

Statement of Special Inspections

Project: LORIS ELEMENTARY SCHOOL MAU REPLACEMENT Permit Number: _____

Project Location: LORIS, SC

Owner/Address: HORRY COUNTY SCHOOLS City _____ Zip _____

Registered Design Professional
In Responsible Charge: Christopher Gilger, PE

Address: 1226 Yeamans Hall Rd

City: Hanahan State: SC Zip: 29410 Phone: 843-566-0161

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This statement of Special Inspections attached is submitted as a condition for permit issuance in accordance with Section 1704 of the 2018 International Building Code. It includes a Schedule of Special Inspection Services applicable to the above referenced project as well as the identity of the individuals, agencies, or firms (completed by others) intended to be retained for conducting these inspections. The Special Inspection Coordinator (Registered Design Professional In Charge of Administering Special Inspections) shall keep records of all inspections and shall furnish interim inspection reports to the Engineer of Record (Registered Design Professional in Responsible Charge of Construction Documents) at a frequency agreed upon by the permit applicant and Building Official prior to the start of work. Discrepancies shall be brought to the immediate attention of the Contractor and the Engineer of Record for correction. If the discrepancies are not corrected, the Special Inspection Coordinator shall bring the discrepancies to the attention of the Building Official and the Engineer of Record prior to the completion of that phase of work. The Special Inspection Coordinator shall submit a Final Report of Special Inspections to the building official at the conclusion of the project and before a certificate of occupancy will be issued.

Statement of Special Inspections encompass the following disciplines:

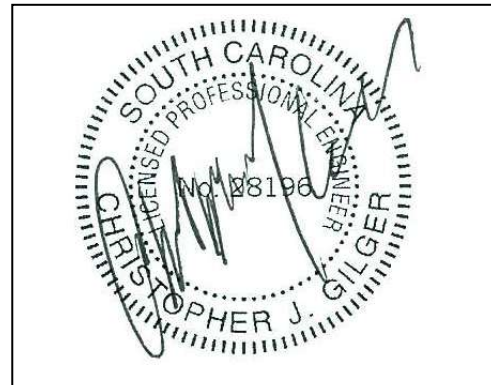
- Structural Mechanical/Electrical/Plumbing
 Architectural Other: _____

Prepared by:

Christopher Gilger, PE
Type or Print Name


Signature

February 28, 2022
Date



Preparer's Seal and Signature Required

To be filled out by the jurisdiction and returned to applicant			
Building Official's Acceptance of Special Inspections			
<input type="checkbox"/> <input type="checkbox"/>			
Frequency of Interim reports: Monthly Bi-Monthly <input type="checkbox"/> Upon Completion <input type="checkbox"/> Per Attached Schedule			
Signature	Date	TMS	Permit Number

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections includes the following building systems:

- | | |
|--|--|
| <input type="checkbox"/> Soils and Foundations | <input type="checkbox"/> Wood Construction |
| <input type="checkbox"/> Cast-in-Place Concrete | <input checked="" type="checkbox"/> Architectural Components |
| <input type="checkbox"/> Precast Concrete | <input type="checkbox"/> Mechanical & Electrical Systems |
| <input type="checkbox"/> Masonry | <input type="checkbox"/> Storage Racks |
| <input checked="" type="checkbox"/> Structural Steel | <input type="checkbox"/> Spray Fire Resistant Material |
| <input type="checkbox"/> Cold-Formed Steel Framing | <input checked="" type="checkbox"/> Special Cases |

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. Special Inspection Coordinator (Registered Professional in Responsible Charge of Administering Special Inspections)		
2. Inspector		
3. Inspector		
4. Testing Agency		
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official and shall be in accordance with the building code or any particular requirements of the specifications or material specific referenced standards. The credentials of all Inspectors and testing technicians shall be provided if requested.

Special Inspection Definitions

Continuous Special Inspection - Special inspection by the special inspector who is present when and where the work to be inspected is being performed.

Periodic Special Inspection - Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed. Unless noted otherwise 100% of the work designated for inspection shall be inspected.

MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.1.1 Special Cases	
Post Installed Anchors	
Installer Qualifications	Review installer training records to confirm they have received manufacturer training per the contract documents
Anchor Installation	<p>Continuously inspect complete process of anchor installation in accordance with requirements of approved ICC ESR report. As minimum review installation procedures including drill bit type, drilling methods, hole preparation and cleaning, spacing, edge distance, embedment depth, adhesive installation, rod installation, curing time, and anchor torque to ensure compliance with manufacturer's instructions and construction documents.</p> <p>(All anchor holes must be inspected during drilling, all anchor holes must be inspected prior to anchor installation, all anchors shall be inspected at final application of required torque)</p>

MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.2.1 Structural Steel	
Review fabricator's source quality assurance inspection and testing report submittals	<p>Periodically review fabricator's source quality assurance inspection and test reports to ensure all inspection and testing is being completed as required and appropriate standards are being met. (100% rate for all source quality control report submittals.)</p>
Conduct Inspections prior to field welding in accordance with AISC 360 Table N5.4-1	<p>Periodically confirm welder qualification records and continuity records are current</p> <p>Periodically confirm that welding procedure specifications (WPS) are available and on site for type and configuration of weld being completed. (100% rate for each type and configuration of weld immediately prior to the weld being completed)</p> <p>Periodically confirm manufacturers certifications are available and on site for all welding consumables. (100% rate for each type of consumable immediately prior to initial use of each consumable)</p> <p>Periodically inspect material identification (type/grade)</p> <p>Periodically confirm that a welder identification system is in place for field welding and that the system is being used (confirm system is in place prior to welding and 100% confirmation of system usage during welding inspection)</p> <p>Periodically inspect configuration and finish of weld access holes (100% inspection rate of all weld access holes immediately prior to completing associated weld)</p> <p>Periodically inspect fit-up of fillet welds including dimensions, cleanliness, and tacking (Random inspection rate for general conformance with a minimum rate of once weekly during steel erection)</p>

MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.2.1 Structural Steel (Continued)	
<p>Conduct inspections during field welding in accordance with AISC 360-10 Table N5.4-2</p>	<p>Periodically confirm that welders are qualified for welds which they are completing and they possess a valid welding certificate for that weld type and configuration (Random inspection rate for general conformance with a minimum rate of once weekly during welding operations)</p> <p>Periodically inspect control and handling of welding consumables including packaging and exposure control. (Random inspection rate for general conformance with a minimum rate of once weekly during welding operations)</p> <p>Periodically confirm that no welding is occurring over cracked tack welds. (Random inspection rate for general conformance with a minimum rate of once weekly during welding operations)</p> <p>Periodically confirm that environmental conditions are acceptable including wind speed limits, precipitation and temperature. (Random inspection rate for general conformance with a minimum rate of once weekly during welding operations)</p> <p>Periodically/Continuously confirm that weld procedure specifications (WPS's) are being followed including settlings of welding equipment, travel speed, selected welding materials, shielding gas type and flow rate, preheat applied, interpass temperature maintained, and proper position. (Continuously inspect for groove welds, multi-pass welds, or welds greater than 5/16". Periodically inspect all other welds a minimum rate of once weekly during welding operations)</p> <p>Periodically/Continuously confirm welding techniques including interpass and final cleaning, each pass with profile limitations, each pass meets quality requirements. (Continuously inspect for groove welds, multi-pass welds, or welds greater than 5/16". Periodically inspect all other welds a minimum rate of once weekly during welding operations)</p> <p>Periodically inspect placement and installation of steel headed stud anchors. (Random inspection rate for general conformance with a minimum rate of once daily during welding operations)</p>

MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.2.1 Structural Steel (Continued)	
<p>Conduct inspections after field welding in accordance with AISC 360-10 Table N5.4-3</p>	<p>Periodically confirm that welds have been cleaned. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically confirm weld size, length and location. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically confirm weld meets visual acceptance criteria including crack prohibition, weld/base-metal fusion, crater cross section, weld profiles, weld size, undercut, and porosity. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically inspect arc strikes. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically inspect k-area for cracks within 3" of welds when welding has been performed in k-area. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically confirm backing and weld tabs have been removed where required. (100% inspection rate with a minimum rate of once weekly during welding operations)</p>
<p>(Continued) Conduct inspections after field welding in accordance with AISC 360-10 Table N5.4-3</p>	<p>Periodically inspect repair activities. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically document acceptance or rejection of welded joint or member. (100% inspection rate with a minimum rate of once weekly during welding operations)</p> <p>Periodically inspect no prohibited welds have been added without the approval of the EOR. (100% inspection rate with a minimum rate of once weekly during welding operations)</p>

MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.11 Special Inspections for Wind Resistance	
1705.11.3 Wind Resisting Components	<p>Periodically inspect the installation of Roof Cladding is in accordance with approved submittals and manufacturer's installation requirements (Random inspection rate for general conformance with a minimum rate of once weekly during roof cladding installation)</p> <p>Periodically inspect the installation of Wall Cladding is in accordance with approved submittals and manufacturer's installation requirements (Random inspection rate for general conformance with a minimum rate of once weekly during wall cladding installation)</p>
MATERIAL / ACTIVITY	SCOPE OF SERVICE
1705.12 Special Inspections for Seismic Resistance	
1705.12.5 Architectural Components	<p>Periodically inspect the erection and fastening of exterior wall cladding to ensure compliance with specifications, approved submittals and manufacturer's installation requirements. (Random inspection rate for general conformance with a minimum rate of once weekly during cladding installation)</p> <p>Periodically inspect the erection and fastening of interior and exterior veneers to ensure compliance with specifications, approved submittals and manufacturer's installation requirements. (Random inspection rate for general conformance with a minimum rate of twice weekly during cladding installation)</p> <p>Periodically inspect installation of interior and exterior nonbearing walls to ensure installation is in accordance with construction documents, specifications, and approved shop drawing submittals and/or manufacturer's instructions. Inspection shall include verifications of fastening of wall components and wall anchorages including number, type and spacing of fasteners as well as confirmation that installed connections allow for specified vertical and/or drift deflections. (100% inspection rate with a minimum inspection rate of once weekly during nonbearing wall installation.)</p>

SECTION 042613 - MASONRY VENEER (SALVAGE AND REINSTALLATION)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Brick.
2. Mortar materials.
3. Ties and anchors.
4. Embedded flashing.
5. Accessories.
6. Mortar mixes.

B. Products Installed but not Furnished under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For the following:

1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

1.4 INFORMATIONAL SUBMITTALS

- A. 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. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installers: All masonry flashing installers must complete the International Masonry Institute Flashing Upgrade training course.

1.6 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.
- 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 in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of veneer, 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 (610 mm) down face of veneer, and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.
 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings 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.
- C. 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 TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 BRICK

- A. ALL EXPOSED BRICK IS TO BE REINSTALLED SLAVAGED BRICK

2.2 CONCRETE MASONRY UNITS

- A. ALL CMU TO BE TWO HOUR RATED.

1. Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1 OR units are listed by UL or a qualified testing agency acceptable to authorities having jurisdiction.

2.3 MORTAR MATERIALS

- A. Mortar Cement: ASTM C1329/C1329M.
- B. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- C. Colored Cement Products: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Colored Masonry Cement:
 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 3. Pigments do not exceed 10 percent of portland cement by weight.
 4. Pigments do not exceed 5 percent of masonry cement or mortar cement by weight.

2.4 TIES AND ANCHORS

- A. General: Ties and anchors extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A641/A641M, Class 1 coating.
 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
- C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire.
- D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick, steel sheet, galvanized after fabrication.
 - a. 0.064-inch- (1.63-mm-) thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.
 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

2.5 EMBEDDED FLASHING

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16 oz./sq. ft. (4.9 kg/sq. m) weight or 0.0216 inch (0.55 mm) thick or ASTM B370, Temper H01, high-yield copper sheet, 12 oz./sq. ft. (3.7 kg/sq. m) weight or 0.0162 inch (0.41 mm) thick.
 2. Fabricate continuous flashings in sections 96 inches (2438 mm) long minimum, but not exceeding 12 ft. (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
- B. Termination Bars for Flexible Flashing, Flanged: Stainless steel sheet 0.019 inch by 1-1/2 inches (0.48 mm by 38 mm) with a 3/8-inch (10-mm) flange at top.

2.6 ACCESSORIES

- A. Weep/Vent Products: Use one of the following unless otherwise indicated:
1. Wicking Material: Absorbent rope, made from cotton, 1/4 to 3/8 inch (6.4 to 10 mm) in diameter, in length required to produce 2-inch (51-mm) exposure on exterior and 18 inches (457 mm) in cavity. Use only for weeps.

2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch (10-mm) OD by 4 inches (102 mm) long.
 3. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.
- B. Proprietary Acidic Masonry 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.

2.7 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use masonry cement mortar cement mortar unless otherwise indicated.
- B. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments do not exceed 10 percent of portland cement by weight.
 2. Pigments do not exceed 5 percent of masonry cement by weight.
 3. Mix to match Architect's sample.
 4. Application: Use pigmented mortar for exposed mortar joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp,

unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- E. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (13 mm) or minus 1/4 inch (6.4 mm).
- 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (13 mm).
- 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6.4 mm) in a story height or 1/2 inch (13 mm) total.

B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
- 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
- 5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.

C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm), with a maximum thickness limited to 1/2 inch (13 mm).
- 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3.2 mm).
- 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (10 mm) or minus 1/4 inch (6.4 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3.2 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.6 mm) from one masonry unit to the next.

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: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Lay hollow brick with face shells fully bedded in mortar and with head joints of depth equal to bed joints. At starting course, fully bed entire units, including area under cells.
 1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.
 2. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 3. Allow cleaned surfaces to dry before setting.
 4. Wet joint surfaces thoroughly before applying mortar.
 5. Rake out mortar joints for pointing with sealant.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached and seismic anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 25 inches (635 mm) o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.7 LINTELS

- A. Install steel lintels where indicated.
- B. Provide offset angle supports where indicated and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are indicated without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches (203 mm) at each jamb unless otherwise indicated.

3.8 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. Extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (203 mm); with upper edge tucked under, lapping at least 4 inches (102 mm). Fasten upper edge of flexible flashing to wall through termination bar.
 - 3. At lintels and shelf angles, extend flashing 6 inches (152 mm) minimum, to edge of next full unit at each end. At heads and sills, extend flashing 6 inches (152 mm) minimum and turn ends up not less than 2 inches (51 mm) to form end dams.
 - 4. Interlock end joints of sawtooth sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

- C. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.
 - 1. Use specified weep/cavity vent products to form weep holes.
 - 2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 - 3. Space weep holes 24 inches (610 mm) o.c. unless otherwise indicated.
 - 4. Space weep holes formed from plastic tubing 16 inches (406 mm) o.c.
 - 5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
 - 6. Trim wicking material flush with outside face of wall after mortar has set.
- D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.

3.9 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, where indicated.
- 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. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.10 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches (102 mm) in each dimension.

2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 3. Do not dispose of masonry waste as fill within 18 inches (457 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042613

SECTION 050520 - POST INSTALLED STRUCTURAL ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wedge anchors
 - 2. Cartridge injection adhesive anchors
- B. This specification section is only intended for use when specifically required by the drawings or other referencing specifications and structural applications. This section is not intended for use in non-structural applications or where not specifically referenced by the drawings or other specification sections.
- C. Related Sections include the following:
 - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 05 Section "Structural Steel Framing" for anchorage of structural steel.

1.3 PERFORMANCE REQUIREMENTS

- A. The basis of design products are as specified in this specification or the contract documents. Product substitutions must have capacities equal to or greater than values calculated for each specific condition calculated when calculated using the data in the referenced ESR report and in accordance with the appropriate design procedure and standards required by the building code. See requirements for substitution submittals.

1.4 DEFINITIONS

- A. Post Installed Structural Anchors: Anchors supporting and/or anchoring structural elements of the building which are installed into hardened concrete or masonry and that are specified in the contract documents or performance based shop drawing design submittals for structural elements.
- B. Wedge Anchors: A torque-controlled anchor, with an integral cone expander and single piece steel expansion clip providing 360-degree contact with the base material while

not requiring oversized holes for installation and an impact section to prevent thread damage with required nuts and washers.

- C. Cartridge Injection Adhesive Anchors: An anchor system consisting of rod insert, nut, washer and a cartridge type, two-component polymer or hybrid mortar adhesive system dispensed and mixed through a static mixing nozzle supplied by the manufacturer.

1.5 SUBMITTALS

- A. Contractor's Statement of Responsibility Per Division 01 Section "Collective Inspections and Structural Testing"
- B. Product Data:
 - 1. Wedge Anchors
 - 2. Cartridge Injection Adhesive Anchors
- C. Research/Evaluation Reports:
 - 1. Submit ICC reports for the following:
 - a. Wedge Anchors
 - b. Cartridge Injection Adhesive Anchors
- D. Substitutions:
 - 1. Substitution requests may only be made using products with ICC-ESR reports for the product in the specific substrate.
 - 2. Substitution request shall include signed and sealed calculations demonstrating that the product is capable of providing equivalent performance of the specified product for each specific location and condition when calculated using the data in the referenced ESR report and in accordance with the appropriate design procedure and standards required by the building code.
 - 3. Substitution request shall specify the diameter and embedment depth of the substituted product
 - 4. Any increase in material labor cost resulting from the substitution shall be the responsibility of the contractor.
- E. Manufacturer's Instruction: Manufacturer's Installation Instructions
- F. Qualification Data: Submit installer qualification data as stated in Quality Assurance section. Qualifications shall be submitted in a letter format for each type of anchor to be installed, and shall include the following:
 - 1. The specific product to be used
 - 2. Complete description of installation procedure
 - 3. Personnel to be trained on anchor installation
 - 4. Date of Manufacturer training

5. Manufacturer's training certificates or letter from manufacturer certifying training was complete with a list of individuals that were trained.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - a. Coordinate meeting with individual preinstallation conferences for the following
 - b. Structural Steel Framing
 - c. Cold-Formed Metal Framing
 - d. Rough Carpentry
- B. Installer Qualifications: The installer shall be experienced in installing anchors equal to type, and into the substrate material required for this project
- C. Installer Training: Conduct a thorough training session with the manufacturer's representative. Each individual responsible for the installation of anchors shall attend the training session. Training shall consist of a review of the complete process for the installation of the anchors and the use of proper equipment for drilling and installing the anchors, to include but not limited to:
 1. Hole drilling procedure. Clarify acceptability of rotary hammer drilling and/or core drilling.
 2. Hole drilling equipment
 3. Type and diameter of drill bits
 4. Hole preparation and hole cleaning technique
 5. Hole cleaning equipment
 6. Adhesive injection technique
 7. Adhesive injection equipment
 8. Anchor rod, nut and washer material requirements and associated cleaning requirements
 9. Anchor and Anchor rod installation
 10. Anchor tightening
 11. Adhesive curing requirements
- D. Certifications: All anchors shall have an ICC ESR Evaluation report indicating conformance with the current applicable Acceptance Criteria for the building code applicable to the project.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Keep anchors, rod materials, nuts and washers in manufacturer's packaging with label intact until needed for use.

- B. Keep anchors free of dirt and debris.
- C. Store anchors in a clean dry area
- D. Protect anchors from corrosion and deterioration.
- E. Store anchors and adhesives in strict accordance with manufacturer's requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Nuts: Having a proof load stress equal or greater than the minimum tensile strength of the associated anchor where type and strength is not specifically indicated by anchor or adhesive manufacturer.
- B. Washers: Of type and material compatible with nuts unless specifically indicated by anchor or adhesive manufacturer.
- C. Plate Washers: Provide ASTM A 36 plate washers of size and configuration specifically indicated.

2.2 CORROSION RESISTANCE

A. Anchors and Anchor Bodies

- 1. Uncoated Carbon Steel: Carbon steel anchors uncoated and free from oil, lubricants and other deleterious substances. Acceptable for use as follows:
 - a. Interior dry conditions
- 2. Zinc Plated: Zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1) Acceptable for use as follows:
 - a. Interior dry conditions
- 3. Hot Dip Galvanized: Carbon steel anchors with hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
 - a. Interior dry conditions
 - b. Exterior conditions
 - c. Anchoring galvanized steel elements
- 4. Stainless Steel: AISI Type 304 or 316 stainless steel and complying with ASTM F 593. Acceptable for use as follows:
 - a. Anchoring treated lumber elements
 - b. Anchoring stainless steel elements
 - c. Anchoring aluminum elements or in contact with aluminum elements.

B. Nuts

1. Uncoated carbon steel: Acceptable for use as follows:
 - a. With Uncoated Anchors
2. Hot Dip Galvanized: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
 - a. With Zinc Plated Anchors
 - b. With Hot Dip Galvanized Anchors
3. Stainless Steel: ASTM F594. Acceptable for use as follows:
 - a. With Stainless Steel Anchors

C. Washers

1. Uncoated carbon steel: Acceptable for use as follows:
 - a. With uncoated anchors
2. Hot Dip Galvanized: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
 - a. With Hot Dip Galvanized Nuts
3. Stainless Steel: AISI Type 304 or 316 stainless steel. Acceptable for use as follows:
 - a. With Stainless Steel Nuts

D. Plate Washers:

1. Uncoated carbon steel: Acceptable for use as follows:
 - a. With Uncoated Nuts
2. Hot Dip Galvanized: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
 - a. With Hot Dip Galvanized Nuts

2.3 WEDGE ANCHORS

- A. Provide anchors with length identification markings conforming to ICC-ES AC01 or ICC-ES AC193 as appropriate based on the anchor substrate..
- B. Size: As indicated on drawings

- C. Embedment depth: As indicated on the drawings but not less than the manufacturer's documented minimum embedment depth. Where not specifically indicated use manufacturer's minimum documented embedment depth.
 - 1. Embedment depth is from surface of concrete or masonry. Anchor lengths and extent of threads shall account for embedment depth, connected elements, plate washers, washers, nut and appropriate stick thru.
- D. Concrete Anchors:
 - 1. Anchors shall be tested in accordance with ACI 355.2 and the most recent issue of ICC-ES AC193 including the following:
 - a. All mandatory testing
 - b. Shear and tension in cracked concrete.
 - c. Critical and minimum edge distances and spacing
 - 2. Anchors design shall be in accordance with ACI 318 Appendix D
 - 3. Where not specifically indicated otherwise in contract documents or approved performance based shop drawings submittal anchors shall be as follows:
 - a. Hilti Kwik Bolt TZ with nut and washer, of required finish, ICC ESR-1917
 - b. Approved equal (See substitution requirements)

2.4 CARTRIDGE INJECTION ADHESIVE ANCHORS

- A. Provide anchors with length identification markings conforming to ICC-ES AC58 or ICC-ES AC308.
- B. Size: As indicated on drawings
- C. Embedment depth: As indicated on the drawings but not less than the manufacturer's documented minimum embedment depth. Where not specifically indicated use manufacturer's minimum documented embedment depth.
 - 1. Embedment depth is from surface of concrete or masonry. Anchor lengths and extent of threads shall account for embedment depth, connected elements, plate washers, washers, nut and appropriate stick thru.
- D. Adhesive: Two component epoxy or two component hybrid system.
- E. Concrete Anchors:
 - 1. Anchors shall be tested in accordance with the most recent issue of ICC-ES AC308 including the following:
 - a. All mandatory testing
 - b. Shear and tension in cracked concrete.
 - c. Critical and minimum edge distances and spacing

2. Anchors design shall be in accordance with ACI 318 Appendix D as amended by the specific design provisions of ICC-ES AC308
3. Where not specifically indicated otherwise in contract documents or approved performance based shop drawings submittal anchors shall be as follows:
 - a. Rods, washers, and nuts of required finish with Hilti HIT RE 500 V3 Adhesive Anchorage System for anchorage to concrete, ICC ESR-3814.
 - b. Rods
 - 1) Carbon Steel Rods: ASTM A193 B7 coated as required for use
 - 2) Stainless Steel Rods: ASTM F593, CW
 - c. Approved equal (See substitution requirements)
4. Where Hilti HIT-HY 200, ICC ESR-3187 system is specifically indicated in contract documents or approved performance based shop drawings submittal anchors shall be as follows:
 - a. For anchors 3/8" to 3/4" diameter: HIT-Z Standard or HIT-Z-R SS rods, washers, and nuts of required finish.
 - b. Approved equal (See substitution requirements)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.
 2. Installation constitutes acceptance of existing conditions and responsibility of satisfactory performance.

3.2 INSTALLATION, GENERAL

- A. Corrosion Resistance: Care shall be taken to ensure an anchor and associated accessories of the proper material and associated corrosion resistance are used for the specification application. See corrosion resistance requirements above.
- B. Where manufacturer recommends the use of special tools for installation of anchors, such tools shall be used.
- C. Match mark and drill, match drill or use other methods to ensure anchors are properly located.
- D. Do not adjust anchor location after installation. Coordinate with EOR for modifications to connected element where anchors are incorrectly located.

- E. All facets of hole drilling, hole cleaning, anchor installation, anchor torqueing shall be in strict accordance with the ICC-ESR report and manufacturer's data.
- F. Drill holes perpendicular to substrate surface.
- G. Drill holes with rotary impact hammer drills using carbide-tipped bits or core drills using diamond core bits as indicated in the ICC-ESR report.
- H. Drill bits and core bits shall be of diameters indicated in the ICC-ESR report.
- I. All holes shall be cleaned with compressed air to remove all drilling dust and other deleterious substances.
- J. Remove water from holes to attain a surface dry condition unless specifically permitted otherwise by ICC-ESR report.
- K. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
- L. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
- M. Perform anchor installation in strict accordance with manufacturer instructions and ICC-ES report.
- N. Anchors shall be installed perpendicular to the substrate face within plus or minus 5 degrees unless specifically permitted otherwise by ICC-ESR report.
- O. Install plate washers where specifically indicated or where connected elements have oversized holes.
- P. Install a round washer under nuts. Round washers are in addition to plate washers where plate washers are required.

3.3 WEDGE ANCHORS

- A. Protect threads from damage during anchor installation.
- B. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.

3.4 CARTRIDGE INJECTION ADHESIVE ANCHORS

- A. Clean all holes per manufacturer instructions using manufacturer's approved tools to remove loose material and drilling dust prior to installation of adhesive.
- B. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
- C. Follow manufacturer recommendations to ensure proper mixing of adhesive components.
- D. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface.
- E. Remove excess adhesive from the surface.
- F. Shim anchors with suitable device to center the anchor in the hole.
- G. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
- H. Observe manufacturer recommendations with respect to installation temperatures.
- I. Hilti HIT-HY200 system anchors shall be installed using the Hilti Safe Set Technology.
 - 1. For conditions using HAS rods the Hilti hollow drill bit and Hilt vacuum system shall be employed.

3.5 FIELD QUALITY CONTROL

- A. Testing and Inspection: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports in accordance with the schedule of special inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.
- B. Galvanizing Repairs: Prepare and repair damaged galvanized coatings with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 050520

SECTION 051200 - STRUCTURAL STEEL FRAMING

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. Structural steel.
- 2. Nonshrink Grout.

- B. Products furnished, but not installed under this Section:

- 1. Anchor rods and embed plates indicated to be cast into cast-in-place concrete, installed under Division 03 Section "Cast-in-place-Concrete"

- C. Related Sections:

- 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- 2. Division 05 Section "Metal Stairs."
- 3. Division 05 Section "Post Installed Structural Anchors" for wedge, and adhesive anchors

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" and as modified herein.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

- 1. Select and complete connections using AISC 360 .
- 2. Use LRFD; data are given at factored-load level.
- 3. All bolted connections for bracing members shall be designed and fabricated as slip critical connections to allow for field reaming of holes to address fit up issues.
- 4. The minimum number of bolts for any connection shall be two.
- 5. All steel to steel connections shall extend at least two thirds of the depth of the supported member being connected.
- 6. All connections shall be designed to fit within the confines of concealed spaces unless specifically noted as acceptable to be exposed to view.

7. Connections shall allow for flush deck bearing at top flange of all beams beneath deck. If cover or flange plates are used a method for flush deck support around the cover/flange plate shall be provided at no cost to the owner.

1.5 SUBMITTALS

- A. Contractor's Statement of Responsibility Per Division 01 Section "Collective Inspections and Structural Testing"
- B. Fabricator's Certificate of Compliance Per Division 01 Section "Collective Inspections and Structural Testing"
- C. Weekly Inspection reports for Shop Fabricated Steel
- D. Nonconformance reports for Shop Fabricated Steel
- E. Product Data:
 1. Primers
 2. Electrodes
 - a. Indicate what welding process will be used with each electrode
 - b. Submit electrodes for both shop and field welding
 - c. Indicate compliance with AWS D1.8 Clause 6.3 for electrodes used in both SFRS Connections and Demand Critical Welds
 3. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 4. Direct-tension indicators.
 5. Tension-control, high-strength bolt-nut-washer assemblies.
 6. Nonshrink grout.
 7. Post installed structural anchors: See specification section 050520
- F. Shop Drawings: Show fabrication of structural-steel components.
 1. All anchor rods shall be detailed with a minimum 2" projection above top of nut in the final installed condition unless noted otherwise.
 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 3. Include embedment drawings showing plan location and elevation of all embedded items.
 4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 6. Include scale drawings of all gusset plates.
 7. Provide minimum 1/4" thick cap plates at the ends of all exposed HSS members, and at the top of all HSS columns.
 8. Equally space filler beams or joists between columns and/or other dimensioned beams unless noted otherwise.

9. Where delegated design submittals are required the delegated design submittal must be included with associated shop drawings or the submittal will not be reviewed.
 10. Identify demand critical welds.
 11. All bolts shall use standard or holes or short-slotted holes (perpendicular to the applied load).
 12. All bolts in the SFRS shall be detailed and installed as pretensioned high-strength bolts
 13. Faying surfaces in all SFRS member bolted connections shall be satisfy the requirements for slip-critical connections with faying surfaces having a class A slip coefficient or higher.
- G. Delegated-Design Submittal:
1. Steel to Steel Connections:
 - a. For structural steel connections indicated to comply with design loads provide structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1) Each individual calculation shall be clearly labeled in coordination with erection drawings such that it identifies the member(s) that the connection applies to.
 - b. Professional Engineer's Statement: A written statement indicating that the for fabrication shop drawings incorporate all the connection requirements included in the calculations submitted for approval inclusive of any corrections required in response to shop drawing review comments. The statement shall be prepared by, and signed and sealed by the professional engineer that completed the calculations submittal.
 - c. The calculations must be included with the associated shop drawing submittal or the submittal will not be reviewed.
- H. Slip Critical Bolt Installation Statement: A written statement indicating the means and equipment to be used to achieve the tightening requirements for clip critical bolt installation. Statement shall identify the specific pre-installation required by the special inspections and acknowledge that this testing must be coordinated and completed prior to commencement of erection.
- I. As-built anchor rod and embed survey
- J. Welding certificates
1. Submit welding certificates for all individuals expected to be performing field welding
- K. Welding Procedure Specifications (WPS's) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each field welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

L. Qualification Data:

1. Fabricator
2. Structural Steel Erector
3. Post Installed Structural Anchor Installer: See specification section 050520

M. Research/Evaluation Reports:

1. Post Installed Structural Anchors per specification section 050520

N. Product Test Reports: For the following:

O. Material Test Reports

P. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Quality Control Plan: Each fabricator and Erector shall provide a job specific Quality Control plan.

1. The plan shall specifically identify all QC and QA inspections the fabricator and erector will be completing, the frequency of those inspections and the contractor's personnel and/or contractor's testing agency that will be completing the specific inspections.
2. AISC Code of Standard Practice
3. The plan shall comply with AISC 360-10 chapter N modified as follows:
 - a. 100% UT of CJP groove welds without reduction.
4. The plan shall comply with AWS D1.1
5. The plan shall comply with the requirements of AISC 341-10 Chapter J,
6. The plan shall comply with AWS D1.8.
7. The plan shall include any additional inspections or testing identified in the contract documents.

B. Connection Design Engineer

1. Responsibility: Preparation of design calculations for structural steel connections
2. Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

C. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category SBD (Conventional Steel Building Structures) and which employs personnel or an independent testing agency that are qualified to complete all the required inspections and testing. Personnel shall be qualified as required by AWS D1.1 where completing weld testing and inspection.

1. Fabricator Responsibility
 - a. The structural steel fabricator shall be responsible for enlisting the steel erector as a direct subcontractor.
 - D. Fabricator's Testing Agency (as required to supplement fabricator personnel): An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated. Personnel shall be qualified as required by AWS D1.1 where completing weld testing and inspection.
 - E. Structural Steel Installer Qualifications: The erector shall be experienced in installing structural steel equal in material, design and scope to the structural steel required for this project.
 - F. Post Installed Structural Anchor Installer: See specification section 050520 for requirements
 - G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - H. Comply with applicable provisions of the following specifications and documents:
 1. AISC 303.
 2. AISC 341-10
 3. AISC 360.
 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - I. Preinstallation Conference: Conduct conference at Project site.
 1. Review special inspection and testing and inspecting agency procedures for field quality control.
 2. Review items requiring special inspection and testing that must be tested and inspected prior to installation of decking, concrete slabs, or other items that might limit access to the item to be tested or inspected
 3. Review welding requirements
 4. Review electrode storage requirements
 5. Review pre-construction bolt installation verification
 6. Review bolt installation calibration requirements
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes and Tees: ASTM A 992.
- B. Channels, Angles-Shapes:
 - 1. ASTM A 36 unless noted otherwise
 - 2. ASTM A 572/A 572M, Grade 50 where indicated.
- C. Plate and Bar:
 - 1. ASTM A 36 unless noted otherwise
 - 2. ASTM A 572/A 572M, Grade 50 where indicated.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
 - 1. Square or Rectangular HSS: $F_y=50$ KSI
 - 2. Round HSS: $F_y=50$ KSI
 - 3. Debonding Agent: Manufacturer's standard agent suitable to maintain separation of steel core and grout encasement and consistent with tested assemblies
 - 4. Fill Material: Manufacturer's standard grout suitable for use as a confining fill material and consistent with tested assemblies.
- E. Welding Electrodes:
 - 1. Comply with AWS D1.1 requirements.
 - 2. In addition all weld filler metal for SFRS connections shall comply with AWS D1.8 Clause 6.3

3. In addition all weld filler metal for Demand Critical Welds shall comply AWS D1.8 Clause 6.3

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 or ASTM A 490 as indicated or as required, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish:

- a. Plain for primed or painted steel
- b. Hot-dip zinc coating, ASTM A 153/A 153M, Class C for hot dip galvanized steel.

2. Direct-Tension Indicators (At Contractor's option for Pretensioned or Slip Critical Connections: ASTM F 959, Type 325 or Type 490 corresponding to bolt type, compressible-washer type.

- a. Finish:

- 1) Plain for unprimed steel or steel receiving standard shop primer.
- 2) Mechanically deposited zinc coating, ASTM B 695, Class 50 for hot galvanized steel or steel to receive high performance top coating.

- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852 or ASTM F 2280 as indicated or as required, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish:

- 1) Plain for unprimed steel or steel receiving standard shop primer.
- 2) Mechanically deposited zinc coating, ASTM B 695, Class 50 for hot galvanized steel or steel to receive high performance top coating.

- C. Threaded Rods: ASTM A 36 unless noted otherwise.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM A 36/A 36M carbon steel.
3. Finish:

- a. Plain for unprimed steel or steel receiving standard shop primer.
- b. Hot-dip zinc coating, ASTM A 153/A 153M, Class C for hot galvanized steel or steel to receive high performance top coating.

- D. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

1. Finish:

- a. Hot-dip zinc coating, ASTM A 153/A 153M, Class C for hot galvanized steel or steel to receive high performance top coating.

E. Post Installed Structural Anchors: See specification section 055020 for products

2.3 PAINT

A. Column Base Paint: A single component, self-priming cold applied Coal Tar Mastic suitable for corrosion protection of below grade steel.

1. Typical at column bases at exterior locations and/or as specifically noted on drawings.
2. Typical for marking protected zones of SFRS

B. Galvanizing Repair Paint: ASTM A 780.

2.4 NONSHRINK GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not enlarge holes by burning.

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type:
 - a. Snug tightened unless noted otherwise
 - b. Slip critical, class "A" for all members of the SFRS.

- B. Weld Connections:

1. Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
3. Elements that are part of the SFRS:
 - a. Comply with AISC 341-10, AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
4. Demand Critical Welds:
 - a. Comply with AISC 341-10, AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 CLEANING

- A. Clean and prepare faying surfaces in class "B" slip critical connections according to SPSC-SP6 "Commercial Blast Cleaning."
- B. Clean and prepare steel surfaces in class "A" slip critical connections that are to remain unprimed according to SSPC-SP 2, "Hand Tool Cleaning" unless noted otherwise.
- C. Clean and prepare steel surfaces that are to remain unprimed according to SSPC-SP 2, "Hand Tool Cleaning" unless noted otherwise.
- D. Clean and prepare steel surfaces in class "A" slip critical connections that are to be primed according to SPSC-SP6, "Commercial Blast Cleaning."

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed to the environment or that will be exposed in the finished work by plugging with zinc solder and filing off smooth.
 - 2. Galvanize loose and hung lintels, shelf angles, all exposed exterior steel and all steel located in exterior masonry walls unless noted otherwise. Coordinate with drawings and specifications.
 - a. Galvanized elements to be top coated shall not be quenched, and shall be swept blast to ensure proper adhesion of top coats.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections
 - 2. The cost for re-inspecting deficient work shall be the responsibility of the fabricator
- B. All source quality control and source quality assurance shall be completed by the fabricator's qualified personnel and/or the fabricator's qualified testing agency and shall be in accordance with the submitted and approved job specific quality control manual.
 - 1. Additional weld inspections as noted herein or in the contract documents.
 - 2. Payment for shop testing and inspection shall be the responsibility of the fabricator.
- C. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- D. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M.
- F. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified as-built survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Where ungrouted anchor rod sleeves are required caulk the annular surface between the sleeve and the anchor rod to prevent grout from entering the sleeves.
 - 2. Set plates for structural members on wedges, shims, or setting nuts as required. All shims shall be steel material.
 - 3. Weld plate washers to top of baseplate as indicated.
 - 4. Snug-tighten anchor rods after supported members have been positioned and plumbed.
 - 5. Bearing plates and loose column base plates shall be grouted and cured prior to erecting the steel to be supported by the plate
 - 6. Base plates attached to columns shall be grouted as soon as possible after the column has been plumbed. Base plates shall be grouted and cured before any elevated slabs are cast or before any column splices are made.
 - 7. Prior to grouting all loose and latent material shall be removed from bearing surfaces and base or bearing plates. Concrete or masonry surfaces shall be broom clean. All shims or wedges shall be left in place and cut flush to the edge of the base or bearing plate.
 - 8. Grout shall be placed solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation and curing instructions for shrinkage-resistant grouts.

- a. Use grout forms and grout surcharging as required to ensure that grout completely fills the space below bearing or base plate, and no voids remain.
9. Paint base plates, anchor bolts and sections of columns below grade and below finished floor with Coal Tar Mastic Paint when indicated on drawings.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - D. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - E. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
 - F. Splice members only where indicated.
 - G. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
 - H. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
 - I. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
 1. For slip critical connections enlarge hole to next standard hole size and provide next standard bolt size.
 - J. Pour stops and edge angles: Pour stops and edge angles shall be field installed based on global building control lines to ensure overall building geometry is maintained.
 1. Do not located based on local member geometry.
- ### 3.4 FIELD CONNECTIONS
- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: As indicated on shop drawings.
 - B. Finger Tight Bolts: All joints noted as finger tight shall be hand tightened as required to install elements. Do not tighten by mechanical means

1. Provide jam nuts to prevent nut from backing off.
2. After initial tightening turn nut and jam nut in opposite direction to bind them against one another.

C. Weld Connections:

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
3. Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
4. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
5. Elements that are part of the SFRS:
 - a. Comply with AISC 341-10 Appendix W, AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

D. Post Installed Structural Anchors: See specification section 050520 for products

3.5 FIELD QUALITY CONTROL

- A. The erector shall complete Field Quality control in accordance with AISC 360 Chapter N
- B. The erector shall complete Field Quality control in accordance with AISC 341-10 Chapter J
- C. Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports in accordance with the schedule of special inspections.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements when the work was deemed deficient upon initial testing or inspection.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
 1. The coating thickness for zinc-rich paint repairs must be 50% higher than the surrounding coating thickness, but not less than 2.0 mils and not greater than 4.0 mils.
 2. The repaired surface should be free of lumps, coarse areas and loose particles

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

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. Soffit/header framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Cold-formed steel framing materials.
 - 2. Soffit/header framing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft. (239 Pa).
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

- a. Upward and downward movement of 1/2 inch (13 mm).
- B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 1. Wall Studs: AISI S211.
 2. Headers: AISI S212.
 3. Lateral Design: AISI S213.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 1. Grade: As required by structural performance.
 2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZM150), or GF30 (ZGF90).

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Anchor clips.
 4. End clips.
 5. Stud kickers and knee braces.
 6. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M.

- B. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

2.7 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.
- E. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.5 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 072716.13 - METAL SELF-ADHERING SHEET MEMBRANE FOR AIR BARRIER TRANSITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnishing and installation of flexible stainless steel self-adhering metal transition membrane sheet for connection of duct to moisture barrier.

1.3 REFERENCES

- A. Air Barrier Association of America (ABAA): www.airbarrier.org.
 - 1. Training and Certification Program for Air Barrier Contractors and Installers.
- B. ASTM International (ASTM): www.astm.org
 - 1. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
 - 3. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
 - 6. ASTM D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 8. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials
 - 9. ASTM E 162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
 - 10. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - 11. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 12. ASTM E 2178 - Standard Test Methods for Air Performance of Building Materials
 - 13. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. American Architectural Manufacturers Association (AAMA): www.aamanet.org
 - 1. AAMA 711-20 Voluntary Specification for Self-Adhering Flashing Use for Installation of Exterior Wall Fenestration Products
- D. Federal Government Publications: www.epa.gov/nscep
 - 1. 40 CFR 59, Subpart D-200 - National Volatile Organic Compound Emission Standards for Architectural Coatings
- E. National Fire Protection Association (NFPA): www.nfpa.org
 - 1. NFPA 285 – Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- F. Sealant, Waterproofing, and Restoration Institute (SWRI): www.swrionline.org :
 - 1. SWRI Validation Program
- G. Brick Institute of America standards:

1. BIA Technical Notes on Brick Construction No. 7, Water Penetration Resistance- Design and Detailing, November 2017.
2. BIA Technical Notes on Brick Construction No. 28B, Brick Veneer/Steel Stud Walls, August 2005.

1.4 DEFINITIONS

A. Terms:

1. Flashing: Flashing is a sheet of thin, impervious material used to prevent water penetration or seepage into a building and direct the flow of moisture in walls. Flashing is critical at junctions such as roof hips and valleys, joints between roofs and vertical walls, roof intersection, or projections such as chimneys, dormers, vent pipes, window openings.
 - a. There are two categories of flashing, exposed and embedded. Exposed flashings that are partially exposed to the exterior are usually made of sheet metal, while embedded (or concealed) flashing can be metal or non-metal and are typically used at the base of cavity walls, above openings, at sills, and shelf angles (a structural steel member that supports and transfers the brick's dead load back to the building frame), and under copings.
2. Cavity wall flashing: Flashing systems in cavity walls located close to the base of the wall so that it will collect the water that goes down the wall.
3. Transition Membrane: A membrane or metal membrane product that provides a flexible connection to achieve continuity of the air barrier wall assembly to roof, window, door, building foundation waterproofing, and related locations of a building facade. It also functions as a secondary weather seal at joints in construction.

1.5 ACTION SUBMITTALS

A. Product Data: For specified products, including:

1. Substrate preparation instructions and recommendations.
2. Recommended primers and accessories
3. Standard details illustrating applications of air barrier assembly products required for the project.
4. Product test reports.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packaging with seals unbroken, labeled with 'manufacturer's name, product, date of manufacture and/or use-by date, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location at a temperature not above 90 deg F (32 deg C).

1.8 PROJECT CONDITIONS

- A. Do not apply transition air barrier products when air or substrate temperatures are above 100 degrees F° (38 degrees C°). or below 20 deg F (-6 deg C) at the time of product application.
 1. Allow wet substrates to dry before applying products

1.9 QUALITY ASSURANCE

A. Qualifications:

2. Manufacturer: Provide transition metal membrane materials by a single manufacturer with not less than twenty-five years of experience in manufacturing flexible transition metal membrane products.
2. Transition metal membrane materials must be able to withstand 250° F temperature without changing the long-term performance of the transition metal membrane.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Flexible transition metal membrane:

1. Basis-of-Design Product: Subject to compliance with requirements, provide fully self-adhered metal transition air barrier sheet membrane York 304 SA – self-adhered water-resistive air barrier metal sheet membrane as manufactured by York Flashings, a zero VOC fully self-adhered air barrier metal transition sheet membrane consisting of flexible 2 mil sheet of type 304 (standard) or 316 stainless steel (more corrosive, coastal areas), butyl adhesive, an interlayer, and a siliconized release liner.
2. Products of other manufacturers listed below meeting or exceeding indicated standards and specified manufacturer's product data characteristics, except as modified below, are acceptable for use, subject to compliance with specified requirements.
 - a. Product standard of quality:
 - 1) GE Silicone, Inc.; GE Elemax SS Flashing
 - 2) VaproShield, Inc.: Vapro Thru-Wall Flashing SA
 3. Product Characteristics:
 - a. Bare stainless steel surface for sealants to adhere to.
 - b. Best in class puncture and tear resistance.
 - c. Butyl adhesive/watertight bond.
 - d. No primer required.
 - e. Flexible, easy to cut and form by hand.
 - f. UV resistant.
 - g. 20-year warranty.
 - h. Fire resistant: ASTM E84 Class A material.
 - i. Mold resistant: passes ASTM D3273.
 - j. Passes AAMA 711-20.
 - k. Passes air barrier material test: ASTM E2178-13.
 - l. Excellent bond to a variety of substrates like OSB, exterior gypsum, plywood, concrete, metals and air barrier materials
 - m. Contributes towards LEED by satisfying EA Credit 1 (optimize energy performance) and EQ Credit 4.1 (low emitting materials)
 - n. Available in: Type 304 & Type 316 Stainless Steel in the following sizes:
4", 6", 9", 12", 18", 24", 36" x 50'
4", 6", 9", 12" x 20'

B. Characteristics:

1. Type: stainless steel core with one uncoated (bare) stainless steel face (outward facing) with a butyl block copolymer adhesive (inward facing).
2. Stainless steel: type 304, ASTM A240. Domestically sourced per DFARS 252.225-7008 and/or DFARS 252.225-7009.
3. Adhesive: block copolymer butyl.
- d. Size: Manufacturer's standard width rolls.

C. Accessories:

1. Polyether sealant:
 - a. York Flashings, Inc.; UniverSeal US-100
 - b. STS Coatings; GreatSeal LT-100

- c. Prosoco, Inc.; R-Guard Joint Seam Sealer
- 2. Splice Tape:
 - a. York Flashings, Inc; York 304 SA
 - b. GE Silicone, Inc.; GE Elemax SS Flashing
 - c. VaproShield, Inc.; Vapro Thru-Wall Flashing SA

York 304 Technical Properties

Property	Test Method	York 304 SA
Puncture	ASTM E 154	2,500 psi
Air Permiability	ASTM E 2178	Pass
Tensile	ASTM D 412	Pass (>143)
	MD	9,107
	CMD	7,088
Fastener Stability	AMMA 711, Sec 5.2.1	
	As Received	Pass
	Thermal Cycling	Pass
Peel adhesion to substrate	ASTM 3330, (lbft/in)	
	OSB	3.5
	Anodized Aluminum	9
	Vinyl	8.5
	Plywood	5.1
	Products Applied to its Face	6.7
Accelerated Aging	ASTM D3330 (lbft/in)	12.7
Elevated Temperature	ASTM D3330 (lbft/in)	16.4
Thermal Cycling	ASTM D3330 (lbft/in)	10.9
Cold Temperature Pliability	ASTM C765	Pass
Peel Adhesion After Immersion	ASTM C765	Pass
	Per-Immersion	8.8
	Post-Immersion	7.6
Resistance to Peel	AAMA 711	Pass
Fire Resistance	ASTM E84	Pass, Class A
Mold Resistance	ASTM D3273	Pass
IBC Vapor Retarder Classification	ASTM E 96	Class 1: 0.1 perms or less

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install membrane on a clean, dry, and smooth substrate.
2. Install where indicated, specified, or required following the manufacturer's written instructions and as follows:
 - a. Splice end joints by overlapping the membrane a minimum of two inches and seal the leading edge with a compatible sealant or metal splice tape.
 - b. Seal all terminations, detailing, leading-edge, and protrusions with compatible sealant.
 - c. Install the membrane using a hard roller and roll the membrane with constant, firm pressure to ensure uniform contact with the substrate.
 - d. When installing the membrane at a 90° or greater angle, prebend the membrane and roll the crease before removing the release liner and installation.
 - e. When installing the membrane over an air barrier, sealants, or below-grade waterproofing, those items must be fully cured.

B. Transition Membrane between two dissimilar materials.

1. Materials to be transitioned must lap onto the stainless steel face of the membrane a minimum of 2". Leave a separation between dissimilar materials.
2. Install the membrane on top of the fully cured lower air barrier, and install the higher air barrier lapped over the top of the stainless steel to avoid a reverse lap. Confirm that the membrane adhesive is compatible with the lower air barrier material.

END OF SECTION 072716.13

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

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. Vapor-retarding, fluid-applied air barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum [**0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa)**], when tested according to ASTM E2357.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR RETARDING

- A. High-Build, Vapor-Retarding Air Barrier (match existing): Modified bituminous or synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils (0.9 mm) or thicker over smooth, void-free substrates.
 - 1. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E2178.
 - b. Vapor Permeance: Maximum 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E96/E96M, Desiccant Method.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D412, Die C.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D4541.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 30 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 - 3. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 ACCESSORIES INSTALLATION

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.

3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
 - C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
 - D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
 - E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
 1. Transition Strip: Roll firmly to enhance adhesion.
 - F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
 - G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
 - H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.
 - I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
 - J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.
- 3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION
- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils (0.9 mm), applied in one or more equal coats.

3.5 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 072726

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Formed duct flashing at drainage plane sheet metal fabrications.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 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.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, 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. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, G90 (Z275) coating designation aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A755/A755M.
 - 1. Surface: Smooth, flat.

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal[**or manufactured item**] 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. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329.
- C. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. 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.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

2.5 WALL SHEET METAL FABRICATIONS

- A. Duct flange trim: Fabricate head, sill, jamb, and similar flashings to extend 3 inches (100 mm) beyond wall openings. Fabricate from the following materials:
1. Galvanized Steel: 18 gauge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, 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.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners[, **solder**], protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
 6. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
- C. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- F. Rivets: Rivet joints in [**uncoated aluminum**] [**zinc**] where necessary for strength.

3.3 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING

- 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.

3.5 PROTECTION

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

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Urethane joint sealants.
4. Immersible joint sealants.
5. Silyl-terminated polyether (STPE) joint sealants.
6. Mildew-resistant joint sealants.
7. Polysulfide joint sealants.
8. Butyl joint sealants.
9. Latex joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Joint-sealants.
2. Joint sealant backing materials.

B. Samples for Initial Selection: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in ~~1/2-inch-~~ (13-mm-) wide joints formed between two ~~6-inch-~~ (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.3 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Manufacturers' special warranties.
2. Installer's special warranties.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Authorized representative who is trained and approved by manufacturer.
2. Testing Agency: Qualified in accordance with ASTM C1021 to conduct the testing indicated.

1.5 MOCKUPS

- ##### A.
- 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.

1.6 FIELD CONDITIONS

A. 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 or are below 40 deg F (5 deg C).
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- ##### A. Special Installer's Warranty: Installer agrees to repair or replace 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.

- ##### B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

- ##### C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint sealants from single manufacturer for each sealant type.

2.2 JOINT SEALANTS, 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.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.3 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested in accordance with ASTM C1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.

2.4 LATEX JOINT SEALANTS (interior joints)

- A. Paintable Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. 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. Provide self-adhesive tape where applicable.

2.6 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 backing materials, free of oily 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.

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 performance of the Work.
- 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 after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 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 joint substrates include the following:
- 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 C1193 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 that 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 in subparagraphs 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 in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Exterior joints in vertical surfaces and horizontal nontraffic surfaces:
 - 1. Joint Locations:
 - a. Joints between duct jackets and brick veneer.
 - b. Counterflashings
 - c. Interior and exterior sides of MEP penetrations of exterior walls.
 - d. Joints between different materials listed above.
 - e. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Interior joints in vertical surfaces and horizontal nontraffic surfaces:
 - 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
 - d. Other joints as indicated on Drawings.
 - e. Joints between dissimilar materials.
- C. Joint Sealant: Paintable Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.
 - 1. Joint-Sealant Color: white.

END OF SECTION 079200

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum ceiling board.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Ceiling Board: ASTM C1396/C1396M.
 - 1. Thickness: Match existing.
 - 2. Long Edges: Tapered.

2.3 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.

2.4 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. 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.
- D. Locate edge and 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. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless 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 structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: 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 C919 and with

manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Ceiling Type: Ceiling surfaces.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. Bullnose Bead: Use at outside corners.
 - 3. LC-Bead: Use at exposed panel edges.
 - 4. L-Bead: Use where indicated.
 - 5. U-Bead: Use at exposed panel edges.
 - 6. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

- a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095123 - ACOUSTICAL TILE CEILINGS – Reinstallation of Removed System

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. Reinstallation of removed acoustical tiles.
 - 2. Reinstallation of removed suspension systems.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site 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 tiles, permit them to reach room temperature and a stabilized moisture content.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, 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.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for

compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

2.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

2.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C636/C636M to match installation standards of existing system.
- 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, countersplaying, 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 to structure 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 (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- 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 tiles.
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 (400 mm) o.c. and not more than 3 inches (75 mm) from ends. 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 tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.
 3. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.
- 2.4 ERECTION TOLERANCES
- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

2.5 ADJUSTING

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

END OF SECTION 095123

SECTION 099124 - INTERIOR PAINTING (MPI STANDARDS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.
 - 1. Gypsum board new and existing, previously painted.
 - 2. Spray-textured ceilings.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 25 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: Match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Spray-Textured Ceiling Substrates:
1. Latex, Flat System, MPI INT 9.1A: Spray applied.
 - a. Prime Coat: Latex, interior, flat, matching topcoat.

- b. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.
 2. Latex System, MPI INT 9.1E: Spray applied.
 - a. Prime Coat: Latex, interior, matching topcoat.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.
 - d. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.
 - e. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.
 - f. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.
 - g. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
 - h. Topcoat: Latex, interior, gloss (MPI Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.
 3. Latex over Alkyd Sealer System, MPI INT 9.1B:
 - a. Prime Coat: Primer sealer, alkyd, interior, MPI #45.
 - b. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.
 - c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.
 - d. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.
 - e. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.
 - f. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
- B. Gypsum Board Substrates:
 1. Latex over Latex Sealer System, MPI INT 9.2A:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.
 - e. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.
 - f. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.
 - g. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.
 - h. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.

END OF SECTION 099124