SECTION 04810
BRICK VENEER MASONRY

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

A. This Section includes the following:
1. Masonry veneer, applied to steel stud back-up.
2. Precast concrete trim in unit masonry facades.
3. Masonry through-wall flashing.

B. Products installed but not furnished under this Section include the following:
1. Loose steel lintels: Furnished under Section 05500.
2. Anchors and inserts furnished under other sections of the specifications.

C. Related Work Specified in Other Sections:
1. Thin brick system (Alternate): Section 04812.
2. Installation of masonry ties attached to structural steel columns and beams: Section 05120, "Structural Steel."
3. Furnishing loose lintels; furnishing and installation of relieving angles anchored to masonry or concrete: Section 05500.
4. Wood nailers and blocking built into unit masonry: Section 06100, "Rough Carpentry."
5. Sheet metal coping and counterflashing: Section 07620

1.03 REFERENCED STANDARDS

A. ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602: "Building Code Requirements for Masonry Structures" and "Specification for Masonry Structures."

1.04 SUBMITTALS

A. Product Data: Manufacturer's specifications, supporting technical data, and where applicable, handling, mixing, installation and maintenance instructions for the following:
1. Each type of masonry unit.
2. Precast trim.
3. Masonry accessories, including horizontal joint reinforcing, veneer anchors, masonry ties, other masonry anchors, expansion joint strips, bond breaker strips, and weeps.
4. Through-wall flashing.
5. Proprietary masonry cleaners.

B. Shop drawings for masonry units with special shapes.

C. Samples for initial selection of brick and precast concrete mixes.

D. Samples for verification purposes of the following:

1. Brick: Full-size units showing full range of exposed color, texture, and dimensions to be expected in completed construction.
   a. Special Shapes: Before shipping to the site, submit at least 3 samples of actual units of each shape, as cast, showing full range of color and dimensional variation to be expected in the product shipped to the site.

2. Precast trim; actual unit of each principal type, for architect's review of color, texture, and workmanship.

3. Masonry accessories, including horizontal joint reinforcing, each type of masonry tie and anchor.

4. Through-wall flashing.

E. Material certificates for the following signed by manufacturer and Contractor certifying that each material complies with requirements.
   1. Each different cement product required for mortar and grout including name of manufacturer, brand, type, and weight slips at time of delivery.
   2. Each type and size of anchors, ties, and metal accessories.

F. Material test reports from a qualified independent testing laboratory employed and paid by Contractor for each of the items listed below. Include test results and interpretation test results relative to compliance with the specifications.
   1. Masonry units.

G. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, telephone numbers, names of Architects and Owners, and other information specified.

1.05 QUALITY ASSURANCE

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

B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

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

D. Preconstruction Testing Service: Engage a qualified independent testing agency to perform the preconstruction testing of clay masonry units, per ASTM C 67.

E. Mockups: Before installing unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

Build mockups to comply with Section 01400 requirements for mockups, and with the following requirements, using materials indicated for the completed Work:

1. Build mockup of area shown on Drawings. Includes a section of curtainwall. Include stud and sheathing back-up, building paper, brick, through wall flashing, jamb, head and sill flashing, metal coping, and accessories. Include a sealant-filled joint at least 16 inches long. Coordinate mock-up with work of other sections involved.

2. Clean exposed faces of mockups with masonry cleaner as indicated.

3. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.

4. Demolish and remove mockups when directed.

G. Preinstallation Conference: Conduct conference at Project site to discuss layout and installation of masonry, protection of the work during installation, and coordination with related and intersecting and penetrating work. Comply with requirements for Project Meetings in Section 01310, "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Protect masonry from chipping and similar damaged during storage and installation. Remove damaged units from the site; do not use in the Work.

D. Store cementitious materials off the ground, under cover, and in dry location.

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

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

1.07 PROJECT SITE CONDITIONS

A. Cold-Weather Requirements: When the ambient temperature falls below 40°F (4.5°C) or the temperature of masonry units is below 40°F (4.5°C), implement the following procedures:
1. Do not lay masonry units having a temperature below 20°F (-7.0°C). Remove visible ice on masonry units before the unit is laid in the masonry.
2. Heat mortar sand or mixing water to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C) at the time of mixing. Maintain mortar above freezing until used in masonry.
3. When ambient temperature is between 25 to 20 deg F (-4 to -7 deg C) use heat sources on both sides of the masonry under construction and install wind breaks when wind velocity is in excess of 15 mph (24 km/h).

4. When ambient temperature is below 20 deg F (-7 deg C) provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32°F (0°C) within the enclosures.
5. When mean daily temperature is between 40°F (4.5°C) and 32°F (0°C), protect completed masonry from rain or snow by covering with a weather resistive membrane for 24 hours after construction.
6. When mean daily temperature is between 32°F (0°C) and 25°F (-4.0°C), completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
7. When mean daily temperature is between 25°F (-4.0°C) and 20°F (-7.0°C), completely cover masonry with insulating blankets or equal protection for 24 hours after construction.
8. When mean daily temperature is below 20°F (-7.0°C), maintain masonry temperature above 32°F (0°C) for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps or by other acceptable methods.

B. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. When the mean daily air temperature exceeds 100 deg F (38 deg C), or exceeds 90°F (32°C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 4 feet (1.2 m) ahead of masonry, and set masonry units within 1 minute of spreading mortar.

PART 2 - PRODUCTS

2.01 BRICK

A. Face Brick: ASTM C 216, Grade SW, Type FBS, and as follows:

1. Unit Compressive Strength: 10,000 psi minimum average gross area compressive strength; average of 5 brick.

2. Initial Rate of Absorption: Between 5 and 20 g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67.

3. Absorption:
   a. 5 Hour Submersion in Boiling Water: Not to exceed 4.0% average of 5 brick, nor 5.0% for any individual brick.
   b. Maximum Saturation Coefficient: Per ASTM C216, 0.64 average of 5 brick; no individual brick higher than 0.75.

4. Rated "not effloresced" when tested in accordance with test method described in ASTM C67.

5. Size: Standard Modular, 3-5/8 inches thick by 2-1/4 inches high by 7-5/8 inches long, within the tolerances specified in ASTM C 216:

6. Manufacturing Method: Extruded brick.

7. Color and Texture: Intent is to use the same brick that was installed on floors 1 and 2 of the recent addition to the Science Building. Furnish "Brushed Royal Velour" as manufactured by the Lachance Brick Co. in Gorham, Maine, a Division of Morin Brick. No substitutions.

B. Provide special molded shapes where indicated and as follows:

1. For applications requiring brick of form, color, texture, and size on exposed surfaces that cannot be produced by sawing standard brick sizes.

2. For applications where stretcher units cannot accommodate special conditions including those at corners, movement joints, bond beams, sashes, and lintels.

C. Provide units without cores or frogs and with all exposed surfaces finished for ends of sills, caps, and similar applications that expose brick surfaces that otherwise would be concealed from view.

2.02 PRECAST CONCRETE TRIM UNITS

A. Materials
1. Portland Cement: ASTM C 150, Type I or III, white or grey as required for color specified.
2. Coarse Aggregates: Granite, quartz or limestone conforming to ASTM C33, except that gradation may vary to achieve the desired finish.
3. Fine Aggregates: ASTM C33, manufacturer or natural sand.
4. Water: Potable.
5. Pigment: Inorganic iron oxide pigments conforming to ASTM C 494.
6. Admixtures: Conforming to ASTM C 494.

B. Mix: 5000 psi compressive strength concrete, air entrained. Use mix which, when cured and dry, will match color of approved samples. Use air-entraining admixture specified; do not use calcium chloride or admixtures containing calcium chloride.

C. Fabrication: Cast concrete in accurately built forms.
1. Fabrication Tolerances:
   a. Length: Plus 6 mm (1/18”) or minus 3 mm (1/16”).
   b. Height: Plus or minus 3 mm (1/16”)
   c. Deviation from square: Difference in diagonals not to exceed 1/16 inch.
   d. Depth: Plus 3 mm (1/16 inch) or minus 6 mm (1/8 inch).
2. Finish Color and Texture: Match precast units installed in Phase 1 (existing construction). Texture is lightly acid-etched, or water-blasted to produce fine-grain texture similar to natural limestone.

D. Acceptance Criteria:
1. Color and texture matching precast units in place on the existing floors below this addition.
2. Variations in dimensions within specified tolerances.
3. Water absorption, ASTM C1195, 6% or less for units with only vertical exposed faces, and 4% or less for units which have horizontal surfaces exposed, such as sills and projecting courses.

4. Units free of cracks, chips, spalls or similar damage which impairs the structural strength or durability of the unit.
5. Even color and texture, matching approved sample when viewed from a distance of 10 feet (3 meters). Architect's judgement shall govern; if Architect determines that an objective measure of uniformity is needed, the CIELAB test referenced in Quality Assurance article shall be used and color variation shall not exceed 1% in hue nor 3% in lightness, chroma and hue combined.
6. No non-structural cracks, chips, voids, or "bugholes" on surfaces exposed to view; or only minor non-structural defects of these types which, in the judgement of the Architect, do not impair appearance.

2.03 MORTAR AND GROUT MATERIALS

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

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

C. Aggregate for Mortar: ASTM C 144, washed to remove possible sources of efflorescence. For joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

D. Aggregate for Grout: ASTM C 404.

E. Water: Clean and potable.

2.04 TIES AND ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide ties and anchors by one of the following:
1. Dur-O-Wal, Inc.
2. Hohmann & Barnard, Inc.
3. National Wire Products Industries.

B. Materials and Corrosion Protection:

1. Wire: Stainless steel. ASTM A 580, Type 304 or Type 316.

2. Stainless Steel Sheet: ASTM A 167, Type 304 or 316.

C. Masonry Veneer Ties, Adjustable Ties: For attachment over sheathing to metal studs, furnish two-piece screw-attached masonry veneer anchor assemblies which allow vertical differential movement between masonry and back-up construction and resist tension and compression forces perpendicular to it.

1. Structural Performance Characteristics: Capable of withstanding at least a 100 lbf load in either tension or compression without deforming over, or developing play in excess of, 0.05 inch.

2. Anchor Section: Stainless steel plate, 1-1/4 inch wide by 6 inches long and minimum 0.1046 inch thick (12 gage), with raised, rib-stiffened 3-5/8 inch long strap stamped into

center to provide slot between strap and plate for insertion of wire tie. Form strap so that clearance between face of plate and back of strap at maximum rib projection is 1/32 inch plus diameter of wire tie. Punch holes for two screws, one near top and one near bottom of strap.

a. Acceptable Products: "DW-10," Hohmann & Barnard, Inc.

3. Wire Tie Section: 0.188 inch diameter stainless steel wire, triangular or trapezoidal shape; length as required to extend 1.5 inches into masonry wythe of veneer face.

4. Screws: Steel drill screws for steel studs, complying with ASTM C 954 except with hex washer head and neoprene washer, #10 diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, with corrosion-resistant organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117; "Traxx," ITW Buildex or "Dril-Flex," Elco Industries, Inc.

5. Neoprene Gaskets: Screw-attached masonry veneer anchor manufacturer's standard closed cell neoprene gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating through screw holes to steel studs behind sheathing.

2.05 EMBEDDED FLASHING MATERIALS

A. Copper-Fabric Laminate: Copper sheet 5 oz. per sq. ft., bonded with asphalt between 2 layers of glass fiber cloth. Furnish product manufactured by one of the following:

1. Afco Products Inc.
2. Dur-O-Wal.
2. Phoenix Building Products.
3. Sandell Manufacturing Co., Inc.
4. York Manufacturing, Inc.

B. Metal Drip Edge: Formed from ASTM B 370 16 ounce-weight cold-rolled copper, lead coated in accordance with ASTM B101; weight of lead coating 12 to 15 lbs./100 sq. ft. with half the weight of lead on each side of the sheet. Form on brakes to provide 1 inch long hemmed drip edge, with straight lines and clean, sharp bends.

C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07620, "Flashing and Sheet Metal."

D. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

A. Expansion Joint Strips: Premolded neoprene or EPDM rubber filler strips complying with ASTM D 1056, Type 2 (closed cell), Class A (cellular rubber and rubber-like materials with specific resistance to petroleum base oils), Grade 1 (compression-deflection range of 2-5 psi), compressible up to 35 percent, of width and thickness indicated.

B. Plastic Weephole Vent: One-piece flexible extrusion manufactured from ultraviolet-resistant polypropylene co-polymer, designed to weep moisture in masonry cavity to exterior, sized to

fill head joints with outside face held back 1/8 inch from exterior face of masonry, in color selected from manufacturer's standard.

C. Cavity Drainage Material: 2-inch- (50-mm-) thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings. Furnish one of the following products, or approved equal:
   1. Mortar Break; Advanced Building Products, Inc.
   2. CavClear Masonry Mat; CavClear.
   3. Mortar Net; Mortar Net USA, Ltd.
   4. Mortar Stop; Polytite Manufacturing Corp.

2.07 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

B. Proprietary Chemical Cleaners: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry or colored mortar surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned:.

   1. Acceptable Manufacturers:
      a. ProSoCo, Inc.
      b. Diedrich Technologies, Inc.

   2. For light-colored brick masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents; ProSoCo "SureKlean No. 600 Detergent." or equal.

   3. For dark colored brick masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors; ProSoCo "SureKlean No. 101 Lime Solvent" or equal.

   4. For light and dark colored masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors; equal to ProSoCo "SureKlean Vanatrol."

   5. Approval of cleaner will not be final until completion of test cleaning specified in Part 3.

2.08 MORTAR AND GROUT MIXES

A. General: Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless specifically indicated.

   1. Do not use calcium chloride in mortar or grout.

   2. If cold-weather admixture is used, add at the same rate for all mortar, regardless of weather conditions, in order to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, using portland cement-lime mortar (not masonry mortar). For measuring sand, use a container whose volume has been accurately determined; do not use shovel counts. Provide mortar types as follows unless higher strength mortar is indicated on the drawings:

1. For masonry veneer, use Type N mortar.

2. Mortar Color: Match color of the mortar used on the lower floors of the Science Building Addition.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PROTECTION OF THE WORK DURING CONSTRUCTION

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

1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

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

1. Protect sills, ledges, and projections from mortar droppings.

2. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.

3. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.

C. Do not build on ice or frozen substrates. Do not build with materials which are at a temperature of less than 40°F at time of installation. Masonry which is so constructed, or which is laid in cold weather without the cold-weather precautions specified in Part 1 of this Section, shall be considered non-conforming, and shall be removed and rebuilt by the Contractor in accordance with these specifications at the Contractor's expense.

3.03 INSTALLATION, GENERAL

A. Thickness: Brick veneer on steel stud walls to the full thickness shown.

B. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

C. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

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

E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.

F. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30g/30 sq. in. (g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

1. To determine whether brick requires wetting, test rate of absorption as follows: Draw a circle the size of a quarter on a brick and place 20 drops of water in the circle. If the water is absorbed within 90 seconds, the brick requires wetting.

G. Keep air spaces in veneer walls free of mortar, so that the downward flow of water is not obstructed. Use methods of laying masonry that will minimize mortar droppings in this space. Build in cavity drainage material as the work progresses, so that it is in place to catch mortar droppings before higher courses are laid.

1. Install cavity drainage material to a height of at least three brick courses above base of the wall and each course of flashings, unless cavity is indicated to be grouted solid.

2. In addition, use a clean-out strip. Place a strip of lumber in the air space that is as wide as the air space is deep at the base of courses being laid, and periodically clean out the space by lifting the lumber strip.

H. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

I. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

J. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

K. Built-In Work: As construction progresses, build-in anchors, inserts, sleeves, and similar items furnished under other sections of the Specifications. Fill in solidly with masonry around built-in items.

L. Coordination with Work of Other Trades: Build surrounding masonry closely around embedded items such as electrical conduit and electrical boxes which are installed by other trades.

M. Provide control joints and expansion joints in clay unit masonry in accordance with Drawings and specifications elsewhere in this Section 04810.

N. Build in horizontal pressure-relieving joints. Place compressible joint filler in joints; leave joint open to depth required to permit installation of sealant and backer rod as specified in Division 7 Sections.

1. Masonry Veneer: Locate joints beneath shelf angles supporting masonry veneer and at other locations where indicated.

3.04 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602; erect masonry within the following tolerances from the specified dimensions.

B. Additionally, comply with the following tolerances:

1. For conspicuous vertical lines, such as external corners, window jambs, reveals, expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.

2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.

3. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.

4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).

5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

3.05 MASONRY VENEER ON STEEL STUDS

A. Bond Pattern: As shown on drawings. At corners and jambs, use units with at least nominal 4-inch horizontal face dimension.

B. Lay masonry veneer with full mortar coverage in bed and head joints.

C. Set precast units in full bed of mortar with all vertical joints slushed full. Wet precast joint surfaces thoroughly before setting.

D. Installing Masonry Ties: The following requirements apply to both exterior and interior masonry veneer, except as indicated.

1. Before beginning a section of work, install tie anchor sections. Fasten plates to studs with screws; use two screws per anchor, unless single-screw type is specified. Locate plates carefully so that screws are approximately centered in the stud flange and at least 1/2" from the edge of the metal.
   a. At exterior face of exterior walls, place a layer of gasket material behind each tie to make screw-holes watertight.

2. Install at least 1 anchor for each 2.67 sq. ft. (0.25 sq. m.) of wall area, and space anchors no farther apart than 18 inches (457 mm) vertically and 32 inches (813 mm) horizontally. Stagger alternate courses.

3. At re-entrant corners, for a distance of 10 feet from the corner and for the full height of masonry veneer, increase the number of ties to 1 per 1.88 sq. ft.

4. Install additional anchors around openings larger than 16 inches in either dimension; place such additional anchors within 12 inches (305 mm) of openings and space no farther apart than 36 inches (1000 mm) on center.

5. Build in adjustable pintle ties as work progresses. Place ties so they extend at least 1.5 inches into the masonry, with at least 5/8" of mortar cover at the exterior face of the wall.

E. Seismic Joint Reinforcing: Install continuous single-wire seismic joint reinforcement in horizontal joints of veneer wythe at maximum spacing of 18 inches on center, vertically.

F. Horizontal Joint Reinforcement: Where veneer is laid in other than running bond, provide horizontal joint reinforcement in veneer wythe. Install single-wire reinforcement, 0.1483 inch (3.8 mm) diameter, spaced at a maximum of 18 inches (457 mm) on center vertically.

G. Keep air space clean of mortar droppings and other materials during construction as specified in Article "Installation, General." Strike joints facing air spaces flush.

H. Jointing: 3/8" thick, unless shown otherwise on drawings. Tool joints slightly concave.

I. Expansion Joints:

1. Location and Spacing: Location is shown on drawings. If not shown, construct expansion joints 30 feet on center, maximum spacing. Locate joints as recommended by BIA Technical Note 18A at locations approved by Architect.

2. Build in joint filler. Leave joint open for a depth of 1/2" to allow for installation of sealant and backer rod specified in Division 7 Section "Joint Sealers." Keep joint clear of mortar.

J. Seismic Isolation: Isolate the sides and top of anchored veneer from the structure so that the vertical and lateral seismic forces resisted by the structure are not imparted to the veneer wythe.

3.06 LINTELS

A. Provide lintels where shown and wherever openings are wider than 1'-0", even if not shown.

B. Build in loose steel lintels as work progresses.

C. Provide at least 8" bearing at each end of lintels. For openings wider than 8'-0", provide one additional inch of bearing each side for each foot or fraction thereof by which opening width exceeds 8'-0".

3.07 FLASHING AND WEEP HOLES

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Prepare substrates against which flashing is to be placed, so that they are smooth and free from projections that could puncture flashing.

1. Provide support for flashing at gaps between ends of shelf angles, including gaps at outside corners, by stripping with flashing embedded in mastic, or by other means acceptable to Architect.

2. Place a bed of mortar under metal and metal-laminate through-wall flashing, sloped to the outside face of the wall to drain water.

C. Install flashing as follows:

1. Install copper-fabric flashing in accordance with the flashing manufacturers' instruction for handling, shaping, supporting and sealing.

2. In masonry veneer walls, make top of inside edge of flashing watertight, as shown.

3. End Dams: At lintels, shelf angles, heads and sills, extend flashing a minimum of 4 inches into masonry at each end, turn up ends at least 2 inches and fold to form an end dam. Wherever a length of flashing terminates at a vertical surface, such as a change in material, turn up ends at least 2 inches and fold to form an end dam. Pre-formed end dams of same material as flashing, may be used; seal such separate units watertight to the flashing.

4. Seal laps and penetrations in flashing with mastic before covering with bedding mortar for the first course of masonry.

5. Metal Drip Edge: Place drip edge in correct position relative to the face of the wall so that drip edge extends 1/2" in front of face of wall and is angled approximately 30 - 45 degrees away from the wall. At end-to-end joints between lengths of metal drip edge, leave 1/4" gap, strip with minimum 6-inch wide self-adhesive EPDM, and cover with lead-coated copper cover plate, minimum 6-inches wide centered over the joint.

6. Lap lower edge of copper-laminate flashing over the metal and seal watertight to the metal with mastic, leaving the laminate flashing exposed temporarily. After wall

construction has been completed, trim copper-laminate flashing flush with face of wall, leaving only the metal drip edge exposed.

D. Weeps: In the first course of masonry immediately above embedded flashing, leave every third head joint open (24 inches on center), and install plastic baffle.

E. Place cavity drainage material immediately above flashing in cavities.

F. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.08 FIELD QUALITY CONTROL

A. The Owner's Testing Agency will observe the preparation of specimens/samples and prisms, and will perform the following tests and inspections. Retesting of materials which fail to meet specified requirements shall be done at the Contractor's expense.

B. Flashing: Through-wall flashing will be inspected for workmanship, watertightness and proper installation. Do not cover flashing with mortar or masonry until it has been inspected and accepted.

C. Brick Tests: For each type and grade of brick, units will be tested in accordance with ASTM C 67 procedures, except 5 bricks will be selected at random for each 100,000 units or fraction thereof installed.

D. Mortar: Mortar composition and properties will be evaluated per ASTM C 780. Tests will be performed before laying of masonry begins, and for each 5000 square feet of wall area or portion therof.

E. Prism Tests: To evaluate consistency of materials and workmanship, masonry prisms will be tested per ASTM E 447, Method B, and as follows:

1. Prepare masonry prisms for testing for each type of wall construction.

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

F. Remedial Work by Contractor: If masonry is not in compliance with specified requirements, repair to Architect's satisfaction, or remove and rebuild. Pay for additional testing required to demonstrate compliance of repaired and rebuilt masonry.

3.09 REPAIRING, POINTING, AND CLEANING

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

B. Remove and replace stained and otherwise damaged precast units and units not matching approved Samples. Precast units may be repaired if methods and results are approved by Architect. If not repaired in place, replace units in a manner that results in precast units matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

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 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Clean the masonry using method approved after test cleaning.

4. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using job-mixed detergent solution or proprietary acidic cleaner.

5. Clean precast concrete by bucket and brush hand-cleaning method using job-mixed detergent solution.

D. Cleaning with Chemical Cleaners: If chemical cleaners are used:

1. Comply with manufacturers instructions for protection, mixing, handling and cleaning.

2. Protect adjacent glass, metal and other non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape. Also place barriers and warning signs as required to protect passers-by, automobiles, plants and other innocent bystanders from splatters, over-spray, and wind-blown chemicals.

3. Require laborers to wear protective clothing, as required by OSHA and as recommended by manufacturer of chemical cleaner.

4. Wet wall surfaces with water prior to application of cleaners, and remove cleaners by rinsing thoroughly with clear water promptly after cleaning has been effected.

5. Clean masonry with proprietary chemical cleaner applied and rinsed off according to manufacturer's written instructions.

E. Protect masonry work from damage and deterioration until time of Substantial Completion.

END OF SECTION 04810