

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

### PART 1 - GENERAL

#### 1.01 RELATED DOCUMENTS

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

#### 1.02 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Face brick.
  - 2. Building (common) brick.
  - 3. Mortar and grout.
  - 4. Reinforcing steel.
  - 5. Masonry joint reinforcement.
  - 6. Ties and anchors.
  - 7. Embedded flashing.
  - 8. Through wall flashing in existing cavity walls.
  - 9. Miscellaneous masonry accessories.
  - 10. Veneer-wall insulation.
  - 11. Masonry waste disposal.
- B. Related Sections include the following:
  - 1. Division 7 Section "Self-Adhered Air/Vapor Barrier System" for system applied to masonry assemblies.
  - 2. Division 7 Section "Through-Penetration Firestop Systems" for firestopping at openings in masonry walls and "Fire Resistive Joint Systems" for firestopping joints at fire-rated masonry walls.
  - 3. Division 7 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.
- C. Products furnished, but not installed, under this Section include the following:
  - 1. Dovetail slots for masonry anchors, installed under Division 3 Section "Cast-in-Place Concrete."
  - 2. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 5 Section "Structural Steel."
- D. Products installed, but not furnished, under this Section include the following:
  - 1. Steel lintels for unit masonry, furnished under Division 5 Section "Metal Fabrications."
  - 2. Two piece counterflashing in masonry joints for metal roof flashing, furnished under Division 7 Section "Sheet Metal Flashing and Trim."
  - 3. Steel frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."
  - 4. Installation of access doors in masonry openings furnished under Division 8 Section "Access Doors and Frames."

### 1.03 DEFINITIONS

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

### 1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01330.
- B. Product Data: For each type of product indicated.
- C. Samples for Initial Selection: For the following:
  - 1. Colored mortar showing the full range of colors available.
  - 2. Weep holes/vents showing colors available.
- D. Samples for Verification: For each type and color of the following:
  - 1. Face brick, in the form of straps of five or more bricks.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
  - 1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
    - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 4. Reinforcing bars.
  - 5. Joint reinforcement.
  - 6. Anchors, ties, and metal accessories.
- G. Submit samples of sand to an approved laboratory for tests. Submit test report for approval.
- H. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

### 1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years experience.
- 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 a single manufacturer for each cementitious component and from one source or producer for each aggregate.

- D. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
  - 1. Build sample panels for typical exterior wall approximately 48 inches long by 24 inches high.
  - 2. Where masonry and mortar are to match existing, erect panels adjacent and parallel to existing surface where directed by Architect.
  - 3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
  - 4. Protect approved sample panels from the elements with weather-resistant membrane.
  - 5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
    - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
  - 6. Demolish and remove sample panels when directed by Architect.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
  - 1. Review procedures and installation requirements of flexible flashings. Parties that shall be present shall include the Contractor, Architect, air/vapor barrier applicator, masonry subcontractor's field superintendent and field workers performing the actual application.
  - 2. Review, installation, handling and protection of stone trim units from chipping and discoloration.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  - 1. Protect Type I concrete masonry units from moisture absorption so that, at time of installation, the moisture content is not more than maximum allowed at time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- E. Protect plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

#### 1.07 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  1. Extend cover a minimum of **24 inches** down both sides and hold cover securely in place.
  2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of **24 inches** down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  1. Protect base of walls from rain-splashed mud and from mortar splatter by 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.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 and the following:
  1. Cold-Weather Construction: When the ambient temperature is within the limits indicated, use the following procedures:
    - a. **40 to 32 deg F**: Heat mixing water or sand to produce mortar temperatures between **40 and 120 deg F**.
    - b. **32 to 25 deg F**: Heat mixing water and sand to produce mortar temperatures between **40 and 120 deg F**. Heat grout materials to produce grout temperatures between **40 and 120 deg F**. Maintain mortar and grout above freezing until used in masonry.
    - c. **25 to 20 deg F**: Heat mixing water and sand to produce mortar temperatures between **40 and 120 deg F**. Heat grout materials to produce grout temperatures between **40 and 120 deg F**. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to **40 deg F** if grouting. Use heat on both sides of walls under construction.
    - d. **20 deg F** and Below: Heat mixing water and sand to produce mortar temperatures between **40 and 120 deg F**. Heat grout materials to produce grout temperatures between **40 and 120 deg F**. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to **40 deg F**. Provide enclosures and use heat on

- both sides of walls under construction to maintain temperatures above 32 deg F within the enclosures.
2. Cold-Weather Protection: When the mean daily temperature is within the limits indicated, provide the following protection, this is in addition to construction procedures specified above:
    - a. 40 to 25 deg F: Cover masonry insulating blankets for 48 hours after construction.
    - b. 25 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 72 hours after construction.
  3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.01 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

### 2.02 MASONRY LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

### 2.03 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
  3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
  4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

- B. Face Brick: ASTM C 216, Grade SW, Type FBS.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of not less than **8000 psi**.
  - 2. Initial Rate of Absorption: Less than **18 g/30 sq. in.** per minute when tested per ASTM C 67.
  - 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
  - 4. Size (Actual Dimensions): **3-5/8 inches** wide by **2-1/4 inches** high by **7-5/8 inches** long.
  - 5. Application: Use where brick is exposed, unless otherwise indicated.
  - 6. Product: To match existing in color and range.
  
- C. Building (Common) Brick: ASTM C 62, Grade SW.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of not less than **8000 psi**.
  - 2. Size: Match size of face brick.
  - 3. Application: Use where brick is indicated for concealed locations.

#### 2.04 MORTAR AND GROUT MATERIALS

- A. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S. Standard masonry cement is not acceptable. Provide the following portland cement-lime mix product to match existing:
  - 1. Eaglebond; Blue Circle Cement, Inc.
  
- B. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
  - 1. Product: Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
    - a. Match existing mortar color.
  
- C. Aggregate for Mortar: ASTM C 144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  
- D. Aggregate for Grout: ASTM C 404.
  
- E. Water: Potable.

#### 2.05 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, **Grade 60**.

#### 2.06 MASONRY JOINT REINFORCEMENT

- A. Masonry Joint Reinforcement, General: ASTM A 951.
  - 1. Exterior Walls: Hot-dip galvanized, carbon steel.
  - 2. Wire Size for Side Rods - Exterior Walls: W2.8 or **0.188-inch** diameter.
  - 3. Wire Size for Side Rods - Interior Walls: W1.7 or **0.148-inch** diameter.
  - 4. Wire Size for Cross Rods: W1.7 or **0.148-inch** diameter.

5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

## 2.07 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with eight subparagraphs below, unless otherwise indicated.
  1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or 316.
  2. Stainless-Steel Sheet: ASTM A 666, Type 304.
  3. Stainless Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Adjustable Anchors for Connecting to Structure: 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- diameter, stainless steel wire.
  2. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inch- diameter, stainless-steel wire.
  3. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.109-inch- thick, stainless-steel sheet.
  4. Tie Section for Concrete: Triangular-shaped wire ties fabricated from 0.188-inch diameter, stainless steel wire.
- D. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.
- E. Adjustable Masonry-Veneer Anchors:
  1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
    - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.
    - b. Fabricate sheet metal anchor sections and other sheet metal parts from 0.078-inch-thick, stainless steel sheet.
  2. Screw-Attached, Masonry-Veneer Anchors with Weather-Resistant Gypsum Sheathing: Units consisting of a wire tie and an adjustable metal anchor section.
    - a. Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing and insulation thickness, allowing screw to seat directly against framing with flanged head covering hole in insulation.
    - b. Wire Ties: Triangular-shaped wire ties fabricated from 0.188-inch- diameter, adjustable, stainless steel wire.
    - c. Product: Heckmann Building Products Inc.; Pos-I-Tie.

3. Screw-Attached, Corrugated Wall Tie: Fabricated from **0.067-inch-** thick (16 gage) minimum, steel sheet, galvanized after fabrication; 7/8 inch wide.
  - a. Location: To tie interior unit masonry to gypsum clad framing or concrete masonry backup; not for use in exterior applications.
4. Fasteners below are for steel studs from 0.033 to 0.112 inch (0.8 to 2.8 mm) thick. "Climaseal" and "Stalgard" finishes by ITW Buildex and Elco Industries comply with coating description. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, **No. 10** diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
  - a. Products:
    - 1) ITW Buildex; Teks Maxiseal with Climaseal finish.
    - 2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.
5. Fasteners for Stone Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts, **Alloy Group 1**.

## 2.08 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
- B. Anchor Bolts: Steel bolts, L-shaped, complying with **ASTM A 307, Grade A**; with **ASTM A 563** hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- C. Postinstalled Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
  1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
  2. Corrosion Protection: Stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2** for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.

## 2.09 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual, Division 7 Section "Sheet Metal Flashing and Trim," and as follows:
  1. Tin-Zinc Alloy Coated Copper: Temper H00 or H01, cold-rolled copper sheet, **16-oz./sq. ft.** weight or **0.0216 inch** thick, coated with tin-zinc alloy and a protective washcoat.
    - a. Product: FreedomGray; Revere Copper Products, Inc.
  2. Fabrication: Form metal flashing to required shape using sheet metal break.
    - a. Fabricate metal flashing with drip edge. Fabricate by extending flashing **3/8 inch** out from wall, with outer edge bent down 45 degrees.
- B. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:



1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.040 inch**.
  - a. Products:
    - 1) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
      - a) Termination Mastic: CCW-704 rubberized bitumen mastic.
    - 2) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
      - a) Termination Mastic: Bituthene Mastic.
- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use the following, unless otherwise indicated:
  1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth **1/8 inch** less than depth of outer wythe, in color selected from manufacturer's standard.
    - a. Products:
      - 1) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      - 2) Hohmann & Barnard, Inc.; Quadro-Vent.
      - 3) Wire-Bond; Cell Vent.
- E. Cavity Drainage Material: Free-draining mesh, made from nonabsorbent, polymer strands that will not degrade within the wall cavity.
  1. Configuration: Strips, full-depth of cavity and **10 inches** wide, with dovetail shaped notches **7 inches** deep that prevent mesh from being clogged with mortar droppings.
  2. Thickness: 2-inches.
  3. Product: Mortar Net; Mortar Net USA, Ltd.
- F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from **0.142-inch** steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
  1. Products:
    - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.

- b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
  - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
  - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.
- G. Stone Setting Buttons: Lead or resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of dimension stone cladding involved without intruding into required depths of joint sealants or causing third-side adhesion between sealant and setting button.

## 2.11 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation with Increased R-Value: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for 1-inch thickness of 5.6 deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product.
- 1. Thickness: 2-inches.
  - 2. Board Width:
    - a. At Weather-Resistant Gypsum Sheathing: 48-inch wide boards.
    - b. At Concrete Masonry Unit Backup: 16-inch wide boards.
  - 3. Edge Treatment: At weather-resistant gypsum sheathing backup provide ship-lapped edges; at concrete masonry unit backup provide square edged panels.
  - 4. Product: Cavymate; Dow Chemical Company.
- B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

## 2.12 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate (Spic and Span) and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned. Muriatic acid is not permitted.
- 1. Cleaners for Brick:
    - a. Diedrich Technologies, Inc.; 202V Vana-Stop.
    - b. ProSoCo, Inc.; Sure Klean Vana Trol.

## 2.13 MORTAR AND GROUT 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. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
- B. Mortar for Unit Masonry and Stone Trim Units: Comply with BIA Technical Notes 8A, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
- 1. For masonry below grade or in contact with earth, use Type M.

2. For reinforced masonry block, use Type S.
  3. For exterior veneer masonry, use Type S.
- C. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required.
1. Pigments shall not exceed 10 percent of portland cement by weight.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  2. Provide grout with a slump of **8 to 11 inches** as measured according to ASTM C 143/C 143M.
- E. Concrete for Unit Masonry: 3000 psi, 28-day compressive strength. Comply with requirements of Division 3 Section "Cast-In-Place Concrete."

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. If unsatisfactory conditions are encountered, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  2. Verify that foundations are within tolerances specified.
  3. Verify that reinforcing dowels are properly placed.
  4. Examine wall framing, sheathing, and air/vapor barrier to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. 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.

- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry when infilling areas within existing masonry.
- G. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
  - 1. 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 feet**, **1/4 inch in 20 feet**, or **1/2 inch** maximum.
  - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than **1/4 inch in 10 feet**, or **1/2 inch** maximum.
  - 3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than **1/8 inch in 10 feet**, **1/4 inch in 20 feet**, or **1/2 inch** maximum.
  - 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus **1/8 inch**, with a maximum thickness limited to **1/2 inch**. Do not vary from bed-joint thickness of adjacent courses by more than **1/8 inch**.
  - 5. For exposed head joints, do not vary from thickness indicated by more than plus or minus **1/8 inch**. Do not vary from adjacent bed-joint and head-joint thicknesses by more than **1/8 inch**.
  - 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than **1/16 inch** except due to warpage of masonry units within tolerances specified for warpage of units.
  - 7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than **1/16 inch** from one masonry unit to the next.

### 3.03 INSULATION INSTALLATION

- A. Fit courses of cavity insulation firmly against air/vapor barrier membrane and sheathing or back-up wythe, with edges butted tightly both ways. If insulation has tongue and groove edges, install with tongue edge up.
- B. Fill cracks and open gaps in insulation with crack sealer compatible with insulation, air/vapor barrier membrane, masonry and gypsum sheathing.
- C. At steel framed walls, screw masonry anchors through insulation, air/vapor barrier membrane, and gypsum sheathing into steel studs. If anchor misses stud, remove anchor and insulation, patch holes in air/vapor barrier membrane, and replace insulation with new insulation.

### 3.04 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 matching existing; do not use units with less than nominal **4-inch** horizontal face dimensions at corners or jambs.

1. At existing masonry removals and repairs, tooth in to match bond pattern of existing masonry.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than **2 inches**. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal **4-inch** horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking 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.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated. Grout cores solid minimum of 16-inches each side of openings.
- G. Fill cores in hollow concrete masonry units with grout **24 inches** under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  1. Install compressible filler in joint between top of partition and underside of structure above.
- I. At fire-rated walls and partitions, coordinate size of joint between top of masonry and underside of structure and between masonry and adjacent construction to comply with Division 7 Section "Fire-Resistive Joint Systems."

### 3.05 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. 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.
- C. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes solid.
  1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
  2. Wet joint surfaces thoroughly before applying mortar.

- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- E. Tool joints in masonry to receive air/vapor barrier slightly concave, filling all joints, free of voids and lumps. Clean around ties, providing smooth surface free of mortar droppings. Review requirements with the air/vapor barrier installer.

### 3.06 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
  - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
    - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
  - 2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
  - 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
  - 2. Place cavity drainage mat at the base flashing of all new masonry, providing a continuous drainage system at base of wall, at heads of windows, doors, and other horizontal interruptions in the cavity. (Note: It is still intended to have mortar dropping minimized through proper placement, drag boards and other methods required to keep cavity clear.)

### 3.07 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of **5/8 inch** on exterior side of walls, **1/2 inch** elsewhere. Lap reinforcement a minimum of **6 inches**.
  - 1. Space reinforcement not more than **16 inches** o.c.
  - 2. Space reinforcement not more than **8 inches** o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than **8 inches** above and below wall openings and extending **12 inches** beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.08 ANCHORING MASONRY TO STRUCTURAL MEMBERS

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

1. Provide an open space not less than **1 inch** in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than **24 inches** o.c. vertically and **36 inches** o.c. horizontally.

### 3.09 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and masonry backup with masonry-veneer anchors to comply with the following requirements:
  1. Fasten screw-attached anchors through insulation, air/vapor barrier, and sheathing to wall framing and to masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  2. Embed tie sections in masonry joints. Provide not less than **2 inches** of air space between back of masonry veneer and face of insulation.
  3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  4. Space anchors as indicated, but not more than **16 inches** o.c. vertically and **16 inches** o.c. horizontally, with not less than 1 anchor for each **1.77 sq. ft.** of wall area. Install additional anchors within **12 inches** of openings and at intervals, not exceeding **8 inches**, around perimeter.

### 3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
  1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Form expansion joints in brick made from clay or shale as follows:
  1. Build in compressible joint fillers where indicated.
  2. Form open joint full depth of brick wythe and of width indicated, but not less than **3/8 inch** for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants."

### 3.11 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and at all exposed block locations.
- C. Provide minimum bearing of **8 inches** at each jamb, unless otherwise indicated.

### 3.12 FLASHING, WEEP HOLES, CAVITY DRAINAGE, 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. Install vents at

shelf angles, ledges, and other obstructions to upward flow of air in cavities, 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 specified.
  2. Extend sheet metal flashing **3/8 inch** beyond face of masonry at exterior and turn flashing down at 45 degrees to form a drip. Lap joints of metal flashing 3 inches, sealing between with full bed of asphalt mastic.
  3. At masonry-veneer walls, extend flexible (rubberized-asphalt) flashing through veneer, across air space and insulation behind veneer, and up face of air/vapor barrier at least **12 inches**, fully adhering to air/vapor barrier free of gaps and wrinkles, using roller to seal contact surfaces. Apply continuous bead of termination mastic along rubberized-asphalt flashing top edge, seams, cuts, and penetrations. Lap flexible flashing onto sheet metal drip flashing 3 inches, stopping minimum 1/2 inch back from face of masonry, providing continuous watertight seal between.
  4. At lintels, shelf angles, and bearing plates, extend flashing a minimum of **8 inches** into masonry at each end, turning up not less than **2 inches** to form end dams with inside corners sealed. At heads and sills, extend flashing **6 inches** at ends and turn up not less than **2 inches** to form end dams with inside corners soldered.
  5. Metal flashing shall be one piece, full width of opening. Where opening width exceeds available sheet metal length, lap joints of metal flashing 3 inches, sealing between with full bed of asphalt mastic. Over the top of each joint, apply a 4-inch wide strip of rubberized asphalt sheet flashing to both the horizontal and vertical legs.
  6. At two-piece receiver and counter flashing furnished in Division 7 Section "Sheet Metal Flashing and Trim," install receiver in stepped fashion, providing proper weeping and drainage to exterior and pan below. Cover top of flashing with 12 inch wide cap strip of flexible flashing, adhering 8 inches to air/vapor barrier free of gaps and wrinkles, lapping 4 inches on to metal flashing, using roller to seal contact surfaces. Apply continuous bead of termination mastic along cap strip top edge.
  7. At base of wall locations where brick shelf is below finish floor elevation, the air/vapor barrier system will be applied to brick shelf as part of air/vapor barrier system specified in Division 7 Section "Fluid-Applied Air/Vapor Barrier System." Where brick shelf is flush with or above finish floor elevation, provide metal drip and flexible flashing, tying into air/vapor barrier system as specified above.
- C. Through-Wall Flashing at Existing Walls: At existing cavity walls requiring new through wall flashing remove approximately 4 foot sections of veneer at a time. Place rubberized asphalt sheet flashing over metal receiver flashing, running back to sheathing, under building paper, and up vertically 8 inches. Provide counterflashing cut into horizontal block joint. Install cover plates at metal flashing joints, sealing between with full bed of asphalt mastic. Apply a 4-inch wide strip of rubberized asphalt sheet flashing over top of each joint, adhering to both horizontal and vertical legs.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:



1. Use specified weep/vent products to form weep holes.
  2. Space weep holes **24 inches** o.c., unless otherwise indicated.
  3. Provide weep holes not more than **8 inches** from end of lintels.
- F. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.
- G. Install vents in head joints in exterior wythes at spacing indicated; if spacing not indicated, space vents 64 inches o.c. Use specified weep/vent products to form vents.
1. Interior of block cells shall be dry before grouting operations occur to facilitate proper absorption of water from grout. Wet or saturated surface dry conditions are not allowed, and shall be allowed to fully dry before grout placement.

### 3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
1. Payment for these services will be made by Owner.
  2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: One set of tests for each **5000 sq. ft.** of wall area or portion thereof.
- C. Mortar Test (Property Specification): For each mix provided, per ASTM C 780.
- D. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.
- E. Inspect cores and clean-out holes before grout is placed.

### 3.14 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. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20 Revised, and manufacturer's printed instructions using the following masonry cleaner:
    - a. Job-mixed detergent solution to remove dirt and soil from standard block to be painted.
    - b. Masonry cleaning compound to clean brick. Allow mortar to cure minimum 14 days before cleaning. Do not allow excessive time to elapse that would prevent thorough cleaning of surface or require stronger chemical cleaning.
  6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
  7. Clean stone trim to comply with stone supplier's written instructions.
- E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

### 3.15 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: Masonry Subcontractor shall coordinate disposal of clean masonry waste with General Contractor. Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by breaking and mixing with fill material as fill is placed.
  1. Break masonry waste to less than **4 inches** in each dimension.
  2. Masonry waste will be permitted in fill under grass areas. Fill material is specified in Division 2 Section "Earthwork."
  3. Do not dispose of masonry waste as fill within **18 inches** of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810