

## SECTION 04810 - UNIT MASONRY ASSEMBLIES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

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

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

- B. Related Sections include the following:

1. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
2. Division 7 Section "Firestopping" for firestopping at tops of masonry walls and at openings in masonry walls.

- 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. Manufactured reglets in masonry joints for metal flashing, furnished under Division 7 Section "Sheet Metal Flashing and Trim."
3. Hollow-metal frames in unit masonry openings, furnished under Division 8 Section "Steel Doors and Frames."

## 1.3 DEFINITIONS

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

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths ( $f'_m$ ) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- B. Provide unit masonry that develops the following net-area compressive strengths ( $f'_m$ ) at 28 days. Determine compressive strength of masonry by testing masonry prisms according to UBC Standard 21-17.
  - 1. For Brick Unit Masonry:  $f'_m = 2000 \text{ psi (13.8 MPa)}$ .

#### 1.5 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
  - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection: For the following:
  - 1. Unit masonry Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
  - 2. Colored mortar Samples showing the full range of colors available.
- D. Samples for Verification: For the following:
  - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
  - 2. Colored mortar Samples for each color required, showing the full range of colors expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project.
  - 3. Weep holes/vents in color to match mortar color.
  - 4. Accessories embedded in the masonry.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
  - 1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.

- b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Mortar complying with property requirements of ASTM C 270.
  3. Grout mixes complying with compressive strength requirements of ASTM C 476. Include description of type and proportions of grout ingredients.
- G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
  1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
    - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
  2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
  4. Each material and grade indicated for reinforcing bars.
  5. Each type and size of joint reinforcement.
  6. Each type and size of anchor, tie, and metal accessory.
- H. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, 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. 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 another means, as acceptable to authorities having jurisdiction.

- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  - 1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

#### 1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides and hold cover securely in place.
  - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in Section 2104.3 of the Uniform Building Code.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is **40 deg F (4 deg C)** 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 (38 deg C)**, or **90 deg F (32 deg C)** with a wind velocity greater than **8 mph (13 km/h)**, do not spread mortar beds more than **48 inches (1200 mm)** ahead of masonry. Set masonry units within one minute of spreading mortar.

## 1.9 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required:
1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
- B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
  2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: UBC Standard 21-1, Grade SW, and as follows:
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **3000 psi (20.7 MPa)**.
  2. Initial Rate of Absorption: Less than **20 g/30 sq. in. (20 g/194 sq. cm)** 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. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from **10 feet (3 m)**.

5. Size: Manufactured to the following actual dimensions:
  - a. Modular: 3-1/2 to 3-5/8 inches (89 to 92 mm) wide by 2-1/4 inches (57 mm) high by 7-1/2 to 7-5/8 inches (190 to 194 mm) long.
6. Application: Use where brick is exposed, unless otherwise indicated.
7. Color and Texture: Old Port Blend by Morin or architects approved equal.

#### 1.10 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: UBC Standard 21-13, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Mortar Cement: UBC Standard 21-14.
- E. Masonry Cement: UBC Standard 21-11.
  1. For pigmented mortar, use a colored cement formulation as required to produce the color indicated or, if not indicated, as selected from manufacturer's standard formulations.
    - a. Pigments shall not exceed 10 percent of portland cement by weight for mineral oxides nor 2 percent for carbon black.
    - b. Pigments shall not exceed 5 percent of mortar cement by weight for mineral oxides nor 1 percent for carbon black.
  2. For colored-aggregate mortar, use natural color or white cement as necessary to produce required mortar color.
- F. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
  1. White-Mortar Aggregates: Natural white sand or ground white stone.
  2. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C 404.
- H. 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.
- I. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer

of the units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

- J. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, refractory mortar; complying with ASTM C 199, medium duty; or an equivalent product acceptable to authorities having jurisdiction.
- K. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated.
- L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
- M. Water: Potable.
- N. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Colored Portland Cement-Lime Mix:
    - a. Eaglebond; Blue Circle Cement.
    - b. Color Mortar Blend; Glen-Gery Corporation.
    - c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
    - d. Centurion Colorbond PL; Lafarge Corporation.
    - e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
    - f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).
  - 2. Mortar Cement:
    - a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
    - b. Lafarge Mortar Cement; Lafarge Corporation.
  - 3. Colored Mortar Cement:
    - a. Magnolia Superbond Mortar Cement; Blue Circle Cement.
  - 4. Mortar Pigments:
    - a. True Tone Mortar Colors; Davis Colors.
    - b. Centurion Pigments; Lafarge Corporation.
    - c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.
  - 5. Cold-Weather Admixture:
    - a. Accelguard 80; Euclid Chemical Co.
    - b. Morseled; W. R. Grace & Co., Construction Products Division.
    - c. Trimix-NCA; Sonneborn, Div. of ChemRex, Inc.

#### 1.11 REINFORCING STEEL

- A. Epoxy-Coated Reinforcing Steel: ASTM A 615/A 615M, **Grade 60 (Grade 400)**; epoxy coated to comply with ASTM A 775/A 775M.

#### 1.12 MASONRY JOINT REINFORCEMENT

- A. General: UBC Standard 21-10 and as follows:
  - 1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls..
  - 2. Wire Size for Side Rods: W1.7 or **0.148-inch (3.8-mm)** diameter.
  - 3. Wire Size for Cross Rods: W1.7 or **0.148-inch (3.8-mm)** diameter.
  - 4. Provide in lengths of not less than **10 feet (3 m)**, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than **16 inches (407 mm)** o.c.

#### 1.13 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- C. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or 316.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, **G60 (Z180)**, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.
- E. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

#### 1.14 BENT WIRE TIES

- A. General: Rectangular units with closed ends and not less than **4 inches (100 mm)** wide. Z-shaped ties with ends bent 90 degrees to provide hooks not less than **2 inches (50 mm)** long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.
- B. Wire: Fabricate from **3/16-inch- (4.8-mm-)** diameter.

#### 1.15 ANCHORS FOR CONNECTING TO CONCRETE

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section: Dovetail anchor section formed from **0.0528-inch- (1.35-mm-)** thick, steel sheet, galvanized after fabrication.
  - 2. Tie Section: Triangular-shaped wire tie, sized to extend within **1 inch (25 mm)** of masonry face, made from **0.1875-inch- (4.8-mm-)** diameter.



## 1.16 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
1. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and contact studs; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.
    - a. Plate 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long with strap 5/8 inch (16 mm) wide by 6 inches (150 mm) long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32 inch (0.8 mm).
    - b. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
  2. Wire Tie Section: Triangular shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
  3. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0677-inch- (1.7-mm-) thick, steel sheet, galvanized after fabrication.
  4. Fabricate wire tie sections from 0.25-inch- (6.4-mm-) diameter, hot-dip galvanized steel wire.
- C. Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm) diameter by length required to penetrate steel stud flange by not less than 3 exposed threads, and with the following corrosion protective coating:
1. Organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
- D. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Screw-Attached, Masonry-Veneer Anchors:
    - a. D/A 213; Dur-O-Wal, Inc.
    - b. D/A 210 with D/A 700-708; Dur-O-Wal, Inc.
    - c. 315-D with 316; Heckman Building Products, Inc.
    - d. Pos-I-Tie; Heckman Building Products, Inc.
    - e. DW-10; Hohmann & Barnard, Inc.
    - f. DW-10HS; Hohmann & Barnard, Inc.

- g. DW-10-X; Hohmann & Barnard, Inc.
    - h. 1004, Type III; Masonry Reinforcing Corporation of America.
    - i. RJ-711; Masonry Reinforcing Corporation of America.
  2. Slip-in, Masonry-Veneer Anchors:
    - a. AA308; Hohmann & Barnard, Inc.
  3. Organic -Polymer-Coated, Steel Drill Screws:
    - a. Dril-Flex; Elco Industries, Inc.
    - b. Traxx; ITW-Buildex.

#### 1.17 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.
- B. Dovetail Slots: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from **0.0336-inch (0.85-mm)**, galvanized steel sheet.
- C. Anchor Bolts: Steel bolts complying with **ASTM A 307, Grade A (ASTM F 568, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
  1. Headed bolts.
  2. Nonheaded bolts, bent in manner indicated.
- D. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  1. Type: Chemical anchors.
  2. 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).
  3. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.

#### 1.18 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:
  1. Copper: **10-oz./sq. ft. (3-kg/sq. m)** weight or **0.0135 inch (0.34 mm)** thick for fully concealed flashing; **16-oz./sq. ft. (5-kg/sq. m)** weight or **0.0216 inch (0.55 mm)** thick elsewhere.
  2. Fabricate through-wall metal flashing embedded in masonry from sheet metal indicated above and with ribs at **3-inch (75-mm)** intervals along length of flashing to provide an integral mortar bond.

- B. Contractor's Option for Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use **[one of]** the following, unless otherwise indicated:
1. Asphalt-Coated Copper Flashing: Manufacturer's standard product consisting of **7-oz./sq. ft. (2-kg/sq. m)** sheet copper coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
    - a. Provide flashing as a complete system with preformed corners, end dams, other special shapes, and seaming materials; all produced by flashing sheet manufacturer.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.
- E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Metal Flashing:
    - a. Cheney Flashing (Dovetail); Cheney Flashing Company, Inc.
    - b. Cheney Flashing (Sawtooth); Cheney Flashing Company, Inc.
    - c. Keystone 3-Way Interlocking Thruwall Flashing; Keystone Flashing Co.
  2. Asphalt-Coated Copper Flashing:
    - a. Cop-R-Cote; Advanced Building Products, Inc.
    - b. Cop-A-Cote; AFCO Products, Inc.
    - c. H & B C-Coat Flashing; Hohmann & Barnard, Inc.
    - d. Type ACC-Asphalt Bituminous Coated; Phoenix Building Products.
    - e. Coated Copper Flashing; Polytite Manufacturing Corp.
    - f. Coated Copper Flashing; Sandell Manufacturing Co., Inc.
    - g. Copperseal; York Manufacturing, Inc.

#### 1.19 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.
- B. Preformed Control-Joint Gaskets: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
1. Styrene-Butadiene-Rubber Compound: ASTM D 2000, Designation M2AA-805.
  2. PVC: ASTM D 2287, Type PVC-65406.

- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch (9-mm) OD by 4 inches (100 mm) long.
- E. Wicking Material: Cotton or polyester rope, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity between wythes.
- F. Cavity Drainage Material: 2-inch- (50-mm-) thick, unless otherwise noted, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
- G. 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 (3.6-mm) steel wire, hot-dip galvanized after fabrication.
  - 1. Provide units with either two loops or four loops as needed for number of bars indicated.
- H. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Plastic Weep Hole/Vent:
    - a. Cell Vent; Dur-O-Wal, Inc.
  - 2. Cavity Drainage Material:
    - a. Mortar Break; Advanced Building Products, Inc.
    - b. CavClear Masonry Mat; CavClear.
    - c. Mortar Net; Mortar Net USA, Ltd.
    - d. Mortar Stop; Polytite Manufacturing Corp.
  - 3. Reinforcing Bar Positioners:
    - a. D/A 811; Dur-O-Wal, Inc.
    - b. D/A 816; Dur-O-Wal, Inc.
    - c. No. 376 Rebar Positioner; Heckman Building Products, Inc.
    - d. #RB Rebar Positioner; Hohmann & Barnard, Inc.
    - e. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
    - f. Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
    - g. O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.

## 1.20 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) 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.
1. Available Products: Subject to compliance with requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:
    - a. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:
      - 1) 200 Lime Solv; Diedrich Technologies, Inc.
      - 2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
    - b. Cleaners for Brick Subject to Metallic Staining:
      - 1) 202V Vana-Stop; Diedrich Technologies, Inc.
      - 2) Sure Klean Vana Trol; ProSoCo, Inc.

#### 1.21 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. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with UBC Standard 21-15, Property Specification.
1. Extended-Life Mortar for Unit Masonry: Mortar complying with ASTM C 1142 may be used instead of mortar specified above, at Contractor's option.
  2. Limit cementitious materials in mortar for exterior masonry to portland cement, mortar cement, and lime.
  3. For masonry below grade, in contact with earth, and where indicated, use Type M.
  4. For reinforced masonry and where indicated, use Type S.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Limit pigments to the following percentages of cement content by weight:
1. For mineral-oxide pigments and portland cement-lime mortar, not more than 10 percent.
  2. For carbon-black pigment and portland cement-lime mortar, not more than 2 percent.
  3. For mineral-oxide pigments and masonry cement mortar, not more than 5 percent.
  4. For carbon-black pigment and masonry cement mortar, not more than 1 percent.

- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.
  - 1. Mix to match Architect's sample.
- F. Grout for Unit Masonry: Comply with UBC Standard 21-19.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with UBC Table 21-C for dimensions of grout spaces and pour height.
  - 2. Provide grout with a slump of **8 to 11 inches (200 to 280 mm)** as measured according to ASTM C 143.
- G. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's directions.

## 1.22 SOURCE QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform source quality-control testing indicated below:
  - 1. Payment for these services will be made by Owner.
  - 2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.

## PART 2 - EXECUTION

### 2.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

### 2.2 INSTALLATION, GENERAL

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

- B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- 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.
- G. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

### 2.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.
- C. 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.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.
- E. 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).
- F. 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).

### 2.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.

Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal **4-inch (100-mm)** horizontal face dimensions at corners or jambs.
  - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow concrete masonry units with grout **24 inches (600 mm)** under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

## 2.5 MORTAR BEDDING AND JOINTING

- A. Lay solid brick-size 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.
  - 1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.



## 2.6 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction.
  - 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. Provide temporary opening by omitting 1 brick every **48 inches (1200 mm)** at bottom of cavity and in first course above flashing. After wall has been built to top of cavity and mortar has set, clean out cavity and then close temporary opening.

## 2.7 MASONRY JOINT REINFORCEMENT

- A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of **5/8 inch (16 mm)** on exterior side of walls, **1/2 inch (13 mm)** elsewhere. Lap reinforcement a minimum of **6 inches (150 mm)**.
  - 1. Space reinforcement not more than **16 inches (406 mm)** o.c.
  - 2. Space reinforcement not more than **8 inches (203 mm)** o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than **8 inches (203 mm)** above and below wall openings and extending **12 inches (305 mm)** beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

## 2.8 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten anchors through sheathing to wall framing with metal fasteners of type indicated.
  - 2. Insert anchor sections in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
  - 3. Embed tie sections in masonry joints. Provide not less than **2 inches (50 mm)** of air space between back of masonry veneer and face of sheathing.
  - 4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 5. Space anchors as indicated, but not more than **18 inches (458 mm)** o.c. vertically and **24 inches (610 mm)** o.c. horizontally, with not less than 1 anchor for each **2 sq. ft. (0.2 sq. m)** of wall area. Install additional anchors within **12 inches (305 mm)** of openings and at intervals, not exceeding **8 inches (203 mm)**, around the perimeter.

## 2.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form expansion joints in brick made from clay or shale as follows:
  - 1. Build flanges of metal expansion strips into masonry. Lap each joint **4 inches (100 mm)** in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints, if any.
  - 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
  - 3. Build in joint fillers where indicated.
  - 4. Form open joint of width indicated, but not less than **3/8 inch (10 mm)** for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Keep joint free and clear of mortar.
- C. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants."
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

## 2.10 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than **12 inches (305 mm)** for brick-size units and **24 inches (610 mm)** for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of **8 inches (200 mm)** at each jamb, unless otherwise indicated.

## 2.11 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. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, 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.
- C. Install flashing as follows:
  - 1. At masonry-veneer walls, extend flashing from exterior face of veneer, through veneer, up face of sheathing at least **8 inches (200 mm)**, and behind air-infiltration barrier or building paper.

2. At lintels and shelf angles, extend flashing a minimum of **4 inches (100 mm)** into masonry at each end. At heads and sills, extend flashing **4 inches (100 mm)** at ends and turn flashing up not less than **2 inches (50 mm)** to form a pan.
  3. Interlock end joints of ribbed 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 Division 7 Section "Joint Sealants" for application indicated.
  4. Extend sheet metal flashing **1/2 inch (13 mm)** beyond face of masonry at exterior and turn flashing down to form a drip.
  5. Cut flashing off flush with face of wall after masonry wall construction is completed.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:
1. Use round plastic tubing wicking material to form weep holes.
  2. Use wicking material to form weep holes above flashing in brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
  3. Space weep holes **24 inches (600 mm)** o.c.
  4. Space weep holes formed from plastic tubing **16 inches (400 mm)** o.c.
  5. In cavities, place mortar net to a height equal to height of first course, but not less than **2 inches (50 mm)**, immediately above top of flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
  6. Place cavity drainage material immediately above flashing in cavities.
- E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
- F. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

## 2.12 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
1. Payment for these services will be made by Owner.
  2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: Tests and Evaluations listed in this Article will be performed during construction for each **5000 sq. ft. (465 sq. m)** of wall area or portion thereof.
- C. Mortar properties will be tested per UBC Standard 21-16.
- D. Grout will be sampled and tested for compressive strength per UBC Standard 21-18.
- E. Brick Tests: For each type and grade of brick indicated, units will be tested according to ASTM C 67.

- F. Prism-Test Method: For each type of wall construction indicated, masonry prisms will be tested per UBC Standard 21-17, and as follows:
1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.

## 2.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
  5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
  6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.
  8. Clean limestone units to comply with recommendations in the Indiana Limestone Institute of America's "Indiana Limestone Handbook."

## 2.14 MASONRY WASTE DISPOSAL

- A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
1. Crush masonry waste to less than 4 inches (100 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 Division 2 Section "Earthwork."
  3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810