

## SECTION 04810 - MASONRY ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete masonry units.
  - 2. Mortar and grout.
  - 3. Reinforcing steel.
  - 4. Masonry joint reinforcement.
  - 5. Ties and anchors.
  - 6. Embedded flashing.
  - 7. Miscellaneous masonry accessories.
  
- B. Related Sections include the following:
  - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
  - 2. Division 7 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
  - 3. Division 7 Section "Through-Penetration Firestop Systems" for penetrations through fire-resistance-rated masonry constructions.
  - 4. Division 7 Section "Fire-Resistive Joint Systems" for fire-resistive joint systems in fire-resistance-rated masonry constructions.
  - 5. Division 7 Section "Joint Sealants" for sealing expansion and control joints in unit masonry.

#### 1.3 DEFINITIONS

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

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths ( $f_m$ ) at 28 days.

- B. Determine net-area compressive strength ( $f'_m$ ) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

#### 1.5 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
- B. Certificates of Compliance: for each type of masonry unit.
- C. 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." Show elevations of reinforced walls.
  - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- H. 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.
  - 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.
- I. Cold-Weather and Hot weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

#### 1.6 QUALITY ASSURANCE

- A. Compressive Strength of Masonry: The compressive strength of masonry units shall be determined by the prism test method. Test shall consist of using three prisms in accordance with ASTM C 1314.
- 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.

#### 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. 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. 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.
- C. Cold-Weather Construction Requirements: When air temperature falls below 40 deg F (4.4 deg C) or when the temperature of masonry units is below 40 deg F (4.4 deg C) Comply with the following cold-weather construction requirements:

1. 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. Wet frozen masonry shall be thawed and warmed to required temperature prior to placement.
  2. When ambient temperature is between 32 to 40 deg F (0 to 4.4 deg C) comply with the following construction requirements:
    - a. Do not lay masonry units having a temperature below 20 deg F (-6.7 deg C).
    - b. Remove visible snow and ice on masonry units before the unit is laid in the masonry. Remove snow and ice from foundation.
    - c. Heat foundation and masonry surfaces to receive new masonry above freezing.
    - d. Heat mixing water or sand to produce temperatures between 40 and 120 deg F (4.4 and 48.9 deg C). Grout materials to be 32 deg F (0 deg C) minimum. Do not heat water or aggregates above 20 deg F (-6.7 deg C).
  3. When ambient temperature is between 25 to 32 deg F (-3.9 to 0 deg C) in addition to above requirements comply with the following construction requirements
    - a. Maintain mortar temperature above freezing until used in masonry.
    - b. Heat grout aggregates and mixing water to produce grout temperatures between 70 and 120 deg F (21 and 48.9 deg C) Maintain grout temperature above 70 deg F (21 deg C) at time of grout placement.
  4. When ambient temperature is between 20 to 25 deg F (-6.7 to -3.9 deg C) in addition to above requirements comply with the following construction requirements:
    - a. Heat masonry surfaces under construction to 40 deg F (4.4 deg C).
    - b. Provide windbreaks or enclosures installed around masonry when wind velocity exceeds 15 mph (24 km/hr).
    - c. Heat masonry to a minimum of 40 deg F (-4.4 deg C) prior to grouting.
  5. When ambient temperature is 20 deg F (-6.7 deg C) and below in addition to above requirements comply with the following construction requirements:
    - a. Provide enclosures for the masonry under construction and use heat sources as required to maintain temperatures above 32 deg F (0 deg C) within the enclosure.
  6. 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.
- D. Cold-Weather Protection Requirements: When air temperature falls below 40 deg F (4.4 deg C) comply with the following protection requirements:
1. When mean daily temperature is between 32 to 40 deg F (0 to 4.4 deg C) comply with the following protection requirements:
    - a. Protect completed masonry work from rain or snow by completely covering with weather resistive membrane for a minimum of 24 hours after construction.

2. When mean daily temperature is between 25 to 32 deg F (-3.9 to 0 deg C) comply with the following protection requirements:
    - a. Protect completed masonry work by completely covering with weather resistive membrane for a minimum of 24 hours after construction.
  3. When mean daily temperature is between 20 to 25 deg F (-6.7 to -3.9 deg C) the following protection requirements shall be adhered to:
    - a. Protect completed masonry work with weather resistive insulating blanket or equal protection for a minimum of 24 hours after construction. (Extend time to 48 hours for grouted masonry).
  4. When mean daily temperature is 20 deg F (-6.7 deg C) and below the following construction requirements shall be adhered to:
    - a. Maintain masonry temperature above 32 deg F (0 deg C) for 24 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps or other acceptable methods. (extend time to 48 hours for grouted masonry)
- E. Hot-Weather Requirements: 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), comply with the following requirements:
1. Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout.
  2. Necessary conditions and equipment shall be provided to produce mortar having temperature below 120 deg F (49 deg C).
  3. The temperature of mortar and grout shall be maintained below 120 deg F (49 deg C).
  4. Sand piles shall be maintained in a damp, loose condition.
  5. Protect unit masonry work from excessive evaporation of water from mortar and grout.
  6. Provide artificial shade (shaded from direct sun light) and wind breaks to protect masonry materials.
  7. When hoses remain inactive for more than 3 minutes flush water with elevated temperature from hoses and discard, do not use hot water to mix mortar or grout.
  8. Mortar mixing times should be no longer than three to five minutes, use smaller batches to minimize drying time.
  9. Flush mixer, mortar transport container and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
  10. Mortar consistency shall be maintained by retempering with cool water.
  11. Do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar.
  12. Mortar shall be used within 2 hours of initial mixing.
- F. Special Protections: When mean daily 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), comply with the following requirement:
1. Fog spray all newly constructed masonry until damp, at least three times a day for a minimum of three days (72 hours).

- G. Special Conditions: When ambient temperature exceeds 115 deg F (46 deg C), or 105 deg F (40 deg C) with a wind velocity greater than 8 mph (13 km/h) requirements of paragraph E shall be implemented in addition the use of ice shall be permitted in mixing the water prior to use. Ice shall not be permitted in mixing the water when added to other mortar or grout materials.
- H. Wet-Weather Protection Requirements: When rain is present or forecast comply with the following requirements:
  - 1. Unless protected, masonry construction should not continue during rainy conditions:
  - 2. Newly constructed masonry shall be protected from rain by draping a weather resistant covering over completed work. The cover shall extend over all newly constructed joints that are susceptible to washout for 12 to 24 hours after curing.

## PART 2 - PRODUCTS

- A. Integral Water Repellent: Provide units made with integral water repellent for interior wythe of concrete masonry unit backup at cavity wall construction.
  - 1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive according to ASTM E 514, with test period extended to 24 hours, show no visible water or leaks on the back of test specimen.
    - a. Available Products:
      - 1) Addiment Incorporated; Block Plus W-10.
      - 2) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block.
      - 3) Master Builders, Inc.; Rheopel.
- B. Concrete Masonry Units: ASTM C 90 and as follows:
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (13.1 MPa).
  - 2. Weight Classification: Lightweight, unless otherwise indicated.
  - 3. Provide Type I, moisture-controlled units.
  - 4. Size (Width): Manufactured to the following dimensions:
    - a. 4 inches (102 mm) nominal; 3-5/8 inches (92 mm) actual.
    - b. 6 inches (152 mm) nominal; 5-5/8 inches (143 mm) actual.
    - c. 8 inches (203 mm) nominal; 7-5/8 inches (194 mm) actual.
    - d. 12 inches (305 mm) nominal; 11-5/8 inches (294 mm) actual
  - 5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

- A. General: Provide shapes indicated and as follows for each form of brick required:

## 2.6 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C 91.
1. Available Products:
- a. Lafarge North America Inc.; Lafarge Masonry Cement.
  - b. Lehigh Cement Company; Lehigh Masonry Cement.
  - c. National Cement Company, Inc.; Coosa Masonry Cement.
- G. Grout: Shall conform to ASTM C 476.
- H. Aggregate for Grout: ASTM C 404.
- I. 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.
- K. 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. 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.
- L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
1. Available Products:
- a. Addiment Incorporated; Mortar Tite.
  - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
  - c. Master Builders, Inc.; Color Cure Mortar Admix or Rheomix Rheopel.

- M. Water: Potable.

## 2.7 REINFORCING STEEL

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including Supplement 1; or ASTM A 617/A 617M, Grade 60 (Grade 400).

## 2.8 MASONRY JOINT REINFORCEMENT

- A. General: ASTM A 951 and as follows:
  - 1. Hot-dip galvanized, carbon-steel wire for interior walls.
  - 2. Stainless-steel wire for exterior walls.
  - 3. Wire Size for Side Rods: W2.8 or 0.188-inch (4.8-mm) diameter.
  - 4. Wire Size for Cross Rods: W2.8 or 0.188-inch (4.8-mm) diameter.
  - 5. 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 ladder type with single pair of side rods and cross rods spaced not more than 16 inches (407 mm) o.c.
- C. For multiwythe composite masonry, provide types as follows:
  - 1. Ladder type with perpendicular cross rods spaced not more than 16 inches (407 mm) o.c. and 1 side rod for each face shell of hollow masonry units more than 4 inches (100 mm) in width, plus 1 side rod for each wythe of masonry 4 inches (100 mm) or less in width.

## 2.9 REINFORCEMENT WITH ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: For cavity wall provide two-piece assemblies that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, 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. Reinforcing for interior wythe: Provide ladder or truss type with single pair of side rods and cross rods spaced not more than 16 inches (407 mm) o.c.
  - 1. Wire Type: 304 Stainless-steel wire.
  - 2. Wire Size for Side Rods: W2.8 or 0.188-inch- (3/16") diameter.
  - 3. Wire Size for Cross Rods: W2.8 or 0.188-inch- (3/16") diameter.
  - 4. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units where indicated.
- C. Wire Anchor and Seismic Masonry Clips: Adjustable rectangular wire tie with and rigid PVC extrusion with snap-in grooves for inserting continuous wire. Size wire tie to extend at least halfway through veneer but with at least 3/4-inch cover on outside face and designed to connect to reinforcing in interior wythe.
  - 1. Anchor Wire: 304 Stainless Steel W2.8 or 0.188-inch- (3/16") diameter.
  - 2. Continuous Wire: 304 Stainless Steel W2.8 or 0.188-inch- (3/16") diameter.

- D. Insulation Clip: Manufacturers standard plastic washer to hold insulation in place.
- E. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following manufacturers:
  - a. Hohmann & Barnard, Inc. (#180 S.I.S. Doub'l Loop-Lock Truss Seismiclip Interlock System)
  - b. or an equal acceptable to the Architect

## 2 . 10 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. for interior use.
- C. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or 316 for exterior use.
- D. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153 for interior use.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304 or 316 for exterior use.

## 2 . 11 TIES AND ANCHORS FOR COLD FORMED METAL FRAMING

- 1. Seismic Masonry-Veneer Anchors: For brick veneer with cold form metal framing backup, provide units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.
  - a. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical leg of connector section.
  - b. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
  - c. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, 2-3/4 inches (70 mm) wide by 3 inches (75 mm) high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least 1-1/2 inches (38 mm) into veneer but with at least 5/8-inch (16-mm) cover on outside face.
  - d. Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.
  - e. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches (32 mm) wide by 6 inches (150 mm) long, 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, 5/8 inch (16 mm) wide by 6 inches (150 mm) long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
- f. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire. Size wire tie to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
  - g. Fabricate sheet metal anchor sections and other sheet metal parts from 0.109-inch- (2.8-mm-) thick, stainless-steel sheet.
  - h. Fabricate wire connector sections from 0.188-inch- (4.8-mm-) diameter, stainless-steel wire.
  - i. Available Products:
    - 1) Dayton Superior Corporation, Dur-O-Wal Division; D/A 213S.
    - 2) Hohmann & Barnard, Inc.; DW-10-X-Seismicclip.
    - 3) Wire-Bond; RJ-711 with Wire-Bond clip.
2. Polymer-Coated, 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 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. Available Products:
    - 1) ITW Buildex; Teks Maxiseal with Climaseal finish.
    - 2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.
3. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with 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 with not less than three exposed threads.
- a. Available Products:
    - 1) Dayton Superior Corporation, Dur-O-Wal Division; Stainless Steel SX Fastener.
    - 2) ITW Buildex; Scots long life Teks.

## 2.12 ADJUSTABLE ANCHORS AND TIES

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  1. Anchor Section: Crimped 1/4-inch- (6.4-mm-) diameter, stainless-steel wire anchor section for welding to steel.
  2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.25-inch- (6.4-mm-) diameter, stainless-steel wire.

- B. 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- (6.4-mm-) diameter, hot-dip galvanized steel wire.
  - 2. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.188-inch- (4.8-mm-) diameter, stainless-steel wire.
  - 3. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from 0.188-inch- (4.8-mm-) diameter, stainless-steel wire.
- C. Partition Top Anchors: 0.097-inch- (2.5-mm-) thick metal plate with 3/8-inch- (10-mm-) diameter metal rod 6 inches (150 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

## 2.13 ANCHORS FOR CONNECTING TO CONCRETE

- A. Flexible Ties: Provide two-piece flexible assemblies that resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section: Formed from 0.1094-inch- (2.8-mm-) thick, stainless-steel sheet designed for attachment to concrete and masonry backup.
  - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm) of masonry face, made from W2.8 or 0.188-inch- (3/16") diameter, stainless-steel wire.
  - 3. #345-BT by Hohmann & Barnard, Inc. or approved equal.

## 2.14 MISCELLANEOUS ANCHORS

- A. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch (0.9-mm), galvanized steel sheet.
- B. 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.
- C. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Type: Chemical anchors.
  - 2. Type: Expansion anchors.
  - 3. Type: Undercut anchors.
  - 4. Corrosion Protection: Where galvanized is indicated on drawings provide Carbon-steel components hot-dip galvanized to comply with ASTM A 153, Class C.

5. Corrosion Protection: Where stainless steel is indicated on drawings provide Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
  6. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
  7. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.
- D. Refer Division 5 Section "Metal Fabrications" for steel lintels shelf angles and top of wall and partition bracing angles for unit masonry.
- E. Partition Top Anchors: 0.097-inch- (2.5-mm-) thick metal plate with 3/8-inch- (10-mm-) diameter metal rod 6 inches (150 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- F. Miscellaneous Anchors: Refer to drawings.

#### 2.15 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Fabricate exposed metal flashing as specified in Division 7 Section "Sheet Metal Flashing and Trim" provide concealed flashing as specified below:
- B. Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use the following, unless otherwise indicated:
1. Copper-Laminated Flashing (Copper Fabric Flashing): Manufacturer's standard laminated flashing consisting of 7-oz./sq. ft. (2-kg/sq. m) sheet copper bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- 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. Copper-Laminated Flashing:
    - a. Copper Fabric Flashing; Advanced Building Products, Inc.
    - b. Copper Fabric; AFCO Products, Inc.
    - c. H & B C-Fab Flashing; Hohmann & Barnard, Inc.
    - d. Copper Fabric Flashing; Polytite Manufacturing Corp.
    - e. Copper Fabric Flashing; Sandell Manufacturing Co., Inc.
    - f. York Copper Fabric Flashing; York Manufacturing, Inc.
- E. Metal Drip Edges: Fabricate from 16-oz./sq. ft lead coated copper sheet. Extend at least 3 inches (75 mm) into wall, with outer edge bent down 30 degrees and hemmed.

1. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight (thickness) indicated below, coated both sides with lead weighing not less than 12 lb/100 sq. ft. (0.59 kg/sq. m) nor more than 15 lb/100 sq. ft. (0.73 kg/sq. m) of copper sheet (total weight of lead applied equally to both sides).
- F. Self Adhering Rubberized-Asphalt Flashing: Provide only where specifically indicated; 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 (1.0 mm).
1. Available Products:
    - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
    - b. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier-44.
    - c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
    - d. Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
    - e. Hohmann & Barnard, Inc.; Textroflash.
    - f. Polytite Manufacturing Corp.; Poly-Barrier Self-Adhering Wall Flashing.
- 2.16 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: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
    1. 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. 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 0.187-inch (4.8-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.
    2. Available Products: Subject to compliance with requirements, materials that may be incorporated into the Work include, but are not limited to, the following:
      - 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.

## 2.18 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  - 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. Available Manufacturers for concrete masonry units:
      - 1) Diedrich Technologies, Inc.
      - 2) EaCo Chem, Inc.
      - 3) ProSoCo, Inc.
    - b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining:
      - 1) 200 Lime Solv; Diedrich Technologies, Inc.
      - 2) Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
    - c. Cleaners for Brick Subject to Metallic Staining:
      - 1) 202V Vana-Stop; Diedrich Technologies, Inc.
      - 2) Sure Klean Vana Trol; ProSoCo, Inc.

## 2.19 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 ASTM C 270, 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. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
  - 2. For masonry below grade, in contact with earth, and where indicated, use Type M or S.
  - 3. For reinforced masonry and where indicated, use Type M or S.

4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls, use Type M or S.
  5. For interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type (fine or coarse) that will comply with Table 5 of 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 (200 to 280 mm) as measured according to ASTM C 143.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Verify that slabs are within tolerances specified.
  2. Verify that reinforcing dowels are properly placed.
  3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

#### 3.2 INSTALLATION, GENERAL

- A. 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.

2. **Wetting of Brick:** Wet brick before laying if the initial rate of absorption exceeds 30 grams per 30 square. inches (30 g/194 sq. cm) per minute or 0.035 ounce per square inch (1 g/645 sq. cm) when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

### 3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602

### 3.4 LAYING MASONRY WALLS

- A. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- B. **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.
- C. **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.
- D. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- E. 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.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
  1. With full mortar coverage on horizontal and vertical face shells.
  2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.

### 3.6 BONDING OF MULTIWYTHE MASONRY

- A. Use masonry joint reinforcement installed in horizontal mortar joints to bond wythes together.
- B. **Corners:** Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.

1. Provide continuity with masonry joint reinforcement at corners by using prefabricated "L" units as well as masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:

1. Provide continuity with masonry joint reinforcement by using prefabricated "T" units.

### 3.8 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 foundations walls and parapet walls at terrace.
  3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings 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.

### 3.9 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 1/2 inch (13 mm) 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 (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

### 3.13 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 multiwythe masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through outer wythe, turned up a minimum of 8 inches (200 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through inner wythe and turn flashing up approximately 2 inches (50 mm) , unless otherwise indicated.
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. 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 plastic weep hole/vents to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c.
3. Place cavity drainage material immediately above flashing in cavities.

E. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use plastic weep hole/vents to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

### 3 . 14 REINFORCED UNIT MASONRY INSTALLATION

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

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

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

### 3 . 15 FIELD QUALITY CONTROL

A. The Owner will engage a qualified independent testing agency to perform field quality control testing indicated below.

1. Refer to Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
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 ASTM C 780.
- D. Grout will be sampled and tested for compressive strength per ASTM C 1019.
- E. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, units will be tested according to ASTM C 140.

### 3.16 SPECIAL INSPECTIONS

- A. Special Inspections and tests shall be performed by the Special Inspector or Special Inspection Agency.
- B. Preconstruction Testing: Perform preconstruction testing as follows:
  - 1. Prism Test: For each type of construction required, according to ASTM C 1314.
- C. Construction Testing: Perform construction testing as follows:
  - 1. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
  - 2. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
  - 3. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
  - 4. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
  - 5. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- D. Verification and inspection of masonry construction shall be Level 1 in accordance with Table 1704.5.1 of IBC 2006, and as follows:
  - 1. Details: Perform an inspection of the masonry to verify compliance with the details shown on the approved construction documents such as proper application of joint details at each connection.
    - a. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
    - b. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
    - c. Place grout only after inspectors have verified proportions of site-prepared grout
  - 2. Welding: Welding inspection shall be in compliance with AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- F. Additional testing performed to determine compliance of corrected work with specified requirements shall be at Contractor's expense.

3 . 17 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 masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.
- E. Field Coat Application for Ground Face Masonry Units: (work to be performed under Division 9 Section "Painting").
  - 1. Cleaning: Prior to application clean and rinse walls strictly following manufacturers instructions and recommendations.
  - 2. Apply 2 field coats: Apply the acrylic coating evenly to cover entire wall surface without forming drops or runs. Follow manufacturers instructions for application.

3 . 18 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. Excess Masonry Waste: Remove excess, clean masonry waste Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04810