SECTION 042000: UNIT MASONRY

PART 1: GENERAL

1.1 SUMMARY

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

1. Concrete masonry units (CMUs).
2. Face brick.

B. See Division 5 Section "Metal Fabrications" for furnishing steel lintels for unit masonry.

1.2 SUBMITTALS

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

B. Samples for each type and color of exposed masonry units and mortars.

C. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1.3 QUALITY ASSURANCE

A. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. If found satisfactory by Architect, panel may be incorporated into the work.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately to verify that new masonry matches adjacent existing masonry to remain.

1.4 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2: PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.2 COLORS, TEXTURES, AND PATTERNS

A. Exposed Masonry Units: Match existing adjacent masonry units.

2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Concrete Masonry Units: ASTM C 90.

1. Match existing adjacent concrete masonry units.

2.4 BRICK

A. General: Provide shapes indicated and as follows:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.

B. Face Brick: ASTM C 216, Grade MW or SW, Type FBS.

1. Match existing adjacent brick.

2.5 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.

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

C. Masonry Cement: Not permitted.

D. Mortar Pigments: Iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Available Products:

a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
b. Davis Colors; True Tone Mortar Colors.
c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.

E. Aggregate for Mortar: ASTM C 144.

1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C 404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Available Products:

a. Addiment Incorporated; Mortar Kick.
b. Euclid Chemical Company (The); Accelguard 80.
c. Grace Construction Products, a unit of W. R. Grace & Co. – Conn.; Morset.
d. Sonneborn, Div. of ChemRex; Trimix-NCA.

H. Water: Potable.

2.6 REINFORCEMENT

A. Masonry Joint Reinforcement: ASTM A 951; mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.

1. Wire Size for Side Rods: W1.7 or 0.148-inch diameter.
2. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
3. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
5. Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
6. Multiwythe Masonry:

a. Adjustable (two-piece) type, with one side rod at each face shell of backing wythe and with ties that extend into facing wythe. Ties engage eyes or slots in reinforcement and extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

7. Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.188-inch-diameter, hot-dip galvanized, carbon-steel continuous wire.

2.7 TIES AND ANCHORS

A. Materials:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Wire: Fabricate from 1/4-inch- diameter, hot-dip galvanized steel wire.

D. 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.

E. Adjustable Masonry-Veneer Anchors

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:

a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05 inch.

2. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.

a. Fabricate wire connector sections from 0.188-inch- diameter, hot-dip galvanized, carbon-steel wire.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing**,** where flashing is exposed or partly exposed and where indicated, complying with Division 7 Section “Sheet Metal Flashing and Trim.”

1. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

2. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend

metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.

B. Flexible Flashing: For flashing not exposed to the exterior, use the following, unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.

a. Available Products:

1) Advanced Building Products Inc.; Copper Fabric Flashing.
2) AFCO Products Inc.; Copper Fabric.
3) Hohmann & Barnard, Inc.; H & B C-Fab Flashing.
4) Phoenix Building Products; Type FCC-Fabric Covered Copper.
5) Polytite Manufacturing Corp.; Copper Fabric Flashing.
6) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing.
7) York Manufacturing, Inc.; York Copper Fabric Flashing.

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 flashing manufacturer.

2.9 BITUMINOUS DAMPPROOFING

A. Cavity Dampproofing: Provide Cold-Applied, Emulsified-Asphalt Dampproofing for Fibered Brush and Spray application: ASTM D 1227, Type II, Class 1

2.10 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

2.11 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer’s standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, unless otherwise indicated.

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

2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.

3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.

1. For masonry below grade or in contact with earth, use Type S.

2. For reinforced masonry, use Type S.

3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.

C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products].

1. Pigments shall not exceed 10 percent of portland cement by weight.

2. Pigments shall not exceed 5 percent of masonry cement by weight.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3: EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before lying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

C. Wetting of Brick: Wet brick before lying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of lying.

D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

3.2 LAYING MASONRY WALLS

A. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry to match existing adjacent masonry; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

B. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

C. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

D. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

3.3 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and concrete masonry units as follows:
1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.

3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.

4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

3.4 CAVITY WALLS

A. Bond wythes of cavity walls together using one of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for 2.67 sq. ft. of wall area spaced not to exceed 24 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.

2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

    a. Use adjustable (two-piece) type reinforcement[with continuous horizontal wire in facing wythe attached to ties.
    b. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.

3. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Coat cavity face of backup wythe to comply with “Bituminous Dampproofing.”

3.5 MASONRY JOINT REINFORCEMENT

A. General: Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

3.6 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 in width between masonry and structural member, unless otherwise indicated.

    2. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.

    3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Fasten seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners.

2. Embed tie sections, connector sections and continuous wire in masonry joints.

3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.

4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.8 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

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

B. Install flashing as follows, unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.

2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use open head joints to form weep holes.

2. Space weep holes 24 inches o.c., unless otherwise indicated.

3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 “Miscellaneous Masonry Accessories” Article.

E. Install vents in head joints in exterior wythes at spacing indicated. Use open head joints to form vents.

3.9 REINFORCED UNIT MASONRY INSTALLATION

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

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

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

3.10 CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
3. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION