

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete masonry units (CMUs).
  - 2. Face brick.
  - 3. Firebox brick.
  - 4. Mortar and grout.
  - 5. Reinforcing steel.
  - 6. Masonry joint reinforcement.
  - 7. Ties and anchors.
  - 8. Embedded flashing.
  - 9. Miscellaneous masonry accessories.
  - 10. Cavity-wall insulation.
- B. Related Sections include the following:
  - 1. Division 07 Section "Air Barriers" for air barrier applied to cavity face of backup wythes of cavity walls.
  - 2. Division 07 Section "Penetration Firestopping" for firestopping at openings in masonry walls.
  - 3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.
- C. Products furnished, but not installed, under this Section include the following:
  - 1. Dovetail slots for masonry anchors, installed under Division 03 Section "Cast-in-Place Concrete."
- D. Products installed, but not furnished, under this Section include the following:
  - 1. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications."
  - 2. Hollow-metal frames in unit masonry and masonry veneer openings, furnished under Division 08 Section "Hollow Metal Doors and Frames."
  - 3. Hollow-metal frames in unit masonry openings, furnished under Division 14 Section "Hydraulic Elevators."

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals: Follow submittal requirements of Division 01 Section "Submittal Requirements" and provide product data on the LEED Materials Documentation Cover Sheet attached as an Appendix to Division 01 Section "Sustainable Design and LEED Requirements."
- C. Shop Drawings: 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.
- D. Samples for Selection: For the following:
  - 1. Decorative concrete masonry units.
  - 2. Face brick, in the form of straps of five or more bricks.
  - 3. Colored mortar.
  - 4. Weep holes/vents.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
  - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
  - 1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
    - b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
    - c. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include brand, type, and name of manufacturer.
  - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 4. Grout mixes. Include description of type and proportions of ingredients.

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5. Reinforcing bars.
  6. Joint reinforcement.
  7. Anchors, ties, and metal accessories.
- G. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports, per ASTM C 780, for mortar mixes required to comply with property specification.
- H. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- I. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years experience.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.
- C. 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.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. 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 ACI 216.1 / TMS 216, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- F. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- G. Mockups: Build mockups, as part of Integrated Exterior Mockup, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups for typical exterior wall, including face wythe and accessories.
    - a. Include a sealant-filled joint at least 16 inches long in exterior wall mockup.
    - b. Include through-wall flashing.

- c. Notify Architect when brick veneer is complete.
  - 2. Clean exposed faces of mockups with masonry cleaner as indicated.
  - 3. Protect accepted mockups from the elements with weather-resistant membrane.
  - 4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
- H. Preinstallation Conferences: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- 1. At least 7 days prior to starting CMU masonry, conduct a meeting to review detailed requirements for mortar and grout mixes and to determine procedures for satisfactory construction and curing operations. Review requirements of submittals, status of coordinating work, and availability of materials. Review requirements tenting and heating. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, including the following:
    - a. Contractor's superintendent.
    - b. Masonry foreman.
    - c. Architect.
  - 2. At least 7 days prior to starting veneer masonry, conduct a meeting to review detailed requirements for mortar mixes and to determine procedures for satisfactory construction operations. Review requirements of submittals, status of coordinating work, and availability of materials. Review requirements tenting and heating. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, including the following:
    - a. Contractor's superintendent.
    - b. Masonry foreman.
    - c. Architect.

#### 1.6 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.
- 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.

## 1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
  - 2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates or setting beds. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the following requirements:
  - 1. Cold-Weather Construction: When the anticipated daytime low temperature is within the limits indicated, use the following procedures:
    - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
    - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Heat masonry units to 40 deg F. Maintain mortar and

- grout above freezing until used in masonry. Use heat on both sides of walls under construction.
- c. 25 to 20 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F.
  - d. 20 deg F and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F.
2. Cold-Weather Protection: When the anticipated daytime low temperature is within the limits indicated, coordinate with the General Contractor to provide the following protection. This is in addition to construction procedures specified above:
    - a. 40 to 32 deg F: Cover masonry with insulating blankets for 48 hours after construction.
    - b. 32 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 72 hours after construction.
  3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- E. Hot-Weather Requirements: Coordinate with the General Contractor to protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

## 2.2 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- C. Provide product that is manufactured within 500 miles of project site.

## 2.3 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide shapes indicated and as follows:
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners, unless otherwise indicated.
- B. Concrete Masonry Units: ASTM C 90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
  - 2. Weight Classification: Normal weight.
  - 3. Curing: Allow masonry units to cure 28 days to permit drying shrinkage before laying.
  - 4. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
  - 5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.
  - 6. 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.

## 2.4 MASONRY LINTELS

- A. Masonry Lintels: Built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

## 2.5 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.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

### B. Face Brick: ASTM C 216, Grade SW, Type FBX (tight dimension).

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 8000 psi.
2. Initial Rate of Absorption: Less than 18 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Surface Coating: Brick with colors or textures produced by application of coatings 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.
5. Size (Actual Dimensions): 3-5/8 inches wide wide by 2-1/4 inches high by 7-5/8 inches long.
6. Application: Use where brick is exposed, unless otherwise indicated.
7. Products:
  - a. Brick Type A: Morin Brick; Academy Smooth Series; Red Range.
  - b. Brick Type B: Belden Brick, Ashberry Velour.

## 2.6 MORTAR AND GROUT MATERIALS

### A. General: Mortar and grout may be provided in one of two options; field mix of Portland cement, lime and sand or with specified Portland Cement-Lime Mix.

### B. Portland Cement: ASTM C 150, Type I or II.

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

### D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.

1. Blue Circle Cement, Inc.: Eaglebond High Strength Type "S".
2. Ciment Quebec, Inc.: Portland and Lime / Type S.
3. Dragon Cement and Concrete: Type S Masonry Cement.



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- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
  - 1. Available Products:
    - a. Davis Colors; True Tone Mortar Colors.
    - b. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
- F. Aggregate for Mortar: ASTM C 144.
- G. Aggregate for Grout: ASTM C 404.
- H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
  - 1. Products: Subject to compliance with requirements, provide the following:
    - a. ACM Chemistries; RainBloc for Mortar.
    - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
    - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- I. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951.
  - 1. Interior Walls: Mill- galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
  - 3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter for interior walls and W2.8 or 0.188-inch diameter for exterior walls.
  - 4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
  - 5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
  - 6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
  - 7. Provide in lengths of not less than 10 feet.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.
  - 1. Available Products:
    - a. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Truss.
    - b. Hohmann & Barnard; Truss-Mesh, #120.
    - c. Wire-Bond; Series 300, Single Wythe.
- D. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Adjustable (two-piece) type, truss design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.
2. Available Products:
  - a. Dur-O-Wall; 3700 Dur-O-Eye.
  - b. Hohmann & Barnard; Lox-All Adjustable Eye-Wire, #170.
  - c. Wire-Bond; Series 900, Level Eye Truss.

## 2.8 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.
  1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
- 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. Where wythes are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
  2. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.
- D. 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. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
    - a. Anchor Section: Gasketed sheet metal plate, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, 5/8 inch wide by 6 inches 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.

- b. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-thick, steel sheet, galvanized after fabrication.
  - c. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch-diameter, hot-dip galvanized steel wire.
  - d. Product:
    - 1) Hohmann & Barnard, Inc.; X-Seal™ Anchor.
3. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
- a. Available Products:
    - 1) ITW Buildex; Teks Maxiseal with Climaseal finish.
    - 2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.

## 2.9 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Refer to Division 07 Section "Sheet Metal Flashing and Trim".
- B. Metal Drip Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, as follows:
  - 1. Metal Drip Edges: Fabricate from 26 gage stainless steel. Extend at least 4-1/2 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and back edge turned up 4 inch.
  - 2. Available Product: No. 1008 by Heckman Building Products Inc.
- C. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions with interlocking counterflashing on exterior face, of same metal as reglet.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fry Reglet Corporation; Fry Reglet MA-4 Masonry Reglet with SpringLok Counterflashing.
  - 2. Material: Stainless steel, 0.019 inch thick.
  - 3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
  - 4. Accessories:
    - a. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
  - 5. Finish: Mill.

- D. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:
1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
    - a. Available Products:
      - 1) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
    - b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
      - 1) Termination Seal: Bituthene® Liquid Membrane.
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
1. Holmann & Barnard: #NS – Closed Cell Neoprene.
  2. Sandell: Closed Cell Neoprene.
  3. Wire Bond: 3000 Horizontal.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use the following, unless otherwise indicated:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
    - a. Available Products:
      - 1) Advanced Building Products Inc.; Mortar Maze weep vent.
      - 2) Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
      - 3) Heckmann Building Products Inc.; No. 85 Cell Vent.
      - 4) Hohmann & Barnard, Inc.; Quadro-Vent.

- 5) Sandell: Cell Vent.
  - 6) Wire-Bond; Cell Vent.
- E. Cavity Drainage Material: 1-inch- thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.
- 1. Available Products:
    - a. Mortar Net by Mortar Net USA, LTD.; Model MN 10-1.
    - b. Mortar Break by Advanced Building Products; Mortar Break.
  - 2. Where brick veneer has CMU or concrete backup wall without cavity, provide Home Slicker Stone & Stucco by Benjamin Obdyke.
- F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
- 1. Available Products:
    - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
    - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
    - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
    - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.
- G. Grout Screen: Monofilament screen fabricated from high-strength, non-corrosive, polypropylene polymers.
- 1. Available Products: Subject to compliance with requirements, grout screen materials that may be incorporated into the Work include, but are not limited to, the following:
    - a. AA3260; AA Wire Products.
    - b. Dur-O-Stop; Dur-O-Wal, Inc.
    - c. MGS; Hohmann and Barnard.

## 2.11 CAVITY-WALL INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin, tongue and groove edges.
- 1. Thickness: As indicated.
  - 2. Products:
    - a. Amofam ; Amoco.
    - b. Formular; Owens Corning.
    - c. Styrofoam; Dow Chemical Company.
- B. Adhesive: Type recommended by insulation board manufacturer for application indicated.

2.12 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate (Spic and Span) and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  - 1. Available Manufacturers:
    - a. 202V Vana-Stop; Diedrich Technologies, Inc.
    - b. Sure Klean Vana Trol; ProSoCo, Inc.

2.13 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in 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, Property Specification. Provide type S mortar for all applications stated unless another type is indicated.
- D. Pigmented Mortar: Use select and proportion pigments with other ingredients to produce color required.
  - 1. Pigments shall not exceed 10 percent of portland cement by weight.
  - 2. Mix to match Architect's sample.
  - 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
    - a. Face brick. Allow for 1 bag mix for brick type A and 2 bag mix for brick type B.
- E. Water-Repellent Mortar Admixture: Use for all CMU.
- F. 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. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
  - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. Verify that foundations are within tolerances specified.
  - 2. Verify that reinforcing dowels are properly placed.
  - 3. Verify that built-in items are in proper location and ready for roughing into masonry work.
  - 4. Examine wall framing and sheathing to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  - 1. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
  - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.

3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 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. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. 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.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

### 3.4 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: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.



- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.
  - 1. At non-fire rated partitions, install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
  - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Article in this Section "Penetration Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units or brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

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- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is necessary, remove mortar and replace.

### 3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using the following method:
  - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
    - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.
  - 2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
  - 1. Install the specified cavity drainage material in thickness to fill the cavity above flashings as work progresses.
- C. Installing Cavity-Wall Insulation: At sheathing, place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. At masonry backup wall, fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
  - 1. Fill cracks and open gaps in insulation with foam insulation specified in Division 07 section "Thermal Insulation".

### 3.7 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c., unless noted otherwise.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
    - a. Reinforcement above is in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
  - 1. At "T" intersection of walls, Strap Anchors may be used in lieu of masonry joint reinforcement. Install 16 inches on center.

- D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.8 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten screw-attached anchors through insulation, air/vapor barrier, and sheathing to wall framing with metal fasteners of type indicated.
  - 2. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of cavity insulation.
  - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
- B. Anchor masonry veneers to structural masonry back-up wythe with wire ties designed to engage pintle-eye assembly incorporated in joint reinforcement.
  - 1. Use individual adjustable metal ties installed in horizontal joints to bond wythes together. Provide ties shown, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally with not less than 1 anchor for each 1.77 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
  - 2. Engage pintles form ties into eyes connected to joint reinforcement.

### 3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control joints in unit masonry where indicated. Provide control joints in masonry partitions at changes in wall heights, at control joints in the wall bottom support material, within 8' of wall corners or intersections for walls greater than 16', and at not less than 24' on center for straight walls. 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. Install control joints in veneer masonry as indicated on the drawings or, if not indicated, at a maximum spacing of 24 feet on center. Locate joints at door and window jambs inasmuch as possible.
  - 1. Provide joints at both sides of windows and doors 6 foot wide or wider.
- C. Form control joints in concrete masonry as follows:
  - 1. Install preformed control-joint gaskets designed to fit standard sash block.
  - 2. Joint reinforcement shall be discontinuous at control joints.
  - 3. Structural bond beam reinforcement shall be continuous through control joints.

- D. Form expansion joints in brick as follows:
  - 1. Build in compressible joint fillers and set back from face of veneer to form open joint 3/4 inch deep and not less than 3/8 inch wide for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

### 3.10 LINTELS

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

### 3.11 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows, unless otherwise indicated:
  - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  - 2. Extend flexible flashing over metal flashing through outer wythe, across air space and insulation, turned up a minimum of 8 inches and adhering to air barrier membrane. Apply termination bar and continuous bead of termination mastic along rubberized-asphalt flashing seams, cuts, and penetrations.
  - 3. At lintels and shelf angles, extend flexible flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 8 inches at ends and turn up 2 inches to form end dams.
- C. Install reglets as follows, unless otherwise indicated:
  - 1. Install reglet on top of masonry unit.
  - 2. Extend flexible flashing over metal reglet through outer wythe, across air space and insulation, turned up a minimum of 8 inches and adhering to air barrier membrane. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, flexible flashing strip.
  - 3. Provide springlock flashing for installation by roofing contractor.
- D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

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1. Use specified weep/vent products to form weep holes.
  2. Space weep holes 24 inches o.c., unless otherwise indicated.
  3. Provide weep holes not more than 8 inches from end of lintels.
- E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.
- F. Install vents in vertical head joints at the top of each continuous cavity. Use specified weep/vent product to form vents.
1. Space vents 24 inches o.c.

### 3.12 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. 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.
  2. Limit height of vertical grout pours to not more than 60 inches.

### 3.13 FIRESTOPPING

- A. Firestopping: Refer to Division 07 Section "Penetration Firestopping" for installation requirements. Provide firestopping, as part of the work of this section, at the top of fire-rated masonry walls between top of partition and underside of structure above, both for new and existing conditions. Where gypsum wallboard is installed at the top of rated existing masonry walls, the firestopping will be provided by others.
1. Bearing walls, not subject to vertical movement, may be grouted solid between top of wall and underside of structure, in lieu of firestopping.

### 3.14 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:

1. Payment for these services will be made by Contractor.
  2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.
- B. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- C. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for compressive strength.
- D. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

### 3.15 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning for CMU: 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. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water. Do not use pressure sprayers, garden hose type and pressure only.
  3. Clean concrete masonry with job-mixed detergent solution by cleaning method indicated in NCMA TEK 8-2A and as applicable to type of stain on exposed surfaces.
- E. Final Cleaning for Brick Veneer: After mortar is thoroughly set and cured for a minimum of 7 days, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  4. Protect metal roof and/or floor deck from contact with cleaner by covering with polyethylene film. Should damage occur to metal deck, repair damaged deck finish by re-priming steel deck materials or applying a ZRC coating to galvanized deck materials.

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5. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water. Do not use pressure sprayers, garden hose type and pressure only.
6. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20 Revised, and manufacturer's printed instructions.

3.16 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste and legally dispose of off Owner's property.

END OF SECTION 042000