

SECTION 042000 - UNIT MASONRY (ASSEMBLIES)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

- B. Related Sections include the following:

1. Division 3 Section "Cast-In-Place Concrete"
2. Division 5 Section "Metal Fabrications"
3. Division 5 Section "Structural Steel Framing"
4. Division 5 Section "Cold Formed Metal Framing"
5. Division 7 Section "Composite Sheet Waterproofing"
6. Division 7 Section "Sheet Metal Flashing and Trim"
7. Division 7 Section "Through Penetration Firestop Systems"
8. Division 7 Section "Joint Sealants"
9. Division 8 Section "Hollow Metal Doors and Frames"

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following net-area compressive strengths (f'_m) at 28 days. Determine compressive strength of masonry from net-area compressive strengths of masonry units and mortar types according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1. For Concrete Unit Masonry: 2000 psi (MPa).

1.1 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory, and other manufactured product specified, to comply with requirements in Division 1 Section "Submittals".
- B. Pre-installation Coordination Drawings: In accordance with Division 1 Section "Project Coordination", prepare Coordination Drawings to coordinate unit masonry assemblies with Work of other trades. Coordination drawings shall be reviewed by all Prime Contractors at the Masonry Pre-Installation Conference. Coordination items include, but are not limited to the following:
 - 1. Sizes and locations of all masonry openings, coordinated with items installed by other trades, both interior and exterior, i.e., louvers, grilles, doors and windows, scuppers, etc. **At a minimum, coordination drawings must show ALL required openings through the finished exterior building masonry.**
 - 2. Locations of all expansion and control joints. Locations of all expansion and control joints. **Submit for approval, a method recommended by recent technical standards published by Industry standards as noted in Paragraph 3.2.A below.**
 - 3. Locations of all in-wall rainwater conductors and outlets through the wall.
 - 4. Locations of all piped sleeves and other foundation penetrations.
- C. Shop Drawings: In accordance with Division 1 Section "Submittals", prepare and submit Shop Drawings including details of the following, at a scale of not less than 3" = 1'-0".
 - 1. Locations and types of lintels.
 - 2. Indicate required horizontal and vertical reinforcing and horizontal masonry bond beams.
 - 3. Fabricated flashing details, sections and installation methods including, but not limited to, through-wall base flashings, sill flashings, head flashings, low roof/high wall flashings, cap flashings, corner flashings, end dam flashings, stepped flashings and 2-piece flashing assemblies.
 - 4. Locations and detailed methods of attachment to supporting structural items and systems.
 - 5. Submit details and installation methods incorporating special shape units.
 - 6. Submit documentation of constructability issues related to design, installation methods, applicable building codes, fire-rating and/or compatibility conditions. Accompany documentation with the most recent technical standards published by the International Masonry Institute, National Concrete Masonry Association, Brick Industry Association and product manufacturer's printed recommendations.
 - a. Compatibility Reports: Certification from foamed-in-place polyurethane insulation manufacturer indicating insulation is chemically and adhesively compatible with all adjoining cavity wall assembly materials including, but not limited to, membrane and metal flashing materials, sealants, backer rods, masonry reinforcing, masonry ties, gaskets and similar materials. List all materials, if any, which may be damaged by coming into contact with foamed-in-place insulation, either by short-term or long-term contact. Refer to Division 7 Section "Foamed-In-Place Insulation."
- D. Samples for Initial Selection of the following:

1. Unit masonry samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required. Submit face brick to show range of colors, texture and mortar types for matching existing brick. Submit concrete masonry samples to illustrate texture.
 2. Colored mortar samples showing the full range of colors available.
- E. Samples for Verification: For the following:
1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 2. Colored mortar samples for each color required, showing the full range of colors expected in the finished construction. **Make samples using the same sand and mortar ingredients to be used on Project.** Label samples to indicate types and amounts of pigments used.
 3. Weeps/vents in color to match mortar color.
 4. Accessories embedded in masonry assemblies.
- F. 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 requirements of the Contract Documents, unless such deviations are specifically brought to the attention of Architect and approved in writing.
- 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 specified:
1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units and gross-area compressive strength of clay bricks.
 2. Mortar complying with ASTM C270.
 3. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.
 4. Submit concrete mix design for filling masonry cells and bond beams. Use concrete mix having a 28-day compressive strength of 3000 psi.
- I. Material Certificates: Signed by manufacturers certifying that each of the following items complies with specified requirements:
1. Each type of masonry unit required.

- a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
- 2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
- 3. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- 4. Each material and grade indicated for reinforcing bars.
- 5. Each type and size of joint reinforcement.
- 6. Each type and size of anchor, tie, and metal accessory.
- J. Hot and Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with hot and cold-weather requirements.

1.2 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1093 to conduct the testing indicated, as documented according to ASTM E548.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color through one source from a single manufacturer and manufacturing plant.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- D. Testing Service: Owner will engage a qualified independent testing agency to perform tests in compliance with applicable codes.
- E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per Applicable Code by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
- F. Sample Panels: Prior to installation of above grade unit masonry, build sample panels, using single wythe veneer materials preliminarily selected for the completed Work. Build sample panels for each type of veneer masonry in sizes approximately 48 inches long by 48 inches high by full unit thickness.
 - 1. Locate panels in the locations indicated or, if not indicated, as directed by Architect.
 - 2. Clean exposed faces of panels with masonry cleaner indicated.
 - 3. Protect approved sample panels from the elements with weather-resistant membrane.
 - 4. Maintain sample panels during construction in an undisturbed condition as a standard for judging the completed Work.

5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Being preliminary in nature, multiple sample panels may be required to finalize unit masonry selections to be used on the Project.
 - b. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels, unless such deviations are specifically approved by Architect in writing.
 - c. Demolish and remove sample panels when directed by Architect.
- G. Mockup Panels: Prior to installation of above grade unit masonry, allowing sufficient time for construction and approval, build mockup panels using materials and products indicated for the completed Work to verify selections made under sample Submittals and to demonstrate aesthetic effects. Build mockup panels to include each type of unit masonry assembly in sizes of full assembly thickness by approximately 72-inches long by 72-inches high or larger to accommodate all necessary components.
 1. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 2. Locate mockups in the location indicated or, if not indicated, as directed by Architect.
 3. Provide masonry opening with installed aluminum window frame, steel lintel, sill and associated blocking, air-barrier and flashing as detailed on Drawings and as specified in this Section.
 4. Include metal coping, roof edge fascia, gutters, thru-wall overflow roof scupper, and associated blocking and fasteners as detailed on Drawings and as specified in Division 7 Section "Sheet Metal Flashing and Trim."
 5. Omit portions of veneer, sill, coping, fascia, and aluminum frame in order to provide viewable "cut-away" areas and items of construction ordinarily hidden behind finished wall construction. Coordinate with Architect prior to Mockup Panel construction.
 6. Build mockups for the following types of unit masonry assemblies in sizes required by full assembly thickness, including face veneer, cavity, backup and accessories. Include a sealant-filled vertical joint at least 16-inches long in each mockup.
 - a. Exposed unit masonry veneer with unit masonry backup assembly.
 - b. Exposed unit masonry veneer with metal stud backup assembly.
 - c. Other assemblies incorporating unit masonry backup and claddings as specified in related sections including but not limited to, metal panel systems and exterior insulation finish system.
 - d. Sealants as specified in Division 7 Section "Joint Sealants."
 7. Clean exposed faces of mockups with masonry cleaner as indicated.
 8. Protect accepted mockups from the elements with weather-resistant membrane.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. 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; aesthetic qualities of

workmanship; incorporation of specified and detailed products and accessories and other material and construction qualities specifically approved by Architect in writing.

- a. 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.

11. Demolish and remove mockups only when directed by Architect.

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

1.3 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 concrete masonry units from moisture absorption so that at the time of installation the moisture content is not more than the maximum allowed at the time of delivery.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mixes 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.

1.4 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 one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24-inches down face next to unconstructed wythe and secure 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 into 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 surfaces.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 50 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning. Follow manufacturer's recommendations for minimum temperature.
- E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 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 BRICK

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

2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTM C216, Grade SW, Type FBS, and as follows:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
2. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C67.
3. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
4. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C67 with no observable difference in the applied finish when viewed from 10 feet.
5. Size: Match Existing size and pattern.
6. Color and Texture: As a minimum standard of quality, this specification is based on the products indicated below. Architect reserves the right to revise and finalize all brick and mortar colors through the sample panel process.
 - a. Match Existing – Preliminary match for basis of design (to be reviewed in field and approved by Architect and Owner): Glen-Gery, E-flashed.
7. Manufacturers: Subject to compliance with specified requirements, additional manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Glen-Gery Corp.
 - b. Belden Brick.
 - c. Watson town Brick.
 - d. Redland Brick, Inc.
 - e. Endicott, Inc.
 - f. General Shale, Inc.
 - g. U. S. Brick

2.2 MORTAR AND GROUT MATERIALS

A. Available Products: Subject to compliance with specified requirements and suitability with specified materials as reviewed by the Architect, products that may be incorporated into the Work include, but are not limited to, the following:

1. Colored Portland Cement-Lime Mix:
 - a. Eaglebond; Blue Circle Cement.
 - b. Color Mortar Blend; Glen-Gery Corporation.
 - c. Rainbow Mortamix Custom Color Cement/Lime; Holnam, Inc.
 - d. Centurion Colorbond PL; Lafarge Corporation.
 - e. Lehigh Custom Color Portland/Lime; Lehigh Portland Cement Co.
 - f. Riverton Portland Cement Lime Custom Color; Riverton Corporation (The).

2. Mortar Pigments:

- a. True Tone Mortar Colors; Davis Colors.
- b. Centurion Pigments; Lafarge Corporation.
- c. SGS Mortar Colors; Solomon Grind-Chem Services, Inc.

3. Water-Repellent Admixture:

- a. Dry-Block Mortar Admixture; W. R. Grace & Co., Construction Products Division.
- b. Mortar Tite; Addiment Inc.
- c. Rheopel; Master Builders.

B. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C207, 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 C207, Type S.

E. Aggregate for Mortar: ASTM C144; except for joints less than 1/4-inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

- 1. Colored-Mortar Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. 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.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer as that used in the concrete masonry units (Section 2.1.C.5.).

- 1. Provide integral water repellent admixture in mortar used for exposed decorative concrete masonry unit construction, including cavity wall construction.

I. Water: Potable.

2.3 REINFORCING STEEL

A. Uncoated Steel Reinforcing Bars: ASTM A615; Grade 60.

2.4 MASONRY JOINT REINFORCEMENT

- A. General: ASTM A951 and as follows:
1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
 2. Wire Size for Side Rods: W1.7 or 0.148-inch diameter unless otherwise noted.
 3. Wire Size for Cross Rods: W1.7 or 0.148-diameter unless otherwise noted.
 4. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
- B. For single-wythe masonry, provide either ladder or truss type with single pair of side rods and cross rods spaced not more than 16-inches o.c. Truss type shall not be used in vertically reinforced unit masonry walls.
- C. For multi-wythe masonry, provide types as follows:
1. Adjustable (2-piece) type with single pair of side rods and cross ties spaced not more than 16-inches o.c. and with separate adjustable veneer ties engaging the cross ties. Crossties are either U-shaped with eyes or rectangular. Space side rods for embedment within each face shell of backup wythe and size adjustable ties to extend at least halfway through outer wythe but with at least 5/8-inch cover on outside face. Unless otherwise indicated, install in first and second courses above finished floor and in alternating back-up masonry courses thereafter.
 - a. Use where indicated and where horizontal joints of facing wythe do not align (1-1/4-inches or less) with those of backup wythe.
 - b. Use where facing wythe is of different material than backup wythe.
 - c. Provide #270 Adjustable Ladder Eye-Wire Anchor System by Hohmann & Barnard, Inc., or equal product.
 2. Adjustable (3-piece) type with ladder type reinforcement at back-up wythe which includes an extended cross rod. A vertical rod is hooked onto the extended cross rod and extends down to and behind the cross rod of the next lower truss type unit. An adjustable vee tie is hooked around the vertical rod for placement into the mortar joint of the face veneer.
 - a. Use where indicated and where horizontal joints of facing wythe do not align (greater than 1-1/4-inches) with those of the back-up wythe.
 - b. Provide Tie-HVR Anchor System by Hohmann & Barnard, Inc., or equal product.

2.5 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, and as required by Building Code Requirements for Masonry Structures; use of hot-dipped galvanized ties and anchors in exterior wall construction.
- B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A82; with ASTM A153, Class B-2 coating.
- C. Galvanized Steel Sheet: ASTM A653, G60, commercial-quality, steel sheet zinc coated by hot-dip process on continuous lines before fabrication.

- D. Steel Sheet, Galvanized after Fabrication: ASTM A366 cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A153.
- E. Steel Plates, Shapes, and Bars: ASTM A36. Plates, shapes, and bars exposed to weather shall be hot-dipped galvanized after fabrication.

2.6 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME OR LINTELS

- 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 3/16-inch diameter, hot-dip galvanized steel wire anchor section for welding to steel.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1-inch of masonry face, made from 0.1875-inch (3/16") diameter, hot-dip galvanized steel wire.

2.7 ANCHORS FOR CONNECTING TO SUBSTRATES

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. X-Seal® Veneer Anchors with VBT-Vee Byna-Tie by Hohmann & Barnard, Inc., or equal product.
 - 2. X-Seal® Anchor shall be coordinated to details and/or conditions for the appropriate length to accommodate cavity width from face of rigid insulation to the masonry veneer and to include the appropriate connection interface to the anchor substrate, pronged legs to match insulation thickness so that prongs abut the steel studs, and/or at masonry the face of the substrates. Provide appropriate stainless steel self-drilling self-tapping screws and gasketed seal tape by Hohmann & Barnard, Inc., or equal product.
 - 3. 2-Seal Byna-Lok Wire Tie shall be coordinated to details and conditions for metal stud wall construction for the appropriate length to accommodate cavity width from face of rigid insulation face to the masonry veneer and to include the insulation thickness and sheathing thickness so that the anchor barrel abuts the metal studs. The anchor barrel has a dual-barrel #12 self-drilling shaft with factory-installed EPDM washers to seal both the face of the insulation and the air barrier. The Byna-Lok Wire Tie is 9 gauge or 3/16-inch wire, anchors spaced at 16-inches x 16-inches directly into metal studs by Hohmann & Barnard, Inc., or equal product.
 - 4. Veneer Anchors #345-SV at sill blocking and #345-BT at jamb blocking spaced and secured at 16-inches o.c. horizontally and vertically. Coordinate details and/or conditions for the appropriate length to accommodate cavity width from face of rigid insulation and/or wood blockings and/or concrete masonry back-up face to the masonry veneer and to include the appropriate connection interface to the anchor substrate. Provide appropriate stainless steel self-drilling self-tapping screws. Hohmann & Barnard, Inc., or equal product.

2.8 JOINT STABILIZATION ANCHORS

- A. General: Provide stabilization anchors in horizontal joints of masonry units across the joint between walls at T-shape wall intersections as follows:
 - 1. Use either a manufactured steel joint stabilizing anchor consisting of two steel rods, connected together on each side of masonry joint by sliding plate assemblies or 1-1/2-inch x 3/16-inch x 32-inch steel strap anchor with 3 inch (90 degree) right-angle bent ends at masonry shear walls.
 - 2. Anchors to be embedded in grout-filled cores of hollow concrete masonry units.
 - 3. 16-inches o.c. vertical spacing.
 - 4. Finish: Mill galvanized or hot-dip galvanized to comply with ASTM A153.

2.9 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment through rigid insulation to wood or metal studs, and as follows:
 - 1. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.05-inch.
- B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
 - 1. Anchor Section: Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs to penetrate insulation/sheathing and contact studs or concrete masonry unit face; and raised rib-stiffened strap stamped into center to provide a slot between strap and plate for connection of wire tie.
 - a. Plate 1-1/4-inches wide by 6-inches long with strap 5/8-inch wide by 6-inches long; slot clearance formed between face of plate and back of strap shall not exceed diameter of wire tie by more than 1/32-inch.
 - b. Provide anchor manufacturer's standard, self-adhering, gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.
- C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Screw-Attached, Masonry-Veneer Anchors:
 - a. X-Seal with box tie with drip and X-Seal Tape, by Hohmann & Barnard, Inc., or equal product.

2.10 MISCELLANEOUS ANCHORS

- A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron inserts of type and size indicated.

- B. Anchor Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153, Class C; of diameter and length indicated and in the following configurations:
 - 1. Headed bolts.
 - 2. Non-headed bolts, bent in manner indicated.
- C. Post-installed 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. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
 - 5. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

2.11 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Fabrications listed in this Section take precedence over materials specified in Division 7 Section "Sheet Metal Flashing and Trim. Fabricate from the following materials:
 - 1. Fabricate through-wall metal flashing embedded in masonry from Type 304, 26 gauge (.018-inches thick) stainless steel formed to shape indicated.
 - 2. Fabricate metal expansion-joint waterstops from Type 304, 26 gauge (.018-inches thick) stainless steel formed to shape indicated.
 - 3. Fabricate stainless steel drip plates from Type 304, 26 gauge (.018-inches thick) stainless steel furnished with a smooth, factory-formed hemmed edge. Width: 3-inches.
- 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. EPDM: Ethylene Propylene Diene Terpolymer synthetic rubber. Flexible 40 mil elastomeric rubber membrane. Minimum width as detailed.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 7 Section "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.
- E. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include the following:
 - 1. Pre-fabricated Metal Flashing:

- a. Cheney Flashing; Cheney Flashing Company, Inc.
 - b. Sandell
2. EPDM and Polypropylene Flexible Membrane Flashings:
- a. Carlisle Pre-Kleened EPDM; Carlisle Coatings & Waterproofing, Incorporated.
 - b. Firestone Flashgard Thru-Wall Flashing; Firestone Building Products Co.
 - c. H & B Textroflash (polypropylene) Thru-Wall Flashing; Hohmann & Barnard, Inc.

2.12 MISCELLANEOUS MASONRY ACCESSORIES/MATERIALS

- A. Available Products: Subject to compliance with requirements, materials that may be incorporated into the Work include the following:
- 1. For substitution products, refer to Division 1 Section "Substitutions" for procedures.
- B. Compressible Expansion Material: Closed cell neoprene sponge with sensitive adhesive on one side ASTM D1056 Grade 2A1.
- 1. Products: Provide one of the following:
 - a. Hohmann & Barnard, Inc., NS-Neoprene Sponge
 - b. Dur-O-Wal, D/A 2015
 - c. Sandell Mfg. Co., Inc.
- C. Compressible Exterior Expansion Joint Filler: Silicone faced acrylic-impregnated expanding foam sealant and closed-cell foam sealant system. ASTM E283-04, compressible up to 50 percent; of width and thickness indicated. Color as selected by Architect, from full range of standard and special colors.
- 1. Products: Provide the following:
 - a. Colorseal, Emseal Joint Systems, Ltd.
- D. Preformed Control-Joint Gaskets: Styrene-Butadiene-Rubber Compound designed to fit standard sash block and to maintain lateral stability in masonry wall. ASTM D2000, Designation M2AA-805.
- 1. Products: Provide one of the following:
 - a. Hohmann & Barnard, Inc.
 - b. Dur-O-Wal
 - c. Sandell Mfg. Co., Inc.
- E. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226, Type I (No. 15 asphalt felt).
- F. Sill Weep: Weeps shall be installed as detailed at 16-inches o.c. on top of the metal drip plate along the length of the sill. Install per manufacturers written instructions.

1. Products: Basis of Design product, Hohmann & Barnard, Inc., 341 W/S Weep
 - a. Medium density polyethylene tested in conformance with ASTM D2244, D638 and D746.
 - b. 3/8-inch O.D. x 4-inch long with extended 4-inch wicks and brass or stainless-steel screen to match color of drip plate.
 - c. Lay extended wicks horizontally in opposite directions.
- G. Cavity Drainage Material: Free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings. Use standard thickness products in compliance with manufacturer's gap tolerance between cavity substrate surfaces.
 1. Products: Provide one of the following:
 - a. Mortar Net; Mortar Net USA, Ltd.
 - b. Mortar Trap, Hohmann & Barnard, Inc.
 2. Full height cavity drainage material for use in insulated cavity walls is acceptable. Provide full height cavity drainage material in all non-insulated veneer masonry walls with minimal cavity space such as site walls.
 - a. CavClear Masonry Mat; CavClear, a Division of Archovations, inc.
- H. Cavity Weep: Free-draining. Color as selected by Architect, from full range of standard and special colors. Provide one of the following:
 1. Mortar Net Weep Vents, Mortar Net USA, Ltd.
 2. Mortar Trap, Hohmann & Barnard, Inc.
 - a. Height of weep shall match height of the specified masonry veneer (up to 4-inches nominal) as indicated in Products. Use the 4-inch nominal height weep at 8-inches or higher masonry veneer units.
 - b. Color as selected to match associated mortar.
 - c. Made from polyester mesh.
 3. Hohmann & Barnard, Inc., QV-Quadro-Vent
 - a. Polypropylene tested in conformance with ASTM D2240, D790B, D638 and D1238B.
 - b. Honeycomb design.
 - c. Color as selected to match associated mortar.
 - d. Size according to associated masonry veneer units.
- I. Cavity Vent: Free-draining. Color as selected by Architect from full range of standard and special colors. Provide one of the following:
 1. Mortar Net Weep Vents, Mortar Net USA, Ltd.
 2. Mortar Trap Weep Vents, Hohmann & Barnard, Inc.

- a. Height of weep shall match height of the specified masonry veneer (up to 4 inches nominal) as indicated in Products. Use the 4-inch nominal height weep at 8-inches or higher masonry veneer units.
 - b. Color as selected by Architect to match associated mortar.
 - c. Made from polyester mesh.
- 3. Hohmann & Barnard, Inc., QV-Quadro-Vent
 - a. Polypropylene tested in conformance with ASTM D2240, D790B, D638 and D1238B.
 - b. Honeycomb design.
 - c. Color as selected to match associated mortar.
 - d. Size according to associated masonry veneer units.
- J. Stud Wall Cavity Wall Flashing Termination Bar: 304 stainless steel 1-inch x 1/8-inch x 8-foot long bar with foam-tite seal, bar punched to accept fasteners at 8 inches o.c., secure into each stud. Hohmann & Barnard, Inc. termination bar T2 with FTS Foam-Tite Seal, or equal product.
- K. Cavity Air Barrier (Installed over C.M.U. above exterior grade): Continuous, single component, asphalt free, fluid applied, vapor permeable self-sealing elastomeric air barrier membrane that permits moisture vapor to escape through the membrane while remaining resistant to water and air penetration per ASTM E2178, ASTM E96 and ASTM E2357. Apply over C.M.U. at 60 square foot (25 mils wet) per gallon. Must be compatible with contacted surfaces and materials including cavity insulation.
 - 1. Basis of Design Product: Enviro-Barrier VP™, Sandell Moisture Protection Systems; Hohmann & Barnard, Inc. Subject to compliance with specified requirements, the following products are also acceptable.
 - a. Air Bloc 31MR – Manufactured by Henry Company
 - b. Perm-A-Barrier VP – Manufactured by WR Grace
 - c. Fire Resist Barritech VP – Manufactured by Carlisle Coatings & Waterproofing
- L. Vapor Retarder (Installed over C.M.U. below exterior grade, at interior floor slab elevation changes, and where noted or detailed): Continuous, fluid applied, asphalt based non-fibered emulsion-type damp proofing which permits moisture vapor to escape through the membrane while remaining resistant to water and air penetration per ASTM D1187, ASTM D1227, E2178, ASTM E96, and ASTM E2357. Must be compatible with contacted surfaces and materials including cavity insulation.
 - 1. Products: Subject to compliance with specified requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Karnak, 100AF Non-filtered Emulsion Dampproofing, Karnak Corporation
 - b. Sealmastic, Non-fibered Emulsion Dampproofing, W.R. Meadow
- M. Cavity Air Barrier (Installed over gypsum sheathing): Continuous, single component, asphalt free, fluid applied, vapor permeable self-sealing elastomeric air barrier membrane that permits moisture vapor to escape through the membrane while remaining resistant to water and air penetration per ASTM E2178, ASTM E96 and ASTM E2357. Apply over exterior gypsum

sheathing at 75 square foot (20 mils wet) per gallon. Must be compatible with contacted surfaces and materials including cavity insulation.

1. Basis of Design Product: Enviro-Barrier VP™, Sandell Moisture Protection Systems; Hohmann & Barnard, Inc. Subject to compliance with specified requirements, the following products are also acceptable.
 - a. Air Bloc 31MR – Manufactured by Henry Company
 - b. Perm-A-Barrier VP – Manufactured by WR Grace
 - c. Fire Resist Barritech VP – Manufactured by Carlisle Coatings & Waterproofing
- N. Cavity Air Barrier Accessories (Installed with C.M.U. and gypsum sheathing): For use in detailing transitions between dissimilar materials, cracks and voids, window and door openings, etc.
 1. Products: Basis of Design products by Hohmann & Barnard include the following:
 - a. Enviro-Barrier™ Mastic, gun grade mastic; Sandell Moisture Protection Systems by Hohmann & Barnard, Inc.
 - b. Stretch-X-Seal Membrane, a flexible self-sealing adhesive backed with release liner, transition membrane flashing and sill tape; Sandell Moisture Protection Systems, by Hohmann & Barnard, Inc.
 - c. Spray-Tape™, a water based single component self-sealing spray or brush applied detail flashing for air barriers applied at 100 square foot (60 mils wet) per gallon, a minimum of 3-inches around the opening and a minimum of 3-inches into the opening; Sandell Moisture Protection Systems, by Hohmann & Barnard, Inc.
 2. Subject to compliance with specified requirements, equal products by the following manufacturers are also acceptable.
 - a. Accessories manufactured by Henry Company
 - b. Accessories manufactured by WR Grace
 - c. Accessories manufactured by Carlisle Coatings & Waterproofing
- O. Cavity Insulation (Installed over C.M.U.): Square edge extruded polystyrene insulation board, 16-inches x 96-inches, complying with ASTM C578, Type IV with a compressive strength of 25 psi. Install with manufacturer's standard board joint sealing system.
 1. Products: Provide one of the following:
 - a. Foamular 250, Owens-Corning Co.
 - b. Cavitymate or Scoreboard, Dow Chemical Co.
- P. Cavity Insulation (Installed over gypsum sheathing): Shiplap or tongue and groove edged extruded-polystyrene board, 48-inches x 96-inches, complying with ASTM C578, Type IV with a compressive strength 25 psi. Install with manufacturer's standard board joint sealing system.
 1. Products: Provide one of the following:
 - a. Foamular 250, Owens-Corning Co.

b. Cavitymate SC, Dow Chemical Co.

Q. Insulation Inserts (Installed in cores of C.M.U. for single wythe masonry installations): Individually molded, expanded polystyrene inserts with a minimum density of 1.3 lbs./c.f., a thermal resistance of 5.0 per inch of thickness at 75 degrees, and complying with ASTM C578 Standard Type X. Insert into each C.M.U. core.

1. ICON Universal Inserts, as produced by Concrete Block Insulating Systems, Inc. or equal product.

R. Gypsum Sheathing: The below specified exterior gypsum sheathing for wall cavity assemblies takes precedence over any Division 6 specified products. Gypsum sheathing complying with ASTM C1177 and ASTM E84 with glass mats both sides and long edges, water-resistant treated core.

1. Dens-Glass Gold Sheathing, Georgia-Pacific.

2.13 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and 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. Follow brick manufacturer's recommendations for cleaning solution for each brick type.

1. Available Products: Subject to compliance with specified requirements, products that may be used to clean unit masonry surfaces include, but are not limited to, the following:

a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar and Not Subject to Bleaching:

- 1) 202 New Masonry Detergent; Diedrich Technologies, Inc.
- 2) Sure Klean No. 600 Detergent; 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.

2.14 MORTAR AND GROUT MIXES

- A. General: Do not use calcium chloride. The use of admixtures shall not be considered unless their suitability is reviewed and approved by Architect and demonstrated by laboratory test results simulating the conditions that warrant the desired use of the admixture.
- 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 C270, Proportion Specification.
 - 1. Limit cementitious materials in mortar to portland cement and hydrated lime.
 - 2. For masonry below grade, foundation walls, retaining walls in contact with earth, and where indicated, use Type M or Type S mortar, 1 part portland cement, 1/4 part Type S hydrated lime and 3-3/4 parts sand, with a minimum 28-day compressive strength of 2500 psi.
 - 3. For above grade exterior brick and non-load bearing partitions use Type N mortar, 1 part portland cement, 1 part hydrated lime Type S and 6 parts sand.
 - 4. For exterior above grade and load bearing clay brick and manufactured stone use Type S mortar.
 - 5. For interior and exterior tuck pointing, use Type N mortar. For restoration work Contractor is required to review the properties of the existing masonry and submit the appropriate type mortar for approval.
 - 6. For new brick veneer above grade use Type N mortar.
 - 7. For natural stone masonry use Type M mortar.
- D. Pigmented Mortar: Select and proportion pigments with other ingredients to produce color required. Limit pigments to the following percentages of cement content by weight:
 - 1. For mineral-oxide pigments and portland cement-lime mortar, not more than 10 percent.
 - 2. For carbon-black pigment and portland cement-lime mortar, not more than 2 percent.
 - 3. For mineral-oxide pigments and mortar cement mortar, not more than 5 percent.
 - 4. For carbon-black pigment and mortar cement mortar, not more than 1 percent.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates combined with selected cementitious materials.
 - 1. Mix to match Architect's sample.
- F. Grout for Unit Masonry:
 - 1. Use either pea gravel cement concrete or grout conforming with ASTM C476 with a minimum 28-day compressive strength of 3000 psi.
 - 2. Provide grout with a slump of 8 to 11-inches as measured according to ASTM C143.

2.15 SOURCE QUALITY CONTROL

- A. Brick Tests: For each type and grade of brick indicated, meet the requirements in the "Brick" Paragraph of this Section. Units will be tested according to ASTM C67.

- B. Concrete Masonry Unit Tests: For each type of concrete masonry unit indicated, meet the requirements in the “Concrete Masonry Units” Paragraph of this Section. Units will be tested according to ASTM C140.

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

3.2 INSTALLATION, GENERAL

- A. Unit Masonry Assemblies shall be installed in accordance with Contract Documents, most recent technical standards published by the International Masonry Institute, the National Concrete Masonry Association, the Brick Industry Association and the product manufacturer’s printed recommendations.
- B. 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.
- C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- E. 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.
- F. 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.

- G. Wetting of Clay Brick: Wet clay brick 3 to 24 hours before laying if the initial rate of absorption exceeds 20 g/30 sq. in. per minute when tested per ASTM C67. Allow units to absorb water so they are damp but not wet at the time of laying.
- H. **NO CONDUIT OR PIPE SHALL BE INSTALLED VERTICALLY OR HORIZONTALLY IN THE CAVITY.** Penetrations through the cavity are permitted for items such as wall hydrants, electrical fixtures and devices, etc. but they shall be horizontal, perpendicular through cavity, and located directly at the intended item.
- I. Install air barrier systems per manufacturer's printed instructions.
- J. Install insulation board systems per manufacturer's printed instructions.
- K. In lieu of field-formed flashing corners and end dams, preformed stainless steel corners and end dams may be used at Contractor's option. All products shall be compatible with the flashing system and shall be installed per the manufacturer's recommended printed instructions in addition to the sealing requirements described in the specification.
- L. Install insulation per manufacturer's printed instructions.
- M. Install single wythe masonry flashing per manufacturer's printed instructions.

3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances specified in ACI 530.1/ASCE 6/TMS 602 and 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 1/4-inch in 20 feet, nor 1/2-inch maximum.
 - 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4-inch in 10 feet, nor 1/2-inch maximum.
 - 3. For conspicuous horizontal lines such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4-inch in 20 feet, nor 1/2-inch maximum.
 - 4. For exposed bed joints, do not vary from thickness indicated by more than 1/8-inch with a maximum thickness limited to 1/2-inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8-inch.
 - 5. For exposed head joints, do not vary from thickness indicated by more than 1/8-inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8-inch.

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: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joints in each course centered on units in courses above and below.
 - a. One-half running bond pattern applies to all standard and painted CMU, to decorative CMU installations, and to modular brick infills where matching adjacent existing patterns.
 - 2. One-third running bond with vertical joints in each third course aligning vertically.
 - a. One-third running bond pattern applies to all utility sized brick installations.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: 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.
- E. 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.
- F. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- G. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Entire courses and/or individual units of irregular surface faced masonry (i.e., split face masonry units) shall be turned smooth side out in locations as directed by Architect during Preinstallation Conference.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof deck above, unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of deck above.
 - 2. At fire-rated partitions, install firestopping in joint between top of partition and underside of deck above to comply with Division 7 Section "Through Penetration Firedrop Systems."

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. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
- B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and compress into place. Do not deeply furrow bed joints or slush head joints.
1. At cavity walls, bevel beds away from cavity to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- C. Set stone trim units in full bed of mortar with vertical joints slushed full. Fill dowel, anchor, and similar holes solid. Wet stone-joint surface thoroughly before setting; for soiled stone surfaces, clean bedding and exposed surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
- D. Site Wall Copings (including cast stone and concrete): Set copings on canted stainless-steel flashing (drip plate flashing) with continuous hemmed drip edge at all faces of wall (length and ends). Install drip plate flashing on sloped mortar bed. Seal laps between lengths of drip plate flashing with lap sealant overlapped a minimum of 4-inches. Secure copings to wall with a kerfed split tail anchor mechanically attached to top of the wall. Set anchors on a membrane patch and fill anchor kerfs between coping pieces with sealant. Shim copings as required for level and alignment. Tool a 3/8-inch sealant joint between coping and the top of drip plate flashing below providing for weeps every 4-feet. Seal all skyward facing and vertical joints in coping material with joint sealant.
- E. Sill Units (including cast stone, concrete and masonry): Tool skyward facing and vertical joints to a point 3/8-inches below the top face of the sill material. Apply a continuous sealant bead in the tooled joints. Sealant to match mortar color. At brick sills tool exposed joints to match adjacent joints. Tool joints between weeps.
- F. Unless otherwise indicated, tool exposed joints slightly concave when thumbprint hard using a jointer larger than the joint thickness.
- G. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with grout at exterior walls, except cavity walls, and solidly with mortar at interior walls and partitions.
- 3.6 BONDING OF MULTI-WYTHE 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.

3.7 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints of back-up wall wythes facing cavities flush.
- B. Installing Cavity-Wall Insulation: Apply rectangular grid adhesive on inside face of insulation boards. 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. Seal or tape all insulation board joints, crack and gaps, piping and conduit penetrations with materials compatible with insulation and masonry.
 2. All insulation board joints and penetrations shall be sealed with manufacturers standard joint sealant systems to meet the air barrier requirements of ASTM E2357 Assembly test and the International Code Council (ICC-ES) Evaluation Report ESR-2142.
- C. Wall Assembly for ASTM C578 polystyrene foam plastic insulation board shall meet the requirements of NFPA 285 Wall Assembly.

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 on exterior side of walls and 1/2-inch elsewhere. Lap reinforcement a minimum of 6-inches.
1. Space reinforcement not more than 16-inches o.c.
 2. Space reinforcement not more than 8-inches o.c. at foundation walls and parapet walls.
 - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- D. At all flashing locations, reinforcement shall not interrupt the flashing.

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. Anchor masonry to structural members with flexible channel slot anchors embedded in masonry joints and attached to the structure. Provide a 1-inch space in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 - 2. Space anchors at the location of the slotted channel anchor assembly on the structural member.

3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated, or if not indicated, in accordance with acceptable best practice procedures. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry as detailed on Drawings or by one of the following approved methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of concrete masonry units on one side of control joint. Fill resultant core with grout and rake joints in exposed faces. **Maximum distance between C.M.U. control joints shall not exceed distances as indicated on Structural Drawings.**
 - 2. Install preformed control-joint gaskets designed to fit sash block.
 - 3. **Submit for approval a method as recommended by recent technical standards published by Industry standards as noted in Section 3.2.A above.**
- C. Form building expansion joints in exterior masonry veneer as follows:
 - 1. Form open joint of width indicated; install compressible exterior expansion joint filler as per manufacturers' recommendations. Keep joint free and clear of mortar. Install at locations indicated on Drawings.
- D. Build in pressure-relieving expansion joints where indicated; construct joints by installing compressible expansion material.

3.11 LINTELS

- A. Install lintels where indicated.
- B. Provide lintels at all masonry wall openings greater than 12 inches wide. Refer to Structural drawings and Lintel Schedule.

3.12 FLASHING, WEEPS, AND VENTS

- A. General: Install continuous embedded flashing and weeps in masonry at shelf angles, lintels, sills, 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. Adhere all flashing to steel angles.
- C. Install flashing as follows:
 - 1a. At thru-wall base flashing conditions and masonry relieving angles at composite masonry walls, including cavity walls, adhere a metal drip plate to the bedding joint of the outer wythe of masonry with elastomeric sealant or manufacturer's approved bonding tape creating a 1/4-inch drip flange. Seal laps between lengths of the metal drip plate with lap sealant overlapped a minimum of 4-inches. Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the outer wythe of masonry (on top of the metal drip plate), back to the outer face of the inner wythe of masonry. Turn membrane flashing up a minimum of 16-inches behind the insulation, over the specified air barrier system, and extend into the inner wythe of masonry 1-1/2-inches. Seal laps between lengths of flashing with lap sealant overlapped a minimum of 4-inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe of masonry. At masonry relieving angle conditions, install backer rod and sealant under the metal drip plate. Install transition membranes as required at all corners, obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.
 - 1b. At thru-wall base flashing conditions and masonry relieving angles at metal stud/masonry veneer walls, adhere a metal drip plate to the bedding joint of the veneer masonry with elastomeric sealant or manufacturer's approved bonding tape creating a 1/4-inch drip flange. Seal laps between lengths of the metal drip plate with lap sealant overlapped a minimum of 4-inches. Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the veneer masonry (on top of the metal drip plate), back to the face of the sheathing. Turn membrane flashing up a minimum of 16-inches behind the insulation, over the specified air barrier system and secure with a metal termination bar and continuous elastomeric sealant. Secure the termination bar into each metal stud. Seal the membrane flashing to the air barrier with the membrane manufacturer's compatible flashing tape. Seal laps between lengths of flashing with lap sealant overlapped a minimum of 4-inches. Provide positive drainage to weeps where bottom of flashing turns out to the veneer masonry. At masonry relieving angle conditions, install backer rod and sealant under the metal drip plate. Install transition membranes as required at all corners, obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.
 - 1c. At masonry opening sill flashing conditions (i.e. windows, etc.), adhere a metal drip plate to the bedding joint of the veneer masonry below the sill with elastomeric sealant or manufacturer's approved bonding tape creating a 1/4-inch drip flange. Seal laps between lengths of the metal drip plate (if any) with lap sealant overlapped a minimum of 4-inches. Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the veneer masonry (on top of the metal drip plate), turned up vertically then continuing horizontally below the window frame sill to meet the angle flashing stop. Flashing shall extend vertically in joint between window frame and vertical leg of angle

flashing stop, terminating just below the top edge. Flashing shall be concealed below joint sealant. Seal laps between lengths of flashing (if and) with lap sealant overlapped a minimum of 4-inches. Extend flashing at sill ends and turn up not less than 2-inches to form a pan. Install air barrier behind the flashing. Provide positive drainage to weeps where bottom of flashing turns out to veneer masonry. At precast sills install weep material horizontally on top of the metal drip plate at 16-inches o.c. At brick sills install sill weeps vertically at 16 inches o.c. Center the weeps upon the length of the sill and tool the joints. At sill blocking provide Hohmann & Barnard, Inc. #345 SV and at jamb blocking provide Hohmann & Barnard, Inc. #345-BT veneer anchors as indicated on Drawings. Space and secure anchors horizontally and vertically at 16 inches o.c. Install transition membranes as required at all jambs and sills and at any obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.

2. At lintels and shelf angles, adhere a metal drip plate with elastomeric sealant or manufacturer's approved bonding tape creating a 1/4-inch drip flange. Seal laps between lengths of the metal drip plate (if any) with lap sealant overlapped a minimum of 4-inches. Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the outer wythe of masonry (on top of the metal drip plate), back to the outer face of the inner wythe of masonry. Turn membrane flashing up a minimum of 16-inches behind the insulation, over the specified air barrier system, and extend into the inner wythe of masonry 1-1/2-inches. Extend EPDM flashing a minimum of 4-inches into the masonry at each end or to cover the full length of the lintel, whichever is greater. At heads and sills, extend flashing at ends and turn flashing up not less than 2-inches to form a pan. Seal laps between lengths of membrane flashing with lap sealant overlapped a minimum of 4-inches. Provide positive drainage to weeps where bottom of flashing turns out to outer wythe of masonry. At masonry relieving angle conditions, install backer rod and sealant under the metal drip plate. Install transition membranes as required at all corners, obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.
- 3a. At low roof to high wall conditions at composite masonry walls, including cavity walls, adhere a two-piece interlocking type, 26-gauge stainless-steel sheet flashing to the bedding joint of the outer wythe of masonry with elastomeric sealant or manufacturer's approved bonding tape. The interlocking sheet flashing shall extend through the outer wythe of masonry. Seal laps between lengths of the metal sheet flashing with lap sealant overlapped a minimum of 6-inches. Turn the embedded metal sheet flashing up a minimum of 2-inches flush with the inner wythe of masonry to form a pan (behind the insulation). Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the outer wythe of masonry (on top of the metal sheet flashing), back to the outer face of the inner wythe of masonry. Turn membrane flashing up a minimum of 16-inches behind the insulation, over the specified air barrier system, and extend into the inner wythe of masonry 1-1/2-inches. Seal laps between lengths of flashing with lap sealant overlapped a minimum of 4-inches. Seal lap between stainless steel flashing and membrane flashing with elastomeric sealant. Install interlocking piece of flashing over roof termination as indicated on Drawings. Install transition membranes as required at all corners, obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.
- 3b. At low roof to high wall conditions at metal stud/masonry veneer walls, adhere a two-piece interlocking type, 26-gauge stainless-steel sheet flashing to the bedding joint of the veneer masonry with elastomeric sealant or manufacturer's approved bonding tape. The

interlocking sheet flashing shall extend through the outer face of the veneer masonry. Seal laps between lengths of the metal sheet flashing with lap sealant overlapped a minimum of 6-inches. Turn the embedded metal sheet flashing up a minimum of 2-inches flush with the sheathing to form a pan (behind the insulation). Extend EPDM (or other specified membrane) flashing from a point 1-inch in from the exterior face of the outer wythe of masonry (on top of the metal sheet flashing), back to the sheathing. Turn membrane flashing up a minimum of 16-inches behind the insulation, over the specified air barrier system and secure with a metal termination bar and continuous elastomeric sealant. Secure the termination bar into each metal stud. Seal the membrane flashing to the air barrier with the membrane manufacturer's compatible flashing tape. Seal laps between lengths of flashing with lap sealant overlapped a minimum of 4-inches. Seal the lap between stainless steel flashing and EPDM flashing with elastomeric sealant. Install interlocking piece of flashing over roof termination as indicated on Drawings. Install transition membranes as required at all corners, obstructions and other interferences in the cavity to assure a continuous and watertight flashing system.

- D. Install cavity weeps, cavity vents, sill sweeps and cavity drainage material in the head joints in exterior wythes of masonry as indicated on Drawings and as follows:
 - 1. Space cavity weeps at minimum 24-inches o.c., 16-inches o.c. at 16-inches long masonry units.
 - 2. Space cavity vents at minimum 48-inches o.c.
 - 3. Install continuous sill weep material horizontally on top of flashing.
 - 4. Place continuous cavity drainage material immediately above flashing in cavities.
 - 5. Test weep with water poured into cavity to insure draining water freely comes out of each weep hole.
- E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.13 AIR BARRIER SYSTEM

- A. Composite Masonry Walls and Cavity Walls: Apply cavity air barrier system on the entire exterior face of the inner wythe of masonry (behind the insulation board) to form a monolithic membrane on the cavity wall. Air barrier accessories and transition membranes shall be installed as detailed and/or required by system manufacturer over all dissimilar material transitions such as wood blocking, structural framing, cracks and voids, door and window openings and any other construction element that will prevent a continuous monolithic membrane. Follow manufacturers recommended installation procedures. System shall meet the requirements of the International Energy Conservation Code (IECC) ASTM E2357 Air Assembly Test.
- B. Metal Stud Masonry Veneer Walls: Apply cavity air barrier system on the entire exterior face of the metal stud wall sheathing (behind the insulation board). Air-barrier accessories and transition membranes shall be installed as detailed and/or required by system manufacturer over all dissimilar material transitions such as wood blocking, structural framing, cracks and voids, door and window openings and any other construction element that will prevent a continuous monolithic membrane. Follow manufacturers recommended installation

procedures. System shall meet the requirements of the International Energy Conservation Code (IECC) ASTM E2357 Air Assembly Test.

3.14 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make the formwork 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 of ACI 530.1/ASCE 6/TMS 602.
- C. 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. Contractor shall engage a qualified independent testing agency to perform field quality-control testing indicated below.
- B. Testing Frequency: Tests and Evaluations listed in this Article shall be performed during construction for each 35,000 bricks or 5,700 concrete masonry units Testing requirements for mortar and grout may be deleted if prism testing is retained.
- C. Mortar properties shall be tested per ASTM C780.
- D. Grout shall be sampled and tested for compressive strength per ASTM C1019.
- E. Prism-Test Method: For each type of structural masonry wall construction indicated, masonry prisms shall be tested per ASTM C1314, and as follows:
 - 1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
- F. Test weeps. Allow masonry 12-hours setting time before test. Test to be done in 10' lengths of cavity.

3.16 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 non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
 - 5. Clean brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-mixed detergent solution.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.

3.17 MASONRY WASTE DISPOSAL

- A. Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042000