

## SECTION 04 26 13 - MASONRY VENEER

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes masonry veneer assemblies:

1. Concrete masonry units (CMU-1 and CMU-2).
2. Mortar materials.
3. Ties and anchors.
4. Embedded flashing.
5. Accessories.
6. Mortar mixes.

B. Products Installed but not Furnished under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angle system for supporting masonry veneer.

C. Products Installed but not Furnished under This Section, subject to Architect approval:

1. Flexible flashings.
2. Sheet metal flashing.

D. Related Requirements:

1. Section 04 22 00 "Concrete Unit Masonry" for site CMU assemblies.
2. Section 05 12 00 "Structural Steel Framing" for structural steel frame elements supports shelf angle assemblies.
3. Section 05 40 00 "Cold-Formed Metal Framing" for framing backup for ties.
4. Section 05 50 00 "Metal Fabrications" for loose lintels installed under work of this Section.
5. Section 07 05 43 "Cladding Support Systems" for shelf angle systems installed under work of this Section.
6. Section 07 19 00 "Water Repellents" for water repellents applied to unit masonry assemblies.
7. Section 07 21 00 "Thermal Insulation" for board insulation installed with masonry ties.
8. Section 07 54 23 "TPO Roofing" for interfaces with shelf support and roof flashing assemblies.
9. Section 07 62 00 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing flashing and reglets installed in masonry joints.
10. Section 07 92 00 "Joint Sealant" for sealant materials including sand.

#### 1.2 COORDINATION

- A. Coordinate orientation and location of stud framing for ties at ends of walls and around openings.
- B. Coordinate locations of supports required for shelf angles furnished in other Sections.

- C. Coordinate items installed prior to masonry, for locating elements based on coursing and masonry jointing where indicated to be symmetrical about masonry joints.
- D. Coordinate anchoring for masonry where masonry is to support other work, including but not limited to hung casework.
  - 1. Coordinate use of additional blocking, shelf angles and loose lintels where omitting masonry assemblies behind supported items. Confirm extents with Architect prior to installation of masonry.

### 1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
  - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
  - 3. Show location and integration of related work in masonry veneer assemblies of ties and reinforcing, flashing assemblies.
  - 4. Show loose lintels and shelf angle assemblies in Section 05 50 00 "Metal Fabrication". Include joints, splices and connections to supports.
  - 5. Show areas of masonry supporting other work.
    - a. Confirm areas of masonry may be omitted. Adjust contract according to Section 01 20 00 "Price and Payment Procedures" where masonry is reduced.
- C. Samples for Initial Selection: Manufacturer's full range or range selected by Architect, for each type and color available for the following:
  - 1. Weep/cavity vents.
- D. Samples for Verification: For each type and color of the following:
  - 1. Decorative CMUs.
    - 4-a. Include custom cut and ground units to match factory faces.
  - 2. Colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
  - 3. Cavity drainage material.
  - 4. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. 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. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include data on material properties.
  - 2. Integral water repellent used in decorative CMUs.
  - 3. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 4. Mortar admixtures.
  - 5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 6. Anchors, ties, and metal accessories.
- C. Qualification Statements: For installer and testing agency.
  - 1. Installers: Include five project examples having similar size and masonry design. List project name, architect, locations, general contractor, and materials list.
- D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer Qualifications: An experienced mason, with not less than five consecutive years' experience, specializing in installing masonry veneer and shelf angle systems similar in design and extent to that indicated and required for this Project and whose work has resulted in construction with a record of successful in-service performance.
  - 2. Testing Agency: Qualified in accordance with ASTM C1093 for testing indicated.

1.8 MOCKUPS

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 36 inches long by 36 inches high by full thickness.
    - a. Include one vertical joint located mid-span, half with sanded sealant joint and remaining half mortar filled.
  2. Build sample panels facing south.
  3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
  4. Protect approved sample panels from the elements with weather-resistant membrane.
  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. 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.
- B. Wall Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution ~~and~~.
1. Build mockups as indicated on Drawings, with a minimum of a typical exterior and interior wall in sizes no less than 60 inches long by full height.
    - a. Include accessories.
    - b. Include an installed sanded sealant control joint at corner.
    - c. Include one glazing opening with special jamb shapes on one edge and the other end of mockup open showing integration of flashing, insulation and ties with reinforcement.
    - d. Include through-wall flashings in exposed end of mockup, including mortar control, weep vents and ties exposed, installed in offset to review each of assembly. Extend each cavity material layer 12 inches from end of masonry, and extending 12 inches from each other for 12-inch face exposure of each layer for review; from masonry edge, extend mortar control 12-inches, insulation 24-inches, through-wall flashing 36-inches, air barrier at 48-inches.
      - 1) Show a top edge of insulation exposed to review tie installation.
    - e. At interior, include loose lintel and opening for other work.
  2. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
  3. Protect accepted mockups from the elements with weather-resistant membrane.
  4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.9 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. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

#### 1.10 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of veneer, 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 face of veneer, and hold cover securely in place.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with 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.
- C. 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 TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.
- E. Field Measurements: Taken prior to fabrication of steel supports, flashings and wall layout for masonry veneer fitting with other construction. Verify dimensions on shop drawings. Note discrepancies affecting the work.
  - 1. Locate existing framed wall openings relative to masonry coursing and terminations.
  - 2. Locate concrete base elevations and faces of concrete finishes; steel supports for shelf angle assemblies and expansion joints.
  - 3. Locate steel supports for shelf angle assemblies.
- F. Established Dimensions, Field Layout: Prior to laying masonry, establish work points in Drawings relative to work in place, to openings, corners and elevations.

1. Determine allowances required for fitting masonry units between work points, to determine joint sizes using actual units.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain exposed masonry units cementitious mortar components mortar aggregate from single producer or manufacturer for each type.
- B. For exposed masonry units cementitious mortar components, obtain each color and grade from single source with resources to provide materials of consistent quality in appearance and physical properties.

### 2.2 MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects will be exposed in the completed Work.
- C. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.
  1. For ends of sills and caps and for similar applications that would otherwise expose unfinished masonry surfaces, provide units without cores or frogs and with exposed surfaces finished.
  2. Provide special shapes indicated and for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
    - a. Visible sawed faces are not permitted unless shown on Drawings and approved in Sample Submittals.
  3. Solid units where lipped and custom sizes with ground faces to match.

### 2.3 MASONRY VENEER

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
    - a. L-shape for corners with return finished and nominal 8-inches long face.
    - b. Lipped at shelf angles and loose lintels.
    - c. As indicated.

- B. Integral Water Repellent: Liquid polymeric, water repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, will show no visible water or leaks on the back of test specimen.
  - 1. Product: Masonry manufacturer's standard.
- C. Decorative CMUs: ASTM C90, medium weight.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the following:
    - a. Mutual Materials, Inc., CMU.
    - b. Pattern and Texture: Standard pattern, ground-face finish, at all exposed faces.
    - c. Color: "Driftwood".
  - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
    - a. Custom size; nominal face of 4 inches by 16 inches long, 4-inch-depth; actual 3-5/8-inches by 15-3/8-inches long, 3-5/8-inches deep.
      - 1) Corner L-Shape Units, Returns: Nominal 8 inches, actual 7-5/8 inches.

## 2.4 MORTAR MATERIALS

- A. Hydrated Lime: ASTM C207, Type S.
- B. Mortar Cement: ASTM C1329/C1329M.
- C. Preblended Dry Mortar Mix: Packaged blend made from mortar cement, sand, mortar pigments, and admixtures and complying with ASTM C1714/C1714M.
- D. Aggregate for Mortar: ASTM C144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Colored Cement Products: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Colored Masonry Cement: Match masonry color, as determined by Architect.
  - 2. Formulate blend as required to produce color indicated.
  - 3. Pigments ~~do~~shall not exceed 10 percent of portland cement by weight.
  - 4. Pigments ~~do~~shall not exceed 5 percent of mortar cement by weight.

- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in mortar of composition indicated.
- H. Water: Potable.

## 2.5 TIES AND ANCHORS

- A. General: Ties and anchors extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
  - 1. Mill-Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A641/A641M, Class 1 coating.
    - a. Acceptable for use at interior only.
  - 2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A1064/A1064M, with ASTM A153/A153M, Class B-2 coating.
  - 3. Stainless Steel Wire: ASTM A580/A580M, Type 304.
  - 4. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
  - 5. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- C. Corrugated-Metal Ties: Seismic type. Limited use.
  - 1. Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.0635-inch- thick, steel sheet, galvanized after fabrication 0.0625-inch- thick, stainless steel sheet.
    - a. Material:
      - 1) Stainless steel. For exterior CMU-1, at fully grouted masonry with connection to concrete foundations.
      - 2) Galvanized. For interior CMU-2 at non-load bearing walls only.
    - b. Products:
      - 1) Wire-Bond 2522 Seismic Veneer Anchor.
      - 2) Hohmann and Barnard, 345.
      - 3) Heckmann Building Products, 360 L-Type.
      - 4) or equal.
    - c. Screw anchors to match tie material and finish. See "adjustable masonry-veneer anchors" for type at exterior.
- D. Adjustable Masonry-Veneer Anchors: Seismic type, thermally broken at CMU-1 exterior and non-thermally broken CMU-2~~CMU-1~~ interior load bearing walls.
  - 1. General: Provide anchors that allow vertical adjustment but resist a 100 lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.



2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0785-inch-thick steel sheet, stainless steel.
3. Fabricate wire ties from 0.187-inch- diameter wire, unless otherwise indicated.
4. Masonry-Veneer Anchors; Double-Pintle Plate: Rib-stiffened, stainless steel sheet metal anchor section with screw holes at top and bottom, projecting horizontal leg with slots for vertical legs of double pintle wire tie. Provide pintle wire tie, wire clip, and continuous wire in veneer. No portion of tie, other than screw anchors, shall penetrate air barrier and sheathing.
  - a. Anchor and pintle to be same base metal unless a plastic-coated pintle is provided for dissimilar metals. Wire reinforcing to be same as pintle; ~~unless with plastic clip is provided~~ for thermal break at pintle and mounting, and for separation of dissimilar metals.
  - b. Products for CMU-1 Exterior:
    - 1) Basis-of-Design: Hohmann and Barnard, THERMAL BH-213 or approved equal.
  - b.c. Products for CMU-2 Interior:
    - 1) Wire-Bond, 2401 RJ-711.
    - 2) Hohmann and Barnard, BH-213.
    - 3) Heckmann Building Products, 213-H.
5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 12 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 1,000 hours in accordance with ASTM B117.
  - a. No. 10 without sealing washer is acceptable for interior.
6. Stainless Steel Screw for Concrete: Type 410 stainless steel anchors for concrete, with nominal 1/4-inch diameter and 1-1/2-inches embedment.
  - a. Product: Simpson Strong Tie, Titen Stainless-Steel Concrete and Masonry Screw TTN25214HSS.

## 2.6 EMBEDDED FLASHING

- A. Flexible Flashing: See Section 07 27 00 "Air Barriers."
- B. Drainage Plane Flashing: Stainless steel, in Section 07 62 00 "Sheet Metal Flashing and Trim."
  1. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
  1. Elastomeric Sealant:
    - a. Silicone for prefinished aluminum and steel.
    - b. Butyl for stainless steel.

- D. 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.
- E. Termination Bars for Flexible Flashing, Flanged: Where flashings are not integrated into air barrier due to sequence. Architect to approve prior to installation of air barrier.
  - 1. Aluminum or stainless steel, 1-1/2 inches tall with a 3/8-inch flange at top. type recommended by manufacturer for spanning between 16-inches o.c. fastener spacing.
    - a. Top of Termination Bars: WRB penetration silicone sealant in Section 07 27 00 "Air Barriers".

## 2.7 ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Weep/Vent Products:
  - 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. Manufacturers: Subject to compliance with requirements, provide products by the following :
      - 1) Advanced Building Products Inc.
      - 2) Hohmann & Barnard, Inc.
      - 3) Keene Building Products.
      - 4) Mortar Net Solutions.
      - 5) Wire-Bond.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Mortar Deflector: Strips, full depth of cavity and minimum 12 inches high, with dovetail-shaped notches that prevent clogging with mortar droppings.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Advanced Building Products Inc.
      - 2) Hohmann & Barnard, Inc.
      - 3) Keene Building Products.
      - 4) Mortar Net Solutions.
      - 5) Wire-Bond.
- D. Proprietary Acidic Masonry 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.

## 2.8 MORTAR 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 mortar cement mortar unless otherwise indicated.
  - 3. For exterior masonry, use mortar cement mortar.
  - 4. For reinforced masonry, use mortar cement mortar.
  - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. 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 C270, Property Specification. Use Type N unless another type is indicated.
  - 1. For masonry below grade or in contact with earth, use Type M.
  - 2. For masonry interior, use Type N or Type O.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
  - 1. Mix to match veneer face and finish color; acceptable to Architect.
  - 2. Application: Use colored-aggregate mortar for exposed mortar joints.

## 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 the Work.
  - 1. Use established dimensions in Part 1 "Field Conditions" Article. Verify, using actual masonry units and jointing sizes, the effect on work points and dimensions shown in the Construction Documents. Verify, horizontally and vertically, prior to installation of masonry and supports, including shelf angles, the locations of corners, openings, and elevations; locations of any built in work of other Sections. Note any required adjustments due to field conditions or other conditions.
  - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - 3. Locate and mark wall studs. At shear walls, continuous metal facing is not intended to support or provide backup to anchors.
  - 4. Confirm with Architect in writing any required deviations from Construction Documents for existing conditions that affect work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- B. Use full-size units without cutting. Cutting is permitted at locations where cut surfaces are concealed and items penetrating masonry. 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.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

### 3.3 SHELF ANGLES

- A. Install shelf angles where indicated and approved in Shop Drawings. Comply with Section 05 50 00 "Metal Fabrications."
  - 1. Set level to elevations required without variance plus or minus.
- B. Provide expansion space at expansion joints in masonry veneer and at butting ends of shelf angles.

### 3.4 TOLERANCES

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/4 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 1/4 inch and without change to end conditions abutting other Work, at openings.
  - 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 1/4 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 ft., 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 ft., 1/4 inch in 20 ft., or 1/4-inch maximum.
  - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/4-inch maximum.
  - 4. For conspicuous vertical lines, such as external corners, opening jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 15 ft., 3/16-inch maximum.
  - 5. For lines and surfaces, do not vary from straight by more than 1/8 inch in 10 ft., 1/4 inch in 20 ft., or 1/4-inch maximum.

6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/8 inch in 10 ft., or 1/4-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 1/16 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.

### 3.5 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. Orient cut ends to internal joints.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in stack bond; use L-shape where indicated, at corners and opening jambs.
- C. Stopping and Resuming Work: Stop work by stepping 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.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

### 3.6 MORTAR BEDDING AND JOINTING

- A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Lay CMUs with face shells fully bedded in mortar and with head joints of depth equal to bed joints. At starting course, fully bed entire units, including area under cells.
  1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.
- C. Fill solid cells with mortar where post-installed anchors are required for attachments of sheet metal flashing cleats and supports.
- D. Fill below grade cells and adjacent voids solid with grout or mortar.

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

### 3.7 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to backup supports, with seismic masonry-veneer anchors to comply with the following requirements:
  - 1. Set anchors in air-barrier sealant over butyl-backed flashing square.
  - 2. Do not blind screw anchors into backing. Tie screws shall be exposed during installation and concealed after installation by insulation.
  - 3. Place insulation tight to side and top edges of placed board insulation. Comply with Section 07 21 00 "Thermal Insulation."
  - 4. Fasten screw-attach anchors through sheathing to stud framing backup with bonded-washer-metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener. Wet seal top of screw anchors or top of tie plate with sealant where indicated on Drawings.
    - a. Where anchor screws do not penetrate backup framing, remove screw and anchor and place a second layer of butyl-backed flashing over hole.
  - 5. Embed tie sections connector sections and continuous wire in masonry joints.
  - 6. Locate anchor sections to allow maximum vertical differential movement of ties up and down, at exterior.
  - 7. Locate anchors so screw fasteners do not penetrate sheet metal flashing and trim.
  - 8. Space anchors as indicated, but not more than 18 inches o.c. vertically and 18 inches o.c. horizontally, with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of top and bottom of wall, openings, ends, corners and control-expansion joints, and at intervals not exceeding 12 inches around perimeter, with one anchor for each square foot of masonry.
    - a. At interior assemblies supporting casework or other hung items, add an additional tie at each casework support point. Coordinate locations with installer of supported item, with Section 06 40 00.
- B. Provide not less than 1 inch of airspace between back of masonry veneer and face of insulation.
  - 1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

### 3.8 ANCHORING MASONRY TO CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete to comply with the following:
  - 1. Anchor masonry with anchors embedded in masonry joints and attached to concrete.
  - 2. Space strap ties with concrete anchors as indicated, but not more than 12 inches o.c. vertically and 16 inches o.c. horizontally with one anchor for each 2 square feet of area.

### 3.9 EXPANSION JOINTS

- A. General: Install expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form expansion joints as follows:
  - 1. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch.
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### 3.10 LINTELS

- A. Install steel lintels where indicated.
- B. Provide offset angle supports where indicate and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are indicated 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, 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 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.
  - 2. Extend flashing through veneer, across airspace behind veneer, and with flexible flashing up face of sheathing at least 8 inches; with upper edge of sheet metal integrated into air barrier, lapping of flexible flashing on sheet metal at least 4 inches and to comply with specified air barrier integration requirements.
    - a. Post-Air Barrier: Where approved by Architect.
      - 1) Extend upper edge of flexible flashing a minimum 12 inches up sheathing and terminate with termination bar. Apply air-barrier sealant to leading edge.
  - 3. At lintels and shelf angles, extend flashing 6 inches minimum, to edge of next full unit at each end. At heads and sills, extend flashing 6 inches minimum, to edge of next full unit and turn ends up not less than 2 inches to form end dams.

4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
- C. Install other related construction where they are indicated to be built into masonry.
- D. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.
  1. Use specified weep/cavity vent products to form weep holes.
  2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
  3. Space weep holes 32 inches o.c. unless otherwise indicated.
- E. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.
- F. Install vents in head joints in exterior wythes at spacing indicated. Use open-head joints to form vents with vent material or stainless steel insect screen across back of open joints.
  1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.
  2. Space vent joints 32 inches o.c. unless otherwise indicated.

### 3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.
- B. Inspections: Special inspections in accordance with Level 2 in TMS 402.
  1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- C. Testing Prior to Construction: One set of tests.
- D. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- F. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

### 3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.



- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, 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: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
  - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

#### 3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION