



TABLE OF CONTENTS

DIVISION 04 — MASONRY

04000 — MASONRY

END OF SECTION



DIVISION 4

SECTION 04000 — MASONRY

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. This section contains the requirements for manufactured units of masonry and natural or cut stone, including masonry restoration and cleaning.
- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 REFERENCE STANDARDS

- A. The Brick Industry Association (BIA), 11490 Commerce Park Drive, Reston VA 20191, www.bia.org.
- B. National Concrete Masonry Association (NCMA) 13750 Sunrise Valley Drive, Herndon, VA 20171-4662, www.ncma.org
- C. Portland Cement Association (PCA), 5420 Old Orchard Road, Skokie, IL 60077, www.portcement.org.
- D. Cast Stone Institute, 813 Chestnut Street, Lebanon, PA 17042, www.caststone.org
- E. ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959, www.astm.org.
 - 1. ASTM C216 Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
 - 2. ASTM C652 Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
 - 3. ASTM C780 Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - 4. ASTM C270 Standard Specification for Mortar for Unit Masonry.
 - 5. ASTM C1019 Standard Test Method for Sampling and Testing Grout; Prism testing is prohibited.
 - 6. ASTM C109/C109M Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).

- 1.03** CMU walls shall be typically used in interior public and student areas. CMU to be considered a finish material as well as a structural material and shall be detailed/ specified per DP's Design and Construction Documents.

1.04 Prior to Commencement of work:

- A. DP shall approve a mock-up wall panel.
 - 1. 6-ft. wide x 5-ft. tall mock-up panel shall include window opening and sill for both CMU and brick walls.



DIVISION 4

SECTION 04000 — MASONRY

- a. The panel shall demonstrate the quality of workmanship to include color range, texture of masonry units; bond mortar joints, joint uniformity, and wall finish e.g. paint or stucco, etc.
- b. The panel shall not be removed until masonry work is complete or until removal is authorized.
- c. Mock up wall shall be erected by the person(s) whose work is typical of the work provided in the PROJECT, because it establishes the standard of workmanship.
- d. Completed masonry work in the building shall conform to the approved panel.

1.05 DP or PROJECT COORDINATOR shall inspect and approve CMU/ brick pallets upon delivery.

A. All CMU/ brick shall be culled for corner/ edge chips or hairline cracks.

1.06 Language shall be added in the DP's Design and Construction Documents regarding the cleaning of exterior brickwork. Excess mortar on the finish surfaces is not acceptable.

1.07 Certification of CMU for compressive strength and weight is required per DP'S Design and Construction Documents

1.08 Wall finish; see SECTION 09000 (Paints and Coatings).

A. In shower/locker rooms, kitchens see SECTION 09000 (Paints and Coatings).

B. Project Color board is to be provided by the DP, and approved in writing by the PROJECT COORDINATOR.

C. No brick for interior walls, unless to match existing and for decorative finish, a written approval from the PROJECT COORDINATOR shall be required.

1.09 DESIGN

A. DP's Design and Construction Documents shall contain a provision for weather protection of masonry units during construction where all masonry units shall be stored under cover during storage and at the end of each work day.

B. In addition to the recommended control joint locations as specified by NCMA or BIA, the DP *shall design for additional control joints* for the following:

1. At ends of window or door headers;
2. At two intersecting exterior walls forming corners;
3. Abrupt changes in wall heights and thicknesses;
4. Where all interior partition wall intersects exterior walls;
5. Where wall, columns, or pilasters abut, in construction joints located at intersection of foundation, roof or floors;
6. In long straight walls, where chases for pipes or fixtures occur;
7. Where bond beam breaks at return angle such as L, T, or U shaped structures
8. Where brick/ stone veneer is applied to block;

PART 2 – MATERIALS & COMPONENTS



2.01 MATERIALS

- A. CONCRETE MASONRY UNITS (CMU): Required strength shall be specified by DP and referenced on DP'S Design and Construction Documents.
1. **Concrete Masonry Units (CMU):** Concrete masonry unit construction shall comply with guidelines established by the National Concrete Masonry Association (NCMA).
 2. **Mortar Type:** Specify type "N" for above grade masonry; specify type "S" for below-grade and other structural applications.
 3. **Expansion and Control Joints:** Expansion joints and control joints shall be detailed and specified to accommodate potential movement that may cause cracking.
 4. **Reinforcing and Grouting:** Hollow cells shall be reinforced and grouted per structural requirements. Test grout per ASTM C 1019.
 5. **Recommended Running Bond.** However, Stack bond/ grooved block can be used for decorative panel with written approval from the PROJECT COORDINATOR.
 6. **Tuck Point** is to be used for repair existing brick joints, can be used for a portion or entire building.
 7. **Corners:** All exposed external concrete block corners shall be bullnose corners. Bullnose shall extend to the floor or to top of base. Rub out all casting irregularities (so as to result in smooth transitions from flat face to rounded corner) before any finish treatment is applied.
- B. METAL
1. **Metal:** Brick ties, plates, fasteners, lintel angles, relieving angles and other metal accessories shall be galvanized steel (minimum G- 90) or stainless steel.
 2. **Flashing:** Flashing shall be carefully thought out and positioned. Flashing shall extend beyond openings and have end dams at vertical terminations. Through-wall flashing for brick veneer shall extend a minimum of 8-inches above weep location. Coordinate and detail the interface between below grade waterproofing and through-wall flashing, base flashing and weeps.
 3. **Reinforcement, Ties & Anchoring Devices:**
 - a. Galvanized wire type devices, where flexible ties are required use two piece units for CMU and double eye type for brick.
 - b. Plastic inserts and anchors are prohibited.
 - c. All exterior walls shall be ventilated by either:
 - 1) Weep hole with cotton rope wicks, cut flush above all thru-wall flashing and must be above grade vent weeps;
 - or
 - 2) Open head joints with mortar net and mesh weep inserts.
 4. **Parapets:** For stone coping and brick masonry veneer above roof areas, through-wall flashing shall be fabricated from copper sheet metal or stainless steel and shall have receivers for roof counter flashing.
- C. BRICK
1. **Brick Type:** For new work, brick shall comply with ASTM C216 and C652, type HBS, grade SW. Building additions and renovations shall match existing brick. Locate Manufacturers as close to site location as feasible.



DIVISION 4

SECTION 04000 — MASONRY

2. **Coursing:** New brickwork adjacent to existing brickwork shall be coursed to match the existing brickwork.
3. All new brickwork, including but not limited to expansion joints, ties and fasteners, and accessories, shall comply with the guidelines established by the Brick Industry Association (BIA).shall
4. **Expansion and Control Joints:** Expansion and control joints shall be detailed and specified to accommodate potential movement that may cause cracking.
5. **Sealant Joints:** Sealant joints shall have backer rod and sealant color shall match adjacent mortar joints to the extent possible. For exposed joints that do not receive a coating, silicone based sealant joint materials are required. See also SECTION 07000.
6. Recommend common running bond shall be used. However, stack bond/ grooved block can be used for decorative panels with written approval from the PROJECT COORDINATOR.
7. Jumbo or other special sizes are to be used only to match existing.
8. Avoid engineered special shapes.
9. To increase the potential of matching later construction, recommend colors with long running history.
10. Specify only regionally manufactured brick with actual size modular units.
11. Grade SW, Type FBS

D. CAST STONE

1. Use of "cast stone" a Division 4 (masonry product) or "architectural precast" (a Division 3 concrete product) in place of natural cut stone as decorative pieces to match, accentuate, or blend with the architectural style of the historic buildings on Campus is both permitted and encouraged. Window sills, headers, string courses, lintels, column caps, wall coping, and other accent details may be cast stone or architectural precast.
2. Cast stone may be dry cast ("zero slump" concrete) or wet cast.
3. The specifications shall require the manufacturer be a producing member of the Cast Stone Institute (CSI) and/or an Architectural Precast Association (APA) Certified Plant, with at least five years manufacturing experience. Bidders shall be required to provide satisfactory owner, architect, and contractor references on past projects.
4. For either product, detailed shop drawings shall indicate structural attachments, flashing, dimensions, and other pertinent information.
5. Provide full width thru-wall flashing with end dams. Rake back joints and install backer rod and sealant. Cast stone shall be coated with a siloxane water repellent to reduce surface absorbency.
6. Reinforcement shall be per the applicable Architectural Precast Association guide spec. galvanized or epoxy-coated steel where coverage is less than 1.5 inches. The DP may also consider the use of non-corroding fiberglass reinforcement.
7. In addition to tests for compressive strength, absorption, and others as required by the Cast Stone Institute, the Architectural Precast Association, or the American Concrete Institute, the specifications for cast stone or architectural precast shall require testing at the manufacturer's plant for chloride ions in the stone/precast and mortar per ASTM C1218 (water-soluble chloride) and/or ASTM C1152 (acid-soluble



DIVISION 4

SECTION 04000 — MASONRY

chloride). The maximum allowable chloride content, which varies depending on the exposure of the stone or precast, is established by ACI 318. These, and all other tests, shall be performed on one sample per every 500 cubic feet of material (stone or precast).

8. For historic buildings, refer to Secretary of Interior Preservation Briefs.

E. "THIN" BRICK IN PRE-CAST PANELS:

1. Manufacturers: "Thin" brick shall be specified and a written approval from PROJECT COORDINATOR is required.

F. GROUT

1. Type "S" used on both above and below grade, unless otherwise noted on the DP's Design and Construction Documents.
2. Recess caulked control joints for weather proofing where walls butt to one another and control joint; see SECTION 07000 (joint sealers).
3. Maximum grout lifts shall be determined by the DP.

G. MORTAR (Portland cement)

1. Type "N" used on both above and below grade when brick is used as a veneer face or unless otherwise noted in the DP's Design and Construction Documents.
2. Color per DP's Design and Construction Documents.
3. On remodel or renovation mortar color shall match existing.
4. Typically use concave joints on all walls, unless otherwise noted, as shown in the DP's Design and Construction Documents.
5. Recess caulked control joints, for weather proofing, where walls butt to one another and control joint.
6. Mortar shall be specified based on performance criteria. Mortar specification and construction shall be sensitive to masonry materials especially for repairs or renovations of structures.
7. Calcium chloride shall not be added to mortar mixes.
9. Test mortar per ASTM C780 and C109.

2.02 WATERPROOFING

A. FLASHING

(Refer to B.I.A. Technical Notes on Brick Construction 21A/ latest revision)

1. **Through-Wall Flashing:** Use thru-wall flashing below caps, above doors and windows, below windows and at base of wall as well as any breaks in vertical cavities. Recommend copper-clad flexible membrane, lapped and sealed at all joints. **Wicks:** Treated rope type cut flush. Install no more than 24-inches o.c. above all thru-wall flashing and must be above grade.
2. **Through-Wall Flashing Installation:**
Refer to B.I.A. Technical Notes on Brick Construction 21A/ latest revision).
 - a. Through wall flashing membranes in cavity wall construction shall be attached to the cavity side of the interior wall with metal termination bars and sealed along the top of the membrane with asphalt based trowel applied mastic.



DIVISION 4

SECTION 04000 — MASONRY

- b. **Weeps:** Weeps shall be installed at all through-wall flashing locations in accordance with Brick Institute of America (BIA) guidelines. Open head joints with mortar net and mesh weep inserts are required rather than cords, tubes or open head joints. Locate through wall flashing and weeps a minimum of 8-inches above adjacent roofs to allow reroofing without interfering with their operation.
- c. All end conditions shall have the through wall flashing membrane turned up and sealed to prevent water from entering the cavity below.
- d. Do not allow mortar to collect in the cavity and clog weep holes.
3. **Sealing around Windows:**
 - a. All sills shall slope toward the exterior of the building to drain water away from the window.
 - b. All windows shall have solid pans under the bottom frame. Pans shall be turned up on the interior side and at the ends. Inside corners of the pans shall be sealed.
 - c. Windows shall not have screws or fasteners exposed to the exterior.
 - d. All windows shall be sealed with caulking approved by the window manufacturer.
 - e. Openings greater than ¼-inch around the perimeter of any window shall have a backer rod installed prior to caulking.
- B. **CAVITY WALLS:** Cavity walls shall be specified, detailed and constructed so that cavities drain freely without being obstructed with mortar accumulations in the cavity. Weep media products shall be used where necessary. Brick ties shall be specified with built-in drips to prevent water from bridging the cavity, also see SECTION 07000.
 1. **Reference** B.I.A. *Technical Notes on Brick Construction 21A/ latest revision*).
 2. **Cavity Anchor Wall Ties and Adjustable Rectangular Cavity Tie Eyes** are to be specified per DP's Design and Construction Documents to meet structural requirements.
 3. Where the membrane extends across the cavity it shall not sag or allow water to stand in the cavity.
- C. **CONTROL AND EXPANSION JOINTS FOR EXTERIOR/INTERIOR CMU WALLS**
 1. **CONTROL JOINTS** required for interior/ exterior CMU walls.
(Refer to NCMA TEK 10 & 10-1A latest revision).
 - a. Control joint locations shall be coordinated between the DPs due to the aesthetic issues associated with having a vertical caulked joint line in the wall.
 - 1) Caulking is never to be the only source of protection against water intrusion
 - b. **Control joints** shall be continuous from foundation or steel lintel to top of brick wall.
 - c. **Mortar joints** shall be tooled smooth or slightly concave with end of brick so that control joint can be properly caulked.
 - d. **Struck or raked joints** shall not be used in exterior walls unless required to match the existing joints in historic buildings.
 - e. Where possible, the placement of downspouts in front of joint lines shall be avoided for new construction.
 - f. Properly prep and prime the respective surfaces and use a backer rod to restrict depth of sealant, then caulk with an polyurethane sealant- shall be one that remains flexible for water tightness.



DIVISION 4

SECTION 04000 — MASONRY

2. EXPANSION JOINTS for CMU WALLS: (Refer to B.I.A. Technical Notes on Brick Construction 18A/ latest revision)
 - a. Expansion joint locations shall be coordinated between the Design Professionals due to the aesthetic issues associated with having a vertical grouted joint line in the wall.
 - b. Where possible, the placement of downspouts in front of joint lines shall be avoided for new construction.
 - c. DP shall design for expansion joints located:
 - 1) At or near corners; at offsets and setbacks;
 - 2) At wall intersections;
 - 3) At changes in wall height;
 - 4) Where wall backing systems changes;
 - 5) Where support of brick veneer changes
 - 6) Where wall function or climatic exposure changes.
- D. WATER SEALANTS
 1. When water repellent systems shall be used, provide breathable systems, not barrier systems.
 2. Reference Secretary of the *Interior's Standards for Rehabilitation and Guidelines for Rehabilitation*, latest edition.
 3. The use of water repellent systems on any buildings with historic designations may be used for special conditions with prior written approval from the PROJECT COORDINATOR.

PART 3 – EXECUTION

3.01 TOLERANCES

- A. Tops of all Masonry walls (exterior and interior) shall allow for expansion and contraction, sealed to eliminate intrusion of elements and infiltration of animals and insects.

3.02 MASONRY RESTORATION AND CLEANING:

- A. Special care shall be used for restoration and cleaning of existing masonry wall surfaces. Sand blast or pressure washing brick surfaces is prohibited; as such cleaning techniques may deteriorate the integrity of the brick masonry and mortar joints. Before chemical cleaners or other methods are used, a sample area in an inconspicuous area shall be test cleaned to verify that the method shall not damage the masonry surfaces.

3.03 QUALITY ASSURANCE

- A. PRE-CONSTRUCTION CONFERENCES: OWNER shall have the option to request a *Building Envelope Pre-Construction Conference* for all new construction and exterior wall renovation projects. Participants shall include, but not limited to: PROJECT COORDINATOR, PCSB Maintenance personnel, the DP, CONTRACTOR, Masonry Installation Contractor, and other related trades' representatives.



DIVISION 4

SECTION 04000 — MASONRY

- B. **MOCK UP PANEL ASSEMBLY:** All new/ major renovation and remodel construction shall require a mock up panel assembly to demonstrate the interfaces of building envelope systems. The DP's Design and Construction Documents shall indicate the nature of the mock up panel(s). Depending on the complexity of the building envelope systems, it may be necessary to provide schematic details of the mock up panel(s).

- C. **TESTING:** Depending on the facility, performance testing of installed masonry systems shall be performed to verify that they are installed properly. The DP's Design and Construction Documents shall indicate the frequency and use of standard field test procedures developed by ASTM.

END OF SECTION