

*Design Guidelines  
and Standards*

■ **Masonry  
Standards**

*Division 4*

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## Masonry Standards

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## Specification Language

- SECTION 04200: UNIT MASONRY**..... 04200-1

## Acronyms And Abbreviations

|             |  |
|-------------|--|
| <b>ASTM</b> | American Society for Testing and Materials |
| <b>CMU</b>  | Concrete masonry unit                      |
| <b>OC</b>   | On centers                                 |
| <b>PVC</b>  | Polyvinyl chloride                         |

## BASIS OF DESIGN

This section applies to Division 4, Masonry.

## BRICK

Select and specify ASTM (American Society for Testing and Materials) C62, Grade SW brick. Grade MW does not offer sufficient weathering characteristics and should be avoided.

Specify that brick masonry be coated with a water-repellent coating. Refer to Section 07180D, Water Repellents.

Building foundations should extend 6 inches above grade in areas with brick to prevent staining from contact with earth.

## CONCRETE MASONRY UNITS

Interior walls of parking garages shall be constructed from concrete masonry units (CMUs). Walls shall extend to the underside of the structure above and shall be properly braced.

Cinder-block masonry is prohibited.

Do not specify lightweight CMUs for exterior applications as a backup material for brick, or in areas subject to moisture.

## STONE

Indiana Limestone is the preferred stone for the University. Building foundations should extend 4 inches above grade where limestone is used to ensure that the absorptive stone is not in contact with earth.

## MORTAR BEDDING AND JOINTING

Specify that horizontal and vertical mortar joints receive full coverage. Furrowing bed joints is prohibited.

Tool exposed joints slightly concave when they are thumbprint-hard, using a jointer larger than joint thickness. Raked joints are prohibited.

## MASONRY REINFORCING

As a minimum, all masonry reinforcing shall be hot-dipped galvanized to comply with ASTM A153, Class B2 (1.5 ounce per square foot; refer to Section 04200, attached). Stainless steel may be appropriate in some situations.

Corrugated wall ties are prohibited.

Horizontal reinforcing with crimps that serve as a drip are prohibited.

Stone anchors shall be stainless steel and shall comply with the recommendations of the Indiana Limestone Institute of America, Marble Institute of America, or National Building Granite Quarries Association, as appropriate. Aluminum anchors are prohibited.

## ■ CONTROL AND EXPANSION JOINTS

The Associate shall design masonry to allow provisions for expansion, contraction, and other movements typical of masonry to prevent cracking. Show all joints on the construction drawings.

## ■ FLASHINGS AND WEEPS

Masonry flashing shall be composite copper/asphalt/kraft paper. (Refer to Section 04200, Unit Masonry, attached.)

Polyvinyl chloride (PVC) flashing is prohibited.

Weeps shall be cotton sash cord. (Refer to Section 04200.)

Plastic tubes, open head joints, and weep vent systems are prohibited.

## ■ MASONRY CLEANING AND PROTECTION

Specify that brick masonry shall be cleaned with proprietary, general-purpose acidic cleaners designed for removing mortar/grout stains' efflorescence and other new construction stains without discoloring or damaging masonry surfaces. Products used should always be the least intrusive product that will adequately clean the masonry. Use of muratic acid is prohibited.

Masonry (brick, concrete masonry, and stone) shall be coated with an anti-graffiti coating from grade up to at least 8 feet, 0 inches (or beyond any accessible location). Because these coatings may slightly darken the masonry, the coating should be applied up to a building change or offset. Anti-graffiti coating shall be compatible with water-repellent coatings.

## ■ MISCELLANEOUS REQUIREMENTS

Plug anchoring items to masonry by use of wood. Use of lead or plastic is prohibited.

### Stone For Entrance Walls And Pylons

#### *Stone*

**Sandstone:** Copper variegated as produced by Briar Hill. Stone shall be sound and free from defects that would impair strength, durability, or appearance.

Color and texture shall be within the range of variations specified and as accepted by the University's representative. Stone shall be carefully selected for minimum variegation; heavy variegation will not be accepted.

Patching or hiding defects will not be permitted.

Chips or stains on exposed face shall be corrected by redressing or cleaning, or replaced with new stone as directed by the Associate.

Finish shall be "smooth sawn" from quarry with shop-applied "light sandblast."

Color shall match University's sample.

Mortar joint thickness shall be ¼ inch.

Coursing and pattern shall be as indicated.

### *Mortar Materials*

**Masonry Cement:** ASTM C91. For pigmented mortars, use premixed, colored masonry cements of formulation required to produce color indicated; or, if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 5 percent of masonry cement by weight for mineral oxides or 1 percent for carbon black. Type N.

**Products:** Subject to compliance with requirements, provide products by one of the following:

- Richmortar
- Kosmortar
- Lehigh
- Brixment

**Sand:** ASTM C144, well-graded, except that 100 percent shall pass through No. 16 sieve for ¼-inch and narrower joints.

**Water:** Clean and free of deleterious substances.

### *Stone Accessories*

**Anchors, Shims, Setting Blocks, and Dowels:** Stainless steel type 302 or 304. Plastic type shims or setting blocks are not permitted.

**Primer:** As recommended by sealant manufacturer whose product is used.

**Back-Up Material:** Closed-cell, resilient urethane rod stock, polyvinyl-chloride foam, closed-cell polyethylene foam, or closed-cell sponge. Material shall be non-staining, non-absorbent, and compatible with sealant used.

**Neoprene Sponge:** 3/8-inch-thick, closed-cell neoprene material conforming to ASTM D1056 Class RE 41 or 2A1; compressibility exceeds 50 percent; size to extend to ¾ inch from each face of stone.

**Stone Cleaner:** As recommended by manufacturer of graffiti-resistant coating.

### *Mixes*

Machine-mix in batch mixer unless otherwise permitted. Use mortar within 2 hours of mixing or discard and remove. Do not use re-tempered mortar. Color to be custom, selected by the Associate.

The intent is to produce mortar which, when thoroughly cured, is slightly darker than the stone. Mortar color shall match approved mock-up.

Use of admixtures to reduce freezing point of mortar mixes will not be permitted.

## Masonry Restoration and Cleaning

### *General Requirements*

Before any masonry restoration is attempted, several factors should be considered. Factors contributing to the deterioration should be determined and corrective action taken to prevent further damage or damage to the new Work. For example, removing efflorescence from brick without stopping the source of water intrusion would be a short-lived solution. The availability of matching brick, mortar, and other components should be determined. It may be difficult or even impossible to match certain older brick. Depending on the Project and its location, concerns for the protection of persons and property may affect how the Work is accomplished. Noise, vibration, abrasives, chemicals, fumes, and other items may pose serious environmental concerns.

The extent of masonry restoration work is often difficult to fully assess. The Associate should have tests performed to determine the condition of the masonry and its components. Investigative field-testing is the best way to assess the project requirements so that the Contract Documents will permit competitive bidding and ensure predictable results. If appropriate, initial test results should be made available to bidders to assist them in preparing bids. Brick should be tested to determine its physical properties and availability. Mortar samples should be tested in a laboratory to determine their composition.

Even with well-documented conditions and a complete set of Contract Documents, it is usually a good idea to establish unit prices for various portions of the work to account for unforeseen conditions.

### *Materials*

**Repointing Brick:** Specify that old mortar shall be removed to a depth of  $\frac{3}{4}$  inch to ensure adequate bond. All loose mortar beyond that depth should be removed. Mortar shall be removed with hand tools only; grinders are prohibited.

**Pointing Mortar:** Specify that the Contractor shall prepare batches of mortar of various mixes until a match is established. Mixing proportions should match those of existing mortar if they can be determined. Do not use mortar that has a higher strength than the masonry. Proportions should be adjusted as necessary. In general, repointing mortar should be approximately one part white Portland cement, two parts lime, and six parts aggregate. Masons should maintain accurate records of mortar mixes and methods. Each

batch should be carefully formulated to ensure consistency from batch to batch. Masonry cement should not be used. Anti-freeze compounds, air-entraining agents, and bonding agents are prohibited. Specify that repointing mortar be prehydrated prior to pointing.

### *Application*

**Pointing Joints:** New mortar should be placed in the joints in multiple layers, allowing each to achieve thumbprint hardness before the next layer is applied. Specify that new mortar be tooled to match existing and that new mortar shall not extend over the face of weathered corners of the brick.

**Cleaning Masonry:** Methods and materials used to clean existing masonry should be evaluated to reduce the possibility of damage to the masonry, damage to adjacent surfaces and grounds, or disruption of the University operations. Cleaning should employ the least intrusive, mildest, and safest methods and materials that will accomplish the Work. Specify that the Contractor perform tests using the proposed cleaning method in a less conspicuous area prior to commencing Work.

Specify pre-construction conferences prior to commencing masonry restoration and cleaning Work. Discuss proposed materials, methods, sequence schedule, project conditions, protection of adjacent surfaces, lawns, and project site, and other relevant items.

Specify that after all restoration and cleaning Work has been completed, brick surfaces shall be coated with a water-repellent coating. Refer to Section 07180D.

**END OF MASONRY SECTION**

**SECTION 04200 — UNIT MASONRY**

*Include the following information in specifications prepared for use on University of Cincinnati projects. This information is supplemental and not intended to be a complete specification.*

**PART 1 GENERAL****1. QUALITY ASSURANCE**

- A. Mock-ups
  - 1. Prior to commencing masonry Work, erect sample wall panels using materials, bond, and tooling required for finish Work.
  - 2. On site and where directed, build 4-foot by 4-foot minimum sample panels reflecting the materials and installation that can be expected in finish Work. Include all special shapes that will be used on the project.
  - 3. Sample panels shall be the same thickness as walls in final construction.
  - 4. Use sample panels to test proposed cleaning procedures, water repellents, and graffiti-resistant coatings.
  - 5. Upon acceptance of sample panels, masonry Work shall commence.
  - 6. Retain samples through the period of masonry Work, removing panels when directed.
- B. Qualifications
  - 1. Masons shall have a minimum of 3 years' prior experience with projects of similar type and size.
  - 2. Corner masons shall be the most experienced crew members.

**1. PROJECT CONDITIONS**

- A. Cold weather consideration
  - 1. Do not perform masonry Work when atmospheric temperature is below 40 degrees F or is predicted to fall below 40 degrees F or rise above 90 degrees F within 72 hours without taking the following precautions:
    - a. Work shall conform to prior referenced standard. Masonry temperature shall not be less than 20 degrees F when laid. Remove visible ice on masonry units. Heat mortar and maintain above freezing until used in masonry.
    - b. Masonry under construction, 20–25 degrees F: Provide heat source and windbreaks on both sides of masonry under construction.
    - c. Masonry under construction, below 20 degrees F: Provide enclosure for masonry under construction and heat source to maintain temperature above 32 degrees F.
    - d. Completed masonry, 40–32 degrees F: Protect completed masonry with cover for 24 hours after construction.
    - e. Completed masonry, 32–25 degrees F: Completely enclose completed masonry with cover for 24 hours after construction.
    - f. Completed masonry, 25–20 degrees F: Protect completed masonry with insulating cover for 24 hours after construction.

- g. Completed masonry, below 20 degrees F: Provide enclosure and supplemental heat as required to maintain masonry temperature above 32 degrees F for 24 hours after construction.
  - h. Accelerating admixtures may be used only with non-load-bearing masonry.
- B. Protection: Protect finished materials from mortar stains.

## PART 2 PRODUCTS

### 2. \_ MASONRY REINFORCING

- A. Horizontal, standard: Truss design with 9 gage side rods and 9 gage cross wires, made from ASTM A82 steel wire, deformed, no drips. Include standard mill galvanized zinc coating finish, except that for exterior walls, provide hot-dipped galvanized joint reinforcing after fabrication to comply with ASTM A153, Class B2 coating (1.5 ounce per square foot).
- 1. Multi-wythe construction: Provide one side rod for each face shell of hollow masonry units more than 4 inches wide plus one side rod for each wythe of masonry 4 inches or less in width. Size widths as required for embedment within each face shell and to engage the outer wythe by at least 1½ inches.
  - 2. Multi-wythe adjustable: Two-piece tab design with continuous single pair of side rods, truss-type diagonal cross roads spaced no more than 16 inches on centers (OC), with separate adjustable rectangular ties that engage the tab extending from the cross ties.

### 2. \_ TIES AND ANCHORS

- A. Veneer anchors: Two-piece assembly consisting of metal anchor section (minimum two fasteners per anchor) and 3/16-inch-diameter pintle (with two legs), hot-dipped galvanized steel. Anchors shall transfer load directly to metal studs without relying on sheathing for load transfer.
- B. Veneer screws: Steel drill screws, #10 diameter by length required to penetrate steel stud flange by not less than three threads, complying with ASTM C954 except with hex washer head and neoprene washer, copolymer corrosion-resistant coating.

### 2. \_ FLASHING MATERIALS

- A. Through wall flashing: Composite 5-ounce copper, fully bonded on both sides by asphalt and rough-textured, creped kraft paper.

### 2. \_ MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep ropes: 100 percent cotton (no plastic cores) sash cord of length required to comply with installation requirements indicated.

## PART 3 EXECUTION

### 3. \_ INSTALLATION – GENERAL

- A. Fill collar joints less than ¾ inch wide solid with mortar for multiple-wythe construction unless otherwise specified or detailed on the Drawings.
- B. Lay walls up using size of units indicated or required.
- C. Cavity Protection: Provide means and methods to prevent bridging of cavity with mortar. Use "clean out" board or other means to keep cavity clean of mortar and mortar droppings. Strike off back of face veneer to remove excess, extruded mortar.
- D. Do not adjust masonry units after setting. If units are disturbed, clean and reset in fresh mortar.

- E. Do not retemper mortar that has begun to set. Discard old mortar and use fresh mortar.

### 3. FLASHING/WEEP HOLES

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, and other obstructions to the downward flow of water in the wall to divert water to the exterior.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar. Install flashing as follows:
  - 1. At composite masonry walls, including cavity walls, extend flashing from the exterior face of the outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within ½ inch of the interior face of the wall in exposed masonry. Where the interior surface of the inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches.
  - 2. At lintels and shelf angles, extend flashing the full length of lintels and a minimum of 12 inches into masonry at each end.
  - 3. At masonry veneer walls, extend flashing from the face of the veneer, through the veneer, up the face of the sheathing at least 8 inches, and behind the barrier/building paper.
- C. Extend flashings through the exterior face of the masonry. Cut off flashing flush with the surface of the wall after masonry wall construction is complete.
- D. Install flashing to comply with the manufacturer's instructions.
- E. Install weep ropes in the head joints in exterior wythes of the first course of masonry immediately above concealed flashings and at the top of the wall cavity. Install weep rope in the cavity turned up a minimum of 12 inches and secured to backup material. Cut rope flush with the face of the wall.
  - 1. Space 16 inches OC for brick masonry unless otherwise indicated.
  - 2. Space 32 inches OC for concrete masonry unless otherwise indicated.

### 3. CLEANING

- A. Perform masonry work in as clean a manner as possible; remove excess materials and mortar drippings daily. Brush mortar droppings from anchors, flashing, and ties as wall is constructed; do not allow mortar to set.
- B. Point holes in joints; completely fill with mortar and tool properly on daily basis.
- C. Let masonry walls cure for at least 2 weeks or longer as required to prevent damage to mortar during cleaning operations.
- D. Use brick-cleaning compound on exterior brickwork in strict accordance with the manufacturer's instructions.
- E. Face brick:
  - 1. Except as otherwise specified by the manufacturer, wet brick and clean with prepared brick-cleaning compound; scrub with stiff fiber brushes and stainless steel or plastic scrapers (containing no ferrous metals); rinse thoroughly with clean water.
  - 2. Do not apply cleaning solution on dry surfaces or let cleaning solution dry on surfaces.
  - 3. Do not allow solution to come into contact with finished surfaces.
  - 4. Solution strength shall be adjusted according to the type of mortar used.

- F. Exposed concrete masonry units:
  - 1. Clean off mortar droppings and rough edges with wire brushes or other acceptable method.
  - 2. Remove loose sand from walls.
  - 3. Do not use cleaning compounds on concrete masonry.
- G. At completion of masonry work in any area, leave area clean and free of mortar residue or other debris.

**3. PROTECTION**

- A. At the end of each day's work, protect tops of walls exposed to weather with waterproof felts or plastic draped over masonry and weighted in place. Brace masonry against storm damage.
- B. Protect mortar from quick drying in hot weather or freezing in cold weather.
- C. Turn scaffold boards into vertical position or cover and secure with clean polyethylene sheet at the end of day's work to prevent runoff staining and splashing of walls in the event of rain.
- D. At the end of each day's work, verify proper storage and protection of materials to be installed. Protect masonry units, mortar, and other masonry materials from moisture.

**END OF SECTION**