

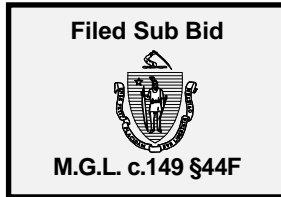
DESIGN AND CONSTRUCTION GUIDELINES AND STANDARDS

DIVISION 4 • MASONRY

04 20 00 • UNIT MASONRY

SECTION INCLUDES

Brick Veneer
Brick Masonry
Concrete Masonry Units
Masonry Flashing



Masonry is a stipulated filed sub-bid category under M.G.L. Chapter 149, §44F. If the cumulative estimated value of the work in this section exceeds \$20,000 and the projects total cost is over \$100,000, it triggers the filed sub-bid requirement.

RELATED SECTIONS

05 50 00 Ornamental and Miscellaneous Iron
07 10 00 Waterproofing & Dampproofing
07 20 00 Building Insulation & Moisture Protection
07 90 00 Sealants
08 10 00 Doors and Frames
08 50 00 Windows
22 00 00 Plumbing
26 00 00 Electrical
28 00 00 Electronic Safety and Security

BRICK VENEER, BRICK MASONRY, AND CMU CAVITY WALLS

MATERIALS

Face brick: ASTM C216; Grade SW
Concrete Masonry Unit ASTM C-90

DESIGN

Refer to the Brick Institute of America for design recommendations.



Brick has a high embedded energy content (resulting in greenhouse gas emissions), but is produced using relatively abundant natural resources and has minimal off-gassing. Many existing brick public housing developments have limited cavity space for supplemental insulation. Improving thermal performance should be done with attention to managing moisture and ventilation.

Larger “jumbo” brick sizes (4x8, 4x12) are less expensive. They should be considered if appropriate for the scale and context of the project, and whenever the standard modular size is not required to match existing conditions.

COST-EFFECTIVE OPTIONS

Panel bricks (8x8 or 12x12 inches) are generally not acceptable because they are difficult to install and tend to leak.

CMU veneers may be considered as cost-effective alternatives to brick veneer provided waterproof admixtures are specified for the CMU and

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mortar. Do not design composite masonry assemblies combining CMU and brick in the same bonded masonry assembly. Specify smooth-face CMU instead of CMU with textured or split face for greater water resistance.

MORTAR

Avoid mortar which is too stiff or stronger than needed. This is particularly true for older buildings where softer brick is often being re-pointed. For new construction the following selections typically suffice:

ASTM C270, Type N for low-rise Masonry Veneer, Type S for load bearing walls and partitions, and Type S or M for below grade masonry work. Site mixed, proprietary masonry cements are not acceptable. Component materials must meet the following standards:

- Portland cement: ASTM C-150
- Hydrated Lime: ASTM C-207, Type S
- Sand: ASTM C-144
- Grout: ASTM C-476

MORTARS & ADMIXES

No mortar additives other than color or waterproofing are acceptable. Re-pointing mortar should be pre-hydrated and of low cement content.

Pointing mortar should be pre-hydrated and of low cement content.

Flashing should be through-wall copper fabric or copper with asphalt coating; PVC through-wall flashing is not acceptable because it does not bond well and is not durable. Zinc-coated copper is recommended for buildings in close proximity to the ocean.

FLASHING

Step flashing for chimneys and similar locations should be copper or zinc coated copper.

Cap flashing should be copper or zinc coated copper.

Aluminum is acceptable only when used as counter flashing and not in contact with mortar or dissimilar metals.

DRAINAGE & WEEPHOLES

Use polymer mesh products, such as Mortar Net, in cavities in areas of masonry replacement, to prevent mortar droppings from blocking weep holes. In new construction, it is recommended to use polymer mesh for the full height and area of the cavity.

Preferred weeps are open head joints with capillary tubes. Polymer mesh or fabric rope weeps are also acceptable. Weeps should be protected to prevent mortar from clogging weep-holes.

Avoid cotton weeps which may disintegrate prematurely and clog. Polymer mesh weeps are typically more effective in providing a larger area of weep-hole opening for better drainage and drying out of wall cavity.

Spacing of weeps depends on the size of bricks used, with 32" o.c. being the maximum.

ANCHORS & TIES

Coordinate specification of anchors with structural, waterproofing, and insulation requirements.

Wire ties and screws must be hot dipped galvanized steel or stainless steel. Bonded masonry should not be used to tie veneer plane to back-up masonry.

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DRAINAGE PLANE DESIGN

Corrugated brick strap ties are not acceptable; use two-piece anchors that permit directional movement and resist corrosion.

Provide relieving angles per structural engineer's recommendations. Joints below relieving angles must be detailed to allow for movement (see illustration); angles must be hot-dipped galvanized. Install plastic bearing strips under the lintel at each jamb where a control joint occurs.

It is recommended that brick veneer on stud back-up be used with either cement board or fiberglass-mat faced gypsum sheathing and a permeable waterproofing membrane such as W.R. Grace Perma-Barrier.

For one and two family construction, plywood or glass-mat gypsum sheathing is acceptable. Specify permeable waterproofing membranes such as W.R. Grace Perma-Barrier or other durable wind-resistant self-sealing membranes

Seal brick cavities at the ends and at penetrations. To effectively manage drainage plane moisture, brick cavities must be flashed at corners, bays and other locations where changes in materials or veneer plane occur.

Where masonry veneer walls are continuous for lengths greater than 40' and at corners, dams should be designed within the veneer drainage cavity to prevent wind-washing.

Depending on the scope of work and the size of the project, the Architect should consider specifying a mock-up. A typical 48" x 48" mock-up showing pertinent details such as metal ties, flashing, mortar net, typical window opening, insulation and back-up wall assembly provides a useful reference for details and workmanship and can also be used as a sample to test cleaning agents during final cleaning. The mock-up should not be installed as part of the finished building.



Provide a minimum cavity depth of 1" between back of brick and face of rigid insulation.

Install waterproofing membrane over sheathing and under rigid insulation.

Detail flashing at ends of cavities to prevent water from running off of the ends of the flashing at doors, windows and similar conditions.

Turn up flashing 8 to 10 inches inside the cavity.

Specify durable waterproof membranes at masonry veneer drainage plane with a minimum 50-60 year anticipated useful life. Not all waterproof air barriers approved by the IBC satisfy this criterion.

Investigate existing conditions and indicate the extent of masonry repair, replacement, and re-pointing at existing brick work. As part of the investigation, check walls for vertical plumb variations and horizontal variations. Also check existing mortar if re-pointing is contemplated.

EXPANSION JOINTS

Provide expansion joints to accommodate thermal expansion per the Brick Institute's recommendations for spacing and locations. Care should be taken to locate joints appropriate for the building context and design. Use remolded, compressible elastic fillers (not fiber board) sealed with permanently elastic sealant.

Protective Coatings: The resolution of water infiltration problems at above ground masonry should be accomplished by means other than masonry

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sealants or coatings. If circumstances demand the use of sealants, a penetrating, “breathable” system containing silane or siloxanes should be used.

Do not paint veneer masonry with oil-based paint or other waterproof paint as this may lead to damaging the brick and mortar during freeze-thaw cycles and it also introduces a high-maintenance painting component to what is otherwise a low-maintenance material. Consult an architect if in doubt about the most durable cost-effective method for addressing water infiltration in a masonry veneer building envelope.

EXECUTION

Workmanship must follow recommendations of the Brick Institute of America, including cold weather requirements and on-site mortar batching.

Protect walls and openings during and after completion of masonry work. Do not leave tops of uncompleted cavity walls open to weather during inclement weather.

If a mock-up panel is specified:

The Contractor must prepare for inspection a large sample panel which includes: weeps, mortar-net, ties, tooled joints, flashing and caulking, angle lintels, and studs with sheathing, as well as **indicate the method of keeping the cavity clean**. This sample should not be part of the project work.

Be sure there is a process in place to oversee work to insure that the masonry cavity is kept clean.

Unit masonry which is installed and subjected to temperatures below 40 degrees during the initial 24 hours of mortar set shall be removed and replaced. Brick which is subjected to temperatures below 40 degrees during the first three days of mortar set shall be tested for minimum mortar compressive strength once the mortar is fully cured.

Masonry materials shall be stored off the ground to avoid contamination with soluble salts commonly found in high concentrations in rain-water puddles and which wick into masonry. Brick and CMU which is stored on the ground should not be used for exterior veneer.

LINTELS

Lintels must be adjusted horizontally and vertically when structurally tied to framing and must be wide enough not to restrict the cavity.

Extend sill flashing beyond window and door jambs and turn up to form a pan. At lintels and relieving angles, extend flashing 1/2” beyond angle leg to form a proper drip edge.

The bottom of the cavity must be kept clean of mortar droppings. This can be done using a rope, board or other processes but be sure devices used to prevent mortar droppings are not left behind, in the cavity. When in doubt schedule investigative testing to verify.

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Head joints must be tight and full.

Mortar joints should be concave or recessed straight edge, metal tooled, and a maximum of 3/8 inch height. Rough finished joints tend to absorb excessive water.

Flush joints are not acceptable.

MASONRY RESTORATION AND CLEANING

Brick or stone masonry shall be cleaned with water and brushes with nonmetal bristles. Diluted detergents may be used. Repeated gentle washings with gentle cleaners are preferred to fewer washings with more abrasive or chemical laden cleaners. Do not use hydrochloric acid (muriatic acid) except in limited applications where other alternatives have been tried and are not successful.

Avoid masonry or grout cleaners which contain phosphates, except where other alternatives are not successful.

Provide adequate worker and site protection to avoid contamination of sites and groundwater and injury to workers.

When power-washing brick and CMU veneers use only low pressure (less than 1000 psi).

Repointing: In existing masonry buildings of historic or local significance, hand-cut mortar joints during removal to avoid damage to brick. Typically removal up to 3/4" depth or to solid mortar is adequate for re-pointing.

Care must be taken to specify compatible replacement mortar. Match new mortar to existing for pointing and repair and be cautious about the lime content of the existing mortar. Consider testing the existing mortar to facilitate specifying compatible new mortar.