Masonry

I. Unit Masonry

A. General

1. Particular care should be taken in designing interfaces of masonry anchors and waterproofing membrane and in placement of through-wall flashings that are designed to transport any water that penetrates the system's cavity out to the exterior.

2. Masonry Mockup

a. Mockup requirements sufficient to verify material selections, demonstrate aesthetic effects, demonstrate the qualities of products and workmanship, demonstrate successful installation of interfaces between components and systems, and, where applicable, perform preconstruction testing to determine system performance.

b. The mockup shall not be destroyed without prior approval of the Amtrak Project Manager, Amtrak Design Manager, Amtrak Construction Manager, or authorized representative.

c. Mockups may not be required for every project. Consult with Design Manager for direction.

B. Masonry Cavity Wall Construction (Existing and New Construction)

1. Repair of existing masonry cavity wall or new masonry cavity wall construction to match existing masonry wall:

a. Research, select, and specify masonry units and mortar to match the existing.

b. See Section VI. Masonry Restoration, Repair, and Cleaning for additional notes on the repair of existing masonry cavity walls.

2. Exterior masonry wall enclosing conditioned spaces shall be of masonry cavity wall construction or other wall assembly appropriate for building use and occupancy.

3. Where appropriate, masonry cavity walls shall include the following components:

a. Exterior Masonry Veneer (see below for masonry unit specifications)

b. Adjustable Masonry Veneer Anchors

c. Air Space

i. Provide minimum 1 ½" clear airspace, continuous for the entire height of the wall above grade.

ii. Prevents blockage of weeps and mortar bridging of cavities. Open cavity spaces are to be filled with continuous inorganic cavity drainage mat from all thru-wall flashings to approximately 10" above the weeps or continuous within the cavity.

iii. All hollow masonry units and wall cavities shall be grouted solid below the level of exterior grade.

d. Vents and Weeps

i. Weeps and vents shall be spaced no more than 2'-0" o.c., horizontally.

ii. The Design Contractor shall specify water-testing of the weep systems during construction at approximately four-foot vertical intervals.

e. Continuous Rigid Insulation

f. Continuous Air Barrier

g. Thru-Wall Flashing

i. Thru-wall flashing shall be provided at tops and bases of all cavity walls, and at all interruptions in the wall cavity such as doors, windows, louvers, and other openings.

h. All thru-wall flashing shall be metal as per section Chapter 7, Thermal and Moisture Protection. Masonry Backup, sized to accommodate the span of the wall.

i. Interior finish

i. Finished masonry or painted gypsum board on metal furring as per specific project.

C. Mortar and Grout

1. Mortar:

i. Mortar shall conform to ASTM C270

b. Structural Mortar

i. Mortar for walls below the ground shall be type M.

c. Veneer Masonry Mortar

i. Type N

d. Mortar for repointing of or in historic masonry walls

i. See notes in Section VI, Masonry Restoration, Repair, and Cleaning

e. All mortar shall be mixed from Portland cement, lime, sand, and potable water only. No “masonry cement” or “mortar cement” products will be accepted.

f. All mortar ingredients shall be proportioned according to volume with a cubic foot mixing box in amounts specified in the local building code.

2. Grout shall be high slump mix conforming to ASTM C476 with a minimum compressive strength of 3000 psi and installed in accordance with ACI-531 for high or low lift procedures.

a. Do not use admixtures, including but not limited to air-entraining agents, accelerators, retarders, water repellents, antifreeze compounds, or any other type of admixture unless otherwise approved by the Amtrak Project Manager or Design Manager.

b. Pigments may be added to mortar to obtain colored mortars, provided that they are produced specifically for use in mortar mixes, and they can be demonstrated to have been successfully employed for this purpose. All colored mortars must be pre-approved by the Amtrak Project Manager.

c. Tool all exposed joints with a concave jointer.

d. Cut joints flush or rake where masonry walls will receive plaster or another direct applied finish.

D. Reinforcement

1. All running bond masonry walls are to have horizontal reinforcing at a minimum of every other course. Where masonry is laid in other than running bond, horizontal joint reinforcement is to be provided at every horizontal joint. Provide fabricated corner sections at all corners.

2. If the masonry surface will be exposed to elements, at the direction of the design manager, reinforcement shall be either epoxy coated in accordance with ASTM A775 or hot dip galvanized in accordance with ASTM A767.

E. Accessories

1. Flashing

a. All flashing shall be sheet metal, see Chapter 7, Thermal and Moisture Protection for additional information.

2. Weeps and Vents

a. Woven Plastic Mesh Weep Vents the full height and width of head joint.

b. Color to match the mortar or clear weep vents shall be provided.

3. Cavity Drainage Mat

a. Drainage mat full depth of cavity and 10 inches high with dovetail shaped notches that prevent mesh from being clogged with mortar droppings.

4. Lintels

a. Loose lintels shall comply with Chapter 5, Metals.

5. Veneer Anchors

a. Provide stainless steel adjustable masonry veneer anchors that allow vertical adjustment but resist tension and compression forces perpendicular to the plane of wall.

b. The adjustable masonry veneer anchors shall be designed for the specific use and design loads.

c. Adjustable masonry veneer anchors for stone veneers shall be fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or post-installed anchor bolts for fastening to substrates or framing.

6. Compressible filler

a. Pre-molded compressible filler strips shall comply with ASTM D 1056, Grade 2A1. The pre-molded compressible filler strips shall be compressible up to 35 percent of width and thickness indicated for the project. The pre-molded compressible filler strip shall be formulated from neoprene.

F. Installation

1. Unless required to comply with recommendations by historic commissions, all masonry shall be laid in standard running bond, unless approved otherwise by the Amtrak Project Manager.

2. Cavity walls shall be designed so that all components including the air space, air/vapor barrier, flashing, cavity drainage mat, weeps and vents and all other elements work in an integrated fashion to allow free drainage of water through the cavity, out of the weeps and away from the structure as well as allowingthe movement of air through weeps and vents to allow drying of the cavity. Locate weeps in conjunction with through-wall flashing at lintels, sills, relieving angles, and a minimum of 8” above finish grade at the bottom of the wall; vents should be positioned near the top of the cavity wall, above the highest flashing/weep location.

G. Cleaning and Protection

1. Masonry exposed to public view shall be specified as graffiti resistant, such that graffiti can be resisted or removed either by graffiti coating, glazing, or other method, and presented to the Amtrak Project Manager for review for appropriateness. For existing historically significant brick masonry, SHPO approval will be required.

II. Brick Masonry

A. Bricks

1. All Brick shall be grade SW, type FBX as per ASTM C216

2. Hollow brick shall comply with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area) as a minimum.

3. Provide solid units without cores or frogs at ends of sills, caps, or in other locations which exposes the top or bottom surface.
4. Provide special shapes at all curves, angles other than 90 degrees, and for application where shapes produced by sawing would result in sawed surfaces being exposed to view.

III. Concrete Unit Masonry

A. Finish

1. Exposed common CMU shall be painted in occupied spaces.

IV. Stone Assemblies

A. General

1. Stone shall be used as a veneer only, see Unit Masonry for cavity wall and masonry backup wall information as well as all information on general masonry construction. In select applications, stone may be used to match or repair historic structural abutment or foundation materials at the direction of the Design Manager.

B. Anchors

1. All anchors, mortars, grouts, sealants, flashings, weeps and vents, and other accessories shall be approved by the manufacturers and the stone suppliers as appropriate to the specified materials, details, and proposed conditions.
   a. All stone anchors, shelf angles, fasteners, and other support members for stone veneers shall be stainless steel.

C. Products

1. **General** – All stone shall comply with the applicable ASTM section for the material and intended use.
2. **Granite:**
   a. Comply with recommendations in NBGQA's "Specifications for Architectural Granite".
3. **Limestone:**
   a. Comply with recommendations in ILI's "Indiana Limestone Handbook".
4. **Other Stone:**
   a. Provide as a minimum with the following:
      i. Maximum absorption per ASTM C97: 3 percent.
      ii. Minimum Compressive Strength per ASTM C170. 7500 psi.

V. Cast Stone Masonry

A. Cast Stone Standards

1. Cast Stone shall be defined as a highly refined architectural concrete product manufactured to simulate natural cut stone.
2. Cast Stone shall comply with the requirements of the Cast Stone Institute Technical Manual.
3. Cast Stone shall comply with ASTM C1364.
4. Casting Method: Vibrant Dry Tamp.
5. Compressive Strength, ASTM C1194: 6,500 psi minimum at 28 days.

6. Absorption, C1195: 6 percent maximum at 28 days.

7. Surface Texture: Fine grained texture similar to natural stone.

a. No air voids in excess of 1/32 in. with the density of such voids shall be less than 3 occurrences per any 1 sq. in. and not obvious under direct daylight illumination at a 5 ft. distance.

B. Cleaner

1. General-purpose cleaner expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces.

C. Water Repellant

1. Apply water repellant for weatherproofing cast stone approved by and in accordance with manufacturer's written instructions after pointing, patching, cleaning, and inspection are completed.

VI. Masonry Restoration, Repair, and Cleaning

A. General

1. Before undertaking repair, restoration, or cleaning of masonry, investigate the specific materials and techniques used in the original construction. Proposed processes, replacement materials and techniques shall be compatible with existing materials. Historically significant structures, including properties listed on the National Register of Historic Buildings, shall comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings, as applicable to masonry cleaning and restoration.

2. Identify and correct underlying problems such as structural issues and water intrusion into the wall at roofs and junctures with other systems before proceeding with repairs to masonry.

3. Firms performing masonry cleaning and restoration work shall have a minimum of 5 years of documented experience in masonry cleaning and restoration.

B. Masonry Cleaning

1. Tests of proposed cleaning methods and materials shall be conducted on limited areas of the materials to be cleaned and observed for both immediate and long-term effects before proceeding.

2. Cleaning of masonry shall be by the gentlest method possible. All cleaning materials shall be thoroughly rinsed off masonry at completion of washing. Water or liquid chemical solutions shall not be used whenthere is a possibility of freezing temperatures.

3. Use of Natural bristle brushes and low-pressure water shall be used during cleaning operations.

4. Diluted detergents, subject to testing on limited areas, may be used.

5. Proprietary masonry cleaners may be used, subject to testing:

a. Use only cleaners expressly approved in writing by cleaner, unit masonry, and mortar manufacturers.

6. Steam Cleaning:

a. Apply low pressures not exceeding 80 psi.

b. Remove softened dirt with wood scrapers, brushes, or cold-water wash.

7. Dry ice blasting may be used, subject to testing.

8. Sandblasting and high-pressure power-washing (greater than 150-200 psi) of masonry are prohibited.

C. Restoration and Repair

1. Modern mortars are stronger and harder than older mortars. The use of modern mortars to re-point existing walls that employed softer mortar can damage masonry. The properties of the existing mortar must be ascertained so that the new mortar can match the existing for color, texture, hardness, strength, and composition.