

Basis of Design

This section applies to the design and construction of masonry walls.

Background

Over 75 percent of the academic, administration, science and housing buildings at the University of Washington main campus are built of masonry. The reason is basic; masonry is a symbol of the strength and permanence of the very institution it embodies. Masonry is a symbol of the quality of education that can be obtained within its walls.

- Permanent, 100 years minimum life
- Low maintenance; clean and seal every 12 years, tuckpoint every 25 years

Programming

- Coordinate type of masonry, i.e., drainage wall or barrier wall, with building structural system.
- Consider vapor drive and air movement in design of exterior walls.
- Consider material movement and differential movements due to forces of temperature, wind, water and earthquake.
- Consider potential damage to brick when used below grade.
- Consider construction quality control when selecting masonry systems.

Design Criteria

- Composite wall, i.e., Parrington Hall, Suzzallo Library
 - 1) Structural steel, heavy timber or concrete building frame
 - 2) Multi-wythe masonry walls
- Drainage wall (Pressure equalized rainscreen), i.e., Meany Hall, CSE/ Phase II
 - 1) Supporting concrete or masonry wall
 - 2) Face masonry
 - 3) Stainless steel wall ties
 - 4) Air space; 2" minimum.
 - 5) Galvanized ledger angles
 - 6) Two-piece flashing
 - 7) Weeps and vents
- Barrier wall, i.e., Mary Gates Hall, Allen Library
 - 1) Concrete or masonry wall
 - 2) Face masonry
 - 3) Grout space; 4" minimum.
 - 4) Stainless steel wall ties
 - 5) Steel wall reinforcing

- Refer to the following industry guidelines:
 - 1) BIA (Brick Institute of America)
 - 2) Northwest Masonry Institute
- Specify the use of salvaged or recycle content materials, where possible, for brick, concrete and steel applications.

Design Evaluation

The following information is required to evaluate the design:

- Programming Phase: Indicate intent to use masonry including statement of design concepts and integration with building structural system.
- Schematic Design Phase: Provide plans and elevations showing locations of masonry. Outline specification noting wall type construction. Outline specifications.
- Design Development Phase: Provide plans and building elevations showing locations of masonry noting specific materials. Show soft joints, supports, and penetrations. Show typical construction details and intersections with other systems, i.e., windows and copings. "Prove the design". Draft specification.
- Construction Documents Phase: Complete design and specifications. 3-D details may be needed. Do not rely on "bidder design" to solve construction problems.

Construction Submittals

The following minimum submittals are required from the Contractor:

- Samples for appearance and conformance to specifications
- Technical data
- Wall elevations for placement of supporting steel, flashing, wall ties. Survey of wall plumbness. Show relationships between materials and openings.
- Details showing fabrication of built-up elements, i.e., flashing and ledgers
- Work plan, foul-weather procedures

Quality Assurance

The following general quality assurance measures apply:

- Full-time inspection of all masonry work by independent forces
- Mock-up is required for large projects; shall not be part of the work; may be used to train installers. Work must be approved prior to working on the building. Use same sequencing as proposed for the building.

Related Sections

- Facilities Services Design Guide - Windows and Curtainwalls
- Facilities Services Design Guide - Metal Walls
- Facilities Services Design Guide - Thermal and Moisture Protection (for sealants)

Products, Materials and Equipment

Brick

- Dense material, low water absorption rate; design with masonry module; use local products.
- Use salvaged or recycled brick where possible.

Cast Stone and Precast Concrete

- Dense material, low water absorption rate; adequate cover over reinforcing; rust-resistant reinforcing; stainless steel anchors and picks

Shims for Setting Masonry

- Non corrosive, non metallic

Mortar

- Type-S mortar is troublesome; use Type-N mortar for brick, concave joint face.

Air Space (at Drainage Wall)

- 2-inch minimum clear

Grout (Barrier Wall)

- 4-inch minimum thickness

Steel Reinforcing

- #4 or larger
- Consider use of high recycled content steel.

Support Steel

- Galvanized steel angles and bent plates, ¼-inch thickness or greater. Galvanized steel shims.
- Consider use of high recycled content steel.

Anchors

- Heckman anchors (and no others), No. 425 Wedge Insert and No. 427 Askew Head Bolts, Galvanized. Stainless steel expansion anchors may be used when cast-in-place anchors miss their mark.
- Epoxy anchors are not acceptable.

Wall Ties

- Dur-O-Wall, Inc., D/A 5213S HD, Seismic System, 12 gauge stainless steel plate and 11 gauge stainless steel pintle accepting 9 gauge stainless steel wire.

- Hohmann and Barnard, DW-I OHS Seismic Interlock System, 12 gauge stainless steel plate, BYNA-TIE, ¼-inch diameter stainless steel wire tie, and Seismicclip No. 250, rigid PVC seismic clip accepting 9 gauge stainless steel wire.
- Dovetail type anchors are not acceptable.

Flashing

- Stainless steel (24 ga) or copper (24 oz) under masonry with hemmed drip
- Flexible membrane counterflashing to back-up wall, W .R. Grace “Peima-A-Barrier,” “Blueskin” by Henry, or approved
- Anchor with metal termination bar

Weeps and Vents

- Open head joints at 24-inches on center
- Bottom and top of walls

Back-up Wall

- Concrete
- Fully grouted CMU
- Metal stud walls may be used for interior masonry walls only.

Damp-proofing/ Water Barrier

- Acceptable systems used are "Sonnoborne", “Sealmastic Asphalt Emulsion, Type 2” by W. R. Meadows, Inc. or “Karnak 220AF” by Karnak. Other systems are acceptable if they meet or exceed the technical performance criteria of the above system.
- “Blueskin” by Henry

Sealers

- The purpose of sealers is to protect the exterior masonry and concrete walls from water and to protect the window glazing from chemical leeching of the masonry and mortar.
- The acceptable water based water repellent sealer system used on campus is “Weather Seal Siloxane WB Concentrate” by ProSoCo. Other systems are acceptable if they meet or exceed the technical performance criteria of the above system.

Installation, Fabrication and Construction

Pre-Construction Conference

- Set quality of work, determine sequence of work, discuss construction means and methods, who will set supporting steel and flashing, intent to enforce the contract, incentives.

Masonry

- Set in full mortar beds; do not move once initial set has taken hold.

Shims for Setting Masonry

- Shall not be exposed

Mortar

- Use only fresh mortar, no retamping, remove fins and droppings from cavities.

Air Space

- Keep clear of all foreign materials.

Grout

- Place in lifts no greater than 4 feet; hold down from tops of wall 1 inch minimum.

Steel Reinforcing

- Keep clear of all surfaces; locate away from other material anchor locations.

Supports

- Shop fabricate and galvanize; make no field cuts; set level, allow ¼ inch between pieces for movement.

Anchors

- Avoid wall reinforcing; pull tests may be required.

Wall Ties

- Install precast units with 2 anchors each.

Flashing

- Shop fabricate corners and ends, weld or solder seams; laps to be 4 inches minimum; set laps in sealant.
- Horizontal surfaces must slope to drain.
- Terminate flexible flashing with metal bar; anchor to wall at 12 inches on center; seal top edge, form corners and ends carefully to promote drainage and not take excessive room in cavity.

Weeps and Vents

- Keep clear of mortar; use open head joints.

END OF DESIGN GUIDE SECTION