

CHAPTER 4:**INTEGRALLY INSULATED CMU WALL**

The Chapter 4 assembly is a **mass wall design approach** with a single-wythe concrete masonry unit (CMU) wall structure and core insulation. The components of this assembly, from interior to exterior, are described in Fig. 4-1. Commonly, split-face block is used for this assembly. This assembly is appropriate for low-rise commercial applications; an example application is shown in Fig. 4-2 on page 4-3. Benefits and special considerations for this assembly are discussed in Table 4-1 on page 4-2.

Building Enclosure Control Functions and Critical Barriers

As noted in the Introduction, an above-grade wall assembly should provide control of water, air, heat, vapor, sound, and fire to serve as an effective and durable environmental separator. Control of these elements is provided by critical barriers such as a water-shedding surface (WSS), water-resistive barrier (WRB), air barrier system (AB), thermal envelope, and vapor retarder (VR). Refer to Fig. i-8 on page i-15 of the introductory chapter for a list of primary building enclosure control functions and associated critical barriers.

INTERIOR

- Single-wythe CMU wall with water-repellent admixture
- Core insulation (or grout, where required)
- Clear water-repellent

EXTERIOR

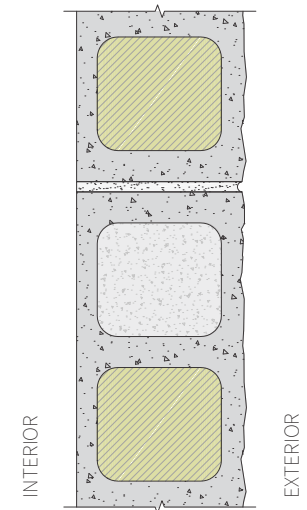


Fig. 4-1 Typical Assembly 4 components from interior to exterior

Table 4-1 Assembly 4 comparison matrix excerpt from the introductory chapter

| Assembly Comparison Category | #4 Integrally Insulated CMU Wall |
|--|--|
| Recommended Occupancy Type | Commercial |
| Building Enclosure Design Approach and Recommended Exposure | Mass Wall Design Approach, Low-Rise Exposure |
| Long-Term Wall Assembly Durability | Structural durability high. Water repellents (admixture and surface applied) and/or opaque coatings provide water resistivity. |
| Typical Wall Thickness | Typical-thickness for single-wythe CMU wall |
| Typical Cladding Design Compliance | Prescriptive/Engineered |
| Typical Thermal Performance | Core insulation provided to meet code compliance; may qualify for energy code compliance exceptions in some areas |
| Special Construction Considerations | Single-wythe wall only; lacks additional cladding and insulation; added moisture control measures recommended |
| Construction Ease with Limited / No Exterior Access (property line applications) | No exterior access required; however, installation of repellents or coatings is limited |
| Fire Resistivity Considerations | Fire resistivity high. |
| Maintenance Considerations | Regular maintenance required; clear water repellent recommended. |
| Price Per Square Foot | Low and High Baseline Cost: \$24.25 - \$36.50 |

Fig. 4-3 illustrates the locations of the critical barrier locations for this assembly. The critical barriers for this assembly are also provided adjacent to each detail at the end of this chapter.

As shown in Fig. 4-3, the WRB and WSS critical barriers occur at/near the CMU wall structure face; the CMU wall structure is also the AB under certain provisions as discussed later in this chapter. The thermal envelope consists of the intermittent foam-insulated core, which may be either resinous foam insulation or loose fill such as perlite. This assembly has no defined VR critical barrier.

The following sections provide more information and discuss best practices for the specific critical barriers of this assembly.

Water-Shedding Surface (WSS)

The WSS is a critical barrier that controls water.

The CMU wall itself, along with grout and core insulation provide the WSS of this assembly. Additional components include sheet-metal flashings and drip edges, sealant joints, and fenestration systems as shown on the details included at the end of this assembly chapter.

Water repellent admixtures are added to the block and mortar of



Fig. 4-2 Typical Assembly 4 application

this assembly and a surface-applied clear-water repellent is also recommended. These repellents—along with other measures such as tooled “V” or concave shape (preferred) mortar joints, sufficient sheet-metal parapet cap design, and other general design recommendations as discussed in the Northwest Concrete Masonry Association (NWCMA) TEK Note on Rain-Resistant Architectural Concrete Masonry—serve to encourage water shed.

When finished, the WSS critical barrier should be free of gaps. Movement joints and joints around fenestrations and penetrations should be continuously sealed with a backer rod and sealant.

Water-Resistive Barrier (WRB)

The water-resistive barrier is a critical barrier that controls water.

Like the WSS, the CMU wall itself along with grout, mortar, and core insulation provide the WRB critical barrier of this assembly. The addition of water-repellent admixtures within the block and mortar and the use of a surface-applied clear water repellent at the wall face will assist with increasing the water-resistivity of the assembly. Additional measures, such as those discussed in the Water-Shedding Surface (WSS) section of this chapter and addressed within the NWCMA Tek Note on Rain Resistant Architectural Concrete Masonry, increase the water-resistivity of the assembly.

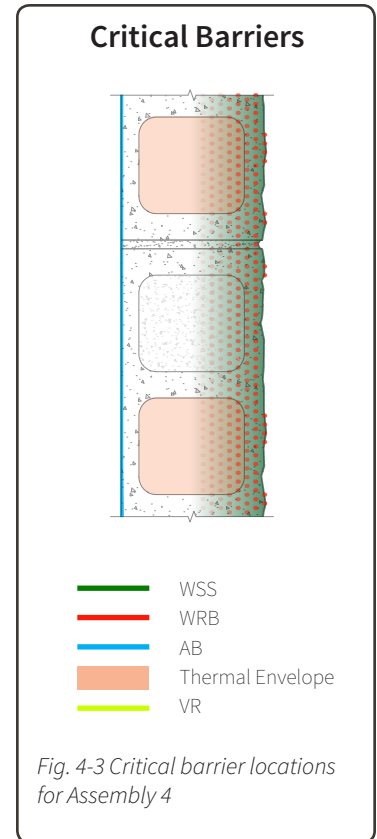


Fig. 4-3 Critical barrier locations for Assembly 4

Additional WRB components include flexible flashing membranes at parapet tops, fluid-applied flashings at rough openings, sealant joints, and fenestration systems as shown on the details included at the end of this assembly chapter.

To increase the water-resistivity of this assembly, a vapor-permeable fluid-applied WRB may be applied to the inside face of the assembly, or an elastomeric coating applied to the exterior CMU wall face may be considered. Refer to the introductory chapter for more information on vapor-permeable WRB discussion.

Air Barrier (AB)

The air barrier is a critical barrier that primarily controls air, heat, and vapor. The AB also controls water, sound, and fire.

The AB system in this assembly is typically satisfied through “deemed to comply” options within the energy codes that govern in the Northwest. Section C402.4 of the 2012 International Energy Conservation Code (IECC), Washington State Energy Code (WSEC), Seattle Energy Code (SEC) and Section 502.4 of the 2014 Oregon Energy Efficiency Specialty Code (OEESC) include “deemed to comply” air barrier considerations including:

- Fully grouted concrete block masonry is a deemed to comply AB material.
- “Concrete masonry walls coated with one application either of block filler or two applications of paint or sealer coating” is a deemed-to-comply air barrier assembly provided all joints are sealed.
- “A Portland cement/sand parge, stucco, or plater minimum 1/2-inch in thickness” is a deemed-to-comply air barrier assembly.

Where a fluid-applied AB and WRB membrane is opted for at the interior face of this assembly or an exterior elastomeric coating applied, these membranes along with window rough opening detailing form the AB system.

Thermal Envelope

The thermal envelope is a critical barrier that controls heat and assists with controlling vapor, sound, and fire.

In this wall assembly, the core insulation provides the thermal envelope. At transition details, the thermal envelope also includes insulation at the roof assembly, slab, and foundation elements. Windows and doors that penetrate this wall are part of the thermal envelope.

The CMU wall of this assembly is also a thermal mass; thus, may provide thermal mass benefits as discussed in the introductory chapter.

Additional thermal envelope discussion is provided in the Thermal Performance and Energy Code Compliance section of this chapter and the introductory chapter.



Fig. 4-4 Installation of self-expanding foam-in-place CMU core insulation

Insulation Selection

This assembly uses core insulation to meet thermal performance requirements of the energy code. Insulation may be loose fill such as perlite but is commonly an expanding resinous foam-in-place insulation product. Foam-in-place insulation is injected through ports typically drilled through the CMU mortar joints following the construction of the CMU wall and grouting similar to that shown in Fig. 4-4.

Vapor Retarder (VR)

The VR critical barrier is a layer that retards or greatly reduces (e.g., vapor barrier) the flow of water vapor due to vapor pressure differences across enclosure assemblies. Unlike the other critical barriers presented in this guide, the VR is not always necessary or required to be continuous.

This assembly has no vapor retarder and utilizes the IBC Section 1405.3 vapor retarder exception for “construction where moisture or its freezing will not damage the materials.” Note that the partially grouted cells do have some vapor-retarding properties but are not relied upon for control of vapor diffusion.

Thermal Performance and Energy Code Compliance

This chapter assembly is typically classified as a “mass” for energy code compliance purposes. Prescriptive energy code compliance values for this assembly are summarized in Table 4-3 on page 4-8 and describe:

- Minimum insulation R-values for a **prescriptive R-value compliance strategy**. When complying with this strategy, Chapters 1, 5, and 6 assemblies should be considered.

- Maximum assembly U-factors for a **prescriptive U-factor alternative compliance strategy**. The effective thermal performance of this assembly is dependent on the properties of the CMU (including density, size, and web configuration) and is also impacted by the grouting schedule and core insulation type. Assembly thermal performance values may be determined from the Thermal Catalog of Concrete Masonry Assemblies published by the National Concrete Masonry Association.
- Footnote (2) for compliance by **exception**. The exception within the 2012 WSEC and 2014 OEESC may be used:

“Provided at least 50% of block cores are filled with vermiculite (or equivalent fill insulation) and enclosing one of the following uses: gymnasium, auditorium, church chapel, arena, kennel, manufacturing plant, indoor swimming pool, pump station, water and wastewater treatment facility, storage facility, restroom/concessions, mechanical/electric structures, storage area, warehouse (storage and retail), and motor vehicle service facility.”

The 2012 WSEC further clarifies:

“Where additional uses not listed (such as office, retail, etc.) are contained within the building, the exterior walls that enclose these areas may not utilize this exception.”

A grouted area calculation chart is provided in Table 4-2 to assist with determining the area percentages of grouted cores versus ungrouted cores (e.g., cores available for insulation fill).

When a **non-prescriptive compliance option** (e.g., a trade-off strategy or whole-building modeling strategy) is used for energy code compliance, this assembly’s effective thermal performance will need to be calculated; however, it may or may not be required to meet the prescriptive values shown in Table 4-3.

Refer to Fig. i-17 on page i-29 of the introductory chapter, which describes the typical process of navigating energy code compliance strategies and options.

Project-specific thermal performance values for the opaque above-grade wall assembly of this chapter should be used for energy code compliance and should be determined from a source that is approved by the local governing jurisdiction. Sources may include the Appendices of the WSEC and SEC, ASHRAE 90.1, COMcheck, thermal modeling, or other industry resources.

Table 4-2 Percent ungrouted and grouted area based on grouted cell spacing

| Percent UngROUTed Area/Percent Grouted Area | | | | |
|---|---------------------------------|-------|-------|-------|
| Horizontal Grout Spacing (Inches) | Vertical Grout Spacing (Inches) | | | |
| | 48 | 40 | 32 | 24 |
| 48 | 69/31 | 67/33 | 63/37 | 56/44 |
| 40 | 67/33 | 64/36 | 60/40 | 53/47 |
| 32 | 63/37 | 60/40 | 56/44 | 50/50 |
| 24 | 56/44 | 53/47 | 50/50 | - |

Movement Joints

The CMU wall of this assembly functions as both the WSS and the structure. CMU is a concrete-based product. It, along with the mortar, will shrink over time due to initial drying, temperature fluctuations, and carbonation. Not only will shrinkage movement need to be considered, but differential movement between the CMU structure and other structural elements, deflection, settlement, and various design loads will need to be addressed.

Crack control within the CMU should be considered to increase water-resistivity of this assembly. Material properties and reinforcing methods of the CMU structural wall should be implemented to reduce cracking; however, control joints within the CMU wall should be implemented to provide a plane of weakness to reduce shrinkage stresses and provide continuity of the WSS at these locations. Control joints in CMU can be constructed in a number of ways. Regardless of the method used, a continuous backer rod and sealant joint should be installed at the joint as shown in Fig. 4-5 on page 4-8 to assist with water shedding and water penetration resistance.

Refer to the introductory chapter for more information on locating movement joints and sealant joint best practices.

Structural Considerations

The CMU block wall of this assembly provides the primary structure of this assembly. It is the responsibility of the Designer of Record to ensure that all structural elements are designed to meet project-specific loads and local governing building codes. Generic placement of grout and reinforced elements are demonstrated within the details of this chapter and are provided for diagrammatic purposes only.

Table 4-3 Assembly 4 prescriptive energy code compliance values excerpted from Table i-1 of the introductory chapter

| OPAQUE ABOVE-GRADE WALL – THERMAL ENVELOPE REQUIREMENTS | | | | | | |
|---|--------------------------|---------------------------------|------------------------|-------------------------|------------------------|---------------------|
| Energy Code | 2012 SEC | 2012 WSEC | 2014 OEESC | 2012 IECC | | |
| Climate Zone | 5 and Marine-4 | 5, 6 and Marine-4 | 5 and Marine-4 | 5 and Marine-4 | 6 | |
| Guide Assembly # | All Other | All Other | All Other | All Other | Group R | Group R |
| 4 | Integrally Insulated CMU | Exterior: R-16ci ⁽¹⁾ | Group R | R-13.3ci ⁽²⁾ | R-13.3ci | R-13.3ci |
| | | U-0.057 (R-17.5) | U-0.057 (R-17.5) | U-0.078 (R-12.8) | U-0.078 (R-12.8) | U-0.078 (R-12.8) |
| | Mass | Exterior: R-16ci ⁽¹⁾ | All Other | R-11.4ci | R-11.4ci | R-13.3ci |
| | | U-0.057 (R-17.5) | U-0.104 ⁽²⁾ | U-0.150 ⁽²⁾ | U-0.078 (R-12.8) | U-0.078 (R-12.8) |
| | | | (R-9.6) | (R-6.7) | U-0.090 ⁽²⁾ | U-0.078 (R-12.8) |
| | | | | | U-0.090 ⁽²⁾ | U-0.078 (R-12.8) |
| | | | | | U-0.078 (R-11.1) | U-0.078 (R-12.8) |
| | | | | | U-0.078 (R-12.8) | U-0.071 (R-14.1) |

⁽¹⁾ When using interior insulation: R-13 + R-6 ci for wood studs or R-13 + R-10 ci for metal studs, when using exterior insulation R-16 ci
⁽²⁾ Provided at least 50% of block cores are filled with vermiculite (or equivalent fill/insulation), and enclosing one of the following uses: gymnasium, auditorium, church/chapel, arena, kennel/manufacturing plant, indoor swimming pool, pump station, water and waste water treatment facility, storage facility, restroom/concessions, mechanical/electric structures, storage area, warehouse (storage and retail), and motor vehicle service facility, in Washington, where additional uses not listed (such as office, retail, etc.) are contained within the building, the exterior walls that enclose these areas may not utilize this exception.



Fig. 4-5 Vertical CMU control joint

CMU Wall

The CMU in this assembly should comply with ASTM C90. Mortar designed for the CMU should conform to ASTM C270 as well as ASTM C1714 when specifying preblended mortar. The mortar type selected should be appropriate for the CMU application; Type S is typically specified. Grout components should comply with ASTM C 476 while aggregate within the grout should comply with ASTM C 404.

Block and mortar should both be specified and provided with a water-repellent admixture as discussed in the Water Repellents section below and the introductory chapter. Refer to the Northwest Concrete Masonry Association for additional information on specifying block, mortar, and grout.

The CMU and mortar joints should be installed in conformance with industry-standard best practices, manufacturer requirements, and guidelines outlined in the NWCMA Tek Note on Rain-Resistant Architectural Concrete Masonry. Appropriate product selection and installation of CMU and mortar materials is necessary to provide a durable and water-resistive cladding

system. The specifics of architectural characteristics and structural properties of the block, mortar, grout, and reinforcing should be designed and reviewed by a qualified Designer of Record. Various industry resources are available to assist with CMU wall design and are listed in the Resources section at the back of this guide.

Corrosion Resistance

For sheet-metal flashings that are integrated within this assembly (including through-wall flashings and sheet-metal drip flashings), it is best practice to provide components that are manufactured of ASTM A167 Type 304 or 316 stainless steel, which is nonstaining and resistant to the alkaline content of mortar and grout materials.

Whereas the use of stainless steel sheet-metal flashing components is not always economically feasible or aesthetically desirable, prefinishing sheet-metal may be considered. Where used, the base sheet metal should receive a minimum G90 hot-dipped galvanized coating in conformance with ASTM A653 or minimum AZ50 galvalume coating in conformance with ASTM A792. The exposed top finish of the sheet metal is recommended to have an architectural-grade coating conforming to AAMA 2605.

Water Repellents

Both integral water-repellent admixtures and a surface-applied clear water repellent are included with this assembly and assist with reducing the water absorption of the CMU wall and encourage water-shedding. Water-repellent admixtures should be used both in the CMU and mortar. Admixture within block units should comply with NCMA TEK 19-7 while mortar admixture should comply with ASTM C1384. More discussion on surface-applied clear water repellents is provided in the introductory chapter.

Both CMU and mortar admixtures as well as surface-applied water repellent should have known compatibility performance.

Pricing Analysis

A pricing analysis for this assembly is provided on Table 4-4 on page 4-11. Pricing demonstrates the relative price per square foot and is based on a 10,000-square-foot wall area with easy drive-up access. Pricing is valued for the 2015–2016 calendar year. Current pricing is also available at www.masonrysystemsguide.com.

Online Availability

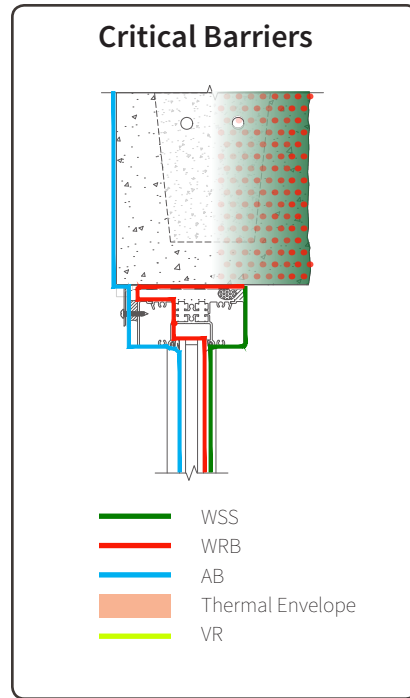
The content of this guide and additional resources may be accessed online at www.masonrysystemsguide.com. Also available online are downloadable versions of two- and three-dimensional assembly details and cutaway sections as well as sample project specifications. Ongoing updates to references and resources included within this guide can also be accessed.

Table 4-4 Assembly 4 integrally insulated CMU pricing analysis

| Assembly 4: Integrally Insulated CMU | | | | | |
|---|-----------------------|---|--|----------------|----------------|
| Assembly Component | Baseline Product | Alternate (call for estimate) | Baseline Cost/ft ² (incl. labor) | | |
| | | | Low | High | |
| INTERIOR | | | | | |
| 1* | Structural CMU wall | 8"x8"x16" standard split-face block with integral block and mortar water repellent; partially grouted | No specified alternate | \$19.00 | \$25.00 |
| 2 | Optional | Groundface block and colors alternates | No specified alternate | \$0.75 | \$2.75 |
| 3 | Rebar | Standard code reinforcement; minimum Category D requirement | Additional reinforcing | \$2.00 | \$5.00 |
| 4 | Core insulation | Resinous foam insulation at block cores | Perlite insulated cores | \$1.25 | \$1.75 |
| 5* | Clear water repellent | Surface-applied clear water repellent | No specified alternate | \$1.25 | \$2.00 |
| EXTERIOR | | | | | |
| Total cost to install 10,000 sq ft wall area w/easy drive-up access --> | | | | \$24.25 | \$36.50 |
| <p>Pricing Analysis Discussion</p> <ul style="list-style-type: none"> - Low and high baseline costs are based on the baseline products listed. Call for an estimate for alternate product pricing. - Baseline costs provided will vary based on product specifics and should be used as an estimate only. - Block prices are for typical units as noted. Pricing can vary based on size, color, and finish and should be confirmed with the unit manufacturer. - *See the Resources section of this guide for a list of resources related to this component. | | | <p>Assembly Plan View</p> | | |

LEGEND

1. Typical Assembly:
 - Single-wythe CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
2. Sealant over backer rod
3. Fluid-applied AB/WRB flashing membrane
4. Continuous AB sealant, tie to continuous seal at window perimeter
5. Continuous back dam angle at rough opening perimeter, minimum 1 inch tall. Fasten window through back dam angle per window manufacturer recommendations
6. Storefront window



Detail Discussion

- To promote watershed away from the window and wall below, consider a sheet-metal flashing with hemmed drip edge as shown in Fig. 4-6.
- AB and WRB continuity is provided by the fully grouted or insulated CMU cores, fluid-applied flashing membrane at the rough opening, and AB sealant transition to the storefront.
- The WSS and WRB critical barriers are at/near the face of the CMU wall. The backer rod and sealant provides continuity of the WSS between the CMU wall and storefront window.

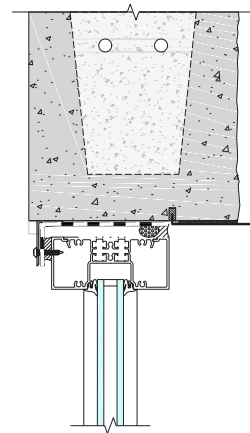
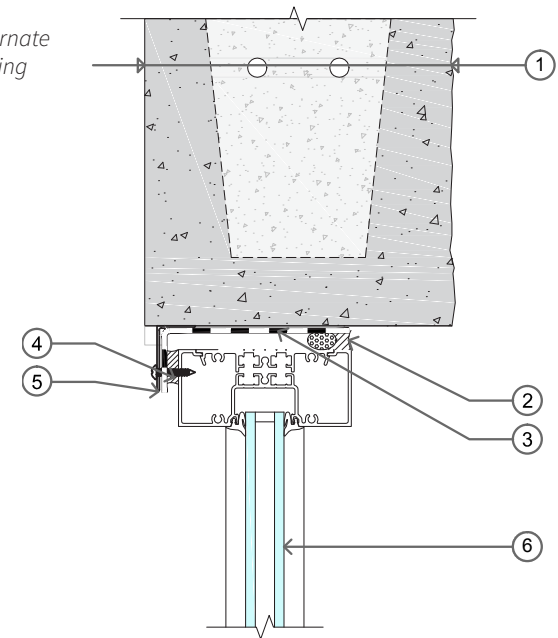


Fig. 4-6 Assembly 4 alternate sheet-metal head flashing

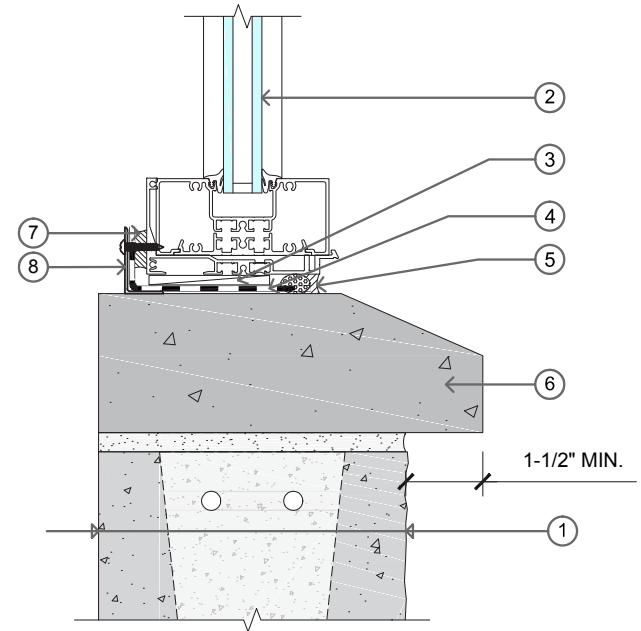
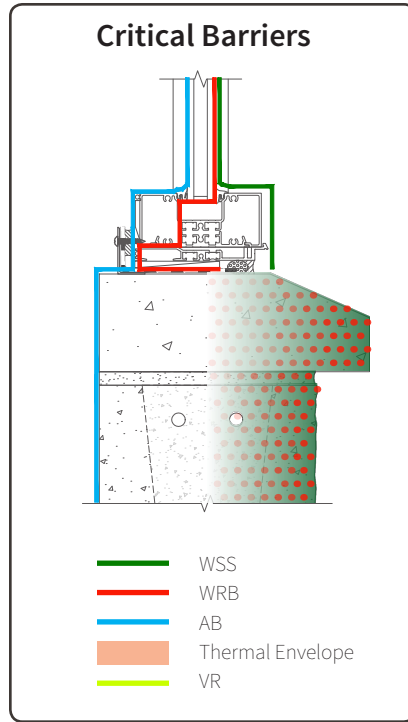


Storefront Window Head

Detail 4-A

LEGEND

1. Typical Assembly:
 - Single-wythe CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
2. Storefront window
3. Minimum 1/4-inch intermittent shims
4. Fluid-applied AB/WRB flashing membrane
5. Wept backer rod and sealant joint
6. Sloped precast concrete sill
7. Continuous AB sealant tied to continuous seal at window perimeter
8. Continuous back dam angle at rough opening perimeter, minimum 1-inch tall, with window fastened through the back dam angle per window manufacturer recommendations



Detail Discussion

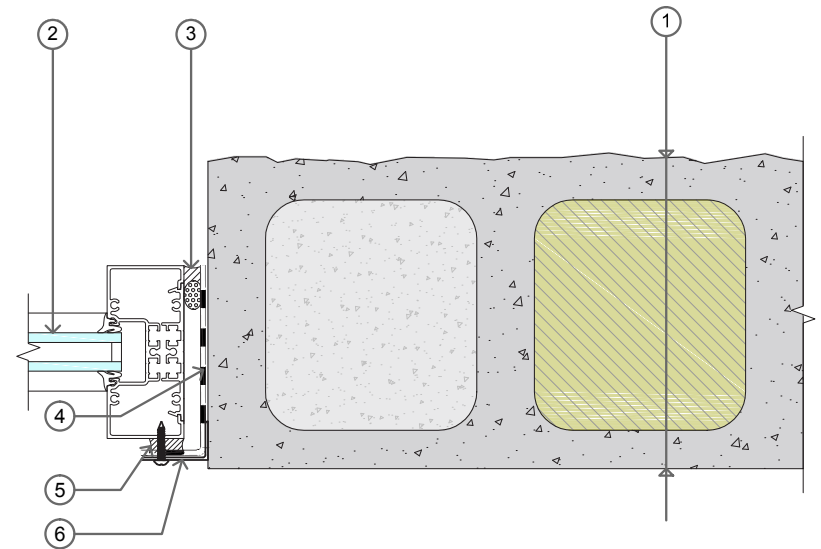
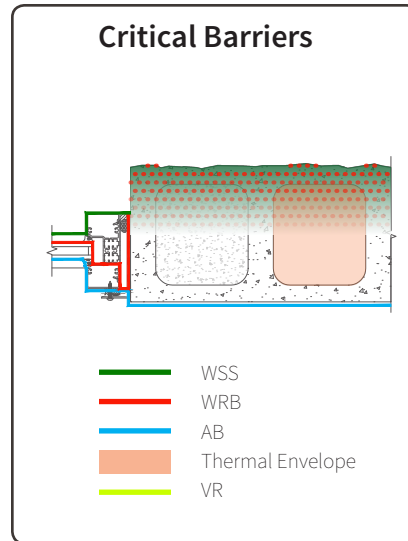
- Intermittent shims which support the sill allow the window rough opening to drain to the exterior. The exterior backer rod and sealant joint at the sill is wept at 1/4-points along the sill to allow for drainage.
- When a sill can is used with the storefront system, a fluid-applied flashing membrane at the rough opening should still be used as shown in this detail. The sealant joint at the sill is wept to provide drainage of the window rough opening.

Precast Window Sill

Detail 4-B

LEGEND

1. Typical Assembly:
 - Single-wythe CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
2. Storefront window
3. Sealant over backer rod
4. Fluid-applied AB/WRB flashing membrane
5. Continuous AB sealant tied to continuous seal at window perimeter
6. Continuous back dam angle at rough opening perimeter, minimum 1 inch tall with the window fastened through the back dam angle per window manufacturer recommendations



Detail Discussion

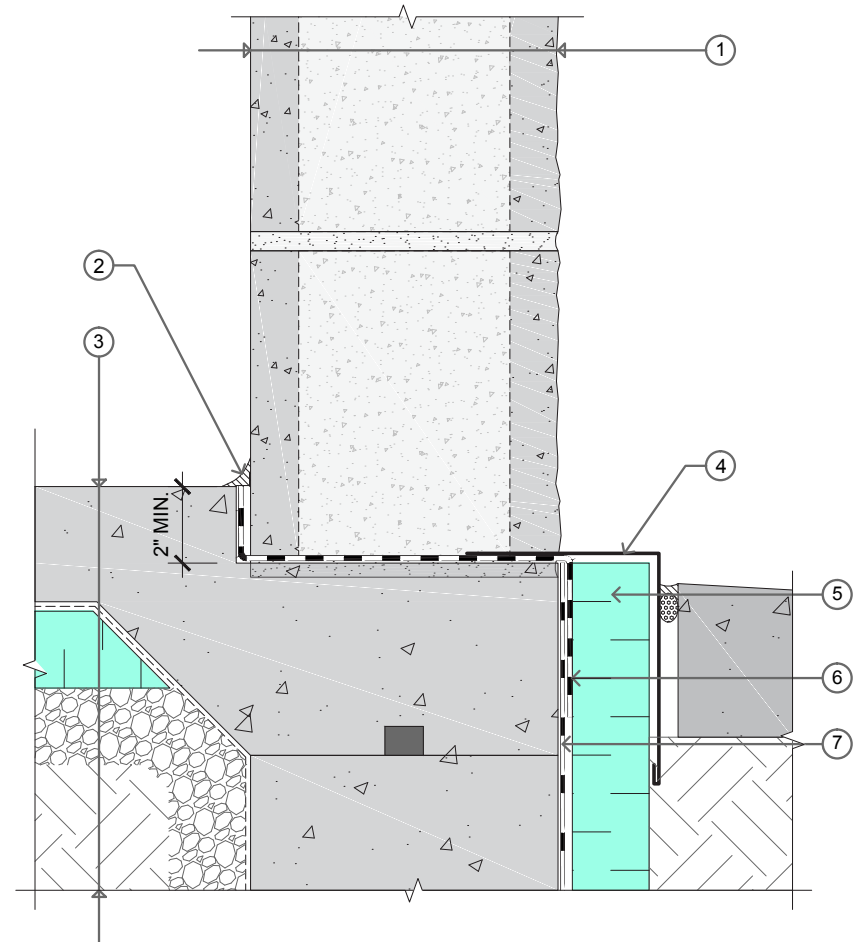
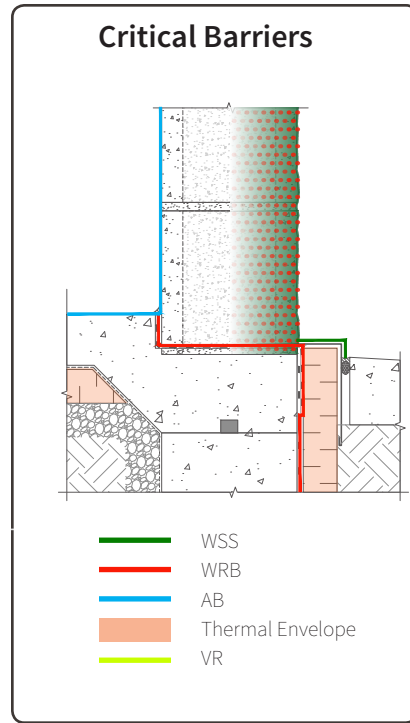
- A fluid-applied flashing is recommended at the window rough opening due to its self-terminating properties.
- The continuous back dam angle shown allows for perimeter attachment of the storefront window without the need for F-clips or similar anchors which often inhibit the AB system critical barrier at the window perimeter. Attachment methods for the storefront window should be confirmed with the window manufacturer during the design phase of the project.

Storefront Window Jamb

Detail 4-C

LEGEND

1. Typical Assembly:
 - Single-wythe CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
2. Continuous AB seal
3. Typical Assembly:
 - Thickened concrete floor slab
 - Vapor barrier
 - Rigid XPS insulation
 - Capillary break
4. Sheet-metal base-of-wall flashing with hemmed edge
5. Rigid XPS insulation
6. Fluid-applied AB/WRB flashing membrane or flexible self-adhered flashing membrane
7. Damp-proofing



Detail Discussion

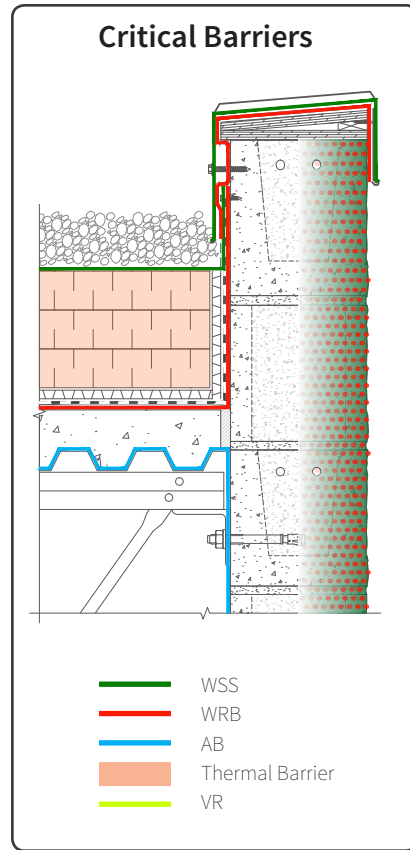
- The sheet-metal base-of-wall flashing protects the rigid XPS foundation insulation from UV exposure and damage. The hemmed edge strengthens the sheet-metal flashing to reduce visual oil-canning. Acceptability of this sheet-metal flashing placement should be confirmed with the project's structural engineer.
- A step at the thickened concrete floor slab perimeter encourages any water collection at the wall base to occur below the finish floor elevation. A minimum of 2-inches should be provided.
- The continuous AB seal transfers the AB system critical barrier from the CMU wall assembly to the concrete floor slab.

Typical Thickened Concrete Floor Slab

Detail 4-D

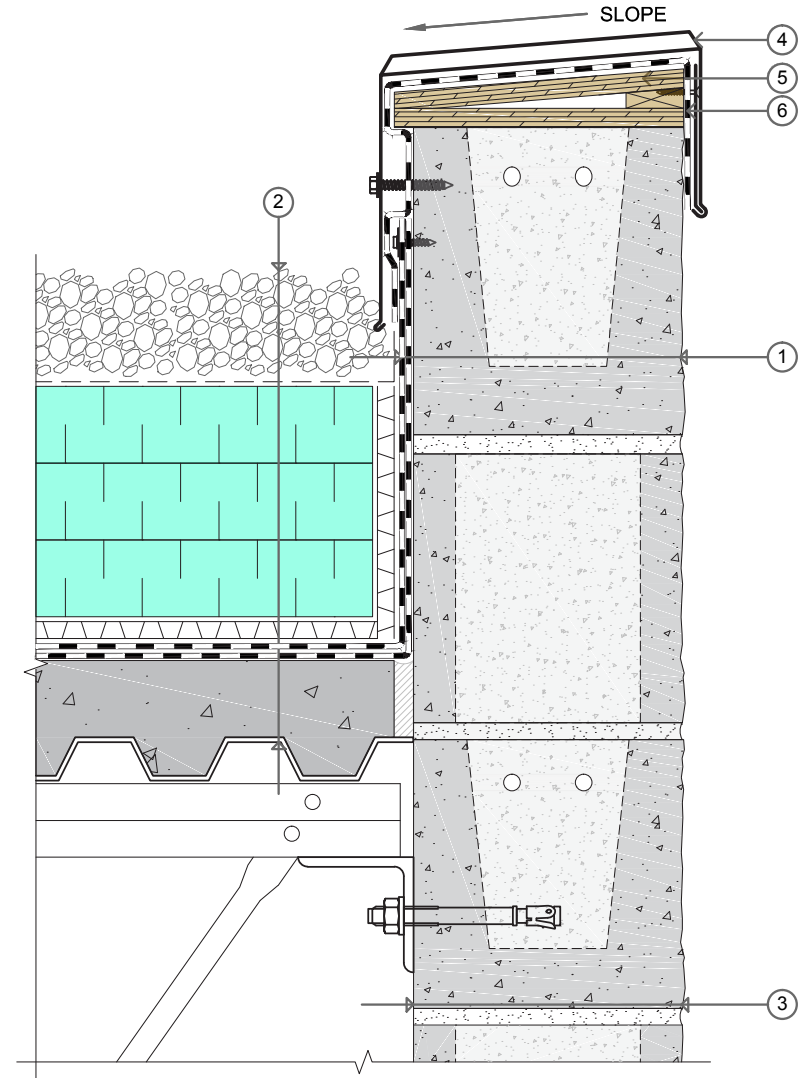
LEGEND

1. Parapet Assembly
 - Inverted roof membrane system
 - Single-wythe CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
2. Inverted roof membrane assembly
3. Typical Assembly:
 - Single-wythe split-face CMU wall with water-repellent admixture at block and mortar
 - Partial core insulation
 - Clear water repellent
4. Standing-seam sheet-metal coping with gasketed washer fasteners
5. Preservative-treated blocking
6. High-temperature self-adhered membrane



Detail Discussion

- The sheet-metal coping with hemmed drip edge protects the wall top and assists with shedding water away from the CMU wall face. The sheet-metal cap should counterflash the top course of block by a minimum of 3-inches.
- When a fluid-applied AB/WRB membrane is applied to the interior face of the single-wythe CMU (to increase water-resistivity and/or to assist with airtightness) this membrane should extend onto the bottom of the roof structure and should be continuous around anchors.



Typical Parapet at Inverted Roof Membrane Assembly

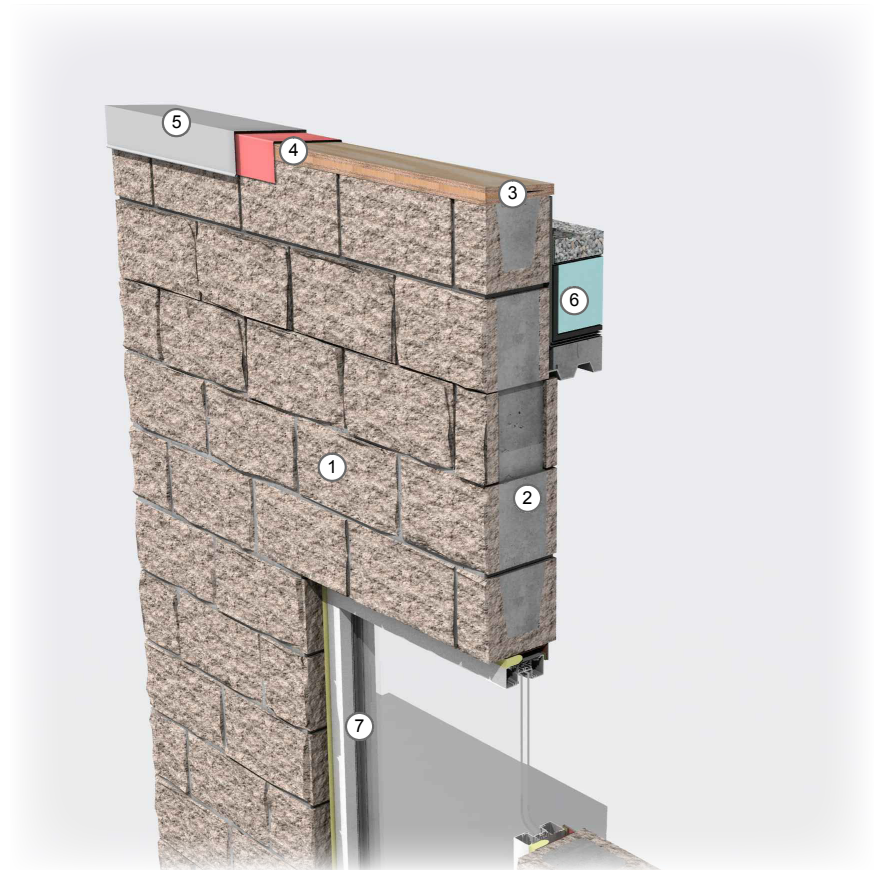
Detail 4-E

LEGEND

1. Single-wythe CMU wall with water-repellent admixture within block and mortar
2. Partially grouted CMU wall
3. Preservative-treated blocking
4. High-temperature self-adhered membrane
5. Standing-seam sheet-metal coping with gasketed washer fasteners
6. Inverted roof membrane assembly
7. Storefront window

3-D Detail Discussion

- Three-dimensional cutaway sections on the next three pages represent two-dimensional details of this assembly.
- This assembly is deemed to comply with some energy code exceptions when at least 50% of the CMU cores are insulated. Some cores may be grouted as shown in Detail 4-F and others insulated as shown in Detail 4-G.
- The high-temperature self-adhered membrane and standing-seam sheet-metal coping protect the top of the wall from water exposure. The sheet-metal drip edge deflects water away from the wall face.
- Detail 4-H describes a typical rough opening with continuous back dam angle. The sill back dam angle creates a sill pan below the window; intermittent shims below the storefront window promote drainage at the sill and out through the sealant joint weeps.
- As shown in Detail 4-G, insulation below the thickened concrete floor slab and exterior of the foundation wall provide additional protection against heat loss at the wall-to-slab interface. The sheet-metal flashing protects the XPS insulation from UV and damage.

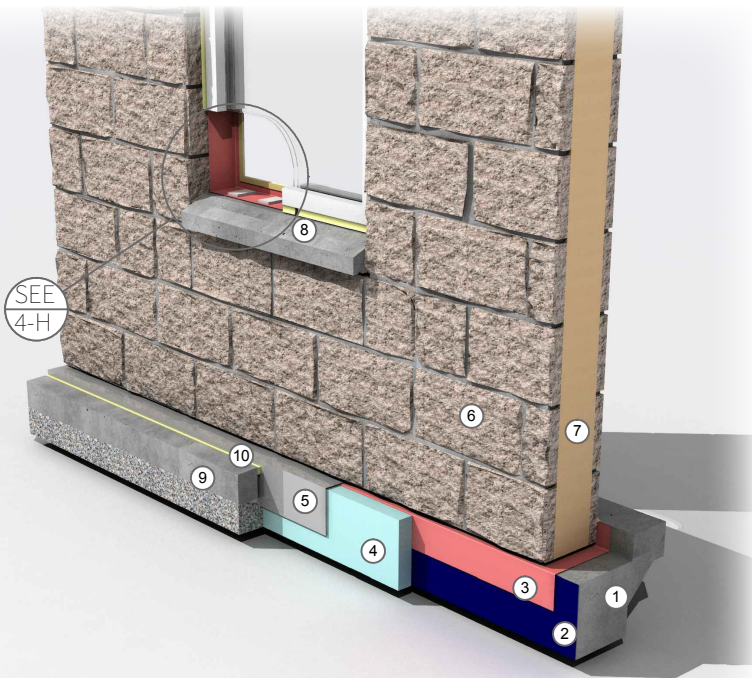


Parapet Assembly Section

Detail 4-F

LEGEND

1. Thickened concrete floor slab
2. Damp-proofing
3. Fluid-applied AB/WRB flashing membrane or flexible self-adhered flashing membrane
4. Rigid XPS foundation insulation
5. Sheet-metal base-of-wall flashing with hemmed edge
6. Single-wythe CMU wall with water-repellent admixture within block and mortar
7. Core insulation
8. Sloped precast sill
9. Concrete sidewalk or other hardscape
10. Continuous hardscape sealant joint

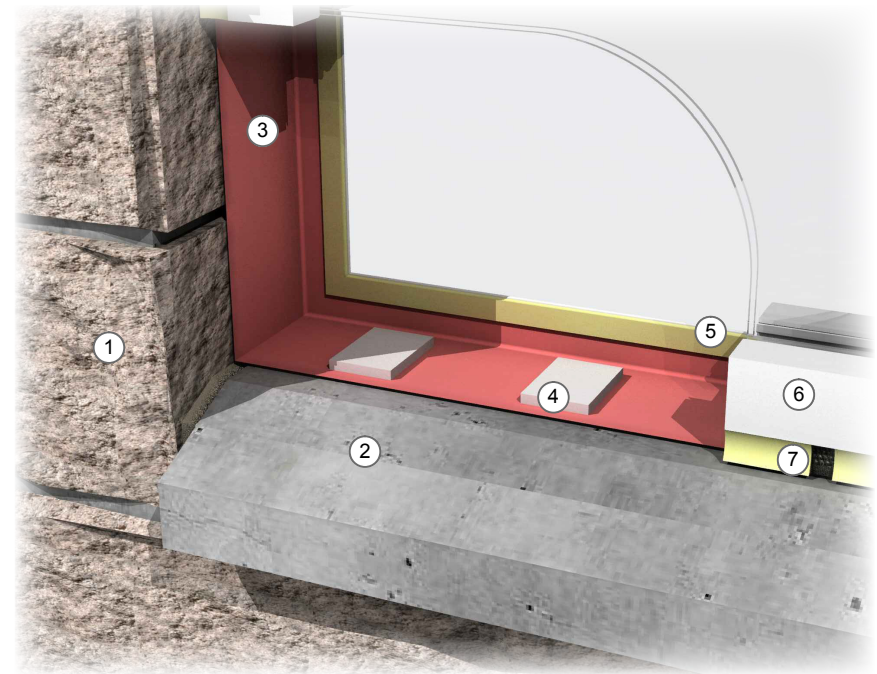


Base of Wall Cutaway Section

Detail 4-G

LEGEND

1. Single-wythe CMU wall with water-repellent admixture within block and mortar
2. Sloped precast sill
3. Fluid-applied AB/WRB flashing membrane
4. Minimum 1/4-inch intermittent shims for drainage
5. Continuous AB sealant tied to continuous seal at window perimeter
6. Storefront window
7. Wept backer rod and sealant joint



Window Jamb and Sill Cutaway Section

Detail 4-H