



2022 SPEC-BRIK® Detailing Guide

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2022 SPEC-BRIK® Detailing Guide

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Introduction

Masonry is one of the oldest and most prevalent construction materials, but many designers are not aware of its numerous performance benefits including structural soundness, fire resistance, mold resistance, energy efficiency, superior durability and sustainability. By combining the beneficial properties of concrete masonry with the latest developments in construction technology, we can provide owners with truly high performance building envelopes that are safe, cost-effective, withstand extreme weather conditions, and energy efficient. Masonry is perfect for providing long lasting comfort and structural integrity. These benefits make concrete masonry an excellent choice for sustainable construction. Recent Code developments increasingly recognize the structural qualities of masonry which make masonry construction more efficient and cost-effective than ever.

Masonry not only meets extreme design parameters, it also offers the flexibility to design projects that balance cost concerns against typical project requirements including time of construction, Code and contractual requirements, and aesthetics. In this Guide, we will offer strategies that will deliver high performance and cost-effective building envelopes using a versatile single wythe masonry wall system: SPEC-BRIK®, which combines the aesthetic appeal of brick with the cost-effectiveness of concrete masonry.

What is High Performance Concrete Masonry?

High Performance Concrete Masonry uses state of the industry best practices relating to the construction of concrete masonry and related building envelope components to produce a building envelope that efficiently meets or exceeds project requirements in a cost-effective manner. While these techniques comply with Code, they also in many instances include additional recommendations that can deliver superior results when it comes to moisture protection, energy efficiency, or other key issues.

Comprehensive Construction Details

This Guide includes a set of Construction Details that offer high performance recommendations for how to detail a variety of common structural elements. Each detail is supported by typical notes and a set of supporting Code references.

A key focus of the details is moisture control. We have attempted in the details to provide guidance for a comprehensive approach to moisture control (some might refer to this as a "belt and suspenders" approach) for long lasting superior performance. There are several general principles in the construction details that address the primary design challenges. It is useful to look at these challenges in a generally applicable way in order to understand what is driving the details. Table 1 lists the common moisture control challenges and how they are addressed in the Guide Details.

Design Issue	Strategies
Condensation at thermal bridge areas (bond beams, lintels, anchorage points, wall base)	<ul style="list-style-type: none"> • Use of WCT™ Block • Integral Water Repellent in block and mortar • Insulate and isolate thermal bridge • Air/Vapor Barrier adjacent to masonry on interior • Consider use of Lighter Weight Block and Grout
Ground moisture penetration (from landscape irrigation, soil condensation and other sources)	<ul style="list-style-type: none"> • Waterproofing of below grade wall area • Insulation • Exterior drainage- Aprons, splashes or tapered soil zone; diversion of stormwater • Integral Water Repellent • Moisture barriers under pad • Elevation offset
Base of Wall Saturation (snow and ice or stormwater accumulation)	<ul style="list-style-type: none"> • Integral Water Repellent • Full grouting
Inadequate Drainage at Collection Points	<ul style="list-style-type: none"> • Flashing and weeps– protected during coating or sealing

Table 1- Moisture Control Strategies

Summary of Moisture Control Tools:

A comprehensive approach to moisture control should consider the following complementary elements:

Surface Protection

- Properly tooled Mortar Joints
- Post-Applied Penetrating Breathable Sealants –or–
- Post-Applied Exterior Breathable Film Forming Coatings
- Masonry appropriate Bead or Gap Sealers (with primer)
- Masonry Accessories

Internal Protection

- Integral Water Repellents in CMU and mortar
- Block Design features (Water Control Technology – WCT™)
- Non-absorptive Integral Insulation
- Integral Air/Vapor Barriers
- Joint and Structural Reinforcement (movement and crack control Design Details
- Collection, Drainable Flashing, Drainable Drip Edges, Drainable Weeps, and Drainable Vent Systems
- Vestibules, and Roof or Window Projections
- Building Aprons

A Note About Masonry Flashing

There are many types of flashing available today, each with its own characteristics. This Guide assumes design and construction compliance with applicable Building Codes as amended and adopted. A Flashing map is included in the next section to show the typical locations where flashing should be considered. Further, and when applicable, the Guide assumes the use of flashing (whether generic, specialized or proprietary, partial or completely through-wall, etc). Yet it also reflects the choices and options available to the Design Community rather than insisting on any particular type of primary and secondary moisture control strategy (belt-and-suspenders approach) regarding a particular project.

For example, there are circumstances where a member of the Design Community with permission of the Certified Building Official (via Plan Review, etc.) may choose primary and secondary methods of moisture control other than the inclusion of flashing. As an example when very heavy reinforcement and grouting is required, generic flashing may be considered impractical or onerous within a multi- or single-wythe masonry wall. Fully grouted walls are a viable, and in some cases, optimal option in place of partially grouted walls. When using full grout, there is no need for flashing and weeps except at areas where there are wall penetrations such as windows or other openings. Similar alternate strategies may be chosen for uniform masonry barrier wall elements. Solid grouted composite (completely grouted – including collar joints – multi-wythe masonry; see Masonry Code TMS 402 definition), solid grouted non-composite multi-wythe masonry walls, and solid grouted single-wythe walls are all considered barrier walls.

Codes and Standards References

There are numerous provisions of Code that are applicable to the construction of masonry walls, many of which are found in sections that may not intuitively seem to be related to masonry. Similarly, there are a variety of applicable standards that may related to other building components or general areas of concern such as energy conservation. We have included a comprehensive set of references to applicable Codes and Standards for the construction of structures using masonry. These are based on Model Code provisions. As always, designers should look to the local Code requirements for guidance on particular

projects.

Guide Specification

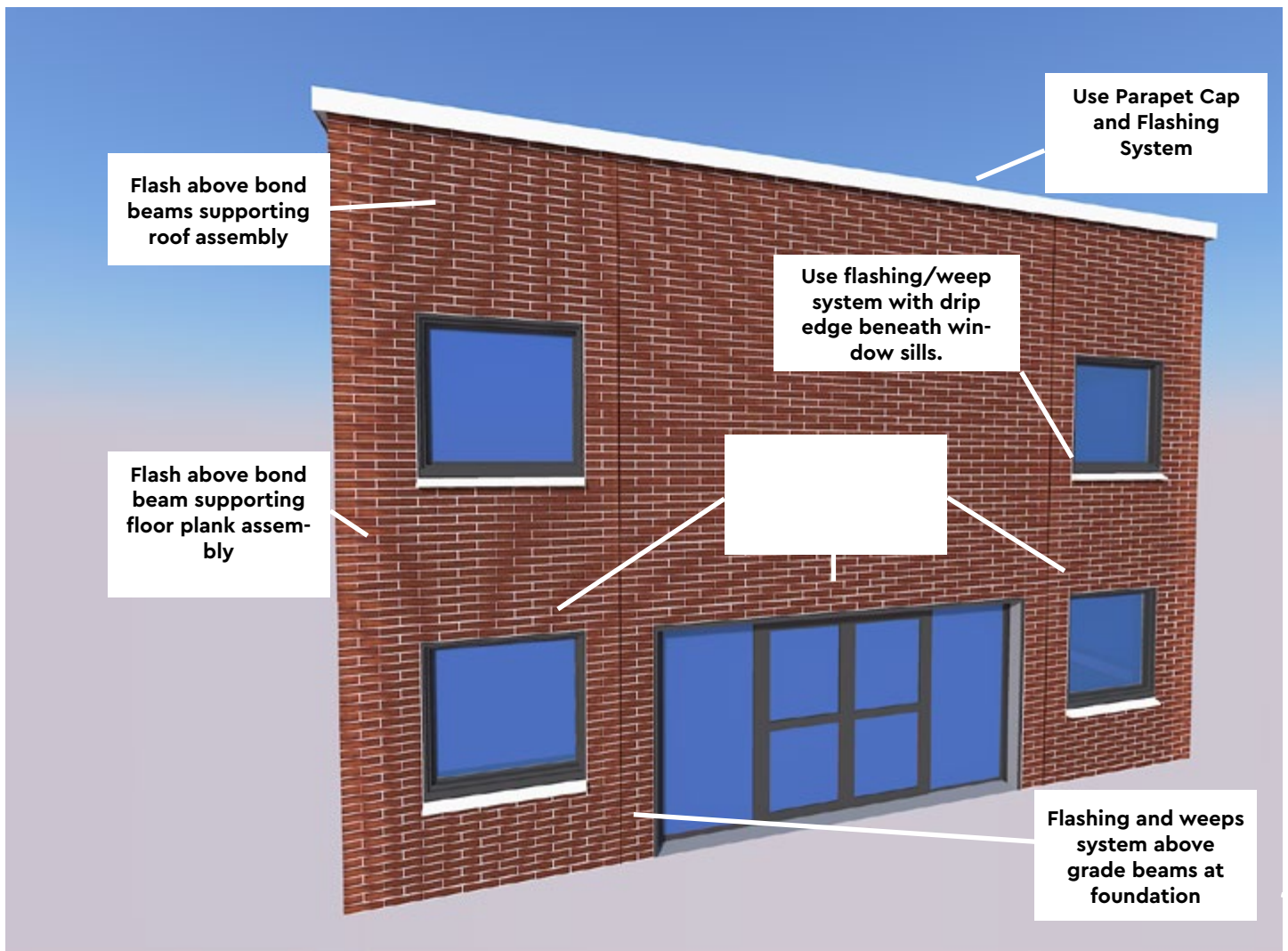
The recommendations incorporated in the construction details are also supported by the Spec-Brik® guide specification, which is an adaptation of an industry standard specification.

Design Resource Center

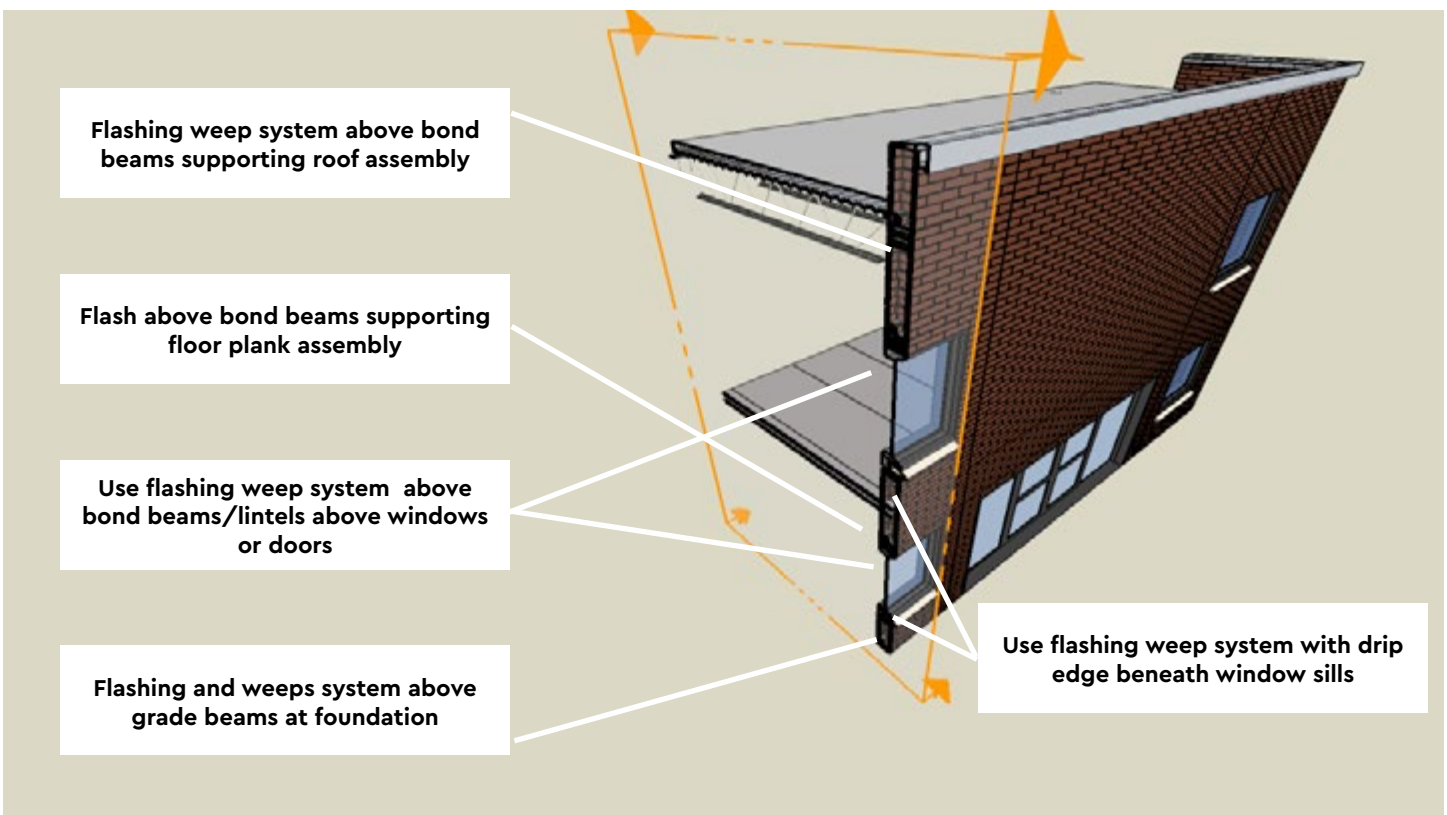
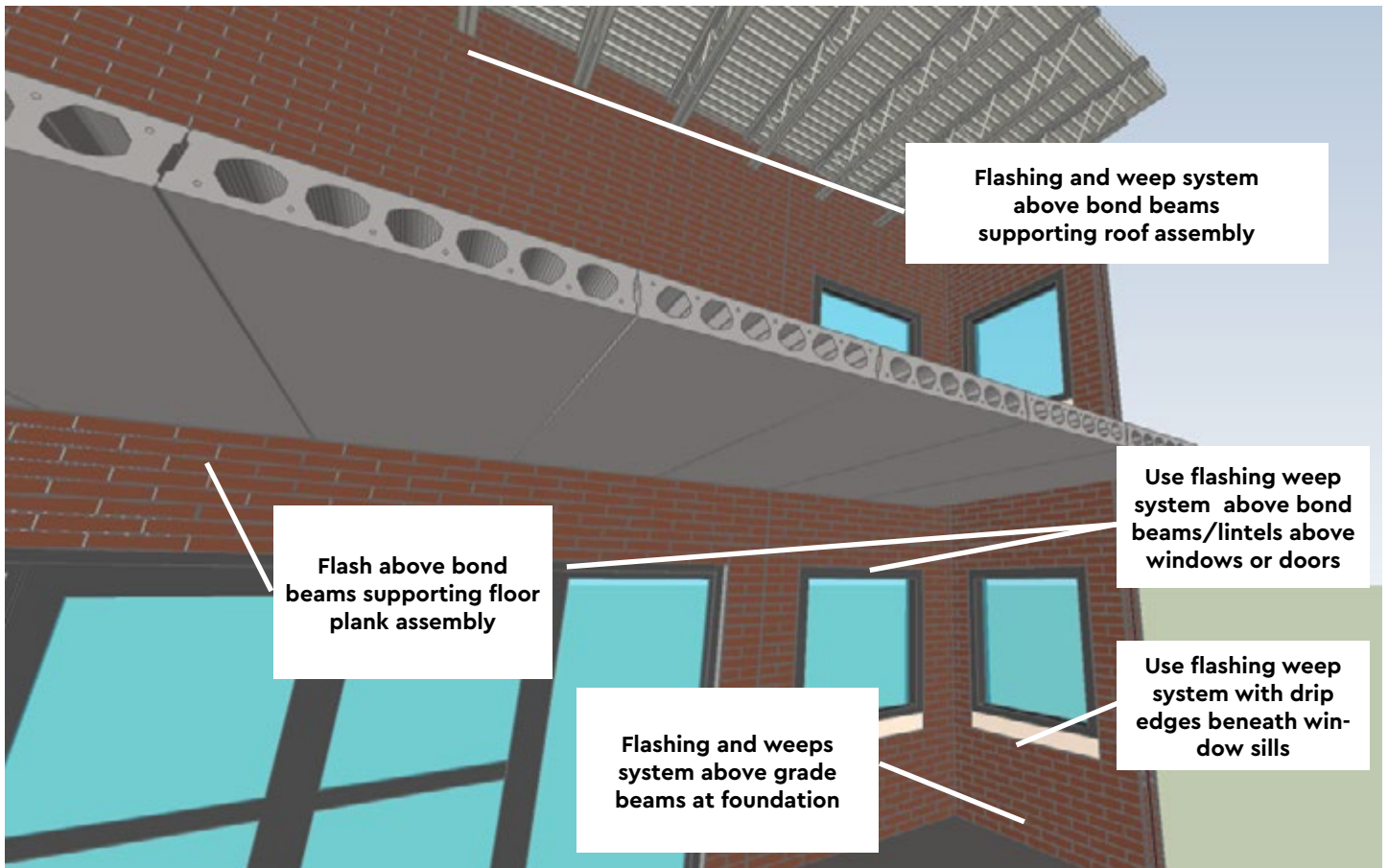
The Concrete Products Group has a dedicated website to provide designers access to design tools, the Design Resource Center, which is a registration based site. The site includes a variety of resources including downloadable versions of the details in this manual in AutoCAD® or Revit formats, our Masonry Designer color catalog and Revit Plug-in, design and construction notes and videos, and other helpful resources. You can request free registration to the site at this link:

[Design Resource Center Access Page: resources.concreteproductsgroup.com](https://resources.concreteproductsgroup.com)

Flashing Placement Map



Flashing Locations – *Flashing should be placed above any interruption in the vertical drainage plane of the wall assembly*





Section I SPEC-BRIK® and SPEC-BRIK WCT™

SPEC-BRIK® Concrete Masonry Units

SPEC-BRIK units are integrally pigmented smooth textured units that have the appearance of brick. They are typically available in "half-high" heights – nominal 4" height – to match the aesthetics of brick (Full height – nominal 8" high unit- are also available). Architectural half high masonry units are a very cost-effective and durable method to match the aesthetics that a traditional brick veneer cavity wall would offer.

Spec-Brik Key Features

ASTM Standard: SPEC-BRIK® Architectural Masonry units are load-bearing concrete masonry units that meet ASTM C 90.

Unit Compressive Strength: ASTM C 90 requires that load-bearing masonry units have a 1900 psi minimum net area compressive strength. There are however, advantages to raising the compressive strength to 2000 psi, as this will allow more efficient structural designs.

Unit Dimensions: Nominal 4" [8"] height x 4" [8" or 12"] depth x 16" [8"] length. Nominal dimensions for masonry take into account the thickness of mortar joints, which are typically 3/8". As a result, the actual dimensions are: 4" nominal = 3-5/8" actual; 8" nominal = 7-5/8" actual and 16" nominal = 15-5/8" actual.

Integral Water Repellent: In most jurisdictions, the use of integral water repellent admixtures (IWR) in both the concrete masonry units and mortar for single wythe masonry structures is highly recommended as part of a belt-and-suspenders moisture control strategy. The standard specification for Spec-Brik™ includes IWR.

In California, due to unique code requirements, IWR needs to be used in the mortar but not necessarily within the block. The distinction of when to include IWR within CMU is project dependent. In such cases the use of a compatible post-applied drainable and breathable wall sealer is one method used to seal the block and mortar.

Integral Water Repellent Admixtures are typically a polymeric material. For CMU that it is mixed into the concrete mix design at the manufacturing plant. Assuming masonry walls are designed, constructed, and maintained correctly as applicable to project conditions, and when used in accordance with the supplier's warranty, IWR should last the lifetime of the concrete masonry unit and help reduce the possibility of efflorescence. Proper design and construction does not assume repeated exposure to improper roof or floor drainage, prolonged plumbing leaks, irrigation sprinklers or related hydrostatic head pressures, salt-spray, landscape and related chemicals, nor expansive and/or sulfate-bearing soils, for example without additional means and methods to resist associated deleterious and/or corrosive effects. Be sure to specify the use of a compatible integral water repellent admixture in the mortar.

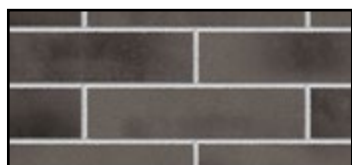


**Countless Aesthetic Options
with SPEC-BRIK®**

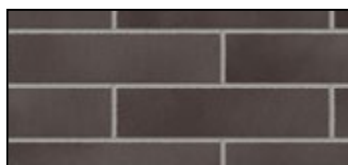


Spec-Brik® Colors

Spec-Brik is available in 12 Standard Colors (custom colors are also available)



Basalt Blend



Chesapeake Blend



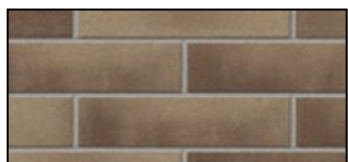
Delaware Blend



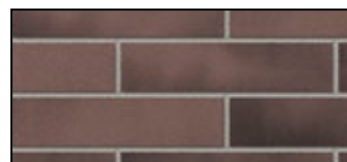
Dixon Blend



Flint Blend



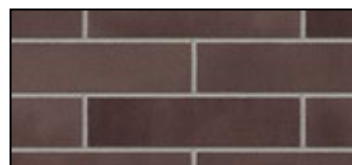
Gardner Blend



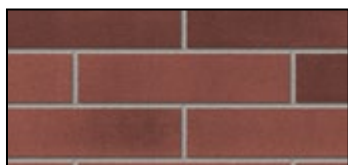
Houston Blend



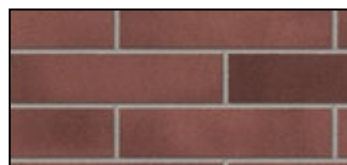
Jefferson City Blend



Panama City Blend



Philadelphia Blend



St. Cloud Blend



Stanton Blend

The colors above are digital renderings of blended Spec-Brik colors. Due to the limitations of the printing process and the importance of viewing masonry materials under realistic site lighting conditions, we strongly recommend viewing a sample board before making color selections and using a job site sample panel as the basis for acceptance of the final work.

Masonry Designer Software

Masonry Designer Software is available at www.concreteproducts.com. This software allows designers to render wall sections with all CPG products and colors, including Spec-Brik, Spec-Block (grey CMU), and Spec-Split (Architectural Split face CMU). The program allows selection of both block and mortar colors, and allows experimentation with combinations of different colors and textures

SPEC-BRIK WCT™

SPEC-BRIK WCT™ is a new, patented block design that encourages proper drainage of moisture in concrete masonry walls. WCT stands for "Water Control Technology". SPEC-BRIK WCT™ is particularly well-suited for use in single wythe masonry walls due to its design elements that redirect any moisture that penetrates into the wall shell downward to the wall's flashing and weep drainage systems. WCT, however, can be an excellent complement to any comprehensive moisture control strategy for masonry construction, and is available in a variety of shapes for the construction of single or multi-wythe walls.

WCT Key Features

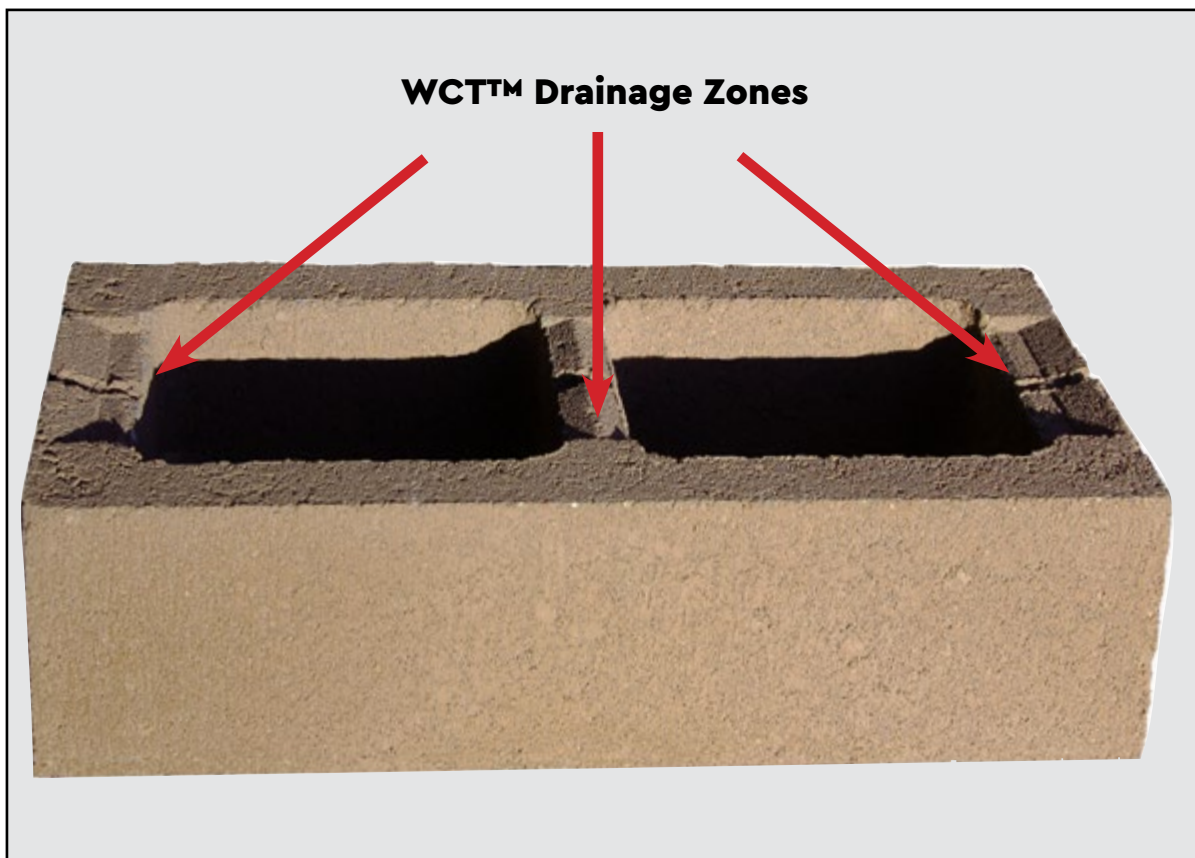
Moisture Control Features. SPEC-BRIK WCT™ uses specially designed drainage zones on the top web of the block, along with subtle texturing and other features to redirect the path of moisture that would otherwise tend to move laterally across the block web towards the interior surface of the wall.

Adaptability. WCT can be employed on a variety of block shapes and fittings. It is invisible from any external viewing angle once the block has been put in place, so it allows the construction of corners or ends without any aesthetic or structural concerns.

Ease of Use. WCT is installed using standard materials and techniques. Integral Water Repellent (IWR) is used in the mortar and block.

Compatibility. WCT works perfectly with traditional moisture control techniques and materials. Each block contains IWR.

Compliance with ASTM Standard: SPEC-BRIK® WCT™ units are load-bearing concrete masonry units that have been tested for compliance with ASTM C 90.



Using Sample Panels – A Proven Method to Drive Successful Results.

In general, the designer should follow the requirements of the most current edition of the "Building Code Requirements and Specification for Masonry Structures"

The jobsite sample panel must be constructed and approved before the masonry work begins on the project. All samples and submittals except the mortar color must be approved before the jobsite sample panel is constructed.

Mortar joint color and tooling greatly influence the finished appearance of the wall and must be approved in the sample panel, and tooled by the mason contractor selected for the project.

Construct the sample panel on the jobsite at a highly visible location where it will not be disturbed before the completion of this project. Use only the materials that were approved in the submittal review and masonry units that were already manufactured for this project.

The contractor should place orders for jobsite sample panel materials with masonry producers so that they have advance notice to manufacture and collect the full range of color for the building for shipment on a separate pallet.

The minimum size of the sample panel dimensions must be at least 4 ft. by 4 ft. A larger panel may allow more options to test cleaning and sealing. One approach is to build a sample panel that is 4ft by 8ft in order to demonstrate how the wall looks both before and after cleaning and surface treatments.

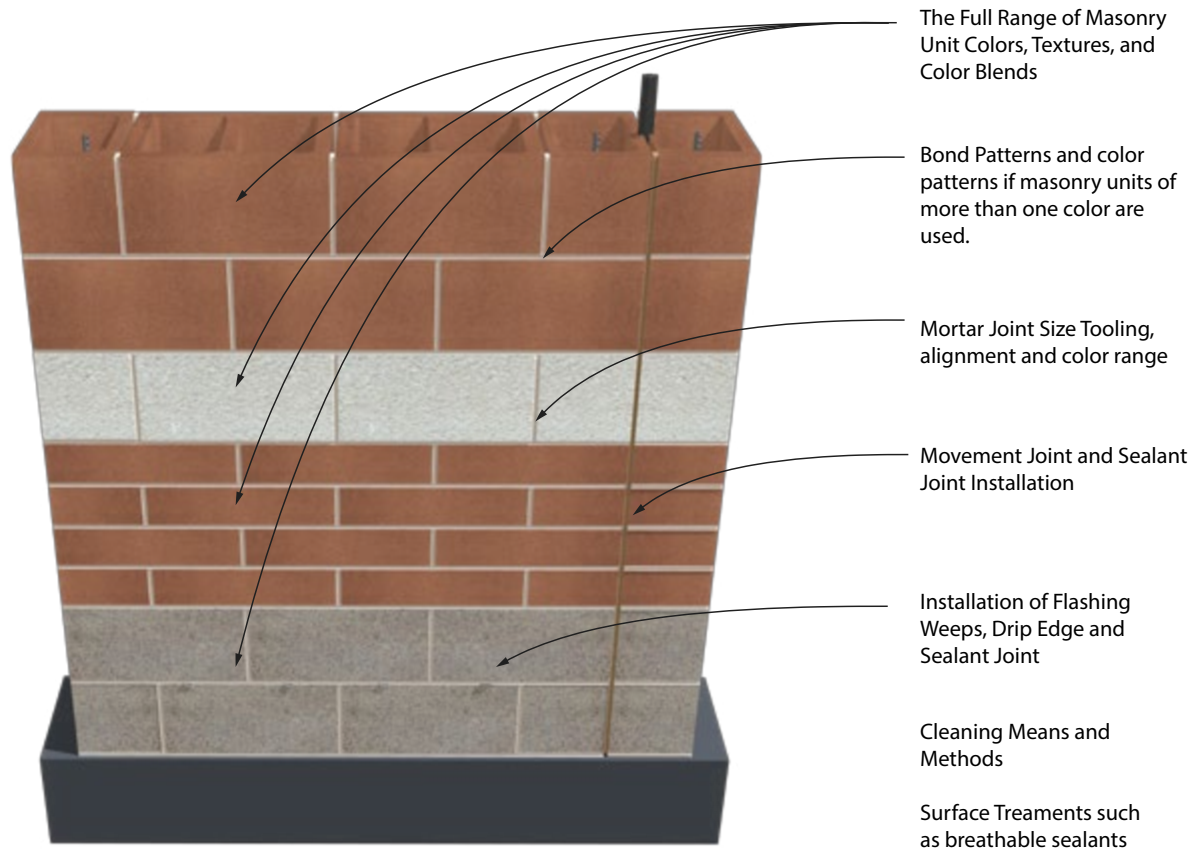
The purpose of jobsite sample panel is to show the acceptable standard of work for the project and it must include:

- The full range of masonry unit color and texture that will be visible in the finished walls.
- Bond pattern and color pattern if masonry units of more than one color are being used.
- Chippage dimensions and frequency including dimensional variation per project specifications.
- Mortar joint size, tooling, alignment, texture and color range.
- If colored mortar is used, the color must be judged after the sample panel has had sufficient time to dry.
- Installation of flashing, weeps, drip edge and sealant joint.
- Movement joint installation and sealant joint
- Cleaning means and methods.
- Surface treatments such as breathable sealants.

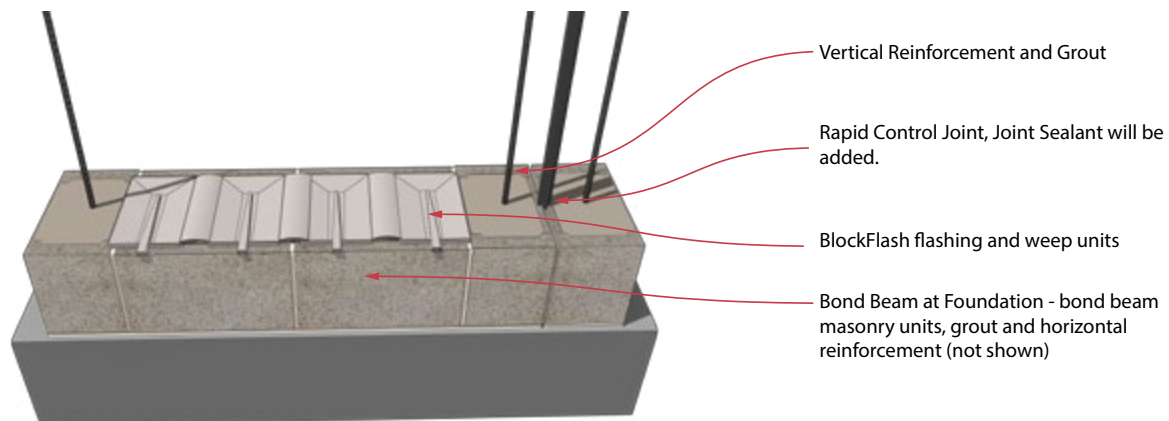
The sample panel will be used for final acceptance of the masonry work and must remain unharmed until the masonry is complete and accepted. The Masonry Code charging language states:

"The acceptable standard for the Work is established by the accepted panel."

The sample panel will be viewed from a distance of 20 feet away under diffused lighting to evaluate the results.



Sample Panel - Items Demonstrated for Approval and Workmanship Standard Setting



Sample Panel- Bond Beam Flashing Detail



Section II Construction Details

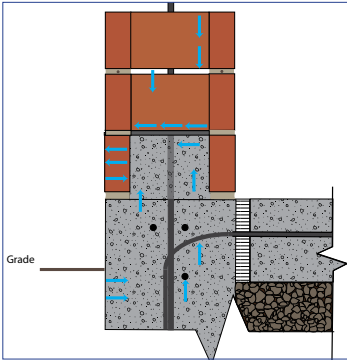


Figure 1. Moisture Movement in a Typical Wall

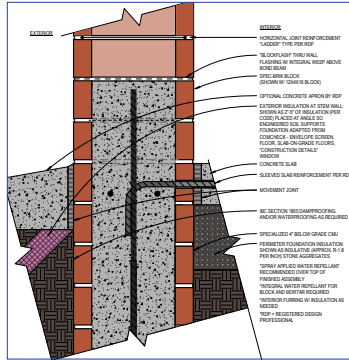


Figure 2. Exterior, Spec-Brik Foundation and Pad

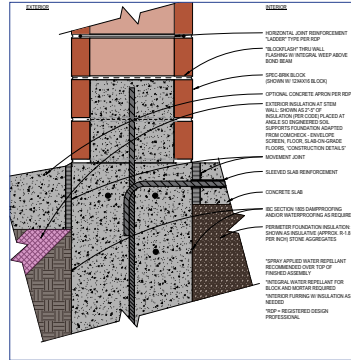


Figure 3. Exterior, Poured Foundation and Pad

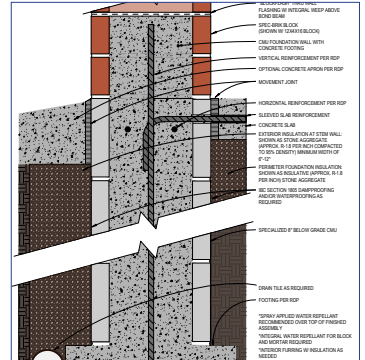


Figure 4. Exterior, CMU Foundation, and Insulative Aggregates

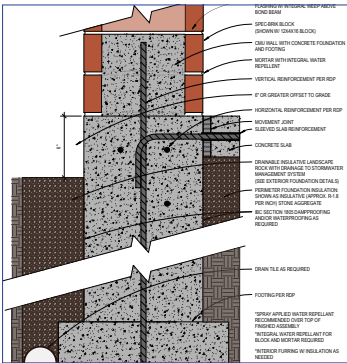


Figure 5. Exterior, Poured Foundation, Pad and Insulative Aggregates

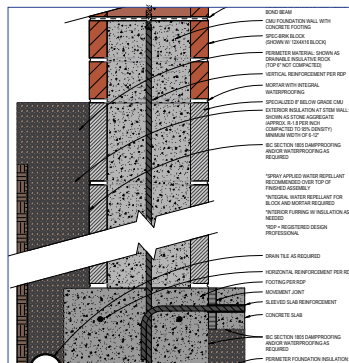


Figure 6. Exterior, Below Grade CMU Wall, and Insulative Aggregates

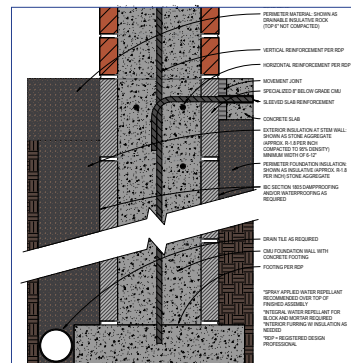


Figure 7. Exterior, CMU Foundation, Insulative Aggregates

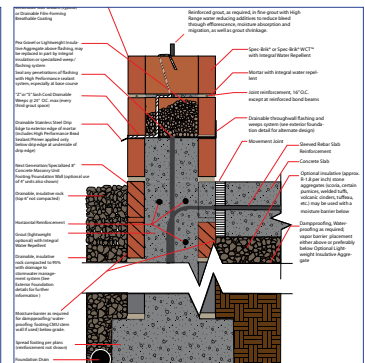


Figure 8. Exterior, Z-Cord Weep, CMU Foundation, Insulative Aggregates

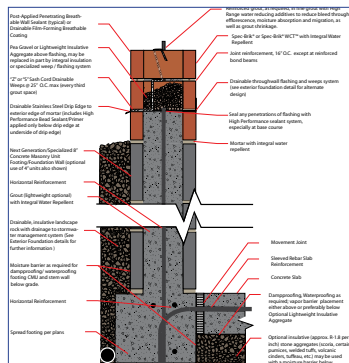


Figure 9. Exterior, Z-Cord Weep, Below Grade CMU Wall

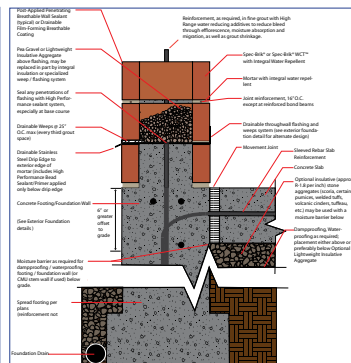


Figure 10. Exterior, Z-Cord Weep, Poured Foundation

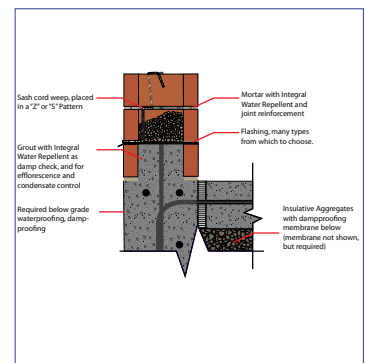
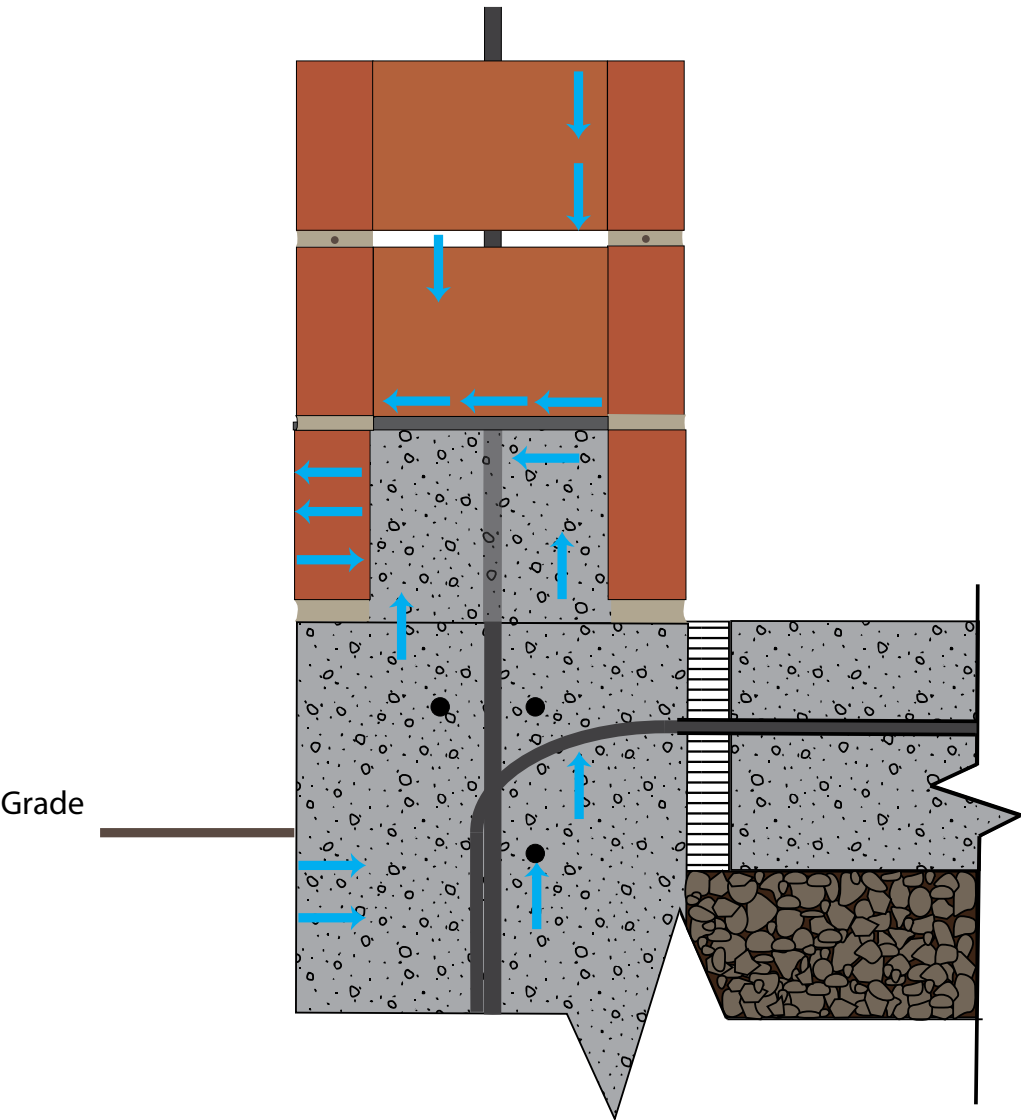


Figure 11. Z-cord flashing detail

Foundation and Base of Wall

Figure 1. Moisture Movement in a Typical Wall



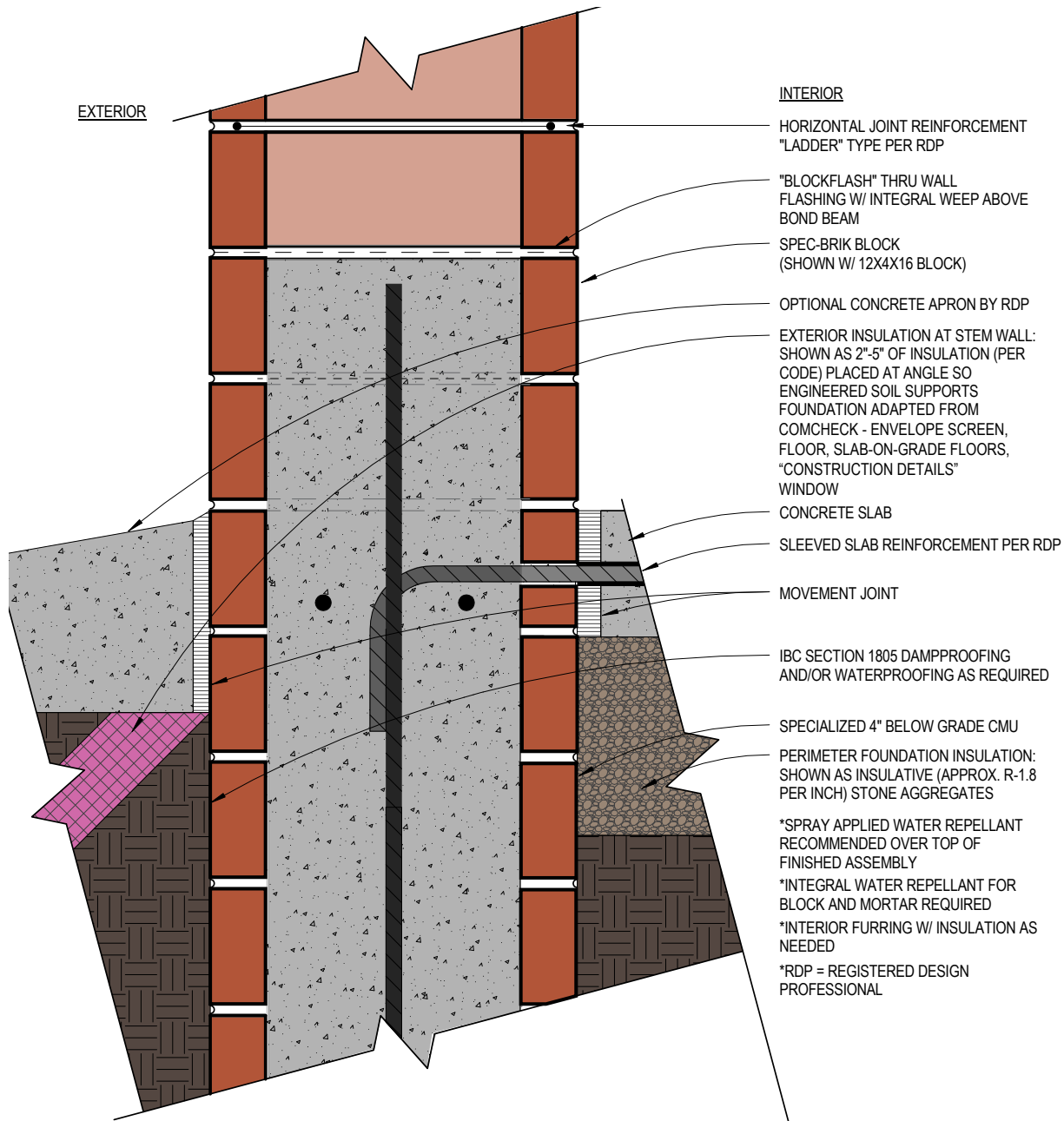
Typical Notes:

1. This illustration shows how absorbed moisture (along with dissolved salts and sulfates) whether from rain, sprinklers, ice/snow, or soil migrates through the area near the base course flashing layer. This is a key area for moisture control through the use of a High Performance sealing and drainage system in this multi-functional area.
2. In order to control moisture penetration from this area, the use of Integral Water Repellent within the mortar, CMU, and grout is very useful, but not always sufficient without the flashing and weep systems that are required by Code. These systems allow the collection and redirection of moisture downward and to the exterior via flashing and weeps.
3. Using an integrated system consisting of proper materials (IWR in the CMU, mortar and grout, and possibly with breathable sealants or breathable, drainable coatings) and a functional drainage system to allow water to exit the wall system is the key to success. Field water intrusion testing can confirm the success of moisture control.

Codes and Standards References

Applicable References are found in Section III.

Figure 2. Exterior, Spec-Brik Foundation and Pad



THE DETAILS PRESENTED IN THIS MANUAL ARE STANDARD DETAILS. DESIGNERS SHOULD MAKE SITE SPECIFIC INVESTIGATIONS TO DETERMINE ACTUAL DESIGN REQUIREMENTS, WHICH MAY VARY.

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THESE STANDARD DETAILS ARE MEANT TO ILLUSTRATE GENERAL PRINCIPLES THAT MAY BE HELPFUL, HOWEVER, FINAL DESIGN AND CONSTRUCTION SHOULD BE BASED ON ACTUAL SITE CONDITIONS AND APPLICABLE LOCAL CODE AND STANDARDS. MANY SITE OR LOCAL CONDITIONS MAY REQUIRE SPECIFIC ADDITIONAL DESIGN CONSIDERATIONS. SUCH CONDITIONS MAY INCLUDE SEISMIC ACTIVITY, LOCAL CLIMATE, WIND LOAD AND STORM CONDITIONS (INCLUDING LIKELIHOOD OF TORNADO OR HURRICANE CONDITIONS), SITE SOILS AND DRAINAGE CONSIDERATIONS, AND A VARIETY OF OTHER FACTORS THAT MAY IMPACT BUILDING PERFORMANCE ON A PARTICULAR SITE.

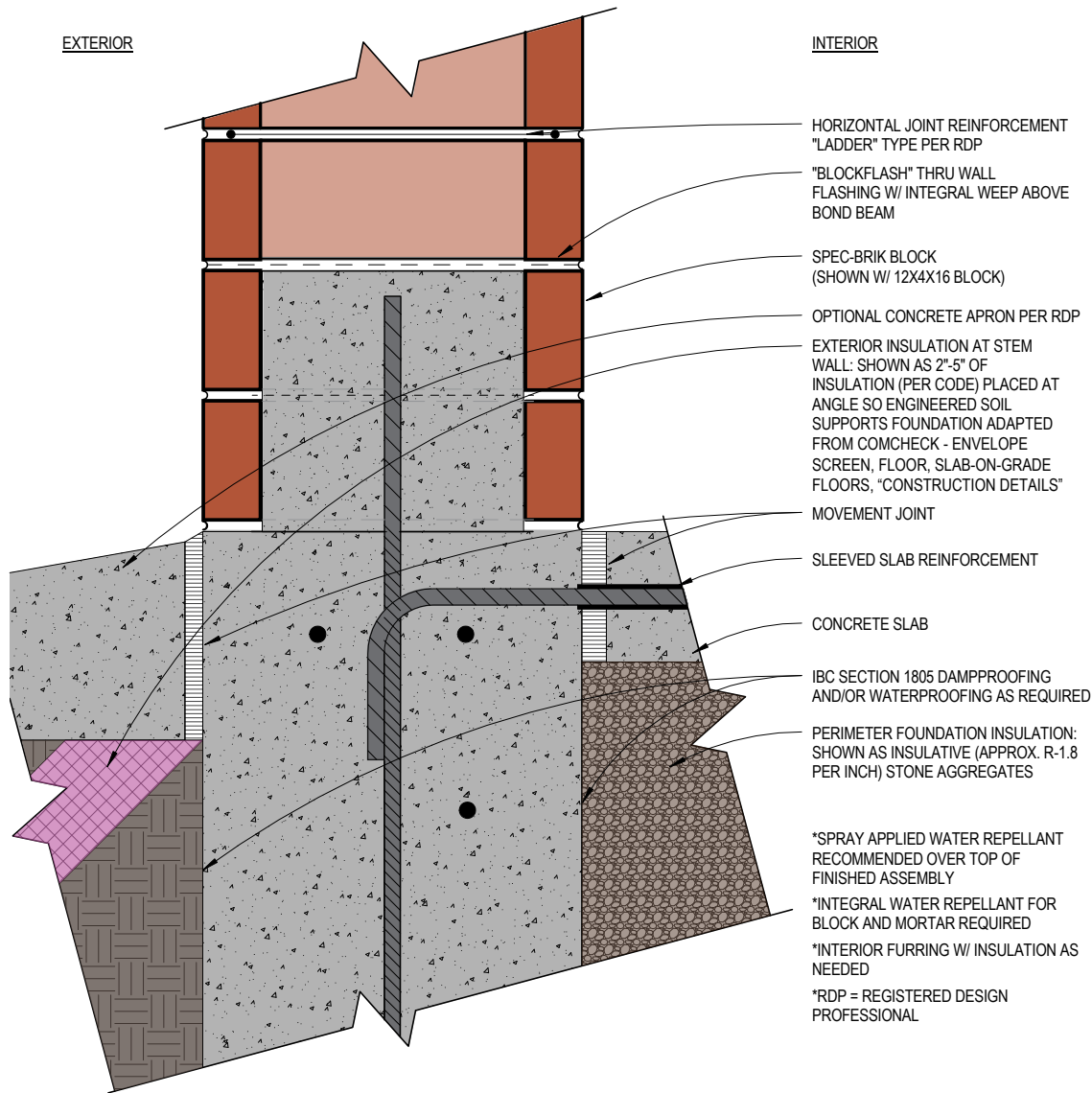
Typical Notes

1. Consult with Structural and/or Geotechnical Engineers for appropriate below-grade insulation material and placement.
2. A tapered (30° from horizontal) 6" zone of free-draining gravel extending from the height of the finished floor to the top of the engineered soil may be substituted for the concrete apron shown.
3. If the zone near the base of wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the footing, foundation wall, foundation, and slab. Isolate the footing, foundation and slab from such elements. The height of the soil and nearby draining curbs should be at least 6 inches below top of finished floor to prevent damage from accumulated mulch, and absorption, pooling or flooding of water.
4. Minimum 6" soil / top of finished floor / footing elevation offset. Within this 6" deep offset, a drainable landscape layer of lightweight insulative aggregate may be placed. This in turn can be combined with a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to spread footing with perforated drainage collection pipe at spread footing. The drainage collection pipe leads to a stormwater drainage system (this is depicted in Figure 4).
5. If landscaping is to be used near the structure, maintain a minimum distance of five feet between the vegetation and irrigation from any lightweight insulative aggregate zone. Trees minimum distance 30'.
6. Isolate the zone near the wall from landscape sprinklers or irrigation.

Codes and Standards References

Applicable References are found in Section III.

Figure 3. Exterior, Poured Foundation and Pad



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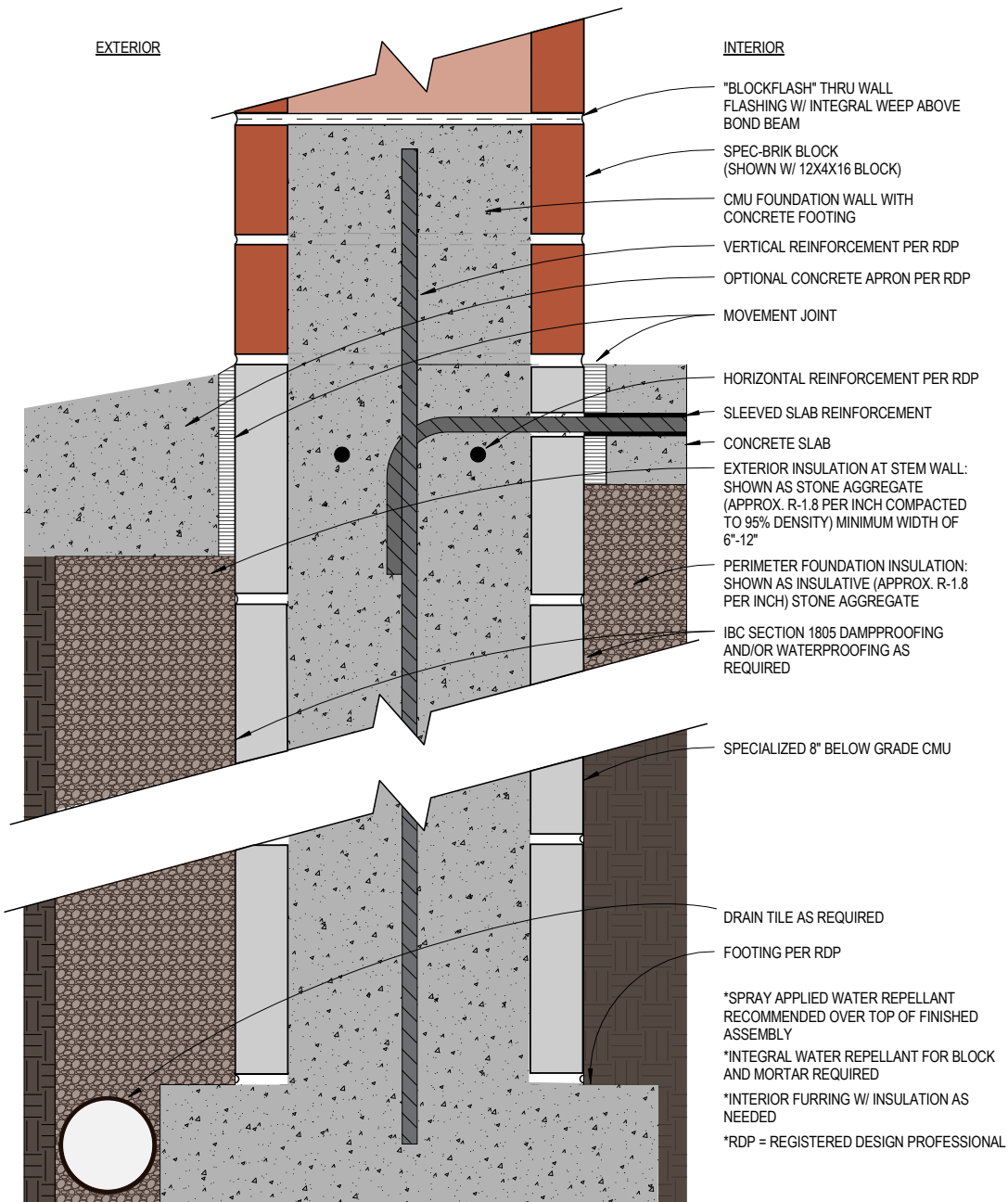
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2. A tapered (30° from horizontal) 6" zone of free-draining gravel extending from the height of the finished floor to the top of the engineered soil may be substituted for the concrete apron shown.
3. If the zone near the base of wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the footing, foundation wall, foundation, and slab. Isolate the footing, foundation and slab from such elements. The height of the soil and nearby draining curbs should be at least 6 inches below top of finished floor to prevent damage from accumulated mulch, and absorption, pooling or flooding of water.
4. Minimum 6" soil / top of finished floor / footing elevation offset. Within this 6" deep offset, a drainable landscape layer of lightweight insulative aggregate may be placed. This in turn can be combined with a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to spread footing with perforated drainage collection pipe at spread footing. The drainage collection pipe leads to a stormwater drainage system (this is depicted in Figure 2A).
5. If landscaping is to be used near the structure, maintain a minimum distance of five feet between the vegetation and irrigation from any lightweight insulative aggregate zone. Trees minimum distance 30'.
6. Isolate the zone near the wall from landscape sprinklers or irrigation.

Codes and Standards References

Applicable References are found in Section III.

Figure 4. Exterior, CMU Foundation, and Insulative Aggregates



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Typical Notes

1. Generally a damp-check needs be placed above the top of the dampproofing or waterproofing for foundation walls, basement walls, or foundations. For below-grade masonry basement walls an additional damp check at the masonry starting course and above the dampproofing or waterproofing for slabs and floors will further control moisture. An above-grade masonry course with flashing also performs as a damp-check Use Integral Water Repellent (IWR) in the masonry. Some exceptions may apply such as for California shear wall testing.
2. Request evidence in writing of, or special inspection for, adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars.
3. If traditional flashing and weep methods are used, drip edge may be omitted if drainable flashing is terminated at or beyond tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose including those with minimal mortar penetration. Drainable weeps (such as non-biodegradable, durable sash cord also allowing optional Z or S pattern) and/or vents are still necessary. As an example, cotton sash cord would be expected to degrade while nylon would be expected to be durable. Flashing, drip edges and weeps are sometimes omitted within single wythe barrier wall systems except as otherwise required by Code or Plans.

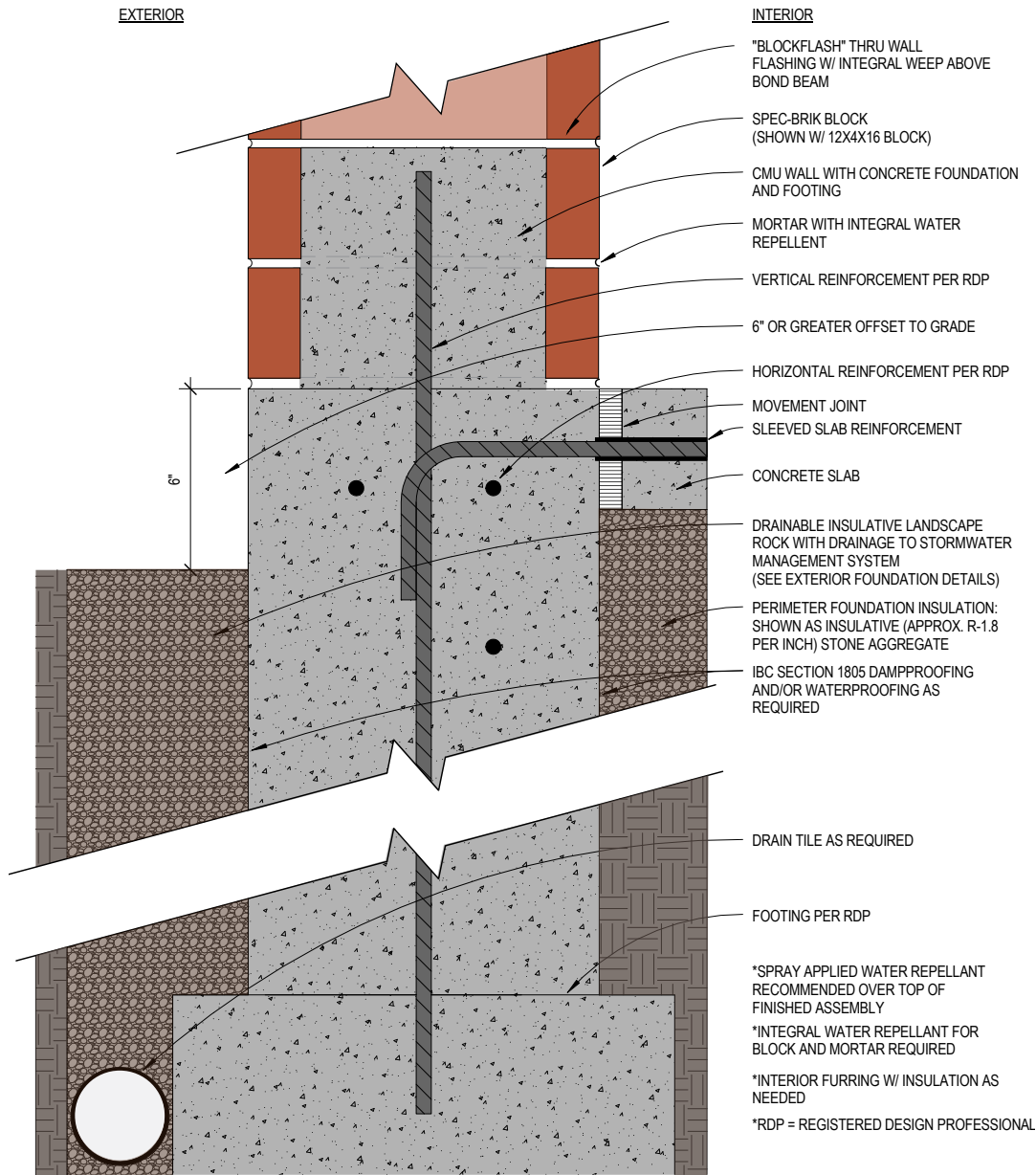
Field water intrusion testing can confirm the success of moisture control.

4. Horizontal Reinforcement placement below grade level is important. See Plans for reinforcement placement and details.
5. Single-wythe walls are self-covering and therefore especially rely upon a "belt-and-suspenders" approach for moisture control. As a result, designers should use a comprehensive approach that may include flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets, drainage offsets, and below-grade damp proofing/water proofing – including alkali, salt, and sulfate resistance.
6. If the zone near the above-grade wall or foundation wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the above-grade wall or foundation wall. Isolate the above-grade wall, foundation wall, footing, foundation, and slab from such elements.
7. There are many aesthetic options to utilize a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to the spread footing with a foundation drain. The drainage collection pipe leads to a stormwater drainage/management system.

Codes and Standards References

Applicable References are found in Section III.

Figure 5. Exterior, Poured Foundation, Pad and Insulative Aggregates



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Typical Notes

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2. Request evidence in writing of, or special inspection for, adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars.
3. If traditional flashing and weep methods are used, drip edge may be omitted if drainable flashing is terminated at or beyond tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose including those with minimal mortar penetration. Drainable weeps (such as non-biodegradable, durable sash cord also allowing optional Z or S pattern) and/or vents are still necessary. As an example, cotton sash cord would be expected to degrade while nylon would be expected to be durable. Flashing, drip edges and weeps are sometimes omitted within single wythe barrier wall systems except as otherwise required by Code or Plans.

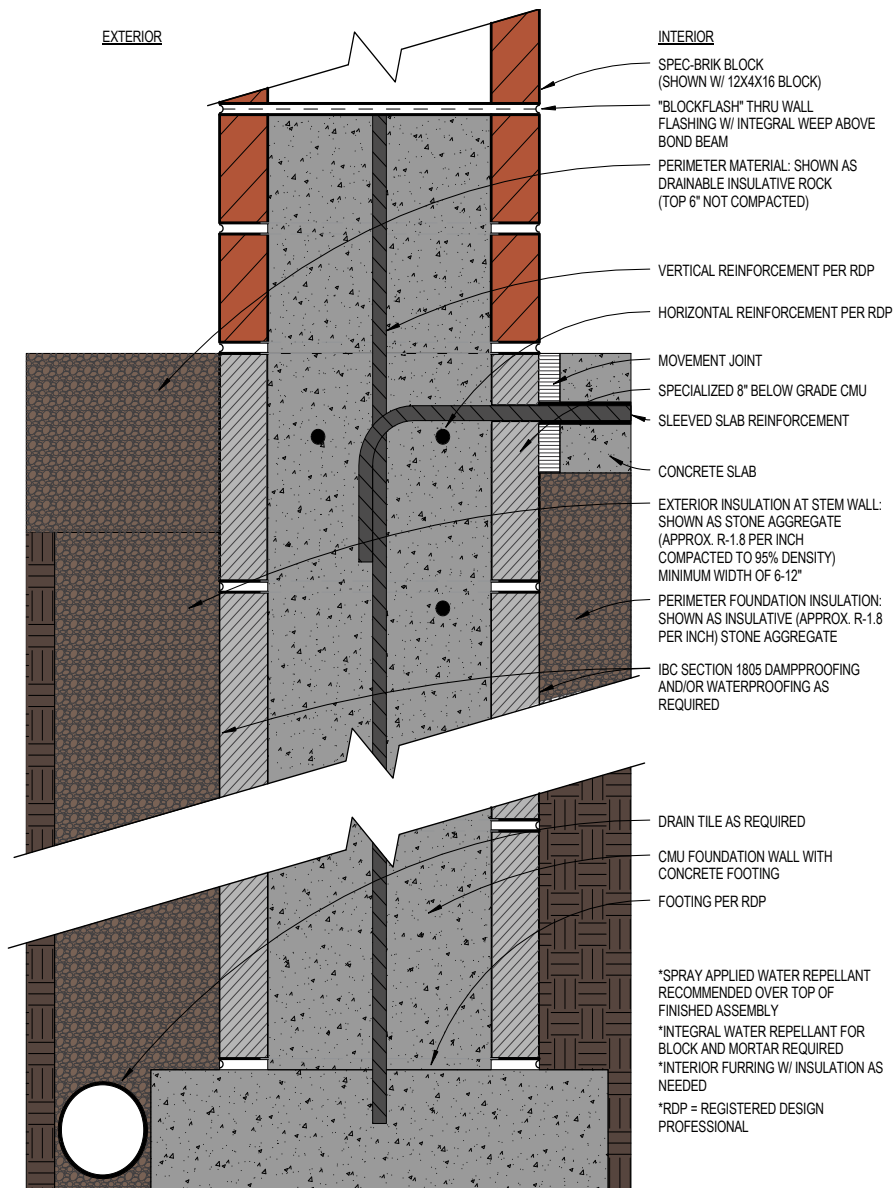
Field water intrusion testing can confirm the success of moisture control.

4. Horizontal Reinforcement placement below grade level is important. See Plans for reinforcement placement and details.
5. Single-wythe walls are self-covering and therefore especially rely upon a "belt-and-suspenders" approach for moisture control. As a result, designers should use a comprehensive approach that may include flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets, drainage offsets, and below-grade damp proofing/water proofing – including alkali, salt, and sulfate resistance.
6. If the zone near the above-grade wall or foundation wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the above-grade wall or foundation wall. Isolate the above-grade wall, foundation wall, footing, foundation, and slab from such elements.
7. There are many aesthetic options to utilize a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to the spread footing with a foundation drain. The drainage collection pipe leads to a stormwater drainage/management system.

Codes and Standards References

Applicable References are found in Section III.

Figure 6. Exterior, Below Grade CMU Wall, and Insulative Aggregates



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2. Request evidence in writing of, or special inspection for, adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars.
3. If traditional flashing and weep methods are used, drip edge may be omitted if drainable flashing is terminated at or beyond tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose including those with minimal mortar penetration. Drainable weeps (such as non-biodegradable, durable sash cord also allowing optional Z or S pattern) and/or vents are still necessary. As an example, cotton sash cord would be expected to degrade while nylon would be expected to be durable. Flashing, drip edges and weeps are sometimes omitted within single wythe barrier wall systems except as otherwise required by Code or Plans.

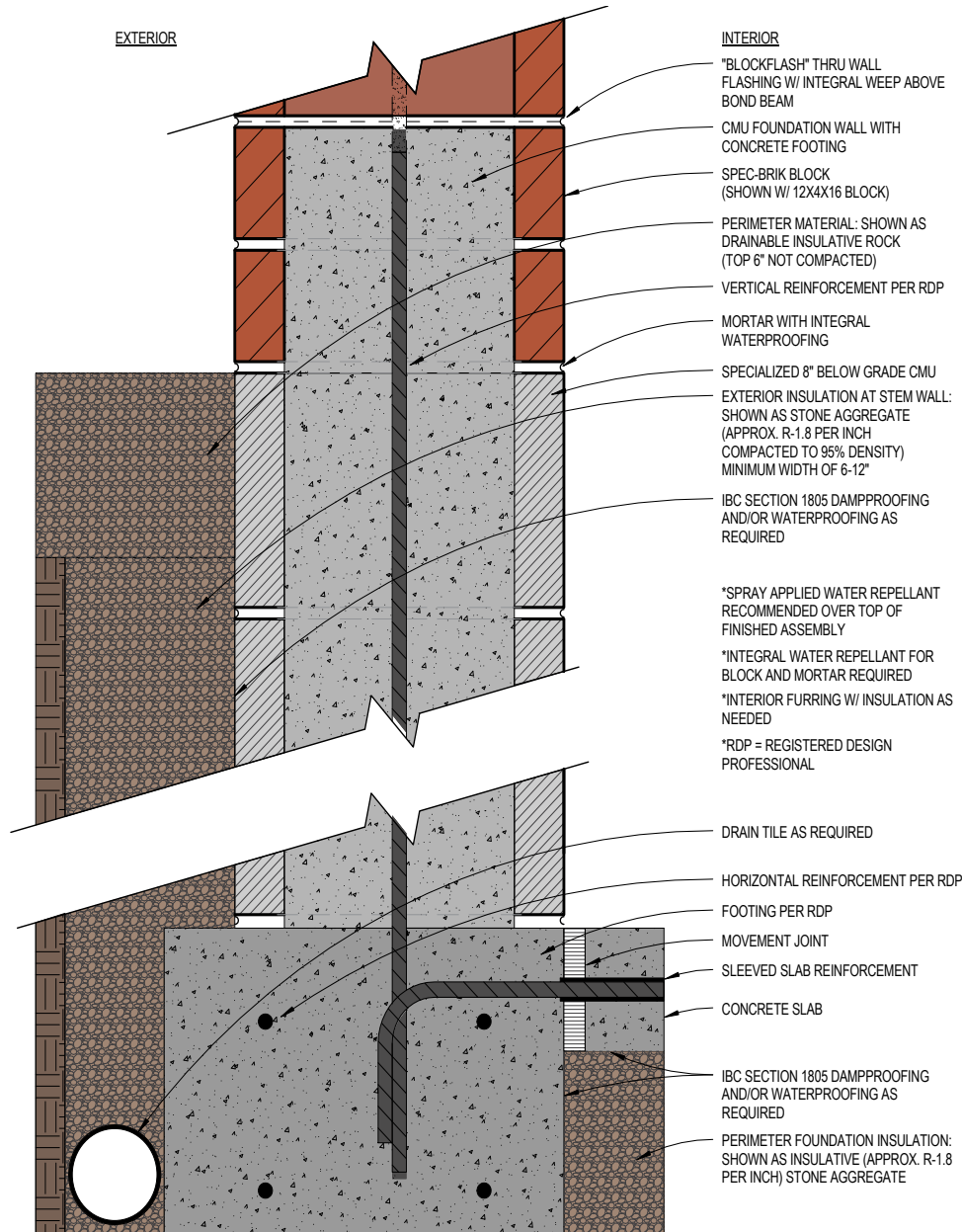
Field water intrusion testing can confirm the success of moisture control.

4. Horizontal Reinforcement placement below grade level is important. See Plans for reinforcement placement and details.
5. Single-wythe walls are self-covering and therefore especially rely upon a "belt-and-suspenders" approach for moisture control. As a result, designers should use a comprehensive approach that may include flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets, drainage offsets, and below-grade damp proofing/water proofing – including alkali, salt, and sulfate resistance.
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7. There are many aesthetic options to utilize a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to the spread footing with a foundation drain. The drainage collection pipe leads to a stormwater drainage/management system.

Codes and Standards References

Applicable References are found in Section III.

Figure 7. Exterior, CMU Foundation, and Insulative Aggregates



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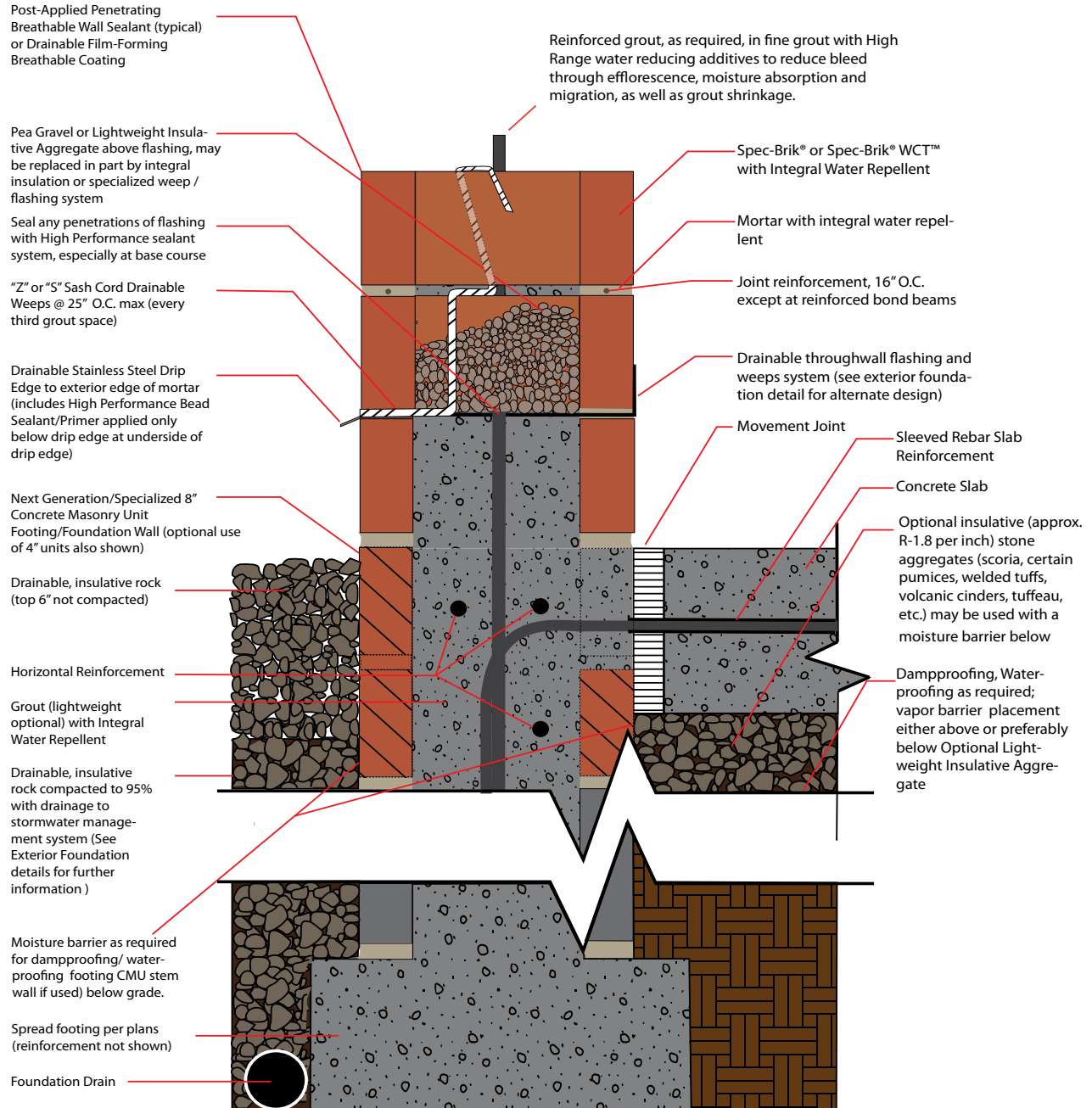
Field water intrusion testing can confirm the success of moisture control.

4. Horizontal Reinforcement placement below grade level is important. See Plans for reinforcement placement and details.
5. Single-wythe walls are self-covering and therefore especially rely upon a "belt-and-suspenders" approach for moisture control. As a result, designers should use a comprehensive approach that may include flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets, drainage offsets, and below-grade damp proofing/water proofing – including alkali, salt, and sulfate resistance.
6. If the zone near the above-grade wall or foundation wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the above-grade wall or foundation wall. Isolate the above-grade wall, foundation wall, footing, foundation, and slab from such elements.
7. There are many aesthetic options to utilize a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to the spread footing with a foundation drain. The drainage collection pipe leads to a stormwater drainage/management system.

Codes and Standards References

Applicable References are found in Section III.

Figure 8. Exterior, Z-Cord Weep, CMU Foundation, Insulative Aggregates



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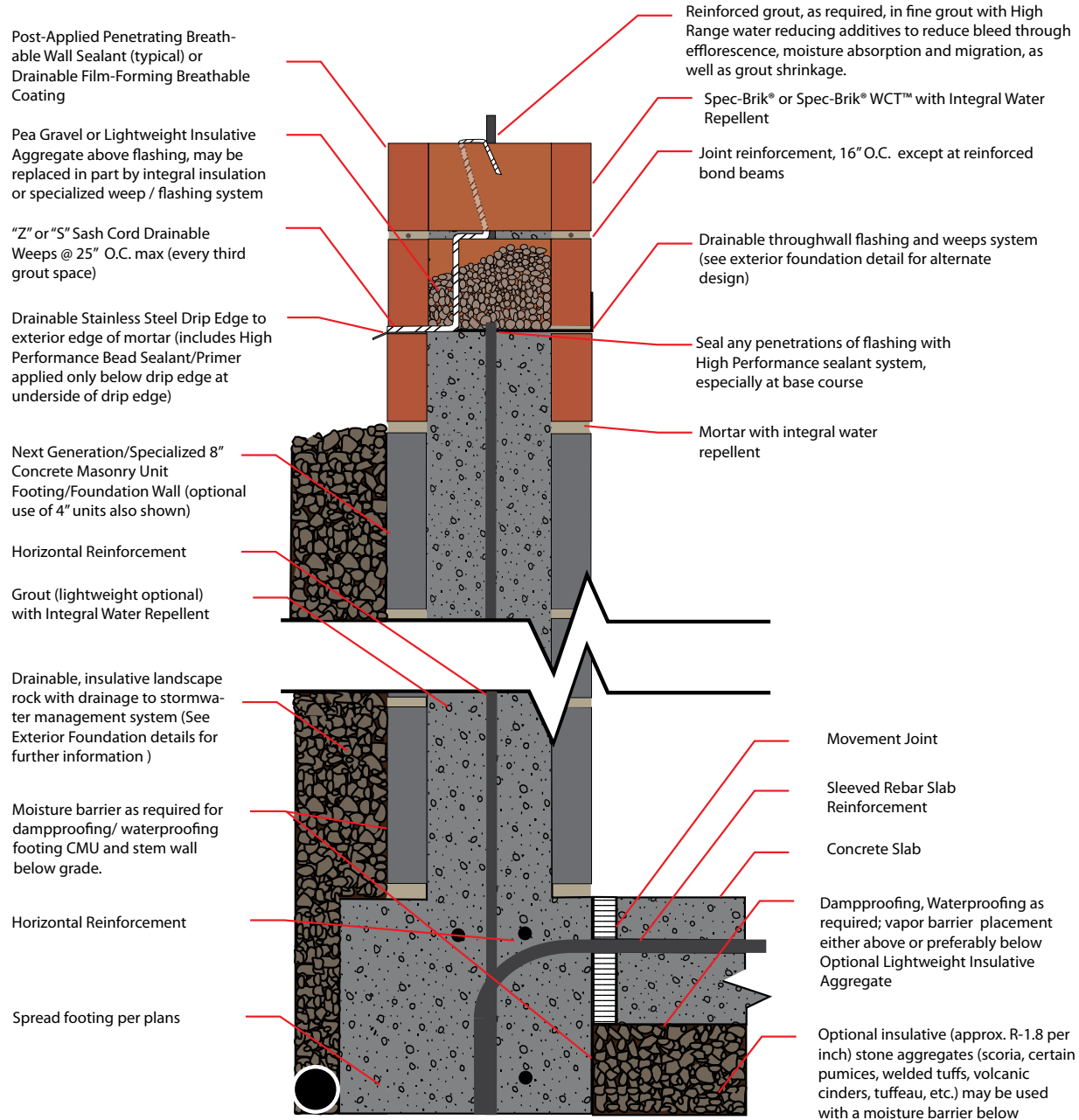
Typical Notes:

1. Generally a damp-check needs to be placed above the top of the dampproofing or waterproofing for foundation walls or foundations and above the damproofing or waterproofing for floors. A masonry course with flashing also performs as a damp-check. Use Integral Water Repellent (IWR) in the masonry.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Testing that these drainage systems are properly functioning after application of the coatings is advised.
3. California projects, or other projects where compliance to vertical wall shear testing is required, may use alternate moisture control techniques (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings; use High Range Water Reducer in grout).
4. Request evidence in writing of adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars.
5. Drip edge may be omitted if drainable flashing is terminated at or beyond tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) are still necessary.
6. Joint Reinforcement requires minimum 6" lap splices and other connections even for non-load bearing elements. See Plans for joint reinforcement lap schedule or details.
7. Assume single wythe walls are self-covering and therefore especially rely upon belt-and-suspenders approach. Flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing / water proofing – including alkali, salt, and sulfate resistance should be each considered. Field water intrusion testing can confirm the success of moisture control.

Codes and Standards References

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Figure 9. Exterior, Z-Cord Weep, Below Grade CMU



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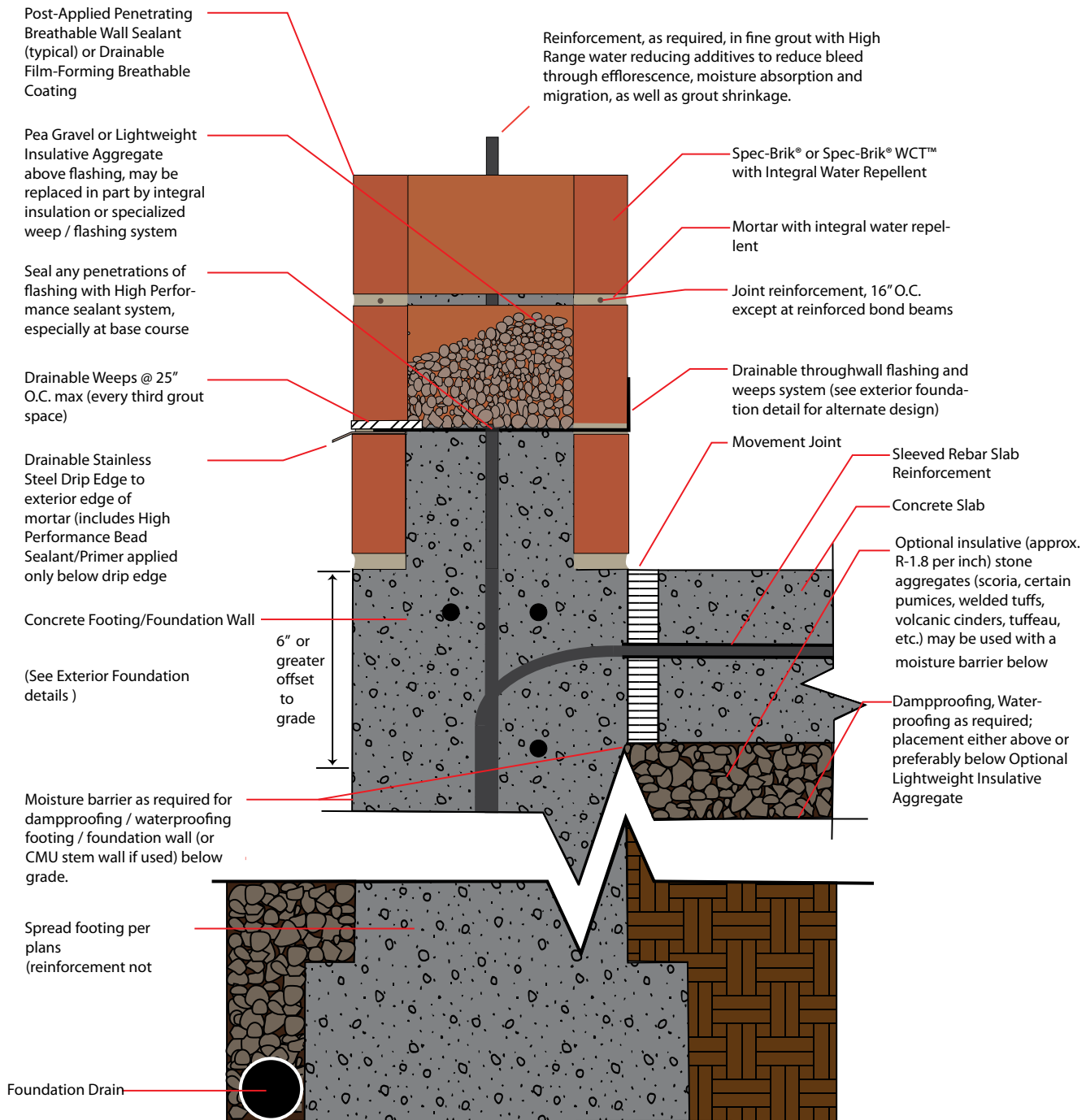
Typical Notes:

1. Generally a damp-check needs be placed above the top of the dampproofing or waterproofing for foundation walls, basement walls, or foundations. For below-grade masonry basement walls an additional damp check at the masonry starting course and above the dampproofing or waterproofing for slabs and floors will further control moisture. An above-grade masonry course with flashing also performs as a damp-check. Use Integral Water Repellent (IWR) in the masonry. Some exceptions may apply such as for California shear wall testing.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Testing that these drainage systems are properly functioning after application of the coatings is advised.
3. California projects, or other projects where compliance to vertical wall shear testing is required, may use alternate moisture control techniques (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings; use High Range Water Reducer in grout).
4. Request evidence in writing of or special inspect for adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars.
5. Drip edge may be omitted if drainable flashing is terminated at or beyond tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose including those with minimal mortar penetration. Drainable weeps (or non-biodegradable, sustainable sash cord also allowing optional Z or S pattern) and/or vents are still necessary. Flashing, drip edges and weeps are assumed omitted within single wythe barrier wall systems except as otherwise required such as by Code or Plans.
6. Horizontal Reinforcement placement below grade level is important. See Plans for reinforcement placement and details.
7. Single wythe walls are self-covering and therefore especially rely upon a "belt-and-suspenders" approach. As a result, designers should consider use of complimentary approaches, including Flashing and weeps, Integral Water Repellent, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets, drainage offsets, and below-grade damp proofing / water proofing – including alkali, salt, and sulfate resistance. Field water intrusion testing can confirm the success of moisture control.
8. If the zone near the above-grade wall or foundation wall is to be landscaped, do not place plant life, roots, irrigation, fertilizers or other chemicals within 3 feet of the above-grade wall or foundation wall. Isolate the above-grade wall, foundation wall, footing, foundation, and slab from such elements.
9. There are many aesthetic options to utilize a minimum 6" – 12" wide 95% compacted lightweight insulative aggregate zone extending down to the spread footing with a foundation drain. The drainage collection pipe leads to a storm water management system.

Codes and Standards References

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Figure 10. Exterior, Z-Cord Weep, Poured Foundation



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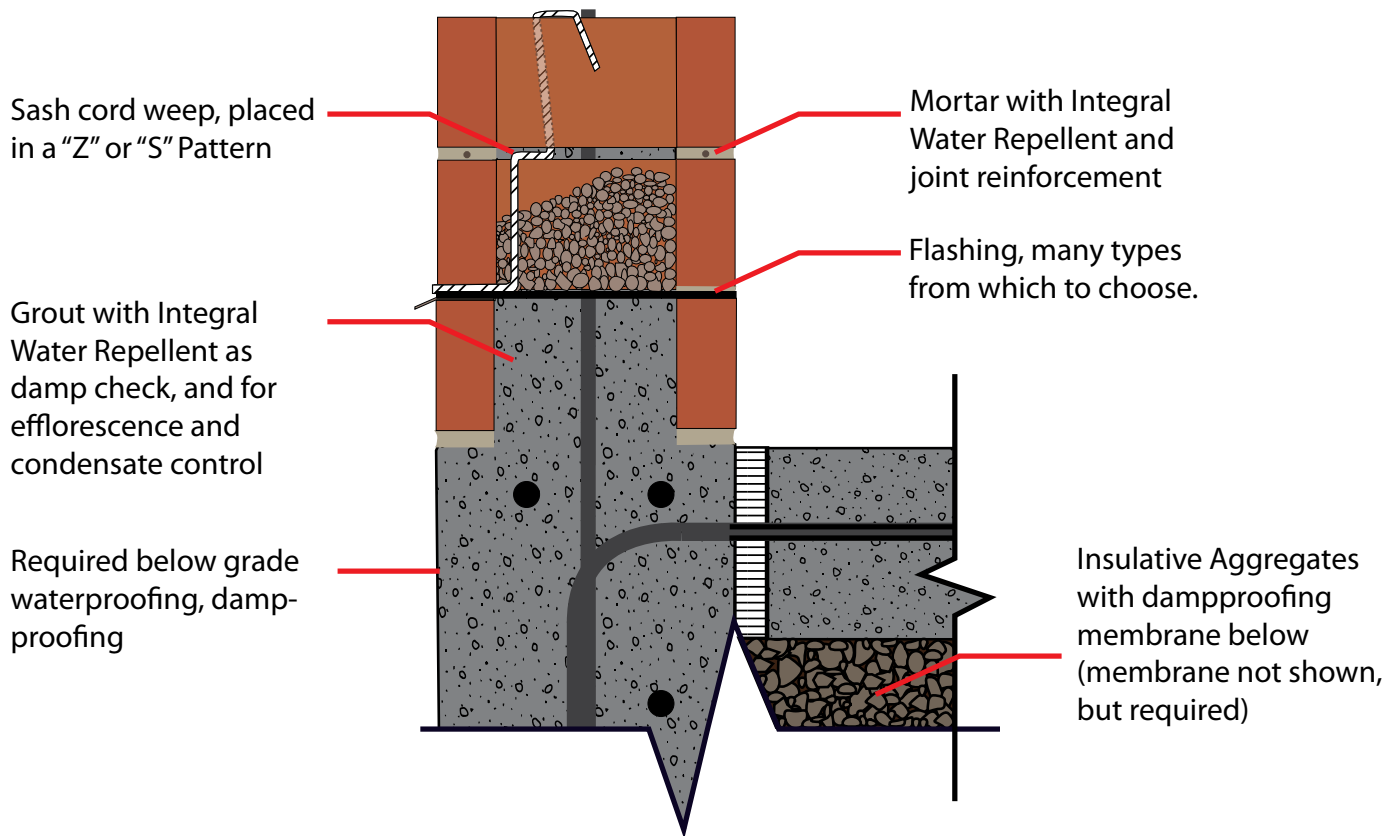
Typical Notes:

1. Masonry Base course with flashing also performs as a damp-check including salt and sulfate resistance. Use Integral Water Repellent (IWR) in the mortar in contact with the base course (and CMU stem wall if used). IWR shall also be used in the grout within the base course (and CMU stem wall if used). Flashing shall be used at and above the base course. Penetrations within the base course flashing shall be sealed with an approved High Performance sealant system. In salt-prone areas a minimum of a multi-applied penetrating breathable sealant or breathable film-forming coating shall be used.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Testing that these drainage systems are properly functioning after application of the coatings is advised.
3. California projects, or other projects where compliance to vertical wall shear testing is required, may use alternate moisture control techniques (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings; use High Range Water Reducer in grout).
4. Request evidence in writing of adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars. Request in writing evidence of sufficient composite-action bond to IWR-containing CMU of Properties-based grout.
5. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface, and assuming mortar contains IWR. There are many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) are still necessary.
6. Joint Reinforcement requires minimum 6" lap splices and other connections even for non-load bearing elements. See Plans for joint reinforcement lap schedule or details.
7. Assume single-wythe walls are self-covering and therefore especially rely upon belt-and-suspenders approach; flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing / water proofing – including alkali, salt, and sulfate resistance should be each considered.

Codes and Standards References

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Figure 11. Z-cord flashing detail



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Typical Notes

1. This is an old, cost-effective non-proprietary method of overcoming drainage blockage due to mortar droppings and grout splash within the ungrouted grout spaces. Because natural cotton sash and hemp twine are typically biodegradable, the use of synthetic cord materials such as nylon, U. V.-resistant polyester, synthetic braids, or other durable and weather-protective material would be preferable for durability.
2. At or below-grade concrete needs to be resistant to corrosion, sulfate, salt (including de-icing chemicals), moisture, chlorides, seawater, and freezing-thawing via Codes and Standards such as IBC Section 1904 . Such Durability is attained in part by:
 - a. Determining Exposure Categories and classes.
 - b. Determining and calculating concrete water-cementitious ratios.
 - c. Determining and calculating minimum specified concrete compressive strength.
 - d. Determining minimum and maximum concrete air entrainment.
 - e. Determining concrete weathering probability.
 - f. Evaluating water-soluble sulfates in soil and/or groundwater to determine Type (II, V, etc.) of cement to use.

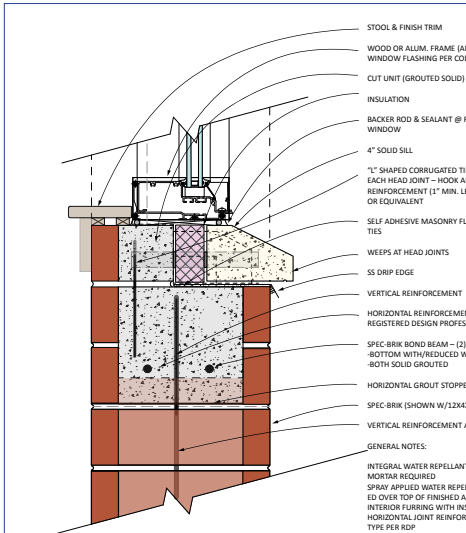


Figure 12. Window Sill

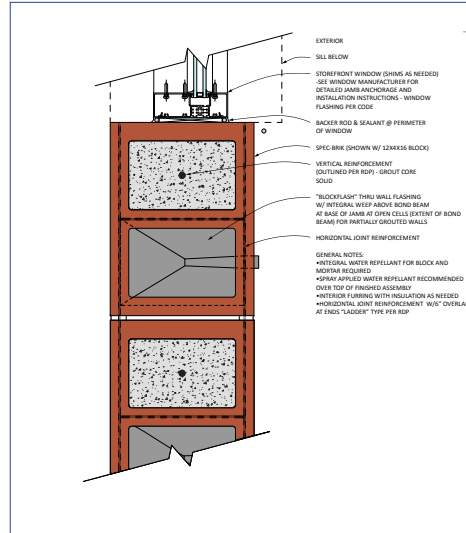


Figure 13. Window Jamb

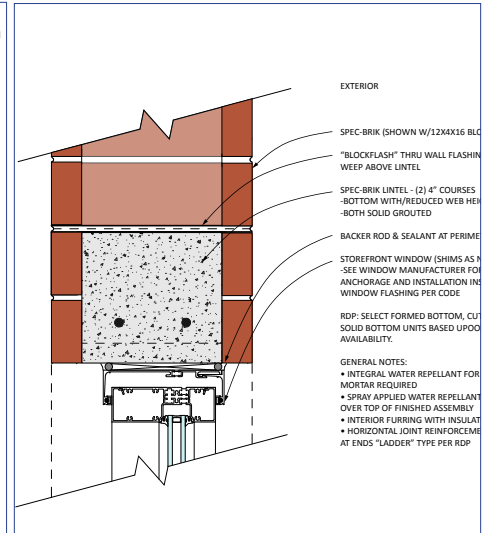
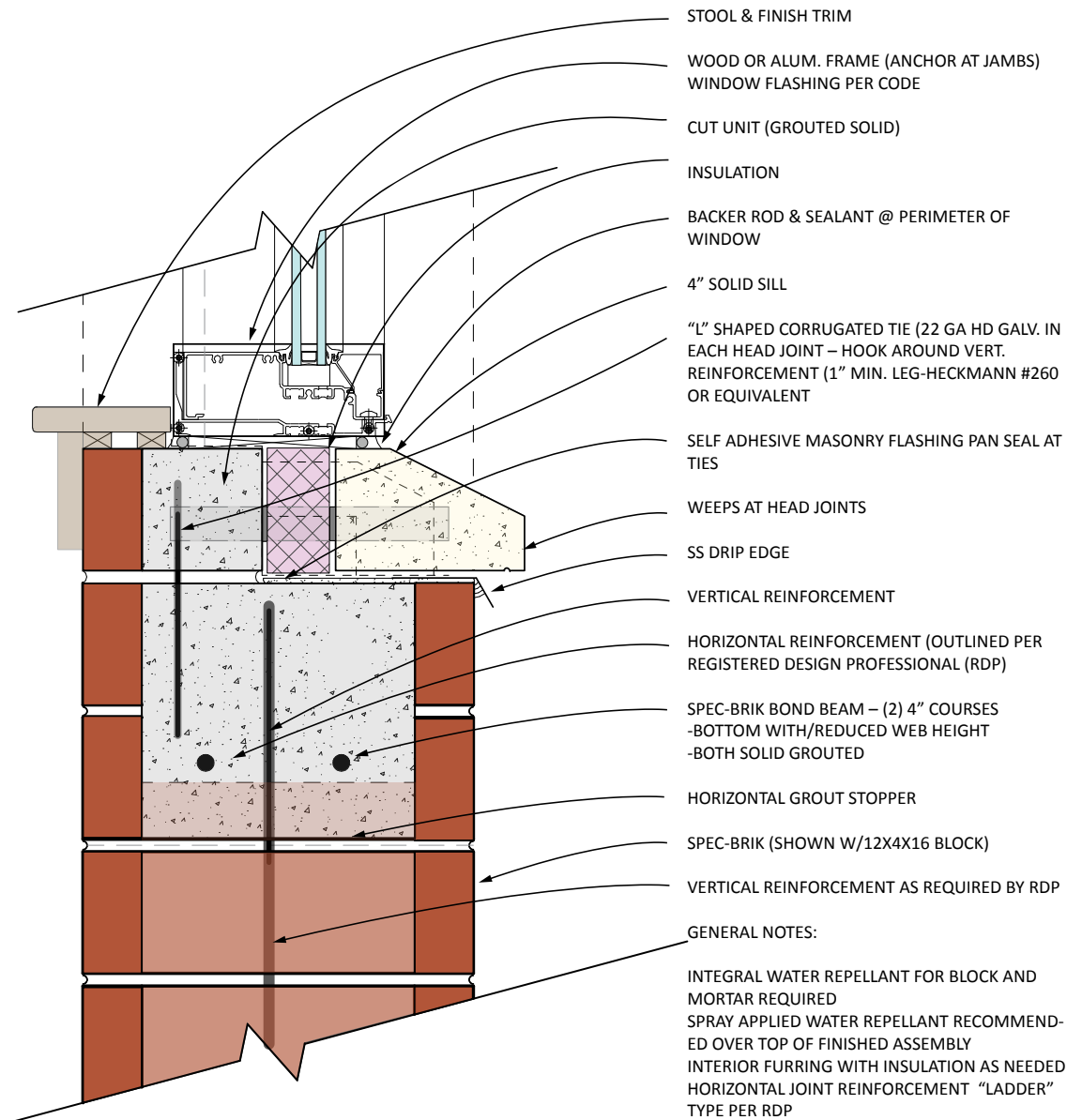


Figure 14. Lintel

Window Sills, Jambs and Lintels

Figure 12. Window Sill



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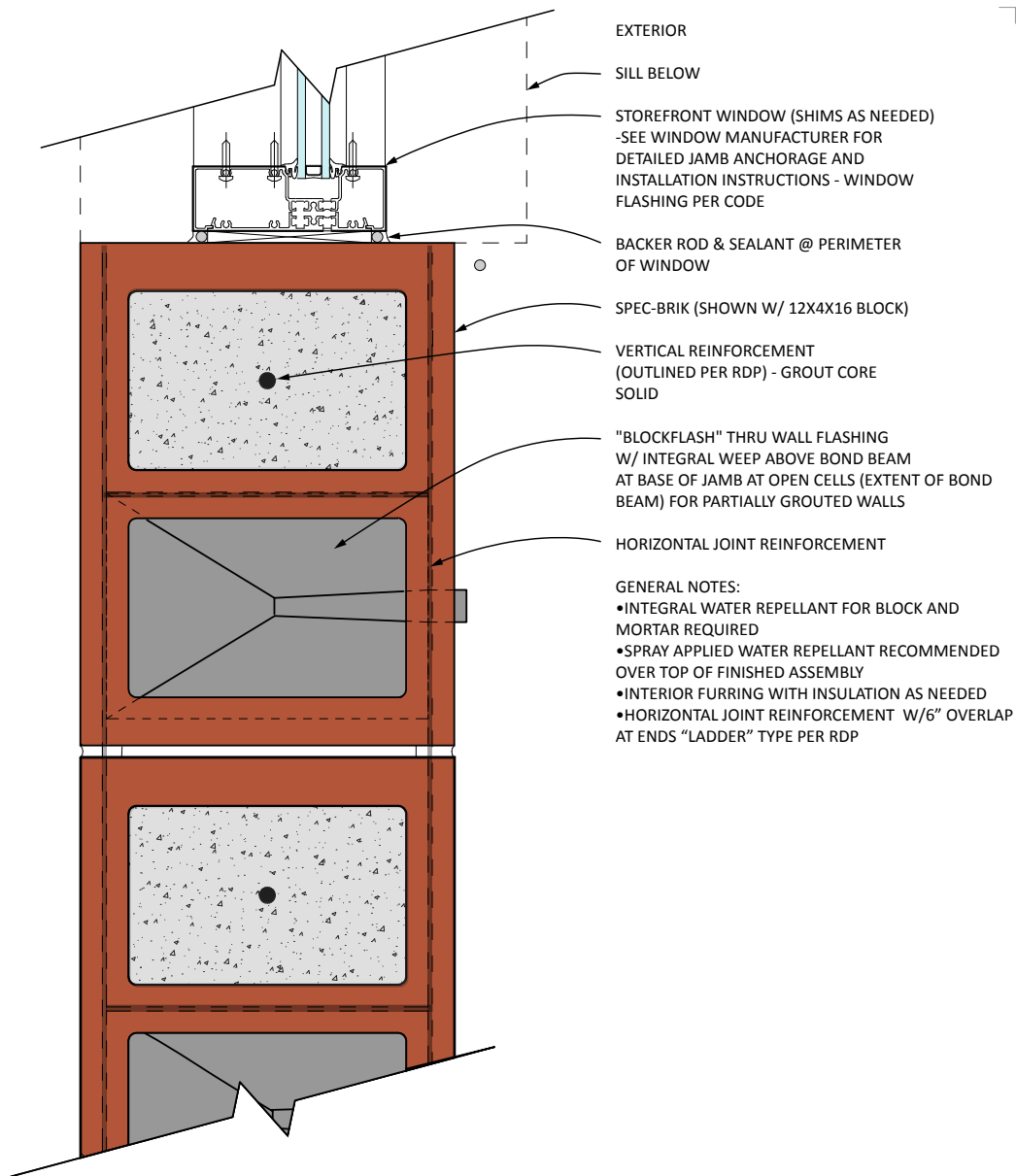
Typical Notes:

1. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior.
2. California projects, or other projects where compliance to vertical wall shear testing is required, may use alternate moisture control techniques (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings; use High Range Water Reducer in grout).
3. Request evidence in writing of adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars. Request in writing evidence of sufficient composite-action bond to IWR-containing CMU of Properties-based grout.
4. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface, and assuming mortar contains IWR. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
5. Joint Reinforcement requires minimum 6" lap splices and other connections even for non-load bearing elements
6. Assume single-wythe walls are self-covering and therefore especially rely upon belt-and-suspenders approach; flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered.

Codes and Standards References

Applicable References are found in Section III.

Figure 13. Window Jamb



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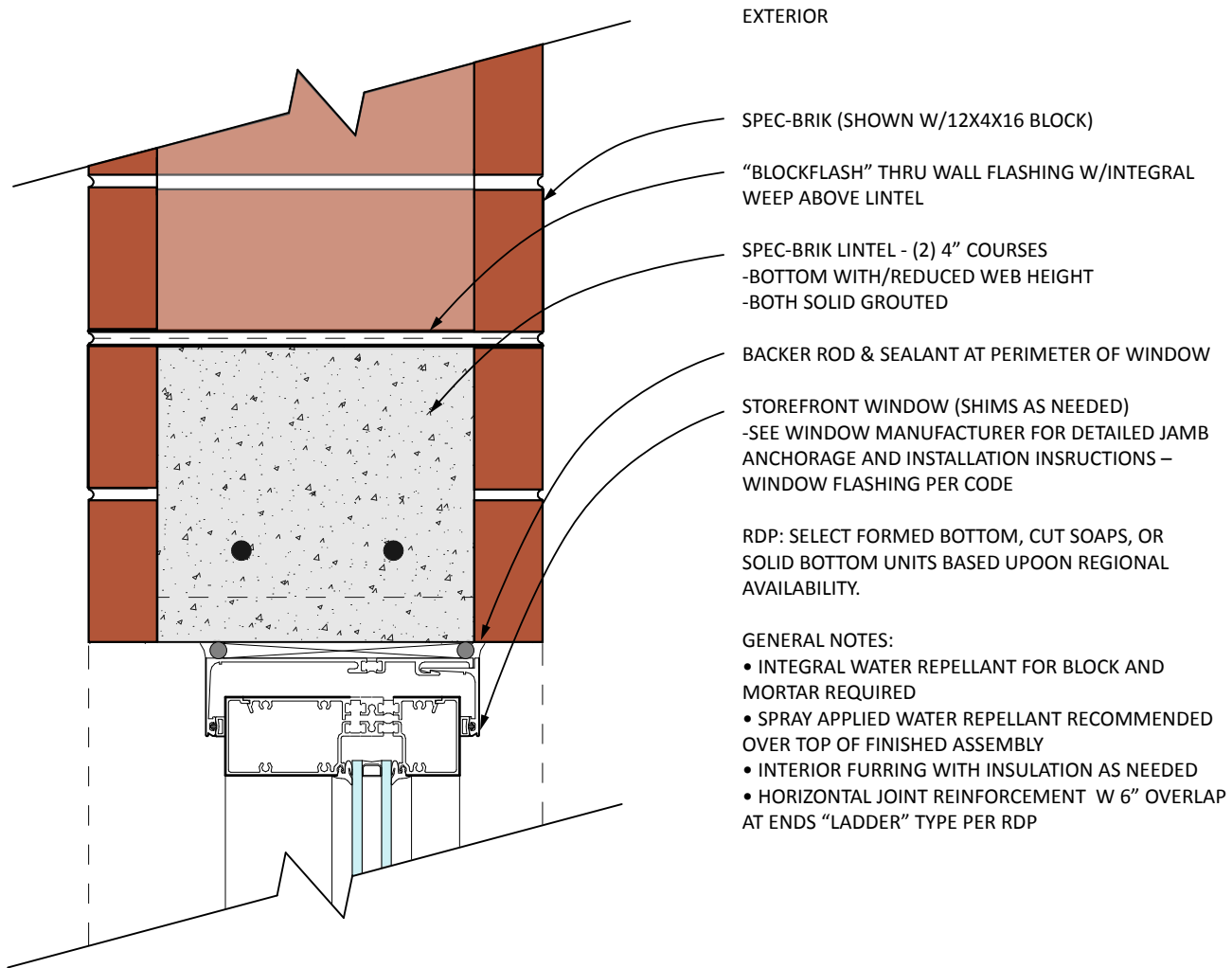
Typical Notes:

1. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior.
2. California projects, or other projects compliant to vertical wall shear testing, may use alternate moisture control techniques (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings; use High Range Water Reducer in grout).
3. Request evidence in writing of adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars. Request in writing evidence of sufficient composite-action bond to IWR-containing CMU of Properties-based grout.
4. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface, and assuming mortar contains IWR. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
5. Joint Reinforcement requires minimum 6" lap splices and other connections even for non-load bearing elements
6. Assume single-wythe walls are self-covering and therefore especially rely upon belt-and-suspenders approach; flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered.

Codes and Standards References

Applicable References are found in Section III.

Figure 14. Lintel



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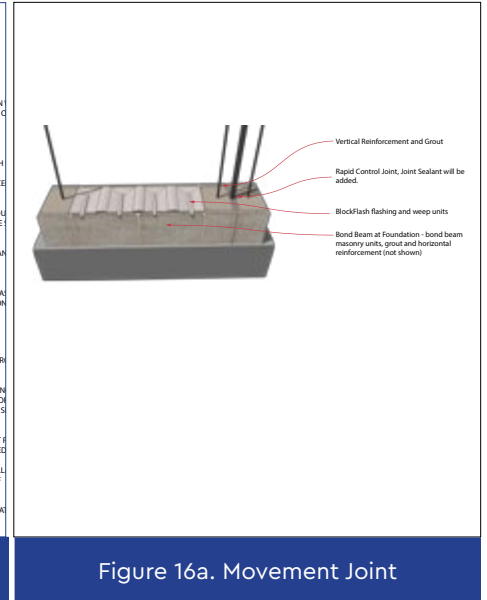
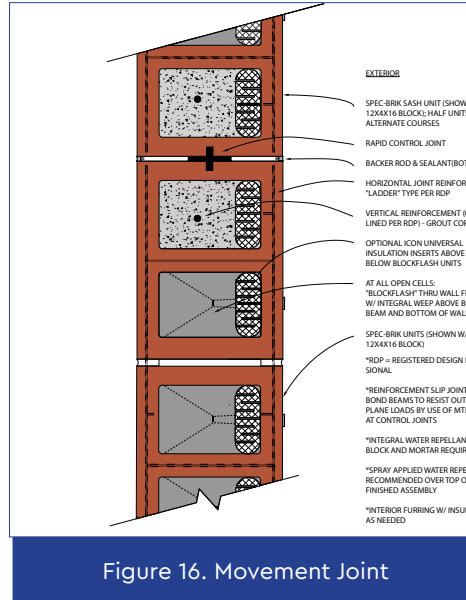
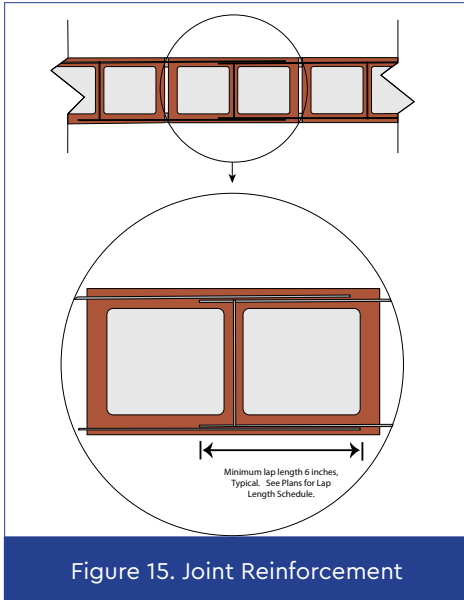
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Typical Notes:

1. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior.
2. California or other projects compliant to vertical wall shear test may use alternate moisture control techniques (omit Integral Water Repellent ("IWR") within CMU; use IWR within mortar; use post-applied breathable penetrating sealants incorporating 2-stage zoned application techniques or drainable film forming coatings).
3. Request evidence in writing of adequate head joint mortar bond to IWR-containing CMU for Properties-based mortars. Request in writing evidence of sufficient composite-action bond to IWR-containing CMU of Properties-based grout.
4. If traditional flashing and weeps methods are used, drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
5. Joint Reinforcement requires minimum 6" lap splices and other connections even for non-load bearing elements.
6. Assume single-wythe walls are self-covering and therefore specially rely upon belt-and-suspenders approach; flashing and weeps, IWR, post-applied moisture control means and measures, High Performance Sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade damp-proofing – including alkali, salt, and sulfate resistance – are each considered .

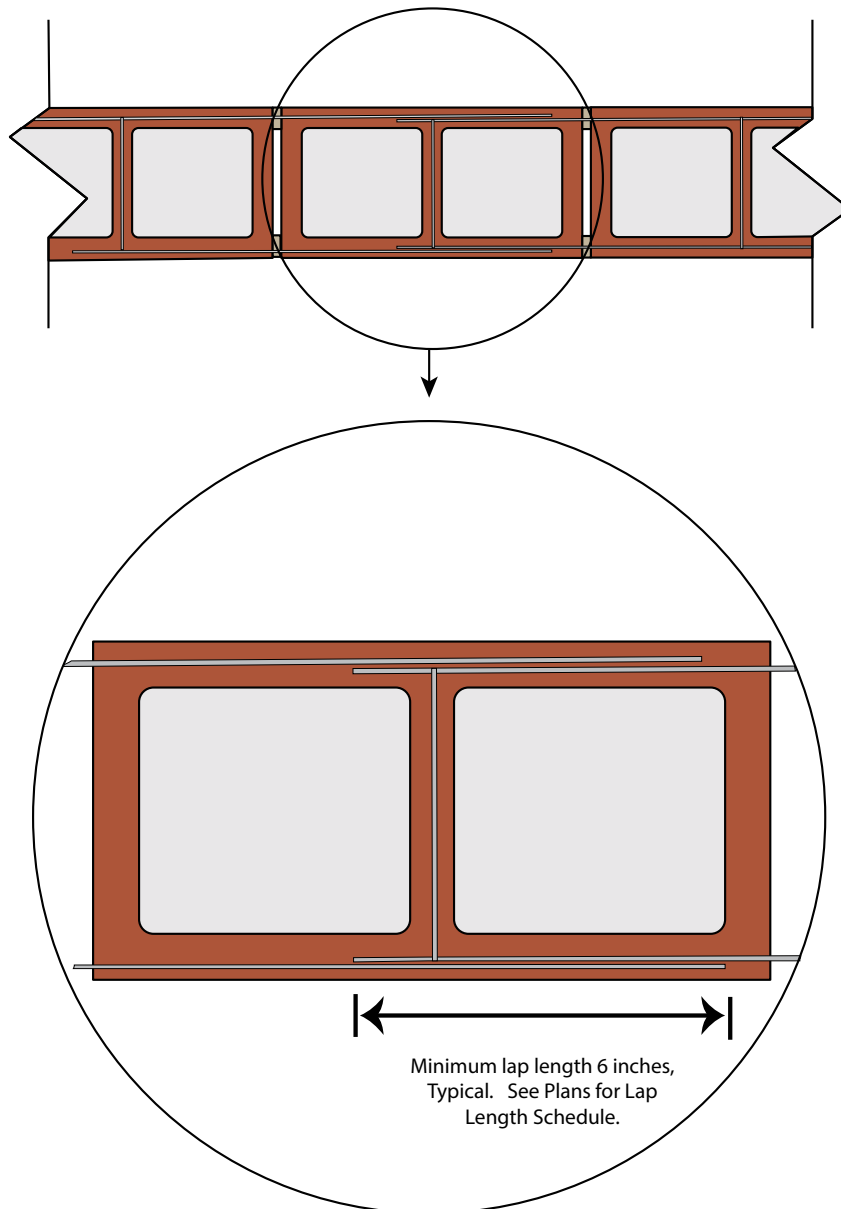
Codes and Standards References

Applicable References are found in Section III.



Joint Reinforcement and Movement Joints

Figure 15. Joint Reinforcement



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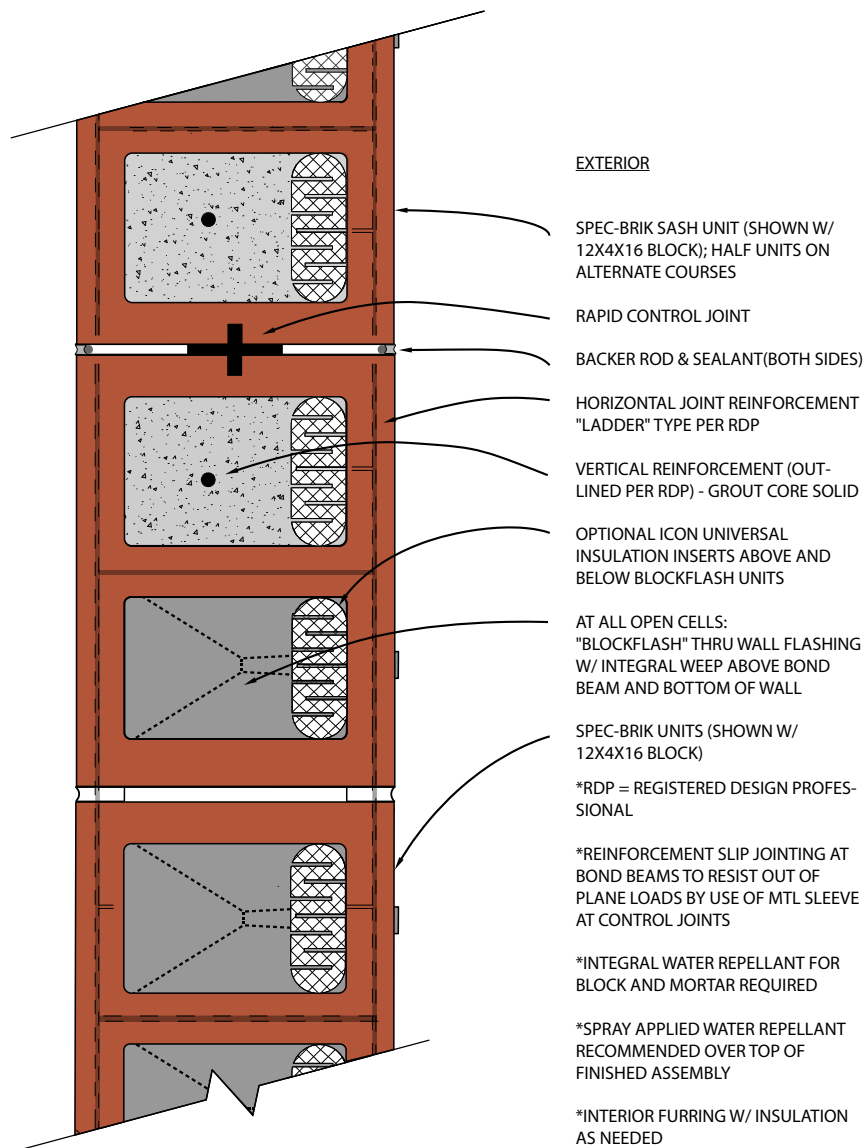
Typical Notes

Lapping the joint reinforcement is required by Code and typically specified. However, the failure to execute this detail properly during construction is a common source of cracking issues.

Codes and Standards References

Applicable References are found in Section III.

Figure 16. Movement Joint



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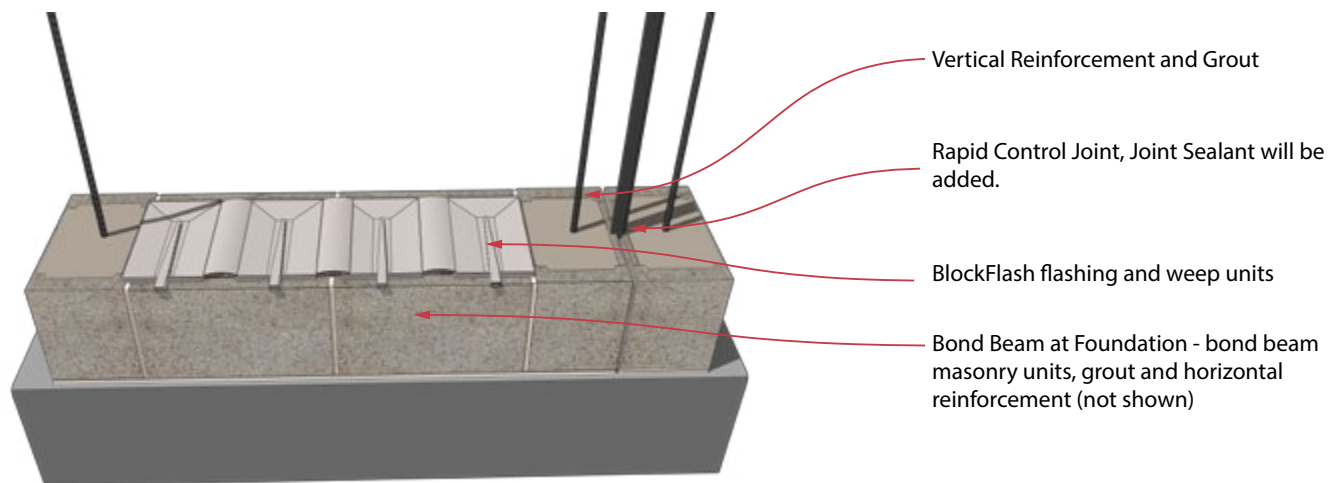
Typical Notes

1. Movement joints are a method to avoid cracking in masonry walls. They are advisable in areas where there are interfaces with materials that may have different expansion properties than the wall as a whole. Placing these joints here will accommodate any slight differential in expansion/contraction properties. The movement joint will be sealed with a gasket and sealants.
2. In general, the specific spacing and placement of movement joints for a project should be reviewed by a structural engineer, but a good rule of thumb is that movement joints should be no further apart than 20 feet in an uninterrupted wall surface, and should be placed adjacent to openings or changes in wall materials.

Codes and Standards References

Applicable References are found in Section III.

Figure 16a. Movement Joint – 3D Rendering



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Typical Notes

1. Movement joints are a method to avoid cracking in masonry walls. They are advisable in areas where there are interfaces with materials that may have different expansion properties than the wall as a whole. Placing these joints here will accommodate any slight differential in expansion/contraction properties. The movement joint will be sealed with a gasket and sealants.
2. In general, the specific spacing and placement of movement joints for a project should be reviewed by a structural engineer, but a good rule of thumb is that movement joints should be no further apart than 20 feet in an uninterrupted wall surface, and should be placed adjacent to openings or changes in wall materials.

Codes and Standards References

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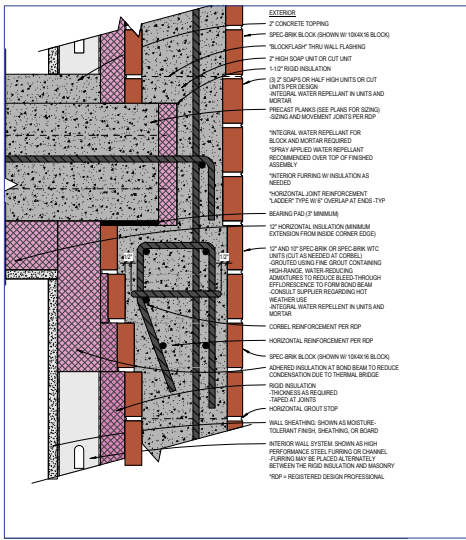


Figure 17. Pre-Cast Plank Option 1

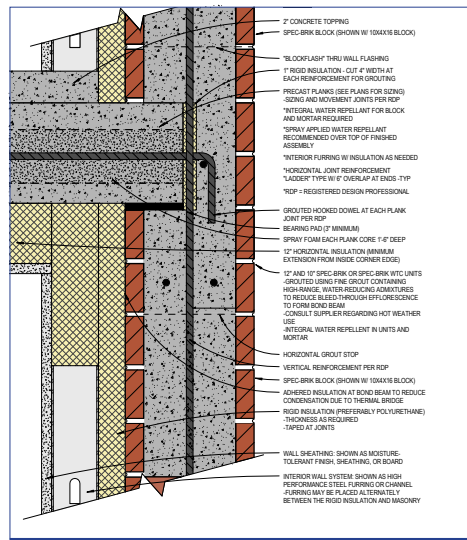


Figure 18. Pre-Cast Plank Option 2

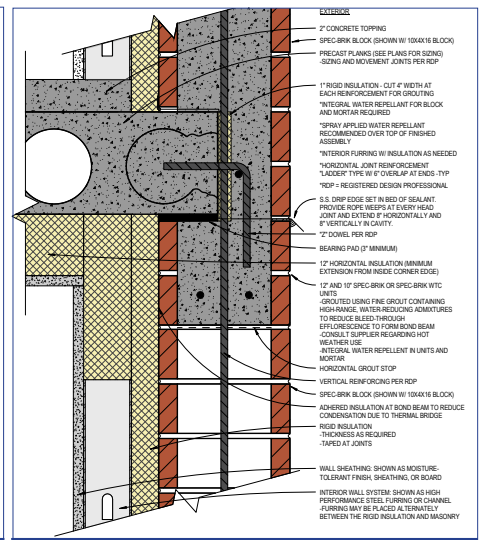


Figure 19. Pre-Cast Plank (Non Bearing) Option 3

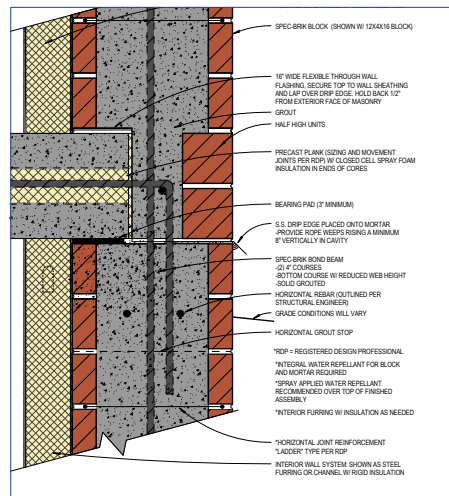


Figure 20. Pre-Cast Plank Option 4

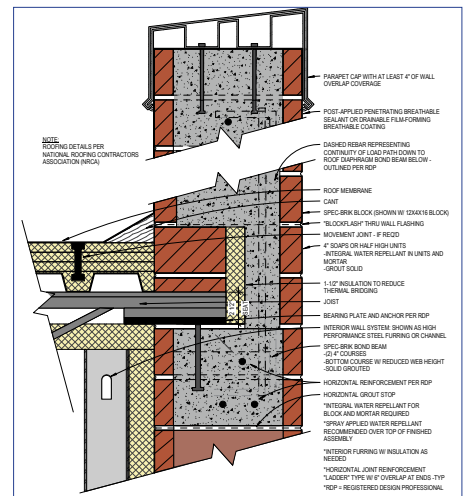
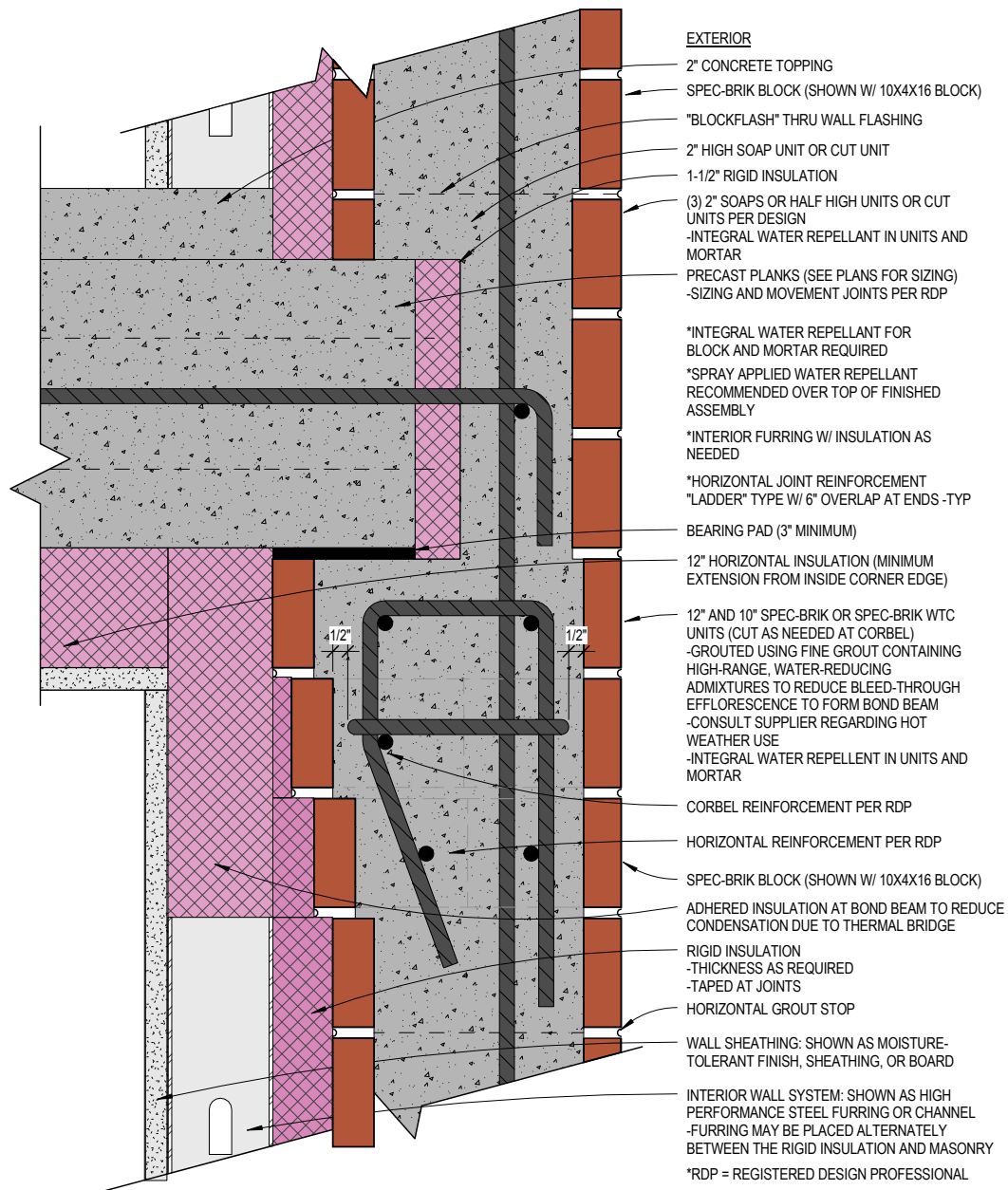


Figure 21. Roof Parapet

Planks and Parapets

Figure 17. Pre-Cast Plank Option 1



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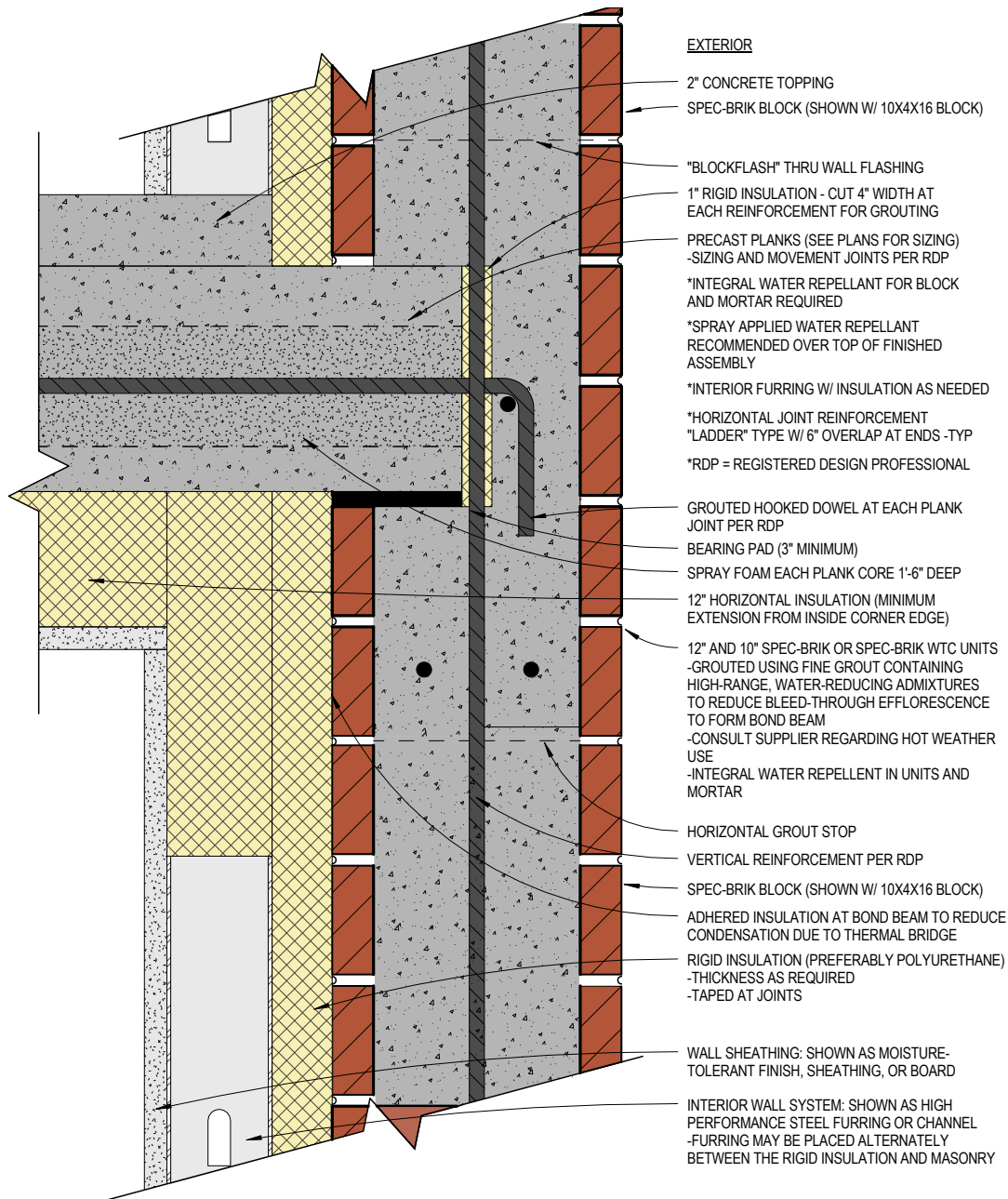
Typical Notes:

1. If traditional flashing and weep methods are used, drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Inspect after coatings application to assure that all such features are functioning properly.
3. California projects may use alternate moisture control techniques for vertical wall shear test compliance (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants or drainable film forming coatings).
4. Assume single-wythe walls are self-covering and therefore especially rely upon design redundancy approach: use of flashing and weeps, IWR, post-applied moisture control means and measures, high performance sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered .
5. Moisture-Tolerant Finish / Sheathing / Board as well as High-Performance steel furring or channel are assumed to be appropriately anchored.

Codes and Standards References

Applicable References are found in Section III.

Figure 18. Pre-Cast Plank Option 2



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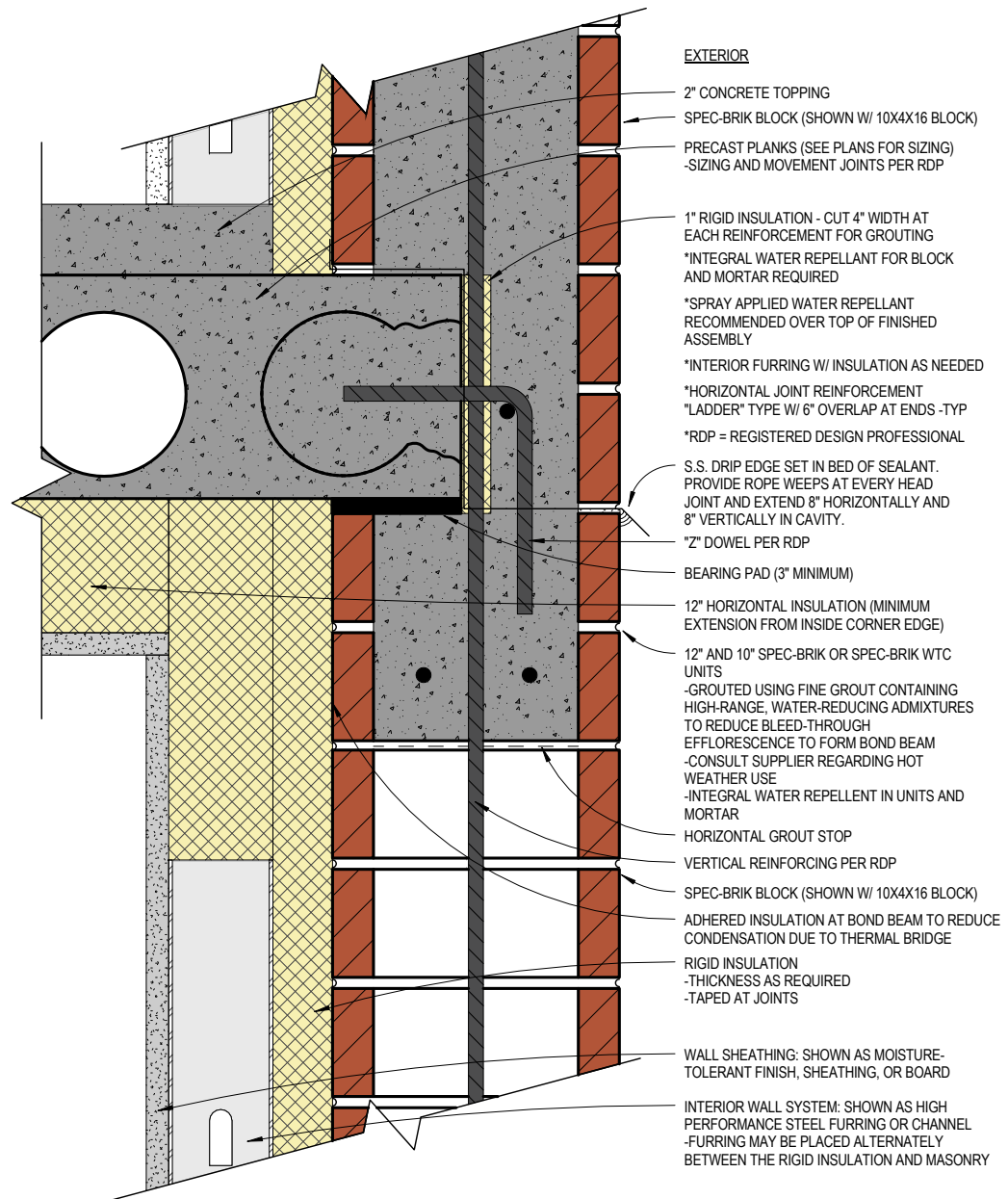
Typical Notes:

1. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Inspect after coatings application to assure that all such features are functioning properly.
3. California projects may use alternate moisture control techniques for vertical wall shear test compliance (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants or drainable film forming coatings).
4. Assume single-wythe walls are self-covering and therefore especially rely upon design redundancy approach: use of flashing and weeps, IWR, post-applied moisture control means and measures, high performance sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered .
5. Moisture-Tolerant Finish / Sheathing / Board as well as High-Performance steel furring or channel are assumed to be appropriately anchored.

Codes and Standards References

Applicable References are found in Section III.

Figure 19. Pre-Cast Plank (Non Bearing) Option 3



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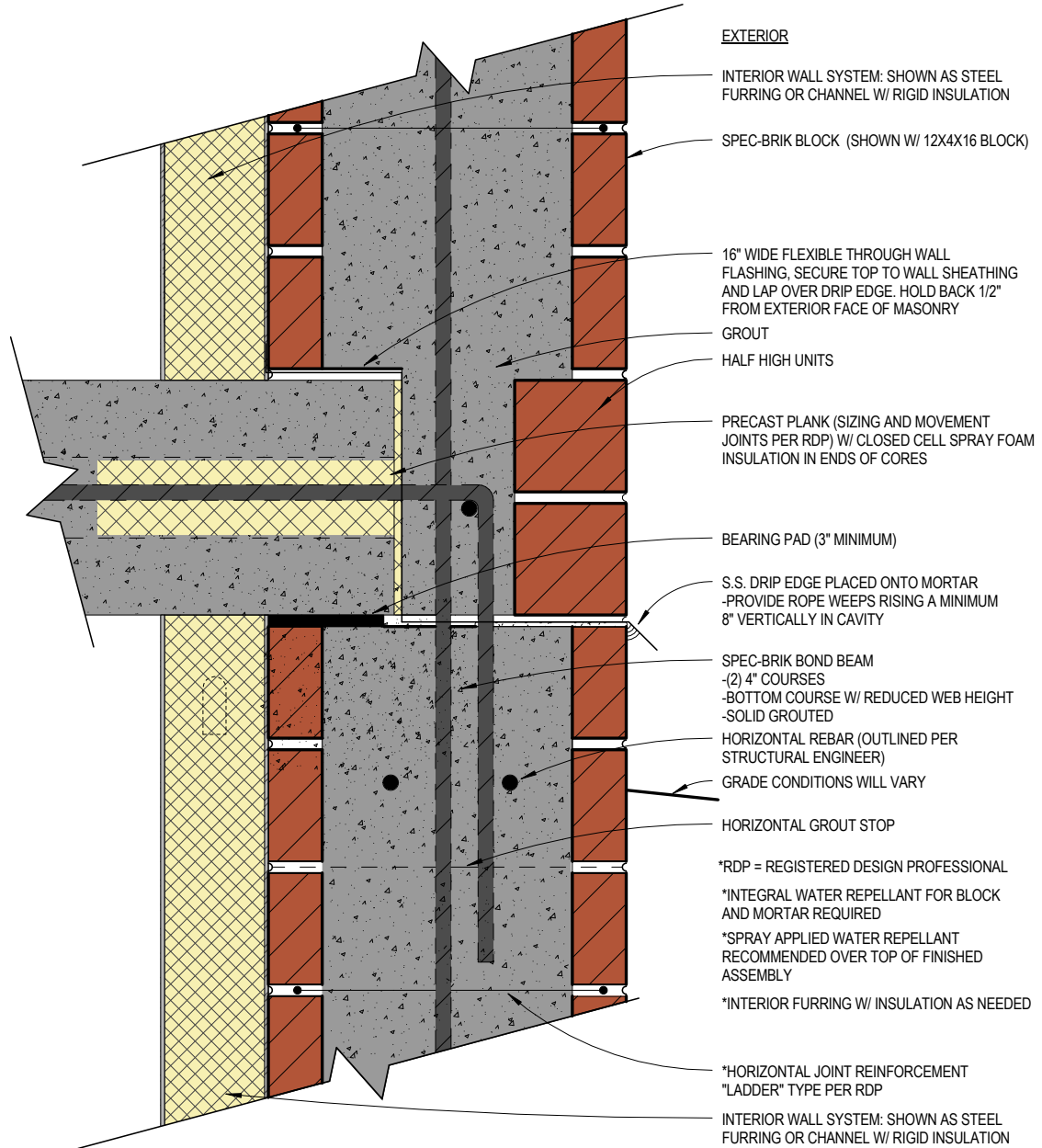
Typical Notes:

1. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Inspect after coatings application to assure that all such features are functioning properly.
3. California projects may use alternate moisture control techniques for vertical wall shear test compliance (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants or drainable film forming coatings).
4. Assume single-wythe walls are self-covering and therefore especially rely upon design redundancy approach: use of flashing and weeps, IWR, post-applied moisture control means and measures, high performance sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered .
5. Moisture-Tolerant Finish/Sheathing /Board as well as High-Performance steel furring or channel are assumed to be appropriately anchored.

Codes and Standards References

Applicable References are found in Section III.

Figure 20. Pre-Cast Plank Option 4



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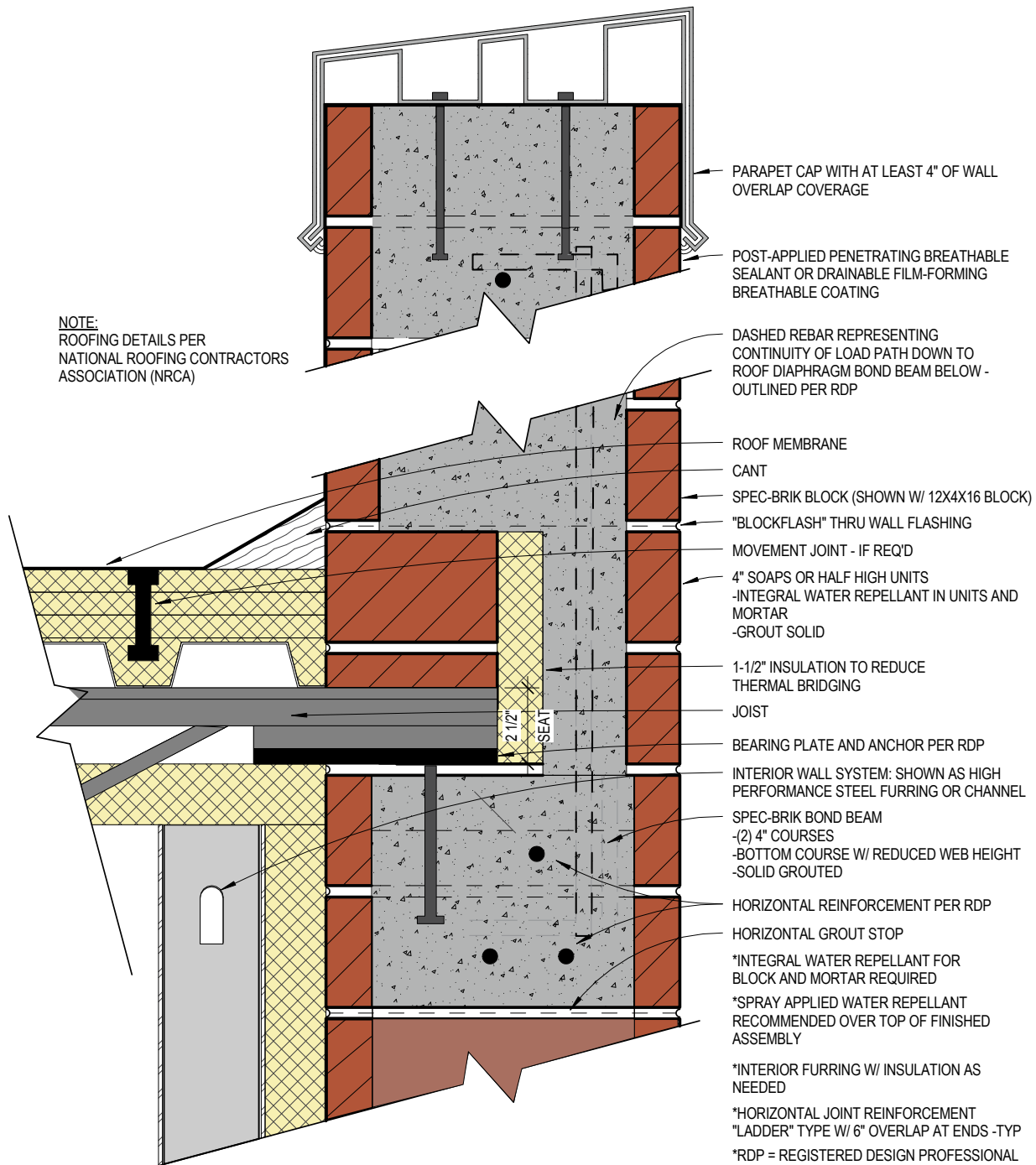
Typical Notes:

1. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Many flashing systems from which to choose. Drainable weeps and/or vents (also allowing optional Z or S pattern) still necessary.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior. Inspect after coatings application to assure that all such features are functioning properly.
3. California projects may use alternate moisture control techniques for vertical wall shear test compliance (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants or drainable film forming coatings).
4. Assume single-wythe walls are self-covering and therefore especially rely upon design redundancy approach: use of flashing and weeps, IWR, post-applied moisture control means and measures, high performance sealant systems, movement joints, damp-checks, crack control, thermal bridging/condensate control, as well as soil elevation offsets and below-grade dampproofing – including alkali, salt, and sulfate resistance – are each considered .
5. Moisture-Tolerant Finish/Sheathing /Board as well as High-Performance steel furring or channel are assumed to be appropriately anchored.

Codes and Standards References

Applicable References are found in Section III.

Figure 21. Roof Parapet



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Typical Notes:

1. All High Performance Movement and Bead Sealant Systems assume use of the appropriate Primer in conjunction with the Sealant.
2. Film-forming Breathable Exterior Coatings must allow flashing, weeps, vents, etc. to drain redirected moisture to the exterior.
3. California projects may use alternate moisture control techniques for shear test compliance (omit IWR within CMU; use IWR within mortar; use post-applied breathable penetrating sealants or drainable film forming coatings).
4. Drip edge may be omitted if drainable flashing is terminated at tooled mortar surface. Drainable weeps and/or vents still necessary.
5. See plans for Scupper and roof drainage details. Use High Performance Sealant system.
6. Both exterior and interior sides of parapet must be moisture-controlled.
7. Vertical walls including Fenestration Framing (glazing and lites not necessarily installed due to future loads such as roof, floors, etc.) and Door Jambs shall pass a two hour 45 degree hose stream, spray bar, or similar exterior wall moisture test. Moisture Test shall be performed during wall construction and before interior insulation and finish placement at representative location(s). Successful completion of such test is proof of contract compliance; future compliance is accomplished through maintenance.

Codes and Standards References

Applicable References are found in Section III.



Section III Codes and Standards References

Applicable Code References for Single Wythe Walls

These references are intended to be a guide to the portions of the Model Codes that apply or relate to the construction of Single Wythe Walls. This set of references is only a starting point, and you should be sure to check the underlying Code itself and be sure to check the local Code that the Authority Having Jurisdiction has authorized for the location applicable to your project.

International Building Code ("IBC") (2006 and 2009); INTERNATIONAL CODE COUNCIL, INC., 4051 West Flossmoor Road, Country Club Hills, IL 60478, including but not limited to:

CHAPTER 1 SCOPE AND ADMINISTRATION; 101.3 Intent, 104.11 Alternative materials, design and methods of construction and equipment, **SECTION 105 PERMITS** 105.1 Required, 105.2 Work exempt from permit, **SECTION 107 SUBMITTAL DOCUMENTS** 107.1 General, 107.2.4 Exterior wall envelope, 107.3.4 Design professional in responsible charge, **SECTION 110 INSPECTIONS** 110.1 General, 110.3.1 Footing and foundation inspection, 110.3.2 Concrete slab and under-floor inspection, 110.3.7 Energy efficiency inspections, 110.3.8 Other inspections, 110.3.9 Special inspections, **SECTION 115 STOP WORK ORDER**.

CHAPTER 2 DEFINITIONS (multiple applicable references).

CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES; SECTION 703 FIRE-RESISTANCE RATINGS AND FIRE TESTS, 703.2 Fire-resistance ratings, 703.2.2 Combustible components, 703.3 Alternative methods for determining fire resistance, **SECTION 704 FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS**, 704.10 Exterior structural members, 705.4 Materials, 705.5 Fire-resistance ratings, **SECTION 719 THERMAL- AND SOUND-INSULATING MATERIALS**, 719.4 Loose-fill insulation, **SECTION 720 PRESCRIPTIVE FIRE RESISTANCE**, 720.1.2 Unit masonry protection, **SECTION 721 CALCULATED FIRE RESISTANCE**, 721.1 General, **TABLE 720.1(2) RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS**, 721.3 Concrete masonry.

CHAPTER 8 INTERIOR FINISHES; SECTION 801 GENERAL, 801.8 Foam plastics, **SECTION 803 WALL AND CEILING FINISHES**, 803.4 Foam plastics, **SECTION 807 INSULATION**. **CHAPTER 12 INTERIOR ENVIRONMENT; SECTION 1207 SOUND TRANSMISSION**, 1207.2 Air-borne sound, 1207.2.1 Masonry, **SECTION 1210 SURROUNDING MATERIALS**, 1210.2 Walls and partitions, 1210.3 Showers.

CHAPTER 13 ENERGY EFFICIENCY; SECTION 1301 GENERAL, 1301.1.1 Criteria.

CHAPTER 14 EXTERIOR WALLS; SECTION 1403 PERFORMANCE REQUIREMENTS, 1403.2 Weather protection, **SECTION 1404 MATERIALS** 1404.4 Masonry, 1404.7 Glass-unit masonry, **SECTION 1405 INSTALLATION OF WALL COVERINGS**, 1405.2 Weather protection, 1405.3 Vapor retarders, 1405.4 Flashing, 1405.4.1 Exterior wall pockets, 1405.4.2 Masonry, 1405.5 Wood veneers (Comparative Requirements), 1405.6 Anchored masonry veneer (Comparative requirements or possible interior placement), 1405.7 Stone veneer (Comparative Requirements), 1405.8 Slab-type veneer (Comparative Requirements), 1405.9 Terra cotta (Comparative Requirements), 1405.10 Adhered masonry veneer, (Comparative Requirements), 1405.10.1 Interior adhered masonry veneers, 1405.11 Metal veneers (Comparative Requirements), 1405.12 Glass veneer (Comparative Requirements), 1405.13 Exterior windows and doors (Comparative Requirements), 1405.14 Vinyl siding (Comparative Requirements), 1405.15 Cement plaster (Comparative Requirements), 1405.16 Fiber-cement siding (Comparative Requirements), 1405.17 Fastening (More Comparative Requirements), **SECTION 1406 COMBUSTIBLE MATERIALS ON THE EXTERIOR SIDE OF EXTERIOR WALLS** (Comparative requirements), **SECTION 1407 METAL COMPOSITE MATERIALS (MCM)** (Comparative Requirements), **SECTION 1408 EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)**; Comparative requirements).

CHAPTER 15 ROOF ASSEMBLIES AND ROOFTOP STRUCTURES (Includes effects of scuppers, drains, and gutters – or their omissions; plumbing and drainage – including blockage and ice dams – affects lower masonry courses, leakage at interfaces with footing, foundation, and slab, as well as below-grade construction), **SECTION 1503 WEATHER PROTECTION**, 1503.1 General, 1503.2 Flashing, 1503.2.1 Locations, 1503.4 Roof drainage, 1503.4.1

Secondary drainage required, 1503.4.2 Scuppers, 1503.4.3 Gutters.

CHAPTER 16 STRUCTURAL DESIGN (In general, an awareness of the many different types of loads, geographic effects, and building categories – each affecting CMU walls requirements, and effect on costs, along with competitive wall requirements and effect on costs),

1603.1.6 Geotechnical information, 1603.1.9 Systems and components requiring special inspections for seismic resistance, 1603.1.7 Flood design data, **SECTION 1604 GENERAL DESIGN REQUIREMENTS**, 1604.2 Strength, 1604.3.4 Masonry, 1604.5 Occupancy category, **TABLE 1604.5 OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES**, 1604.8 Anchorage, 1607.7 Loads on handrails, guards, grab bars, seats and vehicle barrier systems, 1607.7.3 Vehicle barrier systems, 1607.8 Impact loads, 1607.8.1 Elevators, 1607.8.2 Machinery, 1607.11.3 Landscaped roofs, 1607.13 Interior walls and partitions, **SECTION 1608, SNOW LOADS**, **SECTION 1609 WIND LOADS**, 1609.5 Roof systems, 1609.6.4 Design procedure, **SECTION 1610 SOIL LATERAL LOADS**, **SECTION 1611 RAIN LOADS**, **[P] FIGURE 1611.1 100-YEAR, 1-HOUR RAINFALL (INCHES)**, 1611.2 Ponding instability, 1611.3 Controlled drainage, **SECTION 1612 FLOOD LOADS**, **SECTION 1613 EARTHQUAKE LOADS**, **FIGURE 1613.5(1-14) MAXIMUM CONSIDERED EARTHQUAKE GROUND MOTION**.

CHAPTER 17 STRUCTURAL TESTS AND SPECIAL INSPECTIONS, **SECTION 1703 APPROVALS**, 1703.1 Approved agency, 1703.2 Written approval, **SECTION 1704 SPECIAL INSPECTIONS**, 1704.1.1 Statement of special inspections, 1704.3 Steel construction, 1704.4 Concrete construction, 1704.5 Masonry construction, **TABLE 1704.5.1 LEVEL 1 REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION**, **TABLE 1704.5.3 LEVEL 2 REQUIRED VERIFICATION AND INSPECTION OF MASONRY CONSTRUCTION**, 1704.5.1 Empirically designed masonry, glass unit masonry and masonry veneer in Occupancy Category IV, 1704.5.2 Engineered masonry in Occupancy Category I, II or III, 1704.5.3 Engineered masonry in Occupancy Category IV, 1704.6 Wood construction, 1704.7 Soils, 1704.8 Driven deep foundations, 1704.9 Cast-in-place deep foundations, 1704.10 Helical pile foundations, 1704.11 Vertical masonry foundation elements, 1704.12 Sprayed fire-resistant materials, 1704.13 Mastic and intumescent fire-resistant coatings, 1704.14 Exterior insulation and finish systems (EIFS), 1704.16 Special inspection for smoke control, **SECTION 1705 STATEMENT OF SPECIAL INSPECTIONS**,

CHAPTER 18 SOILS AND FOUNDATIONS; SECTION 1801 GENERAL; 1801.1 Scope, **SECTION 1803 GEOTECHNICAL INVESTIGATIONS**, 1803.1 General, 1803.3 Basis of investigation, 1803.5 Investigated conditions, 1803.5.1 Classification, 1803.5.2 Questionable soil, 1803.5.3 Expansive soil, 1803.5.4 Ground-water table, Exception, 1803.5.5 Deep foundations, 1803.5.6 Rock strata, 1803.5.8 Compacted fill material, 1803.5.9 Controlled low-strength material (CLSM), 1803.5.10 Alternate setback and clearance, 1803.5.11 Seismic Design Categories C through F, 1803.5.12 Seismic Design Categories D through F, 1803.6 Reporting, **SECTION 1804 EXCAVATION, GRADING AND FILL**, **SECTION 1805 DAMPPROOFING AND WATERPROOFING**, 1805.1 General, 1805.1.1 Story above grade plane, 1805.1.3 Ground-water control, 1805.2 Dampproofing, 1805.2.1 Floors, 1805.2.2 Walls, 1805.2.2.1 Surface preparation of walls, 1805.3 Waterproofing, 1805.3.1 Floors, 1805.3.2 Walls, 1805.3.2.1 Surface preparation of walls, 1805.3.3 Joints and penetrations, 1805.4 Subsoil drainage system, 1805.4.1 Floor base course, Exception, 1805.4.2 Foundation drain, 1805.4.3 Drainage discharge, **SECTION 1807 FOUNDATION WALLS, RETAINING WALLS AND EMBEDDED POSTS AND POLES**, 1807.1.5 Concrete and masonry foundation walls, Exception, 1807.1.6 Prescriptive design of concrete and masonry foundation walls, 1807.1.6.1 Foundation wall thickness, 1807.1.6.2.1 Seismic requirements, 1807.1.6.3 Masonry foundation walls, 1807.1.6.3.1 Alternative foundation wall reinforcement, 1807.1.6.3.2 Seismic requirements, 1807.2 Retaining walls, 1807.2.1 General, 1807.3 Embedded posts and poles (masonry bracing) 1808.5 Shifting or moving soils, 1808.6 Design for expansive soils, 1808.7 Foundations on or adjacent to slopes, 1808.9 Vertical masonry foundation elements, **SECTION 1809 SHALLOW FOUNDATIONS**, 1809.7 Prescriptive footings for light-frame construction (masonry unit footings) 1809.9 Masonry-unit footings, 1809.10 Pier and curtain wall foundations (includes masonry piers and foundations).

CHAPTER 19 CONCRETE; SECTION 1904 DURABILITY REQUIREMENTS, 1904.1 Water-cementitious materials ratio, 1904.2 Exposure categories and classes (sulfates, etc.), 1904.3 Concrete properties, **TABLE 1904.3 MINIMUM SPECIFIED COMPRESSIVE STRENGTH (f'c)** (relates to exposure, sulfates, etc.) 1904.4 Freezing and thawing exposures, 1904.5 Alternative cementitious materials for sulfate exposure.

CHAPTER 21 MASONRY

CHAPTER 22 STEEL; 2206.2 Design (anchorage; masonry in-fill needs be anchored one way or another).

CHAPTER 23 WOOD; 2304.10.2 Floor framing (on masonry), 2304.10.4 Floor decks (and masonry), 2304.11.2.3 Exterior walls below grade (and masonry), 2304.11.2.5 Girder ends (and masonry walls), 2304.11.2.7 Posts or columns (and masonry), 2304.12 Long-term loading (and masonry), TABLE 2306.6 (a. masonry bracing limit), TABLE 2306.7 (a. masonry shear load), 2308.3.3 Sill anchorage (masonry foundation)

CHAPTER 25 GYPSUM BOARD AND PLASTER; SECTION 2503 INSPECTION (for these purposes, as interior finish or comparative

ements), **SECTION 2504 VERTICAL AND HORIZONTAL ASSEMBLIES; SECTION 2505 SHEAR WALL CONSTRUCTION** (comparative requirements), **SECTION 2506 GYPSUM BOARD MATERIALS** (as interior finish or comparative requirements), **SECTION 2507 LATHING AND PLASTERING** (as interior finish), **SECTION 2508 GYPSUM CONSTRUCTION** (as interior finish or comparative requirements), 2508.2 Limitations, 2508.2.1 Weather protection, **SECTION 2509 GYPSUM BOARD IN SHOWERS AND WATER CLOSETS** (as interior finish or comparative requirements), **SECTION 2510 LATHING AND FURRING FOR CEMENT PLASTER (STUCCO)** (as interior finish or comparative requirements), **SECTION 2511 INTERIOR PLASTER** (as interior finish or comparative requirements),

CHAPTER 26 PLASTIC; SECTION 2601 GENERAL; 2601.1 Scope (for these purposes, primarily as Energy Conservation; insulation. Also as comparative requirements.), **SECTION 2603 FOAM PLASTIC INSULATION,** 2603.4 Thermal barrier, 2603.4.1 Thermal barrier not required, 2603.4.1.1 Masonry or concrete construction, 2603.4.1.11 Interior trim, 2603.4.1.12 Interior signs, 2603.5 Exterior walls of buildings of any height (comparative requirements), 2603.5.3 Potential heat, 2603.5.6 Label required, 2603.5.7 Ignition, Exception (as relating to masonry covering), 2603.7 Plenums (vertical wall application), 2603.8 Protection against termites (comparative requirements and separation distances), Exceptions (as masonry applicable), **SECTION 2604 INTERIOR FINISH AND TRIM, SECTION 2613 REFLECTIVE PLASTIC CORE INSULATION.**

CHAPTER 28 MECHANICAL SYSTEMS; SECTION 2801 GENERAL; 2801.1 Scope.

CHAPTER 29 PLUMBING SYSTEMS; SECTION 2901 GENERAL, [P] 2901.1 Scope.

CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS; SECTION 3002 HOISTWAY ENCLOSURES, 3002.1 Hoistway enclosure protection (as fire-resistance requirements). **SECTION 3006 MACHINE ROOMS,** 3006.4 Machine rooms and machinery spaces (as fire-resistance requirements), **SECTION 3007 FIRE SERVICE ACCESS ELEVATOR,** 3007.2 Hoistway enclosures protection (as fire-resistance requirements), **SECTION 3008 OCCUPANT EVACUATION ELEVATORS,** 3008.9 Hoistway enclosure protection, (as fire-resistance requirements),

CHAPTER 31 SPECIAL CONSTRUCTION; SECTION 3104 PEDESTRIAN WALKWAYS AND TUNNELS; 3104.3 Construction, (as fire-resistance requirements), 3104.5 Fire barriers between pedestrian walkways and Buildings, 3104.10 Tunneled walkway (as fire resistance requirements), **SECTION 3106 MARQUEES,** 3106.5 Construction (as fire and deterioration resistance requirements), **SECTION 3109 SWIMMING POOL ENCLOSURES AND SAFETY DEVICES,** 3109.3 Public swimming pools (as fencing requirements), 3109.4 Residential swimming pools (as barrier requirements),

CHAPTER 32 ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY; SECTION 3201 GENERAL, 3201.4 Drainage (as affects implied project ground-level construction and drainage), 3202.2 Encroachments above grade and below 8 feet in height (as restrictions and allowances),

CHAPTER 33 SAFEGUARDS DURING CONSTRUCTION; SECTION 3301 GENERAL, 3301.1 Scope, **SECTION 3303 DEMOLITION,** 3303.5 Water accumulation (applies both ways), **SECTION 3307 PROTECTION OF ADJOINING PROPERTY** (applies both ways).

International Energy Conservation Code ("IECC"; especially 2006 and 2009);

INTERNATIONAL CODE COUNCIL, INC., 4051 West Flossmoor Road, Country Club Hills, IL 60478; including but not limited to:

CHAPTER 1 ADMINISTRATION, 101.3 Intent,

CHAPTER 2 DEFINITIONS,

CHAPTER 3 CLIMATE ZONES,

CHAPTER 5 COMMERCIAL ENERGY EFFICIENCY, SECTION 502 BUILDING ENVELOPE REQUIREMENTS, TABLE 502.1.2 BUILDING

REQUIREMENTS OPAQUE ELEMENT, MAXIMUM U-FACTORS, TABLE 502.2(1) BUILDING ENVELOPE REQUIREMENTS

- OPAQUE ASSEMBLIES (Minimum R-Values), 502.2.4 Below-grade walls, 502.2.6 Slabs on grade, 502.4 Air leakage (Mandatory), 502.4.3 Sealing of the building envelope, **SECTION 506 TOTAL BUILDING PERFORMANCE**, 506.2 Mandatory requirements, 506.3 Performance-based compliance, 506.4 Documentation, 506.5 Calculation procedure, 506.6 Calculation software tools, 506.6.1 Specific approval

American Society of Heating and Refrigeration Engineers Standard 90.1

("ASHRAE 90.1", or "90.1"; especially 2004 and 2007 editions) (including Normative Appendices as well as Informative Appendices), American Society of Heating and Refrigeration Engineers Inc., 1791 Tullie Circle NE, Atlanta, GA 30329.

3.0 DEFINITIONS, ABBREVIATIONS, AND ACRONYMS, 3.2 Definitions,

4.0 ADMINISTRATION AND ENFORCEMENT, 4.1.7 Normative Appendices, 4.2.1 Compliance Paths,

5.0 GENERAL 5.1.4 Climate, 5.2 Compliance Paths, 5.2.1 a. 5.5 Prescriptive Building Envelope Option, 5.2.1 b. 5.6 Building Envelope Trade-Off Option, 5.2.2 (as relates to Energy Cost Budget), 5.4 Mandatory Provisions, 5.4.1 Insulation, 5.4.3 Air Leakage, 5.4.3.1 Building Envelope Sealing, 5.5 Prescriptive Building Envelope Option, Building Envelope Requirements for Climate Zones Tables 5.5-1 through 8, 5.5.3.2 Above-Grade Wall Insulation, 5.5.3.3 Below-Grade Wall Insulation, 5.5.3.4 Floor Insulation, 5.5.3.5 Slab-on-Grade Insulation, 5.6 Building Envelope Trade-Off Option.

NORMATIVE APPENDIX A RATED R-VALUE OF INSULATION AND ASSEMBLY U-FACTOR, C-FACTOR, AND F-FACTOR DETERMINATION, A.1 GENERAL, A.3 ABOVE-GRADE WALLS, A.4 BELOW-GRADE WALLS, A.5 FLOORS, A.6 SLAB-ON-GRADE FLOORS, A.9 DETERMINATION OF ALTERNATE ASSEMBLY U-FACTORS, C-FACTORS, OR HEAT CAPACITIES,

NORMATIVE APPENDIX B-BUILDING ENVELOPE CLIMATE CRITERIA,

NORMATIVE APPENDIX C METHODOLOGY FOR BUILDING ENVELOPE TRADE-OFF OPTION IN SUBSECTION 5.6.

International Mechanical Code ("IMC") (especially 2006 and 2009); INTERNATIONAL CODE COUNCIL, INC., 4051 West Flossmoor Road, Country Club Hills, IL 60478; Including but not limited to:

CHAPTER 2 DEFINITIONS, SECTION 202 GENERAL DEFINITIONS (especially **AIR, CONDENSATE, CONDITIONED SPACE, ENVIRONMENTAL AIR, NATURAL VENTILATION, OUTDOOR AIR, PLENUM, RECIRCULATED AIR, RETURN AIR, SUPPLY AIR, VENTILATION AIR**),

CHAPTER 3 GENERAL REGULATIONS, SECTION 304 INSTALLATION, 304.10 Clearances from grade (possible affect on masonry wall base course placement), 306.5 Equipment and appliances on roofs or elevated structures (affects wall loads), **SECTION 307 CONDENSATE DISPOSAL**(moisture source on, in, or adjacent to building).

CHAPTER 4 VENTILATION SECTION 402 NATURAL VENTILATION, [B] 402.2 Ventilation area required, [B] 402.4 Openings below grade (affects wall penetrations, drainage, moisture resistance, dampproofing, etc), 403.4 Exhaust ventilation (affects net Energy Conservation, wall penetrations and weather protection, additional supply air and related penetrations, etc.),

CHAPTER 5 EXHAUST SYSTEMS, 501.2.2 Exhaust opening protection (affects net Energy Conservation, wall penetrations and weather protection, additional supply air and related penetrations, etc).

International Plumbing Code ("IPC"; especially 2006 and 2009) INTERNATIONAL CODE COUNCIL, INC., 4051 West Flossmoor Road, Country Club Hills, IL 60478; Including but not limited to:

CHAPTER 2 DEFINITIONS, SECTION 202, GENERAL DEFINITIONS (ACCESS (TO), WASTE),

CHAPTER 3 GENERAL REGULATIONS, SECTION 314; CONDENSATE DISPOSAL; [M] 314.2.1 Condensate disposal (additional potential source of moisture or waste at walls, base courses, footings, slabs, soil, etc.),

CHAPTER 4 FIXTURES, FAUCETS AND FIXTURE FITTINGS, SECTION 417 SHOWERS; 417.4 Shower compartments; 417.4.1 Wall area,

CHAPTER 6 WATER SUPPLY AND DISTRIBUTION, SECTION 605 MATERIALS, JOINTS AND CONNECTIONS; 605.1 Soil and ground water (emphasizing problem soil identification, remediation),

CHAPTER 9 VENTS, SECTION 904 VENT TERMINALS; 904.6 Extension through the wall (wall penetration),

CHAPTER 11 STORM DRAINAGE, SECTION 1102 STORM DRAINAGE, 1101.2 Where required, 1101.7 Roof design (note design assumptions), **SECTION 1106 SIZE OF CONDUCTORS, LEADERS AND STORM DRAINS**, 1106.1 General (Similar design basis as IBC ?), 1106.5 Parapet wall scupper location (wall penetration), 1106.6 Size of roof gutters (collected rain water to drain potentially at footing, foundation, base course area), **SECTION 1107 SECONDARY (EMERGENCY) ROOF DRAINS**, 1107.1 Secondary drainage required, 1107.2 Separate systems required (overflow to footing,

foundation, base course area).

TMS 402/ACI 530/ASCE 5 and Commentary ("TMS 402", "TMS", or "MSJC"; Masonry Code; Building Code Requirements for Masonry Structures; especially 2005 and 2008 editions); The Masonry Society, 3970 Broadway, Suite 201-D, Boulder, CO 80304-1135; 105 South Sunset, Suite Q, Longmont, CO 80501.

TMS 602/ACI 530.1/ASCE 6 and Commentary ("TMS 602", "TMS" or "MSJC"; Masonry Specifications; Specifications for Masonry Structures; especially 2005 and 2008 editions); The Masonry Society, 3970 Broadway, Suite 201-D, Boulder, CO 80304-1135; 105 South Sunset, Suite Q, Longmont, CO 80501.

ASTM International Specifications, Test Methods, and Practices ("ASTM"; as applicable by Code, Standard, or Specification; more recent editions), ASTM International, Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, Including **but** not limited to:

ASTM C 90 Standard Specification for Loadbearing Concrete Masonry Units,

ASTM C 140 Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

NCMA TEK MANUAL; NATIONAL CONCRETE MASONRY ASSOCIATION, 13750 Sunrise Valley Drive, Herndon, Virginia 20171,

www.ncma.org, publications@ncma.org.

NCMA DETAILS; NATIONAL CONCRETE MASONRY ASSOCIATION, 13750 Sunrise Valley Drive, Herndon, Virginia 20171, www.ncma.org, publications@ncma.org.

NCMA Fire Energy and Sound Calculator; NATIONAL CONCRETE MASONRY ASSOCIATION 13750 Sunrise Valley Drive, Herndon, Virginia 20171, www.ncma.org publications@ncma.org.



Section IV Guide Specification

SECTION 04 22 23
ARCHITECTURAL CONCRETE MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Architectural concrete masonry exterior wall veneer facing.
- B. Architectural concrete masonry exterior single wythe walls.

1.2 RELATED SECTIONS

- A. Section 04 05 13.23 – Surface Bonding Masonry Mortaring
- B. Section 04 05 16.26 – Engineered Masonry Grouting.
- C. Section 04 05 19.29 – Stone Anchors.
- D. Section 04 05 19.19 – Masonry Cavity Drainage, Weepholes, and Vents*.
- E. Section 05 20 00 – Metal Joists.
- F. Section 05 50 00 – Metal Fabrications.
- G. Section 07 62 00 – Sheet Metal Flashing and Trim.
- H. Section 07 65 26 – Self-Adhering Sheet Flashing.
- I. Section 07 90 00 – Joint Protection.

1.3 REFERENCES

- A. ASTM C 33 – Standard Specification for Concrete Aggregates.
- B. ASTM C 67 – Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
- C. ASTM C 90 – Standard Specification for Loadbearing Concrete Masonry Units.
- D. ASTM C 91 – Standard Specification for Masonry Cement.
- E. ASTM C 109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
- F. ASTM C 140 – Standard Specification for sampling and testing Concrete Masonry Units.
- G. ASTM C 150 – Standard Specification for Portland Cement.
- H. ASTM C 331 – Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
- I. ASTM C 780 – Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- J. ASTM C 1019 – Standard Test Method for Sampling and Testing Grout.
- K. ASTM C 1072 – Standard Test Methods for Measurement of Masonry Flexural Bond Strength.

- L. ASTM C 1093 – Standard Practice for Accreditation of Testing Agencies for Masonry.
- M. ASTM C 1314 – Standard Test Method for Compressive Strength of Masonry Prisms.
- N. ASTM C 1506 – Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters.
- O. ASTM D 2000 – Standard Classification System for Rubber Products in Automotive Applications.
- P. ASTM D 2287 – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
- Q. ASTM E 72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- R. ASTM E 514 – Standard Test Method for Water Penetration and Leakage Through Masonry.
- S. TMS 402-13 / ACI 530-13 / ASCE 5-13 – Building Code Requirements for Masonry Structures.
- T. TMS 602-13 / ACI 530.1- 13 / ASCE 6-13 – Specification for Masonry Structures.
- U. NCMA TEK Bulletin 3-1C – All Weather Concrete Masonry Construction.
- V. NCMA TEK Bulletin 3-2A – Grouting for Concrete Masonry Walls.
- W. NCMA TEK Bulletin 3-3A – Reinforced Concrete Masonry Construction.
- X. NCMA TEK Bulletin 8-2A – Removal of Stains from Concrete Masonry Walls."
- Y. NCMA TEK Bulletin 10-1A – Crack Control in Concrete Masonry Walls.
- Z. NCMA TEK Bulletin 10-2B – Control Joints for Concrete Masonry Walls.
- AA. NCMA TEK Bulletin 14-4A – Strength Design of Concrete Masonry.
- BB. NCMA TEK Bulletin 19-4A – Flashing Strategies for Concrete Masonry Walls.
- CC. NCMA TEK Bulletin 19-5A – Flashing Details for Concrete Masonry Walls.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Concrete Unit Masonry Construction: Comply with the following:
 - 1. TMS 602-13 / ACI 530.1- 13 / ASCE 6-13 – Building Code Requirements for Masonry Structures.
 - 2. TMS 602-13 / ACI 530.1- 13 / ASCE 6-13 – Specification for Masonry Structures.
 - 3. National Concrete Masonry Association (NCMA) TEK Bulletins.
- B. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in TMS 402/ ACI 530.1/ASCE 5 and TMS 602/ ACI 530.1/ ASCE 6

2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.
- C. **[For HI-R or HI-R-H specifications only]** Pre-installed two piece, interlocking, Concrete Masonry Unit Insulation.
1. Description: Concrete Block Insulation Systems, Inc. expanded polystyrene Insulation Inserts made from flame-retardant treated expandable polystyrene, such as [KORFIL Block Insulation], [KORFIL Hi-R Insulation], [KORFIL Hi-R-H Insulation], and/or [ICON Universal Inserts] which are pre-installed in CMU's prior to delivery to jobsite;
 2. Physical Properties of EPS:
 - a. Typical Density (lbs/cu.ft.) Min.: 1.05–1.50
 - b. Thermal Resistance (R) per inch: 5.00
 - c. Water Vapor Permeance: 1.10
 - d. Water Absorption% volume: <1.00
 - e. Flame Spread Rating: <5.00
 3. Additional Properties of EPS Inserts:
 - a. Rot and Vermin resistance: Produced from expanded polystyrene – full resistant to rot; does not attract vermin, termites or rodents.
 - b. Components: Insulation shall contain no fluorocarbons and no formaldehyde.
 - c. Shape: Two-piece, interlocking insert shall overlap at both head & bed joints with edges of adjacent inserts of the same type. Keyway shall be provided for butt welded cross-rods of 16" o.c. ladder type horizontal wall reinforcement.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.
 2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
 3. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 4. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
 5. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.
 6. Prism Test: For each type of construction required, according to ASTM C 1314.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 – Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods including written plan for cold and hot weather construction and masonry cleaning procedures.
- C. Selection Samples: Submit three full size units of each type/color of exposed architectural concrete masonry unit for review of color and texture to verify compliance with products specified. Provide the maximum color and texture variation range expected in the finished work. Production orders may be released after submittals are approved.
- D. Manufacturer's Certificates and Test Reports: Certify products meet or exceed specified requirements. Test reports should be within 12 months of bid date.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in TMS 602/ACI 530.1/ASCE 6.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum ten years documented experience and a current member in good standing of the National Concrete Masonry Association.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience with projects of similar scope and complexity.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of masonry work while it is in progress.
- D. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- E. Source Limitations: Provide each type of masonry unit from a single manufacturing source to ensure uniform texture and color for continuous and visually related items.
- F. Mock-Up: Prior to starting masonry work build sample wall panel(s) for Archi-

tect's inspection and acceptance. Build panel(s) on a firm foundation, in location acceptable to the Architect. Panel(s) shall be L-shaped, with long side a minimum of 5 foot 4 inches long by 4 foot 0 inches high and with one corner return at least 2 foot 0 inches long. Construct sample panel(s) full thickness, installing wall reinforcement, anchors, ties and other required accessories. Provide special features as directed for control joints, weeps, etc. Panel(s) shall show color range and texture of masonry units, bond, mortar joints and workmanship to be expected for the project.

1. Build sample panels for:
 - a. Each type of exposed unit masonry construction.
 - b. Typical exterior wall.
 - c. Typical interior wall.
 - d. Typical exterior and interior walls.
2. Clean one-half of each sample panel using approved masonry cleaning materials and methods to represent final cleaning. Remaining one-half to remain without final cleaning for comparison purposes.
3. Retain sample panels during construction as a standard for judging completed masonry work. Do not alter, move, or destroy sample panels until work is completed or removal is authorized.

1.8 PRE-INSTALLATION CONFERENCE

- A. Convene an architectural masonry conference approximately two weeks before scheduled commencement of masonry construction and associated work.
- B. Require attendance of installers of components that are to be built-into or otherwise concerned with masonry performance, and installers of other work in and around the masonry which must precede or follow the work and including the Architect, Owner, window, door and roofing representatives and the architectural masonry manufacturer's representative.
- C. Objectives include:
 1. Review foreseeable methods and procedures related to masonry work, including set up and mobilization areas for stored material and work area.
 2. Tour representative areas to receive masonry, inspect and discuss condition of substrate, penetrations and other preparatory work.
 3. Review work of other trades and make provisions to permit installation of their work in a manner to avoid cutting and patching.
 4. Review masonry requirements, Drawings, Specifications and other Contract Documents, including these topics:
 - a. Review and critique the completed Sample panel(s) under diffused light.
 - b. Demonstrate cleaning procedures on the sample panel.
 - c. Set schedule for pre-cleaning meeting and cleaning after installation.

- d. Location of Movement (Control) Joints.
 - e. Use of compatible water repellent admixtures for mortar.
 - f. Availability of clean and potable water for project.
 - g. Installation of flashing details.
 - h. Open issues and concerns.
 - i. Cold/Hot weather procedures.
 - j. Protecting masonry during constructing, including covering walls.
 - k. Post-applied breathable sealant.
- 5. Review and finalize schedule related to masonry and related work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - 6. Review required inspection, testing, certifying procedures.
 - 7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.
 - 8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver architectural concrete masonry units to the job site on wood pallets with manufacturer's recommended unit protective covers.
- B. Inspect architectural concrete masonry units upon delivery to ensure color match with required materials and accepted samples.
- C. Stack masonry units in a dry place off the ground on pallets or a prepared plank platform. Method of stacking is acceptable. Protect with non-staining waterproof tarpaulin coverings arranged to allow air circulation around and above masonry units.
- D. Exercise care in the storage, handling and installation of masonry units. Do not build soiled or damaged masonry units into the work.

1.10 SEQUENCING

- A. Ensure that locating templates and other information required from others for built-in installation of products of this section are furnished in time to prevent interruption of construction progress.

1.11 PROJECT CONDITIONS

- A. Follow hot weather and cold weather requirements in the masonry code and specifications, TMS 402 and TMS 602.
- B. Cold Weather Procedures:

1. Preparation:
 - a. If ice or snow has formed on the masonry bed, remove it by carefully applying heat not to exceed 120 degrees F until the surface is dry to the touch.
 - b. Remove any brick units or mortar that is frozen or damaged.
 - c. When the clay masonry unit suction exceeds 30 grams per minute per 30 square inches, sprinkle with heated water as follows:
 - 1) When units are 32 degrees F or above, heat water to 70 degrees F or above.
 - 2) When units are below 32 degrees F, heat water to 130 degrees F or above.
 2. Work in Progress:
 - a. Air temperature 40 degrees F to 32 degrees F:
 - 1) Heat sand or mixing water to produce mortar temperatures that match air temperature.
 - b. Air temperature 32 degrees F to 25 degrees F:
 - 1) Heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F.
 - 2) Maintain temperature of mortar on boards above freezing.
 - 3) Installation in colder air temperatures will require heat sources on the wall and the use of windbreaks or tents to create a controlled environment suitable for proper bonding and curing.
 3. Completed Work and Work Not in Progress:
 - a. Mean daily air temperature of 40 degrees F to 32 degrees F: Protect masonry from rain and snow for 24 hours by covering with a weather-resistive membrane.
 - b. Mean daily air temperature of 32 degrees F to 25 degrees F: Cover masonry with a weather-resistive membrane for 24 hours.
 - c. Mean daily air temperature of 25 degrees F to 20 degrees F: Cover masonry with insulating blankets for 24 hours.
- C. Hot Weather Procedures:
1. When ambient temperature exceeds 90 degrees F and wind exceeds 8 miles per hour:
 - a. Maintain temperature of mortar and grout between 70 degrees F and 120 degrees F.
 - b. Limit the spread of the mortar bed to 4 feet and place units within 1 minute of spreading mortar.
 - c. Control moisture evaporation in partially or newly completed walls by fog spraying with potable water, covering with opaque plastic or canvas or both.
 2. Protection of Work in Progress:
 - a. Covering:
 - 1) Cover tops of walls with a strong waterproof membrane at

the end of each day or work shutdown. Extend the waterproof membrane cover a minimum of 24 inches down the side of each wall.

- 2) Hold cover securely in place.
 - b. Load Application:
 - 1) Do not apply uniform floor or roof loading for at least 12 hours after completing columns and walls.
 - 2) Do not apply concentrated loads for at least 3 days after completing columns and walls.
 - c. Staining:
 - 1) Prevent grout and mortar from staining the face of masonry.
 - 2) Remove grout and mortar that comes in contact with masonry units immediately.
 - 3) Protect sills, ledges and projections from mortar droppings.
 - 4) Protect base of wall from rain-splashed mud and mortar splatter.
 - 5) Turn scaffold boards on edge when work is not in progress to lessen splattering.
- D. Coordination: Coordinate Work to ensure top of wall is covered and remains covered until properly block openings are protected with coping or finishing system indicated on the Drawings

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Concrete Products Group. Contact: Bill Dawson, Toll Free Tel: 800-789-0872; Email: bdawson@concreteproductsgroup.com. Web: www.concreteproductsgroup.com
1. Regional Manufacturers: Mountain & West:
 - a. Basalite Concrete Products, LLC, Dixon, CA, www.basalite.com
 - b. Orco Block Co., Inc., Stanton, CA, www.orco.com
 - c. Western Materials., Yakima, WA, www.westernmaterials.com
 2. Regional Manufacturers: Midwest
 - a. Amcon Concrete Products, LLC, Mendota Heights, MN, www.amconconcreteproducts.com
 - b. Fendt Builder's Supply, Inc. Farmington Hills, MI, www.fendtproducts.com
 - c. Lee Building Products, Kentucky, Indiana and Tennessee. www.leebp.com
 3. Regional Manufacturers: South & Southeast
 - a. Johnson Concrete Company – Salisbury NC www.johnsoncmu.com
 - b. Lee Building Products, Kentucky, Indiana and Tennessee. www.leebp.com

- c. A-1 Block, Orlando FL, www.a1block.com
 - d. Texas Building Products, Strawn TX www.texasbuildingproducts.com
- 4. Regional Manufacturers: East
 - a. A. Jandris & Sons, Inc., Gardner, MA, www.ajandris.com
 - b. Barnes & Cone, Syracuse, NY, www.barnesandcone.com
 - c. Barrasso and Sons, Inc. Islip Terrace, NY, <https://barrassoandsons.com>
 - d. Dagastino Building Blocks, Inc. <https://www.dagblock.com/>
 - e. Fizzano Brothers, Crum Lynne, PA, www.fizzano.com
 - f. A-1 Block, Orlando FL, www.a1block.com
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 – Product Requirements.

2.2 MATERIALS

- A. Aggregate:
 - 1. ASTM C 33 normal weight aggregate.
 - 2. ASTM C 331 lightweight aggregate.
- B. Cement: ASTM C 150, Type required. Color, White/Grey as required for use with the color specified.
- C. Water Repellent Admixture: Integral polymeric water repellent admixture for concrete masonry units used in masonry exposed to the exterior.
 - 1. Performance requirements:
 - a. Water resistance: ASTM E 514
- D. Color Pigments: Lightfast, alkali-resistant, weather-resistant natural or synthetic iron oxides manufactured specifically for use in concrete masonry units.

2.3 ARCHITECTURAL CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Units: Provide unit type and size(s) indicated on the drawings
 - 1. Masonry units meeting all ASTM C 90 testing requirements and containing integral mixed color **[select applicable products]**:
 - a. Spec-Brik structural masonry units [optional: with Water Control Technology (WCT)]
 - b. Spec-Brik masonry veneer units
 - c. Spec-Brik Jumbo structural masonry units.
 - d. Spec-Thermal Hi-R Half High Insulated masonry units (Spec-Brik HI-R when using Spec-Brik blended colors)
 - e. Spec-Thermal Hi-R-H Half High insulated masonry units (Spec-Brik HI-R-H when using Spec-Brik blended colors)
 - f. Spec-Thermal Hi-R insulated Masonry Units.
 - g. Spec-Thermal Hi-R-H insulated Masonry Units.

- h. Spec-Surface smooth and dense masonry units for painting.
 - i. Spec-Split – Splitface masonry units
 - j. Polished and Textured specialty masonry units.
- 2. Unit Weight:
 - a. Normal weight units.
 - b. Lightweight units.
- 3. Linear shrinkage: Not to exceed 0.065 percent, ASTM C 90.
- 4. Unit Compressive Strength: Minimum net area compressive strength of 2,000 psi.
- 5. Integral Water Repellent Concrete Masonry Units: Provide all exterior wall architectural concrete masonry units, including single wythe walls and facing units, containing the manufacturer's recommended type and amount of an integral polymeric water repellent admixture.
- 6. Color: [choose one of:]
 - a. As selected by Architect from manufacturer's standard colors
 - b. Custom color matching Architect's sample color.
- B. **[If Applicable]**: Pre-installed two-piece, interlocking Concrete Masonry Unit Insulating Inserts:
 - 1. Product: Korfil Hi-R or Hi-R H inserts manufactured by Concrete Block Insulating Systems and distributed by members of the Concrete Products Group (choose applicable insert):
 - a. Korfil Hi-R insert (for 8" nominal height two web units)
 - b. Korfil Hi-R H insert (for 8" nominal height single web units)
 - c. Korfil HI-R Half High insert (for 4" nominal height two web units)
 - d. Korfil Hi-R H Half High insert (for 4" nominal height one web units)
- C. Special shapes:
 - 1. Provide closures, jamb units, headers, lintels, bond beams and other special shapes as indicated.
 - 2. Provide standard manufactured sizes or cut full size units for fractional course height and lengths.

2.4 MASONRY ACCESSORIES

- A. Mortar and grout: Comply with Sections 04060 and 04070. Provide water repellent admixture for exterior wall mortar and grout.
 - 1. Water Repellent Mortar Admixture: Exterior wall mortar admixture shall be compatible to the admixture used to produce the masonry units. Coordinate the selection with the masonry unit manufacturer.
 - 2. Comply with manufacturer's instructions for mixing and mortar preparation.
 - 3. When using bulk pre-blended mortar (silos, bulk bags, etc.) with dry admixture, the admixture in the pre-blended mortar MUST be from the same producer or compatible with that used in the CMU materials.

- B. Masonry Anchorage and Reinforcement: Comply with applicable portions of TMS 602 Article 2.4, and/or Section 04 05 19.29 – Stone Anchors.
- C. Fabricated Steel Lintels: Comply with Section 05 50 00 – Metal Fabrications.
- D. Sheet Metal Flashing and Trim: Comply with Section 07 62 00 – Sheet Metal Flashing and Trim.
- E. Flexible Flashing: Comply with Section 07 65 26 – Self-Adhering Sheet Flashing.
- F. Pan Flashing: BlockFlash, by MortarNet in single wythe walls.
- G. Foamed-in-place insulation materials and installation: Comply with Section 07 21 29 – Spray Foam Insulation.
- H. Control Joints:
 - 1. Vinyl: ASTM D 2287.
- I. Weeps: Weeps are to be used in conjunction with flashing materials for proper functioning of the masonry wall drainage system. Specified weep material is:
 - 1. Weep holes, weep tubes, plastic vents or cells in veneer wall systems such as from Hohmann & Barnard, or equivalent.
 - 2. BlockFlash, by MortarNet in single wythe walls
- J. Masonry Cleaning Materials: Standard-strength proprietary masonry cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new concrete masonry without discoloring or damaging masonry surfaces. Provide cleaning product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units.
- K. Masonry Sealing Materials: Provide cleaning material manufacturer's compatible masonry sealer coating for all single wythe concrete masonry exterior walls.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, structure and installation conditions. Do not proceed with architectural concrete masonry work until unsatisfactory conditions have been corrected.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that items to be built in are in proper location, and ready for roughing into masonry work.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean substrate surfaces thoroughly prior to installation.
- B. Establish lines, levels and coursing. Verify anchors and flashings are correctly located and installed.
- C. Furnish temporary bracing as required during installation of masonry work. Maintain in place until building structure provides permanent support.
- D. Do not wet concrete masonry units except as per TMS 402/602
- E. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement type joints, returns and offsets. Whenever possible, avoid the use of less than half-size units at corners, jambs and other locations. Notify Design Professional when split masonry coursing at heads and sills of openings and cut concrete masonry coursing less than 4 inches in height not permitted.
- C. Lay up walls plumb and true to comply with specified tolerances. Provide square corners, except as otherwise indicated, with courses level, accurately spaced and coordinated with other work. Use double lines at multiple wythe walls.
- D. Pattern bond: Lay exposed concrete unit masonry in running bond with vertical joint in each course centered on units in courses above and below. Bond and interlock each course of each wythe at corners. Do not use units with less than 4 inches of horizontal face dimensions at corners or jambs. Install special shape units where indicated.
- E. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings, load bearing walls, all courses of piers, columns and pilasters and where adjacent to cells or cavities to be reinforced or filled with concrete or grout. Maintain 3/8 inch nominal joint widths, except as necessary at first course bed joints, and except for minor variations required to maintain bond alignment
- F. Lay solid concrete masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints
- G. Compress and cut joints flush for masonry walls that are below grade, concealed or covered by other materials.
- H. Tool joints in all exposed masonry work to a concave joint when thumb print hard, unless plans indicate otherwise.
- I. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.
- J. Step back unfinished work adjoining new work. Rack back 1/2 unit length in

each course; do not tooth. Clean exposed surfaces of set masonry and remove loose masonry units and mortar before laying fresh masonry.

- K. Provide interlocking masonry bond in each course at corners and intersecting walls, unless otherwise indicated on plans such as for stack bond.
- L. Load-bearing walls: If carried up separately, provide rigid steel anchors spaced not more than 2 feet on center vertically. Embed ends in mortar filled cores. Build full height of story to underside of structure. Grout juncture with structure solid with grout.
- M. Non load-bearing walls: Build full height of story to underside of structure, except as otherwise shown. Terminate full height non load-bearing walls one joint thickness below the structure to allow for deflection of the structural element without loading the wall. Provide an open joint for application of joint sealant.
- N. **[If Applicable:]** Pre-installed two-piece, interlocking Concrete Masonry Unit Insulating Inserts:
 - 1. General: Inserts shall be pre-installed by CMU manufacturer prior to delivery to jobsite.
 - 2. Unless otherwise indicated on Construction Documents, inserts shall be left in place when grouting.
- O. As the work progresses, build in items specified under this and other Sections of the specifications. Fill in solidly with masonry around built-in items.
 - 1. Bed hollow metal frame anchors in mortar. Align anchors with joint coursing. Draw anchors tight and fill space between hollow metal frames and masonry solid with fine mortar grout.
 - 2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath or other approved material, in the joint below and rod grout into core.
 - 3. Provide solid masonry bearing for all lintels, beams, joists, plates and load-bearing members.
 - a. Provide solid masonry units or hollow units filled solid.
 - b. Minimum one block course under steel angle lintels and steel joists not bearing on bond beams.
 - c. Minimum two block courses under steel beams and steel beam lintels. Where beams and lintels are parallel with wall, extend solid bearing to walls, extend solid bearing 16 inches each side of centerline of beam.
 - 4. Take particular care to embed all conduits and pipes within concrete masonry without fracturing exposed shells and to fit units around switch, receptacle and other boxes set in walls. Where electric conduit, outlets, switch boxes and similar items occur, grind and cut units before building in services.
 - 5. Install anchors and reglets for flashing and related work built into masonry work.
 - 6. Install reinforcing steel and grout where indicated. Comply with Draw-

ing details for reinforcing [steel size and spacing.

P. Cavity walls:

1. General: Maintain cavity clean of mortar droppings during construction. Strike joints facing cavity flush.
2. Masonry walls: Tie exterior masonry veneer wythe to masonry back-up with adjustable metal ties secured to joint reinforcement built into masonry back-up walls or with individual metal ties secured to concrete masonry back-up.
3. Concrete walls: Tie exterior masonry veneer wythe to concrete back-up with individual metal ties secured to dovetail anchor slots cast in concrete back-up.
4. Space ties 16 inches on centers vertically and horizontally.
5. Install cavity wall insulation as work progresses. Bond with adhesive to exterior face of interior walls. Seal vertical and horizontal joints with adhesive.

Q. Veneer walls:

1. Masonry walls: Tie exterior masonry veneer wythe to masonry back-up with individual metal ties built into masonry back-up walls.
2. Concrete walls: Tie exterior masonry veneer wythe to concrete back-up with individual metal ties secured to dovetail anchor slots cast in concrete back-up.
3. Wood framed walls: Tie exterior masonry veneer wythe to back-up with individual metal ties nailed to wood stud wall framing.
4. Metal framed walls: Tie exterior masonry veneer wythe to back-up with individual metal ties screwed to metal wall framing.
5. Space ties 16 inches on center vertically and horizontally.
6. Place horizontal joint reinforcing in the masonry veneer as follows:
 - a. For nominal 4" high concrete masonry veneer units, place the horizontal joint reinforcement at no greater than 12" vertical spacing.
 - b. For nominal 8" high concrete masonry veneer units, place the horizontal joint

R. Single Wythe walls::

1. Lay masonry units with full head and bead joints.
2. Tool both interior and exterior mortar joints
3. Install all units with "Water Control Technology" (WCT) in proper, "up" position.

S. Horizontal joint reinforcing: Joint reinforcing is specified in Section 04 05 19.29 - Stone Anchors. Install continuous joint reinforcing at all single wythe and back-up concrete masonry walls as follows:

1. In every second block course, 16 inches on center vertically, full height of wall and every block course where shown on the Drawings.

2. In the first two bed joints immediately above and below all openings so that it extends a minimum of 24 inches beyond opening each way.
 3. In the bed joints of the first and second courses below the bearing line in bearing walls when wall receives uniformly distributed floor or roof loads in bed joints 16 inches below bond beams.
 4. In parapet walls 8 inches on center vertically, beginning at a point not less than 12 inches below the ceiling line of the heated space below the roof slab.
 5. Lap reinforcement a minimum of 6 inches and full width at corners and intersections or use special fabricated sections.
 6. Cut or interrupt joint reinforcement at vertical movement control or expansion joints, unless otherwise indicated.
 7. Prefabricated metal joint reinforcement shall not be used as wall ties in multiple wythe walls, except for composite wall construction and two adjacent tiers of concrete block.
 8. Fully embed side rods in mortar
- T. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:
1. Provide an open space not less than 1/2 inch width between masonry and structural member. Keep open space free of mortar or other rigid materials.
 2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to the structure. Provide anchors with adjustable tie sections. Space anchors not more than 24 inches on center vertically and 36 inches on center horizontally.
 3. Anchor veneers to concrete structural members with dovetail anchors.
- U. Control Joints: Provide control joints for exterior masonry construction.
1. Provide sash blocks with premolded shear key. Rake out mortar, if any, and form continuous vertical joints in masonry construction to receive joint sealant at the locations listed below.
 2. Locate control joints as indicated on the Drawings.
- V. Bond Beams: Install bond beams where indicated. Comply with Drawings for reinforcing steel size and spacing. Fill bond beam masonry units solid with concrete fill or coarse mortar grout. Use smooth dowels to allow for horizontal movement at control joints unless otherwise indicated on the Drawings.
- W. Lintels:
1. Install loose steel lintels furnished under Section 05 50 00 – Metal Fabrications Metal Fabrications where shown. Set lintels in full bed of mortar.
 2. Provide minimum bearing at each jamb of 4 inches for openings for less than 6 feet and 8 inches for wider openings
- X. Flashing and weeps: Install flashing as specified in Section 07 62 00 – Sheet Metal Flashing and Trim or Section – .

1. Install concealed through wall masonry flashing at all cavity and veneer wall sills, masonry openings in exterior walls with masonry above head, over all horizontal steel members built into masonry and elsewhere as indicated. Comply with SMACNA "Architectural Sheet Metal Manual" Chapter 4 Flashing recommendations and with NCMA TEK Bulletins 19-4A and 19-5A details to ensure water resistant masonry construction.
2. Install weeps in head joints of final course of exterior masonry wythe above flashing. Space weeps maximum of 24 inches on center horizontally with exterior ends and located to avoid door openings. Install weeps at head joints with outside face of weep material held 1/8 inch from the finish face of masonry unit.
3. Install cavity fill on top of base flashing. Install a bed of mortar, conforming to the curve of the flashing, placed under the metal flashing.
4. Install vents in head joints of final top course exterior masonry veneer wythe. Install at head joints with outside face of vent material held 1/8 inch from the finish face of masonry unit. Space vents 24 inches on center horizontally.
5. Install compressible joint material at lintels and horizontal steel members. Build in joint fillers and seal with joint sealant specified in Section 07 90 00 – Joint Protection.

3.4 REINFORCED CONCRETE MASONRY

- A. Fill scheduled wall and column masonry work. Fill all cores solid with concrete fill/coarse masonry grout as specified in Section 04 05 16.26 – Engineered Masonry Grouting.
 1. Grouting: Comply with TMS 602 grout placement requirements. Consolidate grout at time of placement.
 - a. Low-Lift Grouting: Place concrete fill/coarse masonry grout in maximum 5 foot vertical lifts.
 - b. High-Lift Grouting (If Approved): Place concrete fill/coarse masonry grout in maximum 12 foot vertical lifts (Recommend the use of super plasticizer with hi-lift grout).
 2. Recess top of grout fill minimum 1-1/2 inches below top of course to form a key with following lift.
 3. Where vertical reinforcing is required, install reinforcing before filling operation. Wet sticking of reinforcing is not permitted. Comply with Drawing details for reinforcing steel size and spacing.
- B. Install bond beams where indicated. Install reinforcing before filling operation. Fill units solid with grout. Comply with drawing details for reinforcing steel size and spacing.

3.5 REPAIR AND POINTING

- A. Clean and point exposed architectural concrete masonry at end of each work-

ing day. Remove and re- place masonry units that are loose, chipped, broken, stained, or otherwise damaged. Provide new units to match adjoining units and install in fresh mortar pointed to eliminate evidence of replacement.

- B. During the tooling of joints, enlarge any voids or holes, except weeps and completely fill with mortar. Point up all joints at corners, openings and adjacent work to provide a neat, uniform appearance. Remove line pins and fill all line pin holes.
- C. Wipe off excess mortar as the work progresses. Dry brush with bristle brushes exposed masonry at the end of each day's work. Remove mortar spatters and joint ridges.

3.6 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 1 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site- prepared mortar.
 - 2. Place grout only after, inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.7 CLEANING

- A. Cut out defective mortar joints and holes in exposed masonry and re-point with mortar of matching color and texture. Commence cleaning of the ma-

sonry walls as soon as the mortar is thoroughly set and cured. After mortar has cured for a period of 7 days (and no later than 14 days after completion of installation), the cleaning process can begin.

- B. Demonstrate the cleaning procedure on the sample panel at the job site prior to commencing cleaning on the building. When the sample panel is cleaned to the approval of the Architect, and the walls are complete, clean the building with the approved cleaning method.
- C. Protect adjacent and surrounding surfaces not intended to be cleaned from exposure to the cleaning chemical to prevent damage.
- D. Prevent cleaning chemical from coming into contact with people, motor vehicles, landscaping and other building materials that could be harmed by such contact. Follow Masonry cleaner Manufacturers' recommendations for personal protection.
- E. Clean the exposed masonry surfaces of stains, efflorescence, mortar, grout dropping and debris using methods that do not damage the masonry. Do not use high pressure cleaning or aggressive scrubbing after cleaner application.
- F. The results of the cleaning process shall be inspected by the project Architect or authorized owner representative for acceptance after the walls have dried. For cleaning results to be accepted, the walls must comply with the standard set for the cleaning results on the sample panel, and the walls shall be free from mortar or efflorescence stains, and the color and texture of the finished walls shall not show damage, discoloration or staining from the cleaning process. If such damage or stains are present, then the walls must be cleaned and color corrected, as needed, to remove any such stains, discoloration or damage prior to the application of Coatings
- G. After cleaning allow units to dry and when specified apply a sealer as provided in Section 3.8.

3.8 COATING:

- A. After the results of the cleaning process have been fully accepted by the Architect, apply a colorless, non-staining, non-yellowing, breathable, penetrating water repellent. It shall be applied to the exterior exposed surface of the concrete masonry walls. Water-repellents must be capable of performing over hairline cracks and small voids less than 1/16". "Film Forming" Acrylic sealers will not be allowed. The water-repellent must not alter the color or texture of the wall after the material has fully cured. Follow manufacturer's application recommendations.

3.9 PROTECTION

- A. Protect installed products until completion of project.
 - 1. Protect top of wall until covered or capped to a waterproof condition by subsequent construction.
 - 2. Prevent grout, mortar, and soil from staining the face of masonry to be

left exposed or painted. Remove immediately any grout, mortar, and soil that comes in contact with such masonry

3. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
 4. Protect sills, ledges, and projection from mortar splatter and dropping.
 5. Protect surfaces of windows and door frames; as well as similar products with painted and integral finishes from mortar splatter and dropping
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

Solutions Available Nationwide

The Concrete Products Group LLC (CPG) consists of regional market leaders in the concrete products industry. CPG is committed to providing consistent, innovative and top-quality products to regional and national customers.



Manufacturing Locations

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2025 Centre Pointe Blvd.,
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55120-1221

BARNES & CONE
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Syracuse, NY
13206-0280

**BASALITE CONCRETE
PRODUCTS LLC**
605 Industrial Way
Dixon, CA
95620

BARRASSO AND SONS INC
160 Floral Park Street
Islip Terrace, NY
11752

**DAGOSTINO BUILDING
BLOCKS, INC.**
1111 Altamont Avenue
Schenectady, NY 12303

**FENDT BUILDERS
SUPPLY**
22005 Gill Rd,
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**FIZZANO BROTHERS
CONCRETE
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1776 Chester Pike
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**LEE BUILDING
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