Builder Guideline Booklet™

Superior Walls®

BUILD ON A SUPERIOR FOUNDATION™

R-5® The Original SUPERIOR WALL™

X-TRA INSULATION®

NAHB RESEARCH CENTER GREEN APPROVED
www.GreenApprovedProducts.com

MAN 42-9000 (JUNE 2010)

Introduction

We have written this Builder Guideline Booklet to assist you in successfully using Superior Walls on your project. At Superior Walls we believe that our products and the structures they support need to last for generations. In order for that to happen you must give thoughtful consideration to the details of your wall system and utilize the guidelines provided in this booklet. Additional copies of this booklet are available for download at www.superiorwalls.com.

Proper site preparation and framing connection details are of particular importance. You will note that we have provided excerpts from the *2009 International Residential Code® for One- and Two- Family Dwellings* (often referred to as the "IRC"). These excerpts are included to aid in your understanding of the details or application being discussed in the various sections of this book. Please be aware that your municipality may have other requirements beyond those in the model code.

For additional information or for help with site-specific conditions and details, please consult your design professional or contact your local Superior Walls representative (see Rep Locator on our website, www.superiorwalls.com).

Be Safe!

Superior Walls of America urges you to maintain a safe working environment. The protection of the health and safety of everyone on your jobsite needs to be your primary concern.

Construction work can be particularly hazardous and involve many potential areas of concern. Personal protective equipment and other precautions are essential for a safe construction work environment.

We encourage you to:

- Work to *prevent* accidents and injuries
- Understand and obey requirements of environmental and occupational health and safety laws and regulations
- Increase safety awareness
- Establish safety responsibilities for your employees and subcontractors

Table of Contents

Builder / Owner Responsibilities

The builder / owner is responsible for the following items:

In order for your Superior Walls supplier to install a product that fully meets the design and performance requirements of your project, you must provide the following information:

- Soil type or bearing capacity
- All building floor plans and elevations
- Design load per linear foot on the foundation
- Beam and column locations, sizes and point loads
- Additional point loads and locations, if any

- Determine location of Shear Wall(s), if required
- Window and door locations and rough opening sizes
- Egress considerations
- Locations and sizes of support ledges (brickledge, slab supports, etc.)
- Interior stairway locations and opening sizes

- Inside fill conditions (as with garage, porch or crawlspace frost walls)
- Exterior basement entry system specifications
- Chimney details
- Backfill conditions (rough grading plans)
- Top-of-wall benchmark reference / Finished grade elevation

How the Crushed Stone Footing Works

The physics of the crushed stone footing:

1. The purpose of any wall footing is to distribute the wall's load over a sufficiently large area of soil so that the weight-bearing capacity of the soil is not exceeded.
2. The load of the building is carried by the Superior Walls panel and is transferred to the 1/2" clean crushed stone.
3. The load distribution path through the crushed stone is at an angle approximately 60 degrees from the horizontal.
4. As the depth of the crushed stone layer increases, the effective bearing width on the underlying soil also increases. (See Figure 1.)
5. The tables in this booklet identify the required depth of the crushed stone footing for various wall loads and soil bearing capacities.

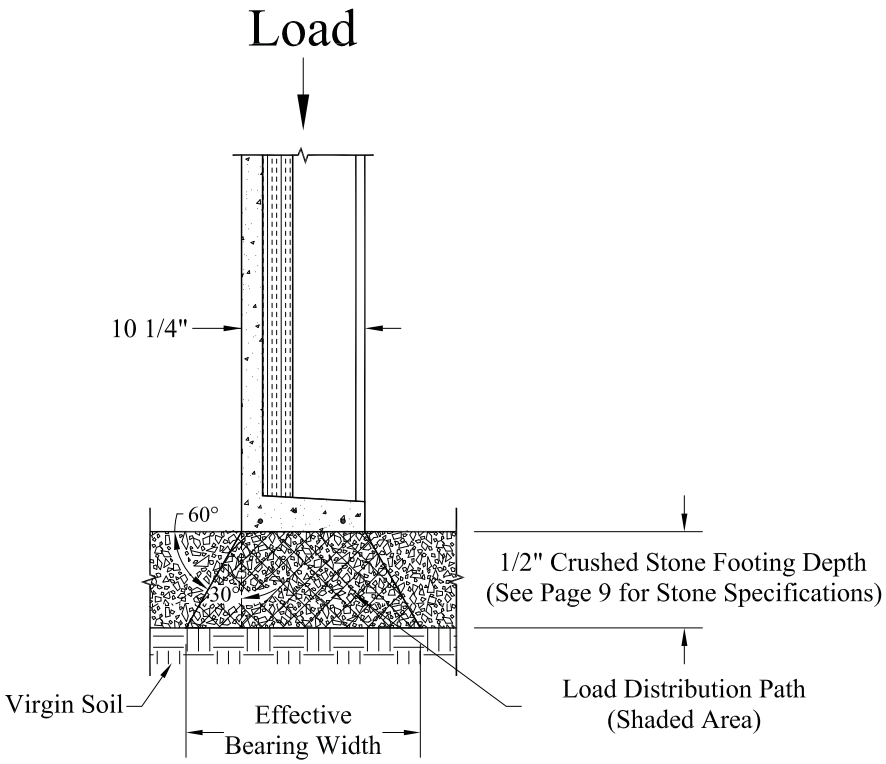


Figure 1

Code Reference:
2009 IRC Section: R403.4

R403.4 Footings for precast concrete foundations. Footings for precast concrete foundations shall comply with Section R403.4. (See Section R403.4.1 Crushed stone footings.)

Crushed Stone Footing / Effective Bearing Width Chart

Crushed Stone Footing Depth (inches)	Effective Bearing Width (inches)
4	14-7/8
5	16
6	17-3/16
7	18-5/16
8	19-1/2
9	20-5/8
10	21-13/16
11	22-15/16
12	24-1/8
13	25-1/4
14	26-7/16
15	27-9/16
16	28-3/4
17	29-7/8
18	31-1/16
19	32-3/16
20	33-3/8
21	34-1/2
22	35-5/8

Site Preparation

Soils Verification

1. Determine your soil type from Table 1 on this page and stone depth requirements from Table 2 on page 6. Superior Walls panels may be used on virtually any type of soil that has a bearing capacity of 1,500 PSF or better. For assistance identifying your soil type consult with:
   - Building Department
   - County Agricultural Extension Service
   - County Conservation District Officer
   - Soils Technician
   - Web Soil Survey website (http://websoilsurvey.nrcs.usda.gov)
   - Excavator
2. Determine allowable Load-Bearing Pressure and Drainage Characteristics. (See Table 1.) This will affect the required depth of the 1/2" clean crushed stone footing.
3. Establish combined footing load per linear foot. (Consider dead load, live load, snow and wind load.) Acquire loading information from building designer or engineer.
4. Determine required depth of the 1/2" clean crushed stone footing. (From Table 2. Remember to allow for this depth when determining excavation depth.)

Table 1
Properties of Soils Classified According to the Unified Soil Classification System
Table reference: 2009 IRC Table R405.1

Soil Group	Unified Soil Classification System	Soil Description	Drainage Characteristics (a)	Frost Heave Potential	Volume Change Potential Expansion (b)	Presumptive Load-Bearing Pressure (PSF) (d)
Group I Excellent	GW	Well graded gravel, gravel-sand mixtures, little or no fines	Good	Low	Low	3000
	GP	Poorly graded gravels or gravel sand mixtures, little or no fines	Good	Low	Low	3000
	SW	Well-graded sands, gravelly sands, little or no fines	Good	Low	Low	2000
	SP	Poorly graded sands or gravelly sands, little or no fines	Good	Low	Low	2000
	GM	Silty gravels, gravel-sand-silt mixtures	Good	Medium	Low	2000
	SM	Silty sand, sand-silt mixtures	Good	Medium	Low	2000
Group II Fair to Good	GC	Clayey gravels, gravel-sand-clay mixtures	Medium	Medium	Low	2000
	SC	Clayey sands, sand-clay mixture	Medium	Medium	Low	2000
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Medium	High	Low	1500(c)
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium	Medium	Medium to Low	1500(c)
Group III Poor	CH	Inorganic clays of high plasticity, fat clays	Poor	Medium	High	1500(c)
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	High	High	1500(c)
Group IV Unsatisfactory	OL	Organic silts and organic silty clays of low plasticity	Poor	Medium	Medium	By Test
	OH	Organic clays of medium to high plasticity, organic silts.	Unsatisfactory	Medium	High	By Test
	PT	Peat and other highly organic soils	Unsatisfactory	Medium	High	By Test

(a) The percolation rate for good drainage is over 4 inches per hour, medium drainage is 2 inches to 4 inches per hour, and poor is less than 2 inches per hour.
(b) Soils with a low potential expansion typically have a plasticity index (PI) of 0 to 15, soils with a medium potential expansion have a PI of 10 to 35 and soils with a high potential expansion have a PI greater than 20.
(c) Where the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation. 2009 IRC Table R401.4.1.
(d) Presumptive Load-Bearing Values of Foundation Materials data from 2009 IRC Table R401.4.1.
(e) CH, MH, OL, OH, and PT are unsuitable as backfill material.

Table 2
Minimum Depth of 1/2” Clean Crushed Stone Footing (Inches)

Construction Type (Assumed Wall Loading)		Soil Type & Load Bearing Capacity (PSF)			
		1500	2000	3000	4000
		MH, CH, CL, ML	SC, GC, SM, GM, SP, SW	GP, GW	
Conventional light-frame construction					
1 – Story	(1100 pounds per linear foot)	4”	4”	4”	4”
2 – Story	(1800 pounds per linear foot)	7”	4”	4”	4”
3 – Story	(2900 pounds per linear foot)	14” (a)	9” (a)	4”	4”
Masonry veneer over light-frame construction					
1 – Story	(1500 pounds per linear foot)	5”	4”	4”	4”
2 – Story	(2700 pounds per linear foot)	13” (a)	8”	4”	4”
3 – Story	(4000 pounds per linear foot)	22” (a)	14” (a)	7”	4”

(a) Crushed stone must be consolidated in 8” lifts with a plate vibrator.
(b) Table allows for 361 pounds per linear foot for self weight of foundation wall.
(c) See Page 9 for Stone Specifications.
(d) Consult your Superior Walls drawing for the required depth of the crushed stone footing for your project.

Typical Crushed Stone Footing Detail

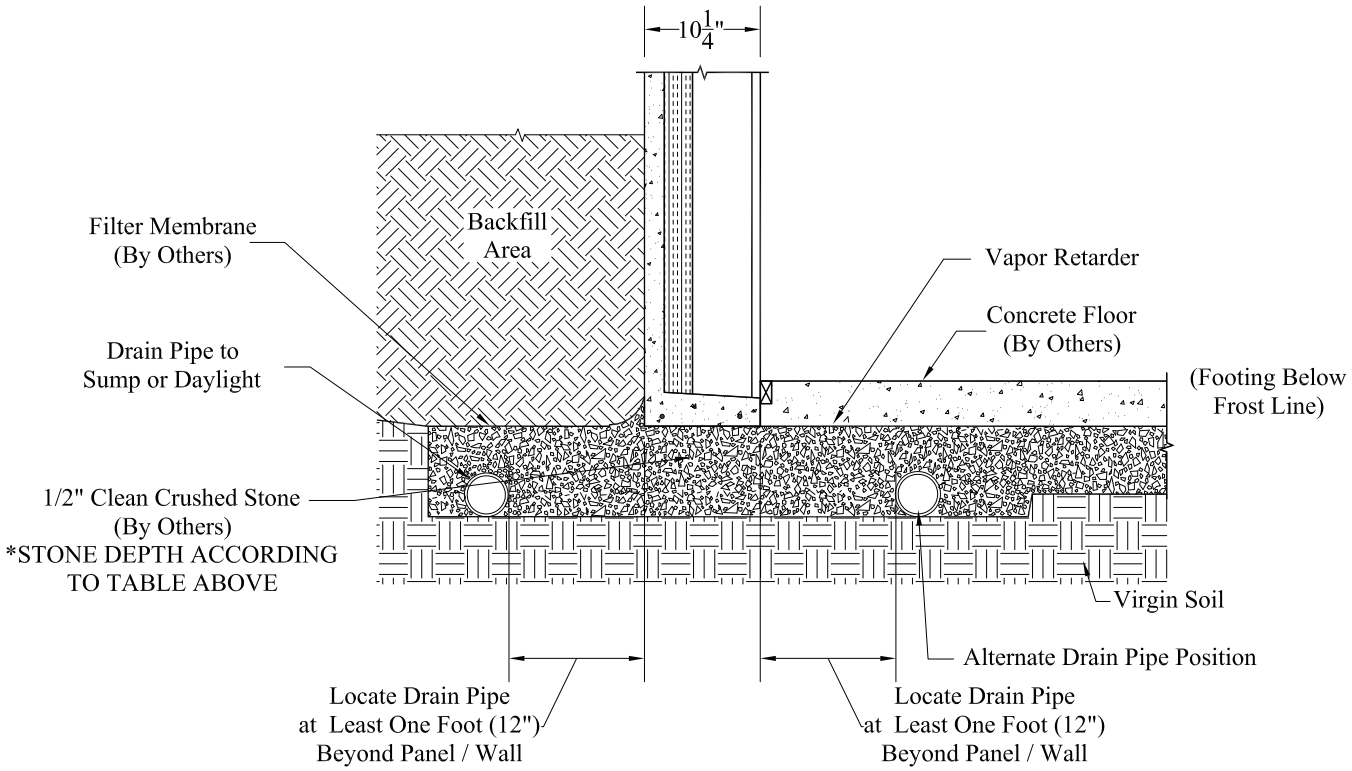


Figure 2

Excavation

- Confirm that you are working from the approved drawing prior to digging.
- See Figure 3, below, for the typical basement excavation detail with full backfill.
- Allow a 2’-0” overdig at base of excavation.
- Ensure compliance with OSHA regulations.
- Slope grade away from foundation walls to fall a minimum of 6” within the first 10’-0” to divert ground water away from the foundation.
- Remember to dig for sump pit (if applicable).

Note: When using an Excavator who is not familiar with Superior Walls, provide them with a copy of the Builder Guideline Booklet or copies of the pages related to excavation including the Excavator’s Checklist found in Appendix C.

Code Reference:
2009 IRC Section: R401.3

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection so as to not create a hazard. Lots shall be graded so as to drain surface water away from foundation walls. The grade away from foundation walls shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

Code Reference:
2009 IRC Section: R404.1.6

R404.1.6 Height above finished grade. Concrete and masonry foundation walls shall extend above the finished grade adjacent to the foundation at all points a minimum of 4 inches (102 mm) where masonry veneer is used and a minimum of 6 inches (152 mm) elsewhere.

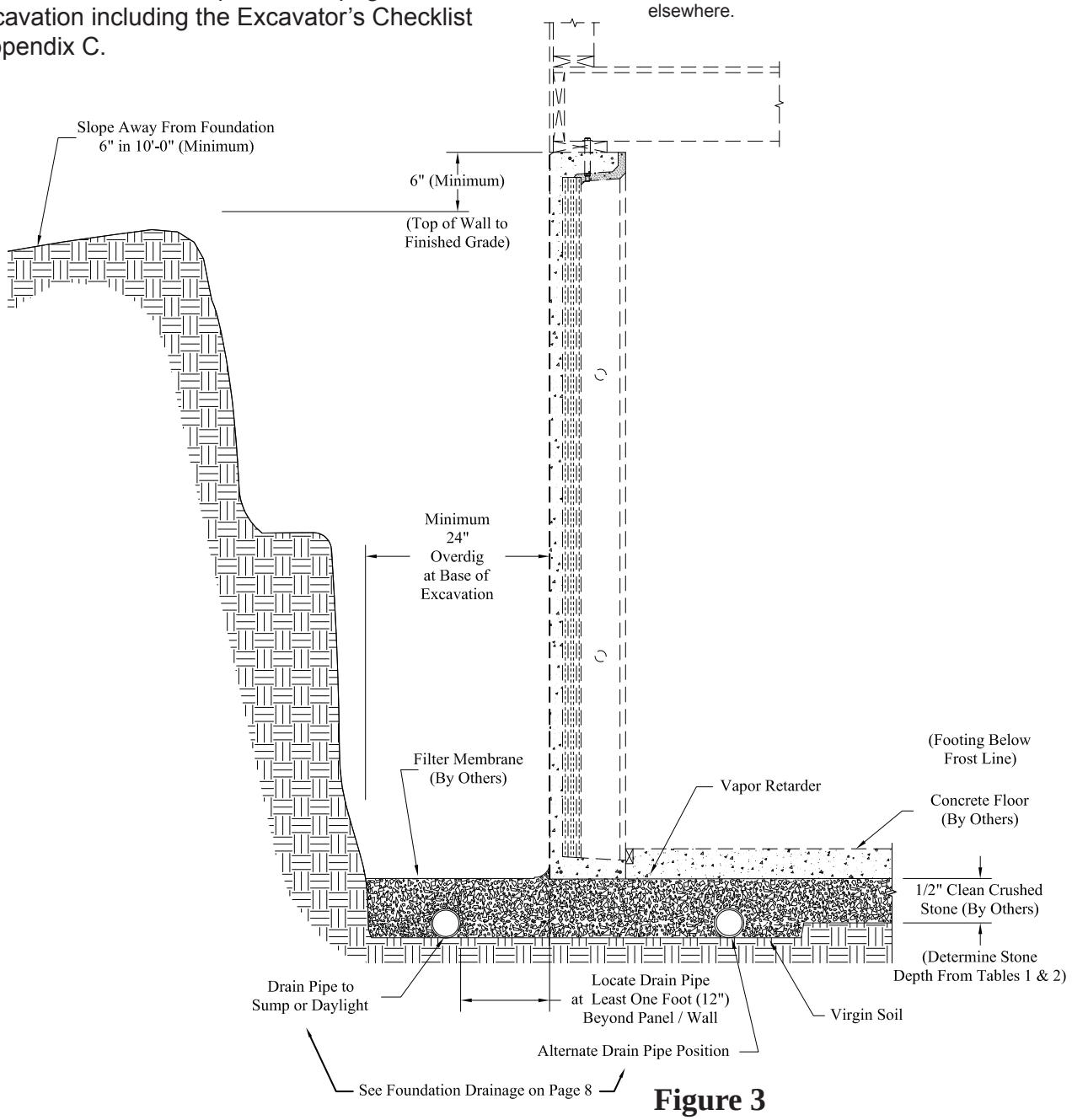


Figure 3

Foundation Drainage

Code Reference:
2009 IRC Section: R405.1.1

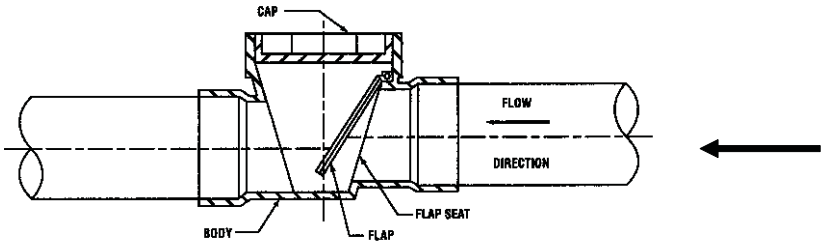
R405.1.1 Precast concrete foundation. Precast concrete walls that retain earth and enclose habitable or usable space located below-grade that rest on crushed stone footings shall have a perforated drainage pipe installed below the base of the wall on either the interior or exterior side of the wall, at least one foot (305 mm) beyond the edge of the wall. If the exterior drainage pipe is used, an *approved* filter membrane material shall cover the pipe. The drainage system shall discharge into an *approved* sewer system or to daylight.

Install perforated drain pipe.

- Use a 4” perforated drainage pipe and locate on either the interior or exterior side of the panel / wall.
- Install pipe below the base of the panel / wall in the crushed stone.
- Locate pipe at least one foot (12”) beyond the nearest edge of the panel / wall.
    - One foot (12”) dimension applies to both interior or exterior pipe location.
    - When the Minimum Depth of the 1/2” Clean Crushed Stone Footing is greater than 20”, the pipe must be located at a greater distance than one foot (12”) to ensure that the pipe is not located within the Crushed Stone Footing “Load Distribution Path”. (See Figure 1.)

Install Sump Pit / Daylight Drain.

- Direct pipe to sump or daylight drain. (A second sump pit or a second outlet to daylight should be considered for large foundations and in areas where you expect a high water table.)
    - Sump Pump, supplied by others, must be checked regularly to ensure proper working order.
    - If a daylight drain is used, a backwater valve must be installed to prevent the backflow of moist air into the stone footing area. This will reduce the likelihood of excessive interior humidity.



Example of a Backwater Valve

Install filter membrane.

- An *approved* filter membrane must be installed over the crushed stone footing area on the exterior of the panel / wall prior to backfilling (even if pipe is located on the interior side of the panel / wall) to reduce the likelihood of the stone becoming clogged with the backfill material and not draining properly.
- “Approved” in this case is defined in the 2009 IRC as “acceptable to the building official.”

NOTE: The above requirements are for precast concrete walls that retain earth and enclose habitable or usable space located below-grade that rest on crushed stone footings. Perimeter drain (4” perforated pipe) is not required on frost wall applications that are below the frost line.

Crushed Stone Footings

Place the crushed stone footing.

- Depth of stone as determined on page 5 and Table 2 on page 6.
- Superior Walls panels must be supported on clean crushed stone. Clean crushed stone shall be free from organic, clayey or silty soils. Crushed stone shall be angular in nature and meet ASTM C33, with the maximum size stone not to exceed 1/2 inch. The crushed stone shall have a 1/2 inch nominal or smaller stone size.
- Place the crushed stone footing on virgin / undisturbed soil.
- If crushed stone footing is deeper than 8", place stone in 8" lifts and consolidate each lift with a plate vibrator.
- Evenly grade the stone to within +/- 1 inch of level.
- Be sure to have enough material on hand for use in final grading by the Superior Walls Certified Installation crew.
- See Figure 2 on page 6.
- Note: Other code-approved stone sizes may be used under the floor slab, adjacent to the clean crushed stone footing and the "Load Distribution Path" (Figure 1 on page 4). When using other code-approved stone sizes under the slab, the transition from the "Superior Walls specified stone" shall occur two feet (24") from the interior edge of the panel / wall. The perforated drain pipe must be located in the "Superior Walls specified stone."

Code Reference:
2009 IRC Section: R402.3

R402.3 Precast concrete. Precast concrete foundations shall be designed in accordance with Section R404.5 and shall be installed in accordance with the provisions of this code and the manufacturer's installation instructions.

Code Reference:
2009 IRC Section: R403.1

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill.

Code Reference:
2009 IRC Section: R403.4.1

R403.4.1 Crushed stone footings. Clean crushed stone shall be free from organic, clayey or silty soils. Crushed stone shall be angular in nature and meet ASTM C 33, with the maximum size stone not to exceed 1/2 inch (12.7 mm) and the minimum stone size not to be smaller than 1/16-inch (1.6 mm). Crushed stone footings for precast foundations shall be installed in accordance with Figure R403.4(1) and Table R403.4. Crushed stone footings shall be consolidated using a vibratory plate in a maximum of 8-inch lifts. Crushed stone footings shall be limited to Seismic Design Categories A, B and C.

Cold Weather Practice / Crushed Stone Frost Protection

- Do not excavate the site too far in advance of the scheduled set date. Do not place footing on frozen soil.
- After the site has been excavated, insulate the area where walls are to be set and protect this area with a waterproof covering.
- Mixing calcium chloride into the stone footing and then covering it will help prevent frost infiltration. (Do not forget to treat the "extra" stone pile – you may need it to fill-in low spaces in the crushed stone footing.)
- Note that 6 inches of straw has approximately the same "R" value as 3 ½" of fiberglass insulation (see chart below).

Insulating Values of Common Building Insulation Materials	
Insulation Material	Approximate "R" Values
1" of Straw	2.0
1/2" of Plywood	0.6
1" of Fiberglass Batt	3.3
1" of Extruded Polystyrene	5.0
Insulated Blankets or Tarps	Per Blanket Manufacturer

Note: These recommendations are compiled from a variety of industry sources.

Corner Pin and Benchmark Placement

1. Establish a benchmark to identify your required top-of-wall elevation. It is critical to properly establish the foundations' elevation to allow for adequate final grading to accommodate code regulations. (Clearly communicate the elevation requirements to your excavator and Superior Walls supplier.)
2. Set pins that define the building corners.
   - Pins should represent the exterior face of the Superior Walls foundation.
   - Verify setback requirements.

NOTE: Check with your Superior Walls supplier or sales representative for specific requirements.

Road Accessibility / Overhead Obstructions

- Consult with your Superior Walls supplier or sales representative for specific details for your jobsite.
- The driveway must be wide enough to allow for trailer and crane access.
- The driveway surface and any culverts or bridges must be able to accommodate the weight of the vehicles.
- 9'-0" and 10'-0" walls are delivered on a drop deck trailer and have limited ground clearance.
- Verify that trees, wires and other overhead obstructions do not block site access.
- The Builder / Homeowner is responsible for any additional equipment or costs necessary to provide access to work area.

Crane Accessibility

- Consult with your Superior Walls supplier or sales representative concerning specific details for your jobsite.
- Access to the foundation area should be prepared so the crane can be positioned in a location that allows it to reach to either side of the foundation or as specified on the drawing.
- Prepare a level crane pad area with a solid base, free of overhead obstructions (trees, wires, etc.) next to the foundation.
- Provide a level area for the trailer to be parked near the crane.

Special Excavation Issues

Intersecting Walls

- When a wall such as a garage wall or crawl space wall intersects the basement wall and rests on a precast ledge, the overdig must not exceed 5’-0”. (See Figure 4.)
- See page 43 for support ledge details.

Overdig Procedure

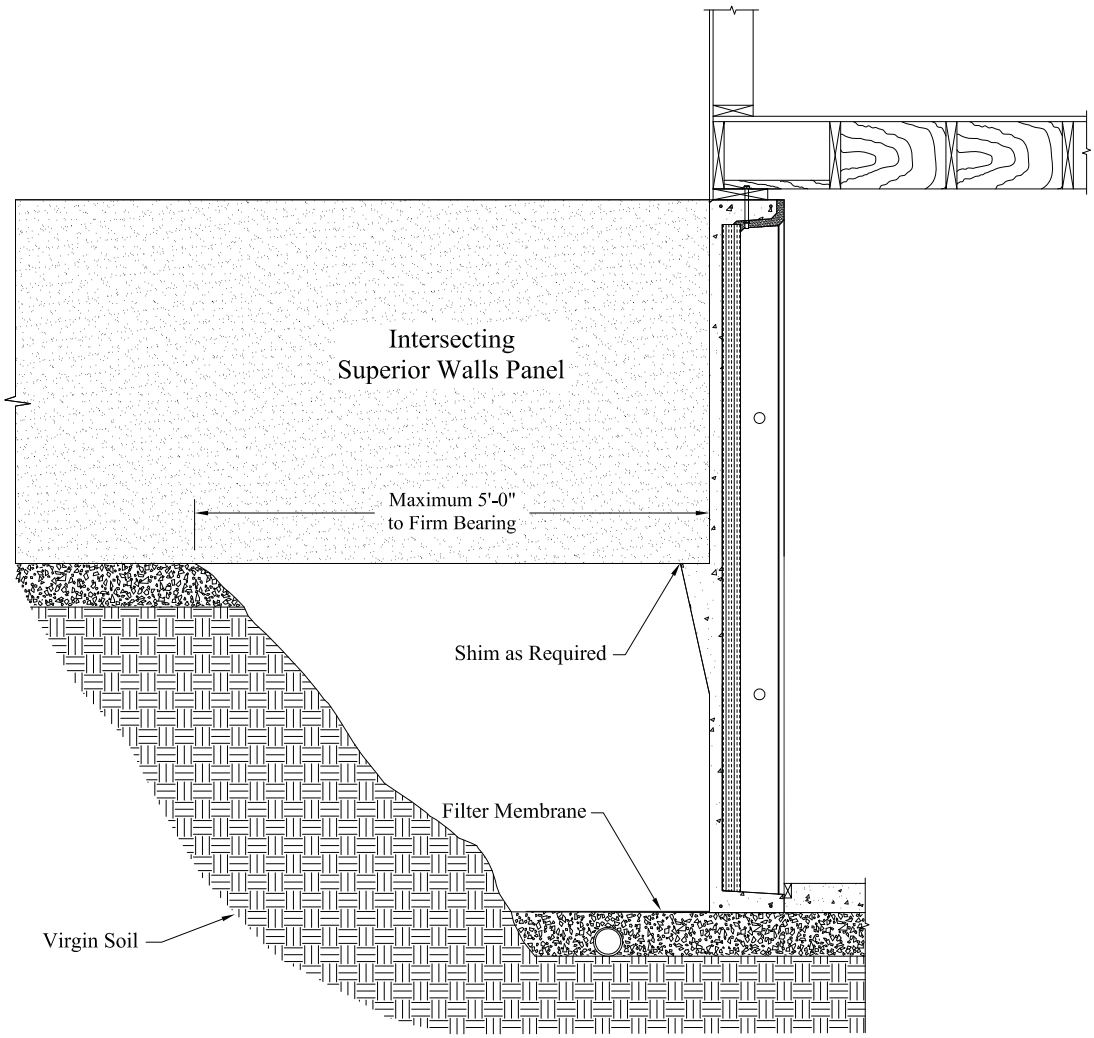


Figure 4

Intersecting Walls (cont.)

- When an overdig is more than 5’-0”, an intermediate support column is required unless project-specific engineering is provided. (See Figure 5.)
- See page 43 for support ledge details.

Excessive Overdig Procedure

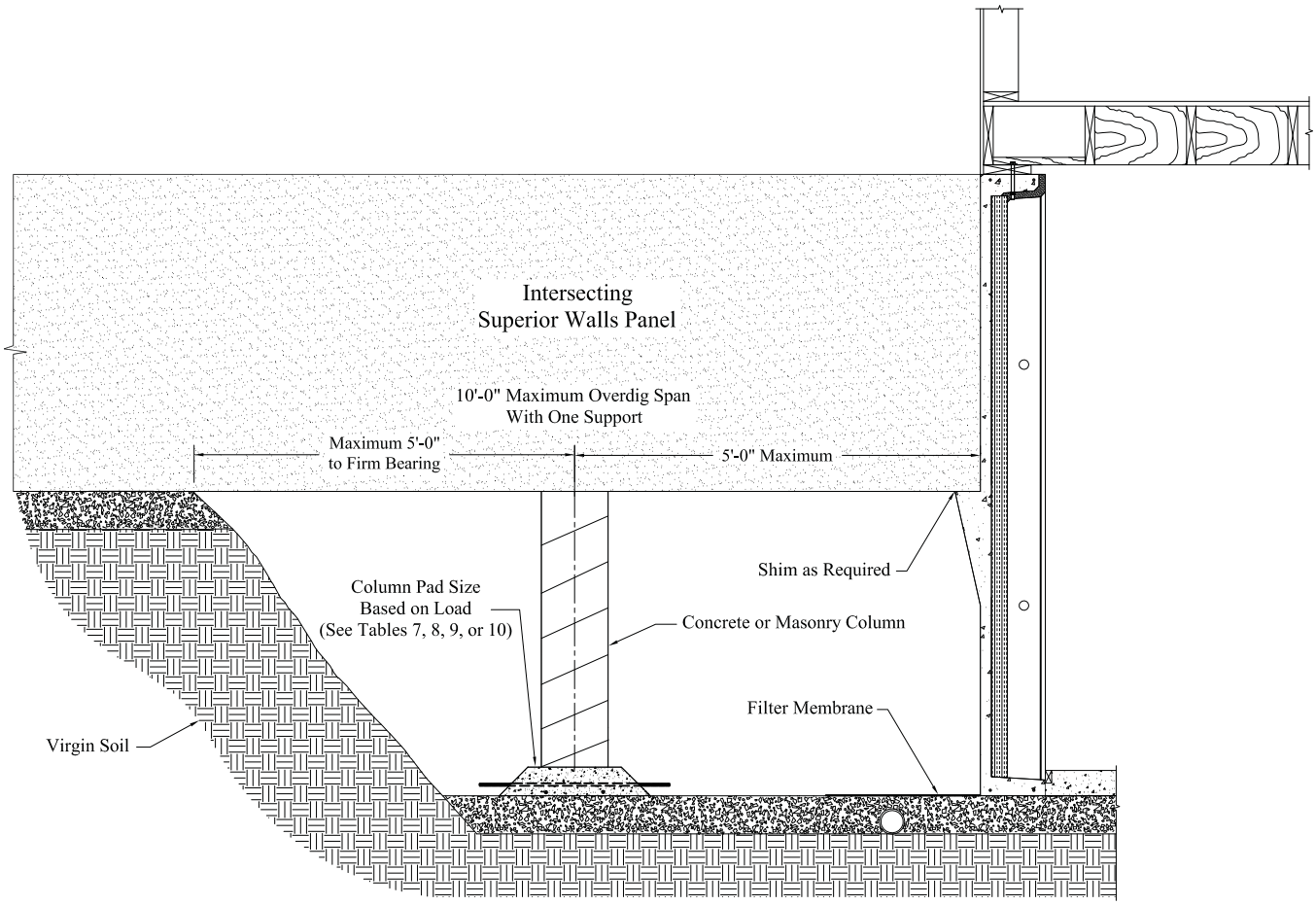


Figure 5

Trenching

- Trenches are typically used for Crawl Spaces, Frost Walls, Garages, and Porches.
- Trenches must be dug to provide a minimum of 24” at base of excavation (both sides of wall.)
- The trenches MUST be dug below frost line.
- Depth of crushed stone per Table 2.
- Walls placed in trenches, as illustrated in Figure 6, do not require a perforated drain pipe to be installed.

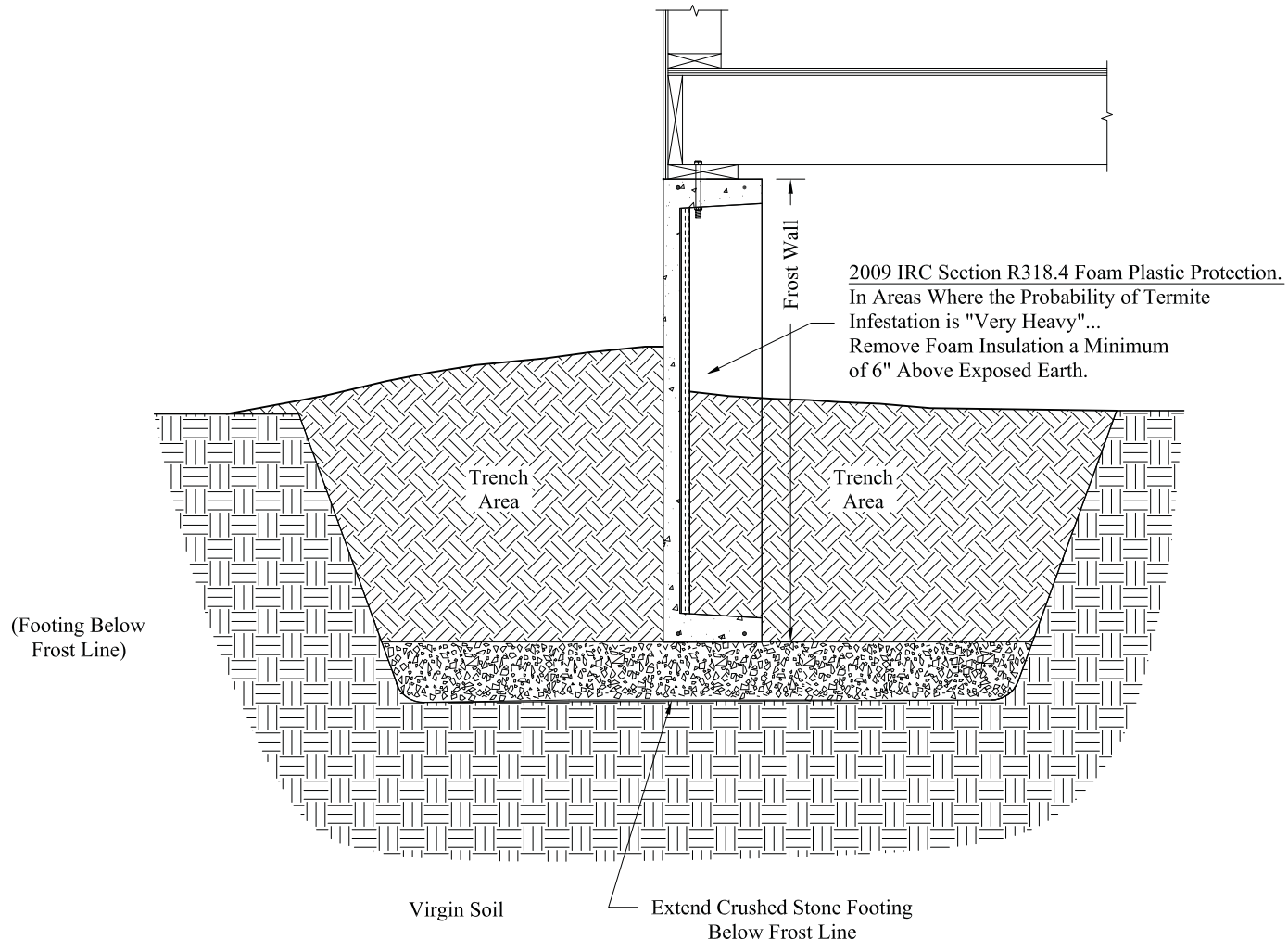


Figure 6

Daylight Basement / Above Grade Walls (Frost Areas)

OPTION 1: Superior Walls Panels as Frost Walls

Projects using Superior Walls panels as frost walls should be detailed according to Figure 7.

Additional requirements include:

- Place backfill carefully to avoid displacing frost walls.
- Bend slab connectors into concrete floor pour, if provided.
- Bolt upper and lower walls together with 1/2” x 7” bolts at a maximum of 48” on center.
- See trenching notes on page 13.

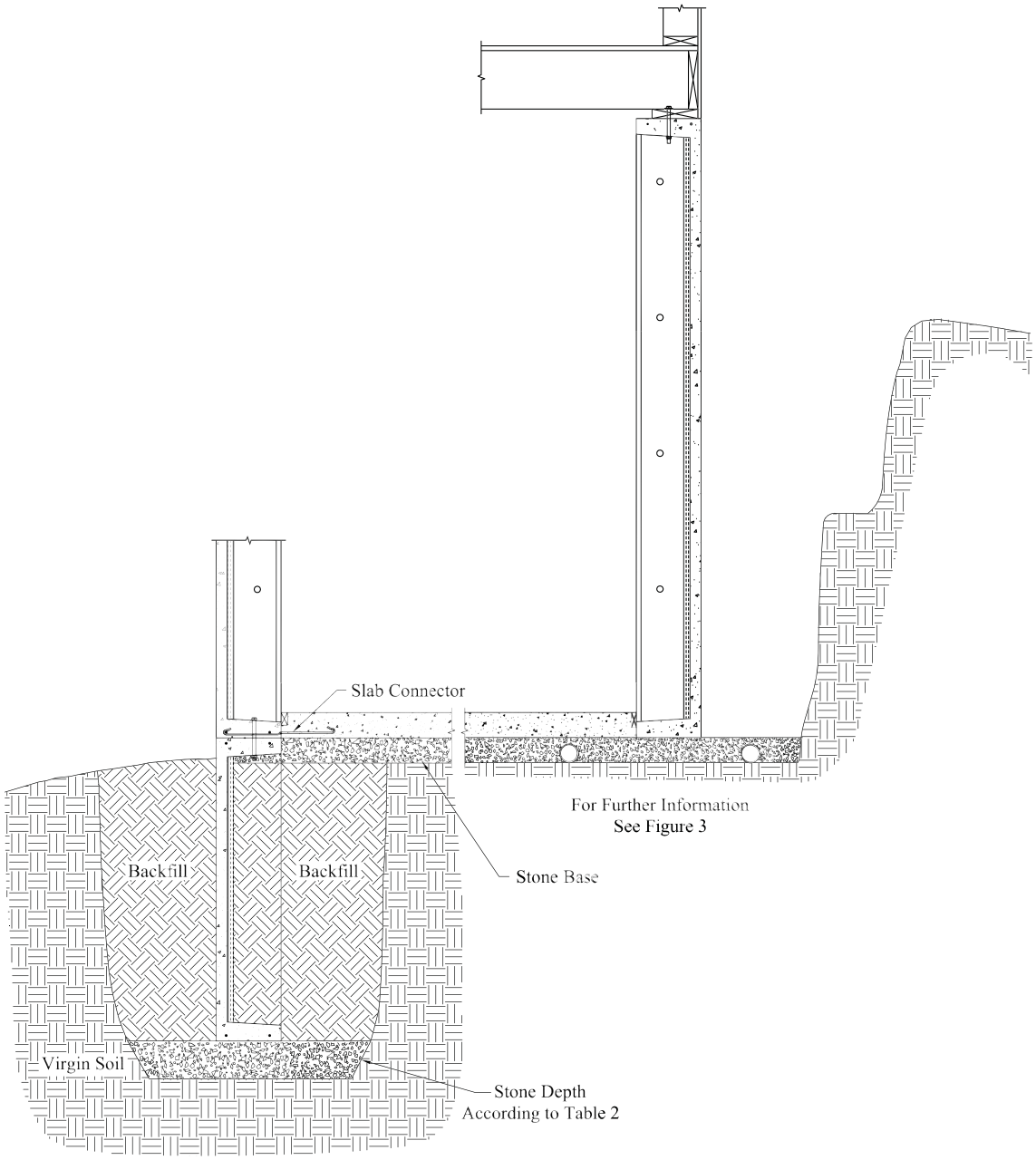


Figure 7

Daylight Basement / Above Grade Walls (Frost Areas)

OPTION 2: Crushed Stone Trench Footing

Projects using Crushed Stone Trench Footings should be detailed according to Figure 8.

Additional requirements include:

- Trench must be in virgin / undisturbed soil. (Bottom and both sides.)
- Width of trench is 36".
- Bottom of trench must extend below local frost depth.
- Provide an outlet (4" pipe) to daylight or to a sump pit with pump. (Do NOT place a continuous pipe in the trench due to the possibility of pipe crushing which could cause wall settlement.)
- Install a backwater valve on the outlet drain pipe to prevent the backflow of moist air into the stone footing area which will reduce the likelihood of excessive interior humidity. (See page 8.)
- Fill trench with 1/2" clean crushed stone, vibrating in 8" lifts with a plate vibrator.
- An "approved" filter membrane must be installed per code. (See page 8.)
- Bend slab connectors into concrete floor pour, if provided.
- Cover the exposed stones on the exterior of the wall with backfill or patio construction (to prevent air and water infiltration), properly sloped away from the wall.

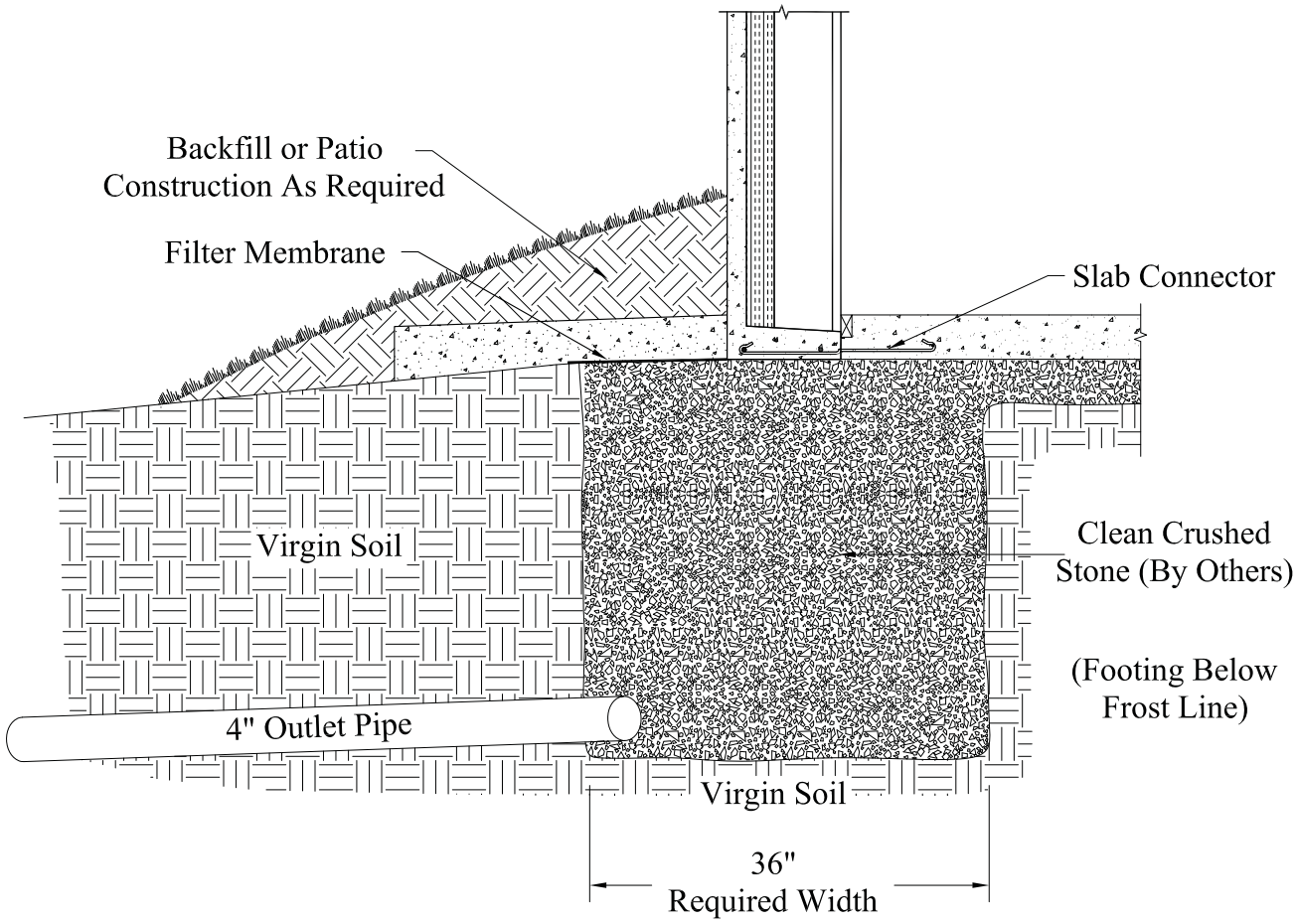


Figure 8

Daylight Basement / Above Grade Walls (Frost Areas)

OPTION 3: Fill-crete* Trench Footing

Projects using Fill-crete* Trench Footings should be detailed according to Figure 9.

Additional requirements include:

- Trench must be in virgin / undisturbed soil. (Bottom and both sides.)
- Minimum width of trench must comply with local building code requirements or Table R403.1. (See Below.)
- Bottom of trench must extend below local frost depth.
- Fill trench with Fill-crete (500 psi minimum compressive strength, air-entrained) to sub-grade elevation to allow for topping-off with the required depth of clean crushed stone.
- An “approved” filter membrane must be installed per code. (See page 8.)
- Bend slab connectors into concrete floor pour, if provided.
- Cover the exposed stones on the exterior of the wall with backfill or patio construction (to prevent air and water infiltration), properly sloped away from the wall.

* Note: Fill-crete is also known as:

- Flowable Mortar
- Flowable Fill
- Lean-mix backfill
- Controlled Low Strength Material (CLSM)
- Flow-crete

Consult your local concrete supplier for appropriate mix specifications.

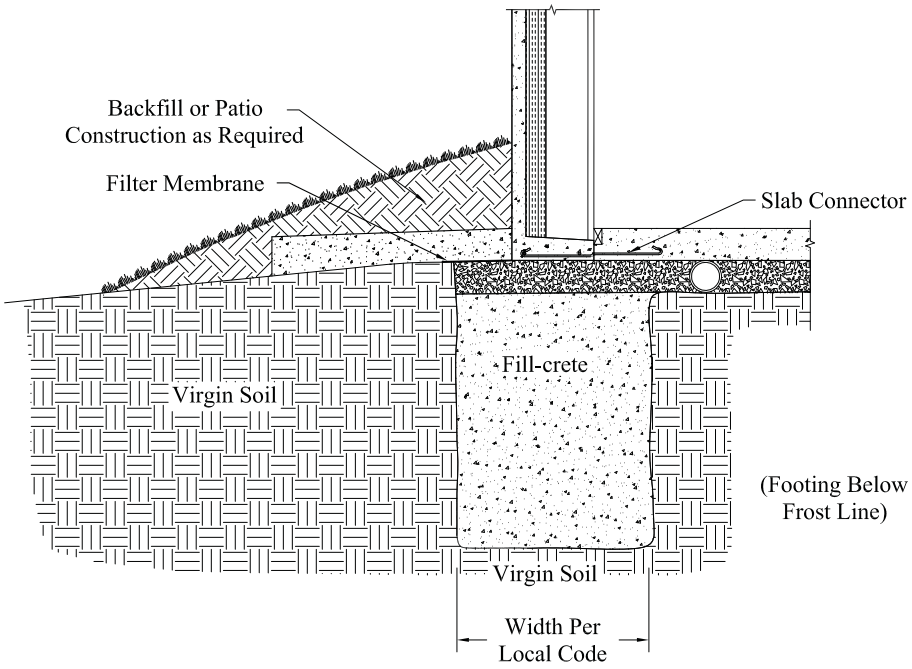


Figure 9

Code Reference:
2009 IRC Table: R403.1

TABLE R403.1
MINIMUM WIDTH OF CONCRETE, PRECAST OR MASONRY FOOTINGS (inches) [a]

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	≥ 4,000
Conventional light-frame construction				
1-story	12	12	12	12
2-story	15	12	12	12
3-story	23	17	12	12
4-inch brick veneer over light frame or 8-inch hollow core masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.
a. Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.

Daylight Basement (Non Frost / Shallow Frost Areas)

- Footing must be on virgin / undisturbed soil.
- Footing shall extend at least 12” below the undisturbed ground surface.
- Use a 4” perforated drainage pipe and locate on either the interior or exterior side of the panel / wall. (See page 8.)
- Direct pipe to sump or daylight drain. (See page 8.)
- An “approved” filter membrane must be installed per code. (See page 8.)
- Bend slab connectors into concrete floor pour, if provided.
- Cover the exposed stones on the exterior of the wall with backfill or patio construction (to prevent air and water infiltration), properly sloped away from the wall.
- A shear wall may be required in certain uneven backfill or open floor plan conditions. (See page 35.)

Code Reference:
2009 IRC Section: R403.1.4

R403.1.4 Minimum Depth.
All exterior footings shall be placed at least 12 inches (305 mm) below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Sections R403.1.4.1 through R403.1.4.2.

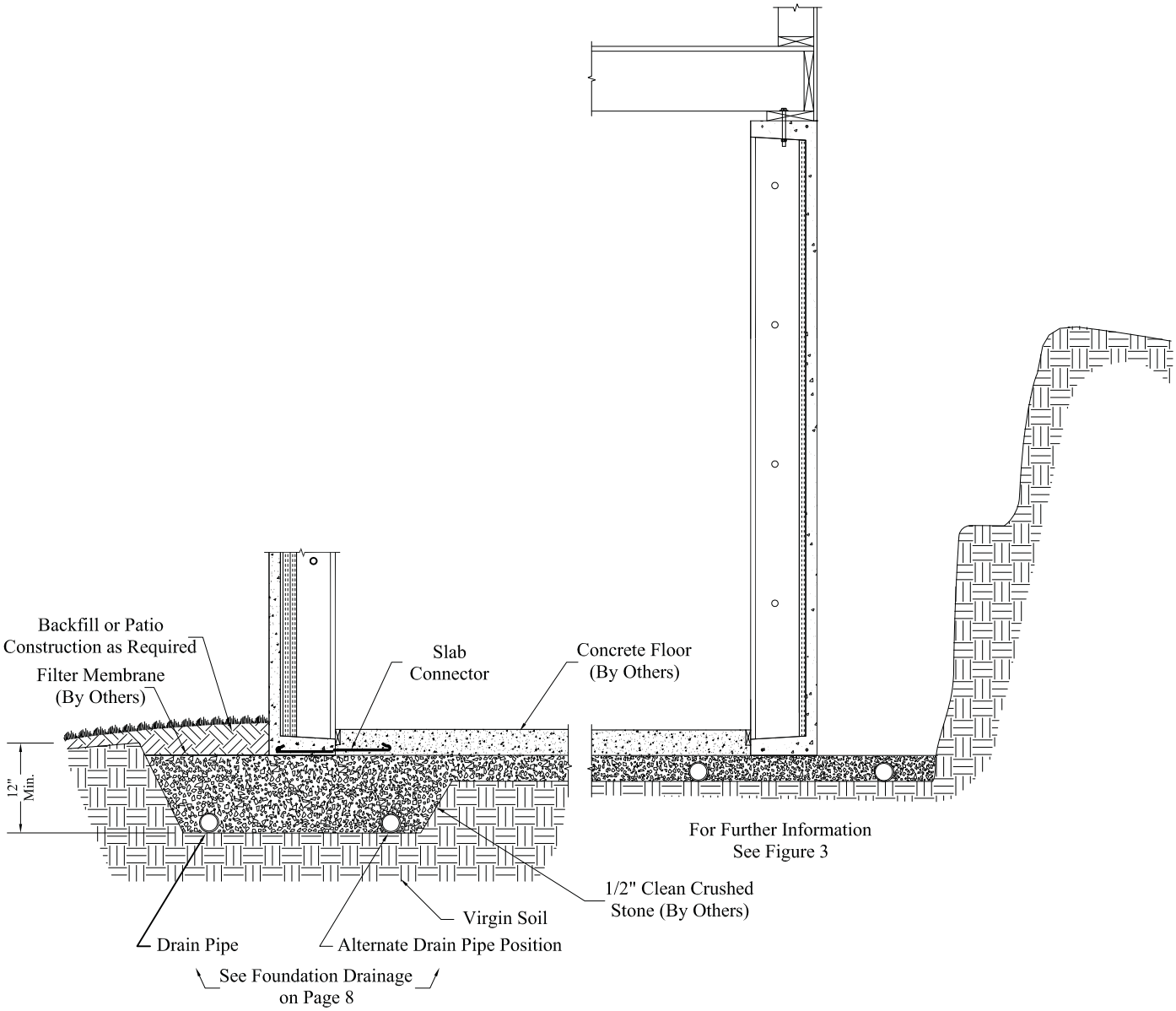


Figure 10

Procedures to Pour Concrete Floor

Typical Floor Pour Detail

- Bend slab connectors into concrete floor pour if provided.
- Fasten a piece of lath at the desired height of the concrete floor to form a screed board (see Figure 11), **or** omit the screed board and allow concrete floor pour to flow between the stud cavities on top of the Superior Walls footer beam.
- Install a vapor retarder per code.
- Typically allow a minimum of a 2” direct contact between wall footer beam and poured concrete floor. (See Figure 11 below.)
- For an insulated slab edge procedure, please contact your local Superior Walls representative.

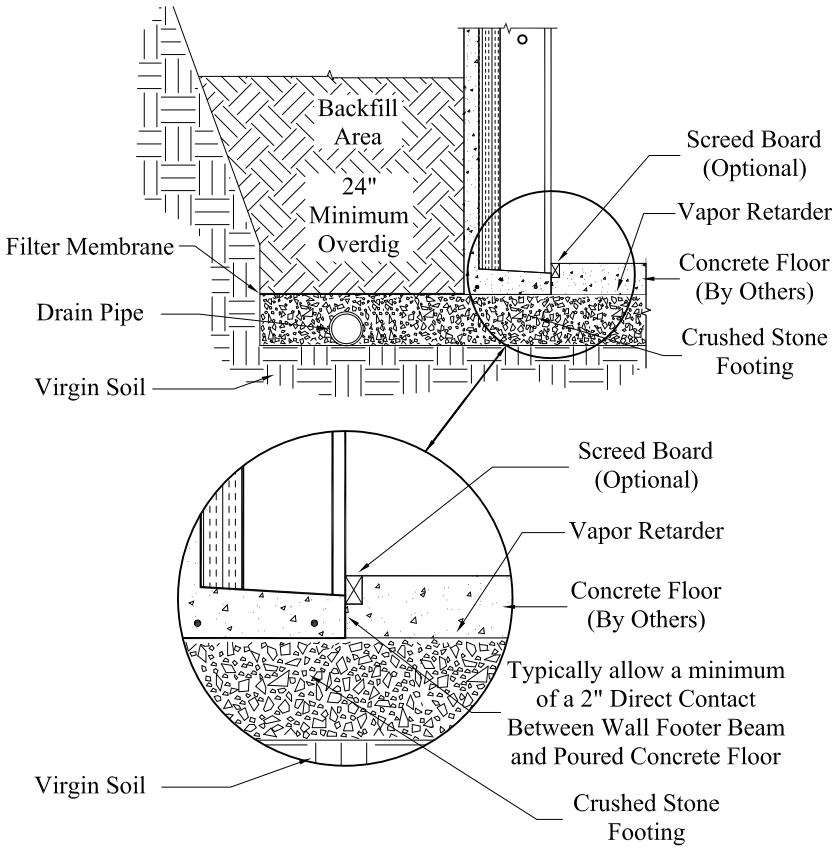


Figure 11

Code Reference:
2009 IRC Section: R506.1

R506.1 General. Concrete slab-on-ground floors shall be a minimum 3.5 inches (89 mm) thick (for expansive soils, see Section R403.1.8). The specified compressive strength of concrete shall be as set forth in Section R402.2.

Code Reference:
2009 IRC Section: R506.2.2

R506.2.2 Base. A 4-inch-thick (102 mm) base course consisting of clean graded sand, gravel, crushed stone or crushed blast-furnace slag passing a 2-inch (51 mm) sieve shall be placed on the prepared subgrade when the slab is below grade.

Exception: A base course is not required when the concrete slab is installed on well-drained or sand-gravel mixture soils classified as Group I according to the Unified Soil Classification System in accordance with Table R405.1.

Code Reference:
2009 IRC Section: R506.2.3

R506.2.3 Vapor retarder. A 6 mil (0.006 inch; 152 µm) polyethylene or *approved* vapor retarder with joints lapped not less than 6 inches (152mm) shall be placed between the concrete floor slab and the base course or the prepared sub-grade where no base course exists.

Exception: The vapor retarder may be omitted:

1. From detached garages, utility buildings and other unheated *accessory structures*.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m²) and carports.
3. From driveways, walks, patios and other flatwork not likely to be enclosed and heated at a later date.
4. Where *approved* by the *building official*, based on local site conditions.

Raised Floor Pour Detail

To pour the basement floor at an elevation higher than the typical elevation shown on page 18:

Option A (Figure 12):

- Cut and remove the foam insulation below the desired floor surface.
- Cut and remove the interior stud facing below the desired floor surface.
- Install a vapor retarder per code.

Option B (Figure 12):

- Leave foam insulation and interior stud facing on Superior Walls panel and pour concrete floor, allowing direct contact between the Superior Walls footer beam and the concrete floor pour.
- Install a vapor retarder per code.

Code Reference:
2009 IRC Section: R318.4

R318.4 Foam plastic protection.
In areas where the probability of termite infestation is "very heavy" as indicated in figure R301.2(6), extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundations walls or slab foundations located below *grade*. The clearance between foam plastics installed above *grade* and exposed earth shall be at least 6 inches (152 mm)

Exceptions:
1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure-preservative-treated wood.
2. When in *addition* to the requirements of R318.1, an *approved* method of protecting the foam plastic and structure from subterranean termite damage is provided.
3. On the interior side of *basement walls*.

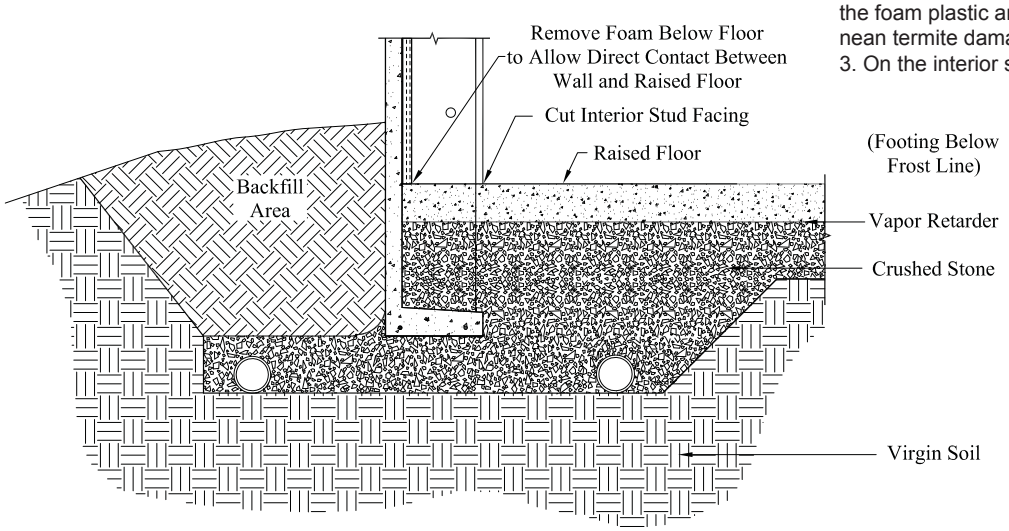


Figure 12 - Option A

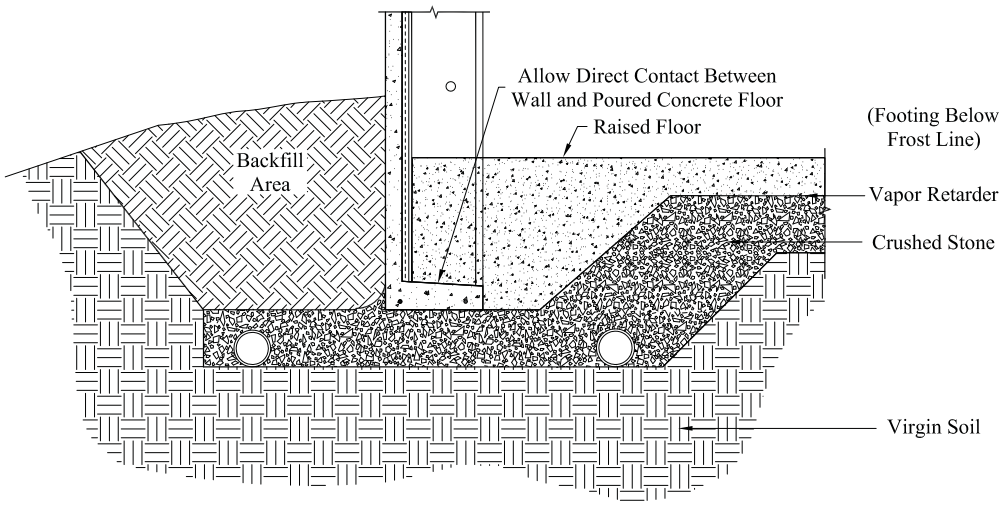


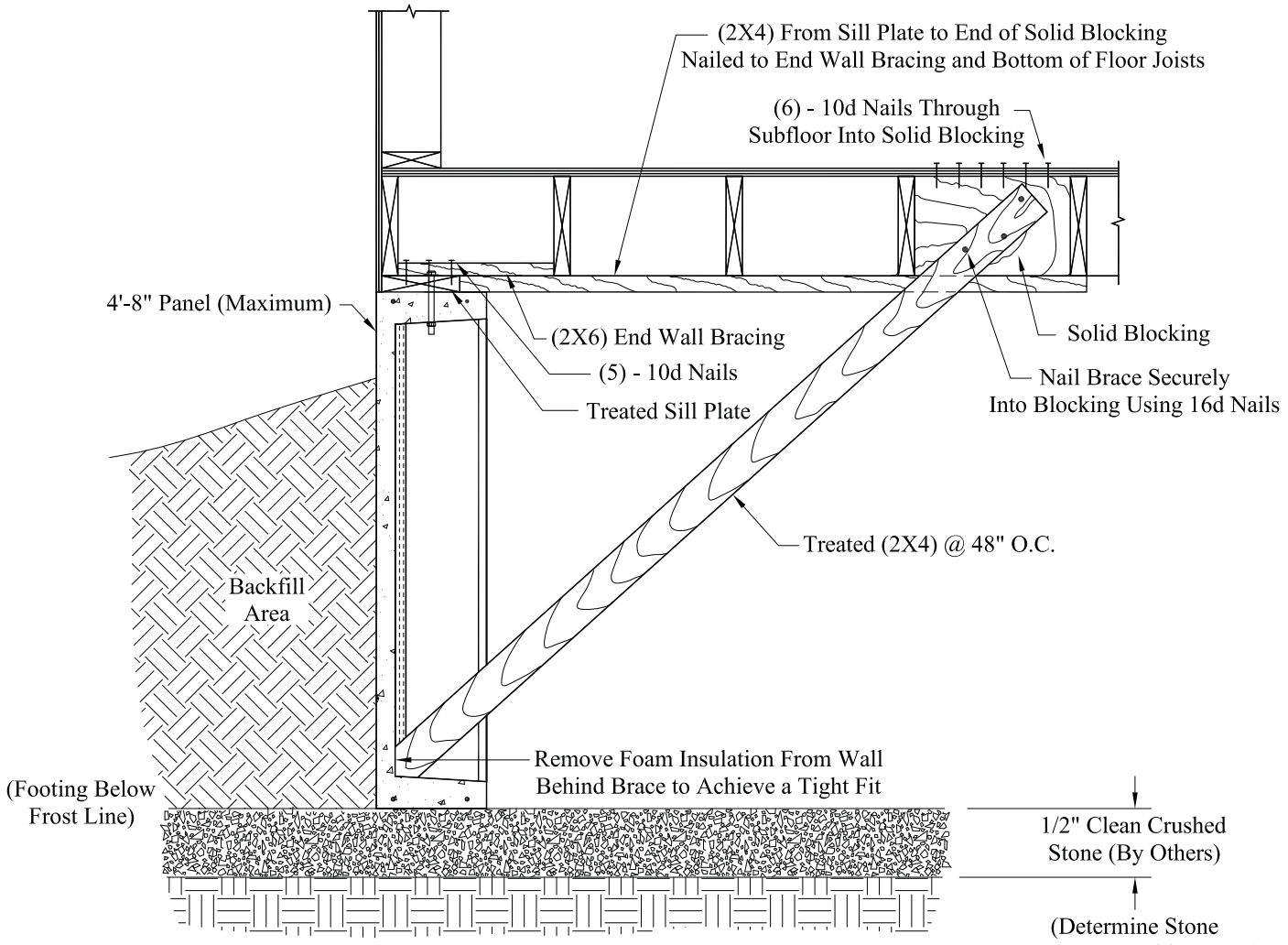
Figure 12 - Option B

Crawl Space Procedures

Crawl Space with Wood Bracing

Code Reference:
2009 IRC Section: R408

R408 UNDER-FLOOR SPACE. See code for requirements.



NOTE: A Concrete Floor Poured Against The Bottom of The Wall, At a Minimum Thickness of 2", May Be Used Instead of The Diagonal Bracing.

Figure 13

Crawl Space without Wood Bracing

For project details similar to the illustration below:

- Fill inside and outside simultaneously to secure bottom of wall.
- Perimeter drain pipe is not required on frost walls that are below frost line.

Code Reference:
2009 IRC Section: R408

R408 UNDER-FLOOR SPACE. See code for requirements.

Code Reference:
2009 IRC Section: R318.4

R318.4 Foam plastic protection.
In areas where the probability of termite infestation is "very heavy" as indicated in figure R301.2(6), extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundations walls or slab foundations located below *grade*. The clearance between foam plastics installed above *grade* and exposed earth shall be at least 6 inches (152 mm)

Exceptions:
1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure-preservative-treated wood.
2. When in *addition* to the requirements of R318.1, an *approved* method of protecting the foam plastic and structure from subterranean termite damage is provided.
3. On the interior side of *basement walls*.

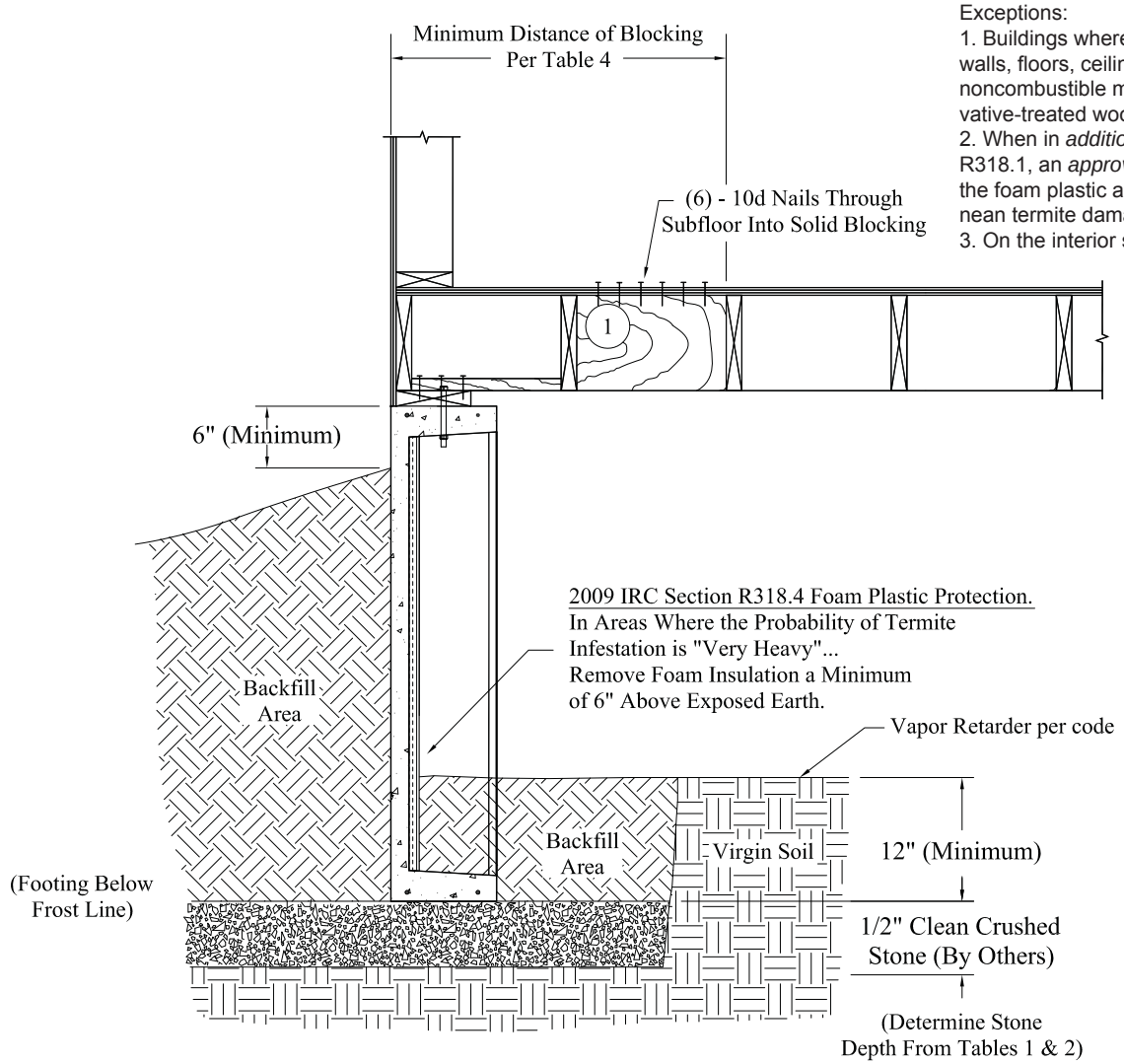


Figure 14

Porches, Garages and Other Inside Fill Conditions

For project details similar to the illustration below:

- Maximum backfill differential is 36”. (Additional reinforcement can be added to most Superior Walls panels for project applications that require backfill differential greater than 36”. Additional reinforcement must be discussed with your Superior Walls representative prior to panel manufacturing.)
- Use flat washers and nuts to fasten a 1/2 inch all-thread rod every 24 inches through precast holes in the bond beam.
- Bend the rod so that it is parallel to the floor pour and centered in the concrete.
- Rod length should extend at least 24 inches beyond the inside edge of the bond beam.
- Use temporary bracing on the exterior of the wall until concrete floor is poured and cured.
- Bottom of wall must be restrained to resist the lateral pressure of the infill material.

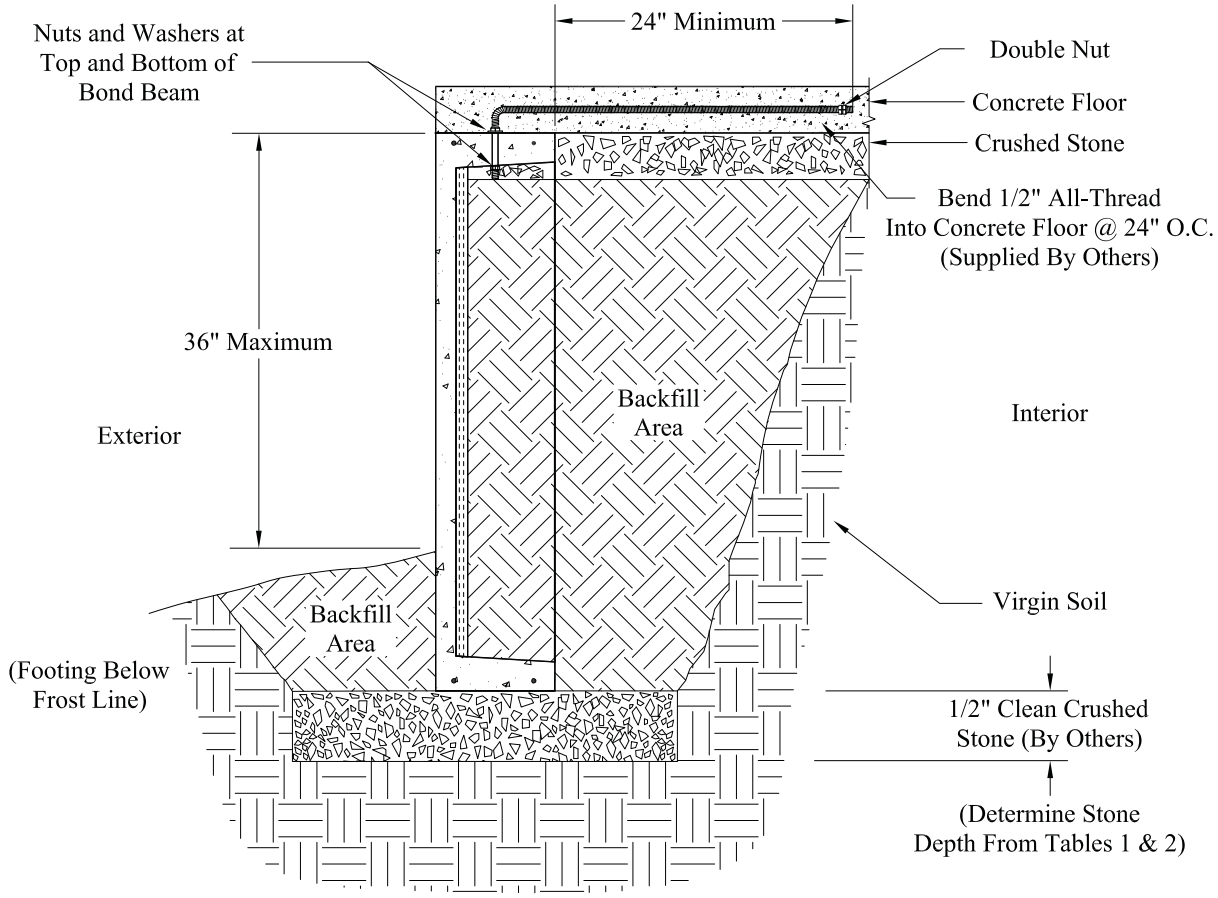


Figure 15

Garage Wall

- This wall type is used primarily for garage frost walls.
- For other inside fill conditions, see instructions on page 22.
- Perimeter drain is not required on frost wall applications that are below the frost line.

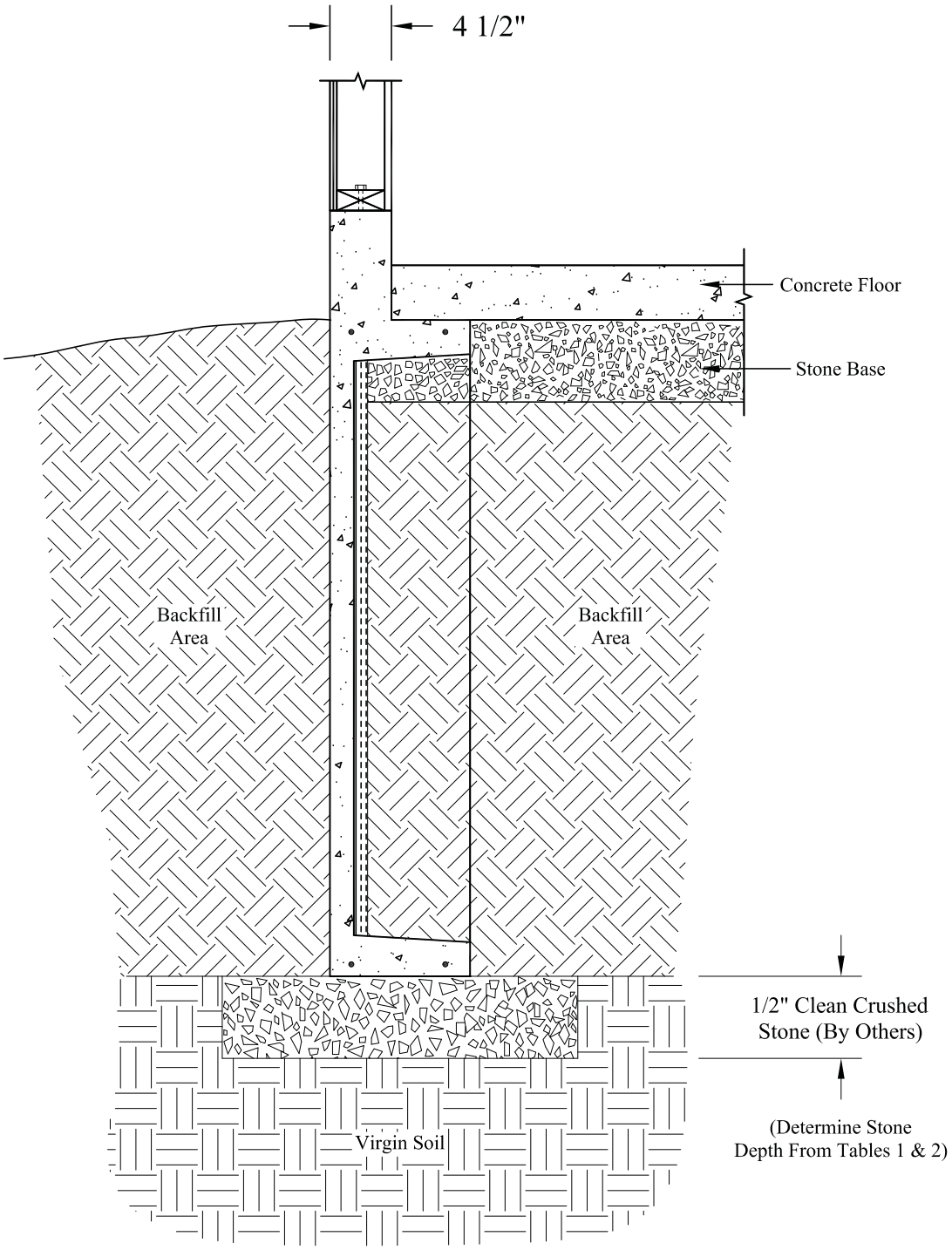


Figure 16

The Framing Connection at the Top of the Wall

To comply with building code requirements, the framing / decking connection at the top of the Superior Walls panel and the floor slab at the bottom of the Superior Walls panel MUST be completed prior to backfilling.

1. Sill Plate
   - Construction adhesive is recommended between the bond beam and the sill plate.
   - 2x10 treated sill plate is recommended.
   - Bolt the sill plate with minimum 1/2" x 5-1/2" bolts using two washers (one above the wood sill plate and one between the nut and the underside of the bond beam) through the precast holes provided in top bond beam. (Refer to fastening schedule in Table 3 on page 27.)
   - Use 1/2" x 3" bolts (with inserts provided in the Superior Wall) to attach sill plate to top of wall above window / door headers and garage walls shown in Figure 16 on page 23.
   - Sill plate must be bolted within 12" of the end of all plate sections. See 2009 IRC – R403.1.6.
   - Sill plate splices must be at least 4'-0" away from any foundation panel joint.
   - Clamps may be used to temporarily secure sill plate in position prior to bolting. (Nails or other methods could result in cracking of the concrete.)

2. Floor Joists Perpendicular to the Foundation Wall
   - Nail each joist securely to sill plate with two 16d nails or according to code. For modular home connections, see Table 4 on page 33.

3. Floor Joists Parallel to the Foundation Wall
   - Nail a 2 x 6 end wall brace securely to the sill plate with five 10d nails every 48" on center. (Braces must be within 12" from the interior of each corner.) See Figure 19 on page 27 and Figure 20 on page 28.
   - Use 1 Solid block if backfill is 0' to 7'-6". Nail the block in line with the 2 x 6 end wall braces. (See page 27.)
   - Use 2 Solid blocks if backfill is between 7'-6" and 9'-6" for joists less than 10" in height. (See page 27.)
   - Use 3 Solid blocks when backfill is between 7'-6" and 9'-6" for joists that are greater than or equal to 10" in height. (See page 27.)
   - See Figure 22 on page 30 for solid blocking details for "I" Joist construction.

Note: 1) See fastening schedule and details on pages 25-34.
2) Warning: Pressure treated lumber requires special fastener considerations; see code reference at right.

Code Reference:
2009 IRC Section: R404.1.7

R404.1.7 Backfill placement. Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by backfill.

Exception: Such bracing is not required for walls supporting less than 4 feet (1219 mm) of unbalanced backfill.

Code Reference:
2009 IRC Section: R403.1.6

R403.1.6 Foundation anchorage.
…wood sill plate shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center...Bolts shall be at least ½ inch (12.7 mm) in diameter …A nut and washer shall be tightened on each bolt to the plate...There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section.

Exceptions:
1. Foundation anchorage, spaced as required to provide equivalent anchorage to ½ inch diameter (13 mm) anchor bolts.

See code for other exceptions.

Code Reference:
2009 IRC Section: R317.3.1

R317.3.1 Fasteners for preservative-treated wood. Fasteners for preservative-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Coating types and weights for connectors in contact with preservative-treated wood shall be in accordance with the connector manufacturer's recommendations...

Exceptions:
1. One-half-inch (12.7 mm) diameter or greater steel bolts.

See code for other exceptions.

Floor Connection: Joists Perpendicular to Superior Walls Panels

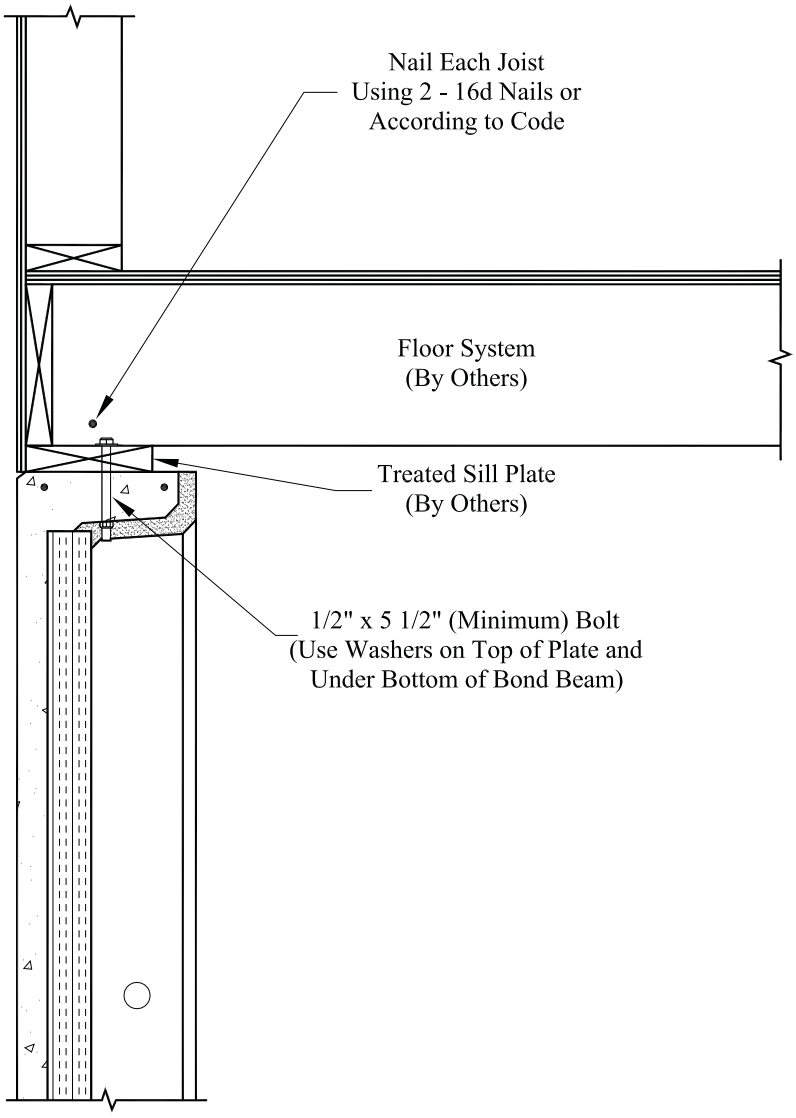


Figure 17

Floor Connection: Joists Perpendicular to Superior Walls Panels (cont.)

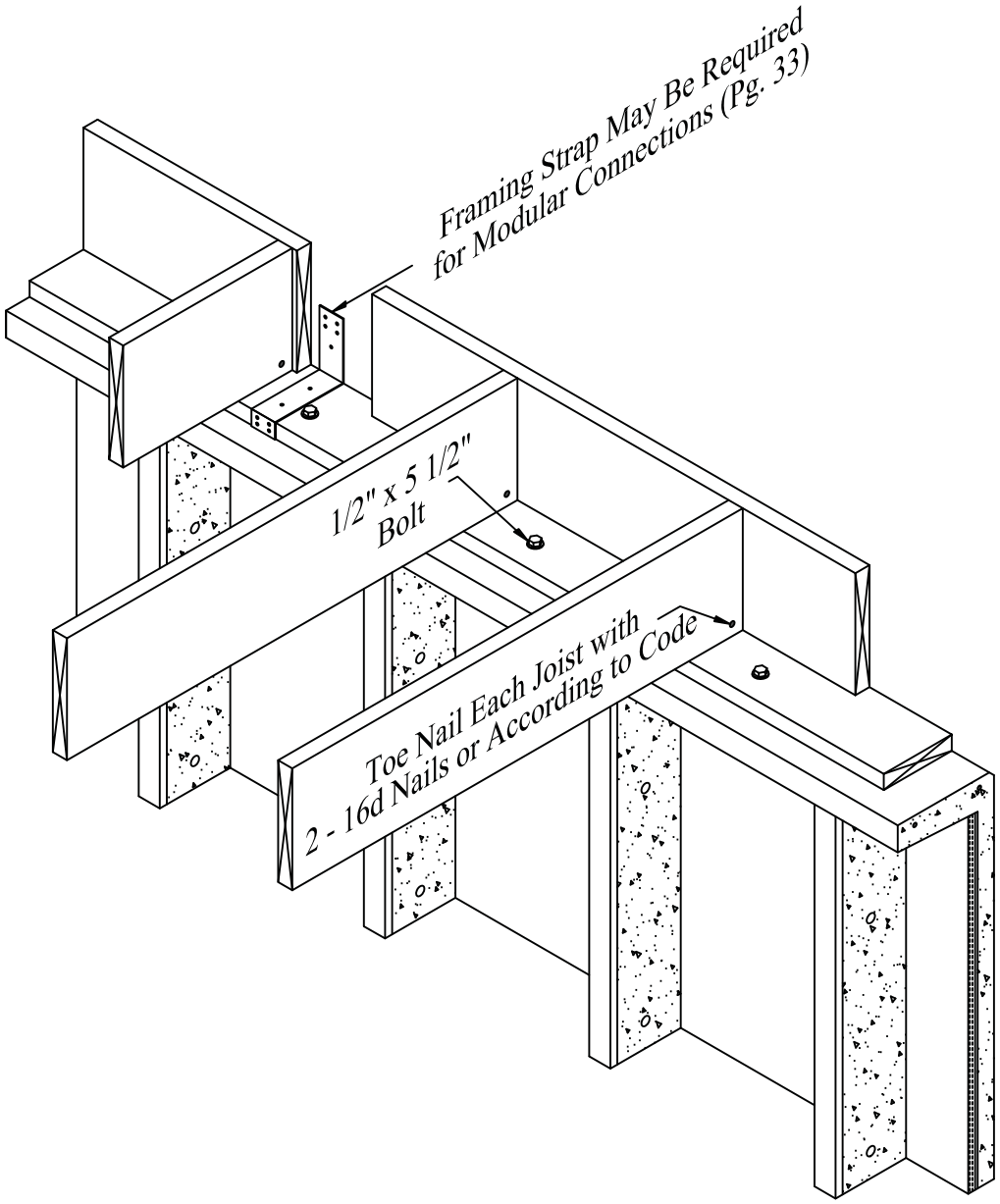


Figure 18

Table 3 Fastening Schedule					
Backfill Height	Joist Height	Sill Plate Bolting	Brace & Block Spacing	Number of Solid Blocks Required	Minimum Distance of Blocking
7’-6” - 9’-6”	≥ 10”	One (1) 1/2” Bolt at 24” OC	48” OC / 12” from the interior of each corner	Three (3)	5’-0”
7’-6” - 9’-6”	< 10”	One (1) 1/2” Bolt at 24” OC		Two (2)	4’-0”
0’ < 7’-6”	Any Height	One (1) 1/2” Bolt at 48” OC		One (1)	2’-0”

Floor Connection: Joists Parallel to Superior Walls Panels

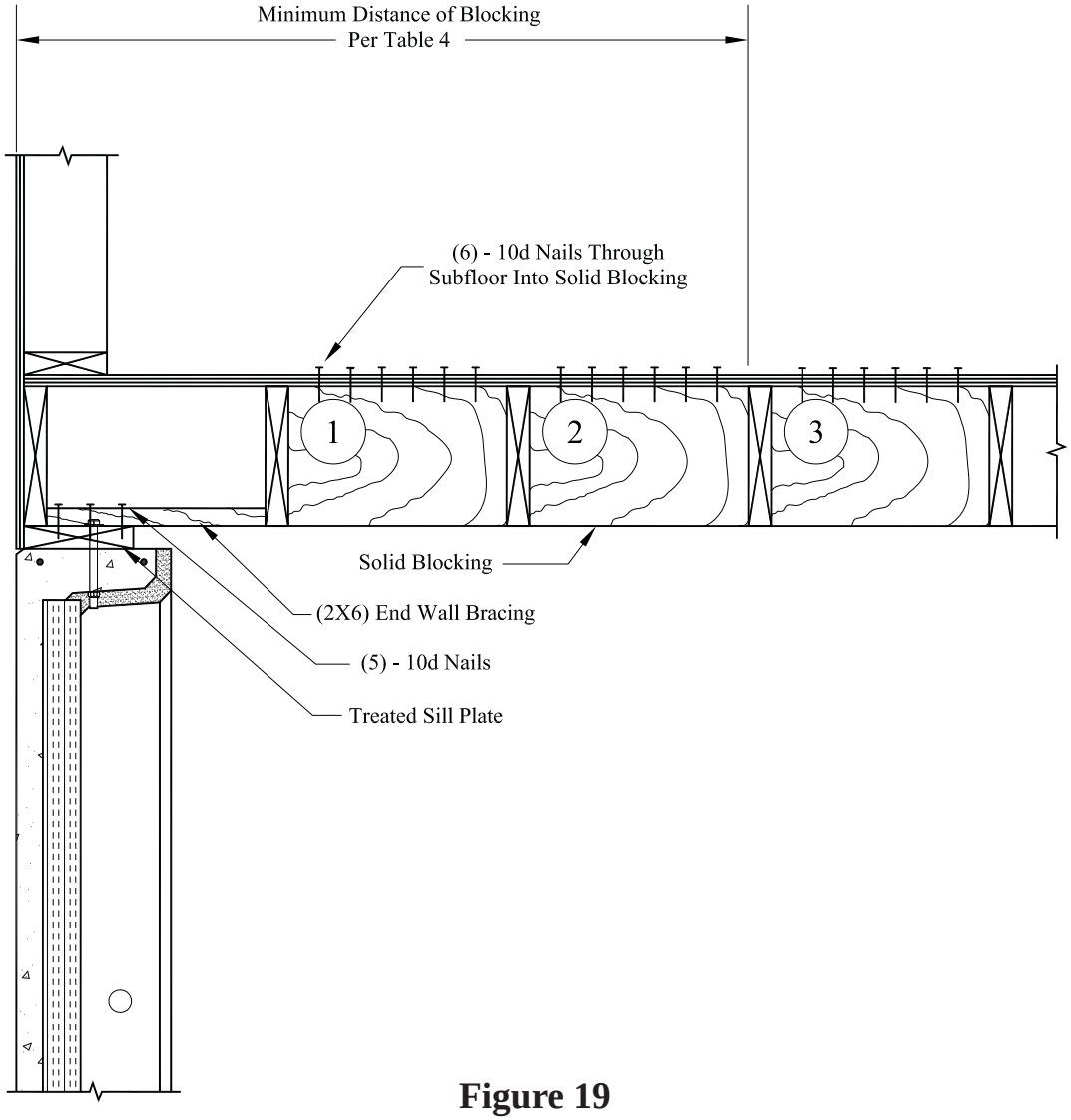


Figure 19

Floor Connection: Joists Parallel to Superior Walls Panels (cont.)

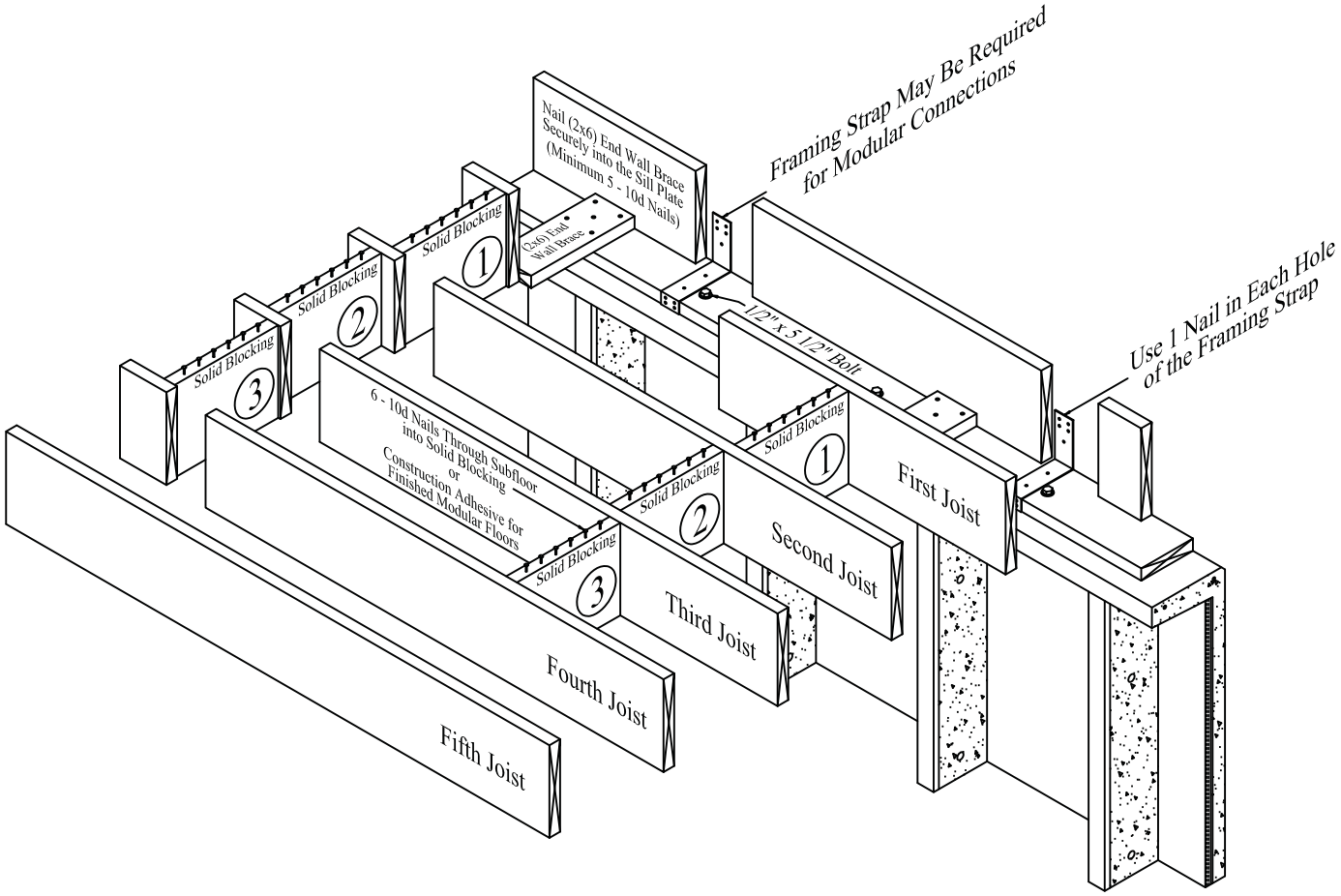


Figure 20

Floor Connection: Joists Parallel to Superior Walls Panels (cont.)

Alternate Blocking to Accommodate HVAC Equipment

To accommodate for HVAC ductwork that is located where Solid Blocking is shown in Figure 19 on page 27 and Figure 20 on page 28, additional blocking is required as shown in Figure 21 (below).

- All requirements of Table 3 remain. (See page 27.)
- Solid Blocking is replaced with 2x6 Flat Blocking. (Locate Flat Blocking between the joists and in line with the 2x6 End Wall Braces.) (See Figure 21.)
- Add Solid Blocking to the next open joist bay to replace the Solid Blocking that was removed to accommodate for the HVAC duct work. (Number of Solid Blocks must comply with Table 3.)

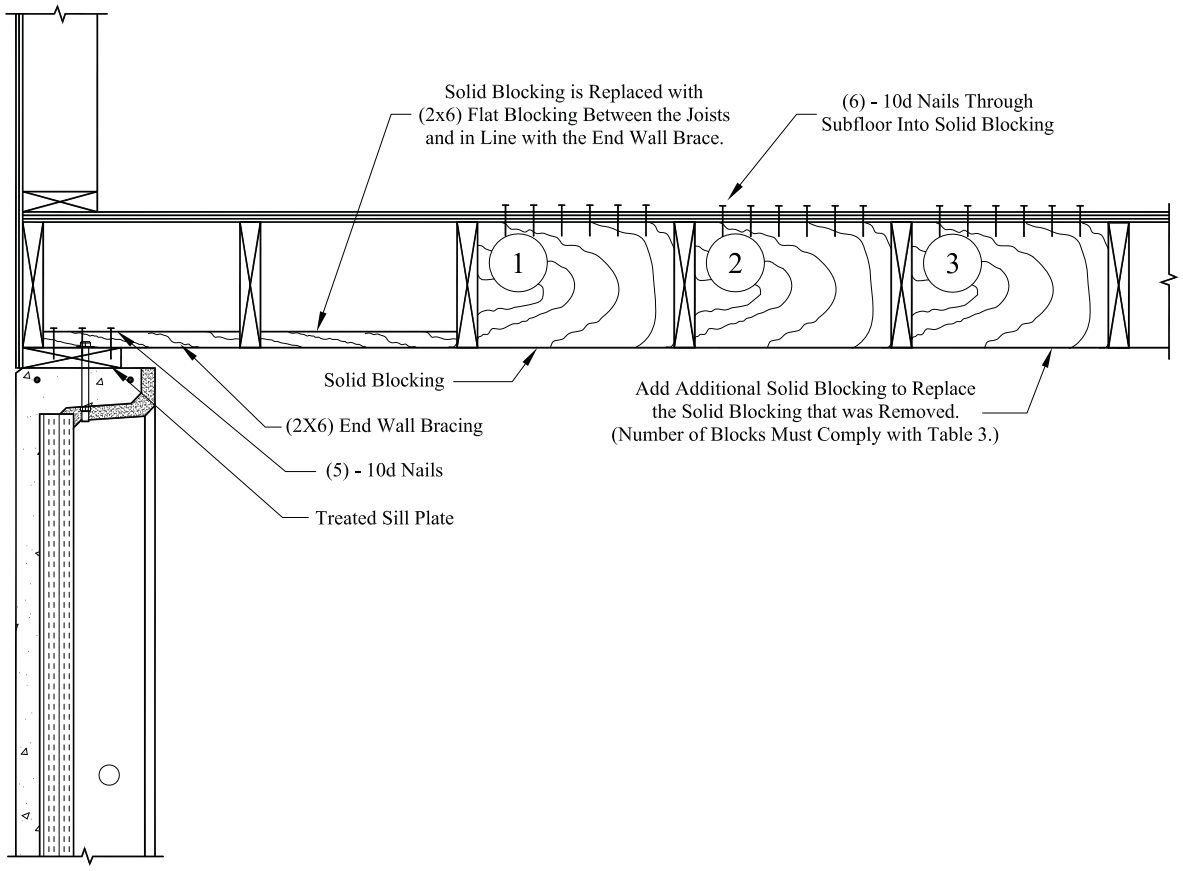
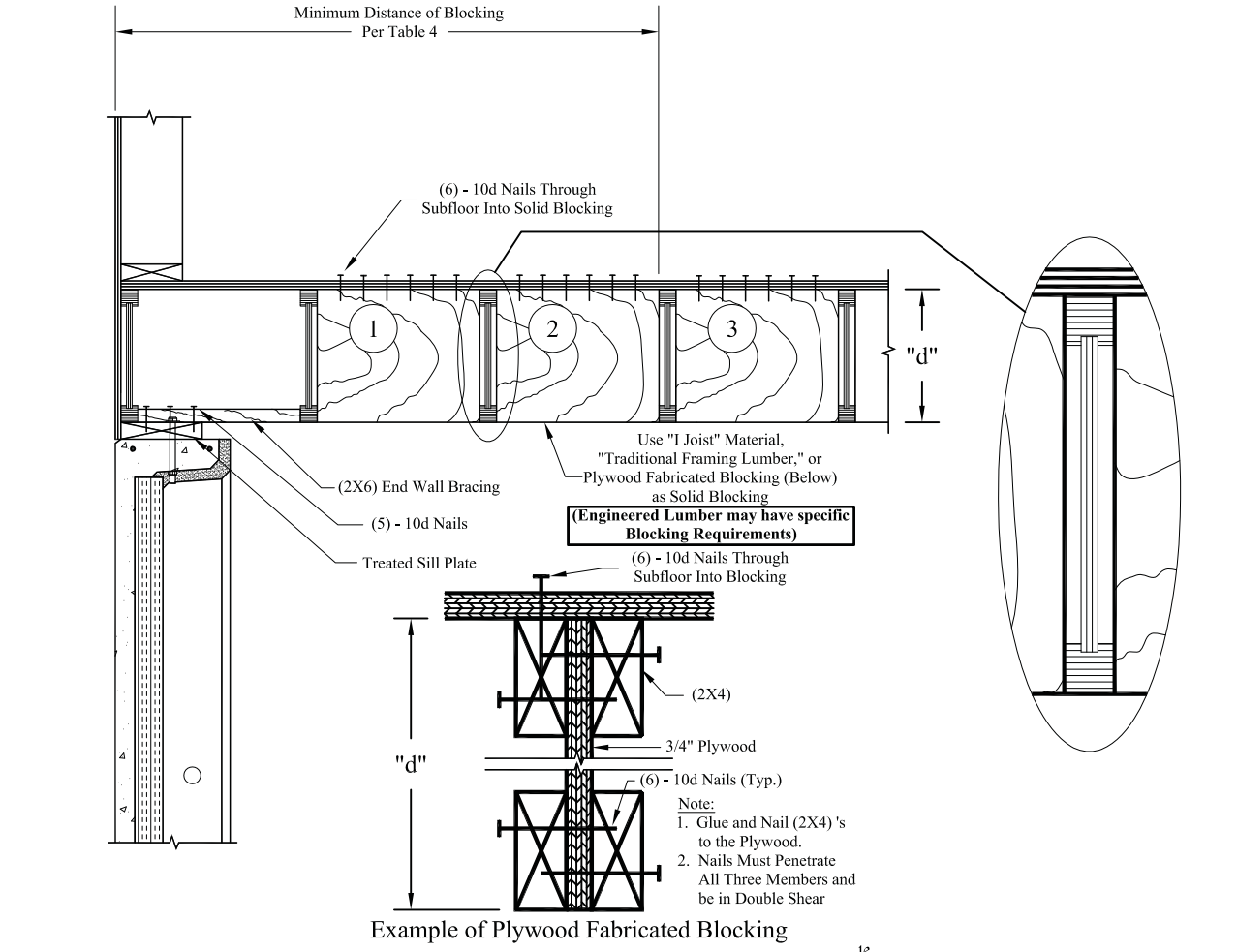


Figure 21

Floor Connection: “I” Joist Blocking Detail



Example of Plywood Fabricated Blocking

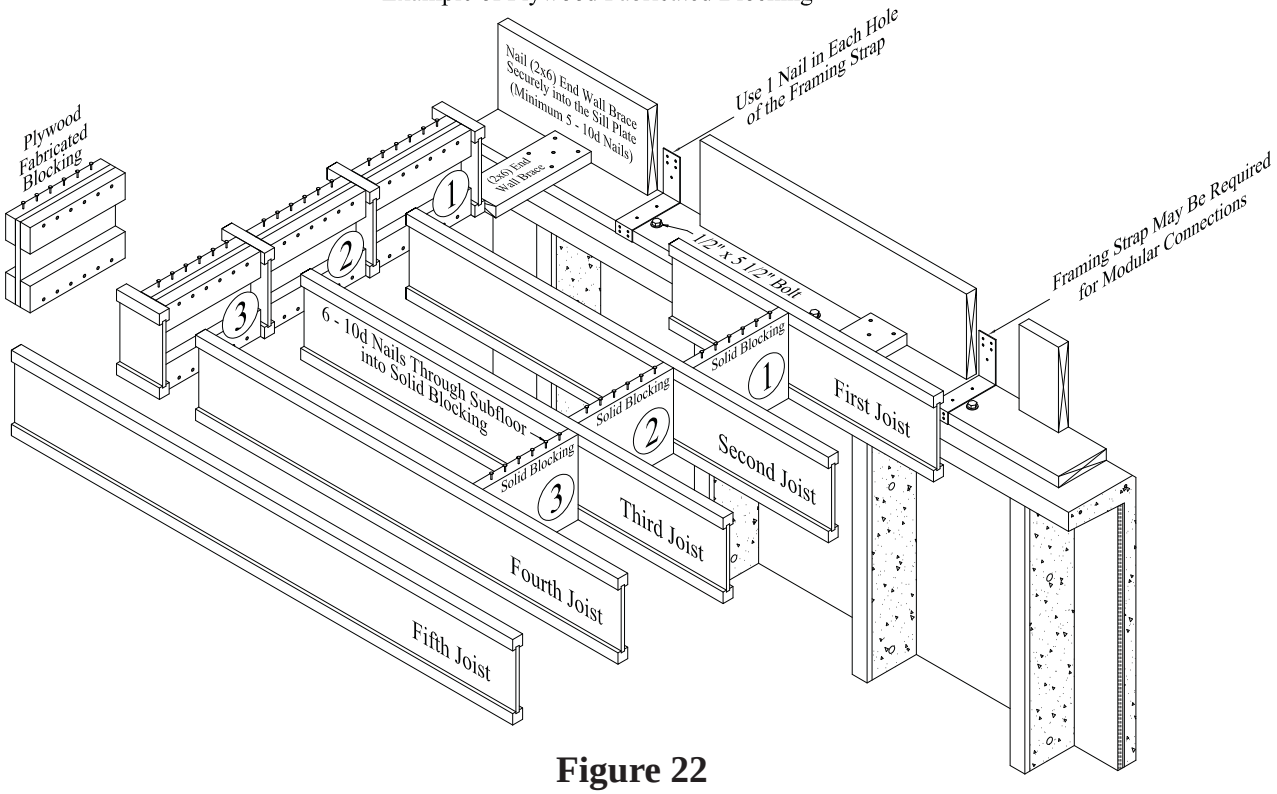


Figure 22

Floor Truss Connection: Top Chord Bearing Floor Truss

Floor Truss Parallel to Superior Walls Panel

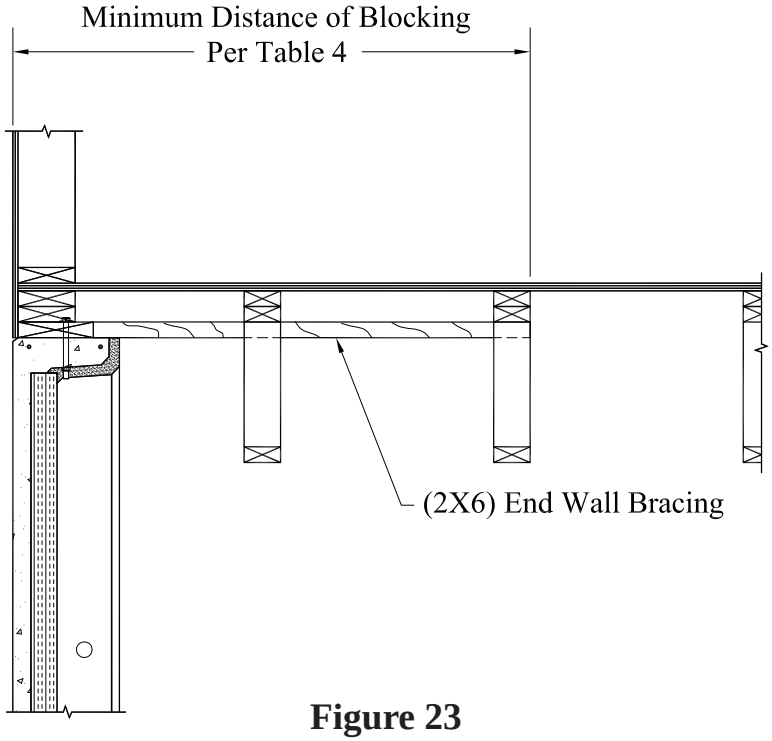


Figure 23

Floor Truss Perpendicular to Superior Walls Panel

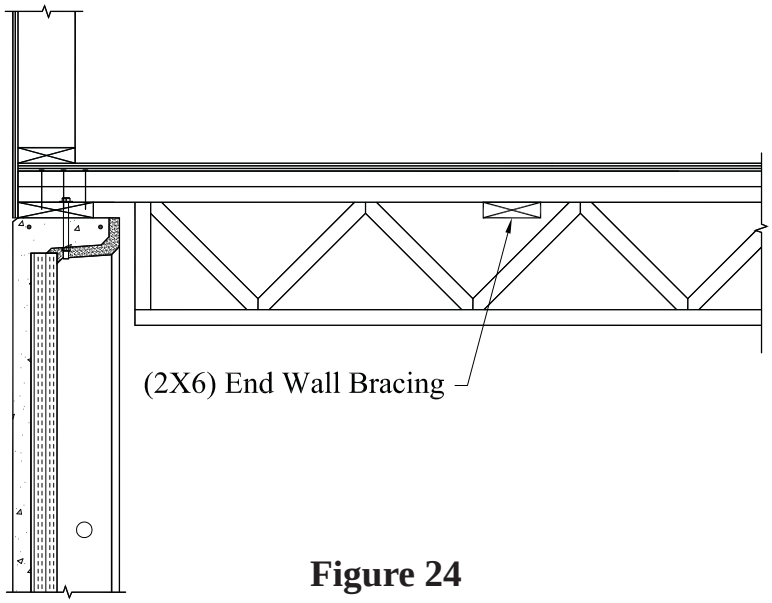


Figure 24

Floor Truss Connection: Bottom Chord Bearing Floor Truss

Floor Truss Parallel to Superior Walls Panel

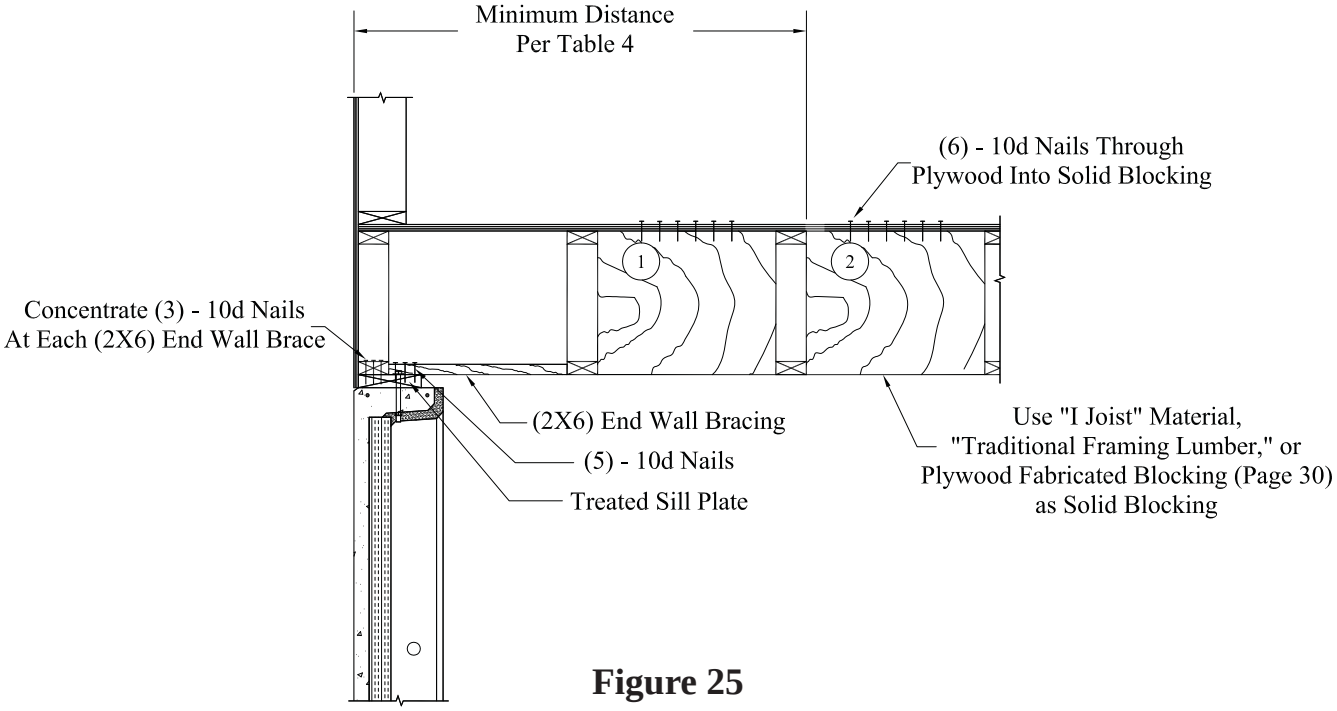


Figure 25

Floor Truss Perpendicular to Superior Walls Panel

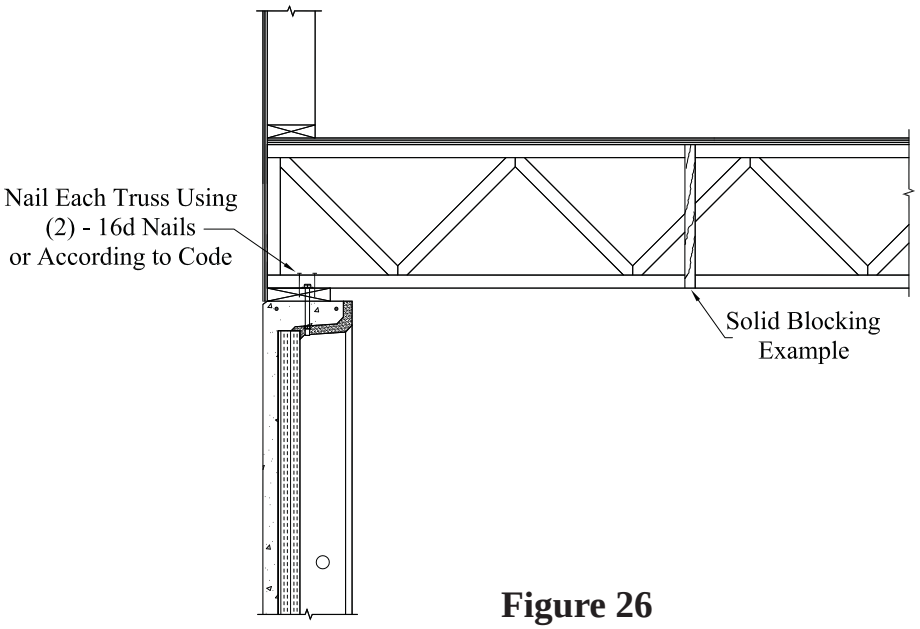


Figure 26

Modular Connection

Sill Plate / Blocking

- Modular manufacturer may attach the sill plate in the factory during the modular construction, or the sill plate can be attached to the top of the Superior Walls panel prior to the modular placement.
- When sill plate and required blocking are completed during modular construction, attach the modular construction as shown in Figure 19 and Table 3 on page 27.
- Construction adhesive is recommended between the bond beam and the sill plate.
- Bolt the sill plate with minimum 1/2" x 5-1/2" bolts using washers tightened to the wood sill plate and the underside of the top bond beam concrete through the precast holes provided. (Refer to fastening schedule in Table 3 on page 27.)
- When sill plate is attached to the top of the Superior walls panel (Separate from the Modular), nail each joist securely to sill plate with two 16d nails or according to code, or use Superior Walls Framing Straps where it is difficult to nail the joists to the sill plate.
- The Framing Strap lies between the band joist and the sill plate and is fastened with 1-1/2" (.148" x 1.500") galvanized nails provided. Use 1 nail in every hole of the Framing Strap. Nail the Framing Strap to sill plate before setting the structure. (See Table 4.)
- Nail 2x6 end wall braces securely to the sill plate, every 48" on center, using five 10d nails. (Braces must be within 12" from the interior of each corner.) See Figure 19 on page 27 and Figure 20 on page 28.
- Add Solid Blocking per Table 3 on page 27, as shown below in Figure 27.
- A shear wall may be required in certain uneven backfill or open floor plan conditions. See page 35 for more information.

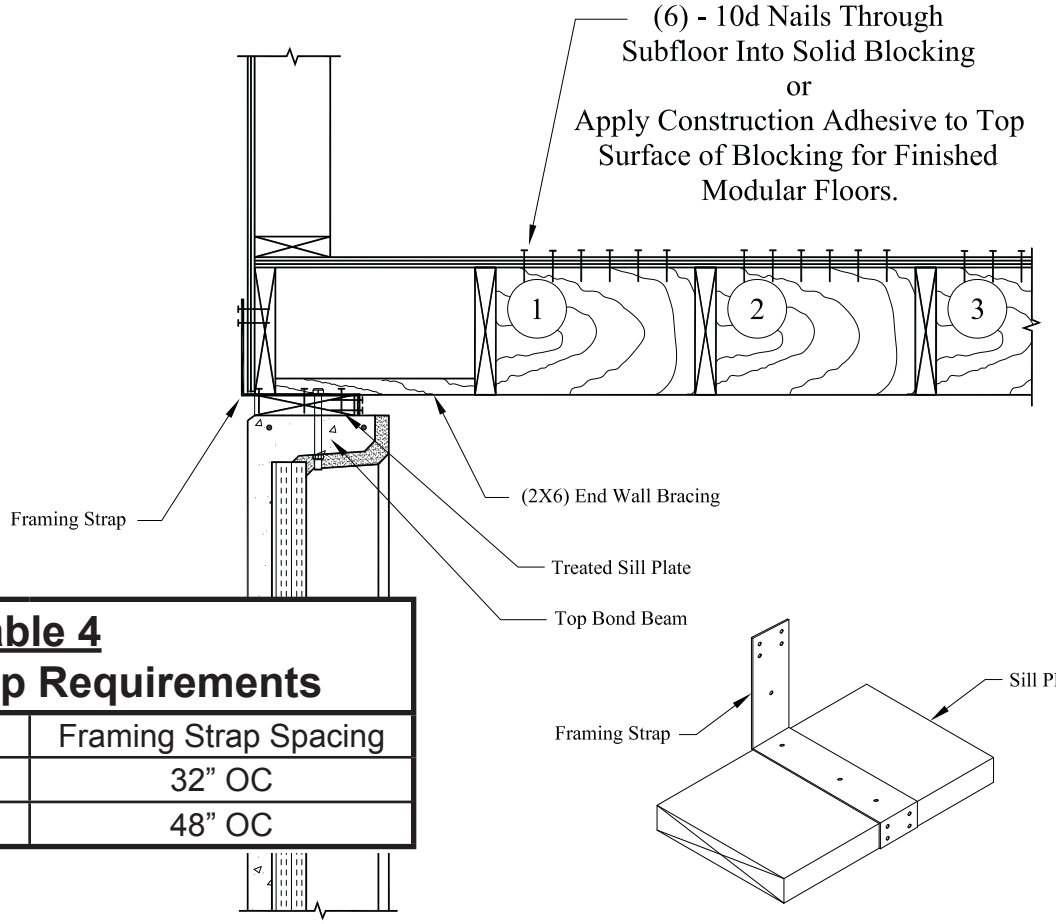


Table 4
Framing Strap Requirements

Backfill Height	Framing Strap Spacing
7'6" - 9'6"	32" OC
0' < 7'6"	48" OC

Figure 27

Typical Roof Truss Connection Detail

CAUTION: Depending on plan dimensions, site conditions, and design details, roof trusses may require structural cross bracing and / or uplift clips. Consult your design professional.

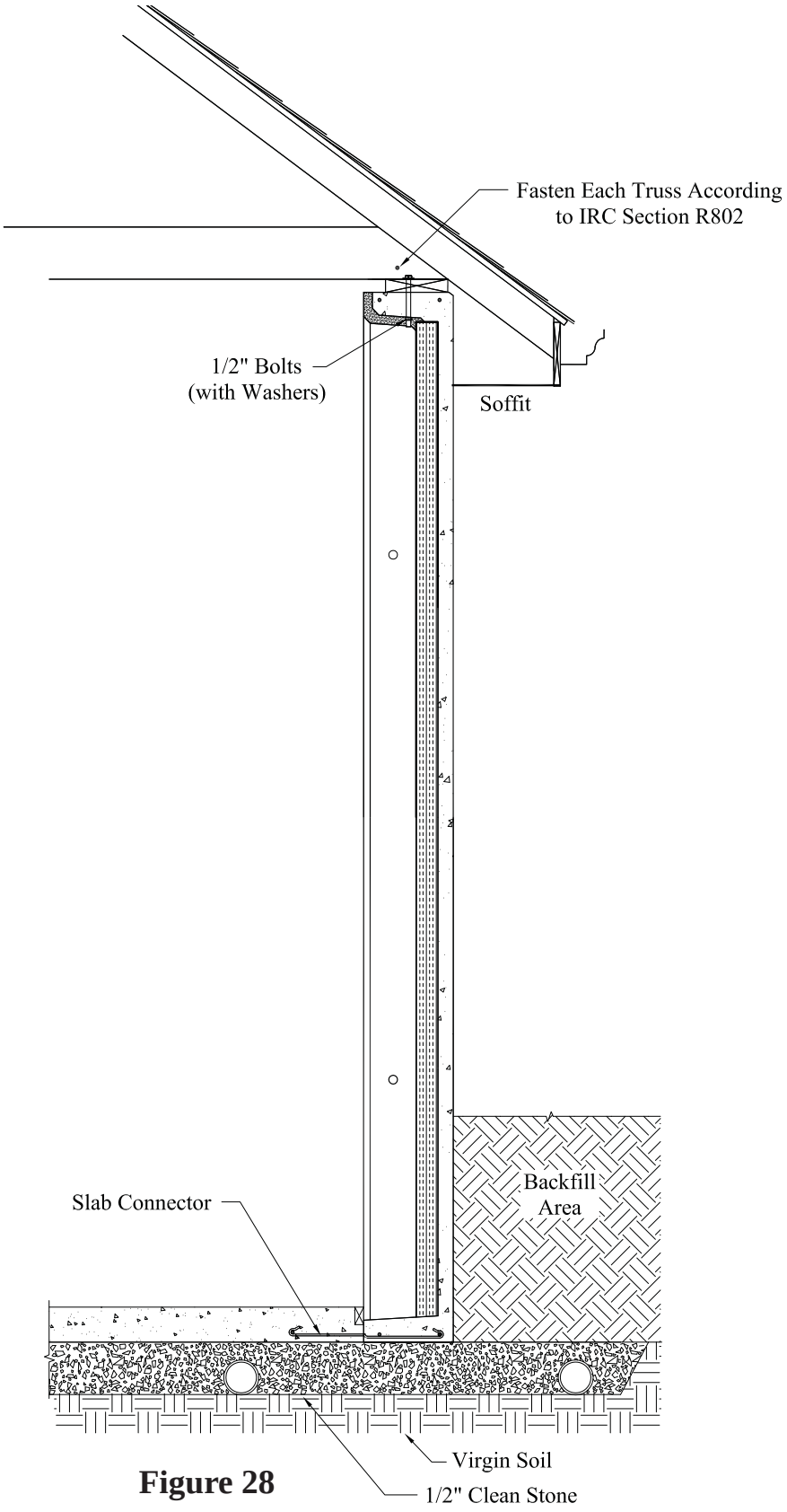


Figure 28

Shear Walls

A shear wall is a mechanism designed to ensure lateral stability to a structure. A shear wall may be required in certain uneven backfill or open floor plan conditions (See Figure 29). It can be constructed by the builder from wood, concrete, masonry (CMU) or steel. If the Architect or Engineer has specified a shear wall for the project, these specifications should be documented in the Architectural drawings. The specifications required from the design professional for shear walls consist of, but are not limited to: Location, Length, Bottom of wall connection and Top of wall connection.

The Table 5: Shear Wall Table, below, provides a guideline to help determine when a shear wall is needed. When the maximum wall lengths exceed the limits shown in Table 5, a shear wall will be required and the project must be individually reviewed by a design professional. Other site conditions such as adjacent driveways or other conditions may necessitate the need for a shear wall even when the wall lengths do not exceed the dimensions in Table 5.

Table 5: Shear Wall Table
Maximum Wall Length Without a Shear Wall

Wall Height	Differential Backfill Height	Soil Type		
		SC, CL	GM, SM, GC, ML	GW, GP, SW, SP
8'-2"	≤ 7'-6"	27'-0"	36'-0"	54'-0"
	≤ 7'-0"	32'-0"	44'-0"	66'-0"
	≤ 6'-0"	52'-0"	70'-0"	105'-0"
9'-0"	≤ 8'-4"	21'-6"	29'-0"	42'-0"
	≤ 7'-0"	36'-0"	48'-0"	72'-0"
	≤ 6'-0"	58'-0"	76'-0"	116'-0"
10'-0"	≤ 9'-4"	18'-0"	23'-0"	34'-0"
	≤ 8'-0"	27'-0"	36'-0"	54'-0"
	≤ 7'-0"	40'-0"	54'-0"	80'-0"
	≤ 6'-0"	64'-0"	86'-0"	128'-0"

"Xi Only"

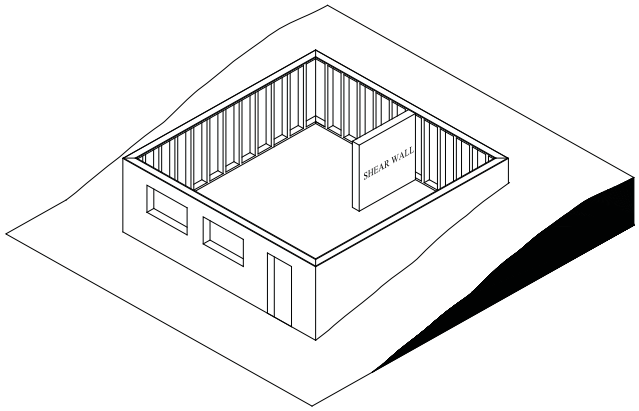


Figure 29

Stairwell Header Procedure

Stairwell openings adjacent to the foundation wall require special consideration because they often result in the foundation wall acting as a retaining wall with no top of wall restraint.

For stairwell openings up to 9’-6” in length and within 8’ of the foundation panels (see Figure 30 on page 37 and Figure 31 on page 38) (see table for Allowable Backfill material):

- Use construction adhesive between the sill plate and the top bond beam of the Superior Walls panel.
- Build a support beam (2x10 sill plate and two 2x8’s), without splices, 2’-0” past each end of the stairwell opening.
- Bolt the support beam with 1/2” bolts, using washers tightened to both the wood sill plate and the underside of the top bond beam, through every precast hole provided over the length of the support beam.
- For stairwell openings larger than 9’6” in length, or for an alternative Stairwell Header Reinforcement Detail, consult an engineer or your Superior Walls supplier.

Allowable Backfill material for 9’-6” Stairwell Opening			
	Wall Height (Xi / R-5)		
Soil Type	8’-2”	9’	10’
GW, GP, SW, SP	OK	OK	OK
GM, SM, GC, ML	OK	†	†
SC, CL	†	†	†
† - Backfill with clean crushed stone. * - Maximum height of backfill is 6” below the top of the wall.			

Stairwell Header Procedure: Parallel Joists

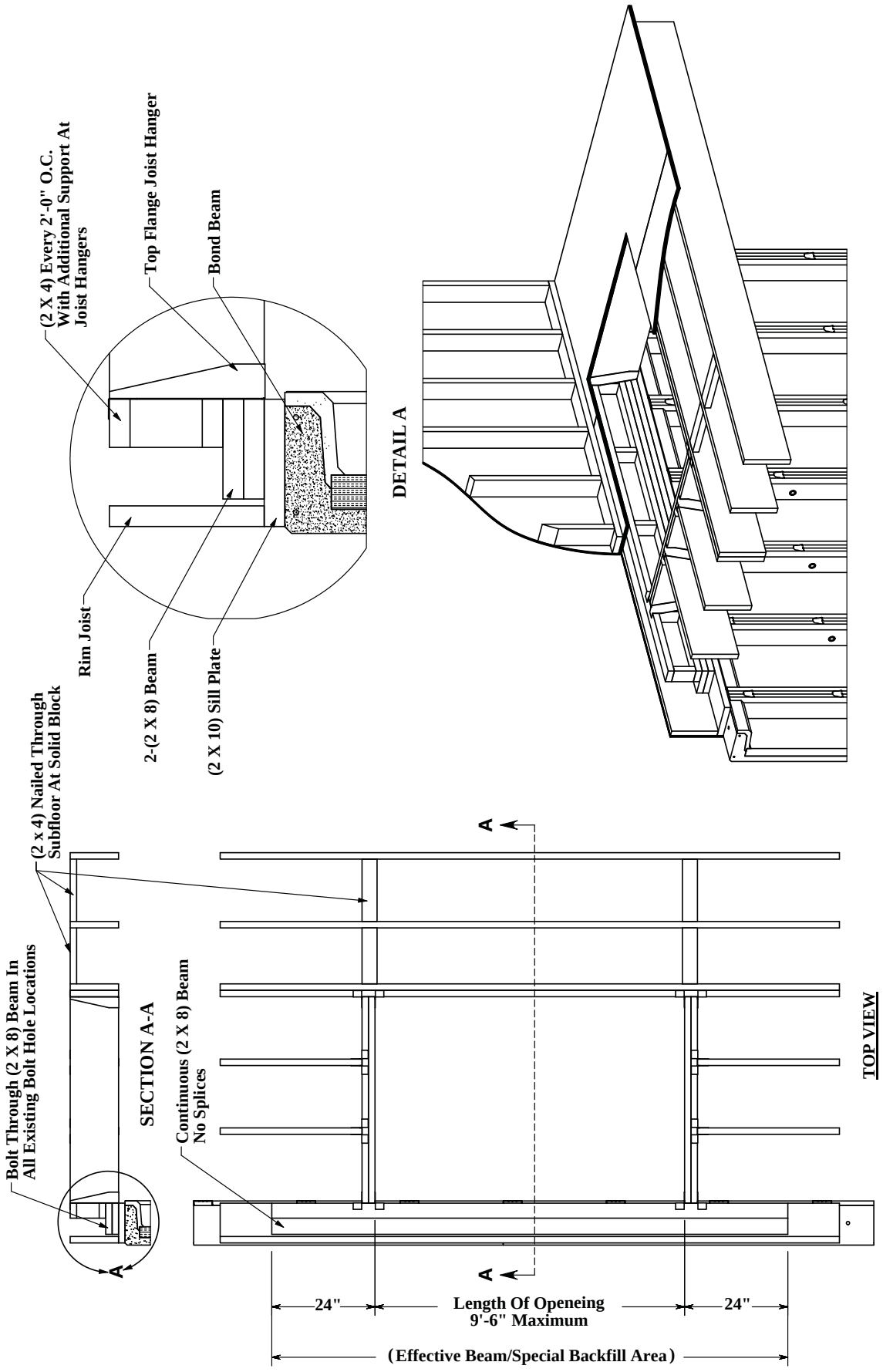


Figure 30

Stairwell Header Procedure: Perpendicular Joists

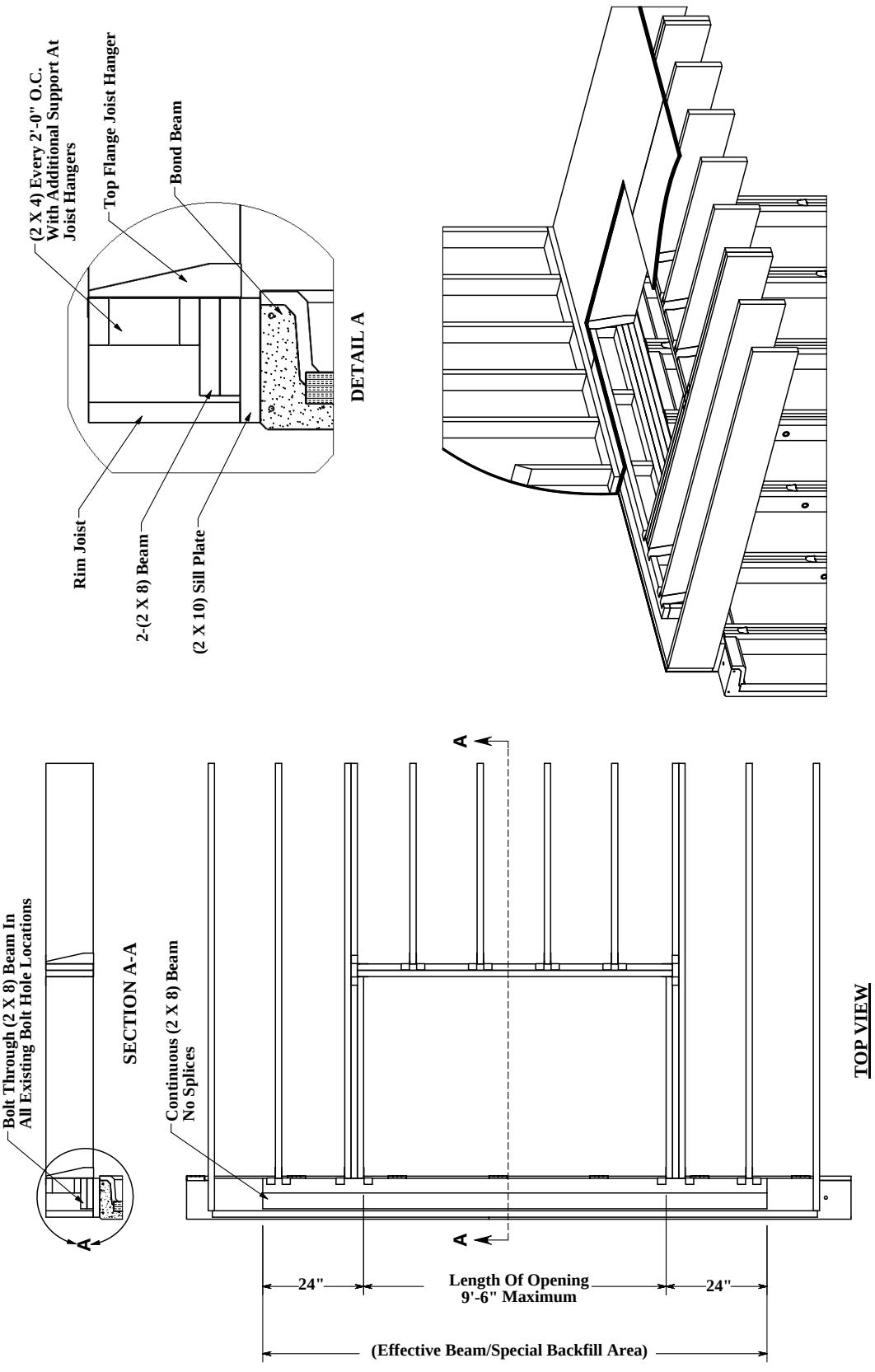


Figure 31

Backfilling Recommendations

WARNING: To comply with building code requirements, the framing / decking connection at the top of the Superior Walls panel and the floor slab at the bottom of the Superior Walls panel MUST be completed prior to backfilling.

- It is the builder's responsibility to ensure proper site conditions.
- **Do not use expansive soil or topsoil for backfill.** See soil chart Table 1 on page 5.
- **Backfill must not exceed 60 pounds per cubic foot (PCF) equivalent fluid pressure (EFP) for any Superior Walls application.** [Note: While Xi wall panels are rated to handle up to 100 PCF, framing connection details illustrated in this booklet have not been evaluated for applications exceeding 60 PCF equivalent fluid pressure.]
- Maximum allowed height of backfill is 6" below the top of the Superior Walls panel.
- Always slope ground away from the foundation according to local code or not less than 6" fall within the first 10 feet. Provide functioning rain gutters, downspouts, and run-outs.
- Allowing heavy equipment to operate near backfilled walls may adversely affect the Superior Walls panels.
- In a condition where there is more backfill inside than outside, the maximum differential is 36". (Additional reinforcement can be added to most Superior Walls panels for product applications that require backfill differential greater than 36". Additional requirements must be discussed with your Superior Walls representative prior to panel manufacturing.)

Code Reference:
2009 IRC Section: R401.3

R401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other *approved* point of collection that does not create a hazard. *Lots* shall be graded to drain surface water away from foundation walls. The *grade* shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

Exception: See code for exception.

Code Reference:
2009 IRC Section: R404.1.6

R404.1.6 Height above finished grade. Concrete and masonry foundation walls shall extend above the finished *grade* adjacent to the foundation at all points a minimum of 4 inches (102 mm) where masonry veneer is used and a minimum of 6 inches (152 mm) elsewhere.

Table 6
Backfill Requirements

	Product Line and Wall Height				
	Xi Walls	R-5 Walls			
Soil Type	All Heights	4'-0" / 4'-8"	8'-2"	9'	10'
GW, GP, SW, SP	OK	OK	OK	OK	OK
GM, SM, GC, ML	OK	OK	OK	OK	OK
SC, CL	OK	OK	OK	OK	Fill with clean crushed stone
All Others	Consult an Engineer				

Code Reference:
2009 IRC Section: R404.1.7

R404.1.7 Backfill placement. Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by backfill.

Exception: Such bracing is not required for walls supporting less than 4 feet (1219 mm) of unbalanced backfill.

Superior Walls does not permit the utilization of this exception.

Point Loading

It is important to identify any concentrated load that will rest directly on the sill plate or bond beam.

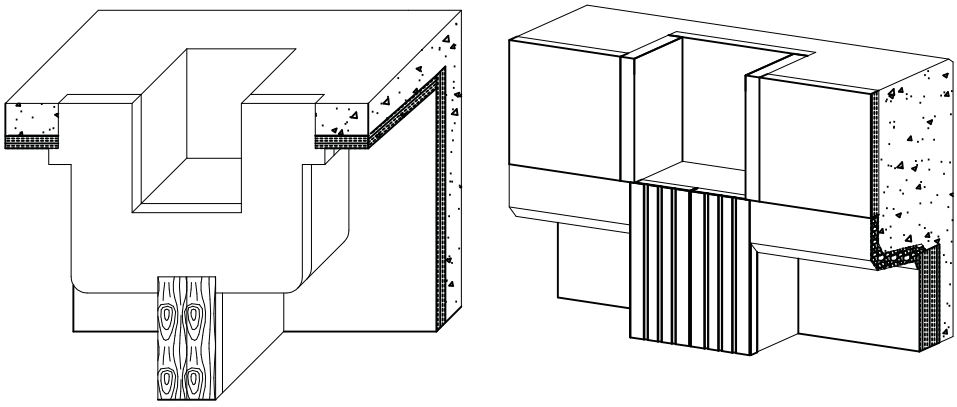
- The maximum uniform load capacity on top of the Superior Walls panels is 5500 pounds per linear foot (PLF).
- When ordering, identify concentrated loads so that the factory can evaluate the load to provide the proper structural members to support it.
- Concentrated loads that must be considered include:
    a) a load that exceeds the project's uniformly distributed load on the wall
    b) any isolated load such as a column load.

Beam Pockets

Beam pockets are designed to support beams that will be located below floor joists. When ordering, **always specify the location, size (width and height), and design loading**.

Code Reference:
2009 IRC Section: R606.14

R606.14 Beam supports. Beams, girders or other concentrated loads supported by a wall or column shall have a bearing of at least 3 inches (76 mm) in length measured parallel to the beam upon *solid masonry* not less than 4 inches (102 mm) in thickness, or upon a metal bearing plate of adequate design and dimensions to distribute the load safely, or upon a continuous reinforced masonry member projecting not less than 4 inches (102 mm) from the face of the wall.



R-5 Beam Pocket Xi Beam Pocket

Figure 32

Precast Column Pads

- The following Precast Column Pad tables only apply to pads that conform to the Superior Walls pre-engineered specifications. For locally designed footing elements, follow the directions of the design professional involved.
- Precast column pads may be ordered for the support of columns designed for the loads indicated on the following charts.
- Crushed stone must be consolidated in 8” lifts with a plate vibrator.**
- “Depth of Stone” assumes 1/2” clean crushed stone, beneath pad, on virgin soil. Consider soil bearing capacity and stone depth requirements when selecting.
- Capacity values assume that the load is centered on the pad and that the column base is a minimum of 6” square.
- Interpolation for other soil bearing values is permitted.
- Capacity was analyzed in accordance with ACI 318-05.*

Table 7
2’ x 2’ x 4-1/2” Precast Column Pad

Depth of Stone	Excavation Width (Minimum)	Allowable Load (lbs.) (Based on soil bearing capacity)			
		1500 psf soil	2000 psf soil	3000 psf soil	4000 psf soil
0”	2’-0”	6,000	8,000	12,000	15,400*
2”	2’-3"	7,210	9,614	14,421	15,400*
4”	2’-5"	8,532	11,375	15,400*	15,400*
6”	2’-7"	9,964	13,285	15,400*	15,400*
8”	2’-10"	11,508	15,344	15,400*	15,400*
10” **	3’-0"	13,162	15,400*	15,400*	15,400*
12” **	3’-2"	14,928	15,400*	15,400*	15,400*
14” **	3’-5"	15,400*	15,400*	15,400*	15,400*

* Denotes pad limit
** Crushed stone must be consolidated in 8” lifts with a plate vibrator.

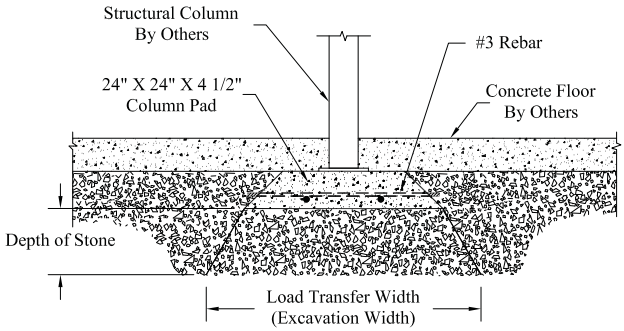


Figure 33

Table 8
3’ x 3’ x 6” Precast Column Pad

Depth of Stone	Excavation Width (Minimum)	Allowable Load (lbs.) (Based on soil bearing capacity)			
		1500 psf soil	2000 psf soil	3000 psf soil	4000 psf soil
0”	3’-0”	13,500	18,000	27,000	28,000*
2”	3’-3"	15,288	20,383	28,000*	28,000*
4”	3’-5"	17,186	22,915	28,000*	28,000*
6”	3’-7"	19,196	25,595	28,000*	28,000*
8”	3’-10"	21,317	28,000*	28,000*	28,000*
10” **	4’-0"	23,549	28,000*	28,000*	28,000*
12” **	4’-2"	25,892	28,000*	28,000*	28,000*
14” **	4’-5"	28,000*	28,000*	28,000*	28,000*

* Denotes pad limit
** Crushed stone must be consolidated in 8” lifts with a plate vibrator.

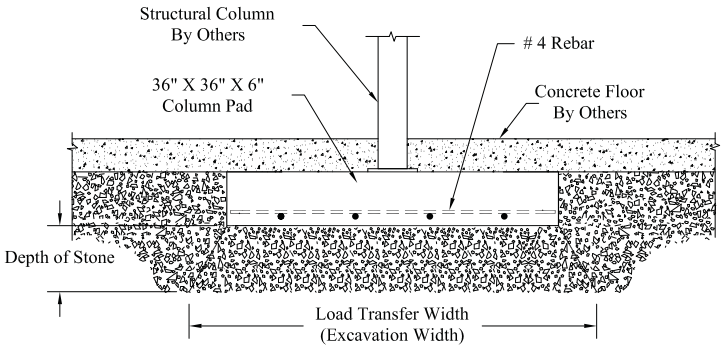


Figure 34

Table 9
4’ x 4’ x 8” Precast Column Pad

Depth of Stone	Excavation Width (Minimum)	Allowable Load (lbs.) (Based on soil bearing capacity)			
		1500 psf soil	2000 psf soil	3000 psf soil	4000 psf soil
0”	4’-0”	24,000	32,000	41,366*	41,366*
2”	4’-3"	26,365	35,153	41,366*	41,366*
4”	4’-5"	28,841	38,455	41,366*	41,366*
6”	4’-7"	31,428	41,366*	41,366*	41,366*
8”	4’-10"	34,126	41,366*	41,366*	41,366*
10” **	5’-0"	36,936	41,366*	41,366*	41,366*
12” **	5’-2"	39,856	41,366*	41,366*	41,366*
14” **	5’-5"	41,366*	41,366*	41,366*	41,366*

* Denotes pad limit
** Crushed stone must be consolidated in 8” lifts with a plate vibrator.

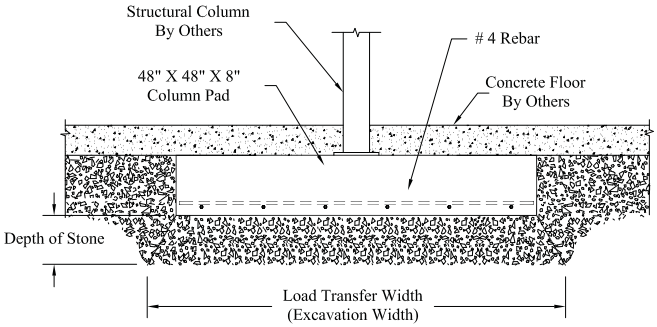


Figure 35

Table 10
28” Diameter x 4-1/2” Precast Column Pad

Depth of Stone	Excavation Width (Minimum)	Allowable Load (lbs.) (Based on soil bearing capacity)			
		1500 psf soil	2000 psf soil	3000 psf soil	4000 psf soil
0”	2’-4”	6,414	8,552	12,828	17,104
2”	2’-7”	7,516	10,021	15,032	20,042
4”	2’-9”	8,705	11,606	17,409	23,213
6”	2’-11"	9,981	13,308	19,962	26,616
8”	3’-2"	11,344	15,126	22,689	28,000*
10” **	3’-4"	12,795	17,060	25,590	28,000*
12” **	3’-6"	14,333	19,111	28,000*	28,000*
14” **	3’-9"	15,958	21,278	28,000*	28,000*

* Denotes pad limit
** Crushed stone must be consolidated in 8” lifts with a plate vibrator.

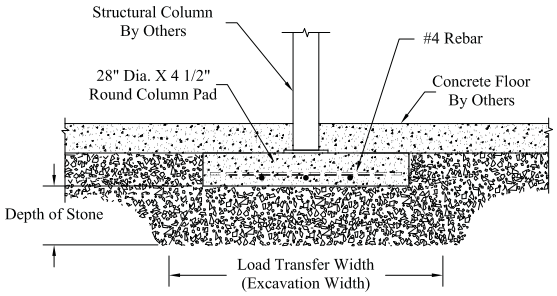


Figure 36

Support Ledges

- You may specify either a 4” or 5-1/2” projection for ledges to support:
  - Brick or stone veneers
  - Adjoining walls
  - Garage, porch or patio floor pours

  These ledges may be either continuous or intermittent. You must specify their vertical and horizontal location.
- Wall ties are needed when the ledge is intended to support masonry veneers and is 16” or more below the top of the Superior Walls panel.
- 4” and 5-1/2” support ledges are rated for 2,900 pounds per linear foot.
- See building code reference for flashing requirements.

Code Reference:
2009 IRC Section: R703.7

R703.7 Stone and masonry veneer, general. See code for requirements.

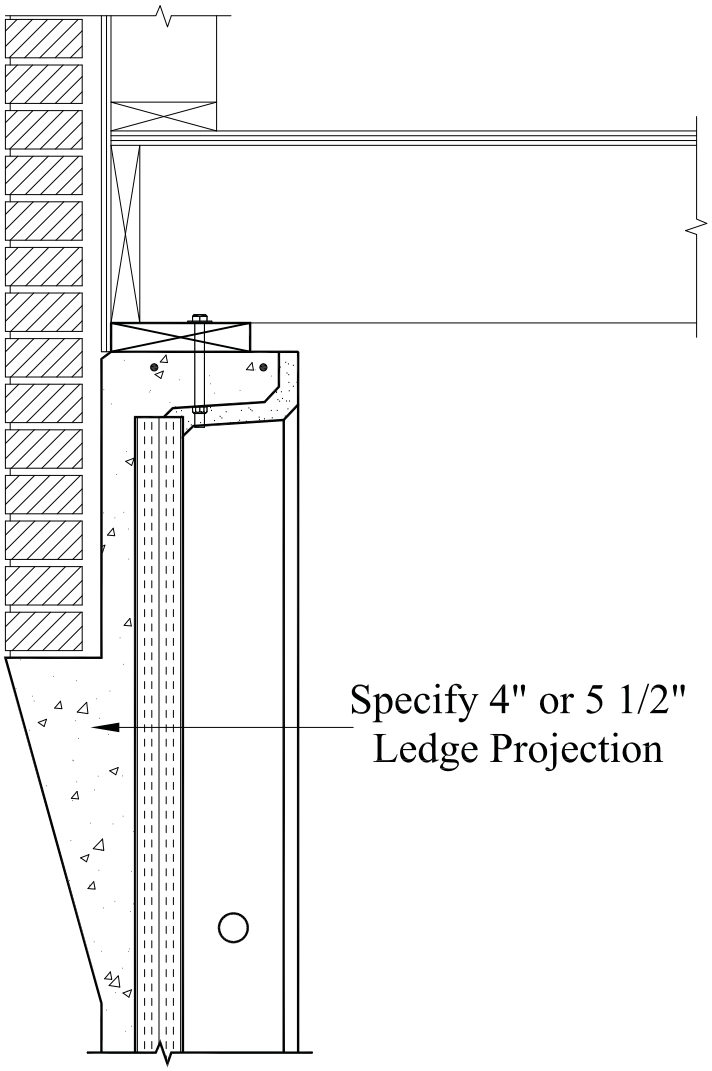


Figure 37

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Additional copies of this Homeowner Guide are available for download at www.superiorwalls.com.

Controlling Humidity and Condensation

Modern construction methods have resulted in tighter, more energy-efficient homes that require planning for the control of humidity and condensation. Because a Superior Walls wall panel is constructed with a high-performance concrete mix and lined with closed-cell foam insulation, it prevents the free flow of moisture through the wall panel. Though this is a good thing when seeking to keep ground water out of your basement; it also acts to keep moisture vapor inside the house.

In certain conditions of high interior humidity and low exterior temperatures, it is possible that condensation may form on the interior surface of the Superior Walls panel. Condensation can occur anytime moist air contacts a surface that has a temperature less than the dew-point of the air.

Condensation may be controlled in a number of ways:

1. By reducing the amount of moisture in the air:
    a. Limit moisture-producing sources or activities like non-vented clothes dryers or hot-tubs.
    b. Use a dehumidifier.
2. By preventing the moisture from reaching the cold wall surface:
    a. Remove the moist air with an exhaust fan or other ventilation.
3. By increasing the temperature of the room:
    a. Add heat and the air will hold more moisture.
    b. Increase the room temperature and you will also increase the temperature of the wall surface.

It is usually most effective to use more than one of these methods in order to effectively control condensation.

"Original Equipment" Foam Insulation

All Superior Walls products are tested to the UL1715 fire test standard and comply with the requirements of the 2009 International Residential Code - Section R316 (Foam Plastic). No additional thermal barrier is required UNLESS additional foam insulation has been added after the panel was manufactured. Superior walls are delivered to your job site with either 1" or 2½" foam insulation installed as a part of the system. This gives the walls an R-5 or R-12.5 rating respectively.

Exterior Helpful Hints

- **Grade** – Slope the ground away from the home a minimum of 6 inches within the first 10 feet from the wall (additional slope may be required by your local building code). Re-grade if soil settles over time.
- **Gutters and Downspouts** - Keep gutters and downspouts free of leaves and debris. Splash blocks or down spout extensions should be used to divert water away from the foundation.

Interior Finishing of Superior Walls Panels

- **Corner Studs and Blocking** – Always use preservative-treated lumber for corner studs and nailers placed against the concrete. For areas where there will be objects fastened to the finished walls between existing studs, install appropriate wood blocking. (i.e. For curtain rods, cabinets, doorstops, or electrical and plumbing fixture locations.)
- **Wiring and Plumbing** – Using the pre-cast holes in the studs, install all electrical wiring and small plumbing lines according to local codes. Holes may be drilled through the top bond beam for wiring and plumbing drops.
- **Drywall and Interior Finishes** – After the corner studs and all blocking are in place, the Superior Walls panels are ready for drywall. Regular ½" drywall is recommended to span the stud spacing. It is best to leave a ½" gap between the concrete floor and the bottom of the drywall to prevent moisture absorption into the drywall. This moisture can cause drywall deterioration and paint finish problems. Attach the drywall using 1" drywall screws (fine thread /

sharp point). A solid bead of construction adhesive should be applied to the top bond beam and the face of the stud. The use of paneling or other similar products should still be backed with a layer of drywall.

- **Exterior Holes in Superior Wall Panels** – Any exterior holes that may be required for such things as sanitary soil lines, electrical service entrance cables, or chimney flues, should be made following these simple procedures:
  1. Mark-out the location and size of the hole required.
  2. Use a masonry hole saw or a hammer drill with a small bit (to drill a series of holes around the perimeter of the hole). With a hammer and chisel start to work the area inside the small holes until the hole is the required size and shape.
  3. After the pipe is installed, completely seal the entire area around it with a flexible sealant to prevent water penetration. A one part urethane or polyurethane sealant, available from your local hardware store, is recommended. (Do not use Acytoxy-cure silicones.)

Adding Insulation to a Superior Walls Panel

There are two insulation methods that will consistently yield satisfactory results and prohibit condensation from forming within the wall cavity:

- Spray-on 2-part polyurethane foam. This is a closed cell material and completely closes off the cavity from moisture penetration. It can be obtained both professionally and as a DIY kit. Several DIY kits are available on the internet. Foam can be sprayed to the required thickness to achieved the desired R-value.

- Add extruded/expanded polystyrene foam board between the studs, and seal between the foam board and studs with a ("great stuff-type") canned polyurethane. The polystyrene foam board is closed cell; moisture cannot pass through, and when used in conjunction with the canned foam, completely closes off the cavity from moisture penetration. Foam board is readily available for the DIY market, as is the canned polyurethane foam.

Generally speaking, after adding any type of exposed foam insulation to the interior of a wall assembly, the building code requires that you cover the insulation with a thermal barrier to protect the insulation from fire - see your local building code for details.

When adding other types of insulation to a Superior Walls wall panel, it is important to consider two factors to ensure that water vapor does not condense within the wall cavity:

1. Controlling the moisture content of the air trapped in the cavity while adding the insulation. (Use of a dehumidifier is recommended.)
2. Restricting moisture-laden air from entering the cavity from the living space or from the earth beneath the wall. (This may be accomplished through the use of paints, sealants, and spray foams. Daylight drains require a trap on the drain line to prevent a back-flow of moist air.)

The essential issue is that you must stop moisture from entering the stud cavity.

- Fiberglass batt, cellulose, Icynene®, or other materials may perform satisfactorily if the considerations noted above are properly dealt with.

NOTE: This information is general in nature and may not be applicable in every situation. Your design professional (i.e. builder, architect, engineer, or supplier) can assist you in special conditions. When in doubt, please ask for guidance concerning your particular application.

Still have questions? Contact your Superior Walls representative for answers to your questions. Find your local representative at www.superiorwalls.com using the Rep Locator link.

BUILDER'S CHECKLIST

Rev: 06/01/10

For use by builders and general contractors to ensure proper foundation design, construction, installation, and performance. All page references made below use the Superior Walls of America Builder Guideline Booklet (Revised June 2010) and the 2009 International Residential Code. Additional copies of this checklist are available for download at www.superiorwalls.com.

1. Provide your local Superior Walls representative with:
   - ☐ Floor plans and elevations
   - ☐ Design load (total pounds) per linear foot on the foundation
   - ☐ Beam and column locations, sizes and point loads
   - ☐ Additional point loads and locations
   - ☐ Window and door locations, rough opening sizes
   - ☐ Egress considerations
   - ☐ Exterior finishes requiring support ledges
   - ☐ Interior stairway locations, opening sizes (affects panel lengths)
   - ☐ Inside fill conditions
   - ☐ Exterior basement entry system specifications
   - ☐ Chimney details

2. Prepare Site:
   - ☐ Building Permits and Inspections
   - ☐ Soils Verification
   - ☐ Excavation
   - ☐ Placement of Drain Pipe and Sump Pit
   - ☐ Installation of Filter Membrane
   - ☐ Cold Weather Practice
   - ☐ Placement of Crushed Stone Footing
   - ☐ Locate Building Corner Pins and Establish Grade
   - ☐ Site Accessibility: Truck and Crane Access, Trailer Unload Area, Crane Pad(s)
   - ☐ Installation of Sill Plate and Framing Attachments
   - ☐ Backfill After Concrete Floor has been Poured and Framing / Decking Connection is complete

3. Provide checklist from Builder Guideline Booklet for:
   - ☐ Excavation
   - ☐ Concrete floor
   - ☐ Framing
   - ☐ Inspection

4. Provide approved drawings (Date: _____ Revision: _____) for:
   - ☐ Excavation
   - ☐ Concrete
   - ☐ Framing

5. Soil characteristics (Pg. 5)
   - ☐ Determine type _____ and allowable Load-Bearing Pressure _____(Table 1 on Pg. 5)
   - ☐ Determine combined footing load per linear foot _____

6. Crushed stone footing (Pg. 6)
   - ☐ Determine stone depth (Table #2 on Pg. 6) _____
   - ☐ Communicate stone depth to excavator

7. Excavation (Pg. 7)
   - ☐ Provide elevations
   - ☐ Set corner pins
   - ☐ Communicate to excavator: site accessibility needs (trucks and crane)

8. Drain system and daylight drain or sump (Pg. 6, 7 & 8)
   - ☐ Communicate to excavator: placement of perforated drain pipe in reference to corner pin location (Figure 2 on Pg. 6, Foundation Drainage on Pg. 8)
   - ☐ Communicate to excavator: location of daylight drain and trap (Pg. 8) or location of sump accumulation tank(s)
   - ☐ Install filter membrane

9. Shear walls (Pg. 35)
   - ☐ Verify need for shear walls
   - ☐ If required, verify that shear walls are attached to floor, outside wall and joist(s) above
   - ☐ Choose shear wall construction: ___ Superior Wall panel or ___ Other construction
   - ☐ If Other construction, communicate construction to framers

10. Concrete floor (Pg. 18)

    NOTE: To comply with building code and Superior Walls of America, Ltd. requirements, the framing / decking connection at the top of the Superior Walls panel and the floor slab at the bottom of the Superior Walls panel MUST be completed prior to backfilling!
    - ☐ Communicate need to embed Superior Walls Slab Connector (if included) into concrete floor pour
    - ☐ Communicate thickness (3 ½"), sub base (4"), concrete psi, vapor retarder under floor (as required per code), and floor reinforcement if required

11. Crawl space (Pg. 20 & 21): **Choose** one of the following:
    - ☐ Treated wooden bracing at 48" O.C., or
    - ☐ 12" minimum inside fill, or
    - ☐ 2" minimum poured concrete floor

12. Framing / Modular connection (Pg. 24 to 33)

    NOTE: To comply with building code requirements, the framing / decking connection at the top of the Superior Walls panel and the floor slab at the bottom of the Superior Walls panel MUST be completed prior to backfilling!
    - ☐ Determine fastening schedule (Table #3 on Pg 27) (_____" OC)
    - ☐ Communicate fastening schedule to framers
    - ☐ Bolted not more than 12" from the ends of each sill plate section (R403.1.6)
    - ☐ Framing strap (if used) lies between band joist and sill plate (Figure #27 on Pg. 33), is fastened with 1-½" nails provided, 1 nail per hole, Verify strap spacing (Table #4 on Pg. 33)

13. Electrical / Plumbing
    - ☐ Communicate proper method to drill / cut holes through Superior Walls panels.

Exterior Holes in Superior Wall Panels – Any exterior holes that may be required for such things as sanitary soil lines, electrical service entrance cables, or chimney flues, should be made following these simple procedures:

1. Mark-out the location and size of the hole required.
2. Use a masonry hole saw or a hammer drill with a small bit (to drill a series of holes around the perimeter of the hole). With a hammer and chisel start to work the area inside the small holes until the hole is the required size and shape.
3. After the pipe is installed, completely seal the entire area around it with a flexible sealant to prevent water penetration. A one part urethane or polyurethane is recommended. (Do not use Acytoxy-cure silicones.)

EXCAVATOR'S CHECKLIST

Rev: 06/01/10

For use by excavators to ensure accuracy of excavation, efficiency in foundation installation, and proper backfilling and grading. All page references made below use the Superior Walls of America Builder Guideline Booklet (Revised June 2010) and the 2009 International Residential Code. Additional copies of this checklist are available for download at www.superiorwalls.com.

1. Builder Guideline Booklet
   - ☐ Obtain your personal copy of the SWA Builder Guideline Booklet

2. Site drawings
   - ☐ Confirm you are working from the approved drawing before you dig
   - ☐ Drawing date:_____ Drawing Rev:_____

3. Building placement
   - ☐ Obtain required benchmark elevations from builder
   - ☐ Excavate per set pins from builder

4. Excavation (Pg. 7)
   - ☐ Trench dug below frost line
   - ☐ Verify with builder either: ____sump pump or _____ daylight drain
   - ☐ If sump pump, number of accumulation tanks _____
   - ☐ Provide minimum 2'-0" over-dig at base of foundation (both sides of wall) (Pg. 7)
   - ☐ Properly bench banks (for excavations more than 5'-0" deep, bench or slope in accordance with OSHA Standard 1926.652)
   - ☐ Provide ramp for access to hole if required
   - ☐ Pile soil a safe distance from hole
   - ☐ Excavate for column pads as required
   - ☐ Prepare access driveway, trailer location pads, and crane pad(s)

5. Crushed stone footing (Pg. 9)
   - ☐ Obtain required stone depth from builder (___inches)
   - ☐ Dig footing per required stone depth (Table #2 on Pg. 6)
   - ☐ Use 4 inch perforated pipe (Figure 2 on Pg. 6) and locate pipe (Foundation Drainage on Pg. 8)
   - ☐ Place drain pipe (Figure 2 on Pg. 6 and Foundation Drainage on Pg. 8)
   - ☐ Clean crushed stone (1/2" Max; Pg. 9)
   - ☐ Consolidate stone in a maximum of 8" lifts with plate vibrator
   - ☐ Direct drain pipe to accumulation tank(s) or daylight (Foundation Drainage on Pg. 8)
   - ☐ Evenly grade the stone to within +/- 1 inch of level
   - ☐ Leave enough stone behind for use in final grading by the wall installation crew
   - ☐ Install filter membrane on top of stone footing prior to backfill (R405.1.1)

6. Concrete floor (Pg. 18)
   - ☐ Clean 4" base provided (R506.2.2)

7. Backfilling (Pg. 39)
   - ☐ Get approval to backfill from builder

   NOTE: To comply with building code requirements, the framing / decking connection at the top of the Superior Walls panel and the floor slab at the bottom of the Superior Walls panel MUST be completed prior to backfilling!

8. Final grading (Pg. 39)
   - ☐ Slope the final soil grade a minimum of 6” fall within the first 10’-0” to divert ground water away from foundation (Pg. 37 and R401.3)
   - ☐ Finished soil grade must be at least 6” below top of the Superior Walls panel (Pg. 39)

CONCRETE WORK CHECKLIST

Rev: 06/01/10

For use by concrete flatwork contractor in pouring the basement floor. All page references made below use the Superior Walls of America Builder Guideline Booklet (Revised June 2010) and the 2009 International Residential Code. Additional copies of this checklist are available for download at www.superiorwalls.com.

1. Builder Guideline Booklet
   - ☐ Obtain your personal copy of the SWA Builder Guideline Booklet

2. Building drawings
   - ☐ Confirm you are working from the approved drawing
   - ☐ Drawing date:_____ Drawing Rev:_____

3. Crawl space (Pg. 20 & 21): Confirm, with builder, one of the following:
   - ☐ Treated wooden bracing at 48" OC, or
   - ☐ 12" minimum inside fill, or
   - ☐ 2" minimum poured concrete floor thickness

4. Concrete floor (Pg. 18)
   - ☐ Clean 4" base (R506.2.2)
   - ☐ Install vapor retarder under floor pour as required by local code (R506.2.3)
   - ☐ 3-½" minimum concrete floor thickness (R506.1)
   - ☐ Fasten lath at the desired height of the concrete floor to form a screed board
   - ☐ Bend slab connectors (if present) down before pouring concrete floor
   - ☐ Provide 2" minimum concrete contact between base of wall and concrete floor

5. Raised concrete floor (at a level higher than the typical elevation) (Pg. 19)
   - ☐ Clean 4" base (R506.2.2)
   - ☐ Install vapor retarder under floor pour as required by local code (R506.2.3)
   - ☐ 3-½" thick minimum floor thickness (R506.1)
   - ☐ Fasten lath at the desired height of the concrete floor to form a screed board
   - ☐ Cut and remove foam insulation at the desired floor surface
   - ☐ Cut and remove the interior stud facing at the desired floor surface

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FRAMER'S CHECKLIST

Rev: 06/01/10

For use by framing contractors to ensure proper framing connection to top of Superior Walls panels. All page references made below use the Superior Walls of America Builder Guideline Booklet (Revised June 2010) and the 2009 International Residential Code. Additional copies of this checklist are available for download at www.superiorwalls.com.

1. Builder Guideline Booklet
   - ☐ Obtain your personal copy of the SWA Builder Guideline Booklet

2. Building drawings
   - ☐ Confirm you are working from the approved drawing
   - ☐ Drawing date:_____ Drawing Rev:_____

3. Crawl space (Pg. 20 & 21): Confirm, with builder, one of the following:
   - ☐ Treated wooden bracing at 48" OC, or
   - ☐ 12" minimum inside fill, or
   - ☐ 2" minimum poured concrete floor thickness

4. Sill plate framing connection (Pg. 24 to 27)
   - ☐ Obtain sill plate bolting frequency from builder (Table #3 on page 27) (__24" OC or ___ 48" OC)
   - ☐ Use ½" x 5-½" (minimum length) bolts with washers in top bond beam
   - ☐ Fasten above window & door headers (Pg. 24)
   - ☐ Use a minimum of 2 bolts per sill plate section and
   - ☐ Bolted not more than 12" from the ends of each sill plate section (R403.1.6)
   - ☐ Sill plate splices are at least 48" from any foundation panel joint

5. Perpendicular floor joist connection (Pg. 24)
   - ☐ Each joist nailed to sill plate with two 16d nails (or three 8d nails per code)

6. Parallel floor joist connection (Pg. 24)
   - ☐ 2 x 6 end-wall braces and joist blocking located every 48" and within 12" from the interior of each corner (Figures 19 & 20 on Pg. 27 & 28)
   - ☐ Nail same 2 x 6 end-wall brace to sill plate with five 10d nails
   - ☐ Obtain number of solid blocks required from builder _____
   - ☐ 1 solid block used if backfill is 0' to 7'-6"
   - ☐ 2 solid blocks used if backfill is between 7'-6" and 9'-6" for joists less than 10" in height
   - ☐ 3 solid blocks used if backfill is between 7'-6" and 9'-6" for joists that are greater than or equal to 10" in height (See fastening details on Pg. 27 to 33)
   - ☐ Blocking requires six 10d nails through floor (conventional construction) or construction adhesive on top of blocking (modular construction) (Pg. 33)

7. Modular connection (Pg. 33)
   - ☐ Obtain required spacing (32" or 48" OC) for framing straps from builder (Table #4 on Pg. 33)
   - ☐ Install framing straps between band joist and sill plate (Figure #27 on Pg. 33)
   - ☐ Nail framing strap with 1 ½" nails provided with straps
   - ☐ 1 nail in every nail hole

8. Wooden Shear wall (Pg. 35)
   - ☐ Determine from builder if a wooden shear wall is required (___ Yes ____ No)
   - ☐ Shear wall attached to concrete floor, wall and floor joist(s) above (per design professional specifications)

9. Stairwell header (Pg. 36 to 38).
   - ☐ Is the long side of the stairway opening within 8' of the parallel Superior Walls panel?
   - ☐ If "YES":
     - ▫ Support beam (2 x 10 sill plate and two 2 x 8's) 2'–0" past each end of the opening without splices
     - ▫ Use ½" bolts in every precast hole through the bond beam
     - ▫ Openings larger than 9'-6" must be reviewed by an engineer

10. Roof truss connections (Pg. 34)
    - ☐ Obtain sill plate bolting frequency from builder per table #4 on page 28 (__24" OC or ___ 48" OC)
    - ☐ Verify with builder what structural cross bracing (for wind loads or backfill) is required for the trusses (per manufacturer's specs)
    - ☐ Verify with builder if uplift clips are required for the trusses

File # _____ Job Name _____
Builder _____ Directions _____
Address _____
_____

Superior Walls®

CODE INSPECTOR'S CHECKLIST

Rev: 06/01/10

For use by building code inspectors to simplify and expedite the inspection process with Superior Walls foundations. All page references made below use the Superior Walls of America Builder Guideline Booklet (Revised June 2010) and the 2009 International Residential Code. Additional copies of this checklist are available for download at www.superiorwalls.com.

1. Verify soil characteristics (Pg. 5)
   - ☐ Minimum 1,500 PSF capacity (Table R401.4.1)

2. Verify crushed stone footing (Pg. 6, 8, & 9)
   - ☐ Stone depth (Table #2 on Pg.6)
   - ☐ Clean crushed stone (1/2" Max)
   - ☐ Filter membrane by others prior to backfill (R405.1.1)

3. Verify excavation (Pg. 7)
   - ☐ Trenches / excavation dug below frost line

4. Verify drain system / sump pump (Pg. 6, 7 & 8)
   - ☐ Drainage pipe installed (Figure 2 on Pg. 6 & Foundation Drainage on Pg. 8)
   - ☐ Accumulation tank for sump if not draining to daylight

5. Verify concrete floor (Pg. 18)
   - ☐ 4" base provided (R506.2.2)
   - ☐ 3-1/2" thick minimum floor thickness (R506.1)
   - ☐ Vapor retarder provided under floor as required (R506.2.3)
   - ☐ 2" minimum concrete contact between base of wall and concrete floor
   - ☐ Slab connectors (if present) bent into concrete floor pour

6. Verify crawl space construction if present (Pg. 20 & 21) and the presence of one of the following:
   - ☐ Treated wooden bracing at 48" OC, or
   - ☐ 12" minimum inside fill, or
   - ☐ 2" minimum poured concrete floor thickness

7. Verify sill plate framing connection (Pg. 24)
   - ☐ Bolted using minimum 1/2" x 5-1/2" bolts with washers in top bond beam
   - ☐ Bolted using 1/2" x 3" bolts above window / door headers
   - ☐ Attached per (Table #3 on page 27) and
   - ☐ Minimum of 2 bolts per plate section and
   - ☐ Sill plate splices must be at least 4'-0" away from any foundation joint, and
   - ☐ Bolted not more than 12", nor less than 7 bolt diameters, of the end of all plate sections (R403.1.6)

8. Verify perpendicular floor joist connections (Pg. 24)
   - ☐ Each joist nailed to sill plate with two 16d nails (or three 8d nails per code) (R602.3(1))

9. Verify parallel floor joist connections (Pg. 24)
   - ☐ 2 x 6 end-wall braces located within 12” from the interior of each corner (Figures 19 & 20 on Pg. 27 & 28)
   - ☐ Same 2 x 6 end-wall braces nailed to sill plate with five 10d nails
   - ☐ 1 solid block used if backfill is 0’ to 7’-6” (nailed in-line with the 2 x 6 end-wall brace)
   - ☐ 2 solid blocks used if backfill is between 7’-6” and 9’-6” for joists less than 10” in height
   - ☐ 3 solid blocks used if backfill is between 7’-6” and 9’-6” for joists that are greater than or equal to 10” in height (See fastening details on Pg. 27 to 33)
   - ☐ Blocking requires six 10d nails through floor (conventional construction) or construction adhesive on top of blocking (modular construction)

10. Verify modular connection (Pg. 33)
   - ☐ Framing strap lies between band joist and sill plate (Figure #27 on Pg. 33)
   - ☐ Framing strap is fastened with 1-1/2” nails provided with straps
   - ☐ Verify 1 nail per hole
   - ☐ Verify strap spacing (Table #4 on Pg. 33)

11. Verify shear walls (Pg. 35)
   - ☐ If present, verify that shear wall is attached to floor, outside wall and joist(s) above
   - ☐ Shear wall must be either a Superior Walls panel or other approved construction

12. Verify stairwell header (Pg. 36). Is the long side of the stairway opening within 8’ of the parallel Superior Wall? If “YES”:
   - ☐ Support beam (2 x 10 sill plate and two 2 x 8’s) 2’-0” past each end of the opening without splices
   - ☐ Use 1/2” bolts in every precast hole through the bond beam
   - ☐ Openings larger than 9’-6” must be reviewed by an engineer or be an alternative Superior Walls Stairwell Header Reinforcement design.

13. Verify backfilling (Pg. 39)
   - ☐ Before backfilling, basement floor must be poured and first floor framing / decking properly attached (R404.1.7)
   - ☐ Height of finished soil grade must be at least 6” below top of Superior Walls Panel (R404.1.6)

14. Verify inside fill conditions (Pg. 22)
   - ☐ Must not exceed 36” more inside fill than outside fill

15. Verify final grade
   - ☐ Slope the final soil grade a minimum of 6” fall within the first 10’-0” to divert ground water away from foundation (R401.3)
   - ☐ Height above finished soil grade must be at least 6” (R404.1.6)

Suggestion for Improvement

Rev: 06/01/10

So that we may continually improve upon the quality of the materials we offer, please take a few moments to complete this Suggestion for Improvement form.

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Name: _____
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Please fax or mail this completed form to:
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Attn: Builder Guideline Booklet Committee
937 East Earl Road
New Holland, PA 17557
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NOTES

Superior Walls®

Green Approved Product

For

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This is to signify that the following products for residential construction

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Manufactured by

Licensees of Superior Walls of America, Ltd.

Have been approved for points toward National Green Building Certification
to the ICC 700-2008 National Green Building Standard as shown on page 2 of this certificate.
The NAHB Research Center hereby authorizes accredited verifiers to award
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Robert L. Hill, Director
Laboratory Sciences and Certification Programs

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Practice #	Practice Description	Potential Points Available	Additional Conditions of Use to Award Points
601.2	Structural systems/advanced framing techniques optimize material usage.	3	To be awarded points, wall system is used for at least 85% of foundation walls or above grade exterior walls.
601.5(1-3)	Precut/preassembled components, panelized, or precast assemblies are utilized for a minimum of 90% of floor, wall, and/or roof system. If points claimed for these systems, points cannot be claimed for Modular or Manufactured home construction.	4	To be awarded points, this product must be utilized for 90% or more of the wall system.
607.1	Products containing fewer materials are used to achieve the same end-use requirements as conventional products.	3	To be awarded points, wall system is used for at least 85% of foundation walls or above grade exterior walls.
701.4.3.1(1)	Insulation is installed in accordance with the manufacturer's instructions or local code. Mandatory for certification.	Mandatory	Must be installed in accordance with local code(s) and the manufacturer's instructions. Other insulation in the building must also meet this practice.

Signed: Robert L. Hill

Robert L. Hill, Director
Laboratory Sciences and Certification Programs

Issuance Date: September 3, 2009

Expiration Date: September 3, 2010

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