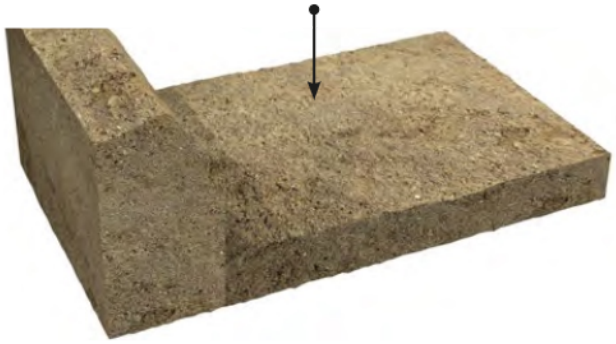
Insulating Concrete Form - Foundation Wall with Ledger

Step 1: Excavate for the foundation to the required depth, exposing undisturbed soil. Protect from standing water and freezing.



Construction Note:

ICF foundation walls for small structures require both top and bottom lateral support where the backfill height exceeds 1.2 m. The top lateral support requirement can be provided either by floor framing supported on top of the wall, or by floor framing supported by a ledger board and joist hangers.

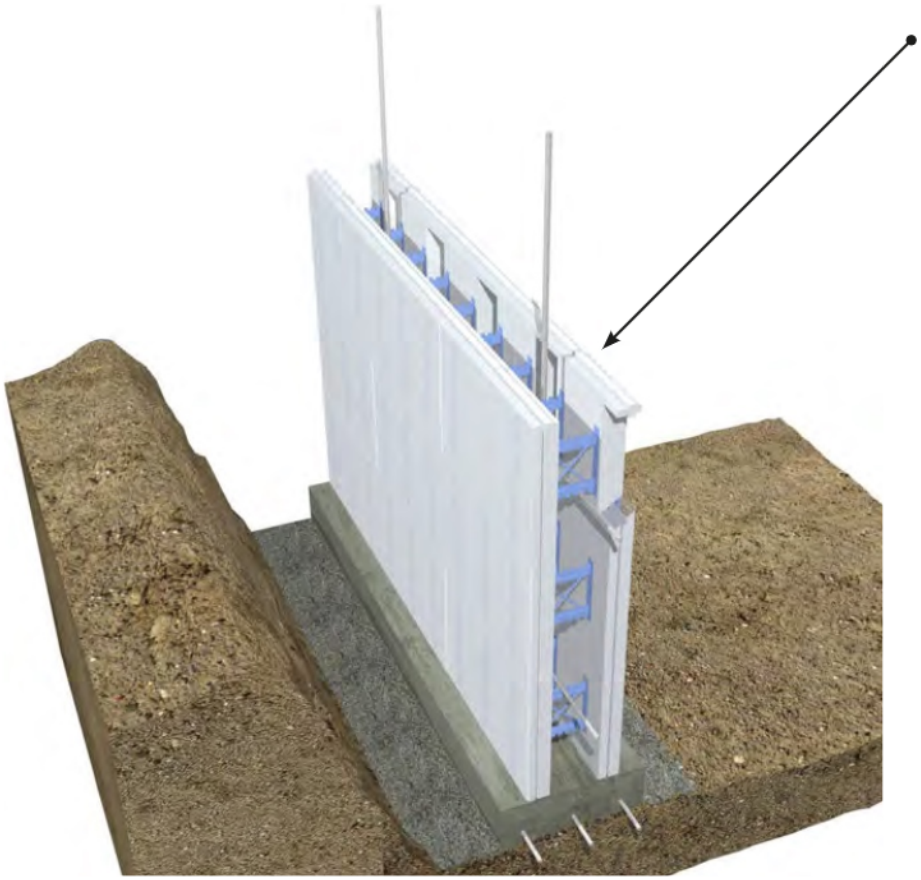
Best Practice Note:

The proper forming and placing of foundations will have a positive impact on the ease of construction and the correct alignment of the structure in the later stages of building. The foundation is also part of the building envelope, forming a mass wall element that will resist ground water penetration, surface water penetration, and rain water penetration from direct impact and run-off water from the upper wall regions. It must be confirmed that the bearing capacity of the soils beneath the foundation are in accordance with the requirements of Part 9 of the code. Additionally, the use of reinforcing steel in the footing of an ICF foundation wall is common (although not required by code) and reduces the likelihood of cracks and localized subsidence under the footing. Good building practice provides for a minimum of 75 mm of concrete cover for any reinforcing steel located in the footing for protection from corrosion. (See also: 7.0 Additional Resources "Housing Foundations and Geotechnical Challenges" in the back of this Guide.)

Step 2: Cast the footing to the required dimension with approved concrete. The ICF foundation wall is required to be formed on a footing with a shear key, or with 15 m vertical steel reinforcing dowels at a minimum 1.2 m o.c. (shown).

Best Practice Note:

Bottom steel in the footing (shown) can improve strength and durability. All reinforcing steel must be applied in accordance with CSA A23.1.



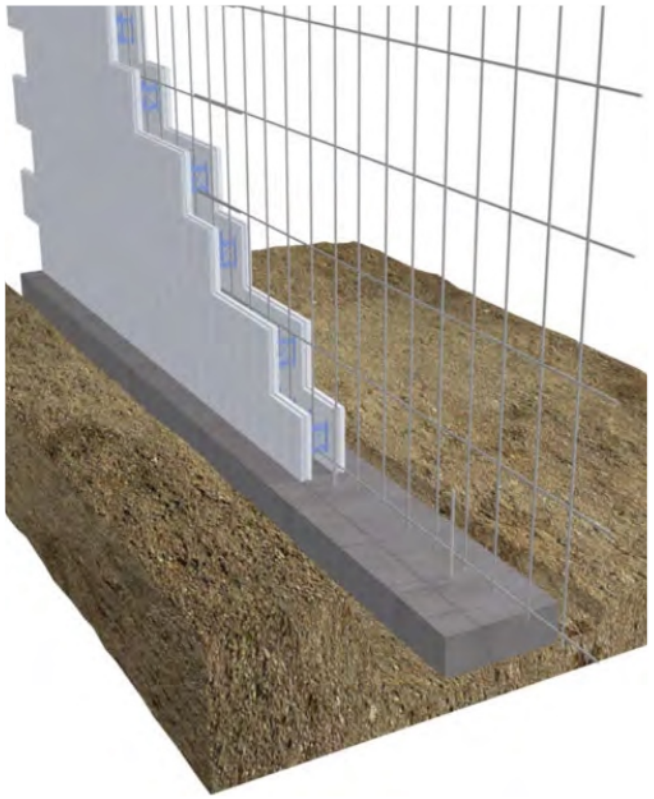
Step 3: Install the ICF system forms onto the footing. Integrate the horizontal steel progressively as the forms are placed and tie any horizontal steel to the form webs as necessary to ensure proper alignment during concrete placing.

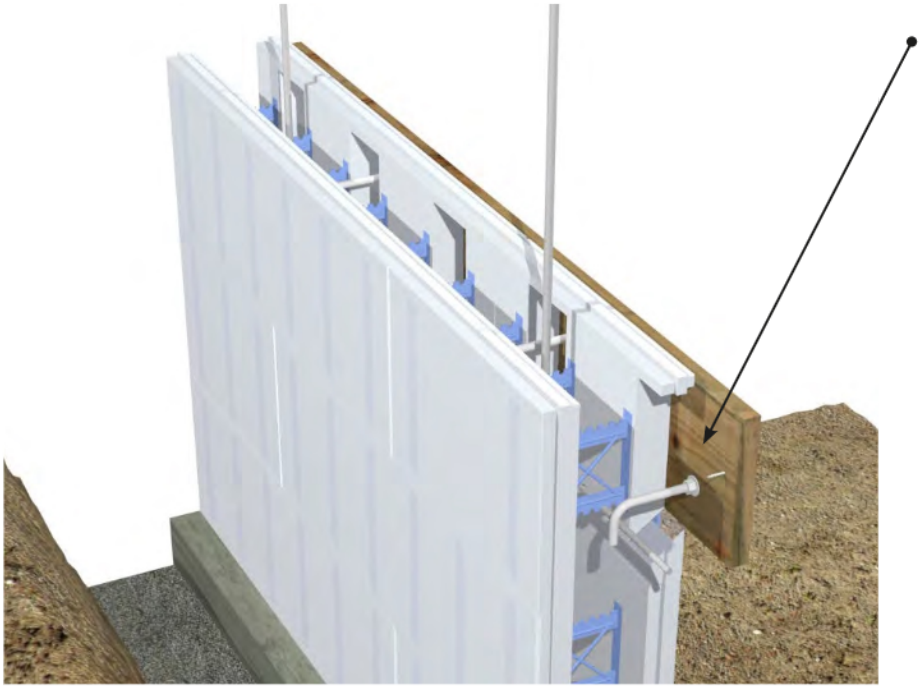
Best Practice Note:

Offsetting the horizontal bar for each successive layer will allow for the vertical bar to be placed in a woven manner from the top of the form wall. This helps to maintain the alignment of the vertical bar during concrete placement.

Construction Note:

The minimum horizontal reinforcing required for an ICF foundation wall is 10 m bars at 600 mm o.c. with one 10 m bar within the top 300 mm of the foundation wall. The requirements for the vertical reinforcing vary according to the width of the concrete and the height of the backfill and can be found in Part 9 of the code. For ICF construction above the ICF foundation wall, lap ends of the vertical reinforcing must extend beyond the finished height of the foundation by at least the minimum overlap requirement of the bar (40 times the diameter of the bar). All reinforcing steel in the foundation must be located on the interior side of the centre line of the concrete and must allow for a minimum of 30mm of concrete cover for protection from corrosion.





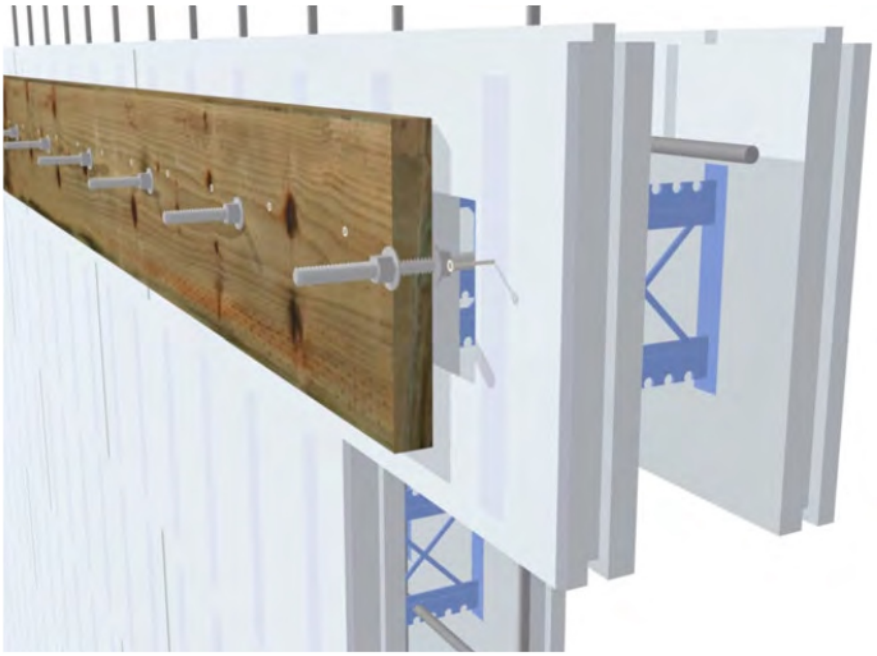
Step 4: The floor structure can be supported by joist hangers attached to a ledger fastened to the interior of the wall as shown as shown in this section. The ledger must be at least 38 mm thick and the depth of the supported floor joists, and must be fastened to the ICF foundation with anchor bolts in accordance with Part 9 of the code. Alternately, the floor structure can be installed onto a plate at the top of the ICF foundation wall as shown in 3.1.06b.

Construction Note:

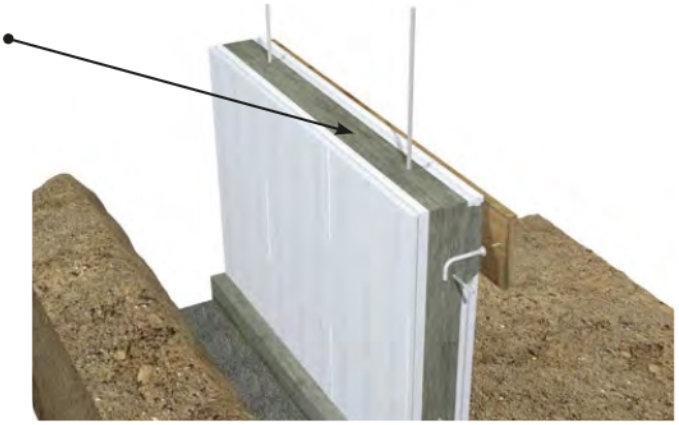
To develop a shear connection of the ledger to the ICF wall, block-outs must be cut through the polystyrene prior to supporting the anchor bolts and placing the concrete. Block-outs should have the bottom cut of the form sloped downward and inward to improve the structural transfer into the concrete. Anchor bolts can either be supported by temporary plates fastened to the ICF fastener flanges, or installed into the ledger which is then fastened to the ICF fastener flanges for support during the placement of the concrete.

Best Practice Note:

It is best practice that these anchor bolts are staggered between the top and bottom 1/3 of ledger width. This helps to prevent overturn in a fire event. For the same reason, it is also recommended that all cut-outs are equal in height to the ledger.



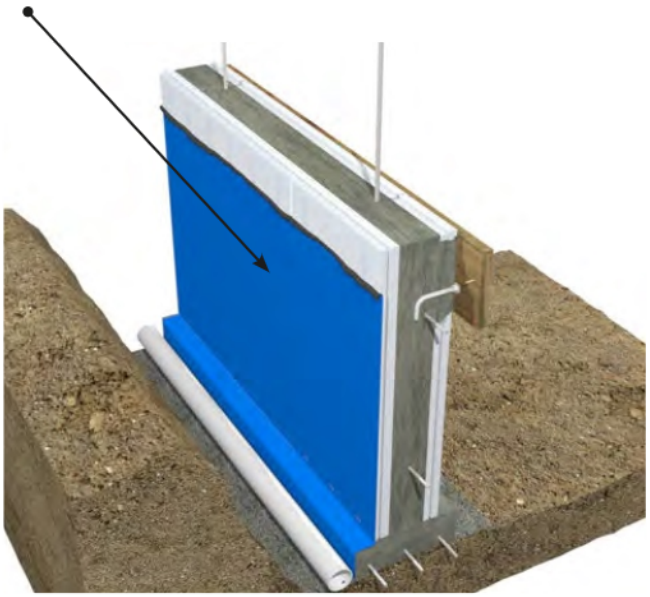
Step 5: Place the concrete with particular attention to proper placement and consolidation. The use of structural shoring provides alignment and support during concrete placement, and can serve as a working platform at the top of the wall. Anchor bolts must be placed into the top of the foundation in accordance with Part 9 of the code for ICF foundations supporting wood-frame construction above.



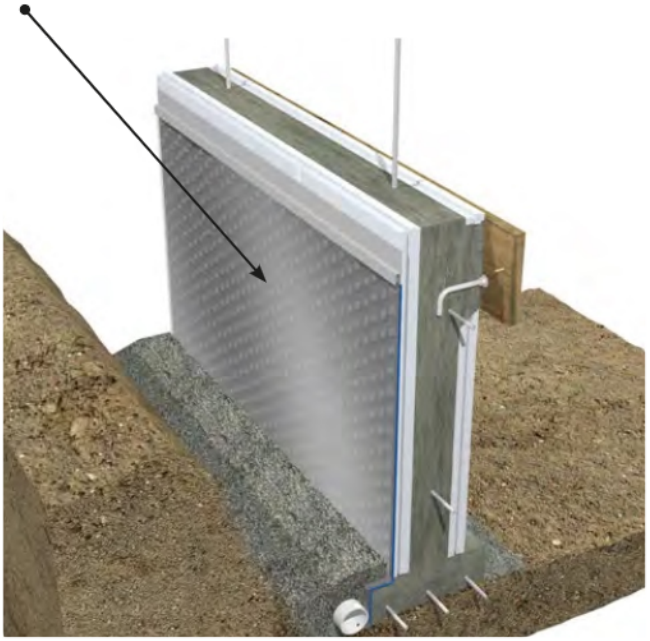
Best Practice Note:

The use of admixtures such as a superplasticizer and air entrainment along with reducing the size of the aggregate, helps to improve the consolidation of the concrete. It is typical to use a pencil vibrator to improve insertion rate and depth, facilitating good concrete consolidation. Concrete suppliers and placing contractors familiar with ICF construction can greatly assist in ensuring the highest quality finished concrete structure.

Step 6: Apply dampproofing or, where there is a likelihood of hydrostatic pressure, waterproofing to the exterior of the ICF foundation wall. Dampproofing and waterproofing materials must be compatible with the form material.



Step 7: If coarse, clean granular material, or a drainage mat are applied adjacent to the foundation wall, it must extend to the footing drain level to facilitate drainage to the footing drain.



Step 8: Install compatible self-adhering membrane from base of footing to four inches above top of slab.

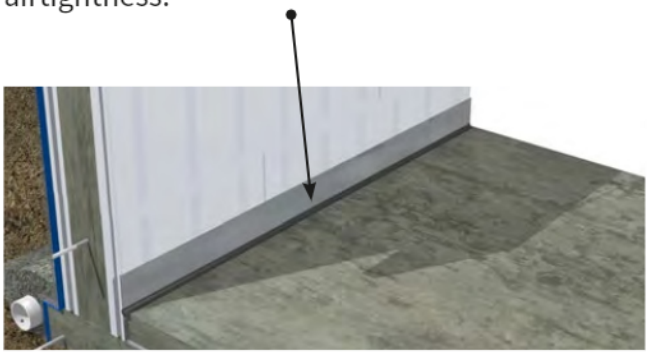
Step 9: Place not less than 100 mm of coarse clean granular material under the slab-on-grade. This layer provides a capillary break for ground water and controls liquid water being drawn up to the slab above and resultant moisture damage to floor finishes. This is required where soil gas provisions are required, and is otherwise considered best practice.

Step 10: Install polyethylene or type S roll roofing under the slab-on-grade as required dampproofing and also to serve as part of the required soil gas control measures for areas where soil gas is known to constitute a hazard.

Construction Note:

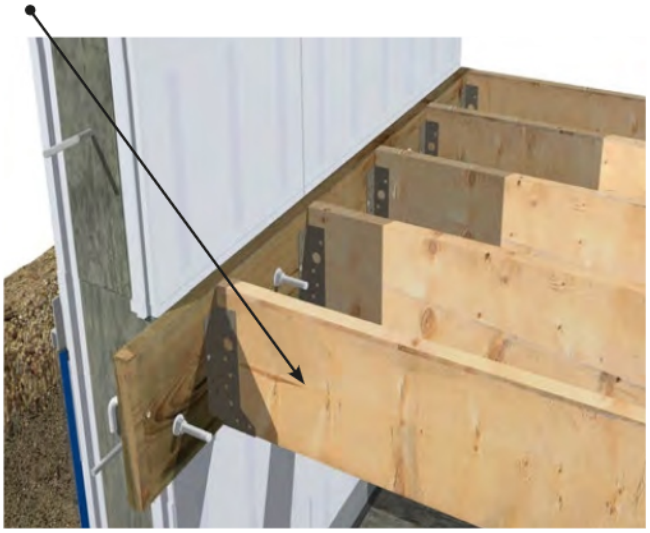
Where the polyethylene under the slab-on-grade is serving as dampproofing only, the laps are to be a minimum of 100 mm. In regions where soil gas is known to constitute a hazard, the polyethylene also serves as soil gas control and the laps are required to be a minimum of 300 mm.

Step 11: Apply compatible, flexible sealants at the slab/wall transition and around all penetrations through the slab as part of the required air barrier and soil gas control in regions where soil gas is known to constitute a hazard, and as a requirement of slab airtightness.

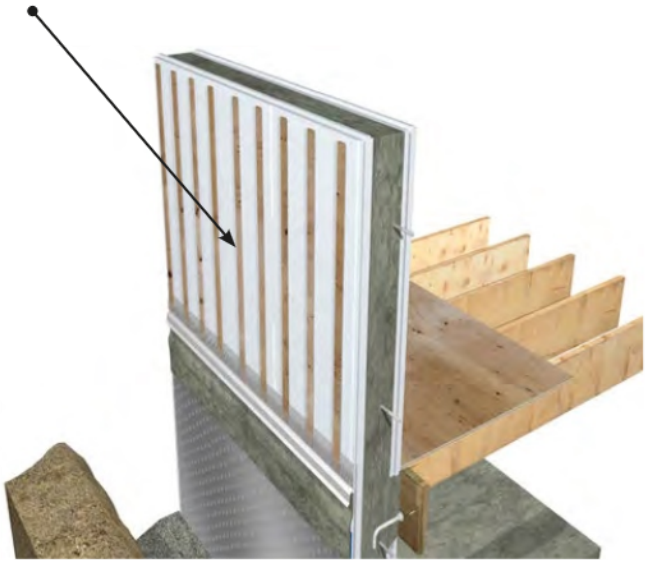


Step 12: If selected, continue assembly of ICF wall above ledger.

Step 13: Install floor joists with joist hangers and approved fasteners.



Step 14: Parge or protect the surface of the ICF from six inches below grade up to the sill flashing. If desired, or required by cladding manufacturer, install treated wood strapping to the wall and insect screen at regions terminating above flashings.



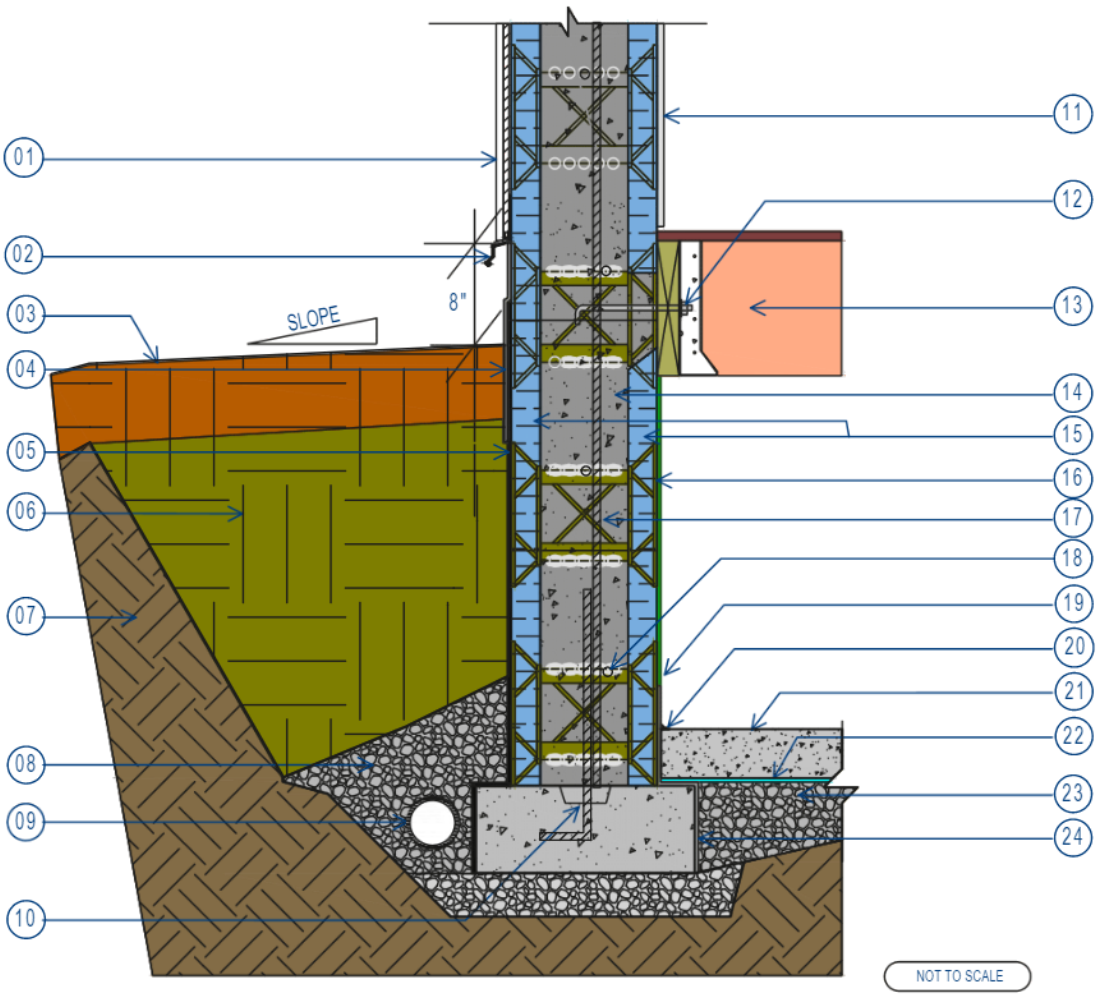
Step 15: Install the selected cladding and seal the transitions to complete the first plane of protection.

Step 16: Back fill the excavation and complete all landscaping with a slope away from the foundation.

Construction Note:

Foamed plastic insulation must be protected from unconcealed adjacent occupied spaces by a barrier including any Part 9 interior finish, or a thermal barrier that meets classification B when tested in conformance with CAN/ULC-S124. Typical thermal barriers are gypsum or a painted coating.

Insulating Concrete Form - Foundation Wall with Ledger



LEGEND

01. EXT. CLADDING, TREATED FURRING STRIPS, SHEATHING MEMBRANE, & SHEATHING
02. PRE-FINISHED METAL FLASHING
03. FINISHED SLOPED GRADE
04. PARGING OR OTHER PROTECTIVE MATERIAL, MIN. 6" BELOW FINISHED GRADE
05. COMPATIBLE DAMPPROOFING OR WATER-PROOF MEMBRANE W/ OPTIONAL PLASTIC DRAINAGE COMPOSITE
06. BACKFILL - COMPACTED STRUCTURAL FILL
07. UNDISTURBED NATIVE SOIL
08. COARSE CLEAN GRANULAR FILL
09. FOOTING DRAIN
10. FOOTING W / KEY, OR WET DOWEL
11. INTERIOR WALL FINISH
12. LEDGER ANCHOR BOLTS - AS PER CODE
13. TREATED WOOD LEDGER BOARD, JOIST HANGERS, & FLOOR SYSTEM
14. CONCRETE CORE
15. ICF FORM
16. ICF WEB
17. VERTICAL REBAR - AS PER CODE
18. HORIZONTAL REBAR - AS PER CODE
19. THERMAL BARRIER - AS PER CODE - NOT REQUIRED IF CRAWLSPACE
20. COMPATIBLE SEALANT FILLET BEAD AT JOINT
21. CONCRETE SLAB
22. 6 MIL POLYETHYLENE - LAPPED
23. MIN. 100mm COARSE, CLEAN GRANULAR FILL WHERE SOIL GAS PROVISIONS EXIST
24. FOIL FACED BUTYL SELF-ADHERED MEMBRANE
25. OPTIONAL - MIN. 100mm COARSE, CLEAN GRANULAR FILL UNDER FOOTING

WHERE TERMITES & CARPENTER ANTS ARE A CONCERN, REFERENCE:
HTTP://CWC.CA/WP-CONTENT/UPLOADS/PUBLICATIONS-BP3_TERMITECONTROL.PDF

FOUNDATION DETAIL 3.1.06-A
INSULATED CONCRETE FORMS - FOUNDATION WALL - LEDGER

FOR ILLUSTRATION PURPOSES ONLY - NOT FOR CONSTRUCTION

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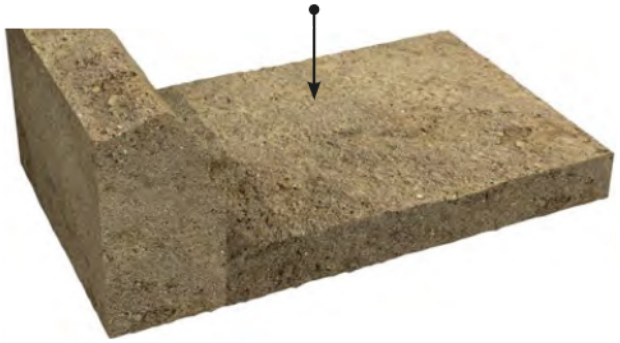

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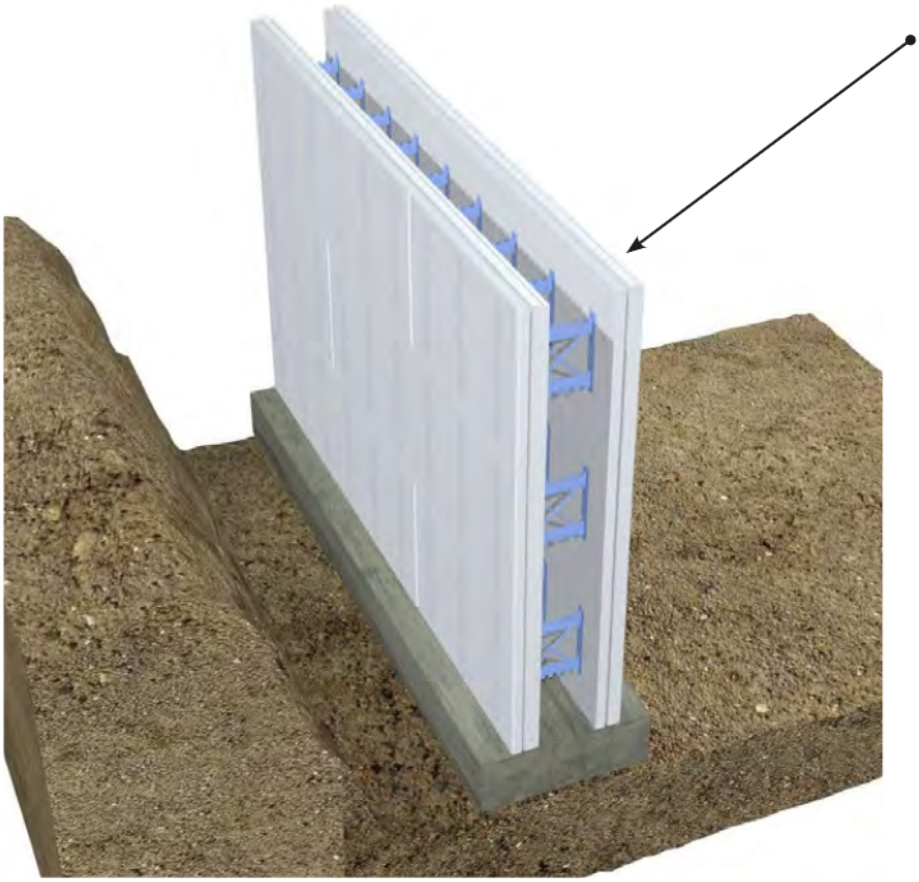

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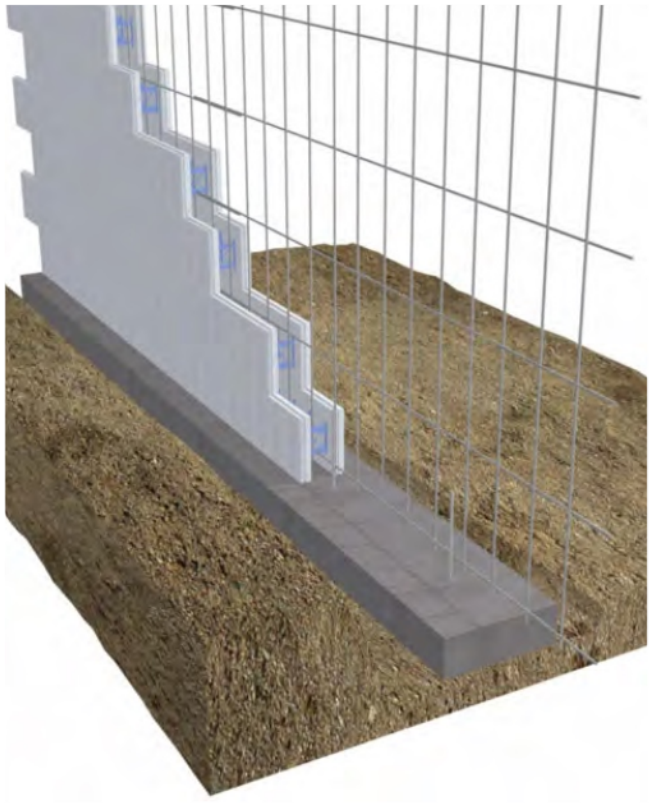

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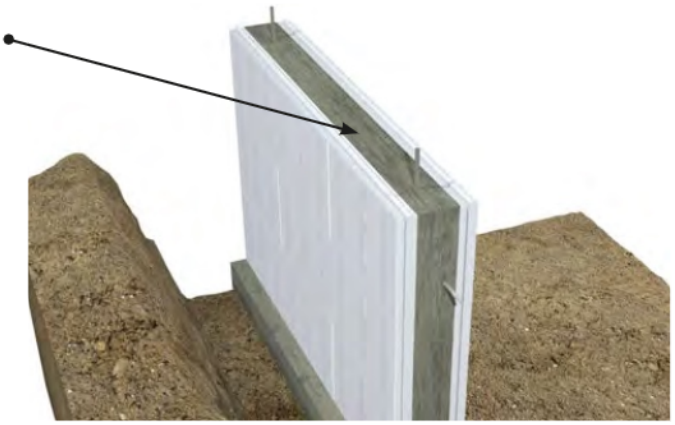

Best Practice Note:

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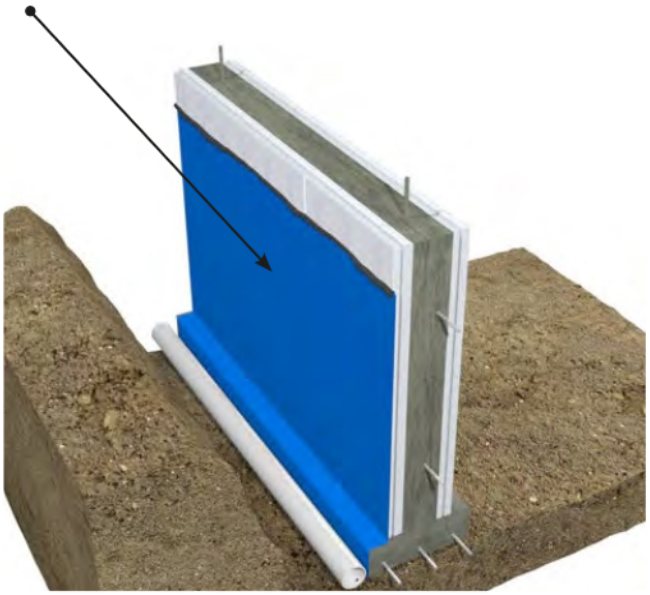
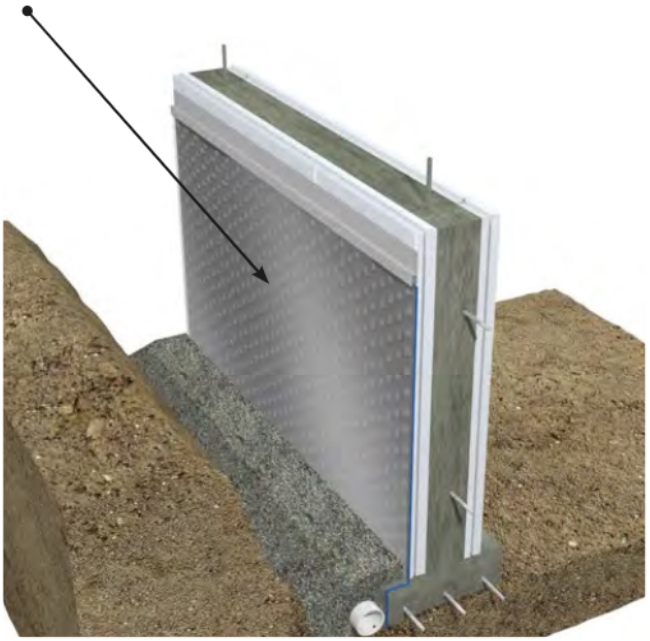
Step 5: Apply dampproofing, or where there is a likelihood of hydrostatic pressure, waterproofing to the exterior of the ICF foundation wall. Dampproofing and waterproofing materials must be compatible with the form material.



Step 6: If coarse, clean granular material, or a drainage mat are applied adjacent to the foundation wall, it must extend to the footing drain level to facilitate drainage to the footing drain.



Step 7: Install compatible self-adhering membrane from base of footing to four inches above top of slab.

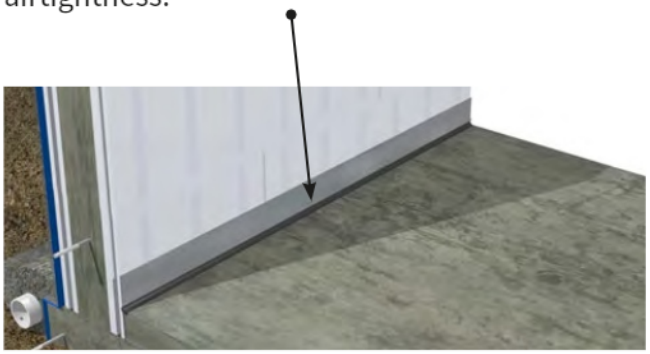
Step 8: Place not less than 100 mm of coarse clean granular material under the slab-on-grade. This layer provides a capillary break for ground water and controls liquid water being drawn up to the slab above and resultant moisture damage to floor finishes. This is required where soil gas provisions are required, and is otherwise considered best practice.

Step 9: Install polyethylene or type S roll roofing under the slab-on-grade as required dampproofing and also to serve as part of the soil gas control measures for areas where soil gas is known to constitute a hazard.

Construction Note:

Where the polyethylene under the slab-on-grade is serving as dampproofing only, the laps are to be a minimum of 100 mm. In regions where soil gas is known to constitute a hazard, the polyethylene also serves as soil gas control and the laps are required to be a minimum of 300 mm.

Step 10: Apply compatible, flexible sealants at the slab/wall transition and around all penetrations through the slab as part of the required air barrier, and soil gas control in regions where soil gas is known to constitute a hazard, and as a requirement of slab airtightness.



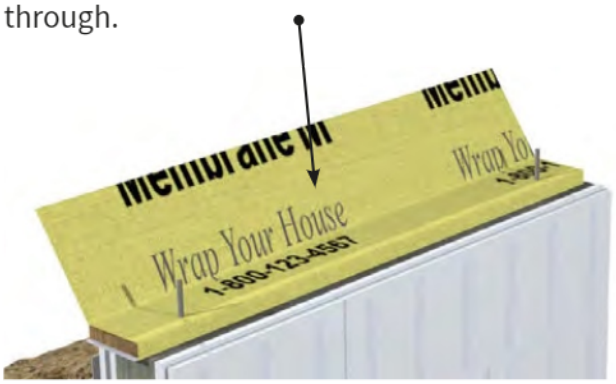
Step 11: Install an approved, closed cell sill gasket or protection for the bottom plate of the frame wall.

Step 12: Place a treated sill plate over the sill gasket and the anchor bolts.

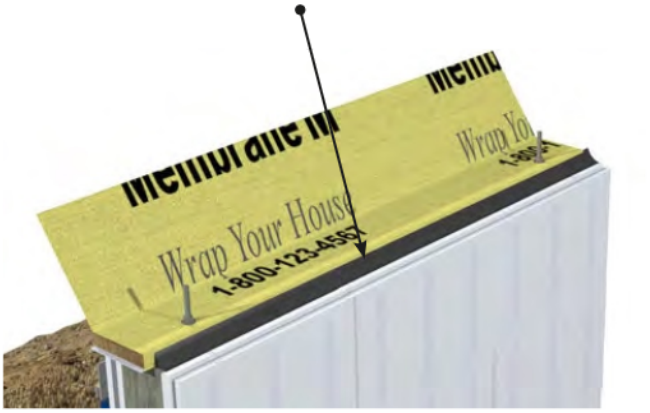
Note:

The continuity of the air barrier system selected for the wall above to the foundation wall must be achieved. This depends on the air barrier system selected. The air barrier illustrated in the following steps shows a transition to the airtight, core of the ICF.

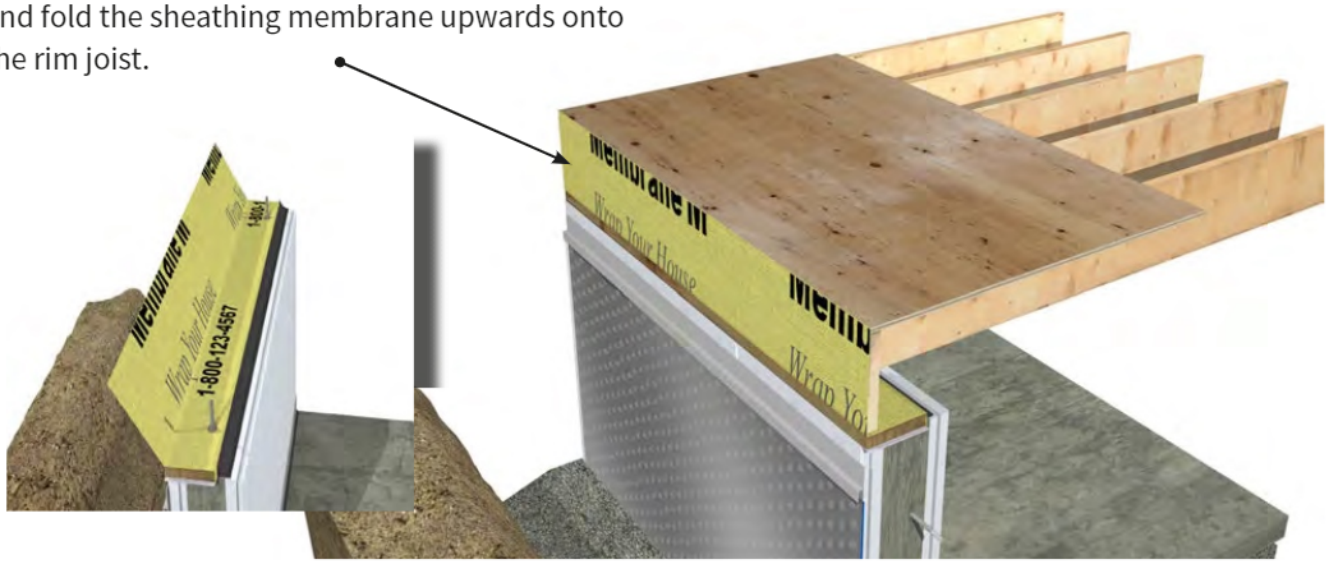
Step 13: Drape a strip of synthetic sheathing membrane (SSM) over the plate. Carefully perforate the SSM to allow the anchor bolts through.



Step 14: Apply compatible, flexible sealant to seal the SSM to the concrete core of the ICF.

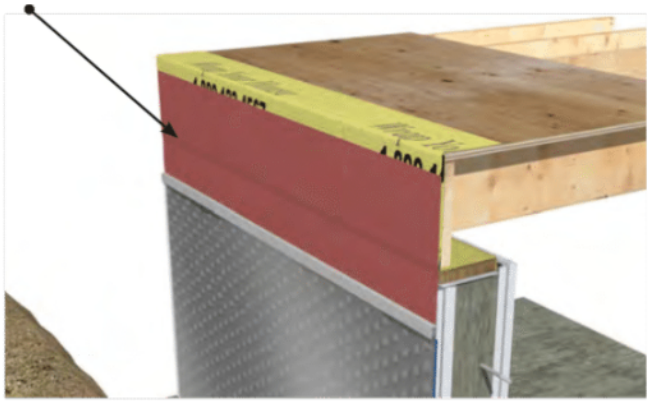


Step 15: Frame and sheath the floor platform and fold the sheathing membrane upwards onto the rim joist.

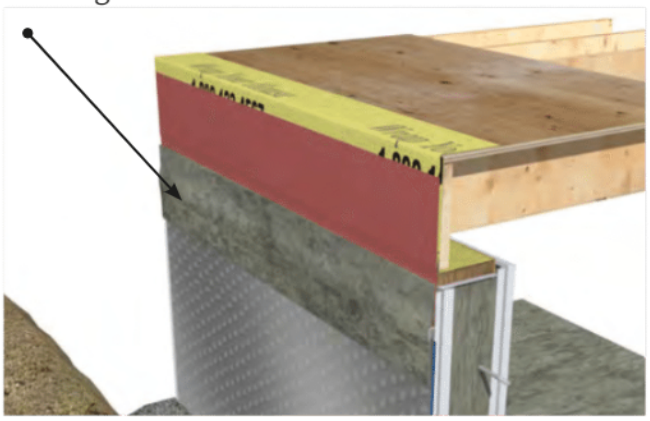


Step 16: Drape a second strip of SSM onto the exterior wall, allowing enough for an upturn onto the bottom plate of the wall (see step 20).

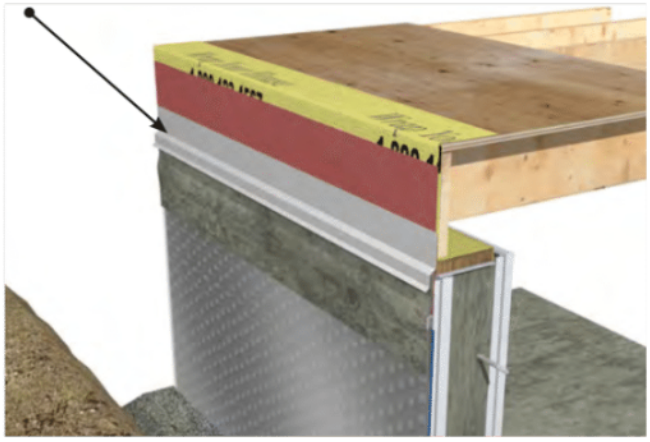
Step 17: Apply SSM tape to seam for airtightness.



Step 18: Parge or protect the surface of the ICF from six inches below grade up to the sill flashing.



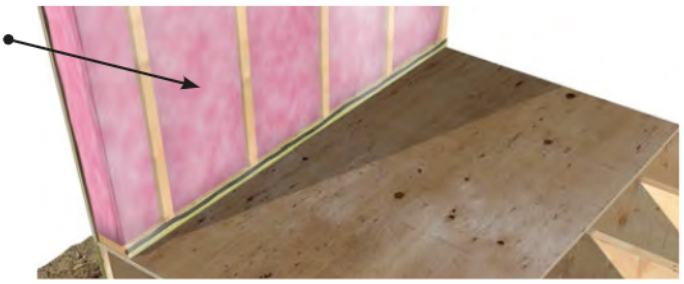
Step 19: Install sill flashing with approved fasteners.

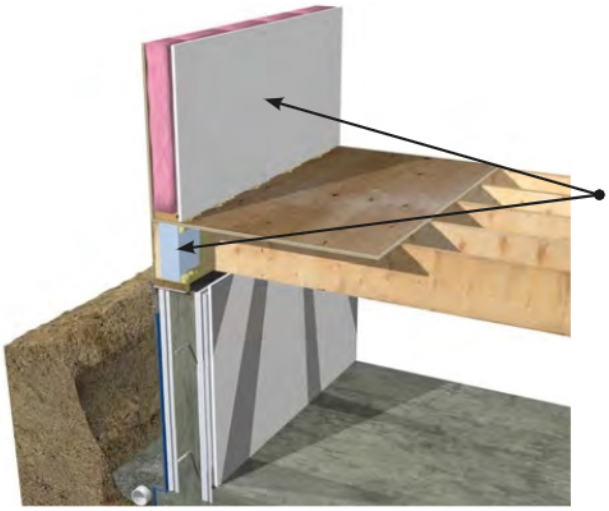


Step 20: Frame and tilt wall into place. Turn the SSM flap upward and staple it in place.

Step 21: Install selected insulation in the wall cavities, and apply acoustic sealant to the flap over the bottom wall plate.

Step 22: Complete the continuity of the air barrier. In this case, the polyethylene air and vapour barrier is fastened into the line of sealant.





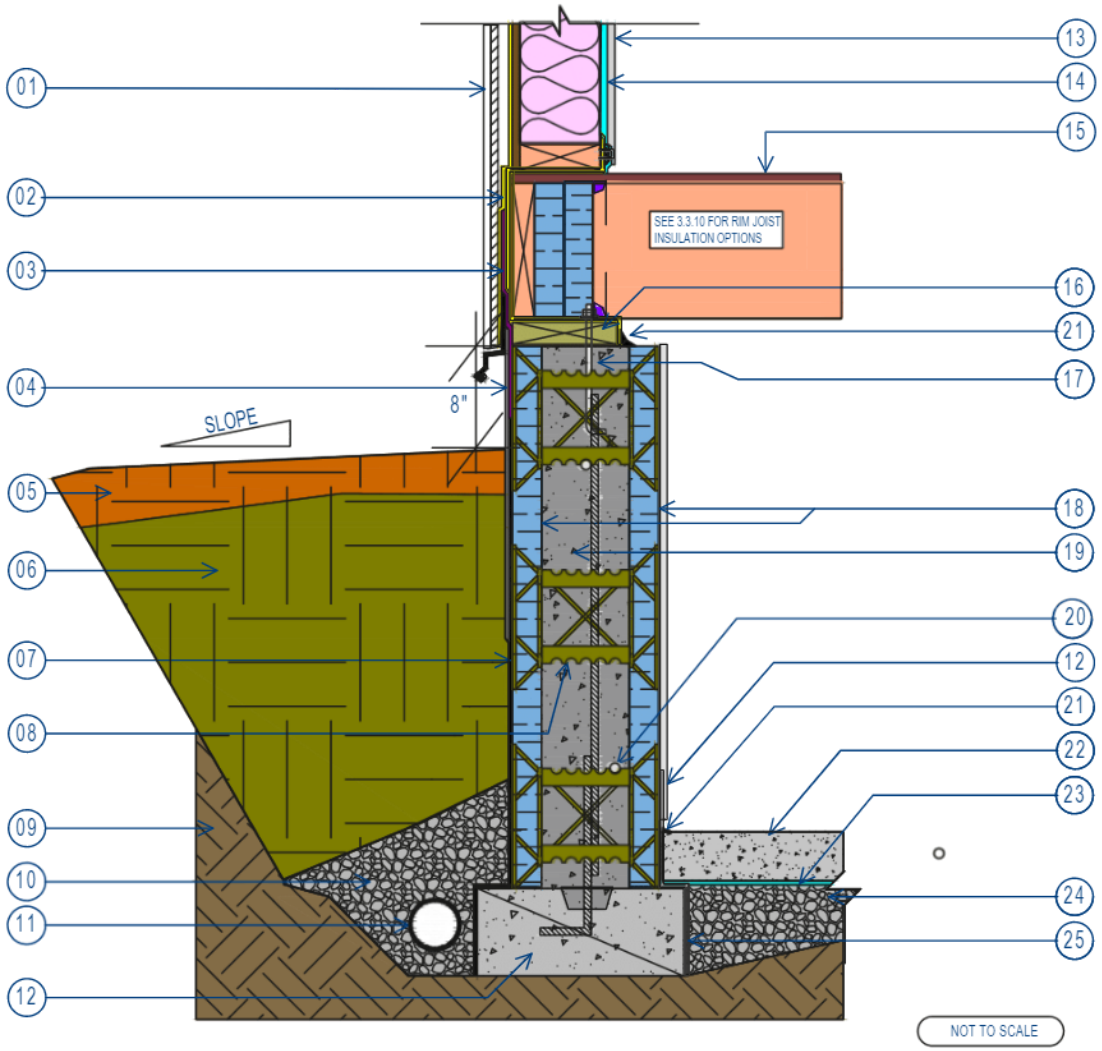
Step 23: Complete the installation of the drywall and interior finishes. Insulate the rim joist region using extruded (EPS) or expanded polystyrene (XPS) foam insulation. Low expansion air sealing foam can be used to achieve continuity of the air barrier through the rim joist. Other methods of insulating the rim joist could also be used.

Step 24: Install sheathing membrane lapping over the sill flashing to improve drainage.

Step 25: If desired, or required by cladding manufacturer, install treated wood strapping to the wall and insect screen at regions terminating above flashings.

Step 26: Install the selected cladding using corrosion-resistant fasteners. Back fill the excavation and complete all landscaping with a slope away from the foundation.

Insulating Concrete Form - Foundation Wall with Platform



LEGEND

01. EXT. CLADDING, TREATED FURRING STRIPS & SHEATHING
02. SHEATHING MEMBRANE
03. VAPOUR PERMEABLE, SELF-ADHERED MEMBRANE
04. PARGING OR OTHER PROTECTIVE MATERIAL, MIN. 6" BELOW FINISHED GRADE
05. FINISHED SLOPED GRADE
06. COARSE CLEAN GRANULAR FILE
07. COMPATIBLE DAMPPROOFING OR WATERPROOF MEMBRANE W/ OPTIONAL PLASTIC DRAINAGE COMPOSITE
08. ICF WEB
09. UNDISTURBED NATIVE SOIL
10. DRAIN ROCK
11. FOOTING DRAIN
12. FOOTING W/ KEY. OR WET DOWEL
13. GYPSUM WALLBOARD

WHERE TERMITES & CARPENTER ANTS ARE A CONCERN, REFERENCE: HTTP://CWC.CA/WP-CONTENT/UPLOADS/PUBLICATIONS-BP3_TERMITECONTROL.PDF

14. 6 MIL POLYETHYLENE - TAPED & SEALED
15. FLOOR SYSTEM
16. SILL PLATE & CLOSED CELL GASKET
17. ANCHOR BOLTS - AS PER CODE
18. INSULATED CONCRETE FORM
19. CONCRETE CORE
20. HORIZONTAL REBAR - AS PER CODE
21. COMPATIBLE SEALANT
22. CONCRETE SLAB
23. 6 MIL POLYETHYLENE - LAPPED
24. NO LESS THAN 100mm COARSE CLEAN GRANULAR FILL WHERE SOIL GAS PROVISIONS EXIST
25. FOIL FACED BUTYL SELF-ADHERED MEMBRANE

FOUNDATION — DETAIL 3.1.06-B

INSULATED CONCRETE FORMS FOUNDATION WALL - PLATFORM FRAMING

FOR ILLUSTRATION PURPOSES ONLY - NOT FOR CONSTRUCTION