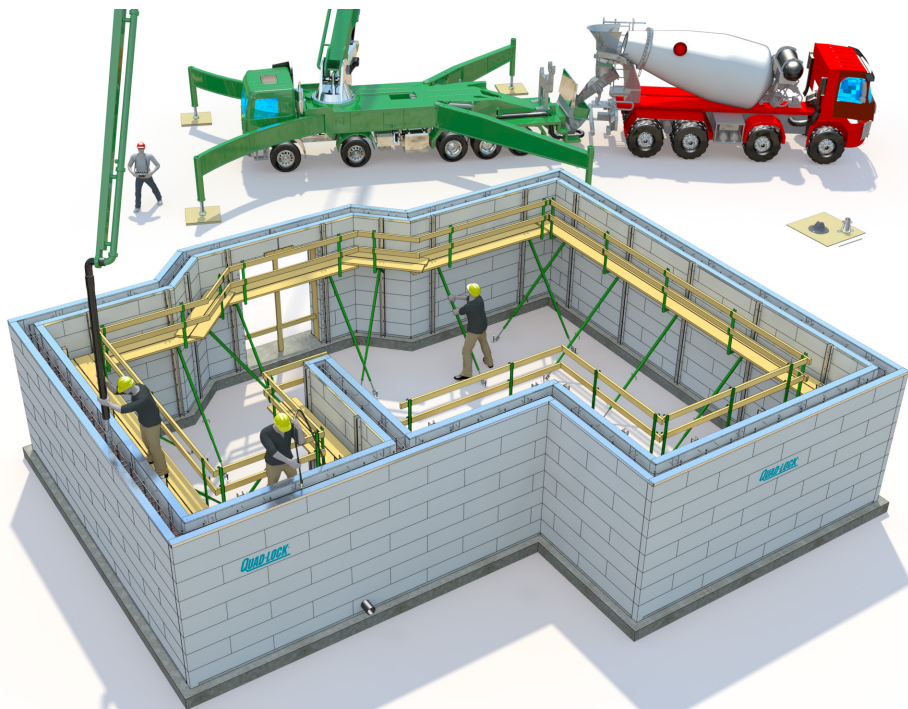




Basic Installation Guide



This guide is intended to serve as an on-site aid for installation of Quad-Lock Insulated Concrete Forms. The instructions contained in this guide relate to typical building details and are not meant to replace applicable building codes, project engineering, or safety regulations. Prior to starting your project, confirm local building codes for cast-in-place concrete construction for your building type, as well as local safety regulations. For more detailed instructions, consult the Quad-Lock Installation Manual and applicable building codes.

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Notes:

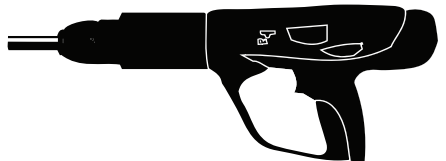
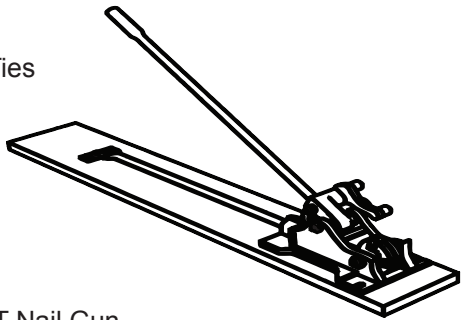
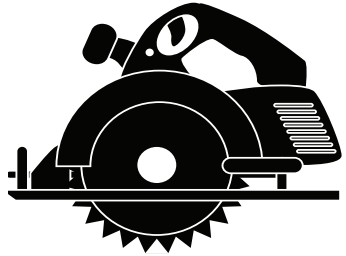
A full-page sheet of graph paper. The top left corner has the word "Notes:" followed by a horizontal line. The rest of the page is covered by a uniform grid of small squares, created by thin gray lines. There are no margins or other markings on the page.

1. Getting Started: General Tips

- Footings poured to within 1/4" of level will make the job much easier. Use a laser level to confirm accuracy of footings.
- When pouring footings, trowel the edges smooth where track will be laid. Clean excess concrete from around cleats that may obstruct track; ensure footing dowels are installed per plans.
- Pre-plan access points for utilities and services. Install sleeves through footings and walls where necessary prior to pouring concrete.
- Organize all ICF and other materials on site to avoid delays. Place panels and ties within easy reach around the entire build area.
- Pre-position corner brackets and pre-bent corner rebar at each corner for use.
- Note exact wall elevations and plan how to achieve them with ICF panels by cutting the first or last course to shorter height.

2. Recommended Tools

- 12" Sliding Compound Miter Saw
- Extendable Utility Knives
- Laser Level
- Cordless Impact Driver
- Measuring Tapes: 25 & 100 ft.
- Hand Saws
- Pruning Shears for cutting Plastic Ties
- Rebar Cutter/Bender
- 6 ft. Level
- Circular Power Saw
- Metal Shears
- Concrete Drill, Gas Powered or PAT Nail Gun
- Personal Protection Equipment

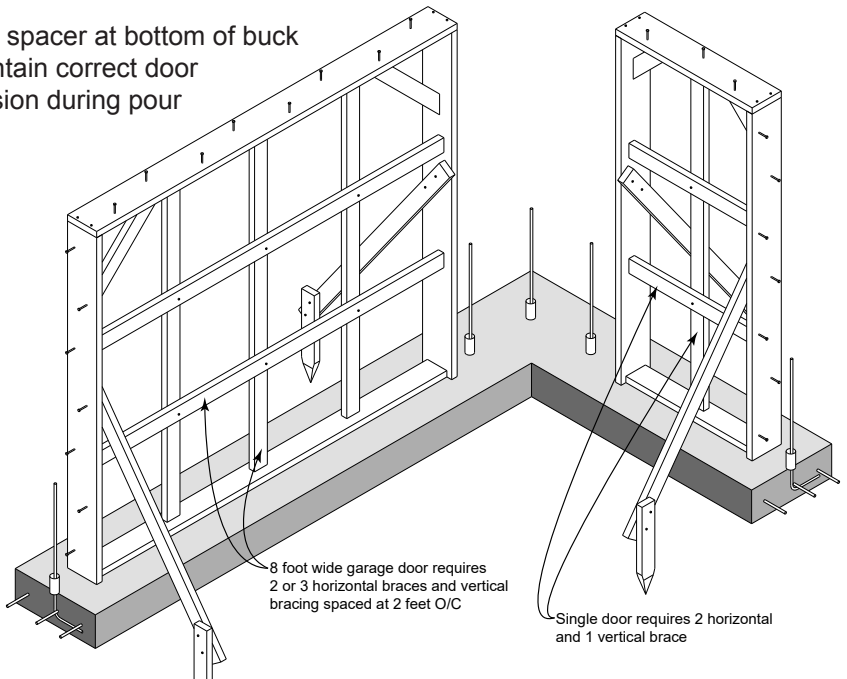


3. Prepare Site & Perform Building Layout

- Clear ALL excess material & debris from footing installation
- Check footing elevations with a laser level; Note elevation issues on the footing with felt pen for later reference
- Do not install vertical rebar at this point.
- Pre-position PVC pipe “collars” (1-1/2" to 2" dia. x 2" to 3" high) over each dowel for later use in securing vertical rebar.
- Lay out walls using chalk lines; Note: Mark only outside building line and allow for ICF panel thickness!
- Check the layout for square by pulling diagonal dimensions
- Mark all window & door centers, dimensions & sill heights

4. Place Door Bucks

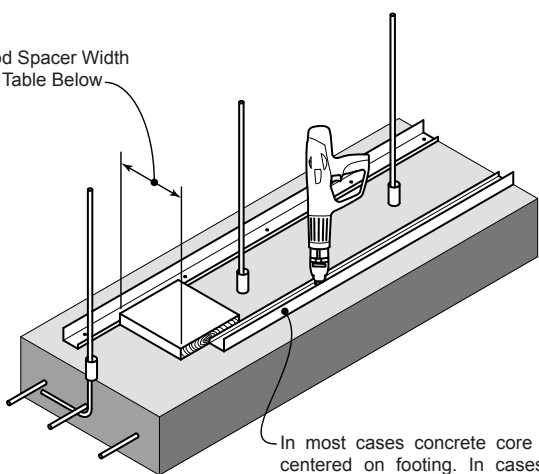
- Locate and mark door openings on strip footing
- Prebuild Door Bucks - for larger openings use vertical braces @ 2 feet o/c and horizontal bracing at 2 to 3 feet o/c. Diagonal corner braces help keep the door buck square during pour. Add shear fasteners to 3 sides
- Set into position on strip footing, plumb, square and brace into position
- Nail 2x spacer at bottom of buck to maintain correct door dimension during pour



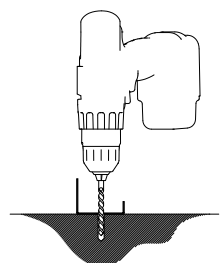
5. Set Metal Track

- Pre-position metal track along the entire footing (2 rows of track)
- Place outside track on chalk line (“building line”)
- Fasten track to footing at each end AND every 16" in-between; Double-check all fastening when finished
- Either fasten with a gas powered or PAT nail gun or use “drill and pin” method
- Cut wood spacers to correctly position inside track apart from outside track
- Lay inside track against spacers & secure to footing
- Continue to place track with spacers and secure

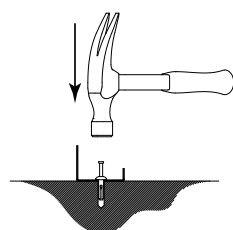
Wood Spacer Width
See Table Below



In most cases concrete core should be centered on footing. In cases of offset insulation wall assemblies (e.g. R-43), ensure the tracks are fastened to center the core on footing (not the entire wall).



STEP A. Drill Guide Hole



STEP B. Secure Fastener

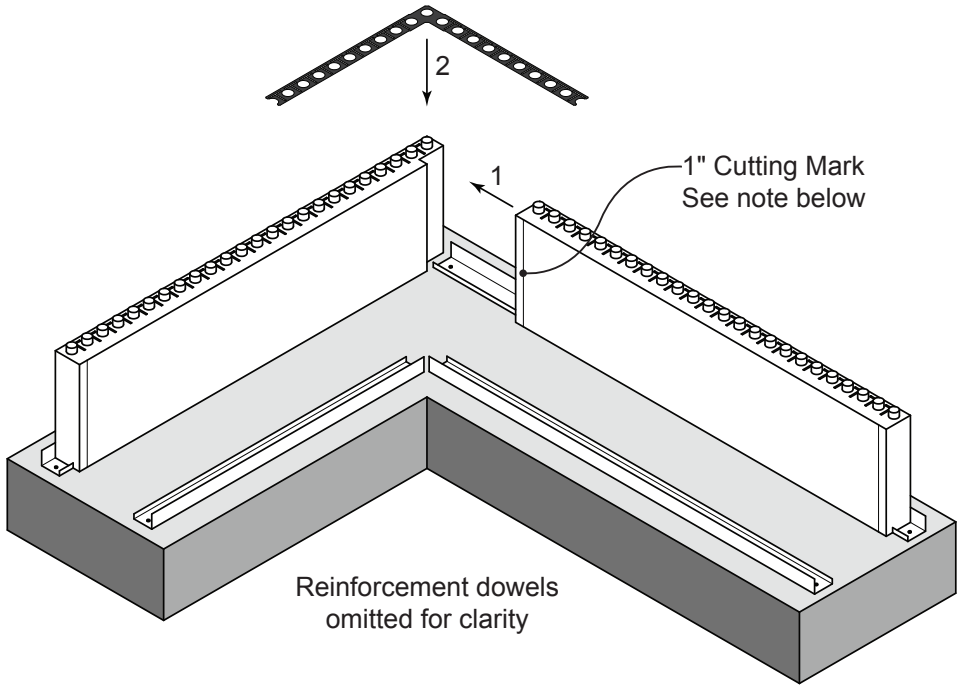
Quad-Lock Track Spacer Width							
R-Value	Track Type	Quad-Lock Tie Color					
		Black	Blue	Yellow	Green	Red	Brown
R-22	2" & 2"	3 11⁄16"	5 11⁄16"	7 11⁄16"	9 11⁄16"	11 11⁄16"	13 11⁄16"
R-28	2" & 2"		5 11⁄16"	7 11⁄16"	9 11⁄16"	11 11⁄16"	13 11⁄16"
	3" & 3"		3 15⁄16"	5 15⁄16"	7 15⁄16"	9 15⁄16"	11 15⁄16"
R-30	2" & 4"		3 11⁄16"	5 11⁄16"	7 11⁄16"	9 11⁄16"	11 11⁄16"
R-38	4" & 4"			3 11⁄16"	5 11⁄16"	7 11⁄16"	9 11⁄16"
R-38 TMO	2" & 2"			7 11⁄16"	9 11⁄16"	11 11⁄16"	13 11⁄16"
R-43	2" & 2"				9 11⁄16"	11 11⁄16"	13 11⁄16"
	3" & 3"				7 15⁄16"	9 15⁄16"	11 15⁄16"



Refer to Installation Manual, if the strip footing is out of level

6. Install Outside Corner Panels

- Start with an Ultra and an Ultra Corner Panel (3.125" thick) to form the outside of the Corner
- Standing inside the corner, Ultra Corner Panel on the left overlaps the Ultra Panel on the right. See graphic below.
- Place Outside Corner Bracket over the knobs.



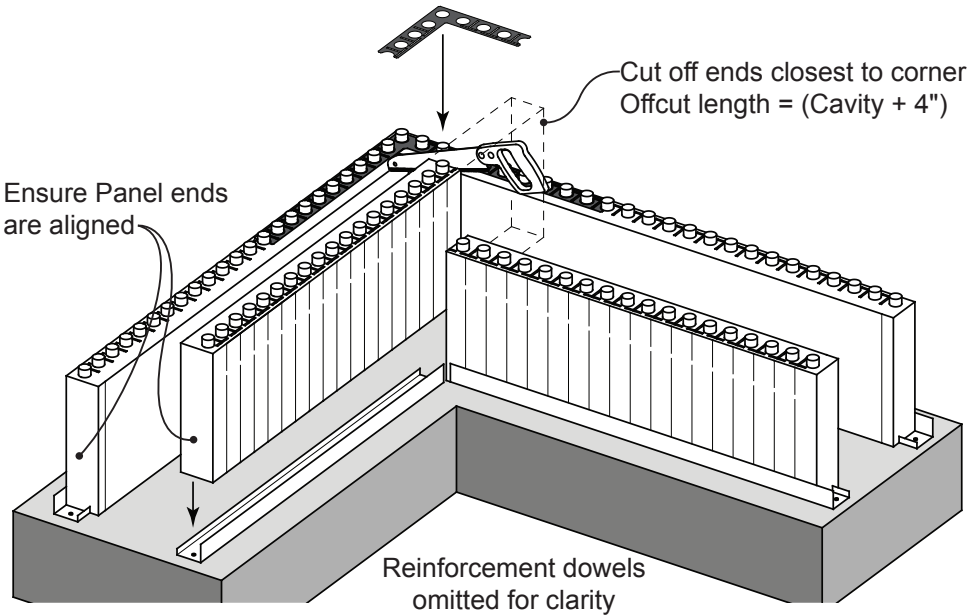
In case the factory made notched Corner Panels are not available:

- Use two standard full length Ultra Panels
- From the right Panel. Cut off 1" from the mating end (to make it 47" long)
- Continue as described above

Refer to Quad-Lock Installation Manual for Waste-minimized corners and corner assembly with Regular (2.25" thick) and Plus (4.25" thick) Panels.

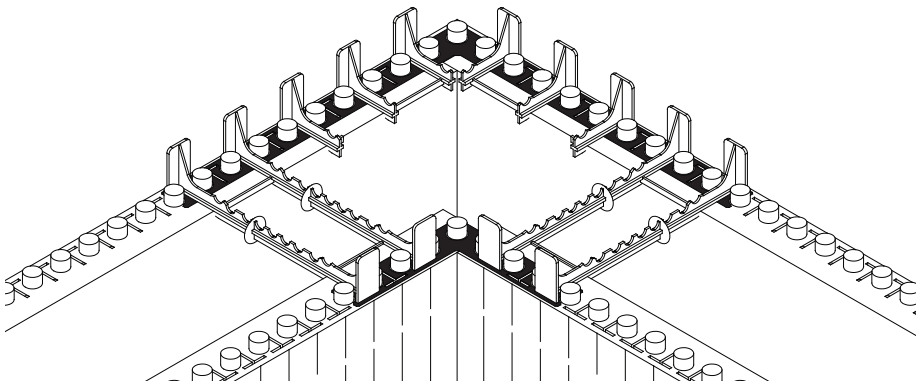
7. Install Inner Corner Panels

- Use two full length Ultra Panels and cut off (concrete cavity + 4") from mating ends of each panel
- Left panel overlaps the right, Secure with Inside Corner Bracket on top
- Ensure factory panel ends are directly opposite one another



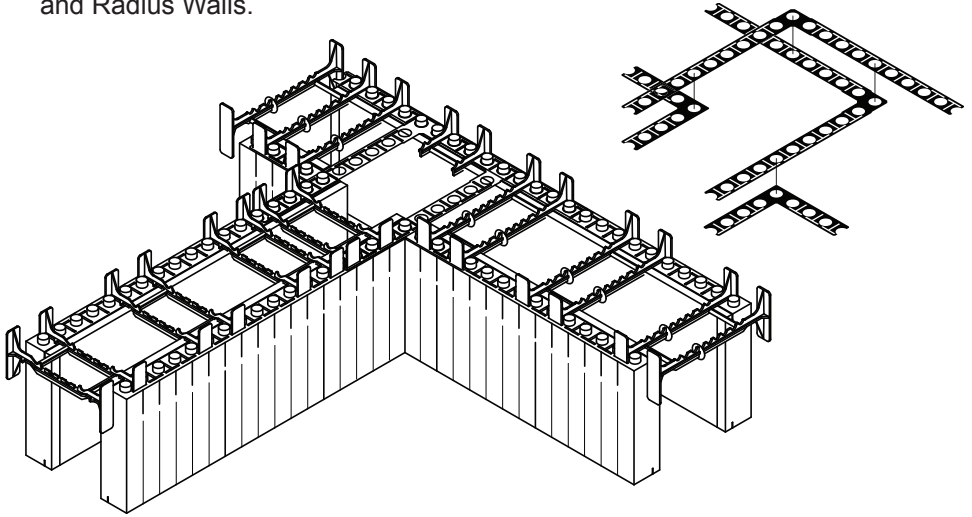
8. Place Corner Plastic Ties and Flanges

- Insert full ties as close as possible to corner with both flanges in Inside Corner Bracket
- Cut flanges from full ties and insert into outside panels slots starting from corner skipping every second slot



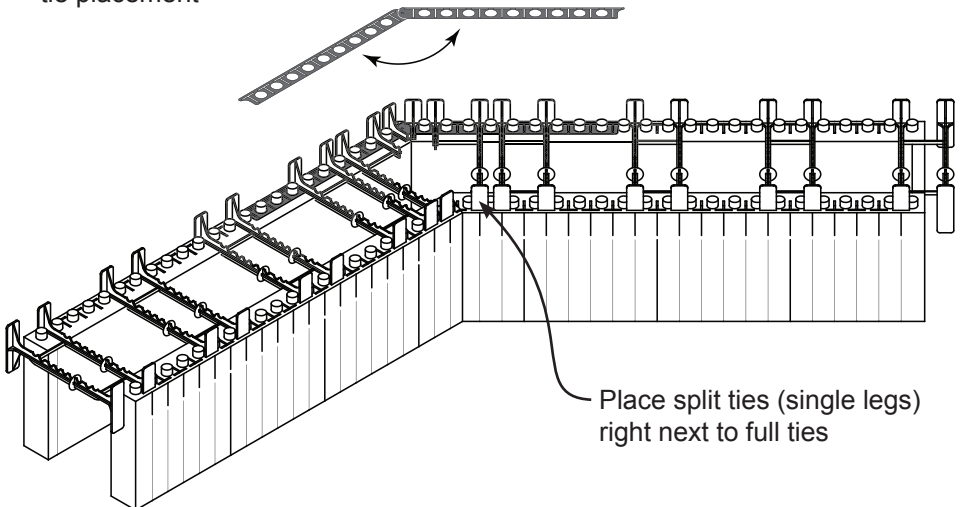
9. Build All First-Course Corners / T-Walls

- Build all 1st course panels for the following: Corners, T-Walls, Angled Corners, and Radius Walls.



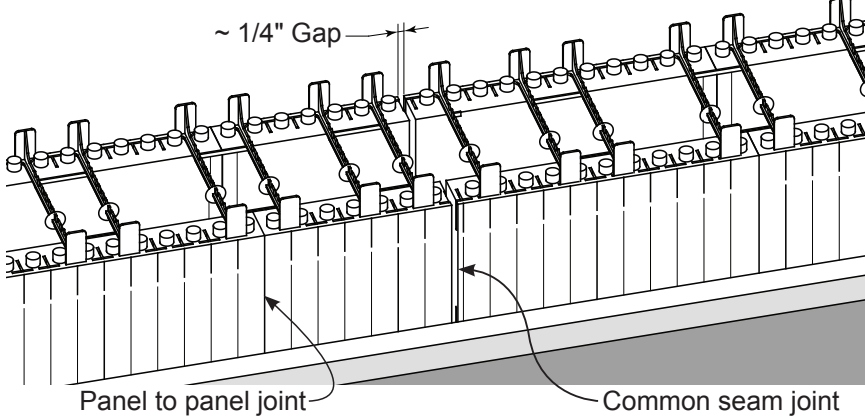
10. Non-90° Angles

- Determine degrees of angle
- Cut each corner panel at $1/2$ the total degrees
- For the outside panels, make the cut so it passes through center of 1st interlock knob
- Angle Brackets are for outside panels only
- Maintain 2" layout positioning between inside and outside panels to allow for tie placement



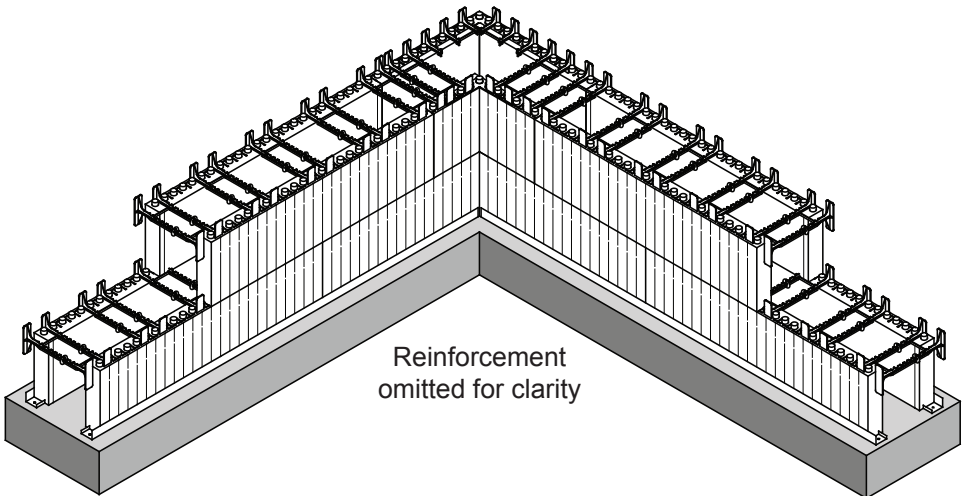
11. Build Odd Wall Lengths to a Common Seam

- If wall length does not fit the 2" increment a common seam is necessary
- Set full panels from corner or angle/T-wall and work towards middle of wall
- Cut last panel to fit leaving a 1/4" gap which continues to top of wall
- Place all first course ties over all deep grooves and panel to panel joints



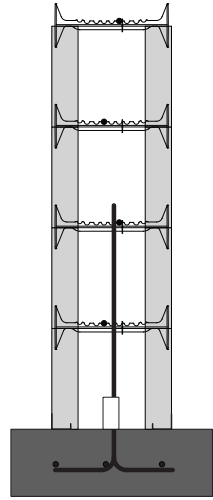
12. Second Course Corners

- Cut a Corner Panel in half - use notched side on the left and the second half on the right. Overlap left over right just like on the first course.
- Place full length panels over joints created by the panels on the first course creating a 24" running bond pattern
- Inner corner panel length: from a 24" long piece cut off (4" + cavity).
- Place all corner brackets, ties and flanges as in first course.



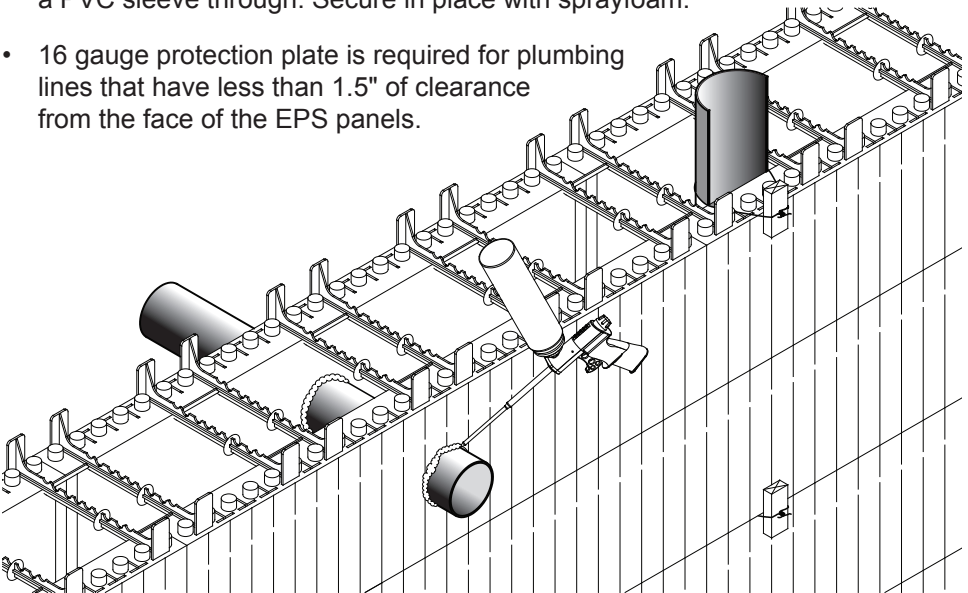
13. Reinforcing Bar

- As described in Section 3, place 2" to 3" long x 1.5" diameter PVC pipe pieces over footing dowels which serve to later secure vertical bar that will be slid down into wall
- Place horizontal rebar into tie cradles with proper overlap. Typically 24" but confirm with building authority or the Engineer of Record (EOR)
- Horizontal bars should alternate side to side to secure vertical bar (to be dropped in)



14. Plumbing Considerations

- Plumbing lines less than 3" in diameter (for Ultra Panels) are placed into cut EPS and secured with sprayfoam **AFTER** concrete pour and after bracing is removed.
- For larger vertical vents or drain lines, create a chase-way by ripping an over-sized PVC pipe in half, lengthwise. Secure one "C" shaped half vertically into the wall cavity as you stack the panels using tie-wire. (See diagram below) Mark the position of the chase on the panel face with a marker pen.
- Through wall penetrations are accomplished with PVC sleeves larger than the line intended to pass through the wall. Cut out EPS on either side and place a PVC sleeve through. Secure in place with sprayfoam.
- 16 gauge protection plate is required for plumbing lines that have less than 1.5" of clearance from the face of the EPS panels.

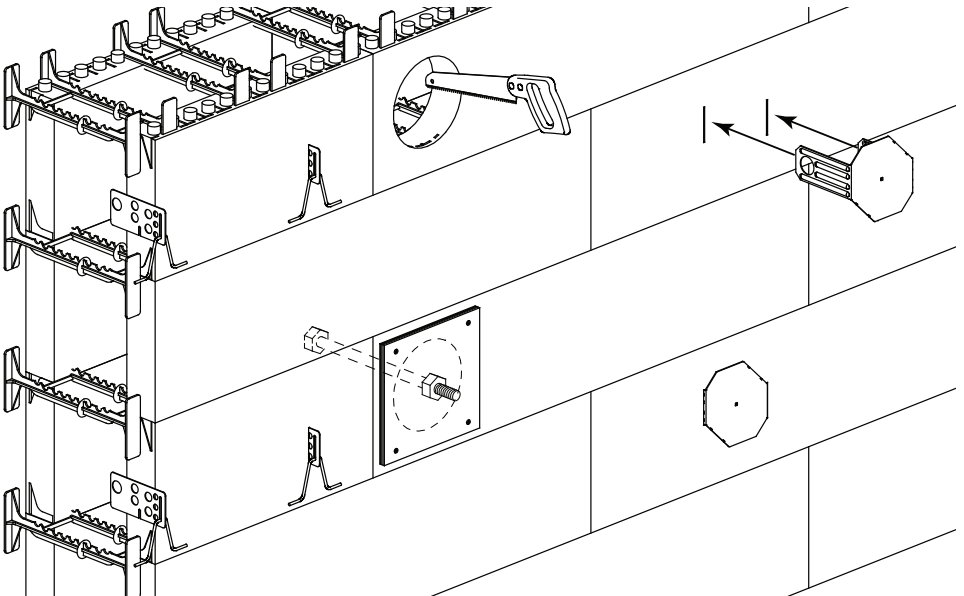


15. Stack Walls

- Continue stacking walls to 4 foot level
- Repeat panel pattern from 1st and 2nd course:
 - 1st, 3rd, 5th... rows should have same panel lengths & lined up vertically
 - 2nd, 4th, 6th... rows should also be identical
- Check corners for plumb regularly
- Ensure that ties are placed at 12" o/c maximum:
 - Over all panel to panel joints and
 - Over all deep grooves
- Ties and flanges should line up vertically regardless of the odd or even course
- Minimize Waste:
 - collect scrap panels and cut to either 12" or 24" or 36" lengths.
 - use scrap panels throughout - be sure to straddle the joints with full ties.

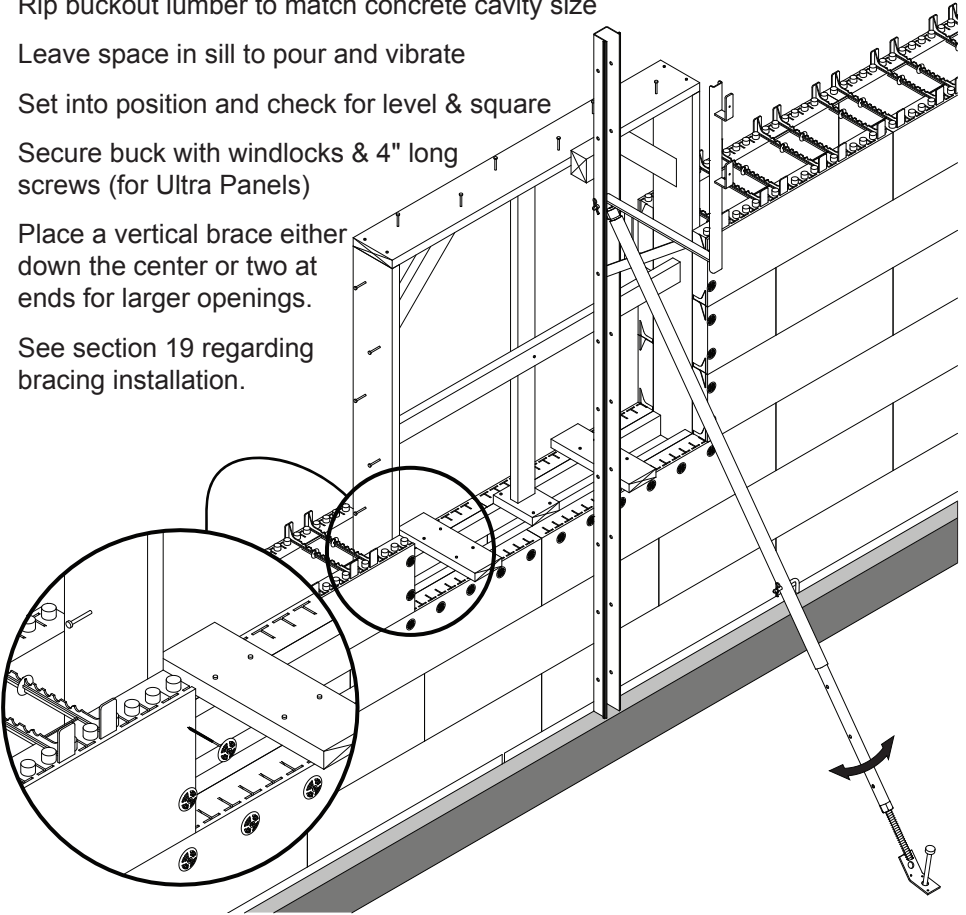
16. Brick Ties and Heavy Duty Attachment Points

- If Brick finish is specified, insert brick ties at correct spacing.
- Heavy duty attachment points (for garage doors, stair stringers, or premanufactured window wells) can be achieved in of the two ways:
 - A.** Simpson ICFVL brackets are placed through the EPS
 - B.** By cutting out 7.5" diameter holes in Ultra EPS panels. These holes are closed off with plywood and filled up with concrete during pour



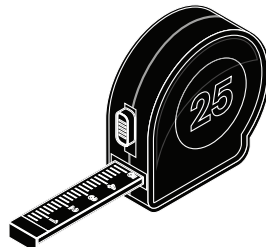
17. Window Openings

- Determine elevations for window openings
- Prebuild all window bucks with internal bracing to prevent deflection
- Rip buckout lumber to match concrete cavity size
- Leave space in sill to pour and vibrate
- Set into position and check for level & square
- Secure buck with windlocks & 4" long screws (for Ultra Panels)
- Place a vertical brace either down the center or two at ends for larger openings.
- See section 19 regarding bracing installation.



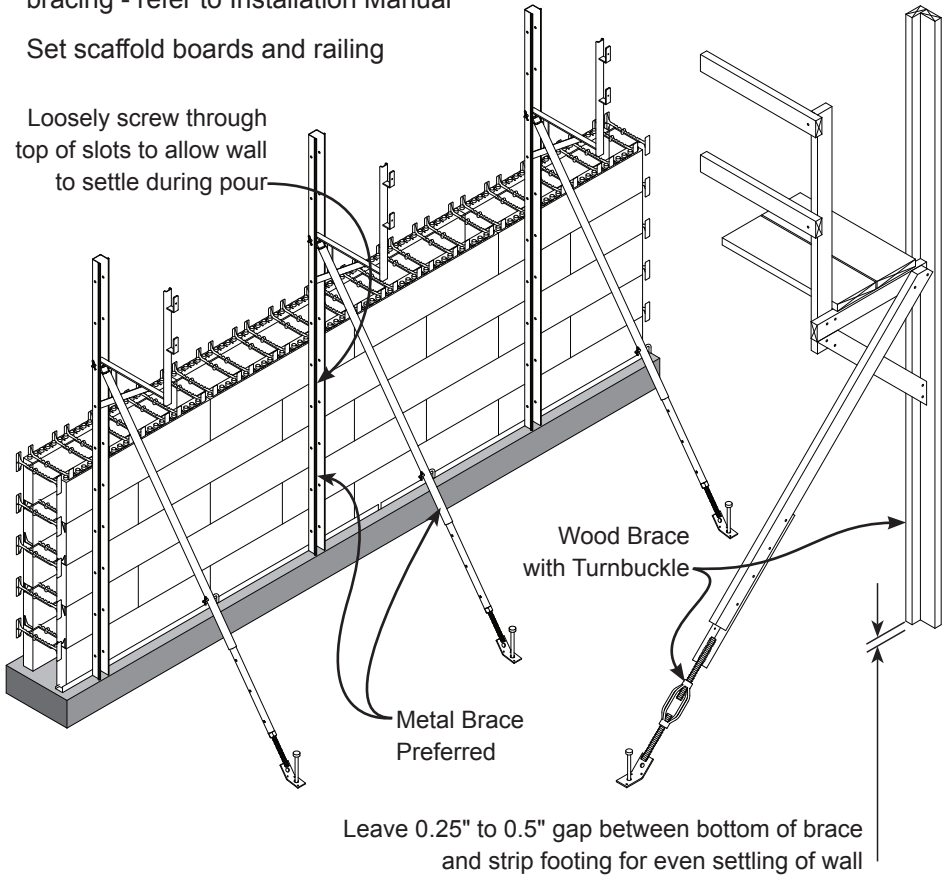
18. Plumb, Straight, Square & Level (PSS&L)

- At the 4 foot level:
STOP ALL INSTALLATION
- Check all walls for:
Plumb
Alignment
Square
Level
Accurate Dimensions
- Make adjustments as necessary



19. Install Bracing

- Attach wood or metal braces to Quad-Lock tie flanges with #10 screws
- Fasten braces into metal track and into every tie (12" o/c)
- Space braces at 5 to 6 feet o/c starting at 2 to 3 feet from inside corners
- Secure diagonal brace legs to ground or slab
- Adjust walls into plumb by adjusting the diagonal leg
- T-walls and corners, **when properly installed**, do not require extra bracing - refer to Installation Manual
- Set scaffold boards and railing

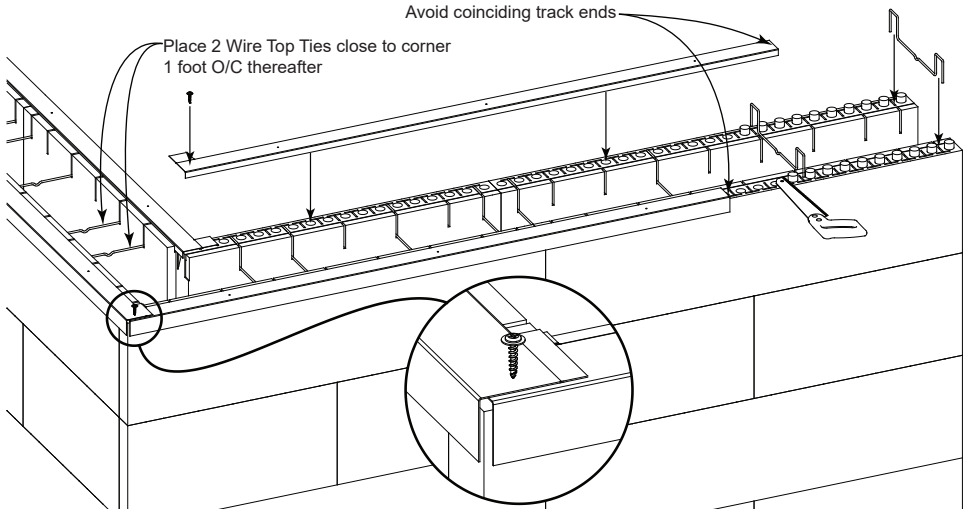


20. Continue Stacking Walls

- Build walls around window and door bucks
- Add additional reinforcement required around openings as specified
- Add penetrations for utilities as required
- Place horizontal rebar per specifications

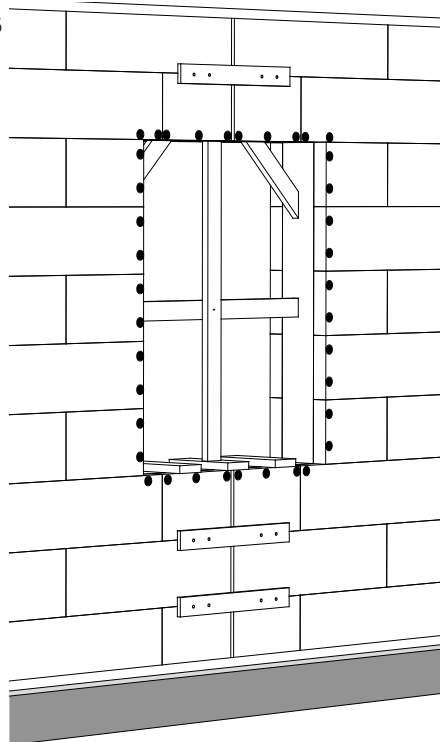
21. Top of Wall

- Remove interlock knobs from top panels.
- Insert 4 Wire Top Ties per panel pair: one at either end and two in between
- Place 2", or 4" metal track over the Wire Top Ties. If using 3" Track, use 1x2 or 1x4 spreaders at 24" o/c instead of Wire Top Ties
- Cut and lap track at corners. Secure corner overlap with a self tapping screw.



22. Secure Common Seams

- Check corners for plumb and secure
- Cut straps out of 1x4's to 24" lengths
- Screw 1x4's to plastic ties across the seam with two screws on either end
- Place straps at every row and on both sides of wall
- Close off the gap with low expansion sprayfoam

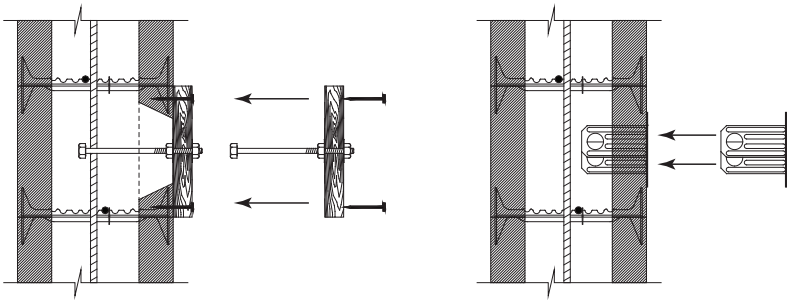


23. Re-Check PSS&L

- Install string line around top course of panels, space out by 3/4"
- Stretch tight and measure gap with 1x4
- Adjust bracing turnbuckles as needed
- Check wall dimensions and plumb at corners

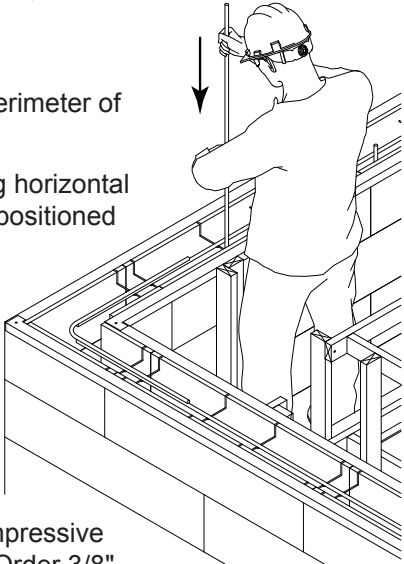
24. Ledger Brackets, Bolts & Beam Pockets

- If using Simpson ICFVL ledger brackets, determine elevation, cut slots in EPS panels and insert legs into wall cavity
- If ledger board is to be attached via bolts, cut out min. 7.5" diameter holes (or square/rectangular keeping the width at min. 7.5") and insert ledger board with bolts pre-assembled. Support with vertical 2xs and secure to Quad-Lock plastic ties
- If the wall terminates with a sill plate on top, bolts will be inserted after concrete pour
- Install beam pockets/block-outs as required.



25. Place Vertical Rebar

- Precut all vertical rebar and place around perimeter of wall
- Slide vertical bars down between alternating horizontal bars. Fit bottom end of vertical bar into pre-positioned PVC holder installed around footing dowels
- Secure with tie wire to top horizontal bar



26. Order Concrete & Pump

- Calculate concrete usage with the chart below and schedule concrete delivery
- Specify ICF type mix with 6" slump and compressive strength as per engineering specifications. Order 3/8" maximum aggregate.
- Order pump with 3" hose or make sure a hose reducer is available

With Ultra Panels, One Cubic Yard of Concrete Covers:	
54 square feet	on 6" concrete core
40.5 square feet	on 8" concrete core
32.4 square feet	on 10" concrete core

27. Pour Day

- Assign crew to handle pump, place concrete, run vibrator, spot bottom of wall for pour height and possible problems, and check for quality control
- Equipment needed: Bolts for sill plate, 1-1/4" pencil vibrators, trowels, water for cleaning, personal protection equipment
- Have plywood and lumber or metal bracing available to repair problem areas
- Place 2 to 3 foot maximum on first lift all around the building. Successive lifts to be between 3 and 4 feet.
- Vibrate with 1-1/4" pencil vibrator, insert through lifts and keep for 1 to 2 seconds every 8" o/c. **DO NOT OVER-VIBRATE**
- Vibrate or shake rebar to clear buildup of concrete
- Pay close attention to consolidation around doors and windows
- Check for plumb straight square and level; and re-align walls with bracing turnbuckles
- To make minor adjustments to elevation, raise track and pin to foam panels
- Screed away excess concrete and trowel smooth
- Set anchor bolts at specified centers
- Recheck and adjust alignment
- Clean concrete from walls with hose or pressure washer
- Clean concrete from all metal bracing and walking boards
- Crew members should thoroughly wash hands and exposed skin areas

28. Remove Bracing

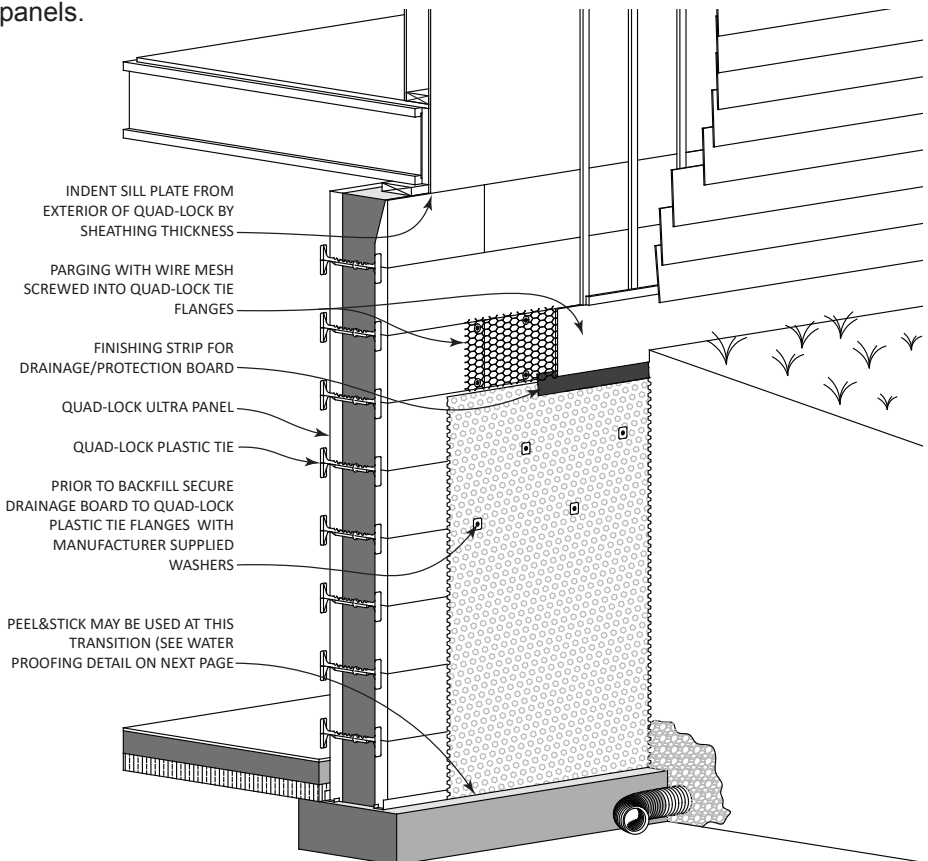
- After sufficient curing, remove vertical braces and window & door bracing
- Fill gaps and holes with spray foam where foam panels may have been damaged
- Rasp foam to level any areas where bowing may have occurred due to excessive vibration
- **DO NOT BACKFILL** before floor is installed

29. Damp Proofing & Water Proofing

- Confirm local code requirements for below-grade water management in your specific area.
- All below grade walls for occupied spaces MUST be damp proofed at a minimum.
- Potential for saturated soils and hydrostatic pressure MAY trigger a requirement for water proofing.
- A well-designed and constructed footing drain is critical. NEVER route water runoff from roof gutters into footing drains, but rather into separate “tight-line” drains.

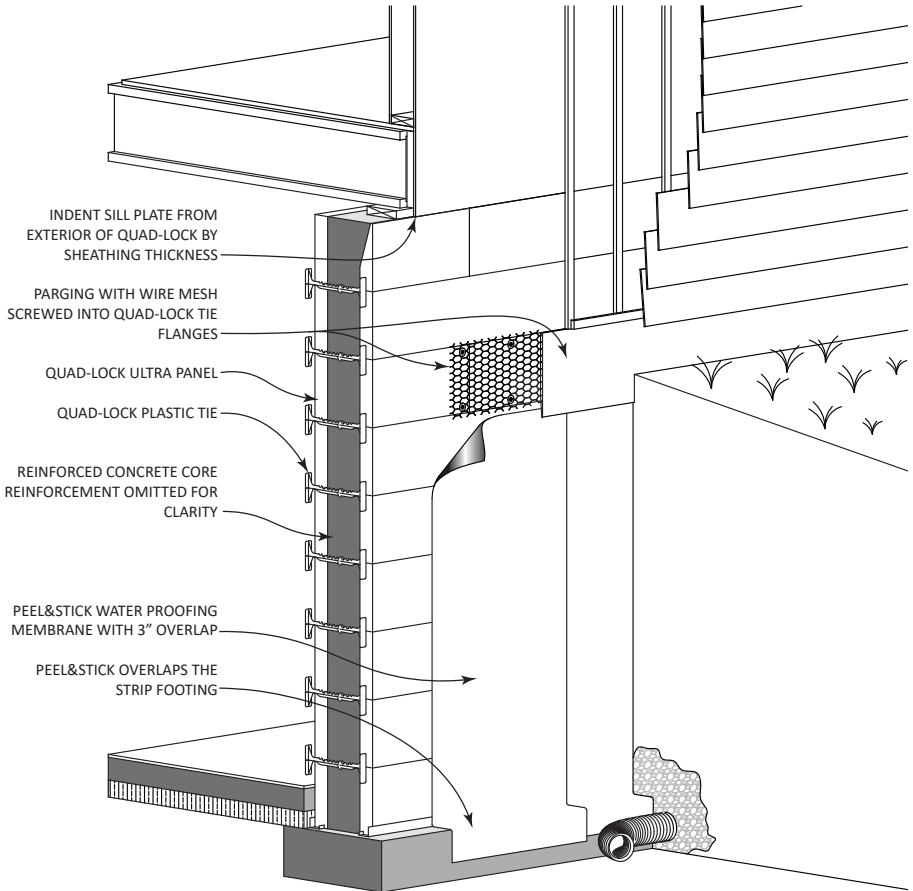
Damp Proofing

- Isolate damp soils from walls by applying a plastic dimpled drainage mat layer over your ICF walls. Terminate drainage mat at grade level using a termination strip supplied by the drainage mat manufacturer.
- Roll-on emulsion damp proofing products (if compatible with EPS) are acceptable when combined with fabric mesh to span joints between ICF panels.



Water Proofing

- For self-adhesive (“peel & stick”) membranes, prime the surface of the ICF with a primer recommended by the membrane manufacturer. Pay attention to temperature and moisture conditions. Clean the footing surface and apply primer to it as well
- Pre-cut self-adhesive membrane to fit VERTICALLY from grade level to footing, plus enough to wrap over edge of footing.
- When primer is adequately dry, immediately apply membrane from top of wall down. Peel away backing paper as you go.



- Quad-Lock recommends that self adhesive membranes be protected against backfill materials.

30. General Checklist

<input type="checkbox"/>	Building lines are snapped on footings. Take into account the EPS panel thickness!
<input type="checkbox"/>	Steel reinforcing details and specifications checked; crew members briefed on placement details
<input type="checkbox"/>	Wall elevations confirmed; ensure adequate brace & scaffold height
<input type="checkbox"/>	Metal track thoroughly checked for secure fastening around entire perimeter
<input type="checkbox"/>	Ensure Quad-Lock Ties placed 12" o/c, horizontally, vertically and flanges in corners (in metal brackets)
<input type="checkbox"/>	Walls aligned and plumb, checked for square
<input type="checkbox"/>	Vertical bracing strong-backs placed at maximum 6 ft. intervals
<input type="checkbox"/>	Braces secured to each tie flange 12" o/c with fasteners specified by brace manufacturer
<input type="checkbox"/>	Common seams secured with plywood cleats after corners are plumbed. Spray foam remaining gaps
<input type="checkbox"/>	Rough opening sizes confirmed; double check rough opening dimensions and elevations. Electrical and plumbing supply entry points located and sleeves placed
<input type="checkbox"/>	Floor elevations and finishes accounted for in placement of door opening elevations
<input type="checkbox"/>	Window/Door buck-outs pre-built; include flashings, water-stops, or any elements left in the wall for prevention of water-intrusion
<input type="checkbox"/>	Panels secured to internal buck-outs with screws and Wind-Locks (both sides)
<input type="checkbox"/>	Openings checked for plumb, straight, square and level; openings braced horizontally and vertically. Window sills open to allow concrete pour & consolidation (always pour sills first!)
<input type="checkbox"/>	Door & window lintel dimensions and reinforcement confirmed; rebar secured

PRIOR TO CONCRETE POUR

<input type="checkbox"/>	Confirm compressive strength on concrete order (psi) from plans or engineering specifications.
<input type="checkbox"/>	Concrete aggregate size confirmed: 3/8" for 6" concrete core and 3/4" for 8" concrete core and larger
<input type="checkbox"/>	Pumping equipment on site with max 3" hose (preferred)
<input type="checkbox"/>	Concrete mix ordered at low slump (3" to 4") with water. Add plasticizer to increase slump. Recommended minimum slump 6" at time of pour
<input type="checkbox"/>	Concrete truck delivery spaced to allow time for placement and initial set of 1 st lift
<input type="checkbox"/>	Adequate labor available for pour. Have working vibrators and cords in place prior to beginning pour

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