

BENCHMARK

Insulated Concrete Forms

Benchmark Foam Insulated Concrete Forms (ICF) forming components should only be assembled by workers who have been properly trained. It is the installer's responsibility to make sure that training is done before construction begins. Serious injury, death or property damage may result from improper assembly and installation of forming components!

Before beginning check local engineering and building codes on cast-in-place concrete construction. This guide covers typical building situations and is not meant to replace specific codes for engineering or safety.

Tools & Materials Needed Before Starting:

TOOLS:

- | | | |
|----------------|------------------|-------------------------|
| • Tape Measure | • String Line | • Course Tooth Hand Saw |
| • Hammer | • Tin Snips | • Utility Knife |
| • Pliers | • Ladder | • Circular Saw |
| • 4' Level | • Electric Drill | • Chalk Line |

MATERIALS:

- | | |
|-------------------------------|--|
| • 2" x 4" Lumber for Bracing | • 2" Lumber for Doors & Windows |
| • 1" x 4" Wooden Grade Stakes | • 3" Course Thread Screws |
| • Plastic Insulation Washers | • High Quality Low Expanding Foam Adhesive |

Inventory Items Needed:



Folding ICF Blocks
16" x 48" blocks with continuous firing tie every 6". Available in 4", 6", 8", 10" and 12" concrete thickness.



King Corner Blocks
Left and Right King Corner Blocks are alternated between courses.



In-Wall Bracing
Steel in-wall bracing is used to help keep your assembled wall straight from corner to corner.



Additional Forms and Ties
Benchmark Foam provides a variety of different forms and ties to construct any wall shape.

Benchmark Foam is not liable for any losses resulting from improper assembly; losses resulting from failure to use the product for its original intended purpose or any losses resulting from the failure of the assembler/installer to follow local building codes.

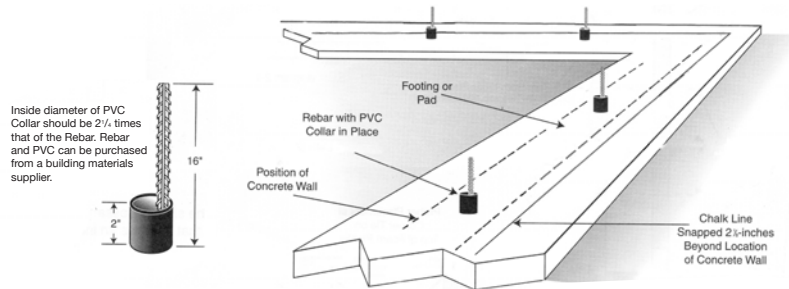
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Quick response is our guarantee.

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1. Footing or Pad Preparations

Footing or pad must be level, uniform and wide enough for the form to rest on. Footing must also be proper width and thickness for soil conditions. Check with local code officials for guidelines and specifications. First course (row) of forms will be glued to the footing/pad, along the chalk line.



2. Start at a Corner

Using low expansion foam adhesive, run a bead of glue along the bottom side of the corner form. Set the corner in place on the footing following the chalk line. Glue will normally set within 20 minutes.



3. Glue First Course of Forms

Once the first course of forms are set, place foam glue every 18-24 inches so that it expands enough to protrude from both sides of the form. Glue both sides of the form wall.



4. Staggered Seam

Using the alternating King Corner blocks, place the corner block onto the first row corner block. These alternating left and right King Corners produce staggered seams through the wall assembly.



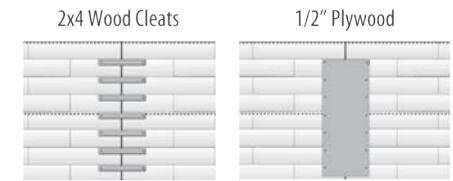
5. Common Seam

Reinforce the common seam at the center of each wall using the same foam adhesive. For common seams that are within 36" from the corner, use additional materials to reinforce the common seam, such as wood cleats (pictured at right).



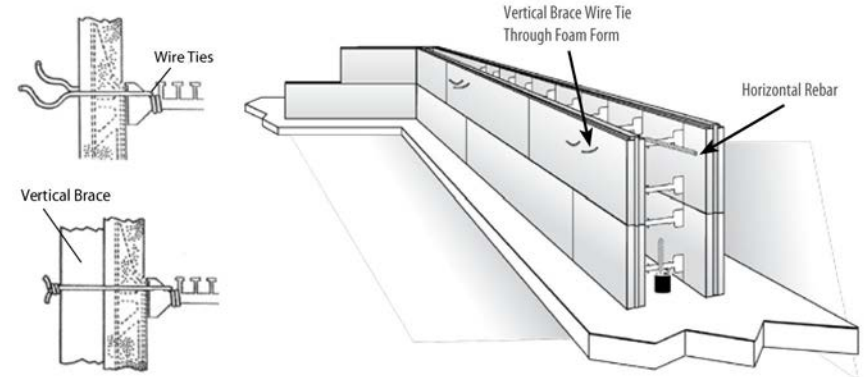
Optional Reinforcing Methods

If building on-bond with a common seam, Benchmark Foam recommends using wood cleats or other forms of reinforcement.



6. Vertical Bracing

Begin installing wire ties with the second course of forms. A 24-inch length of 18 gauge wire is pressed through the form wall and wrapped around a Spacer Tie, leaving the ends extending out. As assembly continues, wire ties should be placed a maximum of every 32 inches up the wall, with rows placed approximately 6-feet apart, along the entire wall. If a brace is also being used to support a work platform. Braces should be placed in the corners to support the work platform. Always follow OSHA guidelines when constructing and working from platforms.



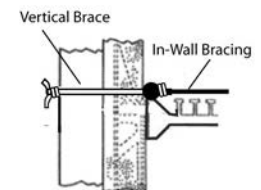
7. In-Wall Bracing

Horizontal in-wall bracing should be installed horizontally at a minimum of every 4' of wall height, and installed horizontally at the top of the top course. Overlap of the in-wall bracing should be at least 1' and is intended to be continuous throughout the entire length of the wall. Always wire-tie the in-wall bracing to the vertical stud wherever the horizontal in-wall bracing is located.



IMPORTANT!

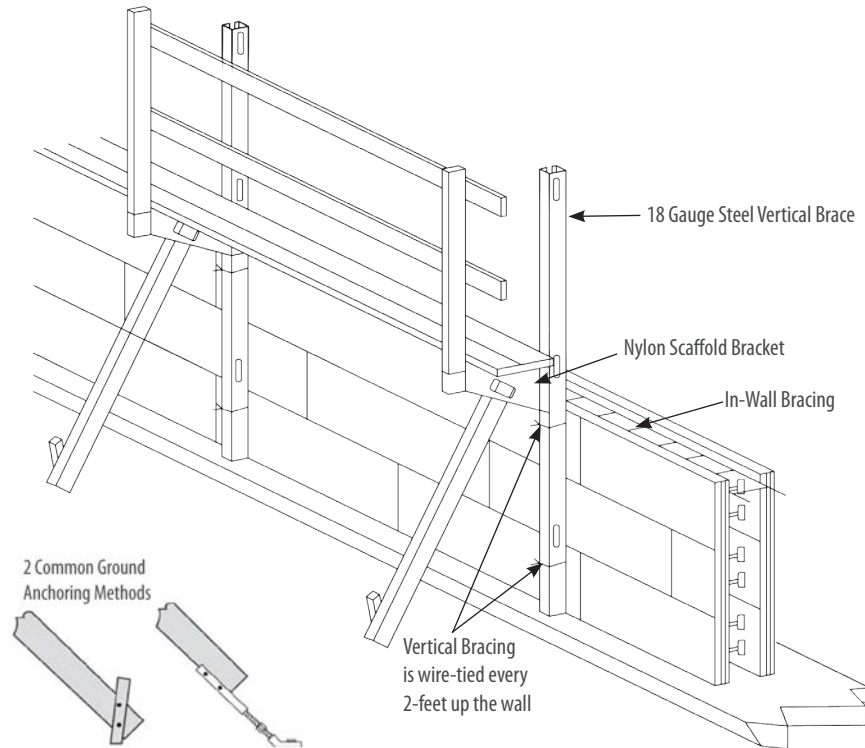
Wherever a vertical brace will be located, make sure to use a wire tie wrapped around the in-wall bracing. This will ensure a straight wall from corner to corner.



8. Vertical Bracing

When assembled wall reaches 4-courses high, exterior vertical braces must be attached along one side of the form. They are placed approximately *6-feet apart and are anchored to the form with the wire ties which were installed earlier. Braces can be good-quality dimensional lumber (2x4) or 18-gauge steel. Additional braces should be used next to window or door jambs. A diagonal “kicker” brace is anchored to each vertical brace. If optional steel In-Wall Bracing is not used, vertical braces should be placed approximately every 4-feet apart, to ensure proper alignment.

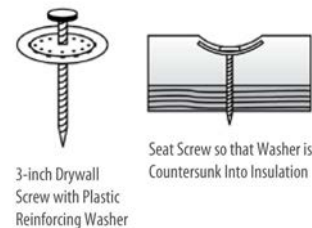
*Maximum spacing of 6 feet is allowed by OSHA guidelines, if brace is also being used to support a work platform.



See Page 11 for alternative method of on-site constructed exterior vertical bracing.

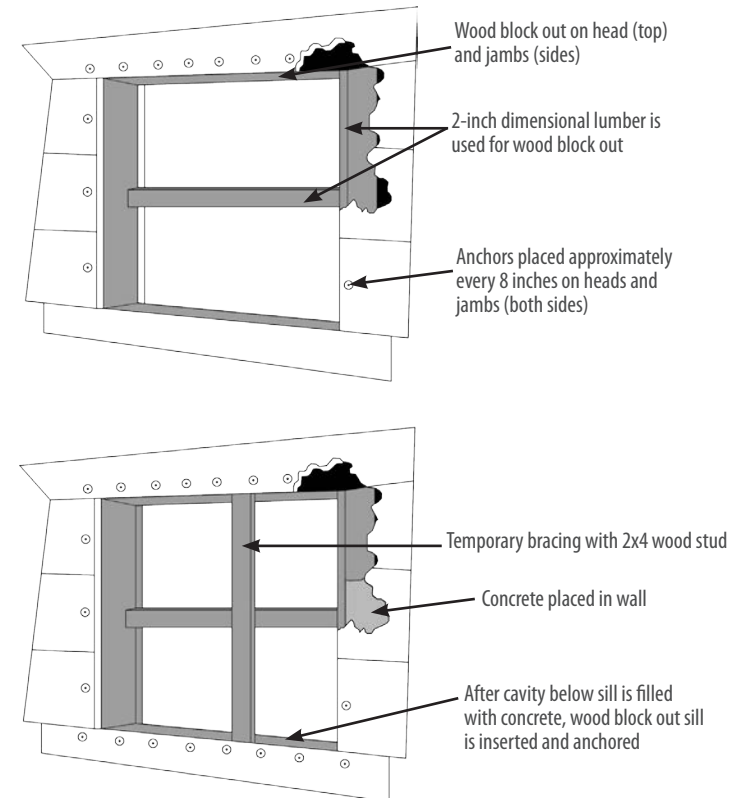
9. Window/Door Casing and Bracing (con't)

Openings can be built during form wall assembly or they can be cut in with a hand saw, after the form is assembled. Before placement of concrete wood block outs are securely anchored at head and jams. A temporary 2x4 wood brace is added to openings over 2-feet tall. Wood sill block out is not placed at this time.



9. Window/Door Casing and Bracing (con't)

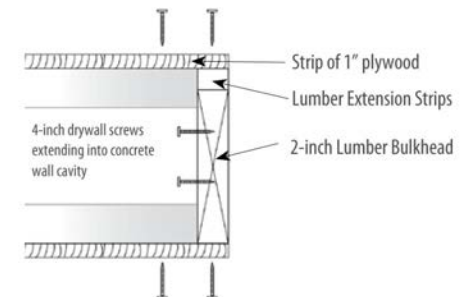
After placement of concrete up to the sill height, the wood block out is positioned at the sill, between the forms walls and anchored. Before placing anymore concrete, temporary 2x4 wood braces are added to openings over 2-feet wide.



See Page 10 for alternative method of window and door casing that promotes positive water drainage and blocks air infiltration.

Alternate Technique for Window and Door Casing

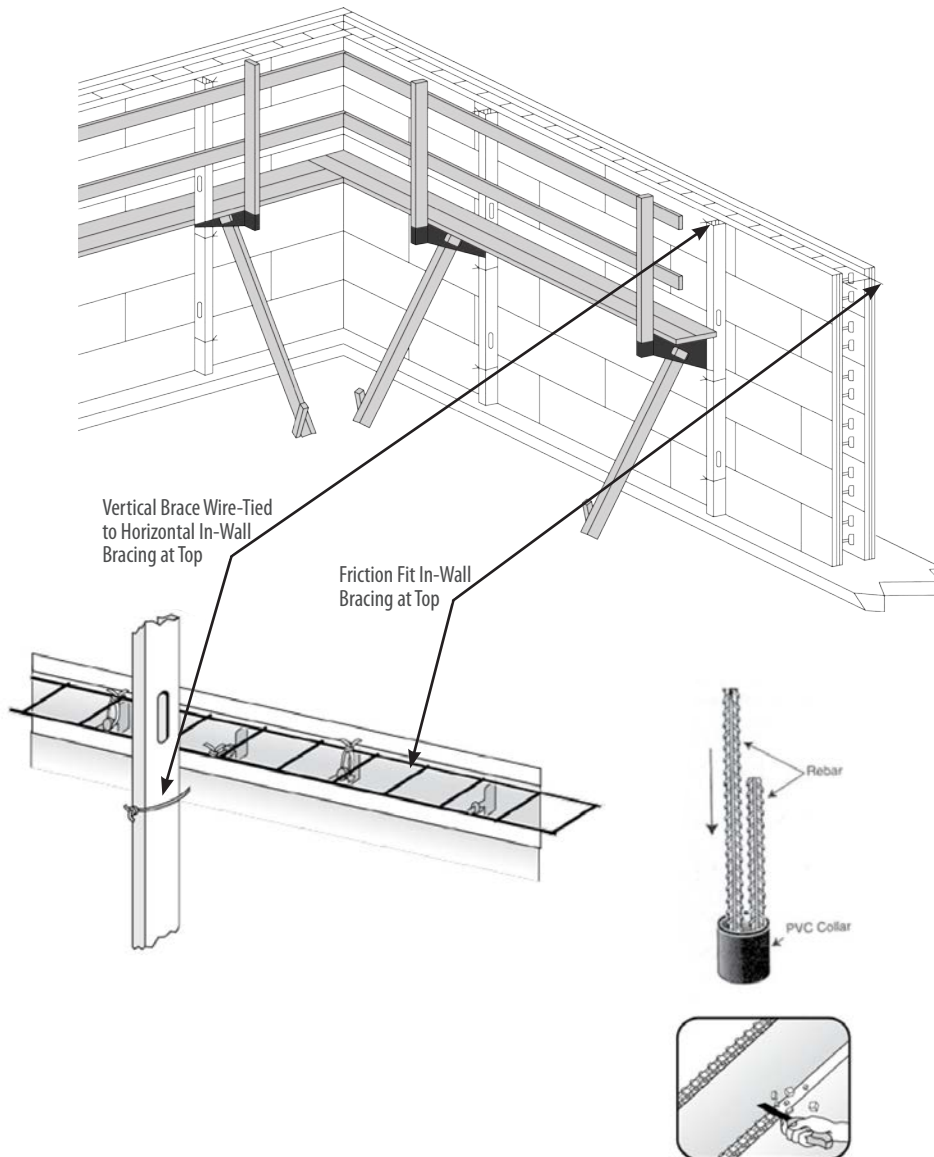
The 2-inch dimensional lumber (for block outs) can be installed flush with trimmed edges of insulation. The 2-inch lumber is anchored in place with strips of 1-inch plywood or 1x4 lumber anchored to bulkhead and plastic spacer ties with drywall screws. Strips of 2-inch lumber are used to extend the width of block out lumber (concrete wall width + 4-inches).



10. Top Assembly of Form Wall

When assembled wall reaches full height, vertical rebar is lowered in between the foam planks. Insert into the PVC collar up against the other rebar protruding from footing or pad and wire-tie to connector tie at top of wall. Steel in-wall bracing is 'friction fit' around the entire wall. The vertical 2x4 braces are anchored to the form with lengths of wire through the form wall and around the steel in-wall bracing.

If a wood frame structure will be constructed above the concrete wall, castellations should be removed with a sharp blade, to ensure a smooth fit.



Calculate Concrete

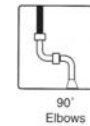
Length in feet x Height in feet x Thickness in inches x .0031 = Cubic yards of concrete

Concrete Specifications

1/2 to 3/4 inch smooth aggregate
2,500 to 4,000 psi mix
4 to 6 inch slump

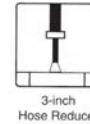
Placing Concrete with Concrete Pump

Concrete is often placed in the insulated form walls with a concrete pump. To minimize the risk of form failure, the discharge pressure from the pump hose should be reduced, by using one of the following techniques. Most pump operators are familiar with these techniques and can provide the necessary accessory if they are notified, in advance.



90° Elbows

90-Degree Elbow - this two-elbow accessory is attached to the pump's delivery hose to reduce discharge volume and pressure.



3-inch Hose Reducer

Hose Reducer - A 3-inch reducer is attached to the pump's delivery hose. The 3-inch discharge hose reduces the concrete's discharge pressure.



Rope or Strap Hose Harness

Hose Harness - If the 90-degree elbow or hose reducer is not available the discharge hose can be fitted with a rope or strap harness to bend it so that concrete is not discharged straight down, into the form. The hose is diverted and allows the concrete to fall naturally.

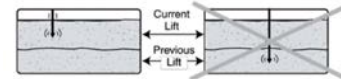
Placing Concrete in Lifts

Place concrete in lifts not to exceed a height of 4-feet, with no more than 8-feet of concrete placed vertically in one hour. This rate must be followed, regardless of how concrete is placed into the form. Placing concrete in lifts over 4-feet per lift can cause immediate form failure (blow-outs).



Vibrating Walls

Only experienced operators should be allowed to use an electronic vibrator with 1-inch head to consolidate concrete.



Wallibrator

Drill attached external vibrators like the Wallibrator can be used to vibrate wall forms from the outside of the form wall. The Wallibrator is available from Benchmark Foam. Ask a sales representative for more information.



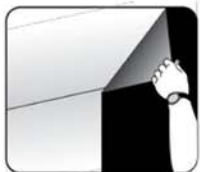
Winter Weather Precaution

If a winter project is delayed for several days. Assembled forms should be covered to protect the accumulation of ice or snow at the bottom of the form. If this debris is not removed, they will cause voids in the wall when the concrete is placed.



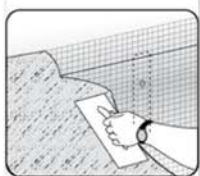
Damproofing

Select only latex or low-solvent liquid damproofing which is approved for application directly onto the polystyrene insulation. Apply a liberal coating directly onto the form sealing the seams in the form wall.



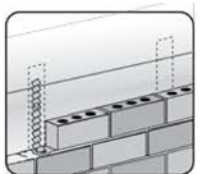
Waterproofing

Self-adhesive membranes (minimum 60 mil thickness) or approved liquid waterproofing materials can be applied directly to the form walls. Follow manufacturer's recommendations for application directly onto rigid polystyrene insulation.



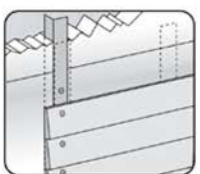
Stucco, EIFS, Synthetic Masonry

Insulation surface must first be roughened by sanding or scratching. For products having a base coat and mesh, the mesh is anchored directly to the concealed tie pads. Follow manufacturer's instructions for proper placement, temperature control, etc. Forms walls which have been exposed to the environment for more than 90 days will normally have a light coat of fine "powder" which must be thoroughly brushed off before applying finish.



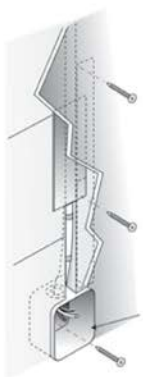
Brick

With a concrete brick ledge, brick veneer (fascia) can be added directly of the form walls. Brick anchors may be attached to the concealed plastic tie pads or may be inserted throughout the form walls, into the form cavity, prior to placement of concrete. Follow local building codes or accepted practices for the placement of brick anchors.



Drywall or Siding

Gypsum board (drywall) is attached directly to the form walls. This is done by anchoring the drywall to the form's concealed continuous vertical furring strips with a drywall screw. The furring strips are the tab-ends of Spacer Ties and are located every 6-inches on both sides of the forms.



Electrical and Plumbing Lines

Follow local codes for the types of electrical and plumbing components which are acceptable for project. Electrical and plumb lines are concealed in the insulation by cutting or carving a pathway approximately 1-1/2" inches deep with a saw, router or hot knife. For junctions or switch boxes, insulation is completely removed and items are anchored directly into the concrete. Electric lines can be protected by running the inside approved metal or plastic conduit. Damage to lines can also be avoided by covering the pathway with a 16-gauge metal strip, approximately 2-inches wide, anchored to the concealed tie pads with a drywall screw.

Electric lines can be held to the back of the pathway by using approved electrical anchors or expandable insulation placed approximately 2-feet apart.

Molded Corners for 4", 10" and 12"

Corners for other wall thicknesses are formed using a molded corner and corner tie.

First Row

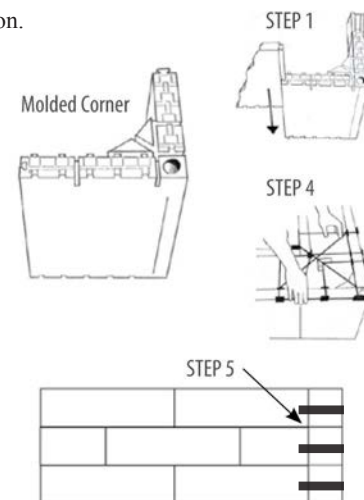
Step 1 - Slide 2 blocks into a pre-molded corner section.

Step 2 - Secure the corner section using foam adhesive.

Step 3 - Adjust blocks to form the 90 degree corner. Remove approx. 2" of the exposed tongue on the inner block to accept the corner tie.

Step 4 - Place Corner Tie onto assembled corner and press down firmly into the pre-molded slots. Be sure to leave 1/2 of the tie above the corner for the next course.

Step 5 - Reinforce the common seam at the corner using clips, plywood, or 2' lengths of 2x4 lumber.



45° Corner

To accommodate ornate features in home layout, Benchmark Foam offers a custom cut 45-degree corner. This corner option maintains the same physical properties of Benchmark ICF blocks, including the easy to install tongue-and-groove interlock that slides flawlessly into Benchmark ICF blocks. The 45-degree corner comes standard in 4' lengths and can be customized to fit your design. Consult with your Benchmark Foam representative for more details.

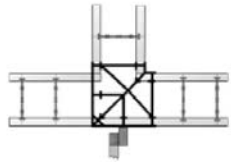


T-Intersection



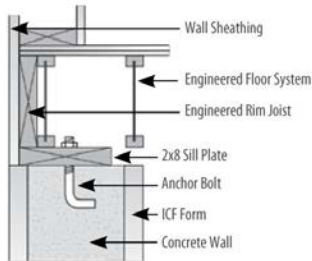
8" Concrete Wall

For a T-Intersection along a straight concrete wall up to 8-inches thick one side of a full block must be removed, at the intersection and the intersecting block is placed at the intersection. Slots must be cut in the blocks, to accommodate an Exposed T-Intersection Tie. A tie is placed at the bottom and top of wall and at each course of blocks. A vertical brace is anchored to support the backside of the T-Intersection.



10" and 12" Concrete Wall

Exposed 90-degree Corner Ties are used in intersections for walls which are over 8-inches thick. The blocks are cut and positioned as usual. The T shape is assembled by alternating the position of the 90-degree Corner Tie as the wall is assembled. Additional bracing is also required. For T-Intersection in concrete walls which are over 12-inches thick, 12-inch Exposed 90-degree Corner Ties are cut apart and re-wired at the new width using 18 gauge wire.

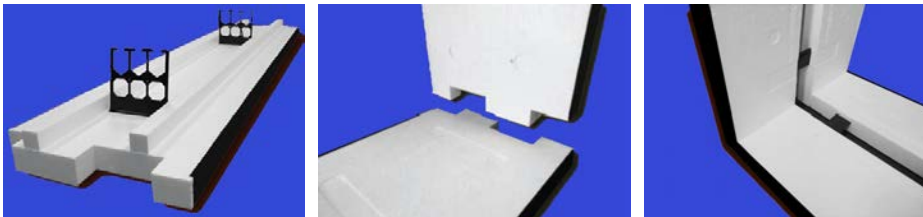


Top Plate

Detail as drawn is a general guide only and does not replace manufacturer's guidelines for application of their products or the prevailing construction codes for a particular region or project design.

Alternative Method of Window and Door Casing

An alternative option to form window and door openings in Benchmark ICF block construction is using Gorilla Buck window and door casings. Manufactured to promote proper water drainage and block air infiltration, Gorilla Buck offers a simple solution with easy installation. Friction-fit assembly has water tight corner connection. The exterior rebar holders mechanically bond buck webs to the concrete to ensure a long-lasting connection.

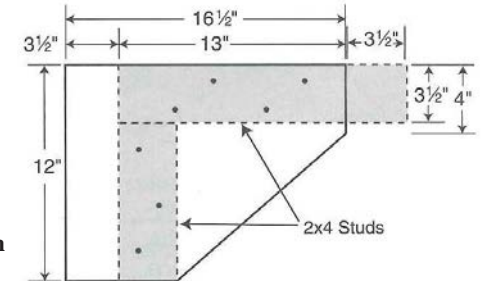


On-Site Constructed Exterior Vertical Bracing

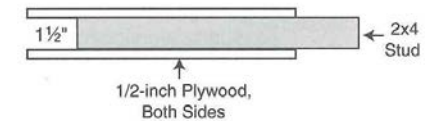
An adjustable brace/scaffold is an accessory item which can be built by the contractor and reused several times. It consists of three primary parts:

1. Adjustable Scaffold Cleats
2. Vertical 2x4 Scaffold Studs
3. Working Platform Rated Planks

Adjustable Scaffold Cleat Side View



Top View



Adjustable Scaffold Cleat

Adjustable Scaffold Cleats are pre-assembled with sections of 2x4 studs and 1/2" plywood using drywall screws. This design allows them to be quickly attached and removed from the vertical scaffold stud.

