Chapter 2. Cap Foundation

Tools needed by volunteers:

Hammer
Nail apron
Tape measure
Square
Utility knife
Pencil

Tools and equipment needed:

Generator
Extension cords
Circular saw
Chop saw
Air compressor
Pneumatic nailers
I-joist cutting jig
Sledgehammer
Adhesive applicator
Framing square
String line
Chalk line
Stepladders
Extension ladder

Materials needed:

2x10 Rim boards
Floor I-joists
¾" Deck OSB
16d nails
8d nails
Joist hangers
Joist hanger nails
2" Button nails
1" Foamboard
2" Foamboard
Construction adhesive
Acrylic caulk
Geocel caulk

Personal Protection Equipment:

Safety glasses (required)
Hard hat – below deck (required)
Fall protection harness (required)

Reference Materials:

House Plan
Manufacturer's Layout Plan

Safety First! Review the Safety Checklist before performing tasks in this chapter.

2.1. INSTALLING I-JOISTS AND SILLBOX

2.1.1. Installing I-Joists

1. Before proceeding with any installation, check the Manufacturer's Layout Plan for details. Verify that all materials are present in the stated dimensions. Note areas on the plan where specific dimensions will be needed.

2. Starting at the zero end, place the end of a measuring tape on the exterior edge of the short wall sill plate and lay out the I-joist centers (typically 19.2" apart), as specified on the Manufacturer's Layout Plan, on both long wall sill plates and the lam-beam. Once the centers have been marked, use the joist layout jig to mark the two sides of the I-joist locations for each center mark and place an "X" between the marked sides.

   NOTE: The diamond mark on most measuring tapes corresponds to multiples of 19.2".

3. Check the width of the rim boards (typically, they are 1⅛", but can vary by as much as ⅛"). From the outside edge of the sill plate, measure in the thickness of the rim board on the sill plates at all four corners and snap a chalk line around the perimeter of the sill plate. This line will be used to position the I-joists. Be sure to check the line for straightness (e.g., by using a string line).

4. At both ends of the house and in the middle, measure the distance from the chalk line on one long wall to the chalk line on the other long wall. If all three measurements do NOT agree, re-snap one or both of the lines using red chalk.

5. To install an I-joist, first verify that at least one end of the I-joist is square (if neither end is square, square up one end). Set the I-joist on a joist location mark made in Step 2 above so its square end is resting on the zero wall covering half of the chalk line. Mark the other end of the I-joist where it intersects the chalk line on the opposite sill plate. Cut the I-joist to that length using a circular saw and the I-joist cutting jig.

6. Position each I-joist on a joist location mark with the end on the zero wall covering half of the chalk line. Check the I-joist for a crown, and install crown up with 3¼" Paslode nails. Nail I-joists into the sill plate using six nails total: at each end, one nail into each side of the flange a minimum of 2" from the end (to avoid splitting the flange); one nail into each side of the flange directly over the joist location mark on the lam beam.

   NOTE: Do NOT hand nail the I-joists with 16d nails as this may split the flange.

7. Not all I-joists can be installed on the first day because the concrete crew needs space into the foundation opening in order to pour the basement floor. Ideally, I-joists are installed at both ends of the foundation and near each support post. If time

allows, other I-joists can be cut and stacked next to nearby I-joists that were permanently installed.

NOTE: Installing I-joists near the support posts helps to stabilize the posts and the lam beam when the floor is being poured.

2.1.2. Installing End Blocking

1. Use I-joist material for end blocking. Beginning at the zero end, mark end blocking locations on the short wall sill plate every 32" o.c. from the outside edge of the long wall sill plate.

   REQUIREMENT: When measured center-to-center, the spacing of the end blocks CANNOT be greater than 32".

2. The 32" spacing needs to be adjusted when either of the following two conditions is encountered:

   a. If the blocking location falls on a foundation bolt, move the marks for the location several inches closer to the previous set of blocking marks in order to position the blocking so it does not fall on the bolt. Then, continue marking blocking locations every 32" o.c. from this latest mark.

   b. If the spacing results in the center of the last end block being positioned less than 32" from the outside edge of the opposite long wall sill plate, install the last end block half way between the second to last end block and the outside edge of the opposite long wall sill plate.

      NOTE: This adjustment on the position of the last end block ensures there is sufficient room for access from the basement into this area.

3. Repeat this process along the other short wall sill plate.

4. Measure the distance from the chalk line to the first I-joist at several locations along the line. Ideally, determine a common measurement that can be used for all the blocking along that wall. Cut enough scrap I-joist material to that length to create end blocks for the entire wall.

5. Set an end block on a blocking location mark made in Step 2.1.2.1. Position the flange of the blocking so its outside edge sits directly above the chalk line on the sill plate. Nail the blocking – with one 3¼" Paslode nail on each side of the flange – a minimum of 2" from the end of the flange.

6. After the rim board has been installed (see Section 2.1.3 below), square the blocking and nail from the rim board into the flanges of the I-joist blocking using 2⅜" Paslode nails - one on the top and one on the bottom.

7. Flush the top of the blocking with the top of the I-joist and make sure the blocking is square to the I-joist. Then, toenail through the I-joist into the flanges of the blocking using 8d nails - one on the top and one on the bottom.

   NOTE: It sometimes helps to clamp the pieces in place before toenailing.

2.1.3. Installing Rim Boards

1. Because the rim boards bear the weight of the outside walls, the width of the rim boards should be identical to, or slightly (no more than ⅛") greater than the height of the I-joists. If this difference is greater than ⅛", rip the rim boards on the table saw so they are the same as, or slightly wider than, the height of the I-joists.

   NOTE: Each rim board may be different (i.e., some need to be trimmed others don't), so test each rim board separately.

2. Dry fit the rim board in its intended location. Check the rim board for a crown; if it has a crown, install crown up. If the rim board sticks up above the I-joists by more than ⅛", repeat Step 1.

3. Apply a thick bead of caulk on the sill plate where the rim board will sit. Install the rim board rough side out. Caulk the seams where rim boards abut.

4. Nail the rim board to the I-joists using 2⅜" Paslode nails. To avoid splitting the joist flanges, use only one nail in each top flange and only one nail in each bottom flange. For the same reason, do NOT seam rim boards on I-joists.

5. Toenail the rim board to the sill plate every 6" using 2⅜" Paslode nails.

6. Mark the locations of all end blocking on the outside face of the rim board with a black marker.

   NOTE: This helps to ensure the sheathing is nailed to the end blocking when the foundation is capped. It also helps locate the blocking so, when erecting exterior walls, the bottom wall plates can be secured to the blocking and not to the rim board.

7. On the first construction day, any rim board above porch areas must be covered with foamboard and house wrap (see Figure 2-1).

   a. Cut a length of house wrap that is 1-2' longer than the length of the porch. Center it on the porch and attach it to the I-joists or end blocking so it hangs over the rim board and extends down about 1" below the top of the 2" foundation foamboard.

   b. Rip 1" foamboard to 10⅞" wide. Place the foamboard over the house wrap and fasten it to the rim board with 2" button nails so it is flush with the top of the rim board and seams are staggered with those of the rim board. Attach

sufficient lengths of foamboard in these areas so it extends about 6-12" beyond the edges of the porch.

NOTE: This step must be completed before concrete can be poured in the porch areas.

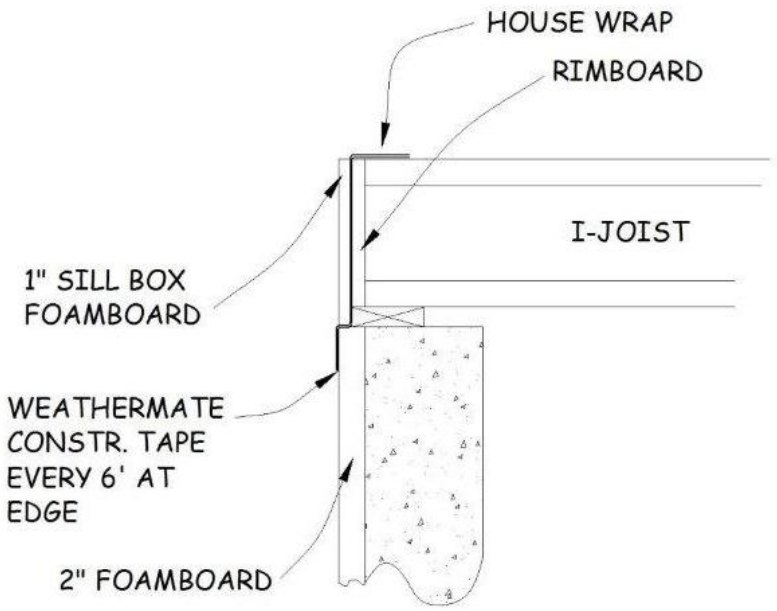

Figure 2-1. Sill Box Section.

2.2. FRAMING STAIR OPENING

1. Typical framing for the stair opening uses a combination of Laminated Veneer Lumber (LVL), lam beam and rim board material.

   NOTE: Some of the following steps may need to be modified for atypical stairway configurations. Use the Manufacturer's Layout Plan to guide the installation.

2. Per the Manufacturer's Layout Plan, lay out joist and LVL spacing for the stairway, labelling the locations for short I-joists with "SX" and the LVL positions with "LVL".

3. Cut material to length.

4. Install the two long LVL beams on the designated marks and toenail the ends to the sill plate or lam beam with 16d or 3¼" Paslode nails.

5. Position the length of rim board on top of the lam beam between the two LVL beams and flush with the face of the lam beam on the stairway side of the beam. Attach the LVL beams to the rim board with 3¼" Paslode nails.

6. Install the short LVL beam by first attaching joist hangers to the long LVL beams in the desired location. Attach the hangers with joist hanger nails. Secure the LVL beam inside the joist hanger using 16d nails (or, if 16d nails will protrude through the thickness of the beam, use joist hanger nails).

7. Mark the location(s) of the short I-joist(s) on the short LVL beam. Measure and cut the I-joist(s) extending from the sill plate to the short LVL beam. Attach joist hangers to the outside face of the short LVL beam in the desired location(s) and install the I-joist(s).

8. Install the temporary stair cover by first attaching the temporary cover support ledgers (lengths of 2x6 with joist hangers attached) to the inside faces of the long LVL beams using 4" lag screws. Then, insert pre-cut 2x6 temporary joists into the joist hangers. Finally, secure the pre-cut OSB temporary covers to the ledger boards with 8d nails.

NOTE: Use hardware found in the trailer in a bin labeled "Temporary Stair Cover Hardware".

2.3. INSTALLING FOAMBOARD IN SILLBOX

2.3.1. Preparation

1. Install the equivalent of 2" of foamboard in the sillbox (using either a piece of 2" or two pieces of 1" foamboard). This may be done before or after the rim board has been installed. Installation is easier if done before rim board installation, and it helps to square up the I-joists for nailing to the rim board.

2. Determine how many pieces are needed and of what length for the entire sillbox. There are two standard sizes: 9-7/16" x 18⅞" for between the I-joists and 9-7/16" x 31⅝" for between the end blocking. Pieces longer or shorter than normal are needed near the stairwell opening and near the corners of the foundation.

3. On the table saw that has been designated to only cut foamboard, raise the blade to ½" above the foamboard and rip the foamboard to 9-7/16" x 8' strips. Make sure all the safety guards are in place.

NOTE: Do NOT use the DeWalt table saw for this operation

2.3.2. Cutting Foamboard to Length

1. Five 18⅞" long pieces can be obtained from an 8' strip. For pieces that are either shorter or longer than 18⅞", determine what combination of pieces to cut from an 8' strip to minimize waste.

2. Unplug the saw. Remove the table saw's fence and the blade guard and put them into the attachment compartment below the saw.

3. Use the "cross cut sled" riding in the left track. Make sure it slides back and forth freely. (The "cross cut sled" will cut the pieces that are 18⅞" and shorter. The longer pieces need to be cut to length with a handsaw.)

4. Slide the piece up to the stop and slide past the saw blade. The piece will be cut to 18⅞".

2.3.3. Notching Foamboard Pieces

1. Unplug the saw.

2. Remove the blade guard (loosen the two thumb screws) and put the guard in the storage area below the saw.

3. Place the "Notch Cutting Jig" on the left side of the saw table so that the blade comes through the jig slot and the jig fits securely in the left side track. Make sure the blade turns freely (no contact with the jig).

4. Adjust the saw blade height so that it is 1½" above the surface of the jig.

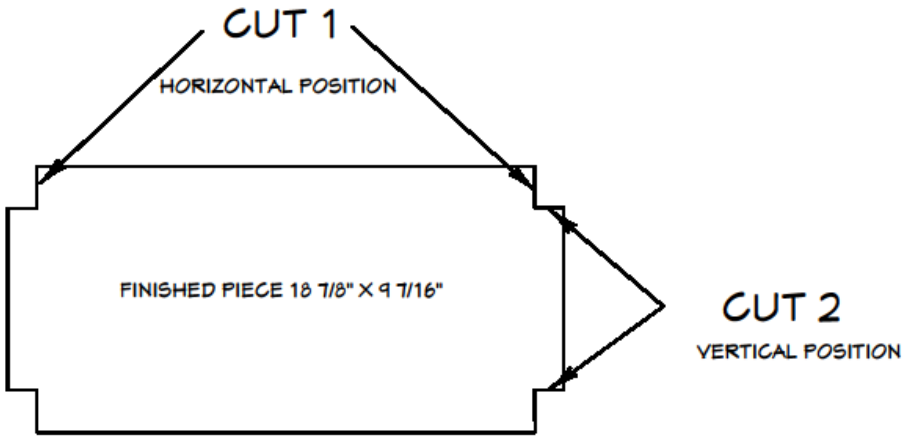

Figure 2-2. Foamboard notches.

5. Set the "adjustable notch guide" in the #1 (HORIZONTAL) notching position (lift and rotate the guide).

6. Plug the saw in and turn it on.

7. Hold the foamboard HORIZONTALLY in the jig against the stop (on the right) and push the foamboard downward into the blade until it hits the surface of the jig. Repeat for the remaining three HORIZONTAL corner cuts.

8. When all pieces have been cut HORIZONTALLY, set the "adjustable notch guide" in the #2 (VERTICAL) notching position (lift and rotate the guide as needed).

9. Hold the foamboard VERTICALLY in the jig against the stop (on the right) and push the foamboard downward into the blade until it hits the surface of the jig to complete the notching cut. Repeat for the remaining three VERTICAL corner cuts.

2.3.4. Installing Foamboard

1. Install the foamboard in the sillbox, carefully cutting around any interfering anchor bolts.

2. Apply acrylic caulk on the inside, where the foamboard meets the sill plate and the I-joists.

3. Fill any notches around the anchor bolts with caulk.

4. Caulk any seams in the foamboard.

NOTE: This process for installing the foamboard is very important because a tight air seal is needed here.

2.4. INSTALLING FLOOR SHEATHING (DECKING)

1. Begin sheathing the floor at the zero corner on the side of the house that does NOT contain the stairwell. Before sheathing, determine the best layout of the sheathing. To minimize waste, determine the best I-joist on which to start a full sheet. Also, make sure that if a piece of sheathing is cut, the drop is useable somewhere else on the floor.

2. Snap a chalk line across the floor joists at 48" from the outside edge of the rim boards on the long wall. Hold the edge of the first row of sheathing to this line.

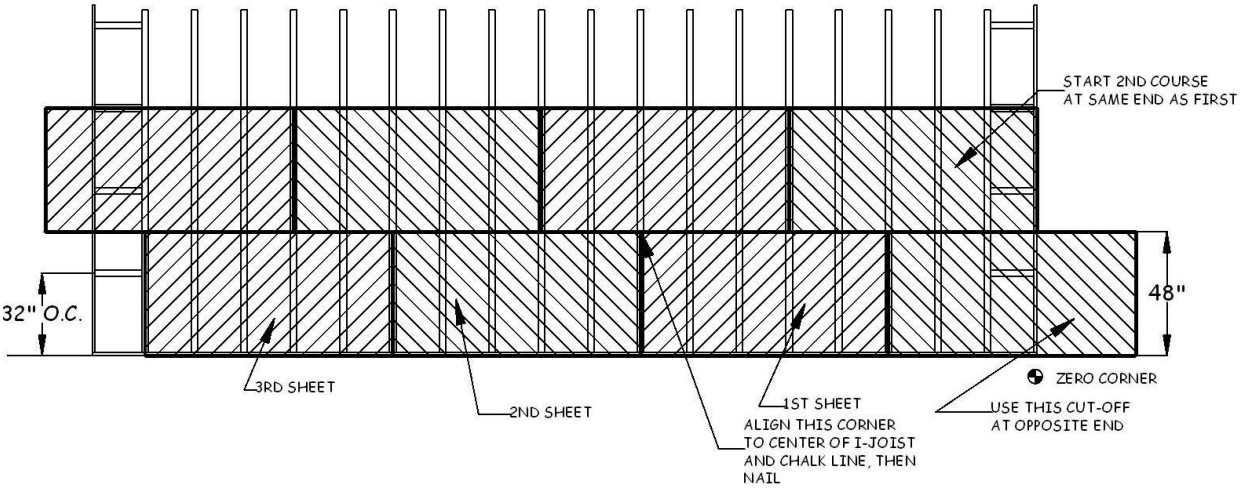

Figure 2-3. Floor Decking Layout.

3. Apply a continuous bead of adhesive to the tops of rim boards, I-joists, and end blocking. Apply two continuous beads on those I-joists where the sheathing edges abut. A continuous bead on the rim board creates an air seal between the sheathing and the rim board. Apply adhesive only when ready to install that piece of sheathing.

   NOTE: Avoid applying excess glue to prevent glue from depositing on tools, decking, porches, and the 2x4 used when securing the sheathing.

4. Before laying a sheet of sheathing, note which side is labeled "This Side Down." Start each row with a full sheet. Working from right-to left, lay a ¾"x4x8 OSB (full sheet) tongue and groove floor sheathing down on the adhesive-covered I-joists, with the grooved edge flush to the chalk line. Make sure the right edge is centered on the selected I-joist at both the chalk line (upper right) and the rim board (lower right). Secure the lower right corner of the sheathing to the rim board with an 8d nail. Next, make sure the upper right corner of the sheathing is still on the chalk line and centered on its I-joist. Secure it with an 8d nail. Move to the upper left corner of the sheet, center the left edge of the sheet on its I-joist and nail the corner to the I-joist. Finally, measuring from the right edge of the I-joist that is under the right edge of the sheet, make marks on the top edge of the sheet every 19.2". Adjust the corresponding I-joists so their right edges are aligned under these marks and nail the sheet to the I-joists.

   NOTE: The above instruction assumes a right-to-left installation. Be sure to switch right and left designations if the installation proceeds from left-to-right.

5. Finish nailing each sheet of sheathing so that there are five 8d nails in the sheathing field and seven nails on each of the ends. On the first row, also nail one 8d nail through the sheathing into the rim board midway between each I-joist. Nail two 8d nails through the sheathing into each piece of end blocking.

6. Complete the first row of sheathing and, if desired, snap a chalk line for adhesive installation of the next row. Make sure to stagger the joints of the sheathing, preferably by two I-joists (see Figure 2-3).

7. Tightly drive the tongues of the second row of sheathing into the grooves of the first row of sheathing with a sledgehammer and a 2x4 scrap so as not to damage the panels. Position and nail the sheets to the I-joists following the procedure generally outlined in Steps 4 and 5 above.

   NOTE: A maximum of ⅛" is allowed between sheathing prior to nailing.

8. After all sheathing has been installed, trim where necessary at the edges of the deck.

9. Check for nails that missed the joists, remove and re-nail.

10. Transfer the end blocking marks made in Section 2.1.3.6 to the decking, making sure each mark is at least 8-10" long. Confirm there are two nails through the sheathing into the blocking where each black mark lands.

11. Cut away sheathing over the stairwell opening leaving 1¼" overhang where the top of stairs will be attached.

12. Thoroughly clean the Adhesive Applicator, removing as much adhesive as possible, before storing it in the Tool Trailer.

    NOTE: Sometimes use of a moist towelette (e.g., wet wipes) may facilitate adhesive removal.

2.5. BASEMENT PREPARATION

1. While the basement floor is clean and dry, apply Geocel caulk to the concrete floor where it meets the wall and any other cracks in the floor. It is much easier to do this now than when framing basement walls.

   NOTE: Sealing the cracks helps air seal the basement and prevents any harmful soil gases from getting in the basement.

2. Remove any framing from basement windows and remove all debris from the egress wells.