

Chapter 1. Beam and Sill Plates

1.1 ESTABLISHING SQUARE SILL PLATE CHALK LINES

1.2 INSTALLING TREATED SILL PLATES

1.3 INSTALLING LAMINATE BEAM

1.4 INSTALLING EGRESS LADDERS AND COVERS

Tools needed by volunteers:

Hammer
Nail apron
Tape measure
Square
Utility knife
Pencil

Tools and equipment needed:

Generator
Extension cord
Circular saw
Chop saw
Reciprocating saw
Drill with $\frac{3}{4}$ " & $1\frac{1}{2}$ " wood auger bit
Drill with $\frac{1}{2}$ " masonry bit
Framing square
String line
Chalk line
Wood chisel
Caulk gun
Ratchet wrench and socket
30' tape measure
50' tape measure
6' level
Stepladder
Extension ladder

Materials needed:

2x6 treated lumber
2x4 lumber
Two laminated beam members
Sill seal
Egress ladder
16d nails
8d nails
 $\frac{1}{4}$ " x $1\frac{3}{4}$ " Concrete screws
 $\frac{1}{4}$ " x $2\frac{3}{4}$ " Concrete screws
 $\frac{3}{8}$ " x $2\frac{3}{4}$ " Power/wedge bolts
 $1\frac{5}{8}$ " Exterior screws
 $5/16$ "x $1\frac{1}{2}$ " Lag screws
 $\frac{1}{2}$ " Nuts
 $5/16$ " Washers
 $\frac{1}{4}$ "x1" Fender washers
Flat metal shims
Air sealing caulk
Spray varnish

Personal Protection Equipment:

Safety glasses (required)
Hard hat – below deck (required)
Ear protection (recommended)

Reference Materials:

House Plan
Manufacturer's Layout Plan

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

1.1. ESTABLISHING SQUARE SILL PLATE CHALK LINES

1.1.1. Checking the Foundation

1. Before marking the foundation, use a broom to remove any debris from the horizontal surfaces of all foundation walls.

1.1.2. For Square or Rectangular Foundations

1. At each corner of the foundation, measure in 4" from the outside wall of the foundation. Measure in from both sides of the corner and mark to create an intersecting initial corner mark.
2. With a long steel tape, "burn a foot" and measure the lengths (between marks) of the long walls. Record the measurements. If the two wall lengths differ by $\frac{1}{8}$ " OR MORE, adjust the corner marks to equalize the lengths by adding one-half the difference at each end of the shorter wall. Verify that both long walls are now the same length.
3. Repeat Step 2 for the two short walls.
4. With a long steel tape, "burn a foot" and measure the diagonals between the corner marks to check for square (see Figure 1-1). If the measurements differ by $\frac{1}{8}$ " OR MORE, adjust the corner marks at each end of the short diagonal by lengthening the corresponding long wall by one-half the difference. Verify the two diagonal measurements now differ by less than $\frac{1}{8}$ ".

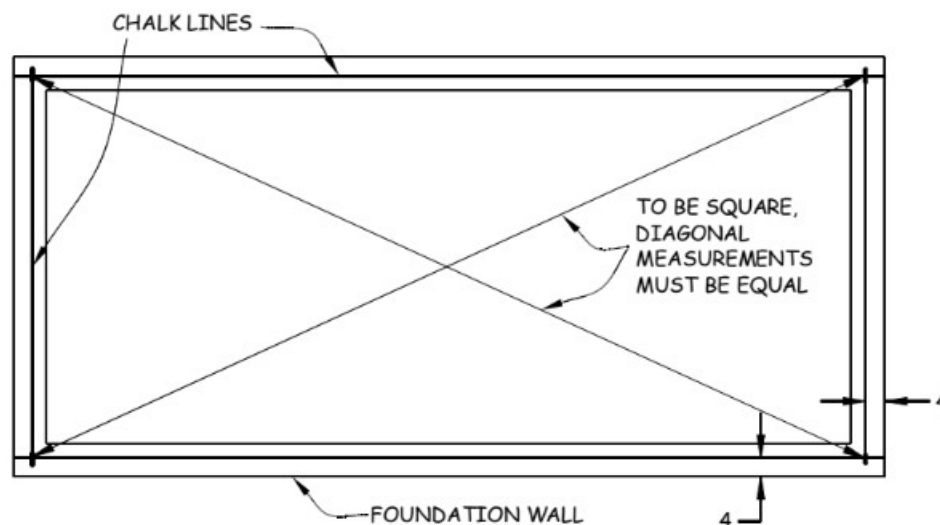


Figure 1-1. Squaring Foundation Lines.

5. Snap chalk lines on all four walls.

6. Check each wall for bow every 5'-8' by measuring from the outside of the foundation to the chalk line. If the chalk line does not fall on the 4" mark, move the entire line in or out as needed in a PARALLEL fashion (to maintain equal wall lengths) by adjusting the marks at the corners. Snap a new chalk line with a different color.

NOTE: The length of the wall being moved is unchanged, but the length of the perpendicular wall IS changed.

7. Spray all chalk lines with clear varnish.

1.1.3. For L-Shaped or Irregularly-Shaped Foundations

1. At all outside corners of the deck (Points 1, 5, 6, 3 and 2) measure in 4" from the outside wall of the foundation. Measure in from both sides of the corner and mark to create intersecting initial corner marks.
2. With a long steel tape, "burn a foot" and measure the distance between Points 1 and 2 (= Line 1-2) and between Points 3 and 2 (= Line 3-2). Using these measurements, locate and mark Point 4.

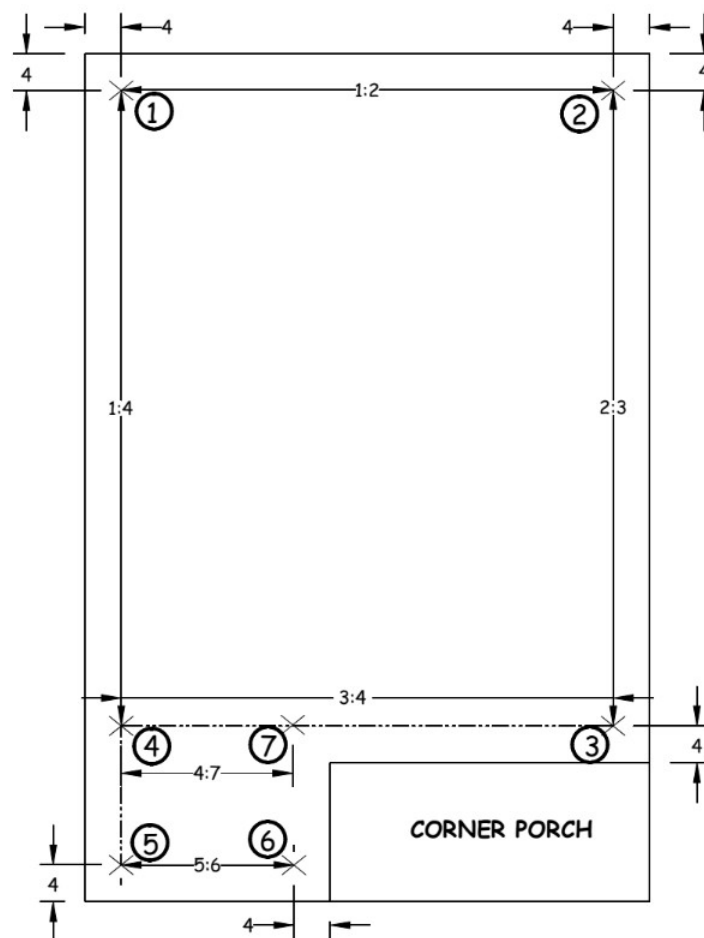


Figure 1-2. Sill Plate Layout with Corner Porch.

3. With a long steel tape, “burn a foot” and measure the diagonals between Points 1 and 3 and between Points 4 and 2 to check for square. If the measurements differ by $\frac{1}{8}$ ” OR MORE, adjust the corner marks at each end of the short diagonal by lengthening the long wall by one-half the difference. Verify the two diagonal measurements now differ by less than $\frac{1}{8}$ ”.
4. Measure Line 5-6 and use this measurement to locate Point 7 on Line 4-3.
5. Measure Line 4-5 and Line 6-7. If not equal, adjust either Point 5 or Point 6 to ensure that Line 5-6 is parallel with Line 4-3.
6. In a similar manner, measure Lines 5-6 and 4-7. If not equal, adjust Point 6 or Point 7 to ensure that Line 6-7 is parallel with Line 1-5.
7. Snap chalk lines on all walls.
8. Check each wall for bow every 5’-8’ by measuring from the outside of the foundation to the chalk line. If the chalk line does not fall on the 4” mark, move the entire line in or out as needed in a PARALLEL fashion (to maintain equal wall lengths) by adjusting the marks at the corners. Snap a new chalk line with a different color.

NOTE: The length of the wall being moved is unchanged, but the length of the perpendicular wall IS changed.

9. Spray all chalk lines with clear varnish.

1.2. INSTALLING TREATED SILL PLATES

1. Trim any foamboard that extends above the top surface of the foundation so that it is flush with that surface. If the poly sheet is intact, do NOT remove it. Later, it will be extended over the outside of the rim board installed in Section 2.1.3.
2. Use a string line to check the straightness of the chalk lines created in Section 1.1. If any lines are not straight, re-snap them using a different color chalk.
3. Install sill plates on the beam pocket walls first. Notch sill plates at the beam pockets so they are flush with the edges of the pockets.
4. Place foam sill seal on top the foundation, at least 1” back of the chalk lines. The sill seal should be about 4” wide. If the roll of sill seal is greater than 7” wide cut the roll in half yielding two discs.
5. To make sure that each sill plate member can be attached to at least two of the foundation bolts, determine the layout of 2x6 treated sill plate members for the entire foundation. Then, cut pieces for each wall to length.

6. Position the sill plate on top the foundation and against the exterior edges of the bolts. Ideally, the sill plate should be oriented so that any crown is up and any edge with wane (an edge with insufficient wood) is either positioned up and to the inside of the foundation or down and to the outside of the foundation.
7. Using a speed square, mark the location of foundation bolt clearance holes by drawing two parallel lines on the sill plate representing the outside edges of the bolt (see Figure 1-3). Determine the distance from the chalk line to the center of the bolt. Measure that distance from the interior edge of the sill plate and draw a line between the two parallel lines.
8. Use a $\frac{3}{4}$ " or $\frac{7}{8}$ " bit to drill clearance holes in the middle of the short line created in the previous step.

NOTE: The diameter of the clearance hole is larger than the bolt diameter in order to facilitate the correct positioning of the plates on the foundation.

9. Place the predrilled 2x6 treated plate members over the foundation bolts. Align the interior of the sill plates with the chalk line. Secure sill plates by installing a round 5/16" washer on top of a rectangular concrete form tab over each foundation bolt followed by a $\frac{1}{2}$ " nut turned tight.

NOTE: Do NOT over-tighten the nuts to the point where the sill plate begins to sag or buckle as this creates problems when rim boards and floor joists are installed later.

10. Toenail the plates with 8d nails.
11. Apply air sealing caulk between all sill plates where they abut. Also apply two lines of caulk along the length of the sill plate tops, each line about 1" from the outside edges of the plates.
12. Install a second layer of 2x6 treated sill plates in the same manner as the first layer. Make sure the seams of the first layer are overlapped by at least 4', that each plate is anchored by at least two bolts, and that there is a bolt no more than 1' from each end of a plate. If necessary, use power/wedge bolts to secure plates in this second layer. Apply air sealing caulk between all sill plates where they abut.
13. Sight along the top of the sill plates to ensure they are straight and there are no valleys or hills. To test, run a string line along all four sides. If necessary, use $\frac{1}{4}$ "x $2\frac{3}{4}$ " concrete screws (or $\frac{3}{8}$ "x $2\frac{3}{4}$ " power/wedge bolts, whichever is more appropriate) to flatten sill plates.

TIP: When installing concrete screws or power/wedge bolts, use a wood bit to drill through the sill plate, then use a masonry bit to drill into the foundation.



Figure 1-3. Sill Plate Installation.

14. Lay a thick bead of air sealing caulk on the interior side of the sill plate where it meets the foundation (see Figure 1-3). Make sure there are no gaps in the caulk when the application is complete.

NOTE: Do NOT apply air sealing caulk if the temperature is below 40°F or if the foundation surface is wet. If either condition exists, the caulking must be postponed to the next build date.

1.3. INSTALLING LAMINATE BEAM

1. Using the dimensions from the foundation wall to the beam as shown on the House Plan, mark the location of the beam on the concrete wall below the pocket.
2. The beam that supports the floor joists is made up of two laminated members,
3. Square up one end of each laminated piece.
4. To determine the required beam length, measure from the back edge of the beam pockets on each end of the basement walls (take two independent measurements). Subtract 1" from the overall length and cut each laminated member to length.
5. Wrap both ends of the laminated piece with black flashing tape extending at least 2" beyond the edge on both the top and the bottom of the beam.
6. Lift and set each member into both beam pockets and center them in the pocket. If necessary, temporarily block them to prevent the two members from falling.
7. Clamp the two pieces together side-to-side (making sure the top of the two members are flush) and top to bottom. Nail the two members together with three 16d or 3" collated nails on 12" centers on both sides of the beam, staggering the nail lines on opposite sides of the beam.

8. Place the beam so there is a ½” gap between each end of the beam and the back end of each pocket and so the beam is aligned with each of the marks on the concrete wall below the pockets that were established in Step 1 above.
9. Use 16d duplex nails to securely attach a long, temporary piece of 2x4 near the middle of the beam. Nail the other end of the 2x4 to the sill plate or drill a hole near the end and place it over a foundation bolt. This will help stabilize the beam while support posts and I-joists are being installed.
10. Mark the mid-point of the width of the sill plates (2¾” from the outside edge of the sill plate) at both ends of the beam. Consult the Construction Supervisor if either sill plate is tipped downward toward the exterior of the foundation. Otherwise, set a 2’ level as a straightedge on top of one end of the beam and extend it over the adjacent sill plate. Using flat metal shims, raise or lower the beam until the end of the level hits the sill plate at the mid-point mark. Repeat at the other end of the beam.
11. Wedge pre-cut treated lumber spacers (located in the Beam Bin in the trailer) securely between the sides of the beam and the concrete in the beam pocket. Square the beam to the foundation wall by placing the long leg of a framing square on top the foundation wall and hanging the short leg down against the face of the beam.
12. Attach support posts to the underside of the beam at proper locations according to the House Plan. Use four 5/16”x1½” lag screws and 5/16” washers to fasten the support post plate to the bottom of the lam beam making sure it is flush to the finished basement side of the beam. Set the bottoms of the posts on the concrete pads and roughly plumb them, but do not anchor at this time.

REQUIREMENT: The threaded adjustment screw and plate must rest on the concrete pad.

13. Approximately 6”-12” from one end of the beam, attach a Beam String Jig (located in the Beam Bin) to the bottom of the beam using four 1⅝” exterior screws. Repeat with the second jig at the other end of the beam. Attach a string line to the slot in one of the jigs and pull it tightly through the slot in the jig at the other end of the beam. Secure the line by tying it to the remaining slot in the second Beam String Jig.

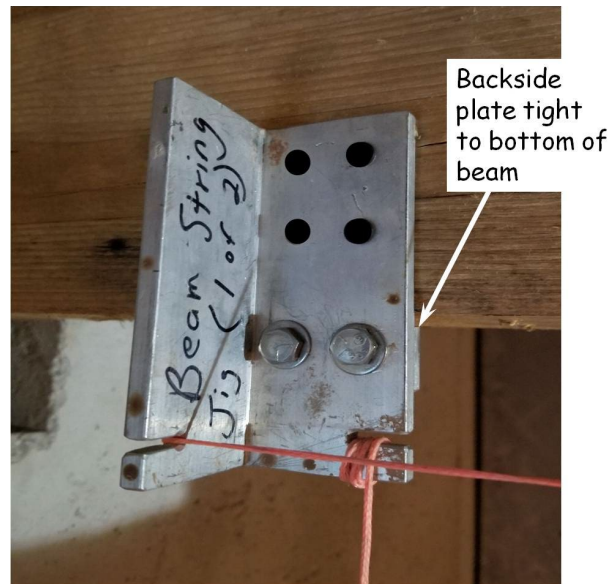


Figure 1-4. Beam String Jig.

14. If the beam is bowed, nail additional 2x4's from the beam to the sill plate, between floor joist locations, holding the end 2" back from the outside edge of the plate (to allow for later installation of the rim board). Confirm that the face of the beam is straight and parallel with the string using a scrap piece of 2x4 as a gauge block on the face of the beam along the entire length of the string.
15. Finish installing the posts. Plumb the posts and re-check that the beam is still straight. Attach each post to its concrete pad by first placing a 1/4"x1" fender washer over each of the holes in the bottom post flange and then securing with 1/4"x1 3/4" concrete screws through each washer into the pad.
16. Confirm that the bottom of the beam is straight and parallel with the string using a scrap piece of 2x4 as a gauge block on the bottom of the beam along the entire length of the string. Adjust the support posts vertically until the bottom of the beam is straight (these settings can be approximate at this point).
17. Check each I-joist above a post and the two end I-joists for crown by sight or use of a string line. All of these I-joists should be straight or have a slight crown up. Verify that the top of the beam at the pockets is flush with the top of the sill plates at the mid-point mark established in Section 1.3.9. If not, consult the Construction Supervisor.
18. Remove the adjustment pins from the support posts.
19. Leave the string line in place. It will be used to confirm the beam location during I-joist installation.

1.4. *INSTALLING EGRESS LADDERS AND COVERS*

1.4.1. Install Egress Ladders

1. Remove the temporary wood egress cover and the metal egress cover underneath it in order to gain access to the egress well.
2. Hang the egress ladder on the rim of the egress well wall opposite to, and approximately centered on, the window.
3. Using a level, make sure the ladder is plumb.
4. Drill through the bottom two holes in the ladder into the egress well wall with a 3/16" drill bit.
5. Attach the ladder to the egress well wall by installing one 1³/₄" concrete screw into each hole.

1.4.2. Install Egress Covers

1. Set the metal egress cover in place - no fasteners are required.
2. Replace the temporary wood egress cover over the metal egress cover. This gives enough strength to stand on or place ladders on the egress cover when working and keeps dirt and straw from going into the egress well during landscaping.

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