

Chapter 17 - Exterior Trim

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Things to Consider

- Porch beams will be wrapped with Smart Trim.
- Frieze boards will be used on the front of all 2-story homes.
- Smart Trim must never be mitered or beveled.
- All six sides of the Smart Trim must be primed and painted before installation.

Components

Concrete Porches
 Porch Post & Beam Trim
 Porch Railings & Balusters
 Frieze Boards

Timing & Prerequisites

- Frieze boards should be installed on the gable end trusses before the trusses are installed.
- Frieze boards cannot be installed until the aluminum cornice returns have been installed.
- Frieze boards must be installed prior to the siding.
- The porch trim cannot be installed until the porch framing has been inspected.
- The porch ceiling should be installed prior to installing the Smart Trim on the beams. The Smart Trim will be installed below the F-channel.
- The porch siding and porch trim activities will require coordination.
 - The porch ceilings and J-channel around the beams should be installed before the beam Smart Trim.
 - The F-channel and soffits for the porch eaves should be installed before the beam Smart Trim.
 - The J-channel on the gable ends cannot be installed until the Smart Trim has been installed on the beams.
- The Porch Railing activities cannot begin until the siding is complete.
- The House/Project Lead will work with the Construction Superintendent to coordinate these activities and to schedule the inspections.

Materials Needed

Porch Beams, Posts & Railings

Beam & Post Trim

Smart Trim (4", 6", 8" and 10")
 White Painter's Caulk
 2" Straight Pneumatic Finish Nails
 White Wood Filler

Railings & Balusters

5/4 Composite trim (6" & 4") for Top Rails
 4/4 Composite trim (4") for Railings
 2X2 Balusters
 3" Exterior Screws for Railings
 2 1/2" Coated Decking Screws
 2" Coated Screws
 6x6 for Post

	Gravel Cement White Wood Filler Sand Paper 6"x3/8" Lag Screws and Washers 1/2" PVC spacer material Exterior Primer Drop Cloths Water for Cleanup
Frieze Boards	
1x6 SPF Pieces of White Rolled Aluminum 2" Straight Pneumatic Finish Nails 2" Roofing Nails Construction Tape White Aluminum Nails	

Frieze Boards (Volunteer)

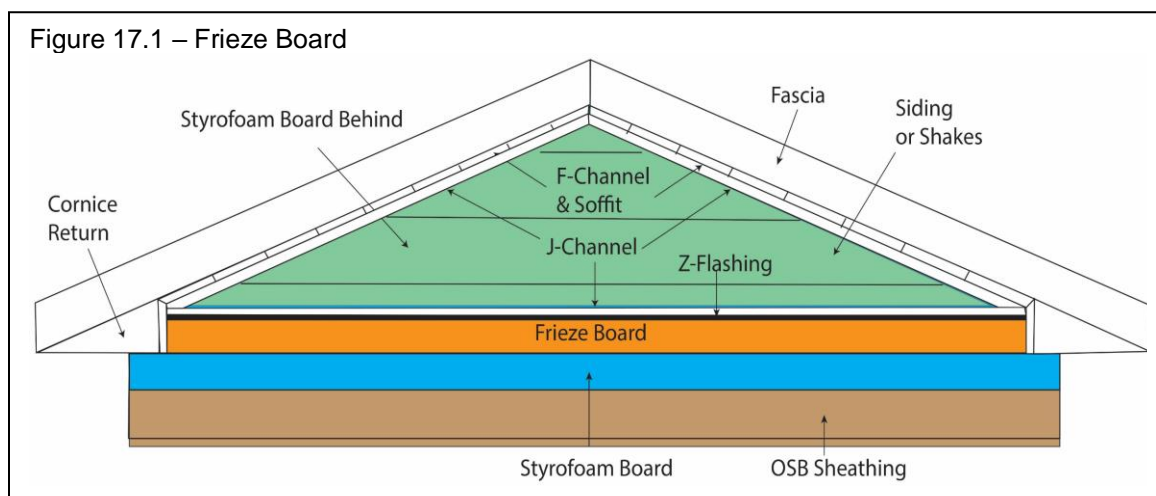
Critical Issues



Safety Issues

- Keep fingers and other body parts away from working areas when using a pneumatic nailer.

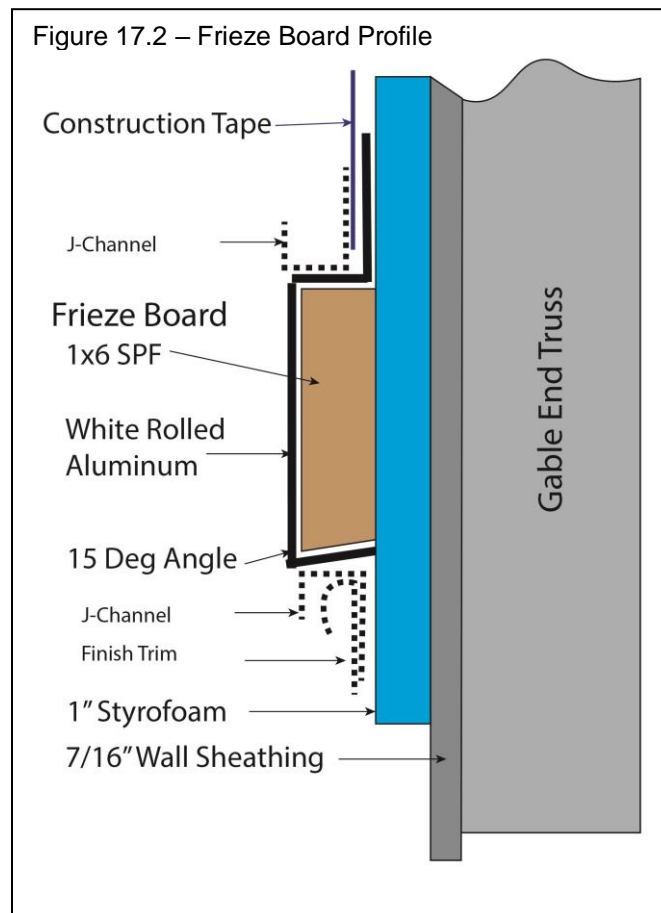
Frieze boards will be installed on all 2-story homes. Frieze boards are installed across the bottom of the gable end trusses; in line with the cornice returns. The bottom edge of the frieze board should be in line with the bottom edge of the cornice return. (See Figure 17.1). For house models with a transition truss, install a frieze board across the bottom of the truss in line with the outside cornice return.



After the cornice returns have been wrapped with aluminum, install pieces 1x6 between the cornice returns and cover them with white aluminum which has been bent to fit over them.

1. Cut pieces of SPF 1x6 long enough to cover the areas between the cornice returns. Leave the pieces short by $\frac{1}{4}$ " for expansion.
2. Bevel the bottom edges to a 15 degree angle. This will prevent water from running back under the siding below.
3. Snap a caulk line across the bottom of the gable, even with the bottom of the cornice returns.
4. Install the Smart Trim above the caulk line made above with 2 $\frac{1}{2}$ " pneumatic finish nails.

5. Bend 8" white rolled aluminum to cover the 1x6. (See figure 17.2)
6. Install the white aluminum over the 1x6 with a row of 2" roofing nails above the 1x6; 1 nail every 24".
7. Apply construction tape over the top flange of the aluminum and onto the Styrofoam.



Trim on Porch Beams (Volunteer)

The porch beams will be covered with $\frac{3}{4}$ " thick Smart Trim.

Before installing the Smart Trim on the beams, complete installation of the F-channel for the porch ceilings, J-channel around the beams for the siding, and the F-channel for the soffits.

Before installing the trim, cut the pieces of trim and dry fit the pieces, then prime and paint all six sides.

Install the Smart trim with 2" finish nails. A pneumatic nailer works best.

Smart Trim on the Bottom of the Beam

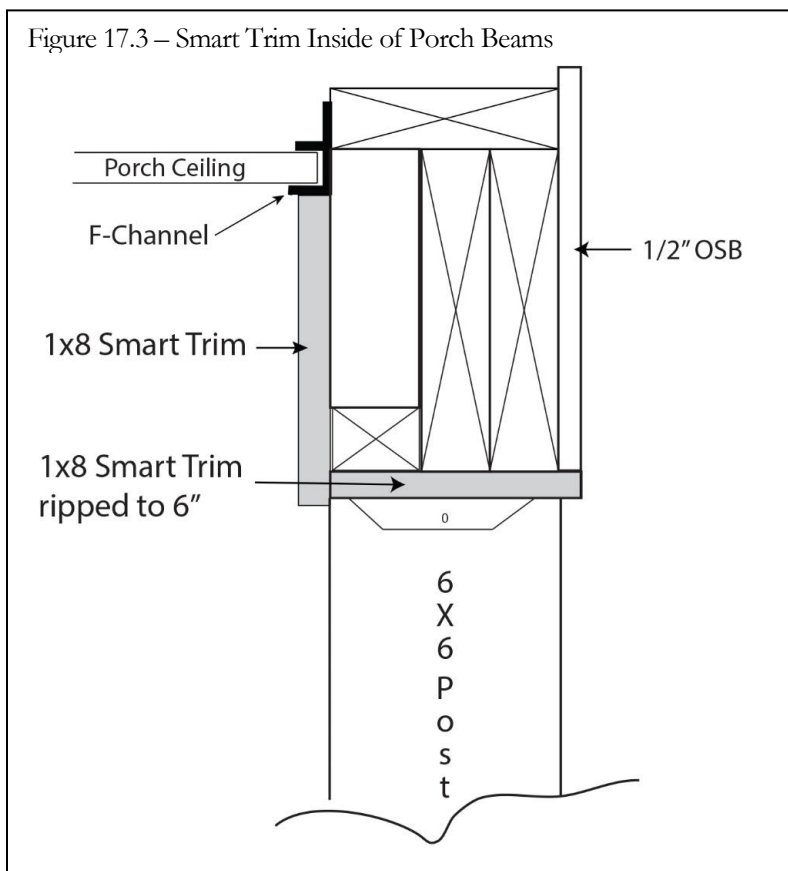
8. Cover the areas on the bottom of the beams between the posts and between the house and the posts with 8" Smart Trim which is ripped to fit. (See Figure 17.3).
9. Cut pieces of 8" Smart Trim long enough to cover the areas between each post. Also, cut pieces of 8" Smart Trim to cover the areas between the last post and the house. Leave a $\frac{1}{4}$ " of gap for expansion.
10. Rip the pieces of Smart Trim to the width on the bottom of the beam; include the post cap brackets in the measurement.
11. Prime and paint all six (6) sides of the trim after cutting/ripping and prior to installing.
12. Attach the trim with two (2) rows 2" finishing nails through the Smart Trim into the beam; one into the 2x8s and one into the 2x3. Place nails every 16".

Smart Trim on the Inside Face of Porch Beams

The inside face of porch beams will be covered with 8" Smart Trim ripped to fit. (See Figure 17.3).

1. Cut pieces of 8" Smart Trim long enough to cover the inside faces of the beams which extend from the front beam to the house. Cut the boards $\frac{1}{4}$ " shorter than the distance from the house to the front beam.
2. Place the Smart Trim on the inside face of the beams with the top edge flush to the bottom of the porch ceiling F-channel. The bottom edge of the Smart Trim should extend approximately $\frac{1}{8}$ " below the Smart Trim on the bottom of the beam. Use clamps to hold the inside Smart Trim tight to the edge of the bottom Smart Trim.
3. Use a router with a straight bit to remove $\frac{1}{2}$ " from the back of the Smart Trim in the areas which will fit over the post cap brackets. Ensure the Smart Trim will fit tight to the beam.

4. Attach the Smart Trim to the beam with 2" finishing nails; 1 row of nails along the top of the Smart Trim into the 2x3 blocks and one row of nails along the bottom edge into the bottom Smart Trim.



Smart Trim on the Outside of the Beam

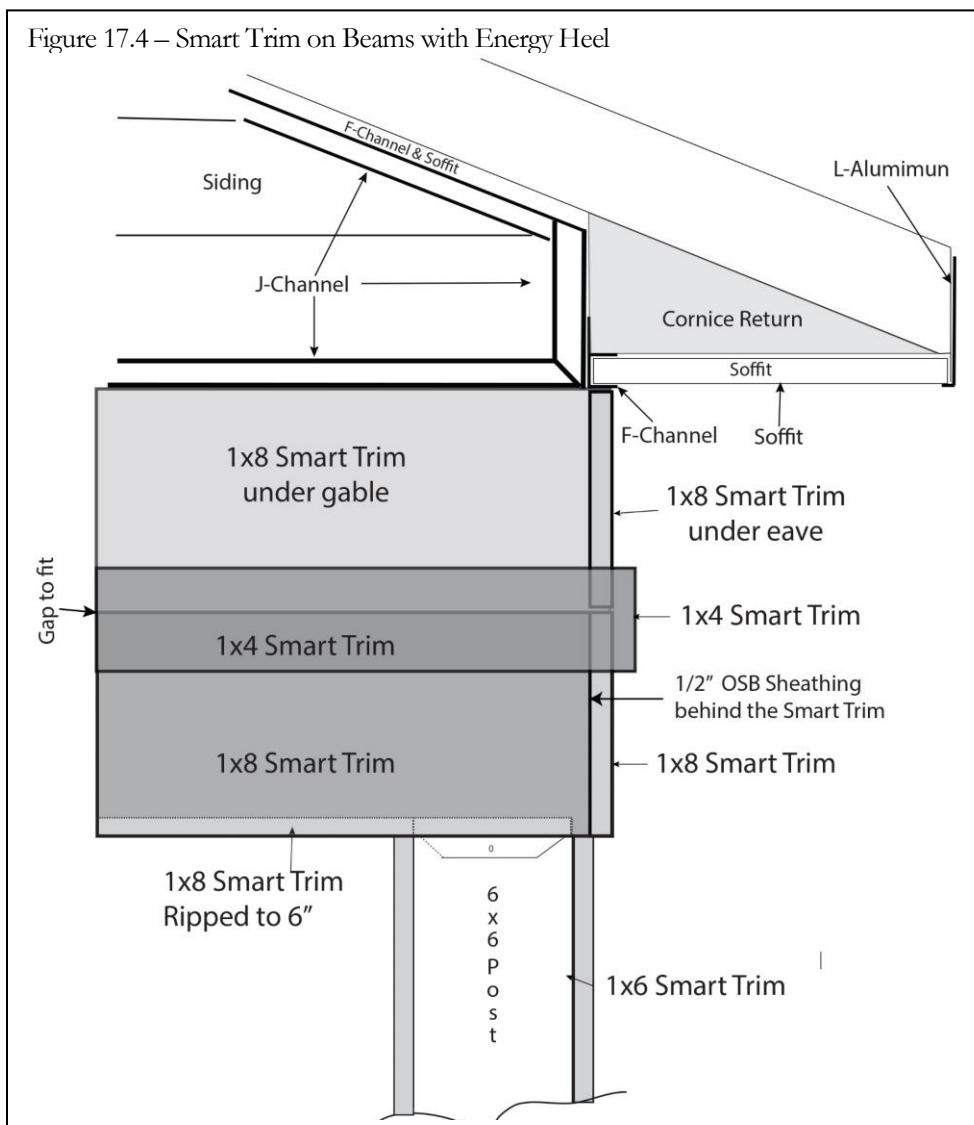
The porch beams support the roof trusses above. In some models these roof trusses are built with an energy heel. The installation of the Smart Trim will vary depending of the trusses used.

Outside of Beams under Trusses with Energy Heals

For porch beams with energy heel trusses, the outside face of the beams will be covered with two pieces of 8" and one piece 4" Smart Trim for each section. (See Figure 17.4).

Side Beams – Cover the sides first. Cut two (2) pieces of 8" Smart Trim and one (1) piece of 4" Smart Trim to fit between the house J-Channel and the end of the beam. The first piece of 8" Smart Trim will be installed flush to the bottom of the soffit F-Channel. The second piece of 8" Smart Trim will be installed even with the Smart Trim on the inside of the beam. The 4" Smart Trim will cover the seam between the two pieces of 8" Smart Trim.

Front Beam – The front Smart Trim extends out over the ends of the beam to cover the ends of the Smart Trim on the sides. Cut 8" and 4" Smart Trim to match the Smart Trim on the sides.

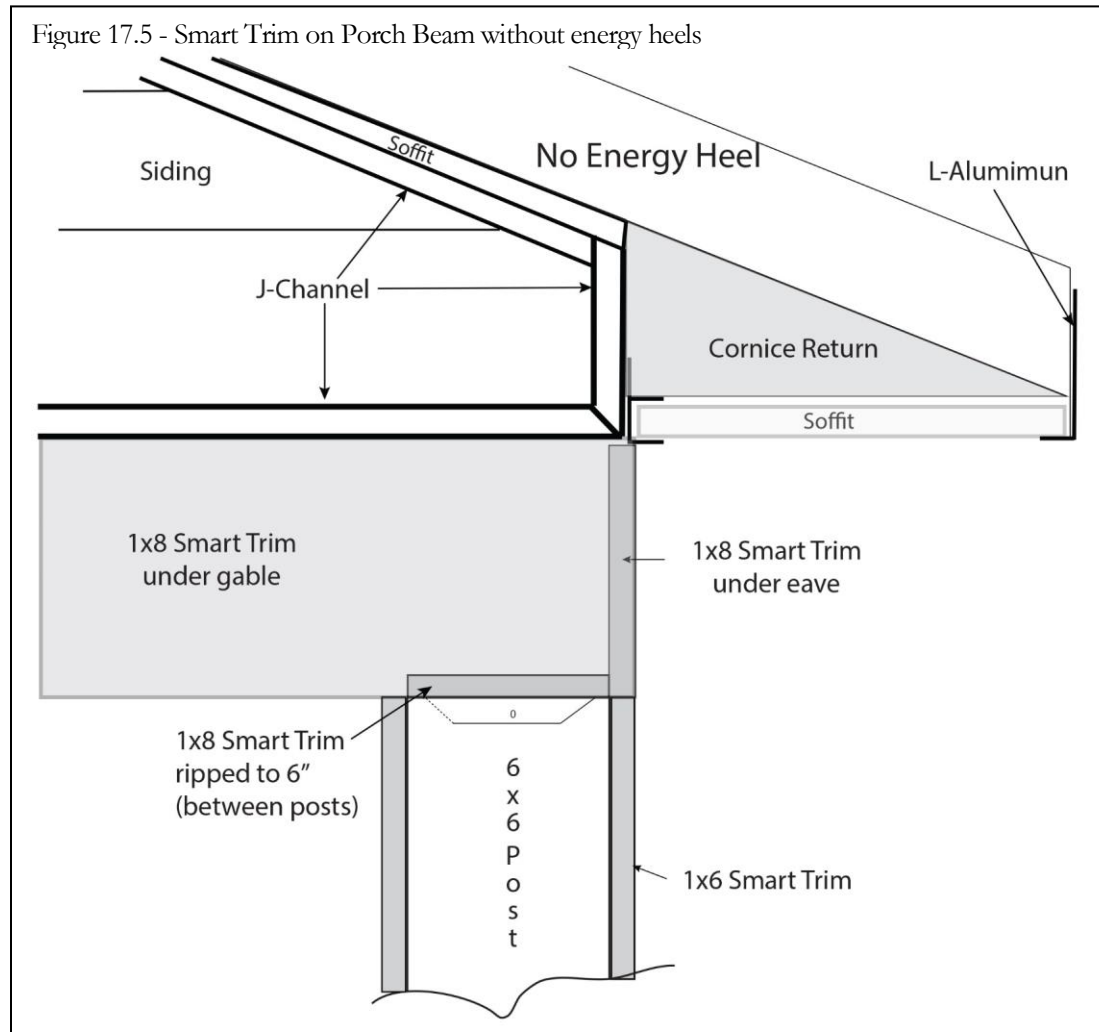


Outside of Beams under Trusses without Energy Heels

For porch beams without energy heel trusses, the outside face of the beams will be covered with a single piece of 8" Smart Trim per section. (See Figure 17.5).

Side Beams – Cover the sides first. Cut a piece of 8" Smart Trim to fit between the J-Channel and the end of the beam. This piece of 8" Smart Trim will be installed flush to the bottom of the soffit F-Channel and sit even with the Smart Trim on the inside of the beam. The Smart Trim may need to be ripped to fit.

Front Beam – The front Smart Trim extends out over the ends of the beam to cover the ends of the Smart Trim on the sides. Cut 8" Smart Trim to match the Smart Trim on the sides.



Smart Trim on Beams Quality Checks

- Ensure the Smart Trim is securely nailed in place.

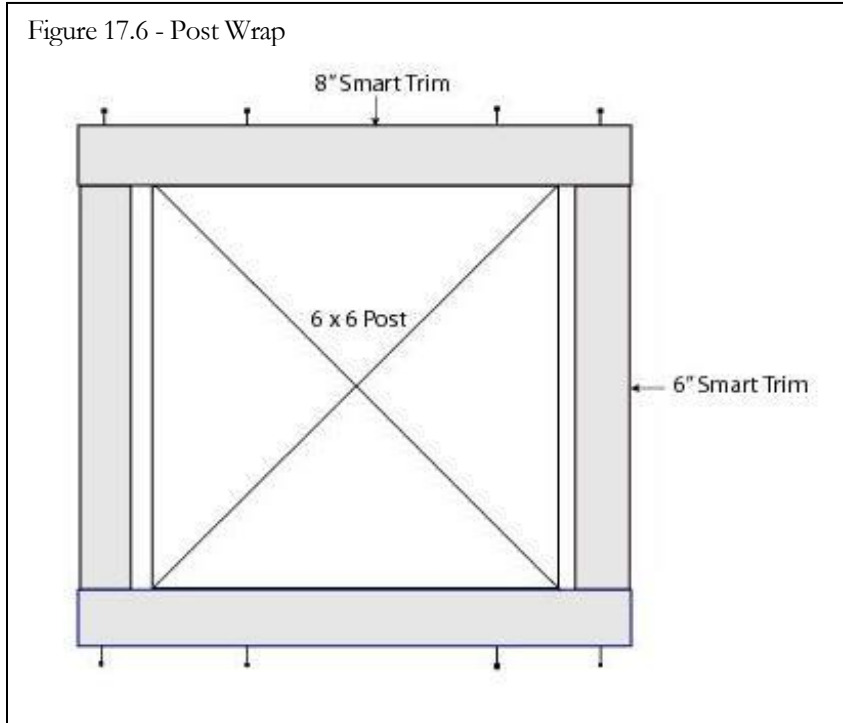
Trim on Porch Posts (Volunteer)

Wrap the Porch Posts

1. Cut and install Smart Trim to wrap the porch posts. (See Figure 17.6).
- Cut pieces of 8" Smart Trim to fit on the front and back of each post. Make sure to measure each post and mark the piece to fit there. The Smart trim should be cut $\frac{1}{2}$ " shorter than the length of the post. Prime the cut edges.
 - Cut pieces of 6" Smart Trim to fit on the sides of each post. Also, leave these pieces $\frac{1}{2}$ " short. Prime and paint all six sides.

- Assemble the sides and back pieces of Smart Trim into a three sided box. On a flat surface, lay the side pieces on edge with the back edge facing up. Position the back piece on top of the side pieces. Adjust the side pieces until the sides are flush with back edges. Attach the pieces with a pneumatic nailer using 2" finishing nails; place 1 nail every 16" down each side.
- Position the assembly over the back of the post with the sides evenly spaced from the post and the top flush to the top. Attach the assembly with a pneumatic nailer using 2" finishing nails; place 1 nail every 24" down the center of the post.
- Position the front Smart Trim on the post with edges flush with the side Smart Trim. Clamp the front piece in place to close the gaps between the front and the sides. Attach the front with pneumatic nailer using 2" finishing nails; place 1 nail every 24" down the center of the post and 1 nail every 16" down each edge into the side trim.

Figure 17.6 - Post Wrap

**Install Decorative Trim at Bottom of each Post.**

Cut pieces of 1x4 Smart Trim to cover the bottom 3 1/2" of each post. This trim will cover the gap between the bottom of the Smart Trim and the porch floor.

1. Cut two (2) pieces of 1x4 Smart trim to fit on the side of each post. Do not miter cut these pieces.
2. Cut two (2) pieces of 1x4 Smart Trim to fit across the front and back, overlapping the Smart Trim on each side.

3. Paint the pieces.
4. Install the pieces flush to the porch floor with 2” finish nails; 2 nails in each piece.

Smart Trim on Post Quality Checks

- Ensure all nails are set and do not protrude from the sides.

Porch Railing (Volunteer)

Railing will be installed on both the front and back porches. Sections of railing will be installed between two posts or between a post and a support post on the house. The house elevations will detail the locations.

Critical Issues

- The top of the porch railings must be 36" above the porch floor.
- The space below the bottom railing of the porch railings must be less than 4"; 3 ½" is recommended where possible.

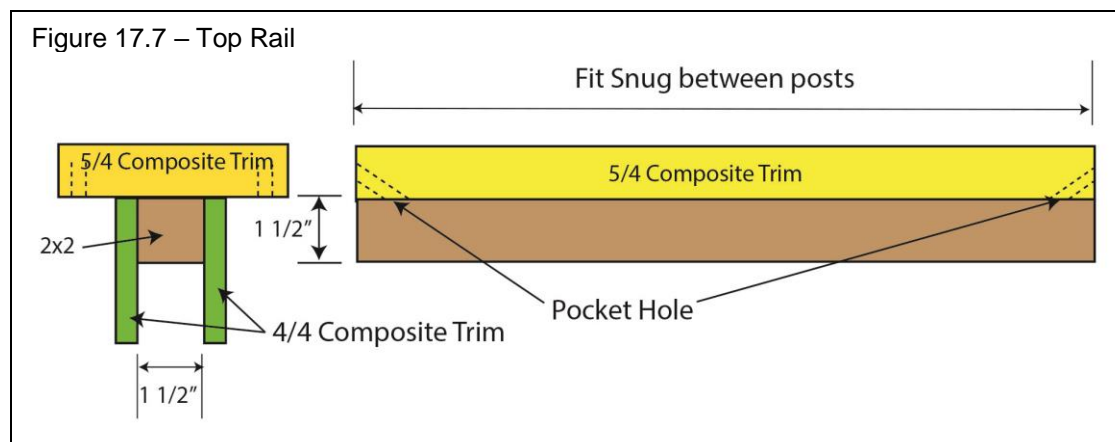
Prepare the Balusters

1. Cut the balusters.
 - Cut the 2x2 balusters to 30". Cut off the beveled end. Cut enough balusters for all railings; approximate 2 ¼ balusters per foot of railing.
2. Prime the balusters before assembling the railings.
 - Set up a flat area. Cover the area with paint tarps.
 - Prime the railing pieces with exterior white primer, making sure to watch for drips.
 - Cleanup any drips before using the pieces.

Build the Porch Top Rails

1. **Mark** the location for the top of the rails.
 - Measure up 36" from the porch floor on the two end posts.
 - Using these two marks, set a level chalk line across the back of the posts. (*Use blue chalk, not red. Red is permanent*).
 - Using a speed square, carry the line around to the sides of the posts. These lines will mark the position for the top edge of the 1x6 top plate.
2. **Cut** porch top rails. (See Figure 17.7).
 - For each section of railing, cut:
 - One (1) piece of 6" - 5/4 Composite trim (1" x 5 1/4") to fit snugly between the posts to be used for the top of the railing. For sections which intersect the house, cut the top piece to fit between the post and the siding.
 - One (1) 2x2 (1 ½" x 1 ½") to fit snugly between the posts. The 2x2 will be installed below the 5/4 to attach the side rails. For sections which intersect the house, cut the 2x2 short by ¾" to allow for the support post.
3. **Prime & Paint** all six sides of the Composite trim and the 2x2s.
4. **Drill** pocket holes for attaching the top rails to the posts.
 - Drill two (2) holes in the underside of each end of the top rail. Position the holes ½" in from the outside edge and ¾" in from the end. Drill the holes at a 45 degree angle.

Figure 17.7 – Top Rail



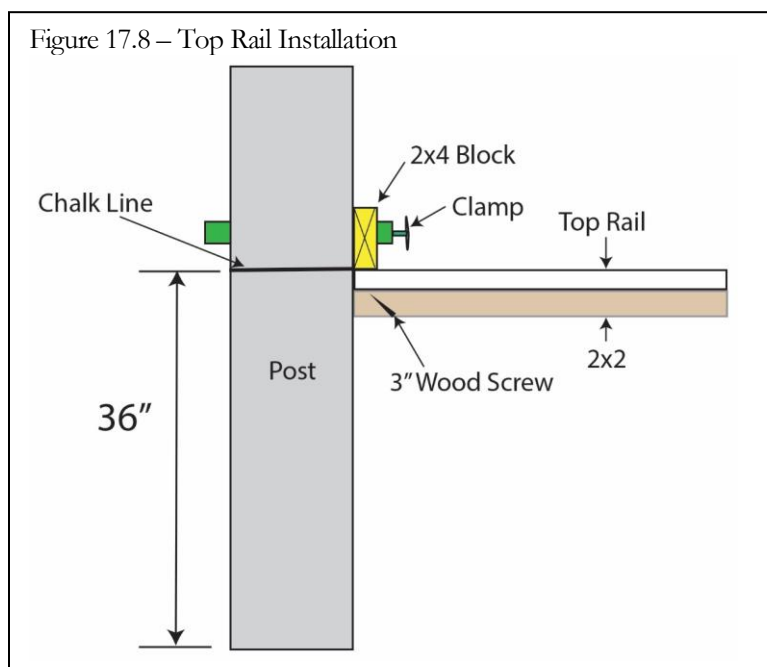
5. **Assemble** the top rails. (See Figure 17.7).

- Lay the top rail upside down. Center the 2x2 under the top rail. Attach the 2x2 with 2" exterior wood screws; 1 screw up through the 2x2 into the top rail every 16".

6. **Install** the top rails which run between posts. (See Figure 17.8).

- On the sides of posts which face the railing to be installed, clamp scrap pieces of 2x4 just above the lines just made. This will be a stop block for positioning the top rail. Hold the 2x4s flush to the lines.
- Position the top rail assembly between the posts and tight to the bottom of the 2x4 stop blocks.
- Center the top rail on each post and attach it to the posts with 3" exterior wood screws; 1 screw through each of the four pocket holes into the post.

Figure 17.8 – Top Rail Installation



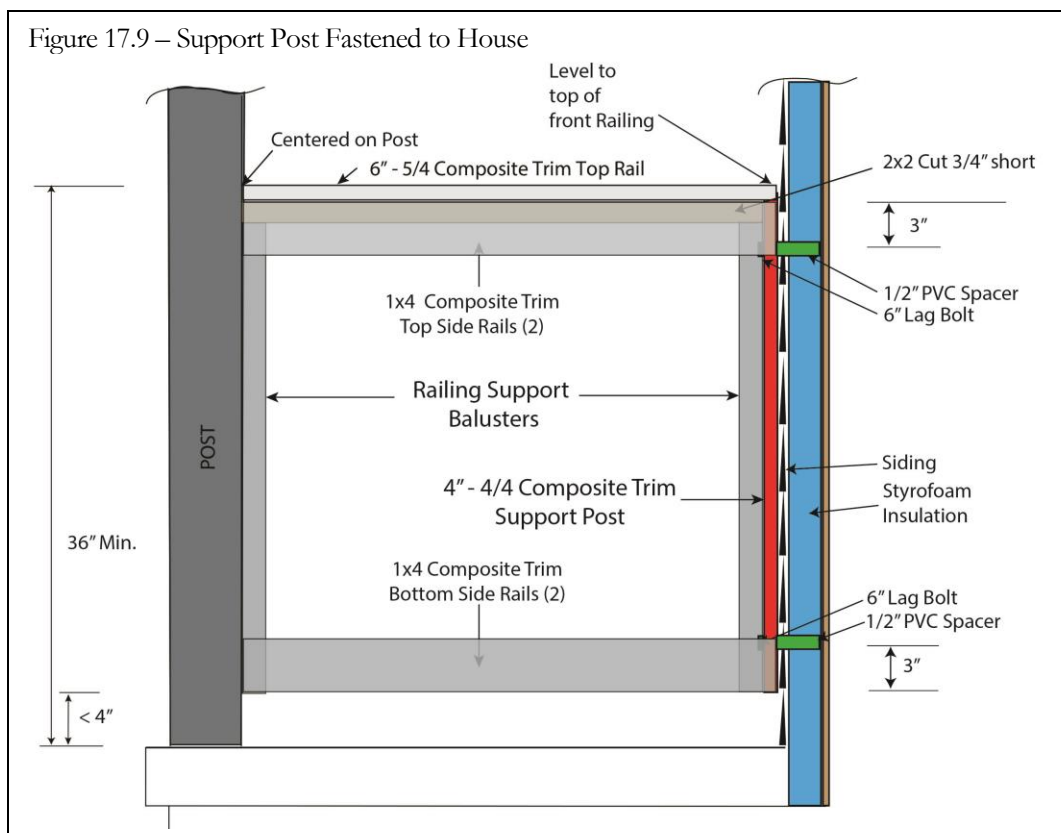
7. **Install Support Posts on the House**

Install a piece of 4" - 4/4 Composite trim (3/4" x 3 1/2") on the house at the point where the railing will be connected. The support will provide a solid connection point.

- Cut a 30" piece of 4/4 Composite trim (3/4" x 3 1/2").
- Prime and paint all the six sides.
- Mark where to install the Support Post. (See Figure 17.9),
 - **Top** – Make a mark on the house level with the bottom of the top rails between the posts. This will be the position for the top of the Support Post.
 - **Side**- Measure the distance from the edge of the porch concrete to the center of the corner post to which the railing will be connected. Then, measure off the concrete porch edge at the house and make a mark on the house at the same distance. That mark will be the center of the support post. Measure back 1/2 the width of the 1x4 and make a mark for the side. Draw a vertical plumb line at the second mark.
- Drill two 3/8" holes in the support post; one 3" from the top in the center of the board and one 3" from the bottom on the board in the center of the board.
- Hold the support post in place and make a mark on the siding through each hole.
- Drill 3/4" holes in the siding and Styrofoam insulation at each mark.
- Cut two (2) 1 7/8" long pieces of 1/2" PVC pipe for spacers; used to prevent the siding from being crushed. Insert the pieces in the holes.
- Attach the support post to the house with 3/8"x6" lag bolts and washers, through the holes in the support post, through the plastic spacers, and into the house sheathing.

8. **Install** the top rails which run between a post and the house.

- As before, on the side of post which faces the railing to be installed, clamp a scrap piece of 2x4 just above the line just made. Hold the 2x4s flush to the line.
- Position the top rail assembly between the post and the house; holding the assembly tight to the bottom of the 2x4 and resting on the support post.
- Center the top rail on the post and attach it to the post with 3" exterior wood screws; 1 screw through each of the two pocket holes into the post.
- Drill and countersink two (2) 1/4" holes in the end of the top rail above the support post.
- Hold the top railing flush with the support post and attach it to the support post with two (2) 3" exterior wood screws.



Build the Porch Railings

1. **Install** the Railing Supports under each end of the Top Rail.
 - On each face of the posts to which a railing will be attached, install a railing support baluster.
 - Center a baluster on the post and hold it tight to the 2x2 on the bottom of the top rail.
 - Drill and countersink two (2) holes in the baluster, one 4" from the top and one 4" from the bottom.
 - Attach the baluster to the post with 3" exterior wood screws; 1 screw through each hole.
 - Repeat this procedure for each post face to which a railing will be attached.
 - The balusters which will be installed on the Smart Trim support post installed on the house above, must have $\frac{3}{4}$ " x $\frac{1}{2}$ " deep holes in the back side of the railing support to fit over the lag bolts in the support post.
2. **Install** the top side rails.
 - Cut two (2) pieces of 1x4 Smart Trim to fit under the top rail. The pieces will fit between the post at each end. Leave a $\frac{1}{8}$ " gap at each end for expansion. Be sure to measure bottom sides of the top railing. If the post are not square, one side will be longer than the other.
 - Attach the top side rails to the sides of the top rail 2x2 with 2" finish nails; 1 nail every 12". Hold the side rails tight to the top rail.

3. Install the bottom side rails.

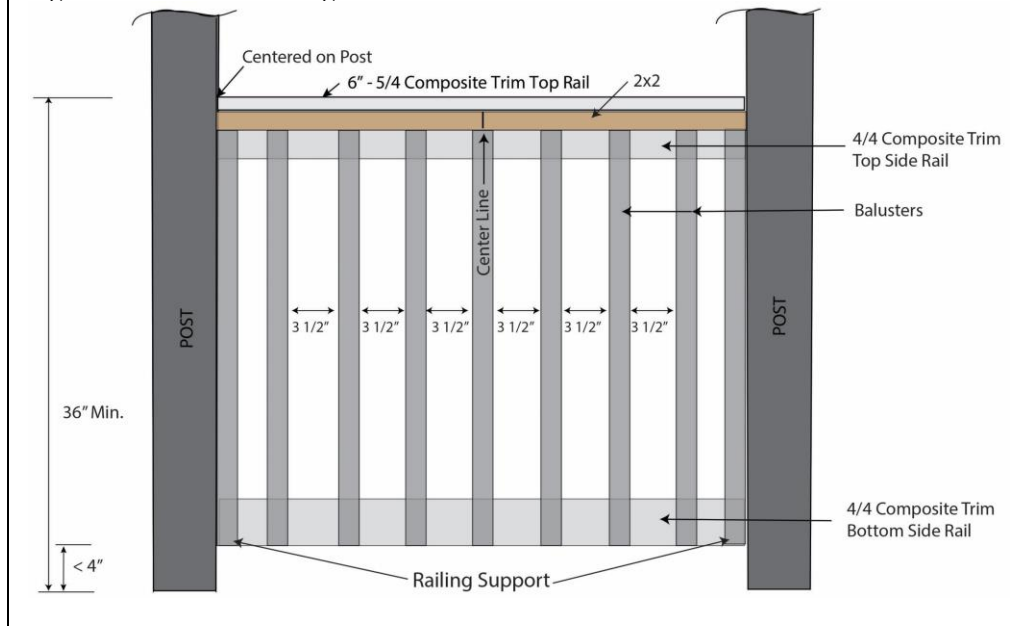
- Cut two (2) pieces of 1x4 Smart Trim to fit across the bottom of the opening. The pieces will fit between the post at each end. Leave a 1/8" gap at each end for expansion. Again, be sure to measure bottom sides.
- Attach one of the bottom side rails to the sides of the railing supports with 2" finish nails; 2 nails into each railing support. Hold the side rails tight to the bottom of the railing support. Ensure the bottom edge of the bottom rail is less than 4" above the porch floor.
- Slide the balusters to be used in this section of railing up in between the top side rails before installing the second bottom side rail.
- Attach the second bottom side rail to the sides of the railing supports with 2" finish nails; 2 nails into each railing support. Hold the side rails tight to the bottom of the railing support.

Install the balusters

Critical Issues

- The balusters in each railing section should appear centered in that section.
- The space between any two balusters must be less than 4".

Figure 17.10 – Porch Railing Balusters



1. Determine the placement of the balusters

The following are three (3) possible methods for determine the placement of the balusters:

1) Trial and Error

- Lay out the baluster placement on the back of one of the top side rails, starting in the middle of the rail.
- Determine the center of the rail.

- Center a baluster on the center mark and mark both sides.
- Place a baluster flush to each end and mark the inside edge. This will identify the location of the supporting balusters.
- Lay a 2x4 spacer next to each side of the baluster. Mark the outside edge.
- Continue along the railing alternating balusters and spacers until the gap between the last baluster and the supporting baluster is less than 4".
- If the gap is less than 1 ½", repeat the procedure above starting with a 2x4 spacer centered at the center mark.
- Use the layout that works the best.

2) Table Lookup

- Measure the length of the railing; subtract 2 ¾" (the width of the two end supporting balusters; then use that number to lookup the number of balusters and spacing required in the Baluster Spacing Guide below.

3) Lots of Math

- Lay out the baluster placement on the back of one of the top side rails, starting in the middle of the rail.
- Determine if the first baluster should be centered in the middle, or if the first space between the center balusters should be centered in the middle with a baluster on either side.
 - Distance between support balusters (D) = length of the railing – 2 ¾".
 - Number of Baluster (N) = (D / 4.875"). Discard the fraction.
 - The distance remaining between support posts and adjacent balusters (R) = ((D – (N * 4.875")) + 3 ½") / 2.
 - If R < 2", subtract 1 from the number of balusters.
 - If the number of balusters is odd, position one baluster centered at the midpoint and mark each side.
 - If the number of balusters is even, place the 2x4 spacer block centered on the midpoint, and then place a baluster on each side of the spacer and mark their positions.
- Once the center baluster(s) is/are positioned, space the remaining baluster off the first with a 2x4 block.
 - Continue laying out the remaining balusters from the middle out to the ends using a 2x4 spacer between each.
 - Verify that the space between the last baluster and the adjacent support post is less than 4" and more than 2". If not, start over switching the position of the center balusters. See determine the location of the center balusters above.

Baluster Spacing Guide

post to post	# balusters	# spaces	actual spacing	adj. spacing	variance	last space
32	7	6	3 25/32	3 3/4		
33	7	6	3 15/16	3 15/16		
34	8	7	3 5/16	3 5/16		
35	8	7	3 15/32	3 1/2	1/4	3 1/4
36	8	7	3 19/32	3 5/8	1/4	3 1/4
37	8	7	3 3/4	3 3/4		
38	8	7	3 29/32	3 15/16	1/4	3 11/16
39	9	8	3 3/8	3 3/8		
40	9	8	3 1/2	3 1/2		
41	9	8	3 5/8	3 5/8		
42	9	8	3 3/4	3 3/4		
43	9	8	3 7/8	3 7/8		
44	9	8	4	4		
45	10	9	3 1/2	3 1/2		
46	10	9	3 5/8	3 5/8		
47	10	9	3 23/32	3 3/4	5/16	3 7/16
48	10	9	3 27/32	3 7/8	5/16	3 9/16
49	10	9	3 15/16	3 15/16		
50	11	10	3 17/32	3 9/16	5/16	3 1/4
51	11	10	3 5/8	3 5/8		
52	11	10	3 23/32	3 3/4	5/16	3 7/16
53	11	10	3 3/16	3 3/16		
54	11	10	3 15/16	3 15/16		
55	12	11	3 17/32	3 9/16	3/8	3 3/16
56	12	11	3 5/8	3 5/8		
57	12	11	3 23/32	3 3/4	3/8	3 3/8
58	12	11	3 3/16	3 3/16		
59	12	11	3 29/32	3 15/16	3/8	3 9/16
60	12	11	4	4		

2. Install the balusters. (See Figure 17.10)

- Align the balusters with the marks on the back of the top side rail and nail them in place with 2" finish nails. Nail through the top side rail into the balusters; 1 nail per baluster. Only nail one side until the bottoms are attached.
- Plumb the balusters and attach them to the bottom side rails with 2" finish nails. Insert 1 nail through both the front and back bottom side rails into each baluster.
- Finish attaching the top side rails with 2" finish nails; 1 nail through the other side rail into each baluster.

3. Fill the holes.

- Apply wood putty to the screw holes made by the screws.
- Allow the putty to dry, then sand to a smooth finish.
- Fill the gaps between the railing pieces with white painter's caulk.

Porch Railing Quality Checklist

- Double check the height of the railing.
- Double check the spacing under the railing.
- Double check the spacing of the balusters.
- Double check the alignment of the balusters to the posts.

Handrails (Volunteer)

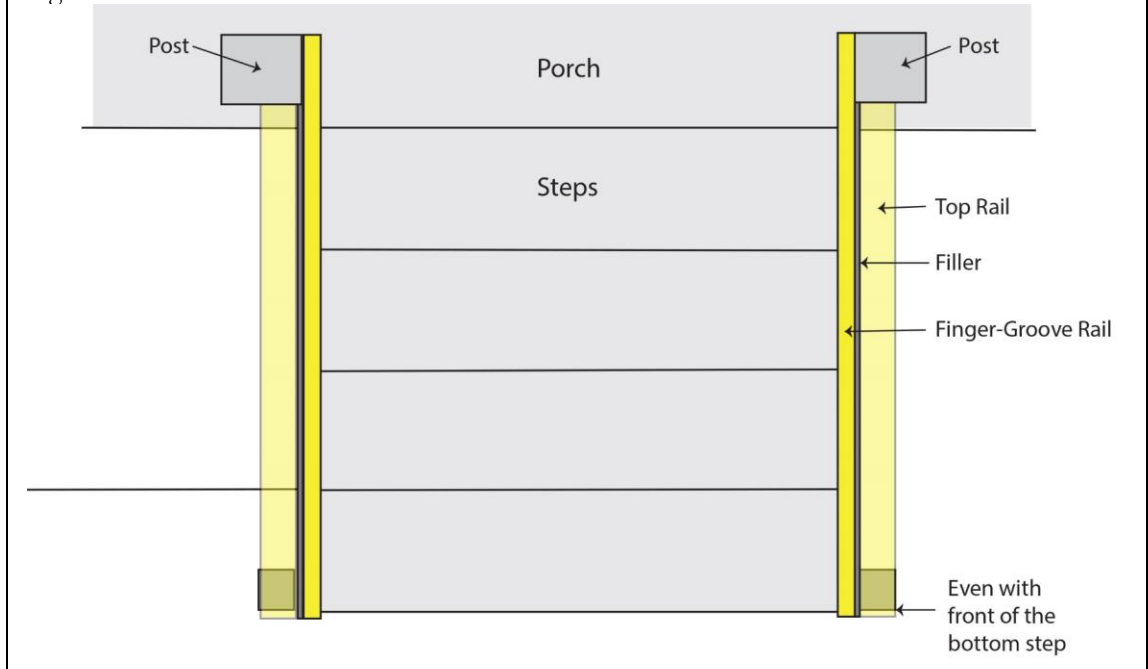
Critical Issues

- If there are four (4) or more rises and/or the porch is 30" or more above grade, handrails are required on both sides.
- Call OPUS before digging the post holes.

Install the Hand Rails

1. Determine placement of the handrail. (See Figure 17.11)
 - The handrail should be placed as close as possible to the sides of the steps and aligned with the inside of the porch post. If there is no porch post aligned with the side of the stairs a 4x4 post must be added.
 - The finger-groove handrail will be installed on the inside of the post. A filler strip will be installed between the top rail of the handrail and the finger-grooved handrail to bring the grooved-handrail even with the inside of the porch post. The filler should not be more than 1 ½".

Figure 17.11 – Handrail Post Placement

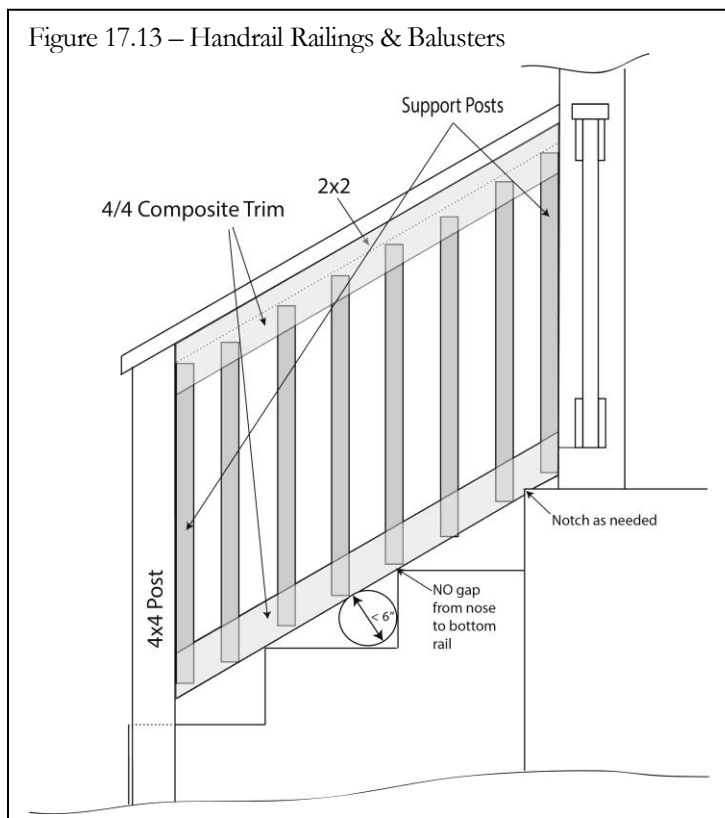


2. Install the bottom post.
 - Dig a 32" deep hole beside the bottom step for the post. The front of the post should be flush with the front of the bottom step and the side of the post should be as close as possible to the step.
 - Fill the bottom of the post hole with 2" to 4" of gravel to allow for water drainage.
 - Place the post in the hole; plumb it; align it with the front of the bottom step; and brace it in place.

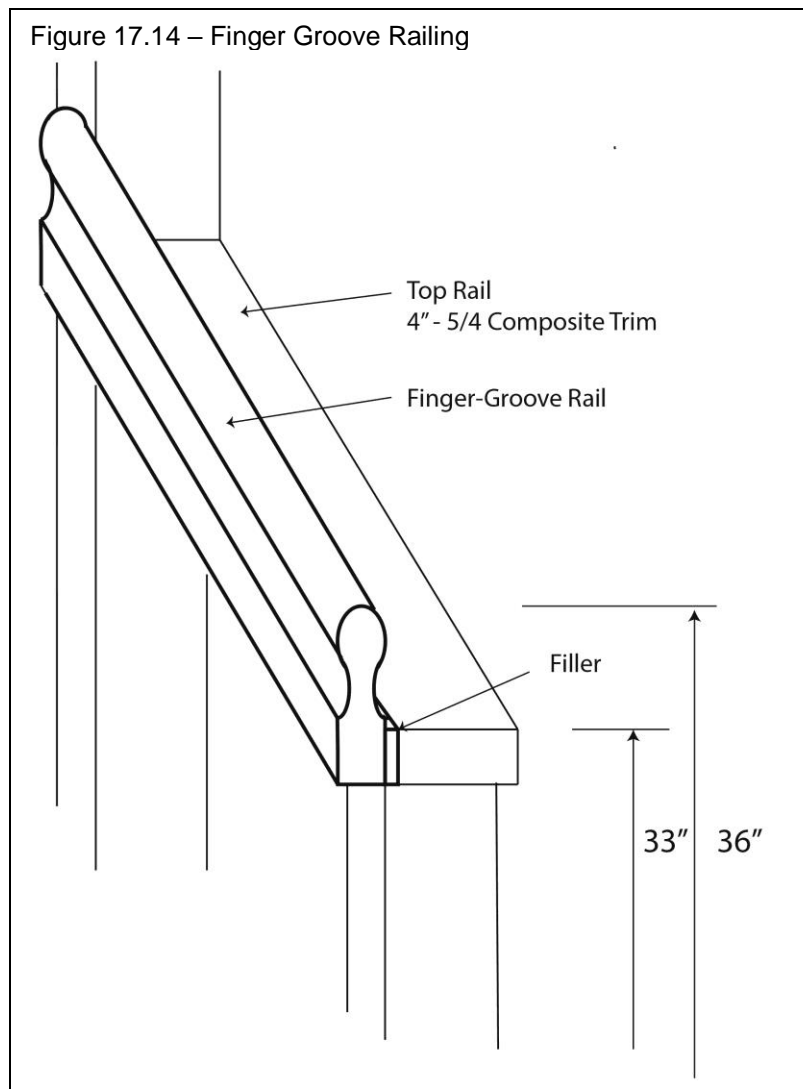
- Fill the hole with concrete. Allow the concrete to setup (about 2 hours) before removing the bracing.
3. Mark the post with the position of the top rail. (See Figure 17.12).
 - **Mark 1** - Mark the front edge of the bottom post just installed with a mark 33" from the top of the nose of the bottom step.
 - **Mark 2**
 - Hold a length of 4" - 5/4 Composite trim (1"x3 1/2") with the 1" side against the porch and bottom posts with its top edge even with Mark 1 from above and parallel to the stairs.
 - While holding the Composite trim to Mark 1, measure up 33" from the nose of the top step to find the angle.
 - Mark the front of the porch post with a mark even with the top of the Composite trim.
 4. Draw a line on the bottom post along the bottom of the Composite trim where it crosses the post.
 5. Cut off the bottom post at that line made above.
 6. Install the top railing.
 - Lay the length of 4" - 4/4 Composite trim (3/4"x3 1/2") to be used as the top rail on the stairs against the top and bottom posts. Draw a vertical line on the back of the top rail where the rail meets the top post.
 - Extend that line across the top of the top rail.
 - Cut the top rail on that line at the angle identified by the line on the back.
 - Hold the top rail in place with the top edge at Mark 2 and the bottom sitting on the post.
 - Draw a vertical line on the side of the top rail 3/4" beyond the post.
 - Extend that line across the top of the top rail.
 - Cut the top rail on that line. The angle should be the same as the top cut.
 - Pre-drill the top or the sides of the top rail for screws to be inserted at an angle back into the top post. Also, Pre-drill the top of the top rail for screws to be inserted down into the bottom post.
 - Cut a piece of 2x2 to fit between the two posts.
 - Lay the top rail upside down. Center the 2x2 under the top rail. Attach the 2x2 with 2" exterior wood screws; 1 screw up through the 2x2 into the top rail every 16".
 - Attach the top rail with 3" screws through the pre-drilled holes into the posts.

9. Cut the stair side rails.
 - For each section of railing, cut four (4) pieces of 4" - 4/4 Composite trim (3/4" x 3 1/2") to fit snugly between the posts. Two (2) pieces will be the top rails, installed across the top of the railing, and two (2) pieces will be the bottom rails, installed across the bottom.
 - Hold the pieces against the post at the location they will be installed. Mark the back side of the pieces with a line along the edge of each post. Cut the pieces.
 - Notch the bottom rails as needed to fit them tightly to the nose of each step. The gap between the bottom rail and the steps must be small enough to not allow a 6" sphere to pass through.
 - Prime and paint the ends of each piece.
4. Mark the baluster placement.
 - The balusters in each railing section should appear centered in that section.
 - The space between any two balusters must be less than 4".
 - Lay out the baluster placement on the back of one of the top side rails, starting in the middle of the rail.
 - Determine the baluster location with the same process used on the porch railings. Use the horizontal length between the posts, not the side rail length, to calculate the number of balusters required.
5. Install the top side rails.
 - Attach the top side rails to the sides of the top rail 2x2 with 2" finish nails; 1 nail every 12". Hold the side rails tight to the top rail.
6. Install the bottom side rails.
 - Attach one of the bottom side rails to the sides of the railing supports with 2" finish nails; 2 nails into each railing support. Hold the side rails tight to the bottom of the railing support.
 - Slide the balusters to be used in this section of railing up in between the top side rails before installing the second bottom side rail.
 - Attach the second bottom side rails to the sides of the railing supports with 2" finish nails; 2 nails into each railing support. Hold the side rails tight to the bottom of the railing support.
7. Install the balusters. (See Figure 17.13)
 - Slide the balusters into position using the marks on the back of the top side rail and nail in place with 2" finish nails. Nail through the top side rail into the balusters; 1 nail per baluster. Only nail one side until the bottoms are attached.
 - Plumb the balusters and attach them to the bottom side rails with 2" finish nails. Insert 1 nail through both the front and back bottom side rails into each baluster.

- Finish attaching the top side rails with 2" finish nails; 1 nail through the other side rail into the baluster.



8. Install the finger-groove handrail. (See Figure 17.14).
 - Hold the finger-groove handrail next to the top rail of the handrail. Draw a line at the top of the handrail along the back side of the porch post. Draw a second line at the bottom of the handrail along the front side of the bottom post.
 - Plumb cut the bottom flush to the front of the bottom post.
 - Plumb cut the top flush to the back of the porch post. Then, round over the back edge.
 - If needed, rip a filler strip from a 2x4 to fit between the finger grooved handrail and the top rail. The filler strip is required for the finger-groove rail to lay flush against the porch post. Cut the strip to a width which holds the rail flush to the post. Multiple pieces of filler can be used. A continuous piece is not required.
 - Attach the finger-groove handrail and filler strip(s) to the top rail using 3 ½" to 5" screws depending of the width of the filler strip; 1 every 16".



9. Fill the holes.

- Apply wood filler to the screw and nail holes.
- Allow the filler to dry, then sand to a smooth finish.
- Fill the gaps between the railing pieces with white painter's caulk.

Hand Railing Quality Checklist

- Check the space between the bottom of the railing up the stairs and the tread below. The opening must be small enough that a 6" sphere cannot pass through.
- Double check the spacing of the balusters (Less than 4").
- Double check the alignment of the balusters to the posts.
- Double check whether one or two hand rails are required.

Summary

Porch Top Railing Height	36"
Clearance below Porch Bottom Railing	Less than 4"
Handrail Height (Top)	33" above stair nosing
Handrail Height (Bottom)	0" above stair nosing
Grooved Handrail Height	36"