

PermaRail Plus Stair Rail Installation Instructions

1-Piece Standard Top Rail System

PermaRail Plus™ – Stair Rail Installation Instructions for 1-Piece Standard Top Rail System

NOTE: STANDARD RAIL MAY BE USED FOR STAIR RAIL UP TO 8' LONG

It is recommended that you check all local, state & national building codes before the design & installation of your PermaRail Plus railing system. The manufacturer is not responsible or liable for any rail system that does not meet the requirements of the governing building code in the location where the system is installed.

1. PREPARE TO MEASURE RAIL SECTION LENGTHS

A. Before taking the measurement, make sure that the newel posts or columns to which the railings will be attached are plumb & secure.

I. If using HB&G PVC newel sleeves & Newel-Loc™ structural post mounts, install following the installation instructions that came with each post mount. If using 4x4 treated wooden newel posts with HB&G PVC newel sleeves, be sure that 4x4 posts have been installed in accordance with your local building code. Cut PVC newel sleeve to final length & slide the newel sleeve over the 4x4 treated wooden post. See Table #1 below for component heights, including newel sleeves (*refer to newel sleeve installation instructions*).

II. If using PVC column wraps such as PermaWrap®, RigidWrap®, or PermaSnap™, be sure supplemental rail attachment blocking has been added to the structural post inside the PVC column wraps at the rail attachment points.

III. If using thin-wall pultruded fiberglass columns such as PermaLite®, add 2x4 or 2x6 pressure treated blocking to the inside faces of the column at the rail attachment points.

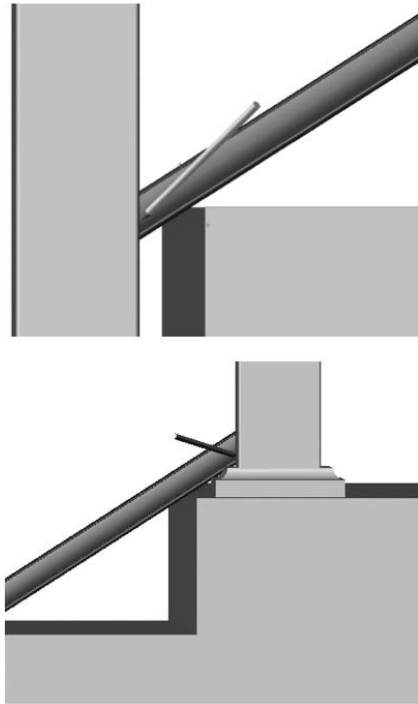
IV. FRP fiberglass columns, such as PermaCast® do not require supplemental blocking. **VERY IMPORTANT – USE 13/64" DIAMETER DRILL BIT TO DRILL THE HOLES IN FRP COLUMNS TO RECEIVE THE RAIL ATTACHMENT BRACKET SCREWS!**

2. MEASURE & CUT RAIL SECTIONS & ALUMINUM RAIL STIFFENERS TO LENGTH

A. Measure the HORIZONTAL distance between the posts (the span) & make a note of it. You will use this measurement when determining your baluster spacing. **Your newel posts should be plumb when taking these measurements.**

B. Lay PVC Standard rail on the stairs, with the legs of the PVC rail facing down. Make sure both ends go past the newel posts at each end of the rail section. Pull the rail up against the sides of the newel posts. With a pencil, mark where you will cut the rail at each end, using the newel posts at each end as your marking guide (*see Drawings 1A & 1B*). Repeat this process with the 2nd piece of rail so it is cut identically like the 1st. Use a power miter box with fine tooth carbide blade to cut the rails at the angle of your pencil marks & test fit each piece between the newel posts. **Be sure your newel posts are plumb when test fitting the rails (refer to newel post installation instructions).**

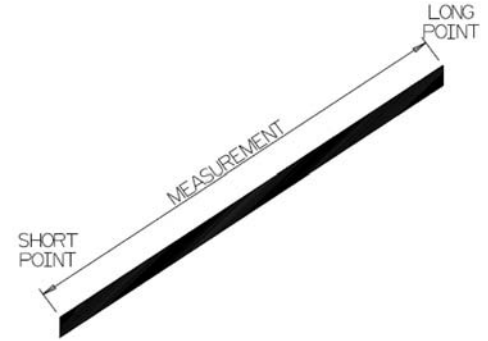
Drawings 1A & 1B: SCRIBE ANGLE OF STAIR RAKE ON RAIL TO CUT



C. To determine the length of the U-shaped aluminum stiffener, measure the distance from the short point to long point (SP-LP) of your cut PVC Standard rails (*see Drawing 2*).

SQUARE CUT the U-shaped aluminum stiffeners 1½" shorter than the short-point-to-long-point (SP-LP) measurement of the PVC Standard rails. For example, if the SP-LP measurement is 65¼", you will **SQUARE CUT** the U-shaped aluminum stiffener 65¼" - 1½" = 63¾".

Drawing 2: MEASURE PVC RAIL SHORT POINT TO LONG POINT

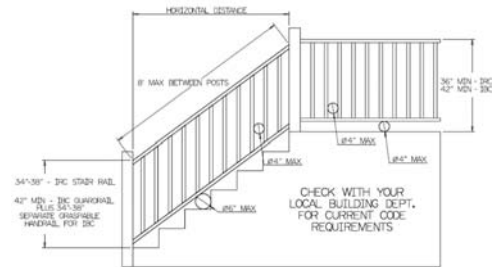


3. LAY OUT THE BALUSTER SPACING

NOTE: For stair rail sections, your baluster spacing is based on the HORIZONTAL distance between newel posts (Refer to Drawing 3).

Start layout from the center of the rail section & work towards each end.

Drawing 3: STAIR RAIL LAYOUT INFORMATION



A. For **Simplified Baluster Spacing** (with variable spacing at the ends of the rail section that does not equal the spacing between the balusters) use the following procedure to determine your layout.

I. Add the baluster thickness + code-compliant spacing. Suggested spacing for 1¼" balusters = 37/8" & suggested spacing for 1½" balusters = 3¾".

NOTE: Check local building codes for maximum allowed spacing.

1. For 1¼" thick balusters, this totals 1¼" + 37/8" = 51/8" **horizontal spacing** distance on center between balusters.

2. For 1½" thick balusters, this totals 1½" + 3¾" = 5¼" **horizontal spacing** distance on center between balusters.

B. For **Equal Baluster Spacing** (all spaces between balusters & spacing at the ends of the rail section are equal)

you can use the following procedure to determine the spacing of the balusters.

NOTE: Check local building codes for maximum allowed spacing.

I. Note the **HORIZONTAL** distance between the posts. (refer to Drawing 3)

1. If you are using 1¼" wide balusters, divide the horizontal distance by 5.125
2. If you are using 1½" wide balusters, divide the horizontal distance by 5.25

II. Divide the **HORIZONTAL** distance by the appropriate number (5.125 or 5.25) from the previous step that corresponds to the thickness of your balusters. As an example, let's say the **horizontal distance** of the rail is 89.5" & we are using 1¼" wide balusters. $89.5 / 5.125 = 17.46$

III. Round the value you obtained up to the nearest whole number. In this example, 17.46 rounds up to 18. This is the number of spaces you will have in this rail section. You will have one more space than balusters, so in this example, you will have 17 balusters. **NOTE: An odd number of balusters results in a baluster in the center of your rail section. An even number of balusters results in a space in the center.**

IV. Multiply 17 by the width of one baluster (in this example, 1¼"). $17 \times 1.25 = 21.25$ ". This is the sum total width of the 17 balusters.

V. Subtract 21.25" from the **horizontal distance** of the rail section. $89.5 - 21.25 = 68.25$ ". This is the sum total width of the 18 spaces.

Divide 68.25 by 18 to determine the width of each space:

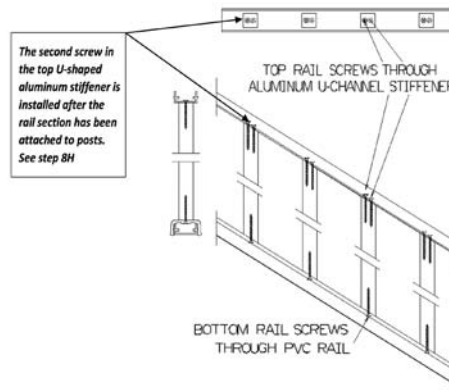
$68.25 / 18 = 3.79$. Round this number up to the nearest 1/16th inch. In this case, that number is 3.8125 or 3¹³/₁₆". This is the width of each space between the balusters & the approximate width of the spaces at each end of the rail section. **NOTE: When rounding up to the nearest 1/16", the width of the spaces at each end of the rail will be slightly**

less than the spacing between the balusters, but this will not be noticeable.

C. When rail is complete, each baluster will receive three #8 X 2½" screws: (see Drawing 4)

- I. 1 screw through the bottom PVC Standard rail into the center of the baluster
- II. 2 screws through the top U-shaped aluminum stiffener into the baluster, ¼" off of center in the opposite direction of the screw installed in the previous step. **Note: the second screw in the top U-shaped aluminum stiffener is installed after the rail section has been attached to posts. See step 8H**

Drawing 4: BALUSTER SCREW LAYOUT



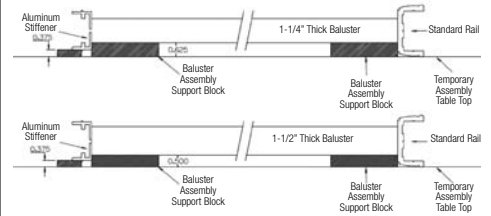
4. SET UP ASSEMBLY STATION & SCREW BALUSTERS TO BOTTOM RAIL / TOP STIFFENER

A. It is recommended to devise a temporary assembly station to make the assembly process quick & accurate. A 4x8 sheet of plywood across a pair of saw horses or workbench works well as temporary assembly table.

I. If you are using 1¼" thick balusters, cut 2 baluster assembly support blocks that are approximately 3½" wide & 5/8" thick. If you are using 1½" thick balusters, cut 2 baluster assembly support blocks that are approximately 3½" wide & ½" thick. You will also need 3/8" support blocks under the aluminum stiffener.

II. (See Drawings 5A & 5B)

Drawing 5A: TEMPORARY ASSEMBLY STATION SETUP

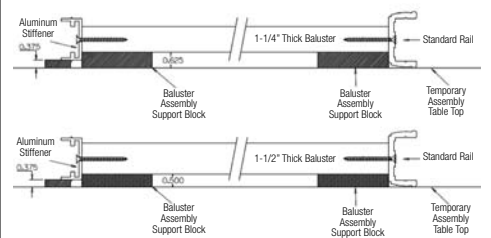


B. Use the #8 X 2½" square-drive screws to fasten the balusters to the rail sections. You must pre-drill 3/16" diameter holes in the aluminum stiffener. It is also helpful, though not necessary, to lay out & pre-drill 1/8" diameter holes for the screws in the PVC rail section. As noted in **Step 3C**, one screw should be used to fasten the PVC rail to each baluster & two screws fasten the aluminum stiffener to each baluster.

IMPORTANT: Use only 1 screw to secure the top aluminum stiffener to the last baluster at each end. If the space between the last baluster & the new post is less than 3-1/4", you will need to use a countersink drill bit to countersink the screw hole in the aluminum stiffener so the head of the baluster screw does not extend above the inside bottom surface of the U-shaped aluminum stiffener. This is necessary so the rail mounting bracket can slide into place over the screw head.

For an odd number of balusters, start by installing a baluster at the center of the rail. For an even number of balusters, start by installing one of the 2 balusters that will be closest to the center of the rail.

Drawing 5B: SCREW BALUSTERS TO RAIL



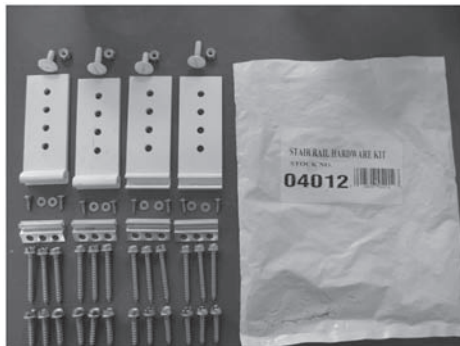
B. Cut a spacer block out of scrap material, exactly the width of the space that will be between two balusters. (See Photo 6) After installing your first baluster at the center of the rail (for an odd number of balusters) or next to

the center space (for an even number of balusters), press the spacer block against one side of that baluster & put the next baluster in place, tight against the other end of the spacer block. Do this at the top and bottom of the baluster. Screw this second baluster in place. Repeat this process for all the remaining balusters. Check your spacing with a tape measure periodically to make sure your spacing is correct & make any necessary adjustments. The installation of the balusters is complete.

Photo 6: BALUSTER SPACER BLOCK



5. ASSEMBLE ADJUSTABLE STAIR RAIL BRACKETS



RAKE-LOC™ STAIR RAIL MOUNTING HARDWARE KIT

A. The Stair Rail Hardware Kit contains 2 pairs of Rake-Loc™ rail attachment brackets that adjust to the rake of the stairs. Each bracket has 2 main parts:

- I. The larger white colored part ("Bracket Base") with 4 holes that will slide into the aluminum stiffener
- II. The smaller silver colored part ("Leaf") with 3 holes, which slide into the round slot of the white-colored part.

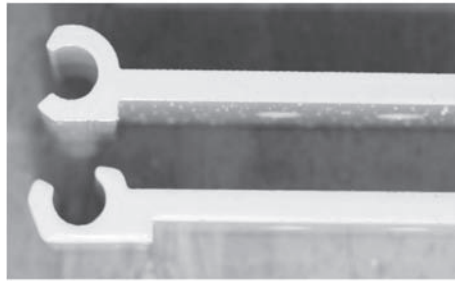
Once the Leaf is slid into position in the round slot of the Bracket Base, the small screws with washers are screwed into the holes in each end of the Leaf. These screws and washers will prevent the Leaf from falling out of the Bracket Base.

B. The 2 bracket bases used at the top of the stairs are different from the 2 used at

the bottom of the stairs (**see Photo 7A**). Slide the Leaf into position in round slot of the Bracket Base. **Note the proper orientation of the Leaves shown in photo 7B**

Photo 7A: BRACKET BASE

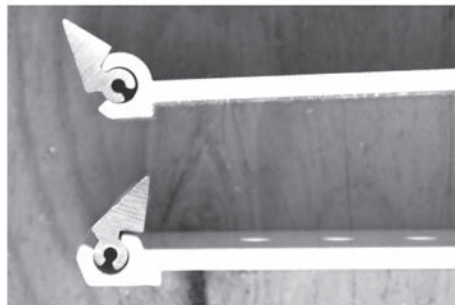
Bracket Base for top of stairs



Bracket Base for bottom of stairs

Photo 7B: ASSEMBLED BRACKET BASE WITH LEAF

Bracket assembly for top of stairs



Bracket assembly for bottom of stairs

After inserting the Leaf into the round slot of the Bracket Base, use the small screws with washers to secure the Leaf in place to prevent it from falling out (**see photo 7C**).

Do not over-tighten the screws. The Leaf needs to be able to rotate back & forth to adjust to the angle of your stairs.

Photo 7C: SECURE LEAF IN PLACE WITH SCREWS

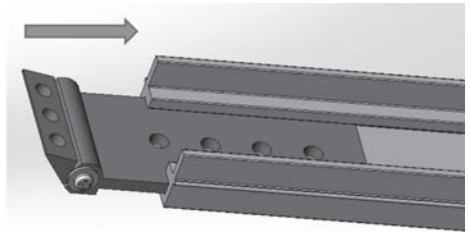


6. INSERT RAKE-LOC™ STAIR RAIL ATTACHMENT BRACKETS INTO BOTTOM ALUMINUM STIFFENER

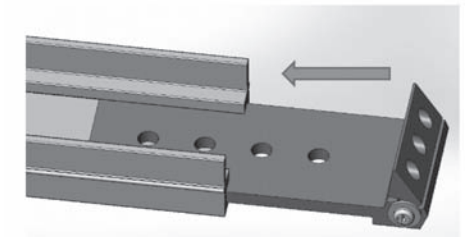
A. Take the U-shaped aluminum stiffener that you square-cut for the bottom rail

section in Step 2C & slide a top-of-stairs Rake-Loc™ bracket assembly into one end & a bottom-of-stairs Rake-Loc™ bracket assembly into the other end. In both cases slide the long leg of the Rake-Loc™ bracket into the slot provided in the aluminum stiffener. (**See drawings 8A & 8B**).

Drawings 8A & 8B: INSERT RAKE-LOC™ RAIL BRACKET ASSEMBLIES FOR TOP OF STAIRS & BOTTOM OF STAIRS INTO THE ALUMINUM STIFFENER



Bracket assembly for top of stairs



Bracket assembly for bottom of stairs

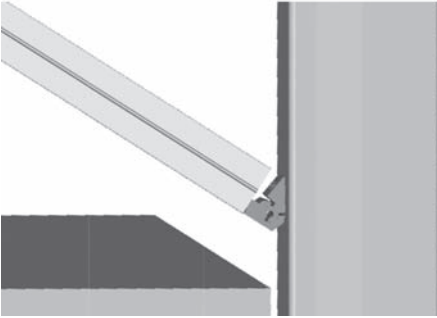
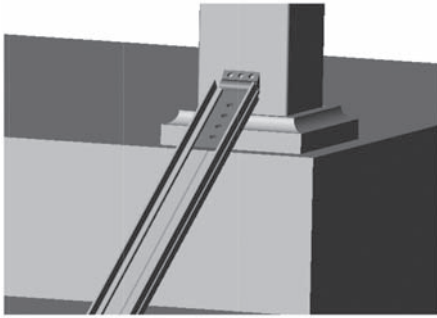
7. INSTALL BOTTOM STIFFENER & RAKE-LOC™ STAIR RAIL ATTACHMENT BRACKETS.

NOTE: The rail section will be installed in-between 2 newel posts, walls, columns, full height posts, or some combination of these components. For this example, we will illustrate a rail section being installed between 2 newel posts (**refer to newel installation instructions**).

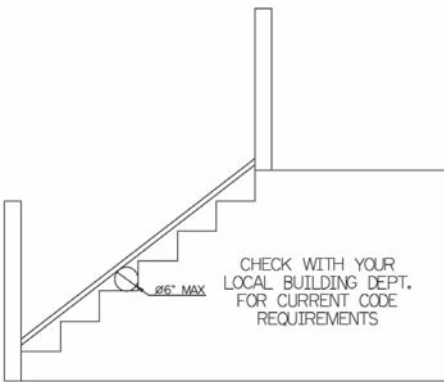
A. Drop the bottom stiffener with Rake-Loc™ attachment brackets into place between the newel posts (**See Drawings 9A & 9B**).

Check with your local building department for the maximum clearance allowed between the bottom of the aluminum stiffener & each step. (**See Drawing 9C**).

Drawings 9A, 9B: DROP BOTTOM STIFFENER INTO PLACE



Drawings 9C: CLEARANCE BETWEEN BOTTOM OF STIFFENER & STEPS



B. Center the aluminum stiffener (with the inserted Rake-Loc™ brackets) on the faces of the newels. Push the face of the adjustable leaf up against the face of the newel post. Use a 12" long, $\frac{3}{16}$ " diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the $\frac{1}{4}$ " diameter hex head screws at each end of the rail. Drill through all 3 holes in the vertical leg of each mounting bracket. **IMPORTANT: The 12" long bit is necessary to drill the holes for the bottom bracket at a shallow angle (See Photo 10B).**

Photo 10A: DRILL PILOT HOLES FOR $\frac{1}{4}$ " HEX HEAD SCREWS – TOP OF STAIRS



Photo 10B: DRILL PILOT HOLES FOR $\frac{1}{4}$ " HEX HEAD SCREWS – BOTTOM OF STAIRS



C. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a $\frac{3}{8}$ " hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (See Photos 11A & 11B)

i. IF USING THE HB&G STEEL NEWEL-LOC™ NEWEL MOUNT SYSTEM, USE THE 1 1/4" LONG HEX HEAD SCREWS.

ii. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

Photos 11A & 11B: DRIVE HEX HEAD SCREWS INTO NEWEL POST



D. Use the 4th hole (the hole furthest away from the newel) in the long legs of the Rake-Loc™ rail attachment brackets to drill 1 hole through the aluminum stiffener at each end of the rail. The 4th hole will be easiest to use. Take a $\frac{9}{32}$ " drill bit & use the hole in the Rake-Loc™ attachment bracket as a guide to drill through the aluminum stiffener. (See Photos 12A & 12B)

Photos 12A & 12B: DRILL MOUNTING BRACKET BOLT HOLE THROUGH ALUMINUM STIFFENER



E. Insert one of the $\frac{1}{4}$ " X $\frac{3}{4}$ " sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN THIS STEP FOR THE BOTTOM RAIL SECTION, BE SURE TO USE THE $\frac{3}{4}$ " - LONG BOLTS. DO NOT USE THE 1" - LONG BOLTS.** (See Photos 13A – 13D)

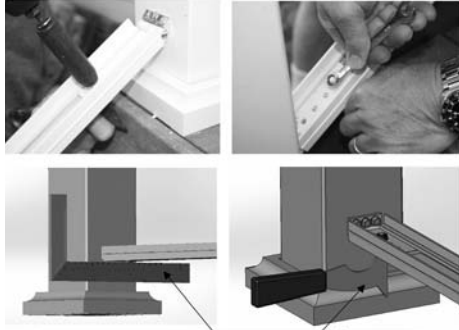
Photos 13A – 13D: INSERT SIDEWALK BOLTS & INSTALL LOCK NUTS



F. Use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten

a 1/4" lock-nut onto the bolt with a 7/16" wrench or driver bit. (See Photos 14A, 14B & Drawings 14C & 14D)

Photos 14A, 14B & Drawings 14C & 14D: TIGHTEN LOCK NUT ON SIDEWALK BOLT



Tri-square can be used if blade is thin enough or use stiff putty knife to hold bolt while installing & tightening nut

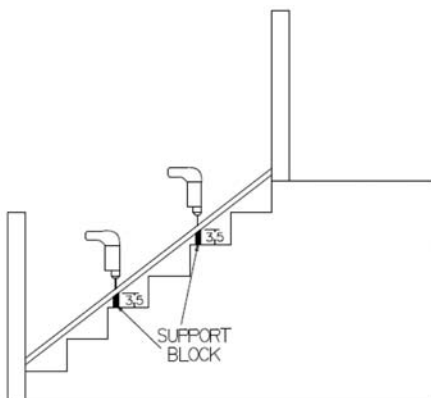
G. Install the 1 1/4" square PVC support blocks. The number of support blocks required will depend on the length of rail. The maximum unsupported span is 44". The blocks that come with the kit are 3 1/2" long & the top of each block should be cut to match the pitch angle of the stairs. Position the support blocks so they rest on a step & contact the underside of the bottom rail.

iii. 6' rail = 1 support block

iv. 8' rail = 2 support blocks

Determine the location of the support blocks & drill vertically through the center of the aluminum stiffener with a 3/16" drill bit at each of those locations. Do not drill into the support blocks. After drilling the holes for each support block, place the support blocks in position & while grasping the support block with one hand, drive a #8 X 2 1/2" long stainless steel flat head screw vertically into the center of each support block. (See Drawing 15)

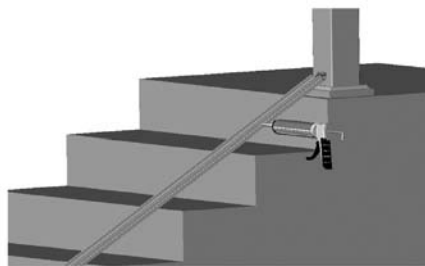
Drawing 15: INSTALL SUPPORT BLOCKS



8. INSERT & INSTALL ASSEMBLED PVC RAIL SECTION

A. Now you are ready to insert & snap into place the PVC rail section you pre-assembled in steps 1-4. Verify that the length of the top & bottom PVC rails are the correct length to fit closely between the support components (newels, columns, posts, or wall). **NOTE: Be sure the decorative newel caps are removed for easier installation of the rail section.** Apply a large bead of Siroflex adhesive caulk to the outside faces of the bottom aluminum stiffener. (See Drawing 16)

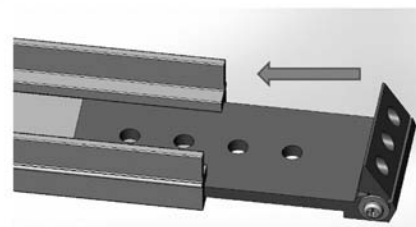
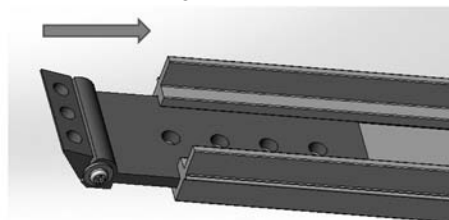
Drawing 16: APPLY SIROFLEX ADHESIVE CAULK TO OUTSIDE FACES OF BOTTOM ALUMINUM STIFFENER



B. Slide the remaining two Rake-Loc™ stair rail attachment brackets into each end of the upper U-shaped aluminum stiffener of your assembled rail section (See Drawings 17A & 17B).

NOTE: LEAVE BRACKETS LOOSE – DO NOT FASTEN THEM TO THE STIFFENER YET.

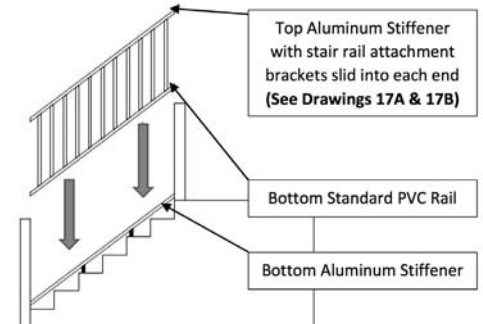
Drawings 17A & 17B: INSERT RAKE-LOC™ BRACKET ASSEMBLIES FOR TOP OF STAIRS & BOTTOM OF STAIRS INTO THE TOP ALUMINUM STIFFENER



C. Take the pre-assembled rail section with the Rake-Loc™ rail attachment brackets inserted into the ends of the top aluminum stiffener, & drop it into position over the bottom aluminum stiffener &

snap it into place. (See Drawing 18A, Photo 18B & Drawing 18C) Clean off any caulk squeeze-out from the bottom rail with a damp rag. Rinse rag & repeat cleaning until all residual caulk has been cleaned off the surface of the rail & the bottom surface of the aluminum stiffener.

Drawing 18A & Photo 18B:: DROP STAIR RAIL

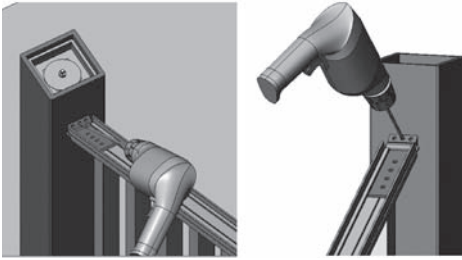


Drawing 18C: UNDERSIDE OF BOTTOM RAIL AFTER SNAPPING RAIL ASSEMBLY INTO PLACE & CLEANING OFF CAULK SQUEEZE-OUT



D. Center the aluminum stiffener (with the inserted Rake-Loc™ brackets) on the face of the newel. Use a 12" long, 3/16" diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the 1/4" diameter hex head screws at each end of the rail. Drill through all 3 holes of the short, moving leg of each Rake-Loc™ mounting bracket (See Drawings 19A & 19B). **IMPORTANT: The 12" long bit is necessary to drill the holes at a shallow angle in the lower bracket.**

Drawings 19A & 19B: DRILL PILOT HOLES WITH LONG DRILL BIT

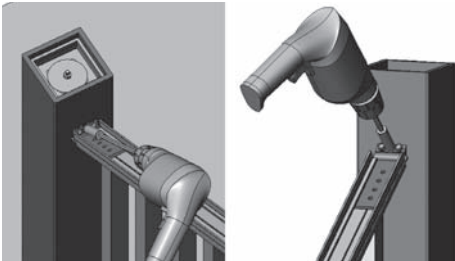


E. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a $\frac{3}{8}$ " hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (See Drawings 20A & 20B)

i. IF USING THE HB&G STEEL NEWEL-LOC™ NEWEL MOUNT SYSTEM, USE THE $\frac{1}{4}$ " LONG HEX HEAD SCREWS.

ii. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

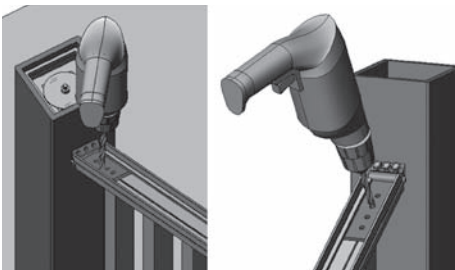
Drawings 20A & 20B: DRIVE HEX HEAD SCREWS INTO NEWEL POST WITH EXTENDED DRIVER BIT



F. After securing the Rake-Loc™ rail attachment brackets to the post, choose one of the 4 holes in the long leg of the Rake-Loc™ bracket that does not interfere with the last baluster.

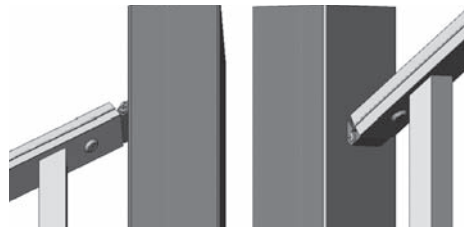
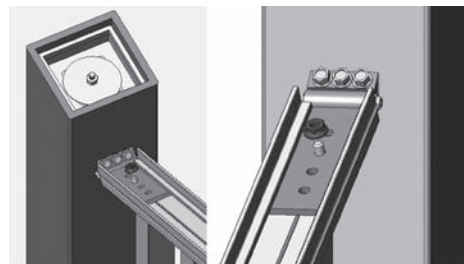
Take a $\frac{9}{32}$ " drill bit & use the Rake-Loc™ attachment bracket hole as a guide to drill 1 hole through the aluminum stiffener & the PVC rail. Repeat at the other end of the rail (See Drawings 21A & 21B).

Drawings 21A & 21B: DRILL SIDEWALK BOLT HOLES IN TOP RAIL



G. Insert one of the $\frac{1}{4}$ " X 1" sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN THIS STEP FOR THE UPPER RAIL SECTION, BE SURE TO USE THE 1"-LONG BOLTS. DO NOT USE THE $\frac{3}{4}$ "-LONG BOLTS.** Refer back to Drawings 14C & 14D & use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten a $\frac{1}{4}$ " lock-nut onto the bolt with a $\frac{7}{16}$ " wrench or driver bit. (See Drawings 22A-22D)

Drawings 22A-22D: INSERT & FASTEN SIDEWALK BOLTS TO SECURE TOP RAIL RAKE-LOC™ ATTACHMENT BRACKETS

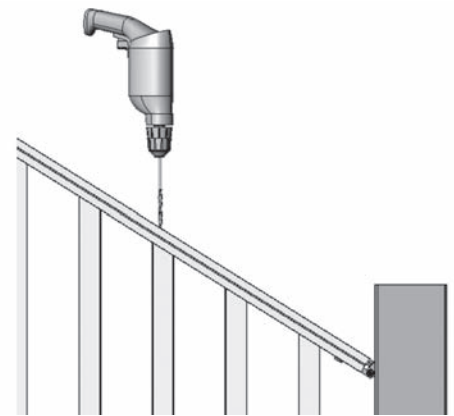


H. Using the groove in the center of the U-shaped aluminum stiffener as a guide, take an electric drill with $\frac{3}{16}$ " diameter drill bit & drill 1 vertical hole through the aluminum stiffener over each baluster. Be sure to lay out your holes so they are approximately $\frac{1}{2}$ " away from the screw used in the initial assembly of the rail (See Drawings 23A & 23B).

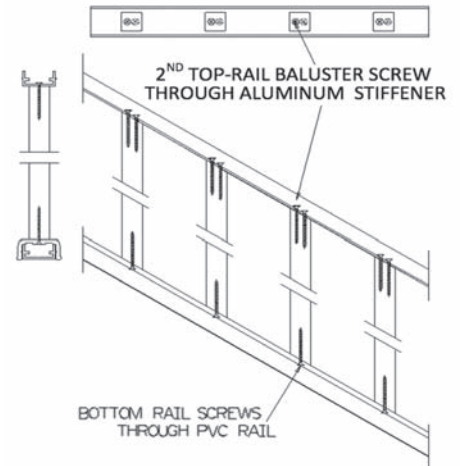
IMPORTANT: Drill only through the aluminum. Do not drill into the baluster because the $\frac{3}{16}$ " diameter hole will be too large for the screw to tighten the PVC baluster properly.

After all the holes are drilled, use the #8 X 2 $\frac{1}{2}$ " square-drive screws to fasten the balusters. Drill & screw through the Rake-Loc™ rail attachment brackets into the top of the last baluster on each end of the rail. Be sure to locate the screw so it misses the screw used in Step 4B to initially secure the last baluster.

Drawing 23A: DRILL U-SHAPED ALUMINUM STIFFENER TO RECEIVE SECOND OF 2-TOP RAIL BALUSTER SCREWS

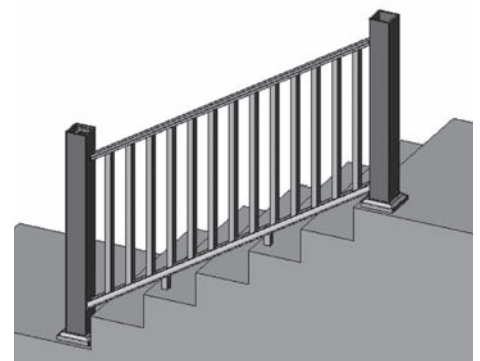


Drawing 23B: BALUSTER SCREW LOCATIONS



When installation of the baluster screws is complete, the rail section will be ready for the installation of the Standard top rail. (See Drawing 24)

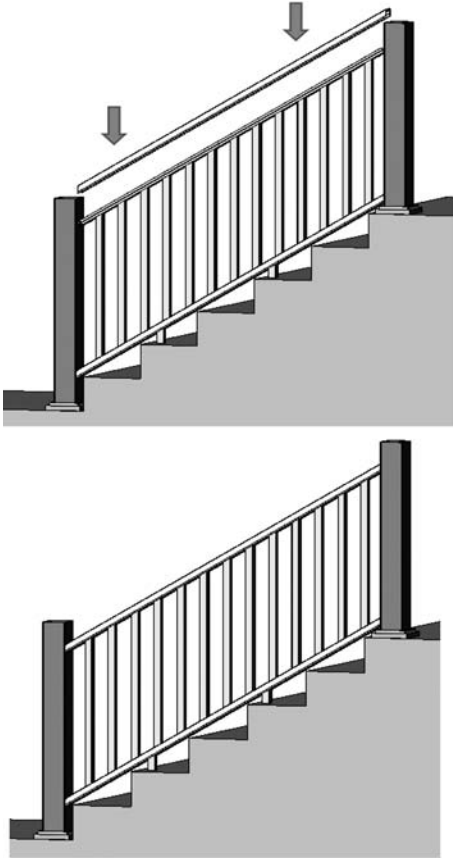
Drawing 24: RAIL ASSEMBLY PRIOR TO STANDARD TOP RAIL INSTALLATION



9. INSTALL STANDARD TOP RAIL

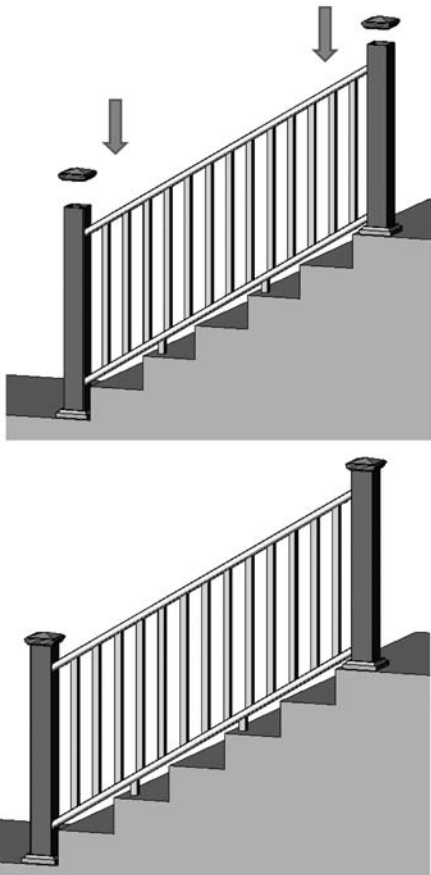
A. Install the Standard top rail by dropping it into position & snapping it into place over the U-shaped aluminum stiffener. **IMPORTANT: Be sure to install the Standard top rail before you install the newel post caps!** (See Drawings 25A & 25B)

Drawings 25A & 25B: INSTALL STANDARD TOP RAIL



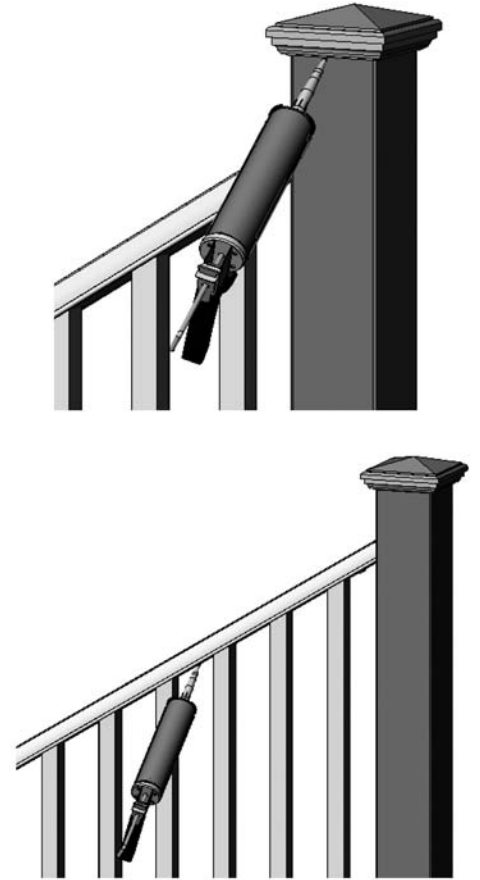
A. Install the newel post caps by pushing them into place on the top of each newel post. **(See Drawings 26A & 26B)**

Drawings 26A & 26B: INSTALL NEWEL POST CAPS

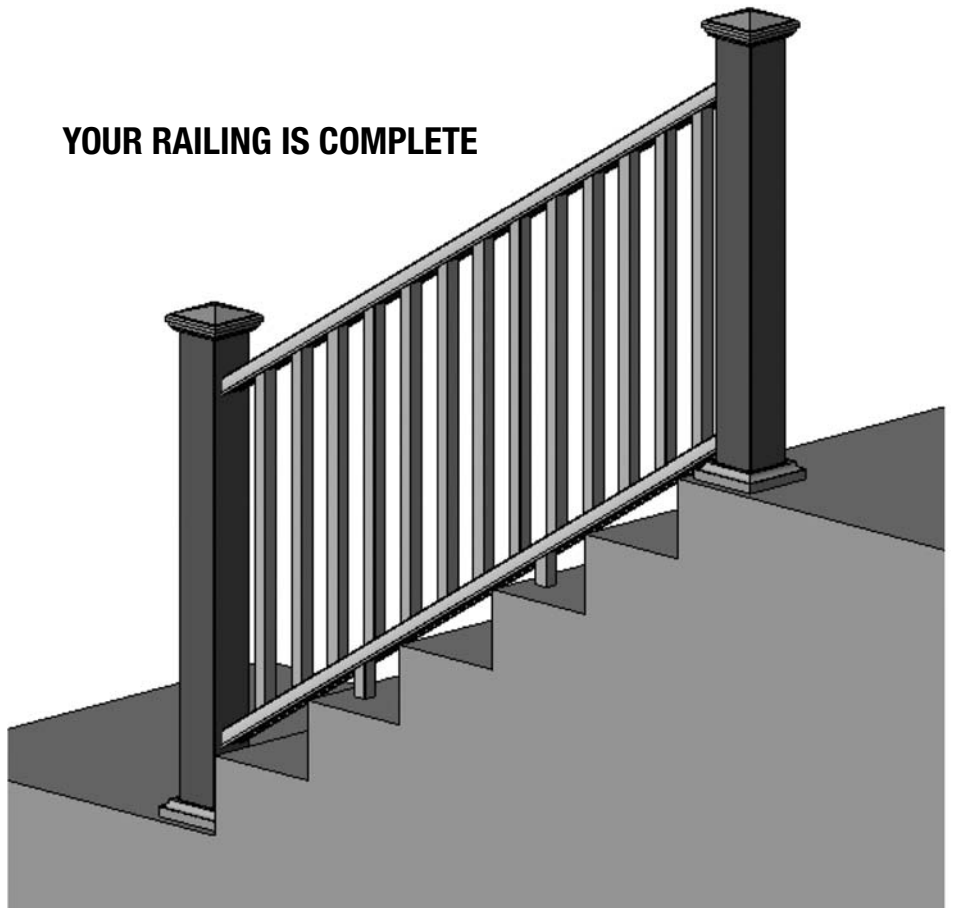


B. There will be a very narrow gap where the legs of the top rail snap into place over the upper U-shaped aluminum stiffener, & also along the bottom edge of the newel post cap where it meets the newel post. Use the provided Siroflex adhesive caulk to bond the Standard PVC top rail to the upper U-shaped aluminum stiffener, & to bond the newel post caps to the newel posts. Caulk the entire length of the top rail on both sides. Caulk around the entire edge under each newel post cap. Wipe the caulk with your finger while at the same time pushing the caulk into the gaps. Wipe any excess caulk off the rail & newel posts with a damp rag. Repeat the cleaning process if necessary so the only caulk visible is the caulk that is up in the narrow gap. **(See Drawings 27A & 27B)**

Drawings 27A & 27B: CAULK NEWEL CAPS & RAIL



YOUR RAILING IS COMPLETE



PermaRail Plus Stair Rail Installation Instructions

2-Piece Decorative Top Rail System

PermaRail Plus™ – Stair Rail Installation Instructions for 2-Piece Decorative Top Rail System

NOTE: STANDARD RAIL MAY BE USED FOR STAIR RAIL UP TO 8' LONG

It is recommended that you check all local, state & national building codes before the design & installation of your PermaRail Plus railing system. The manufacturer is not responsible or liable for any rail system that does not meet the requirements of the governing building code in the location where the system is installed.

1. PREPARE TO MEASURE RAIL SECTION LENGTHS

A. Before taking the measurement, make sure that the newel posts or columns to which the railings will be attached are plumb & secure.

I. If using HB&G PVC Newel-Loc™ sleeves & Newel-Loc™ structural post mounts, install following the installation instructions that came with each post mount. If using 4x4 treated wooden newel posts with HB&G PVC newel sleeves, be sure that 4x4 posts have been installed in accordance with your local building code. Cut PVC newel sleeve to final length & slide the newel sleeve over the 4x4 treated wooden post. (*refer to newel sleeve installation instructions*).

II. If using PVC column wraps such as PermaWrap®, RigidWrap®, or PermaSnap™, be sure supplemental rail attachment blocking has been added to the structural post inside the PVC column wraps at the rail attachment points.

III. If using thin-wall pultruded fiberglass columns such as PermaLite®, add 2x4 or 2x6 pressure treated blocking to the inside faces of the column at the rail attachment points.

IV. FRP fiberglass columns, such as PermaCast® do not require supplemental blocking. **VERY IMPORTANT – USE 13/64" DIAMETER DRILL BIT TO DRILL THE HOLES IN FRP COLUMNS TO RECEIVE THE RAIL ATTACHMENT BRACKET SCREWS!**

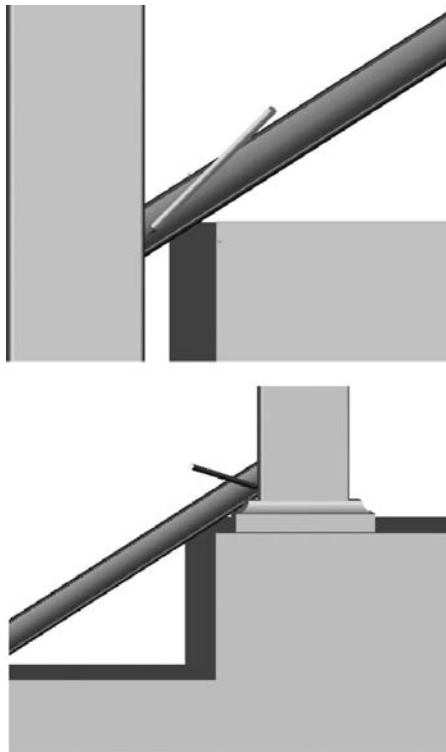
2. MEASURE & CUT RAIL SECTIONS & ALUMINUM RAIL STIFFENERS TO LENGTH

A. Measure the HORIZONTAL distance between the posts (the span) & make a note of it. You will use this measurement when determining your baluster spacing. **Your newel posts should be plumb when taking these measurements.**

B. Lay PVC Standard rail on the stairs, with the legs of the PVC rail facing down. Make sure both ends go past the newel posts at each end of the rail section. Pull the rail up against the sides of the newel posts. With a pencil, mark where you will cut the rail at each end, using the newel posts at each end as your marking guide (*see Drawings 1A & 1B*).

Repeat this process with the top Standard rail lying on the stairs with the legs of the top Standard rail facing up. Use a power miter box with fine tooth carbide blade to cut the rails at the angle of your pencil marks & test fit each piece between the newel posts. **Be sure your newel posts are plumb when test fitting the rails (refer to newel post installation instructions).**

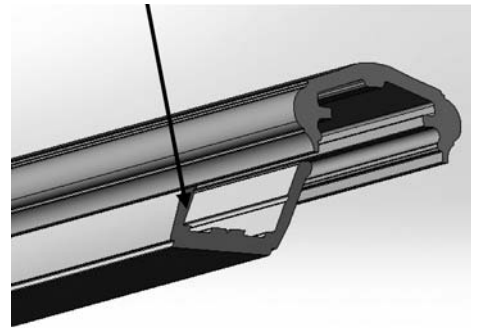
Drawings 1A & 1B:
SCRIBE ANGLE OF STAIR RAKE ON RAIL TO CUT



C. Snap the decorative top rail onto the cut Standard rail, & use the end cuts of the Standard rail to mark the decorative top rail at each end where the decorative top rail will be cut (*see Drawing 1C*).

D. Cut the decorative top rail at the same angle at which you previously cut the Standard rail.

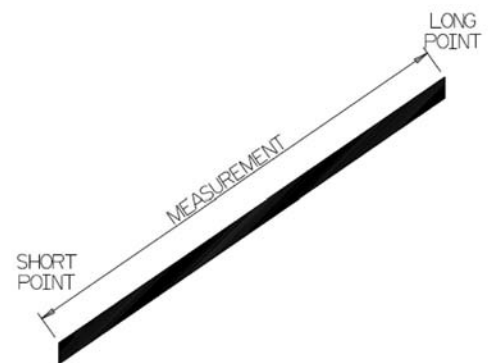
Drawing 1C: MARK DECORATIVE TOP RAIL TO CUT



E. To determine the length of the U-shaped aluminum stiffener, measure the distance from the short point to long point (SP-LP) of your cut PVC Standard rails (*see Drawing 2*).

SQUARE CUT the U-shaped aluminum stiffeners 1½" shorter than the short-point-to-long-point (SP-LP) measurement of the PVC Standard rails. For example, if the SP-LP measurement is 65¼", you will **SQUARE CUT** the U-shaped aluminum stiffener 65¼" - 1½" = 63¾".

Drawing 2: MEASURE PVC RAIL SHORT POINT TO LONG POINT

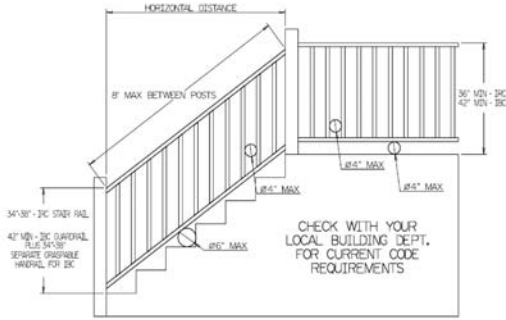


3. LAY OUT THE BALUSTER SPACING

NOTE: For stair rail sections, your baluster spacing is based on the HORIZONTAL distance between newel posts (Refer to Drawing 3).

Start layout from the center of the rail section & work towards each end.

Drawing 3: STAIR RAIL LAYOUT INFORMATION



A. For **Simplified Baluster Spacing** (with variable spacing at the ends of the rail section that does not equal the spacing between the balusters) use the following procedure to determine your layout.

I. Add the baluster thickness + code-compliant spacing. Suggested spacing for 1¼" balusters = 3⅞" & suggested spacing for 1½" balusters = 3¾".

NOTE: Check local building codes for maximum allowed spacing.

1. For 1¼" thick balusters, this totals 1¼" + 3⅞" = 5⅛" **horizontal spacing** distance on center between balusters.

2. For 1½" thick balusters, this totals 1½" + 3¾" = 5¼" **horizontal spacing** distance on center between balusters.

B. For **Equal Baluster Spacing** (all spaces between balusters & spacing at the ends of the rail section are equal) you can use the following procedure to determine the spacing of the balusters. **NOTE: Check local building codes for maximum allowed spacing.**

I. Note the **HORIZONTAL** distance between the posts. (refer to Drawing 3)

1. If you are using 1¼" wide balusters, divide the horizontal distance by 5.125

2. If you are using 1½" wide balusters, divide the horizontal distance by 5.25

II. Divide the **HORIZONTAL** distance by the appropriate number (5.125 or 5.25) from the previous step that corresponds to the thickness of your balusters. As an example, let's say the **horizontal distance** of the rail is 89.5" & we are using 1¼" wide balusters. $89.5 / 5.125 = 17.46$

III. Round the value you obtained up to the nearest whole number. In this example, 17.46 rounds up to 18. This is the number of spaces you will have in this rail section. You will have one more space than balusters, so in this example, you will have 17 balusters. **NOTE: An odd number of balusters results in a baluster in the center of your rail section. An even number of balusters results in a space in the center.**

IV. Multiply 17 by the width of one baluster (in this example, 1¼"). $17 \times 1.25 = 21.25$ ". This is the sum total width of the 17 balusters.

V. Subtract 21.25" from the **horizontal distance** of the rail section. $89.5 - 21.25 = 68.25$ ". This is the sum total width of the 18 spaces.

VI. Divide 68.25 by 18 to determine the width of each space:

$68.25 / 18 = 3.79$. Round this number up to the nearest 1/16th inch. In this case, that number is 3.8125 or 3¹³/₁₆". This is the width of each space between the balusters & the approximate width of the spaces at each end of the rail section. **NOTE: When rounding up to the nearest 1/16", the width of the spaces at each end of the rail will be slightly less than the spacing between the balusters, but this will not be noticeable.**

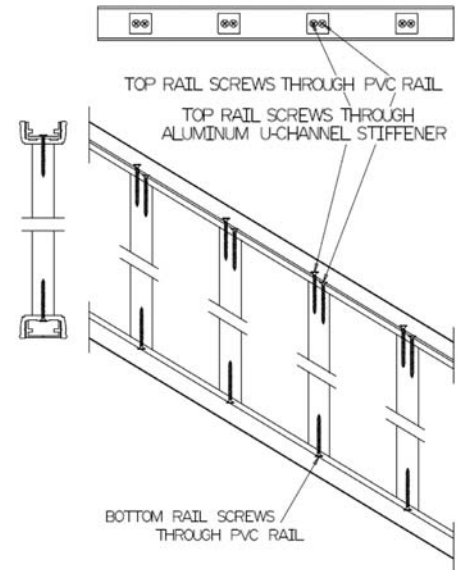
C. When rail is complete, each baluster will receive three #8 X 2½" screws: (see Drawing 4)

I. 1 screw through the bottom PVC Standard rail into the center of the baluster

II. 1 screw through the top PVC Standard rail into the baluster, ¼" off of center

III. 1 screw through the top U-shaped aluminum stiffener into the baluster, ¼" off of center in the opposite direction of the screw installed in the previous step. **Note: this screw is installed after the rail section has been attached to posts. See step 8!**

Drawing 4: BALUSTER SCREW LAYOUT

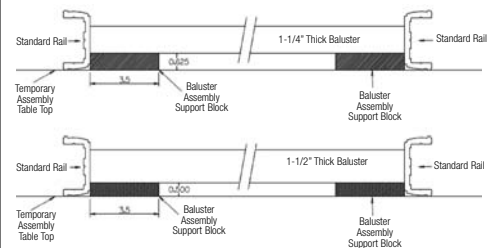


4. SET UP ASSEMBLY STATION & SCREW BALUSTERS TO BOTTOM RAIL / TOP SUB-RAIL

A. It is recommended to devise a temporary assembly station to make the assembly process quick & accurate. A 4x8 sheet of plywood across a pair of saw horses or workbench works well as temporary assembly table.

I. If you are using 1¼" thick balusters, cut 2 baluster assembly support blocks that are approximately 3½" wide & ⅝" thick. If you are using 1½" thick balusters, cut 2 baluster assembly support blocks that are approximately 3½" wide & ½" thick. (See Drawings 5A & 5B)

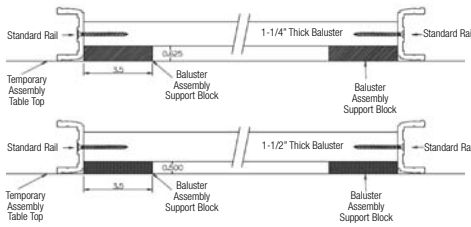
Drawing 5A: TEMPORARY ASSEMBLY STATION SETUP



B. Use the #8 X 2½" square-drive screws to fasten the balusters to the rail sections. It is helpful, though not necessary, to layout & pre-drill ⅛" diameter holes for the screws in the PVC rail sections. As noted in **Step 3C**, one screw should be used at each end of the baluster, screwing the PVC rail pieces to the balusters. For an odd number of balusters, start by

installing one of the balusters at the center of the rail. For an even number of balusters, start by installing one of the 2 balusters that will be closest to the center of the rail.

Drawing 5B: SCREW BALUSTERS TO RAIL



C. Cut a spacer block out of scrap material, exactly the width of the space that will be between two balusters. (See Photo 6) After installing your first baluster at the center of the rail (for an odd number of balusters) or next to the center space (for an even number of balusters), press the spacer block against one side of that baluster & put the next baluster in place, tight against the other end of the spacer block. Do this at the top and bottom of the baluster. Screw this second baluster in place. Repeat this process for all the remaining balusters. Check your spacing with a tape measure periodically to make sure your spacing is correct & make any necessary adjustments. The installation of the balusters is complete.

Photo 6: BALUSTER SPACER BLOCK



5. ASSEMBLE ADJUSTABLE STAIR RAIL BRACKETS

RAKE-LOC™ STAIR RAIL MOUNTING HARDWARE KIT



A. The Stair Rail Hardware Kit contains 2 pairs of Rake-Loc™ rail attachment brackets that adjust to the rake of the stairs. Each bracket has 2 main parts:

- I. The larger white colored part (“Bracket Base”) with 4 holes that will slide into the aluminum stiffener
- II. The smaller silver colored part (“Leaf”) with 3 holes, which slide into the round slot of the white-colored part.

Once the Leaf is slid into position in the round slot of the Bracket Base, the small screws with washers are screwed into the holes in each end of the Leaf. These screws and washers will prevent the Leaf from falling out of the Bracket Base.

B. The 2 Bracket Bases used at the top of the stairs are different from the 2 used at the bottom of the stairs (see Photo 7A). Slide the Leaf into position in the round slot of the Bracket Base. **Note the proper orientation of the Leaves shown in photo 7B**

Photo 7A: BRACKET BASE

Bracket Base for top of stairs



Bracket Base for bottom of stairs

Photo 7B: ASSEMBLED BRACKET BASE WITH LEAF

Bracket assembly for top of stairs



Bracket assembly for bottom of stairs

C. After inserting the Leaf into the round slot of the Bracket Base, use the small screws with washers to secure the Leaf in place to prevent it from falling out (see photo 7C).

Do not over-tighten the screws. The Leaf needs to be able to rotate back & forth to adjust for the angle of your stairs.

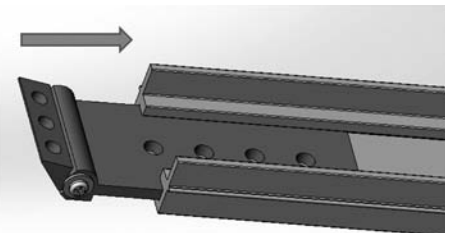
Photo 7C: SECURE LEAF IN PLACE WITH SCREWS



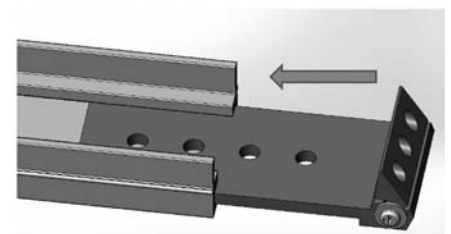
6. INSERT RAKE-LOC™ STAIR RAIL ATTACHMENT BRACKETS INTO BOTTOM ALUMINUM STIFFENER

A. Take the U-shaped aluminum stiffener that you square-cut for the bottom rail section in step 2E & slide a top-of-stairs Rake-Loc™ bracket assembly into one end & a bottom-of-stairs mounting bracket assembly into the other end. In both cases, slide the long leg of the Rake-Loc™ bracket into the slot provided in the aluminum stiffener. (See drawings 8A & 8B).

Drawings 8A & 8B: INSERT RAKE-LOC™ RAIL BRACKET ASSEMBLIES FOR TOP OF STAIRS & BOTTOM OF STAIRS INTO THE ALUMINUM STIFFENER



Bracket assembly for top of stairs



Bracket assembly for bottom of stairs

7. INSTALL BOTTOM STIFFENER & RAKE-LOC™ STAIR RAIL ATTACHMENT BRACKETS.

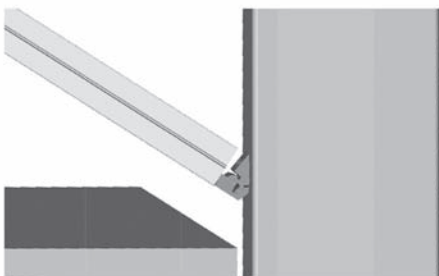
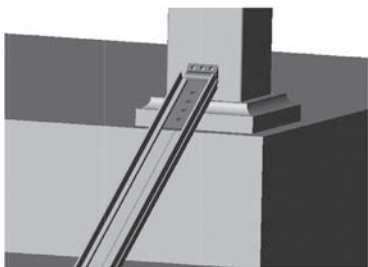
NOTE: The rail section will be installed in-between 2 newel posts, walls, columns, full height posts, or some combination of these components. For this example, we will illustrate a rail section being installed between 2 newel posts (*refer to newel installation instructions*).

A. Drop the bottom stiffener with Rake-Loc™ attachment brackets into place between the newel posts (**See Drawings 9A & 9B**).

Check with your local building department for the maximum clearance allowed between the bottom of the aluminum stiffener & each step. (**See Drawing 9C**).

B. Center the aluminum stiffener (with the inserted Rake-Loc™ attachment brackets) on the faces of the newels. Push the face of the adjustable leaf up against the face of the newel post. Use a 12" long, $\frac{3}{16}$ " diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the $\frac{1}{4}$ " diameter hex head screws at each end of the rail. Drill through all 3 holes in the vertical leg of each mounting bracket. **IMPORTANT: The 12" long bit is necessary to drill the holes for the bottom bracket at a shallow angle** (**See Photo 10B**).

Drawings 9A, 9B: DROP BOTTOM STIFFENER INTO PLACE



Drawings 9C: CLEARANCE BETWEEN BOTTOM OF STIFFENER & STEPS

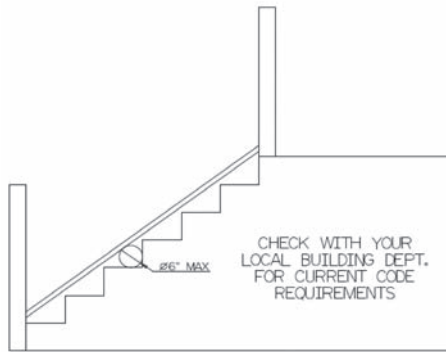


Photo 10A: DRILL PILOT HOLES FOR $\frac{1}{4}$ " HEX HEAD SCREWS – TOP OF STAIRS



Photo 10B: DRILL PILOT HOLES FOR $\frac{1}{4}$ " HEX HEAD SCREWS – BOTTOM OF STAIRS



C. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (**See Photos 11A & 11B**)

i. IF USING THE HB&G STEEL NEWEL-LOC™ NEWEL MOUNT SYSTEM, USE THE $\frac{1}{4}$ " LONG HEX HEAD SCREWS.

ii. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

Photos 11A & 11B: DRIVE HEX HEAD SCREWS INTO NEWEL POST



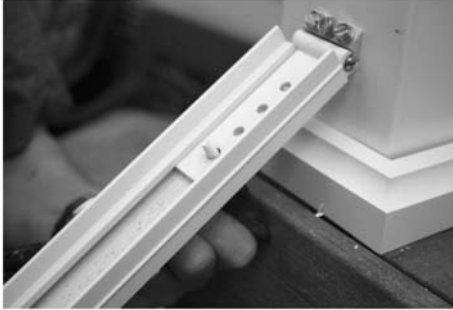
Use the 4th hole (the hole furthest away from the newel) in the long legs of the Rake-Loc™ rail attachment brackets to drill 1 hole through the aluminum stiffener at each end of the rail. The 4th hole will be easiest to use. Take a $\frac{9}{32}$ " drill bit & use the hole in the Rake-Loc™ attachment bracket as a guide to drill through the aluminum stiffener. (**See Photos 12A & 12B**)

Photos 12A & 12B: DRILL MOUNTING BRACKET BOLT HOLE THROUGH ALUMINUM STIFFENER



E. Insert one of the 1/4" X 3/4" sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN THIS STEP FOR THE BOTTOM RAIL SECTION, BE SURE TO USE THE 3/4" - LONG BOLTS. DO NOT USE THE 1" - LONG BOLTS.** (See Photos 13A – 13D)

Photos 13A & 13B: INSERT SIDEWALK BOLTS & INSTALL LOCK NUTS



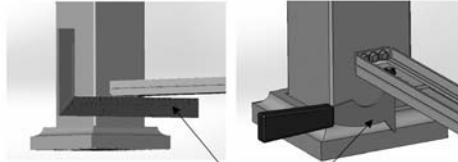
Photos 13C & 13D: INSERT SIDEWALK BOLTS & INSTALL LOCK NUTS



E. Use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten a 1/4" lock-nut onto the bolt with a 7/16"

wrench or driver bit. (See Photos 14A, 14B & Drawings 14C & 14D)

Photos 14A, 14B & Drawings 14C & 14D: TIGHTEN LOCK NUT ON SIDEWALK BOLT



Tri-square can be used if blade is thin enough or use stiff putty knife to hold bolt while installing & tightening nut

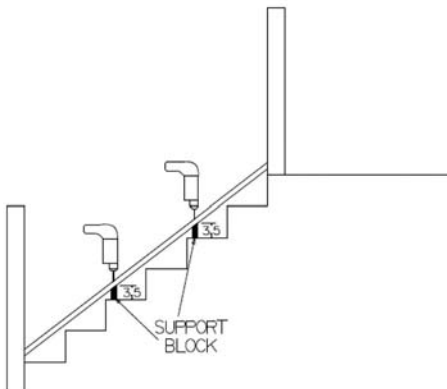
F. Install the 1 1/4" square PVC support blocks. The number of support blocks required will depend on the length of rail. The maximum unsupported span is 44". The blocks that come with the kit are 3 1/2" long & the top of each block should be cut to match the pitch angle of the stairs. Position the support blocks so they rest on a step & contact the underside of the bottom rail.

iii. 6' rail = 1 support block

iv. 8' rail = 2 support blocks

Determine the location of the support blocks & drill vertically through the center of the aluminum stiffener with a 3/16" drill bit at each of those locations. Do not drill into the support blocks. After drilling the holes for each support block, place the support blocks in position & while grasping the support block with one hand, drive a #8 X 2 1/2" long stainless steel flat head screw vertically into the center of each support block. (See Drawing 15)

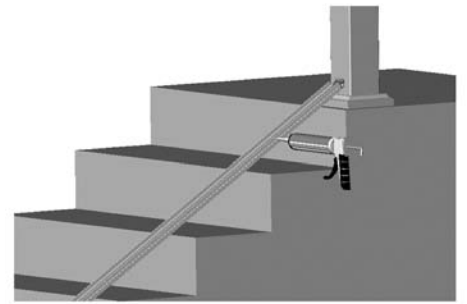
Drawing 15: INSTALL SUPPORT BLOCKS



8. INSERT & INSTALL ASSEMBLED PVC RAIL SECTION

A. Now you are ready to insert & snap into place the PVC rail section you pre-assembled in steps 1-4. Verify that the length of the top & bottom PVC rails are the correct length to fit closely between the support components (newels, columns, posts, or wall). **NOTE: Be sure the decorative newel caps are removed for easier installation of the rail section.** Apply a large bead of Siroflex adhesive caulk to the outside faces of the bottom aluminum stiffener. (See Drawing 16)

Drawing 16: APPLY SIROFLEX ADHESIVE CAULK TO OUTSIDE FACES OF BOTTOM ALUMINUM STIFFENER



B. Take the pre-assembled rail section & drop it into place over the bottom aluminum stiffener & snap it into place. (See Drawing 17A, Photo 17B & Drawing 17C) Clean off any caulk squeeze-out from the bottom rail with a damp rag. Rinse rag & repeat cleaning until all residual caulk has been cleaned off the surface of the rail & the bottom surface of the aluminum stiffener.

Drawing 17A: DROP STAIR RAIL ASSEMBLY INTO PLACE OVER BOTTOM STIFFENER

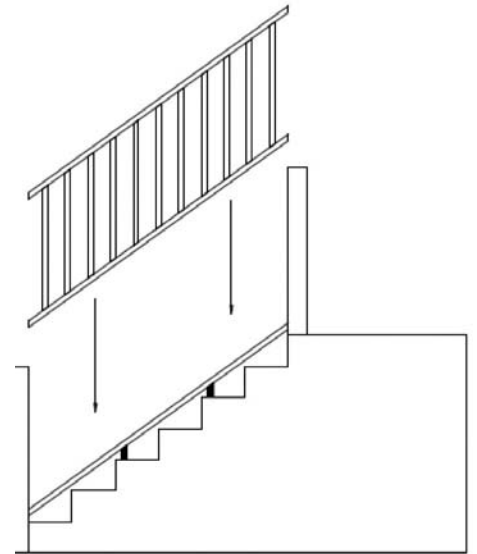


Photo 17B: DROP STAIR RAIL ASSEMBLY INTO PLACE OVER BOTTOM STIFFENER

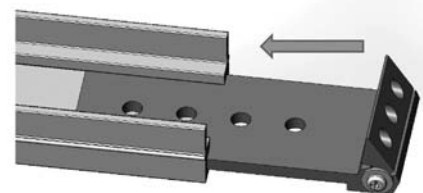
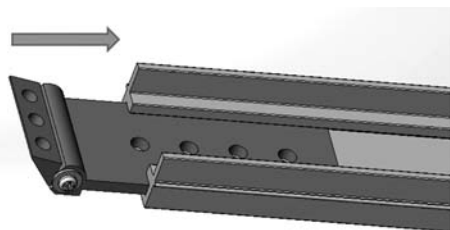


Drawing 17C: UNDERSIDE OF BOTTOM RAIL AFTER SNAPPING RAIL ASSEMBLY INTO PLACE & CLEANING OFF CAULK SQUEEZE-OUT



C. Take top rail aluminum stiffener that you square cut to length in step 2E & slide the remaining two Rake-Loc™ stair rail attachment brackets into each end. (See Drawings 18A & 18B)

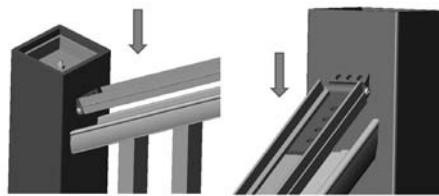
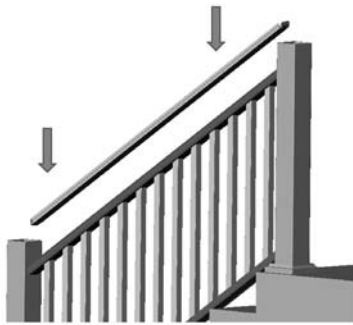
Drawings 18A & 18B: INSERT RAKE-LOC™ STAIR RAIL BRACKET ASSEMBLIES FOR TOP OF STAIRS & BOTTOM OF STAIRS INTO THE TOP ALUMINUM STIFFENER



D. Drop the top aluminum stiffener into the space between the legs of the upper PVC rail. **Note whether the baluster screws in the PVC rail are to the left or right of center over the balusters.** Once the aluminum stiffener is in position,

snap it down into place so the top edges of the legs of the aluminum stiffener are even with the top edges of the legs of the PVC rail. **NOTE: The small ridges on the outside faces of the aluminum stiffener legs running the length of the stiffener should snap into the shallow grooves running the length of the PVC rail, on the inside faces of the PVC rail legs.** (See Drawings 19A, 19B & 19C)

Drawings 19A, 19B, & 19C: DROP TOP ALUMINUM STIFFENER INTO PLACE



E. Center the aluminum stiffener (with the inserted Rake-Loc™ brackets) on the face of the newel. Use a 12" long, $\frac{3}{16}$ " diameter twist drill bit (also called an "aircraft bit") to drill pilot holes for the $\frac{1}{4}$ " diameter hex head screws at each end of the rail. Drill through all 3 holes of the short, moving leg of each mounting bracket. **IMPORTANT: The 12" long bit is necessary to drill the holes at a shallow angle in the lower bracket** (See Drawing 20A).

Drawings 20A & 20B: DRILL PILOT HOLES WITH LONG DRILL BIT

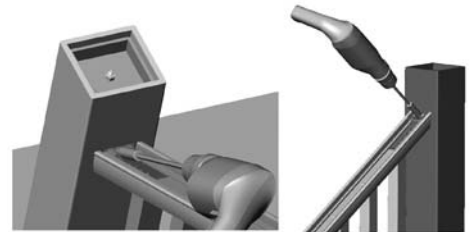


F. Use a drill or impact driver with a 12" long extension & magnetic driver bit holder & a $\frac{3}{8}$ " hex driver bit to drive the $\frac{1}{4}$ " hex head screws into the newel post. (See Drawings 21A & 21B)

i. IF USING THE HB&G STEEL NEWEL NEWEL-LOC™ MOUNT SYSTEM, USE THE $\frac{1}{4}$ " LONG HEX HEAD SCREWS.

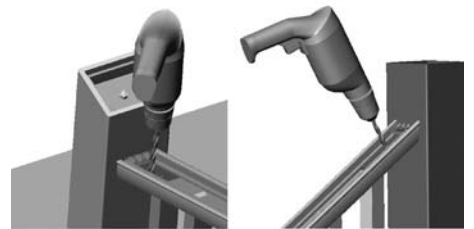
ii. IF USING A PRESSURE TREATED 4X4 POST FOR YOUR NEWEL SUPPORT OR ANY OTHER TYPE OF COLUMN OR POST, USE THE 2" LONG HEX HEAD SCREWS.

Drawings 21A & 21B: DRIVE HEX HEAD SCREWS INTO NEWEL POST WITH EXTENDED DRIVER BIT



G. After securing the Rake-Loc™ rail attachment brackets to the post, choose one of the 4 holes in the long leg of the Rake-Loc™ bracket that does not interfere with the last baluster. Take a $\frac{9}{32}$ " drill bit & use the Rake-Loc™ attachment bracket hole as a guide to drill 1 hole through the aluminum stiffener & the PVC rail. Repeat at the other end of the rail. (See Drawing 22A & 22B)

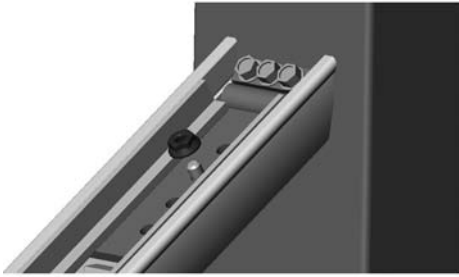
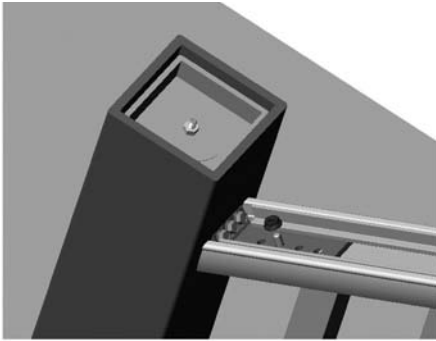
Drawings 22A & 22B: DRILL SIDEWALK BOLT HOLES IN TOP RAIL



H. Insert one of the $\frac{1}{4}$ " X 1" sidewalk bolts with the large, flat, round head, from underneath. **NOTE: THERE ARE 2 DIFFERENT LENGTH SIDEWALK BOLTS. IN THIS STEP FOR THE UPPER RAIL SECTION, BE SURE TO USE THE 1"-LONG BOLTS. DO NOT USE THE 3/4"-LONG BOLTS.** Refer back to Drawings 14C & 14D & use a stiff putty knife or the blade of a tri-square (if thin enough) to prevent the sidewalk bolt from turning as you tighten a $\frac{1}{4}$ " lock-nut onto the bolt with a $\frac{7}{16}$ " wrench or driver bit. (See Drawings 23A, 23B & 23C)

IMPORTANT: Do not over-tighten the sidewalk bolt or the head of the bolt will crush the underside of the PVC rail!

Drawings 23A, 23B & 23C: INSERT & FASTEN
SIDEWALK BOLTS TO SECURE TOP RAIL
RAKE-LOC™ ATTACHMENT BRACKETS



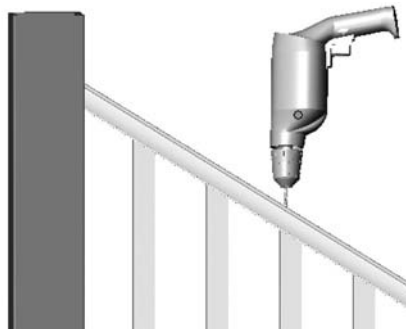
I. Using the groove in the center of the U-shaped aluminum stiffener as a guide, take an electric drill with $\frac{3}{16}$ " diameter drill bit & drill 1 vertical hole through the aluminum stiffener over each baluster. Be sure to lay out your holes so they miss the screw used in the initial assembly of the rail by approximately $\frac{1}{2}$ " (See Drawings 21A & 21B).

If the Rake-Loc™ mounting brackets are over the last balusters, drill through the Rake-Loc™ bracket & then through the stiffener with the $\frac{3}{16}$ " diameter drill bit. Be sure to locate the screw so it misses the screw used in Step 4B to initially secure the last baluster.

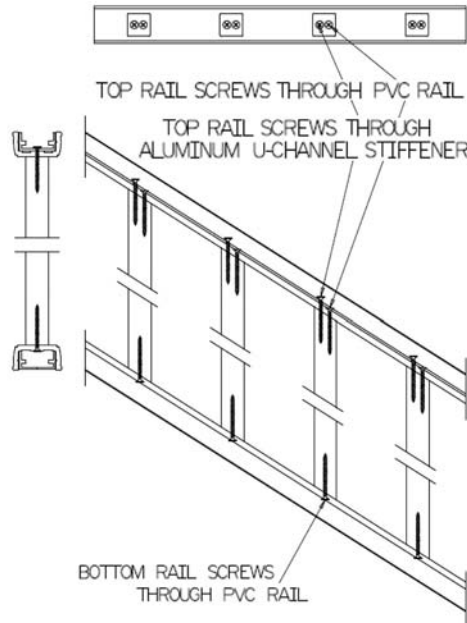
IMPORTANT: Drill only through the aluminum. Do not drill into the baluster because the $\frac{3}{16}$ " diameter hole will be too large for the screw to tighten the PVC baluster properly.

After all the holes are drilled, use the #8 X 2½" square-drive screws to fasten the balusters. Screw through the handrail brackets into the end balusters.

Drawing 21A: DRILL U-SHAPED ALUMINUM
STIFFENER TO RECEIVE BALUSTER SCREWS

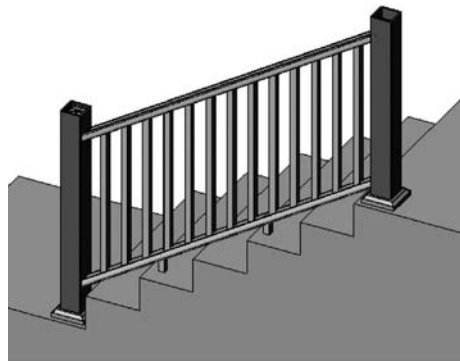


Drawing 21B: BALUSTER SCREW LOCATIONS



When installation of the baluster screws is complete, the rail section will be ready for the installation of the decorative top rail. (See Drawing 22)

Drawing 22: RAIL ASSEMBLY PRIOR TO
DECORATIVE TOP RAIL INSTALLATION



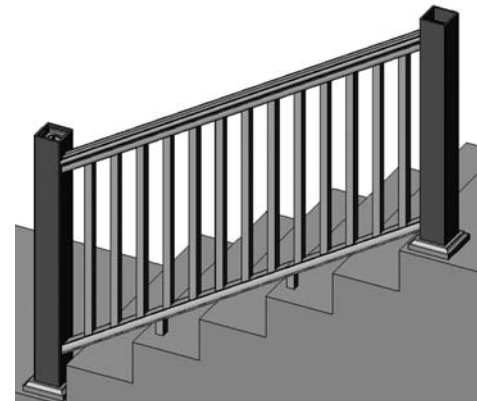
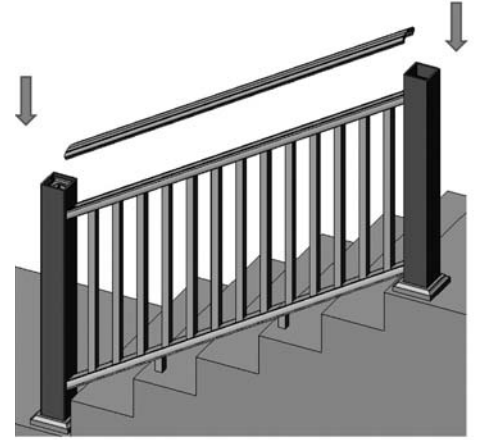
THE RAIL ASSEMBLY IS NOW READY FOR THE INSTALLATION OF THE DECORATIVE TOP RAIL

INSTALL DECORATIVE TOP RAIL

A. Once the top aluminum stiffener has been secured, install the decorative top

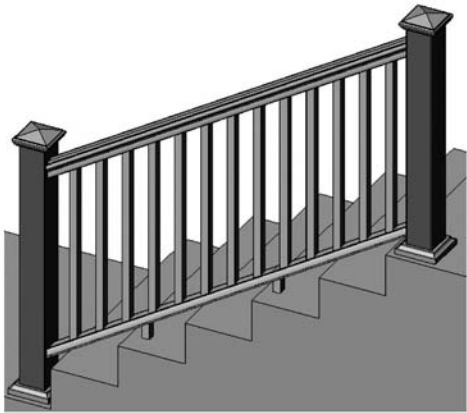
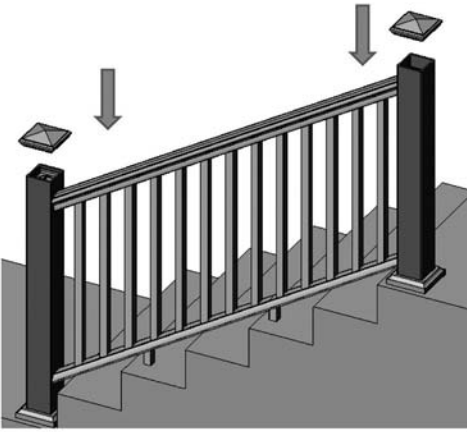
rail by dropping it into position & snapping it into place over the upper Standard sub-rail. **IMPORTANT: Be sure to install the decorative top rail before you install the newel post caps! (See Drawings 23A & 23B)**

Drawings 23A & 23B: INSTALL DECORATIVE
TOP RAIL



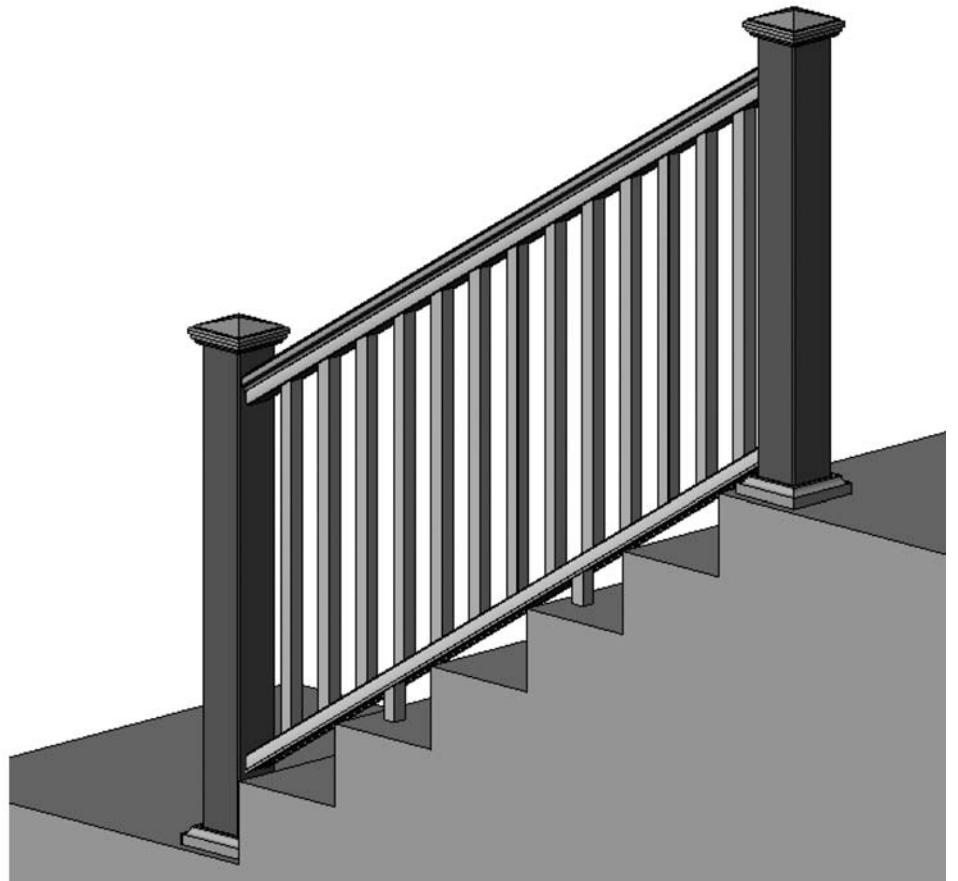
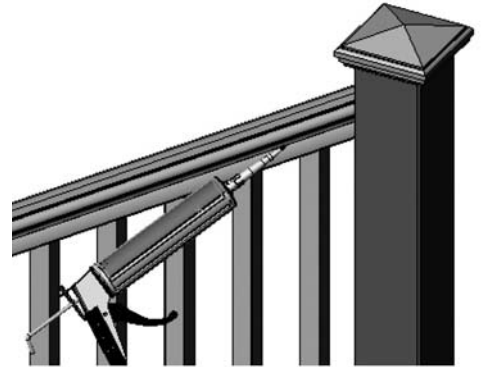
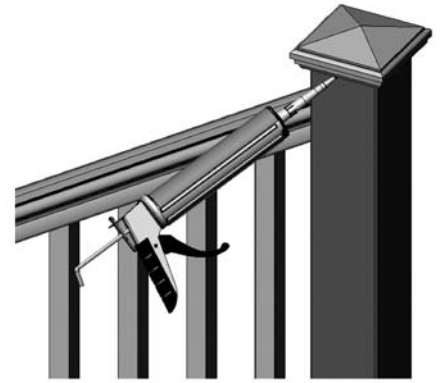
B. Install the newel post caps by pushing them into place on the top of each newel post. (See Drawings 24A & 24B)

Drawings 24A & 24B: INSTALL NEWEL POST CAPS



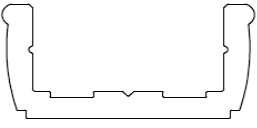


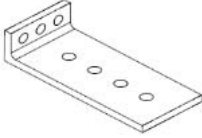





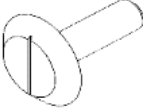


C. There will be a very narrow gap where the legs of the top rail snap into place over the upper Standard sub-rail, & also along the bottom edge of the newel post cap where it meets the newel post. Use the provided Siroflex adhesive caulk to bond the decorative top rail to the upper Standard sub-rail & to bond the newel post caps to the newel posts. Caulk the entire length of the top rail on both sides. Caulk around the entire edge under each newel post cap. Wipe the caulk with your finger while at the same time pushing the caulk into the gaps. Wipe any excess caulk off the rail & newel posts with a damp rag. Repeat the cleaning process if necessary so the only caulk visible is the caulk that is up in the narrow gaps. **(See Drawings 25A & 25B)**




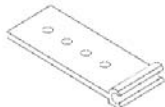
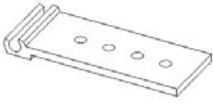
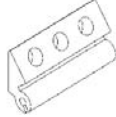







Drawings 25A & 25B: CAULK NEWEL CAPS & RAIL



YOUR RAILING IS COMPLETE

TOOLS & SUPPLIES NEEDED FOR INSTALLATION		USE
Necessary	Power Miter Box	Cut rail components & aluminum stiffeners
Necessary	Cordless Drill	Drill holes, drive fasteners
Recommended	Cordless Impact Driver	Drive fasteners
Necessary	Hammer	Various
Necessary	Caulking Gun	Apply caulk to 2-piece top rail
Necessary	Utility Knife	Various
Necessary	7/16" Wrench	Tighten locknuts for sidewalk bolts
Necessary	5-in-1 "Painters Tool" Putty Knife	Hold sidewalk bolts while driving locknuts
Necessary	Try-square or Combination Square	Mark rails for cutting
Necessary	Magnetic Driver Bit Holder	Drive various fasteners
Necessary	12" Long Magnetic Driver Bit Holder	Drive rail mounting bracket hex head screws
Necessary	3/8" Hex Driver Bit	Drive rail mounting bracket hex head screws
Necessary	#2 Driver Bit for Square Drive Screw	Drive baluster screws
Recommended	7/16" Impact Driver Socket & Impact Driver Socket Adapter	Drive locknuts for sidewalk bolts instead of using 7/16" wrench
Necessary	1/8" Twist Drill Bit	Pilot holes for baluster screws
Necessary	13/64" Twist Drill Bit	Pilot holes for rail mounting bracket hex head screws being driven into FRP columns
Necessary	9/32" Twist Drill Bit	Holes through rail and aluminum rail stiffener for sidewalk bolts
Necessary	3/16" x 12" Long Twist Drill "Aircraft Bit"	Pilot holes for rail mounting bracket hex head screws.
Necessary	3/16" Twist Drill Bit	Pilot holes through aluminum rail stiffeners for baluster screws
Necessary	Rags	Cleanup caulk squeeze out
Necessary	Bucket	Cleanup caulk squeeze out
Necessary	Water for Cleanup	Cleanup caulk squeeze out
Recommended	Denatured Alcohol for Cleanup	Clean pencil marks and others from installation

RAIL KIT ITEM		QUANTITY PER KIT			
		6'	8'	10'	12'
"Standard" Rail		2	2	2	2
Top & Bottom U-shaped Aluminum Stiffener		2	2	2	2
Supplemental Aluminum I-Beam Stiffener		N/A	N/A	1	1
Level-Loc™ Level Rail Attachment Brackets NOT USED WITH STAIR RAIL		4	4	4	4
Baluster 1-1/4" Square		13	18	23	28
Support Block 1-1/4" x 3-1/2"		1	2	2	3
1/4" x 2" Hex Head Rail Bracket Attachment Screws EXTRA		12	12	12	12
1/4" x 1-1/4" Hex Head Rail Bracket Attachment Screws EXTRA		12	12	12	12
1/4" x 3/4" Sidewalk Bolt EXTRA		2	2	2	2
1/4" x 1" Sidewalk Bolt EXTRA		2	2	2	2
1/4" Nylon Insert Lock Nut EXTRA		4	4	4	4
#8x2-1/2" Flat Head Square Drive Baluster Screws		43	60	82	86

DECORATIVE TOP RAIL					
Newport		1	1	1	1
Savannah		1	1	1	1
Belhaven		1	1	1	1
STAIR RAIL HARDWARE KIT					
Top-of-Stairs Rail Attachment Bracket Body		2	2	N/A	N/A
Bottom-of-Stairs Rail Attachment Bracket Body		2	2	N/A	N/A
Stair Rail Attachment Bracket Adjustable Leaf		4	4	N/A	N/A
#3x1/2" Self Tapping Screw		8	8	N/A	N/A
#3 Washer		8	8	N/A	N/A
1/4" x 2" Hex Head Rail Bracket Attachment Screws		12	12	12	12
1/4" x 1-1/4" Hex Head Rail Bracket Attachment Screws		12	12	12	12
1/4" x 3/4" Sidewalk Bolt		2	2	N/A	N/A
1/4" x 1" Sidewalk Bolt		2	2	N/A	N/A
1/4" Nylon Insert Lock Nut		4	4	N/A	N/A