



**PREMIER® RAILROAD GRADE CROSSING
INSTALLTION GUIDE**

GUIDE



GROUNDING IN STRENGTH

RELIABILITY STARTS WITH A WELL-DESIGNED PLAN.
THE RIGHT PRODUCT FOR THE RIGHT JOB. DONE RIGHT.



Forterra's Premier® Railroad Grade Crossings offer significant advantages over other designs. As the creators of the original modular rail crossing, we're able to draw on more than 30 years of experience to continually upgrade and enhance our products. Today, as a result of that expertise, Forterra's Premier Railroad Grade Crossings are easier to install, able to withstand the heaviest road and rail traffic, and require less maintenance. That's why specifying a Forterra Premier product is such a great way to keep your next project on track.



Recommended installation instructions Forterra's Premier® Railroad Grade Crossings

This installation guide is provided as a service to owners/contractors and installers, but is not a substitute for a working knowledge of rail crossing installation. Read instructions and procedures thoroughly. Contractor/installer is responsible for reviewing applicable contract documents and following any instructions contained therein. In the event of a conflict between the contract documents and this guide, consult the owner or project engineer for a determination on which document controls. Forterra provides this guide as a service to its customers and expressly disclaims any liability associated with installation of the Premier Grade Crossing product.

Tools needed to install Premier's concrete tie-less modules

- Leveling device, transit, levels, or 4 foot level
- Plumb bob
- Survey tacks or masonry nails (for offsets)
- 1 1/8" socket & torque wrench (removing and installing the bolts)
- Lining bars
- 1 - board (lengths determine by the size of the hole) board must be able to reach from side to side to screed the material
- String line
- Can of upside down spray paint
- 1/4 inch wood shims or angle braces from hardware store, to install between the modules during installation. Different sizes are needed on curve track and paint stirring sticks work well
- 2 - each 15 inch pry bars for spreading the centers
- 2 - each smaller pry bar for spreading the centers
- 4 - large track jacks (required for setting center panels)
- Brush or gloves for applying module rail slick, rubber glove works well for this
- Air compressor, weed blower or broom to remove debris from center modules

Premier® Railroad Grade Crossing - curve data chart

Symmetrical Module						48" Tapered to 47" Module			
Curve (Degrees)	Curve Radius (ft.)	Low Side Gap (in.)		High Side Gap (in.)		Low Side Gap (in.)		High Side Gap (in.)	
1	5729.7	0.250	1/4	0.327	5/16	-	-	-	-
2	2864.9	0.250	1/4	0.395	3/8	-	-	-	-
3	1910.1	0.250	1/4	0.462	7/16	-	-	-	-
4	1432.7	0.250	1/4	0.530	1/2	-	-	-	-
5	1146.3	0.250	1/4	0.564	9/16	-	-	-	-
6	955.4	0.250	1/4	0.597	9/16	-	-	-	-
6	881.9	0.250	1/4	0.631	5/8	0.859	7/8	0.250	1/4
7	819.0	0.250	1/4	0.665	11/16	0.792	13/16	0.250	1/4
7	764.5	0.250	1/4	0.699	11/16	0.724	3/4	0.250	1/4
8	716.8	0.250	1/4	0.733	3/4	0.690	11/16	0.250	1/4
8	674.7	0.250	1/4	0.767	3/4	0.657	5/8	0.250	1/4
9	637.3	0.250	1/4	0.801	13/16	0.624	5/8	0.250	1/4
9	603.8	0.250	1/4	0.835	13/16	0.591	9/16	0.250	1/4
10	537.7	0.250	1/4	0.869	7/8	0.568	9/16	0.250	1/4
10	546.4	0.250	1/4	0.903	7/8	0.525	1/2	0.250	1/4
11	521.7	0.250	1/4	0.937	15/16	0.492	1/2	0.250	1/4
11	499.1	0.250	1/4	0.971	1	0.459	7/16	0.250	1/4
12	478.3	0.250	1/4	1.005	1	0.426	7/16	0.250	1/4
12	459.3	-	-	-	-	0.393	3/8	0.250	1/4
13	441.7	-	-	-	-	0.360	3/8	0.250	1/4
13	425.4	-	-	-	-	0.327	3/8	0.250	1/4
14	410.3	-	-	-	-	0.294	5/16	0.250	1/4
14	396.2	-	-	-	-	0.261	5/16	0.250	1/4
15	383.1	-	-	-	-	0.250	1/4	0.250	1/4
16	359.3	-	-	-	-	0.250	1/4	0.327	5/16
17	338.3	-	-	-	-	0.250	1/4	0.386	5/8
18	319.6	-	-	-	-	0.250	1/4	0.453	7/16
19	302.9	-	-	-	-	0.250	1/4	0.519	1/2
20	287.9	-	-	-	-	0.250	1/4	0.586	9/16
21	274.4	-	-	-	-	0.250	1/4	0.653	5/8
22	262.0	-	-	-	-	0.250	1/4	0.719	11/16
23	250.8	-	-	-	-	0.250	1/4	0.786	3/4
24	240.5	-	-	-	-	0.250	1/4	0.852	7/8
25	231.0	-	-	-	-	0.250	1/4	0.919	15/16
26	222.3	-	-	-	-	0.250	1/4	0.985	1
27	214.2	-	-	-	-	0.250	1/4	1.051	1-1/16
28	206.7	-	-	-	-	0.250	1/4	1.118	1-1/8
29	199.7	-	-	-	-	0.250	1/4	1.184	1-3/16
30	193.2	-	-	-	-	0.250	1/4	1.250	1-1/4
31	187.1	-	-	-	-	0.250	1/4	1.317	1-5/16
32	181.4	-	-	-	-	0.250	1/4	1.382	1-3/8
33	176.0	-	-	-	-	0.250	1/4	1.448	1-1/2
34	171.0	-	-	-	-	0.250	1/4	1.514	1-5/8
35	166.3	-	-	-	-	0.250	1/4	1.580	1-3/4



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Step 1 - Unloading material

- 1.1 Modules are delivered allowing them to be unloaded with a fork lift or by overhead lift (Image a & b)
- 1.2 Prior to unloading check modules for chips or cracks. Note any defects on your shipping sheet and call the Forterra Premier Railroad contact as listed or your local Premier representative to report damage
- 1.3 Handle modules with care as striking edges or corners will chip the concrete
- 1.4 Unloading by overhead lift requires:
 - One set of 2-ton lifting devices
 - Two or four slings (depending on module size) of equal length to lift modules. 6 ft or 8 ft slings are recommended
 - 4' modules require two slings
 - 8' modules require four slings
- 1.5 Contractor is responsible for assuring proper load distribution onto each lifting attachment. (Upon customer request, Forterra will supply and invoice for lifting devices. Upon satisfactory return of lifting devices Forterra will credit your account.)
- 1.6 Unloaded modules can be stacked up to five units high providing that dunnage is aligned properly and uniformly from bottom to top
 - Module weight 4' = ~5,000lbs, 8' = ~10,000lbs
 - Helpful hint: If machinery is having trouble handling the load you can remove the centers to lighten the load (4' centers ~1,250 lbs and 8' centers ~2,500 lbs)

Step 2 - Preparing area, offsets and setting sub grade for installation

- 2.1 Prior to dismantling the existing grade crossing, stake out the alignment for the new crossing with offsets
 - **Tangent track**
 - Mark offsets every 8 feet
- Or
- **Curved track**
 - Mark offsets every 2 feet for 16 feet at the beginning and ends of curve track and every 8 feet in between (Image d)
 - It is very important to get the proper angle when installing the curve. Offsets every 2 feet at the beginning and end of crossing will help you establish the proper turning angle



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- 2.2 Remove existing grade crossing material including all railroad ties, rail and hardware
- 2.3 Remove all existing sub grade material making the new opening at least 2 feet wider than the new Premier modules
 - For existing crossings remove the existing sub grade material to the hard pan (Image a)
 - For new crossings use 10 to 12 inches of new material
- 2.4 Inspect the sub grade for signs of improper drainage and fouled sub grade, correcting any sub grade deficiencies
- 2.5 Compact the hard pan or existing soil

Step 3A - Setting grade (NOTE: If you are using flowable fill as your sub grade, complete 3A.1 - 3A.3 then proceed to the flowable fill instructions (3B) on pg. 7.

- 3A.1 Use old rails whenever possible as your guide to set the proper grade
 - Additional options to establish grades are rebar pins, wood forms, concrete forms or any means of establishing a finish level grade for modules to be placed upon
- 3A.2 To determine the top of form for setting the grade take the amount of raise you are putting into the crossing minus the height of the modules. Remember different rail sizes require different module heights, check with your Forterra representative to determine the module height
- 3A.3 After the grade has been established prepare the new sub grade using clean compacted material or flowable fill. (If using flowable fill, skip to section 3B on the following page, now)
- 3A.4 Prepare the sub-grade to 95% compaction within one inch of finished elevation (in maximum four inch lifts). The compacted bed should be at least 9' to 10' wide for module placement (Image b)
- 3A.5 Check to make sure grades are still correct and install screed material. Screeding material should be 5/8" minus or less (Image c)
 - Pea gravel or sand is NOT recommended
- 3A.6 Screed material with a straight edge from side to side (Image d)



a



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Step 3B - Flowable fill instructions

- 3B.1 Determine the amount of flowable fill that is needed. (a minimum depth of 5 inches)
- 3B.2 To determine the amount of flowable fill, multiply the length x width x height and divide the total by 27 = yards of flowable fill needed
 - Example: 40 foot crossing with 6" flowable fill
 $40L \times 10W \times .5H = 200$ divided by 27 = 7.41 yards of flowable fill needed
- 3B.3 Order material. (flowable fill has a psi between 1000 and 1500)
- 3B.4 Unload from concrete truck and screed to smooth surface (Image a) Accelerator can be added to quicken the set time
- 3B.5 Take a board across the top surface, screeding off excess material
- 3B.6 Allow material to set up
- 3B.7 Install modules directly on top of hardened flowable fill material
- 3B.8 Go to Step 4 (Establishing the center line) and continue

Step 4 - Establishing the center line

- 4.1 After screeding is complete, or flowable fill has set up, mark the beginning and ending points of the new crossing. Use the offset system selected (from step 2.1) and mark the center line in the crossing area
 - **Tangent track**
 - Establish the center line by pulling a string down the center in tangent track and mark the center of the modules (Image c)
 - **Curved track**
 - Mark the outer edge subtracting 4' from center line measurement thus allowing for measurement directly from offset mark to side of module
 - Use the curve data chart to compute the spacing on high and low sides between the modules to establish the proper curvature (Image d)



a



b



c



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Step 5A - Installing Premier Modules (3 piece)

- 5A.1 Using the unloaded modules you'll now begin setting your track
- **Tangent Track**
 - use 1/4 inch shim, metal angle or 1/4 inch furring strips placing them between the modules being installed. Continue placing modules using the alignment chosen from above
 - **Curved track**
 - Place modules using the spacing suggested by the curve data, continually checking offsets to make sure that you are staying on line. Sometimes curves are not perfectly uniform and will require minor adjustments in the spacing to establish the curvature required (See pg. 4)
- 5A.2 If using beveled ends, make sure you account for the beveled ends and place them in the first and last module position of the crossing
- 5A.3 Remove the center pieces using the lifting devices. Remove both centers at the same time and stack outside the immediate working area. These can be stacked one on the other, up to 5 high (Image a)
- Helpful hint: After removing the bolts take care in keeping the bolt holes clean, if an air compressor is used to clean th debris make sure to also blow out the bolt holes
- 5A.4 Pull rail into position, being careful of the module edges, the concrete module will chip if the edges are struck or rail is dropped on them. A good procedure is to pull the rail from the middle of the track through the middle of the modules after the centers are removed (Image b)
- 5A.5 After rail is in position, lift the rail high enough to install the rubber boot. Start from one end and work the boot from the base of rail up. The high side edge of the rubber boot is on the field side of the rail. Make sure everyone works together from one end to the other
- Helpful hint: use duct tape from the field side to the gauge side to help hold the boot in place (Image c)
- 5A.6 After the boot is installed on the rail, set it on the module approximately 6-8 inches from the edge and apply the module rail slick. Apply the lubricant to the base area and the side to allow the rail and boot to slide into position together
- Helpful hint: Rail slick can be applied by hand using an old glove or by using a white wash brush (Image d)



a



b



c



d

- 5A.7 Install rail as tight as possible prior to using track jacks
- 5A.8 Place two track jacks end to end and jack rail into the rail seat. Use two sets of track jacks at 4 foot and 8 foot intervals, leap frog the track jacks as you install the center panels. On extreme degree curves you will only be able to go every 4 feet with your jacks (Image a)
- 5A.9 To install center panels, lift both panels simultaneously and make sure panels are in line. Lower center panels below the head of rail and place onto base
- Helpful hint: if the center catches on the base and will not seat down, take a 15-inch pry bar and raise the end closest to the base of the rail that is caught on the rail. Adding slack to the slings while raising the bottom will keep the centers from dropping hard onto the modules (Image b)
- 5A.10 Align the center panel holes by making sure the centers are even with the base module, then take your pry bar and open the centers of the panels. Hand start the bolts first, then tighten them down to 125 lbs per foot maximum
- DO NOT OVER TIGHTEN as this will damage center panel insert (Image c)
- 5A.11 Cut the rubber boot at the end of the crossing with a razor knife and install double rail anchors to secure the rail and modules
- 5A.12 Transition ties on both ends of crossing need to be tamped and maintain to protect the crossing from pumping action. To help achieve this install 3-12' ties and 3-11' ties in the transition area to help maintain the profile into the crossing area
- 5A.13 Ties should be boxed anchored on both ends of crossing for 400 feet



a



b



c



d

Step 5B - Installing Premier Plus Modules (1piece)

- 5B.1 Pull rail down the side of crossing and set into cut out section. Be careful not to hit the sides of the concrete crossings
- 5B.2 After rail is in position, lift rail high enough to install the rubber boot. Start from one end and work the boot from the base of rail up. Make sure every one works together from one end to the other (Image a)
 - helpful hint is to use duct tape from the field side to the gauge side to help hold the boot in place. Make sure the high side edge of the rubber boot is toward the field side of the rail
- 5B.3 After installing boot set rail down close to center and apply the module rail slick, slide rail as close as possible into position (Image b)
- 5B.4 Place track jack against rail and concrete and jack into place, attach rail clips and tighten to 125 ft. lbs.
- 5B.5 Drop plastic filler pieces into place and tighten to 125 lbs.
- 5B.8 Cut the rubber boot at the end of the crossing with a razor knife and install double rail anchors to secure the rail and modules
- 5B.9 Transition ties on both ends of crossing need to be tamped and maintain to protect the crossing from pumping action. To help achieve this install 3-12' ties and 3-11' ties in the transition area to help maintain the profile into the crossing area
- 5B.10 Ties should be boxed anchored on both ends of crossing for 400 feet

Caution: Alert the paving contractor that the blacktop roller equipment can damage the edges of the module. Be careful to protect the concrete edges.



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Forterra is a leading manufacturer of water and drainage pipe & products for a variety of water-related infrastructure applications. Based in Irving, Texas, Forterra is comprised of Drainage Pipe & Products, Water Pipe & Products, Structural & Specialty Products and Stormwater Management Systems. We employ more than 5,500 people and operate more than 100 facilities, with products available throughout the U.S. and Eastern Canada.



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