

TREND[®] 350 Tangent

End Terminal Product Description Assembly Manual



TRINITY
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TREND[®] 350

Tangent End Terminal

The TREND[®] 350 Tangent End Terminal has been tested pursuant to National Cooperative Highway Research Program (“NCHRP”) Report 350 specifications. The TREND[®] 350 Tangent End Terminal has been deemed eligible for federal-aid reimbursement on the National Highway System (“NHS”) by the Federal Highway Administration (“FHWA”) as a TL-3 device.

Product Description

Assembly Manual



2525 N. Stemmons Freeway
Dallas, Texas 75207



Important: These instructions are to be used only in conjunction with the assembly, maintenance, and repair of the TREND[®] 350 Tangent End Terminal. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair would result in a deviation from these assembly instructions, contact a Trinity Highway representative.

This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Trinity Highway at (888) 323-6374 or visit www.trinityhighway.com.

The instructions contained in this manual supersede all previous information and manuals. All information, illustrations, and specifications in this manual are based on the latest TREND[®] 350 Tangent End Terminal system information available to Trinity Highway at the time of printing. We reserve the right to make changes at any time. Please contact Trinity Highway to confirm that you are referring to the most current instructions.

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Customer Service Contacts

Trinity Highway is committed to the highest level of customer service. Feedback regarding the TREND® 350 Tangent End Terminal, its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Trinity Highway

Telephone:	(888) 323-6374 (USA) (214) 589-8140 (International)
Fax:	(800) 770-6755 (USA) (214) 589-8423 (International)
E-mail:	product.info@trin.net
Website:	www.trinityhighway.com

Regional Telephone Contacts:

Centerville, Utah	(800) 772-7976
Dallas, Texas	(800) 527-6050
Elizabethtown, Kentucky	(800) 282-7668
Girard, Ohio	(800) 321-2755
Orangeburg, South Carolina	(800) 835-9307

Important Introductory Notes

Proper assembly of the TREND® 350 Tangent End Terminal is critical to achieve performance that has been evaluated and deemed eligible by the FHWA per NCHRP Report 350. These instructions should be read in their entirety and understood before assembling the TREND® 350 Tangent End Terminal. These instructions are to be used only in conjunction with the assembly of the TREND® 350 Tangent End Terminal and are for standard assemblies only as specified by the applicable highway authority. If you need additional information, or have questions about the TREND® 350 Tangent End Terminal, please contact the highway authority that has planned and specified this assembly and, if needed, contact Trinity Highway's Customer Service Department. This product must be assembled in the location specified by the appropriate highway authority. If there are deviations, alterations, or departures from the assembly instructions specified in this manual, the device may not perform as tested.



Important: **DO NOT** use any component part that has not been specifically approved for this system during assembly, repair, or maintenance of this system (p. 8 – 10).

This product has been specified for use by the appropriate highway authority and has been provided to that user who has unique knowledge of how this system is to be assembled. No person should be permitted to assemble, maintain, or repair this system that does not possess the unique knowledge described above. These instructions are intended for an individual who is qualified to both read and accurately interpret them as written. These instructions are intended only for an individual experienced and skilled in the assembly of highway products that are specified and selected by the highway authority.

A manufacturer's drawing package will be supplied by Trinity Highway upon request. Each system will be supplied with a specific drawing package unique to that system. Such drawings take precedence over information in this manual and shall be studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any product assembly.



Important: Read safety instructions thoroughly and follow the suggested safe practices before assembling, maintaining, or repairing the TREND® 350 Tangent End Terminal. Failure to follow this warning can result in serious injury or death to the worker and/or bystanders. Please keep these instructions for later use.



Warning: Ensure that all of the TREND® 350 Tangent End Terminal Danger, Warning, Caution, and Important statements within the TREND® 350 Tangent End Terminal Product Description Assembly Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Ensure adequate time is available for complete assembly, maintenance, or repair before beginning the assembly, maintenance, or repair process.

Safety Symbols

This section describes safety symbols that may appear in the TREND® 350 Tangent End Terminal Manual. Read the manual for complete safety and assembly information.

Symbol

Meaning



Safety Alert Symbol: Indicates Danger, Warning, Caution, or Important. Failure to read and follow the Danger, Warning, Caution, or Important indicators could result in serious injury or death to workers and/or bystanders.



Important: Read safety instructions thoroughly and follow the assembly directions and suggested safe practices before assembling, maintaining, or repairing the TREND® 350 Tangent End Terminal. Failure to comply with these warnings could result in increased risk of serious injury or death in the event of a vehicle impact with a system.



Important: Please keep up-to-date instructions for later use and reference by anyone involved in the assembly of the product.

Safety Rules for Assembly

*** Important Safety Instructions ***

This manual must be kept in a location where it is readily available to persons who assemble, maintain, or repair the TREND® 350 Tangent End Terminal. Additional copies of this manual are available from Trinity Highway by calling (888) 323-6374 or by email at product.info@trin.net. Please contact Trinity Highway if you have any questions concerning the information in this manual or about the TREND® 350 Tangent End Terminal.

Always use appropriate safety precautions when operating power equipment and when moving heavy equipment or the TREND® 350 Tangent End Terminal components. Work gloves, safety goggles, safety-toe shoes, and back protection should be used.



Warning: Safety measures incorporating appropriate traffic control devices specified by the highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site.

Limitations and Warnings

Trinity Highway contracts with FHWA approved testing facilities to perform crash tests, evaluation of the test results, and submittal of results for FHWA review.

The TREND® 350 Tangent End Terminal has been deemed eligible for reimbursement by FHWA as meeting the requirements and guidelines of NCHRP Report 350. NCHRP Report 350 tests are designed to evaluate product performance by closely simulating actual impacts involving a range of vehicles from lightweight cars (approx. 820 kg [1800 lb.]) to full size pickup trucks (approx. 2000 kg [4400 lb.]). The TREND® 350 Tangent End Terminal is certified to the Test Level(s) shown below:

Test Level 3: 100 km/h [62 mph]

These FHWA directed tests are not intended to represent the performance of systems when impacted by every vehicle type, nor every impact condition existing on the roadway. This system is tested only to the test matrix criteria of NCHRP Report 350 as approved by FHWA.

Trinity Highway expressly disclaims any warranty or liability for injury or damage to persons or property resulting from any impact, collision or harmful contact with products, other vehicles, or nearby hazards or objects by any vehicle, object or person, whether or not the products were assembled in consultation with Trinity Highway or by third parties.

The TREND® 350 Tangent End Terminal is intended to be assembled, delineated, and maintained in accordance with specific state and federal guidelines. It is important for the highway authority to select the most appropriate product configuration for its site specifications. Site lay out, vehicle population type; speed, traffic direction, and visibility are important elements that require evaluation in the proper selection of a highway product. For example, curbs could cause an untested effect on an impacting vehicle.

After an impact occurs, the debris from the impact should be removed from the area immediately and the specified highway product should be evaluated and restored to its original specified condition or replaced as the highway authority determines as soon as possible.



Important: It is the sole responsibility of the local highway authority and its engineers to determine whether use or reuse of any part of the system is appropriate or acceptable following an impact. Trinity Highway makes no recommendation or suggestion regarding this determination.



Important: It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual are strictly followed.



Warning: Ensure that this assembly conforms to the guidance provided by the AASHTO Roadside Design Guide.

System Overview

The TREND® 350 Tangent End Terminal is a cost-effective, energy absorbing end treatment used to shield the ends of W-beam barriers.

The TREND® 350 Tangent End Terminal has a nominal length of 37'-6" and a nominal rail height ranging from 27 3/4" to 31".

The TREND® 350 Tangent End Terminal is supported by a Hinged Break-Away (HBA®) post in the first post position, a Steel Yielding Terminal Post (SYTP®) in the second post position, and standard guardrail line posts in the remaining post positions.

The TREND® 350 Tangent End Terminal has been approved as meeting the requirements and guidelines of NCHRP Report 350, Test Level 3 (TL-3) as a re-directive, gating end treatment.

Know Your TREND® 350 Tangent End Terminal

For specific assembly, maintenance, or repair details refer to the state or specifying agency's standard drawing(s) and/or Trinity Highway standard layout drawings (p. 29 and 30).

Inspect Shipment

Carefully uncrate all components. Before assembling the TREND® 350 Tangent End Terminal, inventory the received parts against the shipping list supplied with the system. Refer to the System Components section on the next page of this manual for help in identifying each component. Verify that all parts were received. If parts are missing from the shipment, do not attempt to assemble the system and contact Trinity Highway immediately (p. 3). If parts not specified herein were part of the shipment, do not attempt to assemble the system with non-specified parts and contact Trinity Highway immediately (p. 3).



Warning: DO NOT modify the TREND® 350 Tangent End Terminal in any way.



Warning: Ensure that the TREND® 350 Tangent End Terminal system and delineation used meet all federal, state, specifying agency, and local specifications.



Warning: Ensure that your assembly meets all appropriate Manual on Uniform Traffic Control Devices (MUTCD) and local standards.

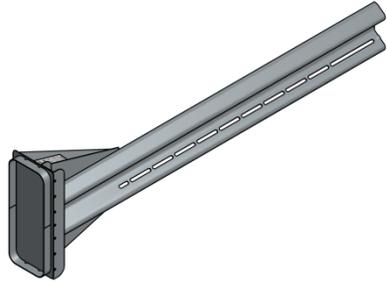
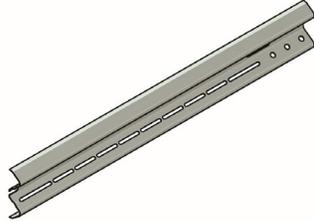
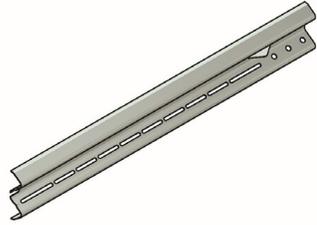
System Components

Below is a list of system components to be used in the repair of your particular TREND® 350 Tangent End Terminal. Please call Trinity Highway customer support if you have any system questions (p. 3).

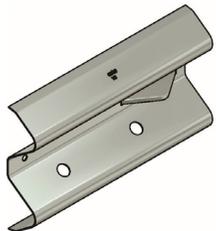
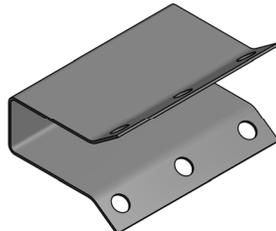


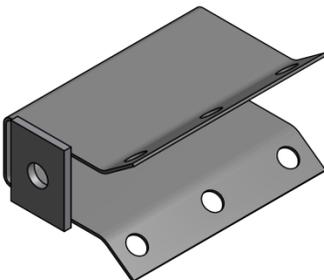
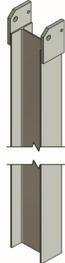
Warning: Use only Trinity Highway parts that are specified herein for assembling, maintaining, or repairing the TREND® 350 Tangent End Terminal. **Do not utilize or otherwise comingle parts from other systems even if those systems are other Trinity Highway systems.** Such configurations have not been tested, nor have they been deemed eligible for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited.

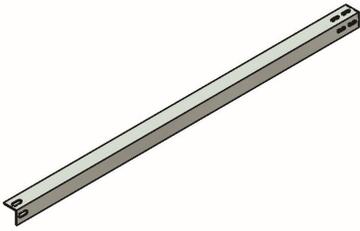
Note: Components are not shown to scale.

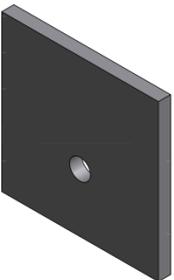
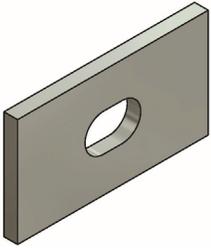
Head Rail		Intermediate Rail		Intermediate Rail with Fin	
					
620708B	x1	618192G	x1	618193G	x4

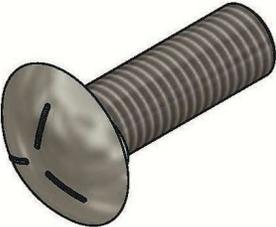
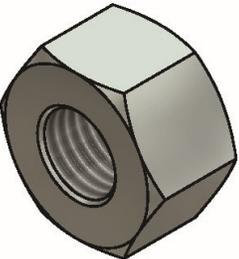
***Note:** The Head Rail Assembly is symmetrical and can be used on the upstream and downstream ends of highway guardrail and on either side of the roadway.

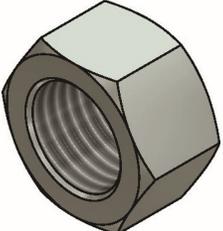
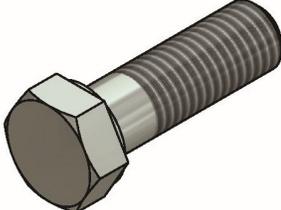
End Rail with Fin		Backing Plate		Spacer	
					
613554G	x1	604465G	x6	620726G	x5

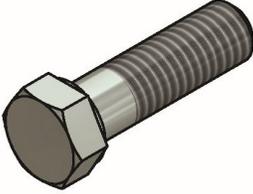
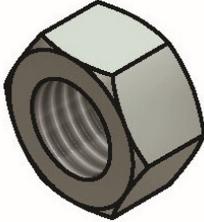
Spacer with Cable Anchor		HBA® Top Post		HBA® Bottom Post	
					
620727G	x1	034074A	x1	033873A	x1

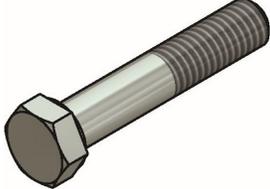
SYTP® 		W6x8.5# Line Post 		Angle Strut 	
014578G	x1	000533G	x4	033795G	x1

Cable 		Bearing Plate 		Washer Bar 	
118439G	x1	000782G	x1	617000G	x6

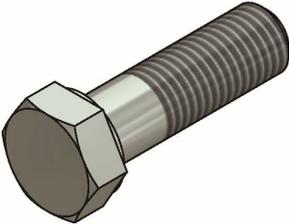
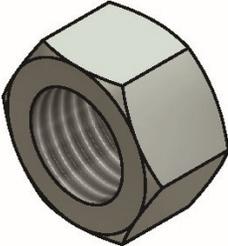
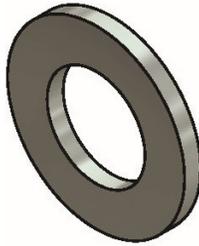
5/8" x 2" Rail Bolt [Grade 5] 		5/8" Hex Nut [Grade 5] 		5/8" Flat Washer [Thick] 	
118614G	x34	003361G	x34	118615G	x34

1" Hex Nut 		1" Flat Washer 		5/8" x 2" Hex Bolt 	
003910G	x2	003900G	x2	003403G	x7

5/8" Rail Nut		7/16" x 1 1/2" Hex Bolt [High Strength]		7/16" Hex Nut	
					
003340G	x7	004390G	x2	004396G	x2

7/16" Flat Washer		7/16" Lock Washer		3/8" x 2" Hex Bolt [High Strength]	
					
004389G	x2	004393G	x2	006321G	x2

3/8" Hex Nut		3/8" Flat Washer		3/8" Lock Washer	
					
006405G	x2	004254G	x2	004258G	x2

3/4" x 2 1/2" Hex Bolt [High Strength]		3/4" Hex Nut		3/4" Flat Washer	
					
003717G	x2	003704G	x2	003701G	x2

3/4" Lock Washer	
	
004699G	x2

Assembly

Recommended Tools

Documentation

- Manufacturer's Instructional Manual
- Manufacturer's Drawing Package

Wrenches

- 1 1/2" Wrench
- 1 1/4" Wrench
- 11/16" Wrench
- 9/16" Wrench
- Socket Wrench Set Including Sizes Referenced Above
- 120 ft-lb Calibrated Torque Wrench

Personal Protective Equipment

- Safety Glasses
- Work Gloves
- Safety-Toe Shoes
- Back Protection
- Reflective Vest

Miscellaneous

- Traffic Control Equipment
- Chalk Line
- Tape Measure
- Marking Paint
- Straight Edge
- Level
- Plumb Line
- Augers
- Soil Tamper
- Post Pounder (commonly used for driving posts)
- 5/8" Alignment Tool (Drift Pin)
- Vise Grip Pliers

Note: The above list of tools is a general recommendation and should not be considered an exhaustive list. Depending on specific site conditions and the complexity of the assembly specified by the appropriate highway authority the required tools may vary. Decisions as to what tools are needed to perform the assembly properly are in the sole discretion of the specifying highway authority and the authority's selected contractor performing the assembly of the system at the authority's specified assembly site.



Important: The drawing package provided with the TREND® 350 Tangent End Terminal must be used with these instructions for proper assembly and should take precedence over these general instructions.

Deploy Traffic Control

A traffic control plan appropriate to the complexity of the project should be prepared and understood by all parties before assembling the TREND® 350 Tangent End Terminal.

Deploy the appropriate work zone safety devices prior to beginning the assembly and keep them present through all phases on the assembly.



Important: Positioning of the posts is critical. Carefully measure each post center to other post centers in the line and from the road. Double check all measurements before placing the posts into the ground.



Important: See Table A on page 17 for specific post heights dependent on downstream rail height.

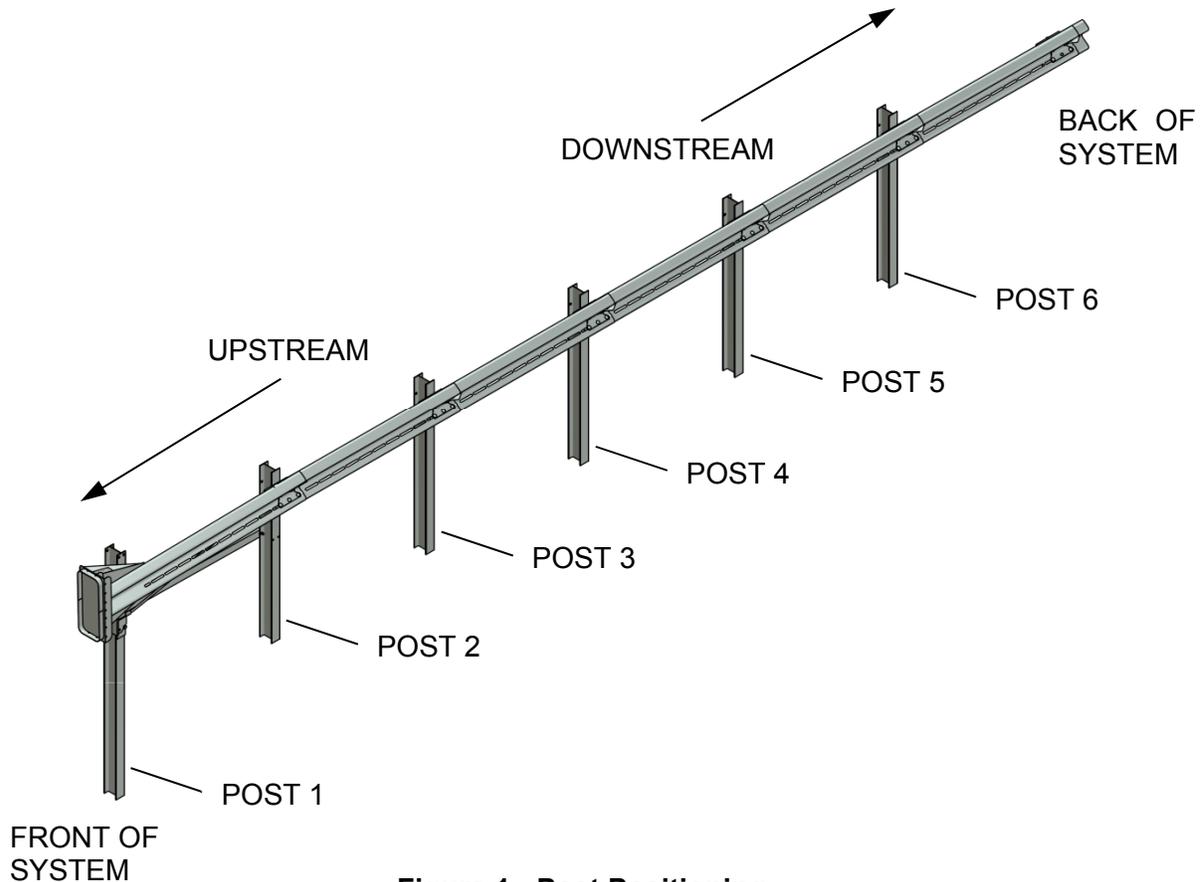


Figure 1 - Post Positioning

1.0 Determine Post Locations

- 1.1 Using a straight edge or plumb line down the existing guardrail face (i.e., traffic side) to the ground, create a datum line (DT1) on the ground. Ensure that this line is parallel with the existing guardrail face. Extend this line ~40' upstream from the end of the existing guardrail. Verify that the datum (DT1) remains parallel to the existing guardrail (Figure 2).

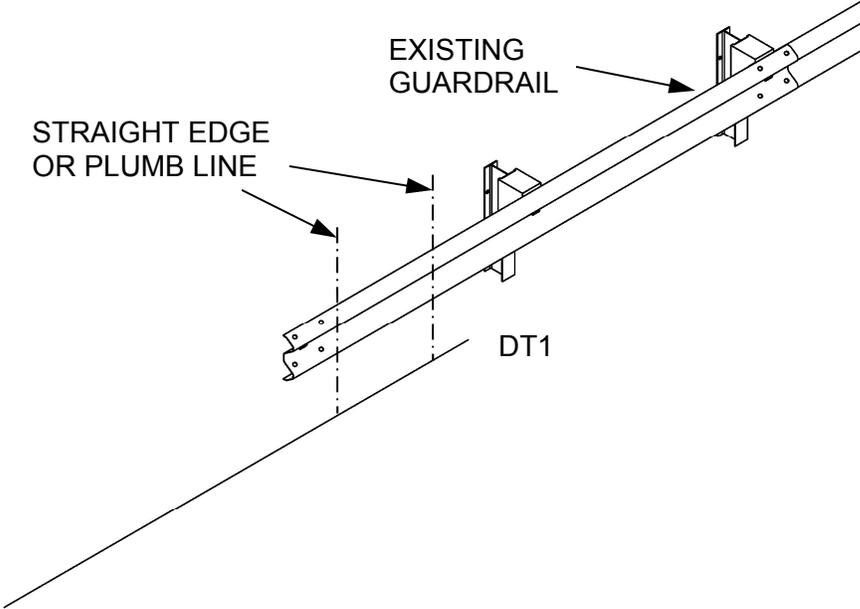


Figure 2 - Determining Post Location

- 1.2 A new guardrail post must be driven into the ground at the end of the guardrail panel. The edge of this new guardrail post must be offset from the datum line DT1 towards the existing guardrail by a distance of 8 1/4" (this offset is needed in order to attach a system spacer between the guardrail post and the guardrail panel). It should be noted that the centerline of this new guardrail post will not align with the existing guardrail posts (Figure 3).
- 1.3 Measure perpendicular from the datum line (DT1) towards the existing guardrail 11 1/4" and make a mark (M1) near the first guardrail post (Figure 3).

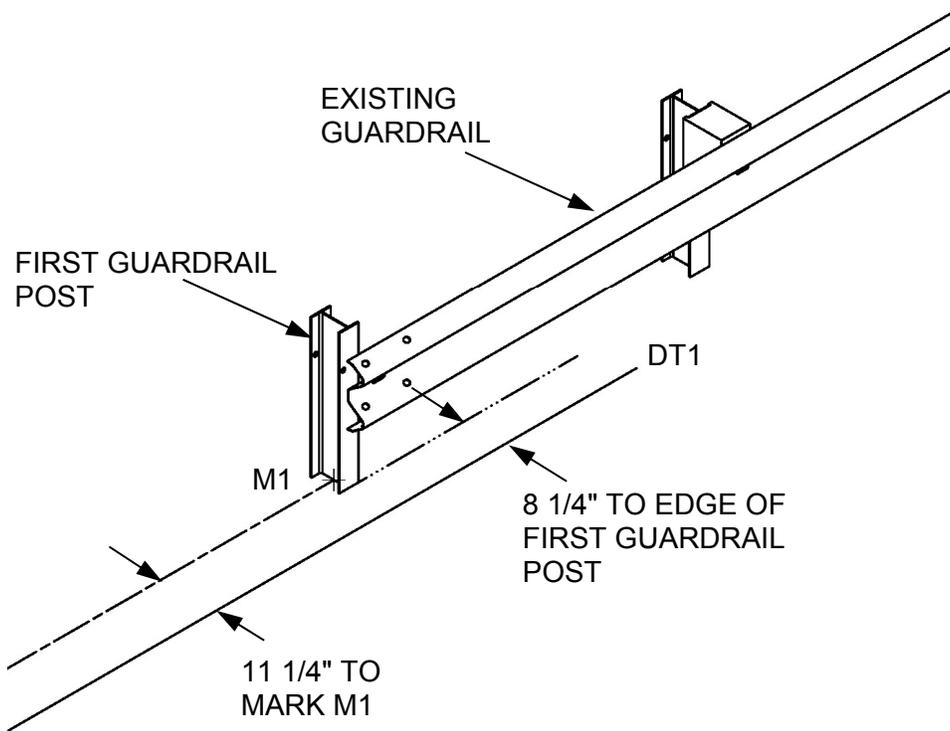


Figure 3 - Determining Post Location

- 1.4 Locate the first post of the TREND® 350 Tangent End Terminal (i.e., Post 1, p. 12). First measure from mark (M1) a distance of 37'-6" upstream and make a second mark (M2) which is perpendicular to datum line (DT1). Verify the perpendicular distance of 11 1/4" from mark (M2) to the datum line (DT1). Adjust mark (M2) if necessary (Figure 4).

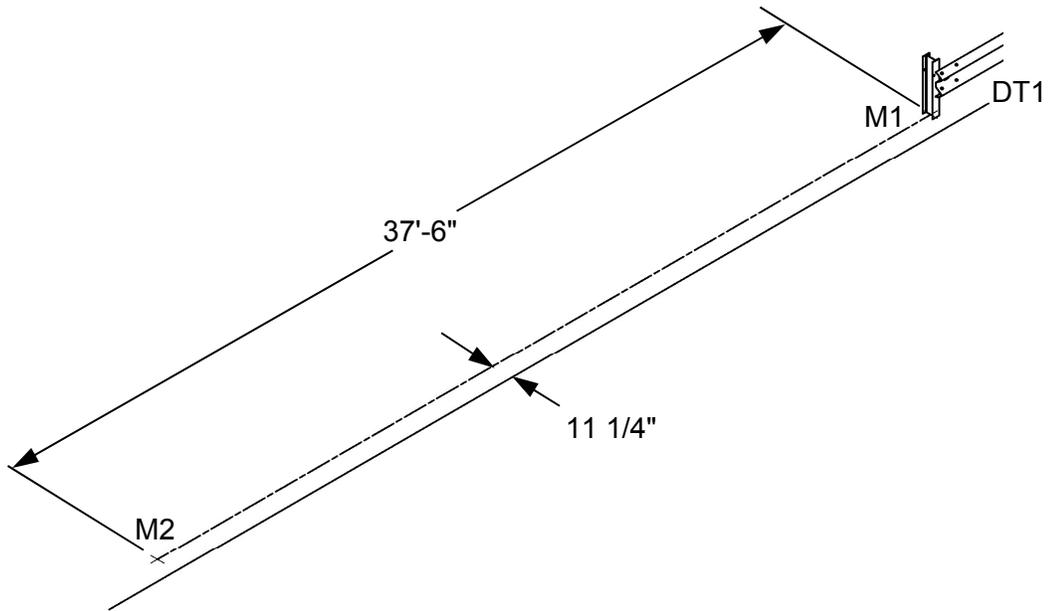


Figure 4 - Locating Post 1

- 1.5 Chalk or stake a line from mark (M1) to mark (M2). This will be the centerline for the system posts.

- 1.6 From location (M2), measure off the rest of the system post locations (i.e., Posts 2 to 6, p. 12), towards the first guardrail post, at 6'-3" intervals (6 total post locations) (Figure 5).

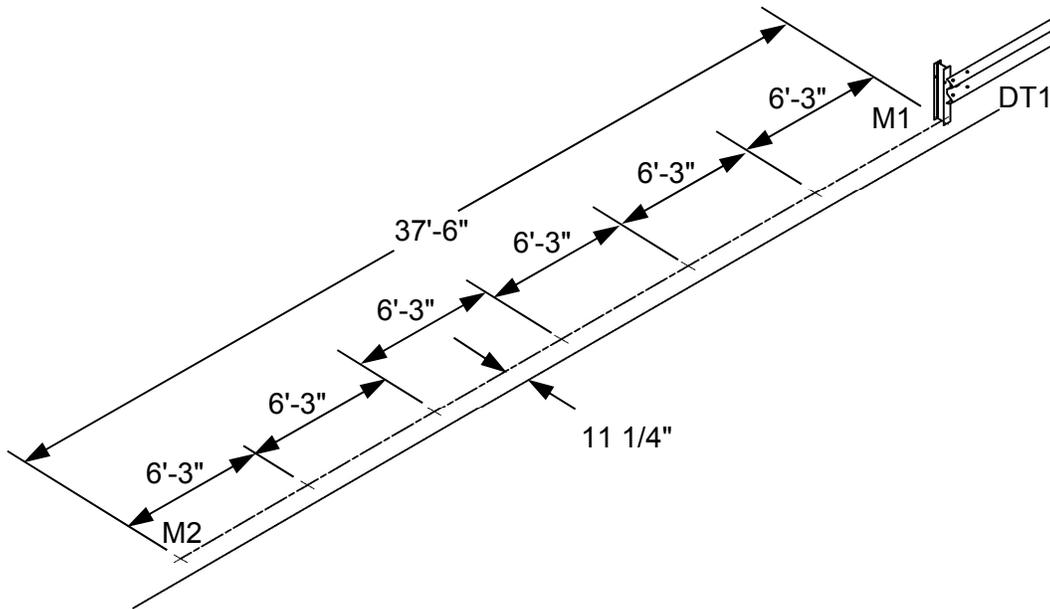


Figure 5 - Post Spacing for TREND® 350 Tangent End Terminal

2.0 Post Assembly



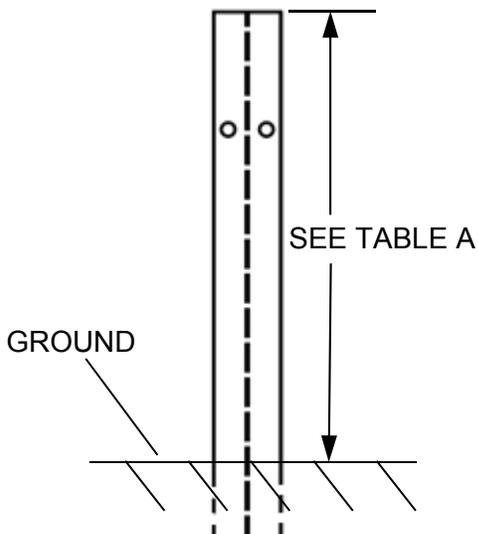
Important: No height transition is required in the downstream rail as the entire height transition occurs within the length of the TREND® 350 Tangent End Terminal.

- 2.1 Starting with the post location closest to the existing guardrail (i.e., Post 6), place (1) W6x8.5# Line Post. Refer to Table A and Figure 6 for the proper post placement height for the allowable downstream guardrail heights.

Note: Post spacing is 6'-3" (p. 16).

Table A - Post Height(s)

Downstream Rail Height (in)	Post Heights Above Ground (in)			
	Post 6	Post 5	Post 4	Post 3
27 3/4	28 5/8	28 5/8	28 5/8	28 5/8
28	28 7/8	28 7/8	28 7/8	28 7/8
28 1/2	29 3/8	29 3/8	29 3/8	29 3/8
29	29 7/8	29 7/8	29 7/8	29 7/8
29 1/2	30 3/8	30 3/8	30 3/8	30 1/8
30	30 7/8	30 7/8	30 7/8	30 1/8
30 1/2	31 3/8	31 3/8	31 3/8	30 1/8
31	31 7/8	31 7/8	31 5/8	30 1/8



**Figure 6 - W6x8.5# Line Posts
(Post 3 - 6) Placement**

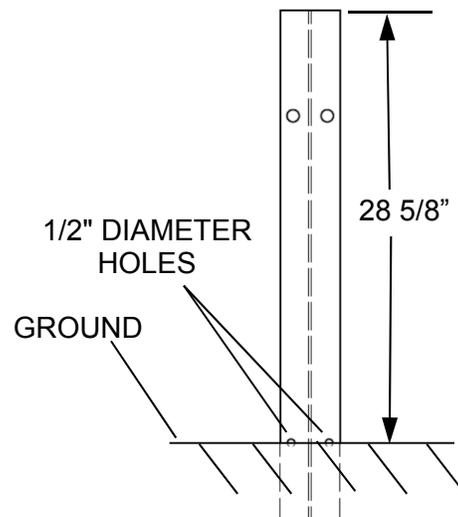


Figure 7 – SYTP® (Post 2) Placement

2.2 Repeat step 2.1 for the remaining three W6x8.5# System Line Posts (i.e., Posts 5, 4, and 3) (Table A and Figure 6 on p. 17).

2.3 Next, place the SYTP® (i.e., Post 2). The top of the post should be approximately 28 5/8" above the ground and the 1/2" diameter holes should be approximately centered on ground line (Figure 7 on p. 17).

Note: Post spacing is 6'-3" (p. 16).

2.4 Place the HBA® Bottom Post (i.e., Post 1) at the end post location (i.e., farthest from the existing guardrail). The bottom of the 13/16" diameter hole in the ears should be even with the ground (Figure 8).

Note: Post spacing is 6'-3" (p. 16).

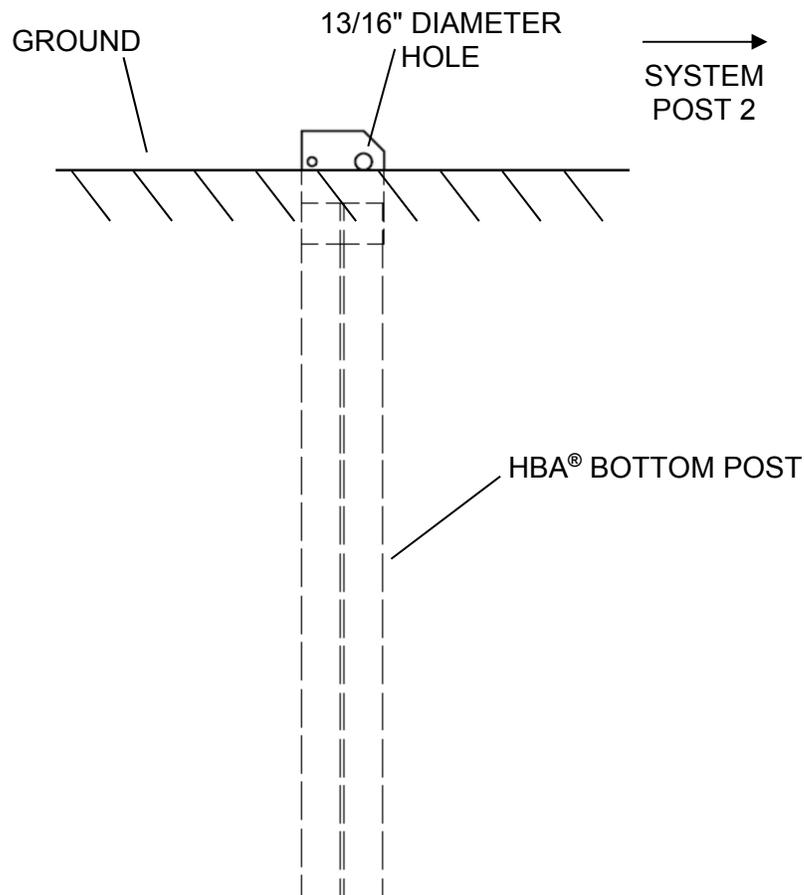


Figure 8 - HBA® Post (Post 1) Placement

- 2.5 Insert the HBA® Top Post into the HBA® Bottom Post. Bolt these Posts together first using (1) 3/4" x 2 1/2" hex bolt, (1) 3/4" flat washer, (1) 3/4" lock washer and (1) 3/4" hex nut, then using (2) 3/8" x 2" hex bolts [High Strength], (2) 3/8" flat washers, (2) 3/8" lock washers and (2) 3/8" hex nuts as shown in Figure 9. The 3/4" x 2 1/2" hex bolt [High Strength] must be fastened through the HBA® Top Post and HBA® Bottom Post on the side opposite the Angle Strut (refer to Section 3.0 Angle Strut Assembly).

Note: The HBA® Top Post Plates (Ears) can be placed on either side of the HBA® Bottom Post Plates (Ears).

There is no torque requirement for these bolts. They should be tightened to a snug position (do not over tighten).

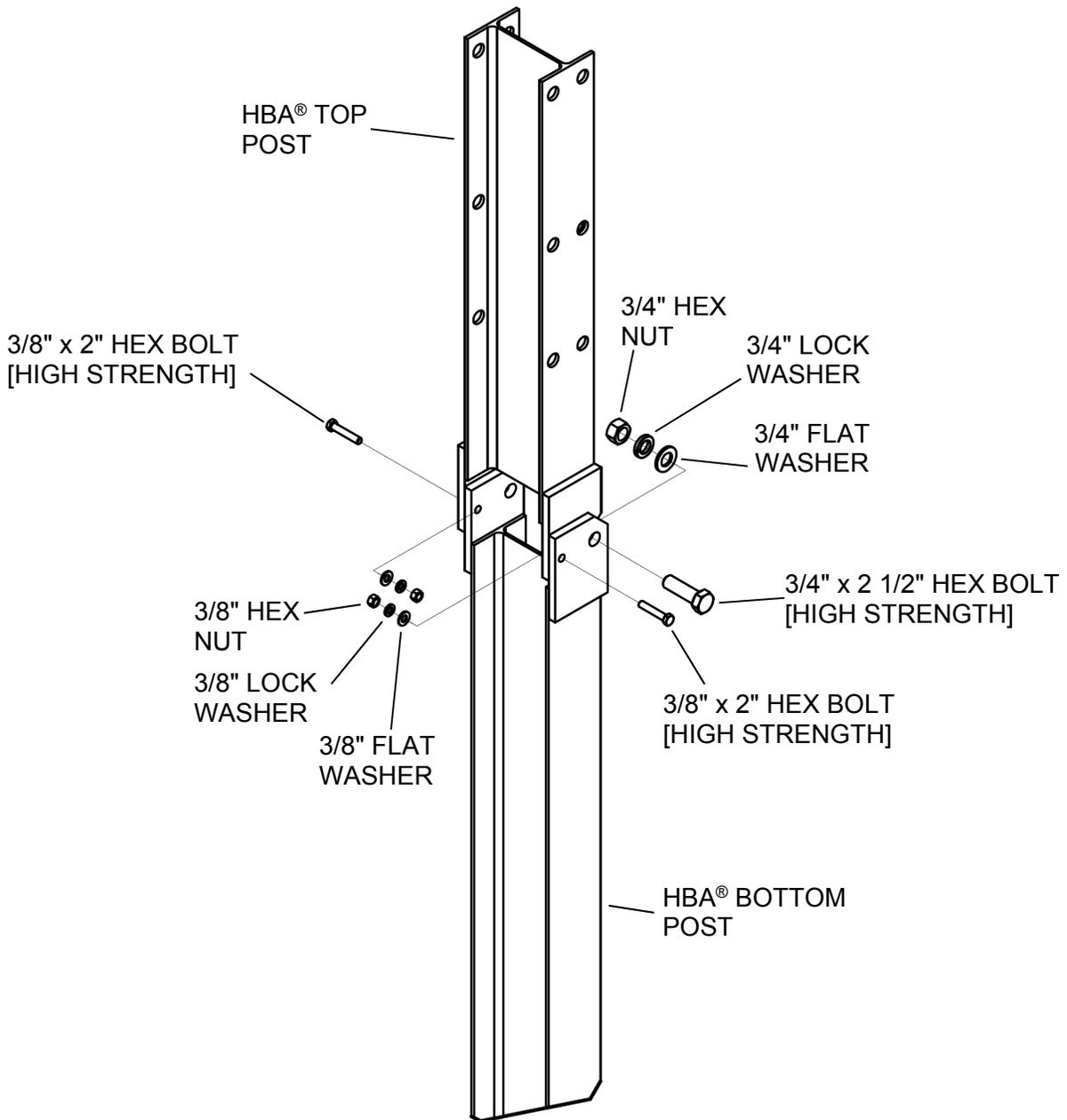


Figure 9 - Post 1 Assembly

3.0 Angle Strut Assembly

- 3.1 Attach the Angle Strut to the HBA® Post using (1) 3/4" x 2 1/2" hex bolt [High Strength], (1) 3/4" flat washer, (1) 3/4" lock washer and (1) 3/4" hex nut. The flat washer and lock washers are placed under the hex nut as shown in Figure 10.

Note: Attach Angle Strut only on embankment side of system.

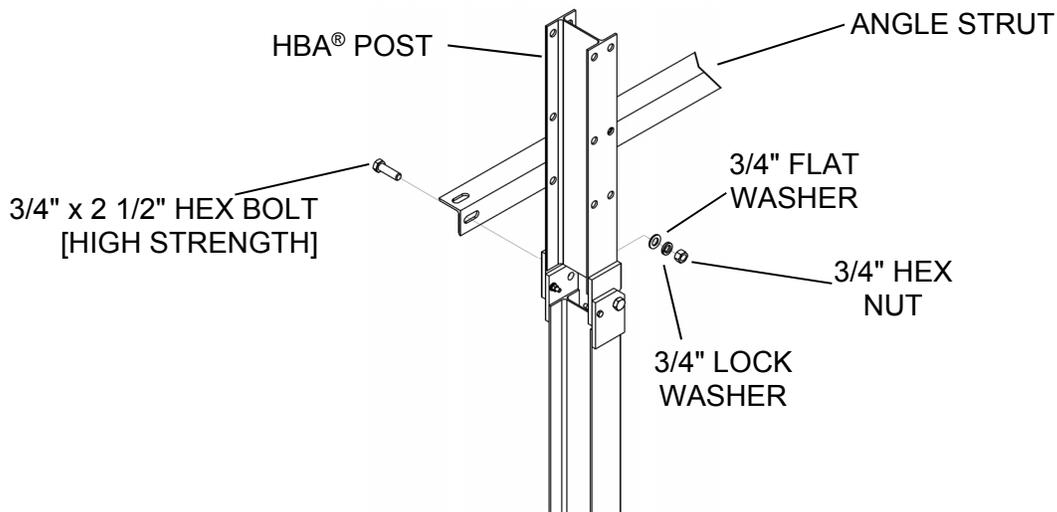


Figure 10 - Angle Strut Assembly

- 3.2 Attach the other end of the Angle Strut to the SYTP® using (2) 7/16" x 1 1/2" hex bolts [High Strength], (2) 7/16" flat washers, (2) 7/16" lock washers and (2) 7/16" hex nuts. Place the flat washers between the bolt heads and the Angle Strut and the lock washers under the hex nuts as shown in Figure 11.

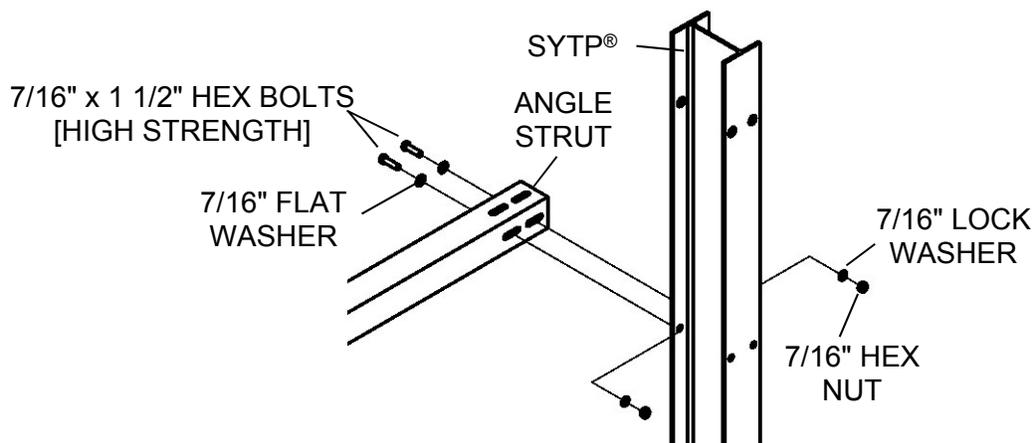


Figure 11 - Angle Strut Assembly

Note: There is no torque requirement for these bolts. They should be tightened to a snug position (do not over tighten).

4.0 Spacer Assembly

- 4.1 Refer to system drawings on page(s) 29 and 30 of this manual for assistance in locating parts.
- 4.2 Use (1) 5/8" x 2" hex bolt, (1) Washer Bar and (1) 5/8" rail nut to attach the Spacer to the first Guardrail Post. All of the Spacers have two slots on the inside for mounting. Orient as shown in Figure 12 (Guardrail Panel not shown for clarity).

Note: The Spacer may be attached to the Post by either slot in the Spacer.

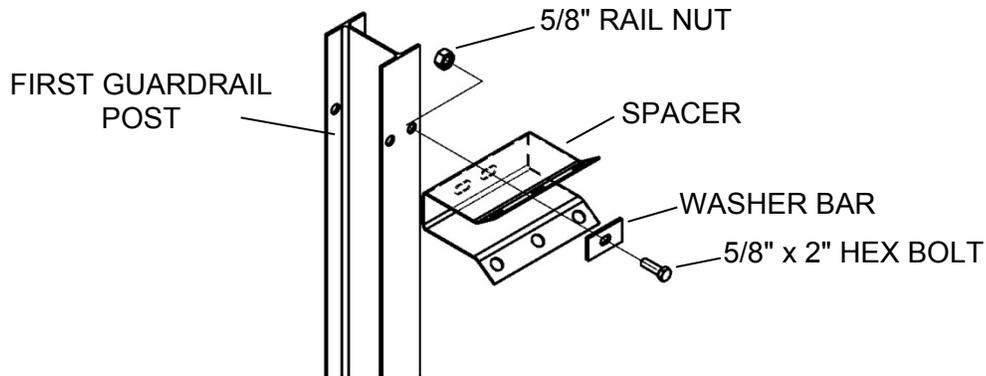


Figure 12 - Spacer Attachment

- 4.3 Working from the guardrail to the front of the TREND® 350 Tangent End Terminal, use (1) 5/8" x 2" hex bolt, (1) Washer Bar and (1) 5/8" rail nut to attach the Spacer to the W6x8.5# Line Post – Posts 6, 5, 4 and 3. All of the Spacers have two slots on the inside for mounting, orient as shown (Figure 12).

Note: The Washer Bar needs to lie between the 5/8" x 2" hex bolt head and the Spacer.

- 4.4 Next use (1) 5/8" x 2" hex bolt, (1) Washer Bar and (1) 5/8" rail nut to attach the Spacer with Cable Anchor to the SYTP® (i.e., Post 2). All of the Spacers have two slots on the inside for mounting, orient as shown in Figure 13.

Note: Post 1 does NOT receive a Spacer (p. 24).

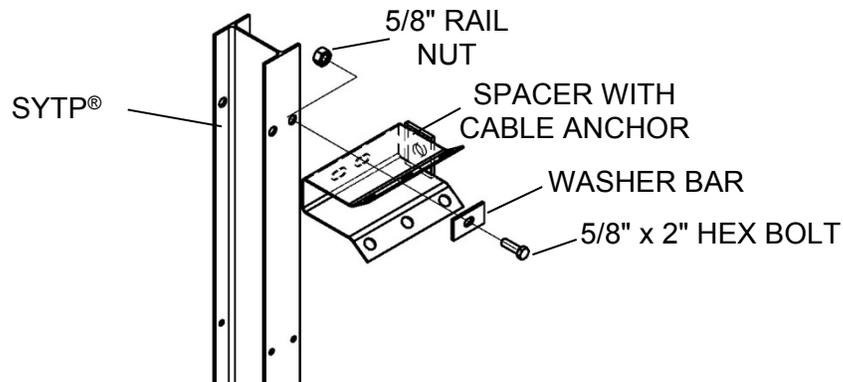
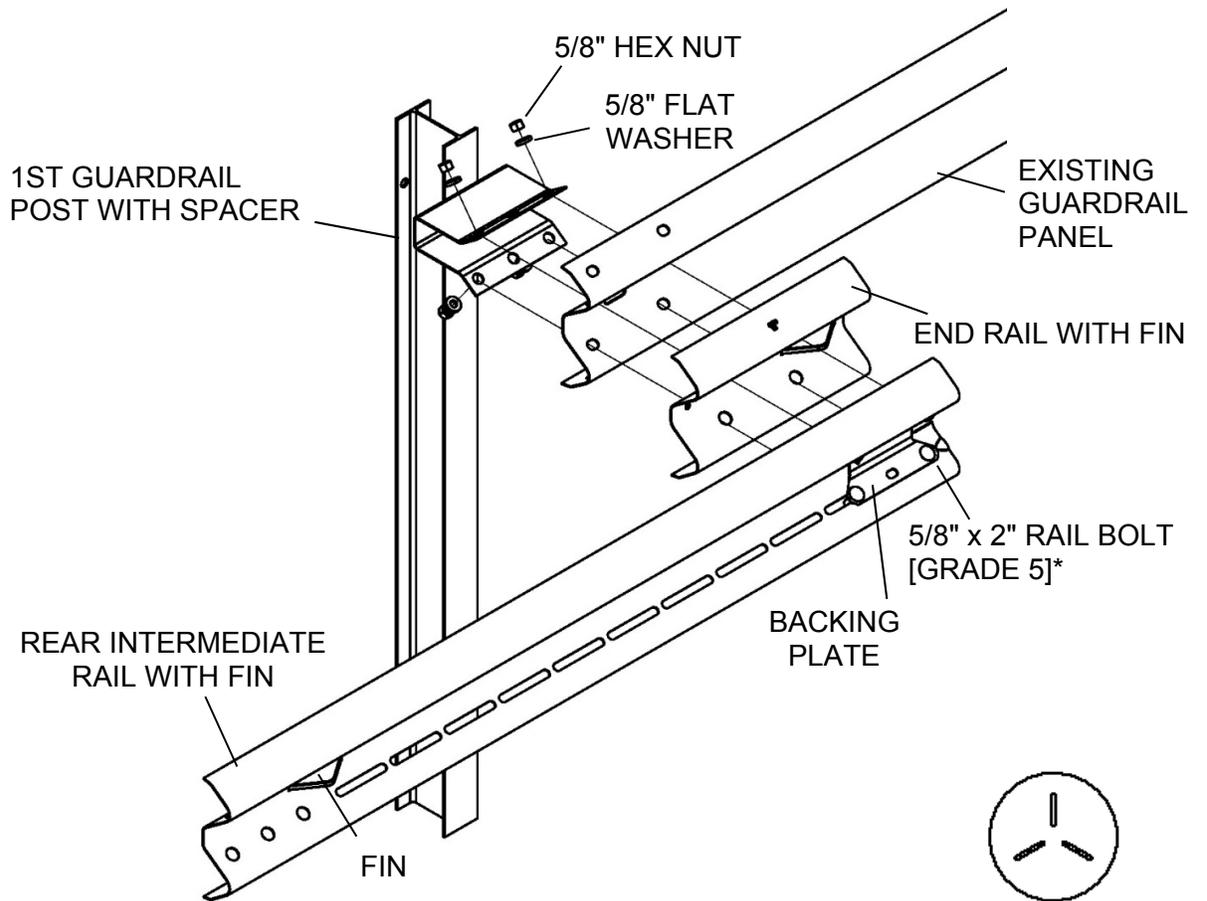


Figure 13 - Spacer with Cable Anchor Attachment

5.0 Rail Assembly

- 5.1 Begin with the End Rail with Fin and the rear Intermediate Rail with Fin. Attach the End Rail with Fin over the existing guardrail panel and the rear Intermediate Rail with Fin over the End Rail with Fin (i.e., the End Rail with Fin is located in between the existing guardrail panel and the rear Intermediate Rail with Fin). You may have to use alignment tools to aid in aligning the holes. Attach using (4) 5/8" x 2" rail bolts [Grade 5], (4) 5/8" flat washers [thick], (4) 5/8" hex nuts [Grade 5] and (1) Backing Plate as shown in Figure 14.

Note: The Backing Plate needs to lie between the rail bolt heads and the Intermediate Rail with Fin (Figure 14).



*Grade 5 head markings

Figure 14 - Rail Attachment

- 5.2 Working from the rear Intermediate Rail, attach the next Intermediate Rail to the system using (6) 5/8" x 2" rail bolts [Grade 5], (6) 5/8" flat washers [thick], (6) 5/8" hex nuts [Grade 5] and (1) Backing Plate as shown. Be sure to overlap the panels as shown in Figure 15; the upstream panel is on top of the downstream panel.

Note: The Backing Plate needs to lie between the rail bolt heads and the Intermediate Rail (Figure 15).

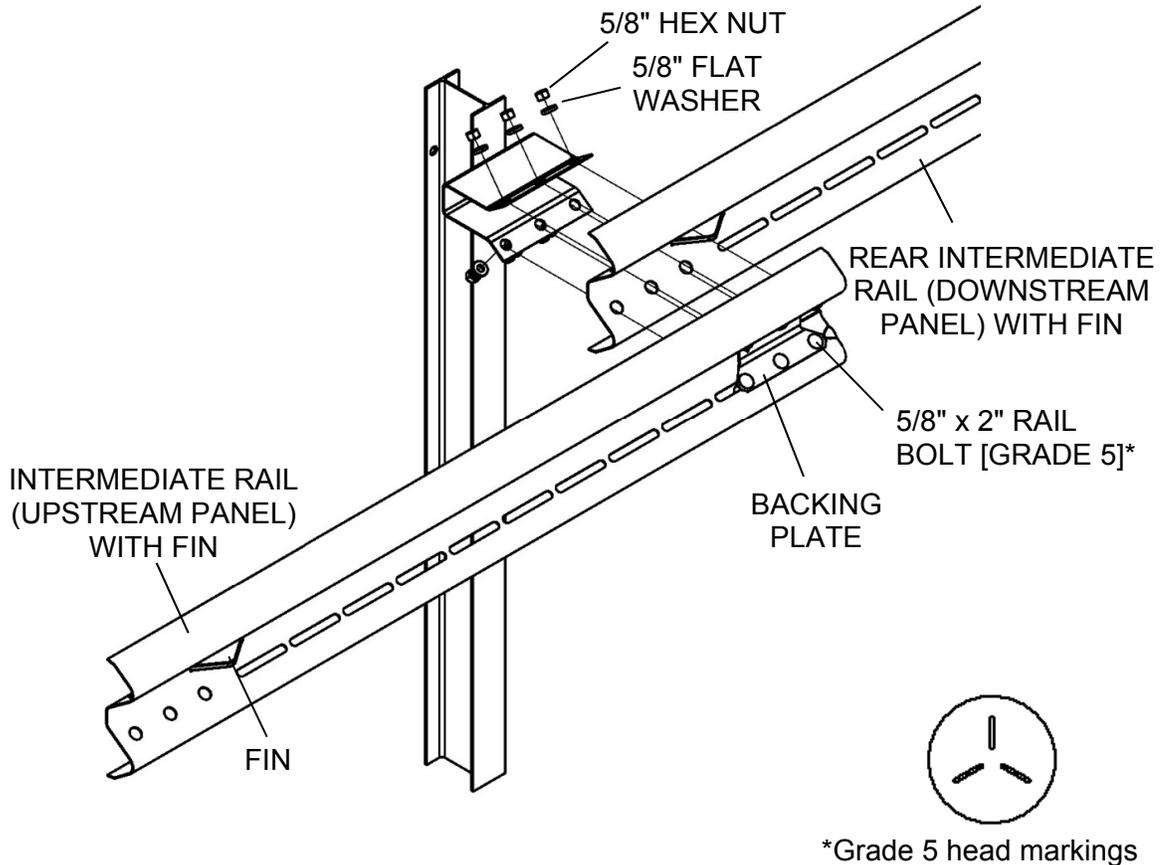


Figure 15 - Rail Attachment

- 5.3 Tighten all 5/8" rail bolts [Grade 5] to a torque of 120 ft-lb using a calibrated torque wrench.



Important: The 5/8" rail bolts [Grade 5] must be tightened to the correct torque for proper system operation. Failure to follow this warning could result in serious injury or death in the event of a collision.

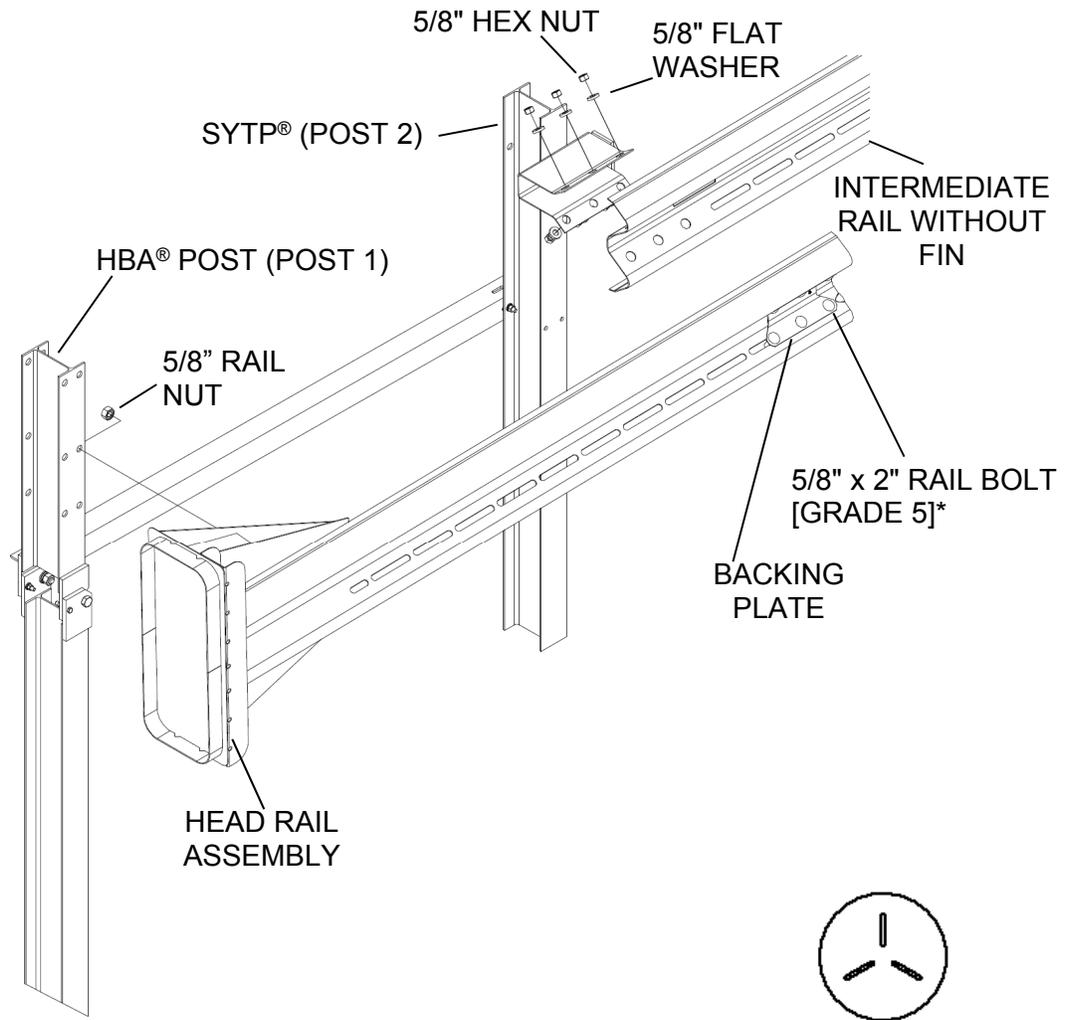
- 5.4 Repeat steps 5.2 and 5.3 until all of the Intermediate Rails are attached.

Note: The final Intermediate Rail to be assembled (at the front of the system) does NOT have a fin.

6.0 Head Rail Assembly

- 6.1 Position the Head Rail Assembly onto the posts; attach using (6) 5/8" x 2" rail bolts [Grade 5], (6) 5/8" flat washers [thick], (6) 5/8" hex nuts [Grade 5] and (1) Backing Plate. Attach the Head Rail Assembly to Post 1 using (1) 5/8" x 2" hex bolt and (1) 5/8" rail nut (Figures 16 & 17).

Note: Due to the location of the Head Rail Assembly mounting holes in posts 1 and 2, the Head Rail Assembly will be oriented with a downward slope toward the front of the system.



*Grade 5 head markings

Figure 16 - Head Rail Attachment

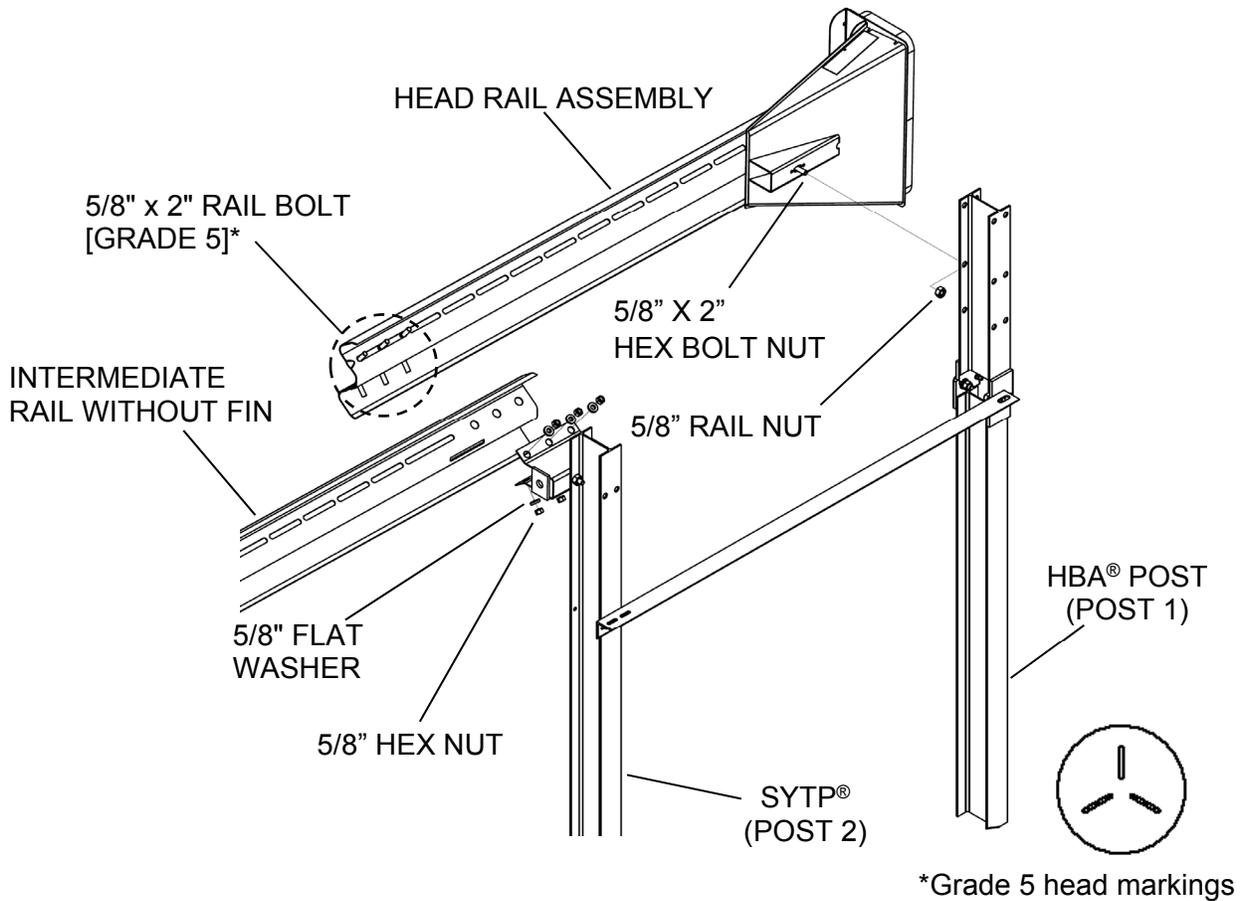


Figure 17 – Head Rail Attachment (Backside)



Important: Verify the top of the Head Rail Assembly head height is 33" above grade (p. 30). Ensure Head Rail Assembly is fully extended toward front of system before tightening fasteners.

6.2 Tighten all 5/8" rail bolts [Grade 5] to a torque of 120 ft-lb using a calibrated torque wrench.



Important: The 5/8" rail bolts [Grade 5] must be tightened to the correct torque for proper system operation. Failure to follow this warning could result in serious injury or death in the event of a collision.

7.0 Cable Routing

- 7.1 Feed one end of the Cable between the HBA® Top Post and HBA® Bottom Post and through the Bearing Plate. **Note: The tabs on the Bearing Plate rest on top of the HBA® Top Post plates (ears).** Secure the Cable using (1) 1" flat washer and (1) 1" hex nut. Thread the nut approximately 3"- 4" onto the Cable end (Figure 18).

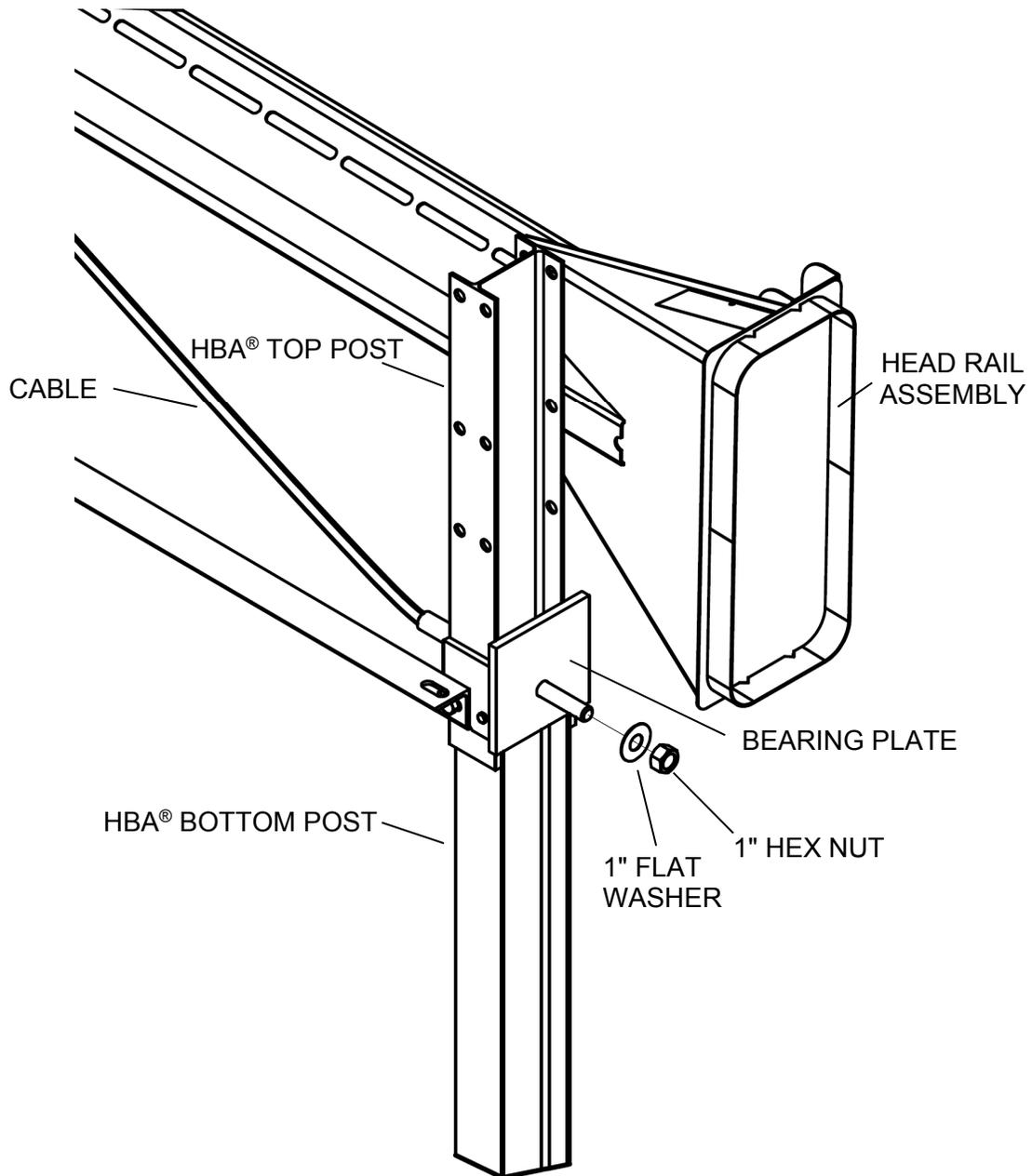


Figure 18 - Cable Attachment

- 7.2 Insert the other end of the Cable through the Spacer with Cable Anchor. Secure the Cable using (1) 1" flat washer and (1) 1" hex nut. Restrain the Cable with Vise Grip Pliers at the end being tightened to avoid twisting the Cable. Make sure the nuts are tight and the Cable is taut (Figure 19; Post 2 not shown for clarity).

Note: The Cable is considered taut when it does not deflect more than 1" when pressure is applied by hand in an up or down direction.

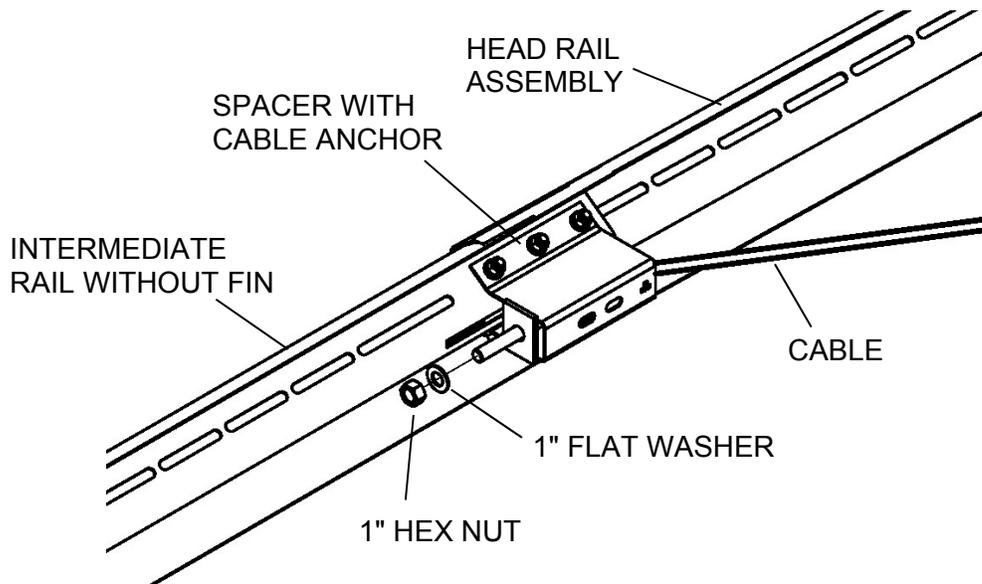


Figure 19 - Cable to Spacer Attachment

Maintenance



Warning: The system must be periodically inspected to ensure proper operation.

Inspections by the appropriate highway authority are recommended as needed based upon volume of traffic and impact history. Visual drive-by inspections are recommended at least once every month. Walk-up inspections are recommended at least twice a year.

Visual Drive-By Inspection

The purpose of the visual inspection is to spot any conditions that would prevent the system from functioning as intended.

1. Check for an unrecorded impact, misalignment, missing fasteners, corrosion, vandalism, etc.
2. Clear any buildup of trash or dirt around the system that could interfere with intended performance.

Walk-Up Inspection

1. Clear and dispose of any debris on the site.
2. Be sure all fasteners are tight.
3. Verify that all the 5/8" rail bolts [Grade 5] are torqued to 120 ft-lb.
4. Check to see that slack is removed from the Cable (tighten nut on threaded Cable end if necessary).

Assembly Checklist

Assembly **performed**
by: _____

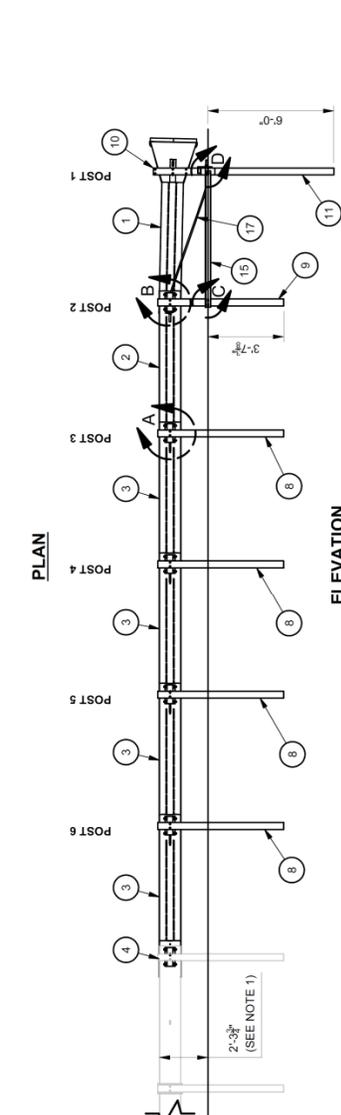
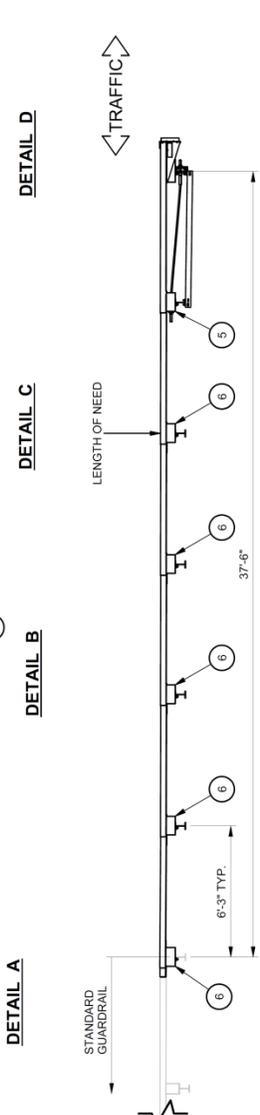
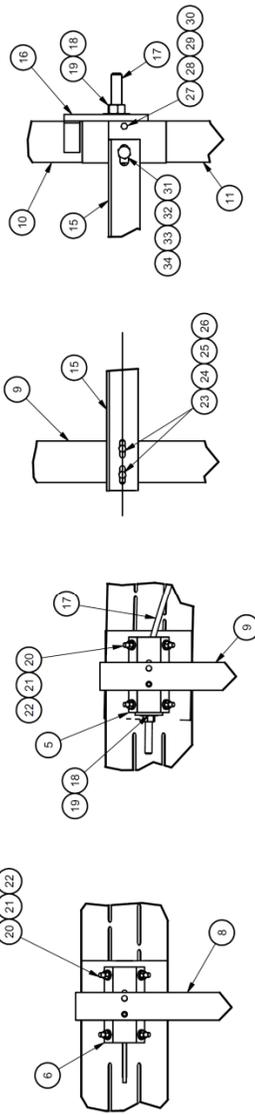
Assembly date: _____

Assembly
location: _____

- Verify the Head height is 33" above grade (Section 6.0).
- Verify that all 5/8" rail bolts [Grade 5] are torqued to 120 ft-lb. Also verify that all 5/8" rail bolt heads are seated flat against each Backing Plate (Sections 5.0 and 6.0).
- Verify that the slack has been removed from the Cable; tighten nuts on Cable ends as necessary (Section 7.0).
- Verify that each Spacer has a Washer Bar seated between the inside of the Spacer and the bolt head that attaches the Spacer to the Post (Section 4.0).
- Verify that all rails are lapped correctly along the length of the system (refer to Sections 5.0 and 6.0).
- Verify that the Head Rail Assembly is oriented with a downward slope towards the front of the system (Note in Section 6.0).
- Verify high strength bolts used on HBA® Post, SYTP®, and system rail connections (Sections 2.0, 3.0, 5.0, and 6.0).

617938

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	620708	HEADRAIL 350 TREND G.W/DECAL	1
2	618192	RAIL W-SHAPE 2228	1
3	618193	RAIL W-SHAPE 2228 W/FIN	4
4	613554	RAIL W/FIN W-SHAPE 525	1
5	620727	SPACER CABLE ANCHOR 350 TE	5
6	604465	SPACER POST RAIL 350 TE	6
7	604465	BACKING PLATE POST TE	6
8	000533	60 POST 6.500DR	4
9	014578	60 POST 6.500DR TYP	1
10	034074	TRND350 HBA BKY PST28.75W/6 HOLES	1
11	033873	ET HBA P1-2 BTM X 6-1 1/2	1
12	003403	5/8"X2" HEX BOLT A307	7
13	617000	WASHER BAR 1/4X2X89M.W/SLOT	6
14	003340	5/8" GR HEX NUT	7
15	033795	SYT-37AN STRT 3.HL 66	1
16	019258	HBA-BRG PUWELDED TABS	1
17	116439	CABLE 95 1/2.350TE	1
18	003900	1" ROUND WASHER F844	2
19	003910	1" HEX NUT A563	2
20	118614	BOLT RAIL 5/8X2.G5.G	34
21	118615	WASHER FLAT 5/8 THICK G	34
22	003361	5/8" HVY HEX NUT A563 DH	34
23	004380	7/16"X1.5" HEX BOLT GRD 5	2
24	004389	7/16" WASHER F844	2
25	004393	7/16" LOCK WASHER	2
26	004396	7/16" HEX NUT A563 DH	2
27	006321	3/8"X2" HEX BOLT GR-5 HDG	2
28	004254	3/8" ROUND WASHER F436	2
29	004258	3/8" LOCK WASHER	2
30	006405	3/8" HVY HEX NUT A563GRDH	2
31	003717	3/4"X2.5" HEX BOLT A325	2
32	003701	3/4" ROUND WASHER F436	2
33	004699	3/4" LOCK WASHER	2
34	003704	3/4" HVY HEX NUT A563 DH	2
35	617939	MANUAL PRODUCT.TREND 350 TANGENT	1



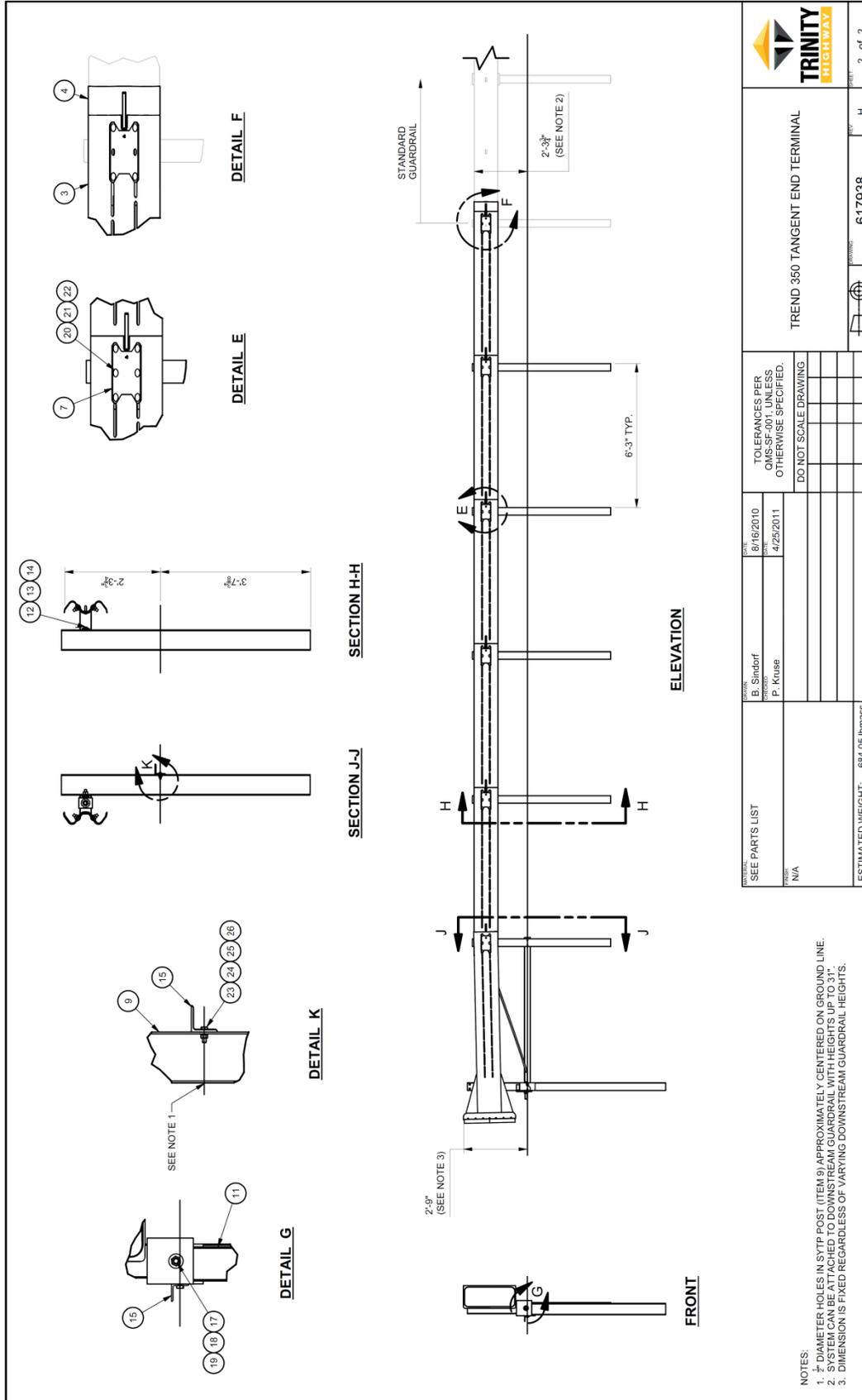
TOLERANCES PER QMS-SP-001 UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING	DATE: 8/16/2010 4/25/2011	DRAWN: B. Smider P. Kruse	ESTIMATED WEIGHT: 684.05 lb/mass
SEE PARTS LIST		ESTIMATE: N/A	
NOTES: 1. SYSTEM CAN BE ATTACHED TO DOWNSTREAM GUARDRAIL WITH HEIGHTS UP TO 31".			

TREND 350 TANGENT END TERMINAL

PART NO. 617938
 REV. H
 1 of 2

TREND® 350 Tangent End Terminal Drawings

617938



NOTES:
 1. † DIAMETER HOLES IN SYTP POST (ITEM 9) APPROXIMATELY CENTERED ON GROUND LINE.
 2. SYSTEM CAN BE ATTACHED TO DOWNSTREAM GUARDRAIL WITH HEIGHTS UP TO 31\"/>

SEE PARTS LIST N/A	DESIGNED BY: S. Spindorf CHECKED BY: P. Kruse	DATE: 8/16/2010 DATE: 4/25/2011	TOLERANCES PER UNLESS OTHERWISE SPECIFIED. DO NOT SCALE DRAWING	TREND 350 TANGENT END TERMINAL
ESTIMATED WEIGHT: 684.05 lb/mass	PART NUMBER: 617938		SHEET: 2 of 2	TRINITY HIGHWAY



TRINITY

HIGHWAY

Ahead of the Curve™

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