VALTIR

TREND® CEN

END TERMINAL

PRODUCT DESCRIPTION ASSEMBLY MANUAL

PN 115278
REVISION D FEBRUARY 2023

TREND® CEN End Terminal

Product Description
Assembly Manual

15601 Dallas Parkway

Suite 525
Addison, Texas 75001

Warning: **The local highway authority, distributors, owners, contractors, lessors, and lessees are responsible for the assembly, maintenance, and repair of the TREND® CEN End Terminal. Failure to fulfill these RESPONSIBILITIES with respect to the assembly, maintenance, and repair of the TREND® CEN End Terminal could result in serious injury or death.**

Important: These instructions are for standard assemblies specified by the appropriate highway authority. In the event the specified system assembly, maintenance, or repair would require a deviation from standard assembly parameters, contact the appropriate highway authority engineer. **Valtir, LLC dba Valtir International ("Valtir International")** representatives are available for consultation if required.

This manual must be available to the worker overseeing and/or assembling the product at all times. For additional copies, contact Valtir International at +1 (214) 589-8140.

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® CEN End Terminal system information available to Valtir International at the time of printing. We reserve the right to make changes at any time.

Part No. 115278

Table of Contents

Customer Service Contacts

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

Valtir International

Telephone:	+1 214 589 8140
E-mail:	www.Valtir.com/Contact
Website:	www.Valtir.com

Important Introductory Notes

Proper anchorage of the TREND® CEN End Terminal is critical to achieve performance that has been tested and evaluated per ENV 1317-4. These instructions should be read in their entirety and understood before assembling the TREND® CEN End Terminal. These instructions are to be used only in conjunction with the assembly of the TREND® CEN End Terminal and are for standard assemblies only as specified by the applicable highway authority. In the event your system assembly requires or involves deviation from standard parameters or, during the assembly process, a question arises regarding a particular assembly step, contact the specifying highway authority for guidance before proceeding. Valtir International remains available, at all times, to consult with the highway authority and you.

This manual is intended to provide guidance for new assemblies of the TREND® CEN End Terminal. **It is critical that the TREND® CEN End Terminal posts are placed in suitable ground/soil/foundations that will allow the system to fully perform in accordance with the design specification. Should you have any question about this, please contact the appropriate highway authority that specified the TREND® CEN End Terminal at this particular location for guidance. Valtir International is available for consultation with that authority.**

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 assist in the assembly, maintenance, or repair of this system that does not possess the unique knowledge described above. These instructions are intended for an individual 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 set of product drawings are available from Valtir International upon request. Such drawings should be reviewed and studied thoroughly by a qualified individual who is skilled in interpreting them before the start of any product assembly.

Safety Symbols

This section describes safety symbols that may appear in the TREND® CEN 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 suggested safe practices before assembling, maintaining, or repairing the TREND® CEN 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 **that is no longer compliant with ENV 1317-4.**
	**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® CEN End Terminal. Additional copies of this Manual are available from Valtir International by calling +1 (214) 589-8140 or www.Valtir.com/Contact. Please contact Valtir International if you have any questions concerning the information in this manual or about the TREND® CEN End Terminal.

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

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

Warning: Ensure that your assembly meets all appropriate local specifications and standards. If you have any question during the assembly of a TREND® CEN End Terminal at a particular system assembly site, contact the specifying highway authority immediately.

Limitations and Warnings

The TREND® CEN End Terminal was tested to meet the requirements and guidelines of the P2 and P4 performance classes using the CEN criteria described in European Standard ENV 1317-4 (Terminals and Transitions).

The required tests are not intended to represent the performance of products when impacted by every vehicle type or every impact condition.

Valtir International does not represent nor warrant that the results of these controlled tests show that vehicle impacts with the products in other conditions would necessarily avoid injury to person(s) or property. Impacts that exceed the tested specifications of the product may not result in acceptable crash performance as outlined in ENV 1317-4, relative to structural adequacy, occupant risk and vehicle trajectory.

Valtir International expressly disclaims any warrant 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 Valtir International or by third parties.

The TREND® CEN End Terminal was designed to be assembled at a specific assembly site and maintained in accordance with local guidelines. Valtir International offers a reflective delineator panel and has reflective tabs for its TREND® line of products.

It is the responsibility of the highway authority engineer, or other specifying authority to carefully select, assemble, and maintain the product. Careful evaluation of the site geometry, vehicle population type, speed, traffic direction and visibility are some of the elements that require evaluation in the proper selection of a safety appurtenance. For example, curbs could cause conditions which differ from those described in ENV 1317-4 and may result in different crash results than those encountered in applicable crash testing.

The TREND® CEN End Terminal may be connected directly to W-Beam barrier with a containment level of N2 and a working width of W2 or W3. For connections to barriers having different containment levels and/or different working widths, appropriate connections, per your local jurisdiction, should be used. For further information, please contact your end terminal supplier.

Know Your TREND® CEN End Terminal

For specific assembly, maintenance, or repair details; refer to the specifying agency's standard drawing(s) and/or Valtir International standard layout drawings. System drawings can be found in the back of this manual.

Inspect Shipment

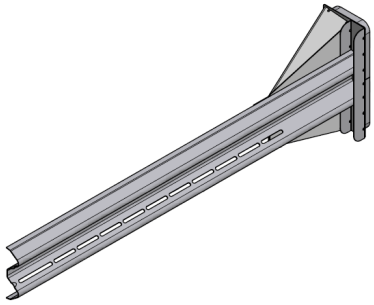
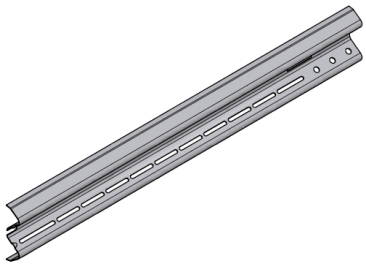
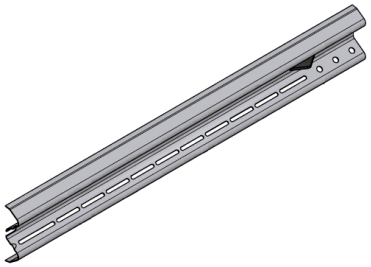
Carefully uncrate all components. Before assembling the TREND® CEN End Terminal, check the received parts against the shipping list supplied with the system. Refer to the System Components section of this manual to help identify each component (p. 6).

Important: Verify that all parts were received.

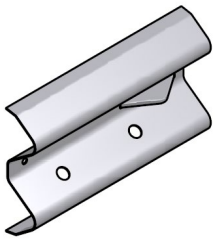
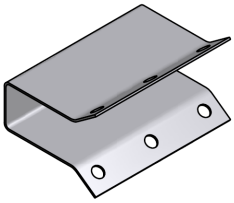
System Components

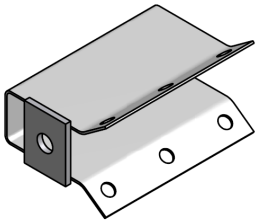
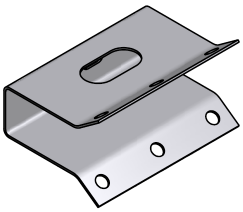
Important: **DO NOT** use any component part that has not been specifically approved for this system during assembly or repair.

		615795B (P4 w/ Driven Posts)	615794B (P4 w/ Concrete Sockets)	615793B (P2 w/ Driven Posts)	615792B (P2 w/ Concrete Sockets)
COMPONENT	**PART NO.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
Head Rail Assembly	610138B	1	1	1	1
Intermediate Rail	613550G	1	1	1	1
Intermediate Rail w/ Fin	613552G	4	4	N/A	N/A
End Rail with Fin	613554G	1	1	1	1
Backing Plate	604465G	6	6	2	2
Spacer	614529G	4	4	N/A	N/A
Spacer w/ Cable Anchor	614512G	1	1	1	1
Spacer w/ Hole for Cable	614531G	1	1	1	1
Upper Post	612781G	6	6	2	2
Lower Post (1.1 m)	612689G	4	N/A	N/A	N/A
Front Lower Post (1.1 m)	612692G	2	N/A	2	N/A
Soil Plate	614481G	1	N/A	1	N/A
Cable Strut	614927G	1	1	1	1
Cable Assembly (11.6 m)	605791B	1	1	N/A	N/A
Cable Assembly (3.6 m)	605792B	N/A	N/A	1	1
E005 Assembly (M10x130 Hex)	115214G	2	2	2	2
E004 Assembly (M10x80 Hex)	115215G	2	N/A	2	N/A
E006 Assembly (M12x50 Hex)	115216G	6	6	2	2
E001 Assembly (M16x50 Rail)	116594B	41	41	13	13
Washer Bar	617000G	5	5	1	1
Concrete Socket	614474G	N/A	6	N/A	2
Short Lower Post (0.82 m)	612695G	N/A	4	N/A	N/A
Short Front Lower Post (0.82 m)	612693G	N/A	2	N/A	2

Head Rail Assembly*	Intermediate Rail	Intermediate Rail w/ Fin
		
610138	613550	613552

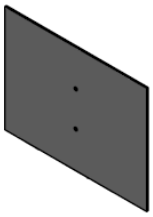
***Note: The Head Rail Assembly is symmetrical and can be used on the upstream and downstream ends of highway barrier and on either side of the roadway.**

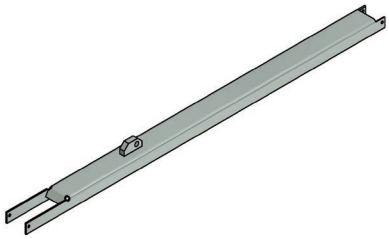
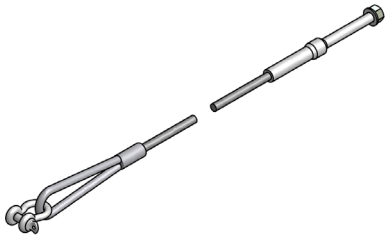
End Rail w/ Fin	Backing Plate	Spacer
		
613554	604465	614529

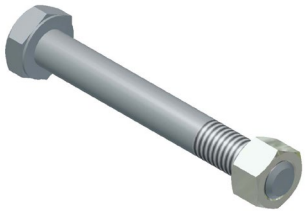
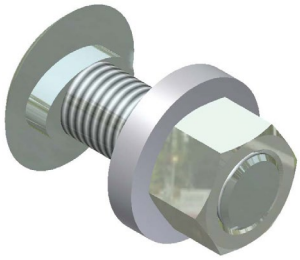
Spacer w/ Cable Anchor	Spacer w/ Hole for Cable	Upper Post
		
614512	614531	612781

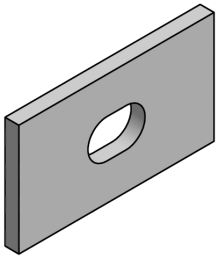
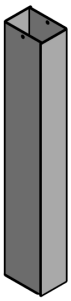
Warning: Do NOT modify the TREND® CEN End Terminal in any way.

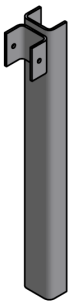
Warning: Ensure that the TREND® CEN End Terminal and delineation used meet all local specifications.

Lower Post (1.1m)	Front Lower Post (1.1m)	Soil Plate
		
612689	612692	614481

Cable Strut	Cable Assembly	E005 Assembly (M10x130 Hex)
		
614927	605791 (11.6 m) 605792 (3.6 m)	115214

E004 Assembly (M10x80 Hex)	E006 Assembly (M12x50 Hex)	E001 Assembly (M16x50 Rail)
		
115215	115216	116594

Washer Bar	Concrete Socket	Short Lower Post (0.82m)
		
617000	614474	612695

Short Front Lower Post (0.82m)

612693G

Warning: Do not assemble, maintain, or repair the TREND® CEN End Terminal until you have read this manual thoroughly and completely understand it. Ensure that all Danger, Warning, Caution and Important statements within the manual are completely followed. Please call Valtir International at +1 (214) 589-8140 if you do not understand these instructions.

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

TREND® CEN End Terminal Assembly

Recommended Tools

Documentation

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

Wrenches

- 16 - 36 mm Hex Socket Drive
- 24 mm Box Wrench
- 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
- 200 mm Core Device
- Soil Tamper
- Post Pounder (commonly used for driving posts)
- 16 mm Alignment Tool (Drift Pin)
- Vise Grip Pliers

Note: The above list of tools is a general recommendation and should not be considered an extensive 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 job are entirely within the 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.

Assembly Procedures

Note: The drawing package provided with the TREND® CEN 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 the TREND® CEN End Terminal assembly begins.

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

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.

Warning: It is the installers' responsibility to ensure that there is proper site grading for the TREND® CEN End Terminal at the location specified by the local agency.

P4 System Assembly

Important: Positioning of the posts is critical. Measure each post from the center to the relevant distance back from the road carefully. Double check all measurements before placing the lower posts into the ground.

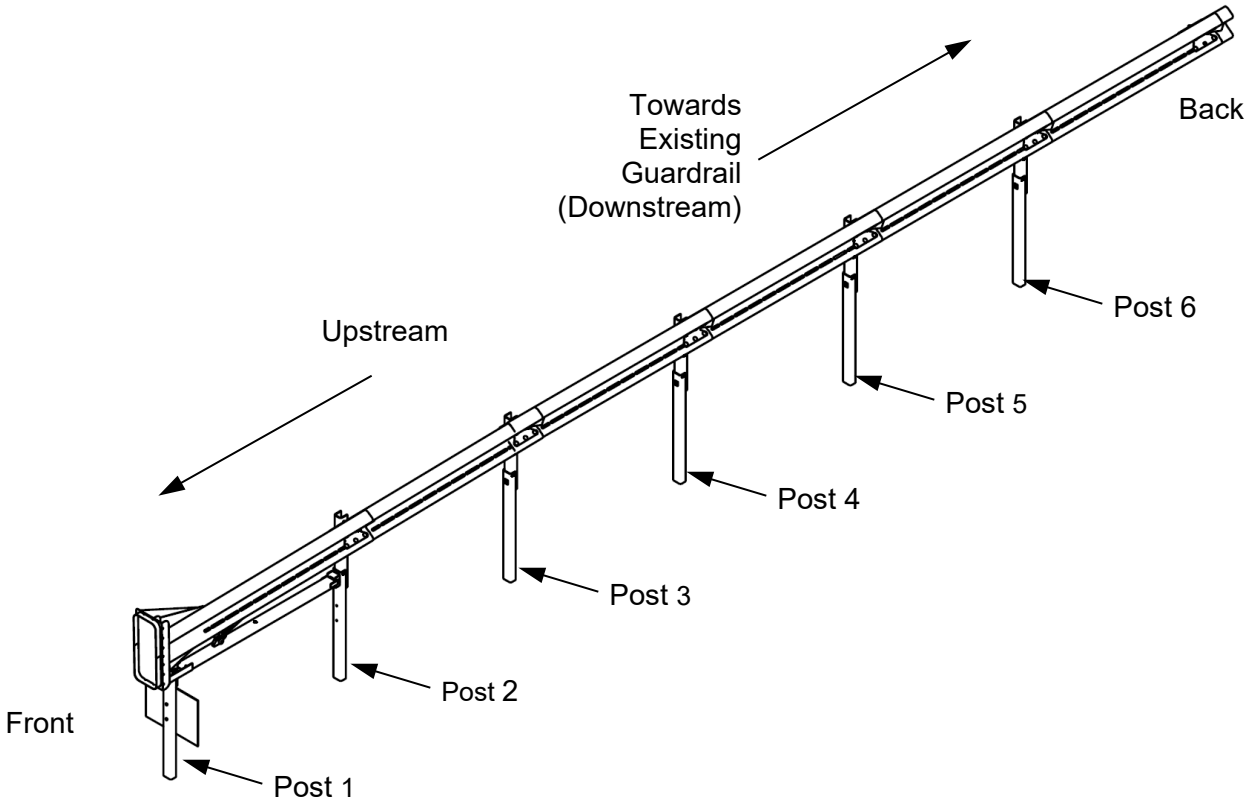


Figure 1

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 ~14 meters upstream from the end of the existing guardrail. Verify that the datum (DT1) remains parallel to the existing guardrail (Figure 2).

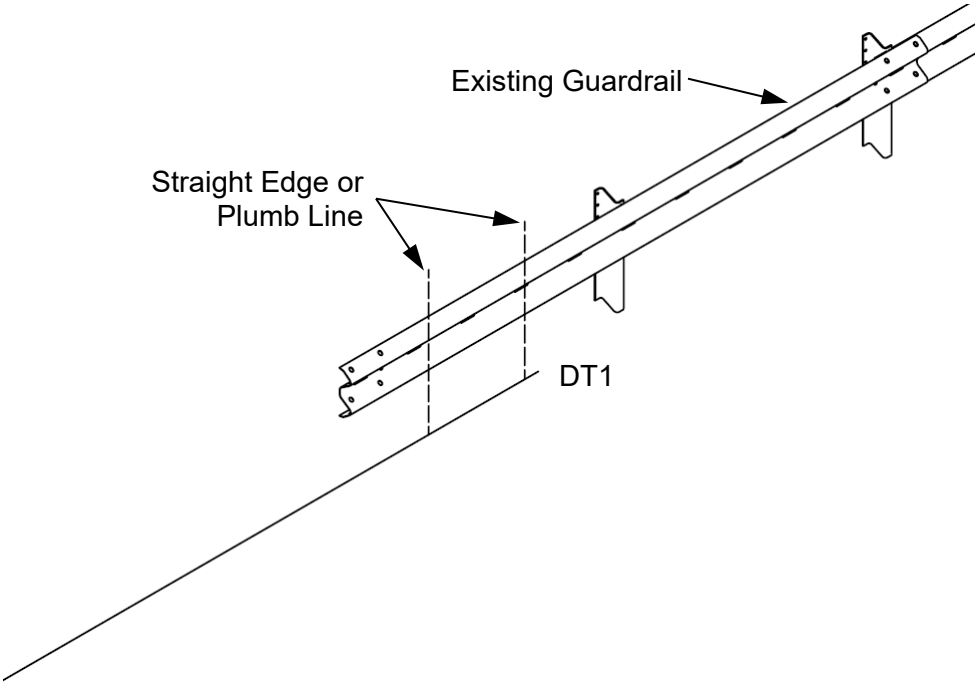


Figure 2

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 210 mm (this offset is needed in order to attach a spacer between the guardrail post and the guardrail panel). It should be noted that the centerline of this new guardrail post may not align with the existing guardrail posts or with the TREND® CEN End Terminal posts (Figure 3).

1.3 Measure perpendicular from the datum line (DT1) towards the existing guardrail 250 mm and make a mark (M1) near the first guardrail post (Figure 3).

Note: Any variation of system post pitch at the end of the guardrail system caused by the addition of the new guardrail post must be 'evened out' to reduce pocketing effects. If the dimensions to the end guardrail post is greater than the system post pitch then adjust by not more than one working width difference the adjacent downstream post.

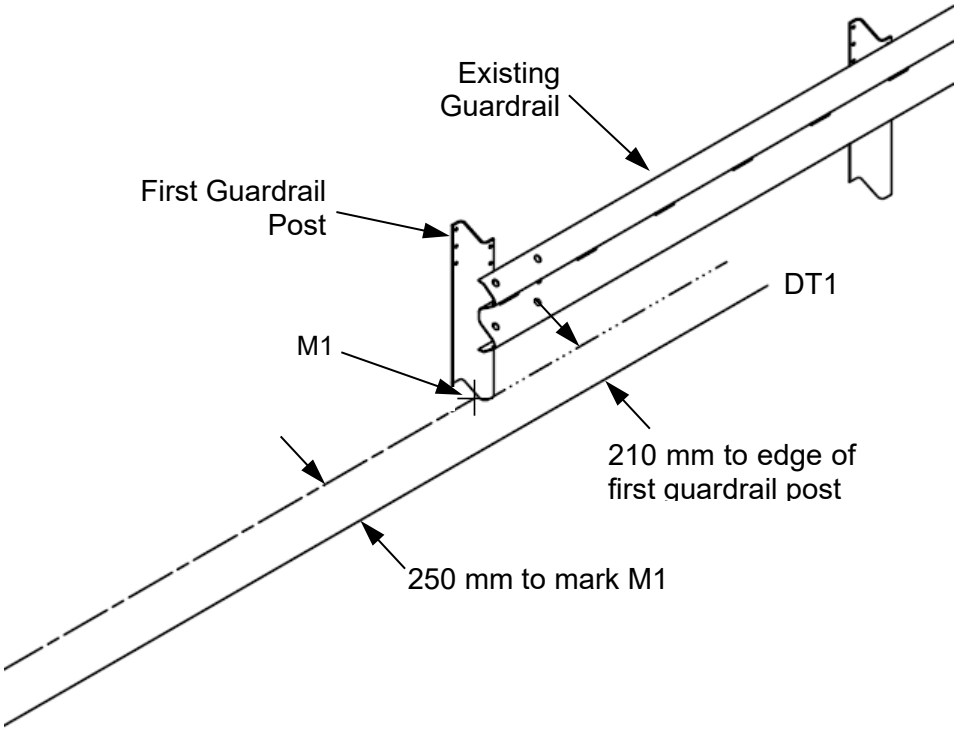


Figure 3

1.4 Locate the first post (Post 1) of the TREND® CEN End Terminal (Figure 1). First measure from mark (M1) a distance of 12m upstream and make a second mark (M2) which is parallel to datum line (DT1). Verify the perpendicular distance of 250 mm from mark (M2) to the datum (DT1). Adjust mark (M2) if necessary (Figure 4).

1.5 Chalk or stake a line from mark (M1) to mark (M2). This will be the centerline for the posts (Figure 4).

1.6 From location (M2), measure off the rest of the post locations [Posts 2 thru 6] (Figure 1), towards the first guardrail post, at 2.0 m intervals [6 total post locations] (Figure 4).

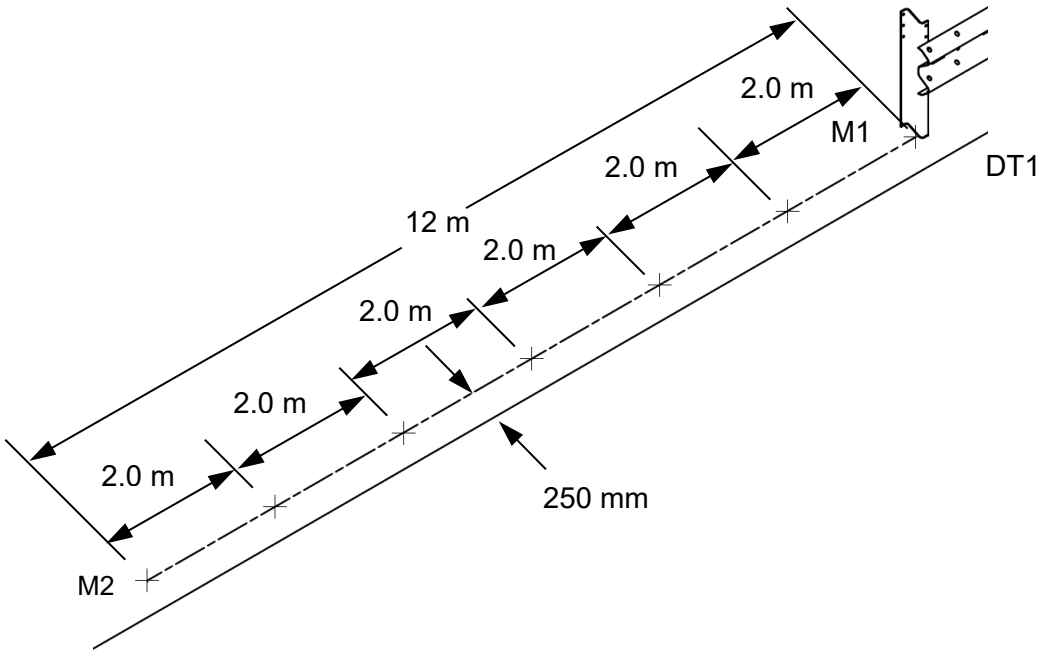


Figure 4

2.0 Post Assembly

2.1 (For Concrete Socket site assemblies, skip this step and proceed to step 2.2)
Using two E004 fastener assemblies (i.e., two 10 mm x 80 mm hex bolts and two 10 mm hex nuts), attach the Soil Plate to one of the Front Lower Posts (Figure 5).

Note: This will be Post 1 (Figure 1 - p. 12).

There is no torque requirement for these bolts. They should be tightened to a snug position.

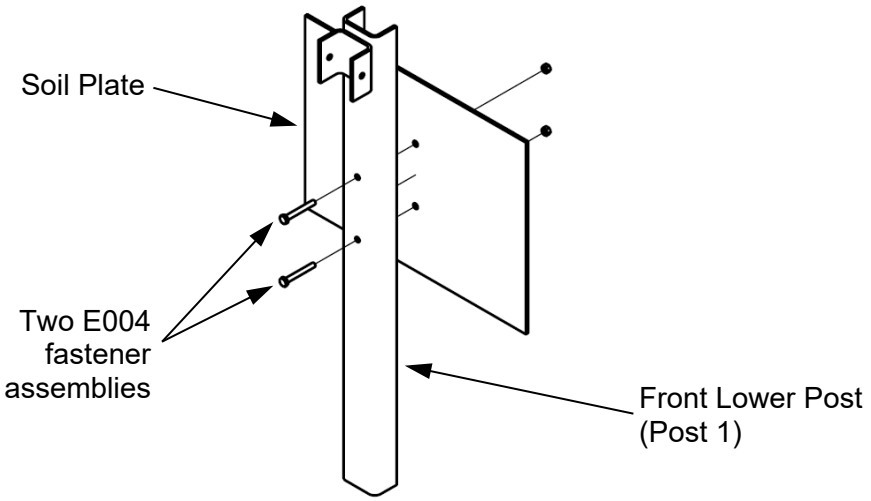


Figure 5

2.2 Starting with the post location closest to the existing guardrail (Post 6), place one Lower Post, orient as shown (Figure 6). The center of the Tension Bolt hole should be approximately 15 mm above the ground (Figure 7).

Note: Post spacing is 2.0 m (Figure 4 on p. 15).

Important: See Section 3.0: Ground Anchorage – Post Foundations

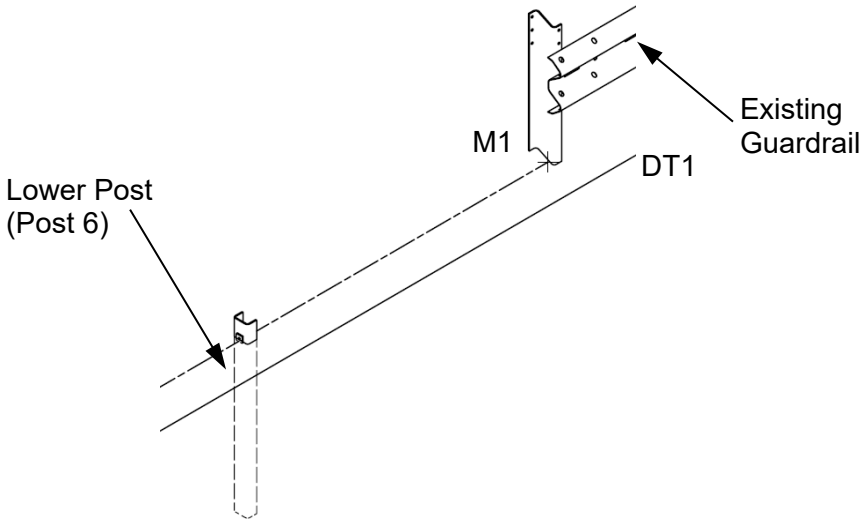


Figure 6

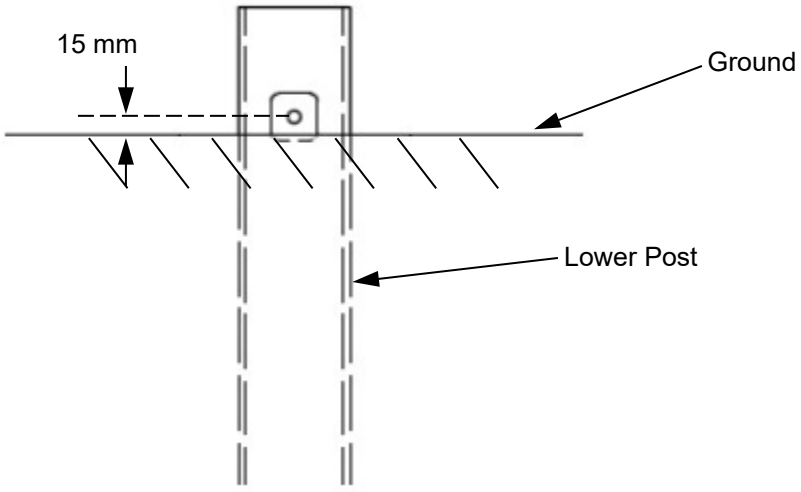


Figure 7

2.3 Repeat step 2.2 for the remaining three Lower Posts (Posts 5, 4 and 3).

2.5 Next, place one Front Lower Post (Post 2), orient as shown (Figure 8). The center of the Tension Bolt hole should be approximately 15 mm above the ground (Figure 9).

Note: Post spacing is 2.0 m (Figure 4 – p. 15).

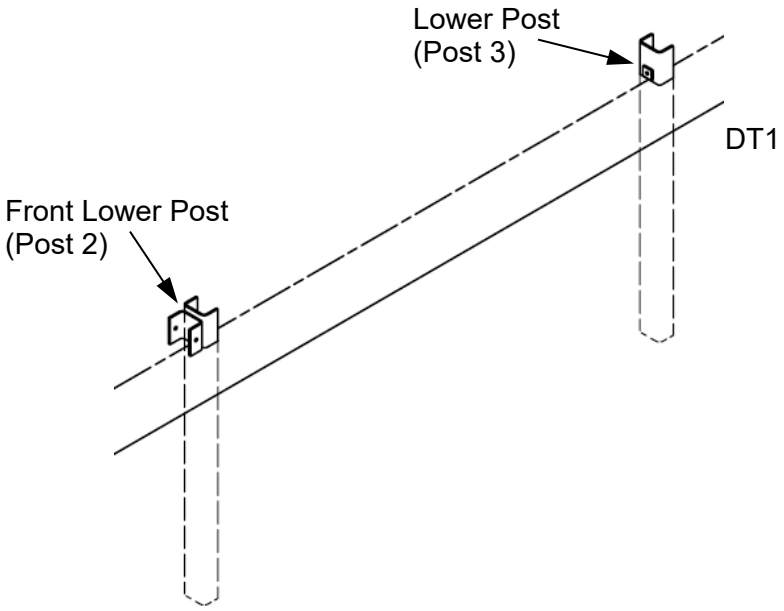


Figure 8

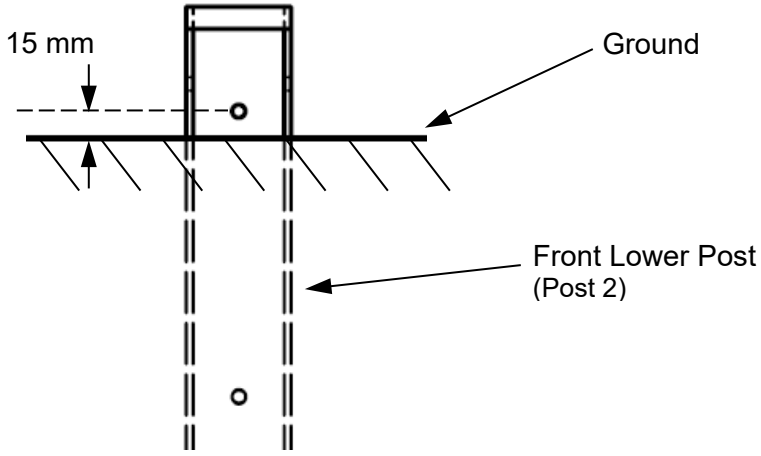


Figure 9

2.6 Place the final Front Lower Post with Soil Plate attached at the last post location (i.e., Post 1, furthest from the existing guardrail). The center of the Tension Bolt hole should be approximately 15 mm above the ground (Figure 10).

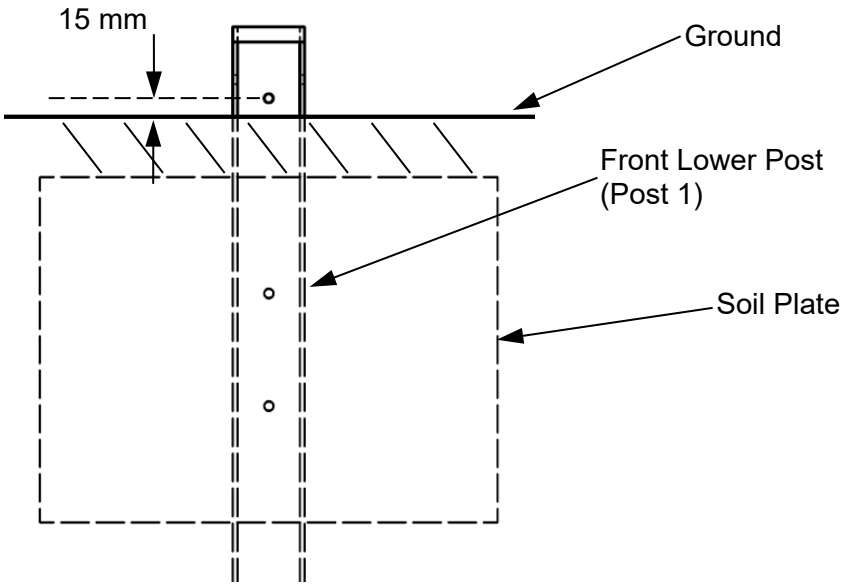


Figure 10

2.7 Insert an Upper Post into the Lower Post.

Note: Be sure to clear all dirt between the Upper Post and Lower Post.

Bolt the two posts together using one E006 fastener assembly (Figure 11). (i.e., one (1) 12 mm x 50 mm hex bolt and two (2) 12 mm hex nuts)

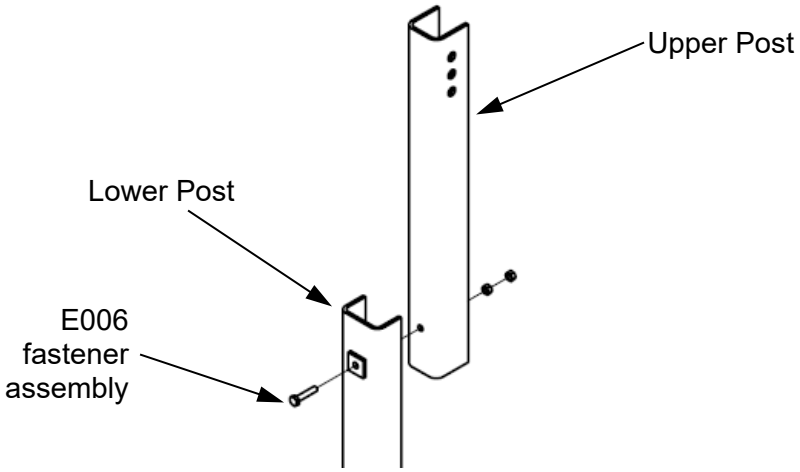


Figure 11

2.8 Tighten the E006 fastener assembly to a torque of 90 N-m using a torque wrench.

Note: The torque is applied using a single Hex Nut. Once the required torque is achieved attach the second Hex Nut and tighten.

2.9 Repeat steps 2.6 through 2.7 for all remaining Lower Posts and Front Lower Posts.

3.0 Ground Anchorage – Post Foundation Testing

Note: It is critical that the TREND® CEN End Terminal posts are placed in suitable ground/soil/foundations that will allow the system to fully perform in accordance with the design specification and applicable impact testing. Suitability of the ground foundation can be ascertained using the following test.

3.1 Ground anchorage testing shall be carried out on a sacrificial post. On completion of the testing, the test post(s) must be removed along with any foundations.

3.2 A horizontal load shall be applied near the top of the post by means of a hydraulic ram with a calibrated load cell, or equivalent. The load is to be applied to the side of the Upper Post near the front face to avoid twisting of the post during testing (Figures 12 and 13).

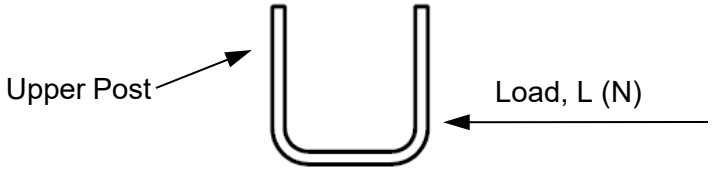


Figure 12

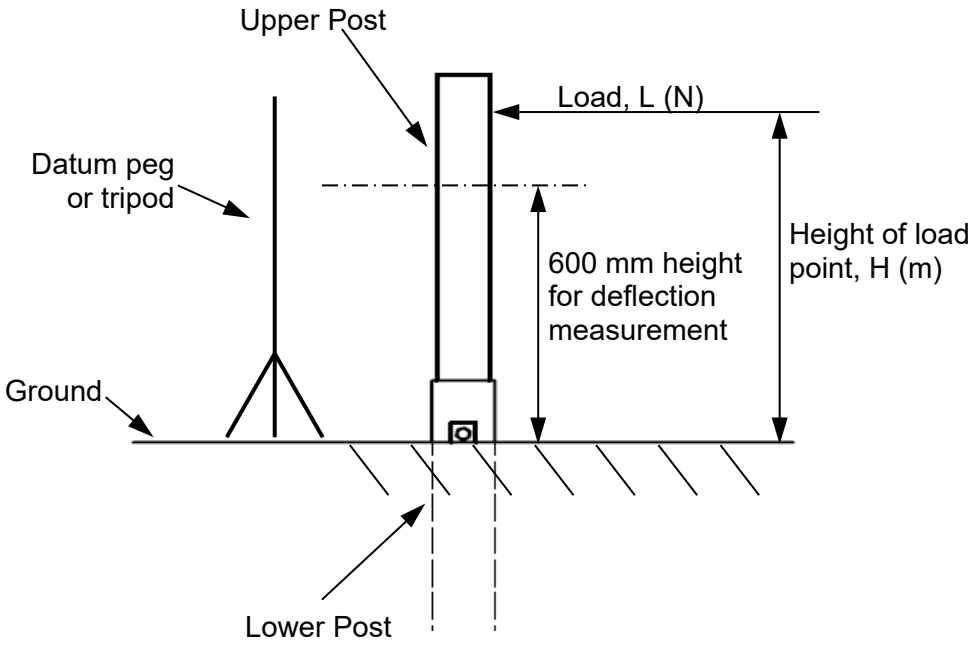


Figure 13

3.3 The load shall be applied by pushing on the post. The hydraulic ram must be supported against a rigid/non-moving part of the work vehicle.

3.5 A datum peg is to be driven into the ground in line with the post and the center line of the hydraulic ram with a height approximately equal to that of the test post (Figure 13). A simple tripod can be constructed for this purpose.

3.6 The load is to be applied in increments of 1000N and the deflection of the post in reference to the datum peg is to be measured and recorded within ±1 mm. The deflection of the post should be measured 600 mm above the ground level (Figure 13).

3.7 The applied bending moment is calculated by multiplying the load (L) measured in Newtons and the load height (H) measured in meters (Figure 13).

3.8 The post/foundation is deemed satisfactory if the post is able to withstand a 9000 N-m bending moment and the measured deflection is less than 150 mm. In addition, there shall be no apparent movement of the concrete foundation (if used).

Examples of recommended ground anchorage options can be found in the TREND® CEN Anchorage Guidelines published by Valtir International.

4.0 Spacer and Rail Assembly

4.1 Refer to system drawings in the back of this manual for assistance in locating parts.

4.2 Use one E001 fastener assembly (i.e., one 16 mm x 50 mm rail bolt, one 16 mm washer, and one 16 mm hex nut), or the existing guardrail manufacturer's hardware to attach the Spacer w/ Cable Anchor to the first guardrail post (supplied by others). All of the Spacers have two slots on the inside for mounting, orient as shown (Figure 14, guardrail panel not shown for clarity).

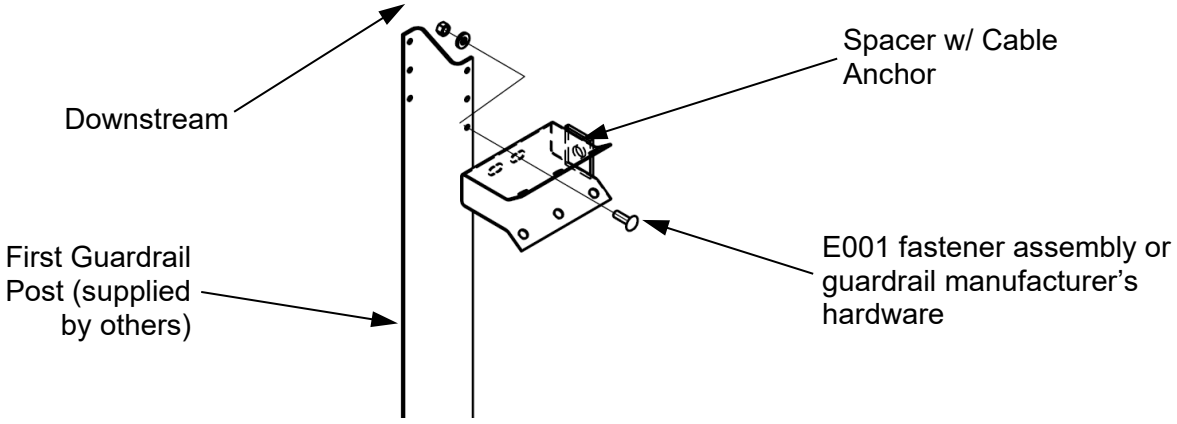


Figure 14

4.3 Working from the guardrail to the front of the TREND® CEN End Terminal, use one E001 fastener assembly (i.e., one 16 mm x 50 mm Rail Bolt, one 16 mm Washer, and one 16 mm Hex Nut) and one Washer Bar to attach the Spacer to the **upper hole** located in the Upper Post – Posts 6, 5, 4 and 3. All of the Spacers have two slots on the inside for mounting, orient as shown.

Note: The Washer Bar must lie between the E001 bolt head and the Spacer (Figure 15).

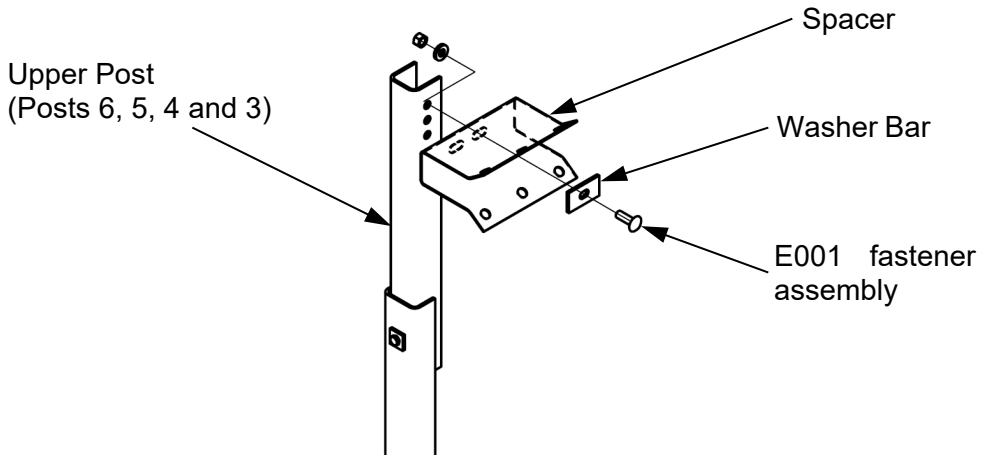


Figure 15

4.4 Next use one E001 fastener assembly (i.e., one 16 mm x 50 mm Rail Bolt, one 16 mm Washer, and one 16 mm Hex Nut) and one Washer Bar to attach the Spacer w/ Hole for the Cable to the **middle hole** located in the second Upper Post. All of the Spacers have two slots on the inside for mounting, orient as shown (Figure 16).

Warning: Post 1 does NOT receive a Spacer (Figure 19 - p. 25).

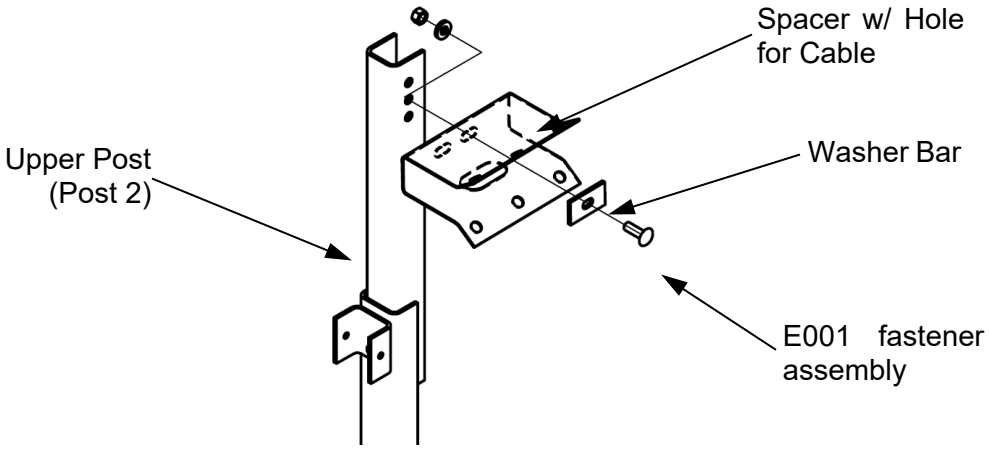


Figure 16

4.5 Begin with the End Rail w/ Fin and the rear Intermediate Rail w/ Fin. Attach the End Rail w/ Fin over the existing guardrail panel and the rear Intermediate Rail w/ Fin over the End Rail w/ Fin (i.e., the End Rail w/ Fin is located in between the existing guardrail panel and the rear Intermediate Rail w/ Fin). You may have to use the alignment tools to aid in aligning the holes. Attach using four E001 fastener assemblies and one Backing Plate as shown.

Note: The Backing Plate must lie between the E001 bolt heads and the Intermediate Rail w/ Fin (Figure 17).

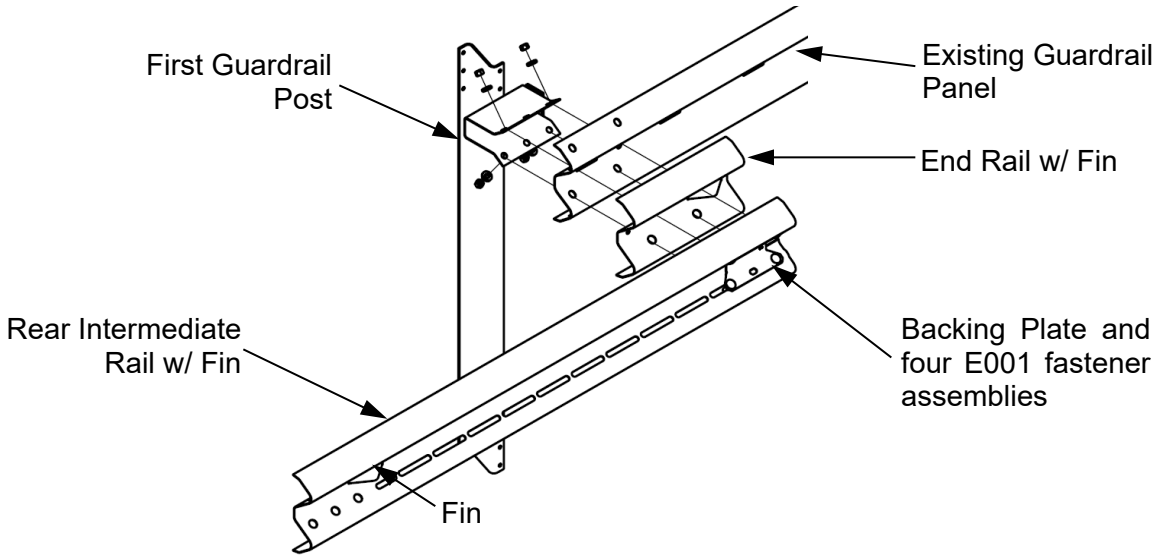


Figure 17

4.6 Working from the rear Intermediate Rail, attach the next Intermediate Rail to the system using six E001 fastener assemblies and one Backing Plate. Be sure to overlap the panels as shown, the upstream panel is on top of the downstream panel (Figure 18).

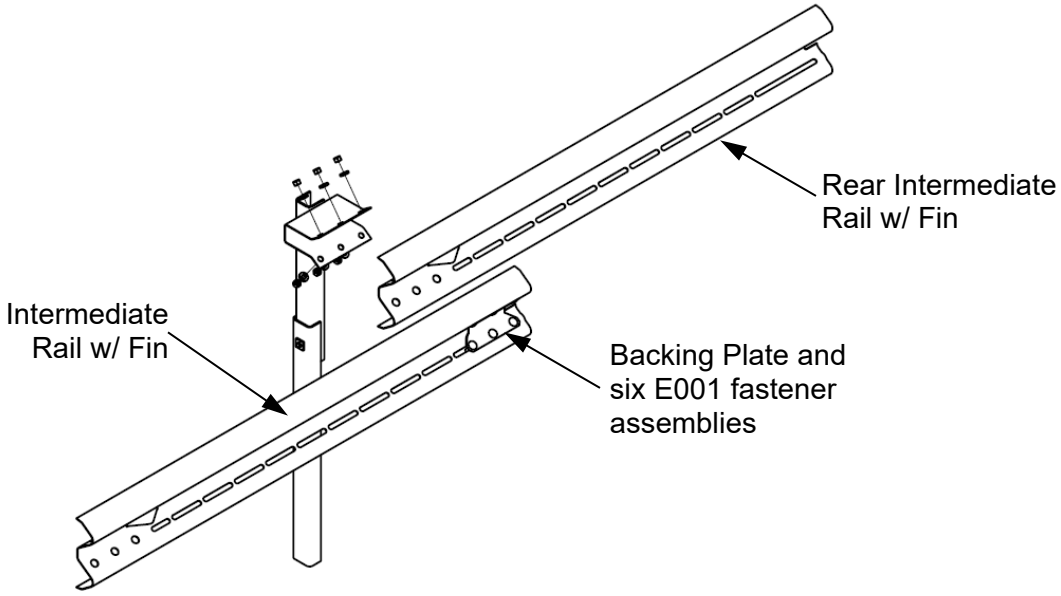


Figure 18

4.7 Tighten E001 fastener assemblies to a torque of 160 N-m using a torque wrench.

Important: The E001 fastener assemblies (rail bolts) 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.

4.8 Repeat steps 4.6 and 4.7 until all of the Intermediate Rails are attached.

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

5.0 Head Rail Assembly

5.1 Position the Head Rail Assembly on the posts and attach using a total of seven E001 fastener assemblies and one Backing Plate.

Note: The Head Rail Assembly attaches to the Head Post through the lowest hole in the Upper Post (Figure 19).

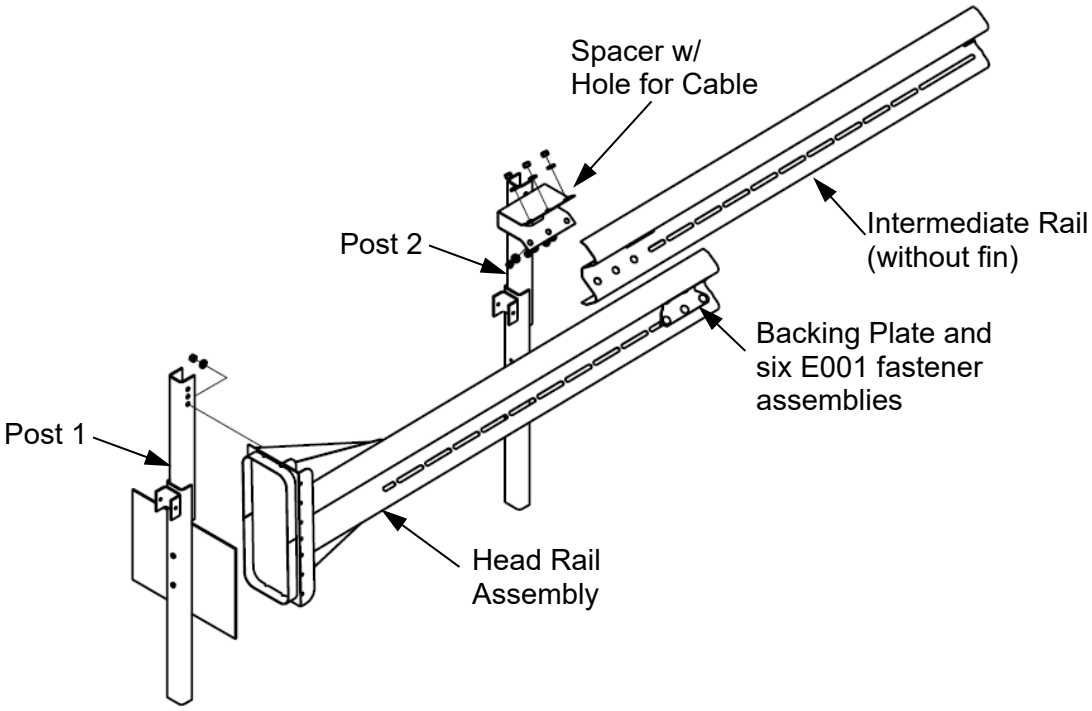


Figure 19

5.2 Tighten E001 fastener assemblies to a torque of 160 N-m using a torque wrench.

Important: The E001 fastener assemblies (rail bolts) 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.

6.0 Cable Routing

6.1 Using two E005 fastener assemblies (i.e., two 10 mm x 130 mm hex bolts and two 10 mm hex nuts) attach the Cable Strut between the two Front Lower Posts and orient as shown (Figure 20, Head Assembly not shown for clarity).

Note: There is no torque requirement for these bolts. They should be tightened to a snug position.

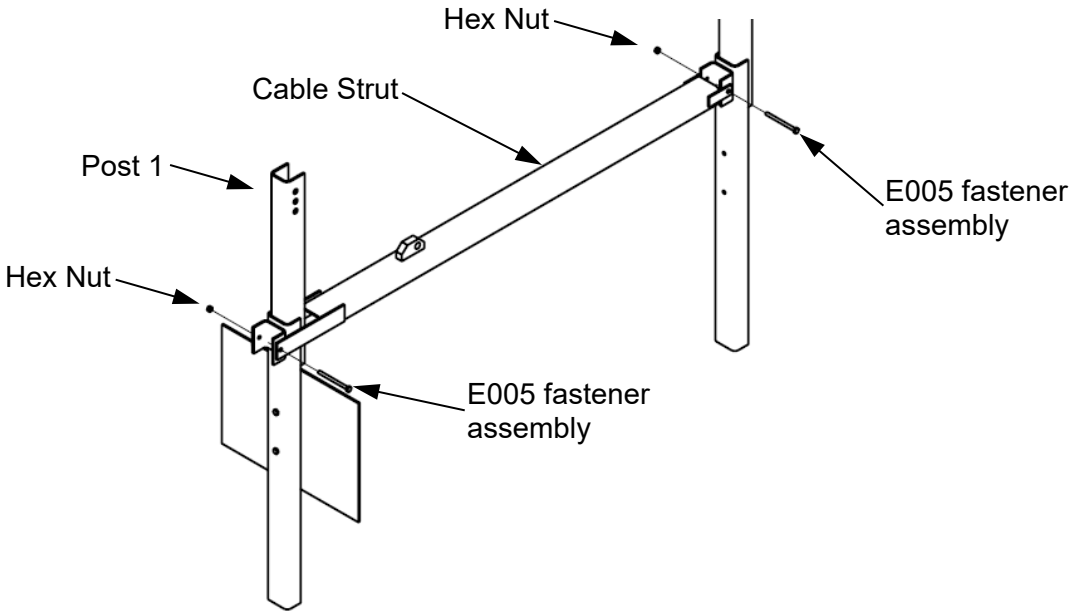


Figure 20

6.2 Attach the loop end of the Cable to the Cable Strut using the Cable Shackle (Figure 21, Head Assembly not shown for clarity).

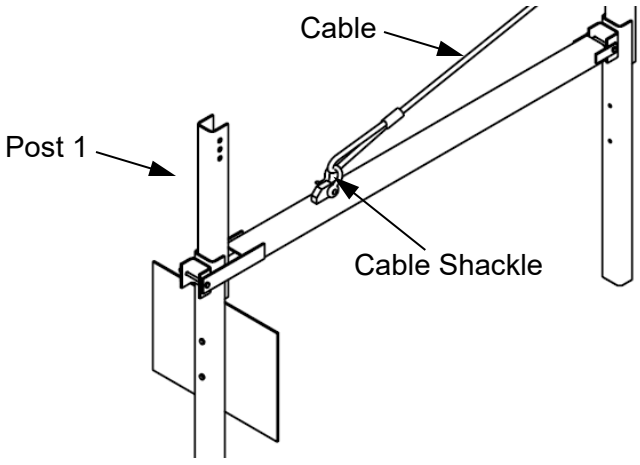


Figure 21

6.3 Feed the Cable up through the hole located on the bottom of the Spacer w/ Hole for the Cable located at Post 2. Next feed the Cable through each of the Spacers (Figure 22).

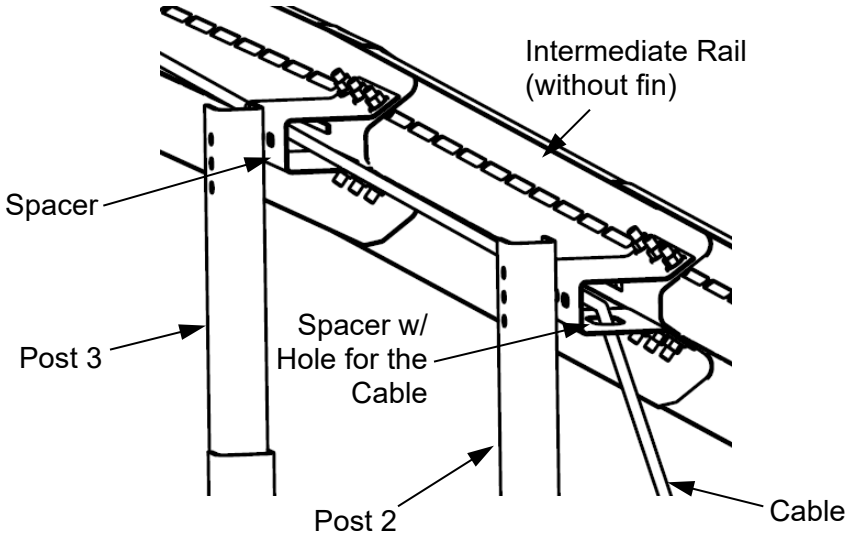


Figure 22

6.4 Insert the threaded end of the Cable through the Spacer w/ Cable Anchor. Secure the Cable using (1) 24 mm flat washer and (1) 24 mm hex nut. Restrain the Cable with Vise Grip Pliers at the end being tightened to avoid twisting the Cable. Make sure the nut is tight and the Cable is taut (Figure 23). The End Rail w/ Fin guardrail panel and first guardrail post not shown for clarity.

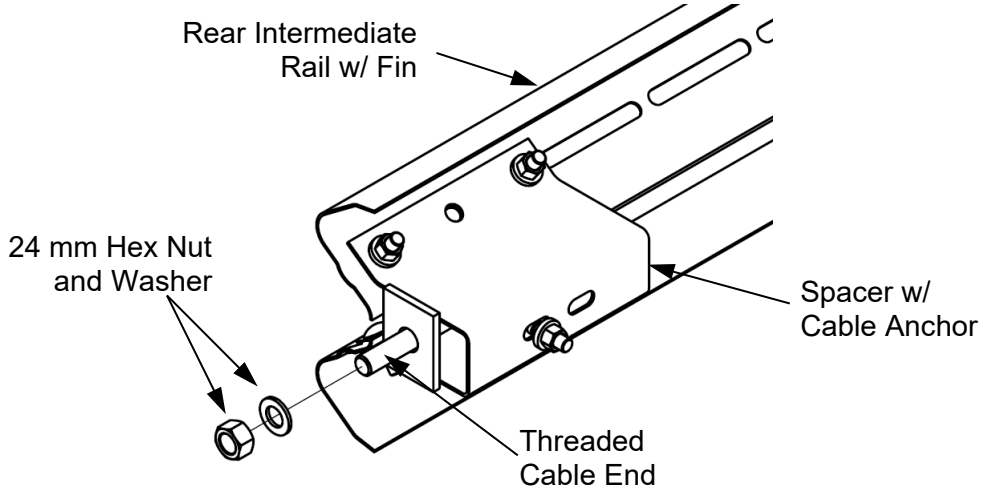


Figure 23

P2 System Assembly

Important: Positioning of the posts is critical. Measure each post from the center to the relevant distance back from the road carefully. Double check all measurements before placing the lower posts into the ground.

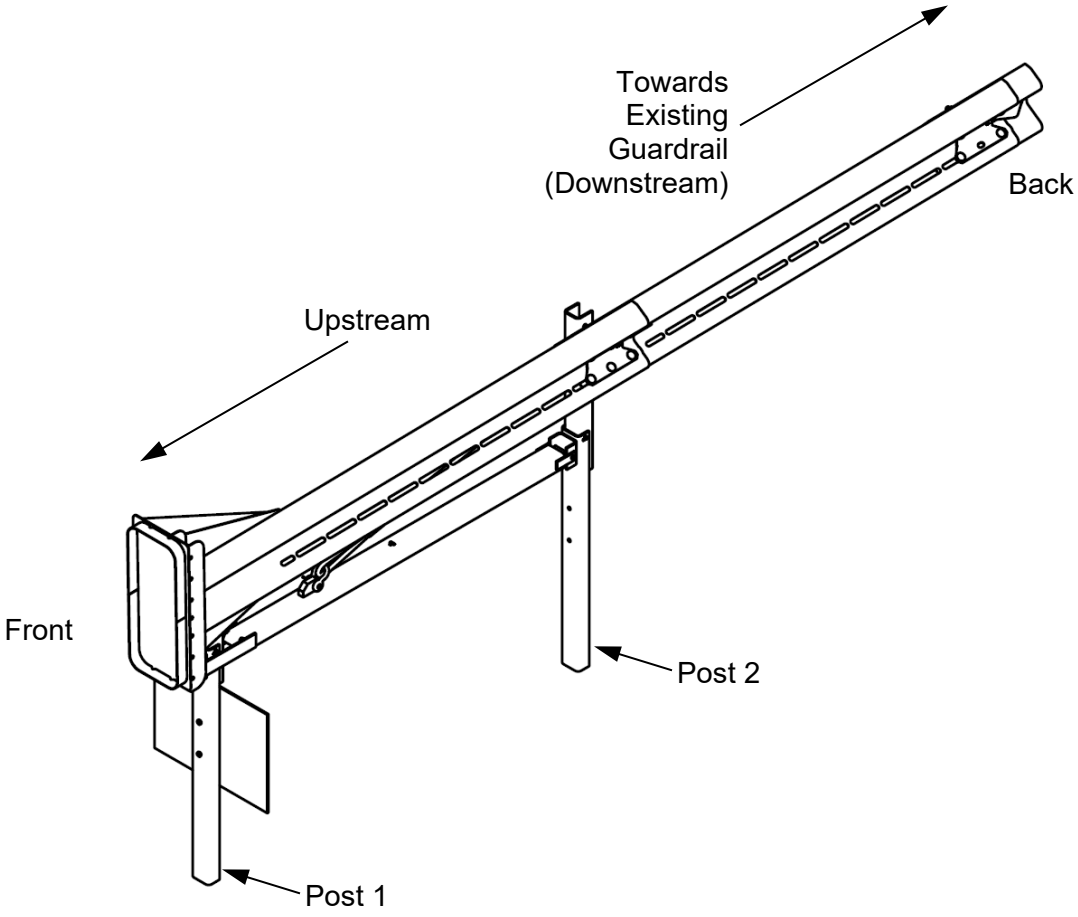


Figure 24

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 ~6 meters upstream from the end of the existing guardrail. Verify that the datum (DT1) remains parallel to the existing guardrail (Figure 25).

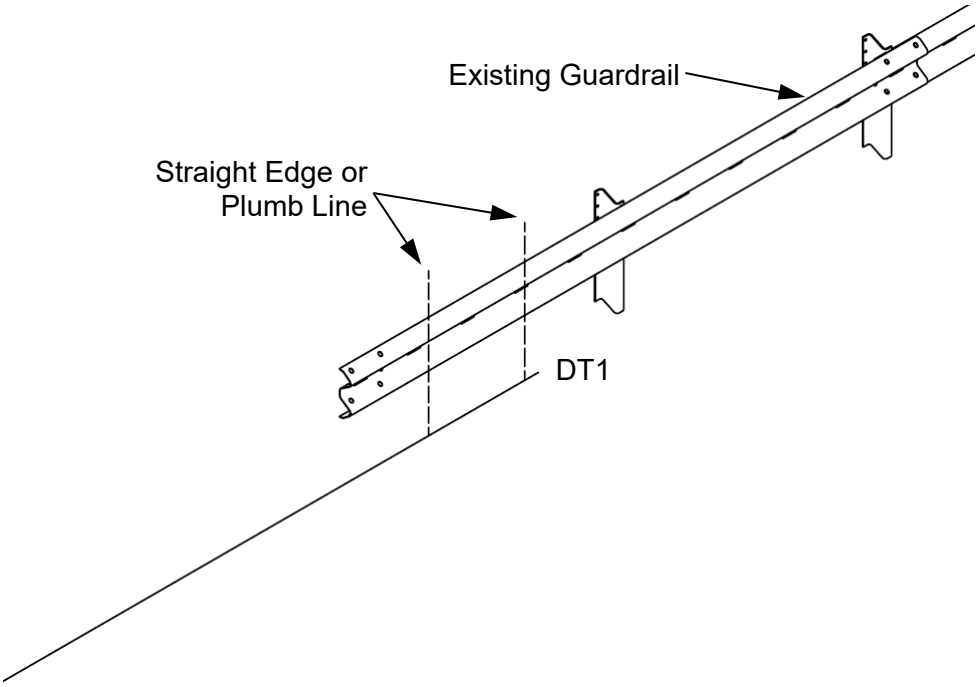


Figure 25

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 210 mm (this offset is needed in order to attach a spacer between the guardrail post and the guardrail panel). It should be noted that the centerline of this new guardrail post may not align with the existing guardrail posts or with the TREND® CEN End Terminal posts (Figure 26).

1.3 Measure perpendicular from the datum line (DT1) towards the existing guardrail 250 mm and make a mark (M1) near the first guardrail post (Figure 26).

Note: Any variation of system post pitch at the end of the guardrail system caused by the addition of the new guardrail post must be 'evened out' to reduce pocketing effects. If the dimension to the end guardrail post is greater than the system post pitch then adjust by not more than one working width difference the adjacent downstream post.

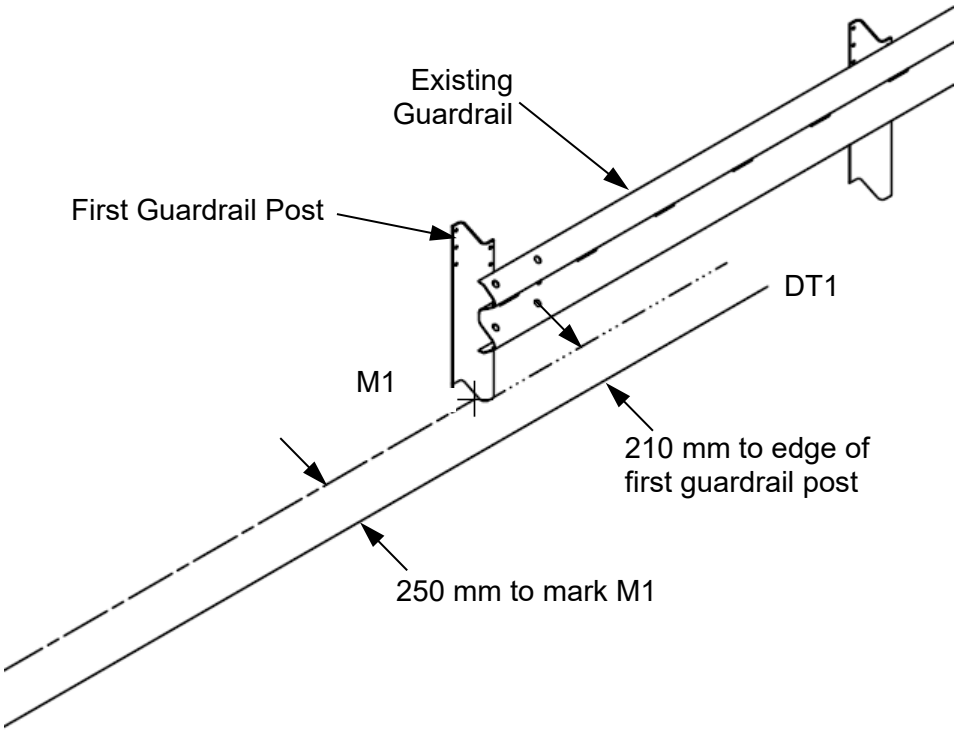


Figure 26

1.4 Locate the first post of the TREND® CEN End Terminal (Post 1, Figure 24). First measure from mark (M1) a distance of 4 m upstream and make a second mark (M2) which is parallel to datum line (DT1). Verify the perpendicular distance of 250 mm from mark (M2) to the datum (DT1). Adjust mark (M2) if necessary (Figure 27).

1.5 Chalk or stake a line from mark (M1) to mark (M2). This will be the centerline for the posts (Figure 27).

1.6 From location (M2), measure off the final post location (Post 2, Figure 24), towards the first guardrail post, at 2.0 m spacing (Figure 27).

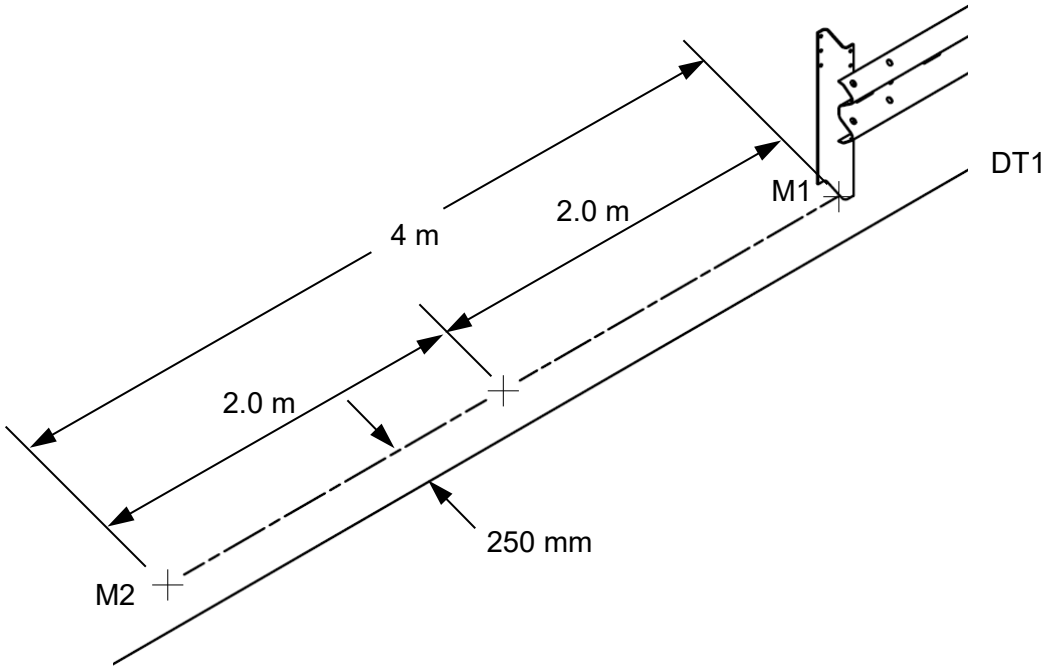


Figure 27

2.0 Post Assembly

2.1 (For Concrete Socket site assemblies, skip this step and proceed to step 2.2)

Using two E004 fastener assemblies (i.e., two 10 mm x 80 mm hex bolts and two 10 mm hex nuts), attach the Soil Plate to one of the Front Lower Posts (Figure 28).

Note: This will be Post 1 (Figure 24 on p. 28).

There is no torque requirement for these bolts. They should be tightened to a snug position.

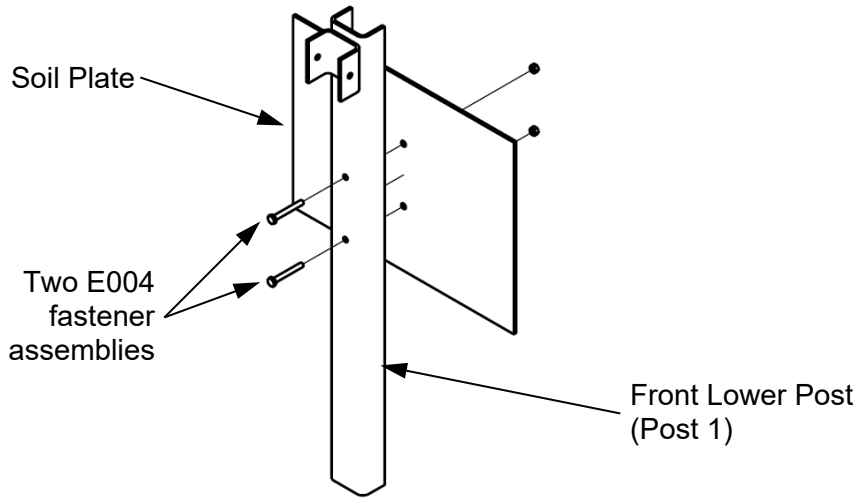


Figure 28

2.2 Starting with the post location closest to the existing guardrail (Post 2), place one Front Lower Post, orient as shown (Figure 29). The center of the Tension Bolt hole should be approximately 15 mm above the ground (Figure 30).

Note: Post spacing is 2.0 m (Figure 27 on p. 31).

Important: Refer to Section 3.0: Ground Anchorage – Post Foundations

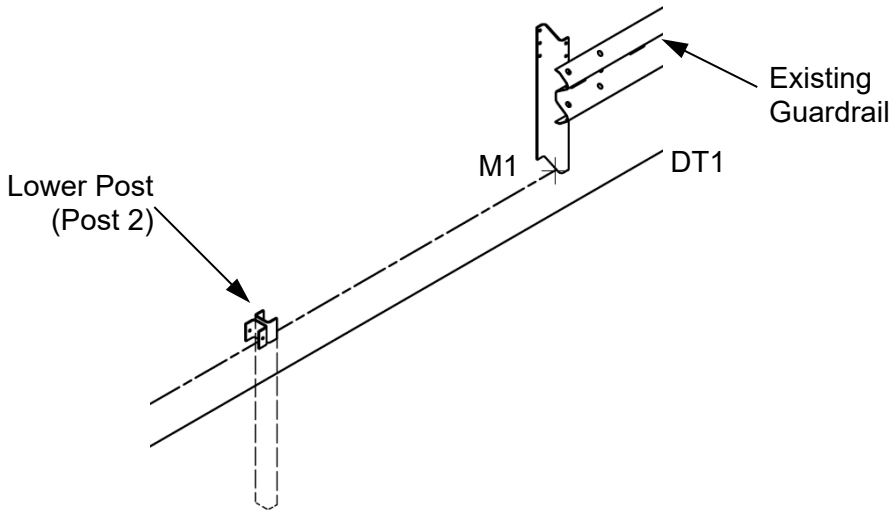


Figure 29

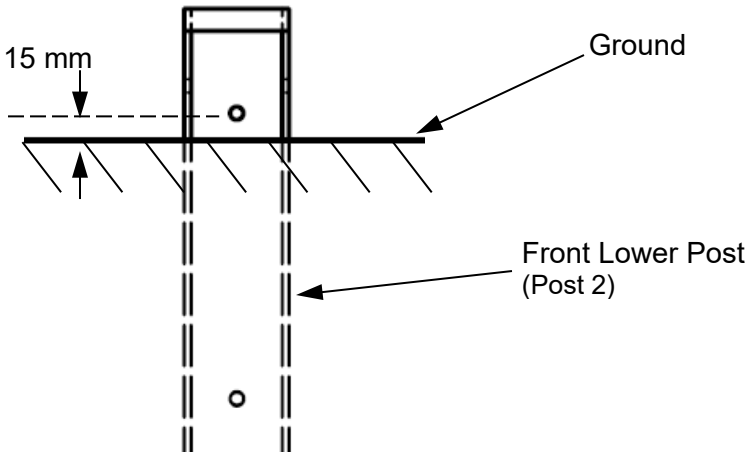


Figure 30

2.3 Place the final Front Lower Post with Soil Plate attached (Post 1) at the last post location (Post 1, furthest from the existing guardrail). The center of the Tension Bolt hole should be approximately 15 mm above the ground (Figure 31).

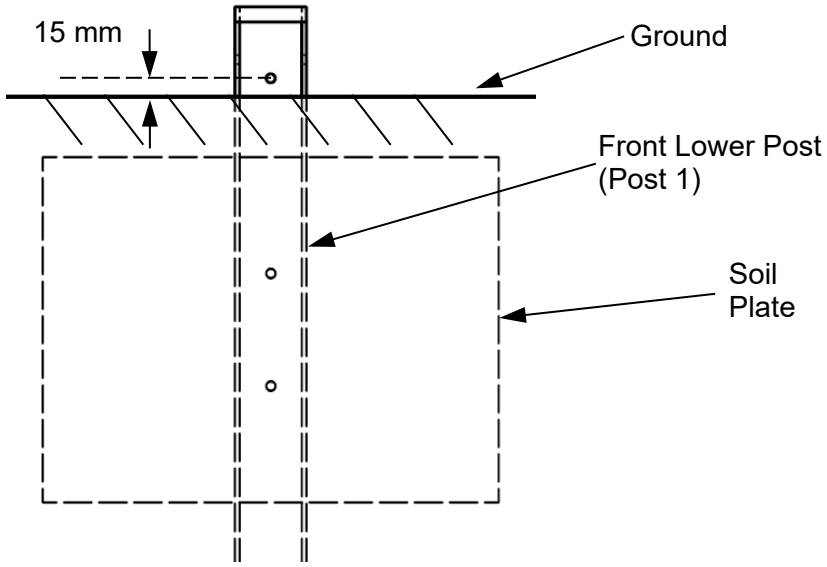


Figure 31

2.4 Insert an Upper Post into the Front Lower Post.

Note: Be sure to clear all dirt between the Upper Post and Front Lower Post. Bolt the two posts together using one E006 fastener assembly (Figure 32) (i.e., one 12 mm x 50 mm hex bolt and two 12 mm hex nuts).

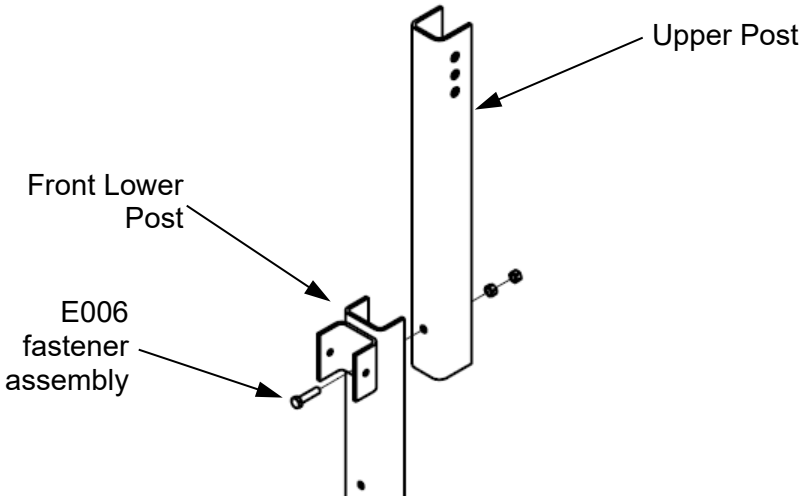


Figure 32

2.5 Tighten the E006 fastener assembly to a torque of 90 N-m using a torque wrench.

Note: The torque is applied using a single Hex Nut. Once the required torque is achieved attach the second Hex Nut and tighten.

2.6 Repeat steps 2.4 through 2.5 for the remaining Front Lower Post.

3.0 Ground Anchorage – Post Foundations

Note: It is critical the TREND® CEN End Terminal posts are placed in suitable ground/soil/foundations that will allow the system to fully perform in accordance with the design specification and applicable impact testing. Suitability of the ground foundation can be ascertained using the following test.

3.1 Ground anchorage testing shall be carried out on a sacrificial post. On completion of the testing, the test post(s) must be removed along with any foundations.

3.2 A horizontal load shall be applied near the top of the post by means of a hydraulic ram with a calibrated load cell, or equivalent. The load is to be applied to the side of the Upper Post near the front face to avoid twisting of the post during testing (Figures 33 and 34).

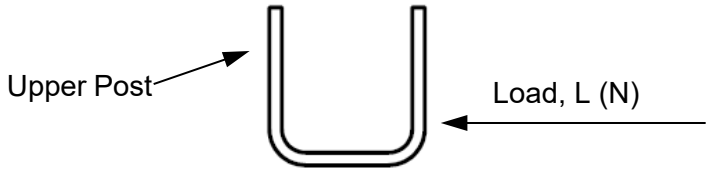


Figure 33

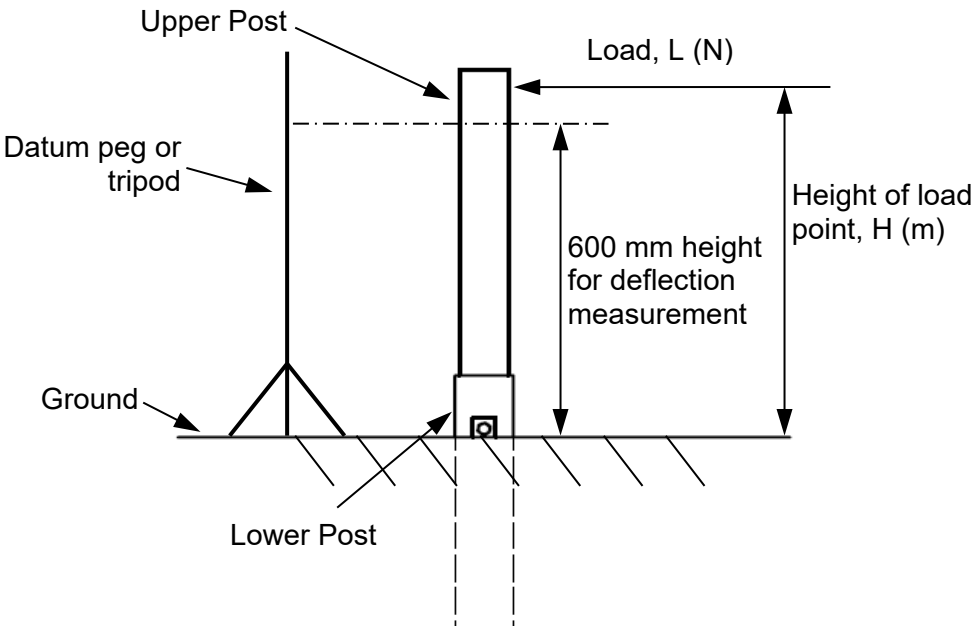


Figure 34

3.3 The load shall be applied by pushing on the post. The hydraulic ram must be supported against a rigid/non-moving part of the work vehicle.

3.5 A datum peg is to be driven into the ground in line with the post and the center line of the hydraulic ram with a height approximately equal to that of the test post (Figure 34). A simple tripod may be constructed for this purpose.

3.6 The load is to be applied in increments of 1000N and the deflection of the post in reference to the datum peg is to be measured and recorded within ±1 mm. The deflection of the post should be measured 600 mm above the ground level (Figure 34).

3.7 The applied bending moment is calculated by multiplying the load (L) measured in Newtons and the load height (H) measured in meters (Figure 34).

3.8 The post/foundation is deemed satisfactory if the post is able to withstand a 9000 N-m bending moment and the measured deflection is less than 150 mm. In addition there shall be no apparent movement of the concrete foundation (if used).

Examples of recommended ground anchorage options can be found in the TREND® CEN Anchorage Guidelines published by Valtir International.

4.0 Spacer and Rail Assembly

4.1 Refer to system drawings in the back of this manual for assistance in locating parts.

4.2 Use one E001 fastener assembly (i.e., one 16 mm x 50 mm rail bolt, one 16 mm washer, and one 16 mm hex nut), or the existing guardrail manufacturer's hardware to attach the Spacer w/ Cable Anchor to the first guardrail post (supplied by others). All of the Spacers have two slots on the inside for mounting, orient as shown (Figure 35, guardrail panel not shown for clarity).

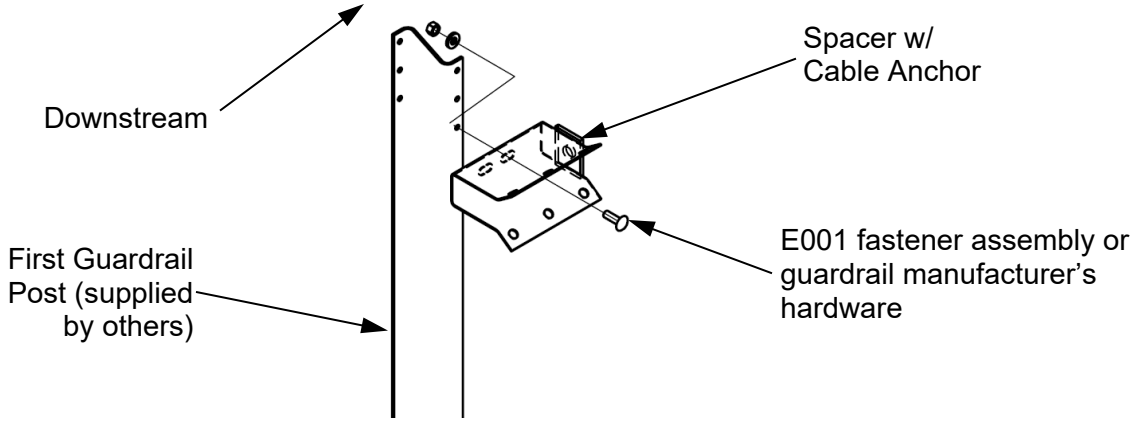


Figure 35

4.3 Next use one E001 fastener assembly (i.e., one 16 mm x 50 mm Rail Bolt, one 16 mm Washer, and one 16 mm Hex Nut) and one Washer Bar to attach the Spacer w/ Hole for the Cable to the **middle hole** located in the second Upper Post. All of the Spacers have two slots on the inside for mounting, orient as shown (Figure 36).

Warning: Post 1 does NOT receive a Spacer (Figure 38 - p. 39).

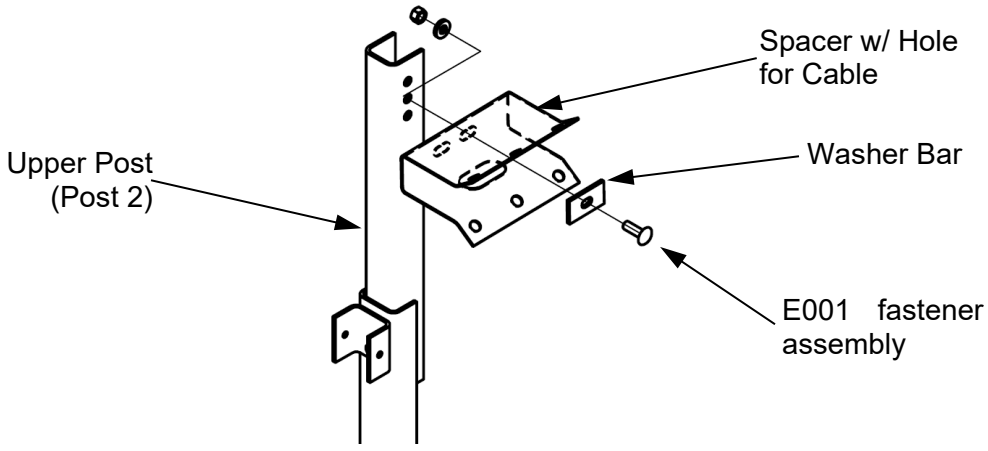


Figure 36

4.4 Begin with the End Rail w/ Fin and the Intermediate Rail. Attach the End Rail w/ Fin over the existing guardrail panel and the Intermediate Rail over the End Rail w/ Fin (i.e., the End Rail w/ Fin is located in between the existing guardrail panel and the Intermediate Rail). You may have to use the alignment tools to aid in aligning the holes. Attach using four E001 fastener assemblies and one Backing Plate as shown.

Note: The Backing Plate must lie between the E001 bolt heads and the Intermediate Rail w/ Fin (Figure 37).

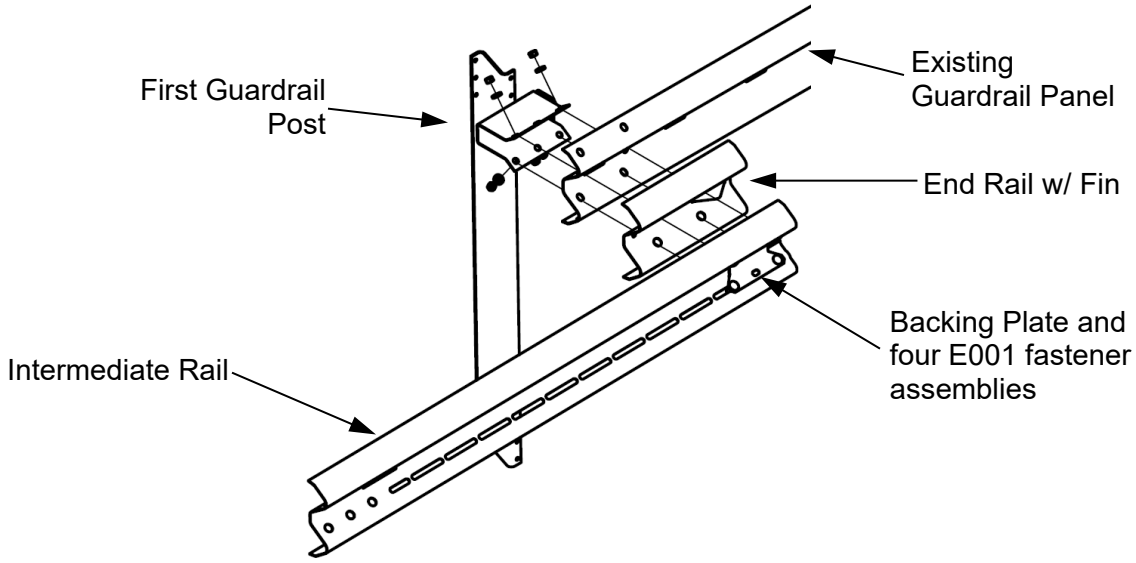


Figure 37

4.5 Tighten E001 fastener assemblies to a torque of 160 N-m using a torque wrench.

Important: The E001 fastener assemblies (rail bolts) 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

5.0 Head Rail Assembly

5.1 Position the Head Rail Assembly on the posts and attach using a total of seven E001 fastener assemblies and one Backing Plate.

Note: The Head Rail Assembly attaches to the Head Post through the lowest hole in the Upper Post (Figure 38).

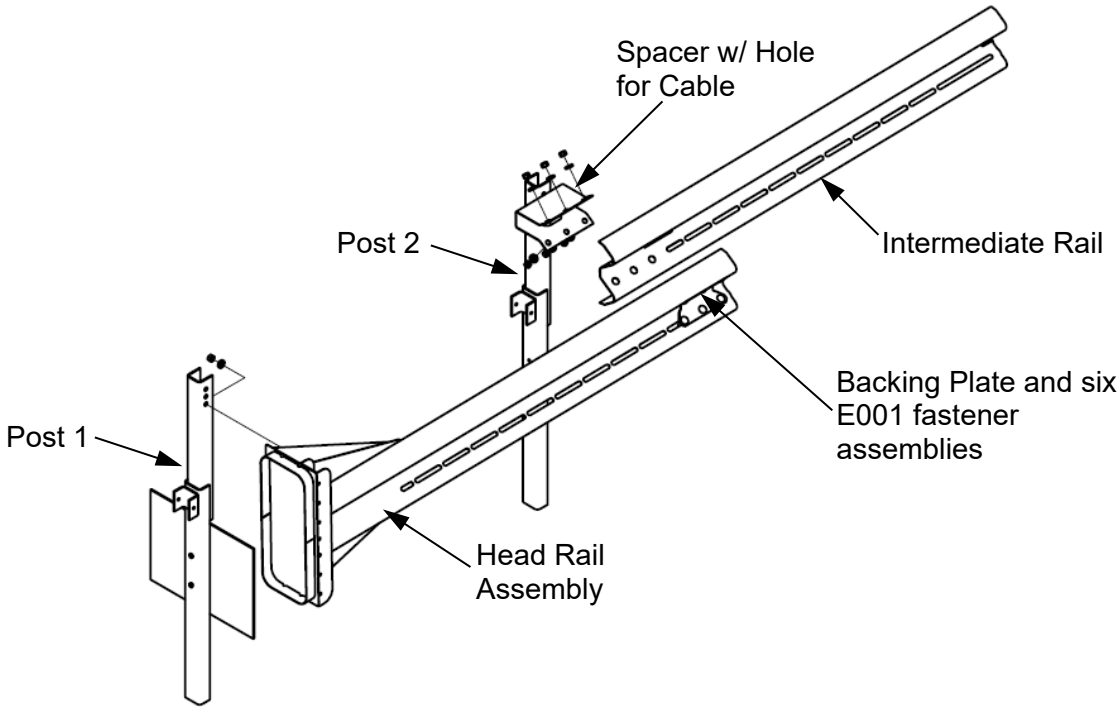


Figure 38

5.2 Tighten E001 fastener assemblies to a torque of 160 N-m using a torque wrench.

Important: The E001 fastener assemblies (rail bolts) 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.

6.0 Cable Routing

6.1 Using two E005 fastener assemblies (i.e., two (2) 10 mm x 130 mm hex bolts and two (2) 10 mm hex nuts) attach the Cable Strut between the two Front Lower Posts and orient as shown (Figure 39, Head Assembly not shown for clarity).

Note: There is no torque requirement for these bolts. They should be tightened to a snug position.

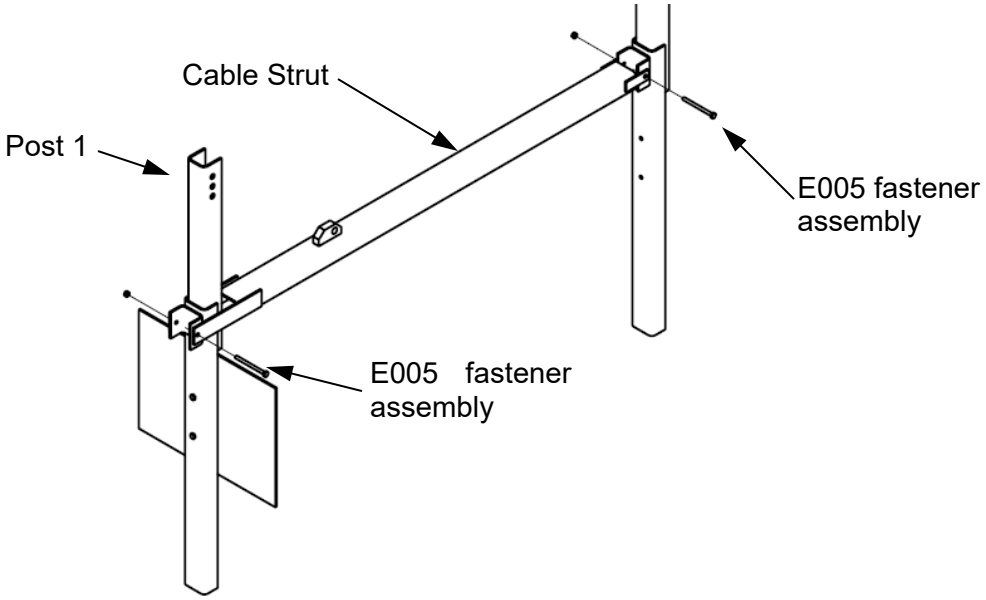


Figure 39

6.2 Attach the loop end of the Cable to the Cable Strut using the Cable Shackle (Figure 40) The Head Assembly not shown for clarity.

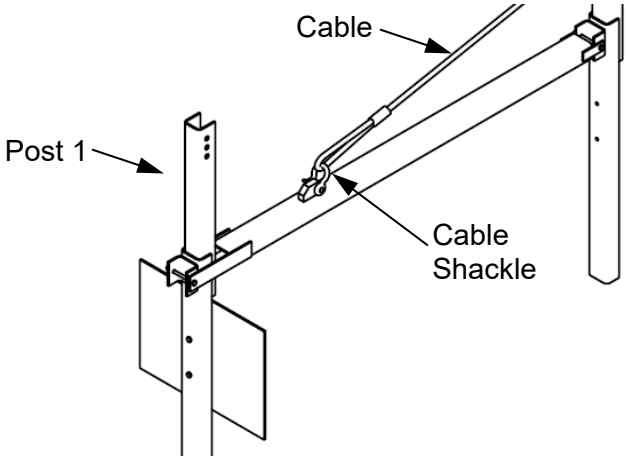


Figure 40

6.3 Feed the Cable up through the hole located on the bottom of the Spacer w/ Hole for the Cable located at Post 2, guardrail panel and first guardrail post not shown for clarity (Figure 41).

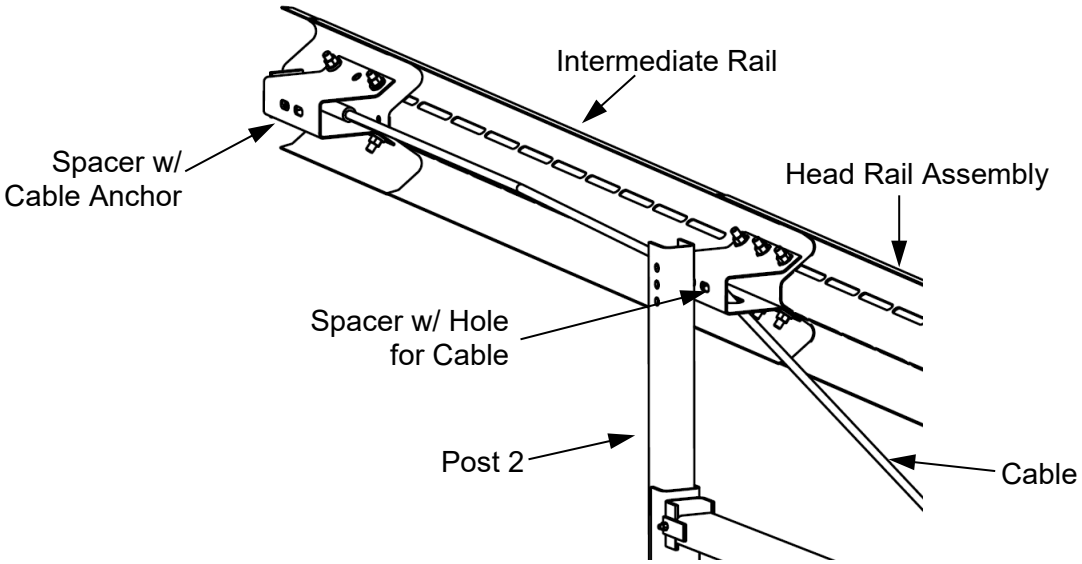


Figure 41

6.1 Insert the threaded end of the Cable through the Spacer w/ Cable Anchor. Secure the Cable using one (1) 24 mm flat washer and one (1) 24 mm hex nut. Restrain the Cable with Vise Grip Pliers at the end being tightened to avoid twisting the Cable. Make sure the nut is tight and the Cable is taut (Figure 23, End Rail w/ Fin, guardrail panel and first guardrail post not shown for clarity).

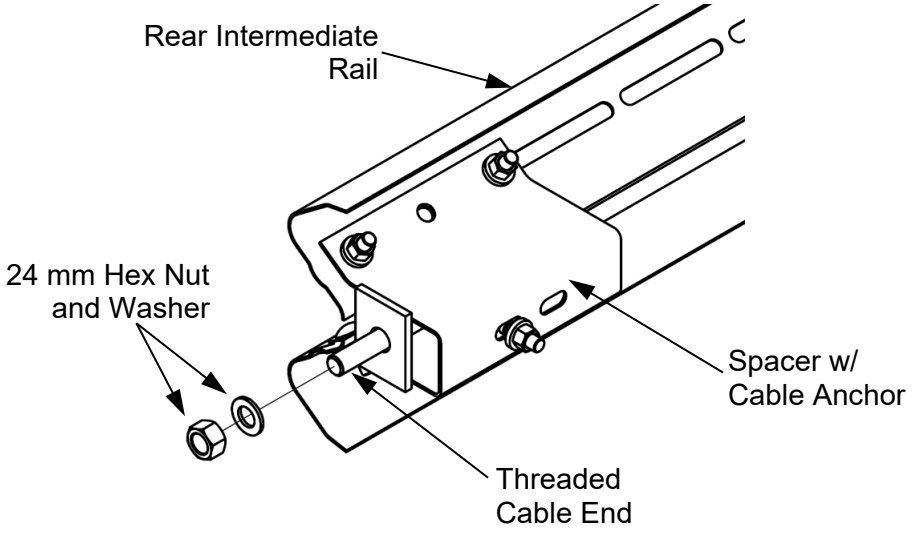


Figure 42

Maintenance

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

It is the responsibility of the appropriate highway authority to regularly inspect the TREND® CEN End Terminal based upon traffic volume and impact history. Visual drive-by inspections are recommended at least once every month. Walk-up inspections are recommended once every two years.

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 proper operation.

Walk-Up Inspection

1. Clear and dispose of any debris on the site.
2. Be sure all fasteners are tight.
3. Verify that all E001 fastener assemblies (16 mm rail bolts) are torqued to 160 N-m.
4. Check to ensure E006 fastener assemblies (12 mm hex bolts) in each post are intact.
5. Verify that all E006 fastener assemblies (12 mm hex bolts) are torqued to 90 N-m.
6. Check to ensure that slack is removed from the Cable (tighten hex nut on threaded Cable end if necessary).

Important: Valtir International makes no recommendation whether use or reuse of any part of the system is appropriate or acceptable following an impact. It is the sole responsibility of the local highway authority and its engineers to make that determination. It is critical that you inspect this product after assembly is complete to make certain that the instructions provided in this manual have been strictly followed.

Assembly Checklist

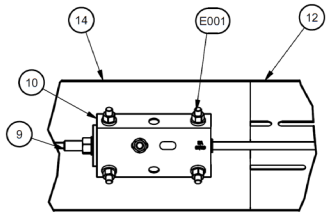
Performed by: _____

Date: _____

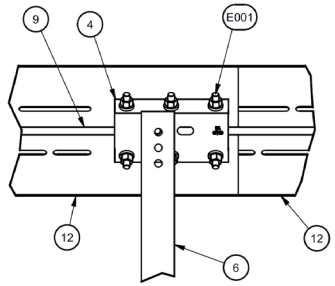
Location: _____

- ☐ Verify that the proper soil/foundation strength has been achieved (refer to Section 3.0).
- ☐ Verify the Rail height is 760 mm ±30 mm above grade.
- ☐ Verify the Head height is 860 mm +0/-30 mm above grade.
- ☐ Verify that all E001 fastener assemblies (16 mm rail bolts) are torqued to 160 N-m. Also verify that all E001 fastener assembly bolt heads are seated flat against each Backing Plate.
- ☐ Verify that all E006 fastener assemblies (12 mm hex bolts) are torqued to 90 N-m.
- ☐ Verify that each E006 fastener assembly (12 mm hex bolts) has two nuts.
- ☐ Verify that the slack has been removed from cable (tighten nut on threaded cable end as necessary).
- ☐ 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 Upper Post (refer to Section 4.0).
- ☐ Verify that all rails are lapped correctly along the length of the system (refer to Sections 4.0 and 5.0).
- ☐ Verify that the Head Rail Assembly and Intermediate Rail (without Fin) are orientated with a down slope towards the front of the System (refer to Sections 4.0 and 5.0).

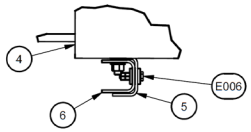
615795 (1 of 2)



DETAIL A



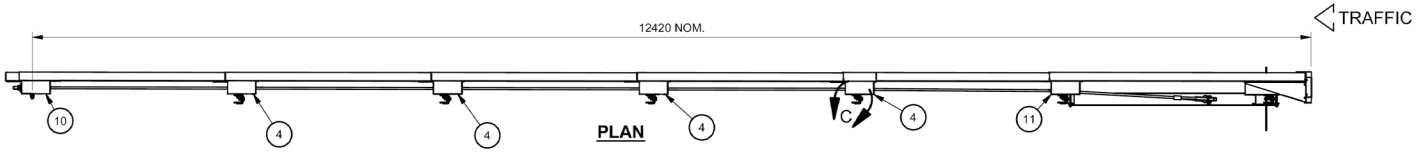
DETAIL B



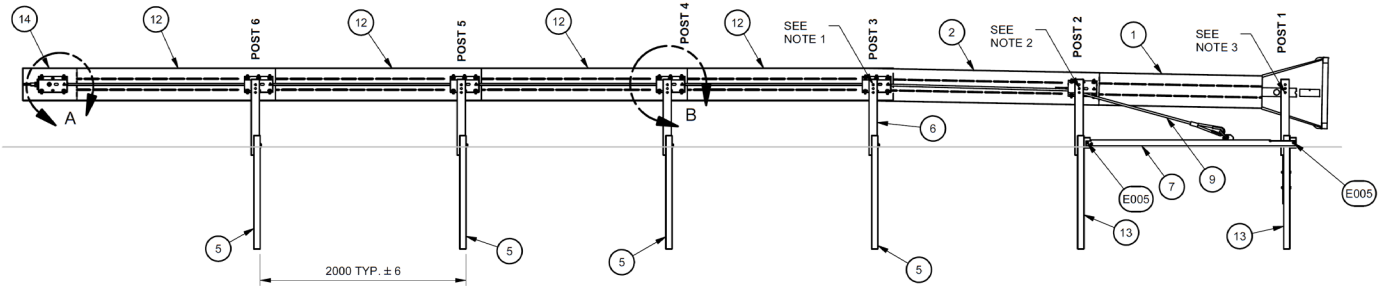
DETAIL C

PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	610138B	HEAD/RAIL,TE,G,W/DECALS	1
2	613550G	RAIL,W-SHAPE,2323,G	1
3	604465G	BACKING PLATE,POST,TE,G	6
4	614529G	SPACER,POST/RAIL,TE,G	4
5	612689G	POST,LOWER,1100,TE,G	4
6	612781G	POST,UPPER,735,TE,G	6
7	614927G	STRUT,TE,G	1
8	614481G	SOIL PLATE,TE,G	1
9	605791B	CABLE ASSY,W/SHACKLE,11640,TE	1
10	614512G	SPACER,CABLE ANCHOR,TE,G	1
11	614531G	SPACER,POST/RAIL/CABLE,TE,G	1
12	613552G	RAIL,W-SHAPE,2323,W/FIN,G	4
13	612692G	POST,LOWER,FRONT,1100,TE,G	2
14	613554G	RAIL,W/FIN,W-SHAPE,525,G	1
15	617000G	WASHER,BAR,1/4X2X89M,W/SLOT,G	5
16	115278B	INSTALLATION INSTRUCTIONS,TREND CEN	1
E001	116594B	RAIL BOLT ASSY,THK WASHER,E001	41
E004	115215G	HX BOLT ASSY,M10X80,E004	2
E005	115214G	HX BOLT ASSY,M10X130,E005	2
E006	115216G	HX BOLT ASSY,M12X50,E006	6

115116B



PLAN



ELEVATION - DEPARTURE SIDE

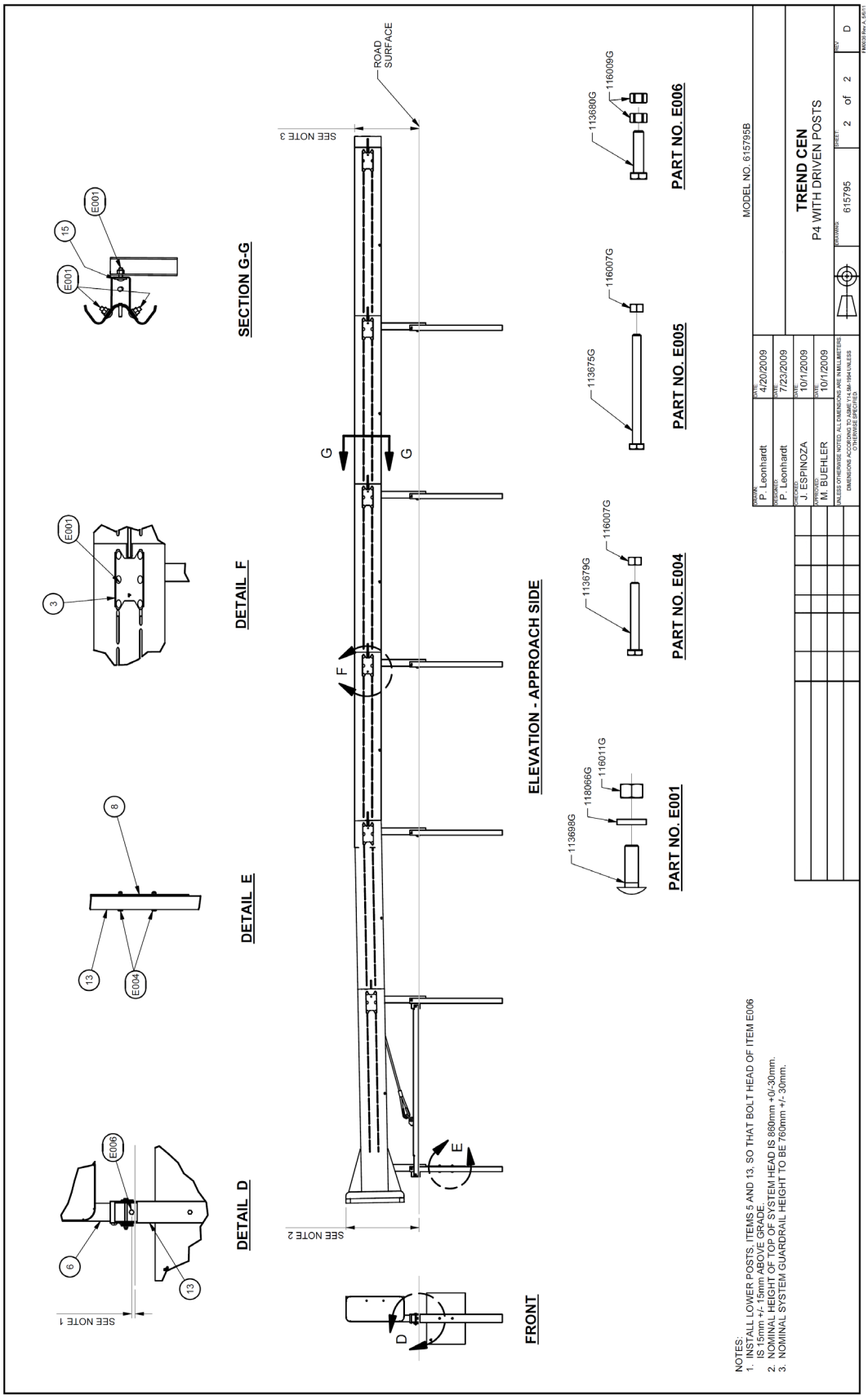
NOTES:
1. ATTACH SPACERS, ITEM 4 IN UPPER HOLES OF UPPER POSTS 3 THROUGH 6.
2. ATTACH SPACER, ITEM 11 IN MIDDLE HOLE OF UPPER POST NUMBER 2. CABLE, ITEM 9, PASSES THROUGH HOLE IN SPACER, ITEM 11.
3. ATTACH HEAD/RAIL, ITEM 1 IN LOWER HOLE OF UPPER POST NUMBER 1. SEE SHEET 2 FOR DETAILS OF GUARDRAIL AND HEAD HEIGHT.

DRAWN: P. Leonhardt	DATE: 4/20/2009	MODEL NO. 615795B
DESIGNED: P. Leonhardt	DATE: 7/23/2009	TREND CEN P4 WITH DRIVEN POSTS
CHECKED: J. ESPINOZA	DATE: 10/1/2009	
APPROVED: M. BUEHLER	DATE: 10/1/2009	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.		DRAWING: 615795 SHEET: 1 of 2 REV: D

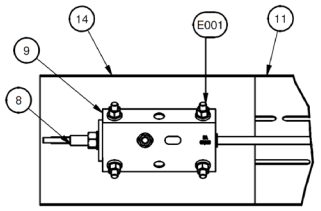
FM0036 Rev A, 5/6/11

TREND® CEN End Terminal – P4 w/Driven Posts

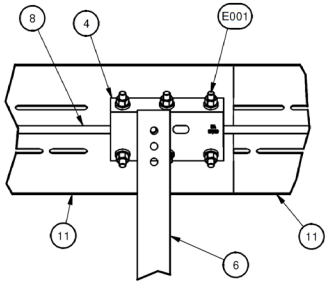
615795 (2 of 2)


SECTION G-G
DETAIL F
DETAIL E
DETAIL D
ELEVATION - APPROACH SIDE
FRONT
ROAD SURFACE
SEE NOTE 1
SEE NOTE 2
SEE NOTE 3
PART NO. E001
PART NO. E004
PART NO. E005
PART NO. E006
MODEL NO. 615795B
TREND CEN
P4 WITH DRIVEN POSTS
615795
NOTES:
1. INSTALL LOWER POSTS, ITEMS 5 AND 13, SO THAT BOLT HEAD OF ITEM E006 IS 15mm +/- 15mm ABOVE GRADE.
2. NOMINAL HEIGHT OF TOP OF SYSTEM HEAD IS 860mm +0/-30mm.
3. NOMINAL SYSTEM GUARDRAIL HEIGHT TO BE 760mm +/- 30mm.

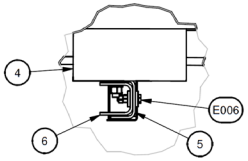
615794 (1 of 2)



DETAIL A



DETAIL B

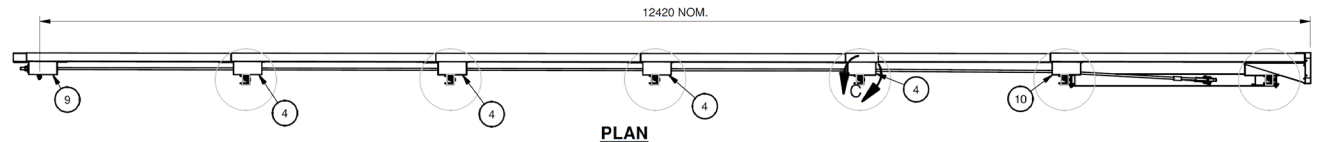


DETAIL C

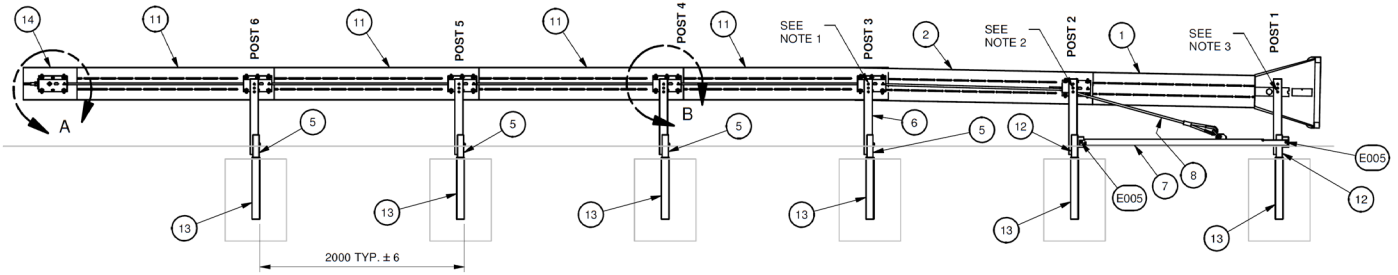
PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	610138B	HEAD/RAIL,TE,G,W/DECALS	1
2	613550G	RAIL,W-SHAPE,2323,G	1
3	604465G	BACKING PLATE,POST,TE,G	6
4	614529G	SPACER,POST/RAIL,TE,G	4
5	612695G	POST,LOWER,SHORT,820,TE,G	4
6	612781G	POST,UPPER,735,TE,G	6
7	614927G	STRUT,TE,G	1
8	605791B	CABLE ASSY,W/SHACKLE,11640,TE	1
9	614512G	SPACER,CABLE ANCHOR,TE,G	1
10	614531G	SPACER,POST/RAIL/CABLE,TE,G	1
11	613552G	RAIL,W-SHAPE,2323,W/FIN,G	4
12	612693G	POST,LOWER,FRONT,SHORT,820,TE,G	2
13	614474G	SOCKET,CONCRETE,TE,G	6
14	613554G	RAIL,W/FIN,W-SHAPE,525,G	1
15	617000G	WASHER,BAR,1/4X2X89M,W/SLOT,G	5
16	115278B	INSTALLATION INSTRUCTIONS,TREND CEN	1
E001	116594B	RAIL BOLT ASSY,THK WASHER,E001	41
E005	115214G	HX BOLT ASSY,M10X130,E005	2
E006	115216G	HX BOLT ASSY,M12X50,E006	6

115117B

TRAFFIC



PLAN



ELEVATION - DEPARTURE SIDE

NOTES:
1. ATTACH SPACERS, ITEM 4 IN UPPER HOLES OF UPPER POSTS 3 THROUGH 6.
2. ATTACH SPACER, ITEM 10 IN MIDDLE HOLE OF UPPER POST NUMBER 2. CABLE, ITEM 8, PASSES THROUGH HOLE IN SPACER, ITEM 10.
3. ATTACH HEAD/RAIL, ITEM 1 IN LOWER HOLE OF UPPER POST NUMBER 1. SEE SHEET 2 FOR DETAILS OF GUARDRAIL AND HEAD HEIGHT.

MODEL NO. 615794B

DRAWN: B. Sindorf	DATE: 7/29/2009
DESIGNED: B. Sindorf	DATE: 7/20/2009
CHECKED: J. ESPINOZA	DATE: 10/1/2009
APPROVED: M. BUEHLER	DATE: 10/1/2009

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS.
DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED

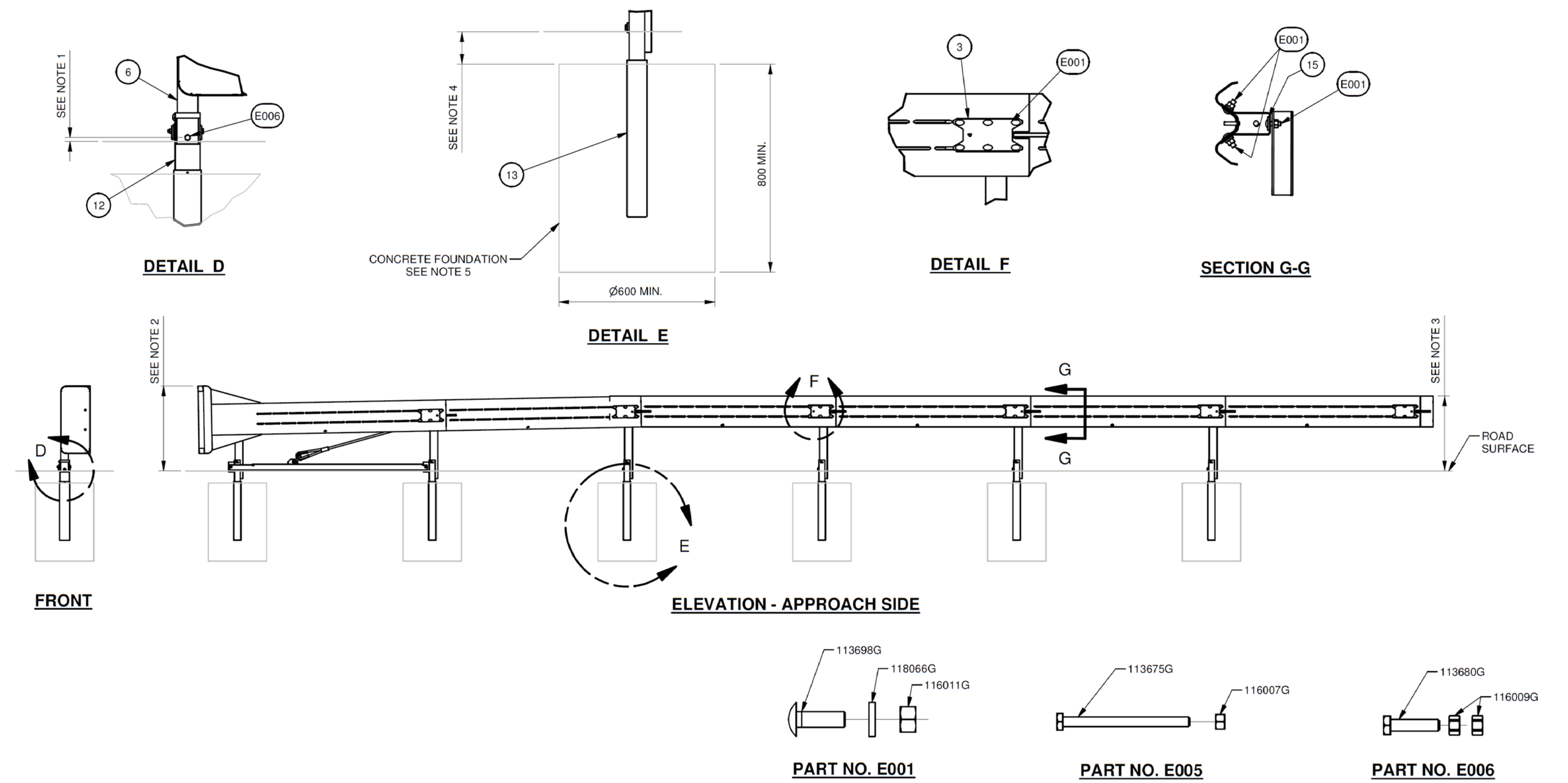
TREND CEN
P4 WITH CONCRETE SOCKETS

DRAWING: 615794 | SHEET: 1 of 2 | REV: D

FM0006 Rev A, 5/9/11

TREND® CEN End Terminal – P4 w/Concrete Sockets

615794 (2 of 2)



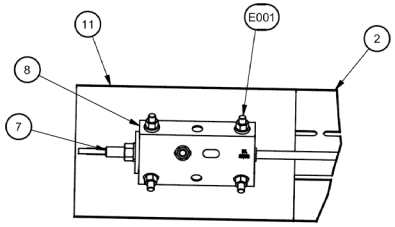
NOTES:
1. INSTALL LOWER POSTS, ITEMS 5 AND 12, SO THAT BOLT HEAD OF ITEM E006 IS 15mm +/- 15mm ABOVE GRADE.
2. NOMINAL HEIGHT OF TOP OF SYSTEM HEAD IS 860mm +0/-30mm.
3. NOMINAL SYSTEM GUARDRAIL HEIGHT TO BE 760mm +/- 30mm.
4. NOMINAL HEIGHT OF TOP OF CONCRETE FOUNDATION TO GROUND LEVEL TO BE 125mm +15/-0mm.
5. CONCRETE TO BE MIX ST5/C25 OR EQUIVALENT.

MODEL NO. 615794B

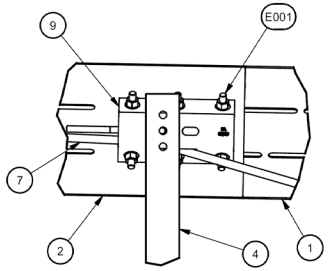
DRAWN: B. Sindorf	DATE: 7/29/2009	
DESIGNED: B. Sindorf	DATE: 7/20/2009	
CHECKED: J. ESPINOZA	DATE: 10/1/2009	TREND CEN P4 WITH CONCRETE SOCKETS
APPROVED: M. BUEHLER	DATE: 10/1/2009	
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS. DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.		DRAWING: 615794 · SHEET: 2 of 2 · REV: D

FM0026 Rev A. 5/6/11

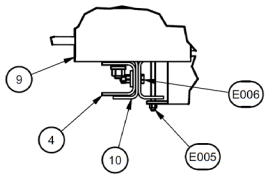
615793 (1 of 2)



DETAIL A



DETAIL B



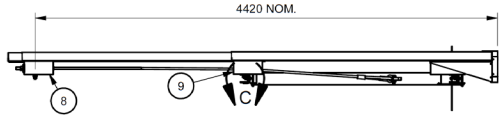
DETAIL C

115118B

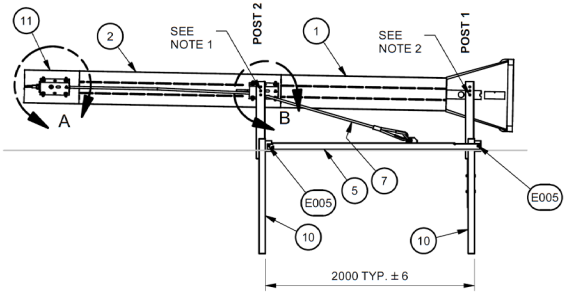
PARTS LIST

ITEM	STOCK NO.	DESCRIPTION	QTY.
1	610138B	HEAD/RAIL,TE,G,W/DECALS	1
2	613550G	RAIL,W-SHAPE,2323,G	1
3	604465G	BACKING PLATE,POST,TE,G	2
4	612781G	POST,UPPER,735,TE,G	2
5	614927G	STRUT,TE,G	1
6	614481G	SOIL PLATE,TE,G	1
7	605792B	CABLE ASSY,W/SHACKLE,3620,TE	1
8	614512G	SPACER,CABLE ANCHOR,TE,G	1
9	614531G	SPACER,POST/RAIL/CABLE,TE,G	1
10	612692G	POST,LOWER,FRONT,1100,TE,G	2
11	613554G	RAIL,W/FIN,W-SHAPE,525,G	1
12	617000G	WASHER,BAR,1/4X2X89M,W/SLOT,G	1
13	115278B	INSTALLATION INSTRUCTIONS,TREND CEN	1
E001	116594B	RAIL BOLT ASSY,THK WASHER,E001	13
E004	115215G	HX BOLT ASSY,M10X80,E004	2
E005	115214G	HX BOLT ASSY,M10X130,E005	2
E006	115216G	HX BOLT ASSY,M12X50,E006	2

TRAFFIC



PLAN



ELEVATION - DEPARTURE SIDE

NOTES:
1. ATTACH SPACER, ITEM 9 IN MIDDLE HOLE OF UPPER POST NUMBER 2. CABLE, ITEM 7, PASSES THROUGH HOLE IN SPACER, ITEM 9.
2. ATTACH HEAD/RAIL, ITEM 1 IN LOWER HOLE OF UPPER POST NUMBER 1. SEE SHEET 2 FOR DETAILS OF GUARDRAIL AND HEAD HEIGHT.

DRAWN: P. Leonhardt	DATE: 10/16/2009
DESIGNED: P. Leonhardt	DATE: 10/15/2009
CHECKED: K. Mortensen	DATE: 12/14/2009
APPROVED: P. Leonhardt	DATE: 12/16/2009

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS
DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED

MODEL NO. 615793B

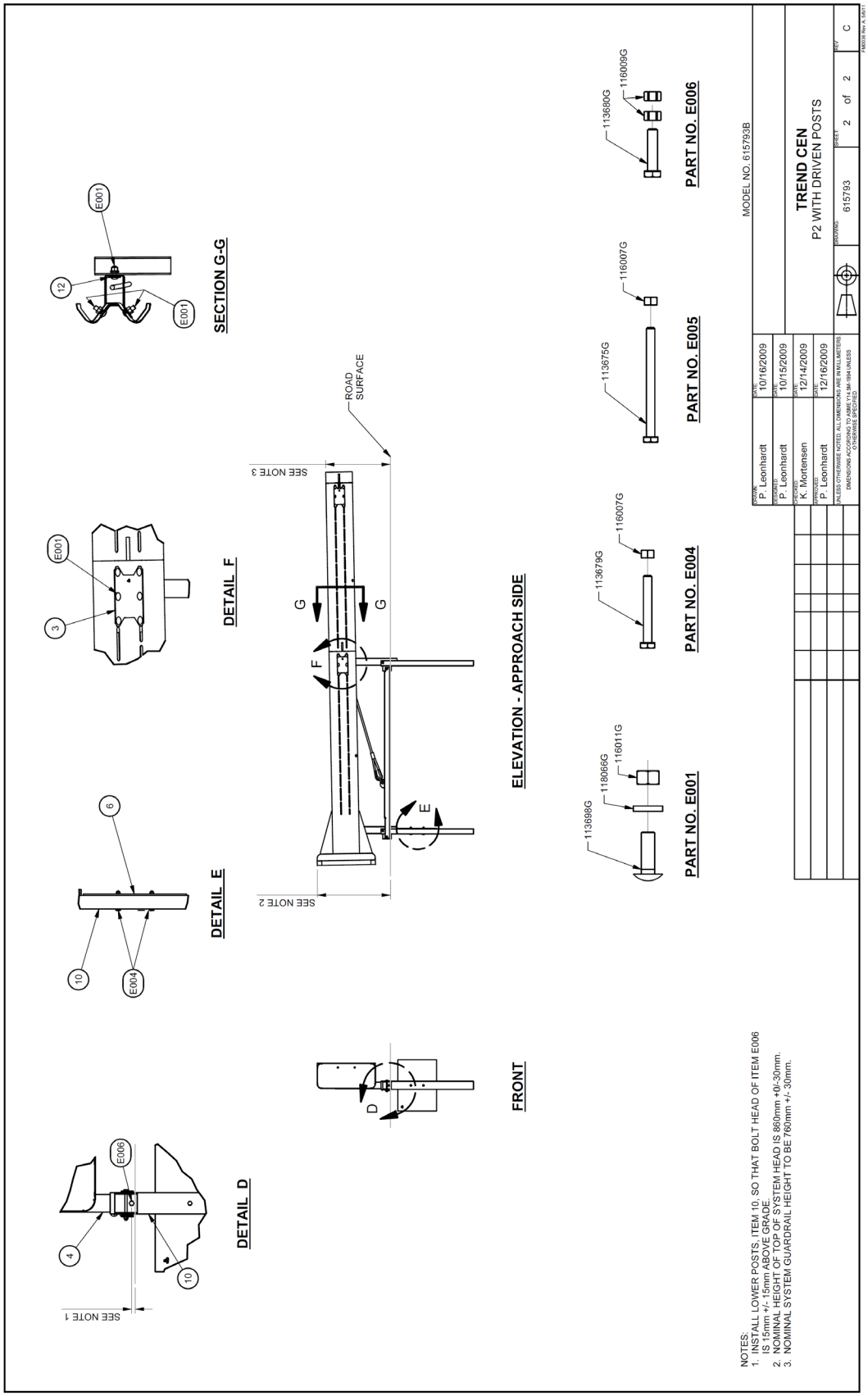
TREND CEN
P2 WITH DRIVEN POSTS

DRAWING:	SHEET:	REV
615793	1 of 2	C

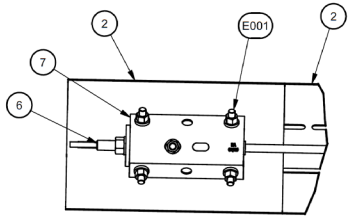
FM0036 Rev A, 5/07/11

TREND® CEN End Terminal – P2 w/Driven Posts

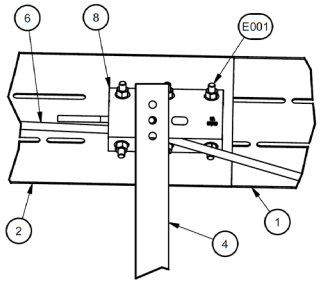
615793 (2 of 2)


SECTION G-G
DETAIL F
DETAIL E
DETAIL D
ELEVATION - APPROACH SIDE
FRONT
ROAD SURFACE
SEE NOTE 1
SEE NOTE 2
SEE NOTE 3
PART NO. E001
PART NO. E004
PART NO. E005
PART NO. E006
NOTES:
1. INSTALL LOWER POSTS, ITEM 10, SO THAT BOLT HEAD OF ITEM E006 IS 15mm +/- 15mm ABOVE GRADE.
2. NOMINAL HEIGHT OF TOP OF SYSTEM HEAD IS 860mm +0/-30mm.
3. NOMINAL SYSTEM GUARDRAIL HEIGHT TO BE 760mm +/- 30mm.
MODEL NO. 615793B
TREND CEN
P2 WITH DRIVEN POSTS
615793
2 of 2
C

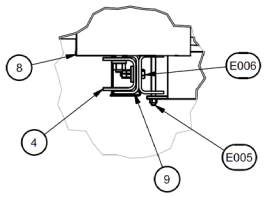
615792 (1 of 2)



DETAIL A



DETAIL B

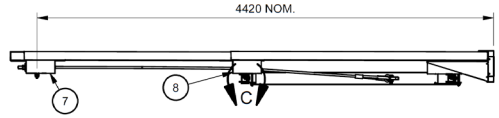


DETAIL C

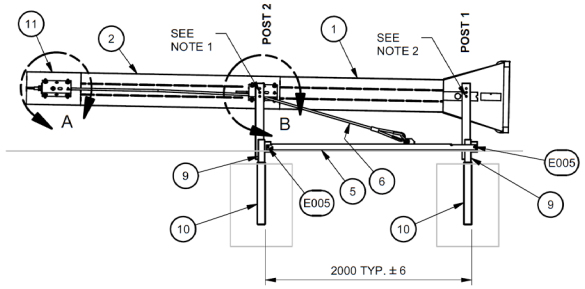
PARTS LIST			
ITEM	STOCK NO.	DESCRIPTION	QTY.
1	610138B	HEAD/RAIL,TE,G,W/DECALS	1
2	613550G	RAIL,W-SHAPE,2323,G	1
3	604465G	BACKING PLATE,POST,TE,G	2
4	612781G	POST,UPPER,735,TE,G	2
5	614927G	STRUT,TE,G	1
6	605792B	CABLE ASSY,W/SHACKLE,3620,TE	1
7	614512G	SPACER,CABLE ANCHOR,TE,G	1
8	614531G	SPACER,POST/RAIL/CABLE,TE,G	1
9	612693G	POST,LOWER,FRONT,SHORT,820,TE,G	2
10	614474G	SOCKET,CONCRETE,TE,G	2
11	613554G	RAIL,W/FIN,W-SHAPE,525,G	1
12	617000G	WASHER,BAR,1/4X2X89M,W/SLOT,G	1
13	115278B	INSTALLATION INSTRUCTIONS,TREND CEN	1
E001	116594B	RAIL BOLT ASSY,THK WASHER,E001	13
E005	115214G	HX BOLT ASSY,M10X130,E005	2
E006	115216G	HX BOLT ASSY,M12X50,E006	2

115119B

TRAFFIC



PLAN



ELEVATION - DEPARTURE SIDE

NOTES:
1. ATTACH SPACER, ITEM 8 IN MIDDLE HOLE OF UPPER POST NUMBER 2. CABLE, ITEM 6, PASSES THROUGH HOLE IN SPACER, ITEM 8.
2. ATTACH HEAD/RAIL, ITEM 1 IN LOWER HOLE OF UPPER POST NUMBER 1. SEE SHEET 2 FOR DETAILS OF GUARDRAIL AND HEAD HEIGHT.

DRAWN: P. Leonhardt	DATE: 9/30/2009
DESIGNED: P. Leonhardt	DATE: 9/29/2009
CHECKED: K. Mortensen	DATE: 12/14/2009
APPROVED: P. Leonhardt	DATE: 12/16/2009

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS.
DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED.

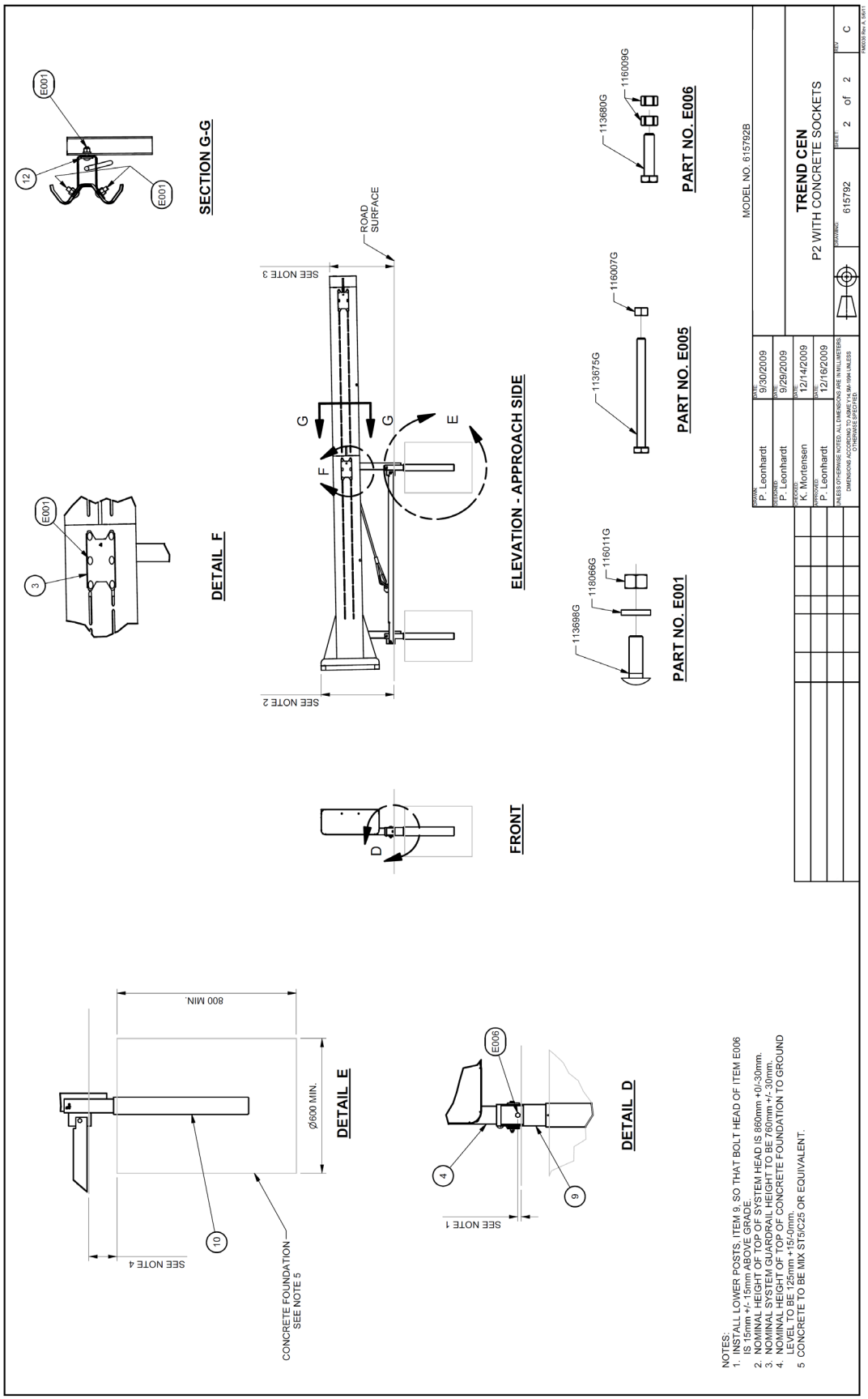
MODEL NO. 615792B

TREND CEN
P2 WITH CONCRETE SOCKETS

DRAWING: 615792 | SHEET: 1 of 2 | REV: C

FM0030 Rev A, 5/6/11

TREND® CEN End Terminal – P2 w/Concrete Sockets


SECTION G-G
E001
12
E001
DETAIL F
3
E001
ELEVATION - APPROACH SIDE
ROAD SURFACE
SEE NOTE 3
SEE NOTE 2
G
G
F
E
D
FRONT
PART NO. E001
113698G
118066G
116011G
PART NO. E005
113675G
116007G
PART NO. E006
113680G
116009G
DETAIL E
800 MIN.
Ø600 MIN.
SEE NOTE 4
10
CONCRETE FOUNDATION SEE NOTE 5
DETAIL D
E006
4
9
SEE NOTE 1
NOTES:
1. INSTALL LOWER POSTS, ITEM 9, SO THAT BOLT HEAD OF ITEM E006 IS 15mm +/-15mm ABOVE GRADE.
2. NOMINAL HEIGHT OF TOP OF SYSTEM HEAD IS 860mm +0/-30mm.
3. NOMINAL SYSTEM GUARDRAIL HEIGHT TO BE 760mm +/- 30mm.
4. NOMINAL HEIGHT OF TOP OF CONCRETE FOUNDATION TO GROUND LEVEL TO BE 125mm +15/-0mm.
5. CONCRETE TO BE MIX ST5/C25 OR EQUIVALENT.
DRAWN P. Leonhardt DATE 9/30/2009
CHECKED P. Leonhardt DATE 9/29/2009
ENGR K. Mortensen DATE 12/14/2009
PROJ MGR P. Leonhardt DATE 12/16/2009
UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE IN MILLIMETERS
DIMENSIONS ACCORDING TO ASME Y14.5M-1994 UNLESS OTHERWISE SPECIFIED
MODEL NO. 615792B
TREND CEN
P2 WITH CONCRETE SOCKETS
DRAWING 615792
SHEET 2 of 2
REV C
FM0008 Rev A, 8/9/11

Notes:

Notes:

Notes:

VALTIR
A TIER ABOVE

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