

EURO-ET[®]

End-Terminal

Product Description

Assembly Manual

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Trinity Highway Products
International

EURO-ET[®]

End-Terminal

Product Description Assembly Manual

Trinity Highway Products, LLC d.b.a.



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Important: This Manual is to be used only in conjunction with the assembly, maintenance, and repair of the EURO-ET[®]. These instructions are for standard assemblies specified by the appropriate highway authority only. In the event the specified system assembly, maintenance, or repair requires or involves deviations from standard parameters, contact the appropriate highway authority engineer. Trinity Highway Products 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 Trinity Highway Products International at the contact numbers listed below or download from the website listed below.

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 EURO-ET[®] system information available to Trinity Highway Products International at the time of printing. We reserve the right to make changes at any time. Please contact Trinity Highway Products International to confirm that you are referring to the most current instructions.

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Customer Service Contacts

Trinity Highway Products International is committed to the highest level of customer service. Feedback regarding the EURO-ET[®], its assembly procedures, supporting documentation, and performance is always welcome. Additional information can be obtained from the contact information below:

Trinity Highway Products International

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Important Introductory Notes

Proper assembly of the EURO-ET[®] End Terminal is critical to achieve tested performance that has been evaluated and accepted per ENV 1317-4. These instructions should be read in their entirety and understood before assembling the EURO-ET[®]. Assembly of this system should only be performed by an experienced worker familiar with highway products who has both the ability and experience to read and understand these instructions. These instructions are to be used only in conjunction with the assembly of the EURO-ET[®] and are for standard assemblies only as specified by the appropriate highway authority. If you need additional information, or have questions about the EURO-ET[®], please contact the highway authority that has planned and specified this assembly and, if needed, contact Trinity Highway Products International Customer Service Department. This product must be assembled in the location specified by the appropriate highway authority just as it was tested and/or approved. If there are deviations, alterations, or departures from the assembly protocol specified in this Manual, the device may not perform as it was tested and accepted.

This Manual is intended to provide guidance for new assemblies of the EURO-ET[®]. **It is critical that the EURO-ET[®] 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 questions about this, please contact the appropriate highway authority that specified the EURO-ET[®] at this particular location for guidance. Trinity Highway Products International is available for consultation with that authority.**

This system, like other Trinity Highway Product International systems, has been crash tested pursuant to ENV 1317-4 mandated criteria. Based on a specific assembly of component parts, the performance of this system, under those criteria, has been observed and reported as such. DO NOT use any component part that has not been specifically crash tested and/or approved for this system during the assembly or repair of this system.

Further, 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.

A manufacturer's drawing will be supplied by Trinity Highway Products International. Each EURO-ET[®] system will be supplied with a specific drawing 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 EURO-ET[®]. 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 EURO-ET[®] Warnings, Cautions, and Important Statements within the EURO-ET[®] Manual are completely followed. Failure to follow this warning could result in serious injury or death in the event of a collision.

Recommended 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 EURO-ET[®]. Additional copies of this Manual are immediately available from Trinity Highway Products International by calling any of the numbers listed above or by E-mail at product.info@trin.net. Please contact Trinity Highway Products International if you have any questions concerning the information in this Manual or about the EURO-ET[®].

Always use appropriate safety precautions when operating power equipment and when moving heavy equipment or the EURO-ET[®] components. Work gloves, safety goggles, steel toe boots, and back protection should be used.

Safety measures incorporating traffic control devices must be used to provide safety for personnel while at the installation, maintenance, or repair site.

Safety Symbols

This section describes safety symbols that may appear in the EURO-ET® Manual. Read the Manual for complete safety and assembly information.

Symbol Meaning



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

Warnings and Cautions

Read all instructions before assembling, maintaining, or repairing the EURO-ET®.



Warning: Do not assemble, maintain, or repair the EURO-ET® until you have read this Manual thoroughly and completely understand it. Ensure that all Warnings, Cautions, and Important Statements within the Manual are completely followed. Please call Trinity Highway Products International at any of the numbers listed above if you do not understand these instructions. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Safety measures incorporating appropriate traffic control devices specified by the appropriate highway authority must be used to protect all personnel while at the assembly, maintenance, or repair site. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Be sure adequate time is available for complete assembly, maintenance, or repair before beginning the assembly, maintenance, or repair process. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Use only Trinity Highway Products International parts that are specified herein for the EURO-ET® for assembling, maintaining, or repairing the EURO-ET®. Do not utilize or otherwise commingle parts from other systems even if those systems are other Trinity Highway Products International systems. Such configurations have not been tested, nor have they been approved for use. Assembly, maintenance, or repairs using unspecified parts or accessories is strictly prohibited. Failure to follow this warning could result in serious injury or death in the event of a vehicle impact with an UNAPPROVED system.



Warning: Do NOT modify the EURO-ET® in any way. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Ensure that the EURO-ET® and delineation used meet all local specifications. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Ensure that your assembly meets all appropriate local specifications and standards. If you have any questions during the assembly of a EURO-ET[®] at a particular system installation site, contact the specifying highway authority immediately. Failure to follow this warning could result in serious injury or death in the event of a collision.



Warning: Ensure that there is proper site grading for EURO-ET[®] placement as dictated by the specifying agency. Failure to follow this warning could result in serious injury or death in the event of a collision.

Limitations and Warnings

The EURO-ET[®] was tested to meet the requirements and guidelines of the 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 existing on the roadway.

Trinity Highway Products 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.

Trinity Highway Products 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 Trinity Highway Products International or by third parties.

The highway authority engineer, or other specifying authority, should be careful to properly 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 unstable behavior by the vehicle.

Know Your EURO-ET®

For specific assembly, maintenance, or repair details; refer to the specifying agency's standard drawing(s) and/or Trinity Highway Products International standard layout drawings. A reference system drawing can be found on Page 18 of this Manual.

Inspect Shipment

Carefully uncrate all components. Before assembling the EURO-ET®, check the received parts against the shipping list supplied with the system. Refer to the Parts List section on Page 9 of this Manual for help in identifying each component. Verify that all parts were received.

How EURO-ET® Works

When the EURO-ET® is impacted end-on within ENV 1317-4 testing criteria, an impacting vehicle has been shown to force the Extruder Head along the guardrail, bending the steel posts while flattening and curving the guardrail away from the traffic as it brings the vehicle to a controlled stop.

Where to Use EURO-ET®

When minimal right-of-way or limited shoulder exists, or if limited budgets do not cover the cost of added earth work requirements for flared terminals, EURO-ET® is a choice for ENV 1317-4 guardrail end treatments.

Why Specify EURO-ET®

EURO-ET®'s potentially reusable Guardrail Extruder Head and HBA Posts may reduce repair cost if hit, which allows reduced parts inventories. Other system features make EURO-ET® easy to assemble and repair.



Parts List

Part Number	Qty	Part Description
EU995/995A	1	EURO-ET® GUARDRAIL EXTRUDER HEAD
EU9/10629G	2	EURO-ET® 4M STANDARD GUARDRAIL
EU32/29G	1	EURO-ET® 4M ANCHOR GUARDRAIL
EU704/704A	1	EURO-ET® CABLE ANCHOR BRACKET
EU782/19258A	1	EURO-ET® BEARING PLATE 200MM x 200MM x 16MM
EU104/33462A	1	EURO-ET® HBA POST TOP 1
EU105/33877A	1	EURO-ET® HBA POST TOP 2
EU103/33873A	2	EURO-ET® HBA POST BOTTOM #1-#2
EU102/33463G	1	EURO-ET® ANGLE STRUT 2062MM
EU101/33464G	2	EURO-ET® FLANGE PLATE 5MM x 70MM x 100MM
EU107/6183G	4	EURO-ET® POSTS C120 x 2000M
EU106/33461G	4	EURO-ET® BRACKET U200
EU4254/4254G	8	10MM WASHERS
EU4261/4261G	4	10MM x 40MM HEX HD BOLT
EU4258/4258G	8	10MM LOCKWASHER
EU6321/6321G	4	10MM x 50MM HEX HEAD BOLT
EU6405/6405G	8	10MM HEX NUT
EU3701/3701G	7	20MM WASHER
EU4699/4699G	4	20MM LOCKWASHER
EU3704/3704G	4	20MM HEX NUT
EU3717/3717G	3	20MM x 65MM HIGH STRENGTH HEX HEAD BOLT
EU3718/3718G	1	20MM x 75MM HIGH STRENGTH HEX HEAD BOLT (POST#2)
EU3000/3000G	1	CABLE ASSEMBLY
EU3300/3300G	5	16MM WASHER
EU3340/3340G	29	16MM DOUBLE RECESS NUT
EU3360/3360G	24	16MM x 32MM GUARDRAIL SPLICE BOLTS
EU3400/3400G	5	16MM x 50MM GUARDRAIL POST BOLTS
EU3900/3900G	2	25MM WASHER
EU3910/3910G	2	25MM HEX NUT

Assembling the EURO-ET®

Materials

As packaged, your EURO-ET® system includes all materials needed for a complete assembly. This will include a 12.0 meter pay length. Note that concrete footings or foundations are not required.

Site Preparation

When the guardrail is assembled tangentially in-line with edge of the shoulder a 25:1 maximum taper can be used so the Extruder Head will not encroach on the shoulder. Minor site grading may be necessary for the assemblies beyond the edge of the shoulder to prevent the HBA Posts from extending more than 100 mm above the ground.

Hinged Breakaway (HBA) Posts

Deploying HBA Bottom Posts

- Option (1)** Drive the HBA Bottom Posts (EU103/33873A) with an approved driving head to the appropriate depths, approximately 1825 mm. Ensure that the posts are positioned so that the larger holes in the ears are on the downstream side (See Figure 1).
- Option (2)** To facilitate assembly in extremely hard soil, drill a 300 mm pilot hole approximately 1825 mm deep and force the HBA Bottom Post (EU103/33873A) to the appropriate depth by impact or vibratory means with an approved driving head.

Note: If option (2) is used, material should be placed in 150 mm lifts and compacted with pneumatic equipment to optimum compaction.

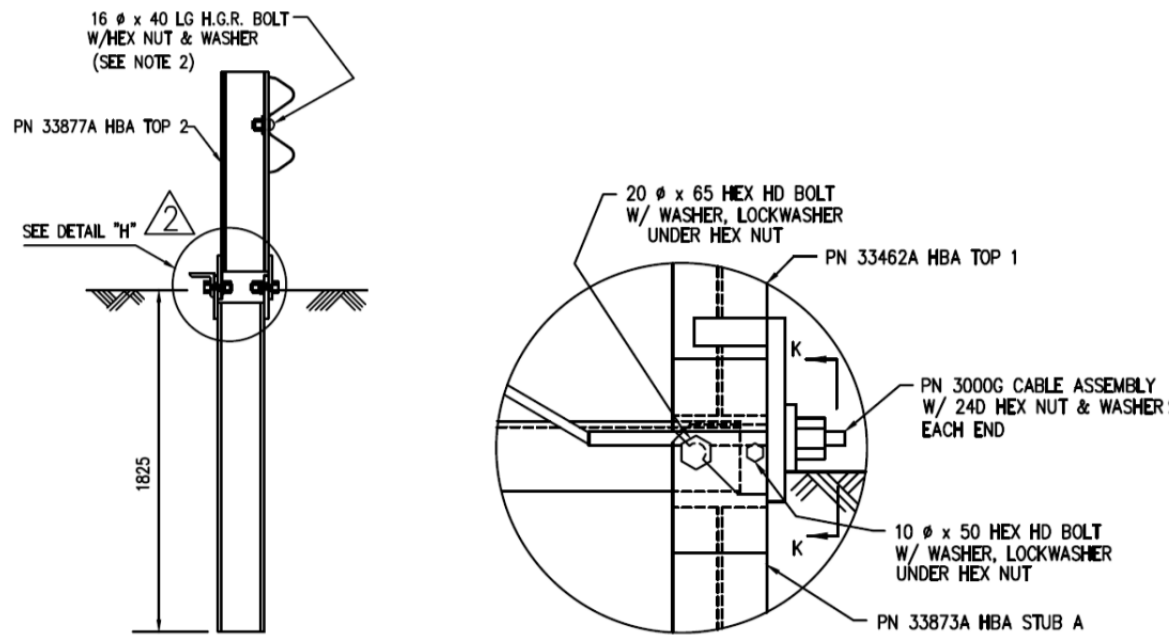


Figure 1

Deploying HBA Top Posts

Once the HBA Bottom Posts (EU103/33873A) are emplaced, the Top HBA Posts can now be assembled. At Post No. 1, assemble the Top HBA Post 1 (EU 104/33462A) by aligning the holes of the ears on the Top and Bottom Posts. In the 11mm holes, fasten a 10mm diameter x 50mm hex head bolt (EU6321/6321G) with a 10mm washer (EU4254/4254G), and 10mm lock washer (EU4258/4258G) under the 10mm hex nut (EU6405/6405G) (See Figure 1). The bolts should be positioned so the nuts are on the inside of the ears (See Figure 3). In the 21mm holes, fasten a 20mm diameter x 65mm hex head bolt (EU3717/3717G) under the 20mm hex nut (EU3704/3704G). There is no torque requirement for these bolts. They should be tightened to a snug position. Do not over tighten these bolts.

Note: Do not fasten the bolt on the field side until the Angle Strut is ready to be attached.

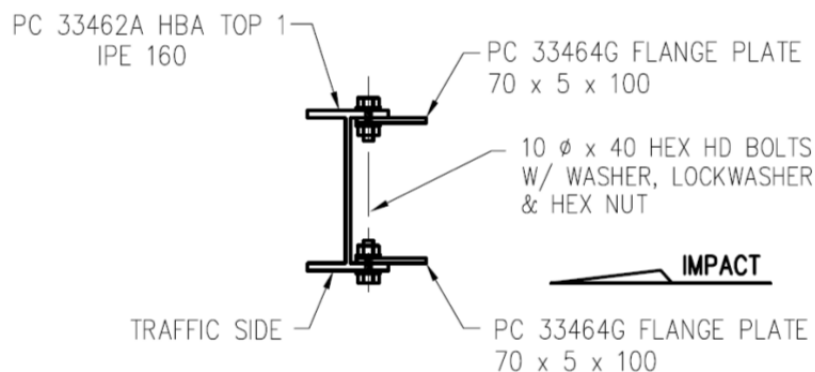


Figure 2

Attach the Flange Plates (EU101/33464G) to center holes of the Top HBA Post 1 (EU104/33462A) flanges with a 10mm x 40mm hex head bolt (EU4261/4261G) and 10mm hex nut (EU6405/6405G) with a 10mm round washer (EU4254/4254G) under the bolt head and a 10mm lock washer (EU4258/4258G) under the hex nut (EU6405/6405G) (See Figure 2).

At Post No. 2 assemble the Top HBA Post 2 (EU105/33877A) by aligning the holes of the ears on the Top and Bottom Posts. In the 11mm holes, fasten a 10mm diameter x 50mm hex head bolt (EU6321/6321G) with a 10mm washer (EU4254/4254G), and 10mm lock washer (EU4258/4258G) under the 10mm hex nut (EU6405/6405G). The bolts should be positioned so the nuts are on the inside of the ears (See Figure 3). In the 21mm holes, fasten a 20mm diameter x 65mm hex head high strength bolt (EU3717/3717G) with a 20mm washer (EU3701/3701G), 20mm lock washer (EU4699/4699G) under the 20mm hex nut (EU3704/3704G). There is no torque requirement for these bolts. They should be tightened to a snug position. Again, do not over tighten these bolts.

Note: Do not attach the bolt on the traffic side until the strut is ready to be assembled.

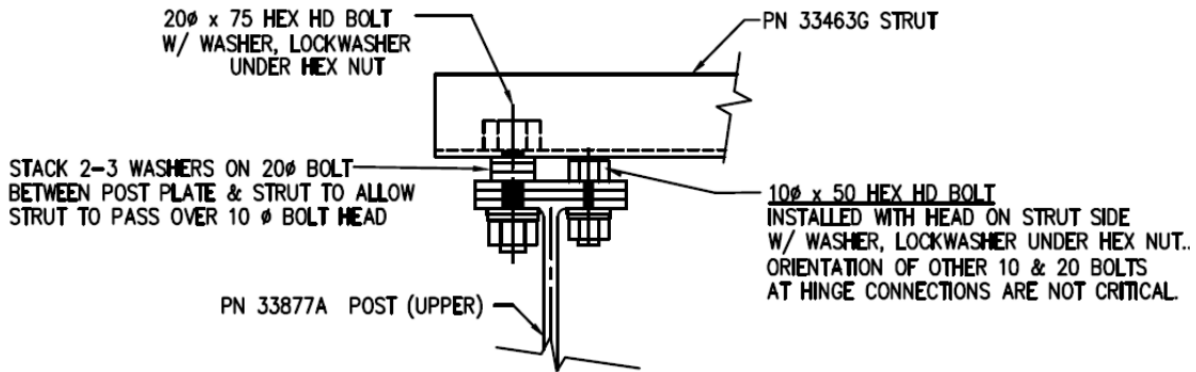


Figure 3

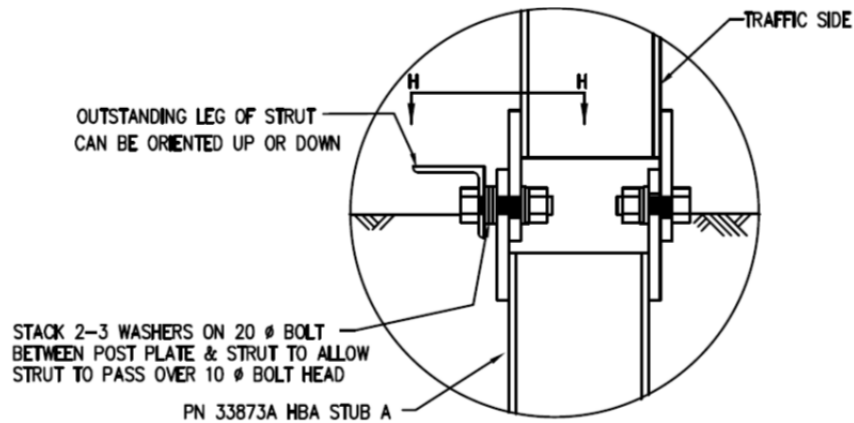


Figure 4

Attaching the Angle Strut

Place the Angle Strut (EU102/33463G) between HBA Bottom Posts (EU103/33873A) at the base of Posts 1 and 2. At Post No. 1, a 20mm x 65mm hex head bolt (EU3717/3717G) is used to attach the Angle Strut (EU102/33463G) to the post. At Post No. 2, a 20mm x 75mm hex head bolt (EU3718/3718G) is used to attach the Angle Strut (EU102/33463G) to the Post. The bolts should be inserted from the traffic side. At Post No. 1, a 20mm washer (EU3701/3701G) and 20mm lock washer (EU4699/4699G) are placed between the 20mm hex nut (EU3704/3704G) and the Angle Strut (EU102/33463G) (See Figure 1). At Post No. 2, three (3) 20mm washers (EU3701/3701G) and a 20mm lock washer (EU4699/4699G) are placed between the 20mm hex nut (EU3704/3704G) and the Angle Strut (EU102/33463G) (See Figure 3).

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

Deploying C120 Posts, U-Brackets and Rail Panels

On a tangent line with HBA Post #1 and #2, designate C120 Posts #3, #4, #5, and #6 assembly locations in increments of 2000mm.

Option 1) Drive the C120 Posts (EU107/6183G) with an approved driving head to the appropriate depth(s) of 1300mm (See Figure 5).

Option 2) To facilitate placing Posts in extremely hard soil, drill a 130mm pilot hole approximately 1300mm deep and force the C120 Post (EU107/6183G) to the appropriate depth by impact or vibratory means with an approved driving head.

If option 2 is used, material should be placed in 150mm lifts and compacted with pneumatic equipment to optimum compaction.



Caution: Do not bolt the Rail Panels to Posts 1, 3, 5, and 7.

At Post locations 5 and 3, fasten the U-Bracket (EU106/33461G) to the 2000mm C120 Post (EU107/6183G) using a 16mm x 50mm Guardrail Post Bolt (EU3400/3400G), a Double Recess Hex Nut (EU3340/3340G), and a Round Washer (EU3300/3300G). The washer is positioned between the Post and the nut (See Figure 5).

At Post location 7, splice the 4000mm Standard Guardrail (EU9/10629G) to the standard run of Guardrail with hardware provided by the standard Guardrail provider, but do not bolt the Rail Panels to the Post and/or spacer.

For the 4000mm Standard Guardrail (EU9/10629G) and 4000mm Anchor Guardrail (EU32/29G), splice the Guardrails together with eight (8) 16mm x 32mm Splice Bolts (EU3360/3360G) and Double Recess Hex Nuts (EU3340/3340G).

At Post location 2, fasten the 4000mm Anchor Guardrail (EU32/29G) to the Top HBA Post 2 (EU105/33877A) using a 16mm x 50mm Guardrail Post Bolt (EU3400/3400G), a Double Recess Hex Nut (EU3340/3340G), and a Round Washer (EU3300/3300G) (See Figure 1).

At Post locations 4 and 6, fasten the Standard Guardrail (EU9/10629G) and U-Bracket (EU106/33461G) to the 2000mm C120 Post (EU107/6183G) using a 16mm x 50mm Guardrail Post Bolt (EU3400/3400G), a Double Recess Hex Nut (EU3340/3340G), and a Round Washer (EU3300/3300G) (See Figure 5). The washer is positioned between the post and the nut.

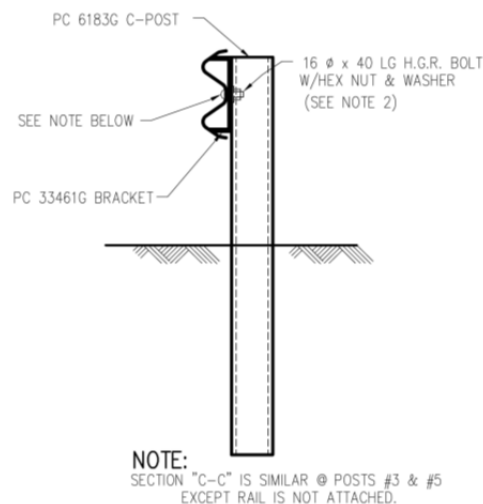


Figure 5

Cable Anchor Assembly

The Cable Anchor Bracket (EU704/704A) is secured to the 4000mm Anchor Guardrail (EU32/29G) by inserting the protruding hooks on the Cable Anchor Bracket (EU704/704A) into the slots in the Anchor Guardrail (EU32/29G). It is locked into place by pulling the Cable Anchor Bracket (EU704/704A) towards the front end of the unit.

Slide one end of the Cable Assembly (EU3000/3000G) into the Cable Anchor Bracket (EU704/704A) and the other end through the space between the Top HBA Post 1 (EU104/33462A) and HBA Bottom Post 1 (EU103/33873A) (See Figure 6). Place a 25mm flat washer (EU3900/3900G) on the end of the Cable Assembly (EU3000/3000G) that extends through the Cable Anchor Bracket (EU704/704A). Place the Bearing Plate (EU782/19258A) with the 125mm dimension up and the 76mm dimension down on the end of the Cable Assembly (EU3000/3000G) that extends through space between the Top HBA Post 1 (EU104/33462A) and Bottom HBA Post 1 (EU103/33873A).

Secure each end of the Cable Assembly (EU3000/3000G) with a 25mm hex nut (EU3910/3910G) and tighten. Restrain the Cable Assembly (EU3000/3000G) with vise grips at the end being tightened to avoid twisting the Cable Assembly (EU3000/3000G). Confirm that the 25mm nuts (EU3910/3910G) are tight and the Cable Assembly (EU3000/3000G) is taut.

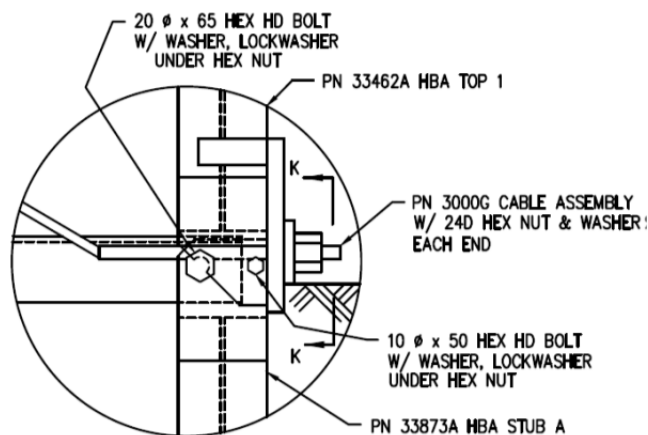


Figure 6

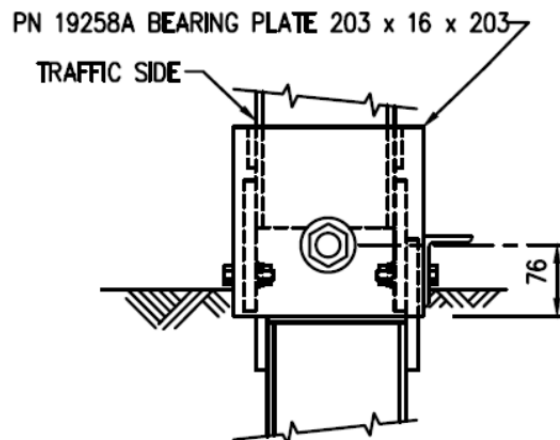


Figure 7

Assembling Guardrail Extruder Head

The final piece to attach is the Guardrail Extruder Head (EU995/995A). Place the Guardrail Extruder Head over the end of the Anchor Guardrail (EU32/29G). The Guardrail Extruder Head (EU995/995A) can be used on the left-or-right-hand shoulder/verge. Be sure the exit slot is on the field side, away from traffic. The Guardrail Extruder Head (EU995/995A) should be pushed on the Anchor Guardrail (EU32/29G) as far as it will go, while making sure that the end edge of the Anchor Guardrail (EU32/29G) is completely inside the Guardrail Extruder Head (EU995/995A) and butting up against the beginning of the bending slot inside the Guardrail Extruder Head (EU995/995A). The two Attachment Brackets of the Guardrail Extruder Head (EU995/995A) have 3 holes in each Bracket to provide tolerance during assembly. Choose the hole in the Bracket that is closest to the predrilled hole in the Top HBA Post 1 (EU105/33877A) while making sure that the edge of the Anchor Guardrail (EU32/29G) is completely inside the Guardrail Extruder Head (EU995/995A). Secure both top and bottom Attachment Brackets of the Guardrail Extruder Head (EU995/995A) to Top HBA Post 1 (EU105/33877A) with a 10mm x 40mm hex head bolt (EU4261/4261G) and washer (EU4254/4254G) under the bolt head and Fender Washer (EU4255/4255G) and lock washer (EU4258/4258G) between the nut (EU6405/6405G) and the flange of Top HBA Post 1 (EU105/33877A).

EURO-ET®

Assembly Check List

COUNTRY: _____

DATE: _____

PROJECT: _____

LOCATION: _____

- The rail height is in accordance with the plans (generally 700mm to 750mm) above the edge of the shoulder of the ground line.
- The 20mm hex head bolts that connect the HBA Bottom Posts to the HBA Top Posts are at ground level and HBA Bottom Posts do not protrude more than 100mm above the ground line (measured by the AASHTO 1.5m cord method). Site grading may be necessary to meet this requirement.
- The 20mm hex head bolts that connect the HBA Bottom Posts to the HBA Top Posts are tightened to a snug position.
- The end of the Anchor Guardrail is fully inserted into the Guardrail Extruder Head and butted up to the beginning of the bending slot inside the Guardrail Extruder Head.
- The HBA Top Post 1 is the only post with holes for attaching the Guardrail Extruder Head and has connecting plates cut at a 45 degree angle.
- The 200mm x 200mm Bearing Plate at post 1 is correctly positioned and the Cable Assembly is taut and correctly assembled (it should be rechecked after assembly to be sure it has not relaxed).
- The backfill material around the posts is properly compacted.
- Each HBA Post has two bolts on either side of the post and should be oriented so that the larger bolt is downstream of the smaller bolt.
- The Anchor Guardrail and Standard Guardrails are not attached to the posts at post locations 3, 5 and 7.
- The object marker (if required) is correctly positioned on the Guardrail Extruder Head Face.

SIGNATURE: _____

Maintenance and Repair

Recommended Equipment for Repair Operation

- Acetylene torch to cut off Extruded Rail
- Heavy duty chain to remove the Guardrail Extruder Head along with a chain hookup as recommended (See below)
- S.A.E. wrench or proper socket sizes
- Vice grip or Channellock® pliers and sledge hammer
- Vehicle to pull the Guardrail Extruder Head off of the damaged rail

Maintenance

Maintenance consists of periodically checking the system to see that the Cable Assembly is taut, and the nuts have not been removed from the Cable Assembly.

Repair

- 1) At the accident site, remove any debris that has encroached onto the traveled way or shoulder/verge. Attach any necessary delineation for the damaged system. Take inventory of the damaged system and determine what parts are reusable and what parts need to be replaced. Check the Guardrail Extruder Head for damage. It is normally reusable. Check the Cable Assembly and Cable Anchor Bracket for damage. The Bearing Plate, nuts, washers, and Cable Anchor Bracket are rarely damaged.
- 2) Obtain those parts that need to be replaced.
- 3) With the replacement parts, return to the repair site.
- 4) Burn off the Extruded Rail near the Guardrail Extruder head. Attach a chain to the Guardrail Extruder Head. Pull the Guardrail Extruder Head off of the Rail with a chain attached to a truck frame while the other end of the Extruded Rail is still attached to the down-stream Rail and Posts that will provide an anchor.
- 5) Remove any damaged Rail that has to be replaced.
- 6) Remove any damaged Posts C120 Posts and U-Brackets.
- 7) Remove any damaged Hinged Breakaway (HBA) Posts.
- 8) After the site has been cleared of damaged debris, the system can be reconstructed following the assembly instructions.



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