Installation and Maintenance Manual

X-Tension™ Guardrail End Terminal



Step by Step Instructions for the ***Tangent, Flared*** and ***Median*** Applications

BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

Barrier Systems Sales and Service
3333 Vaca Valley Pkwy, Vacaville, CA 95688 - Phone (707) 374-6800 Fax (707) 374-6801
www.BarrierSystemsInc.com

Table of Contents

MAINTENANCE

APPENDIX - Drawings

X-Tension Introduction

Introduction

The X-Tension Guardrail End Terminal has been designed and tested to meet the evaluation criteria of NCHRP 350 Test Level 3.

The system has been tested to the guidelines in NCHRP 350 for a non-gating, re-directive guardrail end treatment. When correctly installed and maintained, the system is capable of stopping, containing, or re-directing an errant vehicle in a safe manner under NCHRP 350 impact conditions.

The X-Tension Guardrail End Terminal is the world's first fully re-directive, non-gating guardrail terminal end. The unique X-Tension technology is a tension based solution rather than compression based. It offers exceptional vehicle control and energy absorbing capabilities in head on impacts, where the energy is absorbed with resistance at the impact head rather than being transferred down the rail as occurs with other systems. Even head on, high angle (15^{o} during testing) impacts on the nose resulted in the vehicle being redirected and controlled.

System Overview

The X-Tension Guardrail End Terminal is designed and constructed to provide acceptable structural adequacy, minimal occupant risk and safe trajectory as set forth in NCHRP 350 for guardrail terminal ends.

When impacted head on with an 820 – 2000kg (1800 – 4400lb) vehicle at speeds of up to 100kph (62 mph), the impacting vehicle is brought to a controlled stop or allowed to penetrate to the back side, depending on the impact conditions.

Before Installation

Placement and use of the X-Tension Guardrail End Terminal should be done in accordance with the guidelines and recommendations set forth in the "AASHTO Roadside Design Guide", FHWA memoranda and other state and local standards.

Depending on the application and circumstances at the site, installation and assembly of a Test Level 3 system should take a two person crew less than two hours.

The X-Tension Guardrail End Terminal is a highly engineered safety device made up of a relatively small number of parts. Before starting installation ensure that one is familiar with the make up of the system.

Limitations and Warnings

The X-Tension Guardrail End Terminal has been rigorously tested and evaluated per the recommendations in the NCHRP 350 guidelines for terminals and crash cushions. The impact conditions recommended in NCHRP 350 are intended to address typical in–service collisions.

When properly installed and maintained, the system is capable of containing and re-directing impacting vehicles in a predictable and safe manner under the NCHRP 350 impact conditions.

Vehicle impacts that vary from the NCHRP 350 impact conditions described for guardrail end terminals may result in significantly different results than those experienced in testing. Vehicle impact characteristics different than or in excess of those encountered in NCHRP 350 testing may result in system performance that may not meet the NCHRP 350 evaluation criteria.

Safety Statements

General Safety
All required traffic safety precautions should be complied with. All workers should wear required safety clothing (high visibility vests, steel capped footwear, gloves, hard hats, safety glasses etc.)

All underground services must be located before installation of any posts.

Only Authorized trained personnel should operate any machinery. Where overhead machinery is used, care must be taken to avoid any overhead hazards.

Gloves should be worn at all times. Particular care should be taken to avoid galvanizing spikes.

X-Tension Safety Statements
All installers must be well clear of post driving machinery when in use.

Avoid placing hands or fingers in and around moving parts when components are being lifted and manoeuvred into place. (i.e. around splice holes, etc.)

The cables should be fitted by one person only. Other workers should stand clear to avoid being caught in moving cables.

Securely fasten the impact head and rail before turning the friction plate.

The friction plate should be turned manually with a crow bar and extension handle. Do not attempt to turn it with the assistance of machinery. Ensure crow bar is securely held while the 4 locking bolts are tightened.

X-Tension Parts Identification

Impact Head
(1 Required)
B061072

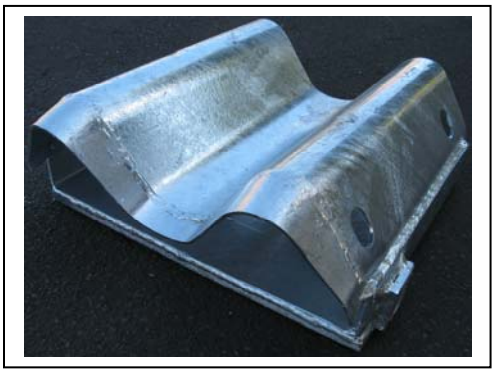
Friction Plate
(1 Required)
B061058

Soil Anchor
(1 Required)
B061104

Slider Bracket + Angle Bar
(1 Required Roadside – 2 Median)
B061079

Cable Bracket
(1 Required)
B061083

Cable Assembly
(2 Required)
B061108



Slider Panel
(1 Required Roadside – 2 Median)
B061088

Post 1 - Top
(1 Required)
B061099

Ground Strut
(1 Required)
B061094

X-Tension Parts Identification (Continued)

Post # 2 (1 Req.)
Roadside can be CRT Timber
B061100

Standard Steel Line Post (3-6)
(CRT Timber Posts allowed roadside)
4002338

Post #1 Bottom
(1 Required)
B061098

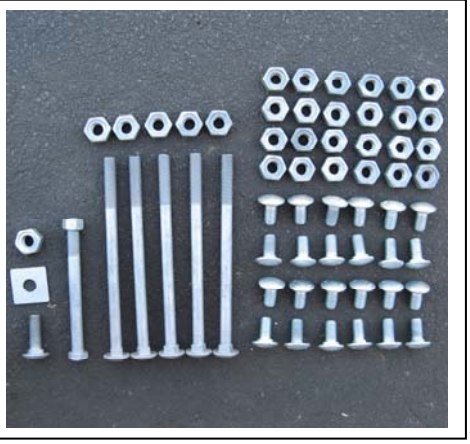
Standard Highway Rail 12'-6"
(3 Required Roadside – 5 Median)
4002018

Median Radius Rail 1 (12'-6")
(1 Required – Shop Curved)
B070233

Median Secondary Head
(1 Required)
B070219

Shear Bolts
(8 Required Roadside - 16 Median)
A070425

Blockout (Plastic or Timber)
(5 Required Roadside – 10 Median)
4001339



Hardware Set
(Roadside)
K070206

X-Tension – Preparation for all Applications

Preparation

Before installing an X -Tension, ensure that all materials required for an 11.4 m (38 ft) system are on site and have been identified. See bill of materials for the particular application and parts identification sheet.

Ensure that the area where the X-Tension is to be installed is flat enough so that the soil anchor will not protrude more than 100mm (4 in) from ground level, when measured with a straight line over a 1.5m (5 ft) cord. Minor site grading may be required.

Soil Conditions

The X-Tension has been designed to be installed in median or edge of road locations and in soil that meets or exceeds the AASHTO "standard soil" specification. If rock is encountered during post installation, refer to appropriate State specifications. Guidelines will vary from State to State.

Tools Required

The same tools required to install standard highway guardrail will also install an X-Tension. ***Specifically:*** Sockets (commonly used in Guardrail), Drill, Wrenches, Large Crow Bar, String line, Level, Augers, Tampers and Post Pounders commonly used in driving posts.

Before Starting

For all applications, begin the installation from the downstream end of the terminal at the point where it joins the standard guardrail (post 7).

For the tangent and flared applications, the X-Tension connects directly to standard steel post or timber post strong post W – beam highway guardrail, SGR04a-b.

The median application X-Tension connects directly to standard steel post or timber post strong post W-beam median barrier SGM04a-b

Follow step by step instructions for the appropriate application.

Important Note about posts and blockouts:

Tangent & Flared Systems:

Post 1 steel – Post 2 either CRT timber or crimped steel
Post 3-6 either CRT timber or standard steel I beam posts

Median system:

Posts 1 & 2 are always crimped steel.
Posts 3 – 6 are standard steel I beam posts

Blockouts may be either composite or timber.

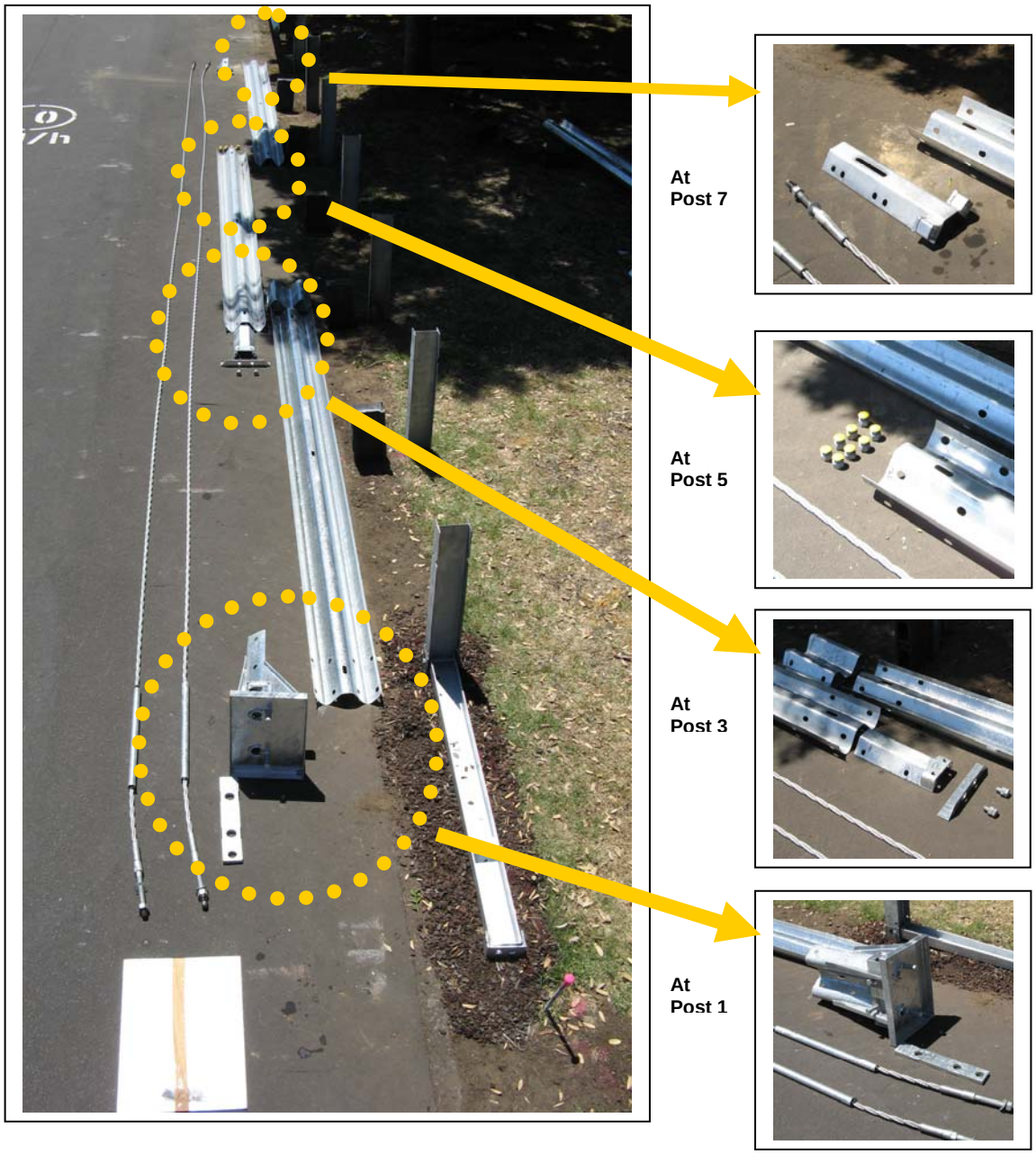
X-Tension - Tangent Installation Instructions

Step 1 - Set Out

The tangent terminal is essentially an 11.4m (38 ft) continuation of the standard guardrail run.

Pull a string line out with the desired offset (0 -450mm : 0-1.5 ft) over the length of the system, in a straight flare (Figure 1). No parabolic curve is required. The string line should be set to follow the roadside edge of the posts.

All the posts except post #1 have a blockout so take care to place the roadside face of post #1 200mm (8 in) towards the roadway to compensate for the lack of blockout.



X-Tension - Tangent Installation Instructions

Step 2 – Installing Posts 6- 2

Install posts 6 to 2 at standard highway rail spacing (1905mm: 6 ft 3 in), to the correct height.
Posts #6 to #3 are either standard “I” beam posts **OR** timber CRT posts. Post 2 is either the Special “I” beam post or a timber CRT (see parts identification photo).

Posts may be directly driven, or in stiff soils a 150mm (6 in) diameter hole drilled, and the post then driven into the hole. The post may also be placed in an oversized augured hole but care must be taken to ensure the backfill is properly compacted.

Hint: Offset Post 3 back from the string line 40-50mm (up to 2 in) to make it easier to push rail 1 and Slider Panel over rail 2.

When driving steel posts, ensure that a driving cap with timber or plastic insert is used to prevent damage to the galvanizing on the top of the posts.

Ensure that Post 2 has the post bolt **holes** on the side nearest the rail (**notches** go to the backside as shown and are only used on the median application (Figure 2).

Bolt the blockout to the post at post 3, prior to attaching to the rail (Figure 3).

Figure 1. Pull a string line with the desired offset.

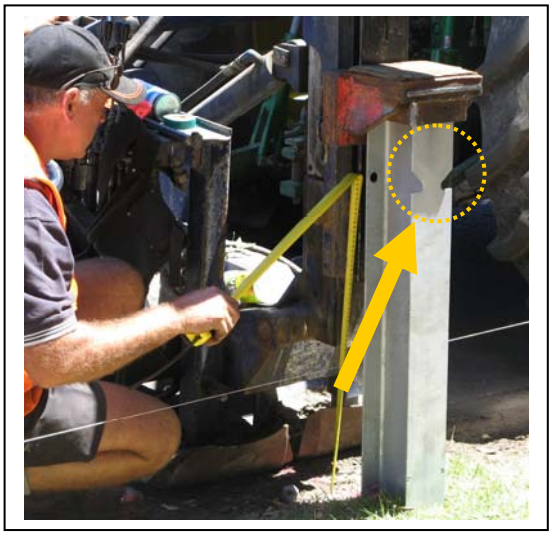


Figure 2. Notches go to the backside.

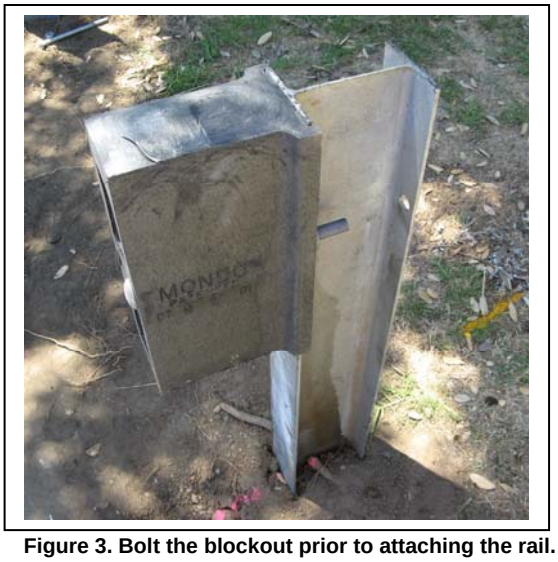


Figure 3. Bolt the blockout prior to attaching the rail.

Step 3 – Post 1, Ground Strut and Soil Anchor

Place the roadside face of post 1 bottom anchor, 200mm (8 in) towards the roadway to compensate for the lack of blockout (Figure 4). Post 1 bottom, the Ground Strut and the Soil Anchor are then placed parallel to the string line at this roadside offset position.

Drive or place the bottom of post 1 in the augured hole so that no more than 75mm (3 in) [100mm (4 in max)] protrudes above ground level (Figure 5). Use the Ground Strut as a template to place the Soil Anchor in the correct place. The Soil Anchor can then be driven into place or placed in an augured hole and backfilled. The Ground Strut should be level **or** lower at the anchor end than at the post 1 bottom end.

Place post 1 top in the post 1 bottom anchor ensuring that the post bolt notches are at the top and facing the Soil Anchor (Figure 6). Use M16 x 200mm (5/8 in x 8 in) hex head bolt with nut and washers. **Do not over tighten bolt.**

Figure 4. Measure 8 in. towards roadway.

Figure 5. Drive post 1 into augured hole.

Figure 6. Post 1 top in post bottom.

Step 4 – Hang Rail 3 and Cable Anchor Bracket

Rail 3 is installed like standard guardrail with post 6 at the center of the rail and blockouts between the rail and post. Place the Cable Anchor Bracket on the back of the rail at the joint between rail 3 and rail 4 (post 7).
The two “boxes” on the cable bracket should be on the impact head side of the splice joint. Attach rails to post with post bolt and splice rail 3 to rail 4 with 8 standard splice bolts (Figure 7).

Figure 7. Splice rail 3 to rail 4 with 8 standard splice bolts.

Step 5 – Hang Rail 2 and Shear Bolts

Before installing rail 2, double check that the blockout is already bolted to post 3.

Bolt rail 2 to the post and blockouts at posts 4 and 5 with the appropriate post bolt (Figure 8). **DO NOT BOLT THE RAIL TO POST 3.**

Splice rail 2 to rail 3 with **the 8 special shear bolts (yellow) supplied (Figure 9)**. **Put the washer and nut on inside of rail.**

IMPORTANT NOTE: DO NOT USE STANDARD SPLICE BOLTS AT POST 5 SPLICE.

Figure 8. Bolt rail 2 to post and blockouts.

Figure 9. Splice rail 2 to rail 3 with 8 special shear bolts.

Step 6 – Attach Slider Bracket to Rail 2

Bolt the Slider Bracket to the end of rail 2 at post 3 (Figure 10). Use 4 standard splice bolts. The angle bar end should be closest to the Impact Head end. **Remove the angle bar and 2 x M20 x 25mm (3/4 in x 1 in) bolts (Figure 11).**

Figure 10. Bolt Slider Bracket to end of rail 2 at post 3.

Figure 11. Remove angle bar bolts.

Step 7 – Assemble Slider Panel onto Rail 1

Start by sitting rail 1 on a blockout or post so that it is raised off the ground as shown (Figure 12). Slide the Slider Panel onto the downstream end of rail at post 3 location (Figure 13) and bolt into place using 4 standard splice bolts, pushing the bolt through from the inside of the slider to the outside so that the **nut is on the traffic face.**
The curved and reinforced (post breaker) end of Slider Panel sits at the rail end.
Use guardrail pin bar or crow bar to assist with lining up splice holes.

Figure 12. Sit rail 1 so it is raised off the ground.

Figure 13. Slide the Slider Panel onto downstream end.

Step 8 – Hang Rail 1

Lift rail 1 with Slider Panel attached and push the slider end over rail 2 (Figure 14). Overlap the rails as per a standard splice joint overlap.

Bolt rail 1 and blockout to post 2 using a standard post bolt that is supplied (Figure 15).

Re-attach the angle bar to the slider bracket on the backside of the rail (Figure 16).

Figure 14. Push Slider Panel over rail 2.

Figure 15. Bolt rail 1 and blockout to post 2.

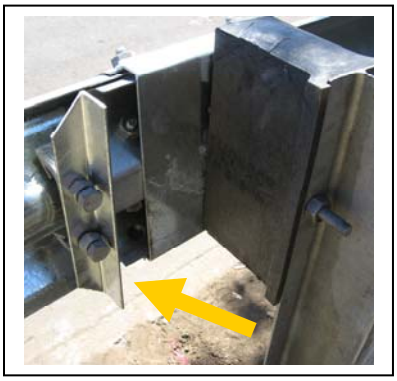


Figure 16. Reattach the angle bar.

Step 9 – Attach Impact Head

Place Impact Head on upstream end of rail 1 and attach using 8 standard splice bolts with nuts on traffic face (Figure 17). **Hint**: Place bottom two bolts first then use guardrail pin bar to lever head up snug onto rail.

Bolt head and rail 1 to post 1 using the supplied M16 x 50mm (5/8 in x 2 in) guardrail post bolt. Use a 50mm x 50mm (2 in x 2 in) washer under the nut on the inside of post 1 (Figure 18).

Figure 17. Attach Impact Head to rail 1.

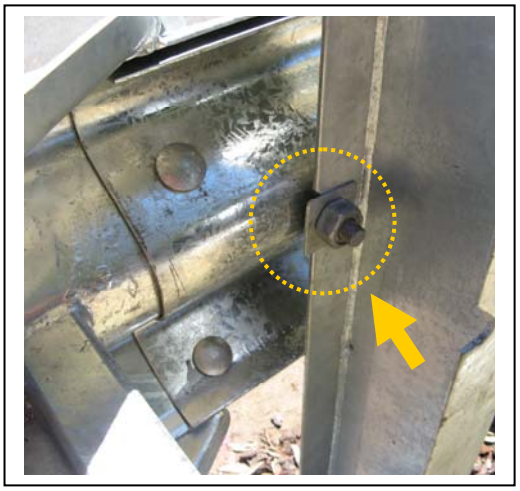


Figure 18. Bolt head and rail 1 to post 1 with washer.

Step 10 – Place the Cables

Push the cables under the steel strap on the Ground Strut (Figure 19) and forward through the holes at the top of the anchor. Lay the cables out parallel to the guardrail, downstream from the anchor.
Ensure that bottom cable (closest to road) has half the thread protruding through the anchor, as shown. Ensure the top cable has the nut wound on a least two turns past the end of the thread (Figure 20).

Figure 19. Push cables under steel strap on Ground Strut.

Figure 20. Thread the nuts as shown.

Step 11 – Installing the Cables

Install the Friction Plate in the top of the Impact Head, adjustment hole up. Take the cable closest to the road, pick up the downstream cable fitting and walk to the head, passing the cable through the bottom hole, through the Friction Plate (Figure 21) and out the backside of the Impact Head.

Now thread the cable down the backside of the rail following the bottom trough of the W-beam and attach to the bottom "box" on the Cable Bracket at post 7. Repeat this process with the other cable but push it through the top hole and thread it along the top trough of the W-beam.

Place the nuts and washer on the cables at the Cable Bracket end but only run them a few turns (Figure 22).

Do not tighten cables at this stage (or the Friction Plate will not turn)

Figure 21. Pass the cable through the bottom hole.

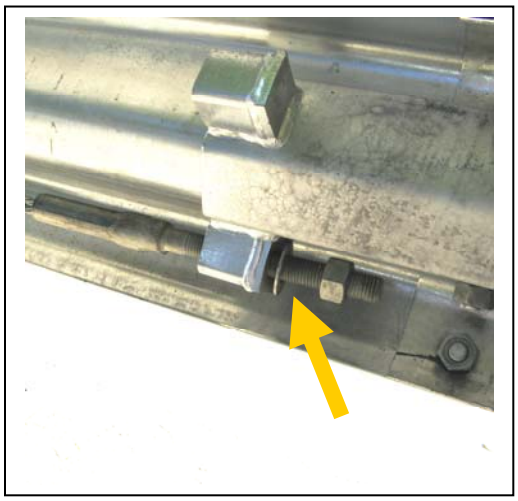


Figure 22. Do not tighten nuts at this time.

Step 12 – Turning the Friction Plate

Put a crow bar through the hole at the top of the friction plate (Figure 23) and turn it to the final position. Using a socket, tighten the 4 - M20 x 75mm (3/4 in x 3 in) bolts on the side of the impact head to lock the bar in the turned position (Figure 24).

Figure 23. Use crow bar to turn Friction Plate.

Figure 24. Use socket to lock bar in the turned position.

Step 13 – Tightening the Cables

Only tighten the cables using the nuts at the Cable Bracket end (post 7) (Figure 25). **Do not tighten the cable nuts at front of the Ground Anchor.**

Tighten the cables until they are taut, i.e. they rest in the backside of the W-beam and do not visibly sag between posts (Figure 26). There is no torque requirement for the cables.

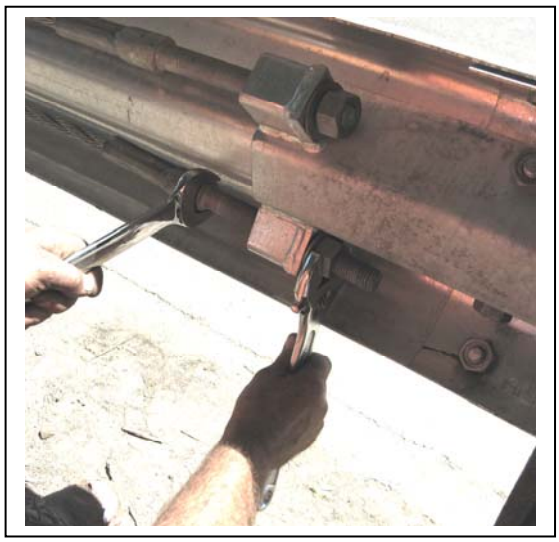


Figure 25. Tighten cables at Cable Bracket end (post 7).

Figure 26. Tighten cables until they are taut.

Step 14 – Attach Nosing

Push nosing into place on the front of the impact head. Attach using the supplied nylon push rivets (Figure 27).

Delineation to be attached to nosing, as per the Local Authorities requirements.

Figure 27. Attach nose using nylon push rivets.

X-Tension - Flared Installation Instructions

This section deals with installation of a Flared X-Tension system in a roadside guardrail terminal end application.

Apart from the initial set out, the flared X-Tension and installation procedure is identical to the Tangent system, the only difference being the amount of offset used.

Site preparation

The Flared terminal may be installed either parallel to the edge of the roadway (tangent) or with the impact head end of the rail offset by up to 1.2m (4 ft) away from the road (Figure 28) in a straight flare, over the length of the system. No parabolic curve is required.

Ensure that the area where the X-Tension is to be installed is flat enough so that the anchor will not protrude more than 75 mm (3 in) [100 mm (4 in) max] above ground level, when measured with a straight line over a 1.5m (5 ft) cord. Minor site grading may be required.

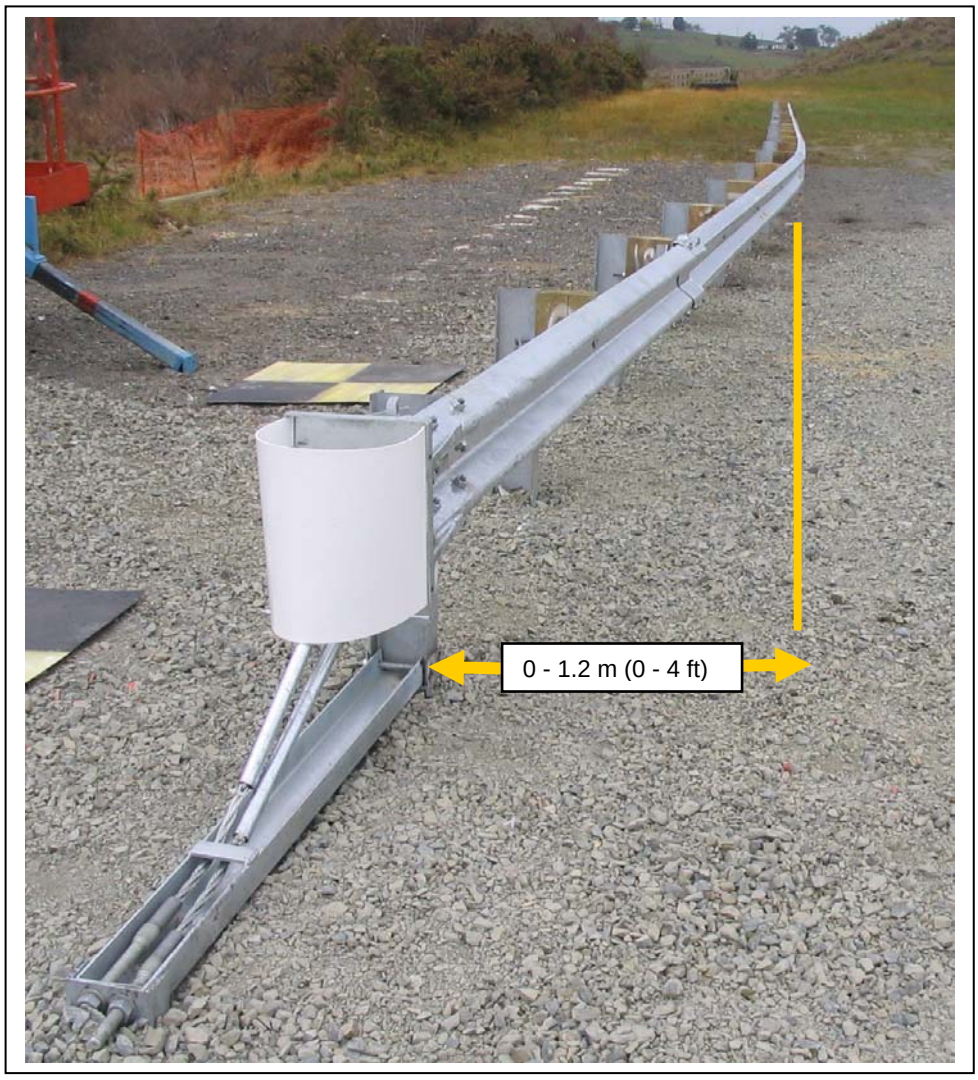


Figure 28. Maximum offset is 1.2 m (4 ft).

X-Tension - Flared Installation Instructions

Step 1 - Set Out

Pull a string line out with the desired offset (0 -1.2m; 0-4 ft)
Note that the flare is a straight flare, over the length of the system (11.4m ; 38 ft)

The string line should be set to follow the roadside edge of the posts (Figure 29).

All the posts except post 1 have a blockout so take care to place the roadside face of post 1 200mm (8 in) towards the roadway (Figure 30).

Post 1 bottom, the Ground Strut and the Soil Anchor are then placed parallel to the string line on the roadside of it (Figure 31).

Figure 29. Pull string line to follow roadside edge of posts.

Figure 30. Place roadside face of post 1 towards roadway.

Figure 31. Place Ground Strut parallel to string line.

Now follow steps 2 – 14 in the Tangent installation instructions.

Note: The "kink" in the line of rail between rail 3 and rail 4 (at post #7) is formed by simply pushing the rails around to follow the flared line of posts. This is not factory bent.

X-Tension - Median Installation Instructions

This section deals with installation of a Median X-Tension system as a Median guardrail terminal end application.

Site preparation

The Median X-Tension system is installed parallel to the standard median barrier, therefore no offset is used (Figure 32).

Ensure that the area where the X-Tension is to be installed is flat enough so that the soil anchor will not protrude more than 100mm (4 in) [preferred 75 mm 3 in)] from ground level when measured with a straight line over a 1.5m (5 ft) cord. Minor site grading may be required.

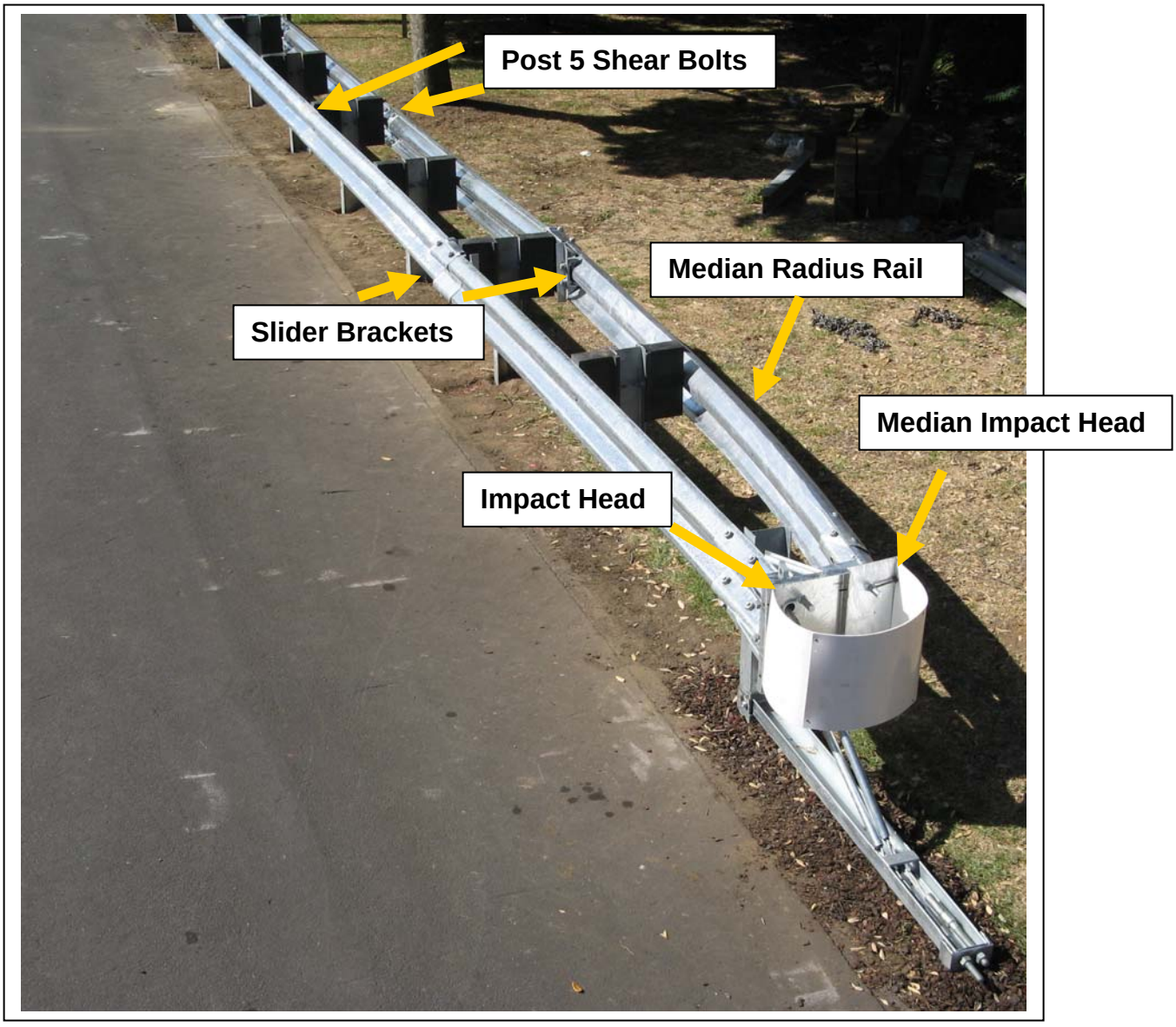


Figure 32. X-Tension median installation.

X-Tension - Median Installation Instructions

Step 1 - Set Out

The Median X -Tension is essentially one Tangent X-Tension installed parallel to one side of the median barrier (Figure 33), with a small number of additional components and rail attached parallel with the other side of the barrier (Figure 34).

Determine which side of the barrier will have the Tangent X-Tension portion of the Median X-Tension installed parallel to it. (Usually the heaviest traffic volume side)

Pull a string line out the length of the system, parallel with the median barrier posts.
The string line should be set to follow the side of the posts, on the side that it is desired to install the tangent X-Tension.

Figure 33. Essentially a tangent system installed parallel to median barrier.

Figure 34. Small number of additional components.

Step 2 – Installing Tangent X-Tension Portion

Follow steps 2 – 13 in the Tangent installation instructions, with the following exceptions.

(1) DO NOT set post 3 back 30-50mm (1 -2 in) as per the instructions in Step 2 of the Tangent installation instructions. For the Median application, Post 3 remains parallel with the other line posts.
(2) As noted on page #7, Post 2 must be steel crimped and Post 3-6 are always standard steel I-beam posts.
Now follow the <u>remaining steps</u> 3 to 8 to complete the backside of the median terminal.

Step 3 – Attach Secondary Impact Head

Fit secondary head to main head by pushing sideways onto the main head as shown below (Figure 35), until the holes in the gussets line up. Fix into place with either the 25mm (1 in) pin and pin lynch, or 2 M24 x 50mm (1 in X 2 in) bolts as shown (Figure 36).

Figure 35. Fit secondary head to main head.

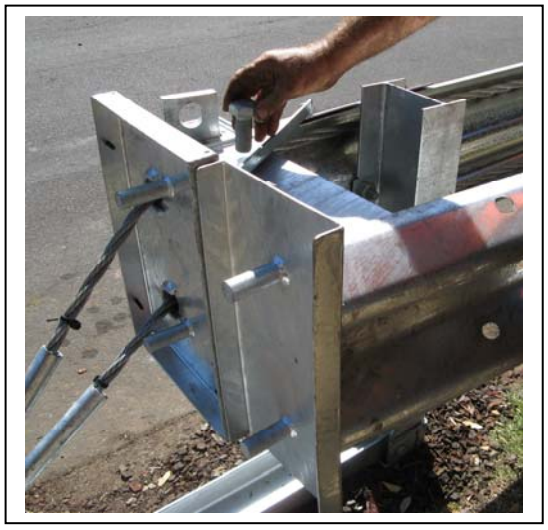


Figure 36. Fix secondary head into place.

Step 4 – Attach Backside Rail #3 and Rail #2

Rails 3 and 2 are installed like standard guardrail with blockouts between the rail and post (Figure 37). Attach rails to post 2, 4, 5 and 6 with blockouts and post bolts supplied (do not bolt the rail to post 3) and splice rail 3 to rail 4 with 8 standard splice bolts. At post 7 lap rail in the direction of traffic as per standard median barrier.

Ensure that rail 2 is spliced to rail 3 using the special shear bolts (yellow head) supplied. DO NOT use standard splice bolts at this joint (Figure 38). Be sure rail 2 is lapped outside rail 3 in both directions.

Figure 37. Rails installed with blockouts.

Figure 38. Splice rail 2 to rail 3 with 8 special shear bolts.

X-Tension - Median Installation Instructions

Step 5 – Attach Slider Bracket to Backside Rail 2

Bolt the Slider Bracket to the upstream end of rail 2 (at post 3) using 4 standard splice bolts (Figure 39). The angle bar end should be closest to the Impact Head end (Figure 40).
Remove the angle bar and 2 M20 X 25mm (3/4 in x 1 in) bolts.

Figure 39. Bolt Slider Bracket to upstream end of rail 2.

Figure 40. Angle bar end should be closest to Impact Head.

Step 6 – Assemble Slider Panel onto Backside Rail 1

Raise the straight end of the curved backside rail 1 and fit the Slider Panel onto the downstream (straight) end of rail (Figure 41) and bolt into place using 4 standard splice bolts, pushing the bolt through from the inside of the slider to the outside so the **nut is on the traffic face (Figure 42).**

The curved and reinforced (post breaker) end of Slider Panel sits at the rail end.
Use guardrail pin bar or crow bar to assist with lining up splice holes.

Figure 41. Fit the Slider Panel onto the straight end of rail.

Figure 42. Push bolt from inside (nut on traffic face).

X-Tension - Median Installation Instructions

Step 7 – Hang Curved Backside Rail #1

Lift rail 1 with Slider Panel attached and push the slider end over rail 2.

Bolt rail 1 and blockout to post 2 using supplied standard post bolt and 50x50mm (2 in x 2 in) washer on inside of post bolt notch on the backside of post 2 (Figure 43).

Re-attach the angle bar to the Slider Bracket (Figure 44) on the backside of the rail (at post 3).

Figure 43. Bolt rail 1 and blockout to post 2 using the square washer.

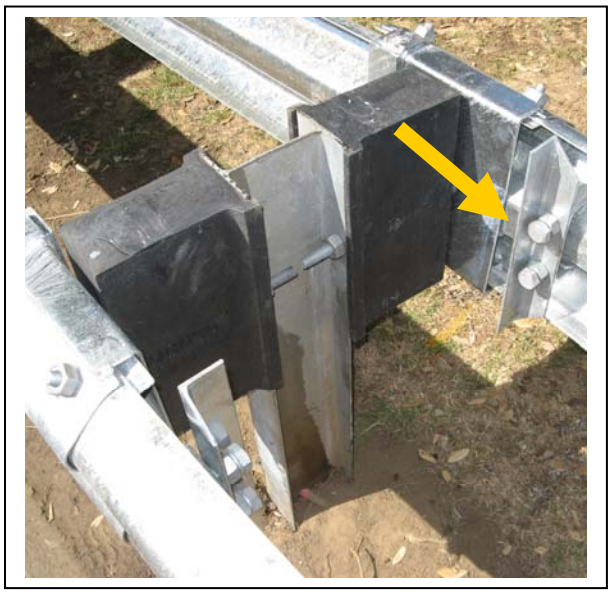


Figure 44. Re-attach the angle bar to the Slider Bracket.

Splice the rail to the secondary impact head using 8 standard splice bolts (Figure 45, 46)**.**

Figure 45. Splice the rail to secondary impact head.

Figure 46. Use 8 standard splice bolts.

Step 8 – Attach Nosing

Push nosing into place on the front of the impact head. Attach using the supplied nylon push rivets (Figure 47).

Delineation to be attached to nosing, as per Local Authorities requirements.

Figure 47. Attach nosing using nylon push rivets.

INSTALLATION CHECKLIST FOR X-Tension Systems

Location			
Installed By		***Date***	
Inspected By		***Date***	

X-Tension Tangent and Flared Systems [System Length 11.4m (38ft)]	***Y/N***	***NA***
• Rail is bolted at all posts except post **3.** • Post 1, post bolt notches face impact head. Bolted to ground strut. • Post 3 to 6 standard steel posts (or timber CRT posts). • Friction plate is turned fully and bolted in place. • Nuts are fitted on traffic face of rail at impact head. • Nosing is fitted to impact head.		
• Ground Strut lays flush with ground. Front of ground strut should be level or lower at the anchor end than at the post end. • Ground anchor does not protrude more than 100mm (4 in) [preferred 75mm (3 in)] above the ground. • The entire Terminal End (11.4m; 38 ft) is installed straight with flare as per design (offset between 0 to 1.2m) (0 to 4 ft).		
• Slider Panel is connected to end of first rail. All 4 holes bolted with **nuts on traffic face**. • Slider Bracket affixed to back of rail 2, with 4 bolts and **nuts on backside of rail**. • **Angle bar is fitted closest to impact head end.** Bolts MUST be wrenched tight.		
• Guardrail for terminal end (i.e. 3 lengths) is 2.7mm (12 gauge) highway rail.		
• **Yellow Shear Bolts correctly installed at post 5** (washer only between nut & rail).		
• **Cables** should be “taut”, not visibly sagging between posts.		
X-Tension Median Application only - as above plus: • Yellow Shear Bolts are correctly installed at post 5. • Slider Panel is bolted to end of first rail. All 4 holes bolted with **nuts on traffic face**. • Slider Bracket affixed to back of rail 2, with 4 bolts and **nuts on backside of rail.** • **Angle bar is fitted closest to impact head end.** Bolts MUST be wrenched tight. • Post bolt at post 2 is in notched post flange and fixed with 50mm x 50mm (2 in x 2 in) washer and nut. • Secondary Impact Head is connected to main impact head. • Additional Guardrails are 2.7mm (12 gauge) highway rail.		

X-Tension Maintenance (Traffic Face Impacts)

Types of repair are divided into two categories:
Traffic Face Impacts and Head on Impacts (Next Page)

Traffic Face Impacts

Key Repair Steps:

1. Remove cables
2. Remove damaged rail
3. Remove components from rails
4. Remove damaged posts
5. Assess damage
6. Reassemble

Step 1: Remove Cables

Undo nuts at downstream cable bracket (post 7). Take out the bolts on the side of the impact head that hold the friction plate in place and rotate the locking bar backwards.
Pull one cable at a time from the front side of the impact head and completely remove them. Rotating the cables as you pull them will help. Undo nuts at ground anchor end and remove cables.

Step 2: Remove Rails

Unbolt the splice bolts first. Then unbolt the post bolts and lower rails to ground.

Step 3: Remove X-Tension Components

All the X-Tension components are attached to the rails with standard splice bolts. Unbolt and remove the components.

Step 4: Remove Posts

Undo the bolt at the bottom of Post 1 and pull out post. For all other damaged line posts, attach a chain to the top half of the post and pull out of the ground with either a crane truck or digger. Note it is sometimes possible to remove steel posts by hand.

Step 5: Assess the Damage

Any part that cannot be reused must be replaced with a new part. Always replace the yellow shear bolts. Cables can be reused.
Generally, all the specialized components of the system such as the head and brackets should be undamaged.

Step 6: Reassemble

Reassemble as per system installation instructions.

X-Tension Maintenance (Head on Impacts)

Head on Impacts

Key Repair Steps:

1. Remove the cables
2. Pull the rails back
3. Remove components from rails
4. Remove damaged posts
5. Assess damage
6. Reassemble

Step 1: Remove Cables

After a head on impact the cables may appear to be slack but may in fact still retain some tension from the impact. Care must be taken when removing the cables. DO NOT UNDO THE CABLES FROM THE GROUND ANCHOR END FIRST, ALWAYS UNDO THE CABLES FROM THE CABLE BRACKET (post 7) FIRST.

Undo nuts at downstream cable bracket (post 7). Take out the bolts on the side of the impact head that hold the friction plate in place and turn the friction plate back. Pull one cable at a time from the front side of the impact head and completely remove them. Rotating the cables as you pull them will help. Undo nuts at ground anchor end last and remove cables.

Step 2: Pull Rails Back Out

Attach a chain or two ton strap to the front of the impact head and pull upstream to its' original position with a light truck or utility vehicle. The components are easier to unbolt when the rails are separated.

Step 3: Remove X-Tension Components

All components are attached to the rails with standard splice bolts. Unbolt and remove parts.

Step 4: Remove Posts

Undo the bolt at the bottom of Post 1 and pull out post. For all other damaged line posts, attach a chain to the top half of the post and pull out of the ground with either a crane truck or digger. Note it is sometimes possible to remove steel posts by hand.

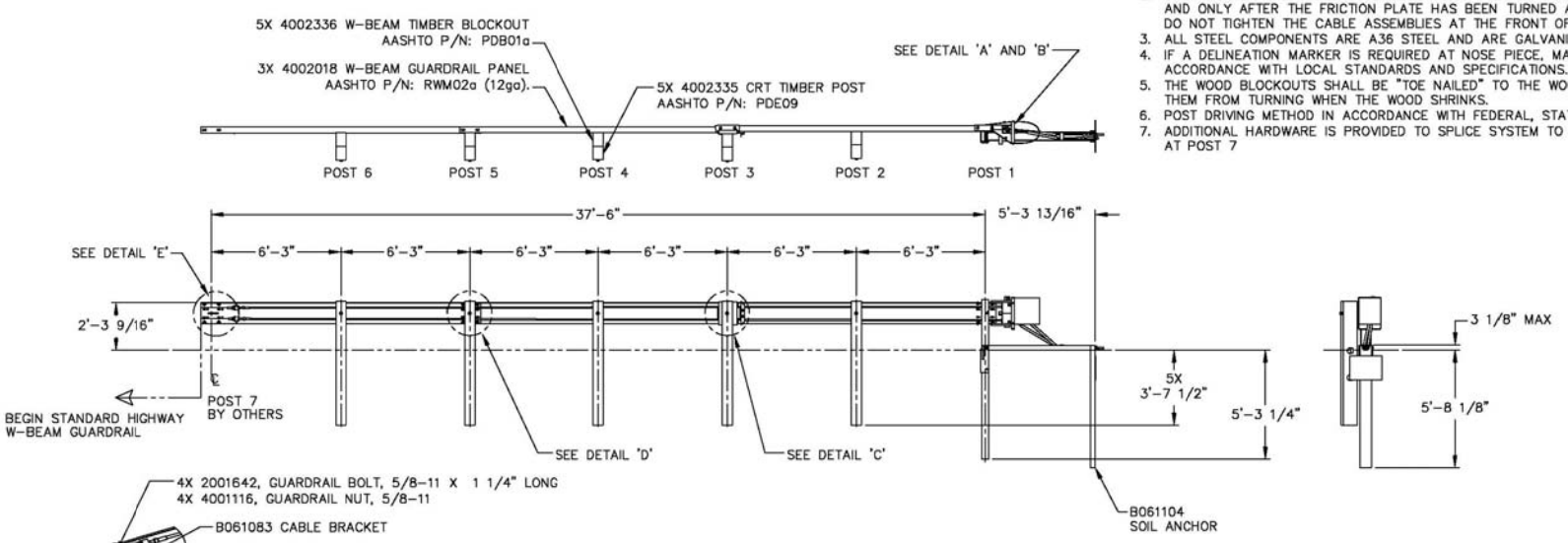
Step 5: Assess The Damage

Any part that cannot be reused must be replaced with a new part. In minor impacts (rails telescoped less than 3 meters (10 feet) the cables can be reused by turning them end for end. If additional damage has occurred, replace the cables. Generally, all the specialized components of the system such as the head and brackets should be undamaged.

Step 6: Reassemble

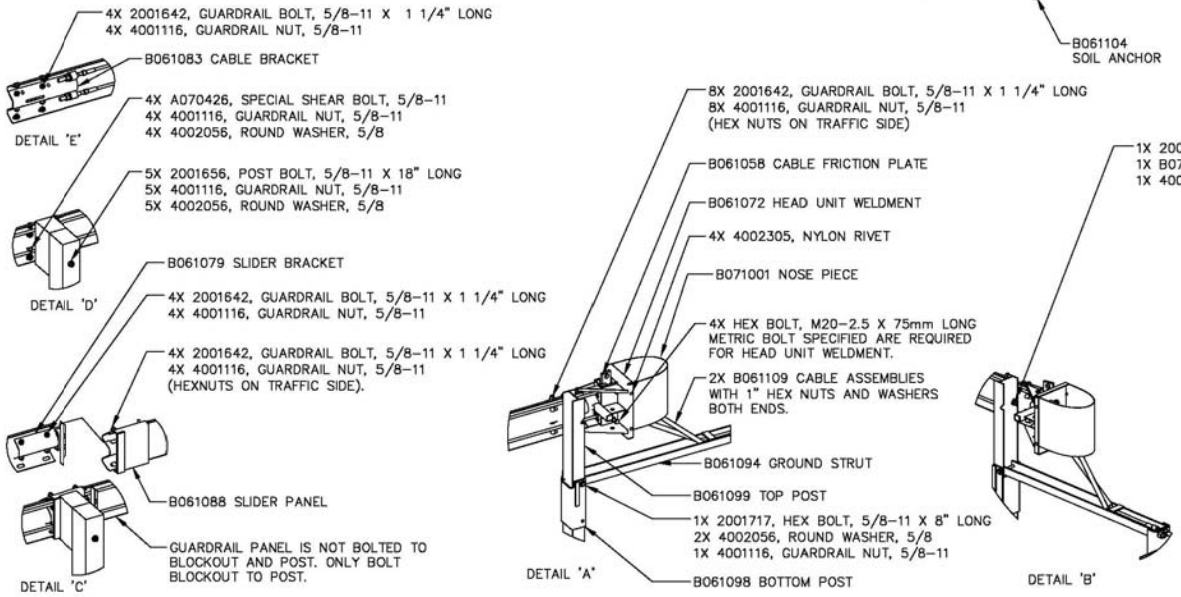
Reassemble as per system installation instructions.

X-TENSION GUARDRAIL TERMINAL SYSTEM, STANDARD, WOOD BLOCKOUT TO WOOD POST, XTGTSS1



NOTES: UNLESS OTHERWISE SPECIFIED

1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
4. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
5. THE WOOD BLOCKOUTS SHALL BE "TOE NAILED" TO THE WOOD POST TO PREVENT THEM FROM TURNING WHEN THE WOOD SHRINKS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7



Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
4002018	3	W-Beam Guardrail RWM02a
4002336	5	W-Beam Timber Blockout PDB01a
4002335	5	CRT Timber Post PDE09
4002305	4	Nylon Rivet
2001642	24	Guardrail Bolt 5/8-11 x 1 1/4"
2000302	1	Post Bolt, 5/8-11 x 2"
2001656	5	Post Bolt, 5/8-11 x 18"
4001116	31	Guardrail Nut, 5/8-11
2001717	1	Hex Bolt, 5/8-11 x 8"
2001615	4	Hex Bolt, M20-2.5x75mm
4002056	7	Round Washer, 5/8
A070426	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

REV.	CHANGES	DATE	BY	REQ'D	NEXT ASSY.	ITEM
0	NEW DRAWING	4/21/08	AEM			

SCALE: NOT TO SCALE

	DATE	INIT.
DRAWN BY	4/21/08	AEM
APPR'D BY		

Standard Tolerance
Angular ± 1/2°
Fractional ± 1/16"
Dec .XXX= ± .010
Dec .XX= ± .030

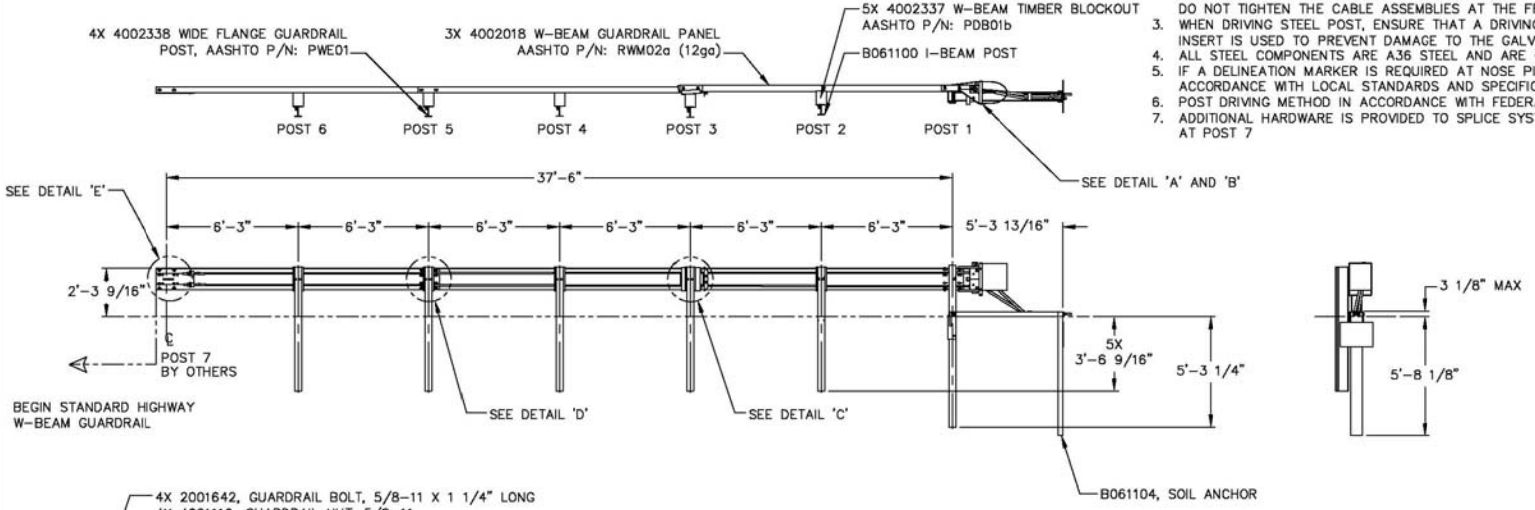
TITLE :
X-TENSION GUARDRAIL TERMINAL SYSTEM DRAWINGS, METRIC & US

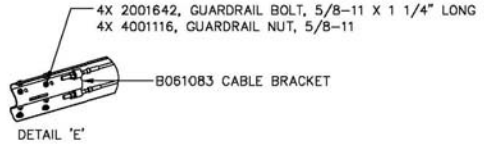
BARRIER SYSTEMS
180 RIVER RD, RIO VISTA, CA 94571
TEL: 707-374-6800 FAX: 707-374-6801

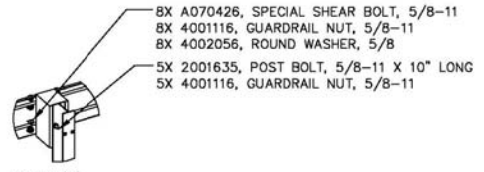
SHEET	DRAWING NUMBER	REV.
1 OF 10	B080439	0

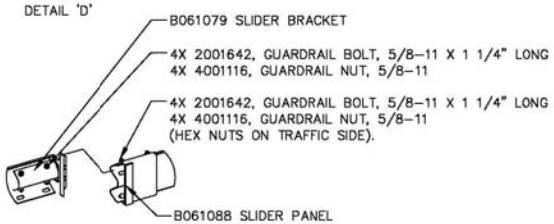
X-TENSION GUARDRAIL TERMINAL SYSTEM, STANDARD, WOOD BLOCKOUT TO STEEL POST, XTGTSS2

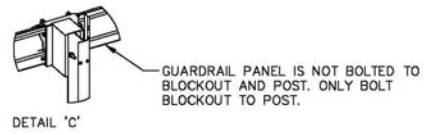
NOTES: UNLESS OTHERWISE SPECIFIED
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7

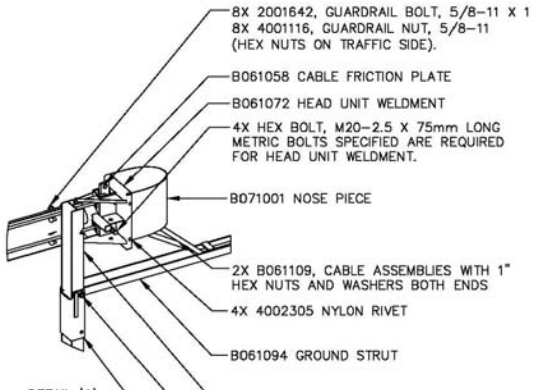










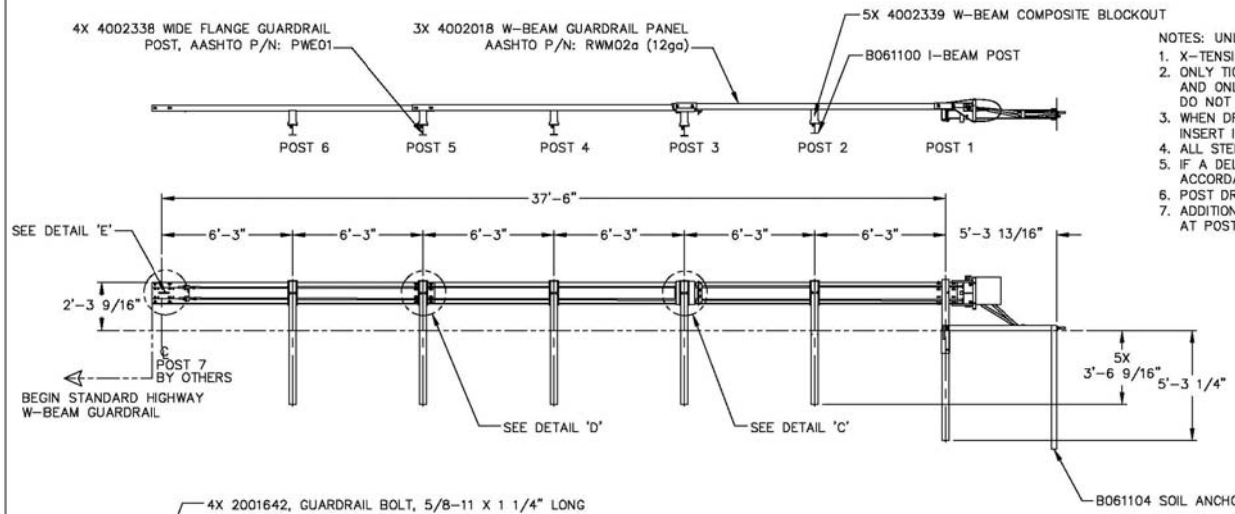


Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
B061100	1	I-BEAM POST, POST 2
4002018	3	W-Beam Guardrail RWM02a
4002337	5	W-Beam Timber Blockout PDB01b
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001642	24	Guardrail Bolt, 5/8-11 x 1 1/4"
2000302	1	Post Bolt, 5/8-11 x 2"
2001635	5	Post Bolt, 5/8-11x10"
4001116	31	Guardrail Nut, 5/8-11
2001717	1	Hex Bolt, 5/8-11 x 8"
2001615	4	Hex Bolt, M20-2.5x75mm
4002056	2	Round Washer, 5/8
A070426	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

SHEET	DRAWING NUMBER	REV.
2 OF 10	B080439	0

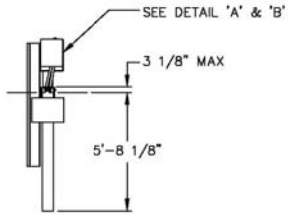
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

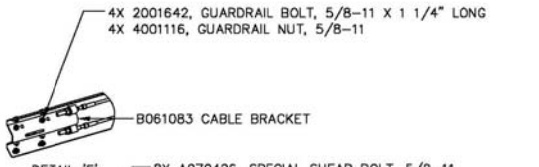
X-TENSION GUARDRAIL TERMINAL SYSTEM, STANDARD, COMPOSITE BLOCKOUT TO STEEL POST, XTGTSS3

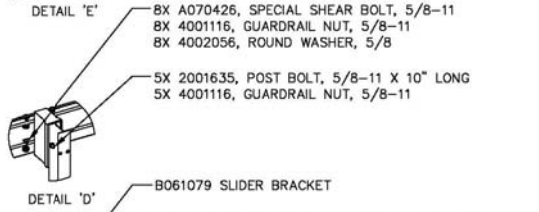


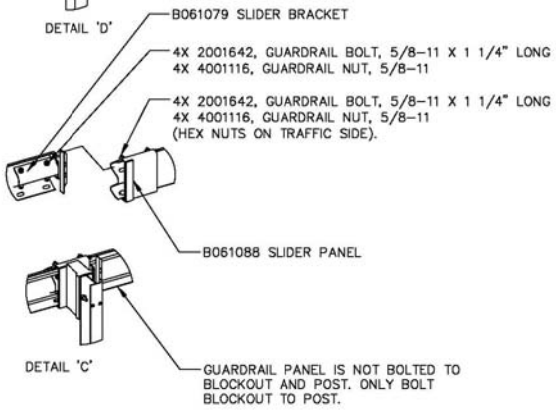
NOTES: UNLESS OTHERWISE SPECIFIED

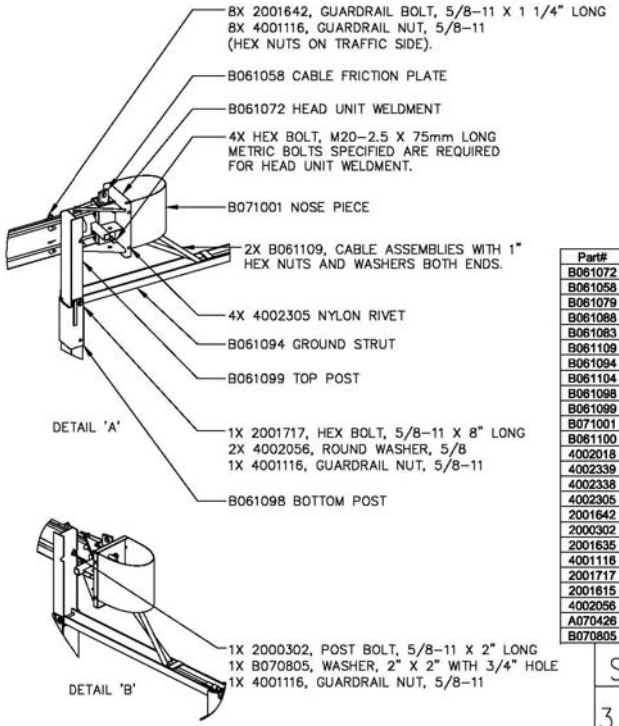
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7









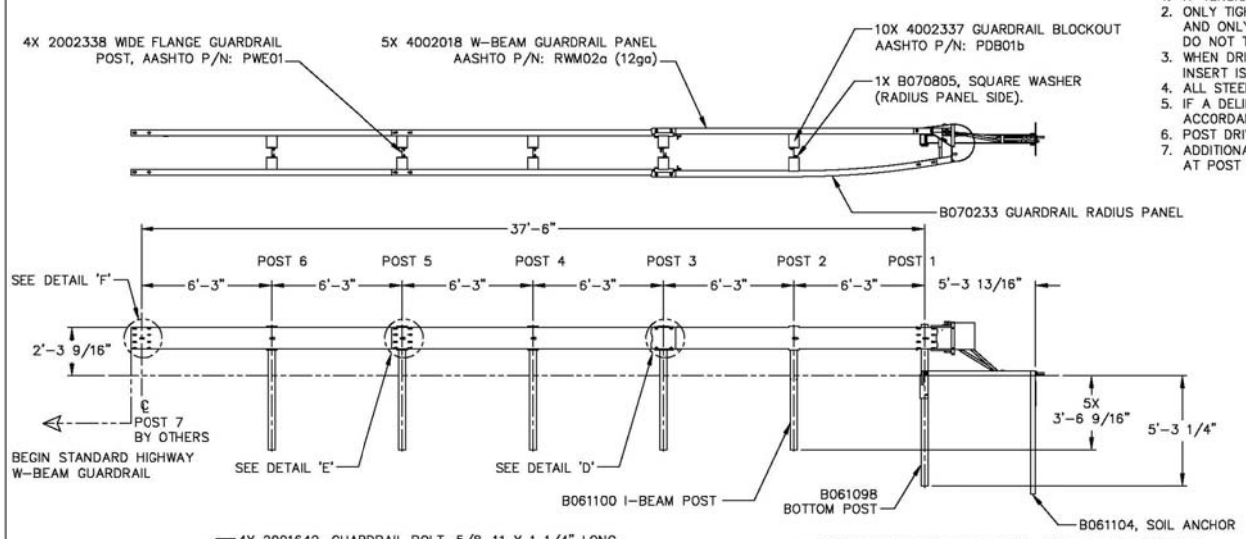


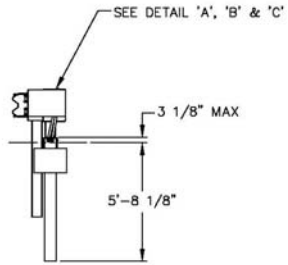
Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
B061100	1	I-BEAM POST, POST 2
4002018	3	W-Beam Guardrail RWM02a
4002339	5	W-Beam Composite Blockout
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001642	24	Guardrail Bolt, 5/8-11 x 1 1/4"
2000302	1	Post Bolt, 5/8-11 x 2"
2001635	5	Post Bolt, 5/8-11x10"
4001116	31	Guardrail Nut, 5/8-11
2001717	1	Hex Bolt, 5/8-11 x 8"
2001615	4	Hex Bolt, M20-2.5x75mm
4002056	2	Round Washer, 5/8
A070426	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

SHEET	DRAWING NUMBER	REV.
3 OF 10	B080439	0

BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

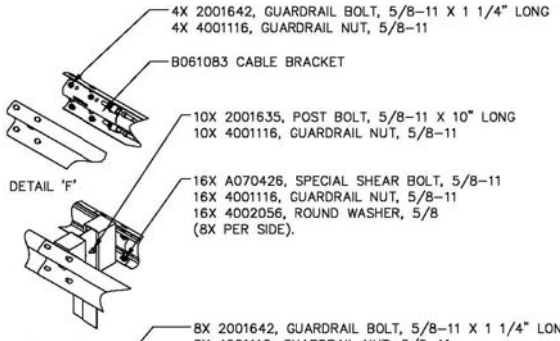
X-TENSION MEDIAN TERMINAL SYSTEM, STANDARD, WOOD BLOCKOUT TO STEEL POST, XTMTSS2

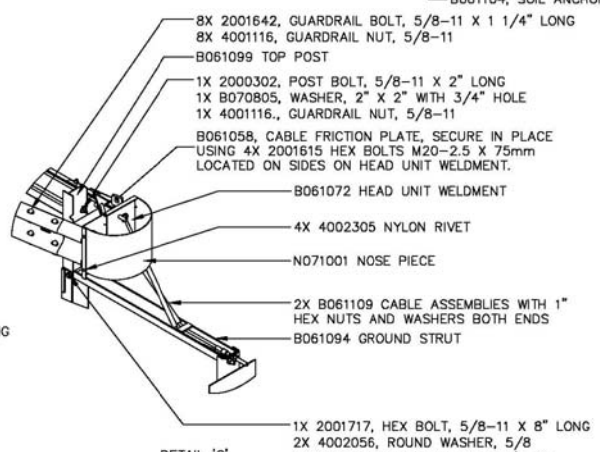


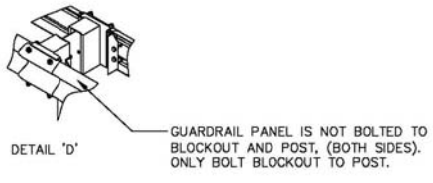


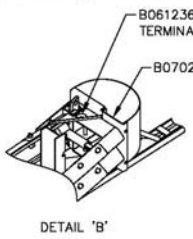
NOTES: UNLESS OTHERWISE SPECIFIED

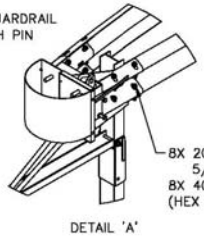
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7







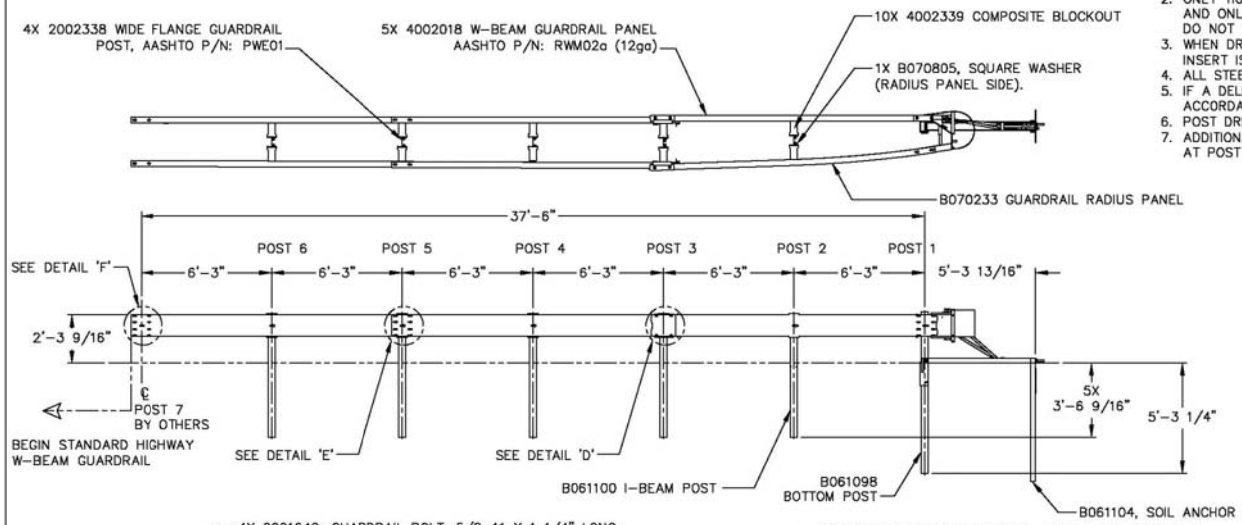


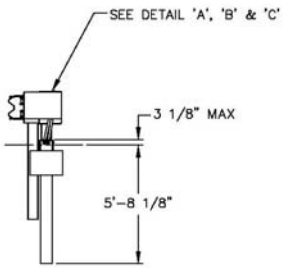


Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	2	SLIDER BRACKET WELDMENT
B061088	2	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B061100	1	I-BEAM POST, POST 2
B071001	1	NOSE PIECE
B070219	1	IMPACT HEAD WELDMENT, MEDIAN TERMINAL, X-TENSION
B061236	1	BAR, MEDIAN GUARDRAIL TERMINAL
B070233	1	PANEL, RADIUS GUARDRAIL, W-BEAM, X-TENSION TERMINAL
4002018	5	W-Beam Guardrail RWM02a
4002337	10	W-Beam Timber Blockout PDB01b
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001642	48	Guardrail Bolt 5/8-11 x 1 1/4"
2000302	1	Post Bolt 5/8-11 x 2"
2001635	10	Post Bolt 5/8-11 x 10"
4001116	60	Guardrail Nut, 5/8-11
2001717	1	Hex Bolt, 5/8-11x 8"
2001615	4	Hex Bolt, M20-2.5x75mm
4002056	2	Round Washer, 5/8
A070426	16	Special Shear Bolt w/ nut & washer
B070805	2	Washer, 2" x 2" w/ 3/4" hole
2000090	1	1/4" Linch Pin

SHEET	DRAWING NUMBER	REV.
4 OF 10	B080439	0

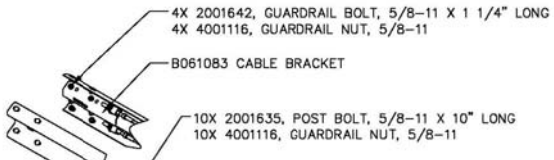
X-TENSION MEDIAN TERMINAL SYSTEM, STANDARD, COMPOSITE BLOCKOUT TO STEEL POST, XTMTSS3

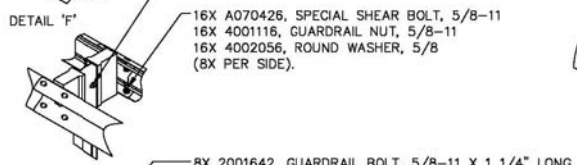


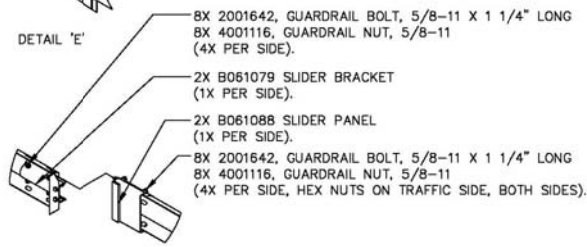


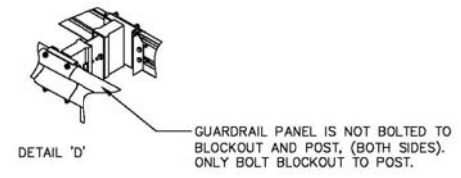
NOTES: UNLESS OTHERWISE SPECIFIED

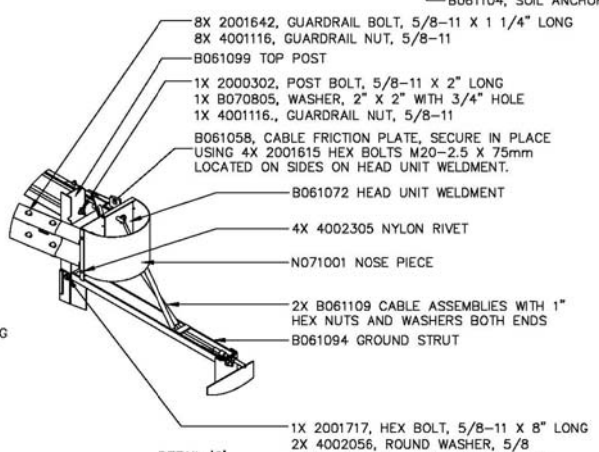
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7

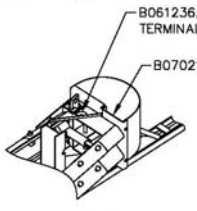


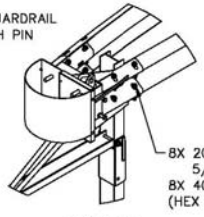












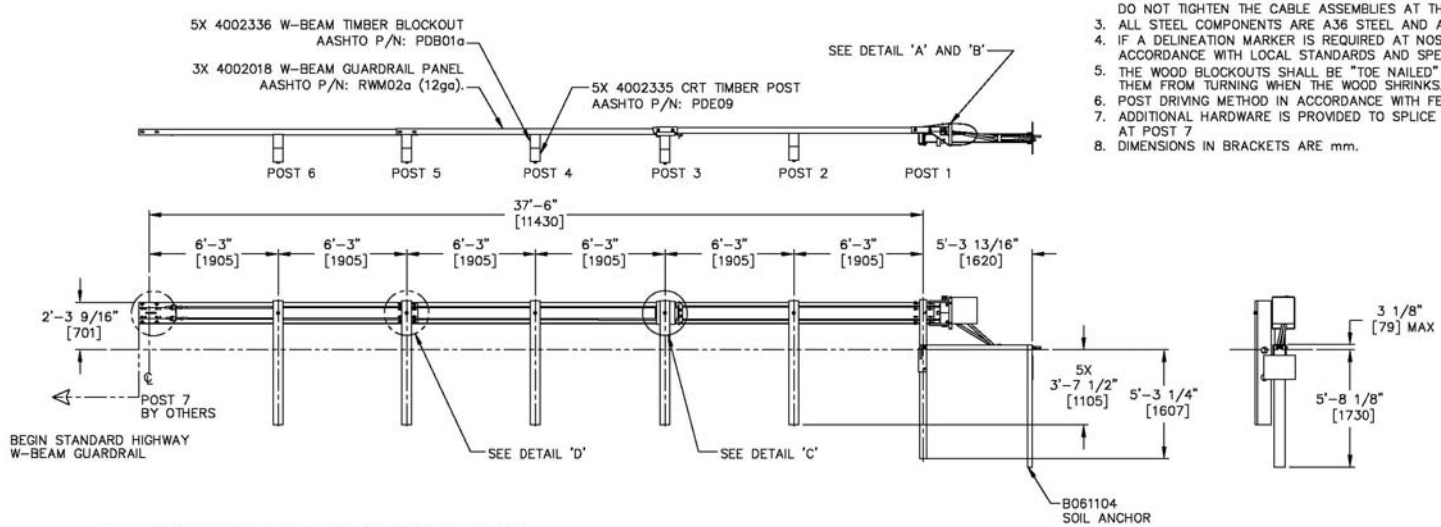
Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	2	SLIDER BRACKET WELDMENT
B061088	2	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B061100	1	I-BEAM POST, POST 2
B071001	1	NOSE PIECE
B070219	1	IMPACT HEAD WELDMENT, MEDIAN TERMINAL, X-TENSION
B061236	1	BAR, MEDIAN GUARDRAIL TERMINAL
B070233	1	PANEL, RADIUS GUARDRAIL, W-BEAM, X-TENSION TERMINAL
4002018	5	W-Beam Guardrail RWM02a
4002339	10	W-Beam Composite Blockout
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001642	48	Guardrail Bolt 5/8-11 x 1 1/4"
2000302	1	Post Bolt 5/8-11 x 2"
2001635	10	Post Bolt 5/8-11 x 10"
4001116	60	Guardrail Nut, 5/8-11
2001717	1	Hex Bolt, 5/8-11x 8"
2001615	4	Hex Bolt, M20-2.5x75mm
4002056	2	Round Washer, 5/8
A070426	16	Special Shear Bolt w/ nut & washer
B070805	2	Washer, 2" x 2" w/ 3/4" hole
2000090	1	1/4" Linch Pin

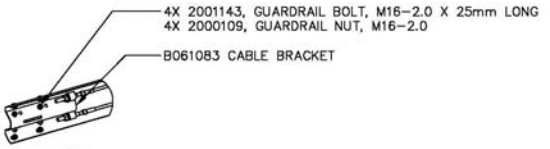
SHEET	DRAWING NUMBER	REV.
5 OF 10	B080439	0

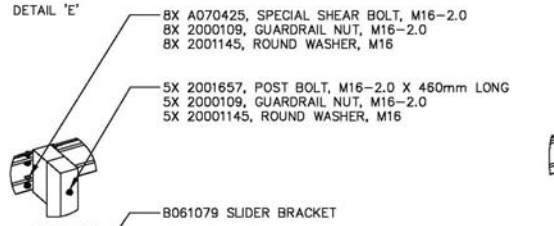
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

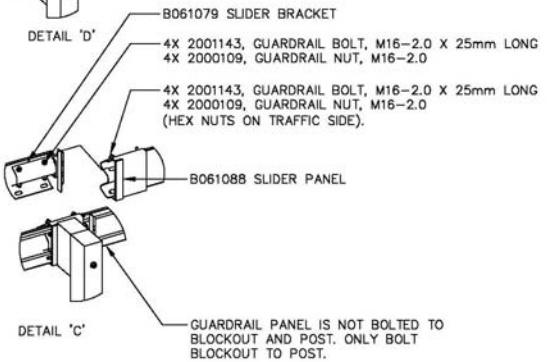
X-TENSION GUARDRAIL TERMINAL SYSTEM, METRIC, WOOD BLOCKOUT TO WOOD POST, XTGTSM1

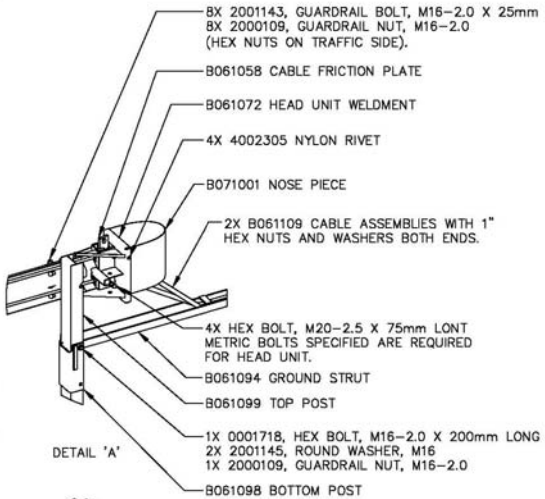
NOTES: UNLESS OTHERWISE SPECIFIED
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
4. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
5. THE WOOD BLOCKOUTS SHALL BE "TOE NAILED" TO THE WOOD POST TO PREVENT THEM FROM TURNING WHEN THE WOOD SHRINKS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7
8. DIMENSIONS IN BRACKETS ARE mm.











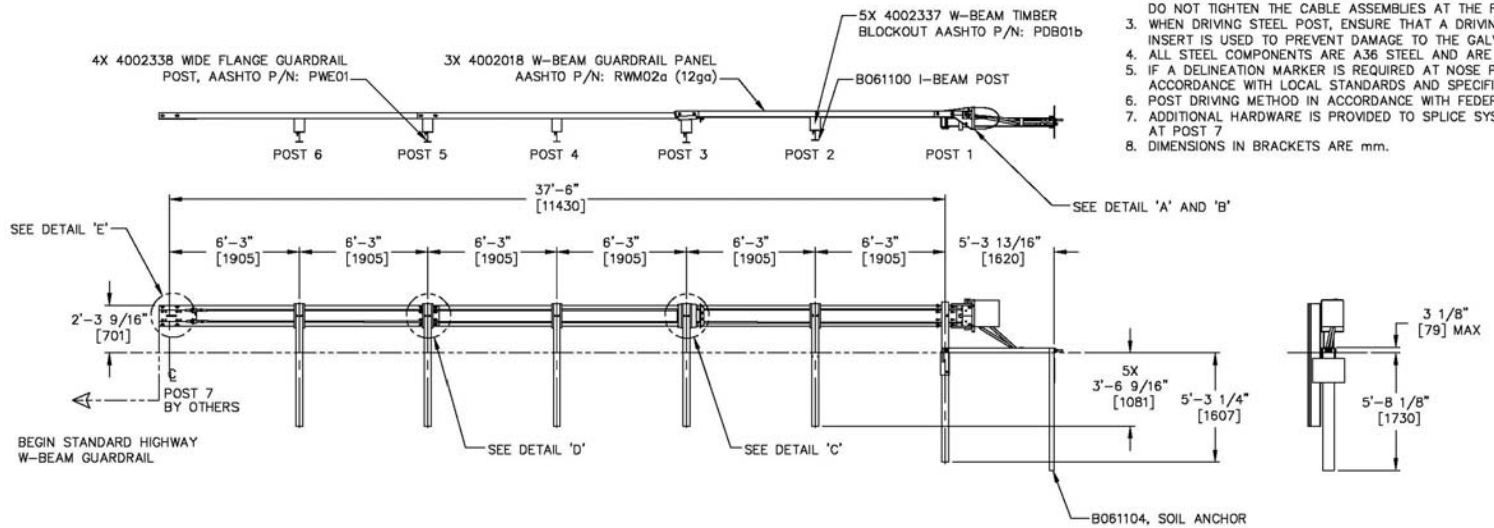
Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
4002018	3	W-Beam Guardrail RWM02a
4002336	5	W-Beam Timber Blockout PDB01a
4002335	5	CRT Timber Post PDE09
4002305	4	Nylon Rivet
2001143	24	Guardrail Bolt M16-2.0 x 25mm
2000431	1	Post Bolt, M16-2.0 x 50mm
2001657	5	Post Bolt, M16-2.0 x 460mm
2000109	31	Guardrail Nut, M16-2.0
2001718	1	Hex Bolt, M16-2.0 x 200mm
2001615	4	Hex Bolt, M20-2.5x75mm
2001145	7	Round Washer, M16
A070425	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

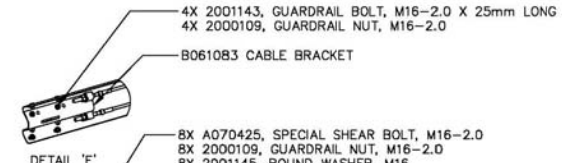
SHEET	DRAWING NUMBER	REV.
6 OF 10	B080439	0

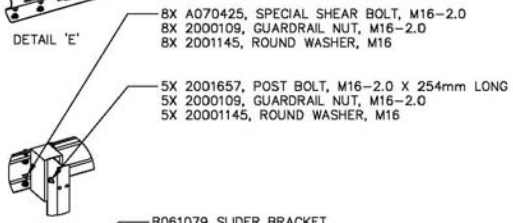
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

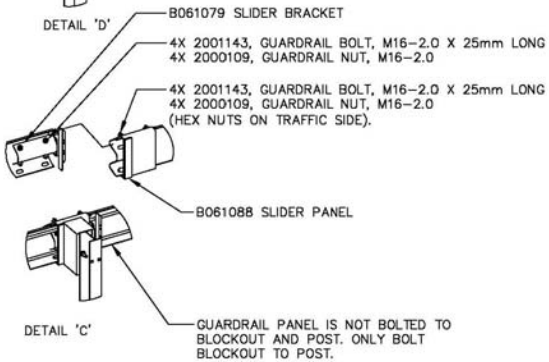
X-TENSION GUARDRAIL TERMINAL SYSTEM, METRIC, WOOD BLOCKOUT TO STEEL POST, XTGTSM2

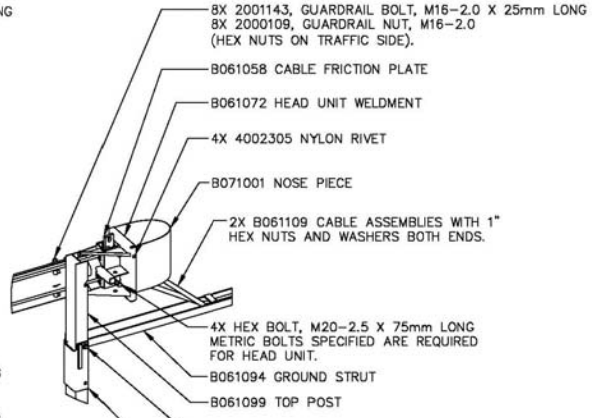
NOTES: UNLESS OTHERWISE SPECIFIED
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7
8. DIMENSIONS IN BRACKETS ARE mm.

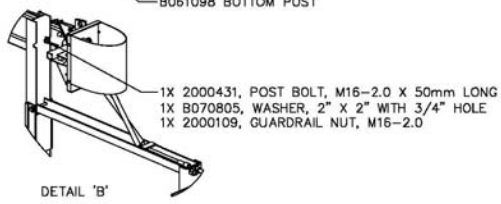










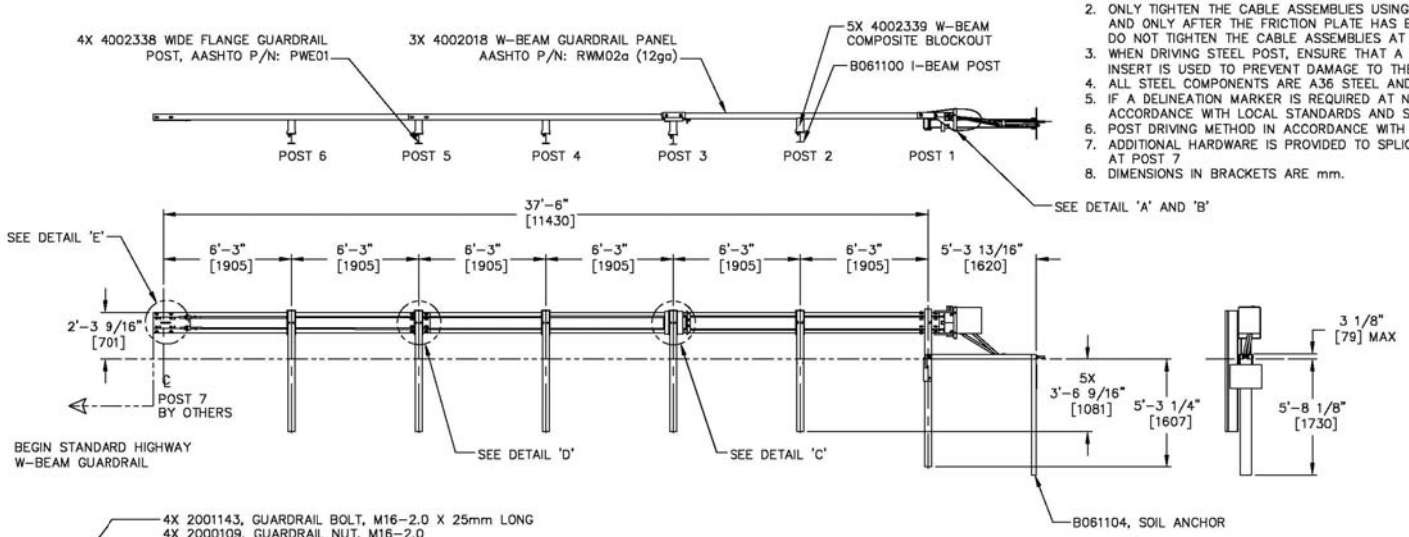


Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
4002018	3	W-Beam Guardrail RWM02a
4002337	5	W-Beam Timber Blockout PDB01b
4002338	5	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001143	24	Guardrail Bolt M16-2.0 x 25mm
2000431	1	Post Bolt, M16-2.0 x 50mm
2001643	5	Post Bolt, M16-2.0 x 254mm
2000109	31	Guardrail Nut, M16-2.0
2001718	1	Hex Bolt, M16-2.0 x 200mm
2001615	4	Hex Bolt, M20-2.5x75mm
2001145	7	Round Washer, M16
A070425	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

SHEET	DRAWING NUMBER	REV.
7 OF 10	B080439	0

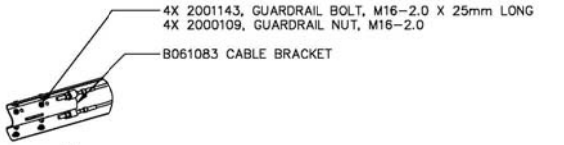
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

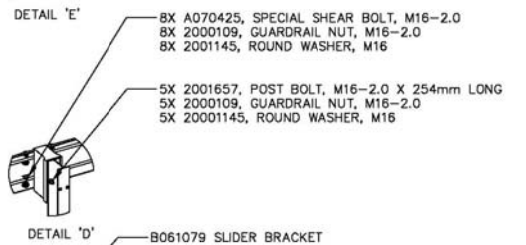
X-TENSION GUARDRAIL TERMINAL SYSTEM, METRIC, COMPOSITE BLOCKOUT TO STEEL POST, XTGTSM3

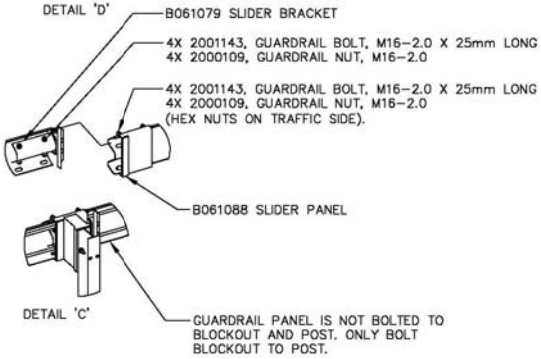


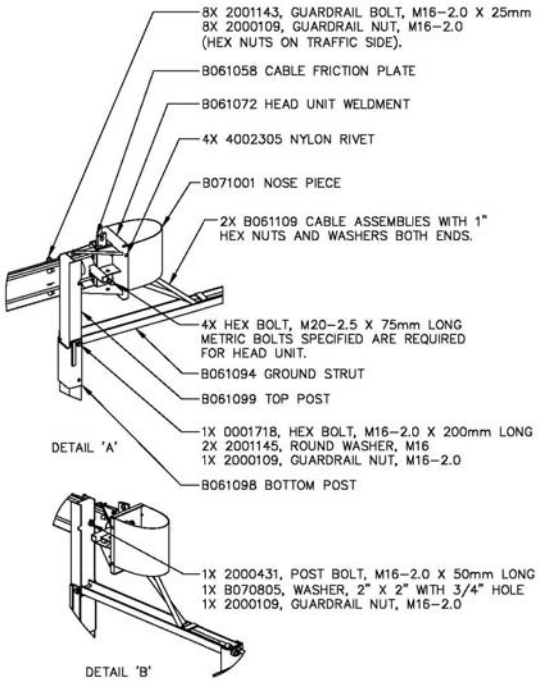
NOTES: UNLESS OTHERWISE SPECIFIED

1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7
8. DIMENSIONS IN BRACKETS ARE mm.







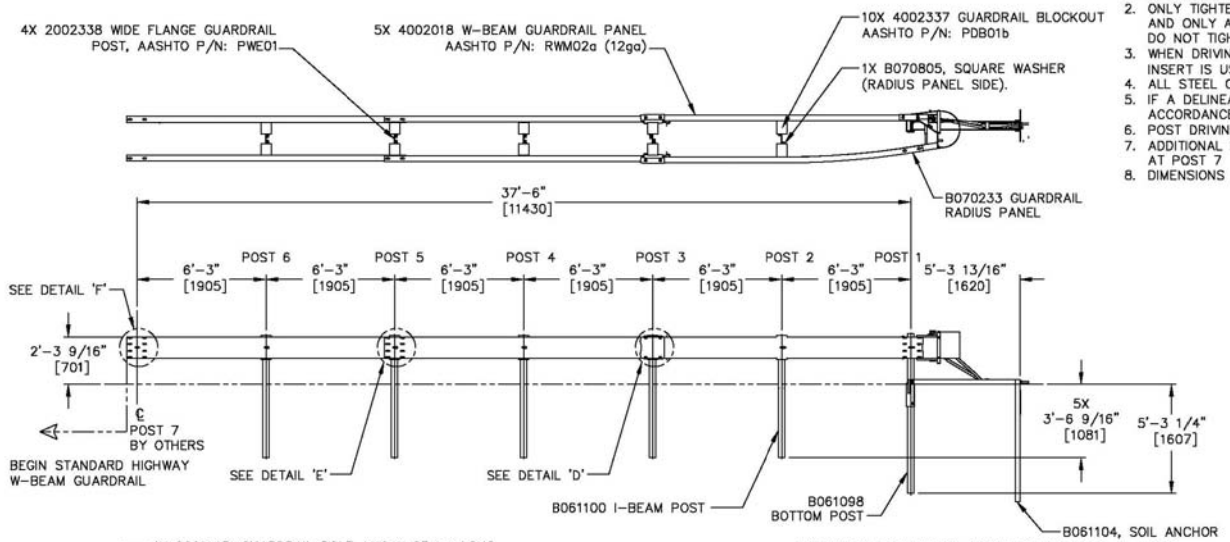


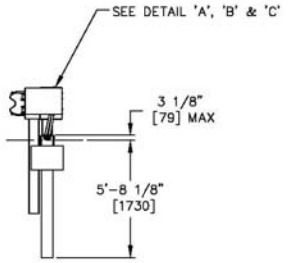
Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	1	SLIDER BRACKET WELDMENT
B061088	1	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B071001	1	NOSE PIECE
B061100	1	I-BEAM POST, POST 2
4002018	3	W-Beam Guardrail RWM02a
4002339	5	W-Beam Composite Blockout
4002338	5	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001143	24	Guardrail Bolt M16-2.0 x 25mm
2000431	1	Post Bolt, M16-2.0 x 50mm
2001643	5	Post Bolt, M16-2.0 x 254mm
2000109	31	Guardrail Nut, M16-2.0
2001718	1	Hex Bolt, M16-2.0 x 200mm
2001615	4	Hex Bolt, M20-2.5x75mm
2001145	7	Round Washer, M16
A070425	8	Special Shear Bolt w/ nut & washer
B070805	1	Washer, 2" x 2" w/ 3/4" hole

SHEET	DRAWING NUMBER	REV.
8 OF 10	B080439	0

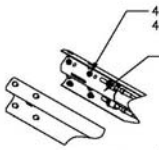
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

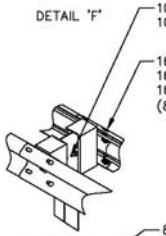
X-TENSION MEDIAN TERMINAL SYSTEM, METRIC, WOOD BLOCKOUT TO STEEL POST, XTMTSM2

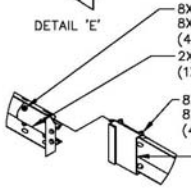


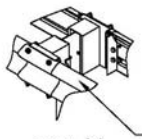


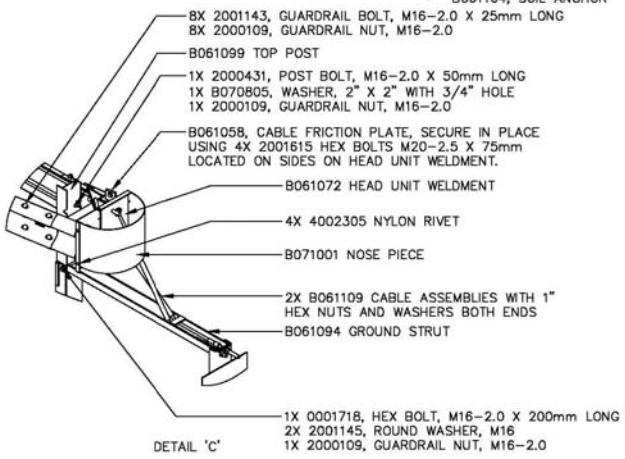
NOTES: UNLESS OTHERWISE SPECIFIED
1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7
8. DIMENSIONS IN BRACKETS ARE mm.

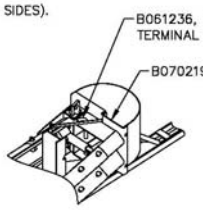


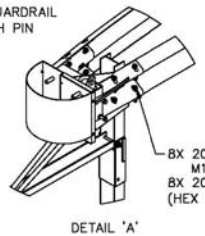










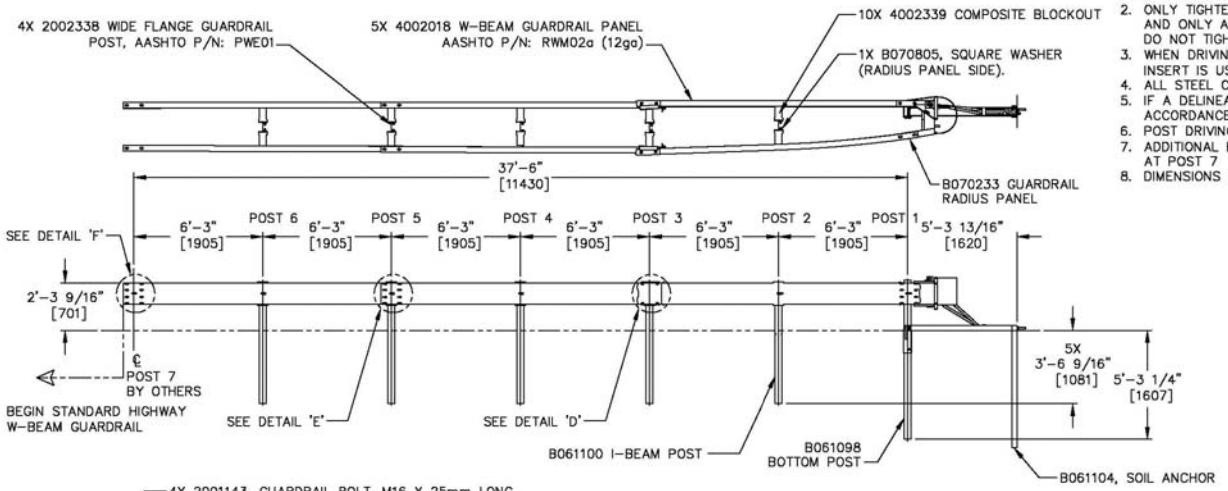


Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	2	SLIDER BRACKET WELDMENT
B061088	2	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B061100	1	I-BEAM POST, POST 2
B071001	1	NOSE PIECE
B070219	1	IMPACT HEAD WELDMENT, MEDIAN TERMINAL, X-TENSION
B061236	1	BAR, MEDIAN GUARDRAIL TERMINAL
B070233	1	PANEL, RADIUS GUARDRAIL, W-BEAM, X-TENSION TERMINAL
4002018	5	W-Beam Guardrail RWM02a
4002337	10	W-Beam Timber Blockout PDB01b
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001143	48	Guardrail Bolt M16-2.0 x 25mm
2000431	1	Post Bolt M16-2.0 x 50mm
2001643	10	Post Bolt M16-2.0 x 254mm
2000109	60	Guardrail Nut, M16-2.0
2001718	1	Hex Bolt, M16-2.0 x 200mm
2001615	4	Hex Bolt, M20-2.5x75mm
2001145	2	Round Washer, M16
A070426	16	Special Shear Bolt w/ nut & washer
B070805	2	Washer, 2" x 2" w/ 3/4" hole
2000090	1	1/4" Linch Pin

SHEET	DRAWING NUMBER	REV.
9 OF 10	B080439	0

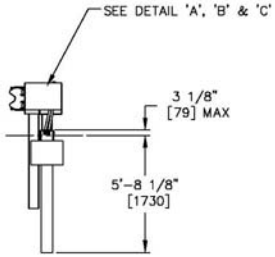
BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

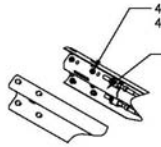
X-TENSION MEDIAN TERMINAL SYSTEM, METRIC, COMPOSITE BLOCKOUT TO STEEL POST, XTMTSM3



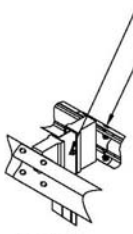
NOTES: UNLESS OTHERWISE SPECIFIED

1. X-TENSION SYSTEM TO BE INSTALLED PER MANUFACTURER INSTRUCTIONS.
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE HEX NUTS AT CABLE BRACKETS AND ONLY AFTER THE FRICTION PLATE HAS BEEN TURNED AT THE HEAD WELDMENT. DO NOT TIGHTEN THE CABLE ASSEMBLIES AT THE FRONT OF THE GROUND ANCHOR.
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING AT THE TOP OF THE POST.
4. ALL STEEL COMPONENTS ARE A36 STEEL AND ARE GALVANIZED PER ASTM A123.
5. IF A DELINEATION MARKER IS REQUIRED AT NOSE PIECE, MARKER SHALL BE IN ACCORDANCE WITH LOCAL STANDARDS AND SPECIFICATIONS.
6. POST DRIVING METHOD IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL STANDARDS.
7. ADDITIONAL HARDWARE IS PROVIDED TO SPLICE SYSTEM TO EXISTING GUARDRAIL AT POST 7
8. DIMENSIONS IN BRACKETS ARE mm.

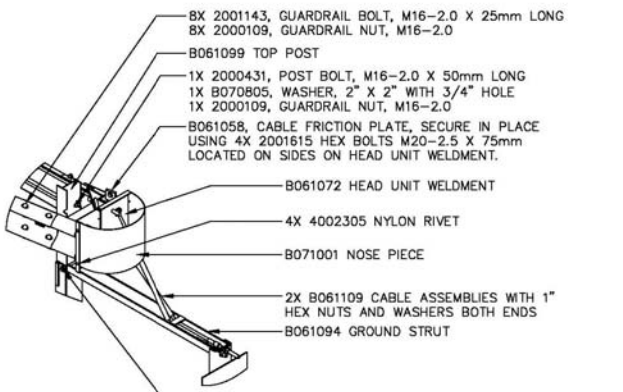




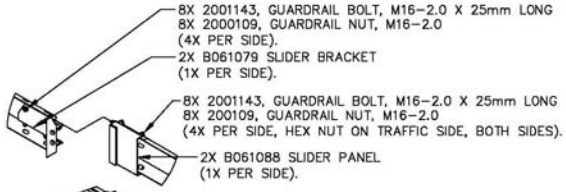
DETAIL 'F'

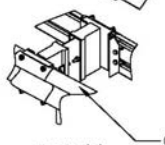


DETAIL 'E'



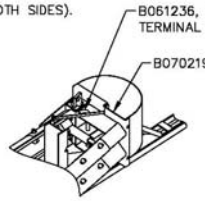
DETAIL 'C'



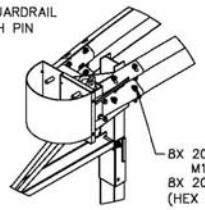


GUARDRAIL PANEL IS NOT BOLTED TO BLOCKOUT AND POST. ONLY BOLT BLOCKOUT TO POST.

DETAIL 'D'



DETAIL 'B'



DETAIL 'A'

Part#	Qty	Part Description
B061072	1	HEAD UNIT WELDMENT
B061058	1	CABLE FRICTION PLATE, HEAD UNIT
B061079	2	SLIDER BRACKET WELDMENT
B061088	2	SLIDER PANEL WELDMENT, W-BEAM
B061083	1	CABLE BRACKET WELDMENT
B061109	2	CABLE ASSEMBLY
B061094	1	GROUND STRUT WELDMENT
B061104	1	SOIL ANCHOR WELDMENT
B061098	1	BOTTOM POST WELDMENT
B061099	1	I-BEAM POST, TOP
B061100	1	I-BEAM POST, POST 2
B071001	1	NOSE PIECE
B070219	1	IMPACT HEAD WELDMENT, MEDIAN TERMINAL, X-TENSION
B061236	1	BAR, MEDIAN GUARDRAIL TERMINAL
B070233	1	PANEL, RADIUS GUARDRAIL, W-BEAM, X-TENSION TERMINAL
4002018	5	W-Beam Guardrail RWM02a
4002339	10	W-Beam Composite Blockout
4002338	4	Wide Flange Guardrail Post PWE01
4002305	4	Nylon Rivet
2001143	48	Guardrail Bolt M16-2.0 x 25mm
2000431	1	Post Bolt M16-2.0 x 50mm
2001643	10	Post Bolt M16-2.0 x 254mm
2000109	60	Guardrail Nut, M16-2.0
2001718	1	Hex Bolt, M16-2.0 x 200mm
2001615	4	Hex Bolt, M20-2.5x75mm
2001145	2	Round Washer, M16
A070426	16	Special Shear Bolt w/ nut & washer
B070805	2	Washer, 2" x 2" w/ 3/4" hole
2000090	1	1/4" Linch Pin

SHEET	DRAWING NUMBER	REV.
10 OF 10	B080439	0

BARRIER SYSTEMS
A LINDSAY TRANSPORTATION SOLUTIONS COMPANY