

X-Tension Guardrail Terminal End General Specifications

I. Description

The X-Tension guardrail terminal end is designed, manufacture and supplied by Barrier Systems Sales and Service LLC.

The X-Tension is a Tangent, Flared, Median, fully redirective, non-gating terminal end which is energy absorbing. The X-Tension substantially consists of an impact head with a brake bar inside, a slider assembly and slider bracket, a cable anchor bracket, a foundation anchor assembly, ground strut, steel breakaway posts and three standard 12 gauge highway W-beam rails.

The total length of the system is 11.4 meters and may be flared at the head end over the 11.4 meters, 0 - 1219mm / 0 – 4' to the face of the rail.

II. Performance

- A. The X-Tension is capable of redirecting vehicles of 820 to 2000Kg's impacting the side of the system at an angle of up to 20 degrees and 100 KPH when impacting from the length of need. The length of need starts at post #1.
- B. When impacted end on with the 820 to 2000Kg vehicle at speeds of up to 100 KPH, the system is brought to a controlled stop or allowed to penetrate to the back side, depending on the impact conditions.
- C. In all end on impacts, varying amounts of energy are dissipated depending on the length of time the vehicle remains in contact with the impact head.
- D. During end on impacts the head, rail one and the slider, telescope over rail two until rail two comes to rest in the back of the impact head. At this point, the V notch bolts joining rail one and two are sheared allowing the entire rail one, head, slider and rail two assembly to slide over rail three.
- E. As the head is pushed down the two cables, the cables are pulled through the brake bar in a torturous path, which dissipates energy.

III. Materials

A. Impact Head

The impact head shall be fabricated from hot rolled steel that is galvanized after fabrication in accordance with AS/NZS 4680.

The hot rolled steel specification – ASM A36 , AS 3678-250, JISG3101 – SS400, BS4360 -43A.

The impact head shall be attached to the end of rail one with 8 standard splice bolts reversed so that the nut is on the traffic face. The head contains the brake bar through which the cables are threaded before tightening the brake bar.

B. Steel Line Posts

These posts are fabricated from W6 x 13.5 standard I beam section. Standard specification for this section is AASHTO M270M (ASTM A 709M) grade 250steel. Posts #1 and #2 are crimped. Posts 3 – 6 are standard guardrail posts as per AASHTO PWE01, Wide Flange Post.

C. Timber Block Outs

Standard routed block outs H4 treated, Number one rough sawn pine. 5 block outs are required; Post #1 does not have a block out.

D. Slider and Slider Bracket

Shall be constructed from standard, 350 grade, guardrail and hot rolled steel of the same specification as the impact head. The slider is bolted to the downstream end of rail one with 4 standard splice bolts reversed so that the nuts are on the outside. The slider bracket is bolted with 4 splice bolts to the end of rail two in the usual manner. Once rail one is slid over rail two into its final position, the locking angle is bolted to the slider bracket. The combination of these two devices allows the rails to telescope when impacted end on and yet still maintain full ribbon strength in the rail during a redirect impact. Both components are to be hot dipped galvanized after fabrication.

E. Cable Anchor Bracket

The cable bracket is fabricated from hot rolled mild steel, 5mm thick, and attached to the back of the rail at the junction between rails 3 and 4. (Post 7). The bracket is attached using four centre splice bolts that are joining the rails. Bracket is also hot dip galvanized after fabrication.

F. Cables

Two cables are constructed using 19mm 3x7 strand galvanised cable complete with an M24 threaded rod swaged onto each end. The cables are attached to the ground anchor point, threaded through the impact head and brake bar, down the back of the W beam in the “hollows” and attached to the cable anchor bracket at the downstream end. The brake bar is then turned and locked into place before the cables are tightened. Cable specification, DSR Galvanized 320 / ASTM A-603

G. Foundation Anchor

Foundation anchor consists of one C section anchor fabricated from mild steel channel and one I section anchor fabricated from the same section and specification as the Line Posts.

The C section anchor shall be constructed from mild steel conforming to the following specifications ASM A36, AS 3678-300, JISG3101 – SS400, BS4360 - 43A.

H. Ground Strut

Ground strut is fabricated from C section mild steel made to the same standard as the foundation anchor specifications. The ground strut shall join the C section anchor point and the, I section, anchor point which is also the bottom half of post one.

I. Post One and Two

Fabricated from the same section and specification as the line posts. Post #1 is a short post and bolts into the top of the, I section, anchor point. Both Post #1 and #2 are crimped near the ground level. The impact head is bolted to post one with a standard 50mm long splice bolt.

J. Bull nose

Fabricated from a, 3mm thick, polyethylene plastic sheeting. This bull nose is “bent” into position on site.

K. Rail Elements

Standard 12 gauge, 2.7mm BMT, 350 grade galvanised W beam. As per AASHTO M180 Class A rail. Three standard sections are required.

L. Fasteners

All fasteners shall be Class 4.6 (Grade2) or greater and galvanized in accordance with ASTM 153. Washers shall be hardened and galvanized.

IV. Construction

Design, selection and placement of the X-Tension terminal end shall be in accordance with the AASHTO Roadside Design Guide and the details shown in the construction drawings. Installation shall be in accordance with the installation instructions supplied by Barrier Systems.

Damaged systems shall be repaired or replaced immediately at the expense of the owner of the installed system.

V. Performance Specification

All leading Guardrail Terminal Ends must be fully re-directive and non-gating, capable of redirecting an errant vehicle from post one in side on impacts. (up to 2000P at 20 Degrees and 100 kph). The terminal end must be telescoping and energy absorbing in end on impacts with the impacting force held in tension rather than compression. No debris shall be expelled from the system.

