



MANUALE DI INSTALLAZIONE E MANUTENZIONE
INSTALLATION AND MAINTENANCE MANUAL



A LINDSAY TRANSPORTATION SOLUTIONS COMPANY

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X-TENSION DS GUARDRAIL END TERMINAL

TABLE OF CONTENTS

Drawings and Check List	2
Tools	6
Installation	7
Foundations	33
Maintenance	34

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REV	DATE	ISSUE	COMMENTS
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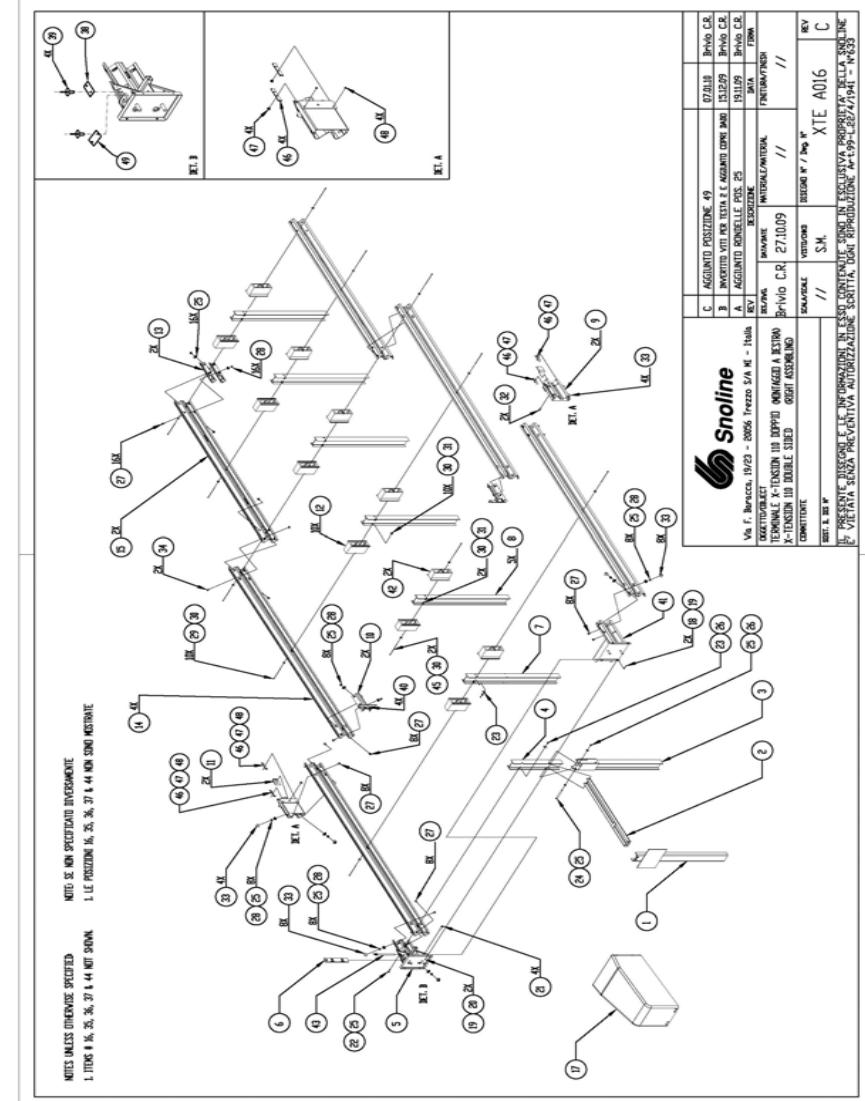
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DRAWINGS AND CHECK LIST



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2

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**TERMINALE "X-TENSION" 110 DOPPIO (MONTAGGIO A DESTRA)
X-TENSION DOUBLE SIDED (RIGHT ASSEMBLING)**

XTE A016		REV. C	Data 07/01/2010		
POS.	DESCRIZIONE (I)	DESCRIPTION (ENG)	PESO TEORICO UN. KG	DIS/DRW	QUANT.
1	Palo d'ancoraggio	Soil anchor weldment	45	XTE 011	1
2	Puntone	Ground strut weldment	29	XTE 012	1
3	Primo palo infisso	Bottom post weldment	32	XTE 013	1
4	Primo palo	I-Beam Post, Top	13	XTE 014	1
5	Unità di testa	Head Unit Weldment	30	XTE 015	1
6	Piastra frizione cavi	Cable Friction Plate	5	XTE 016	1
7	Palo intermedio	I-Beam post, middle	24	XTE 017	1
8	Palo posteriore	Wide flange guardrail post	25	XTE 018	5
9	Pannello cursore	Slider panel weldment	14	XTE 019	2
10	Squadretta	Slider bracket weldment	4	XTE 020	2
	Angolare	Angle bar	1	XTE 021	2
11	Rondella di frizione cursore	Slider washer	0,266	XTE 039	2
12	Distanziale	W-Beam composite blockout	4	XTE 023	10
13	Squadretta fissaggio cavi	Cable bracket	3	XTE 024	2
14	Lama anteriore	W-Beam guardrail panel (4m)	56	XTE 025	4
15	Lama posteriore	W-Beam guardrail panel (3,5m)	45	XTE 026	2
16	Cavo	Cable assembly	19	XTE 027	2
17	Naso	Nose	7,5	XTE 044	1
18	Vite TE M6x25 classe 8.8	Screw TE M6x25 class 8.8			6
19	Rondella piana M6	Washer M6			12
20	Dado medio M6 classe 8	Nut M6 class 8			6
21	Vite TE M20x80 INOX A2-70	Screw TE M20x80 inox A2-70			4
22	Vite TE M16x50 classe 8.8	Screw TE M16x50 class 8.8			1
23	Rondella quadra	Washer square	0,04	XTE 029	2
24	Vite TE M16x200 cl. 8.8 parz. fil.	Screw TE M16x200 class 8.8 threaded partially			1
25	Rondella piana Ø17xØ40	Washer Ø17xØ40			51
26	Dado medio M16 classe 8	Nut M16 class 8			2
27	Vite TT M16x30 classe 8.8	Screw TT M16x30 class 8.8			48
28	Dado medio M16 classe 8	Nut M16 class 8			48
29	Vite TE M10x240 cl. 8.8 parz. fil.	Screw TE M10x240 class 8.8 threaded partially			10

Pagina 1 di 2

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X-TENSION DOUBLE SIDED (RIGHT ASSEMBLING)**

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POS.	DESCRIZIONE (I)	DESCRIPTION (ENG)	PESO TEORICO UN. KG	DIS/DRW	QUANT.
30	Rondella piana Ø10xØ40	Washer Ø10xØ40			24
31	Dado medio M10 classe 8	Nut M10 class 8			12
32	Vite per cursore XT	Screw for slider panel		XTE 043	2
33	Copri dado	Plastic nut protector		XTE 030	24
34	Vite a taglio (KIT da 8 pezzi + rondelle e dadi)	Shear bolt (8 pcs + washer and nut KIT)		K080123	2
35	Cavetto di fissaggio naso L=3100	Nose protector tether L=3100		XTE 032	1
36	Cavetto di fissaggio distanziale L=1400	Blockout tether L=1400			6
37	Morsetto Ø5	Wire rope clamp Ø5		XTE 033	14
38	Targhetta identificazione	Identification plate		TAU 114	1
39	Rivetto AI Ø4,8x14 testa larga	AL rivet Ø4,8x14 -large			4
40	Vite TE M20x30 classe 8.8	Screw TE M20x30 class 8.8			4
41	Testa XT doppio	Head double sided		XTE 040	1
42	Distanziale per cursore	Blockout for slider panel		XTE 041	2
43	Perno	Spidled pin		XTE 042	1
44	Spina a scatto	Pin lynch			1
45	Vite TE M10x180 cl. 8.8 parz. fil.	Screw TE M10x180 class 8.8 threaded partially			2
* 46	Piatto interno per pannello cursore	Internal plate for slider panel		XTE 045	4
* 47	Vite T.S.P.E.I. M12x35 classe 8.8	Screw T.S.P.E.I. M12x35 class 8.8			4
* 48	Dado medio M12 classe 8	Nut M12 class 8			4
49	Targhetta marchio CE	Plate		VAR 179	1
* GLI ELEMENTI SONO COMPRESI NEL PANNELO CURSORE XTE 019		* THE ELEMENTS ARE INCLUDED IN THE SLIDER PANEL XTE 019			

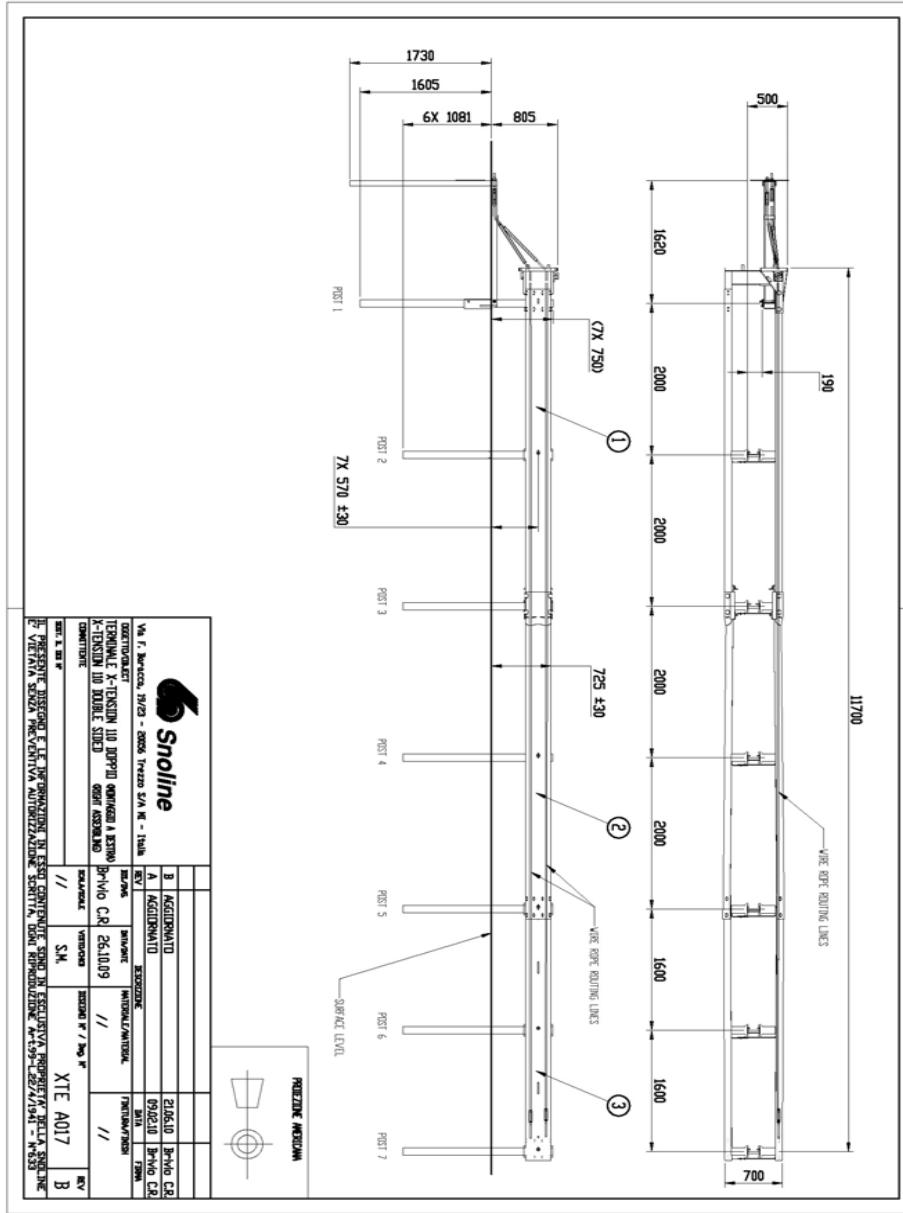
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TOOLS

- 24, 30 ,32 , 38mm sockets/ring-open end spanners
 - Podger bars
 - Large crow bar
 - String line
 - Level
 - Rammers and post drivers (for I-beam posts with external dimension 100x150mm and for C-beam posts with external dimension 166x70mm)



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INSTALLATION

Before installing an X-Tension 110 Terminal, ensure that all the materials required for the system listed in check lists and tools are on site and have been identified.

Begin the installation from downstream end of the terminal at the point where it joins the existing barrier (post 7).

The X-Tension 110 Terminal connect directly to all "W" profile beams or it can be connected to a variety of barriers with suitable connections.

Pull a string line out to give the desired setback over the length of the system, in a straight line parallel to the kerb. The string line should be set to follow and extend the line of the roadside edge of the system posts.

Post 2 to 7 are setback compared with I-beam post, Top and probably with the one of the existing barrier (in case of different spacer block)(Figure 1).



Figure 1 – String over the length of the system



All the posts except post 1 have a spacer block. Post 2 to post 7 are offset 200mm behind the string line. The blockouts are shorter at post 3.

Install posts 7 to 2 at the correct spacing and height. (Figure 2 and drawing at page 8). The spacing between posts 7 and 6 is 1600mm, same as between posts 6 and 5. Posts 5 to 1 are all at the same spacing one to each other.



Figure 2 - Posts 7-2 with the desired offset

Posts may be driven, concreted or socketed. Any damage to the driven posts should be treated appropriately without delay.

Ensure post 2 has post bolt holes are facing the beam (Notches go to backside) (Figure 3).



Figure 3 - Intermediate post 2

Install the bottom post weldment in the correct position so that no more than 100mm protrudes above ground level (Figure 4).



Figure 4 - Install bottom post weldment

Use the Ground Strut as a template to place the soil anchor weldment in the correct position. Place I-beam post top in bottom post weldment. Ensure the post bolt notches are at the top and facing the ground anchor (Figure 5). Use M16 x 200mm hex head screw with nut and washers. **Do not over tighten screws.**



Figure 5 - Lay out the ground strut to correctly space the ground anchor



The soil anchor weldment can then be driven (Figure 6).



Figure 6 - Drive the soil anchor weldment

The ground strut weldment should be level or lower at the anchor end than at I-beam post, top (Figure 7).



Figure 7 - Post 1 installed

Refer to drawing A015 p. 29 for the correct positioning and coupling of the beams with the other elements of the system. Before hanging the connection beam, place W-beam composite blockouts on posts 2,3,4,5,6 and 7. Install blockout teethers into place as shown (Figure 8).

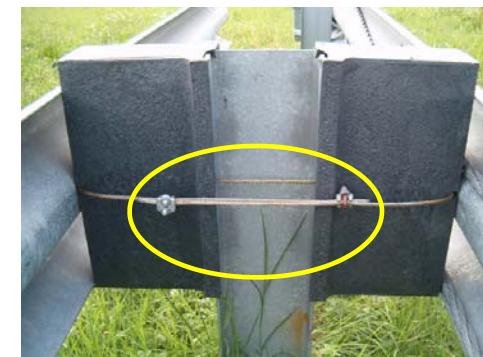


Figure 8 - W-beam composite blockouts to post 2 to 7

As said before, the installation begins from downstream end of the terminal at the point where it joins the existing barrier; the connection rear beam has to be connected at post 6 in the centre of the beam self. Place the cable bracket behind the beam on the junction point between the w-beam guardrail panel 3 (3,5m) and existing barrier beam on post 7 (Figure 9). Fix beam to post 6 and 7 with M10 x 240mm bolts supplied.



Figure 9 - Cable bracket at post 7

Lap w-beam guardrail panel 3 (3,5m) to the 'system' beam (post 7) using 8 standard lap screws, appropriate for the "system" (figure 10).



Figure 10 - Lap connection at post 7

Then pass to W-beam guardrail panel 2 (4m), which has to be lapped to W-beam guardrail panel 3 (3,5m) just installed at post 5.



Figure 11 - Spacer block attached to post 3

Attach slider bracket weldment to w-beam guardrail panel 2 and bolt it at end of panel 2 at the central rectangular slot (Figure 12).



Figure 13 - Slider bracket weldment at post 3

Use 4 dome head lap screws. The slider bracket weldment has to be installed placing the end, which carries the angle bar, towards post 2. Remove the angle bar for coupling panel 2, slider panel and panel 1.

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Bolt w-beam guardrail panel 2 to the w-beam composite blockout and posts at post 4 and 5 with M10x240mm hex head bolt. Lap w-beam guardrail panel 2 to w-beam guardrail panel 3 (3,5m) with the **8 special shear bolts (yellow head)** supplied. Put the washer and nut on inside of beam (Figure 13).



EN Figure 13 - Yellow headed shear bolts at lap joint on post 5

IMPORTANT NOTE: DO NOT USE STANDARD LAP SCREWS AT POST 5.

Thread panel 1 in the slider panel, sitting panel 1 on a blockout or a post so that it is raised off the ground (Figure 14). Attach using 4 dome head lap screws, pushing the screw through from the inside of the slider to the outside so that the **nut is on the traffic face**.



EN Figure 14 - Sit panel 1 so it is raised off the ground.

The slider Panel sits at the beam end. In case use a podger bar to assist with lining up lap holes.
 Lift PANEL 1 with slider panel weldment attached and push the slider end over panel 2 (Figure 15-16).



EN Figure 15 - 16 Push slider panel weldment over panel 2



Overlap the beams so the centre of panel 1 fits to post 2. If the plates inside the slider panel weldment (supplied already mounted), make the insertion of panel 2 difficult, remove them and insert them again after the coupling.

NOTE: the smoothed and folded end has to be turned towards panel 2 in order not to hinder the insertion of panel 3 during the system's functioning (Figure 17).



Figure 17 - Plates insertion side

Bolt panel 1 and w-beam composite blockout to post 2 using M10 x 240mm hex head bolt.



Place impact head on end of panel 1 and attach using 8 dome head lap screws (M16 x 45) with nuts on traffic face. **Hint:** Place bottom two screws first then use podger bar to lever head up snug onto beam. (Figure 18).



Figure 18 - Attach impact head to panel 1

Bolt the head unit weldment and beam to post 1 using the supplied M16 x 45mm dome head bolt. Use a 50mm x 50mm square washer under the nut on the inside of post 1 (Figure 19).



Figure 19 - Bolt the head unit weldment and beam to post 1 with a square washer



Place the ropes and insert the cables as follows. At first insert the end inside the ground strut weldment placed on the ground (Figure 20).



Figure 20 - Insert cable in the ground strut weldment

EN Ensure that bottom rope (closest to road) has half the thread protruding through the anchor, as shown (Figure 21). Ensure the top rope has the nut wound on at least two turns past the end of the thread.



Figure 21 - Thread the nuts as shown



Then encircle the cable (closest to road) making a circle insert it in the bottom hole of the head unit weldment (Figure 22).



Figure 22 - Encircle the cable making a circle and insert it in the head unit weldment

EN Place the cable friction plate in the top of the head unit weldment as shown (Figure 23).



Figure 23 - Pass the rope through the lower hole



Now thread the cable down the backside of the beam behind the w-beam composite blockout and attach to the cable bracket at post 7 (Figure 25).

Repeat this process with the other rope but push it through the top hole of the head unit weldment and thread it along the beam to the cable bracket at post 7 (Figure 24).



Figure 24 - Cable insertion in upper hole

Screw the nuts and washer on the ropes at the cable bracket end without, for the moment, tightening ropes at this stage; this to allow cable friction plate to turn.



Figure 25 - Ropes in cable bracket at post 7



Turn the friction plate. Put a crow bar through the upper hole of the cable friction plate (Figure 26) and turn it to the final position (a quarter turn).



Figure 26 - Use crow bar to turn fiction plate

Using a socket (Figure 27), tighten the 4 - M20 x 75mm bolts on the side of the head unit weldment to lock the cable friction plate in the final position (Figure 28 – 29).



Figure 27 - Use socket to lock bar in the turned position



Fit secondary head to main head by pushing sideways onto the main head (Figure 28), until the holes in the gussets line up.



Figure 28 - Fit secondary head to main head

Fix into place with either the pin and pin lynch (Figure 29).



Figure 29 - Fix secondary head into place

Beams 3 and 2 are installed like standard guardrail with spacer block between the beam and the post (Figure 30). Attach beams to post 2, 4, 5, and 6 with the spacer blocks and the post bolts supplied (do not bolt the beam to post 3) and splice beam 3 to existing barrier with 8 standard splice bolts.

At post 7 lap beam in the direction of traffic as per standard median barrier.



Figure 30 - Beams installed with spacer blocks

Ensure that beam 2 is spliced to beam 3 using the special shear bolts (yellow head) supplied. DO NOT use standard splice bolts at this joint (Figure 31). Be sure beam 2 is lapped outside beam 3 in both directions.



Figure 31 - Splice beam 2 to beam 3 with 8 special shear bolts



Bolt the slider bracket to the upstream end of the beam 2 (at post 3) using 4 standard splice bolts (Figure 32).



Figure 32 - Bolt slider bracket to upstream end of beam 2

The angle bar end should be closest to the impact head end (Figure 33). Remove the angle bar and 2 related bolts.



Figure 33 - Angle bar end should be closest to impact head

Raise the straight end of the backside beam 1 and fit the slider panel onto the downstream end of beam (Figure 34) 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 35). Refer to drawing A015 p. 30 for the correct positioning and coupling of the beams with the other elements of the system.



Figure 34 - Fit the slider panel onto the straight end of the beam



Figure 35 - Push bolt from inside (nut on traffic face)

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Lift beam 1 with slider panel attached and push the slider end over beam 2.

Bolt beam 1 and spacer block to post 2 using supplied standard post bolts and the related washer on inside of post bolt notch on the backside of post 2 (Figure 36).



Figure 36 - Bolt beam 1 and spacer block to post 2 using the square washer

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Re-attach the angle bar to the slider bracket (Figure 37) on the backside of the beam (at post 3).



Figure 37 - Re-attach the angle bar to the slider bracket

Splice the beam to the secondary impact head using 8 standard splice bolts (Figure 38 - 39).



Figure 38 - 39 - Splice the beam to secondary impact head using 8 standard splice bolts

Push nose into place on the front of the impact head. Attach using the supplied rivets (Figure 40).

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



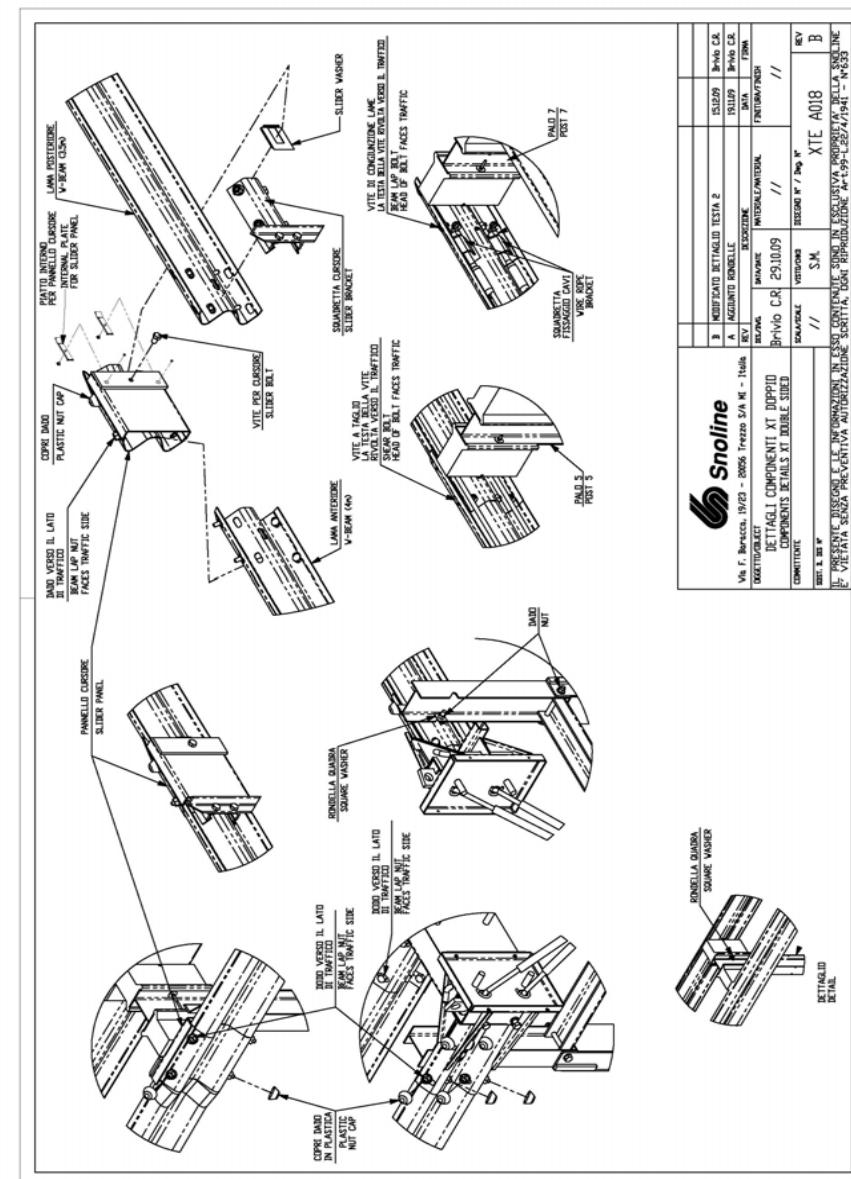
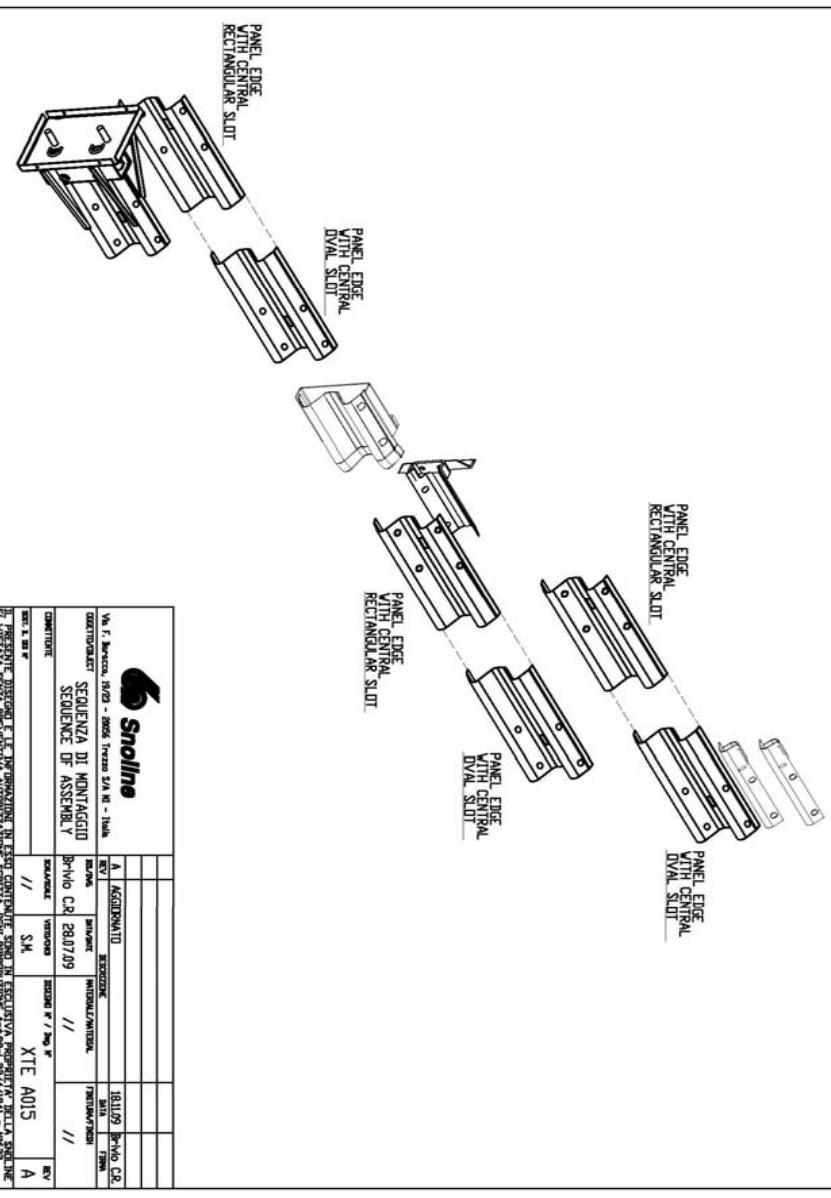
Figure 40 - Attach nose using nylon push rivets

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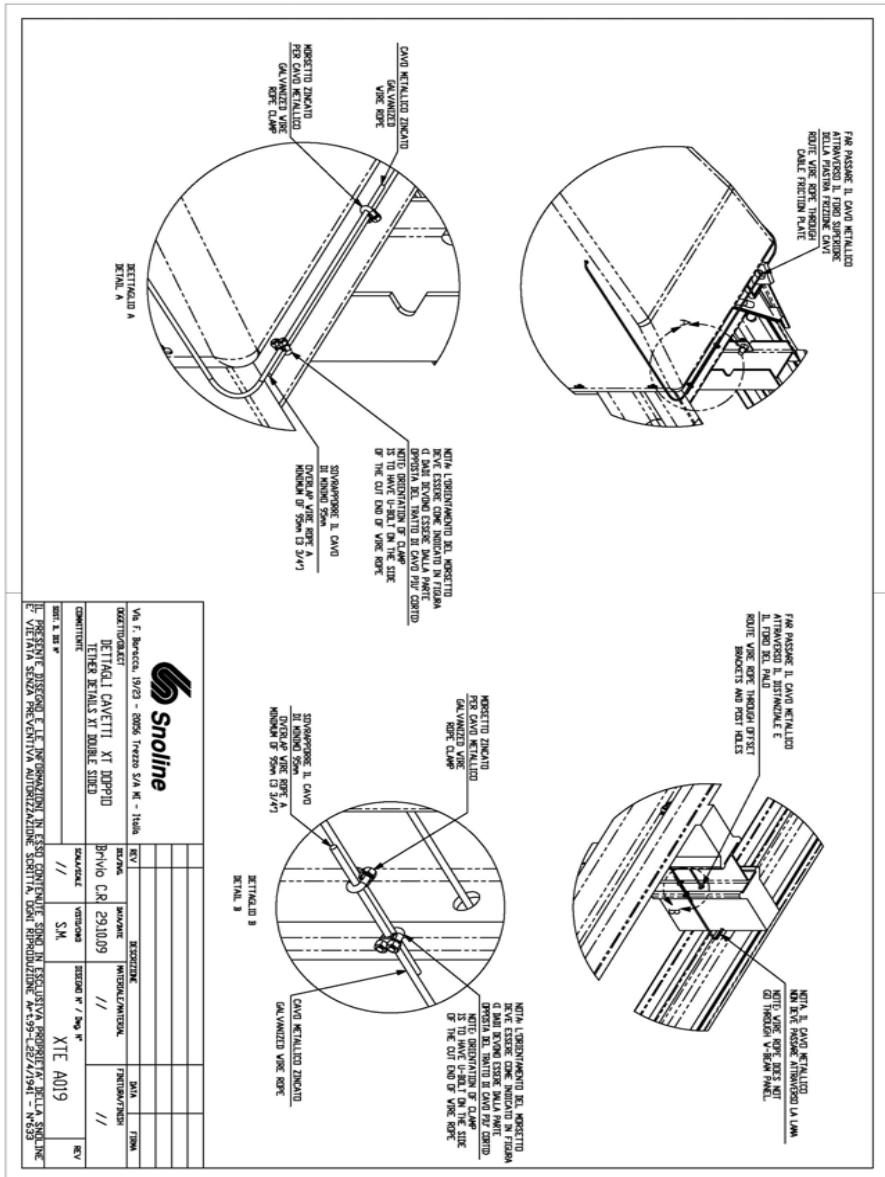




FOUNDATIONS

Ensure that the area where the X-Tension DS is to be installed is prepared so that the ground anchor will not protrude more than 100mm above ground level.

The X-Tension DS has been designed to be installed in verge reserve and median locations. The X-Tension DS offers a selection of post and foundation options to allow the system to be installed in a variety of ground conditions.





MAINTENANCE

Traffic Face Impacts

1. Remove ropes: Undo rope nuts at downstream rope anchor 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 rope at a time from the front side of the impact head and completely remove them. Rotating the rope as you pull them will help. Undo nuts at ground anchor end and remove rope.

2. Remove beams: Unbolt the lap fasteners first. Then unbolt the fasteners and lower beams to ground.

3. Remove X-Tension 110 components: All the X-Tension DS components are attached to the beams with standard splice bolts. Unbolt and remove the components.

4. Remove posts: Undo the bolt at the bottom of post 1 and pull out post. All damaged posts should be removed.

5. Assess the damage: Any part that cannot be reused must be replaced with a new part. **Always replace the yellow shear bolts.** If undamaged Ropes can be reused.

Generally, all the specialized components of the system such as the head and brackets should be undamaged.

6. Reassemble: Reassemble as per system installation instructions.

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Head on impacts

1. Remove ropes: After a head on impact the ropes may appear to be slack but may in fact still retain some tension from the impact. Care must be taken when removing the ropes.

DO NOT UNDO THE ROPES FROM THE GROUND ANCHOR END FIRST, ALWAYS UNDO THE ROPES FROM THE ROPE ANCHOR BRACKET (post 7) FIRST.

Undo nuts at rope anchor 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 ropes as you pull them will help. Undo nuts at ground anchor end and remove ropes.

2. Pull beams 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 suitable vehicle. (The components are easier to unbolt when the beams are separated).

3. Remove X-Tension DS components: Unbolt and remove the components.

4. Remove posts: Undo the bolt at the bottom of post 1 and pull out post. All damaged posts should be removed.

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

6. Reassemble: Reassemble as per system installation instructions.



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