

INFORMATION HANDOUT

FOR CONTRACT NO.: 05-1C8304

Project ID: 0512000238

IN SANTA BARBARA COUNTY, ON ROUTE 154, PM R5.9/22.9

Material Information

- 1) Pavement Profile Data**
- 2) Water Availability Documentation**
- 3) Alternative In-line Terminal System**
 - a. Type SKT
 - b. Type X-LITE
 - c. Type 31" X-Tension
 - d. Type SOFT STOP
- 4) Alternative Flared Terminal System**
 - a. Type Fleet-SP-MGS
 - b. Type SRT-31
 - c. Type 31" X-Tension
- 5) Temporary Alternative Crash Cushion System**
 - a. ABSORB 350 (TL-3)
 - b. SLED (TL-3)
 - c. ACZ-350 (TL-3)

Material Information

1) Pavement Profile Data

Summary of Field Investigations

1. ROADWAY:

Investigations carried out on the existing road, SB-154 between PM 5.9 and PM 7.9 , where Cold In-Place Recycling is proposed, indicate that these materials are suitable for cold in-place recycling. Coring tests and Ground Penetrating Radar (GPR) was used on subject roadbed. The results indicated that the engineering properties of these materials may be improved to provide sufficient strength required to extend the life of this pavement for five years by recycling the upper 0.25' from PM 5.9 to 7.9 and capping with 0.20' of RHMA-G

The general structural section, from the bottom up, is native material, and hot mix asphalt. Cores GPRs and core samples indicated a depth of hot mix asphalt that ranged from 0.033' to 0.58'.

The visual survey of the pavement indicated several areas with transverse, longitudinal and alligator cracking .

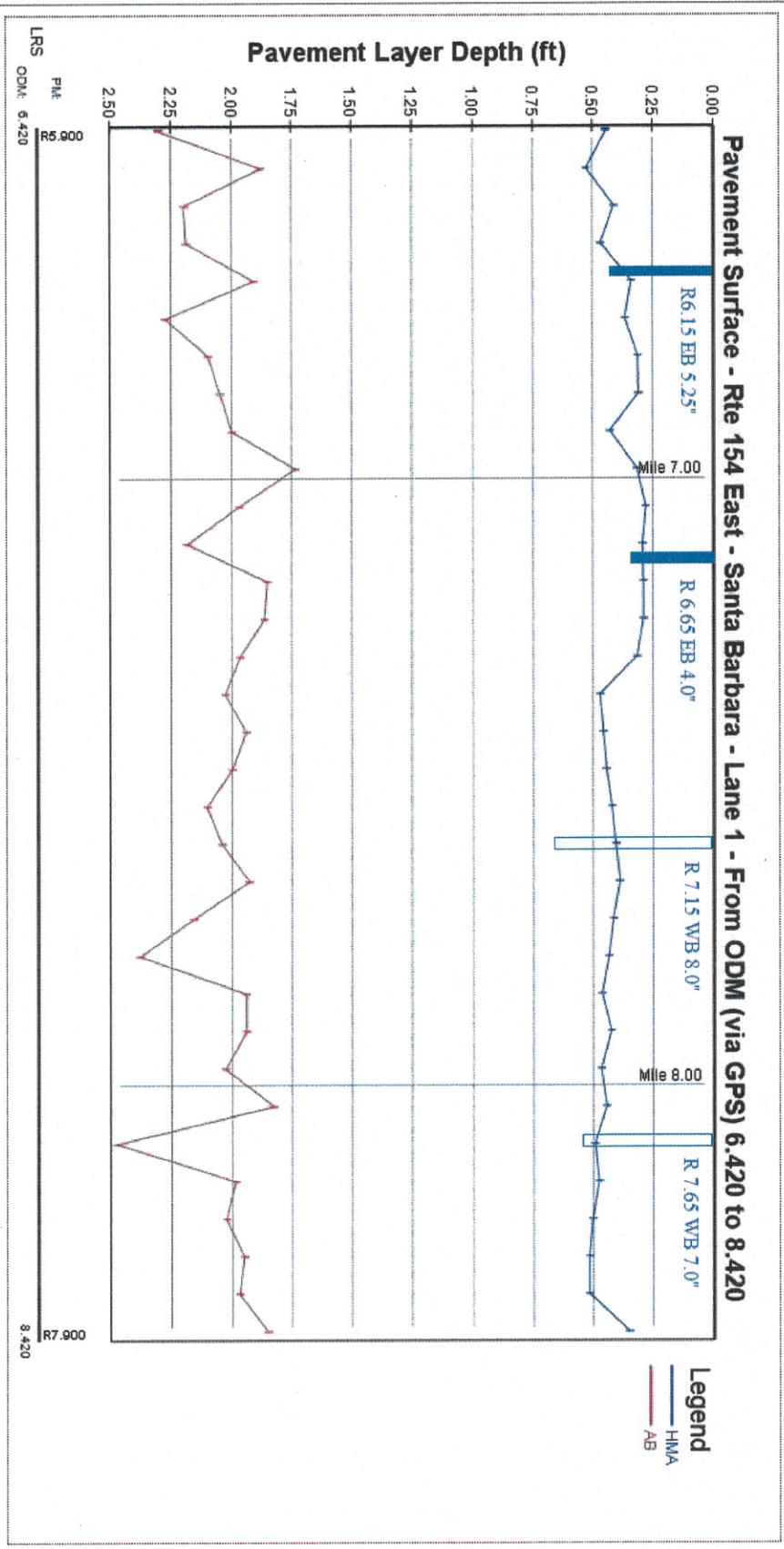
Any reliance placed by the contractor on this information shall be at their own risk and they shall undertake their own separate testing program to determine the materials present and conditions prevailing at the time of construction.

2. WATER AVAILABILITY:

523,510 gallons of water is needed for CIR, RHMA & HMA compaction and Cold Planning Pavement operations. Source of water for this project is available FROM Santa Ynez Water District.

District: County: Route: Post Mile: Direction: Lane:
 Associated ODM: View Range: Inc: Show cores independent of direction & lane
 US Units-Ft US Units-In SI Units

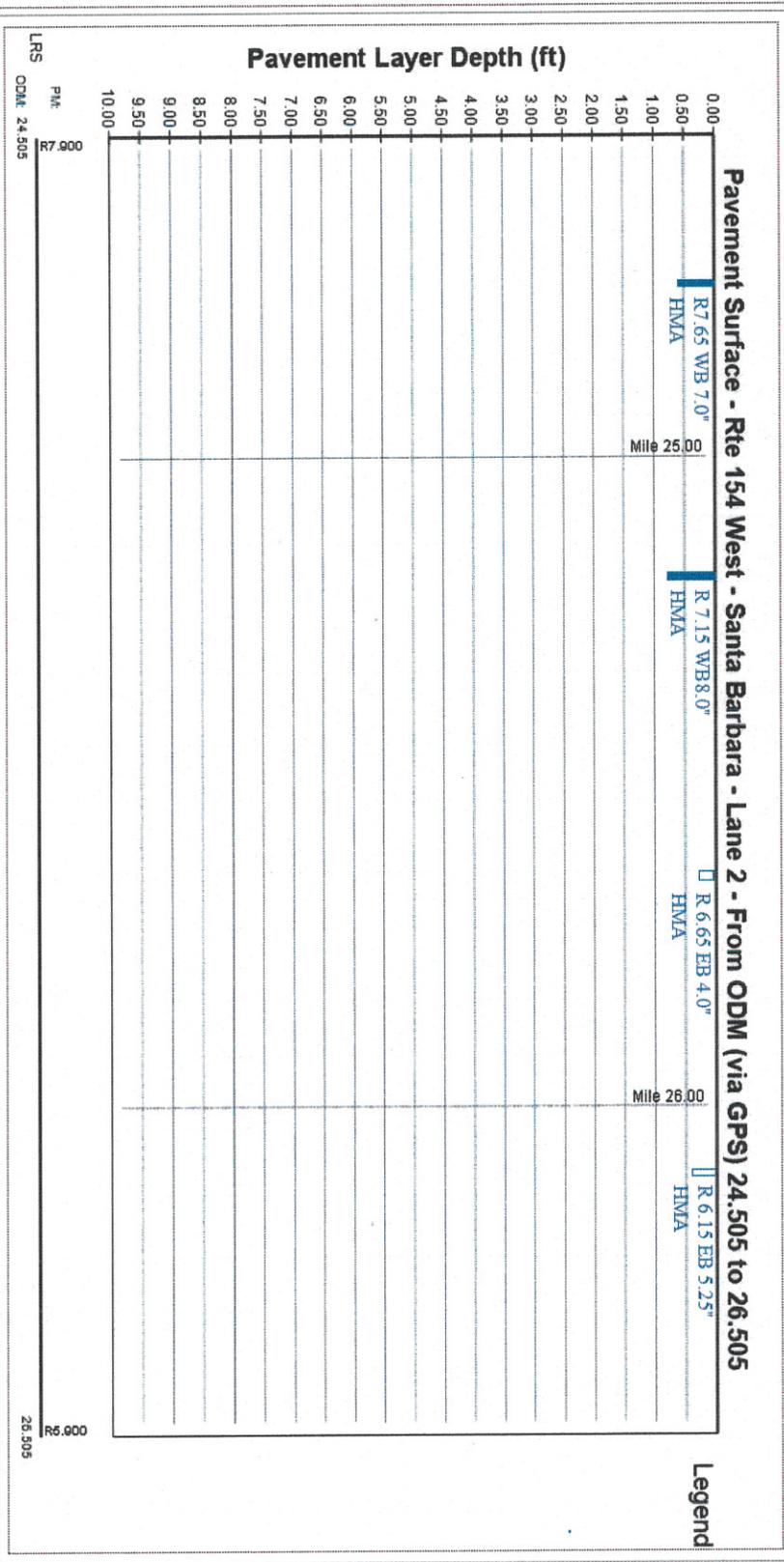
- Plan **Pavement Structure**
- Bridges/OH
 - Connectors
 - Ramps
 - Lanes
 - Route Boundaries
 - Misc



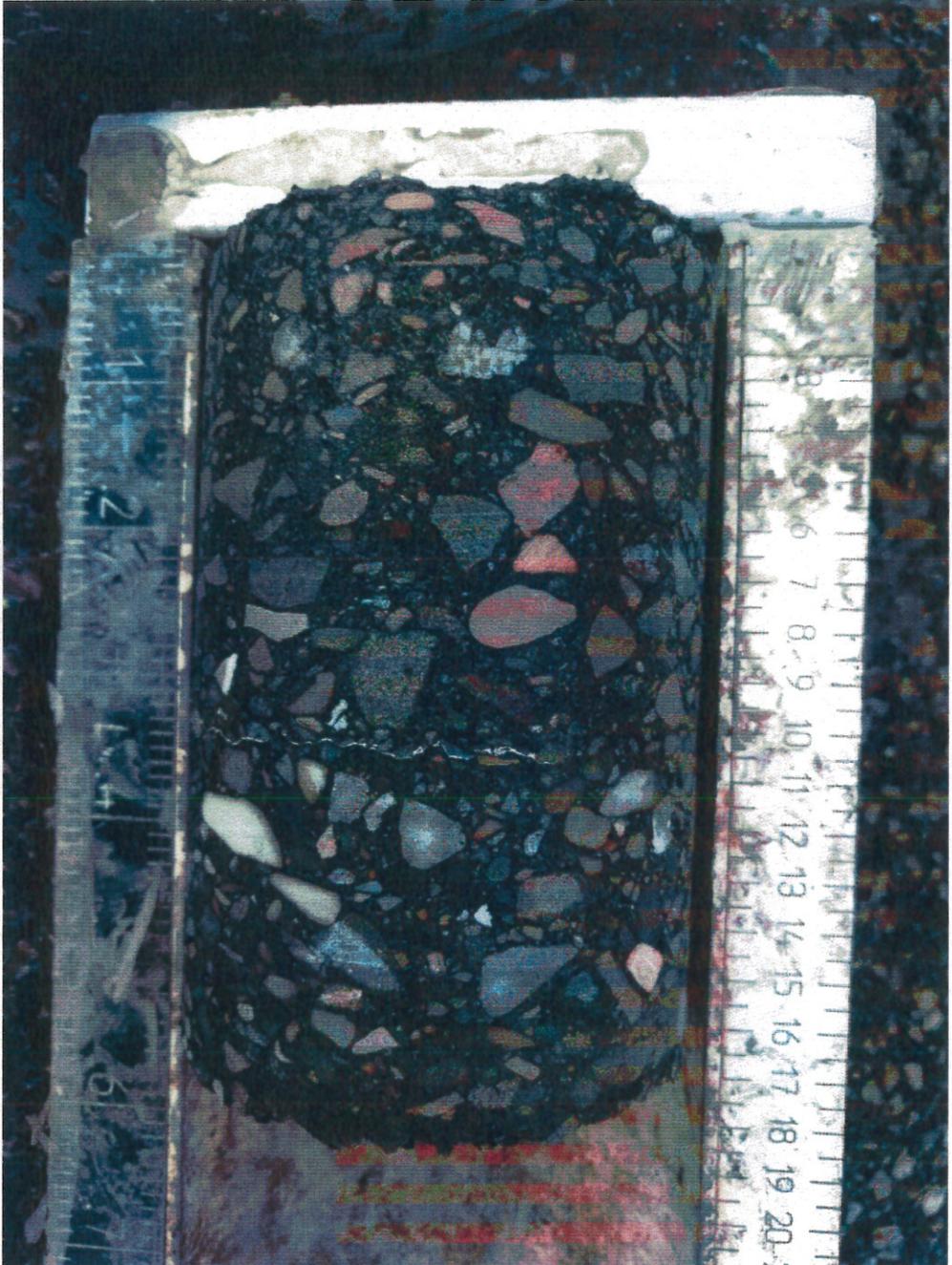
Note: iGPR reports between 4 inches to 6 inches of HMA in 154 EB Lane 1 between R5.9 to R7.9. EB Cores were in good agreement with radar.

District 5
 Santa Barbara
 Route 154
 Post Mile R6.900
 Direction West
 Lane 1
 View Range 2,000
 Inc 3,000
 Show cores independent of direction & lane
 US Units-Ft
 US Units-In
 SI Units

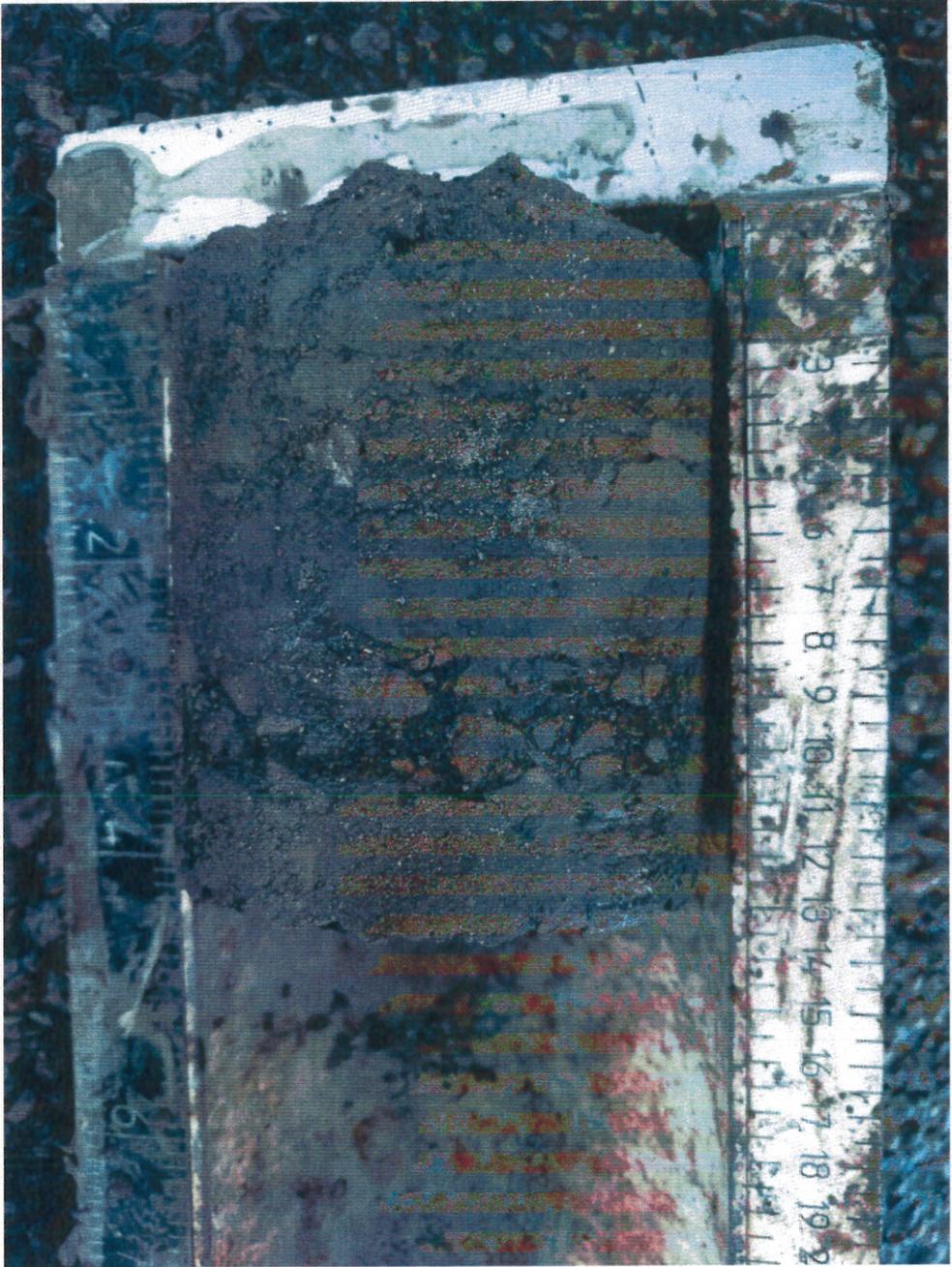
Bridges/OH
 Connectors
 Ramps
 Lanes
 Route Boundaries
 Misc



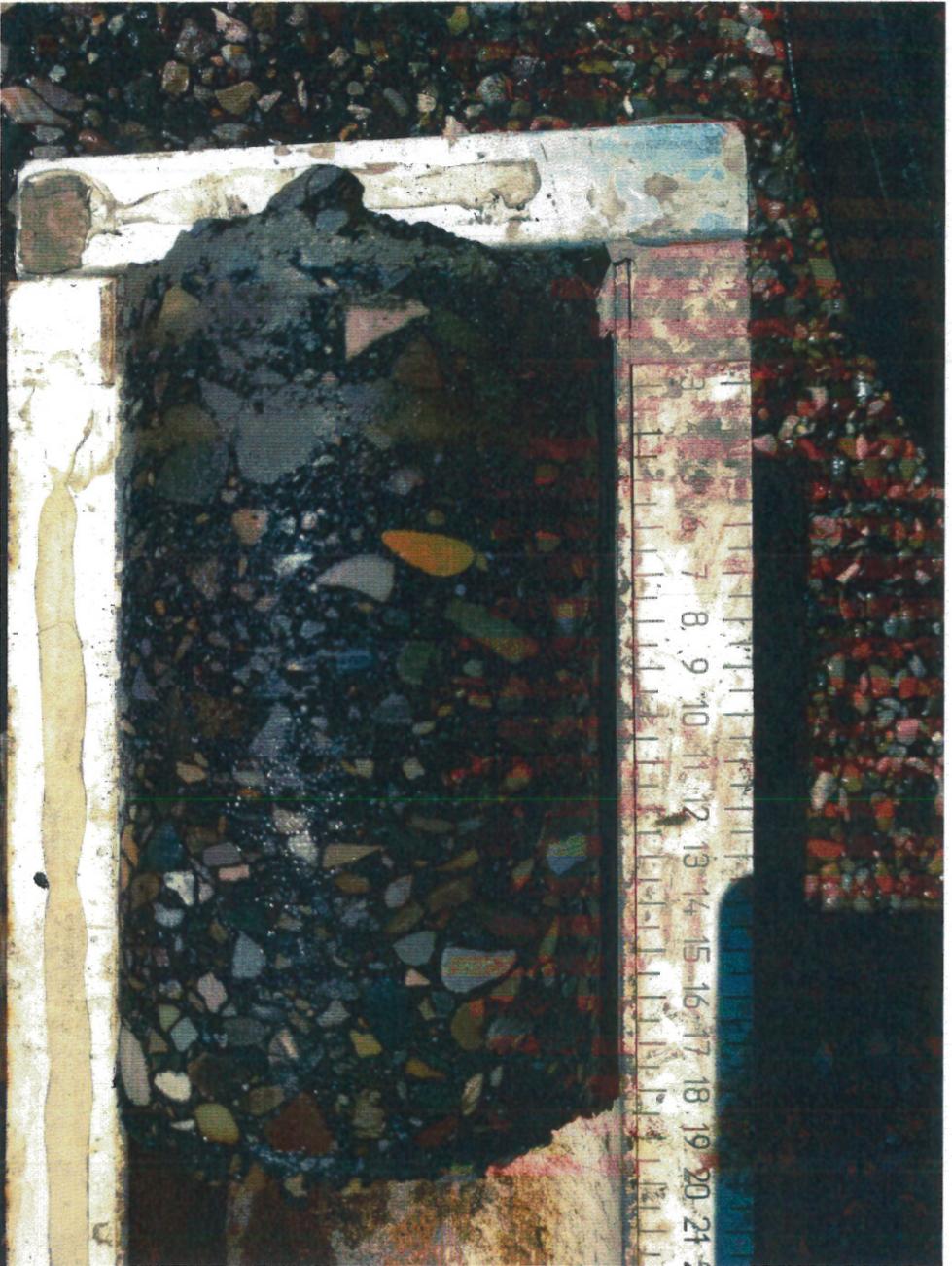
Note: No iGPR Data for 154 WB, and no iGPR Data for passing lanes. WB lane seems to be thicker than EB lane.



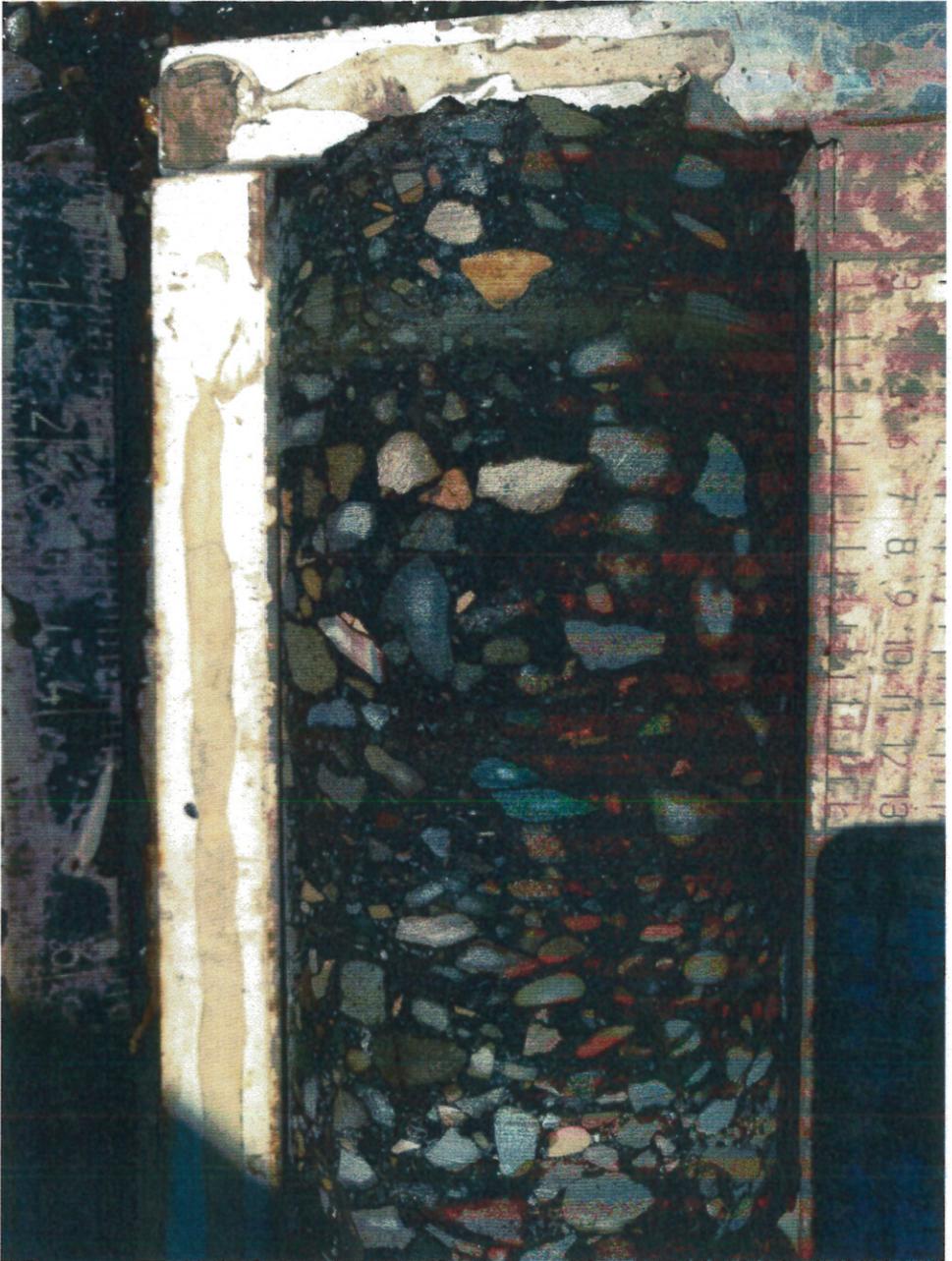
PM 6.15 EB, 5.25 inches of HMA.



PM 6.65 EB, 4.0 inches of HMA (iGPR indicates HMA thickness < 5 inches between EB PM 6.2 to EB PM 6.85)



PM 7.65 WB, 7.0 inches of HMA.



PM 7.15 WB, HMA 8.0 inches of HMA.

Material Information

2) Water Availability Documentation

Zandi, Frank@DOT

From: Rahim, Ashraf M@DOT
Sent: Friday, September 25, 2015 8:13 AM
To: Zandi, Frank@DOT
Subject: FW: SB-154 CAPM Project (water source)

Hello Frank: Below is the email I received from Mr. Dahlstrom, of the Santa Ynez River Water Conservation District, with regard to supplying water for the project. I am glad that an email is sufficient.

I will confirm the NSSPs and will let you know. Also, I will follow this email with an email with IH files that we have so far.

Also, I was informed yesterday that Chris Baab may not be able to return to work for another month and I was asked to sign/stamp the plans/documents for this project.

Thanks,

Ashraf

From: Chris Dahlstrom [mailto:cdahlstrom@syrwd.org]
Sent: Monday, September 21, 2015 10:45 AM
To: Rahim, Ashraf M@DOT
Subject: RE: SB-154 CAPM Project (water source)

Hi Ashraf,

I had to confirm water supplies for serving outside the Santa Ynez River Water Conservation District, ID No.1 boundaries. As you recall in our conversation earlier this month, ID No.1 is in a Stage 2- Critical water supply shortage due to the drought and the new State Hexavalent chromium (Cr6) standards that impacted groundwater production. This stage restricts all sales for use outside the ID No1. Service area until such time the Board cancels the Drought Emergency. However, since this Cal-Trans project is scheduled for next year, and ID No.1 is installing a water production well that can be used for non-potable uses which will be on-line within the next two months, along with the possibility of rain this season, ID NO.1 will be capable of supply the temporary water for this project. The current cost of the water is based on the "temporary" classification rate of \$5.95 per HCF and an administrative/meter setting cost of \$150 per month and must be renewed every two months.

I hope this will meet your needs.

Thank you and please call if you have any questions.

Best regards,

Chris

Chris Dahlstrom
General Manager
Santa Ynez River Water Conservation District, ID No.1
PO Box 157
Santa Ynez, CA 93460
805.688.6015
cdahlstrom@syrwd.org

From: Rahim, Ashraf M@DOT [<mailto:ashraf.m.rahim@dot.ca.gov>]

Sent: Wednesday, September 16, 2015 8:17 AM

To: Chris Dahlstrom

Subject: SB-154 CAPM Project (water source)

Hello Mr. Dahlstrom: I hope my email finds you well. I am just following up on the conversation we had last week concerning the need for water for the subject project. You mentioned getting back to us on M and I am just afraid you may have sent your response to Chris Baab's email while Chris is off until the end of the month. I look forward to hearing from you.

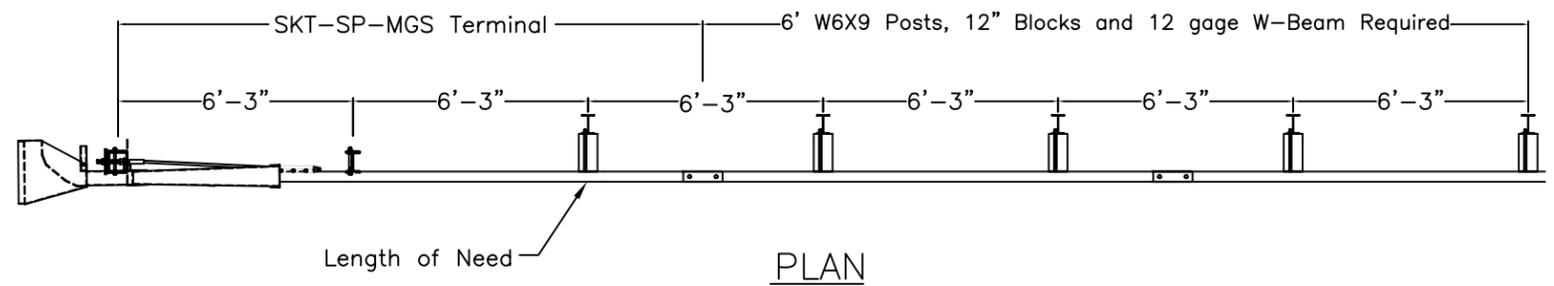
Thank you so much for trying to help us get the project expedited.

Ashraf Rahim, PE.

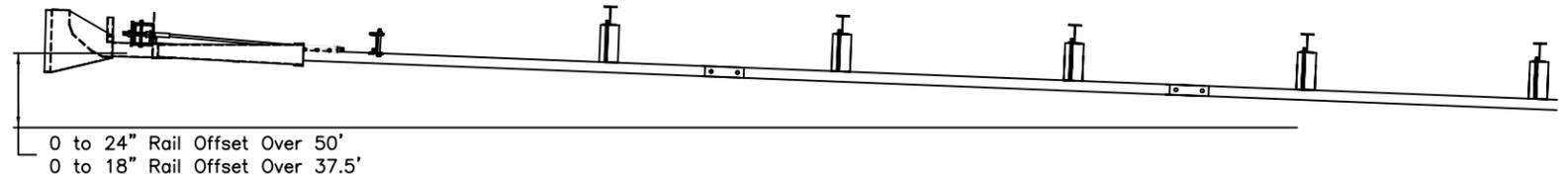
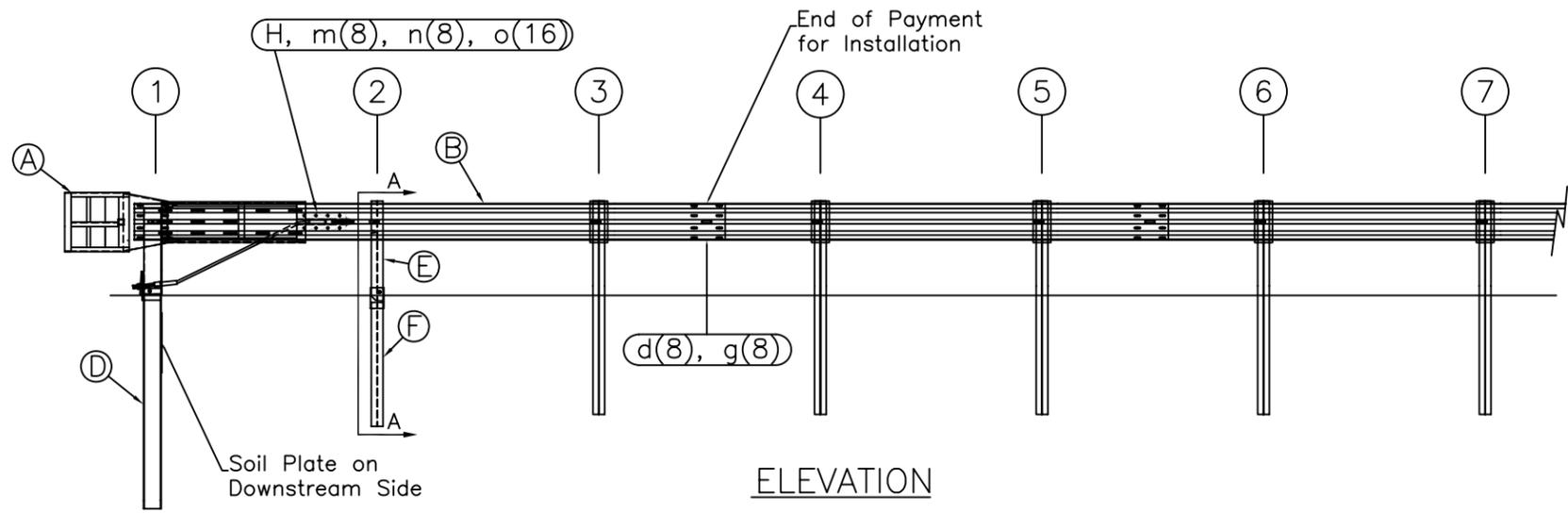
Material Information

3) Alternative In-line Terminal System

- a. Type SKT
- b. Type X-LITE
- c. Type 31" X-Tension
- d. Type SOFT STOP



TRAFFIC →

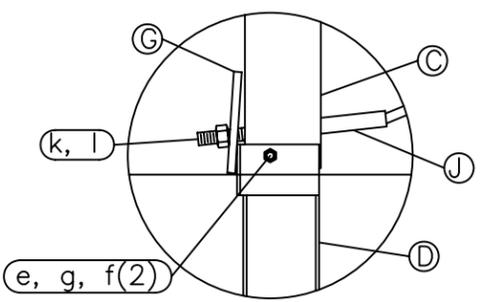


OPTIONAL FLARED INSTALLATION
25:1 maximum flare rate

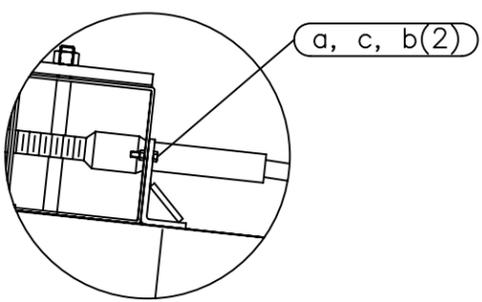
ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{2}$ " Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

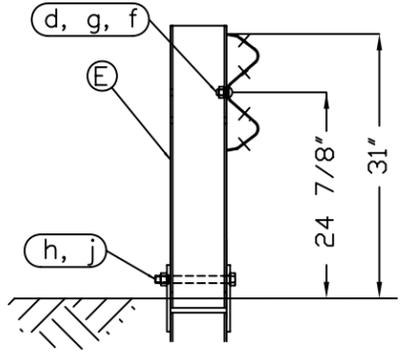
- GENERAL NOTES:
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
 - The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
 - The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
 - When competent rock is encountered, a 12" \varnothing post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
 - A site evaluation should be considered if there is less than 25' between the outlet side of the terminal and any adjacent driving lane.
 - The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.



Post #1 Connection Detail



Impact Head Connection Detail



SECTION A-A
Post #2

RSI
Road Systems, Inc.
Big Spring, TX
Phone: 432-263-2435
or Phone: 330-346-0721

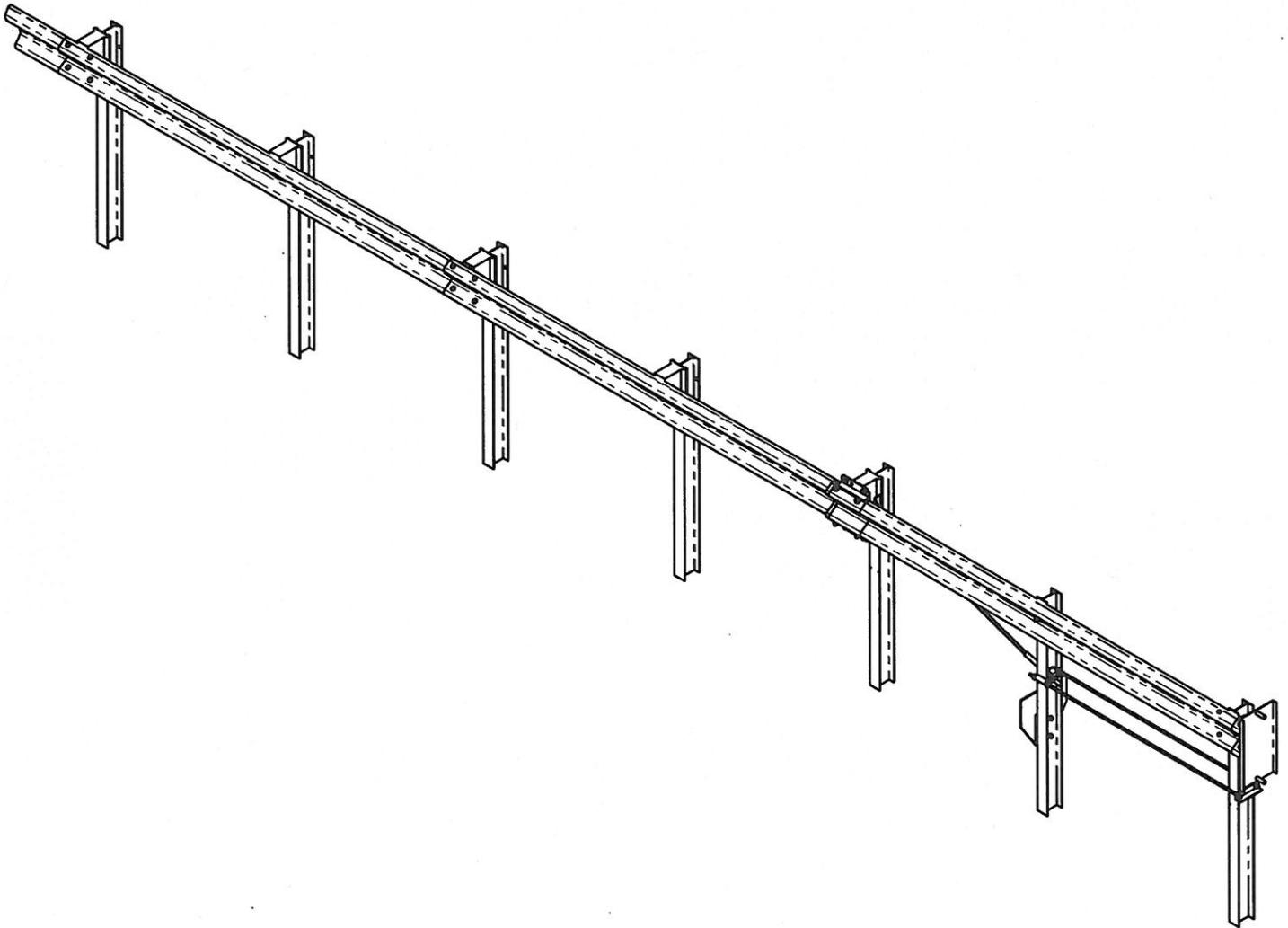
SKT-SP-MGS Terminal
Midwest Guardrail System
31" Top of Rail

Sheet:	1
Date:	02/24/10
By:	JRR
Rev:	0

Drawing Name: SKT-SP-S-MGS Scale: None

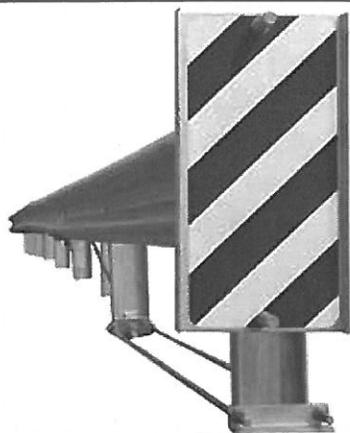
X-LITE® TANGENT

NCHRP 350 TL-3 Redirective, Gating, End Terminal



BARRIER SYSTEMS®

BY LINDSAY



Installation Manual

X-LITE TANGENT END TERMINAL

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Before Installation ----- 3

Limitations and Warnings ----- 3

Preparation ----- 4

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APPENDICES

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Preface

The X-Lite Guardrail End Terminal Tangent System incorporates the latest roadside safety technologies and engineering processes.

As with any roadside safety device, the X-Lite System must be installed in accordance with the manufacturer's specifications to ensure proper performance. Thoroughly review and fully understand the installation instructions and product limitations before starting the installation. Do not start the installation without the proper plans and tools required.

System Overview

The X-Lite System is a re-directive, gating end terminal designed for shielding the ends of guardrail systems. The system offers exceptional vehicle control, energy absorbing capabilities in head on impacts, and is re-directive starting at post 3. The X-Lite is comprised of a head unit, specially designed crimped posts, tension rods, cable assembly, slider assembly, and other standard guardrail components.

Before Installation

Placement and use of the X-Lite System 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 the circumstances at the site, installation should take an experienced two person crew with proper tools approximately two hours to complete.

The X-Lite System is a highly engineered safety device made up of a relatively small number of parts. It is available in both tangent and flared versions. Before starting installation ensure that one is familiar with the make up of the system that is being installed. Prior to installation, ensure that proper manuals and components are on site.

Limitations and Warnings

The X-Lite System has been rigorously tested and evaluated per the recommendations in the National Cooperative Highway Research Program Report 350 (NCHRP Report 350) guidelines for end terminals and crash cushions. The impact conditions recommended in NCHRP Report 350 are intended to address in-service collisions.

When properly installed and maintained, the system is capable of stopping, containing, and re-directing impacting vehicles in a predictable and safe manner under NCHRP Report 350 impact conditions. Vehicle impacts that vary from the NCHRP Report 350 impact conditions for gating, re-directive end terminals may result significantly different than those experienced in testing.

Vehicle impact characteristics different than or in excess of those encountered in NCHRP Report 350 testing (speed and angle) may result in system performance that may not meet NCHRP Report 350 evaluation criteria.

If you need additional information, or have questions about the X-Lite System, please call the Lindsay Transportation Solutions Customer Service Department at (888) 800-3691 (U.S. toll free) or (707) 374-6800.

Preparation

Before installing the X-Lite System, ensure that all materials required for the system are on site and have been identified.

Soil Conditions

The X-Lite has been designed to be installed in soil that meets or exceeds the AASHTO "standard soil" specification. If rock or stiff soil is encountered, the posts may be installed by augering and backfilling the hole. Extra care must be taken to prevent settlement or lateral displacement of the post. Backfill material shall be compacted to optimum compaction.

Before Starting

For all applications, begin the installation from the trailing / back end of the system where it joins the standard guardrail system at post 7.

Required Tools

The system uses standard tools required to install typical guardrail; the list below is a general recommendation.

- Post driver
- Tape measure
- String line
- Hammer
- Stakes
- Pry Bar
- Crescent Wrench
- Vice Grips or Clamps
- 1-5/8" [42 mm] Wrench
- 1/2" Ratchet
- 1-1/4" [32 mm] Socket
- Air Impact Wrench (Optional)
- Pick Axe
- Pipe Wrench or Large Pliers
- Torque wrench
(capable of applying 60 ft. lbs. torque)

Note: The tools list is a general recommendation. Depending on the specific characteristics of the job site, more or less tools may be necessary. The tools listed are for US/Imperial fasteners. If metric hardware is used, use metric equivalents for the hardware as required.



The picture of the X-Lite System above illustrates how the System is referred to throughout this manual.



Required Tools



 STANDARD LIMITED WARRANTY

Lindsay Transportation Solutions, Inc. "LTS" (formerly Barrier Systems) has tested the impact performance of its barriers and crash cushion systems, and other highway safety hardware under controlled conditions, however, LTS does not represent nor warrant that the results of those controlled conditions would necessarily avoid injury to persons or property. LTS EXPRESSLY DISCLAIMS ANY WARRANTY OR LIABILITY FOR CLAIMS ARISING BY REASONS OF DEATH OR PERSONAL INJURY OR DAMAGE TO PROPERTY RESULTING FROM ANY IMPACT, COLLISION OR HARMFUL CONTACT WITH THE PRODUCTS OR NEARBY HAZARDS OR OBJECTS BY ANY VEHICLE, OBJECTS OR PERSONS.

LTS warrants that any product or component part manufactured by LTS will be free from defects in material or workmanship. LTS will replace free of cost any Product or component part manufactured by LTS that contains such a defect.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LTS' LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO REPLACEMENT FREE OF COST (IN THE FORM AND UNDER THE TERMS ORIGINALLY SHIPPED), OR TO REPAIR OR TO MANUFACTURE BY LTS, PRODUCTS OR PARTS NOT COMPLYING WITH LTS SPECIFICATIONS, OR, AT LTS' ELECTION, TO THE REPAYMENT OF AN AMOUNT EQUAL TO THE PURCHASE PRICE OF SUCH PRODUCTS OR PARTS, WHETHER SUCH CLAIMS ARE FOR BREACH OF WARRANTY OR NEGLIGENCE. LTS SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL LOSSES, DAMAGES OR EXPENSES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, ANY SUCH LOSSES, DAMAGES OR EXPENSES ARISING DIRECTLY OR INDIRECTLY FROM THE SALE, HANDLING OR USE OF THE PRODUCTS FROM ANY OTHER CAUSE RELATING THERETO, OR FROM PERSONAL INJURY OR LOSS OF PROFIT.

Any claim by the Buyer with reference to Products sold hereunder for any cause shall be deemed waived by the Buyer unless LTS is notified in writing, in the case of defects apparent on visual inspection, within ninety (90) days from the delivery date, or, in the case of defects not apparent on visual inspection, within twelve (12) months from the said delivery date. Products claimed to be defective may be returned prepaid to LTS' plant for inspection in accordance with return shipping instructions that LTS shall furnish to the Buyer forthwith upon receipt of the Buyer's notice of claim. If the claim is established, LTS will reimburse that Buyer for all carriage costs incurred hereunder.

The forgoing warranty benefits shall not apply to (i) any Products that have been subject to improper storage, accident, misuse or unauthorized alterations, or that have not been installed, operated and maintained in accordance with approved procedures and (ii) any components manufactured by the Buyer.

W030587 Rev. 8

revised February 4, 2013



180 River Road • Rio Vista, CA 94571 • Tel. +1 (707) 374-6800 • Fax. +1 (707) 374-6801

Parts Identification

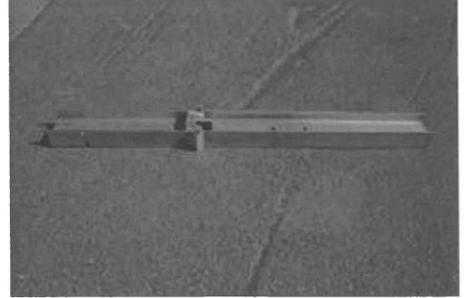
A Complete Bill of Materials for Systems and Kits Can be Found in Appendix A



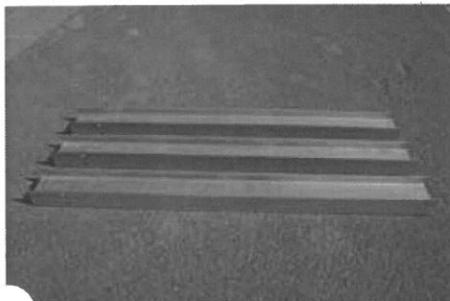
Crimp Post #1 (QTY. 1)
BSI-1310024-00



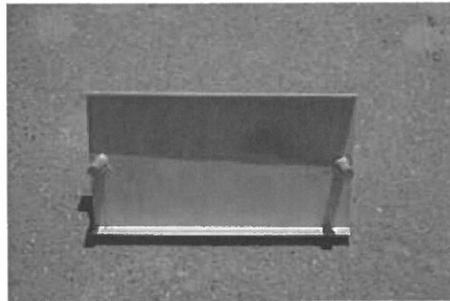
Crimp Post #3 (QTY. 1)
BSI-1310027-00



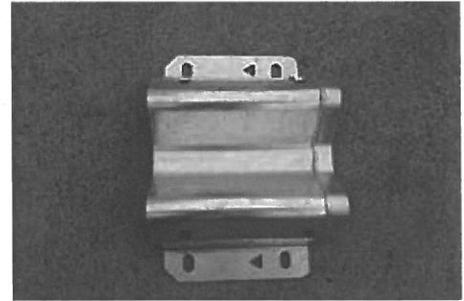
Post II
BSI-1012086-00



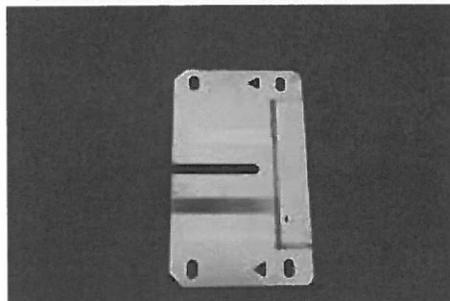
Line Post (QTY. 3)*
BSI-1012078-00



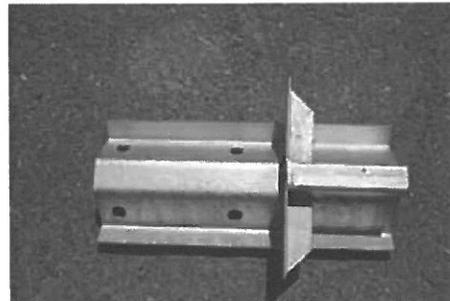
Impact Head
BSI-1012103-00



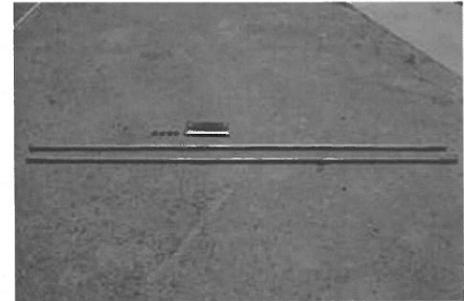
Slider Panel (Front)
BSI-1012093-00



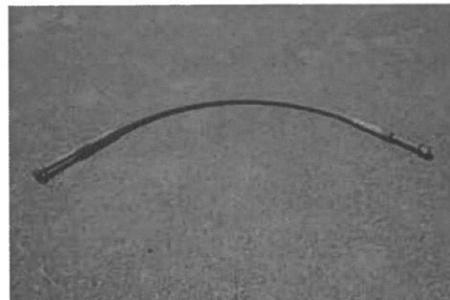
Slider Panel (Back)
BSI-1012096-00



Slider Bracket
BSI-1012090-00



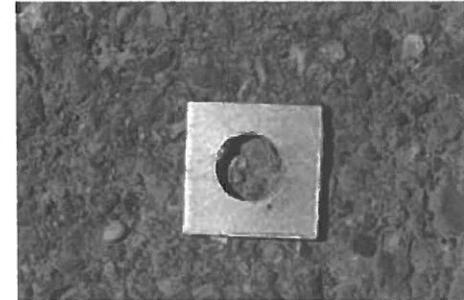
Ground Strut BSI-1012097-00 (QTY. 2), Nut 4001116 (QTY. 4), Angle BSI-1012098-00 (QTY. 1)



Cable Anchor Assembly
BSI-1012104-00



Shear Bolt Kits (8 Yellow Bolts per Kit)
K080123

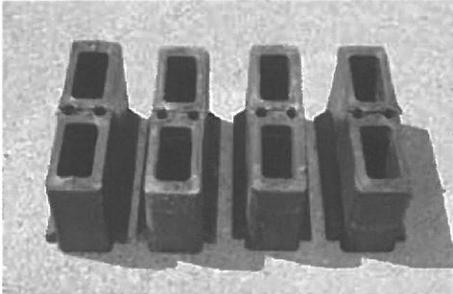


Square Washer (Used on Post 1)
BSI-1102027-00

* Denotes Shipped With Full System Only

Parts Identification

A Complete Bill of Materials for Systems and Kits Can be Found in Appendix A



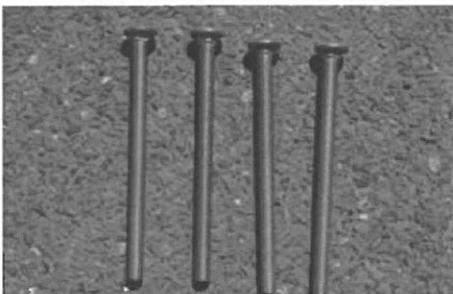
Blockouts (QTY. 4)*
B090534



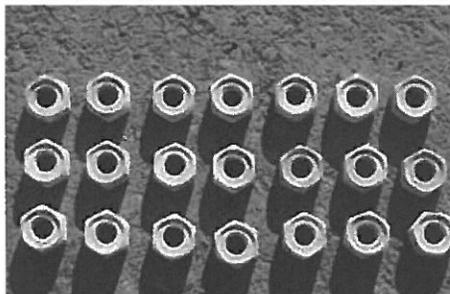
Guardrail Bolts (QTY. 16)*
4001115



5/8" x 2" Guardrail Bolt (For Post 1 & 2)
(QTY. 2)* 2001758



5/8" x 10" Guardrail Bolt (QTY. 4)*
2001840



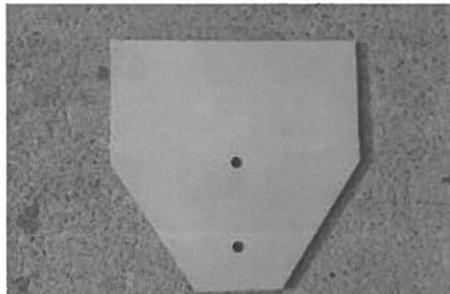
Guardrail Nut (QTY. 22)*
4001116



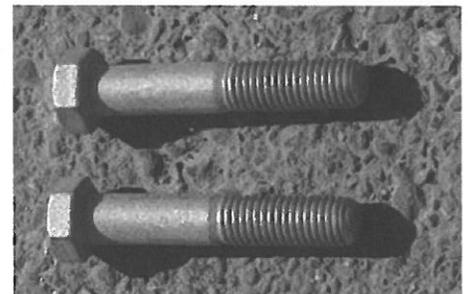
1" Washer (For Slider Panel-Back & Cable Assy.)* (QTY. 2) 2001580



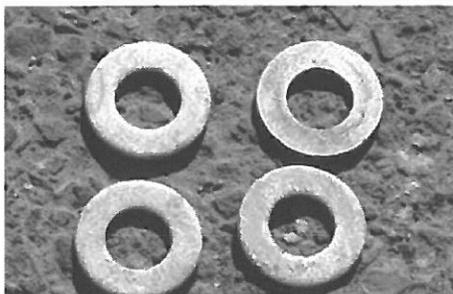
W-Beam Guardrail (QTY. 3)*
4000443



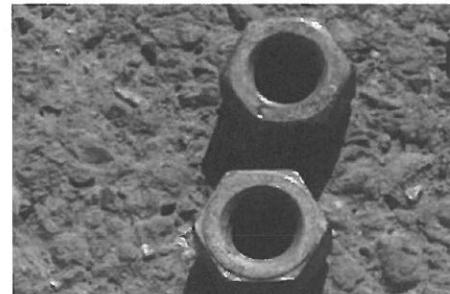
Soil Plate
BSI-1312100-00



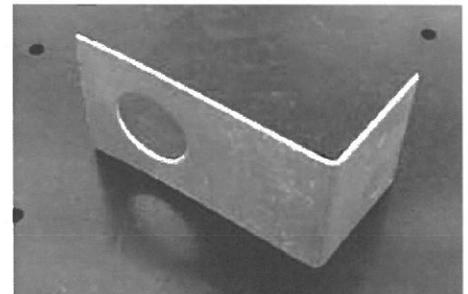
5/8" x 3 1/2" Bolt (Used on Soil Plate)
(QTY. 2) 2000220



5/8" Washer (Used on Soil Plate)
(QTY. 4) 2001636



5/8" Nut (Used on Soil Plate)
(QTY. 2) 2000312



L-Bracket
(used on cable at Post 2) BSI-1303005-00

*** Denotes Shipped With Full System Only**

Step 1 – Assembling Components

Components required:

- (1) Post II – BSI-1012086-00
- (1) Soil Plate – BSI-1312100-00
- (2) W-Beam – 4000443
- (1) Slider Panel (Front)– BSI-1012093-00
- (1) Slider Bracket – BSI-1012090-00

Hardware Required:

- (2) 5/8" x 3 1/2" Bolt - 2000220
- (8) 5/8" x 1 1/4" Guardrail Bolt - 4001115
- (4) 5/8" Washer - 2001636
- (2) 5/8" Nut - 2000312
- (8) 5/8" Guardrail Nut - 4001116

Some components require assembly and it is recommended that this step be completed prior to the start of the system assembly.

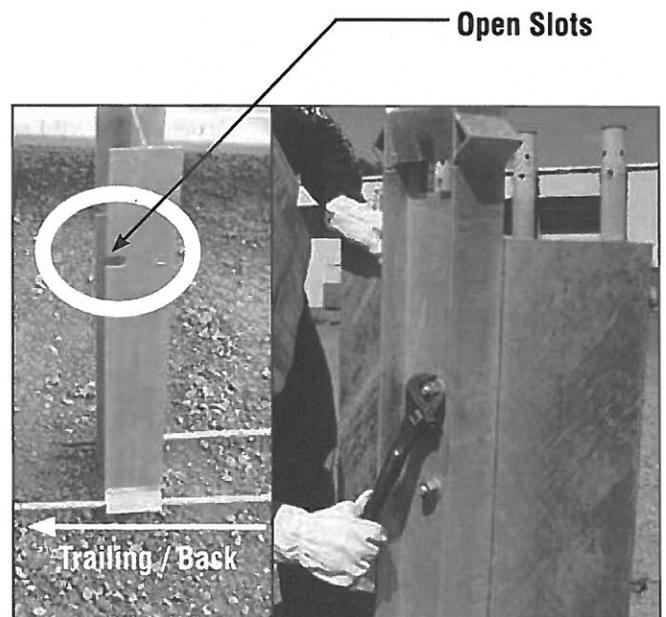
Notes:

Post II Assembly:

1. Attach the soil plate to the trailing / back side of Post II using two (2) 5/8" x 3 1/2" bolts, washers (4), and nuts (2). The trailing / back end of the post is identified by the open slots on the top of the post.

The bolts should be installed from back to front so that the head of the bolts rests on the soil plate.

Depending on your post driver equipment, Post 2 may need to be partially driven before this step can be accomplished.



Attach Soil Plate to Post II

Slider Bracket and Panel Assembly:

2. Attach the slider bracket to the inside of the approach / front end of rail 2 using four (4) 5/8" x 1 1/4" guardrail bolts.

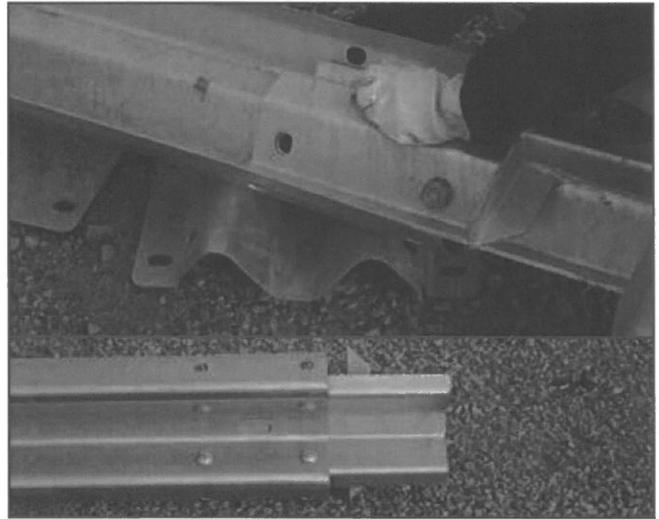
Bolts should be installed with the bolt head on the outside and the nuts the inside.

Note: When properly installed, a portion of the bracket will stick out of the rail.

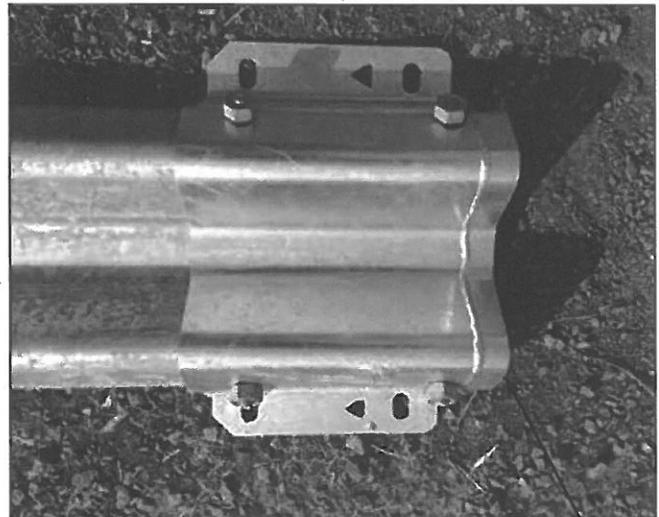
3. Attach the Slider Panel (Front) to the outside of the trailing / back end of rail 1 using four (4) 5/8" x 1 1/4" guardrail bolts.

Bolts should be installed with the bolt head on the inside and the nuts on the outside.

The angled portion of the Slider Panel should extend beyond the end of the rail and should face the trailing / back of the system when assembled in step 18.



Attach Slider Bracket to Rail 2.



Attach Slider Panel (Front) to Rail 1.

**Angled Portion
Extends Beyond the
End of the Rail.**

Step 2 – Post and Blockout Installation

Components required:

- (1) Crimp Post w/ Slots (Post 1)
- BSI-1310024-00
- (1) Crimp Post w/ Holes (Post 3)
- BSI-1310027-00
- (1) Post II Assembly with Soil Plate
- (3) Line Post – BSI-1012078-00
- (4) Blockout – B090534
- (1) Slider Panel (Back) – BSI-1012096-00

Hardware Required:

- (2) 5/8" x 10" Guardrail Bolt - 2001840
- (2) 5/8" Guardrail Nut - 4001116
- (1) 1" Washer - 2001580

Always start the installation at the existing w – beam barrier and assemble the system toward the impact head.

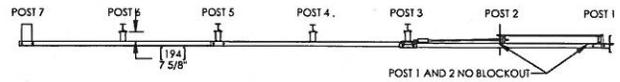
When driving the posts into stiff/rocky soil, place close attention not to bend the posts. If rock or stiff soil is encountered, the posts may be installed by augering and backfilling the holes. Extra care must be taken to prevent settlement or lateral displacement of the post. Backfill material shall be compacted to optimum compaction.

4. Begin by running a string line from the existing posts in a tangent position.

Note: The X-LITE can be installed with an offset of 0 - 24" (0 - 600 mm) over the length of the system.

Note: The front of posts 3-6 will be 7 5/8" (195mm) from the backside of rails 2 and 3 as blockouts are used. Posts 1 and 2 do not require blockouts and will align with the backside of rail 1. Post 3 requires up to an additional 2" (50mm) offset away from the rail to allow space for the slider assembly. (See Step 5.)

Notes:



Post Identification



Existing Trailing / Back Guardrail



Post Layout

5. Begin installing the posts at standard highway post spacing, 75" (1905mm) and post height, 28 1/4" (720mm) or 31 3/4" (805mm).. Post spacing and post height are found on drawing BSI-1012105-00 in Appendix A.

Post 4-6: Line Posts

Note: if you are installing a 50 FT. system, the systems will have an additional 2 posts and an additional section of guardrail. Please reference Appendix A for detail of a 50 FT. system.

Post 3: Crimped Post

Offset Post 3, up to 2" (50mm) back from the string line to allow sufficient space for the slider bracket assembly.

Post 3 is identified by the post having a crimp and holes on one side of the post only. These holes are used to mount the blockout and slider panel (back) on a later step. In addition, Post 3 can be easily identified by having black paint near the bottom.

Post 2: Post II Assembly with Soil Plate

Soil Plate should be on the trailing / back side of the system.

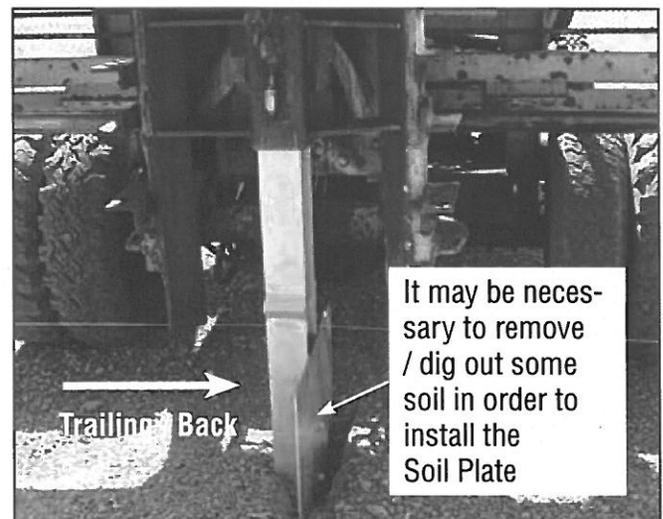
Post 2 does not require a blockout, therefore, align the post with the backside of the rail. Position the outside edge of the post roughly 8" (200mm) from the string line on the rail side of the string.

Depending on your post driver equipment, it may be necessary to partially drive Post 2 prior to attaching the Soil Plate. Begin to drive Post 2 approximately 18" (450mm), more if necessary. If the post is driven more than 18" (450mm) it will be necessary to use a pick ax or other digging tool to remove some of the soil in order to install the soil plate.

Once the soil plate is installed, continue driving the post to the desired height.



Post 3 Offset



Drive Post 2

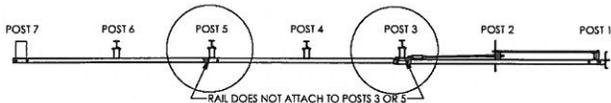
Post 1: Crimped Post

Post 1 does not require a blockout, therefore, align the post with the backside of the rail. Position post roughly 2" (50mm) from the string line on the rail side of the string.

Post 1 is identified by the post having a crimp and slots instead of holes. These slots are used to bolt the guardrail on a later step. In addition, Post 1 can be easily identified by having yellow paint near the bottom.

6. Install blockouts on posts 3-6. Blockouts at posts 3 and 5 must be bolted on before hanging the rails.
7. At post 5, attach the blockout using the 5/8" x 10" bolt. Secure blockout using the approach / front hole on the post. The rail does not attach at post 5.

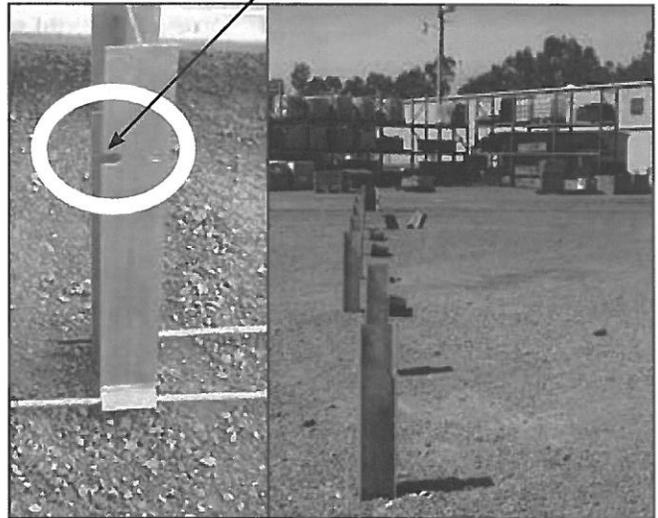
See diagram below for post identification.



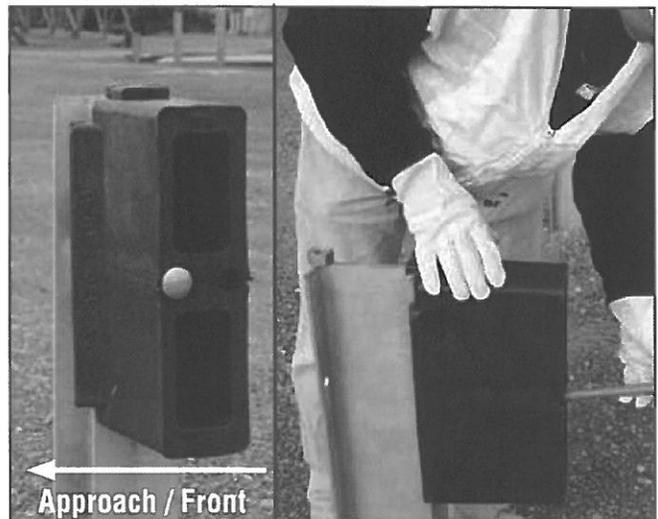
8. At post 3, attach blockout and slider panel (back) using the 5/8" x 10" bolt and 1" washer. The slot on the slider panel should point toward the front of the system. Secure blockout using the approach / front hole on the post.

Blockouts at posts 4 and 6 are secured when the rail is bolted to the posts.

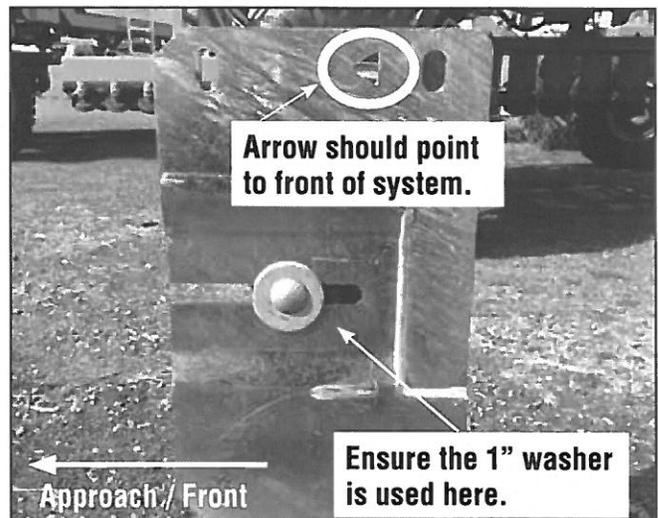
Open Slots



Installed Posts



Install Blockout at Post 5



Slider Panel (Back) and Blockout on Post 3

Step 3 – Install Ground Strut Assembly

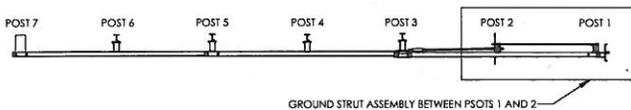
Components required:

- (2) Ground Strut Tension Rods – BSI-1012097-00
- (1) Ground Strut Angle – BSI-1012098-00

Hardware Required:

- (4) 5/8" Guardrail Nut - 4001116

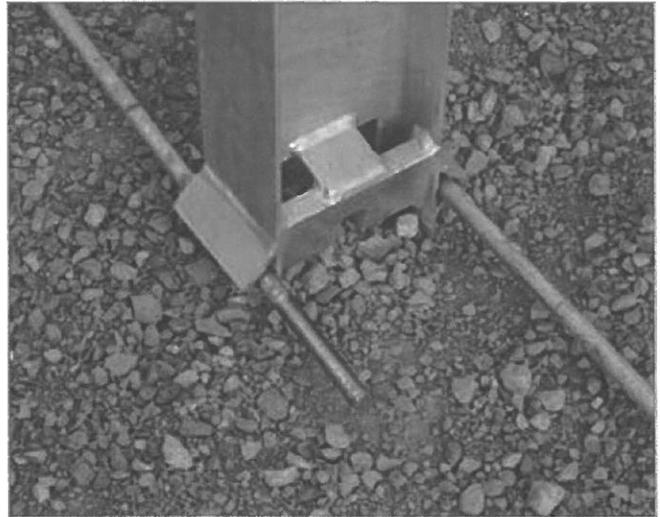
9. Install ground strut tension rods between posts 1 and 2 by sliding the rods through the openings on the bottom of post 2.



10. Secure the rods at post 1 by passing the rods through the small piece of angle with the angle sitting flush on the ground, just above the crimp on the post.

The small piece of angle will sit flush with the ground on 28" systems only. On 31" height systems, the small piece of angle will sit approximately 3" (75mm) off the ground.

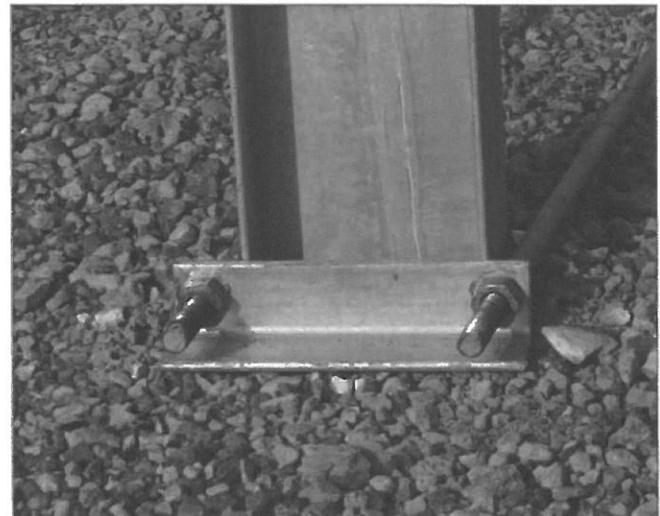
11. Tighten the rods so that there are equal amount of threads exposed at both ends of the rods.



Ground Strut Tension Rods Installed at Post 2



Ground Strut Tension Rods Attached at Post 1



Nuts Tightened on Ground Strut Tension Rods

Step 4 – Hang Rails

Components required:

- (3) W-Beam Guardrail - 4000443**

Hardware Required:

- (2) 5/8" x 10" Guardrail Bolt - 2001840
- (4) 5/8" x 1 1/4" Guardrail Bolt - 4001115
- (2) 5/8" x 2" Guardrail Bolt - 2001758
- (16) Shear Bolts – K080123 (Kit of 8; 2 Required)
- (5) 5/8" Guardrail Nut - 4001116
- (1) 5/8" Nut - 2000468
- (1) Square Washer – BSI-1102027-00

If installing a 50 ft system, the system uses 4 sections of rail in stead of 3.

If you are attaching to an MGS rail system, a transition guardrail panel is necessary.

*Please reference **Appendix A for 50 ft. or MGS system details.***

Note: For the system to telescope properly, the forward most guardrail panel should always be on the outside.

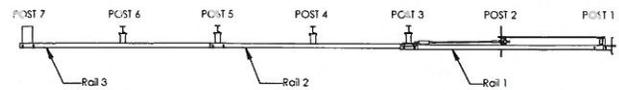
12. Before installing rail 3 ensure that the blackout at post 5 has already been bolted on. Attach rail 3 using the 5/8" x 10" bolt at post 6, pass bolt through the approach / front hole of post.

Note: Rail 3 is not attached to Post 5

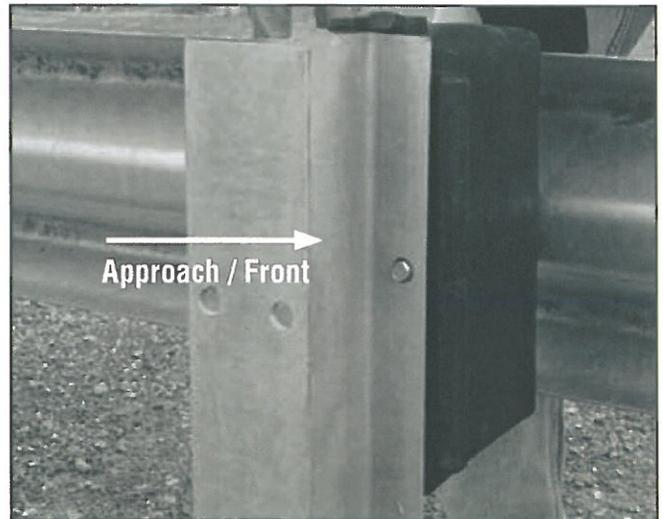
13. Splice rail 3 with the existing rail using the special yellow shear bolts. **DO NOT USE AN AIR IMPACT WRENCH TO TIGHTEN SHEAR BOLTS.**

Ensure that the 10" bolt used secure the rail and blackout passes through both sections of guardrail, blackout and post.

Notes:



Post Identification



Attach Rails to Posts



Shear Bolts at Rail 3 and 4 Connection

14. Before installing rail 2 ensure that the blackout and slider panel (back) at post 3 has already been bolted on. Attach rail 2 using the 5/8" x 10" bolt at post 4, pass bolt through the approach / front hole of post.



Attach Rail 2 at Post 4

15. Splice rail 2 with rail 3 using the special yellow shear bolts. The rails do not attach to post 5. **DO NOT USE AND AIR IMPACT WRENCH TO TIGHTEN SHEAR BOLTS.**



Shear Bolts at Rail 2 and Connection

16. Attach rail 1 using the 5/8" x 2" guardrail bolt at post 2, pass bolt through the trailing / back slot of post.



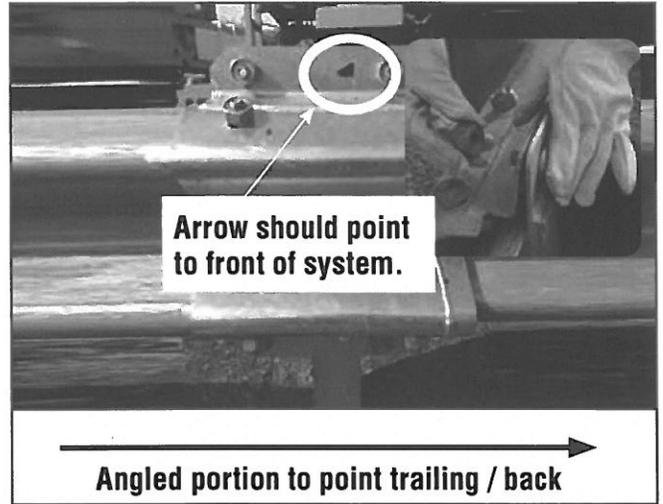
Connect Rails 1 and 2 at Slider Assembly

17. Connect rails 1 and 2 using 5/8" x 1 1/4" guardrail bolts by connecting the slider panel assembly (front and back parts together).

Ensure that the angled portion of the Slider Panel points toward the trailing / back end of the system.

18. Install the bolts from back to front with the nuts on the front side.

19. Attach rail 1 to post 1 using the 5/8" x 2" bolt and square washer, pass bolt through the approach / front slot of post.



Slider Panel Assembly Installed



Attach Rail 1 at Post 1



All Rails Installed

Step 5 – Install Impact Head

Components required:

- (1) Impact Head – BSI-1012103-00

Hardware Required:

- (4) 5/8" x 1 1/4" Guardrail Bolt - 4001115
- (4) 5/8" Guardrail Nut - 4001116

20. Install Impact Head to the approach / front end of rail 1 using 5/8" x 1 1/4" guardrail bolts.

Place Impact Head on the outside of the rail.

21. Install bolts from outside in with nuts on the inside.

Notes:



Install Impact Head at the End of Rail 1



Impact Head Installed

Step 6 – Install Cable

Components required:

- (1) Cable – BSI-1012104-00
- (1) 1" Washer - 2001580
- (1) L-Bracket - BSI-1301005-00

The cable is attached to the bottom of post 2 and at the slider bracket at post 3.

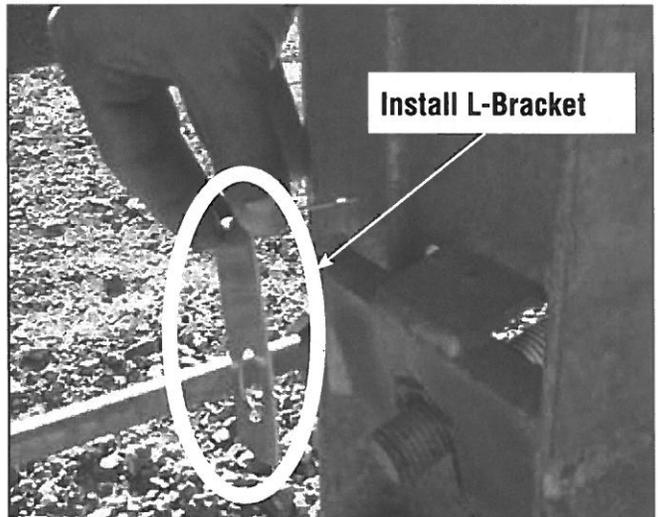
22. Begin to install the cable by passing the threaded end through the slot at the bottom of post 2.

23. Thread the nut so that 1" of the threads are protruding.

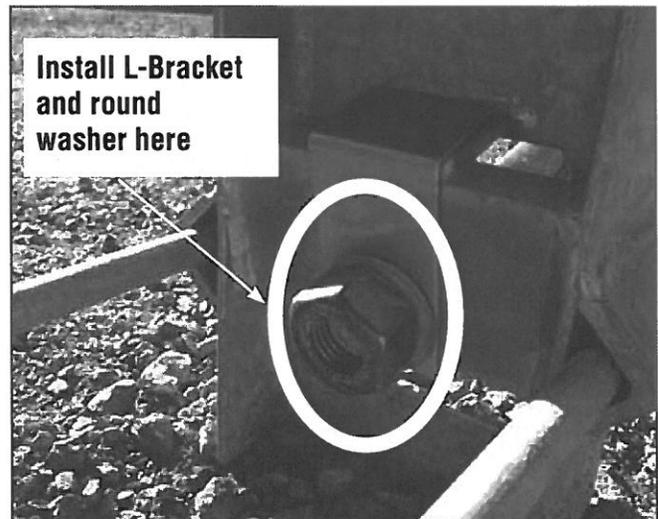
Ensure to install the small L-Shaped bracket and round washer included with the cable. This bracket and washer are critical components and help keep the cable engaged in the slot.

Proceed to thread the nut while not exposing any threads. This will ensure you can achieve the required torque for the cable nut in a subsequent step.

Notes:



Install Cable at Post 2



L-Bracket installed at Post 2 Prior to Tightening

24. Pass the other end of the cable through the slider bracket at post 3.

Install the nut. Tightening of the cable should be done at the bottom of Post 2 in the following step.

25. Tighten the cable nut at Post 2. It will be necessary to use a pipe wrench or large pliers on the backside of the cable to hold it in place while tightening. If the cable is not held in place with a pipe wrench or large pliers, it will spin while you attempt to tighten the cable and you will not be able to tighten it.

Apply approximately 60 FT-Lb torque. Continue to tighten the cable nut until the cable is tight and the approximate torque is achieved.

When tightening, ensure that the L-Bracket does not shift, turn and move out of position.

Note: Standard BCT cables used on other systems may not require a specific torque on the cable nuts. The X-LITE® Tangent system requires a tensioned cable to maintain engagement in the slot on Post 2.

If a torque wrench is not available, use the following method to ensure cable is adequately tensioned:

Tighten cable nut until a maximum 1/2" cable deflection is measured at the midpoint when pressure is applied by hand.



Install Trailing / Back End of Cable Through Bracket at Post 3



Torque cable nut to 60 ft.-lb. at Post 2



Cable Installed

Final Inspection Checklist

Inspection Date	Inspection By:	Item
		Post 1 uses slotted holes
		Post 3, uses standard post holes
		Rail bolted at posts 1, 2, 4 and 6 only (7, 8 for 50 ft. system)
		Rails not bolted to posts at Posts 3 and 5
		Square washer used at Post 1
		Post 2, rail bolted using trailing / back slot on post
		Posts 1, 4, 6, rails bolted using approach / front hole on posts
		Rails 3 and 4 spliced using special yellow shear bolts
		Rails 2 and 3 spliced using special yellow shear bolts
		At Post 7, 10" bolt passes through both guardrail sections, block-out and post.
		Slider assembly properly assembled with bolts from back to front with nuts on the outside
		Angled position of Slider panel points toward the trailing / back end of the system.
		Arrows on slider should point toward the front of the system
		Cable bracket and washer installed on cable at Post 2
		Approximately 60 ft.-lb. torque applied to cable nut at Post 2
		No blockout on Post 1 or Post 2
		Tangent installation or with allowable offset from 0 - 24" (0 - 600mm) over length of the system

Appendix A - System Configuration

The X-Lite System has been tested per the National Cooperative Highway Research Program (NCHRP) Report 350 Test Level 3 and accepted for use on the National Highway System (NHS) by the Federal Highway Administration.

The X-Lite system is a gating, re-directive guardrail end terminal designed to attach to the ends of guardrail systems.

As with all crash cushions and end terminals, the X-Lite system requires appropriate clear zones in accordance with the AASHTO Roadside Design Guide, FHWA memoranda, and other state and local standards.

System drawings and bill of materials can be found on the following pages.

DRAWINGS

X-Lite System, Tangent, 37'-6" DWG# XLTSUS	22
Bill of Materials, 37'-6"	24
X-LITE System, 50 FT. DWG# XLTSUS-50	25
Bill of Materials, 50 FT	27
X-LITE System, Tangent, MGS, 37'-6" DWG# XLTSUS-MGS	28
Bill of Materials, MGS, 37'-6"	30
X-LITE Systems, Tangent, MGS, 50 FT. (Short Panel) DWG# XLTSUS-MGS50S	31
Bill of Materials, MGS, 50 FT., Short	33
X-LITE Systems, Tangent, MGS, 50 FT. (Long Panel) DWG# XLTSUS-MGS50L	34
Bill of Materials, MGS, 50 FT., Long	36

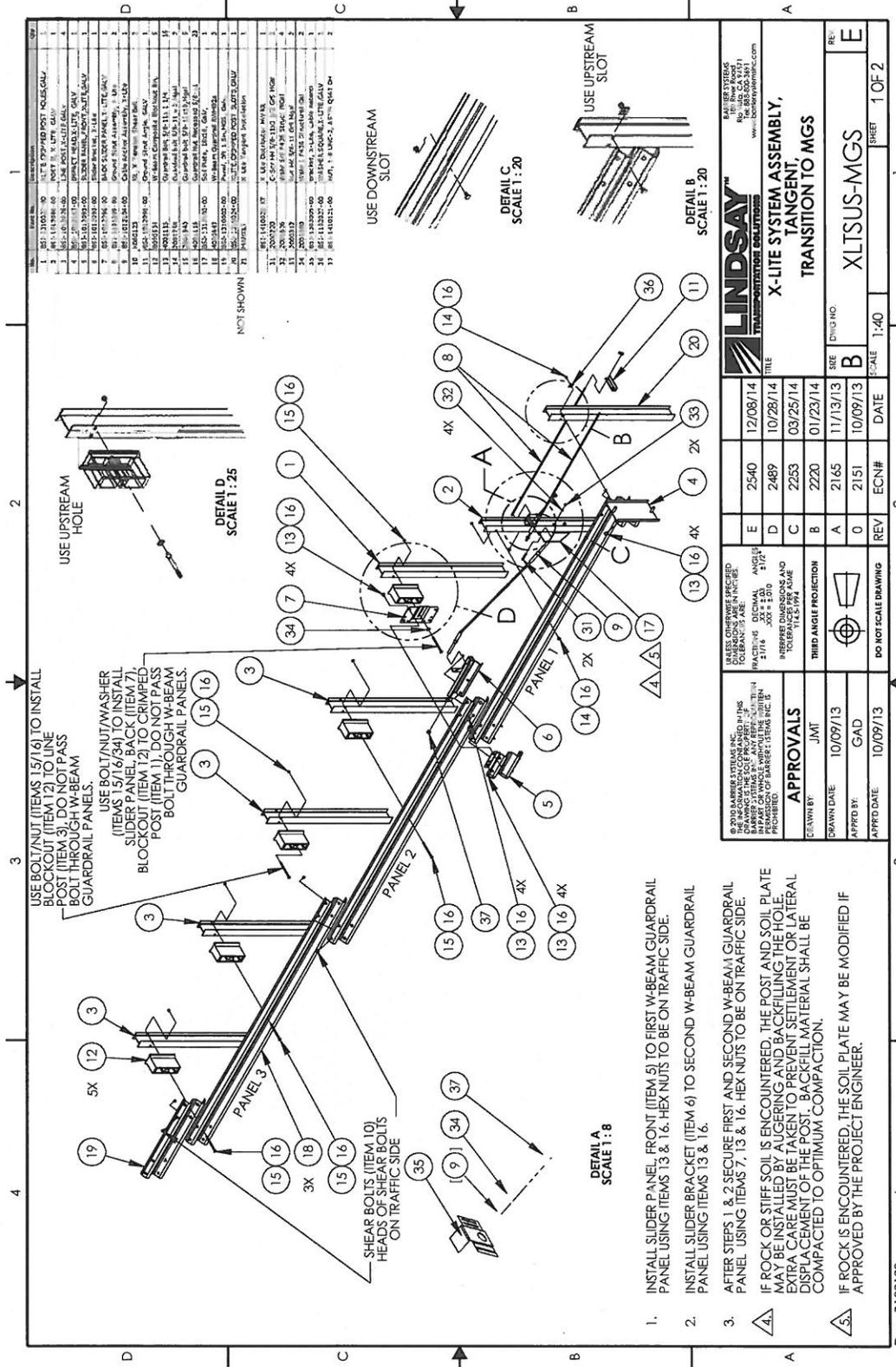
Appendix A -Bill of Materials - X-Lite Tangent, 37' 6"

Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE, CRIMPED POST SLOTS, GALV	1.00	1.00
BSI-1310027-00	XLITE, CRIMPED POST HOLES, GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST, X-LITE, GALV	3.00	-
BSI-1012103-00	IMPACT HEAD, X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL, FRONT, XLITE, GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL, X-LITE, GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	2.00
BSI-1102027-00	WASHER, SQUARE, X-LITE, GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	4.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2001758	Guardrail Bolt 5/8-11 x 2"	2.00	-
2001840	Guardrail Bolt 5/8-11 x 10"	4.00	-
4001116	Guardrail Nut Recessed 5/8-11	24.00	2.00
2001580	Wshr 1" F436 Structural	2.00	2.00
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2	2.00	2.00
2001636	Wshr 5/8 F436	4.00	4.00
2000312	Nut HX 5/8-11	2.00	2.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00

Appendix A -Bill of Materials - X-Lite Tangent, 50'

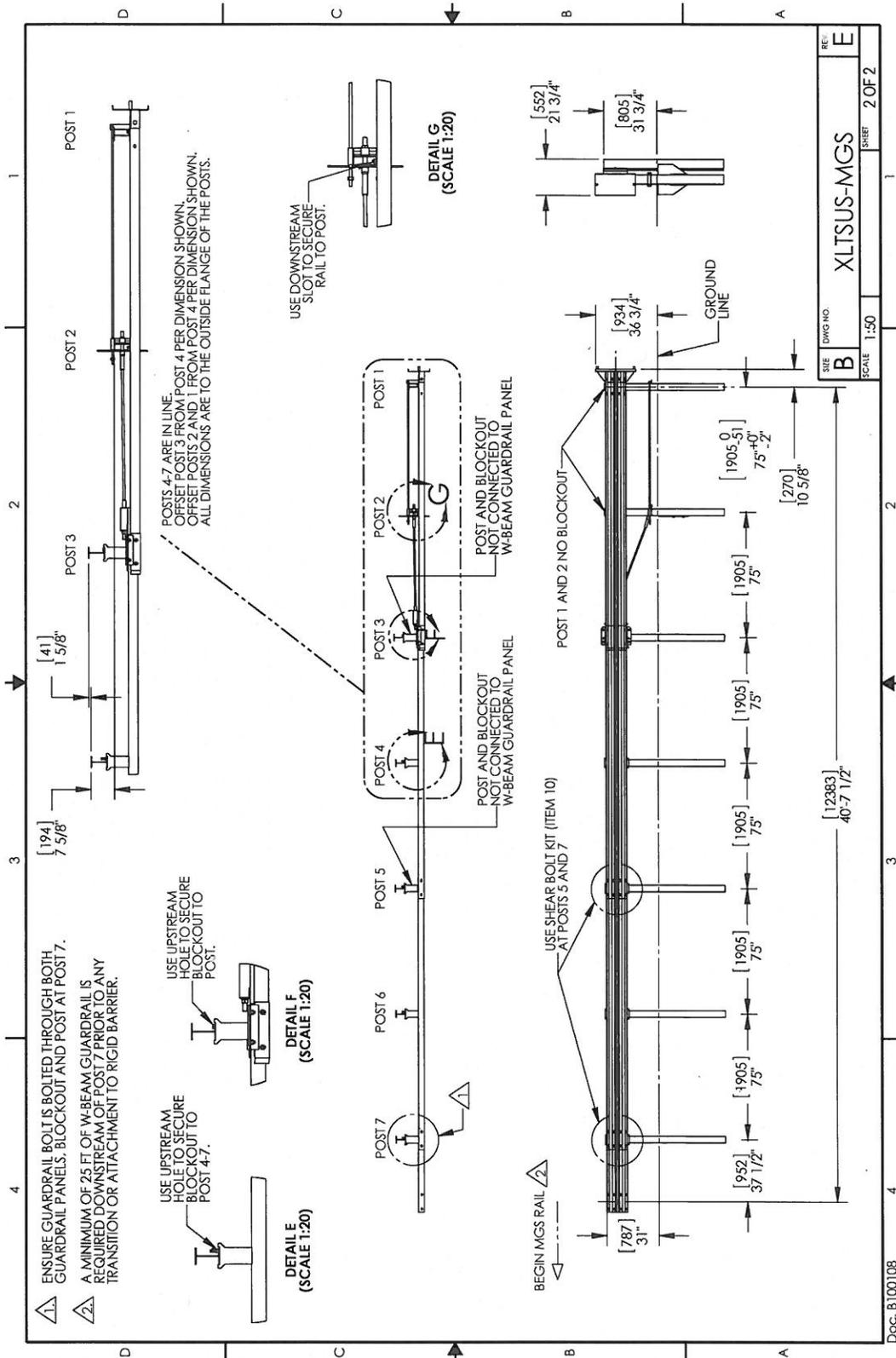
Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	1.00	1.00
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST,X-LITE,GALV	5.00	-
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	2.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	6.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2001758	Guardrail Bolt 5/8-11 x 2"	2.00	-
2001840	Guardrail Bolt 5/8-11 x 10"	6.00	-
4001116	Guardrail Nut Recessed 5/8-11	26.00	2.00
2001580	Wshr 1" F436 Structural	2.00	2.00
4000443	W-Beam Guardrail RWM02a	4.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2 Gr5 MGal	2.00	2.00
2001636	Wshr 5/8 F436 Struct MGal	4.00	4.00
2000312	Nut HX 5/8-11 Gr5 Mgal	2.00	2.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00

Appendix A - System Configuration, 37" 6" MGS



Doc. B100108

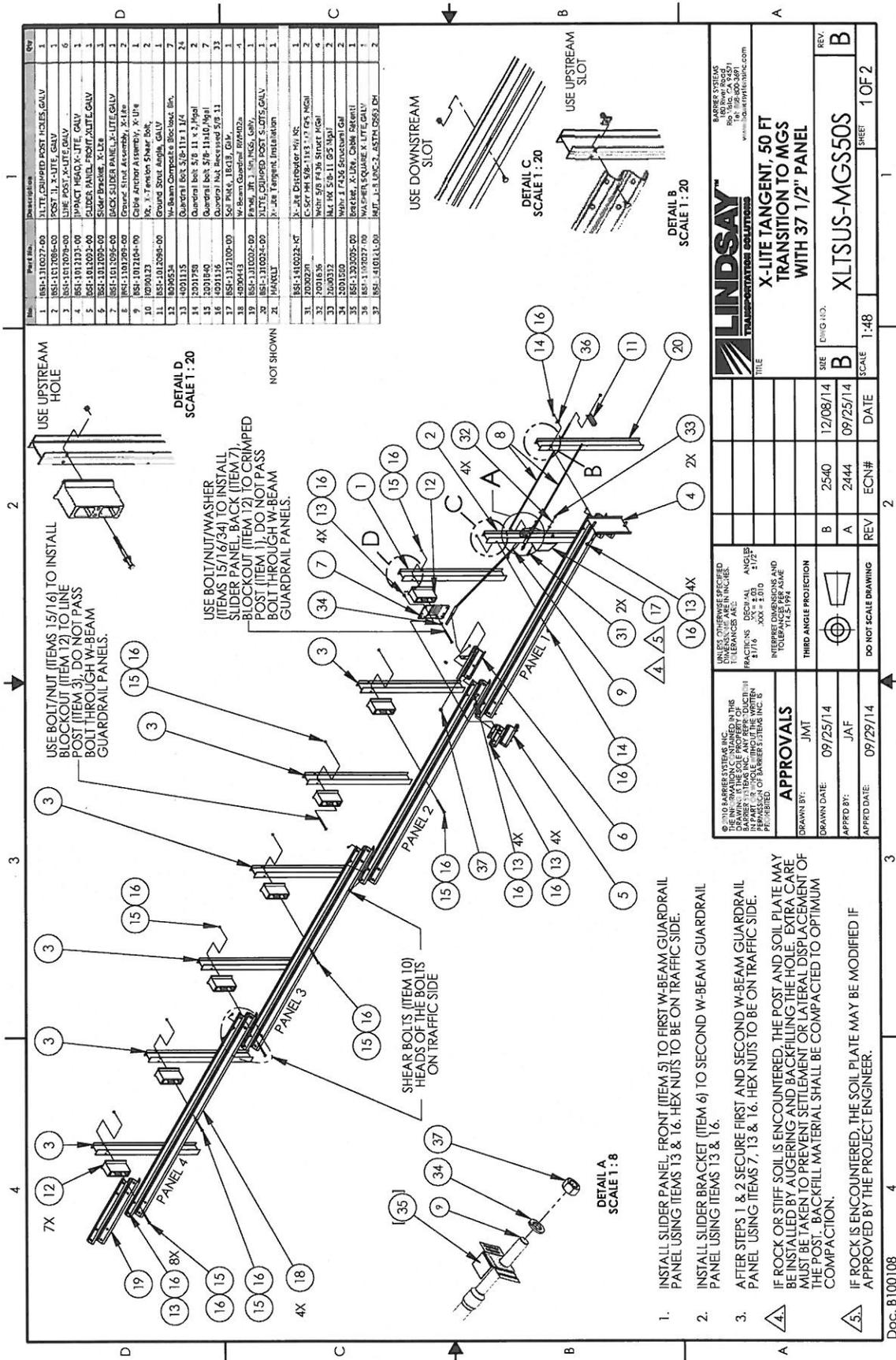
Appendix A - System Configuration, 37' 6" MGS



Doc. B 100108

Appendix A -Bill of Materials - X-Lite Tangent, MGS 37' 6"

Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE, CRIMPED POST SLOTS, GALV	1.00	1.00
BSI-1310027-00	XLITE, CRIMPED POST HOLES, GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST, X-LITE, GALV	3.00	-
BSI-1012103-00	IMPACT HEAD, X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL, FRONT, XLITE, GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL, X-LITE, GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	2.00
BSI-1102027-00	WASHER, SQUARE, X-LITE, GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	5.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2001758	Guardrail Bolt 5/8-11 x 2"	2.00	-
2001840	Guardrail Bolt 5/8-11 x 10"	5.00	-
4001116	Guardrail Nut Recessed 5/8-11	25.00	2.00
2001580	Wshr 1" F436 Structural	2.00	2.00
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2	2.00	2.00
2001636	Wshr 5/8 F436 Struct	4.00	4.00
2000312	Nut HX 5/8-11	2.00	1.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00
BSI-1310016-KT	Transition Kit, MGS, X-Lite	1.00	1.00



Appendix A -Bill of Materials - X-Lite Tangent, 50' MGS Short Panel

Item	Description	Full System	Kit Only
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	1.00	1.00
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST,X-LITE,GALV	6.00	-
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1101209-00	Ground Strut Assembly, X-Lite	2.00	1.00
BSI-1012098-00	Ground Strut Angle, GALV	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	1.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	7.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	24.00	-
2001758	Guardrail Bolt 5/8-11 x 2"	2.00	-
2001840	Guardrail Bolt 5/8-11 x 10"	7.00	-
4001116	Guardrail Nut Recessed 5/8-11	35.00	2.00
2001580	Wshr 1 F436 Structural Gal	2.00	2.00
4000443	W-Beam Guardrail RWM02a	4.00	-
BSI-1310002-00	Panel, 3ft 1.5in,MGS, Galv,	1.00	-
BSI-1312100-00	Soil Plate, 18x18, Galv,	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2	2.00	1.00
2001636	Wshr 5/8 F436	4.00	1.00
2000312	Nut HX 5/8-11	2.00	1.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00

Appendix A -Bill of Materials - X-Lite Tangent, 50' MGS Long Panel

Item	Description	Full System	Kit Only
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	1.00	1.00
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST,X-LITE,GALV	6.00	-
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1101209-00	Ground Strut Assembly, X-Lite	2.00	1.00
BSI-1012098-00	Ground Strut Angle, GALV	1.00	1.00
4001116	Guardrail Nut Recessed 5/8-11	2.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	1.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	7.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2001758	Guardrail Bolt 5/8-11 x 2"	2.00	-
2001840	Guardrail Bolt 5/8-11 x 10"	7.00	-
4001116	Guardrail Nut Recessed 5/8-11	27.00	2.00
2001580	Wshr 1 F436 Structural Gal	2.00	2.00
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1403002-00	Panel, 15ft 7.5 in, MGS, Galv	1.00	-
BSI-1312100-00	Soil Plate, 18x18, Galv,	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2	2.00	1.00
2001636	Wshr 5/8 F436	4.00	1.00
2000312	Nut HX 5/8-11	2.00	1.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00



Lindsay Transportation Solutions Sales and Services, Inc.

180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barriersystemsinc.com

Installation manual for the X-LITE Tangent System are subject to change without notice to reflect improvements and upgrades.

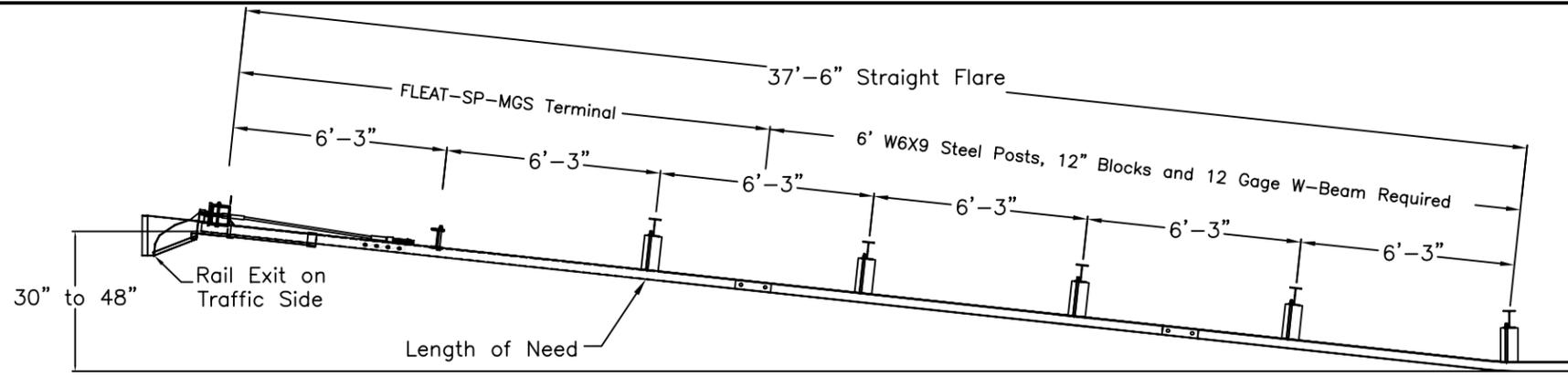
Additional information is available from Lindsay Transportation Solutions Sales and Services, Inc. © Lindsay Transportation Solutions, Inc.

X-LITE TANGENT INSTALLATION 01202015 v11

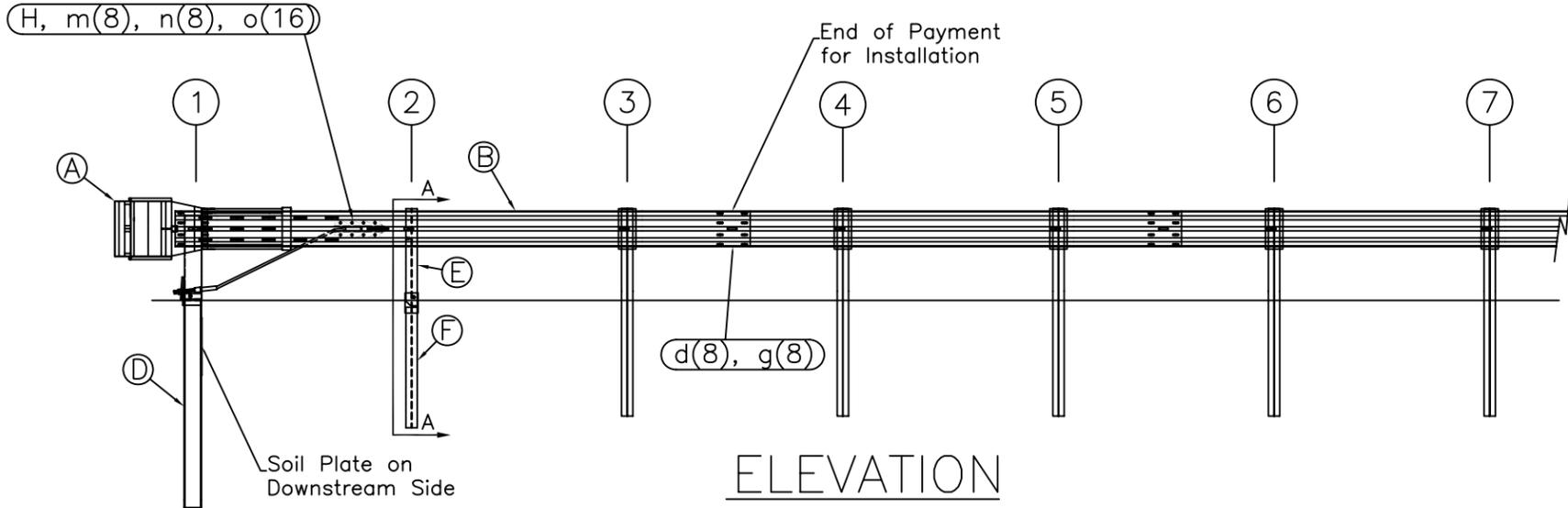
Material Information

4) Alternative Flared Terminal System

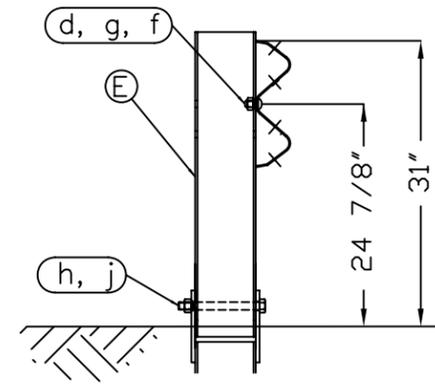
- a. Type Fleet-SP-MGS
- b. Type SRT-31
- c. Type 31" X-Tension



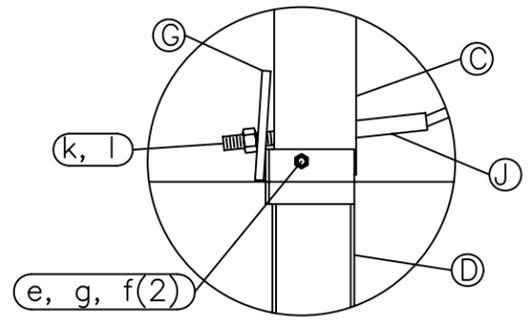
PLAN



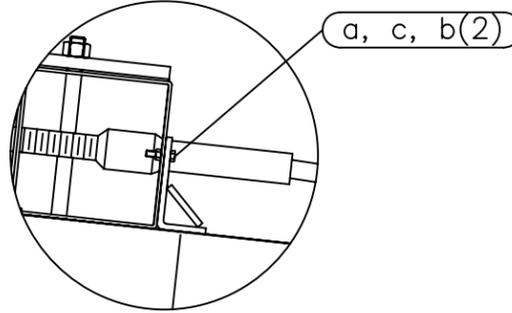
ELEVATION



SECTION A-A
Post #2



Post #1 Connection Detail



Impact Head Connection Detail

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	F3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{8}$ " Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.

Road Systems, Inc.
Big Spring, TX
Phone: 432-263-2435
or Phone: 330-346-0721

**FLEAT-SP-MGS Terminal
Midwest Guardrail System
31" Top of Rail**

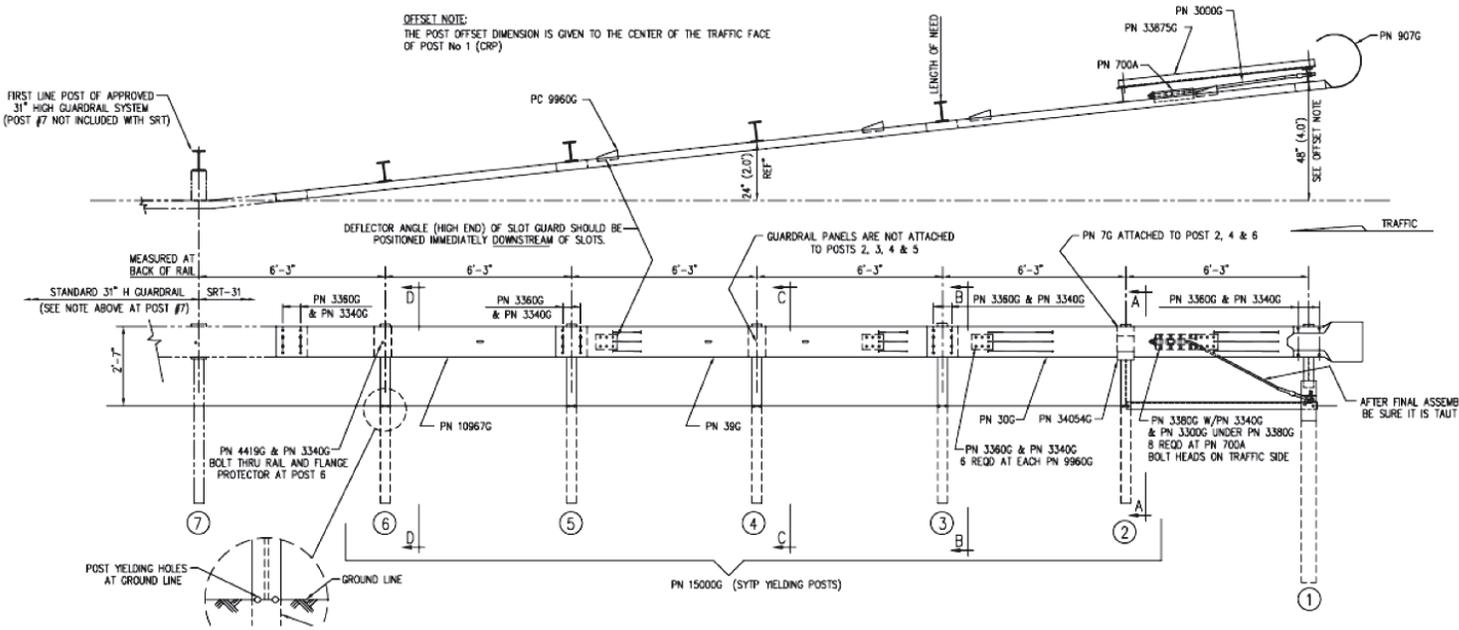
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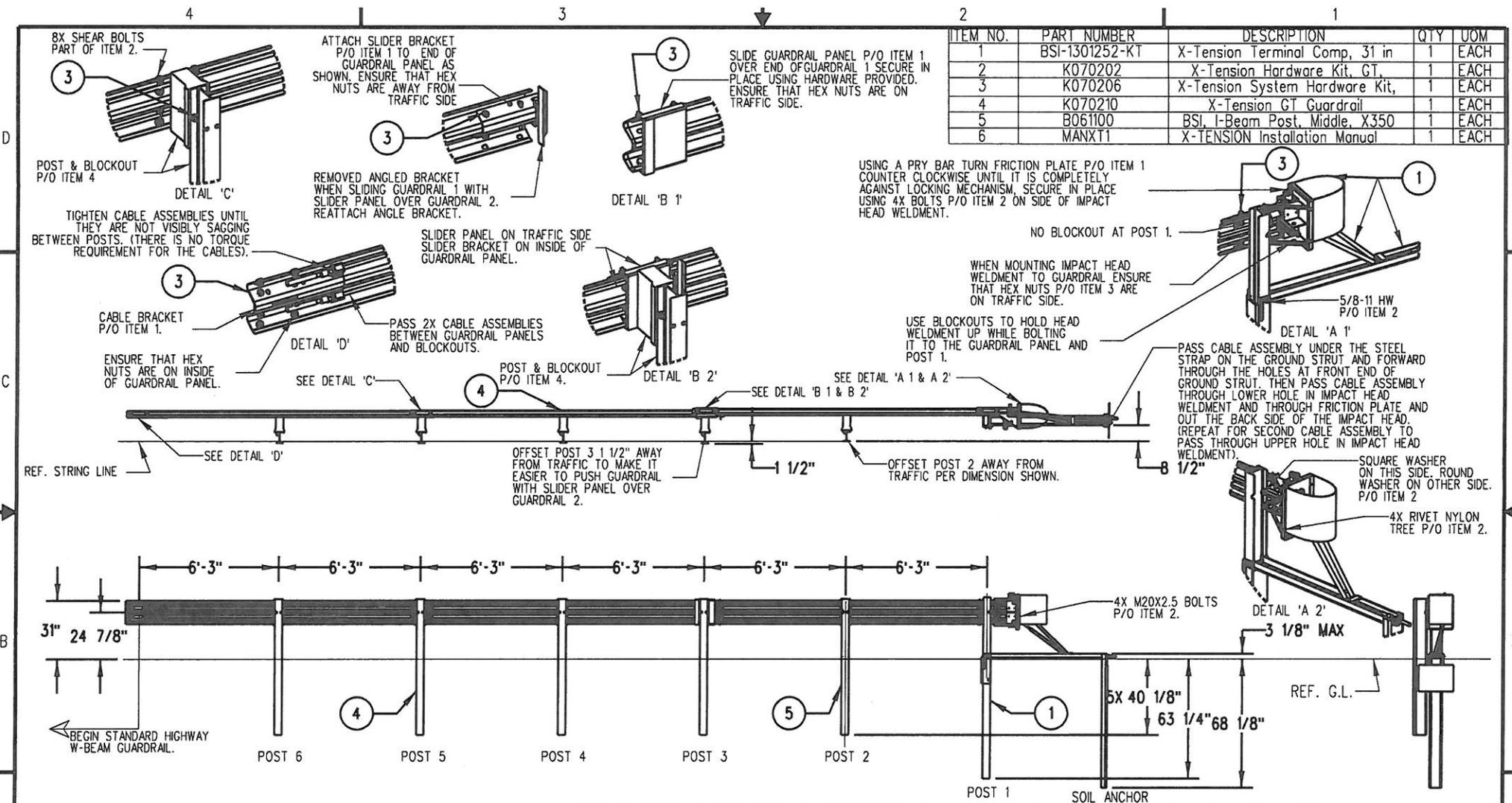
Sheet:	1
Date:	02/24/10
By:	JRR
Rev:	0

KNOW YOUR SRT™ -31 SYSTEM

SRT™ -31 SYSTEM

FOR SPECIFIC INSTALLATION, MAINTENANCE, OR REPAIR DETAILS,
REFER TO
THE STATE/SPECIFYING AGENCY'S STANDARD DRAWING(S) AND/OR
TRINITY STANDARD LAYOUT DRAWINGS





ITEM NO.	PART NUMBER	DESCRIPTION	QTY	UOM
1	BSI-1301252-KT	X-Tension Terminal Comp, 31 in	1	EACH
2	K070202	X-Tension Hardware Kit, GT.	1	EACH
3	K070206	X-Tension System Hardware Kit,	1	EACH
4	K070210	X-Tension GT Guardrail	1	EACH
5	B061100	BSL I-Beam Post, Middle, X350	1	EACH
6	MANXT1	X-TENSION Installation Manual	1	EACH

- NOTES: UNLESS OTHERWISE SPECIFIED.
- SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.
 - ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.
 - WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.

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APPROVALS				TITLE X-TENSION GUARDRAIL TERMINAL SYSTEM STEEL POST WITH COMPOSITE BLOCKOUT 31" RAIL HEIGHT			
<small>DRAWN BY:</small> NMV <small>DRAWN DATE:</small> 2/08/13 <small>APPR'D BY:</small> JMT <small>APPR'D DATE:</small> 2/08/13	<small>THIRD ANGLE PROJECTION</small> 	<small>REV</small> 2067 <small>DATE</small> 03/02/13 <small>REV</small> 2022 <small>DATE</small> 2/08/13	<small>SIZE</small> B <small>SCALE</small> 1:50	<small>DWG NO.</small> XTGTSS5 <small>SHEET</small> 1 OF 1	<small>REV.</small> B		

Material Information

5) Temporary Alternative Crash Cushion System

- a. ABSORB 350 (TL-3)
- b. SLED (TL-3)
- c. ACZ-350 (TL-3)

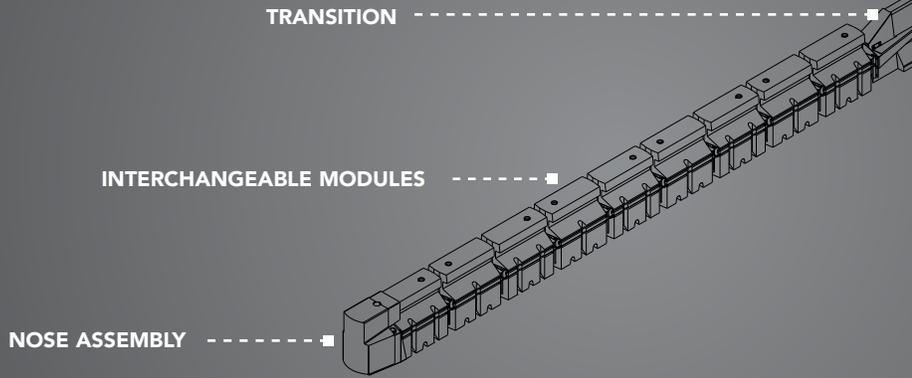
ABSORB 350® | NON-REDIRECTIVE CRASH CUSHION - SACRIFICIAL

- ANCHORLESS INSTALLATION - NO FOUNDATION REQUIRED
- COST EFFECTIVE PROTECTION FROM CONCRETE BARRIER ENDS
- WORLDWIDE PROVEN PERFORMANCE
- NCHRP 350 ACCEPTED



PHYSICAL SPECIFICATIONS

Classification	NR-S	
TL-3 Length	32'	9.7 m
Width	24"	610 mm
Height	32"	813 mm
Module Weight Empty	110 lb.	50 kg
Test Level	NCHRP 350	TL 1/2/3



NARROW ANCHORLESS WATER FILLED CRASH CUSHION

No ground anchoring, the largest selection of transitions and modular technology allow the ABSORB 350 System to be used in multiple speed conditions. The ABSORB 350 System is ideal for contractors due to the ease of maintenance after an impact and quick deployment. At 24" (610 mm) wide, it is ideally suited for narrow areas where road and workspace is limited. The ABSORB 350 System is easy to restore after an impact because the System uses uniform modular components. The use of standardized modular components also helps to reduce inventory costs.

FREQUENTLY ASKED QUESTIONS

Can the nose be angled off the barrier to better face traffic?

Yes, as long as all of the ABSORB 350 modules remain pinned and connected. For larger angles, it is recommended that the last barrier section be moved to face traffic.

Can the ABSORB 350 System be moved while filled with water?

Yes, the System is rigid enough to be repositioned filled with water by sliding the optional wheel / jack assembly under each element.

What transitions are available?

Dozens of transition options are available, including attachments to; Standard NJ / J / K / F, Wide / X-Wide NJ, I-Lock, Smooth Face, JJ Hook, QMB, ArmorGuard®, Orion®, BarrierGuard® and ZoneGuard®.

Can the ABSORB 350 System be used during cold weather?

Since ABSORB 350 modules have no internal steel parts, the use of any approved anti icing chemical is acceptable.

FEATURES

- » Rapid deployment and retrieval
- » No ground anchoring required
- » Low initial price
- » Narrow footprint
- » Can be deployed on almost any road surface
- » Meets NCHRP 350 TL-1, TL-2, TL-3 test criteria
- » Easily transitioned to multiple widths and shapes of barriers
- » Nose and transition are reusable after most design impacts
- » Approved for use in permanent and work zone locations

DISTRIBUTED BY:



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180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barrriersystemsinc.com

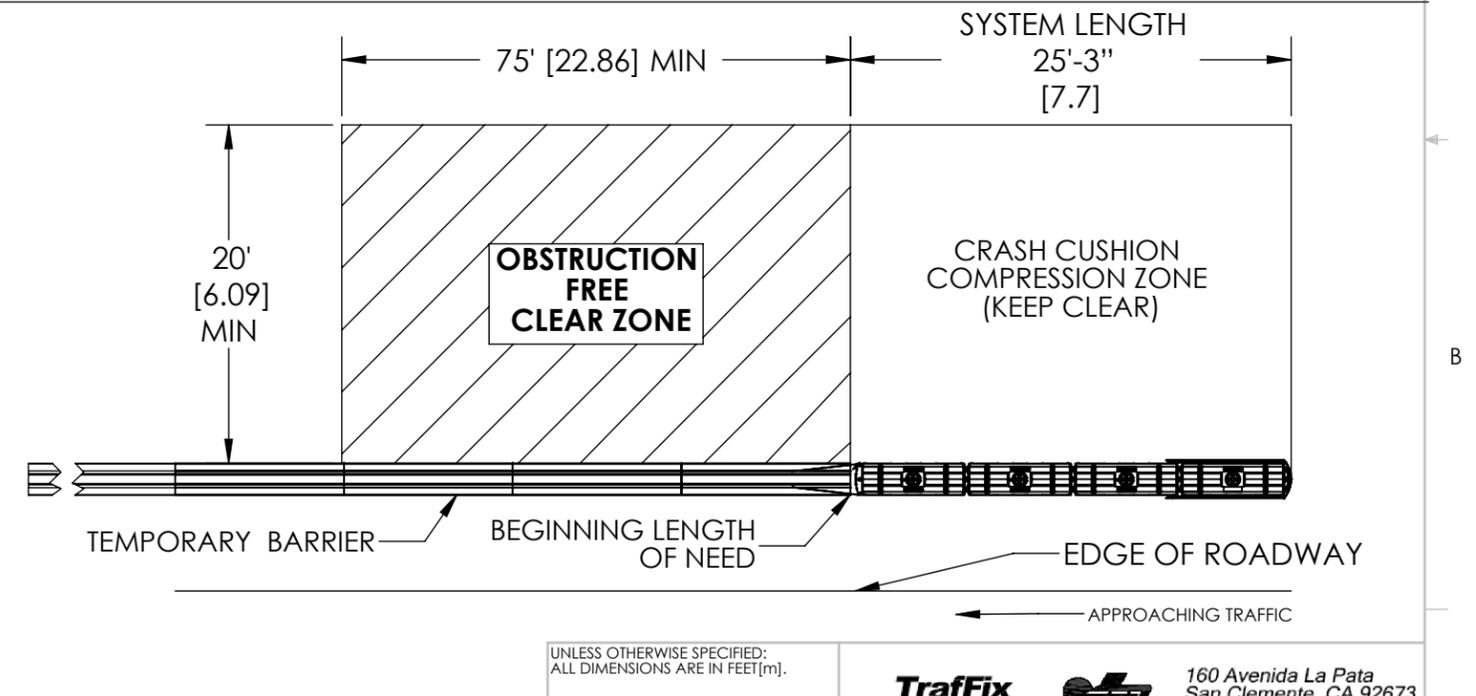
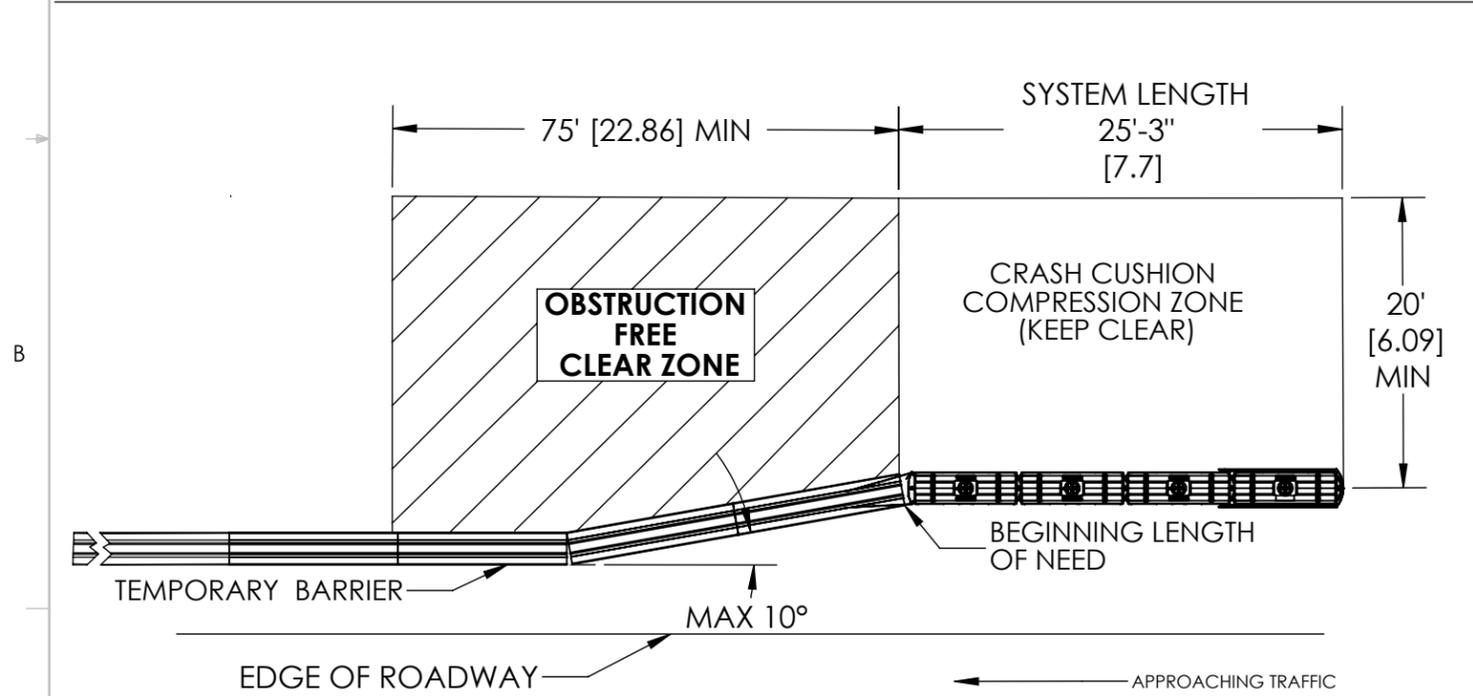
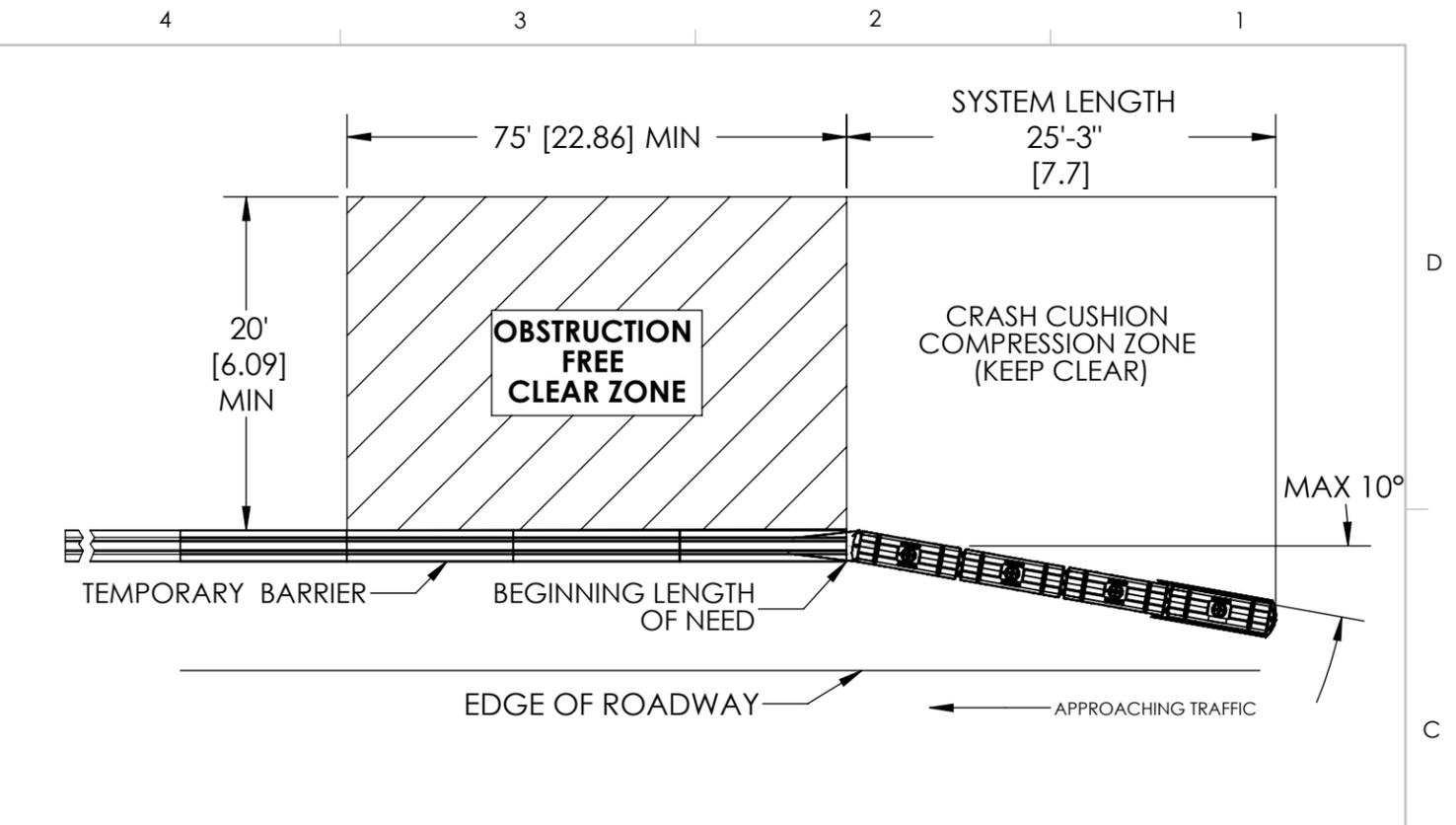
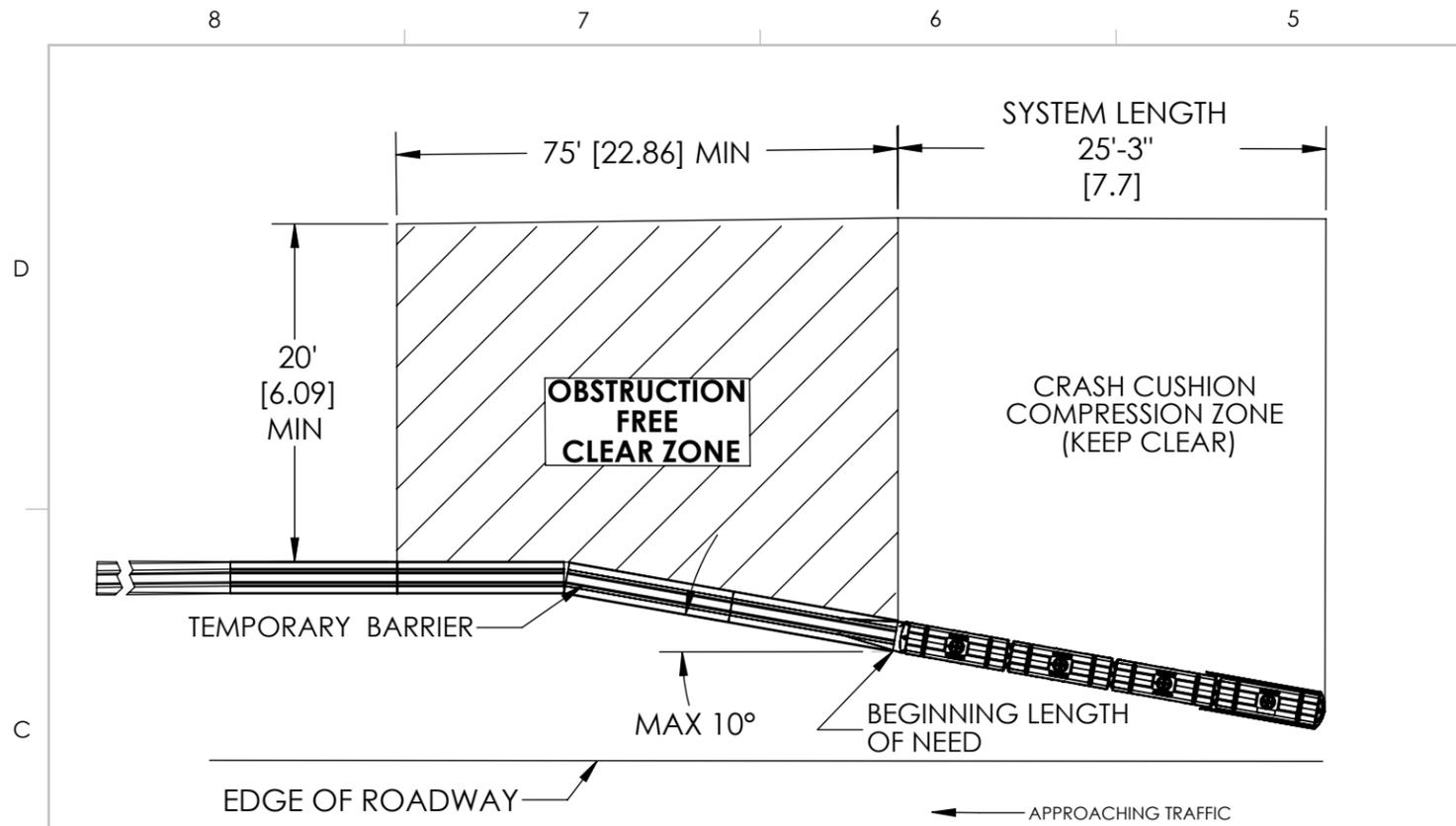
General details for the ABSORB 350 System are subject to change without notice to reflect improvements and upgrades.

Additional information is available from Lindsay Transportation Solutions Sales and Services, Inc. © Lindsay Transportation Solutions, Inc.

PT # ABS04-03252013

SLED EURO TERMINAL MANUFACTURED BY TRAFFIX DEVICES, INC., 160 AVENIDA LA PATA, SAN CLEMENTE, CA 92673 (PHONE: 949-361-5663) AND DISTRIBUTED BY A&A SAFETY. (PHONE: 513-943-6100)

DRAWING NUMBER	DRAWING NAME	MOST RECENT REVISION DATE
300-148	SLED END TREATMENT ANCHORED/UNANCHORED CONFIGURATIONS	6/9/2011
300-147	SLED END TREATMENT SYSTEM	6/10/2011
300-146	SLED END TREATMENT TL3	6/10/2011
45044-Y	SLED END TREATMENT MODULE	6/10/2011
45044-T	SLED END TREATMENT TRANSITION ASSEMBLY (PAGE 1 OF 6 ONLY)	6/2/2010
SPEED CONFIGURATION	TL-2 & TL-3 SPEED CONFIGURATION	--



NOTES:

1. MINIMUM LENGTHS OF TEMPORARY CONCRETE BARRIER ARE BASED ON UN-ANCHORED LENGTHS
2. SLED END TREATMENT SYSTEM DOES NOT REQUIRE ATTACHMENT TO A FOUNDATION. THE SYSTEM CAN BE LOCATED ON FIRM SOIL, ASPHALT, OR CONCRETE SURFACES.
3. SLED SYSTEM ANGLED TOWARD TRAFFIC AT ANGLE APPROPRIATE PER STATE AND LOCAL SPECIFICATION FOR GATING CRASH CUSHION.
4. RUN OF BARRIER SHALL MEET THE LENGTH OF NEED CALCULATION
5. SLED SYSTEM TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATION
6. AN APPROPRIATE OBSTRUCTION FREE CLEAR ZONE MUST BE ADJACENT TO THE SLED SYSTEM. THE OBSTRUCTION FREE CLEAR ZONE REPRESENTS THE IMPACT TEST RECOVERY AREA OF APPROXIMATELY 75 FT LONG BY 20 FT WIDE.
7. IN ADDITION TO THE RECOMMENDED OBSTRUCTION FREE CLEAR ZONE, AN AREA DIRECTLY ADJACENT TO THE CRASH CUSHION (CRASH CUSHION COMPRESSION ZONE) MUST BE KEPT CLEAR

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN FEET [m].

Traffix Devices Inc.
160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
www.traffixdevices.com

TITLE: **SLED END TREATMENT ANCHORED/UNANCHORED CONFIGURATIONS**

DRAWN BY: Mary Dralle
CHECKED BY: FA
APPROVED BY: FA

DATE: 06-09-11
DATE: 06-09-11
DATE: 06-09-11

SIZE **B**

DWG. NO. **300-148**

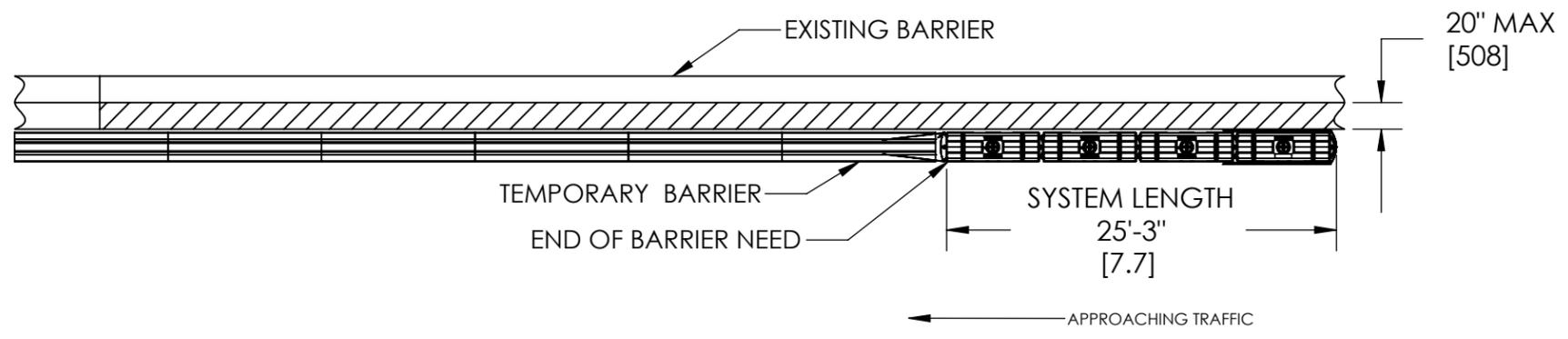
REV **C**

SHEET 1 OF 2

8 7 6 5 4 3 2 1

D
C
B
A

D
C
B
A



ROADSIDE INSTALLATION ON APPROACH OF ELEVATED BRIDGES OR ROADWAYS
 PLACEMENT OF THE SLED SYSTEM ON ELEVATED BRIDGE DECKS OR ROADWAYS ADJACENT TO EXISTING RAIL OR BARRIER SHALL BE OFFSET AT LEAST 20 INCHES [0.5 METER] FROM THE EXISTING RAIL OR BARRIER.
 HATCHED AREA TO BE KEPT CLEAR OF ANY OBJECTS

UNLESS OTHERWISE SPECIFIED:
 ALL DIMENSIONS ARE IN FEET[m].

DRAWN BY: Mary Dralle	DATE: 06-09-11
CHECKED BY: FA	DATE: 06-09-11
APPROVED BY: FA	DATE: 06-09-11

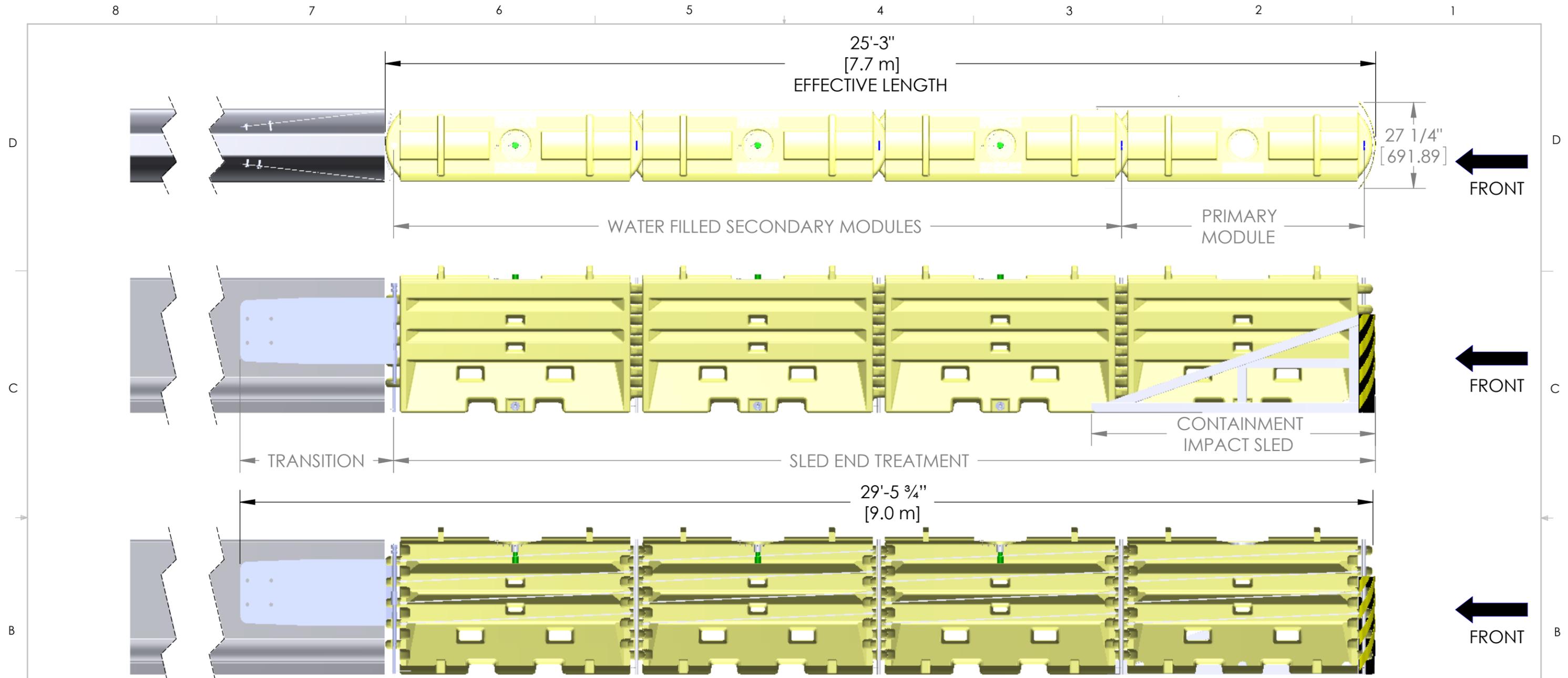
TraFFix
Devices Inc.  160 Avenida La Pata
 San Clemente, CA 92673
 (949) 361-5663
 FAX (949) 361-9205
 www.traffixdevices.com

TITLE: SLED END TREATMENT
 ANCHORED/UNANCHORED
 CONFIGURATIONS

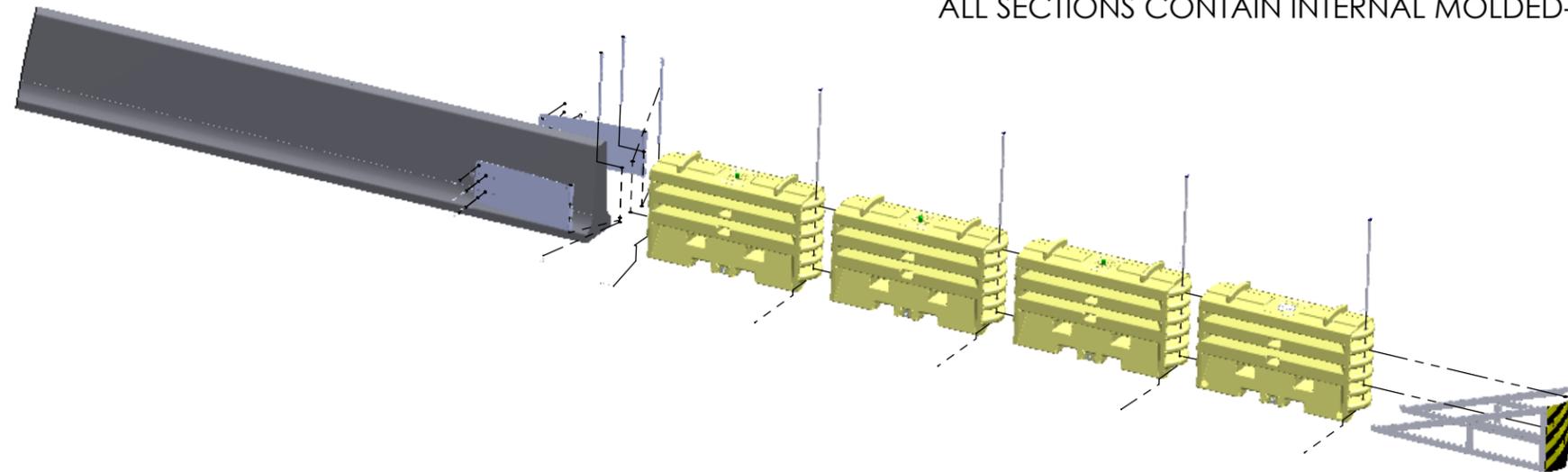
SIZE B	DWG. NO. 300-148	REV C
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SHEET 2 OF 2

8 7 6 5 4 3 2 1



CUT AWAY SLED END TREATMENT
ALL SECTIONS CONTAIN INTERNAL MOLDED-IN CABLES.



UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1" [25.4mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

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San Clemente, CA 92673
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TITLE:
SLED END TREATMENT SYSTEM

DRAWN BY: Mary Dralle
CHECKED BY: FA
APPROVED BY: FA

DATE: 06-10-11
DATE: 06-10-11
DATE: 06-10-11

SIZE
B

DWG. NO.
300-147

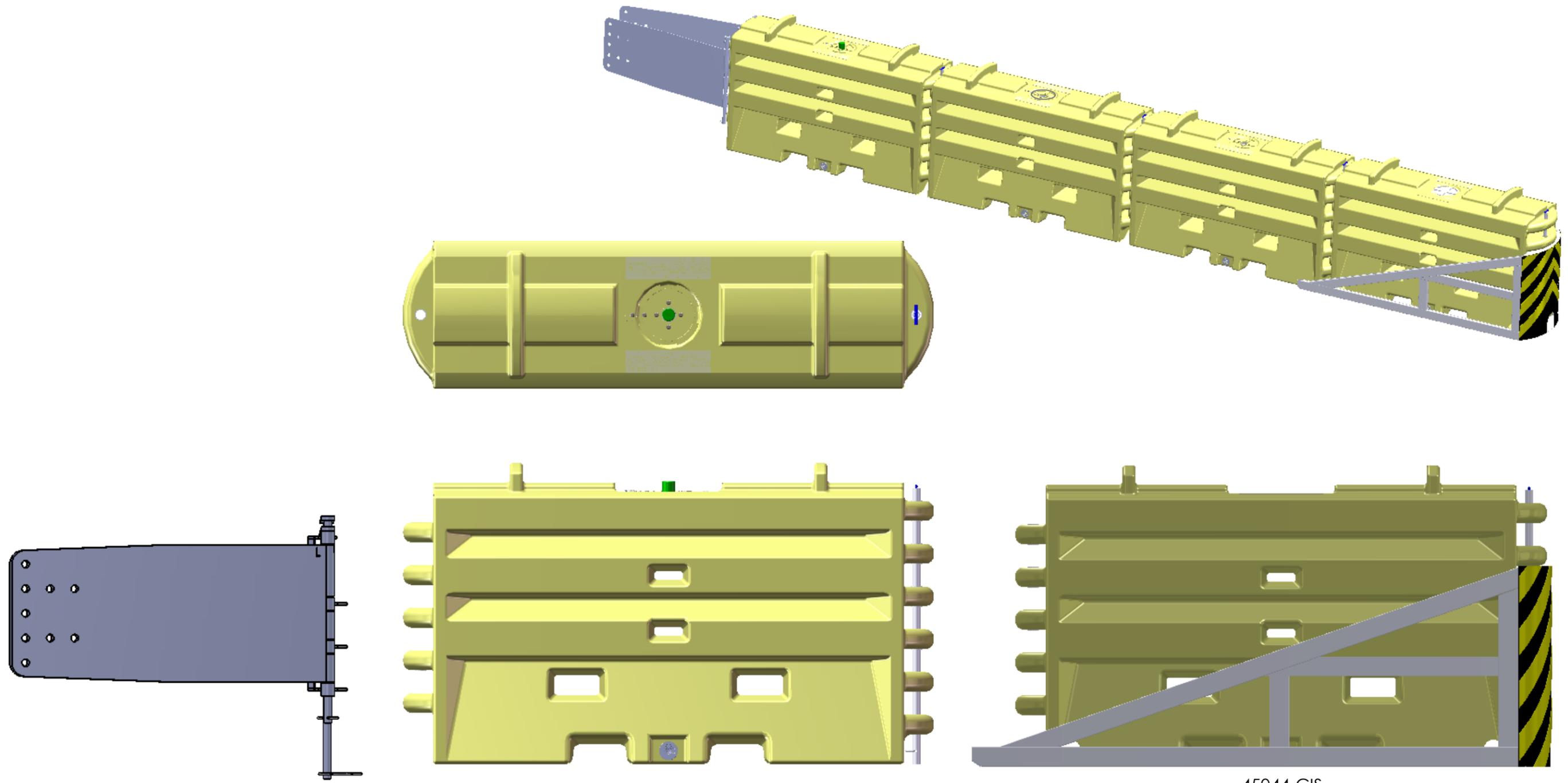
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A

SHEET 1 OF 1

8 7 6 5 4 3 2 1

D
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B
A

D
C
B
A



45044-T

45044-Y

45044-CIS

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16" [1.6mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

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San Clemente, CA 92673
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TITLE:
SLED End Treatment TL3

PN	DESCRIPTION	QTY
45044-Y-CIS	Containment Impact Sled	1
45044-Y	43" SLED End Treatment Module	3
45044-T	SLED End Treatment Transition	1

DRAWN BY: Mary Dralle
CHECKED BY: GM
APPROVED BY: GM
DATE: 06-10-11
DATE: 06-10-11
DATE: 06-10-11

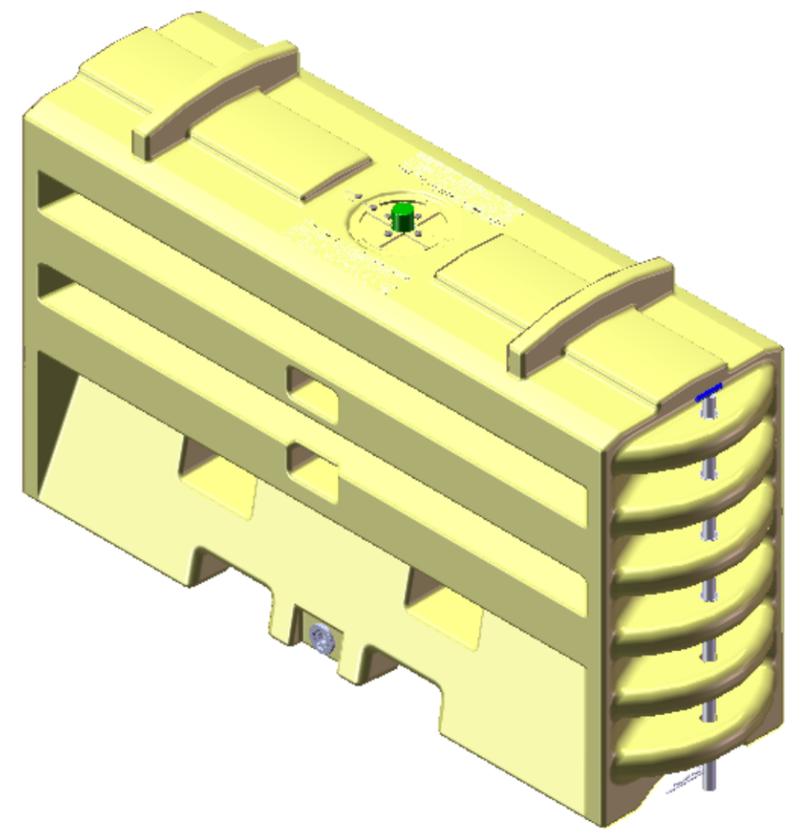
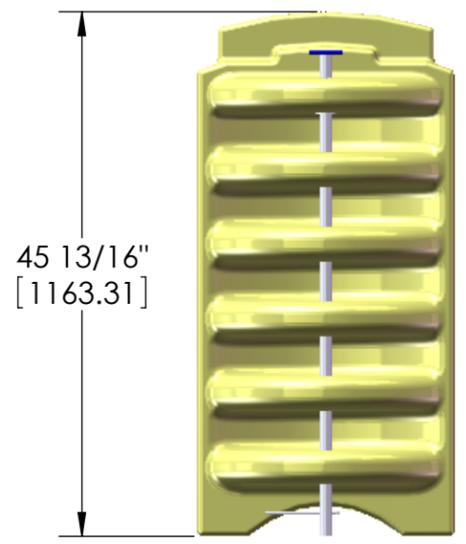
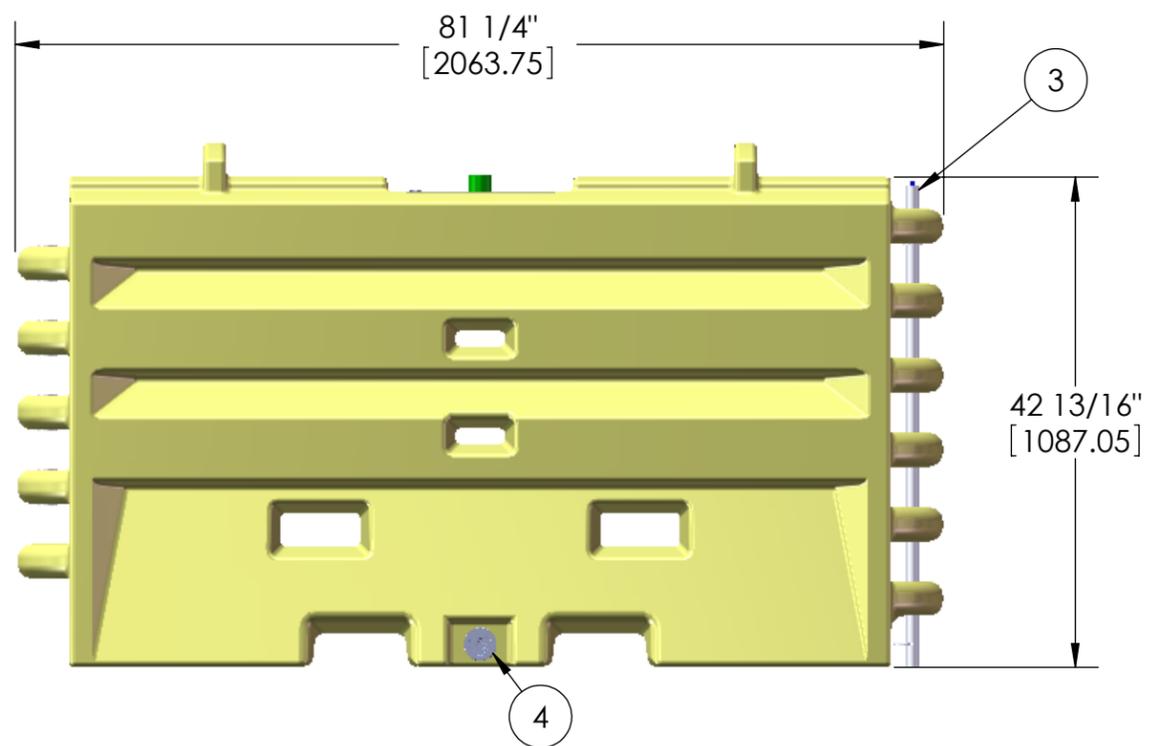
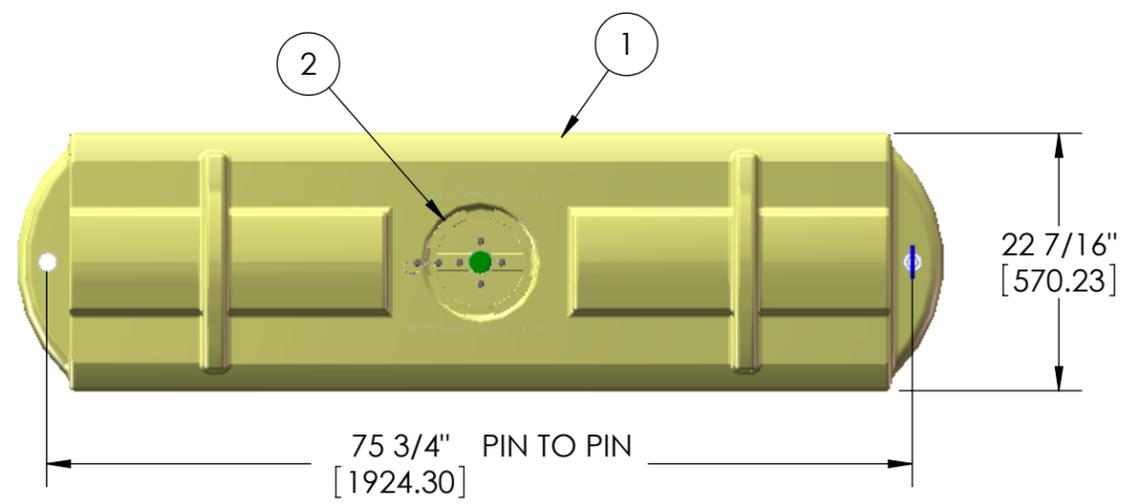
SIZE **B** DWG. NO. **300-146** REV **A**

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D
C
B
A

D
C
B
A



SLED END TREATMENT
 UNITS: INCHES [mm]
 COLOR: YELLOW
 EMPTY WEIGHT: APPROX. 160 LBS. [73 kg]
 FILLED WEIGHT: APPROX. 2000 LBS [907 kg].
 FILL MATERIAL: WATER

ITEM	DESCRIPTION	PN	QTY
1	43" SLED End Treatment	45044-YEL	1
2	Water Level Indicator Fill Cap	18009-Y-I	1
3	Sentry Water Cable Barrier T-Pin w/Keeper Pin	45043-CP	1
4	Water Wall Drain Plug	45033-RC-B	1

UNLESS OTHERWISE SPECIFIED:
 ALL DIMENSIONS ARE IN INCHES[mm].
 TOLERANCES:
 FRACTIONAL: X/X ± 1/16" [1.6mm]
 DECIMAL: .000 ± .0625
 DEGREES: ± 0.5°

Traffix Devices Inc.  160 Avenida La Pata
 San Clemente, CA 92673
 (949) 361-5663
 FAX (949) 361-9205
 www.traffixdevices.com

TITLE: **SLED END TREATMENT MODULE**

SIZE B	DWG. NO. 45044-Y	REV A
------------------	----------------------------	-----------------

SHEET 1 OF 1

DRAWN BY: Mary Dralle
 CHECKED BY: FA
 APPROVED BY: FA

DATE: 06-10-11
 DATE: 06-10-11
 DATE: 06-10-11

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

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C
B
A

D
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A

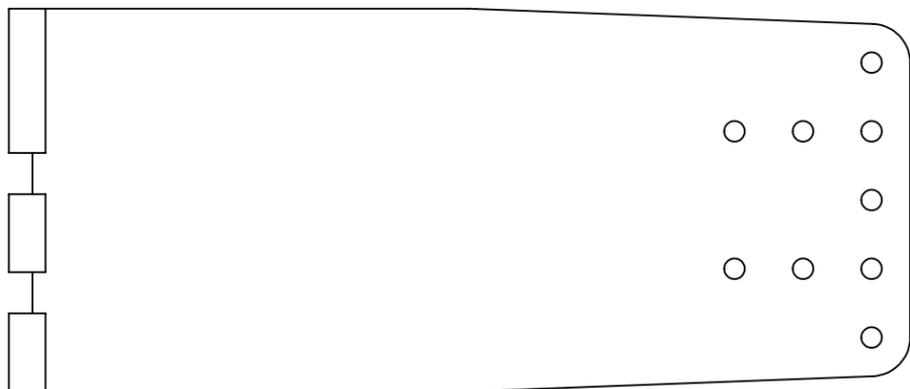
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SLED TRANSITION
SHORT DROP PIN

45130
SLED TRANSITION FRAME

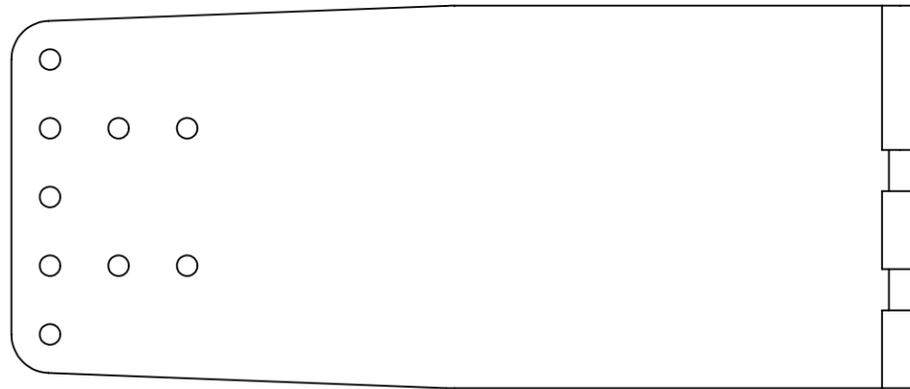
45140
SLED TRANSITION
LONG DROP PIN

45047
BOLT,
TAPER ANCHOR,
3/4" X 4-1/8"

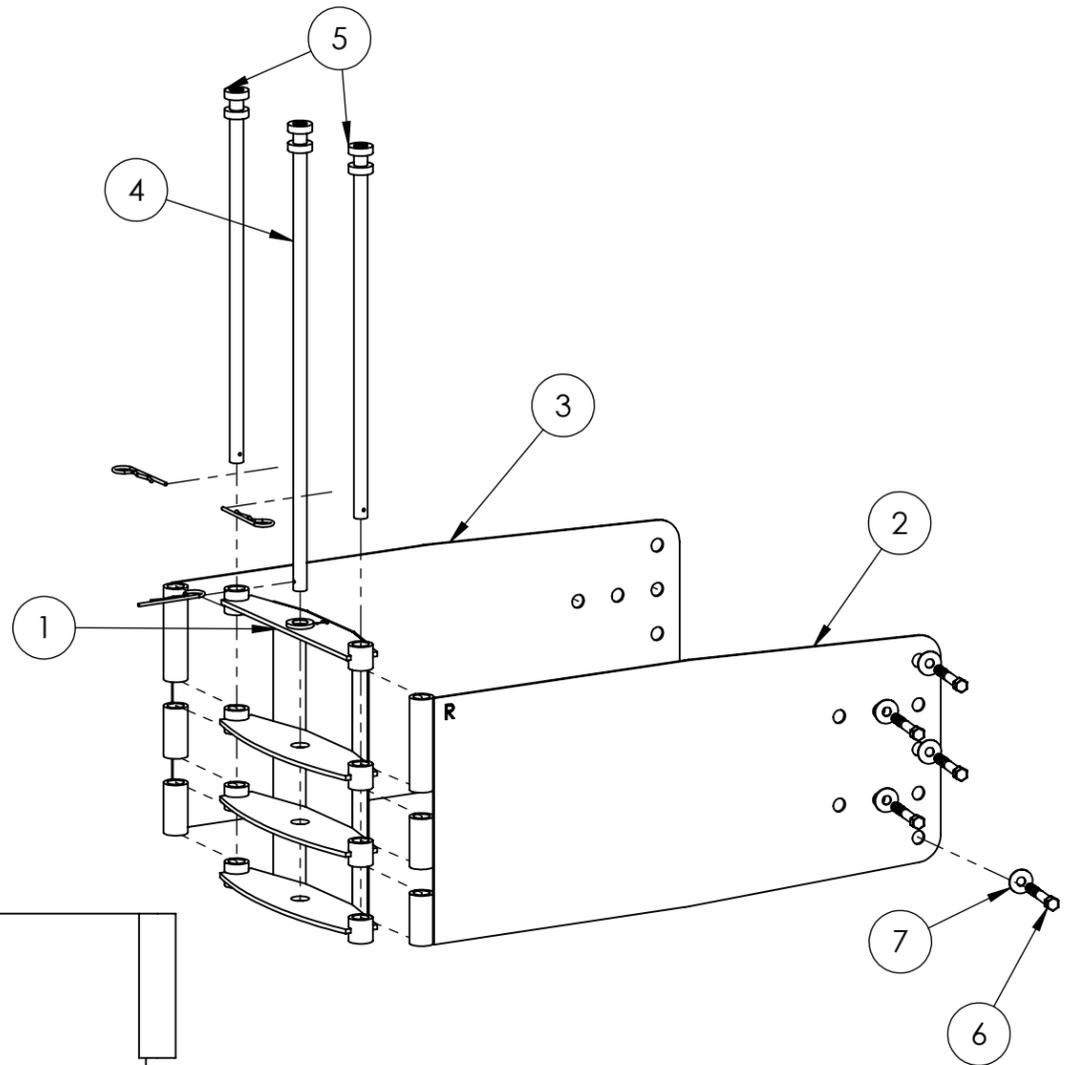
12060
WASHER, FLAT,
3/4"ID X 2"OD



45150L
SLED TRANSITION PANEL, LEFT



45150R
SLED TRANSITION PANEL, RIGHT



ITEM NO.	DESCRIPTION	PN	QTY
1	SLED TRANSITION FRAME ASSY	45130	1
2	RIGHT SLED TRANSITION PANEL ASSY	45150R	1
3	LEFT SLED TRANSITION PANEL ASSY	45150L	1
4	SLED TRANSITION LONG DROP PIN	45140	1
5	SLED TRANSITION SHORT DROP PIN	45145	2
6	BOLT, TAPER ANCHOR, 3/4" X 4-1/8"	45047	9
7	WASHER, FLAT, 3/4"ID X 2"OD	12060	9

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN INCHES[mm].
TOLERANCES:
FRACTIONAL: X/X ± 1/16" [1.6mm]
DECIMAL: .000 ± .0625
DEGREES: ± 0.5°

DRAWN BY: Mary Dralle
CHECKED BY: FA
APPROVED BY: FA
DATE: 06-02-10
DATE: 06-02-10
DATE: 06-02-10

Traffix Devices Inc.  160 Avenida La Pata
San Clemente, CA 92673
(949) 361-5663
FAX (949) 361-9205
www.traffixdevices.com

TITLE: **SLED END TREATMENT TRANSITION ASSY**

SIZE **B** DWG. NO. **45044-T** REV **B**

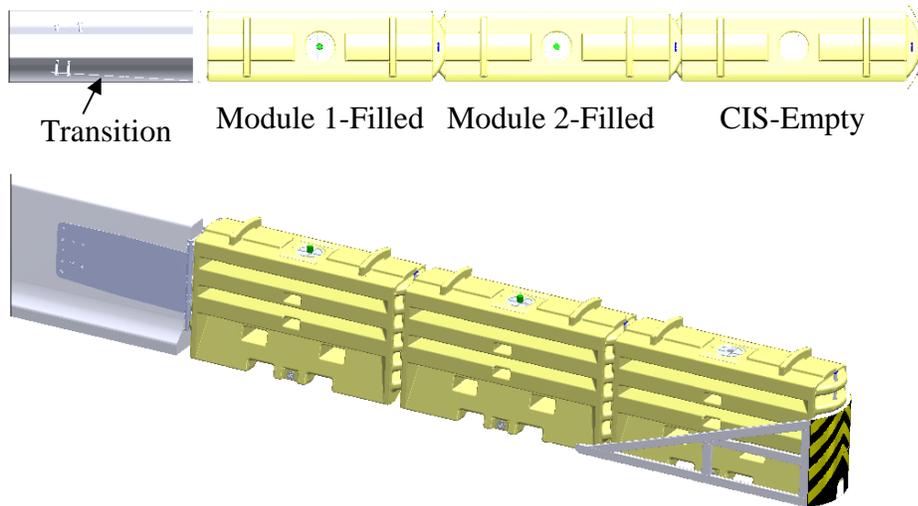
SHEET 1 OF 6

2. FINISH: HOT DIP GALVANIZE
1. MATERIAL: A36 AND A513 STEEL
NOTES: UNLESS OTHERWISE SPECIFIED

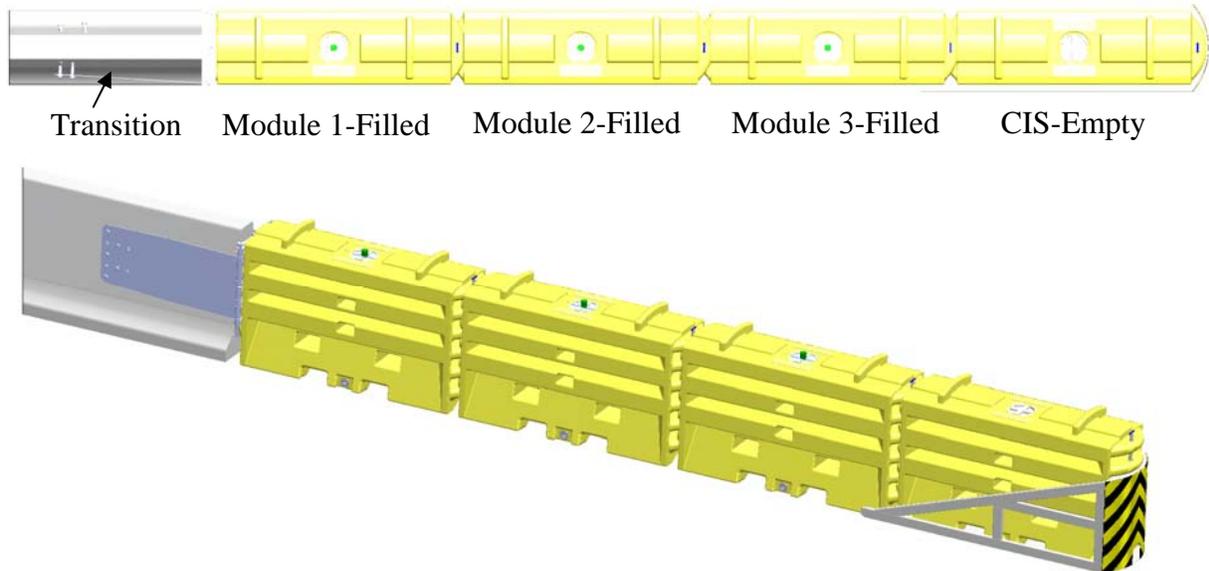
8 7 6 5 4 3 2 1

Speed Configuration

TL-2 Configuration



TL-3 Configuration



* CIS is ALWAYS empty.

ACZ-350™

PORTABLE
TL-2 & TL-3
END
TREATMENT



OVERVIEW

The ACZ-350 System combines ease of use and NCHRP 350, gating, non-redirective TL-2 and TL-3 crash cushion performance for work zone protection. This partially reusable crash cushion can be easily transported, and installed with No Roadway Anchors.

SUPERIOR IMPACT PERFORMANCE

The unique design of the ACZ-350 systems protects errant drivers from impacting concrete barrier ends, and also contains the errant vehicle from vaulting into the workzone.

NON-REDIRECTIVE, GATING CRASH CUSHION SYSTEM

All Crash Cushions defined as Non-redirective and Gating require a clear zone. Clear Zones are areas behind the crash cushion that NO workers, machinery, obstructions or other debris could interfere with an errant vehicle. This area should also remain relatively flat. If there are any questions or concerns, please contact your local Energy Absorption Systems, Inc. representative.

FEATURES AND BENEFITS

- No Vaulting
- Safely contains errant vehicle
- Accommodates impacts up to 2,000 kg, (4,500 lbs) traveling at speeds up to 100 km/h (62 mph)
- Simple and Fast Installation
- Protects Permanent or Temporary, Steel or Concrete Barrier
- Ideal for Work Zones
- No Foundation or Anchoring

EASY CLEAN-UP
NARROW PROFILE
MINIMUM INTRUSION
LOW COST/ AFFORDABLE
QUICK/EASY TO MOVE

ACZ-350™



ENERGY ABSORPTION
SYSTEMS, INC.

SAVING LIVES BY DESIGN®

www.energyabsorption.com

EASY DEPLOYMENT AND REMOVAL

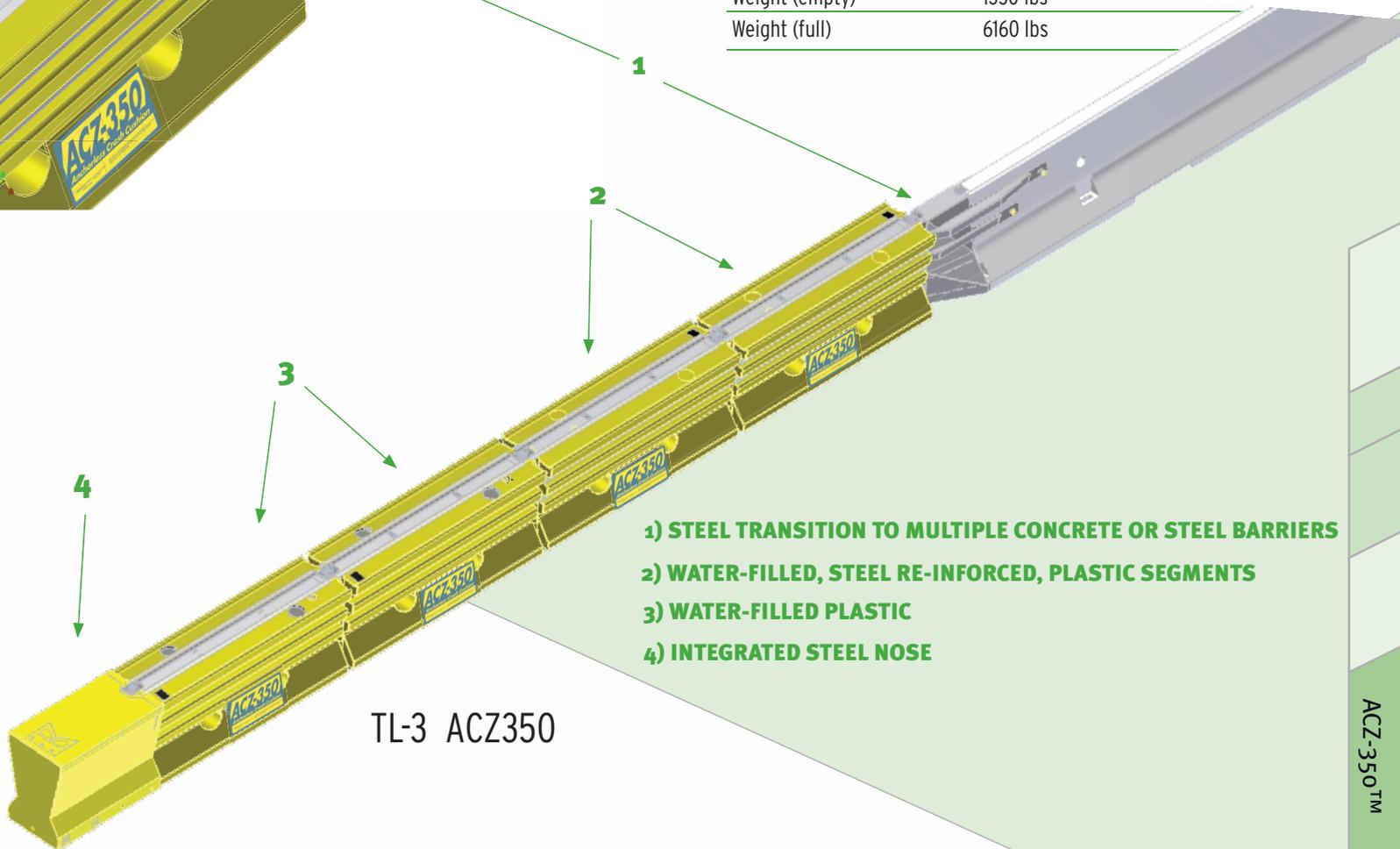
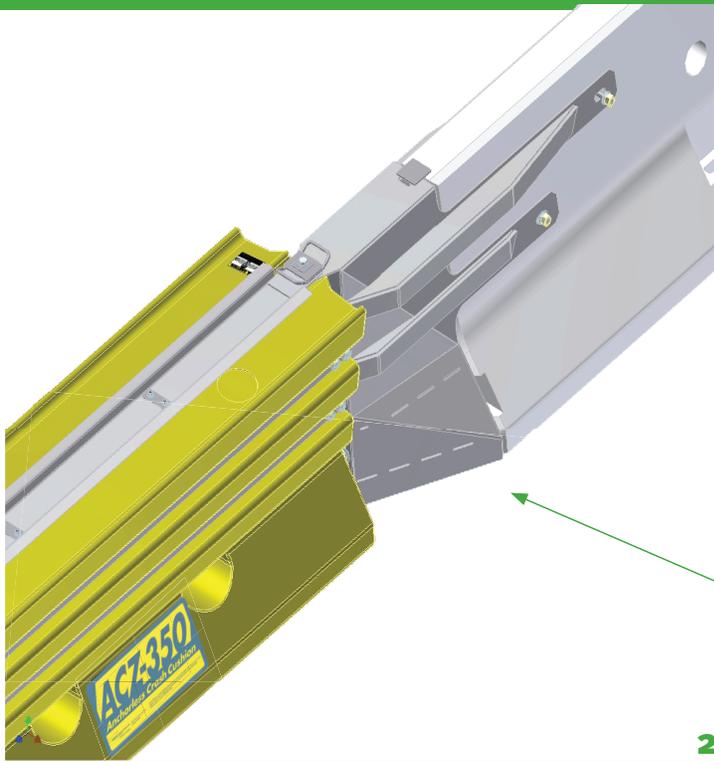
The ACZ-350 System can be easily unloaded and positioned without cranes or heavy equipment. Deployment involves three simple steps:

1. Unload
2. Position and pin barrier sections.
3. Fill Segments with water

SPECIFICATIONS

TL-3

Length	31'-7" (9.6 m)
Width	1'-10" (.6m)
Height	2' 9" (.8m)
Weight (empty)	1350 lbs
Weight (full)	6160 lbs



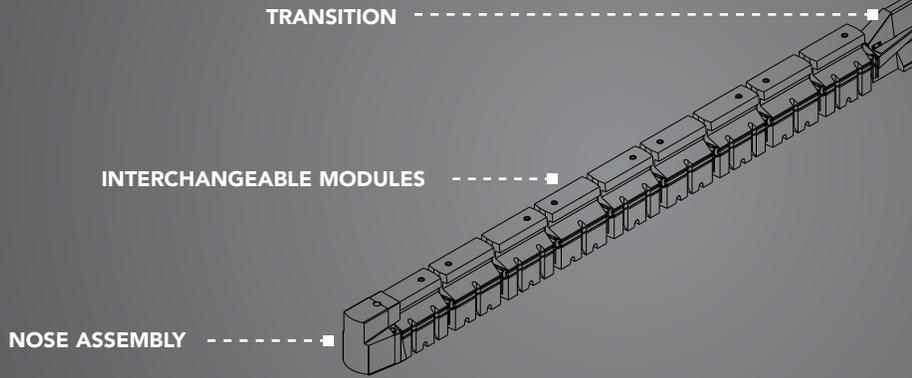
- 1) STEEL TRANSITION TO MULTIPLE CONCRETE OR STEEL BARRIERS
- 2) WATER-FILLED, STEEL RE-INFORCED, PLASTIC SEGMENTS
- 3) WATER-FILLED PLASTIC
- 4) INTEGRATED STEEL NOSE

TL-3 ACZ350

DISTRIBUTED BY:

PHYSICAL SPECIFICATIONS

Classification	NR-S	
TL-3 Length	32'	9.7 m
Width	24"	610 mm
Height	32"	813 mm
Module Weight Empty	110 lb.	50 kg
Test Level	NCHRP 350	TL 1/2/3



NARROW ANCHORLESS WATER FILLED CRASH CUSHION

No ground anchoring, the largest selection of transitions and modular technology allow the ABSORB 350 System to be used in multiple speed conditions. The ABSORB 350 System is ideal for contractors due to the ease of maintenance after an impact and quick deployment. At 24" (610 mm) wide, it is ideally suited for narrow areas where road and workspace is limited. The ABSORB 350 System is easy to restore after an impact because the System uses uniform modular components. The use of standardized modular components also helps to reduce inventory costs.

FREQUENTLY ASKED QUESTIONS

Can the nose be angled off the barrier to better face traffic?

Yes, as long as all of the ABSORB 350 modules remain pinned and connected. For larger angles, it is recommended that the last barrier section be moved to face traffic.

Can the ABSORB 350 System be moved while filled with water?

Yes, the System is rigid enough to be repositioned filled with water by sliding the optional wheel / jack assembly under each element.

What transitions are available?

Dozens of transition options are available, including attachments to; Standard NJ / J / K / F, Wide / X-Wide NJ, I-Lock, Smooth Face, JJ Hook, QMB, ArmorGuard®, Orion®, BarrierGuard® and ZoneGuard®.

Can the ABSORB 350 System be used during cold weather?

Since ABSORB 350 modules have no internal steel parts, the use of any approved anti icing chemical is acceptable.

FEATURES

- » Rapid deployment and retrieval
- » No ground anchoring required
- » Low initial price
- » Narrow footprint
- » Can be deployed on almost any road surface
- » Meets NCHRP 350 TL-1, TL-2, TL-3 test criteria
- » Easily transitioned to multiple widths and shapes of barriers
- » Nose and transition are reusable after most design impacts
- » Approved for use in permanent and work zone locations

DISTRIBUTED BY:



Lindsay Transportation Solutions Sales and Services, Inc.

180 River Road • Rio Vista, CA 94571 • +1 707.374.6800 U.S. Toll Free: 888.800.3691 • www.barrriersystemsinc.com

General details for the ABSORB 350 System are subject to change without notice to reflect improvements and upgrades.

Additional information is available from Lindsay Transportation Solutions Sales and Services, Inc. © Lindsay Transportation Solutions, Inc.

PT # ABS04-03252013