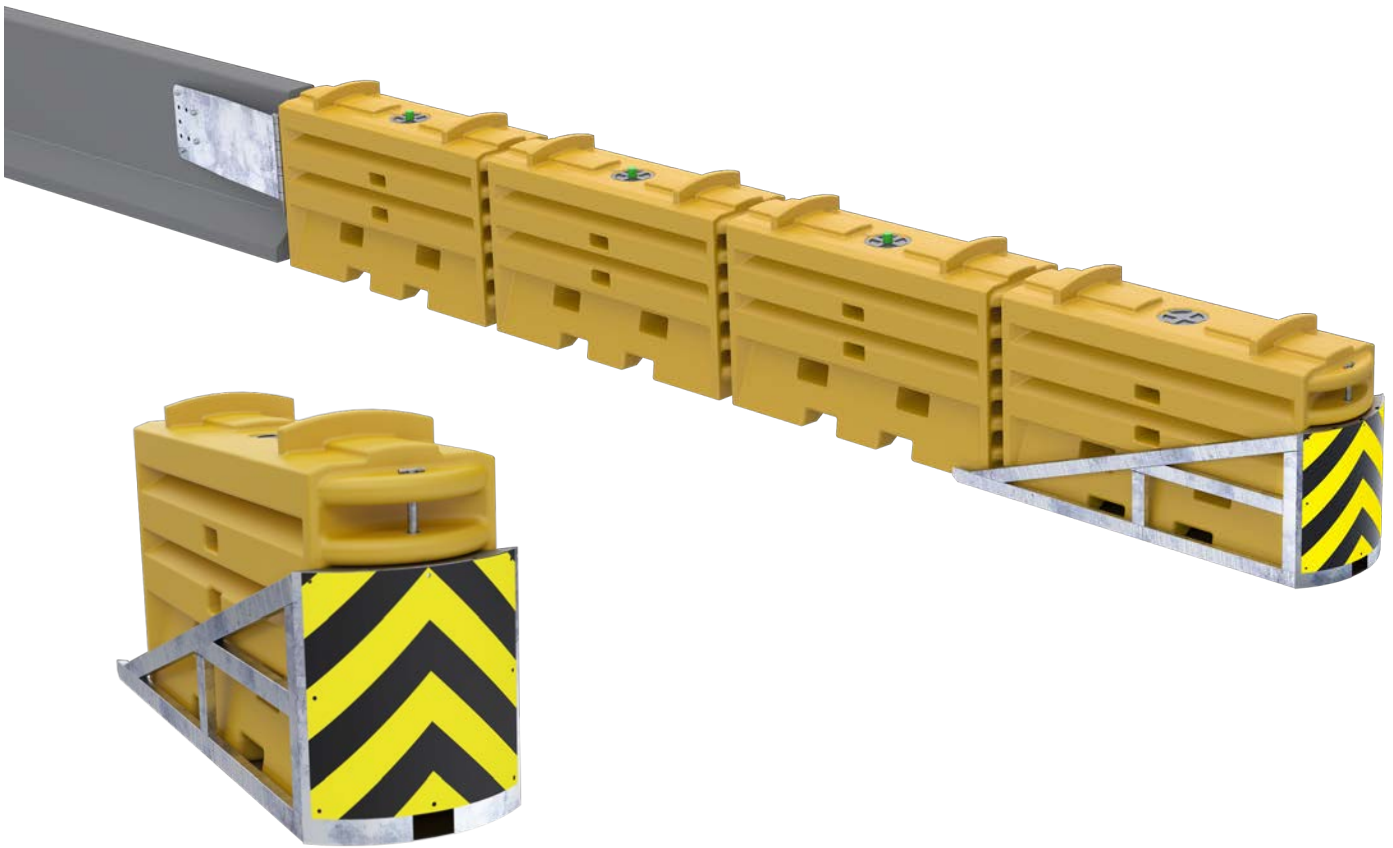


SLED®

End Treatment System Installation Guide



SLED®
Sentry Longitudinal Energy Dissipater



TraFFix
Devices Inc. 
Engineered Products for Safer Highways

Introduction to Guide



Important: These instructions pertain only to the assembly and installation of the SLED® End Treatment System (ETS). Any deviation from the SLED ETS shown would require consultation with the appropriate highway authority Engineer and/or certified Traffix Devices, Inc. representatives. Contact information for Traffix Devices representatives can be found on page 43 of this manual.

















Correct Installation of the SLED ETS is essential for proper performance of the system. For this reason, contacting a Traffix Devices, Inc. Engineering Department manager for assistance installing the system is recommended. Please read this manual in its entirety before assembling or installing the SLED ETS. The information in this Manual supersedes all previous versions and manuals, with updated illustrations and other information available at time of printing; however; Traffix Devices, Inc. reserves the right to make changes at any time. For any questions on proper Installation and Operation of the SLED ETS, please contact us at (949) 361-5663 or email info@traffixdevices.com.



Important: This manual applies to the SLED ETS by Traffix Devices, Inc. It pertains only to the model referenced herein. It requires that all installation, service and repair parts be genuine Original Equipment Manufacturer (OEM) SLED ETS parts that have not been modified or repaired from the original factory design.

Safety Symbols

	Attention! Read and Understand.
	Proceed with Caution.
	Hard Hat Protection Required.
	Hearing Protection Required.
	Safety Glasses or Safety Goggles Required.
	Dust Mask Required. Dust Hazard, wear appropriate dust mask in this area.
	Safety Gloves Required.
	Safety Shoes Required.
	Tip Over Hazard. Do not move this equipment without mechanical assistance.
	Pinch point. Keep hands clear during operation.
	Crush Hazard. Keep feet clear.
	Forklift Required. Caution Forklift Operating.
	Warning Overhead Crane. Stay out from under suspended loads.
	Danger! Toxic Hazard. Do not get on skin, eyes or clothing.



NOTE: The safety symbols list provided is a general recommendation and should not be considered an all-inclusive list. Always follow best practice.

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Warning and Limitations

TrafFix Devices Inc., in compliance with the Manual for Assessing Safety Hardware (MASH) recommended procedures for safety performance evaluation of highway features, contracted the services of an approved ISO certified independent test facility, to conduct crash tests, report findings, and provide complete testing evaluation reports.

The SLED ETS is deemed eligible by the Federal Highway Administration (FHWA) for use on the National Highway System. TL-3 meets the MASH requirements, using the test impact vehicles that range from light weight cars of approximately 1100 kg (2420 lbs.), to full-size pick up trucks of approximately 2270 kg (5000 lbs.).

A series of inline, offset, side and angle impacts at a designated speed of 100 kph (62.1 mph) were conducted to verify the SLED's impact performance. All Occupant Risk Values were deemed a PASS per MASH specifications.

The SLED ETS is designed to be installed and maintained in accordance with the recommendations and guidelines of the governing state and FHWA.

After an impact, damaged components should be removed and replaced with new components.

System Overview

The SLED ETS is a gating, non-redirective crash cushion designed to shield the end of concrete, steel, or plastic barriers.

Crash Performance

The SLED End Treatment Modules are yellow in color. The MASH Test Level 3 (TL-3) System has an overall length of 25.25 ft. (7.7 m) long (pin to pin) and is 2.4 ft. (0.7 m) wide. Each Module has overall dimensions of approximately 6.3 ft. (1.9 m) x 1.9 ft. (0.57 m) x 3.8 ft. (1.2 m) and weighs approximately 160 lbs. (73 kg) when empty and 2000 lbs. (907 kg) when filled.

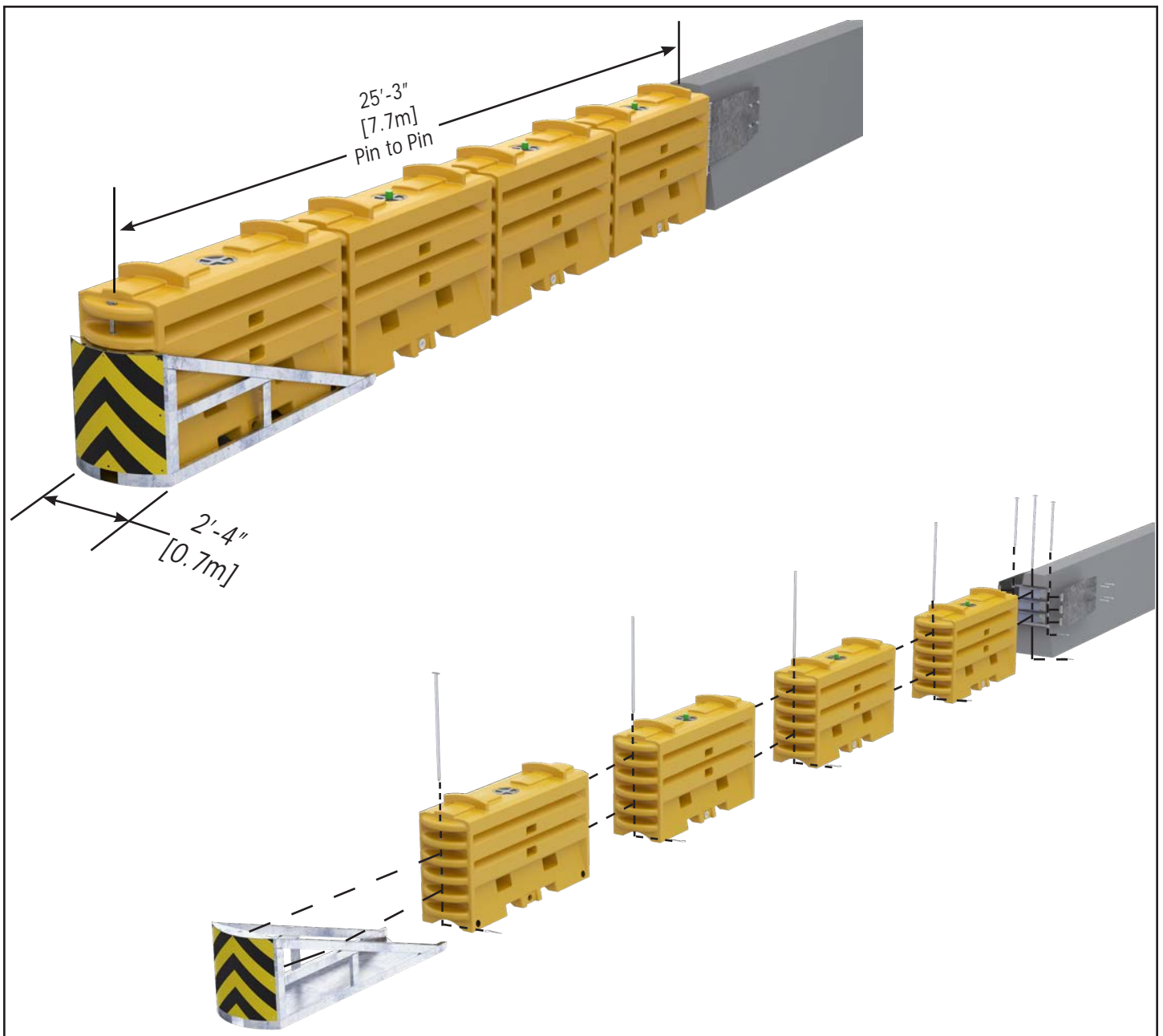


Figure 1: TrafFix Devices SLED ETS shown in TL-3 configuration, as well as exploded view.

Product Overview and Function

The SLED ETS is a water-filled gating, non-redirective crash cushion designed to shield permanent and portable barriers. The SLED ETS consists of three water-filled plastic modules and one empty plastic module. Attached to the front empty module is the patented Containment Impact Sled (CIS), which collects the ruptured debris in front of the impacting vehicle. These components produce the desired energy attenuation characteristics to decelerate an impacting vehicle to meet TL-3 crash-worthy requirements of MASH.

Additional Features:

- MASH TL-3 Tested – Eligible for use on the National Highway System as a TL-3, Crash Cushion.
- Overall TL-3 array length is 25.25 ft (7.7m) long (pin to pin).
- Minimum Barrier Length of Need (LON) for SLED Installation: 40 ft. (12.2m)
- Attaches to various permanent/temporary concrete, steel, or plastic barriers.
- SLED Transition Panels conform to multiple barrier shapes but not limited to shapes such as Jersey Shape, F-Shape, Single Slope, Vertical Shape, and other safety shapes.
- Does not require any external steel for module assembly.
- Rotational molded plastic, modules are manufactured from specially formed material designed to be durable when handled and attenuate when impacted.
- Module sections up to ½” (13 mm) thick reduce nuisance hit damage and the potential for vandalism.

SLED Identification and Orientation

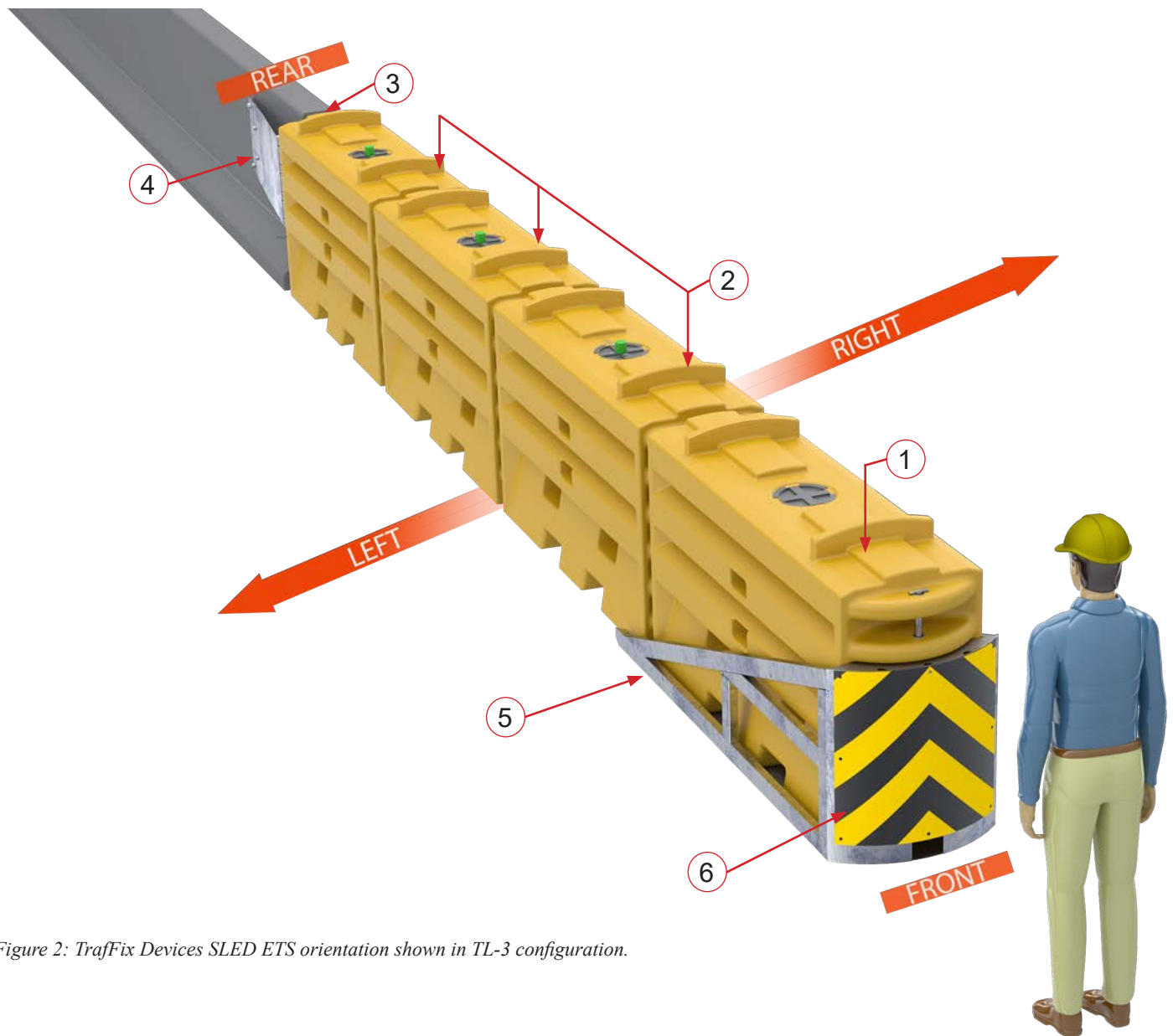


Figure 2: Traffix Devices SLED ETS orientation shown in TL-3 configuration.

- ① - No Fill Module
- ② - Water-Filled Module
- ③ - Transition Frame
- ④ - Transition Panel
- ⑤ - Containment Impact Sled (CIS)
- ⑥ - SLED Nose Sheeting

Product Components and General Specifications

Module Specifications

All SLED ETS Modules are yellow in color and have an outer shell made from energy attenuating plastic. The modules will collapse and rupture when impacted and disperse the contained water. The modules will not crack or corrode when left on the job site or stored for long periods of time.

Overall Dimensions:

Width: 22½" [572 mm]

Height: 42-¾" [1086 mm]

Length: 75-¾" [1924 mm] pin to pin

Weight:

Empty Weight: 160 lbs. [73 kg]

Filled Weight: 2000 lbs. [907 kg]

Fill Capacity:

Volume: 220 Gal [832 L]

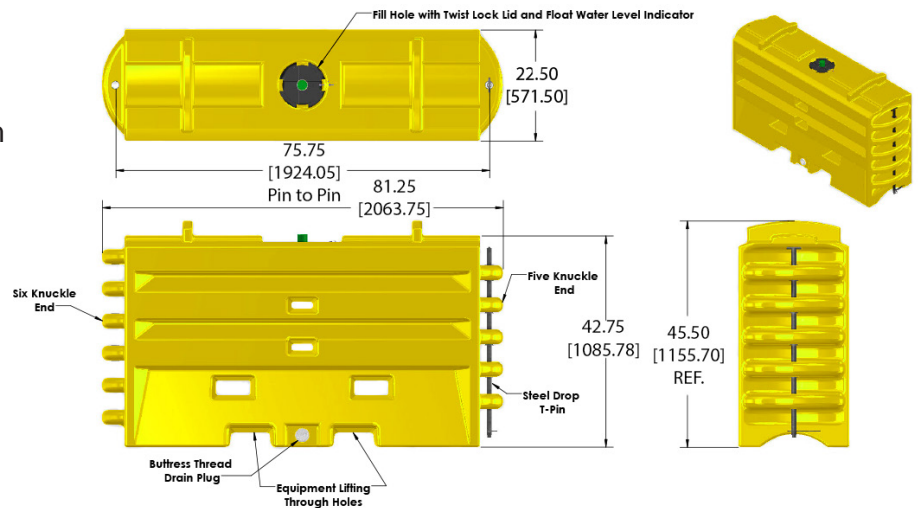


Figure 3: Module Dimensions and details.

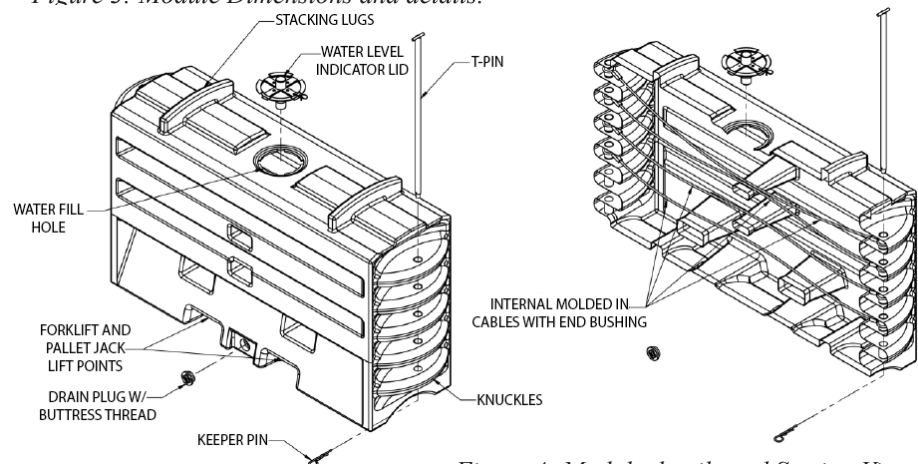


Figure 4: Module details and Section View.

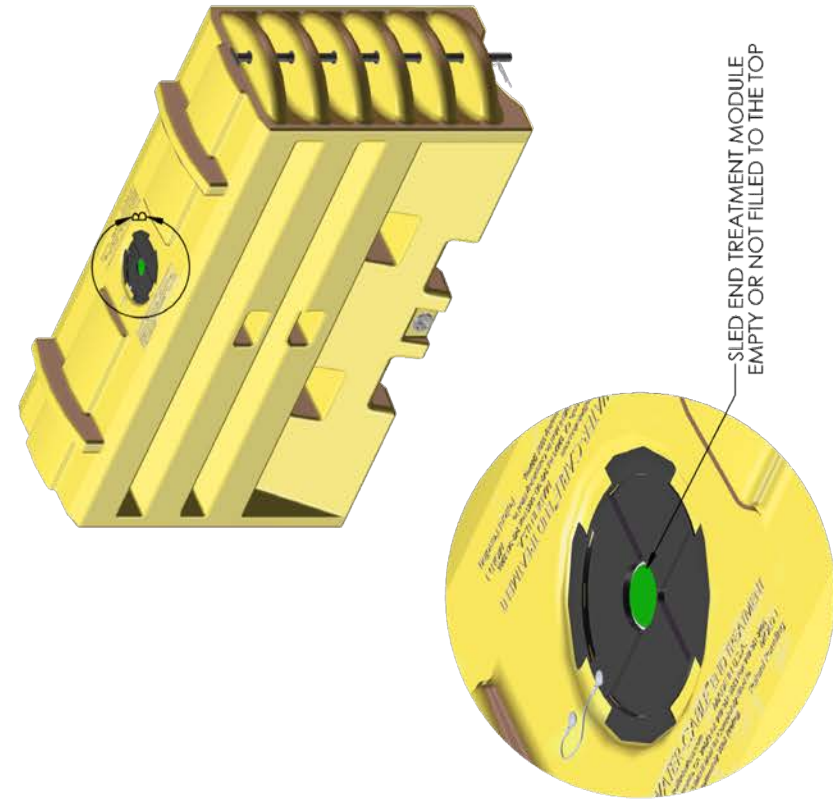
Each module contains an eight inch (8") diameter water fill-hole located on the top surface of each module section. This large diameter opening allows for easy access for water filling using a large diameter hose from a water tanker truck. Each module comes with a twist lock lid to cover the fill hole opening when the water filling process is complete. A water level indicator is designed into the twist lock lid.

For draining, a central drain hole is located at the bottom of each module. Each drain hole contains molded-in Buttress threads. The drain plug requires 1-1/2 turns to seal the plug preventing any water leaks. The molded-in Buttress threads eliminate the possibility of cross threading compared to standard threads used in a spin welded insert. Cracked spin welded inserts may require repair and are typically not reliable, leading to water leaks. The SLED Modules, with molded in Buttress threads, eliminates both issues of cross threading and insert repair.

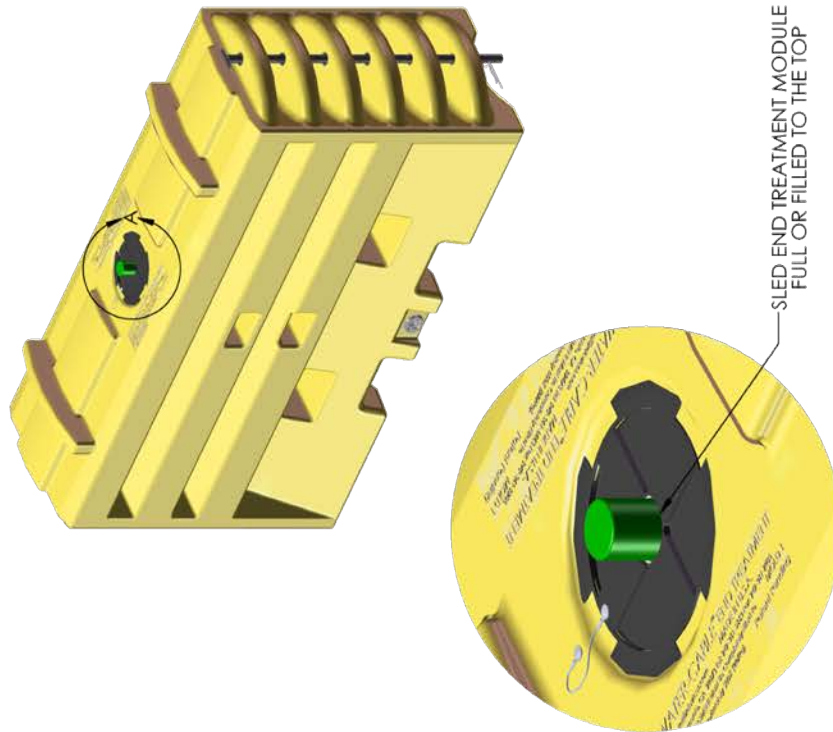
Two forklift pockets (slots) are designed into the modules, located at grade level, which can be used to insert forklift blades for moving the filled or unfilled SLED Modules sections as needed.

⚠ The molded-in steel cables ARE NOT to be used for lifting the modules. Only the two forklift pockets (slots) should be used to lift the modules.

Water Level Indicator Fill Cap



DETAIL B
SCALE 1 : 4

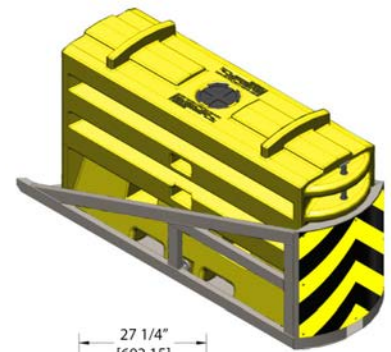
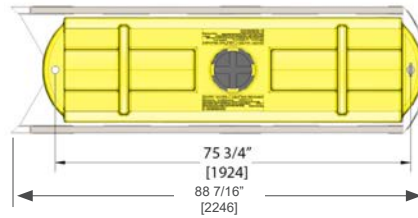


DETAIL A
SCALE 1 : 4

Figure 5: SLED End Treatment Module float cover.

Containment Impact Sled

The Containment Impact Sled (CIS) is attached to the front empty module. The steel CIS is hot-dip galvanized to minimize the effects of corrosion. Upon impact, the CIS slides rearward collecting the ruptured modules.

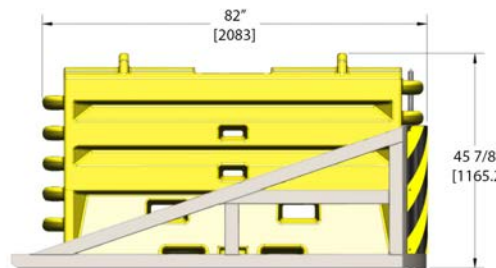


Overall Dimensions:

Width: 27 1/4" [692 mm]

Height: 45 7/8" [1165 mm]

Length: 88 7/16" [2246 mm] (CIS Frame)



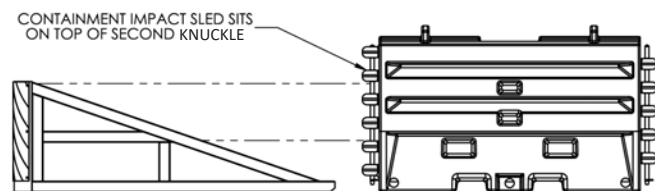
Weight:

Weight: 197 lbs. [89 kg]

Figure 6: SLED End Treatment CIS Module.

The CIS is a tube frame designed with a curved front cap and a flat steel bottom. The CIS Frame is pinned against the empty No-Fill Module with a vertical T-pin that drops through a series of the concentric holes in the Module knuckles, which align with the CIS pin hole.

CONTAINMENT IMPACT SLED INSTALLATION TO 6 KNUCKLE SIDE



CONTAINMENT IMPACT SLED INSTALLATION TO 5 KNUCKLE SIDE

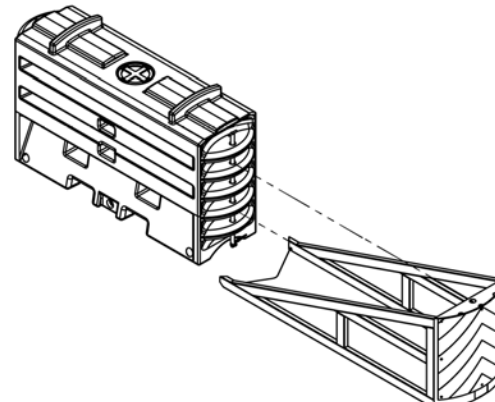
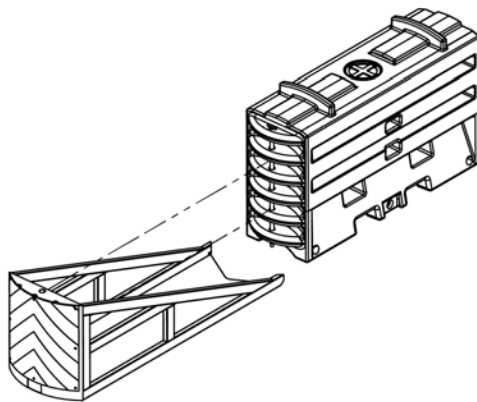
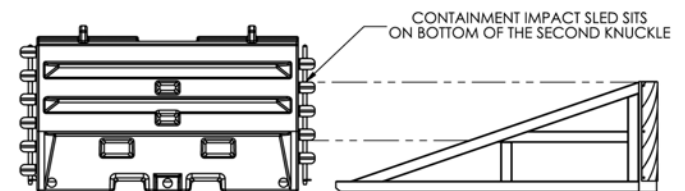


Figure 7: SLED End Treatment CIS installation to both ends of a module.

Transition Attachment For Attaching the SLED To An Array or Barrier

The Transition is made from steel sheeting and tubing that is hot-dip galvanized to minimize the effects of corrosion. The Transition attaches to the rear of the SLED system and is fastened to the shielded barrier with a minimum of eight anchor bolts, with nine bolts preferred.

Overall Dimensions:

- Width: 22 3/8" [568 mm] (Frame)
- Height: 20 7/8" [530 mm] (Panel)
- Length: 49 5/8" [1260 mm] (Panel)

The Transition consists of a frame, universal transition panels, and connection pins. The frame is connected to the rearmost module. The Transition Frame is designed to attach to either the five or six knuckle end of the rearmost module. The Transition Panels are universal, and can be installed on the left or right side.

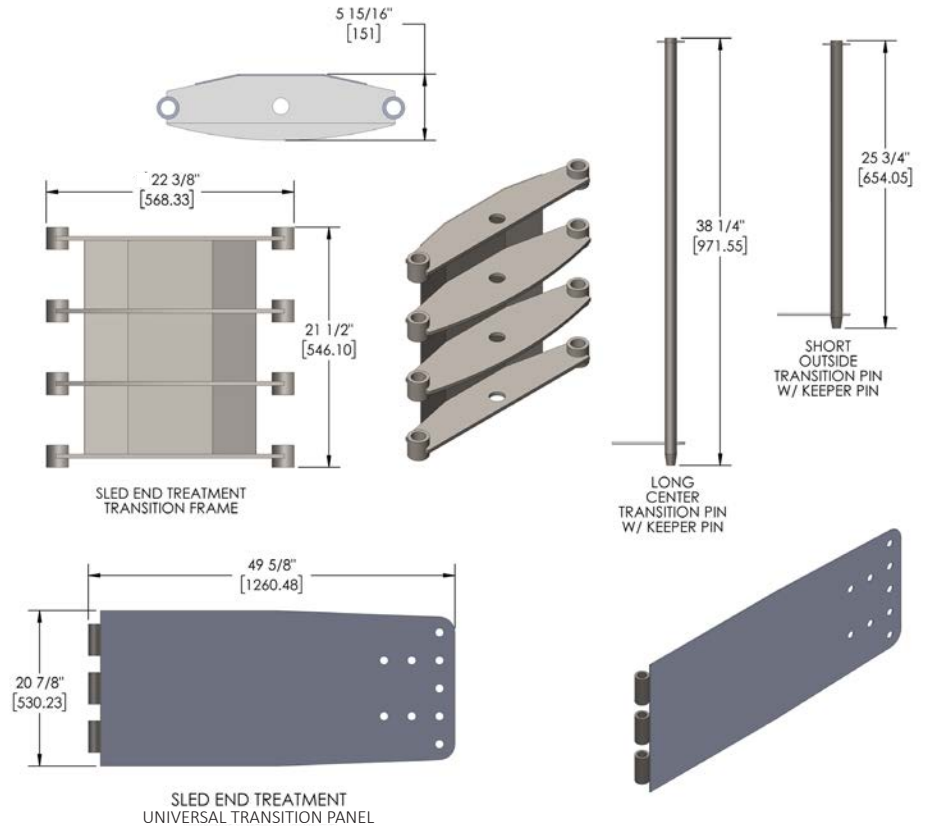


Figure 8: SLED End Treatment Transition.

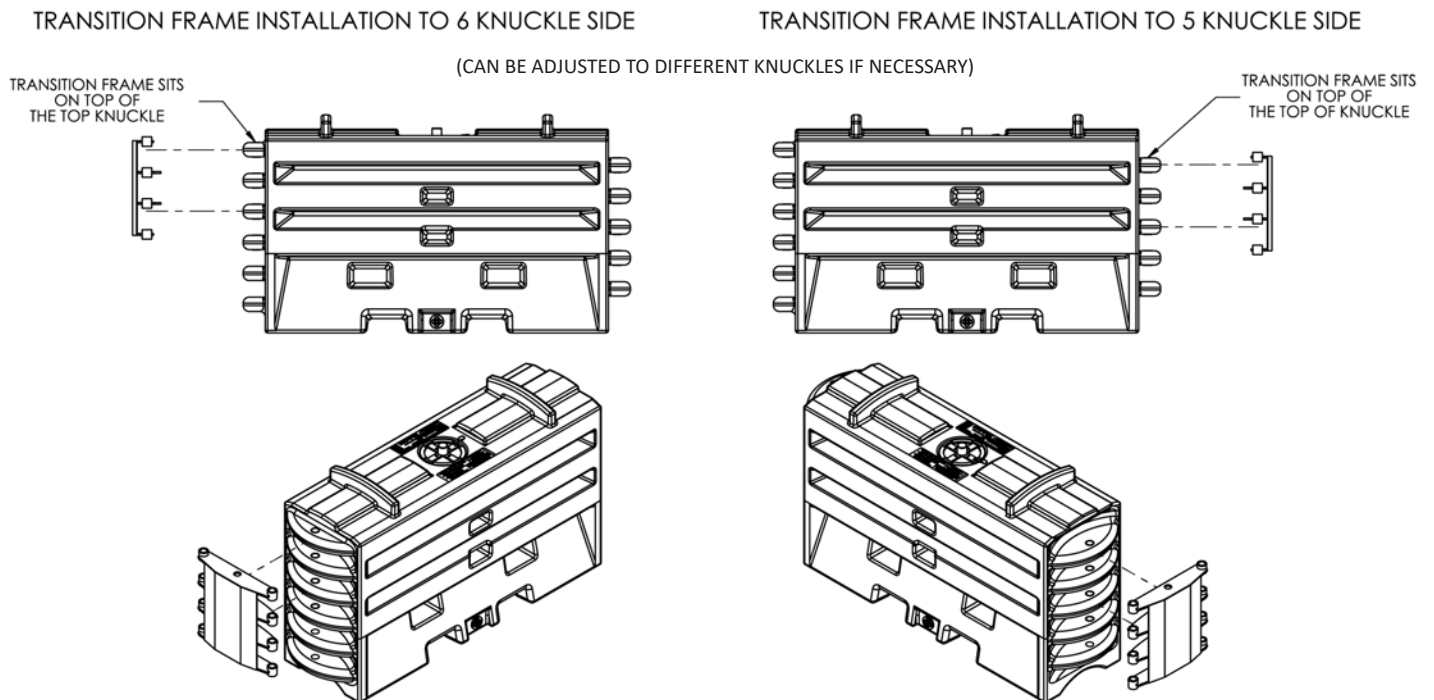


Figure 9: SLED End Treatment Transition Frame installation to both ends of a module.

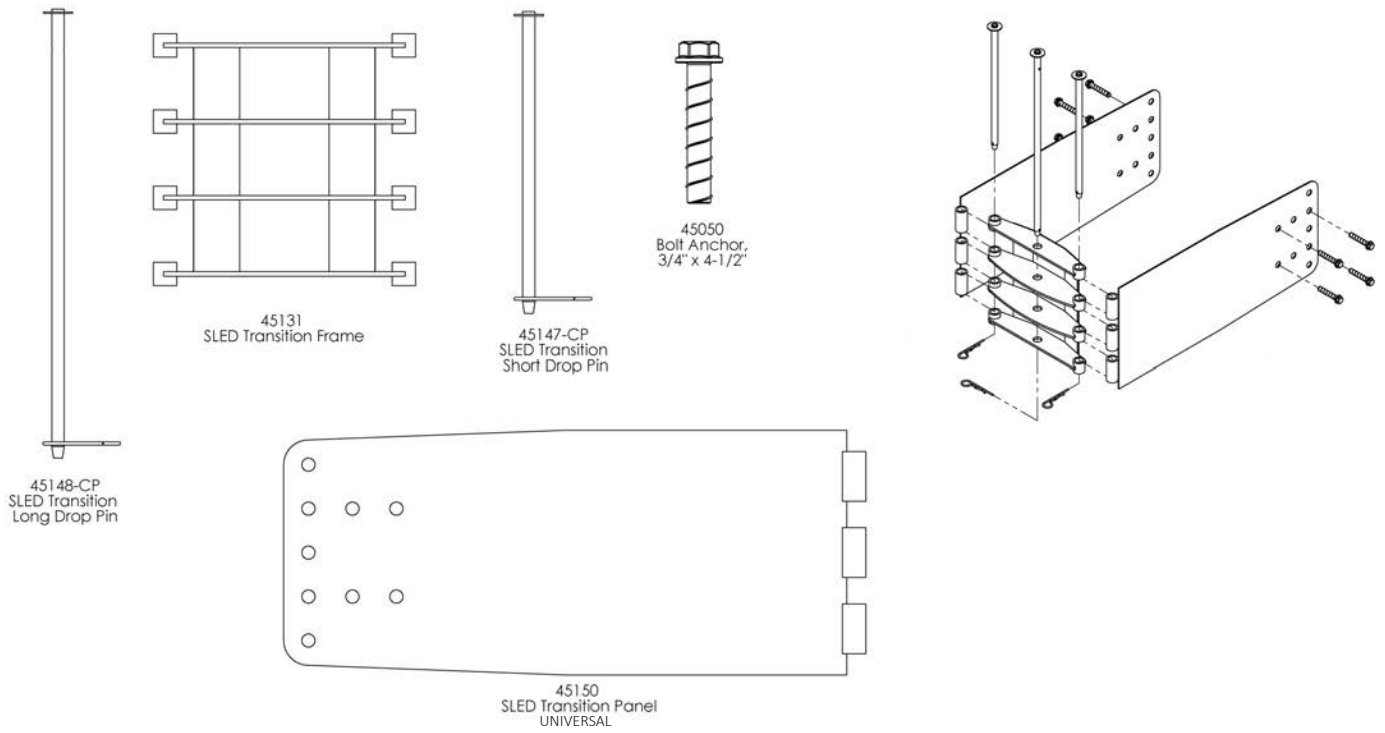


Figure 10: Transition Components & Assembly.

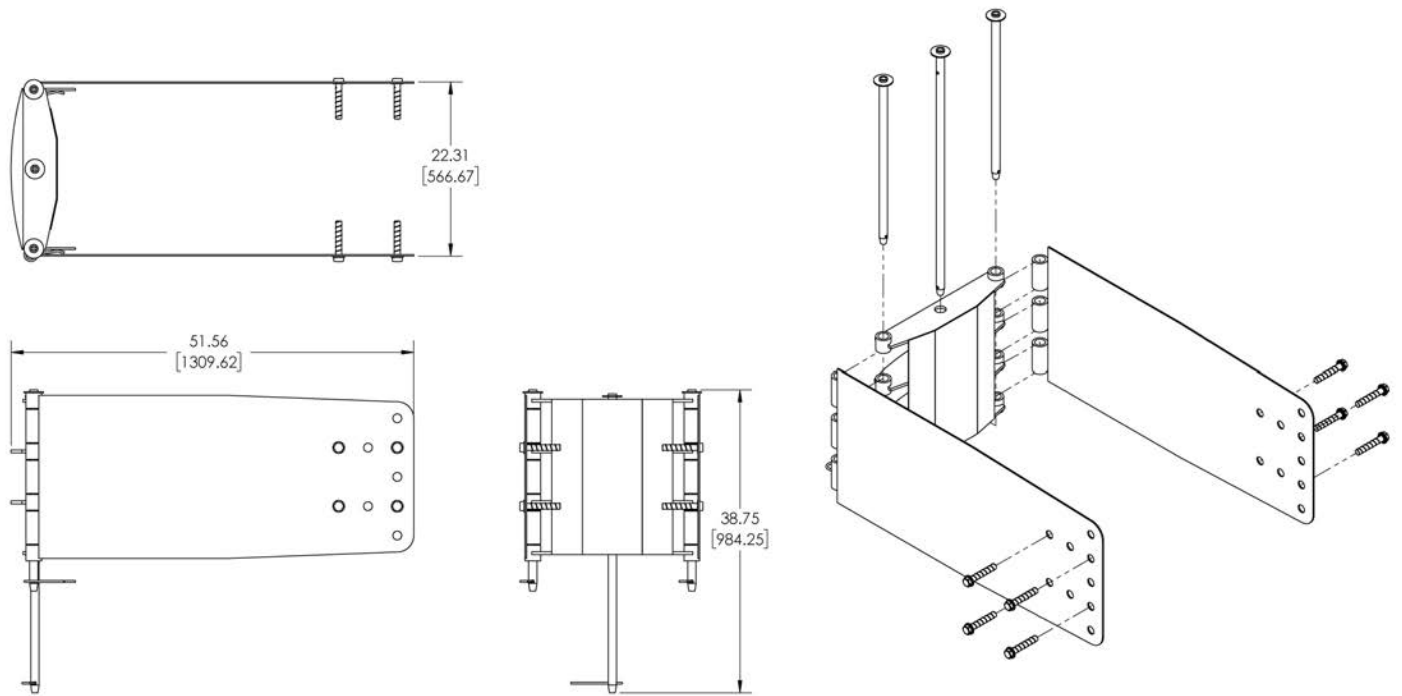







Figure 11: Transition Components & Assembly cont'd.

SLED Parts List

<u>Part No.</u>	<u>Description</u>	
45131	SLED Transition Frame	
45147	SLED Transition Short Drop Pin, 25" length	
45148	SLED Transition Long Drop Pin, 38" length	
45150	SLED Transition Panel, Universal Fit	
45050	Anchor Bolt, 3/4" Dia. X 4-1/2" length	

45032-PN

Keeper Pin



45043-CPGAL

**Interlocking T-Pin,
38" Length**



45044-Y-CIS

**Containment Impact SLED (CIS),
Steel Frame w/Nose Sheeting and No Fill Module**



18009-B-I

"Drive By" Float Fill Cap



45044-Y

**SLED Water-Filled Module,
w/"Drive by" Float Fill Cap & Lanyard, T-Pin
w/Hair Pin & Drain Plug**



Directional Application Definition

The SLED End Treatment modules are designed for a uni-directional traffic application where a gating device is acceptable to the road authority. A general definition of this application is described and graphically displayed below.

Uni-Directional Application: Uni-directional refers to the flow of traffic in a single direction. In this type of application opposite direction impacts would not be probable.

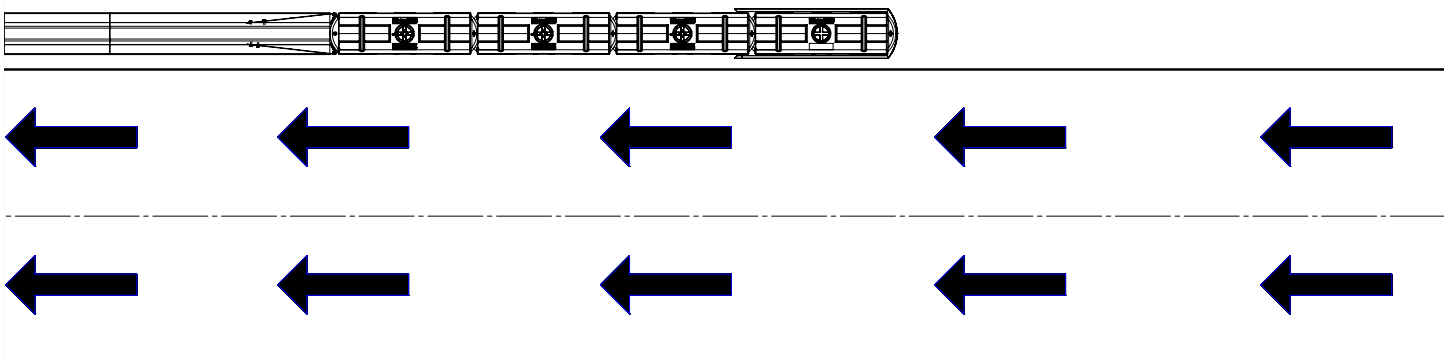


Figure 12: Traffic flow uni-directional application.

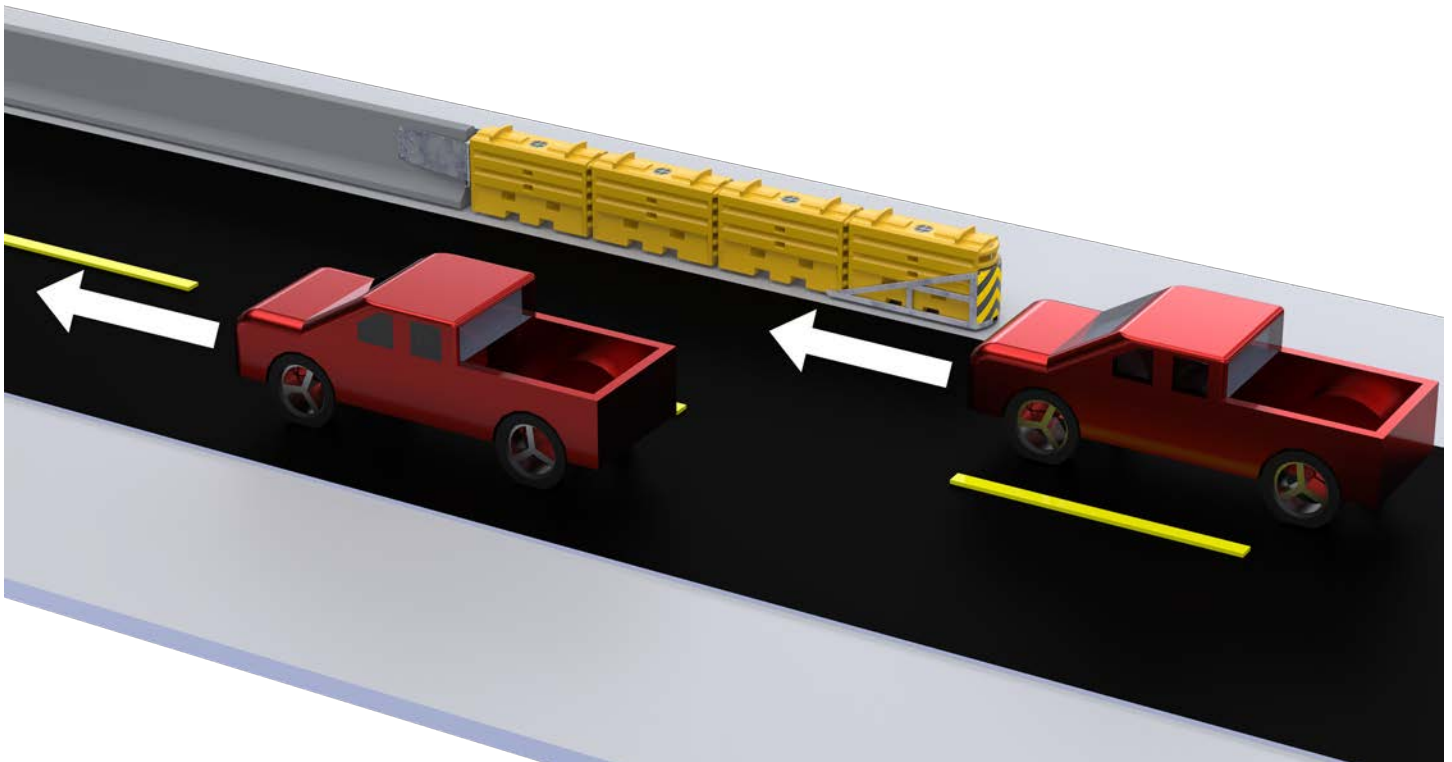
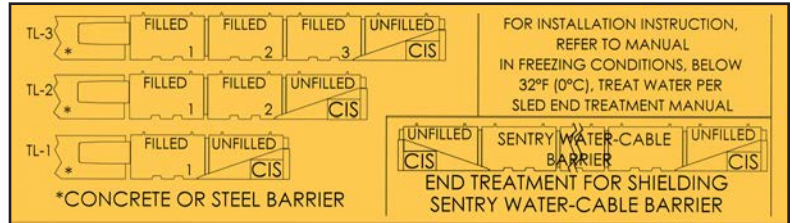
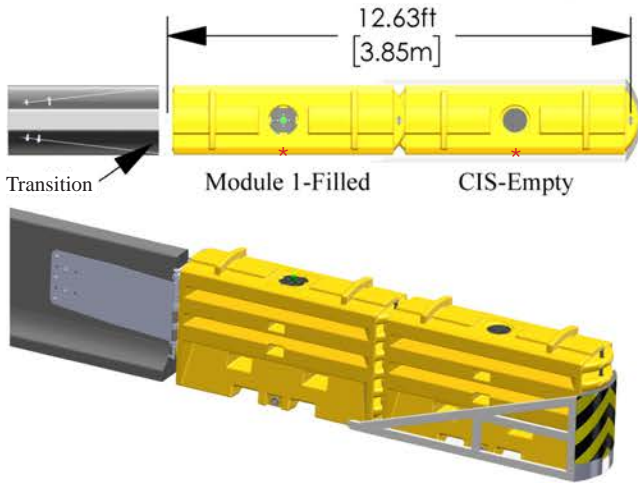


Figure 13: Uni-directional application example.

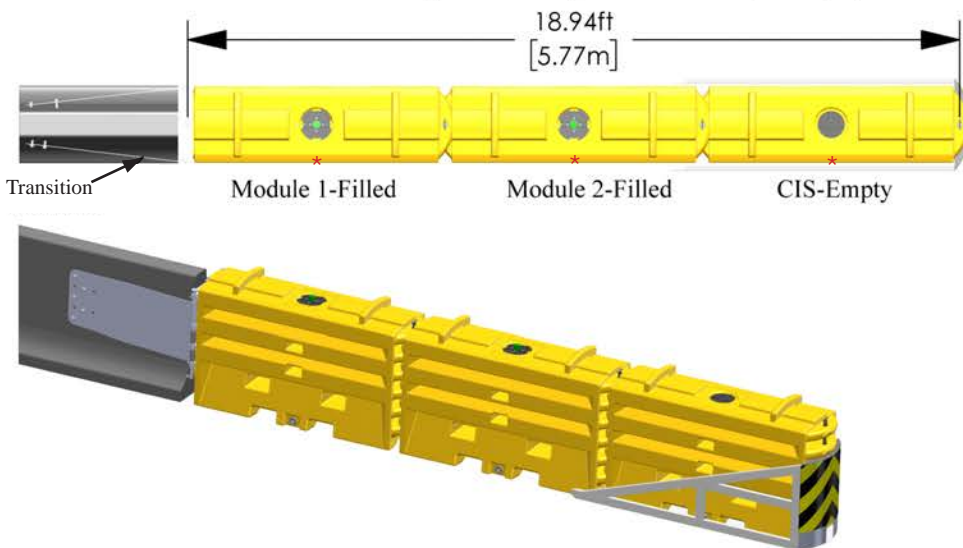
Speed Configuration

TL-1 Configuration up to 50 km/h (31 mph)



*Speed Configuration molded onto every Yellow Module

TL-2 Configuration up to 70 km/h (43 mph)



TL-3 Configuration up to 100 km/h (62 mph)

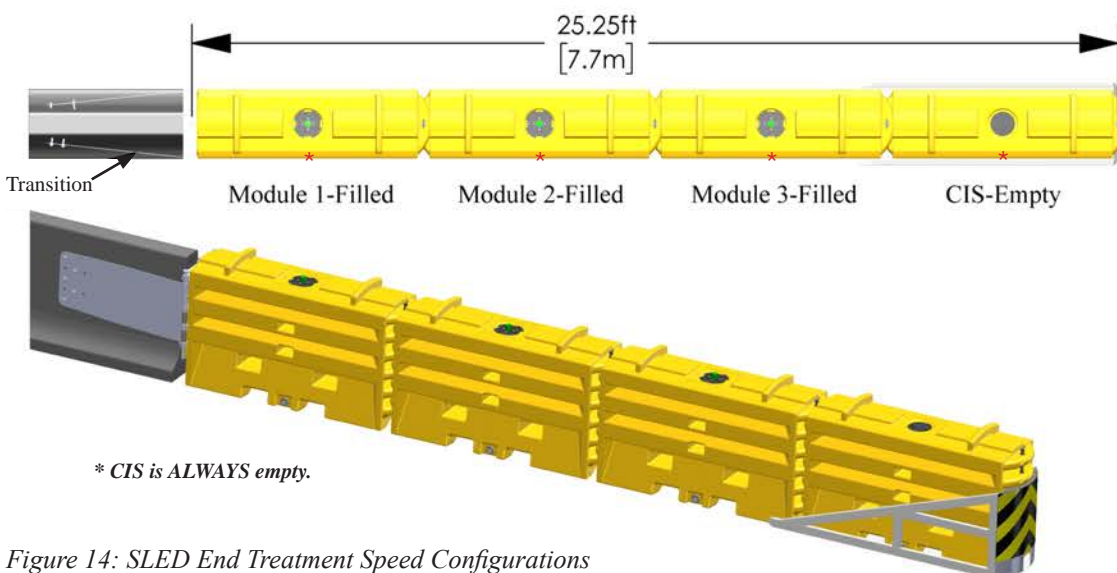


Figure 14: SLED End Treatment Speed Configurations

Recommendations for Stacking

Modules can be stacked **ONLY when empty** and are not designed to be stacked when filled. Stacked empty modules can be no more than three high, as seen below. Designed into the top surface of each module are stacking lugs which fit into recessed formed pockets on the bottom surface of each module. These stacking lugs interlock the modules preventing the wall from shifting during transport or storage. The stacking lugs should be used in conjunction with straps to securely hold the modules in place.

**FOR STORAGE, STACK EMPTY ONLY - DO NOT STACK WHEN FILLED.
STACK ONLY THREE HIGH - MAXIMUM.
FOR STABILITY, A VERTICAL LOCK PIN CAN BE USED
TO VERTICALLY INTERLOCK SECTIONS TOGETHER.**

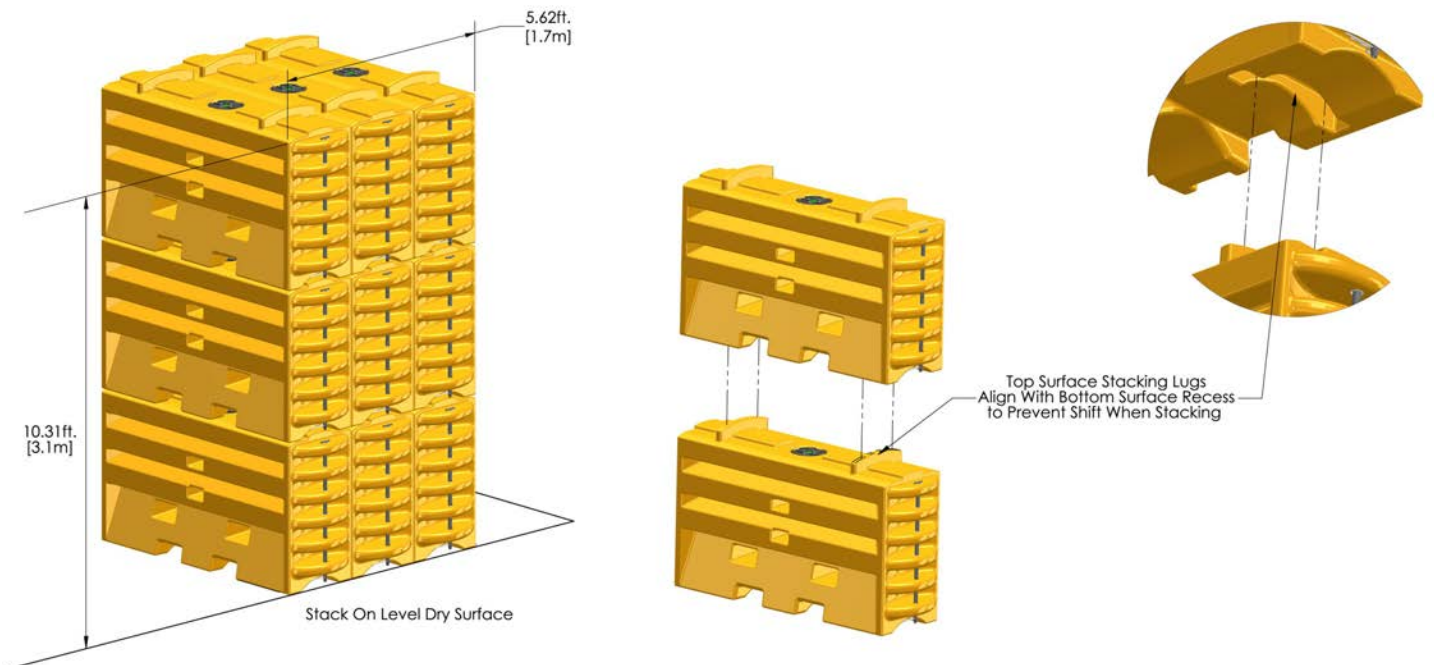


Figure 15: Module Stacking Diagram for Long Term Storage Requirements

SAFETY PRECAUTIONS WHEN HANDLING THE SLED END TREATMENT MODULES

Do not drive with two (2) or more filled modules on a forklift. If maneuvering filled modules is necessary using a forklift, only move filled modules one (1) at a time. If the modules are empty, a maximum of three (3) stacked modules may be moved using a forklift. NEVER stack modules when filled, and NEVER stand underneath or in front of the forklift when handling the modules with a forklift, as modules may fall

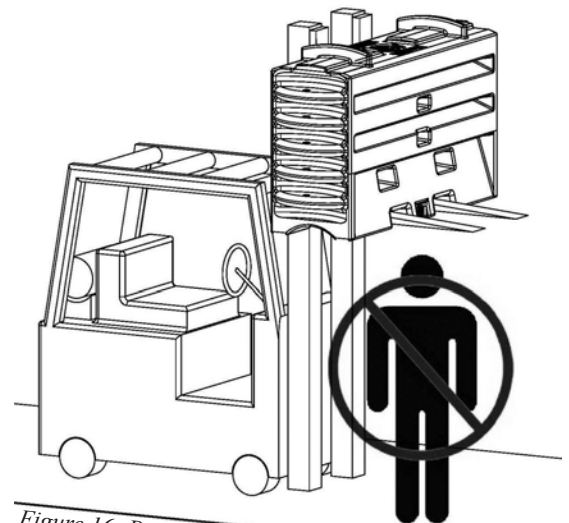


Figure 16: Proper Forklift Procedure

Maintenance and Repair

There are no scheduled maintenance requirements for the SLED modules. It is recommended to check water level periodically to ensure that it is filled to the proper level. The SLED End Treatment is not fully effective unless each section is filled, with exception of the front module. Each module shall have a fill lid with a water level indicator installed, a visual inspection can be made while driving by, otherwise the fill cap should be removed for inspection.

The steel cables should be inspected for any sign of rust or corrosion along the length of the cables, but any surface staining is normal and acceptable. If there is noticeable corrosion or significant rust, use best judgment to assess whether the structural integrity of the steel cables is compromised. If the cables appear too corroded or rusted, it is best practice to replace the module to ensure safety and functionality.

Cracks, holes, or other damages measuring greater than 6" are not eligible for repair– MUST be removed and/or replaced. In a major impact, a severely damaged SLED module should be removed and replaced.

Patching leaks (holes or cracks) in the SLED plastic should be done on completely dry surfaces free of dirt and grease. In addition, any paint or added finish beyond the factory smooth plastic surface should be removed.



*****NO Restrictions on where module can be repaired*****

Plastic welding and welding patches onto the surface is the most common method for repairing any leaking sections of the SLED modules. A plastic repair kit can be obtained from Traffix Devices. The plastic patch and welding rod are made from the same material as the SLED modules. A small butane or propane torch is used for applying heat to the plastic rod. The rod should be melted onto the patch and the wall surface in order to create a secure repair. Temperature for bonding the plastic is 500-550°F (260-290°C). The torch head should be held about 3/16"-1/2" (5-13 mm) away from the weld surface. Care should be taken when applying heat to plastic to ensure that the melting occurs only as desired.

⚠ NOTE: Repairing a crack or hole DOES NOT return the plastic to its original strength, although most repairs are sufficient to ensure a water tight section. Monitoring the repair should be done for a short period after filling to ensure that the repair has been done properly. If leaks cannot be prevented, the module should be replaced.

In addition, if there has been an impact, the T-Pin may be difficult to remove for wall realignment since some section of the device may have been compressed. A forklift will facilitate wall realignment if necessary, without removing the T-pins or to relieve the force on the T-pins.

⚠ NOTE: When moving full modules, use the fork lift pockets located at the bottom of the wall.

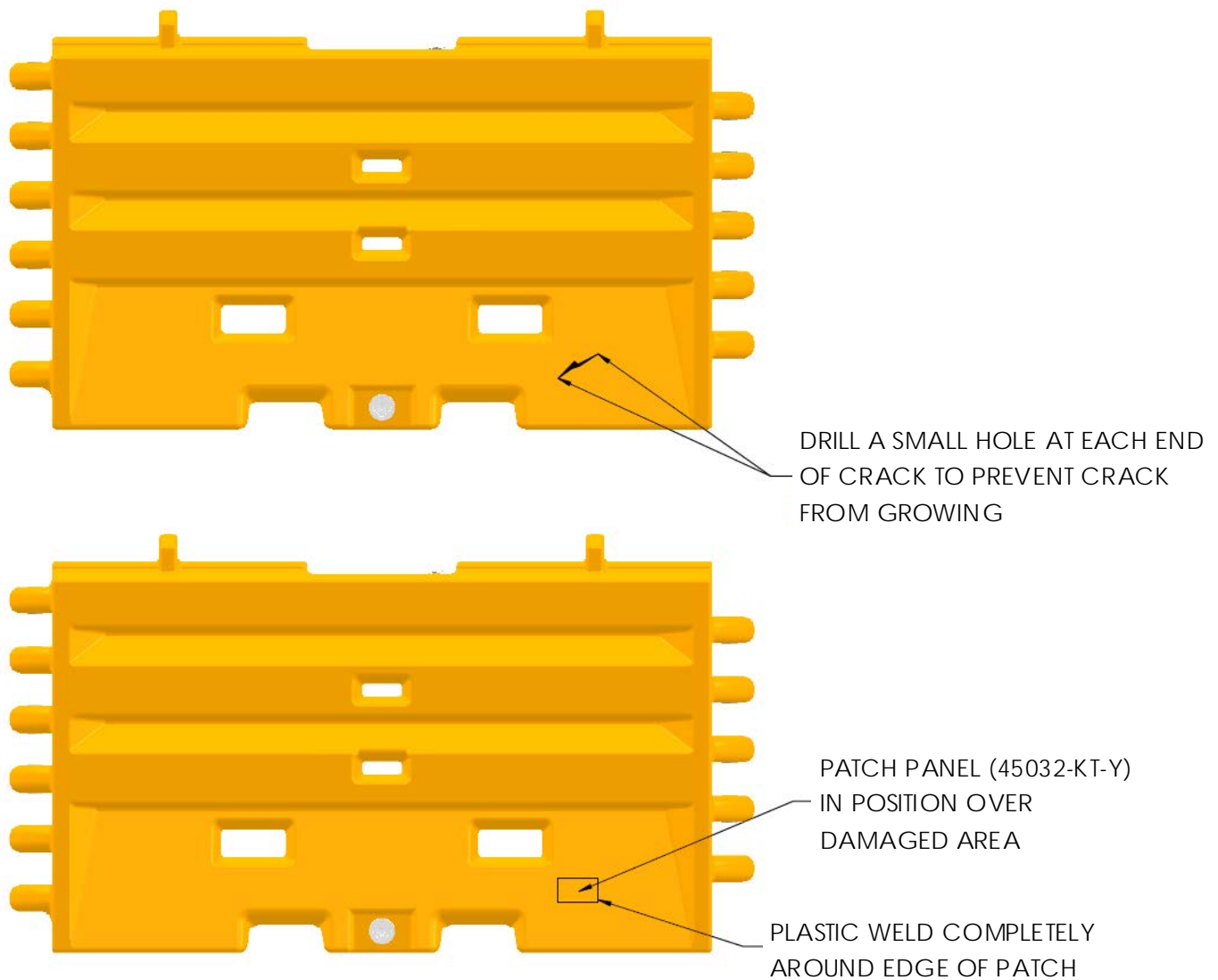


Figure 17: Plastic Welding example

Dismantling

If redeployment to another near-by site is required, a decision should be made as to whether draining of the module is required. If the correct equipment is available, draining may not be necessary, but extreme care must be made when moving the modules because of their weight. The correct equipment would be a forklift and appropriate transport vehicle. If the modules are going to be stored for a period of time or if the correct equipment is not available, the modules should be drained by removing the drain plug or pumping the water out of the fill hole location.

Recycling

Once a module is out of commission, the modules can be disassembled and recycled. The modules are made from HDPE and can be recycled once the internal wire ropes are removed. The steel components can also be recycled.

Water Freezing Prevention

In freezing weather conditions, do not allow the water in the SLED modules to freeze to a solid mass of ice. If the temperature at the SLED site is expected to be at or below the freezing point of water 32° F [0°C], it is recommended that an additive be used to prevent the water in the SLED modules from freezing. See table on page 22.

-Common additives used to prevent water freezing currently used in work zone devices under the same category as the SLED Modules.

SALT (Sodium Chloride)

20% mixture by weight. (SLED/Sentry approx: 368 lbs[167 kg])(Water-Wall approx: 206 lbs[93 kg])

Reduces freezing down to 0° F [-18° C].

Corrosive to inadequately protected steel components (Galvanizing adequately prevents corrosion)

Recommended - premix before filling

Prevent spilling since solution is harmful to vegetation, soils, and wildlife. Draining should be done in an acceptable area.

CALCIUM CHLORIDE

35% mixture by weight. (SLED/Sentry approx: 644 lbs[292 kg])(Water-Wall approx: 360 lbs[163 kg])

Reduces Freezing down to 20° F [-6.6° C].

Corrosive to thin zinc plated components

Corrosive to inadequately protected steel components (Galvanizing adequately prevents corrosion)

High tendency to stay on road surface resulting in slick road surface.

High level of heat created when mixing. It is recommended that pre-mixing is done before filling.

Prevent spilling since solution is harmful to vegetation, soils, and wildlife. Draining should be done in an acceptable area.

ETHYLENE/PROPYLENE GLYCOL

50% mixture by volume. (SLED/Sentry approx: 110 Gal[416 L])(Water-Wall approx: 61 Gal[231 L])

Reduces water freezing to 0° F [-18° C].

High tendency to stay on road surface resulting in slick road surface.

Prevent spilling since solution is harmful to vegetation, soils, and wildlife. Draining should be done in an acceptable area.

LIQUID CMA (Calcium Magnesium Acetate)

25% mixture by volume. (SLED/Sentry approx: 55 Gal[208 L])(Water-Wall approx: 31 Gal[117 L])

Reduces water freezing to 0° F [-18° C].

Has a low environmental impact.

LIQUID POTASSIUM ACETATE

60% mixture by volume. (SLED/Sentry approx: 132 Gal[466 L])(Water-Wall approx: 74 Gal[280 L])

Reduces water freezing to 20° F [-6.6° C]

Low corrosive characteristics and has a low environmental impact.

Recommended water freezing prevention chart solution comparison.

Additive	Environmental Impact	Cost Rating	Protection Temp	Mix Solution Ratio	Mix Solution SLED/Sentry	Mix Solution Water-Wall
Salt (Sodium Chloride)	Harmful	Low	0 °F [-18 ° C]	20% by weight	368 lbs [167 kg]	206 lbs [93 kg]
Calcium Chloride	Harmful	Medium	20 °F [-6.6 ° C]	35% by weight	644 lbs [292 kg]	360 lbs [163 kg]
Ethylene/Propylene Glycol	Dangerous	High	0 °F [-18 ° C]	50% by volume	110 Gal [416 L]	61 Gal [231 L]
Liquid CMA	Non-Toxic	High	0 °F [-18 ° C]	25% by volume	55 Gal [208 L]	31 Gal [117 L]
Liquid Potassium Acetate	Non-Toxic	High	20 °F [-6.6 ° C]	60% by volume	132 Gal [466 L]	74 Gal [280 L]

**The additives shown are solely listed as recommendations-Contact your local/state road authority for verification on which additives are acceptable for use in accordance with federal, state, and local requirements.*

***Contact your local/state road authority for proper disposal procedures for these solutions and ensure these procedures comply with federal, state, and local requirements.*

Installing SLED Object Marker

The Object Marker has been sheeted as a way to easily customize field use. The diagonal stripes used on the Left Hand Traffic Flow can be rotated 90 degrees for Right Hand Traffic Flow. Turn the Object Marker over and it is used for Center Traffic Flow. To determine the correct Object Marker side follow state regulations and installation location. Once the orientation is determined, secure the Object Marker with supplied bolts or fasteners.

Object Marker Is Reversible

Unbolt and Flip Over to Change Pattern



Figure 18: SLED Object Marker Installation







Tools Required

	<p>Lifting and moving equipment to safely lift 5000 lbs, either a fork lift, tractor or crane.</p>
	<p>Air Compressor Generator</p>
	<p>Air Nozzle Bottle Brush</p>
	<p>Anti-Static Wet/Dry Vacuum</p> <p>! It is the responsibility of the installer to consult OSHA silica respiratory standard 29CFR 1910.134 for debris removal from borehole(s) and use TrafFix Devices approved adhesive to achieve optimum tensile strength.</p>
	<p>Dust Collection System</p>
	<p>Tape Measure Chalk Reel and Chalk Pry Bar</p>



NOTE: The tool list provided is a general recommendation and should not be considered an all-inclusive list. Actual tools required will depend on site conditions for the assembly and installation.

Tools Required

	<p>Sledge Hammer Ball Peen Hammer</p>
	<p>Rotary Drill: Bosch RH1255VC or Equivalent 3/4" Diameter Drill Bit 3/4" Rebar Drill Bit</p>
	<p>Ratchet Extensions 1 1/8" Socket</p>
	<p>Impact Driver Torque Wrench 1 1/8" Socket</p>
	<p>12" Adjustable Wrench</p>
	<p>Additional Tools: Hand tools, Tape, Grinder, Hacksaw or Torch</p>



NOTE: The tool list provided is a general recommendation and should not be considered an all-inclusive list. Actual tools required will depend on site conditions for the assembly and installation.

Installation

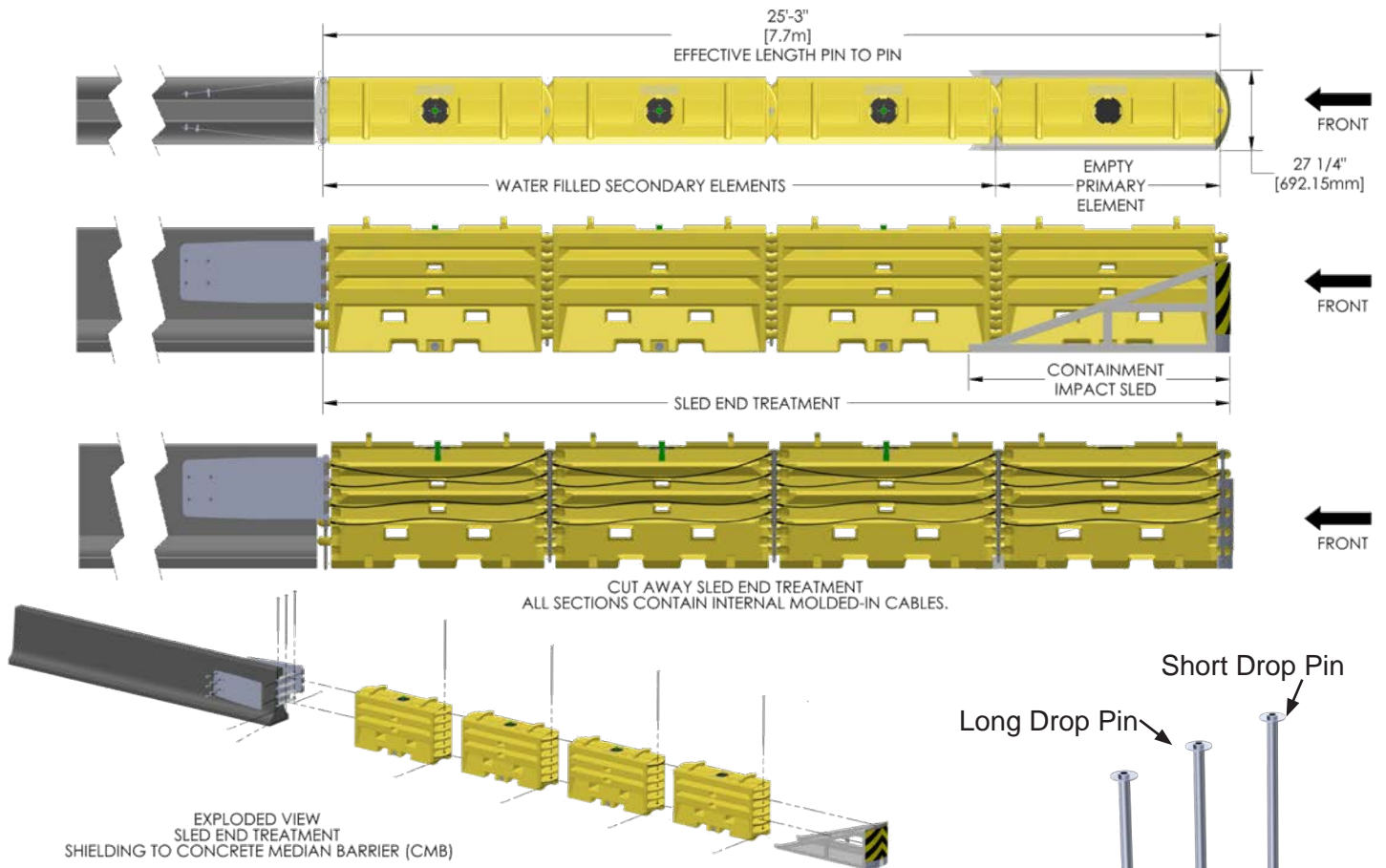


Figure 19: General specifications of installed TL-3 SLED ETS with Transition.

⚠ IMPORTANT:
Read and understand ALL installation instructions before attempting to install the SLED ETS.

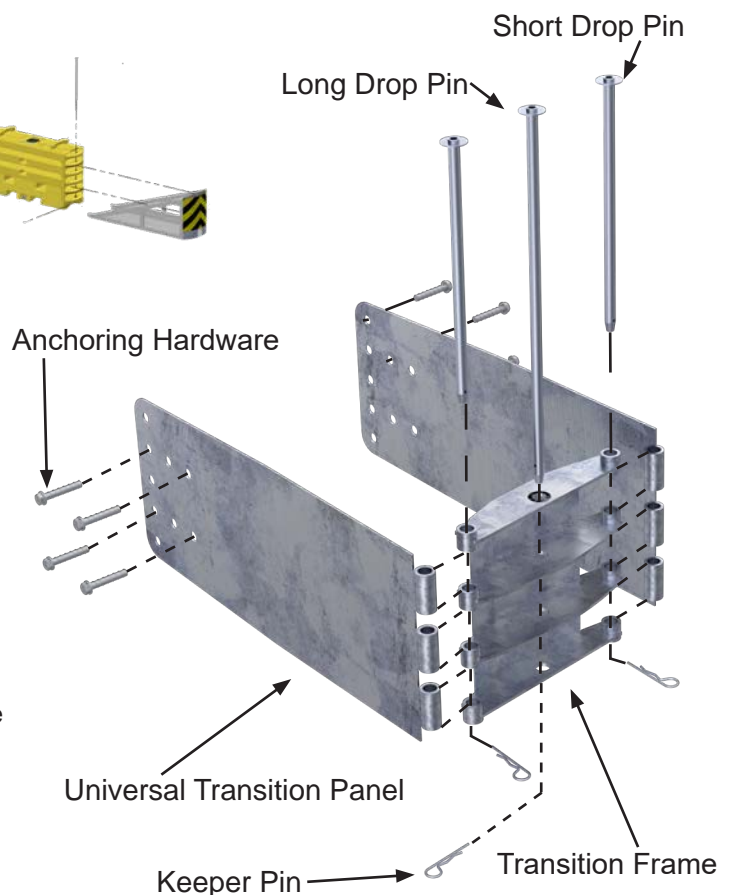
TERMS:

Orientation:

Front or Foremost is towards the nose of the system - towards traffic.
Rear or Rearmost is towards the back of the system - towards the barrier wall.

SLED Transition System Overview:

The SLED Transition consists of several components including the Transition Frame, two (2) Transition Panels, one Long Drop Pin (located in the middle), two (2) Short Drop Pins (one on left side, one on right side), three (3) Keeper Pins (R-Clips) and the anchoring hardware.



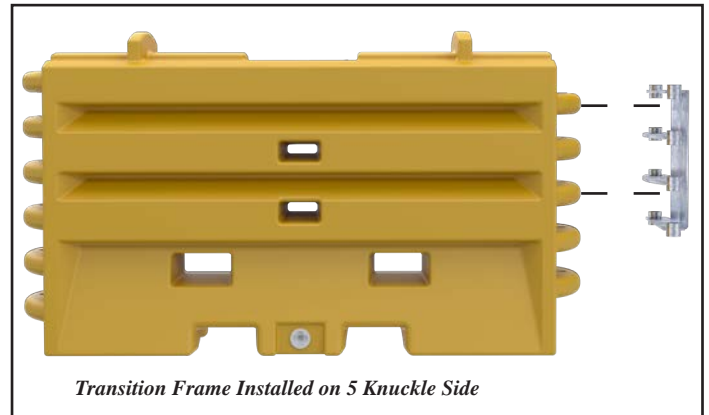
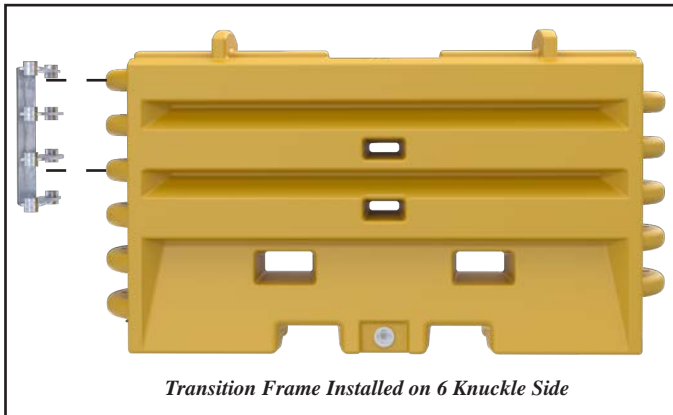
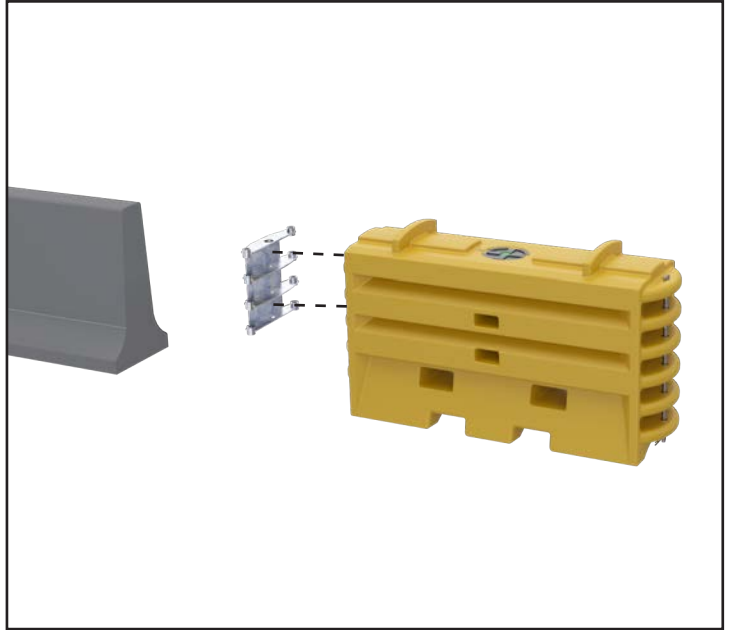
Transition Frame Install

Step 1

Install the Transition Frame to the rearmost SLED Module so that the top rib of the Transition Frame sits on the highest knuckle of the Module. Align center holes of the Transition Frame and the knuckles of the Module.

⚠ Note: For attaching to a CMB shorter than forty-two inches (42”), use the second (or third) knuckle (from top) of the Module, depending if using the five (5) or six (6) knuckle end of the Module.

⚠ Important: Always start with the top knuckle and adjust downward, if necessary.



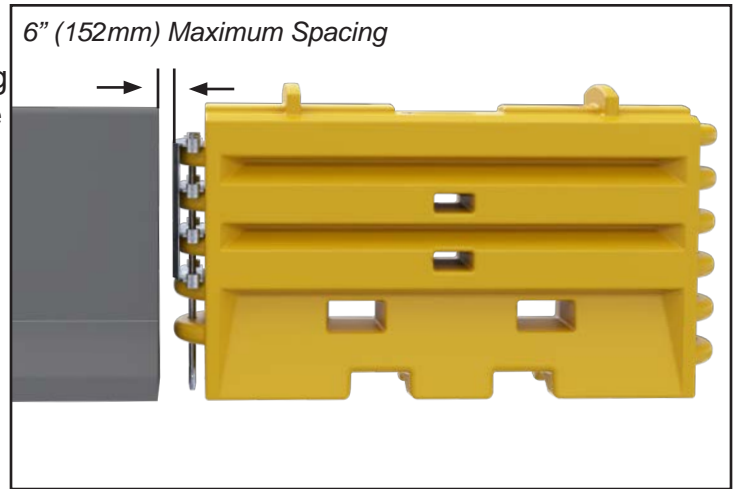
Step 2

Insert the Long Drop Pin through the center holes of the Transition Frame and the Module knuckles until the Long Drop Pin is fully bottomed out.



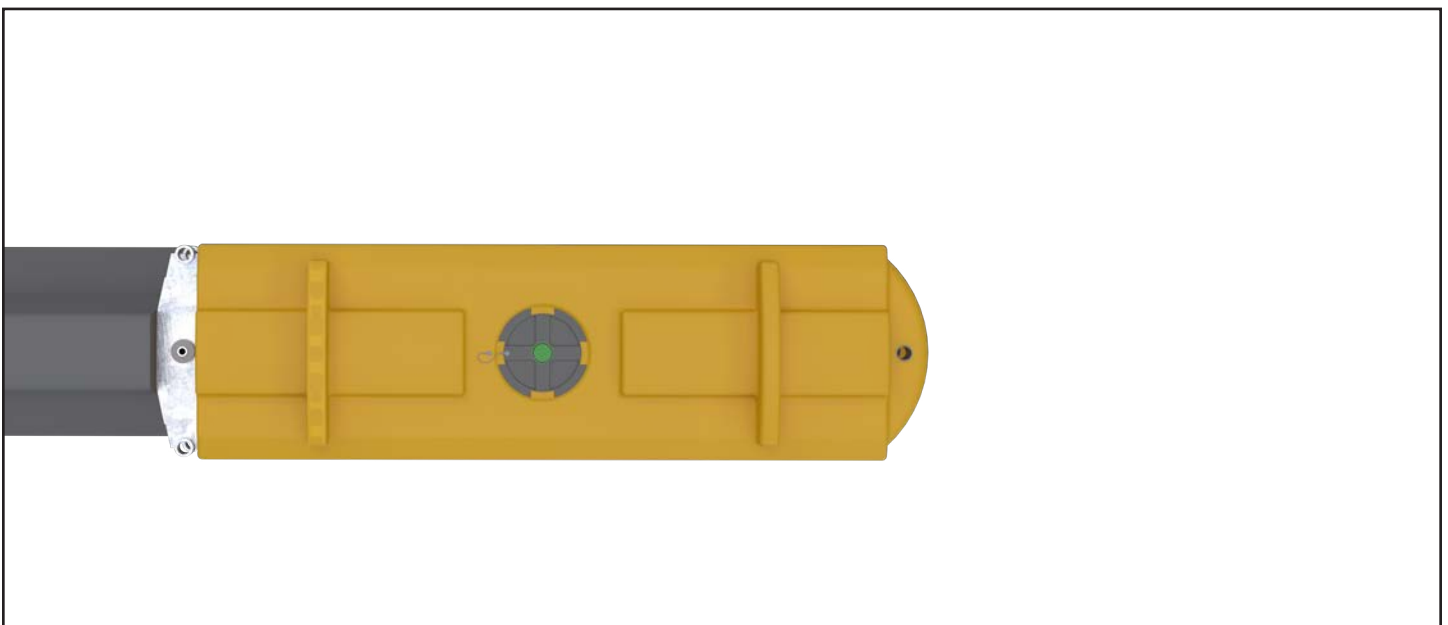
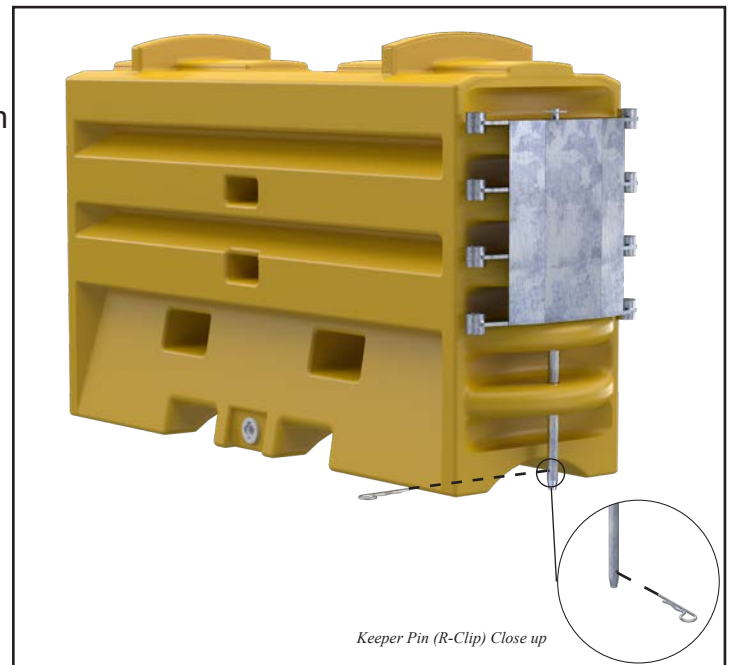
Step 3

Push the Module inline towards the barrier, leaving a maximum of six (6) inches of space between the Transition Frame and the barrier, if possible.



Step 4

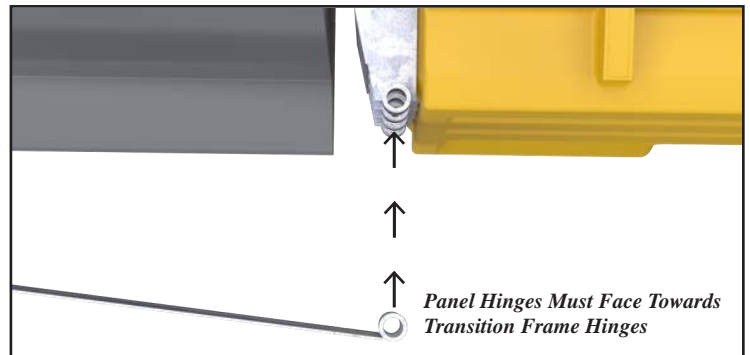
Secure the Long Drop Pin by inserting the Keeper Pin (R-Clip) through the small hole near the bottom of the Long Drop Pin.



Transition Panels Install

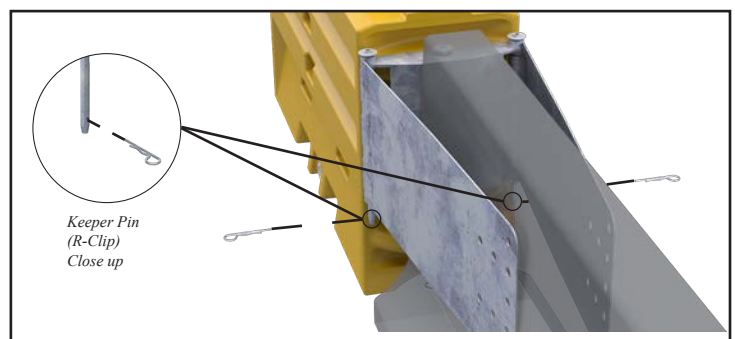
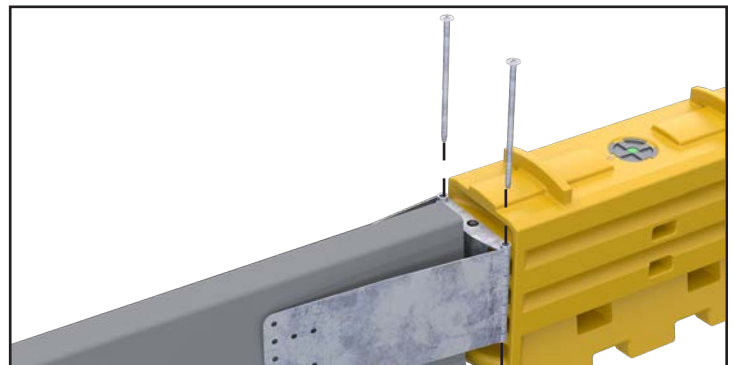
Step 5

Align the Transition Panel hinge(s) with the Transition Frame hinge(s). Each Transition Panel is universal and can be installed on either side. Be sure to install the Transition Panels with the hinges facing inward toward the barrier and the panel outer surface facing outward towards traffic.



Step 6

Install the two (2) Short Drop Pins, one on each side of the transition frame to secure the transition panels to the frame. Secure the Short Drop Pins by inserting the Keeper Pins (R-Clips) through the small through hole near the bottom of each Short Drop Pin. The hinges should now freely rotate about the hinge axis.



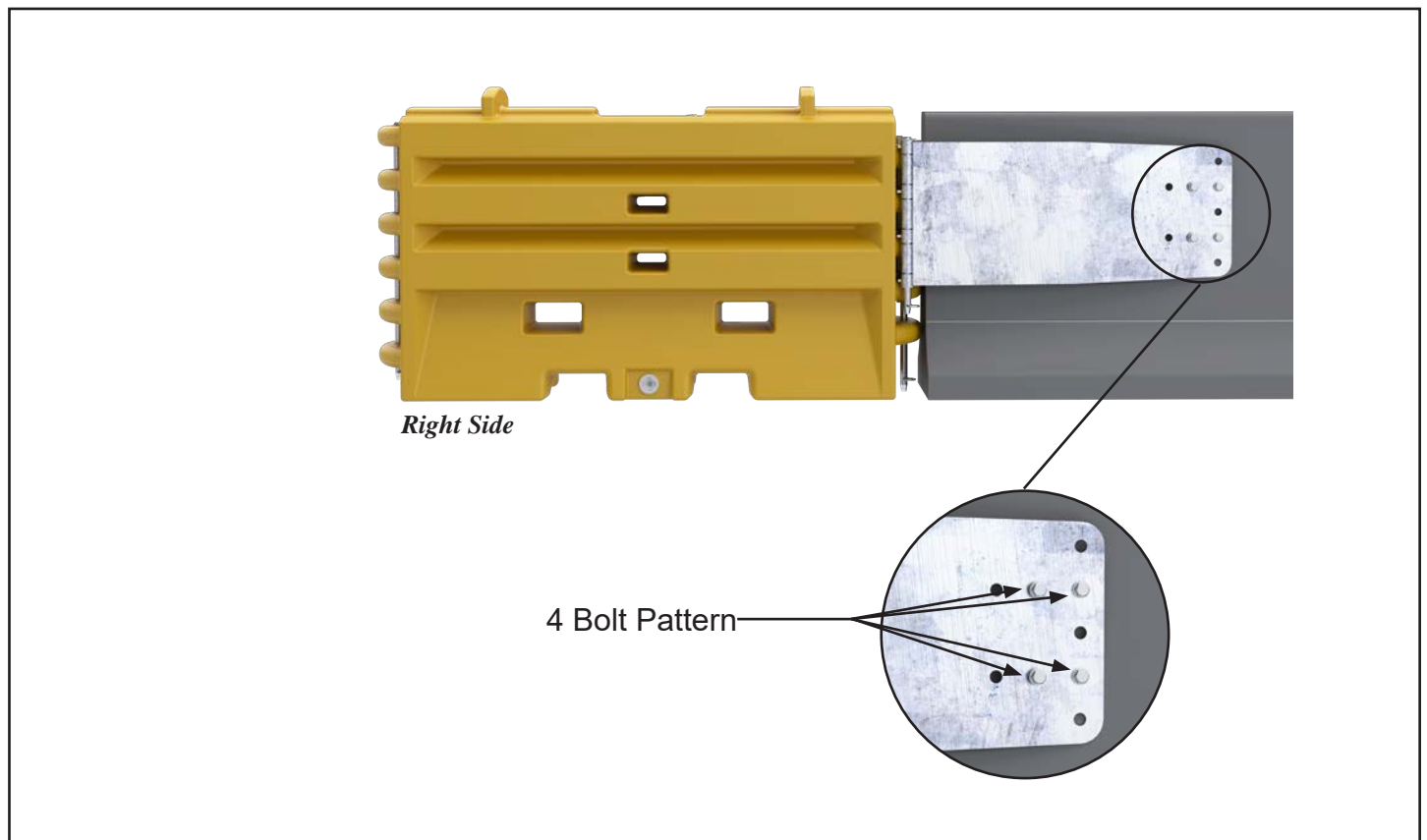
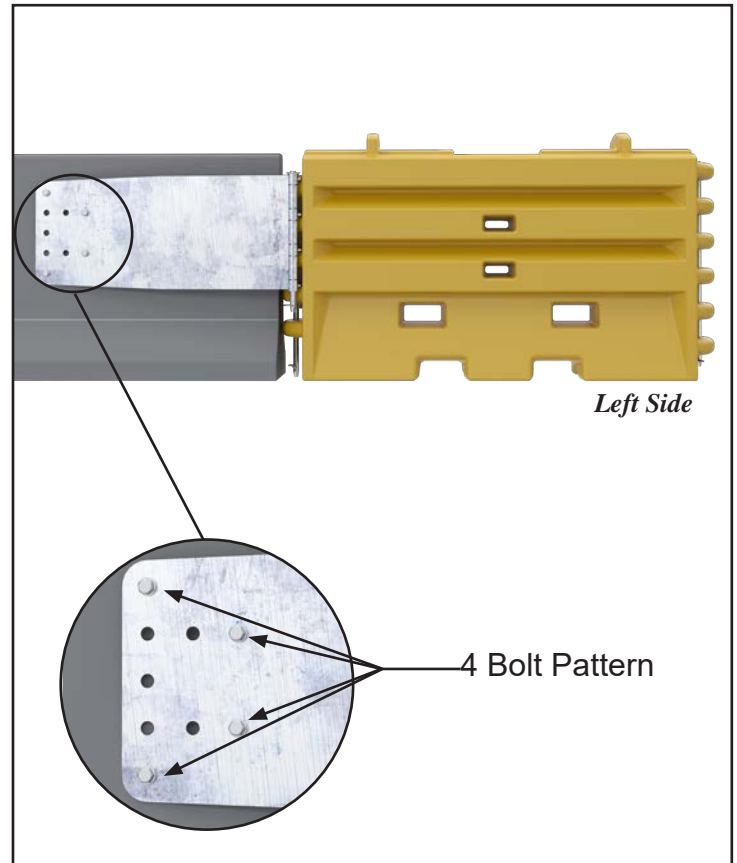
Anchoring to Barrier Wall

Step 7

To anchor the Transition Panels to the barrier wall, refer to the Resident Engineer's (RE) recommendations, as anchoring methods may vary.

⚠ Note: The SLED Transition System requires a minimum of eight (8) anchor bolts with four (4) on each side.

⚠ Note: The four (4) anchor bolt pattern on one side and the four (4) anchor bolt pattern on the opposing side should avoid using the same mounting holes on the opposing panels to prevent contacting each other inside the barrier.

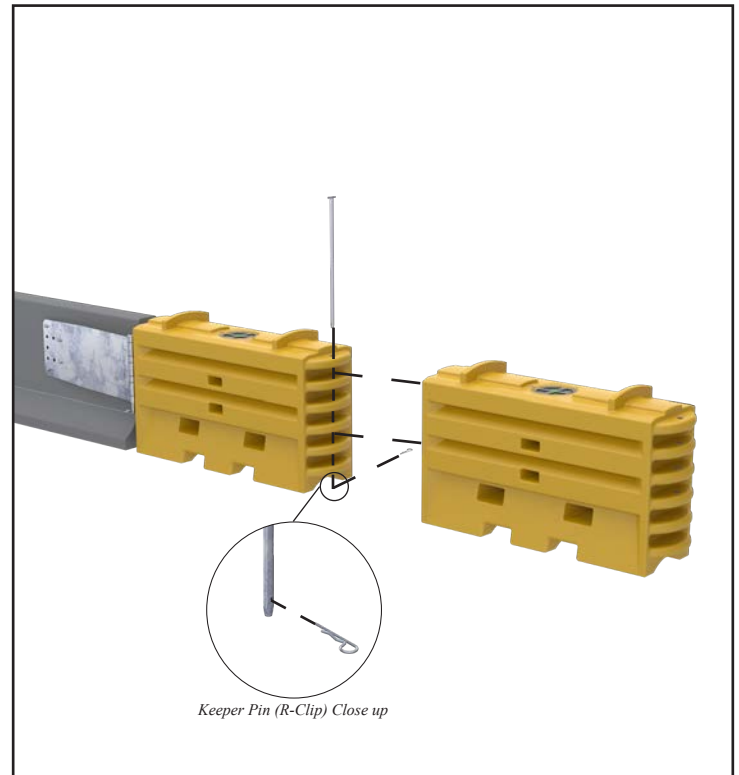


Additional Water-Filled Modules Install

Step 8

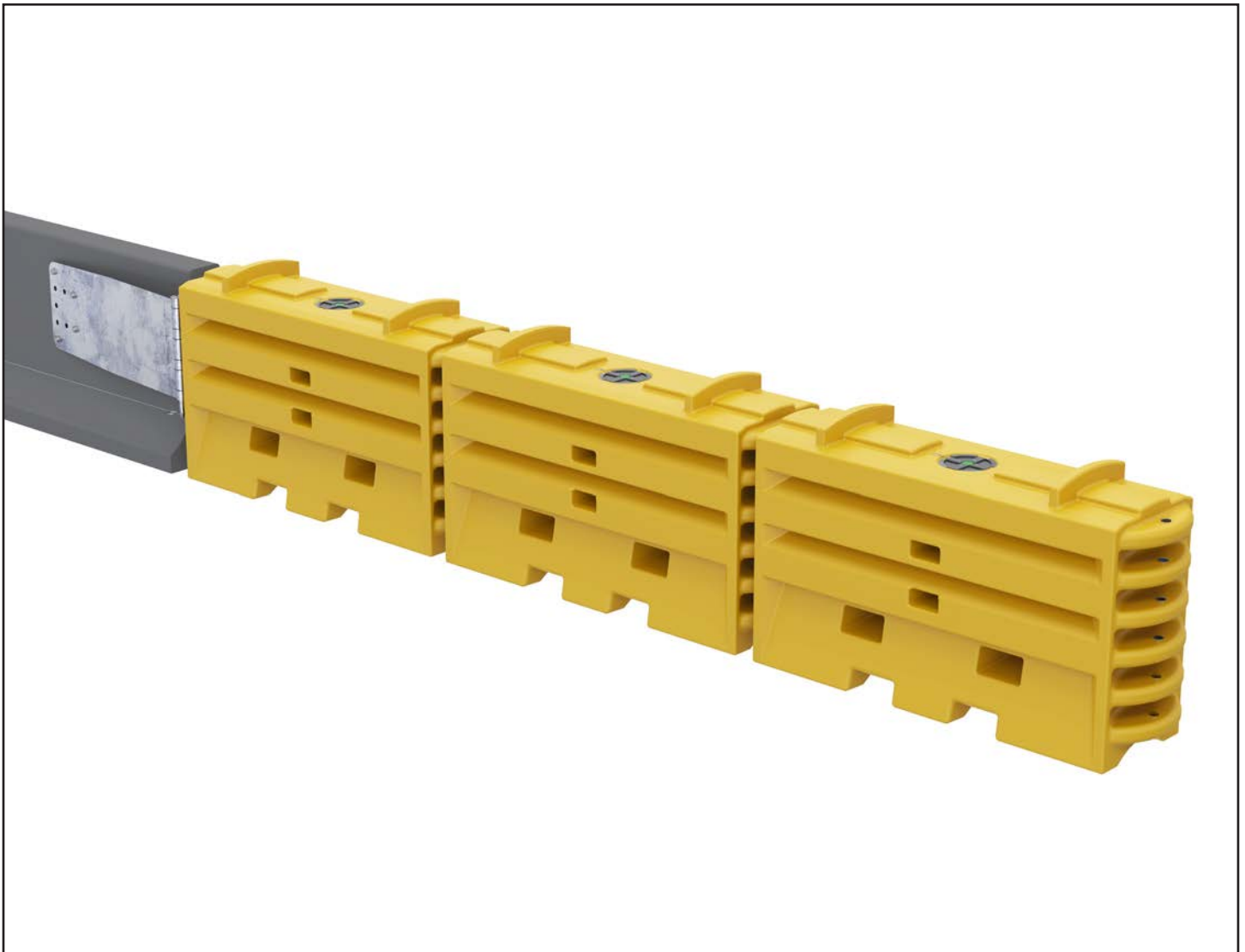
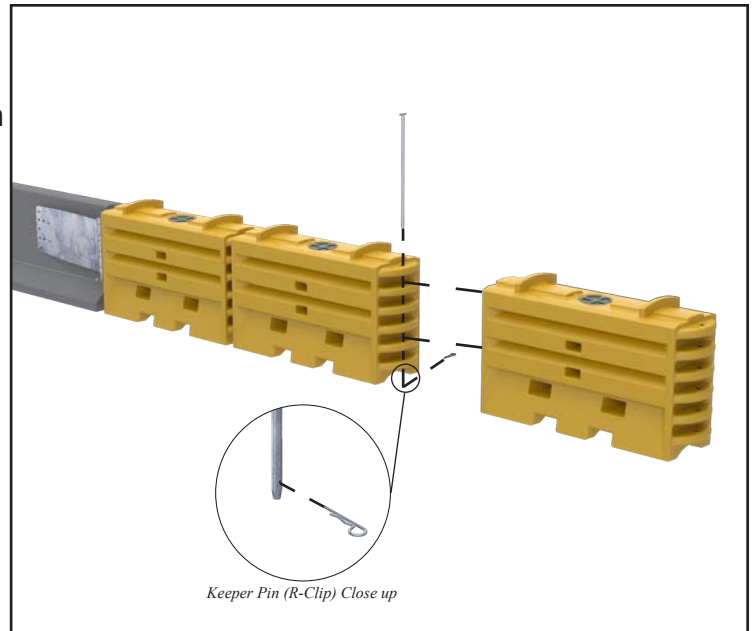
Install the next Module by pushing this Module into the already installed rearmost Module, such that the knuckles of each Module are positively interlocked and the holes are aligned. Be sure to mate the five (5) knuckle Module end with a six (6) knuckle Module end. Insert the T-Pin from the top through the aligned center holes from the interlocked knuckles. Secure the connection between Modules by inserting the Keeper Pin (R-Clip) through the small hole near the bottom of the T-Pin.

***For TL-2 INSTALLATION, PROCEED TO STEP 10
For TL-3 INSTALLATION, PROCEED TO STEP 9***



Step 9

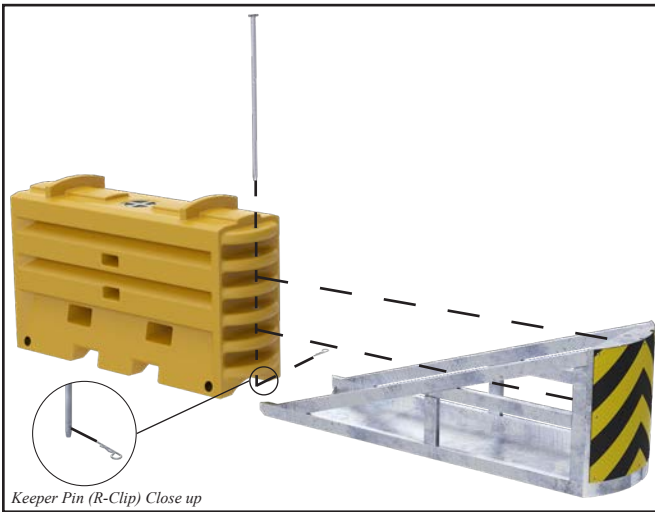
Install the last Module by pushing this Module into the already installed front most Module, such that the knuckles of each Module are positively interlocked and the holes are aligned. Be sure to mate the five (5) knuckle Module end with a six (6) knuckle Module end. Insert the T-Pin from the top through the aligned center holes from the interlocked knuckles. Secure the connection between Modules by inserting the Keeper Pin (R-Clip) through the small hole near the bottom of the T-pin.



Containment Impact Sled (CIS) Install

Step 10

The Containment Impact Sled (CIS) consists of several components including the SLED CIS Frame, a Yellow No Fill Module, T-Pin, and Keeper Pin. These items are pre-assembled and delivered as one unit.



Step 11

Push the pre-assembled CIS into the front most Module so that the knuckles of each are positively interlocked and holes are aligned. Be sure to mate the five (5) knuckle Module end with a six (6) knuckle Module end.

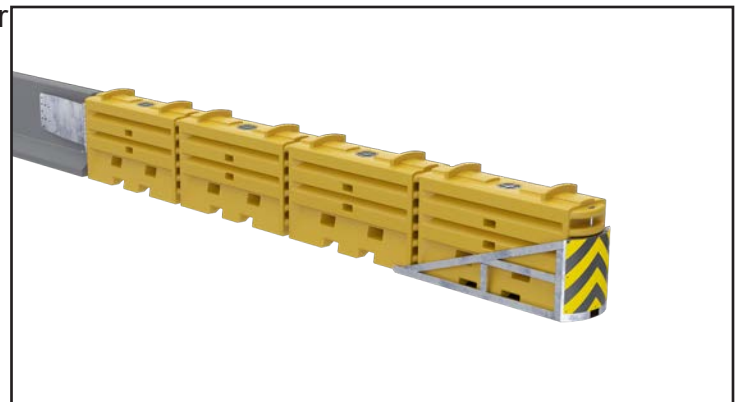
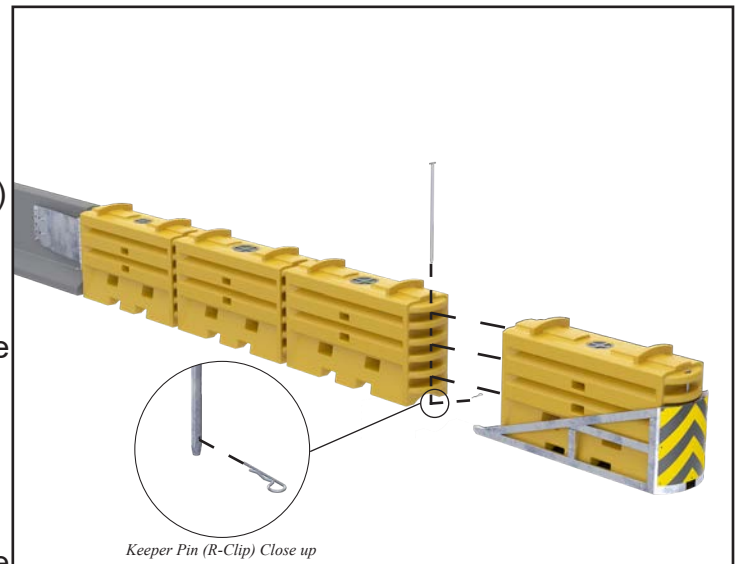
Insert the T-Pin from the top through the aligned center holes from the interlocked knuckles. Secure the connection between Modules by inserting the Keeper Pin (R-Clip) through the small hole near the bottom of the T-Pin.

⚠ Note: The SLED Frame's bottom plate will slide under the front most Module by approximately four (4) inches with the tip of the SLED Frame flanking each side of the front most Module.

Step 12

Double check the alignment of the Transition, the Module(s) and the Containment Impact SLED (CIS), so that all are oriented correctly to the RE's requirements.

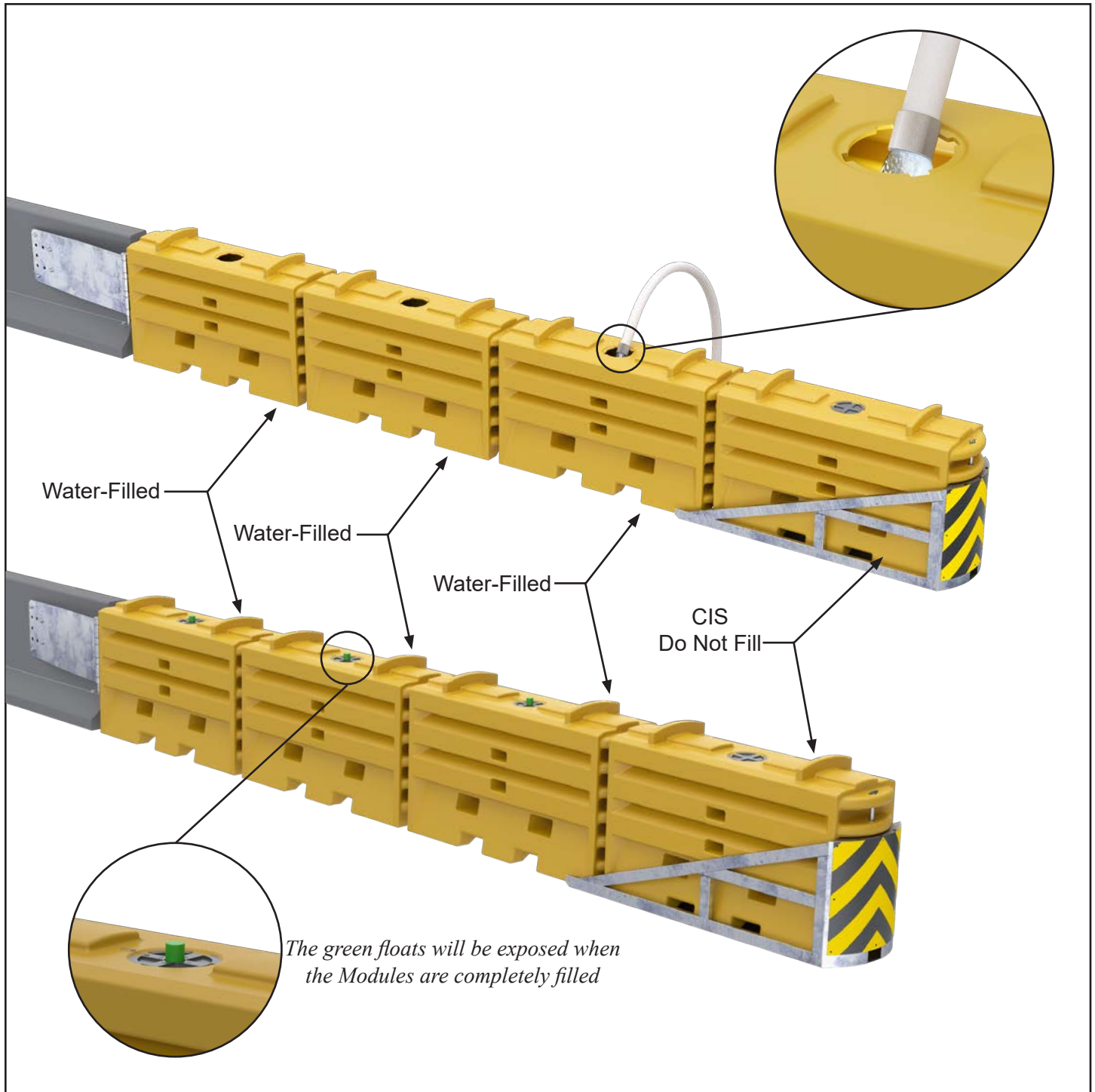
⚠ Note: Do this before filling Modules with water.



Filling SLED End Treatment with Water

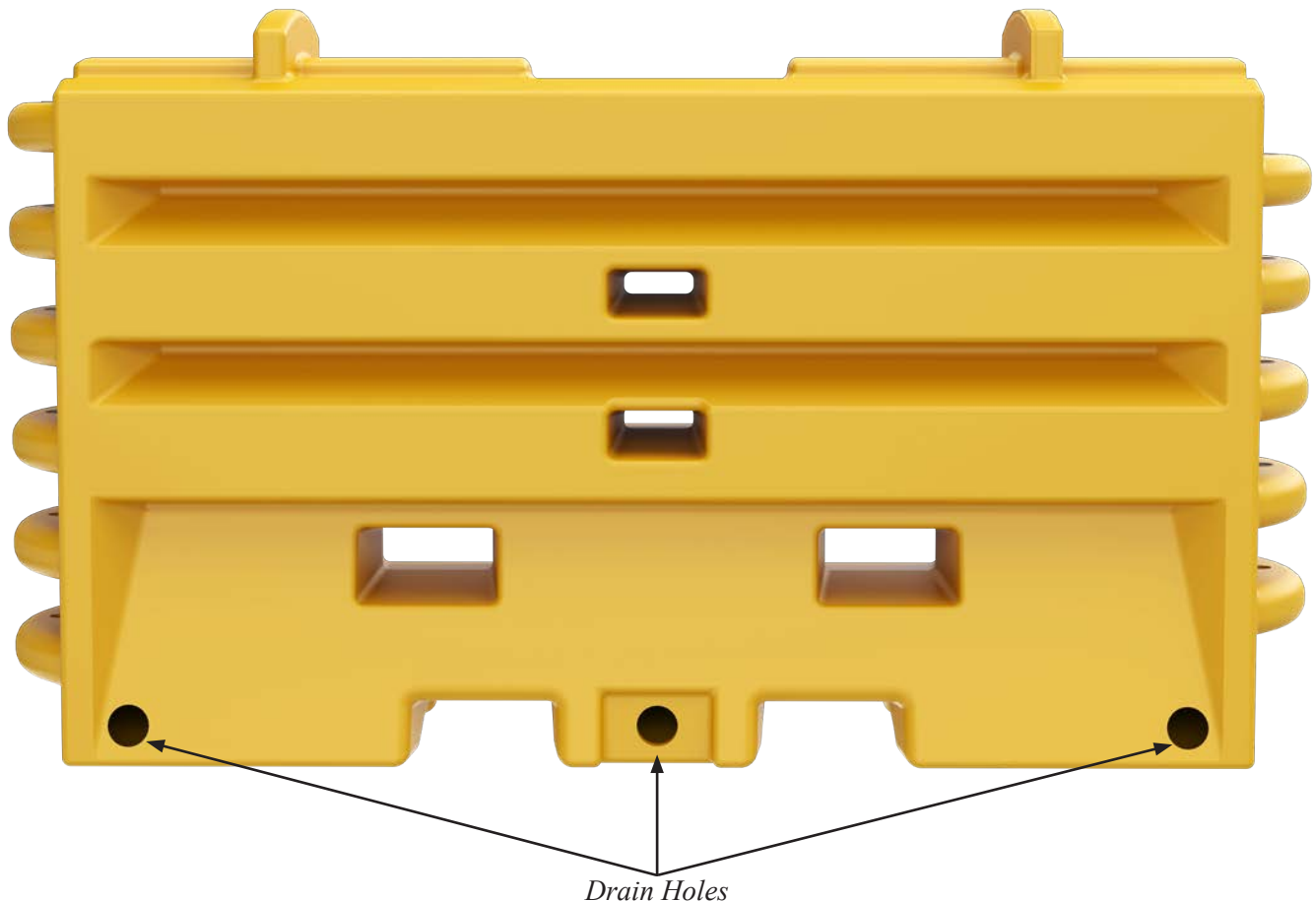
Step 13

Make sure that the Buttress Thread Drain Plug is installed and securely fastened in each Water-Filled Module to be used. Remove the "Drive By" Water Level Indicator Float Lid and fill the Water-Filled Modules only with water or suitable non-freezing solution as described on page 21 of the SLED Installation, Maintenance, And Repair Manual. Reinstall the "Drive By" Water Level Indicator Float Lid. The module is full when the green float of the "Drive By" Water Level Indicator Float Lid is at the maximum height and fully extended.



⚠ IMPORTANT:

The No Fill Module in the Containment Impact Sled (CIS) shall **NOT** be filled with water and is to **ALWAYS** remain empty. The No Fill Module of the CIS contains six (6) open drain holes at the bottom (three (3) on each side) and intentionally manufactured to not retain water.



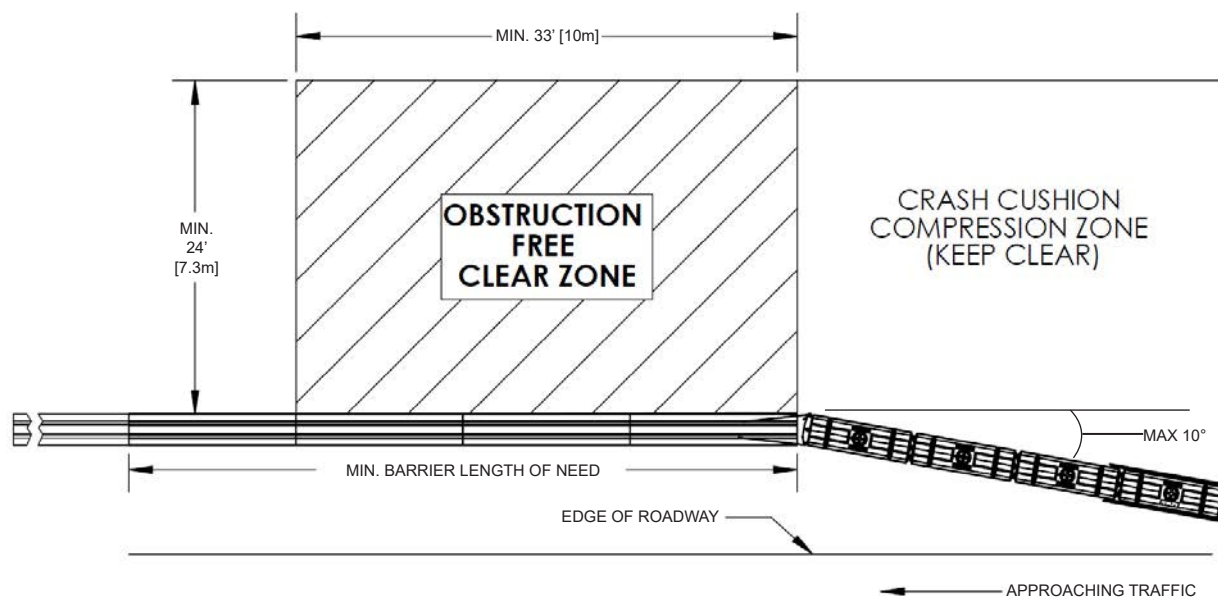
⚠ IMPORTANT:

DO NOT replace a Yellow No Fill Module with a Yellow Water-Filled Module.*
DO NOT replace a Yellow Water-Filled Module with a Yellow No Fill Module.
DO NOT replace a Yellow SLED Module with an Orange or White Sentry Water Cable Barrier Module.
Doing so will alter the performance of the entire SLED ETS.

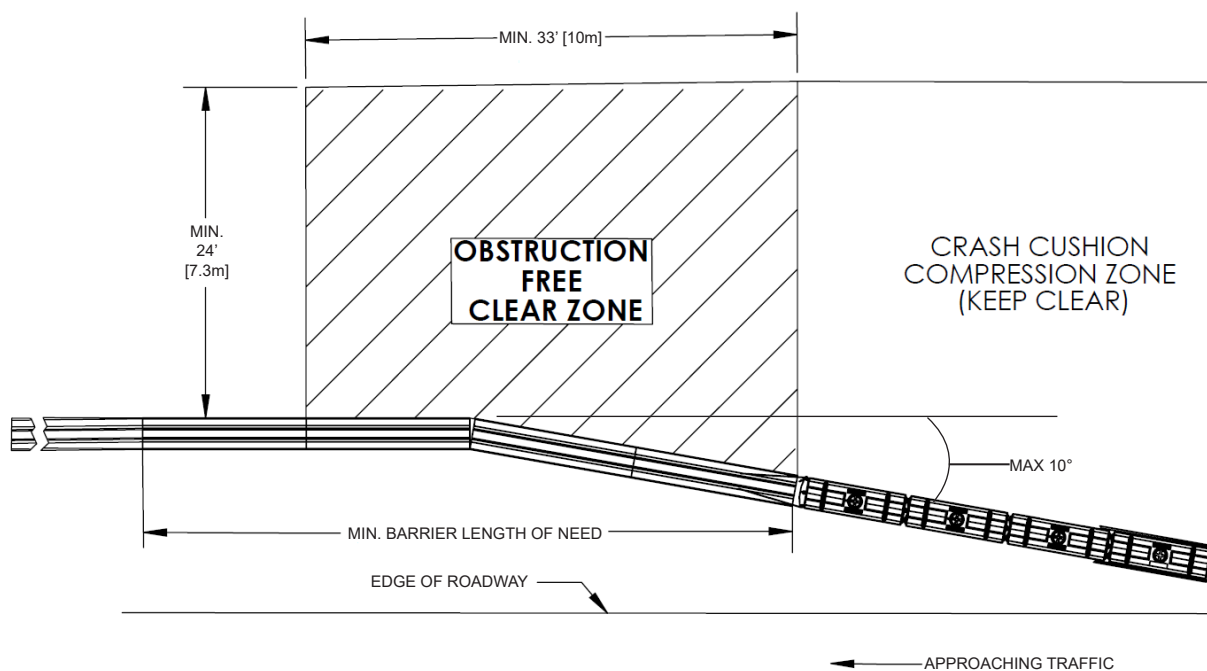
* If six (6) empty drain holes are made at the bottom of a Yellow Water-Filled Module (three (3) on each side), making the Module incapable of retaining water, then a Yellow Water-Filled Module may be used as a replacement for a Yellow No Fill Module.

SLED Clear Zone/Horizontal Curve Installation

In the event that the SLED End Treatment is to be installed on a horizontal curve, the system may be angled towards the approaching traffic up to a maximum angle of 10°. Adjusting the SLED system towards traffic will minimize the possibility of an angled impact from an errant vehicle. Below are example configurations of how the SLED ETS can be adjusted once installed onto the barrier.

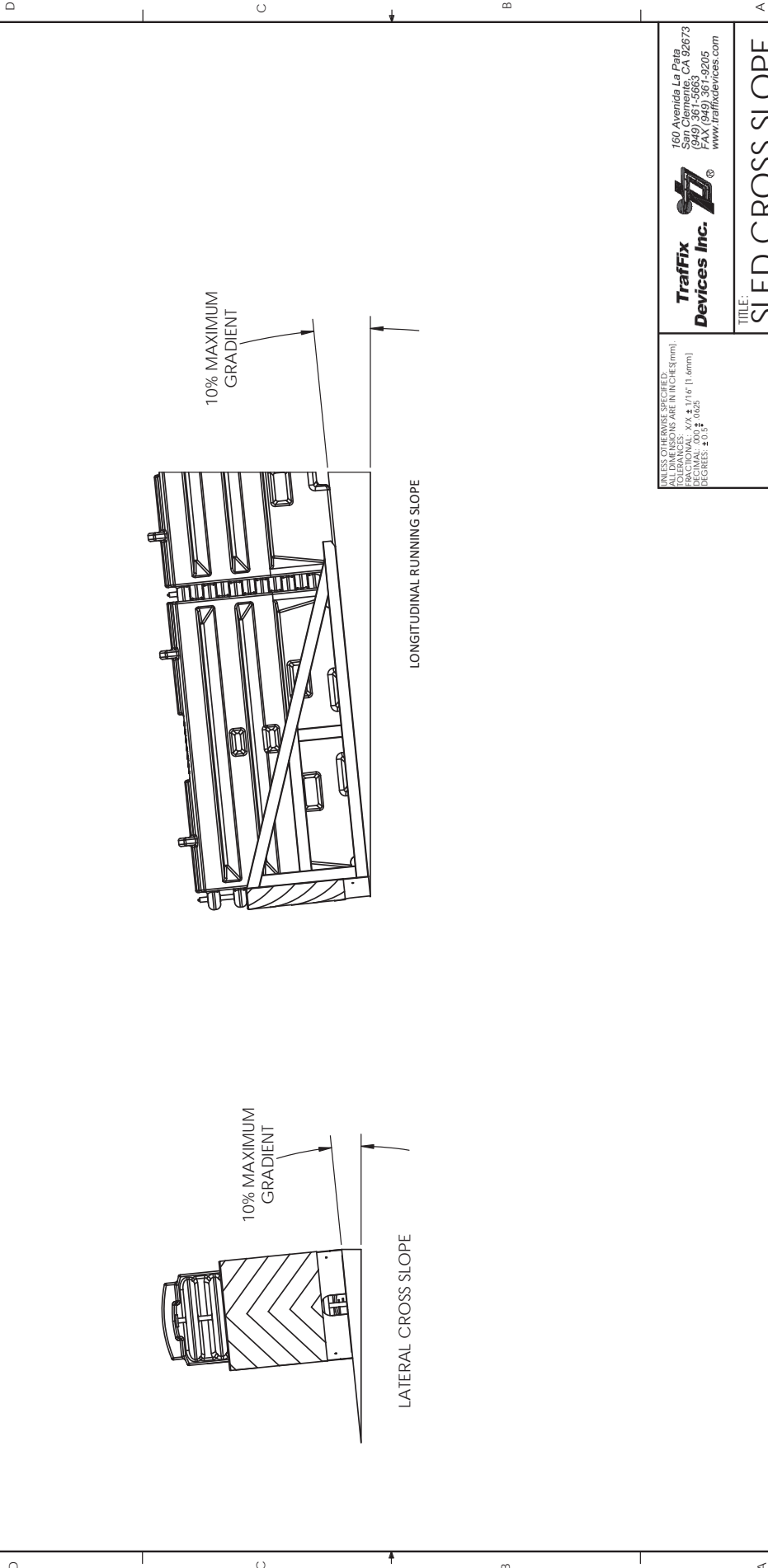


SLED End Treatment angled towards approaching traffic.



SLED End Treatment with part of barrier array angled towards approaching traffic.

1 2 3 4 5 6 7 8



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 Fax: (949) 361-9205
 www.traffixdevices.com

UNLESS OTHERWISE SPECIFIED:
 ALL DIMENSIONS ARE IN INCHES (mm).
 FRACTIONAL: XX ^X/₁₆ ± .016 (1.4mm)
 DECIMALS: .XX ± .0025
 DECIMALS: .05 ± .0025

TITLE:
 SLED CROSS SLOPE
 DEFINITION

DATE:	DATE:	REV
17-09-12	17-09-12	A
DRAWN BY:	CHECKED BY:	SIZE
MARY DEBB	FA	B
APPROVED BY:	DATE:	DWG. NO.
FA	17-09-12	300-187

SHEET 1 OF 1

10% Grade is approximately 6°

TrafFix SLED End Treatment TL-3 General Specifications

I. General

The SLED End Treatment, components, and subassemblies shall be designed and manufactured by TrafFix Devices Inc. (TDI)

Corporate Office San Clemente, California

Manufacturing & Distribution Center, San Clemente, California

II. System Description

The SLED End Treatment is a TL-3 gating, non-redirective crash cushion designed to meet crashworthy requirements of MASH. The SLED ETS shall be used in permanent and temporary installations.

The TrafFix SLED End Treatment shall be constructed from a series of individually linked modules. Each individual module shall consist of:

- Virgin high density polyethylene (HDPE) plastic shell, manufactured in yellow and containing UV stabilizers and antioxidants, molded to a triple faced profile of a ribbed saw tooth shape, designed to reduce penetration, vaulting, and under riding. Each full length saw tooth ribbed surface contains a flat surface, allowing for the adherence of a reflective sheeted section.
- Two stacking lugs which assemble into two recessed voids on the bottom surface. This feature locks the sections together vertically and prevents shifting during transport or when stored.
- Ends constructed with vertically aligned knuckles which interlock with those of adjacent module and accept a 1 $\frac{1}{8}$ inch [28.58mm] diameter steel connecting T-pin. The T-pin is retained after installation by a keeper pin.
- Four internal molded-in corrosion resistant wire rope cables acting as a cable barrier when impacted. Each wire rope is connected to a corrosion resistant steel bushing which is molded into the knuckle sections and contains corrosion resistant surfaces and is of appropriate diameter to meet design speeds of TL-3 impacts.
- Approximate dimensions, weight, and volume: 22.5 in. [572 mm] width x 42 11/16 in. [1084 mm] height x 75 3/4 in [1924 mm] length (pin to pin). Empty weight 160 lbs. [72.6 kg], weight filled 2000 lbs. [907 kg], water volume 220 gal [832 L].
- Fork lift openings to allow for lifting when empty or full.
- One 8 in. [203.2 mm] diameter twist lock fill lid and a 2.25 in. [57.15 mm] diameter molded-in Buttress threaded drain hole with a plug to allow for quick water draining.

III. Performance Criteria

The SLED End Treatment shall be tested and pass all test requirements of MASH for Test Level 3 (TL-3) impact conditions for 1100 kg and 2270 kg [2420 lbs. and 5000 lbs.] vehicles at speeds of 100 km/h [62.1 mph].

The design, manufacturing process, and installation shall be identical between the MASH and NCHRP-350 tested products. Existing inventory is interchangeable as no design changes have been made since the inception of the SLED in February 2011.

The SLED test results shall demonstrate that a water-filled gating non-redirective crash cushion shall safely decelerate the 1100C and 2270P impact vehicles and shall not exceed the maximum allowable occupant risk values.

Occupant impact velocity

Maximum allowable: 12.2 m/s for occupant

Ride down acceleration

Maximum allowable: 20.49 G

Detached debris shall not show potential for penetrating the vehicle occupant compartment or present a hazard to other traffic, pedestrians, or workers in a work zone.

A vehicle impacting the TrafFix SLED End Treatment shall remain upright during and after the collision.

The impacting vehicle's intrusion into adjacent traffic lanes shall be minimized.

FHWA Eligibility Letter CC-131

Use these links to locate the letter either
on the FHWA Website:

[https://safety.fhwa.dot.gov/roadway_dept/
countermeasures/reduce_crash_severity/barriers/
pdf/cc131.pdf](https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/barriers/pdf/cc131.pdf)



U.S. Department
of Transportation

**Federal Highway
Administration**

Or the TrafFix Devices, Inc. Website:

[https://www.traffixdevices.com/docs/attenuators/
sled-us/traffix-sled-us_mash_cc-131.pdf](https://www.traffixdevices.com/docs/attenuators/sled-us/traffix-sled-us_mash_cc-131.pdf)



Regional Sales Manager

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