PRODUCT MANUAL

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Contents

Preface

For optimum performance, Saferoads HV2 Safety Barrier must be designed, installed and maintained as per this manual. Please thoroughly review and understand this manual before using HV2 Safety Barrier.

Local requirements may also impose restrictions. Please refer to local governing body for further information.

If more information is required please contact Saferoads:

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Introduction

Saferoads HV2 Safety Barrier is a free standing temporary longitudinal barrier system successfully crash tested to MASH TL-4.

The patented hybrid technology, and unique connectors, allow Saferoads HV2 Safety Barrier to offer high containment and low deflection, while remaining economical to transport and deploy, with no time-consuming anchoring required.

Saferoads HV2 Safety Barrier provides several unique advantages over other temporary barrier systems including:

- High containment
- Low deflection
- Safe, consistent and reliable redirection
- Fast deployment and retrieval
- No anchoring required
- No loose parts
- Economical to transport
- Maintenance free
- Durable

Applications

Saferoads HV2 Safety Barrier is tested to provide positive protection of work sites by safely redirecting errant vehicles up to 10,000kg (22,000lbs) at 15° and 90km/h (56mph), or 2,270kg (5,000lbs) at 25° and 100km/h (62mph). This allows HV2 Safety Barrier to be suitable for use on any roadside work zone from highways to low speed local streets. When using HV2 Barrier with SLED end treatments, in Australia the design speed is reduced to 80km/h.

The HV2 Safety Barrier can be used on concrete, asphalt and spray sealed surfaces.

Limitations

Saferoads HV2 Safety Barrier has been tested to MASH TL-4 requirements, as required by FHWA and AS3845.1. Installations not in accordance with this manual or impacts outside of MASH TL-4 testing may result in unpredictable performance.

Testing

Saferoads HV2 Safety Barrier has successfully passed a variety of tests to ensure compliance with MASH requirements, including:

- MASH 4-10 (1,100C) – Test No. 690902-SFR7
- MASH 4-11 (2,270P) – Test No. 690902-SFR6
- MASH 4-12 (10,000S) – Test No. 690902-SFR8
- MASH 3-21 (2,270P) – Test No. 132266.01 Reverse Transition with Pinned Crash Cushion
- MASH 3-11 (2,270P) – Test No. 132266.3-11 BLON with SLED
- MASH 3-44M (2,270P) – Test No. 132266.3-44 CIP with SLED

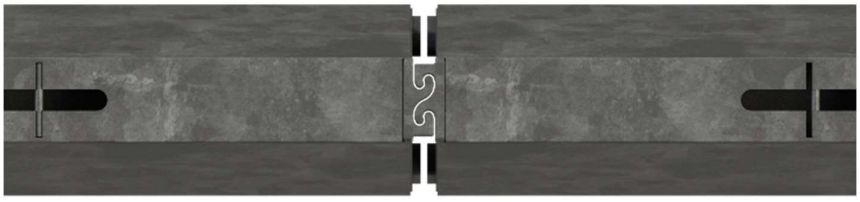
Barrier Segments

A HV2 Safety Barrier installation is constructed from a series of individual barrier segments. Each segment is constructed from steel with concrete ballast. The dimensions of each segment are:

Installed length	5,800mm (19ft)
Segment length	5,846mm (19ft 2in)
Segment width	450mm (18in)
Segment height	900mm (35in)
Weight	2,088kg (4600lbs)

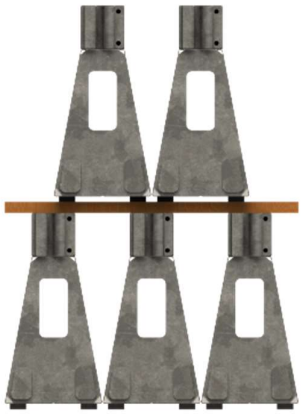
Barrier segments are fastened by an integrated, interlocking joiner, which simply slides together when barriers are lowered into position.

These connectors are bidirectional, allowing barriers to be installed in either orientation.



Barrier segments feature three integrated lifting points. Barriers can be safely lifted from the centre lifting point, or the outer two lifting points.

Barrier segments can be stacked for storage or transport, but appropriate bearers should be used between layers.



Minimum Deployment

HV2 Safety Barrier installations require a minimum deployment length of 98.6m (17no. HV2 Barriers) plus the required end treatments, to safely contain and redirect at MASH TL3.

For MASH TL-4 the minimum Deployment is 278m (48no. HV2 Barriers) plus the required end treatments.

End Treatment

HV2 Safety Barrier installations require appropriate end treatments to ensure occupant safety in the event of an impact to the end of the system.

The QuadGuard Crash Cushion M10 CZ has been successfully tested with the HV2 Safety Barrier using a HV2 transition. This configuration requires anchoring of the end terminal and transition to the ground. Refer to page 11 for deployment details.

The SLED Water Filled Crash Cushion with Transition Kit has been successfully tested with the HV2 Safety Barrier. This configuration does not require any anchoring to the ground and is completely freestanding. Refer to page 12 for deployment details.

Length of Need

Quadguard M10 CZ Crash Cushions

When using QuadGuard M10 CZ Crash Cushions to protect the ends of the system, the length of need begins and ends at the first fender panel of the QuadGuard next to the Yellow Nose for MASH TL-3 Deployments. Refer to the QuadGuard M10 product manual for further information.

For MASH TL-4 Deployments the length of need begins and ends 138m in from the join between the HV2 Barrier and Quadguard.

SLED End Terminals

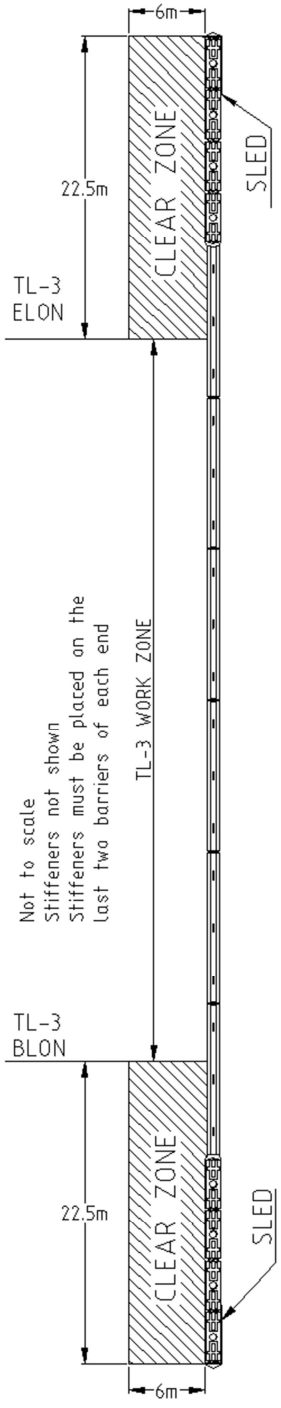
When using SLED crash cushions to protect the ends of the system, the length of need begins and ends midway along the 3rd HV2 Safety Barrier segment, 22.5m (73.8ft) from the beginning or end of the system for MASH TL-3 Deployment. Note a SLED to HV2 Transition Kit is required, see pages 11 and 12 for detail.

For MASH TL-4 Deployments the length of need begins and ends 138m in from the join between the HV2 Barrier and the SLED End Terminal.

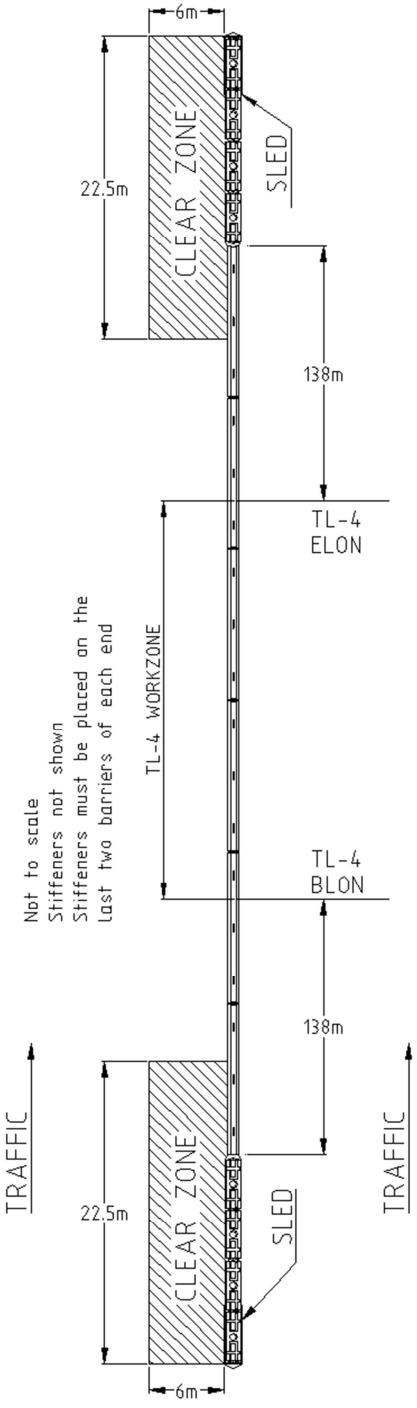
Deployment Options

Limited to 80km/h when using SLED End Treatments.

SLED – TL-3



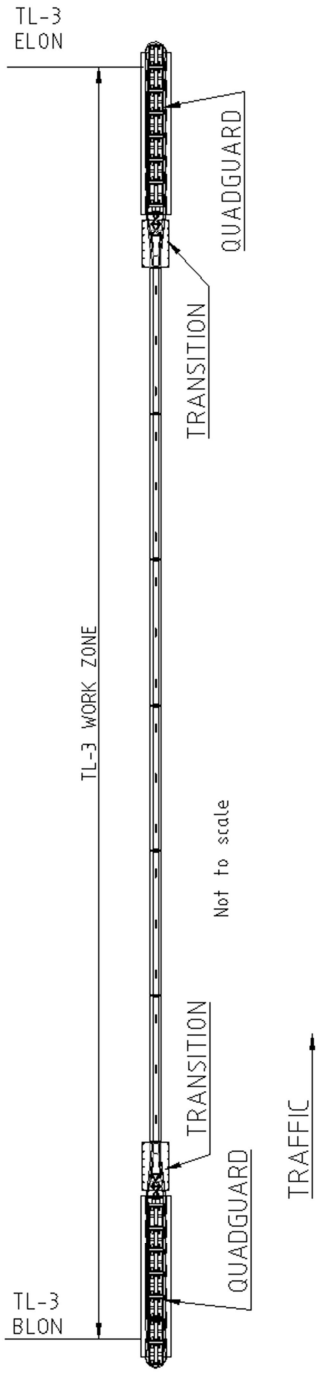
SLED – TL-4



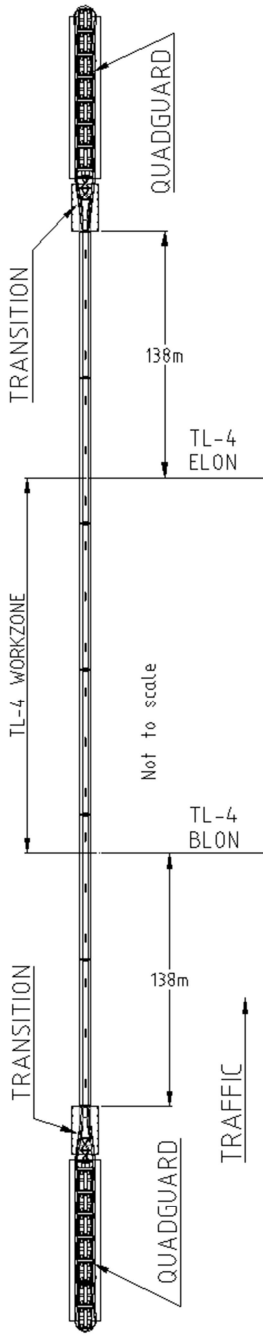
Deployment Options

100km/h when using Quadguard M10 CZ Crash Cushion End Treatments.

QUADGUARD – TL-3



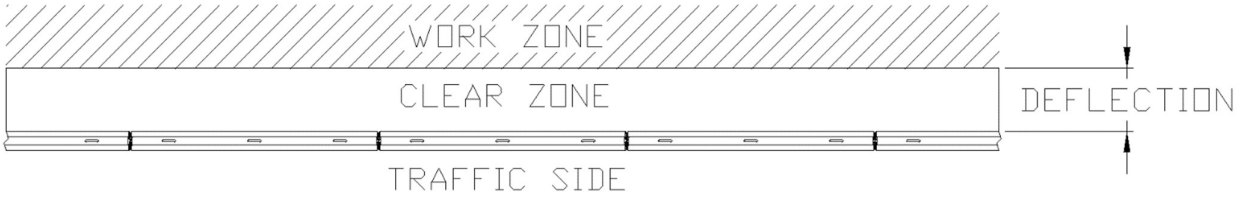
QUADGUARD – TL-4



System Deflection

A sufficient clear zone must be allocated between the HV2 Safety Barrier and the work zone to allow for deflection of the barrier during an impact. The tested deflections are shown in the below table.

Test Level	Vehicle	Speed	Angle	Deflection
TL3	2,270kg (5,000lbs)	100km/h (62mph)	25°	1.47m (4ft 10in)
TL4	10,000kg (22,000lbs)	90km/h (56mph)	15°	2.37m (7ft 10in)



Site Considerations

While Saferoads HV2 Safety Barrier can be installed on most worksites, some obstacles must be avoided. HV2 Safety Barrier should not be installed if there is:

- Curvature tighter than 80m radius
- Cross slope steeper than 5%
- Longitudinal slope steeper than 5%
- Crest sharper than 5%
- Ditch sharper than 5%
- Kerbs or similar obstacles restricting deflection

For more information please contact Saferoads or the relevant road authority.

Barrier Deployment

Before beginning deployment, ensure there is adequate traffic management, and whenever possible personnel should remain on the non-traffic side of the installation. Also ensure appropriate lifting equipment is used and operated by competent personnel.

1. Beginning at the upstream end of the installation, unload the first barrier segment and place in the correct position. Orientation is not important as segments are bidirectional.
2. Working downstream of the first barrier segment, unload the second barrier segment and align the connectors while lowering the segment into position. The connection is made in the top 200mm of the barriers. Remain cautious of potential pinch and crush points when lowering and connecting barriers.
3. Repeat until all barrier segments are placed into the correct position and joined to adjacent barrier segments.
4. For installing an end terminal refer to the relevant deployment section below.

Working Width

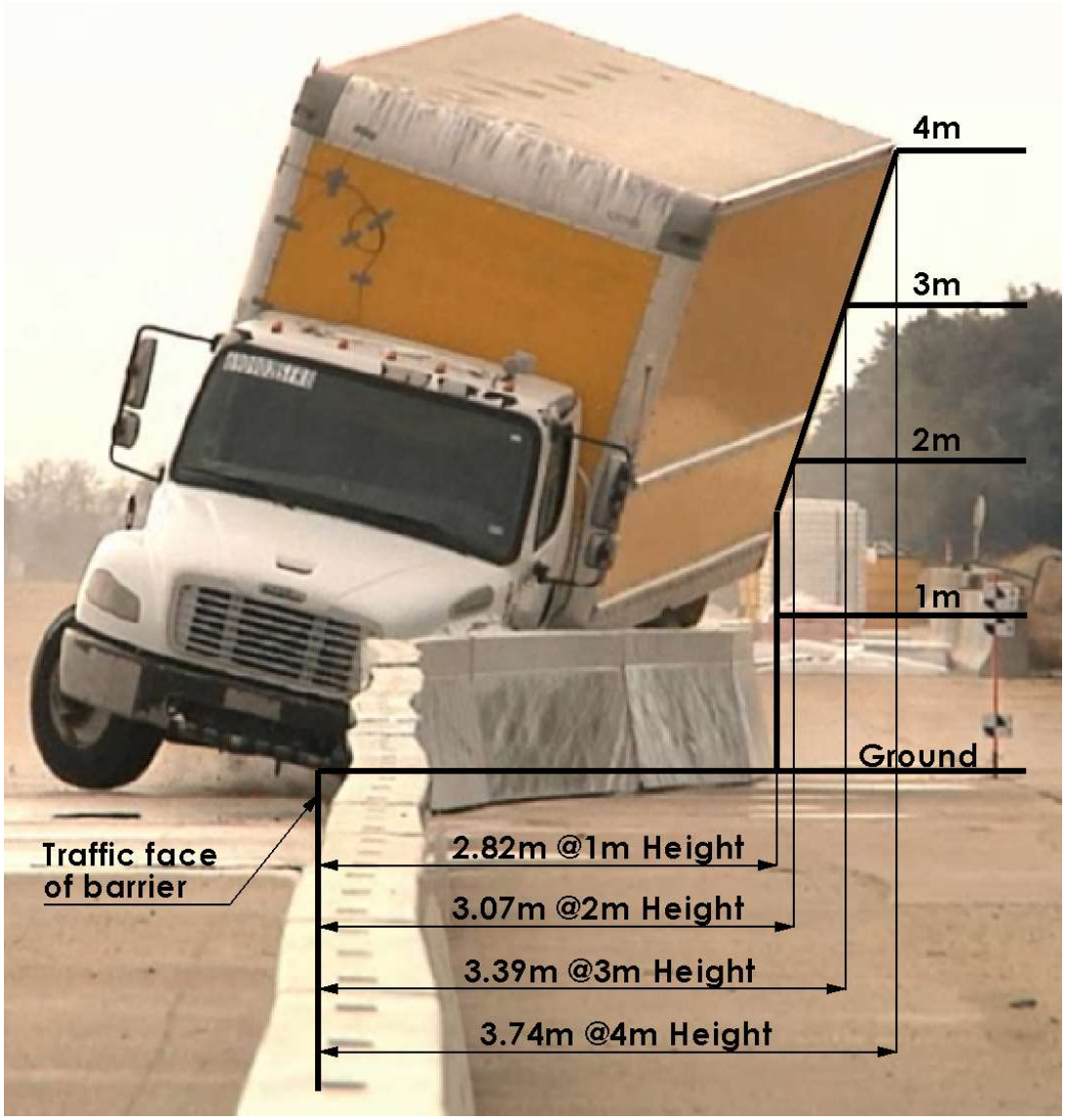
The Working Width is the distance between the traffic face of the barrier before impact and the maximum lateral position of any major part of the barrier or vehicle after impact.

MASH TL-3 – 2,270kg Pickup

The TL-3 Working Width is a constant 1.81m as the vehicle does not roll over the top of the barrier.

MASH TL-4 – 10,000kg Truck

The below image shows the working width of the TL-4 Truck at 1m intervals above the ground. The working width varies depending on the height of the work-zone that requires protection.



QuadGuard M10 CZ Crash Cushion Deployment

When deploying the system with a QuadGuard M10 CZ Crash Cushion, a HV2 Transition must be used between the QuadGuard and the end HV2 Barrier segment. A 610mm (24in) QuadGuard M10 CZ, TL-3 with Tension Strut Backup should be used for a 100km/h system.

1. Replace the side panels (part number 10102004) between the rearmost fender panels and the tension strut backup of the QuadGuard with the HV2 Transition. This transition can remain attached to the QuadGuard, including during transport.

QuadGuard parts excluded for clarity

2. Align the connectors of the HV2 Transition with the connectors of the end HV2 Barrier segment while lowering the QuadGuard and HV2 Transition assembly into position.
3. Anchor both the HV2 Transition and the QuadGuard. The HV2 Transition should be anchored using Hilti HIT-RE 500 V3 epoxy or equivalent. QuadGuard should be anchored according to the QuadGuard M10 product manual.

Surface	Minimum Foundation Depth	Anchor
Concrete	150mm (6in) Concrete	180mm (7in) Stud 140mm (5.5in) Embedment
Asphalt Over PCC	76mm (3in) Asphalt 76mm (3in) Concrete	460mm (18in) Stud 420mm (16.5in) Embedment
Asphalt Over Subbase	150mm (6in) Asphalt 150mm (6in) Compacted Subbase	460mm (18in) Stud 420mm (16.5in) Embedment
Asphalt	200mm (8in) Asphalt	460mm (18in) Stud 420mm (16.5in) Embedment

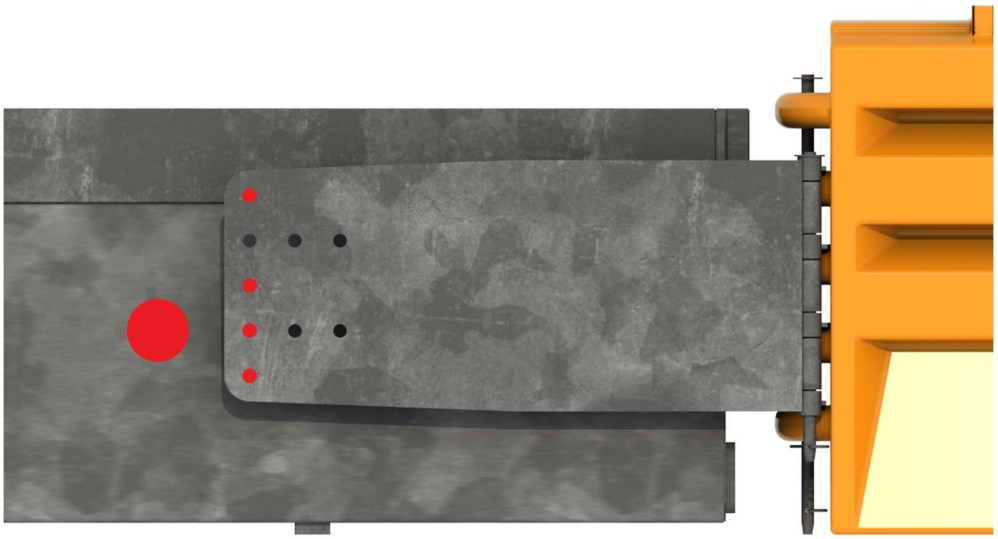
SLED Crash Cushion Deployment

Note: When using HV2 Barrier with SLED end treatments, in Australia the design speed is reduced to 80km/h.

When deploying the system with a SLED Crash Cushion, the generic SLED Transition must be used to connect the SLED to the end HV2 Barrier segment. A SLED to HV2 Transition kit is also required that includes 2no. 3.6m (11.8 feet) Stiffening beams for the first 2 HV2 Barrier joints adjacent to the SLED.

1. Assemble the SLED transition according to the SLED product manual, and position at the end of the system.

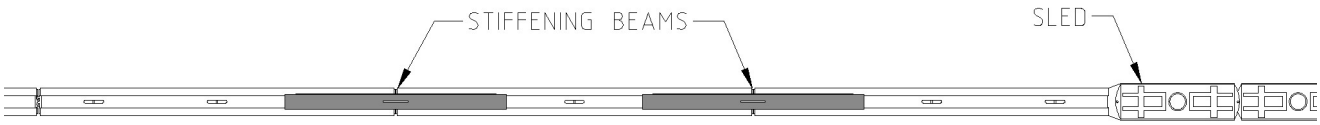
2. Clamp the transition panels to the end HV2 Barrier segment and using the transition panels as a template, drill four 22mm (7/8”) holes through both sides of the HV2 Barrier. The below diagram shows the recommended hole pattern. A 100mm (4”) access hole should also be cut through one side of the barrier in the approximate position shown. This hole should be on the work zone side of the barrier where possible.

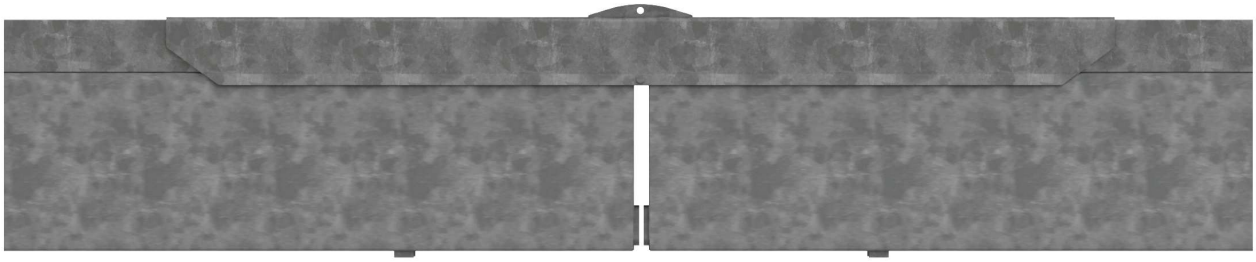


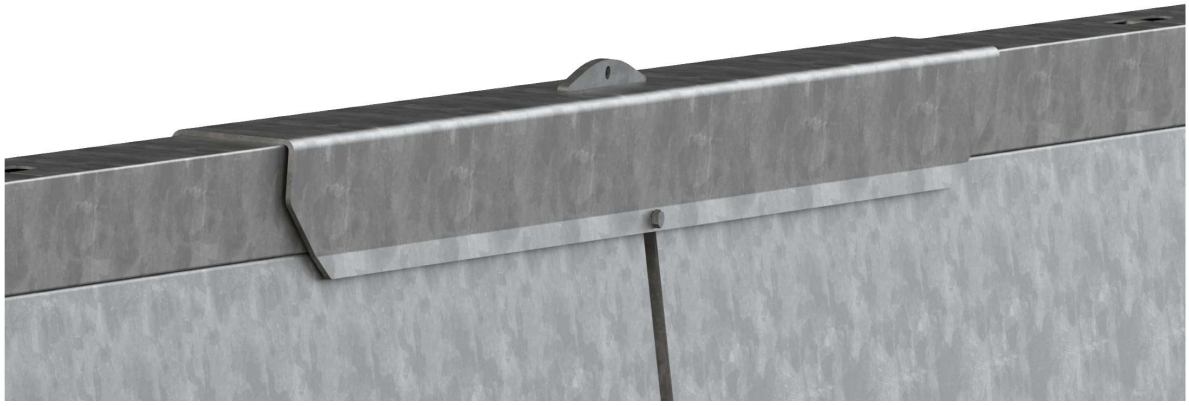
3. Attach the transition panels to the HV2 Barrier using eight M20 x 75mm hex head bolts and nuts. The hex heads are to be on the outside face of the transition plates.

4. Deploy the remaining SLED components according to the SLED product manual.

5. The SLED Transition Kit includes 2 stiffening beams, the 3.6m long U-shaped beams shall be installed at the first 2 HV2 Barrier joints adjacent to the SLED Crash Cushions. A single M20 x 280mm hex head Bolt secures each Beam in place, installed in the centre of the beam under the HV2 Connectors through the gap between the Barriers. Washers are to be installed each end and a Nyloc Nut is to be used.







Maintenance and Repair

No ongoing maintenance is required for the Saferoads HV2 Safety Barrier. Barriers should be inspected regularly and any segments with cracking, tearing, bending or perforation of steel components should be disposed of. Damaged barrier segments can be removed and replaced from between undamaged segments. Repair of barriers is not recommended.

Activity	Hazard Identified	Controls Required	Risk Before Controls	Person Responsible	Residual Risk	Sign Off
Lifting HV2 Segments	Lifting equipment failure	Ensure machinery and operators are appropriately certified. Ensure all equipment is in good, working and tagged condition.	M		L	
	Contact with overhead services	Ensure there are no hazards above the area. If unsure arrange a spotter.	H		L	
	Contact with people or property	Ensure hazards are cleared from area, and do not use lifting equipment in adverse weather.	M		L	
Placing HV2 Segments	Crushing under or between segments	Where possible personnel should be away from area. If personnel are required body parts should be clear when lowering and joining barrier segments. Appropriate PPE should also be worn.	M		L	
Arriving or departing worksite	Collision with people or property	Abide by worksite speed limits and transport routes. Ensure nearby personnel are wearing high-vis clothing.	L		L	
Attending worksite	Environmental hazards	Personnel should wear appropriate clothing and foot wear for environmental conditions.	L		L	
	Excess noise	Where required personnel should wear appropriate hearing protection.	M		L	
	Falling items or debris	Where required personnel should wear appropriate protective gear such as helmets, boots and eye protection.	M		L	