

# HIGHWAYGUARD LDS

## REVISION REGISTER

Revision	Description	Date
1	Issued for use.	10/09/2020.
1 A	Updated conditions, terminals and manual.	9/08/2021
1 B	Permanent use added. Updated conditions, terminals and manual.	11/10/2022
1 C	Updated terminals and manual	22/01/2024
1 D	Updated manual. Additional commentary on product use.	12/06/2026

HighwayGuard is a portable steel barrier, which is anchored to the pavement at the ends (and at intermediate anchors) and is considered a semi rigid system. It is approved for use by Main Roads WA, with conditions under a separate design sheet.

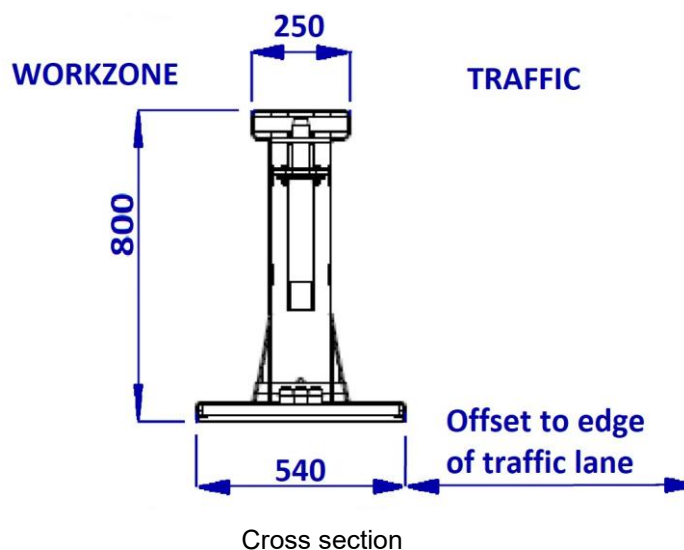
HighwayGuard LDS (Low Deflection System) is a variant of HighwayGuard, with anchors at reduced spacing and reduced deflections. The HighwayGuard LDS is also considered a semi rigid system that is approved for use in temporary applications only.

This product is designed for constrained sites ONLY that cannot accommodate the working widths of more flexible systems. While providing lower working width, this product increases the potential for vehicle occupant risk during high-speed impacts.

Throughout the installation it is recommended to revert to greater pin spacing (Standard) where there is the accepted working width behind the installation.

HighwayGuard LDS may be considered for permanent installation, when crash cushions anchored to concrete slabs are used. However, approval is required from MRWA Road & Traffic Engineering Branch prior to specifying this application.

### Images:



# HIGHWAYGUARD LDS



Isometric View of 6m long unit



Photograph of Installation

## Ownership:

<b>Ownership</b>
Highway Care International Detling Hill, Detling, Maidstone Kent ME14 3HT, United Kingdom
<b>Supplier</b>
Ingal Civil Products 3 Temperley Close, Welshpool 6106 Ph: (08) 9358 9139 <a href="http://www.ingalcivil.com.au/home">http://www.ingalcivil.com.au/home</a>

**Test Level:** Approved to MASH TL 3 and TL 4.

Test Level	Test Description	Intermediate Anchor Spacing	Deflection	Working Width (measured at base of units)
MASH – TL 3	2,270 kg vehicle @ 100 km/h, 25° impact angle	12 m	0.68 m	1.22 m
MASH – TL 3	2,270 kg vehicle @ 100 km/h, 25° impact angle	24 m	1.16 m*	1.70 m*
MASH – TL 4	10,000 kg vehicle @ 90 km/h, 15° impact angle	24 m	1.16 m	2.88 m

\*Note these values based on MASH 4-12 crash test.

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Note that the deflections and working widths were measured in a crash test performed under controlled conditions.

The deflection value is the horizontal offset between the face of the barrier (in this case the toe of the barrier on the traffic side) measured prior to and following vehicle impact.

The working width value is the horizontal offset between the face of the barrier (in this case the toe of the barrier on the traffic side) measured prior to vehicle impact and the maximum lateral position of any major part of the system (in the MASH TL 3 case the toe of the barrier on the workzone side and in the MASH TL 4 case the top of the test vehicle).

Designers should be aware that the working width figure published may not be the working width value achieved in the field for all impacts by errant vehicles.

### Configuration:

- The HighwayGuard LDS system consists of 6 m and 12 m long units. Other components include T-Connectors that allow angles of 2.5°, 5° and 10° to form curved lengths of barrier.
- As the barrier is designed to resist loadings by deflecting the units should be free to move but the system must be anchored at each end and if required at intermediate locations.
- For the MASH TL 3 configuration with the lowest deflection, the location of pinned intermediate anchors shall be at intervals not greater than 12 m.
- For the MASH TL 3 configuration with the greater deflection and the MASH TL 4 configuration, the location of pinned intermediate anchors shall be at intervals not greater than 24 m.
- Anchors for configurations with 12 m intermediate anchor spacing shall consist of 330 mm long chemically anchored M24 threaded rod.
- Anchors for configurations with 24 m intermediate anchor spacing shall consist of 450 mm long chemically anchored M24 threaded rod.
- The configuration of pins for end and intermediate anchors shall be as specified in the HighwayGuard™ LDS Australia & New Zealand Product Manual IMP-124 Rev 1.7 – February 2026.

### Design:

- Design to be in accordance with HighwayGuard™ LDS Australia & New Zealand Product Manual IMP-124 Rev 1.7 – February 2026.
- It is recommended that the barrier should be offset from the edge of traffic lane by:
  - traffic speed 40 km/h or less – 0.2 m;
  - traffic speed 41 to 60 km/h – 0.3 m;
  - traffic speed 61 to 80 km/h – 0.5 m;
  - traffic speed greater than 80 km/h – 1.0 m
- Barrier length must be sufficient to adequately protect the hazard.

### Minimum Length:

60 m (i.e. minimum length tested) for MASH TL 3.

84 m (i.e. minimum length tested) for MASH TL 4.

### Point of Redirection:

The point of redirection for MASH TL 3 conditions shall be the interface between the barrier and the end treatment.

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The leading point of redirection for MASH TL 4 conditions shall be 34.5 m from the start of the HighwayGuard LDS Barrier. The trailing point of redirection for MASH TL 4 conditions shall be 49.5 m from the end of the HighwayGuard LDS Barrier.

### Terminals permitted:

- Absorb-M (suitable for maximum design speed = 80 km/h, maximum posted speed = 70 km/h)
- ArmorBuffa (suitable for maximum design speed = 80 km/h, maximum posted speed = 70 km/h)
- TAU-M crash cushion (may only be installed where reverse impacts are not possible).
- Quadguard M10 CZ crash cushion. May only be installed where reverse impacts are highly improbable and a risk assessment has been completed and steps undertaken to mitigate any risks identified.

### Limitations:

- The ends of the barrier should be shielded with a suitable end treatment or by an overlapping barrier.
- Cannot be placed adjacent to kerbs or other objects within the deflection limits of the barrier, which may prevent lateral displacement.
- Not to be used on longitudinal slopes or crossfalls greater than 8%.
- To be used where pavement thickness is at least:
  - 300 mm thick, consisting of 150mm asphalt on granular subbase,
  - 250 mm thick deep lift asphalt,
  - 200 mm thick reinforced concrete or
  - 250 mm thick unreinforced concrete.For pavements not meeting these requirements design advice shall be sought from the Supplier.
- Cannot be used on radii less than 177 m unless T-Connector units are used.
- Objects should not be placed on top of the barrier as they are designed to move under impact. "Anti-Gawk" screens are not to be attached.

### Installation and Maintenance Requirements:

In accordance with HighwayGuard™ LDS Australia & New Zealand Product Manual IMP-124 Rev 1.7 – February 2026.

The holes in the pavement for the anchors made to accommodate the anchor pins must be repaired to the satisfaction of the road authority.

### Parts to be Replaced after Impact:

Units may need to be repaired after impact or replaced depending on the extent of damage.

### Parts Typically Re-Useable after Impact:

Undamaged units.

### References:

Item	Description
1	Barrier system information can be found on Main Roads file 20/4021.