MASH TL3 Compliant

DELTABLOC®

Jaybro

CONSIDER IT DONE.

DB80 K-150

Portable Concrete Barrier Installation Manual

CALL NOW 1300 885 364 Jaybro.com.au

Version 2025/01

Table of Contents

1.0 Introduction 5

2.0 Specifications 5

3.0 Design Considerations 6

3.1 ECO-Friendly Concrete 6
3.2 Zero Debris Concrete 6
3.3 Barrier Identification 6
3.4 Design Life 6
3.5 Clearance to Hazards 7
3.6 Minimum Installation Length 7
3.7 Curved Installations 7
3.8 Kerbs 8
3.9 Delineation 8
3.10 Foundation Requirements 8
3.11 End Terminals 9
3.12 Points of Redirection 10

4.0 Transitioning to Fully Redirective, Non-Gating Crash Cushions 11

4.1 Securing the Anchor Plates to DB80 K150 14
4.2 Securing the Anchor Plates to a Concrete Foundation 14
4.3 Securing the Anchor Plates to an Asphalt Pavement 15
4.4 Securing the Anchor Plates to a Granular Pavement 15

5.0 Component Identification 16

6.0 Transportation & Storage 17

7.0 Site Preparation 21

7.1 Tools Required 21
7.2 Recommended PPE 21
7.3 Traffic Control 21
7.4 Overhead Obstructions 21
7.5 Unloading Exclusion Zone 21

8.0 Installation Sequence 22

8.1 Butt Joint Inserts 24

DB80 K150 Inspection Form **25**

9.0 Maintenance **26**

10.0 Dismantling & Relocation **26**

11.0 Disposal **26**

12.0 Damage Assessment **27**

12.1 Cracks 27

12.2 Spalling 28

12.3 Barrier Connection 30

Leading Safety

Successfully crash tested to MASH Test Level 3

Complies with AS/NZS 3845.1:2015 Road safety barrier systems and devices

Prevents dangerous crossover vehicle accidents

Environmental Considerations

Available with Zero Debris Concrete minimising damage and extending service life

Available with Eco-Friendly Concrete providing a sustainable, low-carbon concrete option

Superior Design

Low deflection

Suitable for verge or median applications

Patented K-coupling system with internal tension bars

Available in 2m, 4m or 6m element lengths

Nil damage from nuisance impacts

Availability of longer couplers to facilitate installation on tight curves

Fast Assembly

Freestanding system does not require ground anchoring

Identical barrier connections at each end of the concrete element

Elements feature clutch anchors facilitating ease of handling

Compatibility

Available with ABSORB-M water filled crash cushion.

Available with TAU-M non-gating, fully redirective crash cushion

Available with TAU-Xpress Repair non-gating, fully redirective crash cushion

1.0 Introduction

DB80 K150 is a freestanding, F-shape concrete barrier system designed to safely contain and redirect errant vehicles travelling adjacent to workzones and construction sites. Developed by DeltaBloc® of Austria, DB80 K150 has been full-scale crash tested to MASH Test Level 3.

DB80 K150 has been specifically designed for rapid deployment and ease of installation and does not require anchoring to the road foundation. The symmetrical design of DB80 K150 withstands vehicle impacts from either side facilitating installation in verge and median applications.

The simple design of DB80 K150 consists of 6m long elements measuring 800mm high, linked together with a patented K-coupling system. Each element is just 570mm wide ensuring minimal encroachment into adjacent traffic lanes. DB80 K150 is also available in unit lengths of 2m and 4m providing compatibility with specific site measurements.

The F-shape of DB80 K150 is compatible with MASH compliant crash cushions, shielding the blunt end of the system.

2.0 Specifications

Standard Unit Length	6 m
Unit Height	800 mm
Unit Width	570 mm
System Mass	525 kg per metre
MASH TL3 Dynamic Deflection	1.44 m
MASH TL3 Working Width	1.94 m

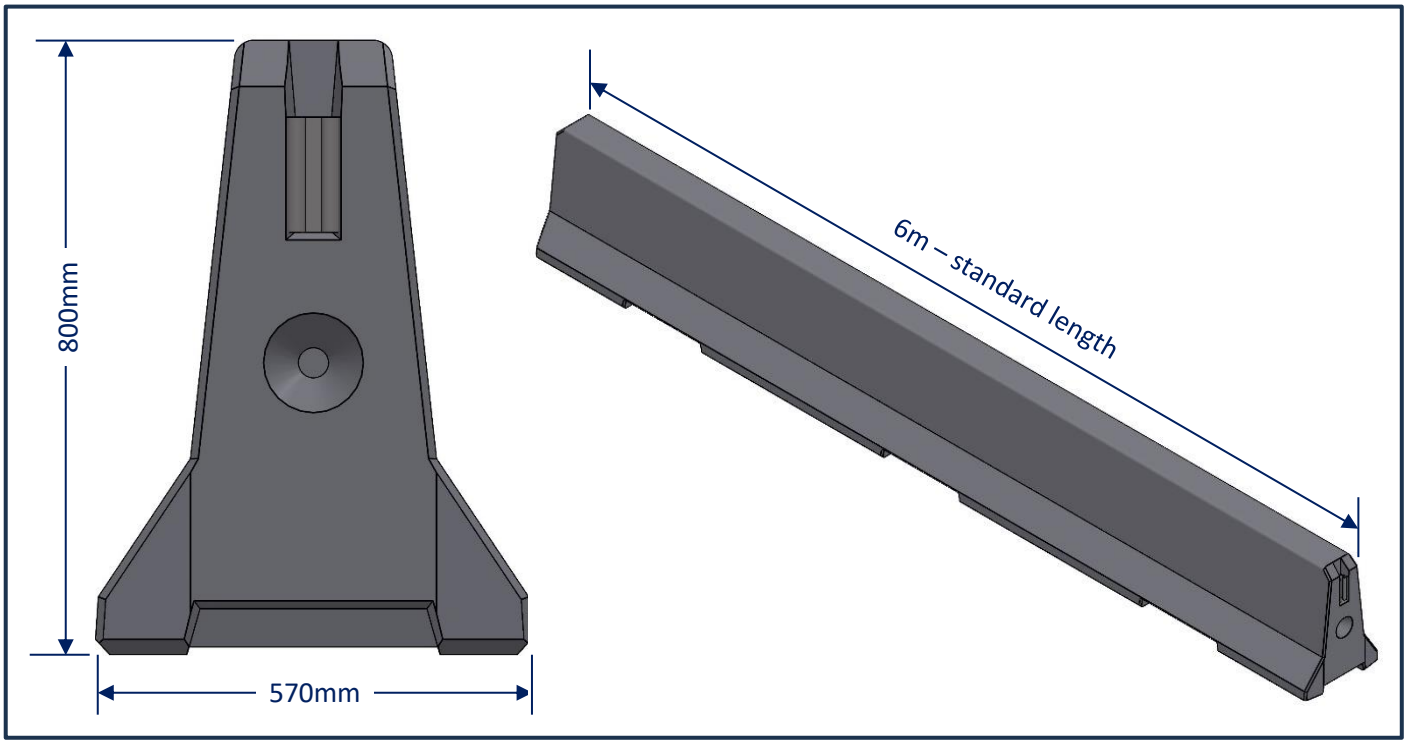


Figure 1: DB80 K150 Dimensions

3.0 Design Considerations

3.1 ECO-Friendly Concrete

DB80 K150 is available with ECO-friendly concrete, providing a sustainable, low-carbon concrete option. The ECO-friendly mix offers a reduction of up to 41.2% in embodied carbon compared with the current Australian Life Cycle Inventory (AusLCI) database value for an ordinary Portland cement ready-mix concrete.

ECO-friendly concrete is designed to perform equal to, or better than conventional concrete, therefore the impact performance of DB80 K150 is unchanged. ECO-friendly barrier elements may be used with non-ECO elements.

3.2 Zero Debris Concrete

Zero Debris Concrete (ZDC) is achieved by adding steel fibres to the concrete mix to improve impact resistance and reduce the potential for detached elements during a vehicle collision. The use of ZDC improves the durability of the concrete element, minimising repairs and maintenance and extending the life of the barrier. The use of ZDC does not change vehicle redirection behaviour, geometry of the concrete barrier or connection details. ZDC barrier elements may be used with non-ZDC elements.

3.3 Barrier Identification

Each DB80 K150 concrete element is labelled as shown in Figure 2. The label is positioned on the end face of the element and identifies the use of ECO-friendly concrete, Zero Debris Concrete or a combination of both.

DELTABLOC® Concrete Barrier by Jaybro						
Model		DB80 K150		DB80 T150S		DB80A T150S
Concrete Mix		Standard		ECO-Friendly		Zero-Debris
Element Length		2m		4m		6m
Element Weight		Kg				
Serial Number						
Cast Date						

Figure 2: DeltaBloc® Barrier Identification

3.4 Design Life

The typical design life of a DB80 K150 concrete element exceeds 20 years. The life of the barrier will be dependent upon damage due to handling or vehicle impacts that may reduce the concrete cover to the reinforcement or expose the reinforcement to atmospheric contaminants.

3.5 Clearance to Hazards

DB80 K150 should be installed with sufficient clearance behind the barrier to allow for the expected movement of the system. The MASH TL3 impact condition (2270kg pick-up truck travelling at 100km/h and 25 degrees) has been developed to represent 'worst case impact scenario'.

Dynamic deflection is the maximum lateral displacement of the barrier during a vehicle impact. When a vehicle strikes a barrier, the dynamic deflection varies according to the characteristics of the impacting vehicle, including vehicle mass, impact speed, angle of impact and the characteristics of the barrier system.

When the hazard is low enough that it does not interfere with the possible vehicle intrusion into the area behind the barrier, for example a batter slope, dynamic deflection is considered the most appropriate clearance measurement.

If the hazard extends above the height of the barrier and may be contacted by the top of the design vehicle during containment and redirection, for example a bridge pier, then the working width is considered the most appropriate clearance measurement.

Please consult with Jaybro for expected DB80 K150 barrier deflections and working widths at varying vehicle speeds and impact angles.

Table 1: DB80 K150 MASH TL3 Crash Test Results

Impact Condition	Dynamic Deflection	Working Width
2270kg pick-up truck travelling at 100km/h and 25 degrees	1.44 m	1.94 m

3.6 Minimum Installation Length

The recommended minimum installation length of DB80 K150 is 60m, excluding the crash cushions at each end of the system.

3.7 Curved Installations

The availability of elongated couplers in combination with shorter element lengths facilitates installation on horizontal curves as detailed in Table 2.

Table 2: Installation on a Horizontal Curve

Element Length	Minimum Horizontal Radius	
	Standard Coupler (97mm)	Extended Coupler (117mm)
2 m	40 m	16 m
4 m	80 m	32 m
6 m	120 m	48 m

3.8 Kerbs

The installation of DB80 K150 on top of a kerb is not recommended. However, if installed on top of a kerb all system components must be free to operate.

3.9 Delineation

Reflective delineators may be secured to the top of the DB80 K150 elements as required by project specifications. Manufactured from plastic or lightweight aluminum, delineators are designed to highlight the safe passage of travel for motorists.

3.10 Foundation Requirements

DB80 K150 is a freestanding barrier placed directly onto the ground. The foundation must be smooth and free of snag points. The height differential between adjacent units should not exceed ± 10mm. Packing under the base area of lower barrier is permitted to achieve a smooth alignment.

It is recommended that the area in advance of the DB80 K150 system be limited to a grading of 10H:1V to ensure that the vehicle's suspension is neither extended nor compressed at the moment of impact with the barrier.

At sites where there is a change in grade between the carriageway and location of the barrier, the angle of the DB80 K150 should not be less than 90 degrees as shown in Figure 3.

There is no longitudinal grade restrictions for the installation of DB80 K150.

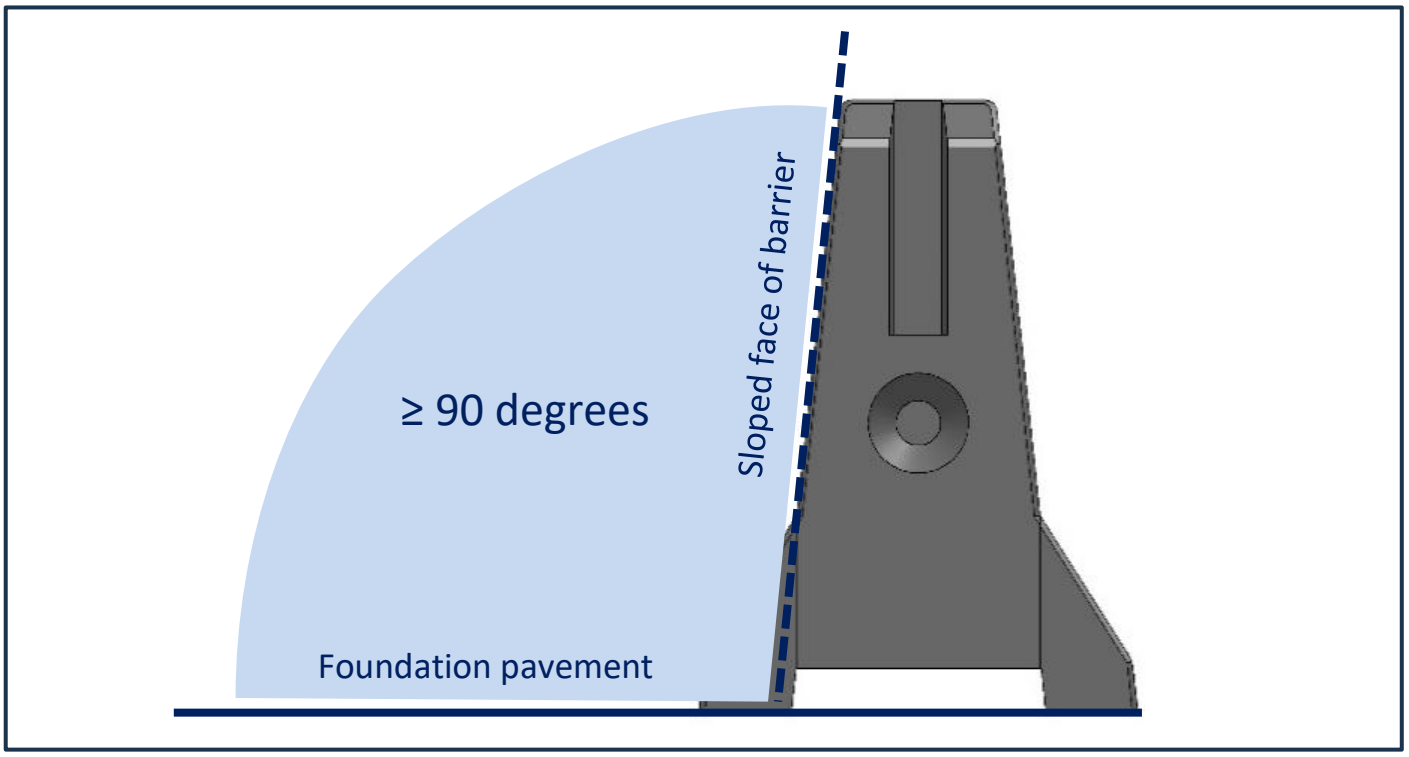


Figure 3: DB80 K150 Installation Angle

3.11 End Terminals

End terminals also known as impact attenuators or crash cushions reduce the severity of an impact with the end of the concrete barrier system. A crash cushion may be classified as gating or non-gating.

Gating or non-redirective crash cushions are designed to allow vehicles impacting near the beginning or nose of the system to safely pass through the unit and travel behind the cushion. Non-gating or fully redirective crash cushions are designed to capture almost all vehicles striking the end of the device and safely decelerate them to a stop. A non-gating crash cushion must capture impacting vehicles during angular tests on the end of the system.

Gating crash cushions typically feature freestanding, water filled cartridges. Since gating crash cushions have no capability to redirect vehicles impacting at the interface with the downstream concrete barrier, they are restricted by Australian state road agencies to roadway speeds of 80km/h or less.

Non-gating crash cushions are anchored to a foundation increasing the lateral strength of the unit facilitating vehicle containment and redirection. Therefore, when connecting a non-gating crash cushion to a freestanding barrier, including DB80 K150, a transition must be installed to progressively stiffen the DB80 K150 system at the interface with the non-gating crash cushion.

Crash cushions licensed to Jaybro by Lindsay USA for attachment to DB80 K150 are listed in Table 3.

Table 3: DB80 K150 Crash Cushions

Crash Cushion	Classification	Lindsay Drawing Reference(s)
Universal TAU-M	MASH TL3 Non-Gating, Fully Redirective	BSI-1911006-AP, BSI-1911007-AP BSI-1911008-AP, BSI-1911009-AP
TAU-Xpress Repair (XR)	MASH TL3 Non-Gating, Fully Redirective	1832994, 1830178
Absorb-M	MASH TL3 Gating, Non Redirective	BSI-2004077-AP

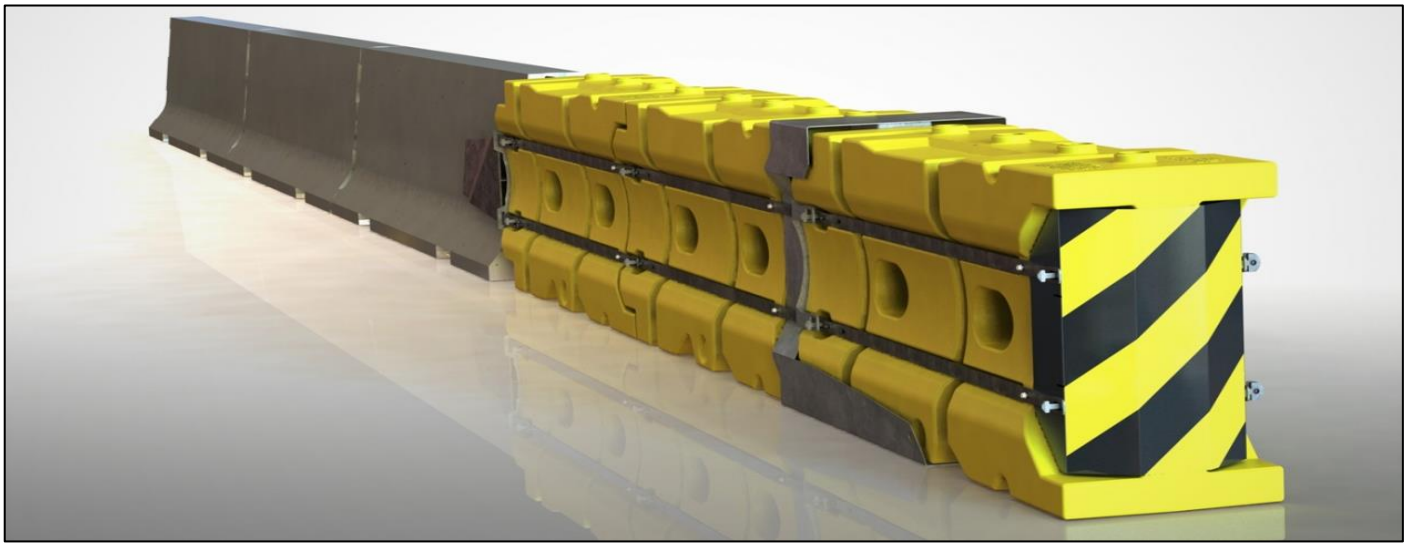


Figure 4: Absorb-M Crash Cushion

3.12 Points of Redirection

During a vehicle collision, the safety barrier system must be capable of resisting lateral forces. Impacts near the ends of an unanchored system may not provide sufficient lateral restraint. Therefore, the safety barrier system must have sufficient barrier length in advance and beyond the point of impact to provide safe vehicle containment and redirection.

The downstream location, measured from the start of the barrier system where vehicle redirection commences, is known as the leading point of need. The distance measured from the end of the system where there is sufficient length of barrier and lateral support to facilitate vehicle redirection, is known as the trailing point of need.

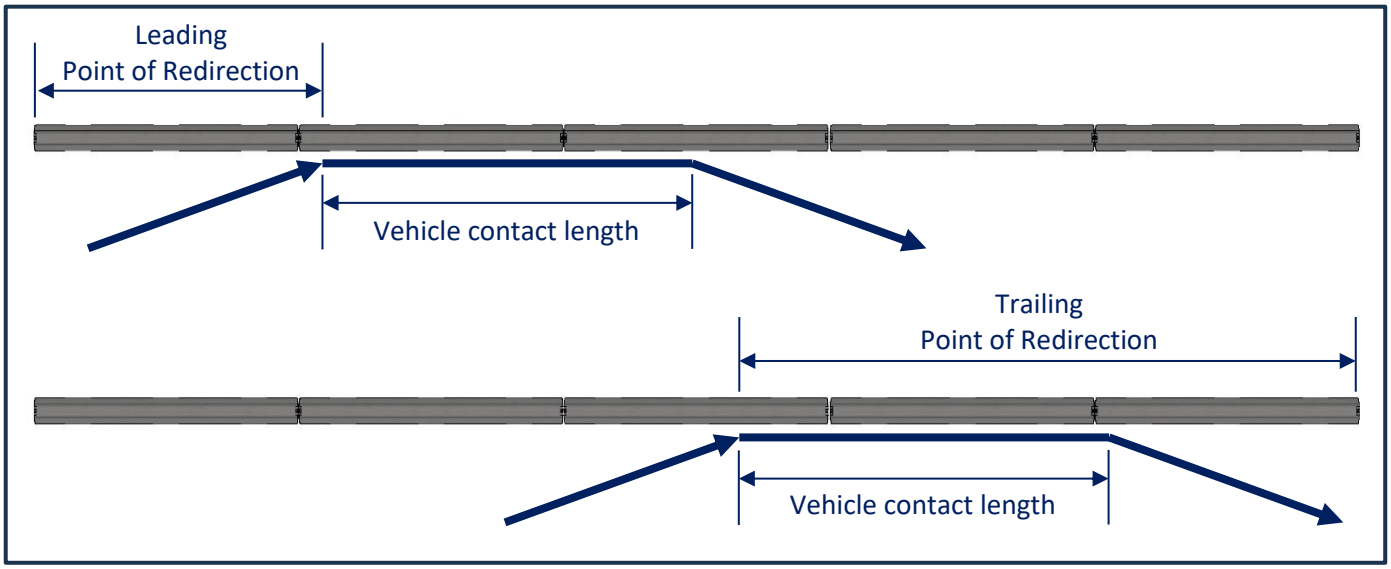


Figure 5: Leading & Trailing Points of Redirection

As described in Section 3.11, DB80 K150 may be installed with non-gating or gating crash cushions.

The MASH crash test evaluation of non-gating crash cushions must demonstrate capturing of the impacting vehicle during angular tests at the end of the system. Therefore, non-gating crash cushions are classified as fully re-directive and the leading and trailing points of need of the safety barrier system are considered to be the nose of the crash cushion.

By contrast, gating crash cushions, typically featuring freestanding, water filled cartridges have no capability to redirect vehicles impacting at the interface with the downstream concrete barrier. Therefore, the leading and trailing points of need of the safety barrier system will typically correspond to the full-scale crash test impact location of the longitudinal barrier that has demonstrated safe vehicle containment and redirection.

Table 4: DB80 K150 Points of Redirection

System Configuration	Leading Point-of-Redirection	Trailing Point-of-Redirection
DB80 K150 with non-gating, fully redirective crash cushions	0 m	0 m
DB80 K150 with gating, non-redirective crash cushions	29.2 m	32.5 m

4.0 Transitioning to Fully Redirective, Non-Gating Crash Cushions

A transition is required when connecting DB80 K150 to an anchored, fully redirective, non-gating crash cushion. The transition features DB80 K150 elements with additional steel plates for anchoring to concrete or asphalt. The transition gradually increases system stiffness, reducing the potential for vehicle pocketing at the interface with the non-gating crash cushion.

The transition comprises three (3) anchored DB80 K150 elements (4m or 6m) as shown in Figure 6. The anchor plates can be secured to concrete or asphalt.

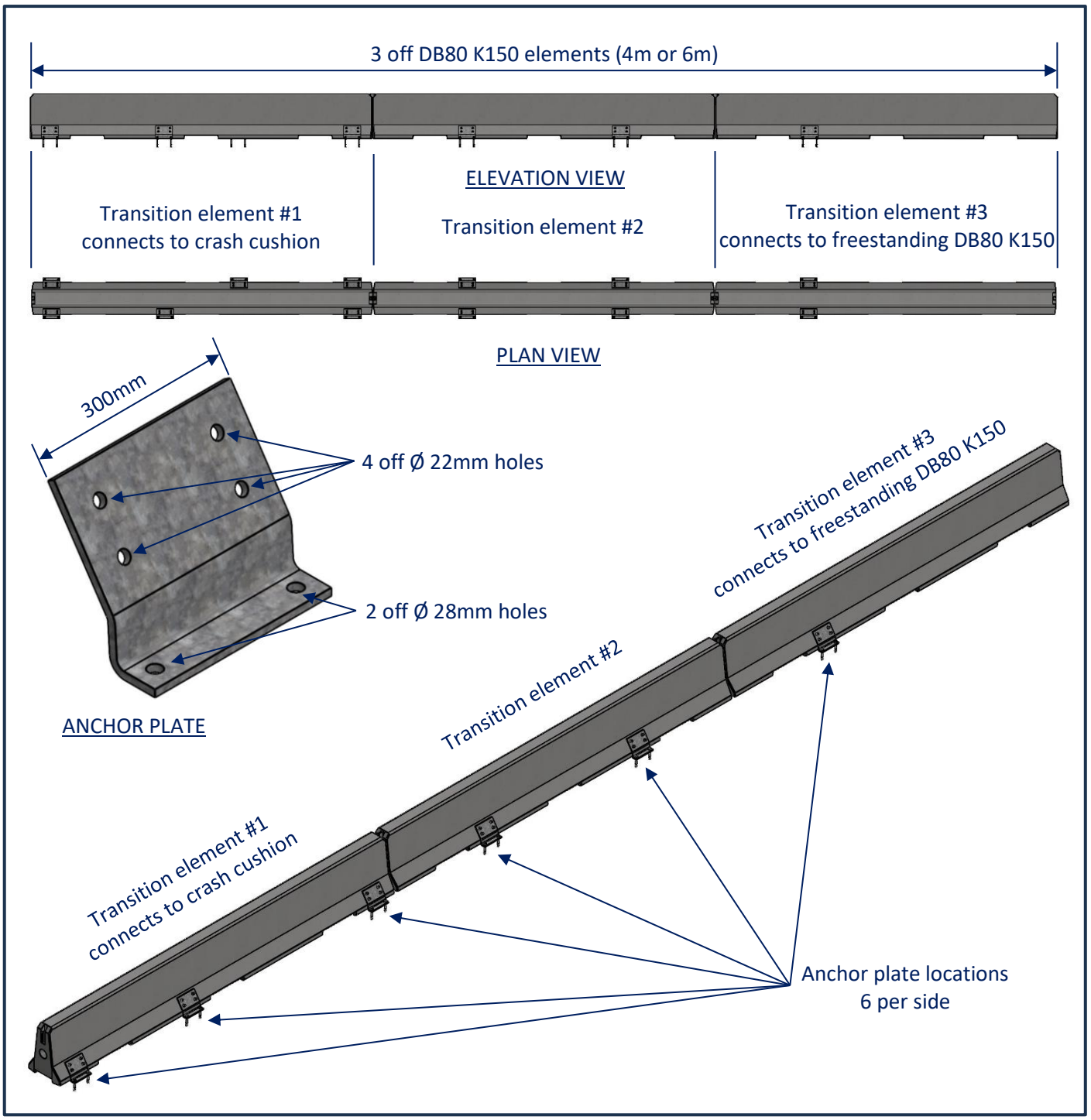


Figure 6: Transitioning to Fully Redirective, Non-Gating Crash Cushions

The anchor plates are secured to the concrete elements onsite using four (4) M16 x 65mm anchor bolts per plate. The positions of the anchor plates are shown in Figure 7.

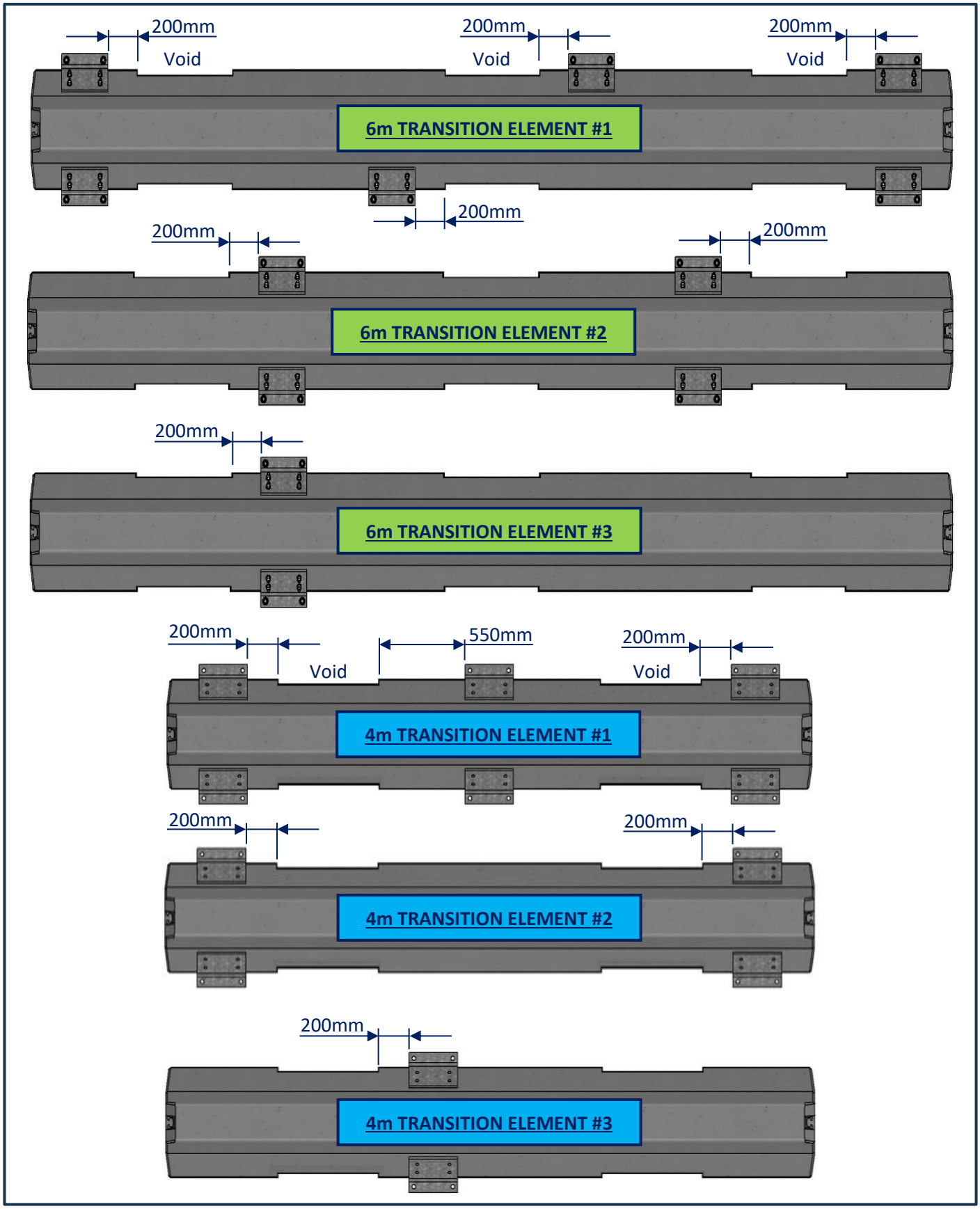


Figure 7: Anchor Plate Locations

If the crash cushion **cannot** be struck by an errant vehicle travelling in the reverse direction, e.g. the roadway is divided by a median barrier, only Transition Element #1 is required as shown in Figure 8.

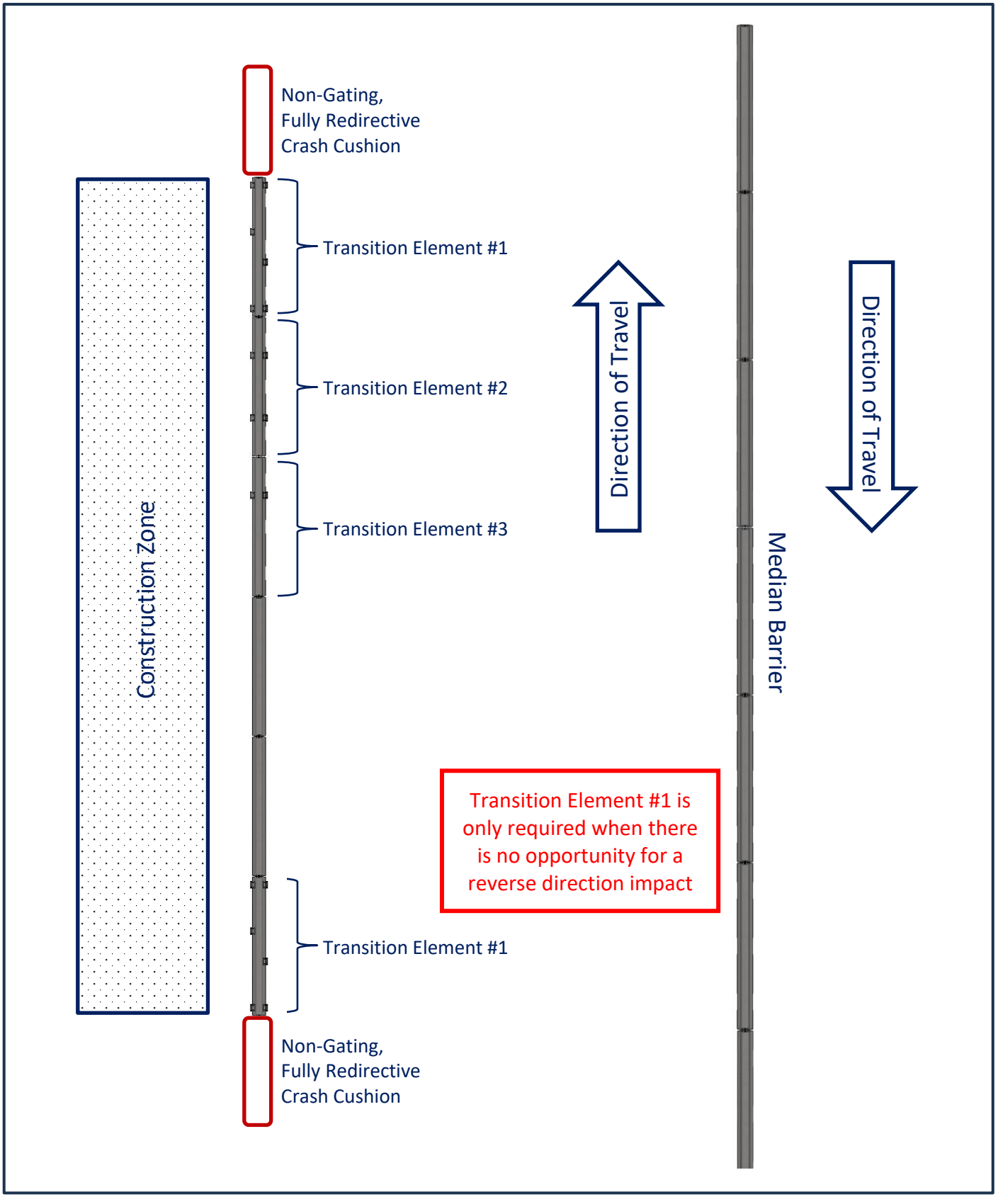


Figure 8: Transition Arrangement on a Divided Roadway

4.1 Securing the Anchor Plates to DB80 K150

Anchor Type: M16 x 65mm galvanised mechanical anchor.

1. Position the anchor plates against the DB80 K150 element as shown in Figure 7.
2. Ensure the bottom of the anchor plate is in contact with the ground surface and mark the four (4) anchor locations.
3. Using a 20mm masonry drill bit, drill each anchor hole to a depth of 70mm.
4. Using compressed air or a pump, thoroughly clean the hole removing all loose debris.
5. Position the nut 3mm below the top of the anchor and drive the anchor into the drilled hole to the full embedment depth and fully tighten.

4.2 Securing the Anchor Plates to a Concrete Foundation

Pavement: minimum 250mm concrete.

Anchor Type: M20 x 250mm galvanised threaded rod with injection mortar.

1. Using a 22mm masonry drill bit, drill each anchor hole to a depth of 200mm.
2. Using compressed air or a pump, thoroughly clean the hole removing all loose debris.
3. Using an applicator, fill approximately 2/3 of the cleaned hole, starting from the bottom to avoid air pockets.
4. Position the nut 3mm below the top of the threaded rod and push the rod into the hole and turn slowly until the rod achieves full embedment depth.
5. Once the injection mortar has fully cured as per manufacturers specifications, fully tighten the nut.

4.3 Securing the Anchor Plates to an Asphalt Pavement

Pavement: minimum 250mm asphalt over 300mm granular pavement.

Anchor Type: M20 x 250mm galvanised threaded rod with injection mortar.

1. Using a 22mm masonry drill bit, drill each anchor hole to a depth of 200mm.
2. Using compressed air or a pump, thoroughly clean the hole removing all loose debris.
3. Using an applicator, fill approximately 2/3 of the cleaned hole, starting from the bottom to avoid air pockets.
4. Position the nut 3mm below the top of the threaded rod and push the rod into the hole and turn slowly until the rod achieves full embedment depth.
5. Once the injection mortar has fully cured as per manufacturers specifications, fully tighten the nut.

4.4 Securing the Anchor Plates to a Granular Pavement

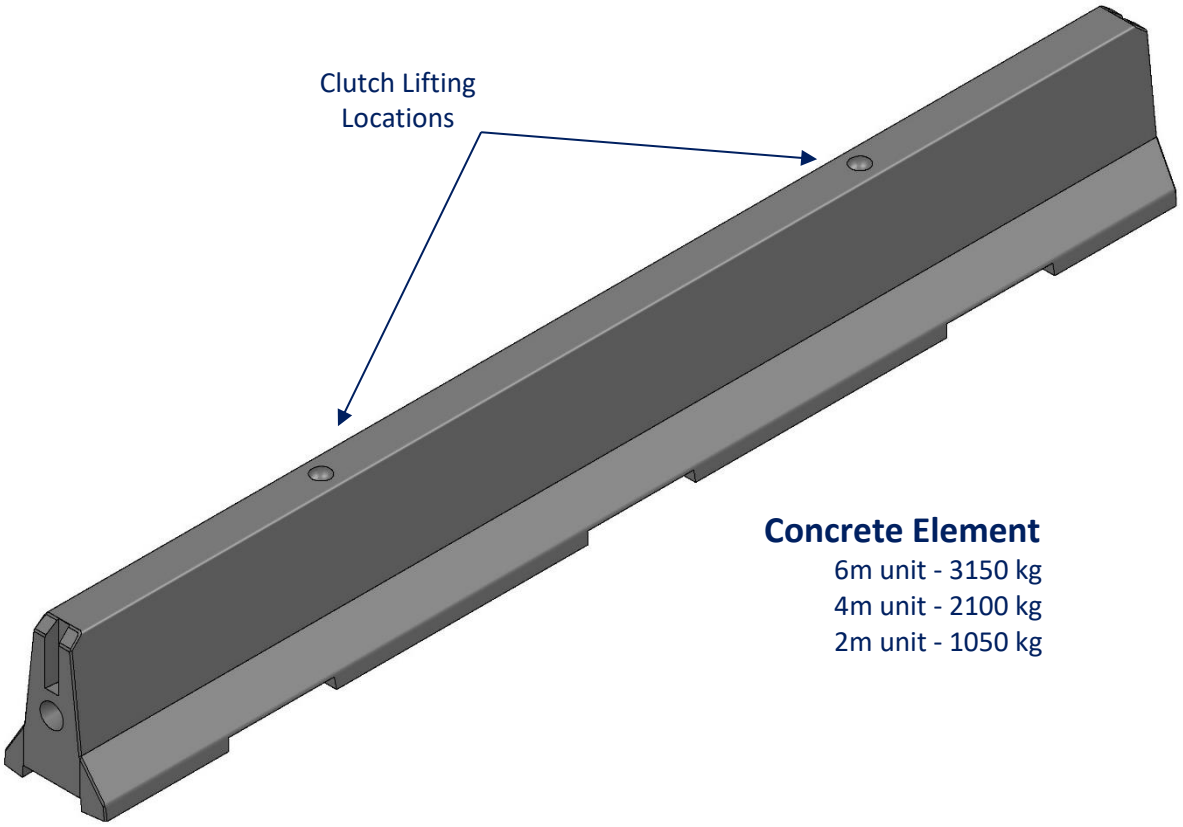
Pavement: minimum 300mm granular pavement.

Anchor Type: M25 x 400mm galvanised pin.

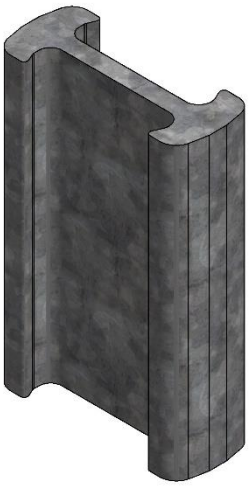
1. Using a 28mm masonry drill bit, drill each anchor hole to a depth of 400mm.
2. Using a hammer, drive the pin to full depth.

5.0 Component Identification

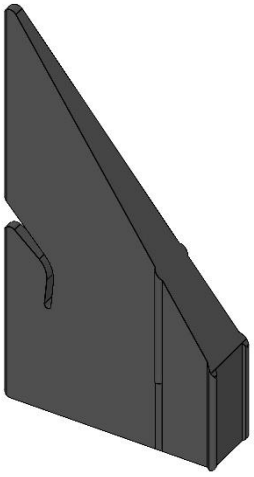
Not to Scale



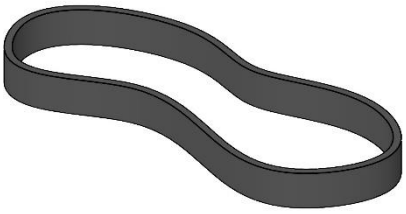
Concrete Element
6m unit - 3150 kg
4m unit - 2100 kg
2m unit - 1050 kg



DB80 K150 Coupler



Butt Joint Insert (optional)



Elastomer Strap (optional)

6.0 Transportation & Storage

The design of DB80 K150 facilitates ease of handling and storage. The centre of gratvity for all DB80 K150 elements is the midpoint of the barrier. Prior to lifting the barrier, each element should be inspected for damage. Each concrete element features clutch lifting points. Alternately the units may be lifted using a forklift or mechanical grab.

When using lifting clutches the following must be observed:

- The lifting clutches should be secured to the barrier by a suitably trained operator.
- Only one (1) barrier element is to be lifted at a time.
- The tabs of the lifting clutch must be aligned with the chain sling.
- The lifting position of the crane should be directly overhead of the centre-of-gravity.
- The lift should be smooth to prevent accidental damage.
- If the lift experiences a snag, the lift should cease immediately. The snag should be investigated and the lift adjusted accordingly.
- Elements should be lifted and lowered vertically as shown in Figure 9.

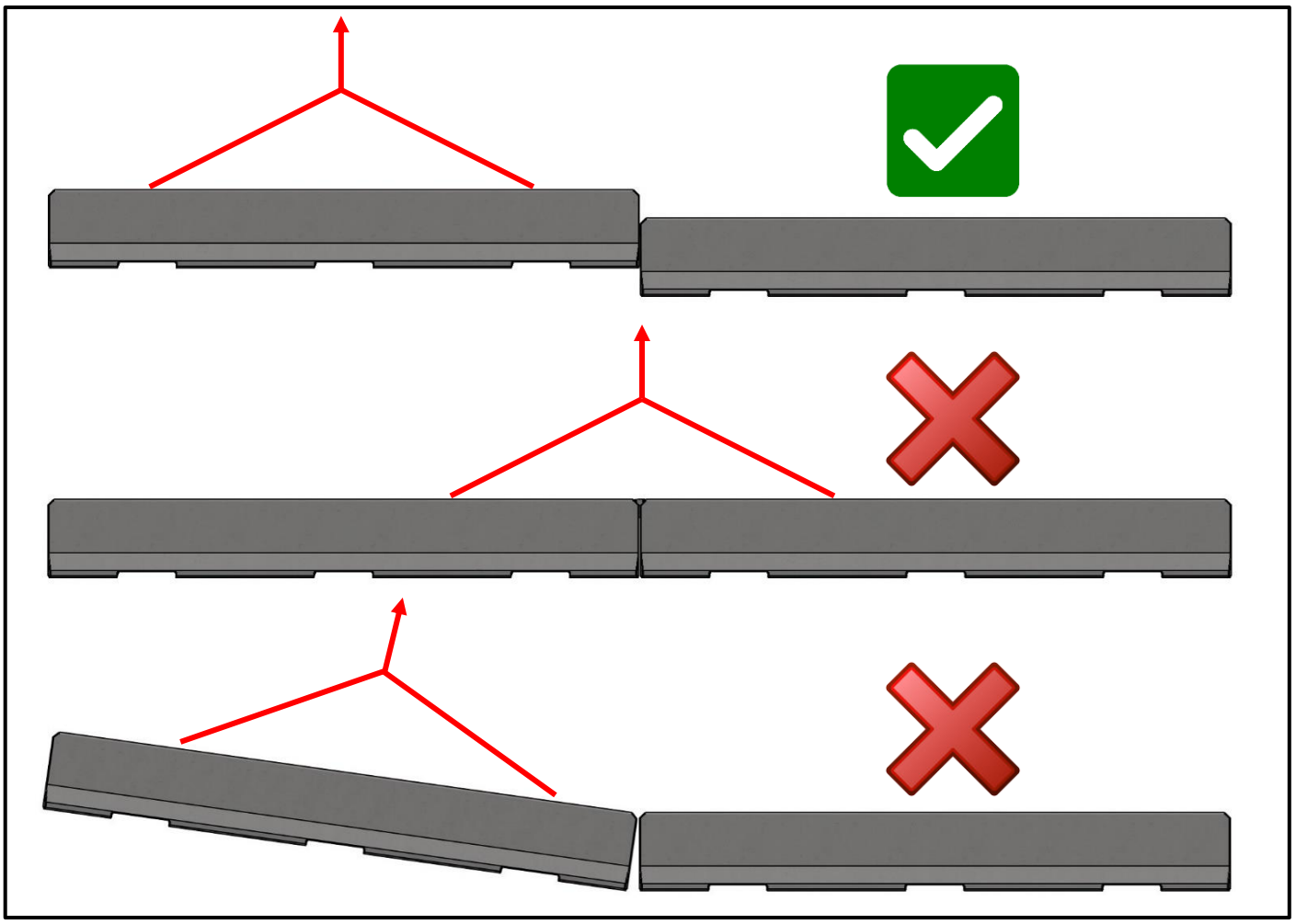


Figure 9: Lifting of DB80 K150 Elements using Clutch Lifting Points

Figure 10: Forklift

Figure 11: Clutch Anchors

Figure 12: Mechanical Grab

DB80 K150 concrete elements may be stacked up to three (3) units high in a staggered pattern as shown in Figure 13. The ground material must be level and suitably compacted to ensure stability of the units. Timber dunnage measuring 100 x 100mm is recommended between each layer. The bottom layer should use wider timber dunnage or concrete blocks. The concrete barriers should not be touching and a gap of 100mm is recommended.

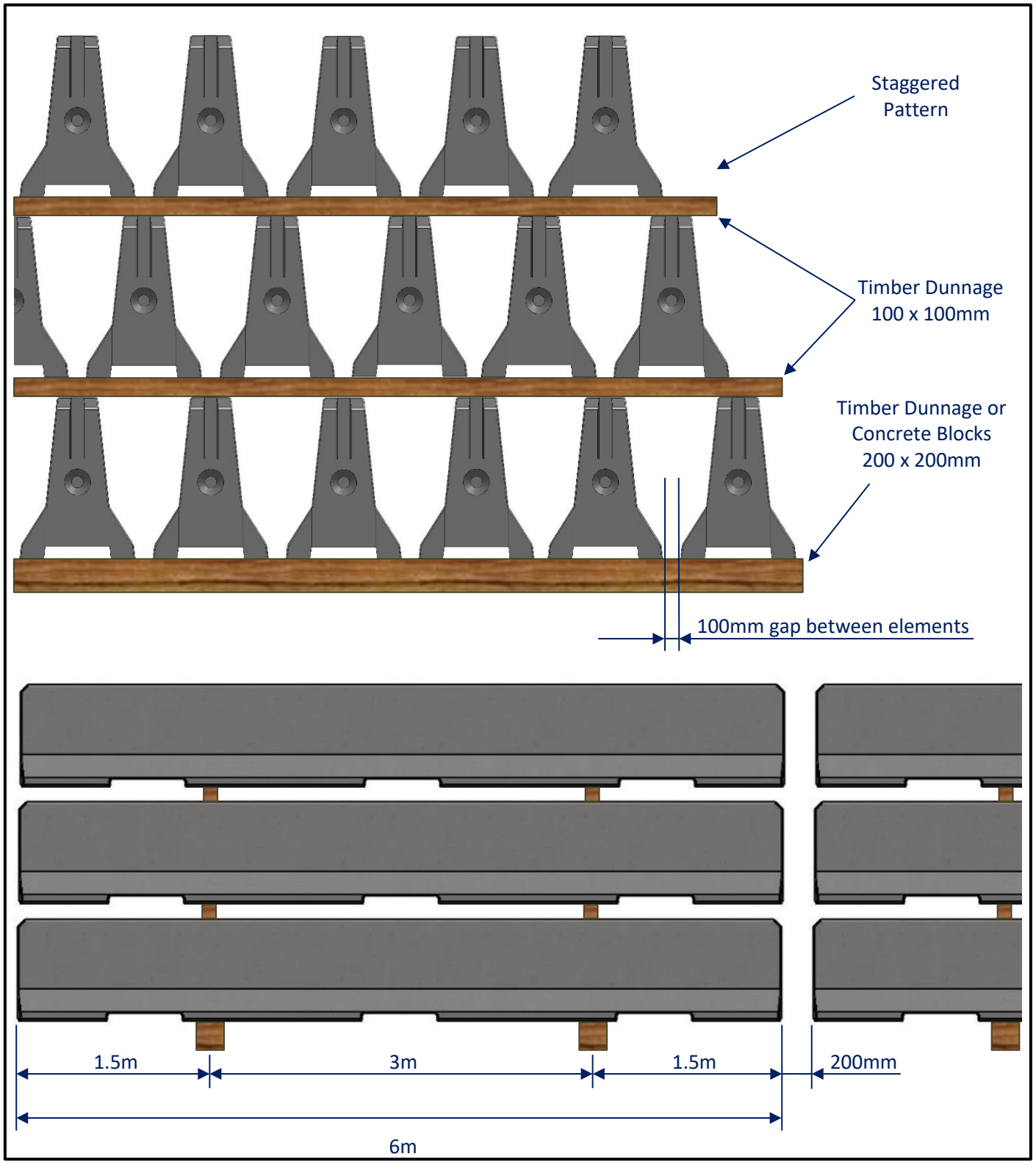


Figure 13: Storage of DB80 K150 Elements

Figure 14: Stacking of DB80 K150 Elements

The floor space required for the storage of DB80 K150 is shown in Table 5.

Table 5: DB80 K150 Floor Space Requirements

Element Length	Floor Space Required 3 rows wide x 3 units high
2 m	4.5 m^2
4 m	8.5 m^2
6 m	13 m^2

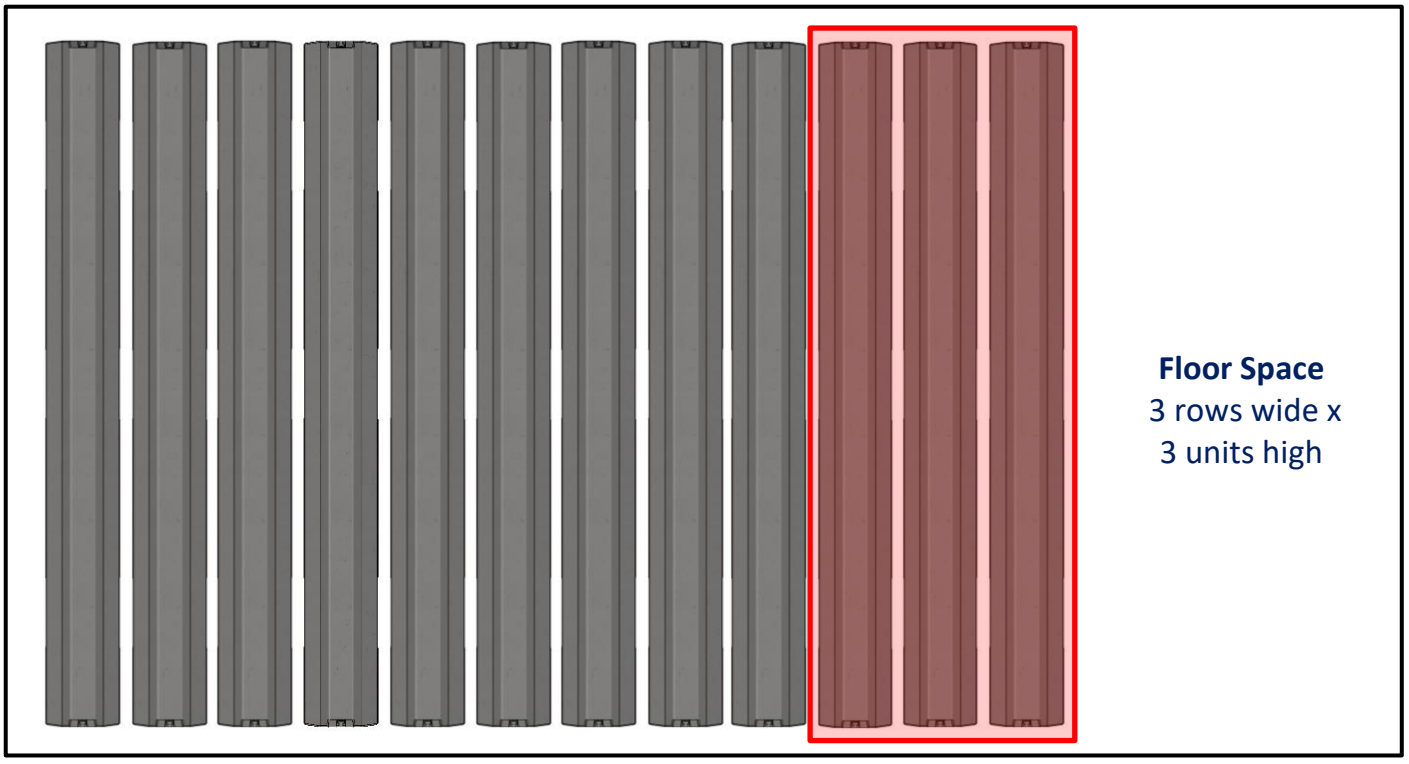


Figure 15: DB80 K150 Floor Space

7.0 Site Preparation

DB80 K150 is a freestanding barrier system that is placed directly onto the ground surface. The ground surface must be firm and free from debris that may impede the safe function of the system. The cross slope of the ground surface should be less than 10%.

7.1 Tools Required

Tools required for the installation of DB80 K150 include:

- Swift lifting clutch.
- Lifting chains or slings, minimum 3m length.
- Cranage.
- Tape measure.
- Marker pen.

7.2 Recommended PPE

It is recommended that the following personal protective equipment (PPE) be provided for the safe installation of DB80 K150:

- Safety footwear.
- Gloves.
- High visibility clothing.
- Hard hat.
- Safety eyewear.

7.3 Traffic Control

Prior to the commencement of any work, the site should be evaluated for risks to workers, pedestrians and other road users. The establishment of traffic control should provide safe travel for passing vehicles and/or pedestrians and appropriately protect workers near the roadside.

7.4 Overhead Obstructions

The site should be evaluated for potential overhead obstructions that may present a risk during the installation process. These obstructions typically include power lines, signage or trees.

7.5 Unloading Exclusion Zone

It is recommended that an exclusion zone be maintained around the unloading process. This provides distance between moving machinery and workers in the event that goods or the machinery move unexpectedly. Unloading and the storing of the product on a level surface is recommended.

8.0 Installation Sequence

It is recommended that a string line be used to establish the alignment of the barrier. When establishing the barrier location, take care noting the following:

- The clearance behind the barrier should be sufficient to accommodate the expected deflection of the system.
- The exposed ends of the barrier should be shielded with an approved crash cushion.
- The attachment of non-gating crash cushions will require transition elements as described in Section 4.0.
- All concrete elements must be inspected for damage prior to deployment.
- The foundation pavement should be inspected for unevenness and appropriately levelled.
- Lifting of all elements must follow the guidelines of Section 6.0.

The recommended installation sequence is as follows:

1. Lift the 1st element and position on the roadway as required.
2. Lift the 2nd element and suspend approximately 100mm above the 1st element. Insert the coupler into the second element and then fully lower, ensuring the coupler fully engages the first element.
3. Ensure the height difference between elements does not exceed 10mm. Use packers under the base area of the lower barrier if required.
4. The gap between elements should not exceed 14mm.
5. Repeat for subsequent elements.

Figure 16: Insertion of Coupler

Figure 17: Coupler Assembly

Figure 18: Inspection of Height Alignment

8.1 Butt Joint Inserts

The use of butt joint inserts is optional. They are designed to minimise localised damage at the connection between elements during a high energy vehicle impact. The installation of the butt joint inserts is undertaken once the coupler has been secured.

1. Take the first butt joint insert and attach the elastomer strap.

2. Using a wire hook, pull the elastomer strap through the void between the two (2) elements and secure the 2nd butt joint insert.

3. Position the butt joint inserts ensuring they do not protrude beyond the edge of each element.

4. Repeat these procedures for subsequent elements.

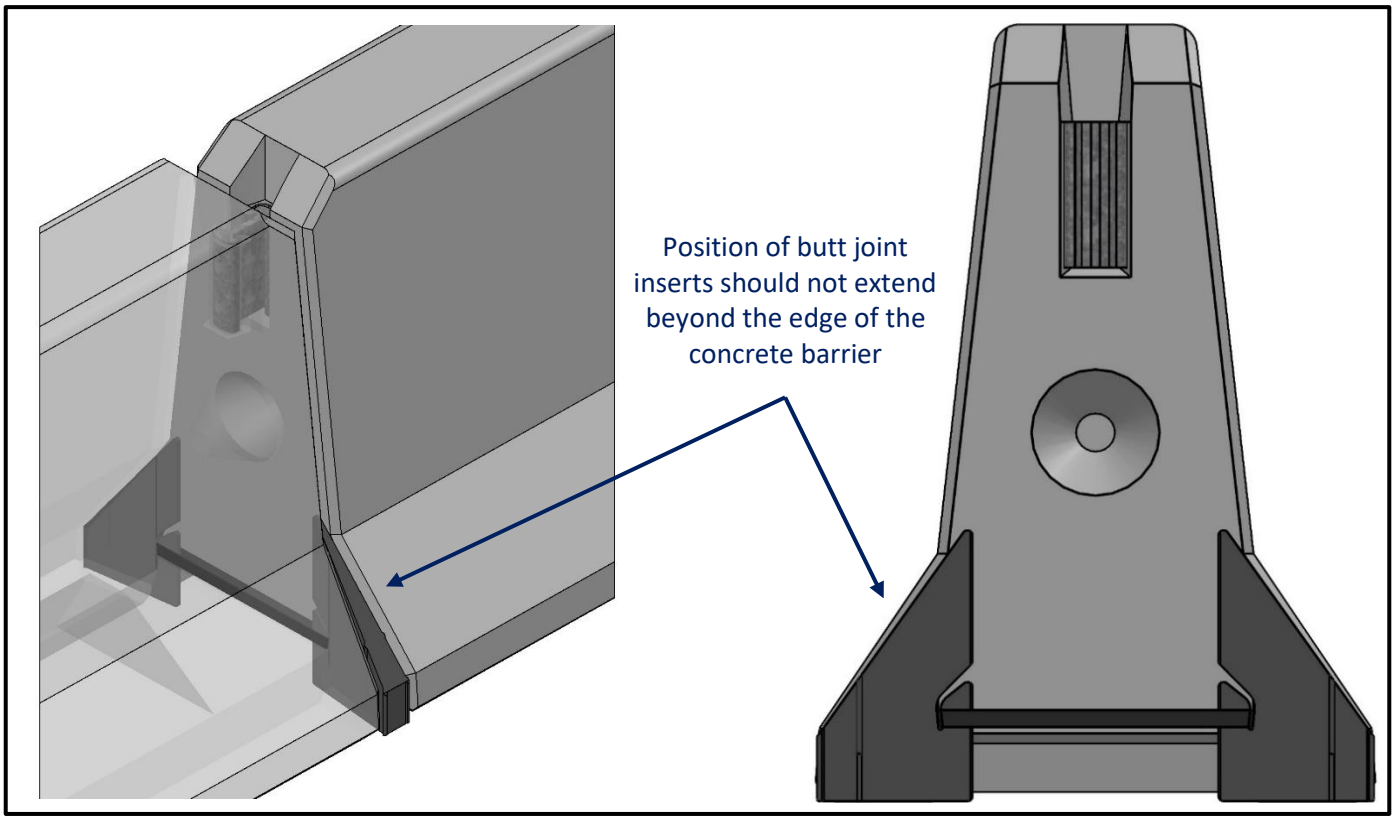


Figure 19: Positioning of Butt Joint Inserts (optional)

DB80 K150 Inspection Form

Inspection Date	
Client	
Project Reference	
Name of Inspector	
Company	

❑ Yes ❑ No	The cross slope of the ground surface is less than 10%.
❑ Yes ❑ No	The area adjacent to the barrier is free of debris.
❑ Yes ❑ No	Each concrete element has been inspected for damage.
❑ Yes ❑ No	The barrier has been correctly aligned with the roadway.
❑ Yes ❑ No	The connecting coupler has been correctly inserted into each element.
❑ Yes ❑ No	The height difference between connecting elements does not exceed 10mm.
❑ Yes ❑ No	The gap between elements does not exceed 14mm.
❑ Yes ❑ No ❑ n/a	The butt joint inserts have been correctly inserted at each join between elements.
❑ Yes ❑ No ❑ n/a	The butt joint inserts do not protrude beyond the edge of the barrier.
❑ Yes ❑ No	A crash cushion is secured to the leading end of the system.
❑ Yes ❑ No	A crash cushion is secured to the trailing end of the system when exposed to opposing traffic.
❑ Yes ❑ No	If the crash cushions are non-gating, transition elements featuring anchor plates and are secured to the pavement as per Jaybro drawings.
❑ Yes ❑ No	Crash cushions have been installed as per manufacturers guidelines.
❑ Yes ❑ No	The barrier system is appropriately delineated.

Comments/Notes

9.0 Maintenance

Walk-up inspections are recommended (with appropriate traffic control) to inspect the following:

- There are no impacts that have caused damage to the system.
- All units are secured with the couplers.
- The butt joint inserts (if installed) are correctly fitted and do not protrude beyond the edge of the barrier.
- The drainage channels at the base of each element are free from debris and obstructions.
- The alignment of the DB80 K150 barrier follows the roadway.
- The area adjacent to the DB80 K150 barrier is free of debris.
- There are no missing elements.
- The ends of the barrier are appropriately shielded with crash cushions.

10.0 Dismantling & Relocation

The dismantling of DB80 K150 follows the installation sequence in reverse. Prior to dismantling the DB80 K150 barrier it is recommended that appropriate traffic control has been established, and the area has been inspected for overhead obstructions. Each barrier element should be inspected for damage prior to lifting. Damaged elements should be assessed as per the guidelines of Section 12.0.

- The elements should be lifted as described in Section 6.0.
- As the elements are lifted, remove the coupler connecting each element.
- If the system features non-gating crash cushions, the anchor plates securing the transition DB80 K150 elements should be disconnected from the pavement prior to lifting.
- Crash cushions must be disconnected from the DB80 K150 barrier prior to lifting.

11.0 Disposal

The local manufacture of DB80 K150 does not include any polluting materials or toxic substances. Concrete elements that cannot be repaired may be recycled.

12.0 Damage Assessment

Damage to a temporary concrete barrier must be suitably assessed to ensure vehicle impact performance is not compromised. Industry guidelines[1] recommended for the evaluation of DB80 K150 are documented in Table 6.

The damage assessment, actions required and repair methods for DB80 K150 elements are identical for units manufactured with standard concrete, ECO-friendly concrete or Zero Debris Concrete.

12.1 Cracks

Cracks in concrete are complete or incomplete separation of the material into two or more parts through breaking or fracturing. Cracking may be caused by mishandling during stacking, lifting, and loading.

Hairline cracks are defined as having a crack width of less than 0.08 mm, which is barely perceptible to the naked eye. These cracks usually develop due to plastic shrinkage of the concrete. These cracks are shallow and unopened and offer very little room to repair, with a low viscosity liquid being the only possible method of repair. These cracks do not affect the structural integrity of the concrete barrier. Therefore, a concrete barrier exhibiting only multiple hairline cracks is acceptable for further use.

Cracks assessed as acceptable can be repaired using a pressure-injected epoxy, gravity-fed sealant, and surface sealant. Injecting epoxy resin is the best technique for filling cracks on a vertical surface such as a barrier face. Injection of epoxy resin can seal cracks as fine as 0.05 mm in width. Using an epoxy resin of low viscosity enables the resin to penetrate the full depth of the crack at working pressure.

In situations where the crack width is deep enough to expose reinforcement, further inspection is required. If superficial corrosion of the reinforcement is present, then the barrier is acceptable with repair, given that the sealing should be able to halt the corrosion process. Superficial corrosion is surface corrosion that is confined to the surface of the metal and exhibits no cracks within the reinforcement.

However, if the corrosion has propagated further inside the surface and the reinforcement is either cracked or has undergone metal loss, then the concrete element is not considered suitable for repair and the barrier should be discarded.

Figure 20: Acceptable Hairline Cracks

Figure 21: Unacceptable Vertical Cracking

[1] Development of Guidelines for Inspection, Repair, and Use of Portable Concrete Barriers—Volume 1: Technical Report 0-7059-R1-Vol1, Texas A&M Institute

12.2 Spalling

Spalling is defined as the flaking or peeling away of concrete from the main body, which may result in fractured, compromised concrete or exposure of reinforcement. Concrete spalling may be located near the barrier segment end connection, along the bottom longitudinal edge of the barrier or near the drainage voids.

A concrete element is considered acceptable regardless of the number and location of concrete spalls present on the barrier provided that the spalling does not cause exposure of reinforcement.

If concrete spalling results in the exposure of barrier reinforcement, then further inspection is needed to determine whether the exposed reinforcement has signs of corrosion and whether such corrosion is superficial or has already caused obvious loss of the rebar cross-section.

Superficial corrosion is surface corrosion that is confined to the surface of the metal and exhibits the absence of cracks or significant section loss. If the corrosion has propagated further inside the surface and the reinforcement is either cracked or has undergone significant metal loss, the concrete element is not considered suitable for repair and the barrier should be discarded.

If a spall exposes rebar but the exposed rebar has no corrosion present or the corrosion is superficial, the concrete element is considered acceptable for repair.

If there is a section of concrete that is damaged but still attached to the barrier, the soundness of the concrete should be assessed. Unsound concrete is defined as a partial hanging of a concrete portion that is susceptible to break off if further impacted. Unsound concrete can be caused by various factors, such as visible cracks, micro-cracks, spalling, and delamination on the surface of the barrier. The following methods exist to determine whether a damaged section of concrete is unsound:

1. Tap the damaged area under consideration with a hammer. If the hammer bounces back, the concrete is sound and has the required compressive strength. However, if the hammer lands with a thud with little or no rebound or a portion of the concrete pulverises and falls off, then the concrete is considered unsound.

2. Drag a screwdriver on the damaged surface under consideration. If the scratching results in a white line or streak, then the concrete is sound. If the scratching results in formation of powder, then the concrete is unsound.

Any detected unsound concrete should be removed. After removal, the underlying section can be further evaluated for acceptability based on concrete spalling criteria.

Repairs to spalling includes cleaning any superficially corroded rebar and patching the spalled concrete that exposed the reinforcement using new concrete with a bonding agent applied to the exposed surface:

1. Clean the surface of the damaged area that needs repair by removing any loose material such as dirt, oil, grease, and unsound or flaking concrete.

2. Scrub and clean the surface of the area to be repaired with a stiff bristle brush.

3. Thoroughly rinse the repair area after cleaning.

4. Achieve the desired consistency of the repair mixture and apply to the dampened damaged area.

5. Level and match the rectifying layer with the surrounding concrete.

Figure 22: Spalling Exposing Rebar

Figure 23: Spalling with no Exposure of Rebar

12.3 Barrier Connection

The connection area between DB80 K150 elements Is known as the Y profile and may be damaged by mishandling during stacking, lifting, and loading. Repairs to the Y profile may be undertaken using the same method recommended for repair to spalling.

The patented DeltaBloc® K-coupling system is used to connect internal tension bars which provides a continuous connection throughout the barrier system and resists the lateral forces of a vehicle impact. Any damage that exposes the internal tension bars is not considered suitable for repair and the barrier should be discarded.

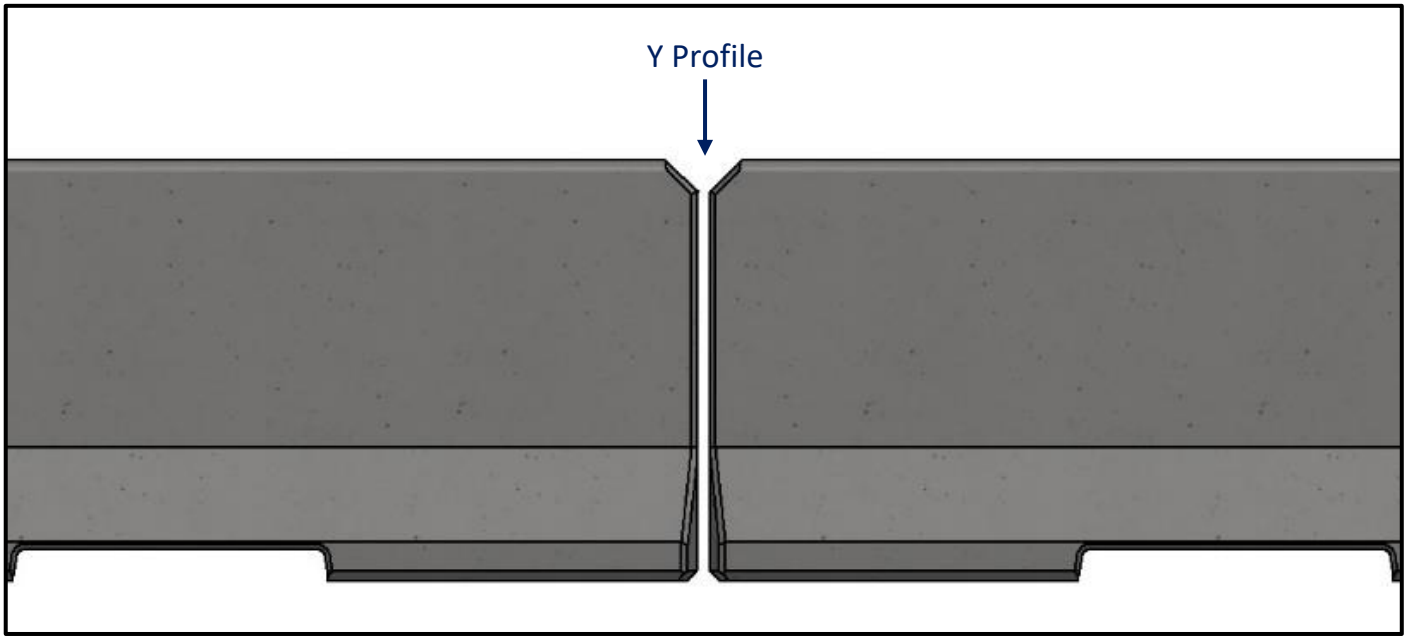


Figure 24: DB80 K150 Y Profile

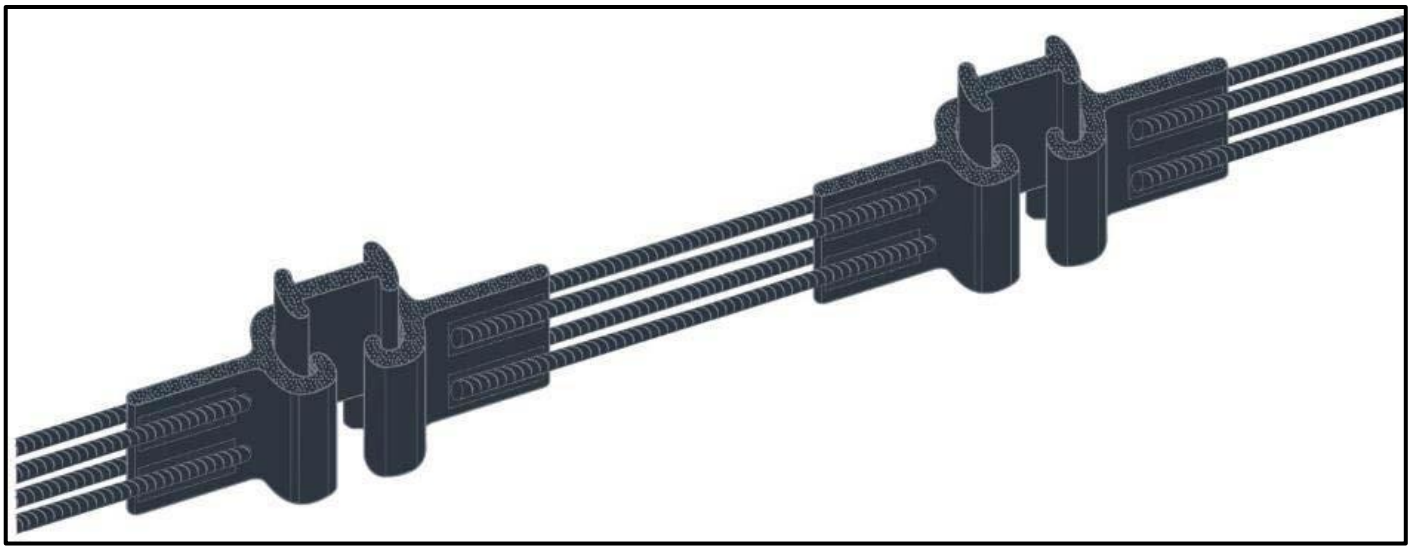


Figure 25: K-Coupling and Internal Tension Bar Arrangement

Figure 26: Damage to Y Profile

Figure 27: Repair of Y Profile

Figure 28: Exposure of Tension Bars

Table 6: DB80 K150 Damage Assessment

Type of Damage	Description of the Damage	Action
Vehicle Contact	Scuff marks.	The element may be used.
Cracking	Hairline cracking.	The element may be used.
	The element has one (1) crack with a width dimension that does not exceed 6mm.	The element may be used following repair.
	The element has one (1) crack with a width dimension that exceeds 6mm.	The element cannot be repaired and must be replaced.
	The element has multiple cracks whose summed width dimensions do not exceed 6mm within a 300mm longitudinal range.	The element may be used following repair.
	The element has multiple cracks whose summed width dimensions exceed 6mm within a 300mm longitudinal range.	The element cannot be repaired and must be replaced.
	Superficial corrosion of the rebar is present.	The element may be used following repair.
	The rebar is either cracked or has undergone metal loss.	The element cannot be repaired and must be replaced.
Spalling	The concrete is unsound.	The unsound concrete must be removed.
	A spall exposes rebar but the exposed rebar has no corrosion present or the corrosion is superficial.	The element may be used following repair.
	A spall exposes rebar and corrosion has propagated further inside the surface and the reinforcement is either cracked or has undergone significant metal loss.	The element cannot be repaired and must be replaced.
Barrier Coupling	The steel coupler is bent or twisted.	The coupler must be replaced.
	Damage to the Y profile at the edge of the barrier element.	The element may be used following repair.
	The tension bar is exposed.	The element cannot be repaired and must be replaced.

DELTABLOC®

Jaybro
CONSIDER IT DONE.