RhinoStop®

Car Park & Industrial Crash Barriers

SafeDirection
CRASH BARRIER SOLUTIONS

safedirection.com.au

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Version	Date	Revisions
10	February 2026	Updates to Crash Test Evaluations

Leading Safety

Compliance to AS/NZS 1170.1 Structural Design Actions (Clause 3.8)

Full scale crash tested to validate performance

Impact conditions designed to exceed those nominated by the Standard

Passenger car impacts performed with a 2000 kg dual cab utility

Crash testing performed on the edge of a 150 mm thick elevate concrete slab

Available with pedestrian fall protection

Energy Absorbing

Yielding base plate reduces the potential for damage to the concrete slab

Controlled absorption of vehicle impact energy

Lower anchor bolt forces

Architectural Solutions

Aesthetic design options

High cross flow ventilation

Fast Assembly

Fully modular systems

Fewer anchor bolts per post

Durable

Galvanised components

Local Support

Designed by Safe Direction for Australian and New Zealand Standards

1.0 Introduction

Car park barriers are a specific range of safety barrier systems designed for the protection of people, buildings, plant and equipment. Their design and function are specific to vehicle movements encountered in a car park or warehouse/industrial environment.

Designers of car park and industrial barriers should consider the following:

- The barriers should be capable of withstanding impact loads in accordance with relevant Australian standards and building codes.
- Impacts are likely to be perpendicular to the barrier i.e. 90 degrees.
- Pedestrian walkways or thoroughfares adjacent to the barrier.
- Channelling of people or restriction of access.
- Falls or a drop to a lower level behind the barrier.
- Available space for a barrier system.
- Impact damage should be confined to the barrier system and not the car park structure.

The Australian-designed range of RhinoStop® crash barriers has been developed specifically for car park, warehouse and industrial applications. The yielding behaviour of the RhinoStop® baseplate absorbs vehicle impact energy, reducing the peak loads transferred to the anchor bolts. The deflection of the system allows for greater load transfer to the adjacent posts, sharing the impact load from the vehicle.

Featuring all-steel designs, RhinoStop® is recognised as the industry leader in modular safety barrier systems and is regularly specified for installation in multi-story car parks, manufacturing facilities, logistics warehouses and other areas that require to withstand a vehicle collision.

For multi-storey car park barrier applications, RhinoStop® has been crash tested when installed along the edge of a 150 mm thick elevated slab, demonstrating safe vehicle containment while preventing damage to the slab. RhinoStop® guard railing can also be configured to provide pedestrian fall protection, providing an economical solution and a narrow footprint.

In warehouse and industrial applications, RhinoStop® products create a safer work environment by separating pedestrians, machinery, heavy vehicles and forklifts. W-beam guardrails may be powder coated yellow, enhancing visibility to shield pallet racking, delineate pathways or protect valuable plant and equipment. RhinoStop® may be configured with a single or double height w-beam guardrail providing a tailored design dependant on specific site requirements.

2.0 How RhinoStop® Works

RhinoStop® posts are significantly stronger than similarly sized and anchored rigid posts. All RhinoStop® barriers incorporate a unique patented yielding base plate that minimises the peak loads transferred to the anchor bolts.

The defining feature of the RhinoStop® posts are the long cuts in the base plate breaking the plate into three fingers connected by a common stem. Upon impact from a vehicle, a plastic hinge will form as the post begins to rotate backwards. This deformation serves two primary functions:

1. The load capacity of the plastic hinge is designed to be less than the pull-out capacity of the anchor bolt, and

2. The deflection of the system allows for greater load transfer to adjacent posts thereby sharing the impact load from the vehicle.

Figure 1: Yielding behaviour of the RhinoStop® baseplate.

3.0 Risk of Rigid Post Systems

The vulnerability of rigid post systems is the high peak load transferred to the anchors upon vehicle impact. This can cause anchor failure, resulting in damage to the concrete substrate. Damage to the concrete substrate is difficult to repair and may compromise the structural integrity of the car park structure.

Figure 2: Impact behaviour of rigid post systems.

4.0 Standards & Guidelines

4.1 AS/NZS 2890.1 Parking Facilities

AS/NZS 2890.1 sets out the minimum requirements for the design and layout for off-street parking facilities, including multi-storey car parks.

Barriers shall be constructed to prevent vehicles from running over the edge of a raised platform or deck of a multi-storey car park including the perimeter of all decks above ground level. They are required wherever the drop from the edge of the deck to a lower level exceeds 600 mm.

AS/NZS 2890.1 states that barriers shall comply with the following requirements:

a) They shall be designed structurally for the loading requirements of AS/NZS 1170.1,

b) If at the end of a parking space, they shall be at least 1.3 m high so that drivers backing into the space can see the barrier above the rear of the vehicle, and

c) They shall not be made from brickwork, unreinforced concrete or other materials likely to shatter on impact.

4.2 Building Code of Australia

A 1 m high continuous barrier (balustrade) must be provided along the side of a floor if the trafficable surface is 1 m or more above the surface beneath.

Openings in the barrier must not allow a 125 mm sphere to pass through any opening.

If the drop to a lower level exceeds 4 m, any horizontal elements between 150 mm and 760 mm above the floor must not facilitate climbing.

The barrier must be of strength and rigidity to withstand the foreseeable impact of people and where appropriate, the static pressure of people pressing against it.

4.3 AS/NZS 1170.1 Structural Design Actions, Part 1 (Clause 3.8)

The horizontal imposed action on barriers required to withstand the accidental impact from vehicles during parking shall be taken as follows:

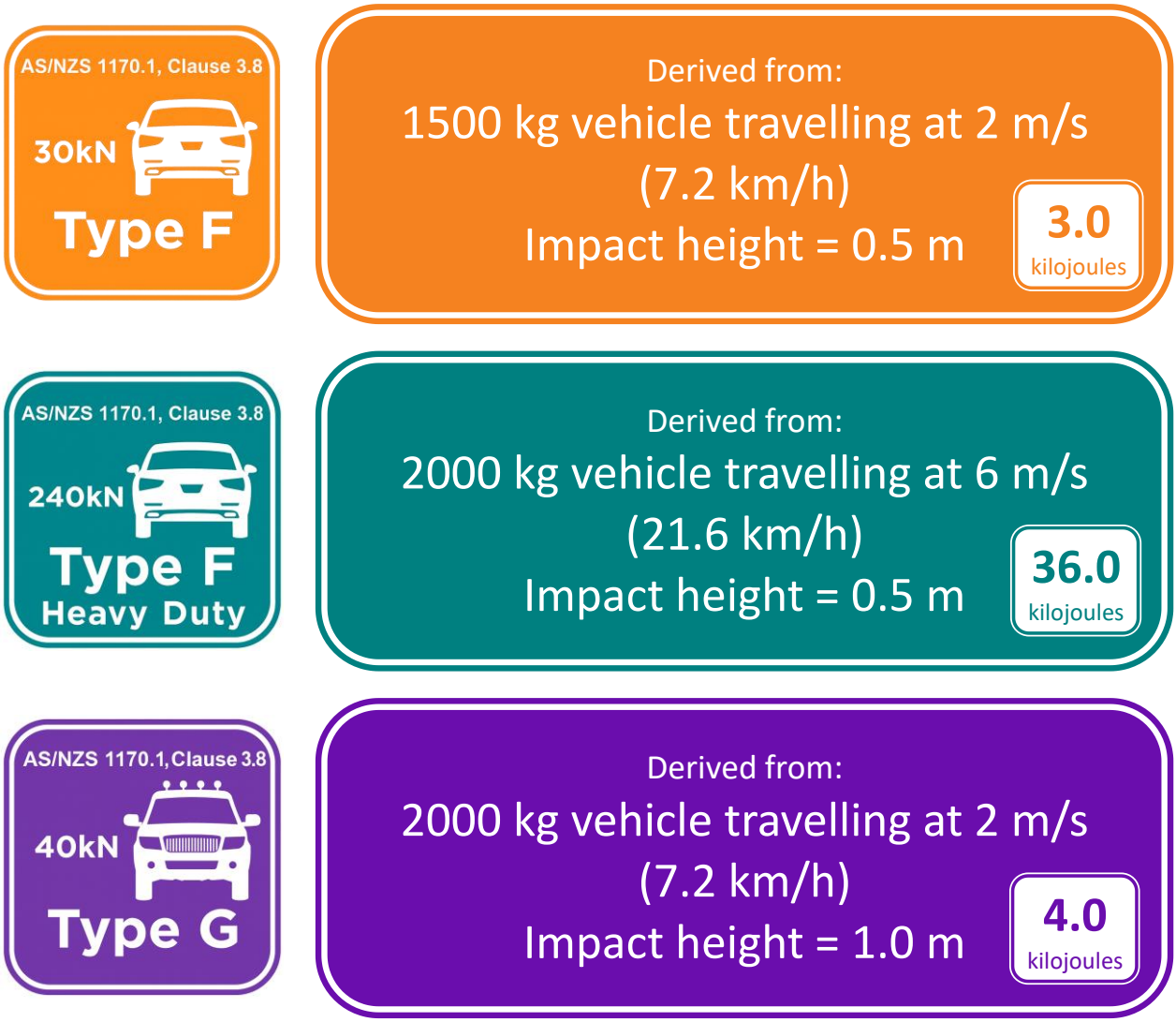
a) For light traffic areas (Type F)

   i. Barriers – 30 kN

   ii. Barriers at the end of straight ramps exceeding 20 m in length and intended for downward travel – 240 kN

b) For barriers in medium traffic areas (Type G) – 40 kN

The impact force shall be distributed over a 1.5 m length at any position along the barrier and shall be assumed to act 0.5 m above floor level for light traffic areas and at 1.0 m for medium traffic areas.



5.0 RhinoStop® Crash Test Evaluation

The Type F (30 kN) impact load nominated in AS/NZS 1170.1 is derived from 1500 kg vehicle travelling at just 2 m/s (7.2 km/h).

This impact condition does not adequately represent a real-life impact scenario since the current Australian vehicle fleet largely comprises heavy passenger vehicles with high acceleration capabilities.

The underlying philosophy when undertaking full-scale crash testing should be 'worst practical conditions.' When selecting the test parameters, such as the test vehicle, impact speed and barrier configuration, every effort should be made to assess the worst, or most critical, conditions.

The average weight of new passenger vehicles sold in Australia is approximately 2000 kg as the vehicle fleet continues to shift towards high centre-of-gravity vehicles. Therefore, each RhinoStop® system has been full-scale crash tested with a 2000 kg dual-cab utility vehicle at up to twice the speed nominated by the Standard.

In addition, each RhinoStop® barrier has been evaluated when positioned on the edge of a 150 mm elevated concrete slab representing a multi-storey car park installation. Furthermore, our short RhinoStop® test article lengths place higher loads on the supporting posts and adequately evaluate the capacity of the anchor fixings.

Safe Direction's crash test evaluation allows designers to select a RhinoStop® barrier specific to the car park vehicle type and likely impact speed. In all performed RhinoStop® impacts there was no damage to the anchors or the 150 mm thick elevated concrete slab.

Figure 3: 2000 kg vehicle impacts performed on the edge of a 150 mm thick elevated concrete slab.

6.0 RhinoStop® Standard

RhinoStop® Standard combines the strength of w-beam guardrail with energy absorbing posts. The yielding behaviour of the RhinoStop® baseplate absorbs vehicle impact energy, reducing the peak loads transferred to the anchor bolts and preventing damage to the concrete slab.

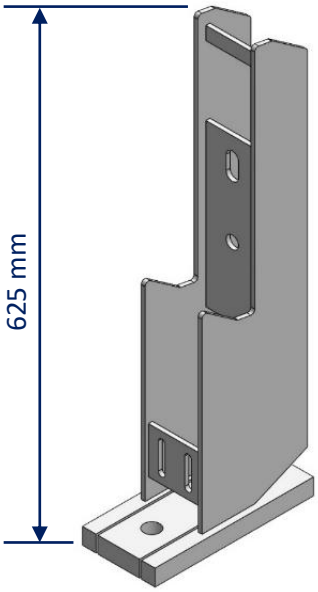
6.1 Crash Test Performance

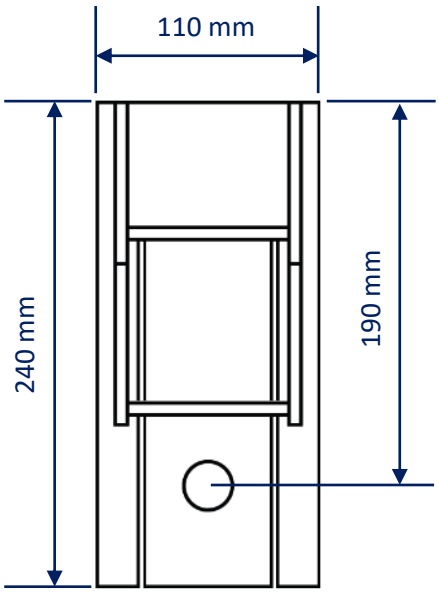
Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
4 m w-beam supported by three (3) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		1500 kilograms	15 km/h	0.5m	12.9 kilojoules
6 m w-beam supported by four (4) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	13 km/h	0.5m	13.0 kilojoules

6.2 Installation Requirements

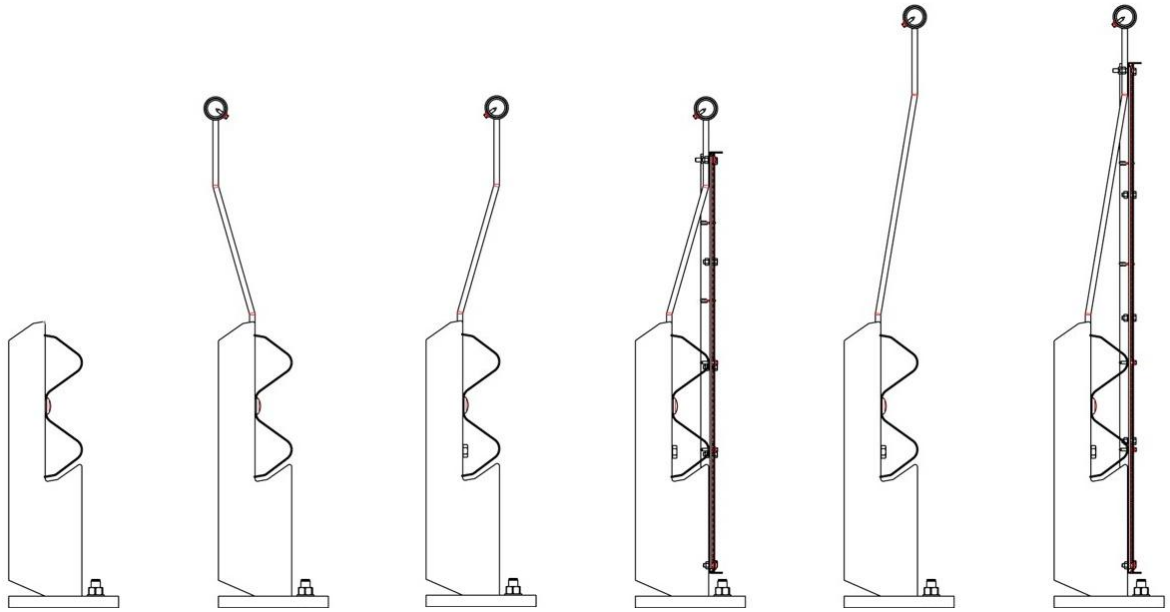
Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	1 off	150 mm

6.3 Post & Baseplate Detail





6.4 Installation Variants



Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Guardrail only 610 mm high	Guardrail with offside handrail 1100 mm high	Guardrail with nearside handrail 1100 mm high	Guardrail with handrail & mesh 1100 mm high	Guardrail with sight rail 1300 mm high	Guardrail with sight rail & mesh 1300 mm high

7.0 RhinoStop® SkyEdge

The unique design of RhinoStop® SkyEdge positions the crash barrier on the outer edge of the car park deck. The alignment of the w-beam guardrail with the edge of the deck ensures the barrier does not encroach into valuable space allocated for car parking. RhinoStop® SkyEdge has become the preferred solution for upgrading existing car parks that have limited floor space and cannot accommodate the additional width of a safety barrier system.

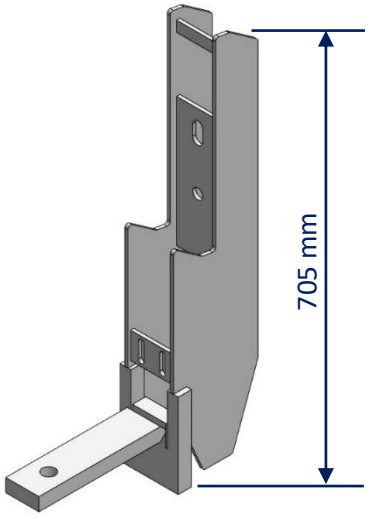
7.1 Crash Test Performance

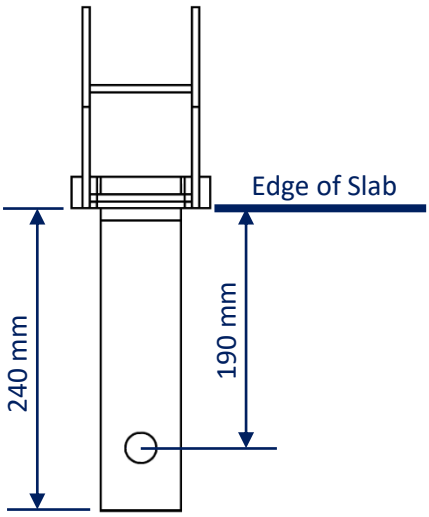
Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
4 m w-beam supported by three (3) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		1500 kilograms	15 km/h	0.5m	12.9 kilojoules
6 m w-beam supported by four (4) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	12 km/h	0.5m	11.7 kilojoules

7.2 Installation Requirements

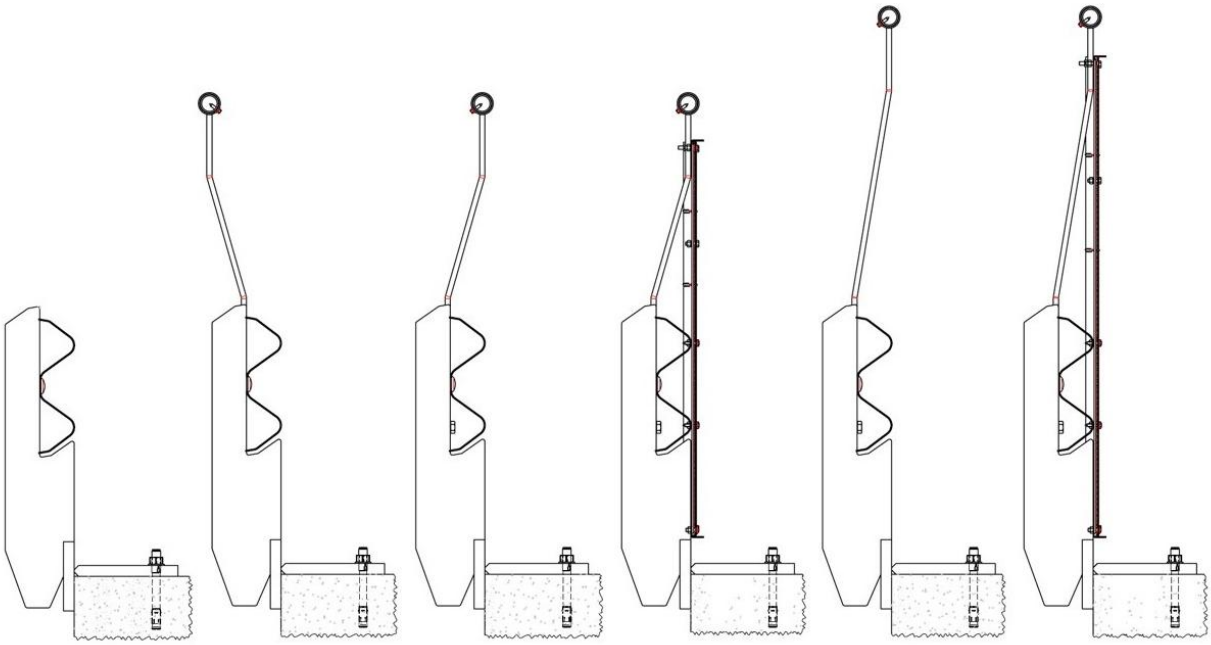
Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	1 off	150 mm

7.3 Post & Baseplate Detail





7.4 Installation Variants



Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Guardrail only 610 mm high	Guardrail with offside handrail 1100 mm high	Guardrail with nearside handrail 1100 mm high	Guardrail with handrail & mesh 1100 mm high	Guardrail with sight rail 1300 mm high	Guardrail with sight rail & mesh 1300 mm high

8.0 RhinoStop® Heavy Duty

RhinoStop® Heavy Duty is designed to withstand high speed impacts typically encountered at the ends of ramps and straight aisles in car parking areas. These areas are prone to vehicle speeds up to 30 km/h and therefore require a barrier system with increased capacity.

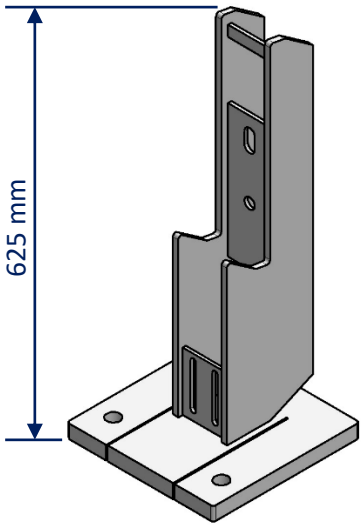
8.1 Crash Test Performance

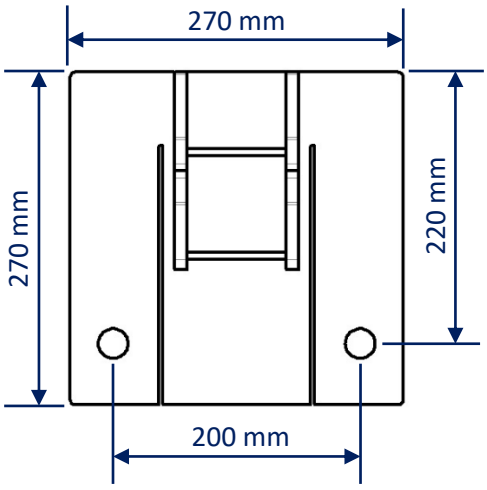
Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
4 m w-beam supported by six (6) posts at 0.8 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	30 km/h	0.5m	67.2 kilojoules
6 m w-beam supported by four (4) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	20 km/h	0.5m	29.6 kilojoules

8.2 Installation Requirements

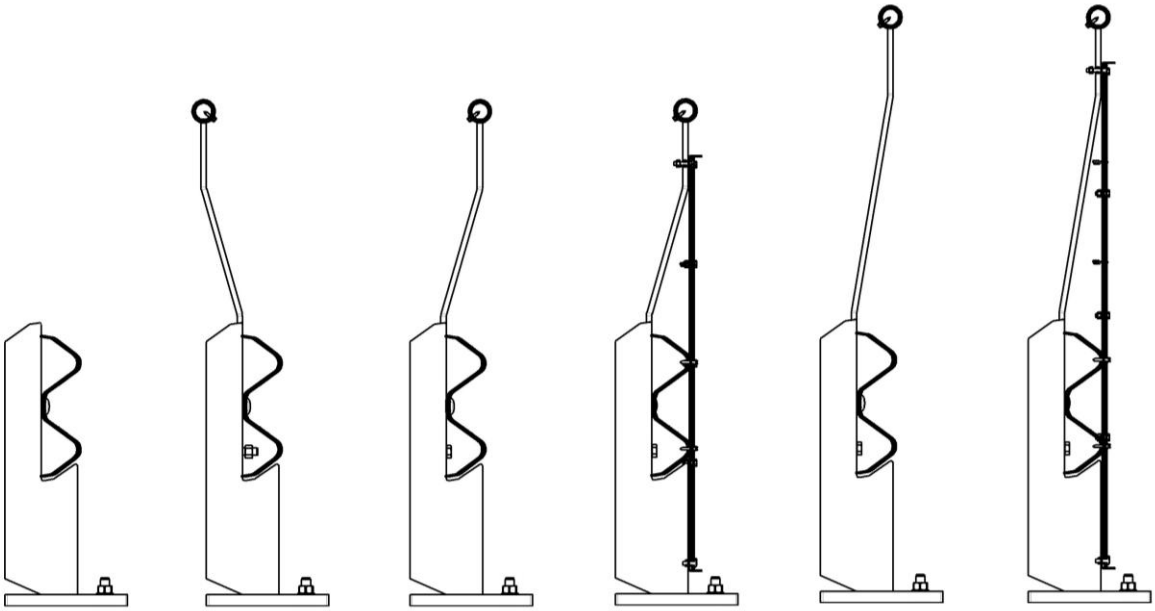
Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	2 off	150 mm

8.3 Post & Baseplate Detail





8.4 Installation Variants



Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Guardrail only 610 mm high	Guardrail with offside handrail 1100 mm high	Guardrail with nearside handrail 1100 mm high	Guardrail with handrail & mesh 1100 mm high	Guardrail with sight rail 1300 mm high	Guardrail with sight rail & mesh 1300 mm high

9.0 RhinoStop® TruckGuard

RhinoStop® TruckGuard features double height w-beam guardrails supported by heavy duty posts designed to withstand impacts from high-centre-of-gravity vehicles. The 1 m system height improves visibility for truck drivers and forklift operators making it the preferred barrier solution for loading docks, transport logistic warehouses and car parks frequented by heavy vehicles.

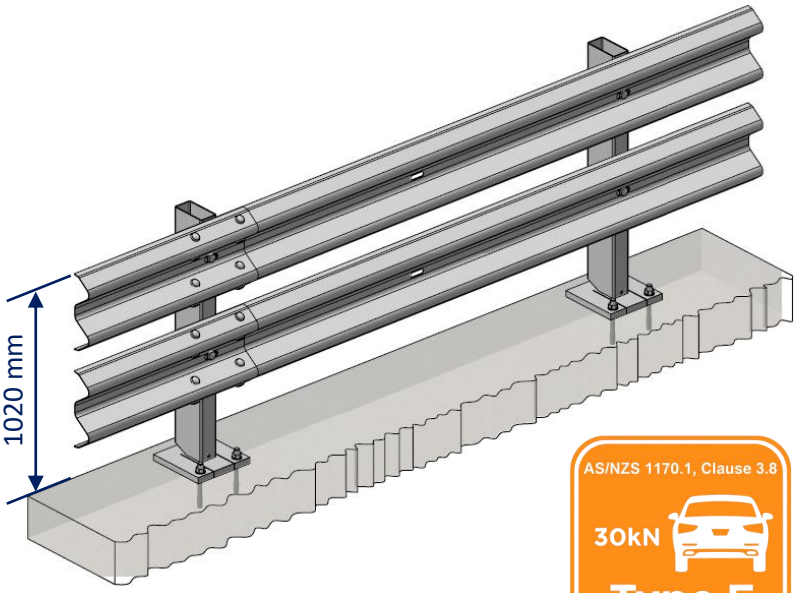
9.1 Crash Test Performance

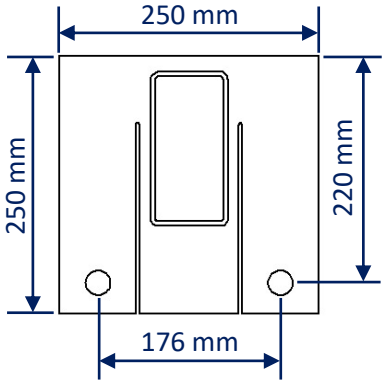
Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
4 m double-height w-beam supported by five (5) posts at 1.0 m centres secured to a 150 mm thick concrete slab.		2000 kilograms	24 km/h	0.5 m	46.2 kilojoules
6 m double-height w-beam supported by four (4) posts at 2.0 m centres secured to a 150 mm thick concrete slab.		2000 kilograms	27 km/h	0.5 m	57.4 kilojoules
8 m double-height w-beam supported by five (5) posts at 2.0 m centres secured to a concrete slab.		2500 kilograms	20 km/h	1.0 m	36.9 kilojoules

9.2 Installation Requirements

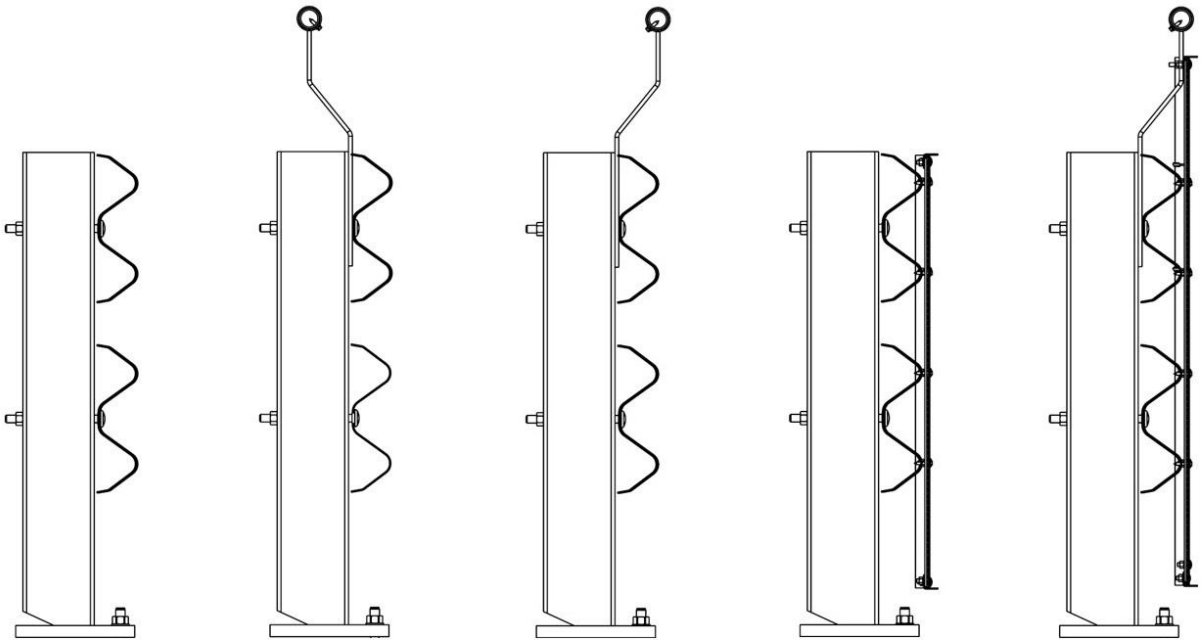
Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	2 off	150 mm

9.3 System & Baseplate Detail





9.4 Installation Variants



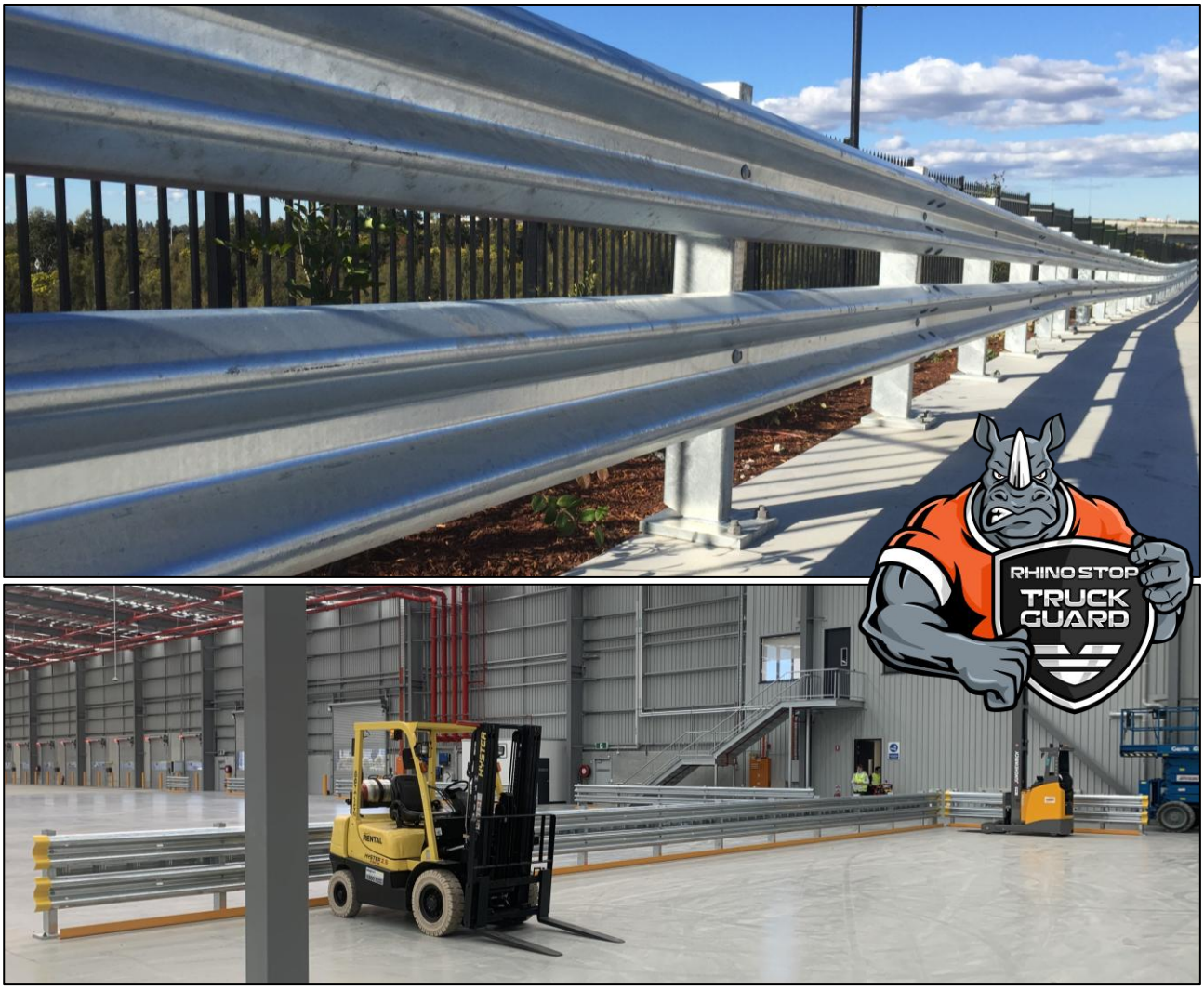
Type 1
Guardrail only
1020 mm high

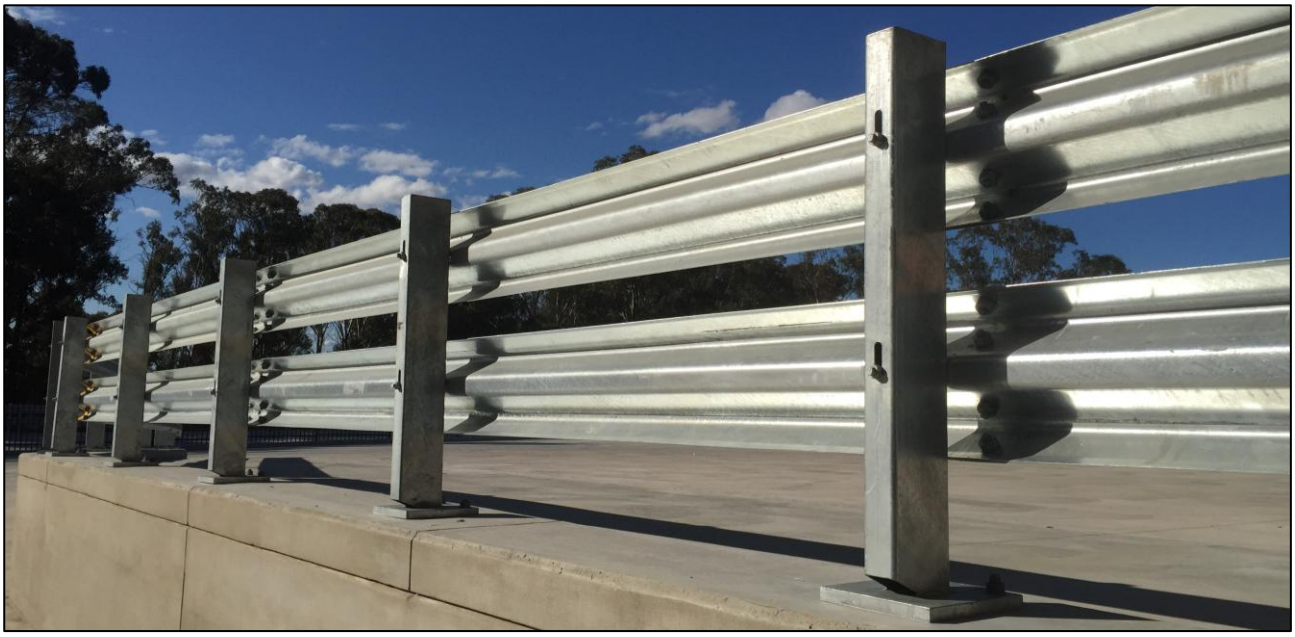
Type 2
Guardrail with
offside handrail
1300 mm high

Type 3
Guardrail with
nearside handrail
1300 mm high

Type 4
Guardrail with
mesh
1020 mm high

Type 5
Guardrail with
handrail & mesh
1300 mm high


RHINO STOP
TRUCK GUARD



10.0 RhinoStop® Elite

RhinoStop® Elite is the benchmark in modular car park safety barriers combining vehicle impact containment with pedestrian fall protection. The aesthetic design of RhinoStop® Elite provides high cross flow ventilation, permits natural light into the car park structure and may be powder coated providing architectural excellence.

The 1100 mm system height demonstrates containment of vehicles with varying bumper heights, an important design consideration for the Australian vehicle fleet and the growing ownership of high-centre-of-gravity SUV vehicles.

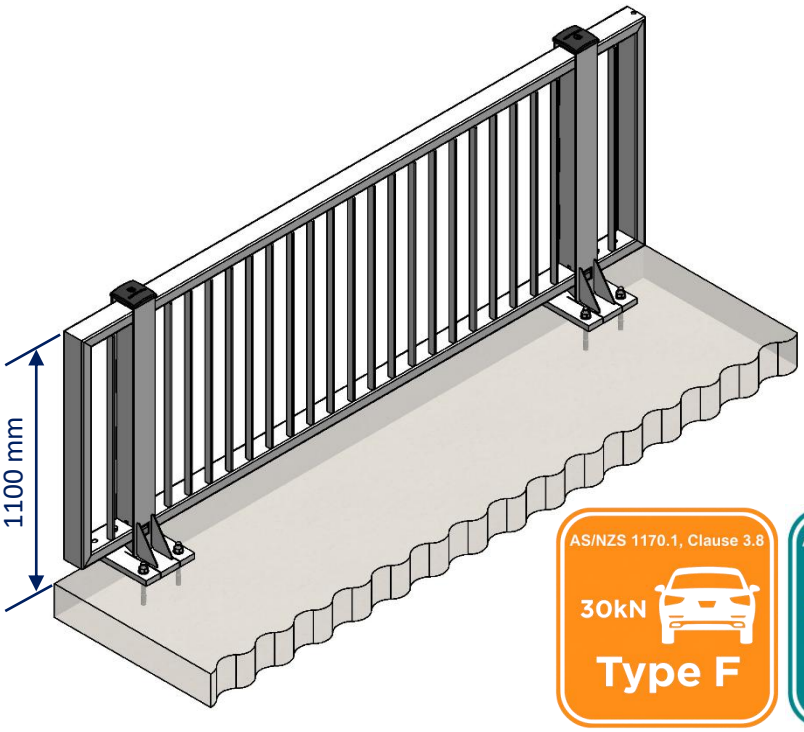
10.1 Crash Test Performance

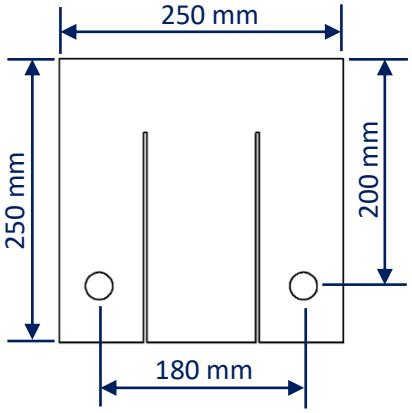
Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
One (1) panel supported by two (2) posts at 2.3 m centres positioned on the outside edge of a 150 mm thick elevated concrete slab.		1500 kilograms	15 km/h	0.5m	13.2 kilojoules
Three (3) panels supported by four (4) posts at 2.3 m centres positioned on the outside edge of a 150 mm thick elevated concrete slab.		2000 kilograms	22 km/h	0.5m	37.2 kilojoules
Two (2) panels supported by three (3) posts at 2.3 m centres positioned on the outside edge of a 150 mm thick elevated concrete slab.		2000 kilograms	20 km/h	1.0m	31.4 kilojoules

10.2 Installation Requirements

Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	2 off	150 mm

10.3 System & Baseplate Detail





11.0 RhinoStop® Screen

RhinoStop® Screen can be configured with mesh infill panels providing a system height of up to 2.5 m. The yielding behaviour of the RhinoStop® Screen baseplate absorbs vehicle impact energy, reducing the peak loads transferred to the anchor bolts. The deflection of the w-beam guardrail allows for greater load transfer to the adjacent posts, sharing the impact load from the vehicle.

RhinoStop® Screen is the preferred crash barrier solution on the upper deck of multi-storey car parks or in parking areas adjacent to critical infrastructure where anti-climb is required.

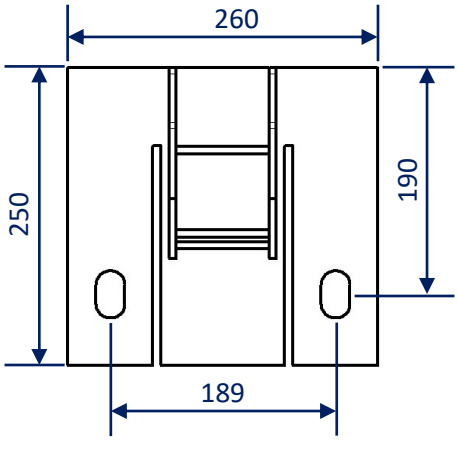
11.1 Crash Test Performance

Barrier Configuration	Vehicle Type	Vehicle Mass	Impact Speed	Impact Height	Impact Energy
6 m w-beam supported by four (4) posts at 2.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	16 km/h	0.5m	20.5 kilojoules
4 m w-beam supported by five (5) posts at 1.0 m centres positioned on the outside edge of a 150 mm elevated concrete slab.		2000 kilograms	23 km/h	0.5m	39.7 kilojoules

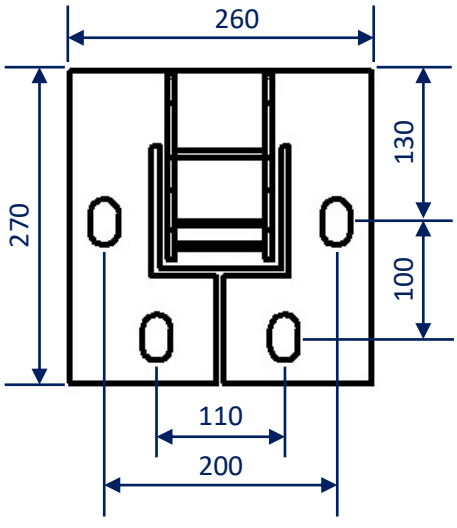
11.2 Installation Requirements

Anchor Type	Drill Depth	Torque	Anchors per Post	Minimum Concrete Slab Thickness
M20 Fischer FBN II	115 mm	200 Nm	2 off or 4 off	150 mm

11.3 Baseplate Detail



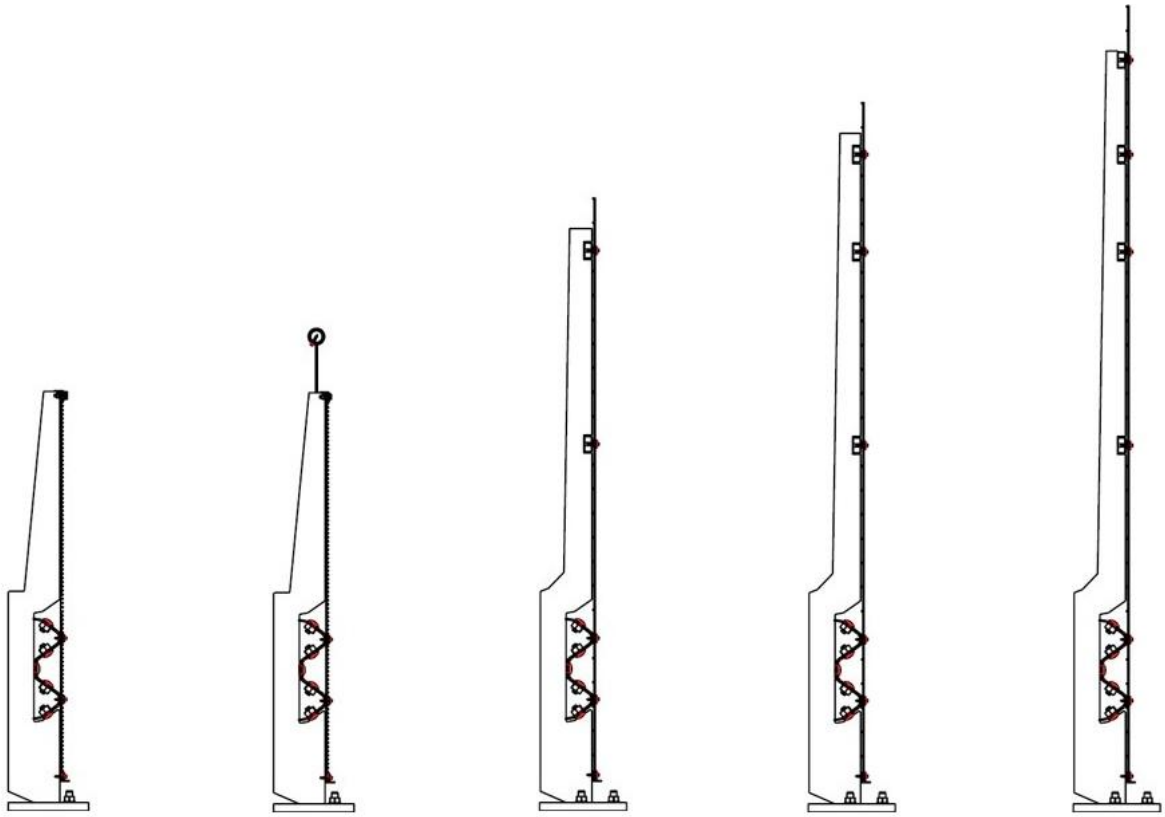
Type 1 and 2



(mm)

Type 3, 4 and 5

11.4 Installation Variants



Type 1
1300mm high

Type 2
1500mm high

Type 3
1900mm high

Type 4
2200mm high

Type 5
2500mm high

12.0 Installation

12.1 Tools Required

Tools required for the installation of RhinoStop® includes:

- Impact drill with 20 mm masonry bit,
- Rattle gun or wrench with 24 mm and 32 mm socket,
- Torque wrench (capacity up to 200 Nm),
- Drop saw,
- Driver, small socket set and step drill bit,
- Grinder with metal cutting disk,
- Hammer,
- 12 mm Pinch bar,
- Metal snips,
- String line,
- Tape measure, and
- Slings or chains.

12.2 Recommended PPE

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

- Safety footwear,
- Gloves,
- Hearing protection,
- High visibility clothing, and
- Sun protection (broad brimmed hat, sunscreen & tinted safety glasses).

12.3 Traffic Control

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

12.4 Below Ground Obstructions

The installation of the RhinoStop® requires drilling of holes into a concrete slab. Prior to the installation of posts an investigation for potential underground hazards such as post tensioned cables, rebar, service conduits or electrical cables should be undertaken. These hazards should be clearly identified prior to set-out of the barrier.

12.5 Unloading Exclusion Zone

Only appropriate load-rated slings and chains should be used for the safe unloading of product. 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 moves unexpectedly.

Unloading and the storing of the product on a level surface is recommended. Storing product adjacent to the installation area eliminates the requirement for workers to carry items over long distances.

12.6 Concrete Curing

When installing RhinoStop® barriers onto a recently poured concrete substrate, the concrete must be fully cured prior to the installation of the anchor bolts. Curing time can vary from site to site and is to be advised by the site construction manager.

12.7 Concrete Thickness

Crash testing of RhinoStop® barriers has been undertaken on a 150 mm thick, 32 MPa, reinforced, elevated concrete slab. Please contact Safe Direction when thinner slabs are encountered.

12.8 Set-Out

It is recommended that a string line be used to establish the alignment of the post locations. When establishing the post locations, take care to note the following:

- Locate and identify any below-ground obstructions,
- Post spacings are not to exceed the maximum (refer to Crash Test Performance of each RhinoStop® barrier),
- Each installation comprises the minimum number of posts (refer to Crash Test Performance of each RhinoStop® barrier),
- The back of the base plate must not extend beyond the edge of the concrete slab (not applicable to RhinoStop® SkyEdge), and
- If there is a fixed hazard behind the barrier, sufficient clearance behind the post is required to allow for the deflection of the system (contact Safe Direction for guidelines).

12.9 Anchor Installation

Please refer to specific RhinoStop® system types for guidelines on number of anchors required per post.

When applying torque to the Fischer FBN II galvanised anchor, the cone bolt is pulled into the expansion clip forcing is against the side walls of the drilled hole.

1. Using a 20 mm masonry drill bit (same diameter as the Fischer FBN II galvanised anchor), drill the anchor hole to the depth nominated for each RhinoStop® system.

2. Using compressed air or a pump, thoroughly clean the hole, removing all loose debris.

3. Position the nut and washer 3 mm below the top of the anchor and drive the anchor into the drilled hole to the full depth.

4. Torque the anchor as required.

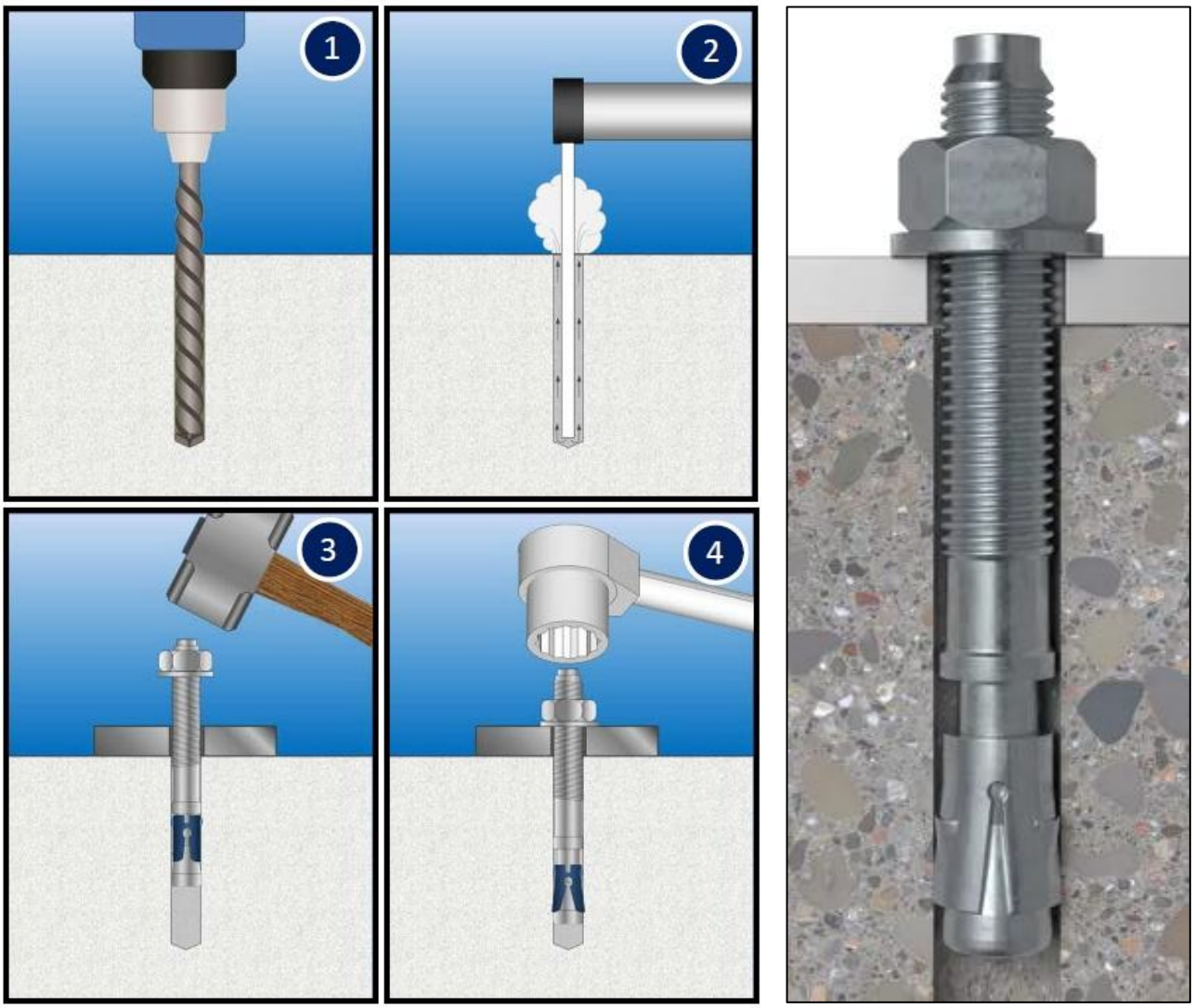


Figure 4: Fischer FBN II anchor bolt installation.

12.10 Cutting & Drilling

RhinoStop® is a modular barrier system, manufactured to suit standard post spacing. During assembly, it may be necessary to cut and drill standard length panels to suit site specific dimensions.

- Cutting of w-beam guardrail panels, handrail pipe, mesh panels and angles is undertaken using a metal cutting disk.
- Drilling of holes into the guardrail panels is recommended using a step drill bit.
- Any damage to the galvanised coating shall be repaired by applying two (2) coats of a zinc rich paint. A silver topcoat is recommended for aesthetics.
- Flame cutting is not permitted for cutting or drilling of any RhinoStop® assembly item.
- Cutting of the Fischer FBN II galvanised anchors is not permitted.

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