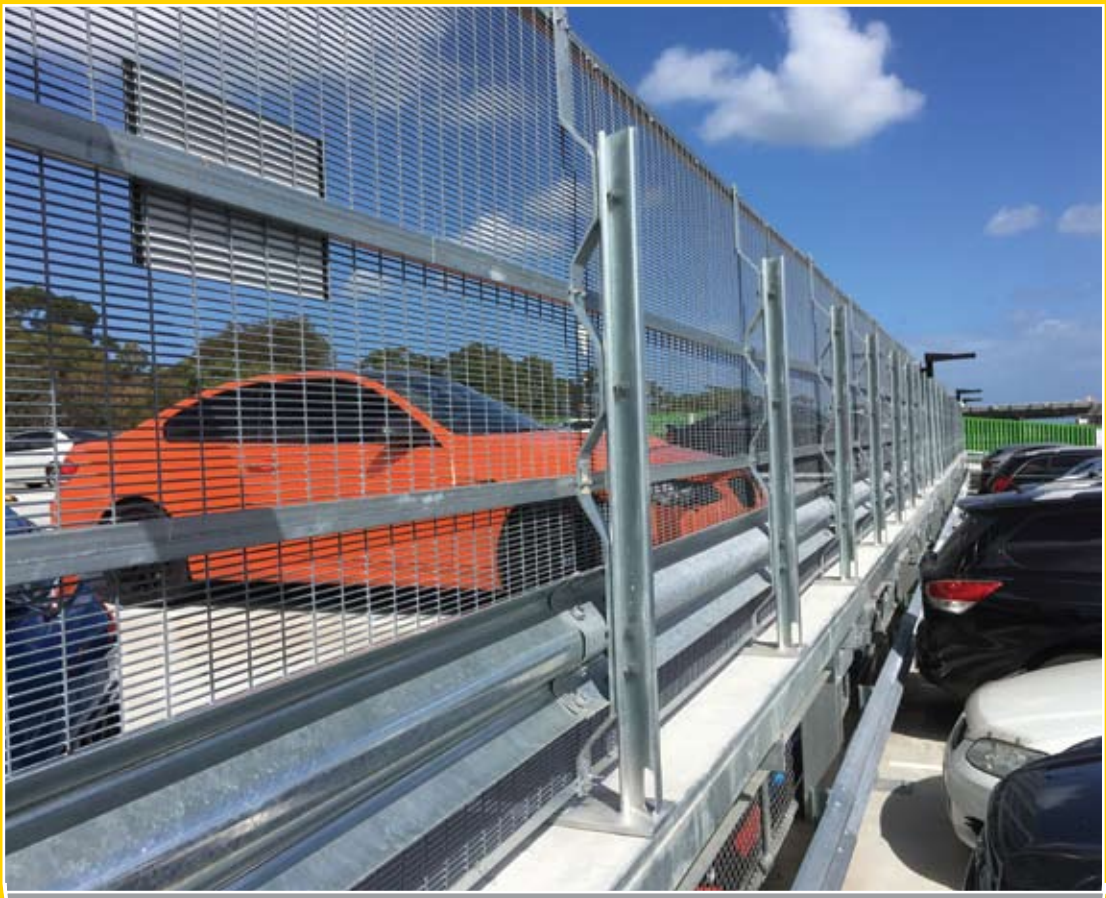
INGAL CIVIL PRODUCTS
A valmont COMPANY

Car Park & Industrial Barriers

Product Manual



Release 12/21

www.ingalcivil.com.au

Contents

1.0 Introduction

Off highway vehicle safety barriers are a specific range of barriers designed for use in car parks, logistics yards, warehouses, factory facilities, retail parks, loading bays, and many other non-roadside applications. Their objective is the protection of people, plant and buildings.

Traditional highway safety barrier systems are designed to contain and redirect errant vehicles traveling at high velocities and relatively low impact angles. Posts are driven into the ground and the surrounding soil provides lateral post support.

Ingal Civil Products' range of car park and industrial barriers are specifically designed for applications where protection is required from heavy vehicle glancing blows and low speed perpendicular impacts. Traditional bolt down rigid posts provide no energy absorption upon impact resulting in damage to the barrier and post foundations. Ingal's range of flexible post systems absorb impact energy, thereby reducing the pullout forces on the hold-down bolts. Fewer hold-down bolts are required resulting in an easier to install system and minimal damage to valuable plant and equipment.

Every linear barrier system from Ingal Civil Products has been independently tested and proven to exceed AS/NZS 1170.1.

2.0 Barrier Selection

Any general perimeter barrier system must be capable of withstanding the relevant impact loads and minimise any residual energy being passed onto the structure that is being protected. The selection of an effective perimeter edge protection is based on a number of variable factors;

- Space available in which to install a barrier system and minimise any encroachment into the travelled way.
- Climbability of the barrier.
- Handrail attachments and mesh infill system requirements.
- Edge detail in relation to suitable anchorage of the barrier system.
- Compliance with relevant Australian Standards and Building Codes

3.0 Standards

3.1 AS/NZS 1170.1:2002 Structural Design Actions, Part 1: Permanent, imposed and other actions

The horizontal impact force on a barrier arising from the movement of vehicles may be calculated as follows;

F = mv2/2D

Where:

F = impact force (N)

m = gross vehicle mass (kg)

v = velocity of the vehicle (m/s)

D= sum of the deflection of the vehicle (crumple zone) and barrier (m).

AS/NZS 1170.1 COMPLIANT

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

Light traffic areas are defined as parking, garages, and driveways restricted to cars, light vans, etc, not exceeding 2500kg gross mass.

In practical terms for car parks, the horizontal impact force on a barrier in a light traffic area is based on a 1500kg vehicle travelling at 2m/s and a 0.1m crumple zone.

The top edge or handrail shall also be designed for the case where a concentrated load of 0.6kN, positioned for the worst effect, acts inward, outward or downward.

Impact Forces from AS/NZS 1170.1

- Light Traffic Areas – 30kN
- Base of down-ramps or straight sections longer than 20m – 240kN
- Medium Traffic Areas – 40kN at 1m height

3.2 AS2890.1:2004 Parking Facilities, Part 1: Off street car parking

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 edge from the deck to a lower level exceeds 600mm

3.3 AS/NZS 1657:1992 Fixed Platforms, Walkways, Stairways and Ladders - Design, Construction and Installation

In walkway areas, a top rail, supported by posts, parallel to the floor or slope of a walkway at a vertical height of not less than 900mm or more than 1100mm is required.

The space between the top rail and the floor may be provided with suitable infill fixed to the top rail and not more than 80mm above the floor. Infill may be fabricated from solid or perforated plate, expanded metal or metal mesh.

3.4 Building Code of Australia

The building code specifies that for balustrading on balconies greater than 1m from the ground, any members (vertical or horizontal) should not permit a 125mm sphere to pass between them.

Once a balcony height of 4m has been exceeded, balustrades should be 1m in height and any horizontal elements within the balustrade or other barrier between 150mm and 760mm above the floor must not facilitate climbing.

3.5 New Zealand Building Code

Performance

F4.3.1 Where people could fall 1 metre or more from an opening in the external envelope or floor of a building, or from a sudden change of level within or associated with a building, a barrier shall be provided.

B1.3.3 Barrier Geometry

Barriers must be continuous for the full extent of the potential fall. They must be sufficiently high to minimise the probability of a person falling over them and be constructed to prevent a person falling through them.

3.6 Environmental Factors

Marine environments can lessen the life of the protective galvanized coating. In these locations, application of a specialized painted coating is strongly recommended. Galvanised surfaces should be washed regularly to remove salt build-up.

Areas of high wind can add harmonic vibrations and overload system components. If handrail and anti-climb mesh is to be used in these locations, all connections should be securely bolted. Use of tec-screws is not advisable.

4.0 ZEE-Park

The ZEE-Park is a high-strength steel car park barrier system.

4.1 Features & Benefits

- Fully tested & compliant system for peace of mind
- Low Initial Deflection
- Suitable for edge protection close to structures or building facades
- Yielding design prevents damage to footings with larger impacts
- Consistent high performance
- High containment capacity
- Single Anchor design – Easier, cost-effective installation
- Handrail & Anti-Climb Mesh attachments available for BCA compliance
- Very low footprint (Only 100mm x 200mm)
- 100% Australian made using Australian Steel & Australian Zinc
- Minimum 3 posts over 4 metre barrier

4.2 Installation instructions – Site Preparation

The site should be prepared free of hazards that may interfere with the installation or operational performance of the system. Some sites may require minor leveling, which can be achieved by placing steel packing plates under the posts.

Recommended Plant & Tools

- Tape Measure
- String Line
- Hammer Drill
- Cordless Drill
- Torque Wrench
- Air Compressor
- Air Rattle Gun
- Small Tools

4.3 Installation Sequence

The following written instructions should be read in conjunction with Ingal Civil Products Drawings:

- STB-020 ZEE-Park Post Arrangement
- STB-021 Handrail Extension and Mesh Infill Panel Arrangement

4.4 Post Installation

1. Using a string line, commence set out by marking the ground for each post location. Posts will typically be at 2000mm centres (max).
2. Leave at least 25mm between the base of the post and any structure to allow for dynamic deflection
3. Drill 22mm holes for each post to a depth of 170mm. Ensure the holes are clean free from dust and debris.
4. Place the post above the drilled hole.
5. Follow mixing instructions for anchoring epoxy carefully. Epoxy M20 x 180mm stud with nut through ZEE-Park post anchor slot
6. Allow epoxy adhesive to fully cure before torqueing M20 nut to 150 Nm.

4.5 Handrail Extension Attachment

1. Align the handrail extension piece with the post and secure through the upper hole in the extension piece using an M16x32mm bolt.

4.6 Rail Attachment

1. Align the w-beam sections with the posts and secure using the M16 x 32mm bolts.
2. If a handrail extension piece is attached, ensure the extension is vertical before securing the bolts.
3. Splice rails together using M16x32mm bolts. Eight (8) bolts are required per splice.
4. Rails should be lapped so that the exposed edge is facing away from approaching traffic.

4.7 Handrail Attachment

1. Align the handrail section with the extension pieces and secure the handrail with Tek-screws.
2. Joins in the handrail are made by butting adjacent handrails together at the post extensions prior to securing with Tek- screws.
3. If a handrail join cannot be located at the post extension, adjacent rails can be spot welded together. A zinc rich paint should then be applied to the welded surfaces. Alternatively, Handrail Joiners (part number 10005563) may be used, secured with welds or Tek-screws.
4. In areas of high wind loading, handrail may be attached using 10009287 handrail attach clamps.

4.8 Anti-Climb Mesh Attachment

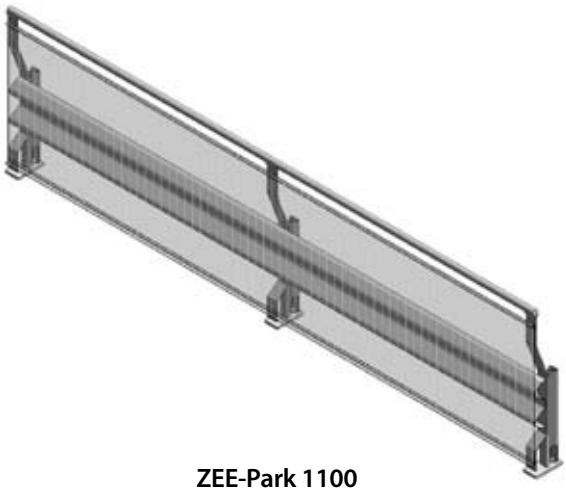
1. Loosely attach 4-slot angle section to upper and lower slots in the handrail cranked extension using M8 x 30mm cup head bolts and nuts
2. Loosely attach anti-climb mesh panel to intermediate slots in upper and lower angles with M8 x 25mm cup head bolts and nuts. Slide the bolt in from the rear of the angle, and place a saddle washer under the nut
3. Once mesh is held in place, remove upper and lower bolts at cranked extensions one at a time. Slide bolt in from rear of angle so that it holds mesh in place, and add a saddle washer and nut.
4. Ensuring gap below lower mesh is less than 100mm, tighten all mesh attachment nuts.
5. If required, add tek-screws with saddle washers through W-beam rail at 500mm centres.
6. Joins in the mesh panels are made by butting adjacent panels together and securing with tek-screws and saddle washers through upper and lower angles and w-beam rail, ensuring both panels are secured..

4.9 ZEE-Park Installation Checklist

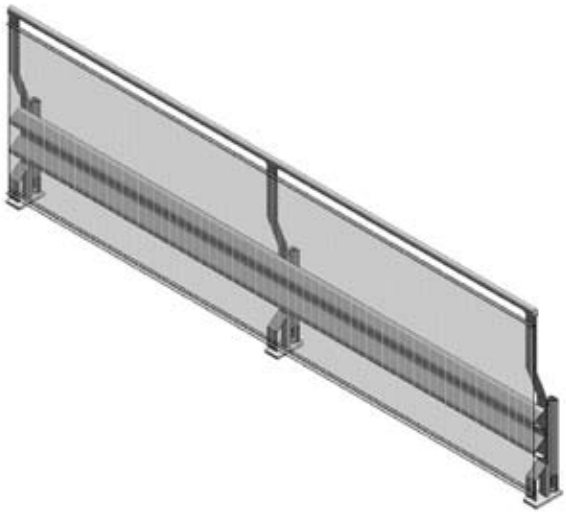
Please complete the following installation checklist to ensure ZEE-Park system performs as designed.

ZEE-Park Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstacles that may impede the operational performance of the system	☐ Yes	☐ No
Have the posts been positioned at a maximum 2000mm spacing	☐ Yes	☐ No
Are the posts orientated correctly	☐ Yes	☐ No
Have the posts been installed using mechanical or chemical anchors nominated in ICP drawings	☐ Yes	☐ No
Handrail Installation		
Are the handrail extensions secured to the posts with two (2) M16 bolts	☐ Yes	☐ No
Are the handrail extensions vertical	☐ Yes	☐ No
Has the handrail been attached to the extension pieces with tek screws	☐ Yes	☐ No
Rail Installation		
Are the rails secured to each post	☐ Yes	☐ No
Are the rails spliced with eight (8) M16x32mm bolts	☐ Yes	☐ No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	☐ Yes	☐ No
Mesh Infill Installation		
Is the gap between the bottom of the mesh panel and ground level less than 100mm	☐ Yes	☐ No
Has the mesh been attached to the upper and lower configurations of the rails using tek screws and saddle clips of 500mm centres	☐ Yes	☐ No
Has the anti-climb mesh sections been joined ensuring the saddle clips engage adjoining panels	☐ Yes	☐ No
Has the stiffening section been attached to the handrail extensions and the top of the mesh panels	☐ Yes	☐ No
General		
Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	☐ Yes	☐ No
Are all fasteners secure	☐ Yes	☐ No
Is all rubbish and debris removed	☐ Yes	☐ No

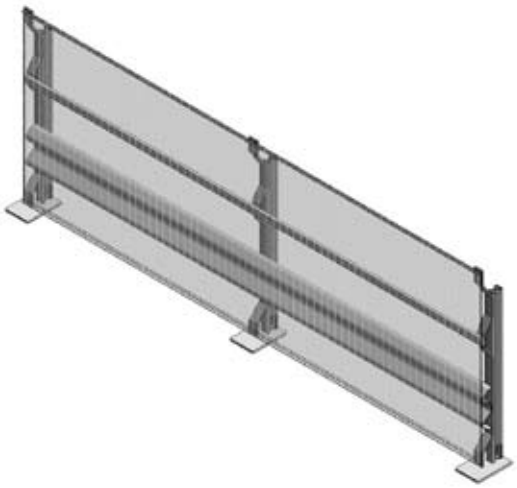
ZEE-Park



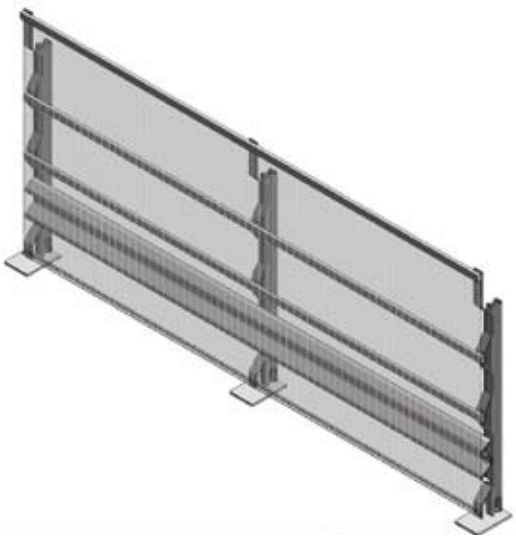
ZEE-Park 1100



ZEE-Park 1300



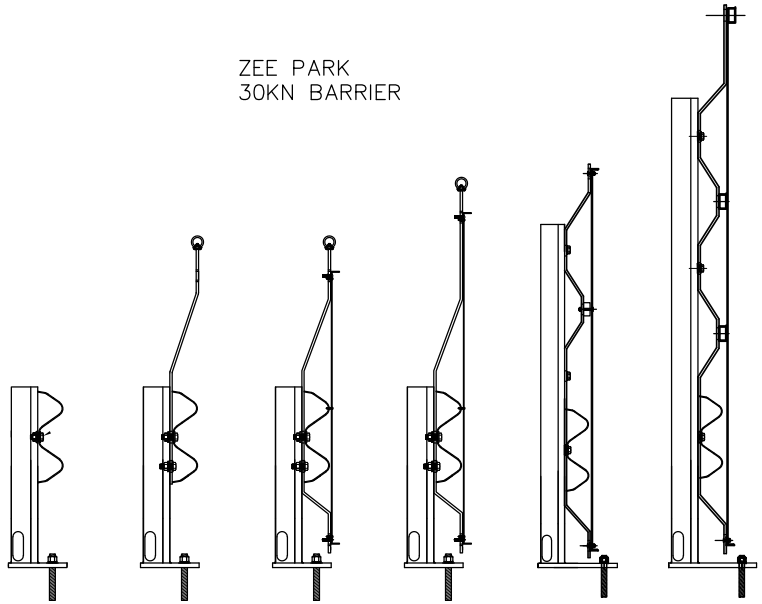
ZEE-Park 1500



ZEE-Park 1800

ZEE-Park & Hand Rail

ZEE PARK
30KN BARRIER



ZEE PARK

ZEE PARK WITH HANDRAIL

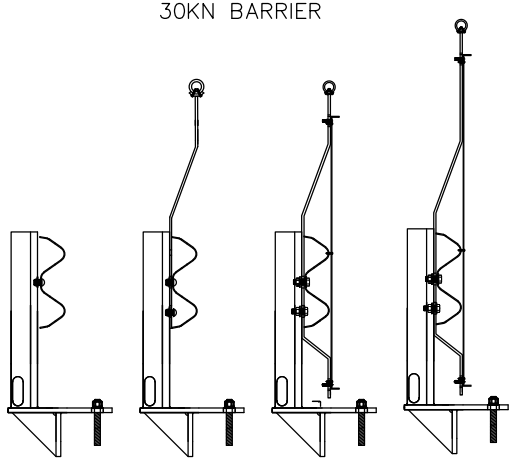
ZEE PARK WITH HANDRAIL & MESH 1100MM

ZEE PARK WITH HANDRAIL & MESH 1300MM

ZEE PARK 1500

ZEE PARK 1800

ZEE PARK
DECK GUARD
30KN BARRIER



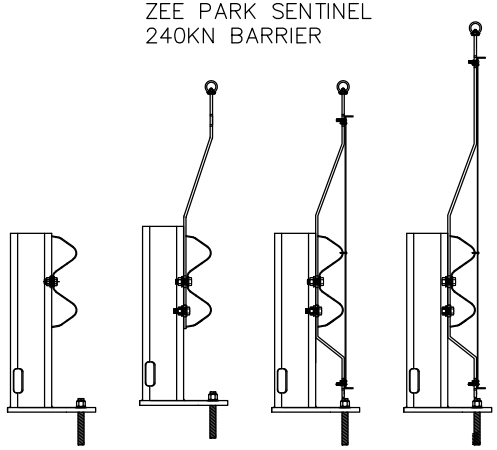
ZEE PARK DECK GUARD

ZEE PARK DECK GUARD WITH HANDRAIL

ZEE PARK DECK GUARD WITH HANDRAIL & MESH 1100MM

ZEE PARK DECK GUARD WITH HANDRAIL & MESH 1300MM

ZEE PARK SENTINEL
240KN BARRIER



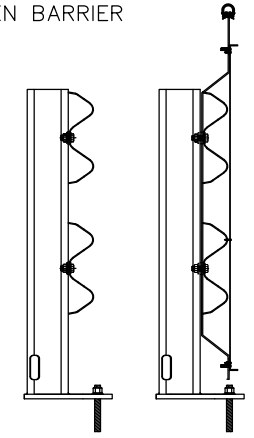
ZEE PARK SENTINEL

ZEE PARK SENTINEL WITH HANDRAIL

ZEE PARK SENTINEL WITH HANDRAIL & MESH 1100MM

ZEE PARK SENTINEL WITH HANDRAIL & MESH 1300MM

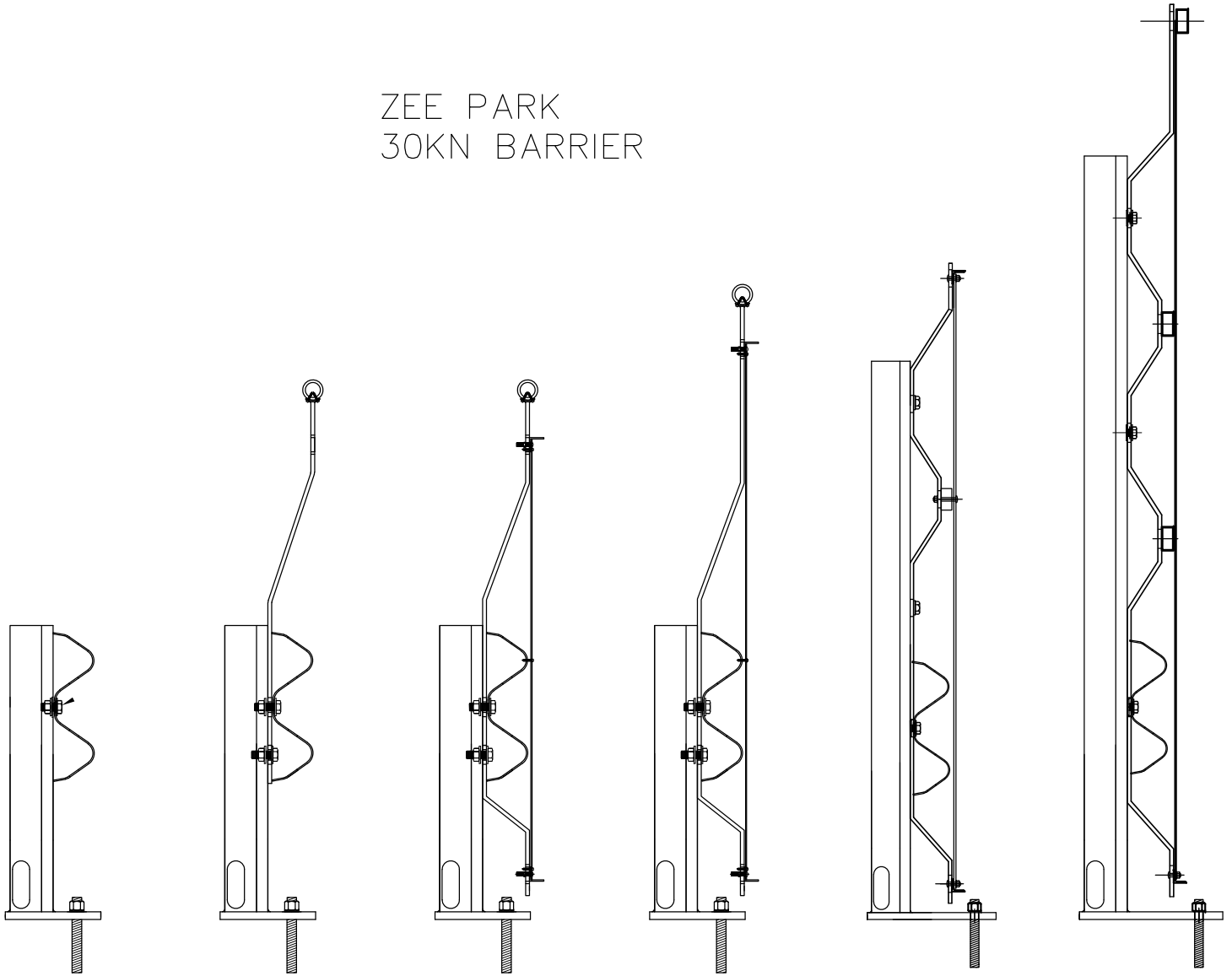
ZEE PARK TRUCK SHIELD
40KN BARRIER



ZEE PARK TRUCK SHIELD

ZEE PARK TRUCK SHIELD WITH HANDRAIL & MESH 1300MM

ZEE PARK
30KN BARRIER



ZEE PARK

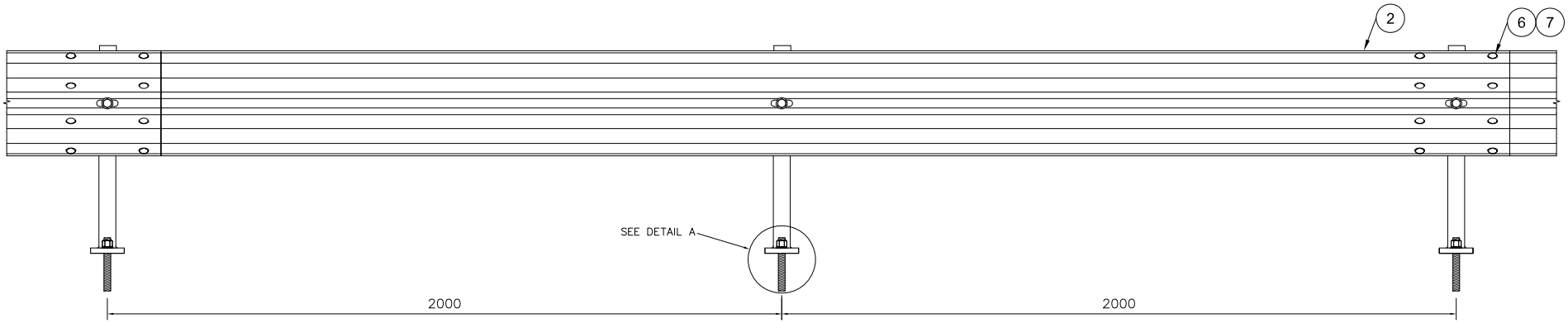
ZEE PARK
WITH HANDRAIL

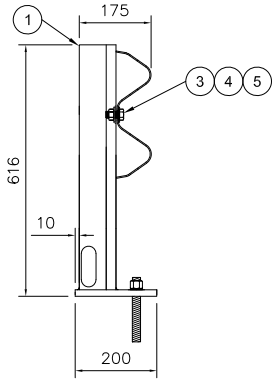
ZEE PARK WITH
HANDRAIL &
MESH 1100MM

ZEE PARK WITH
HANDRAIL &
MESH 1300MM

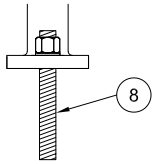
ZEE PARK
1500

ZEE PARK
1800





SIDE VIEW

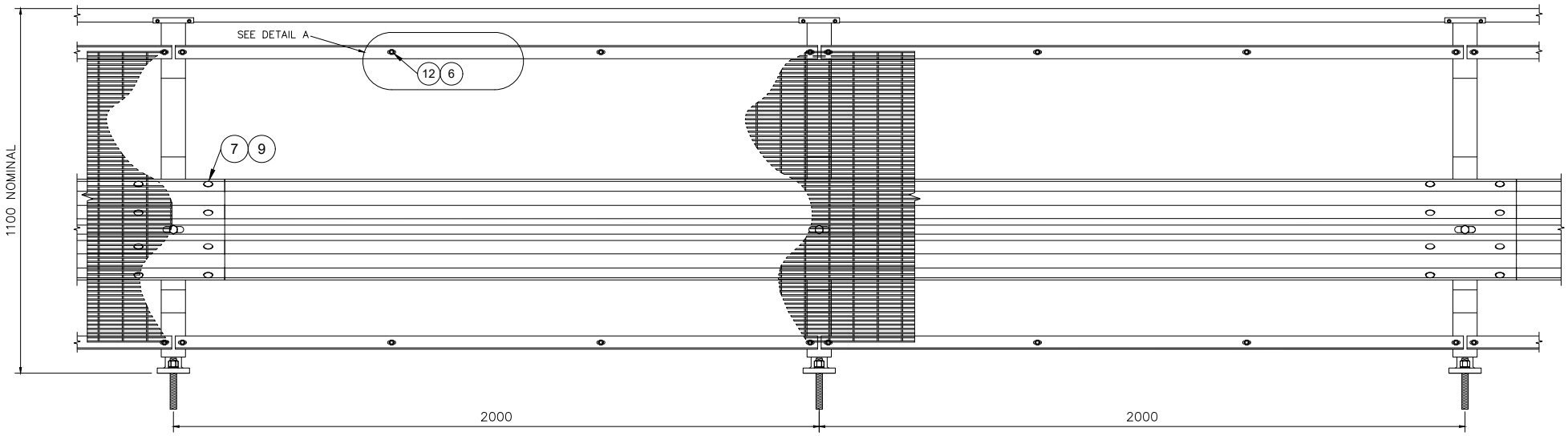


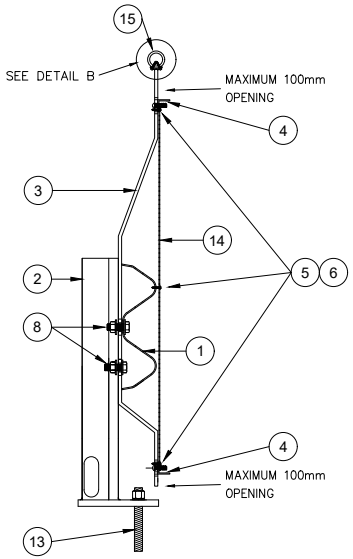
DETAIL A

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10007635	ZEE PARK POST 616MM OALL	2
2	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	1
3	10001347	M16 X 35 HEX HEAD BOLT	2
4	10001242	M16 WASHER	4
5	10001336	M16 HEX NUT GALV	2
6	10001248	M16 X 32 SPLICE BOLT	8
7	10001239	M16 OVERSIZE NUT	8
8	10006675	M20 X 180MM STUD W/NUT & WASHER	–

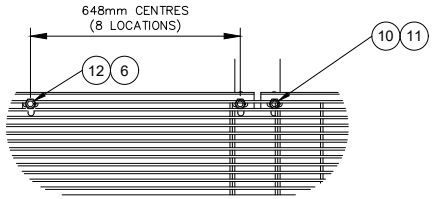
NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-019
ZEE PARK POST AND RAIL
GENERAL ARRANGEMENT
REV 1

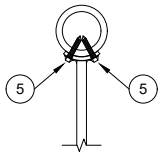




ZEE PARK POST



DETAIL A



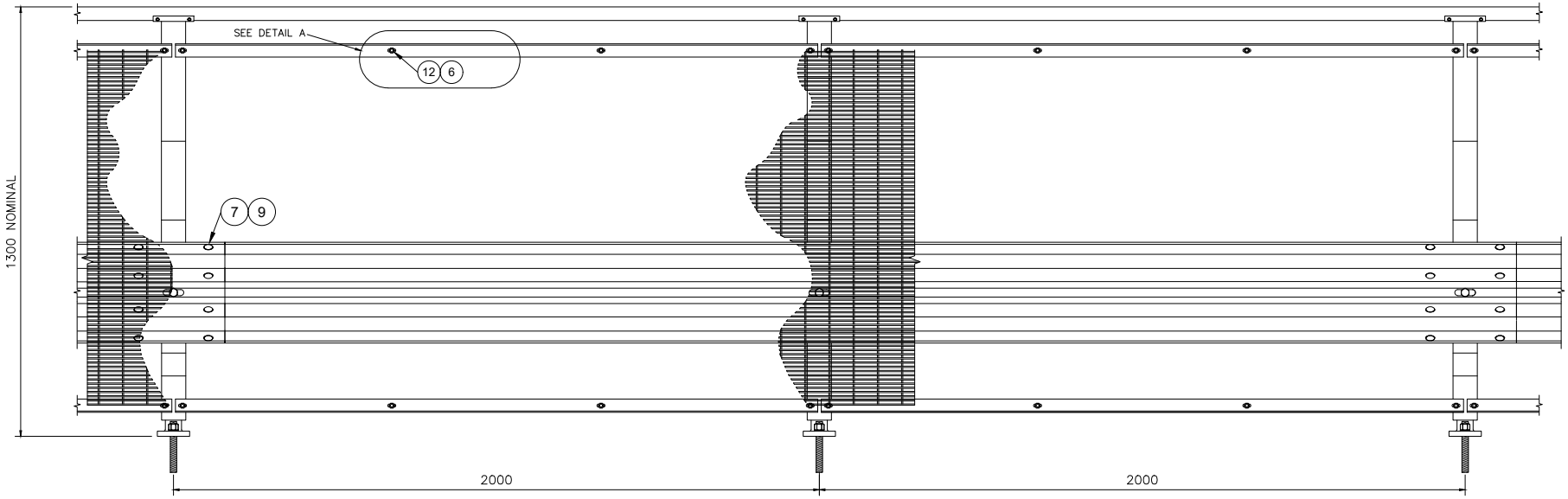
DETAIL B

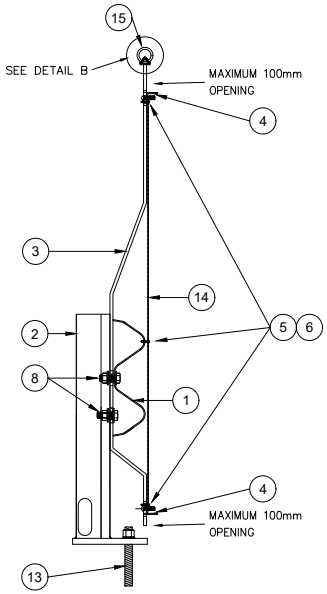
4-OFF TEK SCREWS
PER POST CONNECTION

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	1
2	10007635	ZEE PARK POST 616MM OALL	2
3	10006104	1100MM CRANKED HANDRAIL EXTENSION	2
4	10009021	ANGLE SUPPORT FOR MESH 4-SLOT	4
5	10001311	TEK SCREW 12-14 X 25	24
6	10001742	M8 SECUREMAX SECURITY WASHER	24
7	10001248	M16 X 32 SPLICE BOLT	8
8	10001264	M16 X 45MM HEX BOLT / NUT / 2W	4
9	10001239	M16 OVERSIZE NUT	8
10	10001310	M8 X 30MM CUP BOLT / NUT	8
11	10001305	M8 FLAT WASHER	8
12	10008960	M8 x 25MM CUP HEAD NUT & BOLT	8
13	10006675	M20 X 180MM STUD W/NUT & WASHER	–
14	10001738	900 X 2400MM ANTI-CLIMB MESH PANEL	–
15	10001731	32NB HANDRAIL 6.5M	–

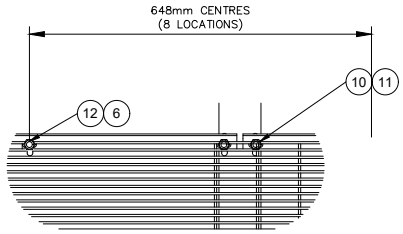
NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-021
ZEE PARK POST WITH HANDRAIL
AND MESH 1100mm
GENERAL ARRANGEMENT
REV 4 – 16/04/2021

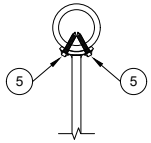




ZEE PARK POST



DETAIL A



DETAIL B

4-OFF TEK SCREWS
PER POST CONNECTION

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	1
2	10007635	ZEE PARK POST 616MM OALL	2
3	10001820	1300MM CRANKED HANDRAIL EXTENSION	2
4	10009021	ANGLE SUPPORT FOR MESH 4-SLOTS	4
5	10001311	TEK SCREW 12-14 X 25	24
6	10001742	M8 SECUREMAX SECURITY WASHER	24
7	10001248	M16 X 32 SPLICE BOLT	8
8	10001264	M16 X 45MM HEX BOLT / NUT / 2W	4
9	10001239	M16 OVERSIZE NUT	8
10	10001310	M8 X 30MM CUP BOLT / NUT	8
11	10001305	M8 FLAT WASHER	8
12	10008960	M8 x 25MM CUP HEAD NUT & BOLT	8
13	10006675	M20 X 180MM STUD W/NUT & WASHER	-
14	10001746	1100 X 2400MM ANTI-CLIMB MESH PANEL	-
15	10001731	32NB HANDRAIL 6.5M	-

NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-024
ZEE PARK POST WITH HANDRAIL AND
MESH 1300mm
GENERAL ARRANGEMENT
REV 4 - 16/04/2021

5.0 ZEE-Park 1500

ZEE-Park 1500 is a development of the High Strength ZEE-Park barrier system, providing additional anti-climb properties above those required under the relevant codes. ZEE-Park 1500 is ideal for upper decks of car park structures, or other areas where anti-climb performance is paramount.

5.1 ZEE-Park1500 Specifications

Finish:	Hot-Dip Galvanized to AS/NZS 4680
Post Height:	1300mm
Footprint:	300mm
Anchors:	2 x M20 x 180mm Chemical Anchors

6.0 ZEE-Park 1800

ZEE-Park 1800 is a high-strength steel car park barrier system.

It has the following features and beneifts:

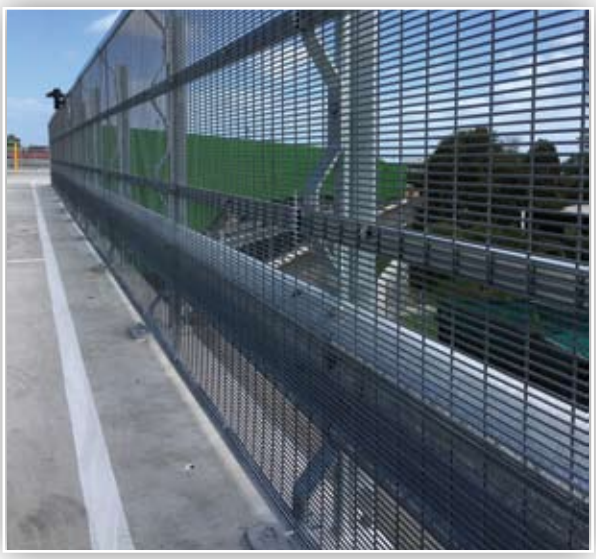
- Fully tested & compliant system for peace of mind
- Low deflection
- Suitable for exposed perimeter edge protection
- Yielding design prevents damage to structure with over-capacity impacts
- Consistent high performance
- High containment capacity
- Two anchor design – easy, cost-effective installation
- 1.8m High Anti-Climb Mesh prevents pedestrian encroachment (other custom heights available).
- Low footprint - only 200mm wide
- 100% Australian Made using Australian Steel & Australian Zinc

6.1 Components

The ZEE-Park 1800 consists of the following components:

10008553	ZEE-Park Post 1600mm
10008563	Anti-climb crank
10000977	Flex-beam guard rail
10008550	Anti-climb mesh 2404mm wide x 1800mm high
10001741	Angles for lower mesh support
10008605	RHS mesh support beams with spacers
Attaching hardware	

For full details on the installation process of the ZEE-Park 1800 refer to the *ZEE-Park 1800 Manual* available from Ingal Civil or your representative.

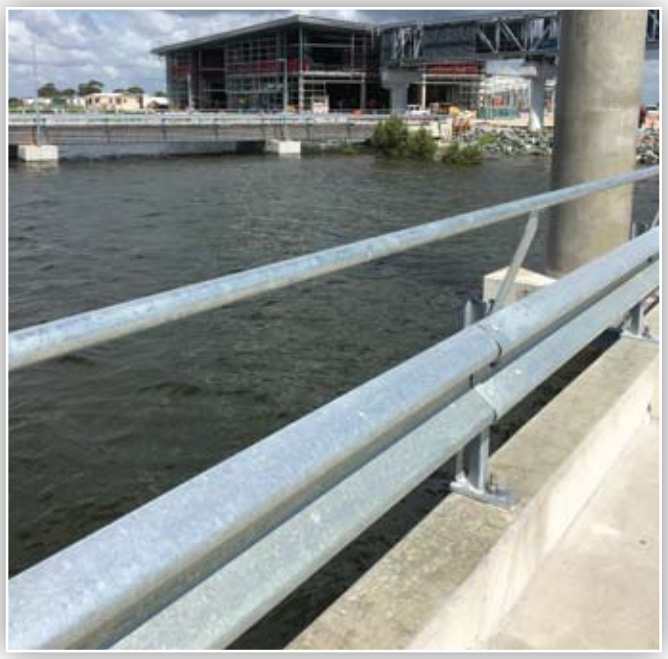


6.2 ZEE-Park 1800 Installation Checklist

Please complete the following installation checklist to ensure ZEE-Park 1800 system performs as designed.

ZEE-Park 1800 Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstructions that may impede system operation?	☐ Yes	☐ No
Have the posts been positioned at a maximum 2000mm spacing?	☐ Yes	☐ No
Are the posts oriented correctly?	☐ Yes	☐ No
Is there at least 100mm between the rear of the baseplate and any structure?	☐ Yes	☐ No
Have the posts been installed with anchors nominated in the drawing package?	☐ Yes	☐ No
Has the anchor been adequately tightened?	☐ Yes	☐ No
Anti-Climb Cranks		
Are the cranks attached to the posts using 3 x M16 x 45mm Bolt with Nut & Washer?	☐ Yes	☐ No
Are the cranks even and aligned horizontally and vertically?	☐ Yes	☐ No
W-Beam Guardrail Installation		
Are the rails secured to each post?	☐ Yes	☐ No
Are the rails spliced with eight (8) M16 x 32mm bolts?	☐ Yes	☐ No
Mesh Support Installation		
Are the lower angle supports installed with less than 100mm gap to floor?	☐ Yes	☐ No
Are all mesh supports aligned horizontally?	☐ Yes	☐ No
Are the tubular spacers installed in all RHS mesh supports?	☐ Yes	☐ No
Anti-Climb Mesh Installation		
Are Tek-Screws and saddle washers installed at 500mm centres?	☐ Yes	☐ No
Have the upper RHS mesh supports been installed so no mesh is protruding?	☐ Yes	☐ No
General		
If the galvanising has been damaged, has the area been repaired with zinc-rich paint?	☐ Yes	☐ No
Are all fasteners secure?	☐ Yes	☐ No
Has all rubbish and debris been removed?	☐ Yes	☐ No

Car Park & Industrial Barriers



7.0 ZEE-Park® Sentinel

AS/NZS 1170.1 COMPLIANT

The new ZEE-Park Sentinel barrier system is an exciting evolution of the proven ZEE-Park AS/NZS 1170.1 compliant car park barrier.

ZEE-Park Sentinel is suitable wherever high-containment barriers are required.

ZEE-Park Sentinel has been tested to the 240kN requirement of AS1170.1 for the ends of down ramps

Until now, bespoke barriers were the only option for these locations. Now, with ZEE-Park Sentinel, there is a low-cost proprietary system available. Car parks can now be designed with ease – using ZEE-Park for deck perimeters and ramp sides, continuing with ZEE-Park Sentinel at the ramp ends, or anywhere else a high-strength barrier system is required.

ZEE-Park Sentinel uses a heavier-duty version of the proven EZY Guard post profile, and is a high-strength semi-rigid system. Sentinel is tested and designed to exceed the 240kN force prescribed under AS/NZS 1170.1. This is achieved with only two anchors per post.

The ZEE-Park Sentinel integrates easily with the Ingal range of car park barriers to create a complete solution.

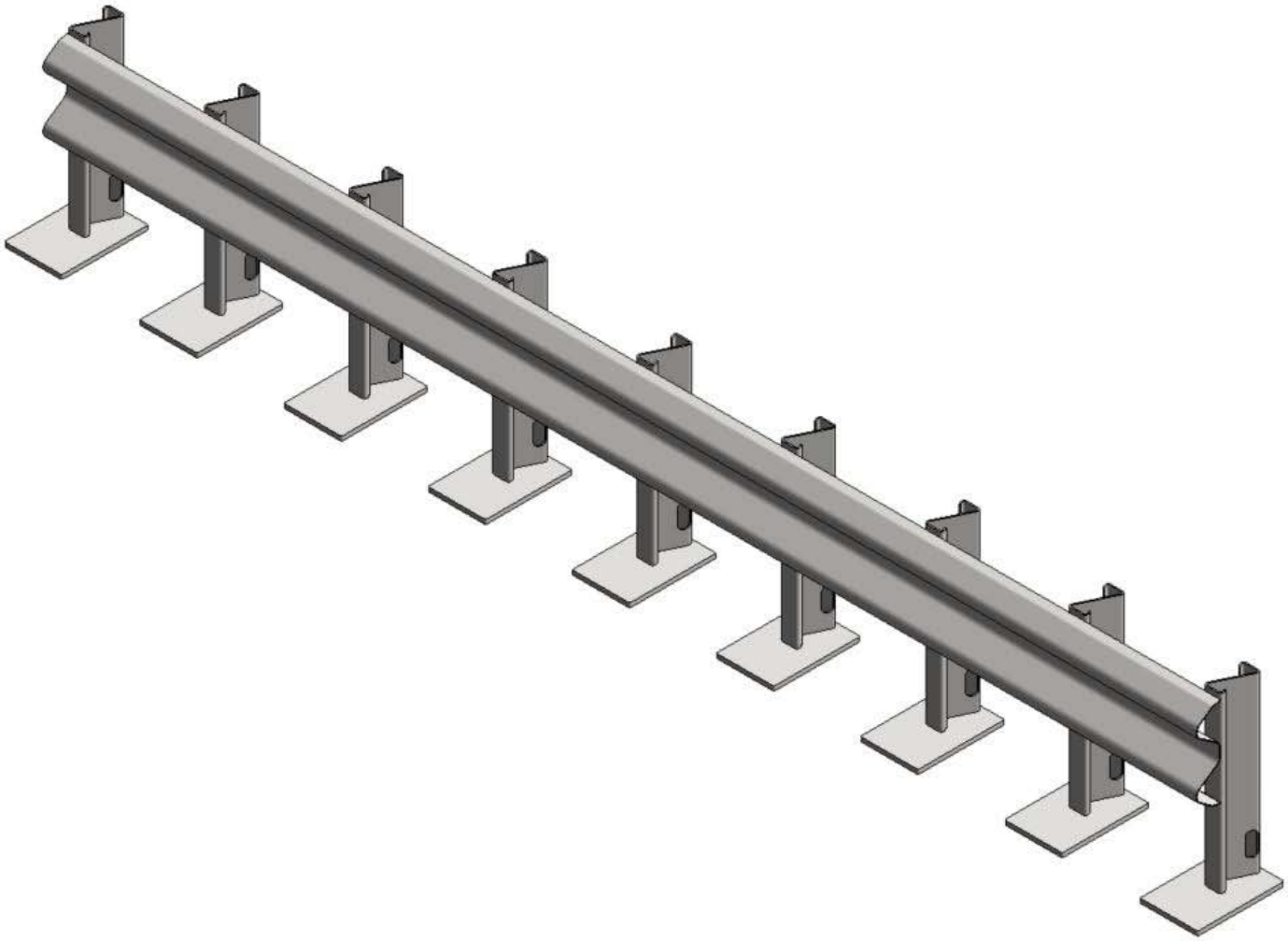
7.1 ZEE-Park Sentinel Specifications

Finish:	Hot-Dip Galvanized to AS/NZS 4680
Post Height:	610mm
Footprint:	200mm x 300mm
Anchor Bolts:	2 per post
Anchor Bolt Size:	M20 x 180mm

7.2 ZEE-Park Sentinel Installation Checklist

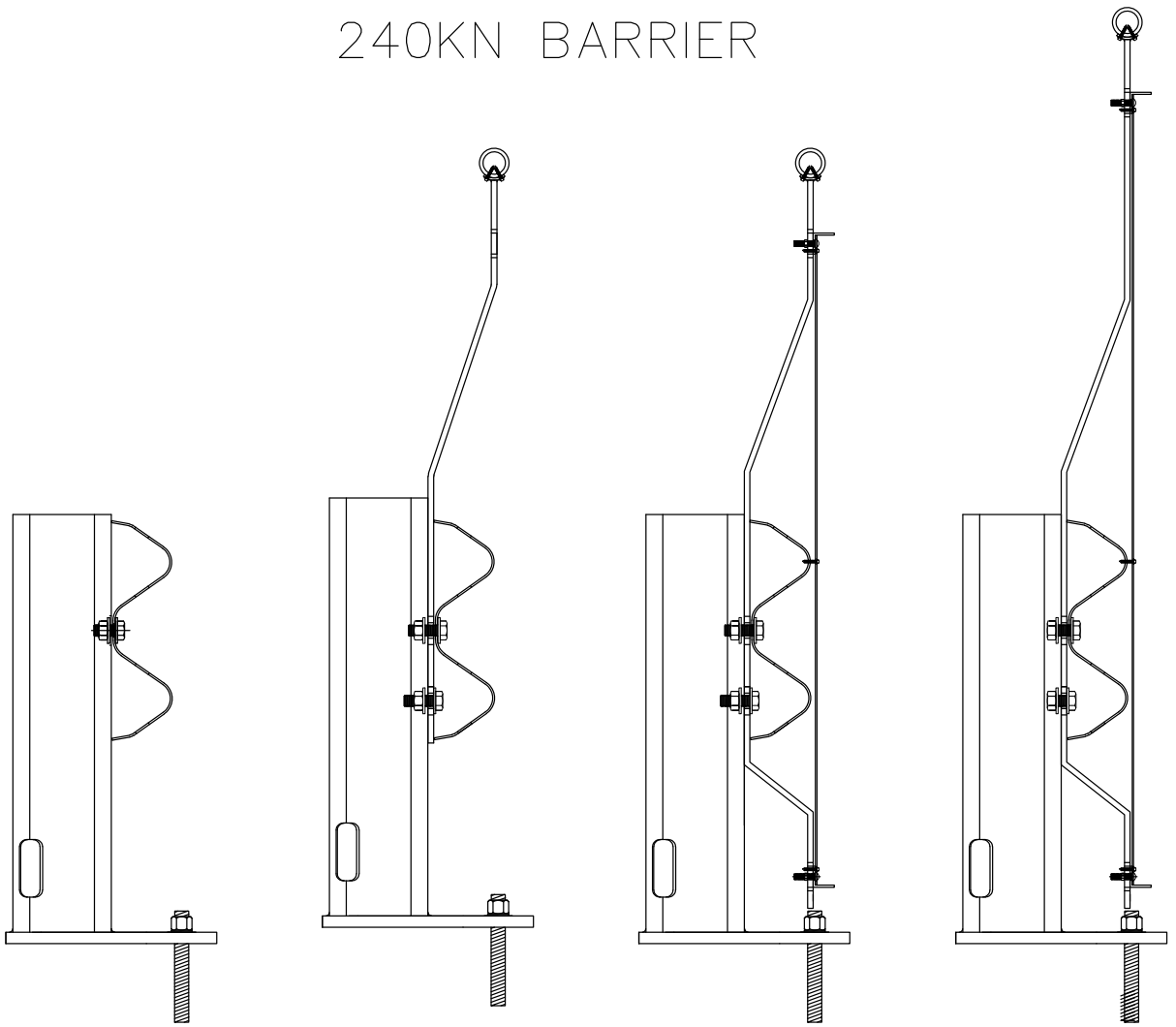
Please complete the following installation checklist to ensure ZEE-Park Sentinel system performs as designed.

ZEE-Park Sentinel Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstacles that may impede the operational performance of the system	☐ Yes	☐ No
Have the posts been positioned at a maximum 500mm spacing	☐ Yes	☐ No
Are the posts orientated correctly	☐ Yes	☐ No
Have the posts been installed using the required number of M20 x 180mm anchors, with the specified chemical adhesive?	☐ Yes	☐ No
Handrail Installation		
Are the handrail extensions secured to the posts with two (2) M16 bolts	☐ Yes	☐ No
Are the handrail extensions vertical	☐ Yes	☐ No
Has the handrail been attached to the extension pieces with tek screws	☐ Yes	☐ No
Rail Installation		
Are the rails secured to each post	☐ Yes	☐ No
Are the rails spliced with eight (8) M16x32mm bolts	☐ Yes	☐ No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	☐ Yes	☐ No
Mesh Infill Installation		
Are the angle sections attached at the top and bottom of the handrail extension pieces	☐ Yes	☐ No
Are the mesh anti-climb sections attached to the lower or upper corrugation of the rail using tek screws and saddle washers at 500mm centres	☐ Yes	☐ No
Are the anti-climb mesh sections tethered at the joins using saddle washers	☐ Yes	☐ No
General		
Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	☐ Yes	☐ No
Are all fasteners secure	☐ Yes	☐ No
Is all rubbish and debris removed	☐ Yes	☐ No



ZEE-Park Sentinel

ZEE PARK SENTINEL
240KN BARRIER

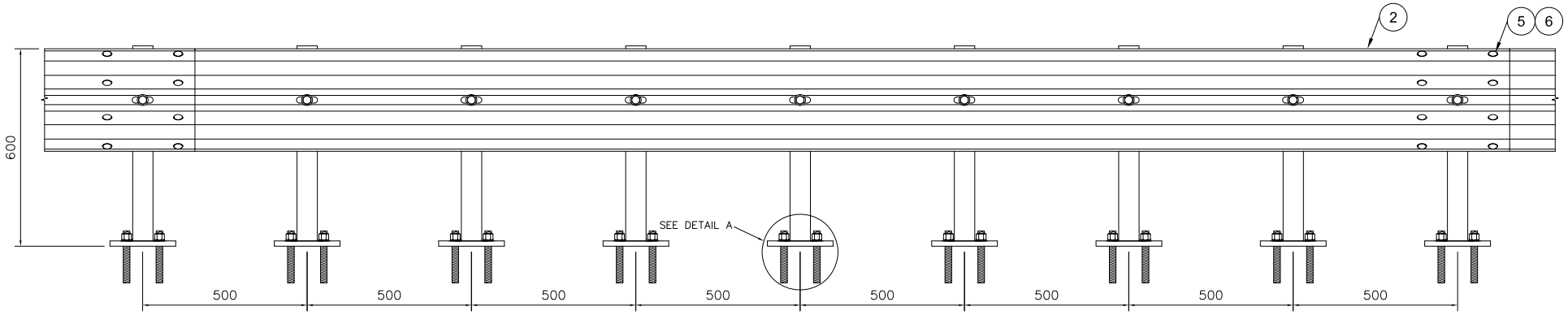


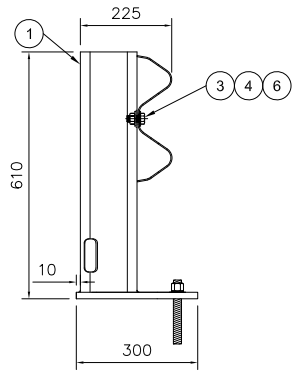
ZEE PARK SENTINEL

ZEE PARK SENTINEL WITH HANDRAIL

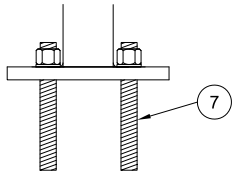
ZEE PARK SENTINEL WITH HANDRAIL & MESH 1100MM

ZEE PARK SENTINEL WITH HANDRAIL & MESH 1300MM





SIDE VIEW



DETAIL A

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10007837	ZEE PARK SENTINEL POST 610mm OAll	8
2	10005590	W-BEAM GUARDRAIL 4.0M N.L.L	1
3	10001347	M16 X 35 HEX HEAD BOLT	8
4	10001242	M16 WASHER	8
5	10006769	M16 X 40 SPLICE BOLT	8
6	10001239	M16 OVERSIZE NUT	16
7	10006675	M20 X 180MM STUD W/NUT & WASHER	–

NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-055
ZEE PARK SENTINEL
GENERAL ARRANGEMENT
REV 0

8.0 ZEE-Park® DeckGuard

The New ZEE-Park® DeckGuard barrier system is an exciting evolution of the proven ZEE-Park AS/NZS 1170.1 compliant car park barrier

ZEE-Park® DeckGuard is designed to allow maximum use of car park floor space, by placing the Flex-Beam guard rail right at the edge of the car park deck. This gives maximum protection with a minimum of space.

The ZEE-Park® DeckGuard also uses the proven EZY Guard post profile, and is a high-strength semi-rigid system. DeckGuard is tested and designed to exceed the force prescribed under AS/NZS 1170.1 for light traffic areas. This is achieved with a single anchor per post.

The ZEE-Park® is designed to spring under light 'nudge' impacts, but predictably yield under severe impacts, preventing damage to the car park structure.

ZEE-Park is suitable for edge protection in multi-storey car parks, and is without doubt the most versatile car park barrier system available.

AS/NZS 1170.1 COMPLIANT

8.1 ZEE-Park DeckGuard Specifications

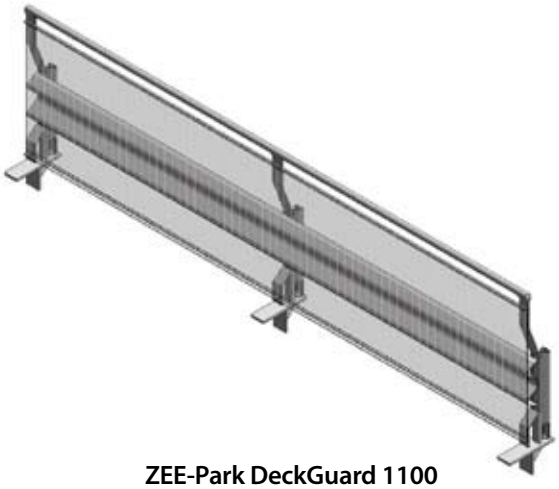
Finish:	Hot-Dip Galvanized to AS/NZS 4680
Post Height:	610mm
Footprint:	100mm x 175mm
Anchor Bolts:	1 per post
Anchor Bolt Size:	M20 x 180mm

8.2 ZEE-Park DeckGuard Installation Checklist

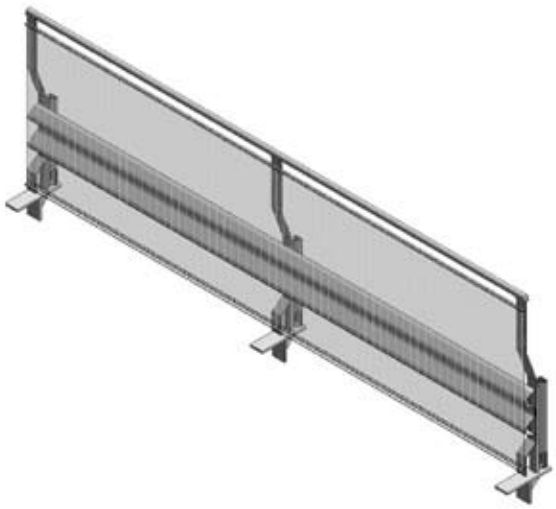
Please complete the following installation checklist to ensure ZEE-Park DeckGuard system performs as designed.

ZEE-Park DeckGuard Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstacles that may impede the operational performance of the system	☐ Yes	☐ No
Have the posts been positioned at a maximum 2000mm spacing	☐ Yes	☐ No
Are the posts orientated correctly	☐ Yes	☐ No
Have the posts been installed using the required number of M20 x 180mm anchors, with the specified chemical adhesive?	☐ Yes	☐ No
Handrail Installation		
Are the handrail extensions secured to the posts with two (2) M16 bolts	☐ Yes	☐ No
Are the handrail extensions vertical	☐ Yes	☐ No
Has the handrail been attached to the extension pieces with tek screws	☐ Yes	☐ No
Rail Installation		
Are the rails secured to each post	☐ Yes	☐ No
Are the rails spliced with eight (8) M16x32mm bolts	☐ Yes	☐ No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	☐ Yes	☐ No
Mesh Infill Installation		
Are the angle sections attached at the top and bottom of the handrail extension pieces	☐ Yes	☐ No
Are the mesh anti-climb sections attached to the lower or upper corrugation of the rail using tek screws and saddle washers at 500mm centres	☐ Yes	☐ No
Are the anti-climb mesh sections tethered at the joins using saddle washers	☐ Yes	☐ No
General		
Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	☐ Yes	☐ No
Are all fasteners secure	☐ Yes	☐ No
Is all rubbish and debris removed	☐ Yes	☐ No

ZEE-Park DeckGuard



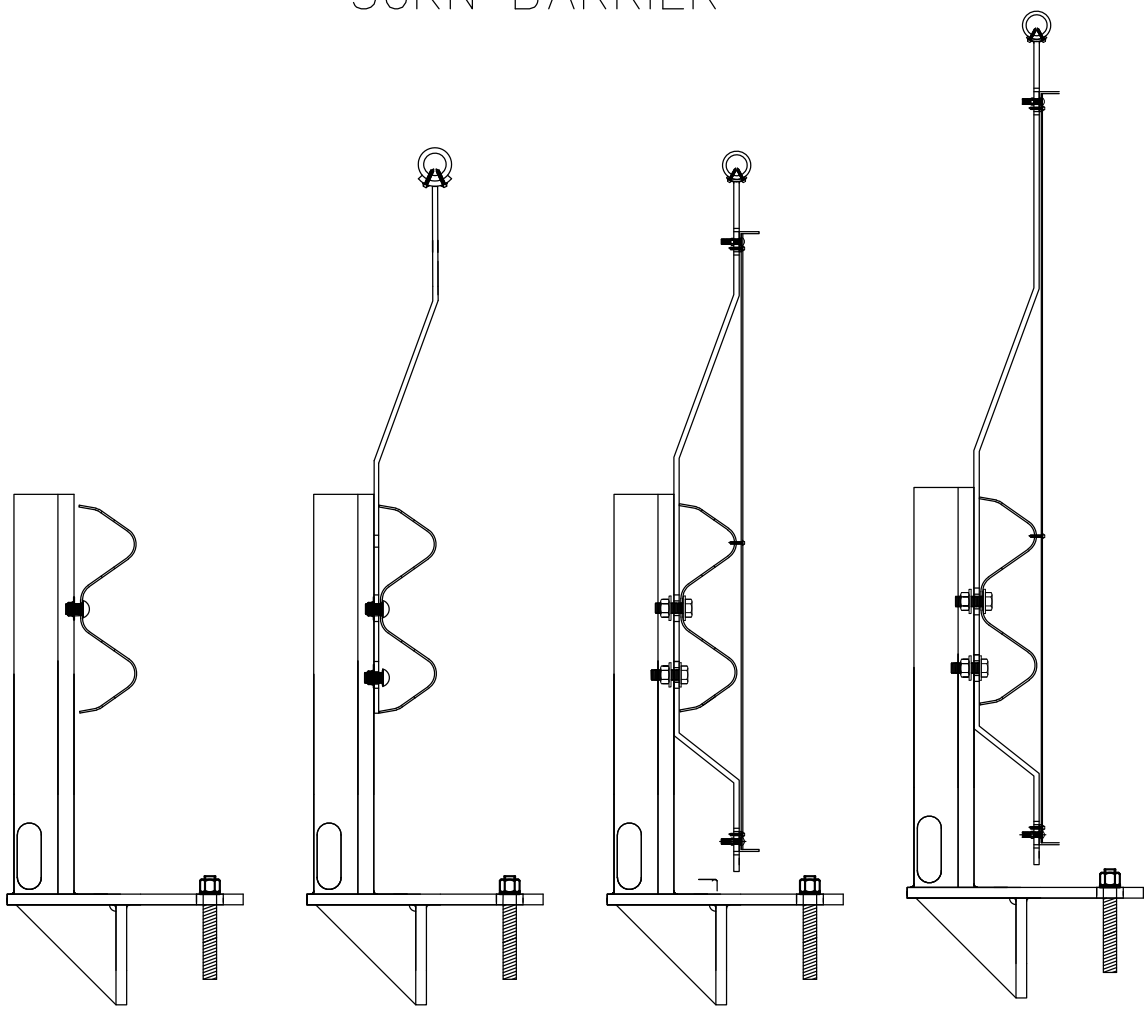
ZEE-Park DeckGuard 1100



ZEE-Park DeckGuard 1300

ZEE-Park DeckGuard & Hand Rail

ZEE PARK
DECK GUARD
30KN BARRIER

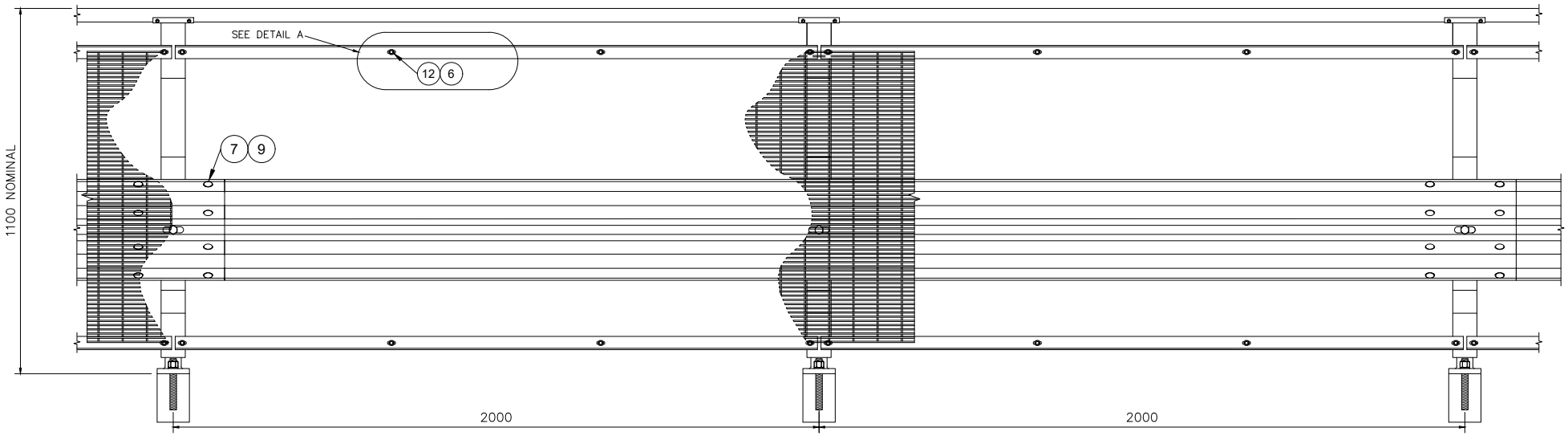


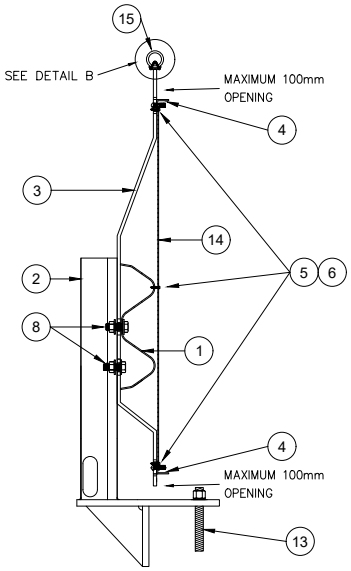
ZEE PARK
DECK GUARD

ZEE PARK
DECK GUARD
WITH HANDRAIL

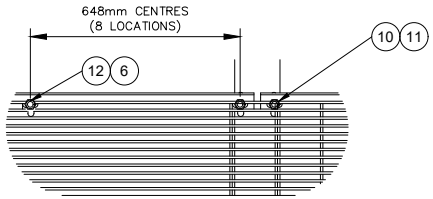
ZEE PARK
DECK GUARD
WITH HANDRAIL
& MESH 1100MM

ZEE PARK
DECK GUARD
WITH HANDRAIL
& MESH 1300MM

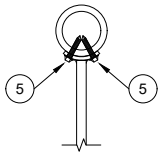




ZEE PARK POST



DETAIL A



DETAIL B

4-OFF TEK SCREWS
PER POST CONNECTION

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10000977	W–BEAM GUARDRAIL 4.0M N.L.L	1
2	10007950	DECK GUARD POST 616mm HEIGHT AGL	2
3	10006104	1100MM CRANKED HANDRAIL EXTENSION	2
4	10009021	ANGLE SUPPORT FOR MESH 4–SLOTS	4
5	10001311	TEK SCREW 12–14 X 25	24
6	10001742	M8 SECUREMAX SECURITY WASHER	24
7	10001248	M16 X 32 SPLICE BOLT	8
8	10001264	M16 X 45MM HEX BOLT / NUT / 2W	4
9	10001239	M16 OVERSIZE NUT	8
10	10001310	M8 X 30MM CUP BOLT / NUT	8
11	10001305	M8 FLAT WASHER	8
12	10008960	M8 x 25MM CUP HEAD NUT & BOLT	8
13	10006675	M20 X 180MM STUD W/NUT & WASHER	–
14	10001738	900 X 2400MM ANTI–CLIMB MESH PANEL	–
15	10001731	32NB HANDRAIL 6.5M	–

NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB–048
ZEE PARK DECK GUARD WITH HANDRAIL AND MESH 1100mm
GENERAL ARRANGEMENT
REV 4 – 16/04/2021

9.0 ZEE-Park® TruckShield

ZeePark TruckShield has been tested to the requirements of AS1170.1 for medium traffic areas, and is suitable for freight terminals, logistics facilities, loading docks, or anywhere separation of heavy vehicles and pedestrians is required.

ZEE-Park TruckShield uses a heavier-duty version of the proven EZY Guard post profile, and is a high-strength semi-rigid system. TruckShield is tested and designed to exceed the force prescribed under AS/NZS 1170.1 for medium traffic areas. This is achieved with only two anchors per post.

Easy installation of the Australian made ZEE-Park TruckShield makes it an ideal choice for a heavy duty car park barrier system.

The ZEE-Park TruckShield Integrates easily with the Ingal range of car park barriers to create a complete solution.

Suitable for:

- Freight terminals
- Logistics facilities
- Loading docks
- Anywhere separation of heavy vehicles and pedestrians is required

9.1 ZEE-Park TruckShield Specifications

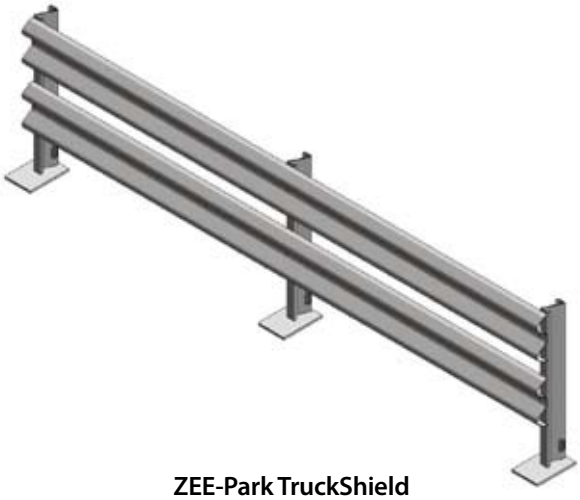
Finish:	Hot-Dip Galvanized to AS/NZS 4680
Post Height:	1055mm
Footprint:	200mm x 300mm
Anchor Bolts:	2 per post
Anchor Bolt Size:	M20 x 180mm

AS/NZS 1170.1 COMPLIANT

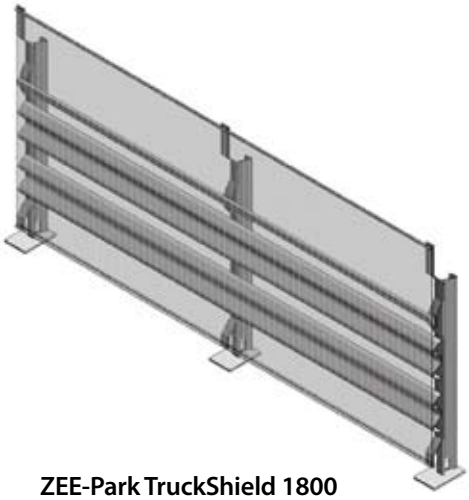
9.2 ZEE-Park TruckShield Installation Checklist

Please complete the following installation checklist to ensure ZEE-Park DeckGuard system performs as designed.

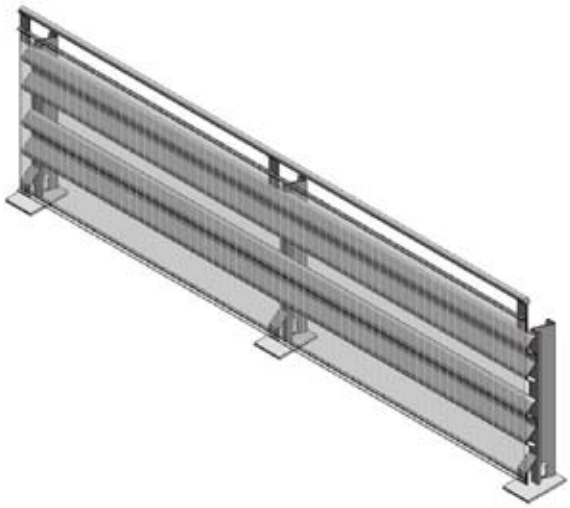
ZEE-Park TruckShield Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstacles that may impede the operational performance of the system	☐ Yes	☐ No
Have the posts been positioned at a maximum 2000mm spacing	☐ Yes	☐ No
Are the posts orientated correctly	☐ Yes	☐ No
Have the posts been installed using the required number of M20 x 180mm anchors, with the specified chemical adhesive?	☐ Yes	☐ No
Handrail Installation		
Are the handrail extensions secured to the posts with two (2) M16 bolts	☐ Yes	☐ No
Are the handrail extensions vertical	☐ Yes	☐ No
Has the handrail been attached to the extension pieces with tek screws	☐ Yes	☐ No
Rail Installation		
Are the rails secured to each post	☐ Yes	☐ No
Are the rails spliced with eight (8) M16x32mm bolts	☐ Yes	☐ No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	☐ Yes	☐ No
Mesh Infill Installation		
Are the angle sections attached at the top and bottom of the handrail extension pieces	☐ Yes	☐ No
Are the mesh anti-climb sections attached to the lower or upper corrugation of the rail using tek screws and saddle washers at 500mm centres	☐ Yes	☐ No
Are the anti-climb mesh sections tethered at the joins using saddle washers	☐ Yes	☐ No
General		
Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	☐ Yes	☐ No
Are all fasteners secure	☐ Yes	☐ No
Is all rubbish and debris removed	☐ Yes	☐ No



ZEE-Park TruckShield

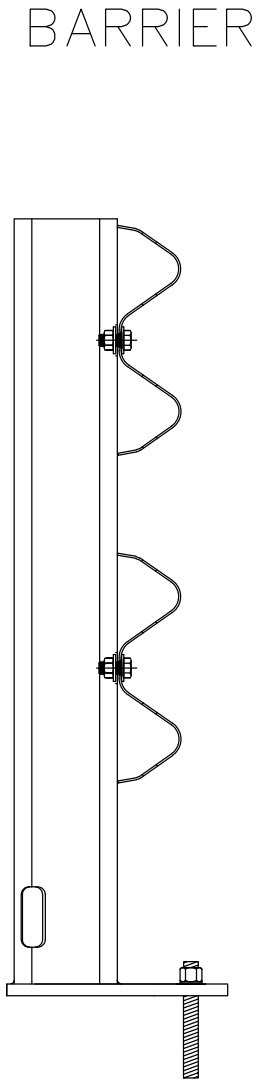


ZEE-Park TruckShield 1800

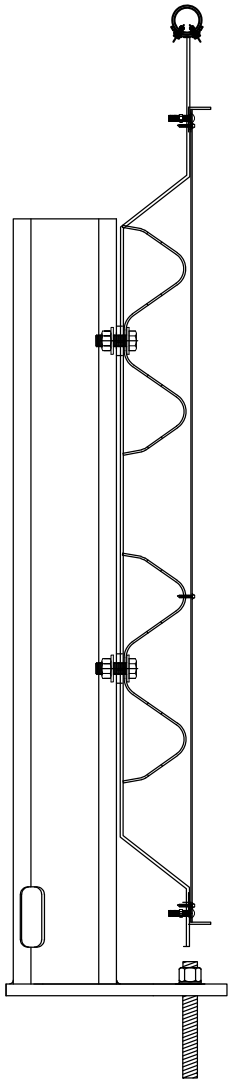


ZEE-Park TruckShield & Mesh

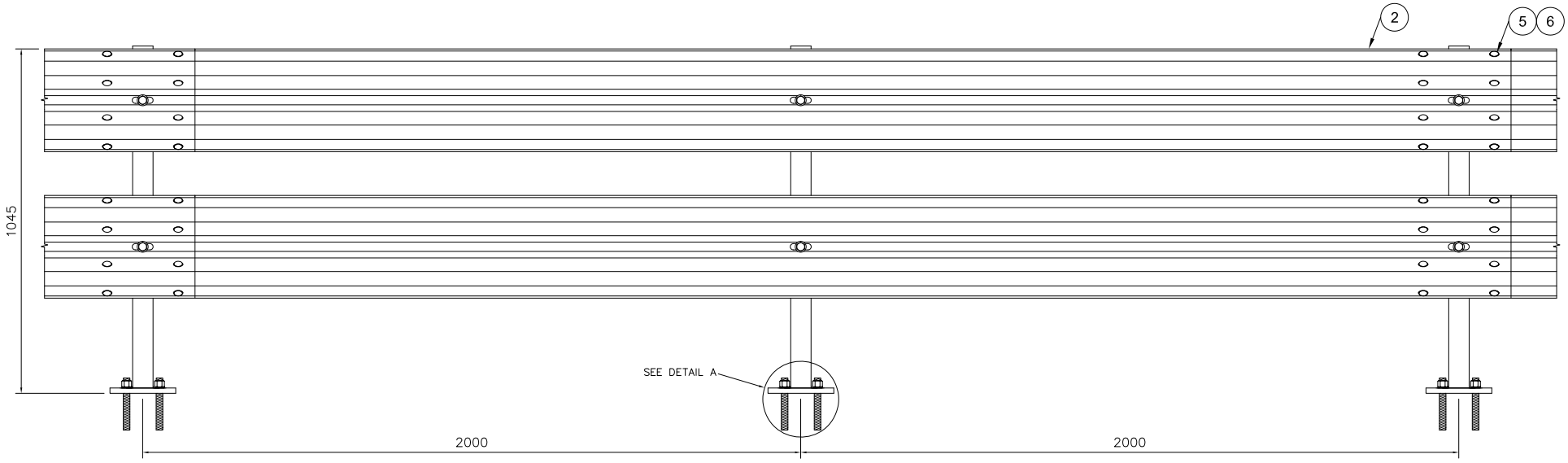
ZEE PARK TRUCK SHIELD
40KN BARRIER

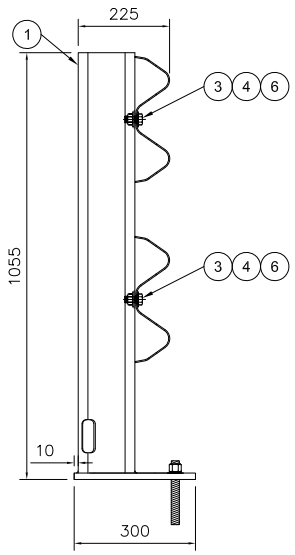


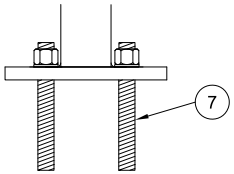
ZEE PARK
TRUCK SHIELD



ZEE PARK
TRUCK SHIELD
WITH HANDRAIL
& MESH 1300MM





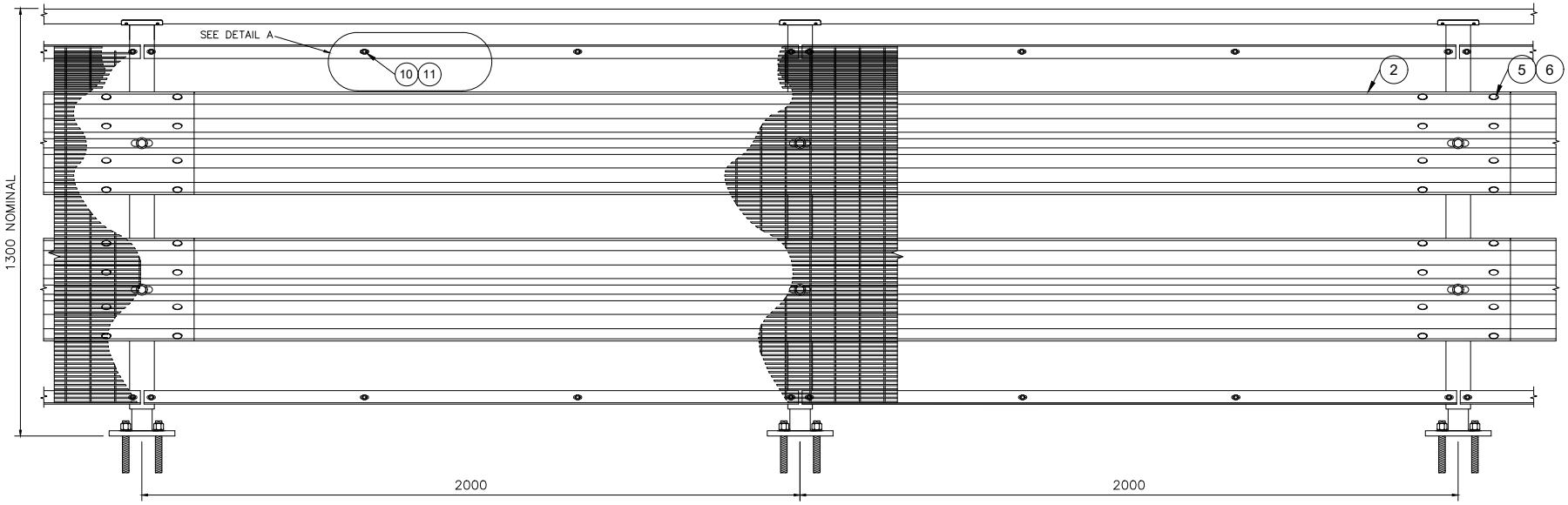


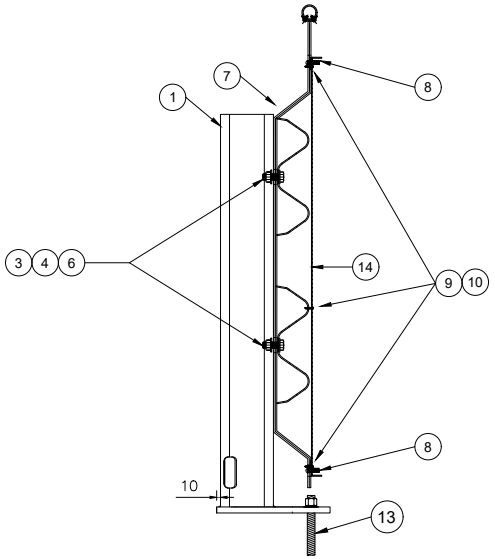
DETAIL A

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10007841	ZEE PARK TRUCK SHIELD POST 1055mm OAll	2
2	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	2
3	10001347	M16 X 35 HEX HEAD BOLT	4
4	10001242	M16 WASHER	4
5	10001248	M16 X 32 SPLICE BOLT	16
6	10001239	M16 OVERSIZE NUT	20
7	10006675	M20 X 180MM STUD W/NUT & WASHER	–

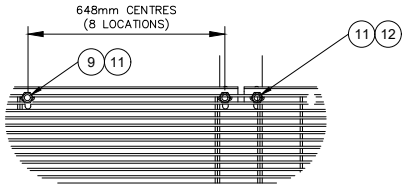
NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-054
ZEE PARK TRUCK SHIELD
GENERAL ARRANGEMENT
REV 0





SIDE VIEW



DETAIL A

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10007841	ZEE PARK TRUCK SHIELD POST 1055mm OAll	2
2	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	2
3	10001347	M16 X 35 HEX HEAD BOLT	4
4	10001242	M16 WASHER	4
5	10001248	M16 X 32 SPLICE BOLT	16
6	10001239	M16 OVERSIZE NUT	20
7	10009387	1300MM CRANKED HANDRAIL EXTENSION	2
8	10001741	ANGLE SUPPORT FOR MESH	4
9	10001311	TEK SCREW 12-14 X 25	32
10	10001742	M8 SECUREMAX SECURITY WASHER	24
11	10001310	M8 X 30MM CUP BOLT / NUT	8
12	10001305	M8 FLAT WASHER	8
13	10006675	M20 X 180MM STUD W/NUT & WASHER	–
14	10001746	1100 X 2400MM ANTI-CLIMB MESH PANEL	–
15	10008605	50 x 25 RHS HANDRAIL 1990MM	2

NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

REVISIONS

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
1	16/04/2021	UPDATED TO SHOW THE 4 SLOT TOP ANGLE, REVERSE NUTS AND BOLTS	VB	PP	PP

REFERENCES

DRAWING NUMBER	REFERENCE DRAWINGS

	NAME	DATE
DRAWN	PP	13/09/2019
CHECKED		
APPROVED		
SCALE	N.T.S. @ A3	
ISSUE FOR	INFORMATION ONLY	

INGAL CIVIL PRODUCTS
A valmont COMPANY

DRAWING AND CONTENTS ARE COPYRIGHT TO INGAL CIVIL PRODUCTS AND CAN ONLY BE USED WITH PRIOR WRITTEN CONSENT FROM INGAL CIVIL PRODUCTS

57-65 AIRDS ROAD
MINTO, N.S.W 2566
PH. +61 2 9827 3333
www.ingalcivil.com.au

PROJECT: QLD RHS HANDRAIL

INGAL CIVIL PRODUCTS PART No.

TITLE: ZEE PARK TRUCK SHIELD WITH HANDRAIL AND 1300mm MESH GENERAL ARRANGEMENT

DRAWING No.: STB-110

Rev: 1

F:\ENGINEERING\SALES & MARKETING\MARKETING DWGS\INGAL CIVIL PRODUCTS - AUSTRALIA\ZEE PARK\STB-110 ZEE PARK TRUCK SHIELD WITH 1300 MESH AND HANDRAIL QLD MOD V2.DWG

10.0 Cable Buffa™ Car Park Cable Barrier

Cable Buffa is a new low-profile car park barrier tested and compliant with AS/NZS1170.1 for light traffic areas.

Utilising the same high-strength galvanized wire rope as our Flex-Fence and MASH Flex highway barriers, Cable Buffa has been proven to easily withstand over twice the required impact loads.

Cable Buffa removes the visual bulk of traditional guardrail barriers, and is ideal for locations where a less obtrusive aesthetic is required. Unlike other cable barriers, Cable Buffa does not require drilling through or connecting to supporting columns. Cable Buffa is surface mounted, and simply bolts down to the car park deck.

10.1 Cable Buffa™ Specifications

Height Top Cable:	720mm
Height Lower Cable:	400mm
Minimum Length:	5.0m
Maximum Post Centres:	5.0m

10.2 Site Preparation

The site should be prepared free of hazards that may interfere with the installation or operational performance of the system. Some sites may require minor leveling, which can be achieved by placing non-shrink grout under the posts.

Recommended Plant & Tools

- Tape Measure
- String Line
- Hammer Drill
- Cordless Drill
- Angle grinder with cut-off wheel
- Torque Wrench
- Rattle Gun
- Ingal Cable Swager
- Ingal Cable Tensioner
- Ingal Cable Tension Gauge
- Small Tools

AS/NZS 1170.1 COMPLIANT

10.3 Installation Sequence

The following written instructions should be read in conjunction with Ingal Civil Products Drawings, Flexfence Tension Unit manual and Flexfence Swaging Unit manual.

1. Using a string line, commence set out by marking the ground for each anchor post location.
2. Mark out intermediate post locations leaving a maximum unsupported cable length of 5m.
3. Bolt one Cable Buffa anchor post initially.
4. Drill 22mm holes through each of the 4 anchor post holes to a depth of 170mm. Ensure the holes are clean free from dust and debris.

Intermediate Posts

5. Follow mixing instructions for anchoring epoxy carefully. Epoxy M20 x 180mm stud with nut through Cable Buffa anchor post hole.
6. Allow epoxy adhesive to fully cure before torqueing M20 nuts to 150 Nm.
7. Bolt down intermediate posts using two diagonal anchors.
8. Bolt down final anchor post once cable lengths are determined.

Anchor Post

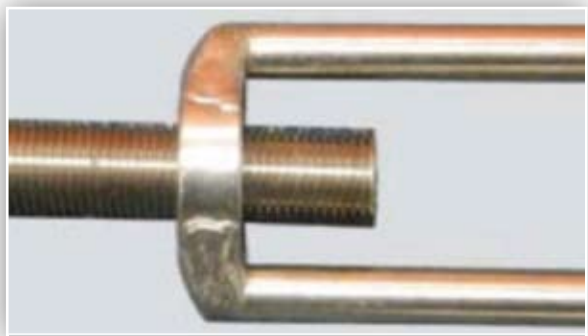
10.4 Cable Installation

1. Measure the total length from the outside face of each anchor post.
2. Subtract 5m from this distance. This will be the length of the longer cables.
3. Unspool the cable, measure and cut 1 x 3m length.
4. Measure and cut one cable the length determined in step 2.
5. Using the Ingal swager, swage a 10001530 fitting on each end of both cables.

Fitting prior to Swage on cable

Fitting once swaged on cable

6. Slide one end of each cable through the lower hole in each anchor post.
7. Thread the long cable through all intermediate posts.
8. Slide the 10001534 tension fitting through the loose end of both cables and secure with supplied nuts. Leave 1-2 threads exposed beyond each nut.



Tension Fitting over Swaged fitting

Attach nut to swaged fitting end

Cable Tensioner in place

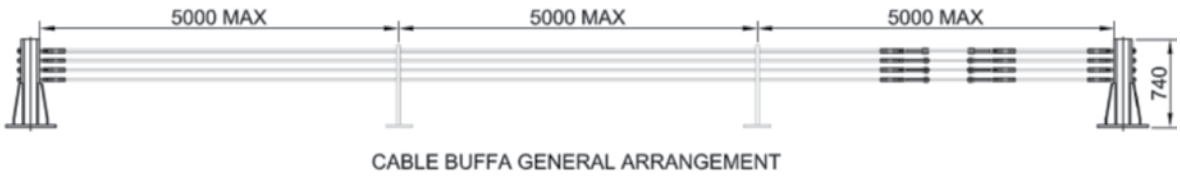
Completed assembly prior to tensioning

9. If cable is too slack, tighten nuts at anchor post ends of cables.
10. Once cable is firm, measure and cut remaining cables as per steps 3 & 4.
11. If cable is still slack, cut one cable short by this amount.
12. Attach remaining cables, remembering to add plastic spacers between each cable.

Checking Cable Tension with Dillon Meter

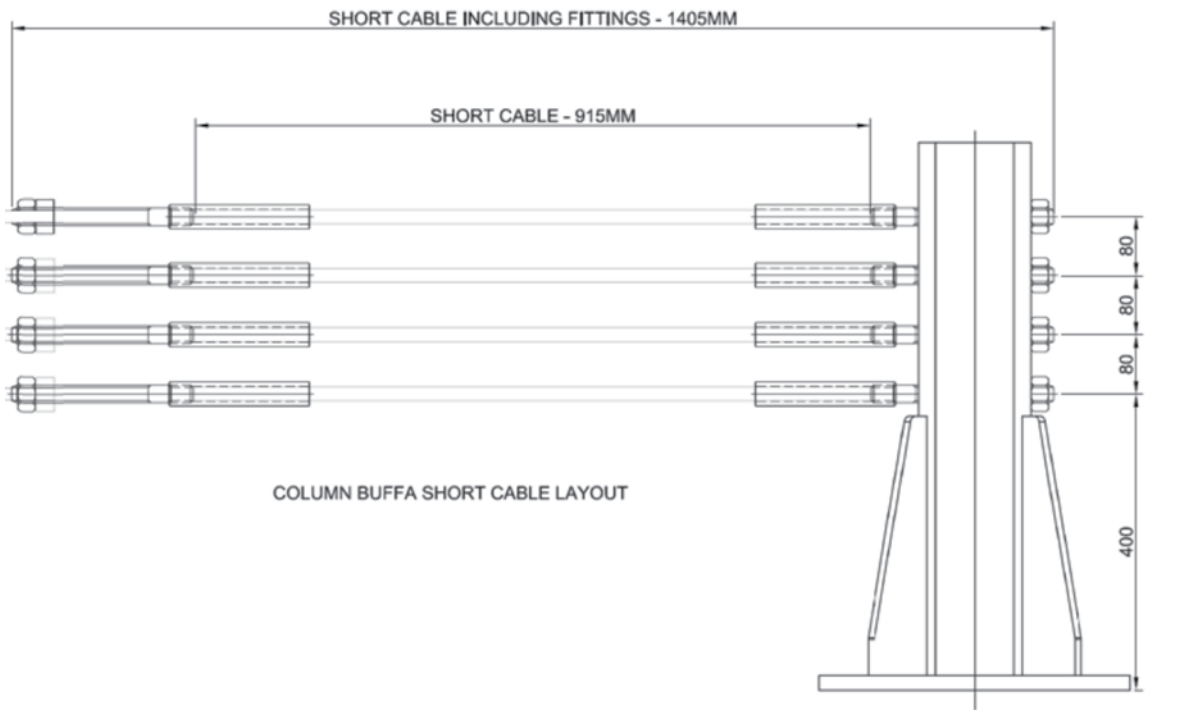
13. When all cables are installed, attach Dillon meter to lower cable and tension cable using Ingal cable tensioner, tightening the nuts between the tension fittings until 10kN tension is achieved.
14. Continue for remaining cables.
15. Repeat process until all cables read 10kN tension.
16. Place top caps on intermediate posts.
17. Check over system
18. System is now operational.

Tension fittings prior to tensioning system



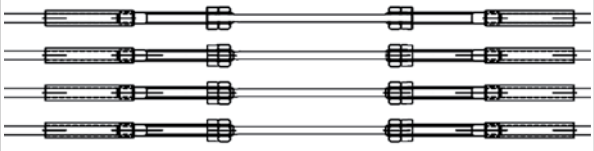
CABLE BUFFA GENERAL ARRANGEMENT

System Layout



COLUMN BUFFA SHORT CABLE LAYOUT

Short Cable Layout



Cable Tension Fittings

10.5 Parts List

Part No	Description
10008991	End Post
10009780	Intermediate Post
10001563	Post Cap
10001567	Plastic Spreader
10001530	End Fitting
10001534	Tension Fitting
10001526	Wire Rope, 19mm

10.6 Cable Buffa™ Installation Checklist

Please complete the following installation checklist to ensure Cable Buffa™ Car Park Barrier system performs as designed.

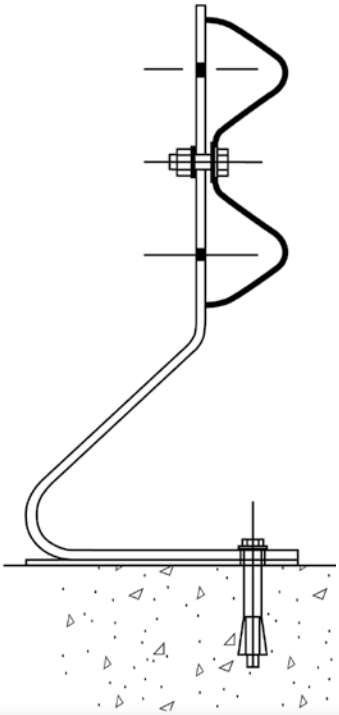
Cable Buffa™ Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
System Installation		
Is the area clear of obstacles that may impede the operational performance of the system?	☐ Yes	☐ No
Is the concrete of sufficient depth and strength (200mm, 32MPa)?	☐ Yes	☐ No
Have the intermediate posts been positioned correctly?	☐ Yes	☐ No
Are the posts orientated correctly?	☐ Yes	☐ No
Have the posts been installed using the holding down anchors nominated in ICP drawings?	☐ Yes	☐ No
Are the cables installed with the tension bays accessable?	☐ Yes	☐ No
Have the cables been tensioned to 10kN?	☐ Yes	☐ No
Cable Tension 1 (Upper)		kN
Cable Tension 2 (2nd)		kN
Cable Tension 3 (3rd)		kN
Cable Tension 4 (Lower)		kN
Is site clean and clear of debris?	☐ Yes	☐ No

11.0 Ingal Spring Steel Buffa™ Classic Post

The Spring Steel Buffa™ is manufactured from high-grade spring steel and is heat-treated for strength and flexibility.

The Spring Steel Buffa™ can deflect up to 300mm upon impact, reducing the forces on the anchor bolts by up to 75%, thereby minimising damage to both the barrier and the impacting vehicle.

The Classic Post only requires one holding down bolt per post. The dynamic deflection of the barrier is contained within the post footprint area, thereby minimising the required clearance to hazards and maximising floor space. The Classic Post is available with handrail extension pieces and anti-climb mesh infill panels.



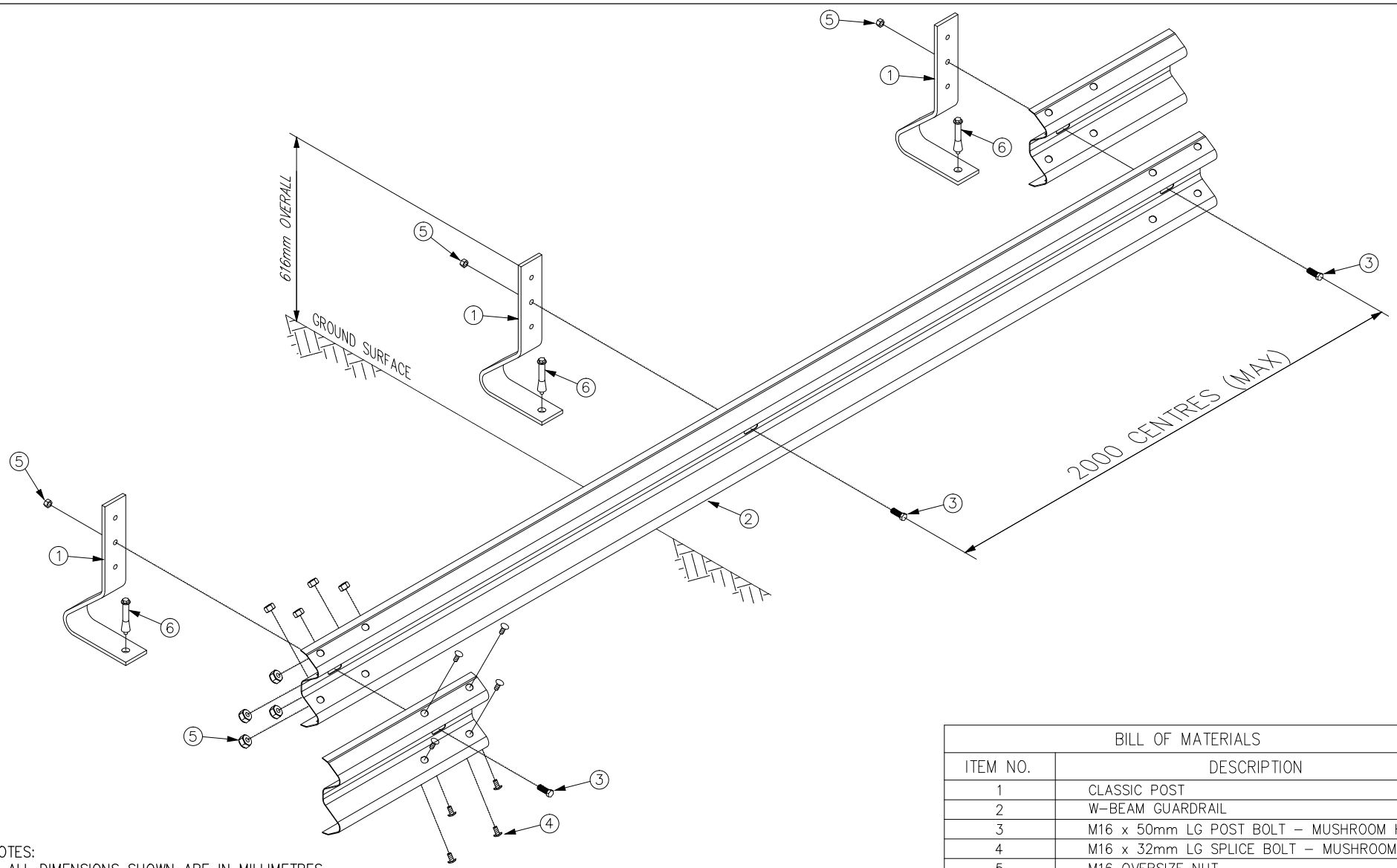
AS1170.1 COMPLIANT

11.1 Classic Post Specifications

Finish:	Hot Dip Galvanized to AS4680
Post Height:	610mm
Footprint:	300 x 100mm
Max. Post Spacing:	2000mm
Deflection:	Up to 300mm
Weight:	11kg
Anchor Bolts:	1 off per post
Anchor Bolt Size:	Dependent upon application

11.2 Classic Post Applications

- Perimeter edge and split-level protection for multi-storey car parks
- Internal and external barrier protection for walls in warehouses and logistic depots
- Protection to high value plant and equipment
- Loading bay ramps



BILL OF MATERIALS	
ITEM NO.	DESCRIPTION
1	CLASSIC POST
2	W-BEAM GUARDRAIL
3	M16 x 50mm LG POST BOLT – MUSHROOM HD
4	M16 x 32mm LG SPLICE BOLT – MUSHROOM HD
5	M16 OVERSIZE NUT
6	ANCHOR BOLT

NOTES:
1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
2. MATERLIAL= AS SHOWN
3. FINISH= AS SPECIFIED

REVISIONS

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
2	26/10/12	NEW DRAWING TEMPLATE; DWG No. WAS STB-04	D.K	M.K	
1	14/08/09	TITLE BLOCK UPDATED	M.S.		
0	12/11/07	INITIAL ISSUE	A.P.	T.C	

REFERENCES

DRAWING NUMBER	REFERENCE DRAWINGS

	NAME	DATE
DRAWN	AJP	12/11/2007
CHECKED	T.C	12/11/2007
APPROVED		
SCALE	N.T.S.	
SIZE	A3	

INGAL CIVIL PRODUCTS
57-65 AIRDS ROAD
MINTO, N.S.W
AUSTRALIA 2566
PH. +61 2 9827 3333
FAX +61 2 9827 3300
www.ingalcivil.com.au

DRAWING AND CONTENTS ARE COPYRIGHT TO INGAL CIVIL PRODUCTS AND CAN ONLY BE USED WITH PRIOR WRITTEN CONSENT FROM INGAL CIVIL PRODUCTS

PROJECT

INGAL CIVIL PRODUCTS REFERENCE No.

TITLE
SPRING STEEL BUFFA
CLASSIC POST
POST & RAIL ASSEMBLY

DRAWING No.
STB-004
REV. 2

12.0 Ingal Spring Steel Buffa™ Standard Post

The Spring Steel Buffa™ is manufactured from high-grade spring steel and is heat-treated for strength and flexibility. The Spring Steel Buffa™ can deflect up to 300mm upon impact, reducing the forces on the anchor bolts by up to 75%, thereby minimising damage to both the barrier and the impacting vehicle.

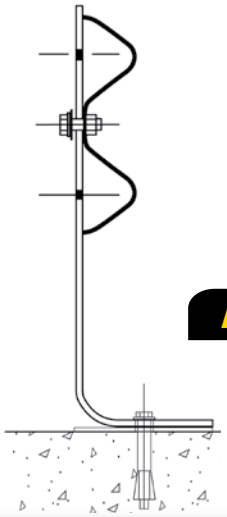
The Standard Post only requires one holding down bolt per post. Rail can be mounted either side of the standard post in order to maximise floor space or to prevent post feet being a trip hazard or to minimize damage to tyres. The Standard Post is available with handrail extension pieces and mesh infill panels

12.1 Standard Post Specifications

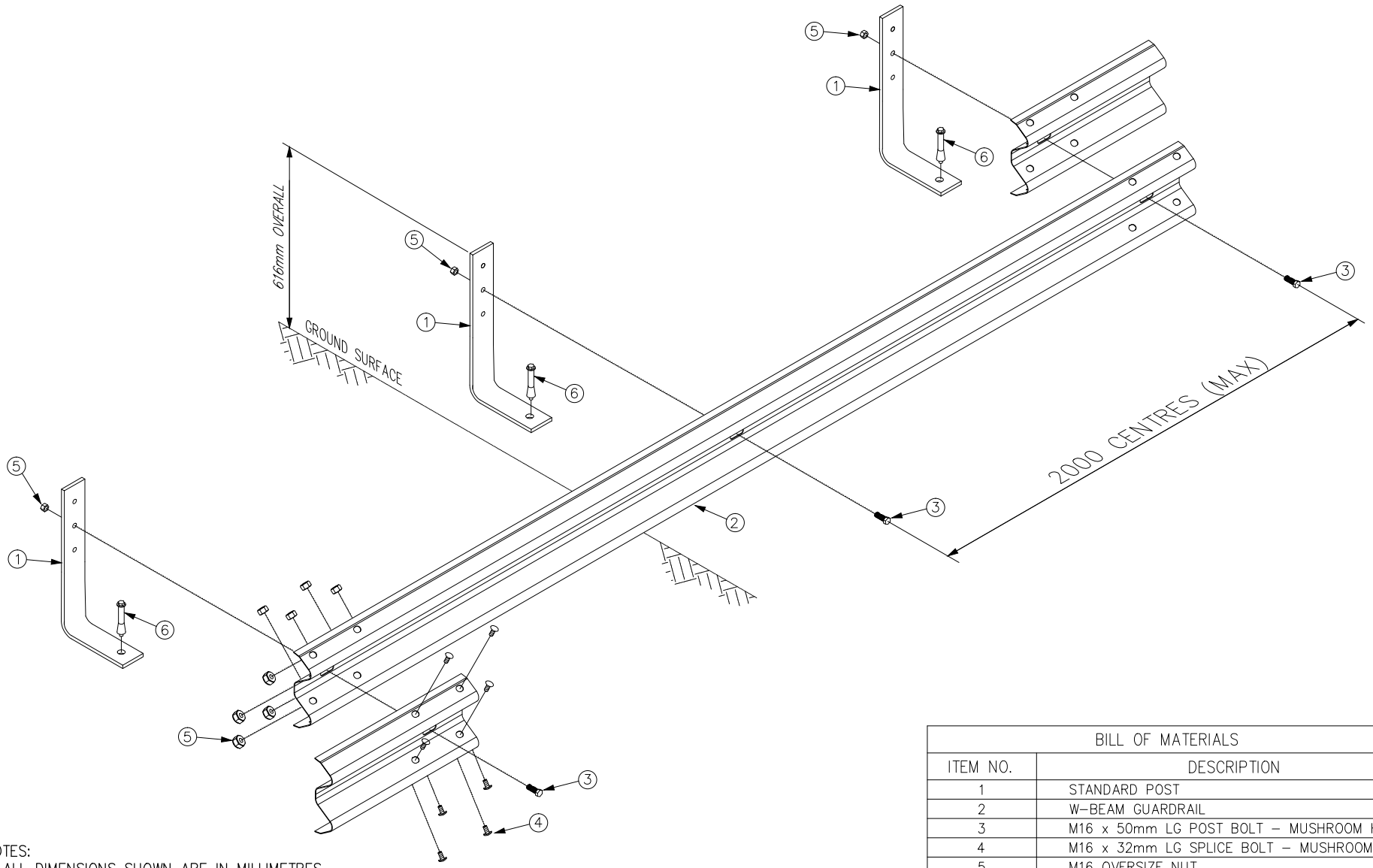
Finish:	Hot Dip Galvanized to AS4680
Post Height:	610mm
Footprint:	300 x 100mm
Max. Post Spacing:	2000mm
Deflection:	Up to 300mm
Weight:	11kg
Anchor Bolts:	1 off per post
Anchor Bolt Size:	Dependant upon application

12.2 Standard Post Applications

- Ramp protection on multi-storey car parks
- Split level protection on multi-storey car parks
- Internal and external barrier protection for walls in warehouses and logistic depots
- Protection to high value plant and equipment
- Loading bay ramps



AS1170.1 COMPLIANT



BILL OF MATERIALS	
ITEM NO.	DESCRIPTION
1	STANDARD POST
2	W-BEAM GUARDRAIL
3	M16 x 50mm LG POST BOLT – MUSHROOM HD
4	M16 x 32mm LG SPLICE BOLT – MUSHROOM HD
5	M16 OVERSIZE NUT
6	ANCHOR BOLT

NOTES:
1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
2. MATERLIAL= AS SHOWN
3. FINISH= AS SPECIFIED

REVISIONS

REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED
2	26/10/12	NEW DRAWING TEMPLATE; DWG No. WAS STB-18	D.K	M.K	
1	14/08/09	TITLE BLOCK UPDATED	M.S.		
0	12/11/07	INITIAL ISSUE	A.P.	T.C	

REFERENCES

DRAWING NUMBER	REFERENCE DRAWINGS

	NAME	DATE
DRAWN	AJP	12/11/2007
CHECKED	T.C	12/11/2007
APPROVED		
SCALE	N.T.S.	
SIZE	A3	

INGAL CIVIL PRODUCTS
57-65 AIRDS ROAD
MINTO, N.S.W
AUSTRALIA 2566
PH. +61 2 9827 3333
FAX +61 2 9827 3300
www.ingalcivil.com.au

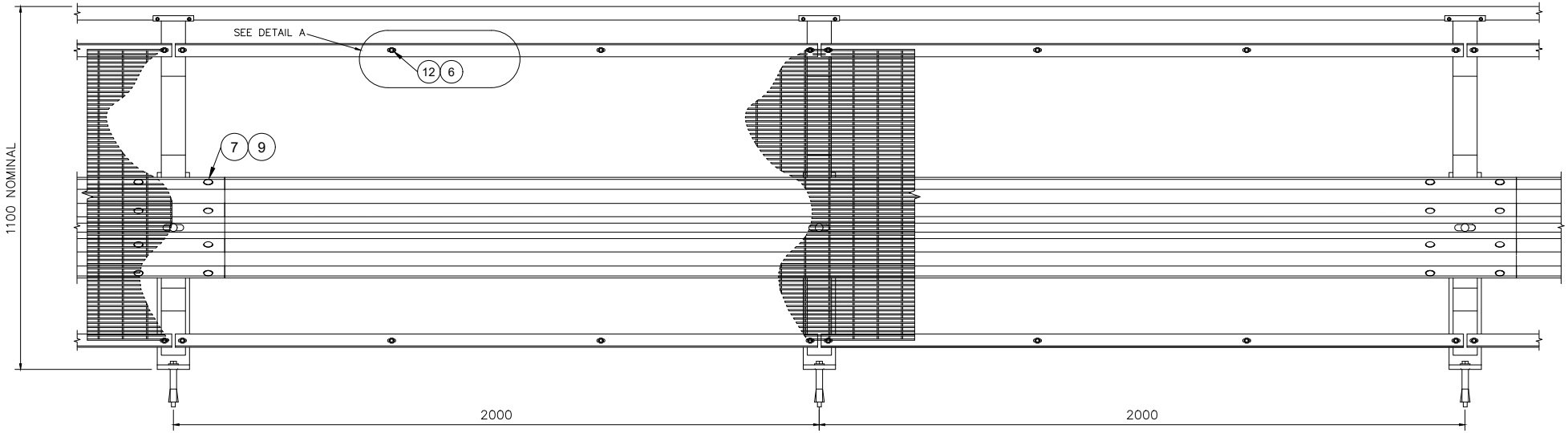
DRAWING AND CONTENTS ARE COPYRIGHT TO INGAL CIVIL PRODUCTS AND CAN ONLY BE USED WITH PRIOR WRITTEN CONSENT FROM INGAL CIVIL PRODUCTS

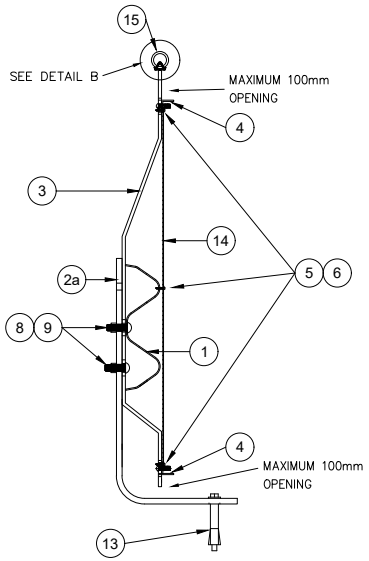
PROJECT

INGAL CIVIL PRODUCTS REFERENCE No.

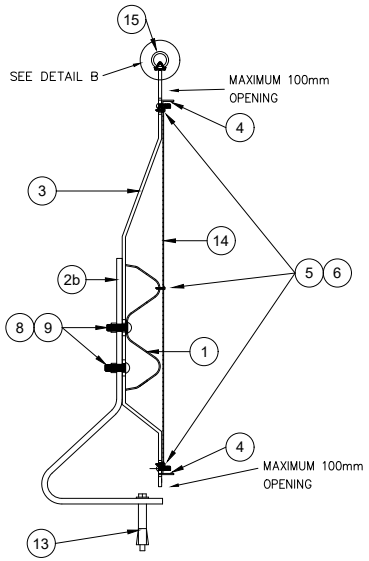
TITLE
SPRING STEEL BUFFA
STANDARD POST
POST & RAIL ASSEMBLY

DRAWING No.
STB-018
REV. 2

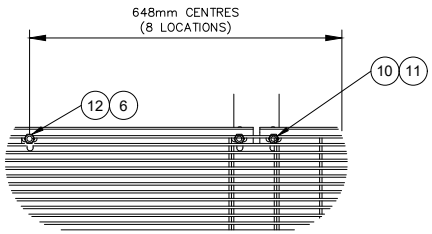




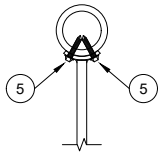
STANDARD POST



CLASSIC POST



DETAIL A



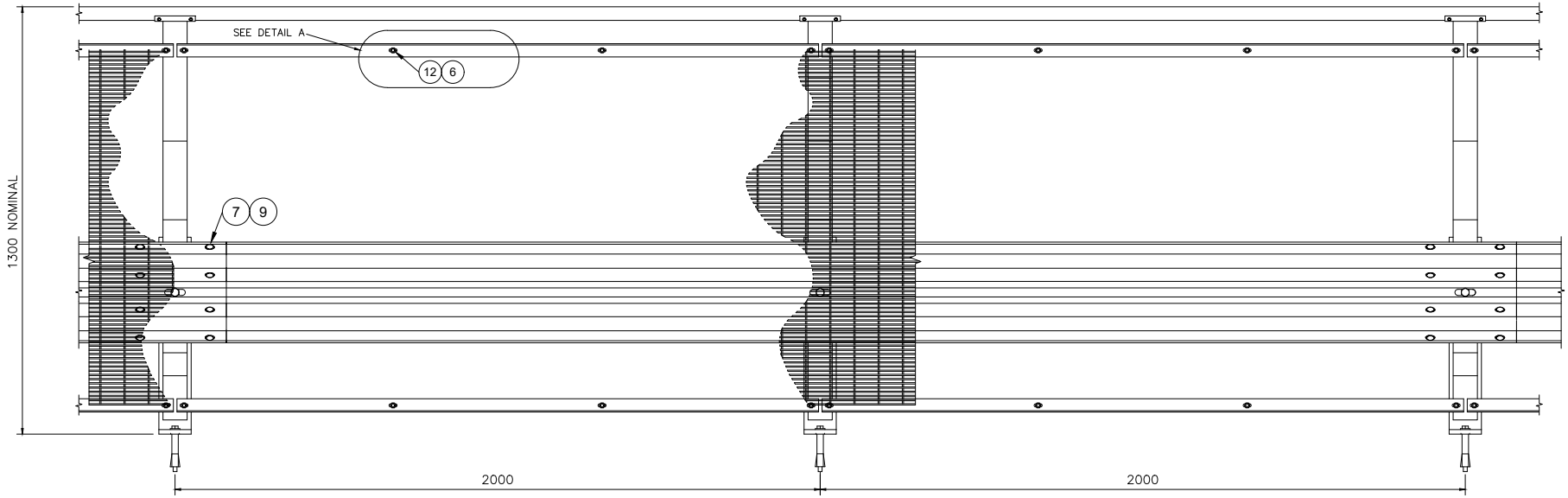
DETAIL B

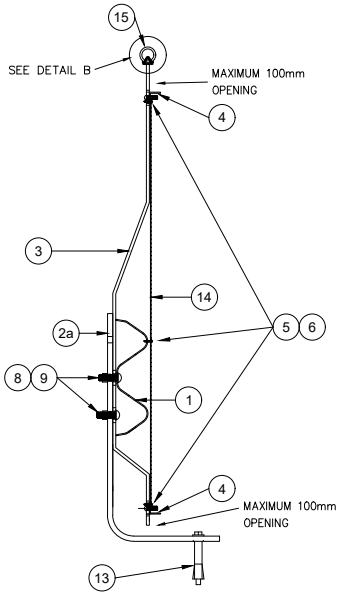
4-OFF TEK SCREWS
PER POST CONNECTION

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10000977	W–BEAM GUARDRAIL 4.0M N.L.L	1
2a	10001697	SPRING STEEL STANDARD POST 610mm OA	2
2b	10001694	SPRING STEEL CLASSIC POST 610mm OA	2
3	10006104	1100MM CRANKED HANDRAIL EXTENSION	2
4	10009021	ANGLE SUPPORT FOR MESH 4–SLOT	4
5	10001311	TEK SCREW 12–14 X 25	24
6	10001742	M8 SECUREMAX SECURITY WASHER	24
7	10001248	M16 X 32 SPLICE BOLT	8
8	10001233	M16 X 50MM POST BOLT	4
9	10001239	M16 OVERSIZE NUT	12
10	10001310	M8 X 30MM CUP BOLT / NUT	8
11	10001305	M8 FLAT WASHER	8
12	10008960	M8 x 25MM CUP HEAD NUT & BOLT	8
13	10006675	M20 X 125MM LG ANCHOR BOLT	–
14	10001738	900 X 2400MM ANTI–CLIMB MESH PANEL	–
15	10001731	32NB HANDRAIL 6.5M	–

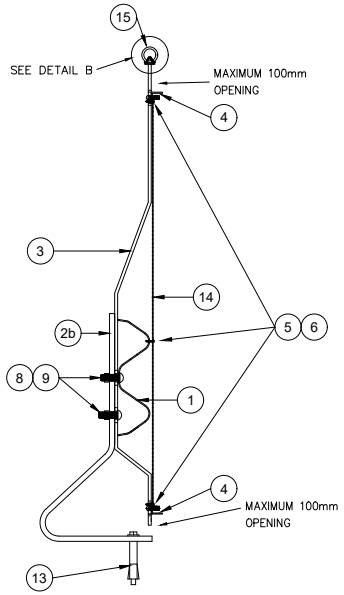
NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB–035A
SPRING STEEL BUFFA WITH
HANDRAIL AND MESH 1100mm
GENERAL ARRANGEMENT
REV 6 – 16/04/2021

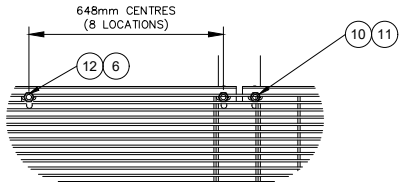




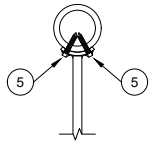
STANDARD POST



CLASSIC POST



DETAIL A



DETAIL B

4-OFF TEK SCREWS
PER POST CONNECTION

ITEM NO.	PART NO.	DESCRIPTION	KIT QTY
1	10000977	W-BEAM GUARDRAIL 4.0M N.L.L	1
2a	10001697	SPRING STEEL STANDARD POST 610mm OA	2
2b	10001694	SPRING STEEL CLASSIC POST 610mm OA	2
3	10006104	1100MM CRANKED HANDRAIL EXTENSION	2
4	10009021	ANGLE SUPPORT FOR MESH 4-SLOT	4
5	10001311	TEK SCREW 12-14 X 25	24
6	10001742	M8 SECUREMAX SECURITY WASHER	24
7	10001248	M16 X 32 SPLICE BOLT	8
8	10001233	M16 X 50MM POST BOLT	4
9	10001239	M16 OVERSIZE NUT	12
10	10001310	M8 X 30MM CUP BOLT / NUT	8
11	10001305	M8 FLAT WASHER	8
12	10008960	M8 x 25MM CUP HEAD NUT & BOLT	8
13	10006675	M20 X 125MM LG ANCHOR BOLT	–
14	10001738	900 X 2400MM ANTI-CLIMB MESH PANEL	–
15	10001731	32NB HANDRAIL 6.5M	–

NOTES:
1. TO BE INSTALLED AS PER THE 'CARPARK & INDUSTRIAL BARRIERS' PRODUCT MANUAL

STB-044
SPRING STEEL BUFFA WITH
HANDRAIL AND MESH 1300mm
GENERAL ARRANGEMENT
REV 6 – 16/04/2021

13.0 Installation of Classic and Standard Post Systems

13.1 Site Preparation

The site should be prepared free of hazards that may interfere with the installation or operational performance of the system.

Some sites may require minor leveling, which can be achieved by placing steel packing plates under the posts.

13.2 Recommended Plant & Tools

- Tape Measure
- String Line
- Levelling Device
- Drilling Tools
- Torque Wrench
- Cutting Tools
- Hand Tools

13.3 Installation Sequence

The following written instructions should be read in conjunction with Ingal Civil Products Drawings;

STB -004 Classic Post Arrangement

STB-018 Standard Post Arrangement

STB-06 Flexi-Post Arrangement

STB-35 Handrail Extension and Mesh Infill Panel Arrangement

13.3.1 Post Installation

1. Using a string line, commence set out by marking the ground for each post location. Posts will typically be at 2m centres (max).
2. If installing the standard post, provide a 300mm clearance from the post to the hazard to accommodate for the expected dynamic deflection.
3. If installing a classic post, the dynamic deflection of the system will be contained within the post footprint.
4. Drill holes for each post to the depths as required by the nominated anchor bolt size. If securing with chemical anchors, ensure the holes are free from dust and debris.
5. Place the post above the drilled hole(s) and insert the holding down bolt, tighten to snug tight.

13.3.2 Handrail Extension Attachment

1. Align the handrail extension piece (also called a crank) with the post and secure through the pre-punched upper hole in the extension piece using an M16x50mm bolt.

   Note: Custom height barriers may require an additional; M16 x 50 Bolt through the lower hole of the extension piece and post.

13.3.3 Rail Attachment

1. Align the w-beam sections with the posts and secure using the bolts nominated in the ICP drawings.
2. If a handrail extension piece is attached, ensure the extension is vertical before securing the M16x65mm bolt through the rail, post and handrail.
3. Splice rails together using M16x32m bolts eight (8) bolts are required per splice.
4. Rails should be lapped so that the exposed edge is facing away from the approaching traffic.

13.3.4 Handrail Attachment

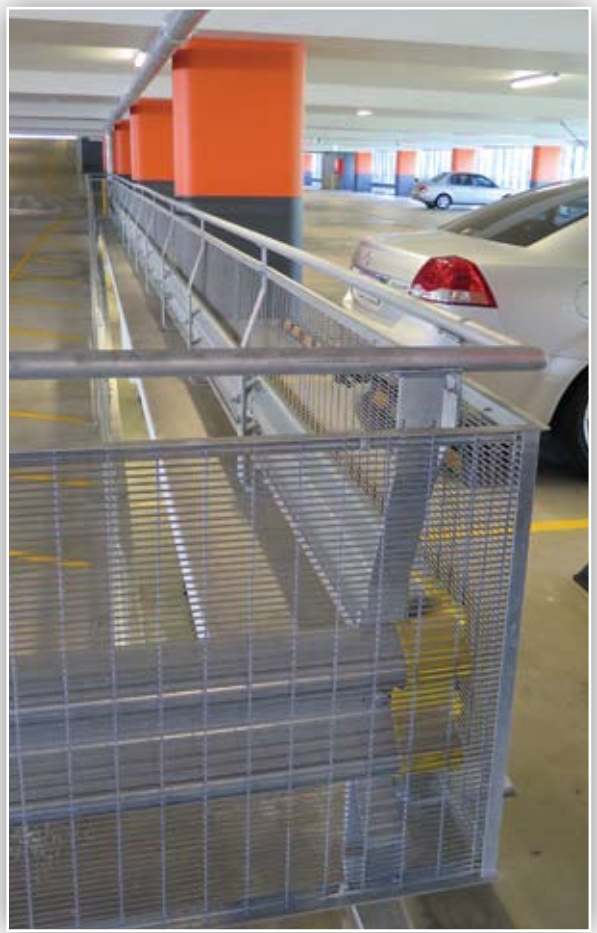
1. Align the handrail section with the extension pieces and secure the handrail with tek screws.
2. Joins in the handrail are made by butting adjacent handrails together at the post extensions prior to securing with tek screws.
3. If a handrail join cannot be located at the post extension, adjacent rails can be spot welded together. A zinc rich paint should then be applied to the welded surfaces.

   Note: Joiners are available from Ingal Civil Products for handrail sections and are recommended to avoid welding.

However the above instructions are to be followed if you are not using a handrail joiner.

13.3.5 Anti-Climb Mesh Attachment

1. Loosely attach 4-slot angle section to upper and lower slots in the handrail cranked extension using M8 x 30mm cup head bolts and nuts
2. Loosely attach anti-climb mesh panel to intermediate slots in upper and lower angles with M8 x 25mm cup head bolts and nuts. Slide the bolt in from the rear of the angle, and place a saddle washer under the nut
3. Once mesh is held in place, remove upper and lower bolts at cranked extensions one at a time. Slide bolt in from rear of angle so that it holds mesh in place, and add a saddle washer and nut.
4. Ensuring gap below lower mesh is less than 100mm, tighten all mesh attachment nuts.
5. If required, add tek-screws with saddle washers through W-beam rail at 500mm centres.
6. Joins in the mesh panels are made by butting adjacent panels together and securing with tek-screws and saddle washers through upper and lower angles and w-beam rail, ensuring both panels are secured.



13.4 Classic and Standard Post System Installation Checklist

Please complete the following installation checklist to ensure Classic and Standard Post systems perform as designed.

Classic and Standard Post System Installation Checklist		
Customer:		
Project:		
Checked By:		
Signed:		
Date		
Post Installation		
Is the area clear of obstacles that may impede the operational performance of the system	☐ Yes	☐ No
Have the posts been positioned at a maximum 2000mm spacing	☐ Yes	☐ No
Are the posts orientated correctly	☐ Yes	☐ No
Have the posts been installed using M20 x 180mm threaded rod and chemical adhesive or M20 x 125mm Trubolt?	☐ Yes	☐ No
Handrail Installation		
Are the handrail extensions secured to the posts with two (2) M16 bolts	☐ Yes	☐ No
Are the handrail extensions vertical	☐ Yes	☐ No
Has the handrail been attached to the extension pieces with tek screws	☐ Yes	☐ No
Rail Installation		
Are the rails secured to each post	☐ Yes	☐ No
Are the rails spliced with eight (8) M16x32mm bolts	☐ Yes	☐ No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	☐ Yes	☐ No
Mesh Infill Installation		
Are the angle sections attached at the top and bottom of the handrail extension pieces	☐ Yes	☐ No
Are the mesh anti-climb sections attached to the lower or upper corrugation of the rail using tek screws and saddle washers at 500mm centres	☐ Yes	☐ No
Are the anti-climb mesh sections tethered at the joins using saddle washers	☐ Yes	☐ No
General		
Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	☐ Yes	☐ No
Are all fasteners secure	☐ Yes	☐ No
Is all rubbish and debris removed	☐ Yes	☐ No

14.0 Rigid Post Systems

For very light impacts, the inherent strength of a steel barrier, rigidly mounted may be sufficient to withstand impacts without suffering damage. However, the full load of any impact is passed through the barrier into the holding down bolts. Stronger impacts will therefore result in damage to the impacting vehicle, the barrier and the foundations.

Rigid posts are available as C posts or U posts depending upon site requirements.

14.1 Rigid Post Specifications

Finish:	Hot Dip Galvanized to AS4680
Post Height:	700 or 750mm (C Post) 700mm (U Post)
Footprint:	200 x 280mm (C Post) 300 x 300mm (U Post)
Typical Post Spacing:	2000mm
Deflection:	Untested to AS/NZS 1170.1:2002
Weight:	18kg
Anchor Bolts:	4 off per post
Anchor Bolt Size:	Dependant upon application

14.2 Rigid Post Applications

- Glancing blow collisions at low speeds with light vehicles
- Internal and external barrier protection for walls in warehouses and logistic depots

15.0 Ingal Column Buffa™

Supporting columns are highly vulnerable to damage from vehicle traffic. Repairs are usually costly, and damage may affect the structural integrity of the supporting column. The Column Buffa™ is also suitable for exposed pipework and lighting columns that are located in trafficable areas.

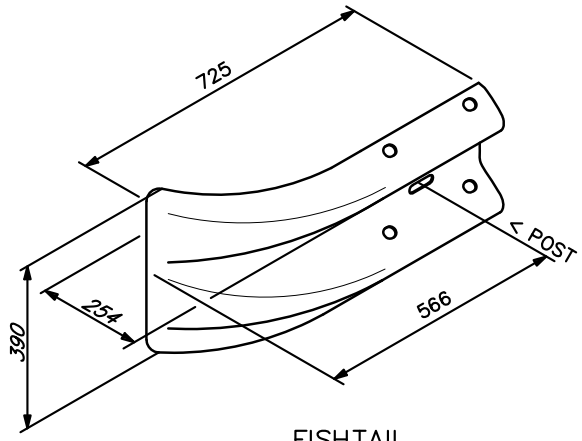
The Column Buffa™ is available in full or semi-circle units with single or double rail, providing protection from low speed impacts. Column Buffas™ are supported by spring steel posts ensuring that damage to the barrier, structure and impacting vehicle is minimised. Posts can be turned inwards to prevent a trip hazard or damage to tyres. Each supporting post only requires one holding down bolt per post.

15.1 Column Buffa Specifications

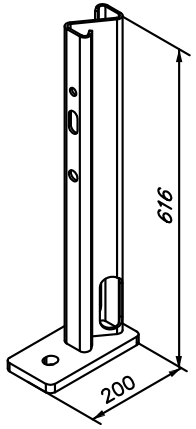
Finish:	Hot Dip Galvanized to AS4680
Post Height:	610mm
Internal Diameters:	750 and 1000mm
Anchor Bolts:	1 per post
Anchor Bolt Size:	Dependent upon application

16.0 Angles and Corners

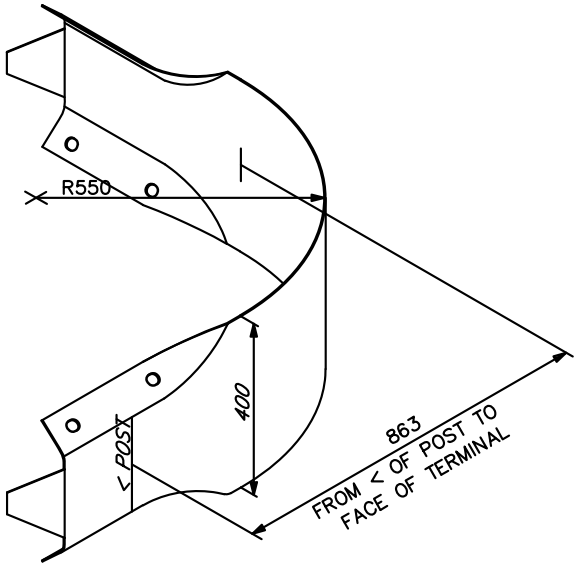
Car park barriers meeting at an angle can be joined using one of our many 45 degree or 90 degree angled sections. These enable use of a continuous barrier system throughout.



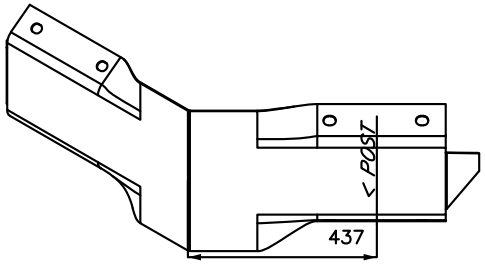
FISHTAIL
Part No. 10000473



ZEE PARK POST
Part No. 10007635

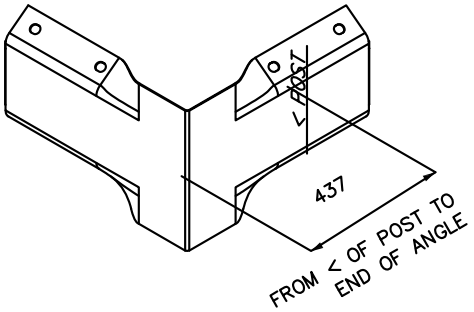


RIGHT ANGLE TERMINAL
Part No. 10000501 – Convex
Part No. 10000504 – Concave

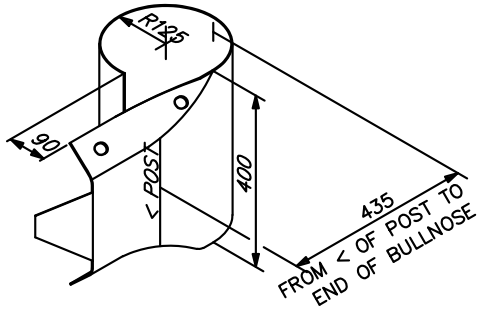


FROM < OF POST TO
END OF ANGLE

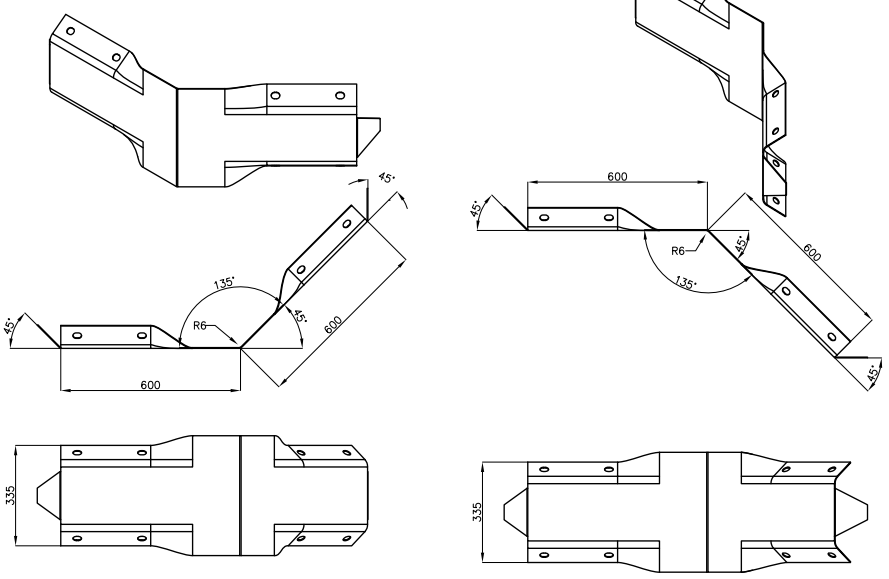
45 DEGREE CONVEX CORNER
Part No. 10008391
Part No. 10008393 (CONCAVE)



90 DEGREE CONVEX CORNER
Part No. 10008395
Part No. 10008397 (CONCAVE)

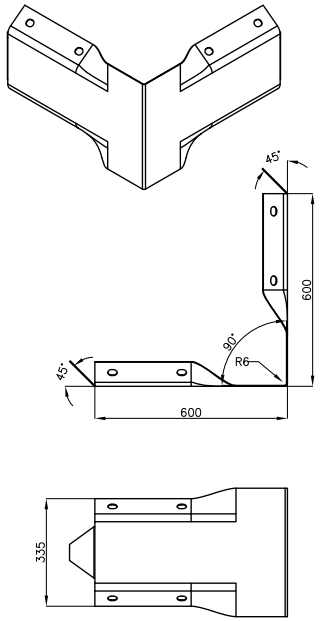


SHORT BULLNOSE
Part No. 10000493

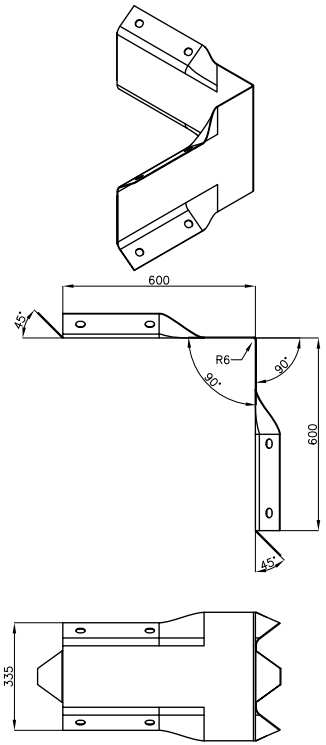


10008391 45 Degree Convex

10008393 45 Degree Concave



10008395 90 Degree Convex



10008397 90 Degree Concave

17.0 Accessories

The following accessories are available to compliment your range of car park and industrial barriers;

- Post Caps
- Short W-beam Bullnose Ends
- Wheel Stops
- Speed Humps
- Corner Protectas
- Plastic Rail Caps
- Steel Bollards

INGAL
CIVIL PRODUCTS
A valmont COMPANY

For more information

contact us on the web

www.ingalcivil.com.au

Head Office: Sydney
57-65 Airds Road, Minto, NSW 2566
Ph: +61 2 9827 3333
Fax: +61 2 9827 3300
Local call (within Australia):
1300 446 425
Email: sales@ingalcivil.com.au

Our Locations:
• Adelaide/NT • Brisbane
• Melbourne • Newcastle
• Perth • Sydney • Wagga
• Auckland • Christchurch