

# Car Park & Industrial Barriers

## *Product Manual*



Release 05/16

[www.ingalcivil.com.au](http://www.ingalcivil.com.au)

## 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 holding down bolts. Fewer holding down bolts are required resulting in an easier to install system and minimal damage to valuable plant and equipment.

## 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.
- Climability 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;

$$F = mv^2/2D$$

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).

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.





### 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



## 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 - 20mm at 30kN
- 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

### 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 torquing 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.



## 4.8 Anti-Climb Mesh Attachment

1. Align the anti-climb panel sections with the front face of the w-beam sections.
2. Using Tek-screws and saddle washers, secure the mesh panels to the w-beam sections ensuring a gap of not less than 100mm exists between ground level and the bottom of the mesh panel.
3. Tek-screws are attached through the top and bottom corrugations of the w-beam sections at spacings of 500mm along the length of the beams.
4. The mesh panels are secured to each handrail extension pieces with a Tek-screw.
5. Joins in the mesh panels are made by butting adjacent panels together and securing with saddle clips ensuring both panels are secured. An additional saddle clip should be attached at the bottom of the panels.
6. Align the stiffening section with the top of the mesh panels and secure to the handrail extensions using an M12x50mm bolt through the pre-punched hole approximately 100mm below the handrail.
7. Joins in the stiffening sections are made by butting adjacent sections together.
8. Between handrail extension pieces, drill holes at 500mm centres and attach the stiffening section to the mesh using M12x50mm bolts.



## 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been positioned at a maximum 2000mm spacing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the posts orientated correctly	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been installed using mechanical or chemical anchors nominated in ICP drawings	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Handrail Installation

Are the handrail extensions secured to the posts with two (2) M16 bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the handrail extensions vertical	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the handrail been attached to the extension pieces with tek screws	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Rail Installation

Are the rails secured to each post	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced with eight (8) M16x32mm bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Mesh Infill Installation

Is the gap between the bottom of the mesh panel and ground level less than 100mm	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the mesh been attached to the upper and lower configurations of the rails using tek screws and saddle clips of 500mm centres	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the anti-climb mesh sections been joined ensuring the saddle clips engage adjoining panels	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the stiffening section been attached to the handrail extensions and the top of the mesh panels	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### General

Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are all fasteners secure	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is all rubbish and debris removed	<input type="checkbox"/> Yes	<input type="checkbox"/> No



## 5.0 Zee Park® Sentinel

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.

**AS/NZS 1170.1 COMPLIANT**



### 5.1 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





## 6.0 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

#### 6.1 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



## 7.0 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

### 7.1 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**



## Installation Checklist

Please complete the following installation checklist to ensure ZEE Park Sentinel, DeckGuard and TruckShield systems performs as designed.

### Zee Park Sentinel, DeckGuard and 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been positioned at a maximum 2000mm spacing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the posts orientated correctly	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been installed using the required number of M20 x 180mm anchors, with the specified chemical adhesive?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

#### Handrail Installation

Are the handrail extensions secured to the posts with two (2) M16 bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the handrail extensions vertical	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the handrail been attached to the extension pieces with tek screws	<input type="checkbox"/> Yes	<input type="checkbox"/> No

#### Rail Installation

Are the rails secured to each post	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced with eight (8) M16x32mm bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	<input type="checkbox"/> Yes	<input type="checkbox"/> No

#### Mesh Infill Installation

Are the angle sections attached at the top and bottom of the handrail extension pieces	<input type="checkbox"/> Yes	<input type="checkbox"/> 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the anti-climb mesh sections tethered at the joins using saddle washers	<input type="checkbox"/> Yes	<input type="checkbox"/> No

#### General

Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are all fasteners secure	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is all rubbish and debris removed	<input type="checkbox"/> Yes	<input type="checkbox"/> No

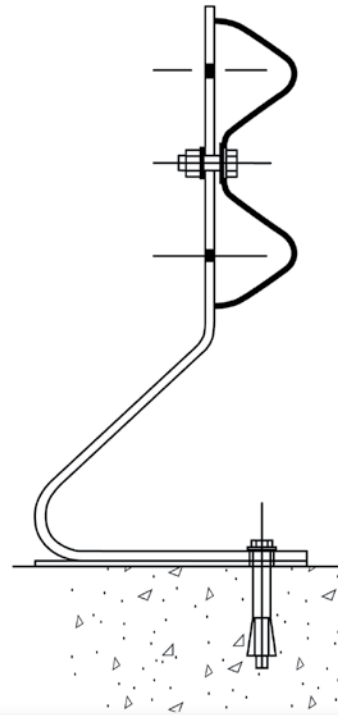


## 8.0 Ingal Spring Steel Buffa™ Classic Post

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**

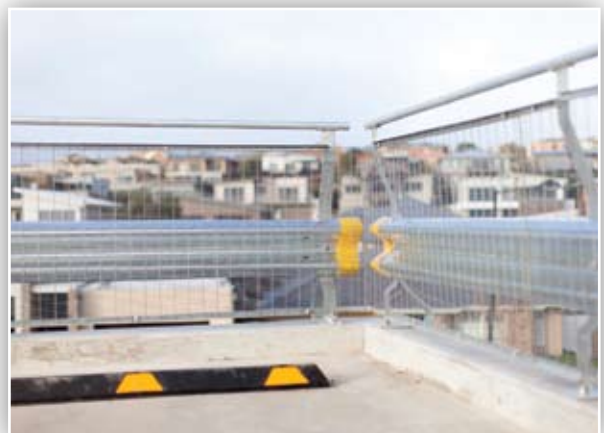


## 8.1 Classic Post Specifications

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

## 8.2 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



## 9.0 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.

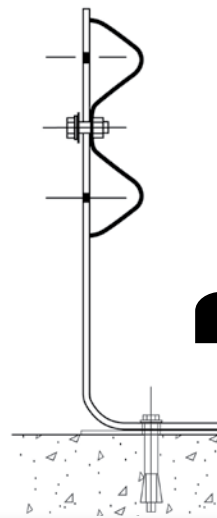
The Standard Post only requires one holding down bolt per post. Rail can be mounted either side of the standard post in order to maximise floor space or to prevent post feet being a trip hazard or to minimize damage to tyres. The Standard Post is available with handrail extension pieces and mesh infill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

### 9.1 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

### 9.2 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**





## 10.0 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.

### 10.1 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

### 10.2 Rigid Post Applications

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



## 11.0 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.

### 11.1 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



## 12.0 Installation of Classic and Standard Post Systems

### 12.1 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.

### 12.2 Recommended Plant & Tools

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

### 12.3 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

### 12.3.1 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.





## 12.3.2 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.

## 12.3.3 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.

## 12.3.4 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.

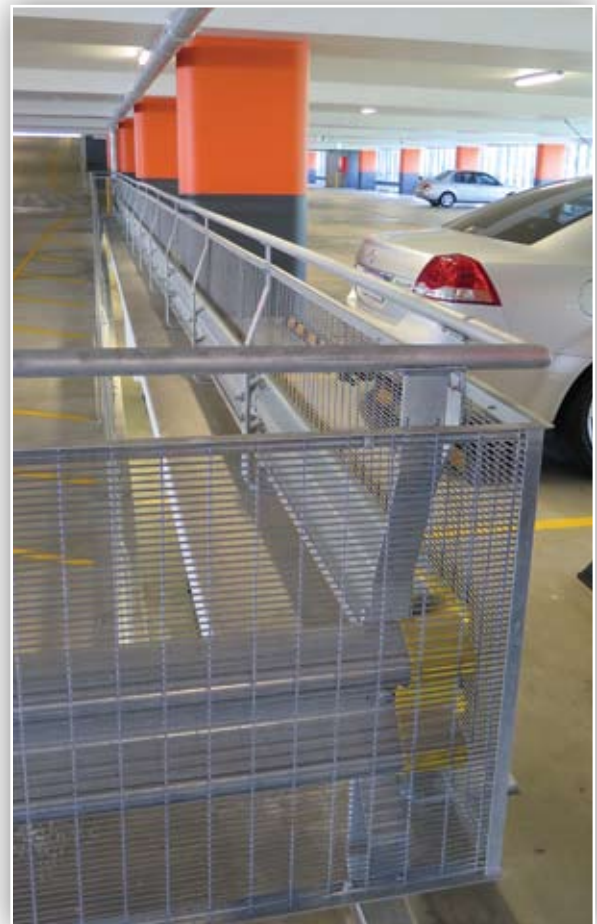


## 12.3.5 Anti-Climb Mesh Attachment

1. Align the angle sections with the pre-punched holes in the handrail extension piece located approximately 100mm below the handrail and secure using an M8 x 30mm cup head bolt and nut. Duplicate this process at the bottom prepunched hole of the handrail extension piece approximately 100mm from the ground.
2. Joins in the angle sections are made by butting adjacent sections together at the extension piece.
3. Place the anti-climb mesh panel sections between the angle sections, secure at the top and bottom angle sections using the tek screws and saddle washers and also through the

corrugation of the w-beam section.

4. Continue this process at spacings of 500mm along the length of the run to secure the mesh.
5. Joins in the mesh panels are made by butting adjacent panels together and securing with the saddle washers and tek screws at the extension piece ensuring both panels are secured.



## 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been positioned at a maximum 2000mm spacing	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the posts orientated correctly	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have the posts been installed using M20 x 180mm threaded rod and chemical adhesive	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Handrail Installation

Are the handrail extensions secured to the posts with two (2) M16 bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the handrail extensions vertical	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the handrail been attached to the extension pieces with tek screws	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Rail Installation

Are the rails secured to each post	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced with eight (8) M16x32mm bolts	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the rails spliced ensuring the exposed edge is facing away from oncoming traffic	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### Mesh Infill Installation

Are the angle sections attached at the top and bottom of the handrail extension pieces	<input type="checkbox"/> Yes	<input type="checkbox"/> 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	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are the anti-climb mesh sections tethered at the joins using saddle washers	<input type="checkbox"/> Yes	<input type="checkbox"/> No

### General

Where the galvanizing has been damaged, has the coating been repaired with a zinc-rich paint	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Are all fasteners secure	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is all rubbish and debris removed	<input type="checkbox"/> Yes	<input type="checkbox"/> No

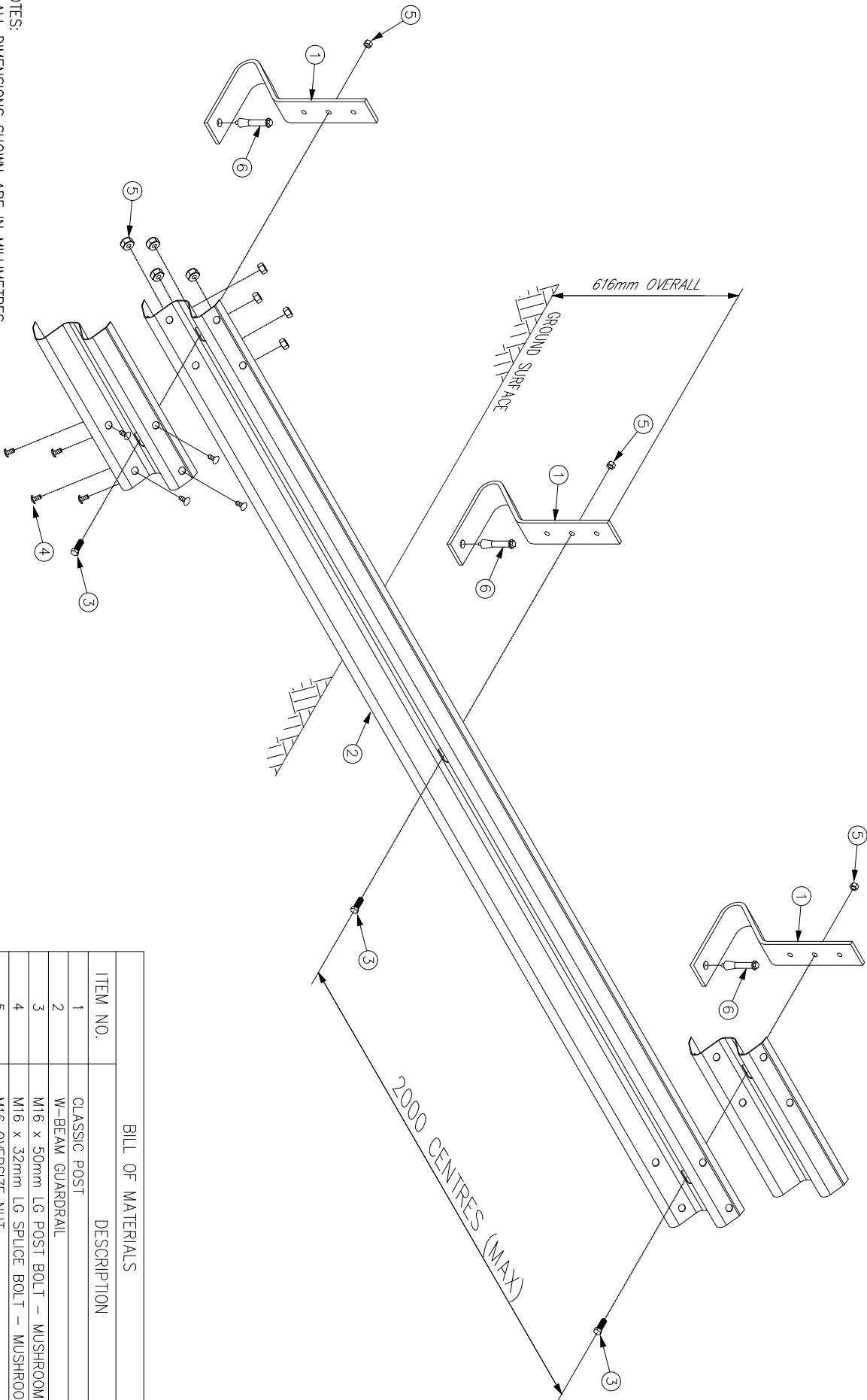
## 13.0 Accessories

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



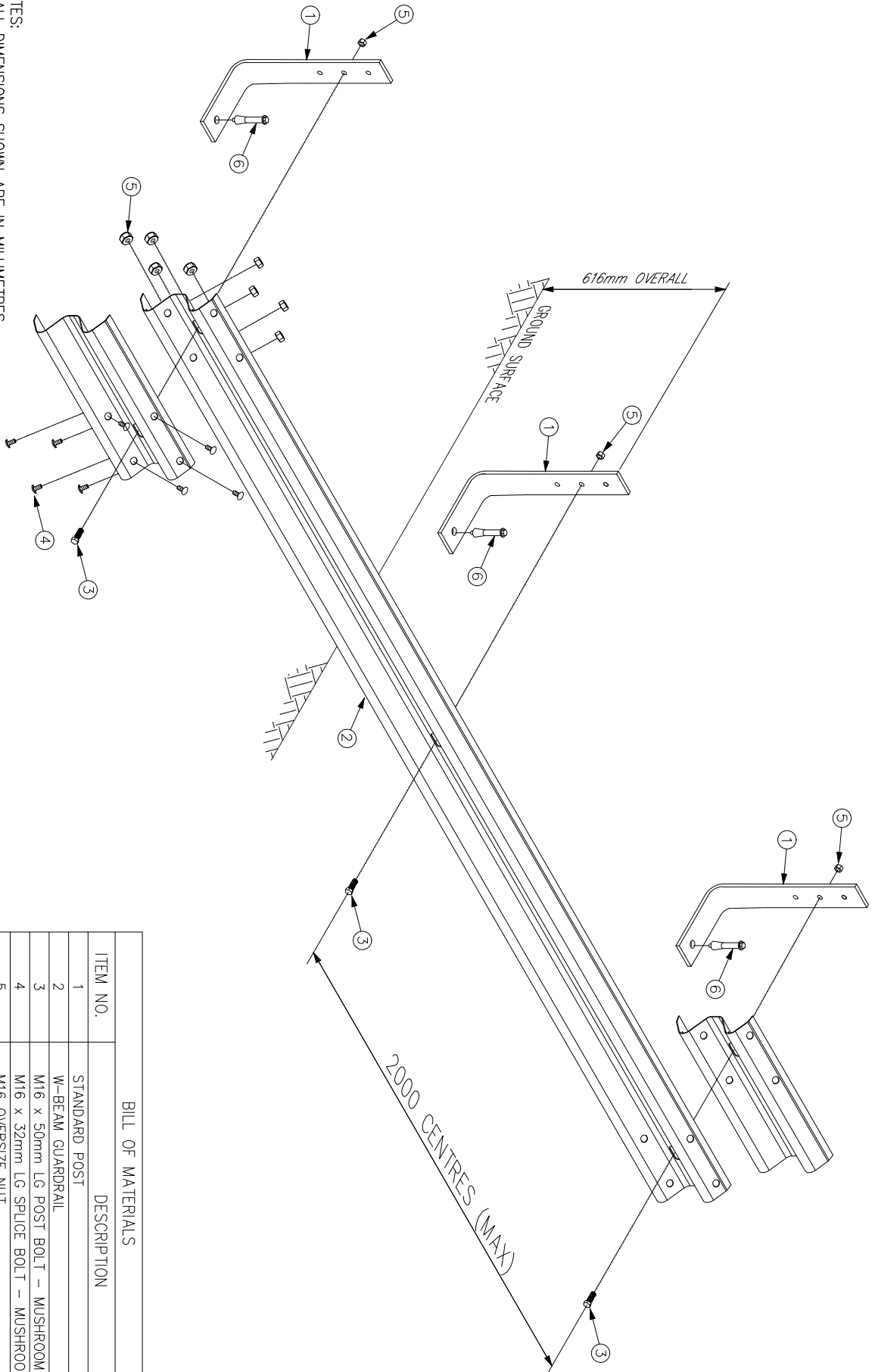




- NOTES:
1. ALL DIMENSIONS SHOWN ARE IN MILLIMETRES.
  2. MATERIAL = AS SHOWN
  3. FINISH = AS SPECIFIED


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

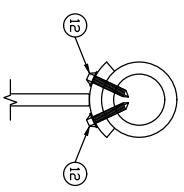
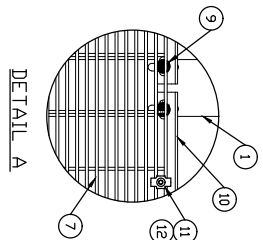
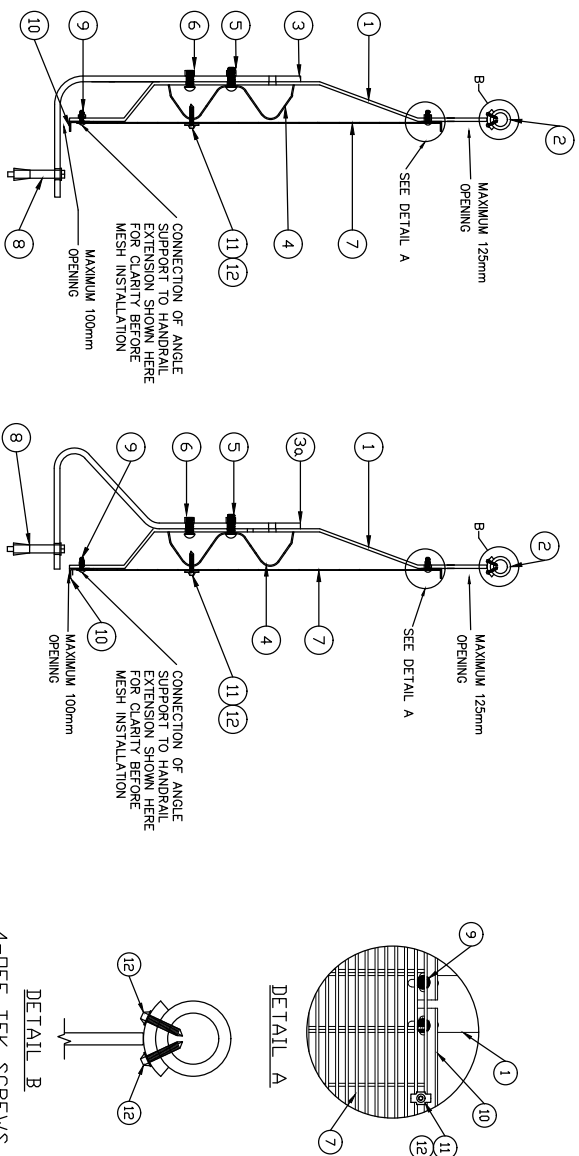
REVISONS		REFERENCES		DRAWING NUMBER		REFERENCE DRAWINGS		SIZE		NAME		DATE		DRAWING AND CONTENTS ARE COPYRIGHT TO INQAL CIVIL PRODUCTS AND CAN ONLY BE USED FOR THE PROJECT FOR WHICH WRITTEN CONSENT FROM INQAL CIVIL PRODUCTS		PROJECT		DRAWING No.	
REV	DATE	DESCRIPTION	DRAWN	CHECKED	APPROVED	DRAWING NUMBER	REFERENCE DRAWINGS	SIZE	A3	NAME	A.P.	DATE	12/11/2007	INQAL CIVIL PRODUCTS	INQAL CIVIL PRODUCTS	PROJECT	SPRING STEEL BUFFER CLASSIC POST & RAIL ASSEMBLY	STB-004	REV. 2
2	12/01/07	NEW DRAWING TEMPLATE: DWG No. WAS STB-04	D.K.	M.K.															
1	12/01/07	TITLE BLOCK UPDATED	A.P.	T.C.															
0	12/01/07	INITIAL ISSUE																	



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

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

REVISIONS			
REV	DATE	DESCRIPTION	DRAWN
2	28/10/12	NEW DRAWING TEMPLATE, DWG No. WAS STB-18	D.K.
1	28/10/12	TITLE BLOCK UPDATED	M.S.
0	12/11/2007	INITIAL ISSUE	A.P.
REFERENCES			
DRAWING NUMBER	REFERENCE DRAWINGS	NAME	DATE
		DRAWN	12/11/2007
		CHECKED	12/11/2007
		APPROVED	
		SCALE	N.T.S.
		SIZE	A3
 INGAL CIVIL PRODUCTS 50/50 MARSDEN ROAD AUSTRALIA 2566 1177 FAX +61 2 9527 3300 www.ingalcivil.com.au			
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TITLE			REFERENCE No.
SPRING STEEL BUFFER STANDARD POST			STB-018
POST & RAIL ASSEMBLY			REV. 2



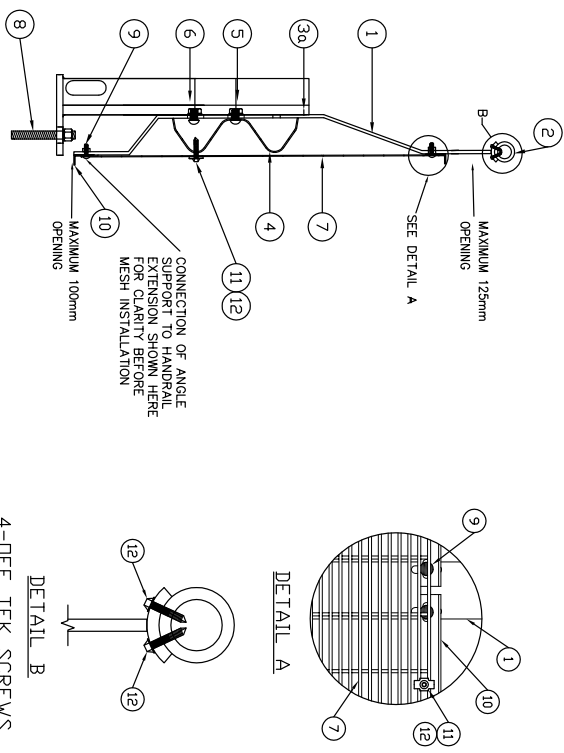
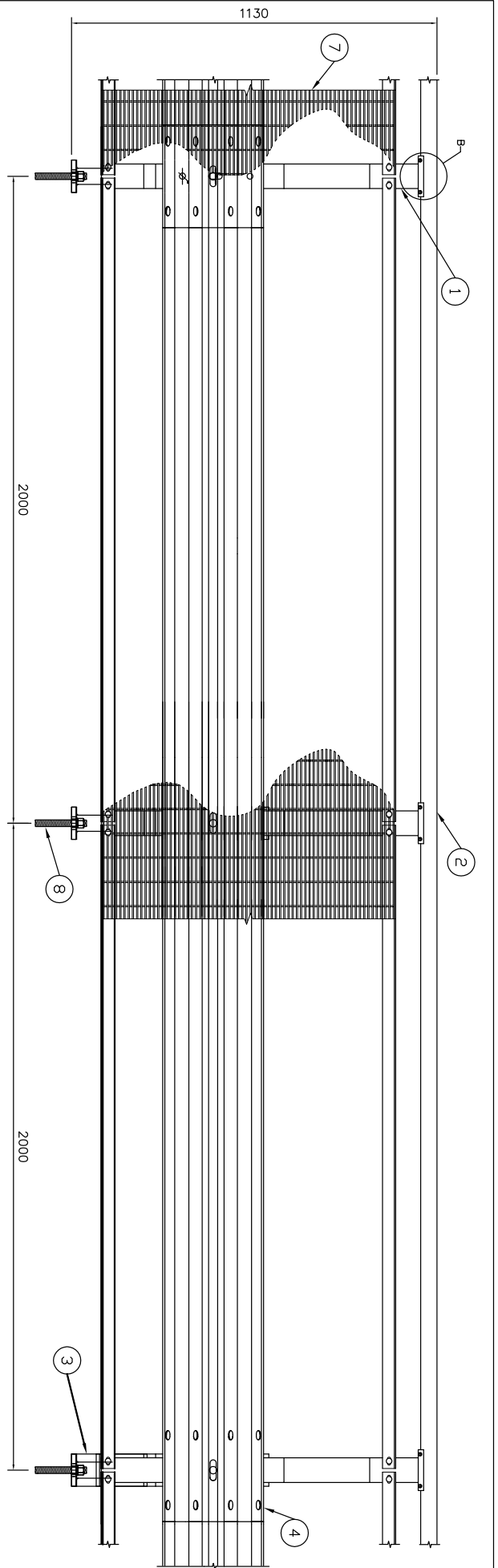
ITEM NO.	INGAL PART NO.	DESCRIPTION
1	10001812 (C2804)	CRANKED HANDRAIL EXTENSION
2	10001713 (C20046)	32NB HANDRAIL
3	10001697 (C1982)	STANDARD SPRING STEEL BUFFA
3a	10001694 (C1980)	CLASSIC SPRING STEEL BUFFA
4	10000977 (C1351G)	G4 W-BEAM GUARDRAIL 4.0M N.L.L
5	10001286 (C1589)	M16 X 65 SPLICE BOLT / NUT
6	10001233 (C1505)	M16 X 50 POST BOLT / NUT
7	10001738 (C2014)	900 X 2400MM ANTI-CLIMB MESH PANEL
8		ANCHOR BOLT
9	10001310 (C1646)	M8 X 30MM BOLT / NUT
10	10001741 (C2015G)	ANGLE SUPPORT FOR MESH
11	10001742 (C2016)	M10 SADDLE WASHER
12	10001311 (C1647)	TEK SCREW 12-14 X 25

NOTES:

1. MATERIAL= AS SHOWN
2. FINISH= AS SHOWN

[illegible]





ITEM NO.	INGAL PART NO.	DESCRIPTION
1	10001812 (C2804)	CRANKED HANDRAIL EXTENSION
2	10001713 (C2004G)	32NB HANDRAIL
3	10007635	ZEE PARK POST
4	10000977	G4 W-BEAM GUARDRAIL 4.2M N.L.L
5	10001347	M16 X 35 HEX HEAD BOLT & SMALL NUT
6	10001727	M12 X 45 HEX BOLT / NUT / 2W
7	10001738 (C2014)	900 X 2400MM ANTI-CLIMB MESH PANEL
8		M20 X 180MM STUD W/NUT & WASHER
9	10001310 (C1646)	M8 X 30MM BOLT / NUT
10	10001741 (C2015G)	ANGLE SUPPORT FOR MESH
11	10001742 (C2016)	M10 SADDLE WASHER
12	10001311 (C1647)	TEK SCREW 12-14 X 25

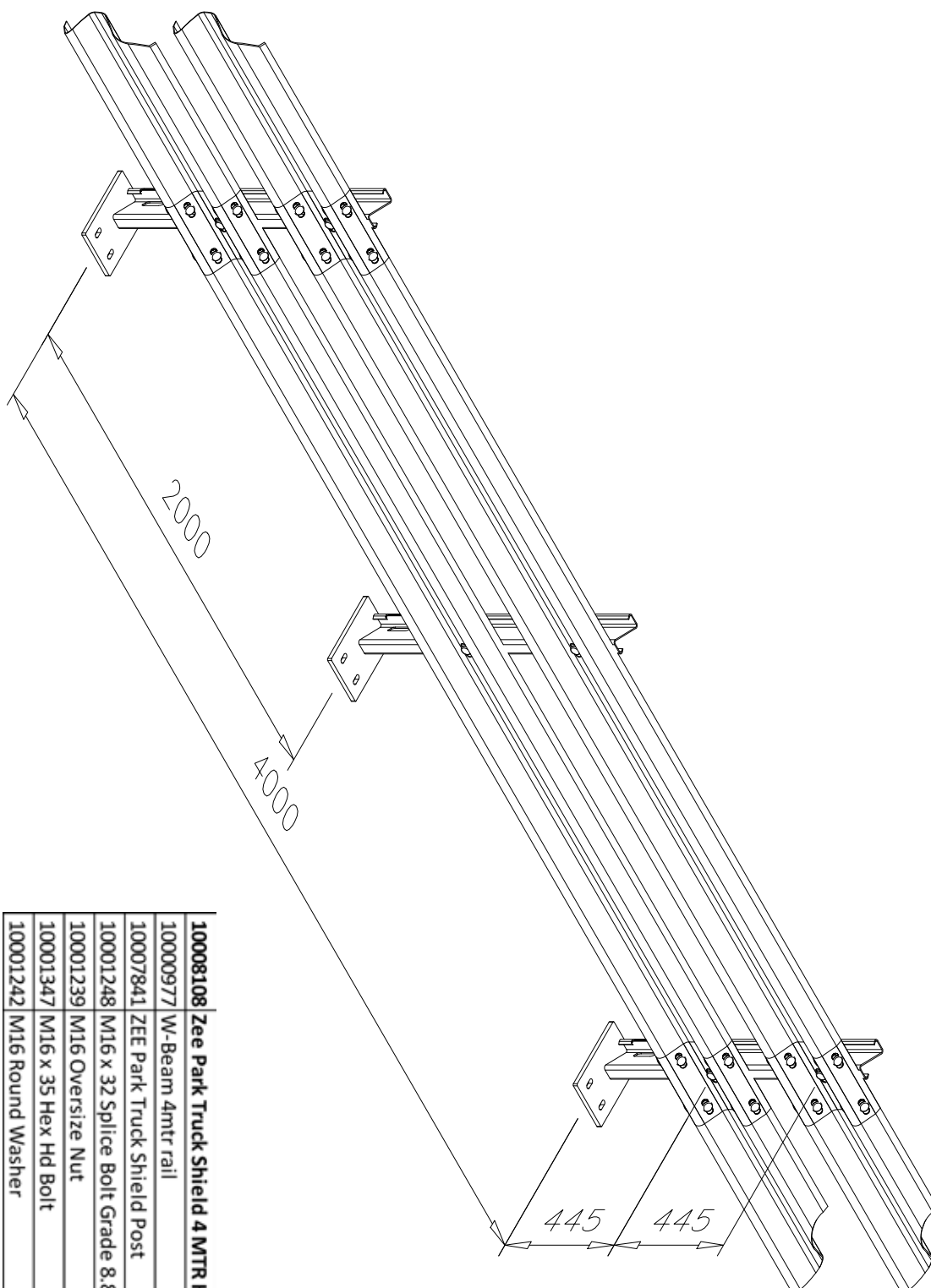
NOTES:  
1. MATERIAL= AS SHOWN  
2. FINISH= AS SHOWN

REVISIONS										REFERENCES										PROJECT										DRAWING No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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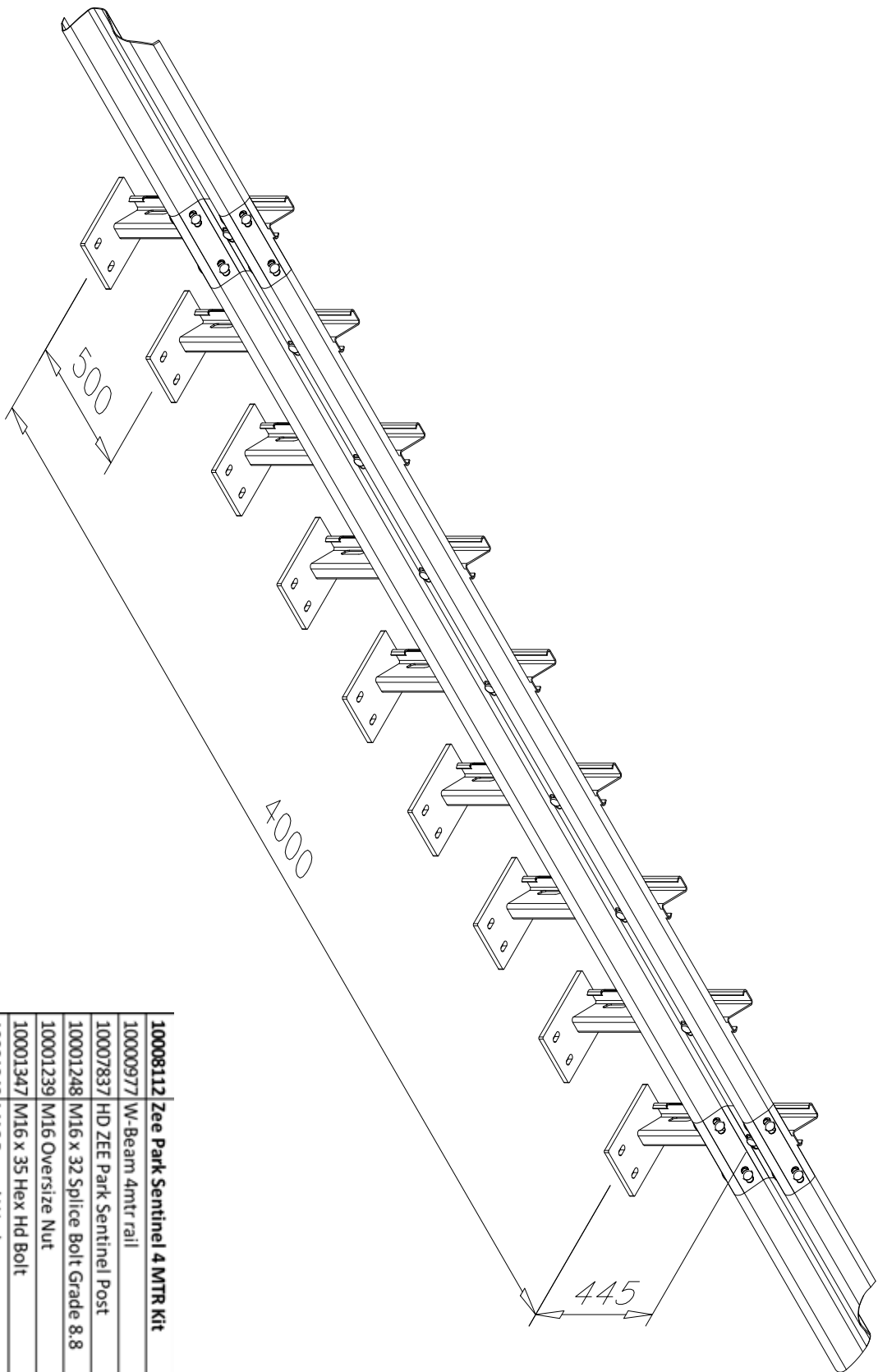
[illegible]

10008108	Zee Park Truck Shield 4 MTR Kit	Qty
10000977	W-Beam 4mtr rail	2
10007841	ZEE Park Truck Shield Post	2
10001248	M16 x 32 Splice Bolt Grade 8.8	16
10001239	M16 Oversize Nut	20
10001347	M16 x 35 Hex Hd Bolt	4
10001242	M16 Round Washer	4





INGAL CIVIL PRODUCTS										PROJECT									
PART No.										TITLE									
DRAWING No.										ZEE PARK SENTINEL ISOMETRIC ASSEMBLY VIEW									
STB-047										DRAWING No.									
REV. 0										REV. 0									

[illegible][illegible]

PROJECT	INFAL CIVIL PRODUCTS
PART No.	
TITLE	DRAWING No.
ZEE PARK SENTINEL ISOMETRIC ASSEMBLY VIEW	STB047
	Rev. 0



*For more information*

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