



# ZERO CIVIL

TECHNOLOGY THAT TRANSFORMS

Photo Dept Transport Safety Yellow Advanced  
Polymer Impact Recovery Bollards

# It's time to move from repetition **to resilience**

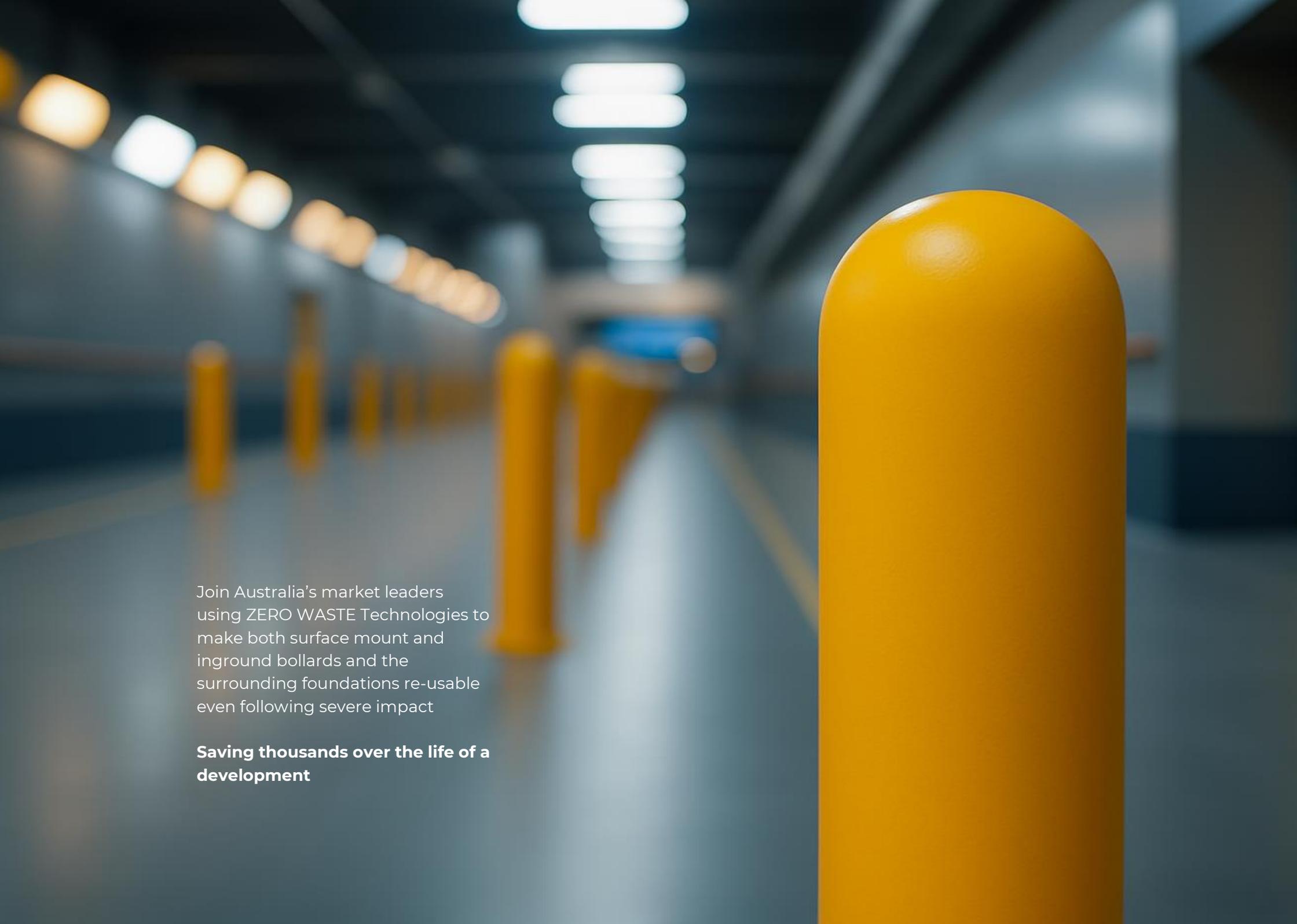


Imported bollards made from low grade steel with poor powder coating (as shown here the cap and powder coating has worn out before the sticker) creating a growing landfill problem

**Resulting in repeated repairs**

Surface Mount bollards should NEVER be used in carparks. When a surface mount bollard is impacted, the impact force is directed to the base plate, which bends or is ripped from the concrete.

**Resulting in repeated repairs**



Join Australia's market leaders  
using ZERO WASTE Technologies to  
make both surface mount and  
inground bollards and the  
surrounding foundations re-usable  
even following severe impact

**Saving thousands over the life of a  
development**

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Quality Australian 60 OD CHS Galvanised steel Pipe 2.9 mm wall thickness

Primed and powder-coated to last.

MRWA Striping available 100W/300R/100W

Taper is removable and reusable

Re-usable ground socket protects surrounding foundations from damage impact after impact

Cap included

Bollards are removable (using removal tool from a standing position) to allow access, for wide loads, maintenance or upgrades.

Socket can be capped when bollard is removed.



Recommended for high speed zones (MRWA Recommends for use on Highways) Suitable for zones from carparks to Highways. Good for shopfront- substantially reducing maintenance- removable and socket can be capped to allow access. Tools required. (MRWA as tools).

## 60 mm Galv steel Bollard In-ground



### RESILIENCE RATING – THREE +HALF

1. Bollard is removable for easy maintenance and to allow access
2. Bollard footings are resistant to impact
3. Footing re-usable following impact
4. Bollard casing is highly resilient to UV rays but not resistant to impact from vehicles
5. Bollard not re-usable following impact
6. MRWA Approved as safe at High impact

VIEW SPECS



100% AUSSIE MADE

## 140 mm Galv steel Bollard In-ground



140 x 1650  
In-ground Galv  
Bollard

Cap included  
(supplied  
separately)

3 mm wall  
thickness

3 mm wall

Ground Anchor  
pin

Ground Anchor

### **RESILIENCE RATING – ZERO**

2. Bollard casing is possibly resistance to light impact but will dent upon high impact. May rust and corrode.
3. Bollard footings not resistance to impact
4. Bollard not re-usable following impact
5. Footing not re-usable following impact

**[Refer to Impact Chart](#)**



100% AUSSIE MADE

Quality Primed & Powder coated for long lasting finish

Available in other colours- ask for colour chart. Min qty 6



Cap included (supplied separately)

Heavy 5 mm wall thickness

Heavy 5 mm

Red or white 100 mm Striping available

MRWA Striping available

Can manufacture with pin

Can manufacture

## 165 mm Powder coated Bollard Inground



### RESILIENCE RATING – HALF

1. Bollard casing is possibly resistance to light impact but will dent or chip upon high impact. May rust and corrode.
2. Bollard and footings not resistance to impact
3. Bollard not re-usable following bad impact
4. Footing not re-usable following impact

[Refer to Impact Chart](#)

RESULT IMPACT RIGID BOLLARD





100% AUSSIE MADE

Quality Primed & Powder coated for long lasting finish

Secured using the Impact Recovery System

Making bollards self-recover from light impact and reusable following severe impact.



Cap included

Heavy 5 mm wall thickness

Secured on ZERO WASTE Foundations 350 or 650 mm Depth

Removable and socket can be capped.

Footings remain reusable following severe impact.

## 165 mm Powder coated Bollard Inground Impact Recovery



### RESILIENCE RATING – THREE + HALF

1. Bollard casing is possibly resistance to light impact but will dent or chip upon high impact. May rust and corrode.
2. Bollard footings resistance to impact
3. Bollard re-usable
4. Footing re-usable

[Refer to Impact Chart](#)

MORE INFO



## 165 mm Powder coated Bollard XHD Inground Impact Recovery



Extra Heavy-duty Resistance Core

### RESILIENCE RATING - FOUR + HALF

1. Bollard casing is possibly resistance to light impact but will dent or chip upon high impact. May rust and corrode.
2. Bollard footings resistance to impact
3. Bollard re-usable
4. Footing re-usable
5. Reduced risk of resistance core bending

[Refer to Impact Chart](#)

MORE INFO





100% AUSSIE MADE

Quality UV stabilised impact resistant material  
Highly durable

Flexes upon impact reducing risk of damage to footings

Available in other colours- ask for colour chart.  
Min qty 10



Cap moulded

Lightweight-  
easy to use

Heavy 7 mm  
wall thickness

Heavy 7 mm

Can concrete fill  
to ground level  
for added  
resistance and  
retain flexibility

## 150 mm Advanced Polymer Inground



### RESILIENCE RATING – TWO + HALF

1. Bollard casing is resistant to impact will not dent, chip or rust (UV stabilised)
2. Bollard footings made resistant to light impact (as bollard flexes) but not resistance to high impact
3. Bollard re-usable following light impact but not re-usable following bad impact
4. Footing re-usable following light impact but not re-usable following bad impact

[Refer to Impact Chart](#)

Quality UV stabilised impact resistant material Highly durable

Cap moulded

Lightweight-easy to use

Secured using the Impact Recovery System

Heavy 7 mm wall thickness

Making bollards self-recover from light impact and reusable following severe impact.

Removable and socket can be capped.

Secured on ZERO WASTE Foundations 350 or 650 mm Depth

Footing remain reusable following severe impact.

100% AUSSIE MADE

# 150 mm Advanced Polymer Impact Recovery Inground



## RESILIENCE RATING – FOUR

1. Bollard casing is resistant to impact will not dent, chip or rust (UV stabilised)
2. Bollard footings resistant to impact
3. Bollards recover from low impact, removable and re-usable following severe impact
4. Footing re-usable following impact

[Refer to Impact Chart](#)



MORE INFO >

Secured using the Extra Heavy Duty Impact Recovery System reducing risk of core bending by 150%

150 mm Advanced Polymer

Secured on ZERO WASTE Foundations 650 mm Depth



Extra Heavy-duty Resistance Core

## 150 mm Advanced Polymer XHD Impact Recovery Inground



### RESILIENCE RATING – SIX

1. Bollard casing is resistant to impact
2. Bollard footings resistant to impact
3. Bollards recover from low impact
4. Bollards re-usable following impact
5. Footing re-usable following impact
6. XHD Resistance core provides reduced risk of resistance core bending

[Refer to Impact Chart](#)

MORE INFO





These bollards in Maylands were installed around 8 years ago and have been clipped by trucks regularly (you can see the scuffing on the concrete base)

One bollard was bowled over by a large truck and the resistance core remained seated in the footing – with no damage to footings and no expensive repairs required.

Photo taken following impact and reinstatement of same bollard in same footing using the same Impact Recovery Rings and a new core.





140 x 1200  
Surface Mount  
Galv Bollard

Cap included  
(supplied  
separately)

3 mm wall  
thickness

3 mm wall

8 mm Base plate  
250 mm diameter  
x 4 holes

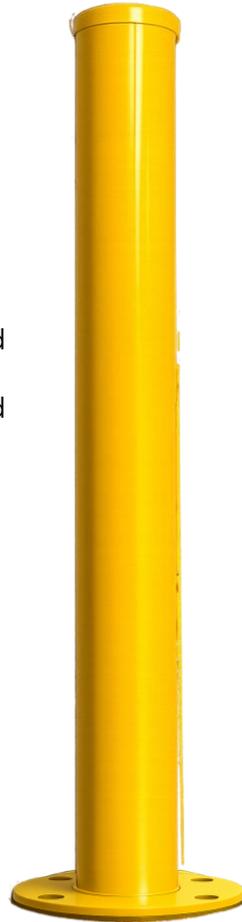
## 140 mm Galv steel Bollard Surface Mount

### **RESILIENCE RATING – ZERO STARS**

1. Bollard casing is possibly resistance to light impact but will dent upon high impact. May rust and corrode.
2. Bollard footings not resistance to impact
3. Bollard not re-usable following impact
4. Footing not re-usable following impact

**[Refer to Impact Chart](#)**

## 140 mm Powder coated Bollard Surface Mount



140 x 1200H  
Surface Mount  
Galv Bollard

Powder Coated

Powder Coated

Cap included  
(supplied  
separately)

3 mm wall  
thickness

3 mm wall

8 mm x 200  
Base Plate 4  
Holes

### RESILIENCE RATING – ZERO

1. Bollard casing will dent or chip upon impact. May rust and corrode over time.
2. Bollard footings not resistance to impact
3. Bollard not re-usable following impact
4. Footing not re-usable following impact

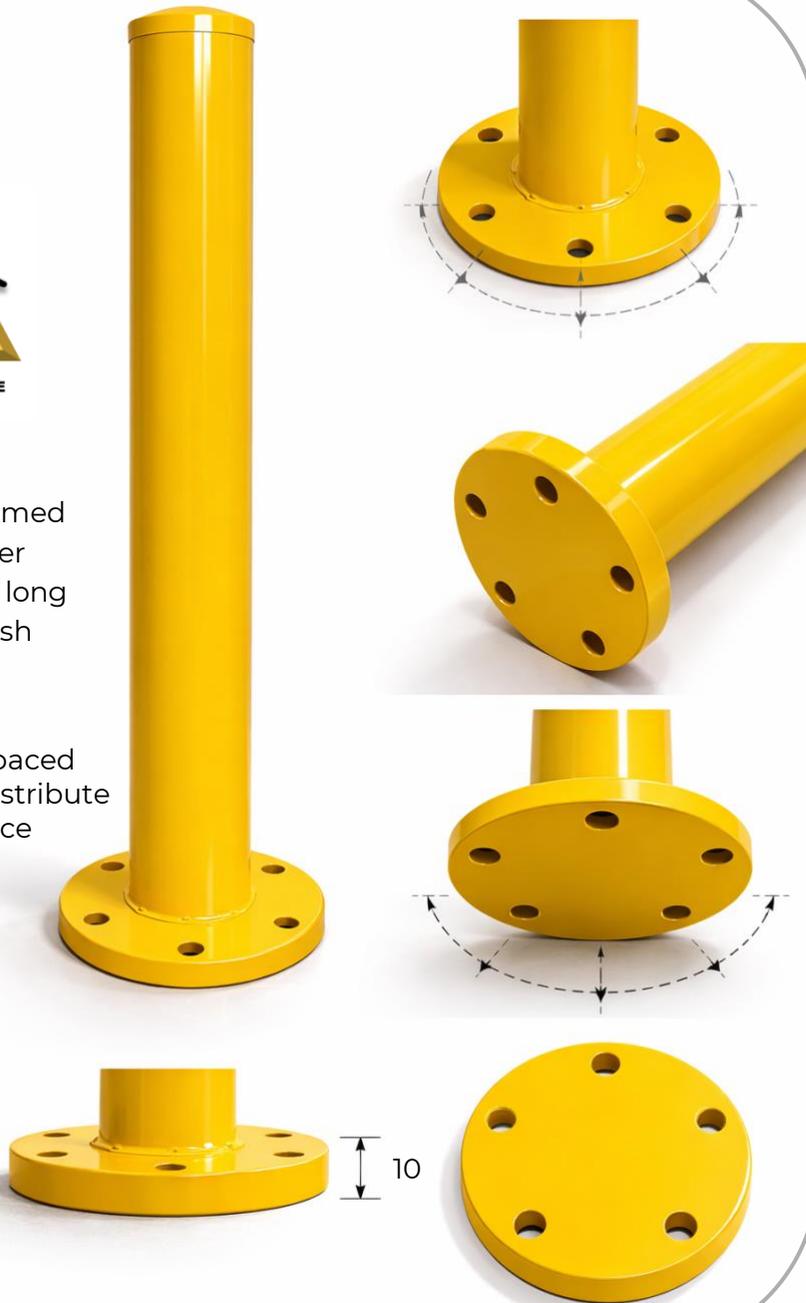
[Refer to Impact Chart](#)



100% AUSSIE MADE

Quality primed and powder coated for long lasting finish

5 evenly spaced anchors distribute impact force



## 165 mm Powder coated Bollard Surface Mount



### RESILIENCE RATING – ONE

1. Bollard casing is resistance to light impact but will dent or chip upon high impact. May rust and corrode.
2. Heavy Duty Bollard Base Plates are resistant to light impact, but bolts will be sheared or ripped from footings upon high impact
3. Bollard not re-usable following bad impact
4. Footing not re-usable following bad impact

[Refer to Impact Chart](#)



100% AUSSIE MADE



Cap included

Heavy 5 mm wall thickness

Secured on Re-usable Heavy Duty 10 mm thick x 300 mm diameter Base Plate with 5 evenly spaced anchors to distribute energy



Footings remain reusable following severe impact.

Quality Primed & Powder coated for long lasting finish

Secured using the Impact Recovery System

Making bollards self-recover from light impact and reusable following severe impact.

## 165 mm Powder coated Surface Mount Impact Recovery Bollard



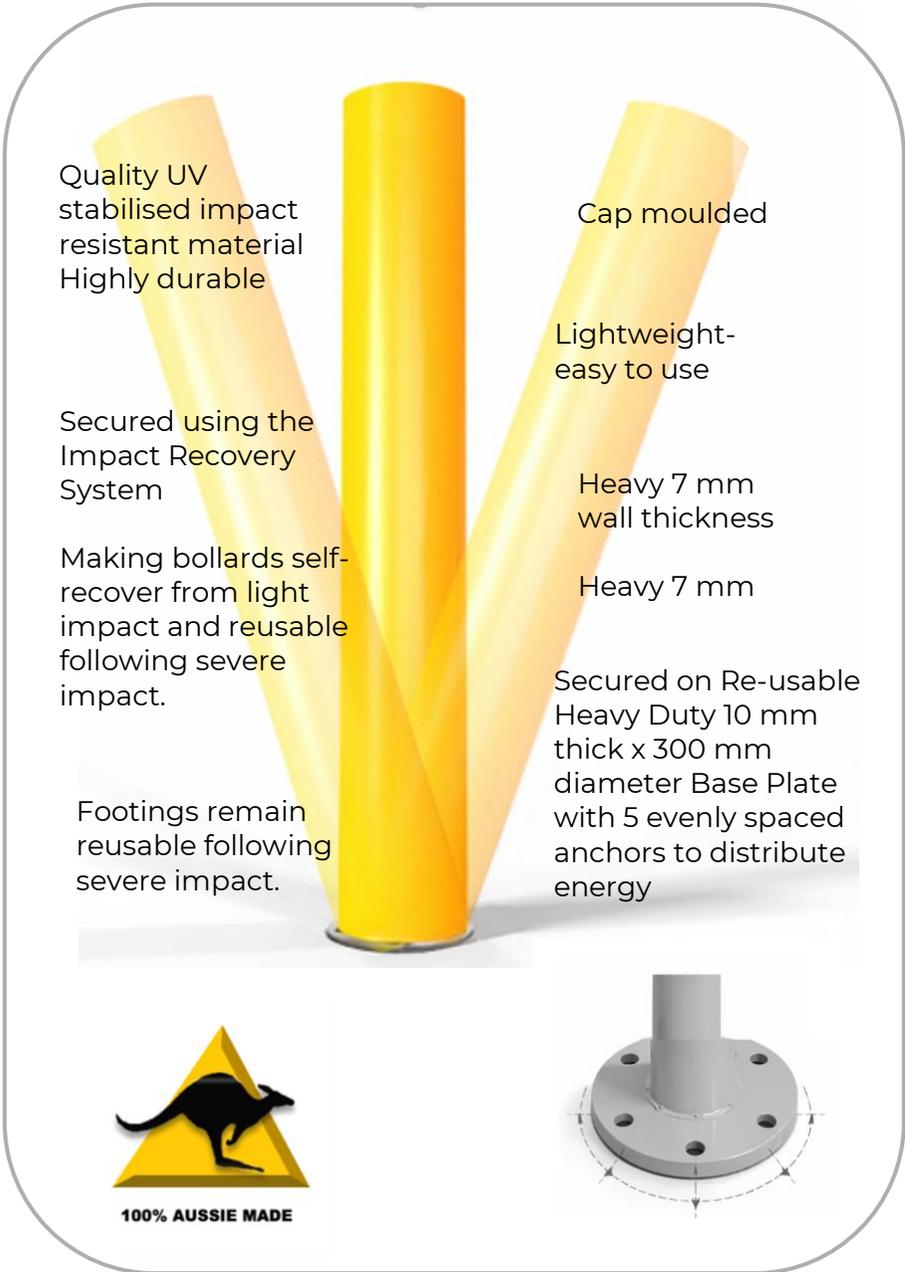
### RESILIENCE RATING – THREE + HALF

1. Bollard casing is possibly resistance to light impact but will dent or chip upon high impact. May rust and corrode.
2. Bollard footings resistance to impact
3. Bollard re-usable
4. Footing re-usable

[Refer to Impact Chart](#)

MORE INFO





Quality UV stabilised impact resistant material  
Highly durable

Cap moulded

Lightweight-easy to use

Secured using the Impact Recovery System

Heavy 7 mm wall thickness

Making bollards self-recover from light impact and reusable following severe impact.

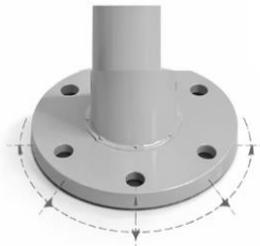
Heavy 7 mm

Footings remain reusable following severe impact.

Secured on Re-usable Heavy Duty 10 mm thick x 300 mm diameter Base Plate with 5 evenly spaced anchors to distribute energy



100% AUSSIE MADE



## 150 mm Advanced Polymer Impact Recovery Surface Mount



### RESILIENCE RATING – FOUR

1. Bollard casing is resistant to impact will not dent, chip or rust (UV stabilised)
2. Bollard footings resistant to impact
3. Bollards recover from low impact, removable and re-usable following severe impact
4. Footing re-usable following impact

[Refer to Impact Chart](#)

MORE INFO



Quality Bollards  
easy to install and  
maintain

Flat (slightly domed)  
welded cap

Polished Satin finish  
(most durable finish)

Secured using the  
Impact Recovery  
System

Heavy 3.6 mm  
wall thickness

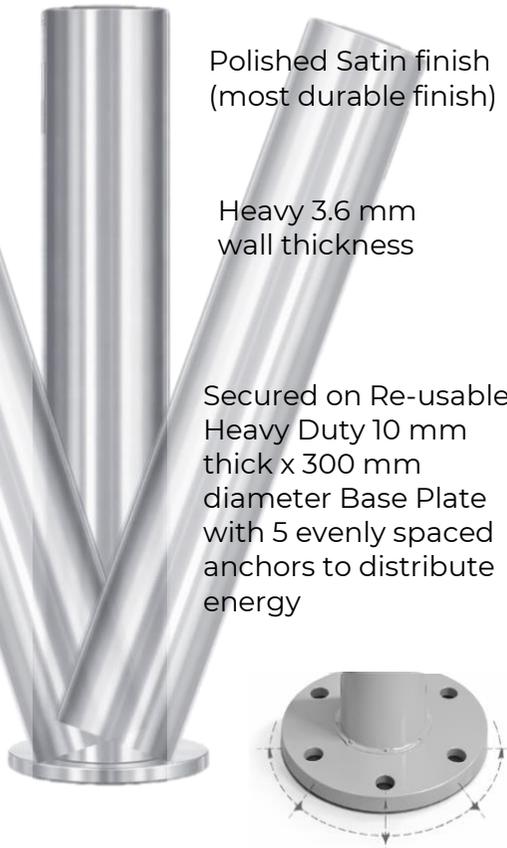
Making bollards self-  
recover from light  
impact and reusable  
following severe  
impact.

Secured on Re-usable  
Heavy Duty 10 mm  
thick x 300 mm  
diameter Base Plate  
with 5 evenly spaced  
anchors to distribute  
energy

Footings remain  
reusable following  
severe impact.



100% AUSSIE MADE



## 168 mm Stainless Steel Impact Recovery Surface Mount



### RESILIENCE RATING- FOUR

1. Bollard casing is resistant to impact will not chip or rust (has most durable finish)
2. Bollard footings resistant to impact
3. Bollards recover from low impact, removable and re-usable following severe impact
4. Footing re-usable following impact

[Refer to Impact Chart](#)

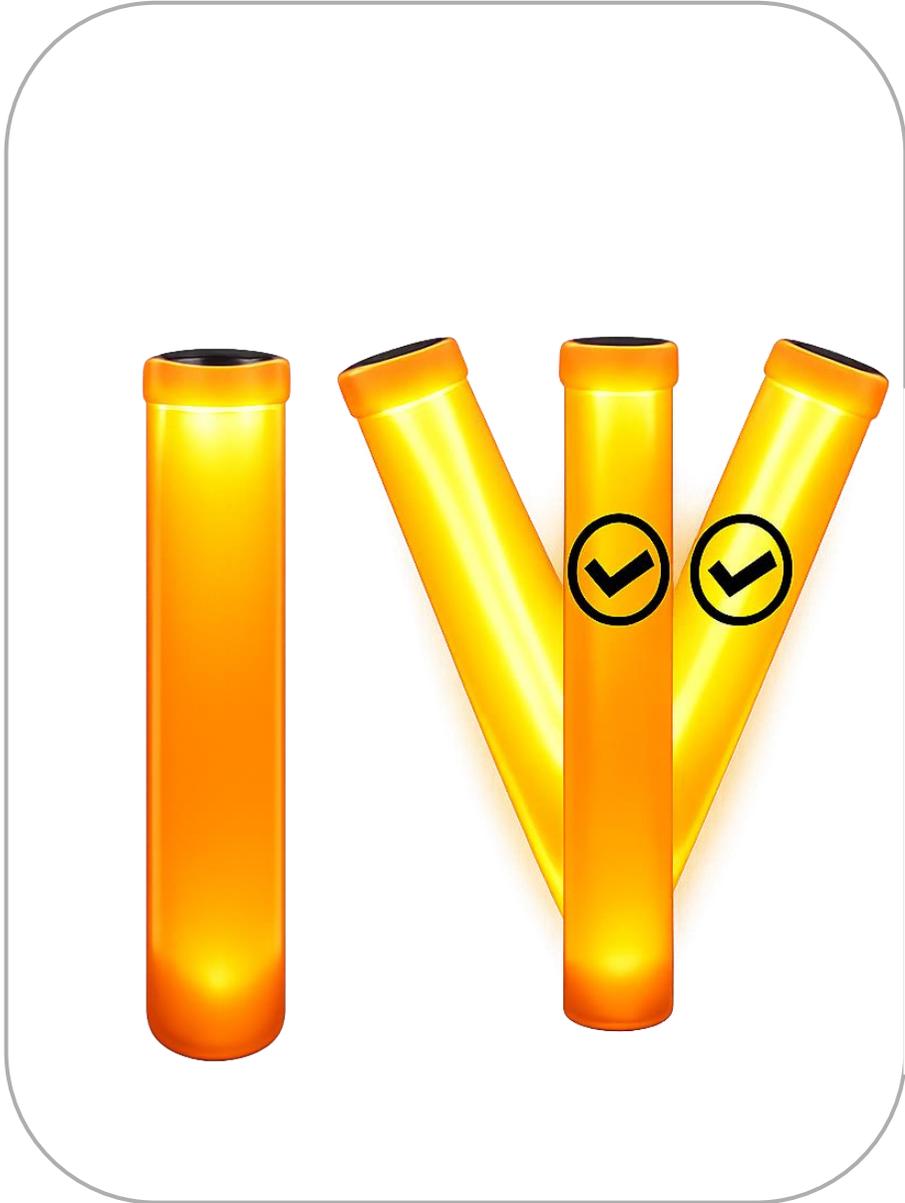
MORE INFO





City of Perth has had these surface Mount Bollards installed for over five years and they remain in good condition today.

City of Perth has installed inground bollards throughout Northbridge (that are removable, and sockets can be capped off) to protect sapling trees- that are now fully grown and is now installing more surface mount bollards in the city.



## Solar lit Glow Bollards



### RESILIENCE RATING – FOUR (SIX IRS)

1. Bollard casing is resistant to impact
2. Solar light has up to 12 hours glow at night (depending upon sunshine during day)
3. No electrical supply required batteries have around 5 + years lifespan
4. Several colours- (white, yellow, orange, blue, red)  
Standard units yellow
5. Recycled units available
6. Can be secured using Impact Recovery System
7. Caps can be retro-fitted

**COMING SOON- IN R&D**

## 190 mm Advanced Polymer Bollard Covers



### RESILIENCE RATING – SIX

1. Bollard Cover is resistant to impact
2. UV Stabilised
3. Heavy walled (7mm walls)
4. Fits 165 Steel Bollards
5. 150 mm Bollard diameter bollards
6. Large range of colours (Min 6 Covers)
7. Easy to attach
8. Easy to clean





## Smart Impact detection Sensors

We are now developing a low cost sensor system to detect impact and send a message to operations enabling fast replacement of damaged bollards.

Unlike other detection options- our system provides instant response, does not require large financial investment and can be rolled out as required (can be retro-fitted) economical for small and large operations).

**UNDER DEVELOPMENT**

# Impact Recovery **Bollards**

## **Bollard Options**

- Steel 165
- Stainless steel 168
- Advanced Polymer 150

## **Footing Options**

- 350 Inground Heavy Duty
- 650 In-ground Heavy Duty
- 650 In-ground Extra Heavy Duty
- Surface Mount Heavy Duty



# Inground **Impact Recovery System**

In-ground Bollards are suitable for almost any application ( concrete/ asphalt/ paved areas)

We recommend

- 350 for most applications
- 650 Depth for bollards subject to impact from utility vehicles and possible high impact Core is used to
- Extra Heavy Duty to reduce maintenance in more high impact regions

Bollards remain rigid but when impacted by a vehicle the rings absorb the impact force allowing the bollard to deflect up to 20 degrees and slowly self-recover.



Ground socket protects surrounding foundations from damage impact after impact

Cap included



Impact Recovery Rings are made from advanced urethane and rubber compound, withstanding hundreds of impacts

# Surface mount **Impact Recovery System**

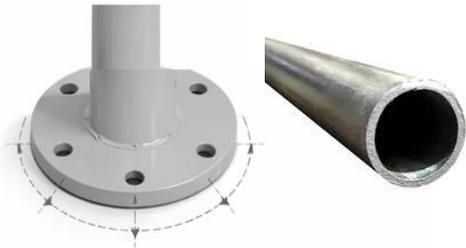
Surface Mount Bollards are suitable for installation into solid concrete pavements, driveways or concrete slabs.

Bollards remain rigid but when impacted by a vehicle the rings absorb the impact force allowing the bollard to deflect up to 20 degrees and slowly self-recover.

If badly impacted the resistance core may bend and need replacing.



Heavy duty base plate with solid upright spigot resists bending and 5 evenly spaced anchors distribute impact force.



Heavy Duty Resistance core resistant forward movement of vehicles beyond 20 degrees.



Impact Recovery Rings are made from advanced urethane and rubber compound, repeated recovering following impact



20°



# Advanced engineering

Bollards are often subject to vehicle impact and when impacted the impact force must go somewhere.

When a rigid bollard is impacted, the force is directed to the base plate, or footing, which is dislodged.

[\*\*Refer to Impact Chart\*\*](#)

Advanced engineering overcomes these problems. By incorporating a shock absorbing mechanism and secured our bollards on a safe secure footing that remains intact when a bollard is severely impacted

## OPTIONS

- Surface Mount
- In-ground 350 mm
- Inground 650 mm
- XHD Inground 650 mm

VISIT WEBSITE FOR SPECS & VIDEOS



# 4 levels of extreme protection



## 3. HEAVY DUTY RESISTANCE CORE

Unlike spring loaded bollards that over-flex, a Heavy-duty resistance core works to prevent deflection of the bollard beyond 20 degrees when impacted by a passenger vehicle. The resistance core can be increased from Heavy Duty to Extra Heavy Duty

## 4. SHOCK ABSORBING IMPACT RECOVERY RINGS

Unlike springs that quickly wear out, creating dangerous litigation risks, our re-usable energy absorbing Impact Recovery Rings create a permanent shock absorbing cushion that absorb the impact force and self-recover, with no reduction in capacity following hundreds of impacts, greatly improving energy absorption, safety and resilience

## 1. PROTECTIVE BOLLARD CASING

You can secure heavy-duty galvanised steel or impact resistant stainless-steel pipe bollards to provide an impact resistant surface, but we highly recommend using our impact resistant advanced polymer bollards to further reduce maintenance. UV stabilised and heavy walled made from advanced polymers they are rust proof, scratch and dent proof, designed to last and further improve energy absorption

## 2. ZERO WASTE FOUNDATIONS:

ZERO WASTE Foundations are made from Advanced Polymers that absorb impact energy protecting the surrounding foundations when a bollard is impacted and continue working keeping items secure following multiple high and low speed impacts.

# resistance core

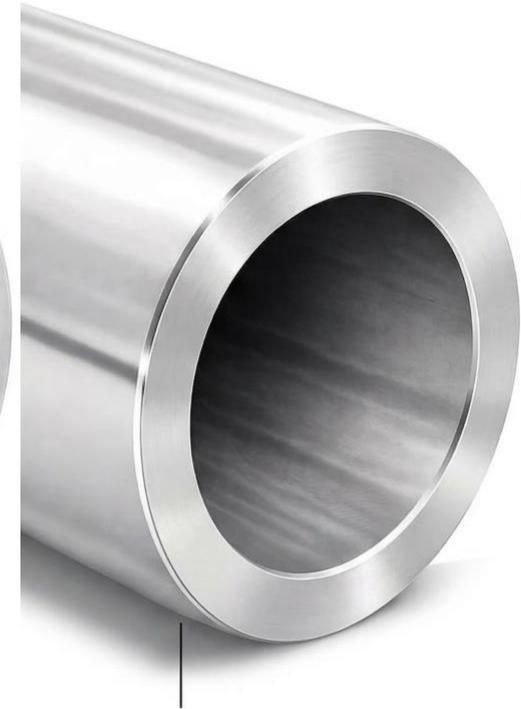
With 650 mm Depth Foundations you can choose an Extra Heavy-duty core that increases resistance to bending by 150%

This reduces maintenance in zones subject to impact from utility vehicles and trucks.

NB: You must weigh up the extra damage to vehicles against the benefit of reduced maintenance.



Heavy Duty Resistance Core



Extra Heavy-duty Resistance Core

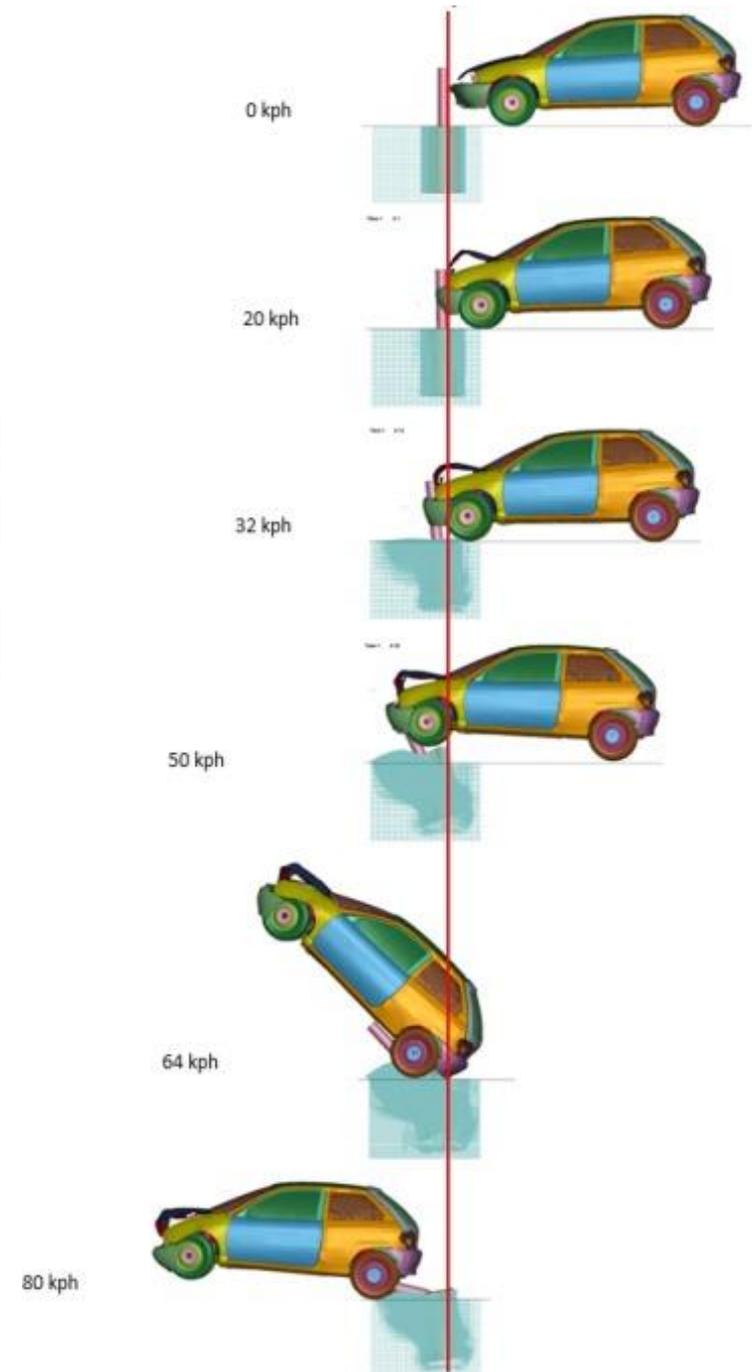
# impact resistance

Solid inground bollards have been the mainstay of the industry for decades, but in recent times with more pedestrians and vehicles on our roads there is a growing concern for the safety factor when designing bollards.

When a car hits something that **doesn't give**, the impact energy has only a few places to go:

1. **The car deforms hard** (front end crush), *then*
2. The vehicle can **ride up the bollard** as the front suspension collapses and the contact point climbs, *then*
3. The car can **pivot and launch** (you see the nose lift → car rotates → wheels leave ground). That's the "projectile" effect that is not suitable for urban environments.

**For a bollard to resist impact, it requires some form of shock absorbing mechanism.**



# In-ground Bollards

## RATING – ONE POINT FOR EACH BENEFIT

7. Bollard casing is resistant to impact
8. Bollard footings resistant to impact
9. Bollards recover from low impact
10. Bollards re-usable following impact
11. Footing re-usable following impact
12. XHD Resistance core provides reduced risk of resistance core bending



Meets requirement



Partially meets requirement

## IMPACT RESISTANT

Resistant to impact from a passenger vehicle (some bollard will flex and self-recover)

## IMPACT RECOVERY

Resistant to impact from a vehicle (self-recover from light impact). Bollard and footings recoverable (re-usable) following even severe impact.

	DEPTH	IMPACT RESISTANT	IMPACT RECOVERY	SPEED AT FAILURE
<b>IN-GROUND BOLLARDS</b>				
<b>140 mm Galv steel Bollard</b>	400 mm	NO	NO	7 kmph
<b>165 mm Powder coated Bollard</b>	400 mm	NO	NO	8 kmph
	650 mm	NO	NO	10 kmph
<b>165 mm Powder coated Bollard IR</b>	350 mm	YES	YES	16 kmph
	650 mm	YES	YES	19 kmph
	XHD 650mm	YES	YES	21 kmph
<b>150 mm Advanced Polymer</b>	600 mm	YES	NO	10 kmph
<b>150 mm Advanced Polymer IR</b>	350 mm	YES	YES	16 kmph
	650 mm	YES	YES	19 kmph
	XHD 650mm	YES	YES	21 kmph

*\* Indicative only, as outcome is affected by vehicle mass, impact angle, braking, height of contact and conditions.  
In High speed zones MRWA recommends our 60 mm Traffic Bollards that are frangible when impacted at high speed without risking injury to vehicle occupants.*

	DEPTH	IMPACT OUTCOME	APPLICATION
<b>IN-GROUND BOLLARDS</b>			
<b>140 PC Steel</b>	400 mm	Light vehicle contact can bend the bollard or damage the footing. Typically suited to visual separation rather than impact-prone areas.	Visual boundary marking where vehicle contact is unlikely.
<b>165 PC Steel</b>	400 mm	With 5mm wall thickness they are slightly stronger than 140 mm steel but still a rigid bollard. Impact loads transfer into the footing and repairs are often required after a strike.	Low-risk urban applications where bollards are primarily for delineation.
<b>165 PC Steel</b>	650 mm	Greater embedment improves resistance to minor contact, though footing damage may still occur under vehicle impact.	Industrial locations requiring static protection or delineation. Not recommended for high speed zones due to risk of injury to occupants upon impact. (Refer to Impact Chart for rigid bollards. P30)
<b>165 mm PC</b>	350 mm	Designed to deflect and self-recover under lower-speed impacts while reducing damage to the surrounding footing.	Carparks and roadside parking areas with solid concrete foundations like traffic islands, concrete footpaths, asphalt.
	650 mm	Greater embedment improves impact resistance and stability while retaining recovery performance.	Roadsides, carparks and council assets exposed to more frequent vehicle contact. Any free-standing bollard with no existing concrete footing
	XHD 650mm	XHD configuration provides the highest resistance in this range for severe low-speed impacts and repeated strikes.	High-risk roadside zones, truck routes, utilities and heavy-duty transport environments.
<b>150 mm AP IG</b>	600 mm	Corrosion-resistant and will flex upon minor impacts, but as a non-recovery bollard it may still require replacement after a heavier strike.	Coastal areas, corrosive environments and locations prioritising durability with lower maintenance. Electrical asset protection
<b>150 mm AP IR</b>	350 mm	Combines corrosion resistance with impact recovery, allowing the bollard to deflect and reduce footing damage under impact.	"as above" Plus Urban streets, car parks, shopfront, transport nodes and sustainability-focused council projects.
	650 mm	Greater embedment increases low-speed impact resistance and improves performance in higher-risk locations.	Higher-risk urban roadsides, intersections and areas with repeated vehicle contact.
	XHD 650mm	Highest-performance polymer option, designed for severe low-speed impacts while preserving the footing and simplifying replacement.	Heavy-duty roadside applications, high density carparks, utilities, industrial areas and transport corridors.

	DEPTH	ON-GOING REPAIRS	RE-USE FOOTING	RE-USE BOLLARD	RATING
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<b>INGROUND BOLLARDS</b>					
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<b>140 PC Steel</b>	400 mm				
<b>165 PC Steel</b>	400 mm				
<b>165 PC Steel</b>	650 mm				
<b>165 mm PC</b>	350 mm	ZERO	YES	YES	
	650 mm	ZERO	YES	YES	
	XHD 650mm	ZERO	YES	YES	
<b>150 mm AP IG</b>	600 mm	WITH BAD IMPACT	WITH LIGHT IMPACT	WITH LIGHT IMPACT	
<b>150 mm AP IR</b>	350 mm	ZERO	YES	YES	
	650 mm	ZERO	YES	YES	
	XHD 650mm	ZERO	YES	YES	

# Surface mount Bollards

## RATING – ONE STAR FOR EACH BENEFIT

1. Bollard casing is resistant to impact
2. Bollard footings resistant to impact
3. Bollards recover from low impact
4. Bollards re-usable following impact
5. Footing re-usable following impact
6. XHD Resistance core provides reduced risk of resistance core bending



Meets requirement



Partially meets requirement

## IMPACT RESISTANT

Resistant to impact from a passenger vehicle (some bollard will flex and self-recover)

## IMPACT RECOVERY

Resistant to impact from a vehicle (self-recover from light impact). Bollard and footings recoverable (re-usable) following even severe impact.

DEPTH

IMPACT RESISTANT

IMPACT RECOVERY

SPEED AT FAILURE

**SURFACE MOUNT BOLLARDS**

**140 Steel Bollard**

Surface Mount

NO

NO

4 kmph

**140 Steel Bollard PC**

Surface Mount

NO

NO

4 kmph

**165 Steel Bollard PC**

Surface Mount

NO

NO

4 kmph

**165 Steel PC IR**

Surface Mount

YES

YES

13 kmph

**150 mm Advanced Polymer IR**

Surface Mount

YES

YES

13 kmph

**168 mm Stainless Steel Heavy Walled Pipe IR**

Surface Mount

YES

YES

13 kmph

	DEPTH	IMPACT OUTCOME	APPLICATION
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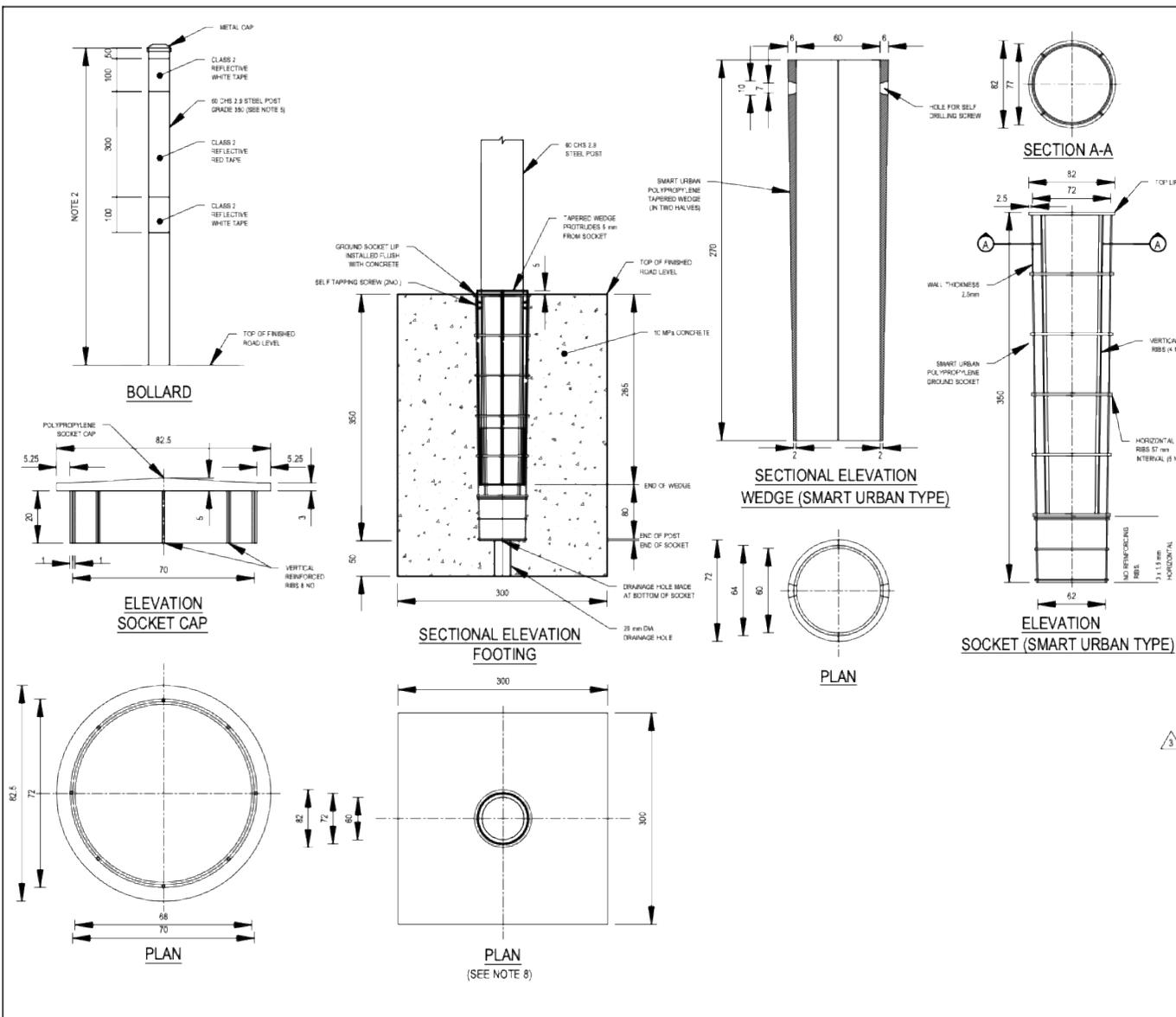
**SURFACE MOUNT BOLLARDS**

<b>140 Steel Bollard</b>	Surface Mount	Surface-mounted rigid bollard. Under impact, anchor bolts may loosen, bend or pull out and slab damage is likely.	Visual separation where vehicle strikes are unlikely. Not suitable for carparks or shopfront protection.
<b>140 Steel Bollard PC</b>	Surface Mount	Similar performance to the standard 140 steel bollard, with powder coating providing finish protection only, not impact recovery.	Low-risk visual delineation in pedestrian environments. Not suitable for carparks or shopfront protection.
<b>165 Steel Bollard PC</b>	Surface Mount	Larger round base redirects impact energy reducing damage but a surface mount bollard without any shock absorbing mechanism ultimately relies on the strength of the concrete anchors.	Used in low-risk areas where installing a foundation is difficult. Not a protection bollard. Not recommended for use on roads with speed limits over 10kmph
<b>165 Steel PC IR</b>	Surface Mount	Designed to absorb and recover from lower-speed impact while reducing damage to the slab and surrounding footing zone.	Car parks, service areas, loading zones and urban spaces exposed to low-speed vehicle contact. Bollard can still chip, scratch rust and corrode (Maximum lifespan if not impacted 20 years)
<b>150 mm AP IR</b>	Surface Mount	Corrosion-resistant impact recovery bollard suited to repeated low-speed strikes and reduced maintenance.	Coastal sites, public realm projects, car parks and sustainability-focused infrastructure. Protecting assets- including electrical. Provide soft surface and low impact for Bike Paths and Disabled parking bays. (Lifespan Bollard 25-50 years/ Foundation 100 years)
<b>168 mm Stainless Steel IR</b>	Surface Mount	Durable impact recovery bollard with corrosion resistance and good low-speed recovery performance.	Premium public realm projects, coastal areas and sites needing appearance, durability and impact recovery. (Lifespan Bollard 25-50 years/ Foundation 100 years)

	DEPTH	MAINTENANCE	REUSE FOOTING	REUSE BOLLARD	RATING
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SURFACE MOUNT BOLLARDS					
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<b>140 Steel Bollard</b>	Surface Mount				
<b>140 Steel Bollard PC</b>	Surface Mount				
<b>165 Steel Bollard PC</b>	Surface Mount				
<b>165 Steel PC IR</b>	Surface Mount	NO	YES	YES	
<b>150 mm AP IR</b>	Surface Mount	NO	YES	YES	
<b>168 mm Stainless Steel IR</b>	Surface Mount	NO	YES	YES	



AMENDMENTS		
NO.	DESCRIPTION	APPROVED & DATE
1.	20mm DIA DRAINAGE HOLE ADDED	17 FEBRUARY 2014
2.	CHANGE AIRSPOTS TO SMART URBAN AMENDED.	
3.	TITLE BLOCK AND FONT UPDATED. MOVING NOTES TO TITLEBLOCK.	

NOTES	
1.	SMART URBAN REMOVABLE BOLLARDS TO BE INSTALLED TO MANUFACTURER'S SPECIFICATIONS AND THIS DRAWING.
2.	HEIGHT OF BOLLARD TO BE 300 mm ABOVE FINISHED ROAD LEVEL UNLESS OTHERWISE SPECIFIED IN THE DESIGN DRAWINGS.
3.	THE SPACING OF BOLLARDS SHOULD BE IN ACCORDANCE WITH THE DESIGN DRAWINGS.
4.	THE SOCKETS SHOULD BE CAPPED WHEN NOT USED.
5.	BOLLARDS AND METAL CAPS SHALL BE COVERED WITH EXTERIOR GRADE LEAD FREE POLYESTER POWDER COAT.
6.	THE FINISHED COLOUR AND SPECULAR GLOSS VALUE SHALL BE EQUIVALENT TO GOLDEN YELLOW Y14 AS SPECIFIED IN ASD30.
7.	ALL DIMENSIONS IN MILLIMETERS.
8.	AS AN ALTERNATIVE TO THE 300x300x400 mm DEEP CONCRETE FOOTING, THE FOOTING MAY BE BORED USING A 300 mm DIA. AUGER TO GIVE CYLINDRICAL 400 mm DEEP FOOTING.

PLANNING AND TECHNICAL SERVICES DIRECTORATE ROAD AND TRAFFIC ENGINEERING BRANCH Website: Ceresat EAST PERTH 6804 Telephone: 138 138	
DRAWN SOORI K. KASIRI 29/04/14	DESIGNED SOORI K. KASIRI 29/04/14
CHECKED D. LANDMARK 26/06/08	APPROVED R. GROVE 26/06/08
P.L.T. NO. 13/4330	
STANDARD DRAWING REMOVABLE BOLLARDS FOR USE ON ROADS UP TO 110 km/h	
200831-0014-3	