Stainless steel **Bollards**

We looked the **same**

Both bollards may look the same. Both stainless, both removable, but we perform very differently.
Choose wisely.

City of Fremantle | City of Perth | mainroads WESTERN AUSTRALIA

When impacted **something's got to give!**

Unless you incorporate some form of shock absorbing mechanism the bollard and footing will need replacing every time

Thin walled

Low quality stainless steel bollards made from light walled inferior grade stainless steel, simply crumple upon impact or rust out creating even more landfill.

Pipe (not tube) is required when bollard may be subject to impact

Removable

Most removable bollards are secured on metal ground sockets that allow dirt and grit to enter the footing, (making bollards unstable) rust and corrode, distort when impacted and bollards quickly become out of alignment (or impossible to remove)

How resilient they are

These bollards look like our bollards but are very different.

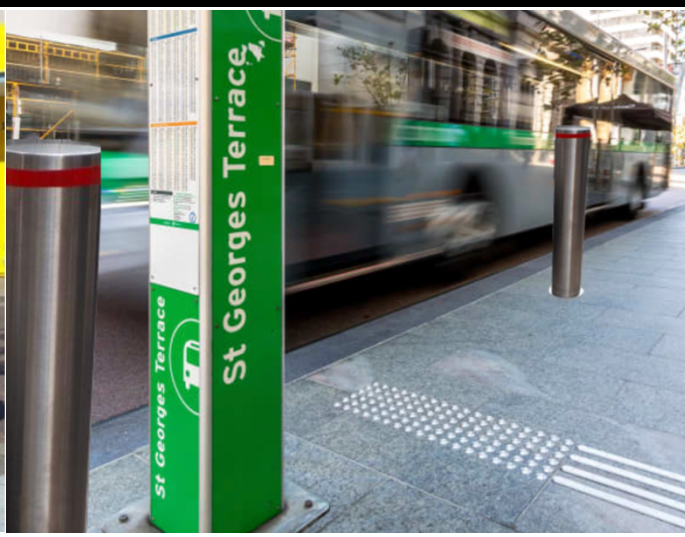
Firstly, they are light walled and fold easily. Secondly, they are rigid, so have no option than to fold upon impact or dislodge to footings -, creating costly removal and replacement repeatedly over the life of a development

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

City of Perth was tired of repeatedly replacing bollards and expensive footings. They had tried “flexible” bollards but found that flexible plastic and spring-loaded bollards offered limited protection to assets and pedestrians and could become unstable over time. They also tried removable bollards, but these quickly failed.

They wanted a bollard that was:

- Removable
- Provided protection
- Low cost to maintain
- Continue performing over time



Protection

The bollard could not simply fold upon impact like spring loaded bollards, it had to provide some resistance to protect the trees they had just planted, and to protect pedestrians and buildings from errant vehicles.

Removable

Bollards had to be removable when the trees were fully grown; to enable restaurants to use the space in the evenings to install tables; and for events. The securing device had to keep working and not allow bollards to become unstable or “stuck”

Low cost to maintain

The bollard had to withstand regular impact from vehicles, without damage to surrounding foundations or expensive footings. (We also made the bollard re-usable)

The main thing they wanted was a means of securing bollards while keeping them easily removable. After trialling our ZERO WASTE Foundations, they wanted a bollard system that could be secured within them and continue working without high annual maintenance costs. After a few years of successful use, they returned for a surface-mount option — and we delivered.

In-ground
Impact Recovery Bollard

Quality Bollards easy to install and maintain

Heavy 3.6 mm wall thickness Bollard casing is resistant to impact

Secured using the Impact Recovery System

Bollards self-recover from low impact, are removable and re-usable following severe impact

Flat (slightly domed) welded cap

Polished Satin finish (most durable finish)

Secured inground using 350 or 650 mm ground socket that locks units in- only removable using tools provided.

Cap provided to cover socket when bollard is removed.

ZERO WASTE Ground socket protects surrounding foundations from damage. Concrete Footings remain reusable following severe impact.

Surface Mount
Impact Recovery Bollard

Quality Bollards easy to install and maintain

Heavy 3.6 mm wall thickness Bollard casing is resistant to impact

Secured using the Impact Recovery System

Bollards self-recover from low impact, are removable and re-usable following severe impact

Flat (slightly domed) welded cap

Polished Satin finish (most durable finish)

Secured on Re-usable Heavy Duty 10 mm thick x 300 mm diameter Stainless steel Base Plate

5 evenly spaced recessed High quality concrete anchors to evenly distribute energy reducing risk of damage

Heavy Duty Base Plate protects foundations from damage. Footings remain reusable following severe impact.

4 Levels of extreme **protection**

1. HEAVY DUTY RESISTANCE CORE

Unlike spring-loaded bollards that can over-flex, the heavy-duty resistance core restricts bollard deflection to approximately 20 degrees under low-speed passenger vehicle impact. For higher-risk zones and areas subject to utility vehicle impact, the 650 mm depth IRS can be upgraded to an Extra Heavy Duty resistance core to further reduce the risk of bending

2. 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 multiple impacts, greatly improving energy absorption, safety and resilience

3. PROTECTIVE BOLLARD CASING

A Heavy-duty impact resistant stainless-steel pipe bollard casing provides an impact resistant surface, designed to last and continue looking good. Under mild inland conditions, stainless bollards may last for decades. In coastal or high-salt environments, 316 stainless steel is generally recommended for improved corrosion resistance and longer aesthetic life.

4. ZERO WASTE FOUNDATIONS:

ZERO WASTE Inground Foundations are made from Advanced Polymers that protect the surrounding foundations when a bollard is impacted and continue working following multiple low and high speed impacts. Surface Mount are made from heavy duty base plate that is highly resilient to impact and with the sacrificial resistance core taking the brunt of the impact- the base plate becomes reusable following even severe impact.

Advanced engineering overcomes these problems

Bollards self-recover

Upon low-speed impact bollards absorb the impact force and slowly self -recover and are removable and reusable following severe impact

No damage to footings

ZERO WASTE Foundations remain in good working condition following both low and high speed impact. Base plates are reusable following impact

Bollards Impact Resistant

ZERO Bollards are made from Australian heavy-duty materials designed to withstand impact, remaining in good condition

Bollard re-usable

Both surface mount and Inground bollards are removable and reusable following severe impact, saving thousands over the life of a development

Footings reusable

ZERO WASTE foundations remain in pristine condition and surface mount base plates are reusable following severe impact, saving thousands

Simple replacements

Bollards are low cost to maintain. If damaged, they are removed and replaced in less than 5 minutes without the need for digging or heavy labour.

Impact resistant base plate

With square base plates the impact force is concentrated on one anchor- with heavy duty round base plates the impact force is evenly distributed, reducing the risk of damage

Superior protection

Unlike flexible bollards that can over-flex, the strong resistance core provides superior protection against errant vehicles, greatly improving safety

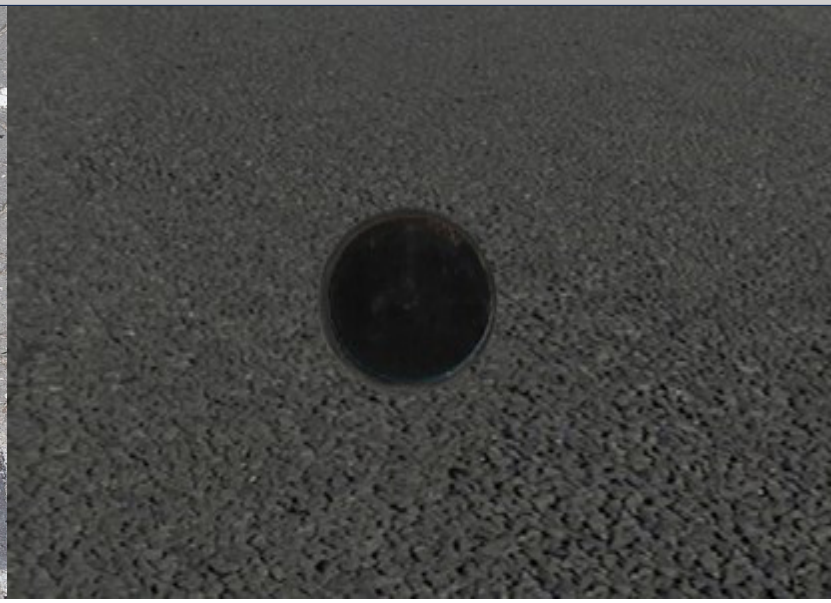
Strong Pipe Bollard

Heavy walled Pipe bollards provide excellent resistance against denting, and rusting greatly extending the potential lifespan

Impact Resistance

The Impact Recovery System enables reuse of the same bollard following repeated low-speed impacts, saving thousands over the life of a development. Unlike other “flexible” bollards, the system incorporates a strong internal resistance core that restricts bollard deflection to approximately 20 degrees under low-speed passenger vehicle impact. It is not a ram-raid bollard and is not designed to stop hostile vehicles

Impact tested to meet requirements for Protection Bollards



ZERO WASTE Footings were impact tested at 60kmph using CHS posts from 2.3 - solid rod and remained intact following multiple impacts. We have had thousands installed for over a decade and they remain in good working condition today.

Bollards were impact tested to meet AS/NZS 3845.2:2017 Standards for Protection Bollards
Tests used heavy Duty resistance core at 300 mm height. Bollards were impacted at 10 kmph in test situation to replicate impact in a carpark . (Image of damaged resistance core provided by City of Perth)

- Vehicle Mass 1860 kg
- Speed 0-10 km/hr
- Installed 350 mm Depth in asphalt.
- Concrete footing 350 mm deep 400 mm wide
- 30 MPa Concrete

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NB: In situ bollards have been impacted on hundreds of occasions, by both passenger vehicles and trucks with both bollard and footings surviving with no injury to vehicle occupants

Impact Tested

Under low-speed impact, the bollard deflected up to approximately 20 degrees, at which point the driver became aware of the impact and reversed off, allowing the bollard to self-recover. Under higher-energy impact, the internal resistance core may bend at ground level and require replacement, while the footings remain undamaged

Result of multiple impacts:

Bollard recovered following multiple impacts, demonstrating no potential to penetrate the occupant compartment or present an undue hazard to other traffic, pedestrians or personnel in a work zone **(Zero disturbance to footing resulting in zero debris)**

VIEW VIDEO →

In the tested low-speed passenger vehicle scenario of 0–10 km/h, the bollard self-recovered following multiple impacts without visible damage or signs of fatigue.

Low impact

At low speed the impact recovery rings absorb the impact force enabling the bollard to deflect a maximum of 20 degrees (before hitting the resistance core), and slowly self-recover

High impact

Although a passenger vehicle will not usually bend an Impact Recovery Bollard under low-speed conditions, a truck or utility vehicle may cause the bollard to bend to around 30 degrees from vertical once the internal resistance core begins to yield

Severe impact

Under severe impact, including higher-speed impact or impact from trucks or utility vehicles, the Impact Recovery Rings absorb the initial force and slow the vehicle. If the vehicle continues to move forward, the resistance core bends at ground level and may deflect up to approximately 75 degrees, restricting further bollard movement. In this case, the resistance core may require replacement

Improve **resistance**

The bollard is secured using a heavy Duty Resistance Core. It is the Impact Recovery Rings that take the initial impact and if the vehicle continues to propel forward the force is transferred to the internal Resistance Core which can bend and need replacing (sacrificial).

Heavy Duty Resistance Core

Extra Heavy-duty Resistance Core

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

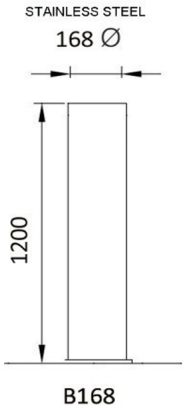
This reduces maintenance in zones subject to impact from utility vehicles and trucks. NB: You must weigh up the extra damage to vehicles against the benefit of reduced maintenance.

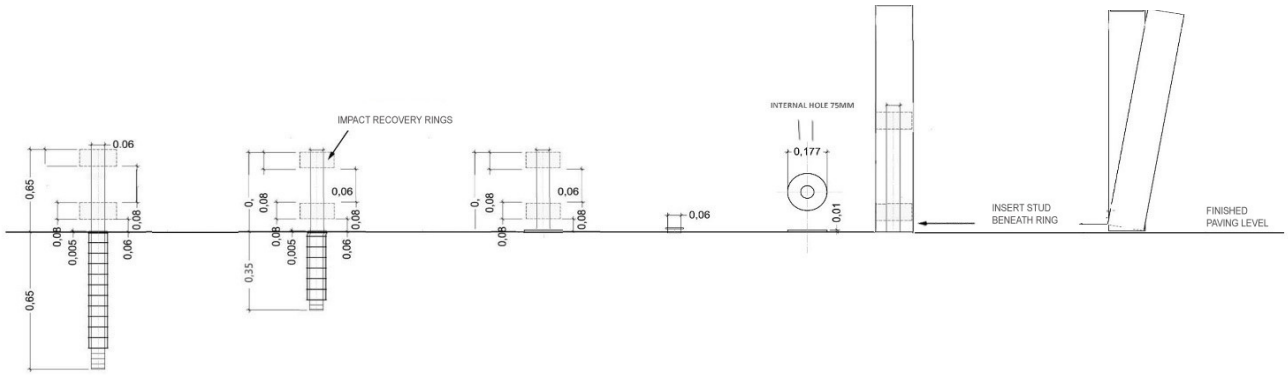
Impact
Resistance chart

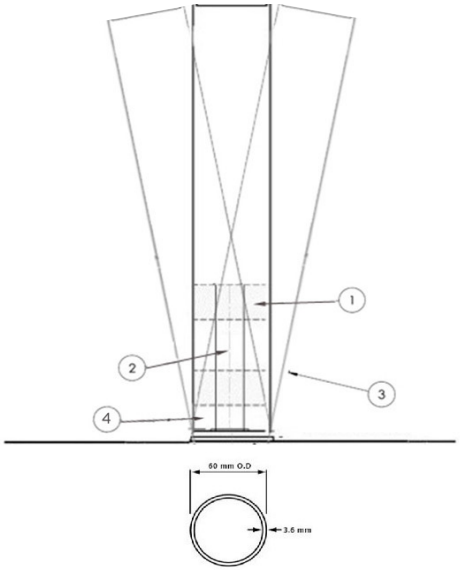
Use this chart to determine the most appropriate method of installing your bollard to suit your requirements.

Option	Resilience	Likely Impact Response	Key Benefits
Tube – Surface Mount	**Low around 1-3 km/h**	Tube is 1.3 mm thick and will easily bend or deform upon vehicle impact.	Not suitable for bollard subject to impact. Decorative or indoor only.
Tube – In-Ground	**Low around 1-3 km/h**	Tube may bend or fold under impact. (Refer to image on back page)	Not suitable for bollard subject to impact. Decorative only.
Pipe – Surface Mount	**Med around 5-8 km/h**	Depending upon weight of base plate (we use Heavy duty to increase resistance)	Easier retrofit than in-ground, strong visual presence, easier replacement than direct-set
Pipe – In-Ground	**Med around 8-12 km/h**	Bollard better withstands impact, but force is transferred into footing and surrounding pavement	Strongest rigid asset protection and can be concrete filled- although costly to maintain
Pipe – SM IRS	**High 10-16km/h**	Impact Rings absorb initial impact energy then resistance core which bends with continued force	Reusable mounting system, easier install and replacement
Pipe – IG IRS 350	**Very High 12-18 km/h**	Impact Rings absorb initial impact energy then resistance core which bends with continued force	Strong balance of resilience, maintainability and easier reinstatement; suitable for asphalt and standard concrete footing areas
Pipe – IG IRS 650	**Very High 15-22 km/h**	Better suited to repeated or heavier accidental impacts; reduced risk of bollard and footing damage	Greater embedment for more demanding locations, easier replacement, reduced maintenance
Pipe – IG IRS 650 XHD	**Extreme 18-28 km/h**	Most resilient option in the range; impact recovery system minimises damage to bollard and footing in severe service conditions	Highest level of resilience and durability, best for repeated strikes and tougher environments

*Speeds are indicative only. Assumes typical 45° impact from 1800kg passenger vehicle.
Failure defined as permanent bollard bend or footing disruption or IRS Resistance Core yield (assuming footings are installed according to Directions provided).







COMPONENTS

1. IMPACT RECOVERY RINGS
2. INTERNAL CORE 300 MM HIGH 3.6 WALL THICKESS
3. BOLLARD CASING - POLY/ STEEL OR STAINLESS
4. SECURING STUD (SECURITY STUD AVAILABLE)

Stud is inserted in hole at base of bollard
and sits below the bottom Impact Recovery Ring

ZEROCIVIL

say goodbye to **repeated repairs**

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If you want to discuss a project, get some ideas for improving the safety, aesthetics or sustainability of a project, try out some of our ZERO WASTE technology or pop in for a coffee - give us a call, we're happy to help.

Innovator of the Year - Dept of Commerce
OH&S WorkSafe Award
Specified by :
MRWA
Dept Transport
Western Power
PTA