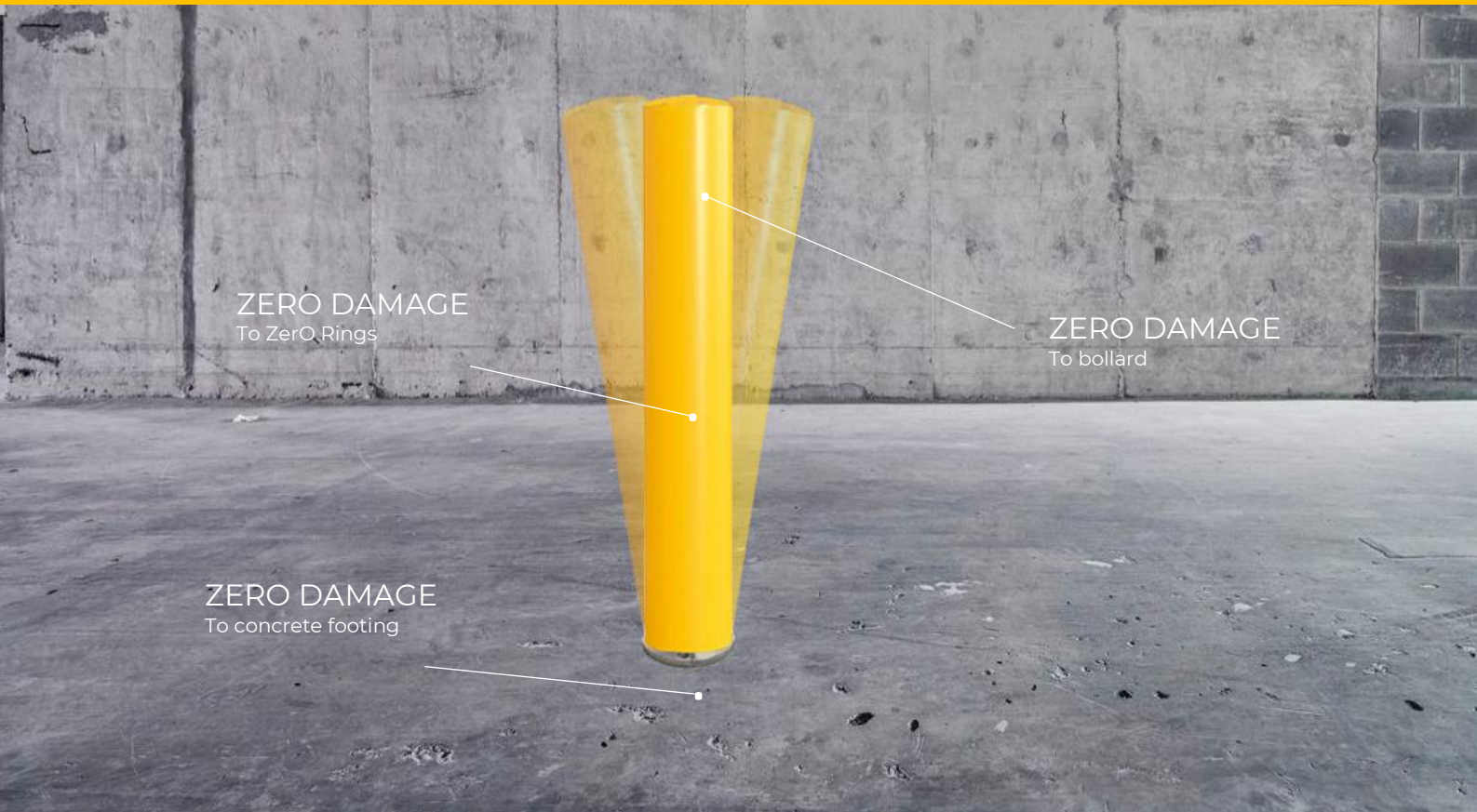


ZERO WASTE

IMPACT RECOVERY SYSTEM



Finally, bollards that don't cost the earth!



ZERO DAMAGE
To ZerO Rings

ZERO DAMAGE
To bollard

ZERO DAMAGE
To concrete footing

City of Perth had a problem maintaining bollards in the busy city centre. They came to us to develop a solution that would provide protection for café strips and pedestrians, reduce damage to vehicles and reduce the escalating cost of maintaining their bollards. We developed a low cost and reusable solution to all of these problems.



THE SUNDAY TIMES



mainroads
WESTERN AUSTRALIA

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Did you realize bollards are actually designed to fail?

For a bollard to be impact resistant the footing needs to be substantial and yet when impacted – something's got to give. Surprisingly its more about the footing than the actual bollard!

A surface mount will just bend or be dislodged upon impact, but if a bollard can stop a vehicle, (say an inground steel bollard) then the force is directed to the footing, and something's got to give!

The result is that every year hundreds of thousands of bollards like this one here, **and the expensive concrete footings are repeatedly sent to landfill** creating hundreds of hours of disturbance in our cities and resulting in thousands of tonnes of highly carbon intensive waste



City of Perth and Fremantle had tried everything but could not find a bollard that kept working impact after impact. They tried spring loaded bollards, but they offered absolutely no resistance to impact and quickly wore out becoming floppy over time causing havoc outside the pub! They tried cheap imported stainless steel ones that just dented and rusted within weeks.

We decided to put an end to this madness!

But our amazingly talented design team managed to fulfill their wish list and more, designing an add on system that transforms everyday bollards into impact resistant, removable, reusable and relocatable bollards that don't cost the earth!



Safe and secure, yet removable

Bollards had to be removable for events and maintenance but had to also be rigid (not floppy), perfectly aligned, remaining safe and secure and not be deflected by hand – so they appear to be solid inground bollards



Resistant to vehicle impact

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 and low cost maintain

When severely impacted instead of the entire footing and bollard having to be replaced- they wanted a low cost means of repairing the damaged bollard and hopefully preserving the concrete and paving



Unlike anything you've seen before, this is truly a game changer

Overcoming 5 of our industry's major problems-
Substantially improving safety & efficiency, saving thousands over the life of a development

For the first time in history instead of repeatedly replacing bollards and the expensive concrete foundations, you can install a bollard that provides both protection and saves you money for decades by making both the bollard and surrounding foundations reusable impact after impact

This overcomes many of the biggest problems associated with Bollard repairs

- Damage & waste
- Digging and heavy labour
- On-going consumption
- Disturbance to public



05

overcoming 5 of our biggest problems

1. Carbon waste

With hundreds of thousands of bollards and the surrounding foundations damaged every year, current methods are consuming vast quantities of carbon intensive concrete and steel, with cheap imported bollards exacerbating the problem. We are already borrowing resources from future generations and with rapid urbanisation the damage and consumption is on the rise



2. Growing disturbance

The disturbance caused by repeated repairs has become a major problem in our cities and with rapid urbanisation and growing safety requirements the disturbance, delays, and associated costs are expected to increase dramatically



3. Growing difficulty

Building and maintaining bollards is hard work, requiring hours of digging and heavy labour; often dealing with traffic, pedestrians and a growing number of dangerous underground services, our civil workers are risking their lives and with fast growing urbanization and a growing number of poorly marked underground services, this job is becoming increasingly dangerous.



4. Growing Costs

Repeatedly replacing valuable concrete footings and bollards provides no future benefit so every year the costs continue to grow. With ever increasing environmental pressures and tipping fees; safety requirements such as dial before you dig and traffic management; global unrest and depleting resources, the cost of materials is rapidly increasing and the gap between the growing demand and the finite budgets continues to grow



5. Cost overruns

It's hard enough to budget for maintenance, but it's the unknown variables, such as delays caused by heavy traffic or rain; pedestrian traffic; injury caused by working in traffic; back injuries from digging and heavy labour; or costly damage to the growing number of (often poorly mapped) underground services, that cause havoc with budgets and the risk of cost overruns is growing.



We decided it was time to put an end to this madness making both the bollard and foundation reusable!



Technology that transforms

Unlike anything you've seen before

Instead of selling you an expensive bollard, that you would need to continually replace this technology is truly revolutionary- providing the world's first low-cost way to transform everyday bollards into impact resistant, removable, reusable and relocatable bollards that don't cost the earth!

Advanced Engineering

No other system enables you to preserve both the bollard and the expensive foundation.

Using a unique built-in memory that allows the material to flex, cushion and reform repeatedly upon impact from vehicles, the Impact Recovery Rings create a permanent cushion that absorbs the impact force of a vehicle and self-recovers following multiple impacts, substantially improving safety and resilience, by reducing the impact force and substantially reducing the cost of repeated replacements



- 1. Strong Resistance core
- 2. Impact Recovery Ring
- 3. Bollard cover

(Steel, Stainless or Poly)



4 Levels of extreme protection

- 1. RESISTANCE CORE** Unlike spring loaded bollards that over-flex, a heavy-duty resistance core prevents deflection of the bollard beyond 20 degrees when impacted by a passenger vehicle
- 2. SHOCK ABSORBING** Unlike springs that quickly wear out, creating dangerous litigation risks, our re-usable energy absorbing ZerO 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 safety and resilience
- 3. PROTECT 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
- 4. PROTECT FOUNDATIONS:** You can surface mount your bollards using our ZerO reusable base plate or secure inground using our ZerO Waste Unbreakable ground sockets. Both options continue working and protecting surrounding foundations impact after impact



We get knocked down, but we get up again. You're never going to keep us down!

Unlike spring-loaded bollards, ZerO Bollards cannot be deflected by hand, remaining perfectly aligned safe and secure year after year.

When impacted by a vehicle bollards deflect to a max of 20 degrees and slowly self-recover.

When severely impacted (truck or utility vehicle) replacements take less than 5 minutes and the bollard, expensive concrete footings and ZerO Rings are reusable impact after impact, saving thousands over the life of a development.



Upon Low Impact

Bollards remain rigid and appear to be solid inground bollards but when impacted by a vehicle they absorb the impact force deflecting a maximum of 20 degrees and self-recovering, with no diminished capacity following hundreds of impacts.

Severe Impact

When severely impacted instead of the entire footing being dislodged, the inner resistance core bends allowing the bollard to fold but not be dislodged- preventing any further forward movement of the vehicle and enabling fast reinstatement

Fast efficient replacements

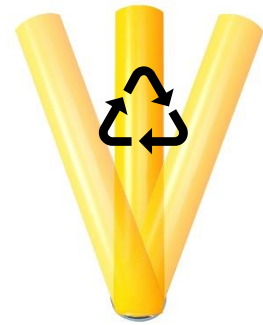
Replacements are simple Following severe impact bollard is easily removed (resistance core replaced) and reinstated in around 5 mins Bollards and ZerO Rings are re-usable impact after impact



Impact Tested

Tested from 10 – 110 kmph

Awarded Innovator of the Year by Dept of Commerce for developing the world's first means for preserving valuable foundations for the entire lifespan of a development



BOTH LABORATORY AND INSITU IMPACT TESTED AT 10 - 110 KMPH

ZERO DAMAGE TO FOUNDATIONS

Zero damage to concrete footing or surrounding paving impact after impact for the entire lifespan of a development.

ZERO WASTE Foundations have no breakable components so continue working for the entire lifespan of a development

ANY STRENGTH RESISTANCE CORE

Impact tests were performed on 2.3 / 2.9 / 3.6 / 5mm and solid rod. 2.3- 2.9 bends too easily upon impact from vehicle. We suggest using a minimum of 3.6 mm wall thickness steel which brings a passenger vehicle travelling >5 kmph to a stop and bends upon impact at high speed or impact from heavy vehicle

ZERO DAMAGE TO BOLLARD

Tests used 3.6 resistance core 300 mm Height. Bollards were impacted at 3-60 kmph. At low speed the bollard deflects up to 20degrees at which time the driver was aware of hitting the bollard and reversed off- allowing the bollard to self-correct. At high speed the internal resistance core bent at ground level and needed replacing.

Safe & Secure

Bollards remain rigid and appear to be solid inground bollards – they cannot be deflected by hand (like other flexible bollards), remaining perfectly aligned safe and secure year after year.

Upon Low Impact

When impacted by a vehicle they absorb the impact force deflecting a maximum of 20 degrees and self-recovering, with no diminished capacity following hundreds of impacts.

Severe Impact

When severely impacted the resistance core bends allowing the bollard to fold but not be dislodged- preventing any further forward movement of the vehicle and enabling fast reinstatement



1. Low speed

Parking lots

When a vehicle impacts a bollard at relatively low speed, the Impact recovery Rings will compress allowing the bollard to deflect up to 20 degrees and slowly self-recover

2. Medium speed

Roads 60 KM Zone

When a vehicle impacts a bollard at relatively High speed the resistance core will initially deflect elastically and if there is sufficient momentum and energy in the errant vehicle, the post's bending strength will be exceeded, leading to plastic deformation concentrated near the top of footing as the bollard bends over and the resistance core will need replacing

3. High speed

Freeways 110 KM Zone

When a vehicle impacts a post at High speed, the same happens as a vehicle travelling at medium speed. If the post shears off the sheared off removal tool must be used to remove the core from the ground socket.

Advanced engineering

ZERO WASTE Foundations are unlike anything you've seen before, made using advanced polymers, they are light years ahead of other fixing devices on the market providing a level of durability previously unseen

ZERO WASTE Foundations are both laboratory and in-situ tested from 10 - 110kmph demonstrating no deformation following hundreds of impacts, without any damage to the surrounding foundations.



1. Advanced polymers

ZERO WASTE Technologies are made using a advanced polymers (previously only used in Aerospace industry) selected as they provide unique shock absorbing and self-healing properties, making them highly suitable for this application.

The unique built-in memory allows the material to flex, cushion and reform repeatedly upon impact from vehicles, without wear and tear over time

The built-in memory allows the material to reform repeatedly upon impact from vehicles. When a damaged bollard is removed, the ground socket returns to its original shape without wear or tear, protecting the surrounding concrete and paving from damage impact after impact.

2. Unbreakable

This is where it gets really Smart. The locking device to secure your bollard uses friction to secure items, which ensures bollards remain perfectly aligned, safe and secure year after year,

Because it requires no pins or padlocks the locking device continues working year after year, and that bollards are easily removable (using tools provided) no matter how long between removals, overcoming all the problems associated with metal devices

Over 300kg of upward force is required to remove the resistance core from the ground socket. The locking capacity remains undiminished, and bollards remain removable using tools provided, following hundreds of impacts.

Re-usable

Rather than sell you a complete bollard and foundation that costs thousands and needs replacing every time it is badly impacted- We have developed the world's first add-on product to enable you to secure almost any design of bollard on ZERO WASTE Foundations, making the bollard self- recover from impact and even re-usable following severe impact.



When severely impacted (truck or utility vehicle) the resistance core can bend and need replacing. Replacements take less than 5 minutes.

A securing stud is removed from the base of the bollard and the bollard slipped of the rings. The rings are removed from the core using a screwdriver and secured to a replacement core.

The bollard, expensive concrete footings and ZerO Rings are reusable impact after impact, saving thousands over the life of a development.



Fast efficient replacements

Replacements are simple Following severe impact bollard is easily removed (resistance core replaced) and reinstated in around 5 mins

Bollards & Rings Reusable

Bollards and ZerO Rings are removed using a security Allen key and screwdriver and re-used time and time again. Withstanding hundreds and hundreds of impacts

Massive return on investment

Foundations remain pristine condition for the entire lifespan of a development. Bollards and Rings are re-usable and the only cost for replacements when badly impacted is the internal core and around 5 minutes labour.



Safer more sustainable bollards

For a bollard to be impact resistant the footing needs to be substantial and yet when impacted – something's got to give. The result is that thousands of bollards and concrete footings are repeatedly replaced and sent to landfill. Unless you incorporate some form of shock absorbing capabilities, the bollard and footing will need replacing every time.

S/MOUNT IRS

Suitable for solid concrete footpaths and foundations. Secured using five evenly spaced concrete anchors. Base is reusable

350 DEPTH IRS

We recommend 350 mm Depth footings for most applications in solid concrete footing and paving (with concrete footing below

650 DEPTH IRS

We recommend 650 mm Depth footings for free standing footings and large items or signs in windy conditions (such as desert signage)

We get knocked down, but we get up again. You're never going to keep us down!

Bollards can be secured using the Impact Recovery System. Bollards cannot be deflected by hand, remaining perfectly aligned safe and secure year after year. When impacted by a vehicle they deflect to a max of 20 degrees and self-recover. When severely impacted (truck or utility vehicle) the resistance core can bend and need replacing. Replacements take less than 5 minutes. The bollard, expensive concrete footings and ZerO Rings are reusable impact after impact, saving thousands over the life of a development.



Upon Low Impact

Bollards remain rigid and appear to be solid inground bollards but when impacted by a vehicle they absorb the impact force deflecting a maximum of 20 degrees and self-recovering, with no diminished capacity following hundreds of impacts.

Severe Impact

When severely impacted instead of the entire footing being dislodged, the inner resistance core bends allowing the bollard to fold but not be dislodged- preventing any further forward movement of the vehicle and enabling fast reinstatement

Fast efficient replacements

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ZERO WASTE

Good quality concrete can last 100 years but paid set will not. If you want your foundations to last, you must use good quality concrete 30MPa for bollards subject to impact

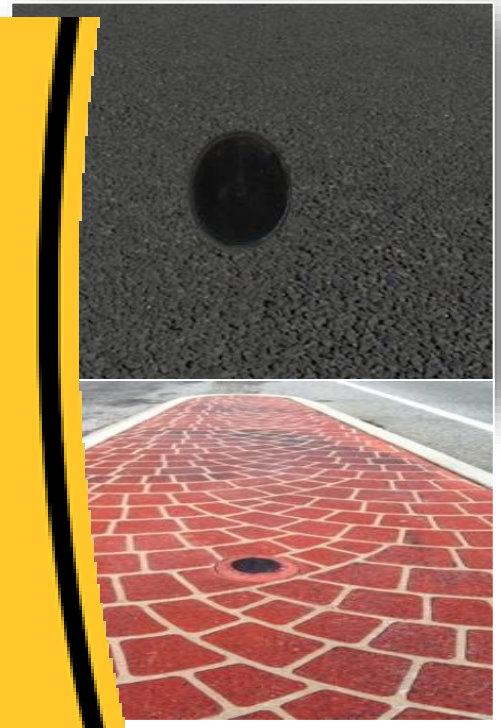
ZERO WASTE Unbreakable Foundations create a protective impact absorbing and self-healing shield between the item and the valuable concrete foundations, protecting the foundations from damage extending the lifespan of the foundations.

Socket must be flush with ground level

Socket must not protrude- it must be installed flush with ground level to avoid damage when items are impacted and trip factors if item is removed.

Taper must be flush with ground level

When item is installed, the Taper must finish flush with ground level to avoid damage when items are impacted, ensuring taper is re-usable



WORKSAFE

Replacements are simple
Following severe impact bollard is easily removed (resistance core replaced) and reinstated in around 5 mins without disturbance to public or foundations



Secure almost any design bollard



STEEL BOLLARD

Australian made 150/165 mm \varnothing galvanised steel x 1250H quality powder coated safety yellow



STAINLESS BOLLARD

Australian made 168 mm \varnothing stainless-steel heavy-duty pipe x 1200H with satin finish



POLYMER BOLLARD

Advanced Polymer bollard 150 mm \varnothing x 1200-1800 H in Safety Yellow smooth finish

Our standard range of bollards

- **Galvanised steel**

Std unit powder coated Safety Yellow, but can be powder coated colour of choice

- **Stainless steel**

Satin finish- the most durable finish

- **Advanced Polymer bollards**

Std unit Safety Yellow, but available in almost any colour- including stone look grey or brown (ask for a colour chart) and can be polished for high shine.

[VIEW BROCHURE](#) >



POLYMER BOLLARD
150 x 1200 H



POLYMER BOLLARD
150 x 1500 H



POLYMER BOLLARD
150 x 1800 H

Footing depth



SMOUNT IRS

Heavy Duty Reusable base plate. Suitable for solid concrete footpaths and foundations.



350 DEPTH IRS

As bollards deflect 350 depth foundations are suitable for most applications in solid concrete footings



650 DEPTH IRS

For free standing footings and bollards that may be subject to severe impact such as trucks or forklifts

Concrete can last 100 years

Good quality 30 MPa concrete can last 100 years, but rapid set is not impact resistant so will not last beyond one or two impacts. Elastomers cannot be used as the added flexibility reduces the holding power of the socket and they simply will not last 100 years

We suggest using 30MPa or greater if you want your footings to last. NB: The footing must be large enough to ensure it is not dislodged when the bollard is impacted (this depends on speed of vehicles/ weight/ soil conditions so differ from location to location)

NOTE It is no longer the bollard casing taking the brunt of the force, but the Resistance core that is designed to bend upon impact.

See notes below



Low Impact

Bollards in carparks are generally hit at low speed and so a surface mount foundation is a good option that also provides low-cost installation using 5 evenly spaced flush mounted concrete anchors

Medium Impact

For bollards that may be subject to impact from passenger vehicles going up to 60km/hr a 350 mm depth foundation (on a 400 mm depth quality concrete footing) will be sustainable.

Severe Impact

For free standing footings or bollards that may be subject to severe impact such as trucks or forklifts we suggest increasing the foundations to 650 mm depth

[VIEW BROCHURE](#)



UNIT INCLUDES

1. Impact Recovery Rings
2. Heavy Duty Internal Core
3. Bollard Casing

Refer to Diagram

OPTIONS

1. Surface Mount
2. In-ground 350 mm
3. In-ground 650 mm
4. Super-flex rings available

Base Plate is 10 mm thick and 200 mm diameter with solid upright spigot. Core is a CH Steel 3.6 wall thickness, secured to base plate using an embedded grub screw. In-ground Smart Sustainable Foundations are made from impact absorbing self-healing plastic and use a self-locking taper to lock the internal core into the socket (only removable using tools provided). Refer to specs for SSF-60

INSTALLATION

Refer to Specs for Sustainable Foundations which can be installed when pouring new concrete footpaths or footings or retro-fitted by core drilling or removing pavers. Surface Mount Base Plate is bolted down using 5 evenly spaced recessed concrete anchors (supplied) to evenly distribute impact force

TOOLS

Surface mount require an Allen key and screwdriver
Removal tool also required for In-ground version



CODE	DETAILS	WEIGHT
IRR-150	Ring to fit 150 Poly Bollard	1 kg
IRR-165	Ring to fit 165 mm Galvanised Steel Bollard	1.25 kg
IRR-168	Ring to fit 168 mm Stainless steel Bollard	1.3 kg
ICORE-SM	3.6 CHS Post x 300 mm	1 kg
ICORE-350	3.6 CHS Post x 650 mm	2 kg
ICORE-650	3.6 CHS Post x 950 mm	3 kg

