How to select the right bollard **for your project**

BOLLARDS REUSABLE

Steel, stainless steel and Advanced Polymer Bollards can now be made removable and reusable following severe impact

FOOTING REUSABLE

Expensive concrete foundations and paving can now be made reusable following severe impact

AS/NZS 3845.2 CERTIFICATION

City of Fremantle | City of Perth | mainroads WESTERN AUSTRALIA | western power | CPB CONTRACTORS | CIMIC | Downer Relationships creating success | Department for Transport

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IF YOUR BOLLARD IS TO PROTECT PEOPLE OR ASSETS- CHOOSE WISELY

Bollard **Options**

STEEL BOLLARD

Steel bollards are the go-to bollard for most people but nowadays there are far better options available

STAINLESS STEEL BOLLARD

For more quality decorative finish stainless steel is your go to- but do not use imported bollards as they just don't last

ADVANCED POLYMER BOLLARD

The latest innovation- impact and rust resistant bollards and bollard covers are the new go-to for major authorities

The most commonly used bollards are steel bollards, surface mounted or installed directly in concrete, but these bollards are gernally not impact resistant as they don't absorb any energy when impacted so the force is directed to the footing

If you want a purely esthetic bollard then these can be fine but most bollards are designed to "protect people or assets" are consequently are subject to occassional or regular impact.

Bollard Type	Install / Detail	*	Speed*	What actually happens
Surface Mount – Standard	Bolted to slab, no socket	**≈ 1 kJ**	**≈ 4 km/h**	Cosmetic only. Bolts bend, pull out or slab chips. Offers almost zero real protection.
In-ground Galv steel	140–165 Ø in **400 mm** footing	**≈ 3 kJ**	**≈ 7 km/h**	Survives trolley/very slow nudge. A light car hit will crack/rotate footing and need replacement.
In-ground 165 Steel – concrete filled	165 Ø, fully filled, **400 mm** footing	**≈ 4 kJ** (no real gain)	**≈ 8 km/h**	Stiffer but *more brittle*. Energy goes straight into the footing. Post and footing usually stuffed; concrete fill also traps moisture → rust + ugly stains.
In-ground 150 mm Poly – partial fill	150 Ø polymer with concrete plug from ~150 mm above ground down into footing	**≈ 6 kJ**	**≈ 10 km/h**	Flexible poly absorbs the hit; the localised plug adds toughness at ground line. Good for low-speed carpark impacts but still not a "security" or highway system.
Impact Recovery 3.5 mm – Surface Mount	3.5 mm steel/poly core on base plate with Impact Recovery Rings	**≈ 10 kJ**	**≈ 13 km/h**	Bollard deflects, car usually stops or rides up, and the bollard self-recovers. Footing and slab generally reusable.
Impact Recovery 3.5 mm – In-ground	3.5 mm core in **350 mm** socket, **400 mm** footing + Rings	**≈ 15 kJ**	**≈ 16 km/h**	Designed for shopfronts/carparks. Takes a decent low-speed hit, post recovers, footing survives with minimal damage.
Impact Recovery 5.5 mm – In-ground (Xtra HD)	5.5 mm core in **650 mm** deep socket + Rings	**≈ 25 kJ**	**≈ 21 km/h**	High-duty option. Handles serious low-speed impacts (drive-through/parking lane stuff-ups) with limited permanent set. Bollard and foundation remain reusable.
Crash-tested Energy-Absorbing Bollard	Certified to AS/NZS 3845.2 / security standard	**100–150+ kJ**	**≈ 40–50 km/h**	Designed and crash-tested to stop a vehicle at specified speed and mass. Bollard deforms sacrificially. Used for hostile-vehicle mitigation & high-risk sites.

- Indicative Energy Before Failure. Speed* of Passenger vehicle

Impact **force**

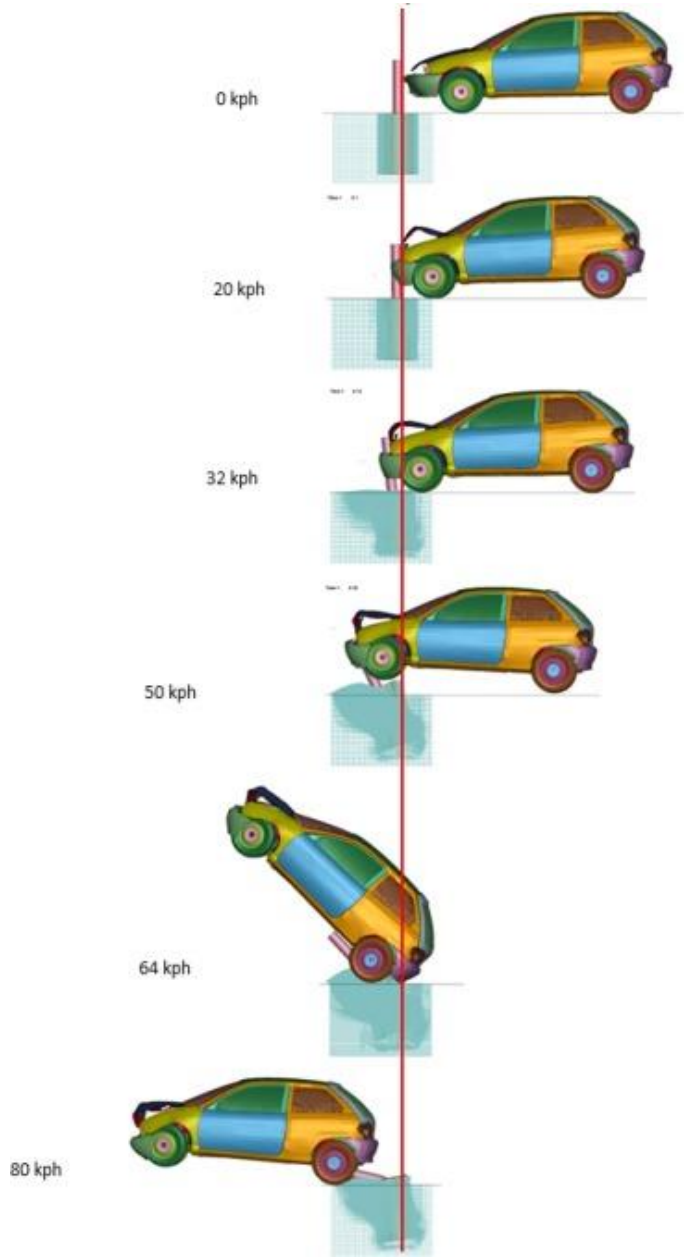
Solid inground bollards

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** and on-going maintenance cost, when designing bollards.

A solid bollard provides no means of absorbing the energy, (impact force) as shown right when a bollard is impacted, in most instances at low speed the car is damaged and at higher speeds the **concrete footing is dislodged**, and the vehicle often becomes a **dangerous projectile.** The outcome of the force (especially when steel bollards are concrete filled) can be fatal.

To overcome this problem

we have incorporated a highly efficient energy absorbing mechanism and secured our bollards on a safe secure footing that remains intact when a bollard is severely impacted.



Impact Recovery **System**

At low-speed vehicle contacts, the Impact Recovery System allows controlled deflection, reducing the risk and severity of vehicle damage.

At higher impact speeds, the bollard is designed to significantly limit forward vehicle movement to protect pedestrians and fixed assets.

ZERO WASTE Unbreakable Foundations absorb impact energy protecting the surrounding foundations when a bollard is impacted and continue working effectively keeping bollards safe and secure for the entire lifespan of a development (100 years)

Energy Absorbing Impact Recovery Rings then absorb the impact force allowing the bollard to deflect up to twenty degrees and self-recovering, without damage.

Strong Resistance Core If the impact forces the bollard beyond twenty degrees the resistance core takes the reduced impact force bending up to a maximum of 75 degrees, leaving the resistance core lodged in the footing providing a barrier to further forward movement of the vehicle

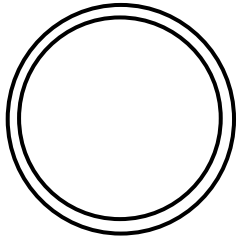
VIEW VIDEO & SPECS

STANDARD RESISTANCE CORE

This is sufficient to stop a passenger vehicle at low speed and reduce the risk of injury to drivers and vehicles. Suitable for all installations (Surface Mount/ 350mm and 650mm depth footings.)

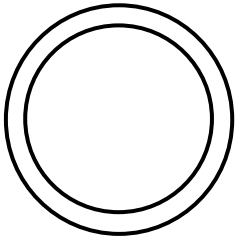
WHEN TO CONSIDER THE EXTRA HEAVY DUTY

If you find the internal resistance core is bending too frequently (Due to trucks or heavy utility vehicles) you can increase the inner core to Extra Heavy Duty. This will increase the resistance by around 150% and reduce the incidence of having to replace the inner core, but this strength internal resistance Core can only be used with 650 mm depth solid 30MPa concrete footings



HEAVY DUTY

A Heavy-Duty Resistance Core is strong enough to stop a passenger vehicle and can be used with Surface Mount and 350 / 650 mm depth footing



EXTRA HDUTY

Extra Heavy-Duty Pipe is substantially stronger so can only be used with 650 mm Depth footings

Some **Tips**

1. Check the Wall Thickness

Most failures happen because the steel is too thin.
Thin steel will dent, buckle and rust out within a few years.

You need

- **minimum 5 mm** wall thickness on 150NB / 165 OD Steel bollards.
- **minimum 3.5 mm** wall thickness on 168 mm Stainless Steel bollards.

2. Footing Depth

The footing determines impact performance. Shallow footings (300–500 mm) fail at low speeds.

- **Impact Recovery can be surface Mounted**
  500 mm = cosmetic protection only for rigid bollard
- **600–800 mm** =Low-speed vehicle protection for rigid bollard
- **900–1200 mm** = engineered impact resistance for rigid bollard

NB: Impact Recovery Bollards are designed to withstand impact and can be surface mounted or installed from 350 mm – 650 mm depth.

3. Avoid Concrete-Filled Steel

Concrete does **not** make a bollard stronger. It makes it **more brittle**, more likely to **crack footings**, and causes **rust**.

Concrete-filled 165 OD steel fails at **~15–20 km/h** in a shallow footing.

4. Powder Coating Quality

Always specify sandblasting + chemical pretreatment + outdoor polyester**.**

- Poor coating lifespan: **3–5 years**
- Quality outdoor polyester: **15–25 years**

5. Stainless Steel? Know the Difference.

Stainless **Tube** = thin, decorative, dents easily
Stainless **Pipe** = structural, expensive, lasts longer

Tube belongs indoors. Pipe (polished to satin finish is best) is the only option if you want outdoor stainless. 304 stainless is suitable for most urban environments; Don't get upsold to 316 stainless unless using in coastal regions or around pools

6. Beware Low Quality Imported Bollards

Not made to Australian standards they look like this (picture right) in no time. (compared to ours that have lasted more than a decade) see back page for pics.

- Cheap powder coating (can fade in less than 12 months)
- Buckle, dent, chip and scratch upon impact
- Rust from the inside out
- Thin inferior quality steel
- Poor welds
- Need replacing often (more landfill)
- Extremely poor reflective striping
- If it's, lightweight, or polished like aluminium → avoid.

7. Standard Surface Mount ZERO Impact Protection

Surface-mounted bollards are **not** designed to stop cars.
They rely on **anchors**, which pull out or shear off at low speed.

Surface mount bollards are for delineation purposes only. Not security or serious protection. Refer to Impact Recovery option that provides resistance against forward movement of a vehicle and is resilient (impact resistant)

8. In-Ground Steel Isn't Impact-Resistant

Classic in-ground steel is **rigid**, so on impact it:

- Bends
- Cracks the footing
- Pops out of the ground

A strong post without a shock-absorption system = failure
Refer to Impact Recovery option for impact resistance and substantially improved resilience

STOP THE LANDFILL

A quick search online reveals most Aussie bollards are bought from China for around AUD $10.00, and they are sold for Aussie steel prices- plus manufacturers profit from regular repeat sales

Footing **Depth**

The footing — **not** the bollard — decides how a system behaves under impact.

- Shallow footings rotate, crack and fail early.
- Deep footings resist overturning and survive impacts.

Impact Recovery Bollards cannot be deflected by hand**,** but under vehicle impact they deflect, absorb energy and self-recover**,** dramatically reducing damage to the footing.

350 mm — Standard Impact-Recovery Bollards

Built for energy absorption, not stiffness.

- Bollard behaves rigid to the touch but deflects under vehicle impact and returns upright.
- Footing remains intact and reusable.
- Bollard is removable and reusable following bad impact

500 mm — Cosmetic Protection Only (Rigid Bollards)

Suitable for:

- Light bumps
- Trolleys
- Low-speed manoeuvres (≈5–8 km/h)

Fails under genuine vehicle impact.
Looks strong — but is not.

600–800 mm — Low-Speed Vehicle Protection (Rigid Bollards)

The minimum depth for meaningful performance in rigid steel bollards is 600 – 800 D x 500 W. More depth = significantly better footing survival.

650 mm — XHD Impact-Recovery Bollards

For heavy-duty or higher-risk sites (XHD) Extra Heavy Duty.

- Minimum depth 650 mm
- Allows the impact-recovery system to absorb much greater energy while keeping the footing reusable.
- Impact tested to stop a vehicle up to 21 kmph
- Bollard removable and reusable following severe impact

1000–1200 mm — Engineered Impact Resistance

Used when real stopping capability is required. This is where rigid systems enter the realm of proper engineered impact resistance

- Embedded to 1M with reenforced footing
- Energy Absorbing Bollards are your only option here
- Impact Tested to stop a vehicle at 60KMPH
- Not reusable following severe impact
- Engineered impact-resistant bollards shall comply with AS/NZS 3845.1 – Road Safety Barrier System

Does size **really matter?**

Despite what many men believe- it's not size that matters

When selecting a bollard for real impact resistance, it's easy to assume that bigger means stronger. But in engineered systems, the outer diameter of the post has very little influence on stopping capability.

What actually matters is **the foundation beneath the ground** and the **internal resistance core** — this is where the energy is absorbed and controlled.

1. The Myth: "A Larger Bollard is Stronger"

Increasing the post diameter (e.g., from 165 mm to 300 mm) may look more imposing, but it **does not increase vehicle-stopping strength** on engineered systems.

- A bollard's visible size is mostly cosmetic. A bollard's *strength* comes from its embedment, footing, reinforcement, and load path.
- If you want your bollard to "look" menacing- add a Bollard cover (190 mm diameter) which will further increase resilience

2. The Reality: Strength Comes From Below Ground

The engineered footing does the work

- Impact energy is transferred into the **650 mm deep reinforced foundation**, not into the outer shell of the bollard.
- This footing and resistance core is what prevents vehicle over-run and limits penetration.

  Without the correct footing, even a large 300 mm bollard will fail

The internal resistance core is the true barrier

- The 165 mm steel core is designed to transfer and dissipate energy correctly**.**
- It allows controlled deflection at low speeds and rigid resistance at high speeds.
- A 300 mm decorative sleeve adds no structural value.
- We have an Extra Heavy-Duty option for high impact zones

3. Why 165 mm is the Correct Specification

- **Tested and validated** on the Extra Heavy Duty Impact Recovery System.
- **Designed to deflect** under low-speed impact, reducing vehicle damage.
- **Engineered to resist** high-speed impact by transferring load into the foundation.
- **Larger diameters do not improve performance** and may actually interfere with correct energy transfer.
- Bigger posts add **cost, weight, and installation effort** with zero stopping benefit.

4. When Larger Bollards *Do* Make Sense

- Wayfinding or visual prominence
- Architectural features
- Pedestrian delineation
- Traffic calming
- Protecting corners or assets from slow-speed bumps

But not for impact resistance.

Larger bollards look stronger — but they **don't stop vehicles any better**.

Choosing a bollard based on its diameter is like judging an iceberg by what you see above the water.

The small part above the surface isn't what stops the ship it's the massive structure hidden beneath that does the real work.

Bollards work the same way:

- What's above ground is just the indicator.
- What's below ground is the strength.
- The engineered foundation is the "iceberg" that absorbs the impact.

A larger visible bollard doesn't mean stronger protection — **the foundation is what stops vehicles, not the size of the post.**

If you need real impact performance, choose the correct engineered system — not a larger post. The foundation does the hard work.

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 pristine condition for the entire lifespan of a development and are reusable following severe impact

Bollards Impact Resistant

ZERO Bollards are made from Australian heavy-duty materials designed to withstand impact without damage, remaining in good condition

Footings reusable

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

Bollard re-usable

Both surface mount and inground bollards can be made removable and reusable following severe impact, saving thousands over the life of a development

Simple replacements

Bollards are low cost to maintain. If badly impacted, 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

Advanced Polymer Bollards

The advanced polymer bollards (and bollards covers) provide excellent resistance against denting, chipping and fading- extending the potential lifespan

Four levels of **extreme protection**

1. You can surface mount your bollards using our reusable base plate or secure inground using our ZERO WASTE Unbreakable ground sockets. Both options continue working impact after impact, year after year

2. Unlike spring loaded bollards that over-flex, when impacted by a vehicle a heavy-duty resistance core prevents deflection of the bollard beyond 20 degrees and with excellent memory properties it self-recovers returning the bollard to upright position following hundreds and hundreds of impacts

3. 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 safety and resilience

4. Our heavy-duty galvanised steel and impact resistant stainless-steel pipe bollards provide an impact resistant surface, but we highly recommend using our advanced polymer bollards to substantially reduce maintenance on your bollards

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

Unlike spring-loaded bollards, Impact Recovery 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) replacements take less than 5 minutes and the bollard, expensive concrete footings and Impact Recovery Rings are reusable impact after impact, saving thousands over the life of a development.

Let’s compare resistance **and on-going maintenance**

	**Steel 165 ∅ Powder coated In-ground** Inground Bollard will chip, scratch and dent upon impact and a 400 mm depth footing will be dislodged at around 10 kmph – a 600 mm footing at around 12-15k mph by passenger vehicle (even lower for utility vehicles or trucks) Recommend XHD Impact Recovery Option		
	**Steel 165 ∅ or 165 ∅ Powder coated Surface Mount** These bollards are *delineators*, not protective structures. Typical s base-plate bollards (165 mm or 219 mm diameter, 3–5 mm wall thickness, 10 mm plate, 4 bolts). Recommend SM Impact Recovery Option		
	**Stainless steel 140/168 Surface Mount** 304 stainless will not *fracture*, but the baseplate and anchors will fail long before the stainless bollard does. Fail at around 5-8kmph Recommend Impact Recovery Option		
	**Advanced Polymer Bollard 1200 H x 150 ∅** Up to around 8kmph the bollard will flex, but concrete footing may fail. Concrete filling (to just above ground level) enhances structural rigidity at the base, improving stability and resistance to minor impacts. Solid plastic bollards are less durable because they are rigid and transfer impact loads straight into the base, increasing the chance of cracking or failure. Recommend Impact Recovery Option		

	**Impact Recovery Steel 165 ∅ 1200 L Powder coated** (Can chip and scratch when impacted. Strong Australian steel). Bollard remains rigid while allowing up to **20° of controlled deflection** during vehicle impact, returning to its upright position after the load is removed. During high-severity collisions, resistance core may need replacement. • **350 mm depth:** impact resistance approx. **15 km/h** • **650 mm depth:** impact resistance approx. **20 km/h** • **XHD:** approx. **25 km/h** • Bollard and concrete footings reusable		
	**Impact Recovery Surface Mount Stainless steel 168 ∅** (Strong Australian Stainless steel. Wont rust, dent, or show scratches). • Bollard can withstand low-speed vehicle contact around 8-10kmph allowing controlled deflection and returning to position after minor impacts. • At high speed the internal resistance core will bend and need replacing- • Bollard, base plate and footings are reusable		
	**Impact Recovery Advanced Polymer 150 ∅** Available in range of colours. Acts exactly the same as other surface mount and in-ground Impact Recovery Bollards but is lightweight to use, UV Resistant – Won't rust or show scratches – dents don't show. Low Cost more resilient option. The bollard of choice by D.O.T/ Western Power /Synergy • **Surface Mount:** impact resistance approx. **15 km/h** • **350 mm depth:** impact resistance approx. **15 km/h** • **650 mm depth:** impact resistance approx. **20 km/h** • **XHD:** approx. **25 km/h** • Bollard and concrete footings reusable **following even severe impact**		
	**Advanced Polymer Bollard Cover 1200 H x 190 ∅ or 150 ∅** (Great if the footings on your bollards are still strong) will outlive and outperform cheap plastic imported covers. Heavy walled and UV resistant made for Australian conditions. 190 ∅ fits over a standard 150/165OD Steel Bollard and 150 fits over 114 OD. or smaller.	NA	

Compliance **Statement**

Zero Civil Impact Recovery System

Meets the following applicable standards and design requirements:

- **UK PAS 13** – Impact Test Specification for Workplace Safety Barriers
- **AS/NZS 1170** – Structural Design Actions
- **AS 4100** – Steel Structures

ZERO WASTE Foundations

- Certified independent testing conducted
- Field-tested under vehicle impact speeds ranging from **10 km/h to 110 km/h**.
- **Foundations remained structurally sound** and in continued operational condition following testing.

ZERO WASTE Removable Bollards

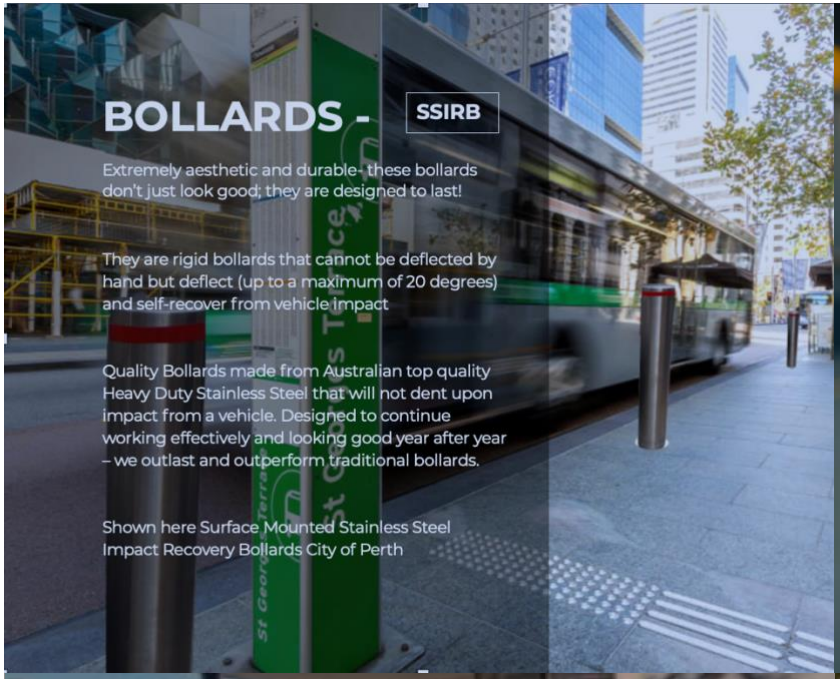
- Field-tested under impact speeds from **10 km/h to 110 km/h**.
- **Footings remained undamaged** and fully functional.
- Bollard units were **easily replaceable** following high-severity impact, as intended.
- MRWA Specified for highways

Impact Recovery Bollards

- Field-tested under impact speeds from **10 km/h to 60 km/h**.
- Both **bollard and footing remained in serviceable condition** following testing.

Nationally Approved

Nationally approved for use by Australian Road Authorities, Western Power, DoT, PTA, and MRWA, and deployed extensively by local authorities and leading developers across Australia



BOLLARDS - SSIRB

Extremely aesthetic and durable- these bollards don't just look good; they are designed to last!

They are rigid bollards that cannot be deflected by hand but deflect (up to a maximum of 20 degrees) and self-recover from vehicle impact

Quality Bollards made from Australian top quality Heavy Duty Stainless Steel that will not dent upon impact from a vehicle. Designed to continue working effectively and looking good year after year – we outlast and outperform traditional bollards.

Shown here Surface Mounted Stainless Steel Impact Recovery Bollards City of Perth

DOT APIRB

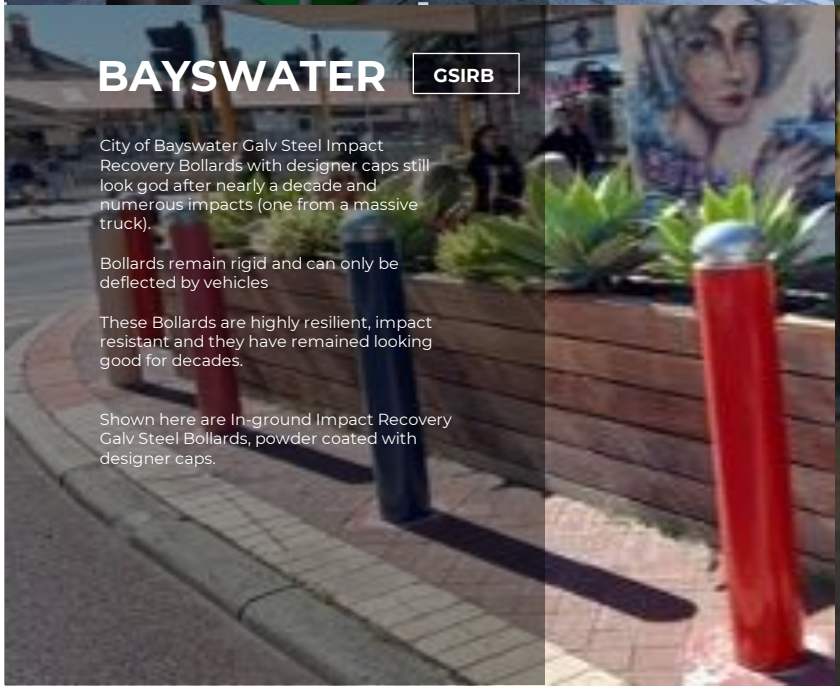
Department of Transport Impact Recovery Advanced Polymer Safety Bollards

Remain rigid and can only be deflected by vehicles

These Advanced Polymer Bollards are highly resilient, impact resistant and UV stabilised they remain looking good for decades.

Wont dent, rust, corrode or chip and scratches do not show.

Shown here surface Mounted Impact Recovery Advanced Polymer Safety Bollards.



BAYSWATER GSIRB

City of Bayswater Galv Steel Impact Recovery Bollards with designer caps still look god after nearly a decade and numerous impacts (one from a massive truck).

Bollards remain rigid and can only be deflected by vehicles

These Bollards are highly resilient, impact resistant and they have remained looking good for decades.

Shown here are In-ground Impact Recovery Galv Steel Bollards, powder coated with designer caps.

FREO GSIRB

City of Fremantle Galv Steel Impact Recovery Bollards with designer caps still look god after more than a decade and numerous impacts.

Remain rigid and can only be deflected by vehicles

These Bollards are highly resilient, impact resistant and they have remained looking good for decades.

Shown here are In-ground Impact Recovery Galv Steel Bollards.