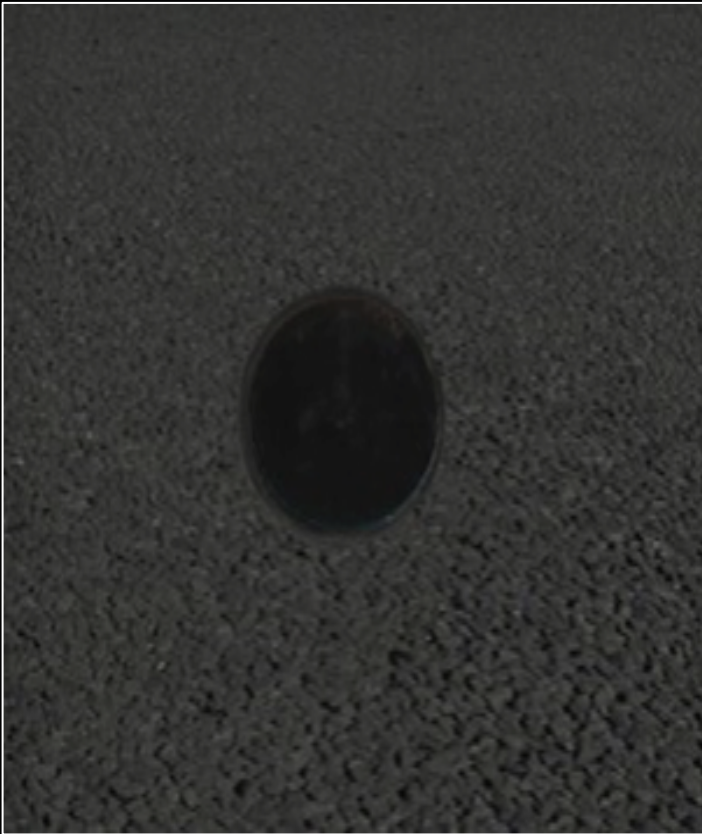


**ZER** 

WASTE FOUNDATIONS

**READ  
THIS.**



**Ground sockets are installed flush with ground level.**

Protecting surrounding concrete and paving from damage when items are impacted. No dangerous trip factors. Items can be removed and ground socket capped.



## **Items are dropped into ground socket automatically locking in**

When impacted by a vehicle the post bends and the socket and taper absorb the impact force protecting the surrounding foundations from damage. Items can be easily removed using tools provided and replaced in less than 5 minutes



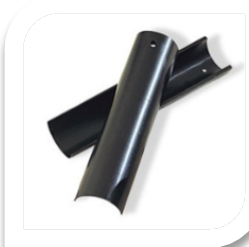
**Impact-absorbing polymer socket**

Advanced polymer construction helps absorb impact energy and protect surrounding foundations.



**Reinforced body**

Vertical and horizontal ribs provide added strength and stability.



**Ribbed base**

Allows sockets to be joined to extend depth – no glue required. Tight fit.



**Flexible depth options**

Standard 350 mm depth, with shorter or deeper options available to suit site conditions.

**Drainage-ready base**

Weak spot provided to allow drainage.

**Reusable self-locking taper**

The taper attaches to item using screws provided and finishes flush when installed.

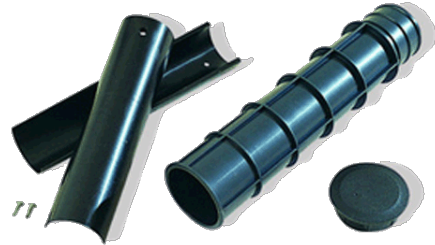
**Reusable cap included**

For use during installation and when items are removed.

Every component is designed to reduce damage, simplify replacement and extend service life.

## UNIT INCLUDES

- **350 mm Ground Socket**
- **Self-locking Taper (two halves)**
- **Cap**
- **Self-drilling screws**



Additional ground socket required to extend depth of ground socket to 650 mm depth (Refer to details page 8-9)

Socket can be reduced to 150 mm depth (Refer to details Page 8-10)

There is no limit to the size or weight item you can install using the ZERO WASTE Foundations. Install bins, seating, tables, barriers, signage, shopfront bollards, large bollards can be installed on the same 60 mm foundations using the Impact Recovery System. ( Refer to page 11)

### **Sold in boxes of 25 units.**

Must be stored out of sunlight.

## TOOLS



Installation tool used to correctly align socket, enables installation of ground socket from standing position

Standard tool comes fitted with Taper to install 350 mm ground sockets.

- To install 150 mm depth socket, re-attach 150 mm Taper to tool in position marked (160 mm from base).
- To install 650 mm depth ground socket, re-attach Taper at position marked (660 mm from base)

This ensures taper does not lock in and the tool is removable by spinning and lifting once concrete has cured.



Removal tool used to lever items from ground socket, operated from standing position, facing traffic, (sheared post removal attachment included)

## **IMPORTANT**

### **1. Ground sockets MUST be installed flush with ground level.**

No ground socket protruding from pavement or concrete footing. So that it cannot be damaged when impacted and provides no trip factors.

### **2. Concrete MUST be 30MPa or greater to be impact resistant.**

Ground sockets must be installed flush with ground level with 150 mm of quality 30MPa concrete on all sides to protect surrounding paving and socket from damage when items are badly impacted. Rapid set is NOT impact-resistant /grout is too flexible and will not last 100 years. Colour concrete to suit surrounding paving or foundations.

### **3. Taper MUST be attached using screws provided**

If Taper is not attached to item using screws provided items will NOT be removable from ground socket Taper must be attached at exact level (5mm alters locking capacity by around 150kgf).

### **4. Taper MUST be installed flush with ground level.**

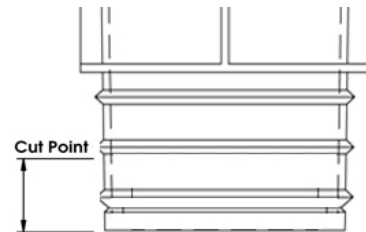
With top of socket (ground level) NOT protruding from ground socket. This ensures taper is re-usable following impact and item is locked in sufficiently. To fully install- firmly tap item until taper is fully installed – this way no dirt and grit will enter, and item will be safely secured

### **5. Installation tool MUST be used**

The installation tool prevents socket from distorting when concrete is impacted- this ensures correct locking capacity of taper. When installing grabrails you can sue grabrail as your installation tool.

## EXTENDING DEPTH OF SOCKET

You can increase the depth by 300 mm increments by truncating a ground socket just below the second horizontal rib and inserting it firmly into the top of a complete ground socket

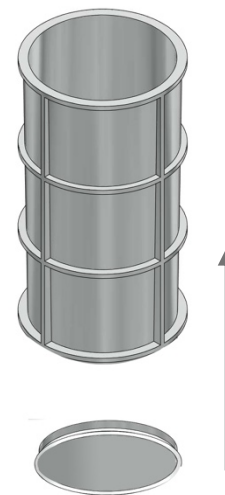
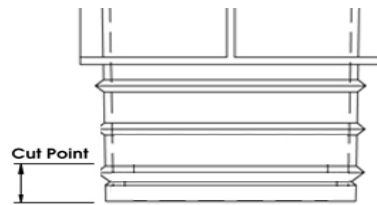


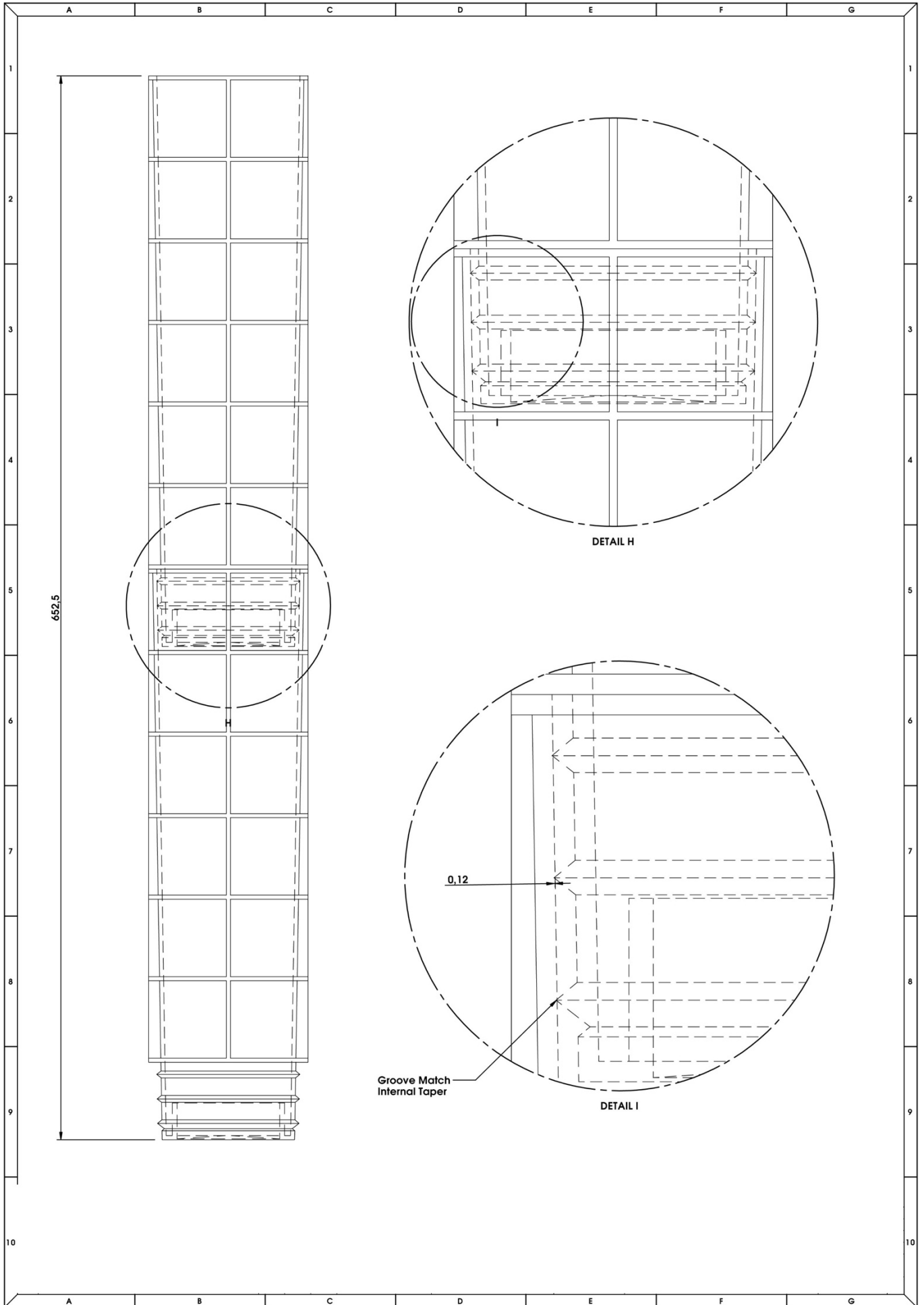
## REDUCING DEPTH OF SOCKET

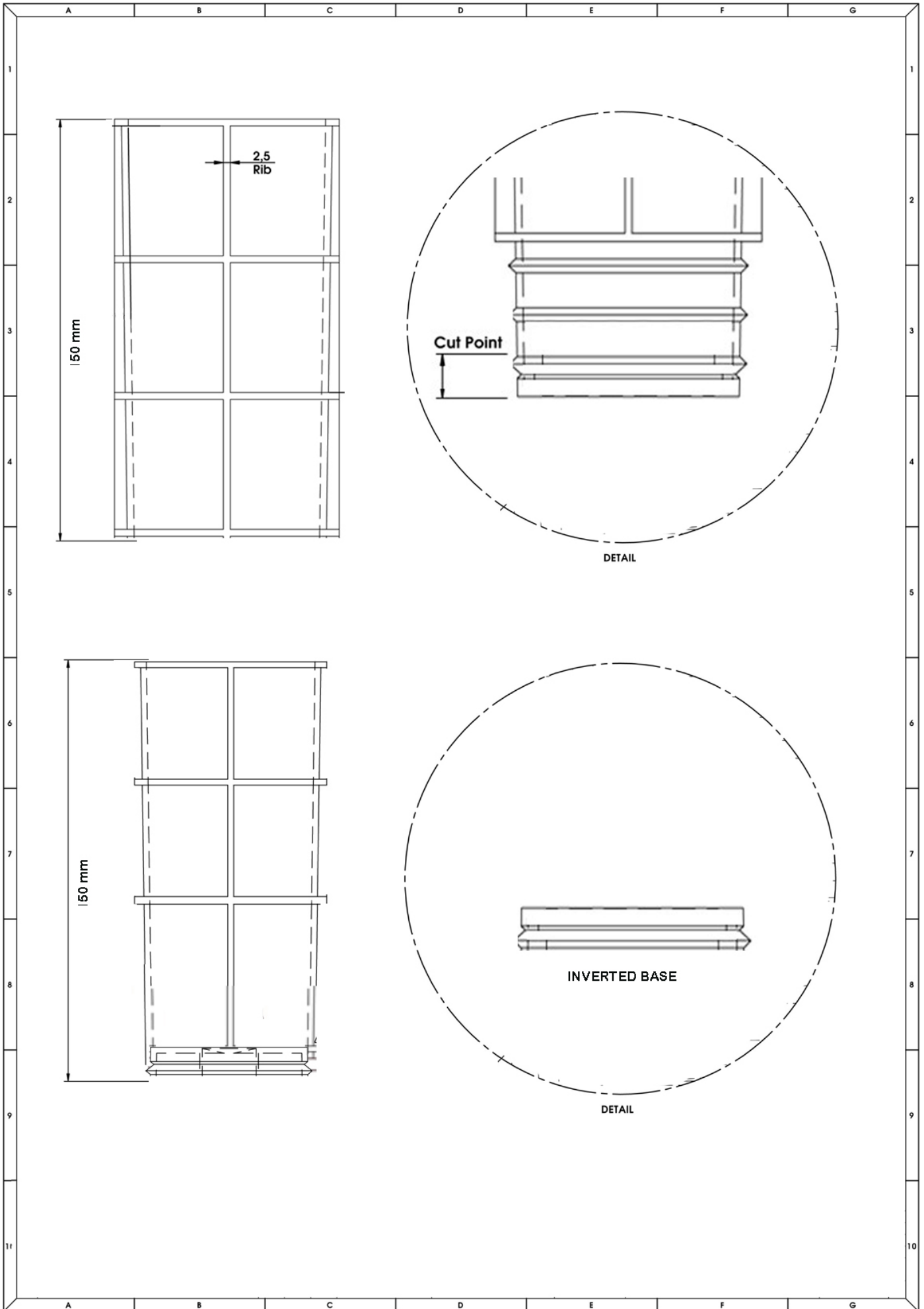
For solid concrete traffic islands or footpaths, you can reduce socket to 150 mm depth.

Truncate the ground socket at exactly 150 mm from top lip, (just below the second horizontal ring from the top) remove base of socket just above bottom rib (as shown right), flip base over and insert into the open end of the truncated ground socket.

This provides a tight fit but can be sealed with industrial glue or weld as an extra precaution. NB: You will need to reduce Taper to 140 mm accordingly.







## NO SIZE OR WEIGHT LIMITATIONS

There is no limit to the **size or weight** item you can install using the ZERO WASTE Foundations. Install bins, seating, tables, barriers, signage, shopfront bollards, large bollards (using the Impact Recovery System). It is the size of the concrete footing that determines the weight bearing- consider the ground socket as a “protective shield”.

## FOOTING MUST BE LARGE ENOUGH TO NOT BE DISLODGED

For the footing to be reusable you must ensure it is large enough that it is not dislodged when items are impacted. You may need a little more concrete to ensure it will last years and will not need replacing.

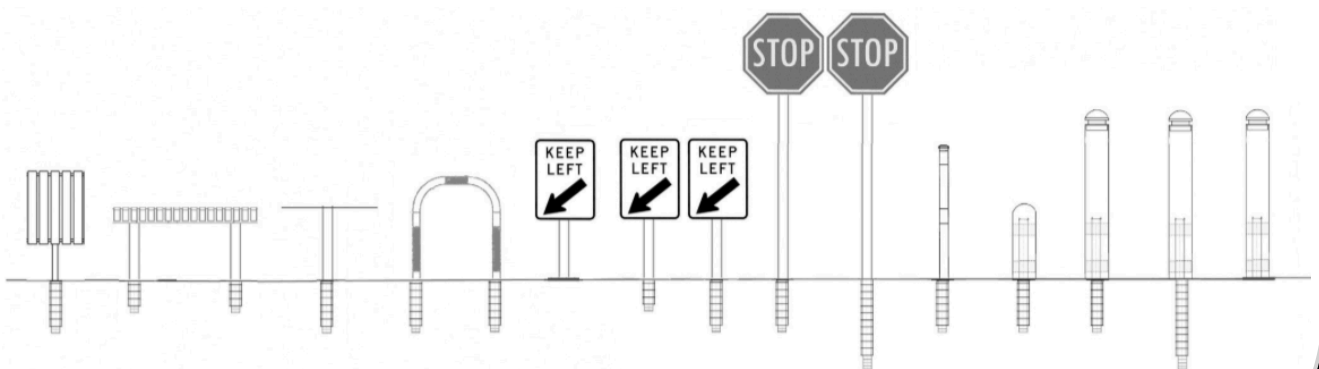
The size footing depends on soil conditions, strength of post, size of item, wind conditions, possible impact force and many other factors. Refer to local guidelines for details

### We suggest:

- 150 mm depth x 150 mm min diameter in solid concrete
- 350 mm depth x 400 mm in diameter in all other locations
- 650 mm depth x 400 mm in diameter for large or heavy items such as football posts/ double posted or large signage or large diameter bollards that may be subject to extreme impact (Refer to Extra Heavy Duty Impact Recovery System)

### DRAINAGE

If you want your sockets to drain any water, simply pierce hole in base (weak spot provided) using screwdriver or drill, and place rubble beneath socket to allow drainage.



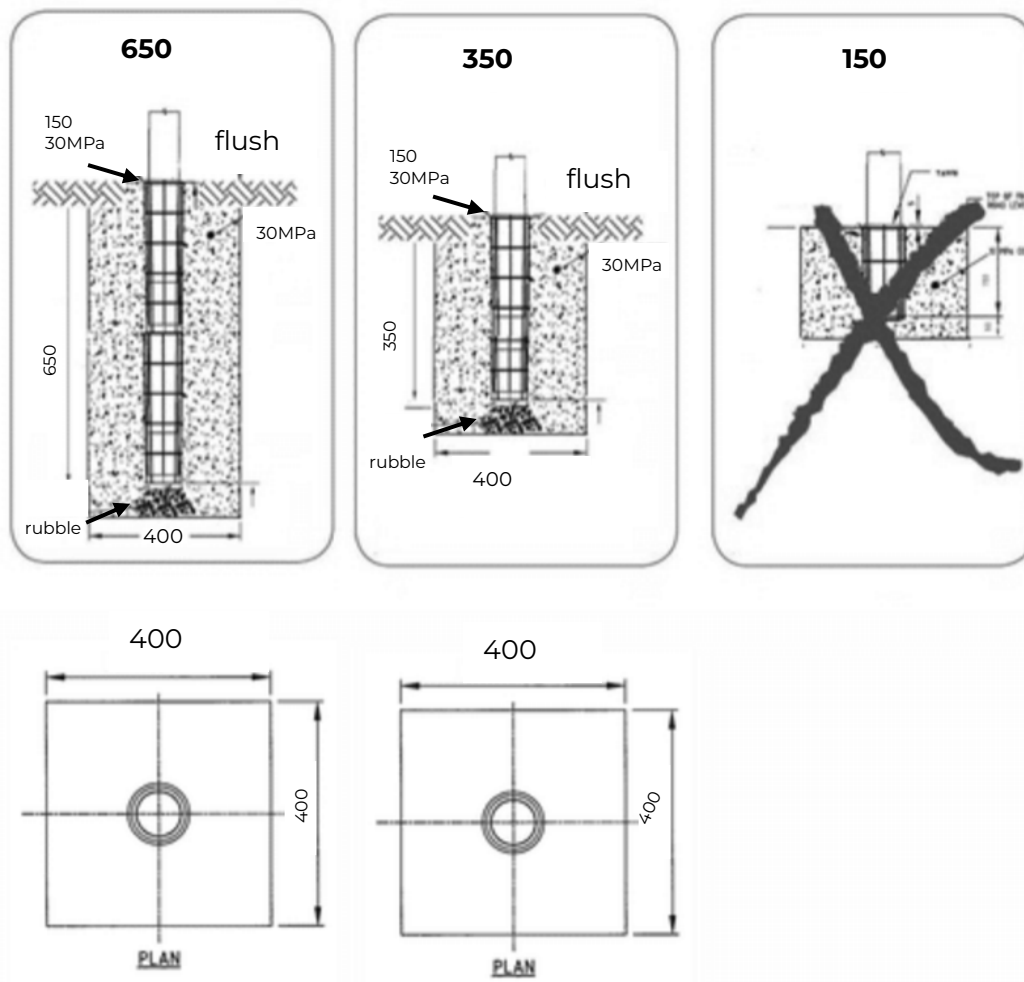
## PAVED AREAS / ASPHALT

### Installing into existing paving or when installing paving.

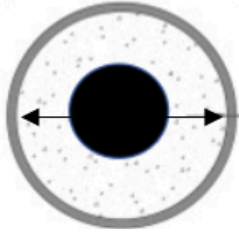
Ground Socket is installed flush with surface of paving and must be completely encased in a minimum of 150 mm solid 30 MPA concrete on all sides to protect brick paving from damage when items are impacted.

Remove pavers or core drill, ensuring ground socket finishes level with road or footpath (allowing a minimum of 150 mm of concrete on all sides of socket) – if you are laying paving refer to New works as you can install sockets when pouring concrete foundations.

NB: Make sure you install caps before spraying asphalt or any time before items are installed to avoid grit entering socket.



## MIN 150 MM CONCRETE ALL SIDES



MIN 150 MM CORE

### TO PROTECT PAVING FROM DAMAGE

When core drilling, a minimum of 150 mm solid 30 MPA concrete is required to surround socket and protect brick paving from damage when items are impacted.

### DO NOT USE RAPID SET OR FLEXI GROUT



If the socket is not surrounded by at least 150 mm of 30 MPa concrete, adjacent paving may be damaged on impact, as the socket is designed to deform to absorb impact forces and paving alone is not sufficient to withstand those loads.

## SOLID EXISTING FOUNDATION

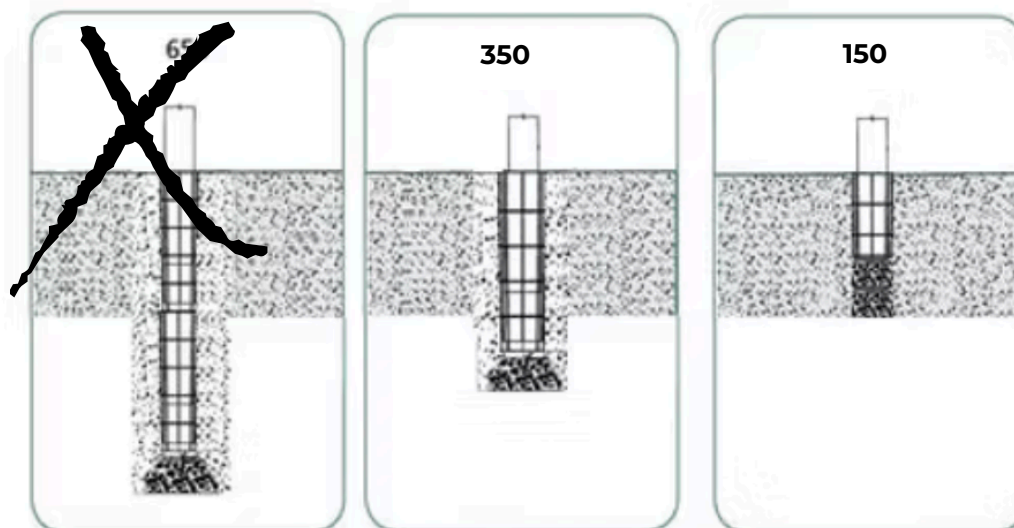
**Such as asphalt carpark/ solid concrete footpath or traffic island min 200 mm thick.**

Ground Socket is installed flush with surface and must be completely encased in a minimum of 150 mm solid 30 MPA concrete on all sides to protect surrounding foundations from damage when items are impacted.

Core drill hole large enough to fit socket and fill gap with quality concrete to secure ground socket to existing foundation. We recommend 150 mm - 350 mm ground sockets (650 mm is not necessary in solid concrete footpaths or foundations) NB: Sockets can be easily truncated to 150 mm and base reinserted.

### **Drainage:**

If you want drainage: Hole can be pierced in bottom of socket using drill or screwdriver (weak spot provided and rubble can be placed beneath socket if you want drainage).



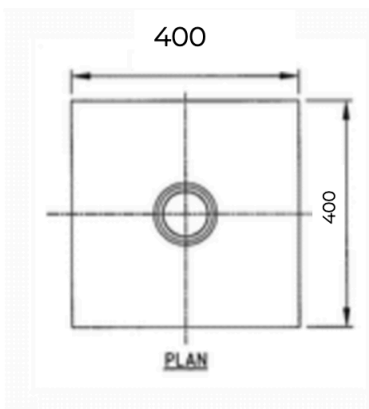
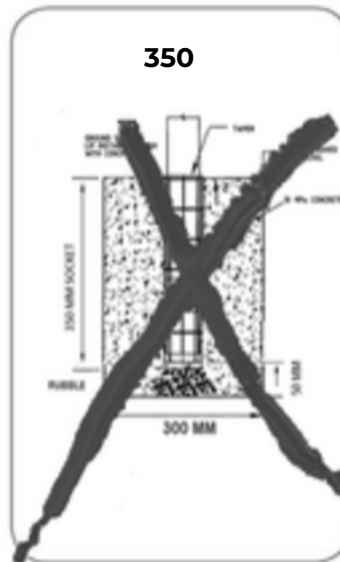
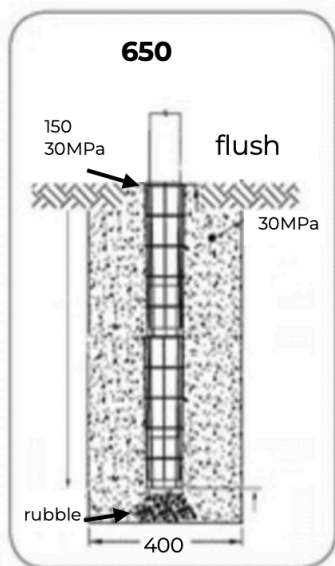
## FREE-STANDING ITEMS - SOIL

Socket is installed flush with surface and must be completely encased in concrete. When installing items directly in soil you need a large footing, so it is more imperative than ever that you make the concrete reusable (must be 30MPa+ to be impact resistant).

NB: Socket does not alter the size concrete footing required- it is simply a protective shield to make the concrete footing re-usable.

We recommend you install a 650 x 400 mm diameter foundation (for bollards likely to be impacted by trucks or heavy vehicles) to provide stability and ensure against dislodgement when bollard is impacted. In sandy soil you may need to reinforce the footing using a reo cage.

Remember these footings will last 100 years if installed correctly, so a little more concrete is money well spent.

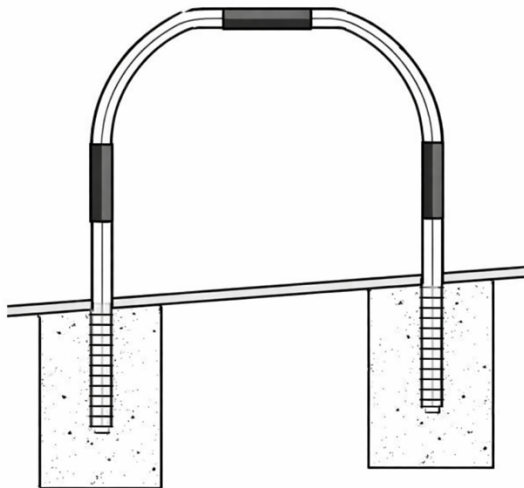


## INSTALLING ITEMS WITH MULTIPLE LEGS

If ground is uneven install both sockets flush with ground level. Place item in sockets and mark on each leg where to attach Taper so it finishes flush with top of ground socket.

Remove item and install sockets as usual.

Attach Taper using self-drilling screws and drop item in socket once concrete has cured. Tap item down firmly until taper finishes flush with ground level. Suitable for bike racks, grabrails, barriers.

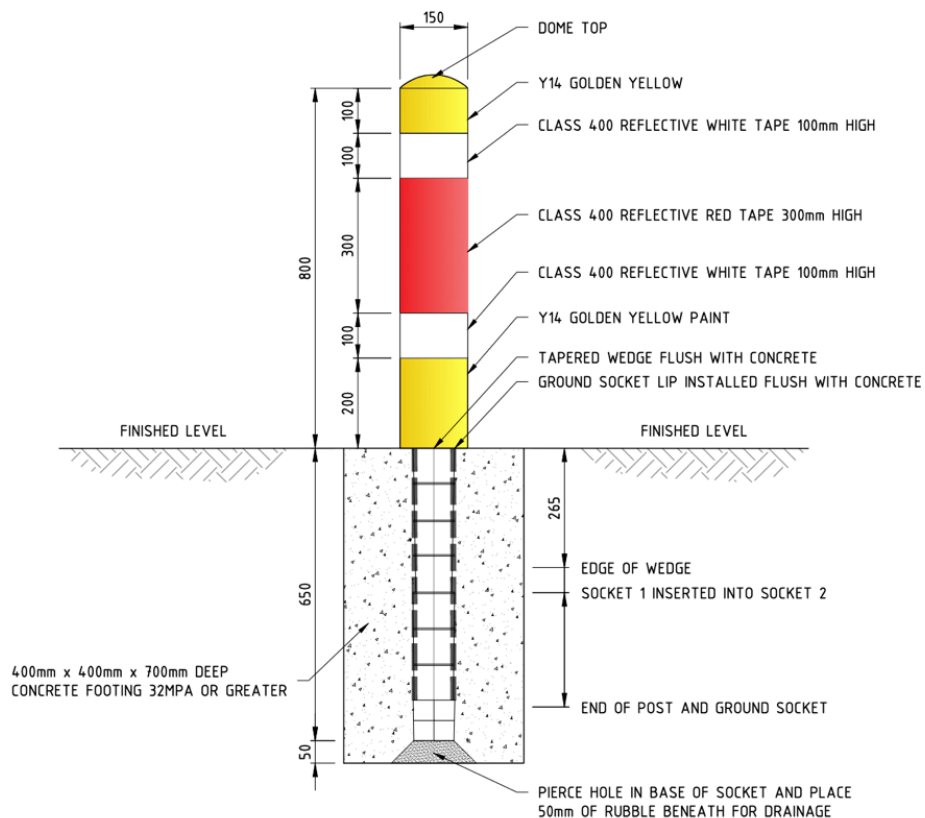


## INSTALLING BOLLARDS

165/ 150 mm steel bollards/ 168 mm stainless steel Bollards or 150 mm Advanced Polymer Bollards (available from Zero Civil) can be installed on the same 60 mm foundations using our **Bollard Impact Recovery System** that:

- Makes bollards impact resistant and
- Makes both bollards and surrounding foundations re-usable impact after impact, saving thousands over the life of a development.

Bollards remain safe, secure and upright and if badly impacted are replaced in less than 5 minutes. This also means bollards can be installed and removed whenever required and easily relocated. No more expensive maintenance and no need to throw away a bollard or the expensive footings again! **(Surface Mount option available)**



DRAWING COURTESY OF PERTH TRANSPORT AUTHORITY

# INSTALLING ground sockets

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ZERO WASTE FOUNDATIONS OUR NO.1 INNOVATION

FOR MORE DETAILS SCAN HERE



# 01

## To install ground socket, you will need:

- Ground Socket
- Cap
- Installation Tool
- Small amount of rubble
- Concrete (30MPa)
- Spirit Level
- 10 mm Masonry Drill Bit
- PH2 Phillips Screwdriver Bit
- Drill / Driver
- Pigment to colour concrete (optional)



## STEP 1.

Installation tool is used to position socket in hole and check alignment using a spirit level



## STEP 2.

Position socket upright using rubble and a little concrete and check alignment using spirit level before pouring concrete to secure (allow room for paving if necessary)

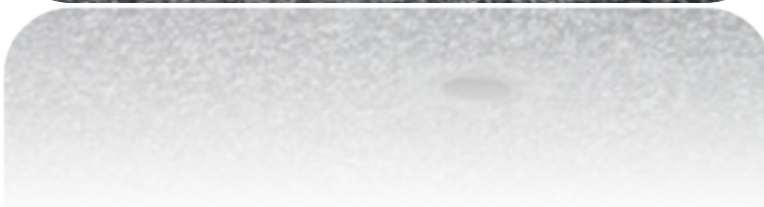


## STEP 3.

Socket must be flush with ground level (leaving space for paving or asphalt) no trip factors.

Make sure installation tool is still installed (or socket is capped) pour 30Mpa concrete to ground level and clean off surface.

NB: Good idea to colour match is going into paving and make sure you install a minimum of 150 mm concrete on all sides of socket to protect paving from damage)



# INSTALLING items

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ZERO WASTE FOUNDATIONS OUR NO.1 INNOVATION

FOR MORE DETAILS SCAN HERE



01

## STEP 1.

Attach Taper using self-drilling screws (if using 2.9 or heavier walled steel we suggest pre-drilling)

This can be done in yard in advance or on location.



## STEP 2.

Once concrete has cured, drop item firmly into ground socket.

Tap item firmly until taper finishes flush with ground level – this provides enough locking power to ensure items cannot be removed without tools and that taper will not be damaged when items are badly impacted.



## When impacted

When lightly impacted post can be bent.  
If badly impacted post will fold but items remain firmly seated in the ground socket.

No damage to footings and items can be removed using ergonomic tools provided.

Flattened posts are removed by slipping base of tool under the item and levering up, to break the seal, then use tools as usual.




## Quickly transition

If used on every damaged item within 2-3 years, the majority of your more vulnerable items will have been replaced with ZERO WASTE Foundations.


The reason this is so important is that **20 % of items are responsible for around 80% of your workload.**

This means that although it will take around 50 years to make all locations sustainable a maximum of 20% of all future work will require digging and heavy labour, or risk of serious injury from hitting underground cables or silicosis




  
**DID YOU KNOW?**

There are approximately 100,000 strikes per year to dangerous underground services

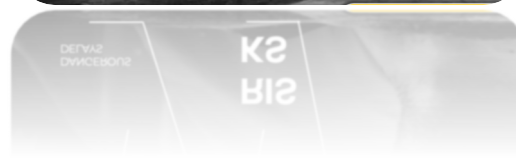


**THE COSTS ARE NOT ONLY FINANCIAL**

DANGEROUS TRAFFIC    UNDERGROUND SERVICES    SILICOSIS

  
**RISKS**

DANGEROUS DELAYS



# INSTALLING Bollards

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IMPACT RECOVERY SYSTEM OUR NO.2 INNOVATION

FOR MORE DETAILS SCAN HERE



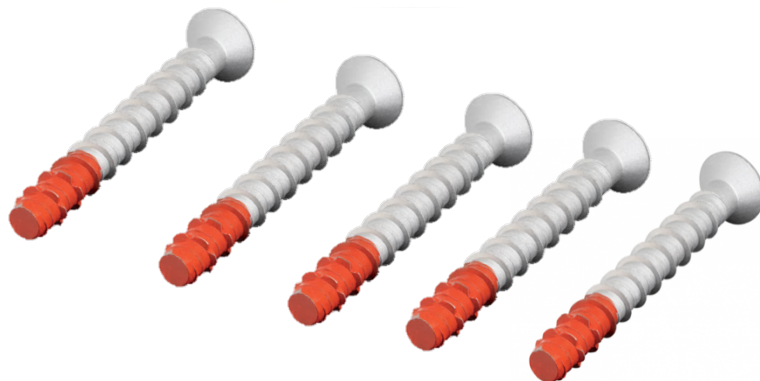
02

# INSTALLING Surface Mount Bollards

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## To install Base Plate, you will need:

- Base Plate
- M12 x 150mm Galvanised Countersunk (10mm In/Hex) Screw bolt Anchors
- Masonry drill bit 10 mm
- Hammer drill
- Hex drill bit



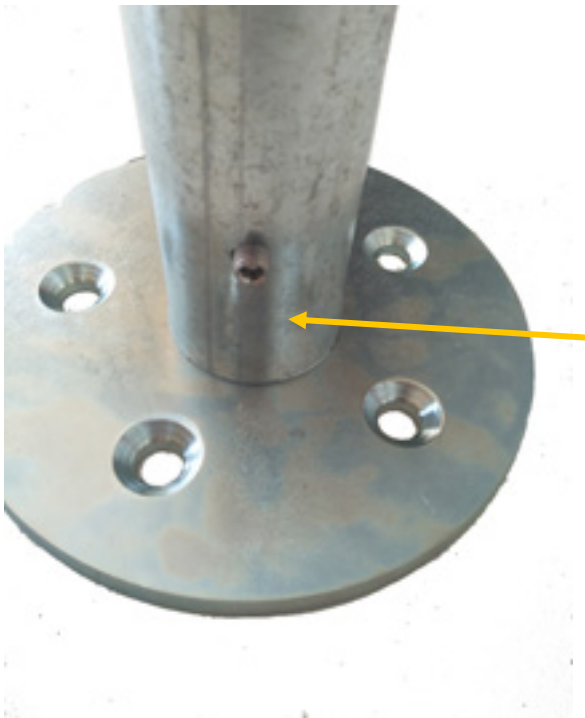
## **STEP 1. Surface Mount**

1. Place base plate on footing and mark where to drill holes to accept concrete anchors.
2. Drill holes
3. Clear holes of concrete dust and insert concrete anchors provided (flush mounted recessed anchors)



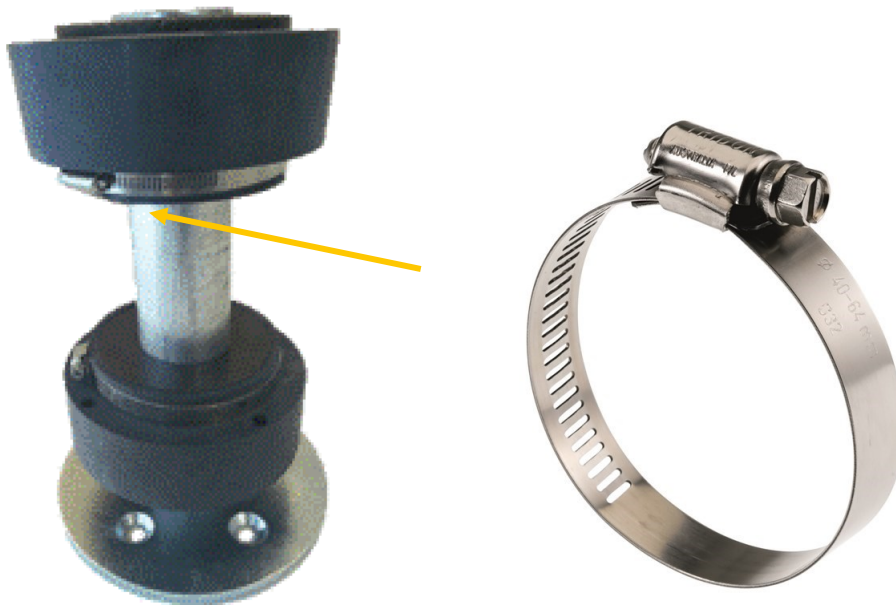
## STEP 2.

Secure resistance core to base plate using securing stud provided.



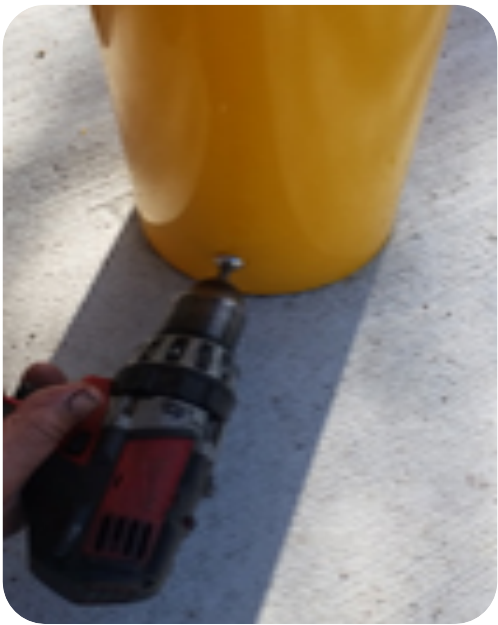
### STEP 3.

Tighten clamps to secure rings to resistance core (top one facing down, bottom one facing upward)



## STEP 4.

Slip bollard over rings and secure stud beneath bottom ring.



# INSTALLING In-ground Bollards

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02

## To install inground bollards you will need

1. Screwdriver (or drill and screw driver bit)
2. Allen key



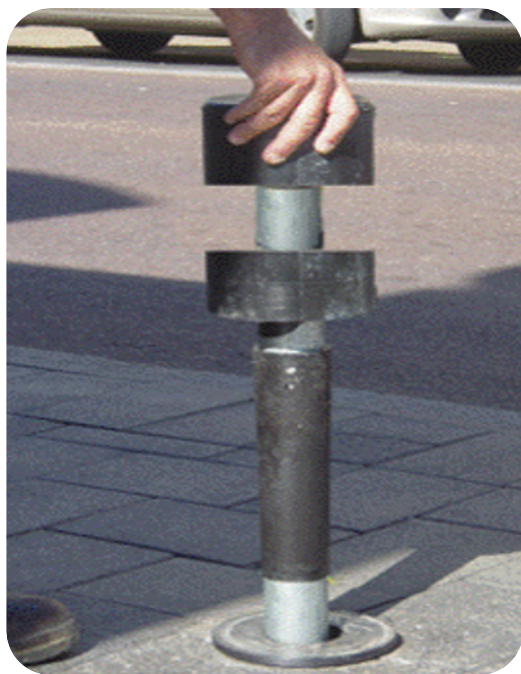
## STEP 1.

Use screwdriver to tighten clamps to secure rings to resistance core (top one facing down, bottom one facing upward)



## STEP 2.

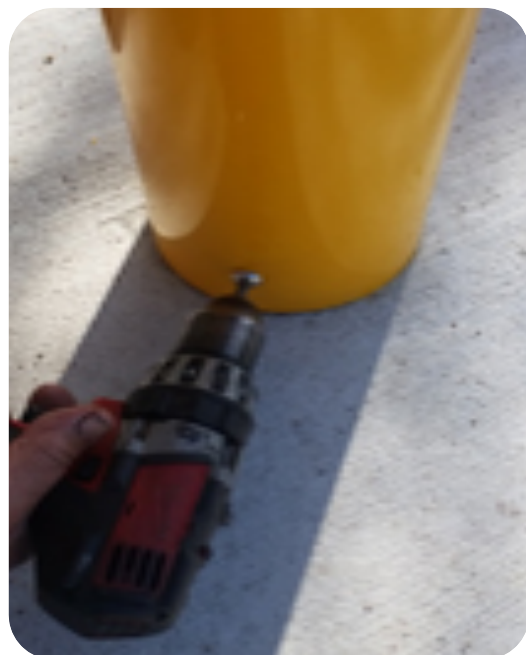
Forcefully drop Resistance core into ground socket. It will automatically lock in.



Optional: Protector cuff available to protect paving from scuffing

### STEP 3.

Slip bollard over rings and secure stud beneath bottom ring using Allen key.



## Resistance Core

### Only replaceable component.

You should buy some of these for stock to ensure you can quickly replace damaged bollards. A standard Heavy Duty Galvanised Resistance Core is sufficient to prevent further forward movement of a passenger vehicle and reduce the risk of injury to drivers and vehicles. Suitable for all installations (Surface Mount/ 350 mm and 650 mm depth footings.)



#### **S/MOUNT RESISTANCE CORE**

Heavy Duty Galvanised Steel. 300 mm Length with securing stud to secure core to base

#### **350 MM DEPTH RESISTANCE CORE**

Heavy Duty Galvanised Steel. 350 mm Depth (650 mm Length) with self-locking Taper attached

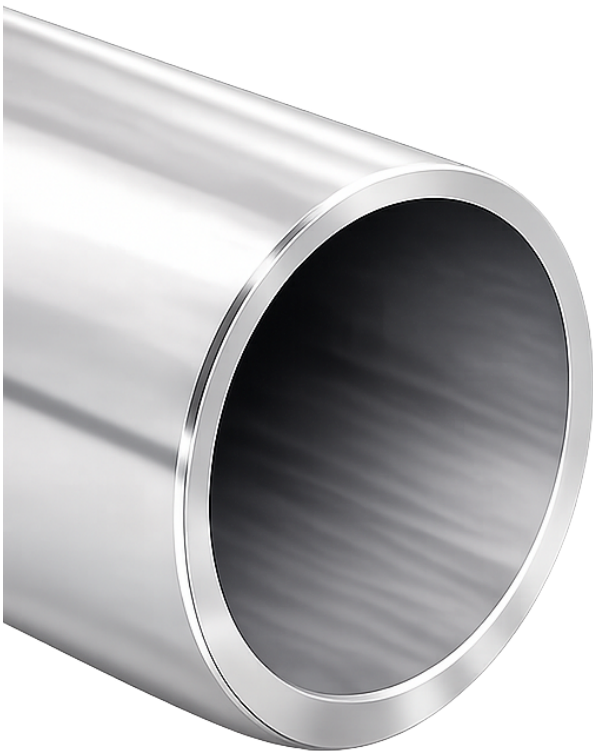
#### **650 MM DEPTH RESISTANCE CORE**

Heavy or Extra Heavy Duty Galvanised Steel. 650 mm Depth (950 mm Length) with self-locking Taper attached

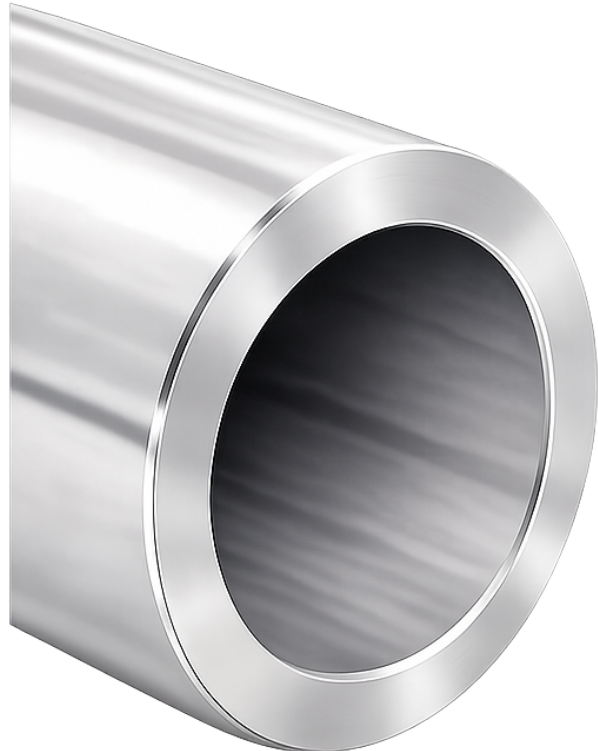
## Extra Heavy Duty Resistance Core

If you find the resistance core is bending too frequently (often due to trucks of utility vehicles impacting them) you can increase the strength an Extra Heavy Duty Resistance Core.

**This will increase the resistance by 150%** reducing 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 and will severely damage a passenger vehicle at high speed.



Heavy Duty Resistance Core



Extra Heavy-duty Resistance Core

## When impacted

Bollards remain rigid and appear to be solid inground bollards (cannot be deflected by hand)

### Upon Low Impact

When impacted by a vehicle they absorb the impact force deflecting a maximum of 20 degrees (when they are restricted any further deflection by the heavy duty Resistance Core) 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

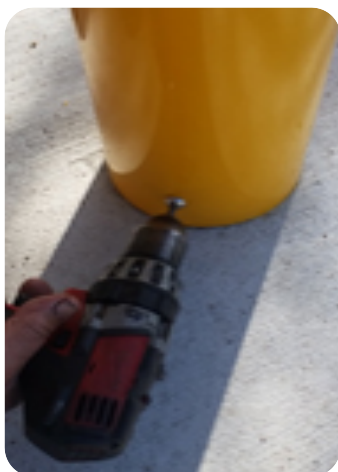


## Removal/Replacement

Following severe impact, the bollard is removed the resistance core replaced and the bollard is reinstated in around five minutes.

The securing stud removed, the bollard slipped off the rings, and the resistance core removed using the ergonomic tool. The resistance core is replaced and the bollard and securing stud reinstated.

The foundations, Bollards and Impact Recovery Rings are all re-usable following multiple impacts.



# No on-going digging or heavy labour

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Bollards are now removable for events, maintenance and future upgrades.

## Events

Install bollards block off roads and cap off ground socket. Install signage, bins, barriers, seating, tables, bollards on the same footing as needed for events, making your city dynamic and events far safer and easier to manage.

## Upgrades

If you want to install new nicer looking bollards- it is as simple as removing bollard and installing new one on the same footings.  
Old bollards can be used in another location – reducing waste

## Only on-going cost

Only on-going material cost is the resistance core- suggesting buying spares so replacements can be made quickly and efficiently .

## Only replaceable component.

## Purchasing the Resistance Core

You can buy these in packs of two units.

Scan QR Code or visit [zerocivil.com](https://zerocivil.com)



# Resilient

bollards & road  
infrastructure



Advanced engineering delivers superior projects and long term resilience,  
building sustainable long term success

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**ZERO CIVIL**  
ZERO WASTE TECHNOLOGY

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