



ZERO WASTE
FOUNDATIONS

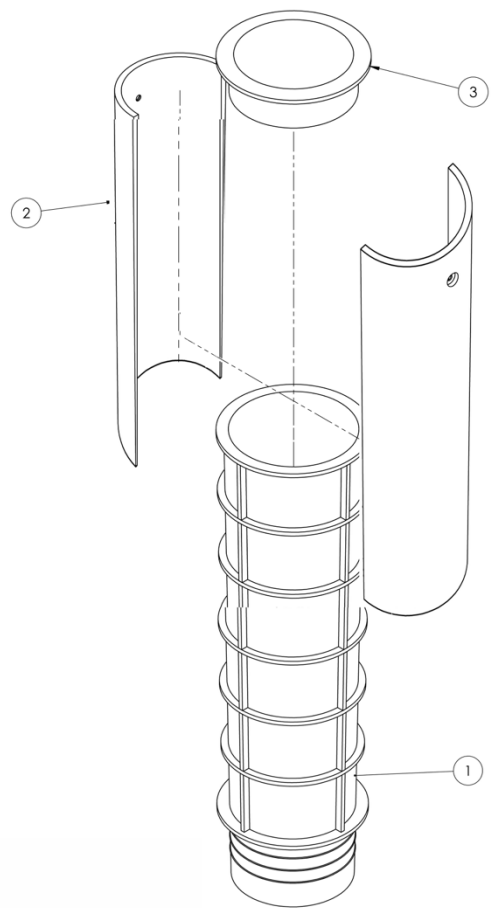


Testing, Approvals
and case studies

01

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UNIT INCLUDES

1. Ground Socket 350 mm
2. Self-locking Taper
3. Cap

Stainless steel self-drilling screws provided.

*** Tools required**

ZERO WASTE FOUNDATIONS

USED TO SECURE:

Road-side and urban infrastructure

- Posts
- Grab-rails
- Barriers
- Bike Racks
- Bollards (60-168Ø)
- Bins
- Seating
- Street furniture
- Traffic light columns (114Ø)



DIMENSIONS

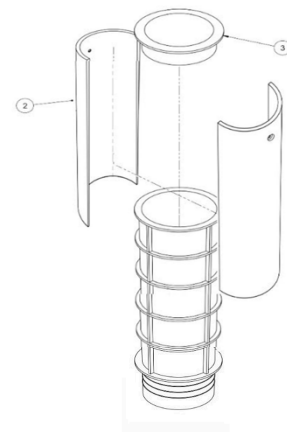
Available to secure 60 mm diameter CHS posts
114 Ø, now in development (Traffic light columns)

NO REPLACEMENT PARTS REQUIRED

Sockets, Taper and screws are all re-usable.

REDUCING DEPTH OF SOCKET

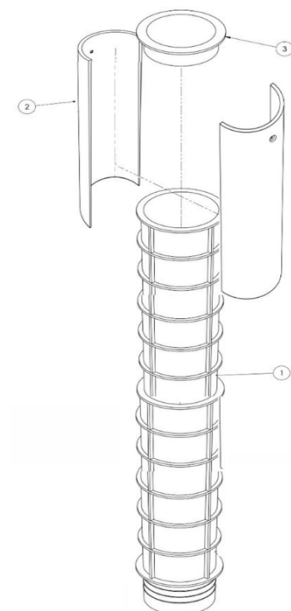
To 250 mm for Securing signs on traffic islands. The socket is truncated at 250 mm, the base of the socket removed and reinserted into the truncated socket. (Fit is tight to prevent ingress of concrete)



EXTENDING DEPTH OF SOCKET

Additional sockets are purchased to extend depth. The base of one socket is truncated and sockets interlock. (Fit is tight to prevent ingress of concrete)

Used for securing Large signage, Large diameter Bollards in High Impact Zones, free-standing items or signage in high wind regions (AS/NZS 1170.2 Wind Regions).



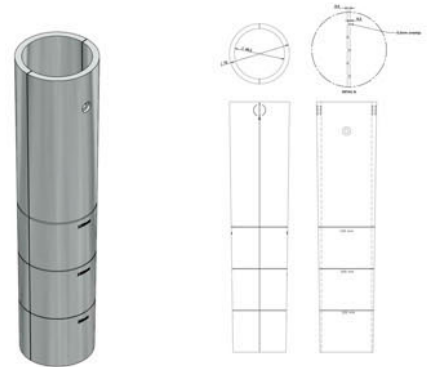
SELF-LOCKING TAPER

Provided in two halves the self-locking Taper creates a sleeve that encircles the post.

A Taper is attached to the post using self-drilling screws (provided) and enables items lock into the ground socket automatically

Items are secured using the Morse Taper Principle (IE: A taper of less than 3 degrees creates a self-locking mechanism).

Vibrations from wind, traffic or vandals will not loosen the taper, (in fact they will act to increase the locking action) Items cannot become loose or unstable over time and can only be removed using the tools provided.



GROUND SOCKET

The ground socket is installed in a concrete foundation (MP3 Concrete to ensure the foundations are not damaged if the item is impacted by a vehicle) and has a reinforced lip that provides a clean black rim that sits flush with ground level and can be capped if items are not in use (providing no trip factors)

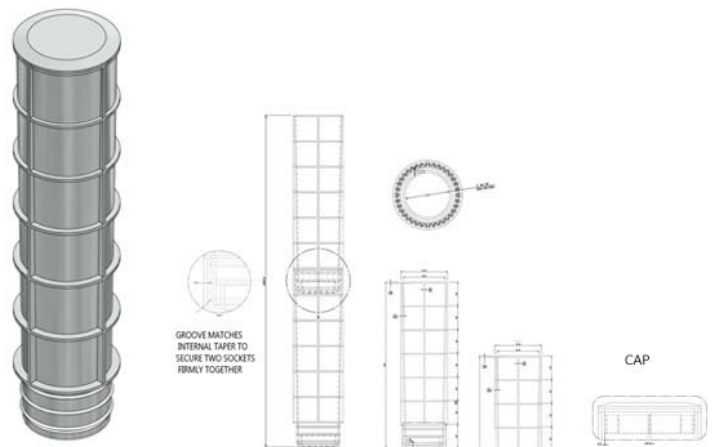
Cap provided has lip to prevent ingress of water and grit.

The socket is reinforced using vertical and horizontal reinforcing ribs, to anchor the socket in a concrete footing, and is tapered internally.

Dirt, grit and water consequently fall to the bottom of the socket and do not adversely affect the locking action.

Sockets can be truncated on site at 150 mm and base reinserted or extended by 300 mm increments by inserting truncated end into a complete unit.

A weak spot provided in base of socket to enable piercing to accept electrical wiring and allow drainage of water.



Formal Testing

TAPER HOLDING CAPACITY

Based on the test results, we recommend the Taper should be attached 340 mm from the base of the post, so the **Taper finishes flush with the top of the ground socket** when item is installed, providing high locking capacity and as taper does not protrude it is protected from damage during impact—allowing the components to be reused.

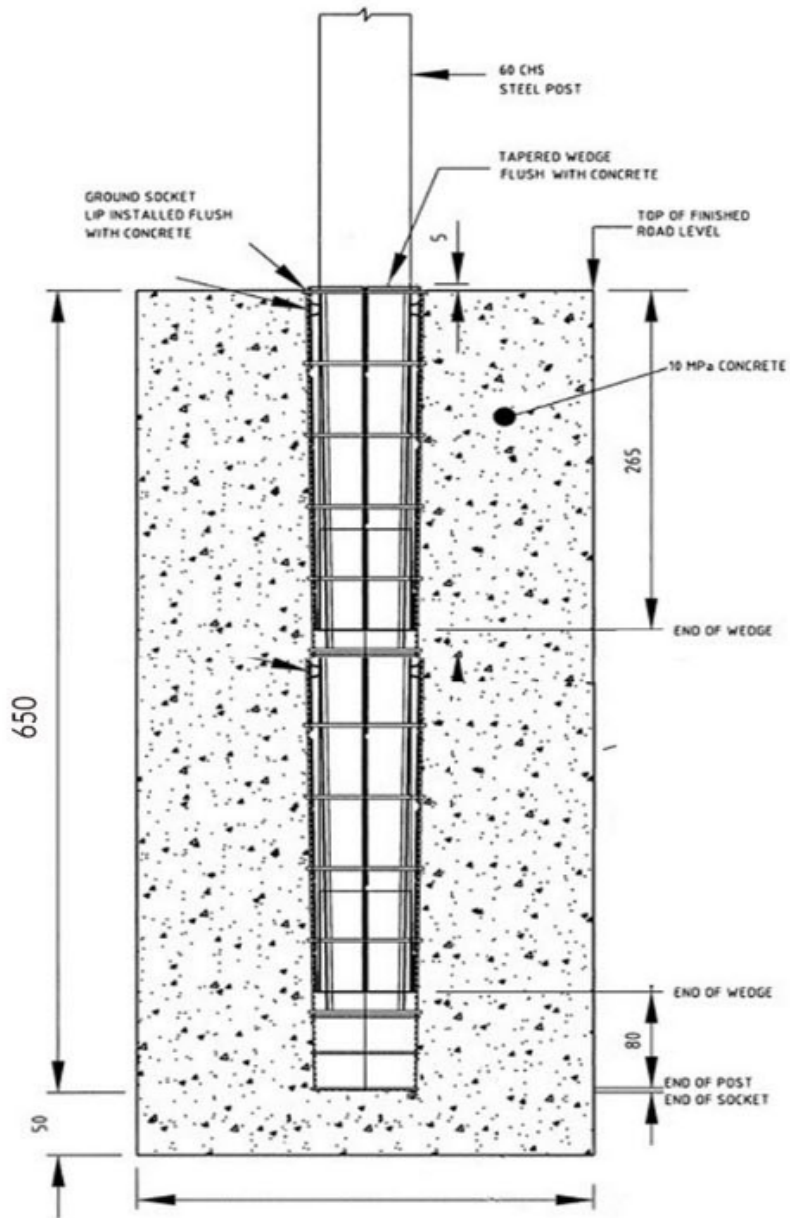
Controlled extraction (baseline holding capacity)

- 10 mm protruding: 200KGF (\approx 2.0 kN)
- 7 mm protruding: 280 KGF (\approx 2.7 kN)
- 5 mm protruding: 350 KGF (\approx 3.4 kN)
- 3 mm protruding: 430 KGF (\approx 4.2 kN)

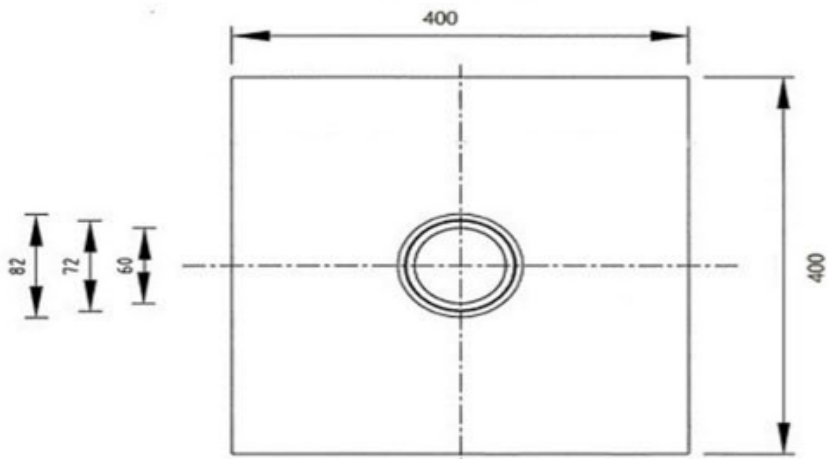
Findings following impact

Impact testing indicates slightly higher extraction force may be required after impact because the event can seat the Taper more tightly in the socket. Subsequent impacts showed negligible change in extraction force.

- 10 mm protruding / 60 km/h vehicle impact: 302 KGF (\approx 3.0 kN)
- 10 mm protruding / 60 km/h vehicle impact: 300 KGF (\approx 2.9 kN)



SECTIONAL ELEVATION
FOOTING



PLAN

HOLDING CAPACITY TESTS

CONDUCTED BY: **PERKINS WORKINGS:**

Engineering Services

Registered Business No80184581

3-6 Bindaring Parade

Claremont WA 6010

H.J.Perkins B.Sc Eng (Hons.) FIE (Aust). CP (Eng)

Test Certificate No UTS 14562

Subject: To confirm holding capacity of the Smart Taper (ZWF)



I witnessed the tests carried out by Aker Unirig and verify the test results to be correct. The load cell and monitor used are checked annually by Australian Calibration Services.

Components

- 350 mm Ground tube
- Taper 275 mm
- Concrete block 200 Diam x 350 mm depth

Equipment used:

Overhead lifting hoist (vertical extraction setup) with chain and lifting collar and webbing slings with tension load cell

Test Conditions

All components were in an ambient temperature of 18 degrees centigrade. The ground tube (ZWF) and the Tapers were moulded in medium flow black polypropylene. The taper on the inside of the ground tube and the outside of the Tapers was 1° from vertical.

TEST PROCEDURE

Test 1 : Taper protruded 10 mm from Ground socket and pressure was applied, with post parting from ground socket at **200kgf**.

Test 2 : Post was reinstated with Taper protruding 10 mm from Ground socket and pressure was applied, with post parting from ground socket at **200kgf**.

Test 3 : Post was reinstated with Taper protruding 5 mm from Ground socket and pressure was applied, with post parting from ground socket at **350kgf**.

FINDINGS

Successive extractions after the initial one did not materially change the effectiveness of the Taper-lock

RECOMMENDATIONS:

From the tests I would recommend the Tapers are adequately effective with 5 mm or less protruding above the top of the ground tube

HOLDING CAPACITY TESTS

CONDUCTED BY: **AAKER UNIRIG PTY LTD**

ACN 082 781 691

PO Box 13

South Fremantle WA 6162

Certificate No UTS 14747-1

Subject: Confirm the holding capacity of the Smart Auto-Locking Taper.



Equipment used:

- A traceable NATA calibrated tension load cell
- Horizontal tested machine, which is operated by one hydraulic ram.
- Client supplied ZERO WASTE Foundations consisted of the following:
 - Two half circle tapered plastic Tapers 275 mm in length, secured to the sign post by means of self-drilling screws.
 - A tapered polypropylene ground tube 350 mm in length, cast in a concrete block.

Procedure

TEST ONE: 10MM PROTRUDING PROVIDES 200 KGF

A signpost with Taper attached was installed into the ground socket, cast into a concrete block, with 10mm of the Taper protruding above the ground socket.

The concrete block was secured to the dead end (or static / fixed / non-moving end) of the test bed. The signpost was fastened to the live end (or the moving end / pulling end). A slow and consistent tension was applied until the signpost complete with the Tapers was parted from the ground tube in concrete. The above tests were conducted seven (7) times. The two sections parted at 200 Kg with no alteration over subsequent tests.

TEST TWO: 7MM PROTRUDING PROVIDES 280 KGF

This test was conducted using the same Taper (sleeves) and ground socket in the concrete block as test one. The signpost was re-installed in the concrete block with seven (7 mm) of the Taper protruding above the ground tube. The test was taken up to 250 Kg with no movement or slippage. The test machine was then increased to maximum speed with the two sections parting at **280 Kg**.

TEST THREE: 3MM PROTRUDING PROVIDES 430 KGF

This test was conducted using the same Taper and ground tube socket cast in the concrete block as test one. The signpost was re-installed in the concrete block with three (3 mm) of the Taper protruding above the ground tube. The test was taken up to 250 Kg with no movement or slippage. The test machine was then increased to maximum speed with the two sections parting at **430 Kg**.

FINDINGS: Suggest items are installed flush with the surface (with Taper not protruding from the socket), providing well in excess of 200 kg of upward force to remove.

4.1. Tests 471 - STATIC PULL FORCE - Wedges 275mm long



Figure 4.1.1. Test 471 Static pull force - wedge at 10mm above the concrete surface.



Figure 4.1.2. Test 471 Static pull force - wedge at 10mm. Maximum force 3,188N.
(325kgf)

IMPACT TESTS

CONDUCTED BY: **Automotive Safety Engineering Laboratories Pty Ltd**

28 Donegal Rd Lonsdale SA 5160

Subject: To confirm the post will bend at the surface of the ground and to determine that the Smart socket will hold in the concrete base when impacted.



TEST ONE: EFFECT OF IMPACT

Two 350 mm ZERO WASTE ground sockets were installed in a concrete footing 300 mm x 300 mm x 350 mm Depth, in an impact test bed. A 60OD /50NB signpost fitted with a self-locking Taper was installed in one ground socket with **10 mm of the Taper showing** above the ground socket.

The sign post was impacted with a test trolley weighing 1800 Kg at a controlled **speed of 60 Km/H**, the impact point was 420 mm above ground level representing the height of an average car bumper height. Following impact, the effort required to remove the impacted signpost from the socket **was 302 Kg/f**.

TEST TWO:

The first post to be impacted was removed and re-installed in the same ground socket used in test one **with 10 mm of the Taper showing** above the ground socket and **required 300 Kg/f to remove** (negligible difference).

NON-IMPACT (DELIBERATE DAMAGE)

CONDUCTED BY: AAKER UNIRIG PTY LTD

ACN 082 781 691

PO Box 13

South Fremantle WA 6162

Certificate No UTS 14747-1

Subject: Confirm the holding capacity of the Smart Auto-Locking Taper under worst case scenario

TEST FOUR: DEMONSTRATING RESISTANCE TO SEVERE INTENTIONAL DAMAGE WITH 50MM OF SOCKET REMOVED

50 mm of the ground socket cast in the concrete block was removed with a pneumatic masonry chisel.

The signpost with the Taper attached (used in Test Two) was re-installed in the ground socket cast in the concrete block with 8 mm of the Taper showing above the ground socket. This was then subjected to the same pressure as Test One. The signpost parted with ground socket cast in concrete at 270 Kg.

IN SERVICE EVIDENCE

20 Years in field

Items remain perfectly aligned and secure in footing year after year



20 Years in field

No damage has been evident to footings in service in traffic zones from carparks-freeway zones up to 110kmph.



IMPACT TESTS FOR IMPACT RECOVERY SYSTEM

CONDUCTED BY:

Smart Urban Pty Ltd

Test to confirm how well the Impact Recovery Bollard recovers from impact

TEST ONE:

A 650 mm Ground socket was installed in a concrete footing 400 mm square and 700 mm deep. A 600D (2.9 wall thickness) post fitted with a Self-locking Taper was installed in the ground socket that was cast in a concrete test bed with 10 mm of the Taper showing above the ground tube. The Impact Recovery Rings and Bollard were secured to the post.

The bollard was impacted with a vehicle at low-speed, the impact point was 420 mm above ground level (the height of an average car bumper).

The bollard deflected approximately 20 degrees upon impact and returned upright without damage to the Impact Recovery System, the bollard or the concrete footings/ paving.



TEST TWO

The process was repeated using an Advanced Polymer bollard with a 400 mm square and 700 mm deep concrete foundation installed directly into soil (and secured to surrounding concrete foundation).

It was impacted using a utility vehicle with bumper bar. This test provided the same results. No evidence of damage to the concrete foundations or bollard after numerous impacts.



[VIEW VIDEO](#)



Approvals & Awards

State Road Authorities

ZERO WASTE Foundations (ZWF) have been accepted for use by multiple road authorities through a combination of (a) specification listings and (b) written correspondence confirming use is permitted subject to stated conditions. Where agencies maintain an approved-products mechanism, ZWF is referenced; accordingly, where no approved list exists, acceptance is documented as “permitted/no objection subject to conditions”. Supporting correspondence and specification extracts are provided in this document.

- NSW Transport (formerly RTA NSW)
- Vic Roads
- Queensland Main Roads
- WA Main Roads
- SA Transport Authority

NSW

Roads & Maritime NSW

Permitted / no objection (subject to conditions)

Functional requirements included:

The use of this device is permitted, subject to:

- o The device supporting a post in a stable vertical position under service conditions,
- o Presenting no additional hazard beyond that inherent with the use of 50 Nominal Bore (60.O.D.) steel posts,
- o Preventing the unauthorized removal of posts,
- o Facilitating the removal and replacement of posts following damage or when otherwise required.
- o The device requiring specialized tools for signpost removal, and
- o The device being used strictly in accordance with the manufacturer's instructions.

Chris Ford [Bob O'Keefe/ Ross Walsh] RTA 1/3/2000.

From: Director, Traffic and Transport

Subject: Use of Segmental Signpost Fixing Devices

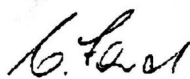
Date: 1 / 03 /1999

The referenced memo directed that the use of these devices be suspended until otherwise directed.

The use of these devices is now permitted subject to:

1. the device requiring specialised tools for sign removal, and
2. the device being used strictly in accordance with the manufacturer's instructions.

Please note that there is no RTA specification, and hence no approved list, covering these devices. Users should therefore ensure that the above conditions for the use of any such device are strictly adhered to.



Chris Ford

QLD

Qld Main Roads Dept

8.2.2 Sign posts

For signs less than 1m² in area, the post size is generally 50NB x 3.2mm CHS. Refer to Appendix. B for determination of post sizes suitable for larger signs or heights.

8.2.5 Posts in sleeves

There are certain situations where it is advisable to install the post into a sleeve inserted into the footing, such as:

1. Where a sign is located on an urban median strip where it may be struck frequently.
2. Where it may need to be removed occasionally, to accommodate the swept path of over-dimensioned vehicles when turning.

This arrangement is only appropriate for small posts up to 50mm nominal bore (60 O.D. CHS Posts). Details of a typical sleeve assembly are presented in Drawing No. 1368 (Appendix D). Variations on the basic theme are just as effective. **"ZERO WASTE Foundations *have an 'as-of-right' approval on this basis*"**

John .C.Douglas Qld MR

VIC

Vic Roads

"We have no objection to the use of the ZERO WASTE Foundations on roadworks provided the system is used consistently with Vic Roads specifications".

John Eldridge 2001.

Relevant Vic Roads specifications include Standard Specification Section 714.

NB: recent upgrades to Vic Roads Spec 714 requires:

- Units to protrude from ground level
- Footings to be a minimum of 450 mm depth

**These specs are for metal fixing devices and do not accommodate the improved efficiency of an advanced polymer fixing system*

ZERO WASTE Foundations

- Are installed flush with ground level (providing no trip factors or litigation risks from rusting and dangerous metal protrusions)
- ZERO WASTE Foundations as shallow as 150 mm depth been field tested and as shallow as 350 mm impact tested by authorised authorities to remain undisturbed upon impact from a vehicle and avoid any disturbance of underground services

ZERO CIVIL is currently liaising with DoT Victoria/VicRoads to formalise recognition of ZWF as an approved alternative socket system

WA

Approved Ref Spec 601 Annexure 601G

Main Roads WA

"ZERO WASTE Foundations provide a significant cost benefit in replacing the damaged sign post by re-using the existing footing.

Our selection is not based on price alone, also the safety & saving aspects.

The ZERO WASTE Foundations allow the quick replacement of posts, with no further effort required to the base and reduces risk to employees by reducing time spent exposed to traffic!" MRWA

MRWA Specs 601 Signs

NOTES

1. For signs facing oncoming traffic, 60.3 mm CHS 2.3 mm posts are to be used in conjunction with a fixing bracket that provides a flat surface of approximate 75 mm x 20 mm around the bolt fixing area to secure the sign to the post. The fixing bracket shall also restrain the sign from rotating around the post.
2. The CHS posts may be also used in situations where the use of a removable post system can have a significant cost benefit in replacing the damaged sign post by reusing the existing footing. Approved systems are given in Annexure 601G.

ANNEXURE 601G

MAIN ROADS APPROVED ALTERNATIVE SIGN POSTS AND POST FIXING DEVICES

1. Smart Taper (post fixing device) – Smart Urban Pty Ltd (TA: ZERO CIVIL)

<https://smarturban.com.au/>

K-Wedge System (owned by KDC System) & "Smart Taper" owned by Smart Urban Pty Ltd are the names used in MRWA Specification 601 Annexure 601G for the post fixing device

ZERO WASTE Foundations is the current for the product.

ZERO CIVIL is the current Trading Name (still owned by Smart Urban Pty Ltd)

Enquiries: Dan Sullivan on 9323 4162
Our Ref: 30-319-132 (H:\Branch Management\Technical Inquiries-
Correspondence\Signs & Pavement Markings\0014.doc)
Your Ref: NA



MAIN ROADS
Western Australia

Don Aitken Centre
Waterloo Crescent
East Perth WA 6004
PO Box 6202
EAST PERTH WA 6892
ABN: 50 860 676 021
Telephone: (08) 9323 41 11
Facsimile: 08 9323 4449
TTY: (08) 9311 8430

Ms L Hoath
Marketing Manager
KDC Systems
20/25 Walters Drive
OSBORNE PARK WA 6017

Dear Ms Hoath

K-WEDGE SIGN FIXING SYSTEM


With reference to your previous correspondence regarding the K-Wedge System for sign fixing, Main Roads would like to advise the following.

- Our Specification 601 – Signs is currently being modified to incorporate a large number of changes, including the use of Circular Hollow Section (CHS) posts for signs used by Main Roads and / or its contractors. The specification will also be modified to include performance parameters for the footing details for the installation of signs using CHS posts.
- These changes will permit the use of the K-Wedge system for installation of signs using CHS posts. All installation should be undertaken according to the manufacturer's specifications and in accordance with Main Roads' specification and Guidelines.
- As previously advised, all sign installation and maintenance works are now contracted out through our Term Network Contracts using Main Roads' specification and guidelines. Those contractors would need to consider the benefits of the K-Wedge system as well as the additional specification requirements for CHS posts as opposed to RHS posts. Accordingly, any future use of your product would be at the discretion of these contractors.

I trust that this information meets your requirements. If you require any further information please contact Dan Sullivan on 9323 4162. In reply please quote file reference 30-319-132.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'R Grove'.

 R Grove
Manager Road and Traffic Engineering
August 13, 2001

AMENDMENTS	
NO.	DESCRIPTION

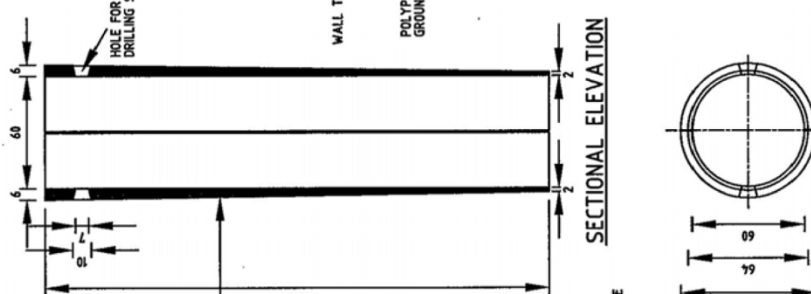
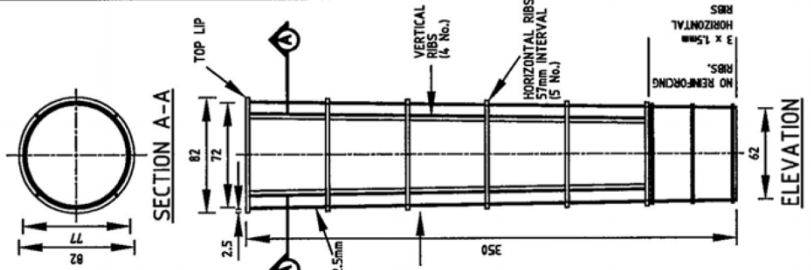
APPROVED & DATE


MAIN ROADS
 Western Australia
 TECHNOLOGY AND ENVIRONMENT DIRECTORATE
 ROAD AND TRAFFIC ENGINEERING BRANCH
 TRANSPORT OPERATIONS
 Perth, Western Australia
 Telephone (08) 923 4111 Fax (08) 923 4449

FILE NUMBER: 06/7698
 DRAWN / CHECKED: SDOOR
 DATE: 06/06/08
 REVISED: 22-6-08
 APPROVED: [Signature]

STANDARD DRAWING
 REMOVABLE BOLLARDS
 FOR USE ON ROADS UP TO 110 km/h

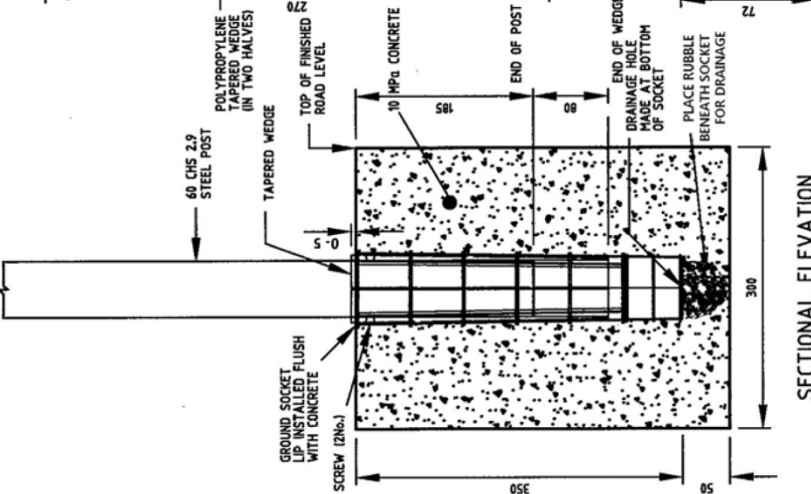
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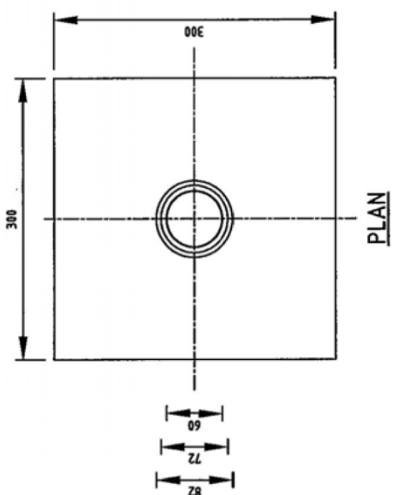
PLAN

NOTES:

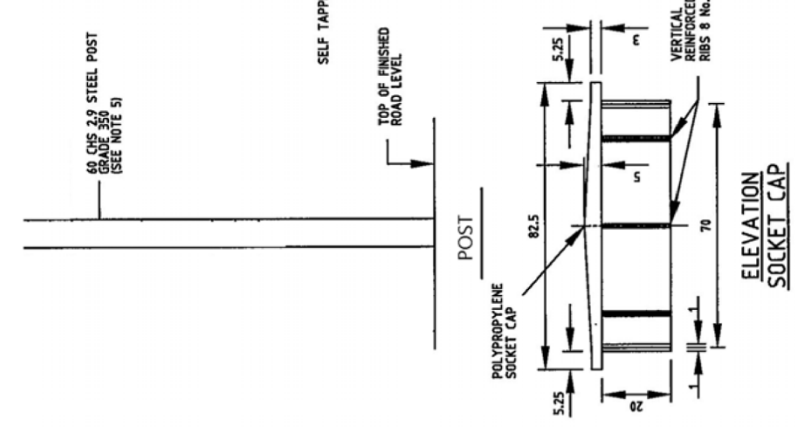
1. SMART FIXED & REMOVABLE POSTS ARE TO BE INSTALLED TO MANUFACTURER'S SPECIFICATIONS AND THIS DRAWING
2. SOCKET CAN BE TRUNCATED AT ANY HORIZONTAL RIB AND GAFFA TAPE USED TO COVER BASE IF UNDERGROUND OBSTACLES ARE HIT WHEN INSTALLING
3. SOCKET CAN BE INSTALLED 150 MM DEEP IN SOLID CONCRETE FOOTPATH OR TRAFFIC ISLAND/ 350 IN STANDARD INSTALL/ 650 IN SOIL.
4. THE SOCKETS SHOULD BE CAPPED WHEN NOT USED.
5. REFER TO MANUFACTURER'S WEB SITE FOR DETAILS smarterurban.com.au



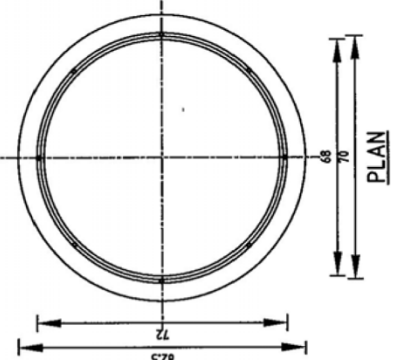
SECTIONAL ELEVATION FOOTING



PLAN



ELEVATION SOCKET CAP



PLAN

SA

*In reply please quote 2001 00308 03
Enquiries to Chris Town
Telephone 8343 2999*

Lisa Kasten-Hoath
Ausposts
PO Box 381 North Beach
Western Australia

TRANSPORT SERVICES
33-37 Warwick Street
Walkerville SA 5081

PO Box 1
Walkerville SA 5081

Telephone 08 8343 2222
Facsimile 08 8343 2585

ABN 92 366 288 135

Dear Lisa,

USE OF TAPER-LOCK IN SA

Thank you for letter, regarding the use of the Taper-Lock post product for use in South Australia. With reference to the samples and documentation supplied to us, Transport Services Division will approve the use of the taper lock posts up to a maximum diameter of 80mm, supporting regulatory/warning type signs alike on roads for which the Department has the maintenance responsibility.

Please note that this Department does not approve products for use on all roads in South Australia. For the local road network, councils would have to give approval for use on their roads.

We approve this product for a period of two years after which a review of field performance will be undertaken before further approvals given.

Yours sincerely,

Wayne Buckerfield
Manager Traffic And Access Standards

18 April 2006

Awards

Department of Occupational Health and Safety

WORKSAFE AWARD

The ZERO WASTE Foundations were presented the WorkSafe Award by the Department of Occupational Health & Safety for its ability to reduce risk of injury to both workers

- **NO DIGGING OR HEAVY LABOUR**
The major cause of injury to road-workers is body stress resulting from heavy labour
- **REDUCED TIME IN TRAFFIC**
The greatest risk of major injury is working in dangerous traffic conditions.

In addition to these safety benefits, ZERO WASTE Foundations remove the need for repeated replacements of concrete footings

- Reducing the risk of workers contracting silicosis.
- Reducing the risk of injury from damage to underground services



Department of Commerce and Trade

INNOVATION AWARD

Australian Small Business Development Corporation awarded ZERO WASTE Foundations the prestigious Innovation of the Year Award. Shown here is the inventor of ZERO WASTE Foundations being presented the award by the state's premier.

Innovation recognised



Case studies



Control engine Wash-Jets with the new easy-to-install control system

Replacement poly posts
slide in easy at Gosnells

MRWA

"Our selection is not based on price alone, rather the safety and saving aspects of the product."

Firstly, for sign locations such as islands and median strips, often with paving and concrete, the replacement of a damaged sign post is both time consuming and requires a lot of unnecessary effort in a dangerous environment.

ZERO WASTE Foundations allow the quick replacement of posts with no further effort required to the base and reduces risk to our employees by reducing the time spent on these islands exposed to traffic.

Secondly, ZERO WASTE Foundations are more resistant to vandalism and deliberate destruction."

Terry Saward Asset Manager for Western Australia's leading urban maintenance contract.



VENTIA

Ventia are responsible for maintaining two of Western Australia's most high-profile tourist destinations, Hillary's Marina and Fremantle Port. Both are high traffic areas on the coastline subject to wind and corrosion.

They use ZERO WASTE Foundations for securing infrastructure from bins to signposts, fencing, grab-rails and bollards.

"The best securing device by far! We have found these products to be exceptional- They have saved us a great deal of maintenance - We find ZERO WASTE Foundations time saving and very reliable."

NB: recently started installing their bollards using the Impact Recovery System and Advanced Polymer Bollard covers.



SUBIACO CITY

Subiaco Town Council (securing parking signage and grab-rails) is one of the more urbanized and well-established local government authorities in WA.

"The main advantage is being able to replace damaged items quickly.

We can now replace damaged items within five minutes of being notified of the damage. As we have such busy shopping districts under our jurisdiction, being able to change items without disturbance to the public is a major advantage."

PRKSONSULT Contractor to Subiaco



VCP STREETCARE HOLLAND:

A distributor of quality street furniture in Holland.

"High quality products. Operating out of Holland we have access to the world's leading technology. We selected the ZERO WASTE Foundations (Street-lock) as our preferred locking device for our high-quality street furniture. ZERO WASTE Foundations make it much easier to install street furniture and is both reliable and aesthetically pleasing."

Used to secure bollards, street furniture, signposts, bike racks, bins, outdoor seating and tables.

VCP continue to sell the system in Europe



TOMEN CORPORATION (TOYOTA) JAPAN

Seeking high quality innovations

Tomen Corporation (Toyota subsidiary) has taken the Smart Urban technology to Japan. Shown here is a representative for Tomen demonstrating the system to the Road Traffic Authority in Japan (Nîgata Police).

“We are very pleased with the ZERO WASTE Foundations and we’re happy to discover that rain, snow and sleet do not adversely affect it. This means maintenance crews can operate year-round without problems.”

NB: One of the major advantages in such highly populated regions is the reduction in disturbance to the public and reduction in waste.



LEIGHTON CONTRACTORS

Leighton Contractors (CIMIC) installed ZERO WASTE Foundations and ZERO WASTE Traffic Bollards on the Southern gateway project to improve sustainability and reduce maintenance. Maintained by **Fulton Hogan** the infrastructure on this projects remains in good condition several years on.

"The Smart removable bollards and grab-rails make our job so much easier".

Dave Landmark, Operations Manager Peel region.



CITY OF PERTH/ FREMANTLE/ BUNBURY

The Smart Impact Recovery System is used by all major cities in WA (**City of Perth; City of Bunbury; City of Fremantle**) to reduce maintenance in busy city centres.

" The Impact Recovery System saves us so much time by reducing damage to foundations, and damaged bollards can be quickly replaced"

Vince Dichera, City of Perth



STIRLING CITY COUNCIL

Stirling City has been one the most proactive councils in WA installing thousands of units in a very short time frame the city has quickly transformed from a state of constant decline to a state of improvement.

One major development is a good example of a smart ZERO WASTE development- The foreshore development remains in pristine condition today



RIO TINTO

Rio Tinto has applied over one thousand Taper-lock units in pre-cast concrete foundations. The sockets protect the foundations from damage and make all items of infrastructure easily removable for maintenance or relocation.

When a site is closed the infrastructure is popped out and the socket capped. The entire base is then re-located to the new site and the infrastructure installed using the Smart Taper- No landfill, no Waste from maintenance and No Carbon footprint.



JESTERS PIES AND CAFES

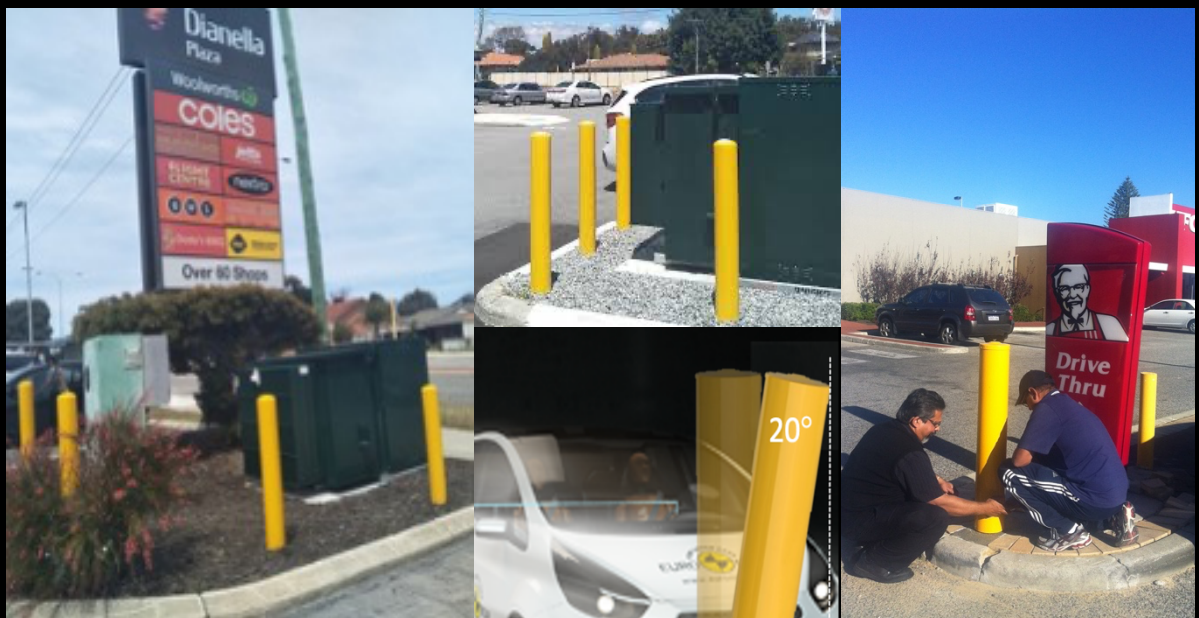
ZERO WASTE Foundations have been used by cafes to install tables, chairs and umbrella supports making them safe and stable, yet easily removable and interchangeable.

Shown here some cafes in Subiaco.



WESTERN POWER

Advanced Polymer bollards installed using ZERO WASTE Foundations using the Bollard Impact Recovery System have been installed on hundreds of locations to protect electrical power stations. And drive thru fast-food outlets

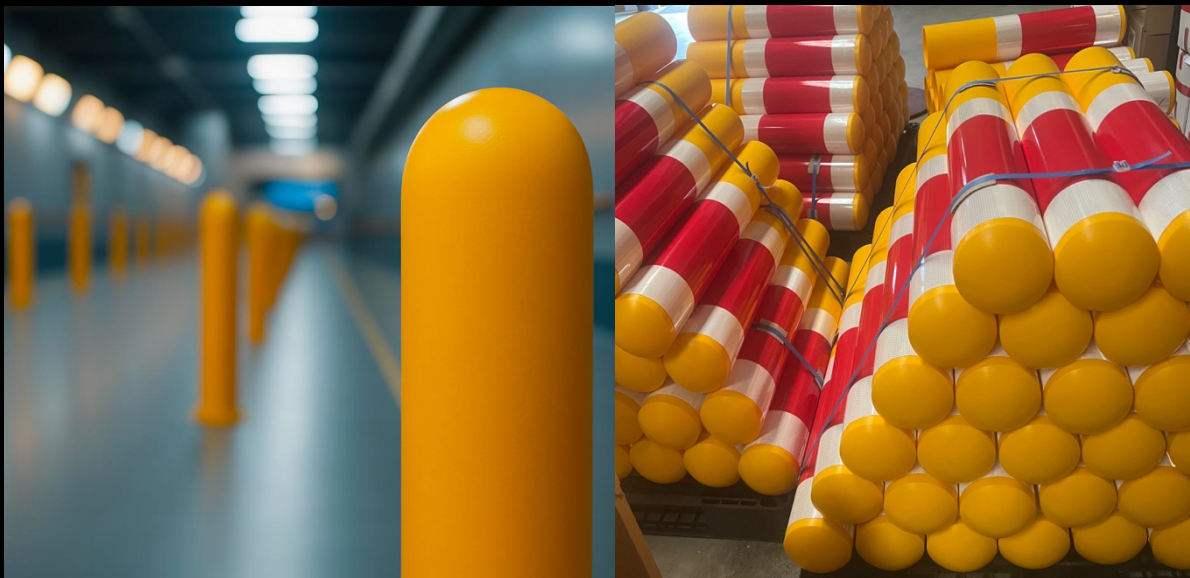


DEPARTMENT OF TRANSPORT WA

Department of Transport recently installed hundreds of Impact Recovery Bollards (Advanced Polymer low impact) on the new train stations in Perth WA

They chose these bollards for

- Impact Resistance
- Resilience
- Safety
- Cost saving
- Price



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CIMIC



CENTRAL COAST
COUNCIL



Public Transport
Authority



CITY OF PERTH
City of Light



HISTORY OF OWNERSHIP

K-Wedge System
KDC Systems Pty Ltd

Taper-lock
KDC Systems Pty Ltd

Smart Taper
Smart Urban Pty Ltd

CURRENT OWNER
Smart Urban Pty Ltd
T/A ZEROCIVIL

ZERO WASTE Foundations
ZEROCIVIL