

TECHNICAL GUIDELINE**RAISING AND LOWERING
SA WATER ACCESS COVERS**

Issued by: Manager Asset Management

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MAJOR CHANGES INCORPORATED IN THIS EDITION

This is the 1st edition and there have been no amendments or revision.

NOTE:

Wording shown as normal text is an SA Water requirement.

Wording shown as italic text is for information only.

Contents

COPYRIGHT AND UPDATE INFORMATION	1
REFERENCED DOCUMENTS	3
SECTION 1: GENERAL	5
1.1 Additional Information	5
SECTION 2: REQUIREMENTS	6
2.1 Introduction	6
2.2 Work practices	6
SECTION 3: PLANNING AND PREPARATION	8
3.1 General	8
3.2 Reasons for Adjustment or Replacement.....	9
3.3 Road Re-alignment and /or Re-surfacing.....	9
3.3.1 Adjustment prior to re-surfacing.....	9
3.3.2 Adjustment after re-surfacing.....	10
3.4 Raising Castings	10
3.4.1 Jacking	10
3.4.2 Mating Spacer Ring (preferred method).....	10
3.4.3 Excavation and Adjustment.....	11
3.5 Lowering Castings	11
3.6 Damaged/Worn Casting Replacement	11
SECTION 4: PROCEDURE	12
4.1 Materials	12
4.2 Outcomes	13
SECTION 5: OCCUPATIONAL HEALTH AND SAFETY	14
SECTION 6: DOCUMENTATION AND WARRANTY	15
4.1 Prior notice	15
4.2 Reporting of Works	15
SECTION 7: ANNEXURES LIST	16
Annex A Jacking Method for Adjusting Access Frames	A1
Annex B Spacer Ring Method for Adjusting Access Frames	B1
Annex C Excavation Method for Adjusting Access Frames	C1
Annex D Water Castings (and relevant Appendices)	D1
Annex E Sewer Castings (and relevant Appendices)	E1
Annex F AS 3996 Load Classification for Cover and Grates	F1
Annex G Reporting of Adjusting SA Water Covers	G1

Referenced Documents

SOUTH AUSTRALIAN GOVERNMENT

The Constructor shall comply with the following publications :

- Waterworks Act 1932 and Regulations there under
- Sewerage Act 1929 and Regulations there under
- Occupational Health, Safety and Welfare Act, 1986 including the Occupational Health, Safety and Welfare (Construction Safety) Regulations 1987
- Environment Protection Act 1993
- Road Traffic Act

SA WATER STANDARDS AND SPECIFICATIONS

The following South Australian Water Corporation Codes of Practice, Standard Specifications and publications shall apply:

- Water Supply Construction Manual and Authorised Product List.
<http://www.sawater.com.au/SAWater/DevelopersBuilders/NetworkInfrastructureStandards/Water+Supply+Manual.htm>
- Sewer Construction Manual and Authorised Product List.
<http://www.sawater.com.au/SAWater/DevelopersBuilders/NetworkInfrastructureStandards/Sewer+Manual.htm>

PRODUCT SPECIFICATION	ITEM
SAW-2200	100mm Inspection point cover and frame
SAW-2201	150mm Inspection point cover and frame
SAW-2202	Maintenance Hole (MH) cover and frame (Lohmeyer)
SAW-2203	Number 3 meter box cover and frame
SAW-2204	Number 4 meter box cover and frame
SAW-2205	Number 5 meter box cover and frame
SAW-2206	Light weight street box cover
SAW-2207	Street box cover with centre access
SAW-2208	Street box frame
SAW-2209	#1 Meter Access Cover and Frame
SAW-2210	#2 Meter Access Cover and Frame
SAW-2211	Electrical Cable Access Cover and Frame
SAW-2212	100 mm Small Valve Streetbox Cover and Frame
SAW-2213	Maintenance Hole (MH) cover and frame (Bell Type)
SAW-2214	Maintenance Hole (MH) cover and frame (TAC Type)

SA WATER SAFE WORK PROCEDURES

SWP70133	Excavator and Backhoe Operation
SWP71528	Top Stone adjust/replace with Street Box
SWP71529	Street Box: Adjust (Excavation or Jacks
SWP71531	Casting: Adjust
SWP71532	Maintenance hole (Bell Type): Adjust Base and Casting
SWP71533	Maintenance hole (Lohmeyer Type): Adjust Base and Casting
SWP75008	Mobile Crane operation
SWP75012	Cranes/Earthmoving Plant Near Power Lines
SWP76010	Whacker operation

DTEI STANDARD SPECIFICATIONS

- DTEI Pavement Reinstatement Configuration
http://www.dtei.sa.gov.au/standards/contractsandtenders/works_on_roads_by_other_organisations
- Specification for Works on Roads
http://www.dtei.sa.gov.au/standards/contractsandtenders/works_on_roads_by_other_organisations

AUSTRALIAN STANDARDS

AS 1742	Manual of Uniform Traffic Control Devices Part 3 - Traffic Control Devices for Works on Roads
AS 2734	Asphalt Hotmix paving guide to good practice
AS3996	Access covers and frames
SAA HB81.1	Field Guide for Traffic Control at Works on Roads - Short-term Urban Works, Daytime Only
SAA HB81.2	Field Guide for Traffic Control at Works on Roads - Short-term Rural Works, Daytime Only

Note: Unless specified otherwise, any Drawings, documents, standard specifications, codes of practice, Australian Standards and any other standards (SA Water, Department of Transport) shall be the latest edition (including amendments and supplementary notices) at the date of execution of the contract.

Section 1: General

This Technical Guideline supersedes all other technical documentation issued on raising and lowering the level of access covers and frames in SA Water's infrastructure and is to be used in conjunction with existing OHS&W documentation (eg SWP). It covers all of the general considerations and methodology for adjusting covers to match the road surface (or proposed new surface level) and applies to all water supply and sewer covers and frames in use in metropolitan and country areas.

The document has been produced by Asset Management section in conjunction with other engineering specialists and is based on SA Water infrastructure design criteria, maintenance staff experience plus Water Services Association of Australia (WSAA) and Australian Standard's recommendations. The document will be revised on a two yearly basis and be signed off by the Manager Asset Management. Minor technical amendments may be added in the intervening period and these will be signed off by the Infrastructure Standards Manager.

Assets Management staff, generally in consultation with operations and contractor staff, will initiate adjustment procedures for new covers and frames and implement changes to adjustment procedures for existing covers and frames.

Any new concepts or ideas regarding maintenance or adjustment of SA Water castings should be referred to the Infrastructure Standards Manager.

All work and materials, where listed, shall comply with this Technical Guideline, the relevant Authorised Products as detailed in the Construction Manuals and the Standard Specifications (see list in Referenced Documents in this manual).

Any works or materials not otherwise specified shall comply with the requirements of the relevant Standards Association of Australia publications.

1.1 ADDITIONAL INFORMATION

Unless otherwise specified, all enquiries regarding this Technical Guideline shall be referred to the Infrastructure standards Group.

Section 2: Requirements

2.1 INTRODUCTION

The life of a roadway is considered by many to be infinite. Unfortunately, with the continually increasing traffic usage of our roadways the consequential road damage is also increasing. As a result, the demands for better quality roadways and improved maintenance are also increasing. Road resurfacing, excavation and reinstatement of road surfaces for maintenance and/or new infrastructure plus loose and rattling covers are now a regular occurrence in the life of a roadway. When road resurfacing or realignment is carried out, the SA Water castings (covers and frames) need to be raised or lowered to the new level of the roadway to ensure ongoing access for operational and maintenance requirements.

This Technical Guideline (TG) has been developed to provide direction to the agencies responsible for roadways within the state on SA Water's requirements relating to adjusting/replacing existing access covers and frames. The TG will ensure that the methods used meet SA Water's requirements and the system used is consistent no matter who is employed to adjust the castings.

2.2 WORK PRACTICES

The work covered by this Technical Guideline includes:

- Typical construction arrangement for all water supply and sewer access point castings including meter access chambers.
- Methods of adjusting casting to new Finished Surface Level (FSL)
- Excavation, backfill and compaction requirements around all structures and appurtenances.
- Restoration of disturbed surfaces including road pavement, clean up of the site and the removal of surplus spoil etc.

The adjusting of castings systems discussed in this document outline the preferred methods, chamber configuration, products to be used, reinstatement details and specific safety issues.

The level of workmanship shall comply with SA Water, DTEI and Local Council requirements/ specifications. In particular, reinstatement of all road pavements (DTEI and council) shall be in accordance with the DTEI Pavement Reinstatement Configuration and Specification for Works on Roads.

See also:

- http://www.transport.sa.gov.au/transport_network/materials_technology/index.asp
- <http://www.sa.gov.au/subject/Transport%2C+travel+and+motoring/Transport+industry+services/Road+construction+and+maintenance>

Since 1998, with the closure of SA Water foundry, a range of new casting designs have appeared in roadways. The most noticeable difference between the new style and the old is the manufacturer's identification. Each cover must now have the manufacturer's name or logo cast into it. The main suppliers of castings are:

- Bianco PCP:
 - BIA
- Cooke Precast (CPC):
 - Havestock
 - WSSA
 - Webforge
- Tyco Water:
- AVK

Details of covers and frames can be found in:

- SA Water's Water Supply Construction Manual (WSCM)
<http://www.sawater.com.au/NR/rdonlyres/A5B496D6-4766-48E6-B9F3-F90A4D6F9069/0/WMainsslss3R3.pdf>
- SA Water's Sewer construction Manual (SCM)
<http://www.sawater.com.au/NR/rdonlyres/E7341BE1-C02E-4873-98FD-80ED5BCED8D/0/SMaintenanceStructureslss3R1.pdf>
and
<http://www.sawater.com.au/NR/rdonlyres/3DAC3A93-A087-45C7-8F49-F658DFDB81D4/0/SInspectionOpeningslss3R1.pdf>

Product 'order codes' for the above castings shall be sourced from the manufacturer or their agent. Methods for adjusting these covers are further discussed in this document.

SA Water stock numbers referred to in the annexes and appendices are provided for information and can be used for reference and/or product identification.

Section 3: Planning and Preparation

3.1 GENERAL

In 2011/12 SA Water intends to introduce a List of Authorised SA Water Casting Adjustment Contractors. Only contractors shown on the current SA Water Authorised Casting Adjustment Contractors List are to be used on raising and lowering SA Water castings activities regardless of who engages them for the project.

Prior to commencing any adjustment operations, the agency or contractor will need to obtain copies of the appropriate access point ID numbers, relevant specifications and drawings to adequately plan and resource the job. Work teams involved will need to have quality procedures in place detailing methods used in identifying, adjusting castings and road reinstatement.

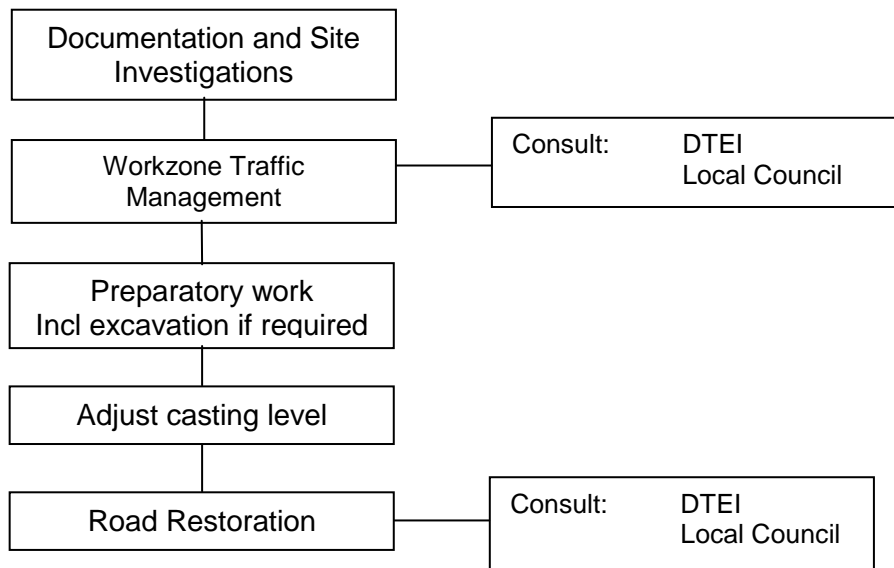
When planning the project and preparing the site, the contractor will need to consider the following issues:

- Regulations/requirements of other authorities in relation to:
 - Occupational Health Safety and Welfare requirements
 - Environmental considerations
- Workzone Traffic Management
- Noise
- Site inspection to identify other constraints
- Ground conditions
- Use of correct fittings
- Preparation of realistic timetables
- Provision of adequate storage areas
- Loading/unloading requirements
- Responsibilities and accountabilities to:
 - Asset owners (SA Water, DTEI, Councils)
 - Asset users (MFS, CFS, DTEI (buses), SA Ambulance etc)
 - Asset managers (SA Water Alliance partners)

In addition, work teams should have contingency plans prepared to ensure that at the end of each days work they can leave the site in a safe condition causing minimal disruption to the public.

Teams involved in work conducted on roadways shall ensure that at least one person on site has been trained and received a certificate in 'Workzone Traffic Management'. This person shall remain on site at all times while the work is in progress.

A suggested work planning procedure is shown below.



3.2 REASONS FOR ADJUSTMENT OR REPLACEMENT

There are a number of reasons for adjusting/replacing castings including the following:

- Road re-surfacing or re-alignment, requiring:
 - Adjusting cover and frame assembly to the new road surface level
- Cracked or seriously chipped covers and/or frame
- Covers and /or frame seating worn, resulting in:
 - Tread pattern on cover missing
 - Cover sitting dangerously low in frame
- Frame moved/dropped, caused by:
 - Compaction or concrete support ring failure.

3.3 ROAD RE-ALIGNMENT AND/OR RE-SURFACING

Raising or lowering of cover and frame assemblies can be done either before or after the resurfacing of the roadway. Both have their advantages and disadvantages and it will be up to the work team and road re-surfacer to come to a mutual agreement as to when each other's process should be done. Timeframes, workloads and costing may play an integral part in the decision regarding which method is used.

3.3.1 Adjustment prior to re-surfacing

This method is used so that no disturbance of the new surface is required after the asphalt has been laid.

The advantage of this method is that if the frames are placed at the correct FSL of the roadway, including adjustment to match proposed asphalt grade, so that when the resurfacing occurs there is no differentiation between the road level and the cover level ie. road profile is adjusted to suit the cover.

The disadvantage with this method is that if the proposed FSL varies it may cause additional expense for the contractor laying the asphalt because a greater amount of asphalt may be required to match the set height of frame or if the frame is low it will need to be raised. This can generally be resolved by working with the asphalt contractor on site so they can determine the likely final level.

3.3.2 Adjustment after re-surfacing

This method allows for the frames to be raised to the correct level after the road has been resurfaced.

The advantage of this method is that if the frame has no external flanging it can be jacked into its final position without disturbing the road surface. See Annex A.

The disadvantage with this method is that if there is an external flange, the asphalt and road base need to be removed to allow the frame to be adjusted. This normally results in a large hole (1 m square) to provide machine access to the frame. The main problem with this system is that it is hard to re-compact the road base around the frame to the same degree of compaction as that achieved for the original road base and this results in the area around the frame subsiding and causing problems particularly for motorcyclists and bike riders. Another disadvantage is that without a special effort being made to identify the location of the cover and frame during re-surfacing they are hard to locate because they may be completely covered with asphalt. See Annex C.

3.4 RAISING CASTINGS

There are three common maintenance methods for of raising castings:

- Jacking
- Insertion of mating spacer ring(s)
- Excavation and adjustment

3.4.1 Jacking (preferred method)

This method is only possible where the frame has no external flanges. The frame is jacked upwards to the new level of the roadway, using a special lifting frame, which causes minimal disruption to the roadway. Packers are placed beneath the frame and mortared into position using a special quick setting mortar. The frame is then pushed down to sit on the packers and mortar to eliminate rocking of the frame. (Jacking procedure is detailed in Annex A).

3.4.2 Mating Spacer Ring (preferred method)

This method is only possible where the frame is designed to incorporate a mating spacer ring. The spacer rings are available in a variety of heights and installation requires the existing spacer ring to be unbolted and removed. The appropriate thickness ring or rings are installed and bolted in place and the cover is then installed to complete the process. (Mating Spacer Ring procedure is detailed in Annex B).

3.4.3 Excavation and Adjustment

This is the least preferred method unless they are raised prior to re-surfacing.

With this method the section of roadway around the casting is excavated to allow easy removal and raising to occur. The casting is then adjusted to the required roadway FSL height using either concrete rings or packing strips and a special quick setting mortar (or a combination of both). Once the final level is achieved, authorised fill shall be placed around the frame and compacted in accordance with the appropriate specification. Care shall be taken to prevent any unnecessary movement of the frame.

Asphalt, to specification, shall be placed around framework to achieve the desired finished surface level. This method must be used if the support structure (usually concrete) is damaged and requires replacement. (Excavation and Adjustment procedure is detailed in Annex C).

3.5 LOWERING CASTINGS

In some circumstances, such as major road re-alignment, the level of the cover may need to be lowered. This may be achieved as follows:

- Removing existing cover, frame and spacer rings/compacted material (if sufficient adjustment is available). Alternatively replacing existing cover support with a thinner support slab and/or cover frame
- For Sewer Maintenance Holes only - removing cover and conversion slab and diamond cutting the existing shaft section to the required level and replacing the cover and conversion slab on a beds of quick setting mortar.
Note: it is important that the quick setting mortar seals any cut reinforcing exposed when the shaft was cut.

Lowering covers and frames can only be done using the Excavation and Adjustment method (see clause 3.4.3 and Appendix C) because the area beneath the cover needs to be exposed. Reinstatement is the reverse of removal.

More detailed procedures and requirements are shown in the Excavation and Adjustment procedures detailed in Annex C).

3.6 DAMAGED/WORN CASTING REPLACEMENT

Because of the age and location of some covers and frames it is possible that a relatively small number may be severely worn or damaged. The assessment criterion is as follows:

- Cracked or seriously chipped covers and/or frame assemblies which present OH&S issues should be replaced under the following conditions:
 - Frame cracked to such an extent it is likely to split apart
 - Cover is cracked into parts or cracked to such an extent it is likely to split
- Worn covers/ cover and frame assemblies should be replaced under the following conditions:
 - Cover sits more than 15 mm below the outer rim of the frame.
 - cover tread pattern has been worn off over an average of more than 70% of the cover's total surface area.

Section 4: Procedure

As a general rule the following flow of activities can be used for guidance:

- Prepare the Work Area
 - Safety equipment
 - Traffic control devices
 - Locate casting from plans or metal detector
 - Obtain required/replacement parts
- Adjustment or replacement of frame
 - Mark area
 - Measure distance from top of frame to new surface level as required by DTEI or Council levels
 - Excavate (if required), lift off cover and raise the frame the required amount using either the jacking method, the replacement ring method (no excavation required) or adjusting the frame after excavation
- Adjustments
 - Jacking**
 - Jack frame and place the appropriate size spacers beneath the frame to obtain the required level
 - Using a quick setting mortar (SIKA 2500, EMACO T545 or similar authorised product) trowel it into the void under frame ensuring it fills the area and encases the spacers.
 - Make minor adjustments by tamping as required to achieve required level and ensure a good seal is achieved around frame and that no rocking of the frame is evident
 - Replace cover
 - Excavation or Adjustment**
 - Identify the appropriate size spacer ring(s) to place beneath the frame to obtain a level slightly less than the required level
 - Making a bed of quick setting mortar (SIKA 2500, EMACO T545 or similar authorised product) lay the spacers in the mortar, trowel mortar into the voids and then provide a bedding for the frame.
 - Lower or place frame onto the bedding and make minor adjustments by tamping as required to achieve required levels. Ensure a good seal is achieved around frame and that no rocking of frame is evident
 - Replace cover
- Reinstatement
 - If raised using jacking or mating spacer ring method, the only reinstatement is a bead of liquid bitumen poured in the gap between the frame and asphalt
 - If adjusted using excavation method backfill, compact and reinstate asphalt to original condition in accordance with DTEI, Local Council or SA Water specifications
- Clean up
 - Remove and dispose of spoil and excavated materials
 - Remove and store all traffic controls
 - Return site to original condition

- Complete the “Raising and Lowering SA Water Covers and Frames Report” and return to SA Water (see Annex G)

4.1 Materials

Only products authorised by SA Water shall be used for the adjustment or replacement of covers and frame/chamber assemblies.

Only materials authorised by DTEI and /or Local Council shall be used for backfill and reinstatement of road surfaces.

Excavated materials shall not be reused in the reinstatement of any trenches. This material shall be removed from site and appropriately disposed of in accordance with the requirements of the EPA. Surplus spoils removal and disposal is the responsibility of the Work Team.

4.2 Outcomes

The adjustment of all covers and frames/chamber assemblies shall be done such that:

- The finished level of cover and frame/chamber assemblies is –0mm +5mm above the road surface when measured with a straight edge which extends 1 metre past the outer edge of each side of the frame/chamber. This shall be done twice with the second measurement taken at 90 degrees to the first.
- Compaction shall match the existing road base.
- Hot mix asphalt is to be placed and compacted to AS 2734 to match existing surface without depressions to ensure no post compaction rutting occurs.
- Frames are to be checked for correct positioning over the infrastructure operating mechanism (eg valve spindle, fire hydrant spindle and bayonet connection).
- Excavations and MH openings are not to be left open over night, preferably, once started all work on each adjustment project is to be completed on the same day.

70mm is the maximum allowed for adjusting frames with packers. Beyond this, excavation is required and the placement of a new concrete spacer ring(s) mortared to the existing slab is required. The cover and frame are then placed on top.

As a guide, road resurfacing thicknesses are as follows:

35(+) mm DTEI roadways
25 mm Council roadways

DTEI roadways

Main roads, high traffic loads (≥ 10% usage by commercial vehicles - heavy) See DTEI website

Council roadways

Side streets, low to medium traffic loads (≤ 10% usage by commercial vehicles - light)

Section 5: Occupational Health and Safety

Hazards and Risks

The following specific hazards and risks are present when undertaking these activities:

- Traffic – includes vehicles and pedestrians
- Falling/slipping into open holes (eg Maintenance Holes)
- Hydrogen sulphide gas (Sewer maintenance access points)
- Heavy earthmoving/mechanical handling equipment
- Vermin (snakes, spiders etc)
- Discarded hypodermic syringes
- Other site specific risks
 - Underground services
 - Overhead services

Employees are responsible for working in a healthy and safe manner, they must observe all safety instructions and requirements, encourage others to work in a healthy and safe manner, cooperate with, support and promote OHS in the workplace and report or rectify any unsafe conditions that come to their attention.

Entry to maintenance holes is restricted to personnel authorised by SA Water and who have completed the appropriate confined space training. NOTE: Specific entry permits are required for each entry.

**DO NOT attempt to enter the sewerage system NO MATTER how SAFE it may appear.
If building material, tools etc enter the sewerage system. Contact SA Water personnel who will attempt to recover/remove the material, tools etc from the system.**

SMOKING or any TYPE OF IGNITION SOURCE is prohibited within 6 metres of any sewer opening, sewer vent, IP or IO.

Section 6: Documentation and Warranty

The Constructor/Contractor shall be responsible for:

- the final adjustment of all castings
- the final restoration of all roadways
- the condition of any trench fill, in both the temporary restored condition and final restored condition, to the satisfaction of the Superintendent's Representative for the duration of the Defects Liability Period.

6.1 Prior Notice

Prior to commencement of any roadway or footpath construction, outside agencies shall provide a program of work to SA Water (or its alliance partners) at least 7 days prior to commencement of work.

6.2 Reporting of Works

Following completion of any casting adjustments, the outside agency/contractor shall complete the "Raising & Lowering of SA Water Covers and Frames Report" (see Appendix G) and forward it to SA Water, information required includes:

- Numbers of each type of casting adjusted
- Exact locations of adjusted castings
- Construction method used for adjusting each casting
- Number and type of any castings replaced
- Exact location of:
 - Any MH with interior concrete deterioration
 - any damaged sewer IP/IO risers
 - any IP/IO where the distance between the FSL of the cover and the top of the riser is greater than 200mm
 - any valve/hydrant access points where the distance between the FSL of the cover and the top of the operating spindle is greater than 300mm

SA Water (or their alliance partners) reserve the right to inspect all or any of the raised covers prior to or on completion of the work. The constructor/Contractor's liability to repair any defects is 12 months from date of completion of the work.*

* To be outlined in specification/contract given by agency requiring the work to be performed.

Section 7 - Attachments

The following Annexes detail the various methods for adjusting cover and frame assemblies and the Appendices detail individual cover and frame assembly systems which are used by SA Water within roadways and are provided to aid in visual identification of such assemblies.

Annex A Jacking Method for Adjusting Access Frames

Annex B Spacer Ring Method for Adjusting Access Frames

Annex C Excavation Method for Adjusting Access Frames

Annex D Water Castings Details

Appendix D1 Topstones

Appendix D2 Streetbox - Large

Appendix D3 Streetbox - Small

Appendix D4 Meter boxes

Annex E Sewer Castings Details

Appendix E1 Bell Type Maintenance Covers (540 mm Diam)

Appendix E2 Lohmeyer Type Maintenance Covers (600 mm Diam)

Appendix E3 TAC Type Maintenance Covers (600 mm Diam)

Appendix E4 Maintenance Shaft Cover and Frame (450 mm Diam)

Appendix E5 Inspection Point (IP) 100 mm and 150 mm Diam

Appendix E6 No. 5 Meter Box Covers (Control Maintenance Holes)

Annex F AS 3996 Load Classification for Cover and grates

Annex G "Raising & Lowering of SA Water Covers and Frames Report" form

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Annex A: Jacking Method for Adjusting Access Frames

A1 GENERAL

The following instruction details the method used for raising access cover frames using the Jacking method. This method is not suitable for all covers and frames and is only suitable for those with no external protrusions which preclude lifting. Cover and frame casting systems suitable for jacking are specified in the description sheets for individual systems.

A2 EQUIPMENT

The following list of equipment and material is required for this process:

- Adjustable lifting frame (complete with lifting legs)
- 2 off 20 ton hydraulic jacks
- Spacer rings to suit lift height to finished level
- Packing mortar (Sika 2500, EMACO T545 or similar authorised product) and installation tools

Optional extras:

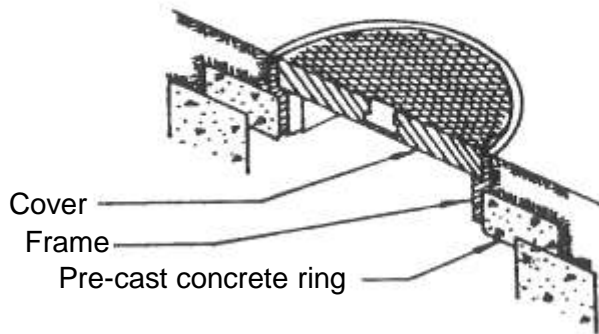
- Flat 6 mm steel bitumen keeper plate with hole the size of the outside of the frame to prevent the existing bitumen from lifting as the frame is being raised.

Note:

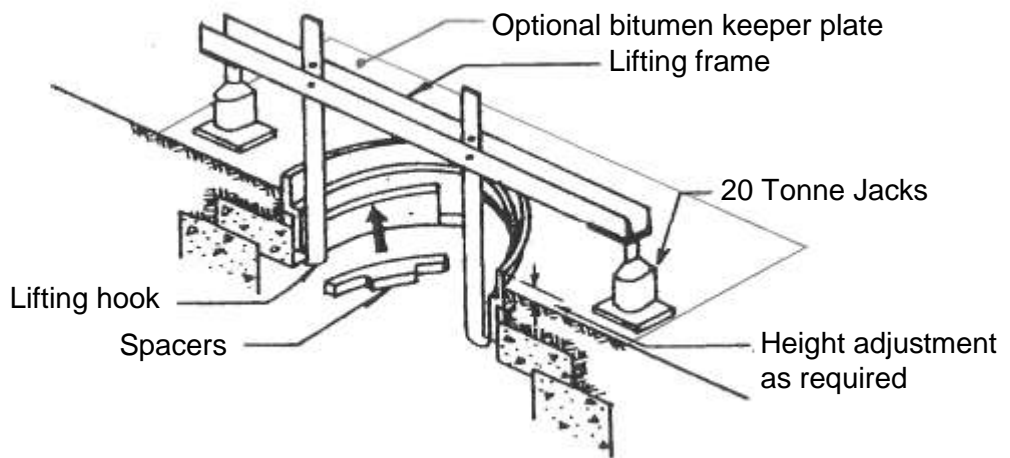
- Keeper plate to be held down by jacks
- Alternate keeper designs are acceptable

A3 PROCEDURE

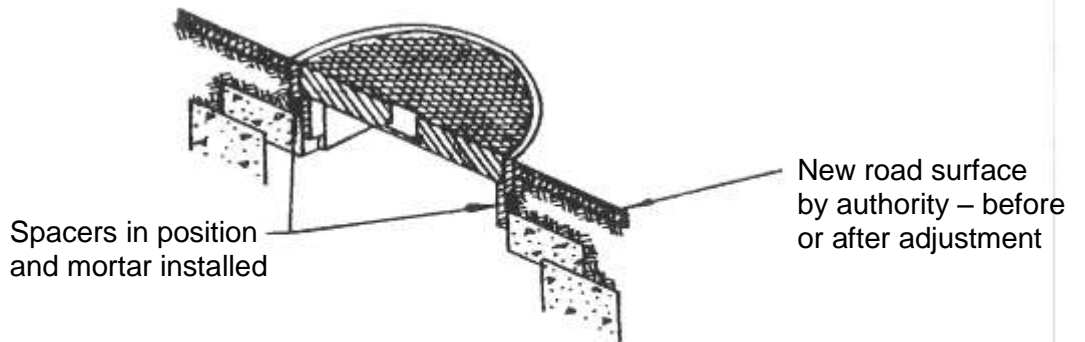
- Prepare a safe work area
- Measure distance from top of frame to new finished surface level and select appropriate spacers.
- Lift off cover and install lifting frame (use of bitumen keeper plate is recommended)
- Raise frame to the required height (plus a sufficient amount to install spacers) by jacking evenly both sides
- Place the appropriate spacers beneath the frame
- Remove lifting frame
- Trowel quick setting mortar (eg SIKA 2500, EMACO T545) into the void under frame ensuring it fills the void and encases the spacers.
- Make minor adjustments by tamping as required to achieve required levels
- Seal any surface gap between the frame and existing road surface with liquid bitumen as appropriate
- Replace cover
- Clean up and return site to original condition



ORIGINAL INSTALLATION



RAISING OF FRAME



ASSEMBLY ADJUSTED TO NEW LEVEL

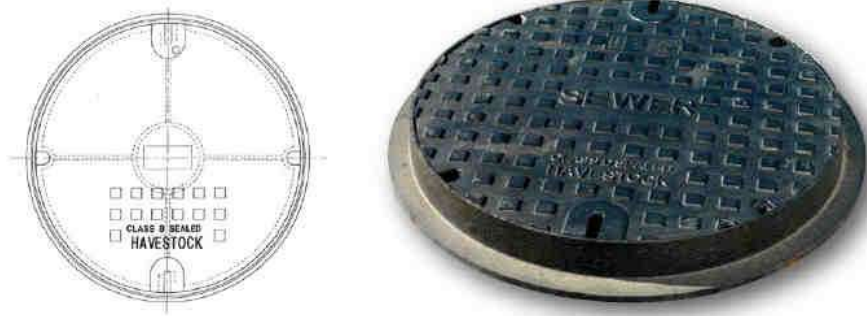
Annex B: Spacer Ring Method for Raising Access Frames

B1 GENERAL

The following instruction details the method used for raising access cover frames using the spacer method. This method can only be used where the cover and frame system is designed for the use of spacers and spacers are available.

The types of cover and frame which can utilise the spacer method are specified in the description sheets for individual systems.

Note CLASS B assemblies (light duty) from the same manufacturers are not raised using this method.



Typical Class B Cover (Parks and Reserves)

B2 EQUIPMENT

The following list of equipment and material is required for this process:

- Suitable hand tools (spanners, levers and cleaning equipment)
- Spacer ring(s) to lift frame height to finished level

B3 PROCEDURE

- Prepare a safe work area
- Measure distance from top of frame to new finished surface level and select appropriate spacer ring(s).
- Lift off cover and identify spacer fixing bolts
- Undo existing fixing bolts and remove existing spacer ring from frame.
- Insert new spacer ring(s)
- **INSERT AND TIGHTEN NEW FIXING BOLTS**
- Seal around outer rim of spacer ring with liquid bitumen.
- Replace cover
- Clean up and return site to original condition

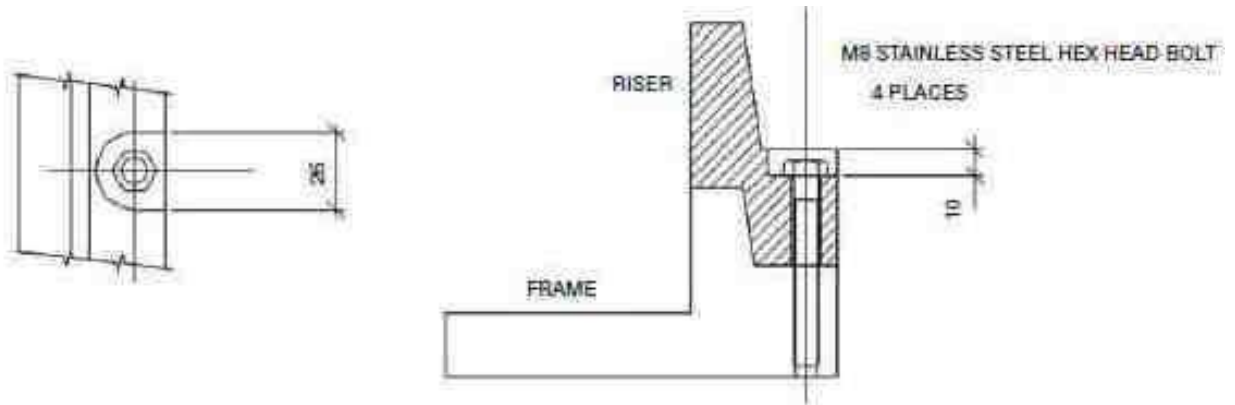
Typical Spacer Ring Type Cover and Frame



Class D Cover (Road Use)
 Authorised by SA Water for use on Sewer use only

Clear Opening (mm)	AS3996 Load Rating	Overall Cover Dia	Overall Frame Dia	Cover Depth	Frame Depth	Cover Marking	Mass (kg)
615	Class B	665	720	50	56	SEWER	40
615	Class D	665	750	50	56	SEWER	50

Riser Ring to suit Spacer Ring Type Cover and Frame



Note:
 Rising rings are only used with Class D covers and frames.

AS3996 Load Rating	Base Frame (no riser)	Riser Height	Finished Frame Height
Class D	60	50	110
Class D	60	75	135
Class D	60	90	150
Class D	60	105	165

Annex C: Excavation Method for Adjusting Access Frames

C1 GENERAL

The following instruction details the method used for raising and lowering access cover frames using the excavation method. **This method is not the preferred method and should only be used where the jacking or spacer method cannot be used.** This system is used for the following:

- frames with external protrusions which prevent lifting,
- situations where a spacer ring cover and frame need to be raised by more than 70 mm, and
- frames which need to be lowered.

Frames which have external protrusions and require the excavation method are specified in the description sheets for each individual casting system.

C2 EQUIPMENT

The following list of equipment and material is required for this process:

- Excavating equipment
- Lifting equipment
- Spacer/Packers to suit lift height to finished level
- Packing mortar (Sika 2500, EMACO T545 or similar authorised product) and installation tools. **Maximum allowable thickness is 50 mm.**
- Imported backfilling material and hot-mix bitumen to suit existing road surface

C3 PROCEDURE

- Prepare a safe work area
- Measure distance from top of frame to new finished surface level and select appropriate spacers.
- Excavate the area around the frame to expose frame and support ring
- Remove cover, frame, support ring and support slab (as appropriate)
- If lowering remove compacted base to required level and replace support slab
- Making a bed of quick setting mortar (eg SIKA 2500, EMACO T545) lay the spacers in the mortar, trowel mortar into the voids and then provide a bedding of mortar for the frame. **Maximum allowable thickness is 50 mm.**
- Lower the support ring onto the bedding and then place the frame on to the support ring and make minor height adjustments by tamping as required to achieve required levels. Ensure a good seal is achieved around frame and that no rocking of frame is evident
- Check frame for correct positioning and replace cover
- Backfill area around frame ensuring it does not move during compaction
- Remove cover and check frame for correct positioning and depth to top of IP or valve /hydrant operating mechanism. Report where:
 - Top of IP is more than 200mm below FSL
 - Top of Valve /Hydrant spindle is more than 300mm below FSL
- If the road has already been raised re-bituminise to match surface level
- Clean up and return site to original condition



Typical excavation

Annex D: WATER CASTINGS

There are a variety of Water Supply related castings, each with their own special adjusting requirements. These are included as separate Appendices as follows:

See Annex F for details of allowable load classifications (based on AS 3996)

Appendix D1 – Topstone

- Cast or Ductile Iron frame set in concrete surround - Class D



Appendix D2 – Street Box – Large

- Cast or Ductile Iron - Class D (full and half height frames used)
- Polyethylene – Class B
- Concrete – Class D
- Fibre cement – Class B



Cast/ Ductile Iron



Polyethylene



Concrete
Fibre Cement (may
contain Asbestos)

Appendix D3 – Street Box – Small

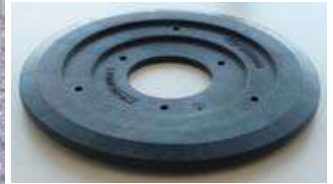
- Cast or Ductile Iron – Class D
- Polyethylene – Class B



Cast/ Ductile Iron



Polyethylene



Appendix D4 – Meter Boxes

- Cast or Ductile Iron – Class D



No2 Meter Box



No3, 4, 5, Meter Box



Multi Meter Service Box

Appendix D1: Topstone (Water)

Technical Data	
Casting Type	Topstone
Application	Unpaved Roads (graded) Easements and Tracks
Technical References	Water Supply Construction Manual 91-0090-01E – Drg C10 Standard Chambers for Below Ground Hydrants for Easements, Tracks and Unsealed Roads
General Installation Requirements	<p>Topstones are positioned using 420 mm Ø concrete spacers to suit the finished height, thickest spacers to be at the bottom.</p> <p>Topstone to be positioned so that:</p> <ul style="list-style-type: none"> • Spindle does not extend into top chamber • a standard valve key can be used, and • in the case of fire plugs so that a hydrant can be connected through the opening without fouling.



Raising Method
<p>Method to be used:</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>Special Requirements</p> <p>Topstones are ONLY to be raised using concrete spacer rings NO packers are to be used</p> <p>Topstones are NOT to be jacked to the road surface. Valve/hydrant spindle cap must not protrude into topstone chamber.</p> <p>Note: This type of topstone is used on unpaved (graded) roads and has been designed to prevent damage to the valve/ hydrant spindle if the grader blade hits or moves the topstone section.</p>

Lowering Method
<p>Method to be used:</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>Special Requirements</p> <ul style="list-style-type: none"> • Lowering of this type of cover and frame requires specialist assessment by SA Water Asset Management staff. Because the valve spindle sits just below the top ring it is normally necessary to locally lower the main and the valve/hydrant. • Valve/hydrant spindle cap must not protrude into topstone chamber. <p>Note: This type of topstone is used on unpaved (graded) roads and has been designed to prevent damage to the valve/ hydrant spindle if the grader blade hits or moves the topstone section.</p>

Materials Data			
Ref No.	Item Description	Stock Number	Item Identification
1	Lid Valve Access (Cast Iron)	5680-0065	
2	Topstone (Concrete with cast in frame)	5680-0045	
3	Valve Chamber (Concrete) 420 mm Ø x 265 mm	5680-0043	
4	Spacer (Concrete) 420 mm Ø x 50 mm	5680-0260	
5	Spacer (Concrete) 420 mm Ø x 75 mm	5680-0261	
6	Spacer (Concrete) 420 mm Ø x 100 mm	5680-0262	
7	Spacer (Concrete) 420 mm Ø x 150 mm	5680-0263	
Authorised Suppliers			
Bianco PCP			

Appendix D2: Street Box - Large

Technical Data	
Casting Type	<p>Class B – Fibre Cement Chamber with DI Cover</p> <p>Class B – Polyethylene with DI Cover</p> <p>Class D - Street Box (Ductile iron) Full and Half height</p> <p>Class D – Concrete Chamber with DI Cover</p>
Application	<p>Paved Roads</p> <p>Footpaths, Easements & Reserves</p>
Technical References	<p>Water Supply Construction Manual 91-0090-02G – Drg C11</p> <p>Standard Chambers for Below Ground Valves - Paved Roads, Easements and Reserves</p> <p>04-1672-01C – Drg C11A</p> <p>Street Box Installations – using half height boxes</p>
Installation Requirements	<p>Chamber is placed on a rectangular or circular Support Block which sits on compacted fill. Care must be taken to ensure no vehicular loading is transferred to the valve or pipe.</p> <p>Chamber to be positioned so that:</p> <ul style="list-style-type: none"> • a standard valve key can be used • for fire plugs so that a hydrant can be connected through the small opening without fouling.



Class B – Fibre Cement Frame
Class D – Concrete Frame (CI Cover)



Class B PE Frame (CI Cover)



Class D-Full and half Height Frames

Raising Method

Method to be used:

JACKING

Chambers are raised by jacking using specialised lifting equipment.

Special Requirements

For in-road applications

- Packers are to be mortared in place using quick setting mortar
- Frame is to be seated on a bed of quick setting mortar ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.
- If a chamber has to be replaced it is recommended that they are wrapped in PE sleeving. This makes adjustments in the future easier.

Note: Class D covers and frames **MUST** be used in improved roads. Class B covers and frames can be used in Easements and Reserves

Lowering Method

Method to be used:

EXCAVATION AND ADJUSTMENT

To lower the finished level it is recommended that the standard Streetbox Frame be changed for a half height Streetbox Frame which is to be placed on a rectangular concrete support slab (5680-0050) to spread the load away from above the main.

Special Requirements

For in-road applications

- Raiser rings (if required) are to be mortared in place using quick setting mortar
- Frame is to be seated on a bed of quick setting mortar ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.
- It is recommended that the frame be wrapped with PE sleeving. This makes adjustments in the future easier.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification
1	Lid Valve Access (Cast Iron)	5680-0065	
2	Cover Street Box (Cast Iron)	5680-0060	
3	Frame Street Box Full Height (Cast Iron)	5680-0061	
4	Frame Street Box Half Height (Cast Iron)	5680-0230	
5	Spacer (Concrete) 600 mm Ø x 75 mm	5680-0072	
6	Spacer (Concrete) 600 mm Ø x 140 mm, or Slab (Concrete) 1200 x 800 x 125 mm thick	5680-0049 5680-0050	
7	Segment Packing Concrete 25 mm	5680-0196	
8	Segment Packing Concrete 38 mm	5680-0197	
9	Segment Packing Concrete 50 mm	5680-0198	
10	Segment Packing Concrete 75 mm	5680-0199	
11	Segment Packing Concrete 100 mm	5680-0200	
12	Segment Packing Fibre Board/plastic 160 x 60 x 6 mm	5680-0313	
13	Frame Concrete or Fibre Cement (may contain Asbestos)	N/A	
14	Frame (HD Polyethylene)	N/A	
15	Cover CI One Piece (no small access opening)	5680-0312	

Authorised Suppliers




Bianco PCP
 Cooke Pre-cast Concrete (CPC) WASA and Webforge
 Tyco Water

NOTE:


The recently introduced procedure (see WSCM Drg C11A) for installation of street boxes requires the use of the rectangular concrete support slab (5680-0050) rather than the circular support (5680-0049). For adjusting projects the rectangular concrete support slab (5680-0050) is the preferred option as it sits on the sides of the trench therefore reducing the chance of subsidence.

Appendix D3: Street Box - Small

Technical Data	
Casting Type	<p>Class B – Polyethylene with DI Cover</p> <p>Class D - Cast or Ductile iron</p>
Application	<p>Class B - Easements and Reserves</p> <p>Class D - Paved Roads</p>
Technical References	<p>Water Supply Construction Manual 91-0090-02G – Drg C11 Standard Chambers for Below Ground Valves - Paved Roads, Easements and Reserves</p>
Installation Requirements	<p>Class B Frame is placed on provided plastic circular support block which sits on compacted fill.</p> <p>Class D Frame is placed on circular Support Block which sits on compacted fill.</p> <p>Care must be taken to ensure no vehicular loading is transferred to the valve or pipe.</p> <p>Class B Street box incorporates a central lifting sleeve for adjustment.</p>

Class B
Surface dimension – 130 mm



Class D
Surface dimension – 160 mm

Raising Method
<p>Method to be used:</p> <p>CLASS B ADJUSTABLE SLEEVE (INCORPORATED IN FRAME)</p> <p>Minor excavation is required around top of frame. Central sleeve is manually lifted to required level, temporarily held in place and backfill is placed and compacted around frame to secure sleeve in required position.</p> <p>CLASS D EXCAVATION AND ADJUSTMENT</p> <p>Cover and frame to be removed and quick setting mortar used to raise the frame to the required height. For lifts over 50 mm non-standard concrete spacers can be used, spacers to be set in mortar. Cover to sit above the surrounding surface to prevent water pooling over and around the cover. Minimum clearance between the underside of the cover and the top of the Valve Spindle is 100 mm. Maximum depth between top of spindle and underside of cover to be 300 mm (Extension spindle may be required)</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> Spacers (if required) to be mortared in place using quick setting mortar frame is to be seated on a bed of quick setting mortar (up to 50 mm thick) ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm. <p>Note: Class D streetboxes MUST be used in improved roads. Class B can be used in Easements and Reserves</p>

Lowering Method

Method to be used:

CLASS B ADJUSTABLE SLEEVE (INCORPORATED IN FRAME)

Minor lowering may be possible if the lifting sleeve system has been used previously. Central sleeve is manually lowered to required level, temporarily held in place and backfill is placed and compacted around frame to secure sleeve in required position. If adjustment is not possible, the Class D "Excavation and Adjustment" method is to be used (see below).

CLASS D EXCAVATION AND ADJUSTMENT

Cover and frame and support block are to be removed. The area below the support block is to be lowered to the required depth and the block replaced at the required depth. Cover and frame to be placed on a bed of quick setting mortar and adjusted to the required height.

Cover to sit above the surrounding surface to prevent water pooling over and around the cover.

Minimum clearance between the underside of the cover and the top of the Valve Spindle is 100 mm.

Maximum depth between top of spindle and underside of cover to be 300 mm (Extension spindle may be required)


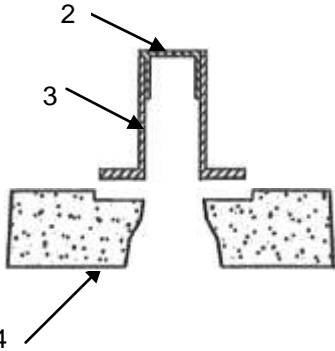
Special Requirements

For in-road applications

- Spacers (if required) to be mortared in place using quick setting mortar
- frame is to be seated on a bed of quick setting mortar (up to 50 mm thick) ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.


Note: Class D streetboxes **MUST** be used in improved roads. Class B can be used in Easements and Reserves

Materials Data


Ref No.	Item Description	Stock Number	Item Identification
1	Streetbox Assembly Class B (PE with DI lid) - Street box Assembly including Base unit	5680-0001 5680-0002	 <p style="text-align: center;">Street box Assembly Class B</p> 
2	Cover DI 100mm Street box	5680-0066	
3	Frame DI 100mm Street box	5680-0067	
4	Support Block (Concrete)		
Authorised Suppliers			
<p>Bianco PCP</p> <p>Cooke Pre-cast Concrete (CPC)</p> <p>Iplex (AVK)</p>			

Appendix D4: Meter Boxes (Water)

Technical Data	
Casting Type	Meter Box (Cast and Ductile iron)
Application	Footpaths Private property Minor Roads
Technical References	Water Supply Construction Manual 96-0083-01B - C16 96-0084-01C - C17 96-0084-02A - C18
Installation and Adjusting Requirements	<p>Meter Boxes do not normally require adjustment unless the surface level is raised or a larger meter is installed.</p> <p>For in-road applications frame is to be seated on a bed of quick setting mortar to suit FSL requirements. Bricks/ pavers are to be mortared in place using quick setting mortar</p>



No.2 Meter Box



No. 3, 4, 5 Meter Boxes

No.3 650 mm x 360 mm (approx) with no access lid
No.4 880 mm x 500 mm (approx) with access lid
No.5 1180 mm x 680 mm (approx) with access lid

Raising Method
<p>Method to be used:</p> <h3 style="text-align: center;">EXCAVATION AND ADJUSTMENT</h3> <p>Cover and frame to be removed, and suitably sized spacers (bricks or pavers) used to raise the frame to the required height. Cover to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Minimum clearance between the underside of the cover and the top of the handle of the Boundary Valve in the fully open position or the top of the meter is to be 100 mm. Maximum clearance to be 300 mm.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> Brick/ paver build-up to be mortared in place using quick setting mortar frame is to be seated on a bed of quick setting mortar (up to 50 mm thick) to ensure cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Lowering Method

Method to be used:

EXCAVATION AND ADJUSTMENT

Cover and frame and support blocks (as required) are to be removed. If all support blocks are removed the area below the support blocks is to be lowered to the required depth and the blocks replaced as required. Cover and frame to be placed on a bed of quick setting mortar and adjusted to the required height.

Minimum clearance between the underside of the cover and the top of the handle of the Boundary Valve in the fully open position or the top of the meter is to be 100 mm. Maximum clearance to be 300 mm.

Special Requirements

For in-road applications

- Brick/ paver build-up to be mortared in place using quick setting mortar
- frame is to be seated on a bed of quick setting mortar (up to 50 mm thick) to ensure cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification
1	No. 2. Cover (Cast Iron)	5680-0030	
2	No. 2 Frame (Cast Iron)	5680-0034	
3	No. 2 Assembly (Cast Iron)	5680-1501	
4	No. 3. Cover (Cast Iron)	5680-0031	
5	No. 3 Frame (Cast Iron)	5680-0035	
6	No. 4 Lid (Cast Iron)	5680-0038	
7	No. 4 Cover (Cast Iron)	5680-0032	
8	No. 4 Frame (Cast Iron)	5680-0036	
9	No. 5 Lid (Cast Iron)	5680-0039	
10	No. 5. Cover (Cast Iron)	5680-0033	
11	No. 5 Frame (Cast Iron)	5680-0037	
12	Spacer (Solid Concrete or Clay Bricks)		
13	Spacer (Solid Concrete or Clay Pavers)		
14	Pre-cast R/C Slabs 50 Thick (to suit)		
Authorised Suppliers			<p>No.3 650 mm x 360 mm (approx) with no access lid No.4 880 mm x 500 mm (approx) with access lid No.5 1180 mm x 680 mm (approx) with access lid</p>
<p>Bianco PCP All CI products</p> <p>Cooke Pre-cast Concrete (CPC) Alternate Aluminium Light Duty No.3 and No4 covers and frame (not for in-road applications)</p>			

Annex E: SEWER CASTINGS

There are a variety of Sewer related castings, each with their own special adjusting requirements. These are included as separate Appendices as follows:

See Annex F for details of allowable load classifications (based on AS 3996)

Appendix E1 – Bell Type Maintenance Hole Cover and Frame (430 mm Diam Access Opening)

- Cast Iron - Class D



Appendix E2 – Lohmeyer Type Maintenance Hole Cover (540mm Diam Access Opening)

- Cast Iron - Class D



Appendix E3 – TAC Type Maintenance Hole Cover (600 mm Diam Access Opening)

- Ductile Iron - Class B and D



Class B



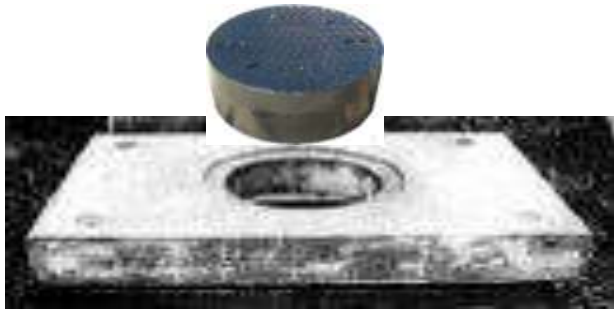
Class D



Street installation

Appendix E4 – Maintenance Shaft Cover and Frame (450 mm Diam)

- Ductile Iron – Class D



Appendix E5 – Inspection Points (IP) 100 and 150 mm Diam

- Cast or Ductile Iron – Class D



Appendix E6 – No. 5 Meter Box Cover (Control Maintenance Holes)


- Cast or Ductile Iron – Class D



Note:

Some original covers were supplied as multi-part (4 sections) covers for ease of lifting and must be replaced with single piece covers

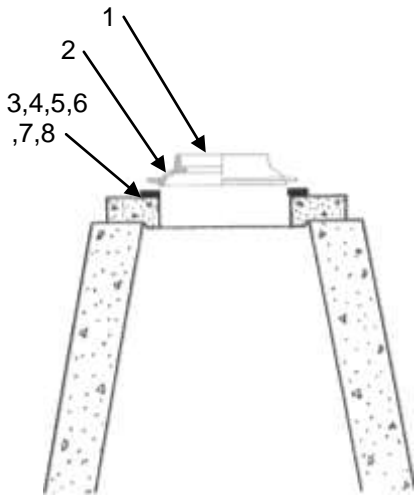
Appendix E1: Bell Type Maintenance Hole Covers & Frame (430 mm Diameter Access Opening)

Technical Data		
Casting Type	Class D – Bell Type MH Cover and Lid (Cast iron) Not installed since 1960s	
Application	Paved Roads Footpaths, Easements & Reserves	
Technical References	KT56-10 Standard Sewer Manhole CI Cover and Frame	
Installation Details	Frame is placed on a circular Support Block which sits on the top of manhole rim (usually conical in-situ manhole)	

Raising Method
<p>Method to be used:</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>Cover and frame to be removed and quick setting mortar used to raise the frame to the required height. For lifts over 25 mm standard concrete rings are to be used, rings are to be set on mortar and a mortar bed is to be provided for the frame to prevent rocking. Cover to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Special Requirements For in-road applications</p> <ul style="list-style-type: none"> frame is to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.


Lowering Method
<p>Method to be used:</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>Cover and frame to be removed. Cover slab and if applicable conversion slab to be lifted away from the MH shaft. Mark a line around the MH the depth to be lowered plus approx 125 mm below the top of the shaft and using a cut-off saw with a diamond blade remove the top section of the shaft above the line <i>This adjustment process included the use of a 75 mm spacer for future adjustment.</i> Install the following as appropriate on individual beds of quick setting mortar:</p> <ul style="list-style-type: none"> a new 75 mm spacer, cover slab and then the cover and frame. Tamp to the required height and grade. support slab, new 75 mm spacer and the cover slab and then the cover and frame. Tamp to the required height and grade. <p><i>Note: it is important that the quick setting mortar seals any cut reinforcing exposed when the shaft was cut.</i> Cover to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Special Requirements For in-road applications</p> <ul style="list-style-type: none"> frame is to be seated so that the cover surface matches finished road surface level and grade

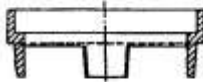
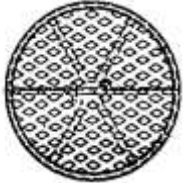
with tolerance + 5 mm -0 mm.

Materials Data			
Ref No.	Item Description	Stock Number	Item Identification
1	Cover (Cast Iron)	5680-0078	
2	Frame (Cast Iron)	Not Available	
3	Spacer (Concrete) 965 mm Ø x 25 mm	5680-0096	
4	Spacer (Concrete) 965 mm Ø x 37 mm	5680-0095	
5	Spacer (Concrete) 965 mm Ø x 50 mm	5680-0094	
6	Spacer (Concrete) 965 mm Ø x 75 mm	5680-0093	
7	Spacer (Concrete) 965 mm Ø x 100 mm	5680-0092	
8	Spacer (Concrete) 965 mm Ø x 150 mm	5680-0091	
Authorised Suppliers			
Bianco PCP			
Cooke Pre-cast Products (CPC)			

Appendix E2: Lohmeyer Type Maintenance Hole Cover & Frame (540 mm Diameter Access Opening)

Technical Data	
Casting Type	Class D – Lohmeyer Type MH Cover and Lid (Cast iron) Installed 1970 -2000 approx
Application	Paved Roads Footpaths, Easements & Reserves
Technical References	94-0167-05A – Drg L5 Construction Details for 1050 mm ID Maintenance Holes 94-0167-06A – Drg L6 Construction Details for 1200 mm ID Maintenance Holes 94-10037 Lohmeyer Cover Details
Installation Details	Frame sits in a circular Cover Slab which sits on the Conversion Slab mounted on the top of the MH shaft section (pre-cast manhole)



Raising Method
<p>Method to be used:</p> <p>Minor Adjustment (up to 75mm)</p> <p style="text-align: center;">JACKING</p> <p>Cast Iron Frame is adjusted by jacking using specialised lifting equipment and Cast Iron Segments which are slipped into the gap under raised frame and rotated into position.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> • Quick setting mortar to be used to establish required level and fix spacers in place • Frame to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm. <p>Major Adjustment</p> <p style="text-align: center;">EXCAVATION and ADJUSTMENT</p> <p>Cover and frame and cover slab to be removed and quick setting mortar used to raise the frame to the required height. For lifts over 75 mm standard concrete rings are to be used, rings are to be set on mortar with a mortar bed for seating the cover slab to prevent rocking.</p> <p>Cover and frame to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> • Cover Slab to be seated on a bed of quick setting mortar ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Lowering Method

Method to be used:

EXCAVATION AND ADJUSTMENT

Remove cover and frame.

Lift the cover and conversion slabs and any spacers away from the MH shaft.

This adjustment process included the use of an existing or new 75 mm spacer for future adjustment.

Calculate the required "Cut Depth" using the following formula:

"Cut Depth with Existing Spacer" = Depth to be lowered plus 50 mm plus the depth of any existing spacers

"Cut Depth without Existing Spacer" = Depth to be lowered plus 50 mm plus 75 mm for a new spacer

Mark a line around the MH the calculated depth below the top of the shaft and using a cut-off saw with a diamond blade remove the top section of the MH shaft (above the line).

Install the following as appropriate on individual beds of quick setting mortar:

- Conversion slab, then existing concrete spacers (as used in calculation) with thickest ring(s) to bottom, followed by the cover slab and then the cover and frame. Tamp to the required height and grade.
- Conversion slab, then new 75 mm spacer followed by the cover slab and then the cover and frame. Tamp to the required height and grade.

Note: it is important that the quick setting mortar seals any cut reinforcing exposed when the shaft was cut.

Cover to sit above the surrounding surface to prevent water pooling over and around the casting.

Special Requirements

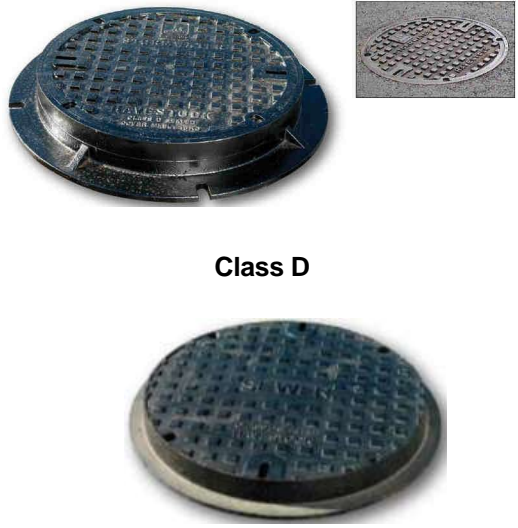
For in-road applications

- frame is to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification
1	Cover (Cast Iron)	5680-0062	
2	Frame (Cast Iron)	5680-0063	
3	Spacer Segment (Cast Iron) 12mm	5680-0144	
4	Spacer Segment(Cast Iron) 25mm	5680-0145	
5	Spacers Segment(Cast Iron) 50mm	5680-0211	
1050 mm Maintenance Holes			
6	Spacer (Concrete) 965 mm Ø x 25 mm	5680-0096	
7	Spacer (Concrete) 965 mm Ø x 37 mm	5680-0095	
8	Spacer (Concrete) 965 mm Ø x 50 mm	5680-0094	
9	Spacer (Concrete) 965 mm Ø x 75 mm	5680-0093	
10	Spacer (Concrete) 965 mm Ø x 100 mm	5680-0092	
11	Spacer (Concrete) 965 mm Ø x 150 mm	5680-0091	
1200 mm Maintenance Holes			
12	Spacer (Concrete) 965 mm Ø x 37 mm	5680-0154	
13	Spacer (Concrete) 965 mm Ø x 75 mm	5680-0153	
Authorised Suppliers			
Bianco PCP			

Appendix E3: TAC Type Maintenance Hole Cover & Frame (600 mm Diameter Access Opening)

Technical Data		
Casting Type	Class B – TAC Type MH Cover and Frame (Ductile Iron) Class D – TAC Type MH Cover and Frame with Adjustment Ring (Ductile Iron) Installed from 2000 (approx) onwards	 <p style="text-align: center;">Class D</p> <p style="text-align: center;">Class B</p>
Application	Class D - Paved Roads Class B - Footpaths, Easements & Reserves	
Technical References	94-0167-05A Drg L5 – Construction Details for 1050 mm ID Maintenance Holes 94-0167-06A Drg L6 – Construction Details for 1200 mm ID Maintenance Holes Note: Drg Shows Lohmeyer cover but TAC arrangement similar except for casting seating configuration (in cover slab).	
Installation Details	Frame sits on a circular Cover Slab which sits on the Conversion Slab mounted on the top of the MH shaft section (pre-cast manhole)	

Raising Method
Method to be used: CLASS D COVER
<p>Standard Adjustment (up to 100mm) (Normal Method)</p> <p style="text-align: center;">SPACER RING</p> <p>As per Appendix C</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> Frame to be raised so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm. <p>Major Height Adjustment (Not normal method)</p> <p style="text-align: center;">EXCAVATION and ADJUSTMENT</p> <p>For covers raised over 100 mm, standard concrete rings are to be used; rings are to be set on mortar with a mortar bed for seating the cover slab to prevent rocking. Thickest rings to bottom.</p> <p>Cover and frame to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> Cover slab and frame to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.
Method to be used: CLASS B COVER
<p>EXCAVATION and ADJUSTMENT (as detailed above)</p>

Lowering Method

Method to be used: CLASS B and D COVERS

EXCAVATION and ADJUSTMENT

Use the system as described for lowering Lohmeyer MH Covers. See Appendix E2 page E2-2.

Cover and frame to sit above the surrounding surface to prevent water pooling over and around the casting.

Special Requirements

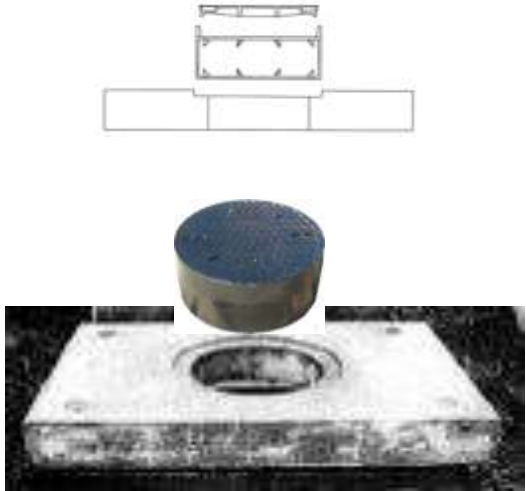
For in-road applications

- Cover slab and frame to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification
1	Cover (Ductile Iron) Class B	5680-0062	<p style="text-align: center;">Class B</p> <p style="text-align: center;">Class D</p>
2	Frame (Ductile Iron) Class B	5680-0063	
3	Cover (Ductile Iron) Class D	5680-0063	
4	Frame (Ductile Iron) Class D	5680-0063	
5	Raiser Ring (Ductile Iron) 50mm	Supplier	
6	Raiser Ring (Ductile Iron) 75mm	Supplier	
7	Raiser Ring (Ductile Iron) 90mm	Supplier	
8	Raiser Ring (Ductile Iron) 105mm	Supplier	
9	Spacer (Concrete) 1200 mm Ø x 38 mm	5680-0154	<p style="text-align: center;">9,10 11,12,13,14,15,16</p> <p style="text-align: center;">1050 or 1200 MH (1050 shown)</p>
10	Spacer (Concrete) 1200 mm Ø x 75 mm	5680-0153	
11	Spacer (Concrete) 965 mm Ø x 150 mm	5680-00091	
12	Spacer (Concrete) 965 mm Ø x 100 mm	5680-00092	
13	Spacer (Concrete) 965 mm Ø x 75 mm	5680-00093	
14	Spacer (Concrete) 965 mm Ø x 50 mm	5680-00094	
15	Spacer (Concrete) 965 mm Ø x 38 mm	5680-00095	
16	Spacer (Concrete) 965 mm Ø x 25 mm	5680-00096	
Authorised Suppliers			
<p><u>Cover and Frame Only</u></p> <p>Havestock</p>			
<p><u>Concrete Products and Cover and Frame</u></p> <p>Bianco PCP</p> <p>Cooke Pre cast Concrete (CPC)</p>			

Appendix E4: Maintenance Shaft Cover and Frame (450 mm Diam)

Technical Data		
Casting Type	Class D – MS Cover (Ductile iron)	
Application	Paved Roads Footpaths, Easements & Reserves	
Technical References	Sewer Construction Manual 02-0289-01 – Drg L16-L18 Standard MS Installation	
Installation Requirements	<p>Chamber is placed on a rectangular support block which sits on compacted fill. Care must be taken to ensure no vehicular loading is transferred to the MS or riser pipe.</p> <p>Chamber to be positioned so that it is central over the riser shaft.</p>	

Class D- Cover, Frame and Support Slab

Raising Method
<p>Method to be used:</p> <h3 style="text-align: center;">JACKING</h3> <p>Chambers are adjusted by jacking using specialised lifting equipment.</p> <p>The MS riser shaft cap must be a minimum of 150 mm and a maximum of 300 mm below the FSL. If it is deeper, the PVC pipe must be cut and extended to meet these requirements.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> • Packers are to be mortared in place using quick setting mortar • Frame is to be seated on a bed of quick setting mortar ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm. • If a chamber has to be replaced it is recommended that they are wrapped in PE sleeving. This makes adjustments in the future easier.

Lowering Method

Method to be used:

EXCAVATION and ADJUSTMENT

To lower the finished level it is necessary to expose and remove the cover, frame and rectangular concrete support slab (5680-0050).

It is then necessary to remove a sufficient amount of the existing backfill material to meet the new depth and slab location requirements. The area under the slab is to be compacted to the required compaction rating and the rectangular concrete support slab reinstalled.

Install the existing cover and frame on a bed of quick setting mortar: Concrete packing rings can be used to achieve the finished height if required. Tamp to the finished height and grade.

The riser shaft of the MS must be a minimum of 150 mm and a maximum of 300 mm below the FSL. If it does not meet these limits, a section of the PVC pipe must be cut out and rejoined to meet these requirements.

Special Requirements

For in-road applications

- Frame is to be seated on a bed of quick setting mortar ensuring cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.
- Packing pieces (if required) are to be mortared in place using quick setting mortar

It is recommended that the frame be wrapped with PE sleeving. This makes adjustments in the future easier.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification
1	MS Cover "Sewer" Access (Ductile Iron)	5680-0407	
2	Frame (Ductile Iron)	5680-0230	
3	Support Slab (Concrete) 1200 x 800 x 150 mm thick	5680-0050	
4	Segment Packing Concrete 25 mm	5680-0196	
5	Segment Packing Concrete 38 mm	5680-0197	
6	Segment Packing Concrete 50 mm	5680-0198	
7	Segment Packing Concrete 75 mm	5680-0199	
8	Segment Packing Concrete 100 mm	5680-0200	
9	Segment Packing Fibre Board/plastic 160 x 60 x 6 mm	5680-0313	
Authorised Suppliers			
Bianco PCP			
Cooke Pre-cast Concrete (CPC)			

Appendix E5: Inspection Point (IP) Covers & Frames (100 mm and 150 mm Diameter)

Technical Data	
Casting Type	100 mm (No.4) IP Cover and Frame (Cast or Ductile Iron) 150 mm (No. 6) IP Cover and Frame (Cast or Ductile Iron)
Application	150 mm IP - Paved Roads Footpaths, Easements & Reserves 100 mm IP - Footpaths, Easements & Reserves
Technical References	94-0167-02A – Drg K2 DN100 &150 IP Details 94-0167-03 – Drg L3 DN150 Inspection Points
Installation Details	Frame sits on a circular ring which sits on 2 x redwood bearers and compacted quarry rubble



Typical IP Arrangement

Raising Method
<p>Method to be used</p> <h3 style="text-align: center;">EXCAVATION and ADJUSTMENT</h3> <p>Standard concrete spacer segments are to be used; segments are to be set on quick set mortar with a mortar bed for seating the IP frame to prevent rocking. Thickest segments to the bottom.</p> <p>When adjusting inspection points (IP's) the riser shall remain in the centre of the block.</p> <p>The top of the IP cap shall be a minimum of 150 mm and a maximum of 300 mm below the FSL. Where the distance is greater the IP shall be cut and PVC pipe of the correct length inserted to meet these requirements.</p> <p>In the event of a 100mm or greater adjustment being required a new concrete base shall be mortared to the top of the existing block.</p> <p>The maximum adjustment permitted will be 150mm, any greater than this will require the structure to be reconstructed as per SA Water Sewer Construction Manual</p> <p>Cover and frame to sit above the surrounding surface to prevent water pooling over and around the casting.</p> <p>Special Requirements</p> <p>For in-road applications</p> <ul style="list-style-type: none"> • Cover slab and frame to be seated so that the cover surface matches finished road surface level and grade with tolerance + 5 mm -0 mm.

Lowering Method

Method to be used:

EXCAVATION and ADJUSTMENT

To lower the finished level it is necessary to expose and remove the cover, frame and support block.

It is then necessary to reconstruct the structure as per SA Water Sewer Construction Manual Drgs K2 and L3.

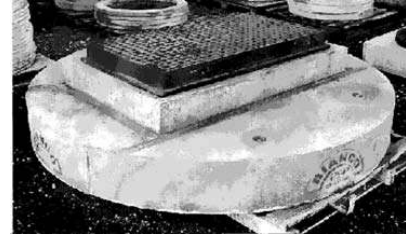
The riser shaft of the IP must be a minimum of 150 mm and a maximum of 300 mm below the FSL.

Materials Data

Ref No.	Item Description	Stock Number	Item Identification	
100 mm IP				
1	Lid (Cast Iron)	5680-0079		
2	Frame (Cast Iron)	5680-0082		
3	IP Concrete Block	5680-0087		
4	IP Recycled Plastic Block	5680-0134		
150 mm IP				
5	Lid (Cast Iron)	5680-0079		
6	Frame (Cast Iron)	5680-0082		
7	IP Concrete Block - Heavy	5680-0086		
8	IP Concrete Block - 150 mm	5680-089		
9	IP Concrete Block -100 mm	5680-0090		
10	Spacer (Fired Brick) 25mm	5680-0012		
11	Spacer (Fired Brick) 35mm	5680-0013		
12	Spacers (Fired Brick) 50mm	5680-0014		
13	Timber Bearers (Redgum)	5510-0653		
Authorised Suppliers				
Bianco PCP				
Cooke Pre cast Concrete (CPC)				

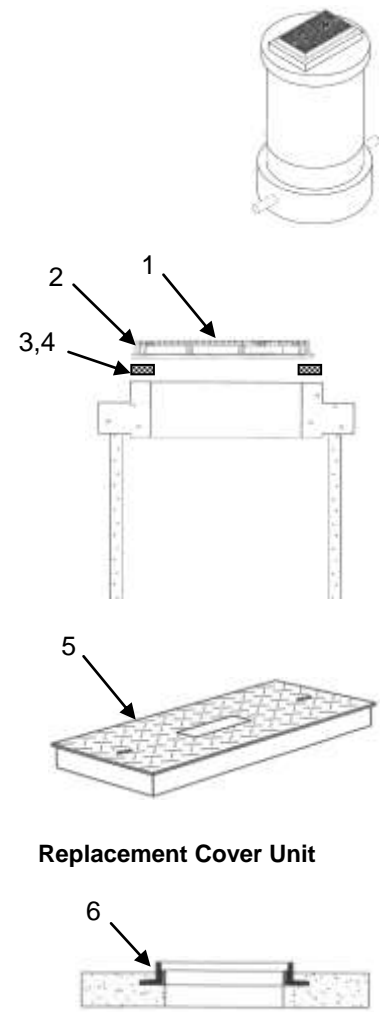
Appendix E6: Control Maintenance Hole Covers & Frames (Based on No.5 Meter box – 1180mm x 680mm)

Technical Data	
Casting Type	Control Maintenance Hole Cover and Frame (Cast and Ductile Iron). Note: Some original covers were supplied as multi-part (4 Sections) covers for ease of lifting. These must now be replaced with single piece covers
Application	Footpaths, Easements & Reserves
Technical References	94-0167-08 – Drg L8 Construction Details for 1500ID Control Maintenance Holes
Installation Details	Cover and frame sit on cover slab seating Control Maintenance Hole Cover and Frame do not normally require adjustment unless the surface level is raised.



Raising Method
<p>Method to be used</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>Cover and frame to be removed and suitably sized spacers (bricks or pavers) seated on a bed of quick setting mortar are to be used to raise the frame to the required height. Cover to sit above the surrounding surface to prevent water pooling over and around the casting.</p>

Lowering Method
<p>Method to be used</p> <p style="text-align: center;">EXCAVATION AND ADJUSTMENT</p> <p>As the support slab sits on MH shaft sections the support slab, frame and cover must be exposed and removed. The shaft section is then cut to height as follows:</p> <ul style="list-style-type: none"> • Calculate the required “Cut Depth” using the following formula: $\text{“Cut Depth”} = \text{Depth to be lowered} + 50 \text{ mm (allowance for quick setting mortar)}$ • Mark a line around the MH the calculated “cut depth” below the top of the shaft and using a cut-off saw with a diamond blade remove the top section of the MH shaft (above the line). <p>Re-install the support slab, followed by the cover and frame. Slab and frame to be placed on a bed of quick setting mortar and tamped to the required height and grade.</p> <p><i>Note: it is important that the quick setting mortar seals any cut reinforcing exposed when the shaft was cut.</i></p> <p>Cover to sit above the surrounding surface to prevent water pooling over and around the casting.</p>

Materials Data			
Ref No.	Item Description	Stock Number	Item Identification
1	No. 5. Cover (Cast Iron)	5680-0033	 <p>Diagram illustrating the components of the Replacement Cover Unit and Replacement Cover Slab & TAC Cover. The unit consists of a concrete slab (6) with a cast-iron cover (1) on top. The cover is supported by a frame (2) and spacers (3,4). An aluminium cover (5) is also shown separately.</p>
2	No. 5 Frame (Cast Iron)	5680-0037	
3	Spacer (Solid Concrete or Clay Bricks)	Supplier	
4	Spacer (Solid Concrete or Clay Pavers)	Supplier	
Replacement Cover Unit			
5	Aluminium Cover (easement use only)	Supplier	
Replacement Cover Slab & TAC Cover			
6	Cover slab (1450 x 900) with cast-in TAC Cover	Supplier	
Authorised Suppliers			
<p>Bianco PCP</p> <p>Cooke Pre cast Concrete (CPC) Aluminium replacement cover unit, and replacement Cover Slab and TAC cover</p>			

Appendix F: AS3996 - Load Classifications of Covers

Water Services Association of Australia (WSAA) and Australian Water Authorities have agreed to use AS 3996 - Covers and Grates as the load rating and testing criteria for all covers and frames used in their water and sewer networks.








Two cover assembly classes have been identified for general water industry use:

- Class B Footpaths, parks and reserves
- Class D Roadways
- Other specialist applications as required

A summary of the class and relevant loading criteria are as shown below:

Access covers and grates shall be designated by classes A,B,C,D,E,F and G according to load capacity as set out in the table below. The design loads as specified below, shall be used for testing.

The appropriate class for a cover or grate depends upon the place of installation. Some place of installation, relative to class, are outlined below. The selection of the appropriate class is the responsibility of the designer and where there is doubt the stronger class shall be selected.

LOAD CLASSIFICATIONS OF COVERS AND GRATES							
AS3996:2006 – ACCESS COVERS, ROAD GRATES & FRAMES							
							
RATING	CLASS A	CLASS B	CLASS C	CLASS D	CLASS E	CLASS F	CLASS G
TYPICAL USE	Areas (including footways) accessible only to pedestrians & pedal cyclists & closed to other traffic (extra light duty)	Areas (including footways & light tractor paths) accessible to vehicles (excluding commercial vehicles) or livestock (light duty)	Malls and areas open to slow moving commercial vehicles (medium duty)	Carriageways of roads & areas open to commercial vehicles (heavy duty)	General docks & aircraft pavements (extra heavy duty - E)	Docks & aircraft pavements subject to high wheel loads (extra heavy duty - F)	Docks & aircraft pavements subject to very high wheel loads (extra heavy duty - G)
NOMINAL WHEEL LOADING Kg	330	2,670	5,000	8,000	13,700	20,000	30,000
SERVICE-ABILITY DESIGN LOAD kN	6.7	53	100	140	267	400	600
ULTIMATE LIMIT STATE DESIGN LOAD kN	10	80	150	210	400	600	900

NOTES:

1. Nominal wheel loads are given for guidance only. Consideration should be given to the type, size and pneumatic pressure of the load applied.
2. Class B design loads exceed AS 5100.2 requirements for footway loading.
3. Class D design loads exceed AS 5100.2 requirements for a W80 wheel load.
4. Class C units are based on intermediate load.
5. The serviceability load is set at 2/3 of the ultimate limit state design load.
6. A force of 1 kN approximately equal to the weight of 100kg.

Appendix G: Reporting of Adjusting SA Water Covers

The Authorised Contractor employed to raise water and sewer covers and frames in roadways is responsible for completion of this form as each Cover is raised. On completion of the project the completed form shall be signed by the Site Supervisor or Company Manager (whoever will be taking responsibility for the work) and forwarded to SA Water.

Completing the information on the form shall be done as follows:

Location ID No

SA Water has an object identifier number for each access point into the systems. These will be provided when the 7 days notification of commencement of work is received.

Nearest House No.

This is to be provided to resolve location identification issues

Type of Cover

List as Sewer or Water and type of cover

Water	Sewer
D1 – Topstone	E1 – Bell Type MH Cover
D2 – Street Box – Large	E2 – Lohmeyer Type Cover
D3 – Street Box – Small	E3 – TAC Type Cover <ul style="list-style-type: none"> • Class B or • Class D
D4 – Meter Boxes <ul style="list-style-type: none"> • No. 2 • No. 3 • No. 4 • No. 5 	E4 – Maintenance Shaft Cover
	E5 – Inspection Points (IP) <ul style="list-style-type: none"> • 100 mm, or • 150 mm
	E6 – No. 5 Meter Box Cover (Control MHs)

Raising/ Lowering / Height

Show as R or L and Height in millimetres

Adjustment Method Used

List one of the three adjusting systems

- Jacking Method
- Spacer Ring Method
- Excavation Method

Replacement Items Used

List any new Items used eg

- Cover,
- Frame
- Support block/slab

Remarks

Existing Problems Found

Issues include

- Serious internal corrosion of concrete
- Corroded ladder/steelwork, etc.

GPS Loc

If available. This is provided to resolve location identification issues

