

TECHNICAL STANDARD**VEHICULAR CROSS-OVERS
FOR
ABOVE GROUND TRUNK MAINS**

Issued by: Manager Asset Management

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APPROVAL TO DEVIATE FROM THIS STANDARD

Approval may be granted by the Asset Owner to deviate from the requirements as stipulated in this Standard if the functional requirements (e.g. Asset Life) for the asset differs from those stated in the Standard, but is assessed as still being acceptable by the Asset Owner's nominated representative.

Any approval to deviate from the stated requirements of this Standard will not be seen as creating a precedent for future like project. Any request to deviate from this Standard must be carried out on a project by project basis where each alternate proposal will be individually assessed on its own merit.

UPDATE INFORMATION

This is the original version of TS142 and there have been no changes or alterations.

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NOTE:

Wording shown as normal text is an SA Water requirement.

Wording shown as italic text is for information only.

Section 1: Purpose

Above ground trunk mains are **NOT** designed to be covered with soil or compactable material for use as an access roadway. While SA Water would prefer not to provide crossings to above ground sections of trunk mains, there are legitimate reasons why, in certain circumstances, there is no other option but to bridge over the main. For this reason a specific design/construction criteria is required to allow vehicular access from one side of the main to the other.

This document is intended to apply to single vehicle cross-overs on smaller above ground steel mains (up to DN600). While the principles described apply to larger above ground mains, roadway crossings and cross-overs for steel mains greater than DN750 require the installation of a gullet.

To minimise maintenance issues and ensure the longevity of above ground steel trunk mains the following policy should be complied with in all instances unless specific approval is given by Assets Planning to do otherwise.

Compliance with this policy will result in a minimisation of above ground trunk main failures and ensure the relevant main achieves the required design life of 120 years.

This document overrides all other instructions issued on cross-overs of trunk mains within SA Water's water distribution system and is the prime document regarding the installation of cross-overs on above ground trunk mains.

The document has been produced by the Asset Management and Engineering Group staff and is based on SA Water and Water Services Association of Australia (WSAA) experience and best practice engineering. 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.

All enquiries regarding this document shall be referred to the Infrastructure Standards Manager.


Section 2: General

Reference to above ground trunk mains generally applies to steel main installed above ground and supported by concrete anchor blocks and concrete chairs/pedestals. While steel is the normal material used for this type of main this document applies equally to all other pipe materials used in the above ground mains application.

The aim of this policy is to minimise any potential damage to above-ground trunk mains by ensuring the main is protected from physical damage and additional loading other than the original design loads. It is also important to ensure the main can be easily inspected and maintained.

The property owner is responsible for all design and construction cost related to the cross-over plus all ongoing repairs and maintenance costs for the access roadway (including the road barrier) and box culverts (including headwalls and wingwalls). SA Water is responsible for any reinstatement after repair activities.

Design layout, engineering support documents and installation plans, based on the requirements of this document, are to be provided to SA Water with the formal application to install any cross-over of SA Water's above ground trunk mains.

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Section 3: Location Policy

When a request for a cross-over on an above ground steel trunk main is being considered, a physical check is to be made to identify the location of any anchor blocks and chairs/supports. The check should also determine any other obstructions likely to create obstacles to the construction of the cross-over.

The section of pipe, including all existing welded collars, within the crossover area is to be inspected by SA Water technical staff for corrosion/damage etc prior to any approvals being given. SA Water will arrange for any necessary preventative maintenance work to be carried out at SA Water's expense. No cross-over construction work is to commence until the maintenance work is complete.

3.1 ROADWAY LOCATION REQUIREMENTS

Cross-overs are not to be installed over anchor blocks but can be installed over chairs/supports providing no loading is applied to the chair/ support or its base.

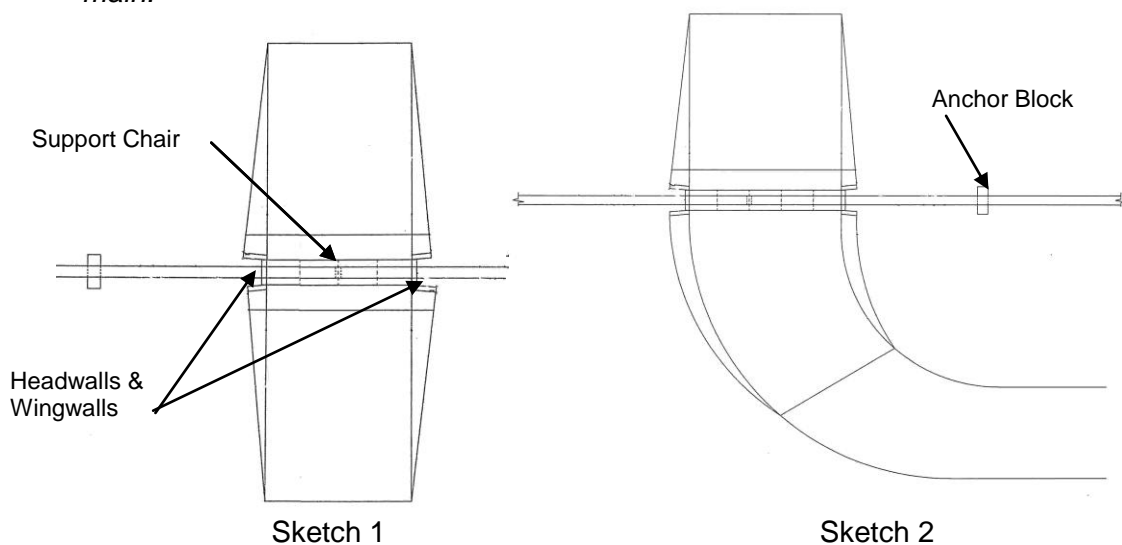
Allowance shall be made for the inclusion of head wall and wing walls to both sides of the crossing to prevent displacement of the compacted road base material used for the approach and pipe cross-over.

3.2 WIDTH OF CROSSOVER

The minimum width of the cross-over is based on an allowance for a single vehicle crossing at any one time. Where the approach and/ or departure roadway (adjacent to the cross-over) is curved, additional width allowance is required for the skewed approach of the vehicle.

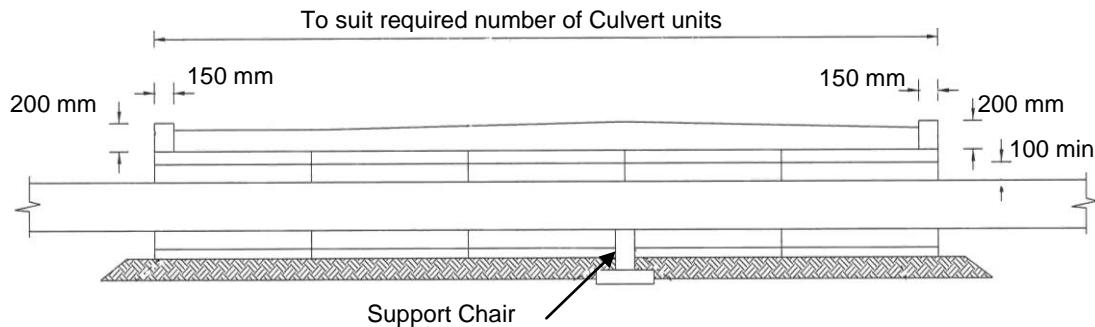
Approach Road Arrangement	Minimum Width
Straight (see Sketch 1 below)	4.5 m
Curved (see Sketch 2 below)	6 m

This is considered to be a safety requirement because these roadways will be unlit and there is the possibility of drivers misjudging the exact position of the cross-over and accidentally driving off the crossover and onto SA Water's above ground main.



Section 4: Cross-over Requirements

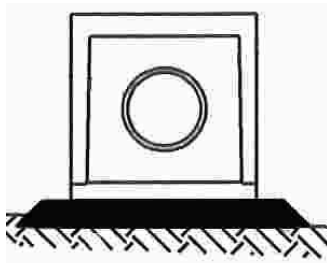
The cross-over shall be created using commercially available box culverts and base plates. The size will vary dependent upon the diameter of the main and the loading requirements. The access roadway will then be formed up and over the culverts using compacted quarry rubble. Bitumen coating (or other alternate surface treatment) of the roadway is optional given that in the event of a leak/burst SA Water reserves the right to remove a section or sections of the box culvert to get access to the main.



Typical Section along main at Cross-over

In situations where there is a water course/ run-off channel/ flood gully adjacent to the above ground main in the vicinity of the cross-over, the design submission is to include the proposed method of ensuring no water flows through the box culvert installation.

4.1 BOX CULVERT REQUIREMENTS



Box culverts and base plates shall be manufactured by an approved supplier and be manufactured in accordance with AS 1597 Part 1. The box culvert shall be a free standing structure surrounding the main and shall have no contact with the main or support chair

The minimum clearance between the maximum outside diameter of the pipe (collar) and the inside of the box culvert is 100 mm. There are standard sizes for box culverts and the most appropriate size is to be selected.

Lifting hooks (Swift Lift) used to install the culvert units are to remain useable to allow for removal of unit(s) by SA Water for maintenance purposes.

Note: lifting hooks can be covered by the compacted quarry rubble (after application of a suitable corrosion prevention system) as this will need to be removed to access the main.

Standard reinforced concrete Headwalls and Wingwalls are required on both ends of the cross-over and are to be manufactured by the same company that manufactured the box culverts to ensure that the units match.

Safety barriers (e.g. Armco railing or heavy duty railing) are to be mounted on the top of both headwalls and wingwalls to prevent vehicles accidentally driving off the edge of the cross-over (refer to DTEI Road Design Standards and Guidelines GD 100 and requirements of local authorities). The minimum height of safety barrier above the top of the headwalls and wingwalls is 600 mm.

4.2 ROADWAY REQUIREMENTS

Approach and departure ramps are to be constructed each side of the box culverts using compacted quarry rubble (PM2/20QG) to a height of 100 mm above the box culverts. Compacted quarry rubble is also to be used for the roadway over the box culverts and is to be approximately 150 mm at the centre of the box culverts.

For safety reasons the preferred maximum grade for the approach roadway is 1:4. The final grade should be shown on the design drawing and approved by SA Water.

Section 5: Installation

The contractor selected to install the cross-over should have a certified quality system and have access to the necessary mechanical handling and compaction equipment required to carry out the task

Box culverts are to be installed in accordance with the manufacturer's specifications.

Engineering assessment for all elements as well as soil condition is required to ensure durability and strength requirements are met in accordance with relevant Australian Standards and to prevent excessive settlements.

Note: any suspect pipe collars are to be repaired or reinstated PRIOR to the installation of the crossover to ensure sufficient access is available for welding under and around the pipe.

5.1 BOX CULVERT INSTALLATION

Base sections shall be placed on a quarry rubble (PM2/20QG) base compacted to 95% Modified Maximum Dry Density (MMDD) to provide a minimum thickness of 150 mm. Precast concrete base sections are to be cut around any pipe supports/ chairs to ensure no loading is applied to any part of the support or its base.

The base slab units of individual box culverts shall be laid on a longitudinal grade of 1% to prevent water pooling in the cross-over area and ultimately weakening the slab foundations.

Box culvert crown units are then seated on the concrete bases and the headwalls and wingwalls are to be installed in their final position prior to the formation and compaction of the access ramp.

The safety barrier e.g. Armco railing or heavy duty railing are to be bolted (or similar fixing) on the top of both headwalls and wingwalls prior to any usage.

A removable vermin barrier is to be installed at both ends of the cross-over to prevent the entry of snakes and other small animals e.g. metal frame with galvanised small opening bird mesh.

5.1 ACCESS RAMP INSTALLATION

The approach and departure ramps are to be constructed simultaneously each side of the box culverts in layers of 150 mm using PM2/20QG quarry rubble compacted to 95% MMDD. Compacted quarry rubble for both access ramps is to be installed to a minimum height of 100 mm above the box culverts. The roadway above the box culverts is to be graded such that the compacted rubble on top of the box culverts is approximately 150 mm at the centre of the cross-over.

The batter on each side of the access ramps is to be 1:1 to ensure stability of the ramp.

Section 6: Responsibilities

The personnel responsible for implementing this policy include:

- All Water Services managers and staff
- Regional Operations Managers
- Local managers
- Project Managers involved in SA Water infrastructure projects
- All SA Water employees involved in installing and maintaining the water supply network
- Contractors and constructors installing and maintaining SA Water infrastructure
- Any party conducting a Land Development who is seeking vehicular access over an above ground water main for any created allotments

SECTION 7: Further Information

For further information concerning this document, contact:

Infrastructure Standards Manager
Telephone (08) 7424 2009
Facsimile (08) 7003 2009
SA Water Infrastructure Division
Level 7, SA Water house, 250 Victoria Square, ADELAIDE, SA 5000
ivor.ebdell@sawater.com.au