ACT Government

PIPE DRAINAGE 03B

MUNICIPAL INFRASTRUCTURE TECHNICAL SPECIFICATION

03 - UNDERGROUND SERVICES

Transport Canberra and City Services

July 2019

Publication Number:	MITS 03B Edition 1 Revision 0	
Date of Effect:	July 2019	
Supersedes:	Standard Specification for Urban Infrastructure Works Section 03 Edition 1 Revision 0 September 2002	
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Document Information

Document	Key Information
Document Title	MITS 03B Pipe drainage
Next review date	
Key words	
AUS-SPEC Base Document	1352 Pipe drainage

Revision Register

Edition/ Revision Number	Clause Number	Description of Revision	Authorised By	Date
1/0				

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1 PIPE DRAINAGE

1.1 General

1.1.1 Responsibilities

1.1.1.1 General

Requirement: Supply and install pipework for the drainage system as documented.

1.1.2 Cross references

General: The following documents are related to this Specification.

1.1.2.1 ACT Legislation

Road Transport (General) Act

Public Roads Act

Scaffolding and Lifts Act

Scaffolding and Lifts Regulation

Work Health and Safety Act

1.1.2.2 Specifications

Requirement: Conform to the following:

MITS 00	Preliminaries
MITS 01	Traffic Management
MITS 03A	Trenching for underground services
MITS 02	Earthworks
MITS 04	Flexible pavement construction
MITS 06	Concrete kerbs, foot paths and minor works
MITS 08	Incidental works
MITS 09	Landscape
MITS 10	Concrete works

1.1.3 Referenced documents

1.1.3.1 Standards

General: The following documents are incorporated into this Specification by reference:

Australian Standards

AS/NZS 1260	PVC-U pipes and fittings for drain, waste and vent application
AS/NZS 1477	PVC pipes and fittings for pressure applications
AS 1646	Elastomeric seals for waterworks purposes
AS/NZS 2041	Buried corrugated metal structures
AS/NZS 2041.1	Design methods

AS/NZS 2041.4	Helically formed sinusoidal pipes
AS/NZS 2566	Buried flexible pipelines
AS/NZS 2566.1	Structural design
AS/NZS 2566.2	Installation
AS 2648.1	Underground marking tape – non detectable tape
AS 2758	Aggregates and rock for engineering purposes
AS 2758.1	Concrete aggregates
AS/NZS 4058	Precast concrete pipes (pressure and non-pressure)
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
AS 4139	Fibre reinforced concrete pipes and fittings
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
AS/NZS ISO 9001	Quality management systems – Requirements
POP001	Electrofusion jointing of PE pipe and fittings for pressure applications
POP003	Butt fusion jointing of PE pipes and fittings – recommended parameters
POP102	Solvent cement welding of PVC pipe

1.1.3.2 Other publications

Proprietary products: To *TCCS Products previously considered for use list.*

1.1.4 Interpretation

1.1.4.1 Abbreviations

General: For the purposes of this Specification the abbreviations given below apply.

DN: Internal diameter of the pipe.

FRC: Fibre-reinforced concrete.

RRJ: Rubber Ring Joint

TCCS: Transport Canberra and City Services, ACT Government and its successors.

VC: Vitrified Clay.

1.1.4.2 Definitions

General: For the purpose of this Specification, the definitions of terms used to define the components of the road reserve are in conformance with *AS 1348, Glossary of Austroads Terms* and *AGRD03*, the definitions given below also apply:

Effective pipe length: The centre-line length dimension specified by the manufacturer and subject to permissible tolerances.

1.1.5 Hold points and witness points

1.1.5.1 Notice

General: Give written notice to the Authorised Person so that the documented inspection and submissions may be made to the **Hold point table** and the **Witness point table**.

Table 3B-1 Hold point table

Item	Clause title	Requirement	Notice for inspection	Release by
Materials				
3B.1	General - Certification	Submit manufacturer's certification	5 working days prior to ordering	Authorised Person
3B.2	Plastic Flexible Pipes - Proprietary products	Submit proprietary product for approval prior to construction	5 working days prior to ordering	Authorised Person
Execution				
3B.3	Installation - General	Give notice for inspection of completed installation and jointed pipes	Progressive before backfilling	Authorised Person

Table 3B-2 Witness point table

Item	Clause title	Requirement	Notice for inspection
Execution			
3B.1	Installation - Joints for concrete pipes	Submit rubber ring joint test results	Progressive
3B.2	Installation - Joints for concrete pipes	Mark position of external bands on each pipe prior to installation	Progressive
3B.3	Flushing	Flush all pipes on completion	14 days prior to completion

1.2 Materials

1.2.1 General

1.2.1.1 Certification

Requirement: Prior to dispatch of each batch to site, submit manufacturer's certification to the relevant pipe standard code.

This is a **HOLD POINT**.

1.2.1.2 Ground conditions

Ground condition: If the chemical composition for the soil is unknown or not tested use the default condition 'Aggressive' to *AS/NZS 2041.1, AS/NZS 4058* or *AS 4139*.

1.2.2 Concrete pipes

1.2.2.1 Precast reinforced concrete pipes

Requirement: Provide precast reinforced non-pressure concrete pipes to *AS/NZS 4058* and in conformance with the following:

- Pipe class and size as shown on the Drawings.
- Tolerance: ± 15mm from manufacturer's nominated effective pipe length.
- Rubber Ring Jointing (RRJ): Provide flexible rubber ring, spigot and socket joints to *AS 1646* for pipes up to and including DN375 not under roads and for pipes up to and including DN675 under roads.
- Flush or butt joints: Use only for the first pipe when extending existing pipes or for pipe sizes greater than RRJ requirements. Provide external bands to the pipe manufacturers specification.
- End caps: RRJ plugs secured with metallic spring clips.
- Load classes: As shown on the drawings.
- Clear cover to reinforcement: Based on normal environments to *AS/NZS 4058 Table 3.3.*
- Maximum limit of water absorption: 6.0%.
- Tests required: Routine tests for cover and dimensional accuracy.

Marking: To *AS/NZS 4058*.

Durability: Protective treatments to *AS/NZS 4058 Appendix E* and the manufacturer's recommendations.

1.2.2.2 Fibre reinforced concrete pipes (FRP)

Requirement: Provide fibre reinforced concrete pipes to *AS 4139* and in conformance with the following:

- Pipe class and sizes: As shown on the drawings.
- Load classes and installation conditions: As shown on the drawings.
- Jointing: Provide flexible, elastomeric, double V-ring joints to *AS 1646* for both rebated and spigot and socket jointed pipes or use a jointing compound comprising plasticised butyl rubber and inert fillers all in conformance with the manufacturer's recommendations. Use flush or butt joints only for the first pipe when extending existing pipes.

Aggregates: To *AS 2758.1.*

Manufacturer's statement: Submit manufacturer's statement of information to *AS 4139 Appendix A2*.

Marking: To *AS 4139 clause 12.*

Durability: Protective treatments to *AS 4139 Appendix B* and the manufacturer's recommendations.

1.2.3 Plastic flexible pipes

1.2.3.1 General

Requirement: Provide flexible pipes including fitting to *AS/NZS 2566.1* with pipe class and size as shown on the drawings.

Pressure polyethylene (PE): To *AS/NZS 4130.*

Polyethelene (PE) and Polypropylene (PP): To *AS/NZS 5065.*

PVC-U pipes: To *AS/NZS 1260* and the following:

- DN100: solid walled, class SN6.
- >DN100: solid walled, class SN8.
- End caps: uPVC.

Pressure PVC-U: To *AS/NZS 1477.*

Joint sealant and type: To *AS/NZS 2566.2 Appendix F.*

Store rubber rings for pipe joints: To *AS 1646*.

Electrofusion jointing for PE pressure pipe: Conform to *POP001.*

Butt fusion jointing for PE pipe: Conform to *POP003.*

Solvent cement jointing for PVC-U pipe: Conform to *POP102.*

1.2.3.2 Proprietary Products

Proprietary products: To the *TCCS Products previously considered for use list*. Submit proprietary product for approval prior to construction.

This is a **HOLD POINT**.

1.3 Execution

1.3.1 Provision for traffic

1.3.1.1 General

Requirement: Conform to *MITS 01 Traffic Management.*

1.3.2 Site establishment

1.3.2.1 Survey

Requirement: Confirm site surface and benchmarks. Conform to *MITS 00 Preliminaries.*

1.3.3 Establishment

1.3.3.1 General

Tolerances dimensions: Construct stormwater pipes and pipe culverts within ± 10mm vertically of the invert levels and within ± 10mm of the horizontal alignment as shown on the drawings.

Loads: If the movement of construction plant in excess of 5t gross mass over pipes is proposed, design protective measures for the crossings.

Handling and storage: Repair damaged units in conformance with manufacture's requirements. Replace units if unable to repair satisfactorily.

Inspection of pipeline components: Inspect all pipe line components for damage and flaws immediately before installation.

1.3.4 Excavation

1.3.4.1 General

Excavation: Conform to *MITS 03A Trenching for underground services* and *MITS 02B Bulk Earthworks.*

Bedding, support and backfill material: Unless otherwise documented, to *MITS 03A Trenching for underground services.*

1.3.5 Installation

1.3.5.1 General

Stiffening of pipe culverts: If required by the manufacturer, provide temporary stiffening struts to the interior prior to filling.

Lifting holes: Prior to backfilling seal lifting holes in all pipes with approved plastic preformed plugs or a 3:1 sand cement mortar.

Scour stops: Provide concrete scour stops on pipelines with >7.0% grade at maximum 5m intervals. Each block shall be 300mm wide (measured parallel to the pipe axis), extend into the solid trench sides and bottom by 150mm and extend 75mm above the crown of the pipe.

Progressive inspections: For each section of the work, give notice for inspection of the completed installation and jointed pipes before commencement of trench backfilling.

This is a **HOLD POINT**.

1.3.5.2 Positioning of pipes

Lay pipes: Install pipes with the socket end upstream.

Top designation: Install pipes which have marks indicating the crown or invert strictly in conformance with the markings.

Length: Provide pipe with minimum length of 1.2m.

Laying and jointing for flexible pipes: Install pipes to *AS/NZS 2566.2 Section 5* and to the manufacturer's recommendations.

1.3.5.3 Curved pipelines

General: Curved pipelines shall be achieved by joint deflection or the use of splayed pipes.

Splays: To *ACTSD-0803.*

Joint deflections: Ensure equal deflection at each joint, install in accordance with manufacturer's recommendation.

1.3.5.4 Joints for concrete pipes

Rubber ring joints(RRJ): Provide to the manufacturer's recommendations. Seal joints with proprietary rubber sleeves in conformance with the manufacturer's recommendations.

Joint testing: Submit joint test results.

This is a **WITNESS POINT**.

Fibre reinforced concrete pipes: Test joints to *AS 4139 Appendix L.*

Precast concrete pipes: Test joints to *AS/NZS 4058 Appendix H.*

Skid rings: To the manufacturer's recommendations, including the use of lubricants if wedge shaped 'skid' rubber rings are required.

Flush or butt joints: Mark position of external bands on each pipe prior to installation to enable checking for correct fitting after installation.

This is a **WITNESS POINT**.

Mortared joints: Effectively seal connection points against the ingress of water and other kinds of material with cement mortar 1: 3 general purpose cement: sand ratio.

1.3.5.5 Flexible joints at structures

Flexible joints: Provide at scour stops, sumps, manholes and other rigid structures to *ACTSD-0831*.

uPVC: Connect at sumps and manholes via a VC/uPVC adapter or purpose manufactured sand roughened uPVC stub or pipe end.

Connection to existing structures: Where detailed on the Drawings connect pipes to existing structures. Breakout existing structures to the minimum extent necessary and reinstate to equal or better condition on completion of the connection.

1.3.5.6 Branches, service ties and junctions

Branches, service ties and junctions: Pipes shall be RCP, or uPVC to *ACTSD-0801* and *0802.*

Termination: Install end cap and identify location with approved plastic tape to *AS 2648.1.* Secure the tape to the end of the tie, bring vertically to the surface and attach to marker post. The marker post shall protrude 300mm above the finished surface.

1.4 Completion

1.4.1.1 Submissions

Work as Executed Records: To *MITS 00B Quality Requirements*.

1.4.1.2 CCTV for Stormwater

Closed circuit television (CCTV) inspections: Submit a report to the Authorised Person for approval in accordance with *TCCS Reference Document 8 Requirements for Work-As-Executed Quality Records* requirements, including video evidence for all drainage structures as follows:

- On completion of all drainage structures and prior to commencement of pavement construction above the drainage structure to verify the works are within the specified tolerances and without visual signs of structural failure.
- No more than 14 days prior to Practical Completion to verify tolerances and ensure there is no obstruction to the flow of water.

Defects: Any defects identified by the CCTV inspection shall be rectified together with a new CCTV inspection report prior to requesting final inspection.

Repair: Repair of damaged pipes by patching is not acceptable.

This is a **HOLD POINT.**

1.4.1.3 Flushing for Stormwater

General: On completion of the entire system, flush all pipes clean from end to end and leave in proper working order.

This is a **WITNESS POINT.**

2 MEASUREMENT AND PAYMENT

2.1 Measurement

2.1.1.1 General

Payments made to the Bill of Quantities: To *MITS 00A General requirements*, this Specification, the drawings and **Pay items.**

2.1.1.2 Methodology

The following methodology will be applied for measurement and payment:

- Allow for all work, materials, testing and quality assurance requirements in each Pay Item.
- Excavation, bedding, support and backfill material for stormwater pipes: Conform to *MITS 03A Trenching for underground services*, paid under this Specification.
- Miscellaneous minor concrete work not included in the pay items in this Specification: Conform to *MITS 10 Concrete works.*
- Backfill under roads, paths and driveways: Extra over to *MITS 03H Road openings and restorations*.
- Disposal of surplus trench spoil: To *MITS 02B Bulk earthworks.*
- Removal of existing stormwater pipes: To *MITS 03A Trenching for underground services.*
- All costs associated with removal of water from excavations shall be included within respective excavation rates for stormwater pipes.
- No Additional payment will be made for excavation in rock, overbreak of trench due to ground conditions or over excavation of trenches.

2.2 Pay items

Table 3B-3 Pay items table

Item No	Pay items	Unit of measurement	Schedule of rates scope
3B.1	Stormwater pipes and pipe culverts	Linear metre of pipe installed and backfilled measured at the centreline of the trench Measured from centre of the stormwater structure	All activities associated with construction of stormwater pipes including excavation of trenches in all types of material encountered including rock, over excavation for bedding, shoring, additional excavation at structures, bedding, laying, jointing (including "sand bands" on flush jointed pipes), joint deflections or curvature of the pipe, backfilling and compaction. This pay item shall also include pipe cutting, connection to existing and/or new pipes and making good pipes damaged during the works. Separate pay items shall be included in the Contract for each pipe material, class of pipe, pipe diameter and the following depth ranges: 0 to 1.5m depth 1.5 to 3.0m depth 3.0 to 4.5m depth 4.5 to 6.0m depth greater than 6.0m depth For example; 3B.1.1 300 RCP Class 2: 0 to 1.5m depth 3B.1.2 300 RCP Class 2: 1.5 to 3.0m depth 3B.1.3 375 RCP Class 4: 3.0 to 4.5m depth Etc... If a depth range is not specified, it is assumed that the rate includes excavation and backfill in all depth ranges.
3B.2	Stormwater pipe fittings	Number of pipe fittings installed	All activities associated with construction of stormwater pipe fittings including supply, installation, jointing, compacting backfill around the connection and all work to the pipes in order to make the connection. A separate pay item shall be included in the Contract for each pipe fitting type. For example; 3B.2.1 100x300 Slope junction 3B.2.2 225x450 Saddle slope junction 3B.2.3 100x30 degree bend Etc...

Item No	Pay items	Unit of measurement	Schedule of rates scope
3B.3	Stormwater pipe branch connections	Number of branch connections installed	All activities associated with the construction of stormwater pipe branch connections including fittings including supply, installation, breaking into the larger main pipe, construction of a flexible joint into larger main pipe, mortaring of the connection, connection to side line pipe and compacting backfill around the connection. A separate pay item shall be included in the Contract for each size of stormwater main and each size of stormwater side pipe. For example; 3B.3.1 375x150 branch connection 3B.3.2 450x150 branch connection Etc...
3B.4	Flexible joints	Number of flexible jointing arrangements installed at the interface with each structure	All activities extra over Stormwater pipes and pipe culverts associated with the construction of flexible joints at rigid structures for stormwater pipes. A separate pay item shall be included in the Contract for each size of pipe. For example; 3B.4.1 300 Flexible joints 3B.4.2 375 Flexible joints Etc...
3B.5	Splayed stormwater pipe	Linear metre of pipe installed measured at the centreline of the pipe	All activities extra over Stormwater pipes and pipe culverts associated with the construction of pipes with factory formed splayed ends for use in curved pipelines. A separate pay item shall be included in the Contract for each size of stormwater pipe. For example; 3B.5.1 900 Splayed pipe 3B.5.2 1200 Splayed pipe Etc...
3B.6	End caps for stormwater mains	Number	All activities associated with the construction of end caps or sealing discs for temporary and permanent dead ends on stormwater mains including supply and installation. A separate pay item shall be included in the Contract for each size of stormwater pipe. For example; 3B.6.1 300 stormwater main dead end 3B.6.2 375 stormwater main dead end Etc...

Item No	Pay items	Unit of measurement	Schedule of rates scope
3B.7	End caps for stormwater ties	Number	All activities associated with the construction of end caps for dead ends on stormwater ties including supply and installation of an end cap, marker tape and marker stake. A separate pay item shall be included in the Contract for each size of stormwater tie. For example; 3B.7.1 100 stormwater tie end cap 3B.7.2 375 stormwater tie end cap Etc...
3B.8	Scour stops	Number	All activities associated with the construction of scour stops on stormwater pipes including over-excavation of pipe trench, concrete formwork, supply, placement, curing and finish of concrete, filter pipe, compressible membrane and additional backfilling of pipe trench over that of a straight uninterrupted pipe length. A separate pay item shall be included in the Contract for each scour stop pipe diameter. For example; 3B.8.1 300 Scour stop 3B.8.2 375 Scour stop Etc...
3B.9	Connect to existing stormwater structures	Each connection	All activities associated with connection to existing stormwater structures including excavation, breaking out structure wall for new pipe, jointing and making good the connection and modifications to structure geometry at the junction. A separate pay item shall be included in the Contract for each pipe diameter and structure type. For example; 3B.9.1 150 connection to existing sump 3B.9.2 300 connection to existing manhole Etc...

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July 2019