<table>
<thead>
<tr>
<th>Publication Number:</th>
<th>MITS 03B Edition 1 Revision 0</th>
</tr>
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<tbody>
<tr>
<td>Date of Effect:</td>
<td>July 2019</td>
</tr>
<tr>
<td>Supersedes:</td>
<td>Standard Specification for Urban Infrastructure Works Section 03 Edition 1 Revision 0 September 2002</td>
</tr>
<tr>
<td>Endorsed By:</td>
<td>Karl Cloos, Director, Infrastructure Planning</td>
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<td>Ken Marshall, Executive Branch Manager, Roads ACT</td>
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**Document Information**

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<th>Document</th>
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<tr>
<td>Document Title</td>
<td>MITS 03B Pipe drainage</td>
</tr>
<tr>
<td>Next review date</td>
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**Key words**

| AUS-SPEC Base Document | 1352 Pipe drainage |

**Revision Register**

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<th>Description of Revision</th>
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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

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

Table 3B-2 Witness point table

<table>
<thead>
<tr>
<th>Item</th>
<th>Clause title</th>
<th>Requirement</th>
<th>Notice for inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>3B.1</td>
<td>Installation - Joints for concrete pipes</td>
<td>Submit rubber ring joint test results</td>
<td>Progressive</td>
</tr>
<tr>
<td>3B.2</td>
<td>Installation - Joints for concrete pipes</td>
<td>Mark position of external bands on each pipe prior to installation</td>
<td>Progressive</td>
</tr>
<tr>
<td>3B.3</td>
<td>Flushing</td>
<td>Flush all pipes on completion</td>
<td>14 days prior to completion</td>
</tr>
</tbody>
</table>
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 manufacturer’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 008 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**

<table>
<thead>
<tr>
<th>Item No</th>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule of rates scope</th>
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</thead>
</table>
| 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... |
<table>
<thead>
<tr>
<th>Item No</th>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule of rates scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>3B.3</td>
<td>Stormwater pipe branch connections</td>
<td>Number of branch connections installed</td>
<td>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.</td>
</tr>
</tbody>
</table>
|        |                                        |                                              | 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... |
<table>
<thead>
<tr>
<th>Item No</th>
<th>Pay items</th>
<th>Unit of measurement</th>
<th>Schedule of rates scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>3B.7</td>
<td>End caps for stormwater ties</td>
<td>Number</td>
<td>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...</td>
</tr>
<tr>
<td>3B.8</td>
<td>Scour stops</td>
<td>Number</td>
<td>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...</td>
</tr>
<tr>
<td>3B.9</td>
<td>Connect to existing stormwater structures</td>
<td>Each connection</td>
<td>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...</td>
</tr>
</tbody>
</table>