



**ACT**  
Government

# SERVICE CONDUITS 03G

MUNICIPAL  
INFRASTRUCTURE  
TECHNICAL  
SPECIFICATION  
**03 - UNDERGROUND SERVICES**

Transport Canberra and  
City Services

July 2019



Publication Number:	MITS 03G Edition 1 Revision 0
---------------------	-------------------------------

Date of Effect:	July 2019
-----------------	-----------

Supersedes: Standard Specification for Urban Infrastructure Works Section 3  
Edition 1 Revision 0 September 2002

Endorsed By:	Karl Cloos	Director, Infrastructure Planning
--------------	------------	-----------------------------------

Approved By: Ken Marshall Executive Branch Manager, Roads ACT

**Document Information**

Document	Key Information
----------	-----------------

Document Title MITS 03G Service Conduits

Next review date	
------------------	--

Key words

AUS-SPEC Base Document	1391 Service Conduits
------------------------	-----------------------

**Revision Register**

Edition/ Revision Number	Clause Number	Description of Revision	Authorised By	Date
--------------------------	---------------	-------------------------	---------------	------

1/0

--	--	--	--	--

**CONTENTS**

**1 SERVICE CONDUITS..... 4**

1.1 General ..... 4

1.1.1 Responsibilities..... 4

1.1.2 Cross references..... 4

1.1.3 Referenced documents ..... 5

1.1.4 Standards ..... 6

1.1.5 Interpretation..... 6

1.1.6 Hold points and witness points ..... 7

1.2 Pre-Construction Planning..... 7

1.2.1 Consultation ..... 7

1.3 Materials..... 8

1.3.1 Conduits ..... 8

1.3.2 Pits..... 9

1.4 Execution ..... 10

1.4.1 Provision for traffic..... 10

1.4.2 Site establishment..... 10

1.4.3 Excavation ..... 10

1.4.4 Bedding and backfilling ..... 11

1.4.5 Conduit installation ..... 12

1.4.6 Pit installation..... 13

1.4.7 Finishing ..... 14

1.5 Completion ..... 14

1.5.1 Submissions..... 14

**2 MEASUREMENT AND PAYMENT .....14**

2.1 Measurement ..... 14

2.2 Pay items ..... 15

**LIST OF TABLES**

Table 3G-1 Hold point table..... 7

Table 3G-2 Witness point table ..... 7

Table 3G-3 Minimum cover depths table ..... 10

Table 3G-4 Minimum separation requirements table..... 11

Table 3G-5 Gas sand bedding materials table ..... 11

Table 3G-6 Pay Items Table ..... 15

# 1 SERVICE CONDUITS

## 1.1 General

### 1.1.1 Responsibilities

#### 1.1.1.1 General

Requirement: Provide electrical and telecommunication conduits and pits as documented.

### 1.1.2 Cross references

General: The following documents are related to this Specification.

#### 1.1.2.1 ACT Legislation

Electrical Safety Act

Gas Safety Act

Public Roads Act

Road Transport (General) Act

Scaffolding and Lifts Act

Scaffolding and Lifts Regulation

Utilities Act

Work Health and Safety Act

#### 1.1.2.2 Commonwealth Legislation

Telecommunications Act

#### 1.1.2.3 Specifications

Requirement: Conform to the following:

MITS 00	Preliminaries
MITS 01	Traffic Management
MITS 02	Earthworks
MITS 04	Flexible pavement construction
MITS 06	Concrete kerbs, footpaths 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 1074	Steel tubes and tubulars for ordinary service
AS 1289	Methods of testing soils for engineering purposes
AS 1289.3.6.1	Determination of the particle size distribution of a soil - Standard method of analysis by sieving
AS 1345	Identification of the contents of pipes, conduits and ducts
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2053	Various Conduits and fittings for electrical installations
AS/NZS 2053.2	Rigid plain conduits and fittings of insulating material
AS/NZS 2053.4	Flexible conduits and fittings of insulating material
AS/NZS 2053.7	Rigid metal conduits and fittings
AS/NZS 2053.8	Flexible conduits and fittings of metal or composite material
AS/NZS 2648	Underground marking tape
AS/NZS 2648.1	Non-detectable tape
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3750	Paints for steel structures
AS/NZS 3750.9	Organic zinc-rich primer
AS/NZS 3879	Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3996	Access covers and grates
AS/CA S009	Installation requirements for customer cabling (Wiring Rules)

#### Austroroads

AP-G72	Telecommunications in road reserves – Operational guidelines for installation
--------	---

### 1.1.3.2 Other publications

Communications Alliance Ltd, Industry guideline, Fibre ready pit and pipe specification for real estate development projects, G645.

NBN, New Developments: Deployment of the NBN Co Conduit and Pit Network - Guidelines for Developers, NBN-TE-CTO-194

#### Typical Shared Trench Procedure, Jemena

Shared Trench Agreement for the ACT – Between Telstra, ActewAGL, ZNX, NBN, Australian Capital Territory

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

## 1.1.4 Standards

### 1.1.4.1 General

Electricity conduits and pit installation: To *AS/NZS 3000*, *AS/CA 5009* and the requirements of the local electricity network distributor.

Telecommunication conduits and pit installation: To *AP-G72*.

NBN: To *New Developments: Deployment of the NBN Co Conduit and Pit Network - Guidelines for Developers*.

Fibre optic cable: To *Fibre ready pit and pipe specification for real estate development projects*.

PVC-U pipe systems installation: To *AS/NZS 2032*.

## 1.1.5 Interpretation

### 1.1.5.1 Abbreviations

General: For the purposes of this Specification the following abbreviations apply:

**FDH:** Fiber Distribution Hub

**NBN:** National Broadband Network Corporation.

**TCCS:** Territory and Municipal Services, ACT Government, and its successors.

### 1.1.5.2 Definitions

General: For the purposes of this Specification the following definitions apply in addition to those of *AS 1348*:

**Shared trench:** A common service trench for telecommunications, gas or electrical services in accordance with the *Shared Trench Agreement for the ACT*.

**Space factor:** Ratio of the sum of the cross sectional areas of the installed cables to the internal cross sectional area of the conduit.

## 1.1.6 Hold points and witness points

### 1.1.6.1 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 3G-1 Hold point table**

Item	Clause title	Requirement	Notice for inspection	Release by
<b>Materials</b>				
3G.1	General – Components	Provide certificates	Before delivery	Authorised Person

**Table 3G-2 Witness point table**

Item	Clause title	Requirement	Notice for inspection
<b>Execution</b>			
3G.1	Construction traffic - Protection measures	Submit certification and verification of protection measures	3 working days
3G.2	Conduit installation - Marking	Marking tape, kerbs	1 working day
3G.3	Completion - General	Clean debris and ensure lids fit securely	3 working days

## 1.2 Pre-Construction Planning

### 1.2.1 Consultation

Requirement: Locate, verify existing underground service locations.

Consultation: Prior to excavation of trenches for service conduits the contractor shall liaise with the service authorities and arrange a site meeting to confirm the servicing and coordination requirements of each authority.

## 1.3 Materials

### 1.3.1 Conduits

#### 1.3.1.1 General

Components: Provide certificates of conformance for all materials and components which are readily identifiable with the batch that they represent.

This is a **HOLD POINT**.

Size of conduit: Unless otherwise shown on the drawings:

- > Space factor < 0.5.
- > Flexible conduit: 25mm.
- > Conduit (under road): 80mm.
- > Conduit (general underground): 50mm.
- > Gas: To *AS/NZS 2053*.
- > Power and lighting: To *AS/NZS 3000 clause 3.11*.
- > Telecommunications: To *AS/CA 5009 clauses 8 and 9*.

Draw cord: Provide polypropylene draw cord in conduits not in use.

Conduit colour: Conform to the following:

- > Gas: Grey.
- > Telecommunications: White.
- > Electrical: Orange.

UPVC priming fluid and solvent cement: To *AS/NZS 3879*.

Marker tape: To *AS 2648.1*.

Fixings Saddles: Double sided fixed.

#### 1.3.1.2 Metallic conduits and fittings

Rigid plain conduits and fittings: To *AS/NZS 2053.7*.

Flexible conduits and fittings of metal or composite material: To *AS/NZS 2053.8*.

Heavy duty galvanized steel tube: To *AS 1074*.

Type: Screwed steel.

Saddles: Conform to the following:

- > Internal: Zinc plated.
- > External: Hot-dipped galvanized.

Corrosion protection of steel conduits: Paint ends and joint threads with zinc rich organic primer to *AS/NZS 3750.9*.

Laid underground: Steel water pipe with protection outside and inside to *AS 1074*.



### **1.3.1.3 Electrical cables enclosed in ferromagnetic enclosures (steel conduit)**

Requirement: Install to *AS/NZS 3000 clause 3.9.10*.

### **1.3.1.4 Non-metallic conduits and fittings**

Heavy duty rigid UPVC: To *AS/NZS 2053.2*.

Flexible conduit: To *AS 2053.4*.

Joints: Cemented or snap on.

## **1.3.2 Pits**

### **1.3.2.1 General**

Pits: Provide cable draw-in pits as shown on the drawings.

Plastic materials: Must be UV stabilised.

Pits: Provide proprietary concrete or polymer concrete moulded pits in conformance with the relevant asset owner requirements.

## 1.4 Execution

### 1.4.1 Provision for traffic

#### 1.4.1.1 General

Requirement: Conform to *MITS 01 Traffic Management*.

### 1.4.2 Site establishment

#### 1.4.2.1 Survey

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

#### 1.4.2.2 Construction traffic

Protection measures: If proposing to move heavy construction plant or vehicles over service conduits without minimum cover depths, provide verification and certification of protective measures.

This is a **WITNESS POINT**.

**Table 3G-3 Minimum cover depths table**

Service	Minimum cover (mm)	
	Non-trafficable areas	Trafficable areas
Telecommunications	450	600
Gas	600	750
Electricity conduits (≥63 mm) * Measured to invert.	850 LV 1100 HV*	950 LV 1050 HV
Other conduits (unless specified by the relevant authority)		750

### 1.4.3 Excavation

#### 1.4.3.1 General

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

Confirmation of inadequate foundation material: Remove and dispose of inadequate foundation material as directed by the Authorised Person to *MITS 02B Bulk Earthworks* and replace the material to **Bedding and backfilling**.

## 1.4.4 Bedding and backfilling

### 1.4.4.1 Bedding

Depth: Provide minimum 50mm bedding for all conduits. Within shared trenches, provide sufficient bedding to achieve minimum separation requirements, as shown in the Minimum separation requirements table.

**Table 3G-4 Minimum separation requirements table**

Minimum separation requirements radial distance (mm)	Telco conduit	Electrical conduit LV*	Electrical conduit HV*	Gas ≤50 mm	Gas >50 mm
Telco conduit	100	150*	300*	150	300
Electrical conduit LV*	150	n/a	n/a	150	300
Electrical conduit HV*	300	n/a	n/a	300	300
Gas ≤50 mm	150	150	300	n/a	n/a
Gas >50 mm	300	300	300	n/a	n/a
Electrical/Telco pits	n/a	n/a	n/a	150	300

Note: \* Electrical cables to be protected.

Electrical: To Evo Energy requirements.

Gas and telecommunications: Provide 'gas sand' bedding for gas and telecommunications conduits to **the Gas sand bedding materials table**. Compact bedding material to DI 70%.

**Table 3G-5 Gas sand bedding materials table**

Sieve size	% Passing (to AS 12.9.3.6.1)
2.36 mm	100
1.18 mm	100
0.425 mm	90-100
0.150 mm	15-40

### 1.4.4.2 Overlay zones

Gas: Backfill the gas main pipe overlay zone with 'gas sand' to **the Gas sand bedding material table**.

Telecommunications: Backfill the telecommunications conduit, haunch, side and overlay zones with select cohesive site material which is free from stones larger than 20mm and free from root zone material.

Sequence: Commence backfilling and compaction at the pipe or wall to confine future backfill material.

### 1.4.4.3 Backfilling

Trench backfill material: Backfill the trench from the top of the overlay zone to the underside of the subgrade, or selected material zone with General Fill in conformance with MITS 02B Bulk earthworks. The backfill shall be free from stones larger than 100mm compacted to the density of the adjacent undisturbed ground or to 90% of modified maximum dry density. Unless otherwise specified, replace stripped topsoil at least 100mm deep.

## 1.4.5 Conduit installation

### 1.4.5.1 General

Requirement: Lay conduits in straight lines parallel or normal to the carriageway and avoiding unnecessary bends.

Identification: Identify all conduits in conformance with *AS 1345* and *AS/NZS 3000*.

Bends: Where required, long radius bends shall be provided. The total bending radii on a single run between two pits shall not exceed 90 degrees.

Drawing cables: Install all conduits and fittings before commencing drawing in of cables.

Conduits not in use: Provide a draw cord for the full length of the conduit and 1 m past either end coiled.

Layout of each conduit within the trench: In conformance with the *Underground Services Shared Trench Agreement* and *AS/NZS 3000 clause 3.11*.

Conduits under roads and other objects: > 1m beyond.

Cap conduits: Provide a non perishable removable cover before backfilling.

Conduit installation tolerance: Conform to the following:

- > ± 50mm of design line.
- > + 20mm of minimum cover.

Entry into pits and footings: Provide large sweep bends for entry into junction pits and light pole footings. Do not provide more than 180° total change of direction in any run of conduit between pits. Install conduits with ≤ 2 right angled bends for each cable draw-in run.

Termination of conduit in post concrete footings: Terminate > 25mm inside the recess in the concrete footing.

Cover: > 600mm and < 800mm below finished level. If > 600mm cannot be achieved encase in concrete in conformance with *AS/NZS 3000 clause 3.11.4.4*.

Surround: Provide clean sharp sand ≥ 150mm around cables and conduits installed underground.

### 1.4.5.2 Marking

Marking tape: Lay at approximately 50% of the depth of the conduit and at conduit bends.

Marks in kerb: Route a mark in the face of kerb on both sides of the road indicating the location of the conduit crossing in conformance to the following:

This is a **WITNESS POINT**.

- > Electrical: The letter 'E'.
- > Telecommunications: The letter 'T'.
- > Height of lettering: 100mm.

Warning tape: Supply and install warning tape where required by the service authority.

Temporary markers: If kerb and gutter construction has not commenced, install temporary timber post markers at the conduit crossings so that markings in the face of kerb can be made at the correct locations at the time of kerb and gutter construction.

#### **1.4.5.3 Joints**

Non metallic: Make sure joints are clean of dirt and grease and burrs before cementing together. Provide a solvent cement weld as recommended by the manufacturer and service authority.

Metallic: Provide threaded couplings with a minimum 25mm length of thread on the end of a conduit or conduit bend.

Flexible conduit: Provide proprietary fittings.

### **1.4.6 Pit installation**

#### **1.4.6.1 General**

Termination for conduits to pits: Provide a drilled hole into the pit < 10mm larger than the outside diameter of the conduit. Turn end of conduits upwards and protrude 50mm into the pit. Seal around the conduit with an approved flexible sealant. Smooth and free from burrs the end of the conduits.

Pits: Install pits to conform to the following:

- > Set flush with the finished level of the surrounding area.
- > Shape surrounding area to prevent ponding within 1m of the pit.
- > Numbered.

Location of electrical pits: As shown on the drawings and the following as required:

- > Within 4m of service points for earthing.
- > At all junctions and sharp changes in direction of conduits.
- > Adjacent to poles.
- > Draw in pit every 50m.

Pit collars: Provide for circular pits before compaction of the backfill material.

Pits installed on batter slopes: Do not install pits on slopes steeper than 3H: 1V unless otherwise shown on the drawings.

Bedding: 5mm nominal size screened aggregate of > 150mm thick.

Drain: Provide drainage in each pit as follows:

- > Drain type: UPVC drain.
- > Diameter: 50mm.
- > Grade: Grade the drain to a stormwater drainage pit or discharge through an embankment batter.

## 1.4.7 Finishing

### 1.4.7.1 General

Pits: Clean of debris and fit lids securely.

This is a **WITNESS POINT**.

## 1.5 Completion

### 1.5.1 Submissions

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

## 2 MEASUREMENT AND PAYMENT

### 2.1 Measurement

#### 2.1.1.1 General

Payments made to the Bill of Quantities: To *MIT 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.
- > Miscellaneous minor concrete work is not included in the Pay Items in this Specification: To *MIT 10 Concrete works*.
- > Erosion and sedimentation control: To *MIT 00C Control of erosion and sedimentation*.
- > Backfilling under roads, paths and driveways: To *MIT 03H Road openings and restorations*.
- > Road crossings for service conduits: Constructed and paid as separate service trenches, not within shared trenches.
- > All costs associated with removal of water from excavations shall be included within respective excavation rates

## 2.2 Pay items

**Table 3G-6 Pay Items Table**

Item No	Pay items	Unit of measurement	Schedule of rates scope
3G.1	Trenching for Service Authorities	Linear metre of excavated trench measured along the centreline.	<p>All activities associated with trenching for service authorities including liaison and coordination, excavation in all types of material encountered including rock, over excavation for bedding, shoring, supply, placement and compaction of bedding and backfill, additional excavation at structures and warning tape.</p> <p>The trench width and depth shall be as specified in the Drawings or by the service authorities and shall vary depending on the number of services in each trench.</p> <p>This pay item shall include the supply, placement and compaction of sand bedding and sand cover in accordance with the Drawings and this specification.</p> <p>This pay item does not include the cost of supply and installation of conduits or cabling and backfill required under roads, paths and driveways.</p> <p>A separate pay item shall be included in the Contract for each trench type. For example;</p> <ul style="list-style-type: none"> <li>3G.1.1 HV Electrical only</li> <li>3G.1.2 2 way Shared trench with gas and telecommunications</li> <li>3G.1.3 3 way Shared trench with electricity, gas and telecommunications</li> </ul> <p>Etc...</p>
3G.2	Conduit provision in a shared trench	Linear meter of conduit installed	<p>All activities extra over trenching for service authorities associated with conduit provision in a shared trench including supply and installation of street lighting, NBN or electrical conduits.</p> <p>This pay item shall include the supply and installation of draw wire, cable protection, long radius 90° bends and warning tape in accordance with the Drawings and this specification.</p> <p>A separate pay item shall be included in the Contract for each size of conduit. For example;</p> <ul style="list-style-type: none"> <li>3G.2.1 23mm dia PVC (NBN)</li> <li>3G.2.2 100mm dia PVC</li> <li>3G.2.3 125mm dia PVC</li> </ul> <p>Etc...</p>

Item No	Pay items	Unit of measurement	Schedule of rates scope
3G.3	Gas Conduits	Linear metre of excavated trench measured along the centreline.	<p>All activities associated with the construction of gas conduits including excavation of trenches in all types of material encountered including rock, over excavation for bedding, shoring, additional excavation at structures, bedding, conduits, laying, jointing, backfilling, and compaction.</p> <p>This pay item shall include the supply and installation of draw wire, warning tape, sand bedding and sand cover in accordance with the Drawings and this specification.</p> <p>This pay item shall not be used for shared trenches.</p> <p>A separate pay item shall be included in the Contract for each conduit size and trench configuration.</p>
3G.4	Telecommunications Conduits	Linear metre of excavated trench measured along the centreline.	<p>All activities associated with the construction of telecommunications conduits including excavation of trenches in all types of material encountered including rock, over excavation for bedding, shoring, additional excavation at structures, bedding, conduits, laying, jointing, backfilling, and compaction.</p> <p>This pay item shall include the supply and installation of draw wire, warning tape, sand bedding and sand cover in accordance with the Drawings and this specification.</p> <p>This pay item shall not be used for shared trenches.</p> <p>A separate pay item shall be included in the Contract for each conduit size and trench configuration.</p>
3G.5	Electrical Conduits	Linear metre of excavated trench measured along the centreline.	<p>All activities associated with the construction of electrical conduits including excavation of trenches in all types of material encountered including rock, over excavation for bedding, shoring, additional excavation at structures, bedding, conduits, laying, jointing, backfilling, and compaction.</p> <p>This pay item shall include the supply and installation of draw wire, cable protection, long radius 90° bends and warning tape in accordance with the Drawings and this specification.</p> <p>This pay item shall not be used for shared trenches.</p> <p>A separate pay item shall be included in the Contract for each conduit size and trench</p>



Item No	Pay items	Unit of measurement	Schedule of rates scope
			<p>configuration. For example;</p> <p>3G.1.1 1 x 50mm Street lighting</p> <p>3G.1.2 2 x 125mm Electrical</p> <p>3G.1.3 6 x 125mm Electrical</p> <p>Etc...</p>
3G.6	End caps	Number	<p>All activities associated with the construction of end caps for dead ends on conduits including supply and installation of an end cap, marker tape and marker stake.</p> <p>A separate pay item shall be included in the Contract for each size of conduit. For example;</p> <p>3G.6.1 23mm dia PVC (NBN)</p> <p>3G.6.2 100mm dia PVC</p> <p>3G.6.3 125mm dia PVC</p> <p>Etc...</p>
3G.7	Installation of NBN Pit	Number	<p>All activities associated with the construction of NBN pits including excavation in all types of material encountered including rock, over excavation for bedding, shoring, supply and placement of bedding, pits and covers.</p> <p>This pay item shall include levelling of pits, backfilling and compaction around the pit.</p> <p>A separate Pay Item shall be included in the Contract for each pit size. For example;</p> <p>3G.7.1 P5</p> <p>3G.7.2 P6</p> <p>Etc...</p>



Transport Canberra and  
City Services

July 2019