PART R53

SUPPLY AND INSTALLATION OF CONDUITS AND PITS

CONTENTS

1. GENERAL

This Part specifies the requirements for the supply and installation of conduits and pits for electrical and telecommunications purposes.

Where relevant to the Contractor's work, the Contractor must comply with:

AS 2053 Conduits and Fittings for Electrical Installations

AS 2648.1 Non-detectable Tape

AS 3000 Electrical Installations

DPTI Standard Drawings:

Drawing No	Sheet No.	Title	Amendment No.
S-4055	33	Plastic Electrical Pit No. 6 with Concrete Covers	1
	34	Plastic Electrical Pit No. 7 with Concrete Covers	0
	35	Plastic Electrical Pit No. 8 with Concrete Covers	1
	36	Plastic Electrical Pit Nos. 6 & 8 (2 Lids/Pit)	1
	56	Road Lighting - Submersible Switchboard / Isolation Pit - Single Phase	0
	66	Plastic Pits - Non Secured Concrete Lids & Surrounds	0
	67	Plastic Pits & Secure Steel Lids - Class A & Surrounds	1
	68	Plastic Pits & Secure Steel Lids - Class A & B Surrounds	1
	69	Plastic Pits & Lockable Steel Lids Class A & B Surrounds	1
	70	Secure & Lockable Steel Lid Components	1

DPTI Standard Drawings are available from the following web site:
http://www.dpti.sa.gov.au/standards/roads-all

Where this Part specifies a higher standard than that required by the above standards, the requirements of this Part will take precedence.

2. COMPLIANCE WITH LEGISLATION

The Contractor must comply with:

(a) *Plumbers, Gas Fitters and Electricians Act 1995* (SA); and

(b) *Electricity Act 1996* (SA).

The Contractor's attention is drawn to Section 12 "Licensed contractor's work to be carried out by registered worker" and Section 13 "Obligation of workers to be registered" of the *Plumbers, Gas Fitters and Electricians Act.*

Pursuant to Section 61 "Electrical Installation Work" of the *Electricity Act,* the Contractor must provide an electrical certificate of compliance, signed by a registered worker authorised to carry out such work, that the installation of the conduit and pits comply with the *Electricity Act 1996*.

Provision of the certificate of compliance shall constitute a **HOLD POINT**.

Works incorporating conduits for communications cabling must comply with the applicable Australian Communications Authority standards.

3. MATERIALS

3.1 Pits

Pits must be made of materials that are capable of being buried in soil without adverse effects. Pits made from plastic or polycarbonate materials are acceptable. Plastic materials must be UV stabilised. Pits and covers must provide sufficient strength to support a wheel loading of at least one tonne without any visible damage, including to the underside of the lid.

Pits must be made to the approximate dimensions shown on Drawing No. S-4530, sheet 5 and Drawing No. S-4055, sheets 33-35 & 50-51.

3.2 Pit Covers

Pit covers must:

(a) be made of reinforced concrete, keyed steel or other suitable materials with appropriately positioned lifting holes;

(b) be tapered to facilitate easy removal (with tools) and replacement of covers;

(c) where specified, be of lockable construction such that it is not possible to remove covers without the use purpose designed tools. Lockable lids must be fabricated as detailed on Drawing S-4055 Sheet 50;

(d) incorporate a permanent non-slip pattern on the top, created by means of casting, engraving or moulding;

(e) be designed such that ground water can escape without removing the cover and prevent the entry of soil or any other objects; and

(f) fit flush with the pit and the pit surround when a gasket is installed.

All covers must be marked "DPTI" and the following:

(a) "ELECTRICAL" or similar where the pits houses electrical power and/or control cabling;

(b) "COMMUNICATIONS" or similar where the pits houses communications cabling.

The markings must be marked permanently on the inside of the pit and on the cover by means of casting, engraving or moulding in bold letters 30 mm high and 3 mm deep.

3.3 Conduit

Electrical conduits must be heavy duty rigid PVC conduit to AS 2053, colour orange for underground cable and UV stabilised for above ground. Communications conduits must conform to ACMA and/or other relevant standards. Flexible conduits must not be used without the prior approval of the Principal.

Where the conduit sizes are not shown on the drawings, the conduit diameter must not be smaller than the size specified in Table 3.3.

Table 3.3: Minimum Conduit Diameter		
	Electrical power (mm)	Communications (mm)
Flexible Conduit:	25	25
ITS Conduit:	100	100
Traffic Signal Conduit:	80	-
Traffic Signal Detector Conduit:	-	50

3.4 Marking Tape

Marking tape must comply with the requirements of AS 2648.1.

3.5 Concrete

Concrete must be minimum Grade N20.

4. DESIGN OF CONDUITS AND PITS

If any details relating to the location and size of conduits and pits have not been provided by the Principal, the Contractor must prepare a conduit system design in accordance with Part D30 “Design – Conduit Systems”.

At least 5 working days prior to the commencement of supply and/or installation of conduits and pits, the Contractor must provide the Conduit System Design, including complete details of the location and size of conduits and pits.

Provision of this documentation shall constitute a **HOLD POINT**.

5. TRENCHING, BORING AND BACKFILL

Excavation and backfill of trenches must comply with Part R07 “Trench Excavation and Backfill”.

Under-road boring must comply with Part R06 “Boring”.

Reinstatement of any existing pavements to be retained must comply with Part R08 “Reinstatement of Existing Pavements”.

All work associated with the installation and / or removal of conduits and pits must be completed prior to the construction of any new road pavement.

6. INSTALLATION OF ELECTRICAL CONDUIT

6.1 General

Conduits must be laid out in straight lines avoiding unnecessary bends and generally parallel or normal to the carriageway.

Variations in levels or changes in direction of underground ducts must be achieved by using the natural flexibility of the conduits. Where this is not possible, the use of 45˚ sweep bends is permitted with radius of 580 mm for 80 mm diameter conduits and 320 mm radius for 50 mm diameter conduits.

"Large sweep" bends must be used to provide entry into junction pits and light pole footings. No more than 180˚ total change of direction is permitted in any run of conduit between pits (e.g. 2 No. x 45˚ entry at either end into draw-in pits).

Conduit joints must be thoroughly cleaned of dirt and grease and burrs removed where any conduit is cut to length, before being cemented together using a solvent cement approved by the conduit manufacturer.

Draw cords must be installed in all electrical conduits and be continuous and without joins for the full length of the conduit. A 1 m length "tail" must be provided at each end of the draw cord. Tails must be coiled and neatly laid in the relevant area. Draw cords must be 4 mm diameter polyethylene mono rope with a breaking load of 5 kN. A draw chord must remain in a conduit following installation of cables.

6.2 Cover

Notwithstanding AS 3000, the cover for conduits without additional protection must be a minimum of 600 mm and a maximum of 800 mm below finished level. Where the existence of public utility services, other underground

obstructions or ground conditions restrict the laying of conduits to less than 600 mm cover, the conduits must be encased in concrete in accordance with AS 3000 or as approved by the Technical Regulator.

Prior to pouring concrete, a **HOLD POINT** shall apply.

6.3 Termination of Conduits in Pits or at Stobie Poles

The hole for the entry of the conduit must be neatly drilled to a maximum of 10 mm larger than the outside diameter of the conduit. The ends of conduits must be turned upwards to facilitate drawing-in of cables and the conduit must protrude into the pit for a minimum of 25 mm and a maximum of 50 mm. The hole around the conduit must be effectively sealed with a flexible sealant (Selleys All Purpose Sealant or similar). Ends of conduits must be smooth and free from burrs.

The ends of conduits at post footings must terminate 25 mm inside the recess in the concrete footing.

Where the conduits are to be connected into an ETSA Utilities underground service pit, the hole for the entry of the conduit must be neatly drilled to a maximum of 10 mm larger than the outside diameter of the conduit or as specified by ETSA Utilities.

Where conduits are attached to stobie poles, the installation of 50 mm diameter conduit in the stobie pole channel or the face of the stobie pole must be as shown on Drawing No. 4516, sheet 1. Bending of the galvanised pipe must not be permitted after the 50 mm PVC conduit has been inserted.

6.4 Additional Requirements for Consumer Connections

Conduits must be the diameter shown on the ETSA Utilities Drawing and laid in accordance with the Drawings.

Low voltage conduits must be terminated in low voltage service pillars as shown on the Drawings and the following ETSA Utilities Drawings:

- E1921 - UD LV Service or Junction Pit, Looped, Footpath Use.
- E1922 - UD Low Voltage - Service Pillar – Looped.

The Contractor must contact ETSA Utilities to obtain copies of these drawings.

7. INSTALLATION OF ELECTRICAL PITS

7.1 General

The Contractor must install all cable draw-in pits and junction pits as necessary for the work.

Notwithstanding any drawing showing a formed pit, pits must comply with Clause 3 "Materials". All pits must be minimum size P2, unless shown otherwise on the drawings or otherwise approved by the Principal.

Pits must be set flush with the finished level of the surrounding area, which must be shaped so that water does not pond within 1 m of the pit. Pits must have a concrete surround as detailed on Drawing No S-4055 Sheet 47 with edges arrised with an edging tool.

Pits must be installed with the long dimension of the covers indicating the direction of the main conduit run.

In paved areas, a concrete surround must be provided. The edges of the surround must be finished with an edging tool.

7.2 Locations for Electrical Pits

In addition to the locations specified on the drawings, pits must be installed as follows:

(a) within 4 m of service points to provide earthing;

(b) at all junctions and sharp changes in direction of conduits;

(c) where necessary, adjacent to poles to provide for tee-off cable joints;

(d) where pits are to be jointly used with traffic signal pits; and

(e) where the distance between draw in pits exceeds 50 m.

7.3 Drain Outlet

When a suitable drainage point is located near a pit, the Contractor must drill a central drain outlet in the base of the pit and install a 50 mm PVC "stormwater" class drainpipe so that any water flows into the drainage point.

7.4 Underground Service Pit for Signal Controllers

Where practicable, the underground service pit must be installed at a minimum distance of 5 m from the signal controller base in footpaths, islands or medians as located during layout of footings and pits and installed as per Drawing No. S-4519, sheet 39. Underground service pits must not be located in painted islands/medians.

8. INSTALLATION OF TELECOMMUNICATIONS CONDUIT

Telecommunication conduit must be located at least 450 mm below the natural ground where located in the road reserve and must be laid out in straight lines avoiding unnecessary bends and generally parallel or normal to the carriageway. The conduit must be able to be identified in the field as the property of DPTI.

Minimum depths of cover within rail boundaries must comply with the Table 8.

Table 8: Minimum Cover Below Rail Level

Line category	Cover below rail level (metres)
Main Lines	1.2
Secondary Lines	1.0
Elsewhere	0.6

In all cases, minimum cover depths must be maintained to a minimum distance of 3 m measured perpendicular to the outer rail.

Draw cords must be installed in all communication conduits and be continuous and without joins for the full length of the conduit. A 1 m length "tail" must be provided at each end of the draw cord. Tails must be coiled and neatly laid in the relevant area. Draw cords must be 4 mm diameter polyethylene mono rope with a breaking load of 5 kN. A draw chord must remain in a conduit following installation of cables.

9. INSTALLATION OF TELECOMMUNICATION PITS

9.1 General

Pits must be bedded in Sa-C Type C sand. If electricity cables pass underneath the communications pit, a protective concrete slab must be provided underneath the pit before placing the bedding sand.

Prior to backfilling, covers must be fitted and visually checked to ensure that the pit is parallel to the edge of the footpath, kerb or property boundary and is flush with the surface of the surrounding footpath, or is built-up at a maximum grade of 1:14, to conform to the fall of the footpath.

9.2 Location of Pits

At a minimum, pits must be located mid-block (between major intersections) and at transverse connections and at all major intersections/junctions. Pits must be installed at the splice point between transverse and longitudinal connections of conduit.

Unless shown otherwise on the drawings, the pit location must:

(a) be installed with the long dimension of the covers indicating the direction of the main conduit run;

(b) not be located at vehicle crossovers;

(c) not be located in places where congestion of services and future maintenance activities by other service agencies could affect the security of DPTI plant;

(d) not be located within 300 mm of low voltage electricity distribution pedestals, pads, domes or service pits; and

(e) not be located in driveways (An existing pit may be left in place given that it is in sound condition and is safe).

Wherever there is a possibility that water could drain into pits, water must be drained to low points en route and conduit plugs must be used to seal vacant conduits.

10. ELECTRICAL TRENCH CAUTION TAPE AND CABLE POSITION MARKER POSTS

Plastic tape marked "Electrical Cable" or "Telecommunications Cable" must be laid along the full length of all conduit trenches, 300 mm above the conduit, unless otherwise specified. More than one tape must be laid in trenches wider than 500 mm. Orange cable slabs may be used as an alternative to the tape.

Electrical cable position marker posts, with identification plate indicating alignment direction, must be installed at changes of direction and not more than 200 m apart and in accordance with AttachmentR53A “Buried Cable Warning Sign Post Details and Installation” and Attachment R53B “Buried Power Cable Warning Sign”.

11. VERIFICATION OF CONDUIT CONDITION

Unless specified otherwise, the Contractor must undertake an internal inspection all conduit (including conduit designed to incorporate additional cable(s) at a later stage). The inspection must use video camera, borescope or similar equipment. It must be undertaken after the completion of all construction work directly above the conduit and provide documentary evidence that the conduit and cables have not been damaged during installation or by subsequent construction work.

12. “AS CONSTRUCTED” DRAWINGS

Upon completion of the work, the Contractor must provide to the Principal “As Constructed” Drawings showing in detail the actual location and depth of conduits and pits, size of cabling and any other relevant data on the base construction drawings.

13. HOLD POINTS

The following is a summary of Hold Points referenced in this Part:

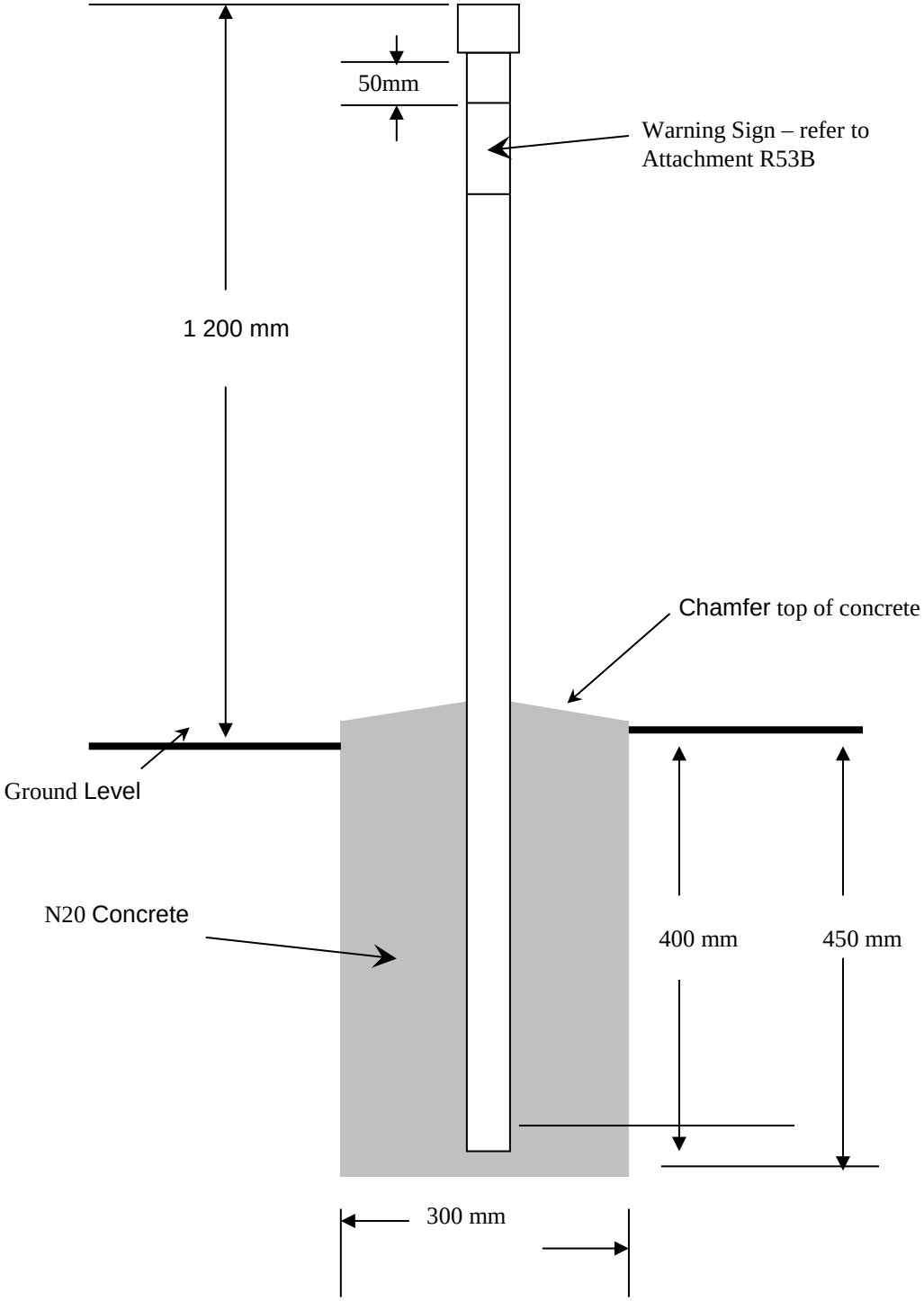
CLAUSE REF.	HOLD POINT	RESPONSE TIME
2.	Certificate of compliance	5 working days
4.	Provision of conduits and pit sizes and locations	5 working days
6.2	Prior to pouring concrete	1 working day

14. VERIFICATION REQUIREMENTS AND RECORDS

In addition to any documentation provided at the Hold Points, the Contractor must supply the following records:

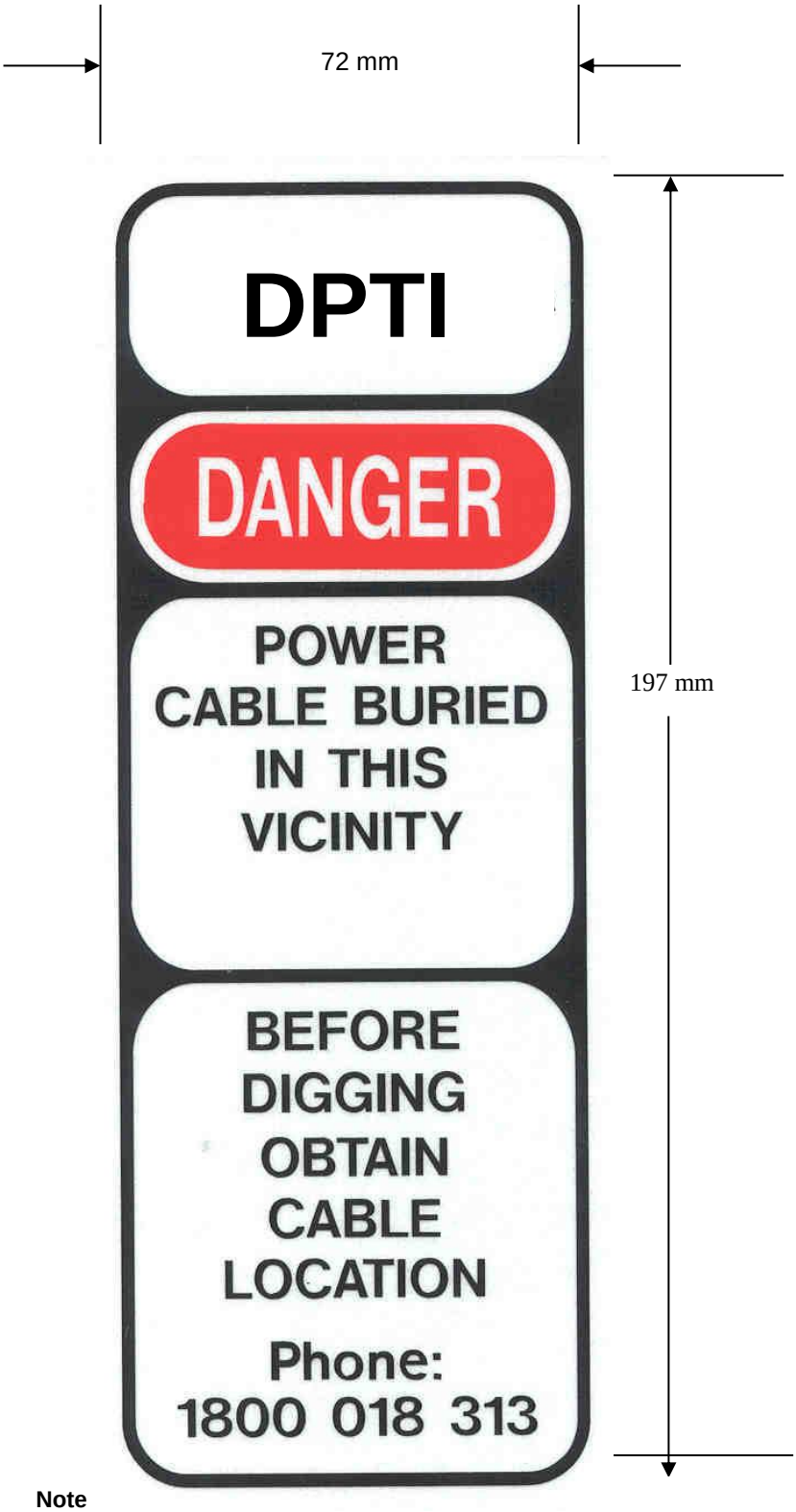
CLAUSE REF.	SUBJECT	RECORD TO BE PROVIDED
11.	Verification of Conduit Condition	Video file showing inside of conduit
12.	Conduit and pit location	“As Constructed” Drawings

ATTACHMENT R53A
BURIED CABLE WARNING SIGN POST DETAILS AND INSTALLATION



Note:
1. Sketch for illustration only – not to scale.
2. Capped steel post, 60 mm O/D, wall thickness 2 mm.
3. "Signal Red" powder coated finish over full length of post.
4. Posts to be located as shown on drawings.

ATTACHMENT R53B
BURIED POWER CABLE WARNING SIGN



Note

1. Background is reflective white.
2. The word DANGER is surrounded by red.
3. All other lettering and borders are in black.