



Underground Distribution Construction Manual


Section C2 – Excavation & Reinstatement

Approved by: A Smith-de Perez

CIVIL WORKS

SECTION C2 - EXCAVATION AND REINSTATEMENT

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	APPD	A. Smith de Perez		CIVIL WORKS		DATE	10/10/08	6229-A4	C
	CKD	J. Lansley		EXCAVATION AND REINSTATEMENT		RECD		SECTION	SUB-SECT.
	DRN	P. Judge		SECTION INDEX		CKD	P. BARNEY	C2	0
	SUB SECT	4.14 Added				DWN	F. AMANPOOR	SHT 1	OF 1
								FILE UDC-C2-0-1C.DWG	

EXCAVATION AND REINSTATEMENT

1. Australian Standards

Workmanship and materials to be in accordance with AS 4678-2002 as applicable

2. Identification of Existing Underground Services

Any information shown on the works plans detailing the existence and location of underground services is to be taken as a guide only and accurate site location information shall be obtained from the underground Service Authorities and by calling the "Dial Before You Dig Service" for underground locations.

In some instances careful excavation of trial holes will be necessary to determine in advance the alignment and depth of services prior to excavating with machinery.

3. Breaking of Sealed Surfaces

The service provider shall employ techniques to break and remove sealed surfaces such that adjacent surfaces are not damaged. Generally, the edges of trenches shall be cut through the full thickness of the sealed surface.

Concrete footways shall be cut at least 50 mm clear on both sides of the intended trench.

Asphalt and bitumen surfaces shall be cut at least 300 mm clear on both sides of the intended trench.

4. Removal, Care and Reinstatement of Grassed Areas

Where the trench alignment is within established grassed areas, the service provider shall be responsible for the removal, care, and reinstatement of removed sections from the trench alignment. The service provider shall employ techniques, which prevent damage to adjacent grassed areas not forming part of the trench alignment.

On completion of backfilling, all grassed areas disturbed by trenching and the work methods employed, shall be reinstated to a condition similar to those found prior to trench excavation with sufficient compaction to prevent settlement and any subsidence shall be topped up after 3 weeks.

5. Maintenance of Barricades


Signs, barricades, lights, trench covers and trench crossovers required for vehicular and pedestrian management, shall remain in place and be regularly inspected and maintained until such time as the safety hazard no longer exists.

The condition of barricades used around trenches and jointing holes shall be regularly monitored. The service provider shall immediately rectify any situation, which presents a potential hazard.

6. Construction of Trenches

6.1 General

Trenches shall be excavated in the underground allocation/alignment to the trench dimensions typified on construction drawings.

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	B								CIVIL WORKS			DATE	10/10/08	6229-A4		B	
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7. Bedding Material

7.1 Electrical Installation

Bedding material shall consist of the following:

- a) A well graded fine sand with a high percentage of clay fines.
- b) A stone free, fine particle friable loam with a high percentage of clay fines.

The common trade name for these products is “pit sand” or “brickies loam”.

Bedding material shall comply with the following requirements:

- Substantially free from lumps;
- Free of particles with any dimensions exceeding 5 mm;
- Free of sharp particles that might cause heavy scratching to cable sheaths, or indentations on ducts.

Bedding material shall be placed around cables, conduits, joints and any other buried ENERGEX plant such that a minimum separation of 50 mm is maintained between ENERGEX plant and the surrounding earth.

Bedding material shall completely surround banks of cable and conduits, ensuring the minimum separation between cables and conduits is maintained, and is lightly compacted prior to backfilling the remainder of the trench.

7.2 General

Excavated material shall not be used for bedding material unless approval is granted by the Service Provider at the time trenches are excavated.

The excavated material shall comply with the bedding material requirements previously mentioned, before it can be approved for use as bedding material.


8. BACKFILL

Backfill material shall comply with the following requirements:

- A maximum particle size of 75 mm for electrical, (25 mm for gas) shall not be exceeded.
- Substantially free from lumps.
- Free from rock and boulder like material.
- Clay materials shall not be used.
- Material with a high moisture content shall not be used.

Backfilling of trenches and excavations shall be carried out after:

- The location of cables, cable joints and conduits have been recorded.
- Rubbish, foreign matter, free water and slurry has been removed from the excavation.
- The location of gas mains and services, valves, conduits and any other associated gas assets have been recorded.

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CIVIL WORKS
EXCAVATION AND REINSTATEMENT
GENERAL REQUIREMENTS

Backfilling of excavations in roadways shall utilise backfill material, placed in layers, and compacted to the specified requirements of the controlling Local Authority or Department of Transport and Main Roads(DTMR).

Should the electricity supply pillars/pits and communication pits not be installed at the same time as the cables and joints, the pillar/pit zone shall be backfilled with pit sand. The site shall then be hand excavated when the electricity supply pillar/pit and communication pits are required to be installed during a later construction phase.

9. COMPACTION

Backfill material shall be compacted by mechanical means in layers not exceeding 250 mm.

All backfill materials to be compacted until the dry field density of the backfill material is not less than 90% (footway) or 95% (roadway) of the maximum dry density as defined in the Modified Compaction Test - Test AS 1289.5.2.1-2003.

10. SUBSIDENCE OF BACKFILL

Service Providers shall be responsible for the maintenance of backfilled trenches and joint bays. Where subsidence occurs within the warranty period, the Service Provider shall immediately secure any hazard, and shall arrange to correct the subsidence as soon as practicable.

11. DEWATERING

Excavations shall be de-watered by pumping. Trenches shall be de-watered prior to backfilling. Obtain local authority approval as required.

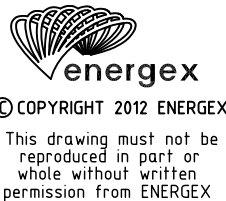
12. REINSTATEMENT OF SEALED SURFACES

The permanent reinstatement of asphalt, bitumen, concrete, paved or tiled surfaces shall be provided by the controlling authority at the developer's cost. Where the controlling authority requires the developer's service provider to arrange for permanent reinstatement of sealed surfaces, the work shall be in accordance with Local Authority or DTMR specified requirements.

13. EROSION PROTECTION

Approved erosion protection (such as concrete spoon drains, stabilised banks etc.) shall be provided to ensure that the cover to ENERGEX's cables and plant is maintained. A statement from a RPEQ civil engineer may be required to validate the method of control.

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	A	A. De Costa	RECD	SECTION	SUB-SECT.	
	C	P. Reif	CKD	C2	1	
	APPD	DEWATERING EXPANDED	P.BARNEY	SHT 3		OF 7
		DWN	F.AMANPOOR	FILE UDC-C2-1-3C.DWG		



UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
 CIVIL WORKS
 EXCAVATION AND REINSTATEMENT
 GENERAL REQUIREMENTS

14. EXCAVATION IN ROCK

Material which can be excavated by a 5 tonne 45 kW (60 HP) mechanical excavator or moderate use of a jackhammer will NOT be regarded as excavation in rock, except where such material has first to be broken up by pneumatic tools or explosives before it can be removed.
Explosives shall only be used by a licensed operator with the approval of the Local (Council) Authority and the Supervising Officer.

SERVICE AUTHORITY	PAINT COLOURS
Communications	White
Gas	Yellow
Electricity	Orange

Only orange paint in accordance with AS 1345 is to be used for the temporary marking of the location of ENERGEX Underground Services and for pegs used to locate ENERGEX poles, stays and structures prior to installation.

15. COMPLETION OF SITE WORKS

All waste and excess materials shall be removed from site when work is complete in accordance with Regulatory and Local Government requirements.

At the completion of work, the site shall be restored to a clean and safe condition.

Where necessary silt mesh shall be left in position until there is no possibility of any material from an excavation finding its way into drainage/water systems or on to private property.

16. TEMPORARY MARKING OF EXISTING SERVICES

Service authorities and the service providers are to use the following paint colours for temporary marking of the location of services.

17. JOINT AND CABLE HAULING BAYS


Joint bays and cable hauling bays shall provide sufficient access to permit the nominated cable joints to be effectively constructed and cables to be easily hauled into conduits. The bottom of pits shall be 300 mm minimum beneath the cable/joint installation level.

18. SETTING OUT

The work shall be accurately set out as detailed on the works plans and any amendments of plans issued before or after commencement of the site work.

19. SURVEY MARKERS

Care shall be exercised so that no survey pegs or permanent marks (PSMs) are disrupted during the course of the works.

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	CKD		P. BARNEY		C2		1									
	DWN		F. AMANPOOR		SHT 4		OF 7									
													FILE UDC-C2-1-4B.DWG			

20. EXCAVATED SPOIL

Excavated spoil shall not be placed on the carriageway or in gutters. The service provider shall have appropriate controls in place to prevent spoil from entering into drainage/water systems in accordance with the Environmental Protection Agency

21. EXCAVATION /TRENCH SECURITY

An appropriate method of support shall be used to prevent the collapse of excavations. Shoring shall be designed, erected and maintained under the supervision of a 'Competent Person' in accordance with statutory requirements.

The installation and removal of shoring, battering or benching shall be carried out in accordance with the requirements of the Workplace Health and Safety Advisory Standards for Excavation.

In addition to the above requirement the Service Provider shall ensure that:

- A minimum of two trained persons shall be on site during the installation and removal of shoring.
- A minimum of one appropriately trained and qualified person shall be on site to:

- (a) Examine the excavation including batter or bench and installed shoring each day, before people commence work.

- (b) Ensure if deficiencies are detected in the excavation, shoring, bench or batter, work in the excavation ceases immediately and persons do not enter the excavation until rectification has been carried out.
- (c) Regular surveillance of the shoring, batter, bench, sides and surrounding surfaces of an excavation should occur while work is progressing to determine if any change in conditions has occurred.

If any changed conditions are detected, the existing control measures to prevent the collapse should be assessed for their adequacy.

Additional information can be obtained from:


- Excavation Advisory Standard
- Civil Construction Safety Manual

22. DAMAGED PLANT

Should any service or plant be damaged during the course of the work, the Operator shall take remedial action and notify the service provider. The service provider shall maintain records of such incidents.

23. MAINTENANCE OF EXISTING PLANT

Due consideration shall be made with regard to the maintenance of all existing (underground) foundations and services, including risk assessments to prevent damage.

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				UPDATE NOTES		DWN	F. AMANPOOR	SHT 5 OF 7	
				CIVIL WORKS EXCAVATION AND REINSTATEMENT GENERAL REQUIREMENTS		FILE UDC-C2-1-5B.DWG			

Where structures, foundations or underground plant are likely to be disturbed by the works, all precautions must be taken to prevent displacement or damage to such plant

The owners of such plant may need to be consulted to determine the appropriate method to protect them against damage. The service provider shall be responsible for any damage caused and shall also be responsible for repairs to damaged plant to the satisfaction of Energex and the owner of the damaged property. The use of photographic records is recommended

ENERGEX shall be notified of any proposed shallow conduit installations and shall advise the service provider of action required.

24. JOINT USE TRENCH

A joint use trench is a trench which is owned by ENERGEX and has the potential to be shared by other parties, principally used for the installation of electricity distribution and communications conduits for immediate and future cable networks, and including a gas reticulation pipe.


Once the joint use trench in the electricity corridor / footpath alignment is backfilled after the initial installation of conduits / cables, any additional gas pipe and conduits must be installed on the relevant party's own alignment in the footpath. Any subsequent excavation in the electricity alignment / corridor, such as for the installation of telecommunication service pits, shall be by hand.

The operator installing cables or conduits shall co-ordinate the installation of all conduits / cables located in the joint use trench when excavation is open. The operator is to ensure clear access is available to the site.

Telecommunications conduits shall not impede on site access to ENERGEX conduits and shall be limited to a horizontal layer of a maximum of 2 x 100mm conduits positioned above the ENERGEX conduits / cables.

Vertical arrays of telecommunications conduits adjacent to ENERGEX's conduits are not permitted due to the need:

- (a) to excavate and remove additional overburden from a wider trench; and
- (b) for direct access by multiple telecommunications parties to conduits to access separate telecommunications pits by offsetting vertical line of conduits.

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Commercial and Industrial developments

Within existing or new commercial and industrial areas, there shall be no joint use trenches in the electricity footpath allocation / alignment.

Such installations are not permitted due to the potential need to excavate for future ENERGEX electrical works including installation of ENERGEX cables, joints and conduit bends.

Where the use of the electricity alignment is required by a third party, that third party may enter into a commercial contract with ENERGEX for the shared use of ENERGEX conduit space under terms and conditions agreed by ENERGEX.

URD and Community Title Development Projects


Joint use trenching arrangements shall be permitted in accordance with the trench section drawings contained within this document.

Augmentation and Undergrounding Projects

Joint use trenching and joint use directional boring may be permitted with the approval of ENERGEX on a case by case basis at the preliminary design stage, such as for undergrounding of overhead projects in non-commercial and industrial areas and joint use road and river crossings.

Joint Use Trench and Joint Use Directional Boring Cost Sharing Arrangements

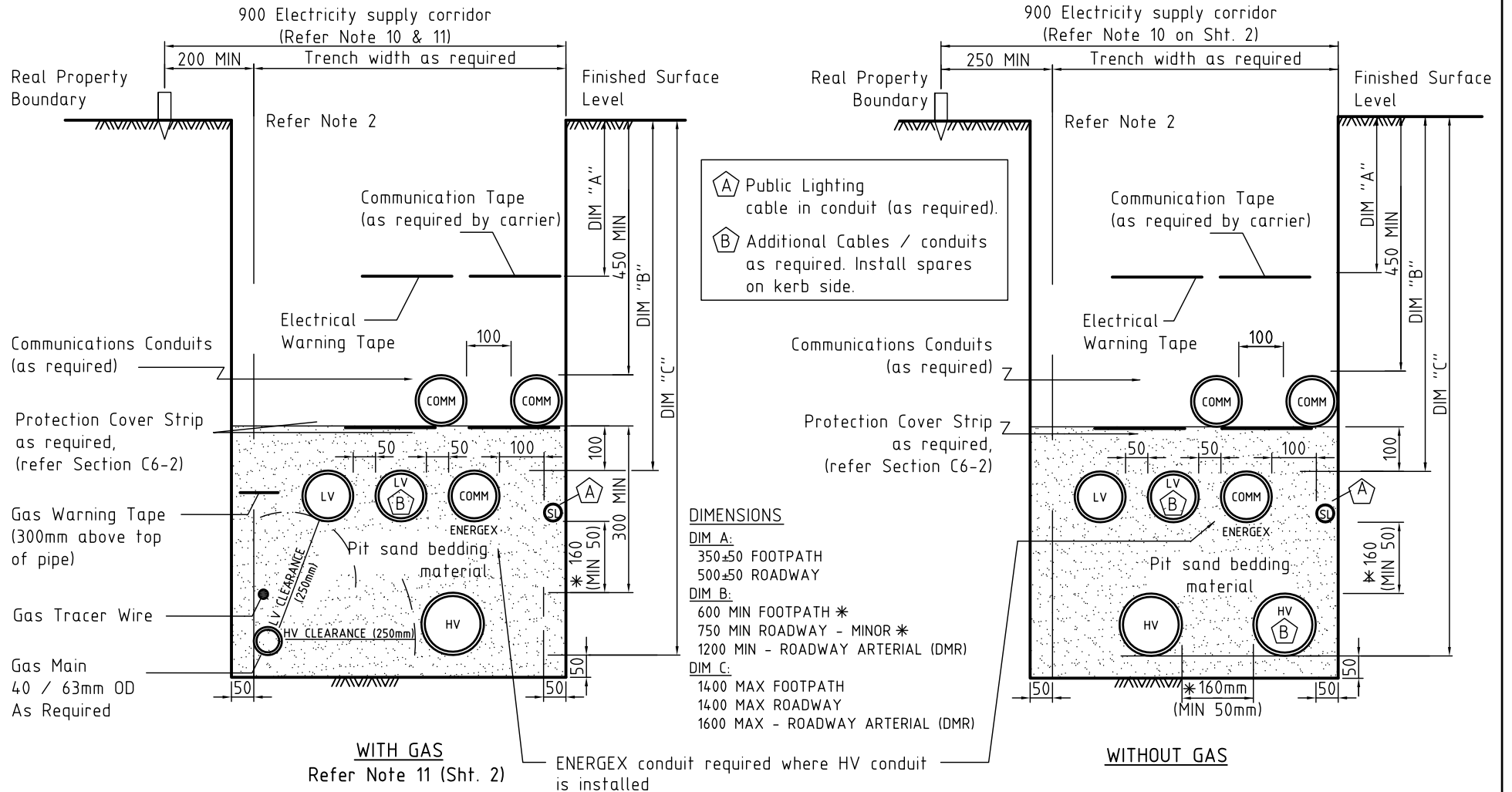
Joint use trench cost sharing arrangements are contained within ENERGEX's Supply & Planning Manual.

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	CKD						P. BARNEY	SHT 7 OF 7					
	DWN						F. AMANPOOR	FILE UDC-C2-1-7B.DOC					

SEE Sheet 2 FOR FURTHER NOTES

* Separation for cable 50mm minimum
(160mm desirable for cable rating)

All cables shall be installed at the correct location and depth. Cables installed outside the footpath corridor, in private property, or at shallow depths are a serious potential hazard to the public and all service authorities personnel



A	ORIGINAL ISSUE	APPD A. Smith de Perez CKD J. Lansley DRN J. Lansley	Max depth in footpath 14,000MM.
	DATE 31/07/2014		

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 CIVIL WORKS
 EXCAVATION AND REINSTATEMENT
 UNDERGROUND ELECTRICAL ALLOCATIONS
 URD ESTATES - FOOTPATH ON PUBLIC ROADS


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DWN F.AMANPOOR	FILE UDC-C2-2.1-1D.DWG	

SEE DRAWING ON C2-2.1 Sheet1

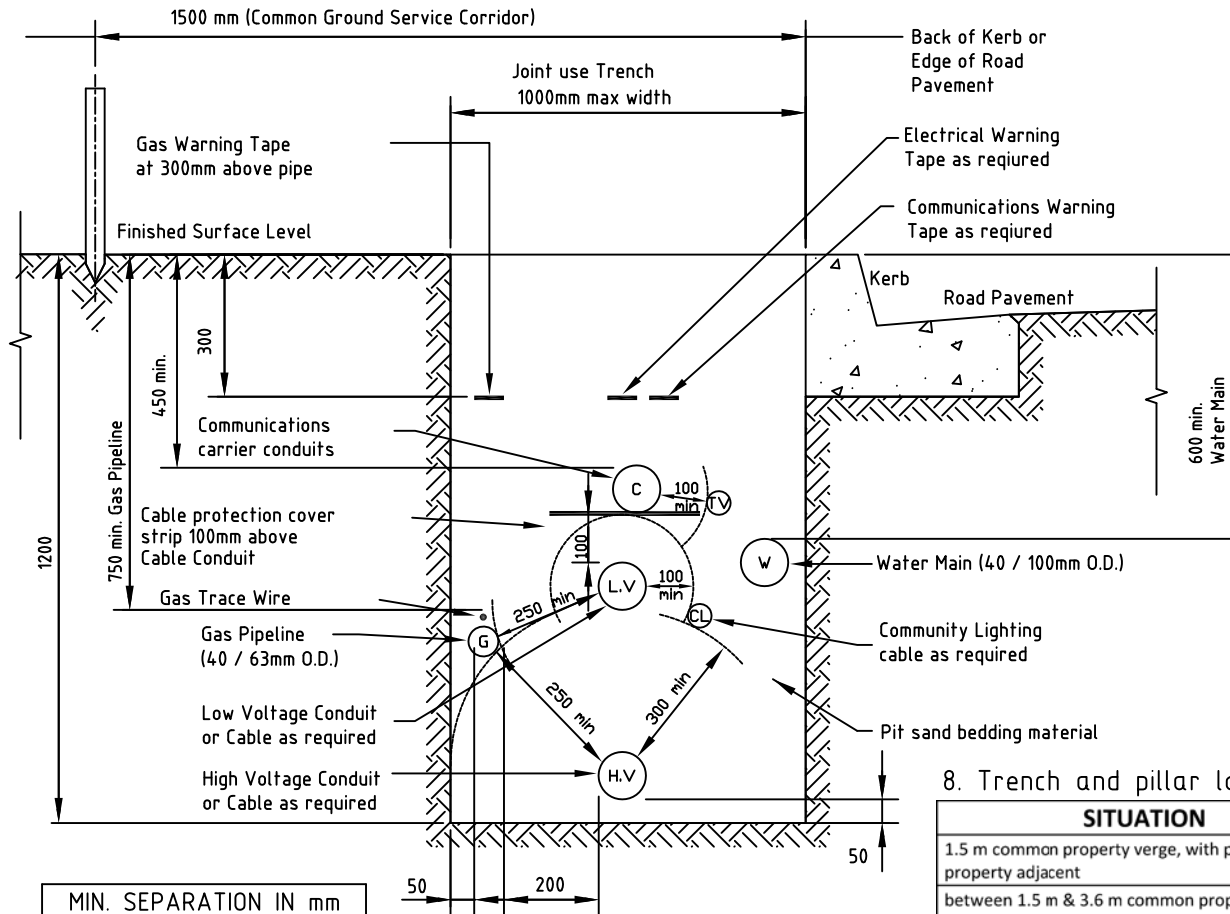
All cables shall be installed at the correct location and depth. Cables installed outside the footpath corridor, in private property, or at shallow depths are a serious potential hazard to the public and all service authorities personnel

Notes:

1. Trench and plant installed as required by works plan.
2. Where practical electricity cables shall not be closer than 250mm to the Real Property Boundary.
3. Trench width and depth to ensure minimum cover and minimum separation of services.
4. Trench level changes shall be graded to a minimum radius of 1830mm.
5. The following shall be located in the communication corridor of the footpath:
 - Communication conduits to be located greater than 450mm below finished surface level.
 - Trunk or major communication conduits, or Trunk optical fibre.
6. ENERGEX high voltage plant shall not be installed within 300mm of another Authority's plant except for gas mains in specially approved situations. See Note 11.
7. ENERGEX low voltage plant shall not be installed within 100mm of communications conduits in joint use trenching.
8. ENERGEX cables and conduits shall cross under other underground services maintaining a minimum separation of 300mm.
9. In commercial and industrial areas communications conduits are not to be in the same trench as ENERGEXs cables/conduits.
10. Refer to drawing no. C2.2.3 for relevant council footpath allocation for electricity services.
11. Joint use with gas not available for 2 x HV conduits unless reduced clearance of 200mm is approved by Gas Company for short distances within the subdivision.
12. Minimum depths as required by Code of Practice Works.
13. Where it is absolutely necessary to reduce cover over conduits to overcome unavoidable site obstructions, refer Section C2 3.2 Sheets 1-3.
14. Maximum depths for going below obstructions is 2.5m without approval from Energex. Lower depths may impact on cable ratings, and there may be additional requirements with regards to backfill and conduit spacing to maintain ratings at depths > 2.5m.
15. An ENERGEX communications conduit (100mm MD UPVC white) is to be installed in trenches with HV cable so that communication cables may be installed between all distribution substations and zone substations.

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								DWN	F.AMANPOOR	SHT 2 OF 2	
							FILE UDC-C2-2.1-2D.DWG				

Building Line or Real Property Boundary




MIN. SEPARATION IN mm						
	HV	G	W	C	CL	TV
HV	-	250	300	300	300	300
LV	300	250	100	100	100	100

Notes:

- For separation between electric cables and other services refer to the typical trench section drawing.
- Community power cables and conduits in group title developments shall be:
 - a minimum of:
 - 300mm from ENERGEX high voltage plant
 - 100mm from ENERGEX low voltage plant
 - constructed in accordance with AS3000 requirements.
- The minimum clear separations between ENERGEX cables and other services shall be adhered to.
- Gas pipelines shall not be closer than 250mm to the building line (face of fascia) or the Real Property boundary
- Minimum separation between gas pipelines and other services pipelines are shown on this drawing.
- Community power cables and conduits in group title developments shall be:
 - a minimum 250mm from Gas pipes.
- Gas pipelines shall be installed at the location and depth. Gas pipeline shall not be laid in private property or at shallow depths


8. Trench and pillar locations in Group Title shall be as follows:

SITUATION	TRENCH	PILLARS
1.5 m common property verge, with private property adjacent	0-1.0 m from back of kerb	front of pillars 1.0 m from back of kerb
between 1.5 m & 3.6 m common property verge, with private property adjacent	0-1.0 m from back of kerb	150 mm from private property (similar to public road)
3.6 m (or greater) common property verge, with private property adjacent	500-900 mm from private property	150mm from private property
no private property – all land is common property	0-1.0 m from back of kerb	150 mm from building line (face or fascia)


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	CKD			EXCAVATION AND REINSTATEMENT			RECD			SECTION	SUB-SECT.
	DRN	P. RELF		UNDERGROUND ELECTRICAL ALLOCATIONS			CKD	P.BARNEY		C2	2.2
	UPDATE PILLAR & TRENCH LOCATIONS			COMMUNITY TITLE DEVELOPMENTS			DWN	F.AMANPOOR		SHT 1 OF 1	
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STANDARD POLE AND UNDERGROUND ALIGNMENTS


LOCAL AUTHORITY	POLE ALIGNMENT	U/G ALIGNMENT	SITUATION	DRAWING REF.	COMMENTS
NORTH					
SUNSHINE COAST REGIONAL COUNCIL					
< 5.0m width (nominal 4.0m wide)	3.5m centre from RP Align	0-0.9m from RP Align (with Gas & Telecom)		RS-100 RS-101	
> 5.0m width	4.5m centre from RP Align	0-0.9m from RP Align (with Gas & Telecom)		RS-100 RS-101	
GYMPIE REGIONAL COUNCIL					
Formerly: Cooloola Shire Council	3.0m centre from RP Align	0.3-0.9m from RP Align		R-08	Council considering pole alignment 1.0m behind kerb for footpaths exceeding 4.0m wide
MORETON BAY REGIONAL COUNCIL					
Formerly: Caboolture Shire Council	3.2m centre from RP Align	0-1.0m from RP Align (with Gas)		A4/01-64	
Formerly: Redcliffe City Council	3.3m centre from RP Align	0-0.9m from RP Align	For standard footpath 4.0m wide	S19A	
Formerly: Pine Rivers Shire Council	3.05m centre from RP Align	0-0.9m from RP Align	For footpaths 3.5m wide	8-0049	
	0.45m from face of kerb	0-0.9m from RP Align	For footpaths exceeding 3.5m wide	8-0049	
	2.75m centre from RP Align	0-0.9m from RP Align	For footpaths without kerbing	Unnumbered sketch	

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	ATHR	P.Relf		EXCAVATION & REINSTATEMENT UNDERGROUND ELECTRICAL ALLOCATION COUNCIL ALIGNMENTS		REC'D		C2	2.3
	Council drawings & requirements updated.					CKD	D. Taylor	Sheet 1 of 4	
		AUTHR	A. McCook	FILE	udc-C2-				

LOCAL AUTHORITY	POLE ALIGNMENT	U/G ALIGNMENT	SITUATION	DRAWING REF.	COMMENTS
BRISBANE					
BRISBANE CITY COUNCIL New Subdivisions	3.25m centre from RP Align (was 3.43m to road face of pole)	0-0.91m from RP Align	For footpaths 3.66m wide to kerb face installed pre 1973	Unnumbered drawing pre 1973 and post 1973	BCC. Licensing Compliance Officer, ph 3403 8888
	2.9m centre from RP Align High side**	0-0.91m from RP Align	For footpaths 3.75m wide to kerb face installed after 1973	W106/1E	Dan Maher, Road and Traffic Design. Ph 3403 0539
	2.74m centre from RP Align Low side**	0-0.91m from RP Align	For footpaths 3.75m wide to kerb face installed after 1973	W106/1E	
	1.75m centre from RP Align	0-0.91m from RP Align	For footpaths 2.44m wide		
	0.3m from back of kerb to pole face	0-0.91m from RP Align	For footpath width exceeding 4.0m		
	2.95m centre from RP Align 0.8m centre behind face of kerb	0-0.9m from RP Align	For 3.75m standard width footpath. For footpaths exceeding 4.75m wide	WS10-1,WS10-2	
	2.845m centre from RP Align High side 3.27m centre from RP Align Low side 0.8m centre behind face of kerb	0-0.9m from RP Align	For 4.25m standard width footpath For footpath exceeding 5.25m	WS10-2, Fig B8.4 (1) and (2)	

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APP'D	J.Lansley			CIVIL WORKS EXCAVATION & REINSTATEMENT UNDERGROUND ELECTRICAL ALLOCATION COUNCIL ALIGNMENTS		APP'D	R. English	6229-A4 C
CKD						DATE	10/10/2008	SECTION
ATHR	P.Relf			REC'D		C2	2.3	
Council drawings & requirements updated.				CKD	D. Taylor	Sheet 2 of 4		
			AUTHR	A. McCook	FILE	udc-C2- 001		


LOCAL AUTHORITY	POLE ALIGNMENT	U/G ALIGNMENT	SITUATION	DRAWING REF.	COMMENTS
WESTERN					
LOCKYER VALLEY REGIONAL COUNCIL					
Formerly: Gatton Shire Council	3.05m centre from RP Align 5.0m centre from RP Align	0-1.2m from RP Align (with Gas)	For footpaths 4.0m wide For footpaths 6.0m wide	EROC-19, unnumbered plan	Use existing alignment in established areas if alignment is non standard
Formerly: Laidley Shire Council	3.2m centre from RP Align	0-1.225m from RP Align (with Gas)	For footpaths 4.0m min wide	LSC-04	
SOMERSET REGIONAL COUNCIL					
Formerly: Esk & Kilcoy Shire Council	2.95m centre from RP Align	0-0.91m from RP Align (low side preferred)	For 3.75m wide footpath	SRC_ROAD-022	Use existing alignment in established areas if alignment is non standard
IPSWICH CITY COUNCIL	3.2m centre from RP Align in Ipswich City council area	0-0.9m from RP Align	Existing established locations		Use existing alignment in established areas if alignment is non standard
	3.4m centre from RP Align in ex-Moreton Shire area	0-0.9m from RP Align	Existing established locations		
	2.95m centre from RP Align	0-0.91m from RP Align	For new subdivisions with footpaths 3.75m wide	STD.R010 & STD.R011	

C	DATE	1/2/2017	 © COPYRIGHT 2009 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS EXCAVATION & REINSTATEMENT UNDERGROUND ELECTRICAL ALLOCATION COUNCIL ALIGNMENTS	WORD				
APP'D	J.Lansley				APP'D	R. English		6229-A4 C	
CKD					DATE	10/10/2008		SECTION	SUB-SECT.
ATHR	P.Relf				REC'D			C2	2.3
Council drawings & requirements updated.					CKD	D. Taylor		Sheet 3 of 4	
			AUTHR	A. McCook		FILE	udc-C2- 001		

LOCAL AUTHORITY	POLE ALIGNMENT	U/G ALIGNMENT	SITUATION	DRAWING REF.	COMMENTS
SOUTHERN					
SCENIC RIM REGIONAL COUNCIL					
	3.0m centre from RP Align	0-0.9m from RP Align (with Gas & Telecom)	For footpaths 4.0m min wide	R-02 R-03	
REDLAND CITY COUNCIL	2.95m centre from RP Align	0-0.9m from RP Align (preferably low side)	For all footpath widths	R-RSC-9	
LOGAN CITY COUNCIL	3.075m centre from RP Align	0-0.75m from RP Align	For footpaths min 3.5m wide	8-00392,8-00393	
GOLD COAST CITY COUNCIL	0.7m from face of kerb	0-0.9m from RP Align (includes Telecom & Cable TV)	For footpaths 3.5-6.0m wide	05-02-005	
	3m centre from RP Align	0-0.9m from RP Align	For footpaths in RURAL areas	05-02-005	

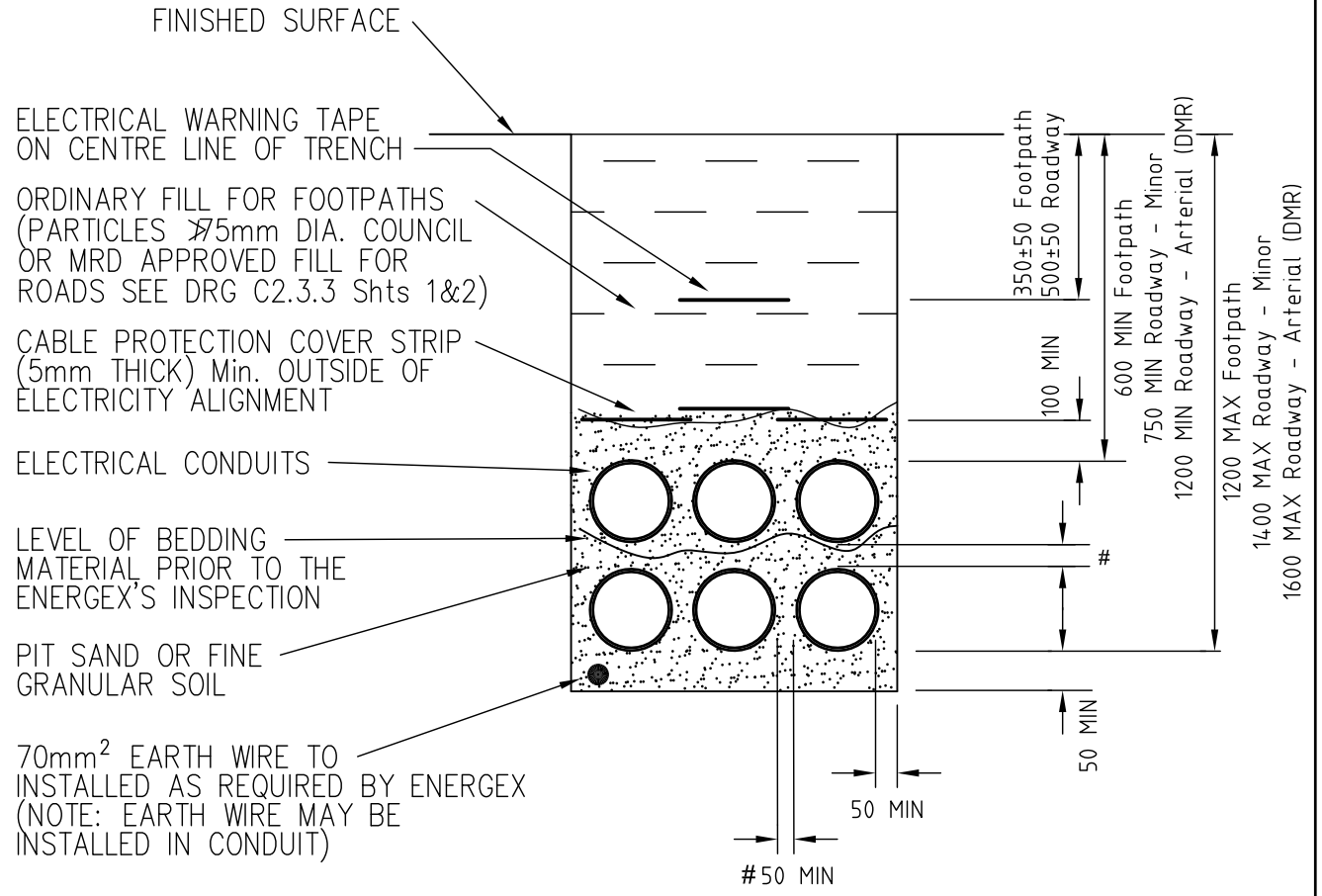
NOTE: These alignments are provided as a guide only and may be varied by Councils from time to time, and for special locations. Project Managers shall ensure that alignments for electricity reticulation and street lighting works are approved by the relevant Council.

This information is duplicated in the Overhead Design Manual Section 1 drawing 6945-A4.

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APP'D	J.Lansley			APP'D	R. English	6229-A4 C	
CKD				DATE	10/10/2008	SECTION	SUB-SECT.
ATHR	P.Relf			REC'D		C2	2.3
Council drawings & requirements updated.				CKD	D. Taylor	Sheet 4 of 4	
			AUTHR	A. McCook	FILE	udc-C2- 6229-A4	
			CIVIL WORKS				
			EXCAVATION & REINSTATEMENT				
			UNDERGROUND ELECTRICAL ALLOCATION				
			COUNCIL ALIGNMENTS				


NOTES

1. CABLE CONDUIT SHALL BE OF THE FOLLOWING TYPE:
LIGHT DUTY ELECTRICAL CONDUIT TO AS/NZS 2053.
CONDUIT BENDS SHALL HAVE A MINIMUM RADUIS OF 1830mm.
2. CONDUITS SHALL BE 80mm, 100mm OR 125mm AS SPECIFIED BY ENERGEX AND SHALL BE SUPPLIED AND INSTALLED BY THE DEVELOPER OR ENERGEX.
CONDUITS SHALL BE SECURELY SEALED TO PREVENT INGRESS OF DIRT UNTIL CABLE INSTALLATION AND THEN RESEALED.
3. EACH CONDUIT TO BE FITTED WITH A 6mm BRAID POLYPROPYLENE DRAW ROPE TO PULL IN HAULAGE ROPE. (MINIMUM BREAKING STRENGTH OF 1.0kN.)
4. ENERGEX MAY NEED TO INSTALL AN EARTH WIRE AND EARTH RODS IN CONDUIT TRENCHES FROM THE SUBSTATION SITE.
5. ELECTRICITY SUPPLY CONDUITS AND CABLES SHALL HAVE POLYMERIC CABLE PROTECTION COVER STRIPS PLACED 100mm ABOVE THE TOP CONDUIT FACE OF THE ELECTRICITY SUPPLY CONDUITS AND CABLES. CABLE PROTECTION COVER STRIP SHALL BE LAPPED WHEN PLACED TOGETHER; 100mm MINIMUM ALONG THE LONGITUDINAL AXIS, 40mm MINIMUM ALONG THE TRAVERSE AXIS AND SHALL EXTEND 40mm MINIMUM PAST THE EXTERNAL EDGES OF THE CONDUIT/CABLE BANK.
6. POLYMERIC CABLE PROTECTION COVER SHALL BE A MINIMUM OF 5mm THICK AS DESCRIBED IN THE AUSTRALIAN STANDARD; AS4702 FPR POLYMERIC CABLE PROTECTION COVERS.
7. REDUCED CONDUIT SEPARATION MAY BE ACCEPTED TO AVOID SPECIFIC OBSTACLES
8. MIN. DEPTHS SHOWN ARE THOSE DEPTHS REQUIRED BY CODE OF PRACTICE, WORKS (MINOR ROADS) AND DMR (ARTERIAL ROADS).



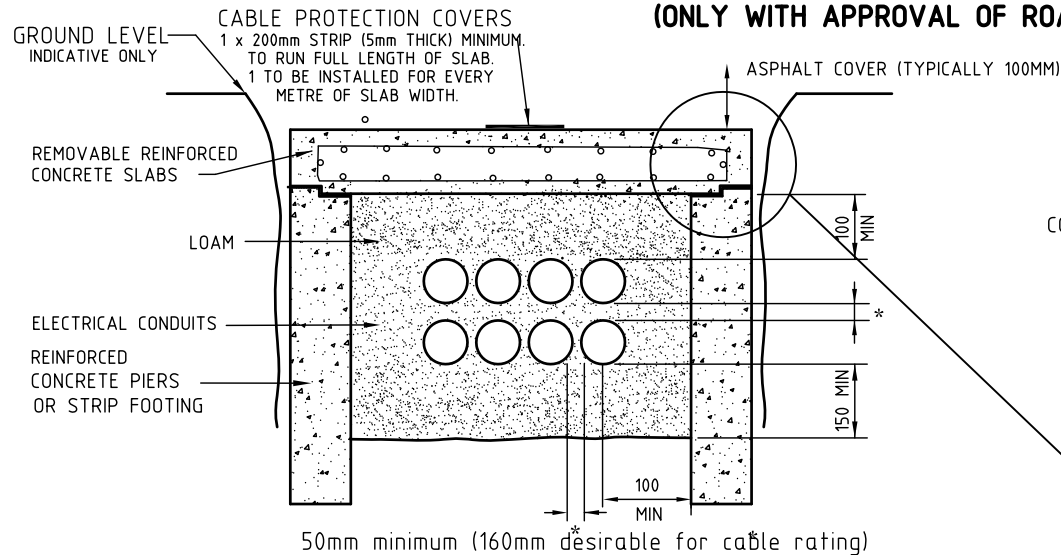
Separation for conduits
50mm Minimum (160mm Desirable for cable rating)

TYPICAL CONDUIT DETAIL

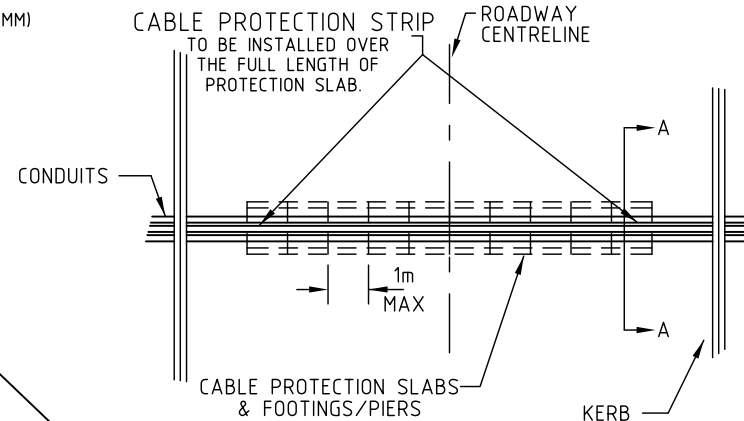
ORIGINAL ISSUE	 © COPYRIGHT 2008 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL		APP'D	R. ENGLISH		CAD
		CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION STANDARD PRACTICE		DATE	10/10/08	6229-A4 A	
				RECD		SECTION	SUB-SECT.
		CKD	P.BARNEY	C2		3.1	
		DWN	F.AMANPOOR	SHT 1		OF 1	
				FILE UDC-C2-3.1-1A.DWG			

METHOD OF LAYING UNDERGROUND ELECTRICAL CONDUITS WHERE STANDARD COVER CANNOT BE ACHIEVED

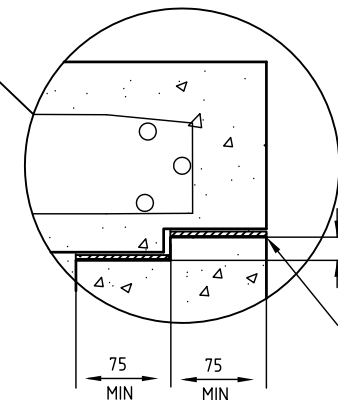
(ONLY WITH APPROVAL OF ROAD AUTHORITY)



PROTECTION SLAB SECTION A-A




PROTECTION SLAB PLAN

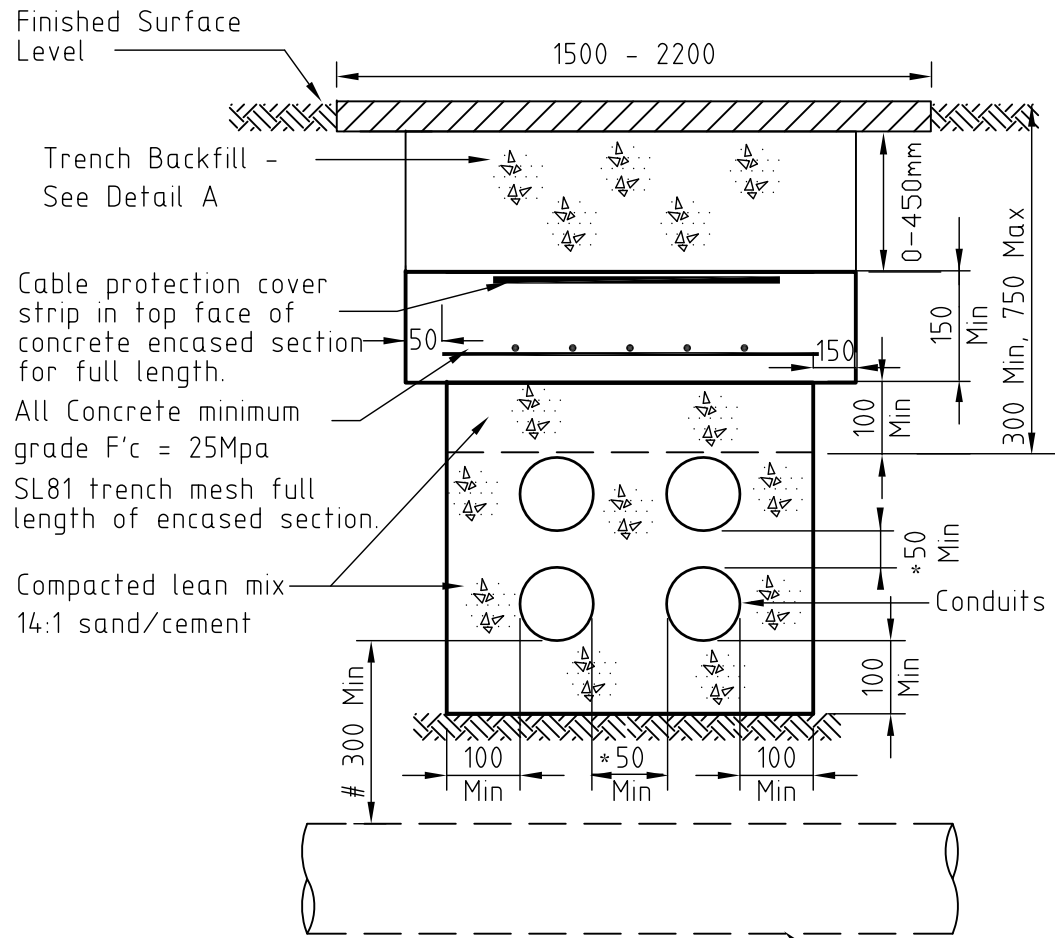


10mm THICK NON-ABSORBANT SEMIRIGID POLYETHYLENE SHEETS STICKED TO EACH SURFACE USING AN ADHESIVE COMPATIBLE WITH THAT MATERIAL

NOTES

1. Concrete Strip Footings or Piers shall be installed to prevent compression of Electrical Conduits by the Concrete Slabs. Slabs and Footings shall be designed and certified to meet DTMR/Council requirements.
2. The Concrete Protection Slabs & Footings/Piers shall be continued until minimum cover of 750mm is achieved or conduits rise to terminate.
3. The Concrete Protection Slabs shall be detailed + jointed at maximum 1.0m centres and fitted with flush mounted lifting eyes to enable removal.
4. Suitable adhesive shall be applied to the top surface of the Strip Footings/Piers before fixing the polyethylene sheets prior to the Protection Slab is installed/poured.
5. Trenches shall be shaped, backfilled and drained to suit DTMR/Council requirements (e.g Pavement drainage to be provided on uphill side of structure & trenches shall be wide enough for suitable compaction.)

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	B	APPD		A. Smith de Perez	CIVIL WORKS	EXCAVATION AND REINSTATEMENT	DATE	10/10/08	6229-A4
A	B	CKD	A. De Costa	CONDUIT INSTALLATION	REDUCED COVER	RECD		SECTION	SUB-SECT.
		DRN	P. Reif			CKD	P.BARNEY	C2	3.2
		UPDATE NOTES				DWN	F.AMANPOOR	SHT 1 OF 3	
								FILE UDC-C2-3.2-1B.DWG	



All Concrete minimum grade F'c = 25Mpa
SL81 trench mesh full length of encased section.

Compacted lean mix 14:1 sand/cement

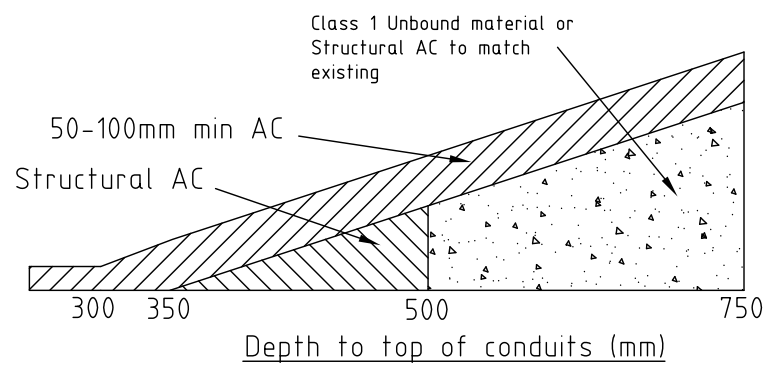
* 50mm (160mm desirable for cable rating)
This dimension may be reduced to 100mm for storm water crossings only.


Other Service Authority Plant obstructing cable installation.

NOTES:

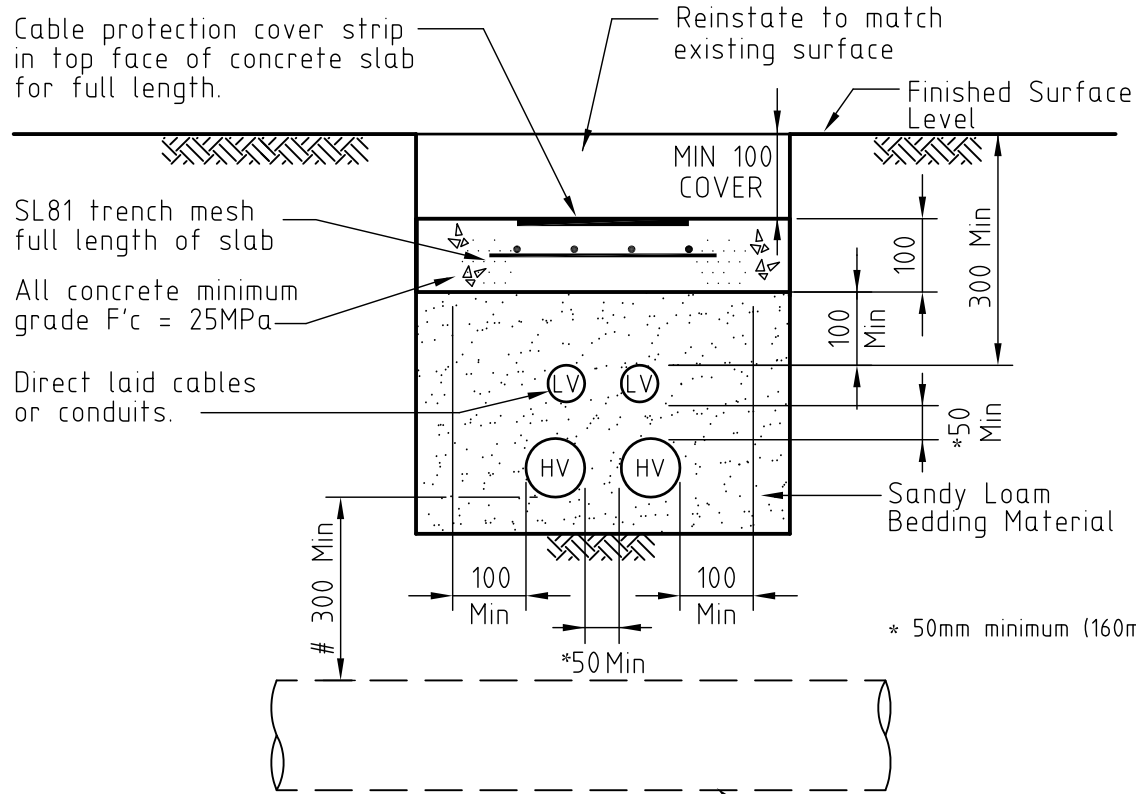
1. Reduced depth limited to 5m of continuous trench and shall not exceed 5% of the total length of trenching on any one project.
2. Transition between standard depth and reduced cover shall be gradual, and shall not exceed pulling bending radius for cables to be run in conduits.
3. The total cover over conduits from the finished surface shall exceed 300mm.
4. This construction shall only be used if there is no other practical / alternative solution.

DETAIL A: BACKFILL DETAILS ABOVE CONCRETE SLAB



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	APPD	A. Smith de Perez			DATE	10/10/08	6229-A4		C			
	CKD	J. Lansley			RECD		SECTION	C2		SUB-SECT.	3.2	
	DRN	J. Lansley			CKD	P. BARNEY	SHT 2		OF 3			
	Trench mesh changes to SL81				DWN	F. AMANPOOR	FILE UDC-C2-3.2-2C.DWG					

**CIVIL WORKS
EXCAVATION AND REINSTATEMENT
CONDUIT INSTALLATION
REDUCED COVER - COUNCIL ROADS**



NOTES:

1. Reduced depth limited to 5m of continuous trench and shall not exceed 5% of the total length of trenching on any one project.
2. Transition between standard depth and reduced cover shall be gradual, and shall not exceed pulling bending radius for cables to be run in conduits.
3. The total cover over conduits from the finished surface shall exceed 300mm.
4. This construction shall only be used if there is no other practical / alternative solution.

* 50mm minimum (160mm desirable for cable rating)

This dimension may be reduced to 100mm for storm water crossings only.

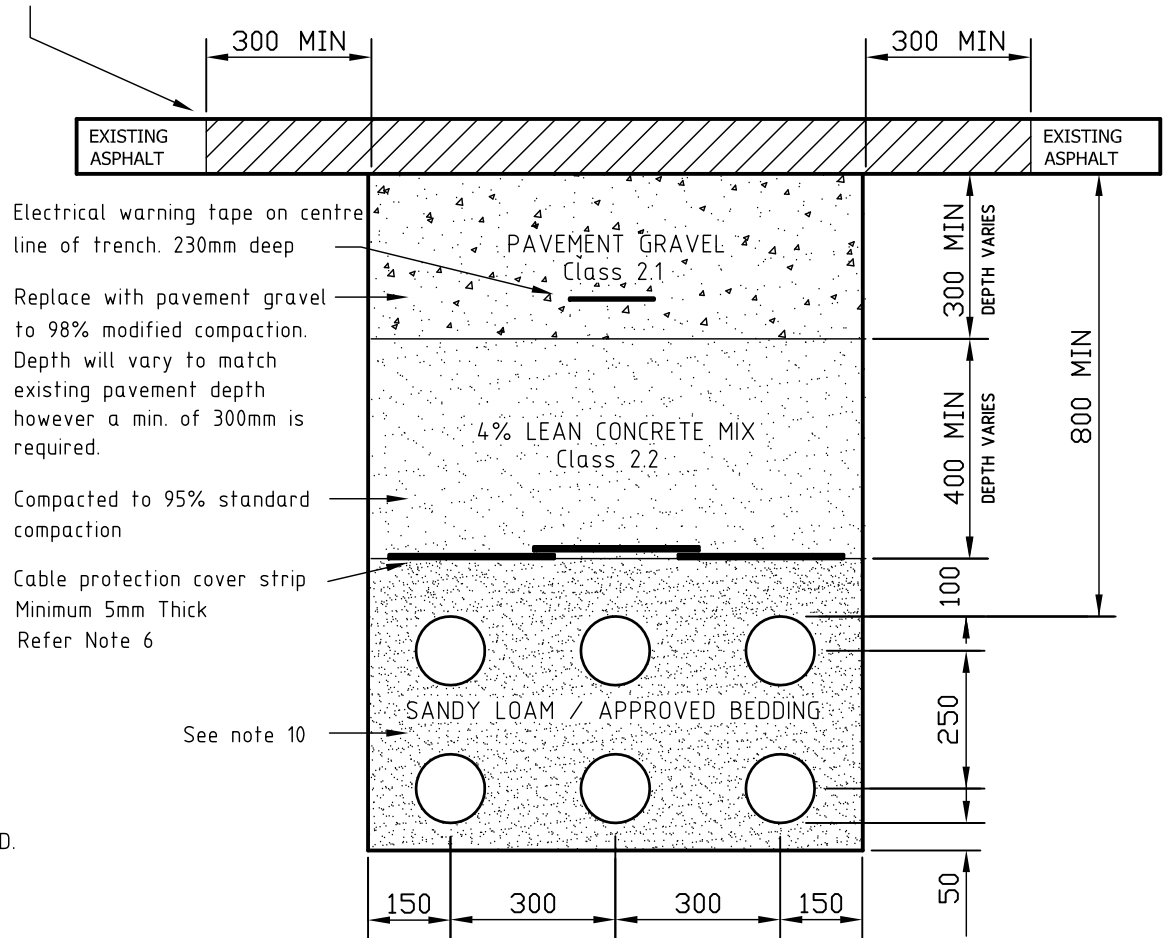
Other Service Authority Plant obstructing cable installation.

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	APPD	A. Smith de Perez			DATE	10/10/08	CIVIL WORKS		RECD		6229-A4 C	
	CKD	J. Lansley			RECD		EXCAVATION AND REINSTATEMENT		CKD	P. BARNEY	SECTION	SUB-SECT.
	DRN	J. Lansley			CKD	P. BARNEY	CONDUIT INSTALLATION		DWN	F. AMANPOOR	C2	3.2
	Trench Mesh updated SL81.				DWN	F. AMANPOOR	REDUCED COVER - FOOTPATHS				SHT 3 OF 3	
A	C								FILE UDC-C2-3.2-3C.DWG			


NOTES

1. CABLE CONDUIT SHALL BE OF THE FOLLOWING TYPE: LIGHT DUTY ELECTRICAL CONDUIT TO AS/NZS 2053. CONDUIT BENDS SHALL HAVE A MINIMUM RADIUS OF 1830mm.
2. CONDUITS SHALL BE 80mm, 100mm OR 125mm AS SPECIFIED BY ENERGEX AND SHALL BE SUPPLIED AND INSTALLED BY THE DEVELOPER OR ENERGEX. CONDUITS SHALL BE SECURELY SEALED TO PREVENT INGRESS OF DIRT UNTIL CABLE INSTALLATION AND THEN RESEALED.
3. EACH CONDUIT TO BE FITTED WITH A 6mm BRAID POLYPROPYLENE DRAW ROPE TO PULL IN HAULAGE ROPE. (MINIMUM BREAKING STRENGTH OF 1.0kN)
4. ENERGEX MAY NEED TO INSTALL AN EARTH WIRE AND EARTH RODS IN CONDUIT TRENCHES FROM THE SUBSTATION SITE.
5. POLYMERIC CABLE PROTECTION COVER SHALL BE A MINIMUM OF 5mm THICK AS DESCRIBED IN THE AUSTRALIAN STANDARD AS4702 FPR POLYMERIC CABLE PROTECTION COVERS.
6. ELECTRICITY SUPPLY CONDUITS AND CABLES SHALL HAVE POLYMERIC CABLE PROTECTION COVER STRIPS PLACED 100mm ABOVE THE TOP CONDUIT FACE OF THE ELECTRICITY SUPPLY CONDUITS AND CABLES. CABLE PROTECTION COVER STRIPS SHALL BE LAPPED WHEN PLACED TOGETHER; 100mm MINIMUM ALONG THE LONGITUDINAL AXIS, 40mm MINIMUM ALONG THE TRANSVERSE AXIS AND SHALL EXTEND 40mm MINIMUM PAST THE EXTERNAL EDGES OF THE CONDUIT/CABLE BANK
7. REDUCED CONDUIT SEPARATION MAY BE ACCEPTED TO AVOID SPECIFIC OBSTACLES
8. TO ALLOW FOR THE REDUCED THERMAL RESISTIVITY OF THE BACKFILL MATERIAL, LARGER CABLES MAY NEED TO BE INSTALLED.
9. THE ROAD CROSSING SHOULD, PREFERABLY, BE AS CLOSE TO PERPENDICULAR TO THE RUNNING LANE AS POSSIBLE.
10. INSTALL REQUIRED NUMBER OF CONDUITS FOR IMMEDIATE AND PLANNED FUTURE USE.

Cut back minimum of 300mm to straight edge and replace with minimum 300mm Asphalt



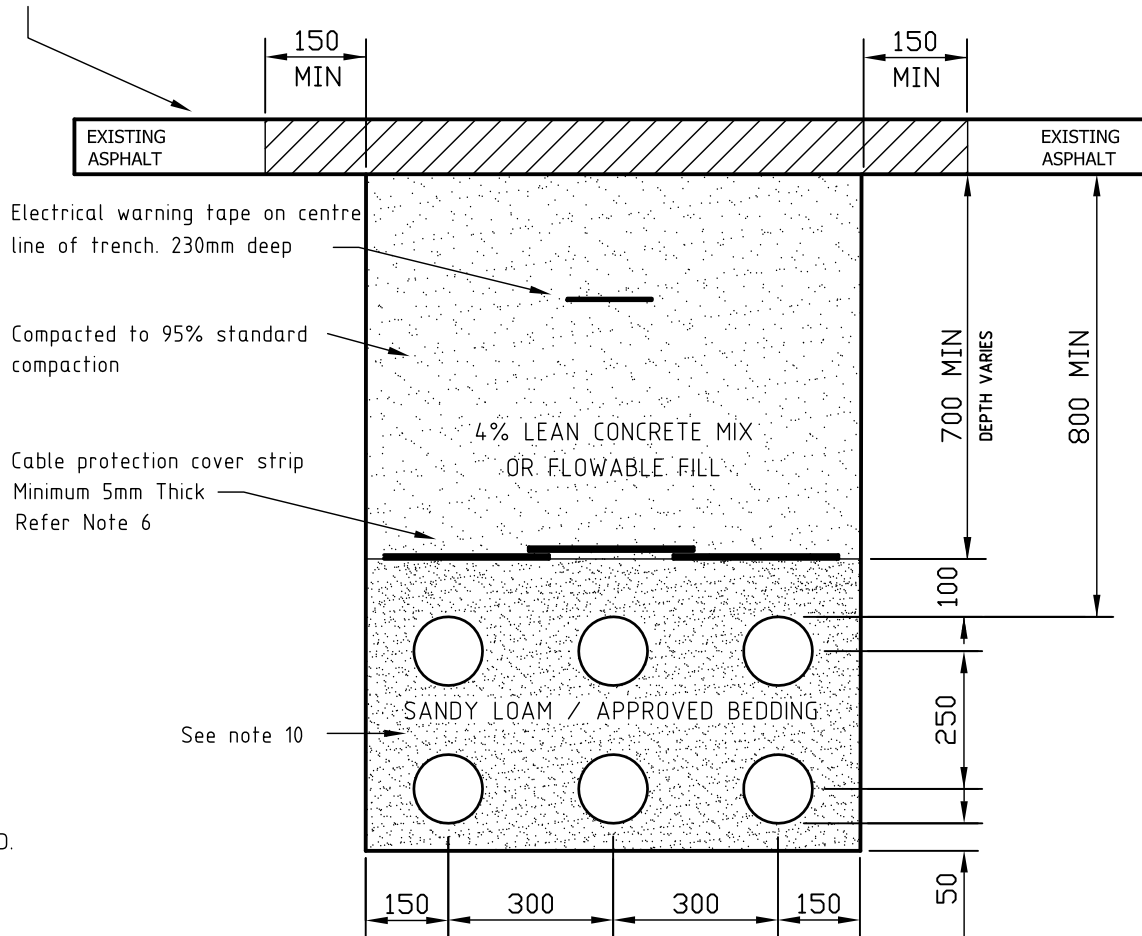
NOTE: LOCAL COUNCIL REQUIREMENTS TO BE CONSULTED BEFORE CONSTRUCTION. AS THEY MAY EXCEED THESE REQUIREMENTS FOR RE-INSTATEMENT IN SOME AREAS.

A	ORIGINAL ISSUE			 © COPYRIGHT 2008 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL		APP'D R. ENGLISH			CAD	
	B	DATE 20/8/15	APPD A SMITH DE PEREZ		CKD -	DRN J LANSLEY	REFERENCE TO LOCAL COUNCIL RE-INSTATEMENT ADDED	DATE 10/10/08	6229-A4	B	
							RECD	SECTION C2	SUB-SECT. 3.3		
							CKD P.BARNEY	SHT 1 OF 2			
							DWN F.AMANPOOR	FILE UDC-C2-3.3-1B.DWG			
CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION DISTRIBUTION CABLES IN LOGAN CITY COUNCIL ROADS											


NOTES

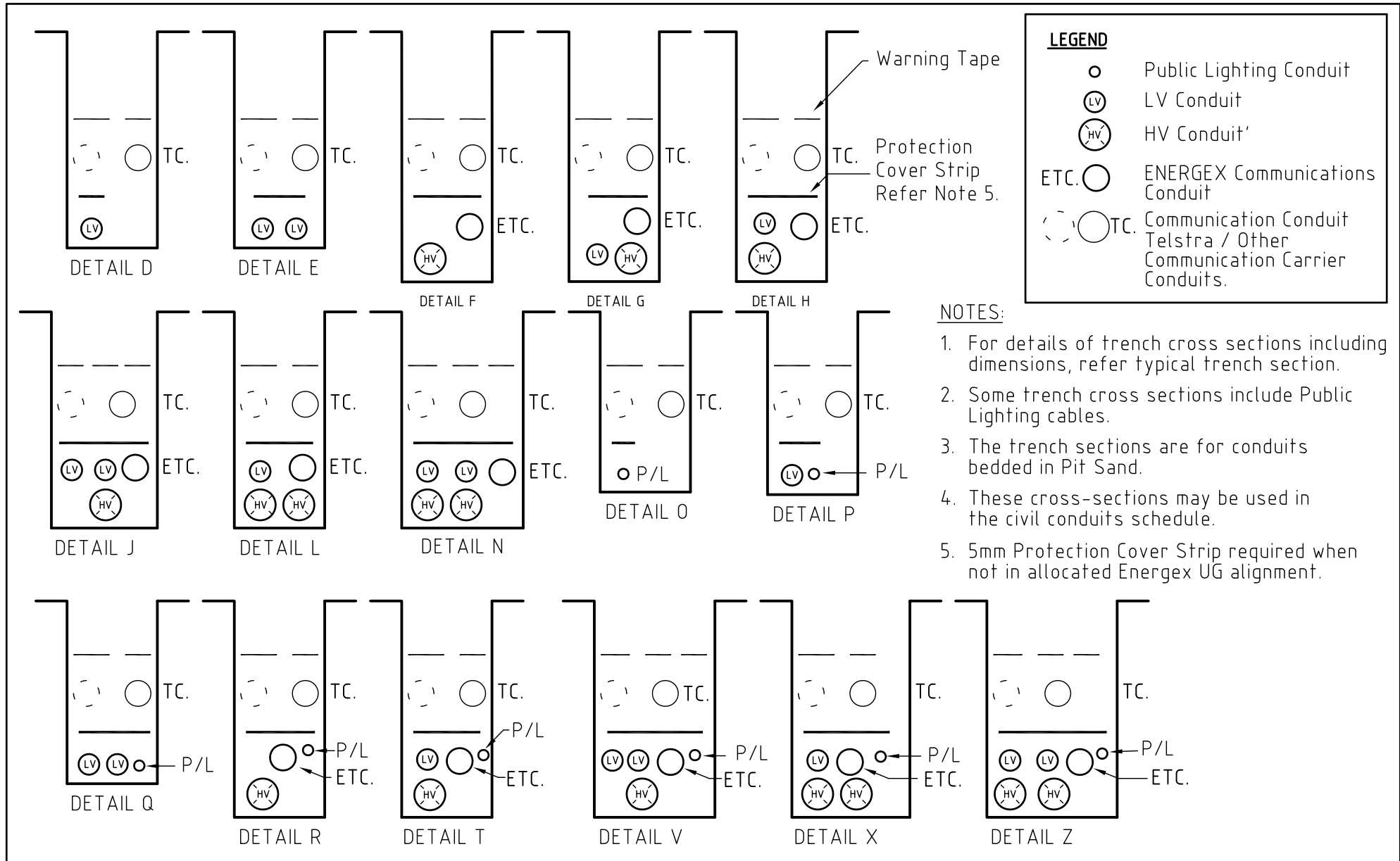
- CABLE CONDUIT SHALL BE OF THE FOLLOWING TYPE: LIGHT DUTY ELECTRICAL CONDUIT TO AS/NZS 2053. CONDUIT BENDS SHALL HAVE A MINIMUM RADIUS OF 1830mm.
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- EACH CONDUIT TO BE FITTED WITH A 6mm BRAID POLYPROPYLENE DRAW ROPE TO PULL IN HAULAGE ROPE. (MINIMUM BREAKING STRENGTH OF 1.0kN.)
- ENERGEX MAY NEED TO INSTALL AN EARTH WIRE AND EARTH RODS IN CONDUIT TRENCHES FROM THE SUBSTATION SITE.
- POLYMERIC CABLE PROTECTION COVER SHALL BE A MINIMUM OF 5mm THICK AS DESCRIBED IN THE AUSTRALIAN STANDARD AS4702 FPR POLYMERIC CABLE PROTECTION COVERS.
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- REDUCED CONDUIT SEPARATION MAY BE ACCEPTED TO AVOID SPECIFIC OBSTACLES
- TO ALLOW FOR THE REDUCED THERMAL RESISTIVITY OF THE BACKFILL MATERIAL, LARGER CABLES MAY NEED TO BE INSTALLED.
- THE ROAD CROSSING SHOULD, PREFERABLY, BE AS CLOSE TO PERPENDICULAR TO THE RUNNING LANE AS POSSIBLE.
- INSTALL REQUIRED NUMBER OF CONDUITS FOR IMMEDIATE AND PLANNED FUTURE USE.

Cut back minimum of 150mm to straight edge and replace with minimum 150mm Asphalt




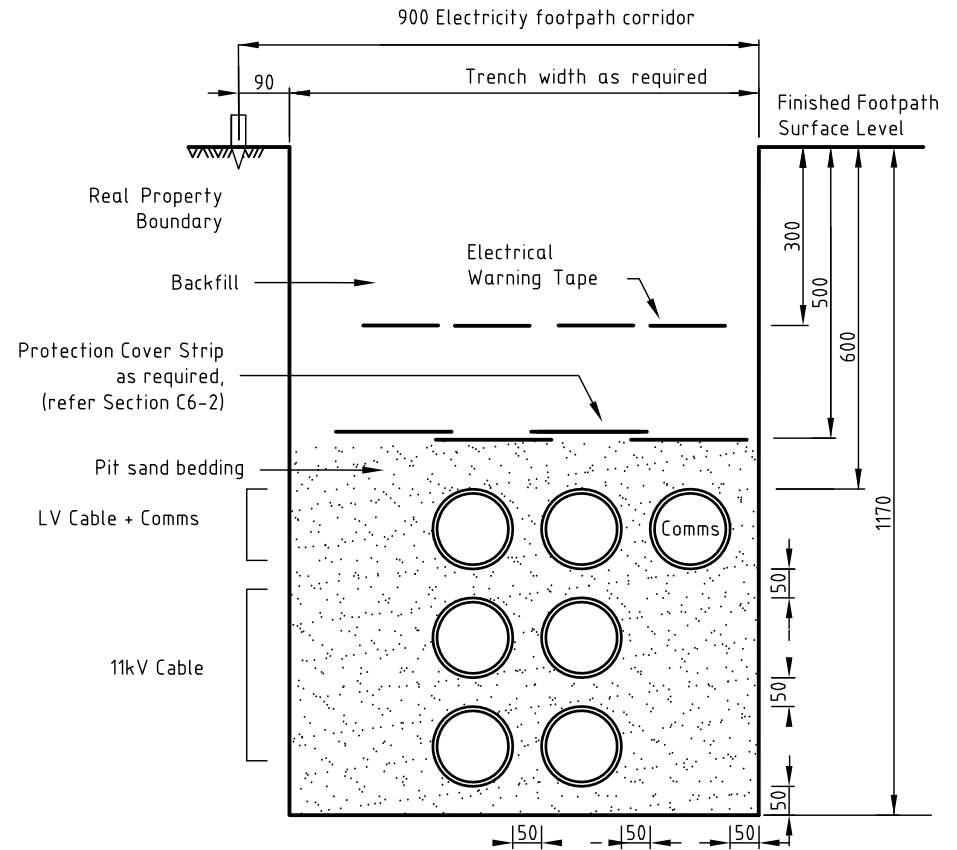
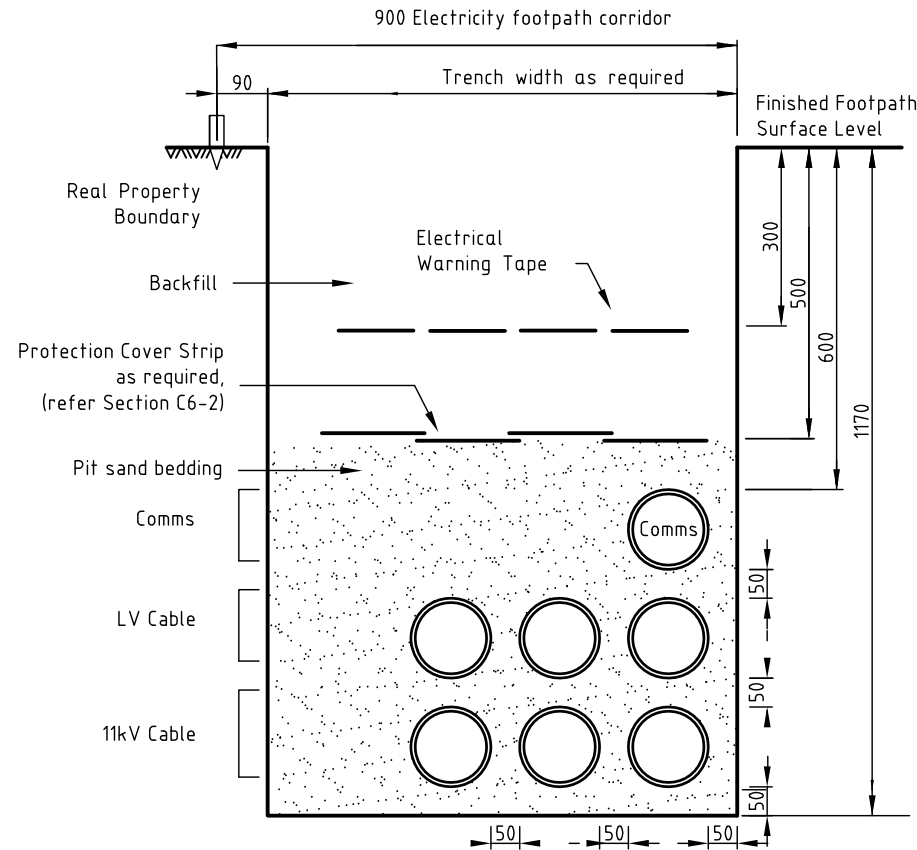
NOTE: LOCAL COUNCIL REQUIREMENTS TO BE CONSULTED BEFORE CONSTRUCTION. AS THEY MAY EXCEED THESE REQUIREMENTS FOR RE-INSTANTMENT IN SOME AREAS.

A	ORIGINAL ISSUE	DATE	APP'D	R. ENGLISH	CAD			
	DATE				20/8/15	6229-A4 B		
	APP'D				A SMITH DE PEREZ	SECTION	SUB-SECT.	
	CKD				-	C2	3.3	
B	DRN	J. LANSLEY	REFERENCE TO LOCAL COUNCIL REQUIREMENTS FOR RE-INSTANTMENT		SHT 2 OF 2			
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A	ORIGINAL ISSUE				UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL			APP'D	R. ENGLISH		CAD
	B	DATE	31/5/11	CIVIL WORKS			DATE	10/10/08	6229-A4 B		
	APP'D	R. ENGLISH	CKD	D. TAYLOR	EXCAVATION AND REINSTATEMENT			RECD		SECTION	SUB-SECT.
	CKD	D. TAYLOR	DRN	A. SYMONDS	CONDUIT INSTALLATION			CKD	D. TAYLOR	C2	3.4
	DRN	A. SYMONDS	URD FOOTPATH & ROADWAY TRENCH SECTIONS - Conduit			DWN	G. TREAGLE	SHT 1 OF 1		FILE UDC-C2-3.4-1B.DWG	



energex
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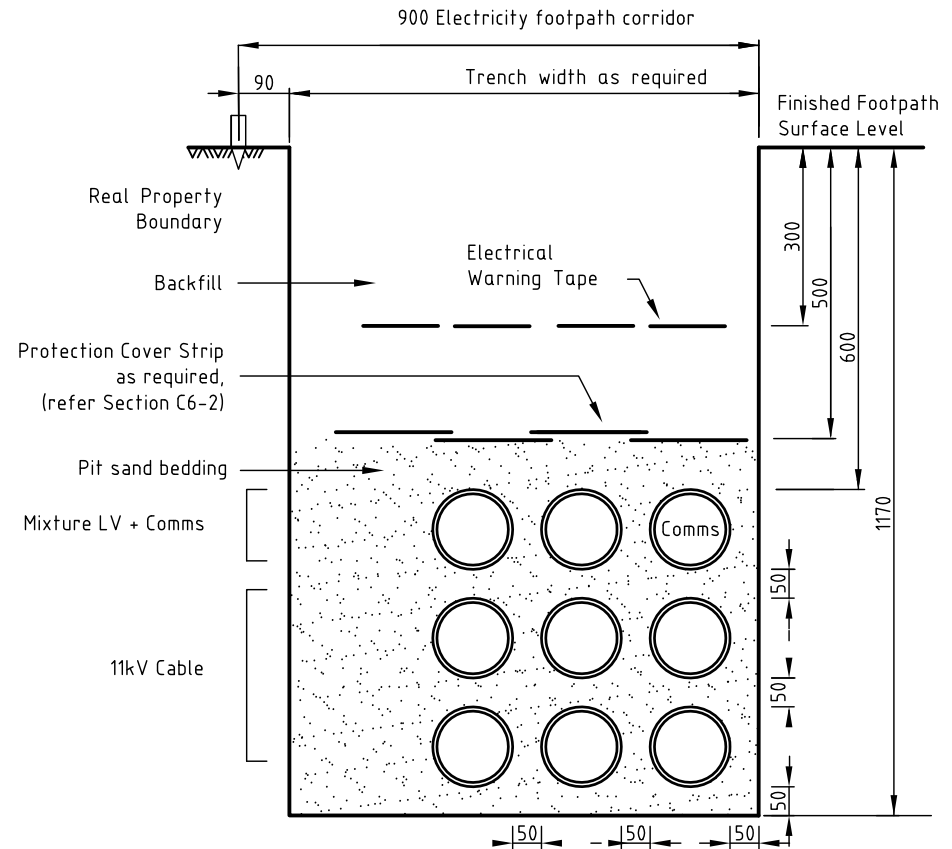
Notes:

- (1) Energex Communication conduit to be 100mm white located top kerbside.
- (2) Power cable conduits to be 125mm orange, light duty.
- (3) Separation for conduits - 50mm minimum, up to 160mm desirable.
- (3) Increased cover required for road crossings.
- (4) Select Backfill and Pit sand bedding complying with section C2-1
- (5) For de-rating factors for cables in duct bank, refer to the Plant Rating Manual

11KV NETWORK


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		CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION		DATE	19/07/11	6229-A4		A	
				RECD	D. TAYLOR	SECTION	SUB-SECT.		
		11KV NETWORK, C&I, & CBD CONDUIT PLACEMENT		CKD	K. GOSDEN	C2		3.5	
				DWN	A. SYMONDS	SHT 1		OF 4	
				FILE UDC-C2-3.5-1A					

C+I, HIGH BLOCK LOADS
(MAJOR SHOPPING CENTRES)

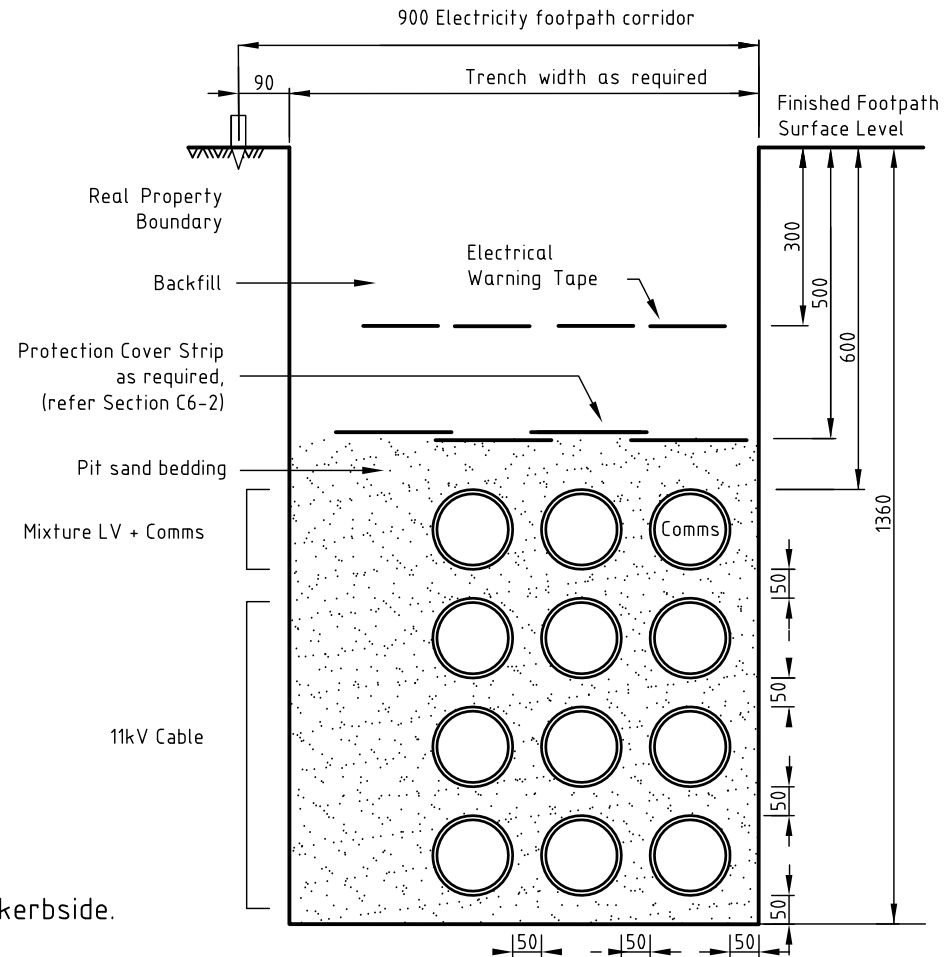


Notes:

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- (2) Power cable conduits to be 125mm orange, light duty.
- (3) Separation for conduits - 50mm minimum, up to 160mm desirable.
- (3) Increased cover required for road crossings.
- (4) Select Backfill and Pit sand bedding complying with section C2-1
- (5) For de-rating factors for cables in duct bank, refer to the Plant Rating Manual


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		CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION 11KV NETWORK, C&I, & CBD CONDUIT PLACEMENT		DATE 19/07/11	6229-A4 A
				RECD D. TAYLOR	SECTION C2 SUB-SECT. 3.5
				CKD K. GOSDEN	SHT 2 OF 4
				DWN A. SYMONDS	FILE UDC-C2-3.5-2A

EXITS FROM C+I SUBSTATIONS

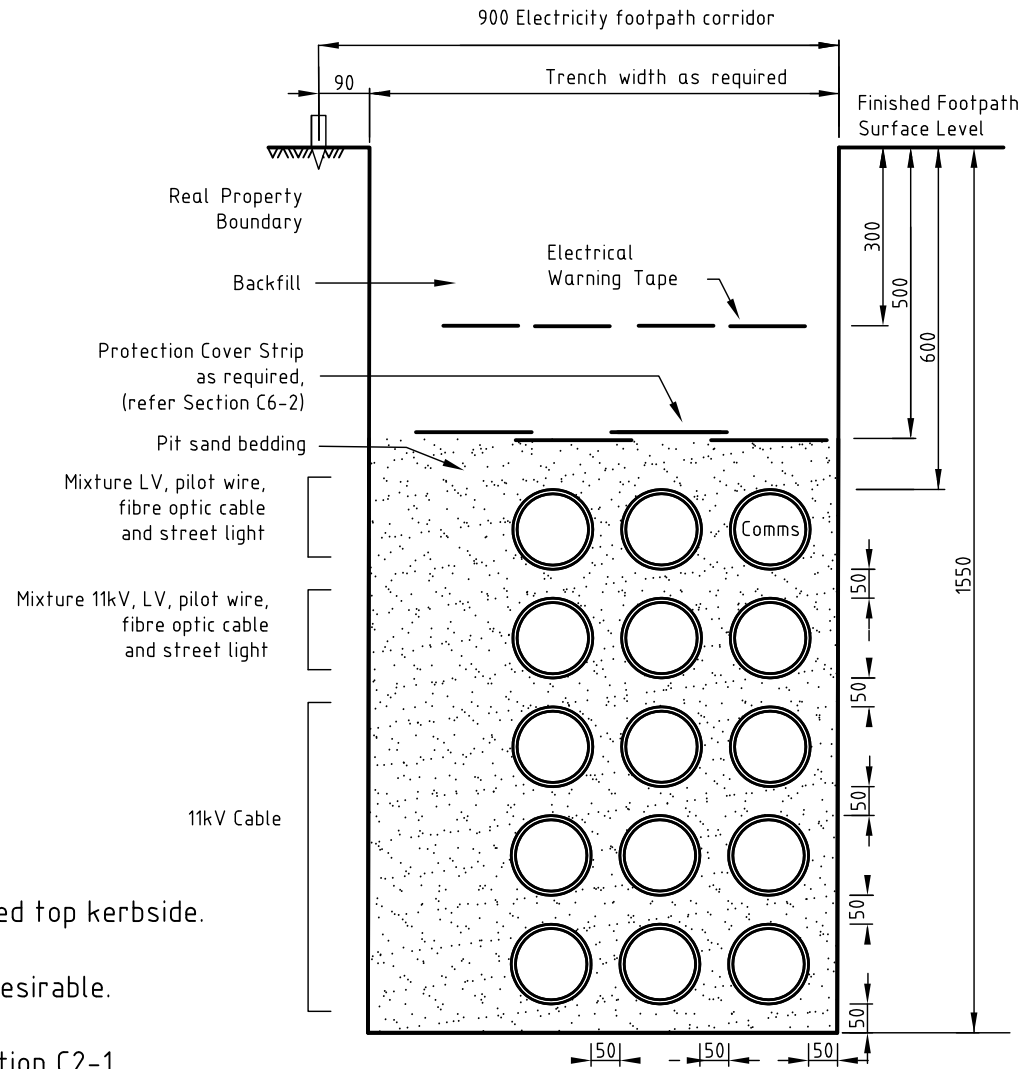


Notes:

- (1) Energex Communication conduit to be 100mm white located top kerbside.
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- (3) Separation for conduits - 50mm minimum, up to 160mm desirable.
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- (4) Select Backfill and Pit sand bedding complying with section C2-1
- (5) For de-rating factors for cables in duct bank, refer to the Plant Rating Manual


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		CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION		DATE	19/07/11	6229-A4		A	
				RECD	D. TAYLOR	SECTION	SUB-SECT.		
		11KV NETWORK, C&I, & CBD CONDUIT PLACEMENT		CKD	K. GOSDEN	C2		3.5	
				DWN	A. SYMONDS	SHT 3		OF 4	
		FILE UDC-C2-3.5-3A							

CBD AND EMERGING CBD LOAD
AREAS (WEST END, MILTON,
NEWSTEAD)



Notes:

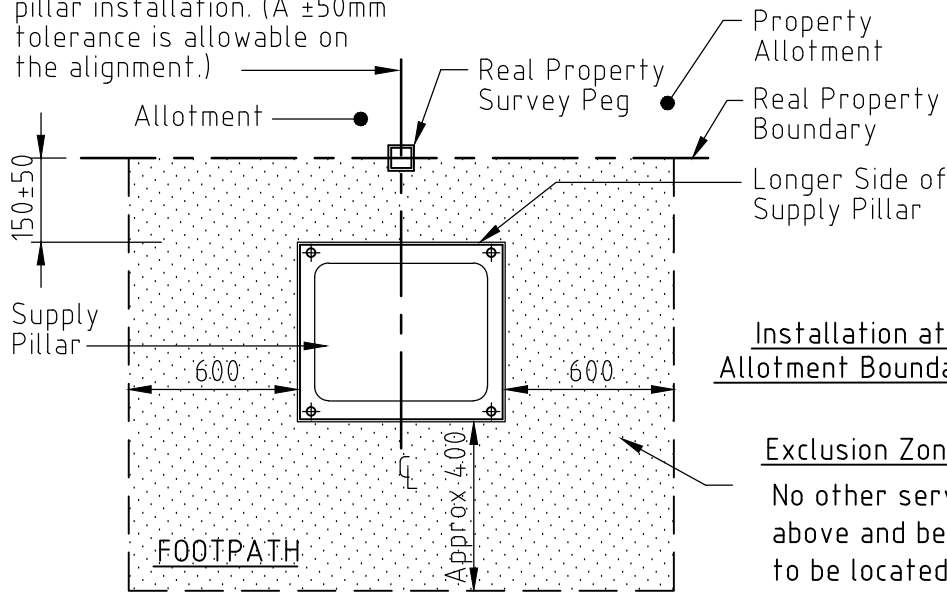
- (1) Energex Communication conduit to be 100mm white located top kerbside.
- (2) Power cable conduits to be 125mm orange, light duty.
- (3) Separation for conduits - 50mm minimum, up to 160mm desirable.
- (3) Increased cover required for road crossings.
- (4) Select Backfill and Pit sand bedding complying with section C2-1
- (5) For de-rating factors for cables in duct bank, refer to the Plant Rating Manual

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		CIVIL WORKS EXCAVATION AND REINSTATEMENT CONDUIT INSTALLATION 11KV NETWORK, C&I, & CBD CONDUIT PLACEMENT		DATE	19/07/11	6229-A4		A
				RECD	D. TAYLOR	SECTION	SUB-SECT.	
				CKD	K. GOSDEN	C2	3.5	
				DWN	A. SYMONDS	SHT 4 OF 4		
		FILE UDC-C2-3.5-4 A						

NOTES:

1. Pillars shall be installed on common ground free of landscaping and permanent structures.
2. Pillars shall be located in areas remote from vehicular access.
3. Should the edge of the pillar base, at ground level, be located less than a 1000mm from the kerb or the edge of trafficable areas, then the pillar shall be protected by two bollards (refer Sheet 4).
4. The lead in conduits to gain access to a consumer's property, remote from pillars, shall be placed and run in the electricity footpath allocation by the customers electrical contractor.

Align Centre Line of base with Centre Line of Survey Peg for pillar installation. (A ± 50 mm tolerance is allowable on the alignment.)

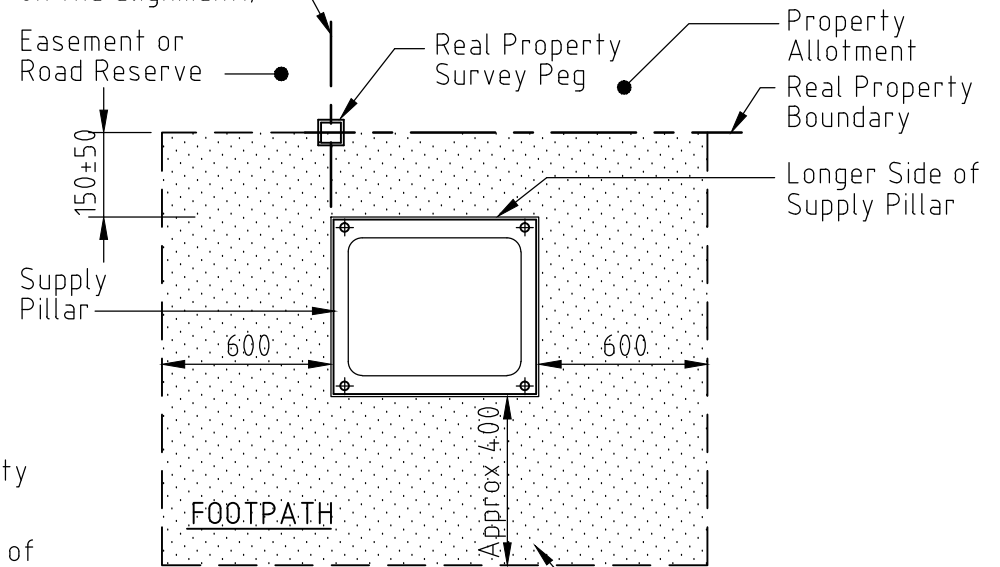


Installation at Allotment Boundaries

Exclusion Zone

No other service authorities' assets including above and below ground plant and equipment are to be located inside this area apart from communications cables and conduits as agreed with ENERGEX.

Offset base to align with centre line of survey peg clear of Road Reserve or Easement area. (A ± 50 mm tolerance is allowable on the alignment.)




Installation at Easement Or Road Reserve Boundary

Exclusion Zone

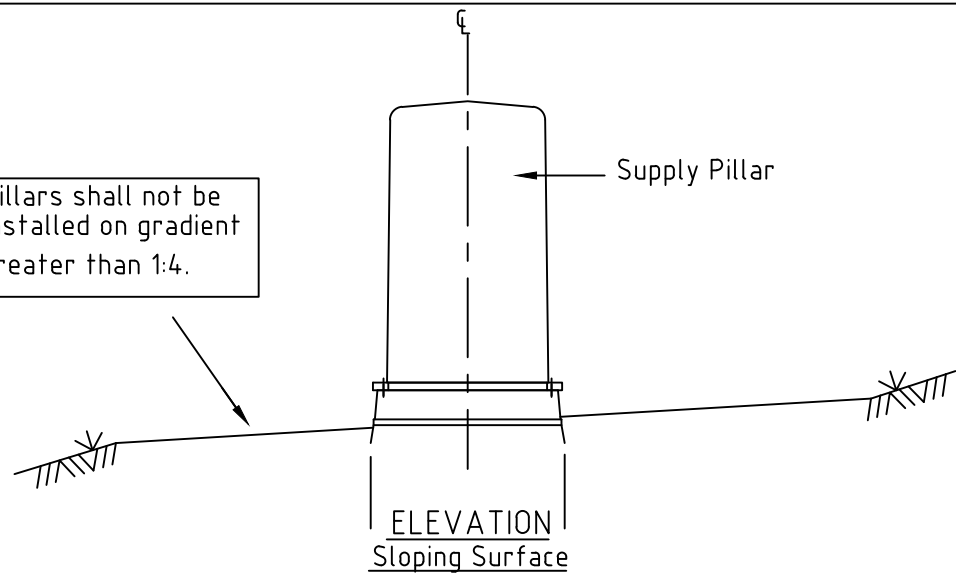
No other service authorities pits or above ground plant is to be located inside this area.

Maintenance Zone

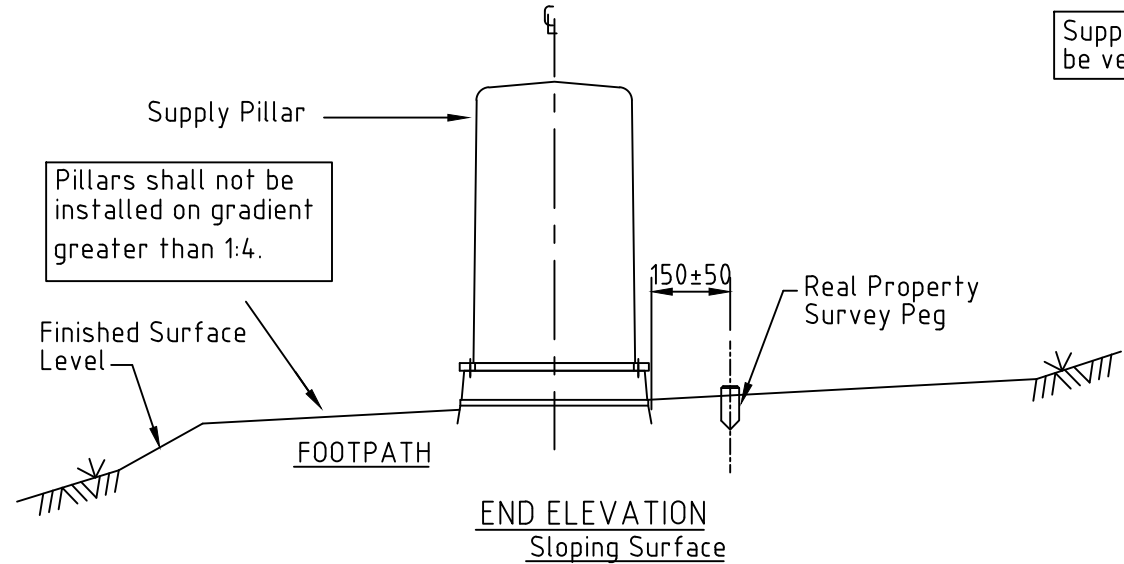
An unobstructed surface is to be provided in front of the pillars for maintenance purposes.

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	B	DATE	9/2/17		CIVIL WORKS		DATE	10/10/08	6229-A4		B
		APPD	J.Lansley		EXCAVATION AND REINSTATEMENT		RECD		SECTION	SUB-SECT.	
		CKD			PILLAR POSITIONING & SERVICE ALLOCATION		CKD	P.BARNEY	C2	4.1	
		DRN	P. Reif		PILLAR - GENERAL REQUIREMENTS		DWN	F.AMANPOOR	SHT 1 OF 5		
Change Maintenance Zone note.								FILE UDC-C2-4.1-1B.DWG			

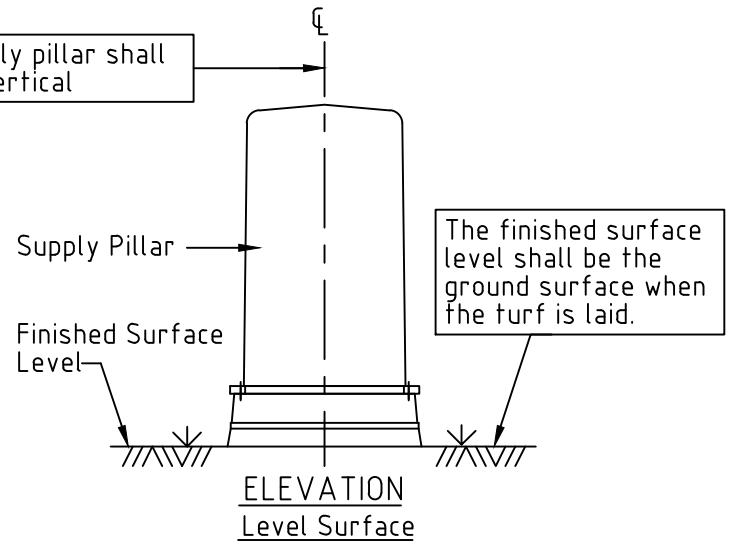
Pillars shall not be installed on gradient greater than 1:4.



Pillars shall not be installed on gradient greater than 1:4.



Supply pillar shall be vertical



NOTES

1. Supply bases shall be installed so that pillars are vertical.
2. Pillars that are NOT VERTICAL shall be electrically safe and shall not create a negative visual aesthetic impact.
3. Pillars shall not be located within swale drains in the road reserve.
4. The exclusion zone around pillars shall be clear of obstructions.

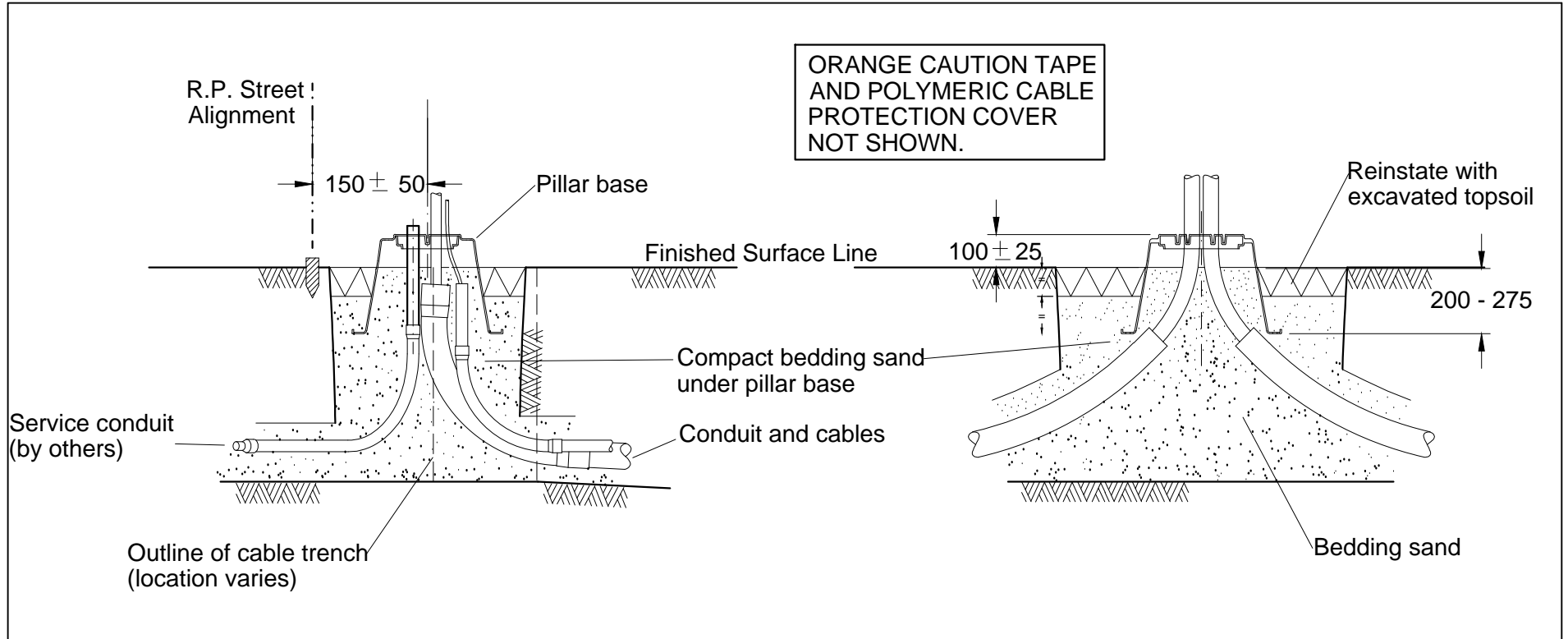
ORIGINAL ISSUE	DATE	APP'D	CKD	DRN	P. Ref
A	9/2/17	J.Lansley			
B					

Remove reference flat area around pillar Update notes.

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CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
PILLAR - GENERAL REQUIREMENTS

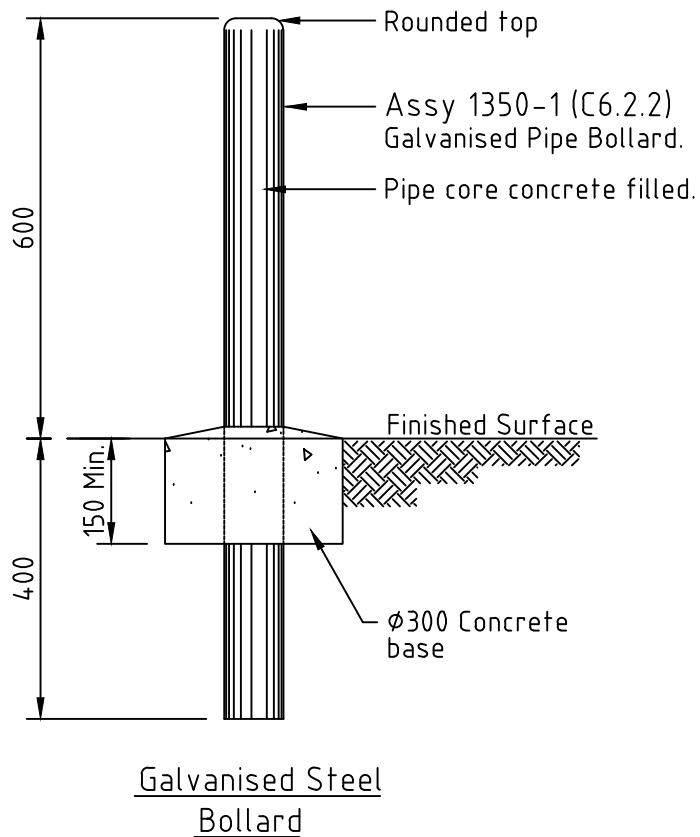
APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	B
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.1
DWN	F.AMANPOOR	SHT 2	OF 5
FILE UDC-C2-4.1-2B.DWG			



NOTES:


1. Locate pillar base with the long side parallel to R.P. Street Alignment
2. Dimension to top of pillar base shall be above the finished surface level (ie. the ground surface after turf is laid)
3. Install pillar base horizontally
4. No excavated soil shall be used as foundation material under pillar base
5. Conduits that finish below ground level shall be sealed off in a manner approved by Energex.

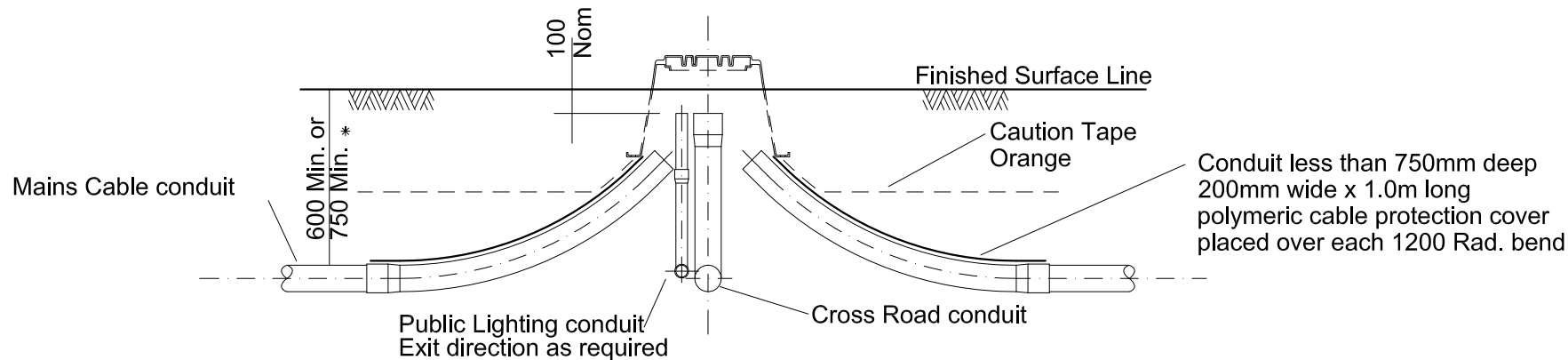
ORIGINAL ISSUE	C	DATE	16/5/17	APP'D J.Lansley	CKD	DRN P Relf	1200 rad 45 deg conduit Bedding sand under pillar	 COPYRIGHT 2017 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION PILLAR - FOUNDATION	APP'D	R. ENGLISH		CAD						
	A													DATE	10/10/08	6229-A4 C			
			RECD												SECTION	C2		SUB-SECT.	4.1
			CKD							P.BARNEY					SHT 3 OF 5				
			DWN							F.AMANPOOR					FILE UDC-C2-4.1-3C.DWG				



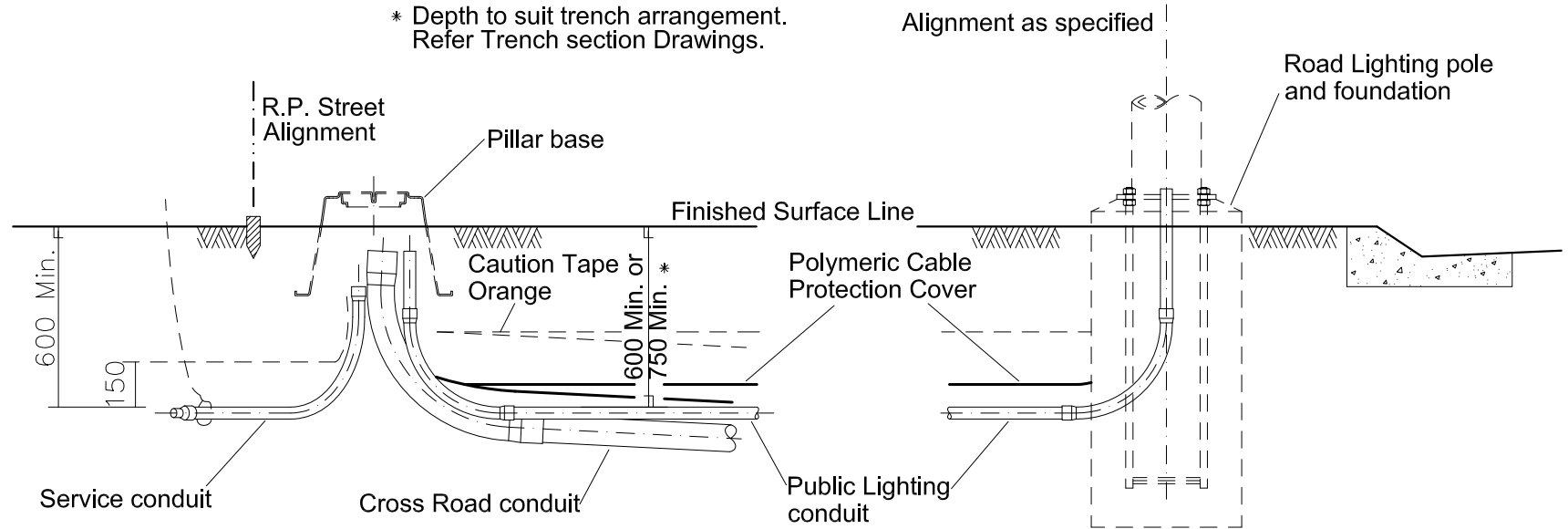
NOTES:

1. Bollards should be located such that they protect the electricity supply pillar from the predominant traffic flow and likely resultant impacts.
2. Bollards shall be located approximately 300mm from the pillar base at ground level.
3. All materials and construction shall be in accordance with Australian Standards.
4. All concrete shall be minimum grade F'c=25MPa.
5. Galvanised pipe bollards may be painted to match the trim of surrounding dwellings.
6. A bollard will not be required provided a barrier such as a fence or other permanent structure protects the pillar from the traffic flow and likely resultant impacts.
7. Refer Sheet 1 Note 3 for bollard requirement.


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	B						DATE	20/8/15	10/10/08	6229-A4		B
							CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION PILLAR - BOLLARD DETAIL		RECD		SECTION	SUB-SECT.
									CKD	P. BARNEY	C2	4.1
									DWN	F. AMANPOOR	SHT 4 OF 5	
									FILE UDC-C2-4.1-4B.DWG			



* Depth to suit trench arrangement. Refer Trench section Drawings.



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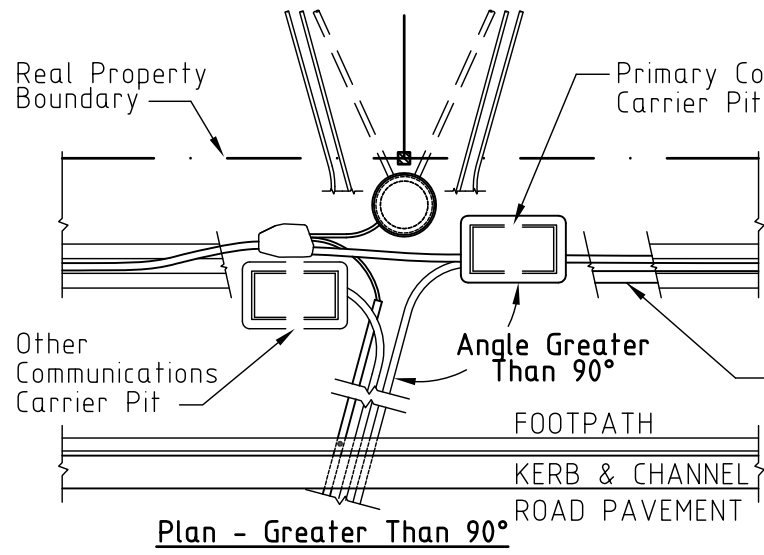
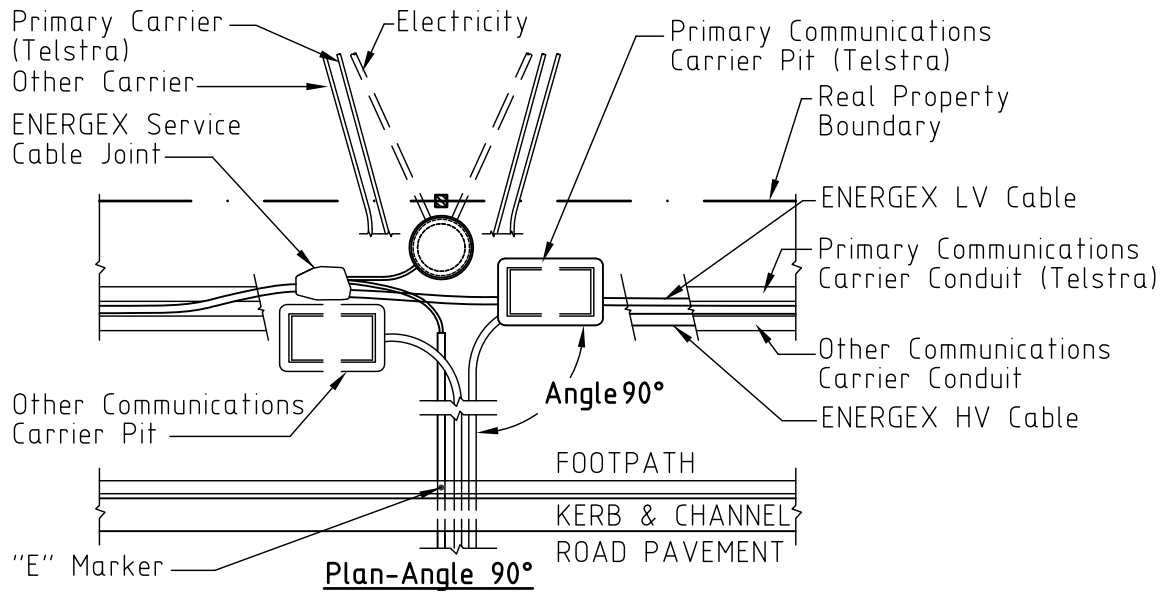
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CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
PILLAR - CONDUIT ENTRIES

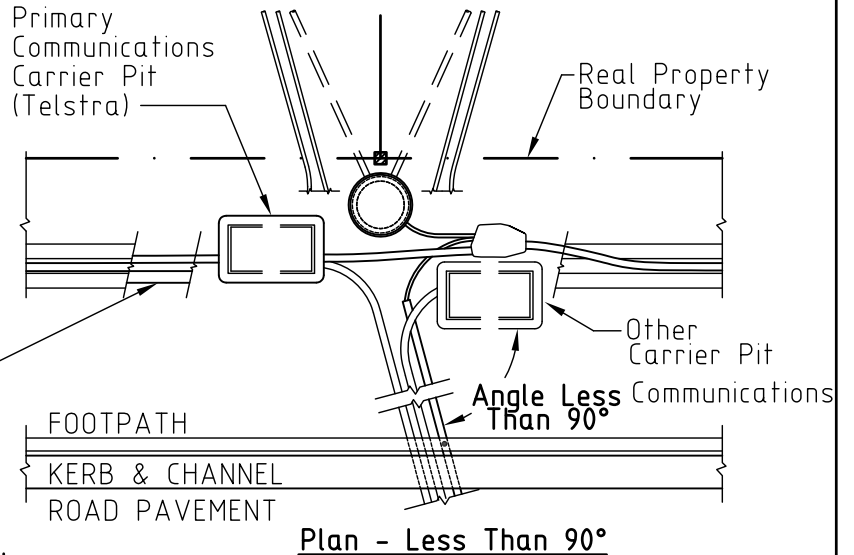
APP'D	J.LANSLEY			CAD
DATE	16/5/17	6229-A4	A	
RECD		SECTION	SUB-SECT.	
CKD	P.RELF	C2	4.1	
DWN	T.BORG	SHT 5		OF 5
FILE UDC-C2-4.1-5A.DWG				

NOTE:
The primary communication pit locations shall be on the right hand side of the electricity supply pit or pillar when viewed from the kerb line. Exceptions to this arrangement are shown on this drawing.

NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.



PIT CONSTRUCTION



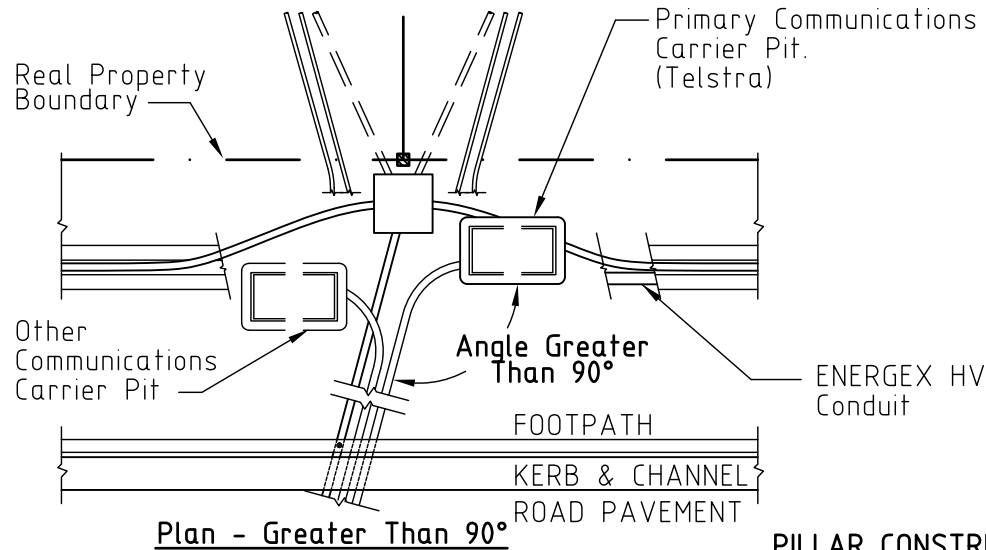
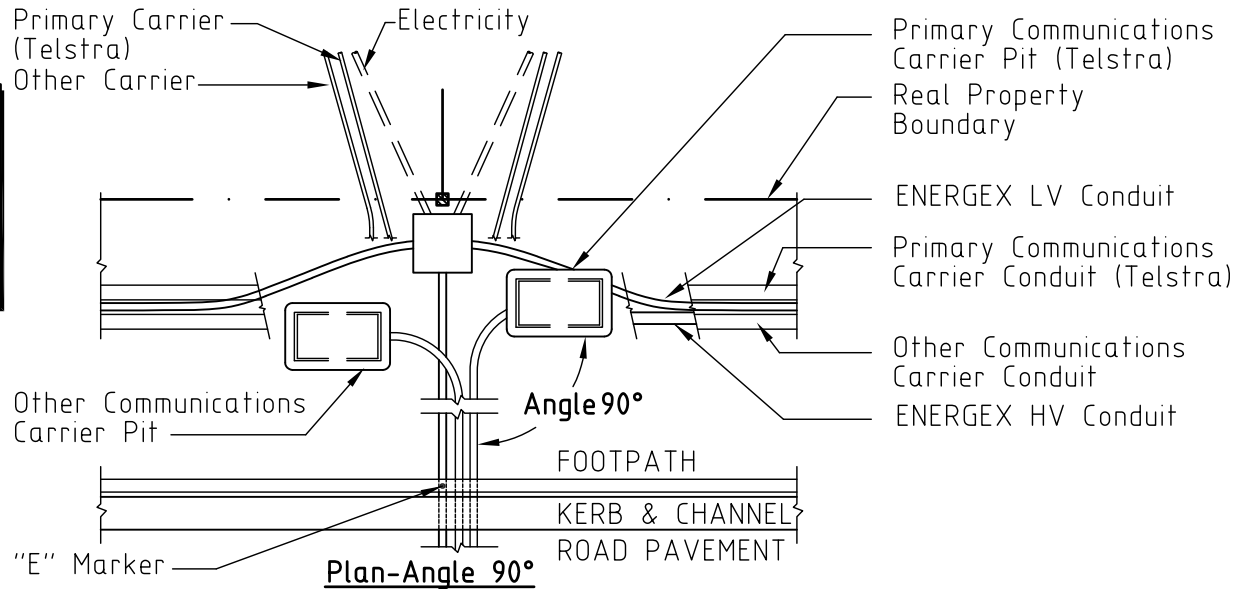
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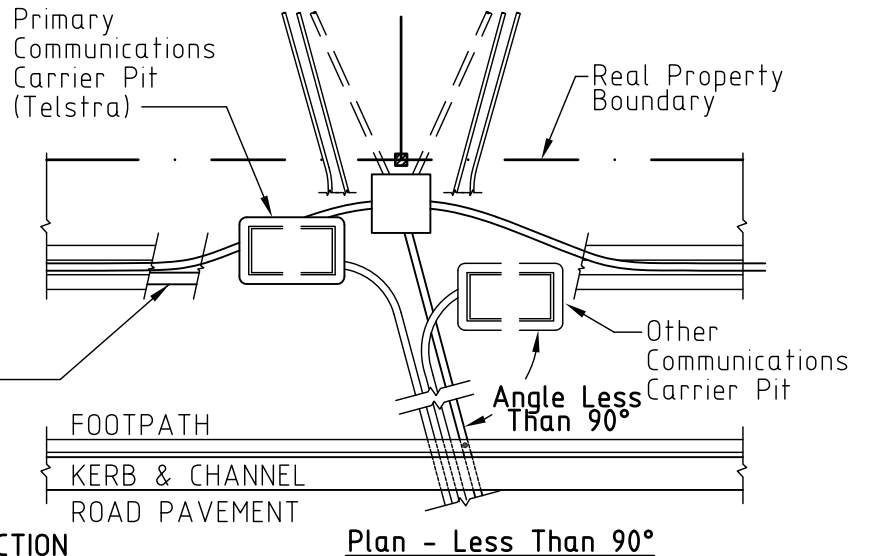
UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
COMMUNICATION PITS ALTERNATIVE LOCATIONS

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P. BARNEY	C2	4.2
DWN	F. AMANPOOR	SHT 1 OF 2	
FILE UDC-C2-4.2-1A.DWG			

NOTE:
 The primary communication pit locations shall be on the right hand side of the electricity supply pit or pillar when viewed from the kerb line.
 Exceptions to this arrangement are shown on this drawing.



PILLAR CONSTRUCTION



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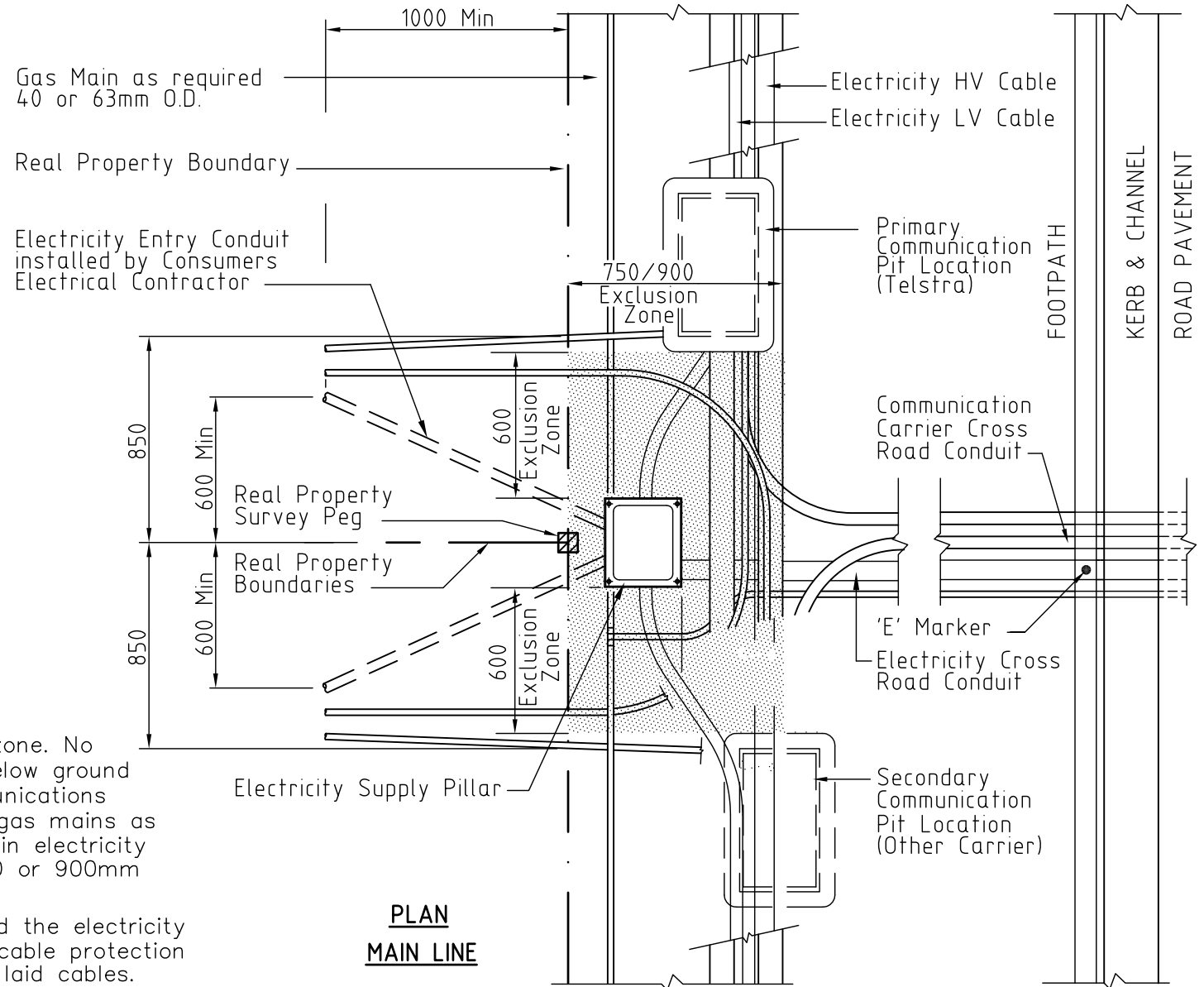
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CIVIL WORKS
 EXCAVATION AND REINSTATEMENT
 PILLAR POSITIONING & SERVICE ALLOCATION
 COMMUNICATION PITS ALTERNATIVE LOCATIONS

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4 A	
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.2
DWN	F.AMANPOOR	SHT 2 OF 2	
FILE UDC-C2-4.2-2A.DWG			




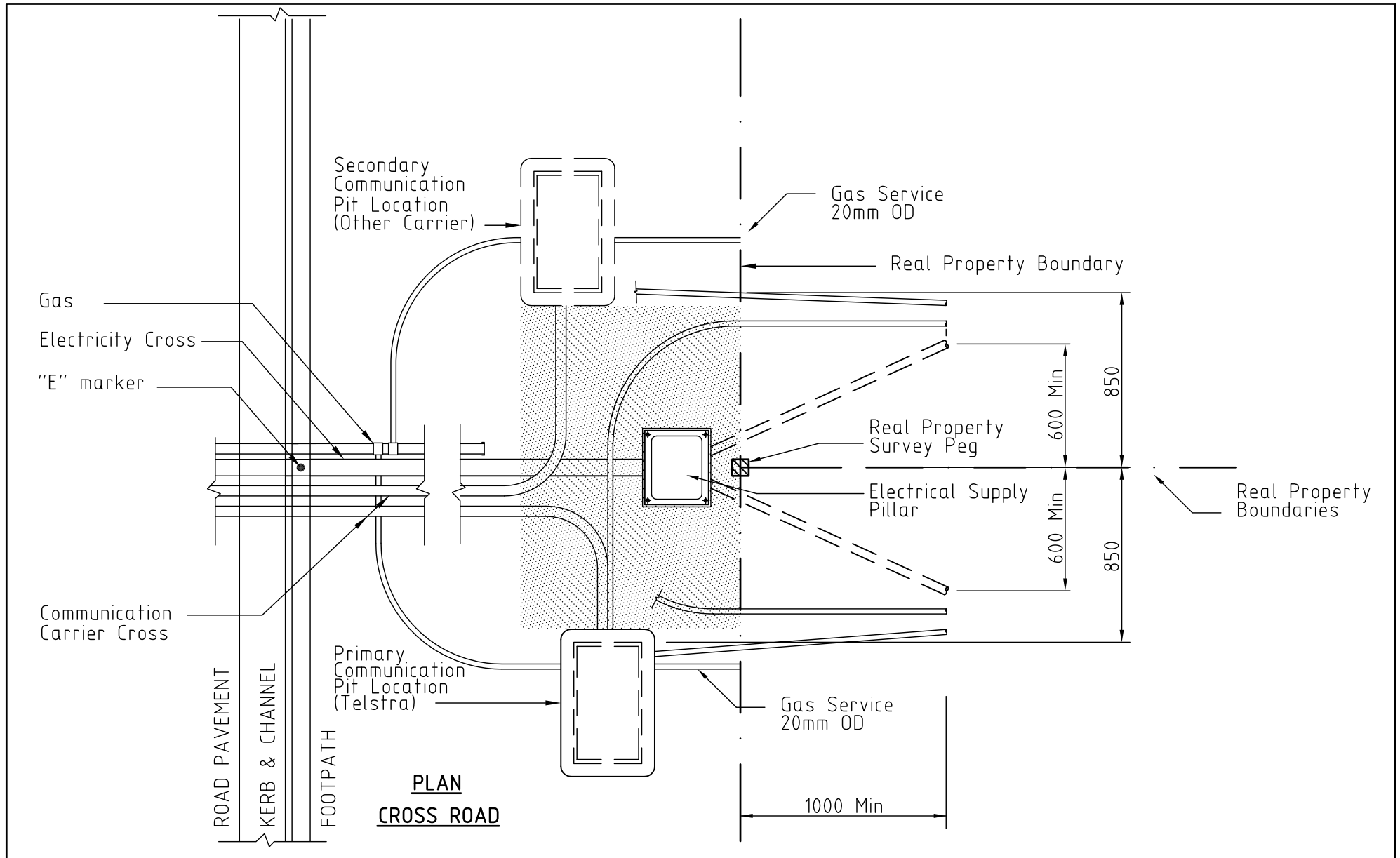
NOTES:


1.ENERGEX pillar exclusion zone. No non-ENERGEX above or below ground assets, apart from communications cables and conduits, and gas mains as agreed with ENERGEX, within electricity allocation of footpath, 750 or 900mm refer Section C2.3.

2.The excavated area around the electricity supply pillar shall have a cable protection cover strip over all direct laid cables.

**PLAN
MAIN LINE**

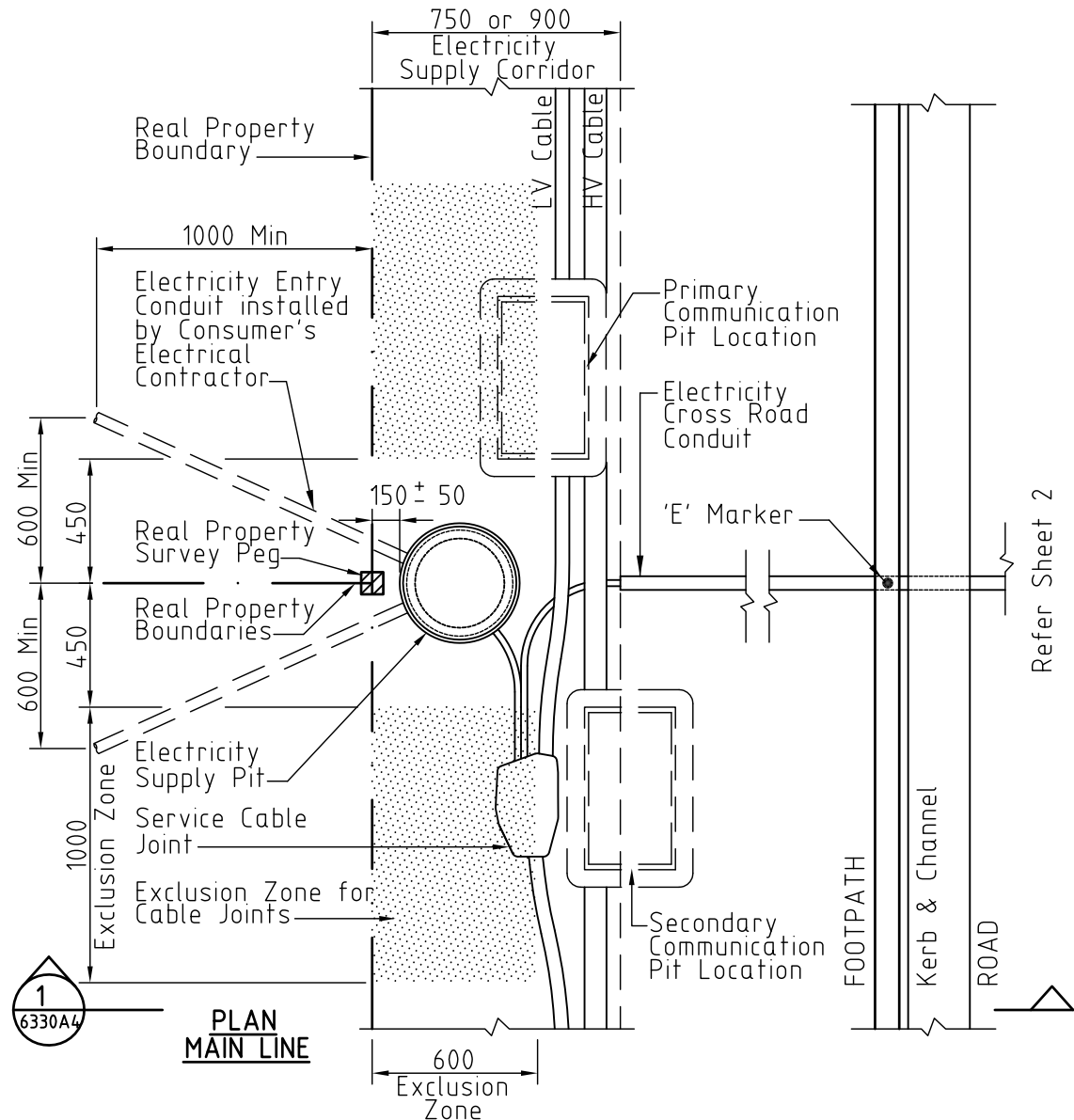
ORIGINAL ISSUE A	 © COPYRIGHT 2008 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL		APP'D R. ENGLISH	CAD	
		CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION ELECTRICITY PILLAR CABLE AND CONDUITS PLAN		DATE 10/10/08	6229-A4 A	
				RECD	SECTION	SUB-SECT.
				CKD P.BARNEY	C2	4.3
				DWN F.AMANPOOR	SHT 1 OF 2	
			FILE UDC-C2-4.3-1A.DWG			




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		CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION ELECTRICITY PILLAR CABLE AND CONDUITS PLAN		DATE	10/10/08	6229-A4 A	
				RECD		SECTION	SUB-SECT.
		CKD	P.BARNEY	C2	4.3		
		DWN	F.AMANPOOR	SHT 2 OF 2			
		FILE UDC-C2-4.3-2A.DWG					

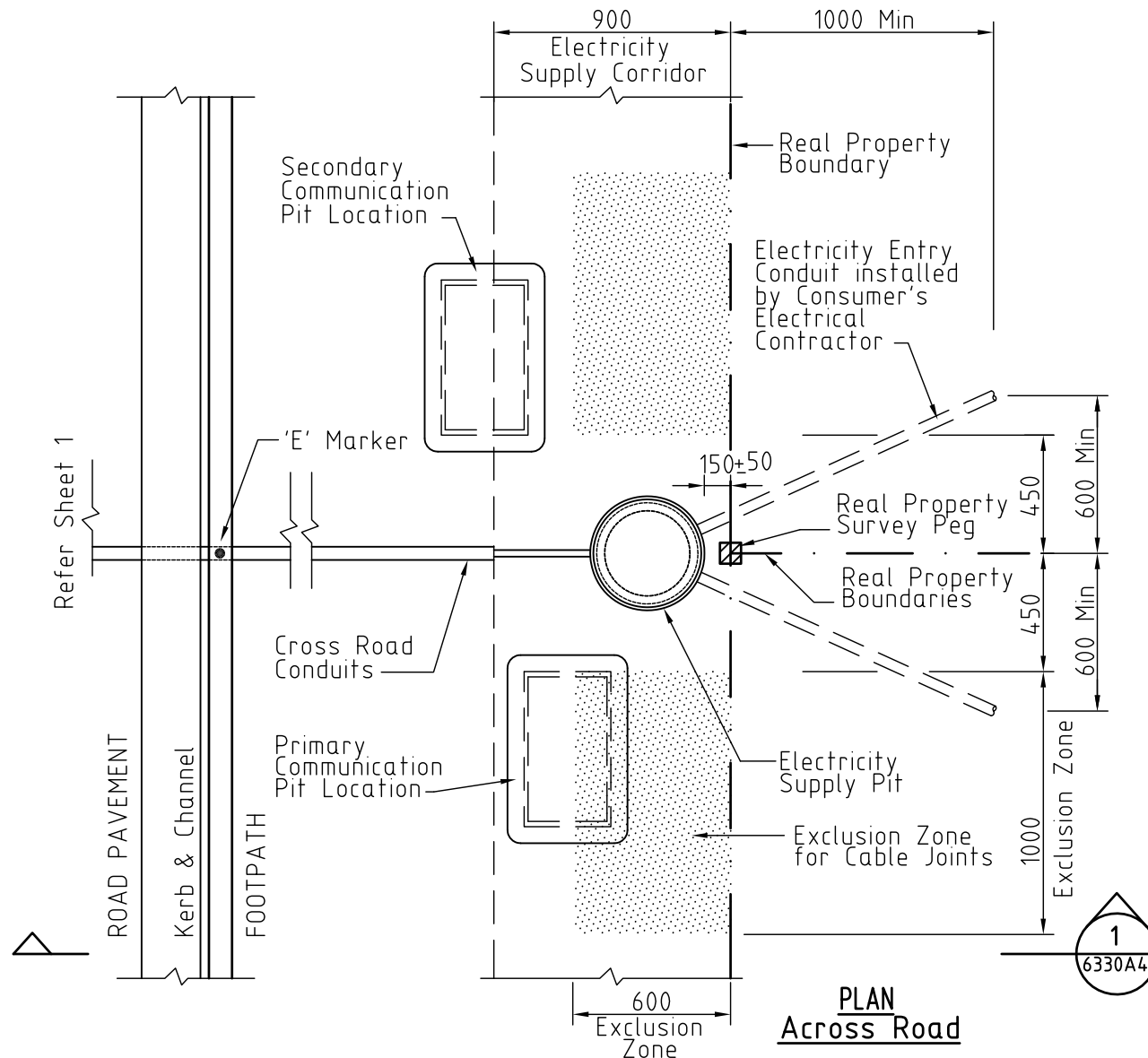
NOTES:

1. The ENERGEX cable joint exclusion zone shall have no other service authorities above ground plant or underground services in this area.
2. The whole excavated area around the electricity supply pit and cable trench shall be covered with cable protection cover strip for a minimum of 2.0 metres either side of the real property survey peg.
3. The service tee cable joint will be generally on the opposite side of the electricity supply pit to the location of the primary communication pit.
4. Hand excavate to install the pit during a later construction phase after cable and joint installation.
5. Primary and Secondary Communication pit locations shown for the situation where conduit service corridor allows both electricity and communication in the same space.




NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.

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				EXCAVATION AND REINSTATEMENT		RECD	SECTION C2
		PILLAR POSITIONING & SERVICE ALLOCATION		CKD P.BARNEY	SHT 1 OF 2		
		ELECTRICITY SUPPLY PITS & CABLES PLAN		DWN F.AMANPOOR	FILE UDC-C2-4.4-1A.DWG		



**PLAN
Across Road**

ORIGINAL ISSUE
A



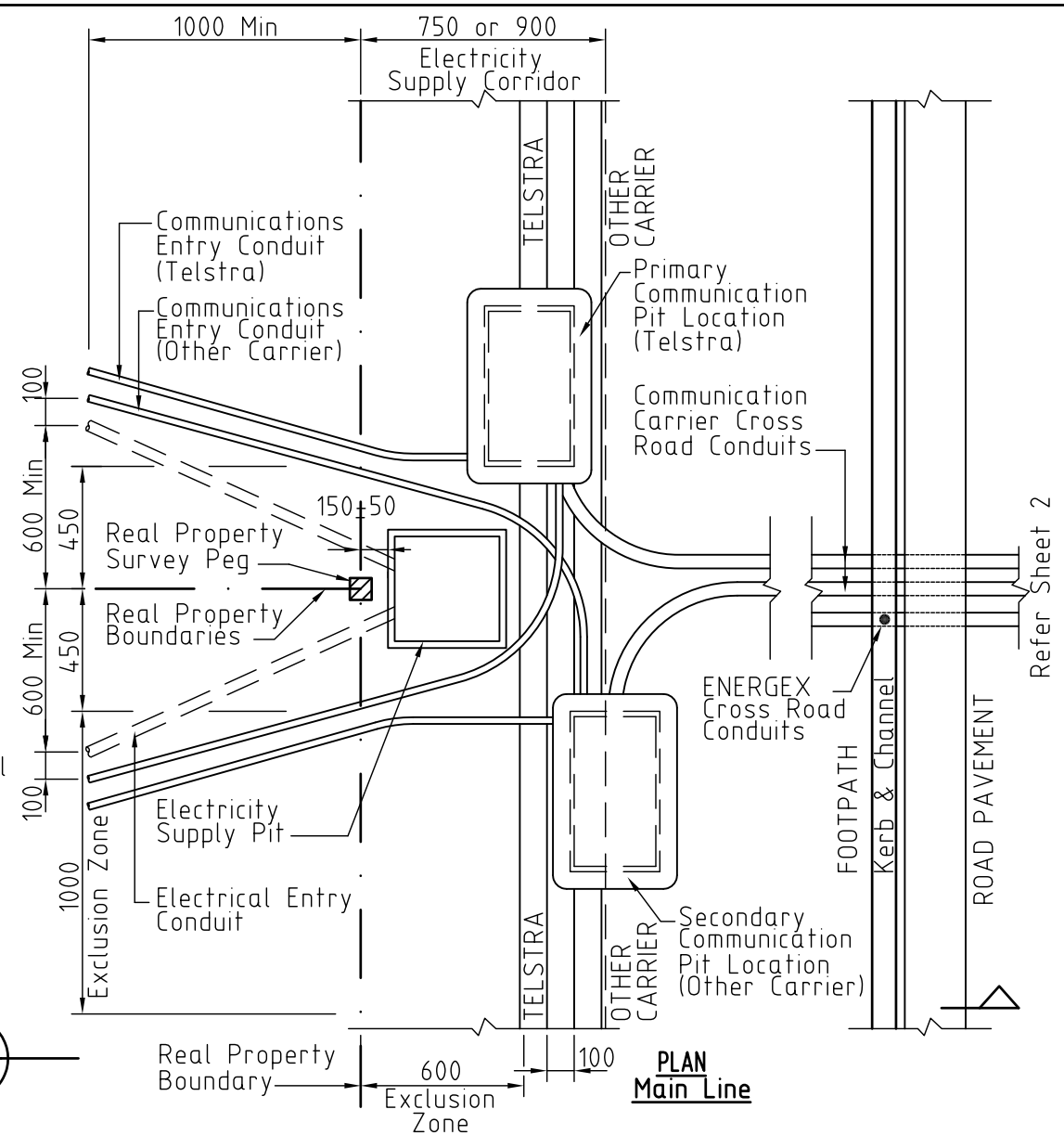
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
ELECTRICITY SUPPLY PITS & CABLES PLAN

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.4
DWN	F.AMANPOOR	SHT 2 OF 2	
FILE UDC-C2-4.4-2A.DWG			

NOTES:


1. The communication conduit and pits shall be supplied and installed by the communications carrier installation contractor.
2. When communications pits are located over any electricity cables additional mechanical protection using approved polymeric covers or 50mm concrete tiles shall be placed 25mm beneath the communication pit.
3. Communications Entry Conduits and extension of the cross road conduits, shall be constructed by the communications carriers installation contractor when the trench is open for the installation of of electricity supply cables and plant.
4. Should the communications pits not be installed at the same construction phase as the mainline communications conduits, the trench excavation shall be completely backfilled with clean pit sand for 2.0m on the pit side of the real property survey peg.
5. The communications carrier's installation contractor shall excavate by hand, to install communications pits after the joint use trench is backfilled.
6. The communication carrier's installation contractor shall supply all the labour and material including clean pit sand to backfill the trench for the installation of the communications conduit and pits.
7. Primary and Secondary communication pit locations shown for the situation where conduits service corridor allows both electricity and communication in the same space.

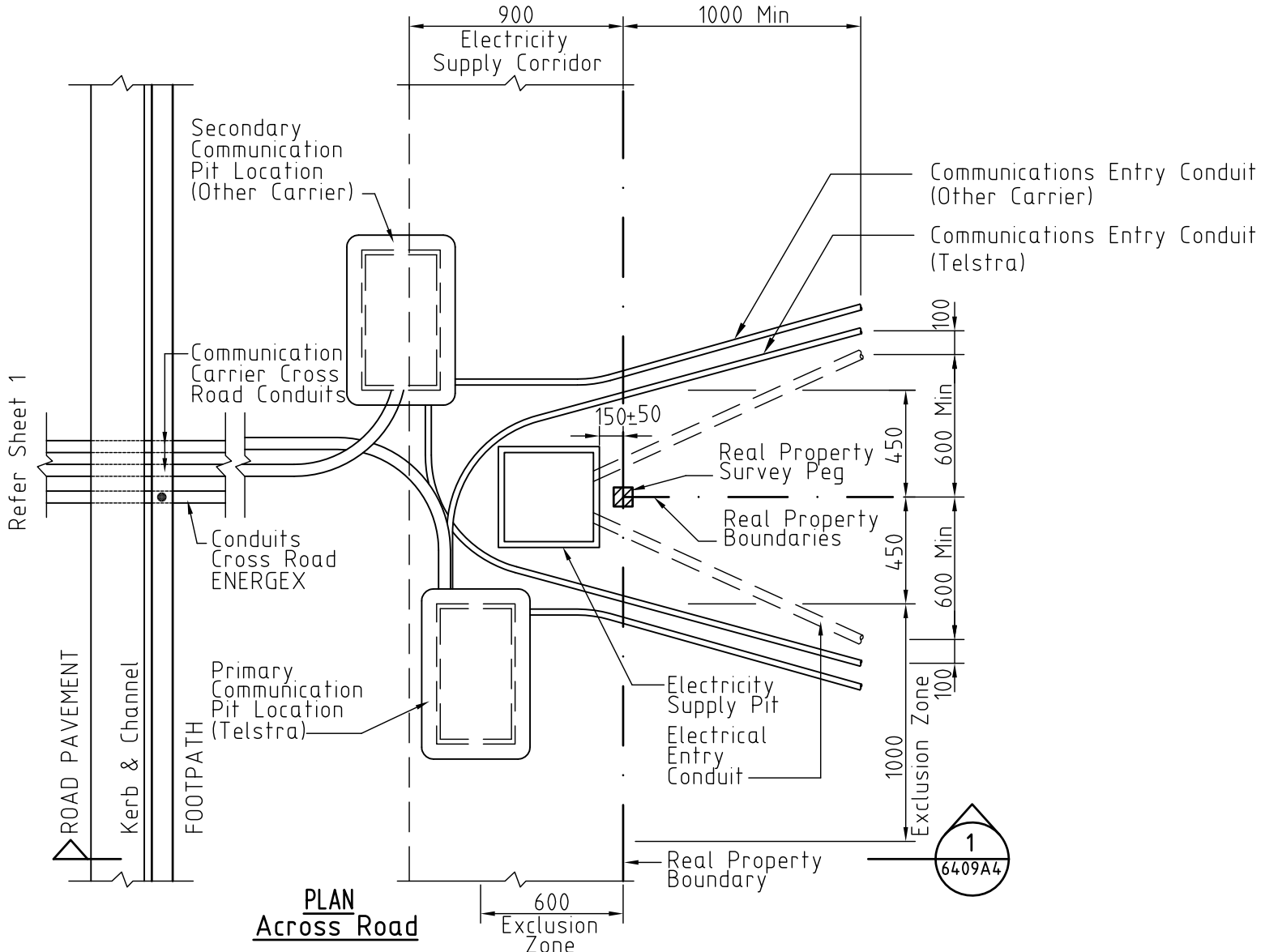


NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.




PLAN
Main Line

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				EXCAVATION AND REINSTATEMENT		RECD		SECTION
		PILLAR POSITIONING & SERVICE ALLOCATION				CKD	P.BARNEY	C2
				COMMUNICATIONS SUPPLY CABLES & PITS		DWN	F.AMANPOOR	SHT 1
				FILE UDC-C2-4.5-1A.DWG				



**PLAN
Across Road**

ORIGINAL ISSUE
A



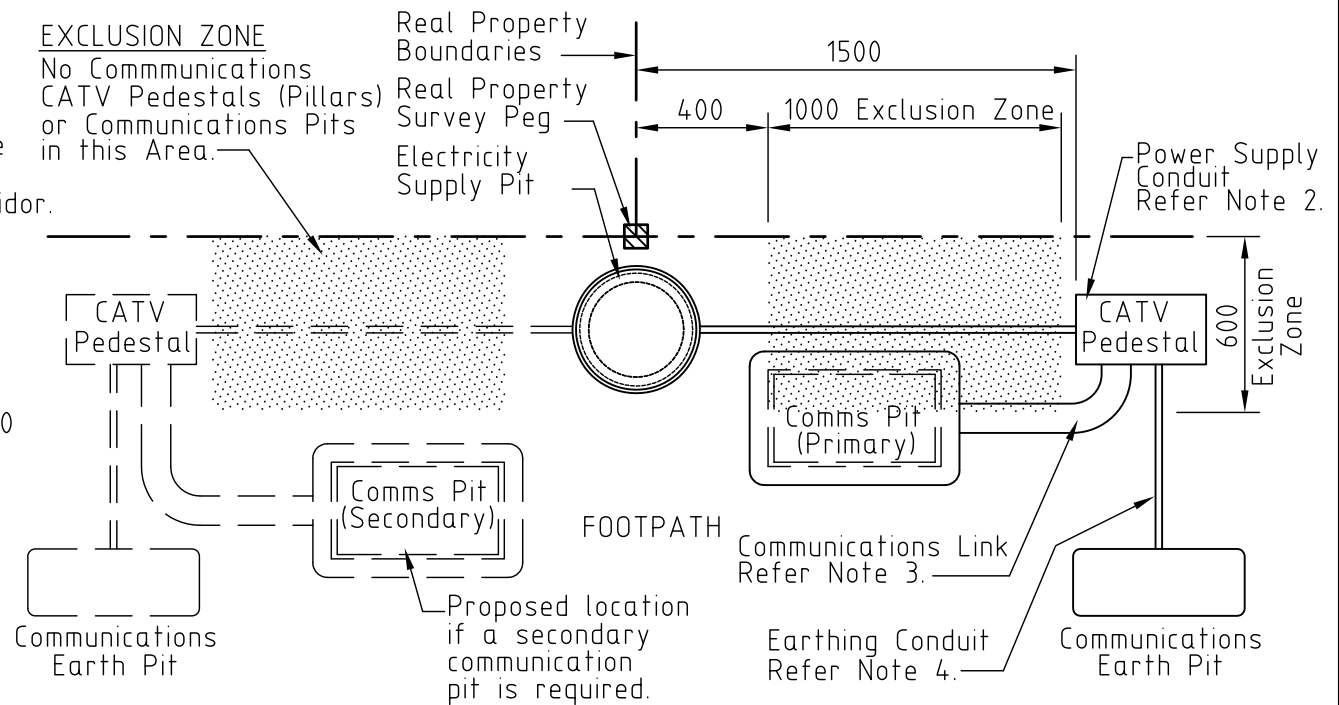
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CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
COMMUNICATIONS SUPPLY CABLES & PITS

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.5
DWN	F.AMANPOOR	SHT 2 OF 2	
FILE UDC-C2-4.5-2A.DWG			

NOTES:


1. A CATV pedestal will be located adjacent to one electricity supply pit or pillar in 500 electricity supply pit or pillar. No more than one CATV pedestal installation is to be established at any single electricity supply pit or pillar. The location of a CATV pedestal shall be outside the exclusion zones when constructed on the electricity supply corridor.
2. Power supply conduit to be 40mm Dia HD orange electrical conduit laid at 600mm below ground level on public lighting alignment in trench. The supply cable shall be a minimum size consumer mains of 16sq.mm SDI. Install to all the requirements of AS 3000 including latest amendments.
3. Communications link conduit; P50 or P100/ 2 x P50 (at a hub pedestal 1 per 500 electricity pits and pillars) laid on communications alignment in the trench with 450mm minimum cover.
4. Earthing conduit to be 25mm minimum Dia HD orange electrical conduit laid 450mm minimum below ground level to earth pit located outside the electricity.
5. Electrical Conduit to be heavy duty orange to AS/NZS 2053.

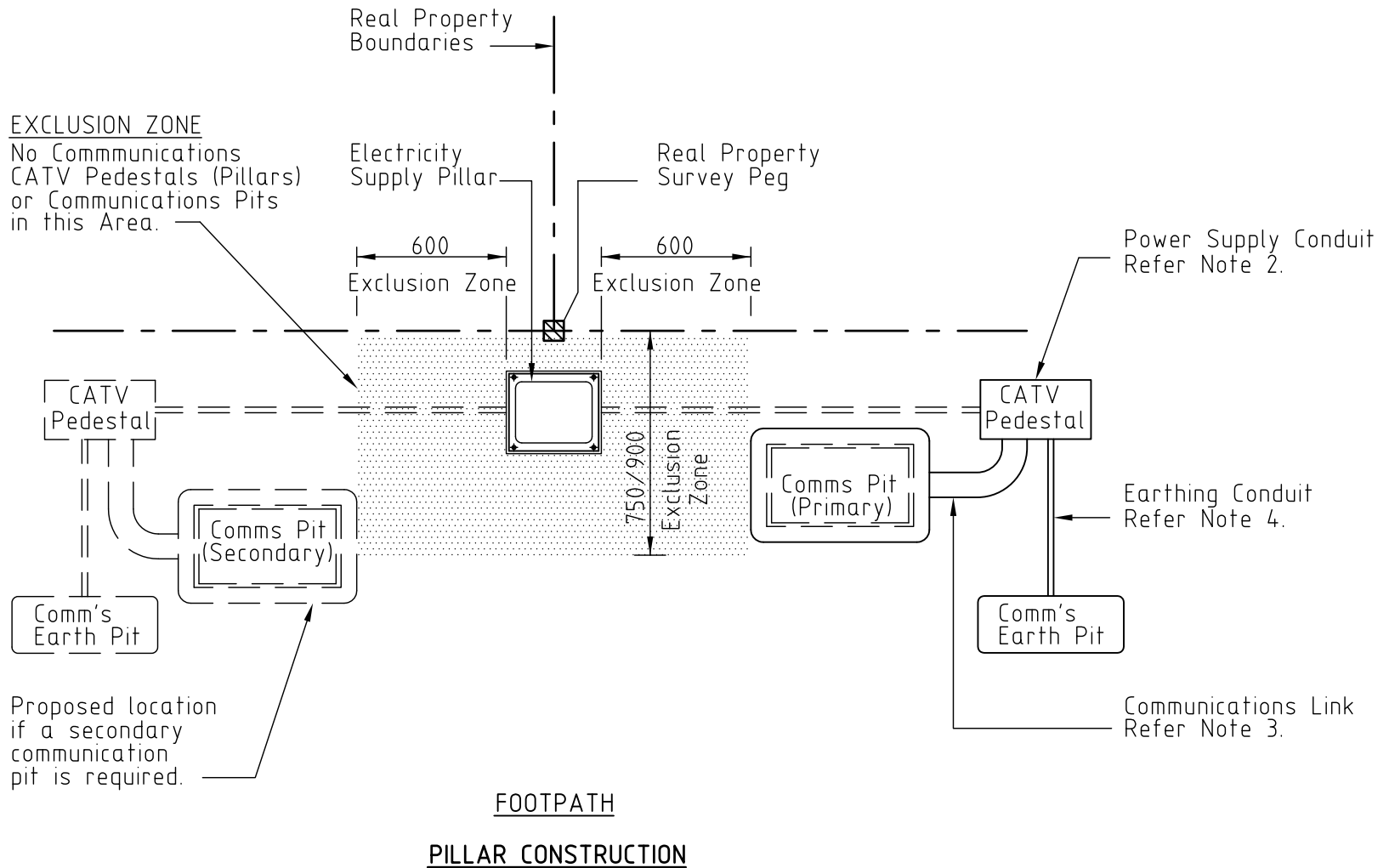



6. Primary and secondary communication pit locations shown for the situation where conduits service corridor allows both electricity and communications in the same space.

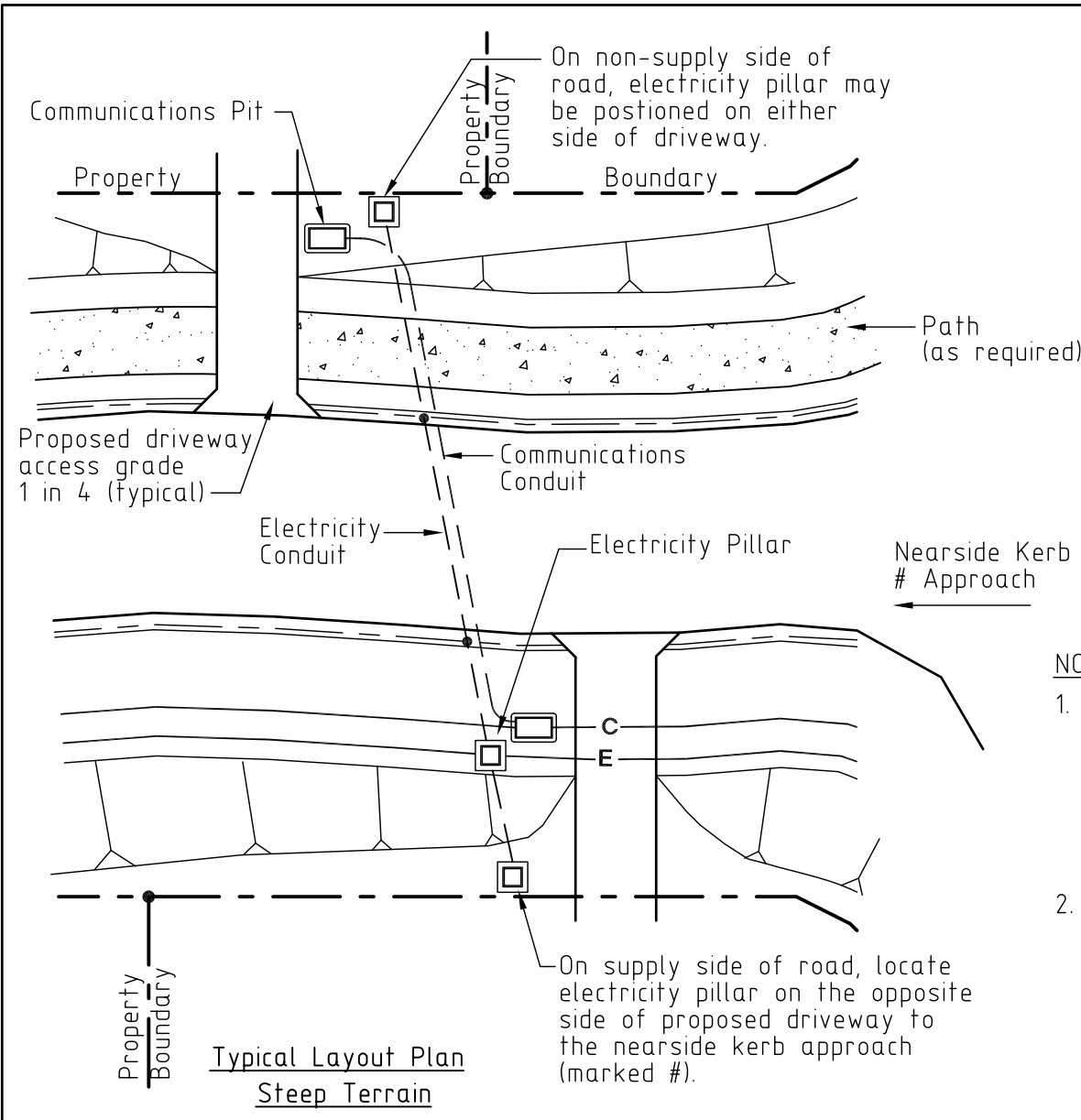
NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.

PIT CONSTRUCTION





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				RECD		SECTION	SUB-SECT.		
		EXCAVATION AND REINSTATEMENT		CKD	P.BARNEY	C2		4.6	
				PILLAR POSITIONING & SERVICE ALLOCATION		SHT 1 OF 2			
BROADBAND COMMUNICATIONS SYSTEM LAYOUT PLAN		DWN	F.AMANPOOR			FILE UDC-C2-4.6-1A.DWG			



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				RECD		SECTION	SUB-SECT.
		CKD	P.BARNEY	C2	4.6		
		DWN	F.AMANPOOR	SHT 2 OF 2			
A				FILE UDC-C2-4.6-2A.DWG			




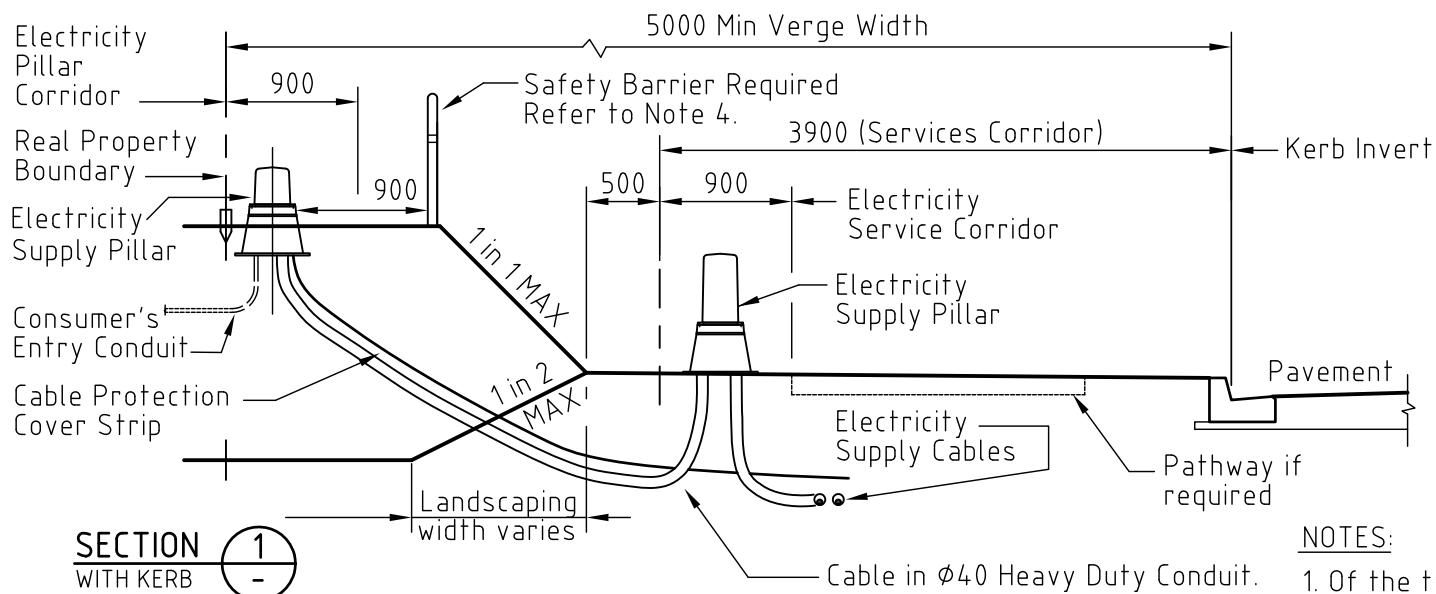
LEGEND

-  Electricity Supply Pillar
-  Communications Supply Pit
-  Electricity Service Cable Joint
-  "E" Marker

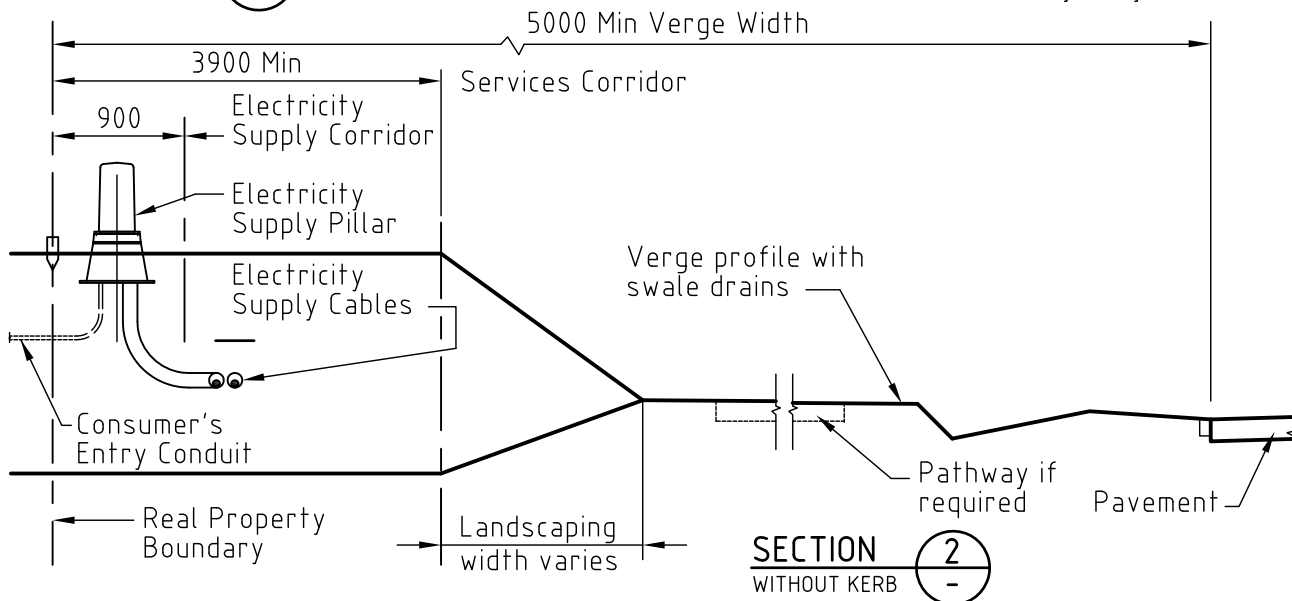
NOTES

1. Should steep terrain conditions in rural estates prevent road crossing conduits being laid in a straight line between the Real Property survey pegs at the boundary intersection, the electricity supply pillars shall be placed at the intersection of the real property boundary and the straight line of the cross road conduit.
2. Electricity supply pillars shall be located on the Real Property Boundary intersection where the surface grade between the carriageway and the supply pillar does not exceed 1 in 4 (Gentle Terrain). Where roadworks cut or fill batters are steeper than 1 in 4, the supply pillar shall be located near to the proposed driveway access with a maximum surface grade no steeper than 1 in 4.

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		CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION SERVICE ALLOCATION RURAL RESIDENTIAL		DATE	10/10/08	6229-A4 A	
				RECD		SECTION	SUB-SECT.
		A		CKD	P.BARNEY	C2	
		DWN	F.AMANPOOR	SHT 1 OF 1		FILE UDC-C2-4.7-1A.DWG	



SECTION 1
WITH KERB



SECTION 2
WITHOUT KERB

NOTES:

1. Of the two alternative alignment models indicated the model to apply for the given length of the road shall be either one or the other dependent on the predominant terrain type and road kerb construction.
2. The alignment selected for the services shall not differ at localised variations in the terrain or road kerb construction.
3. The steep terrain model with kerb and channel shall not apply to roads with swale drains or edge strips in lieu of kerb and channel.
4. Safety Barrier of hot dipped galvanized steel guard railing complying with AS1657

ORIGINAL ISSUE	DATE	APP'D	CKD	DRN	ADDITION OF SAFETY BARRIER
A	31/5/11	R. ENGLISH	D. TAYLOR	A. SYMONDS	
B					

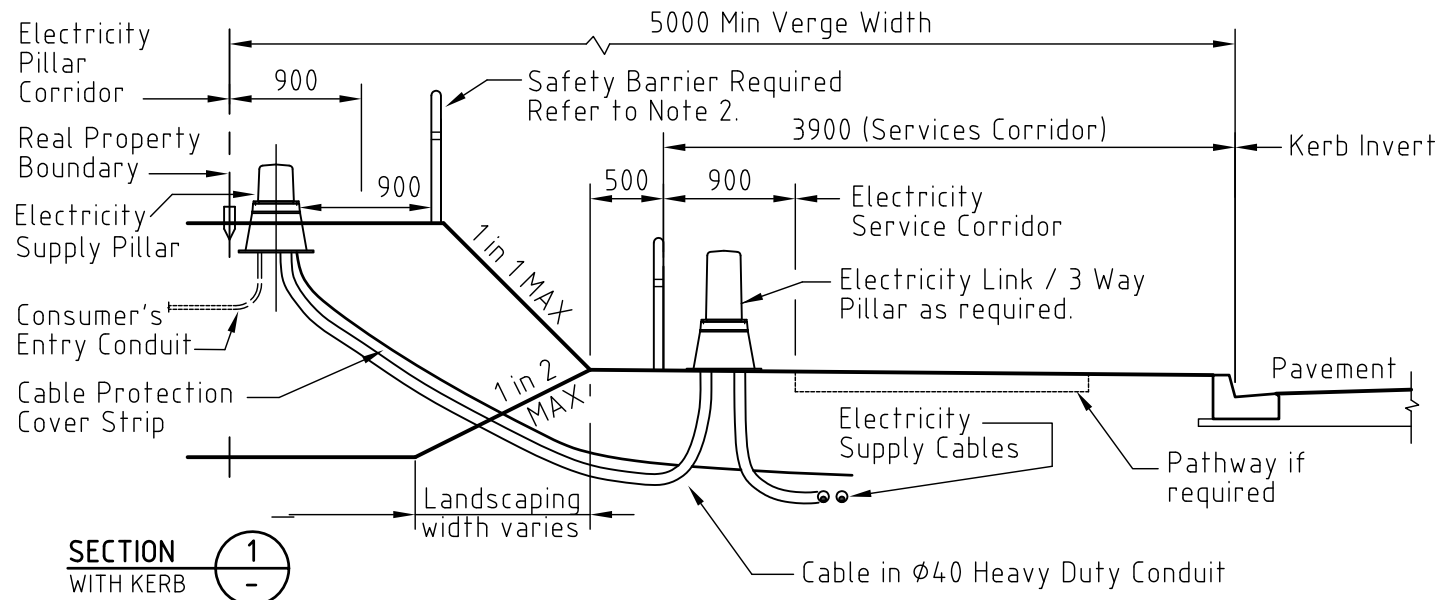


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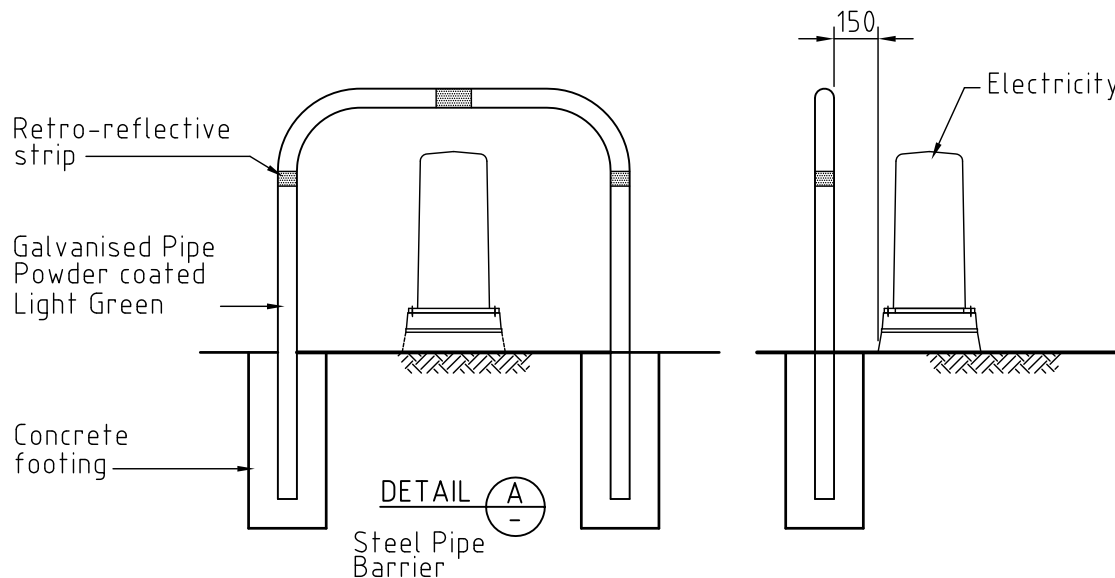
UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

**CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
SERVICE ALLOCATION RURAL RESIDENTIAL STEEP TERRAIN**

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4 B	
RECD		SECTION	SUB-SECT.
CKD	P. BARNEY	C2	4.8
DWN	F. AMANPOOR	SHT 1 OF 1	
FILE UDC-C2-4.8-1B.DWG			




SECTION 1 WITH KERB



DETAIL A

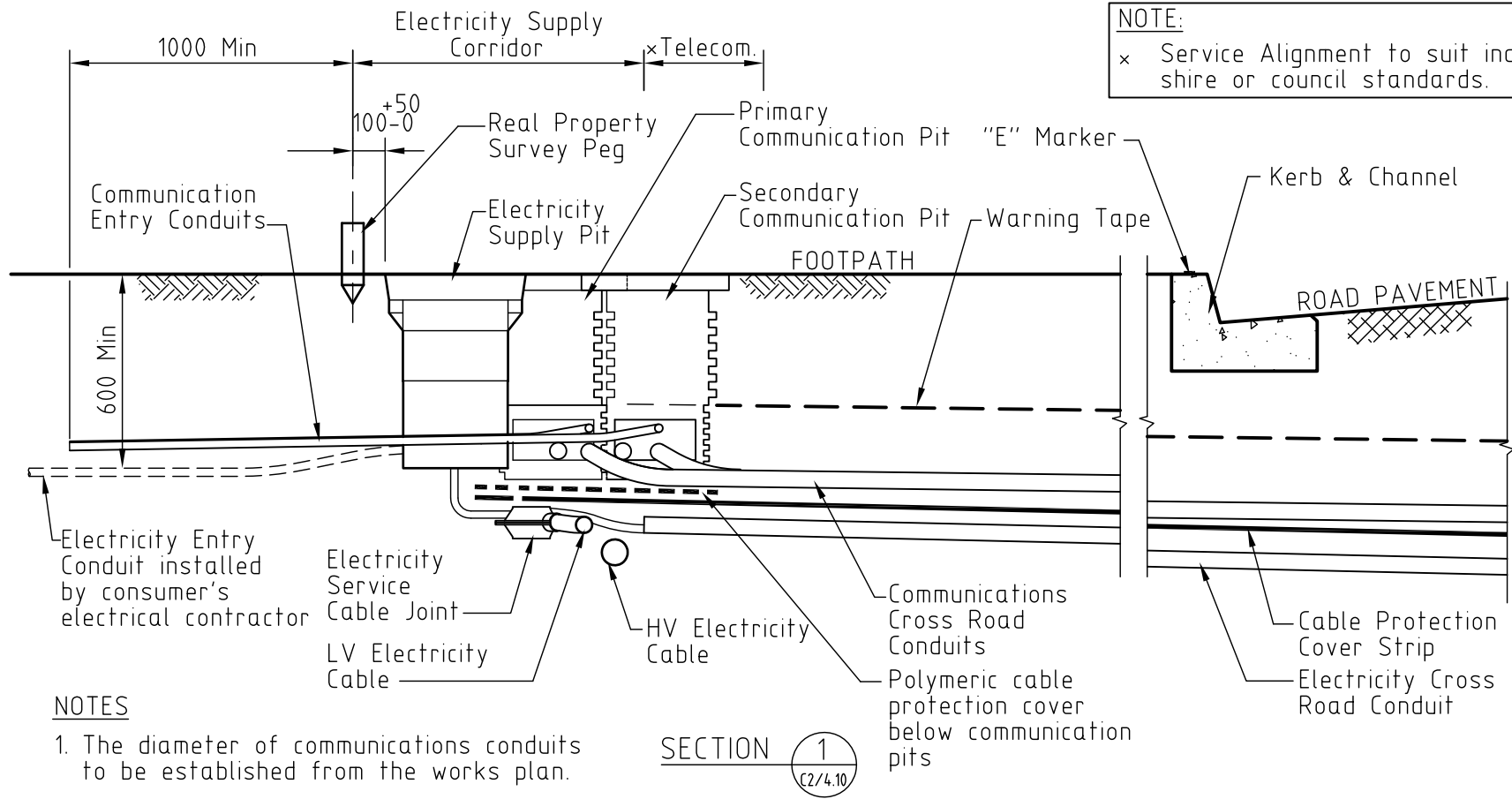
NOTES:

1. Should the electricity supply corridor be located in the middle of the verge, the electricity supply pillar shall be protected by one of the following:
 - a) A natural barrier such as the battered edge of a steep embankment at the back of the supply pillar.
 - b) The steel pipe barrier detailed and approval by the local authority.
2. Safety Barrier of hot dipped galvanized steel guard railing complying with AS1657

ORIGINAL ISSUE	A	DATE	B	APP'D	R. ENGLISH	CKD	P. BARNEY	DRN	F. AMANPOOR	ADDITION OF SAFETY BARRIER	 COPYRIGHT 2011 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION RURAL RESIDENTIAL PROTECTIVE BARRIER	APP'D	R. ENGLISH	<table border="1" style="width: 100%;"> <tr> <td colspan="2" style="text-align: center;">CAD</td> </tr> <tr> <td style="text-align: center;">DATE</td> <td style="text-align: center;">10/10/08</td> </tr> <tr> <td style="text-align: center;">RECD</td> <td style="text-align: center;">6229-A4 B</td> </tr> <tr> <td style="text-align: center;">CKD</td> <td style="text-align: center;">P. BARNEY</td> </tr> <tr> <td style="text-align: center;">DWN</td> <td style="text-align: center;">F. AMANPOOR</td> </tr> </table>	CAD		DATE	10/10/08	RECD	6229-A4 B	CKD	P. BARNEY	DWN	F. AMANPOOR
	CAD																								
	DATE		10/10/08																						
	RECD		6229-A4 B																						
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DWN	F. AMANPOOR																								
DATE	10/10/08																								
RECD	6229-A4 B																								
CKD	P. BARNEY																								
DWN	F. AMANPOOR																								
SECTION	C2	SUB-SECT.	4.9																						
SHT 1		OF 1																							
FILE UDC-C2-4.9-1B.DWG																									


NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.

NOTE:
× Service Alignment to suit individual shire or council standards.



- NOTES**
1. The diameter of communications conduits to be established from the works plan.
 2. All communications conduits shall be plugged.

ORIGINAL ISSUE
A

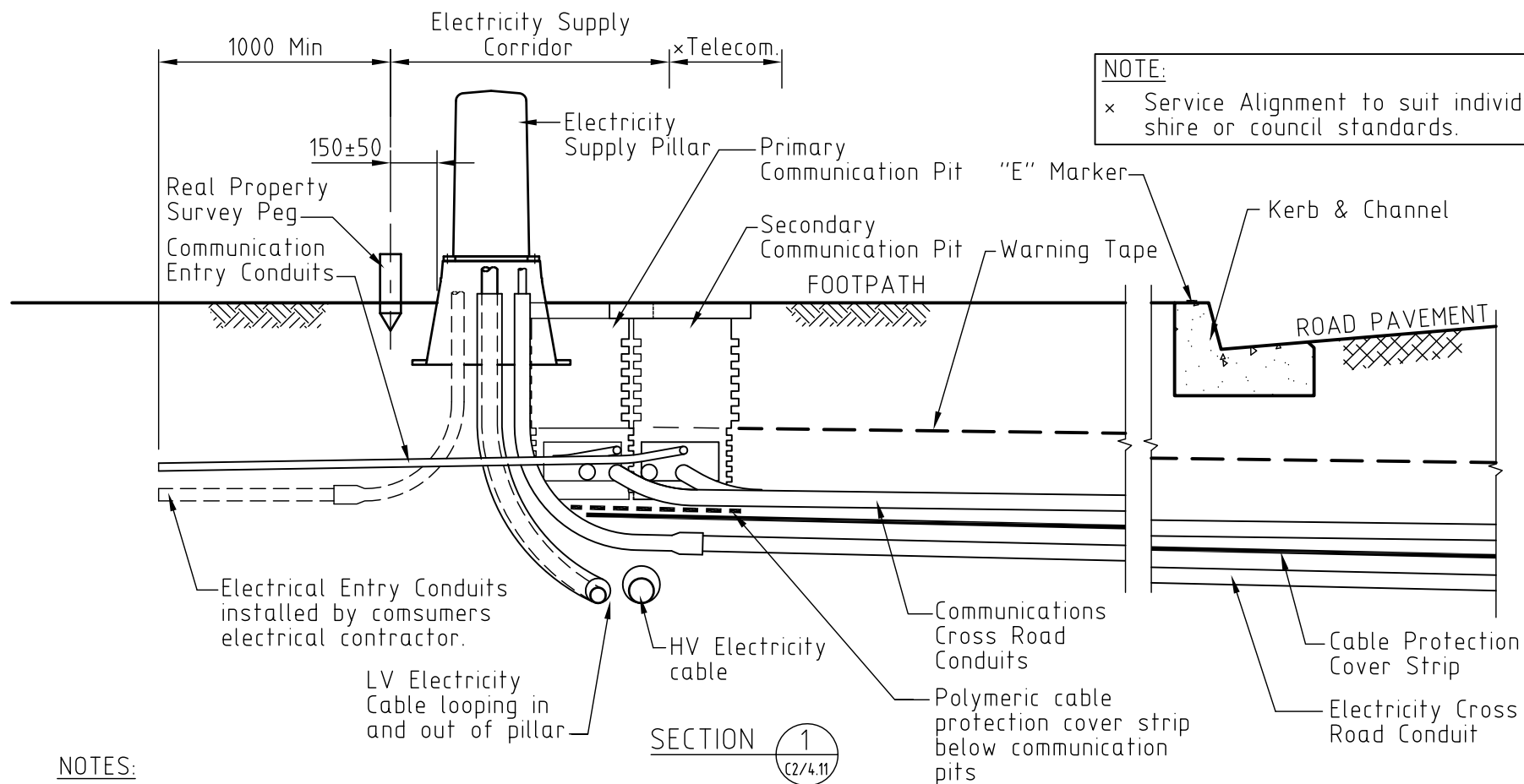


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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

**CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
ELECTRICITY & COMMUNICATIONS PIT CABLE & CONDUIT SECT.**


APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.10
DWN	F.AMANPOOR	SHT 1 OF 1	
FILE UDC-C2-4.10-1A.DWG			



NOTES:

1. The diameter of communication conduits to be established from the works plan.
2. All communications conduits shall be plugged.
3. All electricity conduits shall be plugged.

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A



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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
ELECTRICITY & COMMUNICATIONS PILLAR PIT CABLE & CONDUIT SECTIONS

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4 A	
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.11
DWN	F.AMANPOOR	SHT 1 OF 1	
FILE UDC-C2-4.11-1A.DWG			

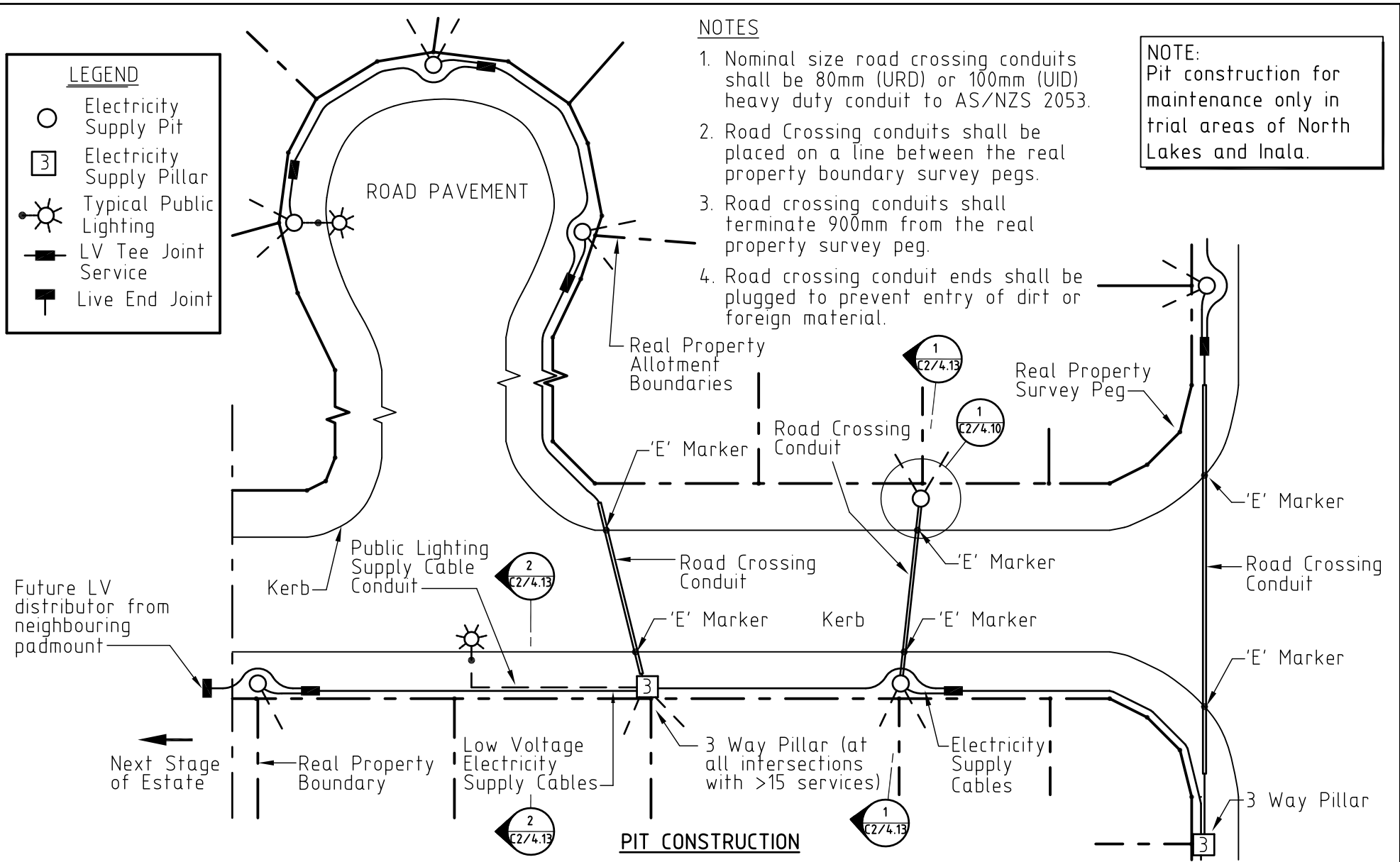
LEGEND


- Electricity Supply Pit
- 3 Electricity Supply Pillar
- ☀ Typical Public Lighting
- LV Tee Joint Service
- ⊥ Live End Joint

NOTES

1. Nominal size road crossing conduits shall be 80mm (URD) or 100mm (UID) heavy duty conduit to AS/NZS 2053.
2. Road Crossing conduits shall be placed on a line between the real property boundary survey pegs.
3. Road crossing conduits shall terminate 900mm from the real property survey peg.
4. Road crossing conduit ends shall be plugged to prevent entry of dirt or foreign material.

NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.



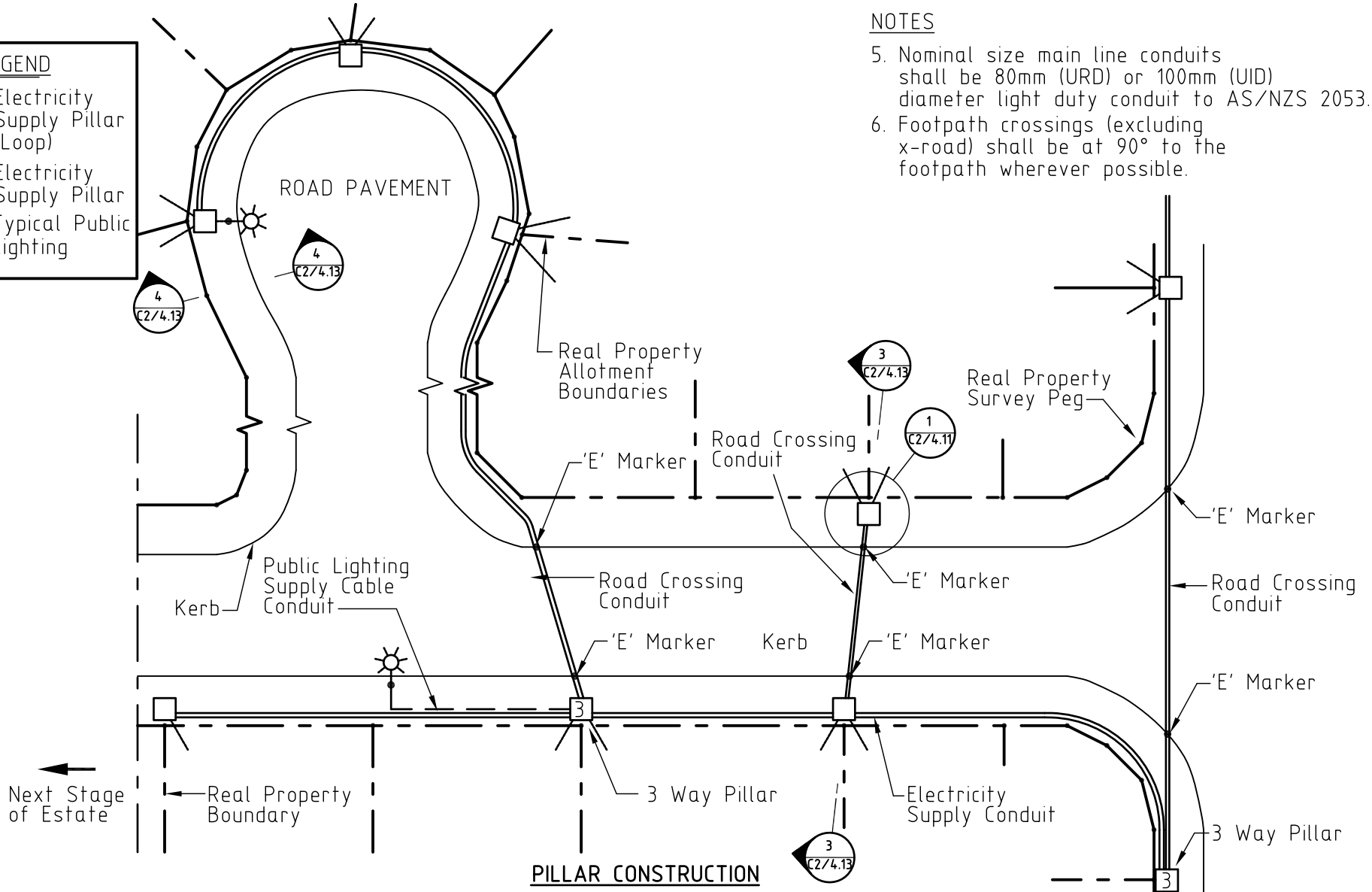
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		CIVIL WORKS		DATE	10/10/08	6229-A4 A		
		EXCAVATION AND REINSTATEMENT		RECD		SECTION	SUB-SECT.	
		PILLAR POSITIONING & SERVICE ALLOCATION		CKD	P.BARNEY	C2		4.12
		ELECTRICITY SUPPLY CABLE & ROAD CROSSING CONDUITS		DWN	F.AMANPOOR	SHT 1 OF 2		FILE UDC-C2-4.12.-1A.DWG

LEGEND

- Electricity Supply Pillar (Loop)
- 3 Electricity Supply Pillar
- ☀ Typical Public Lighting

NOTES

5. Nominal size main line conduits shall be 80mm (URD) or 100mm (UID) diameter light duty conduit to AS/NZS 2053.
6. Footpath crossings (excluding x-road) shall be at 90° to the footpath wherever possible.



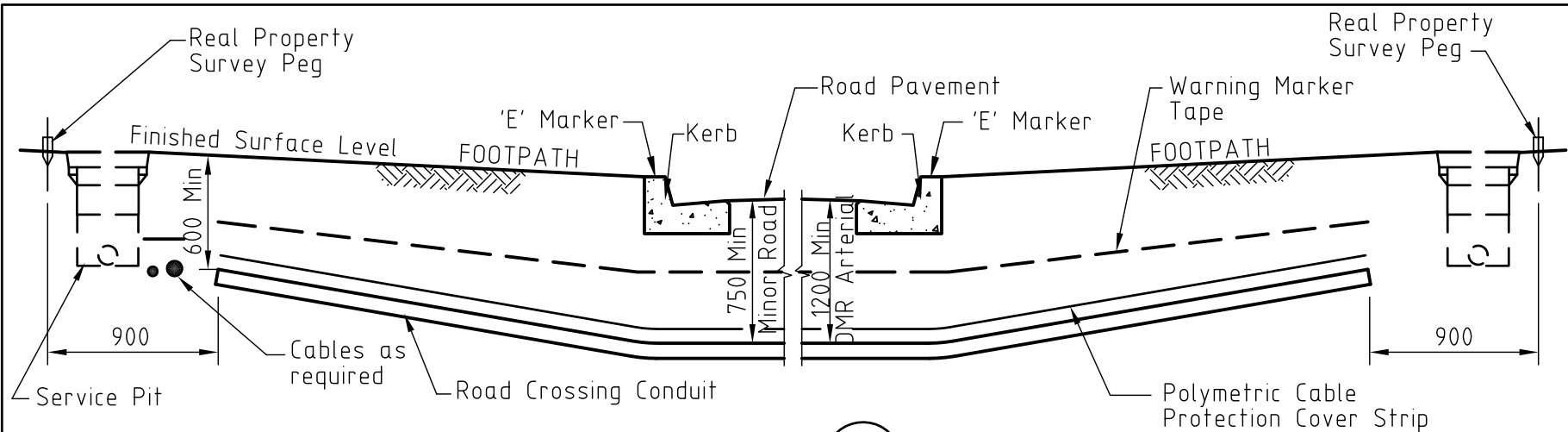
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CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
ELECTRICITY SUPPLY CABLE & ROAD CROSSING CONDUITS

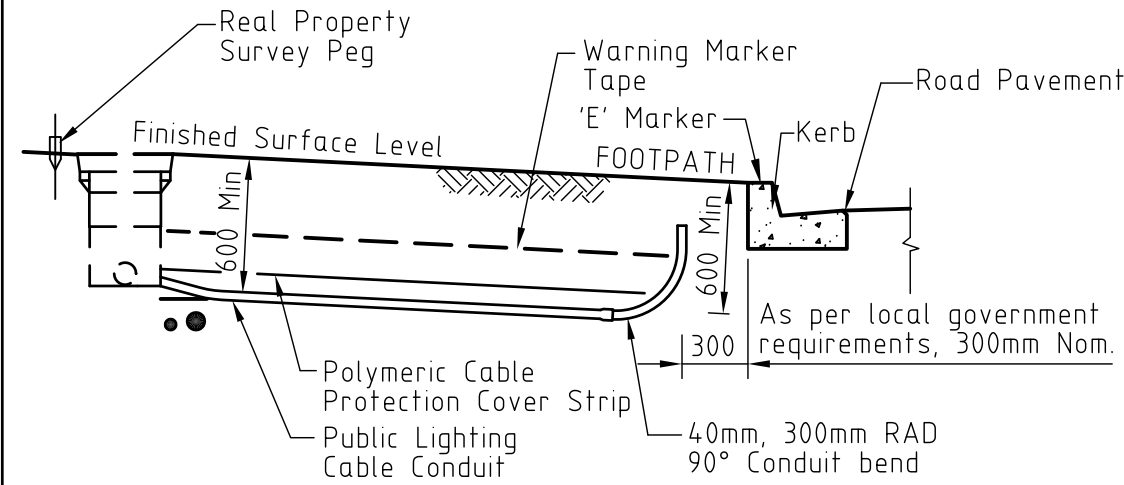
APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.12
DWN	F.AMANPOOR	SHT 2 OF 2	
FILE UDC-C2-4.12.-2A.DWG			



SECTION 1
C2/4.13

NOTES


1. When the cable/conduit changes level the gradient shall have a minimum radius of 1830mm.
2. Road crossing conduits shall be 80mm diameter minimum light duty orange conduit to AS/NZS 2053.
3. Public lighting conduits shall be 40mm diameter heavy duty orange conduits to AS/NZS 2053.
4. Road crossing and public lighting conduit ends shall be plugged or capped to prevent entry of dirt or foreign material.
5. Polymeric cable protection cover strip shall be installed 75mm minimum above electric cables/conduits.

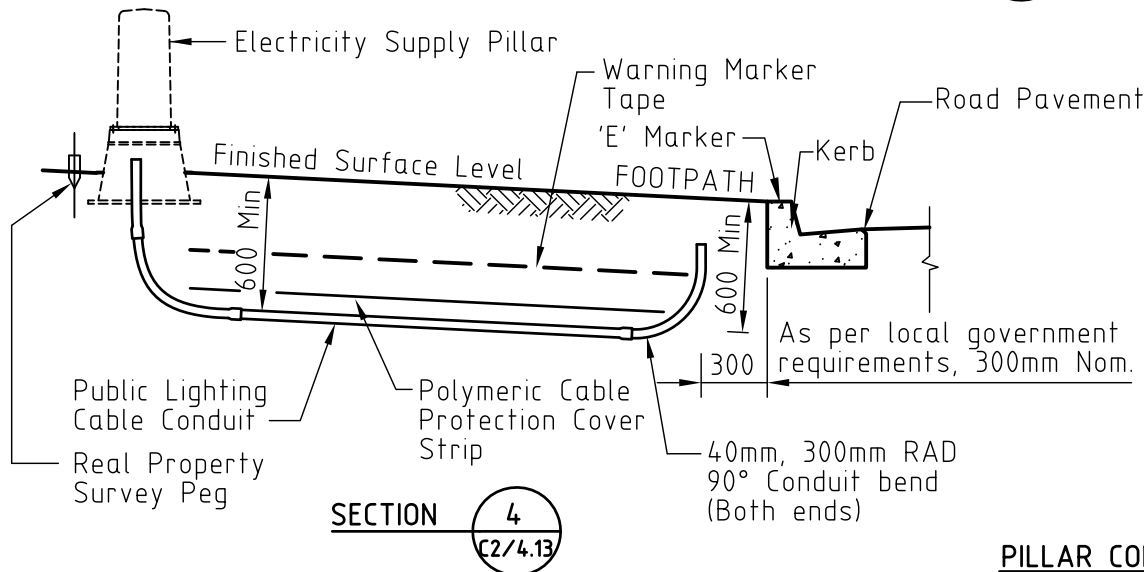
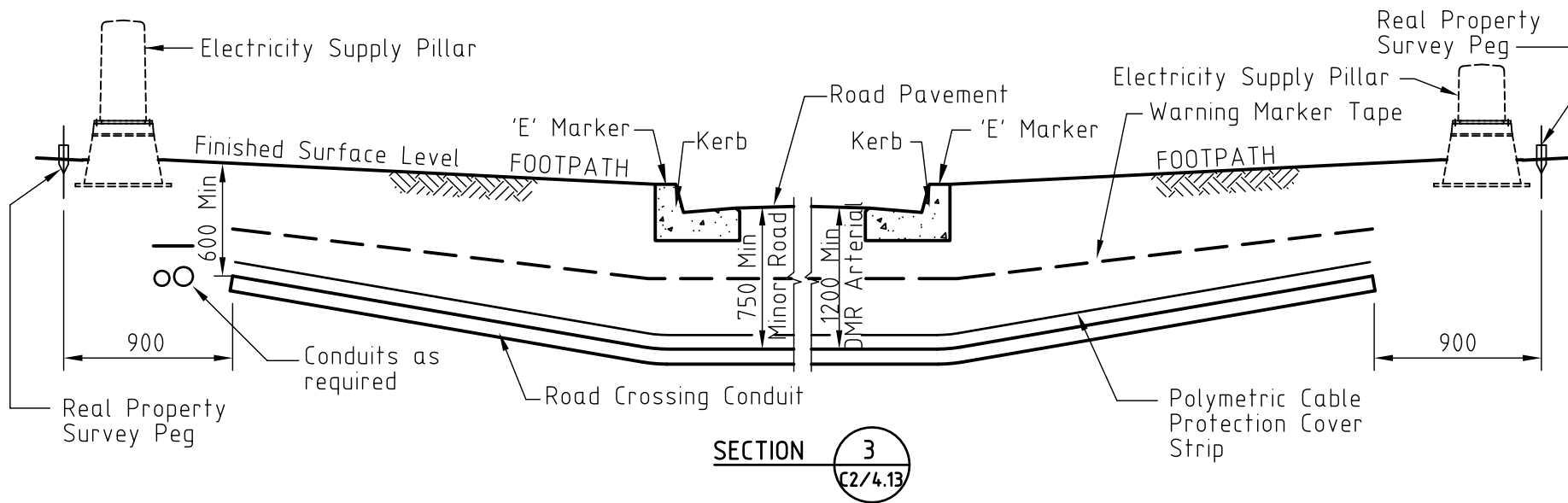


SECTION 2
C2/4.13

PIT CONSTRUCTION

NOTE:
Pit construction for maintenance only in trial areas of North Lakes and Inala.

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		CIVIL WORKS EXCAVATION AND REINSTATEMENT PILLAR POSITIONING & SERVICE ALLOCATION ROAD CROSSING & STREET LIGHT CABLE CROSSING		DATE	10/10/08	6229-A4 A	
				RECD		SECTION	SUB-SECT.
		CKD	P.BARNEY	C2		4.13	
		DWN	F.AMANPOOR	SHT 1		OF 2	
				FILE UDC-C2-4.13-1A.DWG			



PILLAR CONSTRUCTION

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A



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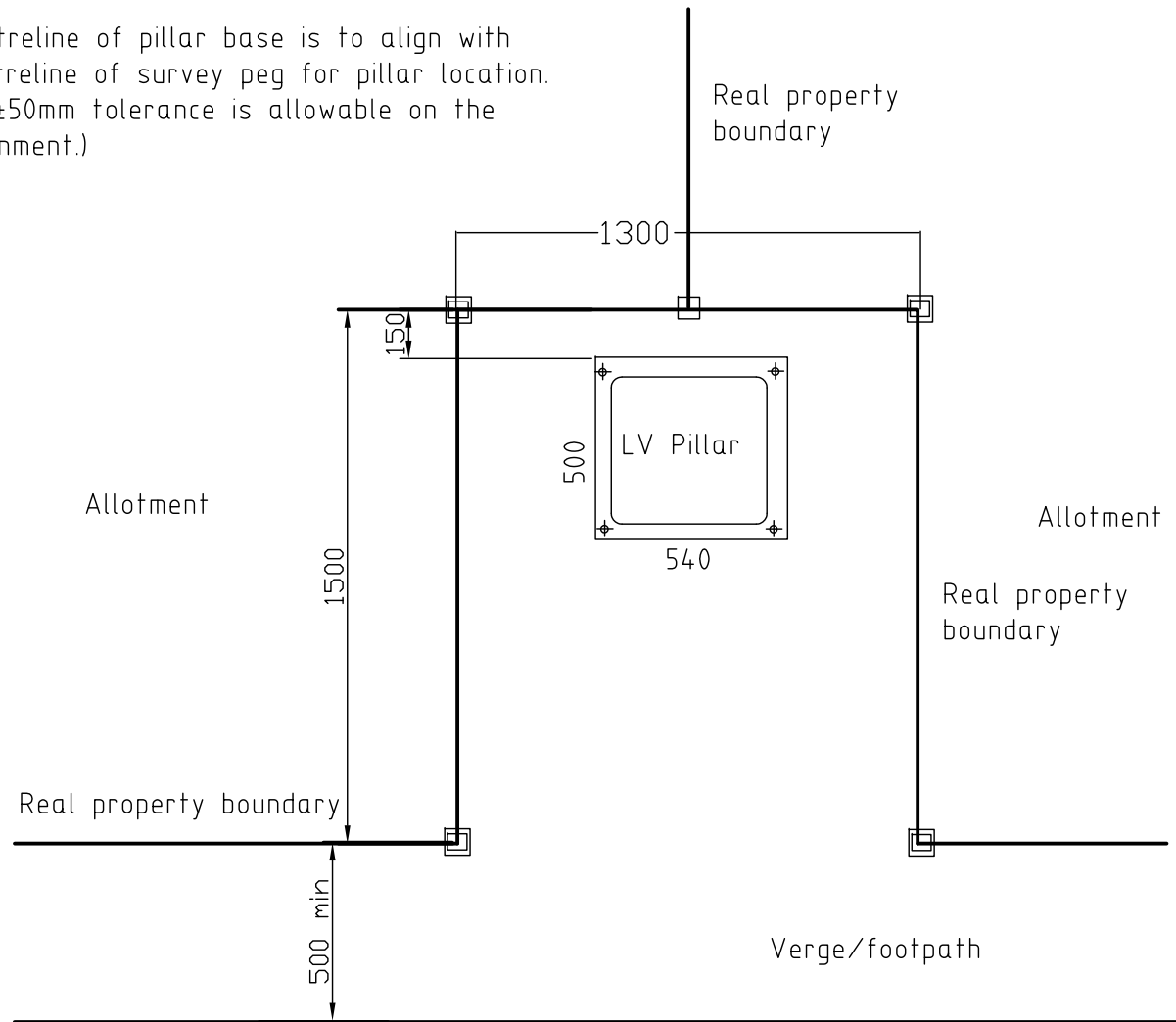
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
EXCAVATION AND REINSTATEMENT
PILLAR POSITIONING & SERVICE ALLOCATION
ROAD CROSSING & STREET LIGHT CABLE CROSSING

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C2	4.13
DWN	F.AMANPOOR	SHT 2 OF 2	
FILE UDC-C2-4.13-2A.DWG			

Centreline of pillar base is to align with centreline of survey peg for pillar location. (A ±50mm tolerance is allowable on the alignment.)



Survey Peg

Rear of kerb (not invert) where kerb edge exists or edge of vehicular traffic area where no kerb exists.

Note 1: Pillar location suitable for use with 100mm LV conduit with 750mm radius conduit bends.

Note 2: LV conduits to be located in 0-500 wide verge/footpath.


Note 3: LV conduits to maintain statutory depth until they turn up into the LV pillar.

Note 4: HV conduits and cables shall not be located in laneways.

Note 5: As the verge/footpath gets wider than 500mm, the depth of the pillar site can be reduced by an equivalent distance. The distance from edge of vehicular trafficable area to rear of pillar site shall always be 2000mm.

Note 6: All Rate 2 streetlights in Laneways shall be Hinge Poles. Streetlights shall not be located in front of service pillars. Conduits for streetlight cables shall be 80mm.

Note 7: Cross street pillars in laneways can be replaced with LV service pit -16sqmm Cu cables only. For details see Section E1-6.1.

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		CIVIL WORKS NARROW LANEWAY DEVELOPMENTS ROAD RESERVE LV PILLAR ARRANGEMENTS PILLAR - GENERAL REQUIREMENTS		DATE	20/8/15	6229-A4		A
				RECD		SECTION	SUB-SECT.	
				CKD	J.LAMBERT	C2	4.14	
				DWN	J.LANSLEY	SHT 1 OF 1		
				FILE UDC-C2-4.14-1A.DWG				