



Underground Distribution Construction Manual


Section C3 – Padmount Transformer Sites

Approved by: A Smith-de Perez

CIVIL WORKS

SECTION C3 - PADMOUNT TRANSFORMER SITES

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	APP'D	A SMITH-DE PEREZ			DATE	10/10/08	CIVIL WORKS		RECD	
	CKD	J.LANSLEY	SECTION		PADMOUNT TRANSFORMER SITES		CKD	P.BARNEY	SECTION	SUB-SECT.
	DRN	P. JUDGE	FILE	C3	SECTION INDEX		DWN	F.AMANPOOR	C3	0
	UPDATED SHEETS FOR 1.1 AND 2.7			SHT	1	OF	1	FILE UDC-C3-0-1B.DWG		

PADMOUNTED SUBSTATION INSTALLATION

1. Site

Padmounted substation sites shall be recessed in the property alignment and shall be surveyed and dedicated as part of the road reservation. The required recessed area (Clearance Zone) is defined below.

PADMOUNT TYPE	All Estates Clear Road Reserve (Width & Depth)
SQUARE TYPE COMMON EARTH	4.8m x 5.0m for Flat Site & Sloping Site with Retaining Wall
SQUARE TYPE SEPARATE EARTH	12.6m x 8.9m
RECTANGULAR TYPE COMMON EARTH	4.6m x 6.7m for Flat Site & Sloping Site with Retaining Wall
RECTANGULAR TYPE SEPARATE EARTH	11.7m x 9.9m

All dimensions are clear internal dimensions. Square Padmounts are preferred.

Provision for separate earthing is always required unless the developer / consultant can prove (via test certificates) that common earthing requirements are satisfied.

Square padmount substations shall be centrally positioned and;

- recessed so that the concrete plinth is 1300mm from the R.P. street alignment or,
- have 2000mm dedicated clear area directly in front of the plinth.

The site shall be a location with:

- ◆ Stable soil conditions
- ◆ Level topography
- ◆ Where possible free from steep batters
- ◆ Where possible 4 metres minimum from edge of permissible residential dwelling construction area.

All new distribution network padmounted transformers, ground mounted transformers, and ring main units shall be installed above the 1:100 year or the Defined Flood Level (DFL), whatever is higher.

For coastal areas, substation site must be located as far as possible from the shoreline and sheltered from salt spray.

Landlocked padmount sites shall also have appropriate easements for electric cables and conduits. They should also allow an additional 700mm in front of the HV end to allow for 2m clear operating zone. Note the clearance zone in this case is not dedicated as part of the road reserve.

Guidelines for locating padmount and ground transformers with oil volumes above 500L but less than 2000L in sensitive areas, refer Supply & Planning Manual - Sect 3.2 - clause 3.2.6.1

Truncated Street Alignment

For substation site on a truncated section of the street alignment; The front edge of the substation plinth shall be 1300 mm from and as near to parallel as possible to the real property street alignment.


A minimum of 900 mm clear access around the substation sides and back shall be maintained to the real property boundary.

Hazardous Areas and Hydrants

The siting of padmount transformers in the vicinity of public swimming pools, service stations, flammable gas or liquid storage tanks should be avoided. Designers shall refer to the following standards:

- AS/NZS 1596 - LP Gas - Storage & Handling
- AS 1940 - Storage & handling of flammable and combustible liquids
- AS/NZS 2229.2 - Fuel Dispensing Equipment for Explosive Atmospheres.
- AS 2430 - Classification of hazardous areas

Note also for the requirement in AS2419.1 - Fire Hydrant Installation that an external fire hydrant or Fire Booster Station shall not be installed within 10m from a distribution transformer (eg padmount or ground transformer), ring main unit, HV metering unit or other ground mounted HV equipment.

ORIGINAL ISSUE	DATE	5/5/17	APPD CKD DRN ADDED NOTES FOR HV EQUIPMENT NEAR HYDRANT, UPDATE EMENT REQTS	 © COPYRIGHT 2014 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES GENERAL SITE REQUIREMENTS	APP'D	R. ENGLISH	CAD	
	DATE	10/10/08				6229-A4 G			
	RECD					SECTION	SUB-SECT.		
	CKD	P.BARNEY				C3	1		
	DWN	F.AMANPOOR				SHT 1 OF 9			
						FILE UDC-C3-1-1G.DWG			

2. Site Preparation

Substation sites shall be prepared in accordance with construction drawings. All excavation and reinstatement shall be in accordance with section C2-1.

3. Retaining Walls / FENCES

Retaining walls shall be installed where a change in ground level of 300mm or more occurs within 2000mm of the substation clearance zone. (Note the clearance zone for common earth substations applies to all situations for this clause).

Fences shall be installed for:

- Residential areas (Typically 1200mm high)
- Sloping sites (either front to back or left-right).

Fences and Retaining walls shall be constructed to ENERGEX standards to satisfy minimum clearance zones of common earth configurations. Refer to section C3-1 for retaining wall construction notes. Alternative designs to those provided in this manual will require a Civil Engineer's Certification.

Separate earth configuration may have a fence / retaining wall positioned outside the clearance zone of Common Earth Configuration but inside the clearance zone required by separate earth configuration.

Metal retaining wall fences shall be used in CMEN areas. (Refer C3.1 Sheet 6)

Non conductive fences shall be used in separate earth locations where the fence is inside the 5m clearance zone required by a separate earth configuration.

4. Padmount Substation Foundation

Where substation sites are very unstable, and conventional foundation construction techniques as described in this document cannot be applied, a special design shall be required.


In such circumstances, the developer shall provide a certified design from a Registered Professional Engineer Queensland (RPEQ) registered to practice in Geotechnical Engineering for ENERGEX consideration. No special designs for substation foundation construction shall be used without endorsement by ENERGEX.

5. Padmount Substation Foundation - Uniculvert

Uniculvert foundations for both stable and unstable soil conditions shall be constructed in accordance with the construction drawings.

6. Padmount Substation Foundation - Concrete Bored Piers

Concrete bored piers shall be installed where site ground conditions do not provide even/equal bearing capacity for padmount foundation.

A	ORIGINAL ISSUE	APPD A. Smith de Perez	CKD	DRN P. Reif	UPDATE NOTES: METAL FENCE IN CMEN AREA	 © COPYRIGHT 2014 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	DATE 10/10/08	6229-A4		B
	RECD						SECTION C3	SUB-SECT. 1			
	CKD P.BARNEY						SHT 2 OF 9		FILE UDC-C3-1-2B.DWG		
						CIVIL WORKS		DWN F.AMANPOOR			
						PADMOUNT TRANSFORMER SITES					
						GENERAL SITE REQUIREMENTS					

Site surface to be finished with concrete slab (as per construction drawings). The 2.0 metre wide apron in front of the substation cabinet shall be finished with a concrete slab sectioned with construction joints for easy removal to excavate.

The formed pathway is to be a concrete slab (refer to the construction drawings). The concrete pathway slab shall be clear of cables and conduits to the substation.

The surface of the pathway slab may be finished with clay brick pavers or concrete tiles over the slab. Installation to be in accordance with the paver/tile manufacturer's installation specification.

ENERGEX cable conduits for the development may be placed in the substation site and shall pass down the sides or through the unculvert foundation. No conduits shall pass under the unculvert foundation. Conduits shall be 750 mm minimum depth below the finished surface level. Ensure end wall knockouts are grouted with a high strength sand and cement grout after conduit/cable installation through unculvert foundation.

12. Padmounted Substation Installation in Council Parks

Substations located in Council parklands, shall be installed as per constructions drawings (refer C3.1 Sheet 5).

13. Bollards Around Padmounts

Bollards shall be installed where padmounts are installed in car parks or other areas where padmounts are likely to be impacted by vehicles. The following outlines the minimum requirement for the design / installation of bollards: -

- Shall be manufactured of 5.6mm thick gal steel (medium)
- Circular tube min 140mm OD filled with concrete and capped.
- Buried 720mm in 400 x 400 x 720(D) concrete pad
- Installed 900mm above ground at 1.5m centres.

14. Enclosures Around Padmounts

A padmount can be enclosed on three sides by walls, but will be open to ventilation in front and no encumbrance above the site. If doors are required at the front, they will be louvered to allow air flow into the padmount, and all signs on the front of the padmount to be duplicated on the doors. Minimum door opening width 3.0m.

15. Structures Adjacent To And Overhanging Padmounts

- No building or permanent structure is allowed within 5m vertical clearance above ground level of the padmount transformer site.
- The LV side of the padmount should be positioned away from offices and livable areas.
- Where possible maintain 4m separation from transformer plinth to offices and livable areas


16. Multiple Padmount Transformer Site

Substations with two padmount transformers at a single site are acceptable under the following conditions:

- Layout as per drawing C3-2.1 Sheet 2.
- No more than two square type padmount transformers
- Not for industrial applications, or where standard HV switchgear in padmount is unacceptable.
- Transformers co-located at one site as a single source of supply
- No dual padmount sites over basements
- LV switchboards to be isolated or connected by castel key interlocks to prevent paralleling.

17. Access to Padmount Transformer Site

Site access to padmount site - 4m wide x 5m high. To suit Franna T25 crane or flatbed truck. Access track to support crane with axle loads up to 10 tonne.

ORIGINAL ISSUE	DATE	APP'D	CKD	DRN	 <p>energex © COPYRIGHT 2014 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</p>	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES GENERAL SITE REQUIREMENTS		APP'D	R. ENGLISH		CAD
								DATE	10/10/08	6229-A4	
	RECD		SECTION	SUB-SECT.							
	CKD	P.BARNEY	C3	1							
	DWN	F.AMANPOOR	SHT 4 OF 8								
A	B	APP'D A SMITH DE PEREZ		Added notes 14-16.				FILE UDC-C3-1-4B.DWG			

18. Artwork on Energex Padmounts and Outdoor RMUs

Artwork on Energex padmount transformers and outdoor RMU's may only be used in the following situations:

- When requested by developer or government authority
- When over-painting of graffiti on Energex's plant has failed.


Technical Requirements

- Water based paints are not suitable for high gloss powder coated surfaces. Metallic paints shall also not be used.
- Acrylic or enamel paints are acceptable.
- Locks, identification labels, nameplates and Site Identification numbers shall not be painted over.

Corporate Requirements

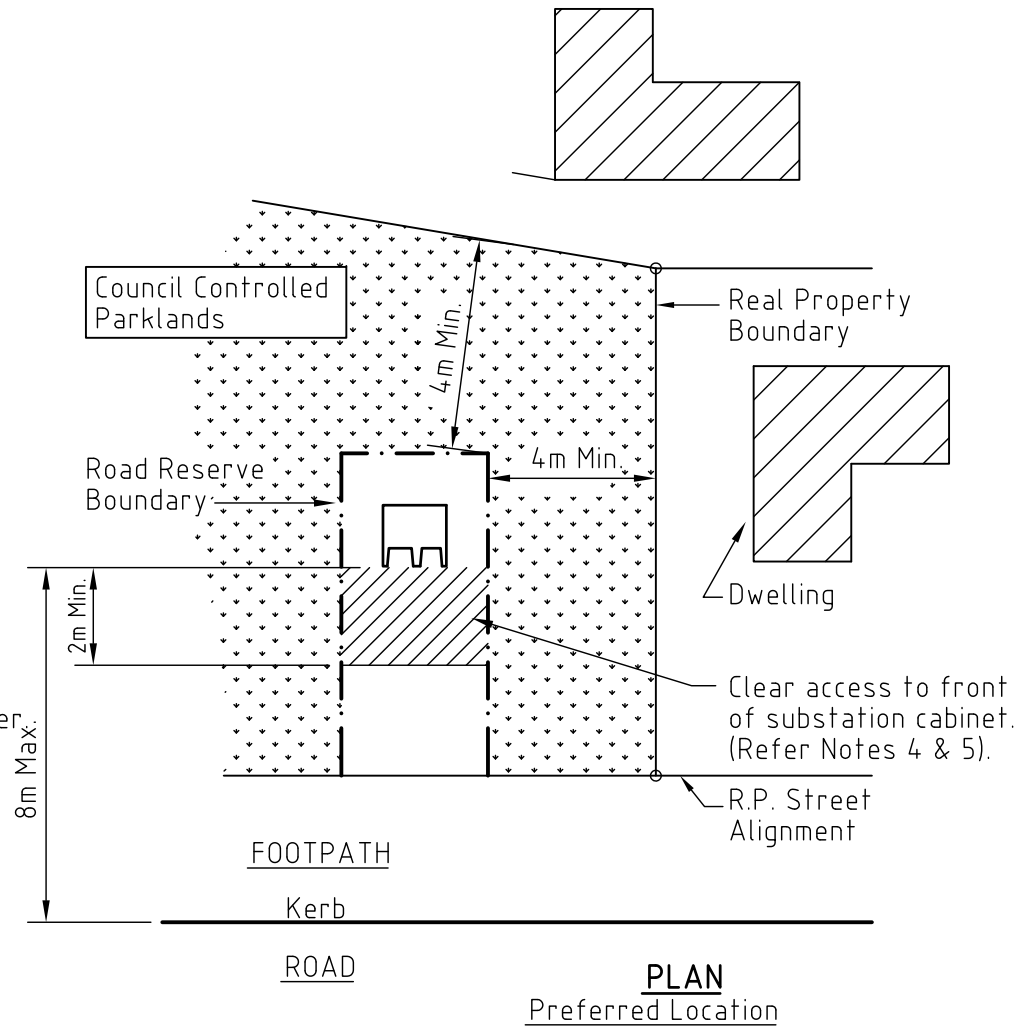
- Approval may be given by Energex Corporate Communications where the proposed artwork promotes the aesthetic values and blends in with surrounding environment.
- The local council and/or developer shall submit the proposed artwork to Energex Asset Manager for approval.
- The local council and/or developer's representative agrees to managing the ongoing maintenance of the artwork.
- All costs associated with the artwork to be borne by the applicant.
- The artwork shall be free of advertising or commercial mentions.
- The artist shall have no rights of claim or ownership of the artwork.


Artwork and posters on underground pillars is prohibited.

ORIGINAL ISSUE A	DATE	20/8/15	 energex © COPYRIGHT 2014 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
	DATE	20/8/15		CIVIL WORKS		DATE	10/10/08	6229-A4 C	
	APP'D	A.SMITH DE PEREZ		PADMOUNT TRANSFORMER SITES		RECD		SECTION	SUB-SECT.
	CKD			GENERAL SITE REQUIREMENTS		CKD	P.BARNEY	C3	1
	DRN	J.LANSLEY				DWN	F.AMANPOOR	SHT 5 OF 9	
		Clause 18 added.					FILE UDC-C3-1-5C.DWG		

Notes:

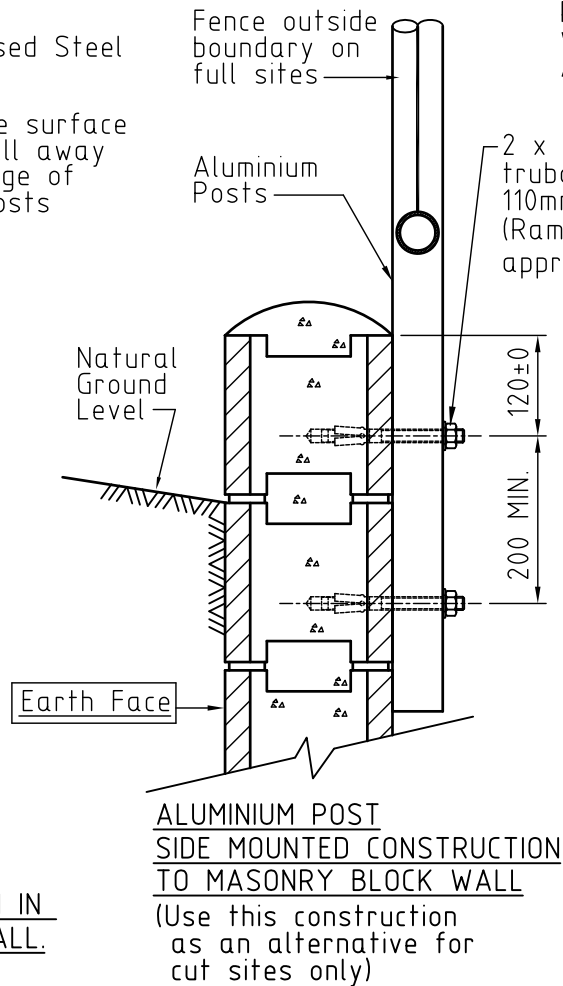
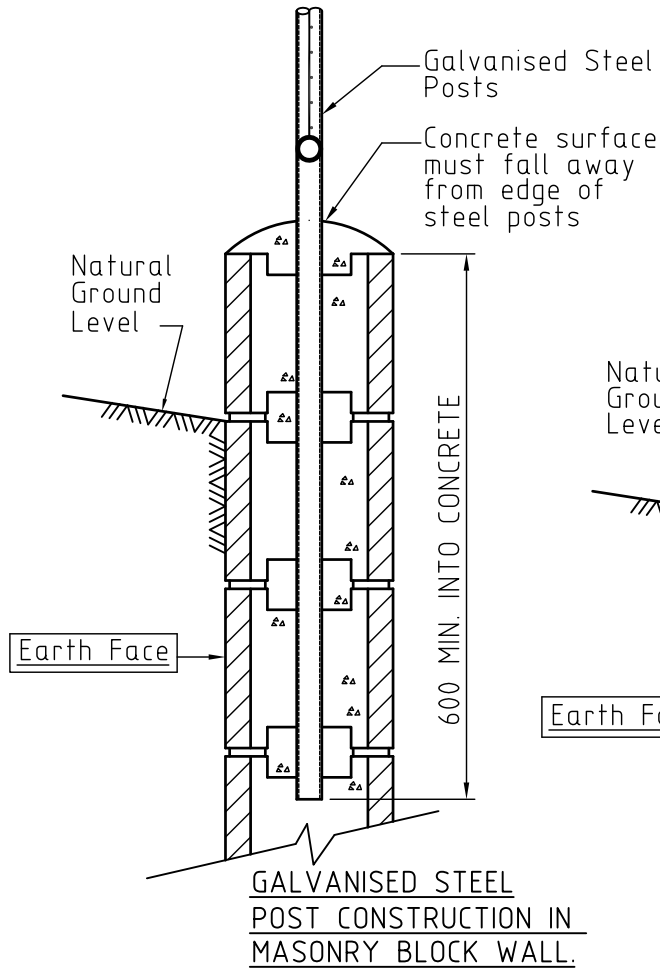
1. A transformer in parkland shall be located:
 - Away from residential dwellings and surrounding properties to minimise visual and sound impact;
 - As close as possible to the road kerb to allow conventional crane access to the transformer.
2. When planting vegetation in parklands, take into consideration the fully matured size of vegetation, ensuring crane access to the site and two metres clear access around the transformer is maintained.
3. The transformer site in parkland may be turfed provided the Local Authority has a regular maintenance policy for vegetation management; and the site is mowed at least four times a year.
4. A minimum width of 2.0 metres of clear access shall be provided in front of the substation cabinet. This will provide a safe working platform and access around the lockable doors when opened for emergency operations.
5. If the property boundary does not adjoin the front boundary of the padmount transformer site, an additional 0.7m shall be added to the depth of the site to allow for 2m clear operating area at the front of the transformer.



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	B	DATE	20/8/15		CIVIL WORKS		DATE	10/10/08	6229-A4		B
	APPD	A. SMITH DE PEREZ	CKD			PADMOUNT TRANSFORMER SITES		RECD		SECTION	SUB-SECT.
	DRN	J. LANSLEY	Added Note 5. DETAIL TO REFLECT LATEST CONTRACT.		COUNCIL PARKLAND		CKD	P. BARNEY	C3	1	
							DWN	F. AMANPOOR	SHT 6 OF 9		FILE UDC-C3-1-6B.DWG

NOTE:

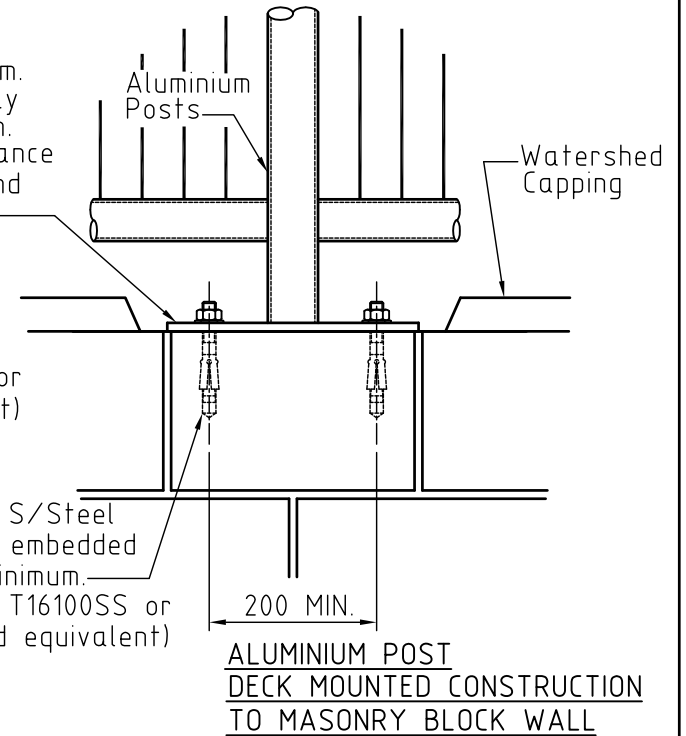
Not suitable for use at padmounted substations with separate LV & HV earthing.



10mm thick Alum. base plate fully welded to Alum. post in accordance with AS1657 and AS 1665.

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16175SS or approved equivalent)

2 x M12 S/Steel trubolts embedded 110mm minimum. (Ramset T16100SS or approved equivalent)



NOTE:

1. A safety fence shall be constructed on retaining wall sloping sites where the difference between ground level and padmount site is 300mm or greater.
2. Chain wire infill and the support cables shall be PVC or baked polyester coated and coloured black or green.
3. Powder coated pool type safety fencing may be used in lieu of chain wire type fencing.
4. All construction of safety fences to be:
 - a) In accordance with AS 1657 / AS 1926 including latest amendments.
 - b) Of a type where infill is between top and toe board / bottom rails.

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A	16/9/15	A SMITH DE PEREZ		J LANSLEY	6A



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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
GENERAL SITE REQUIREMENTS
SAFETY FENCE

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4 B	
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	1
DWN	F.AMANPOOR	SHT 7 OF 9	
FILE UDC-C3-1-7B.DWG			

RETAINING WALL CONSTRUCTION

1. Setting Out

The service provider shall be responsible for the correct setting out of works. The service provider shall establish the actual position of all services on site before commencing work on the site.

2. Compliance

The service provider shall comply with acts of parliament, statutory, municipal and other regulations, or bylaws in any way affecting the working particular with regard to :

- Workplace Health & Safety
- Protection of Public Utilities
- Traffic Hazards and Public Safety.

3. Damage Responsibility

The service provider shall be responsible for any damage to public utility service installations such as water, gas and sewer pipes, electrical, traffic signal or telephone conduits and shall bear the costs of reinstating any service damaged during construction of the works.

Special Conditions

These retaining wall constructions drawings provided by ENERGEX are to be applied in normal situations. Where special conditions exist, (in the opinion of the supervising Civil Engineer) such as :

- Extra heavy surcharge
- Unstable ground conditions
- Property boundary limitations
- Excavation or backfilling restrictions,

the developer shall provide a certified design from a Civil Engineer (RPEQ) for Energex's consideration. No special designs for retaining wall construction shall be used without the approval of Energex (Design).

4. Additional Requests

Additional requests will be required if the developer, or his representative, choose to :

- construct the substation on a slope where the retaining wall would be higher than 2m (refer to the construction drawings); or
- use a different method of construction for the retaining wall.

Requests shall be accompanied by a certified design from a Civil Engineer (RPEQ) for ENERGEX's consideration. No special design for retaining wall construction shall be used without the approval of ENERGEX (Design).


5. Masonry

Concrete masonry materials and workmanship shall comply with AS 3700.

Masonry blocks shall be 200 and 300 series and shall comply with AS/NZS 4455.

Mortar shall consist of 1 part cement, 1/10 part slaked lime and 3 parts sand measured by volume.

The bottom course blocks shall contain an opening to permit clean out of the cell space.

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	DATE	16/9/15		CIVIL WORKS	DATE	10/10/08	6229-A4		C
	APPD	A.SMITH DE PEREZ		PADMOUNT TRANSFORMER SITES	RECD		SECTION	SUB-SECT.	
	CKD			GENERAL SITE REQUIREMENTS	CKD	P.BARNEY	C3	1	
	DRN	J.LANSLEY		RETAINING WALLS - GENERAL REQUIREMENTS	DWN	F.AMANPOOR	SHT 8		OF 9
WAS DRAWING TA					FILE UDC-C3-1-8C.DWG				

6. Foundation

Where the bearing surface under the foundation is silt or clay soil; a 100 mm layer of compacted sand or gravel, bedding material shall be placed under the concrete foundation.

7. Concrete

Concrete work shall comply with AS 3600 and the following table:

	F'c	SLUMP	MAX.AGG.
FOUNDATION	25 MPa	75 mm	20 mm
CORE FILLING	17.5 MPa	150 mm	10 mm

Concrete foundation slab with continuous reinforcement over lapped at joints shall be poured MONOLITHICALLY (in one operation).

8. Reinforcement

Hot rolled deformed bar - "TEMPCORE" complying with AS/NZS 4671. Hard-drawn steel wire reinforcement fabric complying with AS 1303 and AS/NZS 4671.

9. Drainage

50 mm weepholes at 1 200 mm centres shall be provided through walls.

A porous backfill such as gravel or coarse sand shall be provided directly behind the wall to allow water to reach the weepholes. It is essential to have suitable filter material between the wall and the natural ground.

10. Backfilling

Clay soils and organic silts shall not be used as backfill as they have poor drainage characteristics.

Backfill should not be placed or compacted until the wall has cured (14 days minimum for 17.5 MPa concrete) so as to have sufficient strength to withstand backfilling loads.

Backfill shall be compacted to 95% of the maximum dry density as defined in the Modified Compaction Test to AS 1289.5.2.1.

After installation of the substation and cables has been completed the ground within the enclosure shall be backfilled, compacted, levelled and finished in accordance with the construction drawings.

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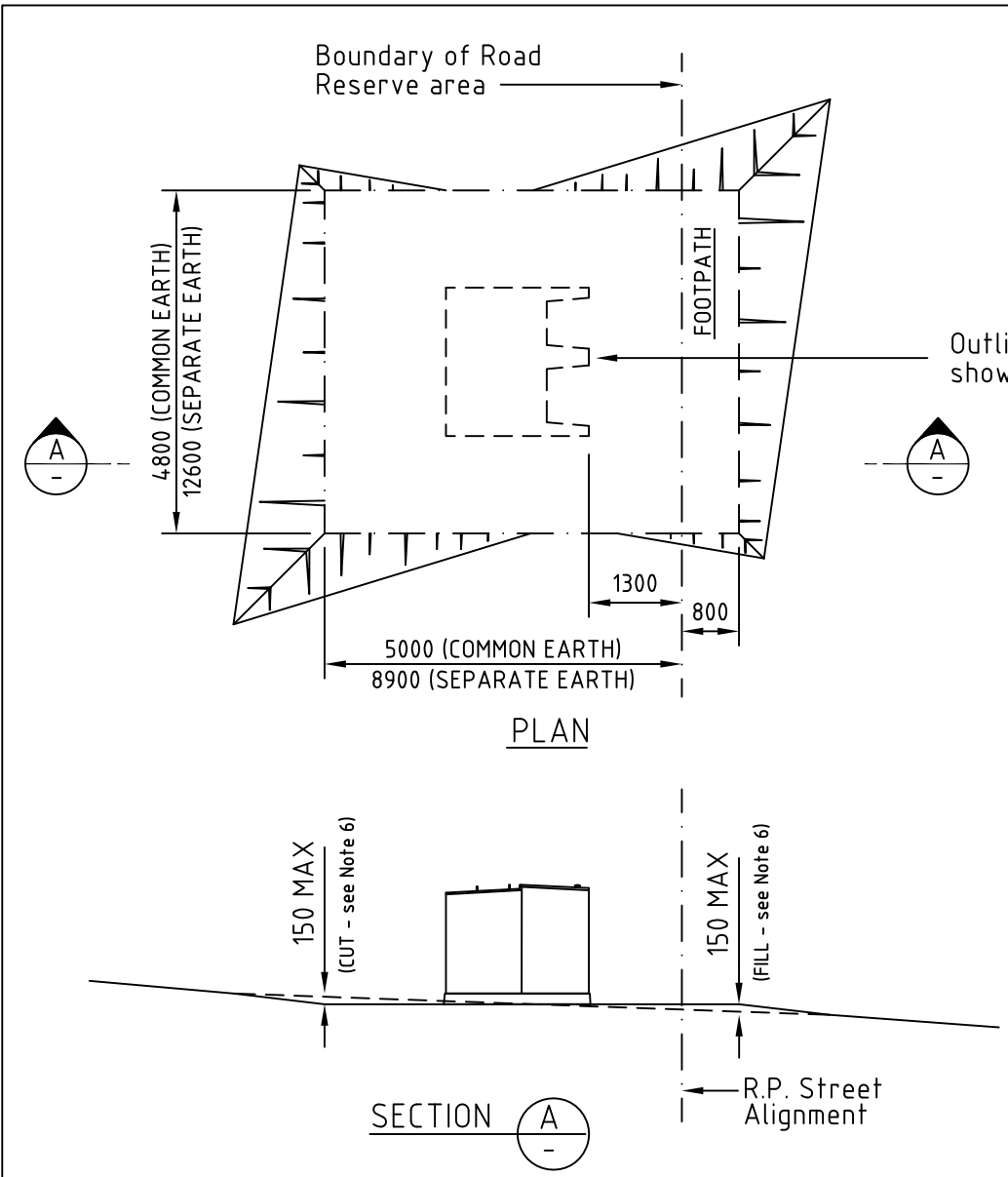


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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
PADMOUNT TRANSFORMER SITES
GENERAL SITE REQUIREMENTS
RETAINING WALLS - GENERAL REQUIREMENTS


APP'D	A.PEREZ	CAD	
DATE	16/9/15	6229-A4	A
RECD		SECTION	SUB-SECT.
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DWN	F.AMANPOOR	SHT 9	OF 9
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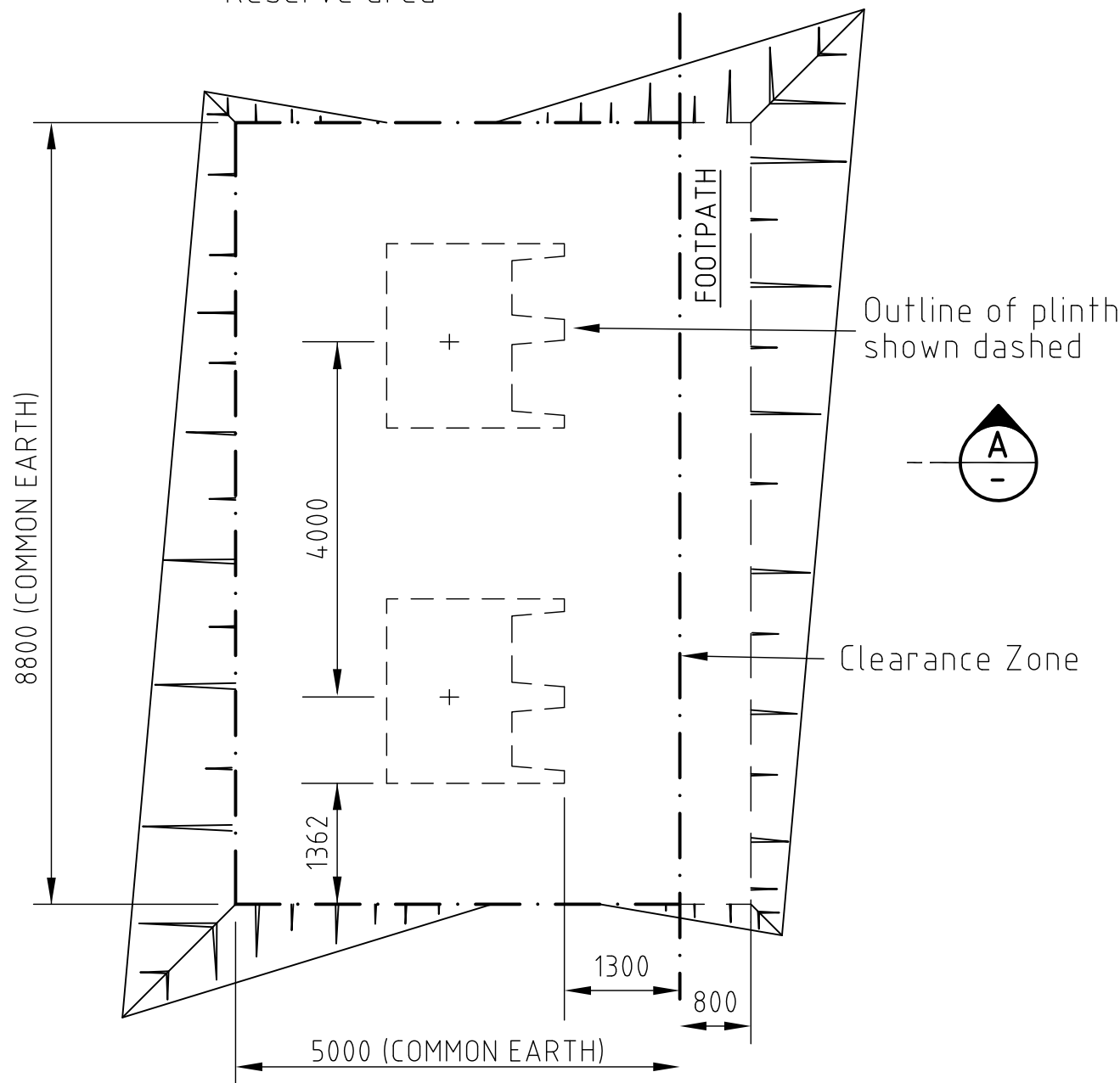
For SEPARATE LV & HV earthing a clearance zone of 12.6m wide by 8.9m deep is required. The clearance zone is to be maintained free from metallic objects, buildings and structures, including their foundations.

NOTE:

1. ENERGEX's padmount clearance zone shall be levelled and surrounding area graded to ensure no water ponding.
2. No services other than the ENERGEX's electric cables shall pass through this substation site.
3. Clear access to the transformer shall be maintained for ENERGEX's personnel and heavy equipment.
4. After installation is complete the site surface is to be finished with a concrete slab.
5. Mature landscaping (including trees, sprinklers etc.) shall not encroach onto the substation site.
6. Cut and fill levels greater than 150mm will require a Civil RPEQ certified design to ensure levels, compaction standards, drainage have been considered, Sites requiring retaining walls shall be designed in accordance with C3-2.6.

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	DATE		9/2/17	CIVIL WORKS		DATE	10/10/08	6229-A4	C
	APPD		J.LANSLEY	PADMOUNT TRANSFORMER SITES		RECD		SECTION	SUB-SECT.
	CKD		-	SQUARE TYPE		CKD	P.BARNEY	C3	2.1
	DRN		P.RELF	SLOPING SITE - MAXIMUM CUT & FILL		DWN	F.AMANPOOR	SHT 1 OF 1	
	CUT & FILL NOTES ALTERED					FILE UDC-C3-2.1-1C.DWG			

Boundary of Road Reserve area

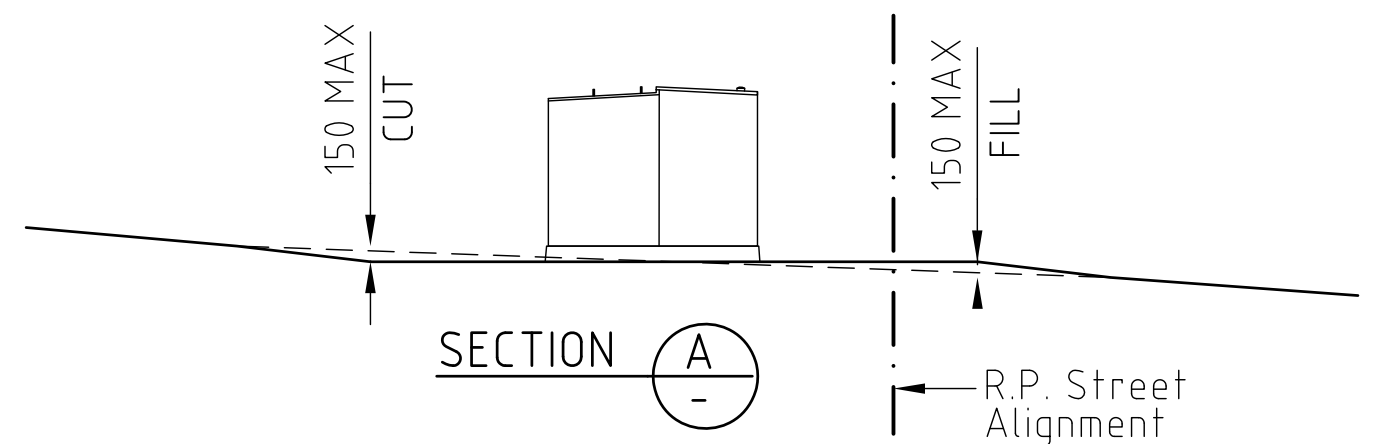


PLAN


The clearance zone is to be maintained free from metallic objects, buildings and structures, including their foundations.

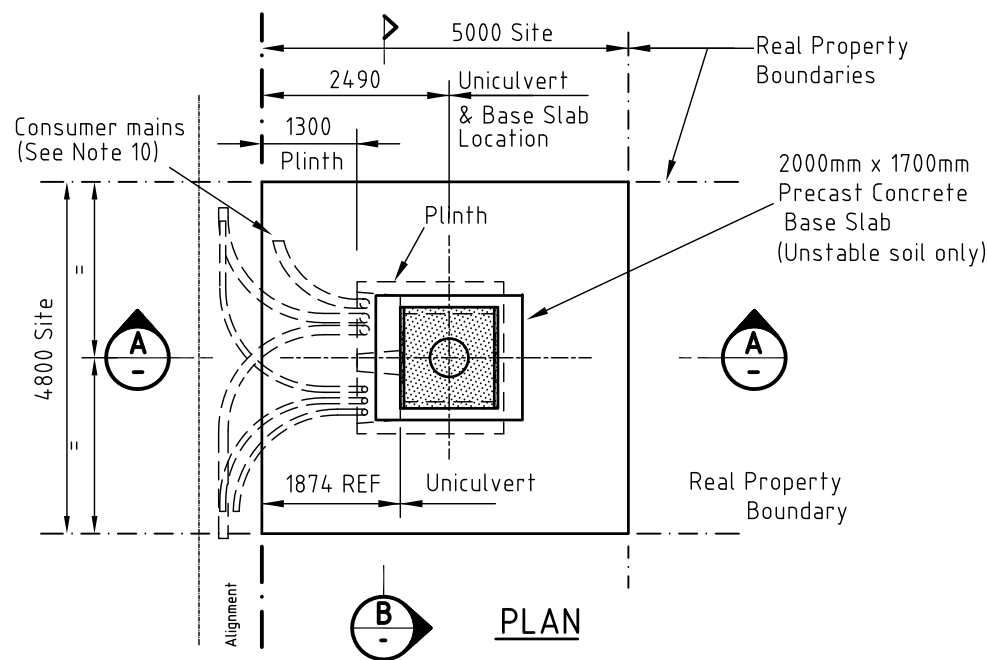
NOTE:

1. ENERGEX's padmount clearance zone shall be levelled and surrounding area graded to ensure no water ponding.
2. No services other than the Energex's electric cables shall pass through this substation site.
3. No services other than Energex's earth grid shall pass through the space between two padmount transformers.
4. Clear access to the transformer shall be maintained for ENERGEX's personnel and heavy equipment.
5. After installation is complete the site surface is to be finished with a concrete slab.
6. Mature landscaping (including trees, sprinklers etc.) shall not encroach onto the substation site.
7. Refer Energex underground distribution construction drawing 6229-C3-2.2 for standard unculvert foundation details.
8. Separation between centers of unculvert is 4000mm



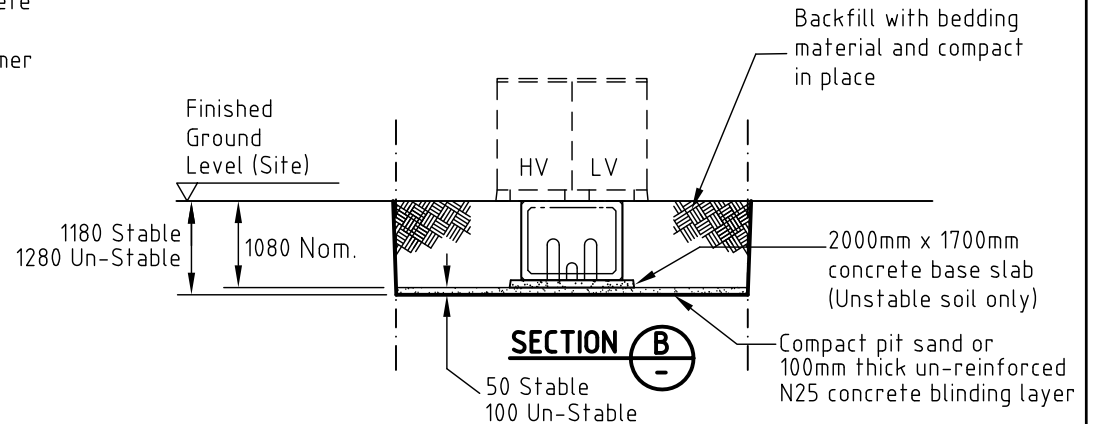
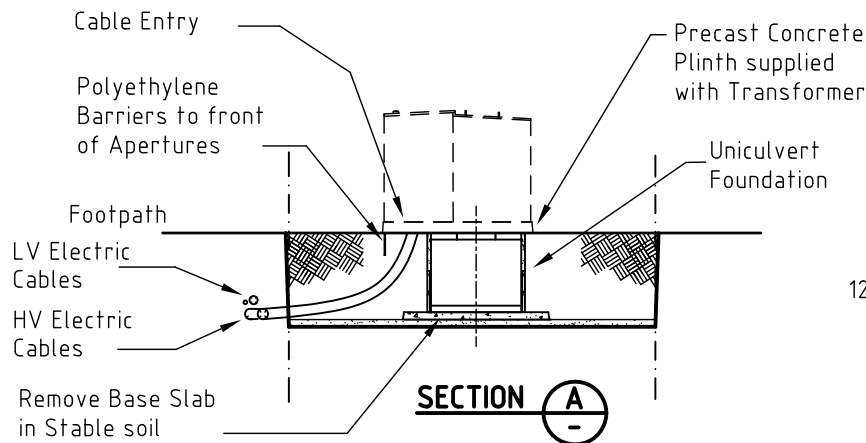
SECTION A

ORIGINAL ISSUE	 © COPYRIGHT 2011 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL		APP'D	C.Lee		CAD
		CIVIL WORKS DUAL PADMOUNT TRANSFORMER SITES SQUARE TYPE SLOPING SITE - MAXIMUM CUT & FILL		DATE	30-10-14	6229-A4 A	
				RECD		SECTION C3	SUB-SECT. 2.1
		CKD	J. Lansley	SHT 2 OF 2			
		DWN	A. Anand	FILE UDC-C3-2.1-2A.DWG			

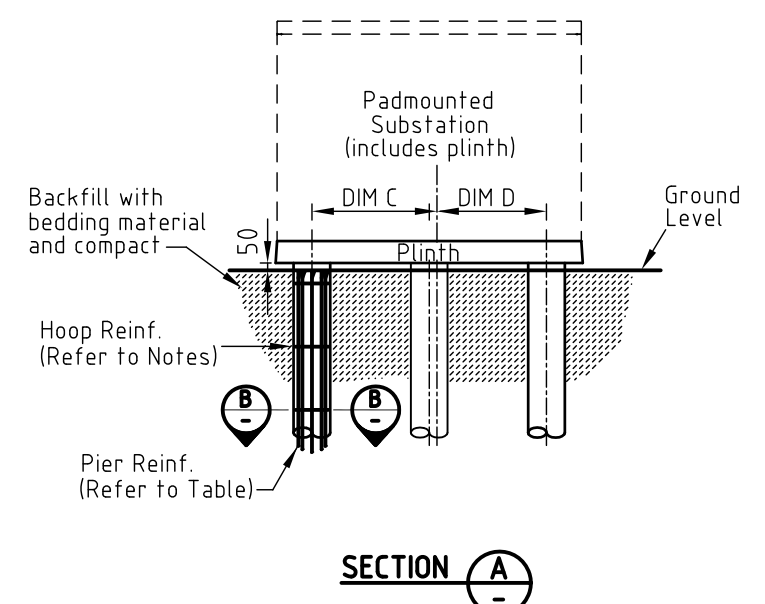
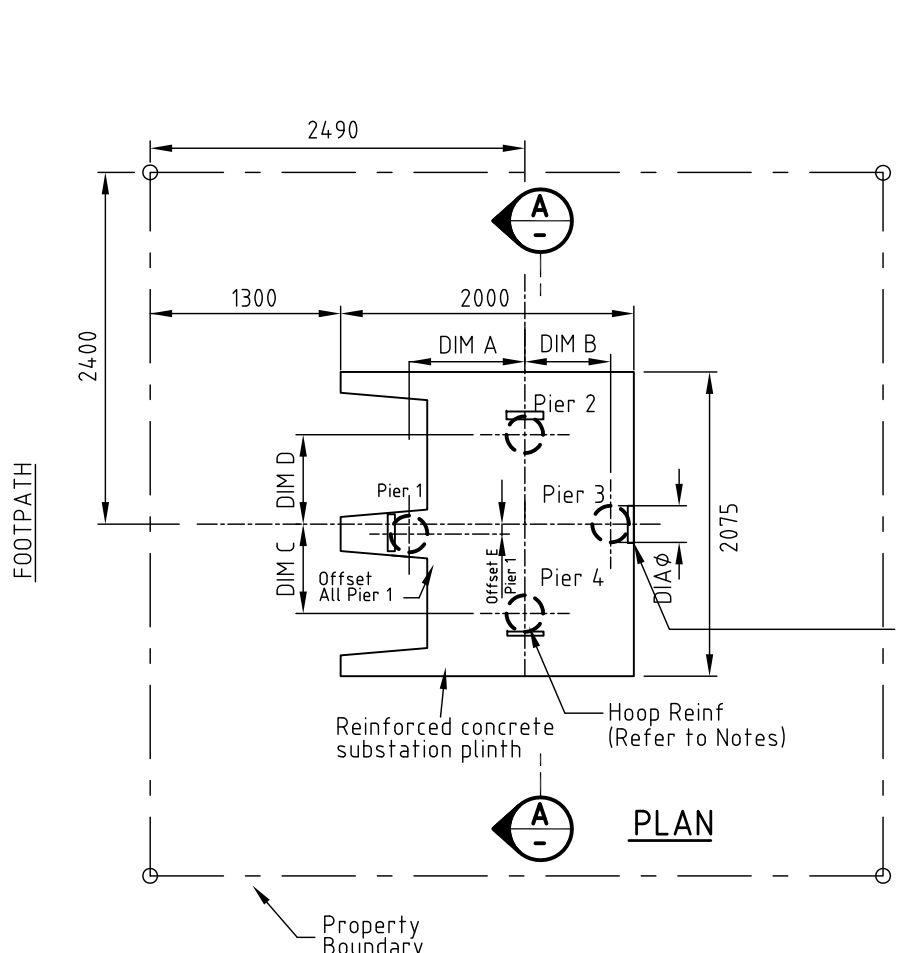


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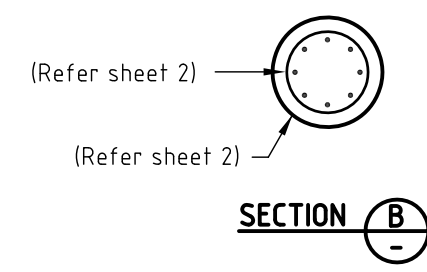
- Foundation design details are as follows:
 - Unstable soils are soft clay to sandy gravel with a soil strength 50 - 150 kPa. These soil types REQUIRE a base slab as shown.
 - Stable soils are very stiff clay to shale/rock with soil strength of 150KPa or higher. These soil types DO NOT REQUIRE a base slab.
- Lift unculvert and base slab separately with 4 x 1.3t Reid Swiflift lifting eyes.
- Position top face of Unculvert at finished ground level. (refer Civil Constructions drawings)
- Installed Unculvert shall be level.
- If deep excavation is required under transformer cabinet and in front of foundation, plinth front edge shall be propped while excavation remains open.
- Foundation Components:
 - 1 x Unculvert (Stock Code 19959)
 - 2 x End Walls (Stock Code 19959)
 - 1 x Base Slab (Stock Code 19960)
 Unculvert and End Walls come assembled with a Layer of Preformed Sealant to the perimeter of the Unculvert End and between the Mating Surfaces.
- Only remove minimum Knockout Area required to pass Conduits (Max. Conduit 150mm Nom. Dia.) or Cables through unculvert void by tapping out Concrete.
- Seal between conduits/cables and concrete end wall at knockout interface by grouting with high strength sand and cement grout after conduit installation to prevent entry of vermin and backfill ingress to unculvert void.
- Excavate to property boundaries to facilitate installation of earth grid.
- Consumers mains (where present) shall not cross HV mains or run back under transformer.




A	ORIGINAL ISSUE	APP'D R. ENGLISH		CAD		
	DATE 20/8/15	DATE 10/10/08	6229-A4		C	
	APPD A.SMITH DE PEREZ	RECD	SECTION C3	SUB-SECT. 2.2		
	CKD	CKD P.BARNEY	SHT 1 OF 1			
	DRN J.LANSLEY	DWN F.AMANPOOR	FILE UDC-C3-2.2-1C.DWG			
Note 10 added. Concrete layer alt to bedding sand.		<p>© COPYRIGHT 2014 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX</p>			<p>UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL</p> <p>CIVIL WORKS PADMOUNT TRANSFORMER SITES SQUARE TYPE FOUNDATION DETAILS - STANDARD UNCULVERT</p>	



Mechanical connections between piers and plinth
(Refer to note 7, sheet 3, Section C3.1)




A	ORIGINAL ISSUE	 © COPYRIGHT 2012 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES SQUARE TYPE FOUNDATION DETAILS - PIER		APP'D	R. ENGLISH			CAD	
	D				DATE	20/8/15	6229-A4		D	
	APPD				A. Smith de Perez	RECD		SECTION	SUB-SECT.	
	CKD				A. De Costa	CKD	P. BARNEY	C3	2.3	
	DRN				P. Reif	DWN	F. AMANPOOR	SHT 1 OF 2		
UPDATE DRAWING		FILE UDC-C3-2.3-1D.DWG								

NOTES:

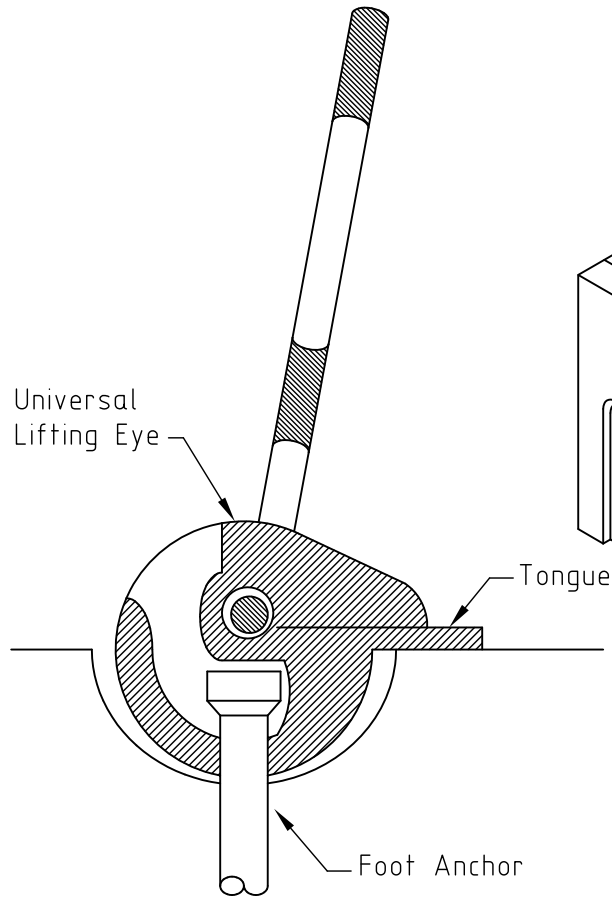
- The foundation is suitable for substations from 200 to 500kVa-11kV/433-250V only. For 750 to 1000kVa -11kv/433-250V use the unculvert foundation.
- The diameters of concrete bored piers is dependant on the supporting stratum bearing capacity as detailed from the table below.
- The minimum depth of a pier shall be at least 2x diameter into the stratum of the undisturbed natural soil and 600mm below cable entry excavation.
If the material is unsuitable then the hole shall be drilled deeper until a firm bearing stratum is reached.
- All bored piers shall be reinforced according to constructions drawings prepared by the service provider's RPEQ and approved by Energex Principal Civil Engineer.
Minimum requirements are shown in the table below.
- All reinforcement shall comply to AS/NZS 4671
- Hoop reinforcement shall be R10 @ 150 C/C
- The minimum concrete cover to steel shall be 70mm.
- The minimum concrete strength shall be 32MPa.
- Concrete piers shall be constructed using a continuous single concrete pour.
- The top of piers shall be level. The maximum variation between the 4 piers shall be 3mm.

SUPPORTING STRATUM	ALLOW. BEARING CAPACITY (kPa)	BORED PIER DIA 'Ø' (mm)	DIMENSION 'A' (mm)	DIMENSION 'B' (mm)	DIMENSION 'C' (mm)	DIMENSION 'D' (mm)	OFFSET 'E' (mm)	DIMENSION 'F' (mm)	REINFORCEMENT	
									No. OF BARS	DIA. OF LONGITUDINAL RODS(mm)
FIRM	50	550	382	515	700	700	68	1150	9	12
STIFF	100	450	447	585	675	675	68	1250	7	12
VERY STIFF	200	300	640	585	675	675	68	1350	5	12
HARD	400	300	640	585	675	675	68	1350	5	12

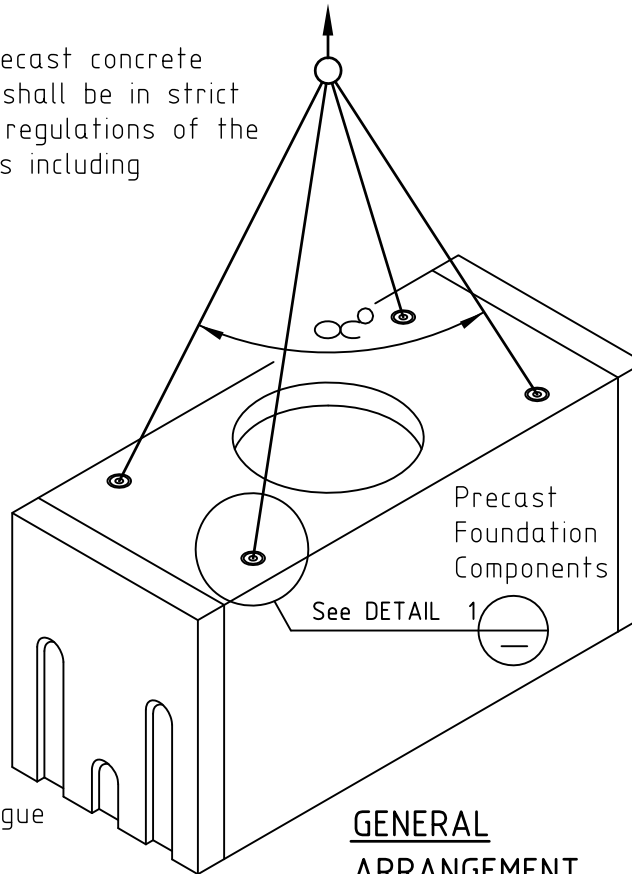
ORIGINAL ISSUE	DATE	20/8/15	 © COPYRIGHT 2012 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES SQUARE TYPE FOUNDATION DETAILS - PIER			APP'D	R. ENGLISH		CAD		
	D						DATE	10/10/08	6229-A4		D	
	APPD	A. Smith de Perez					RECD		SECTION	C3	SUB-SECT.	2.3
	CKD	A. De Costa					CKD	P. BARNEY	SHT 2 OF 2			
	DRN	P. Reif					DWN	F. AMANPOOR	FILE UDC-C3-2.3-2D.DWG			
UPDATE NOTES AND TABLE												

Notes:

Lifting, Handling and Installation of precast concrete foundations on a construction project shall be in strict accordance with the requirements and regulations of the Workplace Health & Safety Regulations including latest amendments.



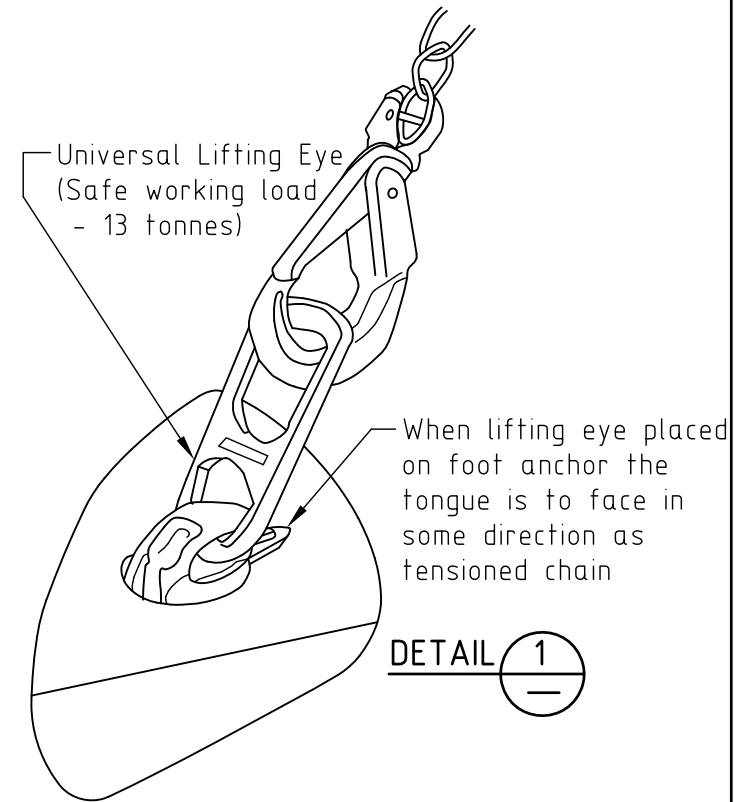
SECTION DETAIL 1



GENERAL ARRANGEMENT


Notes:

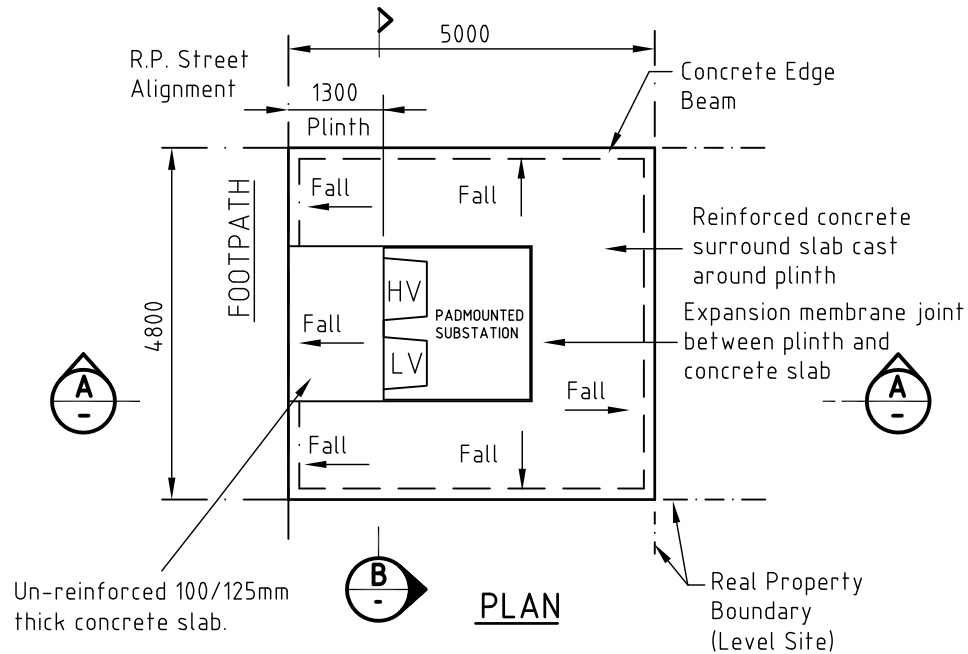
General Arrangement shown for rectangular padmount. Similar lifting and handling requirements apply to square padmount.



Notes:

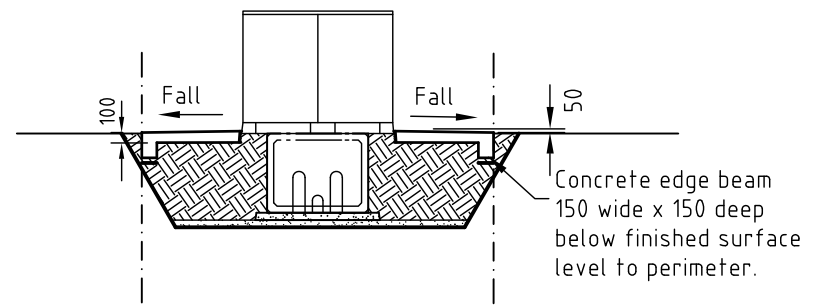
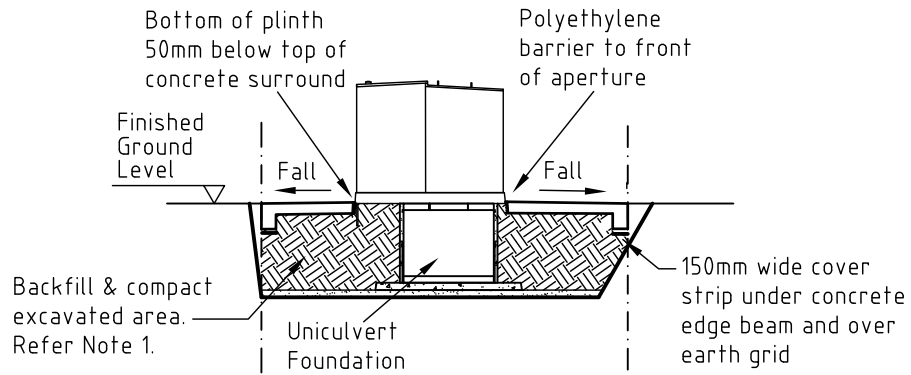
The "Reid Swiftlift" concrete lifting system is used for lifting modules. (Manufacturer - Alan H Reid Pty Ltd) Use only nominated Reid Swiftlift components to lift foundation by Swiftlift anchors. Lift foundation from all four anchors only. The load will always be shared between two diagonal points and ANGLE ∞ ° IS NOT TO EXCEED 60°.


A	ORIGINAL ISSUE				 © COPYRIGHT 2009 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	17/11/09				DATE	10/10/08	6229-A4		B		
	APPD		R. ENGLISH	CKD		D. TAYLOR	DRN	G. TREAGLE	RECD		SECTION	SUB-SECT.	
			GENERAL ARRANGEMENT NOTE FOR LIFTING & HANDLING OF SQUARE PADMOUNTS ADDED.					CKD	P.BARNEY	C3		2.4	
								DWN	F.AMANPOOR	SHT 1		OF 1	
												FILE UDC-C3-2.4-1B.DWG	

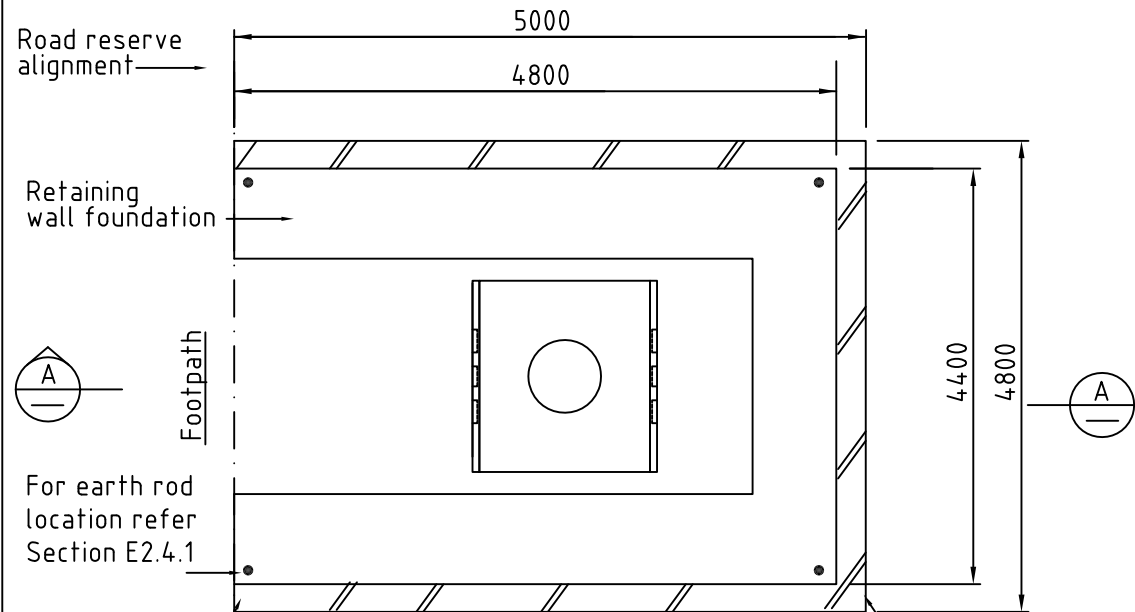


NOTE:

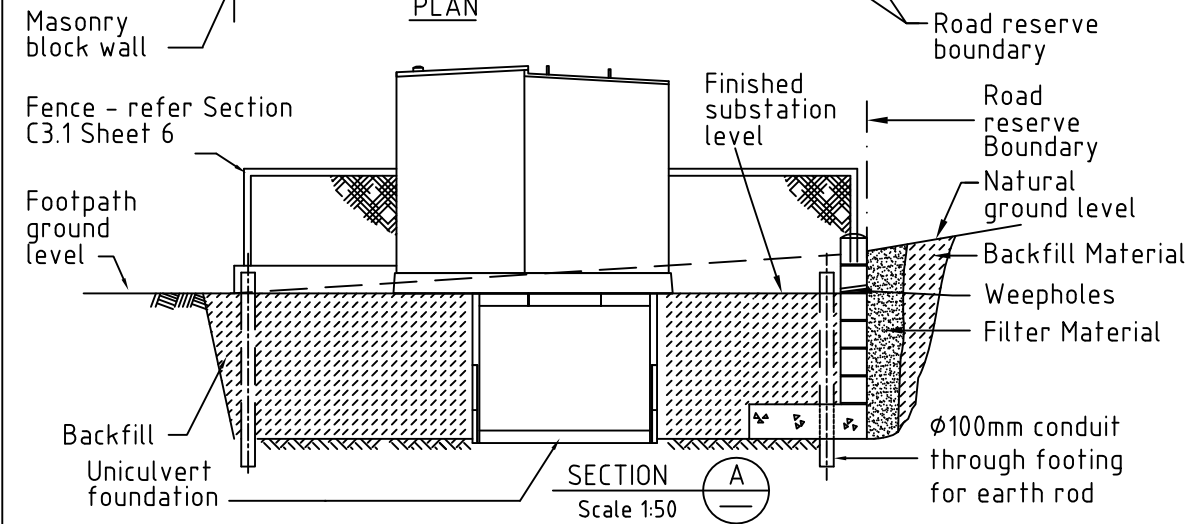
1. Backfill excavated area with crusher dust, deco or pit sand and compact in place. Ensuring that only pit sand is used around direct laid cables.
2. Reinforced concrete surround slab:
 - a) 100/125mm thick slab;
 - b) F62 mesh reinforcement in centre of slab;
 - c) 25 MPa grade concrete;
 - d) Finish by wood float or by nylon broom.
3. The top face of the concrete surround slab shall be 25mm above the final surface level (when turf is laid).
4. The concrete slab is to slope away from plinth falling at a slope of 1 in 25.
5. Cable apertures through the precast concrete plinth shall be backfilled to 50mm from the top of plinth. A 30mm deep layer of 1:16 ratio weak mix concrete shall be placed to seal aperture.
6. The surface of the surround slab may be finished with a stencil pattern surface to match the surrounding pavements of the development. (Use Textcrete or equivalent product. Construct to supplier's specifications.)



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	C	DATE	20/8/15		CIVIL WORKS		DATE	10/10/08	6229-A4 C		
		APP'D	A. SMITH DE PEREZ		PADMOUNT TRANSFORMER SITES		RECD		SECTION	SUB-SECT.	
		CKD			SQUARE TYPE		CKD	P. BARNEY	C3	2.5	
		DRN	J. LANSLEY		CONCRETE SURROUNDS		DWN	F. AMANPOOR	SHT 1 OF 1		
							FILE UDC-C3-2.5-1C.DWG				



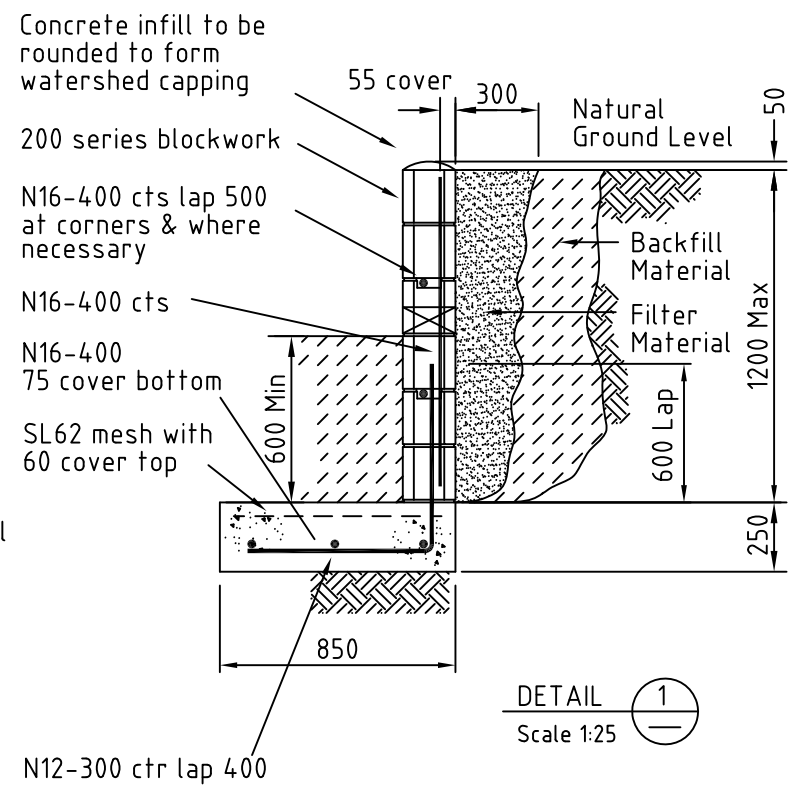
PLAN



SECTION A
Scale 1:50

Concrete Strengths

	F'c	Slump	Aggregate Size (Max)	Cement Content (Min)
Footing	25MPa	75	20mm	-
Blockwork/ Core Filling	17.5MPa	150	10mm	300kg/cu. m



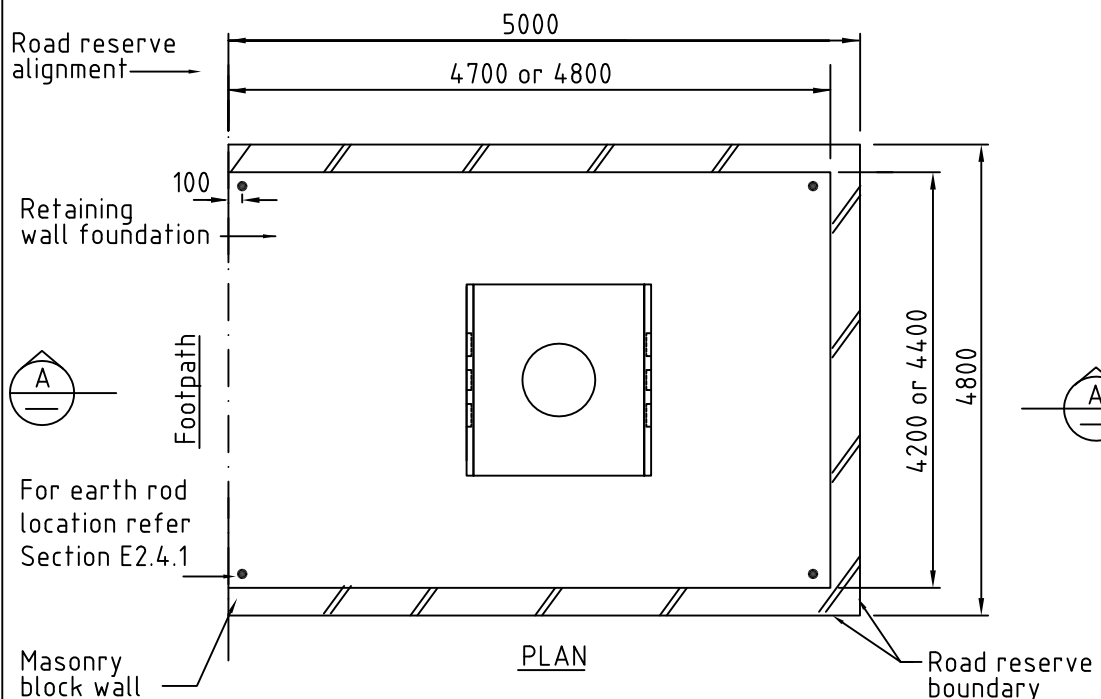
DETAIL 1
Scale 1:25

A	ORIGINAL ISSUE	APPD J.Lansley	CKD	DRN P.Reif	Update re-inforcing & mesh specification.
	DATE 21/2/17				

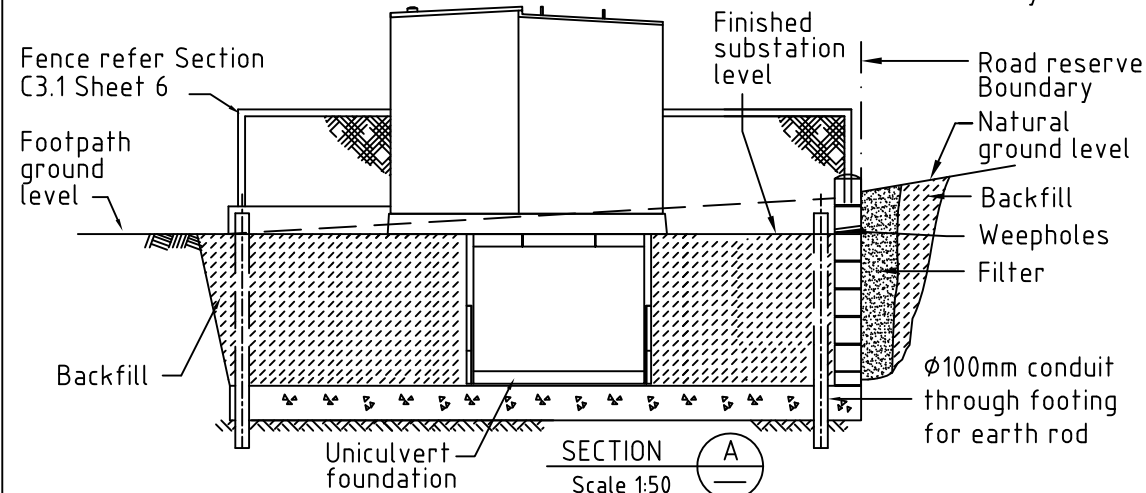
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
SQUARE TYPE
RETAINING WALLS - CUT SLOPING SITE UP TO 1200mm CUT

APP'D R. ENGLISH	FILE	CAD
DATE 10/10/08	6229-A4	C
RECD	SECTION C3	SUB-SECT. 2.6
CKD P.BARNEY	SHT 1 OF 4	
DWN F.AMANPOOR	FILE UDC-C3-2.6-1C.DWG	

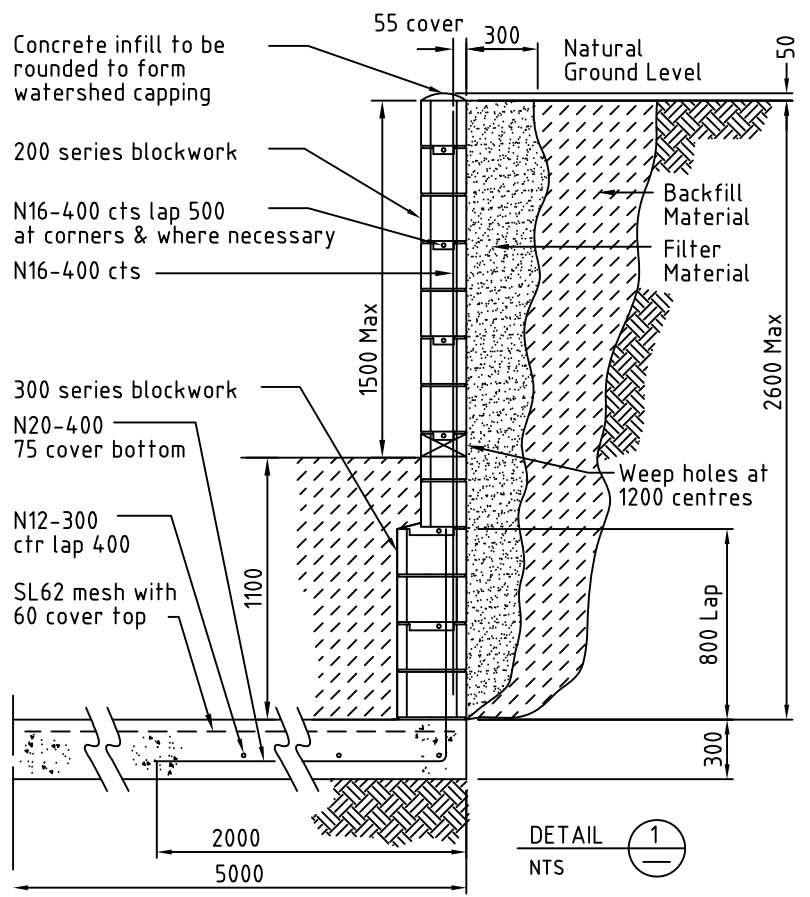


PLAN



SECTION A
Scale 1:50

CONCRETE STRENGTHS REFER SHEET 1



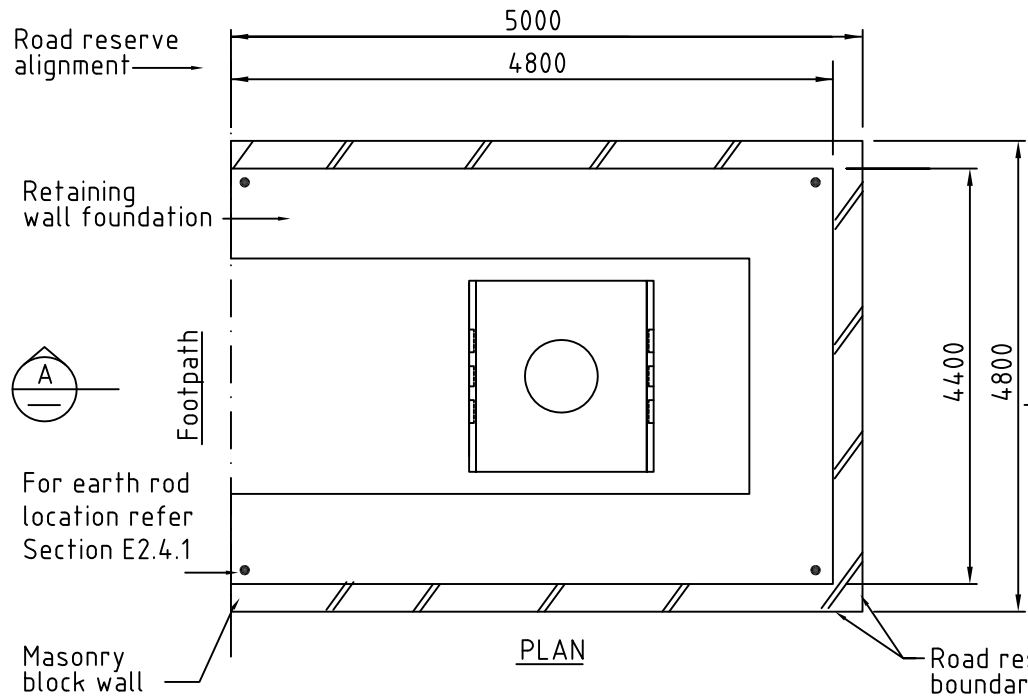
DETAIL 1
NTS

ORIGINAL ISSUE	DATE	APPD	CKD	DRN	Updated re-inforcing & mesh specification
A	21/2/17	J.Lansley			
C					

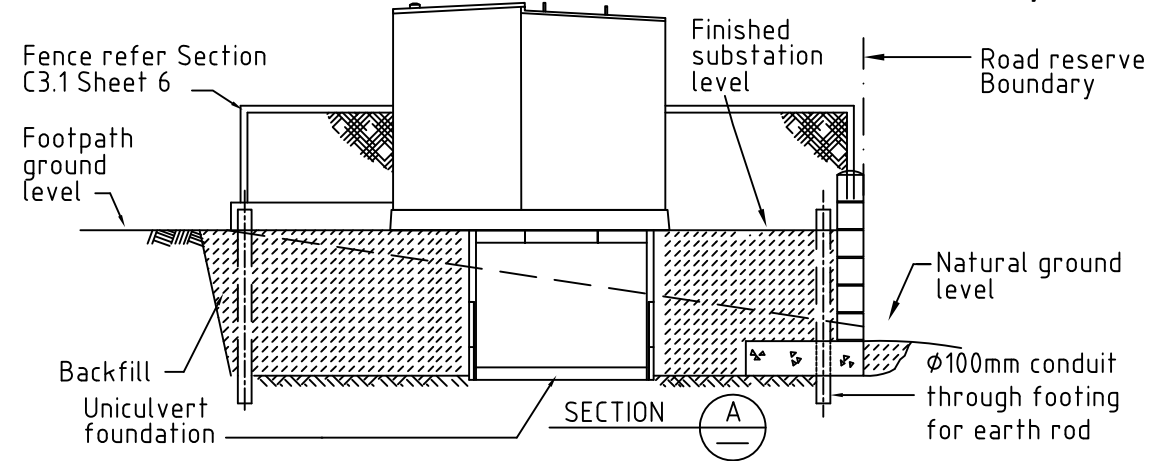
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
SQUARE TYPE
RETAINING WALLS - CUT SLOPING SITE 1200mm-2600mm CUT

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	C
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	2.6
DWN	F.AMANPOOR	SHT 2 OF 4	
FILE UDC-C3-2.6-2C.DWG			



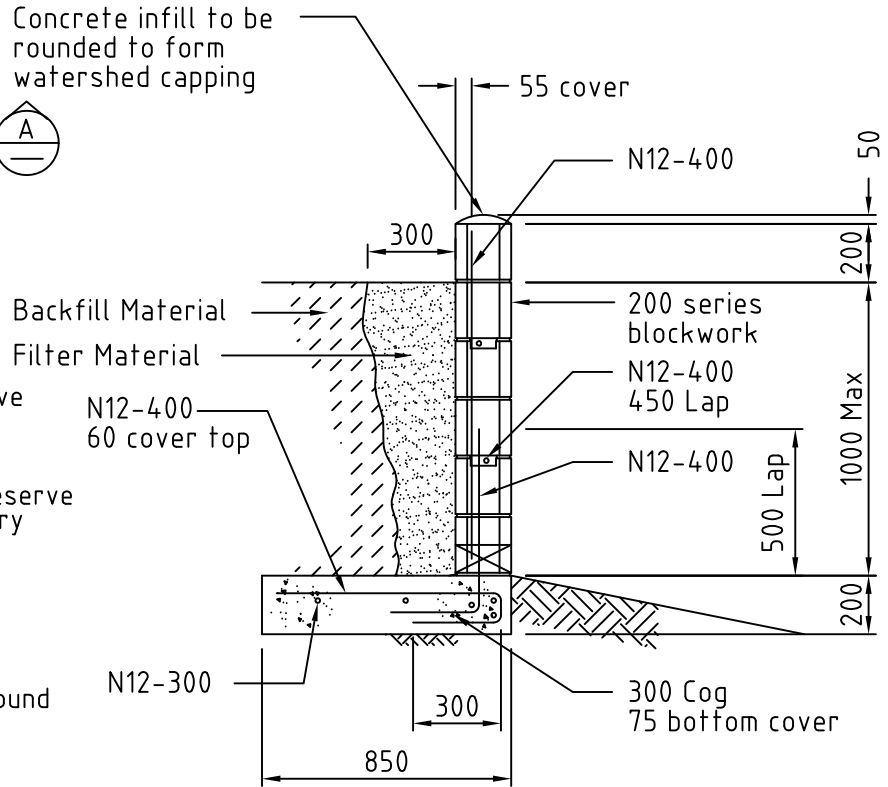
PLAN



SECTION A

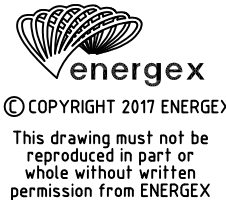
Concrete Strengths

	F'c	Slump	Aggregate Size (Max)	Cement Content (Min)
Footing	25MPa	75	20mm	-
Blockwork/ Core Filling	17.5MPa	150	10mm	300kg/cu. m



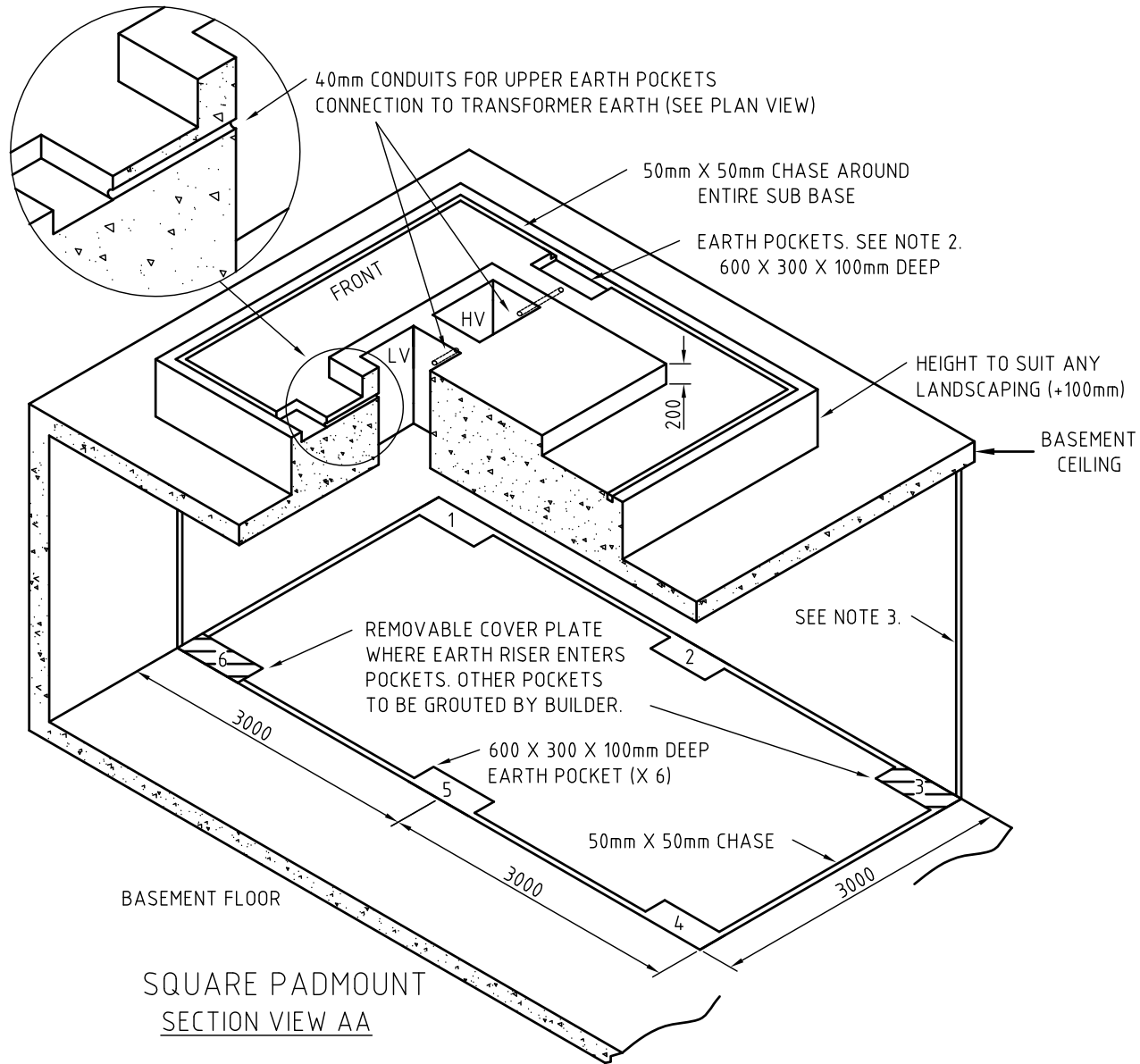
DETAIL 1

ORIGINAL ISSUE	DATE	APPD	CKD	DRN	Update re-inforcing & mesh specification.
A	21/2/17	J.Lansley		P.Reif	




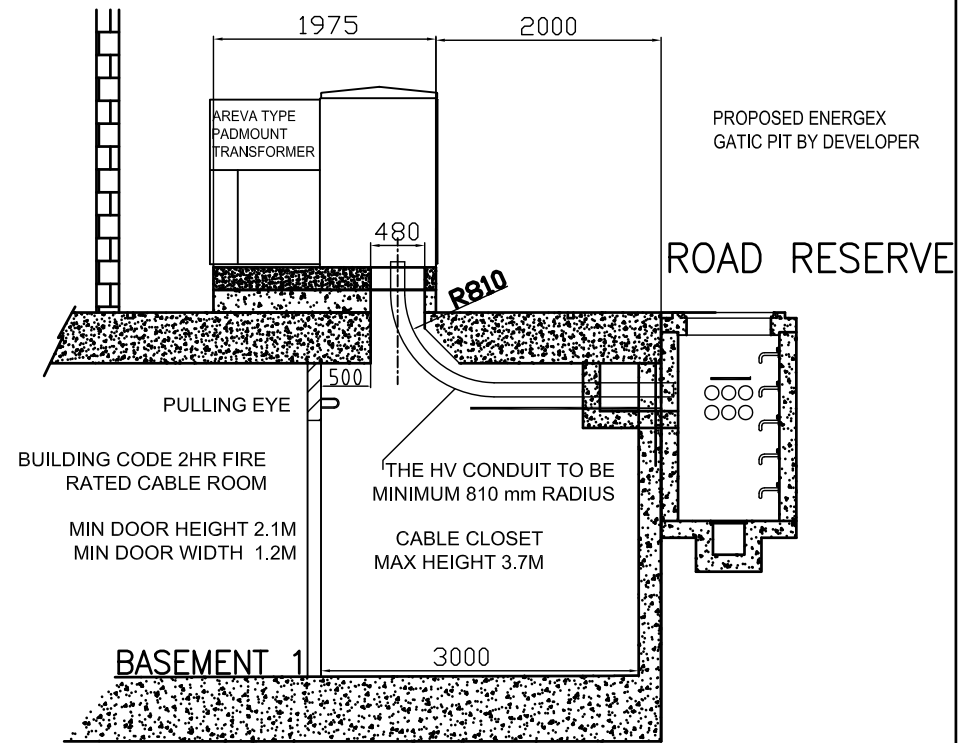
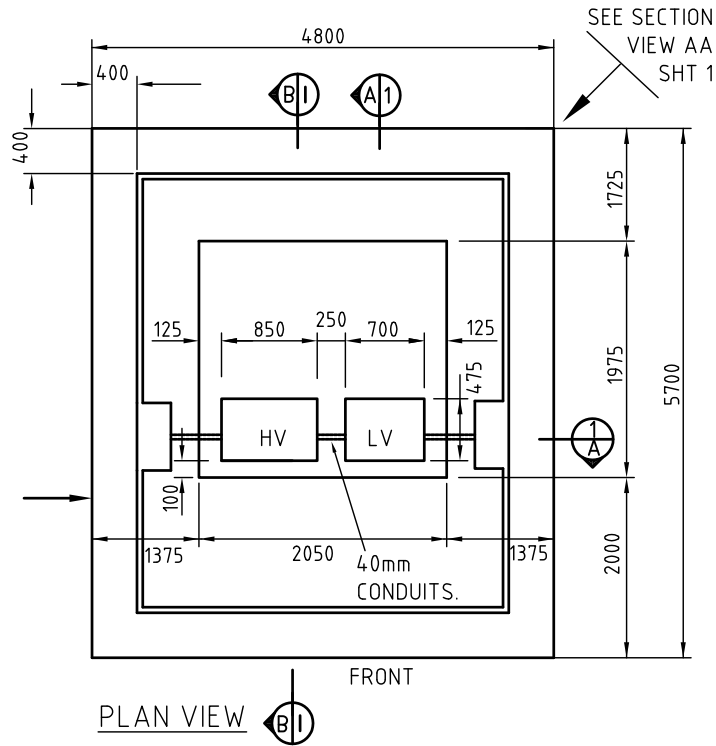
UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
 CIVIL WORKS
 PADMOUNT TRANSFORMER SITES
 SQUARE TYPE
 RETAINING WALLS - FILLED SLOPING SITE UP TO 1.0m FILL

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	C
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	2.6
DWN	F.AMANPOOR	SHT 3 OF 4	
FILE UDC-C3-2.6-3C.DWG			



SQUARE PADMOUNT
SECTION VIEW AA


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	APPD	A. Smith de Perez			CIVIL WORKS	DATE	10/10/08	6229-A4 D			
	CKD	A. De Costa			PADMOUNT TRANSFORMER SITES	RECD		SECTION	SUB-SECT.		
	DRN	P. Relf			SQUARE TYPE	CKD	P. BARNEY	C3	2.7		
	SPLIT OVER 2 SHEETS				LOCATION OVER BASEMENT	DWN	F. AMANPOOR	SHT 1 OF 2			
					FILE UDC-C3-2.7-1D.DWG						

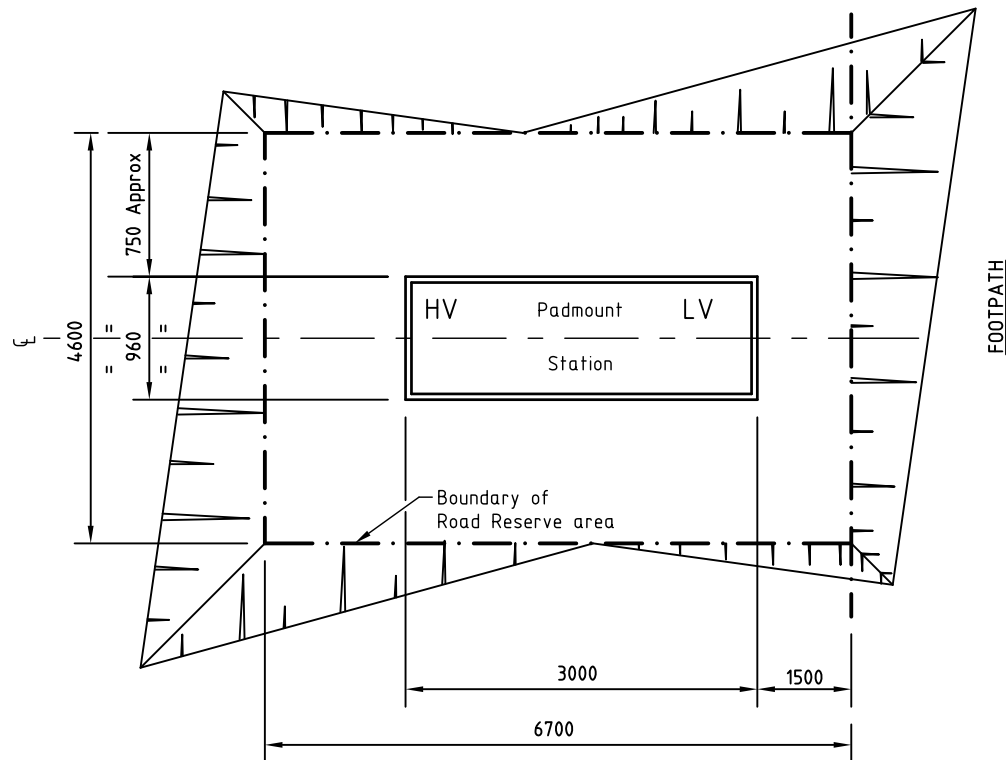


BB SECTION - SIDE VIEW

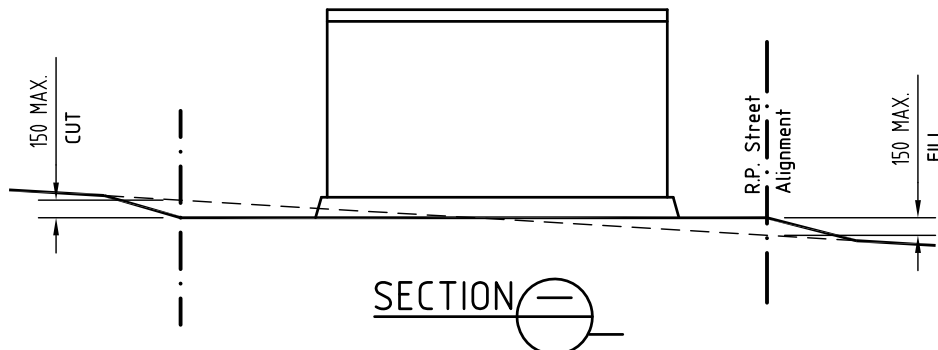
- NOTES: 1. ALL CHASES TO BE GROUTED IN BY BUILDER AFTER ENERGEX WORK COMPLETED.
2. UPPER GRID TO BE CONNECTED TO PADMOUNT VIA 40mm CONDUITS AS PER PLAN VIEW.
3. LOWER GRID TO BE CONNECTED TO PADMOUNT VIA CABLE TRAY, 40mm CONDUIT AND/OR WALL CHASES AS REQUIRED.
4. LOWER GRID LOCATION TO BE DIRECTLY BELOW PADMOUNT SITE, OR AS AGREED BY ENERGEX
5. FOR REMOTE EARTH GRID DETAILS, SEE C&I MANUAL SECTION 15.

6. CABLES TO BE RUN IN A 2HR FIRE PROOFED DEDICATED CABLE ROOM IN BASEMENT. FIRE PROOF SHEETING AROUND CABLES IS NOT ACCEPTABLE. ENERGEX LOCK ON DOOR.
7. SHOWN ON THIS DRAWING ARE THE DIMENSIONAL REQUIREMENTS. CONSTRUCTION DRAWINGS SHALL BE PREPARED BY THE SERVICE PROVIDER'S RPEQ.
8. ENERGEX APPROVED PIT TO BE INSTALLED IN FRONT OF THE TRANSFORMER IN FOOTPATH FOR INCOMING CABLES.
9. CABLE CLOSET TO HAVE DRAINAGE FOR ANY WATER THAT ENTERS.

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		CIVIL WORKS PADMOUNT TRANSFORMER SITES SQUARE TYPE LOCATION OVER BASEMENT		DATE	20/8/15	6229-A4 A	
				RECD		SECTION	SUB-SECT.
		CKD		C3		2.7	
		DWN	J.LANSLEY	SHT 2 OF 2		FILE UDC-C3-2.7-2A.DWG	



PLAN



SECTION

RESIDENTIAL SITES

LV TERMINALS SHALL BE INSTALLED CLOSEST TO THE STREET. THIS ARRANGEMENT WILL ALLOW MAXIMUM SPACE FOR THE MORE FREQUENTLY USED LV SECTION AND EASE OF INSTALLATION OF MORE NUMEROUS NETWORK LV CABLES.

NOTE:

1. ENERGEX's padmount clearance zone shall be levelled and surrounding area graded to ensure NO PONDING of water occurs.
2. No services other than the ENERGEX's electric cables shall pass through this substation site.
3. Clear access to the transformer shall be maintained for ENERGEX's personnel and heavy equipment.
4. After installation is complete the site surface is to be finished with a concrete slab.
5. Mature landscaping (including trees, sprinklers etc.) shall not encroach onto the substation site.

ORIGINAL ISSUE

A



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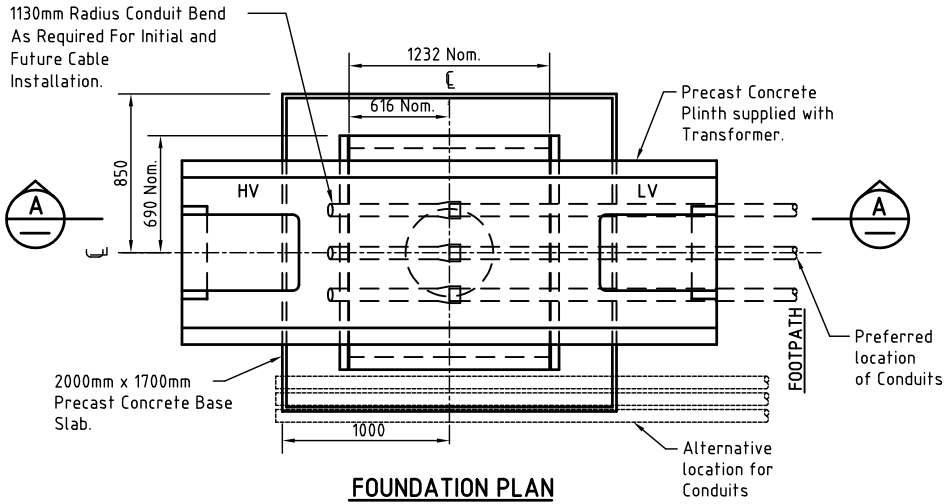
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
 PADMOUNT TRANSFORMER SITES
 RECTANGULAR TYPE
 SLOPING SITE - MAXIMUM CUT & FILL

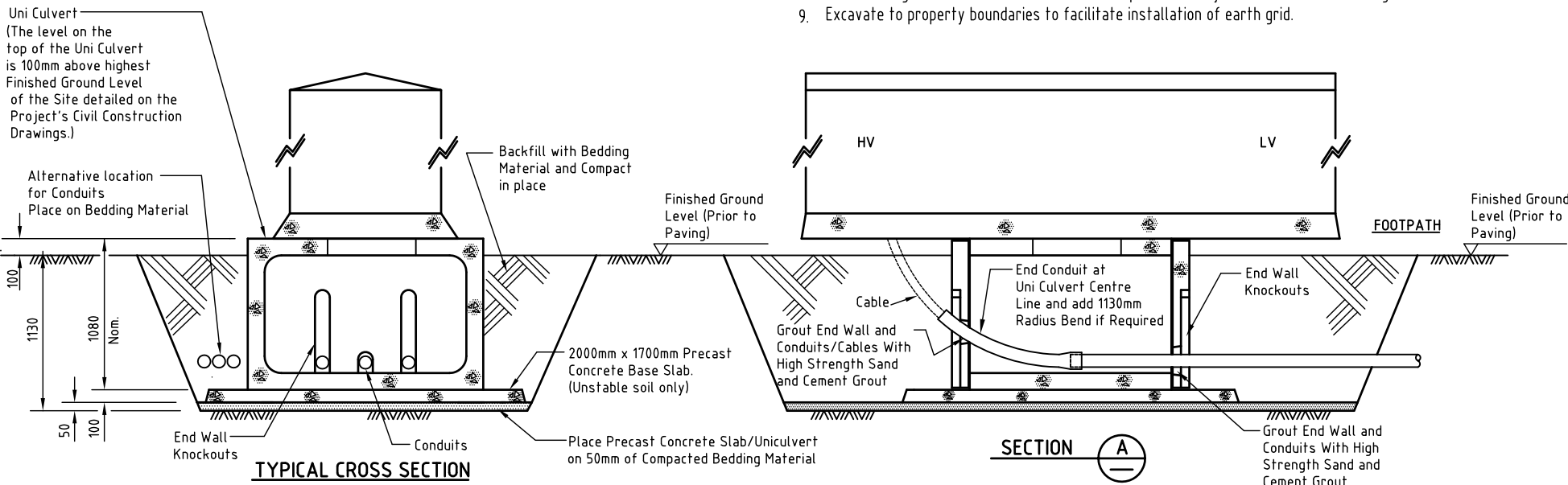
APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.1
DWN	F.AMANPOOR	SHT 1	OF 1
FILE UDC-C3-3.1-1A.DWG			



FOUNDATION PLAN

NOTES:

- Foundation design guide are as follows:
 - Soft clay and sandy soils with allowable bearing capacity of less than 200kPa generally require a base slab
 - Stiff clay to shale/rock with allowable bearing capacity of 200KPa or higher generally DO NOT REQUIRE a base slab.
- Lift unculvert and base slab separately with minimum 4 x 1.3t Reid Swiftlift lifting eyes. The contractors RPEQ is responsible for the lifting design
- Position top face of Uniculvert at finished ground level. (refer Civil Constructions drawings)
- Installed Uniculvert shall be level.
- If deep excavation is required under transformer cabinet and in front of foundation, plinth front edge shall be propped while excavation remains open.
- Foundation Components:
 - 1 x Uniculvert (Stock Code 19959)
 - 2 x End Walls (Stock Code 19959)
 - 1 x Base Slab (Stock Code 19960)
 Uniculvert and End Walls come assembled with a Layer of Preformed Sealant to the perimeter of the Uniculvert End and between the Mating Surfaces.
- Only remove minimum Knockout Area required to pass Conduits (Max. Conduit 150mm Nom. Dia.) or Cables through unculvert void by tapping out Concrete.
- Seal between conduits/cables and concrete end wall at knockout interface by grouting with high strength sand and cement grout after conduit installation to prevent entry of vermin and backfill ingress to unculvert void.
- Excavate to property boundaries to facilitate installation of earth grid.



TYPICAL CROSS SECTION

SECTION A

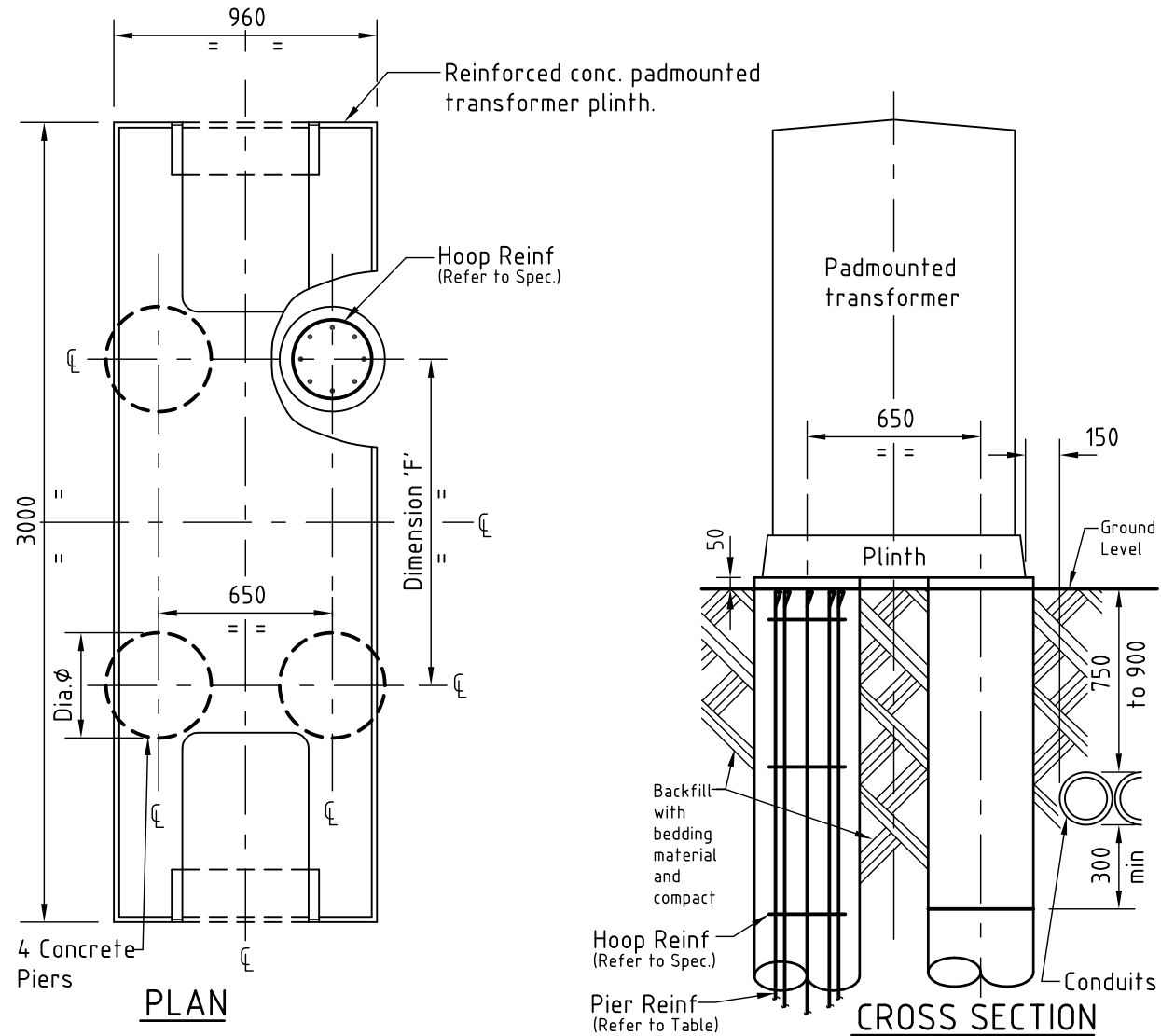
ORIGINAL ISSUE	DATE	20/8/15
	APPD	A. Smith de Perez
	CKD	A. De Costa
	DRN	P. Reif
	UPDATE NOTES	


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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
PADMOUNT TRANSFORMER SITES
RECTANGULAR TYPE
FOUNDATION DETAILS - STANDARD UNICULVERT

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	C
RECD		SECTION	SUB-SECT.
CKD	P. BARNEY	C3	3.2
DWN	F. AMANPOOR	SHT 1 OF 1	
FILE UDC-C3-3.2-1C.DWG			




A	ORIGINAL ISSUE			UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL		APP'D	R. ENGLISH			CAD
	B	DATE	27/7/11	CIVIL WORKS		DATE	10/10/08	6229-A4		B
	APPD	R. ENGLISH	PADMOUNT TRANSFORMER SITES		RECD		SECTION	C3		SUB-SECT.
	CKD	D. TAYLOR	RECTANGULAR TYPE		CKD	P. BARNEY			3.3	
	DRN	A. SYMONDS	FOUNDATION DETAILS - PIER		DWN	F. AMANPOOR	SHT 1		OF 2	
REMOVE THE WORD UNICULVERT FROM THE TITLE DESCRIPTION.			 © COPYRIGHT 2011 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX		FILE UDC-C3-3.3-1B.DWG					

NOTES:

1. The foundation is suitable for substations from 200 to 500kVa-11kV/433-250V only. For 750 to 1000kVa -11kv/433-250V use the unculvert foundation.
2. The diameters of concrete bored piers is dependant on the supporting stratum bearing capacity as detailed from the table below.
3. The minimum depth of a pier shall be at least 2x diameter into the stratum of the undisturbed natural soil and 600mm below cable entry excavation.
If the material is unsuitable then the hole shall be drilled deeper until a firm bearing stratum is reached.
4. All reinforcement shall comply to AS/NZS 4671
5. Hoop reinforcement shall be R10 @ 150 C/C
6. The minimum concrete cover to steel shall be 70mm.
7. The minimum concrete strength shall be 32MPa.
8. Concrete piers shall be constructed using a continuous single concrete pour.
9. The top of piers shall be level. The maximum variation between the 4 piers shall be 3mm.

SUPPORTING STRATUM	ALLOW. BEARING CAPACITY (kPa)	BORED PIER DIA 'Ø' (mm)	DIMENSION 'A' (mm)	DIMENSION 'B' (mm)	DIMENSION 'C' (mm)	DIMENSION 'D' (mm)	OFFSET 'E' (mm)	DIMENSION 'F' (mm)	REINFORCEMENT	
									No. OF BARS	DIA. OF LONGITUDINAL RODS(mm)
FIRM	50	550	382	515	700	700	68	1150	9	12
STIFF	100	450	447	585	675	675	68	1250	7	12
VERY STIFF	200	300	640	585	675	675	68	1350	5	12
HARD	400	300	640	585	675	675	68	1350	5	12

ORIGINAL ISSUE	DATE	20/8/15	 © COPYRIGHT 2012 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES RECTANGULAR TYPE FOUNDATION DETAILS - PIER			APP'D	R. ENGLISH		CAD	
	APPD	A. Smith de Perez					DATE	10/10/08	6229-A4		C
	CKD	A. De Costa					RECD		SECTION	SUB-SECT.	
	DRN	P. Reif					CKD	P. BARNEY	C3	3.3	
	UPDATE NOTES AND TABLE						DWN	F. AMANPOOR	SHT 2 OF 2		FILE UDC-C3-3.3-2C.DWG

ORIGINAL ISSUE

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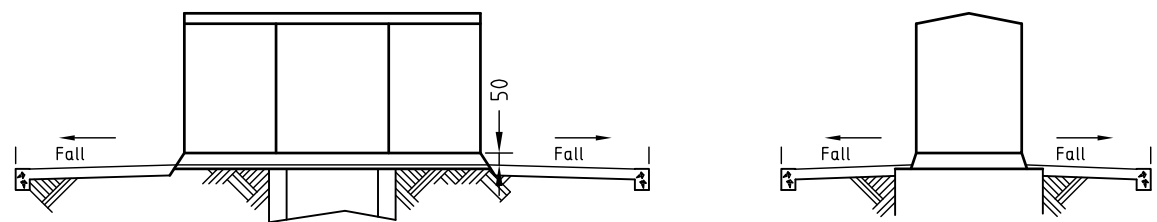
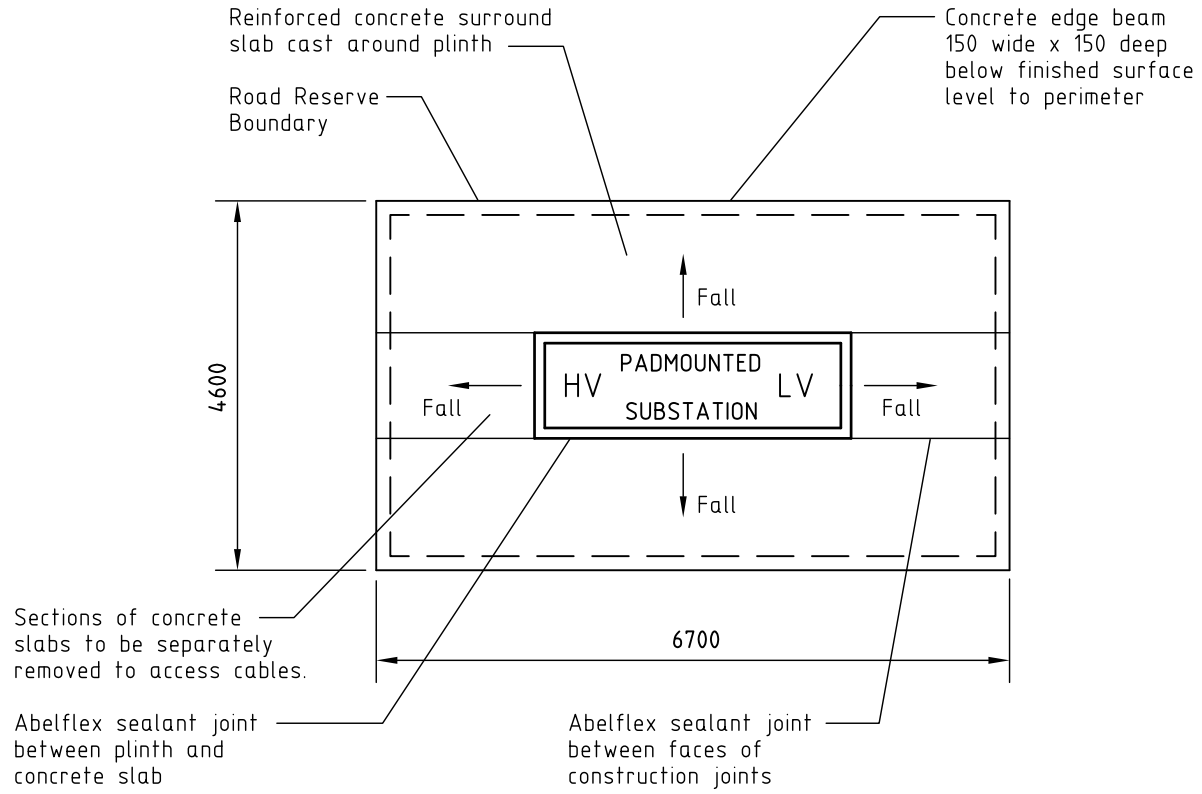
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
PADMOUNT TRANSFORMER SITES
RECTANGULAR TYPE
SPARE

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.4
DWN	F.AMANPOOR	SHT 1 OF 1	
FILE UDC-C3-3.4-1A.DWG			



A ORIGINAL ISSUE

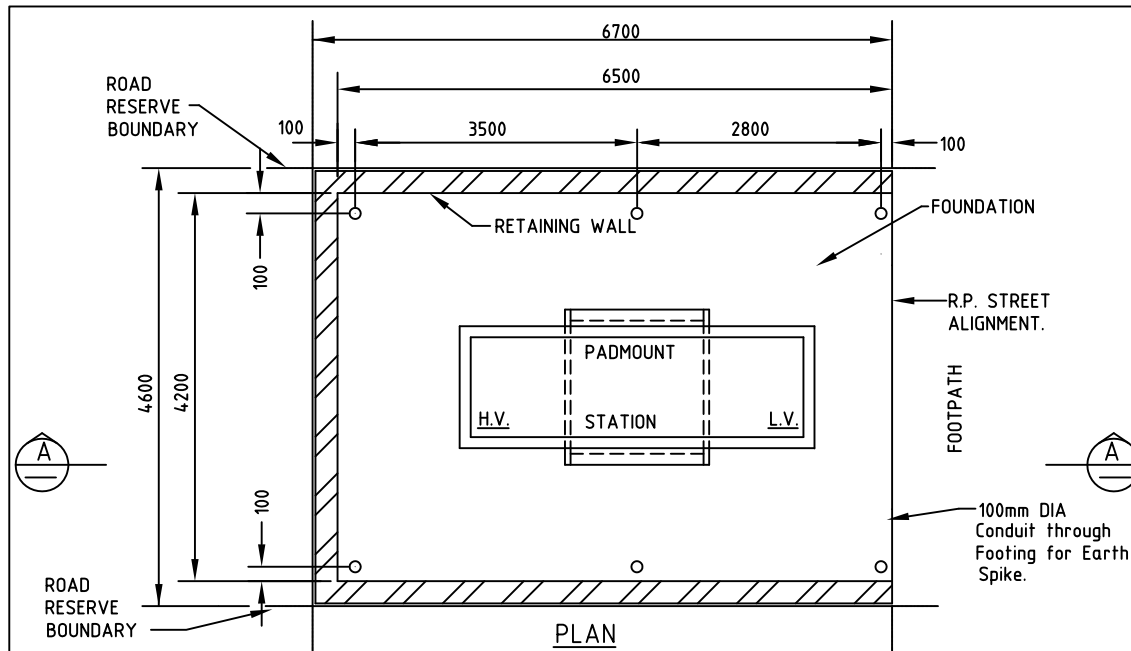


energex
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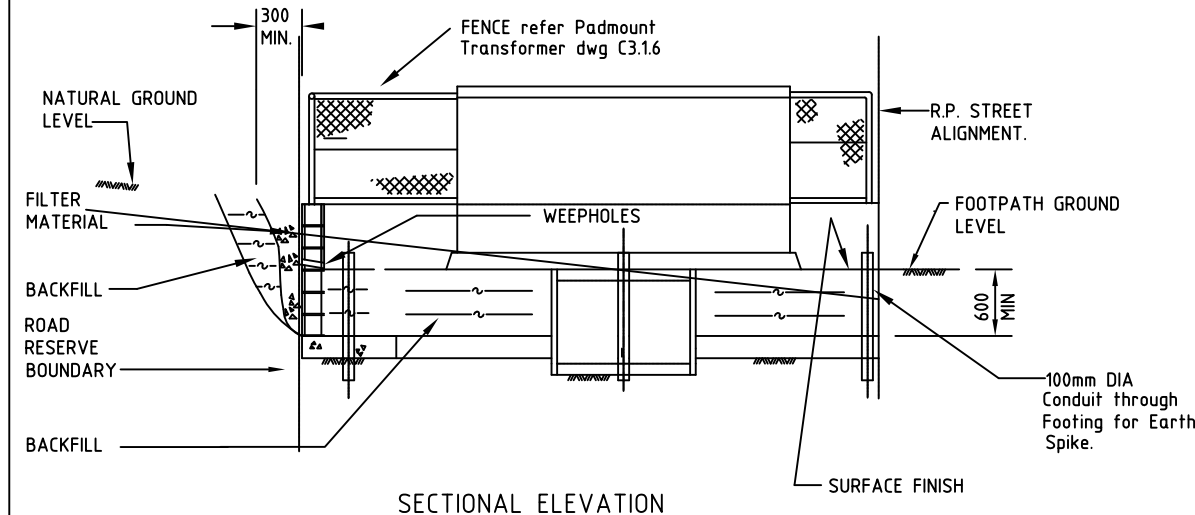
UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
 PADMOUNT TRANSFORMER SITES
 RECTANGULAR TYPE
 CONCRETE SURROUNDS

APP'D	R. ENGLISH		CAD
DATE	10/10/08	6229-A4	A
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.5
DWN	F.AMANPOOR	SHT 1 OF 1	
FILE UDC-C3-3.5-1A.DWG			



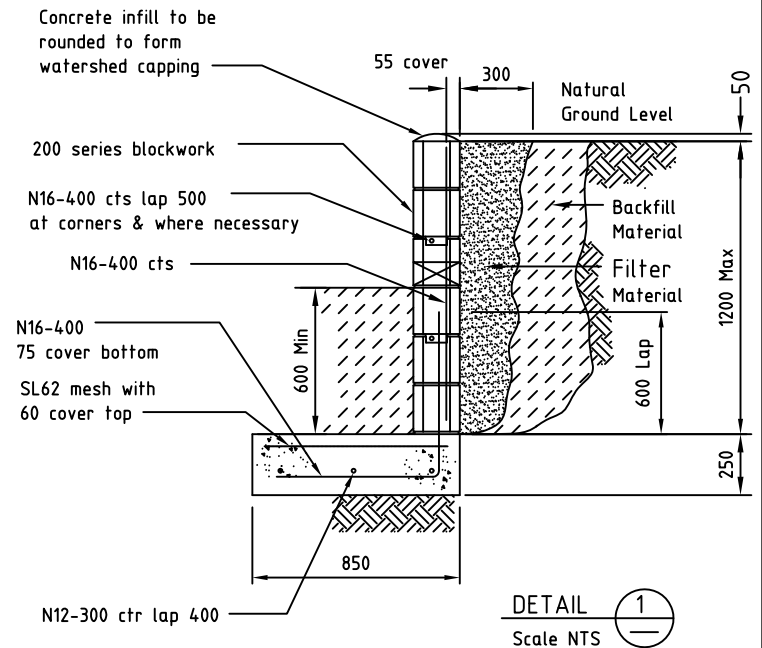
PLAN



SECTIONAL ELEVATION

Concrete Strengths

	F'c	Slump	Aggregate Size (Max)	Cement Content (Min)
Footing	25MPa	75	20mm	-
Blockwork/ Core Filling	17.5MPa	150	10mm	300kg/cu. m



DETAIL 1
Scale NTS

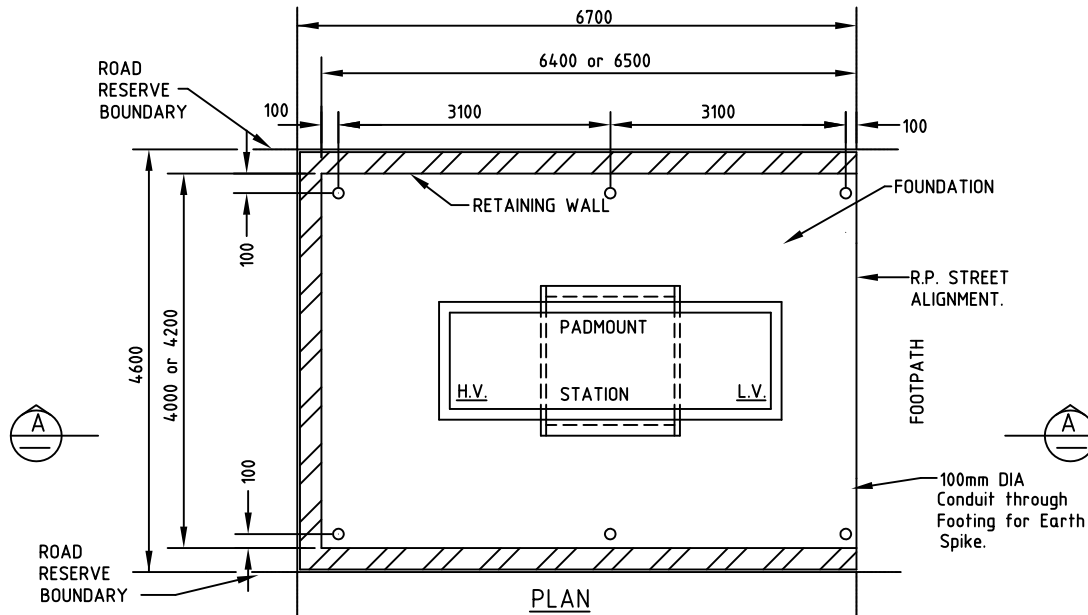
ORIGINAL ISSUE	DATE	APPD	CKD	DRN	Update re-inforcing & mesh specification.
A	21/2/17	J.Lansley		P.Reif	



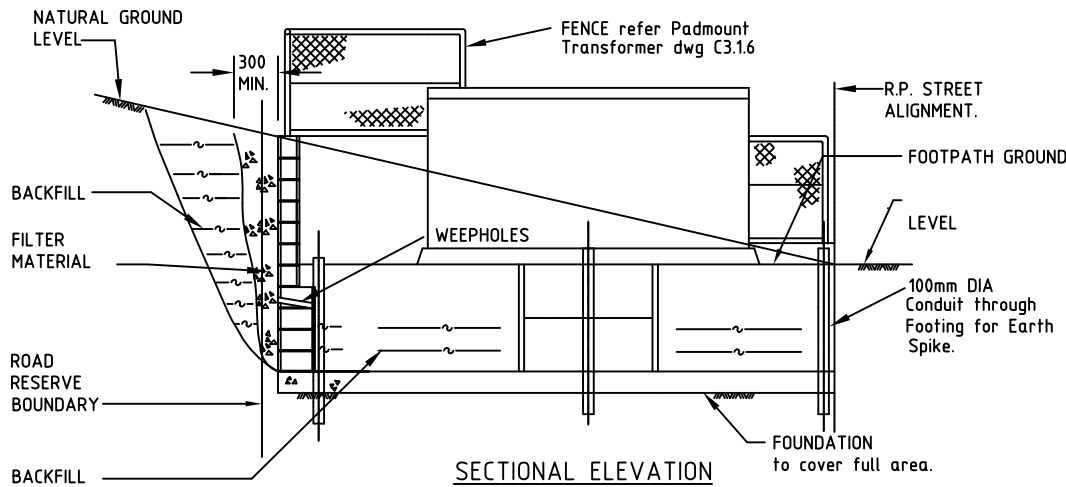
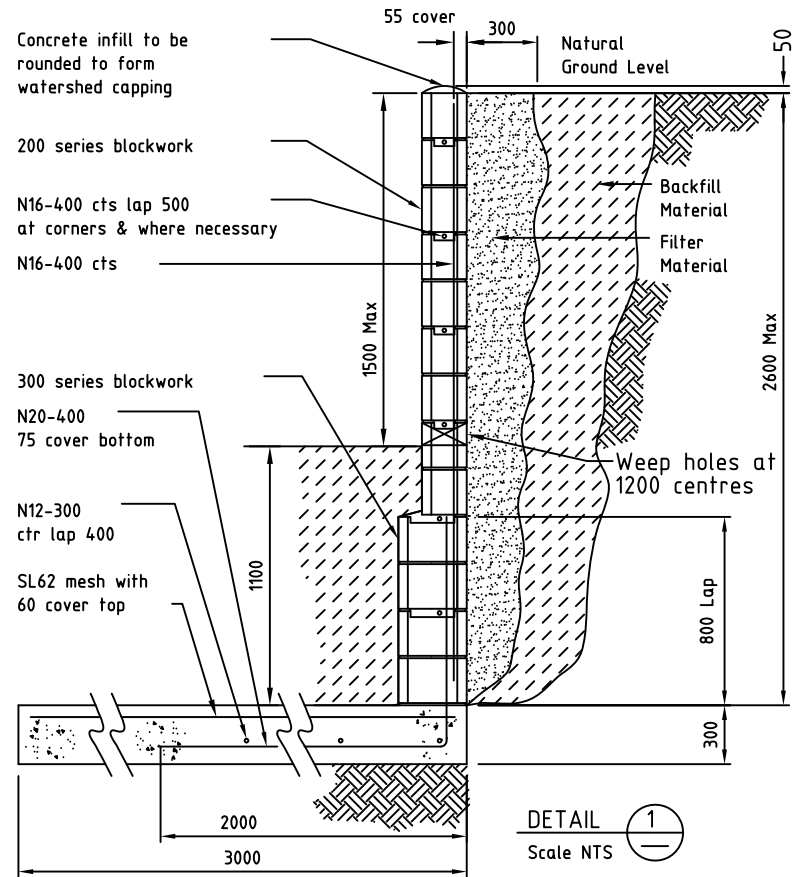
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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
RECTANGULAR TYPE
RETAINING WALLS - CUT SLOPING SITE UP TO 1200mm CUT

APP'D	RENGUSH	CAD	
DATE	10/10/08	6229-A4	B
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.6
DWN	F.AMANPOOR	SHT 1	OF 4
FILE UDC-C3-3.6-1B.DWG			



CONCRETE STRENGTHS REFER C3-3.6 - SHEET 3



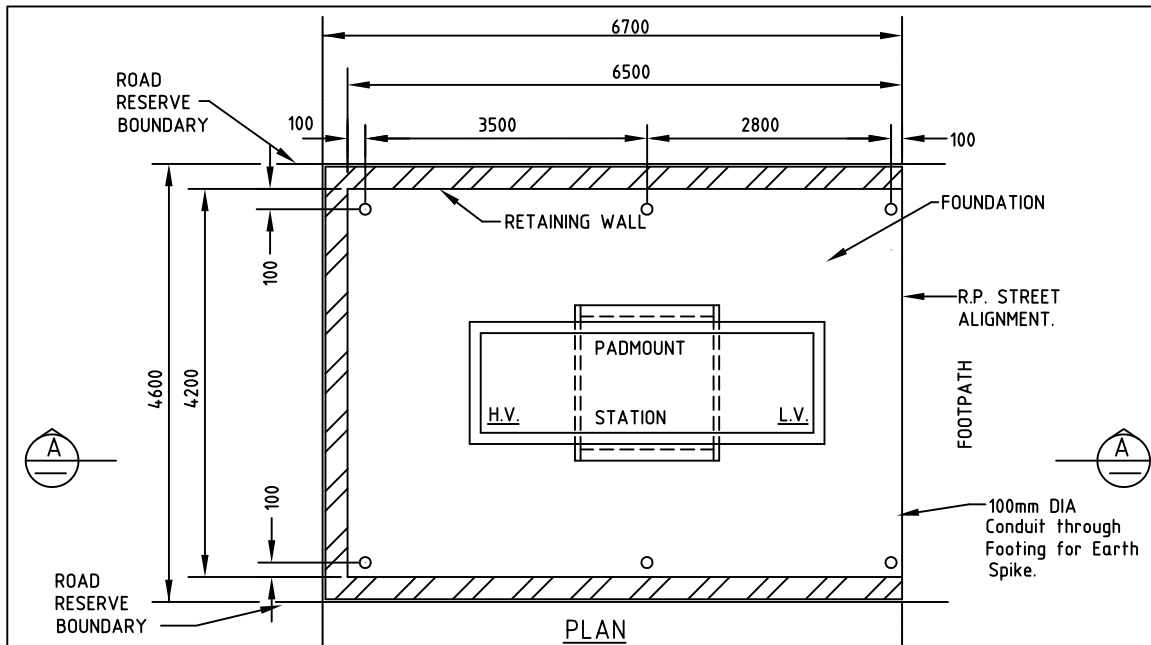
ORIGINAL ISSUE	DATE	APP'D	CKD	DRN	Update re-inforcing & mesh specification
A	21/2/17	J.Lansley		P.Reif	



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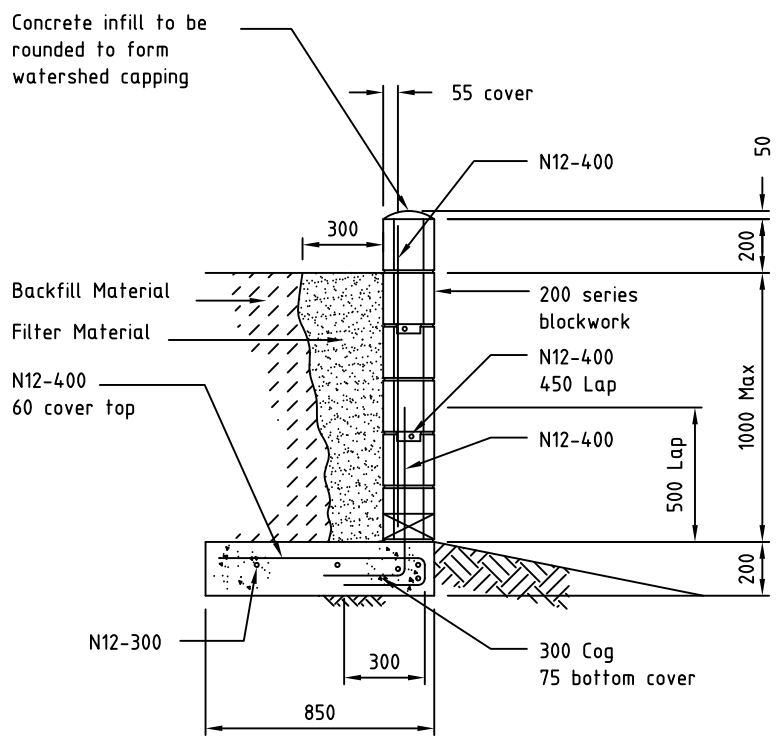
UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
 CIVIL WORKS
 PADMOUNT TRANSFORMER SITES
 RECTANGULAR TYPE
 RETAINING WALLS-CUT SLOPING SITE-1200mm-2600mm CUT

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	C
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.6
DWN	F.AMANPOOR	SHT 2	OF 4
FILE UDC-C3-3.6-2C.DWG			

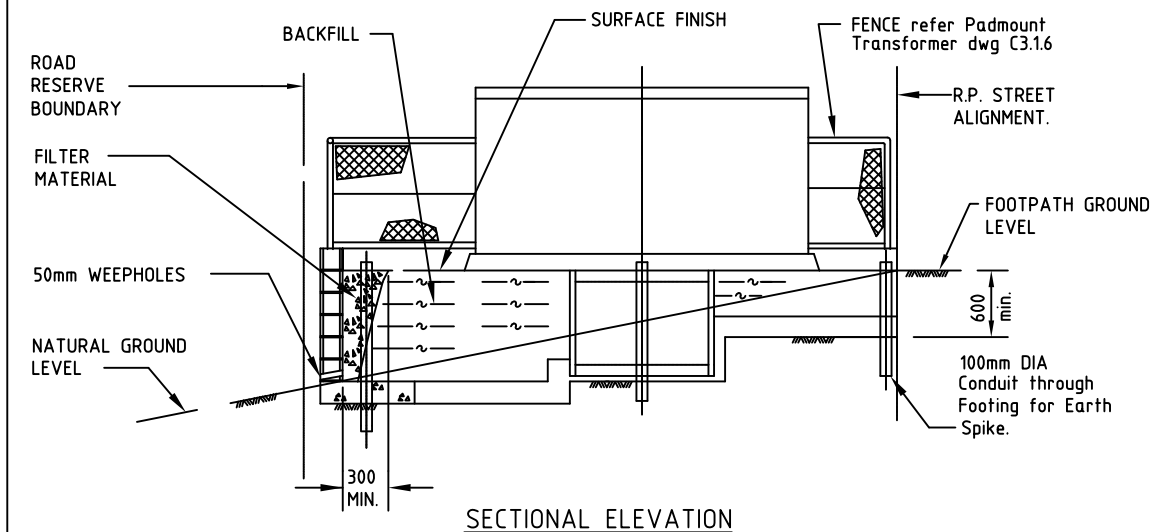


Concrete Strengths

	F'c	Slump	Aggregate Size (Max)	Cement Content (Min)
Foundation	25MPa	75	20mm	-
Blockwork/ Core Filling	17.5MPa	150	10mm	300kg/cu. m



DETAIL 1
Scale NTS



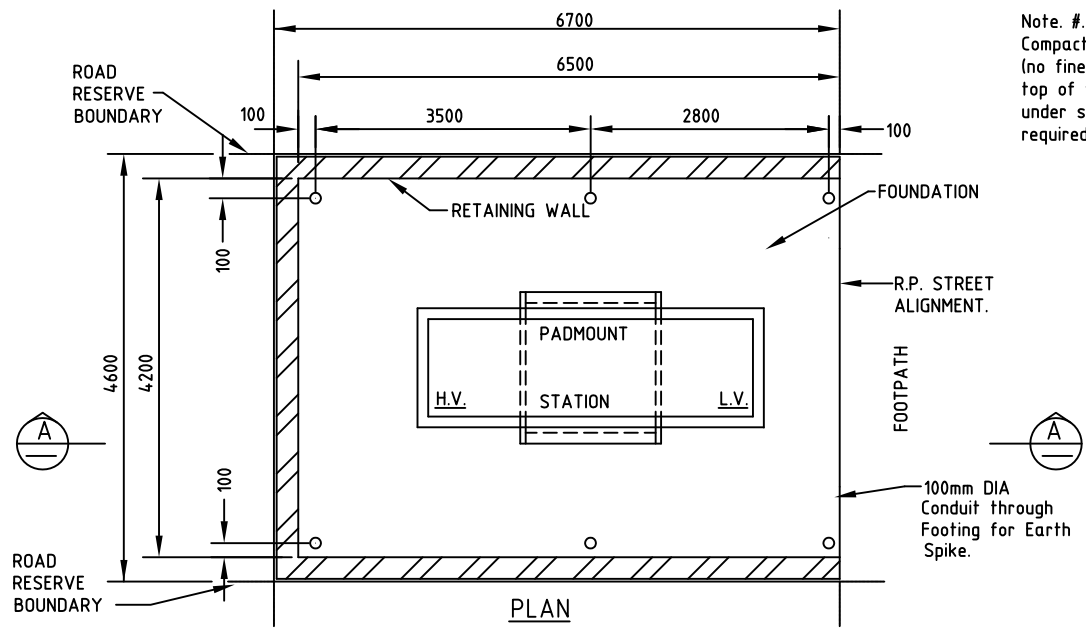
SECTIONAL ELEVATION

ORIGINAL ISSUE	DATE	APPD	CKD	DRN	Update re-inforcing & mesh specification
A	21/2/17	J.Lansley		P.Reif	

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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
RECTANGULAR TYPE
RETAINING WALLS - FILLED SLOPING SITE UP TO 1.0m FILL

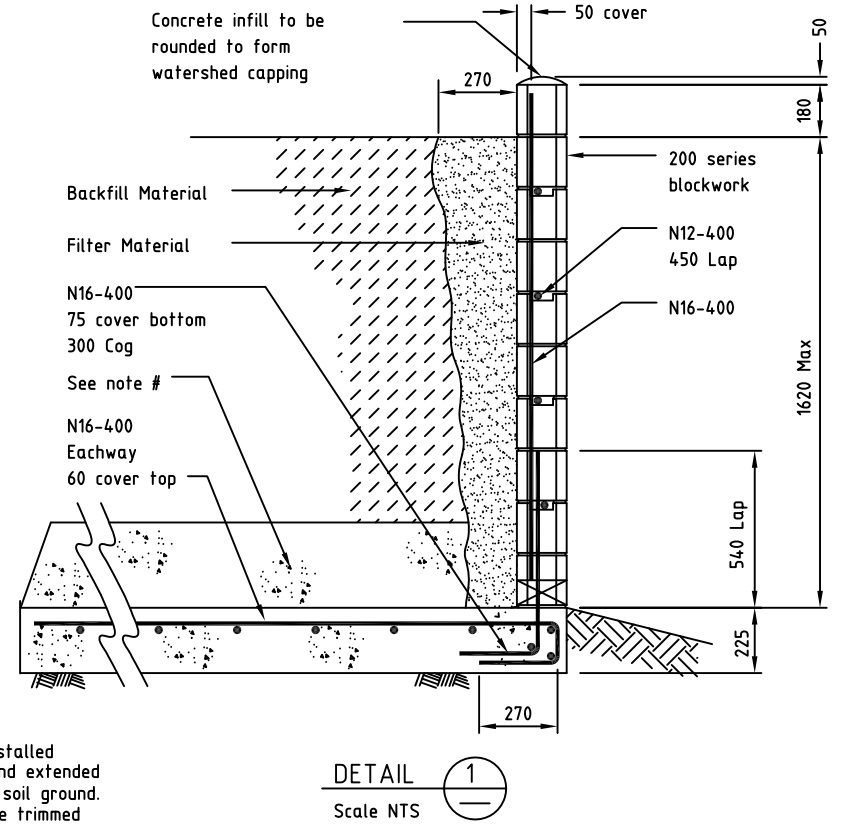
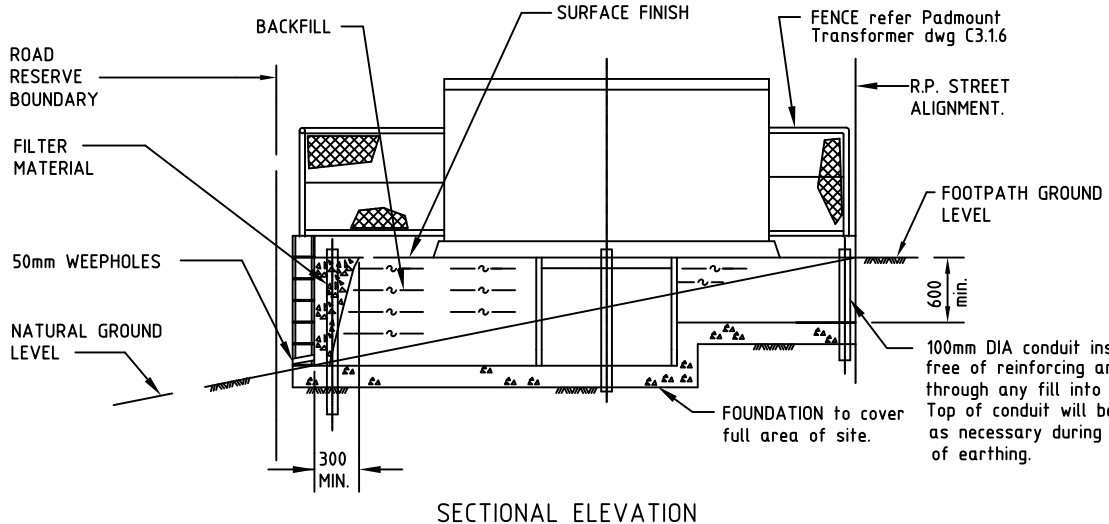
APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	B
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.6
DWN	F.AMANPOOR	SHT 3	OF 4
FILE UDC-C3-3.6-3B.DWG			



Note. #.
Compacted layer of 10MPa (no fines) concrete between top of wall foundation and under side of Uniculvert as required.

Concrete Strengths

	F'c	Slump	Aggregate Size (Max)	Cement Content (Min)
Foundation	25MPa	75	20mm	-
Blockwork/ Core Filling	17.5MPa	150	10mm	300kg/cu. m



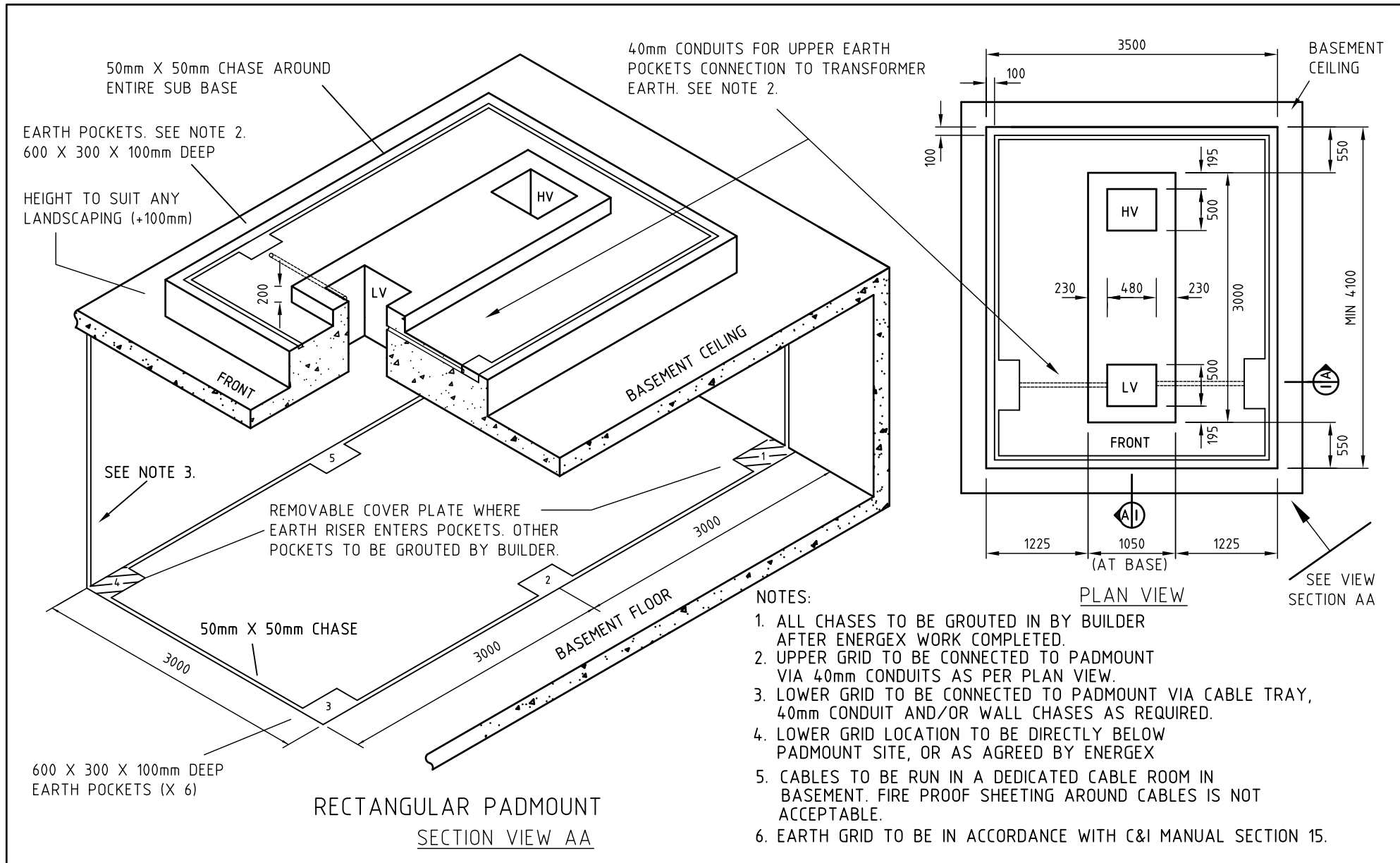
DETAIL 1
Scale NTS


ORIGINAL ISSUE	DATE	APP'D	CKD	DRN	Update re-inforcing & mesh specification
A	21/2/17	J.Lansley		P.Reif	

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UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL
CIVIL WORKS
PADMOUNT TRANSFORMER SITES
RECTANGULAR TYPE
RETAINING WALLS - FILLED SLOPING SITE - 1.0 - 1.75m FILL

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	B
RECD		SECTION	SUB-SECT.
CKD	P.BARNEY	C3	3.6
DWN	F.AMANPOOR	SHT 4	OF 4
FILE UDC-C3-3.6-4B.DWG			



A	ORIGINAL ISSUE	APPD A. Smith de Perez CKD A. De Costa DRN P. Reif UPDATE NOTES	 © COPYRIGHT 2012 ENERGEX This drawing must not be reproduced in part or whole without written permission from ENERGEX	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS PADMOUNT TRANSFORMER SITES RECTANGULAR TYPE LOCATION OVER A BASEMENT	APP'D R. ENGLISH	CAD	
	B				DATE 20/8/15	DATE 10/10/08	6229-A4 B
	RECD				SECTION C3	SUB-SECT. 3.7	
	CKD P.BARNEY				SHT 1	OF 1	
	DWN F.AMANPOOR				FILE UDC-C3-3.7-1B.DWG		