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12th May 2005

OPERATING MANUAL FOR:

ENOGERA to EILDON HILL TRUNK MAIN S40 TRUNK MAINS

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER SYSTEM SERVICES

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DRAWINGS

486/6/25-AA1C0021E	Standard Rectifier Wiring Diagram
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(No Number)	Bimonthly Maintenance Program
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(1.0) **INTRODUCTION**

Steel when immersed or covered in water has a tendency to corrode (or rust) as the oxidized form is more stable than the metal.

Because of this, precaution must be taken to stop or minimize the corrosion reaction to an acceptable level consistent with the design life of the structure. This is normally achieved by the use of protective coatings which control the corrosion reaction by isolating the steel from its surrounding environment.

However, it is not practical to achieve a perfect coating and coating damage will always occur with time. Because of this, corrosion may occur at imperfections in the paint coating, causing further deterioration in the coating as well as loss of metal.

As a result of this, the coating defects must be rectified by periodic maintenance or an additional method of protection used to prevent this deterioration and corrosion occurring. This additional protection is achieved by the cathodic protection system.

(2.0) **CORROSION AND CATHODIC PROTECTION**

Corrosion is an electrochemical process in that it is accompanied by a flow of electrical current.

Corrosion occurs on the surface of metals at active areas known as anodes, which are electrically continuous with less active or passive areas known as cathodes. The electric current flows from the anode through the electrolyte to the cathode, with the circuit being completed by the electrical continuity between the cathode and anode. In practice anodes and cathodes are generally part of the same metallic surface and individual anodic areas may be small.

In applying cathodic protection an external current is applied to the surface so that the entire surface to be protected acts as a cathode. This involves the use of an auxiliary anode and when the current flow from this anode is sufficient, no part of the structure acts as an anode.

An external source of direct current such as a transformer rectifier is used in conjunction with an anode consisting of material with a very slow corrosion rate.

While it is the flow of current which achieves the cathodic protection of the surface it is impractical to measure these currents over individual anodic areas to determine when cathodic protection has been achieved. However, with the flow of cathodic protection current, the structure becomes more negative with respect to the surrounding electrolyte. Because of this, it is possible to state values of metal/electrolyte potential at which corrosion does not occur. This metal/electrolyte potential is generally measured against a standard reference electrode which allows a reproducible potential at which corrosion does not occur to be quoted.

(3.0)

MAINS DETAILS

Size: 1060 mm dia mild steel cement lined.

Coating: Tar Epoxy.

Length: Appox 3.2 km.

Location: From Valve 100 cnr Lloyd St. and Girton St. Enoggera
to Valve 127 Eildon Hill Reservoir.(Entry from Hawdon St.)

Construction

Drawings:

486/1/22-C0024E Cathodic Protection Standard Switchboard Cabinet

486/1/22-AAT0001E Cathodic Protection Test Points

(4.0) CATHODIC PROTECTION DETAILS

(4.1) Type of Cathodic Protection: Impressed Current.

(4.2) Rectifier: Standard 30 Volt, 30 amp direct current output enclosed in a stainless steel switchboard. This system has 1 rectifier installed. The rectifier is in Sedgeley Park, at the end of Moran St. Alderley and has a 240V supply from Energex pole No.64809 Moran St. Alderley.

(4.3) Cathode: The cathode point is located on the 1060 mm dia mains, adjacent to the walkway, approx 20 metres from the rectifier. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection.

(4.4) Anodes: Four 1500 x 75mm silicone iron anodes were installed approximately 80 metres from the trunk mains, in a vertical bed 5 metres deep, in the park adjacent to the creek. The anodes are backfilled with cokebreeze thereby improving anode – ground resistance. The anodes are identified by a marker post and label. See layout drawing.

(4.5) Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the mains. On these mains seven test points have been installed on the trunk main which can be identified from the layout drawing.

(4.6) Associated Drawings:
 Cathodic Protection Test Point Details - 486/1/22-AAT0001E
 Standard Rectifier Wiring Diagram - 486/6/25-AA1C0021
 Cathodic Protection Test Point & Anode - 2 / 10.2050-01 and 2 / 10.2050-02
 Bed Locations S40 Trunk Main.

(4.7) Associated Standards:
 AS/NZS 3000 2000 Electrical Installations
 AS/NZS 2832.1 1998 Cathodic Protection of Metals-Pipes and Cables.

(4.8) Government Regulations:
 Queensland Electricity Safety Rules and Regulations 2002

(5.0) **PERFORMED TESTING**

- (1) Natural Potential Survey.
- (2) Testing of Insulated Flanges, Joints.
- (3) Soil Resistance Testing.
- (4) Current Drain Survey.
- (5) Pipe Coating Anomaly Survey.
- (6) Rectifier Loop Resistance.
- (7) Foreign Structure Interference Survey and Mitigation.
- (8) Final Potential Survey and Commissioning.

(6.0) **CONCLUSION**

Full Cathodic protection has been achieved on this section of trunk mains. The cathodic protection system is registered with the Electrical Safety Office, Department of Industrial Relations, and has approval to operate.

(7.0) **MAINTENANCE**

The cathodic protection system is maintained on a bimonthly basis after commissioning. These checks involve testing rectifier operation and recording of pipe to soil potentials.

12th May, 2005.

Cathodic Protection Unit.

CPS Bimonthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
- 2/ Have appropriate keying.

Labour:

One tradesperson, one vehicle. 20 minutes per site.

Procedure:

- 1/ Identify installation.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Comments.
- 6/ Log entry.

12th May, 2005.

Cathodic Protection Unit

CPS 6 Monthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
- 2/ Have appropriate keying.
- 3/ Set of tools. (Electricians)
- 4/ Multimeter.
- 5/ DC clampmeter.
- 6/ Copper sulphate reference cell and leads.
- 7/ Cleaning equipment.
- 8/ Gatic cover lifters.

Labour:

One tradesperson electrical, one laborer, one vehicle.
Two hours per site.

Procedure:

- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/ Check and record anode string currents.
- 10/ Comments.
- 11/ Log entry.

12th May, 2005.

Cathodic Protection Unit

CPS 60 Monthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
- 2/ Have appropriate keying.
- 3/ Set of tools. (Electricians)
- 4/ Multimeter.
- 5/ DC clampmeter.
- 6/ Copper sulphate reference cell and leads.
- 7/ Cleaning equipment.
- 8/ Gatic cover lifters.
- 9/ Rectifier load bank.
- 10/ PCS2000 Detection Equipment.

Labour:

One tradesperson electrical, one laborer, one vehicle.
Eight hours per site.

Procedure:

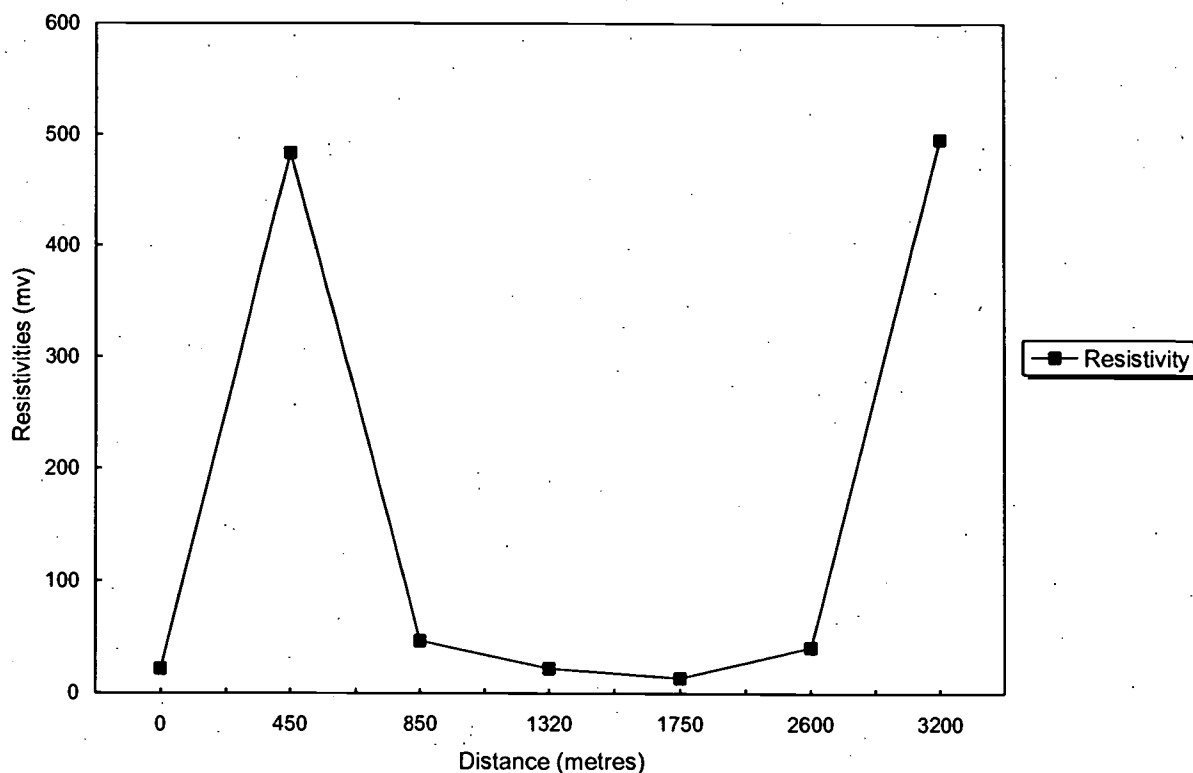
- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/ Check and record anode string currents.
- 10/ Load test rectifier for 10 minutes.
- 11/ Check all switchboard and testpoint terminals for tightness.
- 12/ Check all switchboard and testpoints are labelled and I.D. tags attached.
- 13/ Check plans are correctly drawn and modify if necessary.
- 14/ Remove and inspect anodes.
- 15/ Recheck all interference (CPS) bleeds.
- 16/ Pipecamp structure if applicable.
- 17/ Apply to reregister system if applicable

Brisbane Water Engineering Services

CP Form No. 23

Electrical Engineering Unit**Cathodic Protection System Resistivities Recording Form**Project Enoggera to Eildon Hill S40Date 12th May 2005

Test Point number	Distances to T.P. (metres)	Resistivities at 2 metres ohm metres
1	0	21.75
2	450	483.5
3	850	46.4
4	1320	22
5	1750	13.5
6	2600	41.1
7	3200	496.1
8		
9		
10		
11		
12		
13		
14		

Graph of resistivities vs pipelength

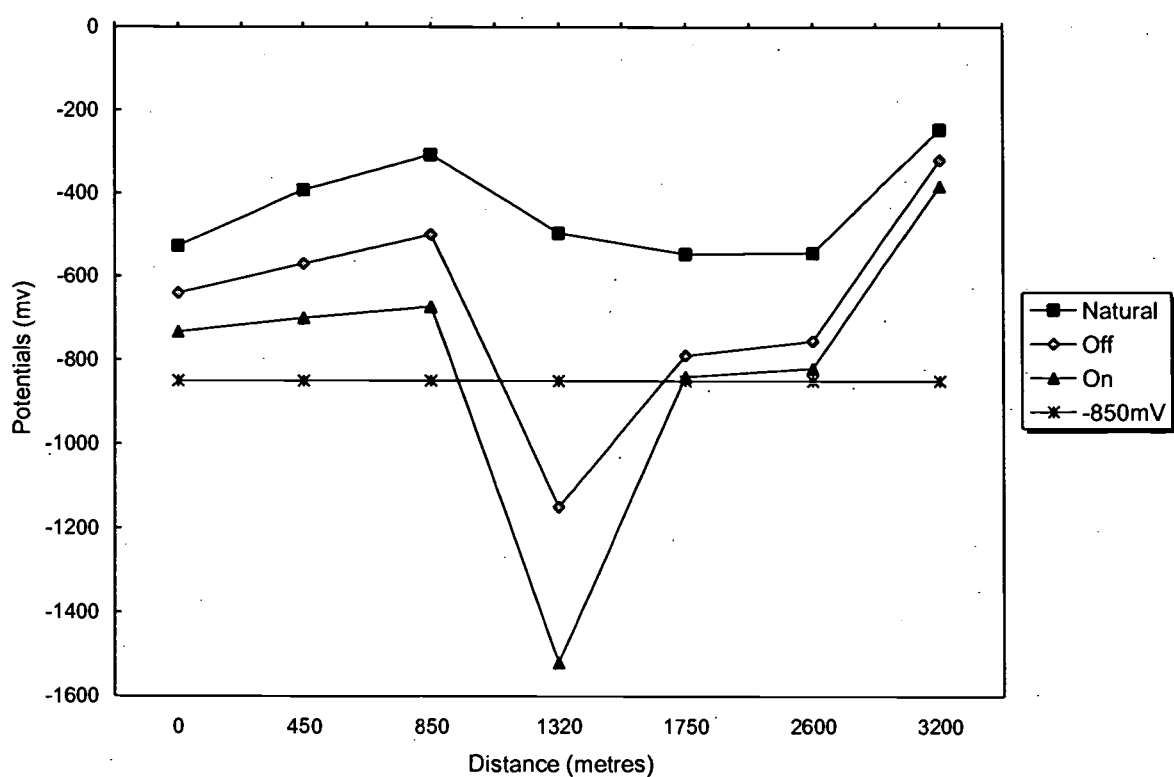
Revision 12/05/2005

Brisbane Water Engineering Services

CP Form No. 23

Electrical Engineering Unit**Cathodic Protection System Potential Recording Form****Project** Enoggera to Eildon Hill S40**Date** 12th May 2005

Test Point number	Distances to T.P. (metres)	Potentials to CuSO ₄			Distance
		Natural (mV)	Off (mV)	On (mV)	
1	0	-527	-640	-733	0
2	450	-392	-570	-700	450
3	850	-307	-500	-673	850
4	1320	-496	-1150	-1520	1320
5	1750	-546	-790	-840	1750
6	2600	-544	-755	-820	2600
7	3200	-247	-320	-383	3200
8					
9					
10					
11					
12					
13					
14					

Rectifier at
TP. No4**Graph of potentials vs pipelength**

Revision 10/08/2005

PTENOGGEILDON40

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection System Loop Resistance

Moran St. Rectifier CPS 205

Date: 12th May 2005

Cathodic Protection System:

Enoggera to Eildon Hill S40 Trunk Main

System Operating Volts:

18

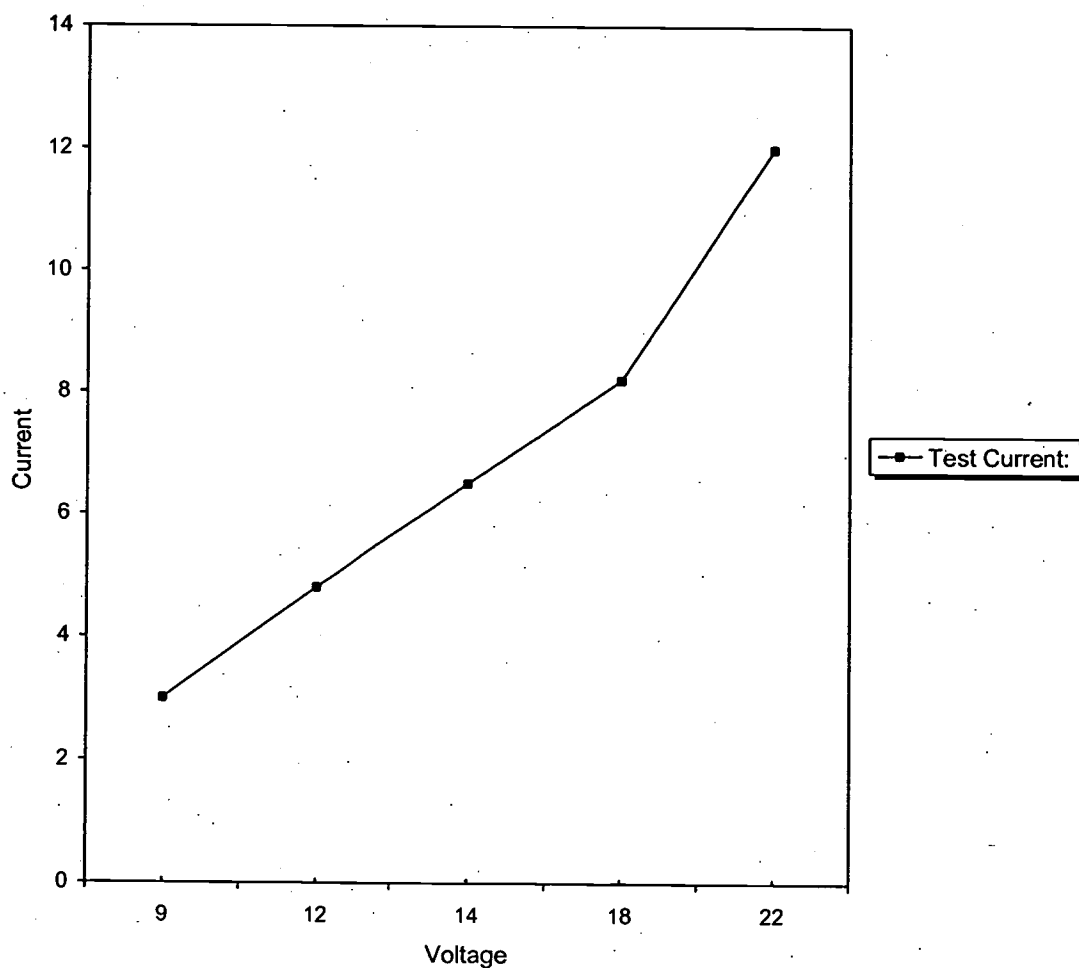
System Operating amps

8.2

Test Voltage:		Test Current:	
(volts)		(amps)	
9		3	
12		4.8	
14		6.5	
18		8.2	
22		12	

Loop Resistance (ohms)
1.4545455

Loop Resistance



22/12/2005

FORM 9
V3.01-04Department of Industrial Relations
ABN 52 293 849 579

APPLICATION TO REGISTER A REGISTERABLE CATHODIC PROTECTION SYSTEM

PLEASE COMPLETE ALL SECTIONS OF THIS FORM- PLEASE PRINT

Application Details

Name of system owner:	Brisbane City Council / Brisbane Water		
		ABN	72002765795
Postal address:	GPO Box 1434 Brisbane 4001		
Contact name:		TEL	

Name of authorised agent of system owner:	Brisbane Water Network Services		
		ABN	72002765795
Postal Address:	268 Cullen Ave Eagle Farm 4009		
Contact Name:	Kerry McGovern		
		TEL	07-34078364

Type of Application: (Tick as appropriate)			
<input checked="" type="checkbox"/> New System			
<input type="checkbox"/> Alteration to an existing system, Registration No:			
<input type="checkbox"/> Renewal of system, Registration No:			
Location of system:	From cnr Lloyd & Girtton Sts. Enoggera to Eildon Hill Reservoir. Hawdon St. Windsor.		
	Rectifier (Sedgeley Park) Moran St Alderley	POST CODE	4051
Structure to be protected:	1060 mm dia Mild Steel Trunk Main		
Maximum operating current:	10.00	Amperes DC	Water or Marine environment Maximum operating voltage: <input type="text"/> Volts

Declaration

I/We, being the owner/operators of the cathodic protection system described above, make application for the registration of this system and certify with respect to the system that:

- (i) I/We have complied with the requirements of Part 11 of *Electrical Safety Regulation 2002*;
- (ii) tests pursuant to section 177 of *Electrical Safety Regulation 2002*, based on the maximum operating current stated this application have been performed;
- (iii) the maximum operating voltage stated in this application in the case of the system operating with an anode/s immersed in water or a marine environment corresponds to the maximum operating current mentioned in paragraph (ii); and
- (iv) any necessary interference mitigation measures for foreign structures (in the case where the system is currently registered) have been tested and are operating satisfactorily.

Signature of system owner: Day Month Year

PRIVACY STATEMENT. The Department of Industrial Relations respects your privacy and is committed to protecting your personal information. The information provided on this form is for the purpose of applying for the registration of a cathodic protection system and monitoring compliance under the Electrical Safety Act 2002, and will be managed within the requirements of Information Standard 42. The Department may be required to disclose your personal information to other government agencies, entities, or persons as may be required by law or that are outsourced functions. This information may also be used for statistical research, information provision and evaluation of our services. We will assume that we have your permission to do this unless you tell us otherwise. You can do this at any time by contacting Equipment Safety on (07) 3237 0281. Further information on our privacy policy is available at www.dir.qld.gov.au

Application of accompany registration fee of \$205.00

Application for systems to be immersed in a marine environment must have technical schedule attached.

Forward to: Electrical Safety Office, LMB 2234 Brisbane Qld 4001

Please note: This is a GST free supply. No tax invoice will be issued.

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject Set 40 Enoggara - Eildon Hill Date 18-11-04T P Location Lloyd St Pump Station T P No. 1Mains Size T P Type B Post**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)

0.2 Ω

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

ZINC TO CuSo4

EARTH TESTINGTEST NO. 1

PIN SPACING

MEGGER READING

RESISTIVITY

TEST NO 2

PIN SPACING

MEGGER READING

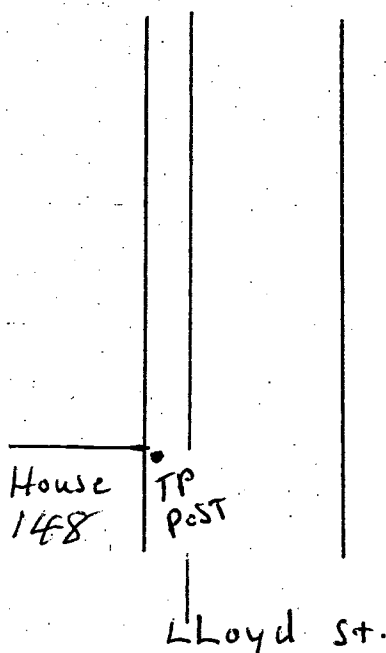
RESISTIVITY

TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWING

Installed new type T Point.
in place of Existing T Point

INSTALLED BY P. Smyth

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject S40 Enoggera to Eildon Hill Date 27-10-04T P Location Chr Lloyd St + Musgrave Rd T P No. 2Mains Size T P Type B Post**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

ZINC TO CuSo4

•1Ω
+604
-392
-1000

EARTH TESTINGTEST NO. 1

PIN SPACING

MEGGER READING

238.5

RESISTIVITY

483.5 ΩpmTEST NO 2

PIN SPACING

MEGGER READING

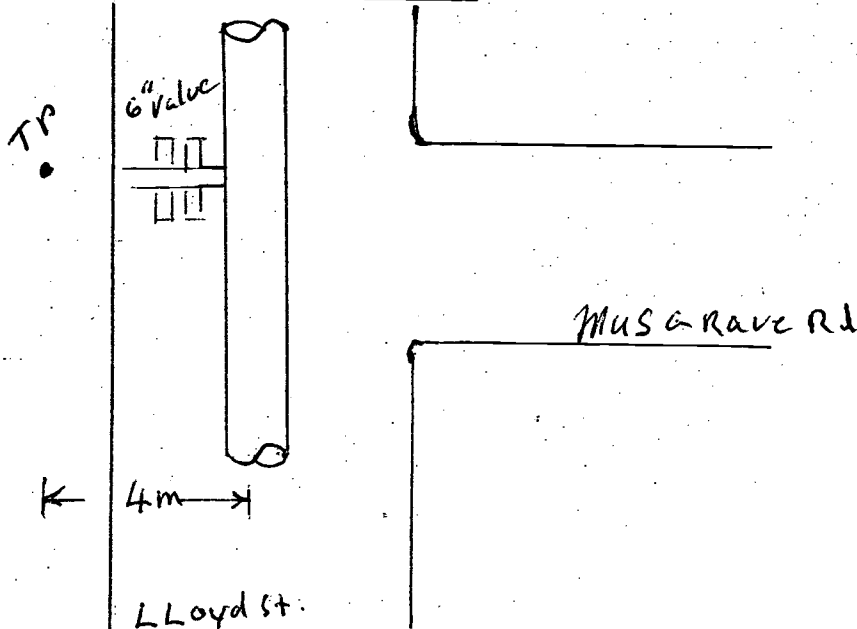
RESISTIVITY

TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWING

INSTALLED BY

P Smyth

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject S40 Enoggera To Eildon HillDate 10-11-04T P Location Cnr Huxley & EnoggeraT P No. 3

Mains Size

T P Type B Pit**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)
 ZINC REFERENCE TO PIPE
 CuSo4 REFERENCE TO PIPE
 ZINC TO CuSo4

0.1 Ω
+ 552
- 307
- 884

EARTH TESTINGTEST NO. 1

PIN SPACING

2

MEGGER READING

3.71RESISTIVITY 46.5 Ω pmTEST NO 2

PIN SPACING

MEGGER READING

RESISTIVITY

TEST NO 3

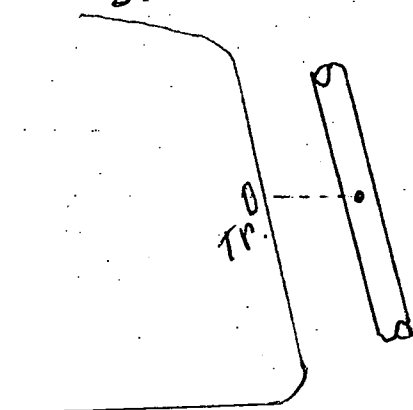
PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWING

Huxley.



Lloyd St

Enoggera Rd

INSTALLED BY

P SMYTH.

Brisbane Water Engineering Services

CP Form No. 17

Electrical Engineering Unit

Cathodic Protection Anode Bed Testing

Sedgeley Pk

Project ENOGGERA to Eildon HillDate 28-2-05ANODE MATERIAL: S Iron

BURIAL: _____

ANODE SIZE/WEIGHT: 75 mmTEST POINT TYPE: Retainer

ANODE PACKAGING: _____

SOIL RESISTIVITY: 22 Ω Pm

ANODE DEPTH: _____

SIGNAGE: YesA1 2.5m A2 3m A4 3.2 A5 3.3

RESISTANCE TO GROUND:

ANODE NO.1 2.5 Ω ANODE No.2 3 Ω ANODE No.3 4 Ω ANODE No.4 5.2 Ω

ANODE No.5 _____

TOTAL _____

ANODE CURRENT

ANODE No.1 _____

ANODE No.2 _____

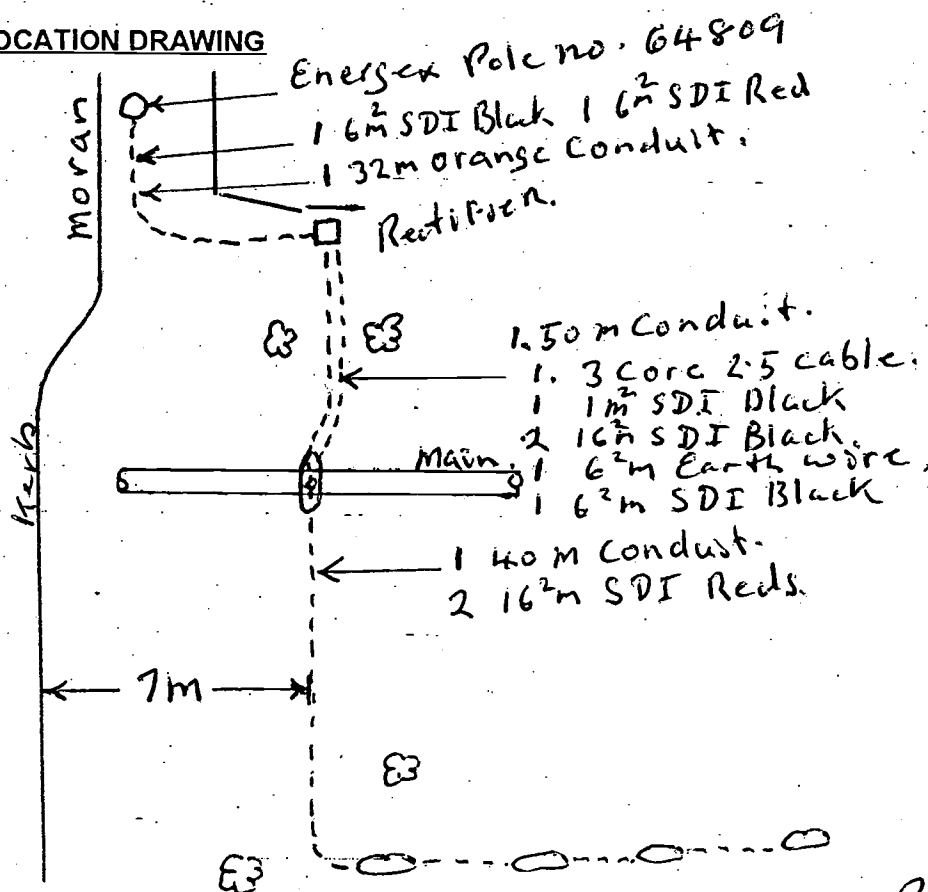
ANODE No.3 _____

ANODE No.4 _____

ANODE No.5 _____

TOTAL _____

LOCATION DRAWING



TESTED BY _____

Enoggera Rd.

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject Enoggera to Eildon HillDate 3-11-05TP Location Ann Clegg St & WilstonTP No. 5

Mains Size

TP Type B**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)
 ZINC REFERENCE TO PIPE
 CuSo4 REFERENCE TO PIPE
 ZINC TO CuSo4

+603
-546
-1157

EARTH TESTINGTEST NO. 1

PIN SPACING

2

MEGGER READING

1.8RESISTIVITY 22.6 Ω pmTEST NO 2

PIN SPACING

MEGGER READING

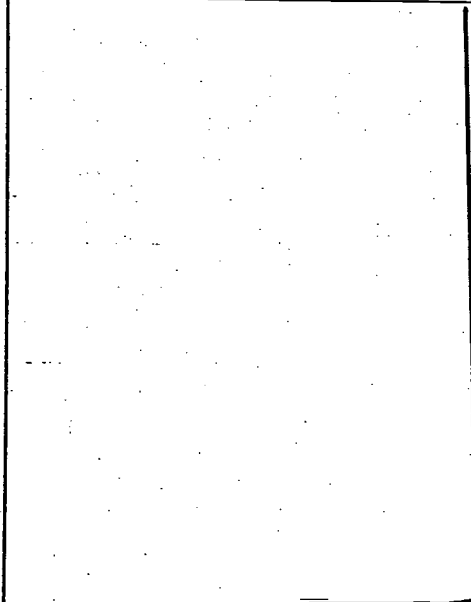
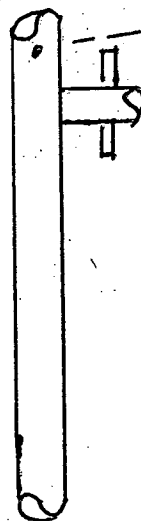
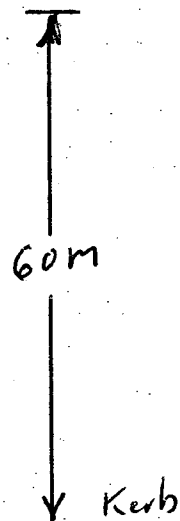
RESISTIVITY

TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWINGClegg StTP pit
12" Take offWilson Rd

INSTALLED BY

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject Enoggera to Eildon HillDate 28-2-05T P Location 150 Loveale StT P No. 6

Mains Size

T P Type B**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)
 ZINC REFERENCE TO PIPE
 CuSo4 REFERENCE TO PIPE
 ZINC TO CuSo4

0.2 Ω
+689
-544
-1146

EARTH TESTING

TEST NO. 1

PIN SPACING

2

MEGGER READING

3.28RESISTIVITY 41 Ω pm

TEST NO 2

PIN SPACING

MEGGER READING

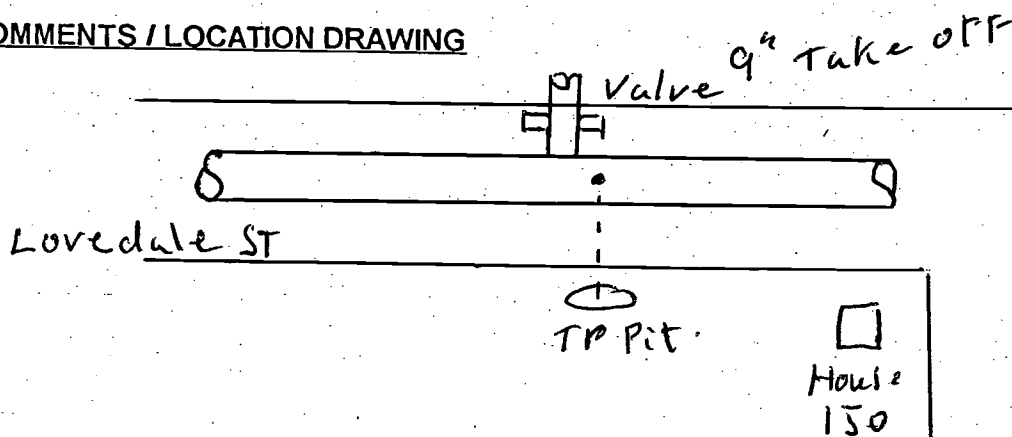
RESISTIVITY

TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWING

INSTALLED BY

Kedron Brook Re

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject S40 ENOGGERA TO EILDON HILL T. MAIN Date 18-11-04TP Location EILDON HILL RESERVOIR V127 TP No. 7Mains Size 1060 TP Type B**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

ZINC TO CuSo4

0.252+804-246-1083**EARTH TESTING**TEST NO. 1

PIN SPACING

MEGGER READING

221.8RESISTIVITY 273.8 Ω mTEST NO 2

PIN SPACING

MEGGER READING

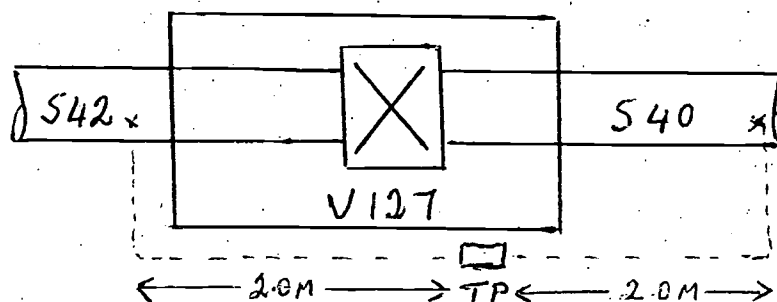
RESISTIVITY

TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWINGINSTALLED BY L. GREAVES

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

ISOLATION N° 2

Project Enoggera - Eildon Hill S40Date 29-7-05**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Chr Lloyd + Gorton St.42"Mild Steel966**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

all Bolts 7200 Ω

NUMBER OF BOLT:

20

FLANGE TO FLANGE RESISTANCE:

196 K Ω

INSULATION CHECKER MODEL 702:

N/A.**POTENTIAL DIFFERENCE TO REFERENCE CELL:**

PROTECTED SIDE:

861 mV

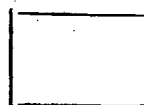
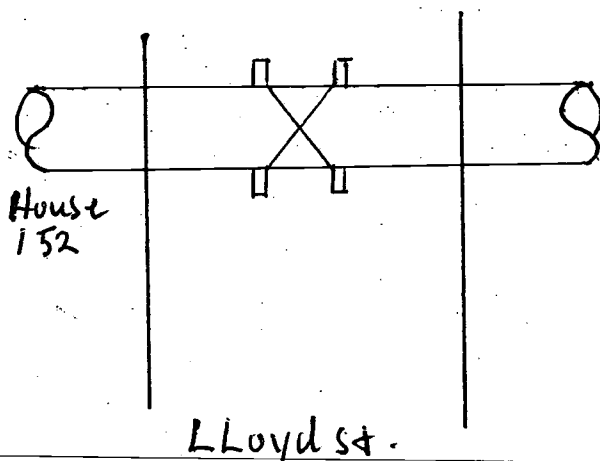
UNPROTECTED SIDE:

523 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Pump Station

TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation No 3

Project S40 Enoggera to Eildon HillDate 27-10-04**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

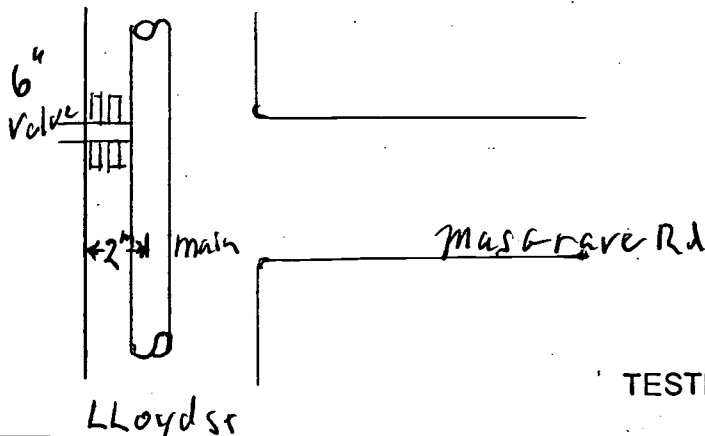
Cnr Lloyd St + Musgrave Rd
 6" Valve
 mild steel
 T/E
 RSV 13180

IN GROUND TESTINGBOLT TO FLANGE RESISTANCE: all Bolts > 200 Ω NUMBER OF BOLT: 12FLANGE TO FLANGE RESISTANCE: 43 Ω INSULATION CHECKER MODEL 702: N/A**POTENTIAL DIFFERENCE TO REFERENCE CELL:**PROTECTED SIDE: -275UNPROTECTED SIDE: -235**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE: _____

NUMBER OF BOLTS: _____

FLANGE TO FLANGE RESISTANCE: _____

COMMENTS / LOCATION DRAWINGTESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

ISolation 4

Project Set 40 Enoggera To Eildon Hill Date 4-11-04**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Cnr Lloyd St + Enoggera RdT/A. Mild steelT/A 12" take off**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

71.2 KΩ

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

464 KΩ

INSULATION CHECKER MODEL 702:

N/A.POTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

-372 mV

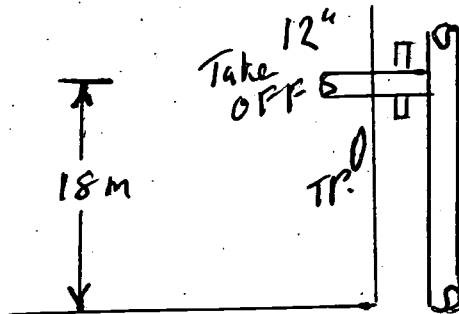
UNPROTECTED SIDE:

344 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWINGLloyd.EnoggeraTESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details FormProject S40 Enoggera - Eildon HillIsolation 5
Date 5-11-04**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Cnr Clegg St + WilstonMild Steel12" Take off**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

INSULATION CHECKER MODEL 702:

all Bolts > 200 Ω 61.2 k Ω N/A**POTENTIAL DIFFERENCE TO REFERENCE CELL:**

PROTECTED SIDE:

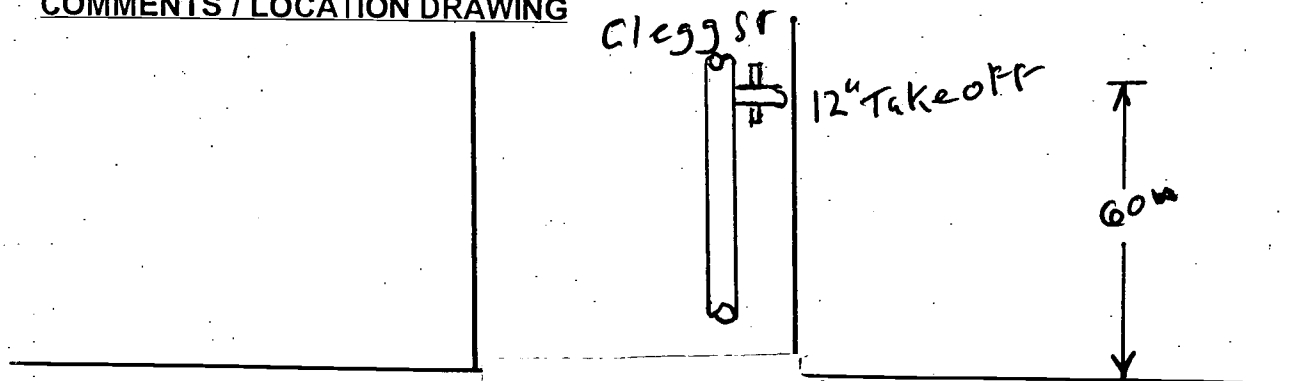
UNPROTECTED SIDE:

- 543 mV- 430 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWINGWilson RdTESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation No. 6

Project Set 40 Enoggera - Eildon HillDate 28-2-05**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Cnr Lovedale + Kedron BrookMild ^{12"} Steel12" Take off**IN-GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

INSULATION CHECKER MODEL 702:

all Bolts 7200 Ω 60.7 m Ω N/A**POTENTIAL DIFFERENCE TO REFERENCE CELL:**

PROTECTED SIDE:

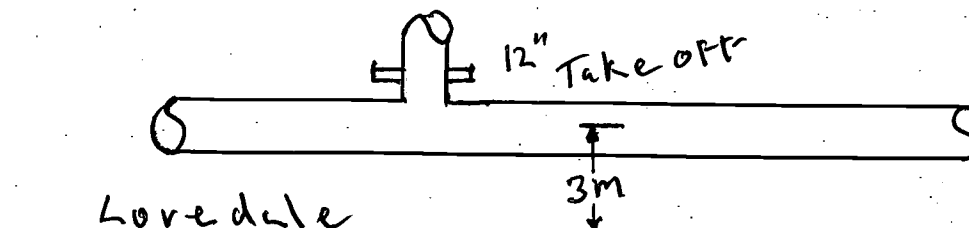
UNPROTECTED SIDE:

-540 mV-416 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWINGKedron
Brook

TESTED BY

P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation No 7

Project S40 Enoggera to Eildon Hill

Date 21-12-04

DESCRIPTION

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

24" Cnr Math arc & Silvester
 Mild Steel
 V 571

IN-GROUND TESTING

BOLT TO FLANGE RESISTANCE:

all Bolts $> 200 \Omega$

NUMBER OF BOLT:

12

FLANGE TO FLANGE RESISTANCE:

128 Ω

INSULATION CHECKER MODEL 702:

N/A.

POTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

-130 mV

UNPROTECTED SIDE:

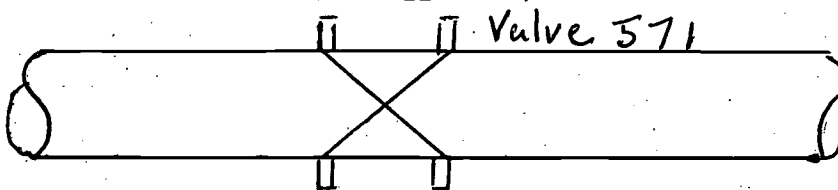
-125 mV

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Valve in pit. in scrubland
 adjacent to V 997

TESTED BY

P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation No 8

Project S40 Enoggera to Eildon HillDate 22-12-04DESCRIPTION

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

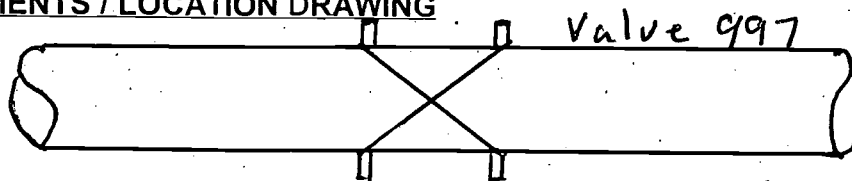
VALVE No.

Cnr Main ave + SilvestenMild SteelV 997IN-GROUND TESTINGBOLT TO FLANGE RESISTANCE: all Bolts > 200 Ω NUMBER OF BOLT: 12FLANGE TO FLANGE RESISTANCE: 200 Ω INSULATION CHECKER MODEL 702: N/APOTENTIAL DIFFERENCE TO REFERENCE CELL:PROTECTED SIDE: 260 mvUNPROTECTED SIDE: 202 mvABOVE TESTING

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Valve in pit in scrubland
Adjacent to V 571

TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

ISOLATION N° 9

Project Enoggera - Eildon Hill S40Date 29-7-05**DESCRIPTION**

MAINS DETAILS:

Eildon Hill

LOCATIONS:

Residua

SIZE:

MATERIAL:

Mild Steel 42"

COATING:

VALVE No.

127**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

all Bolts > 200 Ω

NUMBER OF BOLT:

24

FLANGE TO FLANGE RESISTANCE:

96.6 K Ω

INSULATION CHECKER MODEL 702:

N/A**POTENTIAL DIFFERENCE TO REFERENCE CELL:**

PROTECTED SIDE:

S40 -369

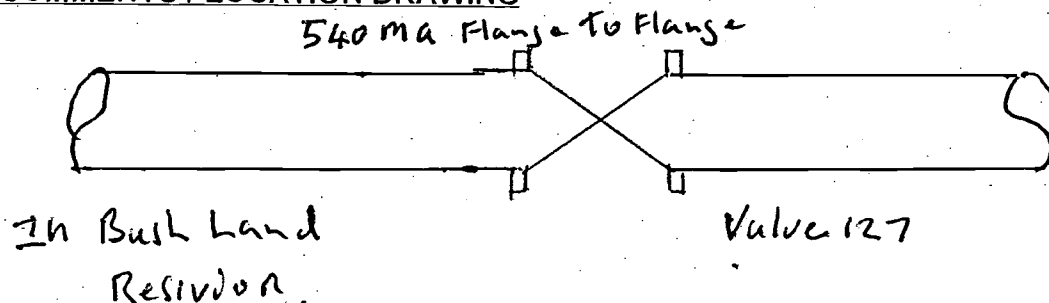
UNPROTECTED SIDE:

S42 -501**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWINGTESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Eildon Hill to Enoggera Unit Reading 20v 10u Date 12-4-05

	Reading	Test Point I. D.	Location	Swing
On	-1660		Moran St	
Off	-850	Light	Park Light	-810
On	-2466			
Off	-924	Light	Park Light.	-1542
On	-2953			
Off	-1000	Light.	Park Light	-1953
On	-2916			
Off	-1400	Light	Park Light.	-1516
On	-2010			
Off	-1013	Light	Park Light 399791	-997
On	-1254			
Off	-886	Light	Park Light	-368
On	-1029			
Off	-686	Light	Park Light	-343
On	-666			
Off	-648	Fence	DOG Fence	-18
On	-500		Sedgley	
Off	-454	men	Pole no 42946	-46
On	-226		Sedgley	
Off	-226	Men	Pole no 50675	0
On	-283		LLOYD ST	
Off	-302	men	Pole no 43412	-19
On	-270		LLOYD ST	
Off	-255	men	Pole no 43413	-15
On	-246		LLOYD ST	
Off	-239	men	Pole no ? 0090	-7
On	-236		LLOYD ST	
Off	-246	men	Pole no 25169	+4
On	-181		LLOYD ST	
Off	-172	men	Pole no 50254	-9

TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results FormProject Eildon Hill to Enoggera Unit Reading 20V 10a Date 12-4-05

	Reading	Test Point I. D.	Location	Swing
On	-330		Lloyd St	
Off	-330	Men	Pole no 25163	0
On	-302		Lloyd St	
Off	-298	Men	Pole no 25161	-13
On	-338		Lloyd St	
Off	-320	Men	Pole no 48578	-18
On	-230		McGregor St.	
Off	-239	Men	Pole no 5626	+9
On	-414		Fifth. av	
Off	-414	Men	Pole no 5888	0
On	-295		Silvester.	
Off	-295	Men	Pole no 5681	0
On	-380		Prim Rose	
Off	-420	Men	Pole no 13298	+40
On	-379		Garden tce	
Off	-383	Men	Pole no 50195	+4
On	-436		Garden tce.	
Off	-436	Men	Pole no 35251	0
On	-472		Alderson.	
Off	-472	Men	Pole no 4497	0
On	-860		Alderson	
Off	-540	Men	Pole light 399785	-320
On	-726		Stedgely Park	
Off	-500	Water	Water meter	-226
On				
Off				
On				
Off				
On				
Off				

TESTED BY P. Smyth

* See Bleed Sheet

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject Eildon Hill - EnoggeraDate 4-5-05Bleed Location Primrose StCPB No. 111FOREIGN STRUCTURE OWNER: Energex Pole no 13298F.S. LOCATION: Primrose StF.S. IDENTIFICATION: men

REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:

REFERENCE TYPE: ZNPOTENTIAL OFF: -420 ON: -380 SW: -40BLEED TYPE: ZNBLEED MATERIAL: ZN

BLEED WEIGHT:

BLEED O/C POTENTIAL: -1185 mvBLEED CURRENT OFF: 1.66 ma ON: 1.66 ma

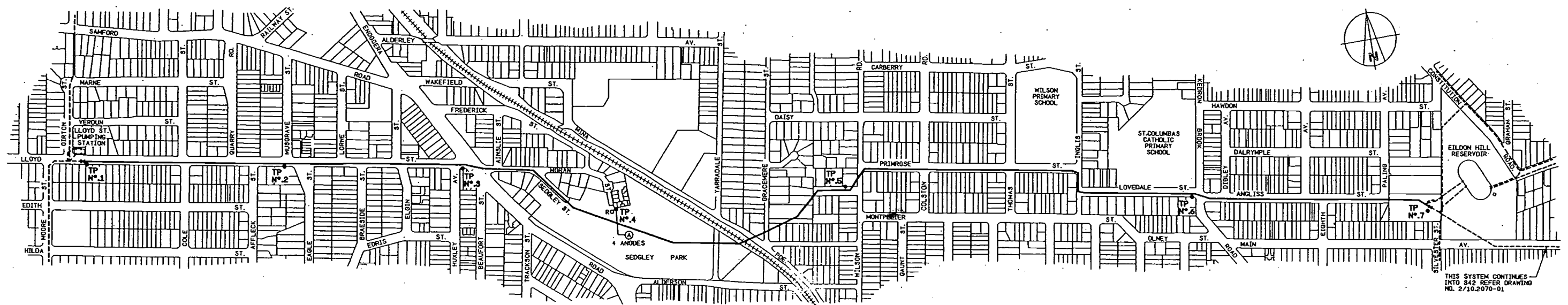
REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:

Bond Off (Rectifier Off)			Bleed On			Resultant Swing
Bleed Off	Bleed On	Swing	Bond Off	Bond On	Swing	
-420	-513	-93	-513	-482	+31	-62

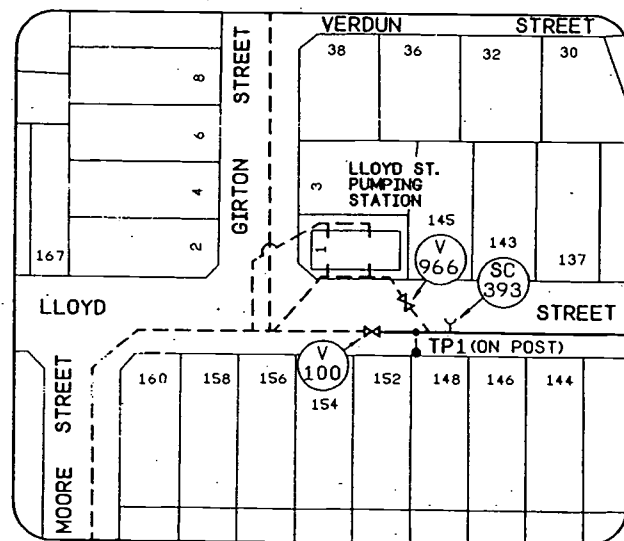
FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) YesIDENTIFICATION TAG INSTALLED? (Y/N) Yes 111

COMMENTS:

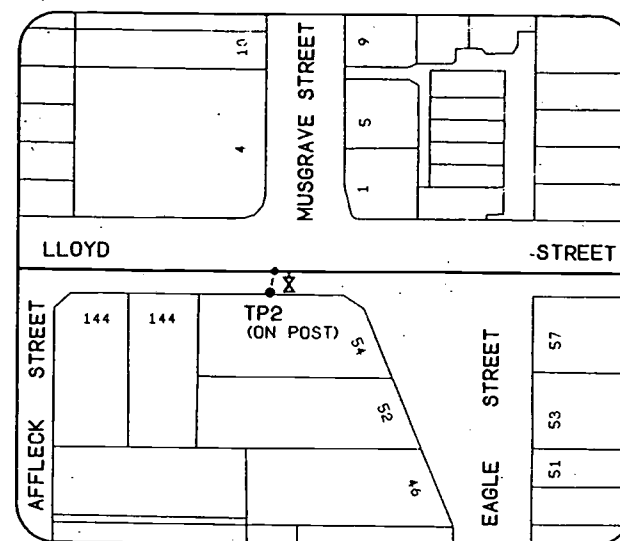
INSTALLED / TESTED BY P. Smyth



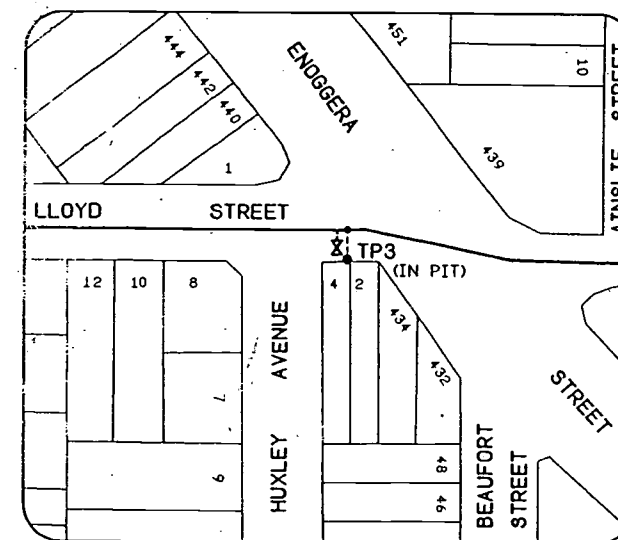
LOCALITY PLAN



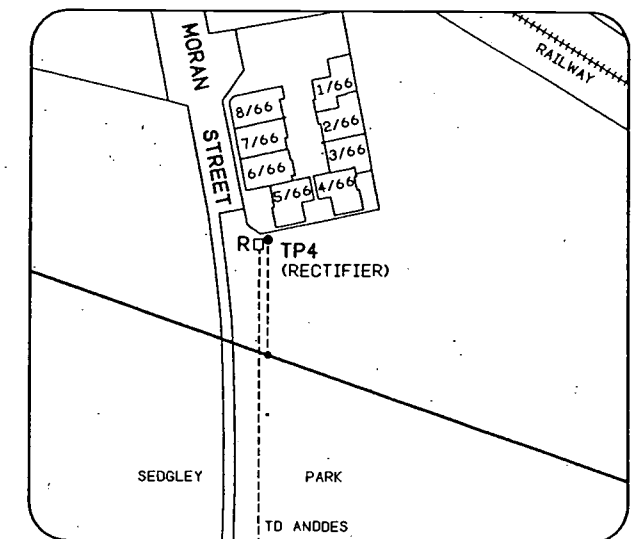
TEST POINT NO.1



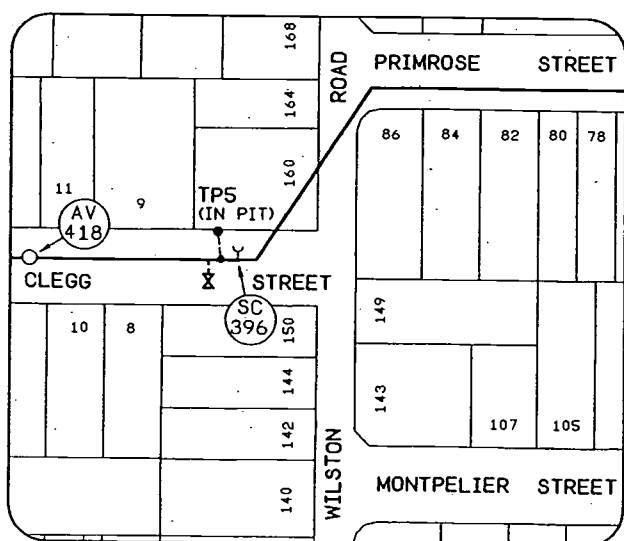
TEST POINT NO.2



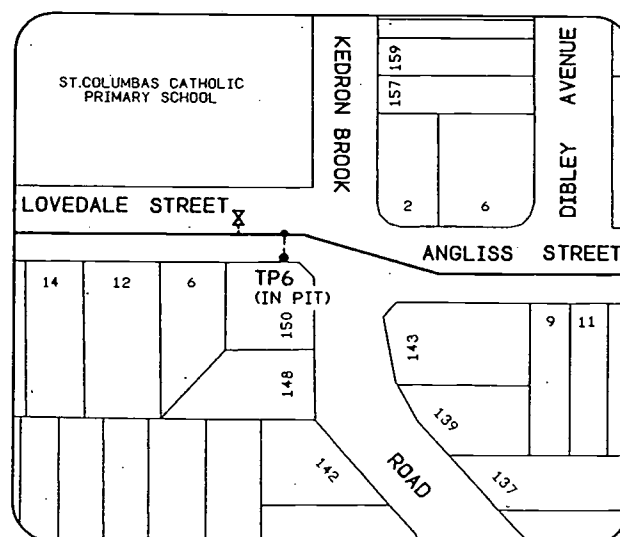
TEST POINT NO.3



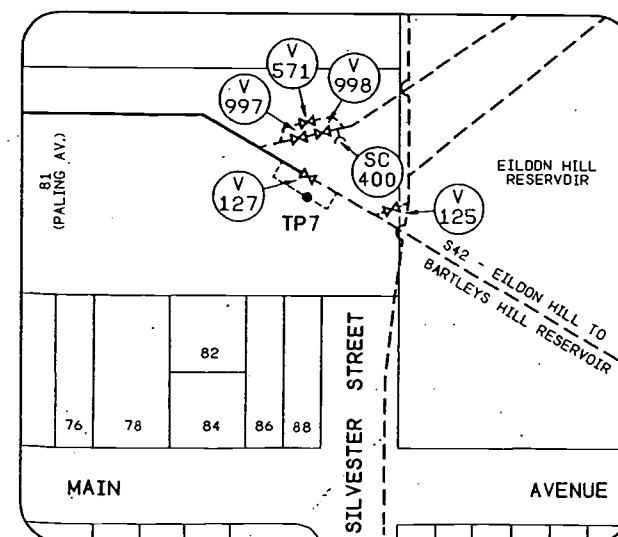
TEST POINT NO.4



TEST POINT NO.5



TEST POINT NO.6



TEST POINT NO.7

DESIGN CHARGE NO.		PA000820	
CONSTRUCTION PROJECT NO.			
AS BUILT RECEIVED			
BY	OFFICER CODE	DATE	
ON MAINTENANCE DETAILS			
START	FINISH	D.R.S. COMMENTS	
FUNDING			
PRIVATE BOOSTER REQUIRED? YES / NO			
FUNDED BY B.C.C. (✓) DEVELOPER ()			
FED. GOVT () STATE () OTHER ()			
D.R.S. OFFICER			
DATE RELEASED			
PLAN CUSTODIAN			
OFFICER/REC'D	DATE RELEASED	LIVE CONNECTION(S) / PASSED(W)	
REFERENCE	DATE	BMAP CAPTURE	
JOB NUMBER	OFFICER CODE	DATE	
BMAP COMMENTS			

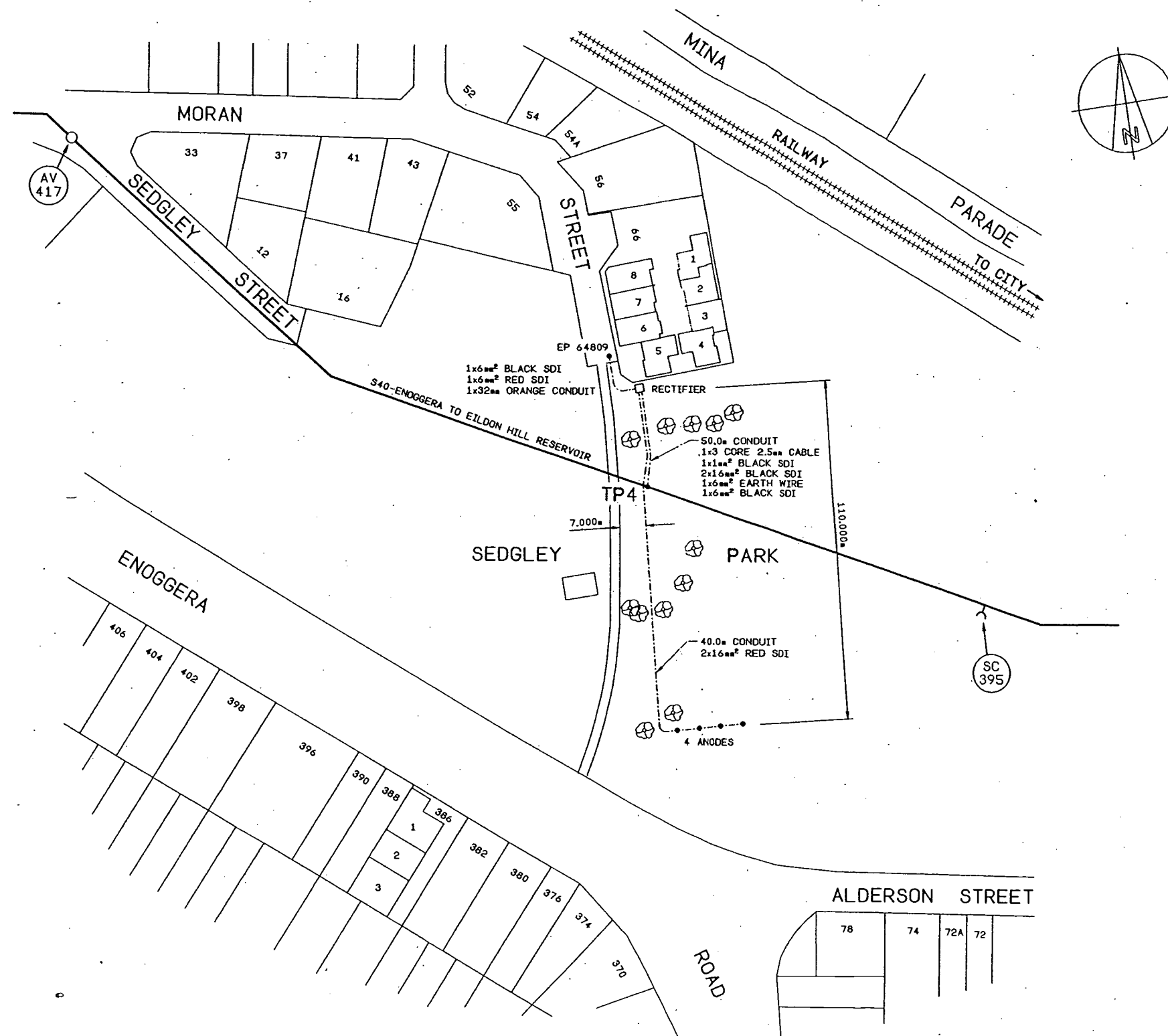
NO.	DATE	AMENDMENT	INITIALS	PRINCIPAL ENGINEER	MANAGER ENGINEERING	PRODUCTION / NETWORK DELEGATE	RPEQ. NO.	DATE	CADD FILE	FILE NO.	SURVEYED	SURVEY NO.	WATER/INFRASTRUCTURE\210205001.DTA	DESIGN	DESIGN CHECK	DRAWN	B.0.8	MAR. 2005	DRAFTING CHECK
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			



PROJECT
S40-ENOGGERA TO EILDON HILL
RESERVOIR

TITLE
CATHODIC PROTECTION TEST
POINT LOCATIONS
TEST POINT NOS. 1 TO 7

SCALE
DRAWING N°
2/10.2050-01
A.H. DATUM
N° 1 OF 2 SHEETS
AMEND.
P



TEST POINT NO.4 AND ANODE BED DETAILS

DESIGN CHARGE NO.		PA000820	
CONSTRUCTION PROJECT NO.			
AS BUILT RECEIVED			
BY	OFFICER CODE	DATE	
ON MAINTENANCE DETAILS			
START	FINISH	D.R.S. COMMENTS	
FUNDING			
PRIVATE BOOSTER REQUIRED?		YES / NO	
FUNDED BY B.C.C. (✓)		DEVELOPER ()	
RED. GOVT ()		STATE () OTHER ()	
D.R.S. OFFICER		DATE RELEASED	
PLAN CUSTODIAN			
OFFICER/REC'D	DATE RELEASED	LIVE CONNECTION(S) / PASSED (✓)	
REFERENCE	DATE	BIMAP CAPTURE	
JOB NUMBER	OFFICER CODE	DATE	
BIMAP COMMENTS			
SCALE			
DRAWING NO.		AH DATUM	
2/10.2050-02		N° 2 OF 2 SHEETS	
		P	

				PRINCIPAL ENGINEER	RPEQ. NO.	DATE	CADD FILE	\\WATER\INFRASTRUCTURE\210205002.DTA		DESIGN		
				MANAGER ENGINEERING		DATE	FILE NO.			DESIGN CHECK		
NO.	DATE	AMENDMENT	INITIALS	PRODUCTION / NETWORK DELEGATE		DATE	SURVEYED			DRAWN	8.0.8	APR. 2005
							SURVEY NO.	FIELD BOOK		DRAFTING CHECK		

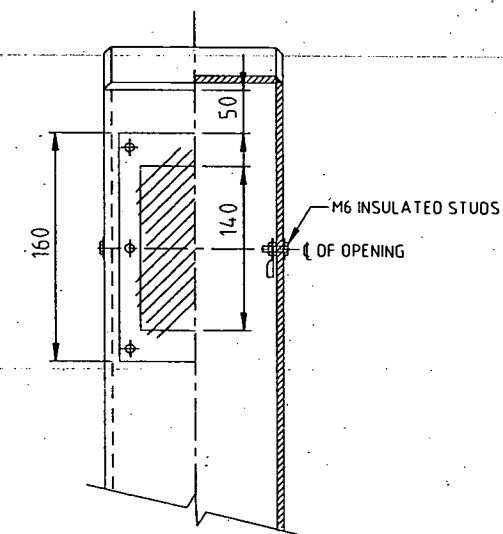
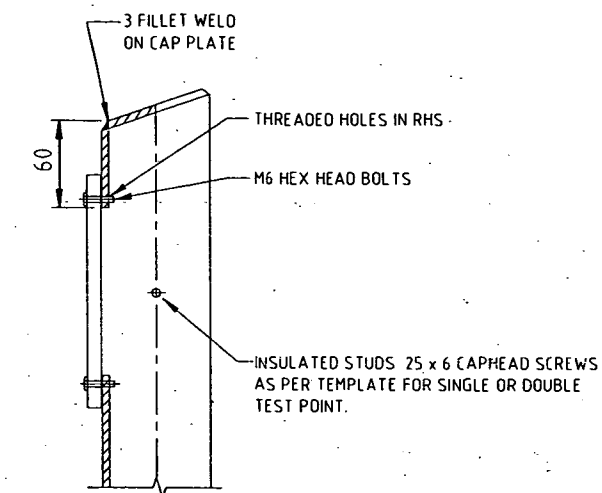
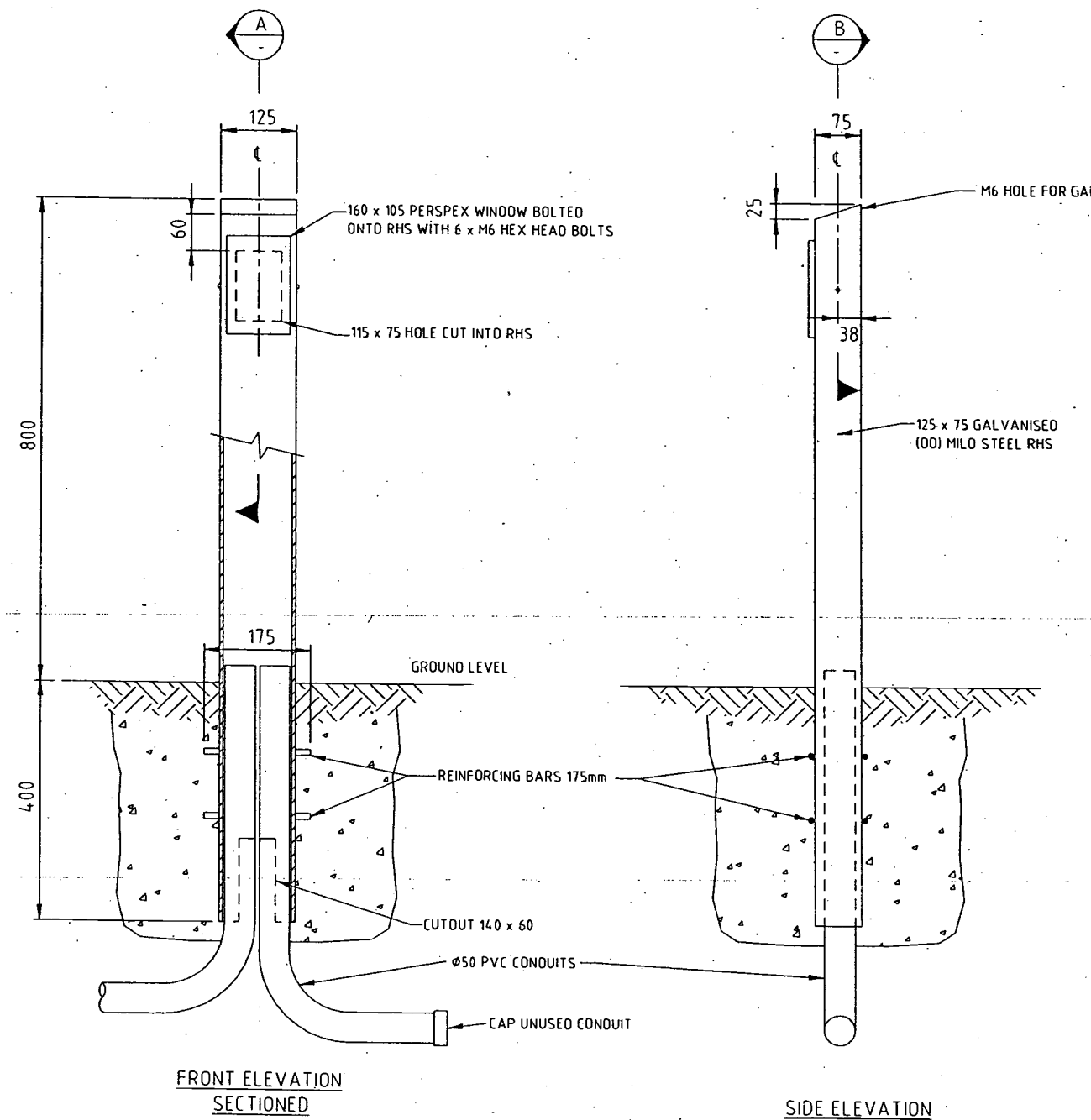


PROJECT
S40-ENOGGERA TO EILDON HILL
RESERVOIR

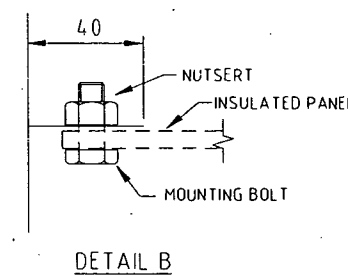
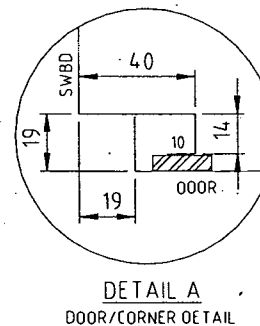
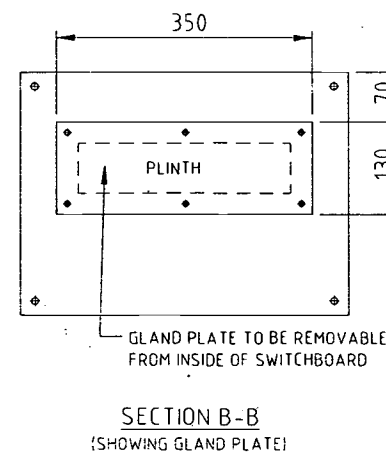
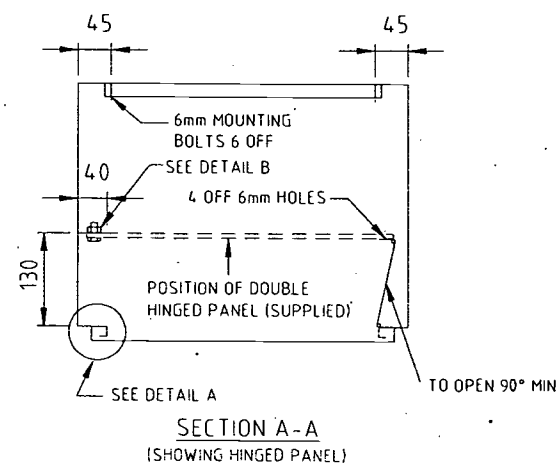
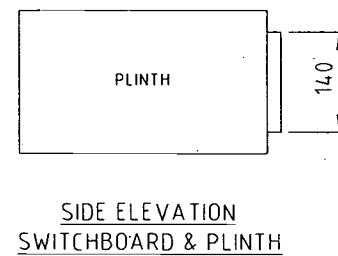
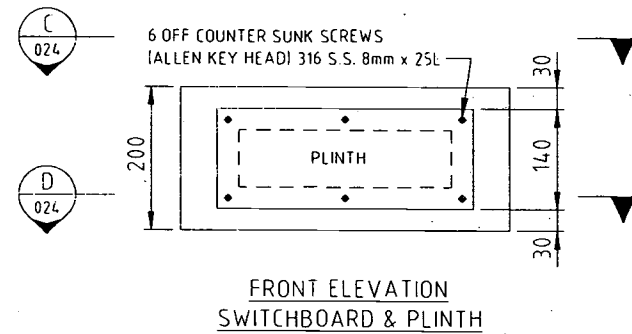
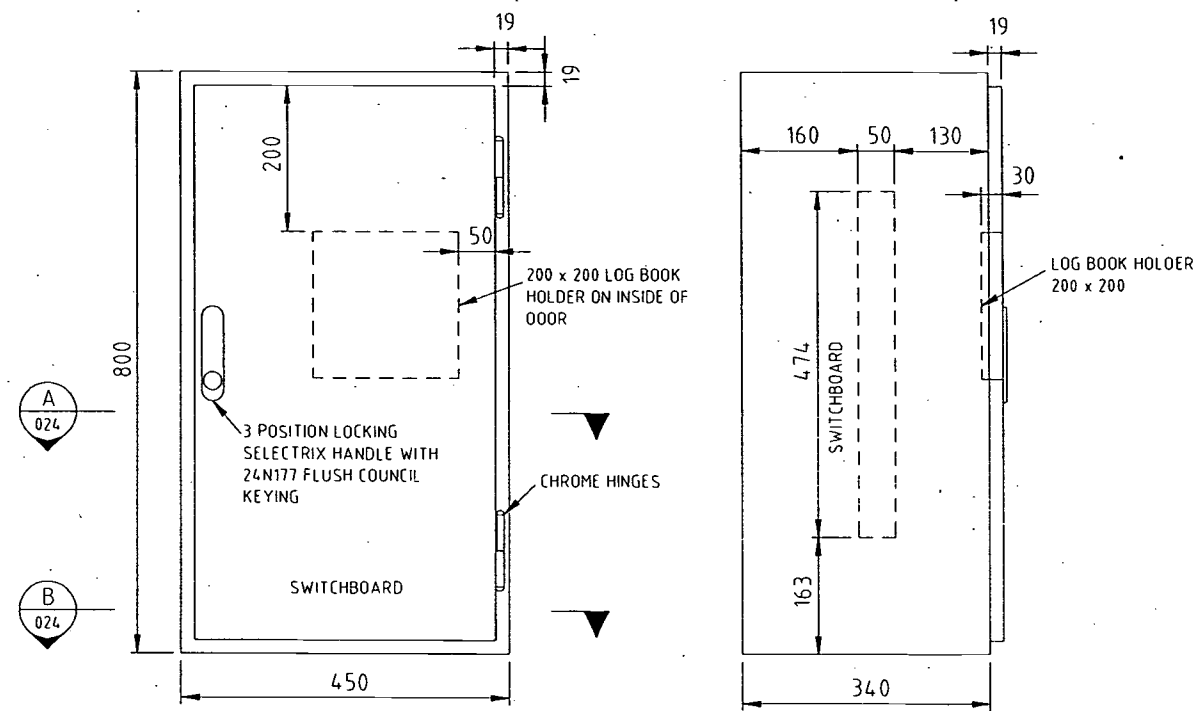
TITLE
CATHODIC PROTECTION TEST
POINT NO. 4 AND
ANODE BED DETAILS

NOTES

1. HOT DIP GALVANISE AFTER FABRICATION.



C		9-02	NOTICE REVISED	HT	DIRECTOR OF P.D. & P.S.	DATE	DESIGN	K.M.G.	5-5-92	JOB FILE	ACAD FILE	2270001-RevA	SHEET SIZE	A1	Brisbane Water	Professional Services Engineering	PROJECT	CATHODIC PROTECTION	TITLE	STANDARD TEST POINT CONSTRUCTION DETAILS	SCALE	NTS	N° 1 OF 1 SHEETS	DRAWING N°	486/1/22-AAT0001E	AMEND.	C
B		11-95	MODIFIED	DLP	ENGINEER IN CHARGE	DATE	DRAWN	DLP	7-5-92	SURVEY No.			FIELD BOOK														
A		5-92	ISSUED FOR APPROVAL	DLP	SUPERVISING ENGINEER	R.P.E.O. NO.	CHECKED			SURVEYED				A.M. DATUM													
NO		DATE	AMENDMENT	INITIALS																							

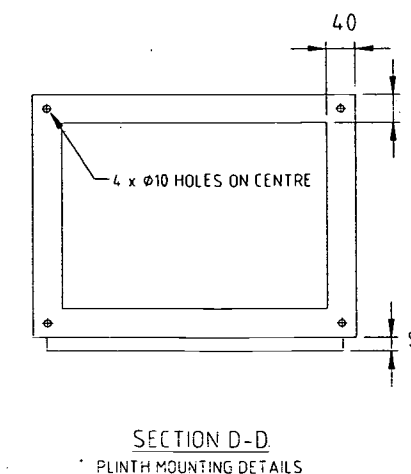
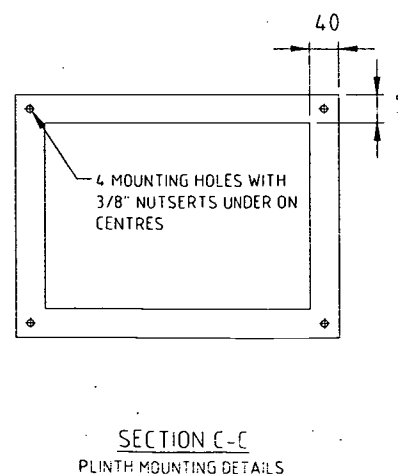


FRONT INSULATED PANEL
(6mm THICK SUPPLIED)

FIG.1
EQUIPMENT PANEL DETAILS

1. CABINET TO BE MANUFACTURED FROM 1.6mm 2B STAINLESS STEEL.
2. UNLESS SPECIFIED, SUPPLY CABINET WITH PLINTH. (MOUNT PLINTH TO SWITCHBOARD CABINET USING STAINLESS STEEL SCREWS).
3. REAR EQUIPMENT PANEL TO BE ZINC PLATED STEEL. POWDER COATED 'ORANGE'. (FULL LENGTH, FULL WIDTH & REMOVABLE). SEE FIG.1.
4. DOUBLE HINGED PANEL SUPPLIED BY B.C.C.
5. PROVIDE 1/4" WW STAINLESS STEEL STUDS TO DOOR & SWITCHBOARD CABINET.
6. DEGREE OF WEATHER PROTECTION IP55.
7. SELECTRIX TYPE HANDLE TO BE SUPPLIED & FITTED BY SWITCHBOARD MANUFACTURER. HANDLE TO BE 1107 SS CU1. KEY TO BE 24N177.
8. DOUBLE HINGED PANEL MOUNT TO BE SUPPLIED WITH MOUNTING BOLTS & NUTSERTS TOP & BOTTOM. SEE DETAIL A.

NUMBER OF SWITCHBOARDS REQUIRED	
NUMBER OF PLINTHS REQUIRED	



C 9-92 NOTIFIED		H1		DATE		JOB FILE		SHEET SIZE		A1		PROJECT		TITLE		SCALE NTS		N° 1 OF 1 SHEETS		DRAWING N°		APPEND	
B 11-95 MODIFIED		DLP		DATE		ACAD FILE		22C0024-Rev.C				CATHODIC PROTECTION		STANDARD SWITCHBOARD CABINET						486/1/22-C0024E		C	
A 5-97 ISSUED FOR APPROVAL		DLP		DATE		SURVEY No.		FIELD BOOK															
NO. DATE		AMENDMENT		INITIALS		R.P.E.O. NO.		DATE		CHECKED		SURVEYED		A.H. DATUM									

