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Eagle Farm Q

4009

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16th June 2005

OPERATING MANUAL FOR:

RAFTING GROUND to TARINGA TRUNK MAIN S36 TRUNK MAINS

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER SYSTEM SERVICES

MANUAL CONTENTS

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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: 1670 mm dia mild steel cement lined.

Coating: Tar Epoxy.

Length: Appox 2.1 km.

Location: From Valve 222 cnr Russell Tce. and Jenkinson St. Indooroopilly
to Valve 67 Woodstock Ave.(near Marmion Pde.) Taringa.

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 the park, adjacent to 65 Carinya St. Indooroopilly and has a 240V supply from the Council switchboard in the park.

(4.3) Cathode: The cathode point is located on the 1670 mm dia mains, adjacent to the retic. valve, approx 120 metres from the rectifier in Carinya St. 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 rectifier. 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 five 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 - 2/10.2422-01

Bed Locations S36 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

Part 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.

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.

16th March. 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.

16th March, 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:

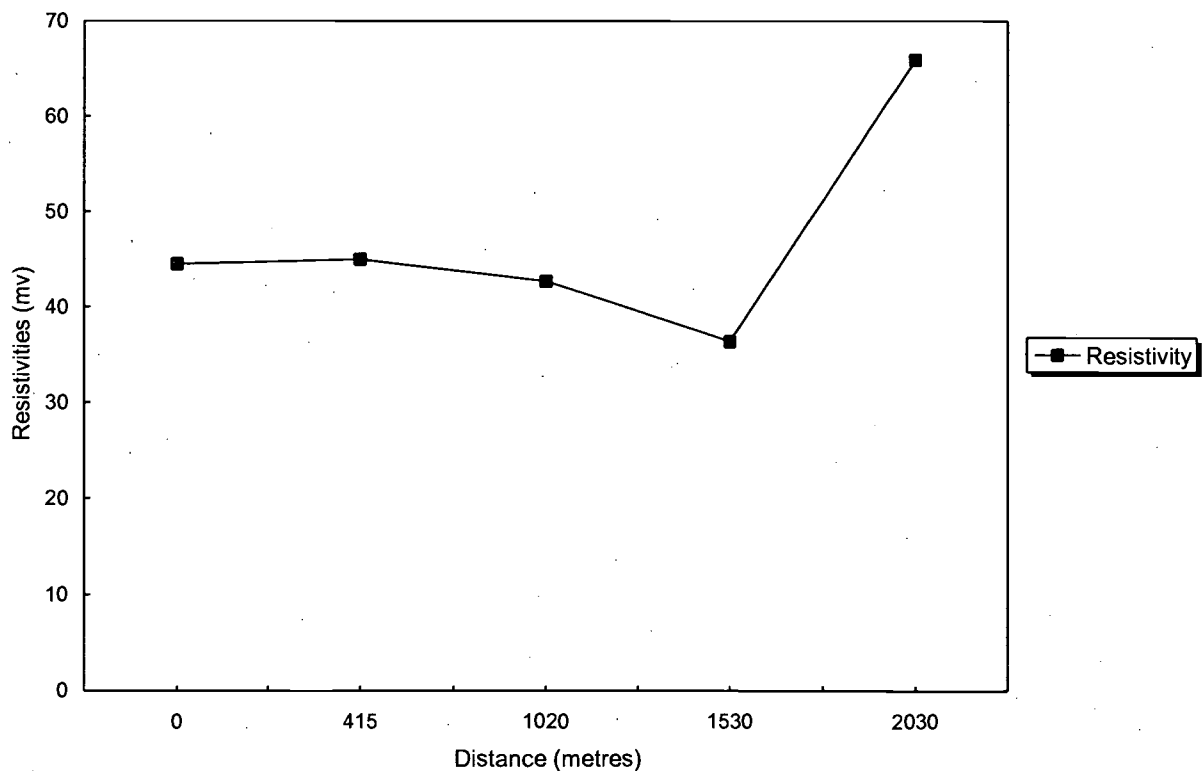
- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/ 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** Rafting Ground to Taringa S36**Date** 16th June 2005

Test Point number	Distances to T.P.	Resistivities at 2 metres
	(metres)	ohm metres
1	0	44.5
2	415	45
3	1020	42.7
4	1530	36.4
5	2030	65.9
6		
7		
8		
9		
10		
11		
12		
13		
14		

Graph of resistivities vs pipelength

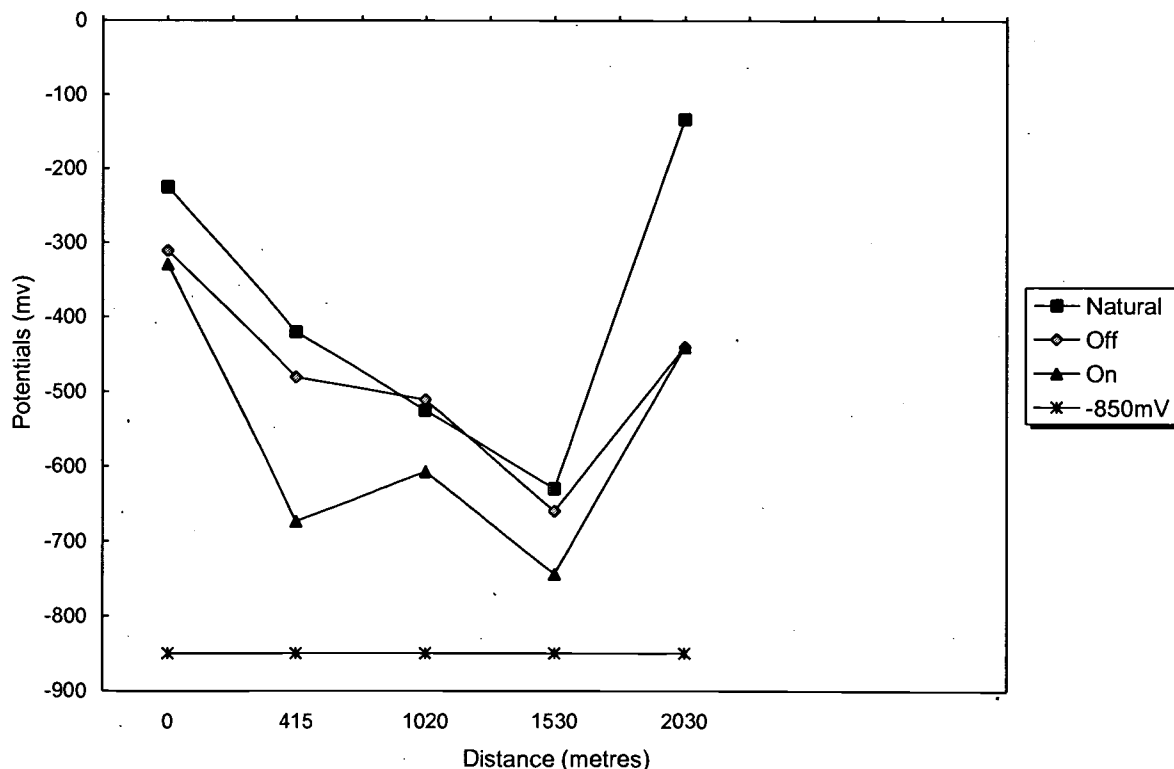
Revision 10/05/2006

Brisbane Water Engineering Services

CP Form No. 23

Electrical Engineering Unit**Cathodic Protection System Potential Recording Form****Project** Rafting Ground to Taringa S36**Date** 16th June 2005

Test Point number	Distances to T.P. (metres)	Potentials to CuSO ₄			Distance
		Natural (mV)	Off (mV)	On (mV)	
1	0	-225	-311	-329	0
2	415	-420	-481	-674	415
3	1020	-525	-511	-607	1020
4	1530	-630	-660	-744	1530
5	2030	-133	-440	-440	2030
6					
7					
8					
9					
10					
11					
12					
13					
14					

Rectifier at
TP. No 2**Graph of potentials vs pipelength**

Revision 10/05/2006

PTRAFTINGGRDTARINGA36

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection System Loop Resistance

Carinya St. Rectifier CPS 218

Date: 21st June 2005

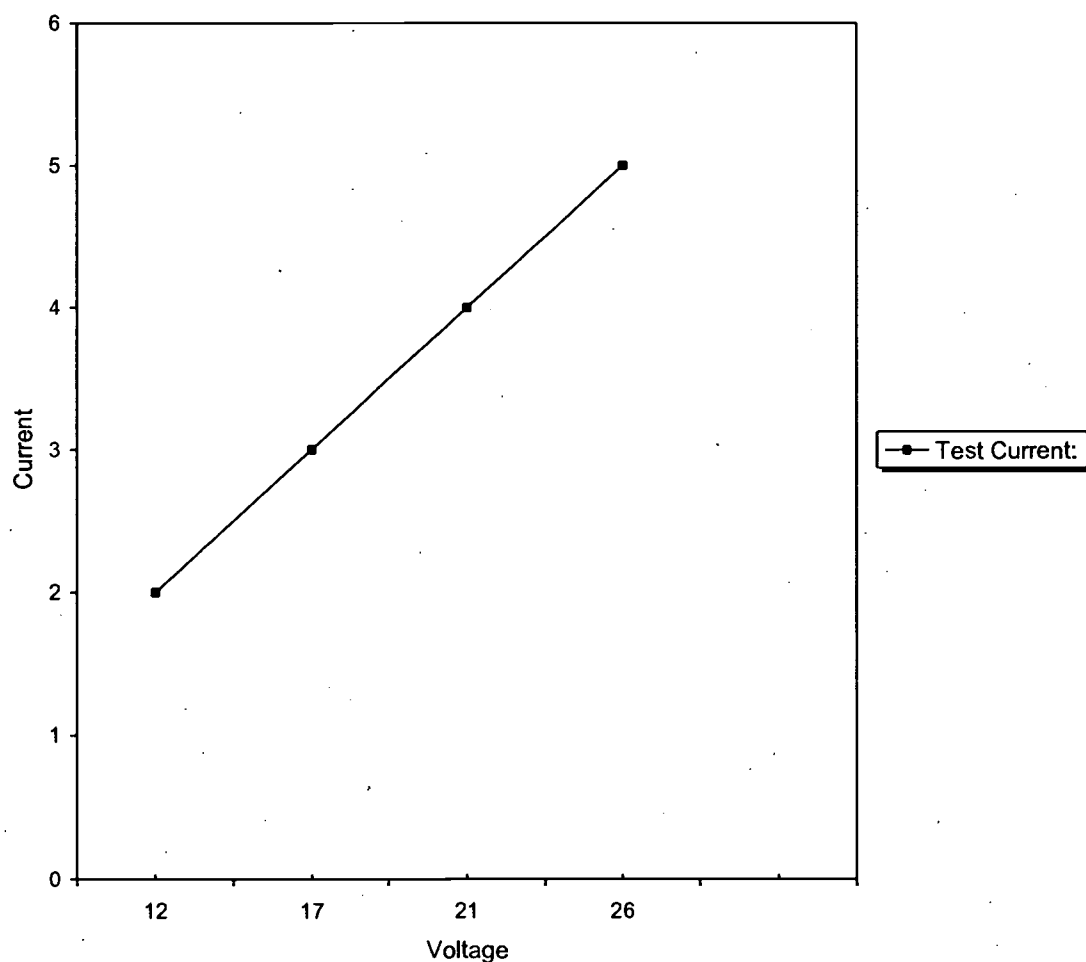
Cathodic Protection System: Rafting Ground to Taringa S36 Trunk Main

System Operating Volts: 26 System Operating amps 5.5

Test Voltage:		Test Current:	
(volts)		(amps)	
12		2	
17		3	
21		4	
26		5	

Loop Resistance (ohms)
5.25

Loop Resistance



21/06/2005

^

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 Valve 222 Russell Tce. Indooroopilly to Valve 67 Woodstock Ave. Taringa		
	Rectifier in park Carinya Street Indooroopilly.	POST CODE	4068
Structure to be protected:	1670 mm dia Mild Steel Trunk Main		
Maximum operating current:	6.00	Amperes DC	Water or Marine environment Maximum operating voltage: 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 <i>Electrical Safety Regulation 2002</i> ;		
(ii)	tests pursuant to section 177 of <i>Electrical Safety Regulation 2002</i> , 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 Kenmore - Taringa
Rafting Ground - TaringaDate 26-10-04

T P Location

T P No. 1 + 1

Mains Size

T P Type

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE)

0.1

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

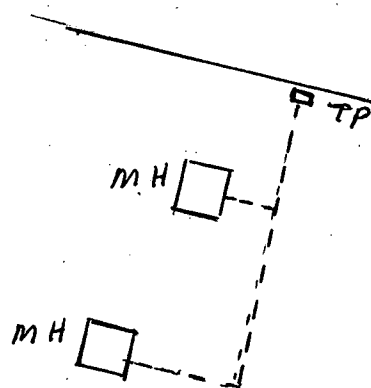
ZINC TO CuSo4

EARTH TESTINGTEST NO. 1

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWINGMove TP's from Valve Pits222 & 221 To TP atProperty AlignmentOriginals left in Pit

INSTALLED BY

J Taylor

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject Rafting Ground - TaringaDate 25-10-04T P Location Caringa St Crotty St 178 E2T P No. 2Mains Size S36 = 54" S60 = 60"T P Type Double B.**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

ZINC TO CuSo4

S36

S60

0.1

0.1

+622

+610

-420

-422

-1059

-1005

EARTH TESTING

TEST NO. 1

PIN SPACING

2m

RESISTIVITY

MEGGER READING

3.59 Ω **COMMENTS / LOCATION DRAWING**Teague StCrotty StCaringa St

60"

54"

S60

S36

kerb

cathode

cathode

Rising Elbow
RSV 22298

TP

Pit

RPL

→ Rect

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Revision 08/01/96

Brisbane Water Engineering Services

CP Form No.18

Electrical Engineering Unit.

Standard Cathodic Protection Test Point Data Gathering FormProject Rafting Ground - TaringaDate 2-11-04T P Location Waverly St Taringa Pde.T P No. 3Mains Size 54 inchT P Type B Pit.**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE)

ZINC REFERENCE TO PIPE

CuSo4 REFERENCE TO PIPE

ZINC TO CuSo4

0.1

~~-1550~~ +536

-525

-1050

EARTH TESTING

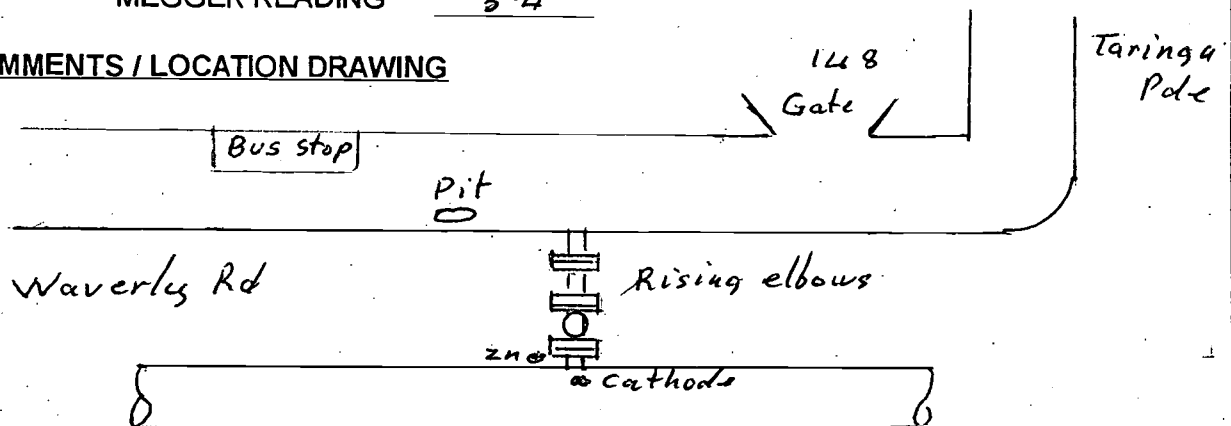
TEST NO. 1

PIN SPACING

2m

RESISTIVITY

MEGGER READING

3.4**COMMENTS / LOCATION DRAWING**

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CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering FormProject Rafting Gnd TaringaDate 16-11-04T P Location 22 Wooley StT P No. 4

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 +502-630-1160**EARTH TESTING**TEST NO. 1

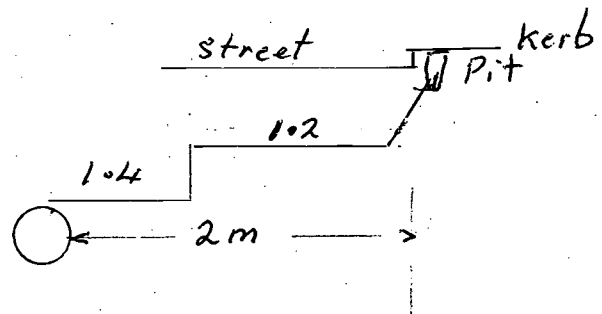
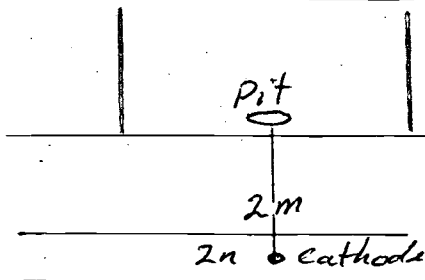
PIN SPACING

2 m

MEGGER READING

2.9 Ω

RESISTIVITY

COMMENTS / LOCATION DRAWING

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CP Form No.18

Electrical Engineering Unit

Standard Cathodic Protection Test Point Data Gathering Form

Project S36 RAFTING GRD tarringaDate 17-11-04T P Location 25 WoodstockT P No. 5Mains Size 54"T P Type B

POTENTIAL TESTING

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

.22
+901
-133
-1033

EARTH TESTING

TEST NO. 1

PIN SPACING 2MEGGER READING 9.28RESISTIVITY $2 \times 2 \times 3.14 \times 9.28 =$

TEST NO 2

PIN SPACING

MEGGER READING

RESISTIVITY

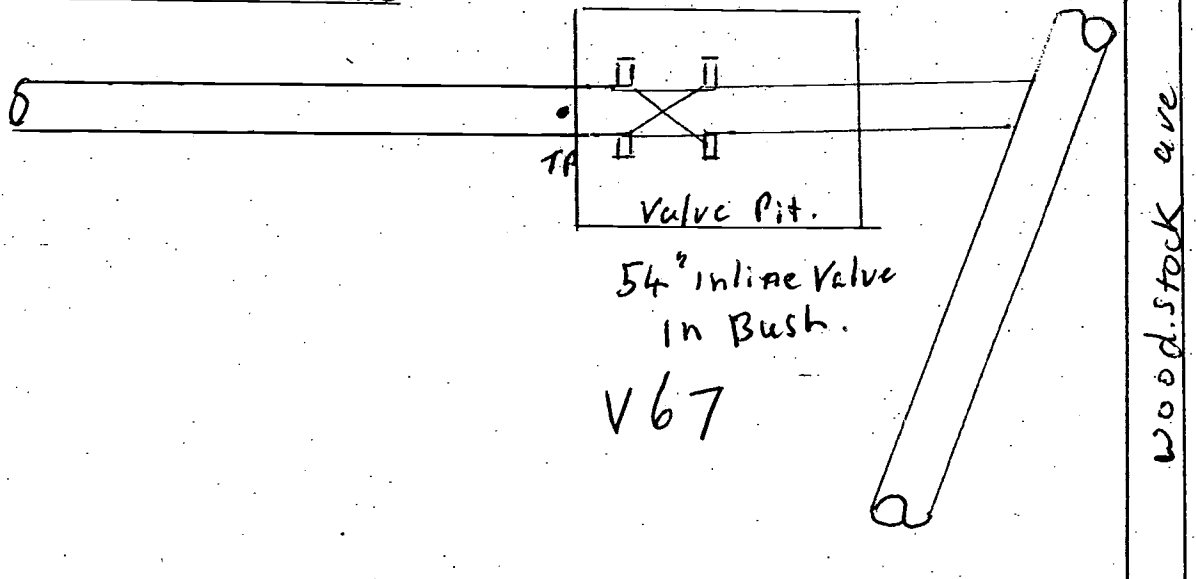
TEST NO 3

PIN SPACING

MEGGER READING

RESISTIVITY

COMMENTS / LOCATION DRAWING



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P. Smyth

Brisbane Water Engineering Services

CP Form No. 17

Electrical Engineering Unit

Cathodic Protection Anode Bed Testing

Project S36 Rafting Ground - TaringaDate 14-6-05

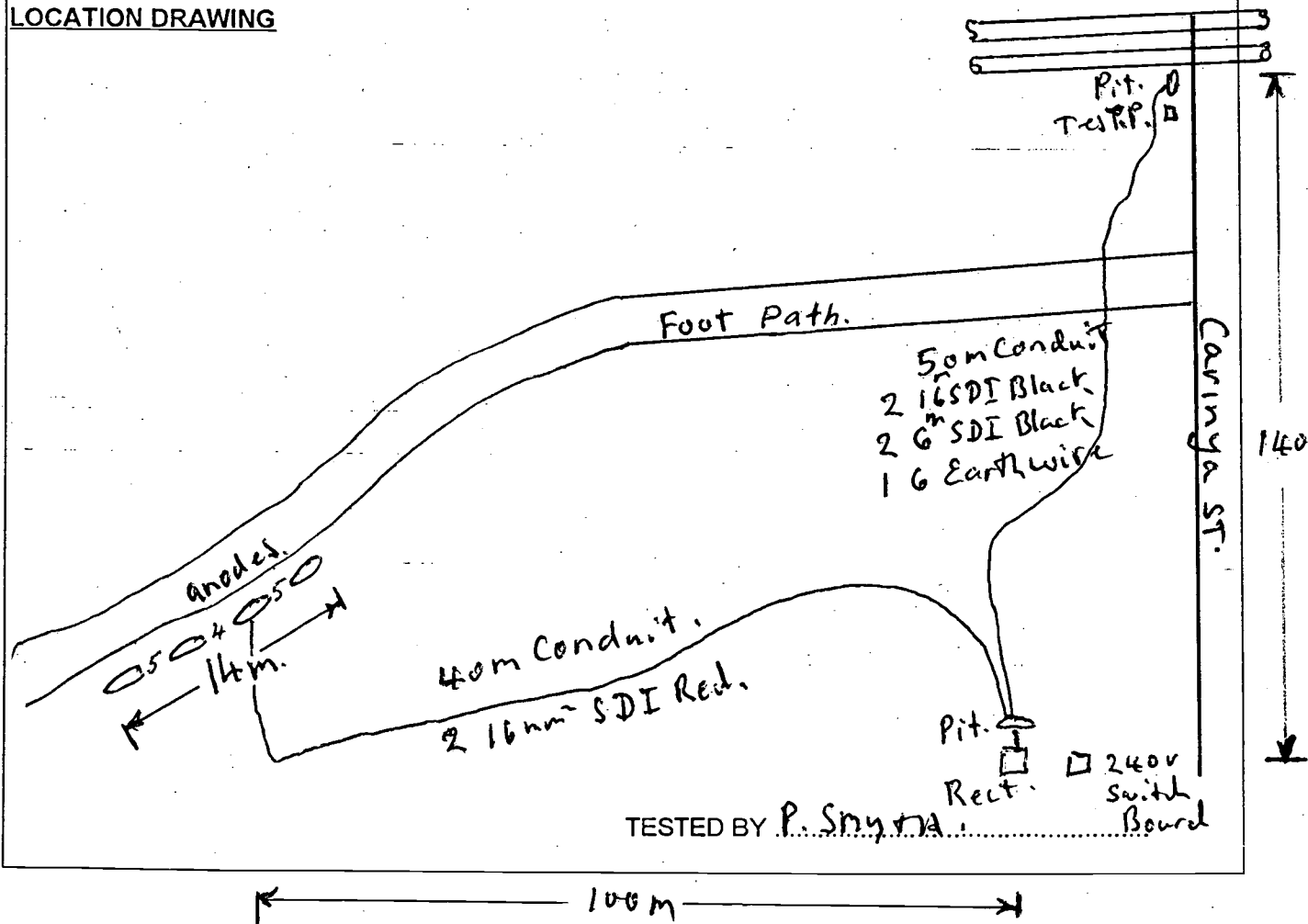
ANODE MATERIAL: Silicon Iron BURIAL: Vertical 4.0 mtrs
 ANODE SIZE/WEIGHT: 1.5m x 75mm 76 kGs TEST POINT TYPE: Rectifier Coupon ^{Pit has}
 ANODE PACKAGING: Direct + coke Breeze SOIL RESISTIVITY: 45 ohm mtrs
 ANODE DEPTH: 4.0 mtr. SIGNAGE: Yes

RESISTANCE TO GROUND:

ANODE NO.1 _____
 ANODE No.2 _____
 ANODE No.3 _____
 ANODE No.4 _____
 ANODE No.5 _____
 TOTAL _____

ANODE CURRENT

ANODE No.1 _____
 ANODE No.2 _____
 ANODE No.3 _____
 ANODE No.4 _____
 ANODE No.5 _____
 TOTAL _____

LOCATION DRAWING

Revision 09/28/95

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation no 3

Project Kenmore - Taringa S36Date 5-6-05**DESCRIPTION**

MAINS DETAILS:

Chr Russell tee & Jenkins St.

LOCATIONS:

SIZE:

48"

MATERIAL:

Mild steel

COATING:

VALVE No.

225**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

all Bolts 7200 Ω

NUMBER OF BOLT:

32

FLANGE TO FLANGE RESISTANCE:

2 m Ω

INSULATION CHECKER MODEL 702:

N/APOTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

-345 mV

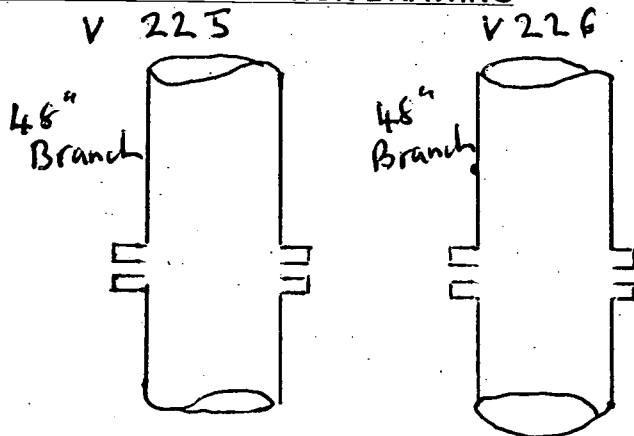
UNPROTECTED SIDE:

-260 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWINGDeep. 5.5m pitclose to Revision

TESTED BY

P. Smyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation No. 4

Project Kenmore - Taringa Set 36Date 5-4-05DESCRIPTION

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Cnr Russell tee + Jenkins48"Mild Steel226IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

INSULATION CHECKER MODEL 702:

all Bolts 7200 Ω 321.5 m Ω N/APOTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

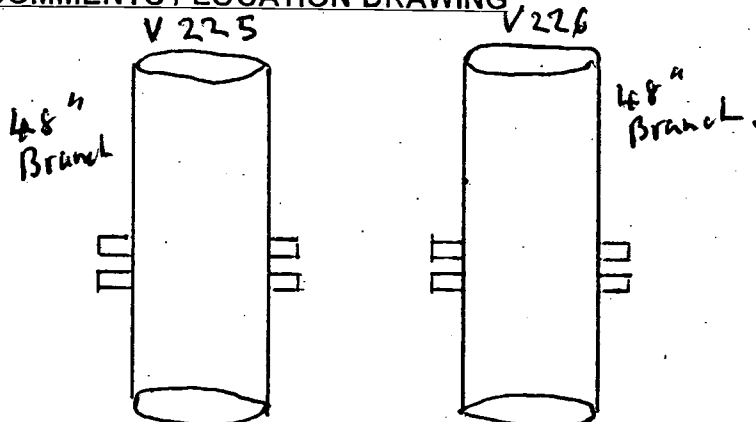
UNPROTECTED SIDE:

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Deep 5.5m Pit:
close to Reservoir

TESTED BY PSmyth

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

ISOLATION N° 5

Project S36 Rafting Ground - TaringaDate 1-7-05**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

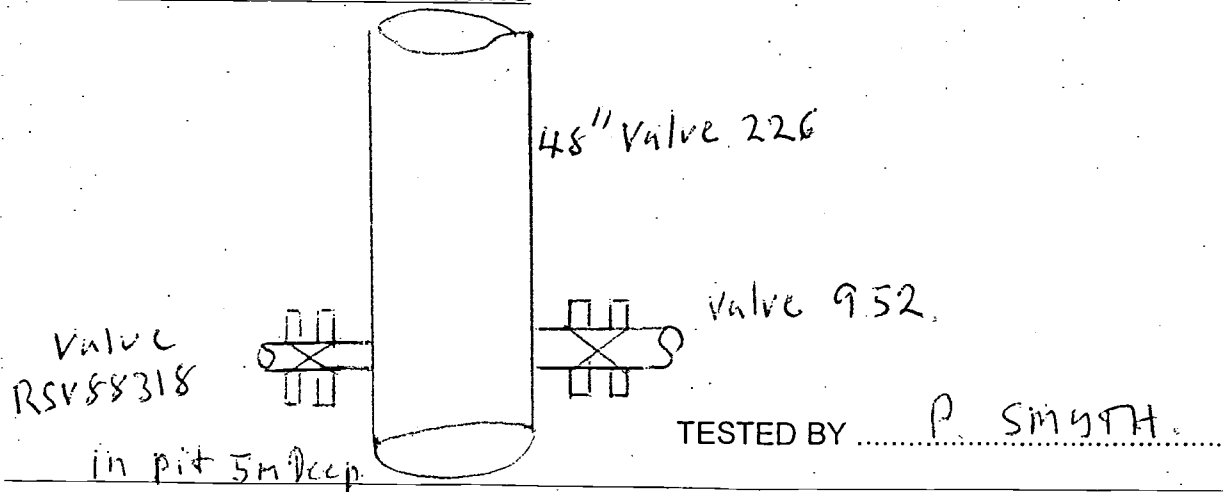
cnr Russell tce + Jenkinson St
12" By Pass Valve
Mild Steel
952

IN GROUND TESTINGBOLT TO FLANGE RESISTANCE: all Bolts > 200 Ω NUMBER OF BOLT: 12FLANGE TO FLANGE RESISTANCE: 0.6 K Ω INSULATION CHECKER MODEL 702: N/A**POTENTIAL DIFFERENCE TO REFERENCE CELL:**PROTECTED SIDE: - 342UNPROTECTED SIDE: - 268**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

ISOLATION N°6

Project S36 Rafting Ground - taringaDate 17-6-05**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Chr Russell + Lee + Jenkinson St6 in. BranchMild SteelRSV 88318**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

all Bolts $> 200 \Omega$

NUMBER OF BOLT:

6

FLANGE TO FLANGE RESISTANCE:

 $< 2 \text{ K} \Omega$

INSULATION CHECKER MODEL 702:

N/APOTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

- 342

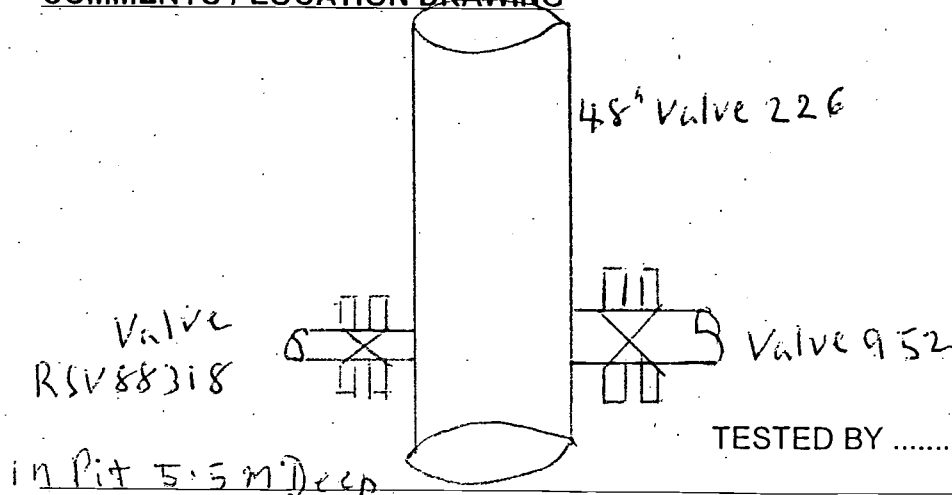
UNPROTECTED SIDE:

- 275**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

Isolation 7

Project Kenmore - Taringa St S36Date 6-4-05DESCRIPTION

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Cnr Russell tce + Jenkinson st.
36" cross 36 + 94
Mild steel
786

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:

all Bolts > 200 Ω

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

0.9 m Ω

INSULATION CHECKER MODEL 702:

N/APOTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

222 mV

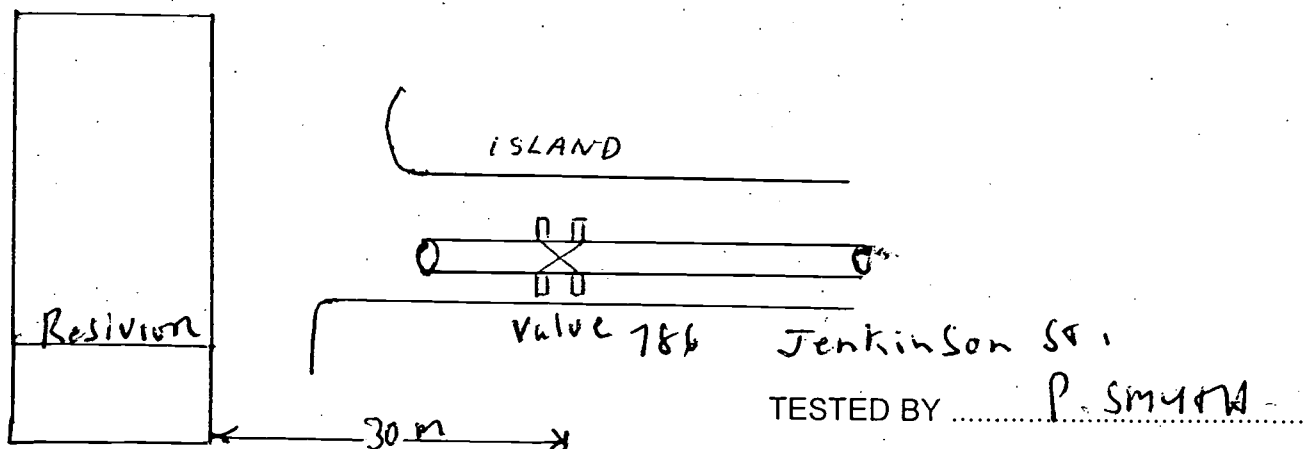
UNPROTECTED SIDE:

330 mVABOVE TESTING

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details FormProject S36 RAFTING GROUND / TARINGADate 3-3-05
ISOLATION N° 9**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

GREENHILL RESERVOIR60"MSCLTAR EPOXYV227**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE: _____

NUMBER OF BOLT: _____

FLANGE TO FLANGE RESISTANCE: _____

INSULATION CHECKER MODEL 702: _____

POTENTIAL DIFFERENCE TO REFERENCE CELL: _____

PROTECTED SIDE: _____

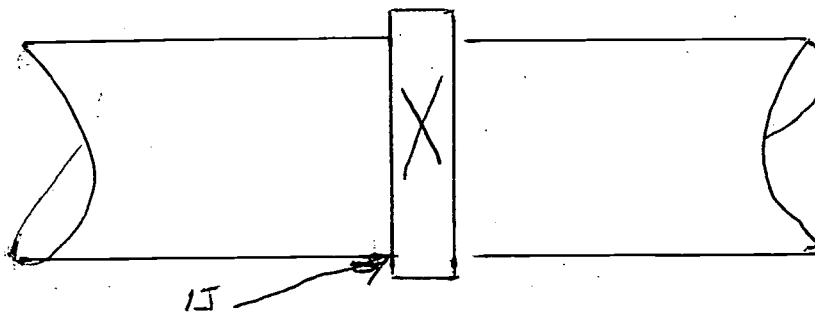
UNPROTECTED SIDE: _____

ABOVE TESTING

BOLT TO FLANGE RESISTANCE: _____

NUMBER OF BOLTS: _____

FLANGE TO FLANGE RESISTANCE: _____

> 15.0 mΩ4448.0 Ω**COMMENTS / LOCATION DRAWING**ISOLATION N° 9V227TESTED BY A. Greaves

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details Form

S36

Project Green Hill Valve 930Date 3-3-05
ISOLATION N° 810**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

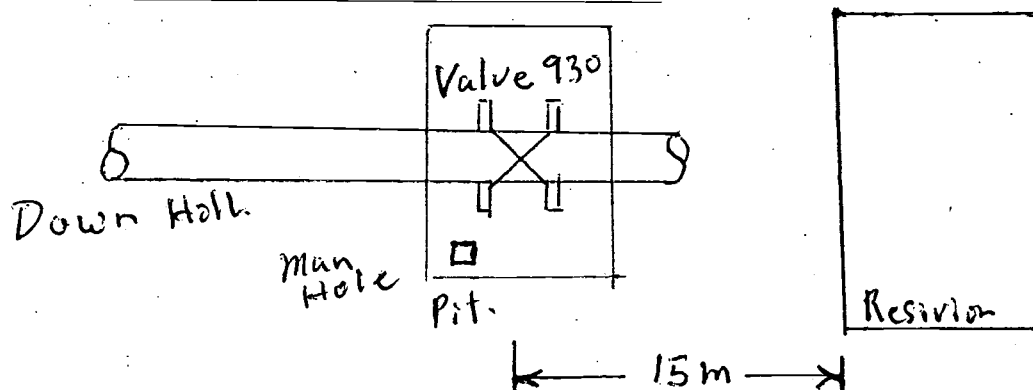
VALVE No.

Green Hills Reservoir60"Mild Steel930**IN GROUND TESTING**BOLT TO FLANGE RESISTANCE: all Bolts $> 200 \Omega$ NUMBER OF BOLT: 32FLANGE TO FLANGE RESISTANCE: 3.2 K Ω INSULATION CHECKER MODEL 702: N/A.POTENTIAL DIFFERENCE TO REFERENCE CELL:PROTECTED SIDE: -382 mVUNPROTECTED SIDE: -425 mV**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 FormProject Rafting Ground - TaringaDate 25-10-04

ISOLATION N°11

DESCRIPTION

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

Caringa St Indrapilly 178 E2
S36 = 54" 360 = 60"
MSCL
Tar Asbestos
RSV22298

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE: > 380 Ω
 NUMBER OF BOLT: 8 off 3 1/2" x 3/4"
 FLANGE TO FLANGE RESISTANCE: 62 Ω
 INSULATION CHECKER MODEL 702: 1N11

POTENTIAL DIFFERENCE TO REFERENCE CELL:

S36
 PROTECTED SIDE: -420
 UNPROTECTED SIDE: -340

ABOVE TESTING

BOLT TO FLANGE RESISTANCE: > 380 Ω
 NUMBER OF BOLTS: 8 off
 FLANGE TO FLANGE RESISTANCE: 62 Ω

COMMENTS / LOCATION DRAWING

Teague St Caringa St Croftly St
60" S60 54" S36



Rising Elbow RSV22298

TP
Pit

TESTED BY

RPL
→ Rect

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit**Insulated Joint Testing Details Form**Project Rafting Ground - TaringaDate 2-11-04
ISOLATION N° 13**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

54 inch

MATERIAL:

MSCL

COATING:

Tar Esbestos

VALVE No.

RV 22274**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

> 7 m Ω

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

439 k Ω

INSULATION CHECKER MODEL 702:

INU**POTENTIAL DIFFERENCE TO REFERENCE CELL:**

PROTECTED SIDE:

- 375

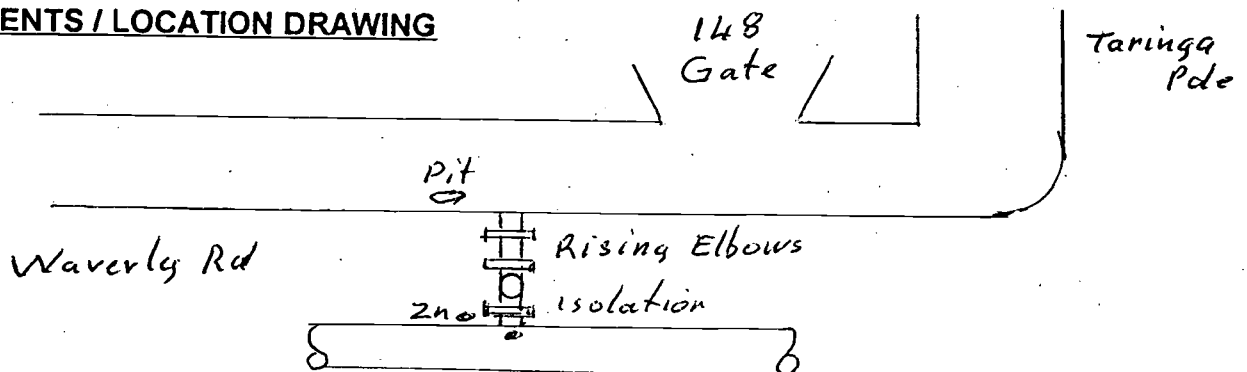
UNPROTECTED SIDE:

- 325**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

COMMENTS / LOCATION DRAWING

TESTED BY

Brisbane Water Engineering Services

CP Form No. 21

Electrical Engineering Unit

Insulated Joint Testing Details FormProject TARINGA TO ENOGGERA S48Date 5-3-03ISOLATION N° 28**DESCRIPTION**

MAINS DETAILS:

LOCATIONS:

SIZE:

MATERIAL:

COATING:

VALVE No.

S48 TARINGA TO ENOGGERAWOOD STOCK AVE TARINGA1530 mmM.S.ENAMEL COATED67**IN GROUND TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLT:

FLANGE TO FLANGE RESISTANCE:

INSULATION CHECKER MODEL 702:

POTENTIAL DIFFERENCE TO REFERENCE CELL:

PROTECTED SIDE:

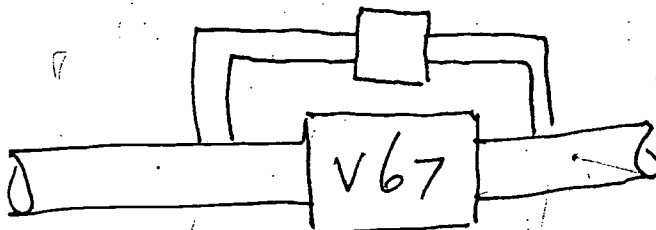
UNPROTECTED SIDE:

-211 mV-213 mV**ABOVE TESTING**

BOLT TO FLANGE RESISTANCE:

NUMBER OF BOLTS:

FLANGE TO FLANGE RESISTANCE:

BETWEEN 2 mΩ TO 5 mΩ326 Ω**COMMENTS / LOCATION DRAWING**By PASSBOLT TO FLANGE 2 mΩN° OF BOLTS 8FLANGE TO FLANGE 40 Ω

TESTED BY

L. Greaves

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project S36 & S60 Marmion. Caryna 26v 5a
 Unit Reading 28v 9a Date 8-9-05

	Reading	Test Point I. D.	Location	Swing
On	-1019	Earth.		
Off	-535	Peg.	Marmion.	-484
On	-1698		Marmion.	
Off	-900	Men	Pole no 517	-798
On	-80		Hilsdon.	
Off	-80	Men	Pole no 40935	0
On	-444		Goldsbrough	
Off	-444	Men	Pole no 28830	0
On	-275		Goldsbrough	
Off	-305	Men	Pole no 458	+30
On	-271		Woodstock	
Off	-280	Men	Pole no 13625	-9
On	-256		woolley	
Off	-256	Men	Pole no 38835	0
On	-223		Taringa.	
Off	-229	Men	Pole no 25564	-6
On	-1000	Earth	Caryna	
Off	-640	Peg.	Distribution Board	-360
On	-1069		Caryna.	
Off	-666	Earth	Park Lights	-403
On	-1569		Caryna	
Off	-1050	Earth	Park Lights	-519
On	-1732		Caryna	
Off	-550	Earth	Park Lights	-1182
On	-239		Caryna	
Off	-239	Earth.	Park Lights	0
On	-160		Pole no 379545.	
Off	-200	Men	Jenkinson St	+40
On	-580			
Off	-420	Men	Jenkinson St.	-160

* See Bleed Sheet

TESTED BY P SMYTH

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject S36 + S60Date 8-9-05Bleed Location Goldsborough St.CPB No. 115FOREIGN STRUCTURE OWNER: EnergexF.S. LOCATION: Goldsborough StF.S. IDENTIFICATION: Men Pole no 458.**REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:**REFERENCE TYPE: CuSO₄POTENTIAL OFF: -350 ON: 392 SW: 42BLEED TYPE: ZN Reference CellBLEED MATERIAL: ZN

BLEED WEIGHT: _____

BLEED O/C POTENTIAL: -1065 mVBLEED CURRENT OFF: 1 ma ON: 1 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	
-390	-735	-345	-735	-721	+14	-331

FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) Yes.IDENTIFICATION TAG INSTALLED? (Y/N) Yes CPB115**COMMENTS:**INSTALLED / TESTED BY P Smith

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject S 36 & S 60Date 8-8-05Bleed Location Jenkson StCPB No. 116FOREIGN STRUCTURE OWNER: EnergexF.S. LOCATION: Jenkson St Green HillF.S. IDENTIFICATION: Men 379545**REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:**REFERENCE TYPE: CuSO₄POTENTIAL OFF: -209 ON: 169 SW: +40BLEED TYPE: ZN Reference CellBLEED MATERIAL: ZN

BLEED WEIGHT: _____

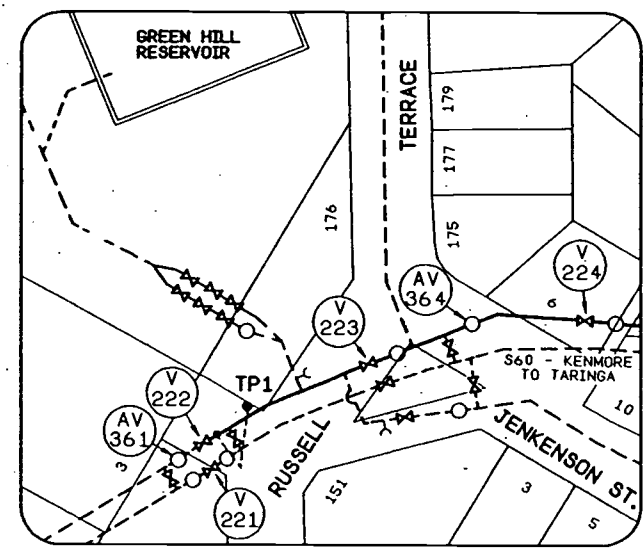
BLEED O/C POTENTIAL: -1080 mVBLEED CURRENT OFF: 1 mA ON: 1 mA**REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:**

Bond Off (Rectifier Off)			Bleed On			Resultant Swing
Bleed Off	Bleed On	Swing	Bond Off	Bond On	Swing	
-209	-475	-266	-475	-438	+37	-229

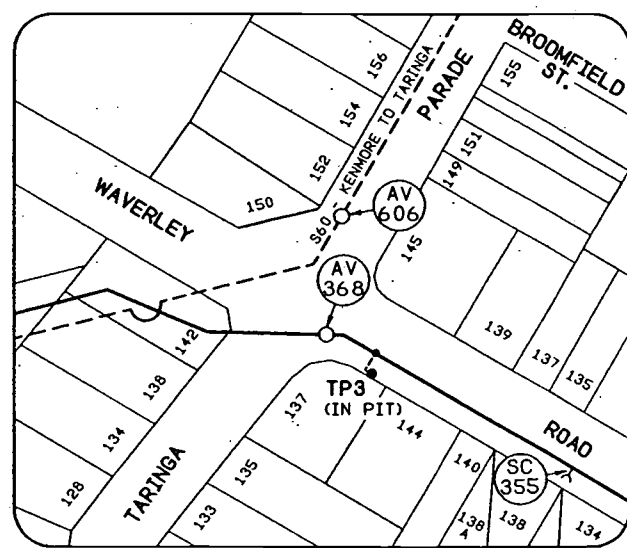
FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) YesIDENTIFICATION TAG INSTALLED? (Y/N) CPB 116**COMMENTS:**INSTALLED / TESTED BY P. Smyth



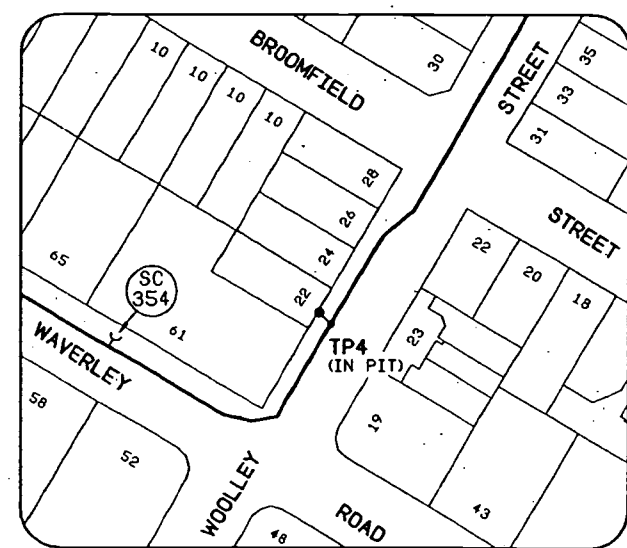
LOCALITY PLAN



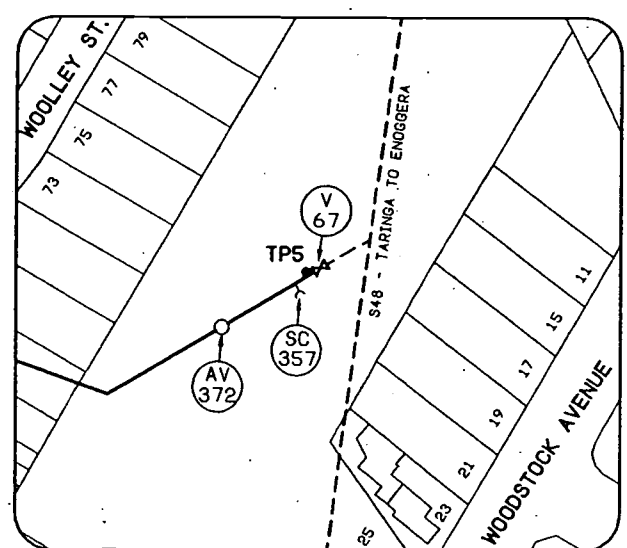
TEST POINT NO.1




TEST POINT NO.3

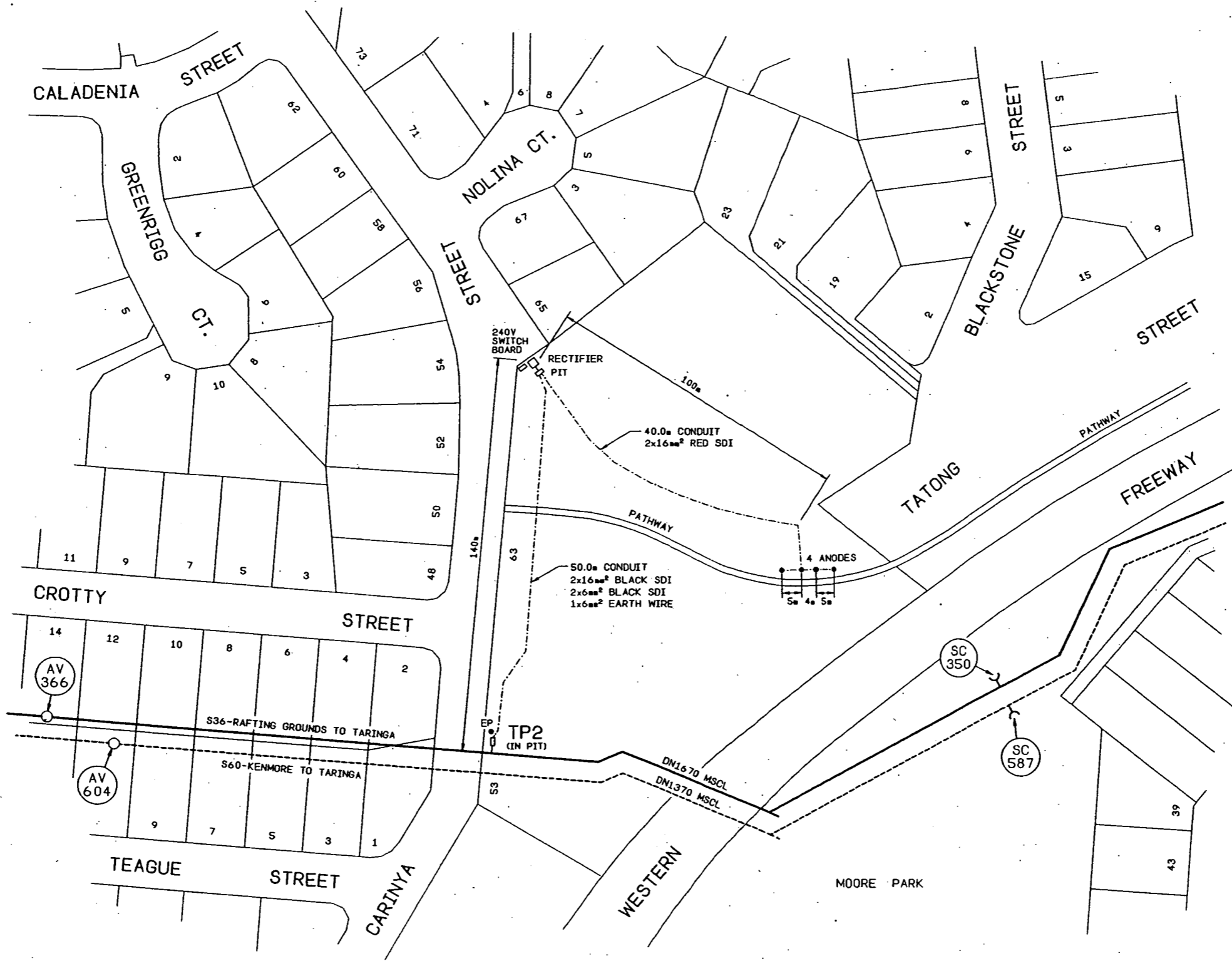


TEST POINT NO.4



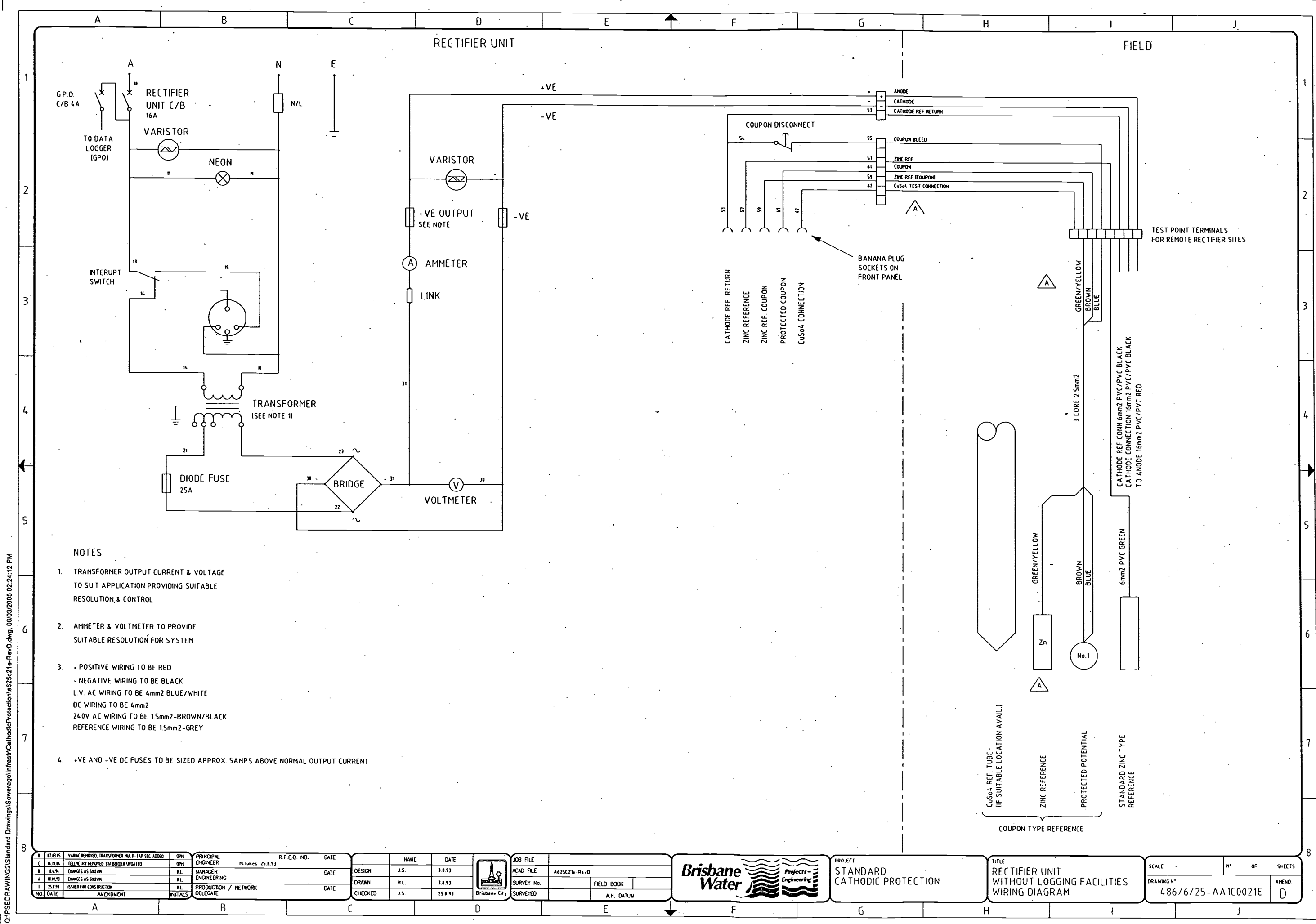
TEST POINT NO.5

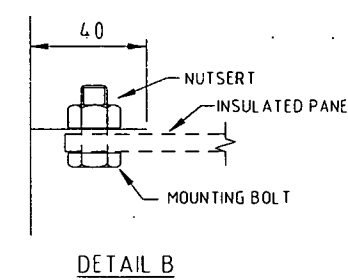
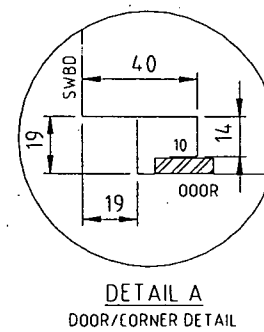
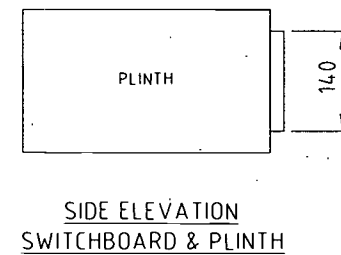
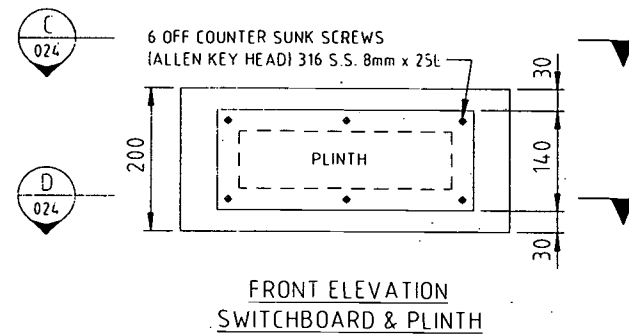
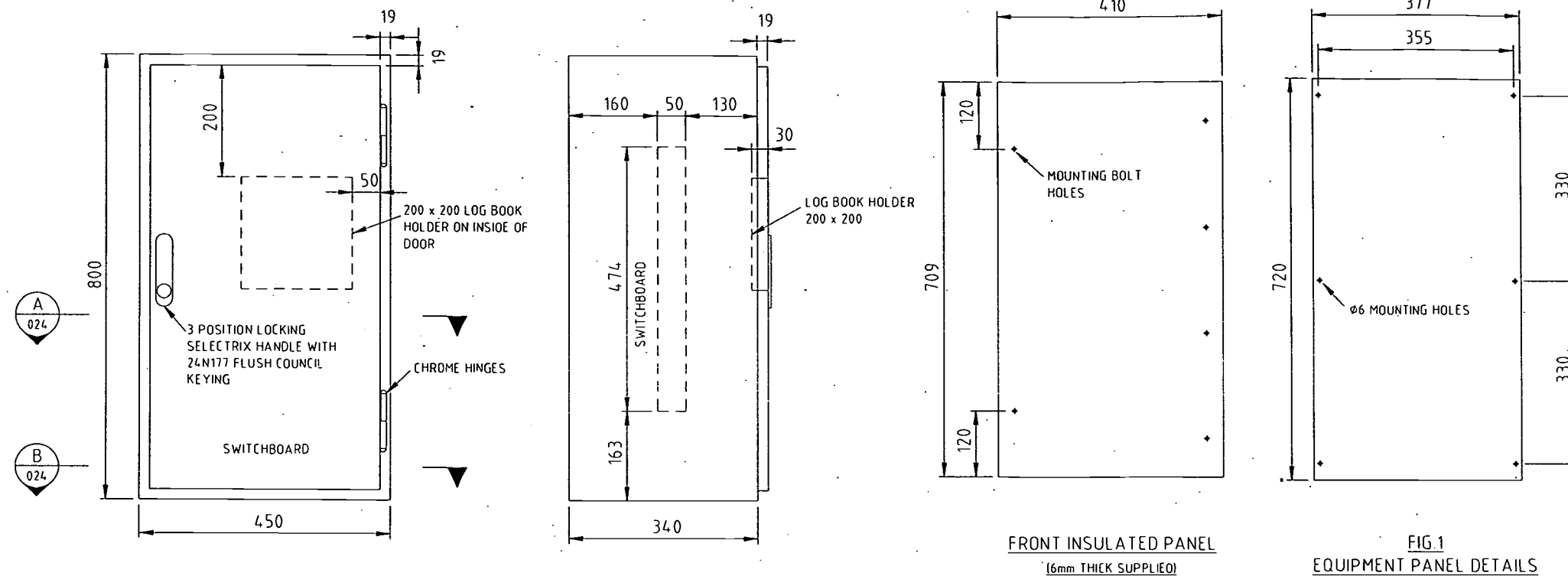
				FUNDING		DRAFTED	B.O.B NOV. 2005						PROJECT	TITLE	SHEET No. 1 OF 2 SHEETS		
				DESIGN WQ No.	PA000820	DRAFTING CHECK		DESIGN	RPEQ No.	DATE	PRINCIPAL DESIGN MANAGER		DATE	S36-RAFTING GROUNDS TO TARINGA	CATHODIC PROTECTION TEST POINT LOCATIONS	BRISBANE WATER DRAWING N°	AMEND.
				CONSTRUCTION WQ No.		CAD FILE	\210242201.DTA								TEST POINT NOS. 1 AND 3 TO 5		
NO	DATE	AMENDMENT		DRAFTED	APPROVED	FUNDING BY BCC (X) EXTERNAL ()	BCC FILE No.	DESIGN CHECK	RPEQ No.	DATE	PRODUCTION/NETWORK DELEGATE		DATE			2/10.2422-01	P.



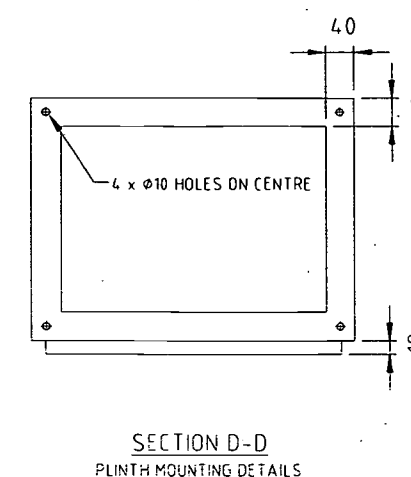
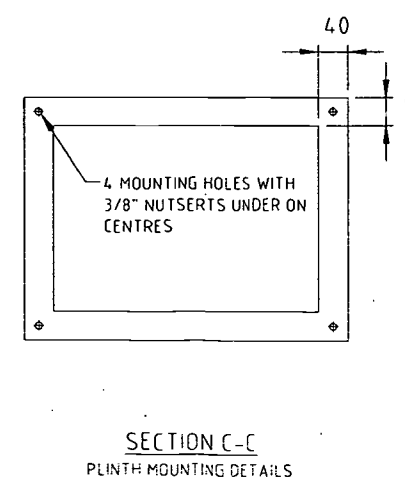
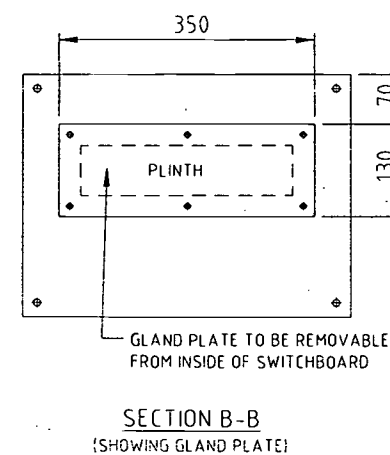
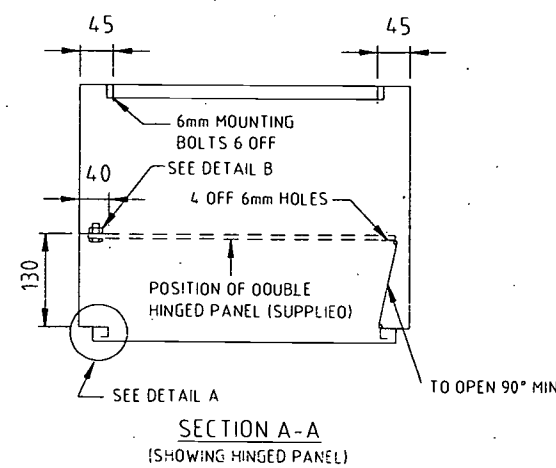
TEST POINT NO.2 AND ANODE BED DETAILS

NO.		DATE		AMENDMENT		DRAFTED FROM		FUNDING		DRAFTED		B.O.B NOV. 2005		DESIGN		RPEQ. No.		DATE		PRINCIPAL DESIGN MANAGER		DATE		PROJECT		TITLE		SHEET No. 2 OF 2 SHEETS		BRISBANE WATER DRAWING N°		AMEND.					
								DESIGN W.D. No. PA000820		DRAFTING CHECK				CONSTRUCTION W.D. No.		CAD FILE		V210242202.DTA		DESIGN CHECK		RPEQ. No.		DATE		PRODUCTION/NETWORK DELEGATE		DATE		S36-RAFTING GROUNDS TO TARINGA		CATHODIC PROTECTION TEST POINT NO. 2 AND ANODE BED DETAILS		2/10.2422-02		P	
								FUNDED BY BCC (X) EXTERNAL ()		BCC FILE No.																											





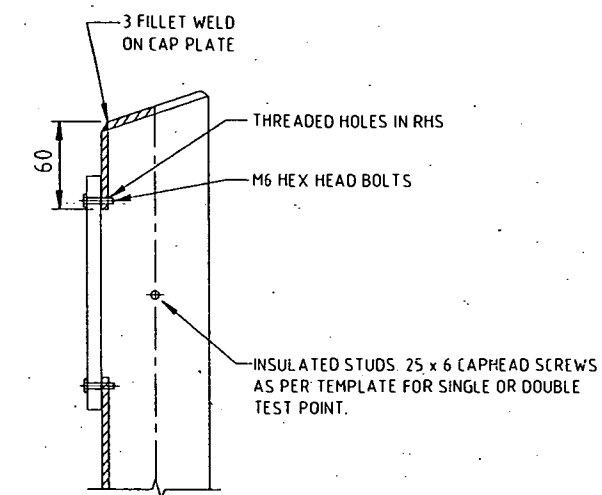
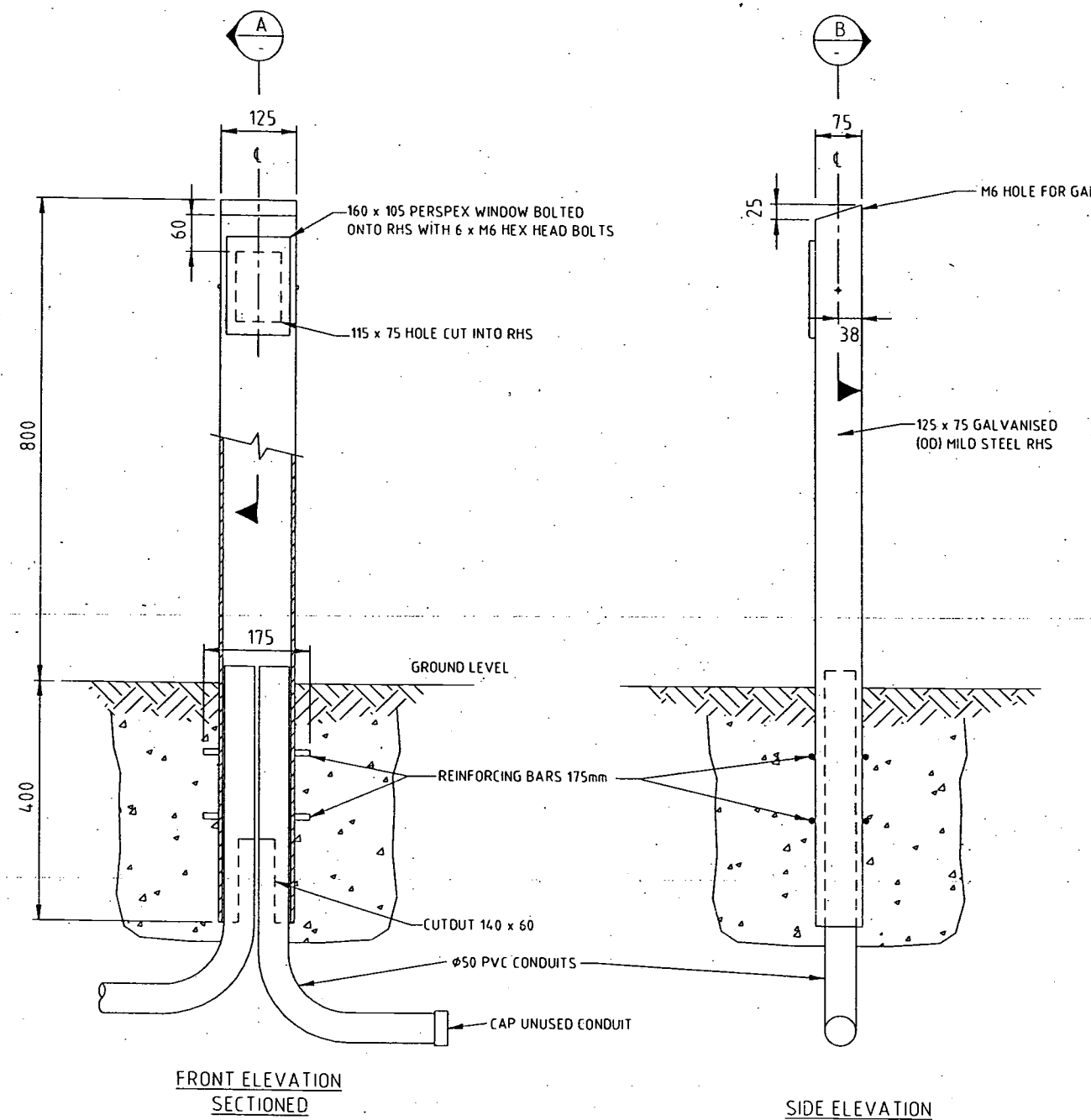
NUMBER OF SWITCHBOARDS REQUIRED	
NUMBER OF PLINTHS REQUIRED	



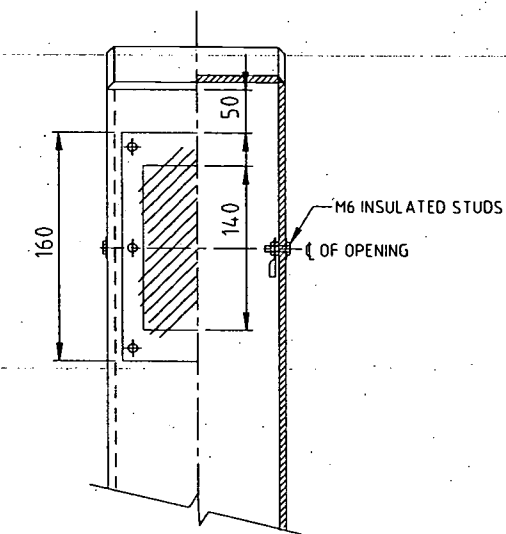
C 9-97 NOT REVISION		H1 DIRECTOR OF P.D. & P.S.		DATE		DESIGN NAME DATE		JOB FILE		ACAD FILE 22C0024-Rev-C		SHEET SIZE A1		PROJECT CATHODIC PROTECTION		TITLE STANDARD SWITCHBOARD CABINET		SCALE NTS		N° 1 OF 1 SHEETS	
B 11-95 MODIFIED		DLP ENGINEER IN CHARGE		DATE		DRAWN DLP		SURVEY No.		FIELD BOOK		A.H. DATUM									
A 5-97 ISSUED FOR APPROVAL		DLP SUPERVISING ENGINEER		R.P.E.O. NO.		CHECKED		SURVEYED													
NO. DATE		AMENDMENT		INITIALS																	

NOTES






1. HOT DIP GALVANISE AFTER FABRICATION.



SECTION A-A



SECTION B-B

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