



25 Bunya Street

Eagle Farm Q

4009

Ph. (07) 3403 8888

Fx. (07) 3403 1898

22nd May 2003

OPERATING MANUAL FOR:

ASPLEY to SPARKS HILL TRUNK MAIN S41 TRUNK MAINS

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER SYSTEM SERVICES

MANUAL CONTENTS

(1.0)	Introduction
(2.0)	Corrosion and Cathodic Protection
(3.0)	Mains Details
(4.0)	Cathodic Protection
(4.1)	Type of System
(4.2)	Rectifier
(4.3)	Cathode
(4.4)	Anodes
(4.5)	Test Points
(4.6)	Associated Drawings
(4.7)	Associated Standards
(4.8)	Government Regulations
(5.0)	Performed Testing
(6.0)	Conclusion
(7.0)	Maintenance

DRAWINGS

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

(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: Enamel Coated.

Length: Appox 3.7 Km.

Location: From Valves 712,713,714 and 715 Aspley Pump Station
to Valves 783,784,633.634 and635 Sparks Hill Reservoir.

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, (Melacula Green) Maundrell Tce and has a 240V supply from Energex pole No.48307 in Maundrell Tce.

(4.3) Cathode: The cathode point is located on the 1060 mm dia mains adjacent to the drain crossing near the corner of Maundrell Tce. and Kinnerton Street Chermside West. 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 90 metres from the trunk mains, in a vertical bed 5 metres deep, in the park (Melacula Green) adjacent to the drain. 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 Bed Locations S41 Trunk Main.	-2/10.2112-01

(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.

22nd May, 2003.

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.

22nd May. 2003.

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.

22nd May, 2003.

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



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DRAWINGS

486/6/25-AA1C0021E

Standard Rectifier Wiring Diagram

(No Number)

Bimonthly Maintenance Program

(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.

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Length: Appox 3.7 Km.

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Drawings:

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(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
 Bed Locations S41 Trunk Main. -2/10.2112-01

(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.
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(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.

22nd May, 2003.

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.

22nd May, 2003.

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.

22nd May, 2003.

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:

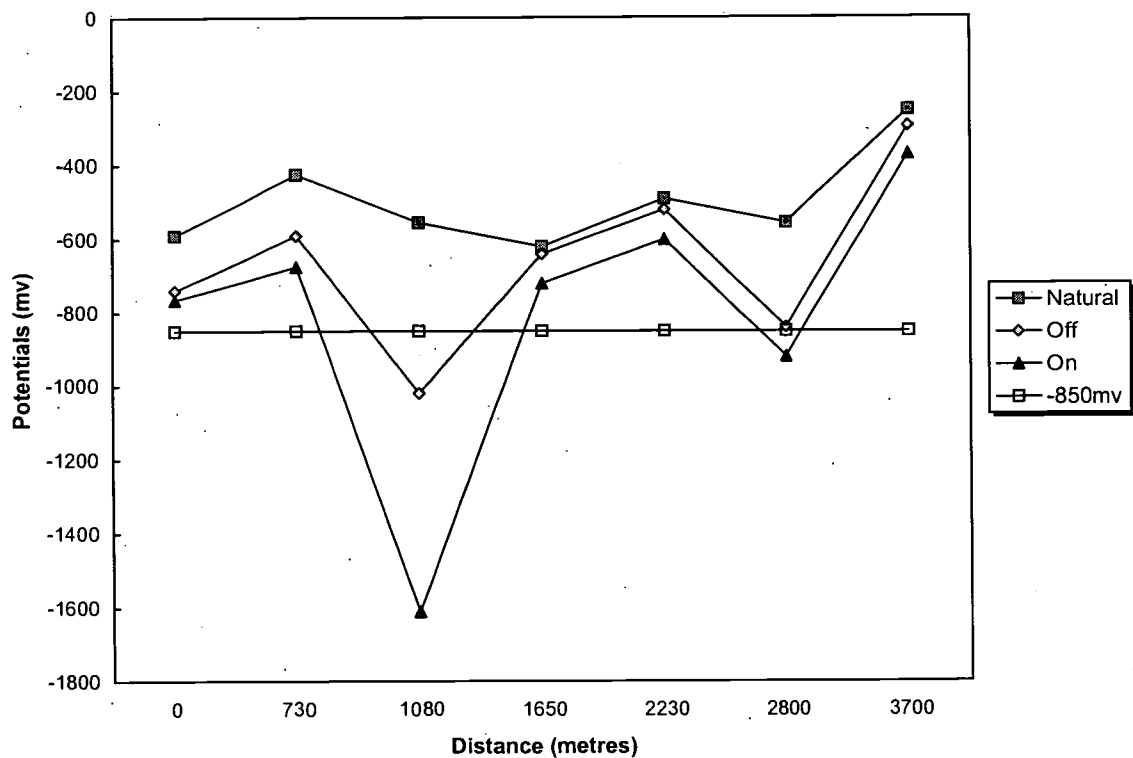
- 1/ Identify system.
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- 13/ Check plans are correctly drawn and modify if necessary.
- 14/ Remove and inspect anodes.
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- 16/ Pipecamp structure if applicable.
- 17/ Apply to reregister system if applicable

Brisbane Water

CP Form No. 23

Network Services**Cathodic Protection System Potential Recording Form****Project** S41 Trunk Main.Aspley to Sparkes Hill**Date** 12th June 2003

Test Point number	Distances to T.P. (metres)	Potentials to CuSO4			(mV)
		Natural (mV)	Off (mV)	On (mV)	
1	0	-590	-740	-765	-850
2	730	-425	-590	-675	-850
3	1080	-555	-1020	-1610	-850
4	1650	-620	-640	-720	-850
5	2230	-490	-520	-600	-850
6	2800	-556	-840	-920	-850
7	3700	-251	-295	-370	-850

Graph of potentials vs pipelength

Brisbane Water

Network Services

Cathodic Protection System Loop Resistance

Maundrell Tce. Rectifier. CPS179

Date: 12th June 2003

Cathodic Protection System:

Aspley Res to Sparkes Hill Res Trunk Main S41

System Operating Volts:

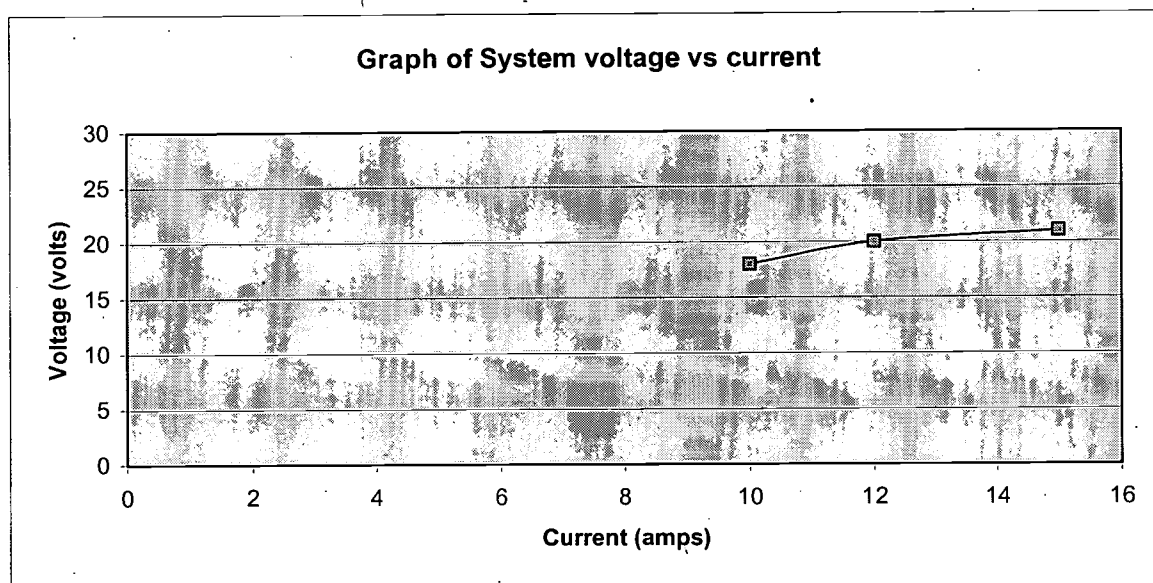
21

System Operating amps:

15

Test Voltage:		Test Current:	
(volts)		(amps)	
18		10	
20		12	
21		15	

Loop Resistance (ohms)
1.4

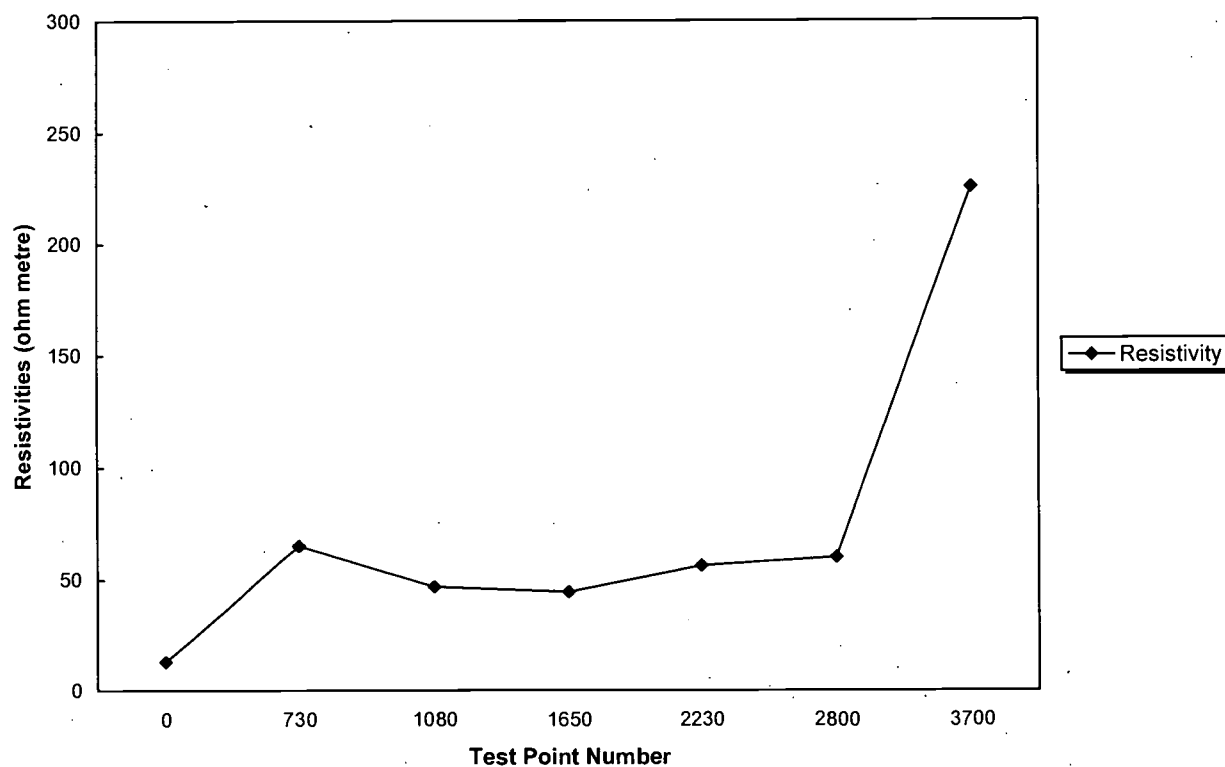


Brisbane Water

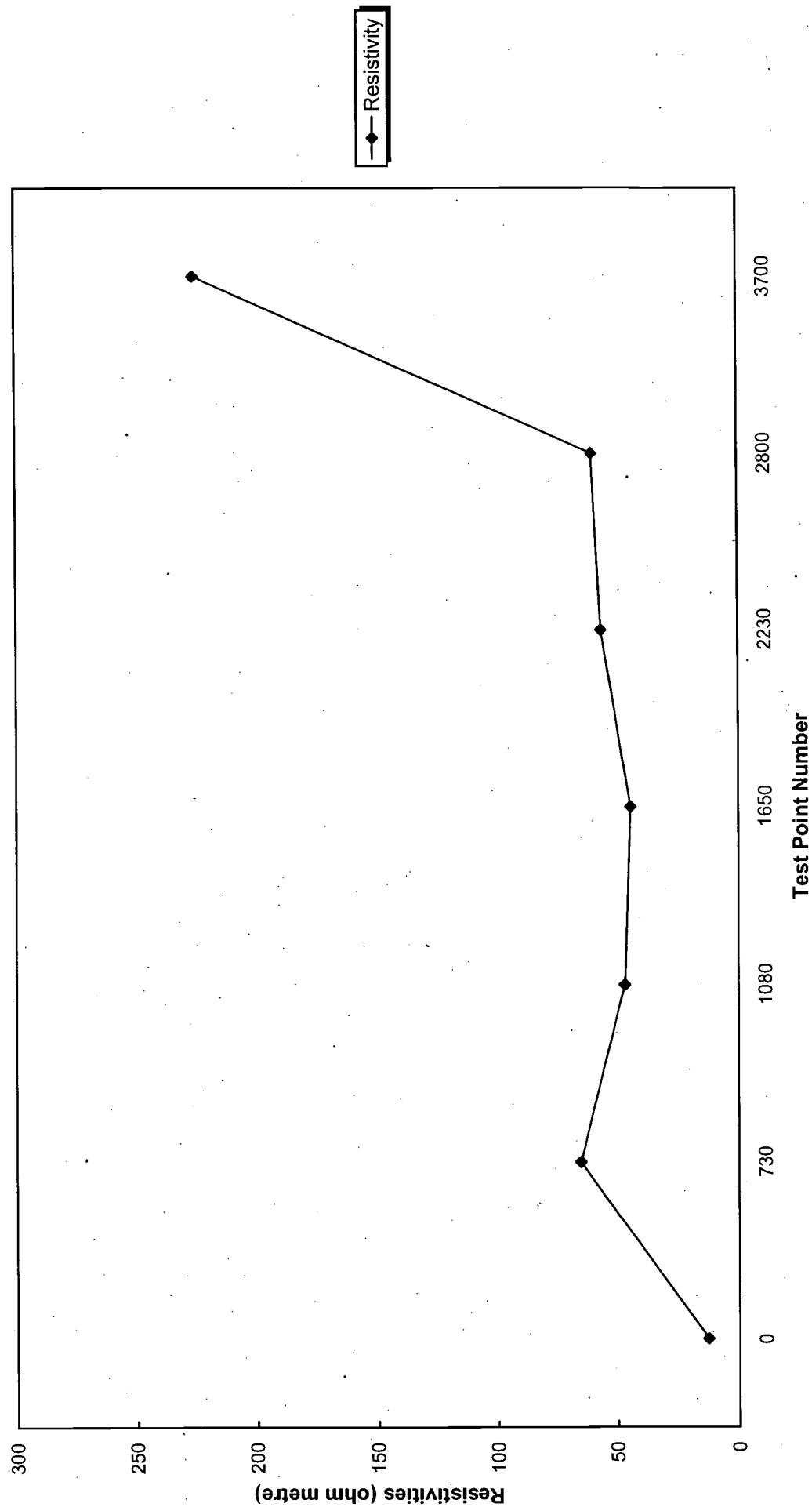
CP Form No. 23

Network Services**Cathodic Protection System Resistivities Recording Form****Project** S41 Trunk Main.Aspley Reservoir to Sparks Hill Reserv**Date** 12th June 2003

Test Point number	Distances to T.P. (metres)	Resistivities at 2 metres ohm metres
1	0	12.8
2	730	65.3
3	1080	46.9
4	1650	44.6
5	2230	56.5
6	2800	60.3
7	3700	226

Graph of resistivities vs pipelength

Graph of resistivities vs pipelength



Resistivity

Please note:
This application must be
accompanied by a fee of
\$200.00

Electricity Act 1994 (Queensland) (160 and 265)
Electricity Regulation 1994 (186 to 210)

Office Use Only:
Fees Paid:
Receipt No:

APPLICATION TO REGISTER A REGISTRABLE CATHODIC PROTECTION SYSTEM (Note 1)

I/We, as system owner/s, hereby make application to register the registrable Cathodic Protection System described below:

Name and postal address of system owner:	Brisbane City Council / Brisbane Water. 5 Bunya Street. Eagle Farm. 4009.	
Contact Name:		Contact Phone:
Name and postal address of authorised agent of system owner:	Brisbane Water Engineering Services 5 Bunya Street Eagle Farm. 4009 Telephone No: 07...../34031849.....	
Contact Name:	Jeff Say	Contact Phone: 07-34031854
Type of application: (tick as appropriate)	<input checked="" type="checkbox"/> New system (Note 2) <input type="checkbox"/> Alteration to an existing system, Registration No:.....(Note 3) <input type="checkbox"/> Existing system, Registration No:.....	
Location of application: (Note 4)	Maundrell Tce Chermside West. 4032 From Aspley Water Pumping Station to Sparkes Hill Reservoir.	
Structure to be protected:	1200mm Dia Mild Steel Trunk Main.	
Maximum operating current: ...12.00 A...Amperes DC	Maximum operating voltage (note 5).....Volts	

I/We, being the owner/s 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 4 of Chapter 3 of Electricity Regulation 1994:
- (ii) the tests pursuant to section 190 of Electricity Regulation 1994 were based on the maximum operating current stated in this Application;
- (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 (i); and
- (iv) any necessary interference mitigation measures for foreign structures (in case where the system is currently registered) have been tested and are operating satisfactorily.

Signature of System owner:..... Date:...../...../.....

**Application should be forwarded with registration fee of \$200.00 to: Electrical Safety Office,
Department of Mines and Energy, GPO Box 995, Spring Hill Q 4004**

NOTES:

- 1(a) A Registrable Cathodic Protection System is an impressed current system the converter of which is capable of delivering a current greater than 0.25A.
- (b) A separate application is required for each Registrable Cathodic Protection System.
- 2 The application with respect to a new system is to be accompanied by a plan indicating full particulars about the system including the names of the owners and location of underground and immersed foreign structures.
- 3 Application submitted pursuant to section 209 of the Electrical Regulation 1994.
- 4 Sufficient details are required to correctly identify the geographical location of the system.
- 5 The maximum operating voltage is only required for a system operating with an anode (or anodes) immersed in water or marine environment.

For such systems:

- Refer section 197 of Electricity Regulation 1994
- The application is to be accompanied by the "Technical Schedule Relating to a Registrable Cathodic Protection Installation in Water or a Marine Environment"

Note: There are three bleeds on the Maundrell Tce. System.

Brisbane Water identification No.CPB 91 is at Energex Pole No 36779 Appleby Rd. Stafford.

Brisbane Water identification No.CPB 92 is at Energex Pole No 11192 Maundrell Tce Chermside West

Brisbane Water identification No.CPB 93 is at Energex Pole No 25207 Maundrell Tce Chermside West



QUEENSLAND GOVERNMENT

Electricity Act 1994

NOTICE OF REGISTRATION OF CATHODIC PROTECTION SYSTEM**Registration No: 3292****Date of Registration:** 17 September 2001 **Expiry Date:** 17 September 2006

The cathodic protection system referred to below has been registered for a term of five years, and the conditions of registration shown hereunder shall apply in addition to the provisions of the Electricity Act 1994 and Electricity Regulation 1994.

Name and Postal Address of System Owner	Brisbane City Council/Brisbane Water 5 Bunya Street EAGLE FARM Q 4009
Location of System	Maundrell Tce (From Aspley Water Pumping Station to Sparkes Hill Reservoir) CHERMSIDE WEST - Post Code: 4032
Structure to be Protected	1200mm Dia Mild Steel Trunk Main

CONDITIONS OF REGISTRATION**Maximum Operating Current:** 12.00 Amperes DC
Regulator

1819101

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject Aspley Sparkes HillDate 7-7-01Bleed Location Appleby RdCPB No. 91FOREIGN STRUCTURE OWNER: EnergexF.S. LOCATION: Appleby RdF.S. IDENTIFICATION: Men Pole no 36719**REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:**REFERENCE TYPE: CU504POTENTIAL OFF: -238 ON: -200 SW: +38BLEED TYPE: ZINBLEED MATERIAL: ZIN

BLEED WEIGHT: _____

BLEED O/C POTENTIAL: -995 mVBLEED CURRENT OFF: 4mA ON: 4mA**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	
<u>-238</u>	<u>-248</u>	<u>-10</u>	<u>-248</u>	<u>-243</u>	<u>+3</u>	<u>-7</u>

FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) YesIDENTIFICATION TAG INSTALLED? (Y/N) yes**COMMENTS:**

INSTRUMENT

INSTALLED / TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject Aspley - Sparkes HillDate 7-7-01Bleed Location Maunderell tceCPB No. 92FOREIGN STRUCTURE OWNER: EnergexF.S. LOCATION: Maunderell tceF.S. IDENTIFICATION: Mem Pole No 11192**REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:**REFERENCE TYPE: CusomPOTENTIAL OFF: -308 ON: -260 SW: +48BLEED TYPE: ZNBLEED MATERIAL: ZN

BLEED WEIGHT: _____

BLEED O/C POTENTIAL: -1010 mVBLEED CURRENT OFF: 5mA ON: 5mA**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	
<u>-308</u>	<u>-320</u>	<u>-12</u>	<u>-320</u>	<u>-315</u>	<u>+5</u>	<u>-7</u>

FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) YesIDENTIFICATION TAG INSTALLED? (Y/N) yes**COMMENTS:**Cusom
INSTRUMENT nINSTALLED / TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details FormProject W. Phey - Sparkes HillDate 7-7-01Bleed Location Mundrell teeCPB No. 93FOREIGN STRUCTURE OWNER: EnergexF.S. LOCATION: Mundrell teeF.S. IDENTIFICATION: Men Pole no 25207**REFERENCE POTENTIALS TO F.S. PRIOR TO BLEED CONNECTION:**REFERENCE TYPE: CuSO₄POTENTIAL OFF: -400 ON: -370 SW: +30

BLEED TYPE: _____

BLEED MATERIAL: ZN

BLEED WEIGHT: _____

BLEED O/C POTENTIAL: -1015mVBLEED CURRENT OFF: 2mA ON: 2mA**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	
<u>-400</u>	<u>-415</u>	<u>-15</u>	<u>-415</u>	<u>-395</u>	<u>+20</u>	<u>+5</u>

FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) YesIDENTIFICATION TAG INSTALLED? (Y/N) Yes**COMMENTS:**CuSO₄
INSTRUMENT 12INSTALLED / TESTED BY P. Smyth

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection Interference Results Form

[illegible]

Brisbane Water Engineering Services

CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Aspley - Sparkes HillUnit Reading 25V 12thDate 7-7-01

	Reading	Test Point I.D.	Location	Swing
On	-192		Stafford Rd.	
Off	-198	Men	Pole 27722	+6
On	-305			
Off	-305	Men	Pole 27776	0
On	-230			
Off	-230	Men	Pole 22282	0
On	-352			
Off	-356	Men	Pole 4371	+4
On	-322			
Off	-320	Men	Pole 24482	+8
On	-236			
Off	-240	Men	Pole 64301	+4
On	-400			
Off	-405	Men	Pole 10141	+5
On	-375			
Off	-380	Men	Pole 30178	+5
On	-709			
Off	-715	Men	Pole 709720	+6
On	-455			
Off	-459	Men	Pole 64303	+4
On	-465			
Off	-471	Men	Pole 64304	+6
On	-297			
Off	-130	Men	Pole 33780	+3
On	-296		Cockle St	
Off	-296	Prot	Station TP. 0	
On	-328			
Off	-316	UnProt	" "	-12
On				
Off				

TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Aspley - Sparkes Hill Unit Reading 25V 12a Date 7-7-01

	Reading	Test Point I. D.	Location	Swing
On	+322		Maundrell tee	
Off	+330	Men	Pole no 36775	+8
On	-267			
Off	-273	Men	Pole no 18450	+6
On	-255			
Off	-255	Men	Pole no 3677	0
On	-435			
Off	-435	Light	Pole 55512	0
On	-472			
Off	-480	Light	Pole 55487	+8
On	-382			
Off	-389	Light	Pole 55510	+7
On	-330			
Off	-337	Men	Pole 33921	+7
On	-373			
Off	-381	Men	Pole 13524	+8
On	-277			
Off	-284	Men	Pole 50085	+7
On	-362			
Off	-370	Men	Pole 40195	+8
On	-183			
Off	-190	Men	Pole 43293	+7
On	-355			
Off	-362	Men	Pole 11189	+7
On	-370			
Off	-400	Men	Pole 2520 7	+30 *
On	-260			
Off	-308	Men	Pole 11192	+48 *
On	-394			
Off	-400	Men	Pole 11194	+6

TESTED BY P. Smyth

Brisbane Water Engineering Services

CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Aspley - Sparkes Hill Unit Reading 2.5v 12c Date 7-7-01

	Reading	Test Point I. D.	Location	Swing
On	-486		Maunderell rce	
Off	-472	Men	Pole no 34635	-14
On	-560			
Off	-500	Men	Pole no 34640	-60
On	-313			
Off	-309	Men	Pole no 34666	-4
On	-544			
Off	-519	Light	Pole no 495210	-25
On	-568		Appleby Rd.	
Off	-525	Light	Pole no 495209	+7
On	-340			
Off	-346	Men	Pole no 50513	+6
On	-570			
Off	-579	Light	Pole no 495208	+9
On	-333			
Off	-340	Men	Pole no 36782	+7
On	-420			
Off	-422	Men	Pole no 32214	+2
On	-340			
Off	-349	Men	Pole no X 1995	+9
On	-200			
Off	-238	Men	Pole no 36779	+38 *
On	-227			
Off	-170	Men	Pole no 37011	-57
On	-320			
Off	-328	Men	Pole no 40594	+8
On	-433			
Off	-433	Light	Traffic Light Pole	0
On	-356			
Off	-320	Men	Pole no 64492	-36

TESTED BY P. SMYTH

Brisbane Water Engineering Services

CP Form No. 27

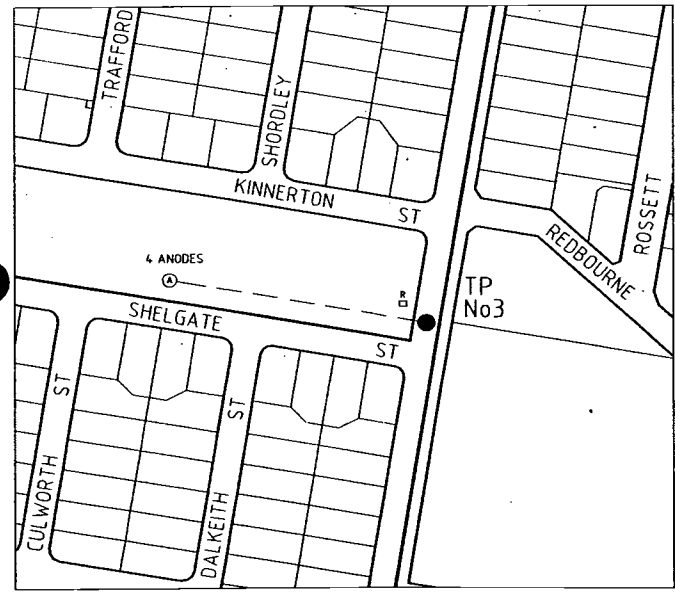
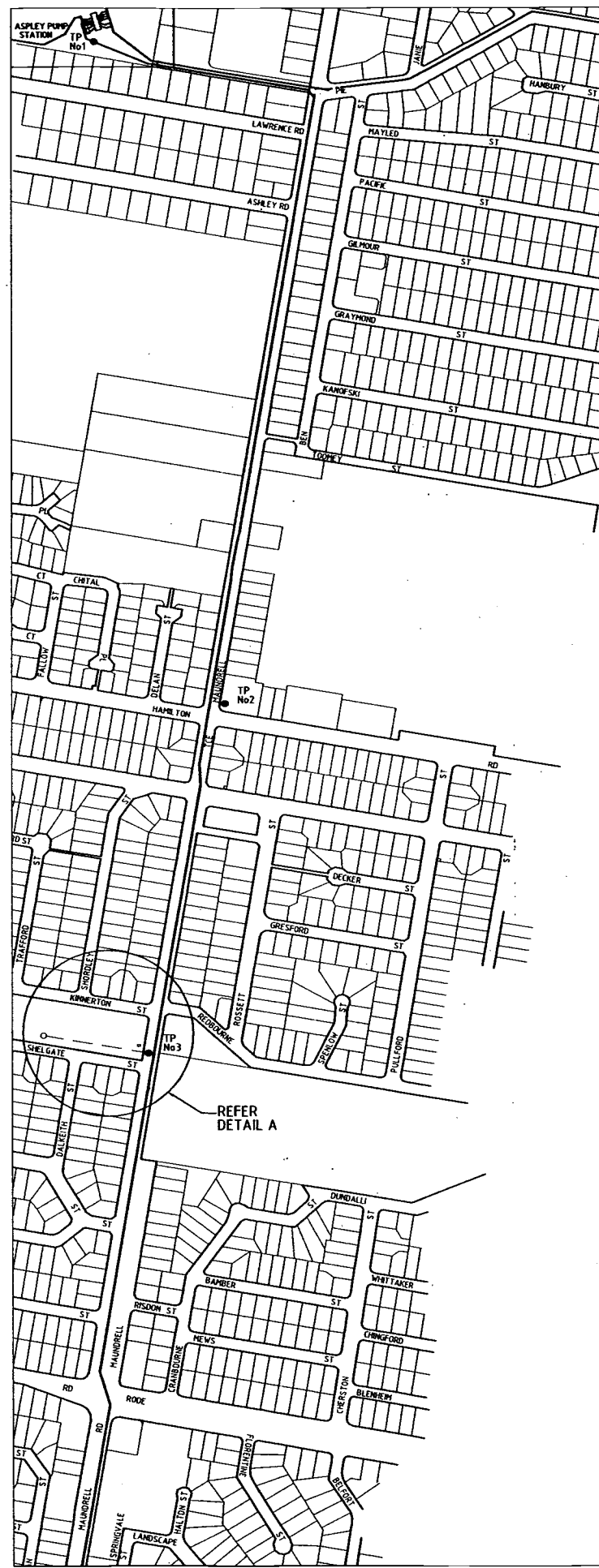
Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project ASpley - SParkes Hill Unit Reading 25v 12a Date 7-7-01

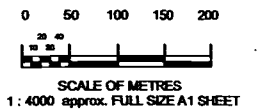
	Reading	Test Point I. D.	Location	Swing
			<u>Manned</u>	
On	-462			
Off	-471	Men	Pole 25203	+9
On	-363			
Off	-369	Men	Pole 22603	+6
On	-333			
Off	-340	Men	Pole 554592	+7
On	-545			
Off	-525	Light	Pole 495213	-20
On	-490			
Off	-460	Men	Pole 34630	-30
On	-480			
Off	-456	Men	Pole 34451	-24
On	-117			
Off	-20	Men	Pole 34633	-97
On	-480			
Off	-488	Men	Pole 33538	+8
On	-370			
Off	-377	Men	Pole 33539	+7
On	-390			
Off	-398	Men	Pole 13520	+8
On	-430			
Off	-438	Men	Pole 10090	+8
On	-784		Reservoir.	
Off	-746	Pipe 54		-38
On	-857			
Off	-845	Pipe 48		-12
On	-801			
Off	-776	Pipe 370		-25
On				
Off				

TESTED BY P. Smyth

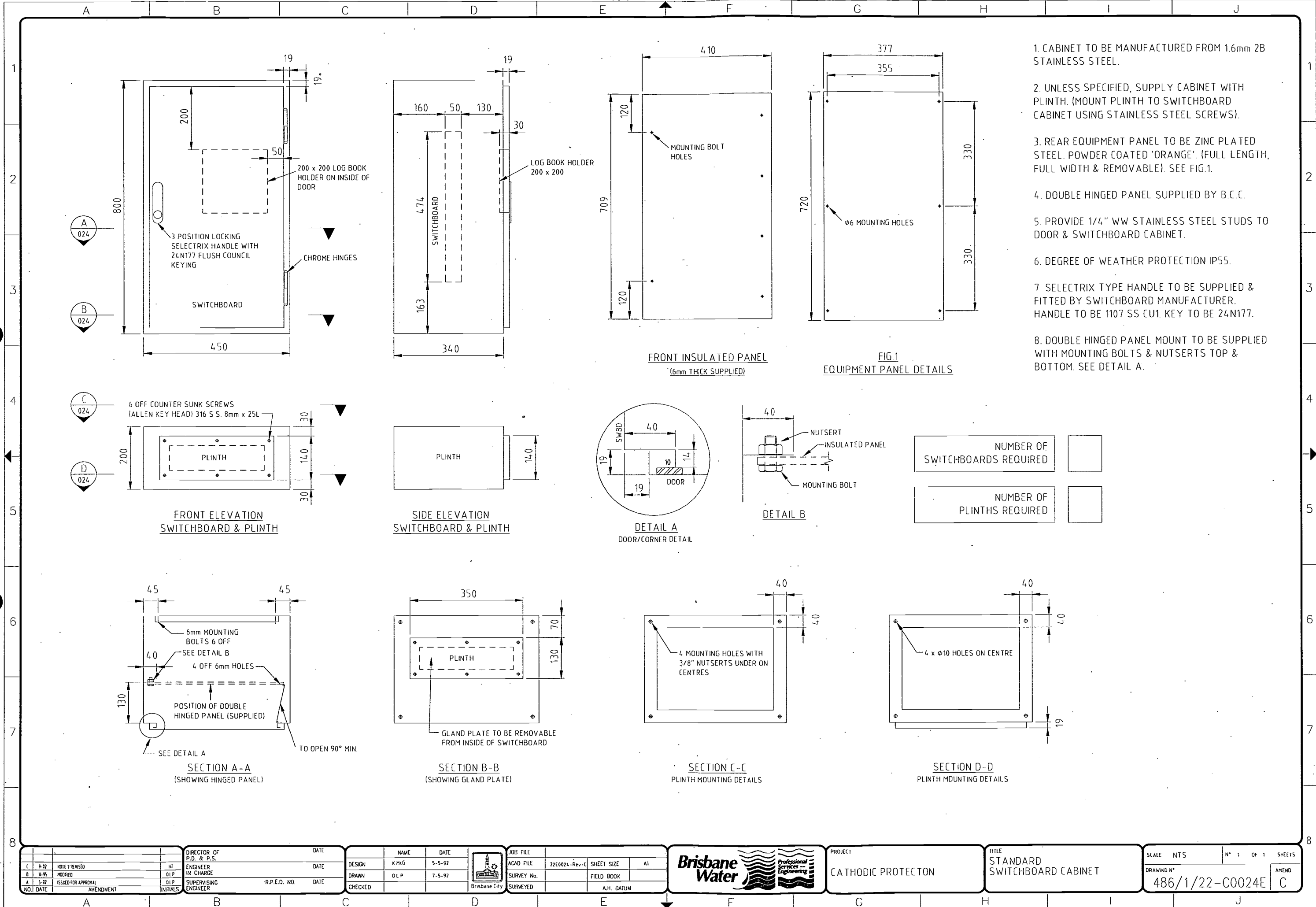


DETAIL A
SCALE: 1:2000 AT


ASSET REGISTER	
TICK APPROPRIATE BOX	
BCC FUNDED	<input checked="" type="checkbox"/> DEVELOPER FUNDED
STATE GOVT. FUNDED	FED. GOVT. FUNDED
AS CONSTRUCTED	
PLOTTED N. KROMAN	DATE 10/02
CHECKED	DATE



NO. DATE		AMENDMENT	INITIAL	DIRECTOR OF PD & PS	DATE	SUPERVISING ENGINEER	R.P.E.Q. NO.	DATE	DESIGN	DESIGN CHECK	DRAWN	N.K.	OCT 02		PROJECT SPARKES HILL RESERVOIR TO ASPLEY S41 TRUNK WATER MAIN	TITLE CATHODIC PROTECTION TEST POINT & ANODE BED LOCATIONS	SCALE AS SHOWN DRAWING NO. 2/10.2112-01	A.H. DATUM N° 1 OF 1 SHEETS AMEND. 0
NO. DATE		AMENDMENT	INITIAL	ENGINEER IN CHARGE	DATE	CADD FILE	210211201	DATE	DESIGN	DESIGN CHECK	DRAWN	N.K.	OCT 02					
NO. DATE		AMENDMENT	INITIAL	SUPERVISING ENGINEER	DATE	SURVEYED	NIL	DATE	DESIGN	DESIGN CHECK	DRAFTING CHECK	H.W.	NOV 02					
NO. DATE		AMENDMENT	INITIAL		DATE	SURVEY NO.	NIL	DATE	DESIGN	DESIGN CHECK	DRAFTING CHECK	H.W.	NOV 02					
NO. DATE		AMENDMENT	INITIAL		DATE	FIELD BOOK	NIL	DATE	DESIGN	DESIGN CHECK	DRAFTING CHECK	H.W.	NOV 02					

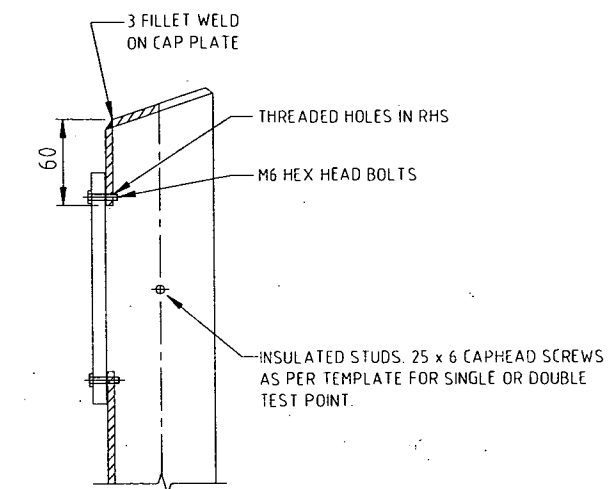
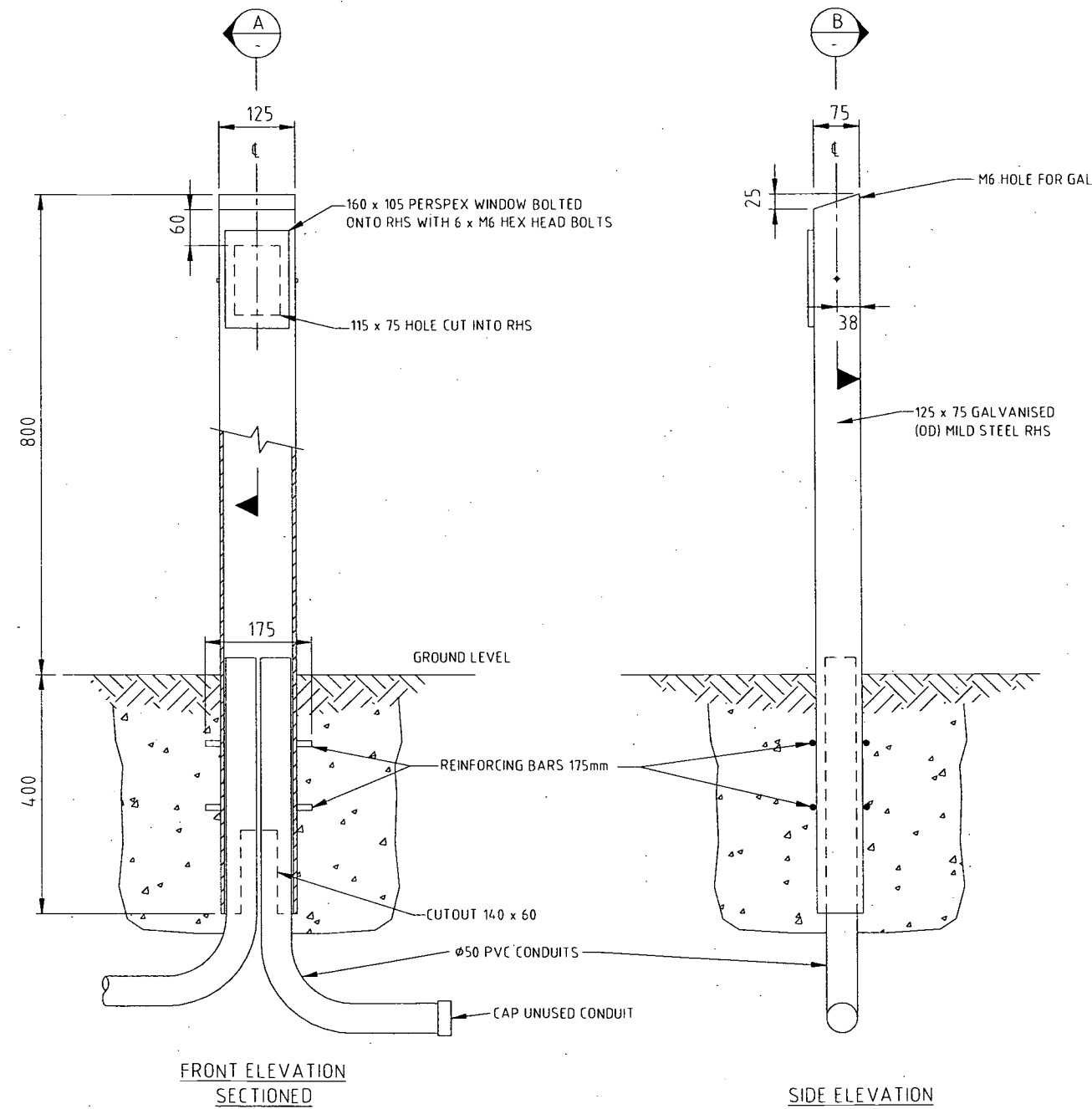


1. CABINET TO BE MANUFACTURED FROM 1.6mm 2B STAINLESS STEEL.
2. UNLESS SPECIFIED, SUPPLY CABINET WITH PLINTH. (MOUNT PLINTH TO SWITCHBOARD CABINET USING STAINLESS STEEL SCREWS).
3. REAR EQUIPMENT PANEL TO BE ZINC PLATED STEEL. POWDER COATED 'ORANGE'. (FULL LENGTH, FULL WIDTH & REMOVABLE). SEE FIG.1.
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.

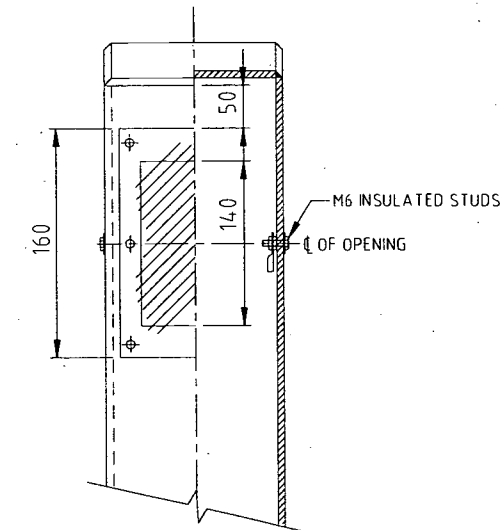
C		9-02	NOTE 1 REVISED	HI	DIRECTOR OF P.D. & P.S.	DATE	DESIGN	K.M.G.	5-5-92	JOB FILE	ACAD FILE	22C0024-Rev-C	SHEET SIZE	A1		PROJECT	CATHODIC PROTECTION	TITLE	STANDARD SWITCHBOARD CABINET	SCALE	NTS	N° 1 OF 1 SHEETS	DRAWING N°	486/1/22-C0024E	AMEND	C
B		11-95	MODIFIED	DLP	ENGINEER IN CHARGE	DATE	DRAWN	D.L.P.	7-5-92	SURVEY No.	FIELD BOOK															
A		5-92	ISSUED FOR APPROVAL	DLP	SUPERVISING ENGINEER	R.P.E.Q. NO.	CHECKED			SURVEYED																
			AMENDMENT	INITIALS		DATE																				

NOTES


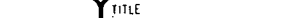
1. HOT DIP GALVANISE AFTER FABRICATION.

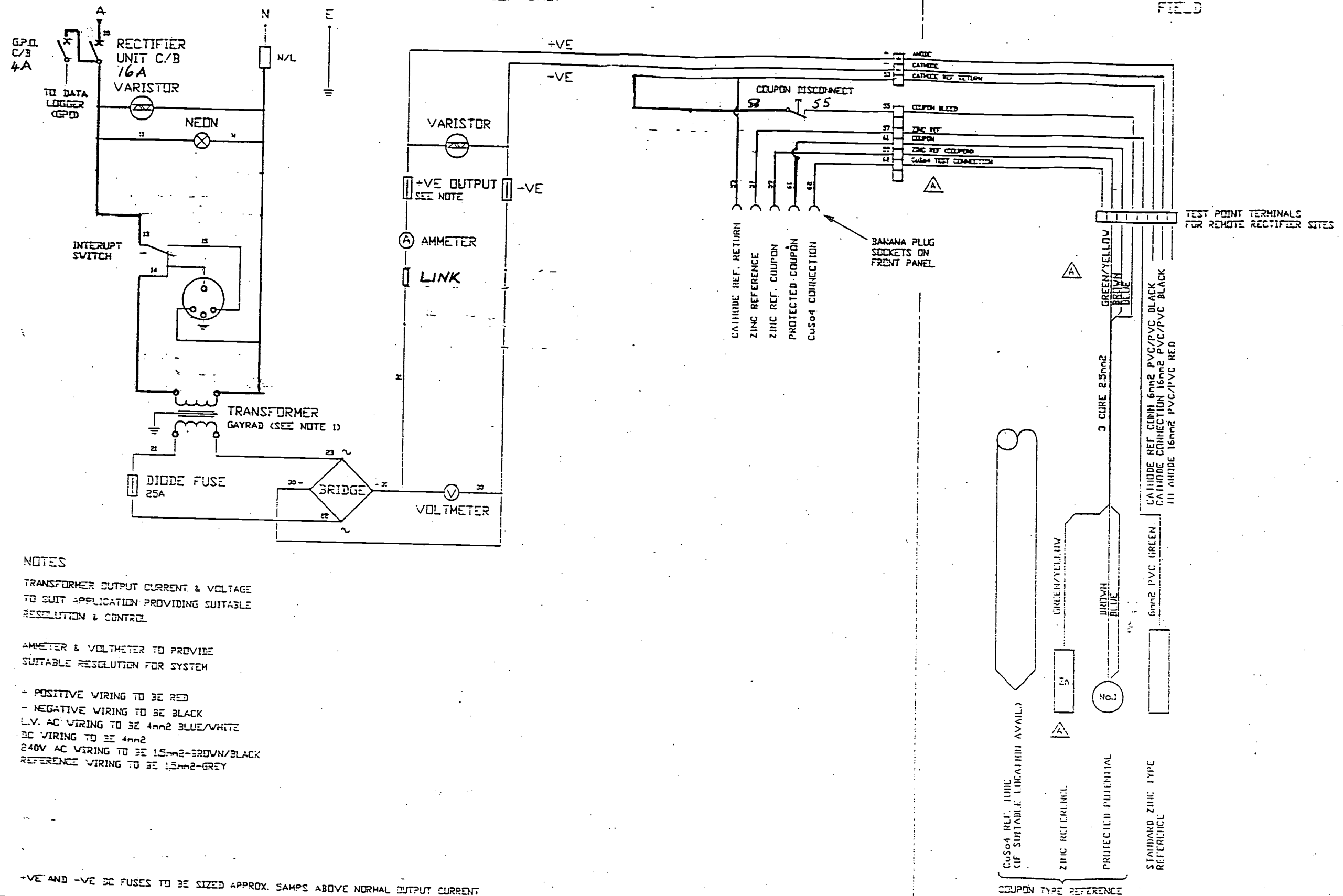


SECTION A-A



SECTION B-B

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



BY	DATE	REVISION	CHECK	APPR
RL	19.12.93	CHANGES AS SHOWN		
RL	25.8.93	ISSUED FOR CONSTRUCTION		



BRISBANE
CITY COUNCIL
DEPARTMENT OF WATER
SUPPLY & SEWERAGE
MECHANICAL & ELECTRICAL SERVICES

PROJECT
STANDARD
CATHODIC PROTECTION

TITLE
RECTIFIER UNIT
WIRING DIAGRAM

DRAWN	NAME	DATE	SUPER. ENG.	NAME	DATE	SCALE	SIZE
DESIGN	J.S.	25.8.93	SENIOR ENG.				A3
CHECKED	J.S.	25.8.93	ELECT. ENG.				A4
DRAWING No.	486/6/25-AA1C0021E					ACCORD FILE No.	A625C21