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20th December.2002

OPERATING MANUAL FOR:

NORTH PINE DAM to BALD HILL TRUNK MAIN

S90 TRUNK MAINS

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER SYSTEM SERVICES

MANUAL CONTENTS

DRAWINGS

(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: 1220 mm Dia mild steel cement lined.

Coating: Fibreglass-Enamel Coated.

Length: Appox 11.0 Km.

Location: From 48" Valve North Pine Dam to South Pine River.

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 20 volt, 20 amp (Ron Thomason Park) and 30 volt, 30 amp (Pine Rivers Park)direct current output enclosed in a stainless steel switchboard. This system has 2 rectifiers installed. One rectifier is in the Pine Rivers Park, Gympie Rd. Strathpine and has a 240V supply from Energex Pole No.54526, located in the Park. The second rectifier is at Ron Thomason Park, Todds Rd. Lawton and has a 240V supply from pillar box No.700153 Todds Rd.

(4.3) Cathode: The cathode points are located on the 1220mm dia mains in the Pine Rivers Park and Todds Rd. opposite Ron Thomason Park. 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 190 metres from the trunk mains, in a vertical bed 5 metres deep, at the rear of Pine Rivers Park and four 1500 x 75mm anodes were installed approx 150 metres from the trunk main, in a vertical bed 5 metres deep, at the rear of Ron Thomason Park. 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 thirteen 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 S90 Trunk Main.	- 17/10.020-01 - 17/10.020-02

(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.

20th December, 2002.
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.

20th December. 2002.
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.

20th December, 2002.
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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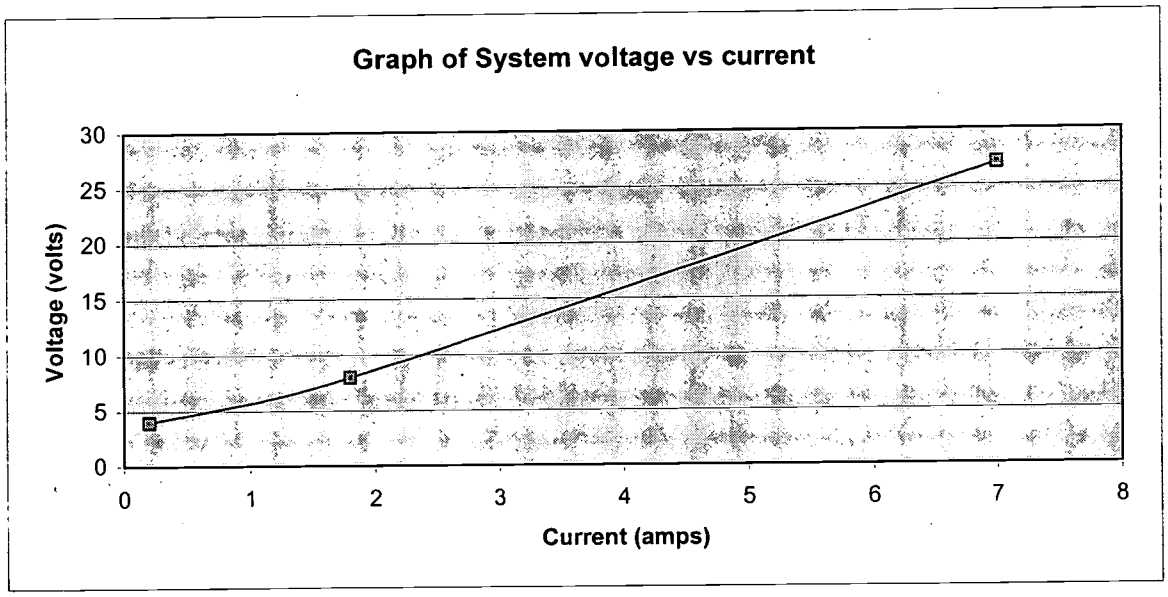
Cathodic Protection System Loop Resistance — Pine Rivers Park Rectifier. CPS124

Date: 27th November 2002
Cathodic Protection System: North Pine Dam to Bald Hills Trunk Main S90
System Operating Volts: 8 System Operating amps: 1.8

Test Voltage: (volts)		Test Current: (amps)	
4		0.2	
8		1.8	
27		7	

Loop Resistance (ohms)
3.85714286



23/12/2002

Brisbane Water

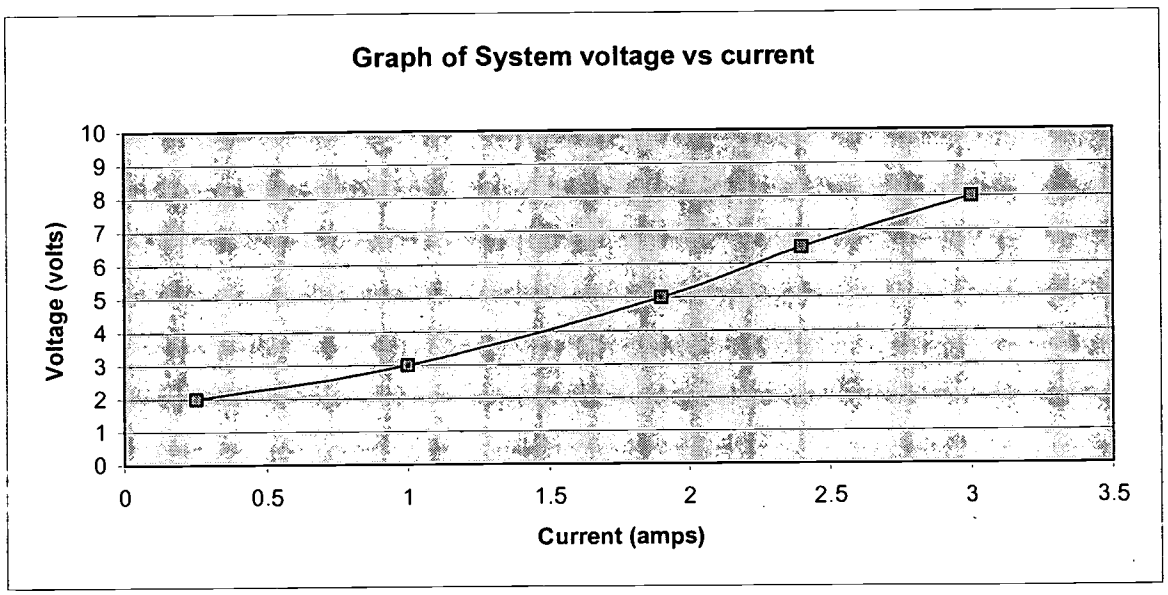
Network Services

Cathodic Protection System Loop Resistance — Todds Rd. Rectifier. CPS196

Date: 27th November 2002
Cathodic Protection System: North Pine Dam to Bald Hills Trunk Main S90
System Operating Volts: 6.5 System Operating amps: 2.4

Test Voltage: (volts)		Test Current: (amps)	
2		0.25	
3		1	
5		1.9	
6.5		2.4	
8		3	

Loop Resistance (ohms)
2.72727273



Brisbane Water CP Form No. 23

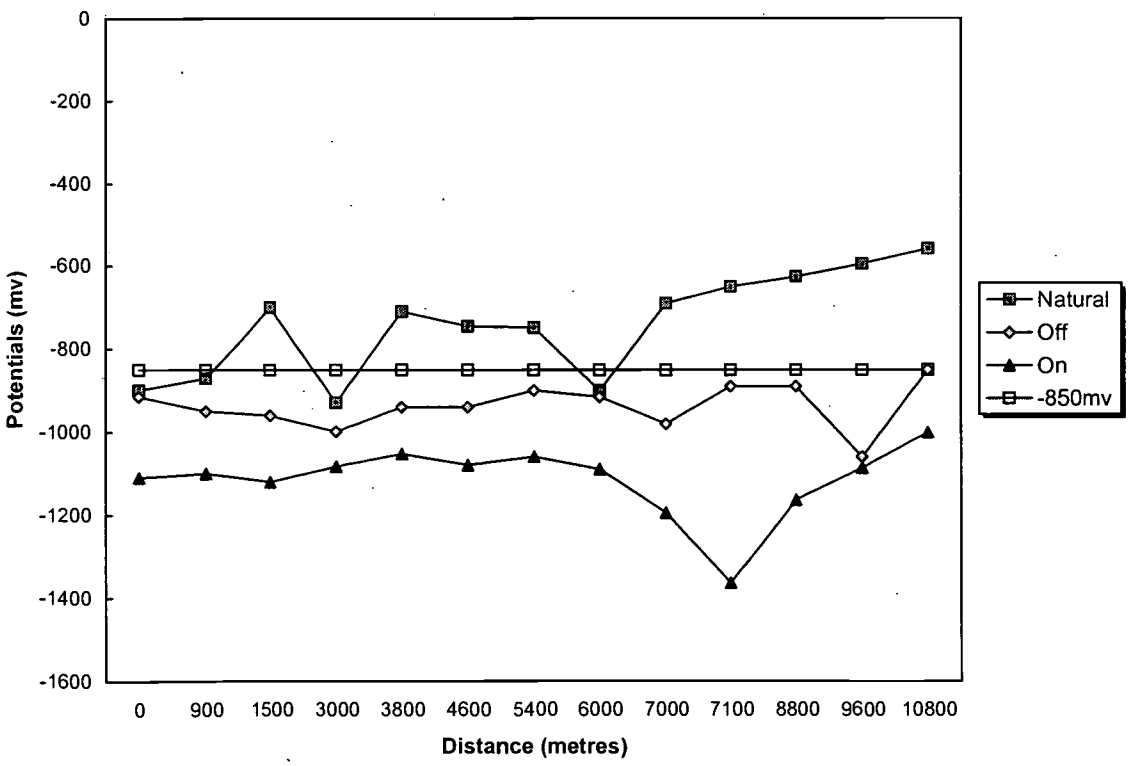
Network Services

Cathodic Protection System Potential Recording Form

Project S90 Trunk Main.North Pine Dam to Bald Hills **Date** 20th Decenber 2002

Test Point number	Distances to T.P. (metres)	Potentials to CuSO4 Natural (mV)	Off (mV)	On (mV)	(mV)
1	0	-900	-915	-1110	-850
2	900	-870	-950	-1100	-850
3	1500	-700	-960	-1120	-850
4	3000	-929	-999	-1083	-850
5	3800	-710	-940	-1053	-850
6	4600	-746	-940	-1080	-850
7	5400	-749	-900	-1060	-850
8	6000	-900	-915	-1090	-850
9	7000	-690	-980	-1195	-850
10	7100	-650	-890	-1364	-850
11	8800	-626	-890	-1164	-850
12	9600	-595	-1060	-1086	-850
13	10800	-559	-850	-1000	-850
14					

Graph of potentials vs pipelength



Revision 6/01/2003

Brisbane Water

CP Form No. 23

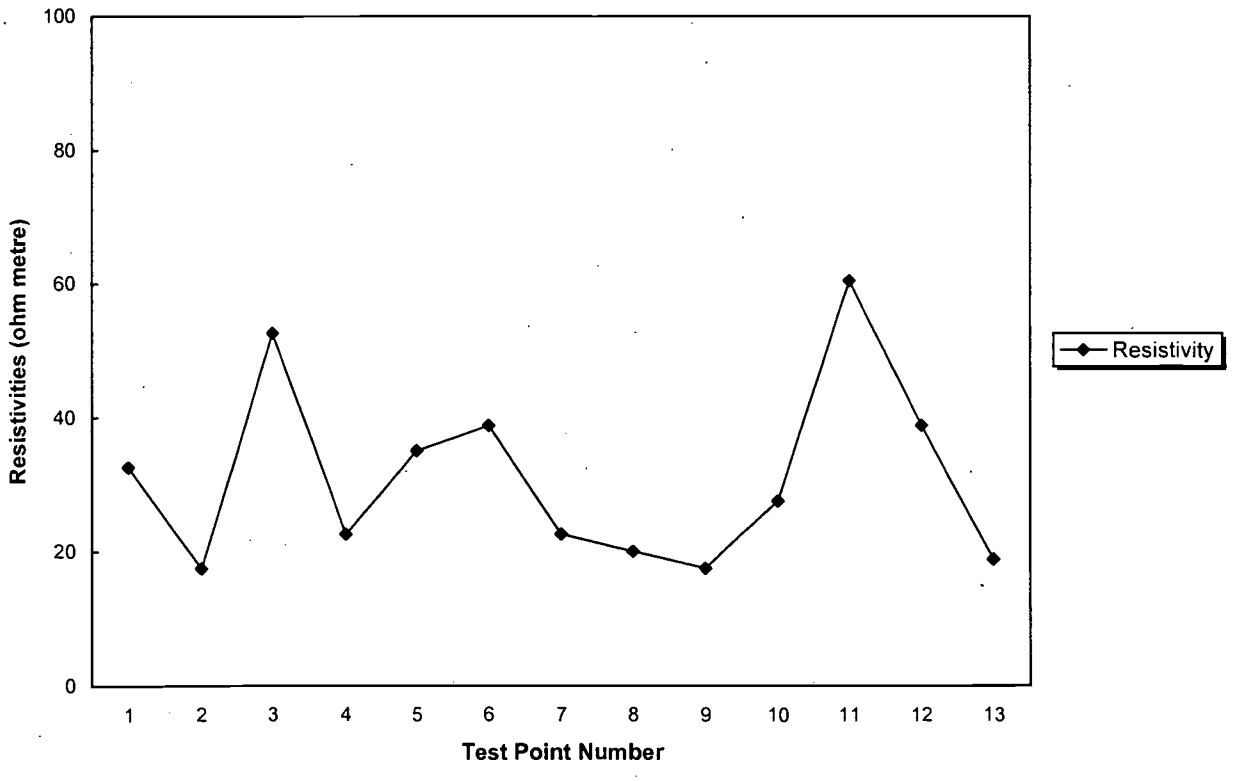
Network Services

Cathodic Protection System Resistivities Recording Form

Project S90 Trunk Main.North Pine Dam to Bald Hills **Date** 20th December 2002

Test Point number	Distances to T.P. (metres)	Resistivities at 2 metres ohm metres
1	0	32.6
2	900	17.5
3	1500	52.7
4	3000	22.6
5	3800	35.1
6	4600	38.9
7	5400	22.6
8	6000	20
9	7000	17.5
10	7100	27.6
11	8800	60.5
12	9600	38.9
13	10800	18.8
14		

Graph of resistivities vs pipelength



Revision 6/01/2003

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

Office use only.
Fees paid:
Receipt no:

Queensland Government
Department of Industrial Relations

ABN – 52 293 849 579

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

APPLICATION TO REGISTER A REGISTRABLE CATHODIC PROTECTION SYSTEM

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 GPO. Box 1434 Brisbane 4001
Contact Name:	Telephone no:
Name and postal address of authorised agent of system owner:	Brisbane Water Network Services 268 Cullen Ave Eagle Farm 4009
Contact Name: Jeff Say.	Telephone no: 34078365
Type of application: (Tick as appropriate)	☑ New system (Note 2) Permit No; ☐ Alteration to an existing system, Registration No: (Note 3) ☐ Renewal of system, Registration No:
Location of system: (Note 4)	Todds Road Lawnton 4501(Ron Thomason Park) (Rectifier No1) From North Pine Dam to South Pine River Bald Hills Post Code 4501
Structure to be protected:	1200mm dia Mild Steel Trunk Main
Maximum operating current: 3.00A 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 (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: Date: / /

Application should be forwarded with registration fee of $200.00 to: Electrical Safety Office, Department of Industrial Relations, PO Box 995, SPRING HILL Q 4004. **Please note: This is a GST free supply. No tax invoice will be issued.**

Refer notes overleaflet →

NOTES:

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

Office use only.
Fees paid:

Receipt no:

Queensland Government
Department of **Industrial Relations**

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Name and postal address of authorised agent of system owner:	Brisbane Water Network Services 268 Cullen Ave Eagle Farm 4009
Contact Name: Jeff Say	Telephone no: 34078365
Type of application: (Tick as appropriate)	☑ New system (Note 2) Permit No; ☐ Alteration to an existing system, Registration No: (Note 3) ☐ Renewal of system, Registration No:
Location of system: (Note 4)	Gympie Road Strathpine 4500 (Pine Rivers Park) (Rectifier No2) From North Pine Dam to South Pine River Bald Hills Post Code 4500
Structure to be protected:	1200mm dia Mild Steel Trunk Main
Maximum operating current: 2.50A 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 (ii); and

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Signature of System owner: Date: / /

Application should be forwarded with registration fee of $200.00 to: Electrical Safety Office, Department of Industrial Relations, PO Box 995, SPRING HILL Q 4004. **Please note: This is a GST free supply. No tax invoice will be issued.**

Refer notes overleaflet →

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 for 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 Electricity Regulation 1994.

4. Sufficient details are required to correctly identify the geographical location of the system. Post Code must be included.

5. The maximum operating voltage is only required for a system operating with an anode (or anodes) immersed in water or a 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 is one bleed on the North Pine Dam to South Pine River System Brisbane Water identification No. CPB 103 is at Energex Pole 297033 Todds Rd.

Brisbane Water Engineering Services CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project North Pine Unit Reading 10V 2.4a Date 27-11-02
8V 3a

	Reading	Test Point I. D.	Location	Swing
On	-140		Todds Rd.	
Off	-220	Men	Pole no 297033	+80
On	-116			
Off	-116	Men	Pole no 243	0
On	-287		Byrnes St.	
Off	-287	Men	Pole no 14433	0
On	-240		Pine River PK	
Off	-240	Men	Pole no 54526	0
On	-12			
Off	-12	Men	Pole no 66231	0
On	-14			
Off	-14	Men	Pole no 66231	0
On	-117		South Pine Rd.	
Off	-113.	Men.	Pole no 21951	0
On	-60		Elles Rd.	
Off	-60	Men	Pole no 50224	0
On	-74			
Off	-74	Men	Pole no 75371	0
On	-120			
Off	-120	Men	Pole no 56005	0
On	-180			
Off	-180	Men	Pole no 59240	0
On	-250			
Off	-250	Men	Pole no 3247	0
On	-520		BRAY PK	
Off	-520	Men	Pole no 93205.	0
On	-6			
Off	-6	Men	Pole no 13920	0
On	-213		IRULA St.	
Off	-217	Men	Pole no 88274	0
	-68		Pole no 376	
Colleen St.	-68			

TESTED BY P. SMYTH

Revision 09/28/95

Brisbane Water Engineering Services CP Form No. 28

Electrical Engineering Unit

Cathodic Protection Bleed Point Details Form

Project North Pine – Bracken Ridge **Date** 24-12-02

Bleed Location Todd Rd **CPB No.** 103

FOREIGN STRUCTURE OWNER: Energex

F.S. LOCATION: Ron Thompson Park

F.S. IDENTIFICATION: Pole No 297033.

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

REFERENCE TYPE: Resistor. CuSO4

POTENTIAL OFF: -255 ON: -345 SW: +90

BLEED TYPE: Resistor. 3R3

BLEED MATERIAL: Resistor 3R3

BLEED WEIGHT:

BLEED O/C POTENTIAL:

BLEED CURRENT OFF: 0 ON: 20 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	
-255	-425	+170	425	459	-34	-136

FOREIGN STRUCTURE OWNER AGREEABLE WITH MITIGATION? (Y/N) Yes

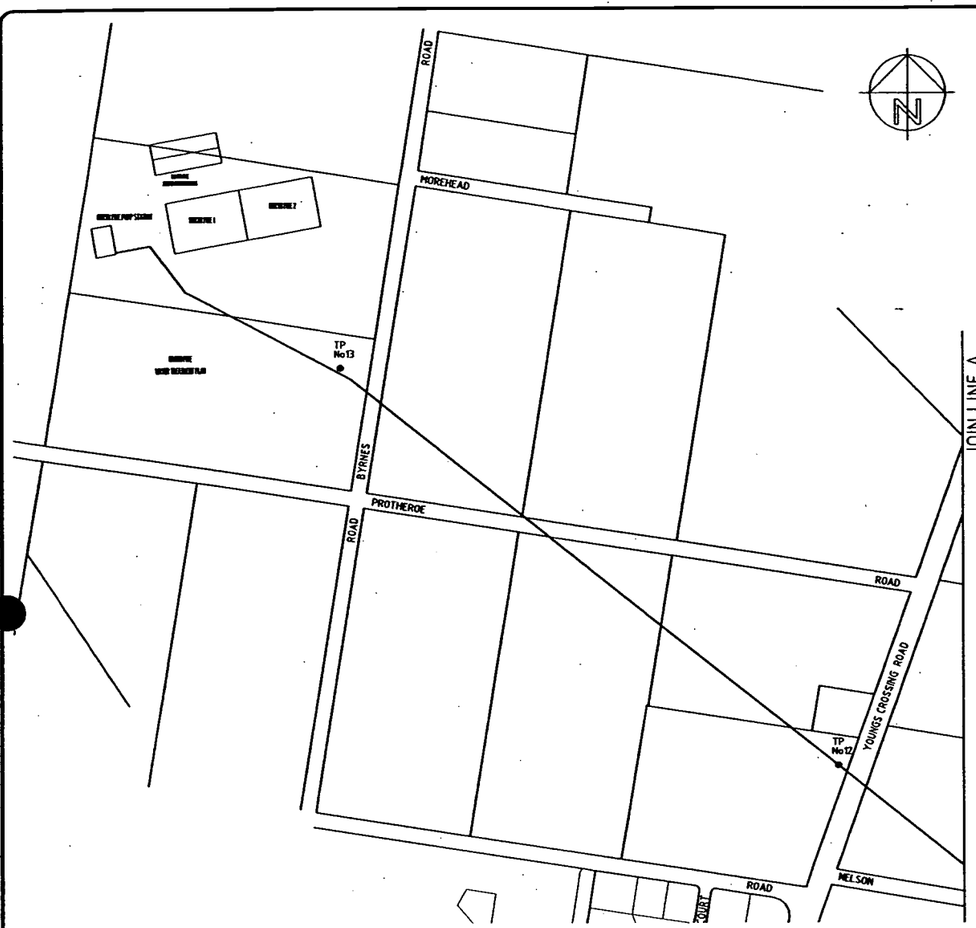
IDENTIFICATION TAG INSTALLED? (Y/N) Yes

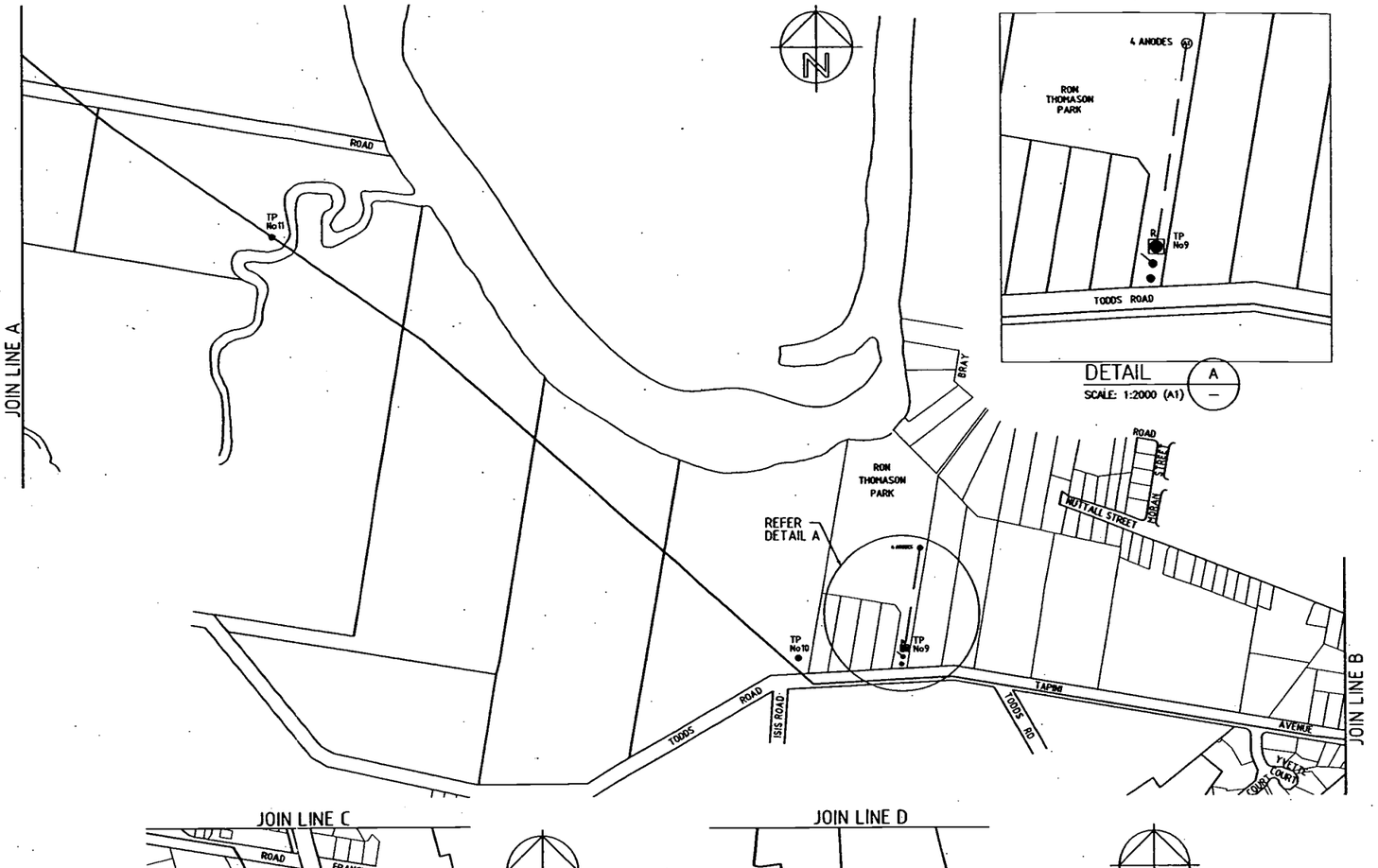
COMMENTS:

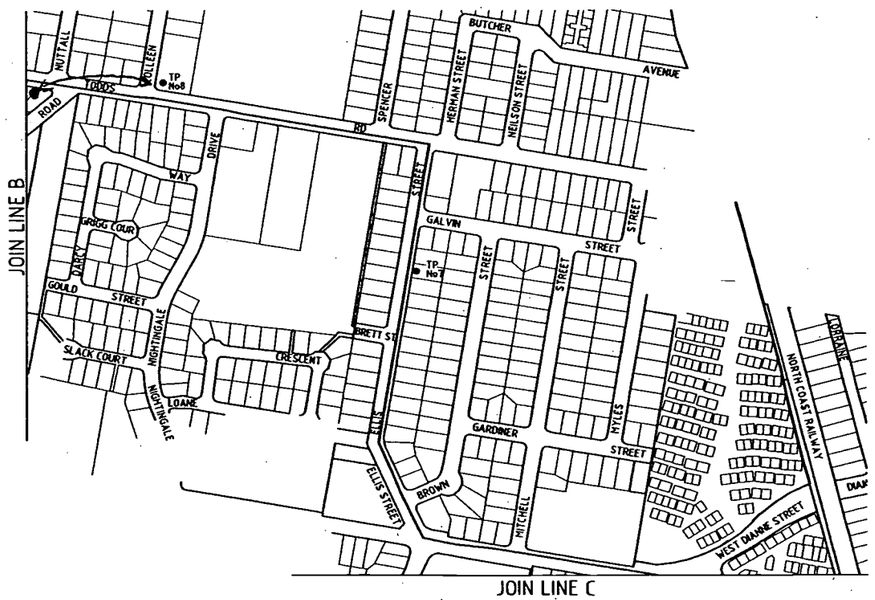
INSTRUMENT

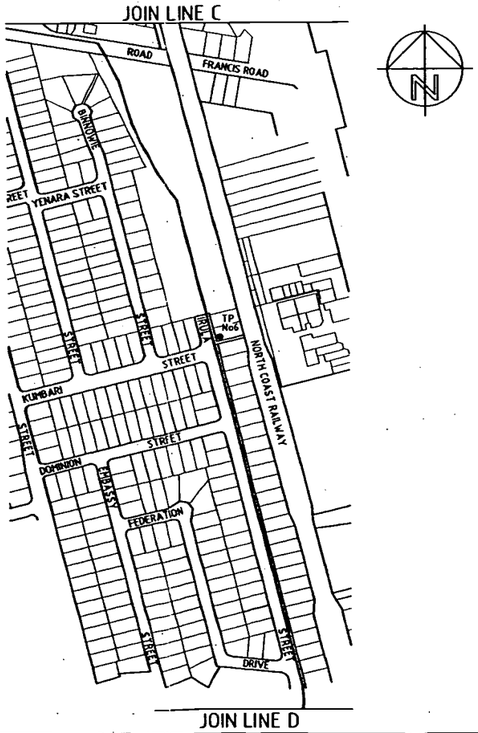
INSTALLED / TESTED BY P. Smyth.

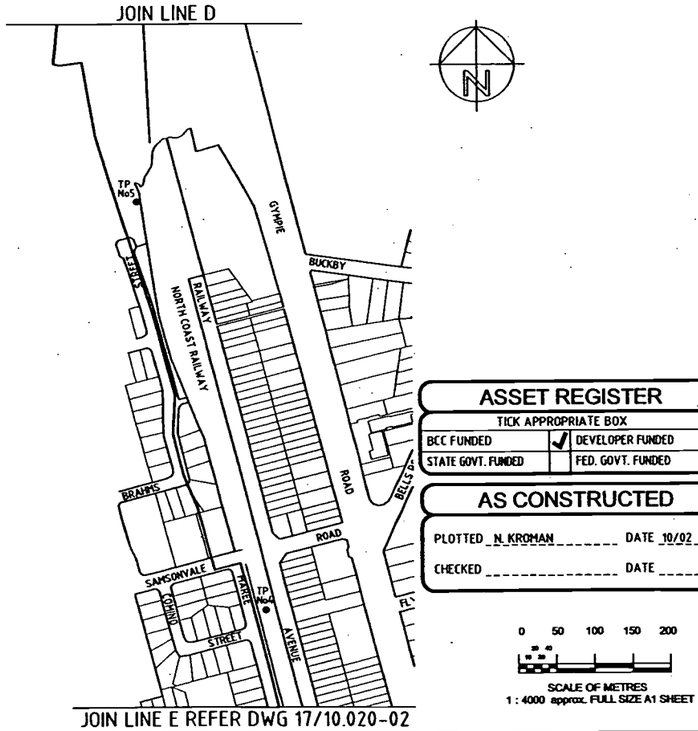
Revision 09/28/95











ASSET REGISTER			
TICK APPROPRIATE BOX			
BCC FUNDED		✓	DEVELOPER FUNDED
STATE GOVT. FUNDED			FED. GOVT. FUNDED

AS CONSTRUCTED

PLOTTED N. KROMAN DATE 10/02

CHECKED _____ DATE _____

0 50 100 150 200

SCALE OF METRES
1 : 4000 approx. FULL SIZE A1 SHEET

NO	DATE	AMENDMENT	INITIAL

DIRECTOR OF PD & PS			DATE
ENGINEER IN CHARGE			DATE
SUPERVISING ENGINEER	RPEQ No		DATE

SUPERVISING ENGINEER		R.P.E.Q. NO.		DATE
CADD FILE	171002001			
JOB FILE		SURVEY NO.	NIL	
SURVEYED	NIL	FIELD BOOK	NIL	

DESIGN			
DESIGN CHECK			
DRAWN	N.K.		NOV 02
DRAFTING CHECK	H.W.		NOV 02

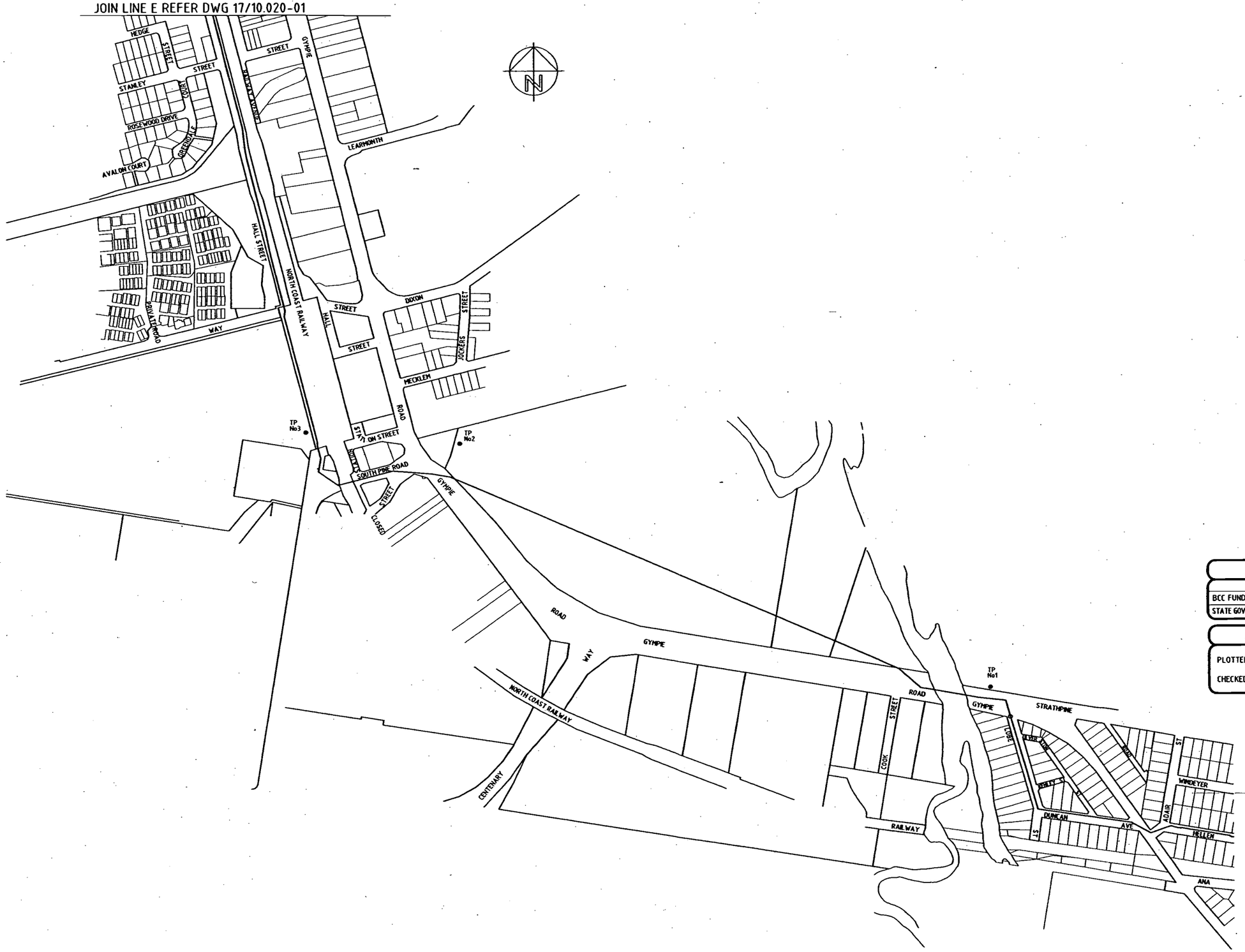
Brisbane Water

PROJECT
BRACKENRIDGE TO NORTH PINE DAM S90 TRUNK WATER MAIN

TITLE
CATHODIC PROTECTION TEST POINT & ANODE BED LOCATIONS

SCALE	A.H. DATUM
AS SHOWN	N° 1 OF 2 SHEETS
DRAWING N° 17/10.020-01	AMEND. 0

JOIN LINE E REFER DWG 17/10.020-01



ASSET REGISTER			
TICK APPROPRIATE BOX			
BCC FUNDED		✓	DEVELOPER FUNDED
STATE GOVT. FUNDED			FED. GOVT. FUNDED

AS CONSTRUCTED

PLOTTED N. KROMAN DATE 10/02

CHECKED _____ DATE _____

0 50 100 150 200

SCALE OF METRES
1 : 4000 approx. FULL SIZE A1 SHEET

NO.	DATE	AMENDMENT	INITIAL

DIRECTOR OF PD & PS			DATE
ENGINEER IN CHARGE			DATE
SUPERVISING ENGINEER	RPEQ No		DATE

SUPERVISING ENGINEER			R.P.E.Q. NO.	DATE
CADD FILE	171002002			
JOB FILE		SURVEY NO.	NIL	
SURVEYED	NIL	FIELD BOOK	NIL	

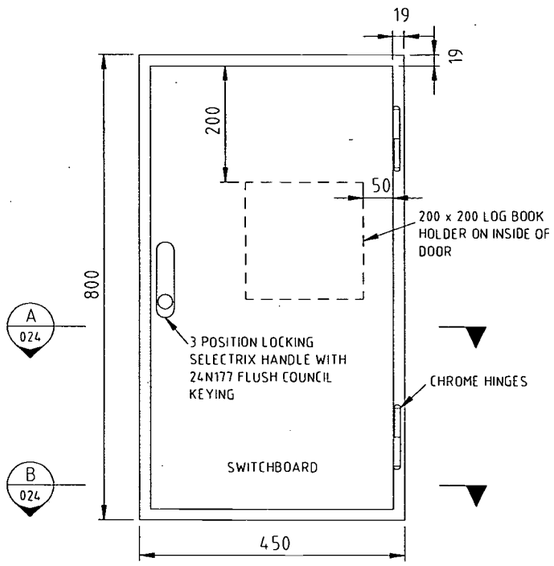
DESIGN		
DESIGN CHECK		
DRAWN	NK	27.08.02
DRAFTING CHECK	H.W.	NOV 02

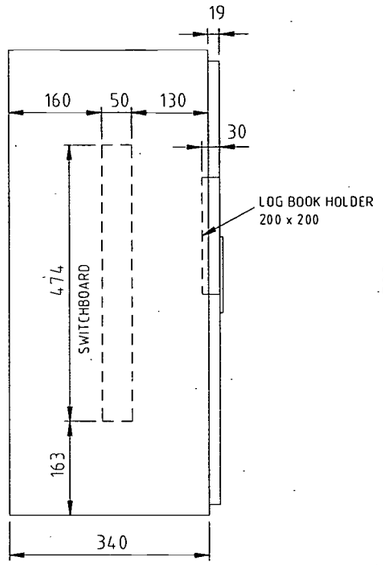
Brisbane Water

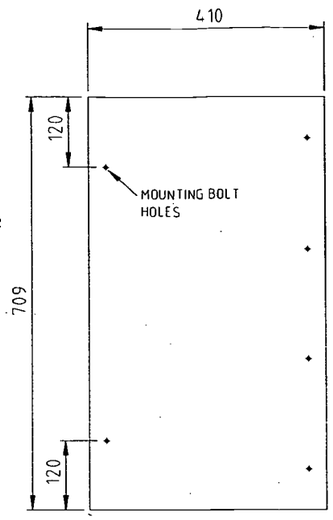
PROJECT
BRACKENRIDGE TO NORTH PINE DAM S90 TRUNK WATER MAIN

TITLE
CATHODIC PROTECTION TEST POINT & ANODE BED LOCATIONS

SCALE	A.H. DATUM
AS SHOWN	N° 2 OF 2 SHEETS
DRAWING N° 17/10.020-02	AMEND. 0







FRONT INSULATED PANEL
(6mm THICK SUPPLIED)

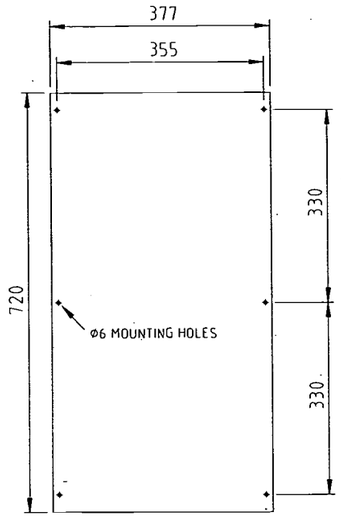


FIG.1
EQUIPMENT PANEL DETAILS

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.

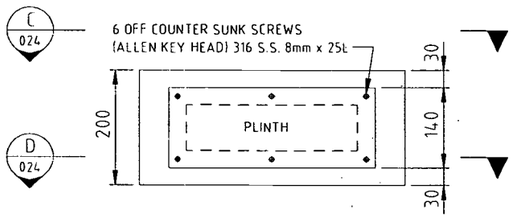
4. DOUBLE HINGED PANEL SUPPLIED BY B.C.C.

5. PROVIDE 1/4" WW STAINLESS STEEL STUDS TO DOOR & SWITCHBOARD CABINET.

6. DEGREE OF WEATHER PROTECTION IP55.

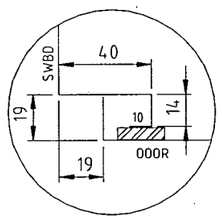
7. SELECTRIX TYPE HANDLE TO BE SUPPLIED & FITTED BY SWITCHBOARD MANUFACTURER. HANDLE TO BE 1107 SS CU1. KEY TO BE 24N177.

8. DOUBLE HINGED PANEL MOUNT TO BE SUPPLIED WITH MOUNTING BOLTS & NUTSERTS TOP & BOTTOM. SEE DETAIL A.

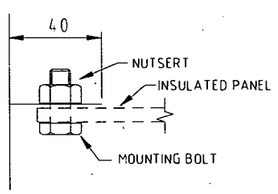


FRONT ELEVATION
SWITCHBOARD & PLINTH

SIDE ELEVATION
SWITCHBOARD & PLINTH

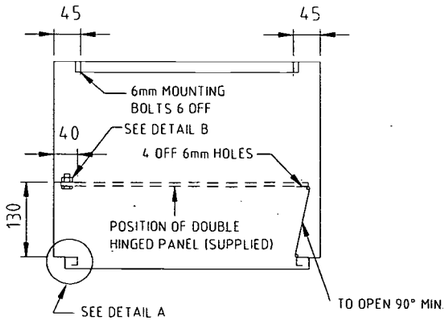


DETAIL A
DOOR/CORNER DETAIL

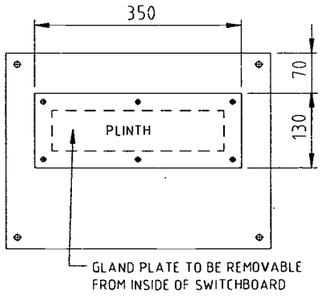


DETAIL B

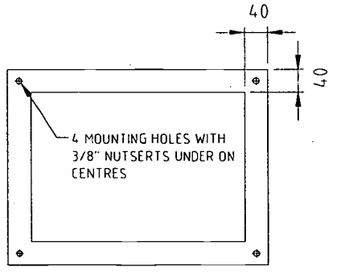
NUMBER OF SWITCHBOARDS REQUIRED	
NUMBER OF PLINTHS REQUIRED	



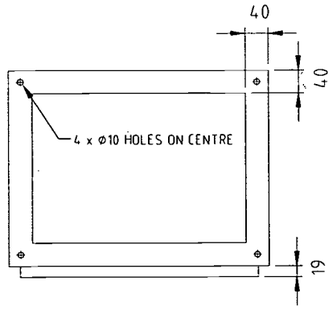
SECTION A-A
(SHOWING HINGED PANEL)



SECTION B-B
(SHOWING GLAND PLATE)



SECTION C-C
PLINTH MOUNTING DETAILS



SECTION D-D
PLINTH MOUNTING DETAILS

NO.	DATE	AMENDMENT	INITIALS
C	9-02	NOTE 7 REVISED	MI
B	11-95	MODIFIED	D.L.P.
A	5-92	ISSUED FOR APPROVAL	D.L.P.

DIRECTOR OF P.D. & P.S. — DATE
ENGINEER IN CHARGE — DATE
SUPERVISING ENGINEER — R.P.E.Q. NO. — DATE

	NAME	DATE
DESIGN	K McG	5-5-92
DRAWN	G L P	7-5-92
CHECKED		

Brisbane City

JOB FILE			
ACAD FILE	22E0024-Rev-C	SHEET SIZE	A1
SURVEY No.	-	FIELD BOOK	
SURVEYED		A.H. DATUM	

Brisbane Water — Professional Services — Engineering

PROJECT: CATHODIC PROTECTON

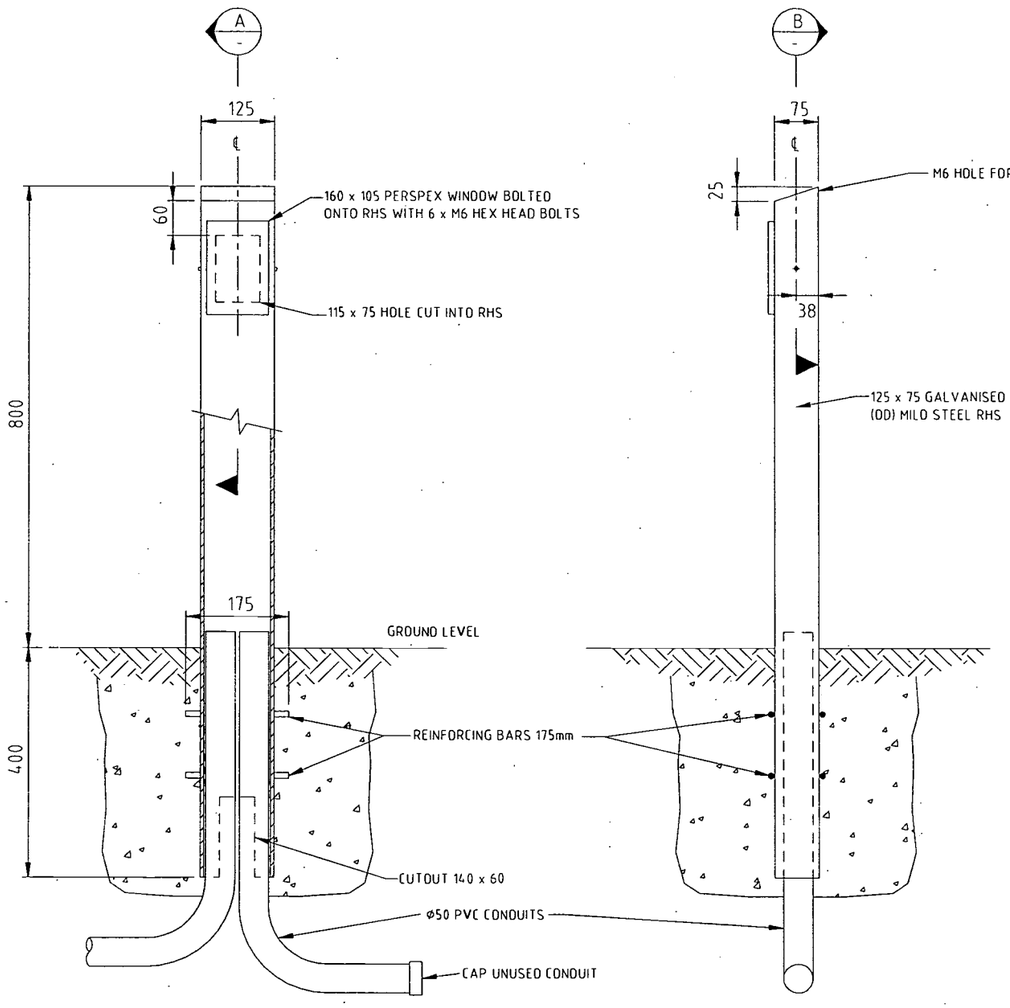
TITLE: STANDARD SWITCHBOARD CABINET

SCALE NTS | N° 1 OF 1 SHEETS

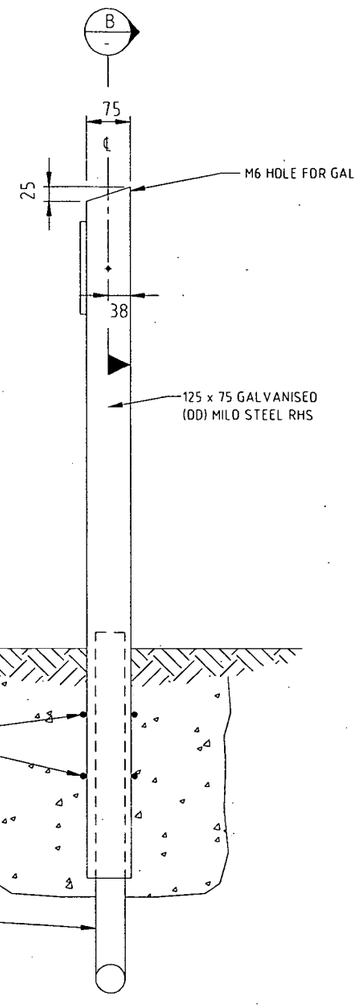
DRAWING N° 486/1/22-C0024E | AMEND. C

NOTES

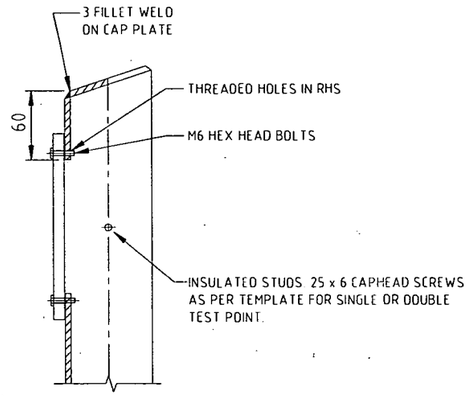
1. HOT DIP GALVANISE AFTER FABRICATION.



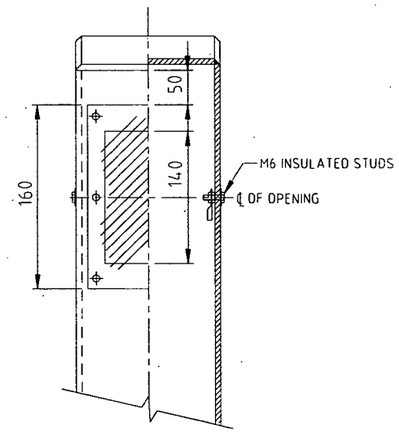
FRONT ELEVATION
SECTIONED



SIDE ELEVATION



SECTION A-A



SECTION B-B

NO.	DATE	AMENDMENT	INITIALS
C	9-97	NOTE 3 REVISED	HT
B	11-95	MODIFIED	D.L.P.
A	5-92	ISSUED FOR APPROVAL	D.L.P.

DIRECTOR OF P.D. & P.S. — DATE
ENGINEER IN CHARGE — DATE
SUPERVISING ENGINEER — R.P.E.Q. NO. — DATE

	NAME	DATE
DESIGN	K.McG.	5-5-92
DRAWN	D.L.P.	7-5-92
CHECKED		

Brisbane City

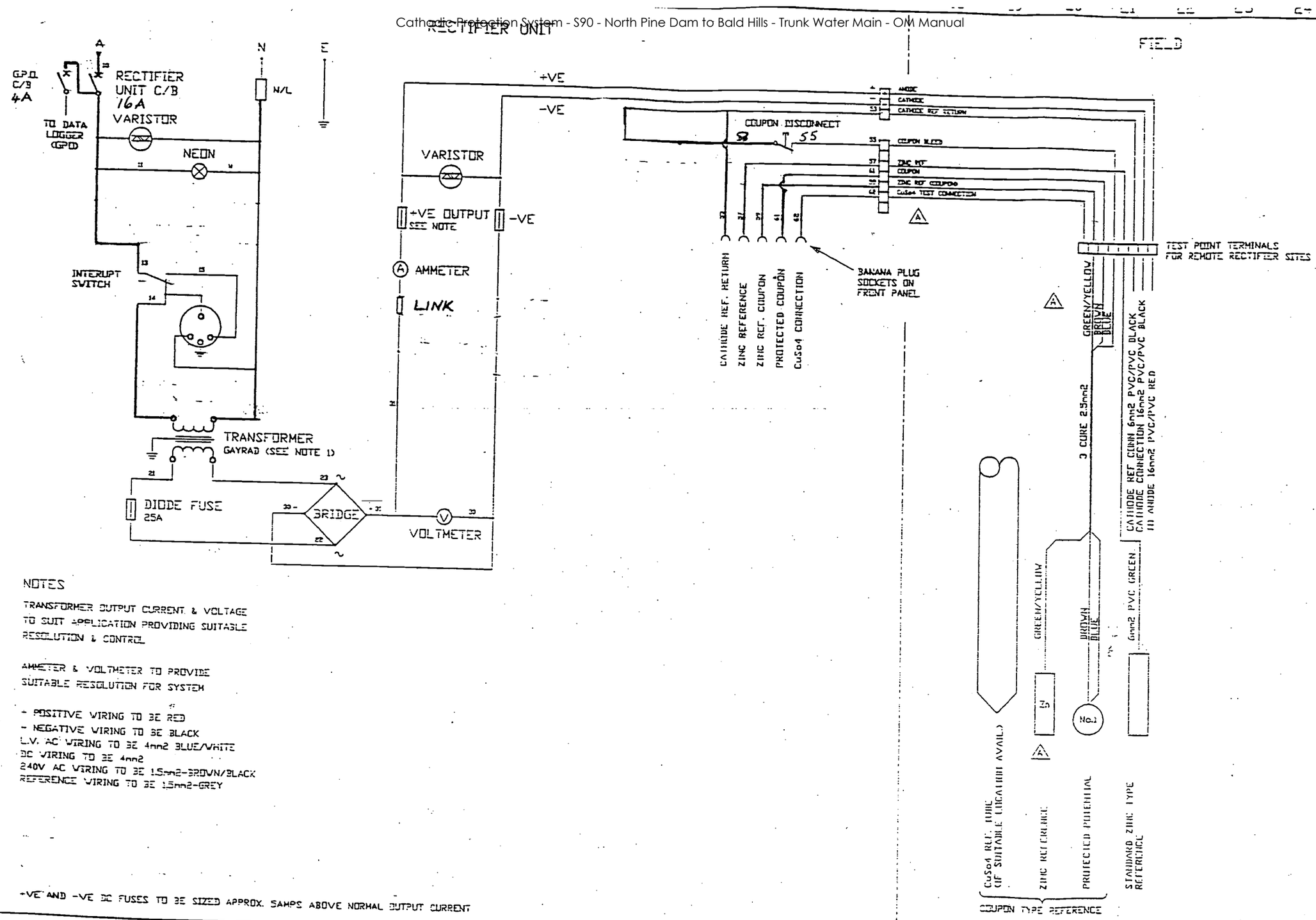
JOB FILE
ACAD FILE 2270001-RevA — SHEET SIZE A1
SURVEY No. — FIELD BOOK
SURVEYED — A.H. DATUM

Brisbane Water — Professional Services — Engineering

PROJECT: CATHODIC PROTECTON

TITLE: STANDARD TEST POINT CONSTRUCTION DETAILS

SCALE NTS — N° 1 OF 1 SHEETS
DRAWING N° 486/1/22-AAT0001E — AMEND C



NOTES

TRANSFORMER OUTPUT CURRENT & VOLTAGE TO SUIT APPLICATION PROVIDING SUITABLE RESOLUTION & CONTROL

AMMETER & VOLTMETER TO PROVIDE SUITABLE RESOLUTION FOR SYSTEM

- POSITIVE WIRING TO BE RED
- NEGATIVE WIRING TO BE BLACK
L.V. AC WIRING TO BE 4mm2 BLUE/WHITE
DC WIRING TO BE 4mm2
240V AC WIRING TO BE 1.5mm2-BROWN/BLACK
REFERENCE WIRING TO BE 1.5mm2-GREY

+VE AND -VE DC FUSES TO BE SIZED APPROX. 5AMPS ABOVE NORMAL OUTPUT CURRENT

	BY	DATE	REVISION	CHECK	APPR
C	R.L.	19.10.93	CHANGES AS SHOWN		
B	R.L.	25.8.93	ISSUED FOR CONSTRUCTION		
A					

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

PROJECT: STANDARD CATHODIC PROTECTION

TITLE: RECTIFIER UNIT WIRING DIAGRAM

	NAME	DATE		NAME	DATE	SCALE	SIZE
DRAWN	R.L.	3.8.93	SUPER. ENG.		25.8.93		A1
DESIGN	J.C.	3.8.93	SENIOR ENG.				AMEND
CHECKED	J.S.	25.8.93	ELECT. ENG.				A

DRAWING No. 486/6/25-AA1C00215E

ACADREF FILE No. A625C21