□ Electrical □ Mechanical □ Water Meters
5 Bunya Street Eagle Farm Q 4009
Ph. (07) 3403 1849
Fx. (07) 3403 1898

Brisbane Water
Engineering Services

25th November 1996

OPERATING MANUAL FOR:

BARTLEYS HILL TO PINKENBA S9 TRUNK MAINS

CATHODIC PROTECTION SYSTEM

CLIENT:

BRISBANE WATER
WATER MAINTENANCE SECTION

□ Electrical □ Mechanical □ Water Meters
5 Bunya Street Eagle Farm Q 4009
Ph. (07) 3403 1849
Fx. (07) 3403 1898

Brisbane Water
Engineering Services

10 February 1997

Subject: Coating defect survey for Bartleys Hill to Pinkenba trunk main.

Equipment used: Pipecamp PCS 2000 coating anomaly equipment.

Length Of Mains: Aprox. 6500 Metres.

Size of mains: 755 mm and 600 mm Dia mild steel cement lined.

Opperator: John Taylor

Date of survey: 4th, 5th, 6th, February 1997.

Procedure: Equipment was set up as per operation manual while operator traversed Pipeline route. Potentials were measured at each test point and no defects were noted greater than 5 millivolts.

Evaluation: Over the length of the main no notable defects were found .

Conclusion: The coating is still of reasonable condition and no further action is needed other than the CP System.

John Taylor
Electrical Engineering Unit

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:	755 and 600 Dia mild steel cement lined.
Coating:	Enamel coated.
Length:	Appox 6.5 Km.
Location:	From Valve Nos.234 and 115 Bartleys Hill Reservoir, Albion to Valve No. 111 at cnr.Kingsford Smith Drive and Randle Rd.

Construction Drawings:

486/6/6-SQ1T0001E	Cathodic Protection Rectifier Unit No.2.
486/6/6-QQ1T0013E	Cathodic Protection Test Points.
486/6/6-QQ1T0014E	Cathodic Protection Test Points.

(4.0) CATHODIC PROTECTION DETAILS

(4.1) Type of Cathodic Protection: Impressed Current.

(4.2) Rectifier: Standard 32 Volt, 10 amp direct current output enclosed in a stainless steel switchboard. Rectifier has a 240V supply from SEQEB Pole No.20848 located in Acacia St. Eagle Farm.The rectifier is on the corner of Acacia St. & Kenyon St. Eagle Farm.

(4.3) Cathode: The cathode point is located on the 755 Dia mains, near MH255 on the corner of Acacia St. & Kenyon St. Eagle Farm. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection.

(4.4) Anodes: Three 1500 x 75mm silicone iron anodes were installed approximately 60 metres from the trunk mains in a vertical bed. The anodes were firstly packaged 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 ten test points have been installed on the 755 Dia main and two test points on the 600 Dia main. In total, the system has 12 test points which can be identified from the layout drawing.

(4.6) Associated Drawings:

Cathodic Protection Details	– 2/14.213
Cathodic Protection Test Point Details	– 2/14.199
Standard Rectifier Wiring Diagram	– 486/6/25–AA1C0021E
Standard Vertical Groundbed Details	– 486/6/25–AA1C0024E

(4.7) Associated Standards:
AS 3000 1986 Australia Wiring Rules
AS 2832.1 1985 Pipes, Cables, Ducts, Guide to Cathodic Protection, Part One.

(4.8) Government Regulations:
Queensland Electricity Acts and Regulations.

(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 Queensland Electricity Commission and has approval to operate.

(7.0) MAINTENANCE

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

25th November 1996.
Electrical Engineering Unit.
Cathodic Protection

CPS Monthly 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.

25th November 1996.
Electrical Engineering Unit.
Cathodic Protection

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.

25th November 1996.
Electrical Engineering Unit.
Cathodic Protection

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

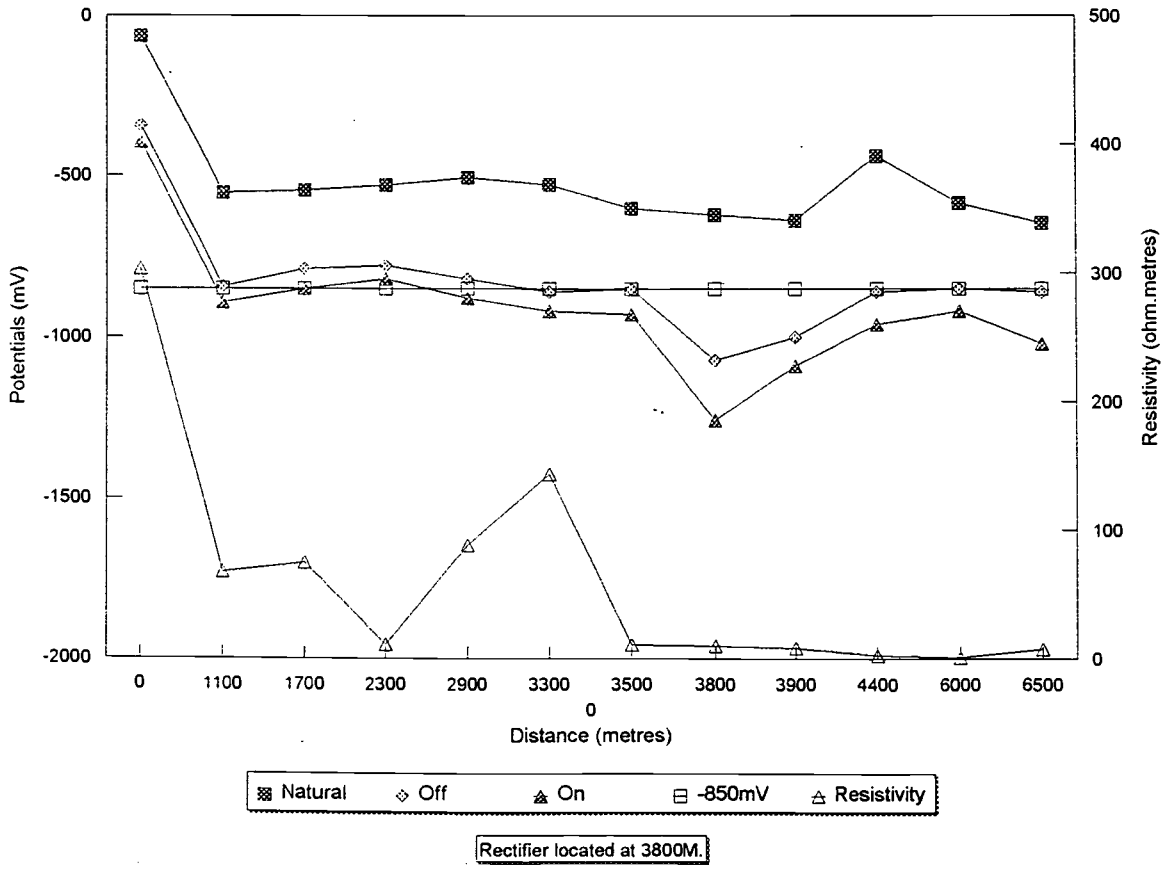
Electrical Engineering Unit

Cathodic Protection System Potential Recording Form

Project BARTLEYS HILL to PINKENBA TRUNK MAIN **Date** 25 Nov. 1996

Test Point number	Distances to T.P.	Potentials to CuSO4			Resistivities at 2 metres
		Natural	Off	On	
	(metres)	(mV)	(mV)	(mV)	(ohm.metres)
1	0	-64	-343	-395	302.5
2	1100	-554	-845	-895	67.5
3	1700	-545	-790	-850	75
4	2300	-530	-780	-820	11.2
5	2900	-506	-820	-880	88.7
6	3300	-528	-860	-920	143.7
7	3500	-601	-850	-930	11.2
8	3800	-620	-1072	-1257	10
9	3900	-638	-1000	-1090	8.7
10	4400	-438	-860	-960	2.5
11	6000	-585	-850	-920	1.2
12	6500	-647	-860	-1020	7.5

Graph of potentials and resistivity vs pipelength



Revision 12/04/96

Brisbane Water Engineering Services
Ph. 34031838 Fx. 34031839
5 Bunya Street
Electrical Engineering Unit
Eagle Farm Q 4009

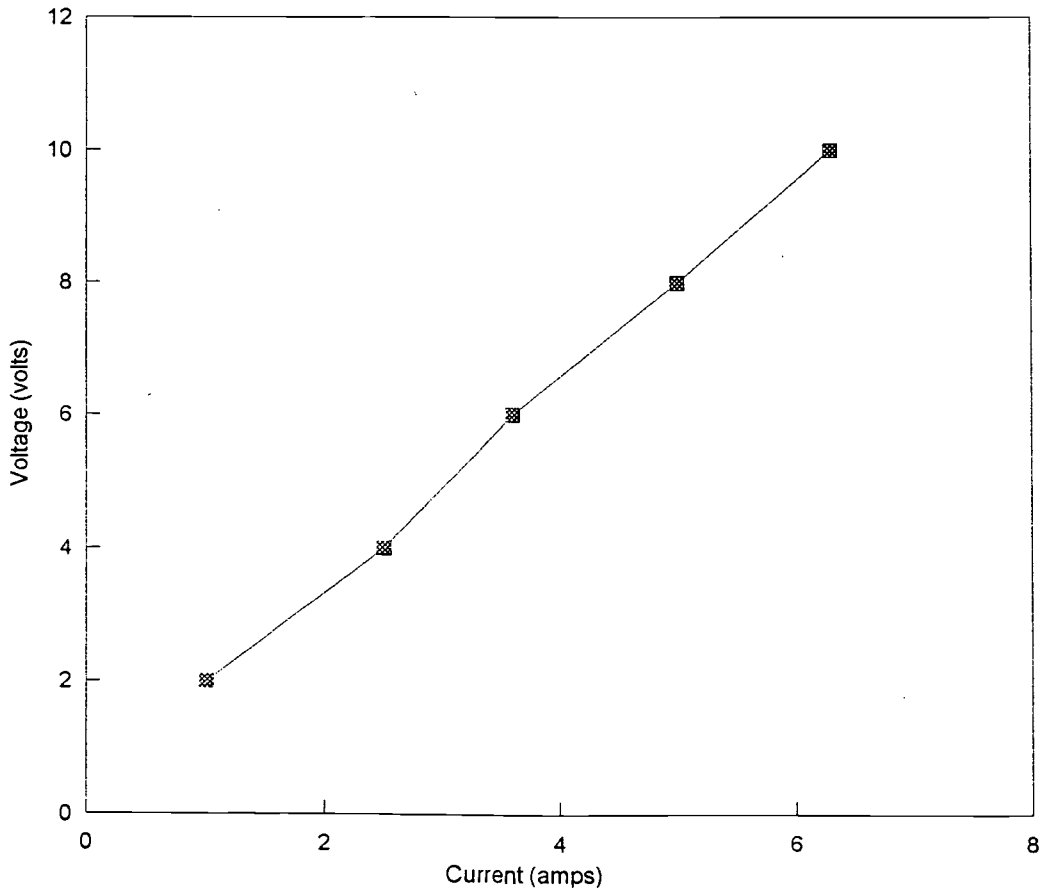
Cathodic Protection System Loop Resistance

Date: 25th November 1996.
Cathodic Protection System: S9 Bartleys Hill to Pinkenba Trunk Main.
System Operating Volts: 10 System Operating amps 6.3

Test Voltage: (volts)		Test Current: (amps)	
2		1	
4		2.5	
6		3.6	
8		5	
10		6.3	

Loop Resistance (ohms)
1.481481

Graph of System voltage vs current.



12/04/96

LOOPBART.WK4

Brisbane Water Engineering Services

CP Form No. 17

Electrical Engineering Unit

Cathodic Protection Anode Bed Testing

Project Bartleys Hill To Pinkenba **Date** 12-7-96

ANODE MATERIAL:	SILICON IRON	BURIAL:	VERTICAL.
ANODE SIZE/WEIGHT:	1500 x 75 m.m	TEST POINT TYPE:	NO.
ANODE PACKAGING:	CANISTER	SOIL RESISTIVITY:	10m = 5.14 Ωm 5m = 25 Ωm
ANODE DEPTH:	5.0 M.	SIGNAGE:	POST.

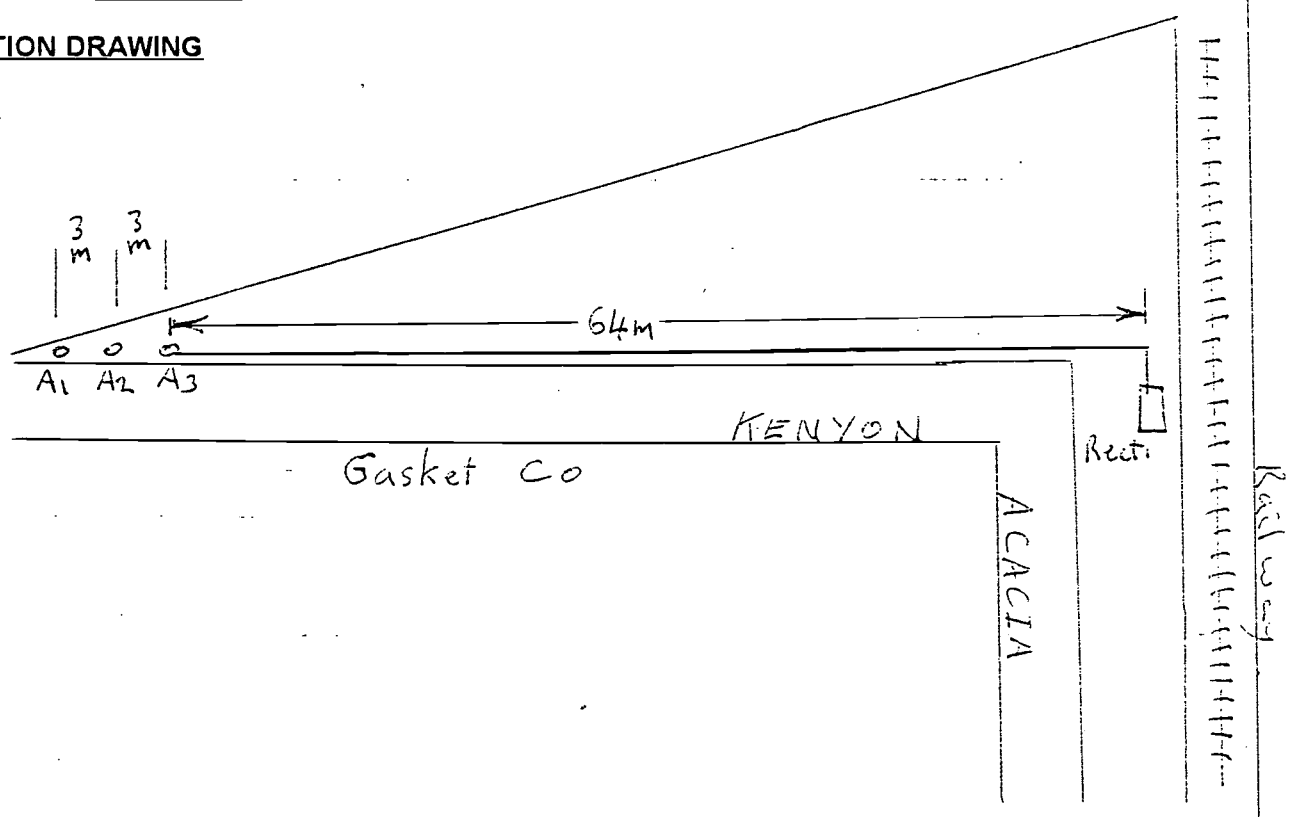
RESISTANCE TO GROUND:

ANODE NO.1	1.9 Ω
ANODE No.2	3.1 Ω
ANODE No.3	2.9 Ω
ANODE No.4	
ANODE No.5	
TOTAL	

ANODE CURRENT

ANODE No.1	2.1
ANODE No.2	2.1
ANODE No.3	2.1
ANODE No.4	
ANODE No.5	
TOTAL	

LOCATION DRAWING



TESTED BY P. SMYTH.

Revision 09/28/95

Telecom AUSTRALIA

41

Facsimile

To Kerry Mc Govern
Electrical Engineering Unit

Facsimile 3403 1837

Company Brisbane City Council

Location Eagle Farm Pumping Station

From McMonagle, Jim
PTT02, TECHNICAL SERVICES

File

Date 6th December, 1996

Total Pages 1

COMMERCIAL AND CONSUMER
EXTERNAL PLANT TECHNOLOGY, QLD.

144 ARTHUR ST
FORTITUDE VALLEY Q 4006

Australia

Telephone (07) 3838 0116
Message Bank
Facsimile (07) 3252 4884

Distrib.

Dear Kerry,

With reference to your two impressed current cathodic protection systems on the Bartley's Hill to Pinkenba trunk water main.

Tests performed by John Taylor (BCC) and John Lambert (Telstra) on Wednesday 20th November 1996 revealed that there was no adverse affect or interference to Telstra's underground plant from the operation of these two systems with the Kenyon St Unit operating at 8.0 volts 5.0 amps and the Orsova St Unit operating at ? volts 32 amps.

Accordingly, Telstra has no objection to the operation or licensing of these two systems up to the above outputs, however should the units be required to operate at higher outputs then additional interference testing may be required.

Thank you for the assistance with the EOS testing.

Regards,

for
MANAGER
EXTERNAL PLANT TECHNOLOGY

5 Bunya Street Eagle Farm Q 4009
Ph. (07) 3403 1849
Fx. (07) 3403 1898

Brisbane Water
Engineering Services

Fax transmission

to: Darryl Ringuet	**from:** Kerry Mc Govern
company/location: SEQEB	**unit:** Electrical Engineering Unit
fax no: 34075986	**ph no:** 34031838 / **fax no:** (07) 3403 1839
PHONE:34075369	
date: 20 September 1996	**no of pages:** (including this page) Three

re: Interference Test Results for BARTLEYS HILL TO PINKENBA Trunk main section 1

message:

In relation to our phone conversation, following is the preliminary results of interference testing of our cathodic system to your structure.

If further on-site testing and / or witnessing of testing by you is requried, please contact the undersigned to arrange those tests.

Could you please reply by FAX or LETTER of your acceptance of the above testing for our records.

Yes I Accept the test data and have no objection to the system being licenced

Signed by .....Date 8 / 11 / 96

No I require witness testing

Signed by .....Date / /

Regards, JOHN TAYLOR

Kerry Mc Govern
Electrical Supervisor

Brisbane Water Engineering Services CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project BARTLEYS HILL / PINKENBA **Unit Reading** 12.0V/6.3A **Date** 10/10/96

	Reading	Test Point I. D.	Location	Swing
On	-675MV	MEN	SEQEB POLE 20848 ACACIA ST.	-20MV
Off	-655MV			
On	-506MV		RAILWAY FENCE ACACIA ST	-18MV
Off	-488MV			
On	-232MV	MEN	SEQEB POLE 10591 BARTLEYS HILL	0
Off	-232MV			
On	-512MV		B.C.C. FENCE BARTLEYS HILL	0
Off	-512MV			
On	-227MV	EARTH	SHELTER SHED. BARTLEYS HILL	0
Off	-227MV			
On	-216MV	WATER METER	38 MASEY ST	0
Off	-216MV			
On	-363MV	NATURAL GAS PIPE	SCHOOL POOL MASEY ST	+3MV
Off	-366MV			
On	-469MV	MEN	SEQEB POLE 20610 MASEY ST	+3MV
Off	-472MV			
On	-433MV	MEN	SEQEB POLE 20627 WINDERMERE RD	0
Off	-433MV			
On	-466MV	MEN	SEQEB POLE 10961 BEATRICE TCE	0
Off	-466MV			
On	-445MV	MEN	SEQEB POLE 20686 NUDGEE RD	+2MV
Off	-447MV			
On	-340MV	WATER METER	FERGIES WAREHOUSE COLLEGE ST.	+2MV
Off	-342MV			
On	-375MV	MEN	SEQEB POLE 20306 COLLEGE ST	+2MV
Off	-373MV			
On	-450MV	WATER METER	9L JACKSON ST	0
Off	-450MV			
On	-309MV	WATER METER	100MM TO GATEWAY COL WOONAH AVE	+3MV
Off	-312MV			

TESTED BY L. Greaves

Revision 09/28/95

Brisbane Water Engineering Services CP Form No. 27

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project BARTLEYS HILL / PINKENBA **Unit Reading** 10 OV2 6 3A **Date** 10/10/96

	Reading	Test Point I. D.	Location	Swing
On	-634mV	UNMARKED		
Off	-634mV	TP	WOONAH AVE	0
On	-436mV		SEWER POLE 20875	
Off	-438mV	MEN	SCHNEIDER RD	+2mV
On				
Off				
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Off				
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TESTED BY .....

Revision 09/28/95

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Bartley's Hill Pinkenba **Unit Reading** ..... **Date** 28-10-96

	Reading	Test Point I. D.	Location	Swing
On	+61	Gas - Valve	@ Joe's Diner	00
Off	+61			
On	-244	MEN	Pole 20940 Kingsford Smith drv.	+1
Off	-245			
On	-203	H P	Joe's diner	00
Off	-203			
On	-363	MEN	Pole 20942	00
Off	-363			
On	-436	Sew Pipes	T.P. Joe's diner 1840	+2
Off	-462			
On	-409	MEN	Pole 20943	00
Off	-409			
On	-362	Water Meter	G. James 1084 Kingsford Smith	00
Off	-362			
On	-457	H P.	@ above	00
Off	-457			
On	-471	Retic Valve	@ above	+1
Off	-470			
On	-339	MEN	Pole 20944 DPS Pumps	
Off	-339			
On	-330	Earth	Railway Relay box @ above.	00
Off	-330			
On	-554	Fence	Railway Crossing Cnr Bunour	+2
Off	-556			
On	-554	Water Tab	Cnr Bunour Kingsford Smith drv	00
Off	-552			
On	-346	MEN	A/B Pole 20959	4
Off	-350			
On	-346	MEN	Pole 48770 Kingsford Smith drv	+4
Off	-350			

TESTED BY ..... J J

Revision 09/28/95

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Bartley's Hill Pinkenba **Unit Reading** ..... **Date** 28-10-96

	Reading	Test Point I. D.	Location	Swing
On	-346	Valve	Schnider st opp Pole 17676	oo
Off	-346			
On	-412	A/B	A/B Pole 328	+4
Off	-416	MEN		
On	-505	Gate	Fence G. James	+oo
Off	-505	Post	mechanical W/shop	
On	-384	Conduit	Flood Light @	+1
Off	-385		Above	
On	-436	MEN	Pole 20872	+6
Off	-442			
On	-458	Pole	Trafic lights cnr	oo
Off	-458		sir kingford smith	
On	-449	MEN	Pole 49033	+6
Off	-454			
On	-432.	MEN	A/B. Pole 20931	+6
Off	-428		Kingsford Smith drive	
On	-574	Fence	Ford. " " "	oo
Off	-574			
On	-394	MEN	Pole 20934	+4
Off	-398			
On	-430	Fence	Ford. Secy Gate	oo
Off	-430			
On	-474	Fence	opp Pole 20939	oo
Off	-474			
On	-164	Water	GJames	-1
Off	-163	Meter	1082 Kingsford Smith	
On	-244	MEN	A/B Pole 20940	+1
Off	-245			
On	-203	HP	G James	oo
Off	-203		1028 Kingsford smith	

TESTED BY ..... GJ

Revision 09/28/95

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection Interference Survey Results Form

Project Bartleys Hill **Unit Reading** ..... **Date** 28-10-96

	Reading	Test Point I. D.	Location	Swing
On	-1020	T. Pt	Cnr Randel Kingsford.	14
Off	-859	12	Smith Rds	
On	-451	MEN	Pole 31099	5
Off	-456		Kingsford Smith drv.	
On	-510	MEN	Pole @ Pomp Stn	00
Off	-510		Kingsford Smith	
On	-475	Earth	Bond. Pump Stn	13
Off	-482		SP146	
On				
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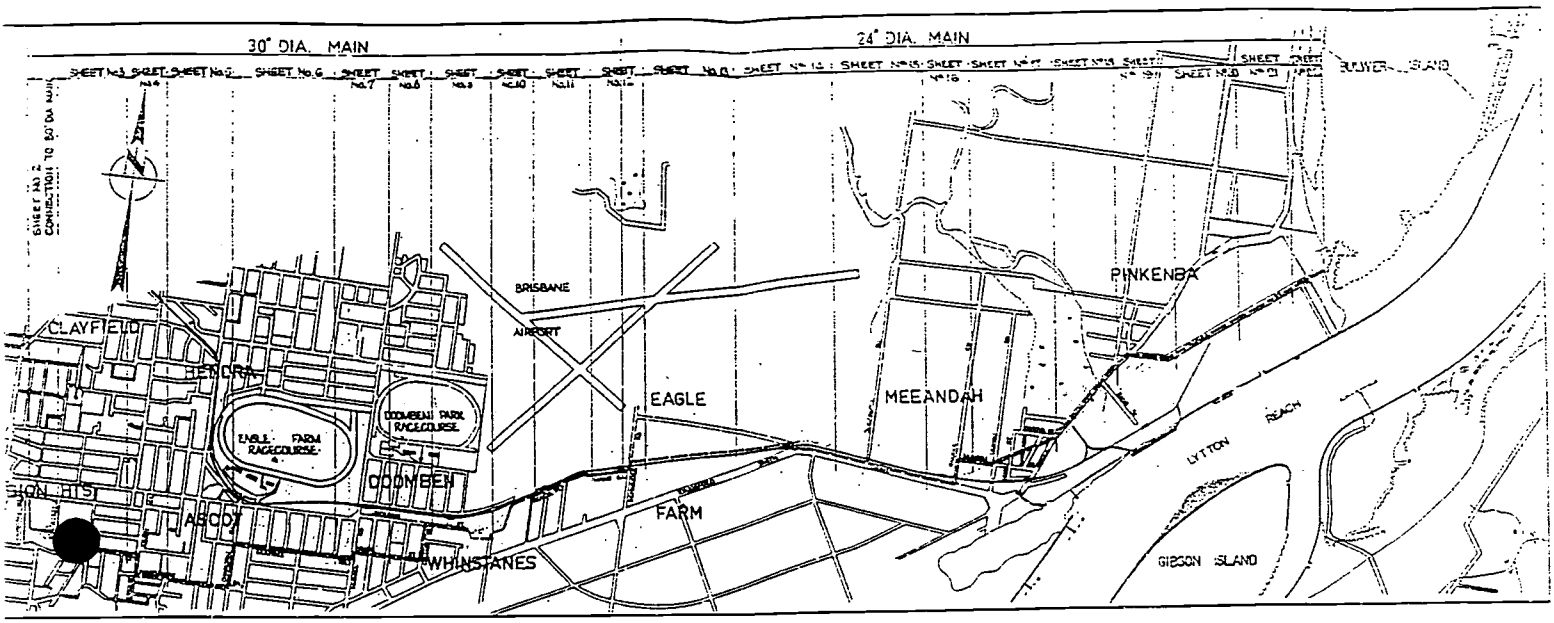
TESTED BY ..... J T .....

Revision 09/28/95



LOCALITY PLAN SHOWING ROUTE OF 30"-24" DIA. MAIN

SCHEDULE OF DRAWINGS

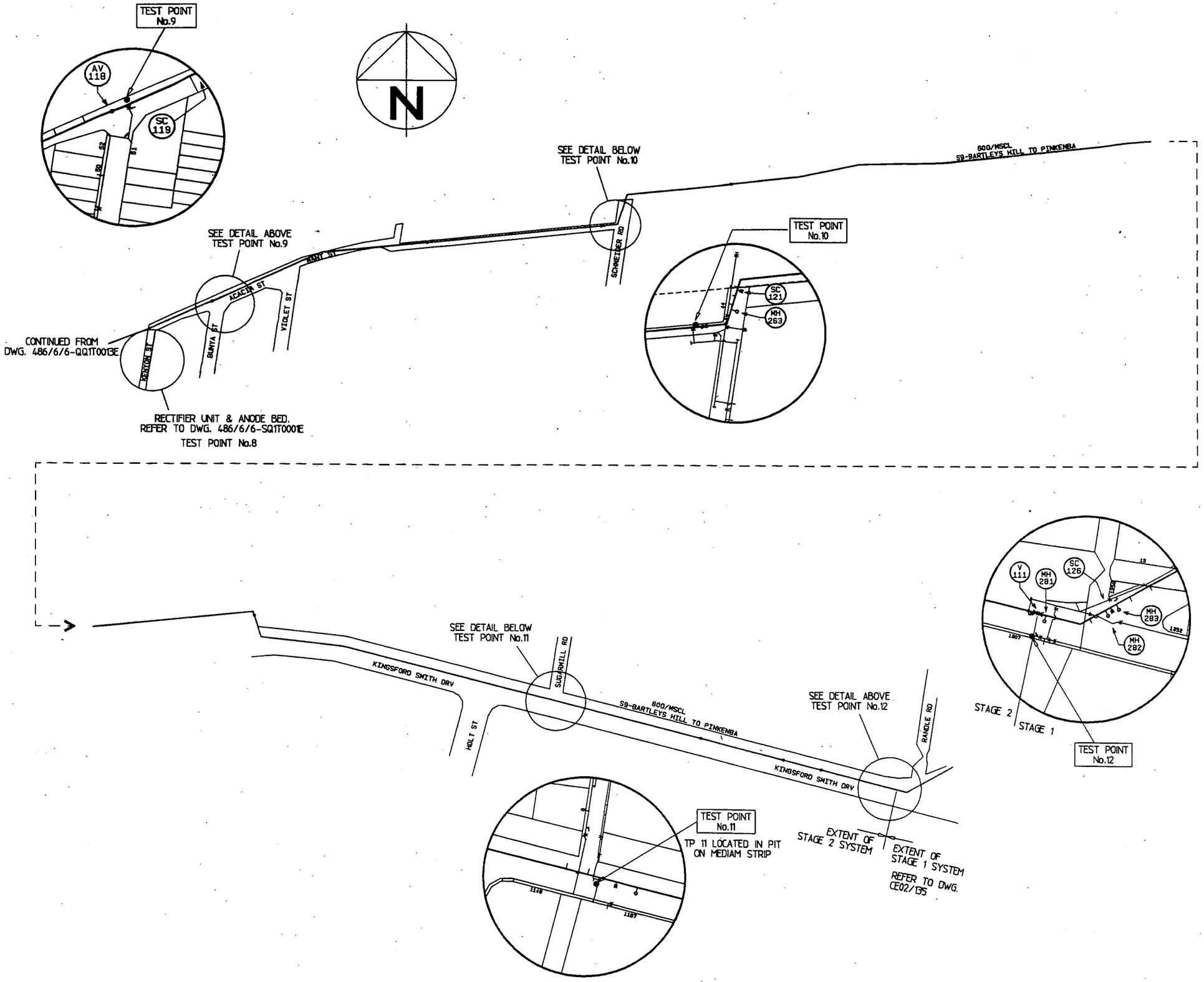
DRAWING NO	TITLE	CHAINAGE	SHEET NO	DRAWING NO	TITLE	CHAINAGE	SHEET NO
2/10·2217	BARTLEYS HILL TO INDUSTRIAL AREA PINKENBA CONNECTION TO 30" DIA. MAIN	00'-417·08'	2	2/10·2233	BARTLEYS HILL TO INDUSTRIAL AREA PINKENBA	16611·34'-18527·86'	14
2/10·2218		00'-1554·09'	3	2/10·2234		18527·86'-20427·86'	15
2/10·2219		1554·09'-2729·07'	4	2/10·2235		20427·86'-21576·69'	16
2/10·2220		2729·07'-4737·67'	5	2/10·2236		21576·69'-23554·60'	17
2/10·2221		4737·67'-6789·90'	6	2/10·2237		23554·60'-25268·97'	18
2/10·2222		6789·90'-7992·92'	7	2/10·2238		25268·97'-26408·49'	19
2/10·2223		7992·92'-9351·13'	8	2/10·2239		26408·49'-28101·69'	20
2/10·2224		9351·13'-11297·93'	9	2/10·2240		28101·69'-29889·15'	21
[redacted]		11297·93'-12067·31'	10	2/10·2241		29889·15'-30751·53'	22
2/10·2230		12067·31'-13267·31'	11	2/10·2242		ANCHOR BLOCKS	23
2/10·2231		13267·31'-14611·34'	12	2/10·2243	BARTLEYS HILL TO INDUSTRIAL AREA PINKENBA	ANCHOR BLOCKS	24
2/10·2232		14611·34'-16611·34'	13	2/10·2244	BARTLEYS HILL TO INDUSTRIAL AREA PINKENBA	PIPE LIST	25

Chief Engineer & Manager

Deputy Chief Engineer & Manager

Construction Engineer

Engineer i/c Design



NOTES

No	DATE	AMENDMENT	INITIALS
A	11.96	MODIFIED	O.L.P.
0	9.96	ISSUED FOR COMMENT	O.L.P.

AMENDENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF TECHNOLOGY SERVICES DATE:

DIRECTOR OF PLANNING & DESIGN DATE:	DIRECTOR OF WATER SUPPLY DATE:	DIRECTOR OF CONSTRUCTION DATE:

DESIGN	J.S.	5.9.96	ENGINEER IN CHARGE
DRAWN	O.L.P.	5.9.96	SUPERVISING ENGINEER
TRACED			
CHECKED			A2 REDUCED
REFERENCES			
CADD FILE No. 66T0014A			
THIS DRAWING WAS PRODUCED USING QIKDRAW			

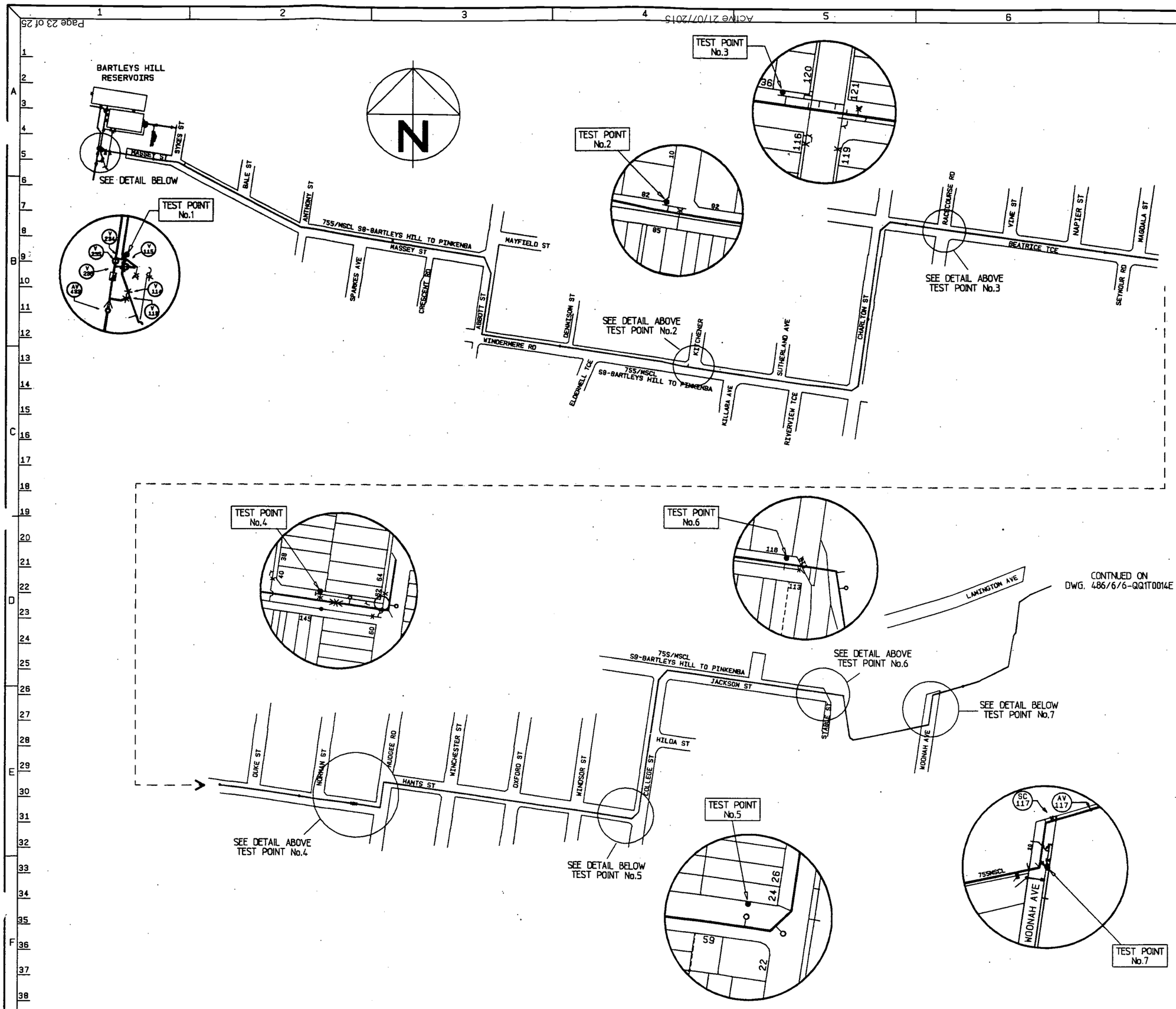
Brisbane City

Brisbane Water
ASSET MANAGEMENT PROFESSIONAL SERVICES

PROJECT:
CATHODIC PROTECTION
S9 - BARTLEY'S HILL TO PINKENBA 755 TRUNK MAIN

TITLE:
CATHODIC PROTECTION
TEST POINTS

SCALE:	No. 2 OF 2 SHEETS	
DRAWING No. 486/6/6-QQ1T0014E		AMEND. A



NOTES

No	DATE	AMENDMENT	INITIALS
0	9.96	ISSUED FOR COMMENT	O.L.P.

AMENDENT & ISSUE REGISTER

MANAGER DATE:	DIRECTOR OF TECHNOLOGY SERVICES DATE:
DIRECTOR OF PLANNING & DESIGN DATE:	DIRECTOR OF WATER SUPPLY DATE:
DIRECTOR OF CONSTRUCTION DATE:	

DESIGN	J.S.	5.9.96	ENGINEER IN CHARGE
DRAWN	O.L.P.	5.9.96	SUPERVISING ENGINEER
TRACED			
CHECKED		18.12.96	A2 REDUCED

REFERENCES

CADD FILE No. 66T00130

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Brisbane City

Brisbane Water

ASSET MANAGEMENT PROFESSIONAL SERVICES

PROJECT:

CATHODIC PROTECTION
S9 - BARTLEY'S HILL TO PINKENBA 755 TRUNK MAIN

TITLE:

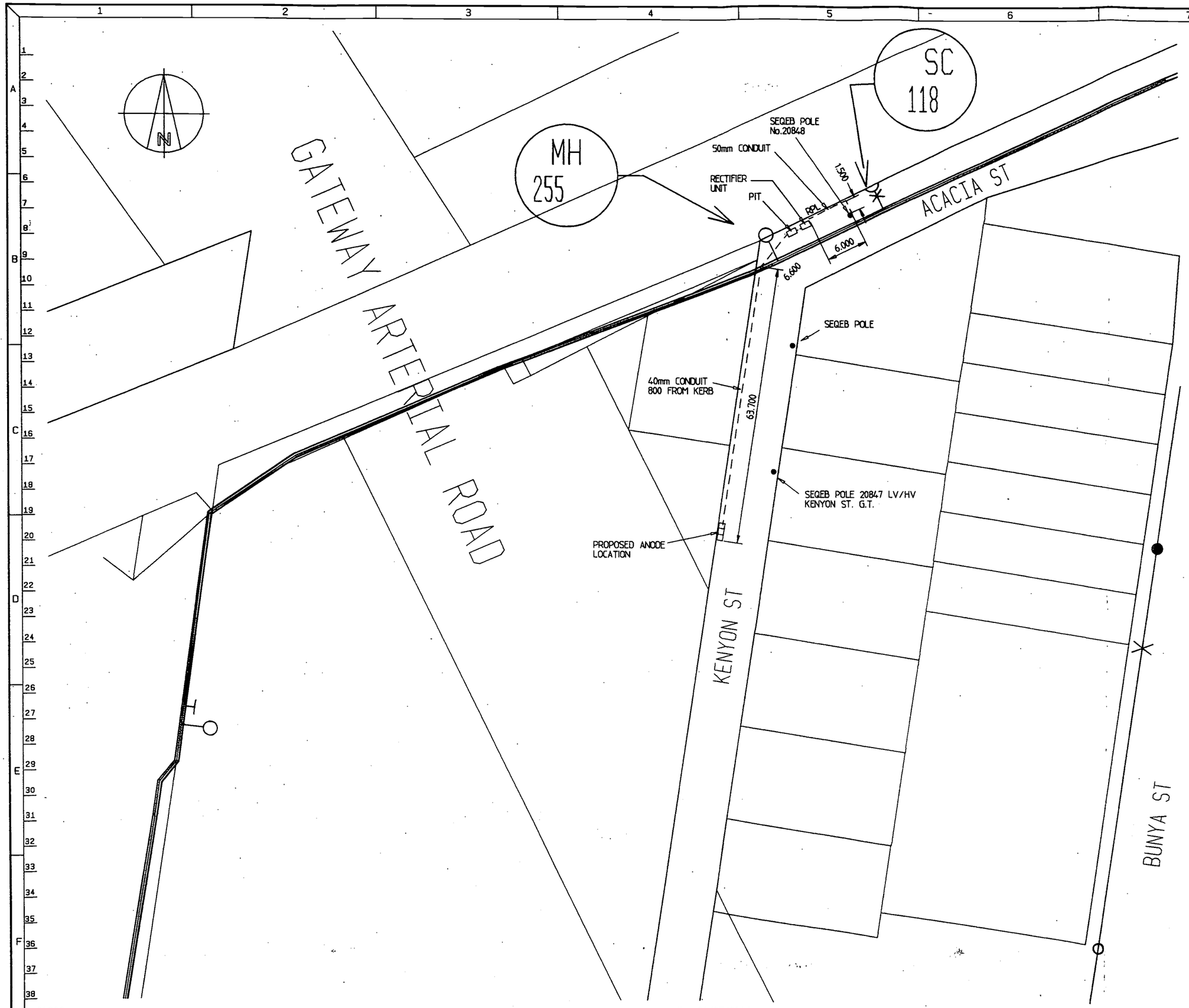
CATHODIC PROTECTION
TEST POINTS

SCALE:

No. 1 OF 2 SHEETS

DRAWING No. 486/6/6-QQ1T0013E

AMEND. 0



NOTES

No	DATE	AMENDMENT	INITIALS
B	11.96	MODIFIED	O.L.P.
A	9.96	MODIFIED	O.L.P.

AMENDENT & ISSUE REGISTER

MANAGER DATE:		DIRECTOR OF TECHNOLOGY SERVICES DATE:	
DIRECTOR OF PLANNING & DESIGN DATE:	DIRECTOR OF WATER SUPPLY DATE:	DIRECTOR OF CONSTRUCTION DATE:	
DESIGN	J.S.	22.1.96	ENGINEER IN CHARGE
DRAWN	O.L.P.	23.1.96	SUPERVISING ENGINEER
TRACED			
CHECKED			A2 REDUCED
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CADD FILE No. 66T0001B			
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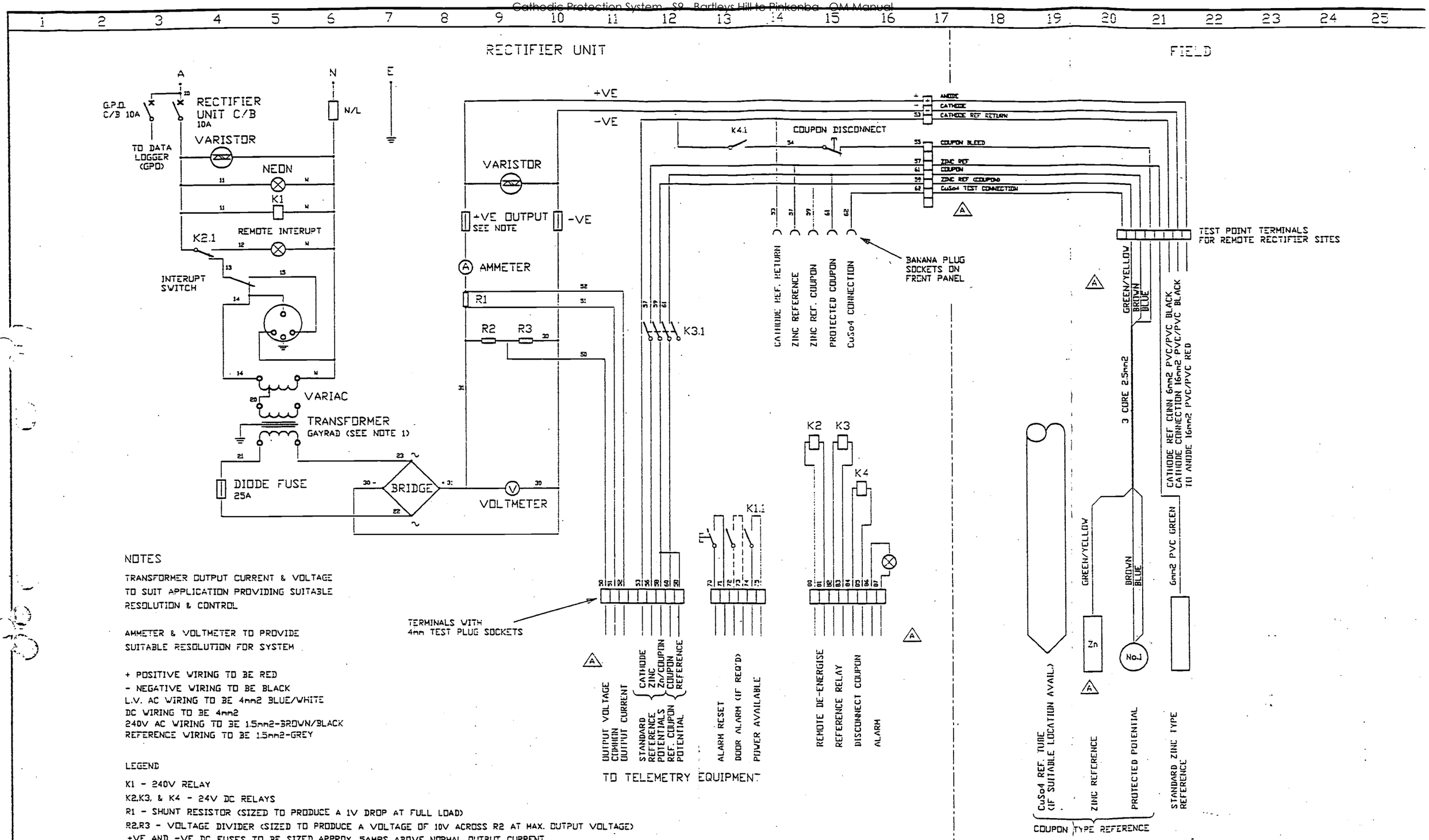
BRISBANE CITY COUNCIL
BRISBANE WATER
TECHNOLOGY SERVICES BRANCH
TECHNICAL SERVICES

PROJECT:
CATHODIC PROTECTION
BARTLEYS HILL TO PINKENBA
TRUNK MAIN

TITLE:
CATHODIC PROTECTION
RECTIFIER UNIT No.2

SCALE: | No. 1 OF 1 SHEETS

DRAWING No. 486/6/6-SQ1T0001E | AMEND. B



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

LEGEND

K1 - 240V RELAY
K2,K3, & K4 - 24V DC RELAYS
R1 - SHUNT RESISTOR (SIZED TO PRODUCE A 1V DROP AT FULL LOAD)
R2,R3 - VOLTAGE DIVIDER (SIZED TO PRODUCE A VOLTAGE OF 10V ACROSS R2 AT MAX. OUTPUT VOLTAGE)
+VE AND -VE DC FUSES TO BE SIZED APPROX. 5AMPS ABOVE NORMAL OUTPUT CURRENT

NO.	BY	DATE	REVISION	CHECK	APPR
A	R.L.	18.10.93	CHANGES AS SHOWN		
0	R.L.	25.8.93	ISSUED FOR CONSTRUCTION		

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

PROJECT: STANDARD CATHODIC PROTECTION

TITLE: RECTIFIER UNIT WITH DATA LOGGING FACILITIES WIRING DIAGRAM

	NAME	DATE		NAME	DATE	SCALE	SIZE
DRAWN	R.L.	3.8.93	SUPER. ENG.	M.J.	25.8.93		A3
DESIGN	J.S.	3.8.93	SENIOR ENG.				
CHECKED	J.S.	25.8.93	ELECT. ENG.				AMEND.

DRAWING No. 486/6/25-AA1C0021E

ACADRIZ FILE No. A625C21

A