Brisbane Water
Engineering Services

□ Electrical □ Mechanical □ Water Meters
5 Bunya Street Eagle Farm Q 4009
Ph. (07) 3403 1849
Fx. (07) 3403 1898
30 th October 1995

OPERATING MANUAL FOR:

NORTH PINE TO ASPLEY TO BRACKEN RIDGE 1060 DIA TRUNK WATER MAIN
CATHODIC PROTECTION SYSTEM

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
WATER MAINTENANCE SECTION

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 and 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:	Dia 1060 mild steel cement lined.
Coating:	Medium Density Fusion Bonded Polyethylene
Length:	5.6 km
Location:	From Gympie rd at Sth PINE RIVER to Bracken Ridge Reservoir to Aspley Reservoir. UBD 109 E4 P5 , 119 H9

Construction Drawings:

486/6/6–LV10015E	Mains Route Plan
486/6/25–AA1C0021E	Standard Rectifer With Data Logging Failities Wiring Diagram

(4.0) CATHODIC PROTECTION DETAILS

(4.1) Type of Cathodic Protection: Impressed Current.

(4.2) Rectifier: Special 32 Volt, 50 amp direct current output enclosed in a stainless steel switchboard. Rectifier has a 240V supply from the Flow Monitoring Station, Cnr Denning st and Barbour rd. A second rectifier is installed at Graham st Carseldine , and is a standard 32 volt 10 amp unit in a stainless steel switchboard fed from the toilet block in the Rotary park cnr. Graham st and Gympie rd.

(4.3) Cathode: The cathode point is located on the 1660 dia mian next to test point adjacent to Bowls club in Nemira 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 200 metres from Gympie rd, and 200 meters from the trunk mains in the creek easement 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.

(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 twenty three test points have been installed for details see dwg no. CE02/136.

(4.6) Associated Drawings:

Cathodic Protection Details	– 2/14.213
Cathodic Protection Test Point Details	– 2/14.199
Standard Rectifier Wiring Diagram	– JE02/104

(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.

12th October 1992
Electrical Workshop
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.

13th October 1992
Electrical Workshop
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.

13th October 1992
Electrical Workshop
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:

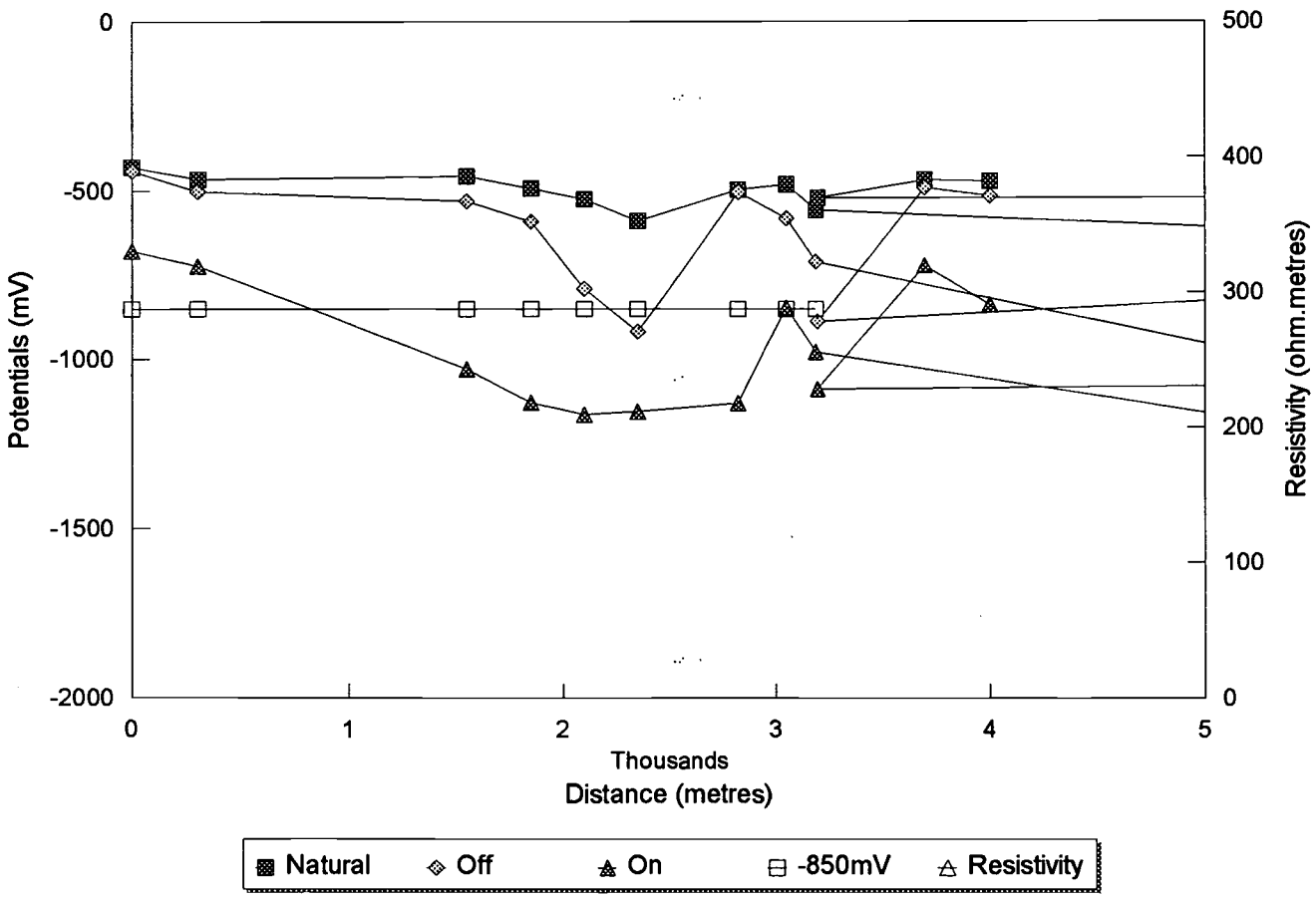
1/ Identify system.
2/ Check system for operation.
3/ Record voltmeter.
4/ Record ammeter.
5/ Record "on" potentials for all test points.
6/ Record "instant off" potentials for all test points.
7/ Record "off" potentials for all test points.
8/ Perform loop resistance and record.
9/ Check and record 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 for "continue to operate" permit if applicable.

System: NORTH PINE TO ASPLEY & BRACKENRIDGE

Cathodic Protection System reference potential and earth resistivity graph.

Test Point number	Distances to T.P.	Potentials to CuSO4 Natural	Off	On	Resistivities at 2 metres
	(metres)	(mV)	(mV)	(mV)	(ohm.metres)
1	0	-430	-440	-676	
2	300	-465	-501	-722	
3	1550	-457	-530	-1030	
4	1850	-492	-590	-1128	
5	2100	-525	-790	-1165	
6	2350	-589	-918	-1154	
7	2825	-495	-503	-1130	
8	3050	-480	-580	-847	
9	3190	-555	-710	-980	
10	5250	-613	-987	-1180	
11	6300	-582	-860	-1080	
12	7050	-577	-940	-1192	
13	7177	-585	-1047	-1195	
14	8300	-514	-684	-918	
15	8800	-505	-647	-926	
16	8950	-520	-688	-1057	
17	3200	-519	-889	-1088	
18	3700	-468	-490	-720	
19	4000	-471	-515	-838	

Graph of potentials and resistivity vs pipelength



Rectifier located at 3050M.

Brisbane Water Engineering Services

Electrical Engineering Unit

Ph. 34031838 Fx. 34031839
5 Bunya Street
Eagle Farm Q 4009

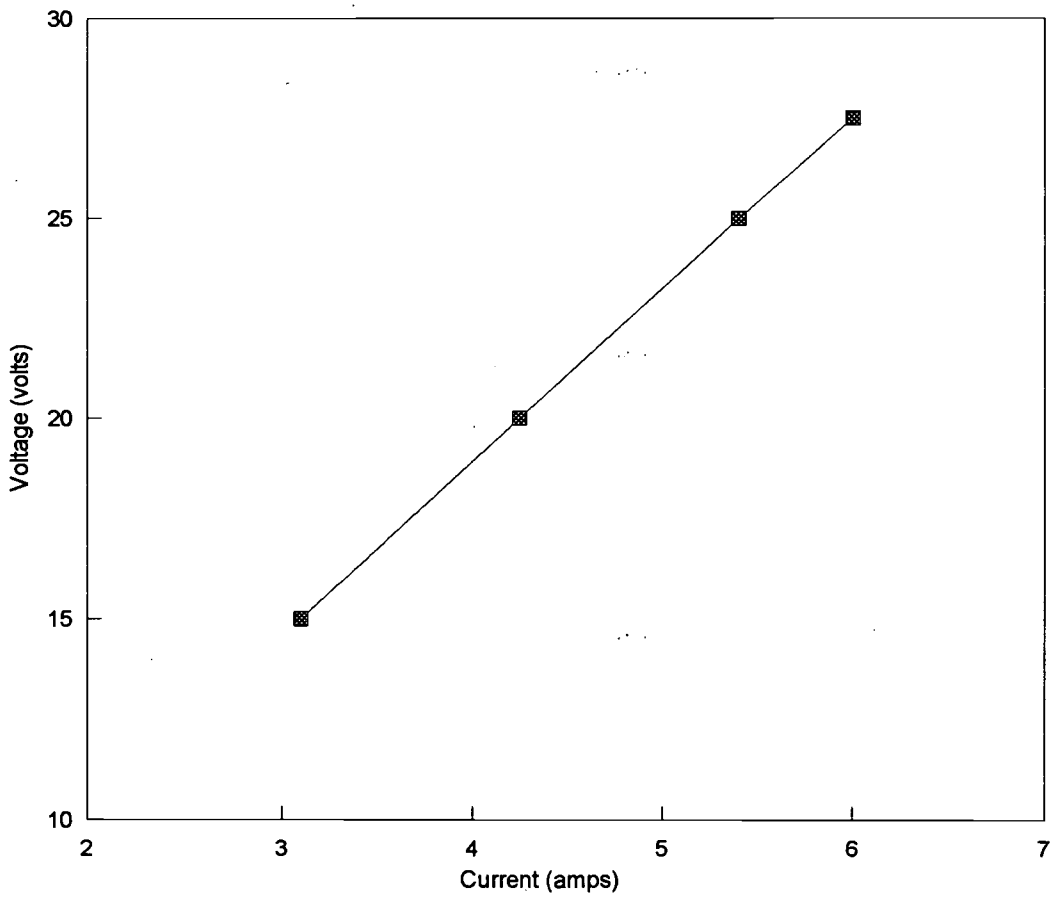
Cathodic Protection System Loop Resistance GRAHAM ST

Date: 20th JUNE 1996
Cathodic Protection System: Ashridge Rd. Darra Rising Sewer Main
System Operating Volts: 2.1 System Operating amps 2.1

Test Voltage: (volts)		Test Current: (amps)	
15		3.1	
20		4.25	
25		5.4	
27.5		6	

Loop Resistance (ohms)
4.62963

Graph of System voltage vs current.



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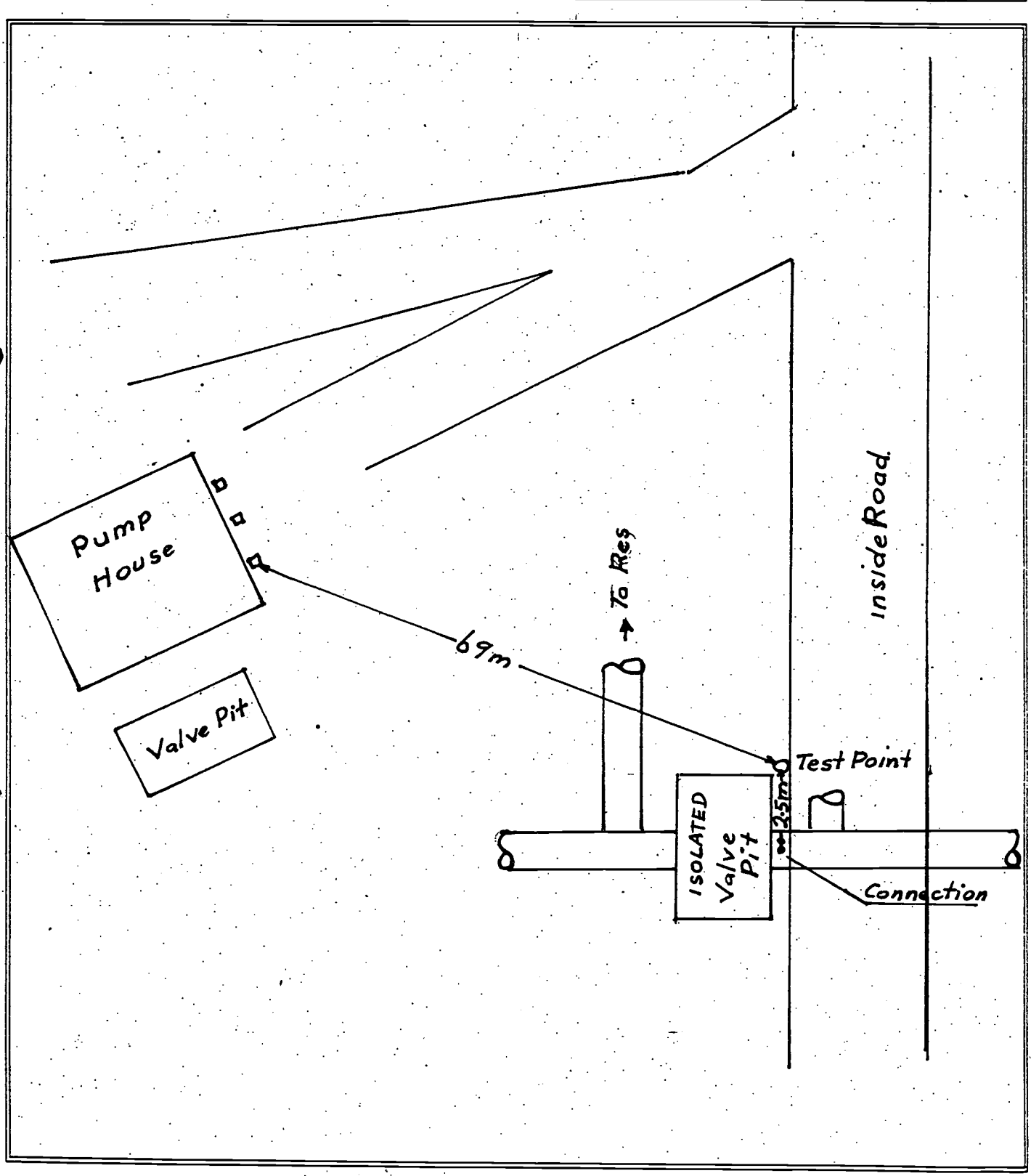
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 6.10.94
Site Plan for: NT. Pine to Aspley Trunk Main
Test Point N°1 Aspley Reservoir UBD II H 7



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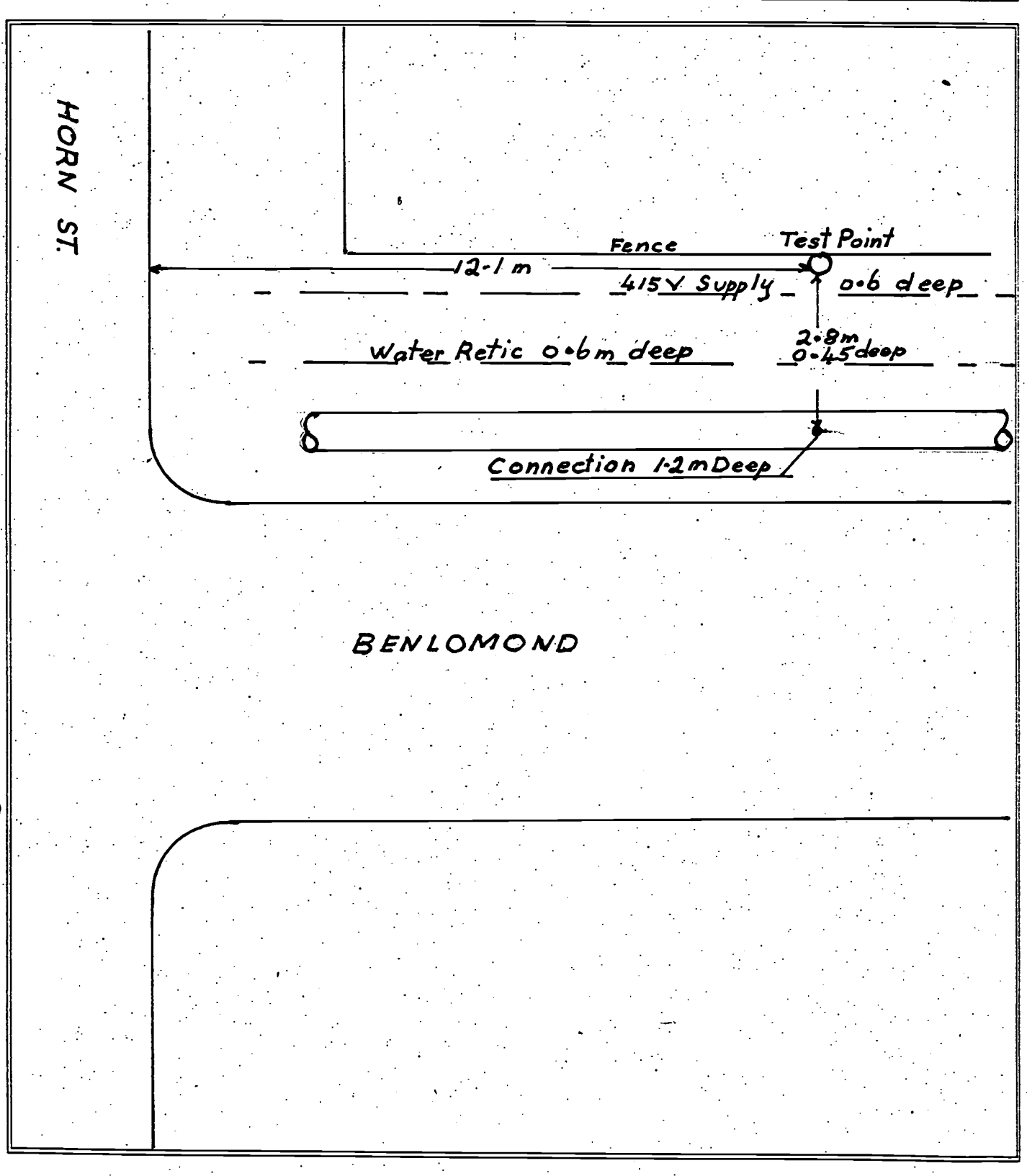
Eagle Farm Pump Station
Electrical Workshop

Date: 6-10-94

Site Plan for: Nt. Pine to Aspley Trunk Main.

Test Point N°2 Benlomond St Horn st UBD 11 F 7



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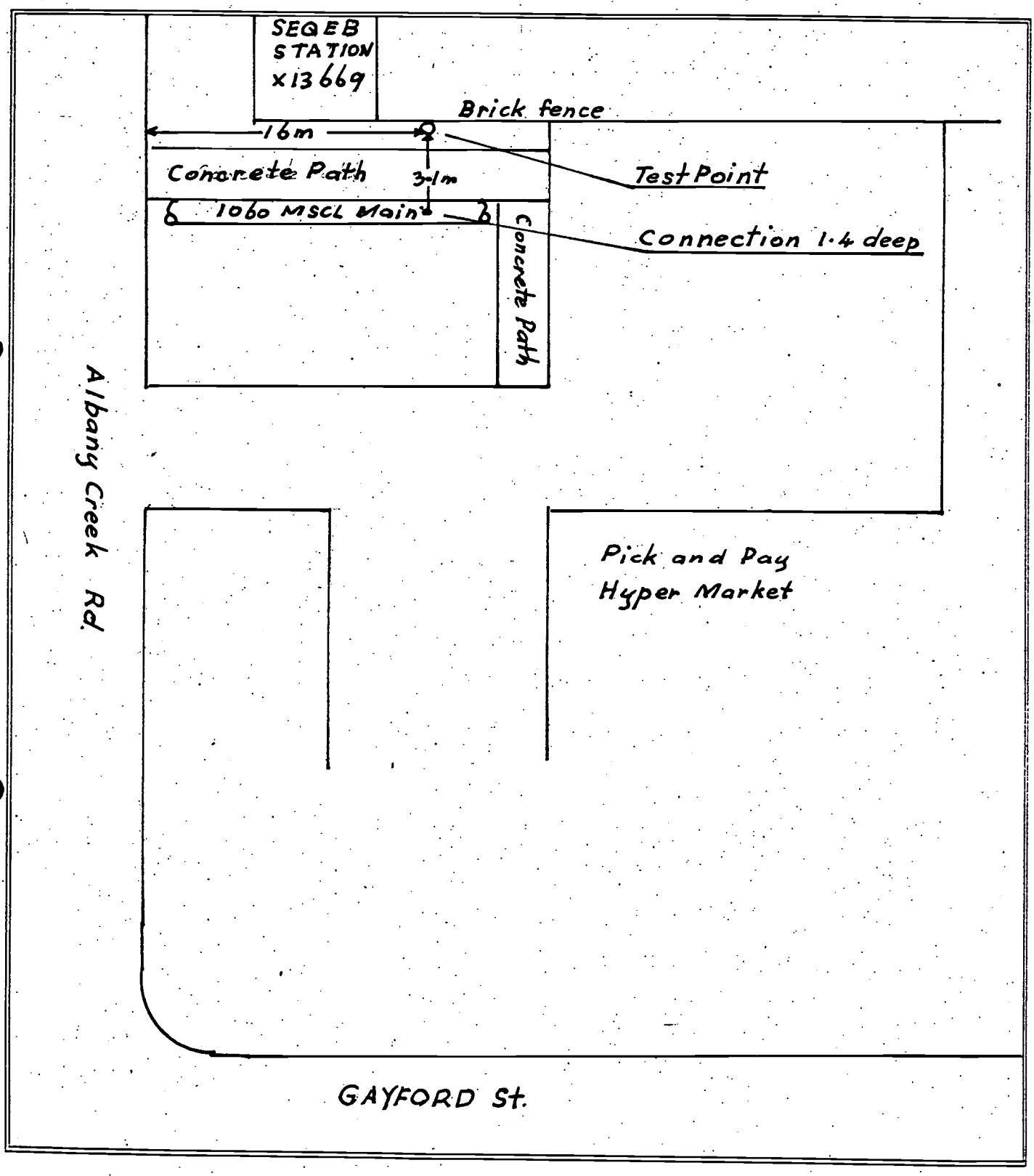
Electrical Workshop

Date: 6-10-94
Site Plan for: Nt Pine to Aspley Trunk Main.

Test Point No 3 ALBANY CREEK Rd UBD 11 D7



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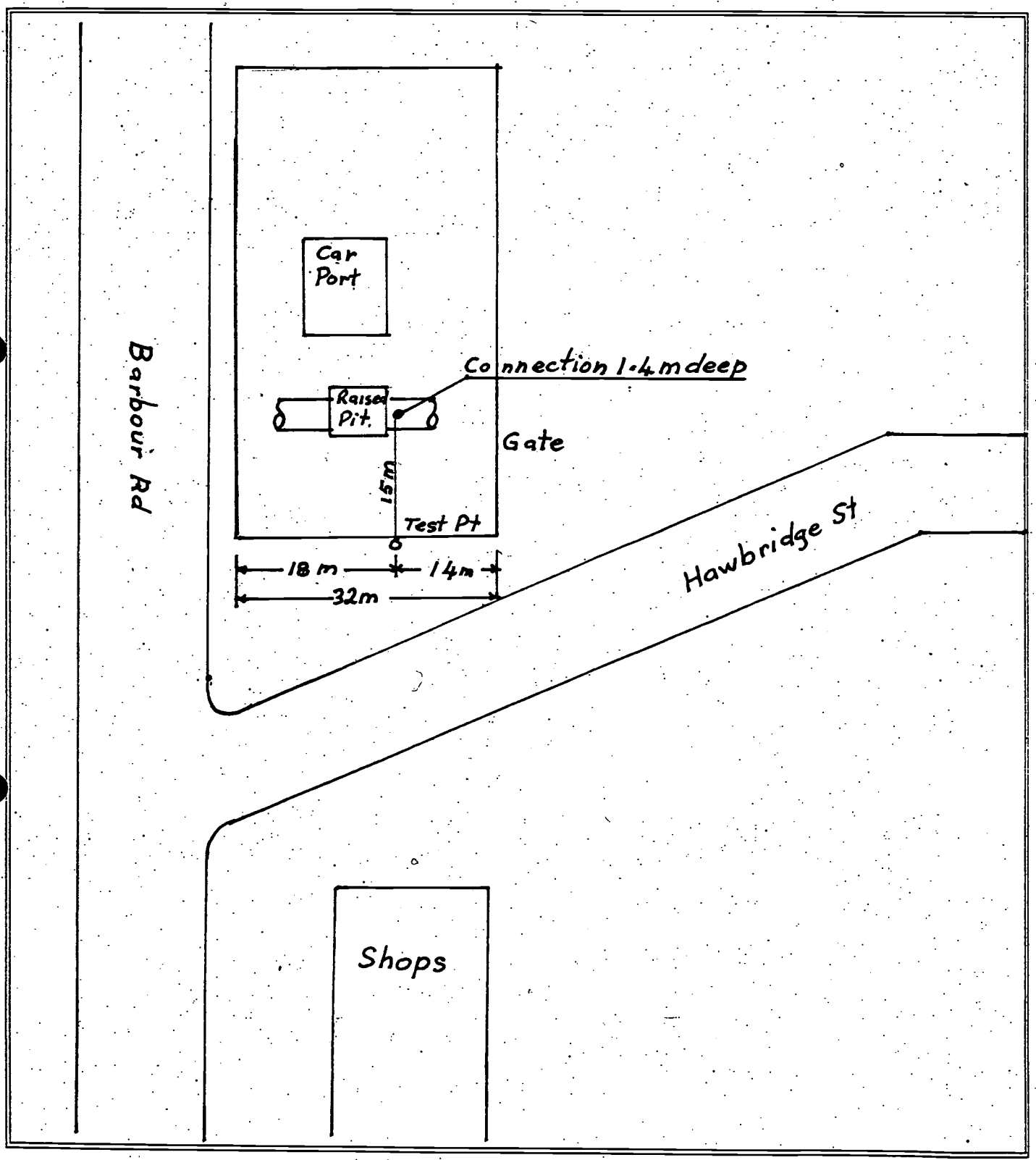
Electrical Workshop

Date: 6-10-94
Site Plan for: Nt Pine to Aspley Trunk Main
Test Point N°4 2 Hawbridge St UBD 11 B7



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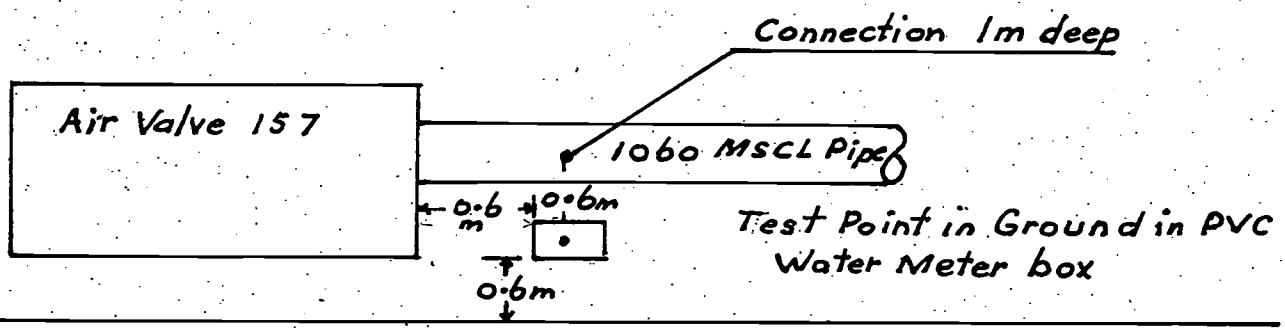
Electrical Workshop

Date: 6 - 10 - 94

Site Plan for: NT Pine - Aspley Trunk Main

Test Point N°5 60 Hawbridge St UBD 11 A7

N° 60 Property Alignment No fence



Hawbridge St.

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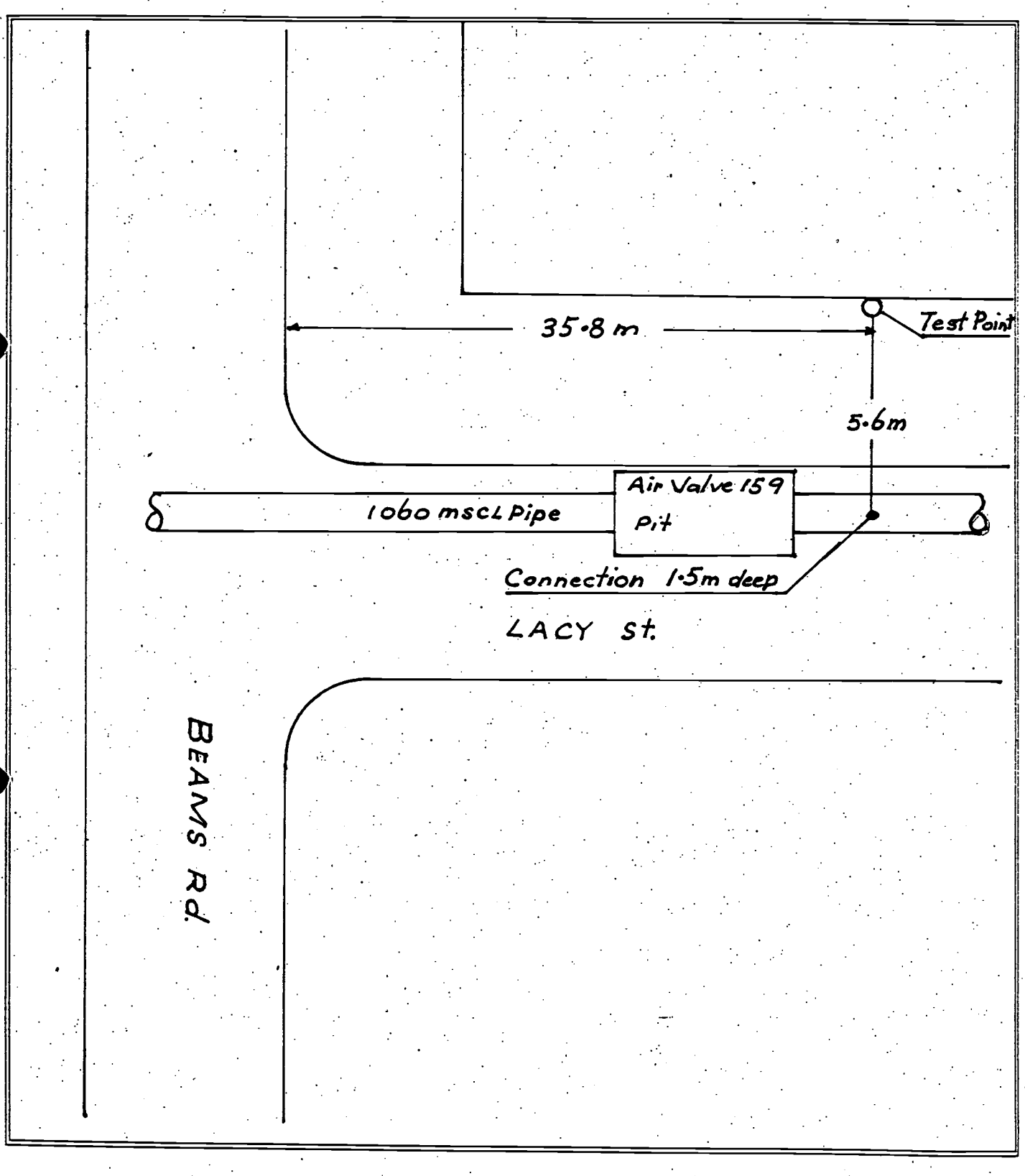
Electrical Workshop

Date: 6-10-94
Site Plan for: NT Pine - Aspley Trunk Main
Test Point N°6 Lacy St near Beams Rd UBD 7 N7



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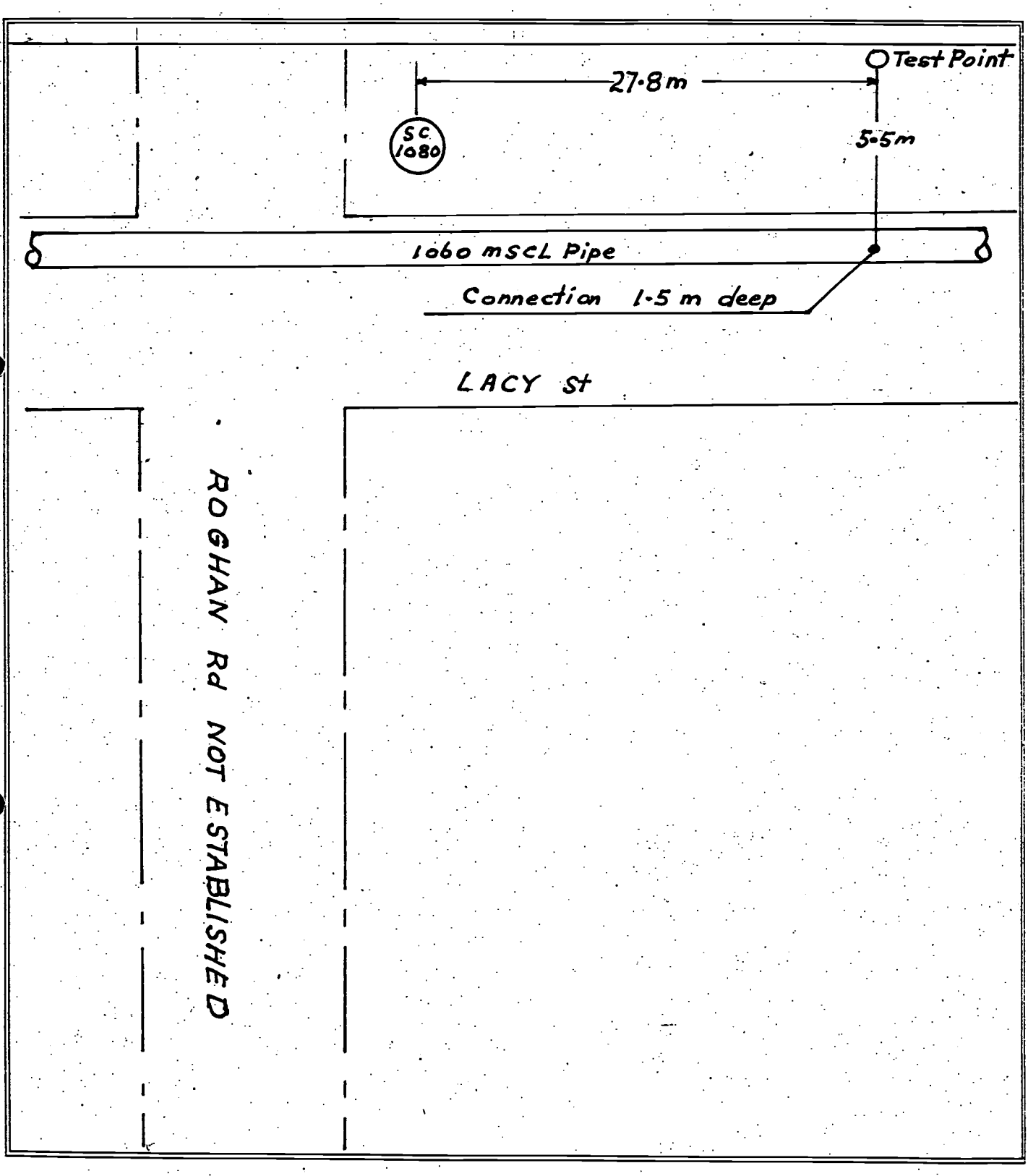
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 10-6-94

Site Plan for: NT Pine - Aspley Trunk Main.

Test Point N°7 Lacy St near Roghan Rd. UBD 7 K7



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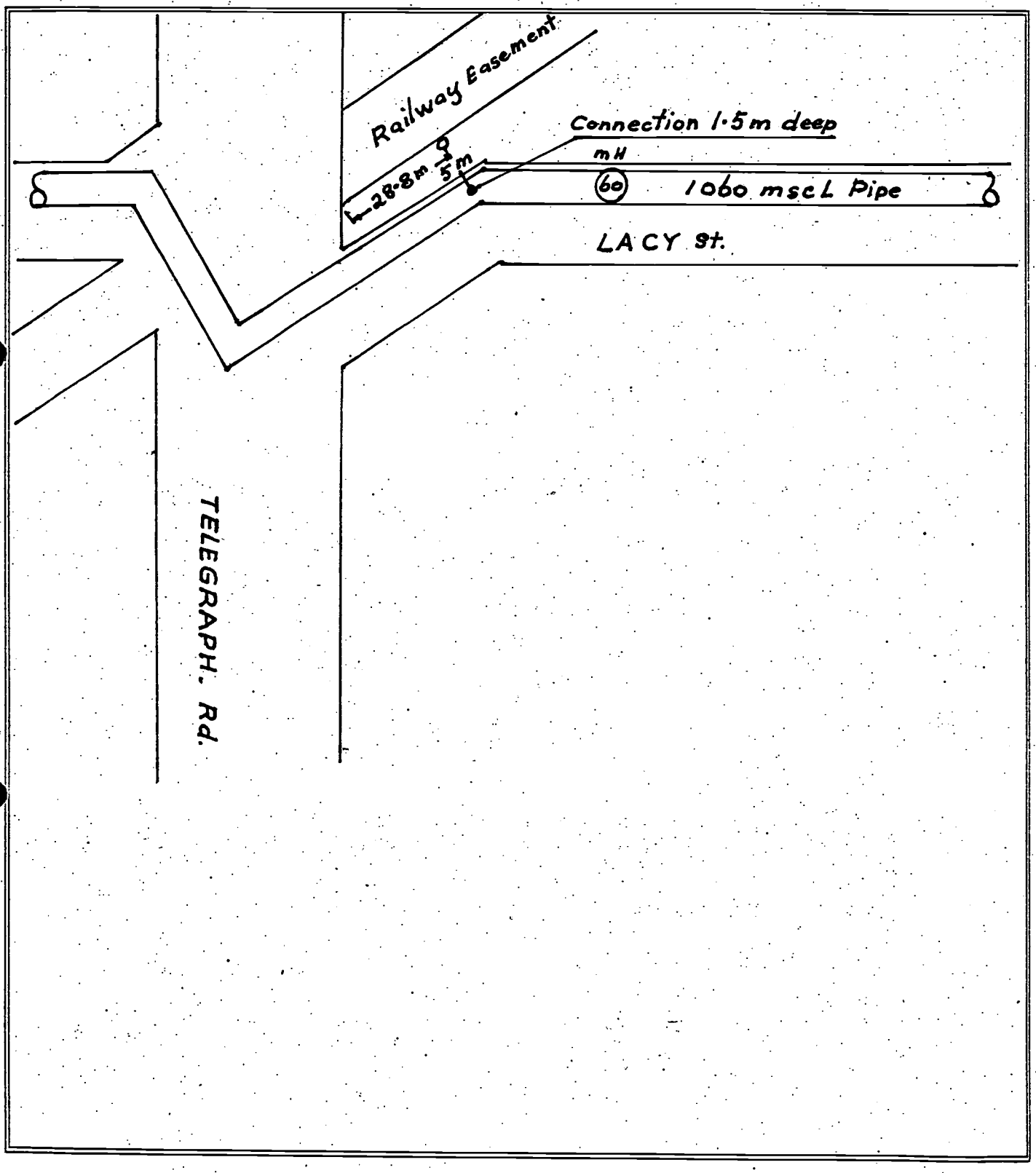
Eagle Farm Pump Station
Electrical Workshop

Date: 10 · 6 · 94

Site Plan for: NT Pine - Aspley Trunk Main

Test Point N°8 Lacy St near Telegraph. Rd UBD 7 H7



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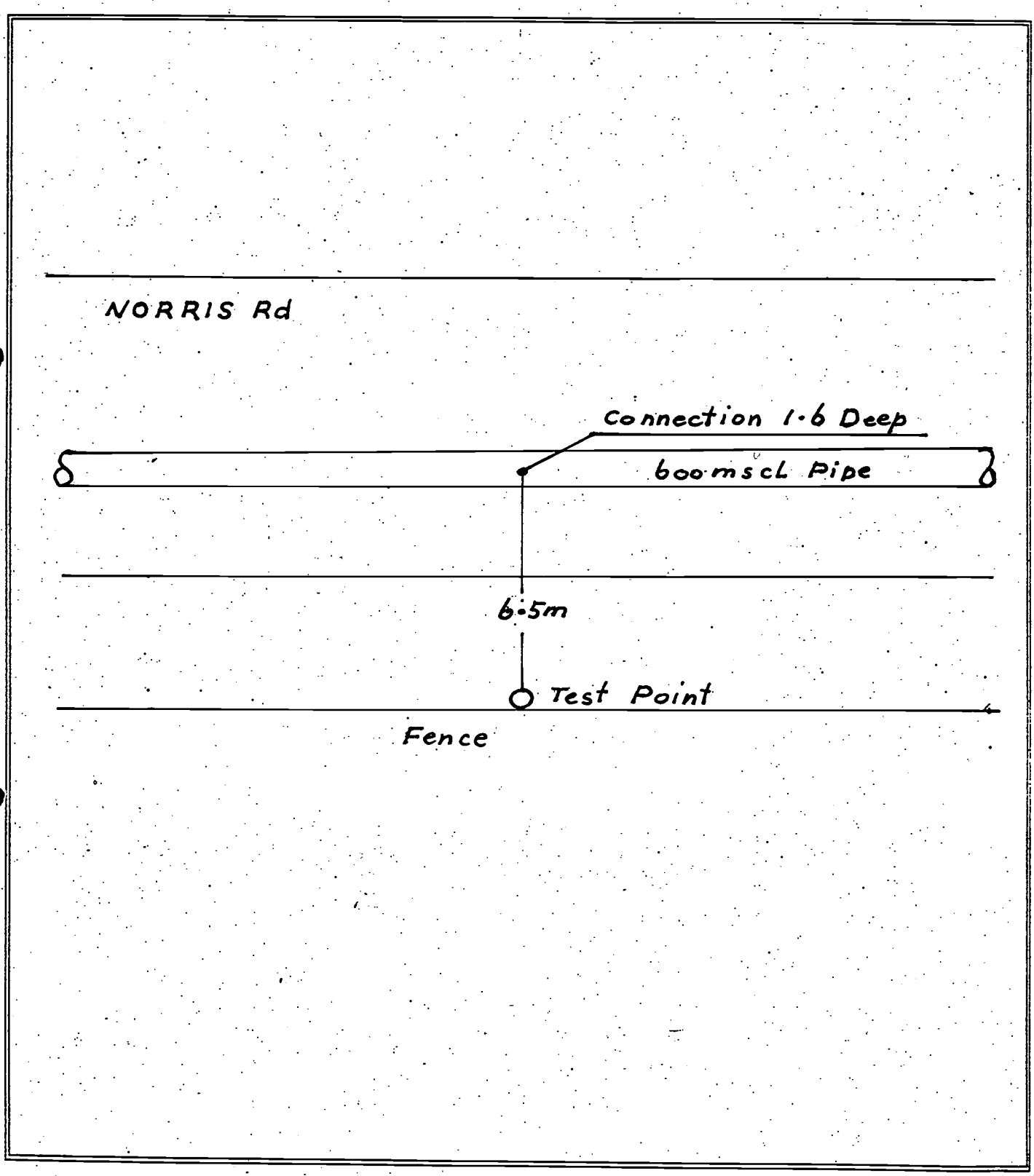
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 10·6·94

Site Plan for: NT Pine - Aspley Trunk Main.

Test Point No 9 146 Norris Rd UBD 7F9



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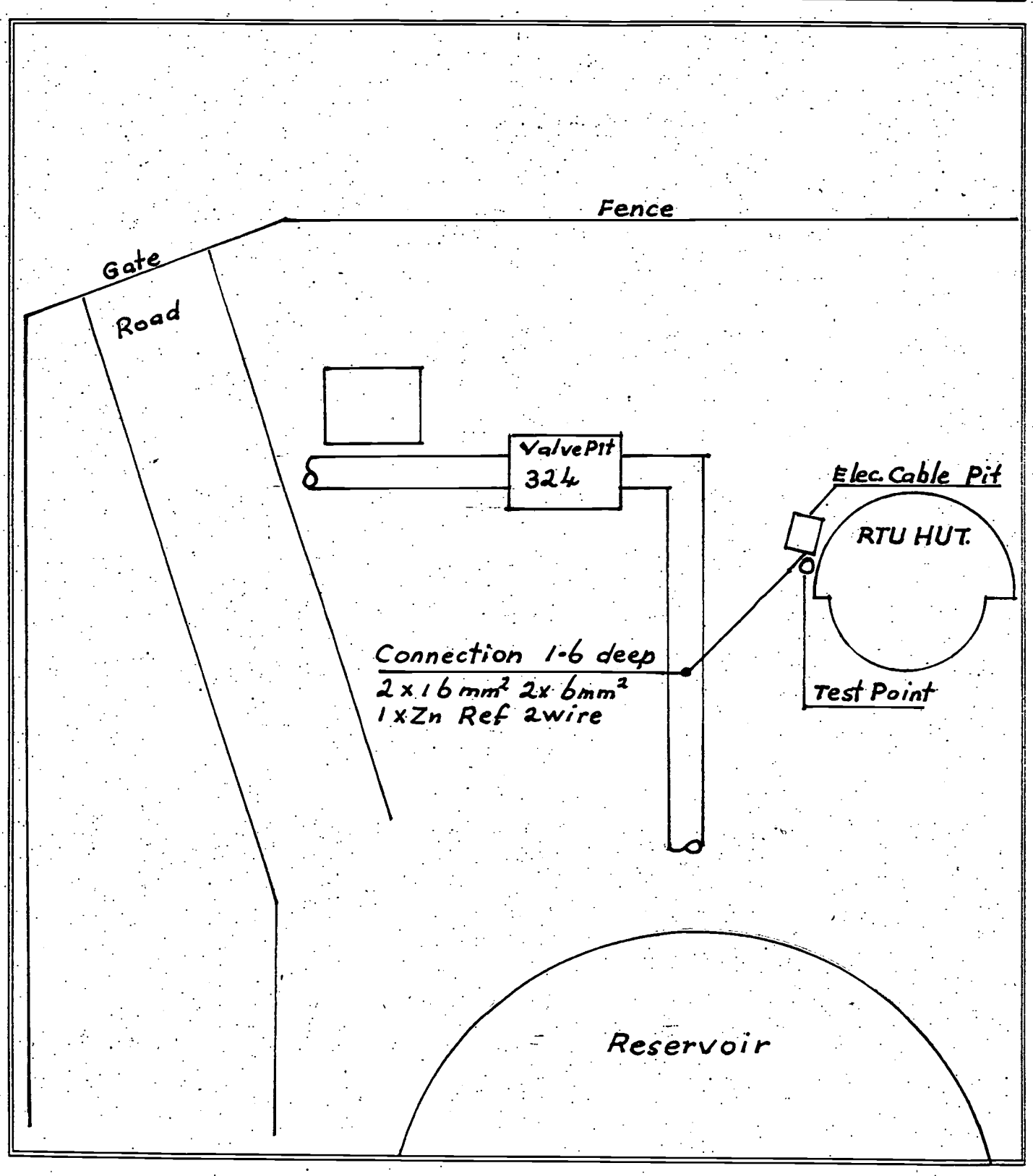
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 10-10-94

Site Plan for: NT Pine - Aspley Trunk Main.

Test Point N°10 Bracken Ridge Reservoir UBD 8F1



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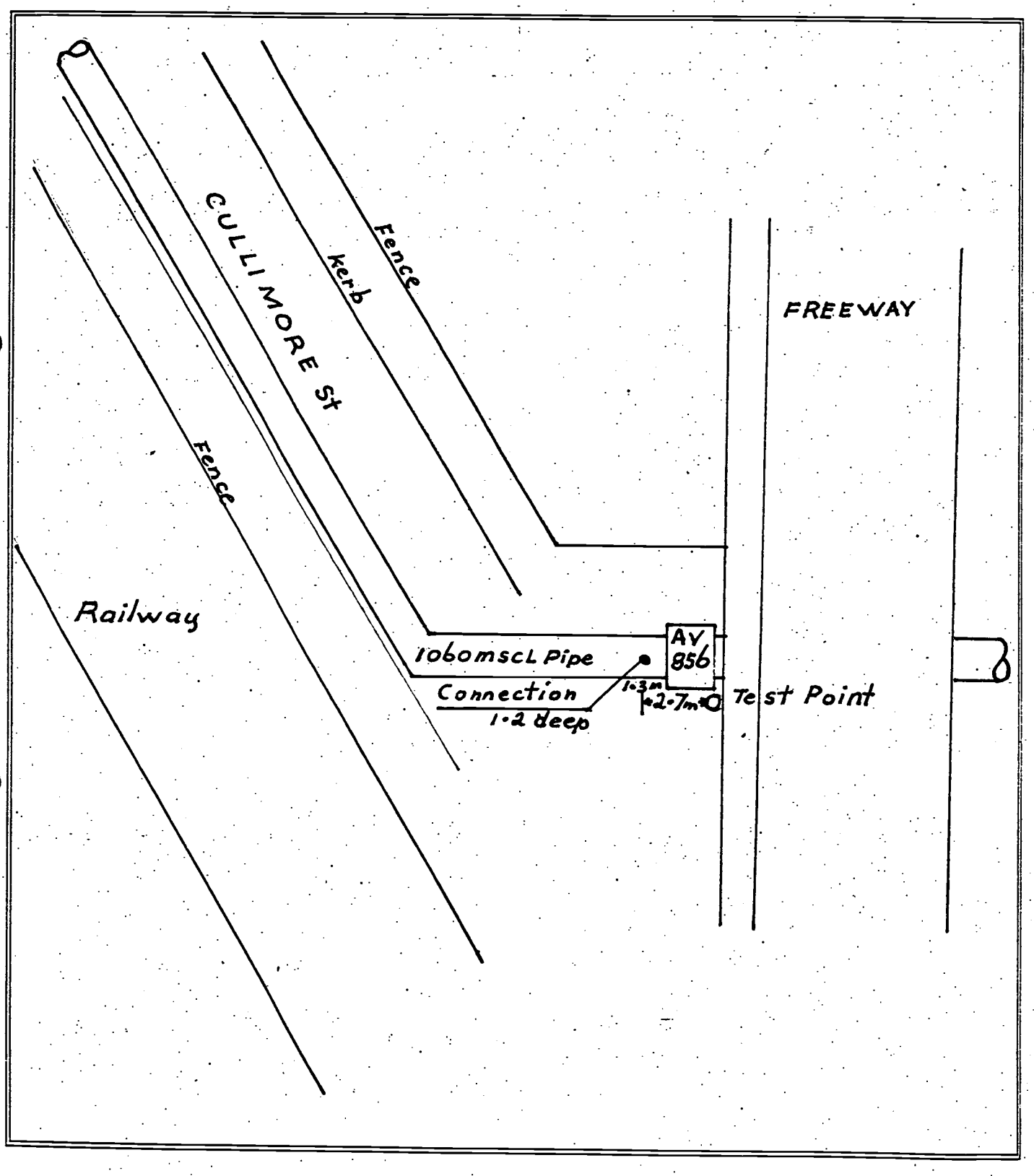
Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 10-10-94
Site Plan for: N.T Pine - Aspley Trunk Main
Test Point N° 11 Cullimore St next to Freeway UBD 7 F 5-5



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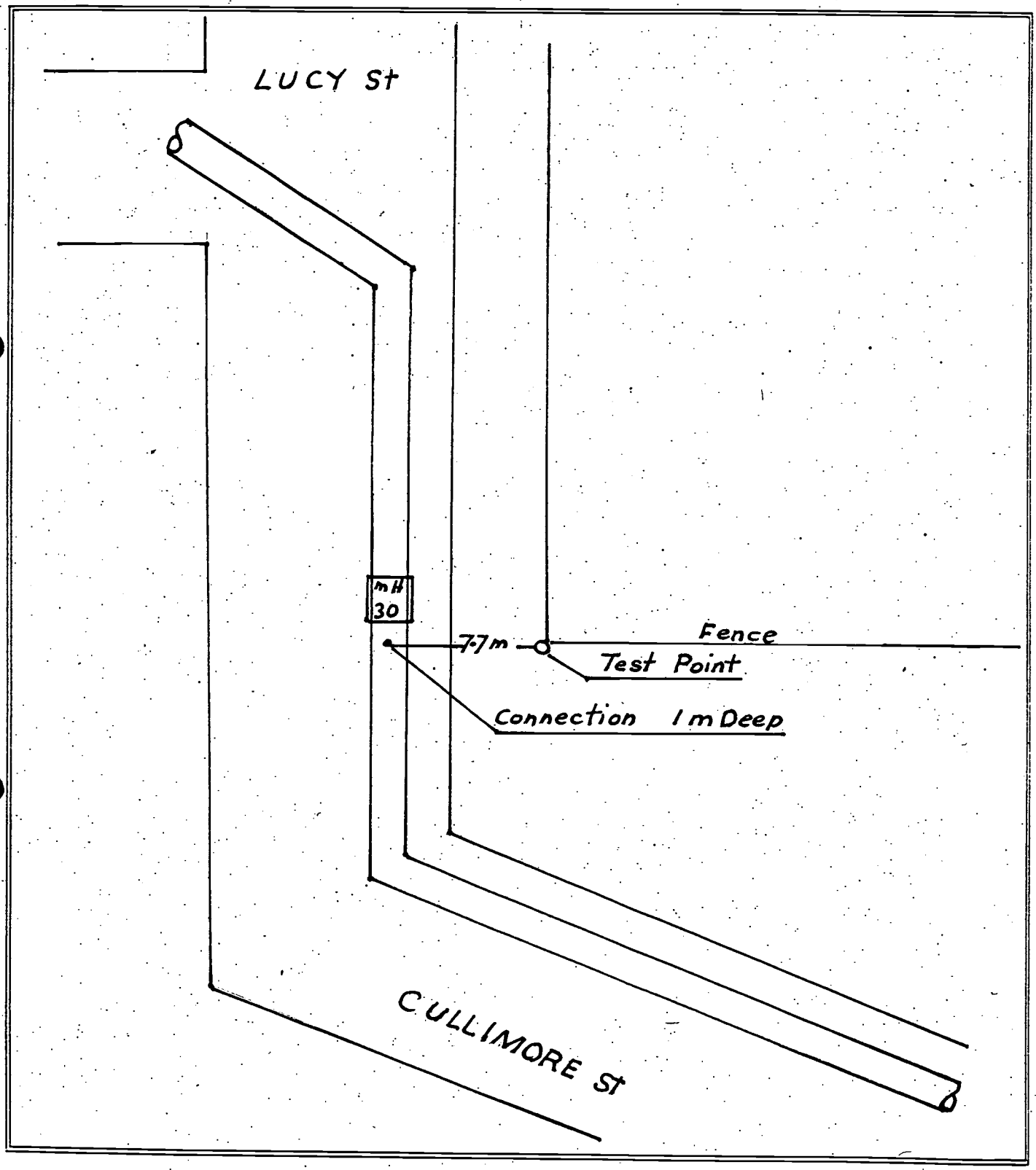
Eagle Farm Pump Station
Electrical Workshop

Date: 10-10-94
Site Plan for: NT Pine - Aspley Trunk Main
Test Point N° 12 30 LUCY St BALD HILLS UBD 7 F5



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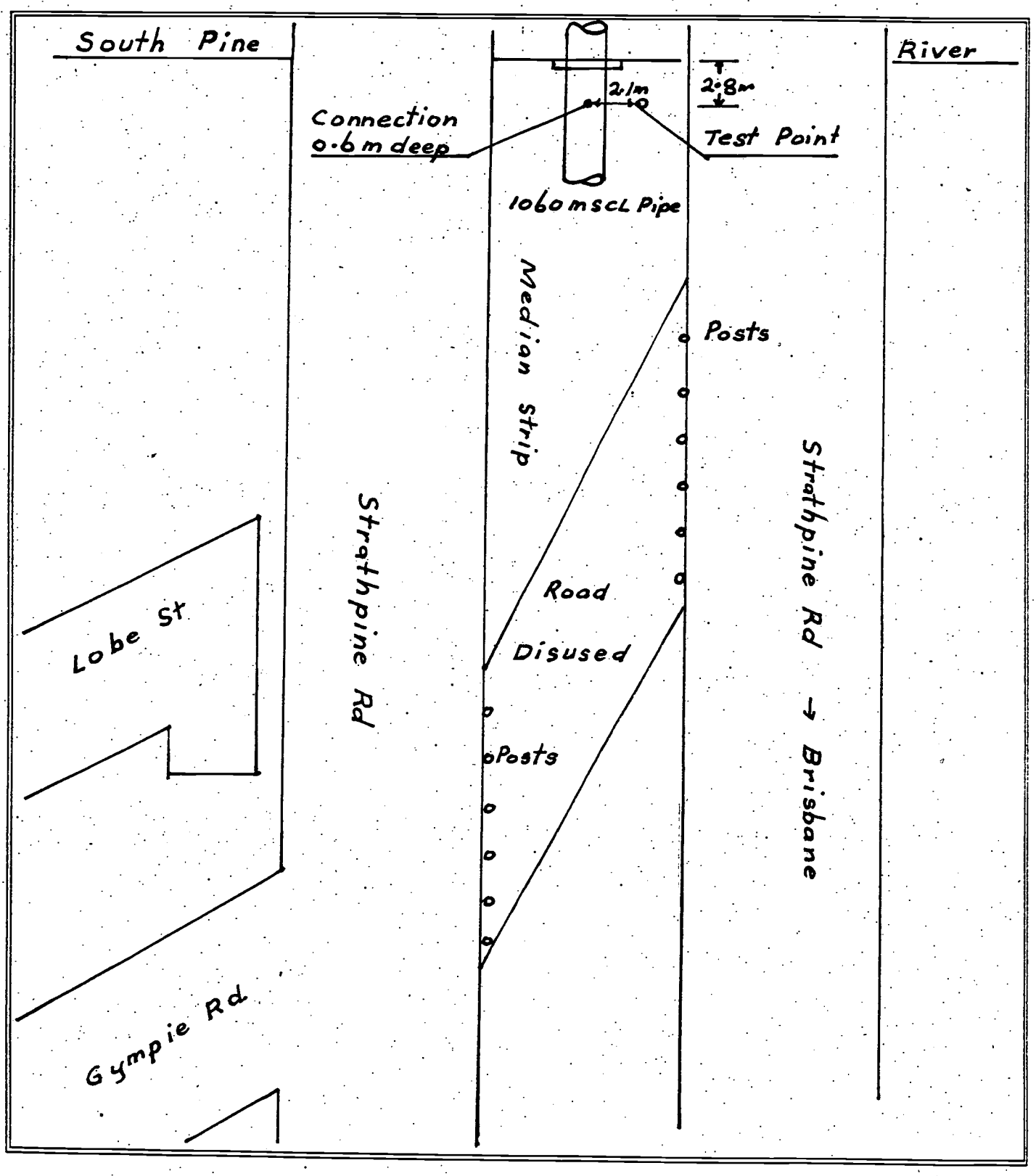
Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 12-10-94

Site Plan for: NT Pine - Aspley Trunk Main U BD 7 E3

Test Point N°13 on Median Strip Strathpine Rd Brisbane Side S. Pine River



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Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date:
Site Plan for: RTU HUT TO SOUTH PINE RIVER

TABLE OF POTENTIALS

Test Point No	Distance to Test Point	Potential to $CuSO_4$ (mV)			Resistance AT 2 METRES
		Natural	OFF	ON	
RTU	00	-430	-580	-876	
1	125		-503	-1130	
2	700		-918	-1547	
3	950		-790	-1165	
4	1200		-590	-1128	
5	1500		-530	-1030	
6	2750		-501	-722	
7	3050		-444	-677	

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Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date:
Site Plan for: RTU - ASPLEY RES

TABLE OF POTENTIALS

Test Point No	Distance to Test Point	Potential to $CuSO_4$ (mV)			Resistance AT 2 METRES
		Natural	OFF	ON	
RTU	00	-414	-690	-880	
1	140		-710	-980	
2	2200		-987	-1180	
3	3250		-860	-1080	
4 RT	4000	-577	-940	-1192	
5	4125		-1047	-1159	
6	5250		-684	-918	
7	5750		-647	-926	
8	5900		-688	-1057	

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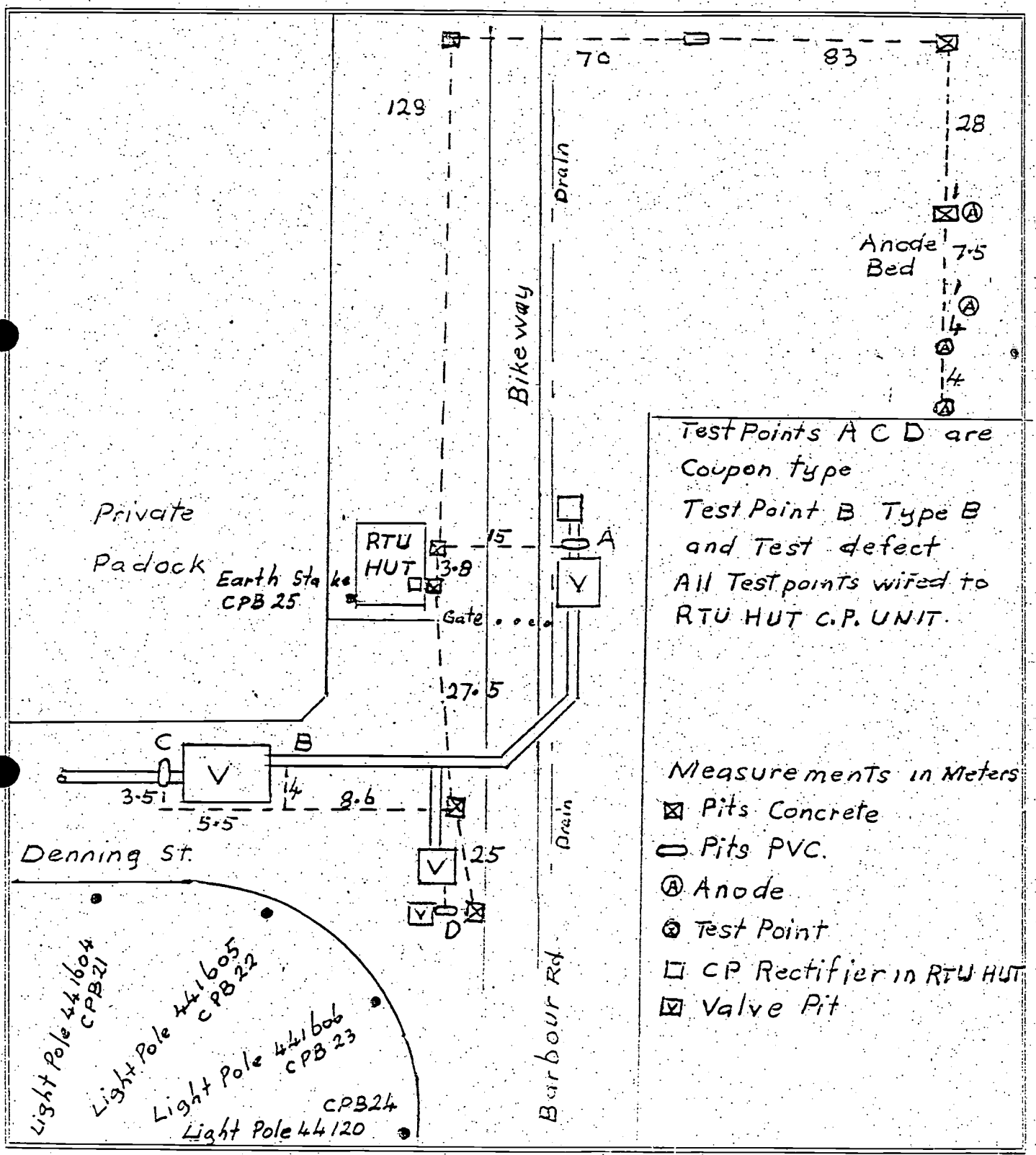
Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 22 - 12 - 93

Site Plan for: BARBOUR Rd
UBD 7 F 8



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BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date 7/4/94
Subject NTH Pine - Aspley RTU Hut - Aspley	

RTU HUT

CuSO4	Pipe	- 880 mv on	- 690 mv off
"	Zn	- 1183 mv on	- 1177 mv off
Zn	Pipe	- 005 mv on	+ 217 mv off

Air Valve 71 Denning St CuSO4 - Pipe - 980mv on - 710mv off

133 Lacy st Air Valve CuSO4 - Pipe -1180mv on - 897mv off

60 Hawbridge CuSO4 - Pipe -1080mv on - 860 mv off

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date 7/4/94
Subject NTH Pine Aspley Graham St Unit.	

Graham St Unit. Set 28 Volts 6.25 Amps

T.P. Bowls club Graham St only on.

CuSO4	Pipe	-877 mv on — 619 mv off	- 577 mv Natural
CuSO4	Zn	-1184 mv on	-1180 mv off — 1170 mv Natural
Zn	Pipe	+306 mv on	+561 mv off + 593 mv Natural

with Barbour Rd. on also

Cu SO4	Pipe	-1192 mv on	- 940 mv off
Cu SO4	Zn	-1183 mv on	- 1177 mv off
Zn	Pipe	- 005 mv on	+217 mv off

SC 145 Park opp Pick + Pay on Gympie Rd

Cu SO4 - Pipe -1159 mv on -1047 mv off

Ben Lomond St Horn St SC 146

CuSO4 - Pipe -918 mv on - 684 mv off

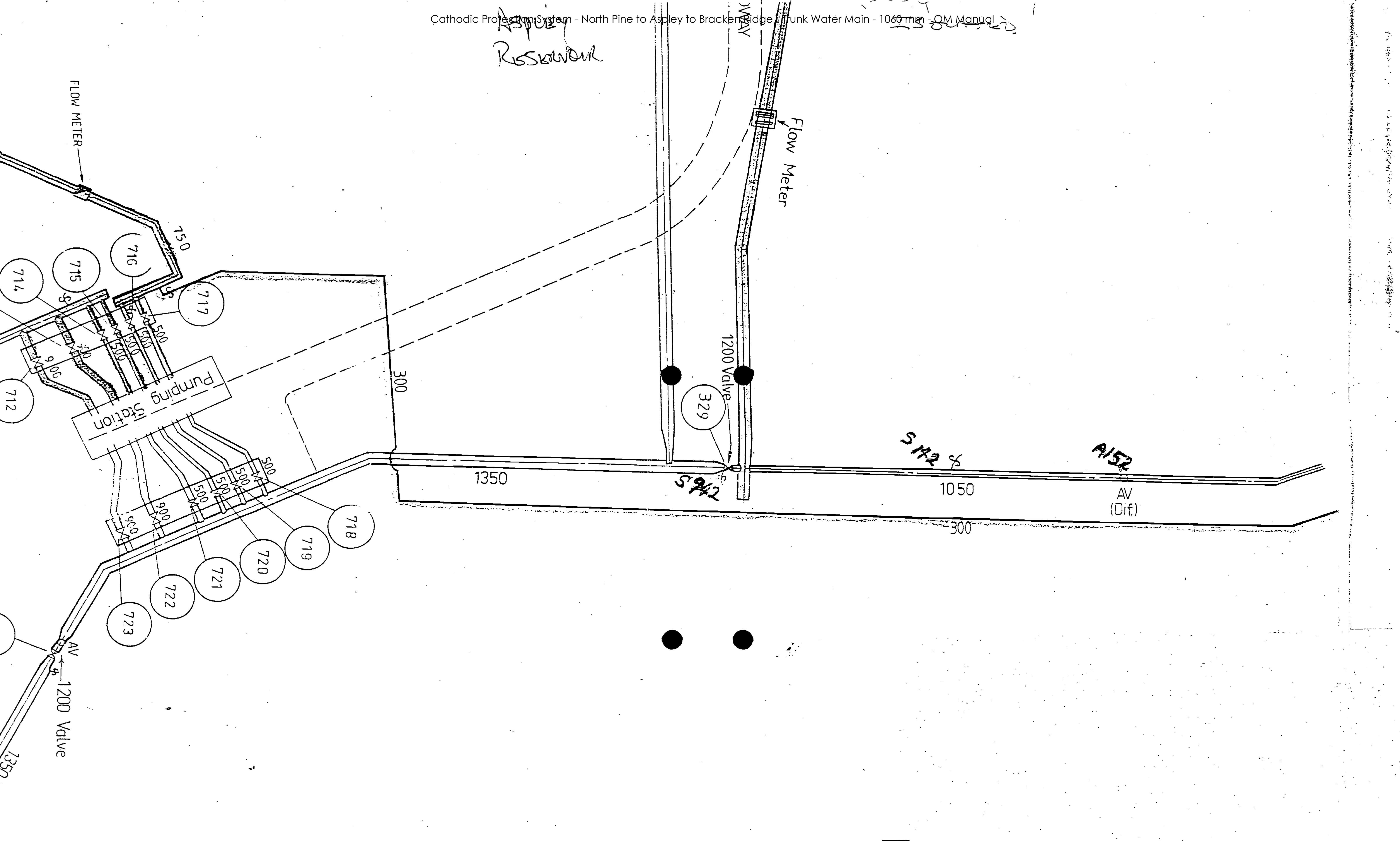
Ironwood St. no access to pipe.

Air Valve 152 inside Aspley Reservoir Premises

CuSO4 - Pipe -926 mv on - 647 mv off

Reservoir main Pipe at Y Road Junction on Pipe direct

CuSO4 - Pipe -1057 mv on - 688 mv off


FLOW METER
750
714
715
716
717
500
500
500
500
900
900
712
Pumping Station
300
1200 Valve
329
Flow Meter
1350
1050
AV
(Dif)
300
500
500
500
500
900
900
718
719
720
721
722
723
AV
1200 Valve
1350

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From.	Date 17/3/94
Subject Nth Pine - Asply Graham Rd. 4. Anodes in use.	

Unit Set 20 Volts Graham Rd RT set only Switched on
Amps 4.25

Test Point	Bonds c/lub	Cathode Connection	
$CuSO_4$ - Pipe	-767	mv on - 601	mv off
$CuSO_4$ - Zn	-1152	mv on - 1156	mv off
Zn - Pipe	+335	mv on +558	mv off

Loop Resistance		
	15 Volts	3.1 Amps
	20 Volts	4.25 Amps
	25 Volts	5.4 Amps
Max	27.5 Volts	6 Amps

Brisbane City Council
Dept. W.S.& S.
Metropolitan Division
Eagle Farm Pump Station

Electrical Workshop

Cathodic Protection Anode Bed Testing

Date: 1-12-93	Structure: NTh Pine - Aspley Trunk Main.
Anode material: Silicon Iron	Anode size/weight: 1500 mm x 75 mm
Packaging: Canister	Burial: Verticle
Depth: 5 meters	Resistivity: 3m 36.5 on 200 Ω scale 688 Ω m 5m 14.7 on 20 Ω scale 461 Ω m
Test Point type: Pit	Signage: Anode Pole with Sign

Resistance to ground:

Anode 1	Anode 2	Anode 3	Anode 4
13.2 Ω	10.5 Ω	11.5 Ω	11.0 Ω

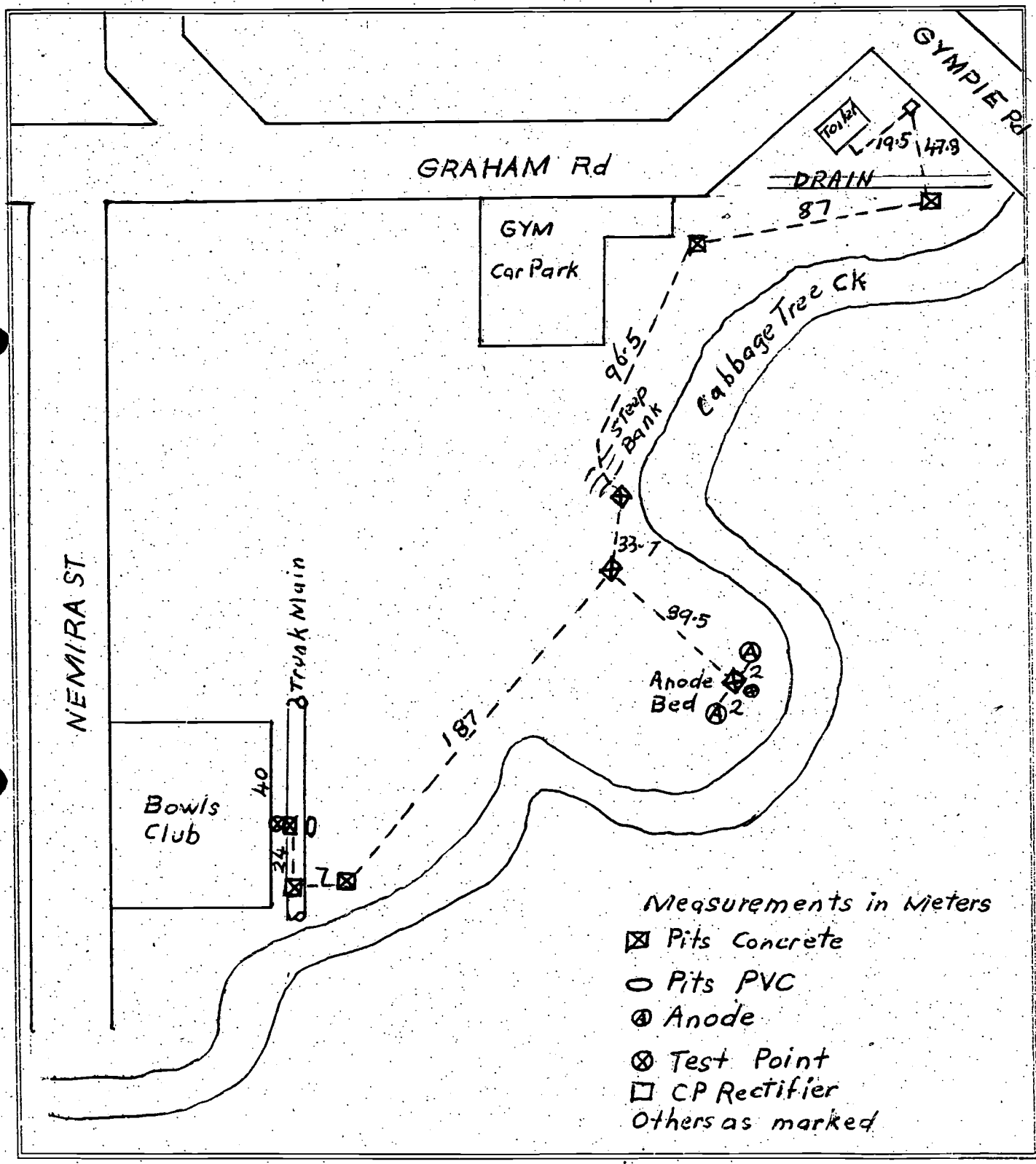
Tested by: J. TAYLOR

Locality Plan:

Refer to Site Plan

Brisbane City Council
Dept of Water Supply and Sewerage
Eagle Farm Pump Station
Electrical Workshop

Date: 22-12-93
Site Plan for: GRAHAM Rd
UBD 11 C7



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BRACKENRIDGE RESERVOIR
BRONWYN ST
LAUTREC ST
NORRIS RD
BARBOUR ROAD
DENNING RD
SEE DETAIL A
TEST POINTS ABC&D
NORTH COAST RAILWAY
LACEY ROAD
BEAMS ROAD
MUSGRAVE AVE
TELEGRAPH ROAD
LINKFIELD ROAD
ROCHAN ROAD
GYMPIE ROAD
SEE DETAIL B
CABBAGE TREE CK
TESTPOINT E
GAYFORD ST
DARWIN ST
MAUNDRELE TERRACE
LAWRENCE ST
ELSANNA ST
MESSMATE
SUGARGUM
IRONWOOD ST
MOUNTVIEW
BEN LOMOND
ASPLEY RESERVOIR
NEMIRA ST
HAWBRIDGE ST
TESTPOINT F
GRAHAM RD
ALBANY CREEK RD
HORN RD
LITTLE CABBAGE TREE CREEK

TO BRACKEN RIDGE RES.
BARBOUR RD
DRAIN
LIGHT POLE No44120. CPB24
LIGHT POLE No441606. CPB23
LIGHT POLE No441605. CPB22
LIGHT POLE No441604. CPB21
25M
8.6M
5.5M
3.5M
DENNING RD
TO ASPLEY RES.
4M
27.5M
GATE
MEN CPB25
3.8M
RTU HUT
15M
PRIVATE PADDOCK
TO NORTHPINE DAM
BIKEWAY
128M
70M
4M
ANODE BED
4M
7.5M
1M
28M
83M

DETAIL A

LEGEND

- CONCRETE PIT
- PVC PIT
- VALVE PIT
- CP RECTIFIER
- ANODE
- ABCDE&F TEST POINTS

GYMPIE ROAD
47.8M
19.5M
87M
DRAIN
TOILETS
GRAHAM ROAD
GYM CARPARK
96.5M
33.7M
69.5M
ANODE BED
1M
2M
2M
2M
1M
187M
7M
TRUNK MAIN
F
24M
CABBAGE TREE CREEK
BOWLS CLUB
NEMIRA ST

DETAIL B

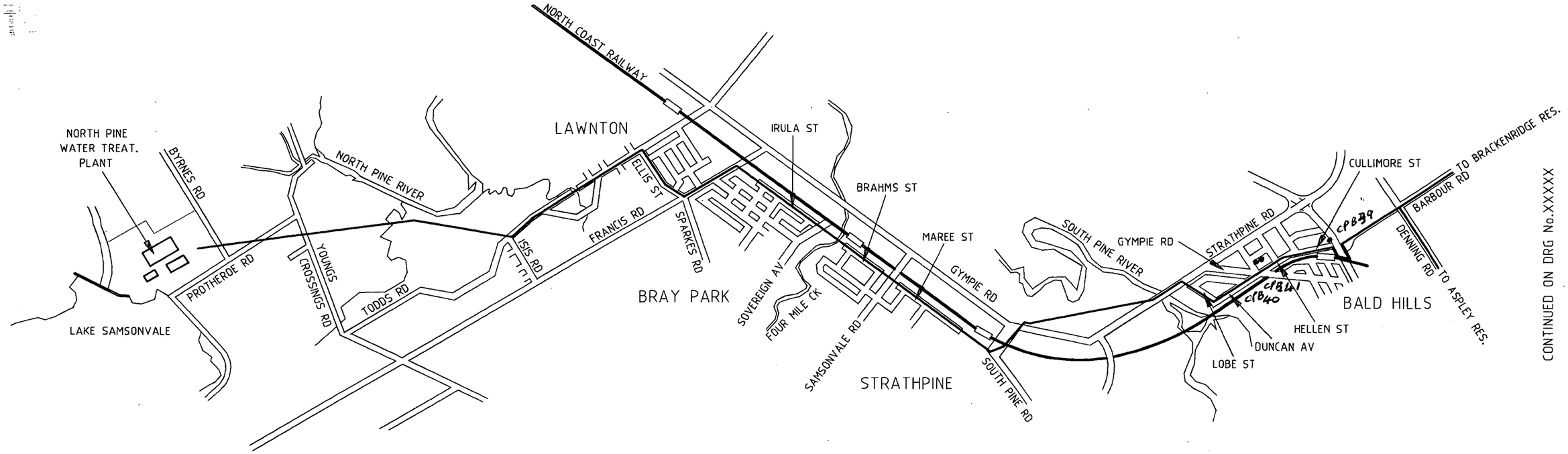
No	DATE	AMENDMENT	BY
0	25.5.94	AS BUILT	R.L.

MANAGER — DATE:
DIRECTOR OF PLANNING & DESIGN — DATE:
DIRECTOR OF CONSTRUCTION — DATE:
DIRECTOR OF M & E SERVICES — DATE:
DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION — DATE:

DESIGN		
DRAWN	R.LISTON	3.4.94
CHECKED		26.5.94
ENGINEER IN CHARGE		
SUPERVISING ENGINEER		

PROJECT: BRACKENBRIDGE TO ASPLEY
TITLE: GRAHAM RD AND BARBOUR RD C.P. SYSTEM
CADD FILE No. 66C0015-

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
MECHANICAL & ELECTRICAL SERVICES
SCALE: NTS | No. 1 OF 1 SHEETS
DRAWING No. 486/6/6-LV1C0015E | AMEND. 0



No	DATE	AMENDMENT	BY
P1	6.5.94	ISSUED FOR COMMENT	R.L.

MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	
DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:

DESIGN		
DRAWN	R.LISTON	6.5.94
CHECKED		
ENGINEER IN CHARGE		
SUPERVISING ENGINEER		

PROJECT
BRACKENRIDGE TO NORTH PINE DAM

TITLE
C.P. SYSTEM

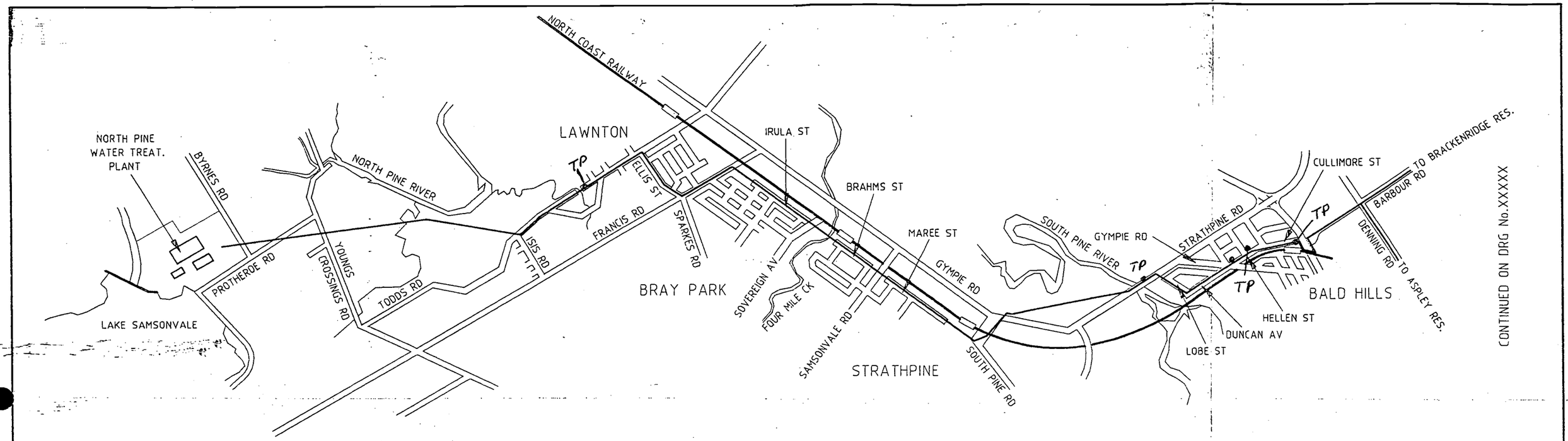
CADD FILE No. NPD

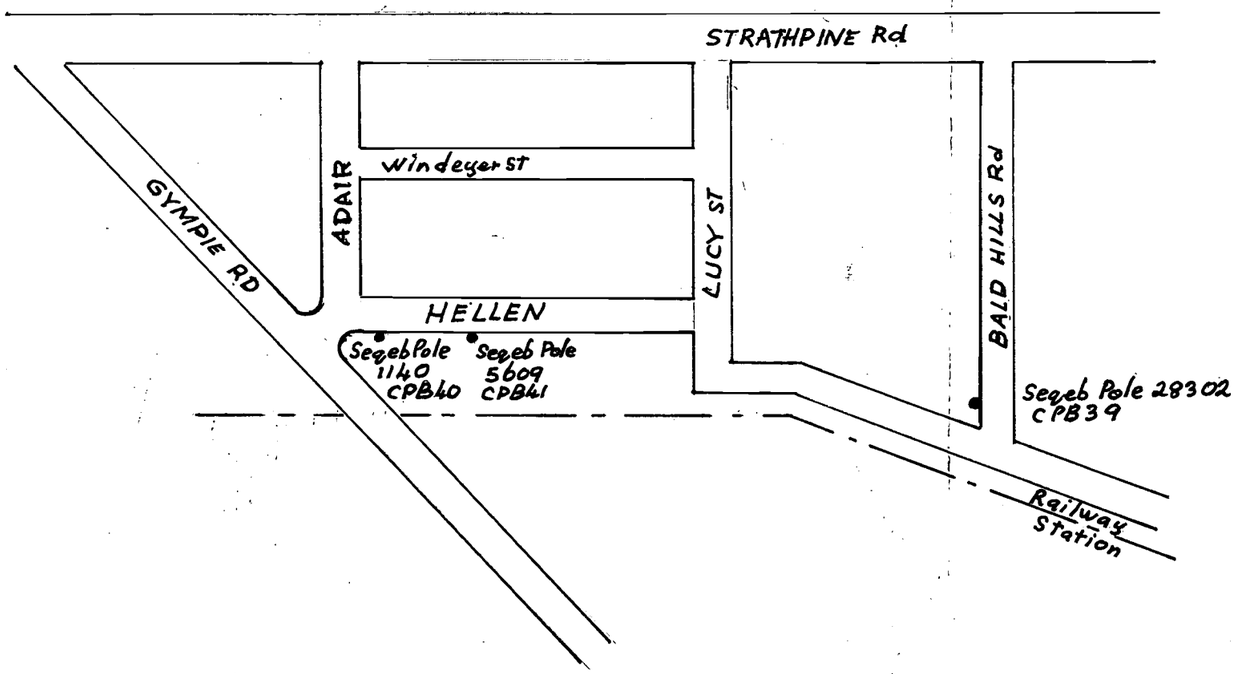
BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
MECHANICAL & ELECTRICAL SERVICES

SCALE: NTS | No. 1 OF 1 SHEETS

DRAWING No.

AMEND. P1





No	DATE	AMENDMENT	BY
P1	6.5.94	ISSUED FOR COMMENT	R.L.

MANAGER — DATE:
DIRECTOR OF PLANNING & DESIGN — DATE:
DIRECTOR OF CONSTRUCTION — DATE:
DIRECTOR OF M & E SERVICES — DATE:
DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION — DATE

DESIGN		
DRAWN	R.LISTON	6.5.94
CHECKED		
ENGINEER IN CHARGE		
SUPERVISING ENGINEER		

PROJECT: BRACKENRIDGE TO NORTH PINE DAM

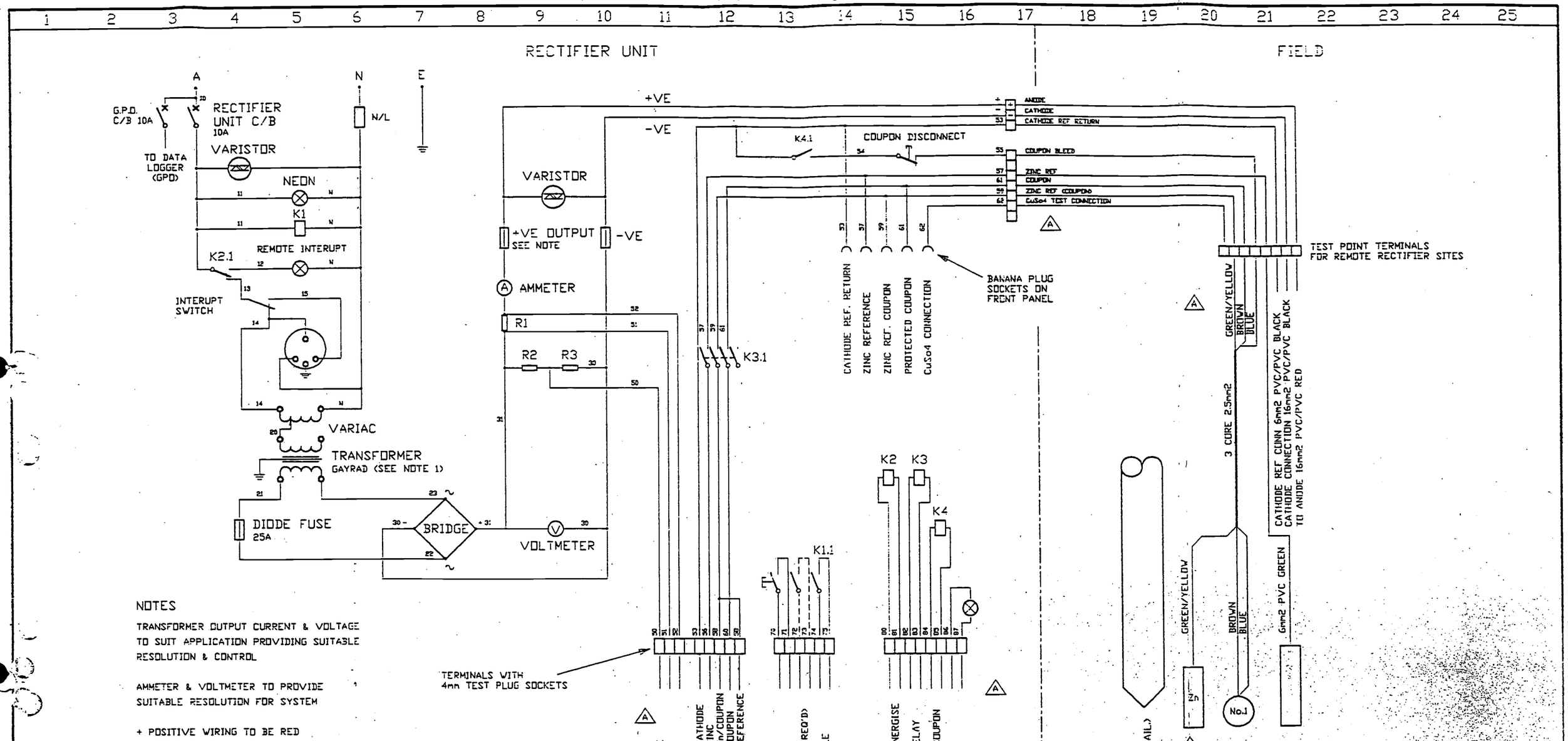
TITLE: C.P. SYSTEM

CADD FILE No. NPD

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

SCALE: NTS | No. 1 OF 1 SHEETS

DRAWING No. | AMEND. P1



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.				AMEND
CHECKED	J.S.	25.8.93	ELECT. ENG.				

DRAWING No. 486/6/25-AA1C0021E
ACADRIE FILE No. A625C21
AMEND A

NT Pine – Asplys – Barbour Rd.

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