

BRISBANE CITY COUNCIL  
DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
ELECTROLYSIS SECTION  
EAGLE FARM PUMPING STATION

OPERATING MANUAL FOR:

DUCIE STREET DARRA 910-600 DIA MILD STEEL TRUNK WATER MAIN  
CATHODIC PROTECTION SYSTEM

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
WATER MAINTENANCE SECTION

23 APRIL 1994

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## **(1.0) INTRODUCTION**

Steel when buried or immersed has a tendency to corrode (rust) as the oxidised form is more stable than the metal.

Because of this, precautions must be taken to stop or minimise 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 practicable to expect a perfect coating during construction and coating damage will also occur with time. Because of this, corrosion may occur at imperfections.

## **(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 low 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 and is generally measured against a standard reference electrode, which permits a reproducible potential at which corrosion does not occur to be quoted.

**(3.0)        MAINS DETAILS**

**Size:**                Dia 910-600 mm mild steel cement lined water trunk mains.

**Coating:**           Fibreglass enamel wrapped.

**Length:**            3500 M

**Location:**        From Wolston Road Jindalee to cnr Acherfield and Boundary Roads Darra.

**Construction**

**Drawings:**        Not available.

**(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 240VAC supply from a nearby SEQEB pole # 13039. The rectifier is located in the park at Ducie Street Darra. UBD 41 M2.

**4.3 Cathode:** The cathode point is located adjacent to the rectifier in ducie street where a type B test point has been installed. The cathode is the point where the cabling from the rectifier is attached to the structure under cathodic protection.

**4.4 Anodes:** One silicon iron anode was installed approximately 160 metres from the trunk mains in a vertical bed 5 metres deep. The anodes were first backfilled with a cokebreeze surround to improve anode ground resistance. The anode location is identified by an in-ground pit and label.

**4.5 Testpoints:** Testpoints are installed on cathodically protected structures to enable testing to confirm that full cathodic protection of the structure is maintained. On these mains 3 testpoints have been installed. For further details see CP details layout drg. 486/6/6-KD1C0011E.

**4.6 Associated Drawings:**

486/6/25-AA1C0021E	Std Rectifier Wiring Diagram
486/1/22-C0023E	Silicone Iron Anode details.
486/6/25-AA1C0026E	Installation details conduit and rectifier.
486/6/25-AA1C0024E	Vertical groundbed details.
No number	Maintenance Details.
486/6/6-KD1C0011E	470 dia MSCL water trunk main CP details.

**4.7 Associated Standards:**

- AS 2832.1 1985 Pipes,Cables,Ducts, Guide to Cathodic Protection. Part 1.
- AS 3000 1991 Australian Wiring Rules

**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.

NOTE: Details of above testing have not been included in this manual but are available upon request.

#### **(6.0) CONCLUSION**

Full cathodic protection has been achieved on this section of the trunk mains.

The cathodic protection system is to be 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. Monthly, Six monthly and sixty monthly maintenance procedures are detailed as attached below.

**(7.1)      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.

**(7.2)      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.

**(7.3)      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.

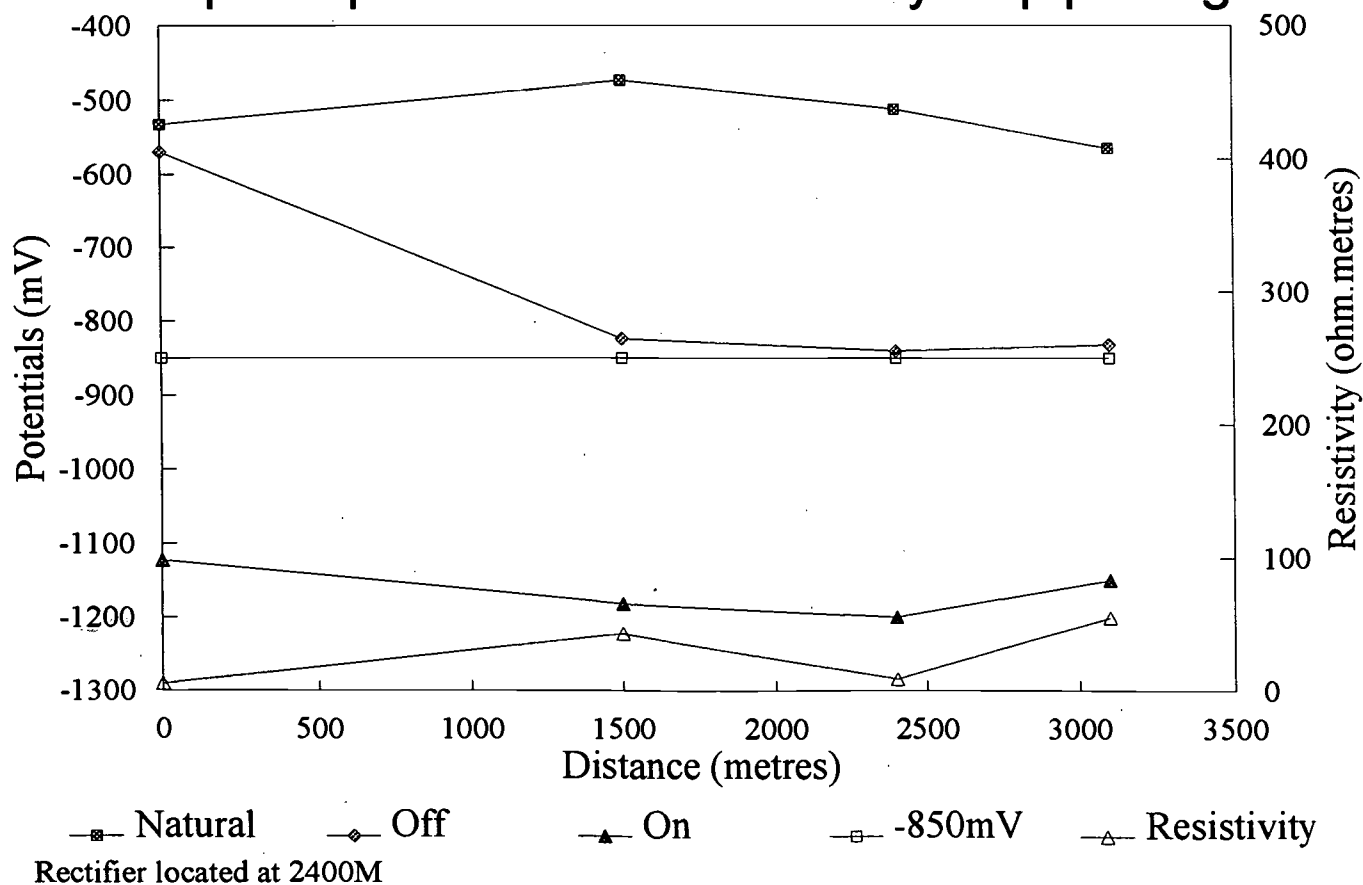
**Brisbane City Council**  
**Dept. W.S.& S.**  
**Metropolitan Division**  
**Eagle Farm Pumping Station**  
**Date: 18h April 1994**  
**Electrical Workshop**

**System:** Ducie Street Darra 910mm to 600mm dia. trunk mains.

Cathodic Protection System reference potential and earth resistivity graph.

Test Point number	Distances to T.P. (metres)	Potentials to CuSO <sub>4</sub>			Resistivities at 2 metres (ohm.metres)
		Natural (mV)	Off (mV)	On (mV)	
1	0	-533	-570	-1123	5.4
2	1500	-474	-824	-1182	42.9
3	2400	-513	-840	-1200	8.8
4	3100	-566	-832	-1150	55.26

**Graph of potentials and resistivity vs pipelength**



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

Cathodic Protection System Loop Resistance

18-Apr-94

Cathodic Protection System:

**Ducie Street Darra 910mm to 600mm diameter trunk**

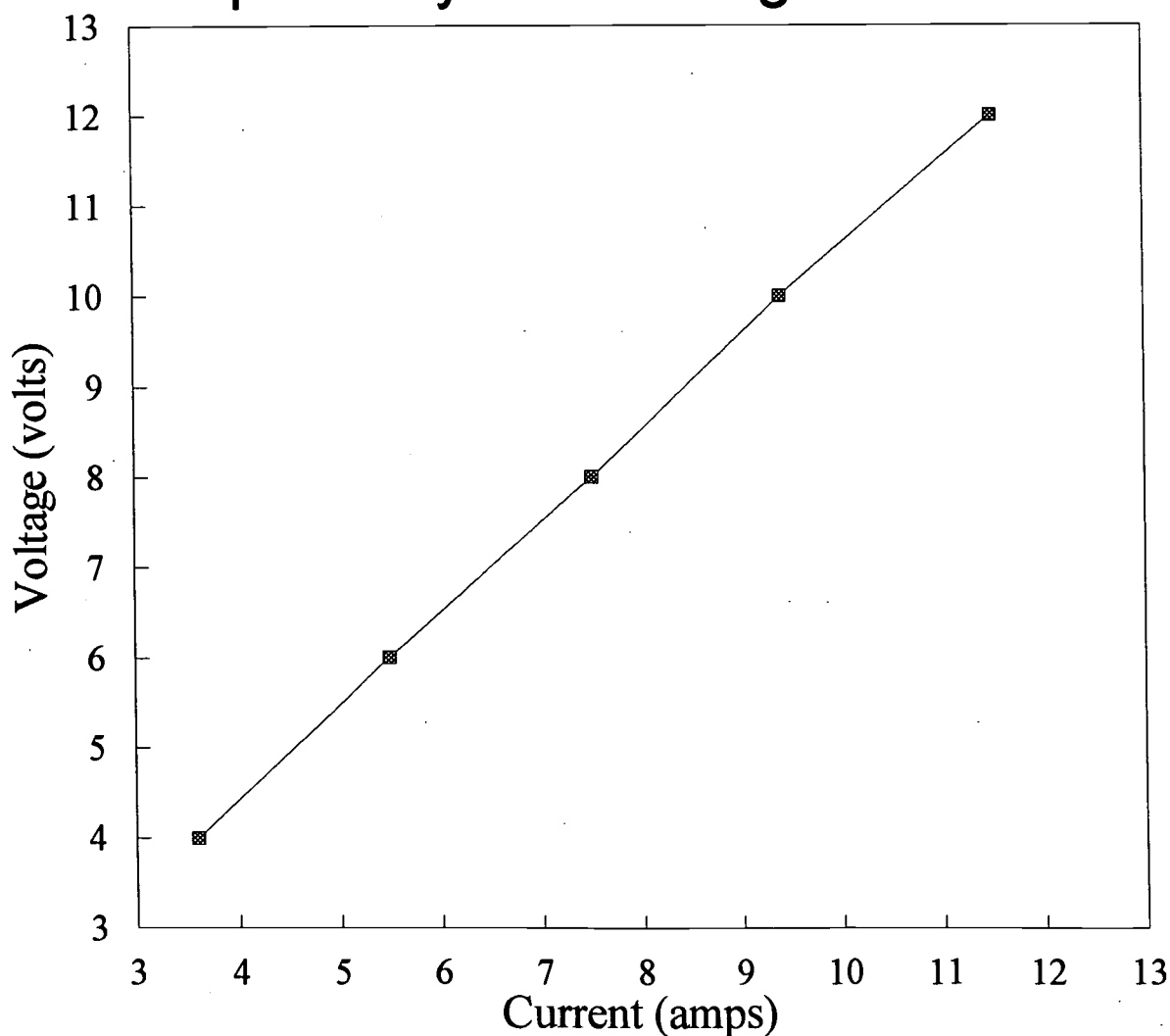
System Operating Volts: 2.5

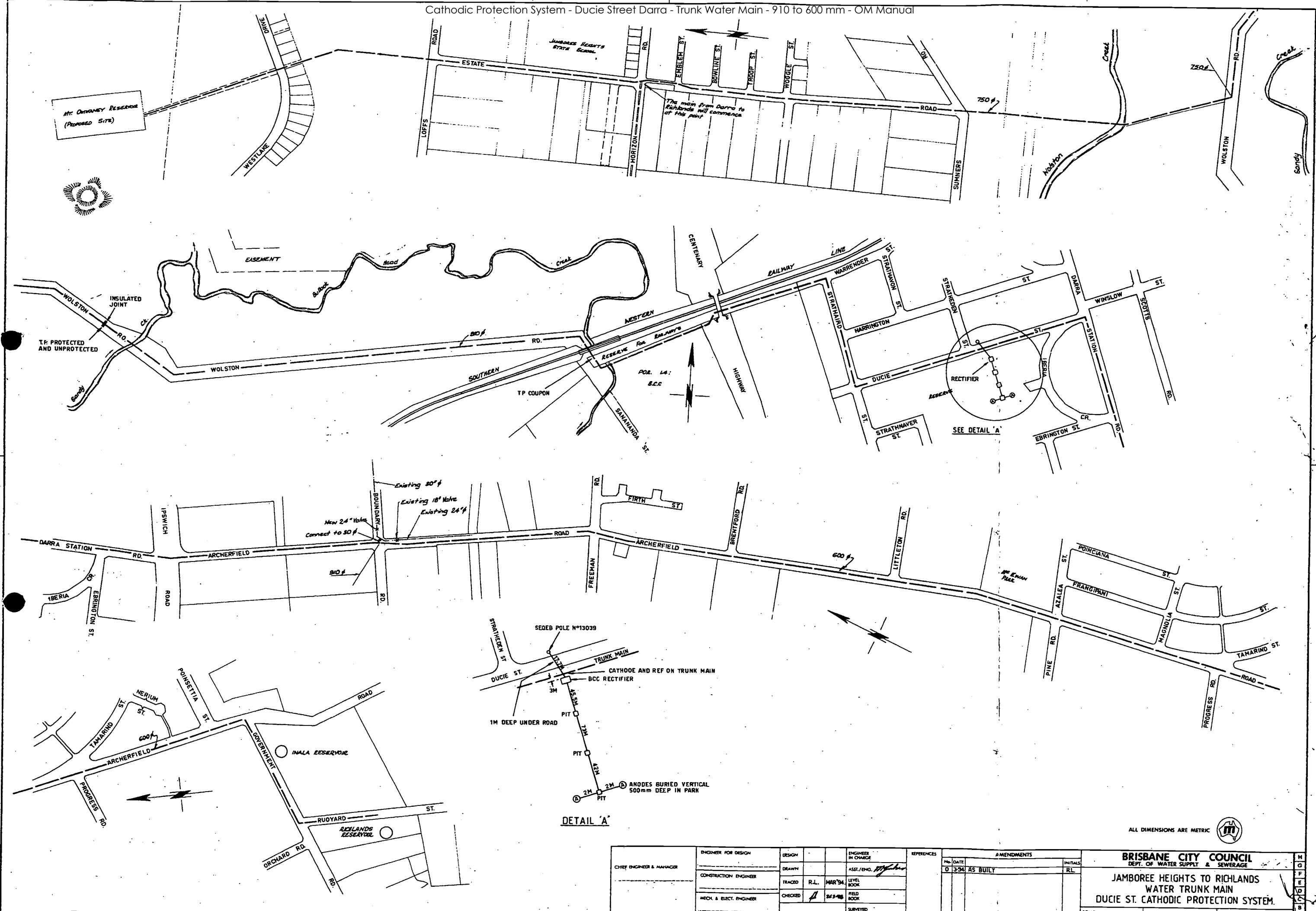
System Operating amps: 3.5

Test Voltage:		Test Current:	
(volts)		(amps)	
4		3.6	
6		5.5	
8		7.5	
10		9.4	
12		11.5	

Loop Resistance (ohms)
1

## Graph of System voltage vs current.





DETAIL 'A'

ALL DIMENSIONS ARE METRIC

CHIEF ENGINEER & MANAGER		ENGINEER FOR DESIGN	DESIGN	ENGINEER IN CHARGE	REFERENCES	AMENDMENTS		INITIALS
		CONSTRUCTION ENGINEER	DRAWN	ASST./ENG. <i>[Signature]</i>		DATE		RL
		MECH. & ELECT. ENGINEER	TRACED	R.L. MAR'94		0 3-94 AS BUILT		
			CHECKED	2-9-98				
			SURVEYED					
<p align="center"><b>BRISBANE CITY COUNCIL</b> DEPT. OF WATER SUPPLY &amp; SEWERAGE</p> <p align="center"><b>JAMBOREE HEIGHTS TO RICHLANDS</b> <b>WATER TRUNK MAIN</b> <b>DUCE ST. CATHODIC PROTECTION SYSTEM.</b></p>								
SCALE		NO.		OF		SHEET		<p>Page 12 of 34</p> <p>DRG. NO. 485/94-K DTC0011E</p>

# MEMORANDUM

To	File No.	
From	Date 21/9/93	
Subject WELSTON RD / RICHMOND RES.		

DUCE ST RECTIFIER

UNIT READING 2.5V at 3.5A.

CuSO<sub>4</sub> to Pipe on - 1200 mV  
off - 840 mV.

AIR VALVE 18 BARRA STATION RD

CuSO<sub>4</sub> to Pipe on - 1232 mV  
off - 564 mV.

VALVE ARCHERFIELD RD.

CuSO<sub>4</sub> to Pipe on - 1150 mV  
- 832 mV

PONY CLUB GROUND

UNPROTECTED

CuSO<sub>4</sub> to Pipe on - 401 mV  
off - 380 mV

PROTECTED

CuSO<sub>4</sub> to Pipe on - 1123 mV  
off - 570 mV

SANDANDA ST

CuSO<sub>4</sub> to Pipe on - 1182 mV  
off - 824 mV

BRISBANE CITY COUNCIL

## MEMORANDUM

To	File No.	
From	Date / /	
Subject		

ARCHERFIELD RD (TP OUTSIDE MACK)  
 Cu SO<sub>4</sub> to Pipe on - 396 mV  
 off - 386 mV

FIRE HYDRANT CNR BOUNDARY RD & ARCHERFIELD RD

Cu SO<sub>4</sub> to pipe - 344 mV

438 ARCHERFIELD RD AV. A560

Cu SO<sub>4</sub> to Pipe on - 312 mV  
 off - 299 mV

Ricklands Res. Inside grounds. (Government Rd)

Cu SO<sub>4</sub> to Pipe on - 333 mV  
 off - 326 mV

## MEMORANDUM

To	File No.	
From	Date 16/8/93	
Subject		

Poney Club grounds

Protected Side

Zn to Pipe	-	290 mV
CuSO <sub>4</sub> to Pipe	-	492 mV
CuSO <sub>4</sub> to Zn	-	832 mV

Unprotected side

Zn to Pipe	-	512 mV
CuSO <sub>4</sub> to Pipe	-	474 mV
CuSO <sub>4</sub> to Zn	-	986 mV

Sandana St

Zn to Pipe	-	706 mV
CuSO <sub>4</sub> to Pipe	-	570 mV
CuSO <sub>4</sub> to Zn	-	1278 mV

Ducie St

Zn to Pipe	-	500 mV
CuSO <sub>4</sub> to Pipe	-	513 mV
CuSO <sub>4</sub> to Zn	-	1014 mV

MEMORANDUM

To	File No.
From	Date / /
Subject	

Archerfield Rd. (Mach Truck)

Zn to Pipe - 517 mV  
CuSO<sub>4</sub> to Pipe - 535 mV  
CuSO<sub>4</sub> to Zn - 1049 mV

BRISBANE CITY COUNCIL  
EAGLE FARM PUMP STATION  
CORROSION SECTION

BRANCH N°1

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 20-2-92  
 TEST POINT TYPE: C

LOCATION: JINDALEE POOL CLUB GROUND  
 MAINS SIZE: 900 mm

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE):  
 ZINC REFERENCE TO PIPE:  
 CuSO<sub>4</sub> REFERENCE TO PIPE:  
 ZINC TO CuSO<sub>4</sub>:

PROTECTED	UNPROTECTED
0.15V	0.15V
+ 331 mV	+ 496 mV
- 553 mV	- 560 mV
- 860 mV	- 994 mV

EARTH TESTING

PIN SPACING: 2 M MEGGER READING: (48x.01) RESISTIVITY: 5.40 Ω  
 PIN SPACING: 3 M MEGGER READING: (19x.01) RESISTIVITY: 3.58 Ω  
 PIN SPACING: 4 M MEGGER READING: (21x.01) RESISTIVITY: 5.27 Ω

SACRIFICIAL ANODE  
 (IF INSTALLED)

ANODE TYPE:  
 ANODE SIZE:  
 ANODE TO PIPE POTENTIAL:  
 ZINC REF TO PIPE:  
 (ANODE CONNECTED)

CuSO<sub>4</sub> REF TO PIPE:  
 (ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:  
 (IF INSTALLED)

INSTALLED BY: J. GAMES

COMMENTS:

WOLSTON RD / ARCHERFIELD RD / BOUNDARY RD  
 BRANCH N°1

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DEPARTMENT OF WATER SUPPLY AND SEWERAGEMECHANICAL AND ELECTRICAL BRANCHMETROPOLITAN DIVISIONEAGLE FARM PUMPING STATIONBRANCH N°1ELECTRICIAL WORKSHOPINSULATED JOINT TESTING DETAILS:

DATE 20-2-92

DESCRIPTION

MAINS DETAILS:- WOLSTON RD / ARCHERFIELD RD / BOUNDARY RD  
 LOCATIONS:- JINDAL BE PONY CLUB GROUNDS - BRANCH N°1  
 SIZE:- 910 CM  
 MATERIAL:- M.S.C.L.D.M.  
 COATING:-  
 NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:-  $> 200 \Omega$   
 NUMBER OF BOLT:- 12  
 FLANGE TO FLANGE RESISTANCE:-  $> 200 \Omega$   
 INSULATION CHECKER MODEL 702:- OK  
 POTENTIAL DIFFERENCE TO REFERENCE CELL  $\text{CuSO}_4$   
 PROTECTED SIDE:-  $-553 \text{ mV}$   
 UNPROTECTED SIDE:-  $-560 \text{ mV}$

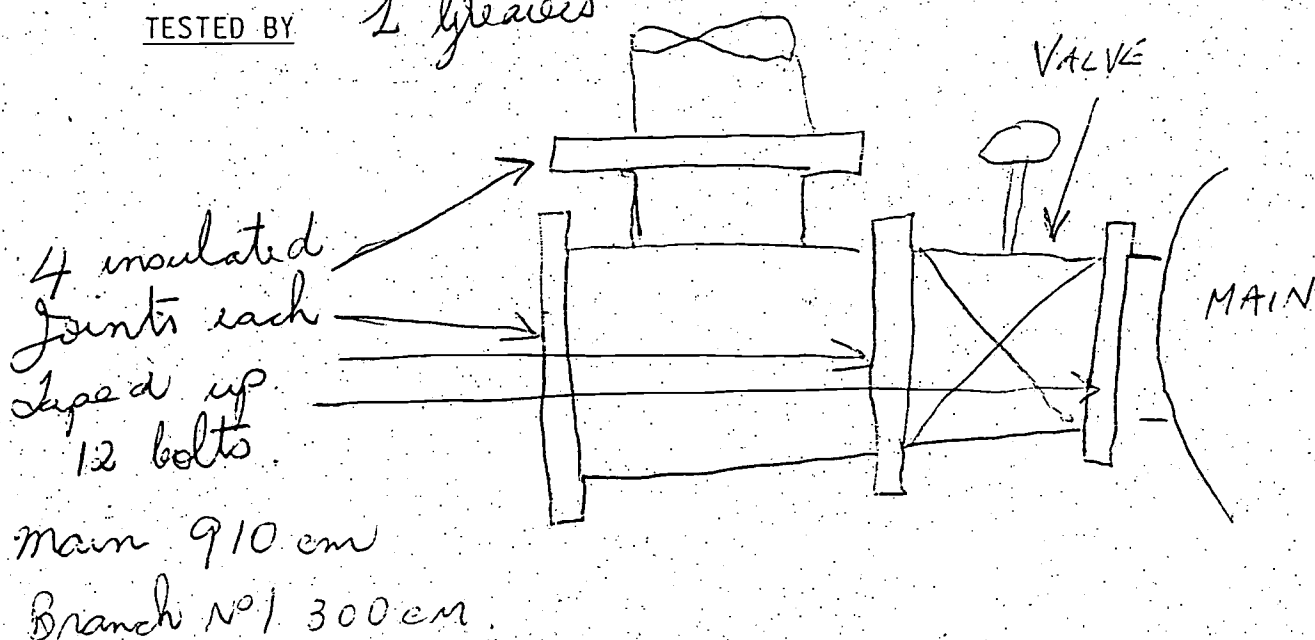
ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
 NUMBER OF BOLTS:-  
 FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

1 greaves



**BRISBANE CITY COUNCIL  
EAGLE FARM PUMP STATION  
CORROSION SECTION**

BRANCH N°2

**STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING**

DATE: 6-3-92  
TEST POINT TYPE: Coupon

LOCATION: SANANANDA ST  
MAINS SIZE: 910 mm

**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE): 0.1  $\Omega$

ZINC REFERENCE TO PIPE:

CuSO<sub>4</sub> REFERENCE TO PIPE: - 474 mV

~~ZINC~~ TO CuSO<sub>4</sub> to white - 106 mV

CuSO<sub>4</sub> to Blue - 472 mV

**EARTH TESTING**

PIN SPACING: 2M	MEGGER READING: (342 x 0.1)	RESISTIVITY: 42.95 $\Omega$
PIN SPACING: 3M	MEGGER READING: (196 x 0.1)	RESISTIVITY: 36.92 $\Omega$
PIN SPACING: 4M	MEGGER READING: (252 x 0.1)	RESISTIVITY: 63.30 $\Omega$

**SACRIFICIAL ANODE  
(IF INSTALLED)**

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO<sub>4</sub> REF TO PIPE:

(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:

(IF INSTALLED)

INSTALLED BY: L. Greaves

COMMENTS:

WOLSTON RD / ARCHERFIELD RD / BOUNDARY RD  
BRANCH N°2.

1 COPY TO FILE  
1 COPY TO T.O.

**DEPARTMENT OF WATER SUPPLY AND SEWERAGE**  
**MECHANICAL AND ELECTRICAL BRANCH**  
**METROPOLITAN DIVISION**  
**EAGLE FARM PUMPING STATION**

BRANCH N<sup>o</sup> 2

## ELECTRICIAL WORKSHOP

## INSULATED JOINT TESTING DETAILS:

DATE 6 - 3 - 92

DESCRIPTION

MAINS DETAILS:- WOLSTON RD / ARCHERFIELD RD / BOUNDARY RD.  
 LOCATIONS:- SANANDA ST.  
 SIZE:- 910 CM  
 MATERIAL:- MSC LDM  
 COATING:-  
 NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:-  $> 200 \Omega$   
 NUMBER OF BOLT:- 12  
 FLANGE TO FLANGE RESISTANCE:-  $80 \Omega$   
 INSULATION CHECKER MODEL 702:- OK  
 POTENTIAL DIFFERENCE TO REFERENCE CELL  $C_5SO_4$   
 PROTECTED SIDE:- - 474 MV.  
 UNPROTECTED SIDE:-

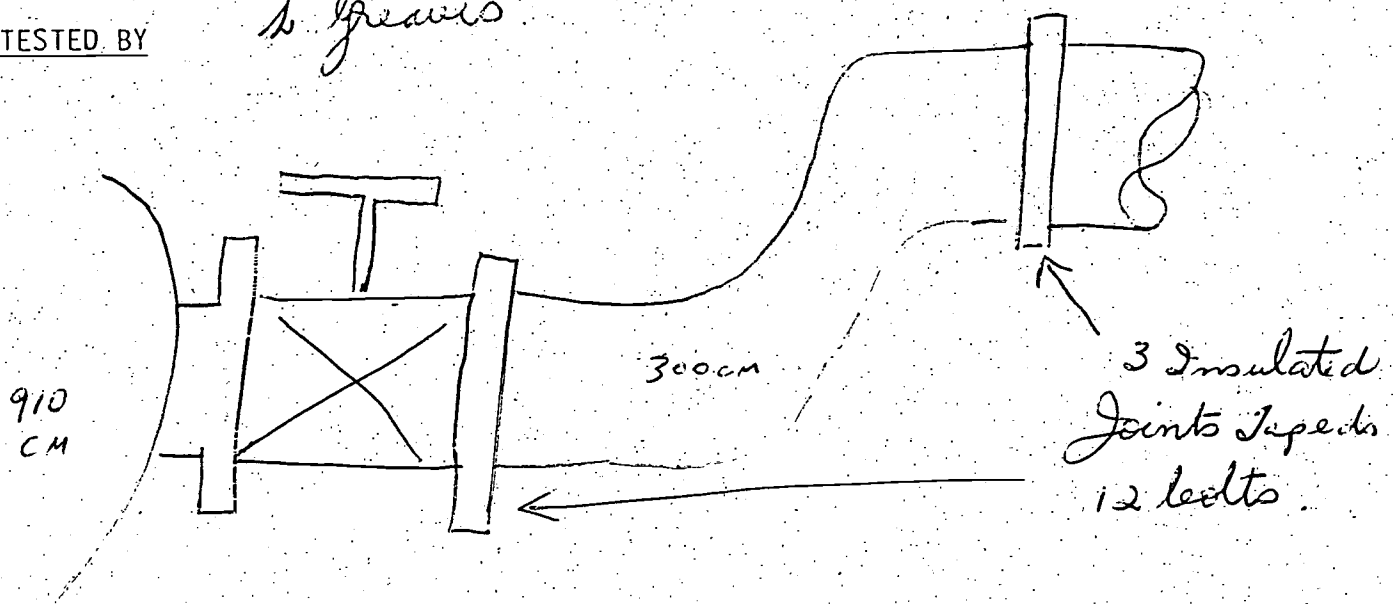
ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
 NUMBER OF BOLTS:-  
 FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

S. Greaves



DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
METROPOLITAN DIVISION  
EAGLE FARM PUMPING STATION

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS: *BRANCH NO 3.*

DATE *12-3-92.*

DESCRIPTION

MAINS DETAILS:- *WILSTON RD - BOUNDARY RD*  
LOCATIONS:- *DUCE ST.*  
SIZE:- *900 $\phi$  WITH 300 $\phi$  TAKEOFF.*  
MATERIAL:- *FIBREGLAS ENAMEL*  
COATING:- *CEMENT LINED.*  
NUMBER:- *ONE*

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- *ALL  $> 200\Omega$*   
NUMBER OF BOLT:- *12*  
FLANGE TO FLANGE RESISTANCE:- *10 $\Omega$ , 40 $\Omega$  (EITHER DIRECTION)*  
INSULATION CHECKER MODEL 702:- *TESTED OK*  
POTENTIAL DIFFERENCE TO REFERENCE CELL  
PROTECTED SIDE:- *-507mv TO CuSO4*  
UNPROTECTED SIDE:- *NOT TESTED*

ABOVE TESTING

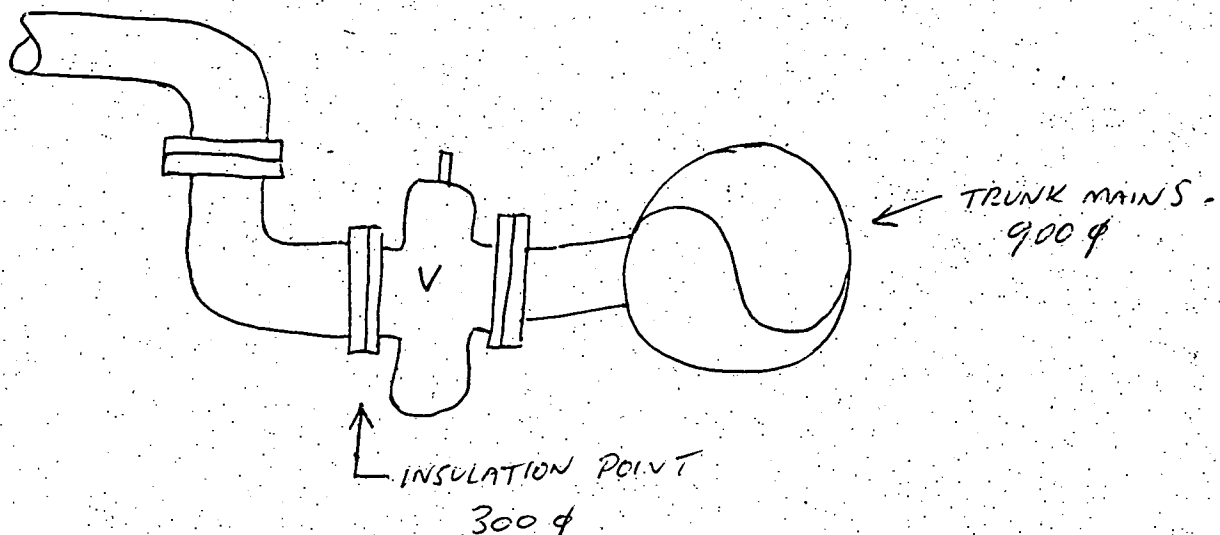
BOLT TO FLANGE RESISTANCE:- *NA*  
NUMBER OF BOLTS:- *NA*  
FLANGE TO FLANGE RESISTANCE:- *NA*

COMMENTS

*127mv ACROSS FLANGE,  
-VE TO UNPROTECTED SIDE.*

TESTED BY

*kmf*



DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
METROPOLITAN DIVISION  
EAGLE FARM PUMPING STATION

BRANCH N° 6

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 13-10-92

DESCRIPTION

MAINS DETAILS:- WOLSTON RD / ARCHERFIELD RD / BOUNDARY RD  
LOCATIONS:- CNR ARCHERFIELD RD & IPSWICH RD  
SIZE:- 12 in Branch  
MATERIAL:-  
COATING:-  
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:-  $> 200 \Omega$   
NUMBER OF BOLT:- 12  
FLANGE TO FLANGE RESISTANCE:-  $20 \Omega$   
INSULATION CHECKER MODEL 702:- OK  
POTENTIAL DIFFERENCE TO REFERENCE CELL CuSO<sub>4</sub>  
PROTECTED SIDE:- -566 mV  
UNPROTECTED SIDE:- -502 mV

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
NUMBER OF BOLTS:-  
FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

S. Greaves

DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
METROPOLITAN DIVISION  
EAGLE FARM PUMPING STATION

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-2-93

DESCRIPTION

MAINS DETAILS:- *Insulated Joint*  
LOCATIONS:- *Cnr Acherfield Rd + Hazlelea St*  
SIZE:-  
MATERIAL:-  
COATING:-  
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- *500  $\Omega$*   
NUMBER OF BOLT:-  
FLANGE TO FLANGE RESISTANCE:- *400  $\Omega$*   
INSULATION CHECKER MODEL 702:- *OK*  
POTENTIAL DIFFERENCE TO REFERENCE CELL  
PROTECTED SIDE:- *- 680 mv CuSO<sub>4</sub>*  
UNPROTECTED SIDE:- *- 441 mv CuSO<sub>4</sub>*

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
NUMBER OF BOLTS:-  
FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

*Pejth*

DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
METROPOLITAN DIVISION  
EAGLE FARM PUMPING STATION

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 4-3-93

DESCRIPTION

MAINS DETAILS:- 12" DUCT CAST STEEL  
LOCATIONS:- Cnr ARCHERFIELD + FREEMAN Rds  
SIZE:- 12"  
MATERIAL:- Duct Cast Steel  
COATING:-  
NUMBER:- 1

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- > 200  $\Omega$   
NUMBER OF BOLT:- 12  
FLANGE TO FLANGE RESISTANCE:- 1 m  $\Omega$   
INSULATION CHECKER MODEL 702:- OK  
POTENTIAL DIFFERENCE TO REFERENCE CELL  
PROTECTED SIDE:- -376  
UNPROTECTED SIDE:- -280

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
NUMBER OF BOLTS:-  
FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

*Plut*

ARCHERFIELD

INSULATED JOINT

FREEMAN

DEPARTMENT OF WATER SUPPLY AND SEWERAGE  
MECHANICAL AND ELECTRICAL BRANCH  
METROPOLITAN DIVISION  
EAGLE FARM PUMPING STATION

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 16-12-22

DESCRIPTION

MAINS DETAILS:- MILD STEEL  
 LOCATIONS:- LNR GOVERNMENT Y ARCHERFIELD RDS (ON FOOTPATH)  
 SIZE:- 300MM  
 MATERIAL:- MAIN TRUNK M/STEEL BRANCH CAST IRON  
 COATING:-  
 NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- > 200  $\Omega$   
 NUMBER OF BOLT:- 12  
 FLANGE TO FLANGE RESISTANCE:- 15  $\Omega$   
 INSULATION CHECKER MODEL 702:- OK  
 POTENTIAL DIFFERENCE TO REFERENCE CELL  
 PROTECTED SIDE:- -566 mV to CuSO<sub>4</sub>  
 UNPROTECTED SIDE:- -538 mV to CuSO<sub>4</sub>

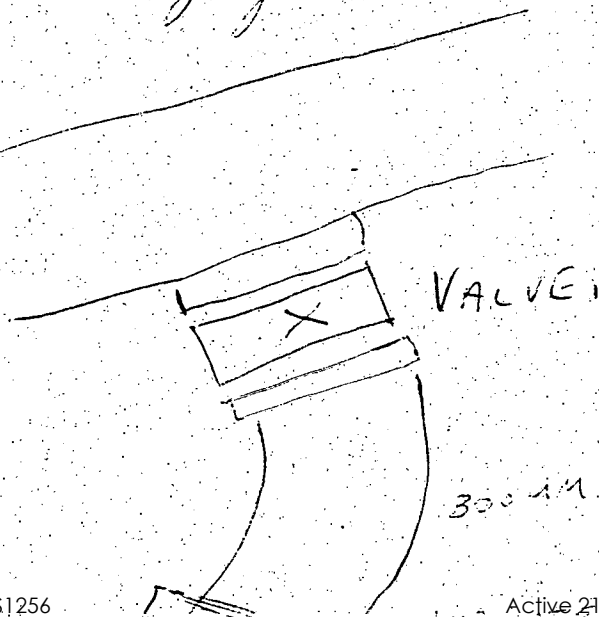
ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-  
 NUMBER OF BOLTS:-  
 FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

L J graves



**DEPARTMENT OF WATER SUPPLY AND SEWERAGE**  
**MECHANICAL AND ELECTRICAL BRANCH**  
**METROPOLITAN DIVISION**  
**EAGLE FARM PUMPING STATION**

**ELECTRICAL WORKSHOP**

**INSULATED JOINT TESTING DETAILS:**

**DATE** 30-11-92

**DESCRIPTION**

**MAINS DETAILS:-** ARCHERFIELD RD.  
**LOCATIONS:-** CNR GOVERNMENT Y ARCHERFIELD RD (IN RESERVOIR GROUND)  
**SIZE:-** 12 INCH  
**MATERIAL:-** MILD STEEL  
**COATING:-** NIL  
**NUMBER:-**

**IN GROUND TESTING**

**BOLT TO FLANGE RESISTANCE:-**  $> 200 \Omega$   
**NUMBER OF BOLT:-** 12  
**FLANGE TO FLANGE RESISTANCE:-**  $32 \Omega$   
**INSULATION CHECKER MODEL 702:-** OK  
**POTENTIAL DIFFERENCE TO REFERENCE CELL**  
**PROTECTED SIDE:-** -446 mV  
**UNPROTECTED SIDE:-** -472 mV

**ABOVE TESTING**

**BOLT TO FLANGE RESISTANCE:-**  
**NUMBER OF BOLTS:-**  
**FLANGE TO FLANGE RESISTANCE:-**

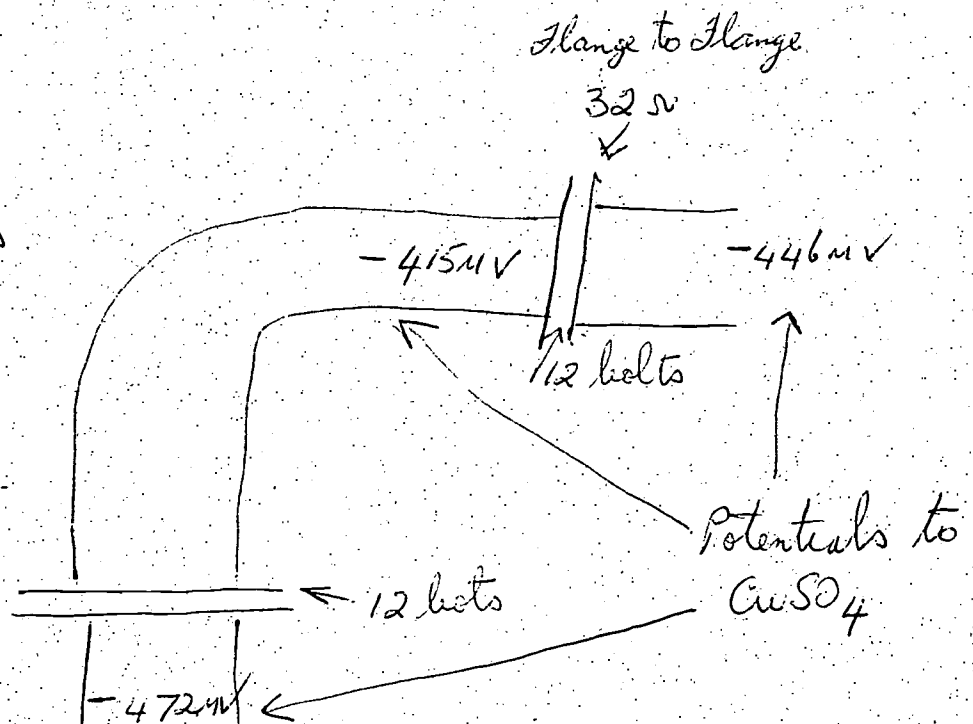
**COMMENTS**

**TESTED BY**

L. Greaves

Flange to Bolts  
all  $> 200 \Omega$

Flange to Flange  
 $28 \Omega$



Electrical Workshop

Cathodic Protection Anode Bed Testing

Date: 10-12-93	Structure: JINDALEE TO RICHLANDS MAIN		
Anode material: SILICONE IRON	Anode size/weight: 1.5M x 75MM		
Packaging: CANISTER	Burial: VERTICAL		
Depth: 5.0M	Resistivity: 3M Reading $006 \times 0.1 = 11.3 \Omega/M$ 5M Reading $005 \times 0.1 = 15.7 \Omega/M$		
Test Point type: PIT	Signage: YES		
Resistance to ground:			
Anode 1	Anode 2	Anode 3	Anode 4
Tested by: L. J. Greaves.			Anode 5
Locality Plan:			

DUCIE ST.

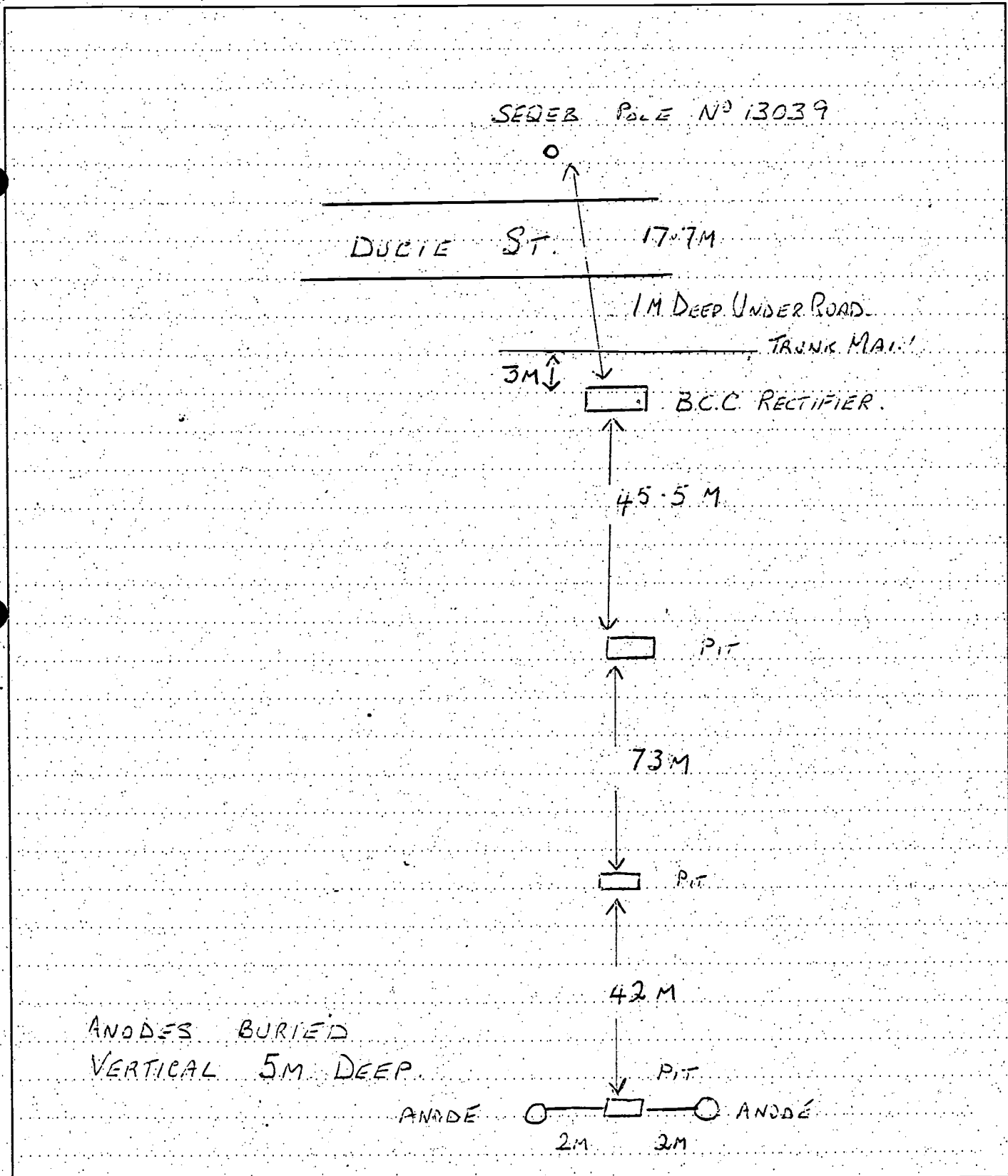
RECT

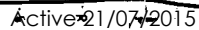
160.5M

ANODE (X) — PIT — (X) ANODE

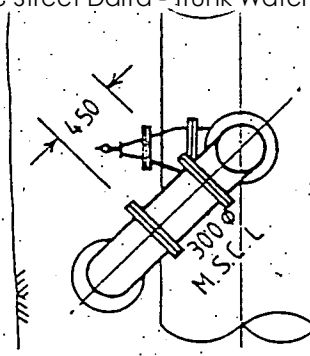
# MEMORANDUM

To	File No.	
From	Date 14/7/93	
Subject DUCIE ST. DARRA. CABLE RUNS LOCATION		





203



SECTION Z

SCALE 1:50

