

21ST DECEMBER 1993

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

OPERATING MANUAL FOR:

**KARAWATHA HIGH LEVEL RESERVOIR TO SUNNYBANK HILLS 755 DIA
WATER TRUNK MAINS CATHODIC PROTECTION SYSTEM.**

CLIENT:

**DEPARTMENT OF WATER SUPPLY AND SEWERAGE
WATER MAINTENANCE SECTION**

MANUAL CONTENTS

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

DRAWINGS

- JE02/104 Standard Rectifier Wiring Diagram.
- (No number) Monthly Maintenance Program.
- 2/81.01 to 2/81.10 Plan and Longitudinal section.
- 2/81.20 Proposed Location of trunk main within existing QEC easement.

(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:	Dia 755 Dia. mild steel cement lined.						
Coating:	Low density fusion banded polyethylene outer coating.						
Length:	3.047 km						
Location:	Karawatha High Level Reservoir to cnr Crompton and Gowan Rd. Sunnybank.						
Construction Drawings:	<table><tr><td>2/81.01</td><td>Locality Plan and Drawing list.</td></tr><tr><td>2/81.02 to 2/81.10</td><td>Plan and Longitudinal Section</td></tr><tr><td>2/81.20</td><td>Proposed location of trunk main within QEC easement.</td></tr></table>	2/81.01	Locality Plan and Drawing list.	2/81.02 to 2/81.10	Plan and Longitudinal Section	2/81.20	Proposed location of trunk main within QEC easement.
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2/81.02 to 2/81.10	Plan and Longitudinal Section						
2/81.20	Proposed location of trunk main within QEC easement.						

(4.0) CATHODIC PROTECTION DETAILS

- (4.1) Type of Cathodic Protection: Impressed Current.
- (4.2) Rectifier: Standard 32V Volt, 15 amp direct current output enclosed in a stainless steel switchboard. Rectifier has a 240V supply from a nearby SEQEB pole #48199. Rectifier is located in Kardella St. behind the SEQEB supply pole #48199.
- (4.3) Cathode: The cathode point is located on the 755 dia. main in the air valve pit, centre of the roundabout cnr of Penson and Kardella Streets. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection.
- (4.4) Anodes: One 1500 x 75mm silicone iron anode was installed approximately 100.0 metres from the trunk mains in a horizontal bed. The anodes were first backfilled with cokebreeze thereby improving anode - ground resistance. The anodes are identified by a marker pit and label. Refer attached drawing number 1.
- (4.5) Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the mains. On these pipes, nine test points have been installed. Refer to attached drawing number 2/81.01.
- (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) Rectifier Loop Resistance.
- (6) Foreign Structure Interference Survey and Mitigation.
- (7) 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 trunk mains. The cathodic protection system will be registered with the Queensland Electricity Commission.

(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:

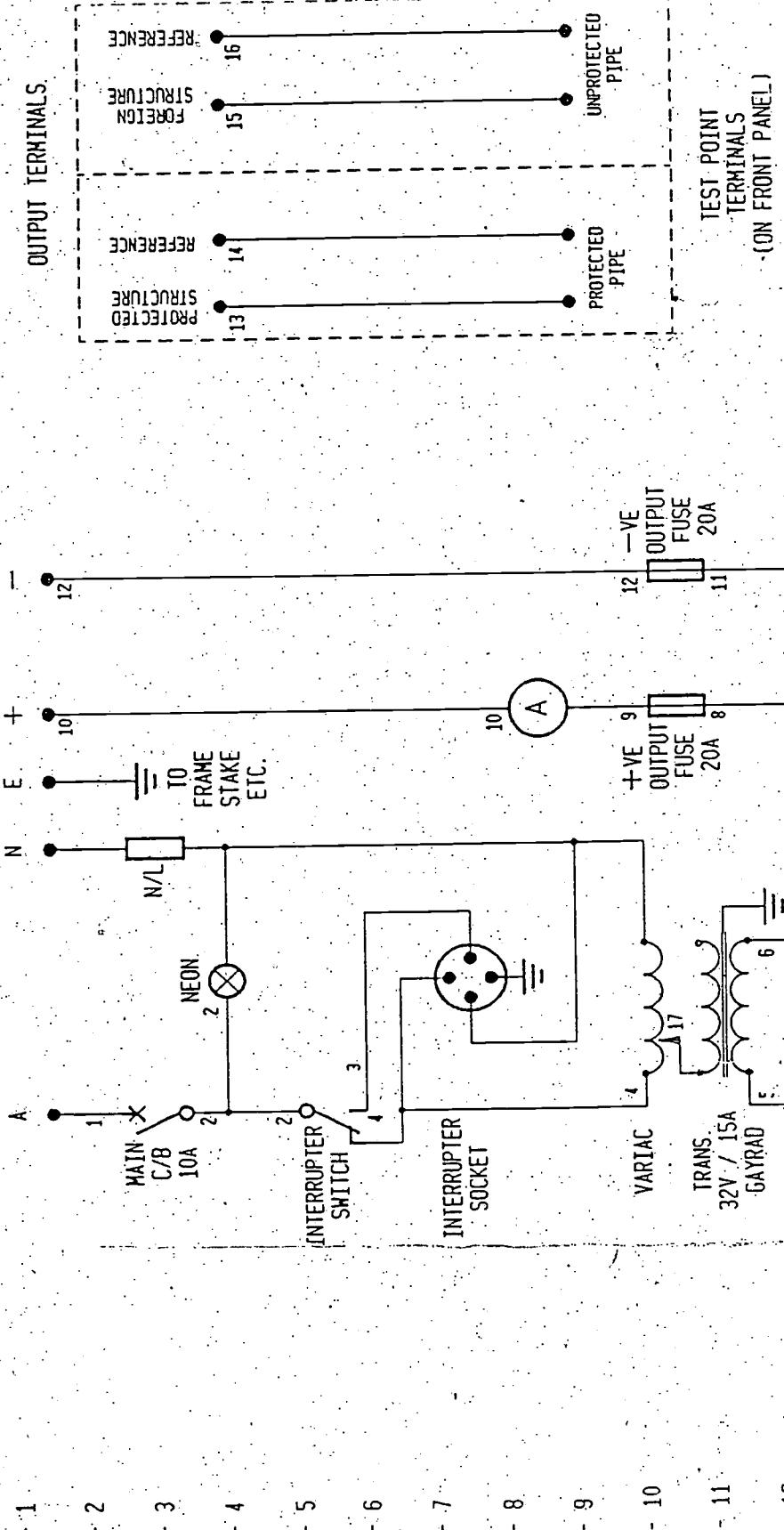
One tradesperson electrical, one laborer, one vehicle.

Eight hours per site.

Procedure:

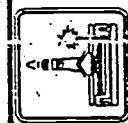
- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/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

OUTPUT TERMINALS



NOTE:

- + POSITIVE TO BE RED
- NEGATIVE TO BE BLACK
- 32V AC WIRING TO BE 4mm²
- DC WIRING TO BE 4mm²
- 240V WIRING TO BE 1.5mm²



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

AMENDMENT SHEET
A
No. JE02/104
DRAFT No.
DRAWING NO.
DATE

PROJECT: CATHODIC PROTECTION		TITLE: STANDARD RECTIFIER WIRING DIAGRAM	
DESIGN	DRAWN	O.L.P.	OK'D
DATE:	DATE:	DATE:	DATE:
DIRECTOR OF PLANNING & DESIGN	DIRECTOR OF SEM. OPERATORS / W.S.	DIRECTOR OF SEM. OPERATORS / W.S.	ENGINEER IN CHARGE
MANAGER	DIRECTOR OF CONSTRUCTION	DIRECTOR OF M&E SERVICES	SUPERVISING ENGINEER
INITIALS DATE	INITIALS DATE	INITIALS DATE	INITIALS DATE
A. 9.90 REDRAWN & MODIFIED	D.O.P.	AMENDMENT	AMENDMENT
No. DATE			

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date / /
Subject	

TEST POINT	INSTANCE	NATURAL VOL	OFF VOL	SOIL RESISTIVITY ΩM	SM
151 Gough St	ON	-182mV		165ΩM	103ΩM
152 Duranget	2020M	-712mV		109ΩM	89ΩM
153 Lexington	1000M	-753mV		61ΩM	52ΩM
154 Lexicon St	1040M	-748mV		155ΩM	135ΩM
155 Birkdale	1640M	-134mV		135ΩM	304ΩM
156 QEC ESE	2020M	-776mV		135ΩM	151ΩM
157 Birkdale	2500M	-153mV		383ΩM	116ΩM
158 Birkdale	2740M	-670mV		326ΩM	357ΩM
159 Birkdale	3000M	-208mV		389ΩM (CON)	314ΩM
160 Birkdale	3040M	-311mV		389ΩM (CON)	314ΩM
	RESERVE				

NOTES - NO MORE READING

NO RESISTANCE
NO INTERFACE

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date
Subject KARAWATHA TRUNK MAIN	

NATURAL POTENTIALS

(NO EARTHING ANODES CONNECTED)

NOTE : - EARTHING ANODES AT QEC EASEMENT DISCONNECTED
TO ALLOW DEPOLARIZATION TO NATURAL POTENTIALS ON
THE 24 SEPTEMBER 1993.

- MOST CuSO_4 MEASUREMENTS TAKEN FROM THE BACK OF
THE KERB BECAUSE THE TRUNK MAIN IS IN THE CENTRE OF
THE ROAD.

TEST POINT N°1 (GOWAN RD & COMPTON RD)

Zn TO PIPE -207 mV

 CuSO_4 TO PIPE -1472 mV CuSO_4 TO Zn -1263 mV

TEST POINT N°2 (GOWAN RD & PENSON ST)

Zn TO PIPE +9 mV

 CuSO_4 TO PIPE -1460 mV CuSO_4 TO Zn -1472 mV

TEST POINT N°3 (RECTIFIER KARDELLA ST)

Zn TO PIPE +705 mV

TEST POINT N°4 (PENSON ST & LEXTON ST)

PIPE A Zn TO PIPE

 CuSO_4 TO PIPE CuSO_4 TO Zn

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date 21/11/93
Subject KARAWATHA TRUNK MAIN PIPE CAMP SURVEY	

RECTIFIER SET AT 4V 250 mA

POTENTIALS : - MULTIMETER

Zn TO PIPE -1150 mV on -850 mV off

- PIPE CAMP (USING 2000 SCALE)

PROBE TO PIPE 1800 on 1400 off

TEST POINTS USING PIPE CAMP

N°1 1650 on 1450 off

N°2 300 on 500 off

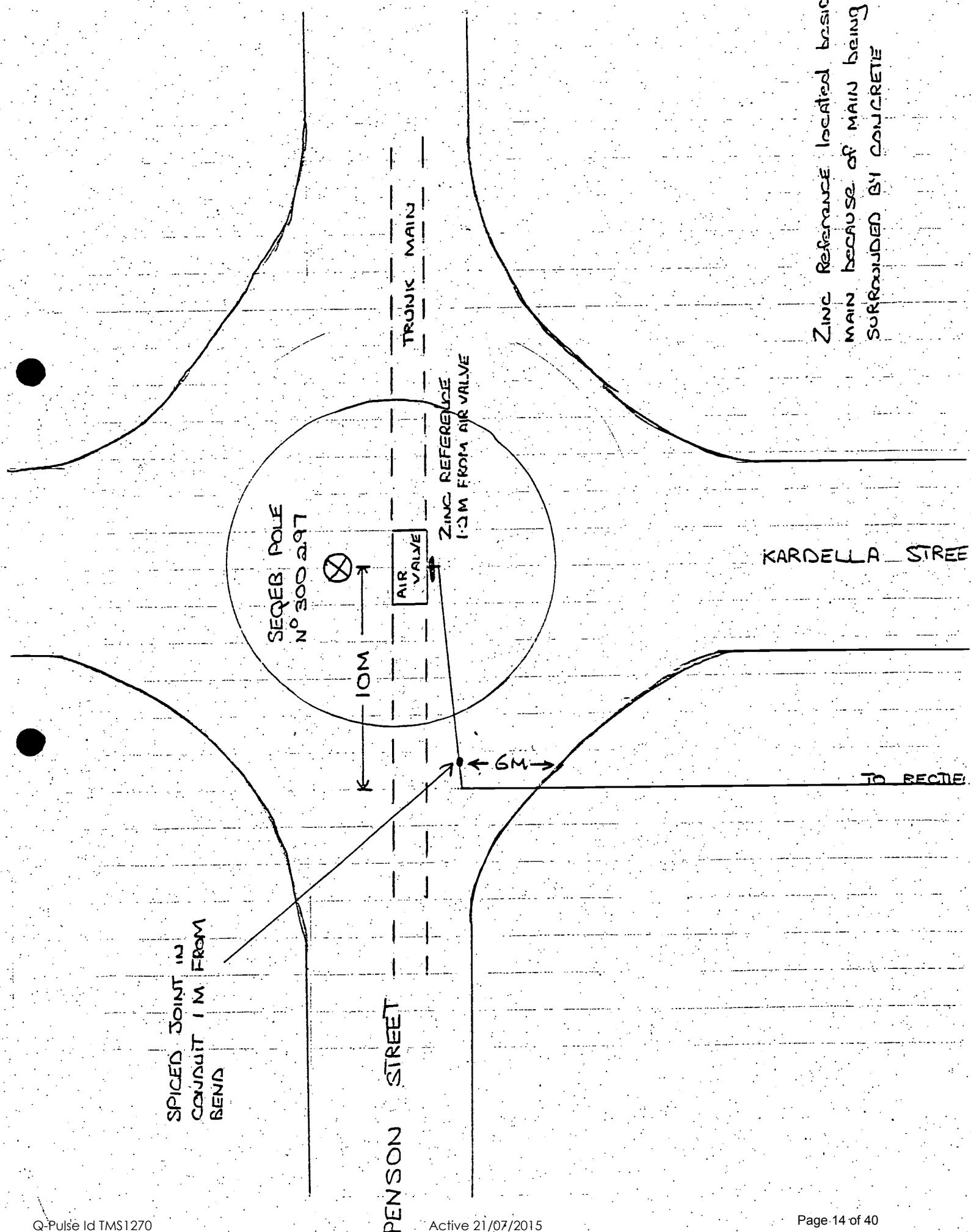
N°3 1700 on 1500 off

N°4 400 on 100 off

N°5 1000 on 900 off

N°6 (REC EASEMENT - NO RINGS) 1500 on 1250 off

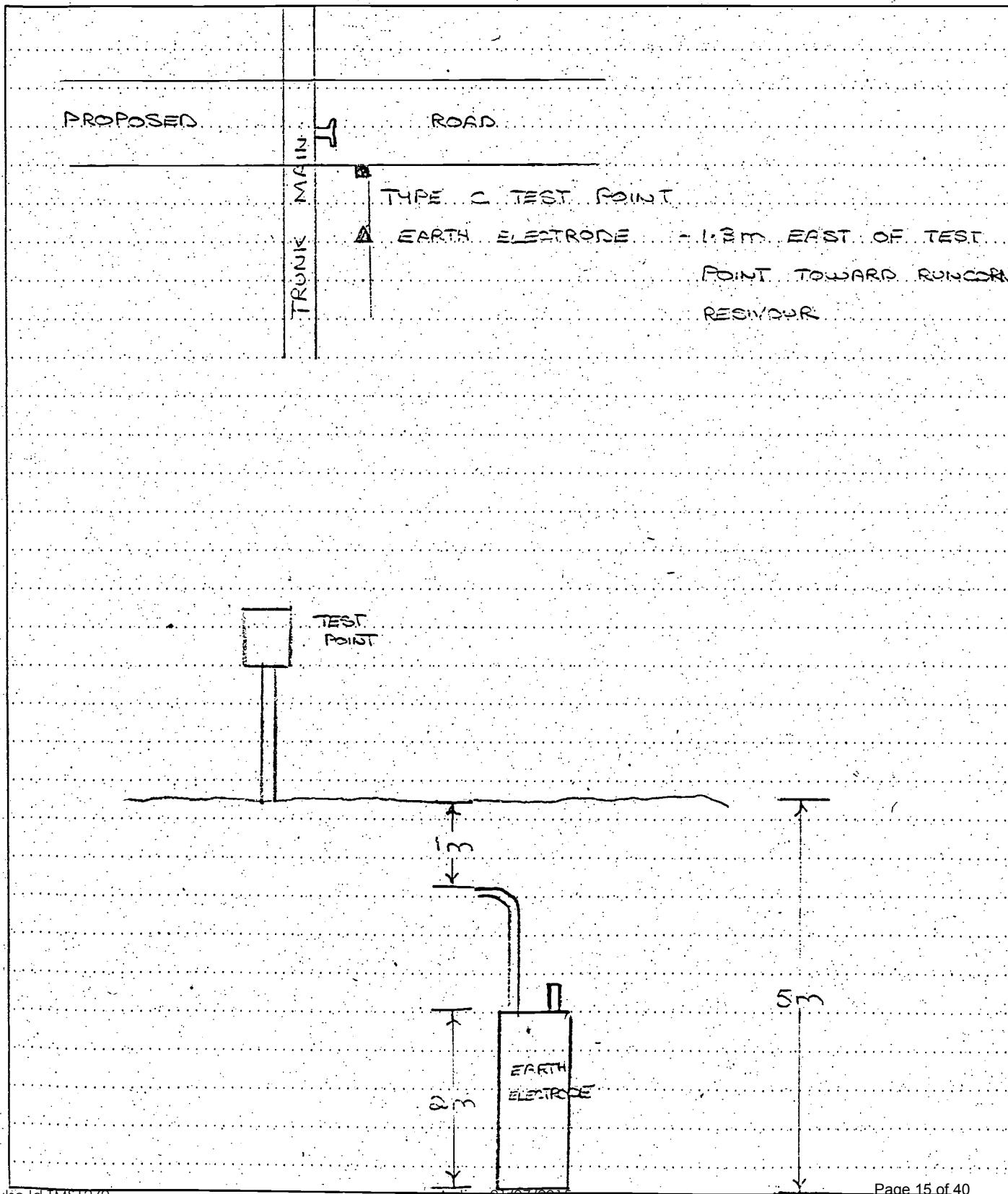
N°7 (RESERVOIR VALVE PT) - NOT POSSIBLE TO READ



BRISBANE CITY COUNCIL

MEMORANDUM

To	File No.
From	Date 10/11/92
Subject EARTH ELECTRODE - KARAWATHA TRUNK MAIN (DRAWING REF. 2/31.04)	



INTERRUPTER: - 20 SECS OFF
10 SECS ON

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
MECHANICAL AND ELECTRICAL SECTION

INTERFERENCE SURVEY RESULTSJOB DESCRIPTION: -

UNIT READING: -

250 mV

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-450	Rectifier M&IV	Pole no: 48199	
OFF	-426		KARDELLA	+24
ON	-444	Light	Roundabout	
OFF	-444	Pole	PEINSON KARDELLA	0
ON	-71	WATER Main	PEINSON	0
OFF	-71			
ON	-420	SEQEBS		
OFF	-417	SP407L	PEINSON ST	+3
ON	-450	SEQEB		
OFF	-450	48201	KARDELLA ST	0
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY: ... P. J. M.

Brisbane City Council
Eagle Farm Pump Station
Electrical Workshops

30th October 1992

Cathodic Protection Calculations for Karawatha High level reservoir to Sunnybank Hills 755dia. trunk water mains.

Trunk mains imformation:-

Route length: 3047 metres

Pipe diameter: 755 mm

Total pipe surface: 7227 metres square.

Coating: Low Density Fusion Bonded Polyethylene Coated.

Structure material: Mild Steel.

From previous trunk mains, current density of similar trunk mains is as follows.

System-----Surface area---Current----Current density

Bardon - Gap trunk mains	5092 metre sq.	200 mA	40 uA/metre sq
Milne Hill trunk mains	5277 metre sq.	200 mA	40 uA/metre sq
Illaween St. trunk mains	4693 metre sq.	500 mA	106 uA/metre sq

Taking worst case scenario ie 100 uA/metre sq. means a current drain on this trunk mains of approximately 722 mA.

Soil Resistivity

Taken at installed test points along pipeline route.

Test point no.	depth metres	resistivity ohm metres
1	3 (5)	162 (103)
2	3 (5)	109 (89)
3	3 (5)	61 (52)
4	3 (5)	75 (125)
5	3 (5)	135 (304)
6	3 (5)	135 (157)
7	3 (5)	88 (116)

Natural Potential Survey

Potentials obtained at installed test points along pipeline route.

Test point no.	Potential(CuSO ₄)	Potential(Zn)
1	-780mv	460mv
2	-712mv	463mv
3	-753mv	470mv
4	-748mv	428mv
5	-484mv	335mv
6	-776mv	90mv
7	-758mv	438mv

Current Drain Testing.

Temporary anode installed in Penson street, approximately 30 metres from test point no. 3.

Rectifier reading 32 volts @ 150 mA

Test point no.	CuSO ₄ (on)	CuSO ₄ (off)	Zn(on)	Zn(off)	
1	-1196mv	-804mv	108mv	407mv	Gowan
2	-1118mv	-708mv	360mv	463mv	Penson
3	-1200mv	-760mv	-----	434mv	Lexton
4	-1187mv	-761mv	138mv	545mv	Lexton
5	-850mv	-747mv	430mv	507mv	Easement
6	-1180mv	-809mv	-16mv	132mv	QEC Ease.
7	-1237mv	-823mv	70mv	480mv	Easement
8	-1137mv	-762mv	-----	-----	P/Stn.

Brisbane City Council
Dept. W.S.& S.
Eagle Farm Pump Station
5 Bunya Street,
Eagle Farm. Q 4009
Ph. 07 2680811
Fx. 07 2680847

Contact: Kerry Mc Govern
Ph. 2680838

To: SEQEB Runcorn
Ph. 2735777
Fx. 2734797

Attention: Jim Pascoe

Subject: Installation of Cathodic Protection Cabinet/System at Kardella Street, Sunnybank.

The mechanical and electrical section at Eagle Farm are intending to install a cathodic protection system on a newly installed section of water supply trunk main's pipework which extends from Gowan Rd. to Karawatha Pump Station.

The cathodic protection system will prevent the corrosion of the new trunk mains, which will considerably extend the life of the trunk mains.

We are considering installing the cathodic protection rectifier in Kardella Street, Sunnybank approximatley 116 metres from Penson Street, with a 240 volt supply coming from your pole no. 48199. We will also need to install a silicone iron anode at a depth of 2 metres, 100 metres from Penson Street and cabling from the rectifier to Penson Street. With the exception of the 240 volt rectifier supply, all other cables will be low voltage DC.

Construction of this system is expected to be started within the next few weeks, at this stage around late November.

Regards,

Kerry Mc Govern.

- ① LODGE APPLICATION FOR SUPPLY (JEFF).
- ② BACKHOE FOR TRUNK MAINS EXCAVATION AND ANODE
- ③ DITCH WITCH FOR TRENCHING.
- ④ EAGLE FARM FOR 240V SUPPLY, PLINTH & SWITCHBOARD & CONNECTIONS.

**APPLICATION FOR THE SUPPLY OF ELECTRICITY**

The South East Queensland
Electricity Board

City Office

150 Charlotte Street, Brisbane, 4000
G.P.O. Box 1461, Brisbane, 4001

**NOTE:- (i) PLEASE CONSULT TELECOM DIRECTORY FOR LOCAL OFFICES
(ii) PLEASE PRINT AND COMPLETE ALL SECTIONS OF THIS FORM**

PLEASE NOTE: LODGEMENT OF A SECURITY DEPOSIT IS REQUIRED PRIOR TO TAKING OVER SUPPLY. APPLICATION FOR DOMESTIC PREMISES REQUIRES CUSTOMERS TO PROVIDE PROOF OF IDENTITY, OR A HIGHER AMOUNT OF SECURITY DEPOSIT (\$150) MAY BE CHARGED.

OFFICE USE ONLY	
Where application lodged?	Customer Account No.
Date lodged	Security Deposit
Staff I.D.	Premises Identity No.
I.D. Verified	F/S No.
<input type="checkbox"/> YES	<input type="checkbox"/> NO

1. NAME(S) OF APPLICANT(S)

MR MRS

MISS MS

MR MRS

MISS MS

MR MRS

MISS MS

CHRISTIAN OR GIVEN NAMES

SURNAME

PRIVATE

BUSINESS

225 4205

2. CONTACT TELEPHONE NO(S)

3. ADDRESS WHERE SUPPLY IS REQUIRED

UNIT/FLAT/SHOP NO

HOUSE/STREET NO

LOT NO.

STREET KARDELLA ST

LOCALITY STRETTON

POST CODE 4116

4. DATE OF TAKING OVER SUPPLY OF ELECTRICITY

18/11/92

5. TARIFF IF KNOWN

21

7. POSTAL ADDRESS FOR ACCOUNTS (IF SAME WRITE AS ABOVE)

B.C.C.W.G. & S. DEPT
MECH. & ELECT. BRANCH
PUNYA ST. EAGLE FARM

6. IS SUPPLY CONNECTED NOW?

 YES NO

3. NATURE OF PREMISES (DOMESTIC/COMMERCIAL/ INDUSTRIAL/FARMING)

10. NAME OF LAST CUSTOMER

11. NAME AND ADDRESS OF OWNER OR AGENT OF PREMISES

12. PLEASE STATE THE NAME & ADDRESS OF YOUR EMPLOYER

13. PLEASE STATE YOUR PREVIOUS ADDRESS

15. I/WE JOINTLY AND SEVERALLY, HEREBY MAKE APPLICATION FOR THE SUPPLY OF ELECTRICITY TO THE PREMISES UNDER THE TERMS SET OUT UNDER THE ELECTRICITY ACT 1976-1986 AND ITS REGULATIONS.

SIGNATURES OF APPLICANTS

M. JUKES

DATE

18/11/92

9. DOG ON PREMISES?

 YES NO

BREED

14. IS A FINAL READING REQUIRED AT YOUR OLD ADDRESS?

 YES NO

DATE REQUIRED / / (48 HRS ADVICE REQUIRED)

FORM 95 (5/78811N 20815)

ATTENTION IS ALSO DRAWN TO THE NEED FOR METERS TO BE IN A POSITION SUITABLE TO SEQEB.

PART 2. ONLY REQUIRED FOR NEW CONNECTIONS AND/OR ALTERATIONS OR ADDITIONS.REAL PROPERTY DESCRIPTION IN FULL Lot No. R.P.
*(Details from rates notice or sales agreement)*APPLICANT'S CONTACT ADDRESS
PRIOR TO CONNECTION

PHONE NO.

BUILDER OR CONSULTANT
(if known)

Name

Address

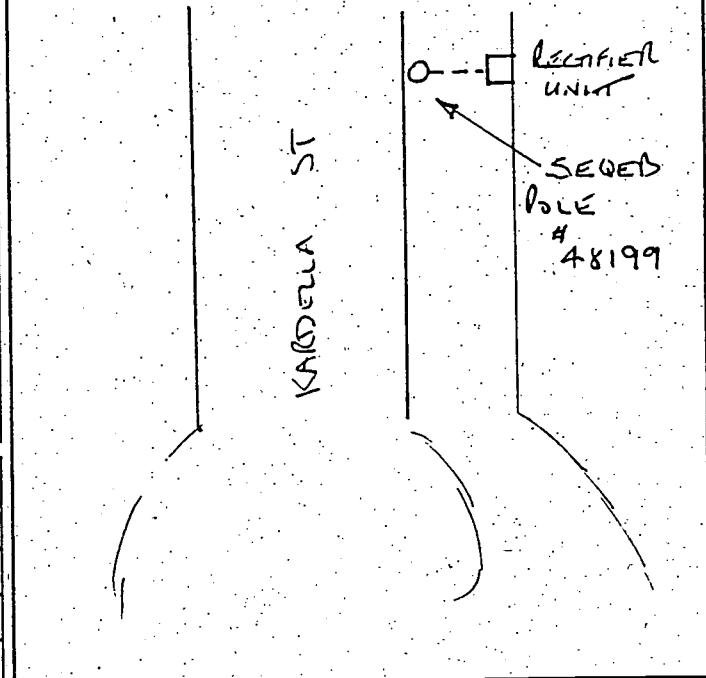
Post Code Telephone No.

ELECTRICAL CONTRACTOR
(if known)

Name

Address

Post Code Telephone No.

PLEASE SKETCH HERE A PLAN TO PREMISES
OUTSIDE RESIDENTIAL AREA *(use landmarks if applicable)*

SUPPLY IS
REQUIR'D FOR:
 Permanent Service
 Temporary Service
 Alterations
 Additions
 New Job
 Other (specify)

IF A NEW INSTALLATION,
CONSTRUCTION SHOULD
BE COMPLETED BY: Date 18/11/92FORWARD QUOTATIONS TO:
 appropriate box
 Builder/Consultant
 Electrical Contractor
 Applicant

LOAD APPLIED FOR									
LIGHTING		POWER OUTLETS		WATER HEATERS		RANGE			
Number	Watts (each)	Number	Watts (each)	Capacity	Storage	Delivery	kW	No. of Plates	kW
1	10A								

OTHER ELECTRICAL APPARATUS			MOTORS			TOTAL LOAD APPLIED FOR <i>(if known)</i>		
Type	Watts	Number	kW (each)	Phases	Total Amps	No. of Phases	Amps per Phase	
RECTIFICATION UNIT	400				15	1	15	

Brisbane City Council
Dept. W.S.& S.
Eagle Farm Pump Station
5 Bunya Street,
Eagle Farm. Q 4009
Ph. 07 2680811
Fx. 07 2680847

Contact: Kerry Mc Govern
Ph. 2680838

To: Darra Water Supply Depot
Ph. 3755050
Fx. 3753559

Attention: Merve Smith

Subject: Installation of Cathodic Protection Cabinet/System at
Kardella Street, Sunnybank.

The mechanical and electrical section at Eagle Farm are intending to install a cathodic protection system on a newly installed section of water supply trunk mains pipework which extends from Gowan Rd. to Karawatha Pump Station.

The cathodic protection system will prevent the corrosion of the new trunk mains, which will considerably extend the life of the trunk mains.

We are considering installing the cathodic protection rectifier in Kardella Street, Sunnybank approximatley 116 metres from Penson Street, with a 240 volt supply coming from your pole no. 48199. We will also need to install a silicone iron anode at a depth of 2 metres, 100 metres from Penson Street and cabling from the rectifier to Penson Street. With the exception of the 240 volt rectifier supply, all other cables will be low voltage DC.

Could you please contact me as soon as possible regarding your depot supplying machinery and labor to facilitate the installation of above test point and cabling to enable testing and commissioning of above system.

Regards,

Kerry Mc Govern.

DEPT. WS & S.

M&E

EAGLE FARM PUMP STATION

LEGEND:-

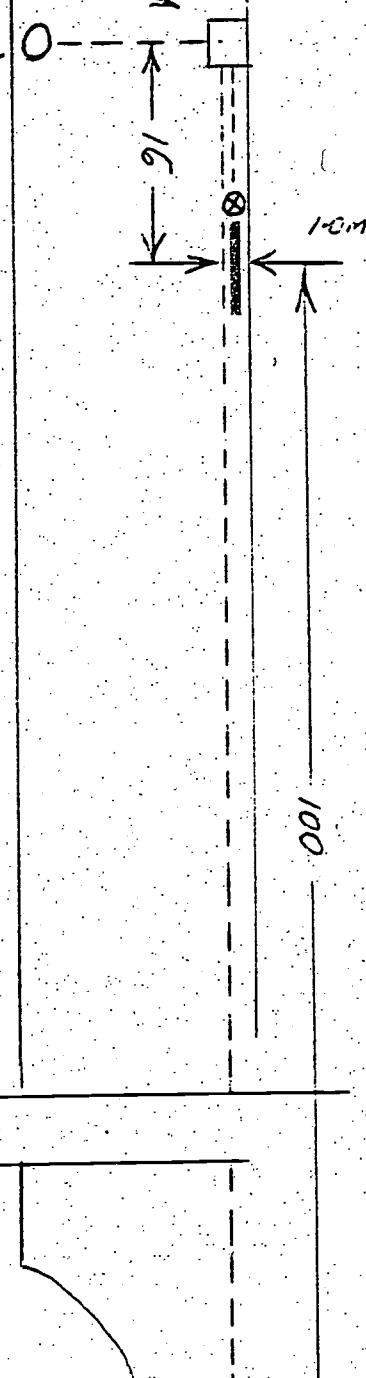
- ⑧ SURFACE ANODE BED INDICATOR.

1500mm x 75 ϕ
SILICONE IRON ANODE.

PROPOSED
CATHODIC
PROTECTION
RECTIFIER

SEQEB
POLE #
48199

KARDELLA ST.



WATER TRUNK MAINS.

PENSON

STREET.

To	File No.	Page 1,
From	Date	2/11/92
Subject	Karawatha Trunk Mains Resistivity Readings	

Outside Pumping Station

2M = $346 \times 0.1 = 34.6 \text{ m} \quad 2.29 \text{ (20 kohm)}$
3M = $173 \times 0.1 = 17.3 \text{ m} \quad 2.44$
5M = $82 \times 0.1 = 8.2 \text{ m} \quad 1.86$

Proposed Site
RECT. UNIT.

SEQ E B

Pole No

48199

*
TESTING POINT

KARDELLA ST

TRUNK MAIN

PENSON ST.

PROPOSED RECT SITE TO SEQ E B Pole No 48199 = 15.7M

PROPOSED RECT SITE TO TESTING POINT = 15.8M

TESTING POINT TO TRUNK MAIN = 95.0M

BRISBANE CITY COUNCIL

MEMORANDUM

To	File No.	Page 2
From	Date	/ /
Subject		

$$\begin{aligned}
 2M &= 61 \times 0.1 = 77 \text{ N/m} & 1.16 & (20 \text{ kN}) \\
 3M &= 55 \times 0.1 = 104 \text{ N/m} & 1.11 & " \\
 5M &= 00 \times 1 = & 1.16 & "
 \end{aligned}$$

SÉQEB Pole
No 409233 (WITH MEN)

PENSON ST.

* TESTING POINT

LEXAN ST.

NW
RDN

To.....	File No:	Page 3.
From.....	Date	1/1/15
Subject.....	-	

SEQEB Pole 409233 To TESTING POINT 17.0M

SEQEB Pole 409233 To TRUNK MAIN 124.0M

TESTING POINT READINGS

$$2M = 50 \times 0.1 \quad 2.12 \text{ (20 kN)}$$

$$3M = 19 \times 0.1 \quad 1.77 \text{ "}$$

$$5M = 21 \times 0.1 \quad 2.02 \text{ "}$$

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

DARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 25-09-92
TEST POINT TYPE: C

LOCATION: PENSON & LEXTON ST
MAINS SIZE: 755

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 10²
ZINC REFERENCE TO PIPE: +70 mV
CuSO₄ REFERENCE TO PIPE: -353 mV
ZINC TO CuSO₄: -1213 mV

EARTH TESTING

IN SPACING: 3m

MEGGER READING: 3.25 (x1) RESISTIVITY: 61.23 Ω/M
MEGGER READING: 16.5 (x10) RESISTIVITY: 51.81 Ω/M

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:
(ANODE CONNECTED)

CuSO₄ REF TO PIPE:
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: M. Grzeszko

ROADWAY (PENSON ST)

COMMENTS: MAIN IS IN ROADWAY (PENSON ST)
CuSO₄ WAS IN FOOT PATH NEAR KERB
EARTH TEST RODE IN FOOT PATH PARALLEL TO MAIN
NO VALVE OR BRANCH LINE IN PLACE... NO INSULATION TEST

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BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 14-8-92
TEST POINT TYPE: B

LOCATION: KARAWATHA TRUNK MAINS
MAINS SIZE: 755 MM M.S PIPE

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.1Ω
ZINC REFERENCE TO PIPE: +335 mV
CuSO₄ REFERENCE TO PIPE: -484 mV
ZINC TO CuSO₄: -820 mV

EARTH TESTING

PIN SPACING: 3M MEGGER READING: (72x0.1) RESISTIVITY: 135.64 Ω/m
PIN SPACING: 5M MEGGER READING: 97x0.1 RESISTIVITY: 304.58 Ω/m

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:
ANODE SIZE:
ANODE TO PIPE POTENTIAL:
ZINC REF TO PIPE:
(ANODE CONNECTED)
CuSO₄ REF TO PIPE:
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: L. Greaves

COMMENTS:

Wires connected on pipe adj to valve spindle.

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BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT NO 3
at Earth mat
switchboard

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 1-10-92
TEST POINT TYPE: B

LOCATION: KARAWATHA TRUNK MAINS
MAINS SIZE: 755MM

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.25Ω

ZINC REFERENCE TO PIPE: +90mV

CuSO₄ REFERENCE TO PIPE: -776mV

ZINC TO CuSO₄: -865mV

EARTH TESTING

PIN SPACING: 3M MEGGER READING: (72x0.1) RESISTIVITY: 135.6Ω/m

PIN SPACING: 5M MEGGER READING: (50x0.1) RESISTIVITY: 157.0Ω/m

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO₄ REF TO PIPE:
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: 1 year ago.

COMMENTS:

2 grading rings installed around this T.P. Box
Also earthing connected in this box.

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BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 25-09-93

TEST POINT TYPE: B

LOCATION: SWR GOOLAN RD & PENSON ST
MAINS SIZE: 755

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 12
ZINC REFERENCE TO PIPE: +403 mV
 CuSO_4 REFERENCE TO PIPE: -712 mV
ZINC TO CuSO_4 : -1175 mV

EARTH TESTING

PIN SPACING: 3m

MEGGER READING: 5.8 (Ω) RESISTIVITY: 109.27 Ω/m

PIN SPACING: 5m

MEGGER READING: 25.6 (Ω) RESISTIVITY: 89.8 Ω/m

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO_4 REF TO PIPE:
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY:

COMMENTS:

MAIN IS IN CENTRE OF GOOLAN RD (OPPOSITE CENTRE ISLAND)
MAIN WAS IN THE FOOT PATH NEXT TO KERB
 CuSO_4 WAS IN THE FOOT PATH PARALLEL TO MAIN IN FOOT PATH
GAS MAIN RUNS PARALLEL TO MAIN IN FOOT PATH
EARTH TESTING DONE IN FOOT PATH
NO INSULATED VALVE TEST DONE

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TEST Point N° 5

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 1-10-92

LOCATION: LEXTON ST

TEST POINT TYPE: B

MAINS SIZE: 755 mm

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2 Ω

ZINC REFERENCE TO PIPE: +428 mV

CuSO₄ REFERENCE TO PIPE: -748 mVZINC TO CuSO₄: -1177 mVEARTH TESTING

PIN SPACING: 3m

MEGGER READING: (40X 0.1) RESISTIVITY: 75.36 Ω/m

PIN SPACING: 5m

MEGGER READING: (40X 0.1) RESISTIVITY: 125.6 Ω/m

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO₄ REF TO PIPE:

(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:

(IF INSTALLED)

INSTALLED BY: *L. Greaves*

COMMENTS:

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BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 1-10-92

TEST POINT TYPE: C

LOCATION: Karawatha TRUNK MAINS
MAINS SIZE: 755 mm**POTENTIAL TESTING**

CATHODE TO CATHODE RETURN (RESISTANCE): 0 mV

ZINC REFERENCE TO PIPE: + 438 mV

CuSO₄ REFERENCE TO PIPE: - 758 mVZINC TO CuSO₄: - 1193 mV**EARTH TESTING**

PIN SPACING: 3M MEGGER READING: (47 x 0.1) RESISTIVITY: 88.5 ohm/m

PIN SPACING: 5M MEGGER READING: (37 x 0.1) RESISTIVITY: 116.18 ohm/m

**SACRIFICIAL ANODE
(IF INSTALLED)**

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO₄ REF TO PIPE:

(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:

(IF INSTALLED)

INSTALLED BY: L. Greaves

COMMENTS:

Protected side only connected to Mains.

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BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 1-10-92

LOCATION: Gowrie Coupton Rd
MAINS SIZE: 755MM

TEST POINT TYPE: B

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.15V

ZINC REFERENCE TO PIPE: +460mV

CuSO₄ REFERENCE TO PIPE: -780mV

ZINC TO CuSO₄: -1238mV

EARTH TESTING

PIN SPACING: 3M MEGGER READING: (86 x 0.1) RESISTIVITY: 162.0Ω/m
PIN SPACING: 5M MEGGER READING: (33 x 0.1) RESISTIVITY: 103.625Ω/m

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE:

ANODE SIZE:

ANODE TO PIPE POTENTIAL:

ZINC REF TO PIPE:

(ANODE CONNECTED)

CuSO₄ REF TO PIPE:

(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT:

BLEED RESISTOR SIZE:

(IF INSTALLED)

INSTALLED BY: L Greaves

COMMENTS:

Insulated joint >70 m between 755mm Trunk
Main & 300mm Branch.

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DEPARTMENT OF WATER SUPPLY AND SEWERAGE

MECHANICAL AND ELECTRICAL BRANCH

METROPOLITAN DIVISION

EAGLE FARM PUMPING STATION

ELECTRICAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 24-03-93

DESCRIPTION

MAINS DETAILS:-

LOCATIONS:- KARAWATHA RESERVOIR

SIZE:- 600 MM

MATERIAL:- STEEL

COATING:- PVC

NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- >200 Ω

NUMBER OF BOLT:- 16 BOLTS PER FLANGE

FLANGE TO FLANGE RESISTANCE:- 50Ω, 20Ω

INSULATION CHECKER MODEL 702:- O.K

POTENTIAL DIFFERENCE TO REFERENCE CELL

PROTECTED SIDE:- RESERVOIR -187 mV

UNPROTECTED SIDE:- TRUNK MAIN -633 mV

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-

NUMBER OF BOLTS:-

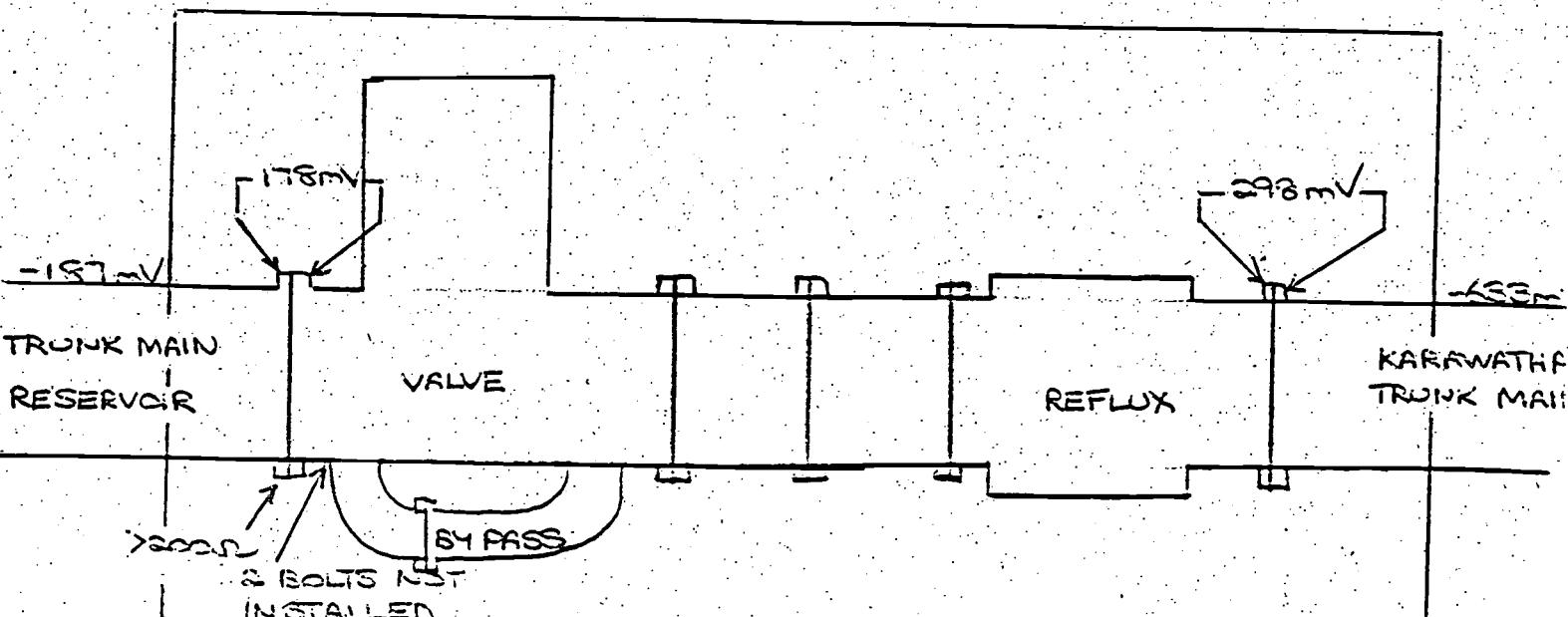
FLANGE TO FLANGE RESISTANCE:-

COMMENTS

INSULATED BOLTS REPLACED BY DARRA WATER SUPPLY

TESTED BY

M. M' CORMICK



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

ELECTRICAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 24-08-93

DESCRIPTION

MAINS DETAILS:-

LOCATIONS:- KARAWATHA RESERVOIR INLET

SIZE:- 600 MM

MATERIAL:- STEEL

COATING:- PVC

NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- $>200\ \Omega$

NUMBER OF BOLT:- 16 BOLTS PER FLANGE.

FLANGE TO FLANGE RESISTANCE:- $30\ \Omega$, $25\ \Omega$, $10\ \Omega$ ACROSS FLANGE

INSULATION CHECKER MODEL 702:- O.K.

POTENTIAL DIFFERENCE TO REFERENCE CELL

PROTECTED SIDE:- RESERVOIR -686 mV

UNPROTECTED SIDE:- TRUNK MAIN -635 mV

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-

NUMBER OF BOLTS:-

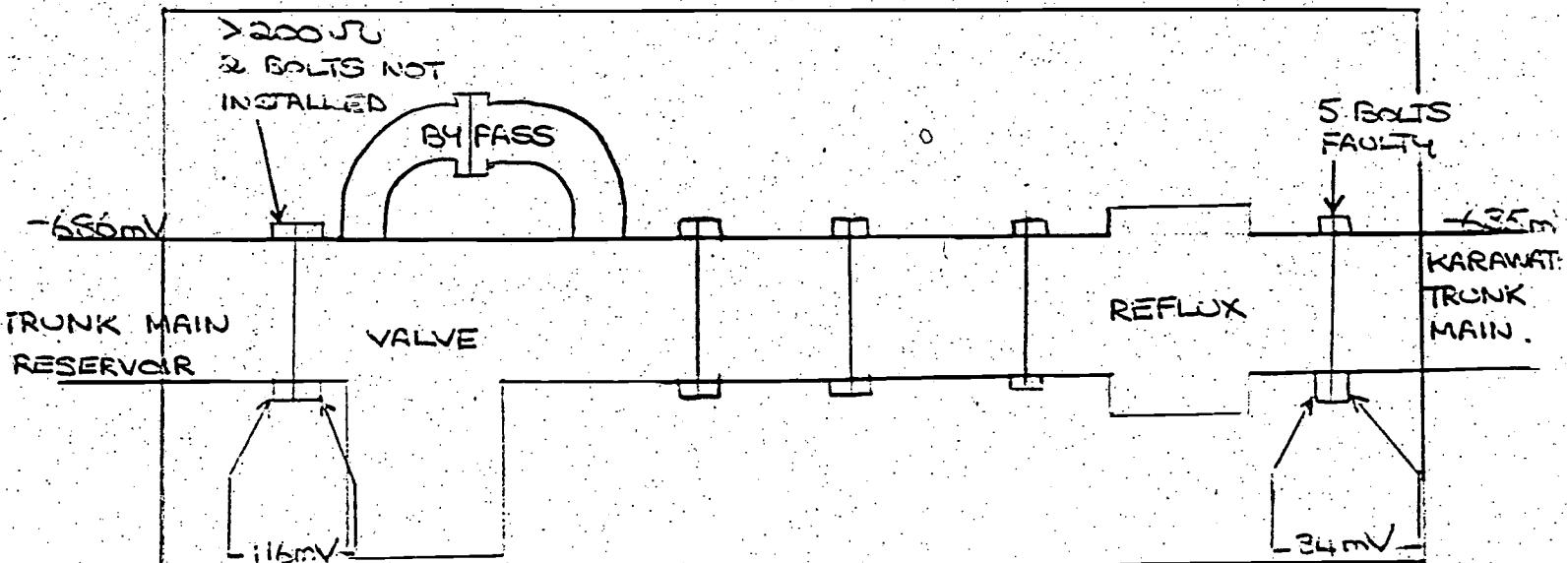
FLANGE TO FLANGE RESISTANCE:-

COMMENTS

INSULATED BOLTS REPLACED BY DARRA WATER SUPPLY

TESTED BY

M. M' CORMICK



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

ELECTRICAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 16-10-91

DESCRIPTION

MAINS DETAILS:-

LOCATIONS:-

SIZE:-

MATERIAL:-

COATING:-

NUMBER:-

450 mm MAINS
KARAWATHA Pump STATION

OUT GOING MAINS.

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:-

NUMBER OF BOLT:-

FLANGE TO FLANGE RESISTANCE:-

INSULATION CHECKER MODEL 702:-

POTENTIAL DIFFERENCE TO REFERENCE CELL

PROTECTED SIDE:-

UNPROTECTED SIDE:-

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-

NUMBER OF BOLTS:-

FLANGE TO FLANGE RESISTANCE:-

all $> 200 \Omega$

as per sketch

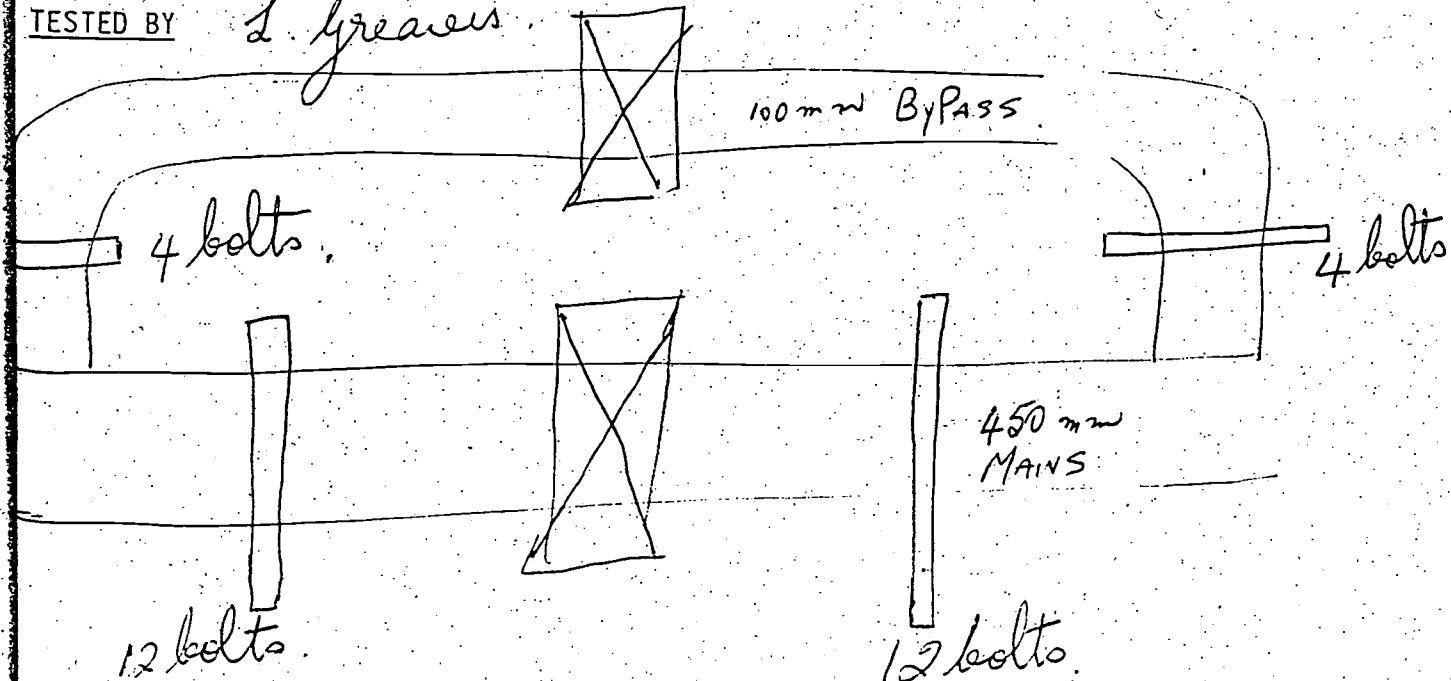
all $> 200 \Omega$

COMMENTS

asked for silicone between flanges

TESTED BY

2 greasers



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

ELECTRICAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE

DESCRIPTION

MAINS DETAILS:- Karawatha to Sunnybank Hills.

LOCATIONS:-

SIZE:- $\phi 300$ take off. valve.

MATERIAL:- Mild Steel.

COATING:-

NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- ALL Bolts. $> 1 \text{ m}\Omega$.

NUMBER OF BOLT:- 12

FLANGE TO FLANGE RESISTANCE:- $1.5 \text{ m}\Omega$

INSULATION CHECKER MODEL 702:- OK.

POTENTIAL DIFFERENCE TO REFERENCE CELL CUSO₄

PROTECTED SIDE:- -860 mV on -830 mV OFF

UNPROTECTED SIDE:- 580 mV on -580 mV OFF.

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-

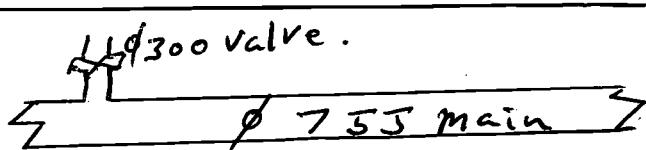
NUMBER OF BOLTS:-

FLANGE TO FLANGE RESISTANCE:-

COMMENTS Flange to Flange 200 mV

TESTED BY

P. SMYTH.



PIPELINE 1
PIPELINE 2
GRADING RINGS 1 & 2
GRADING RINGS 1 & 2

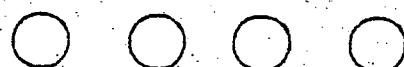
KARAWATHA TRUNK MAIN

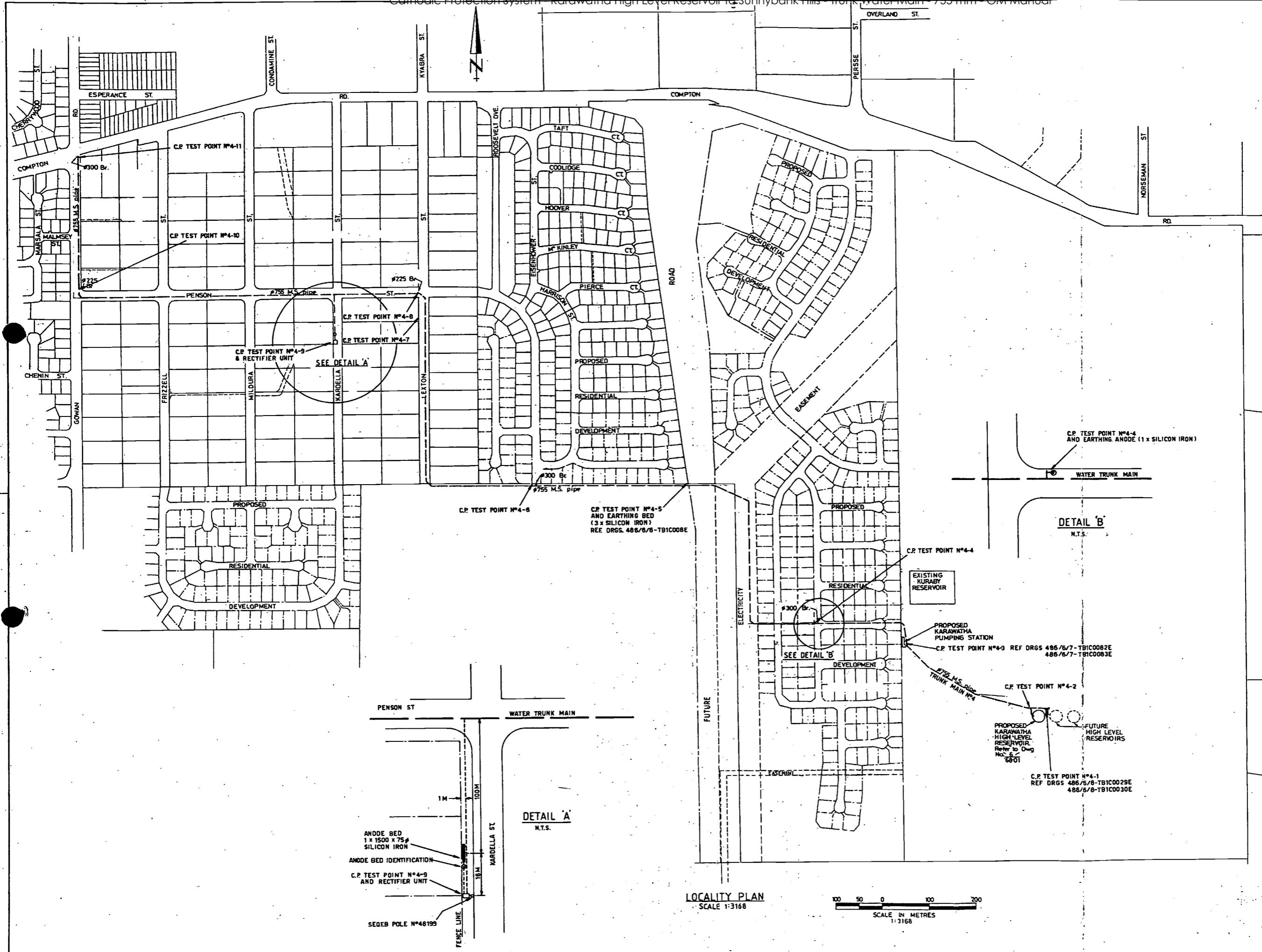
EARTHING 4
EARTHING 4

EARTHING AND GRADING
RING TESTPOINT

Potential O
reference O

not in use

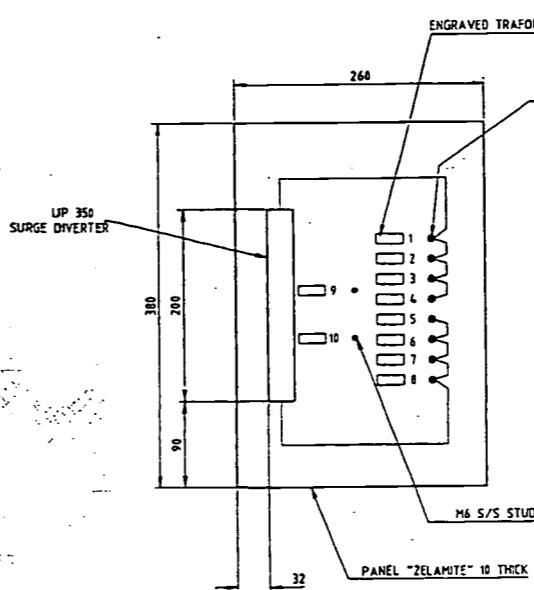
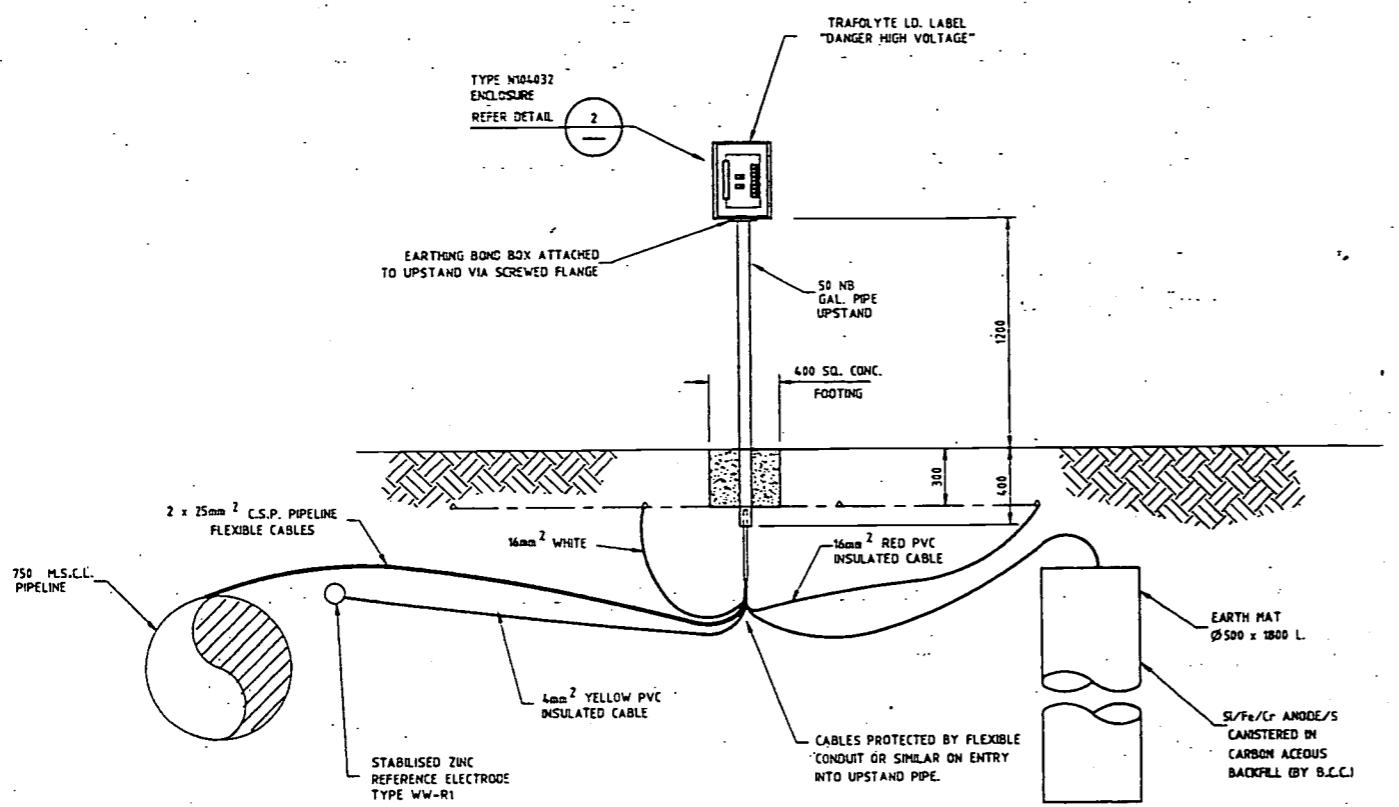




PROJECT
KARAWATHA HIGH LEVEL RESERVOIR
TO SUNNYBANK HILLS 755 DIA
TRUNK MAIN, CATHODIC PROTECTION

TITLE
KAROELLA STREET
CATHODIC PROTECTION SYSTEM

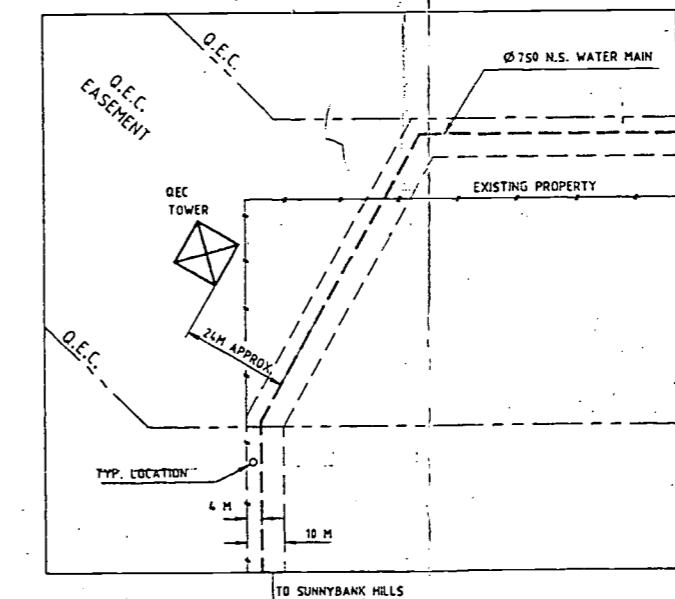
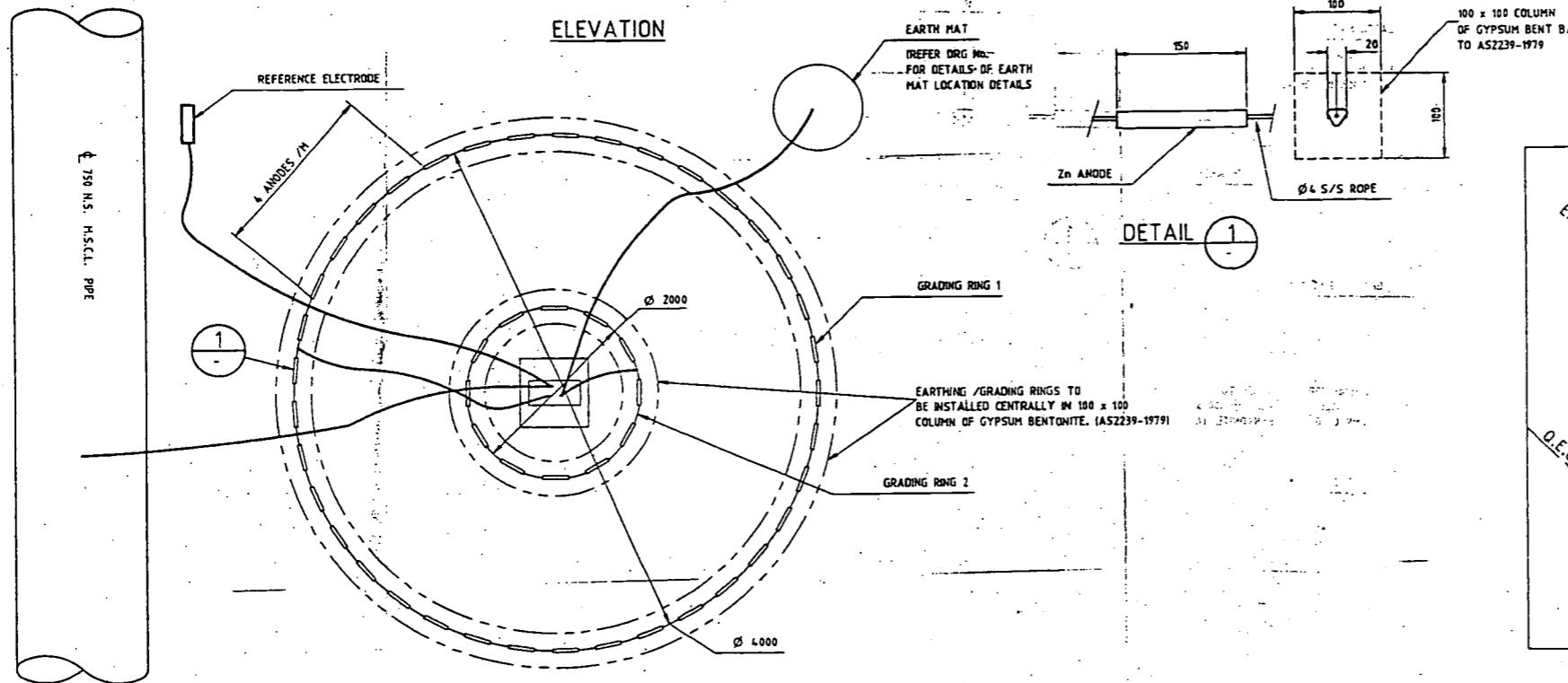
SCALE 1:3168 NR 1 OF 1 SHEETS
DRAWING NO. 486/6/6-TB1C0012E AMEND.
Page 39 of 40



TERMINAL CONNECTIONS	
No.	DESCRIPTION
Z3	GRADING RING 1 16mm ² S.D.L. BLACK
Z3	GRADING RING 2 16mm ² S.D.L. BLACK
Z1	Pipeline 25mm ² C.S.P. BLACK
Z2	Pipeline 25mm ² C.S.P. BLACK
Z4	EARTH MAT 16mm ² S.D.L. RED
Z4	EARTH MAT 16mm ² S.D.L. RED
7	SPARE
8	SPARE
5/G	SPARE
9	POTENTIAL 4mm ² S.G.J. BLACK
10	REFERENCE ELECTRODE 4mm ² S.G.J. YELLOW

DETAIL 2
SCALE 1:5

EARTHING BOND BOX DETAIL



INSET LOCATION PLAN N.T.S.
SEE B.C.C. DRG No. 2/8120 FOR LOCATION OF INSET PLAN
NOTE:
THE POSITION OF ALL SERVICES SHOWN IS APPROXIMATE ONLY.

KARAWATHA TO SUNNYBANK
755 MSCL WATER MAIN
CATHODIC PROTECTION & EARTHING

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SCALE	N.T.S.	BRISBANE CITY COUNCIL	
DRAWN	BOB FOSTER	755 N.S.C.L. WATER MAIN	
CHECKED		H.V. INDUCTION MITIGATION	
DATE	27-8-92		
DESIGNED			
No.	DESCRIPTION	DATE	APPROVED
			7026
	REVISIONS		Q 5291-1 / A
		ISSUED	JCS/APPROV. NO.
			AREA / DRAWING NO. / REV. NO.