

26TH NOVEMBER, 1993

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

OPERATING MANUAL FOR:

**BARTLEY'S HILL TO PINKENBA 600MM DIAMETER TRUNK WATER MAIN
STAGE ONE CATHODIC PROTECTION SYSTEM.**

CLIENT:

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

MANUAL CONTENTS

- (1.0) Introduction
- (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
- (4.6) Associated Drawings
- (4.7) Associated Standards
- (4.8) Government Regulations
- (5.0) Performed Testing
- (6.0) Conclusion
- (7.0) Maintenance

DRAWINGS

Drawing No.1 50A Rectifier Wiring Diagram
CE02/136 Bartley's Hill to Pinkenba Stage 1
(No Number) Monthly Maintenance Program.

(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 600 mild steel cement lined.

Coating: Fibreglas enamel coated.

Length: 9.0 km

Location: Kingsfordsmith Drive Meeandah to Tingira St. Pinkenba.

Construction

Drawings: Not available.

(4.0) CATHODIC PROTECTION DETAILS

- (4.1) Type of Cathodic Protection: Impressed Current.
- (4.2) Rectifier: Special 50V Volt, 50 amp direct current output enclosed in a stainless steel switchboard. Rectifier has a 240V supply from a nearby SEQEB pole number 11068.
Rectifier is located in Orsova Street Pinkenba. UBD 20 E5.
- (4.3) Cathode: The cathode point is located approximately 22 metres directly opposite rectifier in Orsova Street. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection.
- (4.4) Anodes: Five 1500 x 75mm silicone iron anodes were installed approximately 256 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. Refer dwg no CE02/136 and sketches 2 and 3 attached.
- (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 six test points have been installed for details see dwg no. CE02/136.
- (4.6) Associated Drawings:
Cathodic Protection Details – CE02/136
Cathodic Protection Test Point Details – 2/14.199
50 amp Rectifier Wiring Diagram – Sketch No. 1
Conduit layout – Sketch No. 2
Anode layout – Sketch No. 3
- (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:

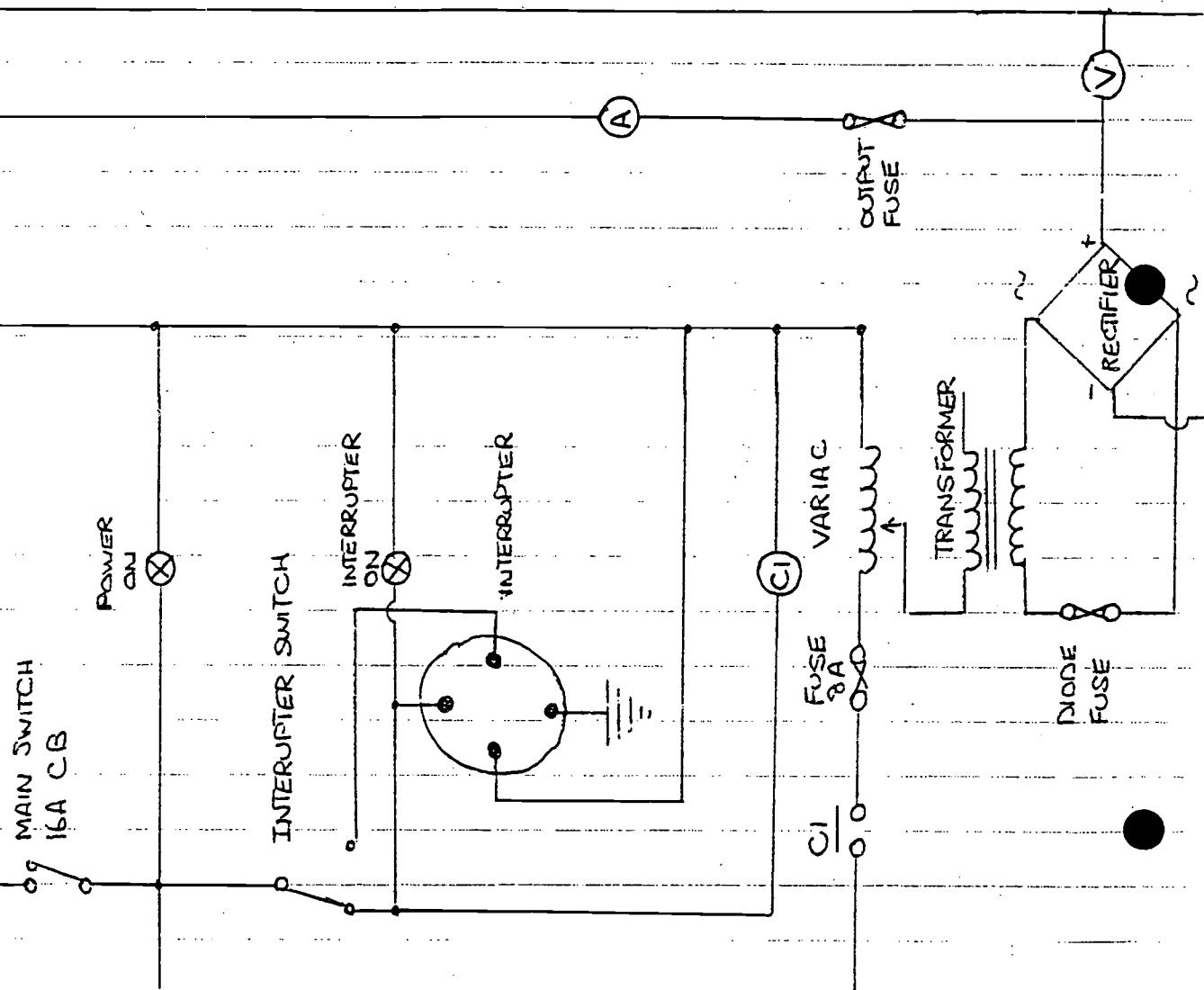
- 1/ Identify system.
- 2/ Check system for operation.
- 3/ Record voltmeter.
- 4/ Record ammeter.
- 5/ Record "on" potentials for all test points.
- 6/ Record "instant off" potentials for all test points.
- 7/ Record "off" potentials for all test points.
- 8/ Perform loop resistance and record.
- 9/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

DRAWING 1031

+VE
-VE

Z

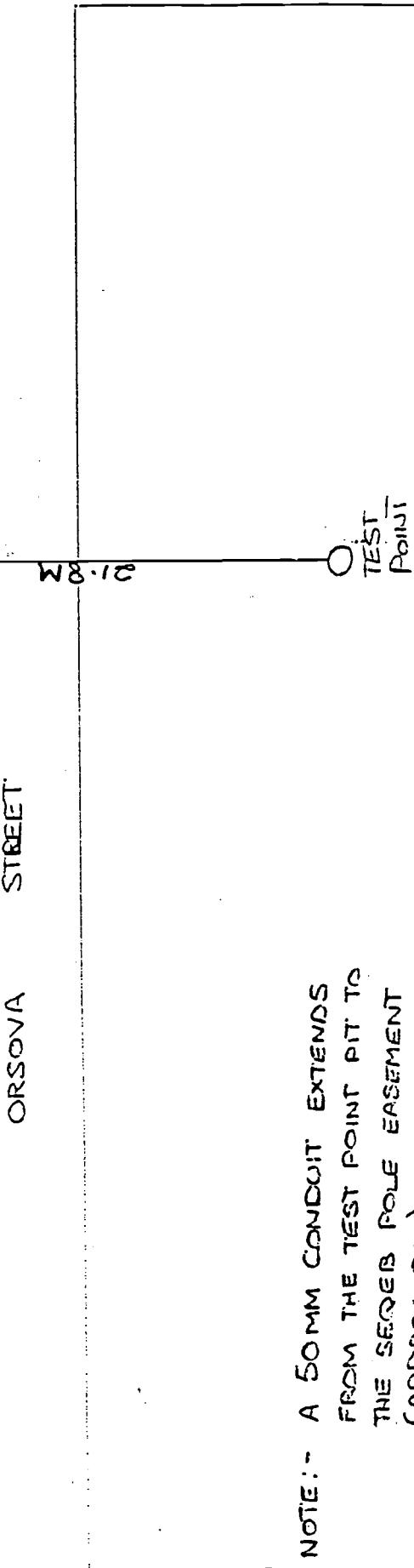
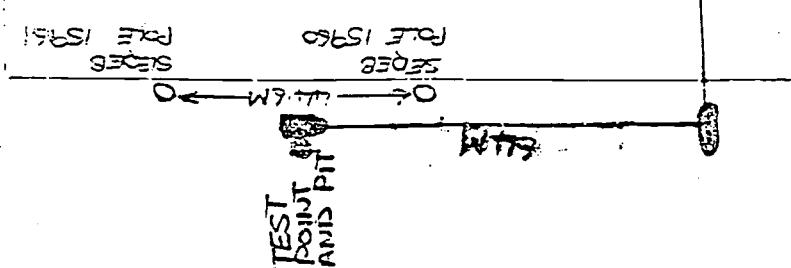
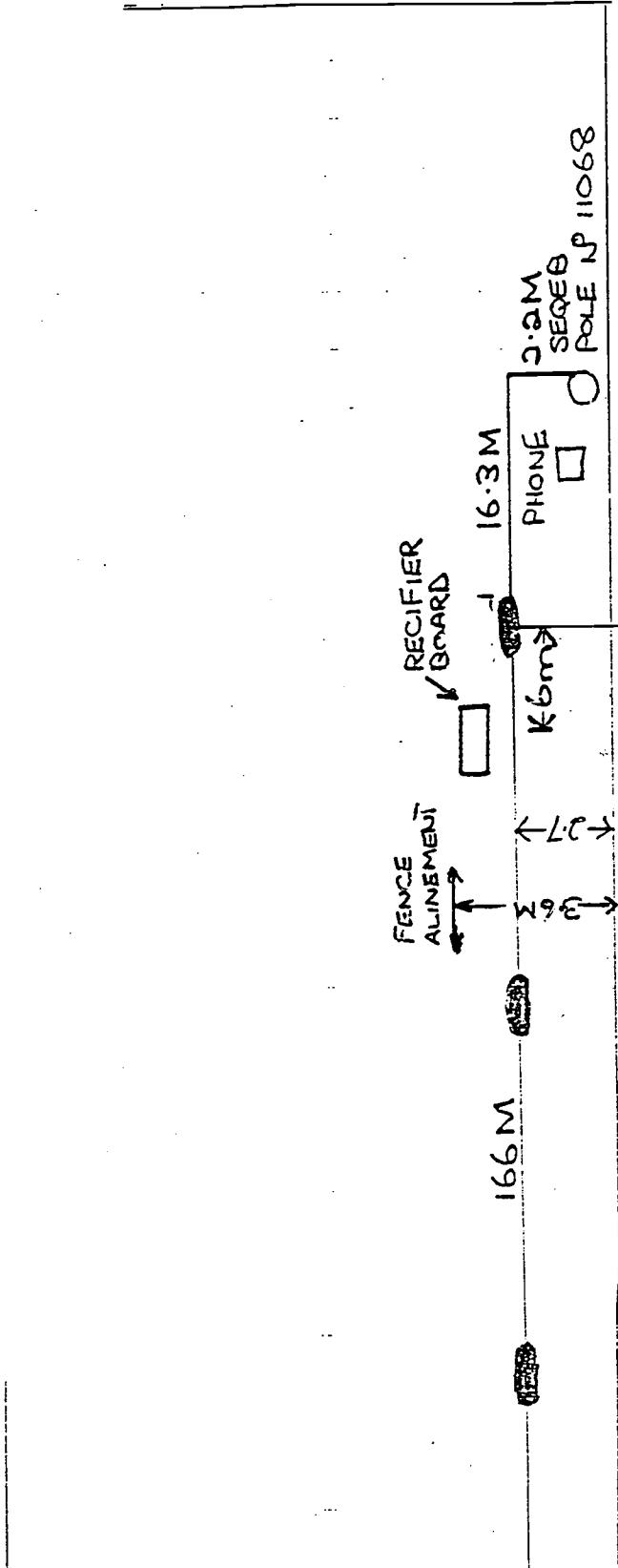
A

1-03-93
SOA RECTIFIER FOR
PINKENBA TRUNK MAIN

21-04-93

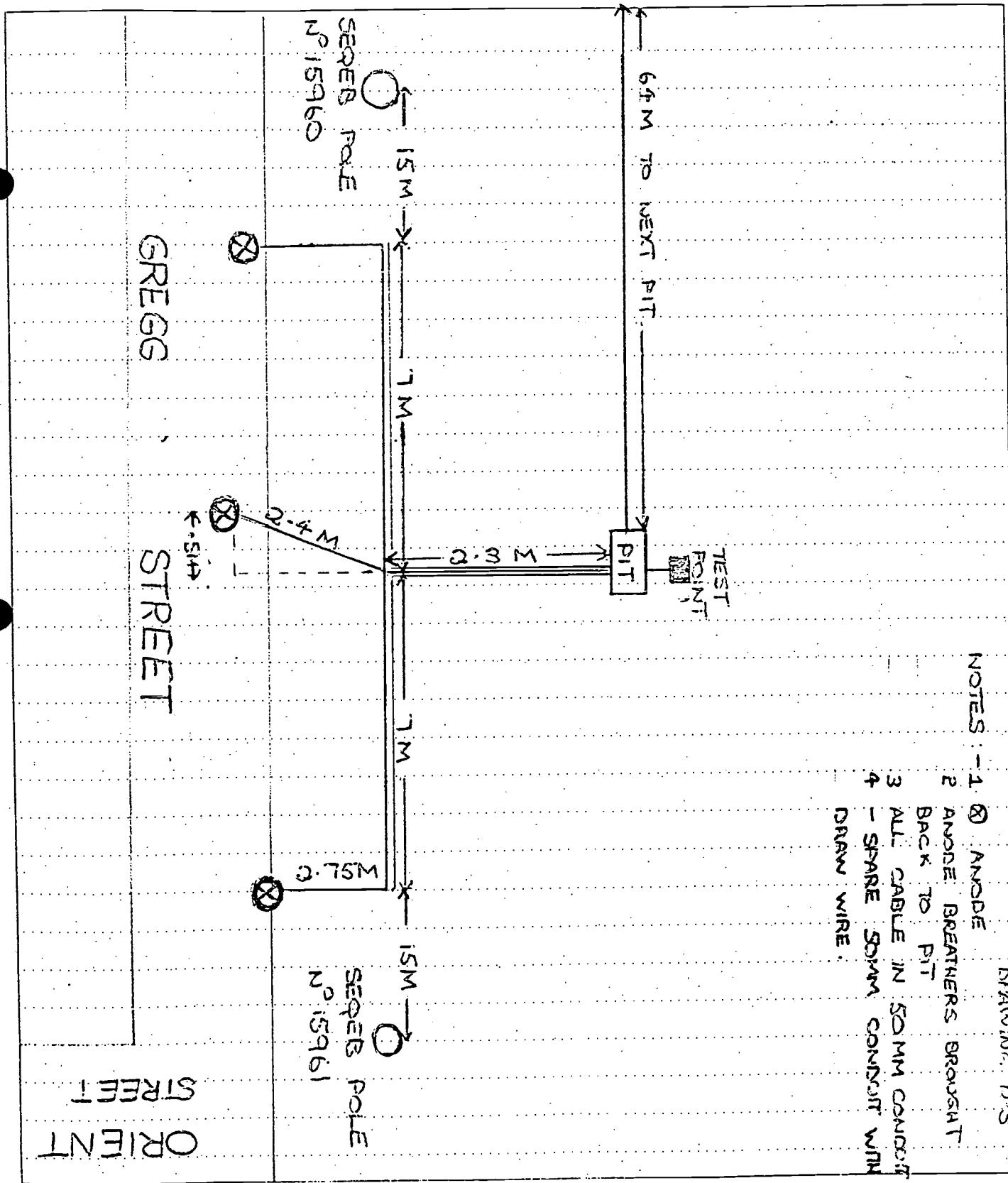
DRAWINGS NO. 2
PROPOSED CONDUIT LAYOUT
FOR ANODE, SUPPLY & CATHODE
CABLES

ORIENT



NOTE:- A 50MM CONDUIT EXTENDS
FROM THE TEST POINT PIT TO
THE SEQEE POLE EASEMENT
(APPROX 2M)

To	File No.
From	Date 27/04/93
Subject PINKENBA TRUNK MAIN - ANODE LOCATION	

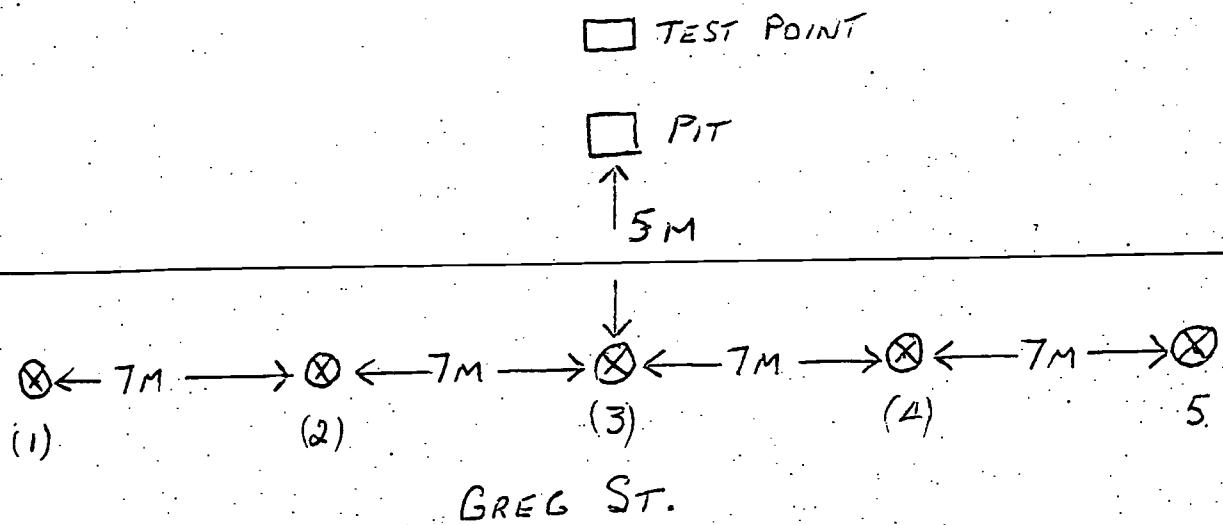


Brisbane City Council
 Dept. W.S. & S.
 Metropolitan Division
 Eagle Farm Pump Station

Electrical Workshop

Cathodic Protection Anode Bed Testing

Date:	16-11-93	Structure:	PINKENBA TRUNK MAIN
Anode material:	SILICONE IRON	Anode size/weight:	1500x75mm.
Packaging:	CANISTER	Burial:	VERTICAL
Depth:	5 METRES	Resistivity:	at 3m 1.7 ohm/metre at 5m 0.9 ohm/metre
Test Point type:	Post	Signage:	Yes.
Resistance to ground:			
Anode 1	0.42 ohm	Anode 2	0.39 ohm
Tested by:		Anode 3 0.37 ohm Anode 4 0.37 ohm Anode 5 0.39 ohm	
Locality Plan:			



PINKENBA.

Facsimile transmission from
BRISBANE CITY COUNCIL

Brisbane City Facsimile 229 1168

Date

25/8/93

To	SEQLIB - TEST BRANCH	Facsimile No.
Attention	DARRYL RINGUET	No. of Pages (including this page)
From	JIM STEELE / JEFF SAY	Facsimile No.
Re	MITIGATION OF PINKENBA INTERFERENCE.	

DARRYL,

PLS FIND ATTACHED A COPY OF

THE MITIGATION RESULTS AS DISCUSSED.

THESE BLEED CONNECTIONS ARE CODED

TO THE ROUTINE TESTING COMPUTER

FILE AND WILL BE TESTED PROBABLY
ONCE PER YEAR.AS YOU CAN SEE, CURRENT OUTPUTS IN
THESE BLEEDS IS MINIMAL TO SMALL AND
ANODES WILL BE REQUIRED AS REQUIRED.

REGARDS

JIM STEELE.

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
EAGLE FARM PUMPING STATION

CATHODIC PROTECTION BLEED POINT DETAILS

CPB NUMBER: 12

DATE INSTALLED: 1-07-93

BCC CATHODIC PROTECTION SYSTEM IDENTIFICATION: PINKENBA TRUNK MAIN

FOREIGN STRUCTURE OWNER: SEQES

F.S. LOCATION: TINSIRA ST, PINKENBA

F.S. IDENTIFICATION: POLE N° 20131

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

REFERENCE TYPE: CuSO₄

POTENTIAL OFF: -531 mV ON: -519 mV SW: +12 mV

BLEED TYPE: SACRIFICIAL

BLEED MATERIAL: ZINC

BLEED WEIGHT: 650g

BLEED O/C POTENTIAL: 577 mV

BLEED CURRENT OFF: NIL ON: NIL

REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:

BOND OFF (RECTIFIER OFF)		BLEED ON				RESULTANT SWING
BLEED OFF	BLEED ON	SW	BOND OFF	BOND ON	SW	
-536 mV	-803 mV	-267	-803	-728	+5	-267 mV

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

IDENTIFICATION TAG INSTALLED? (Y/N) YES

COMMENTS:

INSTALLED/TESTED BY: M. MCCORMICK

NOTE: PLEASE FILE ON COPY AND FORWARD SECOND COPY TO CORROSION TECH
OFFICER.

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
EAGLE FARM PUMPING STATION

CATHODIC PROTECTION BLEED POINT DETAILS

CPB NUMBER: 13

DATE INSTALLED: 1-07-93

BCC CATHODIC PROTECTION SYSTEM IDENTIFICATION: PINKENBA TRUNK MAIN.

FOREIGN STRUCTURE OWNER: SEQES

F.S. LOCATION: EAGLE FARM RD, PINKENBA

F.S. IDENTIFICATION: POLE N° 42845

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

REFERENCE TYPE: CuSO_4

POTENTIAL OFF: -581 mV ON: -553

SW: +28

BLEED TYPE: SACRIFICIAL

BLEED MATERIAL: ZINC

BLEED WEIGHT: 650g

BLEED O/C POTENTIAL: 500 mV

BLEED CURRENT OFF: 40mA ON: 40mA

REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:

BOND OFF (RECTIFIER OFF)		BLEED ON				RESULTANT SWING
BLEED OFF	BLEED ON	SW	BOND OFF	BOND ON	SW	
-582 mV	-732 mV	-150	-732mV	-714mV	+18	-132 mV

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

IDENTIFICATION TAG INSTALLED? (Y/N) YES

COMMENTS:

INSTALLED/TESTED BY: M. MCORMICK

NOTE: PLEASE FILE ON COPY AND FORWARD SECOND COPY TO CORROSION TECH OFFICER.

BRISBANE CITY COUNCIL
DEPT WATER SUPPLY AND SEWERAGE
EAGLE FARM PUMPING STATION

CATHODIC PROTECTION BLEED POINT DETAILS

CPB NUMBER:- 12

DATE INSTALLED:- 8-06-93

BCC CATHODIC PROTECTION SYSTEM IDENTIFICATION:- PINKENBA TRUNK MAIN

FOREIGN STRUCTURE OWNER:- SEQEP

F.S. LOCATION:- TINGIRA ST, PINKENBA

F.S. IDENTIFICATION:- POLE N° 20131

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

REFERENCE TYPE:- CuSO_4

POTENTIAL OFF:- -405 mV ON:- -384 mV SW:- +21 mV

BLEED TYPE:- SACRIFICIAL

BLEED MATERIAL:- ZINC

BLEED WEIGHT:- 650g

BLEED O/C POTENTIAL:- 607 mV

BLEED CURRENT OFF:- NIL ON:- NIL

REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:-

BOND OFF (RECTIFIER OFF)		SW	BLEED ON		SW	RESULTANT SWING
BLEED OFF	BLEED ON		BOND OFF	BOND ON		
-404 mV	-554 mV	-130	-554 mV	-543 mV	+11	-119

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

IDENTIFICATION TAG INSTALLED? (Y/N) YES

COMMENTS:-

INSTALLED IN THE MORNING & BEDDED WITH WATER

TESTED IN THE AFTERNOON

INSTALLED/TESTED BY:-

NOTE: PLEASE FILE ONE COPY AND FORWARD SECOND COPY TO CORROSION TECH OFFICER.

BRISBANE CITY COUNCIL
DEPT WATER SUPPLY AND SEWERAGE
EAGLE FARM PUMPING STATION

CATHODIC PROTECTION BLEED POINT DETAILS

CPB NUMBER:- 13

DATE INSTALLED:- 8-06-93

BCC CATHODIC PROTECTION SYSTEM IDENTIFICATION:- PINKENBA TRUNK MAINS

FOREIGN STRUCTURE OWNER:- SEQEB

F.S. LOCATION:- EAGLE FARM RD, PINKENBA

F.S. IDENTIFICATION:- POLE NO 42845

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

REFERENCE TYPE:- CuSO_4

POTENTIAL OFF:- -475 mV ON:- -446 mV SW:- +29 mV

BLEED TYPE:- SACRIFICIAL

BLEED MATERIAL:- ZINC

BLEED WEIGHT:- 650g

BLEED O/C POTENTIAL:- 567 mV

BLEED CURRENT OFF:- 20 mA ON:- 20 mA

REFERENCE POTENTIALS AFTER CONNECTION TO FOREIGN STRUCTURE:-

BOND OFF (RECTIFIER OFF)		BLEED ON		RESULTANT SWING	
BLEED OFF	BLEED ON	SW	BOND OFF	BOND ON	SW
-475 mV	-495 mV	-20	-495 mV	-466 mV	+29

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

IDENTIFICATION TAG INSTALLED? (Y/N) YES

COMMENTS:-

INSTALLED ZINC EAGS IN THE MORNING & BEDDED DOWN WITH WATER TESTED IN THE AFTERNOON.

INSTALLED/TESTED BY:- M. MCCORMICK

NOTE: PLEASE FILE ONE COPY AND FORWARD SECOND COPY TO CORROSION TECH OFFICER.

MEMORANDUM

To E/F - KERRY McGOVERN.	File No.
From Jim STEELE.	Date 27/5/93
Subject CP OF PINKENBA MAIN SEQUER INTERFERENCE	

KERRY,

SEQUER INTERFERENCE RESULTS INDICATE THAT TWO (2) POLES WILL REQUIRE MITIGATE TO THEIR M.E.N. EARTHS.

Pole Nos 20132 NR CROP KING IN TINGIRA ST + 14 mV

42845 NR TP 3 IN EAGLE FARM RD + 25 mV

DISCUSSIONS WITH DARYL RINGUET INDICATE THAT THESE POLES ARE ON DIFFERENT CIRCUITS HENCE TWO INSTANTIATIONS WILL BE NECESSARY

HE ADVISED THAT HE WOULD ACCEPT MITIGATION BY SACRIFICIAL ANODES. HE ALSO REQUESTED MONITORING / REPORTING ON A ROUTINE BASIS.

Therefore Kerry can you organise Murray when his program permits to undertake this work.

RICHARDSS
Jim

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

INTERFERENCE SURVEY RESULTSJOB DESCRIPTION: - Brisbane J.U.H.I.

UNIT READING: - 15V 44A

	READING,	TEST POINT I.D.	LOCATION	SWING
ON	-14.59		Pinkenba S. School	
OFF	-14.63		Eagle Farm Road,	4
ON	-15.30		Airport	
OFF	-15.15			-15
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY:

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

INTERFERENCE SURVEY RESULTS**JOB DESCRIPTION:** - Boral Gas Pipeline

UNIT READING: - 150 44.4

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-1112		Tingira street Pinkenba	
OFF	H106		outside shell Tank Farm	-6
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY:

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

INTERFERENCE SURVEY RESULTSJOB DESCRIPTION:- PBBP High Pressure CH
Main.

UNIT READING:- 15V 4.4A

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-612		Test Point (S) outside cropping	
OFF	-628		Tingira street Pinkenba	16
ON	-580		Test Point (O) outside Mobil	
OFF	-571		Mechanics terminal	-9
ON	-646		Eagle Farm Road	
OFF	-655		outside Pinkenba Tavern.	9
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY:.....

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

INTERFERENCE SURVEY RESULTS

JOB DESCRIPTION: -

JOB DESCRIPTION:- Mobil Test Points

UNIT READING:-

COMPILED BY:.....

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

INTERFERENCE SURVEY RESULTSJOB DESCRIPTION:- SECER3 MEN

Potentials with CUSC4

UNIT READING:- E.V. 44A.....

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-582		Tingira street Pinkenba	-27
OFF	-555		Number 40141	
ON	-555		Tingira street Pinkenba	-35
OFF	-520		Number 16562	
ON	-609		Tingira street Pinkenba	4
OFF	-613		Number 15389	
ON	-532		Tingira street Pinkenba	0
OFF	-532		number 20176	
ON	-337		Mudlin street Pinkenba	3
OFF	-340		Number 20498	
ON	-559		Eagle farm Road outside Pinkenba	-6
OFF	-553		Railway station Number 2399 Pinkenba	
ON	-528		Tingira street Pinkenba Between incite +	
OFF	-542		Number 20132 cropping	#4 *
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY:.....

BRISBANE CITY COUNCILDEPARTMENT OF WATER SUPPLY AND SEWERAGE
MECHANICAL AND ELECTRICAL SECTIONINTERFERENCE SURVEY RESULTSJOB DESCRIPTION: - Ampol Test Points

UNIT READING: - 15.6 44A

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-1071		Tingira Street Pinkenba	5
OFF	-1076		opposite Shell Tank Farm Gate	
ON	-1036		Tingira Street Pinkenba	6
OFF	-1042		outside crop king	
ON	-1030		Rail Crossing at Eagle Farm Road	-29
OFF	-1001			
ON	-1043		Outside Mobil Mehandra Telmira	-15
OFF	-1028		behind the Fire Water pond.	
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY:.....

To	File No.
From	Date 10/05/93
Subject PINKENBA...TRUNK...MAIN.....ON...POTENTIAL - NON POLARIZED.....	

RECTIFIER SET AT 15V 44A
ANODE CURRENT : TOTAL 39.2A
N° 1 11.4A
N° 2 16.5A
N° 3 15.8A
LOOP RESISTANCE 10V 32A
15V 44A
17V 50A

POTENTIALS

TEST POINT N° 1 - KINGSFORD SMITH DR
PROTECTED - CuSO₄ TO PIPE - 919 mV on
- 623 mV off
Zn TO PIPE 442 mV on
461 mV off
Zn TO CuSO₄ -1364 mV
UNPROTECTED - CuSO₄ TO PIPE -501 mV on
- 551 mV off
Zn TO PIPE 500 mV on
493 mV off
Zn TO CuSO₄ -1102 mV

TEST POINT N° 2 - RECTIFIER BOARD
Zn TO PIPE -126 mV

(CALIBRATE Zn TO CuSO₄ - 1175 mV)

To	File No.
From	Date 10/05/93
Subject: PINKENBA..TRUNK..MAIN.....ON..POTENTIALS... - NON..POLARIZED.....	

TEST POINT N°3 - EAGLE FARM RD

CuSO₄ TO PIPE -1030 mV. on

-825 mV. off

Zn TO PIPE 155 mV. on

370 mV. off

Zn TO CuSO₄ -1138 mV

TEST POINT N°4 - TINGIRA STREET (OUTSIDE CROP KING)

CuSO₄ TO PIPE -805 mV. on

-584 mV. off

Zn TO PIPE 197 mV. on

433 mV. off

Zn TO CuSO₄ -1000 mV

TEST POINT N°5 - TINGIRA STREET (OUTSIDE SHELL)

CuSO₄ TO PIPE -905 mV. on

-634 mV. off

Zn TO PIPE 241 mV. on

478 mV. off

Zn TO CuSO₄ -1154 mV

TEST POINT N°6 - TINGIRA STREET (OUTSIDE SAND STOCK PILE)

PROTECTED: CuSO₄ TO PIPE -826 mV. on

-600 mV. off

Zn TO PIPE 360 mV. on

Zn TO CuSO₄ -1175 mV

UNPROTECTED CuSO₄ TO PIPE -814 mV. on

-731 mV. off

Zn TO PIPE 355 mV

-1176 mV

To	File No.
From	Date 4/11/92
Subject PINKENBA TRUNK MAIN (NATURAL POTENTIALS)	

NATURAL POTENTIALS:-

1) KINGSFORD SMITH DR & RANDLE RD (INSOLATED VALVE PIT)

PROTECTED -484 mV CuSO₄

-474 mV ZN

UNPROTECTED -474 mV CuSO₄

-473 mV ZN

2) ORSONA ST -522 mV CuSO₄

-531 mV ZN

-1055 mV Zn to CuSO₄

3) PINKENBA HOTEL -523 mV CuSO₄

-541 mV ZN

-1063 mV Zn to CuSO₄

4) TINGIRA ST (OUTSIDE CRAP KING)

-500 mV CuSO₄

-523 mV ZN

-1024 mV Zn to CuSO₄

5) TINGIRA ST (OUTSIDE SHELL)

-503 mV CuSO₄

-568 mV ZN

-1072 mV Zn to CuSO₄

6) TINGIRA ST (OPPOSITE CONTAINER SERVICES)

PROTECTED -504 mV CuSO₄

-601 mV ZN

-1125 mV Zn to CuSO₄

Cathodic Protection System - S9 - Bartleys Hill to Pinkenba Stage 1 - Trunk Water Main - 600 mm - OM Manual
BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.
From	Date 4/11/92
Subject PINKENBA TRUNK MAIN (NATURAL POTENTIALS)	

NATURAL POTENTIALS CONT.

6) UNPROTECTED - 524 mV CuSO₄
630 mV Zn
-1154 mV Zn to CuSO₄

MURRAY McCormick

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

INTERFERENCE SURVEY RESULTS

JOB DESCRIPTION:- PINKENBA TRUNK MAIN
SERIES'S MEN'S

UNIT READING:- 19.35 V... 2.26...

	READING	TEST POINT I.D.	LOCATION	SWING
ON OFF	-540mV -550mV		POLE N° 22131 TINGIRA ST (OUTSIDE CROP KING)	+10mV
ON OFF	-501mV -505mV		POLE N° 15387 TINGIRA ST (OUTSIDE GATE 4, SHEEL)	+4mV
ON OFF	-545mV -522mV		POLE N° 16542 TINGIRA ST (OPPOSITE TEST POINT N°6)	-23mV
ON OFF	-572mV -553mV		POLE N° 42141 TINGIRA ST (NEXT TO CONTAINER ENTRY)	-8mV
ON OFF	-584mV -558mV		POLE N° 19989 TINGIRA ST (OUTSIDE CONTAINER YARD)	-16mV
ON OFF	-602mV -602mV		POLE N° 3258 TINGIRA ST (NEXT TO POLE N°19989)	NIL
ON OFF	-231mV -234mV		POLE N° 35090 TINGIRA ST (OPPOSITE TEST POINT N°5)	+3mV
ON OFF	-491mV -490mV		POLE N° 33558 TINGIRA ST (OPPOSITE SHEEL GATE N°4)	-1mV
ON OFF	-485mV -485mV		POLE N° 37314 TINGIRA ST (NEXT TO POLE N°33558)	NIL
ON OFF	-419mV -417mV		POLE N° 34570 TINGIRA ST (OUTSIDE BORAL GRAS)	-2mV
ON OFF	-1091mV -1087mV		POLE N° 24569 TINGIRA ST (OUTSIDE PACIFIC TERMINAL)	-4mV
ON OFF	-307 -307		POLE N° 39389 TINGIRA ST (OPPOSITE TEST POINT N°4)	NIL

COMPILED BY: MURRAY MCINTYRE

4 NOV 1992

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

INTERFERENCE SURVEY RESULTS

JOB DESCRIPTION: - PINKENBA TRUNK MAINS
 SEDER'S M.E.N'S

UNIT READING:- 1.7:25V.....mA.

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-372 mV		POLE N° 11068	
OFF	-392 mV		ORSOVA ST (OPPOSITE TEST POINT N° 2 - TEMPORARY RECTIFIER)	NIL
ON	-612 mV		POLE N° 23926	
OFF	-453 mV		DRENT ST (OPPOSITE ANODE)	-159mV
ON	-325 mV		POLE N° 50023	
OFF	-307 mV		DRENT ST (TRANSFORMER ON CONCRETE POLE)	+2mV
ON	-271 mV		POLE N° A9976	
OFF	-271 mV		EAGLE FARM RD	NIL
ON	-266 mV		POLE N° 20998	
OFF	-286 mV		MUNDIN ST (OUTSIDE R.L. WINDOR & GUNS)	+20mV
ON	-479 mV		POLE N° 1193	
OFF	-479 mV		KINGSFORD SMITH DR (OUTSIDE N° 1360)	NIL
ON	-279 mV		POLE N° 31099	
OFF	-277 mV		KINGSFORD SMITH DR (OUTSIDE SERIES SUB STATION)	-2 mV
ON	-623 mV		POLE N° 21002	
OFF	-621 mV		CNR HUGH & MUNDIN STS	-2 mV
ON	-325 mV		POLE N° 11076	
OFF	-324 mV		HUGH ST (NEXT TO PUMP STATION)	-1 mV
ON	-276 mV		POLE N° 11075	
OFF	-276 mV		HUGH ST (NEXT TO PUMP STATION)	NIL
ON	-135 mV		POLE N° 2568	
OFF	-135 mV		EAGLE FARM RD (NEXT TO SHOP)	NIL
ON	-254 mV		POLE N° 42716	
OFF	-253 mV		EAGLE FARM RD (OPPOSITE RAILWAY STATION)	-1 mV

COMPILED BY: *Mervyn McCormick*
 4 NOV 1992.

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

INTERFERENCE SURVEY RESULTSJOB DESCRIPTION: - PINKENBA TRUNK MAIN

SEWER MENS

UNIT READING: - 19:85V....22A...

	READING	TEST POINT I.D.	LOCATION	SWING
ON	-487 mV		POLE N° 21076	
OFF	-488 mV		TINGIRA ST (OUTSIDE SERIES SUB STATION ACF)	+1 mV
ON	-480 mV		POLE N° 43254	
OFF	-484 mV		EAGLE FARM RD (NEXT TO TEST POINT N°3)	+4 mV
ON	-458 mV		POLE N° 2399	
OFF	-478 mV		EAGLE FARM RD (OUTSIDE RAILWAY STATION)	+20 mV
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				
ON				
OFF				

COMPILED BY: *M. J. McCormick*
4 NOV 1992

To	File No.
From	Date 4/11/92
Subject PINKENBA... TRUNK... MAIN... CURRENT... DRAIN... TEST.....	

RECTIFIER... SET... AT... 19.85 V 20A

KINGFORD... SMITH DR & RANDLE RD... (INSULATED... VALVE... FIT)

PROTECTED		UNPROTECTED	
ON	OFF	ON	OFF
-672mV	-512mV	-537mV	-496mV
CuSO_4	(-41)	ZN	
462mV	471mV	475mV	472mV
			ZN

PINKENBA... ST... (OPPOSITE... SHOP)

CuSO_4	-872 mV	on	-572 mV	off	(-300)
ZN	216 mV	on	498 mV	off	(-282)

PINKENBA... HOTEL

CuSO_4	-787 mV	on	-572 mV	off	(-215)
ZN	374 mV	on	496 mV	off	(-122)

TINGIRA... ST... (OUTSIDE... CRAP KING)

CuSO_4	-670 mV	on	-513 mV	off	(-157)
ZN	385 mV	on	505 mV	off	(-120)

TINGIRA... ST... (OUTSIDE... SHELL)

CuSO_4	-721 mV	on	-554 mV	off	(-147)
ZN	431 mV	on	538 mV	off	(-107)

To	File No.
From	Date 4/11/1982
Subject: PINKENBA TRUNK MAIN - CURRENT DRAIN TEST	

RECTIFIER SET AT 19.85 V 20A

5) TINGIRRA ST - INSULATED VALVE PT (GEOFESTIVE CONTAINER SERVICE)

	PROTECTED		UNPROTECTED	
	ON	OFF	ON	OFF
(-129) CuSO ₄	-673mV	-544mV	-573mV	-544mV
Zn	486mV	587mV	502mV	614mV

MURRY M CORMICK

To	Ref. No.
From	Date
Subject	24-4-92

Pinkenba Trunk main
Cement drain test 20v 20A,

Test 3 Penhaso anode
3 m deep 300 fm from TM

SW

3 Pinkenba Trunk Cus04 off -535 mv
Hold on -750 mv 215

1 off Rundle rd Cus04 off -553 mv
on -760 mv 207

2 Orooswa St. Cus04 off -556 mv
on -860 mv 304

4 off ACP Cus04 off -530 mv
Shenleys on -650 mv 120

5 Ady Shell Plant gate Cus04 off -570 mv
on -680 mv 110

6 near Gymnium Cus04 off -540 ~
Denph on -645 ~ 105

Blyth

8-4-91

Pinkenba Trunk mains
current drain tests.

Test 1 using 3 temporary anodes in creek adjacent to trunk mains. current 25a @ 10V.

Test 2 using 3 temp. anodes approx 50mms from pipeline current 30a @ 16V.

TP location

Test 1

Test 2.

● Near Pinkenba Hotel	off	-554m	-600m
	on	-1103m	-1060m.
	sw	-549m	-460m.
● Opp Rumble Rd & Kingsfordsmith Drive.	off	-562m	-580m
	on	-726m	-780m
	sw	-164m	-200m.
● Orsova St.	off	-564m	-600m
	on	-830m	-890m
	sw	-266m.	-290m.
● Opp ACF & Shirley's	off	-555m	-556
	on	-805m	-860m
	sw	-250m	-304m.
● Adj. Shell Plant Gate	off	-560m	-589m
	on	-768m	-840m
	sw	-208m	-251m
● Near Gypsum Dump.	off	-564m	-560m
	on	-721m	-730m.
	sw.	-157m.	-170m.

Tested by Knf

MEMORANDUM

To	Ref. No.
From	Date
Subject	Pinkenba trunk main - insulated joint

All joints tested above ground
at Newstead Depot 5-2-91

No. 1

300 ft flanged joint

2 bolts.

12V @ 0ma

No. 2

clipped joint

22.4 ma @ 12V.

831 A across joint

No. 3 coated flange and pipe insulation

12V @ 0ma.

no runout across joint.

20-3-90

PSC 2000 survey Pinkenba Trunk mains 600 ft between Pinkenba Hotel and Arseova Test Point.

3 # faults were detected on this section they were :-

- ① - one at test point at pinkenba hotel (site of previous burst).
- ② - another 50m from above test point (at air valve).
- ③ - another 100m from pinkenba test point.

With CP unit on the PSC 2000 recorded an 800 m sweep at Pinkenba test point and 400 m sweep at Arseova Lt test point. Distance between test points was approx. 450 mts.

From Handbook .

$$\text{Estimated signal strength at defect } ① = 800 \text{ mV} + \frac{1}{1+450} (500-200) \text{ mV.}$$

$$= 800 \text{ mV.}$$

$$\text{over line to remote earth voltage} = 200 \text{ mV}$$

$$\text{percent IR} = \frac{200}{800} \times 100 = 25\%$$

$$\text{Potential at defect} = -(1039 - \frac{25}{100} \times (1039 - 54))$$

$$= -915 \text{ mV}$$

Estimated signal strength at defect (2) = $200 \text{ mV} + \frac{50}{50+400} (500-200)$
 $= 767 \text{ mV}$

overline to remote earth voltage = 75 mV.

current $iR = \frac{75}{767} \times 100$
 $= 9.7\%$

Potential at defect = $-(1039 - \frac{9.7}{100} \times 100)(1039 - 544)$
 $= -991 \text{ mV}$.

Estimated signal strength at defect (3) = $200 \text{ mV} + \frac{100}{100+350} (500-200)$
 $= 733 \text{ mV}$.

overline to remote earth voltage = 120 mV

current $iR = \frac{120}{733} \times 100$
 $= 16.4\%$

Estimated signal strength

Potential at defect = $-(1039 - 16.4\% \times 100)(495)$
 $= -958 \text{ mV}$.

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

ELECTRICAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 3-4-91

DESCRIPTION Pinkenba

MAINS DETAILS:-

LOCATIONS:- adj. Boat Ramp

SIZE:-

MATERIAL:- mild steel

COATING:-

NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- More than 200 Ω

NUMBER OF BOLT:- 2

FLANGE TO FLANGE RESISTANCE:- 2 Ω

INSULATION CHECKER MODEL 702:- OK

POTENTIAL DIFFERENCE TO REFERENCE CELL

PROTECTED SIDE:- Cuson - 541 mV

UNPROTECTED SIDE:- Cuson - 534 mV

ABOVE TESTING

BOLT TO FLANGE RESISTANCE:-

NUMBER OF BOLTS:-

FLANGE TO FLANGE RESISTANCE:-

COMMENTS

TESTED BY

Clayton

INSULATED JOINT DETAILS

DATE: 18.9.90

NUMBER - DRAW OFF PIPE FROM 600 ϕ MSCL TO
 MAINS DETAILS - LOCATION:- 300 ϕ CICL
 SIZE:- ORSOVA ST EAVEMENT.
 MATERIAL:- CI FLANGES
 COATING:- N/C

	INSULATED SIDE	UNINSULATED SIDE
PIPE SIZE -	300 ϕ	300 ϕ
COATING -	-	-
FLANGE SIZE -	-	-
BOLT NO. -	-	-
BOLT SIZE -	-	-
TEST POINT:-	SIZE - NA	
	TYPE - NA	

INSTALLED TESTING:-

INSTALLED DATE -

	CURRENT	VOLTAGE -
PROTECTED SIDE CuS04 REF	ON OFF	
UNPROTECTED SIDE CuS04 REF	ON OFF	

IN GROUND

ABOVEGROUND TESTING:- READING (OHMS) - >200Ω INSTALLED
 TESTING

COMMENTS - cast iron take off from trunk mains
 TESTED BY - LRJ

+250m - ve to mains
 all bolts >20mm to
 flange.
 full flange joint
 installed.

INSULATED JOINT DETAILS

DATE: 12-10-90

NUMBER :-

MAINS DETAILS - LOCATION:- Pinkenba Trunk main
 SIZE:- 600 mm take off
 MATERIAL:- MSCL - C1
 COATING:- n.c.

	INSULATED SIDE	UNINSULATED SIDE
PIPE SIZE -	in ground tested	
COATING -	- all bolts <ion to flange.	
FLANGE SIZE -		
BOLT NO. -	- across flanges (200 or both directions)	
BOLT SIZE -		
TEST POINT:-	SIZE -	228 m across flange
	TYPE -	- ve to protected pipe

INSTALLED TESTING:-

INSTALLED DATE:-

	CURRENT	VOLTAGE -
PROTECTED SIDE CuS04 REF	ON OFF	
UNPROTECTED SIDE CuS04 REF	ON OFF	

ABOVEGROUND TESTING:- READING (OHMS) -

COMMENTS - Flange OK, passed

TESTED BY - John

INSULATED JOINT DETAILS

DATE: 20-9-90

NUMBER - POINT C 9" service to shell.

MAINS DETAILS - LOCATION: Pinkenba trunk mains

SIZE:- 600 & MSCL

MATERIAL:-

COATING:- Fibreglass enamel.

INSULATED SIDE

UNINSULATED SIDE

PIPE SIZE -

COATING -

FLANGE SIZE -

BOLT NO. -

BOLT SIZE -

TEST POINT:- SIZE -

TYPE -

INSTALLED TESTING:-

12v in one direction

INSTALLED DATE -

9-2 in opp direction

all bolts passed second test
one fail on first test.

CURRENT

VOLTAGE

PROTECTED SIDE

CuS04 REF

ON

+ to unprot pipe

OFF

- to prot pipe

ON

UNPROTECTED SIDE CuS04 REF

OFF

ABOVEGROUND TESTING:- READING (OHMS) -

COMMENTS - joint appears to be OK.

TESTED BY -

12f

INSULATED JOINT DETAILS

DATE: 17-9-90

NUMBER -

MAINS DETAILS - LOCATION:- Pinkenba end of trunk mains.

SIZE:- 600 φ

MATERIAL:- MSCL

COATING:- fibre enamel.

INSULATED SIDE

UNINSULATED SIDE

PIPE SIZE -

300 φ

300 φ

COATING -

ml

ml

FLANGE SIZE -

—

—

BOLT NO. -

—

—

BOLT SIZE -

—

—

TEST POINT:- SIZE -

—

TYPE -

INSTALLED TESTING:-

INSTALLED DATE -

CURRENT

VOLTAGE -

PROTECTED SIDE CuS04 REF ON
OFF

UNPROTECTED SIDE CuS04 REF ON
OFF

ABOVEGROUND TESTING:- READING (OHMS) 50 mΩ

COMMENTS - 300φ fed to retic mains from trunk mains.
TESTED BY - rwmsmfor

INSULATED JOINT DETAILS

DATE: 11-3-91.....

NUMBER -

MAINS DETAILS -

LOCATION:- Pinkenba trunk main
(boat ramp end)

SIZE:-

MATERIAL:- 300 & flanged joint

COATING:- tested at Newstead depot

INSULATED SIDE

UNINSULATED SIDE

PIPE SIZE -

COATING -

FLANGE SIZE -

BOLT NO. -

BOLT SIZE -

TEST POINT:- SIZE -

TYPE -

INSTALLED TESTING:-

INSTALLED DATE -

CURRENT

VOLTAGE -

PROTECTED SIDE CuS04 REF ON
OFFUNPROTECTED SIDE CuS04 REF ON
OFF

ABOVEGROUND TESTING:- READING (OHMS) - 1 mR across

COMMENTS - OR full gasket installed.

TESTED BY -



INSULATED JOINT DETAILS

DATE: 14-9-90

NUMBER -

MAINS DETAILS -

LOCATION: Cnr EAGLE FARM RD & TINGARA ST.
 PINKENBA
 SIZE: 600 φ 200 mm sccl
 MATERIAL:
 COATING: ~~none~~ FIBREGLASS ENAMEL

INSULATED SIDE

UNINSULATED SIDE

PIPE SIZE -

300 φ

300 φ

COATING -

n/c

n/c

FLANGE SIZE -

—

—

BOLT NO. -

—

—

BOLT SIZE -

—

—

TEST POINT:- SIZE -

TYPE -

INSTALLED TESTING:-

INSTALLED DATE -

CURRENT

VOLTAGE -

PROTECTED SIDE CuS04 REF ON
 OFF

UNPROTECTED SIDE CuS04 REF ON
 OFF

ABOVEGROUND TESTING:- READING (OHMS) - 50 mΩ

COMMENTS - joint OK. 300φ takeoff to retic

TESTED BY - mains

Kmfp

PCS-2000 testing Pinkenba Trunk mains

31-3-90

at Pinkenba Hotel TIP	75cm swing
Defect at TIP	35m
Defect at HP	110m
Defect Tongara St & Eagle Farm Rd.	65m
Defect opp HP on Tongara St & EFrld.	27m
Defect opp pole 1447	25m
Defect 10m from pole 1447 towards Shorlups	25m
Defect 5cm from pole 1447 "	80m
Defect near opp pole 1446	60m
Defect on Tongara St & South Rd	7cm
Defect 4m from pole 20131 towards BP (water mains into Shorlups)	160m
At test point Tongara St	600m
First "T" at end I.J.	60m
Both ends of I.J.	160m
Disconnected trunk mains	40m
700mm water mains into Shorlups opp. test point	160m
Swing at Ormea St test point	400m
Defect 30 mts from test point (down towards King St)	70m
Defect 10m from pole 42779	80m
Defect 1/2 way along scrap heap	60m
Defect near HP	70m

Defect $\frac{1}{2}$ way from Orrova St test point	5cm
to rough st	
other defects same area	50/65cm.
Defect app P/stn (rough st) on footpath	30mm.
Defect 20m in from rough st to	
Mundrah	110m.
Defect $\frac{1}{2}$ between Mundrah St & Rail	
x-way (at concrete block)	90m
Defect near H.P. $\frac{3}{4}$ between Mundrah &	
Rail x-way	60m.
At Randal Rd. test point	700m.
Defect at Pinkenba test point	200m
50m from test near air valve	75m
Defect 100mts from Pinkenba test	
test point towards orsova st	120m

31-3 95

Points from Survey that need
insulating

at point 11 - 225mm take off into Shireys

at point 16 - 225mm take off into Shireys

at point 32 - unknown take off

at point ?? - unknown take off

70

