

05 JULY 1995

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

OPERATING MANUAL
OXLEY ARCHERFIELD PUMP STATION, RISING MAIN

CATHODIC PROTECTION SYSTEM.

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
SEWERAGE OPERATIONS BRANCH

MANUAL CONTENTS

(1.0)	Introduction
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(3.0)	Mains Details
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(6.0)	Conclusion
(7.0)	Maintenance

DRAWINGS

(No Number)	Maintenance Program.
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(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.

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 450 mild steel cement lined.

Coating: Low density fusion bonded polyethylene outer coating.

Length: approx 20m

Location: Boundary Rd , Archerfield UBD42 , K3

**Construction
Drawings:**

Not Available

486/7/7-PE1C2190E

Cathodic Protection Cable Layout

486/7/7-PE1C2191E

Cathodic Protection External Sacrificial
System Connection Diagram.

(4.0) **CATHODIC PROTECTION DETAILS**

(4.1) Type of Cathodic Protection: Sacrificial (Galvanic) System.

(4.2) Cathode: The cathode point is located on the 450 dia. Rising Main in valve pit No.3. The cathode point is where the cabling from the sacrificial anode is attached to the structure under cathodic protection.

(4.3) Anodes: One 20 Kg Magnesium anode was installed approximately 6 metres from the trunk mains in a vertical bed. The anodes were firstly packaged with gypsum/bentonite thereby improving anode to ground resistance. The anodes are identified by a marker pit and label. Refer dwg no 2/14.213.

(4.4) Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the mains. On these mains two test points have been installed for details see dwg no 2/14.213.

(4.5) Associated Drawings:
Cathodic Protection Details – 2/14.213
Cathodic Protection Test Point Details – 2/14.199

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

(4.7) 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) 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 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.

BRISBANE CITY COUNCIL
MEMORANDUM

To	File No.	
From	Date 24/5/95	
Subject Archerfield Rising Main		

anode current 125 ma

Sac anode

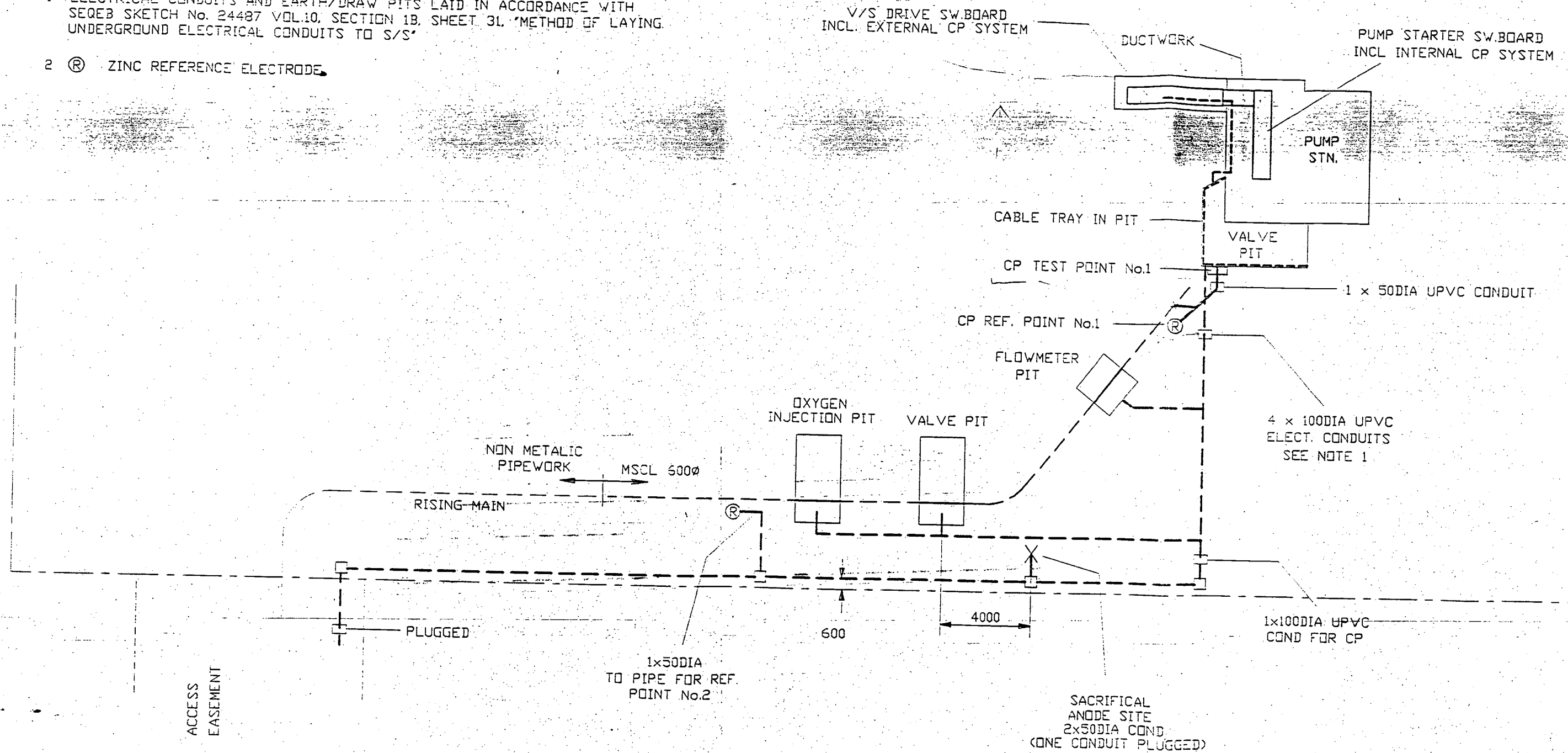
	on	off
ZN R1 to Pipe	+276	+544
ZN R2 to Pipe	+270	+532

Cus04 to Pipe	-882	-593
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Cus04 to Pipe	-843	-573
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NOTES

- 1 ELECTRICAL CONDUITS AND EARTH/DRAW PITS LAID IN ACCORDANCE WITH SEQEB SKETCH No. 24487 VOL.10, SECTION 1B, SHEET 3L, 'METHOD OF LAYING UNDERGROUND ELECTRICAL CONDUITS TO S/S'
- 2 (R) ZINC REFERENCE ELECTRODE



□	R.L.	25.5.94	ISSUED FOR CONSTRUCTION		
No.	BY	DATE	REVISION	CHECK	APPR



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

PROJECT
OXLEY ARCHERFIELD
PUMPING STATION

TITLE
CATHODIC PROTECTION
CABLE LAYOUT

DRAWN	NAME R.L.	DATE 25.5.94	SUPER ENG.	DATE 27.6.94	SCALE N.T.S.
DESIGN	15	25.5.94	SENIOR ENG.		
CHECKED	15	17.6.94	ELECT. ENG.		
DRAWING No. 486/7/7-PE1C2190E					ACADREZ FILE NO. 77C2190-

C.P. TEST POINT No.1

V/S DRIVE SWITCHBOARD, C.P. CUBICLE

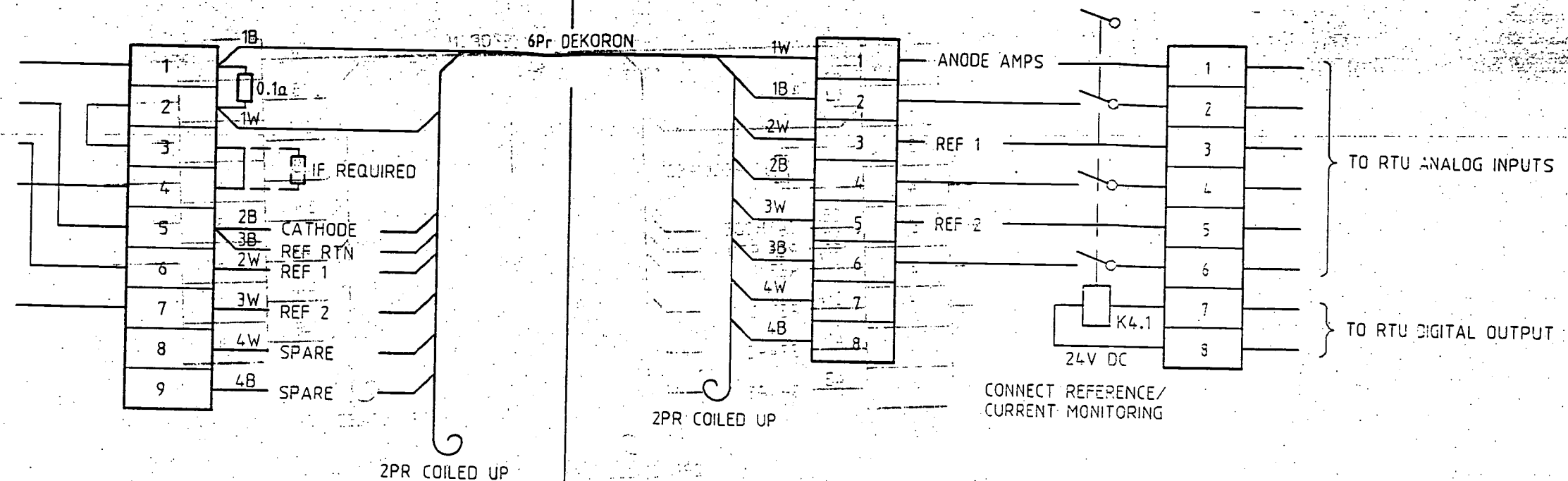
CATHODE REFERENCE RETURN-6mm2 BLACK

CATHODE CONNECTION-16mm2 BLACK

C.P. REFERENCE POINT No.1-6mm2 GREEN

C.P. ANODE (SACRIFICIAL)-16mm2 RED.

C.P. REFERENCE POINT No.2-6mm2 GREEN



MANAGER.

DIRECTOR OF PLANNING
& DESIGN

DESIGN

J.SAY

14.6.94

PROJECT

OXLEY ARCHERFIELD
PUMPING STATION

DATE:

DATE:

DRAWN

R.LISTON

14.6.94

CHECKED

17.6.94

TITLE

CATHODIC PROTECTION
EXTERNAL SACRIFICIAL SYSTEM
CONNECTION DIAGRAMDIRECTOR OF
CONSTRUCTIONDIRECTOR OF
M & E SERVICESDIRECTOR OF SEW.
OPERATIONS & W.S.
DISTRIBUTIONENGINEER
IN CHARGESUPERVISING
ENGINEER

17.6.94

CADD FILE No.

77C2191E



BRISBANE CITY COUNCIL

DEPARTMENT OF WATER SUPPLY
AND SEWERAGE

MECHANICAL & ELECTRICAL SERVICES

SCALE: NTS

No. 1 OF 1 SHEETS

DRAWING No.

486/7/7-PE1C2191E

Page 12 of 22

AMEND.

0

0	16.6.94	ISSUED FOR CONSTRUCTION	R.L.
No	DATE	AMENDMENT	BY

05 JULY 1995

BRISBANE CITY COUNCIL
DEPARTMENT OF WATER SUPPLY AND SEWERAGE
MECHANICAL AND ELECTRICAL BRANCH
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DRAWINGS

(No Number)	Maintenance Program.
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(1.0) INTRODUCTION

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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.

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(3.0) **MAINS DETAILS**

Size: Dia 450 mild steel cement lined.

Coating: Low density fusion bonded polyethylene outer coating.

Length: approx 20m

Location: Boundary Rd , Archerfield UBD199 , C14

Construction Drawings: Not Available

486/7/7-PE1C2190E

Cathodic Protection Cable Layout

486/7/7-PE1C2191E

Cathodic Protection External Sacrificial
System Connection Diagram.

(4.0) CATHODIC PROTECTION DETAILS

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12th October 1992
Electrical Workshop
Cathodic Protection

CPS Monthly Maintenance Details.

Required:

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- 2/ Have appropriate keying.

Labour:

One tradesperson, one vehicle. 20 minutes per site.

Procedure:

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13th October 1992
Electrical Workshop
Cathodic Protection

CPS 6 Monthly Maintenance Details.

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13th October 1992
Electrical Workshop
Cathodic Protection

CPS 60 Monthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
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- 16/ Pipecamp structure if applicable.
- 17/ Apply for "continue to operate" permit if applicable.

2 (R) . ZINC REFERENCE ELECTRODE

