20 AUGUST 1995

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

OPERATING MANUAL
BEENLEIGH ROAD RAIL CROSSING

CATHODIC PROTECTION SYSTEM.

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
WATER OPERATIONS BRANCH

MANUAL CONTENTS

DRAWINGS

(1.0) INTRODUCTION

Steel when immersed or covered in water has a tendency to corrode (or rust) as the oxidized form is more stable than the metal.

Because of this, precaution must be taken to stop or minimize the corrosion reaction to an acceptable level consistent with the design life of the structure. This is normally achieved by the use of protective coatings which control the corrosion reaction by isolating the steel from its surrounding environment.

However, it is not practical to achieve a perfect coating and coating damage will always occur with time. Because of this, corrosion may occur at imperfections in the paint coating, causing further deterioration in the coating as well as loss of metal.

As a result of this, the coating defects must be rectified by periodic maintenance or an additional method of protection used to prevent this deterioration and corrosion occurring. This additional protection is achieved by the cathodic protection system.

(2.0) CORROSION AND CATHODIC PROTECTION

Corrosion is an electrochemical process in that it is accompanied by a flow of electrical current.

Corrosion occurs on the surface of metals at active areas known as anodes, which are electrically continuous with less active or passive areas known as cathodes. The electric current flows from the anode through the electrolyte to the cathode, with the circuit being completed by the electrical continuity between the cathode and anode. In practice anodes and cathodes are generally part of the same metallic surface and individual anodic areas may be small.

In applying cathodic protection and external current is applied to the surface so that the entire surface to be protected acts as a cathode. This involves the use of an auxiliary anode and when the current flow from this anode is sufficient, no part of the structure acts as an anode.

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 300 mild steel cement lined.	
Coating:	Low density fusion bonded polyethylene outer coating.	
Length:	approx 24m	
Location:	Rail Crossing, Beenleigh Road Kuraby.	
Construction Drawings:	10735 to 10737	BCC Drawing Water Supply Reticulation External Main – Layout Plan
	CP95A01	Sacrifical Cathodic Protection System 300MSCL – Rail Crossing Beenleigh Rd.

(4.0) CATHODIC PROTECTION DETAILS

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

(4.2) Cathode: The cathode point is located on the 300 dia. main approx 2 metre from test point No1,located on the rail carpark side.The cathode point is where the cabling from the sacrifical anode is attached to the structure under cathodic protection.

(4.3) Anodes: One 20 Kg Zinc anode was installed approximately 3 metres from the trunk mains in a horizontal bed. The anodes were firstly packaged with gypsum/bentonite thereby improving anode to ground resistance.

(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) 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 6 monthly basis after commissioning. These checks involve testing rectifier operation and recording of pipe to soil potentials.

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:

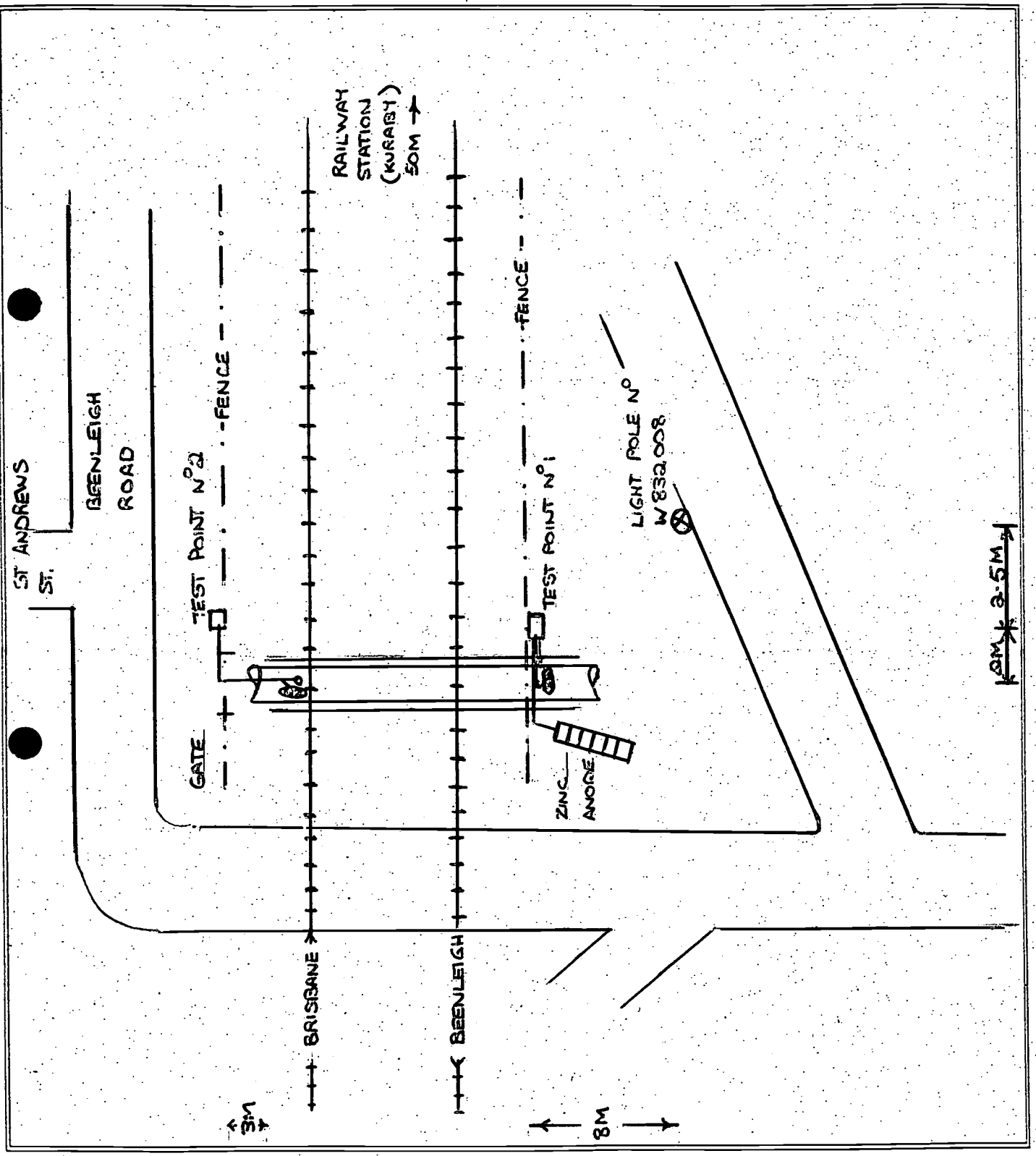
One tradesperson electrical, one laborer, one vehicle.
Eight hours per site.

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

Date: 8th SEPTEMBER 1995
Site Plan for: BEENLEIGH ROAD RAIL CROSSING.
CPS 151



D:\123r3cp\siteplan

BEENLEIGH ROAD RAIL CROSSING

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT N°1
CPS 151

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300MM MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω
ZINC REFERENCE TO PIPE: + 501 mV (NATURAL)
$CuSO_4$ REFERENCE TO PIPE: - 313 mV (NATURAL)
ZINC TO $CuSO_4$: - 811 mV (NATURAL)

EARTH TESTING

PIN SPACING: 2M MEGGER READING: 25.0 RESISITIVITY: $2\pi aR$ = 314.16 Ω/M

PIN SPACING: 5M MEGGER READING: 55.5 RESISITIVITY: $2\pi aR$ = 1743.59 Ω/M

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE: ZINC
ANODE SIZE: 20 kg
ANODE TO PIPE POTENTIAL: 665mV
ZINC REF TO PIPE: -254 mV
(ANODE CONNECTED)

$CuSO_4$ REF TO PIPE: -1075
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT: 500 μA

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: M. McCORMICK

COMMENTS:

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

TEST POINT N°1

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-96

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 270 KΩ TO 1.2 MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 1.08 MΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1075 mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

JOINT ONLY INSULATED ON 1 SIDE.
NO SOIL COVER YET
DRAWINGS SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

M. McCORMICK.

BEENLEIGH RD RAIL CROSSING

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT N°2

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300 MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω

ZINC REFERENCE TO PIPE:	+ 263 mV (NATURAL)	- 504 mV (ON POT)
$CuSO_4$ REFERENCE TO PIPE:	- 314 mV "	- 1081 mV "
ZINC TO $CuSO_4$:	- 576 mV "	- 576 mV "

EARTH TESTING

PIN SPACING: MEGGER READING: RESISITIVITY:

PIN SPACING: MEGGER READING: RESISITIVITY:

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:

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

TEST POINT N°2

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-95

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 60 MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 955 KΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1081 mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

NO SOIL COVER YET, DRAWING SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

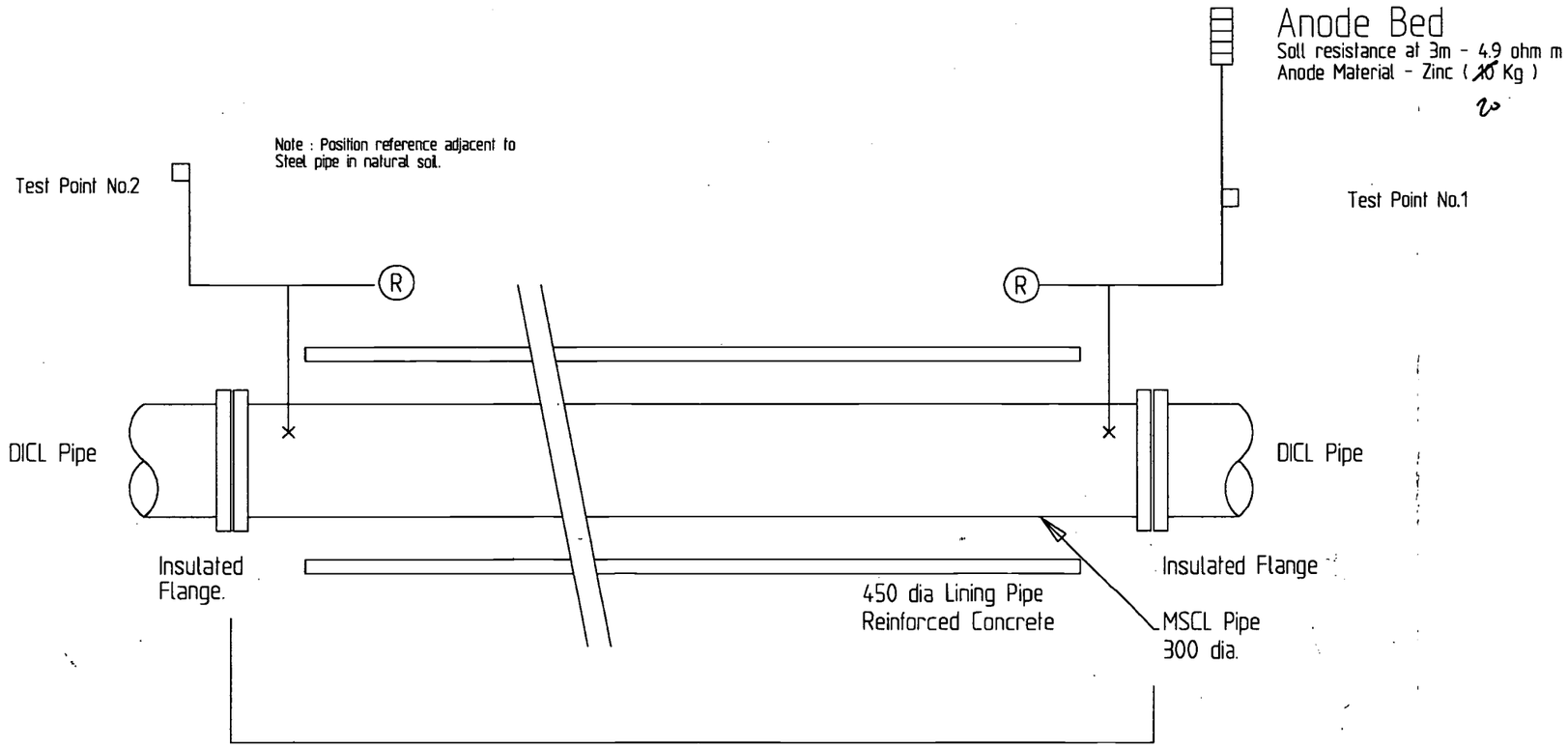
M. McCORMICK.

Notes :

Ressistance to earth - 1.75 ohms
Output Current Available - 140 mA
Use Shunt Resistor to limit current as require

Assuming 2mA per m sq Protection Current
Area of Pipe - 17m sq
Weight of Anode - 10 Kg
Anode Life = 18 years

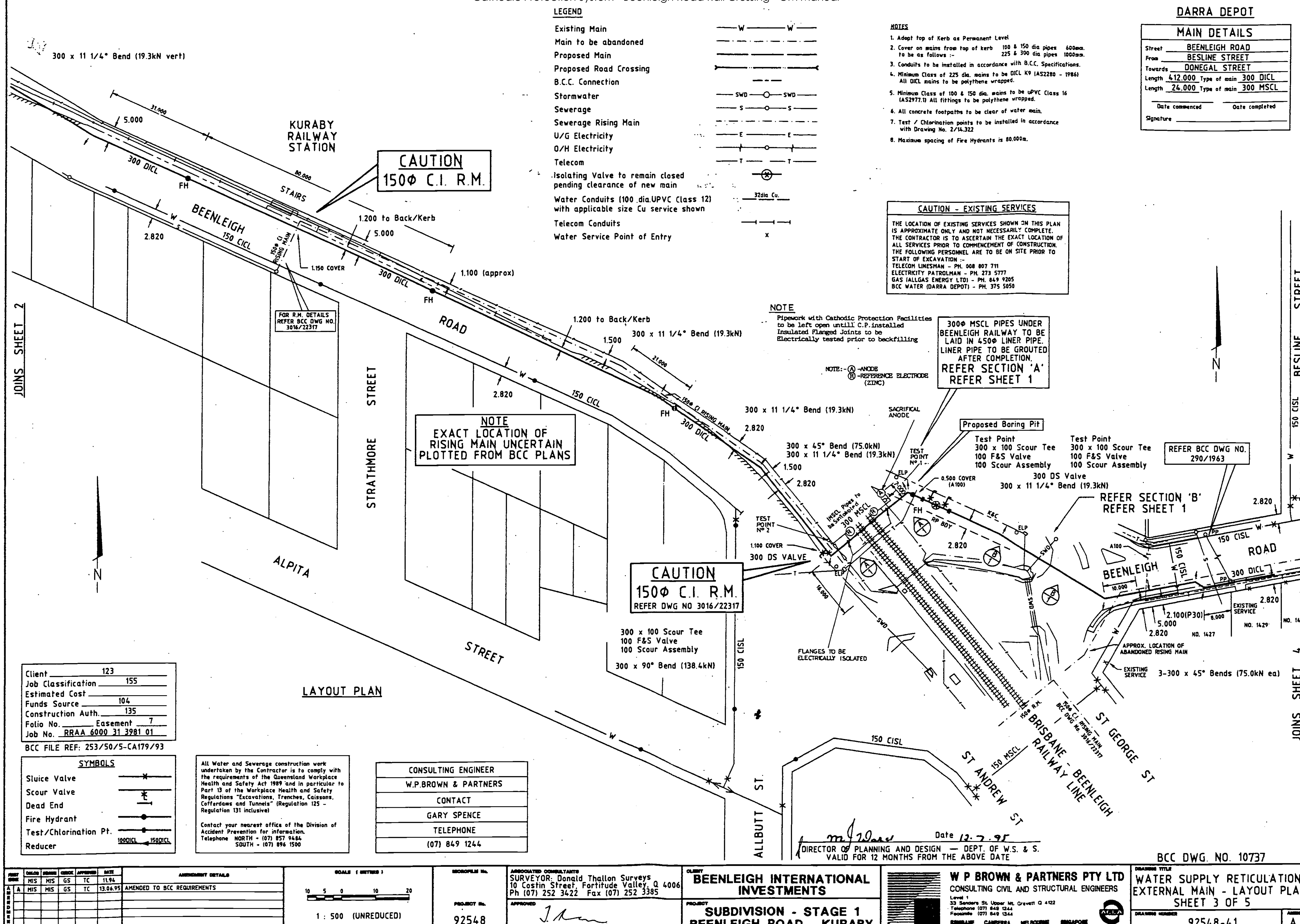
Distance of Anode to Pipe = 6m



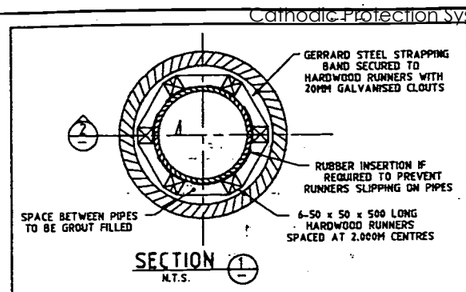
Under Sacrifical Cathodic Protection.

Refer to Drawings :
BCC No. 10735 & 10737
Beenleigh International Investments
Subdivision - Stage 1
Beenleigh Road - Kuraby

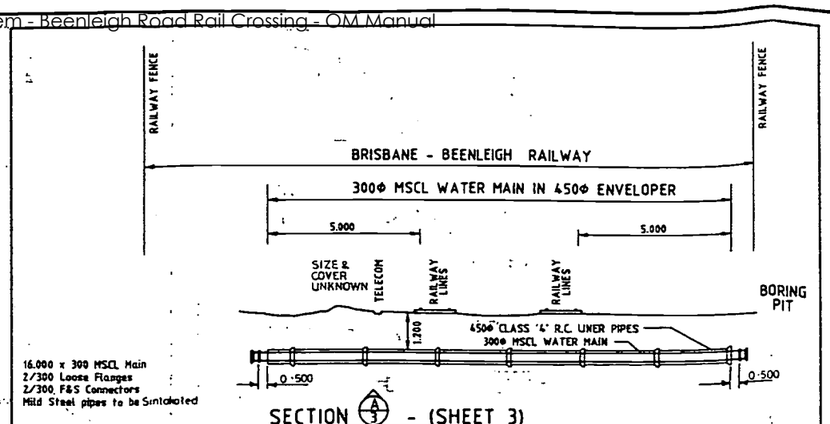
				MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	DESIGN	J.SAY	3.7.95	PROJECT Water Reticulation Main Beenleigh Road - Kuraby	BRISBANE CITY COUNCIL DEPARTMENT OF WATER SUPPLY AND SEWERAGE MECHANICAL & ELECTRICAL SERVICES
						DRAWN	J.SAY	3.7.95		
				DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	CHECKED			TITLE Sacrifical Cathodic Protection System 300 MSCL - Rail Crossing Beenleigh Rd.	SCALE: N.T.S. / No. 1 OF 1 SHEETS
					DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	ENGINEER IN CHARGE				DRAWING No. / AMEND. A
A		ISSUED FOR CONSTRUCTION				SUPERVISING ENGINEER			CADD FILE No. CP95A01	
No	DATE	AMENDMENT	BY							


DARRA DEPOT
MAIN DETAILS
Street BEENLEIGH ROAD
From BESLINE STREET
Towards DONEGAL STREET
Length 412.000 Type of main 300 DICL
Length 24.000 Type of main 300 MSCL
Date commenced Date completed
Signature
LEGEND
Existing Main
Main to be abandoned
Proposed Main
Proposed Road Crossing
B.C.C. Connection
Stormwater
Sewerage
Sewerage Rising Main
U/G Electricity
O/H Electricity
Telecom
Isolating Valve to remain closed pending clearance of new main
Water Conduits (100 dia UPVC Class 12) with applicable size Cu service shown
Telecom Conduits
Water Service Point of Entry
NOTES
1. Adopt top of Kerb as Permanent Level
2. Cover on mains from top of kerb 100 & 150 dia pipes 600mm. 225 & 300 dia pipes 1000mm. to be as follows :-
3. Conduits to be installed in accordance with B.C.C. Specifications.
4. Minimum Class of 225 dia. mains to be DICL K9 (AS2280 - 1986) All DICL mains to be polythene wrapped.
5. Minimum Class of 100 & 150 dia. mains to be uPVC Class 16 (AS2977.1) All fittings to be polythene wrapped.
6. All concrete footpaths to be clear of water main.
7. Test / Chlorination points to be installed in accordance with Drawing No. 2/14,322
8. Maximum spacing of Fire Hydrants is 80.000m.
CAUTION - EXISTING SERVICES
THE LOCATION OF EXISTING SERVICES SHOWN ON THIS PLAN IS APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. THE CONTRACTOR IS TO ASCERTAIN THE EXACT LOCATION OF ALL SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION. THE FOLLOWING PERSONNEL ARE TO BE ON SITE PRIOR TO START OF EXCAVATION :-
TELECOM LINESMAN - PH. 008 807 711
ELECTRICITY PATROLMAN - PH. 273 5777
GAS (ALLGAS ENERGY LTD) - PH. 849 9205
BCC WATER (DARRA DEPOT) - PH. 375 5050
NOTE
Pipework with Cathodic Protection Facilities to be left open untill C.P. installed Insulated Flanged Joints to be Electrically tested prior to backfilling
NOTE:- Ⓐ -ANODE Ⓡ -REFERENCE ELECTRODE (ZINC)
300Φ MSCL PIPES UNDER BEENLEIGH RAILWAY TO BE LAID IN 450Φ LINER PIPE. LINER PIPE TO BE GROUTED AFTER COMPLETION. REFER SECTION 'A' REFER SHEET 1
300 x 11 1/4° Bend (19.3kN vert)
KURABY RAILWAY STATION
CAUTION 150Φ C.I. R.M.
300 DICL
BEENLEIGH
150 CICL
STAIRS
1.200 to Back/Kerb
1.150 COVER
1.100 (approx)
FOR R.M. DETAILS REFER BCC DWG NO. 3016/22317
ROAD
300 x 11 1/4° Bend (19.3kN)
STRATHMORE STREET
NOTE
EXACT LOCATION OF RISING MAIN UNCERTAIN PLOTTED FROM BCC PLANS
150Φ CI RISING MAIN
SACRIFICAL ANODE
300 x 45° Bend (75.0kN)
300 x 11 1/4° Bend (19.3kN)
TEST POINT Nº 1
Proposed Boring Pit
Test Point
300 x 100 Scour Tee
100 F&S Valve
100 Scour Assembly
300 DS Valve
300 x 11 1/4° Bend (19.3kN)
REFER BCC DWG NO. 290/1963
REFER SECTION 'B' REFER SHEET 1
TEST POINT Nº 2
1.100 COVER
300 DS VALVE
ALPITA
STREET
CAUTION 150Φ C.I. R.M. REFER DWG NO 3016/22317
300 x 100 Scour Tee
100 F&S Valve
100 Scour Assembly
300 x 90° Bend (138.4kN)
FLANGES TO BE ELECTRICALLY ISOLATED
150 CISL
BESLINE STREET
JOINS SHEET 2
JOINS SHEET 4
APPROX. LOCATION OF ABANDONED RISING MAIN
EXISTING SERVICE
3-300 x 45° Bends (75.0kN ea)
150 MSCL
ST ANDREW ST
BRISBANE - BEENLEIGH RAILWAY LINE
ST GEORGE ST
ALLBUTT ST.
LAYOUT PLAN
Client 123
Job Classification 155
Estimated Cost
Funds Source 104
Construction Auth. 135
Folio No. Easement 7
Job No. RRAA 6000 31 3981 01
BCC FILE REF: 253/50/5-CA179/93
SYMBOLS
Sluice Valve
Scour Valve
Dead End
Fire Hydrant
Test/Chlorination Pt.
Reducer
All Water and Sewerage construction work undertaken by the Contractor is to comply with the requirements of the Queensland Workplace Health and Safety Act 1989 and in particular to Part 13 of the Workplace Health and Safety Regulations "Excavations, Trenches, Caissons, Cofferdams and Tunnels" (Regulation 125 - Regulation 131 inclusive)
Contact your nearest office of the Division of Accident Prevention for information.
Telephone NORTH - (07) 857 9484 SOUTH - (07) 896 1500
CONSULTING ENGINEER
W.P.BROWN & PARTNERS
CONTACT
GARY SPENCE
TELEPHONE
(07) 849 1244
Date 12-7-95
DIRECTOR OF PLANNING AND DESIGN — DEPT. OF W.S. & S. VALID FOR 12 MONTHS FROM THE ABOVE DATE
BCC DWG. NO. 10737
A MIS MIS GS TC 13.06.95 AMENDED TO BCC REQUIREMENTS
MIS MIS GS TC 11.94
1 : 500 (UNREDUCED)
PROJECT No. 92548
SURVEYOR: Donald Thallon Surveys 10 Costin Street, Fortitude Valley, Q 4006 Ph (07) 252 3422 Fax (07) 252 3385
BEENLEIGH INTERNATIONAL INVESTMENTS
SUBDIVISION - STAGE 1 BEENLEIGH ROAD - KURABY
W P BROWN & PARTNERS PTY LTD
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
WATER SUPPLY RETICULATION EXTERNAL MAIN - LAYOUT PLAN SHEET 3 OF 5
92548-41
A

DARRA DEPOT		
NAME OF ESTATE		BEENLEIGH INTERNATIONAL INVESTMENTS
LOCATION		BEENLEIGH ROAD, KURABY
SUB. PLAN NO.		253/50/5-CA179/93
LENGTH OF MAIN	150mm.	25.000 uPVC
	300mm.	1482.000 DICL
	300mm.	24.000 MSCL
B.C.C. CHARGE NO.		RRAA 6000 31 3981 01
B.C.C. DELEGATES APPROVAL DATE		26/08/1994
RADIUS OVER 16 KM		

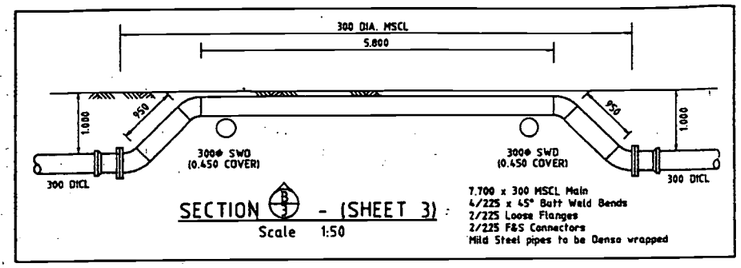


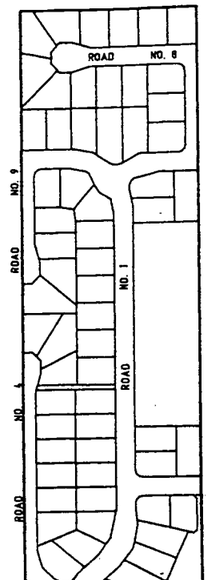
TUNNEL BORING DETAIL



300Φ MSCL WATER MAIN CROSSING - BEENLEIGH RAILWAY

FOR DETAILS OF CATHODIC PROTECTION
REFER BCC M & E SECTION DRAWING
CONTACT MR JEFF SAY 2254207





LOCALITY PLAN
Scale:- 1:2500
Grid Map No. U19/20

NOTES
1. Adopt top of Kerb as Permanent Level
2. Cover on mains from top of kerb to be as follows :- 100 & 150 dia pipes 600mm. 225 & 300 dia pipes 1000mm.
3. Conduits to be installed in accordance with B.C.C. Specifications.
4. Minimum Class of 225 dia. mains to be DICL K9 (AS2280 - 1986) All DICL mains to be polythene wrapped.
5. Minimum Class of 100 & 150 dia. mains to be uPVC Class 16 (AS2977.1) All fittings to be polythene wrapped.
6. All concrete footpaths to be clear of water main.
7. Test / Chlorination points to be installed in accordance with Drawing No. 2/14.322

SYMBOLS
Sluice Valve
Scour Valve
Dead End
Fire Hydrant
Test/Chlorination Pt.
Reducer 100DICL 150DICL

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CONSULTING ENGINEER
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CONTACT
GARY SPENCE
TELEPHONE
(07) 849 1244

Client 123
Job Classification 155
Estimated Cost
Funds Source 104
Construction Auth. 135
Folio No. Easement 7
Job No. RRAA 6000 31 3981 01

BCC FILE REF: 253/50/5-CA179/93

CAUTION - EXISTING SERVICES

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ELECTRICITY PATROLMAN - PH. 273 5777
GAS (ALLGAS ENERGY LTD) - PH. 849 9205
BCC WATER (DARRA DEPOT) - PH. 375 5050

Date 12.7.95
DIRECTOR OF PLANNING AND DESIGN — DEPT. OF W.S. & S.
VALID FOR 12 MONTHS FROM THE ABOVE DATE

BCC DWG. NO. 10735

ISSUE	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
	MIS	MIS	GS	TC	11.94
A	MIS	MIS	GS	TC	13.06.95 AMENDED TO BCC REQUIREMENTS

SCALE (METRES) 50 0 50 100
1 : 2500 (UNREDUCED)

DRG/FILE No. PROJECT No. 92548

ASSOCIATED CONSULTANTS
SURVEYOR: Donald Thallon Surveys
10 Costin Street, Fortitude Valley Q 4006
Ph (07) 252 3422 Fax (07) 252 3385

APPROVED

CLIENT BEENLEIGH INTERNATIONAL INVESTMENTS

PROJECT SUBDIVISION - STAGE 1
BEENLEIGH ROAD - KURABY

W P BROWN & PARTNERS PTY LTD
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
Level 1
33 Sanders St, Upper Mt. Gravatt Q 4122
Telephone (07) 849 1244
Facsimile (07) 849 1344
BRISBANE CANBERRA MELBOURNE SINGAPORE

DRAWING TITLE
WATER SUPPLY RETICULATION
EXTERNAL MAIN - LAYOUT PLAN
SHEET 1 OF 5

DRAWING NUMBER 92548-39
AMEND. A

20 AUGUST 1995

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

OPERATING MANUAL
BEENLEIGH ROAD RAIL CROSSING

CATHODIC PROTECTION SYSTEM.

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
WATER OPERATIONS BRANCH

MANUAL CONTENTS

DRAWINGS

(1.0) INTRODUCTION

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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 300 mild steel cement lined.
Coating:	Low density fusion bonded polyethylene outer coating.
Length:	approx 24m
Location:	Rail Crossing, Beenleigh Road Kuraby.

Construction Drawings:

10735 to 10737	BCC Drawing Water Supply Reticulation External Main – Layout Plan
CP95A01	Sacrifical Cathodic Protection System 300MSCL – Rail Crossing Beenleigh Rd.

(4.0) CATHODIC PROTECTION DETAILS

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

(4.2) Cathode: The cathode point is located on the 300 dia. main approx 2 metre from test point No1,located on the rail carpark side.The cathode point is where the cabling from the sacrifical anode is attached to the structure under cathodic protection.

(4.3) Anodes: One 20 Kg Zinc anode was installed approximately 3 metres from the trunk mains in a horizontal bed. The anodes were firstly packaged with gypsum/bentonite thereby improving anode to ground resistance.

(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) 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 6 monthly basis after commissioning. These checks involve testing rectifier operation and recording of pipe to soil potentials.

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:

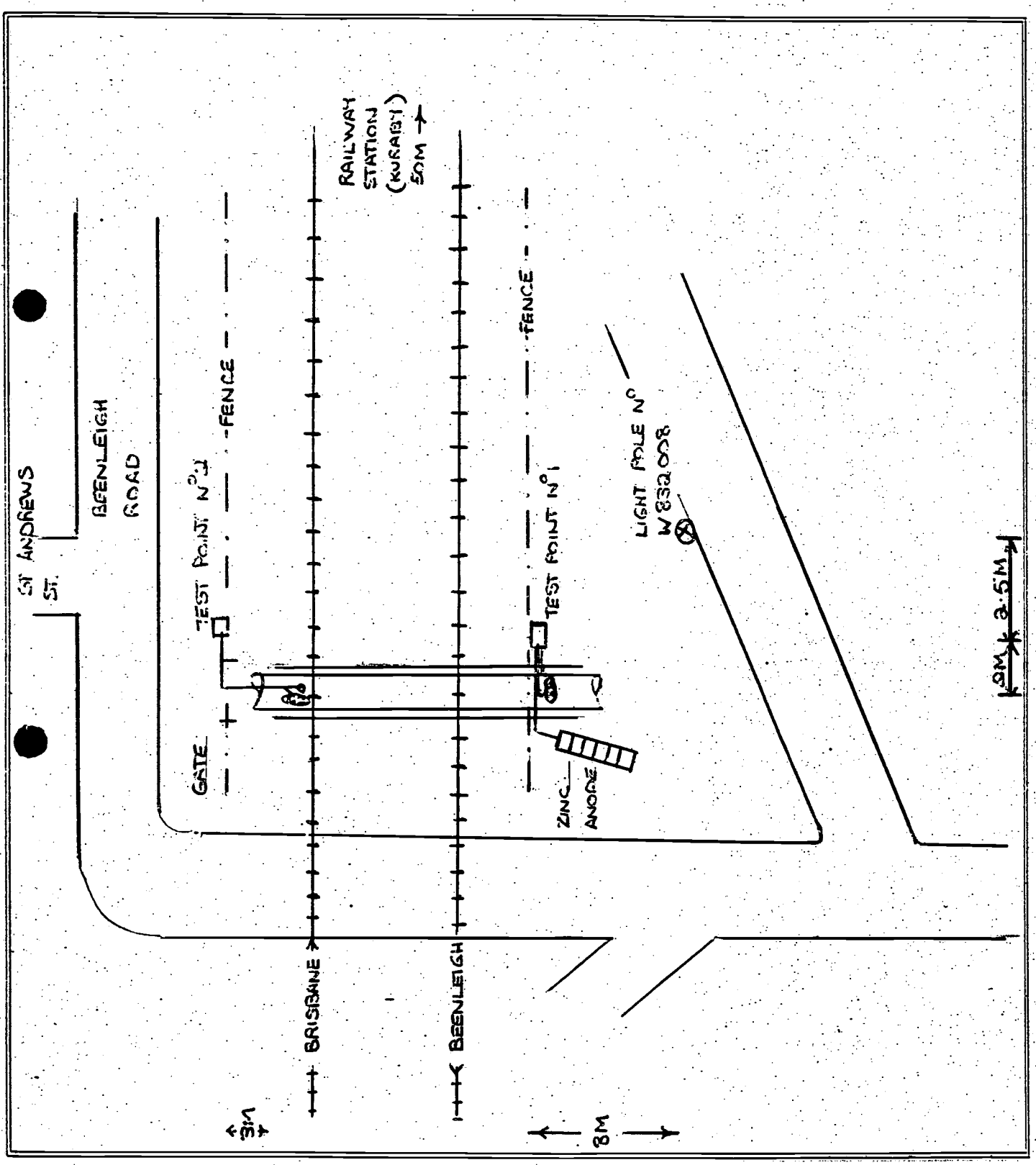
One tradesperson electrical, one laborer, one vehicle.
Eight hours per site.

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

Date: 8th SEPTEMBER 1995
Site Plan for: BEENLEIGH ROAD RAIL CROSSING.
CPS 151



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BEENLEIGH ROAD RAIL CROSSING

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT N°1
CPS 151

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300MM MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω
ZINC REFERENCE TO PIPE: +501 mV (NATURAL)
$CuSO_4$ REFERENCE TO PIPE: -313 mV (NATURAL)
ZINC TO $CuSO_4$: -811 mV (NATURAL)

EARTH TESTING

PIN SPACING: 2M MEGGER READING: 25.0 RESISITIVITY: $2\pi aR$ = 314.16 ΩM

PIN SPACING: 5M MEGGER READING: 55.5 RESISITIVITY: $2\pi aR$ = 1743.59 ΩM

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE: ZINC
ANODE SIZE: 20 KG
ANODE TO PIPE POTENTIAL: 665mV
ZINC REF TO PIPE: -254 mV
(ANODE CONNECTED)

$CuSO_4$ REF TO PIPE: -1075
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT: 500 uA

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: M. M^C CORMICK

COMMENTS:

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

TEST POINT N°1

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-95

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 270KΩ TO 1·2MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 1·08MΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1075mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

JOINT ONLY INSULATED ON 1 SIDE.
NO SOIL COVER YET
DRAWINGS SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

M. McCORMICK.

BEENLEIGH RD RAIL CROSSING

BRISBANE CITY COUNCIL TEST POINT N°2
EAGLE FARM PUMP STATION
CORROSION SECTION

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300 MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω

ZINC REFERENCE TO PIPE:	+263 mV	(NATURAL)	-504 mV	(ON POT.
$CuSO_4$ REFERENCE TO PIPE:	-314 mV	"	-1081 mV	"
ZINC TO $CuSO_4$:	-576 mV	"	-576 mV	"

EARTH TESTING

PIN SPACING: MEGGER READING: RESISITIVITY:

PIN SPACING: MEGGER READING: RESISITIVITY:

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:

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

TEST POINT N°2

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-95

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 60 MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 955 KΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1081 mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

NO SOIL COVER YET, DRAWING SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

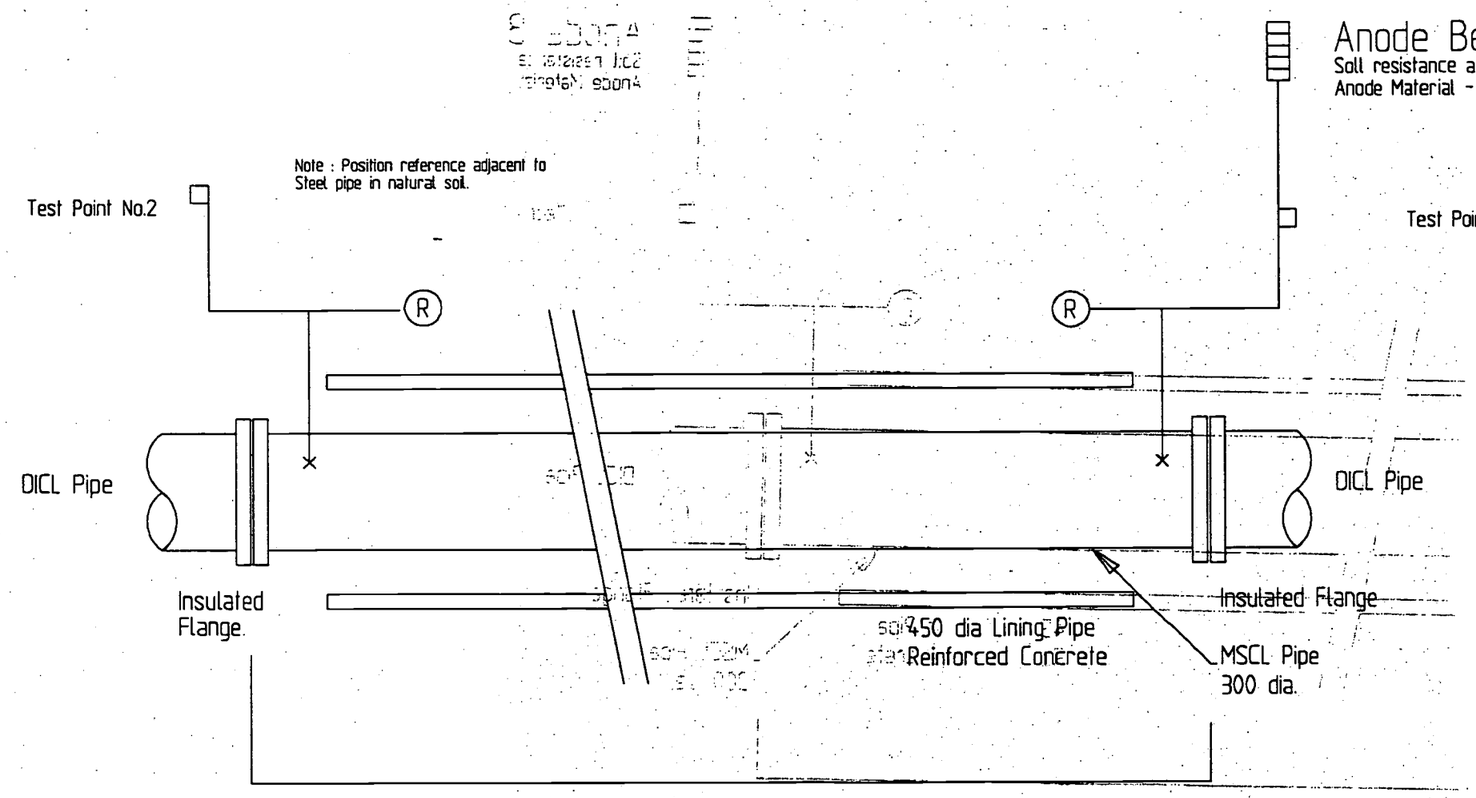
M. McCORMICK.

Notes :

Ressistance to earth - 1.75 ohms
Output Current Available - 140 mA
Use Shunt Resistor to limit current as require

Assuming 2mA per m sq Protection Current
Area of Pipe - 17m sq
Weight of Anode - 10 Kg
Anode Life = 18 years

Distance of Anode to Pipe = 6m



Under Sacrifical Cathodic Protection.

Refer to Drawings :
BCC No. 10735 & 10737
Beenleigh International Investments
Subdivision - Stage 1
Beenleigh Road - Kuraby

				MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:	DESIGN J.SAY 3.7.95	PROJECT Water Reticulation Main Beenleigh Road - Kuraby	BRISBANE CITY COUNCIL DEPARTMENT OF WATER SUPPLY AND SEWERAGE MECHANICAL & ELECTRICAL SERVICES
						DRAWN J.SAY 3.7.95		
				DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	CHECKED	TITLE Sacrifical Cathodic Protection System 300 MSCL E Rail Crossing Beenleigh Rd.	SCALE: N.T.S. / No. 1 OF 1 SHEETS
					DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	ENGINEER IN CHARGE		DRAWING No. / AMEND. A
A		ISSUED FOR CONSTRUCTION				SUPERVISING ENGINEER Active 21/07/2015	CADD FILE No. CP95A01	
No	DATE	AMENDMENT	BY					

20 AUGUST 1995

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

OPERATING MANUAL
BEENLEIGH ROAD RAIL CROSSING

CATHODIC PROTECTION SYSTEM.

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
WATER OPERATIONS BRANCH

MANUAL CONTENTS

DRAWINGS

(1.0) INTRODUCTION

Steel when immersed or covered in water has a tendency to corrode (or rust) as the oxidized form is more stable than the metal.

Because of this, precaution must be taken to stop or minimize the corrosion reaction to an acceptable level consistent with the design life of the structure. This is normally achieved by the use of protective coatings which control the corrosion reaction by isolating the steel from its surrounding environment.

However, it is not practical to achieve a perfect coating and coating damage will always occur with time. Because of this, corrosion may occur at imperfections in the paint coating, causing further deterioration in the coating as well as loss of metal.

As a result of this, the coating defects must be rectified by periodic maintenance or an additional method of protection used to prevent this deterioration and corrosion occurring. This additional protection is achieved by the cathodic protection system.

(2.0) CORROSION AND CATHODIC PROTECTION

Corrosion is an electrochemical process in that it is accompanied by a flow of electrical current.

Corrosion occurs on the surface of metals at active areas known as anodes, which are electrically continuous with less active or passive areas known as cathodes. The electric current flows from the anode through the electrolyte to the cathode, with the circuit being completed by the electrical continuity between the cathode and anode. In practice anodes and cathodes are generally part of the same metallic surface and individual anodic areas may be small.

In applying cathodic protection and external current is applied to the surface so that the entire surface to be protected acts as a cathode. This involves the use of an auxiliary anode and when the current flow from this anode is sufficient, no part of the structure acts as an anode.

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 300 mild steel cement lined.	
Coating:	Low density fusion bonded polyethylene outer coating.	
Length:	approx 24m	
Location:	Rail Crossing, Beenleigh Road Kuraby.	
Construction Drawings:	10735 to 10737	BCC Drawing Water Supply Reticulation External Main – Layout Plan
	CP95A01	Sacrifical Cathodic Protection System 300MSCL – Rail Crossing Beenleigh Rd.

(4.0) CATHODIC PROTECTION DETAILS

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

(4.2) Cathode: The cathode point is located on the 300 dia. main approx 2 metre from test point No1,located on the rail carpark side.The cathode point is where the cabling from the sacrifical anode is attached to the structure under cathodic protection.

(4.3) Anodes: One 20 Kg Zinc anode was installed approximately 3 metres from the trunk mains in a horizontal bed. The anodes were firstly packaged with gypsum/bentonite thereby improving anode to ground resistance.

(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) 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 6 monthly basis after commissioning. These checks involve testing rectifier operation and recording of pipe to soil potentials.

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:

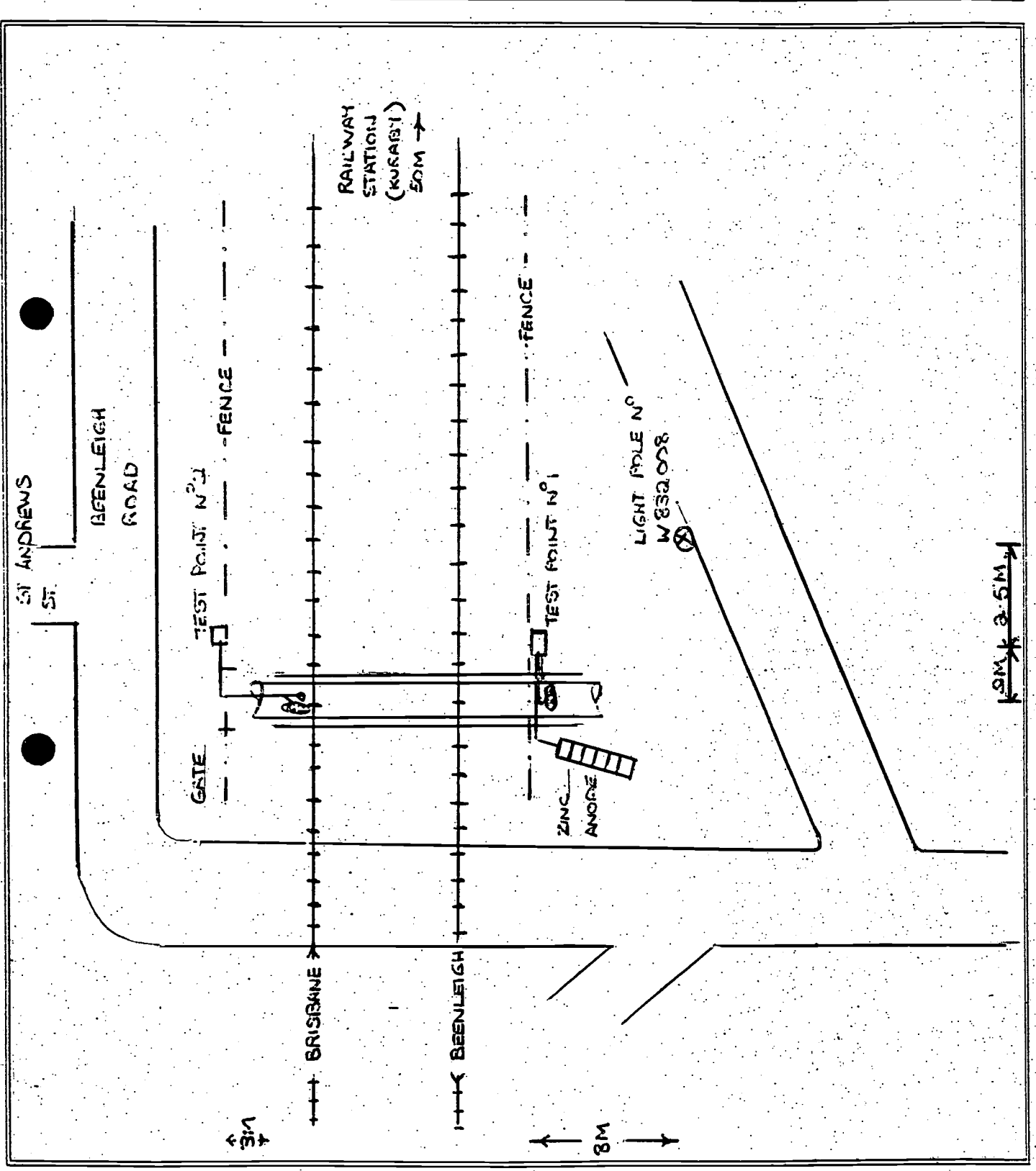
One tradesperson electrical, one laborer, one vehicle.
Eight hours per site.

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

Date: 8th SEPTEMBER 1995
Site Plan for: BEENLEIGH ROAD RAIL CROSSING.
CPS 151



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BEENLEIGH ROAD RAIL CROSSING

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT N°1
CPS 151

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300MM MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω
ZINC REFERENCE TO PIPE: +501 mV (NATURAL)
$CuSO_4$ REFERENCE TO PIPE: -313 mV (NATURAL)
ZINC TO $CuSO_4$: -811 mV (NATURAL)

EARTH TESTING

PIN SPACING: 2M MEGGER READING: 25.0 RESISITIVITY: $2\pi aR$ = 314.16 ΩM

PIN SPACING: 5M MEGGER READING: 55.5 RESISITIVITY: $2\pi aR$ = 1743.59 ΩM

SACRIFICIAL ANODE
(IF INSTALLED)

ANODE TYPE: ZINC
ANODE SIZE: 20 Kg
ANODE TO PIPE POTENTIAL: 665 mV
ZINC REF TO PIPE: -254 mV
(ANODE CONNECTED)

$CuSO_4$ REF TO PIPE: -1075
(ANODE CONNECTED)

SACRIFICIAL ANODE CURRENT: 500 µA

BLEED RESISTOR SIZE:
(IF INSTALLED)

INSTALLED BY: M. M°CORMICK

COMMENTS:

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

TEST POINT N°1

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-96

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 270 KΩ TO 1·2 MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 1·08 MΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1075 mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

JOINT ONLY INSULATED ON 1 SIDE.
NO SOIL COVER YET
DRAWINGS SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

M. McCORMICK.

BEENLEIGH RD RAIL CROSSING

BRISBANE CITY COUNCIL
EAGLE FARM PUMP STATION
CORROSION SECTION

TEST POINT N°2

STANDARD CATHODIC PROTECTION TEST POINT DATA GATHERING

DATE: 11-09-95
TEST POINT TYPE: B

LOCATION: BEENLEIGH RD, KURABY
MAINS SIZE: 300 MSCL

POTENTIAL TESTING

CATHODE TO CATHODE RETURN (RESISTANCE): 0.2Ω

ZINC REFERENCE TO PIPE:	+263 mV	(NATURAL)	-504 mV	(ON PO
$CuSO_4$ REFERENCE TO PIPE:	-314 mV	"	-1081 mV	"
ZINC TO $CuSO_4$:	-576 mV	"	-576 mV	"

EARTH TESTING

PIN SPACING: MEGGER READING: RESISITIVITY:

PIN SPACING: MEGGER READING: RESISITIVITY:

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:

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

TEST POINT N°2

ELECTRICIAL WORKSHOP

INSULATED JOINT TESTING DETAILS:

DATE 11-09-95

DESCRIPTION

MAINS DETAILS:-
LOCATIONS:- BEENLEIGH RD RAIL CROSSING
SIZE:- 300 MSCL
MATERIAL:-
COATING:- POLYETHYLENE - LOW DENSITY
NUMBER:-

IN GROUND TESTING

BOLT TO FLANGE RESISTANCE:- 60 MΩ
NUMBER OF BOLT:- 12
FLANGE TO FLANGE RESISTANCE:- 955 KΩ
INSULATION CHECKER MODEL 702:-
POTENTIAL DIFFERENCE TO REFERENCE CELL
PROTECTED SIDE:- -1081 mV
UNPROTECTED SIDE:- N.A.

ABOVE TESTING

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

COMMENTS

NO SOIL COVER YET, DRAWING SHOWED NO UNPROTECTED CABLE CONNECTIONS

TESTED BY

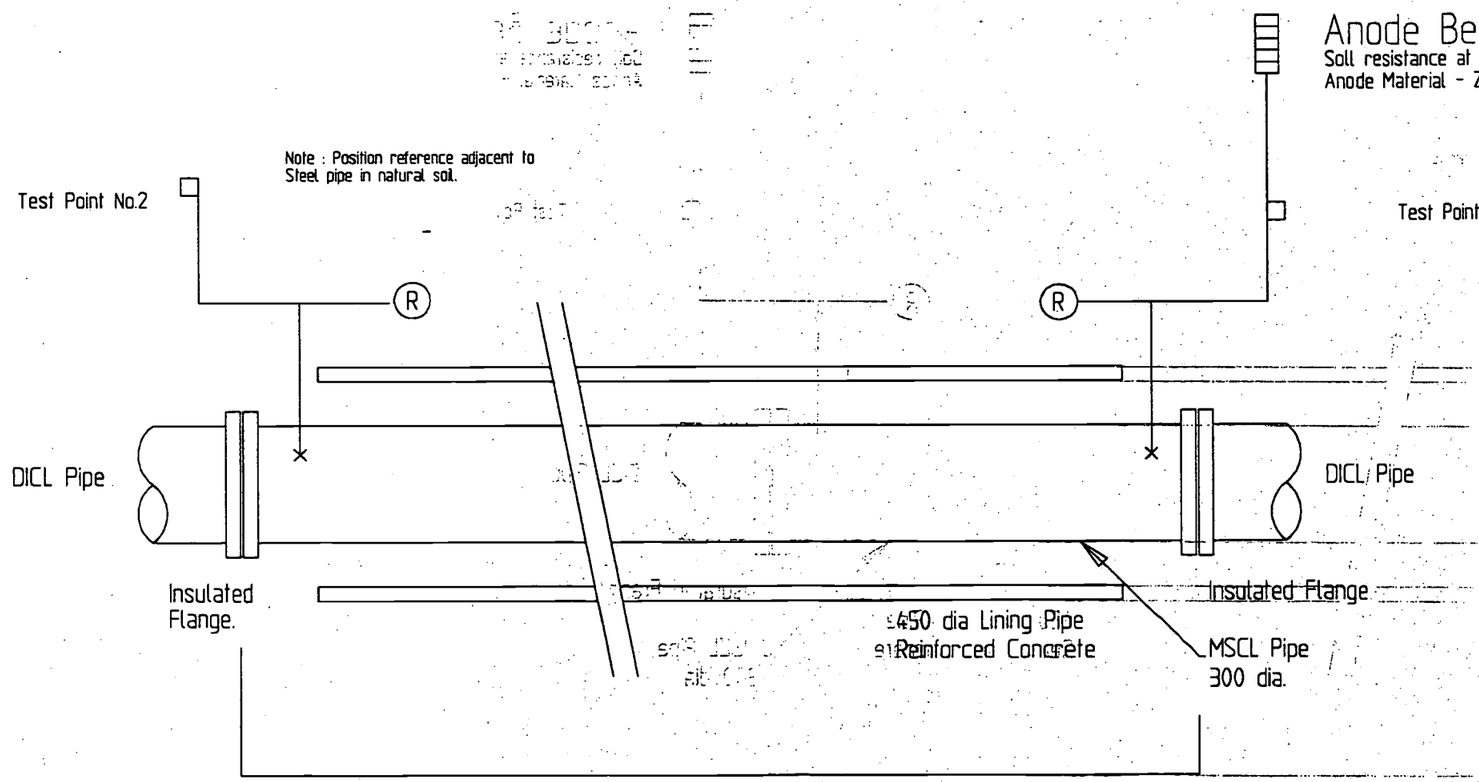
M. McCORMICK.

Notes :

Ressistance to earth - 1.75 ohms
Output Current Available - 140 mA
Use Shunt Resistor to limit current as require

Assuming 2mA per m sq Protection Current
Area of Pipe - 17m sq
Weight of Anode - 10 Kg
Anode Life = 18 years

Distance of Anode to Pipe = 6m



Under Sacrifical Cathodic Protection.

Refer to Drawings :
BCC No. 10735 & 10737
Beenleigh International Investments
Subdivision - Stage 1
Beenleigh Road - Kuraby

				MANAGER DATE:	DIRECTOR OF PLANNING & DESIGN DATE:		
				DIRECTOR OF CONSTRUCTION DATE:	DIRECTOR OF M & E SERVICES DATE:	DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION DATE:	
A		ISSUED FOR CONSTRUCTION					
No.	DATE	AMENDMENT	BY				

DESIGN	PJSAY	3.7.95	PROJECT Water Reticulation Main Beenleigh Road - Kuraby
DRAWN	PJSAY	3.7.95	
CHECKED			TITLE Sacrifical Cathodic Protection System 300 MSCL - Rail Crossing Beenleigh Rd.
ENGINEER IN CHARGE			
SUPERVISING ENGINEER			CADD FILE No. CP95A01

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

SCALE: N.T.S.	No. 1 OF 1 SHEETS
DRAWING No.	AMEND. A