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OPERATING MANUAL FOR:

AUSTRALIAN TRADE COAST SEWER PROJECT VIOLA PLACE SUBMERSIBLE PUMP STATION SP 299

CLIENT:

**BRISBANE WATER
NETWORK SERVICES**

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DRAWINGS

486/5/25- S101	Standard Sewerage Pump Station Cathodic Protection Unit
(No Number)	Bi Monthly Maintenance Program

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.

CORROSION AND CATHODIC PROTECTION

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

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

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

An external source of direct current such as a transformer rectifier is used in conjunction with an anode consisting of material with a very slow corrosion rate.

While it is the flow of current which achieves the cathodic protection of the surface it is impractical to measure these currents over individual anodic areas to determine when cathodic protection has been achieved. However, with the flow of cathodic protection current, the structure becomes more negative with respect to the surrounding electrolyte. Because of this, it is possible to state values of metal/electrolyte potential at which corrosion does not occur. This metal/electrolyte potential is generally measured against a standard reference electrode which allows a reproducible potential at which corrosion does not occur to be quoted.

PUMP DETAILS

Size:	2 X 110.0 Kw submersible pumps.
Coating:	Enamel coated.
Length:	NA
Location:	Viola Place Eagle Farm UBD 141 J13
Construction Drawings:	
486/5/25- S101	Standard Sewerage Pump Station Cathodic Protection Unit.

CATHODIC PROTECTION DETAILS

Type of Cathodic Protection: Impressed Current.

Rectifier: Standard 24 Volt, 5.0 amp direct current output enclosed board inside the stainless steel switchboard. Rectifier has a 240V supply from the stainless steel switch board distribution panel.

Cathode: The cathode point is located on the pump motor, the ladder and the pipes. Two zinc reference are fitted to the pipes in the well and one near the ladder. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection.

Anodes: One silicone iron anode is suspended from the roof of the well .

Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the pumps and pipes. On these pumps and pipes test points have been brought out to the cathodic protection switch board.

Associated Drawings:

Standard Rectifier Wiring Diagram - 486/5/25-S101

Associated Standards:

AS/NZS 3000 2000 Electrical Installations

AS/NZS 2832.1 1998 Cathodic Protection of Metals-Pipes and Cables

Government Regulations:

Queensland Electricity Safety Rules and Regulations 2002

PERFORMED TESTING

- (1) Natural Potential Survey.
- (2) Testing of Insulated Flanges, Joints.
- (3) Current Drain Survey.
- (4) Rectifier Loop Resistance.
- (5) Foreign Structure Interference Survey and Mitigation.
- (6) Final Potential Survey and Commissioning.

Note: Attached copies of above testing can be found in Appendix A.

CONCLUSION

Full Cathodic protection has been achieved on these pumps and pipes.

MAINTENANCE

The cathodic protection system shall be maintained on a regular basis after commissioning. The maintenance schedule recommended in AS2832.1 is as set out below.

- (a) Bi-monthly.
- (b) Six monthly.
- (c) Five yearly.

Potential commissioning data.

Date: 04/04/2006.

Unit set at 8.4 volts 0.25 amps.

Potentials to copper sulphate reference cell.

Potentials	Natural	On	Off
Pipe 1	-444mV	-870mV	-717mV
Pipe 2	-444mV	-870mV	-729mV
Ladder	-444mV	-872mV	-718mV

Interference Testing.

	On	Off	Swing
Fence	-775mV	-775mV	0mV
Radio Pole	-674mV	-668mV	-6mV
Generator Frame	-126mV	-126mV	0mV

Insulated Joints.

The two insulated joints were tested.

Pipe 1 Bolt to flange greater than 37 Megohms. Flange to flange 27 Megohms.

Pipe 2 Bolt to flange greater than 43 Megohms. Flange to flange 13 Megohms

Pipe 1 8 x $\frac{3}{4}$ x 3 $\frac{1}{2}$ inch insulated bolts

Pipe 2 8 x $\frac{3}{4}$ x 3 $\frac{1}{2}$ inch insulated bolts

Tested by J. Taylor.

Appendix A

(Documents attached)

Structure potential levels (Form 37)

Loop potentials.

Standard cathodic protection unit Drg # xxxxxxxxx

Submersible pump station general layout Drg #xxxxxxx

Brisbane Water Engineering Services

Electrical Engineering Unit

Cathodic Protection System Loop Resistance

Viola Place.SP299 Rectifier CPS 220

Date: 05th April 2006

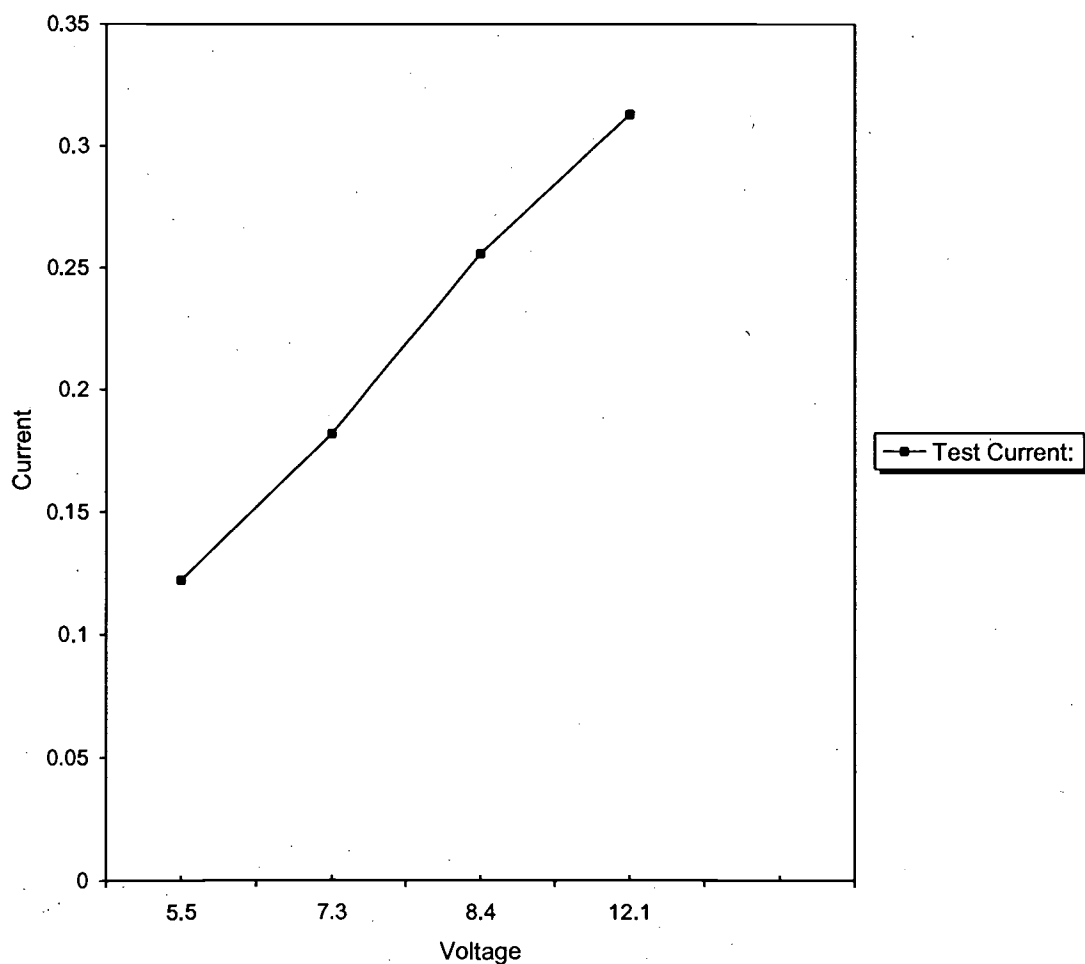
Cathodic Protection System: Viola Place Submersible Pump Station

System Operating Volts: 8.4 System Operating amps 256.0ma

Test Voltage:		Test Current:	
(volts)		(amps)	
5.5		0.122	
7.3		0.182	
8.4		0.256	
12.1		0.313	

Loop Resistance (ohms)
32.8125

Loop Resistance



5/04/2006

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