



**Queensland Urban Utilities**

**SP302 - Progress Road Pump Station**

**Operation & Maintenance Manual**

**Contract Number BW50080-04/05**

**Manuals Cover Pages**

**Created 12/09/2006**

## PROGRESS RD WACOL SPS SP302 MANUALS – STRUCTURE AND GENERAL TOC

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<sup>1</sup> VSD = Variable Speed Drive



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**8 th. August 2006**

**OPERATING MANUAL FOR:**

**PROGRESS ROAD SUBMERSIBLE PUMP  
STATION  
SP 302**

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**CLIENT:**

**BRISBANE WATER  
NETWORK SERVICES**

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## DRAWINGS

(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 115.0 Kw submersible pumps.

Coating: Enamel coated.

Length: NA

Location: Progress Road. Wacol.  
UBD 217 H5

Construction As per Contractor  
Drawings:

## CATHODIC PROTECTION DETAILS

**Type of Cathodic Protection:** Impressed Current.

**Rectifier:** Standard 24 Volt, 5.0 amp direct current output system incorporated in 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 discharge pipes in the reflux valve pit. 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 test panel mounted in the No 1 variable speed drive bay in the rear of the switch board.

**Associated Drawings:**

Standard Rectifier Wiring Diagram  
Drawings

Combined with Pump Station

**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: 08/08/2006.

Unit set at 4 volts 0.6 amps.

Potentials to copper sulphate reference cell.

Potentials	Natural	On	Off
Pipe 1	-359mV	-1323mV	-910mV
Pipe 2	-372mV	-1332mV	-900mV

Interference Testing.

	On	Off	Swing
Fence	-625mV	-625mV	0mV

Insulated Joints.

The two insulated joints were tested.

Pipe 1 Bolt to flange greater than 14 Megohms. Flange to flange 1 Kohms.

Pipe 2 Bolt to flange greater than 17 Megohms. Flange to flange 1.5 Kohms

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

Pipe 2 8 x  $\frac{3}{4}$  x 4 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**

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## Electrical Engineering Unit

Date: 08th August 2006

### Cathodic Protection System Loop Resistance

Progress Rd. SP302 Rectifier CPS226

Cathodic Protection System:

System Operating Volts:

4

Progress Road Submersible Pump Station

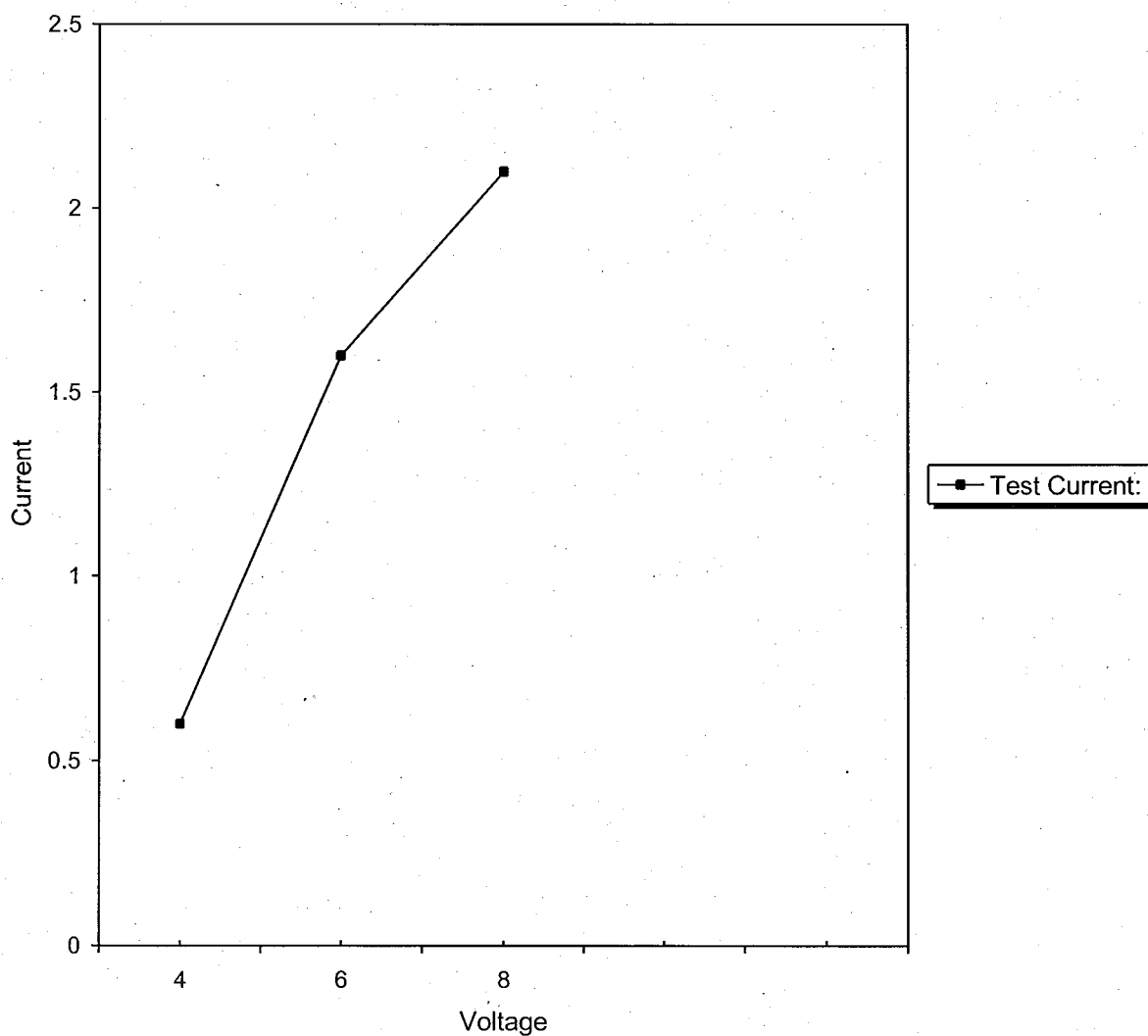
System Operating amps

0.6

Test Voltage: (volts)		Test Current: (amps)	
4		0.6	
6		1.6	
8		2.1	

Loop Resistance (ohms)
3.8095238

Loop Resistance



# PROGRESS ROAD SUB PUMP STATION CATHODIC PROTECTION PROPOSED

MAKE SURE ALL CABLES INTO SWITCHBOARD  
ARE SEALED CORRECTLY

