

Brisbane Water Engineering Services

Electric Mechanical Water Meters

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OPERATING MANUAL FOR:

WENDOUREE CRESCENT SUBMERSIBLE PUMP STATION

CATHODIC PROTECTION SYSTEM

CLIENT:

DEPARTMENT OF WATER SUPPLY AND SEWERAGE
SEWERAGE OPERATIONS BRANCH

16 JULY 1996.

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DRAWINGS

- | | |
|--------------------|-----------------------------------|
| 486/6/25-AA1C0023E | Standard Rectifier Wiring Diagram |
| 2/14.213 | Cathodic Protection Details |
| (No Number) | Monthly Maintenance Program |

Steel when buried or immersed has a tendency to corrode (rust) as the oxidised form is more stable than the metal.

Because of this, precautions must be taken to stop or minimise 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 practicable to expect a perfect coating during construction and coating damage will also occur with time. Because of this, corrosion may occur at imperfections.

(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, 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 low 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 and is generally measured against a standard reference electrode, which permits a reproducible potential at which corrosion does not occur to be quoted.

(3.0) STRUCTURE DETAILS

Size: 2 x 4KW Submersible Sewerage Pumps

Coating: Tar Epoxy Coating

Length: N.A.

Location: Wendouree Crescent Westlake UBD 196 Q5

Drawings: Construction:

486/5/7-PE09RC Pump Station Reinforcement

Included Drawings:

486/7/7-GD1T190E Submersible Pump Station
REV.B TO General Layout

486/7/7-GD1T203E Rectifier Unit With Data
REV.B Logging Facilities, Wiring
 Diagram

486/6/25-AA1C0023E Standard Cathodic Protection
 Submersible Pump Station

(4.0) CATHODIC PROTECTION DETAILS

4.1 Type of Cathodic Protection: Impressed Current

4.2 Rectifier: Standard 32 Volt, 10 Amp direct current output enclosed in a poly carbonate enclosure, installed in the main switchboard. Rectifier has a 240VAC supply from within the Switchboard of pump station SP 261.

4.3 Cathode: The cathode point is made directly to each pump as indicated on the diagrams

4.4 Anodes: One 1000 x 50 silicon iron anode was installed suspended from the top of the wetwell from a suspension bar, cast into the roof of the well.

4.5 Testpoints: Testpoints are installed on cathodically protected structures to enable testing to confirm that full cathodic protection of the structure is maintained. On this structure 2 testpoints have been installed on the pumps and connected via disconnect plugs to terminals on the C.P. unit.

4.6 Associated Drawings:
Nil

4.7 Associated Standards:

AS 2832.1 1985 Pipes, Cables, Ducts, Guide to Cathodic Protection. Part 1.

AS 3000 1991 Australian Wiring Rules

4.8 Government Regulations:

Queensland Electricity Acts and Regulations

(5.0) PERFORMED TESTING

- (1) Natural Potential Survey
- (2) Testing of Insulated Flanges, Joints
- (3) Current Drain Survey
- (4) Rectifier Loop Resistance

(6) 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 these sewerage pumps.

The cathodic protection system is to be 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 pump to electrolyte potentials. Monthly, Six monthly and sixty monthly maintenance procedures are detailed as attached below.

Cathodic Protection System Potentials

Date: 28 May 1996

Cathodic Protection System: Meadowlands Rd Sub Pump Strn.

System Operating Volts: 6 System Operating amps: 0.5

Natural Potential On Potential Off Potential

All Potentials to CuCuso4 Reference Cell in millivolts

Pump 1	Pump	-559	-1064	-817
	Zn Ref 1	-1006	-1184	-1027
	Zn Ref 2	NA		

All Potentials to Zn Reference Cells in millivolts

<u>Pump Zn Ref 1</u>	447	119	211
<u>Pump Zn Ref 2</u>	NA		

All Potentials to CuCuso4 Reference Cell in millivolts

Pump 2	Pump	-558	-1038	-804
	Zn Ref 1	-1009	-1223	-1046
	Zn Ref 2	NA		

All Potentials to Zn Reference Cells in millivolts

<u>Pump Zn Ref 1</u>	449	187	243
<u>Pump Zn Ref 2</u>	NA		

All Potentials to CuCuso4 Reference Cell in millivolts

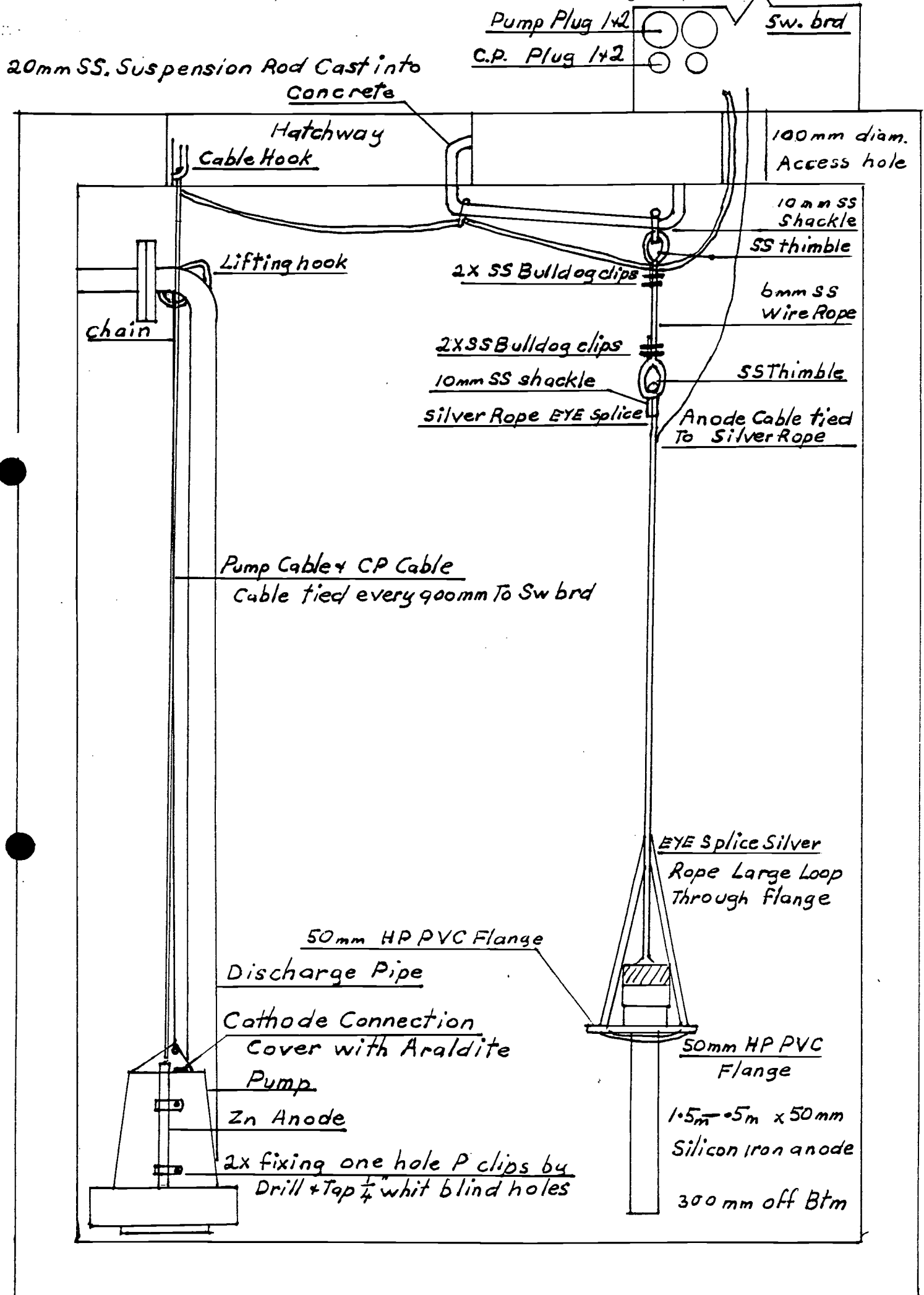
Pump 3	Pump	NA
	Zn Ref 1	NA
	Zn Ref 2	NA

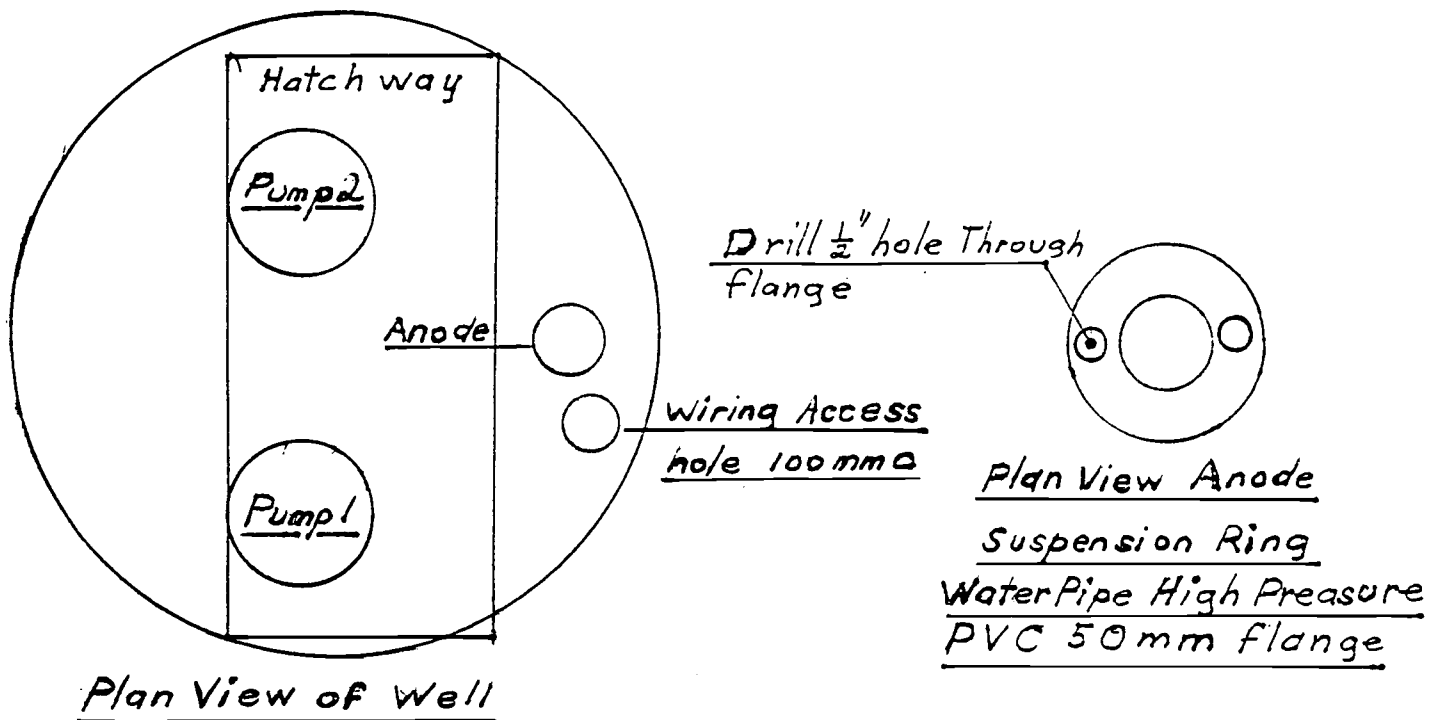
All Potentials to Zn Reference Cells in millivolts

<u>Pump Zn Ref 1</u>	NA
<u>Pump Zn Ref 2</u>	NA

All Potentials to CuCuso4 Reference Cell in millivolts

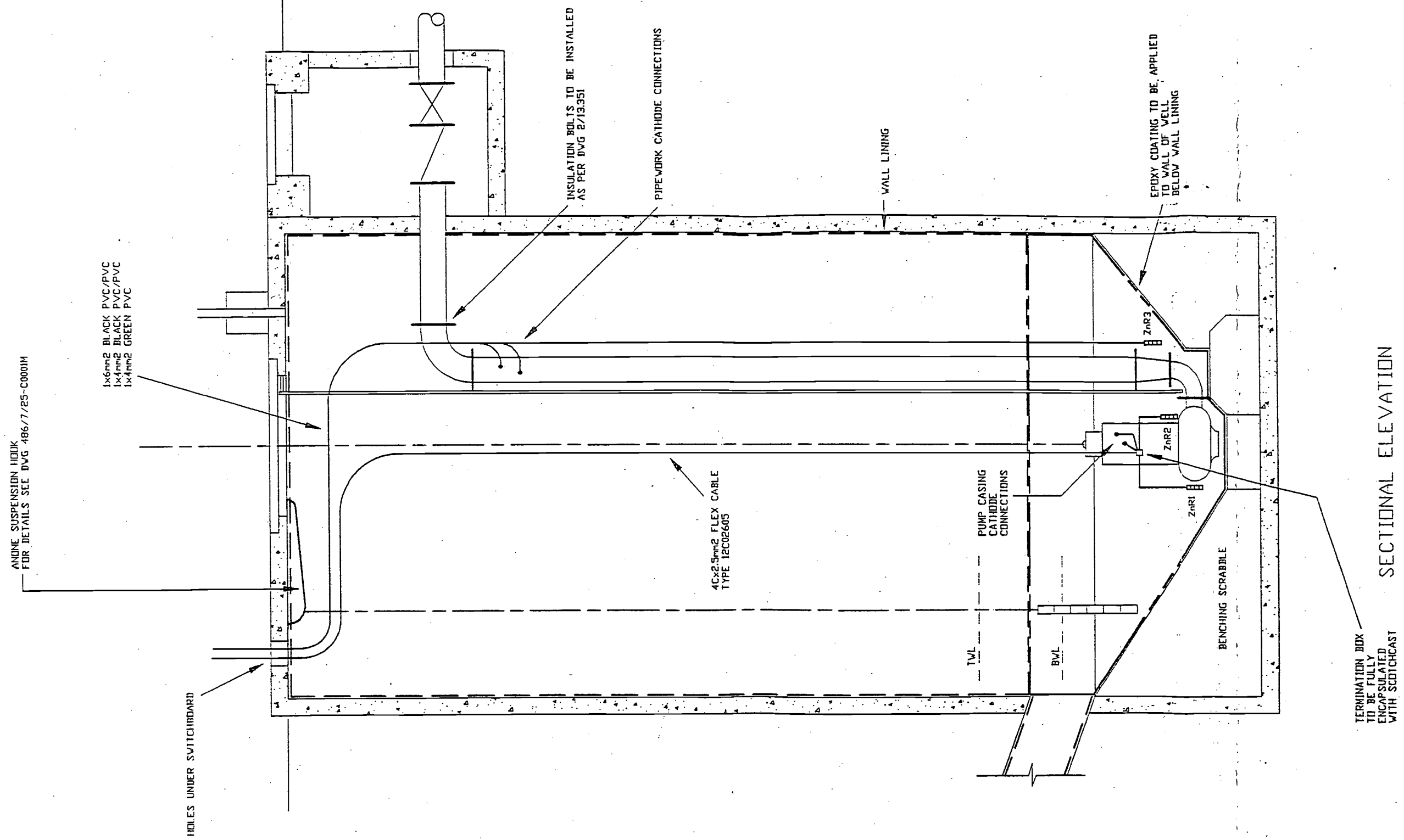
Ladder	-579	-1016	-826
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BILL OF Materials

ITEM Description	Code	Quantity	Purchase from
6mm SS wire Rope	N/A	1 m	Bulivants
10mm S.S. D shackles	N/A	2	"
6mm S.S. wire thimbols	N/A	2	"
6mm S.S. Bulldog clamps	N/A	4	"
Anode Silicon iron 1.5m x 50mm	357	1	Store
Cable 4 core 2.5 Neoprene	21920	20mtrs	"
Cable Ties 200mm	20801	1 Pkt.	"
Nylon Rope	11778	8 mtrs	"
Scotchcast Resin		1	"
Water Pipe 50mm H.P. PVC flange	N/A	1	Plumbers Supl
Zn Anode		2	Wilson + Walton



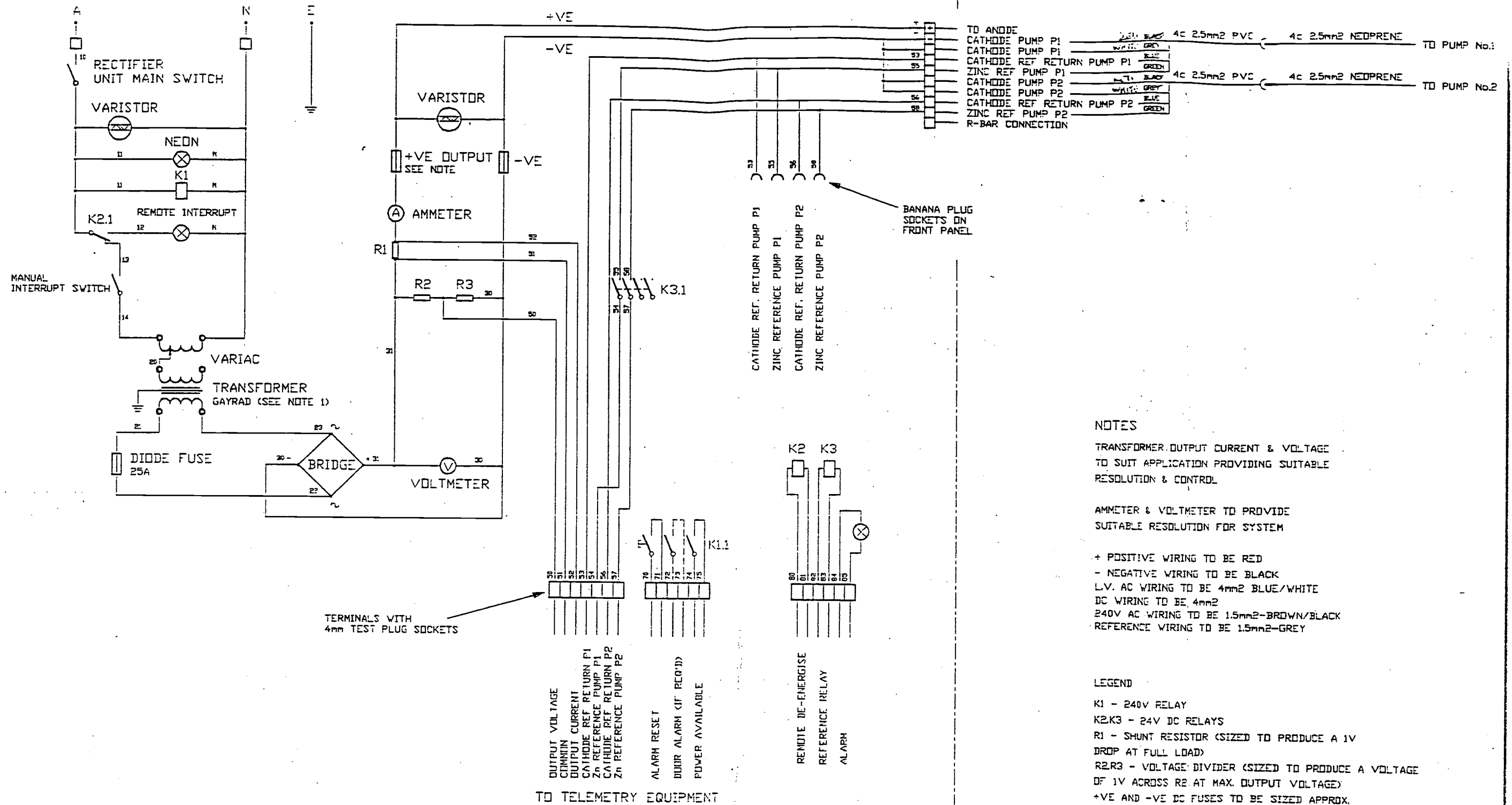
Q-Pulse Id TMS1320 0 16.12.93	ISSUED FOR CONSTRUCTION	R.L.	MANAGER		DIRECTOR OF PLANNING & DESIGN		DESIGN			PROJECT OXLEY ARCHERFIELD CATHODIC PROTECTION	 BRISBANE CITY COUNCIL DEPARTMENT OF WATER SUPPLY AND SEWERAGE MECHANICAL & ELECTRICAL SERVICES		
			DATE:		DATE:		DRAWN	R.LISTON	16.12.93				
			DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS/W.S. DISTRIBUTION		CHECKED				TITLE SUBMERSIBLE PUMP STATION GENERAL LAYOUT
									ENGINEER IN CHARGE 16/07/2015				
									SUPERVISING				
										SCALE: NTS	No. 1 OF 1 SHEETS		
										DRAWING No.		Page 10 of 10	AMEND.
												486/7/7-PF1C0051F	0



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

RECTIFIER UNIT

FIELD



NO.	BY	DATE	REVISION	CHECK	APPR
B	R.L.	16.1.95	WIRE NUMBERS ADDED		
A	R.L.	22.12.94	CIRCUIT CHANGES		
D	R.L.	25.8.93	ISSUED FOR CONSTRUCTION		



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

PROJECT STANDARD
CATHODIC PROTECTION
SUBMERSIBLE PUMP STATION
TITLE RECTIFIER UNIT
WITH DATA LOGGING FACILITIES
WIRING DIAGRAM

DRAWN	NAME	DATE	SUPER	NAME	DATE	SCALE	SIZE
J.S.	R.L.	19.10.93	ENG.	M.J.	1.11.93		A3
CHECKED	NAME	DATE	NAME	DATE	SCALE	SIZE	
J.S.	J.S.	15.10.93	ENG.				
J.S.	J.S.	22.10.93	ENG.				
DRAWING NO. 486/6/25-AA1C0023E						ACAD FILE NO. A625C23	AMEND B