



Brisbane Water Engineering Services

☐ Electrical ☐ Mechanical ☐ Water Meters

5 Bunya Street Eagle Farm Q 4009

Ph. (07) 3403 1849

Fx. (07) 3403 1898

1st APRIL 1997

OPERATING MANUAL FOR:

MACQUARIE ST SUBMERSIBLE PUMP STATION SP119

CLIENT:

**BRISBANE WATER
SEWERAGE UTILITY SERVICES**

MANUAL CONTENTS

(1.0)	Introduction
(2.0)	Corrosion and Cathodic Protection
(3.0)	Pump Details
(4.0)	Cathodic Protection
(4.1)	Type of System
(4.2)	Rectifier
(4.3)	Cathode
(4.4)	Anodes
(4.5)	Test Points
(4.6)	Associated Drawings
(4.7)	Associated Standards
(4.8)	Government Regulations
(5.0)	Performed Testing
(6.0)	Conclusion
(7.0)	Maintenance

DRAWINGS

486/7/7/-TK1C2247E

Standard Rectifier Wiring Diagram

(No Number)

Monthly Maintenance Program

(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 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.

Size: 2 X 37 Kw submersible pumps

Coating: Enamel coated.

Length: NA

Location: Corner of Macquarie St. and Sir Fred Schonell Dr.
St Lucia UBD 179 E2

Construction

Drawings:

486/7/7-TK1C2247E

486/7/7-MI1TO64E

486/7/7-MI1TO66E

486/7/7-MI1TO67E

486/7/7-MI1TO70E

486/7/7-MI1TO72E

Cathodic Protection Rectifier Unit.

Switchboard Electrical Schematic & Three Line Diagram

Switchboard Electrical Schematic & Three Line Diagram

Switchboard Electrical Schematic & Three Line Diagram

Switchboard Termination Diagram Digital Outputs

Switchboard Termination Diagram Analog Inputs

(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 PVC board inside the stainless steel switchboard. Rectifier has a 240V supply from inside the stainless steel switch board distribution panel.
- (4.3) Cathode: The cathode point is located on the pump motor. Two reference anodes are also fitted to the motor one on each side. The cathode point is where the cabling from the rectifier is attached to the structure under cathodic protection. Also under protection are delivery pipes and access ladder.
- (4.4) Anodes: One silicone iron anode is suspended from roof of the well . See layout drawing.
- (4.5) Test Points: Test points are installed on cathodically protected structures to enable testing to ensure full protection of the pumps. On these pumps test points have been brought out to the cp switch board.
- (4.6) Associated Drawings:
Cathodic Protection Details - 2/14.213
Cathodic Protection Test Point Details - 2/14.199
Standard Rectifier Wiring Diagram - 486/6/25-AA1C0021E
- (4.7) Associated Standards:
AS 3000 1986 Australia Wiring Rules
AS 2832.1 1985. Pipes, Cables, Ducts, Guide to Cathodic Protection,
Part One.
- (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.
- (5) Foreign Structure Interference Survey and Mitigation.
- (6) Final Potential Survey and Commissioning.

(6.0) **CONCLUSION**

Full Cathodic protection has been achieved on these pumps and well equipment . 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 pump to water potentials.

1 St. April 1997.

Electrical Engineering Unit.

Cathodic Protection

CPS Monthly Maintenance Details.

Required:

- 1/ Notify plant operator and/or sign entry logs where necessary.
- 2/ Have appropriate keying.

Labour:

One trades person, 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.

1 St. April 1997.

Electrical Engineering Unit.

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 trades person electrical, one labourer, 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.

1st April 1997.

Electrical Engineering Unit.

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 trades person electrical, one labourer, 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 test point terminals for tightness.
- 12/ Check all switchboard and test points 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 to re-register system if applicable

Brisbane Water Engineering Services

CP Form No. 39

Electrical Engineering Unit**Submersible Pump Station Potentials****Project** Macquarie St submersible pump station**Date** 01/04/97**Unit set at** 11 Volts 1 Amps

Cathode current	Ladder	480 ma
	Pipes	460 ma
	Pump 1	74 ma
	Pump 2	68 ma

Potentials to copper sulphate reference cell

	<u>Natural (mV)</u>	<u>On (mV)</u>	<u>Off (mV)</u>
Ladder	-840	-1100	-911
Pipe 1	-680	-1108	-895
Pipe 2	-668	-1110	-899
Pump 1	-675	-1142	-845
Pump 2	-665	-1122	-837

Potentials to associated zinc fixed reference cells

		<u>Natural (mV)</u>	<u>On (mV)</u>	<u>Off (mV)</u>
Zn	Ladder	222	-32	104
Zn	Pipe 1	445	348	173
Zn	Pipe 2	440	-15	132
Zn 1.1	Pump 1	500	-729	158
Zn 1.2	Pump 1	480	-203	214
Zn 2.1	Pump 2	440	-337	194
Zn 2.2	Pump 2	450	-20	270

Insulated Joints**Location** Reflux valve pit**Flange to Flange Resistance**

Pipe 1	749000 Ohms
Pipe 2	959000 Ohms

Flange to Bolt Resistance

greater than 200 megohms
greater than 200 megohms

Insulated Joints**Bolts**

Number	12
Size	16
Length	90

Interference Testing

Nil to foreign structures

COMPILED BYJ. Taylor

Brisbane Water Engineering Services

Ph. 34031838 Fx. 34031839

Electrical Engineering Unit5 Bunya Street
Eagle Farm Q 4009Cathodic Protection System Loop Resistance

Date 2 Nd April 1997

Cathodic Protection System:

Macquarie St submersible pump station

System Operating Volts:

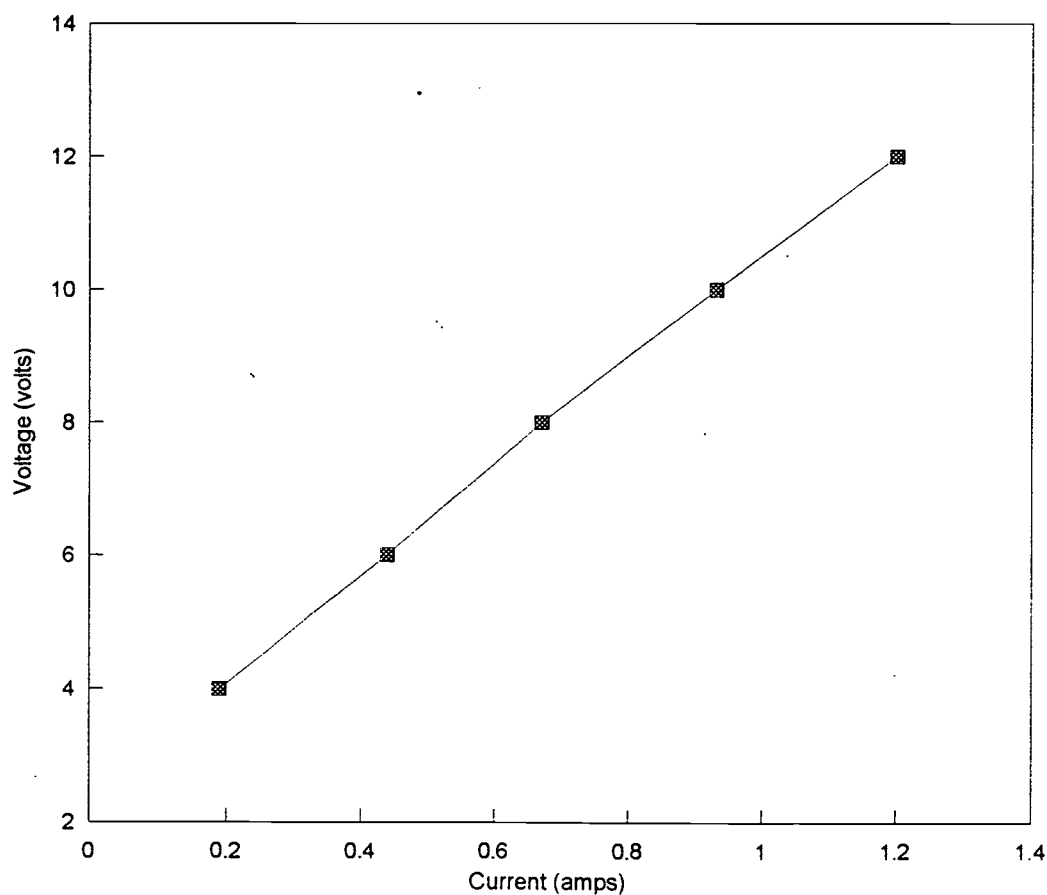
11

System Operating amps

1

Test Voltage:		Test Current:	
(volts)		(amps)	
4		0.19	
6		0.44	
8		0.67	
10		0.93	
12		1.2	

Loop Resistance (ohms)
7.54717

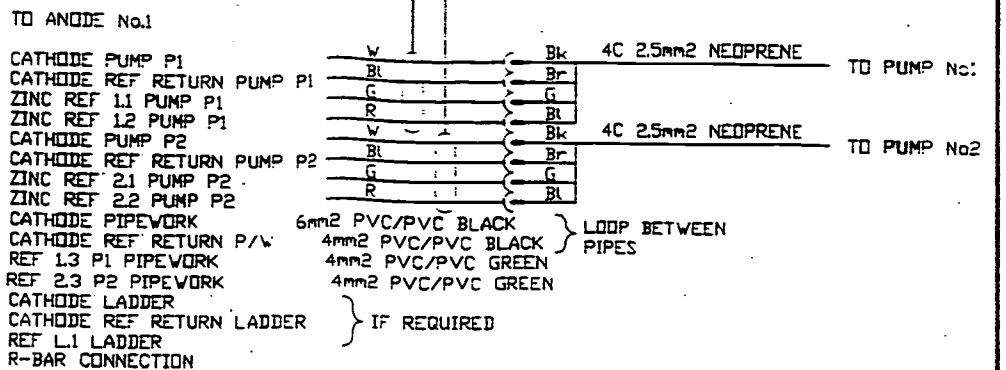
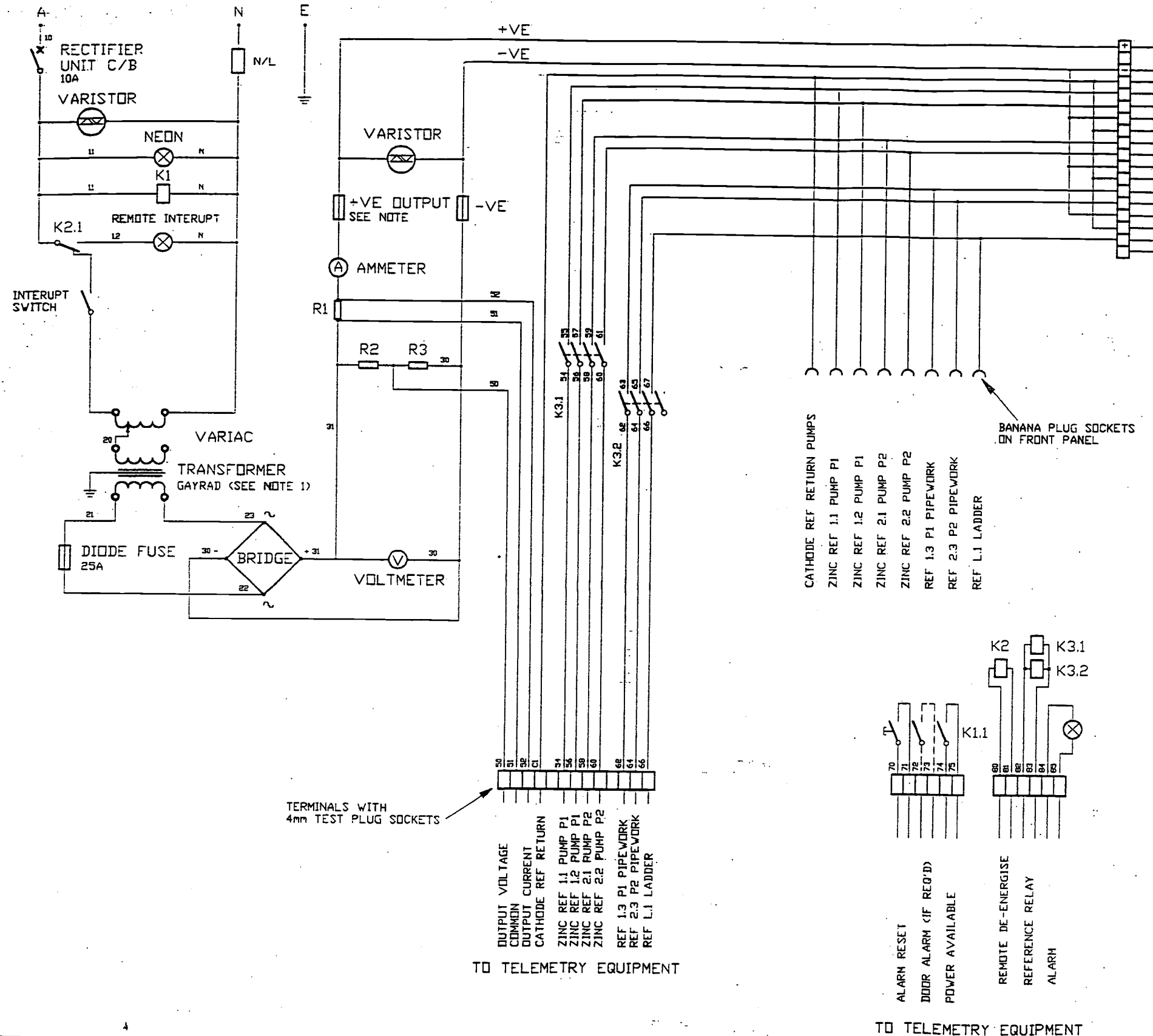
Graph of System voltage vs current.

04/02/97

LPMCQARY.WK4

RECTIFIER UNIT

FIELD



NOTES

TRANSFORMER OUTPUT CURRENT & VOLTAGE
TO SUIT APPLICATION PROVIDING SUITABLE
RESOLUTION & CONTROL

AMMETER & VOLTMETER TO PROVIDE
SUITABLE RESOLUTION FOR SYSTEM

- + POSITIVE WIRING TO BE RED
- NEGATIVE WIRING TO BE BLACK
- L.V. AC WIRING TO BE 4mm² BLUE/WHITE
- DC WIRING TO BE 4mm²
- 240V AC WIRING TO BE 1.5mm²-BROWN/BLACK
- REFERENCE WIRING TO BE 1.5mm²-GREY

LEGEND

- K1 - 240V RELAY
- K2,K3.1,K3.2 - 24V DC RELAYS
- R1 - SHUNT RESISTOR (SIZED TO PRODUCE A 1V
DROP AT FULL LOAD)
- R2,R3 - VOLTAGE DIVIDER (SIZED TO PRODUCE A VOLTAGE
OF 1V ACROSS R2 AT MAX. OUTPUT VOLTAGE)
- +VE AND -VE DC FUSES TO BE SIZED APPROX.
5AMPS ABOVE NORMAL OUTPUT CURRENT

No.	BY	DATE	REVISION	CHECK	APPR
0	R.L.	24.4.95	ISSUED FOR CONSTRUCTION		



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

PROJECT SP265 BILLAN ST., 30kW
SEWAGE SUBMERSIBLE PUMP STATION
2 PUMP RAIL MOUNTED
TITLE RECTIFIER UNIT
WIRING DIAGRAM

DRAWN	NAME	DATE	SUPER ENG.	NAME	DATE	SCALE	SIZE
DESIGN	J.S.	24.4.95	SENIOR ENG.				A3
CHECKED		26.4.95	ELECT. ENG.				
DRAWING No.	486/7/7-TK1C2247E					AMEND	
ACADRE FILE No.	77C2247-						

ELECTRICALLY ISOLATE GUIDE
BARS FROM TOP SLAB

CHEMICALLY ANCHORED GRADE
316 STAINLESS STEEL STUDS

ALUMINIUM HINGED PART COVERS
(HALLCO' TYPE)
COVERS TO BE PROVIDED WITH
PADLOCK LOCKING MECHANISM.
COVERS ARE TO BE FLUSH MOUNTED.
COVERS ARE TO BE REMOVABLE
AND PROVIDED WITH LIFTING LUGS
ON UNDERSIDE.

PUMP WELL

25 W.S. B.S.P. FEMALE SOCKET
AND 25 W.S. CHECK VALVE ON
BOTH INTERNAL RISING MAINS.
Ø25 CHECK VALVES SHALL BE
FITTED AT TOP OF EACH
INTERNAL RISING MAIN AND
ARRANGED TO ACT AS AIR
BLEED VALVES BY INSTALLING
HORIZONTALLY IN THE REVERSE
DIRECTION. THEY SHALL BE
ROTATED SLIGHTLY FROM THE
VERTICAL SUCH THAT THE VALVE
SEAT IS PARTIALLY OPEN.

Ø200 x 90° BEND

ELECTRICALLY ISOLATE FLANGE

Ø200 WEEP FLANGE

NEW VALVE PIT
REFER DWG No. 486/5/7-MIO

Ø200 FLANGED CHECK
(REFLUX) VALVES

TABLE 'D' UNI FLANGES

R.L. 5.730

TOP OF EXISTING
WALLS - R.L. 5.250
50mm CONDUITS

ANODE HOOK
REFER DWG. 486/5/25-S4/3

EXTENDABLE HAND RAIL AS PER
A.S. 1657-1992

STANDARD LADDER. REFER
B.C.C. STD DWG No. 3018/4000.
LADDER MUST BE ELECTRONICALLY
ISOLATED FOR CATHODIC
PROTECTION PURPOSES.
THE STAINLESS STEEL ANCHORS &
FASTENERS MUST BE ELECTRICALLY
ISOLATED FROM THE GALVANISED
LADDER ASSEMBLY.

REMOVE EXISTING LADDER

Ø50 GRADE 316 STAINLESS
STEEL PUMP SLIDE RAILS AND
BRACKETS

DEMOLISH EXISTING R.C. PLATFORM
AND GROUT RECESS TO MATCH
EXISTING I.D. OF WELL

RL. -0.540

REMOVE EXISTING LADDER
AND HANDRAIL

T.W.L. -1.620

ABS AFP 1501.M370 PUMPS

B.W.L. -2.970

EXISTING CONCRETE BENCHING

RL. -4.343

RL. -4.800

FORM 150 x 150 TOE HOLES
IN EXISTING BENCHING

Ø200 x 700 LONG DICL
DOUBLE FLANGED PIPE
Ø200 FLANGED SLUICE VALVES
(ANTI-CLOCKWISE ROTATION
TO CLOSE)
Ø200 x 260 LONG PLAIN END
DICL SHORT PIPES

Ø200 x 1200 LONG DICL
FLANGED PIPE WITH WEEP FLANGE

I.L. 1.750 (EXISTING OVERFLOW OUTLET)

BRACKETS SHALL BE PLACED ONE PER SECTION
OF PIPE WITH BRACKET NEAR FLANGED
JOINT AT TOP END. (500mm BELOW FLANGED JOINT)
STAINLESS STEEL RISING MAIN SUPPORTS.
ELECTRICALLY ISOLATE SUPPORTS
FROM INTERNAL RISING MAIN SO THAT DISSIMILAR
METALS ARE NOT IN PHYSICAL CONTACT.

Ø200 DICL DISCHARGE
PIPEWORK

150 x 200 CAST IRON
DUCKFOOT BEND

NON ELECTRICALLY CONDUCTIVE
BASE GROUT WITH EPOXY (NOT CEMENT)

RL. -3.343

RL. -3.734

EXISTING CONCRETE BENCHING

DUCKFOOT BEND PLINTH
REFER DETAIL

REMOVE BELLMOUTH BENDS

SECTION

A

SCALE 1 : 50

NOTE

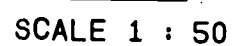
ALL DICL PIPE TO BE
CLASS K12 TO SPECIFICATION
AS 2280-1988. TABLE D.

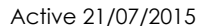
DUCKFOOT BEND GRADE 316
STAINLESS STEEL STUDS
BY CONTRACTOR
STUDS EXPOSED ABOVE CONCRETE
TO BE FITTED WITH INSULATED
SLEEVES, SANDWICH INSULATING
WASHERS BETWEEN STAINLESS
STEEL WASHERS TO AVOID
BREAKAGE.

Y12 LIGS - 200

TOP OF BENCHING

Active 21/07/2015





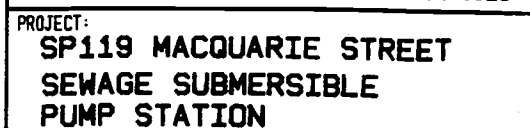

1. CHANGES SHOWN MATCHED.
2. MAIN PUMP DECONTACTORS MOUNTED EXTERNALLY.
3. DISCONNECT & REMOVE PUMP WELL FLUORESCENT LIGHT CIRCUIT & LABEL..
4. DISCONNECT & REMOVE PUMP WELL VENTILATION FAN CIRCUIT & LABEL..
5. DISCONNECT WIRING.
6. CONFIRM RATING OF PUMP CIRCUIT BREAKERS.
7. DISCONNECT & REMOVE SUMP PUMP CIRCUIT.
8. DISCONNECT & REMOVE PUMP WELL FLOODED ELECTROOD RELAY.
9. DISCONNECT & REMOVE SUMP PUMP CONTACTOR. RELAY & PUSH BUTTONS.

AMENDMENT & ISSUE REGISTER

DIRECTOR OF PLANNING & DESIGN	DIRECTOR OF WATER SUPPLY	DIRECTOR OF CONSTRUCTION
----------------------------------	-----------------------------	-----------------------------

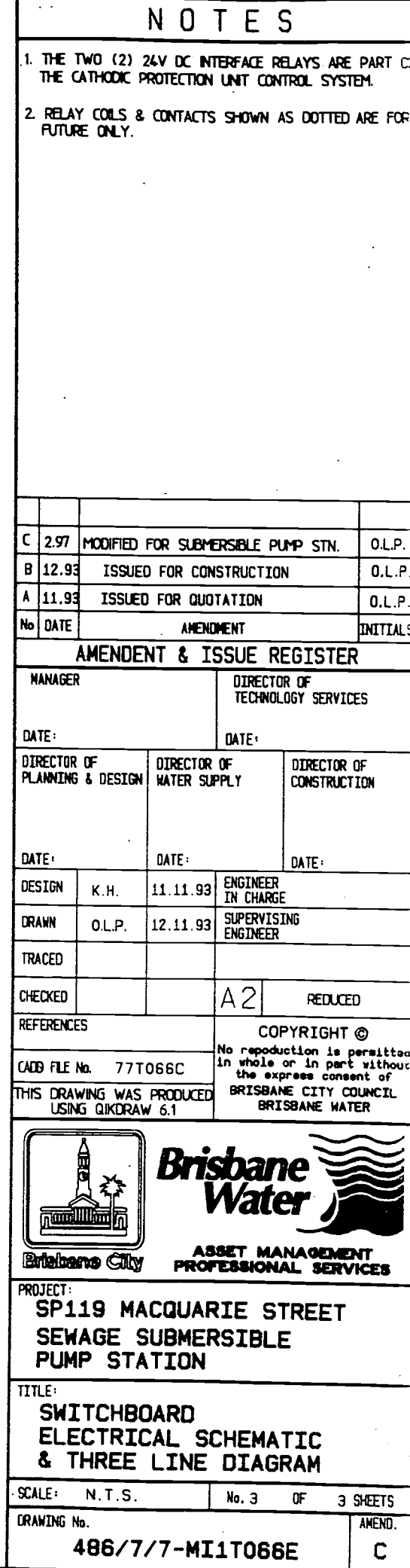
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER

REFERENCES	COPYRIGHT © No reproduction is permitted
------------	---



TITLE:
SWITCHBOARD
ELECTRICAL SCHEMATIC
& THREE LINE DIAGRAM

DRAWING No.		AMEND.
486/7/7-MI11064E		C



NOTES

C	2.97	MODIFIED FOR SUBMERSIBLE PUMP STN.	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT	INITIALS

AMENDMENT & ISSUE REGISTER

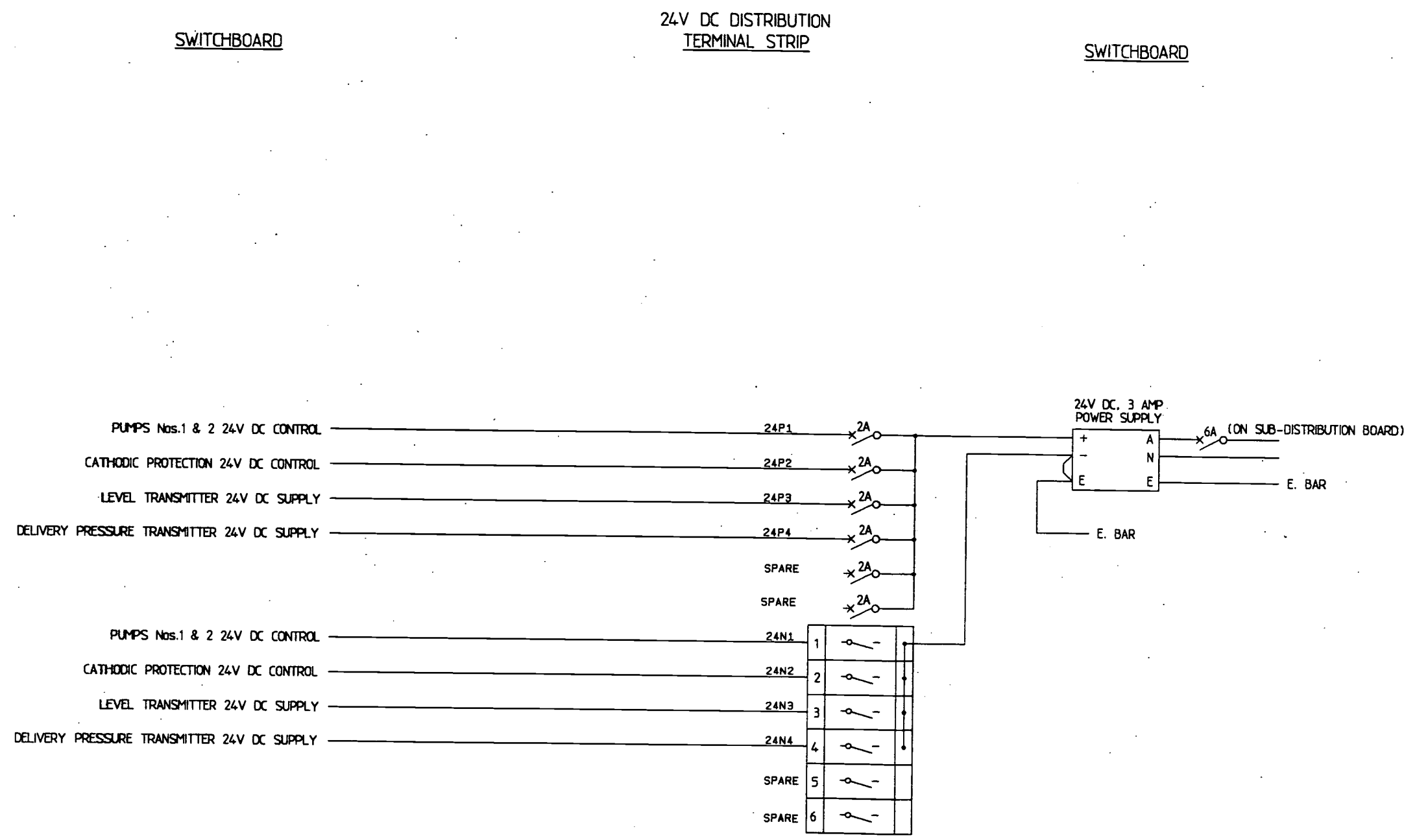
MANAGER		DIRECTOR OF TECHNOLOGY SERVICES	
DATE:		DATE:	
DIRECTOR OF PLANNING & DESIGN		DIRECTOR OF WATER SUPPLY	
DATE:		DATE:	
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER
TRACED			
CHECKED		A2	REDUCED
REFERENCES		COPYRIGHT ©	
CADD FILE No. 77T067C		No reproduction is permitted in whole or in part without the express consent of	
THIS DRAWING WAS PRODUCED USING QIDRAW 6.1		BRISBANE CITY COUNCIL BRISBANE WATER	



PROJECT:
**SP119 MACQUARIE STREET
SEWAGE SUBMERSIBLE
PUMP STATION**

TITLE:
**SWITCHBOARD
TERMINATION DIAGRAM
24V DC DISTRIBUTION**

SCALE:	N.T.S.	No. 1	OF	1 SHEETS
DRAWING No.	486/7/7-MI1T067E			AMEND.
				C



NOTES

- 1. CHANGES SHOWN HATCHED.
- 2. DELETE REFLUX MICRO WIRING.
- 3. DELETE PUMP WELL SUMP PUMP OPERATED & PUMP WELL FLOODED WIRING.

No	DATE	AMENDMENT	INITIALS
C	2.97	MODIFIED FOR SUBMERSIBLE PUMP STN.	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.

AMENDMENT & ISSUE REGISTER

MANAGER	DIRECTOR OF TECHNOLOGY SERVICES	
DATE:	DATE:	
DIRECTOR OF PLANNING & DESIGN	DIRECTOR OF WATER SUPPLY	DIRECTOR OF CONSTRUCTION
DATE:	DATE:	DATE:

DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER
TRACED			

CHECKED		A2	REDUCED
---------	--	----	---------

REFERENCES	COPYRIGHT ©
CADD FILE No. 77T069C	No reproduction is permitted in whole or in part without the express consent of
THIS DRAWING WAS PRODUCED USING QIKORAW 6.1	BRISBANE CITY COUNCIL BRISBANE WATER

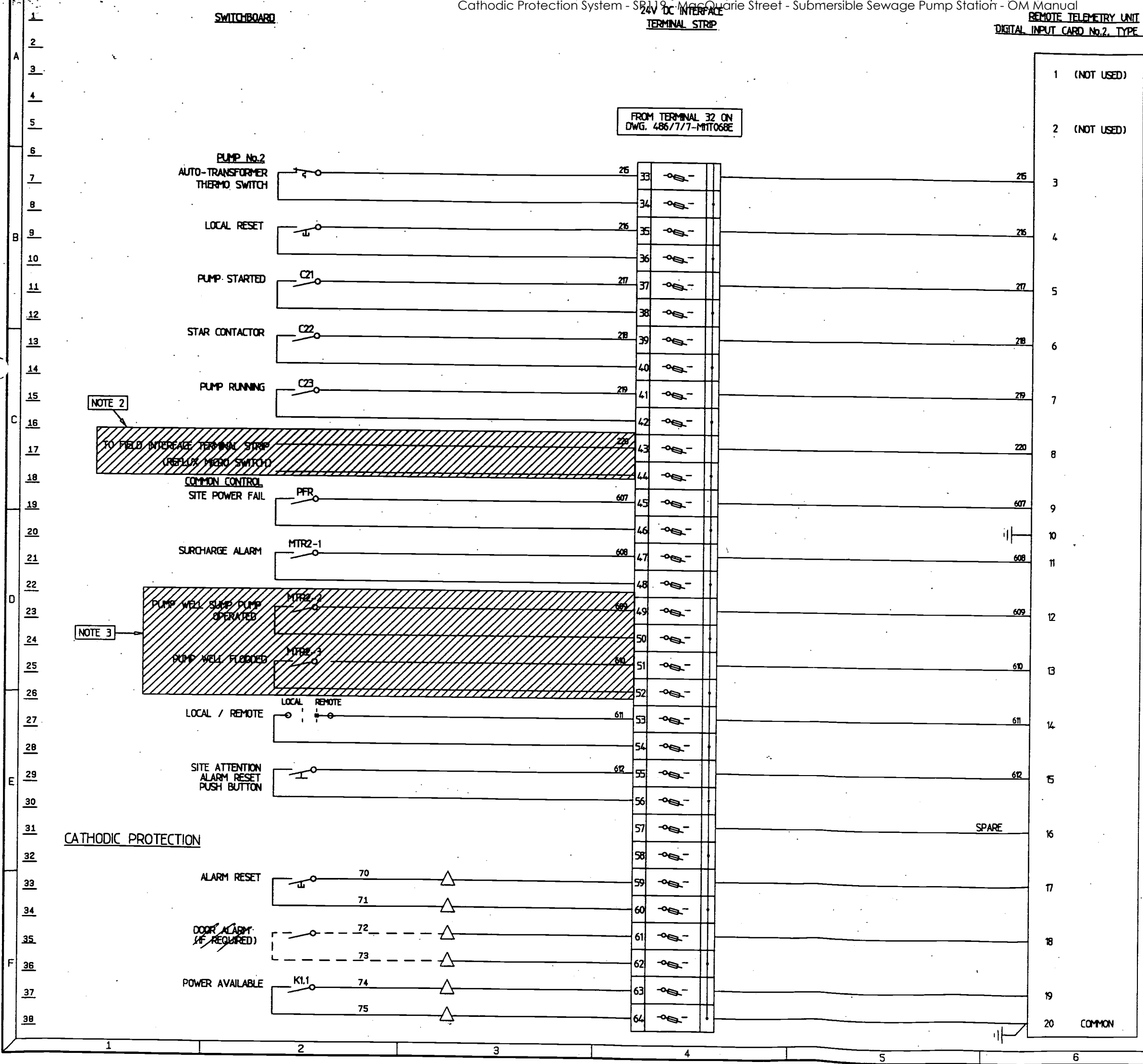


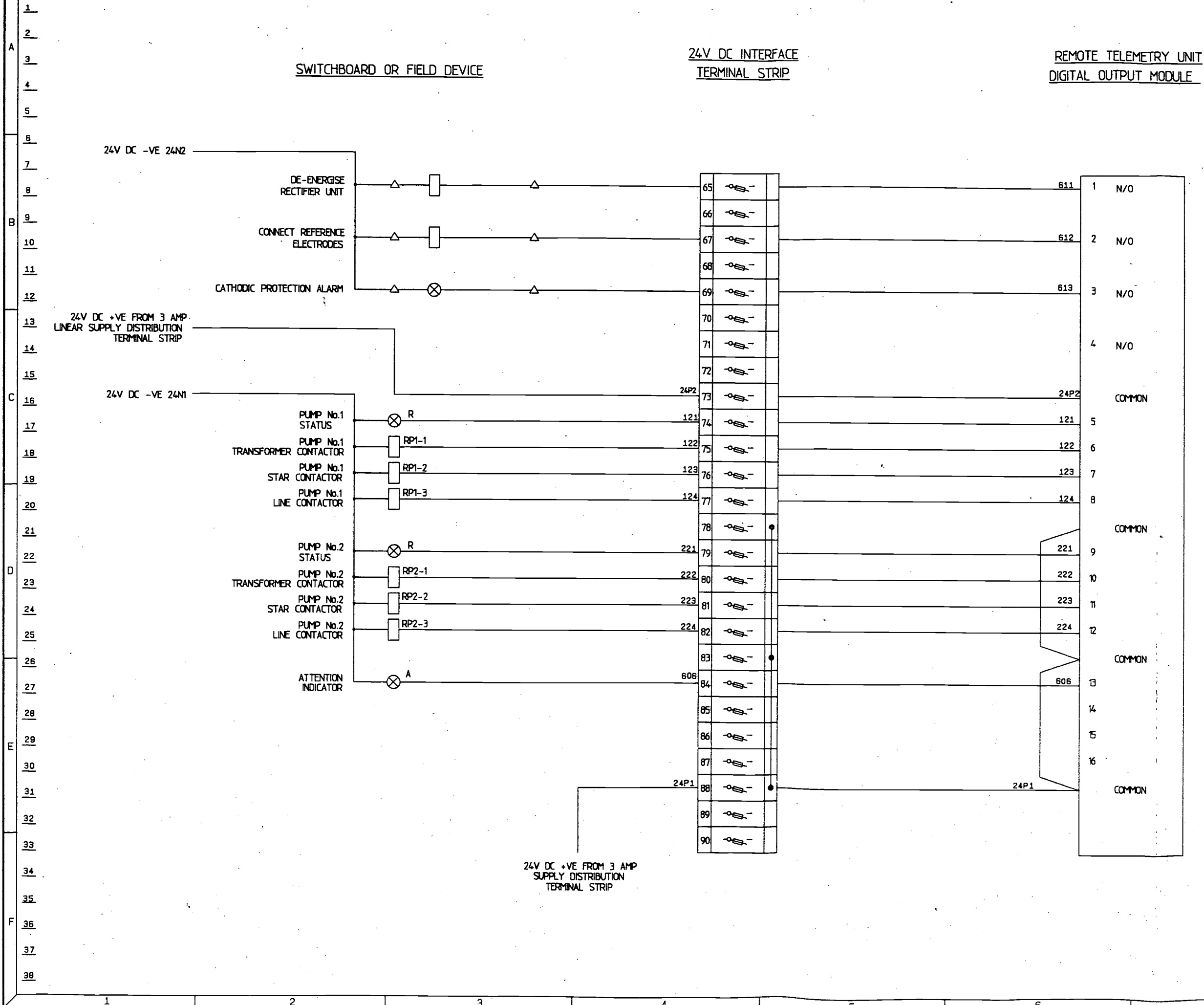
PROJECT:
SP119 MACQUARIE STREET
SEWAGE SUBMERSIBLE
PUMP STATION

TITLE:
SWITCHBOARD
TERMINATION DIAGRAM
DIGITAL INPUTS

SCALE: N.T.S. No. 2 OF 2 SHEETS

DRAWING No. 486/7/7-MI1T069E AMEND. C





NOTES

No	DATE	AMENDMENT	INITIALS
C	2.97	MODIFIED FOR SUBMERSIBLE PUMP STN.	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.

AMENDMENT & ISSUE REGISTER

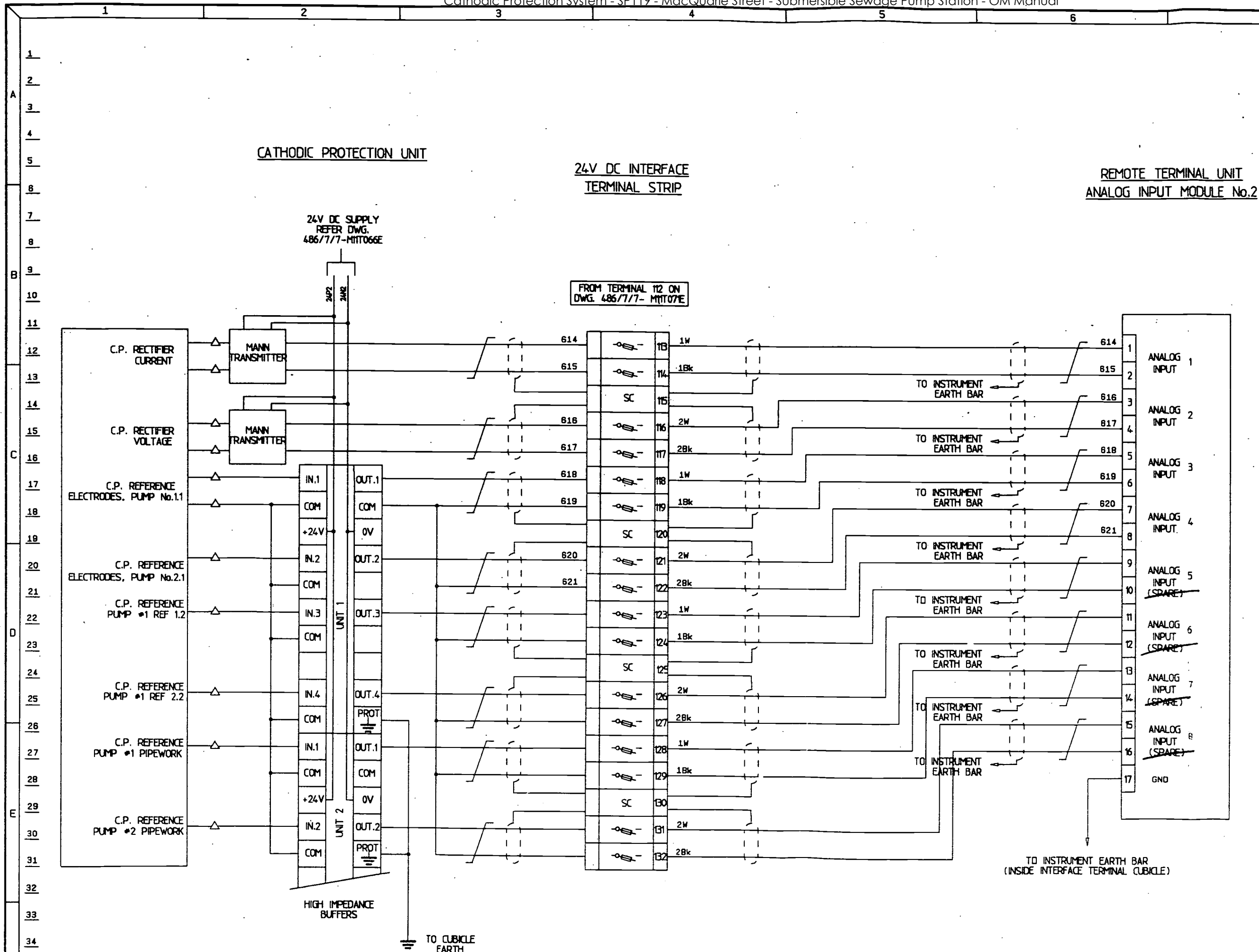
MANAGER		DIRECTOR OF TECHNOLOGY SERVICES	
DATE:		DATE:	
DIRECTOR OF PLANNING & DESIGN		DIRECTOR OF WATER SUPPLY	
DATE:		DATE:	
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER
TRACED			
CHECKED		A2	REDUCED
REFERENCES		COPYRIGHT ©	
CADD FILE No. 77T070C		No reproduction is permitted in whole or in part without the express consent of	
THIS DRAWING WAS PRODUCED USING QIKDRAW 6.1		BRISBANE CITY COUNCIL BRISBANE WATER	



PROJECT:
**SP119 MACQUARIE STREET
SEWAGE SUBMERSIBLE
PUMP STATION**

TITLE:
**SWITCHBOARD
TERMINATION DIAGRAM
DIGITAL OUTPUTS**

SCALE: N.T.S.	No. 1 OF 1 SHEETS
DRAWING No. 486/7/7-MI1T070E	AMEND. C



NOTES

No	DATE	AMENDMENT	INITIALS
C 2.97		MODIFIED FOR SUBMERSIBLE PUMP STN.	O.L.P.
B 12.93		ISSUED FOR CONSTRUCTION	O.L.P.
A 11.93		ISSUED FOR QUOTATION	O.L.P.

AMENDMENT & ISSUE REGISTER

MANAGER		DIRECTOR OF TECHNOLOGY SERVICES	
DATE:		DATE:	
DIRECTOR OF PLANNING & DESIGN	DIRECTOR OF WATER SUPPLY	DIRECTOR OF CONSTRUCTION	
DATE:	DATE:	DATE:	

DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER

TRACED			
CHECKED		A2	REDUCED

REFERENCES	COPYRIGHT ©
CADD FILE No. 77T072C	No reproduction is permitted in whole or in part without the express consent of
THIS DRAWING WAS PRODUCED USING QIKDRAW 6.1	BRISBANE CITY COUNCIL BRISBANE WATER



PROJECT:	SP119 MACQUARIE STREET SEWAGE SUBMERSIBLE PUMP STATION
----------	--

TITLE:	SWITCHBOARD TERMINATION DIAGRAM ANALOG INPUTS
--------	---

SCALE:	N.T.S.	No. 2 OF 2 SHEETS
--------	--------	-------------------

DRAWING No.	486/7/7-MI1T072E	AMEND.	C
-------------	------------------	--------	---