

STANLEY RD ELECTRICAL 1 OF 2

SP 5



**BRISBANE CITY COUNCIL**  
**DEPARTMENT OF WATER SUPPLY & SEWERAGE**  
**TECHNOLOGY SERVICES BRANCH**  
**EAGLE FARM PUMPING STATION**

**MEMORANDUM**

**TO:** EAGLE FARM OPERATORS  
**FROM:** FIELD ENGINEERING  
**DATE:** 17TH JANUARY, 1996  
**SUBJECT:** STANLEY ROAD, SEWERAGE PUMP STATION

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Please be aware of a temporary software change at Stanley Rd.

If the line contactor fails to come in the R.T.U. will not fail the pump.

An alarm will still be raised at Eagle Farm through and will need to be reported immediately.

Regards,



P. TRANTER

c:\wpwin\docs\tranter\stanley.mem

QuickCable  
VER:1.01  
QC11568

BRISBANE CITY COUNCIL  
WATER SUPPLY & SEWAGE  
TECHNICAL SERVICES

CABLE INPUT DATA

MAX DEMAND : 80 Amps  
POWER FACTOR : 0.85  
CABLE LENGTH : 3 m  
OPERATING FACTOR : 1  
MAX VOLT DROP : 2.5 %  
AMBIENT : 25 deg.C  
SHORT CCT TIME : 0.01 s  
MAX FAULT LEVEL : 9 KA

CABLE SIZE

CABLE SIZE : 1x25 Sqmm

CABLE TYPE

CABLE CODE : 5  
CIRC. 3/4-CORE 0.6/1 kV INSULATED AND SHEATHED  
( INCLUDING NEUTRAL SCREENED ) CABLES WITH OR  
WITHOUT EARTH COND. ARMoured AND NON-ARMoured  
CABLE CONFIGURATION : 12  
UNDERGROUND DUCT

CABLE INSULATION : V75  
CONDUCTOR MATERIAL : Cu

CABLE CAPACITY

CURRENT CAP : 105.0 Amps  
VOLTAGE DROP : 0.3 = 0.07 %  
FAULT CAP : 27.8 KA  
MAX LENGTH : 108.2 m

SPARE CAPACITY

SPARE CURRENT CAP : 25.0 = 31.25 %  
SPARE VOLTAGE DROP : 2.4 % AVAILABLE  
SPARE FAULT CAP : 18.8 KA  
SPARE CABLE LENGTH : 105.2 m REMAINING

Facsimile transmission from  
**BRISBANE CITY COUNCIL**

Department of Water Supply and Sewerage  
 Mechanical and Electrical Services Branch  
 I.T. Section



**Brisbane City Council**  
 69 Ann Street  
 Brisbane  
 Queensland  
 G.P.O. Box 1434  
 Brisbane  
 Australia 4001  
 Facsimile 225 6318  
 Telephone 225 6323

To <b>Technical Services</b>		Attention <b>Peter Tranter</b>		Fax.No. <b>(07) 268 0847</b>	
Date <b>14 November 1995</b>	No. of Pages <b>1</b>	From <b>Gerard Anderson</b>		Fax.No. <b>(07) 340 30205</b>	
RE: <b>Stanley Rd Alarms over past weeks</b>					

The following Stanley Rd alarms were taken from the Eagle Farm PC:

14/8/95

06:51:04.4 [EAGLEFRM] R28P2FAIL CFN YES Stanley Pump No.2 Fail  
 06:51:12.0 [EAGLEFRM] R28P2FAIL ALARM is acknowledged by EAGLEFRM  
 07:06:55.1 [EAGLEFRM] R28P2FAIL OK NO Stanley Pump No.2 Fail

18/8/95

11:15:32.7 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 11:15:40.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 11:22:12.7 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local

22/8/95

12:52:52.7 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 12:53:01.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 12:54:42.7 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local

23/10/95

22:15:12.1 [EAGLEFRM] R28P2FAIL CFN YES Stanley Pump No.2 Fail  
 22:15:53.0 [EAGLEFRM] R28P2FAIL ALARM is acknowledged by EAGLEFRM  
 22:18:31.9 [EAGLEFRM] R28P2FAIL OK NO Stanley Pump No.2 Fail

25/10/95

05:52:16.2 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 05:53:06.3 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local  
 06:00:16.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM

31/10/95

13:35:51.4 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 13:35:59.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 13:37:31.4 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local

4/11/95

19:39:11.4 [EAGLEFRM] R28P2FAIL CFN YES Stanley Pump No.2 Fail  
 19:39:11.5 [EAGLEFRM] R28P2LCCF CFN YES Stanley Rd Pump No.2 LC Close Flt  
 19:40:33.0 [EAGLEFRM] R28P2LCCF ALARM is acknowledged by EAGLEFRM  
 19:40:33.0 [EAGLEFRM] R28P2FAIL ALARM is acknowledged by EAGLEFRM  
 20:15:01.4 [EAGLEFRM] R28P2FAIL OK NO Stanley Pump No.2 Fail  
 20:15:01.8 [EAGLEFRM] R28P2LCCF OK NO Stanley Rd Pump No.2 LC Close Flt  
 20:15:51.4 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 20:15:59.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 20:17:31.4 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local

13/11/95

07:39:11.6 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 07:39:17.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 08:05:51.4 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local  
 08:15:01.4 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 08:15:10.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 08:33:51.6 [EAGLEFRM] R28P1RVFTO CFN YES Stanley Pump 1 Reflux Fail To Open  
 08:34:07.0 [EAGLEFRM] R28P1RVFTO ALARM is acknowledged by EAGLEFRM  
 08:39:21.4 [EAGLEFRM] R28P1RVFTO OK NO Stanley Pump 1 Reflux Fail To Open  
 11:45:01.6 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local

14/11/95

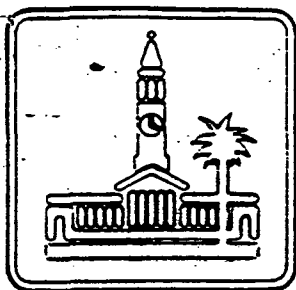
05:45:51.4 [EAGLEFRM] R28P2FAIL CFN YES Stanley Pump No.2 Fail  
 05:45:51.5 [EAGLEFRM] R28P2LCCF CFN YES Stanley Rd Pump No.2 LC Close Flt  
 05:45:48.0 [EAGLEFRM] R28P2LCCF ALARM is acknowledged by EAGLEFRM  
 05:45:48.0 [EAGLEFRM] R28P2FAIL ALARM is acknowledged by EAGLEFRM  
 06:24:11.4 [EAGLEFRM] R28P2FAIL OK NO Stanley Pump No.2 Fail  
 06:24:11.4 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 06:24:11.5 [EAGLEFRM] R28P2LCCF OK NO Stanley Rd Pump No.2 LC Close Flt  
 06:25:01.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 06:25:01.4 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local  
 15:44:51.2 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 15:45:00.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 15:46:31.3 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local  
 15:47:21.4 [EAGLEFRM] R28LOCAL CFN LOCAL Stanley Station In Local  
 15:47:27.0 [EAGLEFRM] R28LOCAL ALARM is acknowledged by EAGLEFRM  
 15:49:01.5 [EAGLEFRM] R28LOCAL OK REMOTE Stanley Station In Local  
 15:53:28.3 [EAGLEFRM] R28SURCH CFN YES Stanley Station Surcharge  
 15:53:40.0 [EAGLEFRM] R28SURCH ALARM is acknowledged by EAGLEFRM  
 15:54:28.2 [EAGLEFRM] R28SURCH OK NO Stanley Station Surcharge  
 15:56:31.3 [EAGLEFRM] R28WWLI CFN YES Stanley Wer Well Invalid  
 15:56:37.0 [EAGLEFRM] R28WWLI ALARM is acknowledged by EAGLEFRM  
 15:57:08.3 [EAGLEFRM] R28SURCH CFN YES Stanley Station Surcharge  
 15:57:16.0 [EAGLEFRM] R28SURCH ALARM is acknowledged by EAGLEFRM

15:57:33.2	[EAGLEFRM]	R28SURCH	OK	NO	Stanley Station Surcharge
16:03:11.2	[EAGLEFRM]	R28LOCAL	CFN	LOCAL	Stanley Station In Local
16:08:59.0	[EAGLEFRM]	R28LOCAL	ALARM is acknowledged by EAGLEFRM		
16:19:01.2	[EAGLEFRM]	R28LOCAL	OK	REMOTE	Stanley Station In Local
16:20:41.2	[EAGLEFRM]	R28WWLI	OK	NO	Stanley Wet Well Invalid
16:21:31.2	[EAGLEFRM]	R28LOCAL	CFN	LOCAL	Stanley Station In Local
16:21:38.0	[EAGLEFRM]	R28LOCAL	ALARM is acknowledged by EAGLEFRM		
16:22:21.3	[EAGLEFRM]	R28LOCAL	OK	REMOTE	Stanley Station In Local
16:28:11.3	[EAGLEFRM]	R28LOCAL	CFN	LOCAL	Stanley Station In Local
16:29:21.0	[EAGLEFRM]	R28LOCAL	ALARM is acknowledged by EAGLEFRM		
16:29:51.3	[EAGLEFRM]	R28LOCAL	OK	REMOTE	Stanley Station In Local
16:29:51.3	[EAGLEFRM]	R28WWLI	CFN	YES	Stanley Wet Well Invalid
16:29:58.0	[EAGLEFRM]	R28WWLI	ALARM is acknowledged by EAGLEFRM		
16:36:31.6	[EAGLEFRM]	R28WWLI	OK	NO	Stanley Wet Well Invalid
16:46:31.2	[EAGLEFRM]	R28LOCAL	CFN	LOCAL	Stanley Station In Local
16:46:46.0	[EAGLEFRM]	R28LOCAL	ALARM is acknowledged by EAGLEFRM		
16:47:21.2	[EAGLEFRM]	R28P1FAIL	CFN	YES	Stanley Pump No.1 Fail
16:47:21.3	[EAGLEFRM]	R28P1TCOF	CFN	YES	Stanley Rd Pump No.1 TC Open Flt
16:47:26.0	[EAGLEFRM]	R28P1TCOF	ALARM is acknowledged by EAGLEFRM		
16:47:26.0	[EAGLEFRM]	R28P1FAIL	ALARM is acknowledged by EAGLEFRM		
16:48:11.3	[EAGLEFRM]	R28P1TCCF	CFN	YES	Stanley Rd Pump No.1 TC Close Fault
16:48:11.3	[EAGLEFRM]	R28P1TCOF	OK	NO	Stanley Rd Pump No.1 TC Open Flt
16:48:18.0	[EAGLEFRM]	R28P1TCCF	ALARM is acknowledged by EAGLEFRM		

hook  
control  
not off  
100 = PSN  
inspected  
dis at close  
whistled

Regards

Gerard Anderson  
340 30212



Brisbane City

# BRISBANE CITY COUNCIL

EAGLE FARM PUMPING STATION  
CNR KINGSFORD SMITH DRIVE & VIOLET STREET  
EAGLE FARM QLD.

G.P.O. BOX 1434  
BRISBANE QLD. 4001

TELEX CIVICS AA41910  
FACSIMILE 2680847

To <i>GIBSON ISLAND</i>	Attention <i>DANIEL BROWN</i>	Fax.No.
Date <i>12-7-95</i>	No. of Pages <i>3</i>	From <i>PETER TRANTER</i>
Phone No. <i>2680848</i>		
RE: <i>STANLEY Rd. ATTACHED SRS EXTRACT</i>		

Apparently the alarm being received is

"PUMP FAILED"

ie 1 or more of the contactors have failed to respond to the o/p of the R.T.V. for greater than 3 sec.

I agree the Terminology is not the best & did raise this long ago

Please check the relays & contactors for operation & contact closure.

It does sound very suspiciously like the contactor you described as having burnt contacts is chattering.

∴ possibly its corresponding relay is bouncing

I will check with you later

Regards  
Peter

C10 = PnRFTO↑

(Rising Edge of Pump No.n Reflux Valve Fail to Open)

C11 = PnRFTC

(Pump No.n Reflux Valve Fault Count Exceeded)

C12 = PnRFC

(Pump No.n Reflux Valve Fail to Open Fault Counter)

## 1.5 PUMP FAILURE \*

### 1.5.1 Functional Description

During a pump start-up sequence if a contactor is requested to open or close and fails to do so within a time determined by the contactor timer (all initially set to 3 seconds), a pump failure will occur which shall cause the flag PnFAIL to latch on and the pump to become unavailable for RTU control.

The PnFAIL flag shall remain latched ON until the pumps LOCAL RESET pushbutton on the switchboard has been pressed or reset from EFPS computer. The pump shall then become available for RTU control.

### 1.5.2 Control Algorithm

The pump failure internal flag (PnFAIL) will be set and reset according to the following control algorithm:-

S0: Pump Not Failed

(PnFAIL reset)

S1: Pump Failed

(PnFAIL set)

case PS of

S0: if C2 or C3 or C4 or C5 or C6 or C7 then PS:= S1;

S1: if C1 or C8 then PS:= S0;

end;

The conditions for the above Algorithms are defined below.

C1 = PnLOCR

(Pump No.n Local Reset Pushbutton Pressed)

C2 = (PnTCC and  $\overline{\text{PnSTRT}}$  and PnTCCl expired)

(Pump No.n Transformer Contactor Fail to Close Timer Expired)

C3 = (PnTCC and PnSTRT and PnTCOp expired)

(Pump No.n Transformer Contactor Fail to Open Timer Expired)

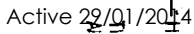
C4 = (PnSCC and  $\overline{\text{PnSC}}$  and PnSCCl expired)

(Pump No.n Star Contactor Fail to Close Timer Expired)

C5 = (PnSCC and PnSC and PnSCOp expired)

(Pump No.n Star Contactor Fail to Open Timer Expired)





## **GUIDELINES FOR LEVEL MEASUREMENTS**

Guidelines for measurement and documentation on the interim telemetry installation.

1. The level probe is to be suspended so that the bottom of the probe is between the obvert of the intake and the B.W.L. (bottom water level).

The total length from the suspension point is to be in a multiple of 100mm.

2. Two (2) starts and two (2) stops, will be provided, each start and each stop will be placed at 100mm apart for 2 pump simultaneous operation stations.

One (1) start and one (1) stop, will be provided, for 1 pump at a time operation stations.

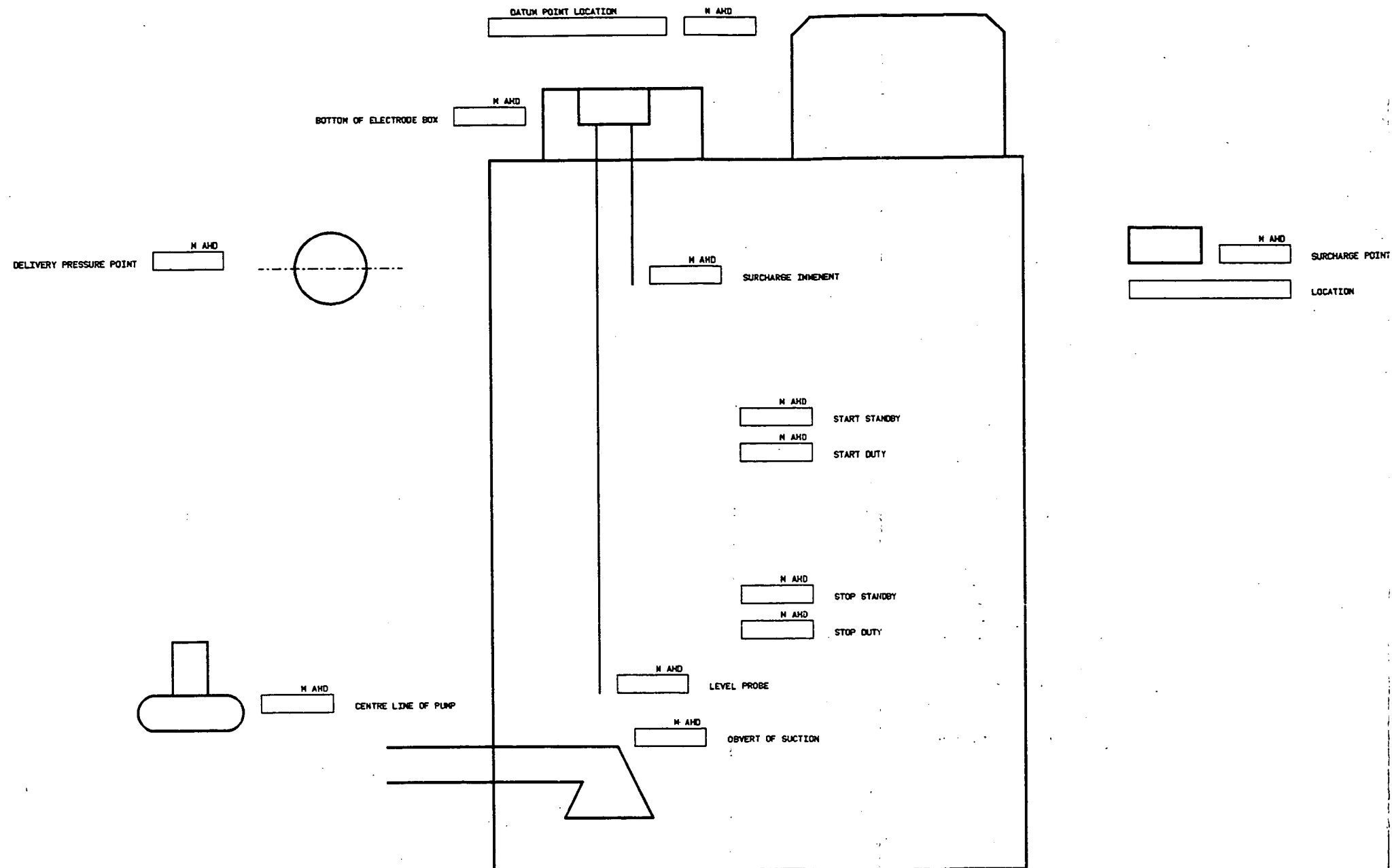
3. Surge imminent is to equate to surge level minus 300mm, and adjusted so that the suspended surge probe length is in a multiple of 10mm.

4. The panel indicator, will indicate % level of the wet well level probe span, and indicate surge imminent via the red line indicator. A label will be placed and marked "Red line indicates surge imminent."

5. The multitrode probe is to be suspended to activate when the wet well reaches surge imminent.

6. A survey is to be carried out at each station to determine the A.H.D. in metres of a permanent bench mark placed in stainless steel.

7. Inferred levels from the bench mark level will be ascertained and included in a similar table as that attached.



## NOTES

A	3/94	ORIGINAL			PWT
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR			INITIALS

## AMENDMENT &amp; ISSUE REGISTER

MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE:		DATE:	
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	
DATE:		DATE:	
DESIGN		ENGINEER IN CHARGE	
DRAWN	PWT	9/3/94	
TRACED		SUPERVISING ENGINEER	
CHECKED		LEVEL BOOK	
		FIELD BOOK	

A.H.DATUM	SURVEYED
CADD FILE No.	REFERENCES
77E035A	

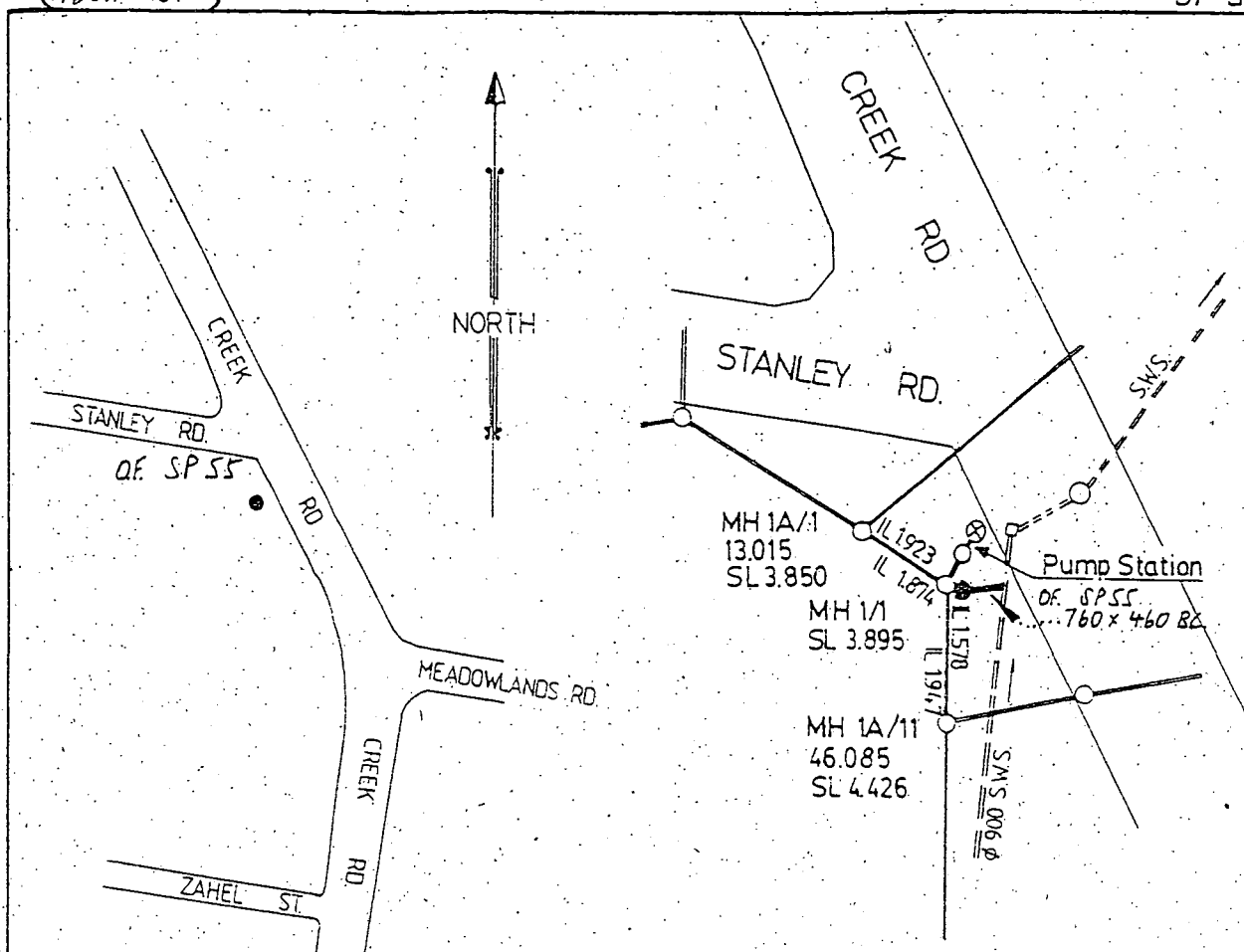


**BRISBANE CITY COUNCIL**  
DEPARTMENT OF WATER  
SUPPLY & SEWERAGE

Brisbane City MECHANICAL & ELECTRICAL SERVICES

PROJECT:	SEWAGE PUMPING STATIONS
TITLE:	STANDARD SURVEY LEVEL SHEET.

SCALE:	NTS	No. 1 OF 1 SHEETS
DRAWING No.	486/7/7-AA1EE035E	AMEND. A



**NOTES**

REPLACES OF 705P

DTP 2534

WORK AS CONSTRUCTED

**Overflow Details:-**

- (a) Distance between FVC and Manhole =
- (b) Flap Valve Type 3
- (c) Invert Level of Overflow at Manhole = 2.630
- (d) Control Invert Level of Overflow at FVC in = 2.705
- (e) Invert Level of Overflow at FVC out = 2.445
- (f) Surface Level at FVC approximately 3.865
- (g) Invert Level of Overflow Pipe at discharge = 2.165
- (h) Approx. Distance from FVC to discharge = 4.000

Butted  
 4/11/92

For further details of Overflow refer to Dwg No 3018/400

WARD	CARINA
CATCHMENT	
MACRO	3001
MICRO	
RECEIVING WATERS	BULIMBA CREEK

SUPERVISING ENGINEER  
SEWER MAINTENANCE

BCC DEPT. OF W.S. & S	DESIGN			LEVEL BOOK		REF.	SCALE N.T.S.
OVERFLOW No. SP55 OF for STANLEY RD. P.S. STANLEY RD. CARINA	DRAWN	28 OCT. 1992	HART	FIELD BOOK		ORG. DTP	DRAWING No.
	TRACED			SURVEYOR		2534	486/5/15- SP55
	CHECKED			PASSED		N 20	No. 1 OF 1 SHEETS

**Stanley Rd. Submersible P/Stn Switchboard****Transducer Tests**

Location: Site

Date: 13th April 1994

Tested by: P Kay

**Equipment Used:**

- Multiamp 0-140 amp AC test set.
- Fluke 87 multimeter (AC)
- Finest 3487A multimeter (4-20mA)

**Transducer types:**

Pump no. 1 &amp; 2 KWH transducer: Crompton Paladin AC amps/DC mA

Type 256 - TWLW Ser No 6935205 0 - 50 Kwatt

Pump no. 1 &amp; 2 current transducer: Crompton Paladin AC amps/DC mA

Type 253 - TALW Ser No 6133104 0 - 5 Amp

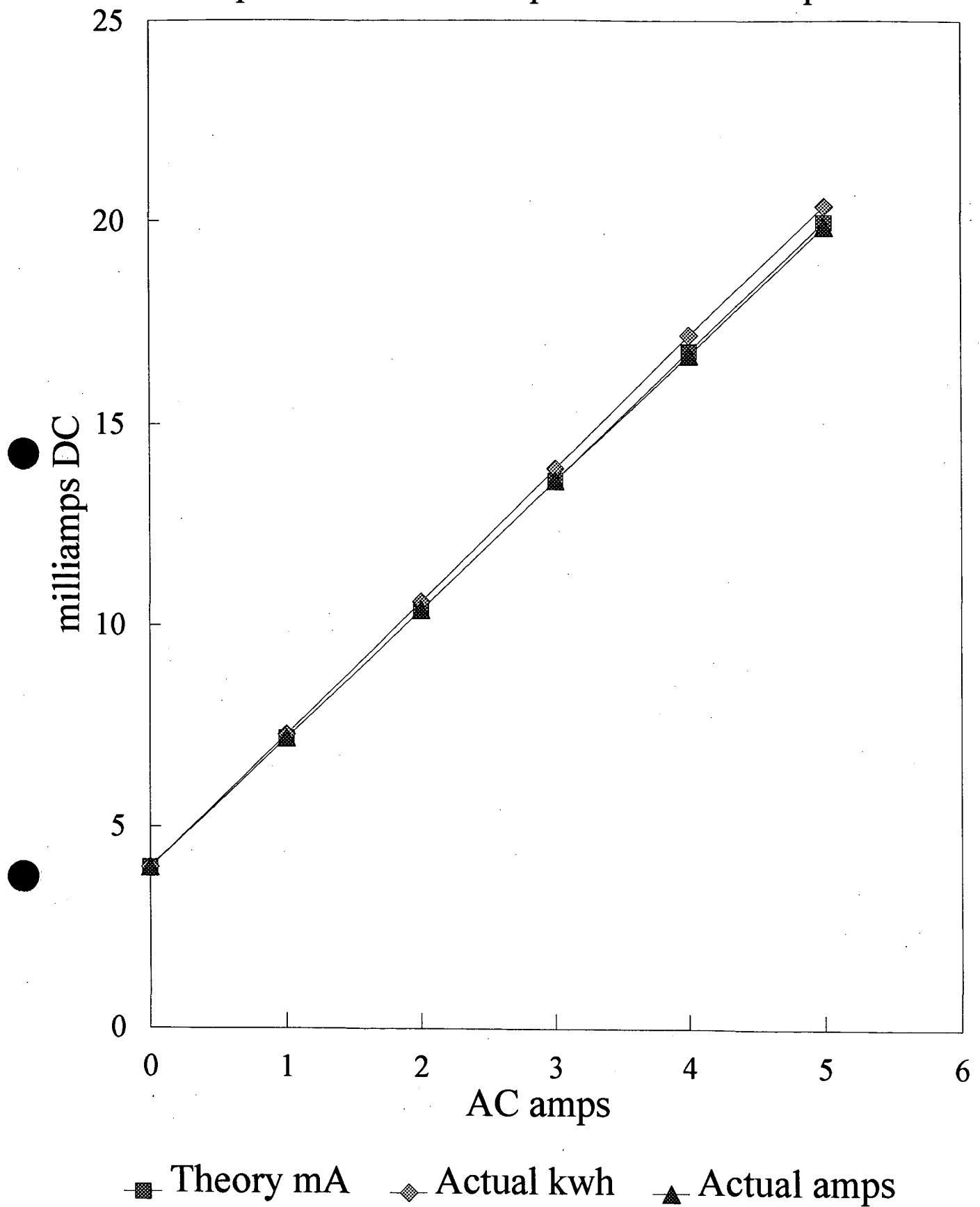
**Pump No. 1 KW transducer.**

Input		Output	
AC amps		DC milliamps	
Theory	Actual	Theory	Actual
0	0	4	4
1	1	7.2	7.3
2	2	10.4	10.6
3	3	13.6	13.9
4	4	16.8	17.2
5	5	20	20.4

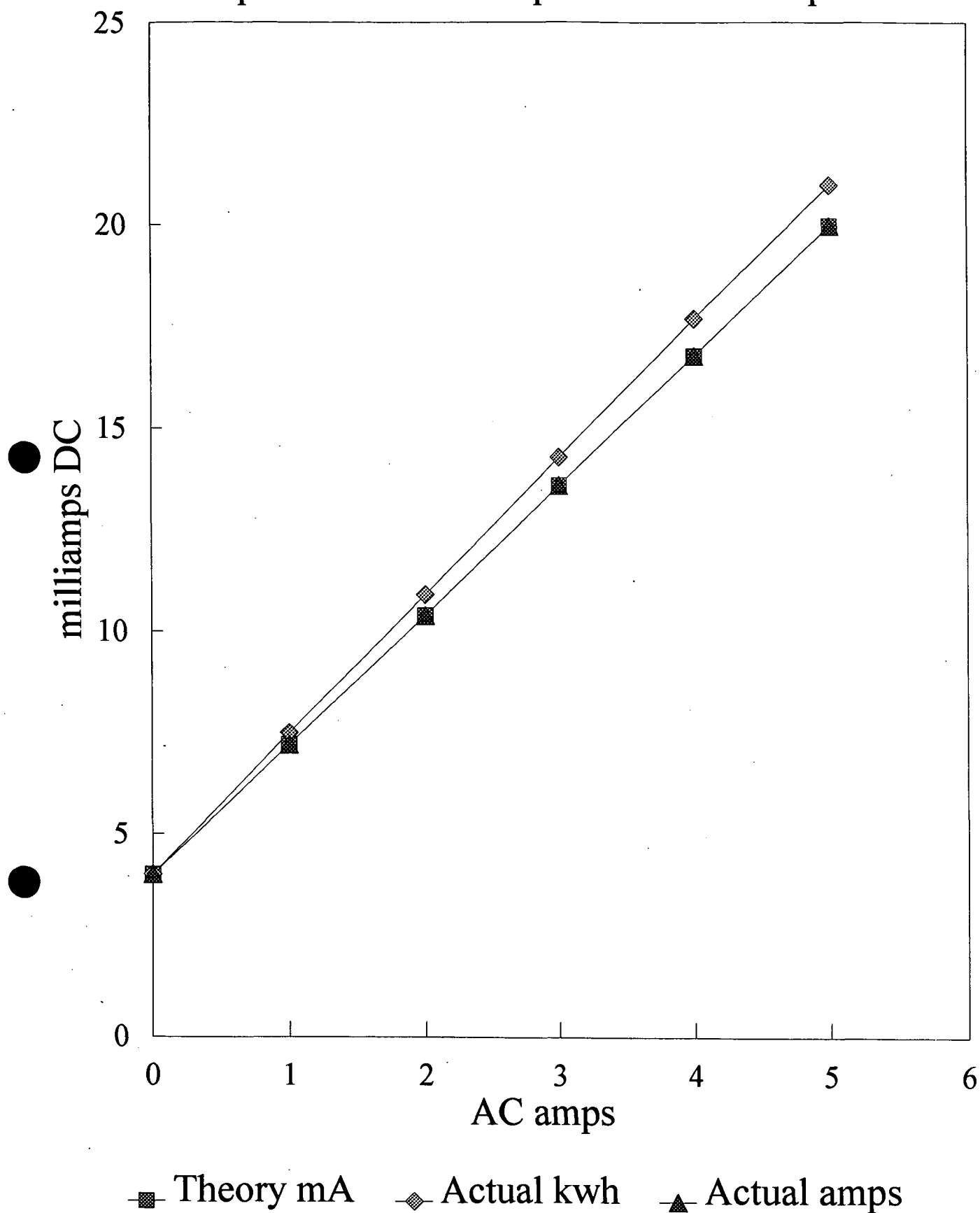
**Pump No. 1 current transducer.**

Input		Output		Ammeter (SW/BD)	
AC amps		DC milliamps		AC amps	
Theory	Actual	Theory	Actual	Theory	Actual
0	0.0	4.0	4	0	0
1	1.0	7.2	7.2	15	13
2	2.0	10.4	10.4	30	29
3	3.0	13.6	13.6	45	45
4	4.0	16.8	16.7	60	60
5	5.0	20.0	19.9	75	74

Stanley Rd.sw/bd pump no. 1 transducer calibration.  
Graph of transducer input current vs output mA.



Stanley Rd sw/bd pump no. 2 transducer calibration.  
Graph of transducer input current vs output mA.



**Pump No. 2 KW transducer.**

Input		Output	
AC amps		DC milliamps	
Theory	Actual	Theory	Actual
0	0.00	4.0	4
1	1.00	7.2	7.5
2	2.00	10.4	10.9
3	3.00	13.6	14.3
4	4.00	16.8	17.7
5	5.00	20.0	21

**Pump No. 2 current transducer.**

Input		Output		Ammeter (SW/BD)	
AC amps		DC milliamps		AC amps	
Theory	Actual	Theory	Actual	Theory	Actual
0	0.0	4.0	4	0	0
1	1.0	7.2	7.2	15	14
2	2.0	10.4	10.4	30	31
3	3.0	13.6	13.6	45	46
4	4.0	16.8	16.8	60	61
5	5.0	20.0	20	75	75



**LOCATION:** Stanley Rd, Carina

**TYPE:** Sewage Conventional Pump Station

**SP NO:** 55

### DATA SHEET

#### STATION INSTRUMENTATION

##### 1. VEGA LEVEL PROBE

ACTION	AHD (m)	% RANGE	mA	LEVEL TRANSDUCER RANGE (m static head)
Range	3.339	100.00	20.00	4.000
Actual Surge	2.594	81.375	17.02	3.255
Surge Imminent (Red Line On Site Gauge)	2.289	73.75	15.8	2.95
(Standby) Pump Start TWL	.700	34.025	9.44	1.361
(Duty) Pump Start				
(Standby) Pump Stop				
(Duty) Pump Stop	-.500	4.025	4.644	.161
Zero	-.661	0.00	4	000

The site level gauge on the switchboard measures 0 - 100%  
 Probe length from electrode box = 4.600 metres

##### 2. PLATYPUS II PRESSURE PROBE

Discharge common manifold centre line = 1.574 metres AHD.

Calibrated to measure

40 m delivery head = 20mA  
 0 m delivery head = 4mA

##### 3. MULTITRODE SURCHARGE RELAY (MTR2)

The 1 point multitrode probe installed such that the electrode in the probe registers surcharge alarm imminent at 2.289m AHD. Probe length from bottom of electrode box = 1.650M

<b>STANLEY ROAD SEWAGE CONVENTIONAL PUMPING STATION SP55</b>			
<b>Description</b>	<b>Distance metres</b>	<b>Metres A.H.D.</b>	<b>Comments</b>
Site <b>BENCHMARK</b>	-	4.194	On concrete retainer, top of wet well
Floor of <b>ELECTRODE BOX</b>		3.939	
Distance from floor of electrode box to <b>SURCHARGE</b>	1.345	2.594	
Distance from floor of electrode box to <b>SURCHARGE IMMINENT</b>	1.650	2.289	Round distance to nearest 10mm.
Distance from floor of electrode box to <b>DELIVERY PRESSURE PROBE</b>	2.365	1.574	In common delivery manifold.
Distance from floor of electrode box to (standby) <b>START</b>	3.239	0.700	= T.W.L.
Distance from floor of electrode box to (duty) <b>START</b>			= T.W.L. - 100mm
Distance from floor of electrode to (standby) <b>STOP</b>			= B.W.L. + 100mm
Distance from floor of electrode box to (duty) <b>STOP</b>	4.439	-0.500	= B.W.L.
Distance from floor of electrode box to <b>CENTRE LINE OF PUMP</b>	4.670	0.731	
Distance from floor of electrode box to <b>LEVEL PROBE</b>	4.600	-.661	Round distance to nearest 100mm
Distance from floor of electrode box to <b>SUCTION OBVERT</b>	4.939	-1.000	

P.T. Rev 3-3-94

## **GUIDELINES FOR LEVEL MEASUREMENTS**

Guidelines for measurement and documentation on the interim telemetry installation.

1. The level probe is to be suspended so that the bottom of the probe is between the obvert of the intake and the B.W.L. (bottom water level).

The total length from the suspension point is to be in a multiple of 100mm.

2. Two (2) starts and two (2) stops, will be provided, each start and each stop will be placed at 100mm apart for 2 pump simultaneous operation stations.

One (1) start and one (1) stop, will be provided, for 1 pump at a time operation stations.

3. Surge imminent is to equate to surcharge level minus 300mm, and adjusted so that the suspended surcharge probe length is in a multiple of 10mm.

4. The panel indicator, will indicate % level of the wet well level probe span, and indicate surcharge imminent via the red line indicator. A label will be placed and marked "Red line indicates surcharge imminent."

5. The span of the level probe shall be (as far as possible) whole metre values but not necessarily the full range of the probe.

e.g. Distance from "Level Probe Zero" to Surge Point may be 5.253 metres.  
A 1 BAR (10 metre probe) could be ranged to 0 - 6 metres to give 4 - 20 mA via the evaluation unit.

6. The multitrode probe is to be suspended to activate when the wet well reaches surge imminent.

7. A survey is to be carried out at each station to determine the A.H.D. in metres of a permanent bench mark placed in stainless steel.

8. Inferred levels from the bench mark level will be ascertained and included in a similar table as that attached.



Brisbane City

## BRISBANE CITY COUNCIL

Department of Water Supply and Sewerage  
Mechanical and Electrical Services Branch  
I.T. Section

# CONVENTIONAL UNDERGROUND SEWAGE PUMP STATION Functional Specification Motorola RTU

Author: John Titmarsh  
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## 1 INTRODUCTION

This document outlines the functional requirements for the control, monitoring, and telemetry of a conventional underground sewage pump station.

Where the term OPERATOR is used, this shall mean the Eagle Farm Pump Station (EFPS) Control Room Operator.

In all Control Algorithms, PS denotes the present state that the Flag, Counter etc is in. S0, S1 etc. are the states that the Flag, Counter etc can be in. The conditions that cause state transitions are denoted as C1...Cn.

## 2 I/O Listing

The following I/O is associated with a conventional underground sewage pump station Motorola RTU.

### Digital Input Card No.1 - Slot 1

ADDRESS	MNEMONIC	DESCRIPTION	LED OFF	LED ON
DI 1	P1PWR	Pump No.1 Power On	Off	On
DI 2	P1TOL	Pump No.1 Thermal Overload	No Fault	Fault
DI 3	P1PB	Pump No.1 Start Pushbutton	Not Pressed	Pressed
DI 4	P1EMS	Pump No.1 Emergency Stop Pushbutton	Pressed	Not Pressed
DI 5	P1THR	Pump No.1 Thermistor	No Fault	Fault
DI 6	P1ATO	Pump No.1 Autotransformer Thermo Switch	Fault	No Fault
DI 7	P1LOCR	Pump No.1 Local Reset Pushbutton	Not Pressed	Pressed
DI 8	P1STRT	Pump No.1 Transformer Contactor	Not Energised	Energised
DI 9	P1SC	Pump No.1 Star Contactor	Not Energised	Energised
DI 10	P1RUN	Pump No.1 Line Contactor	Not Running	Running
DI 11	P1RMS	Pump No.1 Reflux Valve	Open	Closed
DI 12	P2PWR	Pump No.2 Power On	Off	On
DI 13	P2TOL	Pump No.2 Thermal Overload	No Fault	Fault
DI 14	P2PB	Pump No.2 Start Pushbutton	Not Pressed	Pressed
DI 15	P2EMS	Pump No.2 Emergency Stop Pushbutton	Pressed	Not Pressed
DI 16	P2THR	Pump No.2 Thermistor	No Fault	Fault

### Digital Input Card No.2 - Slot 2

ADDRESS	MNEMONIC	DESCRIPTION	LED OFF	LED ON
DI 1	P2ATO	Pump No.2 Autotransformer Thermo Switch	Fault	No Fault
DI 2	P2LOCR	Pump No.2 Local Reset Pushbutton	Not Pressed	Pressed
DI 3	P2STRT	Pump No.2 Transformer Contactor	Not Energised	Energised
DI 4	P2SC	Pump No.2 Star Contactor	Not Energised	Energised
DI 5	P2RUN	Pump No.2 Line Contactor	Not Running	Running
DI 6	P2RMS	Pump No.2 Reflux Valve	Open	Closed
DI 7	STPWR	Site Power On	Off	On
DI 8	SURCH	Surcharge Imminent Alarm	Not Imminent	Imminent
DI 9	PWSP	Pump Well Sump Pump Operated	Not Running	Running
DI 10	PWF	Pump Well Flooded	Not Flooded	Flooded
DI 11	LOCREM	Local/Remote	Local	Remote
DI 12	ATTRS	Site Attention Alarm Reset Pushbutton	Not Pressed	Pressed
DI 13	Spare			
DI 14	Spare			
DI 15	Spare			
DI 16	Spare			





Digital Output Card No.1 - Slot 3

ADDRESS	MNEMONIC	DESCRIPTION	LED OFF	LED ON
DO 1	DERECT	CP De-energise Rectifier Unit	Not Enabled	Enabled
DO 2	CONELC	CP Connect Reference Electrodes	Not Enabled	Enabled
DO 3	Spare			
DO 4	Spare			
DO 5	P1LOCI	Pump No.1 Status Indication Lamp	Not Enabled	Enabled
DO 6	P1TCC	Pump No.1 Transformer Contactor Close	Not Enabled	Enabled
DO 7	P1SCC	Pump No.1 Star Contactor Close	Not Enabled	Enabled
DO 8	P1LCC	Pump No.1 Line Contactor Close	Not Enabled	Enabled
DO 9	P2LOCI	Pump No.2 Status Indication Lamp	Not Enabled	Enabled
DO 10	P2TCC	Pump No.2 Transformer Contactor Close	Not Enabled	Enabled
DO 11	P2SCC	Pump No.2 Star Contactor Close	Not Enabled	Enabled
DO 12	P2LCC	Pump No.2 Line Contactor Close	Not Enabled	Enabled
DO 13	ATTI	Site Attention Indicator	Not Enabled	Enabled
DO 14	Spare			
DO 15	Spare			

Analog Input Card No.1 - Slot 4 (All Inputs 4-20mA)

ADDRESS	MNEMONIC	DESCRIPTION	ENGINEERING UNITS	
AI 1	P1KW	Pump No.1 kW	4mA = 0 KW	20mA = ??? KW
AI 2	P1AMPS	Pump No.1 AMPS	4mA = 0 AMPS	20mA = ??? AMPS
AI 3	P2KW	Pump No.2 kW	4mA = 0 KW	20mA = ??? KW
AI 4	P2AMPS	Pump No.2 AMPS	4mA = 0 AMPS	20mA = ??? AMPS
* AI 5	TEMP1	Temperature at Top of S/board	4mA = 0 Deg C	20mA = 100 Deg C
* AI 6	TEMP2	Temperature at Bottom of S/board	4mA = 0 Deg C	20mA = 100 Deg C
AI 7	Spare			
AI 8	Spare			

(\* - Aberdeen Pde only)

Analog Input Card No.2 - Slot 5 (All Inputs 4-20mA)

ADDRESS	MNEMONIC	DESCRIPTION	ENGINEERING UNITS	
AI 1	WWLEV	Wet Well Level	4mA = 0 mm	20mA = ??? mm
AI 2	DELPR	Delivery Pressure	4mA = 0 METRES	20mA = ??? METERS
# AI 3	CPCUR	CP Rectifier Current	4mA = ? mA	20mA = ??? mA
# AI 4	CPVOLT	CP Rectifier Voltage	4mA = ? V	20mA = ??? V
# AI 5	CPP1RE	CP Reference Electrode Pump No.1	4mA = ? mV	20mA = ??? mV
# AI 6	CPP2RE	CP Reference Electrode Pump No.2	4mA = ? mV	20mA = ??? mV
AI 7	Spare			
AI 8	Spare			

(# - Denotes future analog inputs)



### 3 RTU Functionality

#### 3.1 Sewage Pumps Functionality

##### 3.1.1 PUMP THERMAL OVERLOAD

###### 3.1.1.1 *Functional Description*

With station power available the presence of a pump thermal overload (PnTOL active) will cause the PnTOLL flag to latch. When the pump thermal overload cools and resets (PnTOL inactive) the thermal overload delay reset timer PnTOTM will start. The thermal overload delay reset timer is used to allow a preset time to pass before unlatching PnTOLL. During this delay faults may have cleared.

PnTOLL will be unlatched if any of the following three conditions are true:

1. The pump thermal overload condition is false (PnTOL inactive) and the local reset pushbutton (PnLOCR) is pressed.

or

2. The pump thermal overload condition is false (PnTOL inactive) and a reset from the EFPS computer (PnRset) occurs.

or

3. The thermal overload delay reset timer (PnTOTM) times out. This will be indicated to Eagle Farm by the pump thermal overload auto reset flag (PnTOAR) being active.

A pump will be allowed only three thermal overloads in any eight hour period. Each rising edge of the thermal overload digital input (PnTOL) will be counted by the pump thermal overload counter PnTOC.

The eight hour time period is a time window that can occur at anytime. The eight hour timer PnTOTH will start when PnTOC increments from 0 to 1.

If  $PnTOC = 1$  or  $2$  at the end of the eight hour period (PnTOTH time out) PnTOC will be reset to 0.

If  $PnTOC > 2$  at the end of the eight hour period (PnTOTH timed out) PnTOC will NOT be reset. When  $PnTOC > 2$  the thermal overload fault count exceeded flag PnTOFC will be active and will make the pump unavailable for operation. This pump lockout can be cleared by pressing the pump's local reset pushbutton PnLOCR or by a remote reset from the Operator PnRset. This action will reset PnTOC to 0, making PnTOFC inactive.



### 3.1.1.2 Control Algorithms

The **Pump Thermal Overload Fault Flag (PnTOLL)** will be set and reset according to the following control algorithm:-

S0: PnTOLL Inactive

S1: PnTOLL Active

case PS of

S0: if C1 and C4 then PS: = S1;

S1: if C2 or ((not C1) and C3) or ((not C1) and C6) then PS: = S0;

end;

The **Pump Thermal Overload Fault Delay Reset Timer (PnTOTM)** will operate as follows:

if ((not PnTOL) and PnTOLL) then enable PnTOTM (Start Timer)

else disable PnTOTM (Stop Timer)

The **Pump Thermal Overload Fault Auto Reset Flag (PnTOAR)** will be set and reset according to the following control algorithm.

S0: PnTOAR Inactive

(TOL fault not reset by PnTOTM)

S1: PnTOAR Active

(TOL fault reset by PnTOTM)

case PS of

S0: if C2 then PS = S1

S1: if C1 and C5 then PS = S0

end;

The **Pump Thermal Overload Fault Counter (PnTOC)** will function as follows:

S0: PnTOC = 0

(No TOL faults present)

S1: PnTOC > 0

(1 or more TOL faults)

S2: PnTOC = PnTOC + 1

(Count another TOL fault)

case PS of

S0: if (C4 and C10) then PS = S2

S1: if (C4 and C10) then PS = S2

else if ((not C8) and C9) or (C8 and (C3 or C6)) then PS = S0

S2: PS = S1

end;

The **Pump Thermal Overload Fault 8 Hour Window Timer (PnTOTH)** will operate as follows:

if (PnTOC > 0) then enable PnTOTH (Start Timer)

else disable PnTOTH (Stop Timer)



The **Pump Thermal Overload Fault Count Flag (PnTOFC)** will be set and reset according to the following control algorithm.

S0: PnTOFC Inactive	(Pump No.n Thermal Overload Fault Count Exceeded Flag inactive)
S1: PnTOFC Active	(Pump No.n Thermal Overload Fault Count Exceeded Flag active)

case PS of

S0: if (C7 > 2) then PS = S1	
S1: if (C7 ≤ 2) then PS = S0	

end;

The conditions for the above Algorithms are defined below.

C1 = PnTOL	(Pump No.n Thermal Overload DI active)
C2 = PnTOTM	(Pump No.n Thermal Overload Delay reset Timer Timed Out)
C3 = PnLOCR	(Pump No.n Local Reset Pushbutton pressed, DI active)
C4 = STPWR	(Site Power Available)
C5 = PnTOAR	(Pump No.n Thermal Overload Auto Reset Flag)
C6 = PnRset	(Pump No.n Operator Reset active)
C7 = PnTOC	(Pump No.n Thermal Overload Counter)
C8 = PnTOFC	(Pump No.n Thermal Overload Count is greater than two)
C9 = PnTOTH	(Pump No.n Thermal Overload 8 Hour Timer timed out)
C10 = PnTOL↑	(Rising edge of Pump No.n Thermal Overload DI)

### 3.1.2 PUMP THERMISTOR FAULT

#### 3.1.2.1 *Functional Description*

With station power available the presence of a pump thermistor fault (PnTHR active) will cause the PnTHRL flag to latch. When the pump thermistor cools and resets (PnTHR inactive) the thermistor delay reset timer PnTHTM will start. The thermistor delay reset timer is used to allow a preset time to pass before unlatching PnTHRL. During this delay the motor windings may have cooled to an acceptable level for a restart.



PnTHRL will be unlatched if any of the following three conditions are true:

1. The pump thermistor condition is false (PnTHR inactive) and the local reset pushbutton (PnLOCR) is pressed.

or

2. The pump thermistor condition is false (PnTHR inactive) and a reset from the EFPS computer (PnRset) occurs.

or

3. The thermistor delay reset timer (PnTHTM) times out. This will be indicated to Eagle Farm by the pump thermistor auto reset flag (PnTHAR) being active.

A pump will be allowed only three thermistor faults in any eight hour period. Each rising edge of the thermistor digital input (PnTHR) will be counted by the pump thermistor counter PnTHC.

The eight hour time period is a time window that can occur at anytime. The eight hour timer PnTHTH will start when PnTHC increments from 0 to 1.

If  $PnTHC = 1$  or  $2$  at the end of the eight hour period (PnTHTH time out) PnTHC will be reset to 0.

If  $PnTHC > 2$  at the end of the eight hour period (PnTHTH timed out) PnTHC will NOT be reset. When  $PnTHC > 2$  the thermistor fault count exceeded flag PnTHFC will be active and will make the pump unavailable for operation. This pump lockout can be cleared by pressing the pump's local reset pushbutton PnLOCR or by a remote reset from the Operator PnRset. This action will reset PnTHC to 0, making PnTHFC inactive.

### 3.1.2.2 Control Algorithms

The **Pump Thermistor Fault Flag (PnTHRL)** will be set and reset according to the following control algorithm:-

S0: PnTHRL Inactive

S1: PnTHRL Active

case PS of

S0: if C1 and C4 then PS:= S1;

S1: if C2 or ((not C1) and C3) or ((not C1) and C6) then PS:= S0;

end;

The **Pump Thermistor Fault Delay Reset Timer (PnTHTM)** will operate as follows:

if ((not PnTHR) and PnTHRL) then enable PnTHTM (Start Timer)  
else disable PnTHTM (Stop Timer)



The **Pump Thermistor Fault Auto Reset Flag (PnTHAR)** will be set and reset according to the following control algorithm.

S0: PnTHAR Inactive (Thermistor fault not reset by PnTHTM)  
S1: PnTHAR Active (Thermistor fault reset by PnTHTM)

case PS of

S0: if C2 then PS = S1

S1: if C1 and C5 then PS = S0

end;

The **Pump Thermistor Fault Counter (PnTHC)** will function as follows:

S0: PnTHC = 0 (No Thermistor faults present)  
S1: PnTHC > 0 (1 or more Thermistor faults)  
S2: PnTHC = PnTHC + 1 (Count another Thermistor fault)

case PS of

S0: if (C4 and C10) then PS = S2

S1: if (C4 and C10) then PS = S2

else if ((not C8) and C9) or (C8 and (C3 or C6)) then PS = S0

S2: PS = S1

end;

The **Pump Thermistor Fault 8 Hour Window Timer (PnTHTH)** will operate as follows:

if (PnTHC > 0) then enable PnTHTH (Start Timer)  
else disable PnTHTH (Stop Timer)

The **Pump Thermistor Fault Count Flag (PnTHFC)** will be set and reset according to the following control algorithm.

S0: PnTHFC Inactive (Pump No.n Thermal Overload Fault Count Exceeded Flag inactive)  
S1: PnTHFC Active (Pump No.n Thermal Overload Fault Count Exceeded Flag active)

case PS of

S0: if (C7 > 2) then PS = S1

S1: if (C7 <= 2) then PS = S0

end;

The conditions for the above Algorithms are defined below.

C1 = PnTHR (Pump No.n Thermistor DI active)

C2 = PnTHTM (Pump No.n Thermistor Delay reset Timer Timed Out)



C3 = PnLOCR	(Pump No.n Local Reset Pushbutton pressed, DI active)
C4 = STPWR	(Site Power Available)
C5 = PnTHAR	(Pump No.n Thermistor Auto Reset Flag)
C6 = PnRset	(Pump No.n Operator Reset active)
C7 = PnTHC	(Pump No.n Thermistor Counter)
C8 = PnTHFC	(Pump No.n Thermistor Count is greater than two)
C9 = PnTHTH	(Pump No.n Thermistor 8 Hour Timer timed out)
C10 = (PnTHR)↑	(Rising edge of Pump No.n Thermistor DI)

### 3.1.3 PUMP AUTOTRANSFORMER THERMO SWITCH

#### 3.1.3.1 *Functional Description*

With station power available the presence of a pump autotransformer thermal fault (PnATO active) will cause the PnATOL flag to latch. When the autotransformer resets (PnATO active) the pump autotransformer fault delay reset timer PnATTM will start. The autotransformer delay reset timer is used to allow a preset time to pass before unlatching PnATOL. During this delay the core windings may have cooled to an acceptable level for a restart.

PnATOL will be unlatched if any of the following three conditions are true:

1. The pump autotransformer fault condition is false (PnATO active) and the local reset pushbutton (PnLOCR) is pressed.

or

2. The pump autotransformer fault condition is false (PnATO active) and a reset from the EFPS computer (PnRset) occurs.

or

3. The autotransformer delay reset timer (PnATTM) times out. This will be indicated to Eagle Farm by the pump autotransformer auto reset flag (PnATAR) being active.

A pump will be allowed only three autotransformer faults in any eight hour period. Each falling edge of the autotransformer digital input (PnATO) will be counted by the pump autotransformer counter PnATC.

The eight hour time period is a time window that can occur at anytime. The eight hour timer PnATTH will start when PnATC increments from 0 to 1.



If  $PnATC = 1$  or  $2$  at the end of the eight hour period ( $PnATTH$  time out)  $PnATC$  will be reset to  $0$ .

If  $PnATC > 2$  at the end of the eight hour period ( $PnATTH$  timed out)  $PnATC$  will **NOT** be reset. When  $PnATC > 2$  the autotransformer fault count exceeded flag  $PnATFC$  will be active and will make the pump unavailable for operation. This pump lockout can be cleared by pressing the pump's local reset pushbutton  $PnLOCR$  or by a remote reset from the Operator  $PnRset$ . This action will reset  $PnATC$  to  $0$ , making  $PnATFC$  inactive.

### 3.1.3.2 Control Algorithms

The **Pump Autotransformer Fault Flag ( $PnATOL$ )** will be set and reset according to the following control algorithm:-

S0:  $PnATOL$  Inactive

S1:  $PnATOL$  Active

case PS of

S0: if (not C1) and C4 then PS:= S1;

S1: if C2 or (C1 and C3) or (C1 and C6) then PS:= S0;

end;

The **Pump Autotransformer Fault Delay Reset Timer ( $PnATTM$ )** will operate as follows:

if ( $PnATO$  and  $PnATOL$ ) then enable  $PnATTM$  (Start Timer)

else disable  $PnATTM$  (Stop Timer)

The **Pump Autotransformer Fault Auto Reset Flag ( $PnATAR$ )** will be set and reset according to the following control algorithm.

S0:  $PnATAR$  Inactive

(Autotransformer fault not reset by  $PnATTM$ )

S1:  $PnATAR$  Active

(Autotransformer fault reset by  $PnATTM$ )

case PS of

S0: if C2 then PS = S1

S1: if (not C1) and C5 then PS = S0

end;

The **Pump Autotransformer Fault Counter ( $PnATC$ )** will function as follows:

S0:  $PnATC = 0$

(No Autotransformer faults present)

S1:  $PnATC > 0$

(1 or more Autotransformer faults)

S2:  $PnATC = PnATC + 1$

(Count another Autotransformer fault)





case PS of

S0: if (C4 and C10) then PS = S2

S1: if (C4 and C10) then PS = S2

else if ((not C8) and C9) or (C8 and (C3 or C6)) then PS = S0

S2: PS = S1

end;

The Pump Autotransformer Fault 8 Hour Window Timer (PnATTH) will operate as follows:

if (PnATC > 0) then enable PnATTH

(Start Timer)

else disable PnATTH

(Stop Timer)

The Pump Autotransformer Fault Count Flag (PnATFC) will be set and reset according to the following control algorithm.

S0: PnATFC Inactive

(Pump No.n autotransformer Fault Count Exceeded Flag inactive)

S1: PnATFC Active

(Pump No.n autotransformer Fault Count Exceeded Flag active)

case PS of

S0: if (C7 > 2) then PS = S1

S1: if (C7 ≤ 2) then PS = S0

end;

The conditions for the above Algorithms are defined below.

C1 = PnATO

(Pump No.n Autotransformer DI active)

C2 = PnATTM

(Pump No.n Autotransformer Delay reset Timer Timed Out)

C3 = PnLOCR

(Pump No.n Local Reset Pushbutton pressed, DI active)

C4 = STPWR

(Site Power Available)

C5 = PnATAR

(Pump No.n Autotransformer Auto Reset Flag)

C6 = PnRset

(Pump No.n Operator Reset active)

C7 = PnATC

(Pump No.n Autotransformer Counter)

C8 = PnATFC

(Pump No.n Autotransformer Count is greater than two)

C9 = PnATTH

(Pump No.n Autotransformer 8 Hour Timer timed out)



C10 = PnATO↓

(Falling edge of Pump No:n  
Autotransformer DI)3.1.4 PUMP REFLUX VALVE FAILURE3.1.4.1 *Functional Description*

The RTU will monitor the pump reflux microswitch digital input (PnRMS) when the pump is both running and stopped.

The reflux microswitch contact states will be as follows:

Pump Stopped - Reflux down - Reflux Microswitch Contact CLOSED

Pump Running - Reflux up - Reflux Microswitch Contact OPEN

On pump start up, an RTU reflux microswitch timer (PnRODT) of 30 seconds shall be started. If the reflux valve fails to open within this time period, then the reflux valve fail to open flag (PnRFTO) will be latched on and the pump shall stop and become unavailable for RTU control. If a pump is running, and the reflux valve closes, and remains closed for 30 seconds, then the reflux valve fail to open flag (PnRFTO) will be latched on and the pump shall also immediately stop and become unavailable for RTU control.

If the pump reflux fails to open (PnRFTO latched on) the pump reflux fail to open delay reset timer (PnRFTM) will start.

PnRFTO will be unlatched if any of the following three conditions are true:

1. The local reset pushbutton (PnLOCR) is pressed.

or

2. A reset from the EFPS computer (PnRset) occurs.

or

3. The pump reflux fail to open delay reset timer (PnRFTM) times out. This will be indicated to Eagle Farm by the pump reflux fail to open fault auto reset flag (PnRFAR) being active.

If a pump stops and the reflux valve fails to close within 10 seconds, an alarm only will be generated, Pump Reflux Valve Closing Fault, (PnRVCF) at EFPS. This condition will not cause the pump to become unavailable for RTU control.

The flag PnRVCF can be reset via the EFPS computer keyboard or from the LOCAL RESET pushbutton at the switchboard.

A pump will be allowed only three pump reflux valve failures in any eight hour period. Each rising edge of the Pump Reflux Valve Fail to Open Flag (PnRFTO) will be counted by the pump reflux fail to open counter PnRFC.



The eight hour time period is a time window that can occur at anytime. The eight hour timer PnRFTH will start when PnRFC increments from 0 to 1.

If  $PnRFC = 1$  or  $2$  at the end of the eight hour period (PnRFTH time out) PnRFC will be reset to 0.

If  $PnRFC > 2$  at the end of the eight hour period (PnRFTH timed out) PnRFC will NOT be reset. When  $PnRFC > 2$  the reflux valve fault count exceeded flag PnRFTC will be active and will make the pump unavailable for operation. This pump lockout can be cleared by pressing the pumps local reset pushbutton PnLOCR or by a remote reset from the Operator PnRset. This action will reset PnRFC to 0, making PnRFTC inactive.

### 3.1.4.2 Control Algorithms

The **Pump Reflux Valve Fail to Open Fault Flag (PnRFTO)** will be set and reset according to the following control algorithm:-

S0: PnRFTO Inactive

S1: PnRFTO Active

case PS of

S0: if C2 and C3 and C7 then PS:= S1;

S1: if C1 or C4 or C5 then PS:= S0;

end;

The **Pump Reflux Valve Fail to Open Delay Reset Timer (PnRFTM)** will operate as follows:

if C8 then enable PnRFTM

(Start Timer)

else disable PnRFTM

(Stop Timer)

The **Pump Reflux Valve Fail to Open Fault Auto Reset Flag (PnRFAR)** will be set and reset according to the following control algorithm.

S0: PnRFAR Inactive

(Reflux Fail to Open fault not reset by PnRFTM)

S1: PnRFAR Active

(Reflux Fail to Open fault reset by PnRFTM)

case PS of

S0: if C4 then PS = S1;

S1: if C8 and C9 then PS = S0;

end;

The **Pump Reflux Fail to Open Fault Counter (PnRFC)** will function as follows:

S0: PnRFC = 0

(No Reflux Fail to Open faults present)

S1: PnRFC > 0

(1 or more Reflux Fail to Open faults)

S2: PnRFC = PnRFC + 1

(Count another Reflux Fail to Open fault)



case PS of

S0: if C10 then PS = S2;

S1: if C10 then PS = S2;

else if ((not C11) and C6) or (C11 and (C1 or C5)) then PS = S0;

S2: PS = S1;

end;

The Pump Reflux Fail to Open Fault 8 Hour Window Timer (PnRFTH) will operate as follows:

if (PnRFC > 0) then enable PnRFTH

(Start Timer)

else disable PnRFTH

(Stop Timer)

The Pump Reflux Fail to Open Fault Count Flag (PnRFTC) will be set and reset according to the following control algorithm.

S0: PnRFTC Inactive

(Pump No.n Reflux Valve Fault Count Exceeded Flag inactive)

S1: PnRFTC Active

(Pump No.n Reflux Valve Fault Count Exceeded Flag active)

case PS of

S0: if (C12 > 2) then PS = S1;

S1: if (C12 <= 2) then PS = S0;

end;

The conditions for the above Algorithms are defined below.

C1 = PnLOCR

(Pump No.n Local Reset Pushbutton Pressed)

C2 = PnRUN

(Pump No.n Running)

C3 = PnRMS

(Pump No.n Reflux Microswitch DI)

C4 = PnRFTM

(Pump No.n Reflux fail to open delay reset timer timed out)

C5 = PnRset

(Pump No.n Operator Reset Active)

C6 = PnRFTH

(Pump No.n Reflux 8 hour timer timed out)

C7 = PnRODT

(Pump No.n Reflux Delay Open Timer timed out)

C8 = PnRFTO

(Pump No.n Reflux Valve Fail to Open Fault)

C9 = PnRFAR

(Pump No.n Reflux Valve Auto Reset)



C10 = PnRFTO↑	(Rising Edge of Pump No.n Reflux Valve Fail to Open)
C11 = PnRFTC	(Pump No.n Reflux Valve Fault Count Exceeded)
C12 = PnRFC	(Pump No.n Reflux Valve Fail to Open Fault Counter)

### 3.1.5 PUMP FAILURE

#### 3.1.5.1 *Functional Description*

During a pump start-up sequence if a contactor is requested to open or close and fails to do so within a time determined by the contactor timer (all initially set to 3 seconds), a pump failure will occur which shall cause the flag PnFAIL to latch on and the pump to become unavailable for RTU control.

The PnFAIL flag shall remain latched ON until the pumps LOCAL RESET pushbutton on the switchboard has been pressed or reset from EFPS computer. The pump shall then become available for RTU control.

#### 3.1.5.2 *Control Algorithm*

The pump failure internal flag (PnFAIL) will be set and reset according to the following control algorithm:-

S0: Pump Not Failed	(PnFAIL reset)
S1: Pump Failed	(PnFAIL set)

case PS of

S0: if C2 or C3 or C4 or C5 or C6 or C7 then PS:= S1;

S1: if C1 or C8 then PS:= S0;

end;

The conditions for the above Algorithms are defined below.

C1 = PnLOCR	(Pump No.n Local Reset Pushbutton Pressed)
C2 = (PnTCC and PnSTRT and PnTCCl expired)	(Pump No.n Transformer Contactor Fail to Close Timer Expired)
C3 = (PnTCC and PnSTRT and PnTCOp expired)	(Pump No.n Transformer Contactor Fail to Open Timer Expired)
C4 = (PnSCC and PnSC and PnSCCl expired)	(Pump No.n Star Contactor Fail to Close Timer Expired)
C5 = (PnSCC and PnSC and PnSCOp expired)	(Pump No.n Star Contactor Fail to Open Timer Expired)



- C6 = (PnLCC and PnRUN and PnLCCI expired) (Pump No.n Line Contactor Fail to Close Timer Expired)
- C7 = (PnLCC and PnRUN and PnLCOp expired) (Pump No.n Line Contactor Fail to Close Timer Expired)
- C8 = PnRset (Pump No.n Operator Reset Active)

### 3.1.6 PUMP AVAILABILITY

A pump will be available for RTU control according to the following algorithm:-

P1AV = P1PWR and P1TOLL and P1THRL and P1ATOL and P1FAIL  
 and P1TOFC and P1THFC and P1ATFC and PWFLD and P1EMSL  
 and P1RFTO and P1RFTC

P2AV = P2PWR and P2TOLL and P2THRL and P2ATOL and P2FAIL  
 and P2TOFC and P2THFC and P2ATFC and PWFLD and P2EMSL  
 and P2RFTO and P2RFTC

If any of these conditions are not met then the pump is unavailable for RTU control and will not be able to be started automatically or locally via the LOCAL START pushbutton.

### 3.1.7 PUMP EMERGENCY STOP CONTROL

#### 3.1.7.1 Functional Description

Upon detection of the operation of the EMERGENCY STOP pushbutton via RTU input PnEMS, the flag PnEMSL will be latched on and the pump will be unavailable. If the station is in REMOTE, the flag will remain latched on until the EMERGENCY STOP pushbutton has been released and either the pump LOCAL RESET pushbutton has been operated or the station is switched to LOCAL. If the station is in LOCAL the flag will remain latched on until the EMERGENCY STOP pushbutton has been released.

#### 3.1.7.2 Control Algorithm

The control of the emergency stop pushbutton latch flag (PnEMSL) is based on the following control algorithm:-

S0: EMS Inactive (PnEMSL inactive)  
 S1: EMS Active (PnEMSL active)

case PS of

S0: if C1 then PS:= S1;

S1: if not(C1) and (not(C3) or (C3 and C2)) then PS:= S0;

end;



The conditions for the above Algorithms are defined below.

C1 = PnEMS	(Pump No.n Emergency Stop Pushbutton)
C2 = PnLOCR	(Pump No.n Local Reset Pushbutton)
C3 = LOCREM	(Pump Station In Remote)

### 3.1.8 PUMP LOCKOUT

#### 3.1.8.1 *Functional Description - Lockout due to autotransformer rating.*

A pump (when selected in REMOTE) is only permitted 12 starts within any 1 hour period. To ensure this limit is not exceeded, when a pump completes a full start-up sequence it will not be permitted to start again for five minutes. This will ensure that a maximum of 12 pump starts can occur for each pump every hour.

In the event of a surcharge, or the pump being selected in LOCAL, this lockout will be disabled allowing the pump to start after an initial one (1) second delay. Once a pump is required to start, the second pump will be inhibited from running until the first pump has stopped.

#### 3.1.8.2 *Control Algorithm*

The pump lockout flag (PnLOK) will be set and reset according to the following control algorithm:-

S0: Pump Able to Start	(PnLOK reset)
S1: Pump Locked Out	(PnLOK set)

case PS of

S0: if C1 and C4 then PS:= S1;

S1: if C2 or C3 or (not C4) or ((not C5) and (not C6)) then PS:= S0;

The conditions for the above Algorithms are defined below.

C1 = PnSTR↑	(Rising edge of Pump No.n Start Request Flag)
C2 = SURCH	(Surcharge Alarm Active)
C3 = PnLock	(Pump No.n Lockout Timer Expired)
C4 = LOCREM	(LOCKREM in Remote)
C5 = PnHldL	(Pump No.n Hold Latch Flag)
C6 = PnSTR	(Pump No.n Start Request Flag)



### 3.1.8.3 Functional Description - Lockout Due To Pump Well Flooded

The sump pump shall start when the high level probe is reached. A sump pump running warning shall be initiated and displayed at EFPS. The sump pump shall continue to run until the level falls below the low level probe.

Both main pumps shall be locked out in the event of the pump well flooding. This is activated by a level probe at the pump well sump. Pump well flooding also initiates an alarm. The pump lockout condition can only be cleared by pressing the LOCAL RESET pushbutton at the switchboard.

### 3.1.8.4 Control Algorithm

The pump well flooded latch flag (PWFLD) shall be set and reset according to the following control algorithm:-

S0: PWFLD Inactive	(Pump Well Dry)
S1: PWFLD Active	(Pump Well Flooded)

case PS of

S0: if C1 then PS:= S1;

S1: if (not C1) and C2 then PS:= S0;

end;

The conditions for the above Algorithms are defined below.

C1 = PWF	(Pump Well Flooded)
----------	---------------------

C2 = PnLOCR	(Pump No.n Local Reset Pushbutton)
-------------	------------------------------------

## 3.1.9 PUMP STATION CONTROL

### 3.1.9.1 Functional Description

Control of the pump station will be based on the current state of the sewage wet well level with the station operating on a duty/standby configuration. Under normal conditions, with the wet well rising, the duty pump will start once the wet well level is greater than the Start Duty Pump Level Setpoint (STRDTY - site specific, refer label on switchboard). The duty pump will then stop when the wet well level is less than the Stop Duty Pump Setpoint (STPDY - site specific, refer label on switchboard).

Upon stopping, the duty pump reverts to the standby mode and the standby pump becomes the duty pump for the next pump cycle based on the level setpoints STRDTY and STPDY.

Should the current duty pump fail to start, thereby becoming unavailable for RTU control, the standby pump shall be available to start immediately based on the wet well level setpoints of STRDTY and STPDY.

**ONLY ONE PUMP MAY OPERATE AT ANY ONE TIME**





In the event of a failure of the wet well level probe, the duty pump will immediately stop and control of the pump station will be based on activation of the surcharge electrode. Once the surcharge alarm, RTU input SURCH, becomes active the duty pump will start. The duty pump will operate until the surcharge electrode goes inactive and has been inactive for a time determined by the surcharge inactive timer - duty (SATIMD - initially set to 6 minutes).

### 3.1.9.2 Control Algorithm

The automatic operation of the pump station will be based on the wet well level according to the following control algorithm:-

```

S0: Stop All Pumps                (Reset RUNDTY)
S1: Start Duty Pump              (Set RUNDTY)

case PS of
  S0: if (C1 or (C5 and C3)) then PS := S1;
  S1: if ((not C5) and C2) or (C4 and (not C3)) or C6 then PS := S0
end;
```

The conditions for the above Algorithms are defined below.

C1 = (WWLEV > STRDTY)

C2 = (WWLEV < STPDY)

C3 = SURCH (Surcharge alarm active)

C4 = WWLEVI and SATIMD (Wet Well Level Invalid and Surcharge Inactive Timer - Duty Expired)

C5 = WWLEVI (Wet Well Level Invalid)

C6 = WWLEVI↑ (Rising Edge of Wet Well Level Invalid)

### 3.1.10 INDIVIDUAL PUMP CONTROL

#### 3.1.10.1 Functional Description

A pump will start if it is the duty pump and the duty pump is required to start, or if it is the standby pump and the duty pump has failed to start. The pump will only start if it is available for RTU control and the pump lockout flags are inactive. A pump start shall be delayed by the pump start delay timer PnSTDT (initially set to 1 second). A pump will stop if it is no longer required to run in REMOTE, or if it is no longer available.

When the station is switched to LOCAL, any running pump will be stopped and the RTU will perform no automatic pump controls until the station is returned to REMOTE. With the station in LOCAL the pumps can be started via the "Start" pushbutton, (the pump start shall be delayed by the pump start delay timer PnSTDT, initially set to 1 second). The pump will run only while the "Start" pushbutton is pressed. Only one pump will be allowed to run at any time.



## 3.1.10.2 Control Algorithm

The control of each individual pump will be based on the following algorithm:-

PUMP NO.1

S0: Stop Pump No.1

(Reset P1STR)

S1: Start Pump No.1

(Set P1STR)

case PS of

S0: if ((C6 and C2 and C3) or ((not C6) and C7)) and  
(not C13) and C1 and (not C12) then PS := S1;

S1: if (not C1) or (C6 and (not C3)) or C10  
or ((not C6) and (not C7)) then PS:= S0;

end;

PUMP NO.2

S0: Stop Pump No.2

(Reset P2STR)

S1: Start Pump No.2

(Set P2STR)

case PS of

S0: if ((C6 and C8 and C3) or ((not C6) and C9)) and  
(not C14) and C5 and (not C11) then PS := S1;

S1: if (not C5) or (C6 and (not C3)) or C10  
or ((not C6) and (not C9)) then PS:= S0;

end;

The conditions for the above Algorithms are defined below.

C1 = P1AV

(Pump No.1 Available)

C2 = DUTYP1

(Pump No.1 Duty)

C3 = RUNDY

(Duty Pump Required to Run)

C4 = P2RUN

(Pump No.2 Running)

C5 = P2AV

(Pump No.2 Available)

C6 = LOCREM

(Pump Station in Remote)

C7 = P1PB

(Pump No.1 Start Pushbutton Pressed)

C8 = DUTYP2

(Pump No.2 Duty)

C9 = P2PB

(Pump No.2 Start Pushbutton Pressed)

C10 = LOCREM↓

(Station Initially Switched to Local)



C11 = P1STR	(Pump No.1 Start Request Flag)
C12 = P2STR	(Pump No.2 Start Request Flag)
C13 = P1Lok	(Pump No.1 Locked Out)
C14 = P2Lok	(Pump No.2 Locked Out)
C15 = P1STDT	(Pump No.1 Start Delay Timer Expired)
C16 = P2STDT	(Pump No.2 Start Delay Timer Expired)
C17 = P1RUN	(Pump No.1 Running)

### 3.1.11 PUMP STATUS INDICATION LAMP

#### 3.1.11.1 *Functional Description*

The pump status indication lamp, RTU output PnLOCI, will remain steady on if the pump has completed its start up sequence and the PnRUN input is active. The lamp will remain active until the PnRUN input becomes inactive.

The pump status indication lamp will flash slow (1 second on / 1 second off) if the pump is unavailable for RTU control. The lamp will cease to flash slow when the pump becomes available for RTU control.

The pump status indication lamp will flash fast (0.3 second on / 0.3 second off) if the pump is locked out due to the lock out timer not expired. The lamp will cease to flash fast when the lock out timer expires.

#### 3.1.11.2 *Control Algorithm*

The pump local indication lamp output will be set and reset according to the following control algorithm:-

S0: Pump Local Indication Lamp Inactive	(PnLOCI inactive)
S1: Pump Local Indication Lamp Active	(PnLOCI active)

case PS of

S0: if C1 or ((not C2) and C5) or (C2 and (not C4) and C3 and C6)) then PS:= S1;  
 S1: if (not C1) and (C2 or (not C5)) and ((not C2) or (not C3) or C4 or (not C6))  
 then PS:= S0;

end;

The conditions for the above Algorithms are defined below.

C1 = PnRUN	(Pump No.n Running)
C2 = <u>PnAV</u>	(Pump No.n Unavailable)

C3 = PnLok	(Pump No.n Locked Out)
C4 = PnSTR	(Pump No.n Start Request Flag)
C5 = FlshT1	(Flasher 1 second Timer Expired)
C6 = FlshT3	(Flasher 0.3 second Timer Expired)

### 3.1.12 PUMP START SEQUENCE

#### 3.1.12.1 *Functional Description*

When a pump is requested to start the following start-up sequence will be followed:-

1. The star contactor shall close.
2. When the star contactor has closed, the transformer contactor shall close.
3. After a time determined by the sequence timer (PnTIME - initially set to 1 second), the star contactor shall open.
4. When the star contactor has opened, the line contactor shall close.
5. When the line contactor has closed, the transformer contactor shall open.

#### 3.1.12.2 *Control Algorithm*

Once selected to run, the start-up sequence for each pump is given by the following algorithm:-

S0: All Contactors Open	(PnTCC inactive, PnSCC inactive, PnLCC inactive)
S1: Star Contactor Closed	(PnTCC inactive, PnSCC active, PnLCC inactive)
S2: Transformer Contactor Closed	(PnTCC active, PnSCC active, PnLCC inactive)
S3: Star Contactor Open	(PnTCC active, PnSCC inactive, PnLCC inactive)
S4: Line Contactor Closed	(PnTCC active, PnSCC inactive, PnLCC active)
S5: Transformer Contactor Open	(PnTCC inactive, PnSCC inactive, PnLCC active)

case PS of

- S0: if C3 then PS:= S1;
- S1: if C1 and C7 then PS:= S2;
- else if (not C1) then PS:= S0;
- S2: if C2 and C4 and C5 and then PS:= S3;
- else if (not C1) then PS:= S0;
- S3: if C1 and C4 and C8 then PS:= S4;
- else if (not C1) then PS:= S0;
- S4: if (not C2) and C6 then PS:= S5;
- else if (not C1) the PS:= S0;
- S5: if (not C1) then PS:= S0;

end;



The conditions for the above Algorithms are defined below.

C1 = PnSTR	(Pump No.n Start Request Flag)
C2 = PnSC	(Pump No.n Star Contactor DI)
C3 = PnSTR↑	(Rising Edge Pump No.n Start Request Flag)
C4 = PnSTRT	(Pump No.n Transformer Contactor DI)
C5 = PnTIME	(Pump No.n Sequence Timer Expired)
C6 = PnRUN	(Pump No.n Line Contactor DI)
C7 = PnSC↑	(Rising Edge of Pump No.n Star Contactor DI)
C8 = PnSC↓	(Falling Edge of Pump No.n Star Contactor DI)

### 3.1.13 PUMP DUTY SELECTION

#### 3.1.13.1 *Functional Description*

This pump station operates on a duty/standby configuration whereby one pump is designated the duty, the second pump as standby. A pump duty/standby change will occur if the duty pump becomes unavailable for RTU control or when the duty pump stops.

#### 3.1.13.2 *Control Algorithm*

The selection of the duty pump will be based on the following algorithm:-

S0: Pump No.1 Duty	(P1DUTY active, P2DUTY inactive)
S1: Pump No.2 Duty	(P1DUTY inactive, P2DUTY active)
S2: No Duty	(P1DUTY inactive, P2DUTY inactive)

case PS of

S0: if C4 and ((not C3) or (C5 and C7) then PS:= S1;  
 S1: if C3 and ((not C4) or (C6 and C7) then PS:= S0;  
 S2: if C3 then PS:= S0;  
       else if (not C3) and C4 then PS:= S1;

end;

The conditions for the above Algorithms are defined below.

C1 = DUTYP1	(Pump No.1 Duty)
C2 = DUTYP2	(Pump No.2 Duty)
C3 = P1AV	(Pump No.1 Available)



C4 = P2AV	(Pump No.2 Available)
C5 = PIRUN↓	(Falling Edge of Pump No.1 Running)
C6 = P2RUN↓	(Falling Edge of Pump No.2 Running)
C7 = DtyLok	(Duty Lock Flag)

### 3.2 RTU Power-UP Control

Initially after power up the RTU shall perform the following control.

1. Make pump no.1 duty;

### 3.3 RTU Generated Alarms

The following alarms will be generated by the RTU and sent back to Eagle Farm SCADA system.

#### Alarm Description

#### Alarm Point

Pump No.1 Control Circuit De-energised	P1PWRL
Pump No.1 Thermal Overload	P1TOLL
Pump No.1 Thermal Overload Fault Count Exceeded	P1TOFC
Pump No.1 Thermal Overload Autoreset	P1TOAR
Pump No.1 Thermistor Fault	P1THRL
Pump No.1 Thermistor Fault Count Exceeded	P1THFC
Pump No.1 Thermistor Autoreset	P1THAR
Pump No.1 Autotransformer Thermistor Fault	P1ATOL
Pump No.1 Autotransformer Fault Count Exceeded	P1ATFC
Pump No.1 Autotransformer Autoreset	P1ATAR
Pump No.1 Fail to Start	P1FAIL
Pump No.1 Reflux Valve Failed to Open	P1RFTO
Pump No.1 Reflux Fail to Open Fault Count Exceeded	P1RFTC
Pump No.1 Reflux Valve Failed to Close (Alarm Only)	P1RVCF
Pump No.1 Reflux Valve Fail to Open Autoreset	P1RFAR
Pump No.1 Emergency Stop Latch	P1EMSL
Pump No.1 Run Flag	P1RUNF
Pump No.2 Control Circuit De-energised	P2PWRL
Pump No.2 Thermal Overload	P2TOLL
Pump No.2 Thermal Overload Fault Count Exceeded	P2TOFC
Pump No.2 Thermal Overload Autoreset	P2TOAR
Pump No.2 Thermistor Fault	P2THRL
Pump No.2 Thermistor Fault Count Exceeded	P2THFC
Pump No.2 Thermistor Autoreset	P2THAR
Pump No.2 Autotransformer Thermistor Fault	P2ATOL
Pump No.2 Autotransformer Fault Count Exceeded	P2ATFC
Pump No.2 Autotransformer Autoreset	P2ATAR
Pump No.2 Fail to Start	P2FAIL
Pump No.2 Reflux Valve Failed to Open	P2RFTO



Pump No.2 Reflux Fail to Open Fault Count Exceeded	P2RFTC
Pump No.2 Reflux Valve Failed to Close (Alarm Only)	P2RVCF
Pump No.2 Reflux Valve Fail to Open Autoreset	P2RFAR
Pump No.2 Emergency Stop Latch	P2EMSL
Pump No.2 Run Flag	P2RUNF
Pump Station Site Power Fail	SPFL
Pump Station Surge Alarm	SURCHL
Pump Station in Local Control	LOCL
Pump Station Wet Well Flooded	PWFLD
Pump Station Sump Pump Operated	SPOP
Wet Well Level Invalid	WWLEVI
Delivery Pressure Invalid	PresI
Pump No.1 kWatts Invalid	P1kW
Pump No.2 kWatts Invalid	P2kW
Pump No.1 Amps Invalid	P1AmpI
Pump No.2 Amps Invalid	P2AmpI
RTU I/O Module Failure	I/OFal
RTU AC Failure	ACFail
RTU Battery Failure	Batery

### 3.4 RTU Communications

The RTU shall initiate a communication to the Eagle Farm SCADA system upon the detection of the following conditions.

1. A change of state of any digital input or specified internal flags;
2. A percentage change in wet well level as follows:

Rising wet well - +2% change in level

Any pump running < 3 minutes - -5% change in level

Any pump running > 3 minutes - -2% change in level

There is a delay before retransmission can occur to prevent a monopolising of the network.



For each RTU-Eagle Farm communication the status of the entire site shall be sent. The format of the reply message is defined below.

TxBuf,0	Bit 15	Pump No.1 Power Off
	Bit 14	Pump No.1 Thermal Overload
	Bit 13	Pump No.1 Emergency Stop
	Bit 12	Pump No.1 Thermistor Fault
	Bit 11	Pump No.1 Autotransformer Thermal Fault
	Bit 10	Pump No.1 Failed
	Bit 9	Pump No.1 Running
	Bit 8	Pump No.1 KW Signal Invalid
	Bit 7	Pump No.1 AMPS Signal Invalid
	Bit 6	Pump No.1 Thermal Overload Fault Count Exceeded
	Bit 5	Pump No.1 Thermistor Fault Count Exceeded
	Bit 4	Pump No.1 Autotransformer Fault Count Exceeded
	Bit 3	Pump No.1 Thermal Overload Fault Auto Reset
	Bit 2	Pump No.1 Thermistor Fault Auto Reset
	Bit 1	Pump No.1 Autotransformer Fault Auto Reset
	Bit 0	Pump No.1 Reflux Valve Failed To Open
TxBuf,1	Bit 15	Pump No.2 Power Off
	Bit 14	Pump No.2 Thermal Overload
	Bit 13	Pump No.2 Emergency Stop
	Bit 12	Pump No.2 Thermistor Fault
	Bit 11	Pump No.2 Autotransformer Thermal Fault
	Bit 10	Pump No.2 Failed
	Bit 9	Pump No.2 Running
	Bit 8	Pump No.2 KW Signal Invalid
	Bit 7	Pump No.2 AMPS Signal Invalid
	Bit 6	Pump No.2 Thermal Overload Fault Count Exceeded
	Bit 5	Pump No.2 Thermistor Fault Count Exceeded
	Bit 4	Pump No.2 Autotransformer Fault Count Exceeded
	Bit 3	Pump No.2 Thermal Overload Fault Auto Reset
	Bit 2	Pump No.2 Thermistor Fault Auto Reset
	Bit 1	Pump No.2 Autotransformer Fault Auto Reset
	Bit 0	Pump No.2 Reflux Valve Failed To Open
TxBuf,2	Bit 15	Site Power Fail
	Bit 14	Station Surge
	Bit 13	Station in Local
	Bit 12	Wet Well Level Invalid
	Bit 11	Delivery Pressure Invalid
	Bit 10	Pump Well Flooded
	Bit 9	Sump Pump Operated
	Bit 8	RTU I/O Module Failure
	Bit 7	RTU AC Failure
	Bit 6	RTU Battery Failure
	Bit 5	Pump No.1 Reflux Valve Closing Fault
	Bit 4	Pump No.1 Reflux Valve Fail to Open Fault Count Exceeded
	Bit 3	Pump No.1 Reflux Valve Fail to Open Fault Auto Reset Flag
	Bit 2	Pump No.2 Reflux Valve Closing Fault
	Bit 1	Pump No.2 Reflux Valve Fail to Open Fault Count Exceeded
	Bit 0	Pump No.2 Reflux Valve Fail to Open Fault Auto Reset Flag





TxBuf,3	Pump No.1 kWatts
TxBuf,4	Pump No.1 Amps
TxBuf,5	Pump No.1 Minutes Run
TxBuf,6	Pump No.1 Operations
TxBuf,7	zero (was Pump No.1 Average Flow, no longer calculated in RTU)
TxBuf,8	Pump No.2 kWatts
TxBuf,9	Pump No.2 Amps
TxBuf,10	Pump No.2 Minutes Run
TxBuf,11	Pump No.2 Operations
TxBuf,12	zero (was Pump No.2 Average Flow, no longer calculated in RTU)
TxBuf,13	Wet Well Level
TxBuf,14	Delivery Pressure
TxBuf,15	RTU Temperature
TxBuf,16	Temperature at Top of Switchboard (Aberdeen Only)
TxBuf,17	Temperature at Bottom of Switchboard (Aberdeen Only)
TxBuf,18(19)	Inflow
TxBuf,20(21)	Volume Pumped

### 3.5 RTU Calculations

#### 3.5.1 CALCULATIONS

The following calculations will occur in the RTU and be communicated back to Eagle Farm.

1. Calculation of inflow based on wet well level.
2. Total Volume Pumped based on Inflow and wet well level.
3. Motor Power Filtering.
4. Pump Operations.
5. Pump Minutes Run.

#### 3.5.2 INFLOW

##### 3.5.2.1 *Functional Description*

Inflow into the wet well will be calculated using the wet well level. From the wet well level and using provided constants, a storage value (in m<sup>3</sup>) for any wet well level can be determined. At constant specified periods an increase in storage capacity will be calculated for that period, and this increase will be converted to a litres per minute inflow value. This calculation will only occur when the pumps are not in operation. During times when a pump is operating, the inflow will be kept constant at the value prior to the pump operation.

### 3.5.2.2 Calculation Algorithm

The calculation of wet well inflow will be based on the following calculation algorithm:-

if C1 and C2 and C3 then

```
{
    Head = Level% * K1;           (Head in Metres)
    StoNow = Head * K2;           (Storage in m3)
    InFlow = (StoNow - StoOld) * 1000; (InFlow in l/min)
    StoOld = StoNow;
}
```

The conditions for the above Algorithms are defined below.

C1 = P1RUN and P2RUN (No Pumps Running)  
 C2 = INFTIM (Inflow Timer Expired)  
 C3 = StpDly (Stop Delay Timer Expired)

### 3.5.3 VOLUME PUMPED

#### 3.5.3.1 Functional Description

This calculation is performed to determine the volume pumped by the pump station. The volume pumped is calculated by determining the total flow into the wet well during pump operation and adding to this volume change in the wet well during this same period. This volume change is determined by storing the volume in the wet well when the duty pump starts (or standby pump if required) and subtracting the volume when the duty pump stops. These calculations shall be performed at the end of each pump cycle.

#### 3.5.3.2 Calculation Algorithm

The calculation of wet well inflow will be based on the following calculation algorithm:-

if (C1 and (not C2)) or (C3 and C4) then

```
{
    StrPSr = StoNow;
}
```

if (C1 and (not C2)) then

```
{
    InfPSr = TotInf;
}
```

if C5 and (not C2) then

```
{
    TotVol = TotVol + (TotInf - InfPSr) + (StoStr - StoNow);
}
```



The conditions for the above Algorithms are defined below.

C1 = (P1RUN or P2RUN)↑	(Rising Edge of Either Pump Running)
C2 = MidPls	(Midnight Pulse)
C3 = ((P1RUN or P2RUN)	(Either Pump Running)
C4 = (StoNow > StrPSr)	(Storage Level Now > Storage Level at Pump Start)
C5 = ((P1RUN and P2RUN)↓	(Falling Edge of Neither Pumps Running)

### 3.5.4 MOTOR POWER FILTERING

#### 3.5.4.1 *Functional Description*

Motor power kiloWatt signals for each pump are inputs to the RTU. Filtering of these signals shall occur prior to transmission to Eagle Farm. This sampling will involve calculating a rolling average over 5 samples at 1 second intervals.

#### 3.5.4.2 *Calculation Algorithm*

The filtering of the kilowatt motor power signals will be based on the following algorithm :-

if second then

```
{
    PnKW5 = PnKW4;
    PnKW4 = PnKW3;
    PnKW3 = PnKW2;
    PnKW2 = PnKW1;
    PnKW1 = PnKW;
    PnKWF = (PnKW1 + PnKW2 + PnKW3 + PnKW4 + PnKW5) / 5
}
```

### 3.5.5 PUMP OPERATIONS

#### 3.5.5.1 *Functional Description*

A value will be kept for each pump on the number of pump starts that have occurred since midnight.

#### 3.5.5.2 *Calculation Algorithm*

The determination of the number of pump operations will be based on the following algorithm:-

if PnRUN↑ then PnOp = PnOp + 1;



### 3.5.6 PUMP MINUTES RUN

#### 3.5.6.1 *Functional Description*

A minutes run counter shall be kept for both pumps that will be cleared at midnight. For every second that the pump is running a pumps seconds counter (PnSECS) counter will be incremented. When this counter reaches 60, a pumps minutes counter (PnMIN) will be incremented by one and the pump seconds counter will be cleared.

#### 3.5.6.2 *Calculation Algorithm*

The calculation of pump minutes run will be based on the following calculation algorithm:-

if second and PnRUN then PnSECS = PnSECS + 1;

if PnSECS = 60 then

```
{  
  PnMin = PnMin + 1;  
  PnSECS = 0;  
}
```

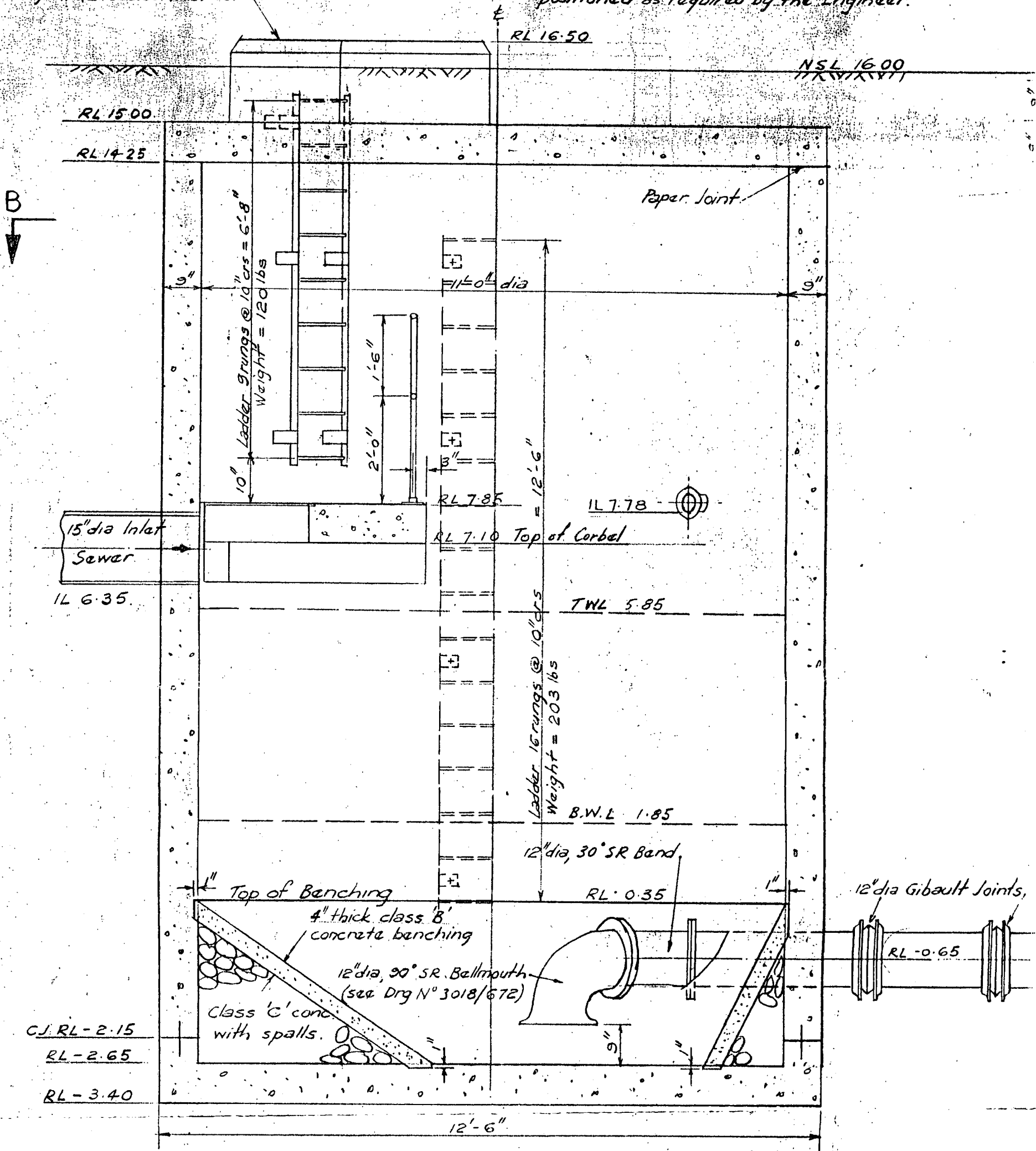
end;

76318

For details of Top Slab of Wet Well  
see Drg N° 3018/663

M.S. Cover & Frame to be supplied  
by M&E Section B.C.C.

Core holes for electrodes to be  
positioned as required by the Engineer.



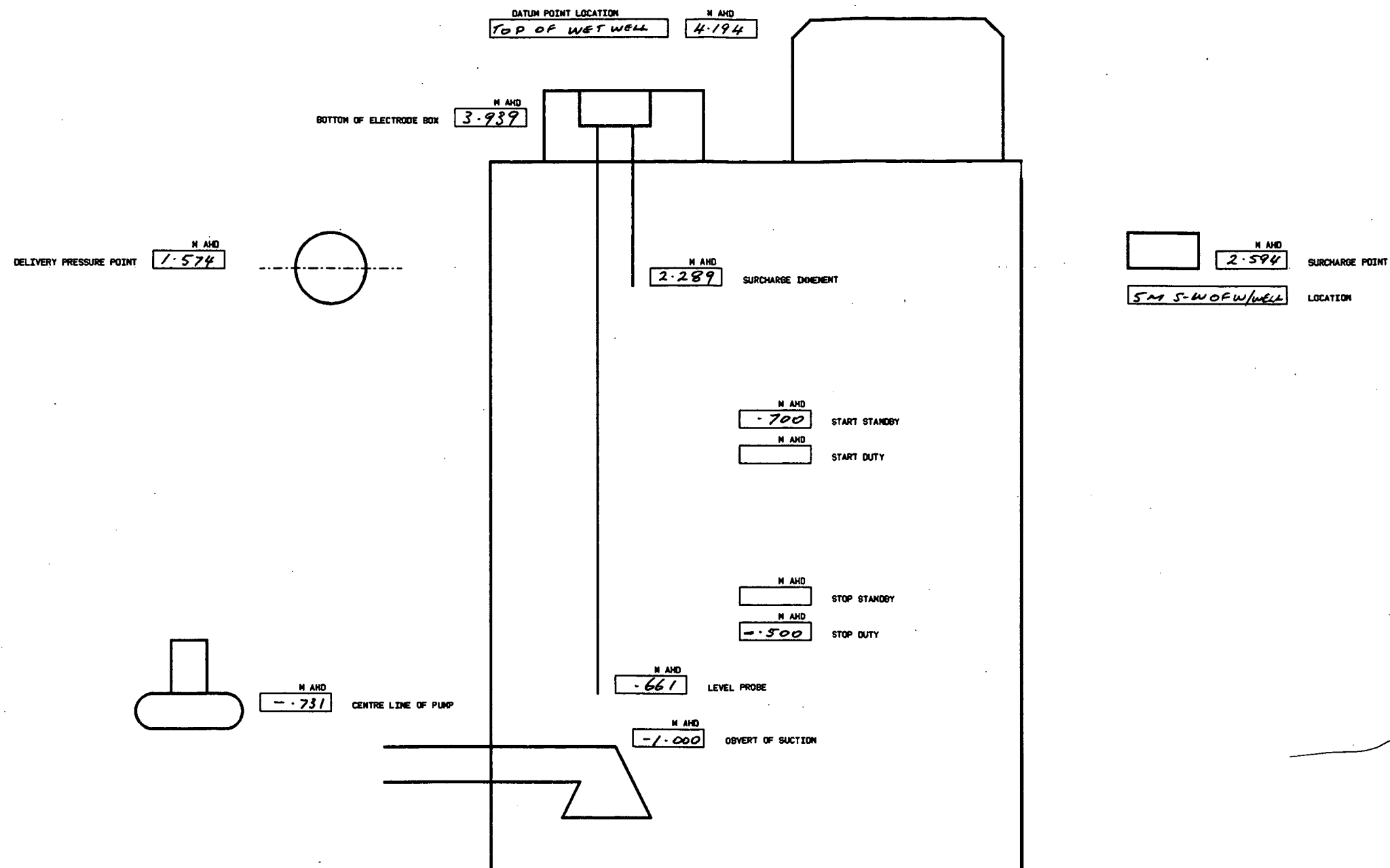
For details of Top Slab, Intermediate slab & Base slab  
of Wet Well see Drg N° 3018/663

Expected Design flow

is 110 L/sec @ 18 M

SECTION A-A

For details of scour and  
see Site Plan Drg N°  
Page 53 of 105



# NOTES

A	3/94	ORIGINAL	PWT
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT & ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN		
DATE:	DATE:		
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	
DATE:	DATE:	DATE:	
DESIGN		ENGINEER IN CHARGE	
DRAWN	PWT	9/3/94	SUPERVISING ENGINEER
TRACED			LEVEL BOOK
CHECKED			FIELD BOOK

A.H.DATUM	SURVEYED
CADD FILE No.	REFERENCES
77E035A	

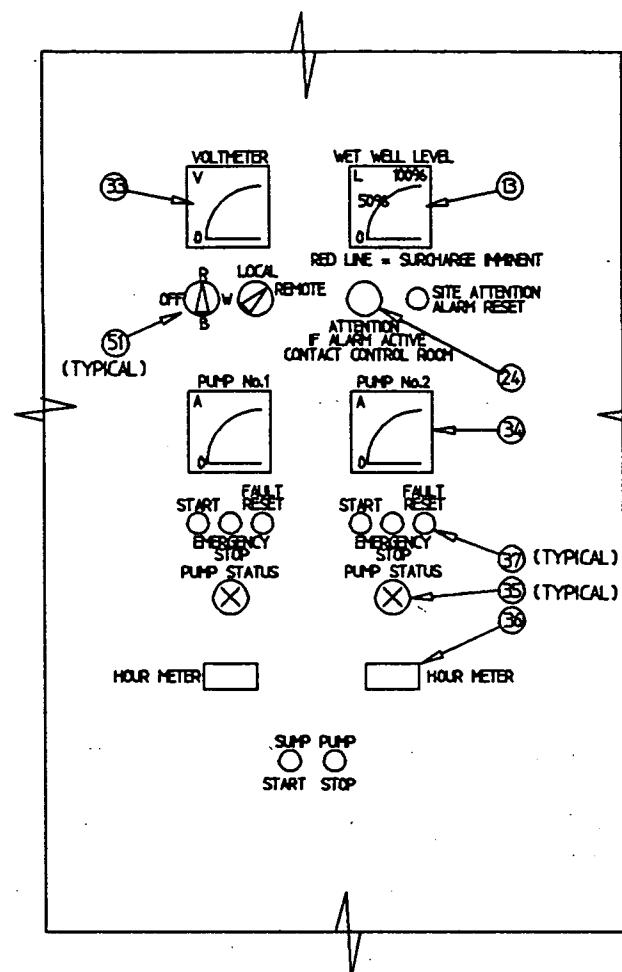


**BRISBANE CITY COUNCIL**  
DEPARTMENT OF WATER SUPPLY & SEWERAGE  
MECHANICAL & ELECTRICAL SERVICES

PROJECT:	SEWAGE PUMPING STATIONS		
TITLE:	STANDARD SURVEY LEVEL SHEET.		
SCALE:	NTS	No. 1 OF 1 SHEETS	
DRAWING No.	486/7/7-AA1EE035E		AMEND. A

## EQUIPMENT LIST

No.	ITEM
1	INCOMING CIRCUIT BREAKER
2	MOTOR CIRCUIT BREAKERS FOR PUMPS 1 & 2
3	SUMP PUMP CIRCUIT BREAKER
4	COMBINED FUSE SWITCH FOR SUBDISTRIBUTION BOARD
5	SUBDISTRIBUTION BOARD 18 WAY CHASSIS
6	AUTO-TRANSFORMER 30 kW, 12 STARTS / HOUR
7	AUTO-TRANSFORMER CONTACTORS:
7.1	LINE
7.2	TRANSFORMER
7.3	STAR
8	SUMP PUMP STARTER
9	PUMPS 1 & 2 THERMAL OVERLOAD RELAYS:
10	POWER FAILURE RELAY
11	CURRENT TRANSDUCER
12	KILOWATT TRANSDUCER
13	ANALOG LEVEL METER (4-20mA) 96 X 96
14	LEVEL TRANSMITTER
15	PRESSURE TRANSMITTER EVALUATION UNIT
16	8W FLUORESCENT LIGHT
17	REMOTE TELEMETRY UNIT
18	MULTITRODE RELAY
19	THERMISTOR RELAY
20	240V AC INTERFACE RELAY
21	24V DC INTERFACE RELAYS
22	CT'S (MOTORS) CLASS 1 TOROIDS 5A SECONDARY
23	PROTECTION FUSES FOR VOLTMETER & TRANSDUCERS
24	ATTENTION INDICATOR
25	24V DC INTERFACE TERMINALS
26	240V AC CIRCUIT BREAKERS FOR PUMP CONTROL
27	240V AC CONTROL TERMINALS
28	24V DC MINIATURE CIRCUIT BREAKERS
29	SURGE DIVERTER FOR INCOMING POWER SUPPLY
30	CATHODIC PROTECTION UNIT
31	GLAND PLATES
32	FIELD DEVICE INTERFACE TERMINALS (POWER, CONTROL, EARTHING)
33	VOLTMETER (96 X 96)
34	AMMETER (96 X 96)
35	LED CLUSTER INDICATING LIGHT
36	HOURS RUN METER
37	PUSH BUTTON
38	SURGE DIVERTER FOR RTU POWER SUPPLY
39	SURGE DIVERTERS FOR ANALOG SIGNALS
40	3A, 24V DC LINEAR POWER SUPPLY
41	FLOW METER EVALUATION UNIT
42	10A G.P.O.
43	DOOR SWITCH
44	C.T. TEST LINKS
45	MAIN EARTH LINK
46	MAIN NEUTRAL LINK
47	SUB DISTRIBUTION NEUTRAL LINK
48	SUB DISTRIBUTION EARTH LINK
49	SUMP PUMP THERMAL OVERLOAD UNIT
50	CONTROL NEUTRAL LINK
51	SELECTOR SWITCH (64 X 64)
52	3 PHASE (4 PIN) W/P SWITCHED OUTLET
53	1 PHASE (3 PIN) W/P SWITCHED OUTLET

EQUIPMENT MOUNTED ON ESCUTCHEON PLATE  
IN FRONT OF MOTOR STARTING EQUIPMENT

(NOTE 1)

(DRAWING NOT TO SCALE.  
SWITCHBOARD SUPPLIER SHALL SUBMIT ESCUTCHEON  
LAYOUT, SHOWING ACTUAL DEVICE SIZES & POSITIONS,  
TO BCC FOR APPROVAL PRIOR TO CONSTRUCTION.)

## PUMP STATUS INDICATION LIGHTS:

ON = RUNNING  
SLOW FLASH = FAULT  
FAST FLASH = START INHIBITED

## NOTES

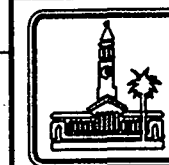
1. IF NECESSARY EQUIPMENT MOUNTED ON THE  
ESCUTCHEON SHALL BE POSITIONED SLIGHTLY OFF  
CENTRE TO ENSURE THAT THEY DO NOT CONTACT  
DOOR RETURNS WHEN THE ESCUTCHEON IS OPENED.

No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.

## AMENDMENT &amp; ISSUE REGISTER

U	MANAGER		DIRECTOR OF PLANNING & DESIGN		
	DATE:		DATE:		
E	DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
	DATE:		DATE:		DATE:
	DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE	
	DRAWN	O.L.P	12.11.93	SUPERVISING ENGINEER	
	TRACED				
	CHECKED				

CADD FILE No.	REFERENCES
777049C	



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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

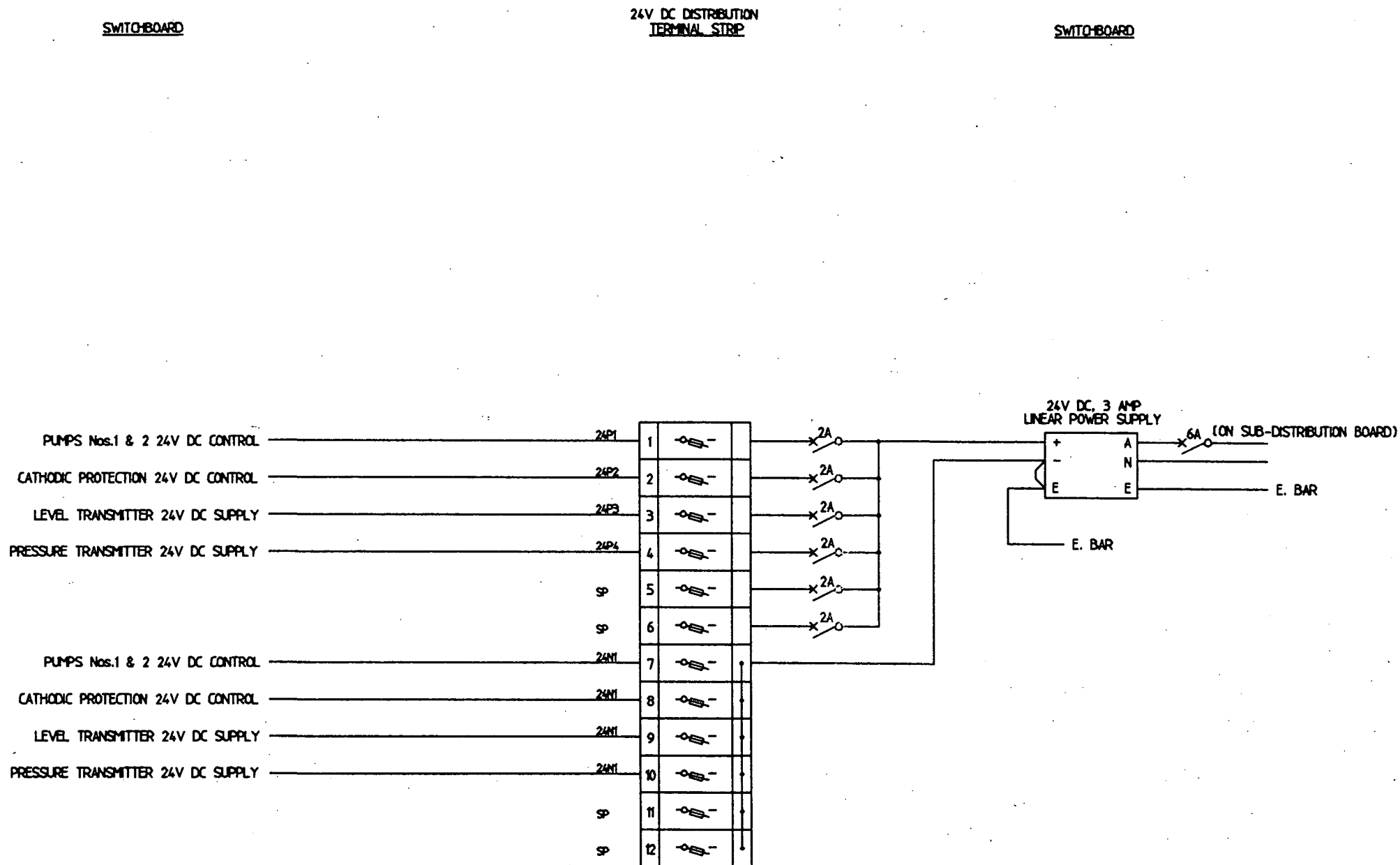
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**SWITCHBOARD  
CUBICLE CONSTRUCTION  
& GENERAL ARRANGEMENT**

SCALE: N.T.S. No. 3 OF 3 SHEETS


DRAWING No. 486/7/7-TK1T049E

AMEND. C

ORIGINAL

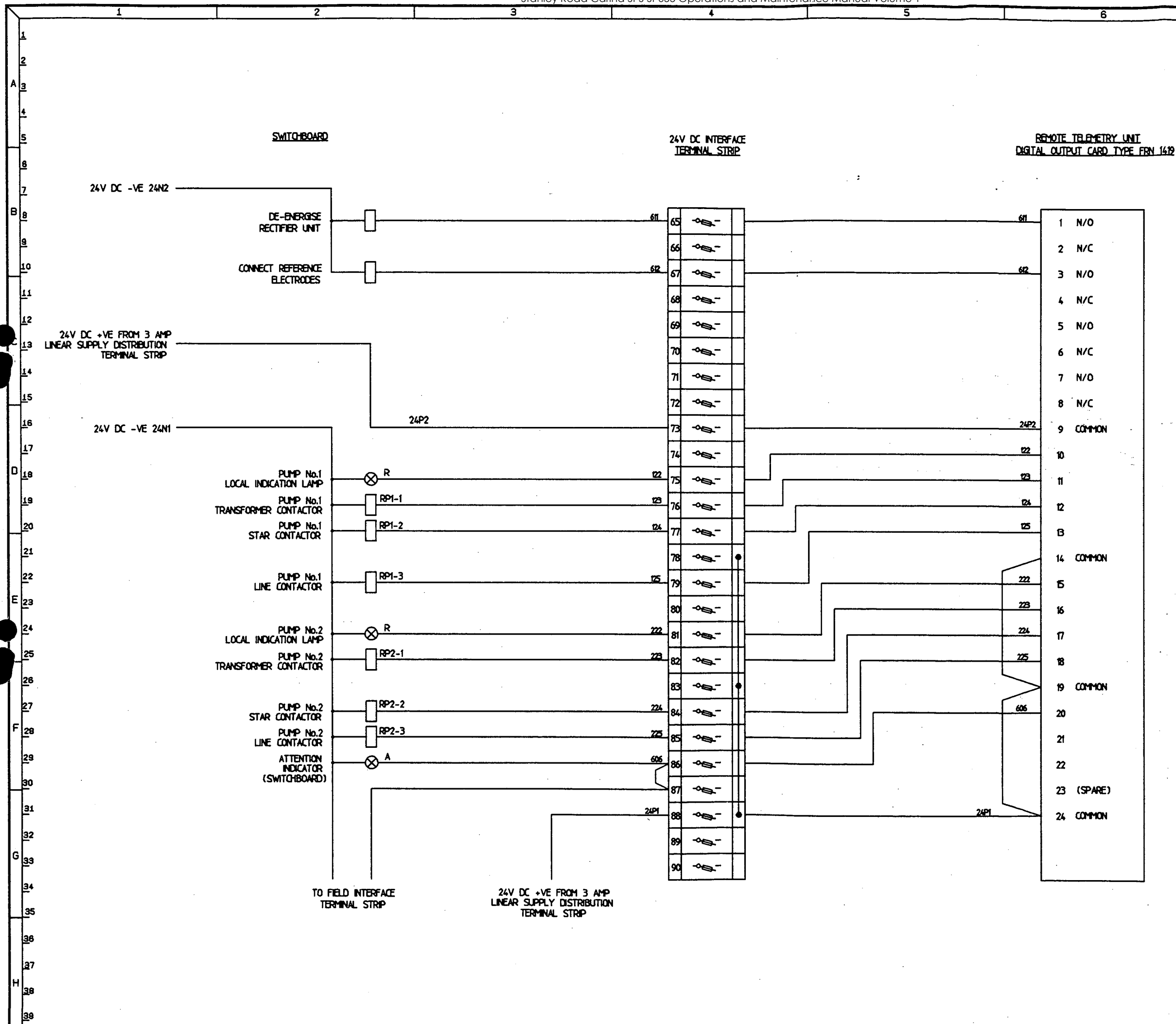


**ORIGINAL**

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A	11.93	ISSUED FOR QUOTATION		O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR		INITIALS
D	<b>AMENDMENT &amp; ISSUE REGISTER</b>			
MANAGER		DIRECTOR OF PLANNING & DESIGN		
DATE:		DATE:		
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
E	DATE:	DATE:		DATE:
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE	
DRAWN	O.L.P	12.11.93	SUPERVISING ENGINEER	
TRACED				
CHECKED				
F	CADD FILE No.		REFERENCES	
	77T056B			
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H	PROJECT: SP55 STANLEY ROAD SEWAGE CONVENTIONAL PUMP STATION			
TITLE: SWITCHBOARD TERMINATION DIAGRAM 24V DC DISTRIBUTION				
SCALE: N.T.S.		No. 1 OF 1 SHEETS		
DRAWING No.				AMEND.
486/7/7-TK1T056E				B



## NOTES



C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT &amp; ISSUE REGISTER

MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE:		DATE:	
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES	
DATE:		DATE:	
DESIGN		ENGINEER IN CHARGE	
DRAWN		SUPERVISING ENGINEER	
TRACED			
CHECKED			

CADD FILE No.		REFERENCES	
77T055C			



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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

TITLE:  
**SWITCHBOARD  
TERMINATION DIAGRAM  
DIGITAL OUTPUTS**

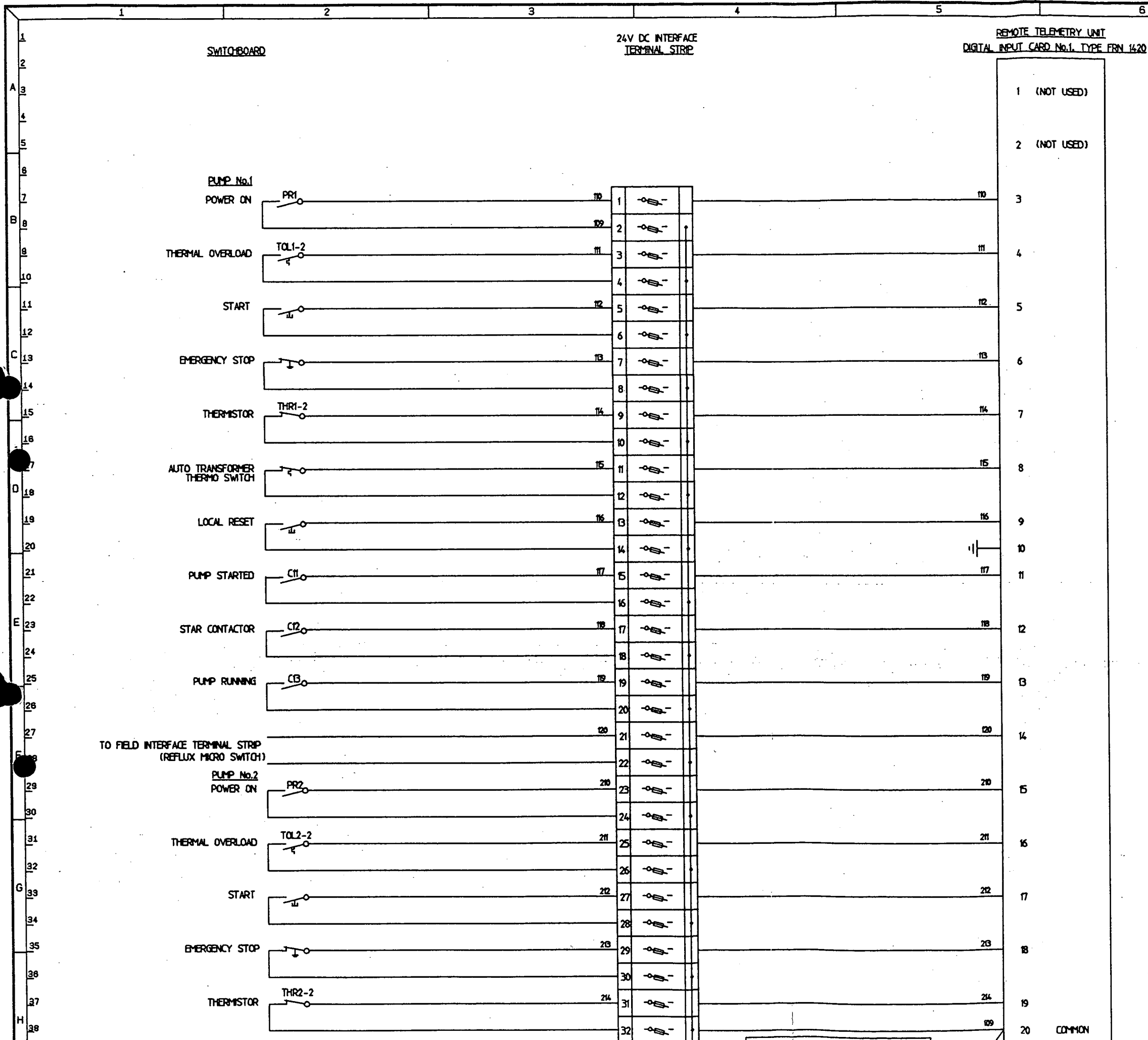
SCALE: N.T.S. No. 1 OF 1 SHEETS

DRAWING No. AMEND.

486/7/7-TK1T055E Page 57 of 105

ORIGINAL

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B							
C							
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	A	11.93	ISSUED FOR QUOTATION				O.L.P.
	No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR				INITIALS
D	<b>AMENDMENT &amp; ISSUE REGISTER</b>						
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	DATE:			DATE:			
	DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION		
	DATE:		DATE:		DATE:		
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	DRAWN	O.L.P	12.11.93	SUPERVISING ENGINEER			
	TRACED						
	CHECKED						
F	CADD FILE No. 77T054C			REFERENCES			
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	<b>PROJECT:</b> SP55 STANLEY ROAD SEWAGE CONVENTIONAL PUMP STATION						
H	<b>TITLE:</b> SWITCHBOARD TERMINATION DIAGRAM DIGITAL INPUTS						
	SCALE: N.T.S.			No. 2 OF 2 SHEETS			
	DRAWING No.						AMEND.
	486/7/7-TK1T054E						C



CONTINUED ON DWG. 486/7/7-TKIT054E

**ORIGINAL**

NOTES

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A	11.93	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT & ISSUE REGISTER

C	MANAGER		DIRECTOR OF PLANNING & DESIGN		
	DATE:		DATE:		
F	DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
	DATE:		DATE:		DATE:

DESIGN	K.H.	11.11.83	ENGINEER IN CHARGE
DRAWN	O.L.P	12.11.83	SUPERVISING ENGINEER
TRACED			
CHECKED			

F	CADD FILE No. 77T053B	REFERENCES
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**BRISBANE  
CITY COUNCIL  
DEPARTMENT OF WATER  
SUPPLY & SEWERAGE  
MECHANICAL & ELECTRICAL SERVICES  
INFORMATION TECHNOLOGY**

PROJECT:  
SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

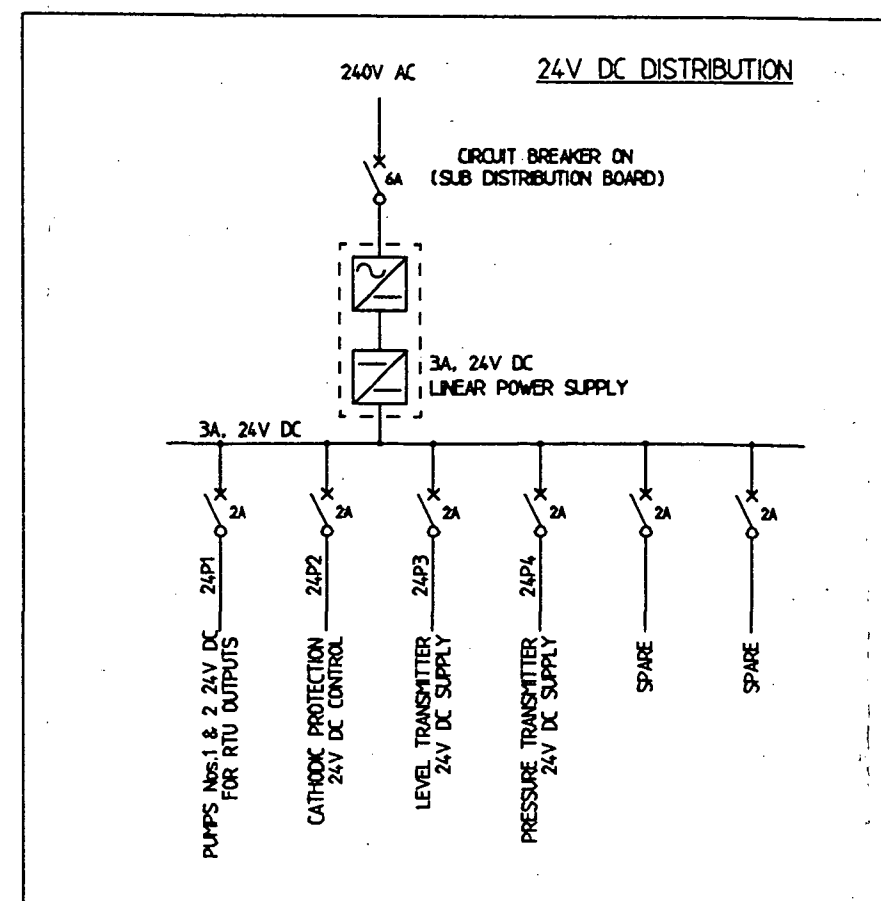
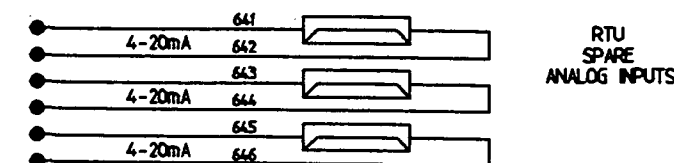
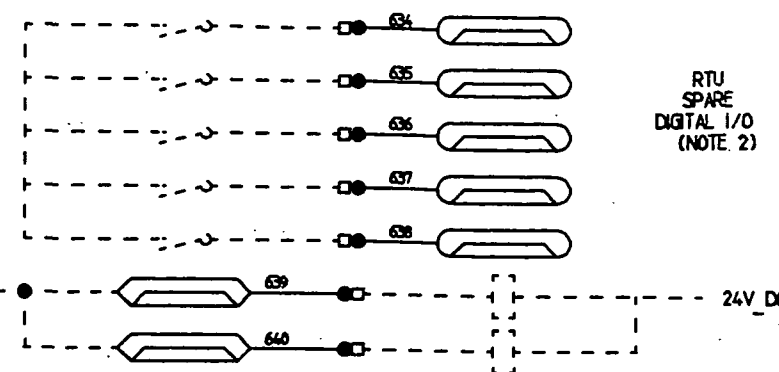
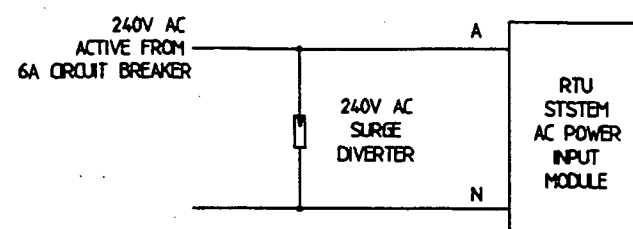
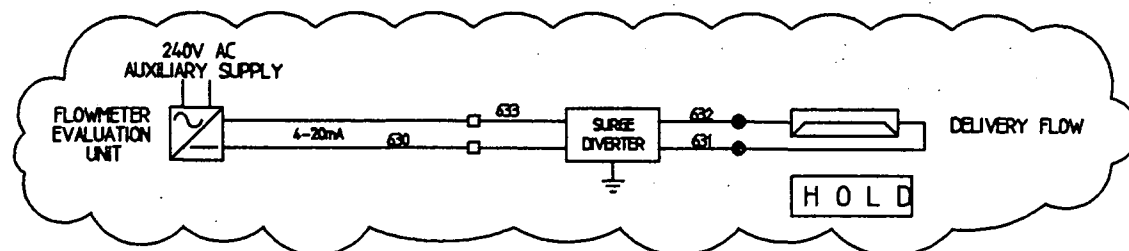
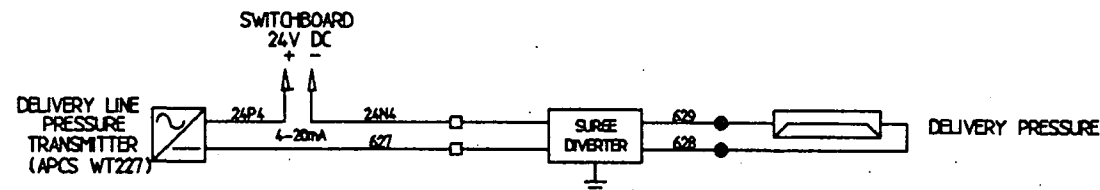
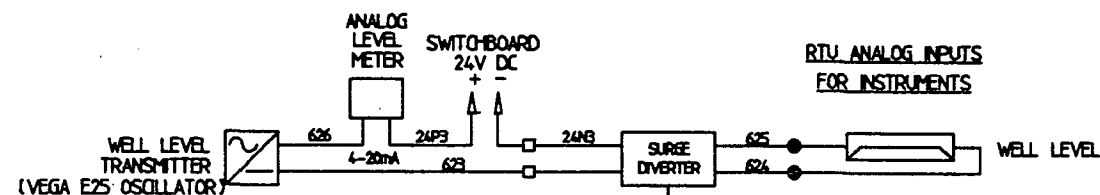
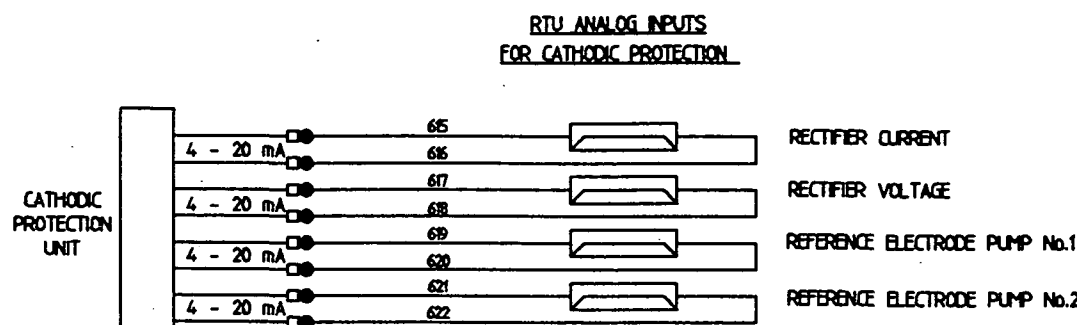
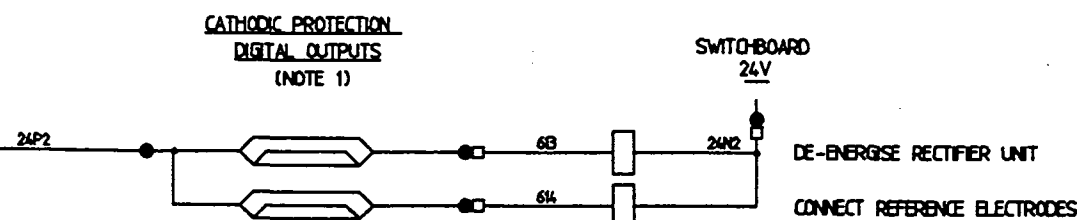
TITLE: SWITCHBOARD  
TERMINATION DIAGRAM  
DIGITAL INPUTS

SCALE: N.T.S.	No. 1 OF 2 SHEETS
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DRAWING No.	486/7/7-TK1T053E	AMER.	B
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# NOTES

- THE TWO (2) 24V DC INTERFACE RELAYS ARE PART OF THE CATHODIC PROTECTION UNIT CONTROL SYSTEM.
- RELAY COILS & CONTACTS SHOWN AS DOTTED ARE FOR FUTURE ONLY. ALLOW ONLY FOR SWITCHBOARD INTERFACE TERMINALS & SPACE FOR TWO (2) ADDITIONAL 24V DC INTERFACE RELAYS.



## AMENDMENT & ISSUE REGISTER

DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
B 12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A 11.93	ISSUED FOR QUOTATION	O.L.P.
No DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

DATE	DATE	DATE
DESIGN	K.H.	11.11.93
DRAWN	O.L.P.	12.11.93
TRACED		
CHECKED		

DATE	DATE	DATE
DESIGN	K.H.	11.11.93
DRAWN	O.L.P.	12.11.93
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DRAWN	O.L.P.	12.11.93
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DATE	DATE	DATE
DESIGN	K.H.	11.11.93
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DATE	DATE	DATE
DESIGN	K.H.	11.11.93
DRAWN	O.L.P.	12.11.93
TRACED		
CHECKED		

DATE	DATE	DATE
DESIGN	K.H.	11.11.93
DRAWN	O.L.P.	12.11.93
TRACED		
CHECKED		

ORIGINAL

## ELV CONTROL

## RTU INPUTS

PUMP No.1  
POWER ON

THERMAL OVERLOAD

START

EMERGENCY STOP

THERMISTOR

AUTO TRANSFORMER THERMO SWITCH

LOCAL RESET

PUMP STARTED

STAR CONTACTOR

PUMP RUNNING

REFLUX MICRO SWITCH

PUMP No.2  
POWER ON

THERMAL OVERLOAD

START

EMERGENCY STOP

THERMISTOR

AUTO TRANSFORMER THERMO SWITCH

LOCAL RESET

PUMP STARTED

STAR CONTACTOR

PUMP RUNNING

REFLUX MICRO SWITCH

COMMON CONTROL  
SITE POWER FAILURE

SURCHARGE ALARM

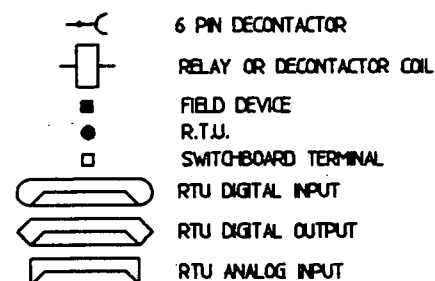
PUMP WELL SUMP PUMP  
OPERATED

PUMP WELL FLOODED

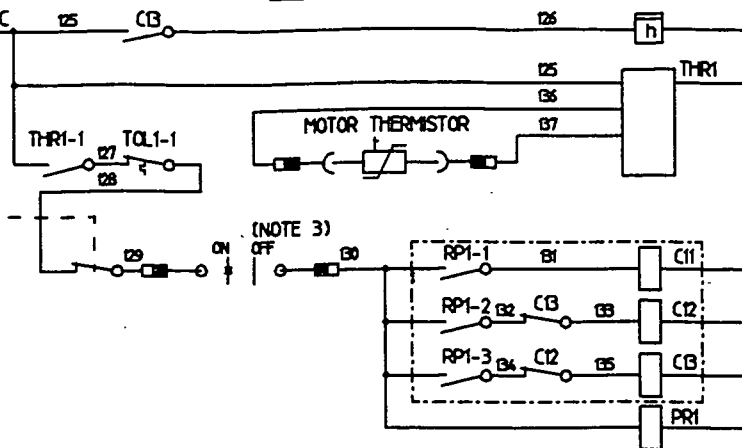
LOCAL REMOTE

SITE ATTENTION ALARM  
RESET PUSHBUTTON

## LEGEND:



## 240V AC CONTROL

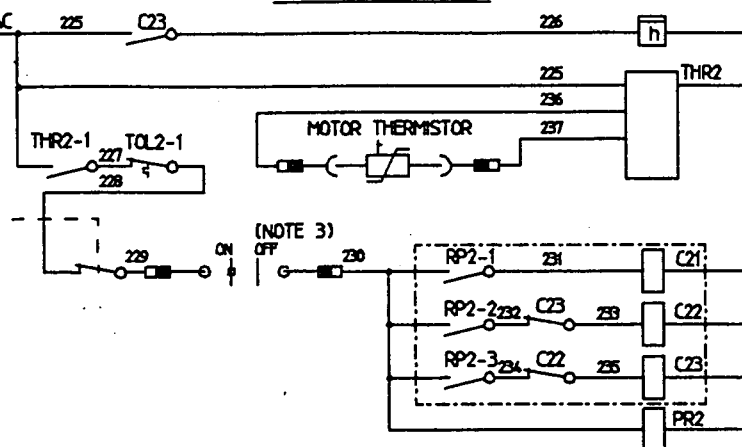
240V AC FROM  
PUMP CONTROL  
CIRCUIT (SHT.1)

PUMP No.1

HOURS RUN

THERMISTOR RELAY  
AUTO RESET

## 240V AC CONTROL

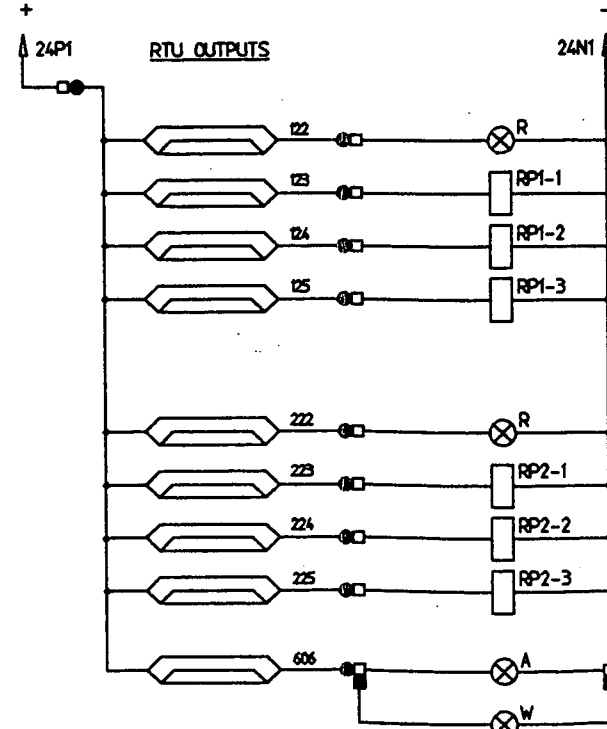
240V AC FROM  
PUMP CONTROL  
CIRCUIT (SHT.1)

PUMP No.2

HOURS RUN

THERMISTOR RELAY  
AUTO RESETSWITCHBOARD  
24V DC

## RTU OUTPUTS



## NOTES

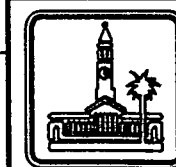
- 24V DC INPUT / OUTPUT INDIVIDUAL PROTECTION FUSES NOT SHOWN. (I.e. PART OF INTERFACE TERMINAL STRIP U.O.N.).
- ALL WIRES & CABLE CORES TO BE FERRULED WITH GRAVOPLAST COMPATIBLE LABELLING. THE FOLLOWING PREFIXES SHALL BE USED:  
No.1 PUMP = 1.  
No.2 PUMP = 2.  
No.3 PUMP = 3.  
SUMP PUMP = 5  
COMMON WIRING = 6 (I.e. FLOW, LEVEL, PRESSURE)
- ON / OFF ISOLATOR SWITCHES LOCATED ADJACENT TO MOTORS IN PUMP WELL.

C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT &amp; ISSUE REGISTER

MANAGER		DIRECTOR OF PLANNING & DESIGN			
DATE:		DATE:			
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	
DATE:		DATE:		DATE:	
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE		
DRAWN	O.L.P	12.11.93	SUPERVISING ENGINEER		
TRACED					
CHECKED					

CADD FILE No.	REFERENCES
777051C	

BRISBANE  
CITY COUNCILDEPARTMENT OF WATER  
SUPPLY & SEWERAGEMECHANICAL & ELECTRICAL SERVICES  
INFORMATION TECHNOLOGY

PROJECT:  
SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

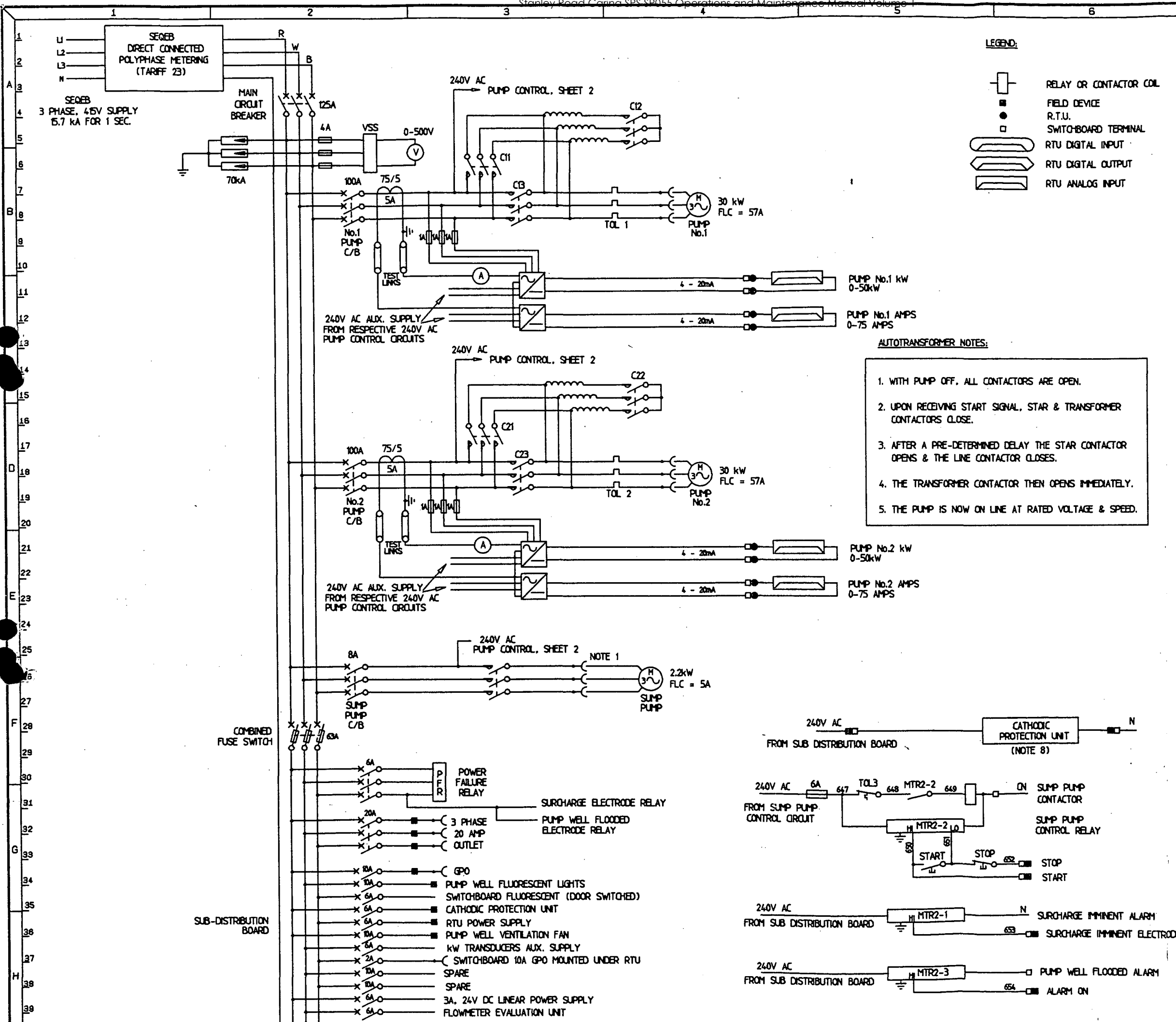
TITLE:  
SWITCHBOARD ELECTRICAL SCHEMATIC  
& THREE LINE DIAGRAM

SCALE: N.T.S. No. 2 OF 3 SHEETS

DRAWING No. 486/7/7-TK1T051E

C

ORIGINAL



## NOTES

1. MAIN PUMP DECONTACTORS & SUMP PUMP OUTLET LOCATED IN UPPER SECTION OF PUMP WELL.
2. SWITCHBOARD NEUTRAL & EARTH LINKS TO BE POSITIONED ADJACENT TO EACH OTHER IN CLOSE PROXIMITY TO THE MAIN INCOMING SWITCH.

C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.
No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS

## AMENDMENT & ISSUE REGISTER

E	MANAGER		DIRECTOR OF PLANNING & DESIGN		
	DATE:		DATE:		
E	DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
	DATE:		DATE:		DATE:
	DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE	
	DRAWN	G.L.P	12.11.93	SUPERVISING ENGINEER	
E	TRACED				
	CHECKED				

F	CADD FILE No. 77T050C	REFERENCES
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**BRISBANE  
CITY COUNCIL**  
**DEPARTMENT OF WATER  
SUPPLY & SEWERAGE**  
**MECHANICAL & ELECTRICAL SERVICES**  
**INFORMATION TECHNOLOGY**

PROJECT:  
SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

TITLE:	SWITCHBOARD ELECTRICAL SCHEMATIC & THREE LINE DIAGRAM
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SCALE: N.T.S.	No. 1 OF 3 SHEETS
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DRAWING No.	AMEND.
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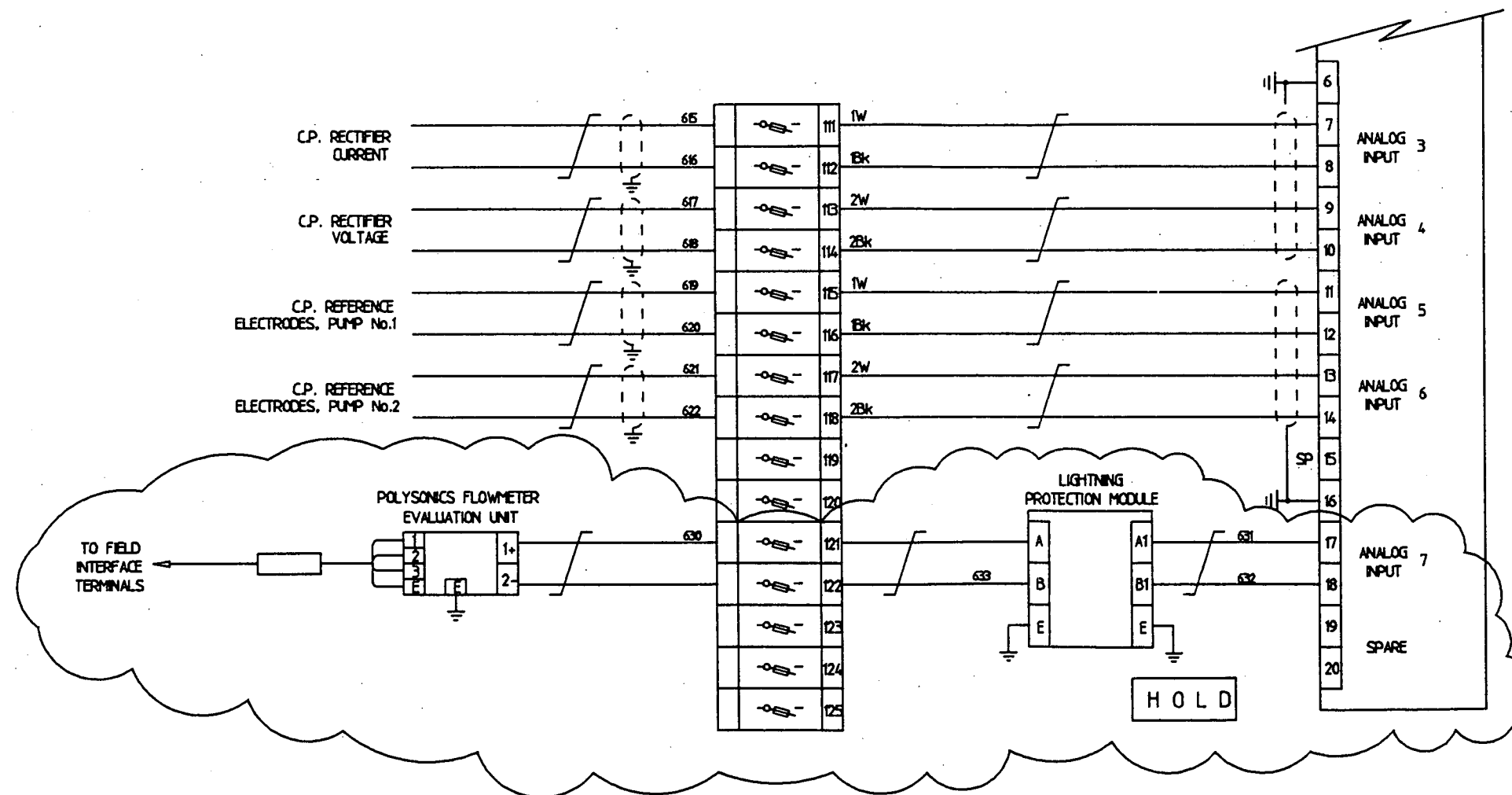
486/7/7-TK1T050E

10

# NOTES

CATHODIC PROTECTION UNIT

24V DC INTERFACE  
TERMINAL STRIP

REMOTE TELEMETRY UNIT  
ANALOG INPUT CARD No.2 TYPE FRN 1421


No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
C	4.94	MODIFIED	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 PLANNING & DESIGN		
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DATE:	DATE:		DATE:	
E	DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
	DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER
	TRACED			
	CHECKED			

CADD FILE No.	REFERENCES
77T059C	



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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

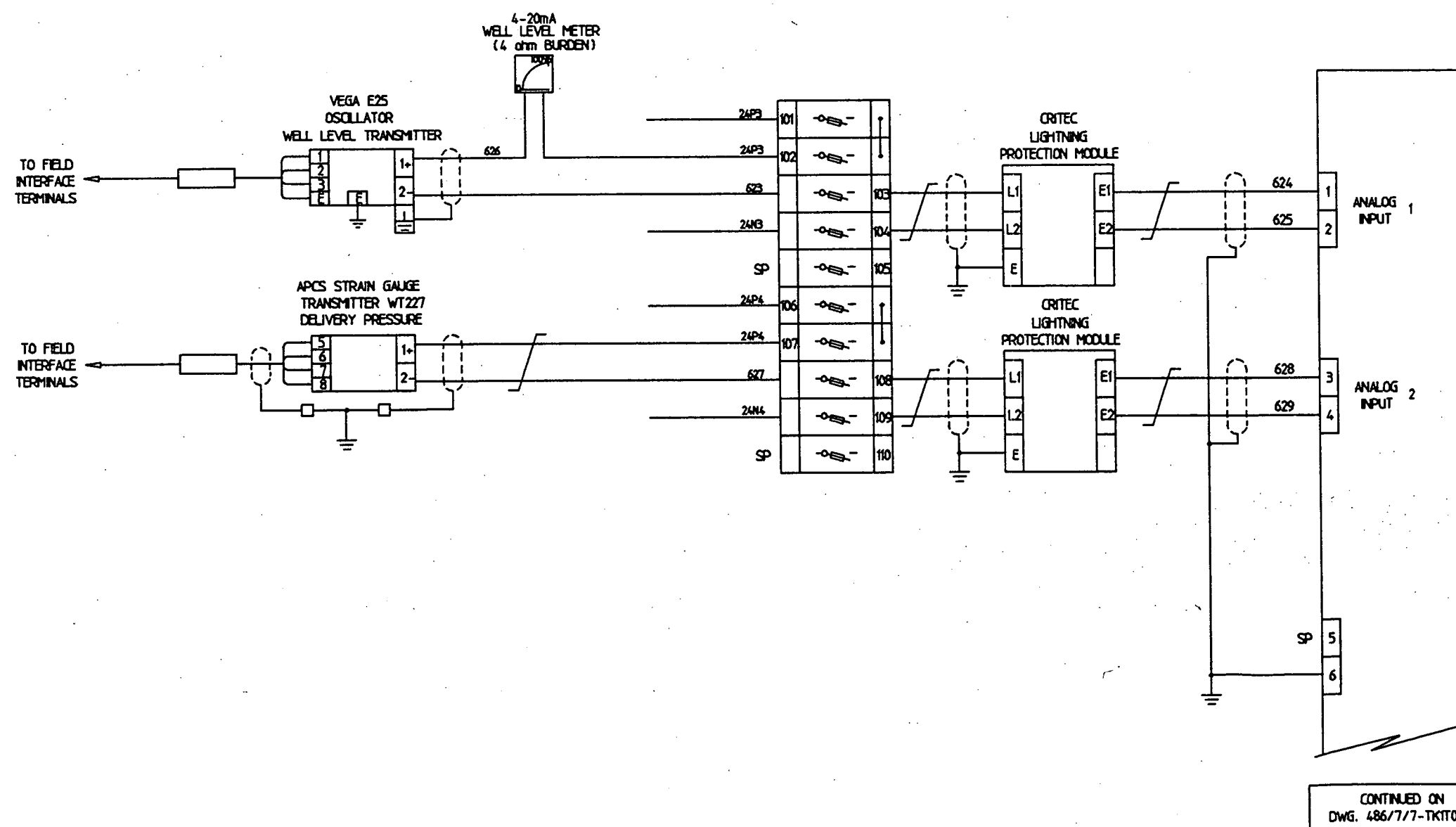
TITLE:  
**SWITCHBOARD  
TERMINATION DIAGRAM  
ANALOG INPUTS**

SCALE: N.T.S.	No. 3 OF 3 SHEETS
DRAWING No. <b>486/7/7-TK1T059E</b>	AMEND. <b>C</b>

ORIGINAL

## NOTES

INSTRUMENT TRANSMITTERS

24V DC INTERFACE  
TERMINAL STRIPREMOTE TELEMETRY UNIT  
ANALOG INPUT CARD No.2 TYPE FRN 1421

No	DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A	11.93	ISSUED FOR QUOTATION	O.L.P.

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MANAGER	DIRECTOR OF PLANNING & DESIGN		
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DIRECTOR OF CONSTRUCTION	DIRECTOR OF N & E SERVICES	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	
DATE:	DATE:	DATE:	
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.	12.11.93	SUPERVISING ENGINEER
TRACED			
CHECKED			

CADD FILE No.	REFERENCES
77T058C	



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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

TITLE:  
**SWITCHBOARD  
TERMINATION DIAGRAM  
ANALOG INPUTS**

SCALE: N.T.S. No. 2 OF 3 SHEETS

DRAWING No. 486/7/7-TK1T058E AMEND. C

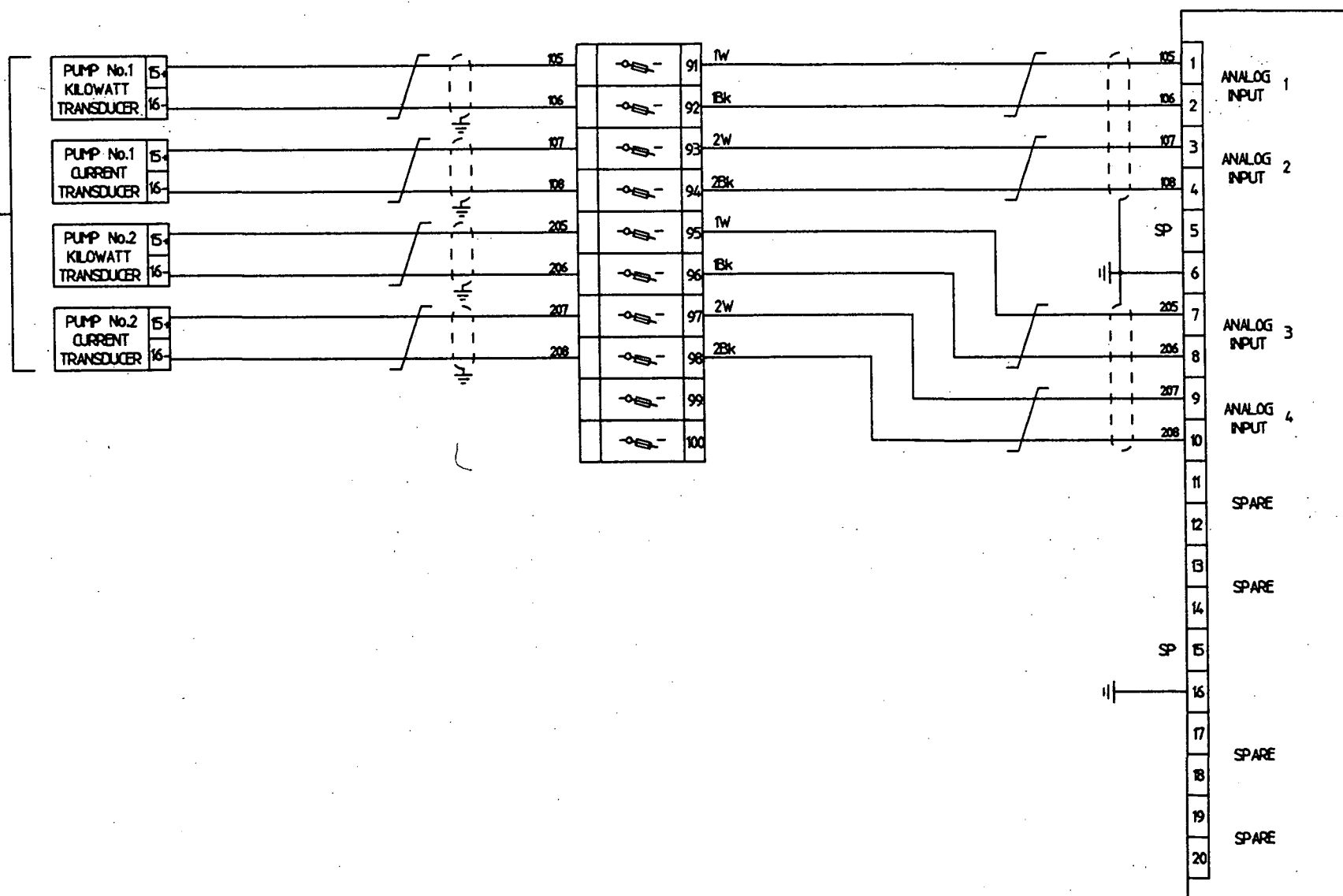
ORIGINAL



INSTRUMENT TRANSMITTERS

24V DC INTERFACE  
TERMINAL STRIP

REMOTE TELEMETRY UNIT  
ANALOG INPUT CARD No.1 TYPE FRN 1421

TO  
CURRENT TRANSFORMERS  
& 415V / 240V  
POWER CONNECTIONS


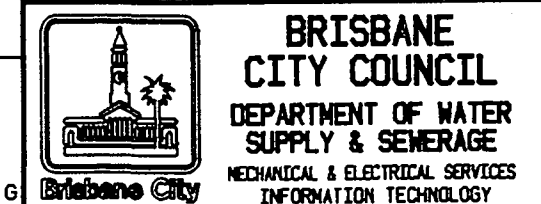
## NOTES

C	4.94	MODIFIED	O.L.P.
B	12.93	ISSUED FOR CONSTRUCTION	O.L.P.
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DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES		DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	
DATE:		DATE:		DATE:	
DESIGN	K.H.	11.11.93	ENGINEER IN CHARGE		
DRAWN	O.L.P	12.11.93	SUPERVISING ENGINEER		
TRACED					
CHECKED					

CAD FILE No.	REFERENCES
77T057C	


PROJECT:  
SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION

TITLE:  
SWITCHBOARD  
TERMINATION DIAGRAM  
ANALOG INPUTS

SCALE: N.T.S. No. 1 OF 3 SHEETS

DRAWING No. 486/7/7-TK1T057E

AMEND. C

ORIGINAL

## NOTES

1. POWER INTERFACE TERMINALS NOT SHOWN.  
POWER TERMINALS SHALL BE ALLOCATED FOR WHEN  
DESIGNING & BUILDING THE SWITCHBOARD.

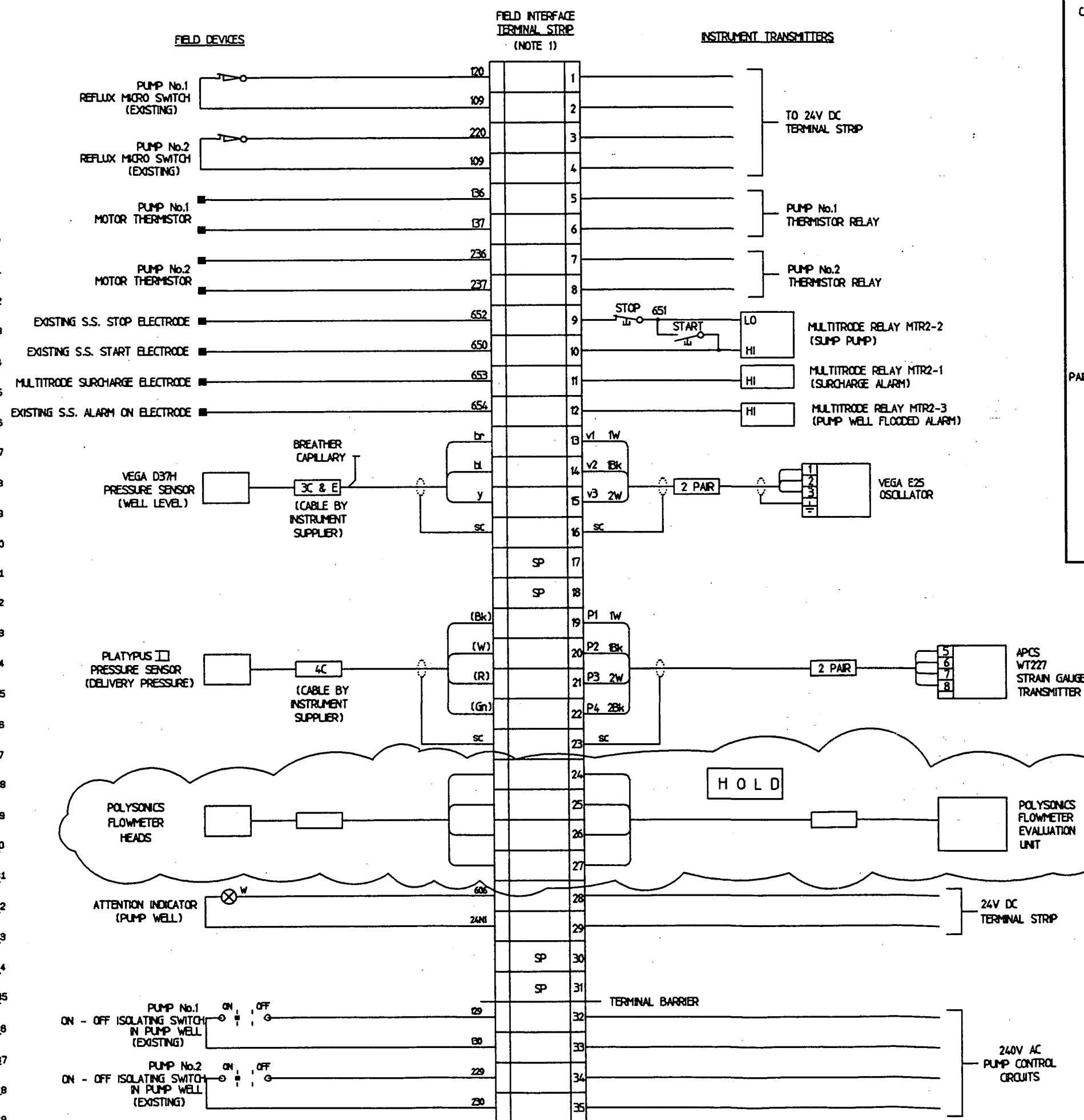
## CABLE SCHEDULE:

## 20 CORE MULTI-CORE

CORE No.	
1	136
2	137
3	236
4	237
5	129
6	130
7	229
8	230
9	R
10	W
11	B
12	ACTIVE
13	NEUTRAL
14	ACTIVE
15	NEUTRAL
16	ACTIVE
17	NEUTRAL
18	SPARE
19	SPARE
20	SPARE

## 10 PAIR DECON

PAIR	W	B	
1	W	120	REFLUX MICRO No.1
1	B	109	REFLUX MICRO No.1
2	W	220	REFLUX MICRO No.2
2	B	109	REFLUX MICRO No.2
3	W	652	SUMP STOP ELECTRODE
3	B	650	SUMP START ELECTRODE
4	W	654	PUMP WELL FLOODED
4	B		
5	W	606	ATTENTION ALARM INDICATOR
5	B	24NI	ATTENTION ALARM INDICATOR
6	W		
6	B		



ORIGINAL



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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

TITLE:  
**SWITCHBOARD  
TERMINATION DIAGRAM  
FIELD INTERFACE TERM. STRIP**

SCALE: N.T.S. No. 1 OF 1 SHEETS

DRAWING No. AMEND.

486/7/7-TK1T060E

# NOTES

- DOOR INSULATION TO BE 25mm THICK FIBREGLASS THERMAL INSULATION IN ALUMINUM SANDWICH. INSULATION TO BE SECURELY FASTENED TO INSIDE OF DOOR BY MEANS OTHER THAN ADHESIVE.
- THERMAL INSULATION SHALL COVER AS MUCH AS POSSIBLE OF THE INSIDE DOOR SURFACE AREA.
- ALL SUNSHIELD MATERIALS 316 STAINLESS STEEL SHEETING 1.6mm THICK.
- 30mm LONG STAINLESS STEEL STANDOFFS TO BE DE-MOUNTABLE FROM INSIDE THE CUBICLE USING DOMED NUTS, BUT TO BE WELDED TO ACTUAL SUNSHIELD. STANDOFFS TO BE 12mm DIA. SS ROD.
- 'Z' SECTION WELDED TO TOP OF SWITCHBOARD. REMOVABLE SUNSHIELD CONNECTED TO 'Z' SECTIONS.
- THIS SWITCHBOARD DESIGN CAN ACCOMMODATE THE THERMAL LOADS OF SEWAGE PUMPS UP TO A RATING OF 63KW EACH IN CONJUNCTION WITH THE CONTROL & MONITORING EQUIPMENT LISTED ON DWG. 486/7/7-RJT03SE. FOR HIGHER PUMP RATINGS THE THERMAL RATING OF THE SWITCHBOARD SHALL BE RECALCULATED.

DATE	AMENDMENT / ISSUE TO / ISSUE FOR	INITIALS
B 12.93	ISSUED FOR CONSTRUCTION	O.L.P.
A 11.93	ISSUED FOR QUOTATION	O.L.P.

## AMENDMENT & ISSUE REGISTER

MANAGER	DIRECTOR OF PLANNING & DESIGN
DATE:	DATE:
DIRECTOR OF CONSTRUCTION	DIRECTOR OF M & E SERVICES
DATE:	DATE:
DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION	DATE:
DESIGN	K.H.
11.11.93	ENGINEER IN CHARGE
DRAWN	O.L.P.
12.11.93	SUPERVISING ENGINEER
TRACED	
CHECKED	

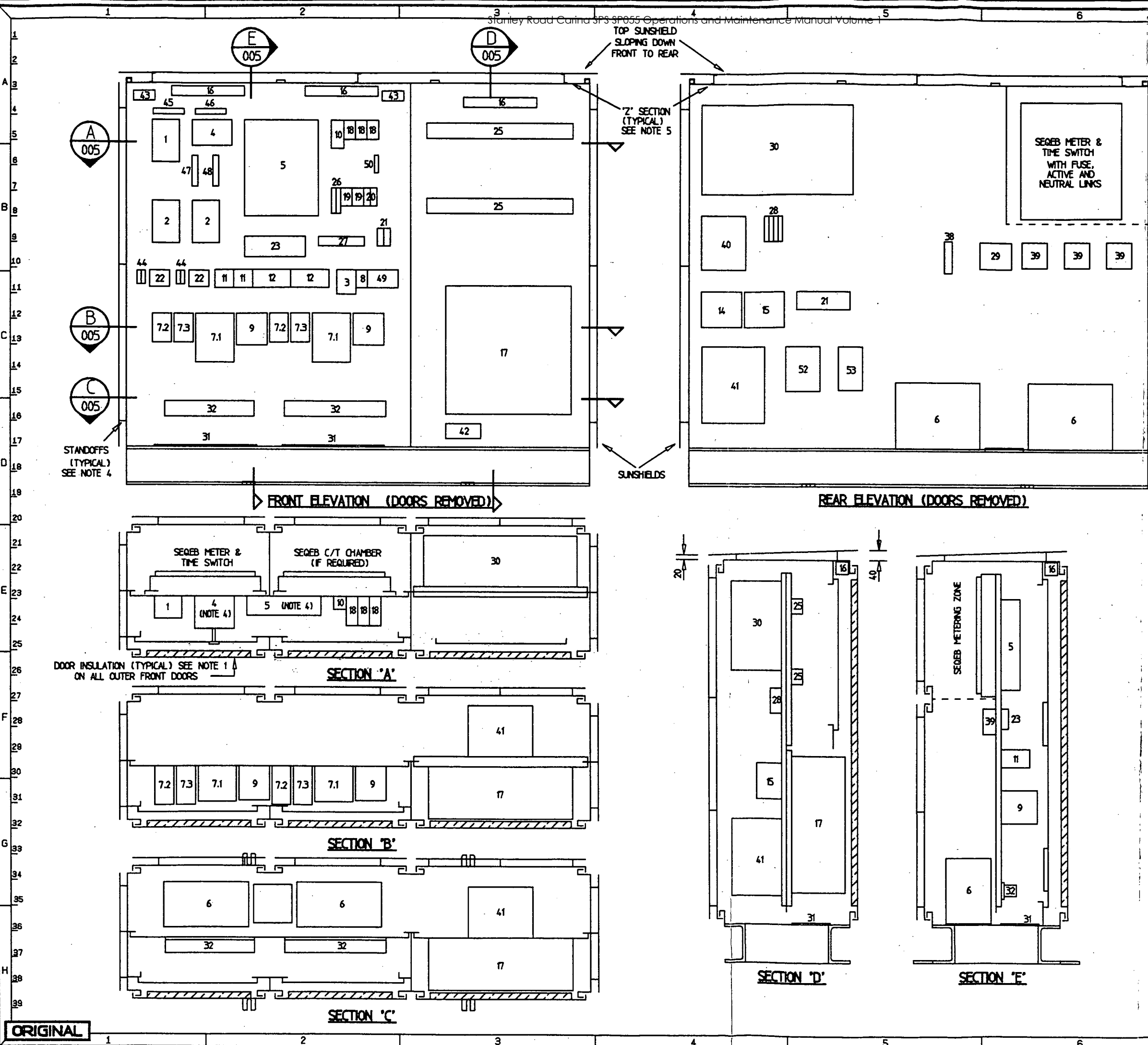
CADD FILE No.	REFERENCES
77T048B	

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

PROJECT:  
**SP55 STANLEY ROAD  
SEWAGE CONVENTIONAL  
PUMP STATION**

TITLE:  
**SWITCHBOARD CUBICLE  
THERMAL INSULATION  
& SUNSHIELD DETAILS**

SCALE: N.T.S.	No. 2 OF 3 SHEETS
DRAWING No.	AMEND.
486/7/7-TK1T048E	B



**REQUISITION FOR MATERIALS OR SERVICES**

PRINT NEATLY IN BLOCK LETTERS

WE 231465

From Dept/Div. <i>WSSS</i>	Depot/Section <i>Tech Services</i>	Date <i>24-12-93</i>
-------------------------------	---------------------------------------	-------------------------

To Dept/Div. <i>Field Sect</i>	Section	Depot/Location
-----------------------------------	---------	----------------

Location of Job <i>Stanby Rd. Conv.</i>
--------------------------------------------

Description <i>Please check delivery pressure of pumps &amp; pass on to me "URGENT Need to order instrument".  "This may have already been done".  17 M Head.</i>	Attach additional information to requisition and quote Req. No. on attachment.
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------

Account Code Description	Estimated Cost
Account Code <i>S T S A 3 / 31 / 693</i>	
Contact Officer's Name (please print) <i>P. FRATER</i>	Officer Code <i>10E</i>
Location	Phone No.

Ext. ....
Requisitioning Officer's Name (please print)
Requisitioning Officer's Signature

Ext. <i>898</i>
Authorising Officer's Name (please print)
Authorising Officer's Signature

NOT TO BE USED FOR REQUISITIONING PURCHASES OR  
ITEMS FROM SUPPLY STORES

Stanley

Rev 1, 8/12/93

## PROCEDURES FOR THE IMPLEMENTATION OF SWITCHBOARDS WITH I.D.T.S. FUNCTIONALITY BY M & E (METRO) STAFF

This document lists the basic steps to be followed when installing switchboards with I.D.T.S. Functionality at existing or new sewage pump stations. This work shall be the responsibility of a Technical Officer or Special Class Electrician.

The steps are generally in time sequence.

Design criteria and budget format are attached.

Item	Description
1.0	Establish project budget. (See budget format attached.)
2.0	<p>Establish project schedule.</p> <p>Note: Long lead items are;</p> <ul style="list-style-type: none"> <li>· switchboard 6 - 8 weeks</li> <li>· RTU 6 - 8 weeks</li> <li>· polyphase two rate meters 2 - 3 months</li> <li>· Vega probe, 4 - 6 weeks, if non standard length cable required.</li> </ul>
3.0	<p>If an upgrade, do a site audit, as per I.D.T.S. documentation. If a new site, design Engineer* to advise;</p> <ul style="list-style-type: none"> <li>· motor kW ratings</li> <li>· sewage level control range</li> <li>· pump delivery pressure range</li> </ul> <p>to allow early ordering of switchboard and field instruments.</p> <p>* The design Engineer may be from an external consultant or M &amp; E Capital Projects or M &amp; E (Metro).</p>
4.0	<p>Prepare switchboard specification, Preferred Equipment List, Scope Document and drawings for quotation by at least 3 switchboard suppliers. Example documents are available in Ken Harvey's files. Issue quotation documentation. One (1) week is adequate for such quotes.</p>
5.0	<p>Advise relevant SEQEB Depot of the project, preferably in writing, covering such issues as;</p> <ul style="list-style-type: none"> <li>· metering requirements (what, where, when)</li> <li>· fault level at site (for switchboard design drawings)</li> <li>· method of SEQEB mains changeover (i.e. use of pillar or in-line cable joints).</li> </ul> <p>BCC has received SEQEB dispensation for the:</p> <ul style="list-style-type: none"> <li>· use of in-line joints for switchboard upgrades</li> <li>· use of dual rate, polyphase meters (whole current or C.T. driven).</li> </ul>

Rev 1, 8/12/93

Item	Description
6.0	Place order on Information Technology (I.T.) Section for; RTU hardware RTU software, including Functional Specification for the site, communications and Operator Interface radio path survey.
7.0	If an upgrade, get quotation from Aggreko Generator Rentals for use of suitably rated generator during changeover of switchboards. Place order as soon as possible.
8.0	Order field instrumentation (see design criteria attached); Vega level probe for pump control Platypus II pressure probe for delivery pressure Multitrode single point probe for surcharge control Site attention alarm light. The Vega E25 Adjustment unit and Platypus II A.P.C.S. transmitter shall be issued free to the switchboard contractor.
9.0	Review the RTU Functional Specification from I.T., sign off the approved version and return to I.T. to allow preparation of detailed RTU code.
10.0	If an upgrade, prepare a set of installation sketches and a detailed installation schedule for the Field Section. Issue sketches as early as possible (i.e. at least 4 weeks before commissioning date) to enable ordering of miscellaneous equipment and preparation of site works etc.
	It is essential that site meetings be held (especially for upgrades) with the Electrical Field Foreman prior to the preparation of the detailed installation schedule. It will be the Technical Officer or Special Class Electrician's responsibility to manage and design the work, enabling the Field Section to concentrate on the installation.
11.0	After placing order for switchboard: Get a switchboard construction schedule from the contractor nominating drawing review date, workshop test date and delivery date). Review switchboard construction drawings submitted by contractor. Contractor workshop drawings shall be signed off "approved as noted" and returned to the Contractor A.S.A.P. so as to not to delay switchboard delivery. Request a recommended spares list. Ensure that maintenance manuals and label lists are submitted for approval prior to final workshop testing.
12.0	Conduct ongoing expediting for; delivery of instruments switchboard construction ordering of meters and C.T.'s by SEQEB RTU and software delivery.

Rev 1, 8/12/93

Item	Description
13.0	If an upgrade, determine if wall mounted junction boxes are needed for power (415V/240VAC) and control (24VDC) cable extensions to new switchboard. Order junction boxes as required via EFPS Electrical Workshop.
14.0	Witness switchboard factory tests by the contractor and approve switchboard ready for delivery by the contractor. EFPS Electrical Workshop to check current and kW transducers during factory tests.
15.0	If an upgrade, have generator delivered to site and in conjunction with portable test panel and have one (1) main pump and the sump pump transferred to generator power.
16.0	Contractor delivers switchboard to site and bolts down. Field Section grouts switchboard base.
17.0	SEQEB installs and tests metering. Switchboard made ready to accept SEQEB mains power.
18.0	Site works by Field Section, as per installation sketches and detailed installation schedule. This work includes standard pre-energisation tests.
19.0	One main pump to be commissioned on RTU control so that the other main pump being supplied by the generator can be cut over to the new switchboard.
20.0	Final commissioning of pump station under full RTU control.
21.0	Site clean up, demobilisation and completion of "as built" drawing mark ups by Field Section.

**1993/94 CAPITAL PROJECTS****BUDGET ESTIMATES**

SITE:

	<b><u>ITEM DESCRIPTION</u></b>	<b><u>BUDGET PRICES \$</u></b>	
		<b><u>Supply</u></b>	<b><u>Install</u></b>
1.	Switchboard		
2.	Remote Telemetry Unit (including radio system)		
	- Hardware		
	- Software		
3.	Starters external to switchboard		
	- Pri. Res.		
	- Sec. Res.		
	- VVVF		
4.	Instruments		
	- Analog Level (Vega)		
	- Digital Level (Multitrode)		
	- Pressure (Platypus II)		
	- Flow (Polysonics)		
5.0	<b><u>Site Works (Installation)</u></b>		
5.1	Core holes		
5.2	3 $\phi$ mains supply (SEQEB)		
5.3	3 $\phi$ mains cable (SEQEB pillar to swbd)		
5.4	Motor power cable extension		
5.5	Control cable extensions		
5.6	Duct/Tray		
5.7	Site attention light (dry well)		
5.8	Genset hire		
5.9	Remove old switchboard		
5.10	SEQEB time (isolation, meter testing etc.)		
5.11	Earthing		
5.12	Power junction box		
5.13	Control junction box		
5.14	Dry well decontactors		
5.15	Civil preparation (excavation, concrete etc)		
5.16	Mechanical preparation		
5.17	Changeover labour		
	- L/hand		
	- Electrician		
	- Apprentice		
	- Helper		
5.18	Landscaping		
5.19	Miscellaneous materials		



Rev 1, 8/12/93

<b>6.0</b>	<b><u>Site Works (Commissioning)</u></b>		
6.1	Electrical Engineer		
6.2	Technical Officer		
6.3	Special Class Electrician		
6.4	Field Section Staff		
<b>7.0</b>	<b><u>Design and Project Management</u></b>		
7.1	Electrical Engineer		
7.2	Technical Officer		
7.3	Special Class Electrician		
7.4	Field Section Staff		
<b>8.0</b>	<b><u>Radio System</u></b>		
8.1	Radio parts		
8.2	Radio path survey and report		
	<b>SUBTOTALS 1</b>		
<b>9.0</b>	<b><u>Administration &amp; Supervision</u></b>		
	13.5% on Materials		
	40 % on Labour		
	<b>SUBTOTALS 2</b>		
<b>10.0</b>	<b><u>Contingency</u></b>		
	15% on all costs		
<b>11.0</b>	<b>Overall Totals</b>		
<b>12.0</b>	<b>Grand Total</b>		

Rev 1, 8/12/93

**Sites with IDTS Functionality**  
**1993/94 Capital Works Program**  
**Instrument Design Criteria**

**1. DELIVERY PRESSURE**

1.1 Check rising main pressure (m water gauge) and select Platypus II sensor with correct measuring range.

1.2 Generic type is:

Platypus II sensor, 4 wire strain gauge with 0.5 inch BSP male process connection with suitable length of cable, and ACPS-WT227 din rail mounted 4 - 20 mA loop powered strain gauge transmitter.

1.3 Supplier:

Electrochemical Engineering Pty Ltd.  
170 Hyde Road  
Yeronga Queensland 4104  
Ph (07) 848 3833  
Fax (07) 848 3498  
Contact: Arthur Kokolekos

**2. WELL LEVELS (ANALOG AND DIGITAL)**

2.1 Determine pumping range and surcharge levels for the site and select pressure range (m water gauge) to cover these levels.

2.2 Generic type for analog measurements is:

Vega D37H/E25 Pressure Sensor  
Complete with E25 oscillator (4 - 20mA output) and cable to suit.

2.3 Supplier:

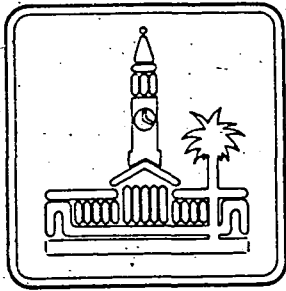
Vega Australia Pty Ltd  
4/15 Ferguson Street  
Underwood Queensland 4119  
Ph (07) 841 1477  
Fax (07) 341 1311  
Contact: Eve Robertson

- 2.4 Select Multitrode single point probe (for interfacing with Multitrode MTR2 relay in switchboard) with suitable length of single core cable.

Supplier:

BEP Engineering Products Pty Ltd  
123 Boundary Street  
West End Queensland 4101  
Ph (07) 844 1711  
Fax (07) 844 8878  
Contact: Charles Binyon

- 3.0 Cable lengths for all instruments are selected such that the cable from the sensor to the field interface terminals in the switchboard is continuous i.e. no joints.



Brisbane City

## BRISBANE CITY COUNCIL

EAGLE FARM PUMPING STATION  
 CNR KINGSFORD SMITH DRIVE & VIOLET STREET  
 EAGLE FARM QLD.

G.P.O. BOX 1434  
 BRISBANE QLD. 4001

TELEX CIVICS AA41910  
 FACSIMILIE 2680847

URGENT

Ray Thompson

To SEQEB- MANSFIELD		Attention <i>223 6510</i> KEN CLIVE <i>Senior T.O.</i>	Fax.No. 07-343 1531
Date 16/11/93	No. of Pages 2	From KEN HARVEY	Phone No. 07-268 0833
RE: SWITCHBOARD UPGRADE, STANLEY ROAD, CARINA			

en,

Further to our fax resent 9/11/93 we are now preparing designs for the Stanley Rd switchboard and would like to confirm that a polyphase, two rate meter and a time switch will be made available for installation into the switchboard by yourselves during commissioning which is planned for the week ending 4th February 1994.

Please note that we have received approval for the use of polyphase meters in our new style aboveground switchboards from Mr Max Mackenzie, SEQEB Tests and Measurement Group, Banyo (see copy of letter attached).

The use of a polyphase two rate meter allows us to design a switchboard of minimum dimensions with reduced public impact.

Your compliance with this request would be appreciated and would allow us to standardise this switchboard design with those being installed in the SEQEB, Geebung and SEQEB, Taringa area's where polyphase two rate metering has recently been approved for use in our switchboards.

Regards,

*Ken Harvey*  
 KEN HARVEY

Electrical Engineer

*Telecom 17/11/93*  
*Ray Thompson - will confirm delivery of*  
*P/P meter for 4th Feb. Think he*  
*has one on the shelf and will*  
*re-work it for*  
*our job.*

N.B. Existing metering is direct connected, polyphase.  
 We assume you will re-use this equipment in our new switchboard.

# The South East Queensland Electricity Board

150 Charlotte Street Brisbane Qld 4000  
 GPO Box 1461 Brisbane Qld 4001 Australia  
 Telephone National (07) 223 4000  
 International +61 7 223 4000  
 Telegraphic Address - SEQEB Brisbane  
 Facsimile National (07) 229 5921 (07) 229 7545  
 International +61 7 229 5921 +61 7 229 7545  
 Telex AA 41079

Local Office:

Address all correspondence to the Secretary.

In reply please quote 692/30/17  
 ACII:MM:lb

Enquiries: Mr M Mackenzie  
 223 5317

Brisbane City Council  
 GPO Box 1434  
 BRISBANE Q 4001

ATTENTION: Mr K Harvey

19 July, 1993

Dear Sir,

Re:

## SEWAGE PUMPING STATION SWITCHGEAR

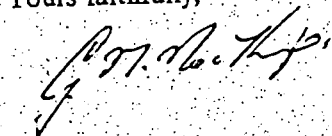
We acknowledge receipt of your letter dated 15 May 1993 and advise we would agree for these installations to be metered by SEQEB polyphase whole current metering equipment.

With regard to the amended drawings AA1T002A and AA1T005E submitted on the 21 June 1993 we advise the proposal is acceptable provided:

1. The switchboard equipment is arranged and installed to comply with the requirements of AS3000 1991 - Clause 2.23, in particular Clauses 2.23.3, 2.23.4.5 and Clause 2.23.5.
2. The metering installation complies with the requirements of Section 10 of the SEQEB Conditions of Supply and Metering booklet.
4. The necessary approval for the cathodic protection system has been obtained as required by Section 285 of the Electricity Act 1976.

However, final approval of the completed installation rests with the SEQEB officer carrying out the "on site" inspection of the completed installation.

Yours faithfully,


for SECRETARY

**REQUISITION FOR MATERIALS OR SERVICES**

PRINT NEATLY IN BLOCK LETTERS

WE 231473

From Dept/Div. <i>WSS</i>	Depot/Section <i>Lab Services</i>	Date <i>28.7.98</i>
------------------------------	--------------------------------------	------------------------

To Dept/Div. <i>Rec + Health.</i>	Section <i>Landscape Construction</i>	Depot/Location
--------------------------------------	------------------------------------------	----------------

Location of Job <i>Stanley Rd Pumping Station.</i>
-------------------------------------------------------

Description <i>As per your quote 1887</i> <i>\$ 2991.00</i>
<i>faxed to 268 5564</i>
Attach additional information to requisition and quote Req. No. on attachment.

Account Code Description	Estimated Cost																				
Account Code																					
<table border="1"> <tr> <td>S</td><td>M</td><td>5</td><td>1</td><td>1</td><td>/</td><td>1</td><td>0</td><td>0</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>		S	M	5	1	1	/	1	0	0	1										
S	M	5	1	1	/	1	0	0	1												

Contact Officer's Name (please print) <i>P. TRANDER</i>	Officer Code <i>105</i>
Location	Phone No.

Ext. ....
Requisitioning Officer's Name (please print)
Requisitioning Officer's Signature

Ext. <i>2620848</i>
Ext. <i>848</i>
Authorising Officer's Name (please print)
Authorising Officer's Signature

NOT TO BE USED FOR REQUISITIONING PURCHASES OR  
ITEMS FROM SUPPLY STORES



BRISBANE CITY COUNCIL

**SUPERINTENDANT'S INSTRUCTIONS**Department of Recreation and Health  
Parks and Gardens Branch

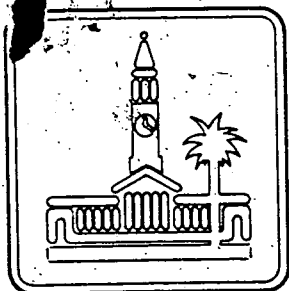
01997

To <i>PETER TRANTER. T.O.E.</i>	No.
Of <i>WS / S.</i>	Date <i>27.7.94</i>
Re Project <i>PUMPING STATION CRN CREEK + STANLEY.</i>	Contract No. <i>2682298.</i>

*AS PER YOUR REQUEST FOR PRICE TO TURF + TOP  
SOIL AREA + PLANT TREES, MULCH + STAKE.  
ALSO INSTALL ONE PANEL COPPIERS LOG FENCE.*

*TOTAL EST PRICE. \$2991.00*

<b>DISTRIBUTION</b> 1. Contractor 2. Parks Branch 3. Client 4. Cost Clerk 5. File	Signed <i>P. S. Parker</i>	Date <i>27.7.94.</i>
	Received <i>L. Jones</i>	Date <i>27-7-94</i>



Brisbane City

# BRISBANE CITY COUNCIL

EAGLE FARM PUMPING STATION  
CNR KINGSFORD SMITH DRIVE & VIOLET STREET  
EAGLE FARM QLD.

G.P.O. BOX 1434  
BRISBANE QLD. 4001

TELEX CIVICS AA41910  
FACSIMILIE 2680847

To <i>Sewer Sect</i>		Attention <i>Eric Vikumsons</i>	Fax.No. <i>2200859</i>
Date <i>21-2-94</i>	No. of Pages <i>2</i>	From <i>PETER TRANTER</i>	Phone No. <i>2680848</i>
RE: <i>Stanley Rd Sewerage Pump Station</i>			

A. H. D. LEVEL.

*2-3-94*

*4.194 A.H.D. metres*

*Bench mark with  
white curb painted around*



**REQUISITION FOR MATERIALS OR SERVICES**

PRINT NEATLY IN BLOCK LETTERS

WE 231467

From Dept/Div. <i>WSTS MFE</i>	Depot/Section <i>TECH SERVICES</i>	Date <i>21-2-94</i>
-----------------------------------	---------------------------------------	------------------------

To Dept/Div. <i>Survey Sect</i>	Section <i>13th floor</i>	Depot/Location <i>B. A.C.</i>
------------------------------------	------------------------------	----------------------------------

Location of Job <i>Stanley Rd Sewage Pump Station.</i>
-----------------------------------------------------------

Description <i>Please survey, datum point at pump station, &amp; provide A.H.D. in metres. Datum point marked with S.S. consist of white painted circle.</i>
<i>UBD 28 K.S.</i>
<i>STANLEY Rd</i>
<i>CHERRY Rd</i>
<i>PUMP STATION ACCESS</i>
<i>WET WELL</i>
<i>Datum Point * A.H.D. ? Metres.</i>
Attach additional information to requisition and quote Req. No. on attachment.

Account Code Description <i>Stanley Rd Switchboard Replacement</i>	Estimated Cost														
Account Code															
<table border="1"> <tr> <td><i>S</i></td> <td><i>F</i></td> <td><i>L</i></td> <td><i>K</i></td> <td><i>5</i></td> <td><i>/</i></td> <td><i>7</i></td> <td><i>3</i></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		<i>S</i>	<i>F</i>	<i>L</i>	<i>K</i>	<i>5</i>	<i>/</i>	<i>7</i>	<i>3</i>						
<i>S</i>	<i>F</i>	<i>L</i>	<i>K</i>	<i>5</i>	<i>/</i>	<i>7</i>	<i>3</i>								

Contact Officer's Name (please print) <i>PETER TRANTER</i>	Officer Code <i>TOE</i>
Location <i>E/F Tech Services</i>	Phone No. <i>2680848</i>

Ext. ....
Requisitioning Officer's Name (please print)
Requisitioning Officer's Signature

<i>P. TRANTER</i>	Ext. <i>888</i>
Authorising Officer's Name (please print)	
<i>P. Tranter</i>	
Authorising Officer's Signature	

NOT TO BE USED FOR REQUISITIONING PURCHASES OR  
ITEMS FROM SUPPLY STORES

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

**MEMORANDUM**

**TO:** JOHN TITMARSH  
**FROM:** PETER TRANTER  
**DATE:** 18TH JANUARY, 1994  
**SUBJECT:** STANLEY ROAD

John, the following dates have been locked in to complete Stanley Road Sewage Pumping Station switchboard replacement.

Software to be loaded, onsite

03  
~~02~~-03-94

Remote monitoring required

10-03-94

Testing of functionality  
on site and at Eagle Farm

13-03-94

Should you not be able to meet these times please advise me as soon as possible.



**P. TRANTER**  
**TECH OFFICER**  
**ELECTRICAL**

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

**MEMORANDUM**

**TO:** ROB KILLICK  
**FROM:** PETER TRANTER  
**DATE:** 20TH JANUARY, 1994  
**SUBJECT:** STANLEY ROAD SWITCHBOARD REPLACEMENT

Switchboard completed at Power Electric.

28-02-94

**Preliminary Work**

*Location of Services Telecom, SE053, Traffic, water & electricity etc 21-02-94*

1. Replace existing fan with the Hison fan and cowl. (stock item) 21-02-94

2. Excavation required; 22-02-94

- a) from power pole to new switchboard location
- b) top of slab where new switchboard is to be located
- c) from new switchboard J-Box to new electrode box
- d) top of wet well slab for new electrode box

3. Core holes; 23-02-94

- a) through top of slab, dry well, 2 of 100mm diameter
- b) through top of slab, wet well, 3 of ~~50~~<sup>100</sup>mm to suit 3 hole electrode box.

4. Place conduits in preparation for boxing, include 3rd 100mm to J-Box. *use SECA for Dry Well* 23-02-94  
*deal ant use silicone or similar for wetwell*

5. Boxing and pouring of both pads including electrode box and cable entry area, F81 reinforcing mesh and bonding as required. 24/25-02-94

6. Make up aluminium checker plate cover for cable entry and place <sup>ON</sup> J-Box. 28-02-94
7. Run new cables and conduit to J-Box. 28-02-94
  - a) Mains as per attached schedule.
  - b) Level probe and multitrode.
8. Install new supply to top 415V x-aim (contractor required) to core fuses out. 28-02-94

### Changeover

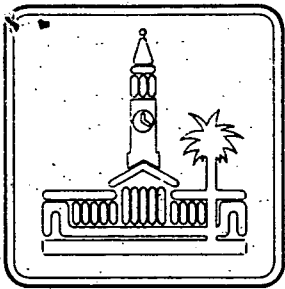
1. Install new switchboard and antenna. 01-03-94
2. Complete connections of: 02-03-94
  - a) Mains
  - b) Level Probe
  - c) Multitrode
3. I.T. to download software. Test operation of switchboard. In conjunction with inspection etc. *(Contact Ray Thompson, SEQEB Mansfield.)* 02-03-94
 

*03*  
*02-03* *more days off*
4. Run temporary supply to 1 of the pumps from the new board. Bridge reflux inputs. 03-03-94
5. Test run switchboard using level probe. 03/04-03-94
6. Disconnect old SEQEB supply from pole and switchboard. Return meters to Mansfield. 08-03-94
7. Remove old switchboard, resistor banks, sump pump, stop start station and auto dialler with cabinet. 08-03-94
8. Fit: 08-03-94
  - a) New junction box on wall in replacement of old switchboard. Electrical Workshop to supply.
  - b) Pressure probe in common manifold  
1" BSP fitting to be pre-installed.
9. Run new conduits and supplies to equipment i.e. decontactors, sump pump outlet, 3 $\phi$  and 1 $\phi$  outlets lighting, new delivery pressure probe and light switch. 08/09/10-03-94

Note! A cabling of new dry well flooded electrode supply may be required.

- |     |                                                                                                                               |                |
|-----|-------------------------------------------------------------------------------------------------------------------------------|----------------|
| 10. | Extend isolation switches, reflux switches, bottom level lighting, fan supply and sump pump electrodes to new connection box. | 08/09/10-03-94 |
| 11. | Fit site attention alarm.                                                                                                     | 08/09/10-03-94 |
| 12. | Complete connections to the new switchboard.<br>Remote monitoring available at Eagle Farm.                                    | 10/11-03-94    |
| 13. | Test switchboard.                                                                                                             | 14-03-94       |
| 14. | Change over second pump.                                                                                                      | 15-03-94       |
| 15. | Test in conjunction with I.T. of functionality.                                                                               | 15-03-94       |

**P. TRANTER**  
**TECH OFFICER**  
**ELECTRICAL**



Brisbane City

## BRISBANE CITY COUNCIL

EAGLE FARM PUMPING STATION  
 CNR KINGSFORD SMITH DRIVE & VIOLET STREET  
 EAGLE FARM QLD.

G.P.O. BOX 1434  
 BRISBANE QLD. 4001

TELEX CIVICS AA41910  
 FACSIMILIE 2680847

To <b>PES</b>	Attention <b>GERRY PRICE</b>	Fax.No. <b>274 3929</b>
Date <b>26/1/94</b>	No. of Pages <b>1</b>	From <b>KEN HARVEY</b>
RE: <b>SWITCHBOARDS FOR FEROL &amp; STANLEY</b>		Phone No. <b>2680833</b>

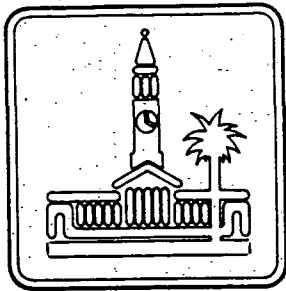
WHERE SURGE ARRESTORS ARE INSTALLED,  
 PLEASE ENSURE THAT "LINE SIDE"  
 AND "PROTECTED SIDE" WIRING ARE  
 RUN IN SEPARATE DUCTS AT LEAST  
 300 mm APART.

THE LINE SIDE WIRING OF CIRCUITS  
 PROTECTED BY S.D.'s SHALL NOT BE  
 INSTALLED IN THE SAME DUCTS AS  
 NON PROTECTED CIRCUITS.

copy S. KEANE  
 P. PRANTER

REGARDS

274 3929



Brisbane City

## BRISBANE CITY COUNCIL

EAGLE FARM PUMPING STATION  
 CNR KINGSFORD SMITH DRIVE & VIOLET STREET  
 EAGLE FARM QLD.

G.P.O. BOX 1434  
 BRISBANE QLD. 4001

TELEX CIVICS AA41910  
 FACSIMILE 2680847

To DES	Attention GERY PRICE	Fax.No. 274 3929
Date 16/2/94	No. of Pages 1	From KEN HARVEY
Phone No. 268 0833		
RE: SWITCHBOARDS FOR FEROL / STANLEY		

THE DESIGN CURRENTLY CALLS FOR THE  
 USE OF CLUSTER LED GLOBES COMBINED  
 WITH AN AMBER LENS FOR THE  
 SWITCHBOARD MOUNTED "ATTENTION INDICATOR"  
 LIGHT. THIS ARRANGEMENT IS NOT BRIGHT ENOUGH  
 TO SEE FLASHING IN DAYLIGHT.

PLEASE REPLACE THE LED'S WITH A NORMAL  
 24 V.D.C. GLOBE FOR THIS LIGHT ONLY.

REGARDS



BRISBANE CITY COUNCIL

## REQUISITION FOR MATERIALS OR SERVICES

PRINT NEATLY IN BLOCK LETTERS

WE 231466

From Dept/Div. <i>Tech Service</i>	Depot/Section	Date <i>17-1-98</i>
---------------------------------------	---------------	------------------------


To Dept/Div. <i>Elect W/shop</i>	Section	Depot/Location
-------------------------------------	---------	----------------

Location of Job	
-----------------	--

Description	Remarks
<p>Please construct Terminal box as attached Drawing</p>	
	<p>Attach additional information to requisition and quote Req. No. on attachment.</p>

Account Code Description										Estimated Cost
Account Code										
S	F	L	K	5	/	7	3			

Contact Officer's Name (please print) <i>P. FRANKER</i>	Officer Code <i>105</i>
Location	Phone No. <i>848</i>

<div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Ext. ....</div> <div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Requisitioning Officer's Name (<i>please print</i>)</div> <div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Requisitioning Officer's Signature</div>	<div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Ext. ....</div> <div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Authorising Officer's Name (<i>please print</i>)</div> <div style="border-bottom: 1px dotted black; margin-bottom: 5px;">  </div> <div style="border-bottom: 1px dotted black; margin-bottom: 5px;">Authorising Officer's Signature</div>
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NOT TO BE USED FOR REQUISITIONING PURCHASES OR

CC401 P.C. 5730

ITEMS FROM SUPPLY STORES

Printed by B.C.C. Dept of Transport

POWER TERMINAL LIST	
PUMP NO1	3x SAK4
MOTOR THERMISTOR	2x SAK4
PUMP NO2	3x SAK4
MOTOR THERMISTOR	2x SAK4
PUMP NO1 ISOLATOR	2x SAK4
PUMP NO2 ISOLATOR	2x SAK4
SUMP PUMP	3x SAK4
FAN	2x SAK4
1st SPO	3x SAK4
2nd SPO	4x SAK4
3rd SPO	4x SAK4
4th SPO	4x SAK4
SPARE	4x SAK4

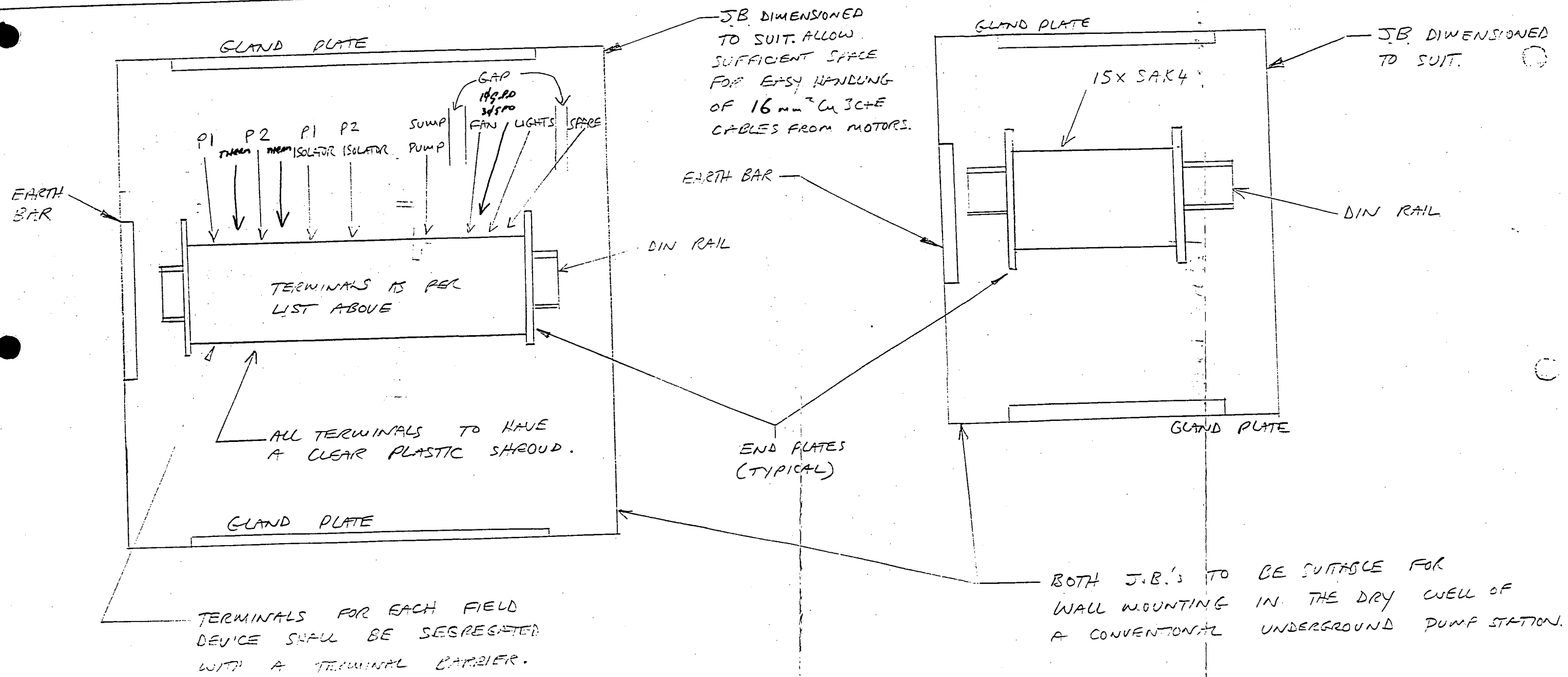
CONTROL TERMINAL LIST	
PUMP NO1 REFLEX MICRO	2x SAK4
PUMP NO2 " "	2x SAK4
STOP ELECTRODE	1x SAK4
START ELECTRODE	1x SAK4
ALARM ON ELECTRODE	1x SAK4
ATTENTION INDICATOR	2x SAK4
SPARE	11 x SAK4
TOTAL	15x SAK4
	20

## JUNCTION BOX SPECIFICATION

1. EACH ENCLOSURE SHALL BE OF A GREY (OPAQUE) REINFORCED POLYESTER COMPOUND WITH GREY (OPAQUE) LIDS SECURED BY CAPTIVE NYLON SCREWS (SLOT HEADED) THAT CAN ONLY BE REMOVED BY USE OF A TOOL.
2. BOXES SHALL PROVIDE IP65 (MINIMUM) DEGREE OF PROTECTION AND COME COMPLETE WITH MOUNTING PLATE, EARTH BAR, TERMINALS, DIN RAIL & GLAND PLATES.

STANLEY RD  
SP55  
CONTROL-BOARD UPGRADE

NOT TO SCALE



## JUNCTION BOX LAYOUTS

Active 29/01/2014







CABLE INPUT DATA

-----  
MAX DEMAND : 80 Amps  
POWER FACTOR : 0.85  
CABLE LENGTH : 3 m  
DERATING FACTOR : 1  
MAX VOLT DROP : 2.5 %  
AMBIENT : 25 deg.C  
SHORT CCT TIME : 0.01 s  
MAX FAULT LEVEL : 9 KA

CABLE SIZE

-----  
CABLE SIZE : 1x25 Sqmm

CABLE TYPE

-----  
CABLE CODE : 5  
CIRC. 3/4-CORE 0.6/1 kV INSULATED AND SHEATHED  
( INCLUDING NEUTRAL SCREENED ) CABLES WITH OR  
WITHOUT EARTH COND. ARMoured AND NON-ARMoured  
CABLE CONFIGURATON : 12  
UNDERGROUND DUCT

CABLE INSULATION : V75  
CONDUCTOR MATERIAL : Cu

CABLE CAPACITY

-----  
CURRENT CAP : 105.0 Amps  
VOLTAGE DROP : 0.3 = 0.07 %  
FAULT CAP : 27.8 KA  
MAX LENGTH : 108.2 m

SPARE CAPACITY

-----  
SPARE CURRENT CAP : 25.0 = 31.25 %  
SPARE VOLTAGE DROP : 2.4 % AVAILABLE  
SPARE FAULT CAP : 18.8 KA  
SPARE CABLE LENGTH : 105.2 m REMAINING

BRISBANE CITY COUNCIL

## MEMORANDUM

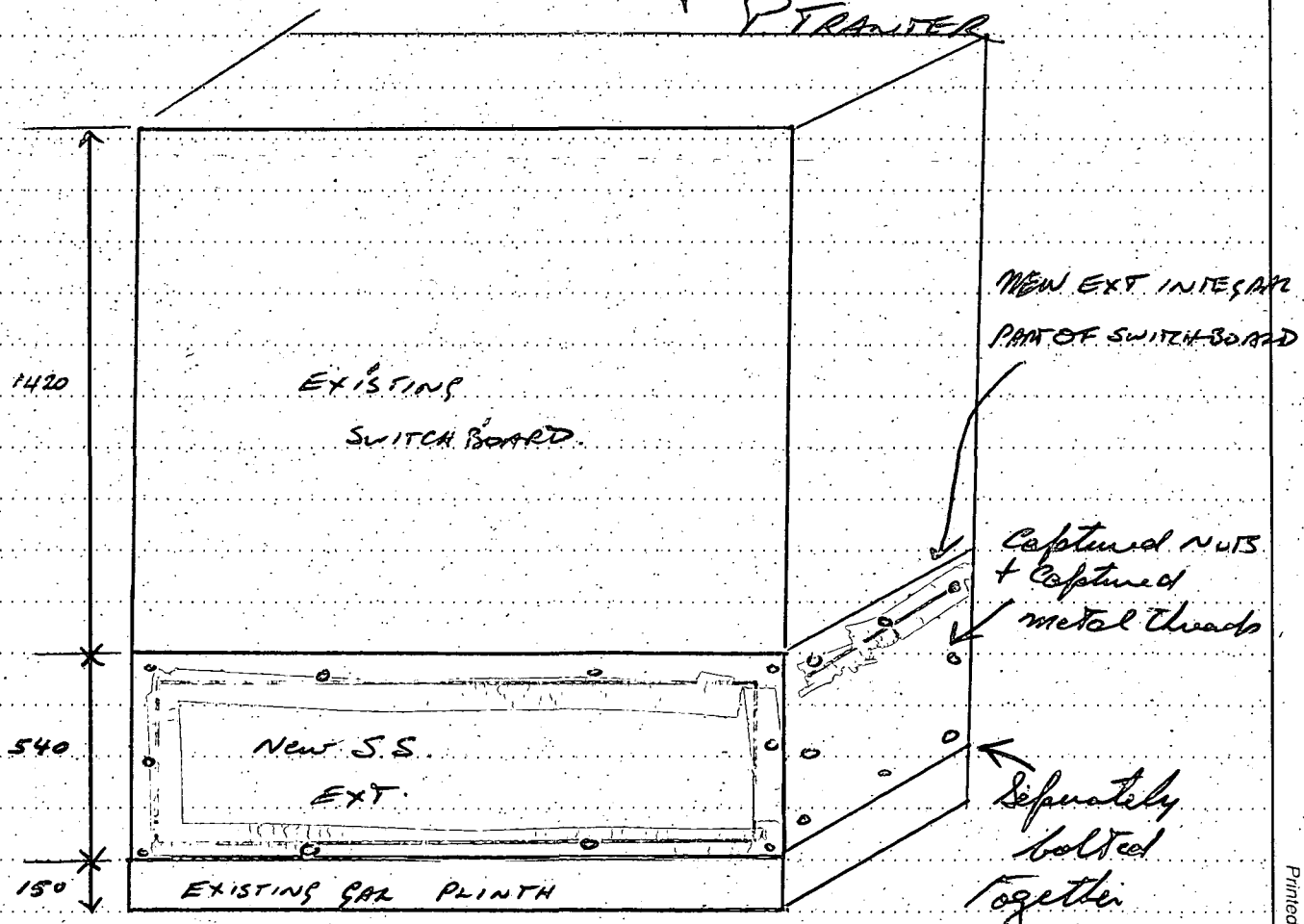
2743929

To	Cery Price		File No.
From	Pete Tranta	Date	10/1/94
Subject	Stanley Rd. Switch Board		

Please provide a quote on revision to switch board design to incorporate an extension box.  
 Material is to be all stainless steel & is to be an integral part of the switch board.  
 The galvanneal plinth is to remain at the bottom of the extension.  
 Please fax your reply to 2680847

Regards

P. TRANTA



# IDEAL

## Electrical

### SUPPLIERS

IDEAL ELECTRICAL SUPPLIERS (EAGLE FARM) PTY. LTD.

A.C.N. 011 007 300

921 KINGS RD SMITH DRIVE, EAGLE FARM QLD 4007

PHONE (07) 868 1400 FACSIMILE (07) 268 7355

BRISBANE COUNCIL.

ATTEN KSW

REFER. KOISHI STREET

3 EX/STOCK BRISBANE RSST SYDNEY

PRICE INCLUDES DOMS. \$157-00 EACH 24V  
SALES TAX EXEMPT.

PLEASE ADVISE WHEN ORDERING COLOUR OF  
DOME - RED, AMBER, BLUE OR CLEAR

REGARDS

PAUL

Amber 17-1-94  
Ordered Koishi 24V  
SL524 24V D.C.  
SL5D C clear



## QUOTATION

DATE: 25/11/93

PROJECT: PRICES

OUR REFERENCE: LISA

ORIGINATING OFFICE: BRISBANE

TERMS: 30 DAYS

VALIDITY: 30 DAYS

DELIVERY: EX STOCK

**C.N.W. ELECTRICAL PTY. LTD.**

PER: \_\_\_\_\_

**TOTAL VALUE: \$** \_\_\_\_\_

**HEAD OFFICE: 1038 STANLEY STREET, EAST BRISBANE, QLD 4169**

FAX (07) 391 4010 PHONE (07) 391 6022

**BRANCH OFFICES: 237 SHAKESPEARE STREET, MACKAY, QLD 4740**

FAX (079) 57 3848 PHONE (079) 57 3899

93 ANDERSON STREET, CAIRNS, QLD 4870

FAX (070) 53 7823 PHONE (070) 53 7622



**C.N.W. ELECTRICAL PTY. LTD.**  
ELECTRICAL WHOLESALEERS EST. 1952

**LISA KILICK**  
SALES REPRESENTATIVE

1038 STANLEY STREET  
EAST BRISBANE, QLD 4159  
PO BOX 301, EAST BRISBANE, QLD 4159

MOBILE: 016 710 334  
TELEPHONE: (07) 391 6022  
FACSIMILE: (07) 391 4010

INSTRUCTION No SL5-14

# STROBE LIGHT SL-5

For Total Security Equipment

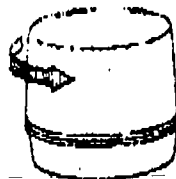
## KOBISHI

KOBISHI ELECTRIC CO., LTD

2-10-1 KOBISHI ELECTRIC CO., LTD  
TEL: (03) 3212-4121 FAX: (03) 3212-4121

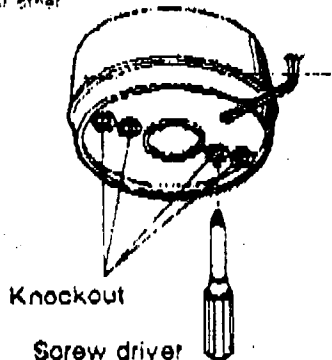
## INSTALLATION

- (1) Rotate the lens counterclockwise to remove the lens

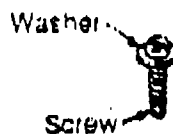


- (2) 4 knockouts on the base are provided for mounting

- (3) Break through the knockout for only using mounting pin or screwdriver or other tools. Do not break through other knockouts for weather protection



- (4) Set the rubber washer with screw as indicated below



- (5) Set the base on the mounting surface

- Mounting: Mounting pin or screw is provided on back surface of base. Mounting screws are provided on back surface of base. Mounting pins are also a clearance fit for front mounting with M4 x 65 long.
- Installation: Mount on wall with M4 screws or wall mount to 4 round plaster only with M4 x 65 long screw.

## SPECIFICATIONS

- Input Voltage: 12VDC, 24VDC  
Positive Red  
Negative Black
- Input Current: 500mA at 12VDC  
250mA at 24VDC
- Flash Rate: 20 to 120 per minute
- Lead Wire: 518 gauge leads, UL Listed, Approximately 270mm long
- Electrical Protection: inadvertent reversal of input polarity will not damage unit or draw current
- Operating Life: In excess of 200 hours

- Flash Energy: (BY 0.1 Measuring Method)

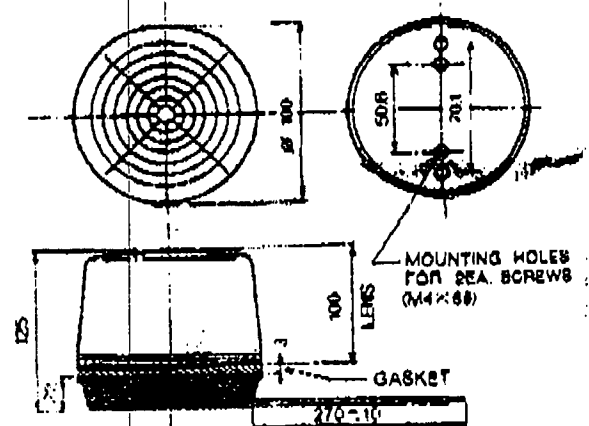
	12V	24V
Clear	23.0	23.0
Red	0.0	0.0
Blue	21.0	21.0
Ambur	22.0	22.0

(100,000)

- Base: High impact resistant, Black A.B.S. Plastic approximately 100mm diameter.
- Lens: High impact resistant, clear, polycarbonate. Other colors available on special order. Red, Amber, Blue.
- Construction: Rainlight.
- Operating Temperature Range: -10°C - 50°C
- Accessory: 2 rubber washers

• The specification may change for modification without notice in advance.

## DIMENSIONS mm



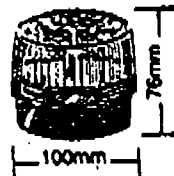
# STROBE LIGHTS

## KOBISHI

Incorporating a xenon tube and solid state circuit, this efficient, weatherproof strobe light has an ABS black plastic base and a polycarbonate lens. Night time visibility range is 800 metres. Lights can be operated continuously for more than 200 hours. Lenses are easily interchangeable.

Refer to Page 6 of Price List

Red (R), amber (A), blue (B), Clear (C)



### Computer Code

### Voltage Range

### Flashes per min.

SL112	12Vdc (70K12)	180mA	10-14.4	70,000 candelas	60-100
SL124	24Vdc (70K24)	125mA	20-28.8	70,000 candelas	60-100
SL1D	Spare Dome - red (R), amber (A), blue (B), clear (C)				



SL512	12Vdc (160K12)	530mA	10-14.4	160,000 candelas	60-110
SL524	24Vdc (160K24)	210mA	20-28.8	160,000 candelas	60-110
SL5D	Spare Dome - red (R), amber (A), blue (B), clear (C)				

**C.N.W. ELECTRICAL PTY. LTD.**  
ELECTRICAL WHOLESALERS EST. 1952

**LISA KILICK**  
SALES REPRESENTATIVE

1038 STANLEY STREET  
EAST BRISBANE, QLD 4169  
PO BOX 301, EAST BRISBANE, QLD 4169

MOBILE: 018 719 334  
TELEPHONE: (07) 391 6022  
FACSIMILE: (07) 391 4010

## INSTRUCTION No. SL5-14

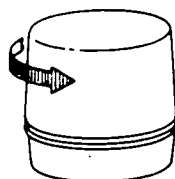
STROBE LIGHT  
SL-5*For Total Security Equipment***KOBISHI****KOBISHI ELECTRIC CO.,LTD**

3-4-6 KAMINAKAZATO, KITA-KU, TOKYO, 114 JAPAN

PHONE: (03) 3913-4321 FAX: (03) 3913-4328 TELEX: J24276 CABLE ADDRESS: KOBISHI BELL

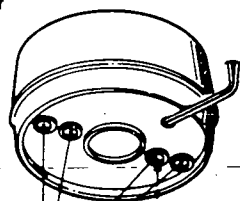
## INSTALLATION

- (1) Rotate the lens counterclockwise to  
move the lens.



- (2) 4 knockouts on the base are provided  
for mounting.

- (3) Break through the knockout for only  
using mounting by a screwdriver or other  
tools. Do not break through other  
knockouts for weather protection.



Knockout

Screw driver

- (4) Insert the rubber washer with screw as  
indicated below.

Washer

Screw

- (5) Set the base on the mounting surface.

- Mounting—Mounting from rear of mounting  
surface, using two M4 thread  
cutting screws. Holes are provided  
on back surface of base. Holes  
are also a clearance fit for front  
mounting with M4 × 65 long.
- Installation—Mounts on bell box with M4  
screws or wall mount to 4 round  
plaster ring with M4 × 65 long screw.

- (6) Tighten the lens to the base by rotating  
it right.

## SPECIFICATIONS

- Input Voltage : 12VDC, 24VDC.  
Positive Red  
Negative Black
- Input Current : 500mA at 12VDC.  
250mA at 24VDC.
- Flash Rate : 20 to 120 per minute.
- Lead Wire :  $\approx$  18 gauge leads. U.L.  
Listed. Approximately  
270mm long.
- Electrical Protection : Inadvertent reversal of input polarity will  
not damage unit or draw current.
- Operating Life : In excess of 200 hours.

- Flash Energy  
(BY UL Measuring Method)

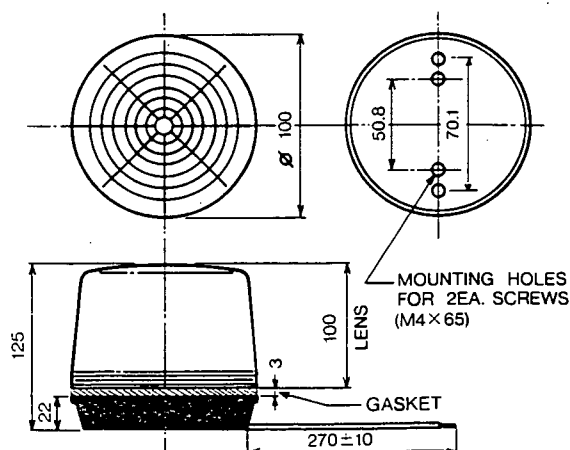
	12V	24V
Clear	23.0	23.0
Red	8.0	8.0
Blue	21.0	21.0
Amber	22.0	22.0

(cd. sec)

- Base : High impact resistant, Black A.B.S.  
Plastic approximately 100mm diameter.
- Lens : High impact resistant, clear, polycarbonate.  
Other colors available on special order.  
Red, Amber, Blue.
- Construction : Raintight.
- Operating Temperature Range :  $-10^{\circ}\text{C}$ – $50^{\circ}\text{C}$
- Accessory : 2 rubber washers

※ The specification may change for modification without notice in advance.

## DIMENSIONS mm



904163 00245938

PURCHASE REQUISITION/CHANGE ORDER/REQUEST

WARNING: THIS IS NOT AN OFFICIAL ORDER  
Please print neatly in BLOCK LETTERS

Original to be sent to  
Supply Services Branch

On Cost Code	Date 24/12/93	Order No. 1EF
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Department / Division	Delivery Site 25 BUNYA ST Eagle Farm	Supplier (If Requisitioner nominates a supplier, state justification in Description column) Electro chemical Engineering P/L Address 170 HYDE RD YONGA Q 4104 Phone No. 8483833	Confirm (Y)
		Vendor Code	

Delivery Advice ATT: P. TRANTER 2680848	Charge Comment (Receiving Point/Information)	Order Start Date / /	Delivery / End Date / /
--------------------------------------------	----------------------------------------------	-------------------------	----------------------------

Contract / Quotation No.	Buyer's Name	Phone	Order (Settlement) Discount %	Terms	E & C / Stores Board Approval Date / /	Freight / Other Charges (Y)	Total Charges
--------------------------	--------------	-------	-------------------------------	-------	-------------------------------------------	-----------------------------	---------------

Job Cost and General Ledger Codes				Description ⇒ Indicates New Field	* Recurring Y / N	Unit of Measure	Qty	Unit / <del>Total</del> Cost <small>Delete Inapplicable</small>	Dis. %	Dis. %	Sur- charge \$ or %
JC	Project	Task	Cost Code	⇒							\$ or %
JC	SA 3	3.1	673	Plenty pro II, 4 WIRE, .5 BSP							
GL	Work Centre		Acc. Element	Opt. Code		EA	1	715.00			
JC				⇒							\$ or %
GL						EA	1	285.00			
JC				⇒							\$ or %
GL											\$ or %
JC				⇒							\$ or %
GL											\$ or %
JC				⇒							\$ or %
GL											\$ or %
JC				⇒							\$ or %
GL											\$ or %

Requisitioner's Name (please print)	Phone No.	Authorisation The goods / services are required, funds for the purchase have been appropriated and payment is approved subject to the satisfactory receipt and acceptance of the goods / services.	Name (please print)	Payroll No.
Signature			Signature	Date / / Officer Code

Department /Division	Delivery Site 25 BUNY AST Eagle Farm	Supplier (If Requisitioner nominates a supplier, state justification in Description column) Vega Australia P/L	Confirm (Y)
		Address 4/15 Ferguson St UNDERWOOD	
		Phone No. 8411477	
		Vendor Code	

Delivery Advice ATT. P. TRANTER 2680848	Charge Comment (Receiving Point/Information)	Order Start Date / /	Delivery /End Date / /
--------------------------------------------	----------------------------------------------	-------------------------	---------------------------

Contract /Quotation No.	Buyer's Name	Phone	Order (Settlement) Discount %	Terms	E & C/Stores Board Approval Date / /	Freight /Other Charges (Y)	Total Charges
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Job Cost and General Ledger Codes				Description ⇒ Indicates New Field	* Recurring Y/N	Unit of Measure	Qty	Unit / Total Cost Delete Inapplicable	Dis. %	Dis. %	Sur- charge \$ or %
Project	Task	Cost Code		⇒							\$ or %
GL JC	5 TSA 3	31	693	VEGA D37H / E25 Premium							
GL	Work Centre	Acc. Element	Opt. Code	Amor, with E25 500kV cable 8-20mA		EA	1	2188.00			
GL JC				⇒							\$ or %
GL				* 20 m of cable - 4 Bar.							\$ or %
GL JC				⇒							\$ or %
GL											\$ or %
GL JC				⇒							\$ or %
GL											\$ or %
GL JC				⇒							\$ or %
GL											\$ or %
GL JC				⇒							\$ or %
GL											\$ or %

Requisitioner's Name (please print)	Phone No.	Authorisation The goods /services are required, funds for the purchase have been appropriated and payment is approved subject to the satisfactory receipt and acceptance of the goods /services.	Name (please print)	Payroll No.
Signature			Signature	Date / /
				Officer Code

PURCHASE REQUISITION/CHANGE ORDER/REQUEST

WARNING: THIS IS NOT AN OFFICIAL ORDER  
Please print neatly in BLOCK LETTERS

Original to be sent to  
Supply Services Branch

On Cost Code

Date  
/ /

Order No.  
157

704161 - 0245940

Department / Division	Delivery Site 25 Burg St Eagle Lam	Supplier (If Requisitioner nominates a supplier, state justification in Description column) BEP Engineering Products / L Address 123 Boundary St West End Q4101 Phone No. 844 1711	Confirm (Y)
		Vendor Code	

Delivery Advice ATTN: P. FRANKER	Charge Comment (Receiving Point/Information)	Order Start Date / /	Delivery / End Date / /
-------------------------------------	----------------------------------------------	-------------------------	----------------------------

Contract / Quotation No.	Buyer's Name	Phone	Order (Settlement) Discount %	Terms	E & C / Stores Board Approval Date / /	Freight / Other Charges (Y)	Total Charges
--------------------------	--------------	-------	-------------------------------	-------	-------------------------------------------	-----------------------------	---------------

Job Cost and General Ledger Codes				Description ⇒ Indicates New Field	* Recurring Y / N	Unit of Measure	Qty	Unit / Total Cost Delete Inapplicable	Dis. %	Dis. %	Sur- charge \$ or %
JC	Project STSA 3	Task 31	Cost Code 693	⇒ MULTITRADE Single Point							\$ or %
GL	Work Centre		Acc. Element	⇒ Probe 30m cable		EA	1	88.00			
JC				⇒							\$ or %
GL											
JC				⇒							\$ or %
GL											
JC				⇒							\$ or %
GL											
JC				⇒							\$ or %
GL											
JC				⇒							\$ or %
GL											

Requisitioner's Name (please print)	Phone No.	Authorisation The goods / services are required, funds for the purchase have been appropriated and payment is approved subject to the satisfactory receipt and acceptance of the goods / services.	Name (please print)	Payroll No.
Signature			Signature	Date / / Officer Code

BRISBANE CITY COUNCIL  
WATER SUPPLY & SEWAGE  
TECHNICAL SERVICES

QuickCable  
VER:1.0I  
QC11568

CABLE INPUT DATA

MAX DEMAND : 80 Amps  
POWER FACTOR : 0.85  
CABLE LENGTH : 3 m  
DERATING FACTOR : 1  
MAX VOLT DROP : 2.5 %  
AMBIENT : 25 deg.C  
SHORT CCT TIME : 0.01 s  
MAX FAULT LEVEL : 9 KA

CABLE SIZE

CABLE SIZE : 1x25 Sqmm

CABLE TYPE

CABLE CODE : 5

CIRC. 3/4-CORE 0.6/1 kV INSULATED AND SHEATHED  
( INCLUDING NEUTRAL SCREENED ) CABLES WITH OR  
WITHOUT EARTH COND. ARMoured AND NON-ARMoured

CABLE CONFIGURATON : 12  
UNDERGROUND DUCT

CABLE INSULATION : V75  
CONDUCTOR MATERIAL : Cu

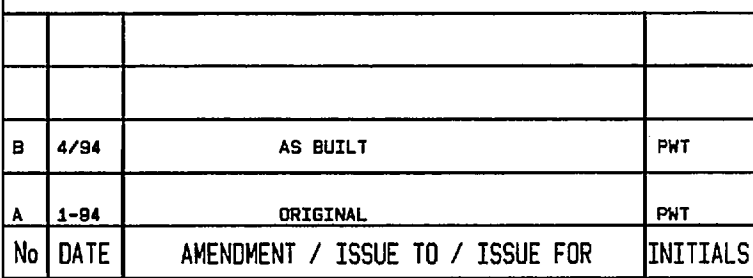
CABLE CAPACITY

CURRENT CAP : 105.0 Amps  
VOLTAGE DROP : 0.3 = 0.07 %  
FAULT CAP : 27.8 KA  
CABLE LENGTH : 108.2 m


SPARE CAPACITY

SPARE CURRENT CAP : 25.0 = 31.25 %  
SPARE VOLTAGE DROP : 2.4 % AVAILABLE  
SPARE FAULT CAP : 18.8 KA  
SPARE CABLE LENGTH : 105.2 m REMAINING





MANAGER		DIRECTOR OF PLANNING & DESIGN	
DATE:		DATE:	
DIRECTOR OF CONSTRUCTION		DIRECTOR OF M & E SERVICES	DIRECTOR OF SEW. OPERATIONS / W.S. DISTRIBUTION
DATE:		DATE:	DATE:
DESIGN			ENGINEER IN CHARGE
DRAWN	PWT	13-1-94	SUPERVISING ENGINEER
TRACED			LEVEL BOOK
CHECKED			FIELD BOOK



**BRISBANE**  
CITY COUNCIL  
DEPARTMENT OF WATER  
SUPPLY & SEWERAGE

**Brisbane City** MECHANICAL & ELECTRICAL SERVICES

TITLE: ELECTRICAL LAYOUT

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