QUEENSLAND URBAN UTILITIES

Western Region Switchboard Replacement Project SP357 – Mount Crosby Rd, Tivoli

ELECTRICAL SWITCHBOARD SITE SPECIFIC MANUAL

Developed by:



J & P RICHARDSON INDUSTRIES

CAMPBELL AVENUE WACOL QLD 4076

ABN 23 001 952 325 ACN 001 952 325

Ph. (07) 3271 2911 Fax. (07) 3271 3623

CONTENTS

- 1.0 DRIVE PARAMETERS
- 2.0 "AS INSTALLED" DRAWINGS
- 3.0 COMMISSIONING PLAN
- 4.0 DESIGN REPORT

Note: This manual is to be used in conjunction with the provided **Western Region Switchboard Replacement Project Packages 1-6 Master Manual**

1.0 DRIVE PARAMETERS

2.0 "AS INSTALLED" DRAWINGS



UrbanUtilities

SP357 MOUNT CROSBY ROAD SEWAGE PUMPING STATION

SITE COVER SHEET

DWG No.	TITLE	SHEET	REVISIONS						
486/5/7-0224-000	SITE COVER SHEET	00	C	D	E	F	G		
486/5/7-0224-001	POWER DISTRIBUTION SCHEMATIC DIAGRAM	01	C	D	E	F	G		
486/5/7-0224-002	PUMP No1 SCHEMATIC DIAGRAM	02	C	D	E	F	G		
486/5/7-0224-003	PUMP No2 SCHEMATIC DIAGRAM	03	C	D	E	F	G		
486/5/7-0224-004	RESERVED (PUMP No3 SCHEMATIC DIAGRAM)	04	C	D	E	F	G		
486/5/7-0224-005	RESERVED (SUMP PUMP SCHEMATIC DIAGRAM)	05	C	D	Ε	F	G		
486/5/7-0224-006	ATS CONTROLS SCHEMATIC DIAGRAM	06	C	D	E	F	G		
486/5/7-0224-007	COMMON CONTROLS SCHEMATIC DIAGRAM	07	C	D	Ε	F	G		
486/5/7-0224-008	MULTISMART POWER DISTRIBUTION	08	C	D	E	F	G		
486/5/7-0224-009	MULTISMART 3PC MODULE TERMINATION DIAGRAM	09	C	D	E	F	G		
486/5/7-0224-010	MULTISMART 3MP MODULE TERMINATION DIAGRAM	10	C	D	E	F	G		
486/5/7-0224-011	MULTISMART 3PC MODULE TERMINATION DIAGRAM	11	C	D	E	F	G		
486/5/7-0224-012	MULTISMART 3PC MODULE TERMINATION DIAGRAM	12	C	D	E	F	G		
486/5/7-0224-013	MULTISMART 3PC MODULE TERMINATION DIAGRAM	13	C	D	Ε	F	G		
486/5/7-0224-014	MULTISMART 3PC MODULE TERMINATION DIAGRAM	14	C	D	E	F	G		
486/5/7-0224-015	MULTISMART 3PC MODULE TERMINATION DIAGRAM	15	C	D	E	F	G		
486/5/7-0224-016	SWITCHBOARD EQUIPMENT SCHEDULE	16	C	D	E	F	G		
486/5/7-0224-017	SWITCHBOARD CABLE SCHEDULE	17	C	D	E	F	G		
486/5/7-0224-018	SWITCHBOARD LABEL SCHEDULE	18	С	D	E	F	G		
486/5/7-0224-019	SWITCHBOARD CONSTRUCTION DETAILS	19	C	D	Ε	F	G		
486/5/7-0224-020	SWITCHBOARD CONSTRUCTION DETAILS	20	C	D	Ε	F	G		
486/5/7-0224-021	LEVEL PROBES & PRESSURE TRANSMITTER INSTALLATION DETAILS	21	C	D	E	F	G		
486/5/7-0224-022	SWITCHBOARD GENERAL ARRANGEMENT ELEVATIONS	22	C	D	Ε	F	G		
486/5/7-0224-023	SWITCHBOARD GENERAL ARRANGEMENT SECTIONS	23	C	D	Ε	F	G		
486/5/7-0224-024	RESERVED (DISCONNECT BOX)	24	C	D	E	F	G		
86/5/7-0224-025	SITE LAYOUT	25	1	2	3	4	F		
86/5/7-0224-026	SITE LAYOUT - ISOMETRIC VIEW	26	0	F	-	-	-		

STANDARD VARIABLES	
DESCRIPTION	VALUES
CT METERING ISOLATOR	NOT APPLICABLE
NORMAL SUPPLY MAIN SWITCH	125A S250PE/3 125
GENERATOR SUPPLY MAIN SWITCH	125A S250PE/3 125
PUMP1 CIRCUIT BREAKER	63A S125NJ/3 063
PUMP2 CIRCUIT BREAKER	63A S125NJ/3 063
PUMP3 CIRCUIT BREAKER	NOT APPLICABLE
DRY WELL SUMP PUMP CIRCUIT BREAKER	NOT APPLICABLE
PUMP SOFT STARTER SIZE	PSE45 22kW
PUMP RATING	22kW 40A
PUMP FORWARD CONTACTOR	CAS7-43D-04C-24VDC
PUMP REVERSING CONTACTOR	CAS7-43D-04C-24VDC
SUMP PUMP RATING	NOT APPLICABLE
SUMP PUMP CONTACTOR & TOL	NOT APPLICABLE
PUMP SOCKET OUTLET + INCLINE SLEEVE	DS3 3134013972 + 51CA757
PUMP INLET PLUG + HANDLE	DS3 3138013972 + 313A013
WET WELL LEVEL TRANSMITTER	WL52XXA4AMD1DD1X 1.937m
EMERGENCY STORAGE WELL LEVEL TRANSMITTER	NOT APPLICABLE
DELIVERY PRESSURE TRANSMITTER	VEGABAR52
FLOWMETER RANGE	NOT APPLICABLE
RADIO	TRIO ER450
EMERGENCY PUMPING TIME	120sec
No of SINGLE POINT PROBES	1
INCOMING MAINS SUPPLY CABLE	25mm ²
MAIN EARTHING CABLE	16mm ²
INCOMING GENERATOR SUPPLY CABLE	NOT APPLICABLE
SOFT STARTER 3 PHASE SUPPLY	10mm ²

	STANDARD DESIGN OPTIONS	
OPTION	DESCRIPTION	FITTED
Α	INDIVIDUAL PUMP MOISTURE IN OIL (MIO) SENSOR AND FAULT RELAY	MS NO
В	INDIVIDUAL PUMP MOTOR AUX PROTECTION SENSORS AND FAULT RELAYS	MO ESE
C	INDIVIDUAL PUMP REFLUX VALVE MICROSWITCH	MSS NO
D	STATION MANHOLE SURCHARGE IMMINENT	MS NO
E	STATION DRY WELL SUMP PUMP AND LEVEL INDICATION SENSORS AND RELAYS	MSS NO
F	STATION PERMANENT GENERATOR - ATS AND CONTROL CONNECTIONS	YES DAKED
G	STATION EMERGENCY STORAGE LEVEL SENSOR	MS NO
Н	STATION DELIVERY FLOWMETER	MSS NO
1	BACKUP COMMUNICATION - NEXT G	YES DARSO
J	PUMP CONNECTION (Via De-contactors)	YES DE
K	CATHODIC PROTECTION	MS NO
L	MOTOR THERMISTORS (Via De-contactors)	YES DAKED
М	ODOUR CONTROL	MS NO
N	CURRENT TRANSFORMER (CT) METERING	MS NO
0	PUMPS ELECTRICAL INTERLOCK	MS NO
Р	WET WELL WASHER	MS NO
Q	AUX PIT SUMP PUMP AND LEVEL PROBE	MO ESEC
R	TELEMETRY RADIO	YES DEED
S	WET WELL PRIMARY PROBE	YES DERECT
T	DOUBLE SIDED SWITCHBOARD	YES DEKED
U	DELIVERY PRESSURE TRANSMITTER	YES DAKED
٧	CHEMICAL DOSING	MS NO

ELECTRICAL AS BUILT CERTIFICATION

05.12 AS INSTALLED

Q-Pulse Id TMS267

E 04.12 FACTORY ACCEPTANCE TESTING MODIFICATIONS B.A. R.B. DRAFTED B.A. R.B. DRAFTING CHECK R.BARRETT DESIGN 08.12 LEVEL PROBE MEASUREMENTS UPDATED L.P. R.B. CAD FILE 57-0224set G

31-08-11 R.P.E.Q. No. DATE Original Signed by J.READ 7727 31-08-11

MANAGER ENGINEERING SERVICES

Urban Utilities SEWAGE PUMP STATION

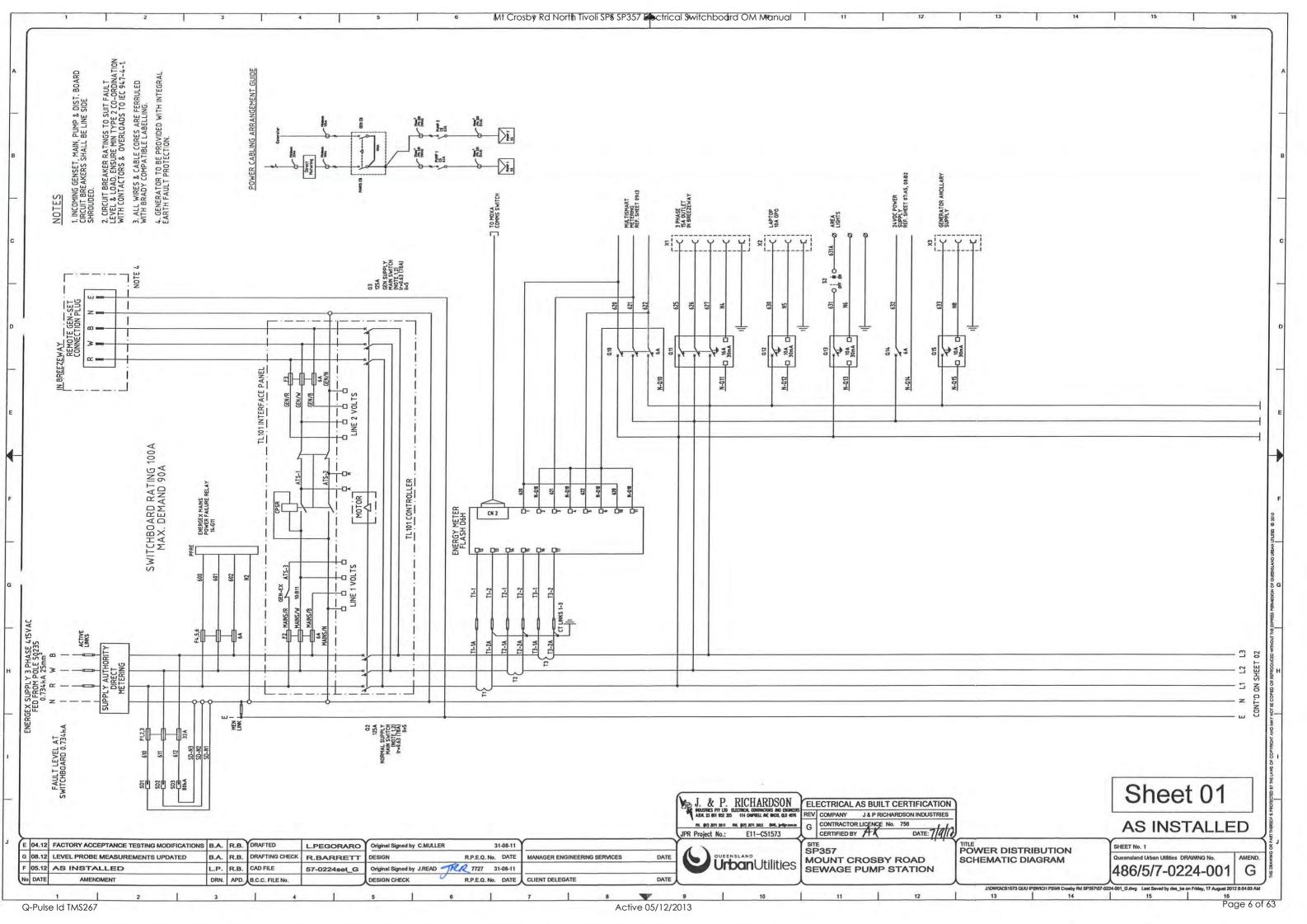
SITE COVER SHEET

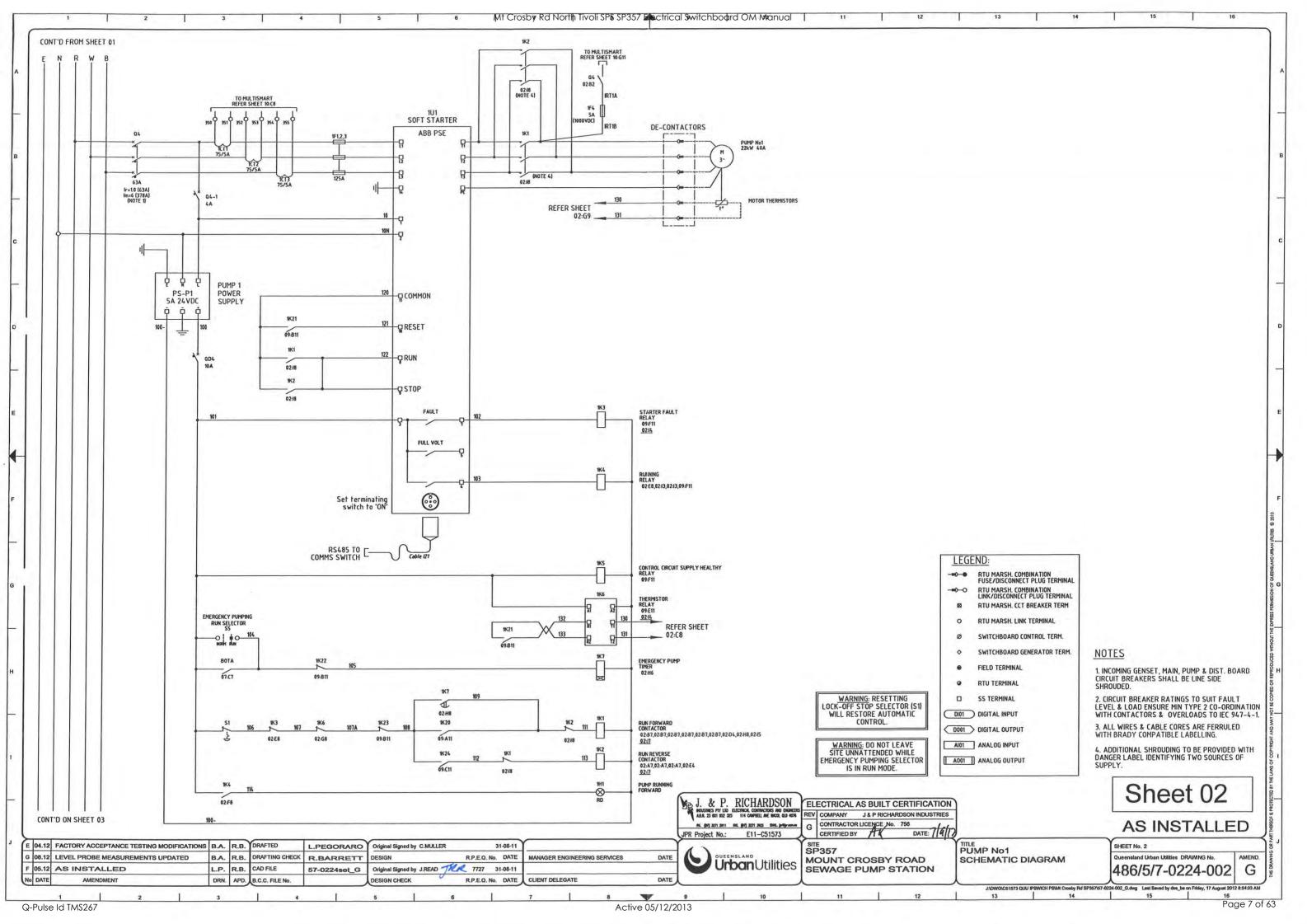
AS INSTALLED

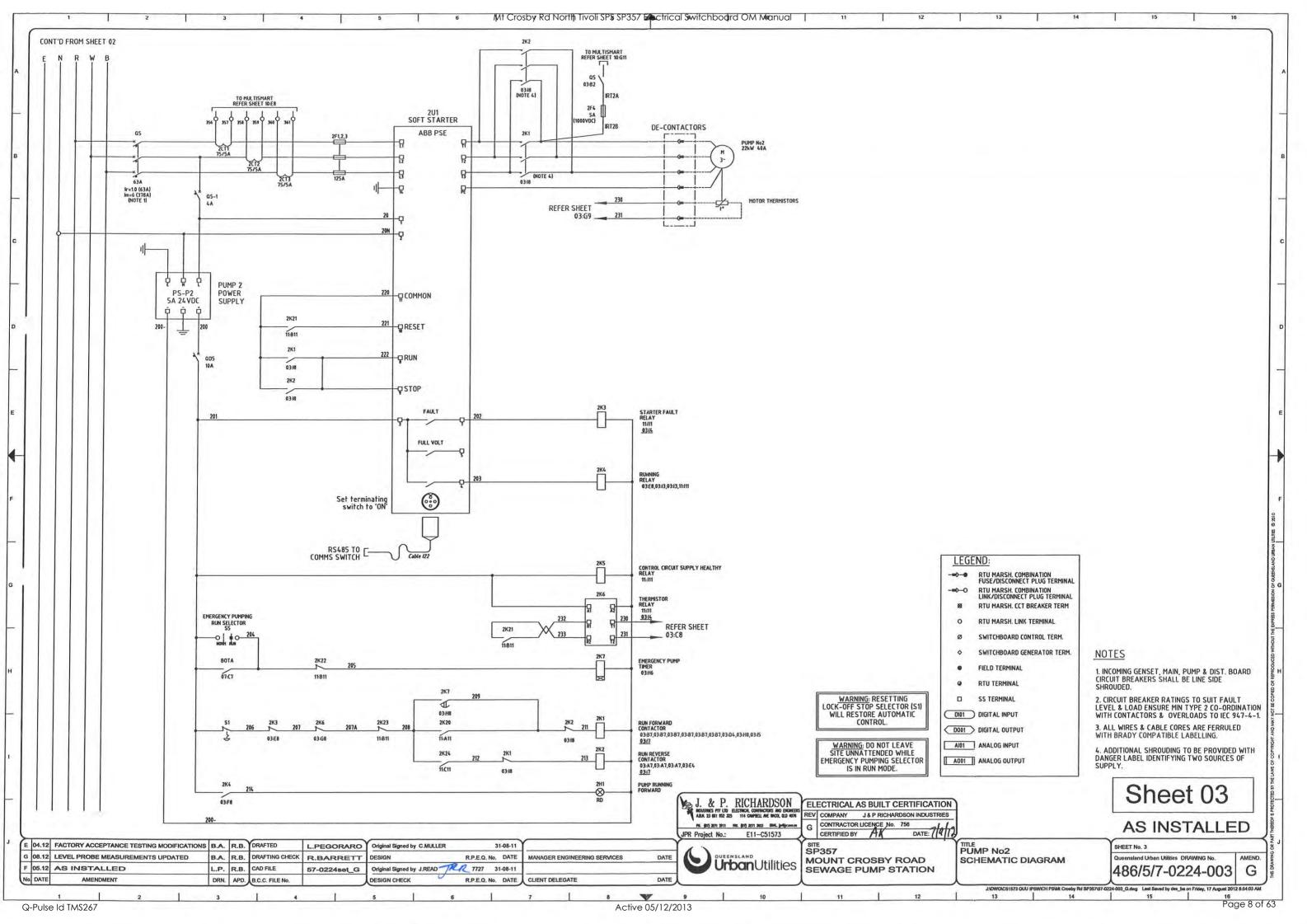
Sheet 00

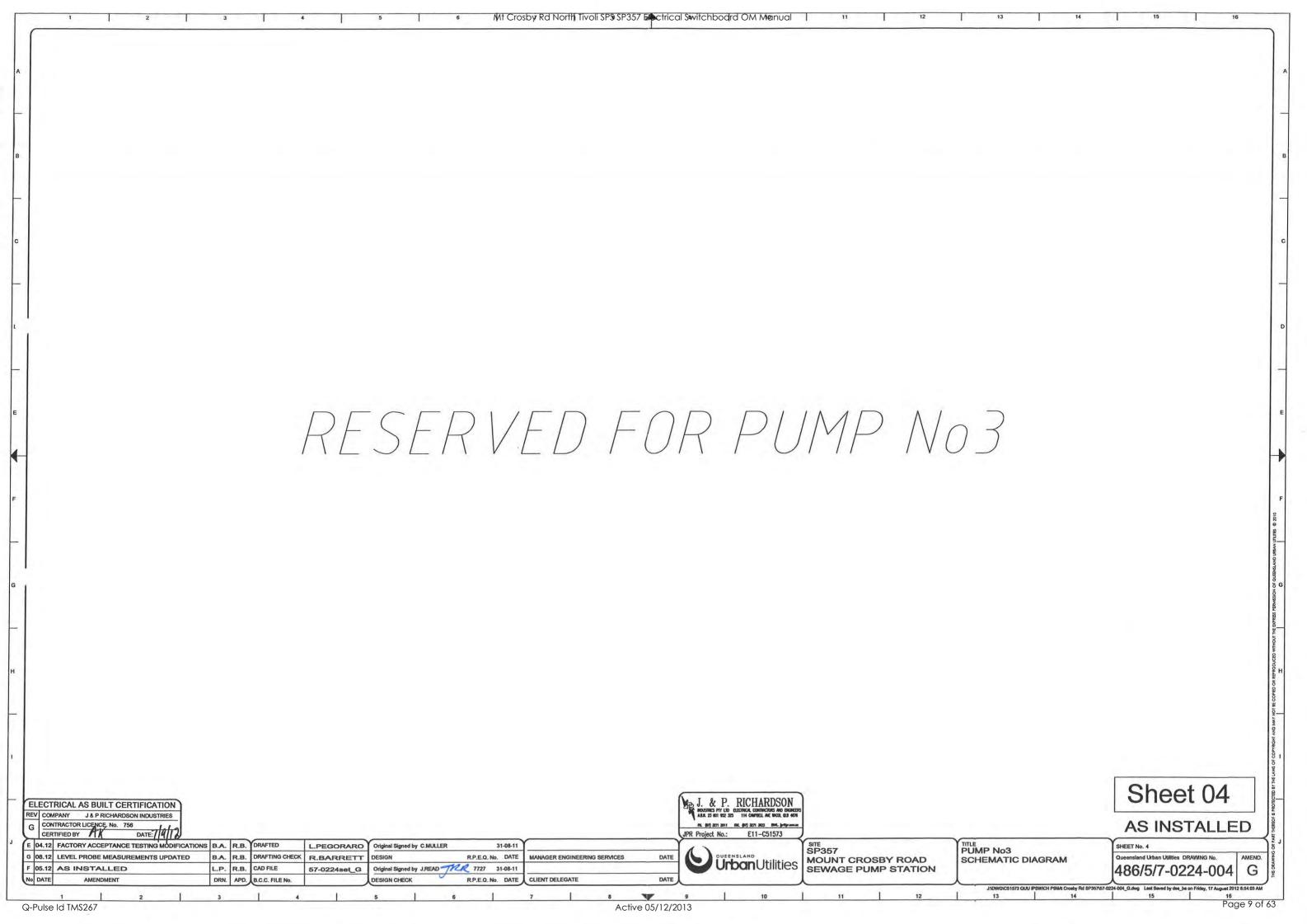
Queensland Urban Utilities DRAWING No. 486/5/7-0224-000

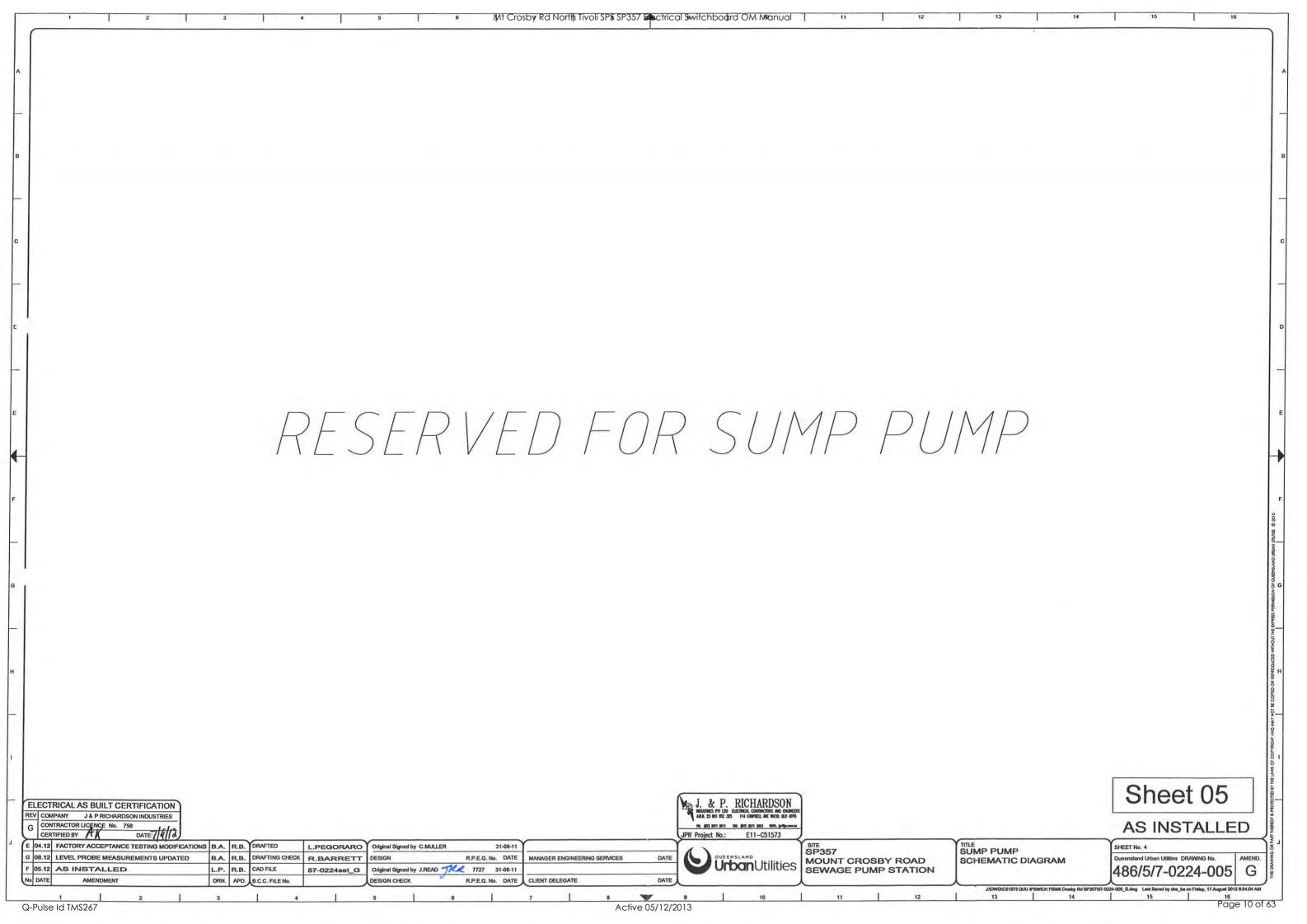
Active 05/12/2013

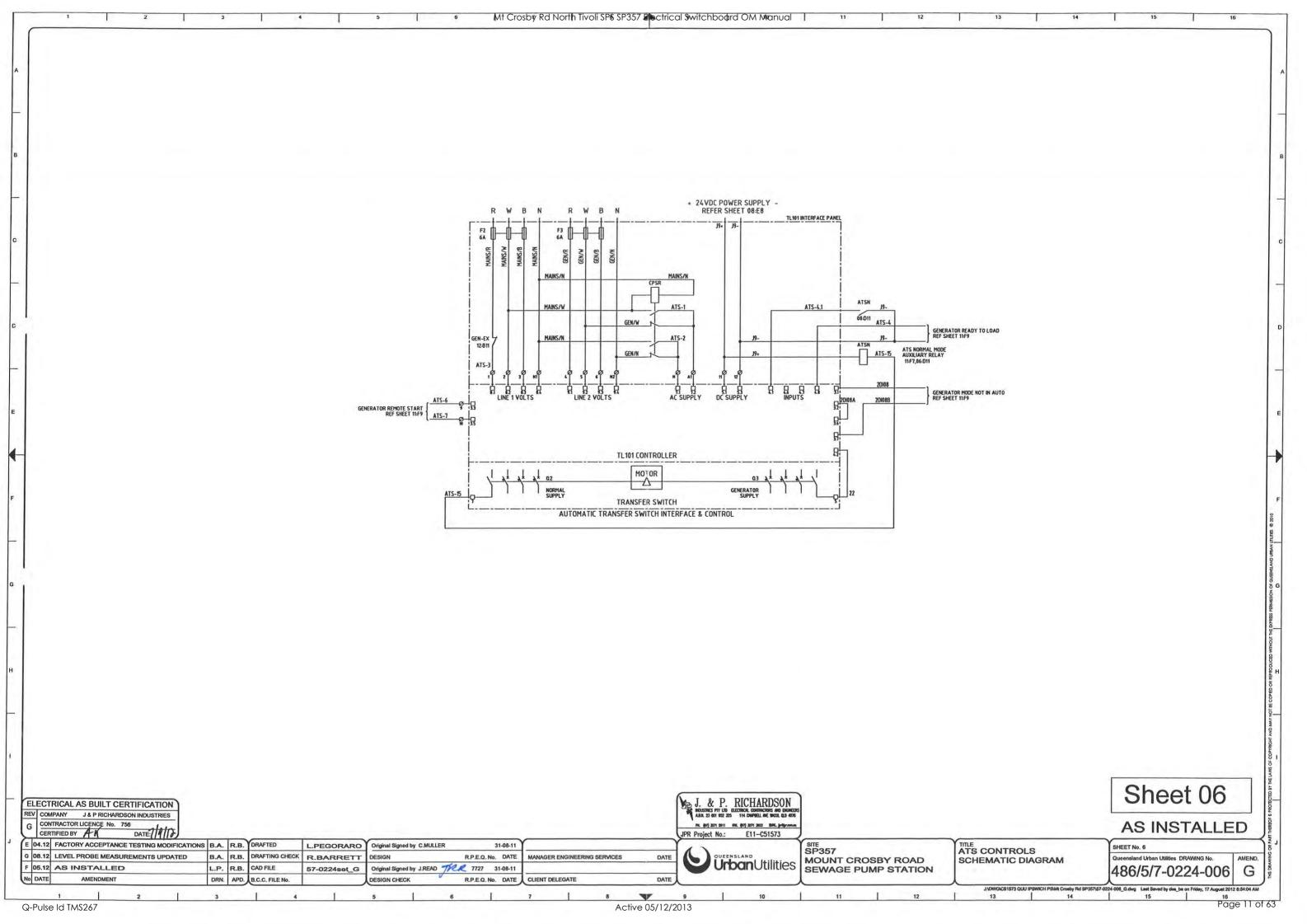


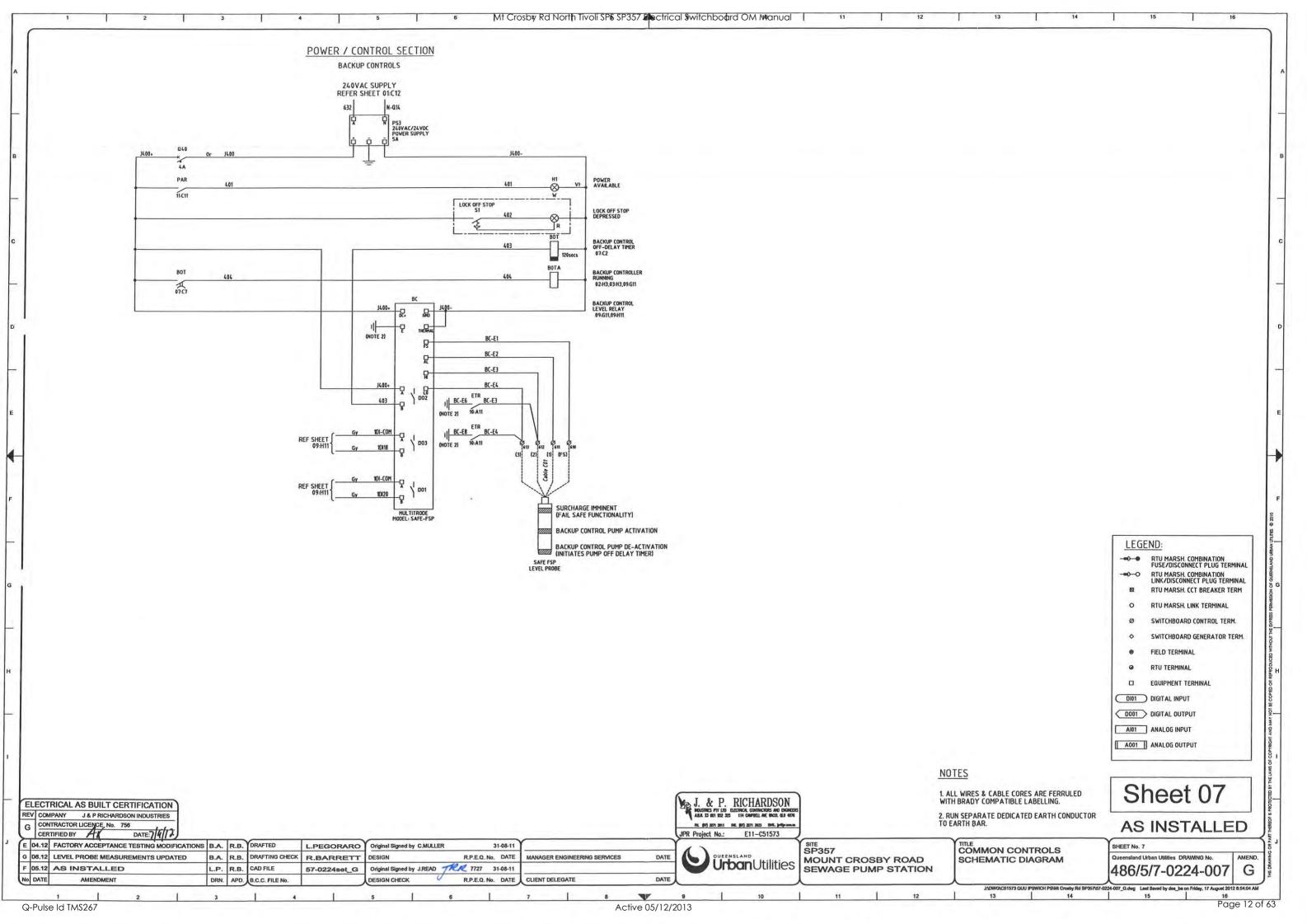


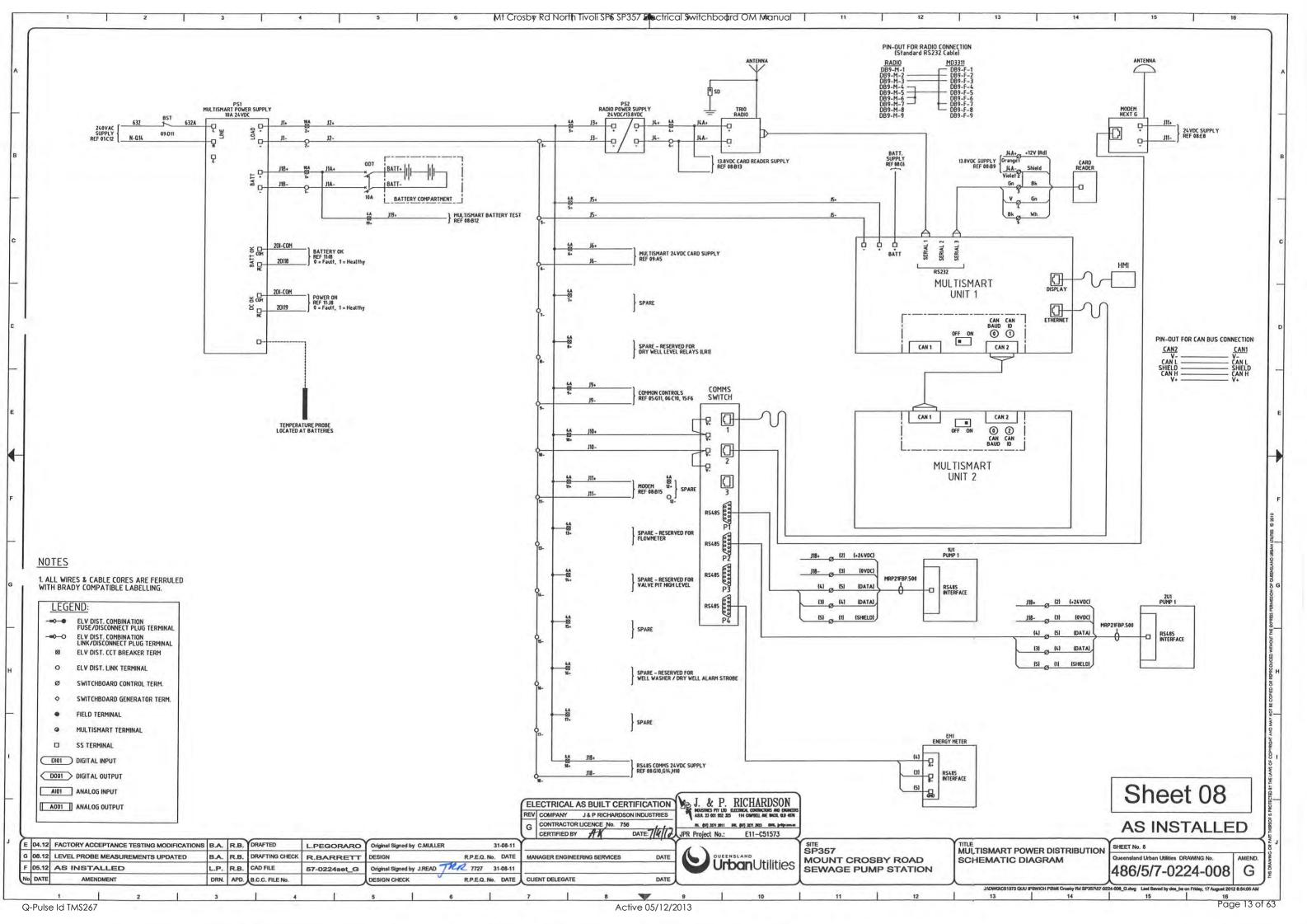


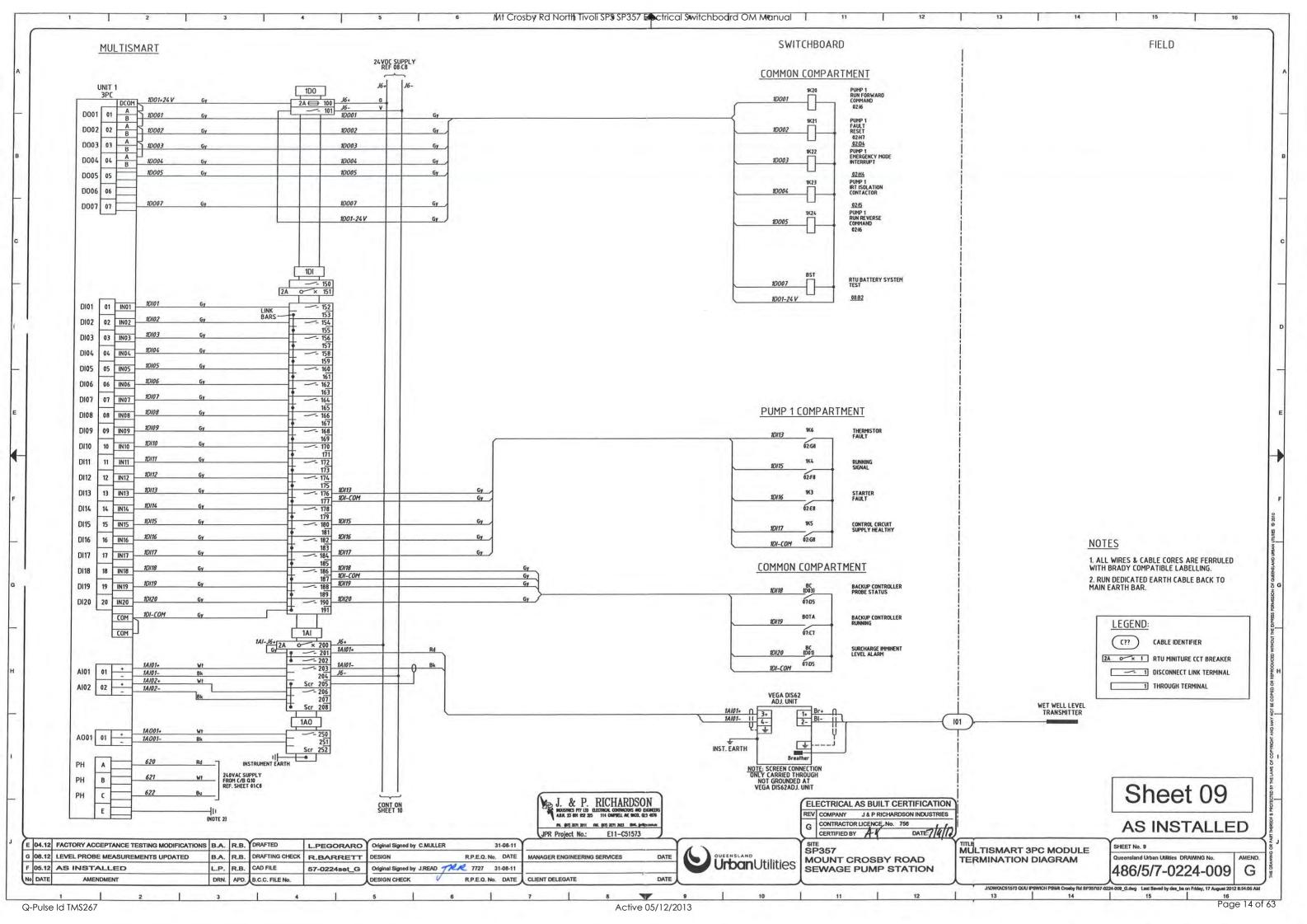


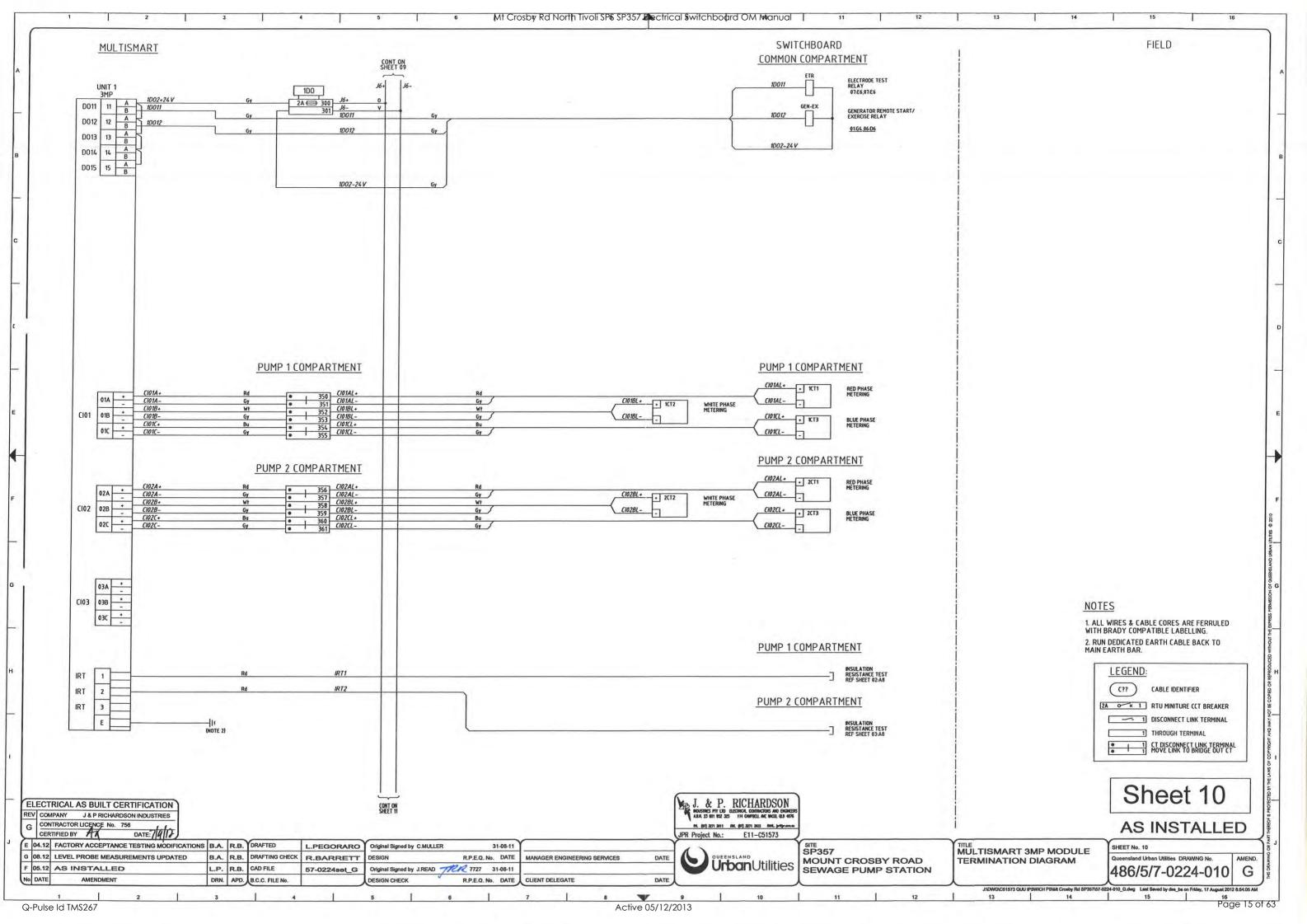


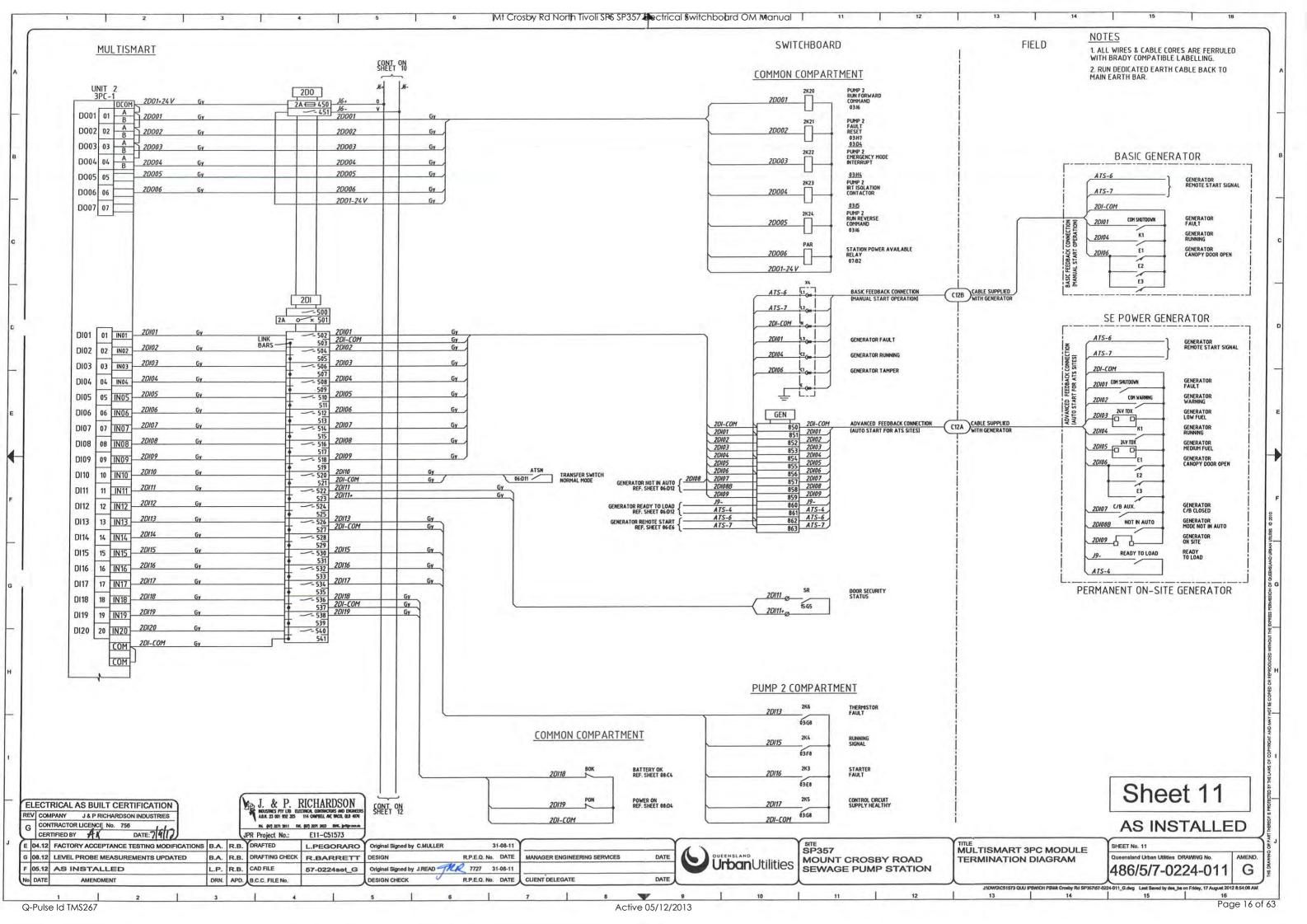


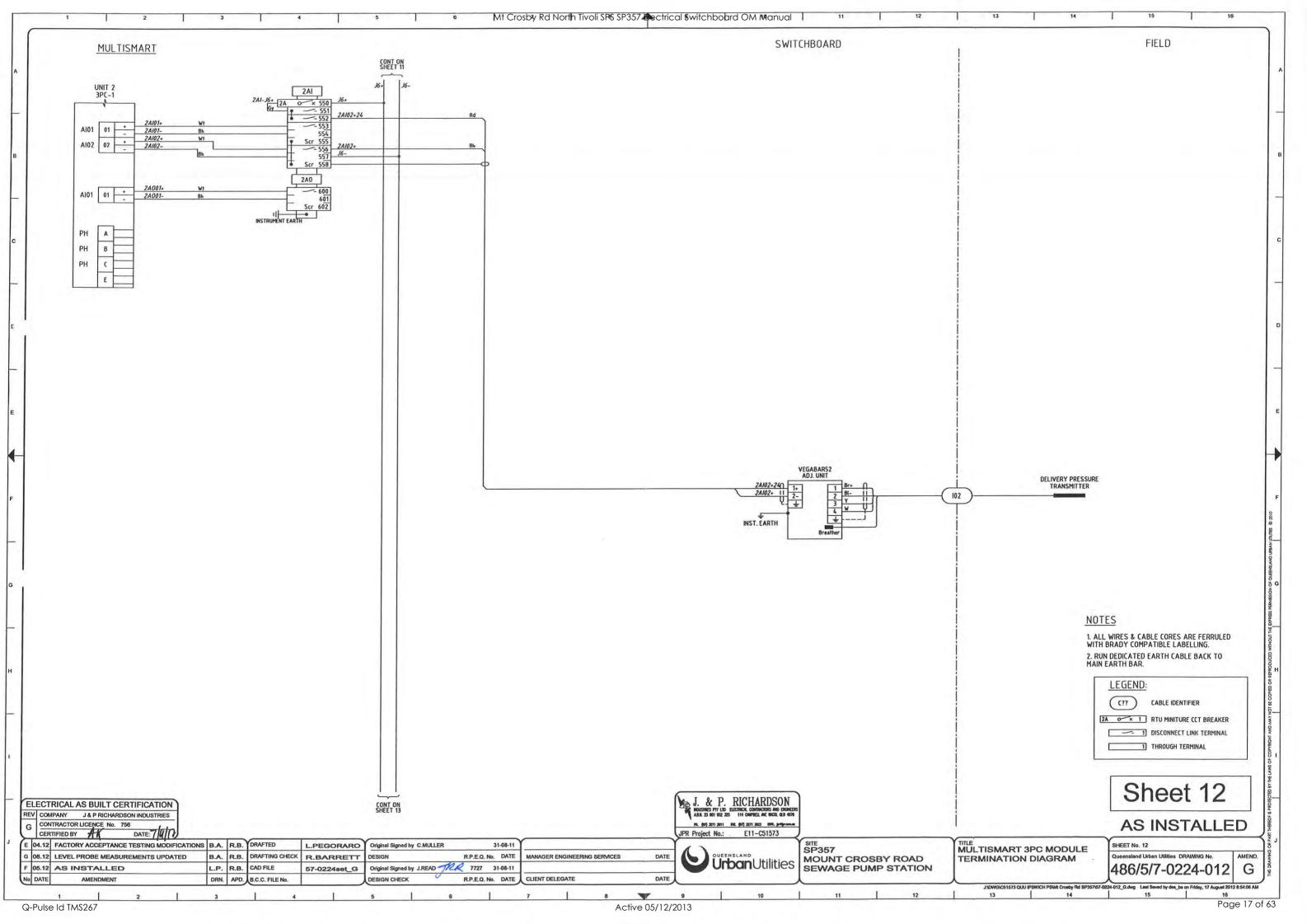


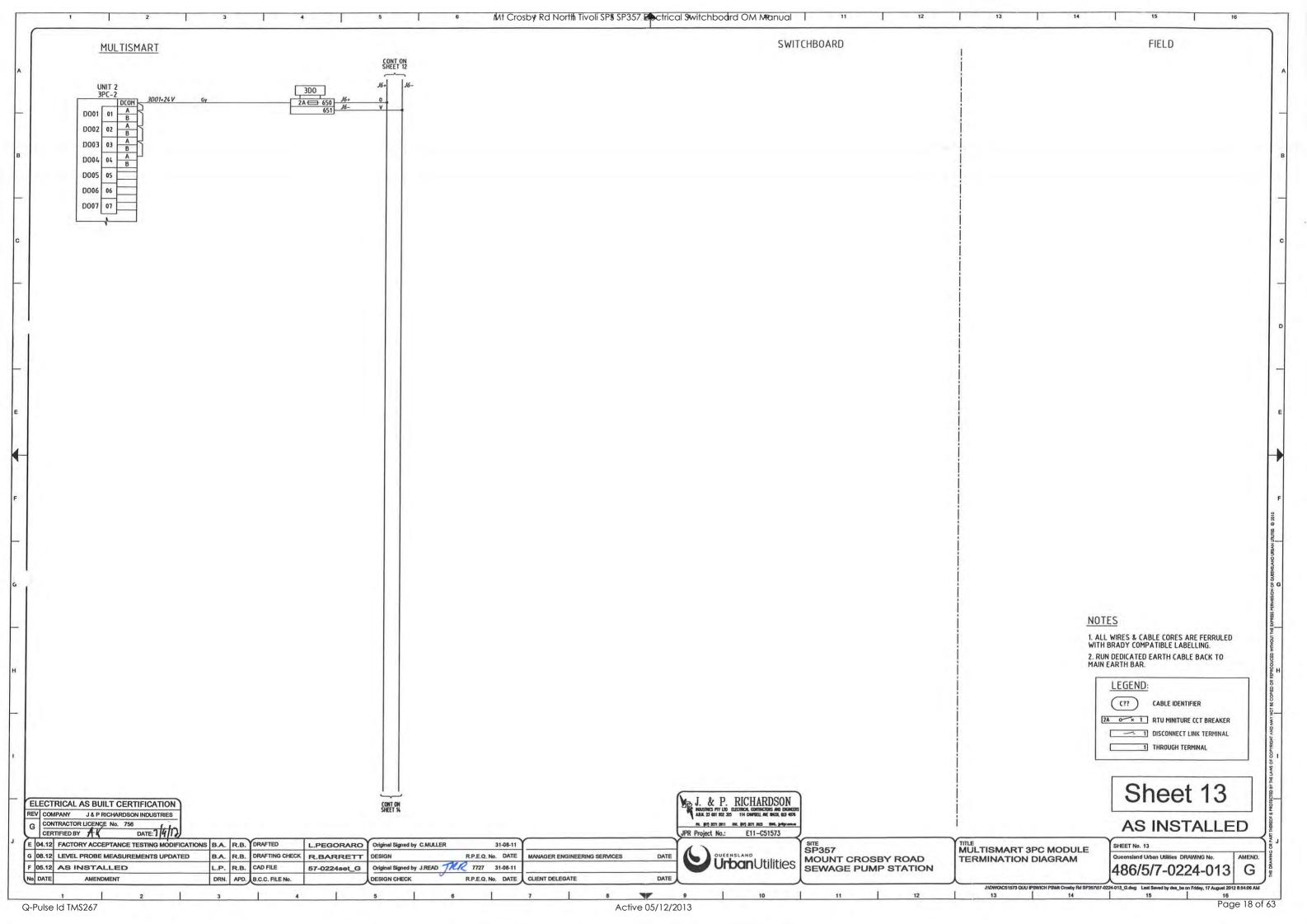


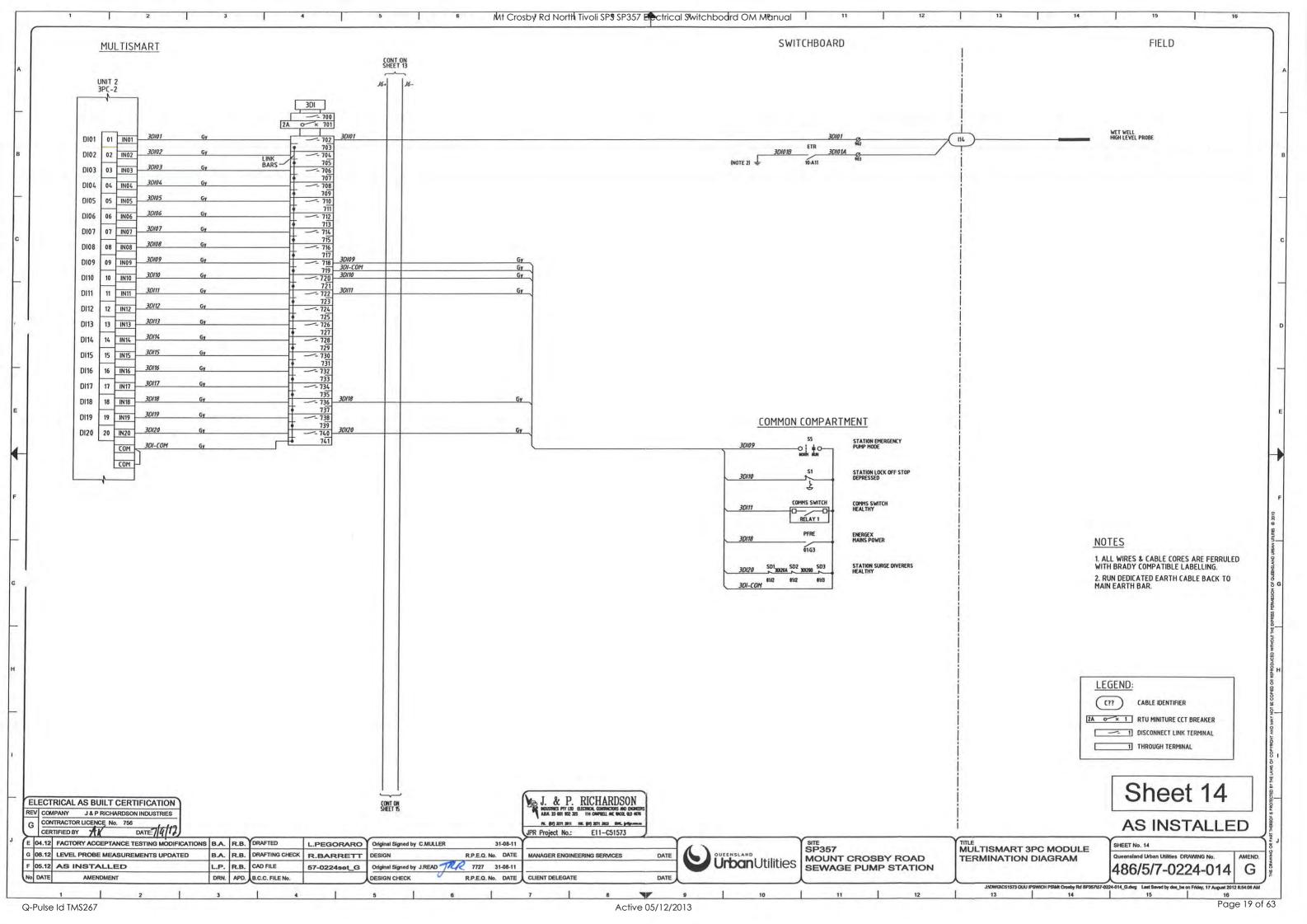


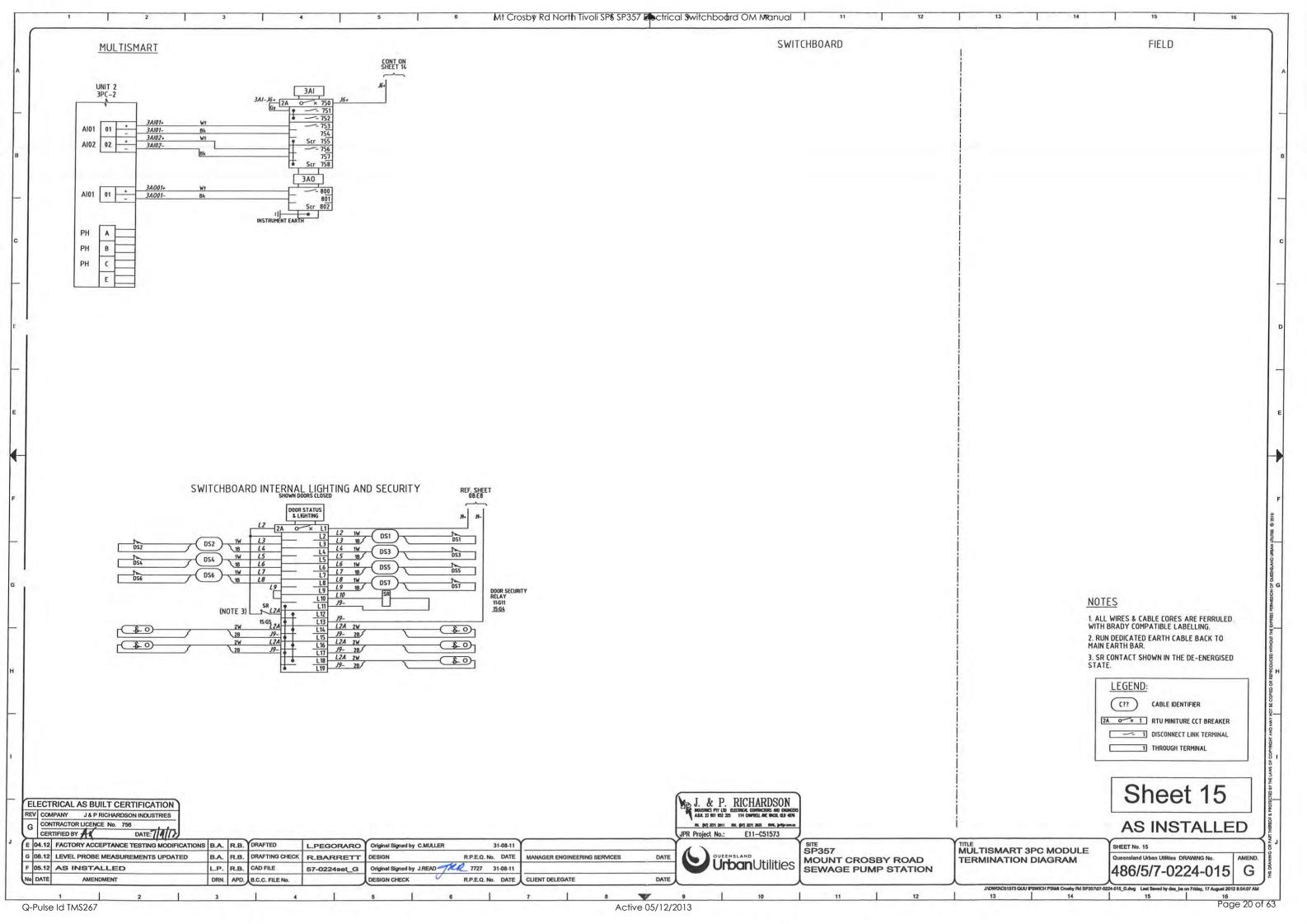




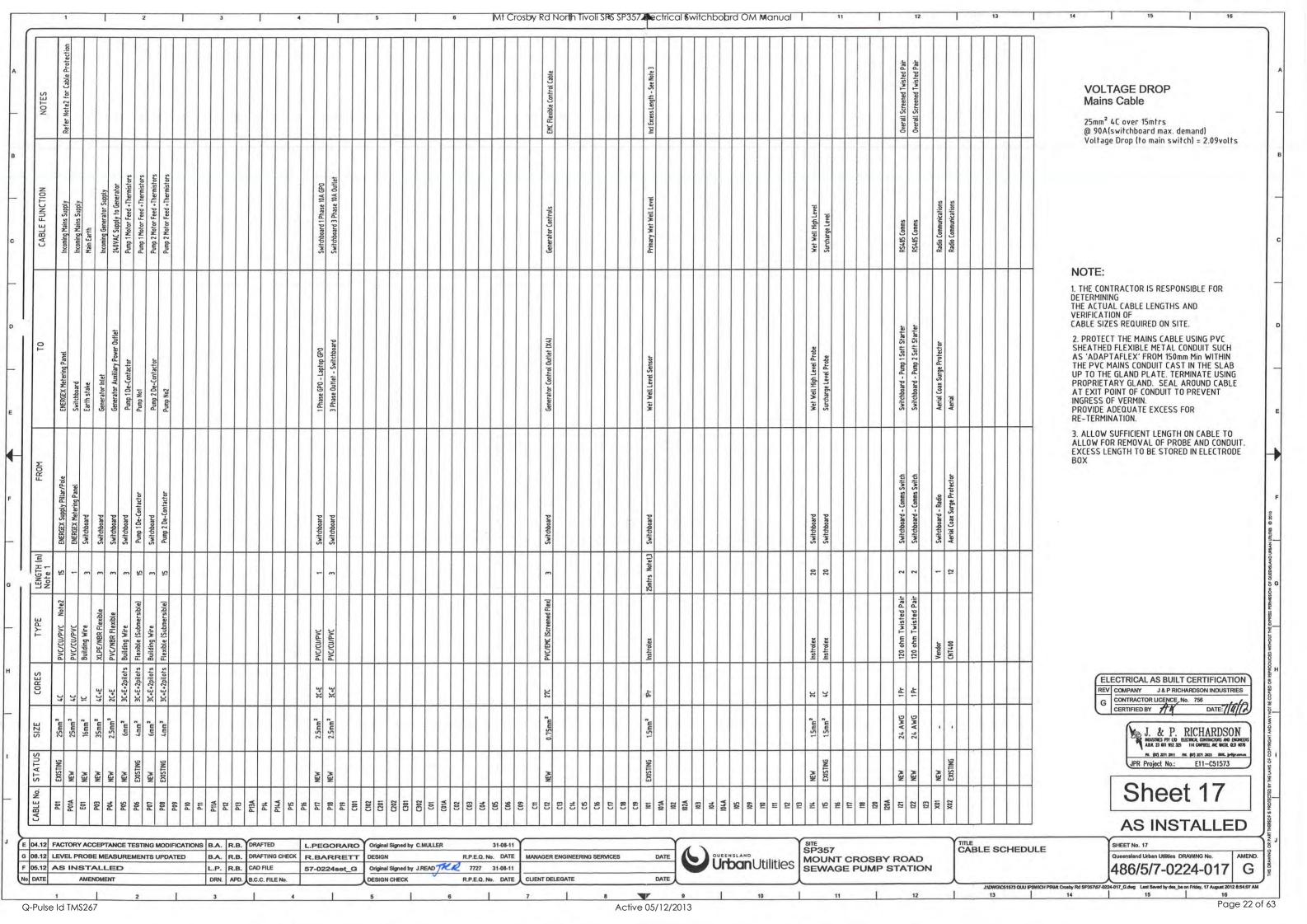




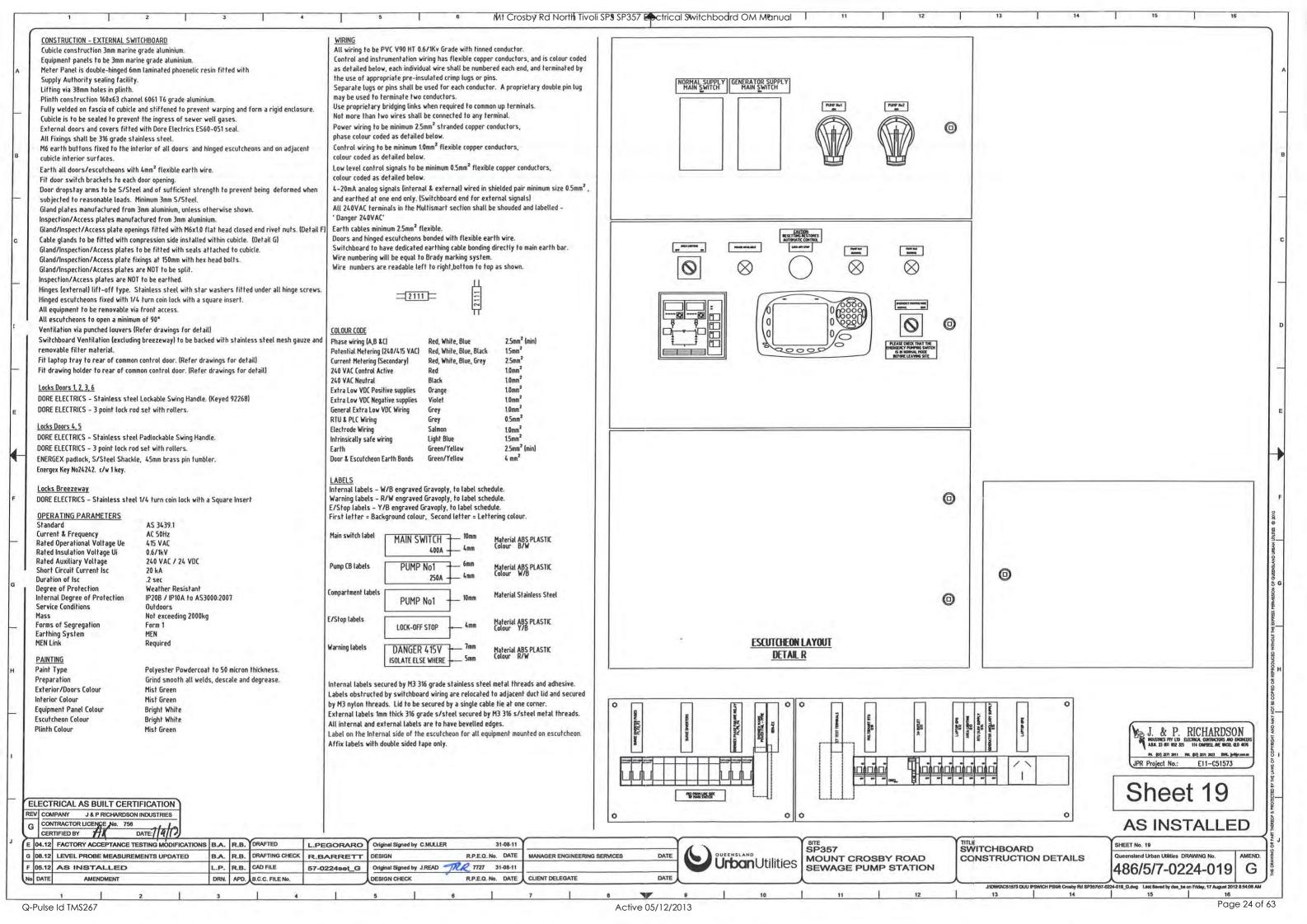


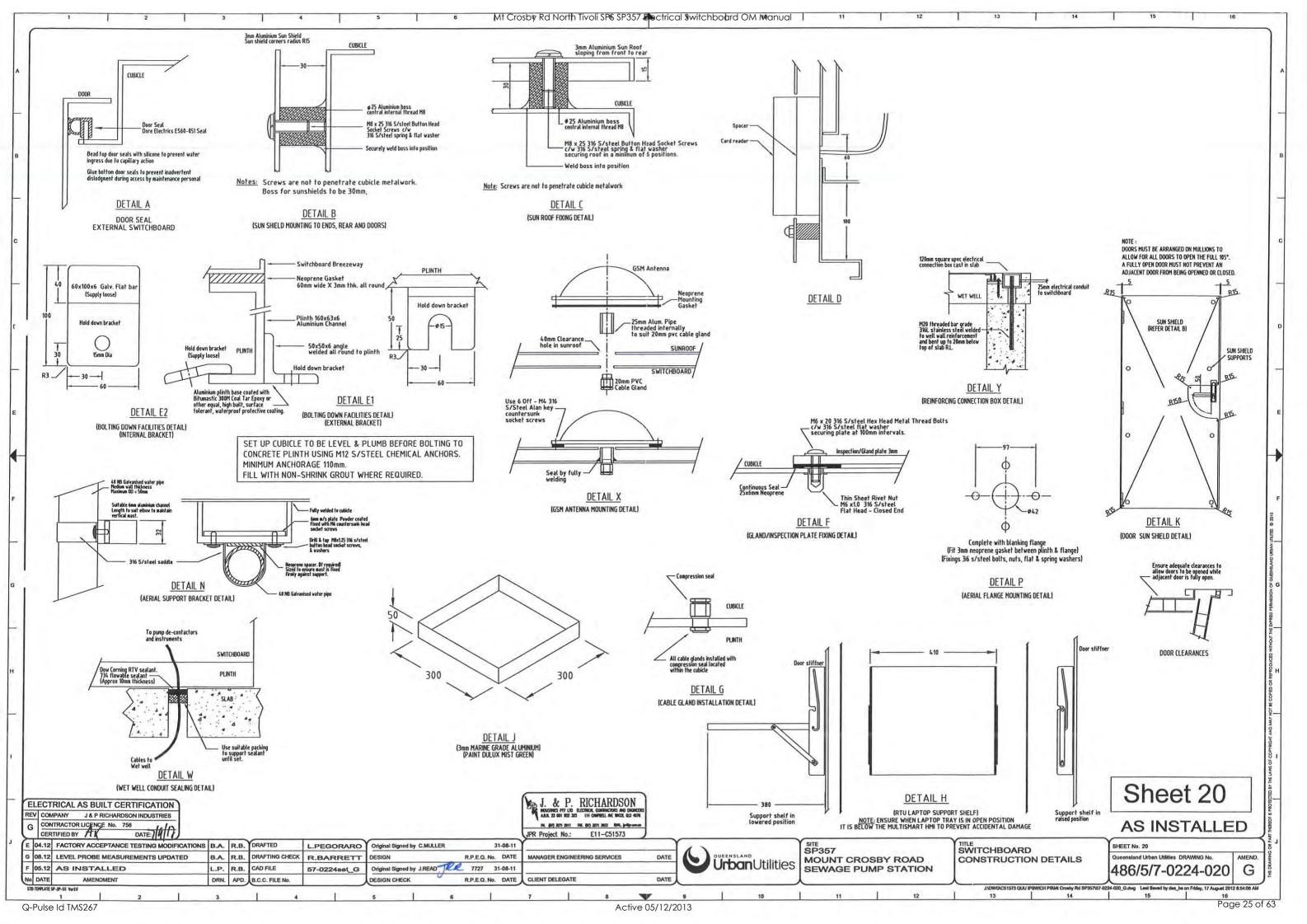


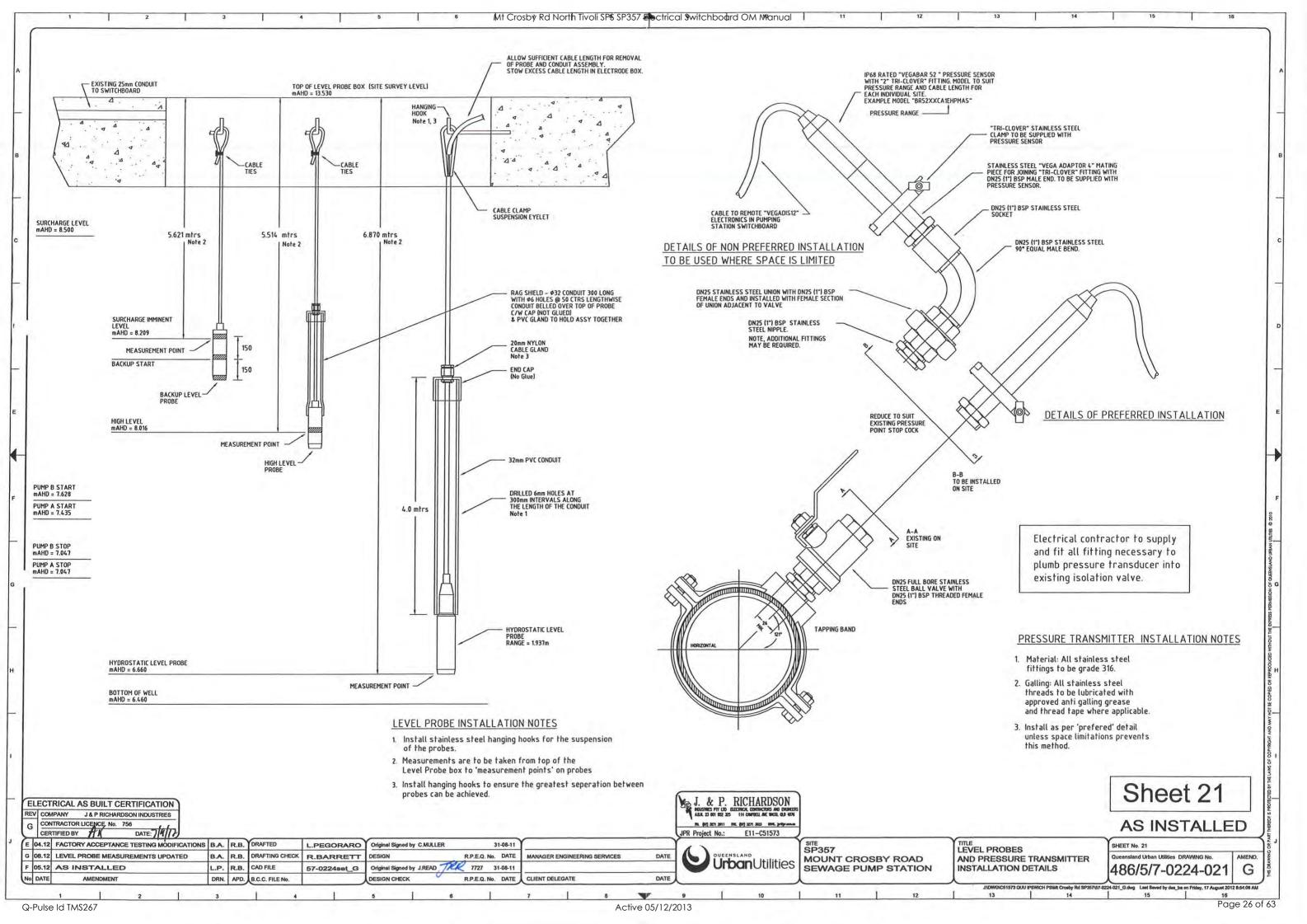
м от	Y DESCRIPTION	MANUFACTURER	CATALOGUE No	REMARKS	ITEM C	TY DESCRIPTION	MANUFACTURER	CATALOGUE No	REMARKS	ITEM QTY	DES	CRIPTION	MANUFACTURER	CATALOGUE No	REMARK
3	ACTIVE LINKS	CLIPSAL	BP165/7R		59	2 1,2K6 - PUMP THERMISTOR RELAY	SPRECHER & SCHUH	RT7-E2		123	NOT USED				
+-	NOT USED	10			60	1 1K7 - PUMP 1 EMERGENCY PUMP TIMER	CARLO GAVAZZI	DAA-51-C-H24		124 1	COMMS SWITCH		MOXA	NPORT 6450/SAA V1.5	1
	NOT USED	<u> </u>		-	61						MULTISMART RTU PUMP CO	INTROLLER	MULTITRODE	MSM-QUU2	
.					61	1 2K7 - PUMP 2 EMERGENCY PUMP TIMER	CARLO GAVAZZI	DAA-51-C-M24		125	HMI KEYPAD	MINOLEUN	-		
-	NOT USED				62	NOT USED			-				4		
1	Q2, Q3 - BASIC TRANSFER SWITCH	TERASAKI	BTSS2PE12533	Set Ir= 0.63 (78A) Char= 5	63	NOT USED				1	EXTENSION I/O		<u> </u>		
1	Q2, Q3 - ELECTRONIC CONTROLLER & INTERFACE PANEL	TERASAKI	TL101CIP		64	2 1,2H1 - PUMP RUNNING RED INDICATOR	SPRECHER & SCHUH	D7P-P4-PN3R		126					
1	GENERATOR INLET PLUG	MARECHAL	DS2 3928017	c/w 312A126	65	2 1,2F4 - INSULATION RESISTANCE TESTING FUSES	WOHNER / FERRAZ SHAWHUT	31971 c/w DCT5-2	5A 1000V FUSE & HOLDER	127 1	SWIPE CARD READER		INDALA	IN-ASR-610/1	+ SPACER (SP-610-
3	QLD SERVICE FUSES (METERING LINKS)	COOPER BUSMANN	HSB22BWCL	<u> </u>	66	2 PUMP REFLUX VALVE LIMIT SWITCH	HONEYWELL	BZ-2RW82-A2	c/w support stands	128	NOT USED				
1	MAIN NEUTRAL LINK		THOUSE THE STATE OF THE STATE O		67					129	NOT USED				
+-:		SWBD BUILDER		 	 ' 	2 1,2K20 - PUMP RUN FORWARD COMMAND RELAY	FINDER	38.51.24 VDC		 			VECA VECAUELLES	WL52-XXA4AMD1DD1X	-
1	MAIN EARTH LINK	SWBD BUILDER			68	2 1,2K21 - PUMP FAULT RESET RELAY	FINDER	46.52.0074 24VDC	+ 97.02 BASE	-	WET WELL LEVEL PROBE		VEGA - VEGAWELL52		
1	F1,2,3 - SURGE DIVERTER CIRCUIT FUSES	WOHNER	31113 c/w 3 x 31189	32A FUSES & HOLDERS	69	2 1,2K22 - PUMP EMERGENCY MODE INTERRUPT RELAY	FINDER	38.51.24VDC		131 1	WET WELL LEVEL ADJUSTI	IENT UNIT	VEGA - VEGADIS62	DIS62-XXKMASX	ļ
3	SD1,2,3 - SURGE DIVERTER	CRITEC	TDS1100-2SR-277		70	2 1,2K23 - PUMP IRT ISOLATION CONTACTOR	FINDER	38.51.24 VDC		132 1	DELIVERY PRESSURE TRAI	ISMITTER	VEGA - VEGABAR52		
1	F4,5,6 - PHASE FAILURE FUSES	WDHNER	31113 c/w 3 x 31184	6A FUSES & HOLDERS	71	2 1.2K24 - PUMP RUN REVERSE COMMAND RELAY	FINDER	38.51.24VDC		133 1	TRICLOVE FITTING FOR VE	ABAR52	VEGA	ADAPTOR 4	
1	PFRE - ENERGEX MAINS PHASE FAILURE RELAY	CARLO GAVAZZI			72	1 S1 - PUMP LOCK OFF PUSHBUTTON	SPRECHER & SCHUH	D7P-LMT44 + D7-ALP + D7-N3R	c/w D7-X10 + D7-X01	134 2	CORROSION INHIBITOR		CORTEC	VPCI-110	
 '		CARLO GAVAZZI	DPB-01-C-M48	<u> </u>		<u> </u>			(/ • 01-XIV + 07-XVI			CHITCH CURCE DIVERTERS		-	1
	NOT USED		4		 	2 S1 - PUMP LOCK OFF SAFETY CONTACTS	SPRECHER & SCHUH	D7-X01S				r switch surge diverters	NOVARIS	SL36/G	+
3	T1,2,3 - ENERGY METER CT's	IME	TAI 400	150/5A	74	1 S2 - AREA LIGHTING SELECTOR SWITCH	KRAUS & NAIMER	CA10 A221-FT2 F×	ENGRAVED 'OFF-ON'	136	NOT USED		ļ		
1	EM1 - ENERGY METER	ELECTREX	FLASH-D 6DH2 c/w D2	c/w RS485	75	1 SS - EMERGENCY PUMPING SELECTOR SWITCH	KRAUS & NAIMER	CA10 A223-FT2 F×	ENGRAVED 'NORMAL-RUN'	137	NOT USED				
1	Q4 PUMP1 CIRCUIT BREAKER + T2HS Handle + Shroud	TERASAKI	E125NJ3063	Set Ir= 1.0 (63A) Im= 6	76	1 H1 - POWER AVAILABLE WHITE INDICATOR	SPRECHER & SCHUH	D7P-P7-PN3W		138	NOT USED				
1 1			1	 	77	1 PAR - POWER AVAILABLE RELAY	FINDER	38.51.24VDC		139	NOT USED				1
+	Q5 PUMP2 CIRCUIT BREAKER + T2HS Handle + Shroud	TERASAKI	E125N J 3063	Set Ir= 1.0 (63A) Im= 6	 					14.0			1		1
6	ATS CARTED CIRCUIT FUSES		SC20	c/w 6A CART		2 PUMP POWER SOCKET OUTLET + INCLINE SLEEVE	MARECHAL	DS3 3134013972 + 51CA757	-		NOT USED				
\perp	NOT USED				79	2 PUMP POWER INLET PLUG + HANDLE	MARECHAL	DS3 3138013972 + 313A013		141	NOT USED				
	NOT USED				80	NOT USED				142	NOT USED				
1	Q10 MULTITRODE MULTISMART METERING CIRCUIT BREAKER	TERASAKI	DTCB6306C		81	NOT USED				143	NOT USED				
1	Q11 15A GPO CIRCUIT BREAKER	TERASAKI	DTCB6316C	בלע חכובות את אחוו	82	NOT USED			 	144 1	2 x 300mm TELESCOPIC BA	TTFRY TRAY RAII	UES	DSCH MD 300mm	
+:			-	c/w DSRCM-32-30-3PN	- · · · ·				<u> </u>	<u> </u>	Z X JANIIM LECTOCOLIC DA		.1	<u> </u>	_1
1	Q12 RTU LAPTOP GPO CIRCUIT BREAKER	TERASAKI	DSRCBH-10-30A		83	NOT USED				ļ			ITCHBOARD TERMINA	T	Jane
1	Q13 SITE LIGHTING CIRCUIT BREAKER	TERASAKI	DSRCBH-10-30A		84	NOT USED				164.0 2	10A MINIATURE THERMAL	CIRCUIT BREAKER	PHOENIX CONTACT	TCP 10	(071 2314)
1	Q14 DC SUPPLY CIRCUIT BREAKER	TERASAKI	DTCB6106C		85	NOT USED				164.1 17	4A MINIATURE THERMAL	IRCUIT BREAKER	PHOENIX CONTACT	TCP 4	(071 2259)
1	Q15 GENERATOR ANCILLARY SUPPLY CIRCUIT BREAKER	TERASAKI	DSRCBH-10-30A		86	1 SINGLE POINT PROBES	MULTITRODE	1 off - 020130FSP-Shield	1 off - 0.2/1-'x' (1 core)	164.2 7	2A MINIATURE THERMAL	IRCUIT BREAKER	PHOENIX CONTACT	TCP 2	(071 2217)
+-	NDT USED		DOMEDIT IV DVA		87	············	FINDER			164.3 26	TERMINAL MOUNTING BLO		PHOENIX CONTACT	UK6-FSI/C	(311 8203)
-						1 SR - SECURITY LIGHTING CONTROL RELAY		46.52 24VDC	c/w 97.02 BASE	1			_	<u> </u>	
	NOT USED				88	1 INSTRUMENT EARTH BAR	CLIPSAL	L12		164.4 2	10-TERMINAL PLUG-IN BR	IDGING BAR	PHOENIX CONTACT	FBI 10-8	(020 3263)
	NOT USED				89	NOT USED				164.5 69	1 x DISCONNECT, 1 x PHAS	E, 1 x PE TERMINAL	PHOENIX CONTACT	PIT2.5-PE/L/LTB	(321 3957)
1	NOT USED				90	NOT USED				164.6 9	TERMINAL END PLATE		PHOENIX CONTACT	D-PITI/3B	(321 3976)
+	NOT USED				91	NOT USED				164.7 4	COMBINATION TERMINAL		PHOENIX CONTACT	PIT2.5-TG	(321 1003)
╂					 ~ 					 		DAL	DUOCHIV CONTACT	D CILCYSALED 31	(202 6940)
	NOT USED				92	NOT USED				164.8 4	FUSE CONNECTOR WITH LE		PHOENIX CONTACT	P-FU 5X20 LED 24	(303 6819)
1	DIST. BD EARTH LINK	DORE ELEC.	165E24		93	1 ATSN - ATS NORMAL MODE AUXILIARY RELAY	FINDER	46.52 24 VDC	c/w 97.02 BASE	164.9 6	20-TERMINAL PLUG-IN BE	IOGING BAR	PHOENIX CONTACT	FBS 20-5	(303 0226)
1	DIST. BD NEUTRAL LINK	DORE ELEC.	165N24	c/w E/N FEET	94	1 GEN-EX - GENERATOR EXERCISE RELAY	FINDER	38.51 24 VDC		164.10 51	THROUGH TERMINAL		PHOENIX CONTACT	PIT2.5	(320 9510)
1	DIST. BD 15 POLE 3 PHASE BUS BAR	TERASAKI	ICL213		95	1 PS3 - BACKUP CONTROL POWER SUPPLY	WEIDMULLER	PRO-H-5A (89513 40000)		164.11 5	TERMINAL END PLATE		PHOENIX CONTACT	D-ST2.5	(303 0417)
2		TERASAKI								164.12 31	DISCONNECT TERMINAL		PHOENIX CONTACT	PIT2.5-MT	(321 0156)
-			ICLEC23	-		1 Q40 - BACKUP CONTROL CIRCUIT BREAKER	TERASAKI	DTCBDC104C						D-PIT2.5-MT	(321 1003)
+	X1 - 3 PHASE SWITCHEO OUTLET 20A	CLIPSAL	56C520			1 BC - BACKUP CONTROL LEVEL RELAY	MULTITRODE	SAFE-FSP 24VDC		J	TERMINAL END PLATE		PHOENIX CONTACT	l	
1	X2 - 1 PHASE DIN-RAIL MOUNTED OUTLET 10A	CLIPSAL	4PS010		98	1 BACKUP LEVEL PROBE	MULTITRODE	3-SEGNENT PROBE			TERMINAL END BRACKET		PHOENIX CONTACT	CLIPFIX 35-5	(302 2276)
1	X3 - GENERATOR ANCILLARY POWER OUTLET 10A	CLIPSAL	56\$0310	IP56	99	1 BOT - BACKUP OFF-DELAY TIMER	CARLO GAVAZZI	DBB-01-D-M24		164.15 2	TEST PLUG		PHOENIX CONTACT	PS 5	[303 0983]
1	X4 - GENERATOR CONTROL OUTLET 10A	CLIPSAL	56\$0710	IP56		1 BOTA - BACKUP OFF-DELAY TIMER HOLD RELAY	FINDER	55.34.0074 24VDC	+ 94.04 BASE	164.16 18	TERMINAL GROUP MARKE	R	PHOENIX CONTACT	UBE/D	(080 0307)
	Q4-1, Q5-1 - PUMP 240VAC CONTROL CIRCUIT BREAKER	TERASAKI		+	101					164.17 18	CT TEST LINK TERMINALS		PHOENIX CONTACT	URTK/S	(031 1087)
			DTCB6104C			5 E1-5 - LED SWITCHBOARD LIGHT	LUMIFA	LF1B-C3S-2THWW4					PHOENIX CONTACT	TS-RTK	1
-	QD4, QD5 - PUMP 24VDC CONTROL CIRCUIT BREAKER	TERASAKI	DTCBDC110C		102	7 DS1-7 - SWITCHBOARD DOOR MICRO SWITCHES	CAMSCO	SM202	7 OFF N/C	165 9	TERMINAL BARRIERS		PROCESS CONTACT	13-111	+
1	QD7 - BATTERY SHORT CCT PROTECTION CIRCUIT BREAKER	TERASAKI	DTCBDC210C		103	NOT USED				166	NOT USED			L	
2	PS-P1,2 - PUMP 240VAC-24VDC POWER SUPPLY	WEIDMULLER	895134 00 00	120W 5A/24VDC	104	1 BST - RTU BATTERY SYSTEM TEST RELAY	FINDER	38.51.24VDC		1			MISCELLANEOUS		
 		ABB	PSE45		105	1 ETR - ELECTRODE TEST RELAY	FINDER	55,34.0074 24VDC	+ 94.04 BASE	167 1	ENERGEX PADLOCK - 45	mm brass pin tumbler	H.A. REED LOCKSMITHS	KEY No 24242 & S/S Shackle	c/w 1KEY
-				+	106		I INDLA	33.37.0014 E4TUL	- /T.TT DIIGL	168 Lot	WET WELL CONDUIT SEA		RUBBER	TO SUIT CONDUITS	Defail 'W'
2		ABB	PS-FBPA	1		NOT USED									
1	NOT USED				107	NOT USED				169 Lot		TAILED FOR PRESSURE TX	FITTINGS	STAINLESS STEEL	Sheet 17
2	1,2F1-3 - SEMI-CONDUCTOR FUSES	WOHNER / BUSSMANN	33217 c/w 3 x 170M1568	125A FUSES & HOLDER	108	1 PS1 - MULTISMART POWER SUPPLY	POWERBOX	PB251A-24CM-CC-T		170 1	EARTH ROD CONNECTION	BOX	NESCO	ERB1 (if cased in slab)	PIT-03 (if direct in
6	1,2CT1-3 - CURRENT TRANSFORMERS	IME	TAI BB	75/5A	109	2 BATTERIES - INCLUDING SPILL TRAYS	YUASA	UXH38-12		171 1	LINE TAP - BONDING TO	ARTHING ROD	CLIPSAL	BP26	
1	NOT USED				110	1 PS2 - RADIO POWER SUPPLY	POWERBOX	PBIH-2412J-CC	 	172 1	EARTHING ROD		COPPER ROD	13mm Diameter	1
									-						+
<u> </u>	NOT USED				111	1 RADIO	TRIO	ER450		173	NOT USED				-
	NOT USED			<u> </u>	112	1 RADIO COAX SURGE PROTECTOR	POLYPHASER	IS-50-NX-C2		174	NOT USED				
4	K1,K2 - PUMP FWD/REV CONTACTOR	SPRECHER & SCHUH	CAS7-43D-04C-24VDC		113	1 INTERNAL COAX CABLE (Radio to Lightning Arrester)	TRIO	SMAM/NH/TL23		175	NOT USED				
		SPRECHER & SCHUH	7-PW43		114	1 EXTERNAL COAX CABLE (Lightning Arrester to Aerial)	RF INDUSTRIES	ANDREW - CNT400		176	NOT USED				1
 										- - - - - - - - - -				 	+
1	<u> </u>	SPRECHER & SCHUH	CM7		115	1 RADID 2m STANDARD RS232 9MALE/9FEMALE	ELECTUS	WC-7534	ļ	177	NOT USED				
4	K1,K2 - PUMP CONTACTOR AUX.	SPRECHER & SCHUH	CA7-PA-20	<u> </u>	116	1 RADIO ANTENNA (15 ELEMENT 13dB ALUM)	TRIO .	ANTY-13-900A	+ ANTSTRUT9	178	NOT USED				
	NOT USED				117	2 RADIO COAX PLUG	PULSE	N-203HS		179	NOT USED				
	NOT USED				118	1 RADIO ANTENNA U-CLAMP	RF INDUSTRIES	UNV		180	NOT USED				1
					119				LENGTH CHIEF					<u> </u>	
	NOT USED					1 ANTENNA MAST C/W 20mm NYLON CABLE GLAND	SWBO BUILDER	SHEET 22	LENGTH = 6 MTRS	ים מגען	CHARDSON	CELEGEBIAN :A -:	III T OFFICIAL	引ってよった	4 10
2	1,2K3 - CONTROL RELAYS	FINDER	46.52.0074 24 VDC	+ 97.02 BASE	120	·	MAXON	EM-770WUNI	I I	NOUSTRIES PTY LTD ELECTI	ICAL CONTRACTORS AND ENGINEERS	ELECTRICAL AS BU			il IO
2	1,2K4 - CONTROL RELAYS	FINDER	38.51.24 VDC		121	1 PROFILE DISC ANTENNA	MAXON	C3L A30-BD170F	1 1)	ABJN. 23 001 952 325 1	14 CHAPBELL ANE NACOL OLD 4076	REV COMPANY J&P		7	
2	1,2K5 - CONTROL RELAYS	FINDER	38.51.24 VDC		122	NOT USED					27) 3271 3523 BML jpftjgrænum	H CONTRACTOR LICEN		AS INS	TALLE
			J							Project No.:	E11-C51573	CERTIFIED BY H	L DATE: 9/		., \
3 A	MENDED EQUIPMENT	B.A. R.B. YDRAF	FTED L.PEGORAR	Original Signed by C.MULLE	ER	31-08-11		1	SP357]	TITLE EQUIPMENT SO	CHEDULE (SHEET No. 16	
2 L	EVEL PROBE MEASUREMENTS UPDATED	B.A. R.B. DRAF	FTING CHECK R.BARRET	DESIGN	R.	P.E.Q. No. DATE MANAGER ENGINEERING SERVICE	ES DATE	Urban Ut	MOLINT	CROSBY I	ROAD	E-GON WILLIAM OF	.,	Queensland Urban Utilities	DRAWING No.
_	0.0107411.50	L.P. R.B. CAD	FILE 57-0224set_	H Original Signed by J.READ®	NO	7727 31-08-11		Unban Ut	ilities SEWAGE					486/5/7-02	224_016
2 A	S INSTALLED	L.F. JR.B. TONE	37-0224881	i ongman orginou by on the b						. I OWII C	1/1/10/1				

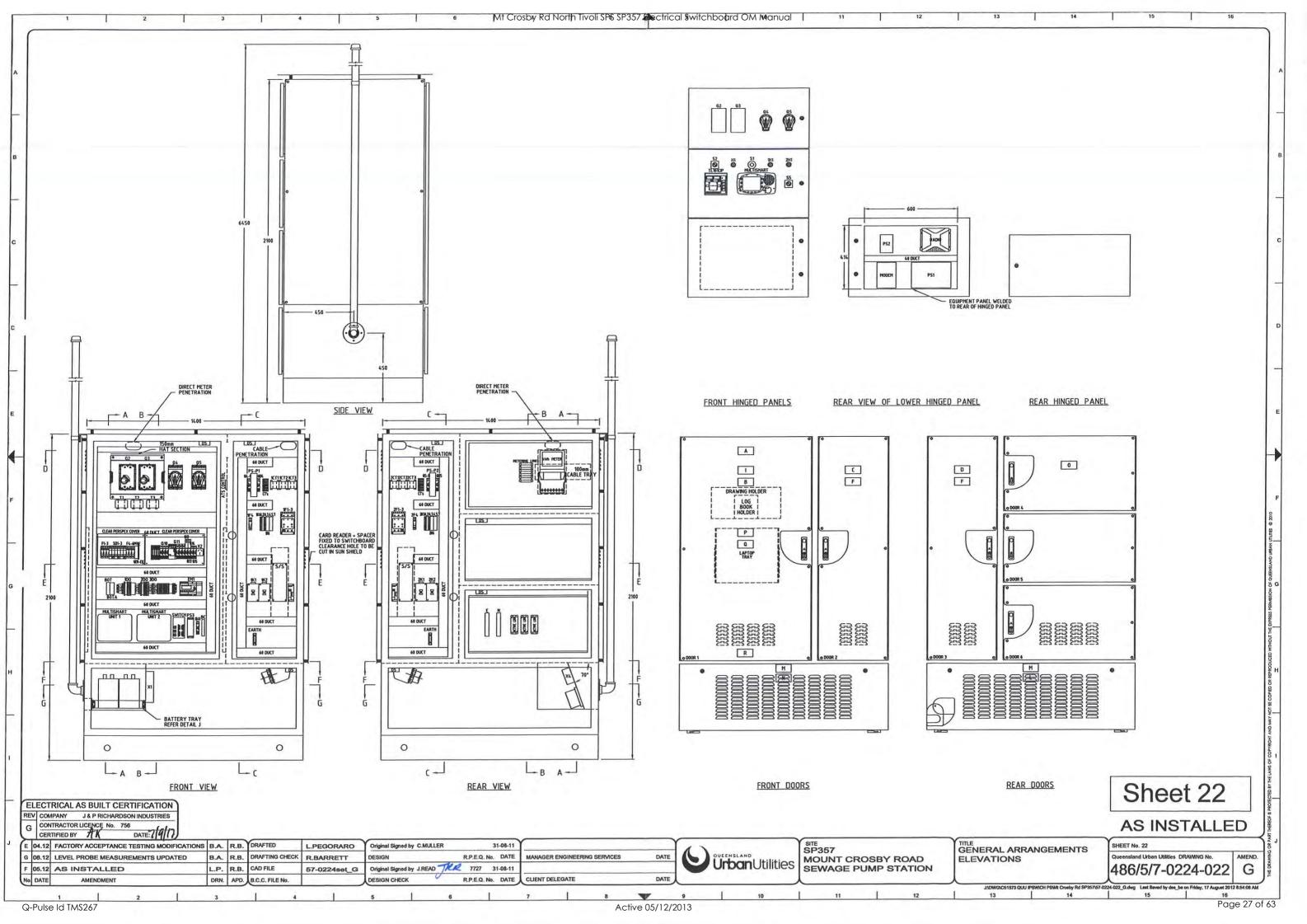


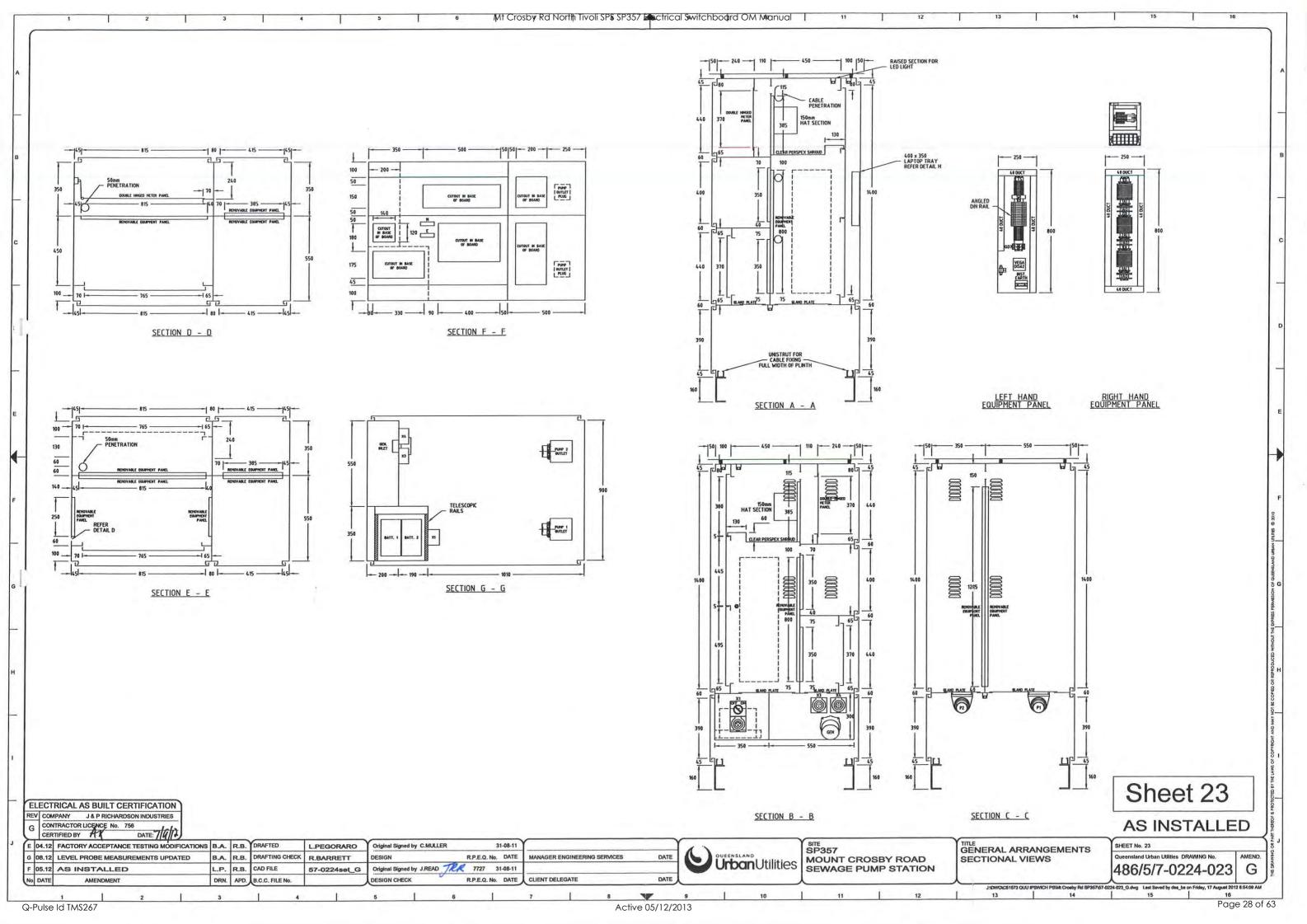
Control Cont	ITEM DESCRIPTION - INTERNAL LA	BEL LABEL 1	LABEL 2 (IF NECESSARY	LABEL 3 (IF NECESSARY	1 TEXT	MATERIAL /	ITEM	DESCRIPTION - INTERNAL LABEL	LABEL 1	LABEL 2 (IF NECESSARY	LABEL 3 (IF NECESSA	"" HEIGH	T MATERIAL / COLOUR	1	EXTERNAL DOOR LAB	EL LIST	4	
Control Cont	ACTIVE LINKS		Cayball Res		6mm	W/B	78	PUMP DE-CONTACTOR	PUMP No1	PUMP No2		6mm	n ABS PLASTIC	LABEL	TEXT	TEXT HEIGHT	PAINT FILL (LETTERING	G) QUANTI
Commonweal Commonwea	02 ENERGEX SUPPLY		(Note: Hount Additional Warning Label - Hem 2001		10na 10na	ABS PLASTIC								A	SP357	25mm	Black	1
Control Cont	Le la	78A	manany cause - mem 2401	-	4mm									В	COMMON CONTROL	10mm	Black	1
The content and the content	03 GENERATOR SUPPLY	MAIN SWITCH			10mm	8/W									C001.3	- 3		+
	13 FNERGY METER CURRENT TRANSCORDARS		12	13		ABS PLASTIC				+		-	+		Livery 1	77.000		-
The control of the						W/B				-	1	-	_	-	PUCIF ROZ	10mm	Black	1
Continue			DUMO N. 2			W/B				1				E				
Control of the cont	15/16 PUMP CIRCUIT BREAKER				4mm	W/B		2.4					1 1		WARNING THIS SITE IS MONITORED BY THE CONTROL POOM OF EASE INFORM THE	8mm	Black	2
Water Properties Water Prope						Leton	10					1 20	السالحاك					
The content of the	10 PHASE FAILURE FUSES				4mm	ABS PLASTIC W/B - R/W	72	LOCK-OFF STOP PUSHBUTTON	LOCK-OFF STOP	REFER LABEL 211	\$1	6mm		G	SUPPLY AUTHORITY METERING ISOLATOR	10mm	Black	1
Section of the control of the cont		1,7,7			1		74	AREA LIGHTING SWITCH	AREA LIGHTING		SZ	4aa	ABS PLASTIC	н				
	20 MULTISMART RTU CIRCUIT BREAKER				4mm	ABS PLASTIC	75	EMERGENCY PUMPING MODE START SWITCH	EMERGENCY PUMPING MODE	REFER LABEL 210	55	4mm	ABS PLASTIC		MAIN SWITCHES	10mm	Black	1
Total Control Contro	21 3 PHASE OUTLET CIRCUIT BREAKER	3¢ OUTLET			4mm	ABS PLASTIC			POWER AVAILABLE		HI	400	ABS PLASTIC	1		17000	- Side	-
All Property Continues		LAPTOP GPO				ARC DI ACTIC			BST	-		4an		,				-
Commitment Com		012			4mm	W/B			50				W/B	K				
Committee Comm		013			4mm	W/B	87	DOOR SECURITY RELAY					W/B	L	GENERATOR DE-CONTACTOR	10 mm	Black	1
Column C	24 RTU POWER SUPPLY CIRCUIT BREAKER	014			4mm	W/B	n	POWER AVAILABLE RELAY					W/B	н	PUMP DE-CONTACTORS	10 mm	Black	1
Column	25 GENERATOR ANCILLARY SUPPLY CB				4mm	ABS PLASTIC W/B		ATS CONTROL RELAY	CPSR			4mm		N	BATTERIES	10mm	Black	1
Control Cont							94	GENERATOR EXERCISE RELAY	GEN-EX			4mm	ABS PLASTIC	0	SUPPLY AUTHORITY METERING	10mm	Black	1
Marriagness	17 ATS CONTROL FUSES					W/8	93	ATS AUXILIARY RELAY	ATSN			4am	ABS PLASTIC					1
MATERIAL STATE 1997		0A	OA.		400		- "		ETR			4mm	ABS PLASTIC					-
					-				HOXA			Lan		-				-
Performance					-		124	COMM2 2 MIICH	-			-		R	ンパー・1040-00	10mm	Black	1
Performance																		
Performance						1			de la casantal			3						1
Separate Control of the Control of	40 PUMP 240VAC CONTROL CIRCUIT BREAKER		PUMP No2 QS-1		4mm	ABS PLASTIC		DELIVERY PRESSURE ADJ. UNIT	DELIVERY PRESSURE									1
MON MARKET	41 PUMP 24 VDC CONTROL CIRCUIT BREAKER	PUMP No1	PUMP No2		4mm	ABS PLASTIC	108		MULTISMART 24VDC			4am	ABS PLASTIC	T				
Post Control		BATTERY	uUS		4mm	ABS PLASTIC			26/12 VDC			4mm	ABS PLASTIC	1	DANGED		OTE	1
Machine Mach	The state of the s	007 PS-P1	PS-P2		4mm	W/B	-		CONVERTER - RADIO			488	W/B	U	ELECTRICAL EQUIPMENT			2
MATERIAL PROPERTY THE PROPERTY	43 PUMP 240VAC-24VDC POWER SUPPLY				-		-		POT	1			W/B					
MARCHARD		CINCE DIRECT PIECE	EED COOK! HE COOK			100 00 100 10	99	BACKUP OFF-DELAY TIMER					W/B		EXTERNAL LABELS 1mm THICK. 316 GRADE STAINLESS STEEL. FIXED	WITH M3 316 STAINLESS	STEEL METAL THREADS.	
Max Service Max	8 SURGE DIVERTER FUSES	F1.2.3 32/32A	OF MAIN SWITCH		4mm	W/B - R/W	100	BACKUP TIMER AUXILIARY RELAY	and the second				W/B		FIELD LABEL LIST			
Procedure of the Control of the Co	9 SURGE DIVERTERS	SURGE DIVERTERS	OF MAIN SWITCH		4mm	ABS PLASTIC	96	BACKUP CONTROLLER CIRCUIT BREAKER				4mm	ABS PLASTIC	LABEL	TEXT	TEXT HEIGHT	PAINT FILL (LETTERING)	QUANTIT
MAX NOTICE MAX	11 PHASE FAILURE RELAY		FED FROM LINE SIDE		4mm	ABS PLASTIC	95	BACKUP CONT. 240VAC/24VDC POWER SUPPLY	BACKUP CONTROLLER					AA	MAIN EARTH CONDUCTOR - DO NOT DISCONNECT (On Main Earth Electrode)	5mm	ABS PLASTIC - W/B	1
MATERIAL			OF TIMES WITCH			ABS PLASTIC						4am	ABS PLASTIC					1
Secretary Secretary Secre		MAIN EARTH			4mm	W/B		1000	RADIO SURGE PROTECTION				W/B					
Management Ma	7 7 774 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7					W/8		(100-16-1) (A 110-00) (110-010)	The state of the state of the	MIE TICMANT			W/B					
Ministry 1501 15	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				1 - 1 - 2	W/B	125	TELEMETRY UNIT	UNT1				W/B	AD				
STATE STAT	2 SUB-BOARD EARTH LINK	EARTH	1	/	488	W/B	120	HODEM				4mm	W/B	AE				
MODIFICATION MITTHEW CLUST Mode and processes	4					ABS PLASTIC		TERMINAL HEADER					ABS PLASTIC	AF				
1997 00	8 INSTRUMENT EARTH LINK	INSTRUMENT EARTH			4nn	ABS PLASTIC		TERMINAL HEADER	DIGITAL OUTPUTS	DIGITAL OUTPUTS	DIGITAL OUTPUTS	4am	ABS PLASTIC	AG				
REALIST DESCRIPTION STORE No. 10.00	7 LAPTOP GPO	LAPTOP GPO			4mm	ABS PLASTIC		1.00 de la datació	DIGITAL INPUTS	DIGITAL INPUTS	DIGITAL INPUTS	480	ABS PLASTIC					
REALIST DESCRIPTION STORE No. 10.00		X1	-	,	4mn	ABS PLASTIC			ANALOG INPUTS	ANALOG INPUTS	ANALOG INPUTS	4nm	ABS PLASTIC	~1				-
CARTINITION CONTINUES Continue Continu		GENERATOR			1	ABS PLASTY			1AI	2AI	ANALOG OUTDUTS	4mm	M/B		DETAILO			
CARTINITION CONTINUES Continue Continu		ANCILLARY SUPPLY			4mm	W/B - R/W		Carlotte and the carlot	140		340	4nn	W/B		DETAIL U			
Pop State	9 GENERATOR CONNECTION SOCKETS	CONTROL			Lmm	W/B - R/W	200	HEADER LABEL (Incomer Section)				6mm	W/B					
Pop State	GENERATOR POWER CONNECTION SOCKET	INLET	12.2		6mm	ABS PLASTIC W/B	201	HEADER LABEL (Over Terminals 600-613)	LEVEL PROBES			4mm	ABS PLASTIC W/B					
POP GROSS TRANSPORDS ST. 10 ST. 20 St. 2	7 PUMP SEMI-CONDUCTOR FUSES	1F1-3	2F1-3 175A		4mm	ABS PLASTIC	202	HEADER LABEL (Over Shrouded Terminals)	WARNING			4nm	ABS PLASTIC					
POP GROSS TRANSPORDS ST. 10 ST. 20 St. 2	4 PUMP SOFT STARTER	PUMP No1	PUMP No2		4mm	ABS PLASTIC	1000	7617 F36	GENERATOR	AREA		4nm	ABS PLASTIC					
Purp Purp Control	8 PUMP CURRENT TRANSFORMERS	KT1 KT2 KT3	2CT1 2CT2 2CT3		4mm	ABS PLASTIC		and the same of th	LUNNECTIONS	LIGHTING	7	-	W/8					
Page		1K1	2K1		4mp	ABS PLASTIC	-	DIND CONCESSIONS	PUMP Not	PUMP No2		6nn	ABS PLASTIC					
Pop STATICE AUXILITY	1 10 1 10 10 10 10 10 10 10 10 10 10 10				0.000.0	W/8		CONTACTOR COLUMN				6mm	W/B ARS PLASTIC					
PUPP REMOVED FIGURE 18						W/B	-	METER PANEL WARNING SIGN	FROM EXTERNAL LABEL LIST 1	ADJACENT METERS I		6mm	W/B					
PUPP REMOVED FIGURE 18	PUMP STARTER FAULT RELAY	111111111111111111111111111111111111111				W/B	207	INSPECTION PLATE LABELS - GLUE ONLY	DO NOT INSTALL GLANDS	DO NOT INSTALL GLANDS	Cos 7	6mm 6mm	ABS PLASTIC W/B					
PREPARENT NELLAY NO NO NO NOT THE DEPOSIT NELLAY NO NO NO NOT THE DEPOSIT NELLAY NO NO NOT THE DEPOSIT NELLAY NO NO NOT THE DEPOSIT NELLAY NO NOT THE DEPOSIT NELAY NO NOT THE DEPOSIT NELLAY NEL AS NOT THE DEPOSIT NELLAY NEL NELLAY NELLA	PUMP RUNNING RELAY	1K4	284			ABS PLASTIC W/B		MAIN SWITCH WARNING LABEL	WARNING:	THIS BOARD IS SUPPLIED FROM 2		6mm	ABS PLASTIC					
PAPP PREMISTRING RELAY NO. 10 ILAN SPECIAL PAPP REMISTRATION RELAY PAPP REMISTRATION MODIFICATIONS IS A. R.B. ORAPITED LEPE ABSPRESSION RELAY REP BRANCH RECVIOURN STEEL ESTINON MODIFICATIONS IS A. R.B. ORAPITED LEPE ABSPRESSION RELAY REP BRANCH RECVIOURN STEEL ESTINON MODIFICATIONS IS A. R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATIONS IS A. R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATIONS IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATIONS IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATIONS IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON MODIFICATION IS A.R.B. ORAPITED LEPE ABSPRESSION RECVIOURN STEEL ESTINON RECVIOURN STEEL ESTINON RECVIOURN STEEL ESTINON RECVIOURN STE	PUMP SUPPLY HEALTHY RELAY	1KS	2KS		4mm	ABS PLASTIC	208	switches	BEF	ORE WORKING ON THIS SWITCHBOA	RO.							
DRIGHET PARP TREET No. No	N 200 (200 NEC 200 NEC	1166	2K6		4mn	ABS PLASTIC		Label size to be approximately 240 x 60	ULTERATOR	THE START IF NURTHAL SUPPLY	JOURNEU.	1						
PRIP RIST FORWARD COMMUND RELAY RY	N-Spirot Event Brune of	1K7	2K7			W/B	-		-	-								
PRIP REMINISTRATE COMPAND RELAY REP REMINISTRATE REMINISTR	CHEROCHET PURP TIMER		70									4	ARS DI ASTI					
PRIP RIST TORMAND COMPAND RELAY REF TO SEARCH WAR STATIST RESTREAM REF TO SEARCH WAR S							210	OPERATOR LABEL	PLEASE CH	ECK THAT THE EMERGENCY PUMPIN	IG SWITCH	omm						
PURP RIM FORMAD COPMAD RELAY REAL REST REST REAL REST RELAY REAL REST REST REST REST REST REST REST REST									IS III	NONMAL MODE BEFORE LEAVING S	HIE							
PURP FAULT REST RELAY PURP DER ROWN FOR MITERAPT RELAY PURP DER ROWN FOR MITERAPT RELAY PURP DER ROWN FOR MITERAPT RELAY PURP PUR ROWN FOR MITERAPT RELAY PURP PUR ROWN FOR MITERAPT RELAY PURP PUR ROWN FOR MITERAPT RELAY PURP PURP PURP PURP PURP PURP PURP PUR								OPERATOR LABEL		CAUTION: RESETTING RESTORES	N The state of the	6mm	ABS PLASTIC W/R					
PUPP PRIOR EST REALY PUPP RESTRICT (ORNING TO ACCEPTANCE TESTING MODIFICATIONS B.A. R.B. ORAFTED L.PEGORARO Original Signed by C.MALLER PUPP RAINING MOKATOR							ZH	rositioned Over Lock-Off Stop Pushbuffon		AUTOMATIC CONTROL								
PUPP FIREMENT REVERSE COMMAND ENTEROPY FOLLAY PUPP PRISONATION CONTRACTOR PUPP MANNING NORATION PUPP PRISONATION CONTRACTOR CONTR	PUMP RUN FORWARD COMMAND RELAY	1K20	2K20		4nn	ABS PLASTIC												
PUMP PERGENCY MODE INTERRIPT RELAY PUMP PER ISOLATION CONTACTOR PUMP PER ISOLATION (TOST RESISTANCE FUSE STATE PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION (TOST RESISTANCE FUSE STATE PUMP PER ISOLATION (TOST RESISTANCE FUSE STATE PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION (TOST RESISTANCE FUSE STATE PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION PUMP PER ISOLATION (TOST RESISTANCE FUSE PUMP PER ISOLATION (TOST RESISTANCE FUSE FUSE PUMP PER ISOLATION (TOST RESISTANCE FUSE FUSE FUSE FUSE FUSE FUSE FUSE FUS		1K21	2K21		4mm	ABS PLASTIC												
PUPP RTISOLATION CONTACTOR PUPP RTISOLATION CONTACTOR PUPP RISOLATION DOCKATOR PUPP RISOLATI	Out the parties are the	1K22	2K22			ABS PLASTIC												
PURP RINNER VERSE COMPAND RELAY PURP RINNER SOLITATION PURP RINNER S						W/B										-		
PURP INSUATION TEST RESISTANCE FUSE PURP INSUATION TEST RESISTANCE FUSE 31/5 31/5 31/5 4 mm MS PLASTIC MINNING PURP Not PURP				12-3		W/B									(<u> </u>	C	hoot 1	0
PURP INSUATION TEST RESISTANCE FUSE PURP INSUATION TEST RESISTANCE FUSE 31/5 31/5 31/5 4 mm MS PLASTIC MINNING PURP Not PURP	PUMP IRT ISOLATION CONTACTOR					W/B		(ELECTRICAL	AS BILL T CERTIFIC	MOITA					Ma I & P RICHARDSON		neel I	0
PURP RUNNING NOKATOR PURP NO PROPERTY OF THE PURP NO PROPERTY AND ATTEMPT OF THE PURP NO PROPERTY OF T	PUMP IRT ISOLATION CONTACTOR	F4	2F4 32/5A		4mm										POLISTRES PTY LID ELECTROL COMPACIONS NO BIONESIS		10 Car A 20 Can (1)	
CACTORY ACCEPTANCE TESTING MODIFICATIONS B.A. R.B. ORAFTED L.PEGORARO Original Signed by C.MULLER 31-08-11 DESIGN R.P.E.Q. No. DATE WANAGER ENGINEERING SERVICES DATE OF CLIENT DESIGN R.P.E.Q. No. DATE OF CLIENT DESIGN CHECK R.P.E.Q. NO. DATE	PUMP IRT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY	32/5A	PUMP No2	141	4mm	ABS PLASTIC			RLICENCE No. 756							40	INICTAL	1
ACTORY ACCEPTANCE TESTING MODIFICATIONS B.A. R.B. ORAFTED L.PEGORARO Original Signed by C.MULLER 31-08-11 DESIGN R.P.E.Q. No. DATE LABEL SCHEDULE SHEET No. 18 SHEET No. 18 SHEET No. 18 SHEET No. 18 Gueensland Urban Utilities DRAWING No. AMAGER ENGINEERING SERVICES DATE AMENDMENT DRN. APD. B.C.C. FILE No. DRN. APD. B.C.C. FILE No. DESIGN CHECK R.P.E.Q. No. DATE DESIGN CHECK R.P.E.Q. No. DATE CLIENT DELEGATE DESIGN CHECK R.P.E.Q. No. DATE CLIENT DELEGATE DATE SHEET No. 18 SHEET No. 18 SHEET No. 18 SHEET No. 18 CHAPTION SHEET NO. 18 CH	PUMP IRT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY PUMP INSULATION TEST RESISTANCE FUSE	32/5A PUMP No1	KUNNINU	ZHI	4mn	W/B			AV DATE	ावित्र)						AS	INSTAL	LEL
LEVEL PROBE MEASUREMENTS UPDATED B.A. R.B. DRAFTING CHECK R.BARRETT DESIGN R.P.E.Q. No. DATE AS INSTALLED L.P. R.B. CAD FILE 57-0224set_G DESIGN CHECK R.P.E.Q. No. DATE DESIGN R.P.E.Q. No. DATE DESIGN R.P.E.Q. No. DATE DESIGN R.P.E.Q. No. DATE DESIGN CHECK R.P.E.Q. No. DATE DATE DESIGN CHECK R.P.E.Q. No. DATE DESIGN CHECK R.P.E.Q. No. DATE DATE DESIGN CHECK R.P.E.Q. No. DATE DATE DESIGN CHECK R.P.E.Q. No. DATE DESIGN CHECK R.P.E.Q. No. DATE DATE DATE DATE DATE DATE DATE DATE	PUMP IRT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY PUMP INSULATION TEST RESISTANCE FUSE	32/5A PUMP No1 RUNNING							· / J	11111		~			TITLE	PLUTTY I	10	
AMENDMENT DRN. APD. B.C.C. FILE No. DESIGN CHECK R.P.E.Q. No. DATE CLIENT DELEGATE DATE	PUMP IRT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY PUMP INSULATION TEST RESISTANCE FUSE PUMP RUNNING MOKATOR	RUNNING	DRAFTED I	PEGORARO Orio	ginal Sign	ed by C.MULLER		31-08-11				1	SITE					
AMENDMENT DRN. APD. B.C.C. FILE No. DESIGN CHECK R.P.E.Q. No. DATE CLIENT DELEGATE DATE	PUMP IRT ISOLATION CONTACTOR PUMP IRT ISOLATION CONTACTOR PUMP INSULATION TEST RESISTANCE FUSE PUMP RUNNING MOKATOR FACTORY ACCEPTANCE TESTING	MODIFICATIONS B.A. R.E				ed by C.MULLER			ERING SERVICES	DATE (DUEENSLAND		SP357					. 1.
	PUMP IRT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY PUMP INSULATION TEST RESISTANCE FUSE PUMP RUNNING MOKATOR FACTORY ACCEPTANCE TESTING LEVEL PROBE MEASUREMENTS	MODIFICATIONS B.A. R.E.	B. DRAFTING CHECK	R.BARRETT DES	SIGN		R.P	P.E.Q. No. DATE MANAGER ENGINE	ERING SERVICES	DATE (Urbant Itilit	tios	SP357 MOUNT (BY ROAD	Queensland	Urban Utilities DRAWING No.	
	PUMP RT ISOLATION CONTACTOR PUMP RUN REVERSE COMMAND RELAY PUMP INSULATION TEST RESISTANCE FUSE PUMP RUNNING MOKATOR FACTORY ACCEPTANCE TESTING LEVEL PROBE MEASUREMENTS AS INSTALLED	MODIFICATIONS B.A. R.E UPDATED B.A. R.E L.P. R.E	B. CAD FILE 5	R.BARRETT DES	SIGN ginal Sign	ed by J.READ	R.P	P.E.O. No. DATE MANAGER ENGINE	ERING SERVICES		Urban Utilit	tios	SP357 MOUNT (BY ROAD	Queensland	Urban Utilities DRAWING No.	

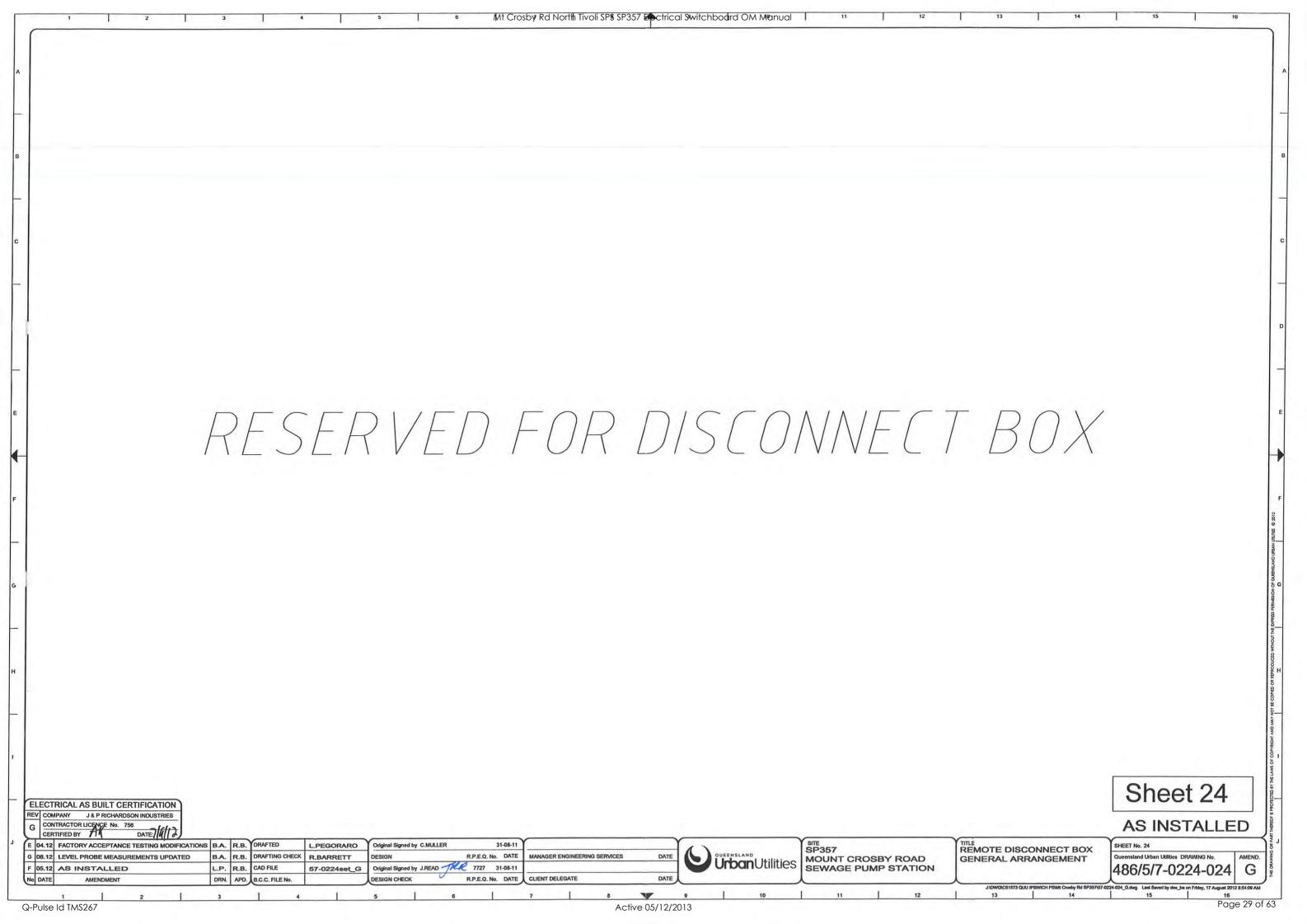


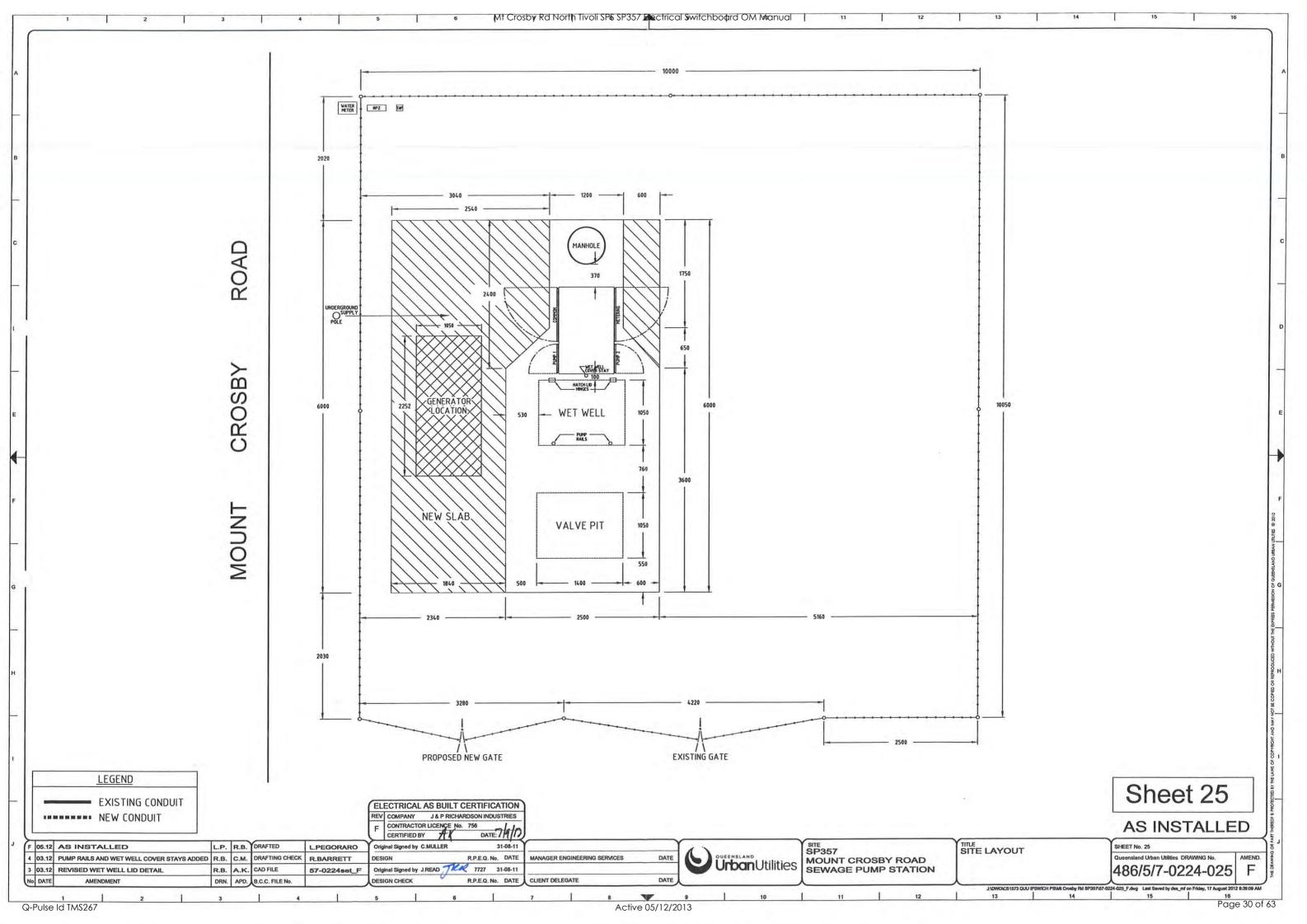


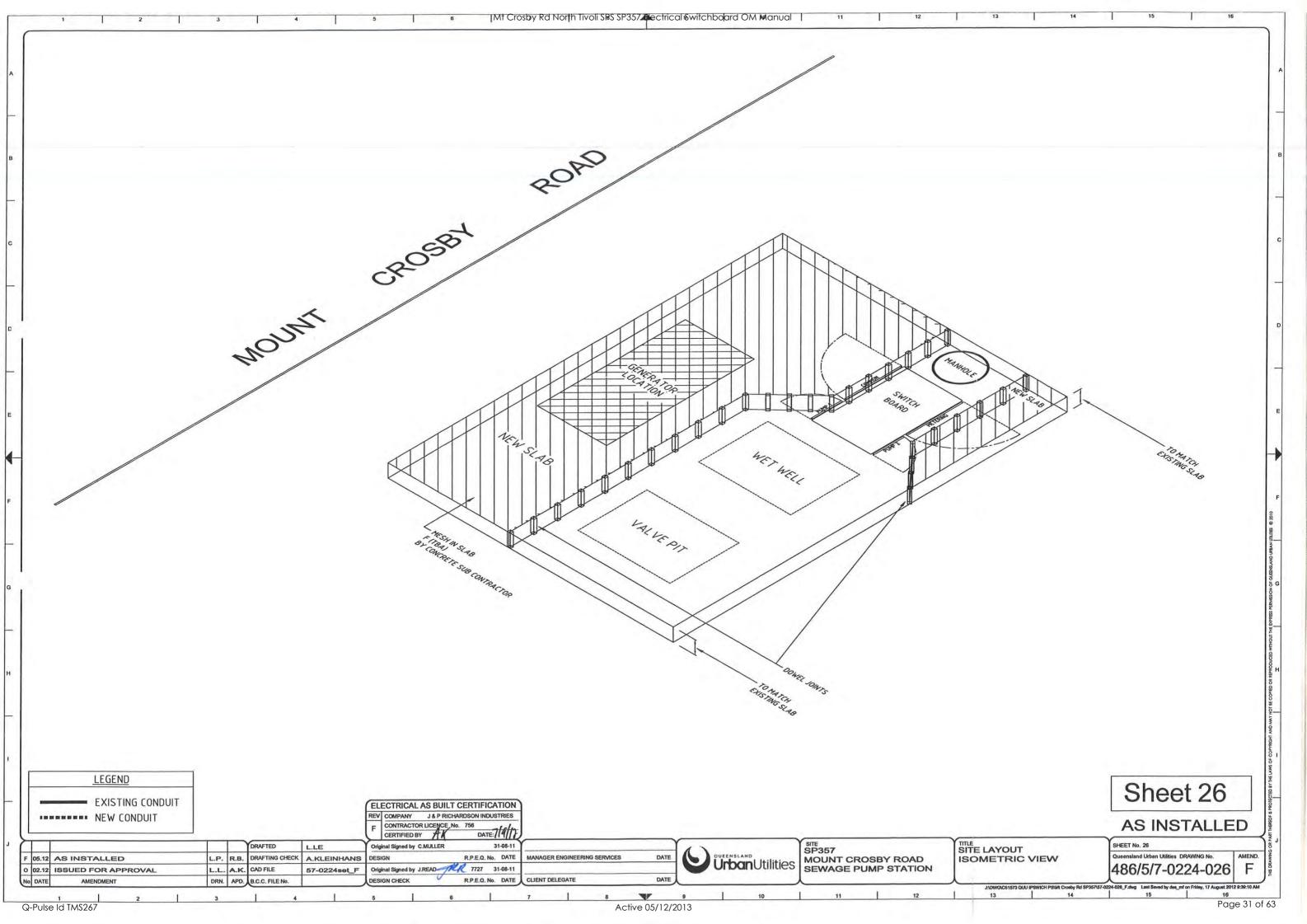










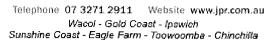


3.0 COMMISSIONING PLAN



J&P RICHARDSON INDUSTRIES PTY LTD

Electrical Contractors and Engineers









WORKING IN PARTNERSHIP WITH



SEWAGE PUMP STATION

SWITCHBOARD REPLACEMENT COMMISSIONING PLAN

Site ID and Name	SP357 Mt. Crosby Road
Commissioning Date	02/05/2012

In Attendance

Name	Role During Commissioning	Company
Faheem Saleh	Commissioning Supervisor	QUU Projects
Glenn Cross	Project Site Supervisor	J &P Richardson
Johann Joubert	Control Systems Engineer	Lend Lease
Paul Matthews	Control Systems Engineer	Lend Lease
Robert Gleadhill	Applications Engineer	Multitrode

Doc Id:

006142

Active Date:

2 November

200712

QUU Confidential

Printed:

1/05/2012

Owner: Alex Witthoft

Developed Template:

Template: (Modified by J & P Richardson) QUU Flood Recovery Project - Phase 2C: 30 Ipswich Switchboards Replacement

Commissioning Plan Standard Pumping Station

1 INTRODUCTION

This document is the standard testing procedure for a switchboard change over at a sewage pumping station. The procedure ensures that for a two pump sewage pump station, at least one pump will be operational at all times. The basic cut-over procedure is as follows:

- 1. Install temporary pumping system (pump controller and generator).
- 2. Disconnect sewage Pump #2 from existing switchboard and connect to temporary pumping system.

PUMP #1 IS NOW RUNNING THE STATION FROM EXISTING SWITCHBOARD

3. Fully commission Pump #2 on the temporary pumping system.

PUMP #2 IS NOW RUNNING THE STATION FROM TEMPORARY PUMPING SYSTEM

- 4. Disconnect Pump #1, consumer mains, and all field instrumentation from the existing switchboard.
- 5. Install new switchboard and connect to consumer mains.
- 6. Connect Pump #1 to the new switchboard and test in "emergency pumping" mode (via the "Emergency Start" switch).

PUMP #2 IS STILL RUNNING THE STATION FROM THE TEMPORARY PUMPING SYSTEM AND PUMP #1 CAN BE RUN UNDER "EMERGENCY PUMPING" MODE FROM NEW SWITCHBOARD.

- 7. Connect all field instrumentation.
- 8. Fully commission Pump #1 on the new switchboard to operate in "Local" and "Remote" modes.

PUMP #1 IS NOW RUNNING THE STATION FROM NEW SWITCHBOARD

- 9. Connect Pump #2 to the new switchboard and fully commission on the new switchboard to operate in all modes.
- 10. Complete the Site Acceptance Test (SAT) including all pump, RTU and SCADA testing.

NOTE:

This testing procedure will only be acceptable on sites that do NOT need two pumps to run during the cut over procedure.

(Confirm the current running conditions of the existing switchboard before commencing).

For sites that require two pumps to run simultaneously under dry weather conditions during the proposed cut over period, a site-specific cut over procedure must be developed to incorporate adequate flow control measures (ie tankers or temporary pumps).

Doc Id: Printed: 006142 1/05/2012

Active Date:

2 November 200712

QUU Confidential

PRE - CHANGE OVER WORKS CHECKLIST

The following checklist is to be completed and signed by the electrical contractor.

2.1 SWITCHBOARD FACTORY ACCEPTANCE TEST

Contractor Task J & P RICHARDSON, LEND LEASE, MULTITRODE	Completed
FAT has been completed as per QUU FAT Document and all defects that were identified have been rectified.	2714112

2.2 CONCRETE SLAB EXTENSION

Contractor Task J & P RICHARDSON	Result
Confirm the concrete slab extension is complete including all necessary conduits.	OK E NA 🗆

2.3 SUPPLY AUTHORITY

Contractor Task J & P RICHARDSON	Outcome
The relevant supply authority has been organised to install the metering into the New Switchboard.	Company ENERGY Booked for 2 / 5/ /2 @(time) Ref #

2.4 NEW RADIO ANTENNA MAST LOCATION

Contractor Task J & P RICHARDSON, LEND LEASE	Result
Check the location of the antenna mast and ensure that the new/old position will not be directly below electrical transmission lines.	Location OK 🗹
·	Antenna dir/45 °

2.5 TEMPORARY GENERATOR SIZE

Contractor Task J & P RICHARDSON	Completed
Note the kW of each pump.	Pump #1 <u>22</u> kW
	Pump #2 <u>22</u> kW
Determine the type of generator and size of pump starter required.	Genset Size kVA
Confirm generator starting battery is in good condition, (have a contingency plan)	Date Booked 30141 12
	Delivery Date 2 /57/2
	Delivery Time 6m

Electrical Contactor's Supervisor J & P RICHARDSON

Name:..... Glenn Cross Date: 2-5./2

Signature:

Doc Id: Printed: 006142 1/05/2012 Active Date:

2 November 200712

Owner: Alex Witthoft Developed Template: (Modified by J & P Richardson)

QUU Confidential

3 CHANGE OVER WORKS

The following sequence of works that must be carried out in order. One pump must be operational at all times. After each phase has been completed, the commissioning manager will record the results and instruct the commissioning team to commence work on the next phase.

3.1 STEP 1 - INSTALL TEMPORARY PUMPING SYSTEM

3.1.1 Register with Control Room

Contractor Task J & P RICHARDSON	Outcome
Call the QUU Control Room Operator (CRO) and inform him that you are on site. Record the CRO's Name and Officer Code and record the time of the call. Advise CRO that you are performing a switchboard changeover and that you will initially be taking one pump off line. Give the operator a contact name and number and ask that he contact you if any level alarm is activated on site.	Name: TRAVON CRO: Time:

3.1.2 Existing Switchboard Parameters

Contractor Task J & P RICHARDSON,		Outcome
Ensure that the station is fully functional (pump can run)		OK 🛭
Record the direction of the installed antenna for later reference. LEND L	LEASE	Antenna dir. 145°
Record the kWhr meter serial numbers.		#
Record 3 phase motor currents.	Pump #1	u23.5 v. 235 w. 23.5
Note rate of wet well pump down time.	Pump #2	U <u>23.5</u> V. <u>23.5</u> W. <u>23.5</u> U. <u>24.5</u> V. <u>24.5</u> W. <u>24-</u> 5
Record pump rotation Mains Supply C'wise (RWB) Anti C'wise	***	C'wise (RWB) Anti C'wise
F	Pump #1	
F	Pump #2	

Electrical Contactor's Supervisor	QUU Commissioning Manager	
Name:Glenn Cross Date: 2.5.12	Name: Faheem Saleh Date: 25.12	
Signature:	Signature:	

Doc Id: 006142

Printed: 1/05/2012

Active Date: 2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

Page 36 of 63

QUU Confidential

3.1.3 Prepare and Install Temporary Pump Controller and Generator

Contractor Task J & P RICHARDSON	Outcome
Position generator in an appropriate location. Locate away from the work site to reduce noise.	ок 🗹
Position fire extinguisher and oil spill bund kit as per risk analysis.	ok □ [/]
Connect the temporary pump controller to the generator and test connection (ie point to point to confirm correct connection)	ок 🗹
Install Multitrode level sensors and set the Start and Stop levels to be equivalent to the current Start and Stop levels of the existing switchboard parameters.	ок 🗹
Install the backup audible and visual alarm system (powered by separate battery). Test electrodes back to temporary pump controller to confirm operation.	OK 🗹
Ensure that the generator fuel will be sufficient to enable the generator to run loaded for 12 hours. (This may require extra fuel – arrange if required).	ок 🗖
Start the generator and measure the 3 phase volts and record the phase rotation.	C'wise (RWB) Anti C'wise ☐ □

Electrical Contactor's Supervisor

Name:.....Glenn Cross ... Date:

Signature:

QUU Commissioning Manager

Name:... Faheem Saleh...... Date: ..

Signature:

Doc Id: 006142

Printed:

1/05/2012

Active Date:

2 November 200712

Owner: Alex Witthoft Developed Template:

(Modified by J & P Richardson)

3.2 STEP 2 - CONNECT PUMP #2 TO TEMPORARY PUMPING SYSTEM

Contractor Task J & P RICHARDSON	Outcome
On the existing switchboard, Isolate sewage pump (Pump #2) as per JPR Isolation Tag and Lock Out procedure. (Unplug from Decontactor).	OK 🗗
Disconnect Pump #2 from the existing switchboard and remove the power and control cables from the switchboard.	ок 🗹
Connect Pump #2 power and control cables to the temporary pump controller .	OK □
Electrically test Pump #2 to temporary pump controller connections.	OK D
Switch the existing switchboard to "Local" and stop Pump #1.	OK □⁄
Manual Test of Temporary Pumping System: (Confirm Pump Direction) Manually start the submersible pump and closely monitor wet well level to confirm that the level is dropping. When confirmed, stop pump.	ок 🗹
Auto Test of Temporary Pumping System: (Confirm Pump Cycle) Allow the temporary pumping system to complete one full start and stop cycle	OK 🗹
automatically to confirm complete system is functioning correctly. This is a HOLD point. Do not proceed until the temporary pump is confirmed to be controlling the wet well level.	TIME: 9.32

3.3 STEP 3 - DISCONNECT EXISTING SWITCHBOARD AND REMOVE

3.3.1 Disconnect Pump #1 and Remove Existing Switchboard

Contractor Task J & P RICHARDSON	Outcome
On the existing switchboard, Isolate sewage pump (Pump #1) as per BW Isolation Tag and Lock Out procedure. (Unplug from Decontactor).	OK 🗗
Disconnect Pump #1 from the existing switchboard and remove the power and control cables from the switchboard and place near the temporary system so as to enable a quick changeover for Pump #2 if required.	ок 🗹
Isolate main incomer at the switchboard. Ensure all secondary sources of power (ie on site Generator) are also isolated. Confirm there is no load.	OK ₫
Remove primary 3-phase fuses from power pole. Lock fuses in lockout box as per BW Isolation and Lock Out procedure. Fuse Size ——amps	ок 🗖
Disconnect mains cable from the switchboard.	OK □∕
Disconnect all other control and communication cables and remove	OK D
Remove the existing switchboard away from job site.	OK 🗗

171 4 1	~ , ,		a .
Electrical	Contactor	2	Supervisor
	Contractor	v	Dupoi viooi

Name:.....Glenn Cross ... Date:

Signature:

QUU Commissioning Manager

Name:... Faheem Saleh...... Date: 4.5.

Signature: .

Doc Id:

006142

Printed: 1/05/2012

Active Date: 2 Nove

2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

3.4 STEP 4 - INSTALL NEW SWITCHBOARD

3.4.1 Install new switchboard

Contractor Task J & P RICHARDSON	Outcome
Install and connect the required (new or existing) mains and earth as per the contract.	New Existing
Record the cable insulation resistance of the 3 phases	A <u>loot</u> Megohm B <u>loot</u> Megohm. C <u>loot</u> Megohm
Record earth resistance	ohms
Point to point phase continuity	R to L1 OK□ W to L2 OK□ B to L3 OK□

3.4.2 Install Supply Authority Metering

Task J & P RICHARDSON (ENERGEX)	Outcome
Install the direct connected kWhr Meter or Energex to connect CT metered metering as per 2.3	ок 🗗
Record the new meter number	4-1466207
Get the new NMI Number off the Energex C&I officer	31

3.4.3 Energise New Switchboard

Contractor Task J & P RICHARDSON	Outcome
Retrieve mains 3-phase pole fuses from lock out box as per JPR Isolation and Lock Out procedure.	OK D
Ensure new switchboard main incomer is turned "Off".	OK 🗹
Install the 3-phase pole fuses. Check MEN connection.	OK 🗹
Turn on mains switch	окб
Check 3 phase voltages ENERGEX REQUIRE CLOCKWISE FOR METER	AB 420 V BC 420 V CA 420 V
Check phase rotation and ensure it is the same as determined earlier.	OK EX A
Confirm that a corrosion inhibitors has been positioned in the switchboard	OK 🗹

Electrical Con	itactor's Supervisor	QUU Commissioning Manager
Name:	Glenn Cross Date: 2.5./2	Name: Faheem Saleh
Signature:		Name: Faheem Saleh Date: 7.5

Doc Id: 006142 Printed: 1/05/2012 Active Date: 2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

3.5 STEP 5 - CONNECT PUMP #1 TO NEW SWITCHBOARD

Contractor Task J & P RICHARDSON	Outcome
At the beginning of this procedure, Pump #2 is operating under the control of the temporary switchboard running from the Generator.	OK 🗗
Isolate submersible Pump #1 and Pump #2 at the new switchboard , as per JPR Isolation and Lock Out procedure.	ок 🗹
Via the MERACHAL plug in sockets provided on the switchboard reconnect the power and control cables for Pump #1 only (the pump that is not connected to the generator set) If VFD connection is direct connect.	ок 🗇
Before beginning the next step ensure that the well level is between 'Start' and 'Stop' level and Pump #2 is not running. Isolate Pump #2 to prevent it from running during the next test	OK ₽
De-isolate this now connected Pump #1. Check the rotation by starting the pump via the local "Emergency Start" switch. Monitor pump / wet level operating parameters.	ок 🛮
Check the 3 phase motor current and compare with original readings.	A <u>23.5</u> Amps
PUMP #1 Can now be run in an emergency under the control of the new switchboard.	B <u>23.5</u> Amps
When checking is complete - Isolate Pump #1	С <u>23.</u> б Amps
De-isolate Pump #2 so that the station is again under the control of the temporary switchboard.	OK □∕

3.6 STEP 6 - CONNECT FIELD INSTRUMENTATION TO NEW **SWITCHBOARD**

3.6.1 Field Devices

Contractor Task J & P RICHARDSON	Outcome
Install and connect the hydrostatic level probe to the transmitter Do not tighten shroud cable compression gland	OK ☑ 0 to 6-87 Mtrs
Install and connect the Multitrode LR3 wet well high level relay Probe	OK □ at <u>≤.5/4</u> Mtrs
Install and connect the Multitrode SIR surcharge imminent level relay Probe	OK ☐ at <i>S</i> :621 Mtrs

Electrical Contactor's Supervisor

Name: Glenn Cross ... Date: 2.5./2

Signature:

QUU Commissioning Manager

Name:... Faheem Saleh....... Date: .

Signature:

Doc Id: 006142

Printed:

1/05/2012

Active Date:

2 November 200712

Owner: Alex Witthoft Developed Template: (Modified by J & P

Richardson)

3.6.2 Install Generator Mains (For Sites with Permanent Generators)

Contractor Task J & P RICHARDSON	Outcome
Record insulation resistance of the 3-phases	A <u>Loof</u> Megohm B <u>Loof</u> Megohm. C <u>Loof</u> Megohm
Record earth resistance	ohms
Point to point phase continuity	R to L1 OKD W to L2 OKD B to L3 OKD

3.6.3 Radio Antenna Installation

J & P RICHARDSON in conduction with LEND LEASE Programmer Task	Outcome
Install new mast with Antenna, orientate antenna to the position determined in section 3.1.2 connect coaxial cable plugs.	OK 🗹

3.6.4 Telemetry and SCADA Communications Checks

LEND LEASE Programmer Task	Outcome
Lend Lease programmer must complete the following procedures From the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.) Section 1: Setup and Pre-Commissioning Checks	ок 🗹

3.7 STEP 7 - COMMISSIONING PUMP #1

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Outcome
Before doing the next step ensure that the well level is between 'Start' and 'Stop' level and Pump #2 is not running. Isolate Pump #2 to prevent it from running during the next test.	ок 🗹
At this stage the Lend Lease Programmer must complete the following procedures From the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.) Section2: On Site Commissioning Procedure (Pump #1 Only)	ок 🗹
Once Pump #1 has been commissioned, leave the new switchboard in control of the site operating under "Remote" control.	ок 🗆

Electrical Contactor's Supervisor	QUU Commissioning Manager
Name:Glenn Cross Date:	Name: Fahgem Saleh Date: 7/. 5. 1/2.
Signature:	Signature:

Doc Id: 006142

Active Date: 2 November 200712

QUU Confidential

Printed: 1/05/2012 Owner: Alex Witthoft Developed Template: (Modified by J & P Richardson)

3.8 STEP 8 - CONNECT PUMP #2 AND COMMISSION

3.8.1 Connect Pump #2 to New Switchboard

Contractor Task J & P RICHARDSON	Outcome
At the beginning of this procedure, Pump #1 is operating under the control of the new switchboard running from the supply authority.	ок 🗆
Shut down the generator and disconnect Pump #2 from the temporary switchboard	OK □∕
Ensure Pump #2 circuit breaker at the new switchboard is still isolated and locked out as per BW Isolation and Lock Out procedure.	OK ☑
Via the MERACHAL plug in sockets provided on the switchboard, connect the power and control cables for Pump #2.	OK D
De-isolate this now connected submersible pump. Check the rotation of this submersible pump by bumping the pump On / Off via the local "Emergency Start" switch.	ок 🗹
Check the 3-phase motor current and compare with original results.	A 24.5 Amps
PUMP #2 Can now be run in an emergency under the control of the new switchboard.	A $\frac{24.5}{9}$ Amps
	C <u>24.5</u> Amps

3.8.2 Commissioning of Pump #2

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Outcome
Before beginning the next step ensure that the well level is between "Start and Stop" level and Pump #1 is not running. (Station under the control of the new board) Isolate Pump #1 to prevent it from running during the next test.	ок 🗗
Lend Lease Programmer must complete the following procedures From the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.) Section2: On Site Commissioning Procedure – (Pump #2 Only)	OK □
Once Pump #2 has been commissioned, de-isolate Pump #1 and leave that new switchboard in control of the site operating under remote control with both pumps able to run	ок 🎞 /

Electrical Contactor's Supervisor

Name:.....Glenn Cross ... Date: 2:5:2

Signature:

QUU Commissioning Manager

Name:... Faheem Saleh...... Date: .?

Signature: M

Doc Id: 006142

Q-Pulse Id TMS267

Printed: 1/05/2012

Active Date:

2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

3.9 STEP 9 - COMPLETE TESTING

3.9.1 Site Acceptance Testing (S.A.T) - Remaining Tests

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Outcome
Once pump 2 has been commissioned Complete any remaining procedures in Section 2 from the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.)	OK 🗗
Check operation of SIR for 20 sec. with probe to prove probe operation and operation of 2 pumps	ок 🗹
Check operation LR3 with probe to prove RTU and probe	OK 🗹
Seal conduits with denso and grout under switchboard.	OK 🗗
Check Energex Phase Fail Input.	OK 🗹
Confirm automatic control of pumps.	ок 🗹
Check Parameter 203 of Soft Starter is a positive value	OK 🗹
Confirm correct operation of all door locks	OK 🗹
Confirm Operation & Maintenance Manual left on site.	OK 🗹

3.9.2 SCADA Testing

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Outcome
The Lend Lease Programmer must complete the following procedures with the assistance from the Lend Lease Commissioning Engineer and Lend Lease SCADA Commissioning Engineer in the Control Room. From the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.) Section3: SCADA Commissioning Procedure	ок 🗹

3.9.3 Preliminary Work Completion by Electrical Contractors

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Outcome
Leave the site clean and tidy and hazard free.	OK 🗹
Confirm with BW that the job is complete and their staff can leave.	OK 🗹
Confirm with BW that BW staff will lock up the site on completion of the switchboard change over work.	OK Z
Note: If there is a problem with finishing the work due to unforeseen circumstance refer to the Risk Analysis attached.	OK 🗹

Electrical Contactor's Supervisor

Name:.....Glenn Cross ... Date: 2-5.12

Signature:

QUU Commissioning Manager

Name:... Faheem Saleh...... Date:

Signature: Wall

Doc Id: 006142

Printed: 1/05/2012

Active Date:

2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P

(Modified by J & Richardson)

QUU Flood Recovery Project - Phase 2C: 30 Ipswich Switchboards Replacement

Commissioning Plan Standard Pumping Station

3.9.4 Register Control Room

LEND LEASE Programmer Contractor Task	Outcome
Commissioning Engineer to call the Control Room Operator (CRO) and inform him that the site works is complete and that the site is now fully in "Remote" control and that all alarms are to be acted on as per the alarm instructions. C.R.O. to confirm that the site is healthy and that there are no alarms active. Record the C.R.O.'s name and Officer Code and record the time of the call.	Name CRO TIME:

Electrical Contactor's Supervisor	QUU Commissioning Manager
Name:Glenn Cross Date:	Name: Faheem Saleh Date:
Signature:	Signature:

Doc Id: 006142 Printed: 1/05/2012 Active Date: 2 November 200712

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

4 Post Change Over Checklist

4.1 DELIVERABLES FROM RTU PROGRAMMER

LEND LEASE Programmer Contractor Task	Date Completed
Within 7 days of the change over the following must be completed and signed off by the Lend Lease Programmer Complete Section 4: Post Commissioning from the SSM086 Standard Fixed Speed Sewage Pumping Station (S.A.T.)	1 1
The BW Programmer will ensure that the Control Room Acceptance (CRA) form is signed by the Manager of the Control Room Officers. The form is to be handed to the Contracts Manager (CM).	1 1

4.2 DELIVERABLES FROM ELECTRICAL CONTRACTOR

LEND LEASE Programmer & J & P RICHARDSON Contractor Task	Date Completed
All documentation required under the contract is to be provided with the time specified (AS BUILT's, Electrical Certificates etc).	29 161 12

4.3 DELIVERABLES FROM COMMISSIONING MANAGER

LEND LEASE Commissioning Manager & J & P RICHARDSON Contractor Task	Date Completed
All documentation is handed to the Project Manager to that the new switchboard asset can be capitalised and handed over to the customer.	
Factory Acceptance Test Sheet – Completed & signed off.	OK 🗆
Electrical Inspection Sheet – Completed & signed off.	OK ☑
Site Acceptance Test Sheet – Completed & signed off.	OK 🗆
Commissioning Plan – Completed & signed off.	OK ₽
Control Room Acceptance Form – Completed & signed off	OK 🗹
As built Drawings have been updated, drafted and taken to site along with the Site Specific Functional Specification,	29 106120-2

4.4 SUGGESTIONS FOR IMPROVEMENT

Suggestion	Recommended By

Electrical Contactor's Supervisor	QUU Commissioning Manager
Name: Glenn Cross Date: 23 . 06 25 Signature	Name: Faheem Saleh Date:
Signature (Signature:
Doc Id: 006142 Active Date: 2 Novem	nber 200712 QUU Confidential

Owner: Alex Witthoft
Developed Template:
(Modified by J & P
Richardson)

4.0 DESIGN REPORT

MOUNT CROSBY ROAD SEWAGE PUMPING STATION

C51573 Queensland Urban Utilities

Design Report



Registered Professional Engineer of Queensland
MR. JUSTIN READ
RPEQ 7727
DIV: ELECTRICAL

Date	Description	Rev	Author	Reviewer
16-04-2012	RPEQ Certification	0	Ashley Hulsman	Justin Read (RPEQ)

CONTENTS

1	INTRODUCTION	3
2	RESULTS SUMMARY	4
3	CONCLUSION / RECOMMENDATIONS	5
4	SUPPORTING DESIGN DATA	6

1 INTRODUCTION

The purpose of this document is to provide information on the Electrical Design for the

MOUNT CROSBY ROAD SEWAGE PUMP STATION Switchboard replacement.

The design was undertaken under the direct supervision of an RPEQ registered electrical engineer in accordance with the requirements for the provision of professional engineering services as detailed in the Professional Engineers Act 2002.

2 RESULTS SUMMARY

The pump station operating under Energex Mains supply has a prospective Fault Current of 734A with the switchboard having an acceptable Fault Rating of 10,000A.

A prospective Touch Voltage of 115VAC is calculated, and as this value is greater than the required 50VAC Touch Voltage, the clearance of this fault must occur within 0.33 seconds as per AS/NZS3000-2007 Figure B4 Maximum Duration of Prospective 50 Hz Touch Voltage. Inspection of the time/current curve for the 125A main circuit breaker confirms that this will be the case.

The 15M long consumers mains (1x25mm², 4C+E PVC/PVC) has a calculated voltage drop of 2.09V that is below the required 5% permitted between the Point of Supply and the switchboard installation. The calculated current carrying capacity of the above mentioned cabling is 94A. Short Circuit Temperature Rise calculations show that the Minimum Cable Size required is 0.66mm².

The maximum demand of the pump station is calculated at 90A with the switchboard main switch setting being 80A (limited by size of Energex primary fuse). Empirical evidence is that the maximum demand of the station is less than 90A as the station was operating pre-flood and was supplied by this same Energex primary fuse.

The pump station operating under the Generator Supply with a minimum prospective Sustained Short Circuit Fault Current of 630A has a prospective Touch Voltage of 1.21VAC. This value does not exceed of 50VAC. The clearance of this fault must occur within 5 seconds. Inspection of the time/current curve for the 125A generator circuit breaker confirms that this will be the case.

3 CONCLUSION / RECOMMENDATIONS

The design complies with the requirements of the applicable Australian Standards with respect to Voltage Drop, Fault Level, Fault Loop Impedance, current carrying capacity and short circuit temperature rise when operating under the current Energex Mains Supply parameters or standby generator supply (utilising a generator with a minimum sustained short circuit current rating of 630A)

Low voltage protection discrimination curves show that the 80A Energex Supply Authority fuses cannot grade against the Pump Station Main Switch under fault conditions between approximately 890A and 1100A. QUU may choose to further investigate the consumers mains cable size with the view to upgrading the Energex primary fuse.

4 SUPPORTING DESIGN DATA

- Touch Potential / Fault Current Calculations Sheets
- Industrial Maximum Demand Three Phase Calculation Sheet
- Consumers Mains Current Carrying Capacity Sheet
- Consumers Mains Short Circuit Temperature Rise Calculation Sheet
- Cable Schedule
- Circuit Breaker Time / Current Characteristic and Protection Discrimination Curves

SP357 - Mt Crosby Road

DESIGN CALCULATIONS

Developed By



J. & P. RICHARDSON INDUSTRIES PTY LTD 114 CAMPBELL AVENUE WACOL 4076 Ph (07) 3271 2911 FAX (07) 3271 3623

Document Revision History

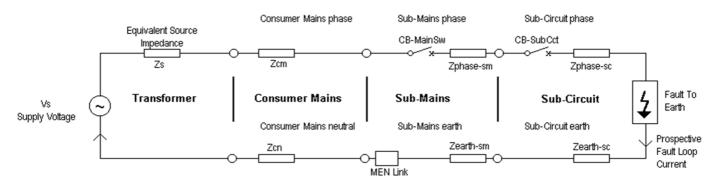
Revision	Date	Ву	Authorised By	Short Desc. of changes
Α	8/05/2012	Ashley Hulsman	Clayton Berlin	Initial Text
		•	•	

TOUCH POTENTIAL/FAULT CURRENT CALCULATIONS

Main Switchboard



Equivalent Circuit



Enter data into grey areas

Transformer ¹		
Capacity	kVA	500
Impedance ²	%	4
Prospective Fault Level of Transformer	MVA	12.5
Prospective Fault Current of Transformer	kA	17.39006835
Advised or Alternative Fault Current of Transformer ³	kA	
Source Impedance Z _S at 230Vac	Ω	0.013800981
¹ The transformer calcs neglect any impedance upstream	of the transform	ner
² If left blank a transformer impedance of 5% will be assur	ned	
3 Leave blank to calculate Z_{S} based on Transformer Capa	acity & Impedan	се

Consumer Mains		
Length of Consumer Mains cable	m	221
Size of active conductor	mm ²	7/0.104CU
Number of parallel active conductors		1
Size of associated earth-return conductor ¹	mm ²	7/0.104CL
Number of parallel earth-return conductors		1
Impedance of single-core of active cable @ 75°C ²	Ω/km	0.6482
Impedance of single-core of earth cable @ 75°C ²	Ω /km	0.6482
Impedance of active conductors Z _{CM}	Ω	0.1432
Impedance of earth (neutral) conductors Z _{CN}	Ω	0.1432
If the MEN is at the switchboard, this is the neutral conductor. Transformer, this is the earth conductor. Transformer this Add UR 2004, 2004.	ductor; if the MEN is	s at the
² From Table A4 of HB 301 - 2001		

Sub Mains	•	•
Length of Sub-mains cable	m	15
Size of active conductor	mm ²	25
Number of parallel active conductors		1
Size of associated earth conductor	mm ²	25
Number of parallel earth conductors		1
Impedance of single-core of active cable @ 75°C 1	Ω/km	0.8922
Impedance of single-core of earth cable @ 75°C 1	Ω/km	0.8922
Impedance of active conductors Z _{PHASE-SM}	Ω	0.0134
Impedance of earth (neutral) conductors Z _{EARTH-SM}	Ω	0.0134
¹ From Table A4 of HB 301 - 2001		

Sub-Circuit Sub-Circuit			
Length of Sub-circuit (motor) cable	m	0	
Size of active conductor	mm ²	1	
Number of parallel active conductors		1	
Size of associated earth conductor	mm ²	1	
Number of parallel earth conductors		1	
Impedance of single-core of active cable @ 75°C ¹	Ω /km	25.8007	
Impedance of single-core of earth cable @ 75°C 1 Ω /km			
Impedance of active conductors Z _{PHASE-SC}	Ω	0.0000	
Impedance of earth conductors Z _{EARTH-SC}	Ω	0.0000	
¹ From Table A4 of HB 301 - 2001			

Fault Current & Touch Potential		
Impedance of active circuit Z _A	Ω	0.1704
Impedance of earth/neutral circuit Z _E	Ω	0.1566
Fault Current I _{SC} (at 240Vac)	Α	733.81215
Touch Potential V _T at point of fault	Vac	114.94
Total Upstream Impedance	Ω	0.3271

Main Switch: Ir=0.63 (78A) Im= Characteristic 5

Examine the time-current curve for the circuit-breaker/fuse which is providing the overcurrent protection to ensure that I _{SC} is high enough to guarantee operation of the protective device within the specified time.

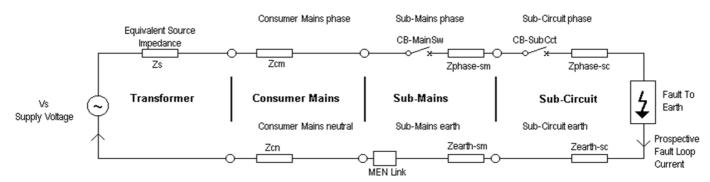
Use the table "Additional Earth" within this workbook to examine the effect on I_{SC} and V_T of adding additional earth conductors.

TOUCH POTENTIAL/FAULT CURRENT CALCULATIONS

Main Switchboard



Equivalent Circuit



Enter data into grey areas

GENERATOR						
Capacity	kVA	145				
Impedance ²	%					
Prospective Fault Level of Transformer	MVA					
Prospective Fault Current of Transformer	kA					
Advised or Alternative Fault Current of Generator ³	kA	0.63				
Source Impedance Z _S at 230Vac	Ω	0.380952381				
¹ The transformer calcs neglect any impedance upstream	of the transform	ner				
² If left blank a transformer impedance of 5% will be assu	ımed					
3 Leave blank to calculate Z $_{ m S}$ based on Transformer Cap	pacity & Impedan	се				

Length of Consumer Mains cable	m	0
Size of active conductor	mm ²	1
Number of parallel active conductors		1
Size of associated earth-return conductor ¹	mm ²	1
Number of parallel earth-return conductors		1
Impedance of single-core of active cable @ 75°C ²	Ω/km	25.8007
Impedance of single-core of earth cable @ 75°C ²	Ω/km	25.8007
Impedance of active conductors Z _{CM}	Ω	0.0000
Impedance of earth (neutral) conductors Z _{CN}	Ω	0.0000
If the MEN is at the switchboard, this is the neutral cond transformer, this is the earth conductor. From Table A4 of HB 301 - 2001	ductor; if the MEN is a	at the

MAINS TO GENERATOR INLET		
Length of Sub-mains cable	m	3
Size of active conductor	mm ²	35
Number of parallel active conductors		1
Size of associated earth conductor	mm ²	35
Number of parallel earth conductors		1
Impedance of single-core of active cable @ 75°C 1	Ω/km	0.6486
Impedance of single-core of earth cable @ 75°C 1	Ω/km	0.6486
Impedance of active conductors Z _{PHASE-SM}	Ω	0.0019
Impedance of earth (neutral) conductors Z _{EARTH-SM}	Ω	0.0019
¹ From Table A4 of HB 301 - 2001		

Sub-Circuit							
Length of Sub-circuit (motor) cable	m	0					
Size of active conductor	mm ²	1					
Number of parallel active conductors		1					
Size of associated earth conductor	mm ²	1					
Number of parallel earth conductors		1					
Impedance of single-core of active cable @ 75°C ¹	Ω/km	25.8007					
Impedance of single-core of earth cable @ 75°C 1	Ω /km	25.8007					
Impedance of active conductors Z _{PHASE-SC}	Ω	0.0000					
Impedance of earth conductors Z _{EARTH-SC}	Ω	0.0000					
¹ From Table A4 of HB 301 - 2001							

Fault Current & Touch Potential		
Impedance of active circuit Z _A	Ω	0.3829
Impedance of earth/neutral circuit Z _E	Ω	0.0019
Fault Current I _{SC} (at 240Vac)	Α	623.62935
Touch Potential V _T at point of fault	Vac	1.21
Total Upstream Impedance	Ω	0.3848

Generator Switch: Ir= 0.63 (78A) Im= Characteristic 5

Examine the time-current curve for the circuit-breaker/fuse which is providing the overcurrent protection to ensure that I SC is high enough to guarantee operation of the protective device within the specified time.

Use the table "Additional Earth" within this workbook to examine the effect on I_{SC} and V_T of adding additional earth conductors.

INDUSTRIAL MAXIMUM DEMAND THREE PHASE CALCULATION

Red Phase White Phase Blue Phase

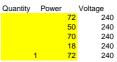
<u>Lighting</u> Full connected load

2x36W Fluoros 1x50W

1x70W Security Bulkheads

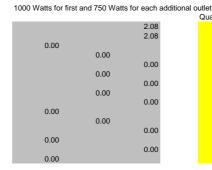
1x18W 2x36W Fluoros

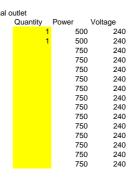




Socket Outlets not exceeding 10Amps

PLC Programming EXT Switchboard Outlet





Socket Outlets exceeding 10Amps

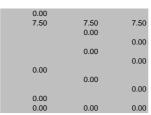
1st Point single phase or External Fill Point Outlet 1st Point three phase

Highest Rating for first and 75% of full current rating of remainder

Note: - If 3 phase then put calculation valve across all three phases

Quantity

0.00





Air Conditioning, Ranges and Cooking Appliances General Load

Ocherar Loud

1st Device single phase or 1st Device three phase Additional Devices

General Loads Additional Devices

Highest Rating for first and 75% of full current rating of remainder Note: - If 3 phase then put calculation valve across all three phases

90.43 Amps

	0.00	
0.00	0.00	0.00
		0.00



Storage Heater (HWS)

Full load connected

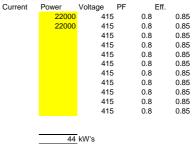
Hot Water System 0.00

Power Voltage 240

Motors

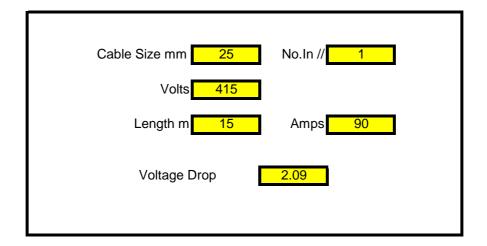
Highest Rating for first and 75% of full current rating of second and 50% of full load of remainder

45.01	45.01	45.01
33.76	33.76	33.76
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00
0.00	0.00	0.00



*NOTE: All G.P.O's have been de-rated due to infrequent use.

Voltage Drop Calculation



Current Carrying Capacity Calculation

Cable Type	PVC/PVC	
Number of Cores	4C	
Cable Size	25	mm2
Maximum Demand	90	amps
Current Carrying Capacity	94	amps

Notes on Calculation:-

- :- Enter Mains cable data from Cable Schedule.
- :- Determine maximum demand from 'Industrial Maximum Demand' sheet.
- :- Determine Current Carrying Capacity from appropriate tables in AS/NZ 3008.1.1:2009, depending on cable size, type and installation method. ie. Table 7, 8, 13 or 14
- :- IF Current Carrying Capacity exceeds maximum demand then the installation complies.

Short Circuit Temperature Rise Calculation

Cable Type PVC/PVC **Cable Size** 25 mm2 **Assume Initial Temp of Cable** 75 Deg. Value of Short CCT. Current 734 Amps **Trip Time of Protective Device** 0.01 Secs Value of K (temp. constant) 111 **Minimum Size Cable Required** 0.66 mm2

Notes on calculation.

- :- Enter Mains cable data from Cable Schedule.
- :- Assume maximum initial temperature of cable type. ie. XLPE/PVC 90 deg, PVC/PVC 75 deg
- :- Value of Short CCT Current can be found on Main Switchboard Sheet.
- :- Determine Trip Time of Protective Device from Circuit Breaker Trip Curve and Settings.
- :- Determine Value of K (constant) from AS/NZ 3008.1.1:2009 Tables 52 and 53.
- :- If value of 'Minimum Size Of Cable Required' is smaller or equal to the size of cable installed, then the installation complies.

	Mt Crosby Rd North Tivoli SPS SP357 Electrical Switchboard OM Manual																													
J & P Richard	Ison Industries Pty Ltd.																													Cable List
В	С	D	E	F	G	Н	1	J	K	L M	N	R	Т	AC	AG	AH	Al	AJ	AL	AN	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA
Comments	Feed from	To Location	Equipment Type	Starter	Volts	Kw	FLA	Cable Size (mm2)	No In//	Cable Type	Voltage Drop Cable	Cable Earth Size	Sup Earth Size	Active Earth Fault A (calculated)	Touch Potential	Circuit Status PASS / FAIL	Clearance Time :- Actual	Clearance Time :- Required	Margin 0.4s	Margin 5s	Circuit Breaker Part No.	Amps	Poles	KiloAmps	Маке	Series	Supplier	5S Trip Amps	0.4S Trip Amps	Comments
2 Mains Supply	Switchboard	Pump 1 De-Contactor	Pump	S/S	415	22	40	6	1	3 Building Wire	1	2.5		656.9	120.6	PASS	0.010	0.180	279	279	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
3 Mains Supply	Pump 1 De-Contactor	Pump No.1	Pump	S/S	415	22	40	4	1	5 5C & E Submersibl	e 6	4		449.7	120.4	PASS	0.010	0.330	72	72	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
4 Mains Supply	Switchboard	Pump 2 De-Contactor	Pump	S/S	415	22	40	6	1	3 Building Wire	1	2.5		656.9	120.6	PASS	0.010	0.330	279	279	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
5 Mains Supply	Pump 2 De-Contactor	Pump No.2	Pump	S/S	415	22	40	4	1	5 5C & E Submersibl	e 6	4		449.7	120.4	PASS	0.010	0.330	72	72	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
6																														
7 Generator Supply	Switchboard	Pump 1 De-Contactor	Pump	S/S	415	22	40	6	1	3 Building Wire	1	2.5		567.2	16.4	PASS	0.010	5.000	189	189	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
8 Generator Supply	Pump 1 De-Contactor	Pump No.1	Pump	S/S	415	22	40	4	1	5 5C & E Submersibl	e 6	4		405.7	45.9	PASS	0.010	5.000	28	28	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
9 Generator Supply	Switchboard	Pump 2 De-Contactor	Pump	S/S	415	22	40	6	1	3 Building Wire	1	2.5		567.2	16.4	PASS	0.010	5.000	189	189	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
10 Generator Supply	Pump 2 De-Contactor	Pump No.2	Pump	S/S	415	22	40	4	1	5 5C & E Submersibl	e 6	4		405.7	45.9	PASS	0.010	5.000	28	28	S125NJ363	63	3	36	Terasaki	TemBreak 2 Therm-Mag type MCCB	NHP	378.0	378.0	SET: Ir=1 Im=6
11																														
12 Instrumentation	Switchboard	Wet Well Level Sensor	Control		24			1.5	1 :	10 1pr																				
13 Instrumentation	Switchboard	Wet Well High Level Probe	Control		24			1.5	1 :	25 2C																				
14 Instrumentation	Switchboard	Surcharge Level	Control		24			1.5	1 :	0 4C																				

CNT400

L:\C51573 QUU Phase 2C Flood Recovery\12 Working\Design Reports\SP357 Mount Crosby Road\Mount Crosby Printed: 24/09/2012 10:46 AM

Q-Pulse Id TMS267

Aerial Coax Surge Diverter

COMMS

Aerial

Matthew Fewtrell



Selectivity Analysis Program

Ph No.: 07 3271 2911

Mobile No.:

Fax No.:

Email: m_fewtrell@jpr.com.au

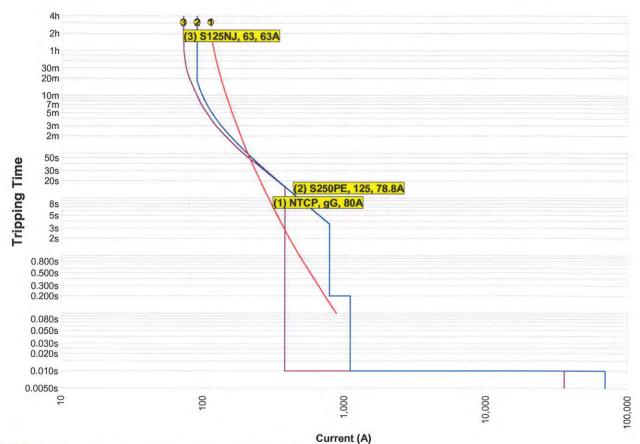
Project: SP357-Mt Crosby Rd File: Mt Crosby Rd SP357 **Printed**: 24 Sep 2012

10:56 am

SUPPLY

Circuit: PUMP CIRCUIT BREAKER (3ø)C2

TIME/CURRENT CURVE



Up Stream - ENERGEX MAIN SWITCH (3ø):

Circuit I.D.: C2 (3ø) Fuse Model: NTCP Breaking Capacity: 80 kA

Catalogue #: NTCP 80

SUPPLY AUTHORITY FUSES (3ø) 1 kA 80A 1 kA **ENERGEX MAIN SWITCH (3ø)**



Matthew Fewtrell



Selectivity Analysis Program

Ph No.: 07 3271 2911

Mobile No.:

Fax No.:

Email: m_fewtrell@jpr.com.au

Project: SP357-Mt Crosby Rd File: Mt Crosby Rd SP357
Printed: 24 Sep 2012

10:56 am

SUPPLY

Circuit: PUMP CIRCUIT BREAKER (3ø)C2

TIME/CURRENT CURVE

2

Up Stream - PUMP CIRCUIT BREAKER (3ø):

Circuit I.D. : C2 (3ø)

Circuit Breaker (MCCB) Model: S250PE

OCR: 125

Trip Setting: 79 A

Breaking Capacity: 70 kA

Catalogue #: S250PE 3 125

ENERGEX MAIN SWITCH (3ø)

1 kA 🙏 50-125A

Set 79A TRIP

PUMP CIRCUIT BREAKER (3ø)

NHP®

Adjustable Settings:

IR Characteristics

0.63 5

78.8 A

3

Down Stream - PUMP CIRCUIT BREAKER (3ø):

Circuit I.D. : C2 (3ø)

Circuit Breaker (MCCB) Model: S125NJ

Trip Unit: 63

Trip Setting: 63 A

Breaking Capacity: 36 kA

Catalogue #: S125NJ 3 63

PUMP CIRCUIT BREAKER (3ø)

1 kA 40-63A

Set 63A TRIP



NHP®

Adjustable Settings:

Ir Im

1 6

63 A 378 A

Matthew Fewtrell



Selectivity Analysis Program

Ph No.: 07 3271 2911

Mobile No.:

Fax No.:

Email: m_fewtrell@jpr.com.au

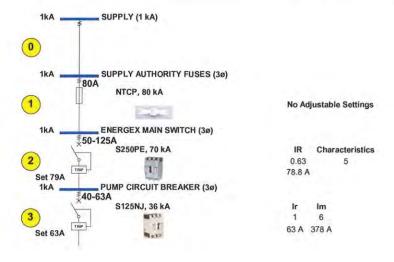
Project: SP357-Mt Crosby Rd File: Mt Crosby Rd SP357 **Printed**: 24 Sep 2012

10:56 am

SUPPLY

Circuit: PUMP CIRCUIT BREAKER (3ø)C2

TIME/CURRENT CURVE



Page 63 of 63