

SHEET INDEX

SHEET #	SHEET DESCRIPTION
1	COVER SHEET
2	240V SINGLE PHASE, SINGLE PUMP LIFT STATION 0.5 TO 10 HP ELECTRICAL STANDARDS
3	240V SINGLE PHASE, SINGLE PUMP LIFT STATION EQUIPMENT RACK ELEVATION
4	TYPICAL PUMP CONTROL CABINET, DFS CABINET & JUNCTION BOX DETAILS
5	TYPICAL PUMP CONTROL PANEL SCHEMATIC WIRING DIAGRAM
6	TYPICAL PUMP CONTROL PANEL SCHEMATIC WIRING DIAGRAMS
7	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
8	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
9	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
10	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
11	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
12	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
13	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
14	TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM
15	TYPICAL LIFT STATION ONE LINE DIAGRAMS
16	ELECTRICAL SCHEDULES AND LOAD CALCULATIONS
17	TYPICAL LIFT STATION ELECTRICAL DETAILS
18	CONDUIT AND CABLE SCHEDULE AND PANEL SCHEDULE
19	INSTRUMENTATION LEGEND ABBREVIATIONS AND SYMBOLS
20	TYPICAL LIFT STATION P&IDs



PUMP STATION STANDARD ELECTRICAL DETAILS 240V SINGLE PH PUMP 1/2 TO 10 HP



CITY OFFICIALS

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Mark Bunker	Councilmember
Kathleen Beckman	Councilmember
David Allbritton	Councilmember
Hoyt Hamilton	Councilmember
William B. Horne II	City Manager

Tara Kivett, P.E.
City Engineer

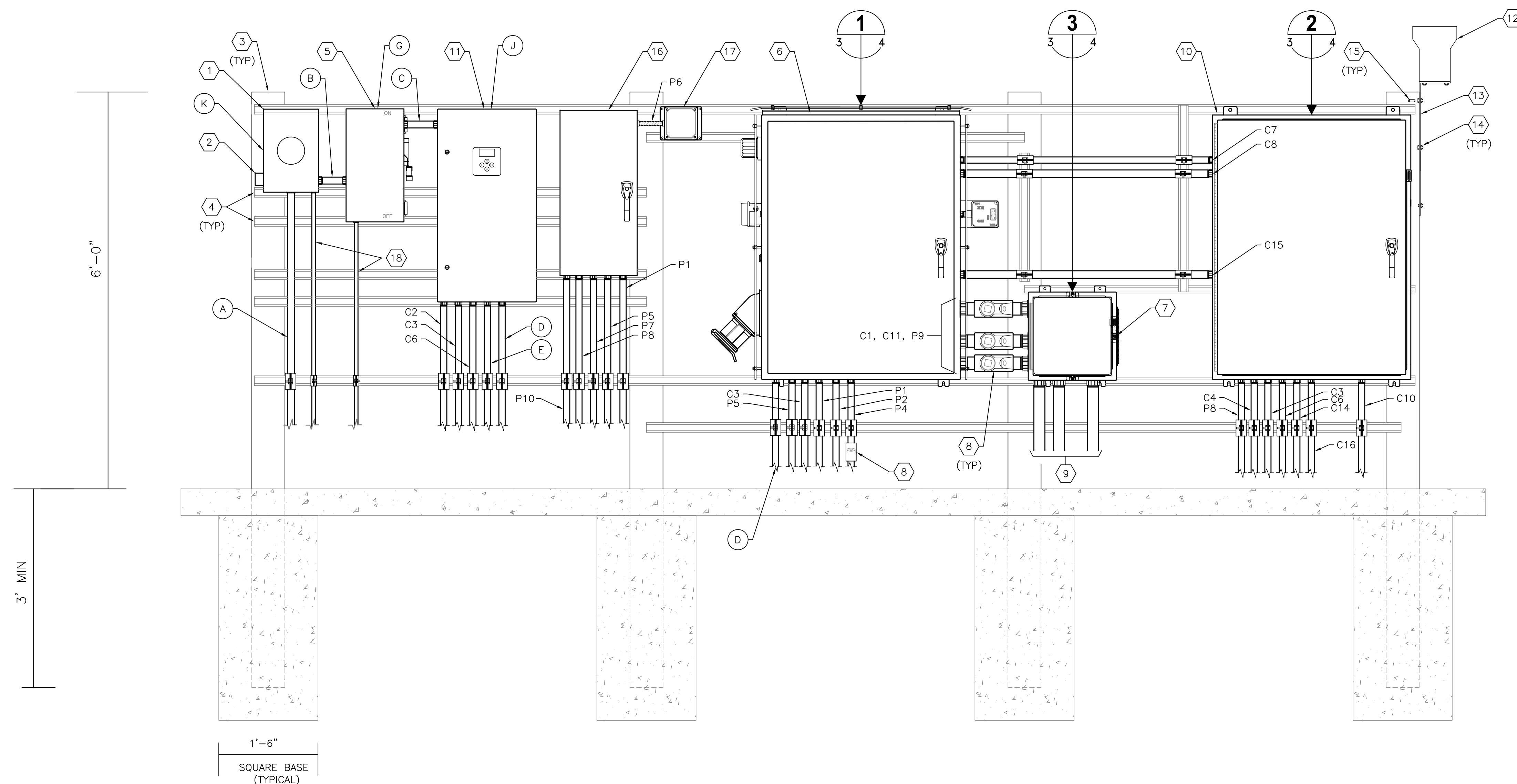
Approved For
Construction

CITY ENGINEER D. TARA KIVETT, P.E. #86611

Date Approved

100% PLANS PRELIMINARY

City Project No. 18-0058-UT
City Plan Set No. 2020011



240V 3-PHASE SINGLE PUMP STATION
EQUIPMENT RACK FRONT SIDE ELEVATION
SCALE : NONE

KEYED NOTES:

- | | | | |
|---|--|----|--|
| 1 | PROVIDE AND INSTALL METER SOCKET. REFER TO EQUIPMENT SCHEDULE FOR SIZE/TYPE REQUIRED. COORDINATE REQUIREMENTS WITH UTILITY. | 10 | DATA FLOW SYSTEMS (DFS) CABINET. REFER TO DETAIL ON SHEET 4. |
| 2 | PROVIDE AND INSTALL UTILITY APPROVED LIGHTNING PROTECTION DEVICE. | 11 | PROVIDE AND INSTALL NEW 240V, 2-POLE, SOLID NEUTRAL AUTOMATIC TRANSFER SWITCH (ATS). REFER TO EQUIPMENT SCHEDULE FOR SIZE/TYPE REQUIRED. |
| 3 | PROVIDE AND INSTALL 6" X 6" X 9' REINFORCED SQUARE CONCRETE POST. | 12 | PROVIDE AND INSTALL NEW 8" RAIN GAUGE. XYLEM RG600 WITH 4-20MA OUTPUT TIPPING BUCKET CONVERTER MODULE, XYLEM ELA000. |
| 4 | PROVIDE AND INSTALL 1-5/8" X 1-5/8" 316 STAINLESS STEEL UNISTRUT WITH STAINLESS STEEL HARDWARE. NOTE: INSTALL ALL BOLTS FOR UNISTRUT COMPLETELY THROUGH CONCRETE POSTS. | 13 | PROVIDE AND INSTALL 10" SQUARE 1/4" ALUMINUM BRACKET, OVERFLOW LIGHT ALUMINUM BRACKET. |
| 5 | PROVIDE AND INSTALL 2-POLE, 240V, FUSED DISCONNECT IN NEMA 4X STAINLESS STEEL ENCLOSURE. REFER TO EQUIPMENT SCHEDULE FOR SIZE/TYPE REQUIRED. DISCONNECT SHALL BE PAD-LOCKABLE. | 14 | PROVIDE AND INSTALL 3/4" STAINLESS STEEL NUT AND BOLT (TYP). |
| 6 | PROVIDE AND INSTALL NEW PUMP CONTROL PANEL. REFER TO DETAIL ON SHEET 4. | 15 | PROVIDE AND INSTALL STAINLESS STEEL WEDGE ANCHOR IN CONCRETE POST TO SECURE RAIN GAUGE BRACKET (TYP). |
| 7 | PROVIDE AND INSTALL NEW 16" X 16" X 6" NEMA 4X 316 STAINLESS STEEL JUNCTION BOX WITH STEEL BACKPANEL. PROVIDE STAINLESS STEEL LOUVER PLATE AND FILTER. REFER TO DETAIL ON SHEET 4. | 16 | PROVIDE AND INSTALL 240V, 60A, SINGLE-PHASE LOADCENTER IN NEMA 3R STAINLESS STEEL ENCLOSURE. REFER TO SHEET 18 FOR PANEL SCHEDULE. |
| 8 | PROVIDE AND INSTALL CROUSE-HINDS EYS TYPE SEALS W/CHICO COMPOUNDS. | 17 | PROVIDE AND INSTALL SURGE PROTECTION DEVICE (SPD) UNIT, 120/240V, 3ø, TYPE 1, ASCO SERIES 400, IN NEMA 4X ENCLOSURE. |
| 9 | 2" CONDUITS TO WET WELL. C12, C13 AND P11. CABLES FOR PUMP MOTORS, LEVEL TRANSDUCER AND FLOATS ARE ALL BY RESPECTIVE MANUFACTURER. | 18 | REFER TO ONE LINE DIAGRAM FOR REQUIRED GROUNDING ELECTRODE CONDUCTORS. ALL CONDUCTORS SHALL BE INSTALLED IN 1" CONDUIT. |

GENERAL NOTES:

1. ALL PANELS SHALL BE LABELED FOR THE ARC FLASH RISK HAZARD PRESENT AT EACH PIECE OF EQUIPMENT.
2. PROVIDE CONDUIT AND CONDUCTOR BETWEEN PUMP CONTROL PANEL AND NEW DFS RTU ENCLOSURE AS REQUIRED (NOT SHOWN FOR CLARITY).

TIMOTHY THOMAS P.E. No. 47079



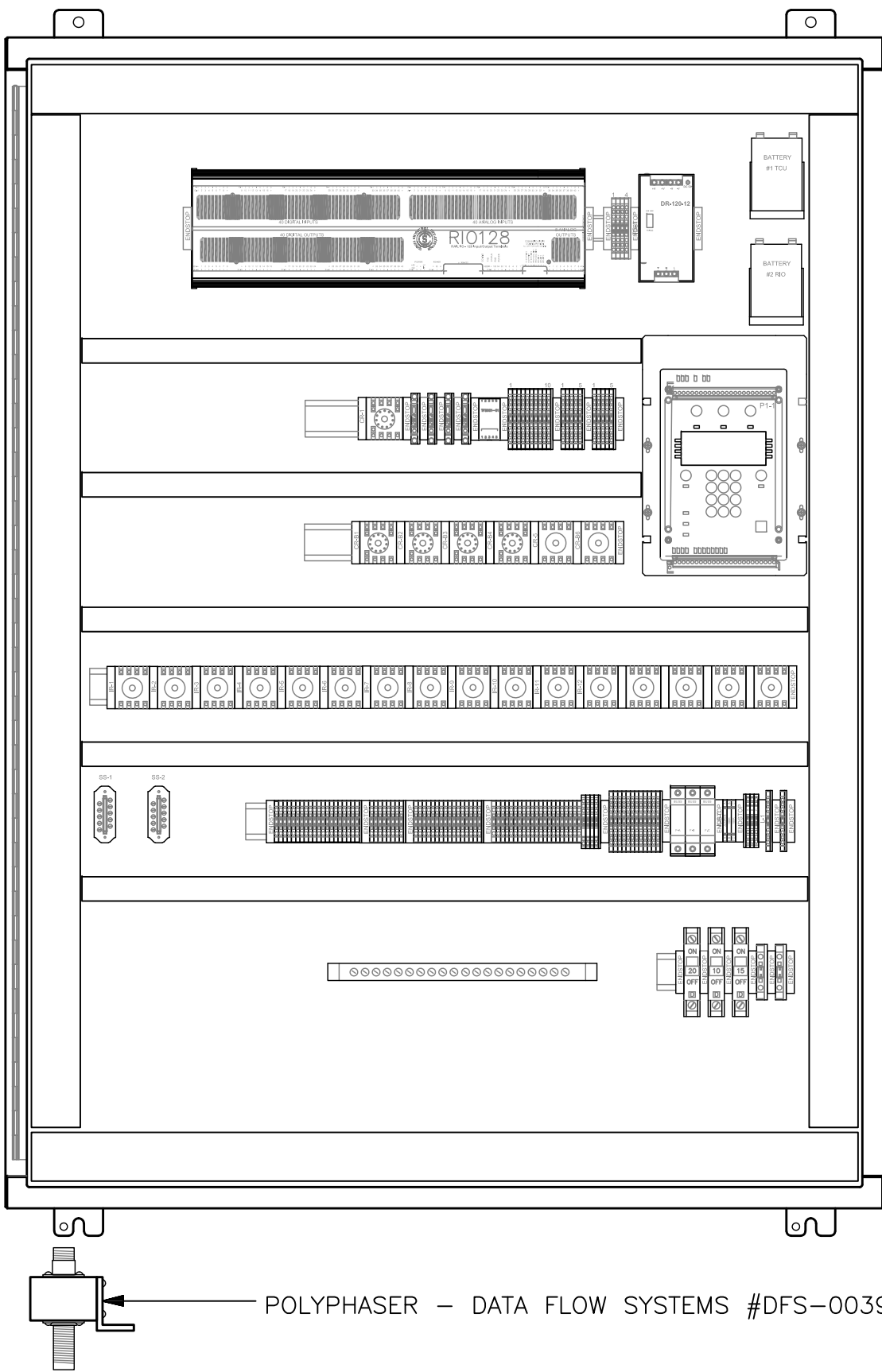
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CITY OF CLEARWATER, FLORIDA
ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756



240V SINGLE PHASE, SINGLE PUMP STATION EQUIPMENT RACK ELEVATION

DWG NAME: #####	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: #####	DATE DRAWN: #####	DRAWN BY: JLH	HORIZ. N/A
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DFS CABINET DETAIL

ENCLOSURE:

BACK PANEL:

PUMP CONTROL PANEL DETAIL

(OUTER DOOR REMOVED FOR CLARITY)

HAMMOND HW483612S16HK (48"H x 36"W x 12"D) NEMA 4X
RATED TYPE 316 STAINLESS STEEL WITH BOLT-ON DRIP
SHIELD, PAD-LOCKING HASP AND 0.25" THICK ALUMINUM
SUN SHIELDS ON TOP AND SIDES. OUTER DOOR SHALL HAVE
ROLLER CAM TYPE 3-POINT, PAD-LOCKABLE HANDLE,
WELDED ON STUDS FOR PRINT POCKET AND 90° STOP.

HID-4836, 0.125 BLACK ENGRAVED ALUMINUM WITH CONTINUOUS HINGE, TWIST LATCHES, AND 90° STOP

PUMP CONTROL PANEL BACK PANEL

BACK PANEL:

HAMMOND 18P4533 (45"H x 33"W) FABRICATED FROM 12 GA
STEEL FINISHED IN WHITE.

JUNCTION BOX ENCLOSURE DETAIL

JUNCTION BOX:

HAMMOND 1418N4S16G6 (16"H x 16"W x 6"D) NEMA 4X
RATED TYPE 316 STAINLESS STEEL WITH BOLT-ON DRIP
SHIELD AND INTEGRAL 12 GA. INNER PANEL. OUTER DOOR
SHALL HAVE STAINLESS STEEL 1/4-TURN LATCHES AND
PAD-LOCKING HASP.

BACK PANEL:

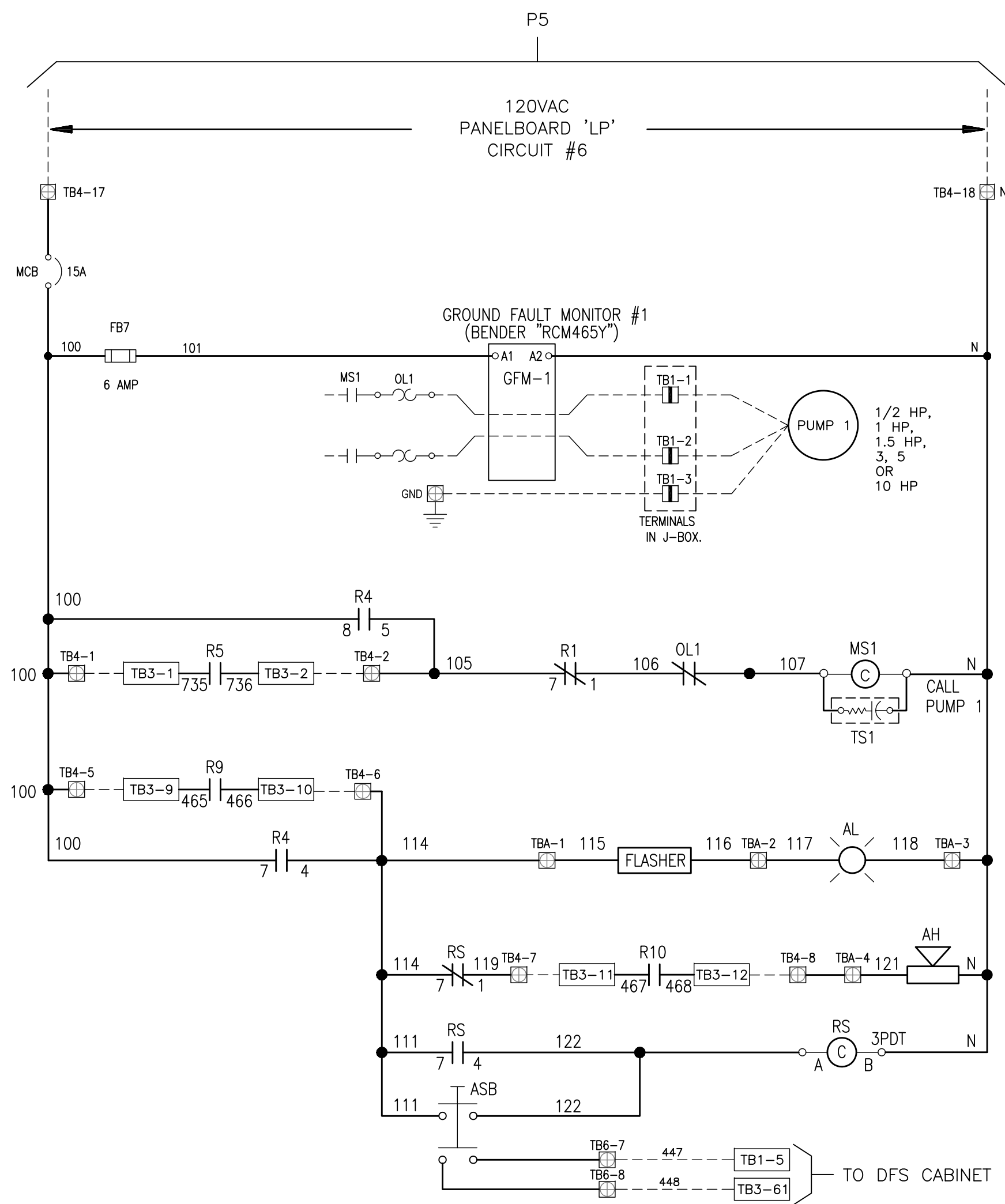
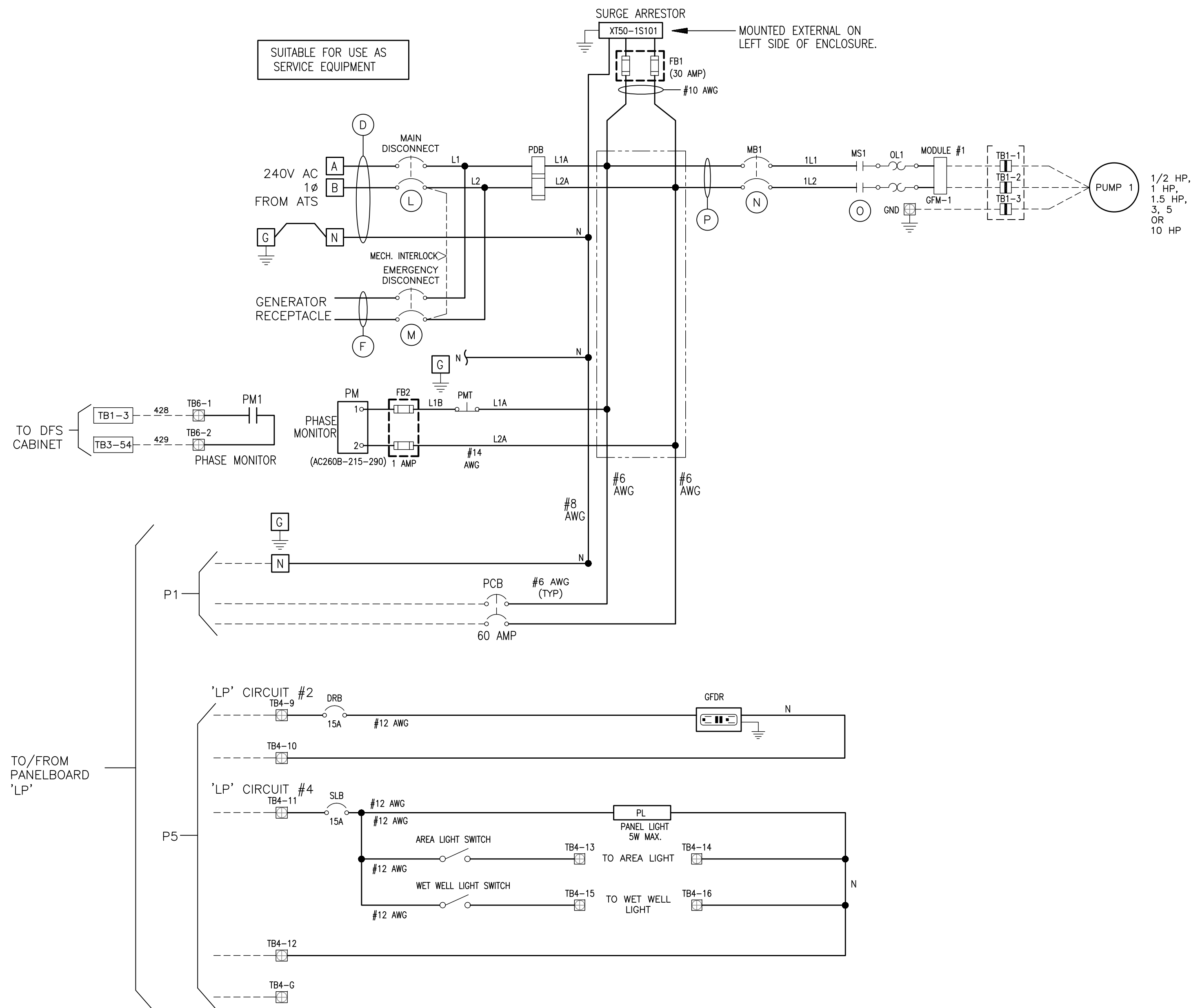
HAMMOND EP1616 (14.2"H x 14.2"W) FABRICATED FROM 12 GA. WHITE ENAMELED STEEL.

LOUVER:

WIEGMANN WAVK0808SSA (10.56"H x 9.5"W) FABRICATED FROM 316 STAINLESS STEEL. PROVIDE WIEGMANN WAFLT88 FILTER KIT FOR LOUVER.

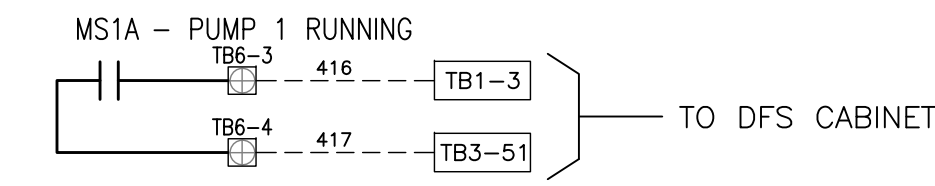
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JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET: 4 OF 20
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- NOTES:
- PANEL SHALL BE U.L. 698A LABELED FOR HAZARDOUS LOCATIONS AND SERVICE ENTRANCE RATED.
 - ANTENNA CABLE SURGE SUPPRESSOR SHALL NOT BE LOCATED OR MOUNTED IN THE INTRINSICALLY SAFE AREA.
 - CONTROL WIRING SHALL BE #14 AWG.
 - INTRINSICALLY SAFE WIRING TO BE LIGHT BLUE IN COLOR.
 - REFER TO MANUFACTURER'S TECHNICAL DATA SHEET FOR PROPER WIRING OF THIS DEVICE PER INTRINSICALLY SAFE DEVICES.
 - ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

- LEGEND:
- TBX-X TERMINAL BLOCK LOCATED IN DFS CABINET
 - TBX-X TERMINAL BLOCK LOCATED IN PUMP CONTROL PANEL
 - TBX-X TERMINAL BLOCK LOCATED WET WELL JUNCTION BOX



RECORD DRAWINGS				
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APPROVED BY:	PROJECT ENGINEER	DATE		
	CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 33721	DATE	REVISION	BY DATE

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ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756



TYPICAL PUMP CONTROL PANEL SCHEMATIC WIRING DIAGRAM

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
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TIMOTHY THOMAS P.E. No. 47079

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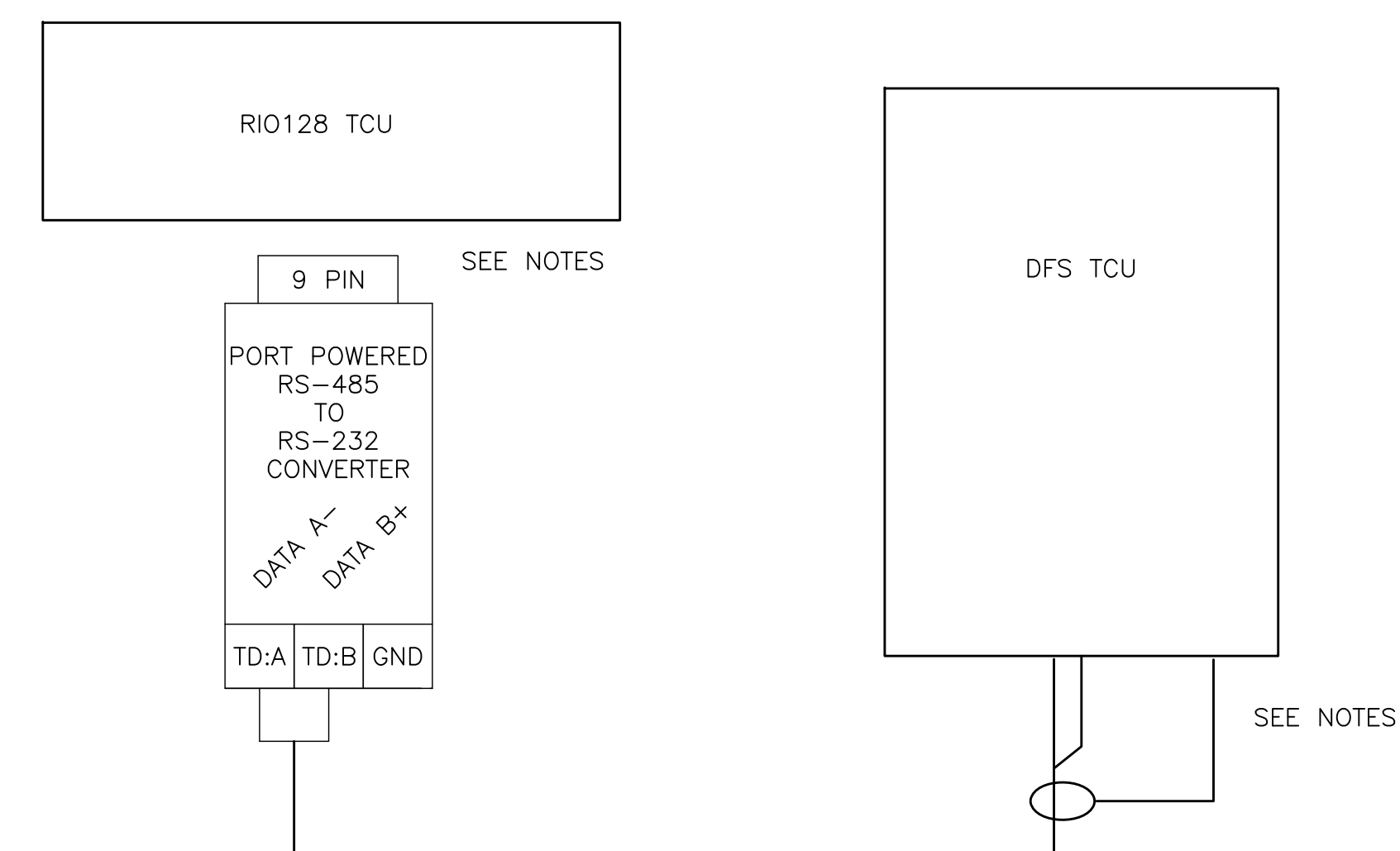
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CONTROL WIRE SIZE #16 UNLESS NOTED
ANALOG WIRE #18 SHIELDED TWISTED PAIR
AC CONTROL WIRES - RED
NEUTRAL WIRES - WHITE
DC+ WIRES - BLUE
DC- WIRES - BLUE/WHITE
POWERED FROM FIELD - YELLOW
FIELD WIRING - - - - -

NOTE:

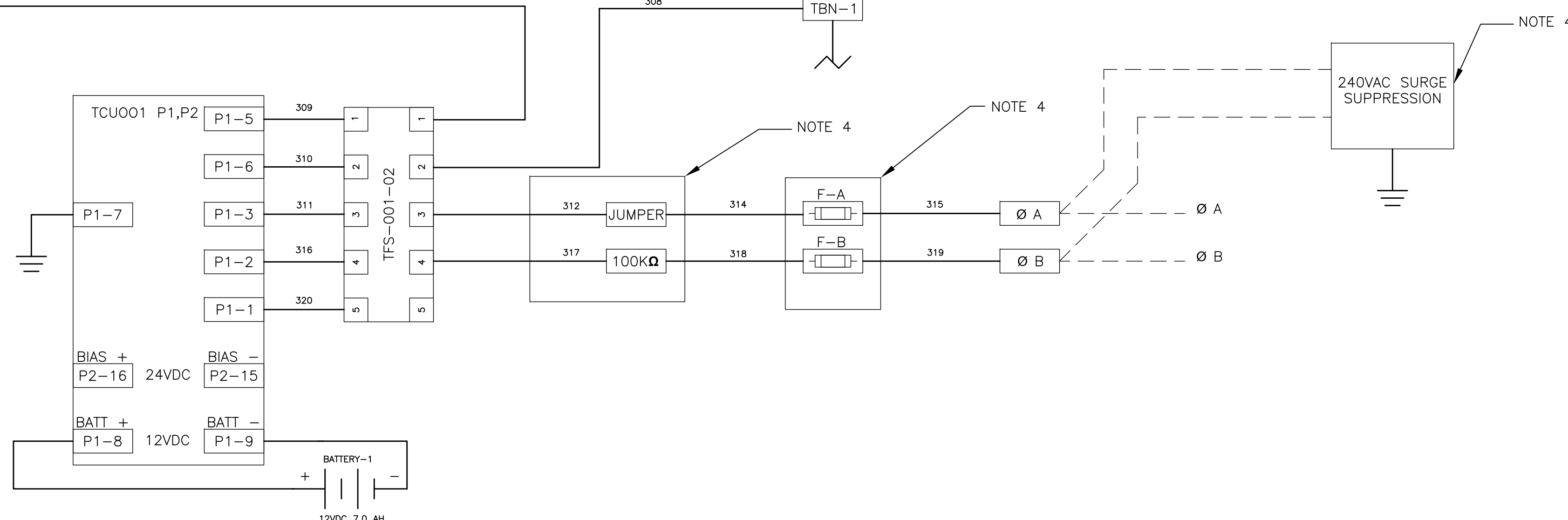
- (1) ALL GROUNDING CONNECTIONS TO BE SINGLE POINT TO GROUND BUS ONLY.
- (2) AC AND DC BUS ARE TYPICAL TERMINAL BLOCK BUSES.
- (3) WIRES FOLLOW LEGEND UNLESS OTHERWISE MARKED.
- (4) ALL FUSES ARE 1 AMP SLOWBLOW UNLESS NOTED.
- (5) 250VAC RATED FUSES AND HOLDER REQUIRED FOR 240VAC LINE
- (6) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.



COMMUNICATIONS RISER DIAGRAM

NOTE:

- (1) RIO-128 CONNECTOR J1 (RS-232) CONNECT RS-485 PORT POWERED CONNECTOR
- (2) RS-485 TERMINAL BLOCK TD:B (DATA B+) TERMINATES TO TCU CONNECTOR P4-3
- (3) RS-485 TERMINAL BLOCK TD:A (DATA A-) TERMINATES TO TCU CONNECTOR P4-4
- (4) TERMINATE THE SHIELD OF THE COMMUNICATION CABLE TO TCU CONNECTOR P4-5

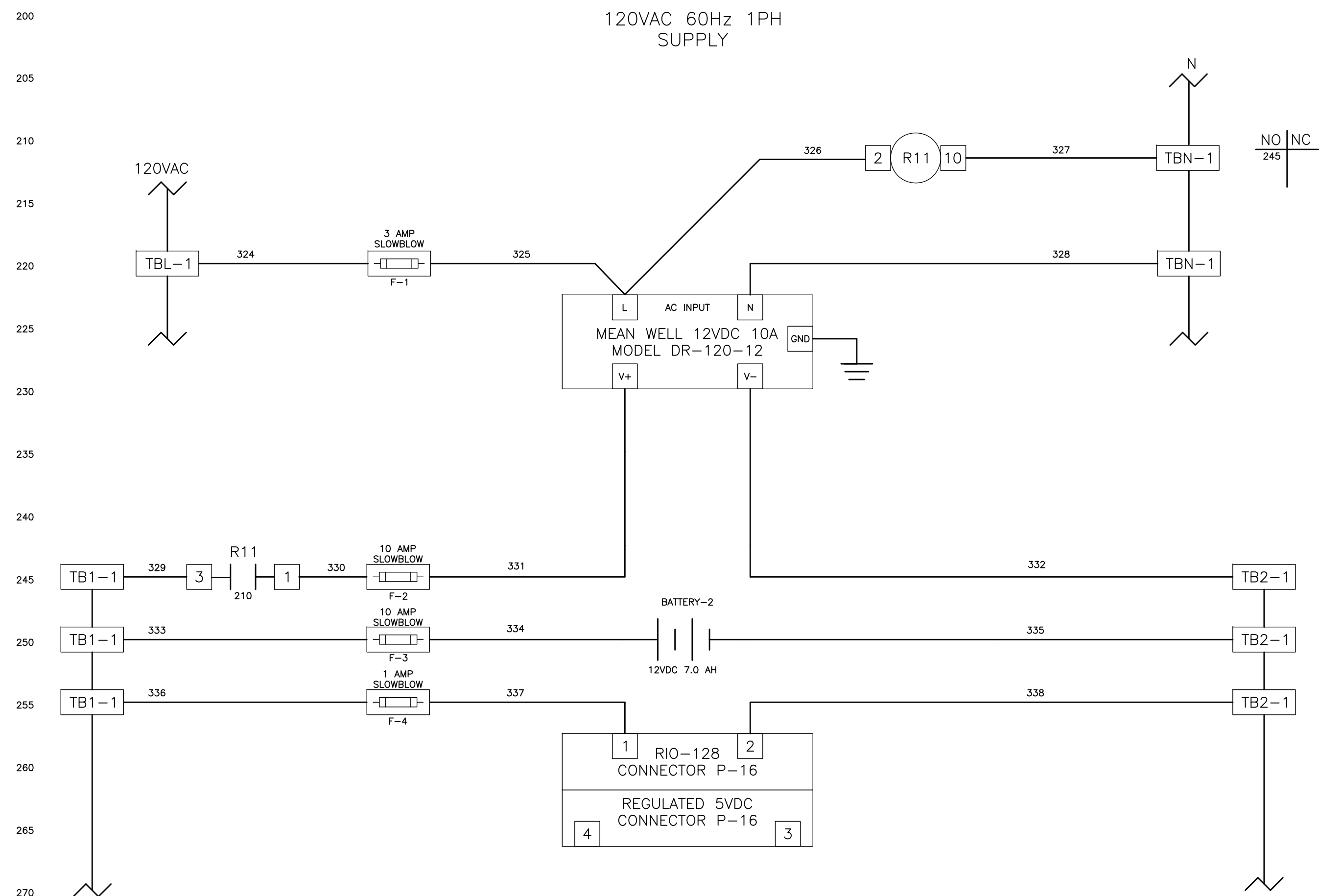


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TYPICAL DFS CABINET
SCHEMATIC WIRING DIAGRAM

DWG NAME: #####	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: #####	DATE DRAWN: #####	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 7 OF 20
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WIRE LEGEND

CONTROL WIRE SIZE #16 UNLESS NOTED
ANALOG WIRE #18 SHIELDED TWISTED PAIR
AC CONTROL WIRES - RED
NEUTRAL WIRES - WHITE
DC+ WIRES - BLUE
DC- WIRES - BLUE/WHITE
POWERED FROM FIELD - YELLOW
FIELD WIRING - - - - -

- NOTE:
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 - (3) WIRES FOLLOW LEGEND UNLESS OTHERWISE MARKED.
 - (4) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

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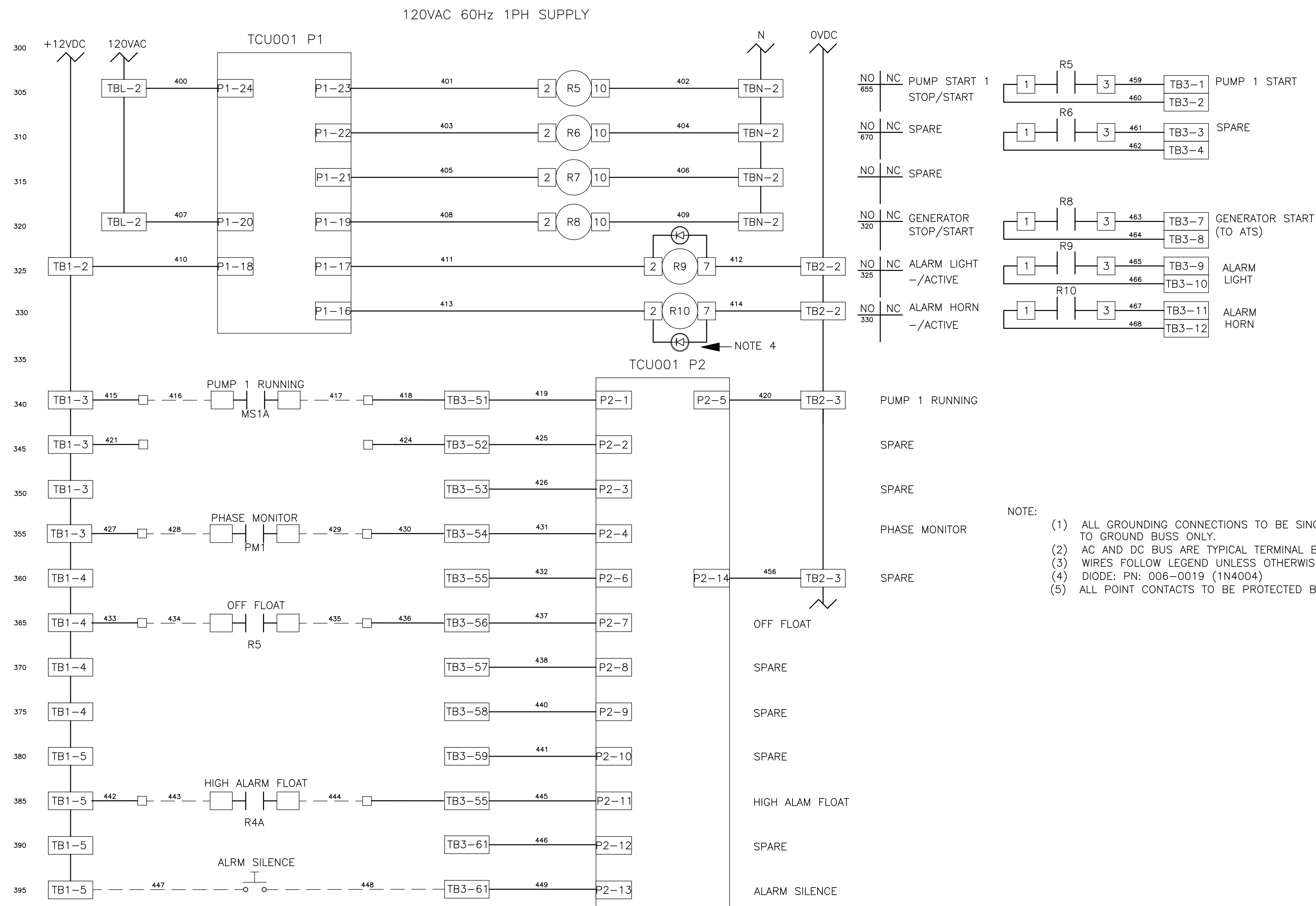
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CITY ENGINEER MICHAEL D. QUILLLEN, P.E. # 33721		DATE		

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TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM

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CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 8 OF 20
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- NOTE:
- (1) ALL GROUNDING CONNECTIONS TO BE SINGLE POINT TO GROUND BUSS ONLY.
 - (2) AC AND DC BUS ARE TYPICAL TERMINAL BLOCK BUSSES.
 - (3) WIRES FOLLOW LEGEND UNLESS OTHERWISE MARKED.
 - (4) DIODE: PN: 006-0019 (1N4004)
 - (5) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

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CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
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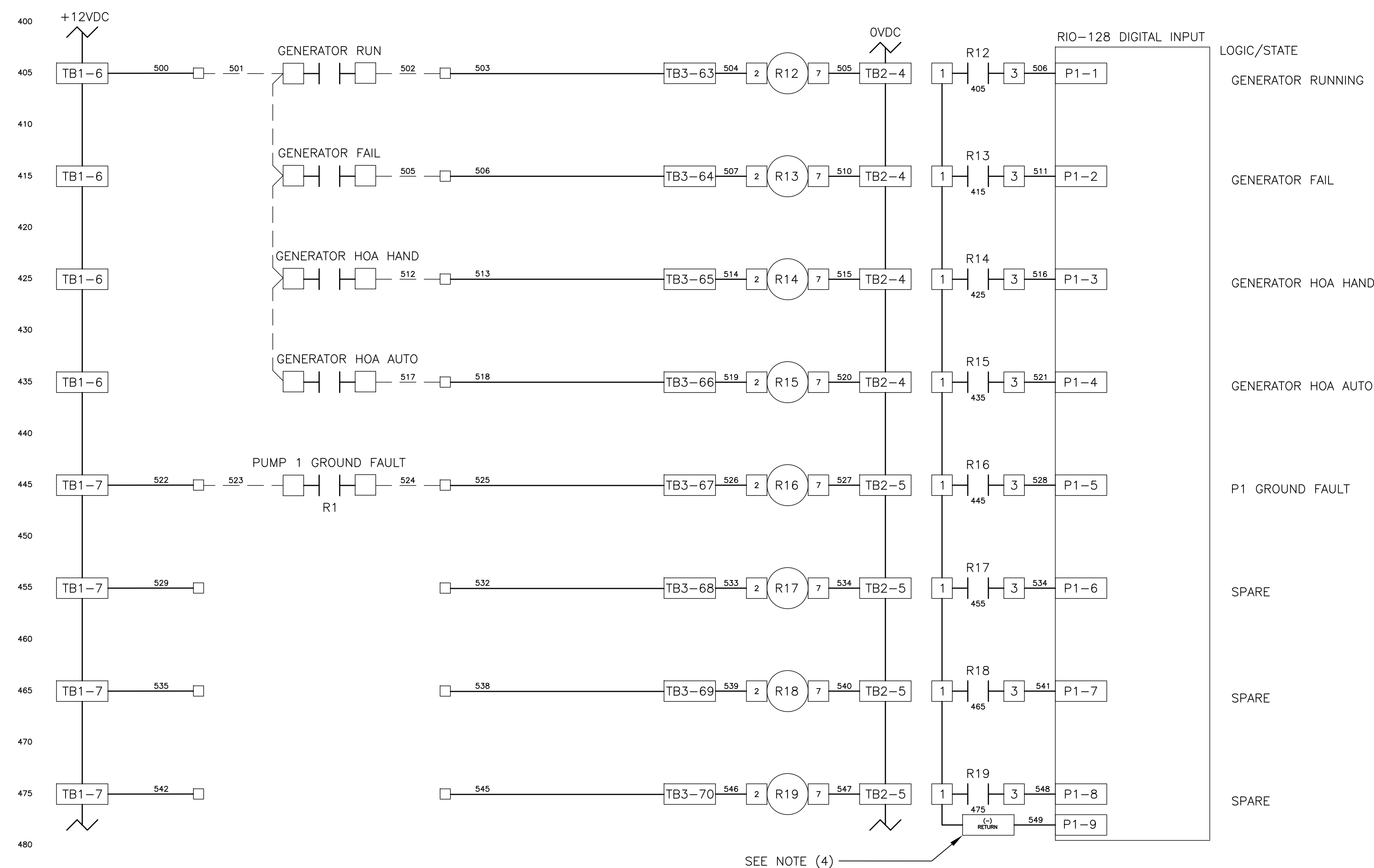
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TYPICAL DFS CABINET
SCHEMATIC WIRING DIAGRAM



WIRE LEGEND

CONTROL WIRE SIZE #16 UNLESS NOTED
ANALOG WIRE #18 SHIELDED TWISTED PAIR
AC CONTROL WIRES - RED
NEUTRAL WIRES - WHITE
DC+ WIRES - BLUE
DC- WIRES - BLUE/WHITE
POWERED FROM FIELD - YELLOW
FIELD WIRING - - - - -

NOTE:

- (1) ALL GROUNDING CONNECTIONS TO BE SINGLE POINT TO GROUND BUS ONLY.
- (2) AC AND DC BUS ARE TYPICAL TERMINAL BLOCK BUSES.
- (3) WIRES FOLLOW LEGEND UNLESS OTHERWISE MARKED.
- (4) TERMINAL BLOCKS ARE FOR THE DC RETURN (-) BUS FOR THE RIO-128 DIGITAL INPUTS.
- (5) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

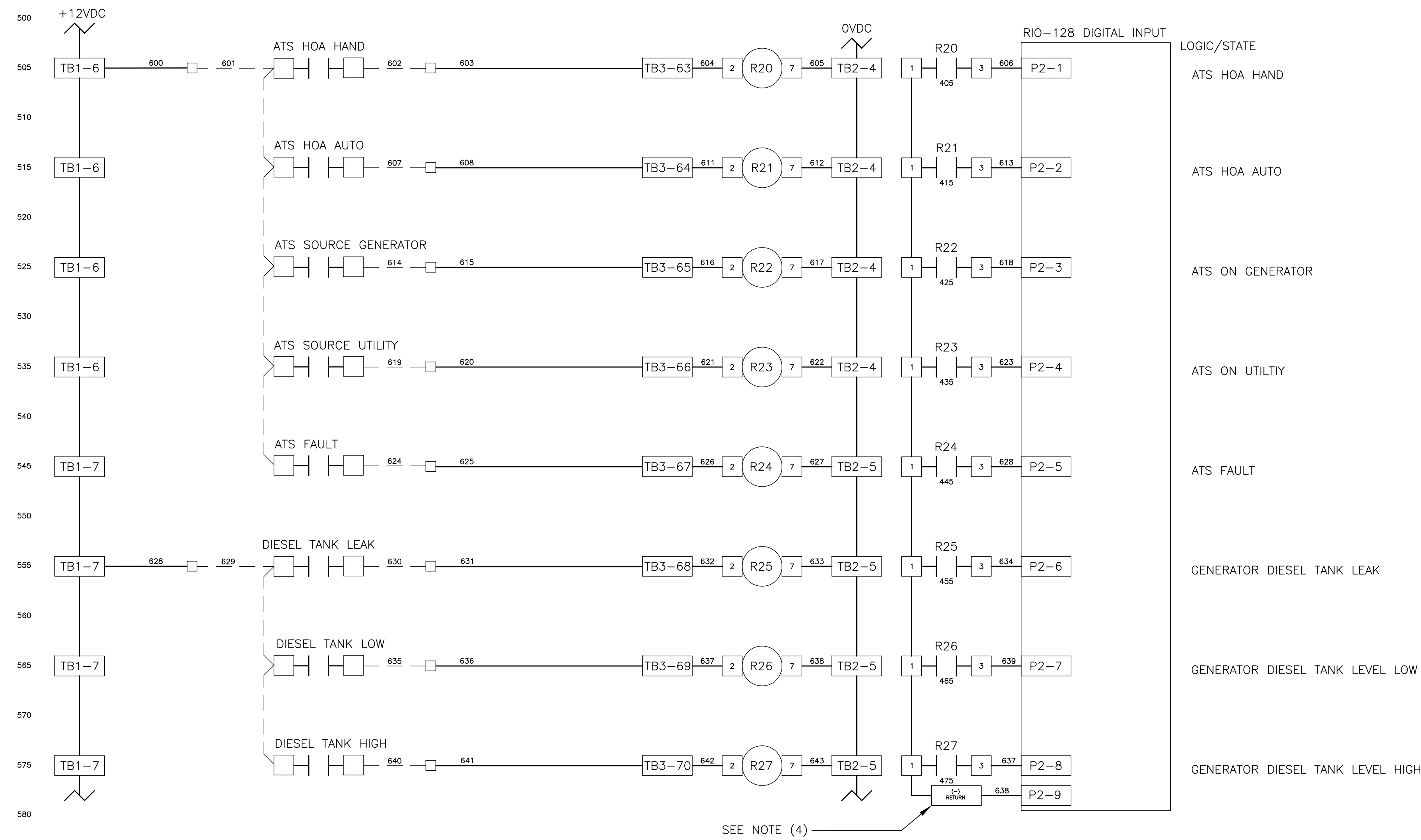
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TYPICAL DFS CABINET
SCHEMATIC WIRING DIAGRAM

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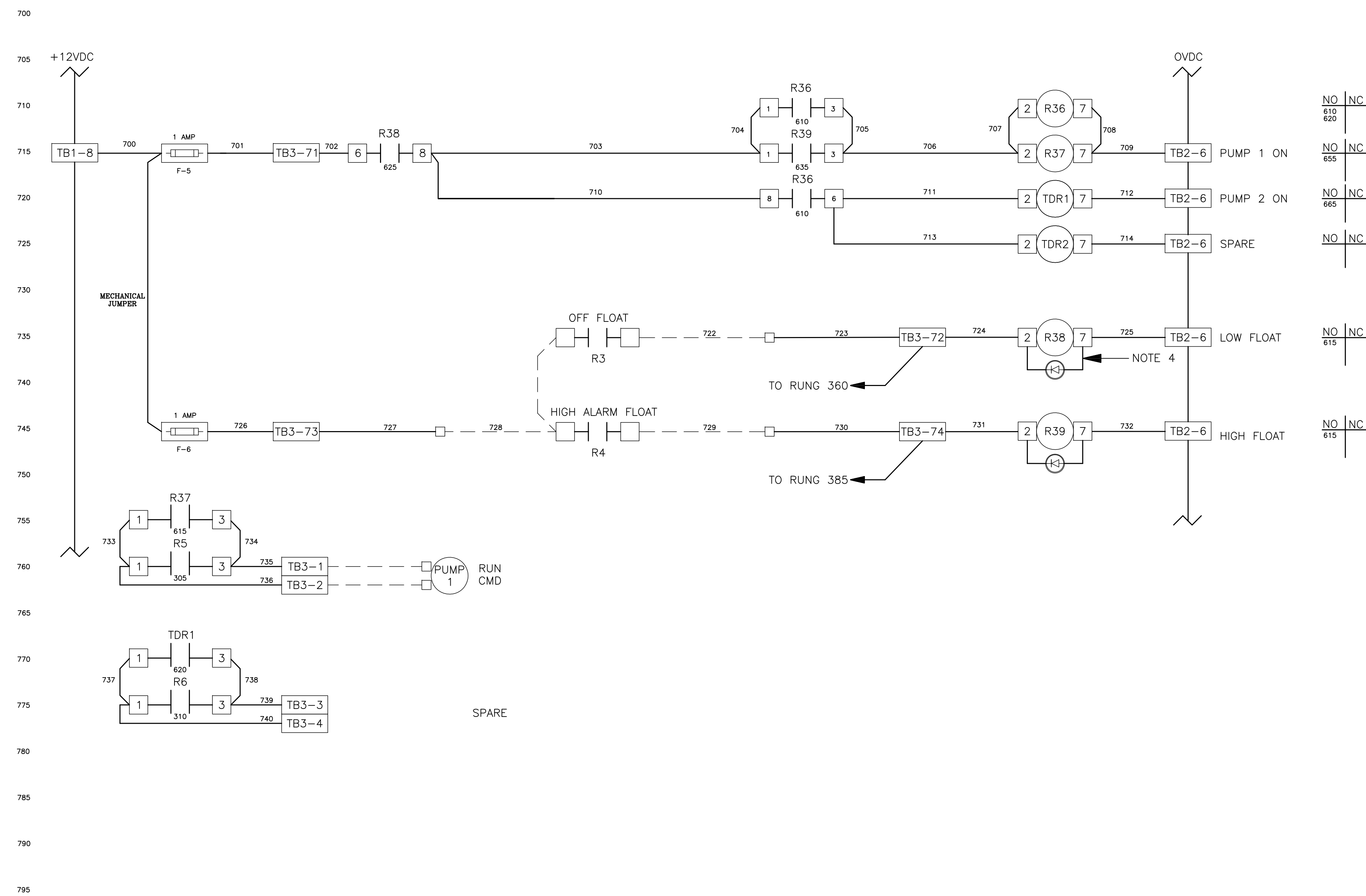
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SCHEMATIC WIRING DIAGRAM

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JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 11 OF 20
APPROVED FOR			



- NOTE:
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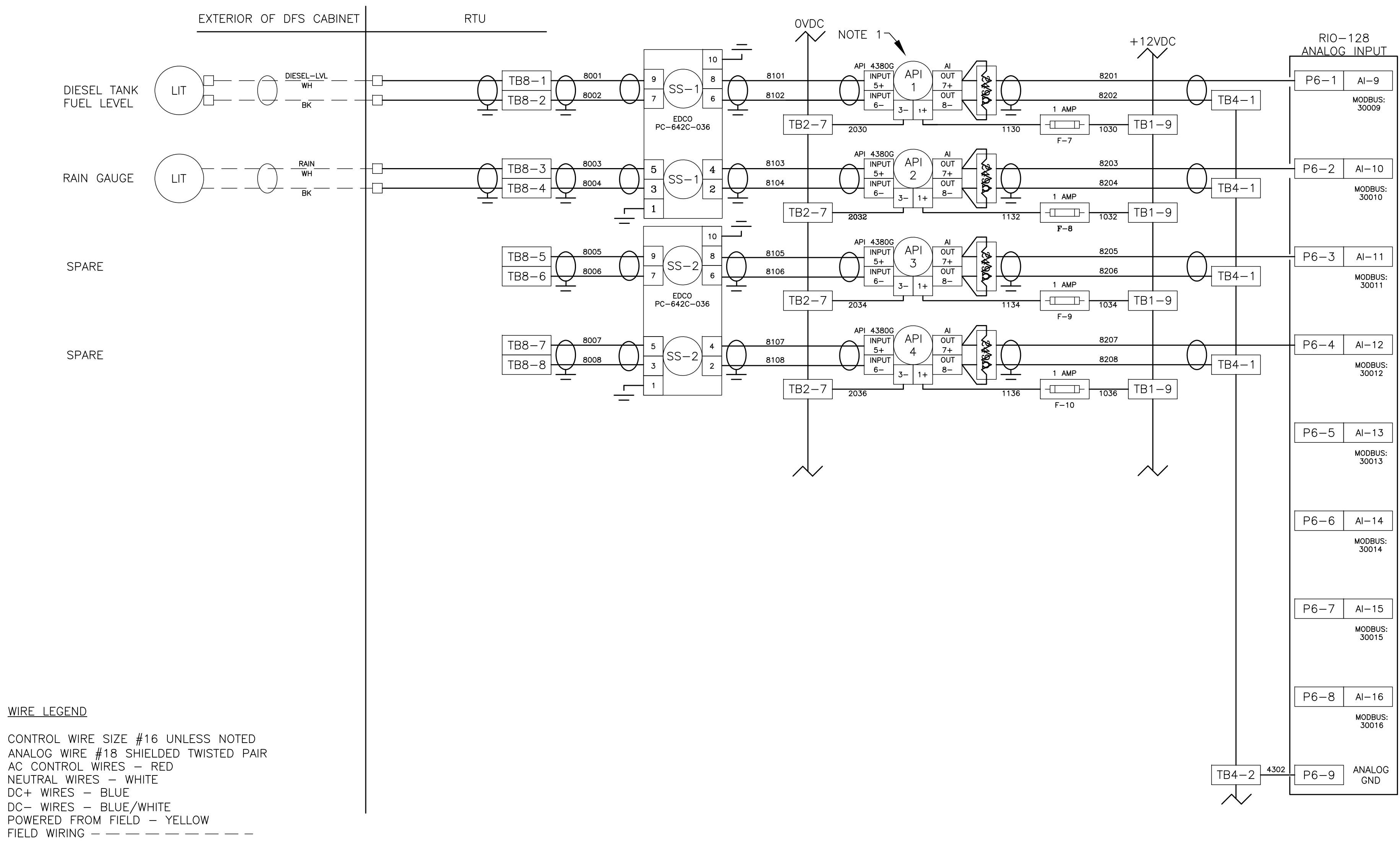
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TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 12 OF 20
APPROVED FOR			



WIRE LEGEND

CONTROL WIRE SIZE #16 UNLESS NOTED
ANALOG WIRE #18 SHIELDED TWISTED PAIR
AC CONTROL WIRES - RED
NEUTRAL WIRES - WHITE
DC+ WIRES - BLUE
DC- WIRES - BLUE/WHITE
POWERED FROM FIELD - YELLOW
FIELD WIRING - - - - -

NOTE:

- (1) LOOP ISOLATORS ON ANALOG INPUTS MUST BE CORRECTLY CONFIGURED FOR 4-20ma INPUT & 4-20ma OUTPUT BEFORE INSTALLING; FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE AND VOIDS FACTORY WARRANTY
- (2) DO NOT EXCEED 5.5 VOLTS ON ANALOG INPUTS.
- (3) LOOP ISOLATORS ARE RECOMMENDED FOR CIRCUIT PROTECTION.
- (4) STATIC SENSITIVE DEVICES; OBSERVE PROPER ESD PROCEDURES DURING INSTALLATION.
- (5) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

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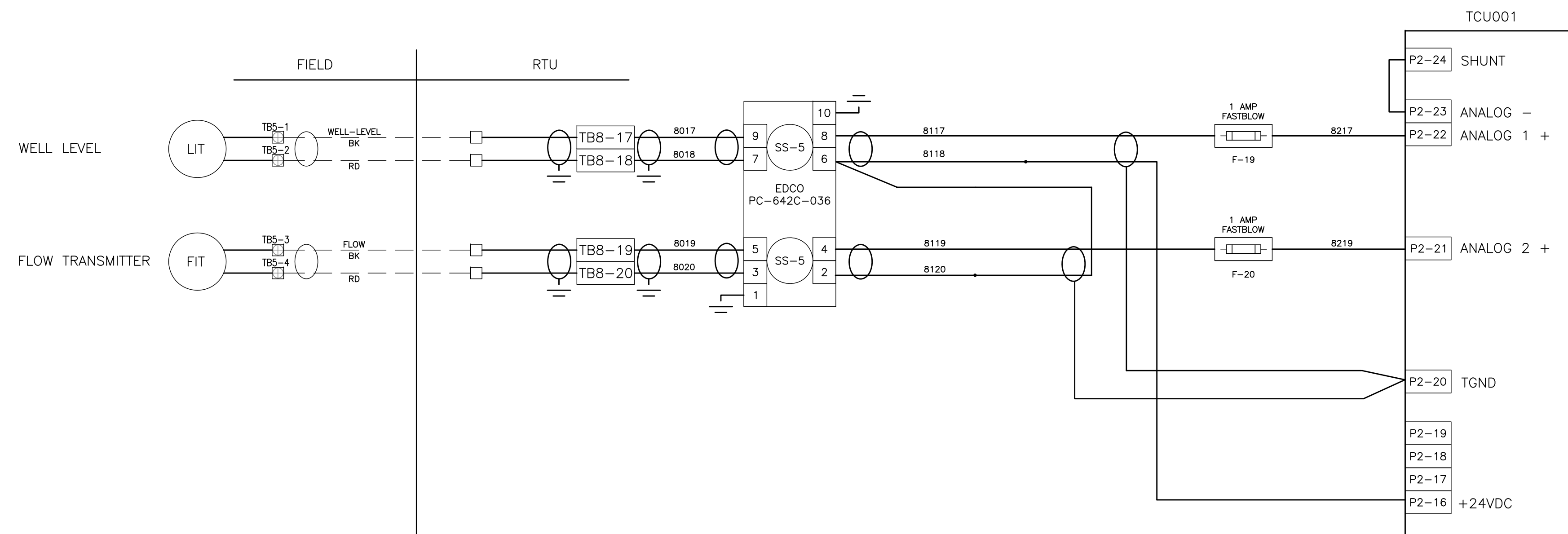
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TYPICAL DFS CABINET
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JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 13 OF 20
APPROVED FOR			



WIRE LEGEND

CONTROL WIRE SIZE #16 UNLESS NOTED
ANALOG WIRE #18 SHIELDED TWISTED PAIR
AC CONTROL WIRES - RED
NEUTRAL WIRES - WHITE
DC+ WIRES - BLUE
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FIELD WIRING - - - - -

NOTE:

- (1) LOOP ISOLATORS ON ANALOG INPUTS MUST BE CORRECTLY CONFIGURED FOR 4-20ma INPUT & 4-20ma OUTPUT BEFORE INSTALLING; FAILURE TO DO SO WILL RESULT IN EQUIPMENT DAMAGE AND VOIDS FACTORY WARRANTY
- (2) DO NOT EXCEED 5.5 VOLTS ON ANALOG INPUTS.
- (3) LOOP ISOLATORS ARE RECOMMENDED FOR CIRCUIT PROTECTION.
- (4) STATIC SENSITIVE DEVICES; OBSERVE PROPER ESD PROCEDURES DURING INSTALLATION.
- (5) ALL POINT CONTACTS TO BE PROTECTED BY ANTIOXIDANT COMPOUND.

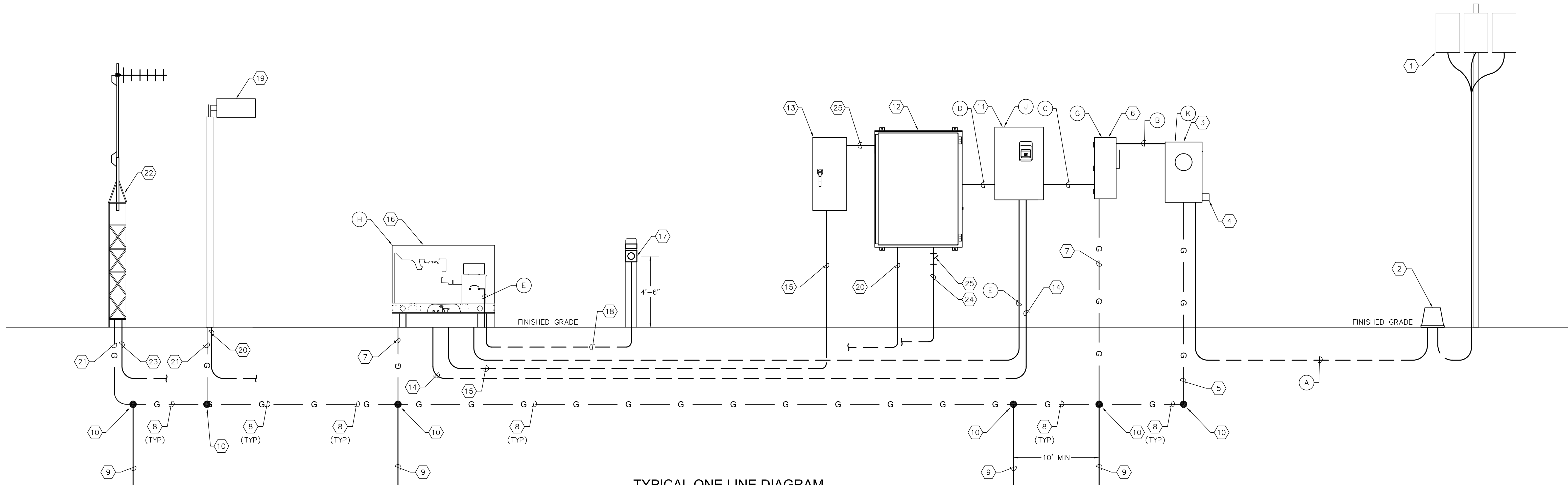
RECORD		DRAWINGS			
SURVEYED BY:		DRAWN BY:			
REVIEWED BY:					
PROJECT ENGINEER		DATE			
APPROVED BY:					
CITY ENGINEER MICHAEL D. DUBIELL P.E. # 33951		DATE		REVISION	BY DATE

CITY OF CLEARWATER, FLORIDA
ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756



TYPICAL DFS CABINET SCHEMATIC WIRING DIAGRAM

DWG. NAME: #####	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: #####	DATE DRAWN: #####	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 14 OF 20
APPROVED FOR _____			



TYPICAL ONE LINE DIAGRAM

ONE LINE DIAGRAM NOTES:

- (1) UTILITY TRANSFORMERS. COORDINATE ALL WORK WITH UTILITY.

(2) PROVIDE AND INSTALL UTILITY APPROVED PEDESTAL.

(3) PROVIDE AND INSTALL NEW 240V, SINGLE PHASE, METER SOCKET. GROUND METER SOCKET PER UTILITY SPECIFICATIONS. COORDINATE NEW ELECTRICAL SERVICE ENTRANCE REQUIREMENTS WITH UTILITY. REFER TO SCHEDULE FOR SIZE REQUIRED PER SITE.

(4) PROVIDE AND INSTALL UTILITY APPROVED LIGHTNING PROTECTION DEVICE.

(5) PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTOR. COORDINATE REQUIREMENTS WITH UTILITY.

(6) PROVIDE AND INSTALL NEW 240, 3-POLE DISCONNECT IN NEMA 4X STAINLESS STEEL ENCLOSURE. PROVIDE SOLID NEUTRAL AND GROUND LUG KITS TO MAKE DISCONNECT SERVICE ENTRANCE RATED. REFER TO SCHEDULE FOR AMPERE AND FUSING REQUIREMENTS.

(7) PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTOR.

(8) PROVIDE AND INSTALL 1/0 AWG CU GROUNDING ELECTRODE CONDUCTOR.

(9) PROVIDE AND INSTALL 5/8" X 20"-0" GROUNDING ELECTRODE.

(10) EXOTHERMIC WELD.

(11) PROVIDE AND INSTALL 2-POLE, S/N, 240V, TRANSFER SWITCH IN NEMA 3R STAINLESS STEEL ENCLOSURE. REFER TO SCHEDULE FOR SIZE.

(12) PROVIDE AND INSTALL PUMP CONTROL PANEL.

(13) PROVIDE AND INSTALL 240V, 60A, SINGLE-PHASE LOADCENTER IN NEMA 3R STAINLESS STEEL ENCLOSURE. REFER TO SHEET 18 FOR PANEL SCHEDULE.

(14) PROVIDE AND INSTALL 4-#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. FOR GENERATOR START CONTROL. VERIFY/COORDINATE REQUIREMENTS WITH TRANSFER SWITCH/GENERATOR MANUFACTURER.
- (15) PROVIDE AND INSTALL THE FOLLOWING CIRCUITS FOR GENERATOR AUXILIARY EQUIPMENT : 2#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. FOR GENERATOR ALTERNATOR HEATER. 2#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. FOR GENERATOR BLOCK HEATER. 2-#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. FOR GENERATOR BATTERY CHARGER. CONFIRM/COORDINATE REQUIREMENTS WITH GENERATOR MANUFACTURER.

(16) PROVIDE AND INSTALL NEW 240V, 1ø, 3-WIRE GENERATOR IN WEATHERPROOF ENCLOSURE. REFER TO SCHEDULE FOR SIZE. REFER ALSO TO SPECIFICATIONS.

(17) GENERATOR EMERGENCY SHUT DOWN PUSH BUTTON STATION. MAINTAINED 2 POSITION SWITCH w/ 1-5/8" DIA. OPERATOR, 1 N.O. & 1 N.C. CONTACT MOUNTED IN A NEMA 4X SS ENCLOSURE, 4'-6" ABOVE FINISHED GRADE ON 6" X 6" X 9' CONCRETE POST. PROVIDE PHENOLIC NAMEPLATE ABOVE PUSH BUTTON STATION. NAMEPLATE SHALL BE THREE-PLY PHENOLIC RED-WHITE-RED ENGRAVED THROUGH THE FIRST RED LAYER. LETTERING SHALL BE 1/2" MIN., EDGES OF NAMEPLATE SHALL BE BEVELED 45 DEG. NAMEPLATE SHALL READ AS FOLLOWS: "GENERATOR EMERGENCY SHUT DOWN".

(18) PROVIDE AND INSTALL 2#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. FOR GENERATOR EMERGENCY SHUT DOWN CIRCUIT.

(19) PROVIDE AND INSTALL AREA LIGHT. QUANTITY VARIES PER LIFT STATION SITE.

(20) PROVIDE AND INSTALL 2-#12 THWN CU + 1-#12 THWN CU GND IN 3/4"C. TO PUMP CONTROL PANEL FOR AREA LIGHT POWER.

(21) PROVIDE AND INSTALL #8 CU BONDING CONDUCTOR.

(22) NEW DFS ANTENNA.

(23) PROVIDE AND INSTALL COAXIAL CABLE IN 2"C. TO DFS CONTROL CABINET.

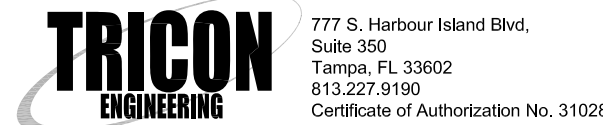
(24) 2-#12 THWN + 1-#12 THWN CU GND IN 3/4" C. TO WET WELL LIGHT. 3/4" CONDUIT SHALL BE A CONTINUOUS RUN OF RIGID ALUMINUM CONDUIT. THE RIGID ALUMINUM CONDUIT EXTENDING BELOW GRADE SHALL BE COATED WITH TWO COATS OF AN ASPHALTUM-TYPE PAINT ALONG ITS ENTIRE LENGTH BELOW GRADE, EXTENDING 6" ABOVE GRADE (OR ABOVE THE TOP OF THE FINISHED SLAB) AND IN ITS ENTIRETY WITHIN THE WET WELL.

(25) PROVIDE AND INSTALL 3/4" EYS SEAL FOR CONDUIT TO WET WELL FOR WET WELL LIGHT.

GENERAL NOTES:

1. NOT ALL CONDUITS AND CONDUCTORS REQUIRED SHOWN FOR CLARITY. REFERENCE OTHER SHEETS FOR ADDITIONAL REQUIREMENTS.

TIMOTHY THOMAS P.E. No. 47079



RECORD DRAWINGS				
SURVEYED BY:	DRAWN BY:			
REVIEWED BY:				
PROJECT ENGINEER	DATE			
APPROVED BY:				
CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 335721	DATE			

CITY OF CLEARWATER, FLORIDA
ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756



TYPICAL LIFT STATION
ONE LINE DIAGRAMS

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 15 OF 20
APPROVED FOR			

EQUIPMENT, CONDUIT AND CONDUCTOR SCHEDULES

	1/2 HP STATIONS		1 HP STATIONS		1.5 HP STATIONS		3 HP LIFT STATIONS		5 HP LIFT STATIONS		10 HP LIFT STATIONS			
CONDUIT/CONDUCTORS	CONDUCTORS	CONDUIT	CONDUCTORS	CONDUIT	CONDUCTORS	CONDUIT	CONDUCTORS	CONDUIT	CONDUCTORS	CONDUIT	CONDUCTORS	CONDUIT	FROM:	TO:
(A)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL	1-1/2" C.	2-#1 THWN CU + 1-#1 THWN CU NEUTRAL	1-1/2" C.	UTILITY	METER
(B)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#1 THWN CU + 1-#1 THWN CU NEUTRAL + 1-#6 THWN CU GND	1-1/2" C.	METER	MAIN DISCONNECT
(C)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#1 THWN CU + 1-#1 THWN CU NEUTRAL + 1-#6 THWN CU GND	1-1/2" C.	MAIN DISCONNECT	ATS
(D)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#1 THWN CU + 1-#1 THWN CU NEUTRAL + 1-#6 THWN CU GND	1-1/2" C.	ATS	PUMP CONTROL PANEL
(E)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND	1-1/2" C.	2-#1 THWN CU + 1-#1 THWN CU NEUTRAL + 1-#6 THWN CU GND	1-1/2" C.	ATS	GENERATOR SET
(F)	2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND		2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND		2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND		2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND		2-#3 THWN CU + 1-#3 THWN CU NEUTRAL + 1-#8 THWN CU GND		2-#1 THWN CU + 1-#1 THWN CU NEUTRAL + 1-#6 THWN CU GND		PUMP CONTROL PANEL	GENERATOR RECEPTACLE
(P2)	2-#12 THWN CU + 1-#12 THWN CU GND		2-#12 THWN CU + 1-#12 THWN CU GND		2-#12 THWN CU + 1-#12 THWN CU GND		2-#10 THWN CU + 1-#10 THWN CU GND		2-#8 THWN CU + 1-#10 THWN CU GND		2-#6 THWN CU + 1-#8 THWN CU GND		PUMP CONTROL PANEL	WET WELL JUNCTION BOX

EQUIPMENT							NOTES:
(G)	100 AMPERE DISCONNECT FUSED AT 100 AMPERES	100 AMPERE DISCONNECT FUSED AT 100 AMPERES	100 AMPERE DISCONNECT FUSED AT 100 AMPERES	100 AMPERE DISCONNECT FUSED AT 100 AMPERES	100 AMPERE DISCONNECT FUSED AT 100 AMPERES	200 AMPERE DISCONNECT FUSED AT 125 AMPERES	ALL DISCONNECTS SHALL BE PADLOCKABLE
(H)	240V, 1ø, 30 KW GENERATOR WITH 100 AMPERE MAIN CIRCUIT BREAKER	240V, 1ø, 30 KW GENERATOR WITH 100 AMPERE MAIN CIRCUIT BREAKER	240V, 1ø, 30 KW GENERATOR WITH 100 AMPERE MAIN CIRCUIT BREAKER	240V, 1ø, 30 KW GENERATOR WITH 100 AMPERE MAIN CIRCUIT BREAKER	240V, 1ø, 30 KW GENERATOR WITH 100 AMPERE MAIN CIRCUIT BREAKER	240V, 1ø, 30 KW GENERATOR WITH 125 AMPERE MAIN CIRCUIT BREAKER	
(J)	240V, 100 AMPERE TRANSFER SWITCH	240V, 100 AMPERE TRANSFER SWITCH	240V, 100 AMPERE TRANSFER SWITCH	240V, 100 AMPERE TRANSFER SWITCH	240V, 100 AMPERE TRANSFER SWITCH	240V, 125 AMPERE TRANSFER SWITCH	
(K)	100 AMPERE, 240V, SINGLE PHASE METER	100 AMPERE, 240V, SINGLE PHASE METER	100 AMPERE, 240V, SINGLE PHASE METER	100 AMPERE, 240V, SINGLE PHASE METER	100 AMPERE, 240V, SINGLE PHASE METER	125 AMPERE, 240V, SINGLE PHASE METER	
PUMP CONTROL PANEL							NOTES:
(L)	100 AMPERE MAIN CIRCUIT BREAKER	100 AMPERE MAIN CIRCUIT BREAKER	100 AMPERE MAIN CIRCUIT BREAKER	100 AMPERE MAIN CIRCUIT BREAKER	100 AMPERE MAIN CIRCUIT BREAKER	125 AMPERE MAIN CIRCUIT BREAKER	
(M)	100 AMPERE EMERGENCY CIRCUIT BREAKER	100 AMPERE EMERGENCY CIRCUIT BREAKER	100 AMPERE EMERGENCY CIRCUIT BREAKER	100 AMPERE EMERGENCY CIRCUIT BREAKER	100 AMPERE EMERGENCY CIRCUIT BREAKER	125 AMPERE EMERGENCY CIRCUIT BREAKER	
(N)	15 AMP MOTOR CIRCUIT BREAKER	15 AMP MOTOR CIRCUIT BREAKER	20 AMP MOTOR CIRCUIT BREAKER	35 AMP MOTOR CIRCUIT BREAKER	60 AMP MOTOR CIRCUIT BREAKER	90 AMP MOTOR CIRCUIT BREAKER	
(O)	ALLEN BRADLEY 509 NEMA SIZE 1 MOTOR STARTER	ALLEN BRADLEY 509 NEMA SIZE 1 MOTOR STARTER	ALLEN BRADLEY 509 NEMA SIZE 1 MOTOR STARTER	ALLEN BRADLEY 509 NEMA SIZE 1 MOTOR STARTER	ALLEN BRADLEY 509 NEMA SIZE 1 MOTOR STARTER	ALLEN BRADLEY 509 NEMA SIZE 2 MOTOR STARTER	
(P)	#12 AWG CU MOTOR CONDUCTORS	#12 AWG CU MOTOR CONDUCTORS	#12 AWG CU MOTOR CONDUCTORS	#10 AWG CU MOTOR CONDUCTORS	#8 AWG CU MOTOR CONDUCTORS	#6 AWG CU MOTOR CONDUCTORS	

LOAD CALCULATION: 1/2 HP	LOAD CALCULATION: 1 HP	LOAD CALCULATION: 1.5 HP	LOAD CALCULATION: 3 HP	LOAD CALCULATION: 5 HP	LOAD CALCULATION: 10 HP
MOTORS: PUMP NO. 1: 1/2 HP, 240 VAC, 1 ø, 5.0 A + 25% OF LARGEST MOTOR 1.2 A SUB-TOTAL 6.2 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 26.2 A SERVICE SIZE: 100 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.	MOTORS: PUMP NO. 1: 1 HP, 240 VAC, 1 ø, 8.0 A + 25% OF LARGEST MOTOR 2.0 A SUB-TOTAL 10.0 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 30.0 A SERVICE SIZE: 100 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.	MOTORS: PUMP NO. 1: 1.5 HP, 240 VAC, 1 ø, 10.0 A + 25% OF LARGEST MOTOR 2.5 A SUB-TOTAL 12.5 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 32.5 A SERVICE SIZE: 100 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.	MOTORS: PUMP NO. 1: 3 HP, 240 VAC, 1 ø, 17.0 A + 25% OF LARGEST MOTOR 4.3 A SUB-TOTAL 21.3 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 41.3 A SERVICE SIZE: 100 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.	MOTORS: PUMP NO. 1: 5 HP, 240 VAC, 1 ø, 28.0 A + 25% OF LARGEST MOTOR 7.0 A SUB-TOTAL 35.0 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 55.0 A SERVICE SIZE: 100 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.	MOTORS: PUMP NO. 1: 1 HP, 240 VAC, 1 ø, 50.0 A + 25% OF LARGEST MOTOR 12.5 A SUB-TOTAL 72.5 A AUXILIARY EQUIPMENT 20.0 A TOTAL MAXIMUM PHASE AMPERES 92.5 A SERVICE SIZE: 125 A, 240 VAC, 1 ø, 3 - WIRE MINIMUM.

RECORD DRAWINGS

SURVEYED BY:

DRAWN BY:

REVIEWED BY:

PROJECT ENGINEER

DATE

APPROVED BY:

CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 335721

DATE

REVISION

BY

DATE

CITY OF CLEARWATER, FLORIDA
ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756

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ELECTRICAL SCHEDULES
AND LOAD CALCULATIONS

DWG NAME: ###

CONTRACT NO.: ###

JOB NO.: 22609.19

APPROVED FOR

FIELD BOOK: N/A

DATE DRAWN: ###

DESIGNED BY: TDT

SURVEYED BY: CLEARWATER

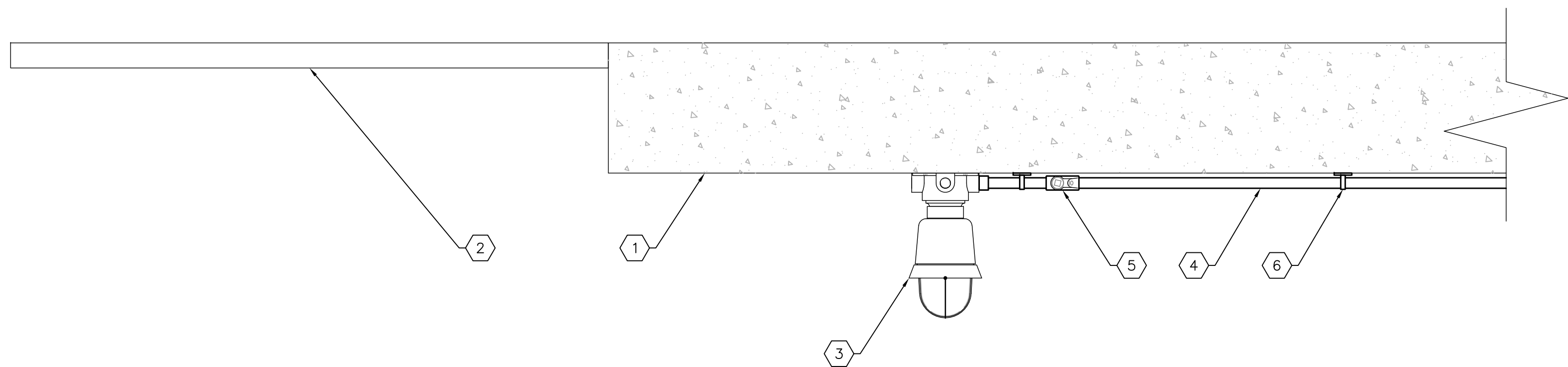
DRAWN BY: JLH

CHECKED BY: GLW

SCALE: VERT. N/A

HORIZ. N/A

SHEET NO.: 16 OF 20



TYPICAL WET WELL LIGHT DETAIL
SCALE: NONE

KEYED NOTES:

1

UNDERSIDE OF PROPOSED WET WELL SLAB.

2

PROPOSED WET WELL HATCH.

3

PROVIDE AND INSTALL WET WELL LED LIGHT. CROUSE HINDS 120V WITH 19W LED DRIVER. PROVIDE GLOBE AND GUARD. SUITABLE FOR USE IN CLASS 1, DIVISION 1 ENVIRONMENT. UL WET LABEL. CROUSE HINDS MODEL #EVLEDBX2C701.

4

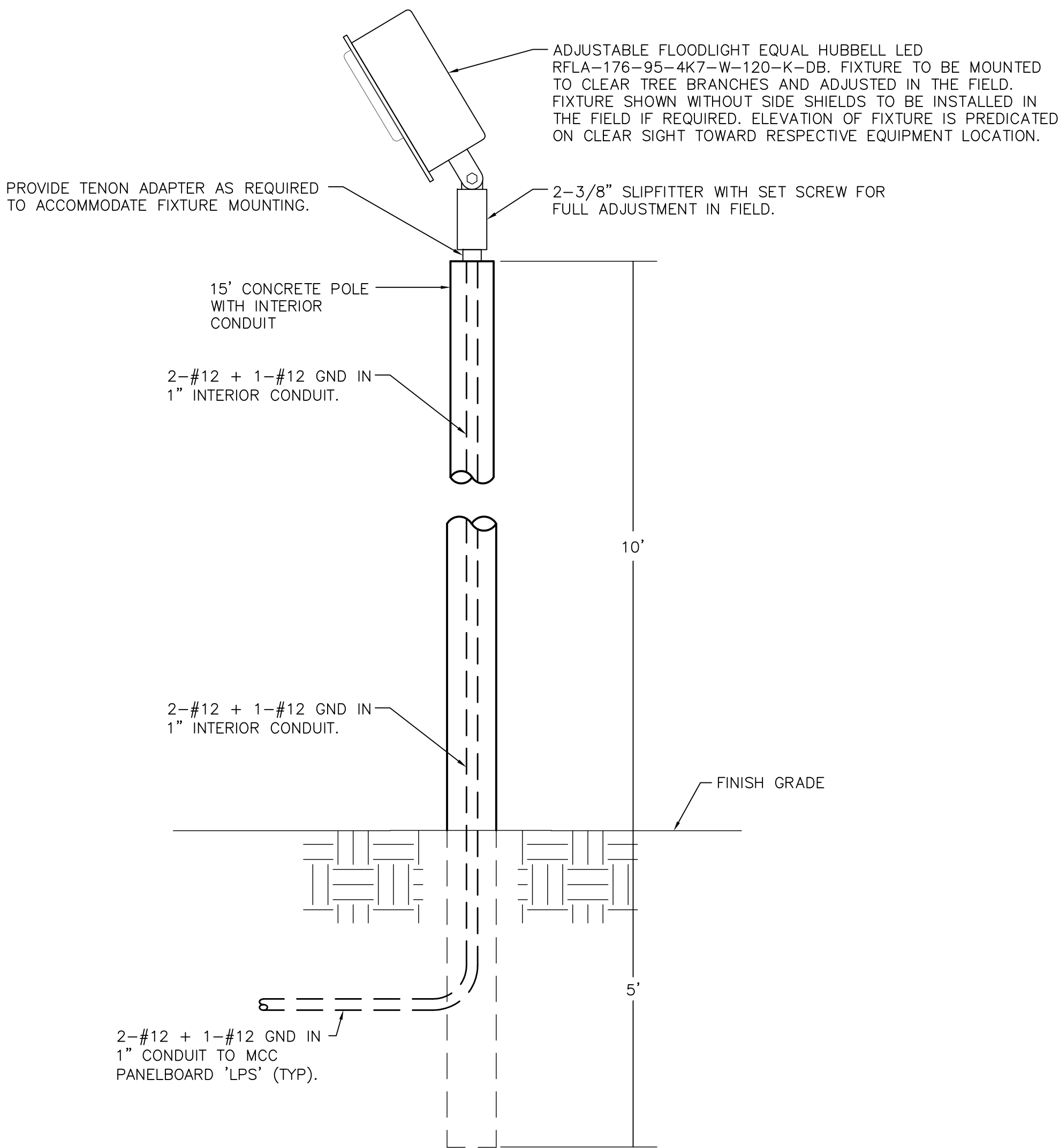
2-#12 THWN + 1-#12 THWN CU GND IN 3/4" C. TO WET WELL LIGHT. 3/4" CONDUIT SHALL BE A CONTINUOUS RUN OF RIGID ALUMINUM CONDUIT TO PUMP CONTROL PANEL. THE RIGID ALUMINUM CONDUIT SHALL BE COATED WITH TWO COATS OF AN ASPHALTUM-TYPE PAINT IN ITS ENTIRETY.

5

PROVIDE AND INSTALL 3/4" EYS SEAL.

6

PROVIDE AND INSTALL STAINLESS STEEL CONDUIT STRAPS SECURED WITH STAINLESS STEEL TAPCONS AND STAINLESS STEEL WASHERS.



TYPICAL AREA LIGHT DETAIL
SCALE: NONE

RECORD DRAWINGS				
SURVEYED BY:	DRAWN BY:			
REVIEWED BY:				
PROJECT ENGINEER	DATE			
APPROVED BY:				
CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 33721	DATE			

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TYPICAL LIFT STATION
ELECTRICAL DETAILS

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 17 OF 20
APPROVED FOR			

TIMOTHY THOMAS P.E. No. 47079

TRICON
ENGINEERING

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Suite 350
Tampa, FL 33602
813.227.9100
Certificate of Authorization No. 31028

POWER CONDUIT AND CABLE SCHEDULE					
CONDUIT No.	QTY/SIZE	NUMER OF CONDUCTORS/SIZE	FROM	TO	REMARKS
P1	1-1/4"	2-#6 + 1-#6 NEU + 1-#8 GND	PUMP CONTROL PANEL	PANELBOARD 'LP'	
P2	3/4"	2-#12 + 1-#12 GND	PUMP CONTROL PANEL	AREA LIGHT(S)	QUANTITY OF AREA LIGHTS DIFFERS BETWEEN LS 54 AND LS 65.
P3	3/4"	2-#12 + 1-#12 GND	1ST AREA LIGHT	2ND AREA LIGHT	WHEN REQUIRED.
P4	3/4"	2-#12 + 1-#12 GND	PUMP CONTROL PANEL	WET WELL LIGHT	
P5	3/4"	4-#12 + 4-#12 NEU + 1-#12 GND	PANELBOARD 'LP'	PUMP CONTROL PANEL	120V POWER CIRCUITS FOR RECEPTACLE, LIGHTS AND CONTROLS. 'LP' CIRCUITS 2, 4, 6 AND 8.
P6	3/4"	2-#10 + 1-#10 NEU + 1-#10 GND	PANELBOARD 'LP'	PANELBOARD 'LP' SURGE PROT	CONNECT SURGE PROTECTION DEVICE VIA NON-METALLIC FLEXIBLE CONDUIT.
P7	1"	6-#12 + 2-#12 NEU + 1-#12 GND	PANELBOARD 'LP'	GENERATOR	POWER FOR GENERATOR BLOCK HEATER, ALTERNATOR HEATER AND BATTERY CHARGER. 'LP' CIRCUITS 5/7, 9 AND 11.
P8	3/4"	2-#12 + 1-#12 GND	PANELBOARD 'LP'	DFS CABINET	120V POWER FOR DFS CABINET. 'LP' CIRCUIT 10.
P9	2"	REFER TO 'P2' ON SHEET 16	PUMP CONTROL PANEL	WET WELL JUNCTION BOX	PUMP #1 POWER.
P10	3/4"	2-#12 + 1-#12 GND	PANELBOARD 'LP'	FLOW METER TRANSMITTER	120V POWER FOR FLOW METER TRANSMITTER. COORDINATE CONNECTION REQUIREMENTS WITH FLOW METER MANUFACTURER. 'LP' CIRCUIT 13.
P11	2"	CABLE SUPPLIED WITH PUMP	WET WELL JUNCTION BOX	WET WELL	PUMP #1 POWER.
C1	2"	4-#12 + 1-#12 GND	PUMP CONTROL PANEL	WET WELL JUNCTION BOX	CONDUCTORS FOR FLOATS.
C2	3/4"	4-#12 + 1-#12 GND	ATS	GENERATOR	GENERATOR STOP/START SIGNAL. COUNT INCLUDES SPARES.
C3	1"	16-#12 + 1-#12 GND	ATS	DFS CABINET	SIGNALS FOR ATS IN AUTO, ATS IN MANUAL, SOURCE - UTILITY, SOURCE - GENERATOR, ATS FAIL AND SCADA START GENERATOR. COUNT INCLUDES SPARES.
C4	1"	10-#12 + 1-#12 GND	GENERATOR	DFS CABINET	SIGNALS FOR GENERATOR RUNNING, GENERATOR IN AUTO, GENERATOR IN MANUAL AND GENERATOR FAIL. COUNT INCLUDES SPARES.
C5	3/4"	2/C-#16 TWISTED SHIELDED	PUMP CONTROL PANEL	FLOW METER TRANSMITTER	4-20mA FLOW METER SIGNAL.
C6	3/4"	2-#12 + 1-#12 GND	ATS	DFS CABINET	GENERATOR STOP/START SIGNAL FROM DFS (SCADA REMOTE START SIGNAL).
C7	1"	TWO (2) 2/C-#16 TWISTED SHIELDED	PUMP CONTROL PANEL	DFS CABINET	4-20mA FLOW METER SIGNAL AND LEVEL TRANSMITTER SIGNAL. BOTH CABLES SHALL BE BELDEN 8719.
C8	1-1/4"	12-#14 + 1-#14 GND	PUMP CONTROL PANEL	DFS CABINET	12V DC I/O SIGNALS BETWEEN PUMP CONTROL PANEL AND DFS CABINET. REFER TO DFS SCHEMATIC WIRING DIAGRAMS. COUNT INCLUDES SPARES.
C9		2/C-#16 TWISTED SHIELDED	DFS CABINET	RAIN GAUGE	CABLE BY RAIN GAUGE MANUFACTURER. CABLE NOT SHOWN ON PLANS FOR CLARITY. PROVIDE CABLE GROMMET FOR DFS CABINET.
C10	2"	EMPTY	DFS CABINET	DFS ANTENNA	CONDUIT FOR ANTENNA COAXIAL CABLE. CABLE TO BE INSTALLED BY DFS.
C11	2"	2/C-#16 TWISTED SHIELDED	PUMP CONTROL PANEL	WET WELL JUNCTION BOX	CONDUCTORS FOR LEVEL TRANSMITTER.
C12	2"	FLOAT CABLES SUPPLIED WITH FLOAT	WET WELL JUNCTION BOX	WET WELL	OFF AND HIGH FLOAT CABLES.
C13	2"	CABLE SUPPLIED WITH TRANSMITTER	WET WELL JUNCTION BOX	WET WELL	LEVEL TRANSMITTER CABLE.
C14	3/4"	2/C-#16 TWISTED SHIELDED	DFS CABINET	GENERATOR	4-20mA GENERATOR DIESEL TANK LEVEL SIGNAL.
C15	1-1/4"	14-#14 + 1-#14 GND	PUMP CONTROL PANEL	DFS CABINET	120V AC I/O SIGNALS BETWEEN PUMP CONTROL PANEL AND DFS CABINET. REFER TO DFS SCHEMATIC WIRING DIAGRAMS. COUNT INCLUDES SPARES.
C16	1"	8-#14 + 1-#14 GND	DFS CABINET	GENERATOR	I/O SIGNALS BETWEEN GENERATOR AND DFS CABINET FOR LEAK, LOW LOW LEVEL AND HIGH LEVEL ALARM SIGNALS. COUNT INCLUDES SPARES.

PROPOSED PANEL SCHEDULE													
PANEL 'LP' ; SQUARE D CO. ; 120/240 VOLTS, 1Ø, 3W ; 60 AMP MAIN ; SURFACE ENCLOSURE													
QO ; CIRCUIT BREAKER ; 35K AIC RATING ; TOP AT 5'-6" AFF													
EQUIPMENT SERVED	CIRCUIT BREAKER			KVA/PHASE		CIRC. NO.	CIRC.		CIRCUIT BREAKER			EQUIPMENT SERVED	
	POLE	AMPS	FRAME	A	B		A	B	POLE	AMPS	FRAME		
SURGE PROTECTION DEVICE	2	30	QOB			1	2	0.8		1	20	QOB	PUMP CONTROL PANEL RECEPTACLE
" "	-	-	-			3	4		1.0	1	20	QOB	PUMP CONTROL PANEL LIGHTS
GENERATOR BLOCK HEATER	2	20	QOB	1.2		5	6	0.4		1	20	QOB	PUMP CONTROL PANEL CONTROLS
" "	-	-	-		1.2	7	8		0.4	1	20	QOB	PUMP CONTROL PANEL CONTROLS
GENERATOR ALTERNATOR HEATER	1	20	QOB	0.8		9	10	0.6		1	20	QOB	DFS CABINET
BATTERY CHARGER	1	20	QOB		1.0	11	12						SPACE
FLOW METER TRANSMITTER	1	20	QOB	0.2		13	14			--	--	--	SPACE
SPARE	1	20	QOB			15	16			--	--	--	SPACE
SUB-TOTAL KVA				2.2	2.2			1.8	1.4				
TOTAL CONNECTED LOAD = 7.6 KVA								TOTAL DEMAND LOAD = 7.6 KVA					

RECORD DRAWINGS				
SURVEYED BY:	DRAWN BY:			
REVIEWED BY:				
PROJECT ENGINEER	DATE			
APPROVED BY:				
CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 335721	DATE	REVISION	BY	DATE

CITY OF CLEARWATER, FLORIDA
ENGINEERING DEPARTMENT
100 S. MYRTLE AVE.
CLEARWATER, FL 33756



CONDUIT AND CABLE SCHEDULE
AND PANEL SCHEDULE

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 18 OF 20
APPROVED FOR			

TIMOTHY THOMAS P.E. No. 47079

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FUNCTION SYMBOL SCHEDULE

IDENTIFICATION LETTERS					
	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		PROGRAMMER		
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING		GLASS VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTOR	MOMENTARY			MIDDLE, INTERMEDIATE
N	VIBRATION		IGNITOR	ISOLATOR	
O	OPERATION	OFFSET	ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY, EVENT	INTEGRATE, TOTALIZE	INTEGRATE		
R	RADIATION		RECORD, PRINT		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE	TREND	MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VISCOSITY	VACUUM		VALVE, DAMPER, LOUVER, GATE	
W	WEIGHT, FORCE, TORQUE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y				RELAY, COMPUTE, CONVERT	
Z	POSITION			FINAL CONTROL ELEMENT	UNCLASSIFIED

LINE DESIGNATIONS

INSTRUMENTATION SIGNAL _____
ELECTRICAL POWER _____
DATA LINK — D — D —
RADIO LINK — R — R —
FIBER OPTIC DATA — F — F —

MISCELLANEOUS NOTATIONS

S/D = SHUTDOWN
O/R = OVERRIDE
MCS = MASTER CONTROL STATION
VFD = VARIABLE FREQUENCY DRIVE
PCC = PROCESS CONTROL CABINET
LCP = LOCAL CONTROL PANEL
ES = ELECTRICAL SUPPLY (120VAC)

EQUIPMENT NOTATION

B = BLOWER OR FAN
E = ENGINE
G = GENERATOR
F = FILTER
GS = GRINDER/SCREEN
K = COMPRESSOR
H = HOIST
ME = MECHANICAL EQUIPMENT
MX = MIXER
P = PUMP
T = TANK OR SUMP

CONTROLLER NOTATION

PV= PROCESS VARIABLE INPUT
SP= SET POINT INPUT
C= CONTROL OUTPUT

INPUT/OUTPUT NOTATIONS

AI = ANALOG INPUT
AO= ANALOG OUTPUT
DI = DISCRETE INPUT
DO= DISCRETE OUTPUT

HAND SWITCH NOTATION

HOA = HAND-OFF-AUTO
S/S = START/STOP
SEL = SELECTOR
O/C = OPEN/CLOSE
O/O = ON/OFF
LOS = LOCKOUT-START
LOR = LOCAL-OFF-REMOTE
OAC = OPEN-AUTO CLOSE
CAO = CLOSED-AUTO OPEN

VALVE DESIGNATIONS

MOV = MOTOR OPERATED VALVE

GENERAL ABBREVIATIONS

SCADA – SUPERVISORY CONTROL AND DATA ACQUISITION.
PLC – PROGRAMMABLE LOGIC CONTROL
SA – SURGE SUPPRESSOR DEVICE

 INTERLOCK

 CONTINUATION OF SIGNAL OR DATA TO/FROM SHEET NUMBER INDICATED

BASIC SYMBOLS

SINGLE FUNCTION



OR



OR



OR



OR



OR



OR



OR



OR

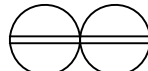


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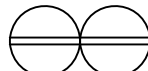
MUTIPLE FUNCTION



FIELD MOUNTED INSTRUMENT OR DEVICE



FRONT OF PANEL MOUNTED INSTRUMENT ON LCP, PCC, MCS, OR VFD



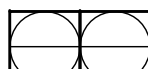
REAR OF PANEL MOUNTED INSTRUMENT ON LCP, PCC, MCS, OR VFD



FRONT OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL



REAR OF PANEL MOUNTED INSTRUMENT ON MAIN PANEL



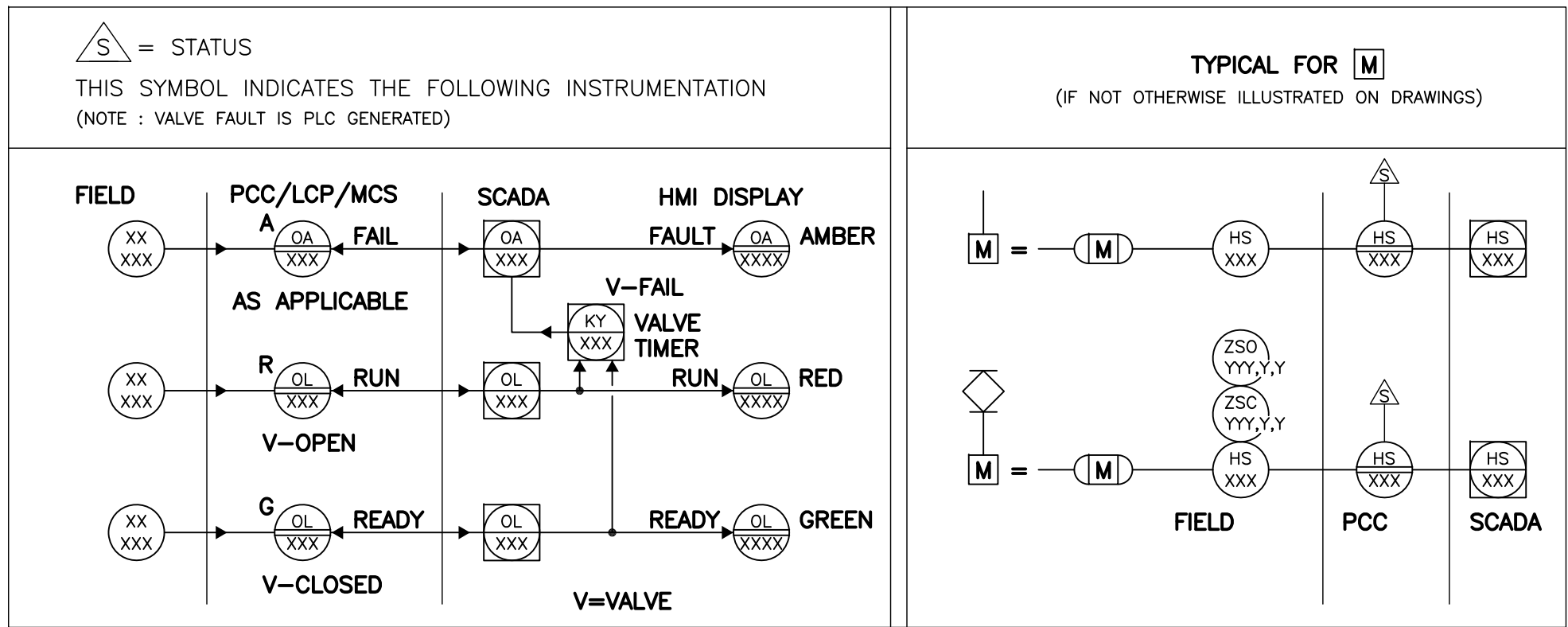
PLC AND/OR COMPUTER SOFTWARE COMPONENT (OPERATOR ACCESSIBLE UNDER NORMAL CONDITIONS) OR



PLC AND/OR COMPUTER GENERATED COMPONENT (NOT OPERATOR ACCESSIBLE UNDER NORMAL CONDITIONS)



DATA FLOW SYSTEMS RTU INPUT/OUTPUT




RECORD DRAWINGS				
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REVIEWED BY:				
PROJECT ENGINEER		DATE		
APPROVED BY:				
CITY ENGINEER MICHAEL D. QUILLEN, P.E. # 33721		DATE		
REVISION		BY	DATE	

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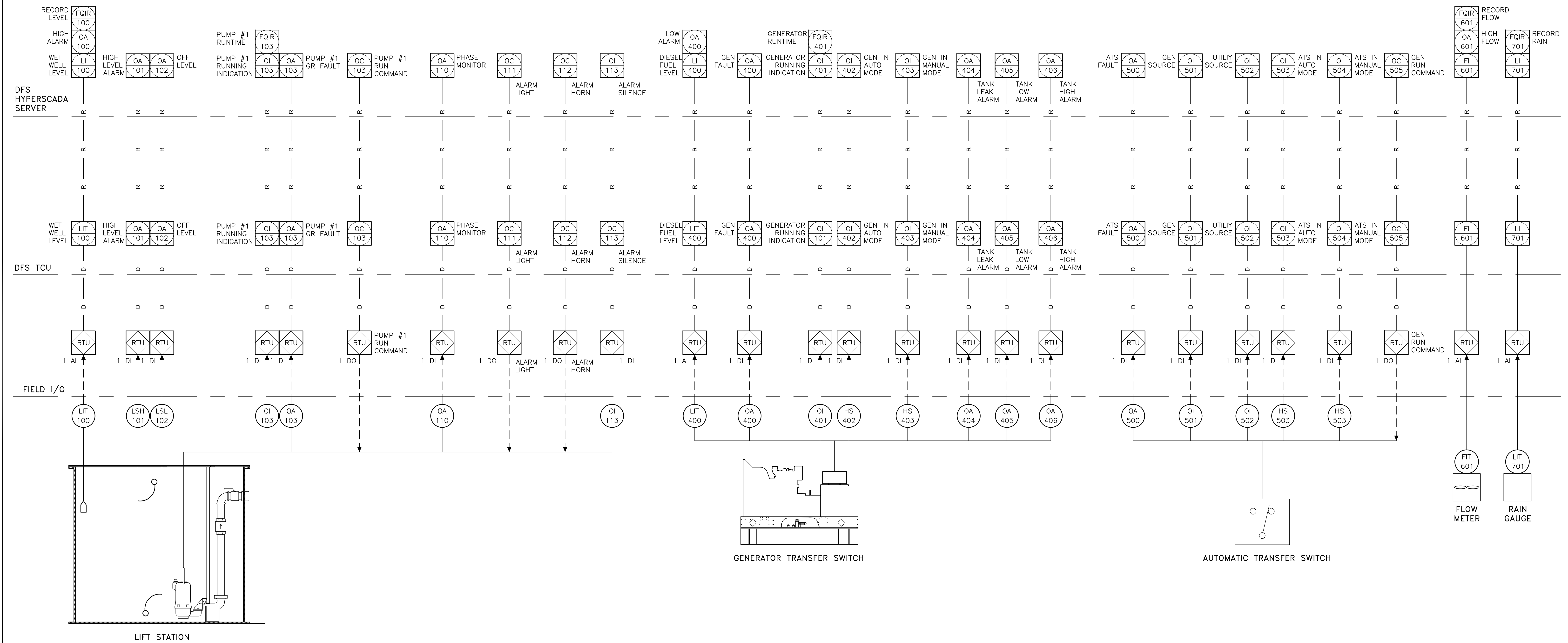


INSTRUMENTATION LEGEND
ABBREVIATIONS AND SYMBOLS

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 19 OF 20
APPROVED FOR			



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PROJECT ENGINEER	DATE			
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CITY ENGINEER MICHAEL D. QUILLIN, P.E. # 335721	DATE			
REVISION		BY	DATE	

CITY OF CLEARWATER, FLORIDA
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TYPICAL LIFT STATION P&ID'S

DWG NAME: ###	FIELD BOOK: N/A	SURVEYED BY: CLEARWATER	SCALE: VERT. N/A
CONTRACT NO.: ###	DATE DRAWN: ###	DRAWN BY: JLH	HORIZ. N/A
JOB NO.: 22609.19	DESIGNED BY: TDT	CHECKED BY: GLW	SHEET NO.: 20 OF 20
APPROVED FOR			

TIMOTHY THOMAS P.E. No. 47079

TRICON
ENGINEERING

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