CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL, AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

710 AVIS DRIVE
ANN ARBOR, MI 48108
PHONE: (734) 665-6000 FAX: (734) 213-3003
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TETRA TECH

ELECTRICAL SHEETS

INSTRUMENTATION SHEETS

PROJECT LOCATION:

KALAMAZOO, MICHIGAN

CLIENT INFORMATION:

CITY OF KALAMAZOO

Tt PROJECT No.:

200-19743-21003

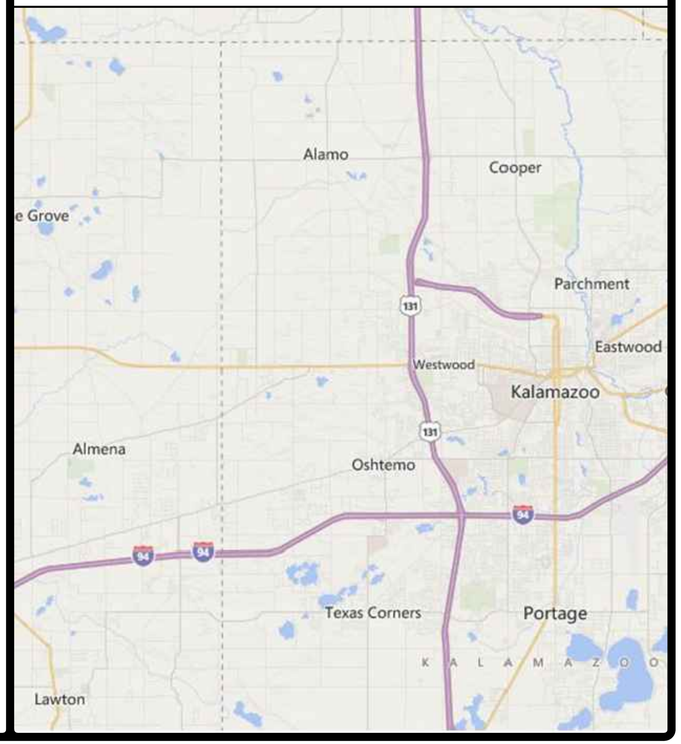
CLIENT PROJECT No.:

PROJECT DESCRIPTION / NOTES:

ISSUED:

OWNER REVIEW 10-15-21
OWNER REVIEW 11-4-21
OWNER REVIEW 1-27-22
FINAL OWNER REVIEW 2-18-22
QA/QC 4-27-22
FOR BIDDING AND CONSTRUCTION 4-28-22

VICINITY MAP:



BACKGROUND PLAN AND ONE LINE SYMBOLS

SYMBOL	DESCRIPTION
	CONTROL SWITCH (SEL. OR P.B.) SEE CIRCUITS FOR SPECIFIC TYPE
F FL	SEE CIRCUITS FOR SPECIFIC TYPE FLOAT SWITCH - FLOW SWITCH
T M	TEMPERATURE - HUMIDISTAT SWITCH (SUBSCRIPT=NO. OF STAGES)
L P V	LIMIT (PROXIMITY TYPE) PRESSURE - VACUUM SWITCH
ALT	ELECTRICAL OR MECHANICAL ALTERNATOR (SEE WIRING)
OS	OVERLOAD SWITCH OR DEVICE
TB	TERMINAL BOX
	SOLENOID VALVE
PC	PHOTOCELL LINE VOLTAGE
	AS NOTED (LIGHTING PANEL, CONTROL PANEL, DISTRIBUTION PANEL, ETC.) WALL MOUNTED
JB	JUNCTION BOX
	TRANSFORMER
	CONDUIT WITH CONDUIT SEAL FITTING
	CONDUIT EXPOSED
	CONDUIT CONCEALED
E	DIRECT BURIED CONDUIT
UG	DIRECT BURIED CABLE
OH	OVERHEAD LINE
DB	UNDERGROUND DUCT BANK
EDB	EXISTING UNDERGROUND DUCT BANK
1 2 3 4 5 6	CONCRETE ENCASED DUCT BANK WITH CABLE LOCATIONS, AND SPARE DUCTS AS INDICATED ON DRAWINGS
	CABLE REEL
L L L L	MULTI-STACK ALARM LIGHTS
	SELECTOR SWITCH / PUSHBUTTON. FUNCTIONS AS SHOWN IN WIRING DIAGRAMS
	LOW VOLTAGE DISCONNECT SWITCH
	LOW VOLTAGE FUSE (BELOW 600V)
	HIGH VOLTAGE FUSE (ABOVE 600V)
1 RV, 2 FVR, 3 2S,2W	ALL STARTERS SHALL BE FULL VOLTAGE, NON-REVERSING UNLESS OTHERWISE INDICATED. (FVR) FULL VOLTAGE REVERSING (RV) REDUCED VOLTAGE (2S, 2W) TWO SPEED, TWO WINDING
	600V, 3 POLE MOLDED CASE CIRCUIT BREAKER, FRAME & RATING AS SHOWN
1 2 A-3	SINGLE PHASE, FRACTIONAL HP MOTOR TO LOCATION INDICATED (SEE NOTE 2 ON STANDARD NOTE SHEET)
86	DEVICE SYMBOL WITH TYPE DEVICE
A 1	THREE PHASE LOAD WITH IDENTIFICATION

SYMBOL	DESCRIPTION
FT 10	TAG NO. (BALLOON) FOR DEVICE INDICATED
FT 10, A-3, MCP OR CP-1	FOR POWER (SEE NOTE 2 ON STANDARD NOTE SHEET) 3/4"C(2/C#18SH) CONDUIT AND WIRE RUN FROM DEVICE INDICATED TO LOCATION INDICATED
	CAPACITOR, 3 PHASE, SIZE AS INDICATED
F C	DISCONNECT SWITCH (F) = FUSED, (C) = CIRCUIT BREAKER
	MAGNETIC STARTER (BACKGROUND DRAWINGS ONLY)
SIZE 2	COMBINATION MAGNETIC STARTER FUSED UNLESS NOTED (CIRCUIT BREAKER)
LC	COMBINATION LIGHTING CONTACTOR WITH HAND-OFF-AUTO SWITCH
R	MANUAL STARTER (R) = REVERSING
CP	CONTROL PANEL
1/8 UH-19	UNIT HEATER, 1/8 HORSEPOWER
	LIGHTING ARRESTOR
A-3	LOW VOLTAGE HOME RUNS 120/208V, 120/240V (SEE NOTE 2 ON STANDARD NOTE SHEET)
NEMA 4	WATERTIGHT
NEMA 4X	WATERTIGHT AND CORROSION PROOF
NEMA 7	EXPLOSION PROOF - CLASS I, DIVISION 1, GROUP D
NEMA 9	EXPLOSION PROOF - CLASS II, DIVISION 1
K	KEYLOCK
SD	SMOKE DETECTOR
E	EXIT LIGHT
	FLUORESCENT LUMINAIRE
	INCANDESCENT LUMINAIRE
	HIGH INTENSITY DISCHARGE LIGHT
EM	EMERGENCY BATTERY PACK
DS	DESK INTERCOM SET
	CAMERA
PTZ	DOME CAMERA (PAN, TILT, ZOOM)
52	DRAW OUT CIRCUIT BREAKER (ABOVE 600 VOLT)
	CIRCUIT BREAKER WITH STAB CONNECTION
(3) 50/5	CURRENT TRANSFORMER, AND RATIO (WITH NUMBER REQUIRED SHOWN)

WIRING DEVICE SCHEDULE

SYMBOL	DESCRIPTION	NEMA TYPE
	125V, 2P, DUPLEX, 3W	5-20 R
	SIMPLEX RECEPTACLE	
	QUAD RECEPTACLE	
S	20A, 120/277V SWITCH	SPST

CONTROL CIRCUIT & PILOT DEVICE LEGEND

SYMBOL	DESCRIPTION
	PRESSURE ACTUATED SWITCH
	FLOW ACTUATED SWITCH
	LIMIT SWITCH - NORMALLY OPEN
	LIMIT SWITCH - NORMALLY CLOSED - HELD OPEN
	LATCHING CABLE SWITCH
	MOMENTARY PUSHBUTTON OPERATOR-NORMALLY CLOSED
	MOMENTARY PUSHBUTTON OPERATOR-NORMALLY OPEN
	CONTROL RELAY CONTACT - NORMALLY OPEN
INST.	TIMING RELAY INSTANTANEOUS CONTACT
CR	CONTROL RELAY COIL
CR L, CR U	TWO COIL LATCHING RELAY
	TIMED CLOSED CONTACT ON ENERGIZATION
	TIMED OPEN CONTACT ON DE-ENERGIZATION
	ZERO SPEED OR ANTI-PLUGGING SWITCH
	MAINTAINED STOP-START PUSHBUTTON OPERATOR
	MAINTAINED PUSH - PULL OPERATOR
	LOCAL TERMINALS WITH EXTERNAL WIRING
T	TIMING RELAY COIL
T 1	TIMING RELAY COIL (OFF DELAY)
G	INDICATING LIGHT
	PUSH-TO-TEST INDICATING LIGHT
X1 X2	SECONDARY TRANSFORMER
	MOLDED CASE CIRCUIT BREAKER
	GENERAL DISCONNECT SWITCH

SYMBOL	DESCRIPTION
	SELECTOR SWITCH - NORMALLY OPEN
	FLOAT ACTUATED SWITCH
	TEMP. ACTUATED SWITCH
	LIMIT SWITCH - NORMALLY CLOSED
	LIMIT SWITCH - NORMALLY OPEN - HELD CLOSED
	TIME DELAY FUSE
	PUSHBUTTON OPERATOR WITH MUSHROOM HEAD
(F)	FIELD LOCATED STOP BUTTON
	CONTROL RELAY CONTACT - NORMALLY CLOSED
INST.	TIMING RELAY INSTANTANEOUS CONTACT
O H C	SELECTOR SWITCH OPERATOR WITH FUNCTION SHOWN
	TIMED OPEN CONTACT ON ENERGIZATION
	TIMED CLOSED CONTACT ON DE-ENERGIZATION
R 1	PUSH-TO-TEST INDICATING LIGHT
	MAINTAINED STOP - MOMENTARY START PUSHBUTTON (JOG)
	SOLENOID OR CLUTCH
ETI	ELAPSED TIME INDICATOR
X1 X2	120VAC TRANSFORMER
	PUSHBUTTON OPERATOR WITH MUSHROOM HEAD
	THERMAL OVERLOAD
(F)	FIELD LOCATED
	TERMINAL POINT
	TERMINAL
	LOW VOLTAGE FUSE
	FUSIBLE TERMINAL BLOCK
	CONTROL POWER TRANSFORMER
	RECEPTACLE

NOTE: THE PLC I/O ADDRESS SHALL BE USED AS THE WIRING TAG SCHEME FOR ALL PANEL AND FIELD CONTROL WIRING. COORDINATE WITH ELECTRICAL CONTRACTOR.

I.S.A. STANDARD LETTER FUNCTIONS

SYMBOL	FIRST LETTER	SUCCEEDING LETTERS
A	ANALYSIS, ANALOG	ALARM
B	BURNER, FLAME	BATCH
C	CONDUCTIVITY, COMMAND	CONTROL (FEEDBACK TYPE)
D	DENSITY, SPECIFIC GRAVITY	
E	VOLTAGE	PRIMARY ELEMENT
F	FLOW RATE	RATIO
G	GAGING	GLASS
H	HAND, MANUAL	HIGH
I	CURRENT	INDICATE
J	POWER	SCAN
K	TIME, TIME SCHEDULE	CONTROL (NO FEEDBACK)
L	LEVEL, LIGHT	LOW
M	MOISTURE, HUMIDITY	MIDDLE, MODULATE
N		
O	OVERLOAD	ORIFICE
P	PRESSURE, VACUUM	POINT
Q	QUANTITY	TOTALIZE, INTEGRATE
R	RADIOACTIVITY	RECORD, PRINT, RECEIVE
S	SPEED, FREQUENCY, SOLENOID	SWITCH
T	TEMPERATURE, TURBIDITY	TRANSMIT, TRANSFORM
U	MULTIVARIABLE	MULTIFUNCTION
V	VIBRATION, VISCOSITY	VALVE, DAMPER, LOUVER
W	WEIGHT, FORCE	
X		
Y		RELAY, COMPUTE
Z	POSITION	DRIVE, ACTUATE

PROTECTIVE RELAY LEGEND

DEVICE NO.	DESCRIPTION
2	SYNC. TIMER 0-5 MIN.
25	SYNCHRONIZING
27	SHORT TIME UNDERVOLTAGE
32	REVERSE POWER RELAY
38	TEMPERATURE
40	LOSS OF EXCITATION
43	SELECTOR SWITCH
47	PHASE SEQUENCE & UNDERVOLTAGE
49	THERMAL
50/51	INSTANTANEOUS AND VERY INVERSE
51	VERY INVERSE
51G	INVERSE GROUND FAULT
51N	NEUTRAL OVERCURRENT
51V	OVERCURRENT RELAY WITH VOLTAGE RESTRAINT
52/CS	CONTROL SWITCH
59	INSTANTANEOUS OVERVOLTAGE
60	VOLTAGE BALANCE
62	TIME DELAY
64	SHORT TIME LOW PICK UP OVERVOLTAGE
67	DIRECTIONAL OVERCURRENT
69	LOCKOUT CONTROL SWITCH
78	OUT OF STEP
81	OVER/UNDER FREQUENCY RELAY
83	MULTI-CONTACT AUXILIARY
86/HR	MULTI-CONTACT AUX. HAND RESET
87	DIFFERENTIAL OVERCURRENT

SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
PT	POTENTIAL TRANSFORMER	W	WATTMETER
CT	CURRENT TRANSFORMER	AP	ALARM POINT
A	AMMETER	CPT	CONTROL POWER TRANSFORMER
V	VOLTMETER	(2) (3)	NUMBER OF DEVICES REQUIRED
PF	POWER FACTOR METER	ETI	ELAPSED TIME METER

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SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL LEGEND

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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OF 19

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NOTES:

1. FIELD VERIFY CONDUIT ROUTING AT THE SEWAGE LIFT STATIONS WITH OWNER. CORE HOLES AS REQUIRED TO SUIT INSTALLATION OF THE CONDUITS SHOWN. PATCH WITH NON-SHRINK GROUT.
2. TURN OVER TO OWNER AT PROJECT COMPLETION OPERATION AND MAINTENANCE MANUALS (QUANTITY AS SPECIFIED) TO OWNER.
3. IN ADDITION TO PATCH CABLES SUPPLIED FOR THE PROJECT, FURNISH 30-10FT LONG MULTIMODE DUPLEX FIBER OPTIC PATCH CABLES (LC-LC) CONNECTORS, AND 30-10FT CAT-6 PURPLE PATCH CABLES FOR OWNERS USE. TURN OVER CABLES TO OWNER.
4. MULTIMODE FIBER OPTIC PATCH CABLES, AND ETHERNET PATCH CABLES SUPPLIED IN THE PROJECT SHALL BE COLORED PURPLE.
5. FIBER OPTIC PATCH PANELS SHALL BE THE PRODUCT OF CORNING CABLE SYSTEMS. (RACK OR SURFACE MOUNTED AS SHOWN", LC STYLE CONNECTORS, WITH QUANTITY OF BULKHEADS AS SHOWN.

GENERAL CONSTRUCTION NOTES:

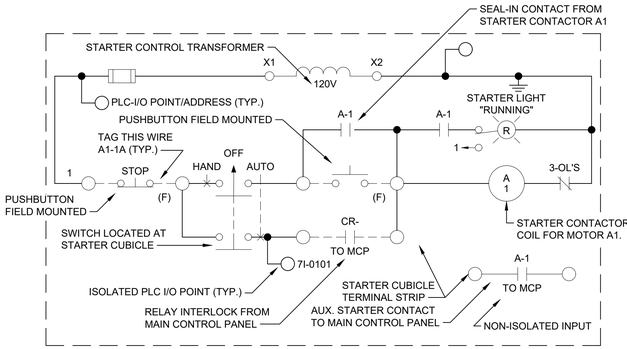
1. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN LIGHT LINE WEIGHTS ON THE DRAWINGS ARE EXISTING ITEMS TO REMAIN. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN HEAVY LINE WEIGHTS ARE NEW THIS CONTRACT.
2. ITEMS SHOWN OR NOTED TO BE DEMOLISHED ON THE DRAWINGS ARE EXISTING ITEMS TO BE REMOVED FROM SITE BY CONTRACTOR UNLESS NOTED TO BE TURNED OVER TO OWNER.
3. FOR ITEMS INDICATED AS "FIELD LOCATE", THE CONTRACTOR SHALL FIELD VERIFY FOR INTERFERENCE AND FOR LOCATIONS OF MOUNTING FLANGES, CONNECTION POINTS, ETC.
4. CONDUIT ROUTINGS SHOWN ON BACKGROUND PLANS ARE INTENDED ROUTINGS ONLY. EXACT CONDUIT ROUTINGS FOR CONDUITS, AND LENGTH SHALL BE FIELD LOCATED AND VERIFIED BY THE CONTRACTOR. COORDINATE CONDUIT ROUTING IN FINISHED AREAS WITH OWNER. CONDUIT TO BE CONCEALED IN THESE AREAS.
5. REFER TO THE CABLE MANUFACTURER'S RECOMMENDATIONS FOR MINIMUM BEND RADIUS FOR FIBER OPTIC CABLES. INSTALL NEW PULL BOXES (PB) AS REQUIRED FOR CONDUITS. SIZE PULL BOXES AS REQUIRED PER FIBER OPTIC CABLE MANUFACTURERS RECOMMENDATIONS.
6. PANELS SHALL BE MOUNTED OFF WALLS WITH STRUT, CONDUITS SHALL BE MOUNTED ON STRUT INCLUDING SINGLE RUNS.
7. CONDUIT ENTERING CONTROL PANELS AND ELECTRICAL EQUIPMENT ENCLOSURES SHALL BE FILLED WITH DUCT SEAL, INCLUDING OPENINGS IN BOTTOM OF PANELS, AND EQUIPMENT.
8. REPAIR SIDEWALKS AND ROADWAYS DUE TO SITE WORK ADDITIONS, THE EXTENT OF THE REPAIR REQUIRED SHALL BE FIELD VERIFIED PRIOR TO BIDS IN CONJUNCTION WITH THE WORK SHOWN IN THE CONTRACT DOCUMENTS. PRIOR TO TRENCHING, FIELD LOCATE EXISTING GAS LINES, TELEPHONE LINES, SPRINKLER LINES, ETC. COORDINATE WITH OWNER
9. PULL CORDS SHALL BE INSTALLED IN CONDUITS CONTAINING NETWORK CABLES, AND FIBER OPTIC CABLES.
10. CORE HOLES AS REQUIRED TO SUIT INSTALLATION OF CONDUIT AND WIRING/CABLING AS SHOWN. FIELD VERIFY EXACT EXTENT OF WORK REQUIRED.
11. FURNISH PULL BOXES FOR FIBER OPTIC CABLE. COORDINATE EXACT BENDING RADIUS WITH MANUFACTURER.
12. NEW CONDUITS INSTALLED THIS CONTRACT WITH FIBER OPTIC CABLES SHALL BE LABELED WITH PHENOLIC TAGS (AT BEGINNING TO END) TO INDICATE THE NUMBER OF STRANDS, ORIGINATION AND DESTINATION. TAGS TO BE COLOR CODED ORANGE FOR MULTIMODE.
13. WHERE NEW CONDUITS SHOWN TO BE INSTALLED PASS UNDER ROADWAYS, CONDUITS SHALL BE CONCRETE ENCASED.
14. PRIOR TO EXCAVATION, FIELD LOCATE EXISTING UTILITIES. COORDINATE WITH OWNER.
15. AREAS WHERE CAMERAS ARE SHOWN TO BE INSTALLED SHALL BE CLASSIFIED AS NEMA 4, UNLESS CALLED OUT OTHERWISE.
16. THE ASSOCIATED INSTRUMENTATION DRAWINGS SHOW EXISTING WIRES AND TERMINAL NUMBERS REQUIRED TO PROPERLY INTERFACE WITH NEW EQUIPMENT. THIS INFORMATION WAS COLLECTED FROM AS-BUILT DRAWINGS AND EXTENSIVE FIELD VERIFICATION. THE INFORMATION SHALL BE USED AS A GUIDE IN RE-TERMINATION. IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE THE WIRING AND TO REVISE TO SUIT AS REQUIRED. CHANGES IN THE CONTRACT OR COST WILL NOT BE GRANTED FOR THIS COORDINATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE PROPOSED WORK SHOWN.
17. CONDUIT ROUTINGS SHOWN ON BACKGROUND PLANS ARE PROPOSED ROUTINGS ONLY. EXACT CONDUIT ROUTINGS AND LENGTH SHALL BE FIELD LOCATED AND VERIFIED BY THE CONTRACTOR. COORDINATE CONDUIT ROUTING IN FINISHED AREAS WITH OWNER. CONDUIT TO BE CONCEALED IN THESE AREAS.
18. CONDUIT/RACEWAYS, PULL BOXES, TERMINAL BOXES, AND JUNCTION BOXES TO BE INSTALLED WITH 316 STAINLESS STEEL FASTENERS SUPPORTS, AND THREADED ROD, ETC. (CHANNEL STRUT TO ALSO BE STAINLESS STEEL). MINIMUM STRUT LENGTH TO BE 12 INCHES, WHERE POSSIBLE. TYPICAL FOR NEMA 12, 4, AND 7 AREAS.
19. WIRING FOR STARTERS SHALL BE IN ACCORDANCE WITH NEMA CLASS II B STANDARDS. SUBMIT ENGINEERED SHOP DRAWINGS FOR ALL STARTERS SHOWN TO BE WIRED.
20. WIRE NUMBERS (1, 3, 5, ETC.) SHALL BE PREFIXED WITH STARTER TAG NUMBERS. THE WIRE NUMBER AFTER THE PREFIX SHALL BE THE MANUFACTURER'S WIRE NUMBERING SYSTEM. WIRE MARKERS SHALL BE USED AT EACH WIRE TERMINATION POINT.
21. IN AREAS WHERE EQUIPMENT AND CONDUIT IS REMOVED, REPAIR WALL AND FLOOR SURFACES AS REQUIRED TO MATCH SURROUNDING AREA. WHERE DEVICES ARE REMOVED FROM CONCEALED BOXES, FURNISH AND INSTALL A BLANK COVER ON THE BOX.
22. FIBER OPTIC CABLE SHALL BE AS CALLED OUT ON SYSTEM CONFIGURATION DRAWINGS, MULTIMODE, ALL DIELECTRIC, SUITABLE FOR INSTALLATION UNDERGROUND IN WET CONDUIT.
23. LEGEND PLATES/EQUIPMENT NAMETAGS TO BE MATTE WHITE BACKGROUND, BLACK LETTERING. THIS IS TYPICAL FOR MOTOR CONTROL CENTERS, CONTROL PANELS, SWITCHGEAR, PANELBOARDS, DISCONNECT SWITCHES, LIGHT SWITCHES, FIELD INSTRUMENTS, LIGHT CONTACTORS, FIELD STARTERS, ETC.
24. FURNISH, AND INSTALL PHENOLIC NAMETAGS ON THE EXTERIOR OF ALL NEW CONDUITS (THIS PROJECT" CONTAINING E-FO, F.O., E-NET, POWER, SIGNAL, AND CABLES. NAMETAGS TO BE INSTALLED ON EACH CONDUIT AT EACH END, BETWEEN ENCLOSURES ORANGE BACKGROUND, WHITE LETTERING, FOR MULTIMODE FIBER, YELLOW BACKGROUND, WHITE LETTERING, SINGLE MODE FIBER, EXAMPLE: "24 - E-FO - TFPP TO FPP-1". FOR POWER: "480V POWER FROM MCC-S TO MCC-B1". FOR CONTROL: "CONTROL WIRES - TO BPP". FOR SIGNAL: "SIGNAL WIRES - TO BPP".

GENERAL NOTES:

1. PRIOR TO SUBMITTING A BID FOR THE WORK DETAILED UNDER THIS CONTRACT, BIDDER SHALL VISIT THE SEWAGE LIFT STATIONS. THE BIDDER SHALL FULLY ACQUAINT ONESELF WITH EXISTING FIELD CONDITIONS AT EACH SITE. NO BULLETINS WILL BE WRITTEN FOR WORK DUE TO LACK OF VERIFICATION OF EXISTING SITE CONDITIONS AND WIRING.
2. NO WIRES SHALL BE TERMINATED TO TERMINAL STRIPS, OR OTHER EQUIPMENT WITHOUT FIRST VERIFYING SIGNAL TYPE. DAMAGES RESULTING FROM LACK OF VERIFICATION SHALL BE BORNE BY THE CONTRACTOR. CONTRACTOR SHALL COORDINATE SIGNAL TYPE AND VOLTAGE WITH I/O CARDS SHOWN.
3. WITHIN CONTROL PANELS, NAMEPLATES SHALL BE PROVIDED TO INDICATE DIFFERENT VOLTAGE LEVELS WITHIN PANELS. ALSO, A NAME TAG (YELLOW BACKGROUND, RED LETTERING) SHALL BE LOCATED ON THE FRONT OF EVERY PANEL INDICATING THAT WHEN MAIN PANEL IS DISCONNECTED 120V IS STILL PRESENT FROM FIELD DEVICES (YELLOW WIRING/ISOLATED INPUT CARDS.)
4. PHENOLIC TAGS ON FACE OF CONTROL PANELS SHALL HAVE WHITE BACKGROUND AND BLACK LETTERING (EXCEPT WARNING TAGS; YELLOW BACKGROUND RED LETTERING).
5. PROVIDE SAFETY COVERS ON 480V MOLDED CASE MAIN CIRCUIT BREAKERS TO INSULATE THE INCOMING CABLES AND SIDE CONDUCTORS FROM CONTACT. (TYP. FOR CONTROL PANELS.) PROVIDE BREAKER LOCKS FOR PUMP CIRCUIT BREAKERS (MCP)AND MAIN PANEL BREAKERS.
6. REFER TO WIRING DIAGRAMS FOR ADDITIONAL INFORMATION ON ISOLATED I/O. A COMMON NEUTRAL MAY BE USED FOR SEVERAL ISOLATED INPUTS FROM THE SAME STARTER. PROVIDE NEUTRAL JUMPERS WIRES WITHIN THE PANEL AS REQUIRED.
7. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN LIGHT LINE WEIGHTS ON THE DRAWINGS ARE EXISTING ITEMS TO REMAIN. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN HEAVY LINE WEIGHTS ARE NEW THIS CONTRACT.
8. ITEMS SHOWN CROSSHATCHED (OR NOTED TO BE DEMOLISHED) ON THE DRAWINGS ARE EXISTING ITEMS TO BE REMOVED, FROM SITE BY CONTRACTOR.
9. INSTALL A SINGLE CONDUCTOR INSULATED (RHW, THWN, OR XHHW) COPPER GROUND WIRE IN EACH CONDUIT, SIZE AS SHOWN ON DRAWINGS, OR AS A MINIMUM PER THE NATIONAL ELECTRICAL CODE. THIS GROUND WIRE SHALL BE CONNECTED AT EACH END TO THE EQUIPMENT GROUND. THIS ALSO INCLUDES INSTRUMENTATION DEVICES SUCH AS LEVEL, PRESSURE, FLOW TRANSMITTERS, LIMIT SWITCHES, CONDUITS, NETWORK AND I/O CABLES.
10. THE FOLLOWING EXAMPLE COMPONENT IDENTIFICATION SHALL BE USED AS APPROPRIATE:

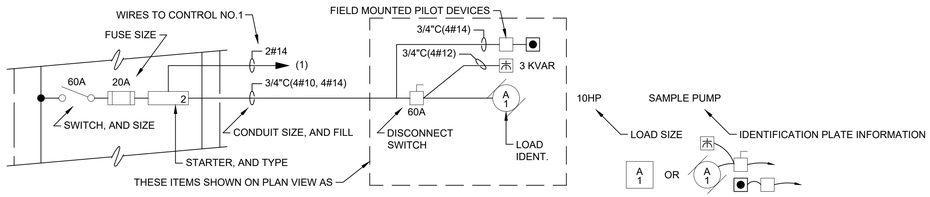
(F) FIELD MOUNTED, NOT AT STARTER OR OTHER CONTROL PANELS
(S) STARTER PANEL MOUNTED
(MCP)AT MAIN CONTROL PANEL
(1) AT CONTROL PANEL NO.1
(2) AT CONTROL PANEL NO.2
(TCP) AT TEMPERATURE CONTROL PANEL

11. REFER TO DETAIL SHEETS. CONTRACTOR SHALL FURNISH AND INSTALL HARDWARE AND APPURTENANCES (I.E. PIPE TAPS, WETWELL BUBBLER TUBES, VALVES, COPPER TUBING, BALL VALVES, PNEUMATIC PIPING, SPOOL PIECES, ETC.) FOR FIELD DEVICES SHOWN (FLOWMETERS, PRESSURE TRANSMITTERS, LEVEL TRANSMITTERS, ETC.). WORK SHALL BE COORDINATED WITH OTHER TRADES (MECHANICAL INSTRUMENTATION, ETC.) CONTRACTOR SHALL BE RESPONSIBLE FOR SYSTEM COORDINATION AND INSTALLATION.
12. ETHERNET AND FIBER OPTIC TERMINATIONS SHALL BE PERFORMED BY A QUALIFIED REPRESENTATIVE OF CABLE MANUFACTURER, THE CABLES SHALL BE TESTED. NO SPLICING SHALL BE PERMITTED OF FIBER OPTIC CABLES, BETWEEN PANELS. FIBERS SHALL BE TERMINATED AT PATCH PANELS, INCLUDING SPARES.
13. REFER TO THE CABLE MANUFACTURER'S RECOMMENDATIONS FOR MINIMUM BEND RADIUS FOR FIBER OPTIC CABLES. INSTALL NEW PULL BOXES (PB) AS REQUIRED FOR CONDUITS. SIZE PULLBOXES AS REQUIRED PER FIBER OPTIC CABLE MANUFACTURERS RECOMMENDATIONS.
14. CABLES (INCLUDING FIBER, ETHERNET, CONTROL WIRE, ETC.) WHERE PASSING THROUGH A PULLBOX SHALL BE LABELED AND COMPLETELY IDENTIFIED WITH IDENTIFICATION NUMBERS AND ORIGINATION/DESTINATION. THIS ALSO INCLUDES ALL CABLE BUNDLES ENTERING CONTROL PANELS, PULLBOXES, ETC.
15. CONTROL WIRES SHALL BE TAGGED WITH THE PLC I/O ADDRESS, AND A DESCRIPTION ADDRESS IN THE FIELD AND AT THE PANEL. REFER TO INSTRUMENTATION DRAWINGS, CONTROL PANEL WIRING DIAGRAMS. (TYP.)
16. THE FIELD DEVICES SHOWN ON THE P&ID'S, ELECTRICAL BACKGROUNDS, AND DETAILS SHEETS MAKEUP THE FIELD DEVICE EQUIPMENT REQUIREMENTS. NOT ALL FIELD DEVICES REQUIRED ARE SHOWN ON THE P&ID'S.
17. UPS SELECTED SHALL BE COMPATIBLE WITH ISOLATION TRANSFORMERS. (TYP.)
18. REFER TO I/O DRAWING LAYOUT FOR ADDITIONAL SIGNALS NOT SHOWN ON P&ID FLOW DIAGRAMS.
19. TURN OVER TO OWNER EXISTING PLC, AND RADIO EQUIPMENT DEMOLISHED IN THIS CONTRACT.



A 1 EXAMPLE PUMP
(TAG A1)
(EXAMPLE CIRCUIT)

STARTER NAMEPLATE



MCC SAMPLE LEGEND EXAMPLE

NOTE: TURN OVER ALL DEMOLISHED EQUIPMENT TO OWNER.

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL NOTES

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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STATION NAME	STATION ADDRESS
CLIMAX ROAD LIFT STATION	11523 CLIMAX ROAD, GALESBURG, MI.
WOODS LAKE LIFT STATION	2830 OAKLAND DRIVE, KALAMAZOO, MI.
L-AVENUE LIFT STATION	12459 EAST "L" AVENUE
AUGUSTA WEBSTER LIFT STATION	120 N. WEBSTER, AUGUSTA
WINDING WAY LIFT STATION	4510 WINDING WAY

LIFT STATION ADDRESSES

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SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER, CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
SITE ADDRESSES

Project No.:	200-19743-21003
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Drawn By:	JLS
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OF 19

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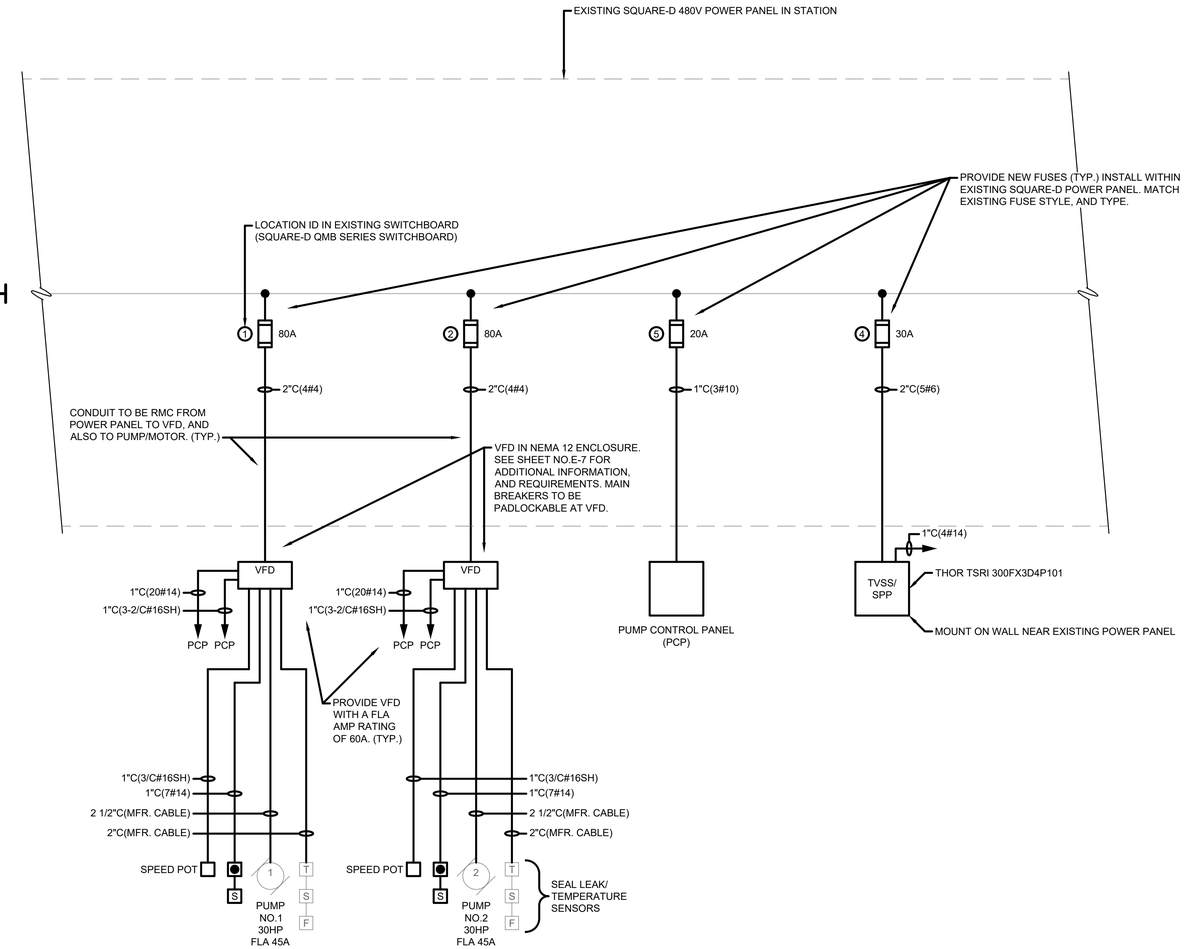

PARTIAL POWER ONE-LINE DIAGRAM (WOODS LAKE)

NO SCALE

CONTRACTOR TO COORDINATE WITH OWNER ON BYPASS PUMPING. COORDINATE WITH OWNER PRIOR TO BEGINNING SWITCHOVER. STATION MUST REMAIN IN OPERATION DURING SWITCHOVER, AND INSTALLATION OF NEW EQUIPMENT.

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
WOODS LAKE LIFT STATION
POWER ONE-LINE

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-4

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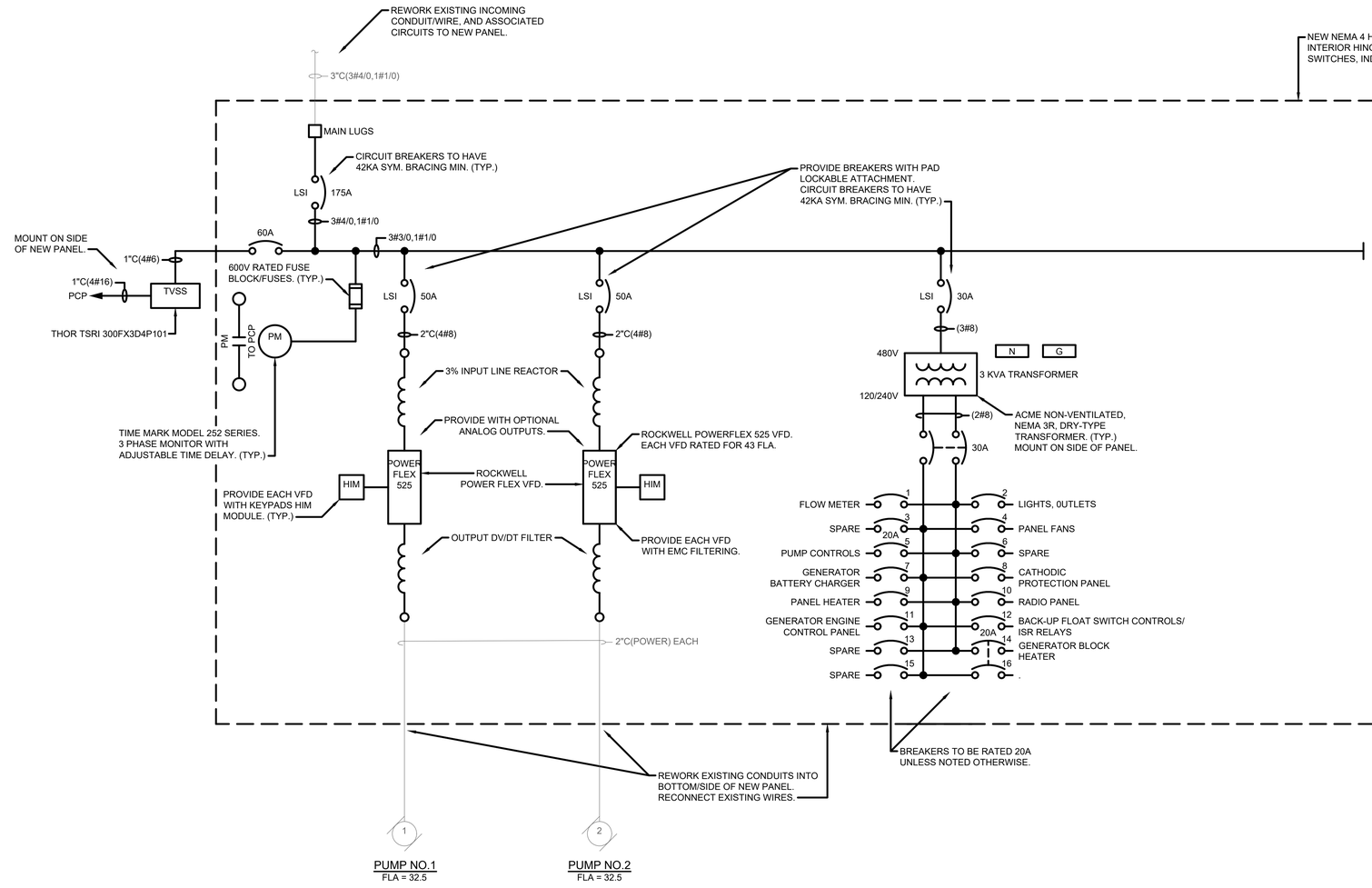

PARTIAL POWER ONE-LINE DIAGRAM (AUGUSTA-WEBSTER LIFT STATION)

NO SCALE

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ELECTRICAL

AUGUSTA - WEBSTER LIFT STATION POWER ONE-LINE

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-5

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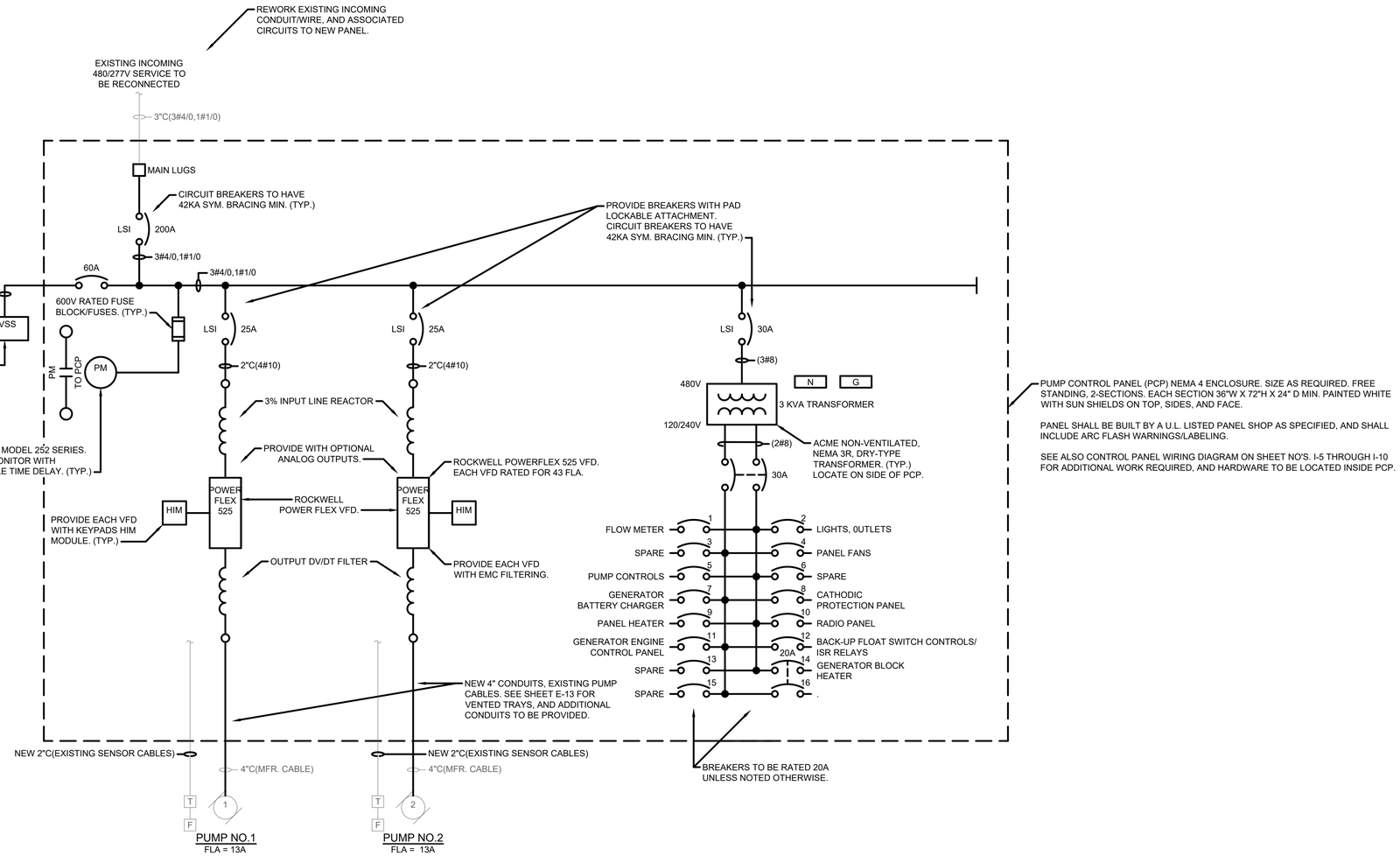

PARTIAL POWER ONE-LINE DIAGRAM (CLIMAX LIFT STATION)

NO SCALE

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE
ELECTRICAL
CLIMAX LIFT STATION
POWER ONE-LINE

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-6
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4/27/2022 11:20:07 AM - \\TT.LOCAL\IER\PROJECTS\ANN ARBOR\IER\197431200-19743-21003\CAD\SHEETFILES\E\PUMP STATION\SIE-6_CLIMAX LS POWER ONE-LINE.DWG - SHANK, JASON

AMMETER 0-50A
LOCATE AFTER CPT, AND BEFORE VFD/BYPASS CONTACTOR.
SWITCH A-B-C-OFF
BP
OL'S
FAST ACTING ELECTRONIC FUSES
CONNECT PUMP/SENSOR CABLES.
480V, 3 PHASE INCOMING POWER
50/5
IC
OC
VARIABLE FREQUENCY DRIVE
KEY PAD
DV/DT
PHASE MONITOR (PM)
5% INPUT LINE REACTOR
OUTPUT DV/DT FILTER
SQUARE-D SDA-3650 SERIES SURGE DEVICE. (TYP.)
CPT-VA AS REQUIRED (2KVA MIN.) 480-120V
CONDUIT/WIRES TO MOTOR/PUMP BY OWNER.
TIME MARK C259 SERIES
NEMA 12 ENCLOSURE (NEMA CLASS IIB WIRING)
T-1
CR-3
POWER ON
ON DELAY 0-60 SEC. SET AT 5 SEC.
CONTACT FROM - MOTOR HIGH TEMPERATURE RELAY.
NEMA 12 ENCLOSURE
HOT MOTOR WINDING
RESET
SEAL LEAK DETECTOR/ TEMPERATURE RELAY
NEMA RATED CONTACTORS
INPUT CONTACTOR
OUTPUT CONTACTOR
MECHANICAL INTERLOCK
BYPASS CONTACTOR
OFF
VFD
BYPASS
TO PCP
START
STOP
HAND
REMOTE
REVERSE
PM
PUMP START/STOP (FORWARD)
PUMP START/STOP (REVERSE)
PCP (CR-163)
PCP (CR-315)
PCP (CR-167)
SPEED SELECT TO VFD - SEE AT RIGHT
RUNNING
CR-2
VFD RUNNING
CONTACT FROM VFD BELOW
SEAL WATER SOLENOID
IN REMOTE
IN VFD POSITION
SEAL LEAK
IN BYPASS POSITION
CONTINUED AT UPPER RIGHT
CONTINUED AT LOWER LEFT
REMOTE SELECTED, USE 4-20MA SIGNAL FOR SPEED REFERENCE. IF HAND, USE LOCAL SPEED POTENTIOMETER FOR SPEED REFERENCE. SEE SWITCH, AND NOTE BELOW.
CONFIGURE VFD TO RUN AT FULL SPEED WITH DI-4 ENABLED, AND VFD SELECTOR SWITCH IN AUTO. (BACK-UP START/STOP)
HAND
LOCAL - POTENTIOMETER ON DOOR.
REMOTE - POTENTIOMETER AT PUMP.
BACK-UP START/STOP SIGNAL. SEE SHEET I-15. RUN AT 60 HZ. (FLOAT BACKUP MODE)
CR-315
CR-4
CR-5
START/ STOP
+24V DC
DI-1 (FORWARD)
DI-2 (REVERSE)
DI-3
DI-4
DI-5
CONTACT CLOSED WHEN SWITCH IN AUTO POSITION
VFD FAULT
VFD RUNNING
TO DIAGRAM AT LEFT
TO LOGIC AT LEFT
MFR. CABLE
KEYPAD
LOCAL SPEED POT
REMOTE SPEED
VARIABLE FREQUENCY DRIVE
AI
AO
4-20MA FROM PCP COMMAND
4-20MA SPEED FEEDBACK TO PCP
4-20MA MOTOR AMPERAGE TO PCP
ROCKWELL POWER FLEX 753 SERIES DRIVE WITH CONTROL INTERFACE OR ABB
FURNISHED BY OWNER. INSTALLED, AND CONNECTED BY CONTRACTOR.
SEAL LEAK/ MOTOR TEMPERATURE RELAY

WOODS LAKE
RAW SEWAGE PUMP NO.1

(TYP. FOR RAW SEWAGE PUMP NO.2)

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
WOODS LAKE LIFT STATION
VFD WIRING DIAGRAMS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Types of motor controllers, including:
   1. Variable Frequency Drives

1.02 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings (seven copies) covering the items included under this Section. Shop Drawing submittals shall include:
   1. Shop Drawings: Submit Shop Drawings of motor controllers showing wiring diagrams, dimensions and sizes.
   2. Product Data: Submit manufacturer's data and installation instructions on motor controllers.
   3. Wiring Diagrams: Submit power and control wiring diagrams for motor controllers
   4. Submit operation and maintenance manuals for the drives. Submit electronic copies on CD, as well as three hard cover copies.

1.03 QUALITY ASSURANCE

A. Codes and Standards:
   1. UL Compliance: Comply with applicable requirements of UL 486A and B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL listed and labeled.
   2. NEMA Compliance: Comply with applicable requirements of NEMA Standards ICS 2, "Industrial Control Devices, Controllers and Assemblies," and Pub No. 250, "Enclosures for Electrical Equipment (1,000 Volts Maximum)," pertaining to motor controllers and enclosures.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with specified requirements, manufacturer offering products shall be (no or equal):
   1. ALLEN-BRADLEY CO. (POWER FLEX 753 SERIES) POWER FLEX 525 FOR AUGUSTA-WEBSTER, AND CLIMAX LIFT STATIONS.
   2. ABB ACS580 SERIES.

2.02 MOTOR CONTROLLERS

A. Variable Frequency Drives: This system shall comprise a motor and a variable frequency drive and
   1. Motor: as coordinated with the pump manufacturer.
   2. Variable Frequency Drive: The variable frequency drive unit shall convert 480 volt plus 10 percent, minus 5 percent; 3-phase; 60 hertz plus or minus 2 hertz, input power into an adjustable frequency output. Output power shall be of suitable capacity and wave form to provide stepless speed control of the specified AC motor throughout a continuous speed range of 10:1 under variable torque load not exceeding 1.25 times the motor's full load rating in an ambient of 0-40 degrees C with up to 95 percent humidity. The drive continuous run amperes rating shall be 1.25 times the full load ampere of the load or as shown on the electrical one-line drawings whichever is greater. The drive shall be able to withstand external short circuits without fuse blowing or device failure. The drive shall comply with the latest requirements of IEEE519 2014.

3.

a. Drives of the pulse-width-modulation type shall have current limit protection for the drive and load of 110 percent of motor nameplate rating for variable torque loads for a minimum of 1 minute before automatically disconnecting the drive.
b. Provide instantaneous static overvoltage and overcurrent protection. Provide undervoltage trip upon input power loss or phase loss without component failure and automatic restart upon return of full power and command. The drive shall not be damaged by application of incorrect phase sequence.
c. Provide input circuit breaker interlocked with the door.
d. Provide input, output, and bypass contactors(Nema rated) where shown on contract drawings.
e. Provide three spare fuses of each type used.
f. Provide 3-phase thermal overloads at the output to the motor.
g. Provide line voltage transient suppression and immunity to local ambient electrical noise. The drive shall not create radiated or conducted RFI which disturbs the function of adjacent equipment. Units shall be furnished as six pulse drives with input and output filtering to comply with above requirements. Furnish 5% input line reactor or Matrix AP input filter as shown on drawings and DV/DT output filters on drive output for each drive.
h. Provide drive fault detection circuit with contacts for remote alarm used by others. The drive shall shut down on any type of failure. Cause of drive shutdown shall be displayed on operator interface.
i. Provide isolation of signal circuits from the power circuits. The drive shall have self-protection from regenerative power on rapid decrease of speed signals.
j. Provide a forced air ventilation system to remove heat from the drive enclosure. Power for the ventilation system shall be provided from the drive circuits. The fans shall be completely serviceable without having to dis-assemble the drive and shall be interlocked with the drive run status.
k. Where shown on the wiring diagrams, the drive shall accept a speed control signal from either an isolated or non-isolated 4-20 mA source while in the automatic speed control mode and from a door-mounted speed potentiometer when the manual mode is selected. In addition, provide a door-mounted operator interface panel that allows remote/local mode selection and manual speed control. Furnish selector switches and pilot lights for the control shown on the wiring diagrams. Devices to be mounted on face of drive door, controls section.
l. The drive shall output an isolated 4-20 mA speed signal for remote speed indication.
m. The drive shall accept a remote start/stop contact closure while in the Auto mode and from operator interface when the Local mode is selected. Refer to the wiring diagrams for additional control requirements.
n. The drive shall have an alphanumeric operator interface display capable of displaying amps, voltage, kW, rpm, frequency, and elapsed running time.
o. Provide a delay to restart the motor after the motor is running. The delay to restart shall be adjustable from 3 to 60 seconds. Minimum delays greater than 5 seconds will not be accepted.
p. The 4-20 mA input signal shall control the motor speed between 10 percent of full speed and full speed. The 20 mA signal being full speed and 4 mA being minimum speed. The 4-20 mA input signal shall control the motor speed between the adjustable minimum and maximum speed settings. The minimum speed shall be field adjustable from 10-70 percent of rated speed. The maximum speed shall be field adjustable from 70-100 percent of rated speed. The minimum and maximum speed settings shall override the 4-20 mA signal at their respective settings. The speed signal shall follow a linear time ramp, adjustable from 4 to 20 seconds. Provide separate acceleration and deceleration control. The motor speed shall follow the input signal, in the steady state, with a plus or minus 2 percent linearity.
q. The drive shall be of modular construction for ease of maintenance.
r. The drive shall be capable of communicating monitoring and diagnostic functions.
s. Coordinate with the pump supplier for the installation and wiring associated with the seal leak/motor temperature sensor. Refer to the wiring diagrams for additional information.
   1) Provide, for remote use by others, two normally open contacts rated 3amps at 120 volt AC which close when the controller is running, or faults.
t. In pump applications and where shown on Drawings, the variable frequency drives shall contain the necessary circuitry to energize a 120 volt AC pump seal water solenoid valve when the pump is running. The rating of this circuit shall be sufficient to control a solenoid valve with an inrush of 360 VA and a holding VA of 120.
u. The drives shall be assembled, and built by the manufacturer. Drives assembled by the Contractor do not comply with this specification.
v. The entire drive electronics/circuit boards shall be conformal coated.
w. Drives shall be provided with input surge protection and fast acting electronic fuses.
x. Three spare fans shall be provided.
y. The drive shall be supplied within a free standing NEMA 12 enclosure or as shown on contract drawings. Drives shall be constructed such that they can be located back to back. Service of equipment including fans and ventilation filters shall be from the front, of the enclosure. No maintenance of parts shall be required from the drive rear. Cable entry for incoming power and pump wiring shall be from the bottom or top of the enclosure as coordinated with the Contractor.
z. The door mounted keypad shall also serve to maintain/store the drive configuration.
aa. Selector switches, contactors, relays, pilot lights, etc., shall be NEMA rated.
bb. The drive including the VFD, contactors, relays, switches, drive enclosure shall be supplied as a complete system by the VFD manufacturer Rockwell or ABB.

4. All wires are to be identified, and the identifying mark shown on the schematics and wiring diagram. Documentation of schematics, wiring diagrams, terminal strips, and operating and maintenance manuals shall be supplied at Shop Drawing time and delivered with the equipment.
5. The drive manufacturer shall provide a field start-up and calibration service on-Site for five eight hour days for the drives. The manufacturer shall configure the drive parameters based on the inputs shown and motor information as supplied by the Contractor/pump manufacturer. The manufacturer's personnel shall have a stable 4-20 mA source, and a plus or minus 0.5 percent accurate 3-1/2-digit, digital milliamp meter to be used in the calibration procedure.
6. The system calibration shall be checked at 100 percent, 75 percent, 50 percent, and minimum speed points. The minimum and maximum speeds shall be set. The deceleration and acceleration rates shall be set. The delay to restart shall be set. Settings by the drive manufacturer, to be performed on-site as coordinated with the Owner/Engineer.
7. Furnish a 36 month warranty on each drive from date drives are placed on-line at the Owner's facility.
8. Furnish one eight hour day of follow-up training following installation and start-up of the drives at the Owners facility. Provide training materials and handouts for up to twenty (20) people of the Owners staff.

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE
ELECTRICAL
WOODS LAKE LIFT STATION
VFD SPECIFICATIONS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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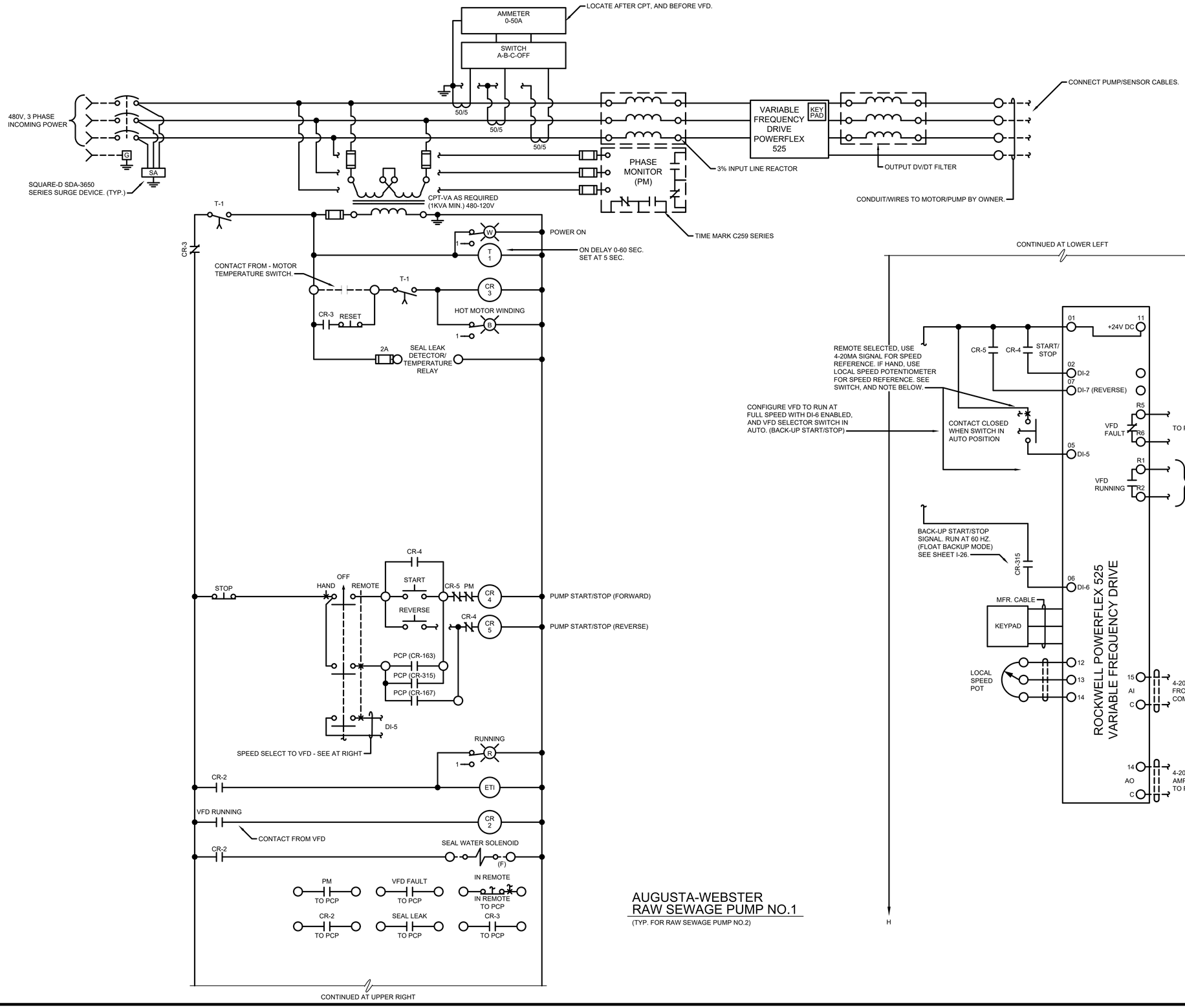

AUGUSTA-WEBSTER RAW SEWAGE PUMP NO.1

(TYP. FOR RAW SEWAGE PUMP NO.2)

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CLIMAX, LAVIENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
AUGUSTA-WEBSTER LIFT STATION
VFD WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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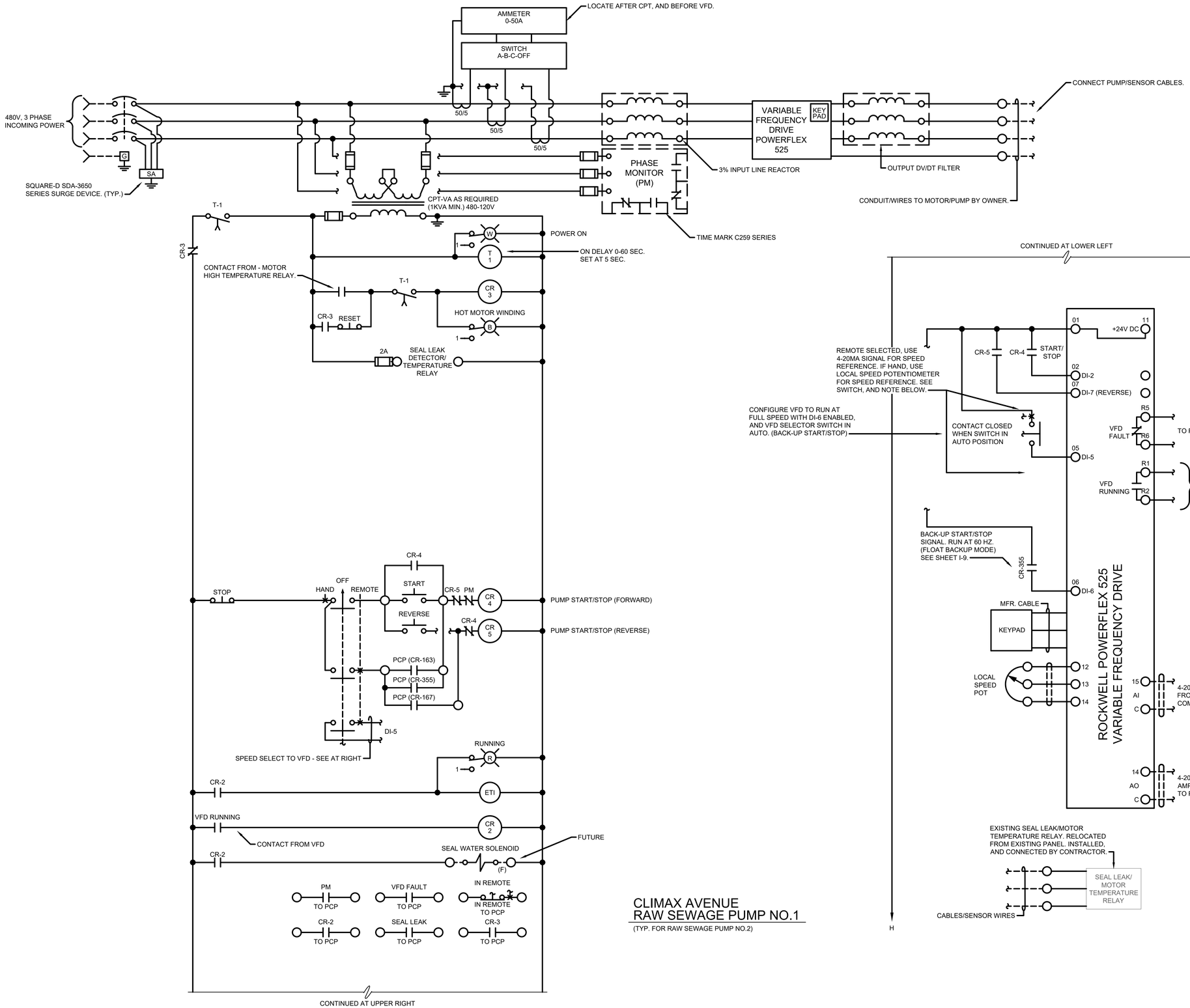

CLIMAX AVENUE
RAW SEWAGE PUMP NO.1

(TYP. FOR RAW SEWAGE PUMP NO.2)

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, I-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
CLIMAX AVENUE LIFT STATION
VFD WIRING DIAGRAMS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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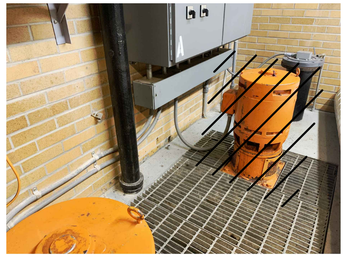
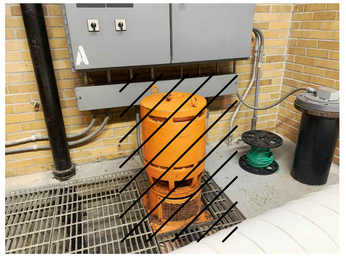
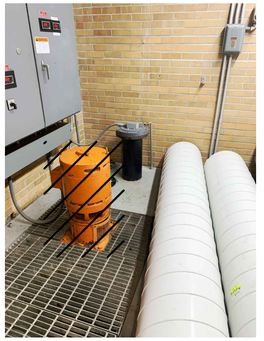
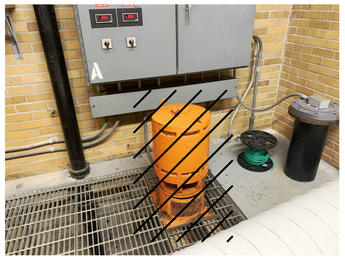




FIELD LOCATE NEW PANEL THIS AREA BETWEEN DRAIN LINE, AND LEVEL TRANSMITTER STILL WELL PIPE.

MOUNT ON STRUT RACK. POSITION TO SUIT AVAILABLE SPACE.





≈16'±

MOUNT ON STRUT RACK. POSITION TO SUIT AVAILABLE SPACE.

VFD-P2

VFD-P2

2"C(4#4)

MDP

2"C(4#4)

MDP

1"C(20#14)
1"C(2-2/C#16SH)

1"C(20#14)
1"C(2-2/C#16SH)

VFD'S, AND PANEL FURNISHED BY CONTRACTOR, DELIVERED TO SITE BY CONTRACTOR, INSTALLED BY OWNER.

SPEED POT, AND START/STOP STATION. 3RD LEVEL ON WALL.

VFD NO.2

VFD NO.2

1

PCP

SECURE PANEL TO FLOOR, AND WALL.

TIT 1

TE 1

NEMA 12 AREA

SPEED POT, AND START/STOP STATION. 3RD LEVEL. ON WALL.

VFD NO.1

VFD NO.1

2

NEMA 4 AREA AT PUMPS

≈22'±

1"C(3#10)

1"C(2/C#16SH)

MDP

PCP

DRY PIT SUBMERSIBLE PUMPS BELOW GRATING ON LOWER LEVEL BY OWNER. ASSUME DISTANCE OF 75 FT. BELOW. SEE ONE-LINE DIAGRAM FOR CONDUIT/WIRE REQUIREMENTS.

REPLACE EXISTING FUSES IN MDP FOR PUMPS NO.1, AND 2 WITH 60A FUSES.

PCP

EXISTING LP

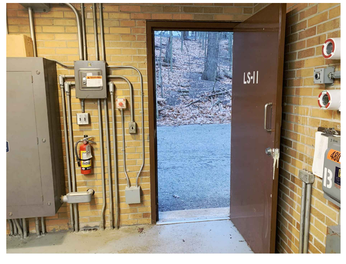
1"C(4#14)

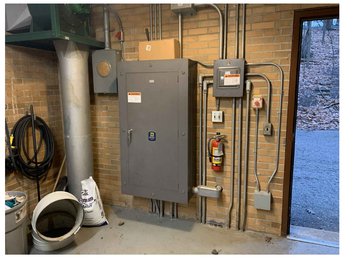
2"C(5#6)

MDP

TVSS

TURN OVER TO OWNER





WOODS LAKE LIFT STATION BACKGROUND PLAN PROPOSED WORK

NO SCALE

NOTE:

COORDINATE BYPASS PUMPING WITH OWNER. STATION MUST REMAIN IN OPERATION DURING CONSTRUCTION.

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
WOODS LAKE LIFT STATION BACKGROUND PLAN

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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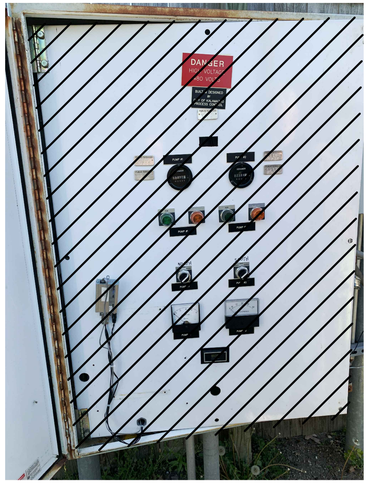
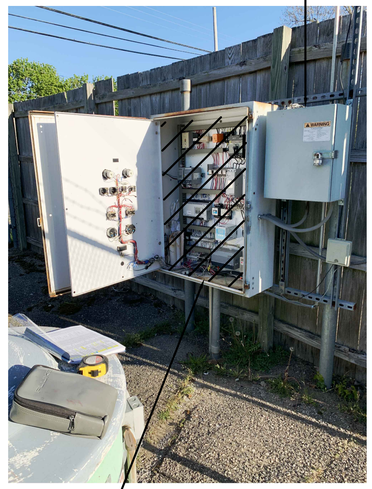
NOTES:

1. DEMOLISH THE EXISTING PUMP CONTROL PANEL AND TURN OVER TO OWNER.
2. REMOVE THE EXISTING LEVEL TRANSMITTER AND RELOCATE TO NEW PANEL/SUBPLATE.
3. REWORK EXISTING CONDUITS INTO SIDE, AND BOTTOM TO SUIT NEW PANEL INSTALLATION.
4. RECONNECT EXISTING WIRES FOR POWER, CONTROL AND SIGNAL.
5. INSTALL ANTENNA ON TOP OF 60 FT. WOOD POLE. (WOOD POLE BY OWNER) ROUTE CABLES UP POLE, AND SECURE AS REQUIRED. (TYP. OF 2 - YAGI ANTENNA'S, AND 2 - CABLES) MAINTAIN 7 FT. OF VERTICAL SEPARATION. CABLE, AND GROUND KITS/WEATHERPROOF KITS ARE FURNISHED BY CONTRACTOR, INSTALLED BY CONTRACTOR. POLE IS FURNISHED AND INSTALLED BY OWNER. ANTENNA IS FURNISHED BY OWNER, INSTALLED BY CONTRACTOR. FURNISH, AND INSTALL 10 FT. 2" SCHEDULE 40 ALUMINUM MAST PIPE FOR MOUNTING ANTENNAS AT TOP OF POLE/MAST PIPE FOR MOUNTING VERTICAL SEPARATION.
6. INSTALL NEW RADIO PANEL AT BASE OF POLE. INSTALL NEW 2 - 1 INCH PVC-RMC CONDUITS FOR POWER/CONTROL AND FIBER TO NEW PUMP CONTROL PANEL. (1"C(3#12,6#14), 1"C(2 - 50-MICRON FIBER ZIP CORDS) ASSUME THE POLE DISTANCE TO PANEL IS 125 FT. PATCH YARD BACK TO ORIGINAL CONDITION. CONDUITS MAY BE INSTALLED EXPOSED WITHIN STATION FENCED AREA. SUPPORT CONDUITS AS REQUIRED WITH 316 STAINLESS STEEL STRUT.
7. SAWCUT EXISTING CONCRETE PAD AS REQUIRED FOR NEW CONDUIT. PATCH BACK TO ORIGINAL CONDITION.
8. COORDINATE BYPASS PUMPING WITH OWNER. STATION MUST REMAIN IN OPERATION DURING CONSTRUCTION.
9. DEMOLISH THE EXISTING MAGNETIC FLOWMETER AND MAKE-UP SPOOL PIECE, AND ASSOCIATED CONDUIT AND WIRE FROM THE FLOWMETER TO THE FLOW TRANSMITTER. FLOW TRANSMITTER LOCATED OUTSIDE NEXT TO EXISTING PUMP CONTROL PANEL IN A SEPARATE NEMA 4 ENCLOSURE. INSTALL THE NEW MAGNETIC FLOWMETER AND DUCTILE IRON SPOOL PIECE. INSTALL NEW 1 INCH RMC CONDUIT UP TUBE. EXIT TUBE WITH PVC-RMC CONDUIT OVER TO EXISTING FLOW TRANSMITTER ENCLOSURE. SAW CUT EXISTING CONCRETE AREA TO SUIT NEW CONDUIT. PATCH BACK TO ORIGINAL CONDITION. FURNISH NEW MAGNETIC FLOWMETER 4 INCH 0-1060GPM. FURNISH WITH POLYURETHANE LINER AND REMOTE TRANSMITTER. FURNISH CABLE LENGTH AS REQUIRED BETWEEN FLOWTUBE AND TRANSMITTER. METER TO BE RATED CLASS 1, DIVISION 1 GROUPS C, AND D. PROVIDE FLOW TRANSMITTER WITH HART PROTOCOL.



DEMOLISH EXISTING FLOW TRANSMITTER. LOCATE NEW FLOW TRANSMITTER IN EXISTING ENCLOSURE. RECONNECT EXISTING 120V AC TO NEW CIRCUIT BREAKER NO.1 IN PCP. INSTALL NEW SHIELDED CABLE FROM FLOW TRANSMITTER TO PCP. TURN OVER EXISTING FLOWMETER, AND TRANSMITTER TO OWNER.

EXISTING FLOWMETER FOR SEWAGE FLOW METERING.



SECURE NEW PANEL TO CONCRETE PAD.

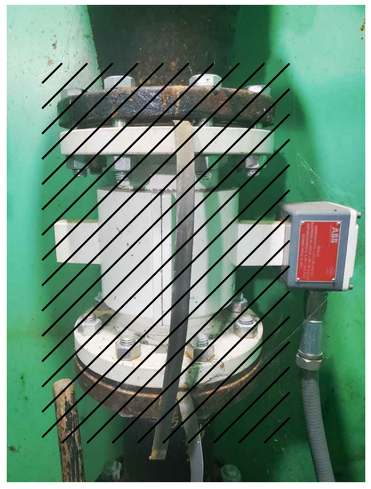
REWORK EXISTING CONDUITS/WIRES INTO BOTTOM, AND SIDE OF NEW PCP. RECONNECT EXISTING WIRES.

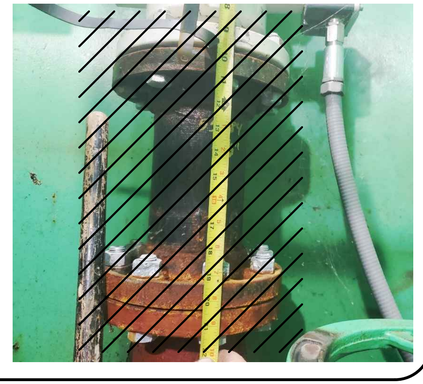
NOTE: FIELD LOCATE, AND INSTALL FLOATS IN EXISTING WETWELL. SAW CUT EXISTING CONCRETE PAD. PATCH BACK TO ORIGINAL CONDITION. INSTALL VENTED TRAY/TERMINAL BOX FOR FLOAT FOR FLOAT SWITCHES. WETWELL IS APPROXIMATELY 50 FT. FROM DRYWELL.

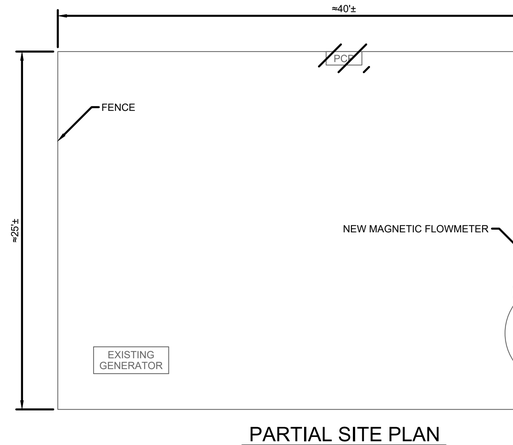
AUGUSTA-WEBSTER LIFT STATION BACKGROUND PLAN PHOTOS

NO SCALE

SEE NOTE NO.9.



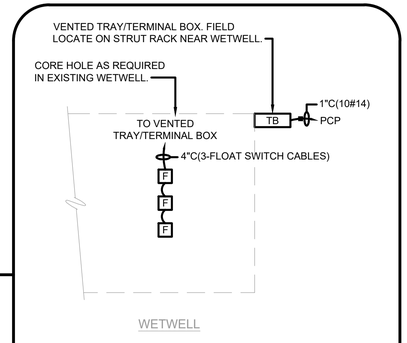




PARTIAL SITE PLAN

NO SCALE.
FIELD VERIFY EXISTING DIMENSIONS, AND WORK SHOWN.

PATCH DRIVEWAY BACK TO ORIGINAL CONDITION. FIELD VERIFY CONDUIT ROUTING PRIOR TO BIDS.



SAMPLE BLOCK DIAGRAM

TETRA TECH
www.tetratech.com
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ANN ARBOR, MI 48108
PHONE: (734) 665-6000 FAX: (734) 213-3003

MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER
CLIMAX, LA-VENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
AUGUSTA - WEBSTER LIFT STATION BACKGROUND PLAN

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-12
OF 19

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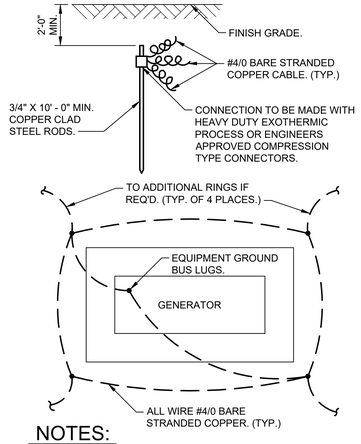
Bar Measures 1 inch

4/27/2022 11:33:39 AM - \\TT.LOCAL\IER\PROJECTS\ANN ARBOR\IER\197432\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\E-12_AUGUSTA WEBSTER_BACKGROUND PLAN.DWG - SHANK, JASON

NOTES:

1. DEMOLISH THE EXISTING PUMP CONTROL PANEL AND TURN OVER TO OWNER.
2. REMOVE THE EXISTING LEVEL TRANSMITTER AND RELOCATE TO NEW PANEL/SUBPLATE.
3. REWORK EXISTING CONDUITS INTO SIDE, AND BOTTOM TO SUIT NEW PANEL INSTALLATION THAT ARE TO REMAIN.
4. RECONNECT EXISTING WIRES FOR POWER, CONTROL AND SIGNAL.
5. INSTALL NEW PVC-RMC CONDUITS BETWEEN WETWELL, AND VENTED TRAY. SEE EXISTING WETWELL PLAN BELOW, THIS SHEET.
6. INSTALL THREE (3) NEW VENTED TRAYS AS SHOWN. FROM EACH TRAY TERMINAL BOX, INSTALL PVC-RMC CONDUITS TO THE NEW PUMP CONTROL PANEL AS SHOWN SEPARATE THE INTRINSICALLY SAFE CIRCUITS FOR LEVEL MEASUREMENT AND BACK-UP FLOATS AS REQUIRED. PROVIDE SEAL FITTINGS ON CONDUITS BETWEEN NEW PUMP CONTROL PANEL AND THE NEW TERMINAL BOXES/VENTED TRAYS.
7. INSTALL NEW 24 FT. 2" SCHEDULE 40 ALUMINUM MAST PIPE TO NEW STRUT RACK BESIDE NEW PCP. ROUTE CABLE FROM ANTENNA INTO SIDE OF PCP.
8. MOUNT YAGI ANTENNA AT TOP OF MAST PIPE. GROUND MAST PIPE WITH NO.6 AWG GREEN INSULATED RHW-USE GROUND WIRE.
9. SAWCUT EXISTING CONCRETE PAD AS REQUIRED FOR NEW CONDUITS. PATCH BACK TO ORIGINAL CONDITION.

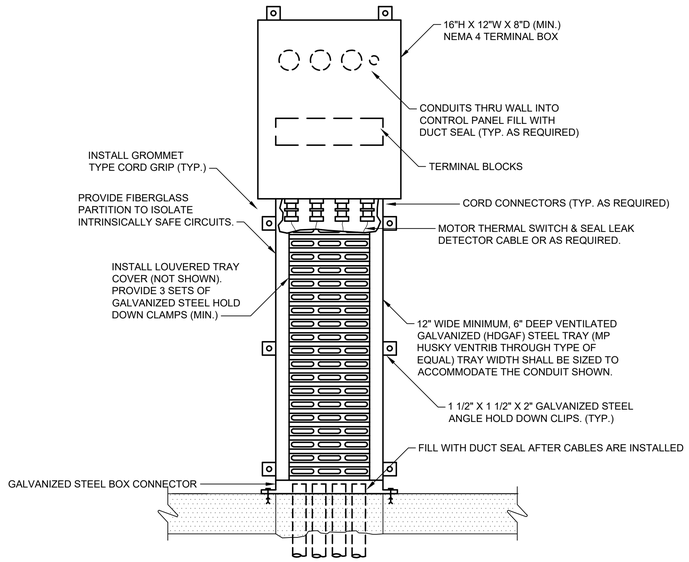


NOTES:

ADDITIONAL CONCENTRIC RINGS SHALL BE ADDED AS REQ'D. TO MEET THE (5) OHM SPECIFIED RESISTANCE. EACH RING TO HAVE 4 GROUND RODS, AND SPACE 10 FEET FROM THE INNER RING.

GROUND MAT

NO SCALE

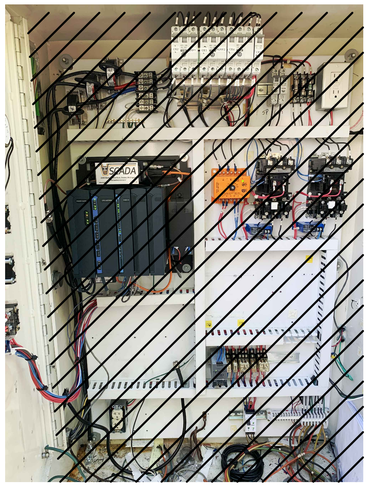


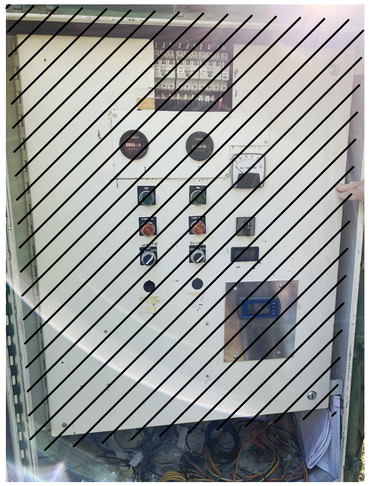
VENTED TRAY DETAIL (TYP. OF 3.)

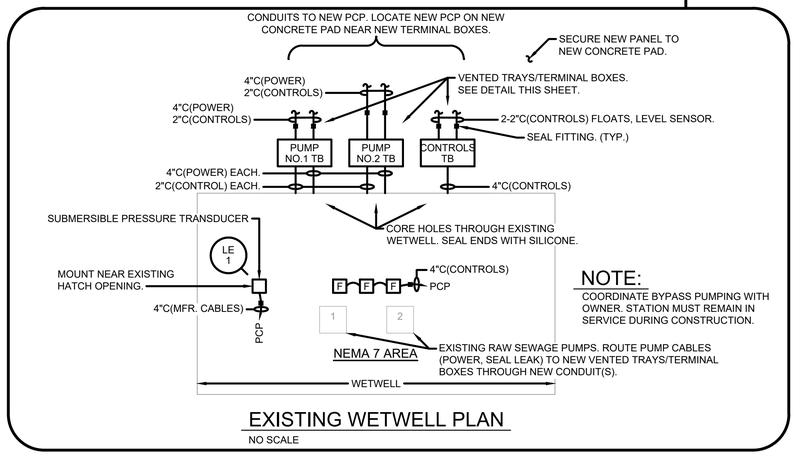
PUMP NO.1, PUMP NO.2, AND CONTROLS.

POUR NEW CONCRETE PAD 8" THICK BY 24" WIDE BY 72" LONG MINIMUM FOR NEW PANEL.

INSTALL NEW GROUND MAT, THIS AREA. BOND TO NEW PUMP CONTROL PANEL, RADIO PANEL, AND COAXIAL CABLE/MAST PIPE ON NEW WOOD POLE.







EXISTING WETWELL PLAN

NO SCALE

NOTE:

COORDINATE BYPASS PUMPING WITH OWNER. STATION MUST REMAIN IN SERVICE DURING CONSTRUCTION.

CLIMAX LIFT STATION BACKGROUND PLAN PHOTOS

NO SCALE

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ANN ARBOR, MI 48108
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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL CLIMAX LIFT STATION BACKGROUND PLAN

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-13
OF 19

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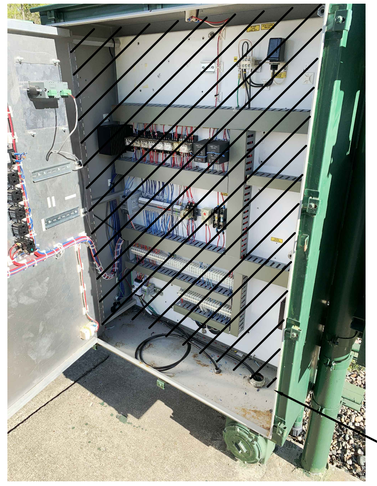
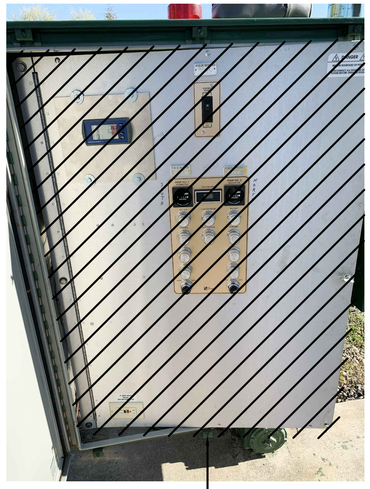
Bar Measures 1 inch

4/27/2022 11:45:59 AM - \\TT-LOCAL\IER\PROJECTS\ANN ARBOR\IER\197430\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\E-13_CLIMAX_BACKGROUND PLAN.DWG - SHANK, JASON

NOTES:

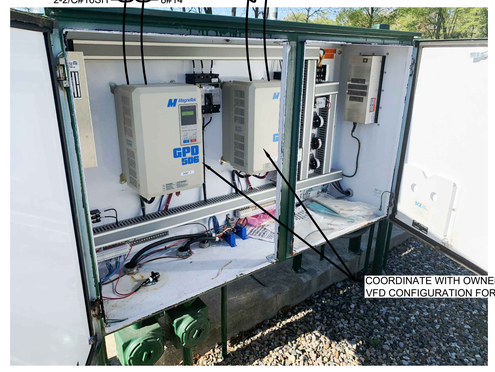
1. FURNISH AND INSTALL A NEW BACKPANEL AND INNER DOOR WITHIN THE EXISTING PUMP CONTROL SECTION CABINET.
2. REFER TO INSTRUMENTATION DRAWINGS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
3. INSTALL ANTENNA AT TOP OF NEW 80 FOOT WOOD POLE. (WOOD POLE BY OWNER) ROUTE CABLE UP POLE, AND SECURE AS REQUIRED. CABLE, AND GROUND KITS/WEATHERPROOF KITS ARE FURNISHED BY CONTRACTOR, INSTALLED BY CONTRACTOR. 80 FOOT WOOD POLE IS FURNISHED AND INSTALLED BY OWNER. ANTENNA IS FURNISHED BY OWNER, INSTALLED BY CONTRACTOR.
4. INSTALL NEW RADIO PANEL AT BASE OF POLE. INSTALL NEW 2 - 1 INCH PVC-RMC CONDUITS FOR POWER AND FIBER TO NEW PUMP CONTROL PANEL 1"C(3#12,6#14), 1"C(2 - 50-MICRON DUPLEX FIBER ZIP CORDS). FROM RADIO PANEL AT POLE. DISTANCE FROM POLE TO PANEL (100 FT.)
5. SAWCUT EXISTING CONCRETE PAD AS REQUIRED FOR NEW CONDUITS. PATCH BACK TO ORIGINAL CONDITION.





INSTALL NEW SUBPLATE, AND INTERIOR DOOR WITHIN EXISTING PANEL.
FIELD MEASURE EXISTING PANEL, AND INSTALL NEW SUBPLATES, AND DOOR TO SUIT
EXISTING PANEL DIMENSIONS. SEE SHEETS I-17 THROUGH I-21 FOR ADDITIONAL INFORMATION.
RELOCATE EXISTING SEAL LEAK/MOTOR TEMPERATURE RELAYS TO NEW PANEL. RE-POWER,
AND CONDUIT TO NEW PLC INPUTS.

CONNECT REVERSE INPUT TO EXISTING VFD'S.
COORDINATE CONNECTION WITH OWNER.
ROUTE CABLES WITHIN PANEL TO PLC I/O.



NOTE:

COORDINATE BYPASS PUMPING WITH OWNER. STATION MUST REMAIN IN SERVICE DURING CONSTRUCTION.

L-AVENUE LIFT STATION PHOTOS

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
L-AVENUE LIFT STATION
BACKGROUND PLAN

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-14
OF 19

Bar Measures 1 inch

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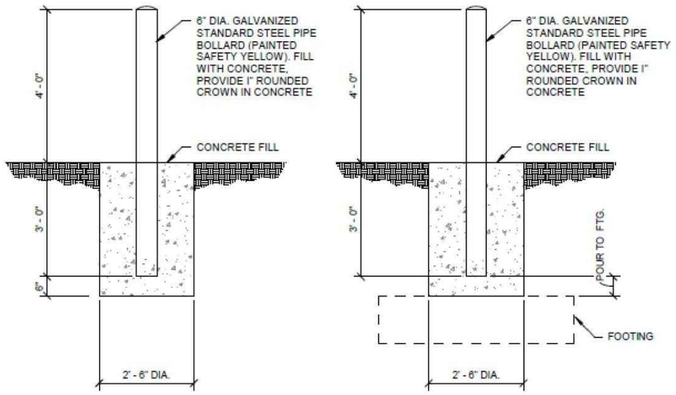
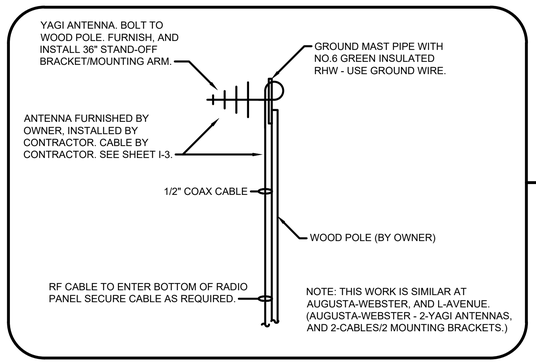
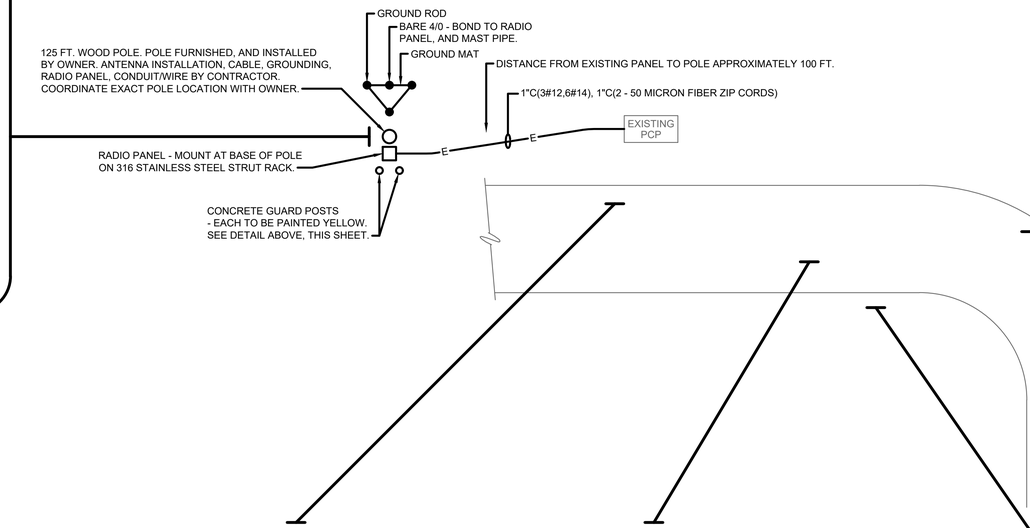
4/27/2022 11:49:31 AM - \\TT-LOCAL\IER\PROJECTS\ANN ARBOR\IER\19743\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\E-14_L-AVENUE_BACKGROUND PLAN.DWG - SHANK, JASON



TYP. BOLLARD DETAIL

SCALE 1/2" = 1'-0"





WINDING WAY LIFT STATION BACKGROUND PLAN - PHOTOS

NO SCALE

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL
WINDING WAY LIFT STATION BACKGROUND PLAN

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-15

OF 19

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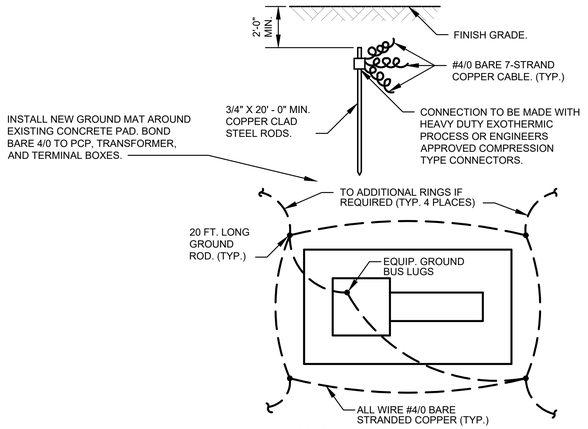
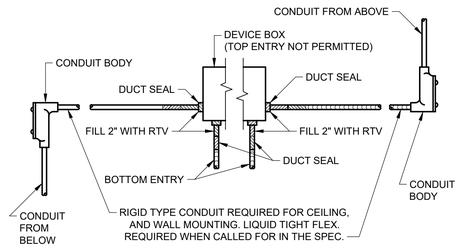


NOTE:
ADDITIONAL CONCENTRIC RINGS SHALL BE ADDED AS REQUIRED TO MEET THE (5) OHM SPECIFIED RESISTANCE. EACH RING TO HAVE 4 GROUND RODS AND SPACED 10 FEET FROM THE INNER RING.

GROUND MAT DETAIL

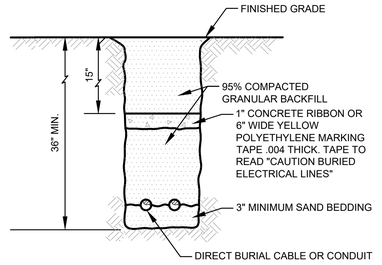
NO SCALE



NOTE:
FOR ANY DEVICE NOT FURNISHED BY ELECTRICAL (EXCEPT HVAC, AND MOTORS.)

DEVICE BOX CONDUIT DETAIL

NO SCALE
NEMA 4 AREA ONLY



TRENCHING DETAIL

NO SCALE

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-16
OF 19

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Bar Measures 1 inch

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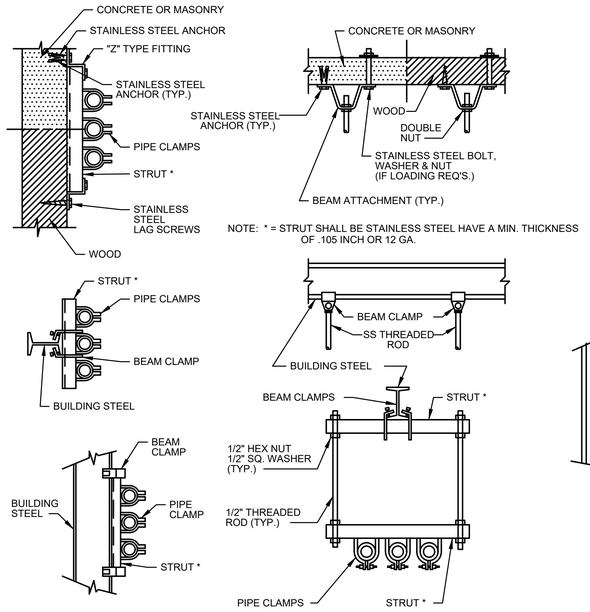


NOTE: * = STRUT SHALL BE STAINLESS STEEL HAVE A MIN. THICKNESS OF .105 INCH OR 12 GA.

VERTICALLY RACKED SUSPENDED RUN

NO SCALE

NOTES:

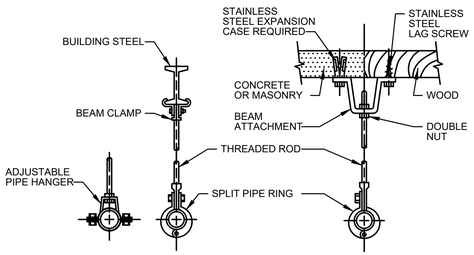
1. ALL MOUNTING HARDWARE AND SUPPORTS TO BE 316 STAINLESS STEEL.

HORIZ. RACKED SUSPENDED RUN

NO SCALE

NOTES:

1. ALL MOUNTING HARDWARE AND SUPPORTS TO BE 316 STAINLESS STEEL.

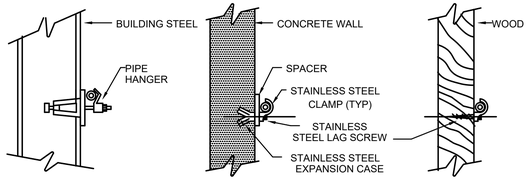


SINGLE CONDUIT HANGERS

NO SCALE

NOTES:

1. ALL MOUNTING HARDWARE AND SUPPORTS TO BE 316 STAINLESS STEEL.

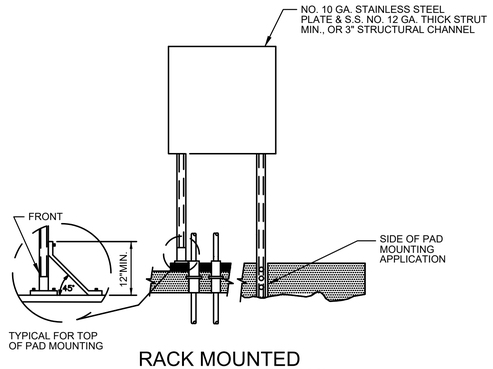


VERTICAL AND HORIZONTAL CONDUIT RACKS AND HANGERS

NO SCALE

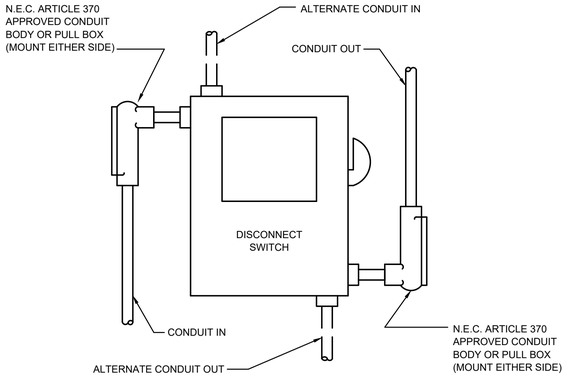
NOTES:

1. ALL MOUNTING HARDWARE AND SUPPORTS TO BE 316 STAINLESS STEEL.



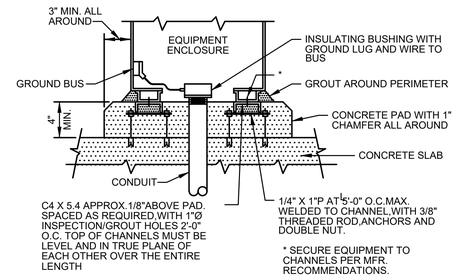
RACK MOUNTED EQUIPMENT DETAIL

NO SCALE



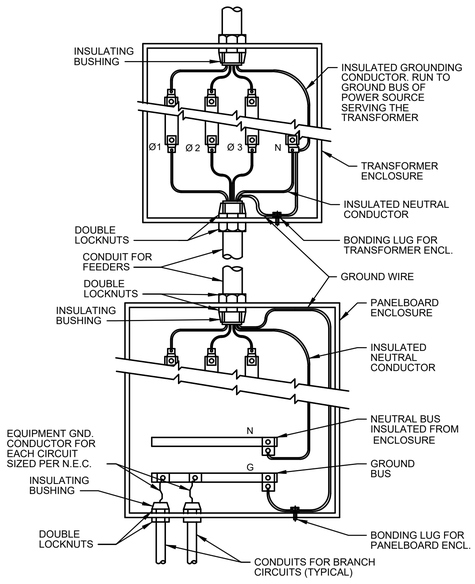
DISCONNECT SWITCHES

NO SCALE



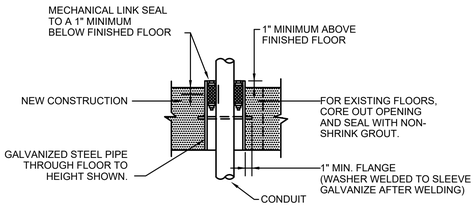
PAD MOUNTED EQUIPMENT DETAIL

NO SCALE



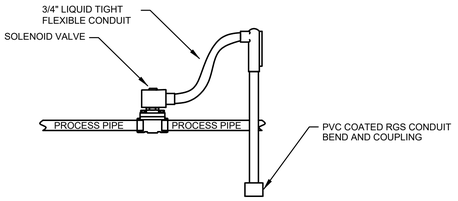
CONDUIT GROUNDING DETAILS FOR TRANSFORMERS, DISTRIBUTION PANELS AND WALL MOUNTED ENCLOSURES

NO SCALE



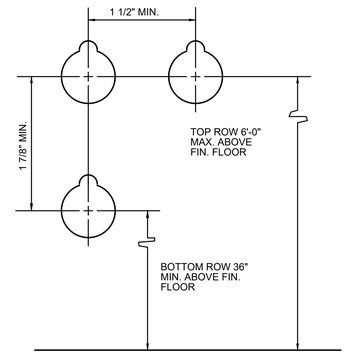
INTERIOR FLOOR CONDUIT SLEEVE DETAIL

NO SCALE



SOLENOID STUB-UP DETAIL

NO SCALE



TYPICAL PUSHBUTTON, PILOTLIGHT SELECTOR SWITCH PANEL SPACING

NO SCALE

ALL HARDWARE SHALL BE 316 STAINLESS STEEL INCLUDING NUTS, BOLTS, WASHERS, ANCHORS, STRUTS, ETC. THIS REQUIREMENT HAS PRECEDENCE OVER STANDARD DETAILS, AND PROJECT MANUAL/SPECIFICATIONS.

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-17

OF 19

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Bar Measures 1 inch

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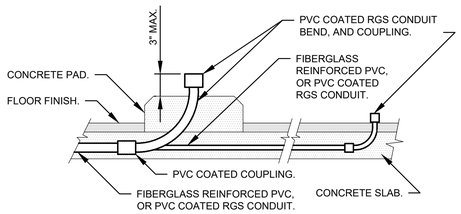
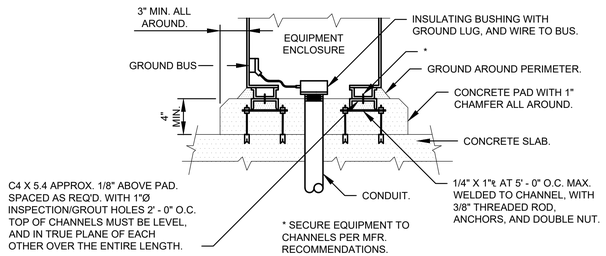
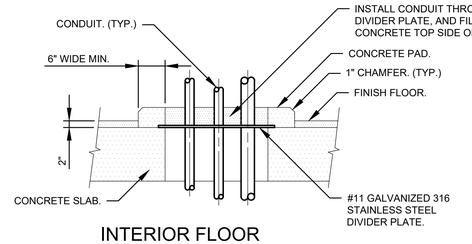


NOTE:
PVC COATED CONDUIT BENDS, AND FITTINGS SHALL BE USED WHERE CONCEALED CONDUIT RUNS ARE STUBBED UP FROM THE SLAB. RISERS ON POLES SHALL BE PVC COATED RGS INCLUDING WEATHERHEADS.

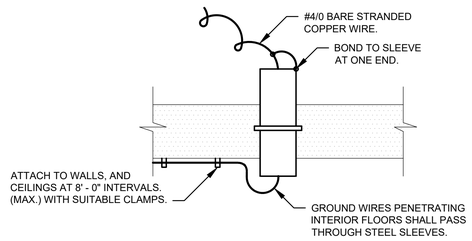
CONDUIT STUB-UP DETAIL
NO SCALE



OUTDOOR PAD MOUNTED EQUIPMENT DETAIL
NO SCALE



INTERIOR FLOOR CONDUIT FLOOR OPENING DETAIL
NO SCALE



INTERIOR GROUND FLOOR SLEEVE
NO SCALE

ALL HARDWARE SHALL BE 316 STAINLESS STEEL INCLUDING NUTS, BOLTS, WASHERS, ANCHORS, STRUTS, ETC. THIS REQUIREMENT HAS PRECEDENCE OVER STANDARD DETAILS, AND PROJECT MANUAL/SPECIFICATIONS.

TETRA TECH
www.tetratech.com
710 AVIS DRIVE
ANN ARBOR, MI 48108
PHONE: (734) 665-6000 FAX: (734) 213-3003

MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

E-18
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Bar Measures 1 inch

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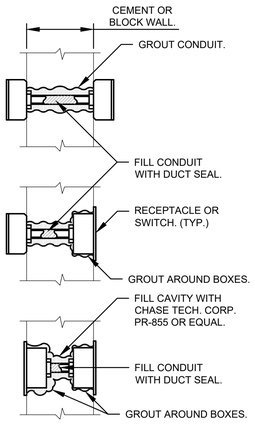
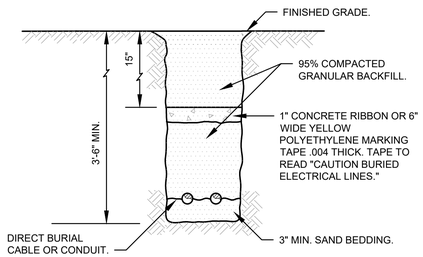


WALL BOXES BACK-TO-BACK

NO SCALE

- FOR SOUND PROOFING



TRENCHING DETAIL

NO SCALE

ALL HARDWARE SHALL BE 316 STAINLESS STEEL INCLUDING NUTS, BOLTS, WASHERS, ANCHORS, STRUTS, ETC. THIS REQUIREMENT HAS PRECEDENCE OVER STANDARD DETAILS, AND PROJECT MANUAL/SPECIFICATIONS.

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

ELECTRICAL DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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GRAPHIC SYMBOLS FOR INSTRUMENTATION ITEMS

	DESCRIPTION	SYMBOL	DESCRIPTION
	DEVICE MOUNTED ON PANEL		FLOW ACTUATED SWITCH - NC
	BOARD OR PANEL MOUNTED DEVICE - DEVICE MOUNTED INSIDE PANEL		TEMPERATURE SWITCH - NO
	FIELD OR LOCALLY MOUNTED DEVICE		TEMPERATURE SWITCH - NC
	PROGRAMMED FUNCTION NOT NORMALLY ACCESSIBLE TO OPERATOR		LIMIT SWITCH (PROXIMITY TYPE) - NORMALLY OPEN
	PROGRAMMED FUNCTION ACCESSIBLE THROUGH OPERATOR'S INTERFACE DEVICE		LIMIT SWITCH (PROXIMITY TYPE) - NORMALLY CLOSED
	PLC INPUT OR OUTPUT POINT		LIMIT SWITCH (PROXIMITY TYPE) - NORMALLY CLOSED - HELD OPEN
	INTERLOCKING		LIMIT SWITCH (PROXIMITY TYPE) - NORMALLY OPEN - HELD CLOSED
XOR	EXCLUSIVE OR		CONTROL RELAY CONTACT - NORMALLY OPEN
A	ALTERNATOR		CONTROL RELAY CONTACT - NORMALLY CLOSED
OR	OR		LIGHTING ARRESTOR
AND	AND	ETI	ELAPSED TIME INDICATOR
S	MOTOR STARTER	T	TIMING RELAY COIL
P	PURGE	T 1	TIMING RELAY COIL (OFF DELAY)
L	COMPLEX LOGIC	G	INDICATING LIGHT
	COMPUTER LOGIC SYSTEM		PUSH-TO-TEST INDICATING LIGHT
	TERMINAL OR TRANSITION POINT		BATTERY
	FLOAT SWITCH	X1 X2	SECONDARY TRANSFORMER
	PARTIAL FLUME		VARIABLE RESISTOR
	MIXER		RESISTOR
	SEAL		MOLDED CASE CIRCUIT BREAKER
	OFF PAGE CONNECTOR		SPEED SWITCH
	PROCESS MACHINERY MOTOR		MOMENTARY PUSHBUTTON OPERATOR - NORMALLY CLOSED
	VENTURI OR INSERT FLOW TUBE		MOMENTARY PUSHBUTTON OPERATOR - NORMALLY OPEN
	IN-FLOW ELEMENT (PROPELLER TYPE)		SELECTOR SWITCH - NORMALLY OPEN
	IN-LINE FLOW ELEMENT (MAGNETIC TYPE)		PUSHBUTTON OPERATOR WITH MUSHROOM HEAD
	IN-LINE FLOW ELEMENT (ULTRASONIC)		SOLENOID OR CLUTCH
	FLOW ORIFICE		THERMAL OVERLOAD
	TURBIDITY METER	(F)	FIELD LOCATED
	ROTOMETER		TERMINAL POINT
	PUMP		TERMINAL
	BLOWER		LOW VOLTAGE FUSE
	GENERAL USE DISCONNECTING SWITCH		FUSIBLE TERMINAL BLOCK
	TIME CLOSED CONTACT ON ENERGIZATION		CIRCUIT BREAKER WITH STAB CONNECTION
	TIME OPENED CONTACT ON ENERGIZATION		CONTROL POWER TRANSFORMER
	TIME CLOSED CONTACT ON DE-ENERGIZATION	CR L / CR U	TWO COIL LATCHING RELAY
	TIME OPENED CONTACT ON DE-ENERGIZATION		RECEPTACLE
	FLOAT ACTUATED SWITCH - NO	OFF HAND AUTO	SELECTOR SWITCH OPERATOR WITH FUNCTION SHOWN
	FLOAT ACTUATED SWITCH - NC		
	PRESSURE ACTUATED SWITCH - NO		
	PRESSURE ACTUATED SWITCH - NC		
	FLOW ACTUATED SWITCH - NO		

GRAPHIC SYMBOLS FOR INSTRUMENTATION ITEMS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
FOC-DI(X) FOC-DO(X)	DISCRETE INPUT TO FIBER CONVERTER (PROVIDE WITH 120V AC P/S FIBER CONVERTER TO DISCRETE OUTPUT) (PROVIDE WITH 120V AC P/S (WEED EOTEC - 2S07/2H07 WITH 120V AC P/S)) QUANTITY (X) AS NOTED ON DRAWINGS	FOC-AI(X) FOC-AO(X)	ANALOG INPUT TO FIBER CONVERTER. FIBER CONVERTER TO ANALOG INPUT (WEED EOTEC 2T14/2R14 WITH P/S AS REQUIRED) QUANTITY (X) AS NOTED ON DRAWINGS
FOC	FIBER OPTIC CONVERTER - TYPE, AND STYLE AS NOTED		FLANGED DIAPHRAGM SEAL
FOPP	FIBER OPTIC PATCH PANEL - CONNECTORS, AND QUANTITY AS REQUIRED		

GRAPHIC SYMBOLS FOR VALVES

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	STROKE OR POSITION ACTUATOR CYLINDER (OPEN-SHUT)		CHECK VALVE
	STROKE OR POSITION ACTUATOR CYLINDER (THROTTLING)		PLUG VALVE
	PNEUMATIC DIAPHRAGM OR POSITIONER (OPEN-SHUT)		BUTTERFLY VALVE, DAMPER OR LOUVER
	PNEUMATIC DIAPHRAGM OR POSITIONER (THROTTLING)	S	TWO - WAY SOLENOID VALVE OPERATOR
M	MOTOR OPERATED (THROTTLING)	M	ELECTRONICALLY CONTROLLED CHECK VALVE
M	MOTOR OPERATED (OPEN - SHUT)	S D	TWO - WAY SOLENOID VALVE OPERATOR - DETENTED
	SLIDE - STOP GATE	S	THREE - WAY SOLENOID VALVE OPERATOR
	SLUICE GATE	S	FOUR - WAY SOLENOID VALVE OPERATOR
	AIR SET ASSEMBLY	S-S MD	MANIFOLD STYLE BLOCK I/O SOLENOID VALVE - DUAL COILS
	BALL VALVE		
	GLOBE VALVE		
	GATE VALVE OR KNIFE GATE		

NOTE: THE PLC I/O ADDRESS SHALL BE USED AS THE WIRING TAG SCHEME FOR ALL PANEL AND FIELD CONTROL WIRING. COORDINATE WITH ELECTRICAL CONTRACTOR.

INSTRUMENTATION LINE SYMBOLS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	ELECTRICAL SIGNAL	E-NET	ETHERNET COMMUNICATION SIGNAL-UNSHIELDED TWISTED PAIR (UTP)-SPEED AS INDICATED
// //	AIR LINE/PNEUMATIC SIGNAL		
L	HYDRAULIC SIGNAL	E-FO	ETHERNET FIBER OPTIC COMMUNICATIONS SIGNAL
	ELECTROMAGNETIC OR SONIC SIGNAL	FO	PLC REMOTE I/O FIBER OPTIC COMMUNICATION SIGNAL
O	SOFTWARE SIGNAL	V-FO	ETHERNET VIDEO FIBER OPTIC
	CONNECTION TO PROCESS, OR MECHANICAL LINK		

I.S.A. STANDARD LETTER FUNCTIONS

SYMBOL	FIRST LETTER	SUCCEEDING LETTERS
A	ANALYSIS, ANALOG	ALARM
B	BURNER, FLAME	BATCH
C	CONDUCTIVITY, COMMAND	CONTROL (FEEDBACK TYPE)
D	DENSITY, SPECIFIC GRAVITY	
E	VOLTAGE	PRIMARY ELEMENT
F	FLOW RATE	RATIO
G	GAGING	GLASS
H	HAND, MANUAL	HIGH
I	CURRENT	INDICATE
J	POWER	SCAN
K	TIME, TIME SCHEDULE	CONTROL (NO FEEDBACK)
L	LEVEL, LIGHT	LOW
M	MOISTURE, HUMIDITY	MIDDLE, MODULATE
N		
O	OVERLOAD	ORIFICE
P	PRESSURE, VACUUM	POINT
Q	QUANTITY	TOTALIZE, INTEGRATE
R	RADIOACTIVITY	RECORD, PRINT, RECEIVE
S	SPEED, FREQUENCY, SOLENOID	SWITCH
T	TEMPERATURE, TURBIDITY	TRANSMIT, TRANSFORM
U	MULTIVARIABLE	MULTIFUNCTION
V	VIBRATION, VISCOSITY	VALVE, DAMPER, LOUVER
W	WEIGHT, FORCE	
X		RELAY, COMPUTE
Y		DRIVE, ACTUATE
Z	POSITION	

ABBREVIATIONS

SYMBOL	DESCRIPTION
R	RESET
T	TRIP
AS	AIR SUPPLY
DO	DISSOLVED OXYGEN
GS	GAS SUPPLY
HS	HYDRAULIC SUPPLY
NS	NITROGEN SUPPLY
ORP	OXYGEN REDUCTION POTENTIAL
SS	STEAM SUPPLY
SP	SET POINT
WS	WATER SUPPLY
PV	PROCESS VARIABLE
F.O.	FAIL OPEN
F.C.	FAIL CLOSE
SBPP	SCREEN BUILDING PROCESSOR PANEL
TFBMPP	TERTIARY FILTER BUILDING MAIN PROCESSOR PANEL
HVACP	HEATING VENTILATION AIR CONDITIONING CONTROL PANEL - I/O
MD	MAIN DISCONNECT
%	GAIN OR PROPORTIONAL CONTROL
∫	INTEGRAL OR RESET CONTROL
D	DERIVATIVE OR RATE CONTROL
V	VELOCITY ALGORITHM
1-0	ON - OFF CONTROL
√	SQUARE ROOT EXTRACTOR
Σ	ADD OR TOTALIZE
Δ	SUBTRACT OR DIFFERENCE
>	HIGHEST MEASURED VARIABLE
<	LOWEST MEASURED VARIABLE
E/I , I/P	CONVERT ONE TO ANOTHER
* , /	MULTIPLY, DIVIDE
±	BIAS OR REVERSING
f(x)	CHARACTERIZE - (EQUATION / /D/%/ETC.)

NOTE: TURN OVER ALL DEMOLISHED EQUIPMENT TO OWNER.

TETRA TECH
www.tetratech.com
710 AVIS DRIVE
ANN ARBOR, MI 48108
PHONE: (734) 665-6000 FAX: (734) 213-3003

MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION LEGEND

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-1
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NOTES:

1. FIELD VERIFY CONDUIT ROUTING AT SEWAGE LIFT STATIONS WITH OWNER. CORE HOLES AS REQUIRED TO SUIT INSTALLATION OF THE CONDUITS SHOWN. PATCH WITH NON-SHRINK GROUT.

2. TURN OVER TO OWNER AT PROJECT COMPLETION OPERATION AND MAINTENANCE MANUALS (QUANTITY AS SPECIFIED) TO OWNER.

GENERAL CONSTRUCTION NOTES:

1. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN LIGHT LINE WEIGHTS ON THE DRAWINGS ARE EXISTING ITEMS TO REMAIN. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN HEAVY LINE WEIGHTS ARE NEW THIS CONTRACT.

2. ITEMS SHOWN OR NOTED TO BE DEMOLISHED ON THE DRAWINGS ARE EXISTING ITEMS TO BE REMOVED FROM SITE BY CONTRACTOR UNLESS NOTED TO BE TURNED OVER TO OWNER.

3. FOR ITEMS INDICATED AS "FIELD LOCATE", THE CONTRACTOR SHALL FIELD VERIFY FOR INTERFERENCE AND FOR LOCATIONS OF MOUNTING FLANGES, CONNECTION POINTS, ETC.

4. CONDUIT ROUTINGS SHOWN ON BACKGROUND PLANS ARE INTENDED ROUTINGS ONLY. EXACT CONDUIT ROUTINGS FOR CONDUITS, AND LENGTH SHALL BE FIELD LOCATED AND VERIFIED BY THE CONTRACTOR. COORDINATE CONDUIT ROUTING IN FINISHED AREAS WITH OWNER. CONDUIT TO BE CONCEALED IN THESE AREAS.

5. REFER TO THE CABLE MANUFACTURER'S RECOMMENDATIONS FOR MINIMUM BEND RADIUS FOR FIBER OPTIC CABLES. INSTALL NEW PULL BOXES (PB) AS REQUIRED FOR CONDUITS. SIZE PULL BOXES AS REQUIRED PER FIBER OPTIC CABLE MANUFACTURERS RECOMMENDATIONS.

6. CONDUITS/RACEWAYS, PULL BOXES AND JUNCTION BOXES TO BE INSTALLED WITH 316 STAINLESS STEEL CHANNEL STRUT. MINIMUM STRUT LENGTH TO BE 12 INCHES, WHERE POSSIBLE.

7. PANELS SHALL BE MOUNTED OFF WALLS WITH STRUT, CONDUITS SHALL BE MOUNTED ON STRUT INCLUDING SINGLE RUNS.

8. CONDUIT ENTERING CONTROL PANELS AND ELECTRICAL EQUIPMENT ENCLOSURES SHALL BE FILLED WITH DUCT SEAL, INCLUDING OPENINGS IN BOTTOM OF PANELS, AND EQUIPMENT.

9. REPAIR SIDEWALKS AND ROADWAYS DUE TO SITE WORK ADDITIONS, THE EXTENT OF THE REPAIR REQUIRED SHALL BE FIELD VERIFIED PRIOR TO BIDS IN CONJUNCTION WITH THE WORK SHOWN IN THE CONTRACT DOCUMENTS. PRIOR TO TRENCHING, FIELD LOCATE EXISTING GAS LINES, TELEPHONE LINES, SPRINKLER LINES, ETC. COORDINATE WITH OWNER

10. PULL CORDS SHALL BE INSTALLED IN CONDUITS CONTAINING NETWORK CABLES, AND FIBER OPTIC CABLES.

11. CORE HOLES AS REQUIRED TO SUIT INSTALLATION OF CONDUIT AND WIRING/CABLING AS SHOWN. FIELD VERIFY EXACT EXTENT OF WORK REQUIRED.

12. FURNISH PULL BOXES FOR FIBER OPTIC CABLE. COORDINATE EXACT BENDING RADIUS WITH MANUFACTURER.

13. NEW CONDUITS INSTALLED THIS CONTRACT WITH FIBER OPTIC CABLES ARE TO BE LABELED WITH PHENOLIC TAGS (AT BEGINNING TO END) TO INDICATE THE NUMBER OF STRANDS, ORIGINATION AND DESTINATION. TAGS TO BE COLOR CODED ORANGE FOR MULTIMODE.

14. WHERE NEW CONDUITS SHOWN TO BE INSTALLED PASS UNDER ROADWAYS, CONDUITS SHALL BE CONCRETE ENCASED.

15. PRIOR TO EXCAVATION, FIELD LOCATE EXISTING UTILITIES. COORDINATE WITH OWNER.

16. AREAS WHERE CAMERAS ARE SHOWN TO BE INSTALLED SHALL BE CLASSIFIED AS NEMA 4, UNLESS CALLED OUT OTHERWISE.

17. THE ASSOCIATED INSTRUMENTATION DRAWINGS SHOW EXISTING WIRES AND TERMINAL NUMBERS REQUIRED TO PROPERLY INTERFACE WITH NEW EQUIPMENT. THIS INFORMATION WAS COLLECTED FROM AS-BUILT DRAWINGS AND EXTENSIVE FIELD VERIFICATION. THE INFORMATION SHALL BE USED AS A GUIDE IN RE-TERMINATION. IT SHALL REMAIN THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE THE WIRING AND TO REVISE TO SUIT AS REQUIRED. CHANGES IN THE CONTRACT OR COST WILL NOT BE GRANTED FOR THIS COORDINATION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE PROPOSED WORK SHOWN.

18. CONDUIT ROUTINGS SHOWN ON BACKGROUND PLANS ARE PROPOSED ROUTINGS ONLY. EXACT CONDUIT ROUTINGS AND LENGTH SHALL BE FIELD LOCATED AND VERIFIED BY THE CONTRACTOR. COORDINATE CONDUIT ROUTING IN FINISHED AREAS WITH OWNER. CONDUIT TO BE CONCEALED IN THESE AREAS.

19. RACEWAYS, PULL BOXES AND JUNCTION BOXES TO BE INSTALLED WITH 316 STAINLESS STEEL FASTENERS SUPPORTS, AND THREADED ROD, ETC. (CHANNEL STRUT TO ALSO BE STAINLESS STEEL). MINIMUM STRUT LENGTH TO BE 12 INCHES, WHERE POSSIBLE. TYPICAL FOR NEMA 12, 4, AND 7 AREAS.

20. WIRING FOR STARTERS SHALL BE IN ACCORDANCE WITH NEMA CLASS II B STANDARDS. SUBMIT ENGINEERED SHOP DRAWINGS FOR ALL STARTERS SHOWN TO BE WIRED.

21. WIRE NUMBERS (1, 3, 5, ETC.) SHALL BE PREFIXED WITH STARTER TAG NUMBERS. THE WIRE NUMBER AFTER THE PREFIX SHALL BE THE MANUFACTURER'S WIRE NUMBERING SYSTEM. WIRE MARKERS SHALL BE USED AT EACH WIRE TERMINATION POINT.

22. IN AREAS WHERE EQUIPMENT AND CONDUIT IS REMOVED, REPAIR WALL AND FLOOR SURFACES AS REQUIRED TO MATCH SURROUNDING AREA. WHERE DEVICES ARE REMOVED FROM CONCEALED BOXES, FURNISH AND INSTALL A BLANK COVER ON THE BOX.

23. FIBER OPTIC CABLE SHALL BE AS CALLED OUT ON SYSTEM CONFIGURATION DRAWINGS, SINGLE MODE, ALL DIELECTRIC, SUITABLE FOR INSTALLATION UNDERGROUND IN WET CONDUIT.

GENERAL NOTES:

1. PRIOR TO SUBMITTING A BID FOR THE WORK DETAILED UNDER THIS CONTRACT, BIDDER SHALL VISIT THE SEWAGE LIFT STATIONS. THE BIDDER SHALL FULLY ACQUAINT ONESELF WITH EXISTING FIELD CONDITIONS AT EACH SITE. NO BULLETINS WILL BE WRITTEN FOR WORK DUE TO LACK OF VERIFICATION OF EXISTING SITE CONDITIONS AND WIRING.

2. NO WIRES SHALL BE TERMINATED TO TERMINAL STRIPS, OR OTHER EQUIPMENT WITHOUT FIRST VERIFYING SIGNAL TYPE. DAMAGES RESULTING IN LACK OF VERIFICATION SHALL BE BORNE BY THE CONTRACTOR. CONTRACTOR SHALL COORDINATE SIGNAL TYPE AND VOLTAGE WITH I/O CARDS SHOWN.

3. WITHIN CONTROL PANELS, NAMEPLATES SHALL BE PROVIDED TO INDICATE DIFFERENT VOLTAGE LEVELS WITHIN PANELS. ALSO, A NAME TAG (YELLOW BACKGROUND, RED LETTERING) SHALL BE LOCATED ON THE FRONT OF EVERY PANEL INDICATING THAT WHEN MAIN PANEL DISCONNECTED 120V IS STILL PRESENT FROM FIELD DEVICES (YELLOW WIRING/ISOLATED INPUT CARDS.)

4. PHENOLIC TAGS ON FACE OF CONTROL PANELS TO HAVE WHITE BACKGROUND AND BLACK LETTERING (EXCEPT WARNING TAGS; YELLOW BACKGROUND RED LETTERING).

5. PROVIDE SAFETY COVERS ON ALL 480V MOLDED CASE MAIN CIRCUIT BREAKERS TO INSULATE THE INCOMING CABLES AND SIDE CONDUCTORS FROM CONTACT. (TYP. FOR CONTROL PANELS.) PROVIDE BREAKER LOCKS FOR PUMP CIRCUIT BREAKERS (MCP)AND MAIN PANEL BREAKERS.

6. REFER TO WIRING DIAGRAMS FOR ADDITIONAL INFORMATION ON ISOLATED I/O. A COMMON NEUTRAL MAY BE USED FOR SEVERAL ISOLATED INPUTS FROM THE SAME STARTER. PROVIDE NEUTRAL JUMPERS WIRES WITHIN THE PANEL AS REQUIRED.

7. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN LIGHT LINE WEIGHTS ON THE DRAWINGS ARE EXISTING ITEMS TO REMAIN. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN HEAVY LINE WEIGHTS ARE NEW THIS CONTRACT.
8. ITEMS SHOWN CROSSHATCHED (OR NOTED TO BE DEMOLISHED) ON THE DRAWINGS ARE EXISTING ITEMS TO BE REMOVED, FROM SITE BY CONTRACTOR.

9. INSTALL A SINGLE CONDUCTOR INSULATED (RHW, THHN, OR XHHW) COPPER GROUND WIRE IN EACH CONDUIT, SIZE AS SHOWN ON DRAWINGS, OR AS A MINIMUM PER THE NATIONAL ELECTRICAL CODE. THIS GROUND WIRE SHALL BE CONNECTED AT EACH END TO THE EQUIPMENT GROUND. THIS ALSO INCLUDES INSTRUMENTATION DEVICES SUCH AS LEVEL, PRESSURE, FLOW TRANSMITTERS, LIMIT SWITCHES, CONDUITS, NETWORK AND I/O CABLES.

10. THE FOLLOWING EXAMPLE COMPONENT IDENTIFICATION SHALL BE USED AS APPROPRIATE:

(F) FIELD MOUNTED, NOT AT STARTER OR OTHER CONTROL PANELS
(S) STARTER PANEL MOUNTED
(MCP)AT MAIN CONTROL PANEL
(1) AT CONTROL PANEL NO.1
(2) AT CONTROL PANEL NO.2
(TCP) AT TEMPERATURE CONTROL PANEL

11. REFER TO DETAIL SHEETS. CONTRACTOR SHALL FURNISH AND INSTALL HARDWARE AND APPURTENANCES (I.E. PIPE TAPS, WETWELL BUBBLER TUBES, VALVES, COPPER TUBING, BALL VALVES, PNEUMATIC PIPING, SPOOL PIECES, ETC.) FOR FIELD DEVICES SHOWN (FLOWMETERS, PRESSURE TRANSMITTERS, LEVEL TRANSMITTERS, ETC.). WORK SHALL BE COORDINATED WITH OTHER TRADES (MECHANICAL INSTRUMENTATION, ETC.) CONTRACTOR SHALL BE RESPONSIBLE FOR SYSTEM COORDINATION AND INSTALLATION.

12. ETHERNET AND FIBER OPTIC TERMINATIONS SHALL BE PERFORMED BY A QUALIFIED REPRESENTATIVE OF CABLE MANUFACTURER, THE CABLES SHALL BE TESTED. NO SPLICING SHALL BE PERMITTED OF FIBER OPTIC CABLES, BETWEEN PANELS. FIBERS SHALL BE TERMINATED AT PATCH PANELS, INCLUDING SPARES.

13. REFER TO THE CABLE MANUFACTURER'S RECOMMENDATIONS FOR MINIMUM BEND RADIUS FOR FIBER OPTIC CABLES. INSTALL NEW PULL BOXES (PB) AS REQUIRED FOR CONDUITS. SIZE PULLBOXES AS REQUIRED PER FIBER OPTIC CABLE MANUFACTURERS RECOMMENDATIONS.

14. CONDUIT ENTERING CONTROL PANELS AND ELECTRICAL EQUIPMENT ENCLOSURES SHALL BE FILLED WITH DUCT SEAL, INCLUDING OPENINGS IN BOTTOM OF PANEL.

15. CABLES (INCLUDING FIBER, ETHERNET, CONTROL WIRE, ETC.) WHERE PASSING THROUGH A PULLBOX SHALL BE LABELED AND COMPLETELY IDENTIFIED WITH IDENTIFICATION NUMBERS AND ORIGINATION/DESTINATION. THIS ALSO INCLUDES ALL CABLE BUNDLES ENTERING CONTROL PANELS, PULLBOXES, ETC.

16. CONTROL WIRES SHALL BE TAGGED WITH THE PLC I/O ADDRESS IN THE FIELD AND AT THE PANEL.

17. THE FIELD DEVICES SHOWN ON THE P&ID'S, ELECTRICAL BACKGROUNDS, AND DETAILS SHEETS MAKEUP THE FIELD DEVICE EQUIPMENT REQUIREMENTS. NOT ALL FIELD DEVICES REQUIRED ARE SHOWN ON THE P&ID'S.

18. UPS SELECTED SHALL BE COMPATIBLE WITH ISOLATION TRANSFORMERS. (TYP.)

19. REFER TO I/O DRAWING LAYOUT FOR ADDITIONAL SIGNALS NOT SHOWN ON P&ID FLOW DIAGRAMS.

1I 0117 PROCESSOR NO.1, INPUT RACK 0, SLOT (OR GROUP) 1, BIT 17

EXAMPLE OF P&ID I/O SYMBOL

NOTE: THE PLC I/O ADDRESS SHALL BE USED AS THE WIRING TAG SCHEME FOR ALL PANEL AND FIELD CONTROL WIRING. COORDINATE WITH ELECTRICAL CONTRACTOR.

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, I-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION NOTES

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-2
OF 30

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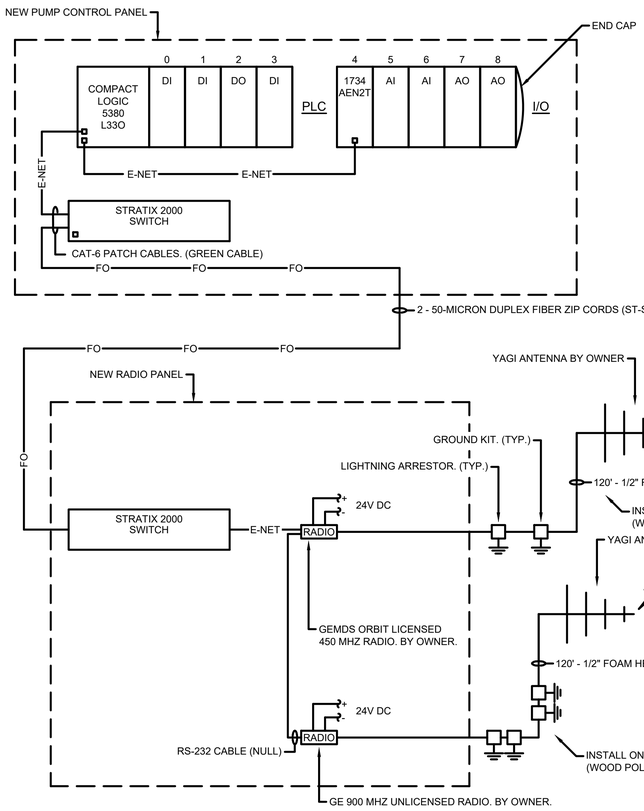
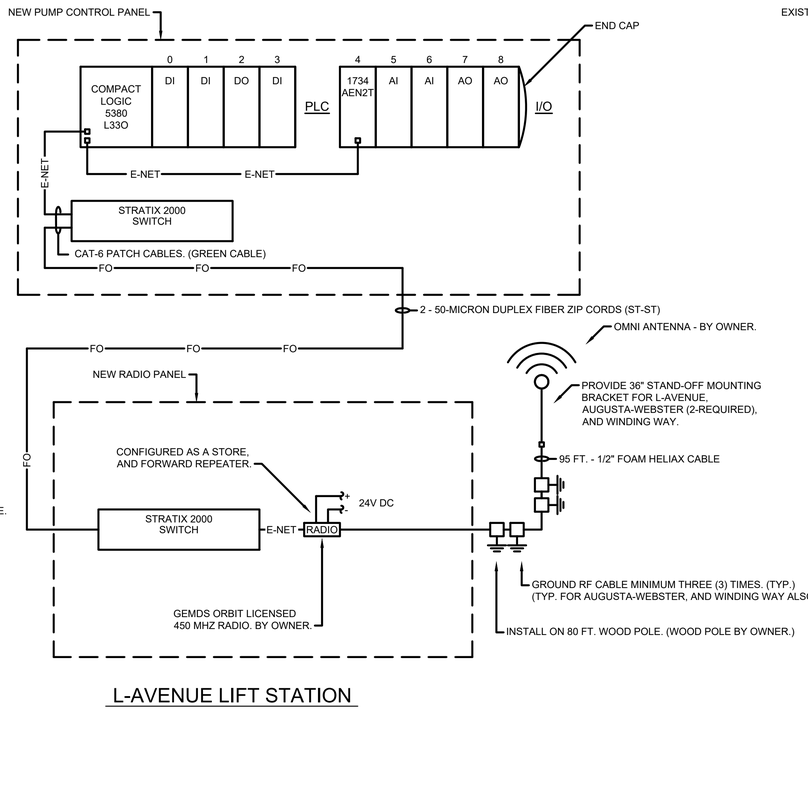
Bar Measures 1 inch

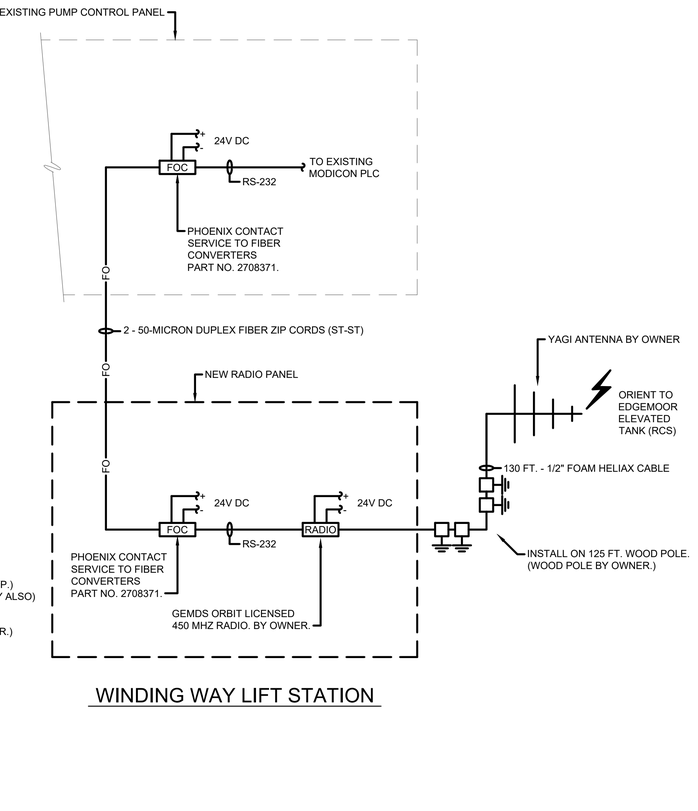
2/22/2022 5:36:32 PM - \\TT LOCAL\IER\PROJECTS\ANN ARBOR\IER\19743\200-19743-21003\CAD\SHEETFILES\EIP\LIMP STATIONS\I-2_I-NOTES.DWG - SHANK, JASON



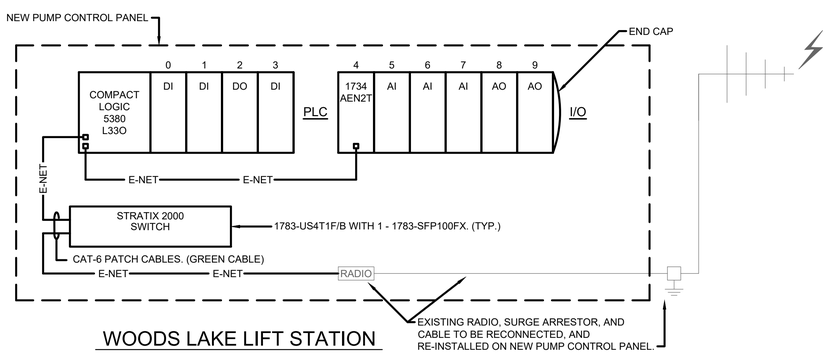
AUGUSTA - WEBSTER LIFT STATION



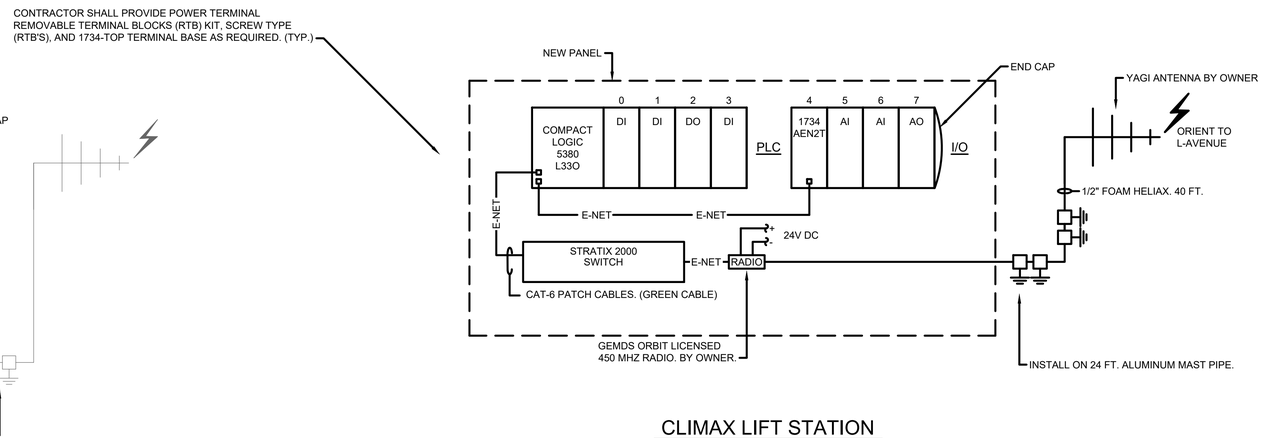
L-AVENUE LIFT STATION



WINDING WAY LIFT STATION



WOODS LAKE LIFT STATION



CLIMAX LIFT STATION

NOTE:

PLC PROGRAMMING, AND RADIO PROGRAMMING BY OWNER/TETRATECH.

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION SYSTEM CONFIGURATION DRAWING

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-3

OF 28

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Bar Measures 1 inch

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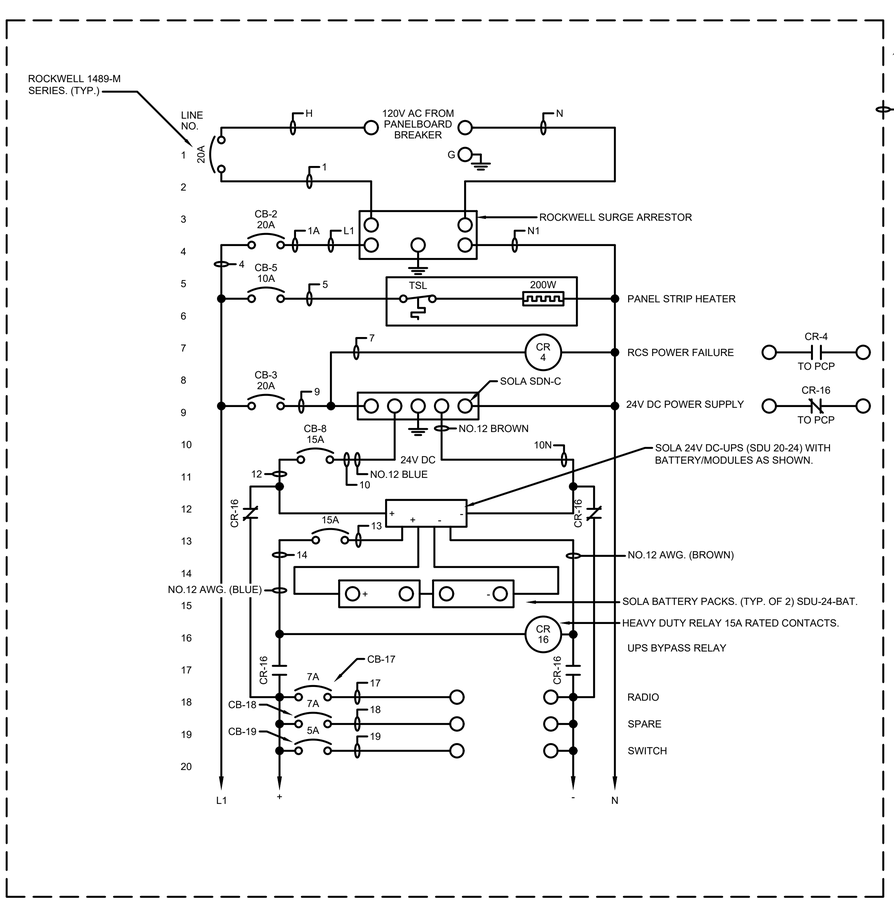

RADIO PANEL (RP) WIRING DIAGRAM

SIZE ENCLOSURE AS REQUIRED.
PROVIDE WINDOW KIT FOR RADIO.

(TYP. FOR AUGUSTA-WEBSTER, L-AVENUE, AND WINDING WAY LIFT STATIONS.)

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INSTRUMENTATION RADIO PANEL (RP) WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-4
OF 28

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Bar Measures 1 inch

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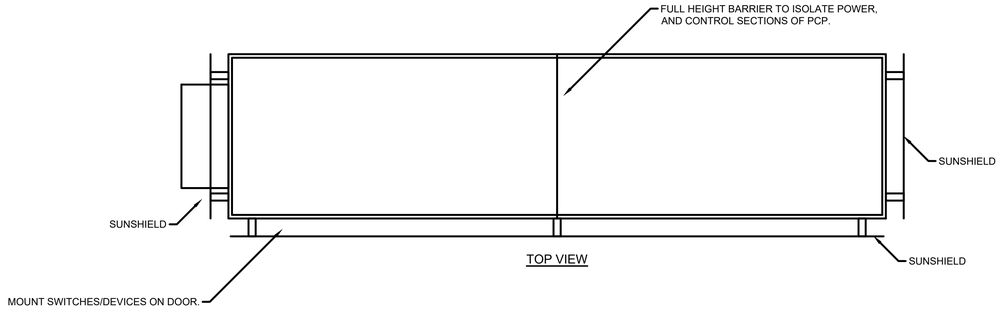
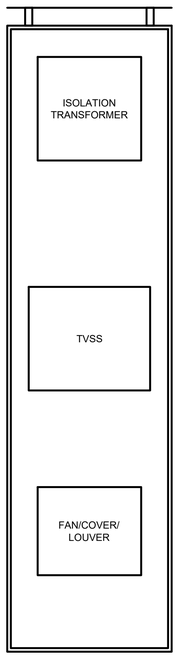
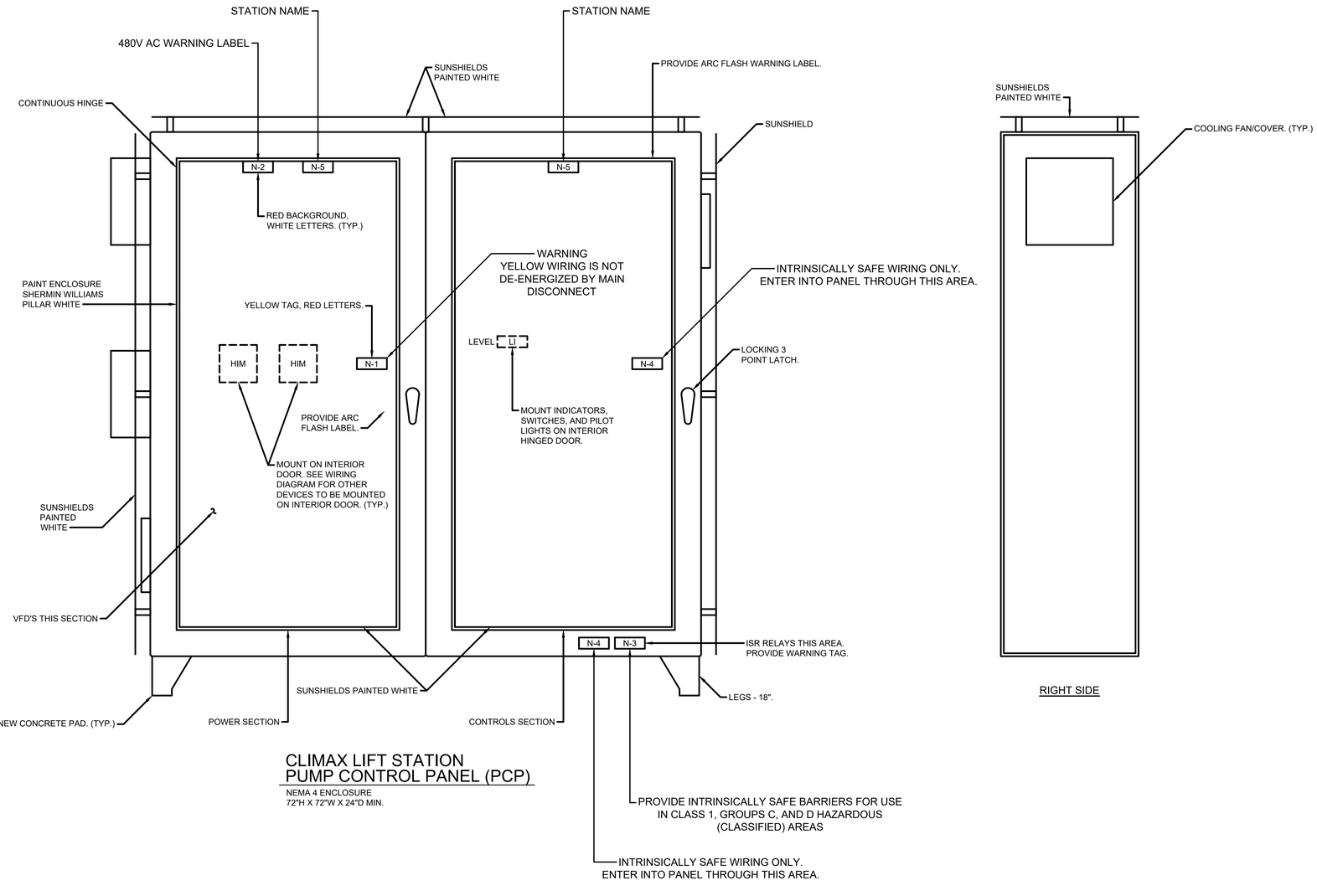


TOP VIEW



LEFT SIDE



RIGHT SIDE

CLIMAX LIFT STATION
PUMP CONTROL PANEL (PCP)

NEMA 4 ENCLOSURE
72"H X 72"W X 24"D MIN.

PROVIDE INTRINSICALLY SAFE BARRIERS FOR USE IN CLASS 1, GROUPS C, AND D HAZARDOUS (CLASSIFIED) AREAS

INTRINSICALLY SAFE WIRING ONLY. ENTER INTO PANEL THROUGH THIS AREA.

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION

CLIMAX LIFT STATION MAIN CONTROL PANEL LAYOUT, SUBPLATE DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-5

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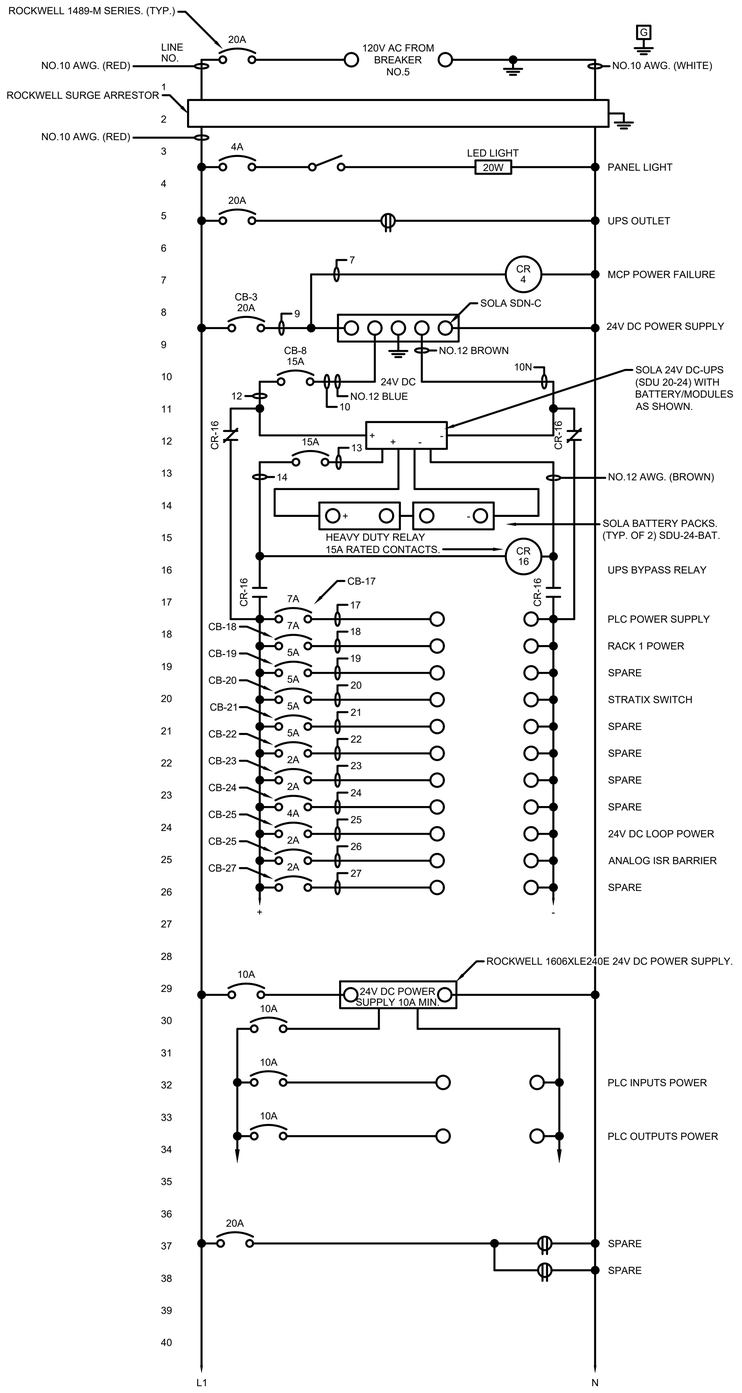

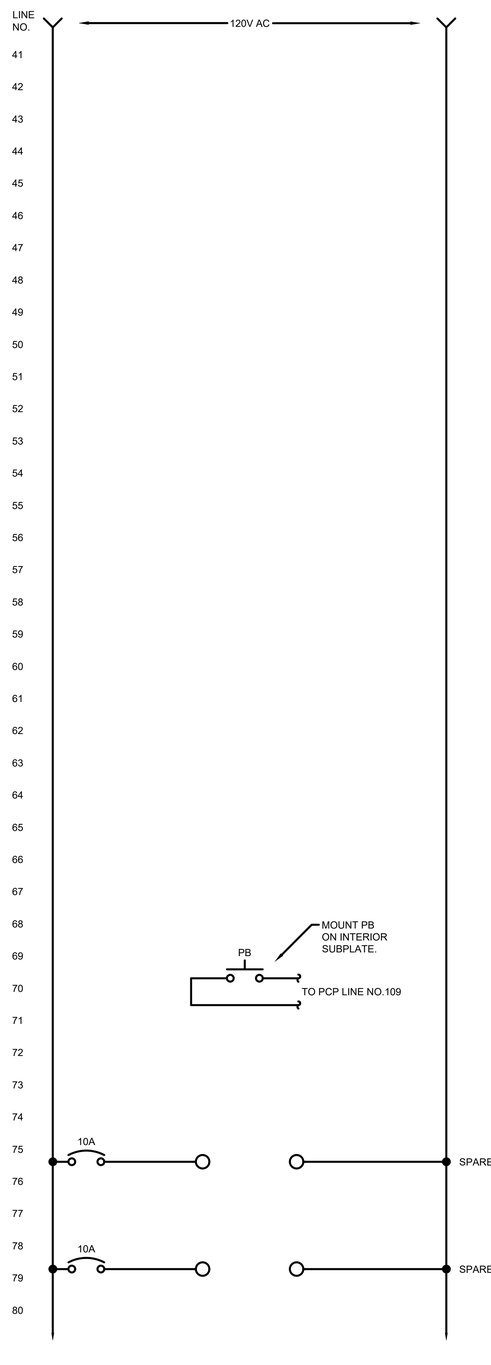

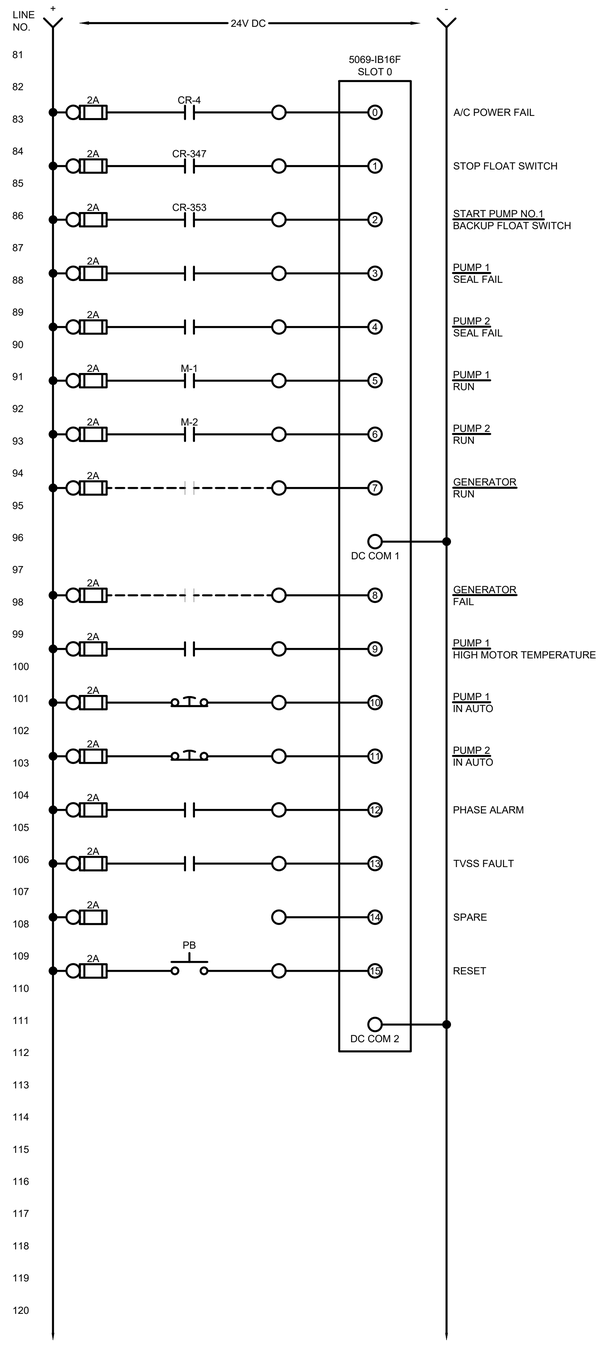

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LA-VENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
CLIMAX PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-6
OF 28

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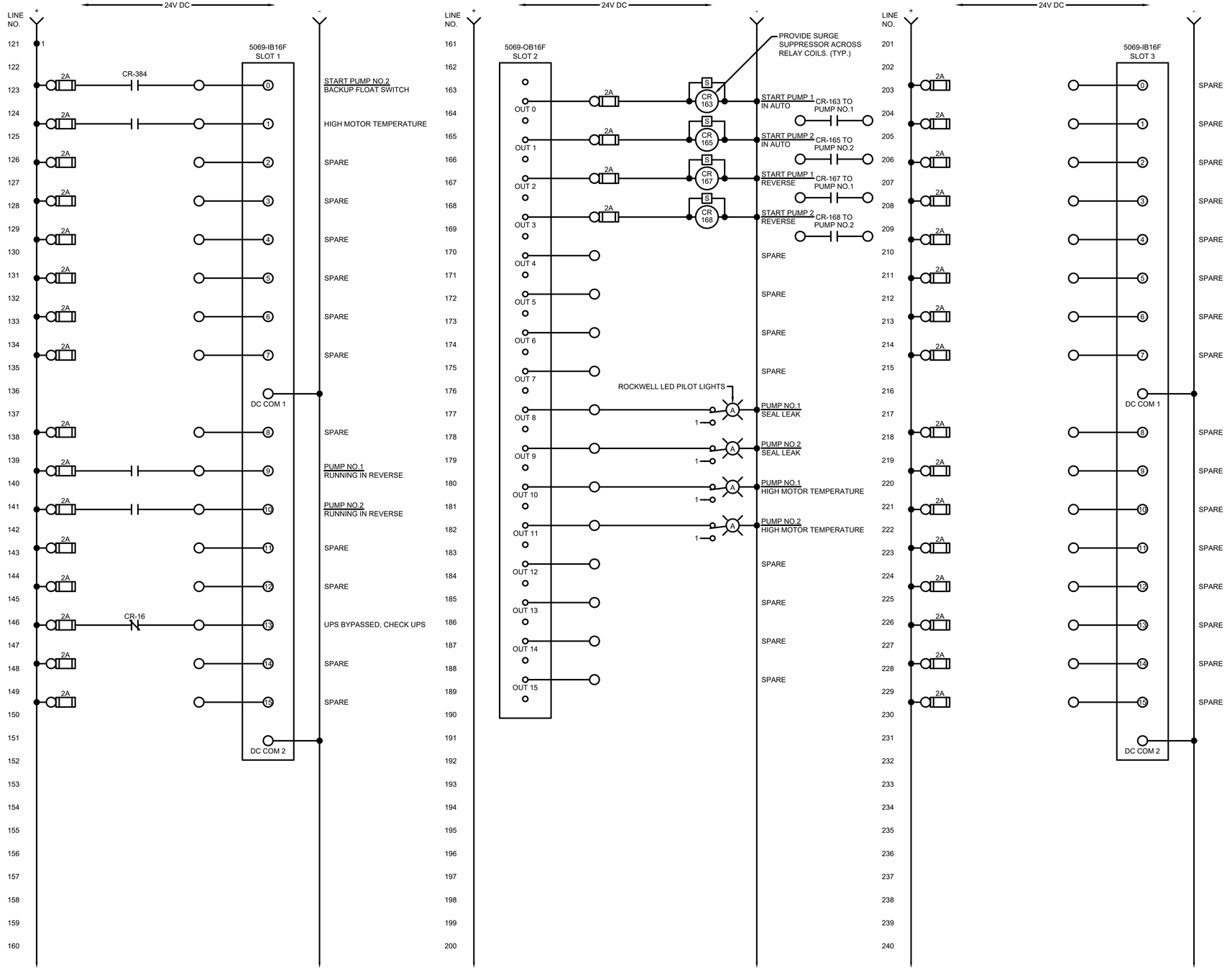

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
CLIMAX PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-7

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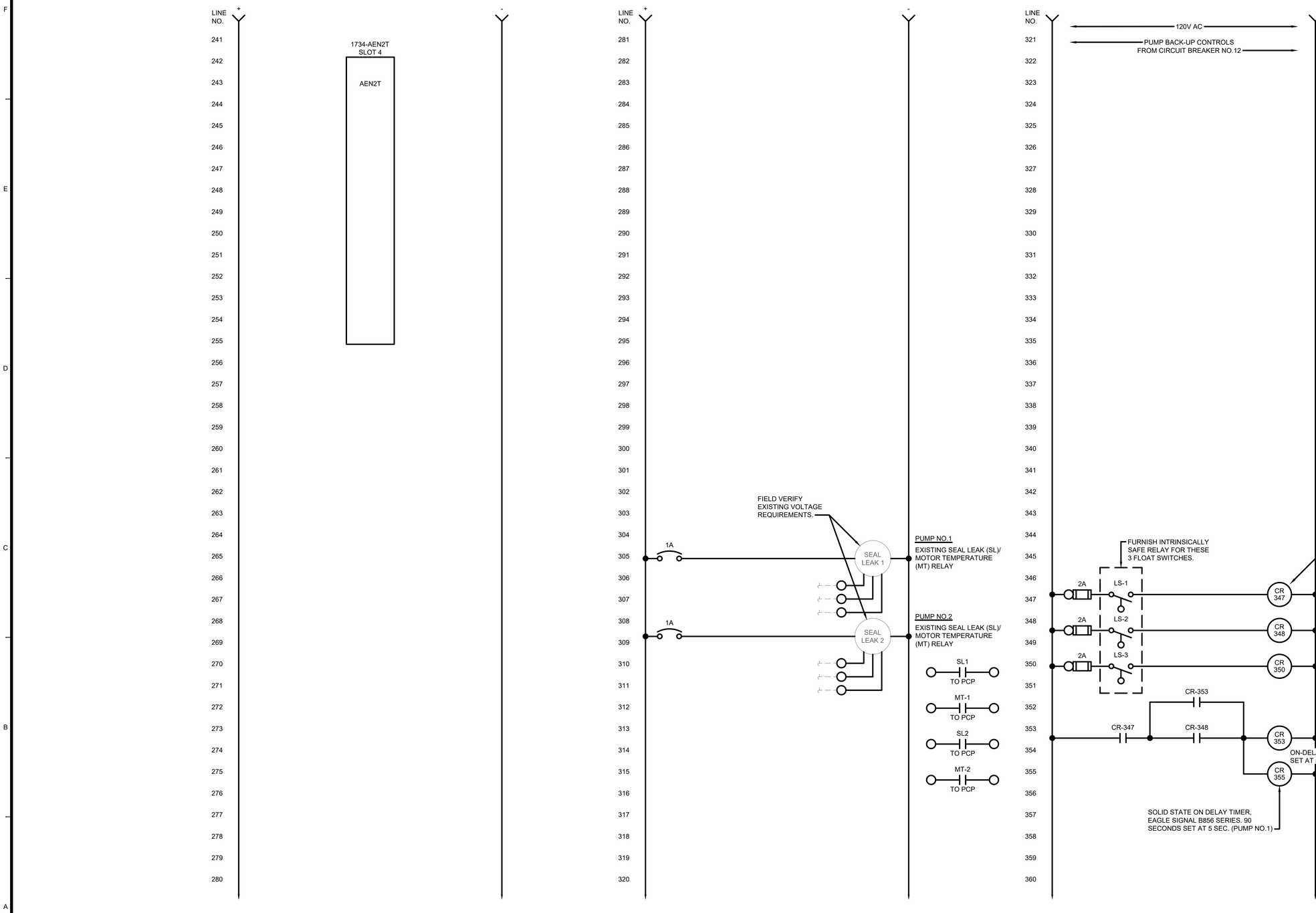

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER
CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
CLIMAX PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-8

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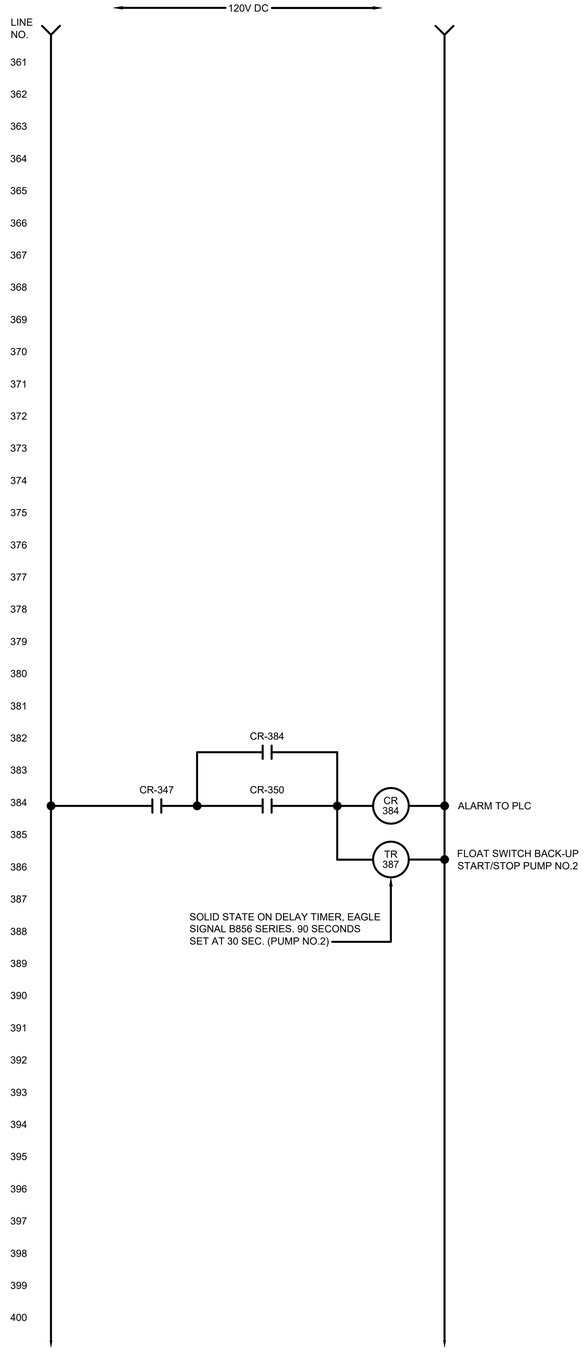

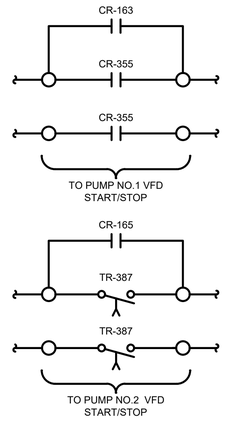

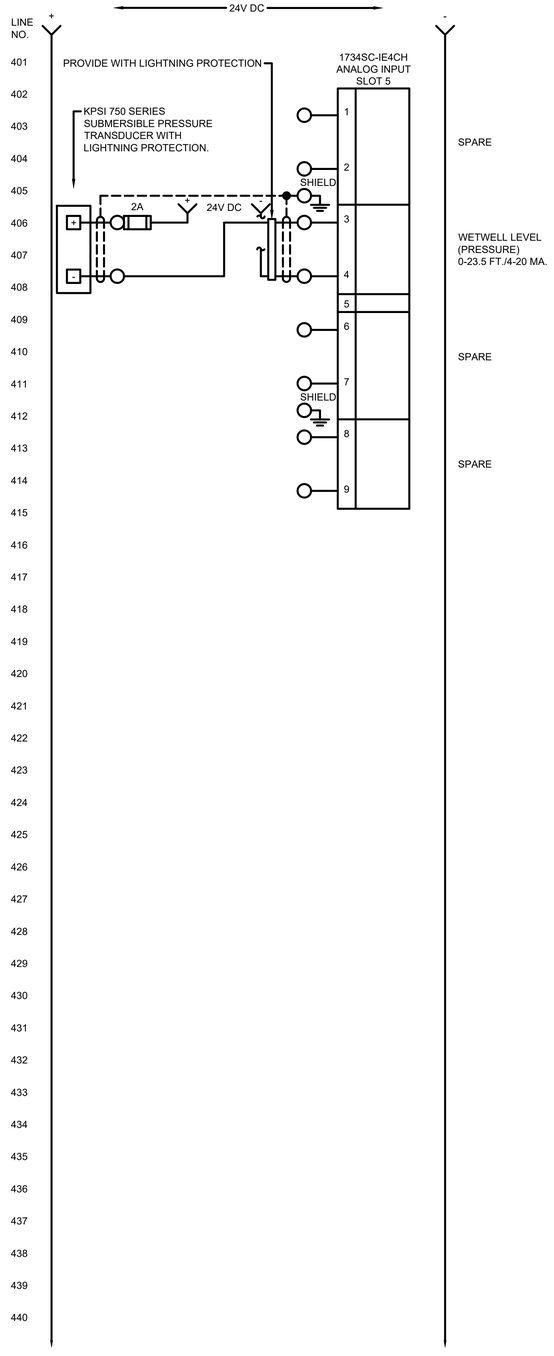

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
CLIMAX PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-9

OF 28

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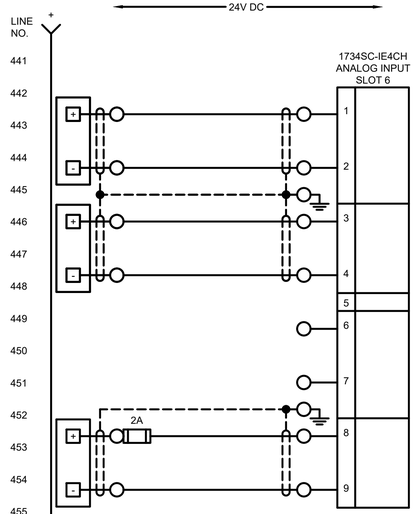

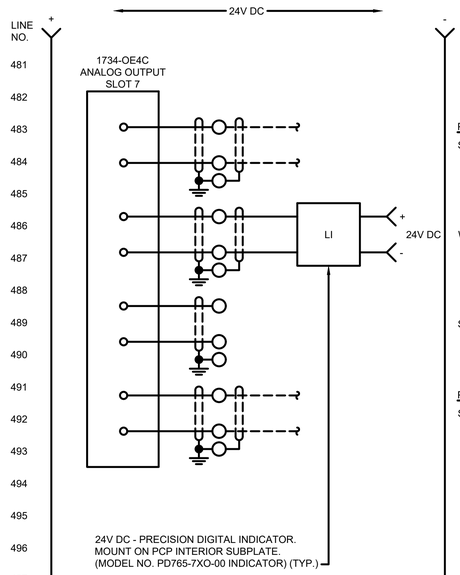

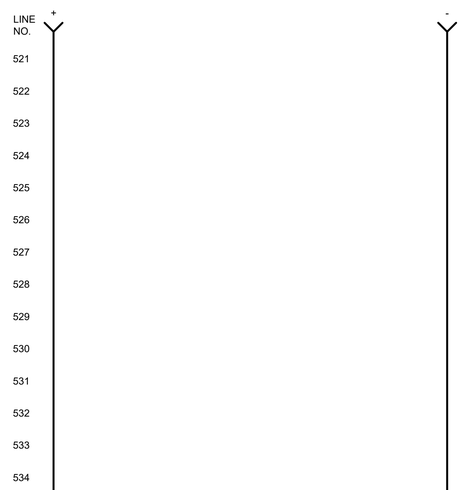

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER
CLIMAX, I-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
CLIMAX PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-10

OF 28

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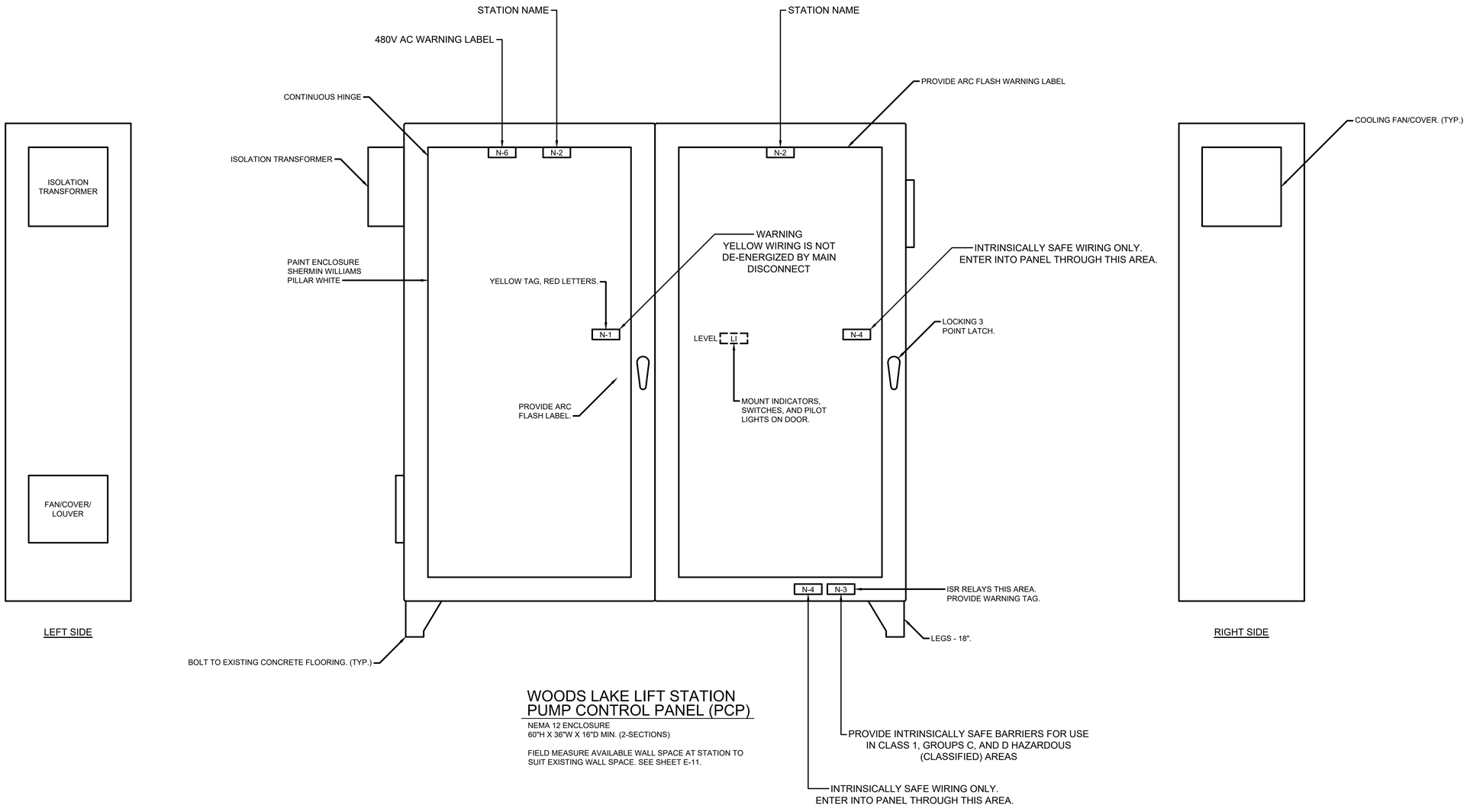

WOODS LAKE LIFT STATION
PUMP CONTROL PANEL (PCP)

NEMA 12 ENCLOSURE
60"H X 36"W X 16"D MIN. (2-SECTIONS)

FIELD MEASURE AVAILABLE WALL SPACE AT STATION TO SUIT EXISTING WALL SPACE. SEE SHEET E-11.

PROVIDE INTRINSICALLY SAFE BARRIERS FOR USE IN CLASS 1, GROUPS C, AND D HAZARDOUS (CLASSIFIED) AREAS

INTRINSICALLY SAFE WIRING ONLY.
ENTER INTO PANEL THROUGH THIS AREA.

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER, CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
WOODS LAKE LIFT STATION MAIN CONTROL PANEL LAYOUT, SUBPLATE DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-11
OF 28

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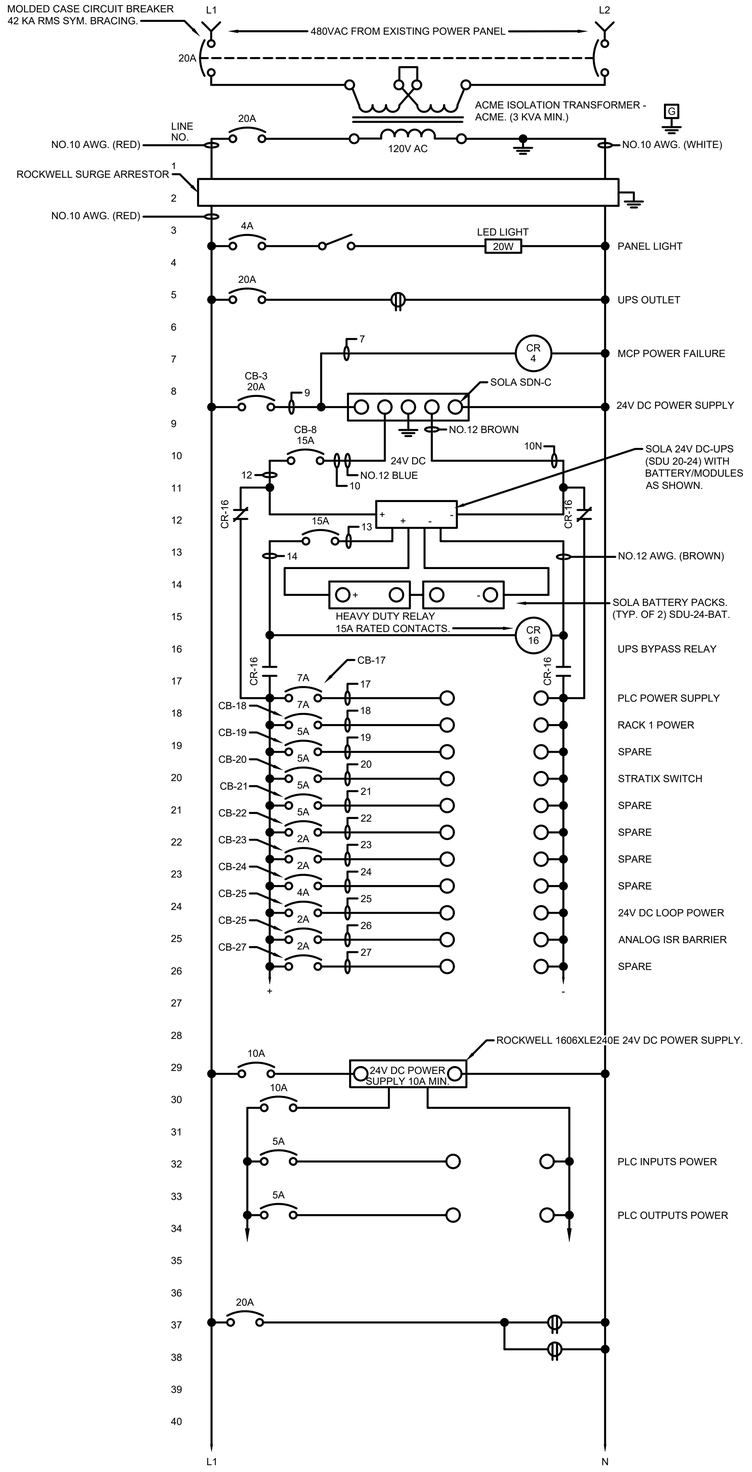

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LA-VENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
WOODS LAKE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-12
OF 28

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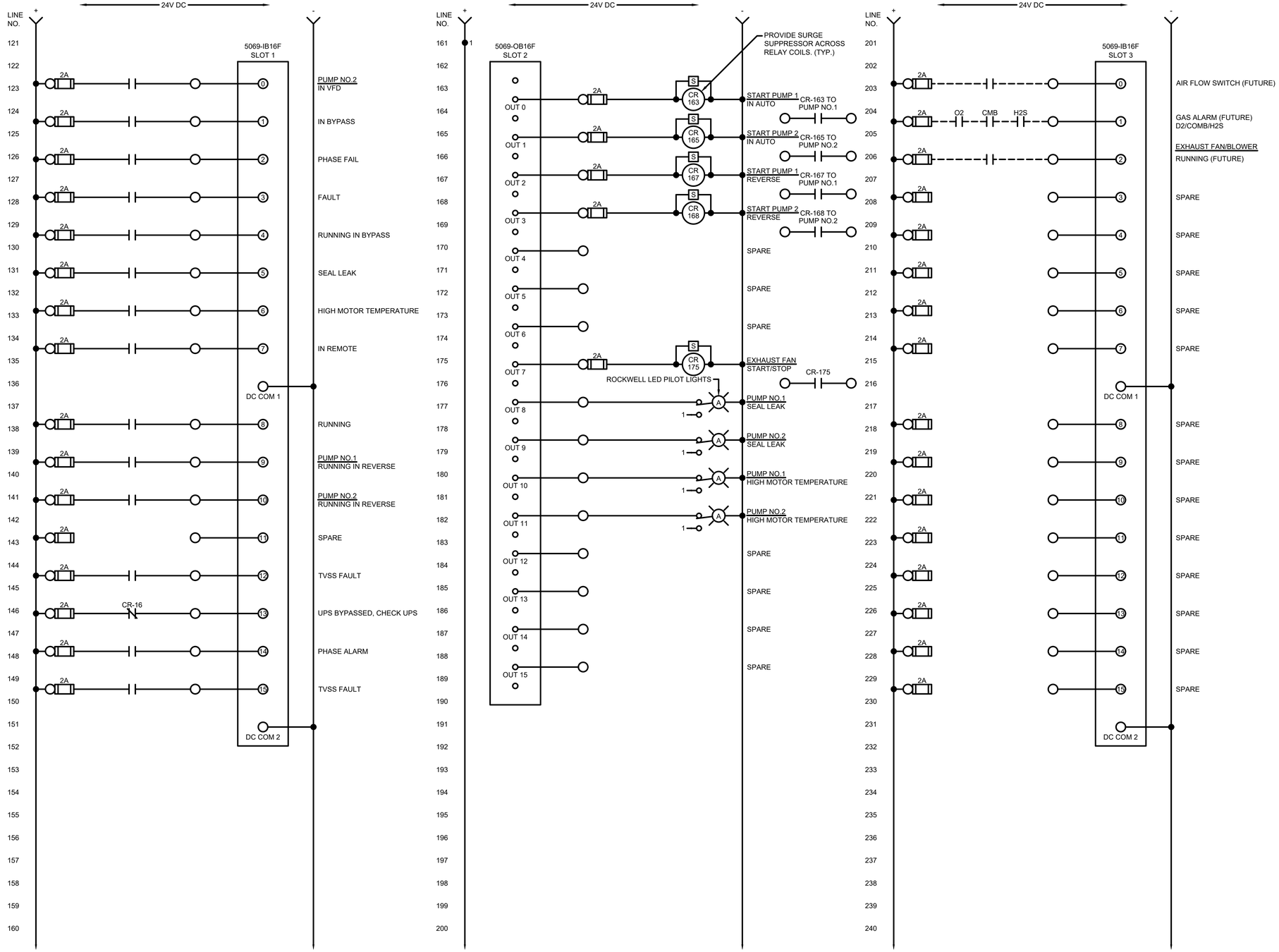

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SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION WOODS LAKE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-13

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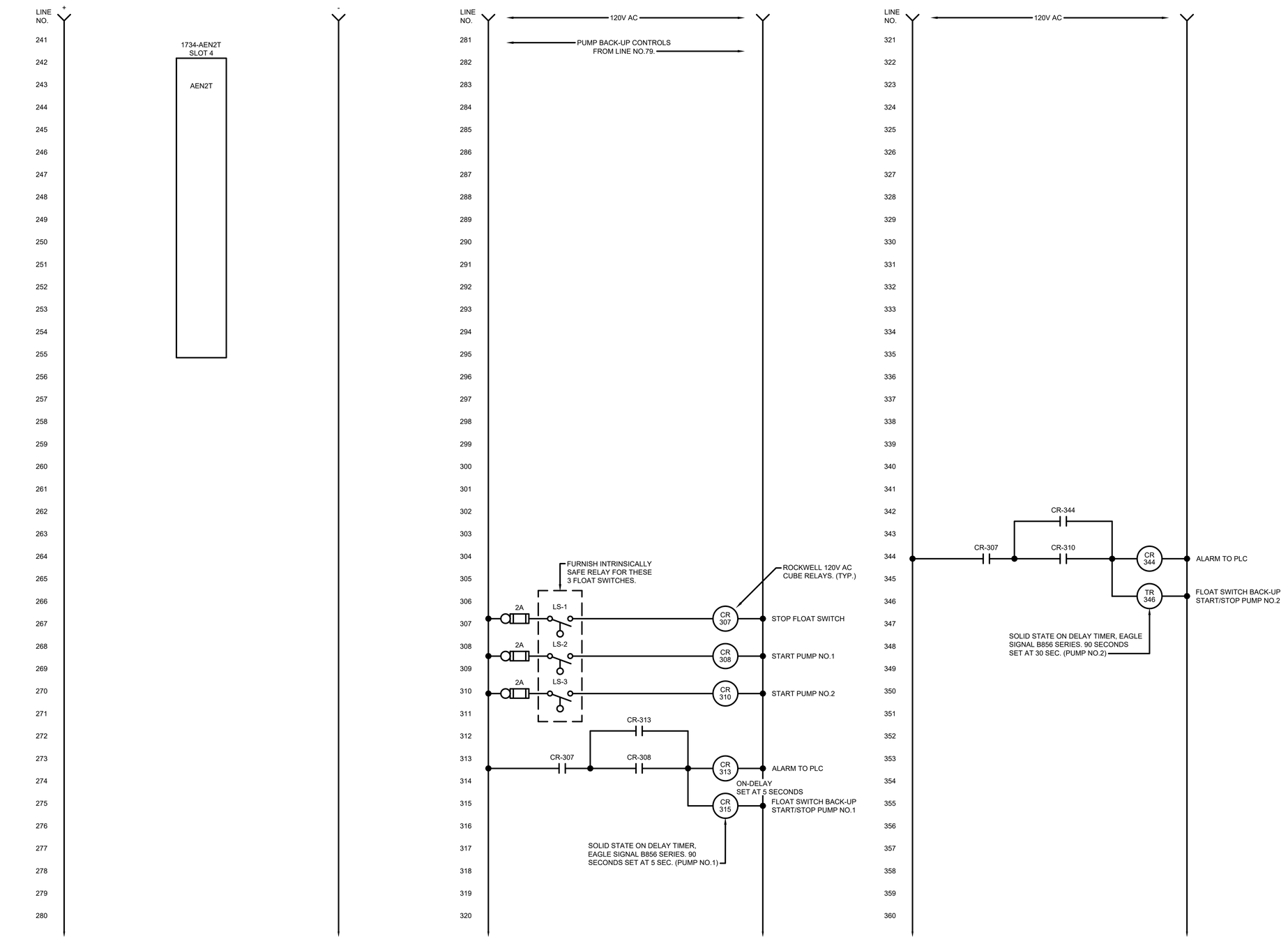

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
WOODS LAKE PUMP CONTROL PANEL
WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-14

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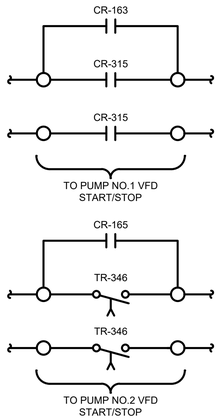

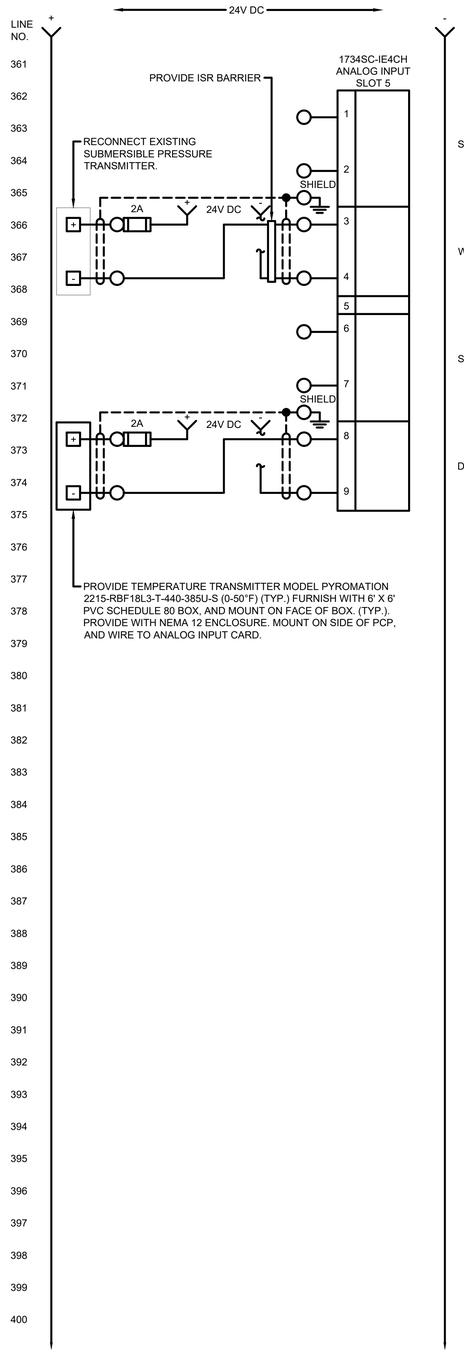

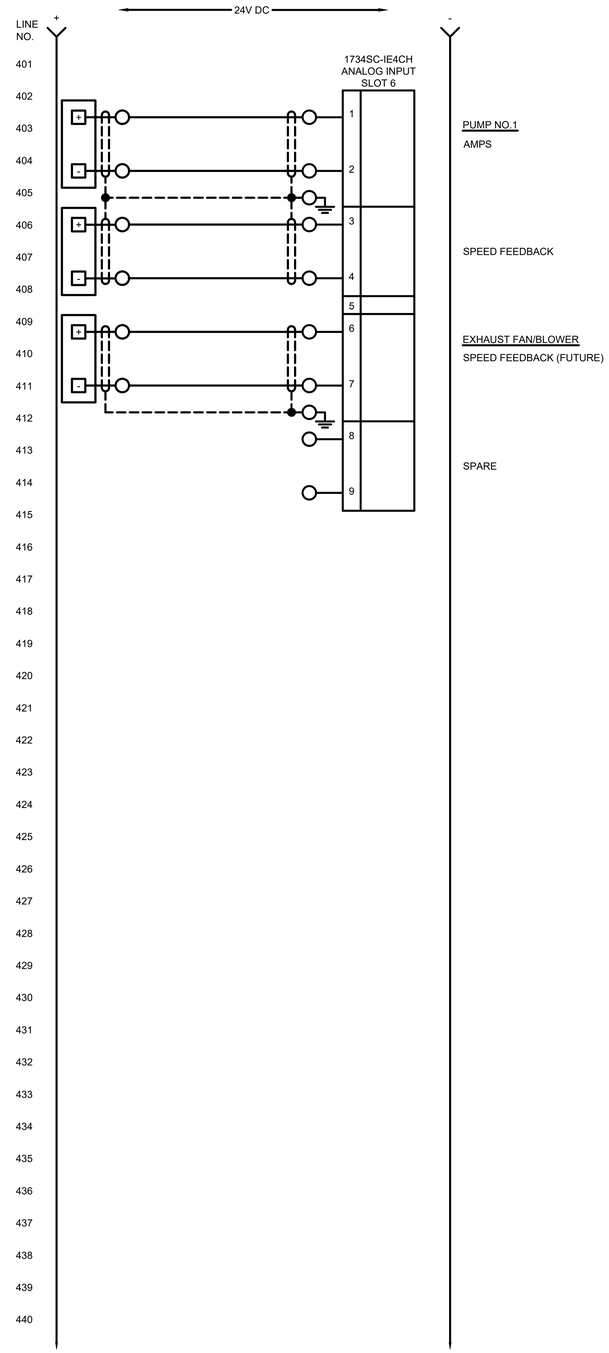

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MARK	DATE	DESCRIPTION

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-A AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
WOODS LAKE PUMP CONTROL PANEL
WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-15

OF 28

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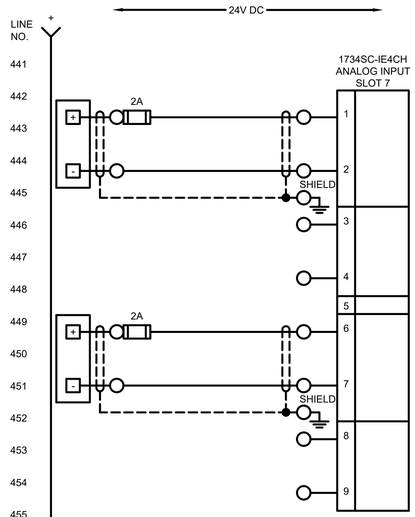
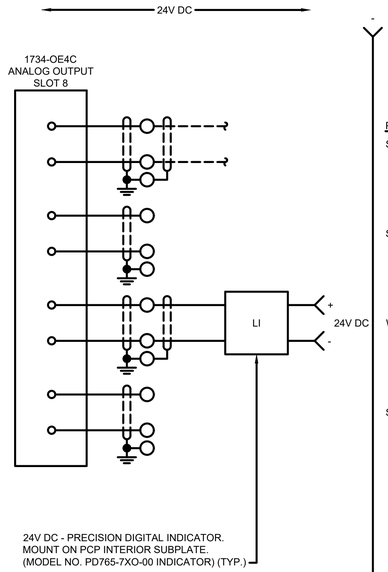
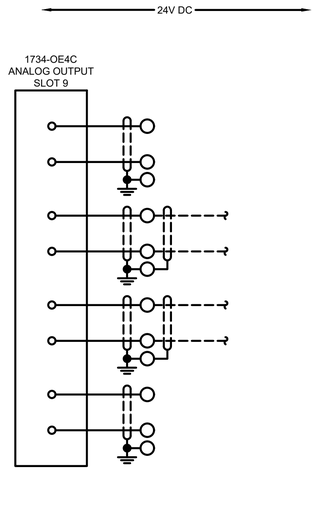
Bar Measures 1 inch

2/25/2022 2:05:44 PM - \\TT-LOCAL\IER\PROJECTS\ANN ARBOR\IER1\19743\200-19743-21003\CAD\SHEETFILES\IEP\PUMP STATIONS\I-15_WOODS LAKE_PCP WIRING DIAGRAM_IV.DWG - SHANK, JASON







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443	PUMP NO.2	
444	AMPS	
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447	SPARE	
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449		
450	PUMP NO.2	
451	SPEED FEEDBACK	
452		
453		
454	SPARE	
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LINE NO.	+	-
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483		PUMP NO.1
484		SPEED CONTROL
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487		SPARE
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490		WETWELL LEVEL
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493		SPARE
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523		SPARE
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525		
526		EXHAUST FAN/BLOWER
527		SPEED CONTROL (FUTURE)
528		
529		PUMP NO.2
530		SPEED CONTROL
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532		SPARE
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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-A VENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
WOODS LAKE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-16

OF 28

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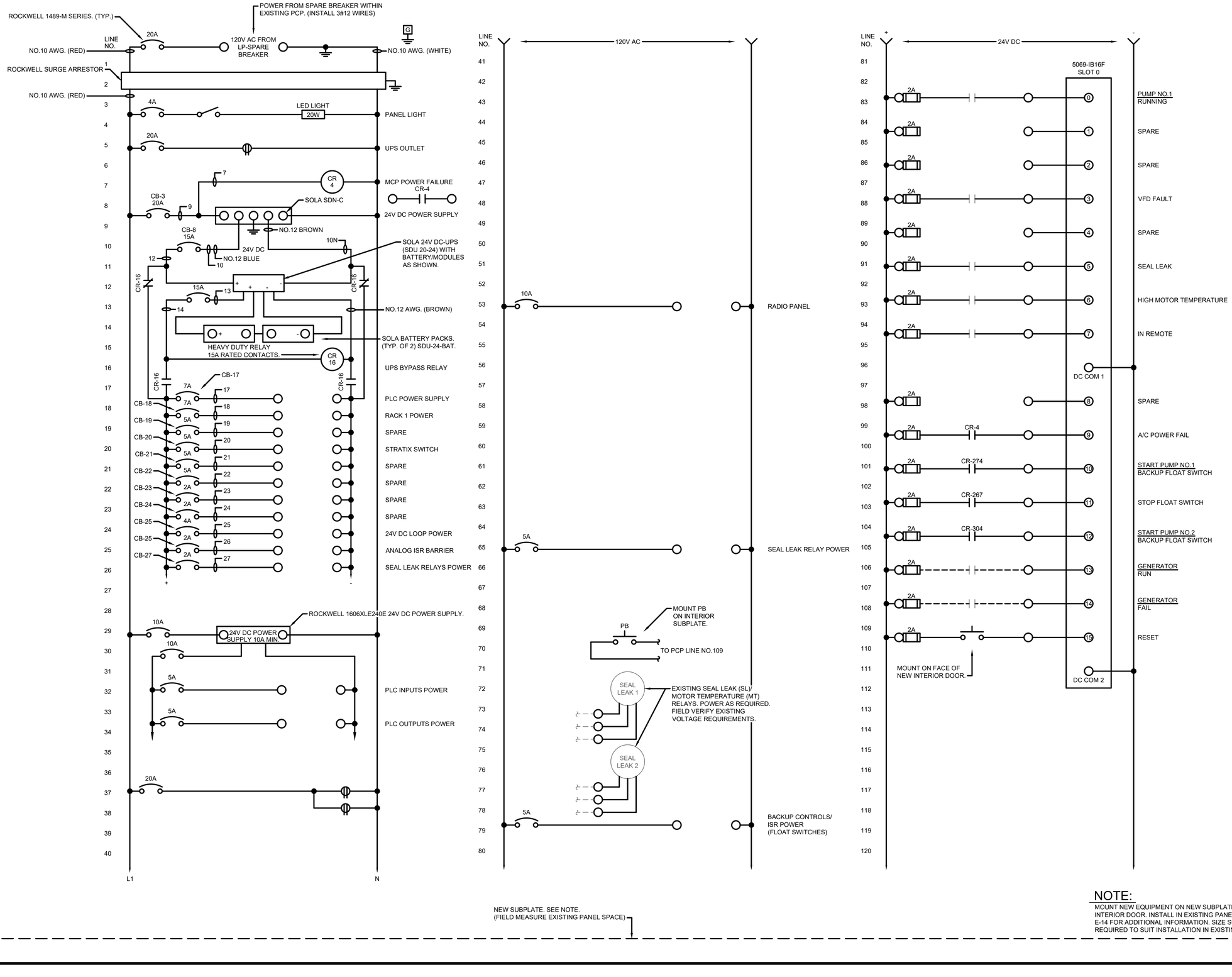
Bar Measures 1 inch

2/25/2022 2:07:20 PM - \\TT-LOCAL\IER\PROJECTS\ANN ARBOR\IER1\19743\200-19743-21003\CAD\SHEETFILES\IEP\PUMP STATIONS\I-16_WOODS LAKE_PCP WIRING DIAGRAM_V.DWG - SHANK, JASON



NOTE:

MOUNT NEW EQUIPMENT ON NEW SUBPLATE, AND NEW INTERIOR DOOR. INSTALL IN EXISTING PANEL. SEE SHEET E-14 FOR ADDITIONAL INFORMATION. SIZE SUBPLATE AS REQUIRED TO SUIT INSTALLATION IN EXISTING PANEL.

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION L-AVENUE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-17
OF 28

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Bar Measures 1 inch

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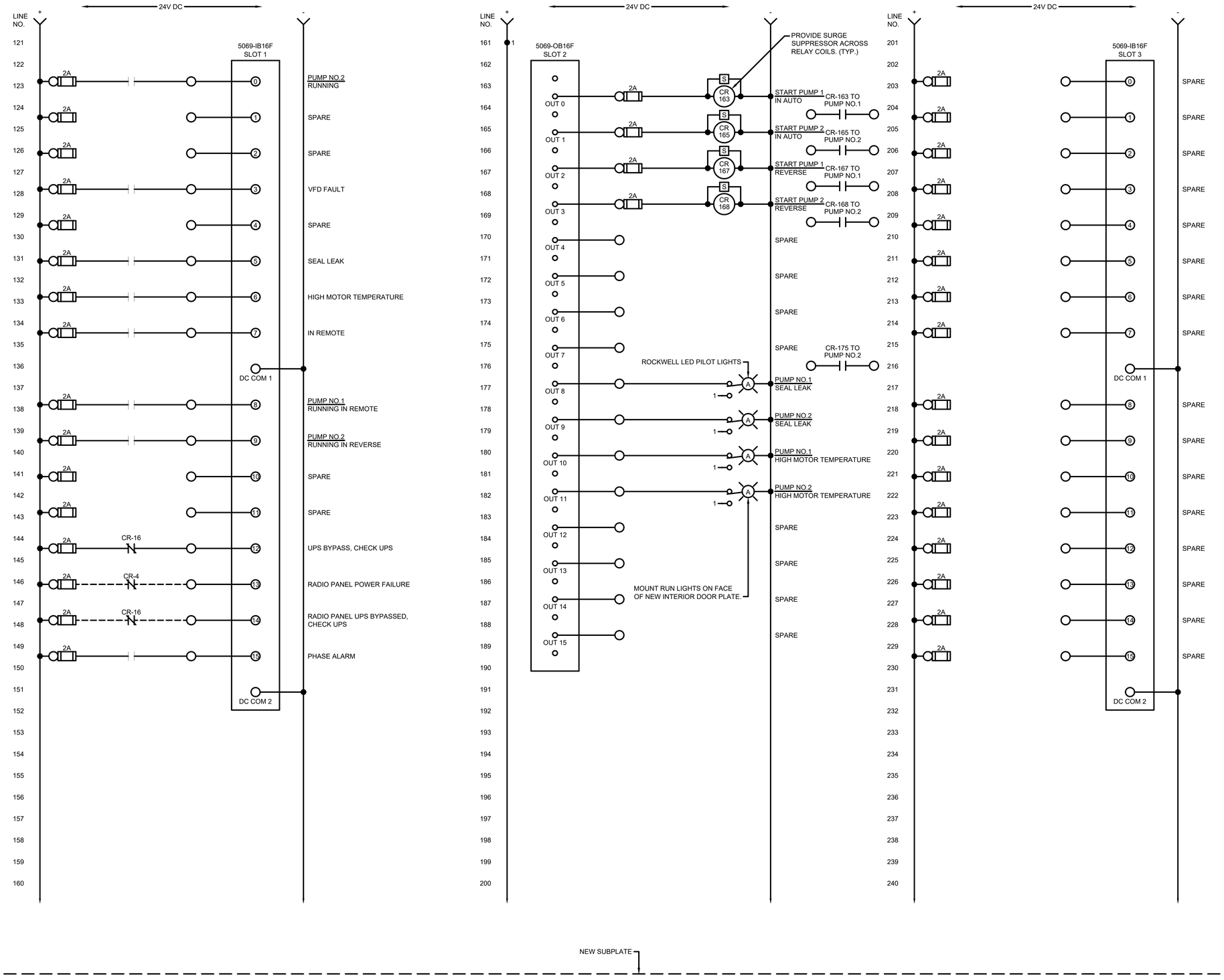

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION L-AVENUE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-18

OF 28

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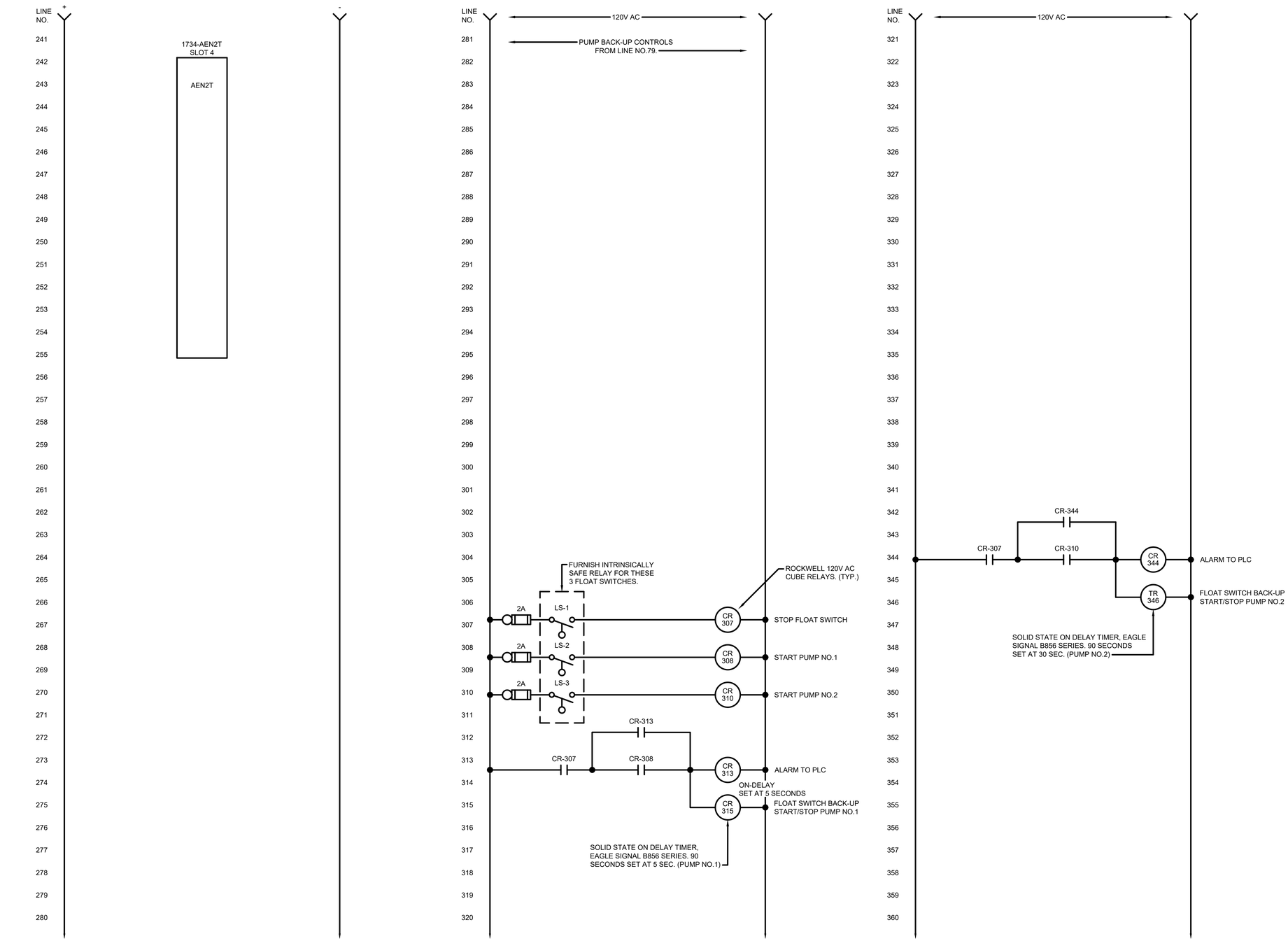

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION L-AVENUE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-19

OF 28

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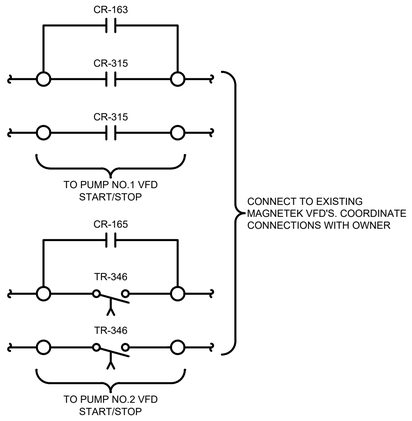
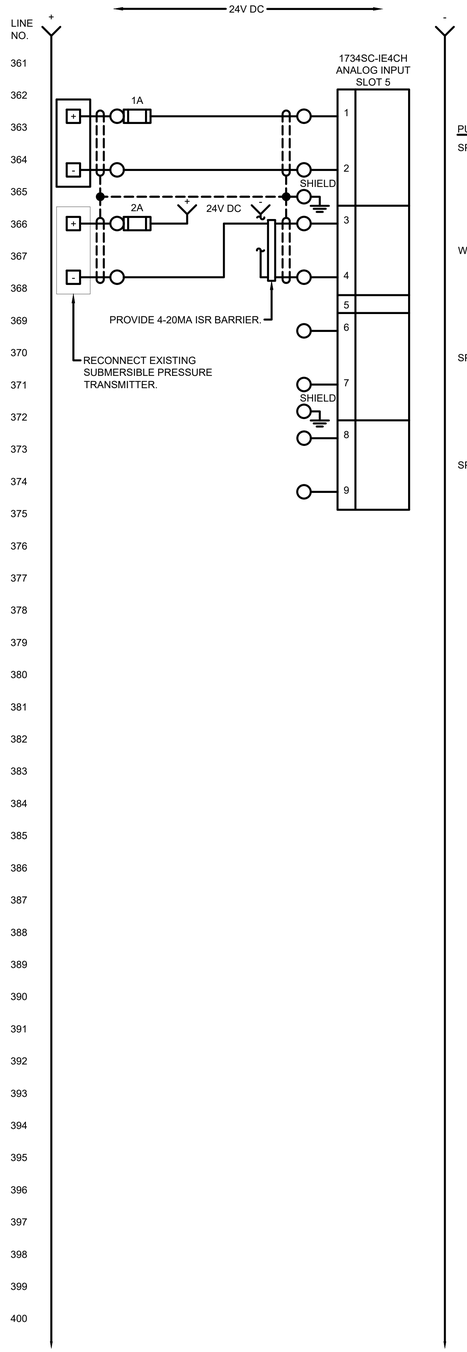
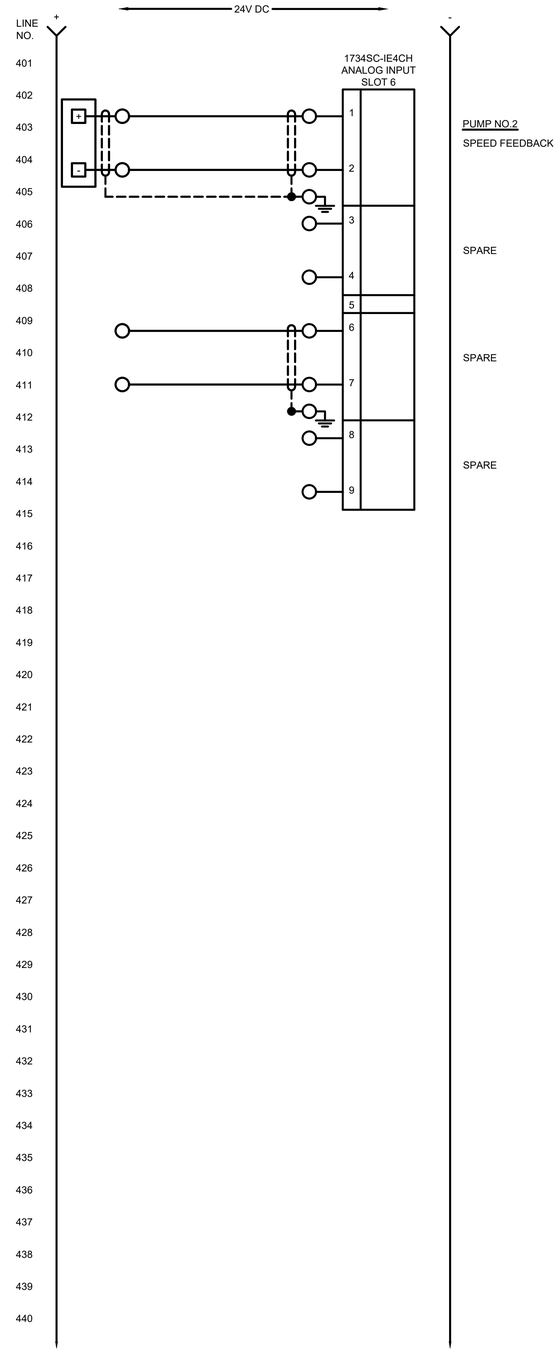
Bar Measures 1 inch

2/25/2022 2:11:12 PM - \\TT.LOCAL\IER\PROJECTS\ANN ARBOR\IER\19743\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\I-19_L-AVENUE_PCP WIRING DIAGRAM_III.DWG - SHANK, JASON







NEW SUBPLATE

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SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION L-AVENUE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-20

OF 28

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Bar Measures 1 inch

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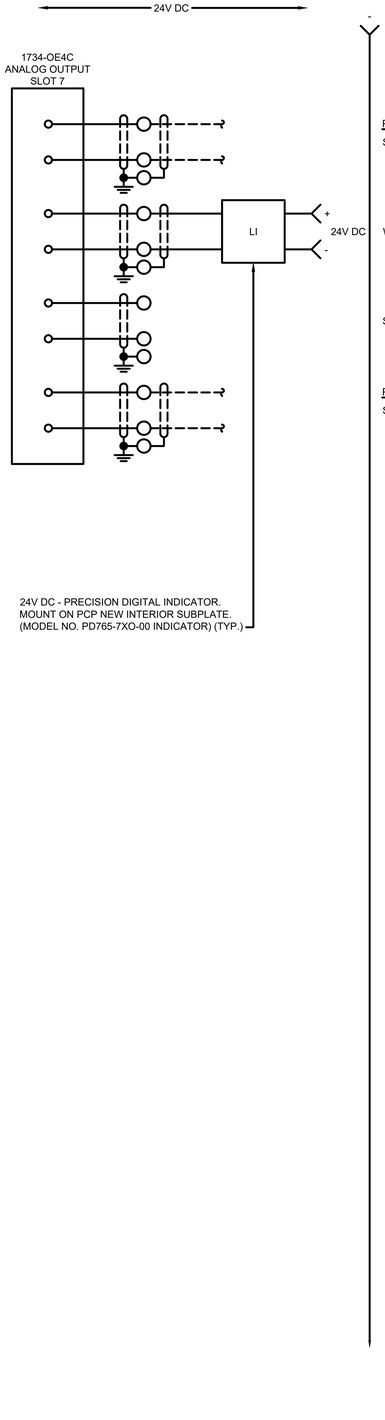

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NEW SUBPLATE

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CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, L-AVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
L-AVENUE PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-21

OF 28

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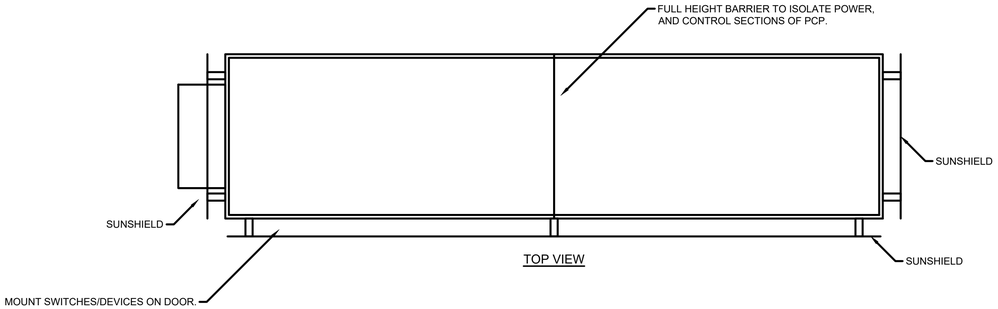
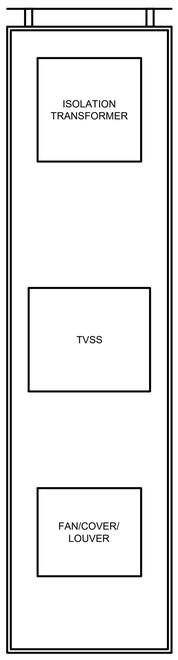
Bar Measures 1 inch

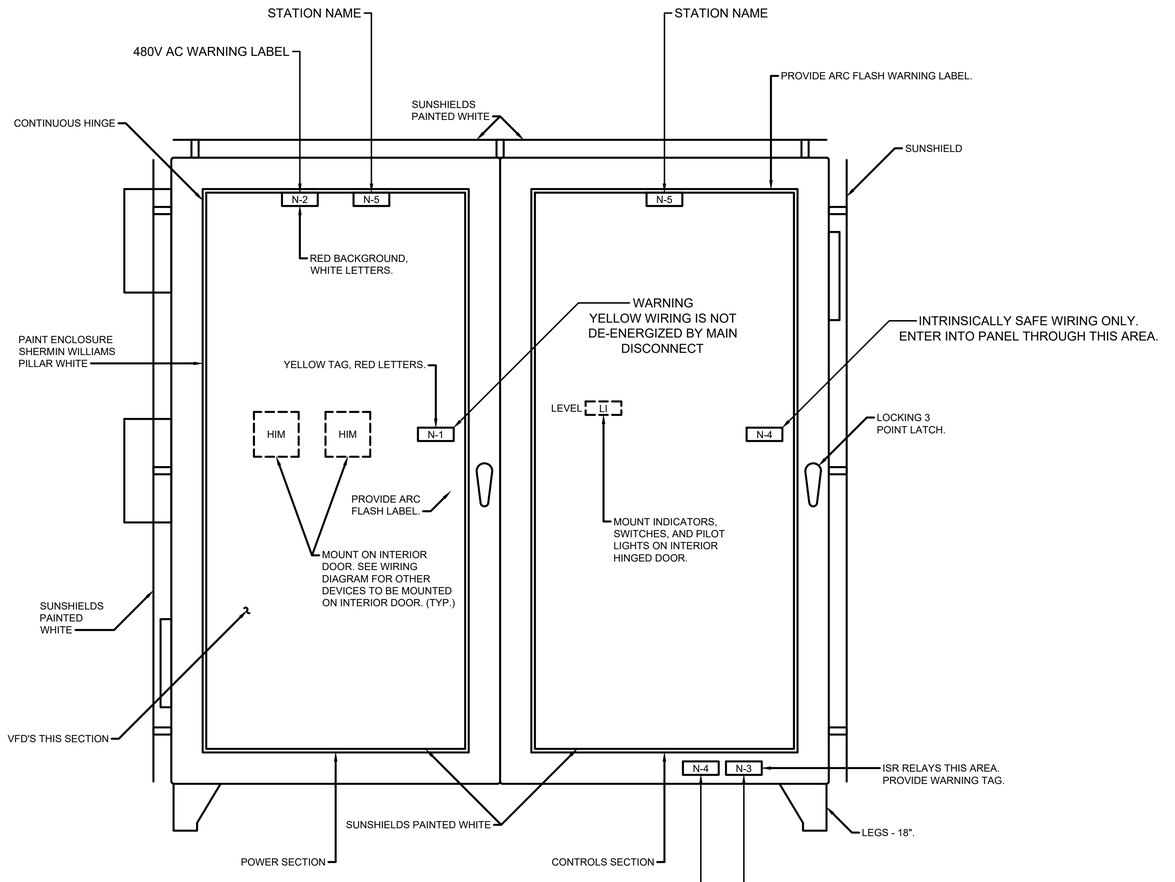
2/24/2022 12:29:40 PM - \\TT.LOCAL\ER\PROJECTS\ANN ARBOR\ER\19743\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\I-21_L-AVENUE_PCP WIRING DIAGRAM_V.DWG - SHANK, JASON

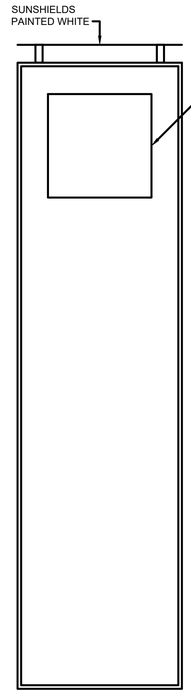


TOP VIEW



LEFT SIDE





RIGHT SIDE

AUGUSTA-WEBSTER LIFT STATION PUMP CONTROL PANEL (PCP)

NEMA 4 ENCLOSURE
72"H X 72"W X 16"D MIN.

PROVIDE INTRINSICALLY SAFE BARRIERS FOR USE IN CLASS 1, GROUPS C, AND D HAZARDOUS (CLASSIFIED) AREAS

INTRINSICALLY SAFE WIRING ONLY. ENTER INTO PANEL THROUGH THIS AREA.

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LA-VENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
AUGUSTA-WEBSTER LIFT STATION MAIN CONTROL PANEL LAYOUT, SUBPLATE DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-22
OF 28

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Bar Measures 1 inch

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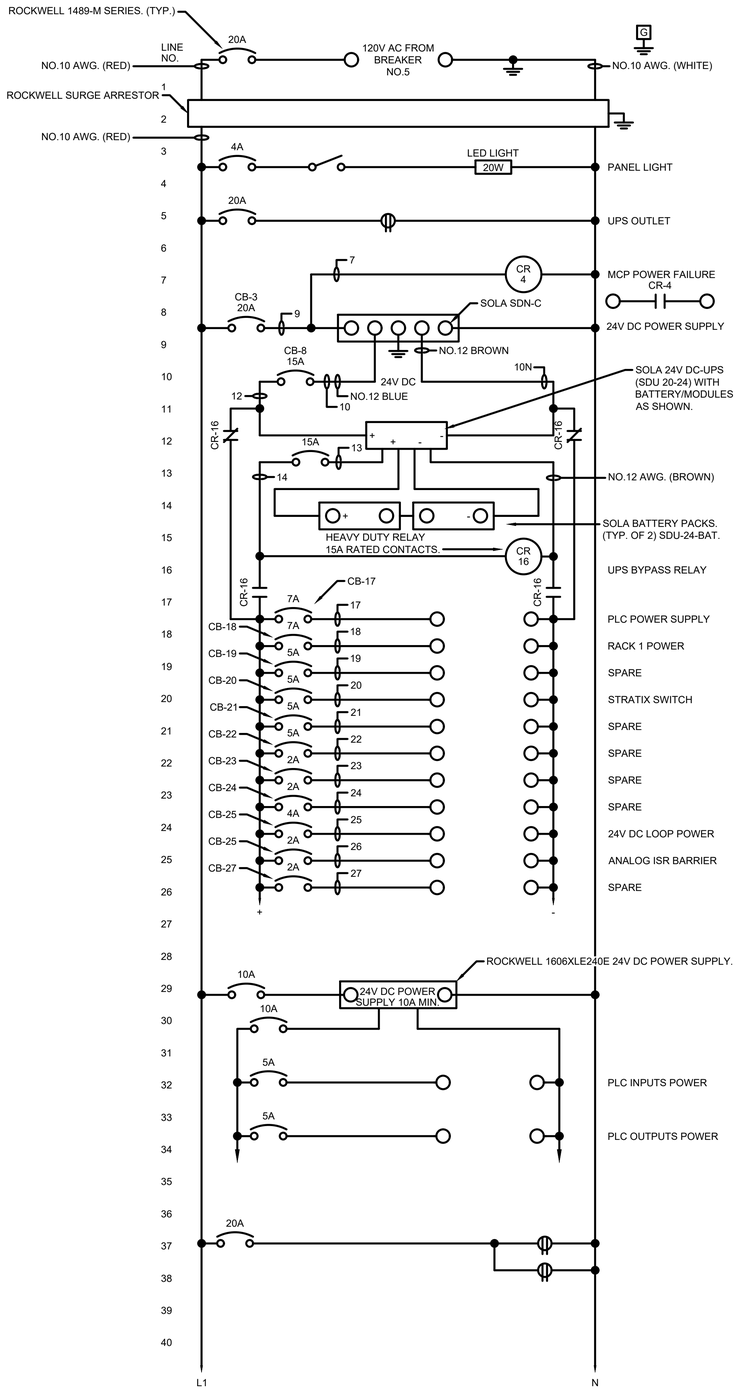

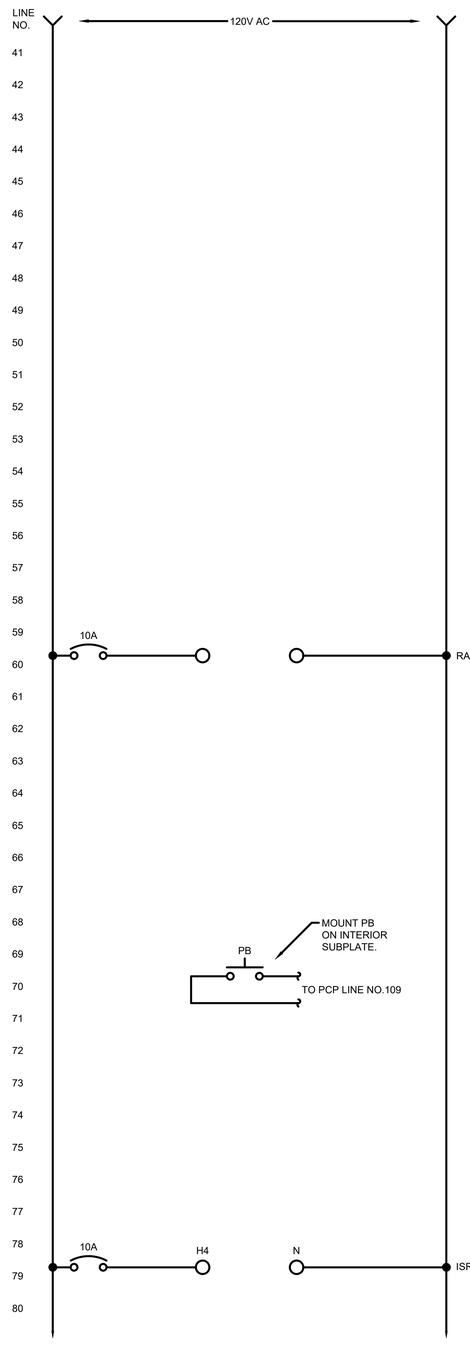

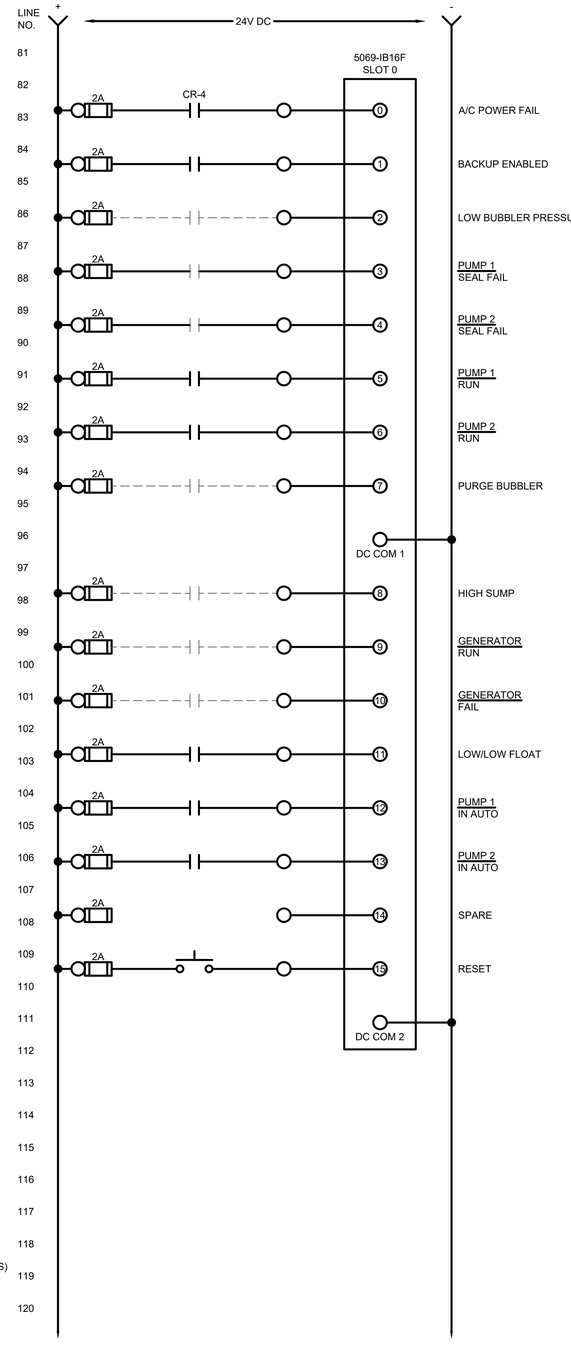

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER CLIMAX, LA-VENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION AUGUSTA-WEBSTER PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-23
OF 28

Copyright: Tetra Tech

Bar Measures 1 inch

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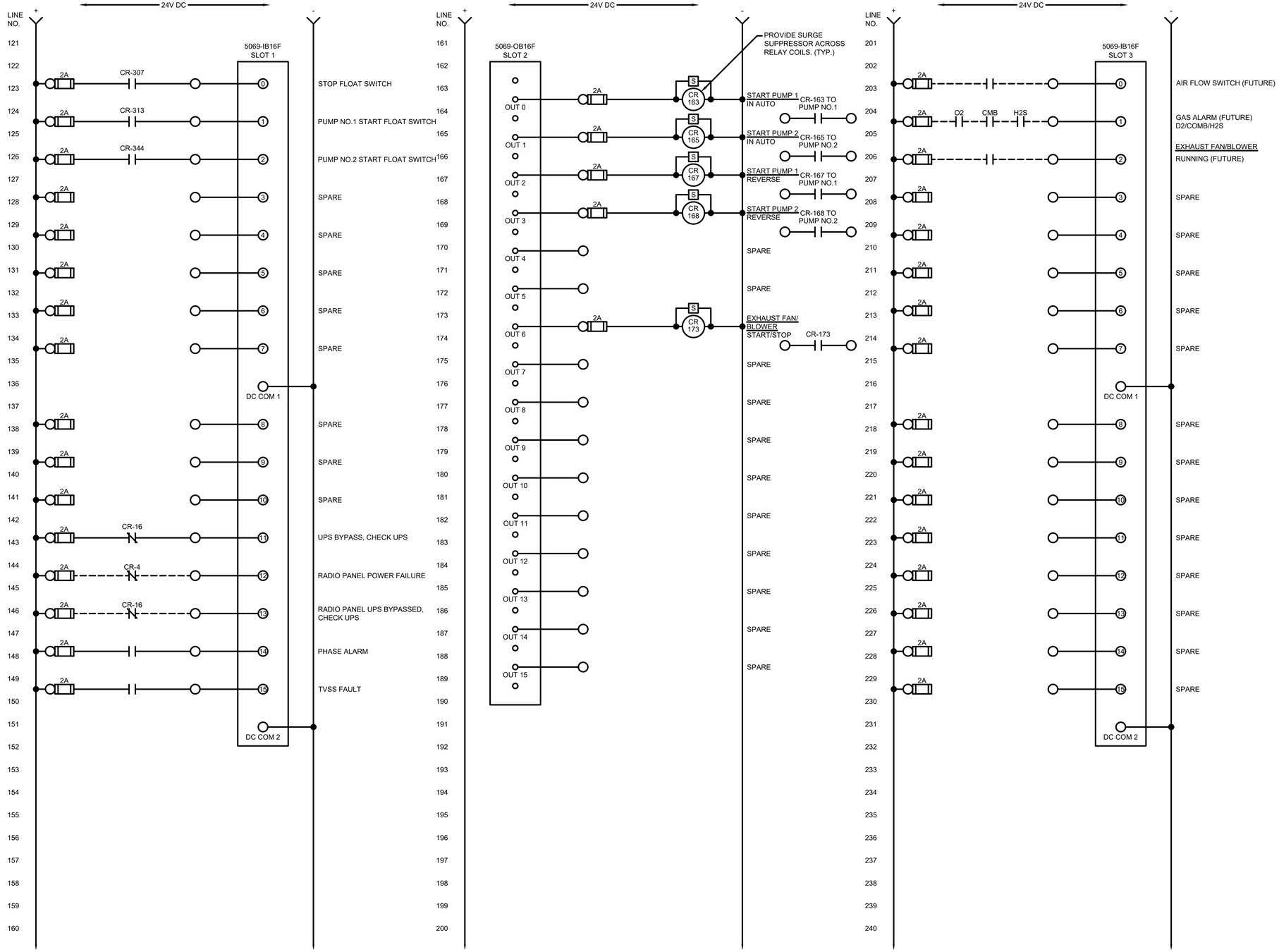

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MARK	DATE	DESCRIPTION

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER, CLIMAX, L-LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION AUGUSTA-WEBSTER PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-24

OF 28

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Bar Measures 1 inch

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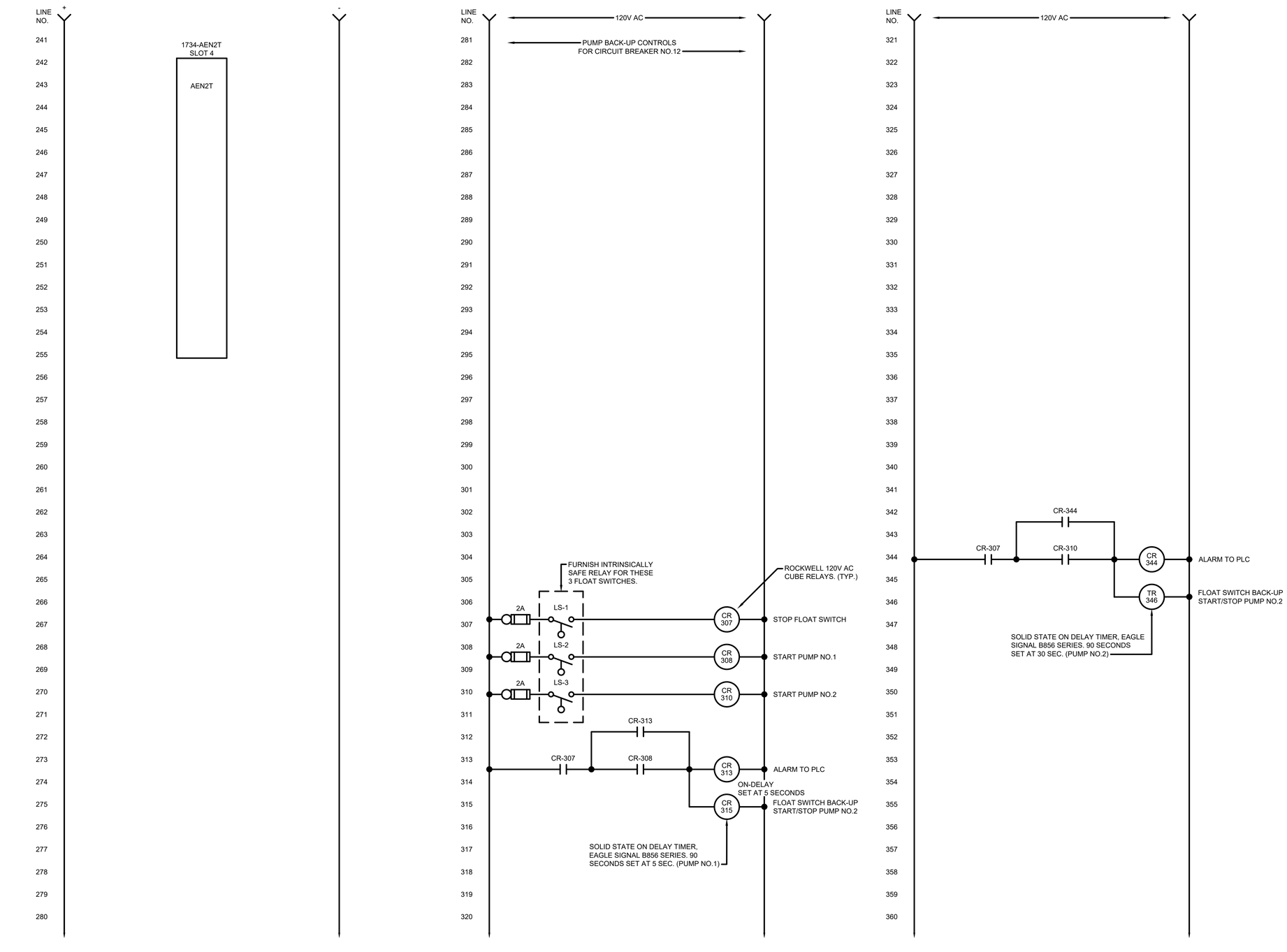

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER
CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
AUGUSTA-WEBSTER PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-25

OF 28

Copyright: Tetra Tech

Bar Measures 1 inch

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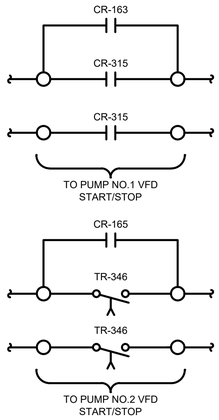

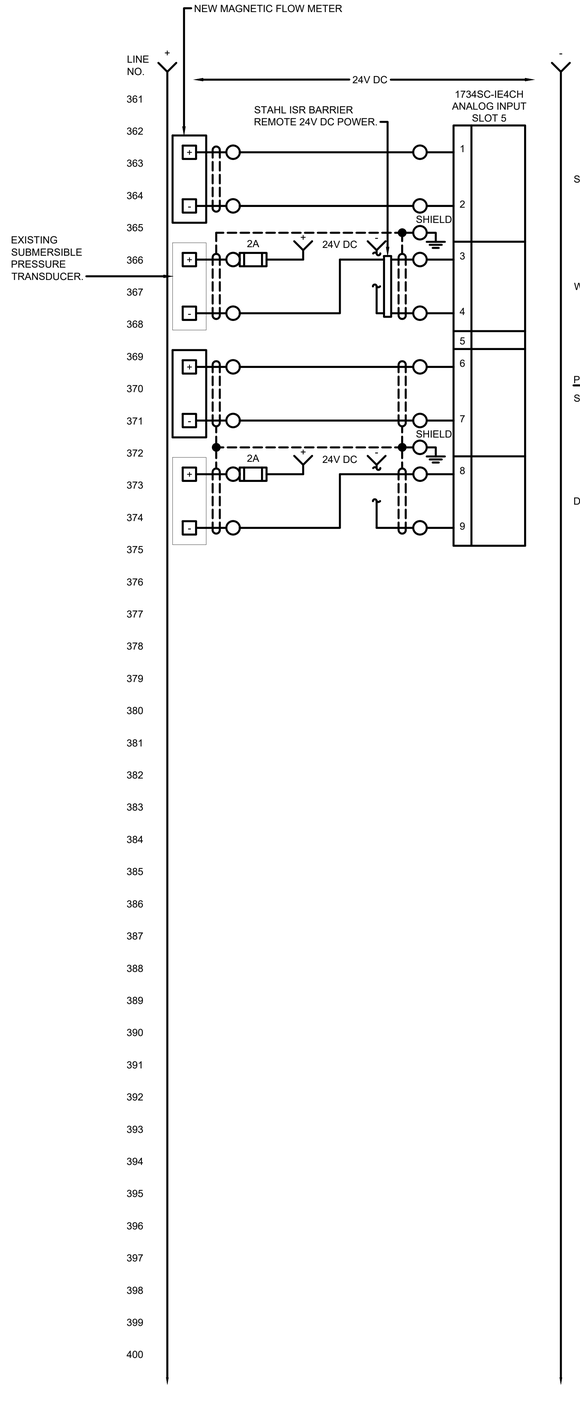

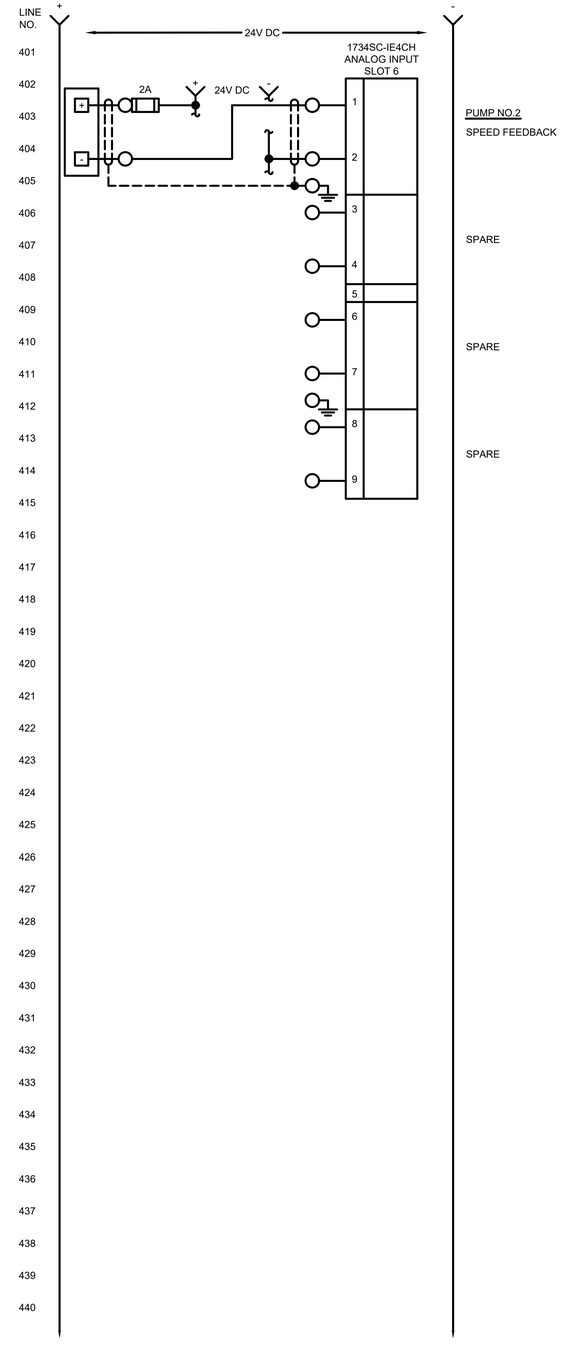

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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER, CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
AUGUSTA-WEBSTER PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

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OF 28

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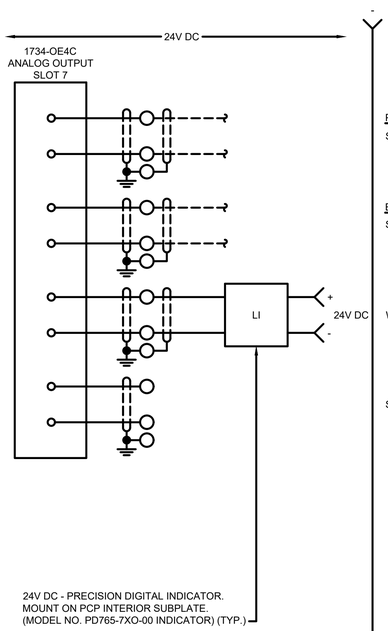
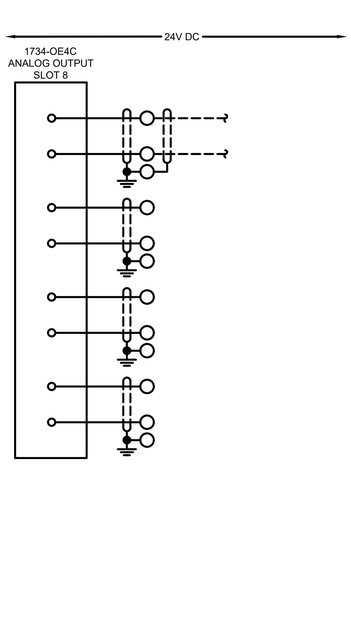
Bar Measures 1 inch

2/25/2022 2:25:07 PM - \\TT LOCAL\IER\PROJECTS\ANN ARBOR\IER\197432\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\I-26_AUGUSTA-WEBSTER_PCP WIRING DIAGRAM_IV.DWG - SHANK, JASON





LINE NO.	+	-
441		
442		
443		PUMP NO.1
444		SPEED CONTROL
445		
446		EXHAUST FAN/BLOWER
447		SPEED CONTROL (FUTURE)
448		
449		WETWELL LEVEL
450		
451		
452		SPARE
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LINE NO.	+	-
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483		PUMP NO.2
484		SPEED CONTROL
485		
486		SPARE
487		
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489		SPARE
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491		
492		SPARE
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LINE NO.
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www.tetratech.com
710 AVIS DRIVE
ANN ARBOR, MI 48108
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MARK	DATE	DESCRIPTION	BY

CITY OF KALAMAZOO, MICHIGAN

SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER
CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION
AUGUSTA-WEBSTER PUMP CONTROL PANEL WIRING DIAGRAM

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-27
OF 28

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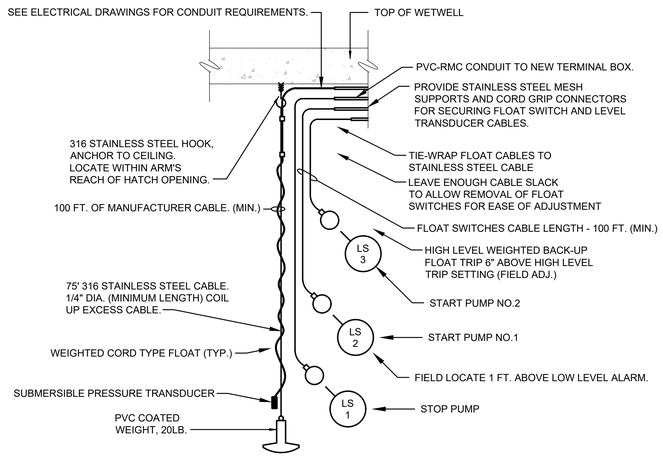
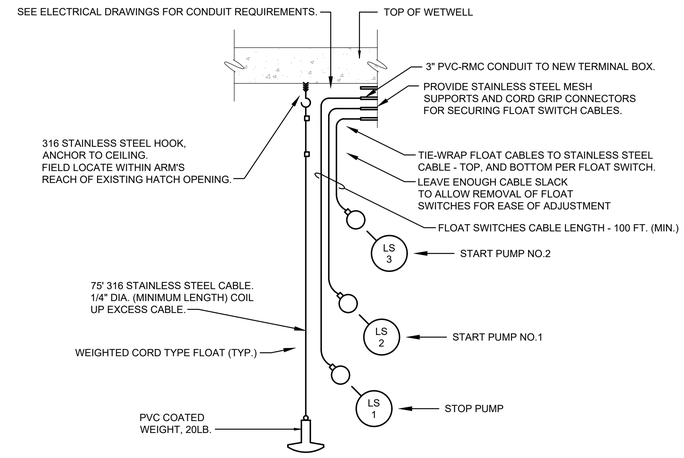
Bar Measures 1 inch

2/25/2022 2:27:25 PM - \\TT LOCAL\IER\PROJECTS\ANN ARBOR\IER\19743\200-19743-21003\CAD\SHEETFILES\E\PUMP STATIONS\I-27_AUGUSTA-WEBSTER_PCP WIRING DIAGRAM_V.DWG - SHANK, JASON



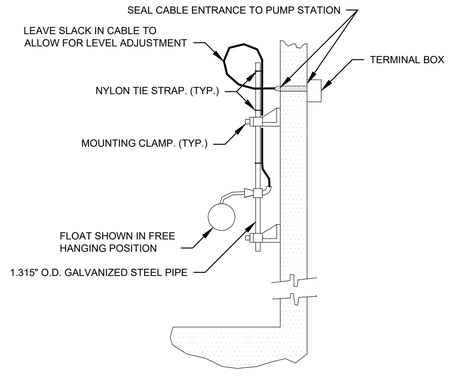
SUBMERSIBLE LEVEL TRANSMITTER, FLOAT SWITCH MOUNTING DETAIL

NO SCALE
(CLIMAX LIFT STATION)



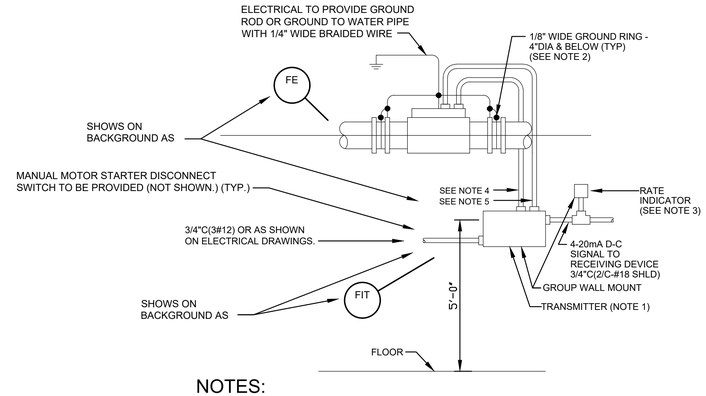
FLOAT SWITCH MOUNTING DETAIL

NO SCALE
AUGUSTA-WEBSTER LIFT STATION



CORD TYPE - SINGLE FLOAT SWITCH

NO SCALE



NOTES:

1. LOCATION FOR TRANSMITTERS NOT INTEGRALLY MOUNTED ON THE FLOW METER.
2. GROUND MAGMETER AS INSTRUCTED BY THE VENDOR.
3. INSTALL SEPARATELY MOUNTED INDICATOR. NOT REQUIRED ON INDICATING WALL MOUNTED TRANSMITTERS.
4. POWER WIRING, 1"C(4#12) OR AS SUPPLIED BY MANUFACTURER.
5. SIGNAL WIRING, 1"C(6/C-#18SHLD.) OR AS SUPPLIED BY MANUFACTURER.

MAGNETIC FLOWMETER INSTALLATION

NO SCALE
SEE "DEVICE BOX CONDUIT DETAIL FOR INSTALLATION

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CITY OF KALAMAZOO, MICHIGAN
SEWAGE LIFT STATIONS ELECTRICAL AND CONTROLS UPGRADES AUGUSTA-WEBSTER, CLIMAX, LAVENUE, WINDING WAY, WOODS LAKE

INSTRUMENTATION DETAILS

Project No.:	200-19743-21003
Designed By:	GCJ
Drawn By:	JLS
Checked By:	MSJ/GCJ

I-28
OF 28

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Bar Measures 1 inch

4/27/2022 12:03:29 PM - \\TT.LOCAL\ER\PROJECTS\ANN ARBOR\ER\19743\200-19743-21003\CAD\SHEETFILES\EIPUMP STATIONS\I-28_I-DET.DWG - SHANK, JASON