

Schedule A

General Description of Equipment and Specifications

1. REGULATORY REQUIREMENTS

- .1 Comply with Safety Codes Act and rules and regulations made pursuant thereto, including the Canadian Electrical Code.
- .2 Unless otherwise indicated, all references to "Canadian Electrical Code" or "CEC" shall mean the edition of the Canadian Electrical Code, Part I, CSA C22.1, and the variations made thereto by Alberta regulation, which are in force on the date of bid closing for the Contract.
- .3 All electrical products shall be tested, certified and labeled in accordance with a certification program accredited by the Standards Council of Canada. Where a product is not so labeled, provide written approval by the authority having jurisdiction.
- .4 Submit to authority having jurisdiction and Utility Company, necessary number of drawings and specifications for examination and approval prior to commencement of electrical work. Pay associated fees.
- .5 Submit to Owner, copy of electrical permit obtained from authority having jurisdiction.
- .6 If authority having jurisdiction conducts an electrical inspection, submit copy of certificate of acceptance provided by authority having jurisdiction.

2. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- .1 Submit shop drawings, product data and samples, as specified, indicating details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment and materials.

3. OPERATION AND MAINTENANCE DATA

- .1 Provide the following for all systems and components:
 - .1 Manufacturer's product data, including performance curves and schematic and wiring diagrams for all electrical control systems.
 - .2 Manufacturer's installation instructions.
 - .3 Manufacturer's operation instructions.
 - .4 Manufacturer's maintenance instructions, including complete parts list for all serviceable components.
- .2 Provide a comprehensive list of Subcontractors, Sub-subcontractors and suppliers who supplied and installed systems and components.
- .3 Provide copies of all inspection certification reports from authorities having jurisdiction.

4. RECORD DRAWINGS

- .1 Record actual locations of all pull boxes, panelboards, luminaires, feeders, electrical equipment and electrical site services.
- .2 Record any changes to circuit designations.
- .3 Indicate on record drawings exact dimensioned locations of buried services and embedded or concealed conduits in floors and masonry walls. Obtain acceptance of this information by Engineer before commencing backfilling or concrete placement.
- .4 Include on record drawings all revisions due to engineering change orders, site alterations, additions and field ordered changes made during construction.

5. COORDINATION

- .1 Coordinate work specified in Division 26 with work specified in other Divisions. Ensure that proper arrangements and provisions are made for work specified in Division 26.

6. SOURCE OF SUPPLY

- .1 All like materials shall be by a single manufacturer.

7. REFERENCE STANDARDS

- .1 Comply with standards of following organizations:
 - .1 Electrical and Electronic Equipment Manufacturers Association of Canada (EEMAC).
 - .2 Institute of Electrical and Electronic Engineers (IEEE).

8. PRODUCT OPTIONS AND SUBSTITUTIONS

- .1 Product Options
 - .1 For products specified by Non–proprietary Specification:
 - .1 Select any product by any manufacturer that meets the requirements of the Contract Documents.
 - .2 For products specified by Proprietary Specification:
 - .1 Select any product or manufacturer named; or

- .2 Select a substitute product or manufacturer in accordance with substitutions.
 - .3 For products specified by Proprietary Specification and accompanied by words indicating that substitutions will not be accepted:
 - .1 Select any product or manufacturer named; Substitutions will not be permitted.
- .2 Substitutions
 - .1 Where Substitute Products are permitted, unnamed products will be authorized by the Owner, subject to the following:
 - .1 Substitute Products shall be the same types as, be capable of performing the same functions as, and meet or exceed the standards of quality and performance of the named product(s). Substitute Products shall not require revisions to the Contract Documents nor to work of Other Contractors.
 - .2 Do not order or install Substitutions without the Owner's authorization.
 - .3 If, in the Owner's opinion, a Substitution does not meet the requirements of the Contract Documents, provide a product that, in the Owner's opinion, does meet the requirements of the Contract Documents.
- .3 Changes to Authorized Products and Manufacturers
 - .1 Do not change products or manufacturers, authorized by the Owner for use in performance of the Work, without the Owner's written authorization.

9. DISCONNECTS

- .1 Disconnects: to CAN/CSA C22.2 No.4-M89, heavy duty, lockable, non-fused, with poles, voltage, amperage, kw ratings and enclosures as indicated on drawings and required by CEC to suit application.

10. SUPPORTING DEVICES

- .1 Provide metal brackets, frames, clamps, channels, straps and related devices to adequately support weight of equipment and raceways.

11. TESTING

- .1 Prior to energizing any portion of the electrical system, perform megger tests on all parts of the distribution system. Results shall meet the requirements of the CEC, authority having jurisdiction and the Contract Documents.

END OF SECTION

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1. GENERAL

1.1 RELATED SECTIONS

- | | | |
|----|--|-----------------|
| .1 | Basic Electrical Requirements: | Section 260500. |
| .2 | Electrical Starting and Testing by Contractor: | Section 260800. |

1.2 PRODUCT DATA

- .1 Comply with requirements of Sections 260500.

1.3 COORDINATION

- .1 Coordinate installation with Section - Mechanical Equipment Controls to provide a complete integrated functional system.

2. PRODUCTS

2.1 MODULAR MOTOR CONTROL CENTERS

- .1 Motor control centers to CSA C22.2 No. 14-95 and as follows:
- .1 Bus Characteristics:
 - .1 Capacity: as shown on drawings.
 - .2 Construction: rectangular section copper, tin plated joints.
 - .3 Bracing: 42,000 Amperes symmetrical (minimum).
 - .4 Neutral bus: as shown on drawings.
 - .5 Ground bus: Copper.
 - .2 General Construction:
 - .1 To EEMAC standards for construction of Class I motor control center with type B wiring.
 - .2 Dead front, multi-unit, modular type with assembly of vertical stacks containing cubicles sized to house equipment required.
 - .3 Minimum height per module: 305 mm.
 - .4 Horizontal bussing across top or center and vertical bussing down each stack.
 - .5 Wiring gutter across top and bottom and vertically down each stack. Wiring gutter shall be barriered from busway compartments.

- .6 Each module for motor control shall house disconnect breaker, motor control device, relays, and control transformer as shown on drawings. Modules for feeders will house only one or two feeder breakers. All breakers shall have a door mounted operating handle with lock-off facility. Opening of module is restricted by the used of a defeater screw, unless breaker is in the "Off" position.
- .7 Each combination starter or disconnect switch assembly shall be mounted in tub or rack assembly of removable plug-in type with necessary bus connection stabs.
- .8 Blank combination starter spaces shall have hinged cover section provided with full bussing to receive future rack assemblies.

2.2 CONTROL RELAYS

- .1 Rating: 10 amperes, 300 volts AC.
- .2 Coil: 120 Volts AC.
- .3 Poles: as required.

2.3 SURGE PROTECTION DEVICE

- .1 Manufacturer/Model: As shown on drawings.
- .2 Locate within MCC enclosure as indicated on drawings.

2.4 AUTOMATIC TRANSFER EQUIPMENT

- .1 Locate within MCC enclosure as indicated on drawings. Refer to section 263623.

2.5 POWER QUALITY METER

- .1 Metering of Ia, Ib, Ic, In, Va, Vb, Vc, Vab, Vbc, Vca, PF, Hz, W, var, VA, Wh, varh, Vah.
- .2 Harmonic analysis through 63rd with THD and TIF.
- .3 Event Recorder minimum 100 events.
- .4 Waveform capture.
- .5 Data logger minimum 90,000 events.
- .6 Voltage Disturbance Recorder minimum 500 events.
- .7 Digital and analog I/O for control and alarms.

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.8 Ethernet data communications.

.9 Power to be supplied from customer supplied 120VAC UPS.

2.6 ACCEPTABLE MANUFACTURERS

.1 Eaton, Allen-Bradley/Rockwell, Schneider, or approved equivalent.

3. EXECUTION

3.1 INSTALLATION

.1 Set and secure modular motor control center in place on concrete housekeeping pad.

.2 Make field power and control connections as indicated.

.3 Provide heater elements to suit motors installed.

.4 Provide breakers to suit motors installed.

.5 Tighten bus connections and mechanical fasteners to assure permanent and effective connection.

.6 Adjust operating mechanisms for free mechanical movement.

.7 Touch-up scratched or marred surfaces to match original finish.

.8 Avoid top cable entry. If top entry is necessary, ensure liquid tight.

3.2 PROTECTION OF COMPLETED WORK

.1 Protect motor control centers to prevent entry of duct, paint and other foreign matter.

3.3 TESTING

.1 Comply with requirements of Section 260800.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

- .1 Start-up and commissioning.

1.2 CODES AND STANDARDS

- .1 Design and construct the VFD in accordance with the applicable sections of the following standards or as modified in the specification.
 - .1 ANSI C84.1982 -- Voltage Ratings for Electric Power Systems and Equipment.
 - .2 CAN/CSA-C22.2 -- Industrial Control Equipment No. 14-M91.
 - .3 ANSI C37-90.1-1989 -- Guide for Surge Withstand Capability Tests.
 - .4 Equipment shall have CSA approval.
 - .5 Equipment shall comply with the electrical bylaws of the local electrical authority.
 - .6 Equipment shall be designed and manufactured in compliance with ISO-9001 quality standards.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Division 01 – Submittals Section.
- .2 Submit full technical data, service and parts facilities complete with manufacturer's published data.
- .3 Full shop drawings to be submitted for VFD equipment, submit as a minimum.
 - .1 Specification and Data Sheets.
 - .2 Manufacturer's published warranty documents.
 - .3 Shop drawings showing plan and elevation views with certified overall and interconnection point dimensions.
 - .4 Interconnection wiring diagrams showing all external connections required; with all field wiring terminals marked in a consistent manner.
 - .5 Manufacturer's installation instructions.

.6 Manufacturer's recommended spare parts.

.7 Complete parts list.

1.4 COORDINATION

- .1 It shall be the responsibility of the Variable Frequency Drive manufacturer to obtain all operating data and operating characteristics of the electric motors and the pump/motor combinations as may be required to ensure that the VFD's will safely and efficiently drive the intended equipment over the full range of intended operating conditions for the expected service life of 25 years.

2. PRODUCTS

2.1 GENERAL

- .1 The Contractor shall ensure full and complete coordination of the drive and motor characteristics which shall include, but not be limited to, the following:
- .1 A guarantee that the drive and motor meet the load demands and acceleration requirements of the driven equipment throughout the speed range when the input voltage varies over a range of 10%; and,
 - .2 Ensuring complete compatibility of the drive's current limit protection with the motor thermal withstand capability.
- .2 The drive shall be 97% efficient at full speed and full load. Fundamental power factor shall be 0.98 at all speeds and loads.
- .3 Controlled acceleration and deceleration times, separately adjustable, shall be provided.
- .4 Separately adjustable minimum and maximum frequency limits shall be provided.
- .5 The drive shall be capable of regulating the frequency to a $\pm 1\%$ of the setpoint over the full input voltage and ambient temperature operating range.
- .6 The vendor data shall indicate the efficiency, power factor, kW output, heat rejection and harmonic distortion of the drive 25%, 50%, 75% and 100% operating points.
- .7 Audible noise levels produced by the drive shall be limited 80 dBA sound pressure at one meter, at any point throughout the operating range of the drive.
- .8 The drive input shall be protected to withstand surges as defined in ANSI Std. (C37.90.1 - 1989, Guide for Surge Withstand Capability (SWC) Tests.
- .9 The drive shall be capable of data communications via Ethernet TCP/IP or Ethernet/IP.

2.2 CONSTRUCTION REQUIREMENTS

- .1 The drive shall be enclosed in the motor control center unless otherwise specified. Hinged, front access doors shall be provided.
- .2 The drive shall be complete with cable compartments for connection of incoming and outgoing cables.
- .3 When auxiliary cooling is required, the drive shall have fans and the required controls for proper operation.
- .4 Front panel interface module with LCD display and entry keypad to provide the following functions as a minimum:
 - .1 Drive setup parameters
 - .2 Diagnostic information
 - .3 Drive operating values
- .5 The drive shall have, as a minimum, hardwired connections as follows:
 - .1 Hand-Off-Auto (HOA) switch. HOA to be mounted on VFD enclosure door.
 - .2 Manual speed adjust device potentiometer for speed control when HOA is in "Hand". Potentiometer to be mounted on VFD enclosure door.
 - .3 Run Status
 - .4 Fault Status
 - .5 Auto Status
 - .6 Run Command
 - .7 Frequency Command
 - .8 Frequency Feedback
- .6 The drive shall provide the following signals via data communications as a minimum:
 - .1 Fault Reset
 - .2 Active Faults
 - .3 Phase Current
- .7 The diagnostic system shall monitor each alarm and shutdown function and shall display the status of each point on the cubicle front panel.
- .8 Terminal blocks for control, alarms, metering and diagnostics shall each be readily accessible, grouped and shall be segregated from power devices, for personnel safety.

- .9 Each terminal block, fuse, control switch, circuit breaker, auxiliary switch, relay, instrument transformer and other auxiliary component shall be permanently labeled to correspond with the schematics and wiring diagrams.
- .10 The shop drawing shall state what corrosion protection is provided.

2.3 PROTECTION SYSTEMS

- .1 All power connections, cables and buswork shall be braced to withstand the available asymmetric short circuit current.
- .2 The drive shall be equipped with a minimum of 15 ms power loss ride-through capability.
- .3 The loss of AC input power longer than 15 ms shall cause the drive to shutdown in an orderly fashion, without causing pulsations in the drive or motor systems.
- .4 The drive shall have the capability of being restarted with a remote signal from the PLC control system.
- .5 The drive shall not be affected by radio frequencies emitted by portable radios/transmitters.
- .6 The drive shall protect itself against the following as a minimum:
 - .1 Under/over voltage
 - .2 Overcurrent
 - .3 Over-temperature
 - .4 Output short circuit
 - .5 Output ground fault
 - .6 Stall

2.4 ACCEPTABLE SUPPLIERS

- .1 Qualifications: service and parts facilities in the Province of Alberta with 24 hour service, experienced in installation and operation of VFD's.
- .2 Drives shall be by Rockwell 753 Series, Eaton DG1 Series, Schneider ATV600 Series, Toshiba AS3 Series.

2.5 WARRANTY

- .1 Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment.
- .2 The warranty shall include all parts, labor, travel time and expenses.

END OF SECTION

1. GENERAL

1.1 RELATED SECTIONS

- .1 Basic Electrical Requirements: Section 260500.

1.2 SYSTEM

- .1 Unit to be designed for fully automatic operation upon power failure. Unit to sense utility failure, initiate generator start sequence, and transfer load under correct parameters.

2. PRODUCTS

2.1 COMPONENTS

- .1 Automatic transfer switch: Contactor based, 3 pole, fully automatic electrically operated, mechanically held, for all load classes with normal and emergency supply 3 phase, 3 wire, complete with auxiliary engine starting contacts, to operate on disruption of voltage or frequency (user adjustable settings) on any phase of normal power. Amperage and voltage as shown on drawings.
- .2 Provide time delay relays, adjustable from 10 seconds to 5 minutes to delay transfer from normal to standby until standby power source has obtained 90 per cent of rated voltage.
- .3 Provide time delay relays, adjustable from 1 to 5 minutes, to delay transfer from standby to normal source. Engine rundown period of "No-Load" for 5 minutes.
- .4 Fault level to match level of specified equipment fed from transfer switch.
- .5 In cover of transfer switch provide indication of transfer switch position complete with test switch to simulate a power failure.
- .6 Provide four sets of contacts to indicate supply being used. Two sets of contacts to be closed when normal supply is sourced. Two sets of contacts to be closed when standby supply is sourced.
- .7 Provide a feature which will monitor a remote contact (from station control system). Closure of this contact will initiate a transfer to standby power if the transfer switch is in the utility power position. Opening of this contact will initiate a transfer to utility power if the transfer switch is in the generator power position.
- .8 Capability of Ethernet data communication for remote monitoring of equipment. Communication module to have an embedded webpage which can be viewed with a standard Web browser. Webpage to display all information available on local display.

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2.2 ACCEPTABLE MANUFACTURERS

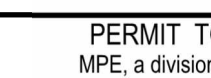
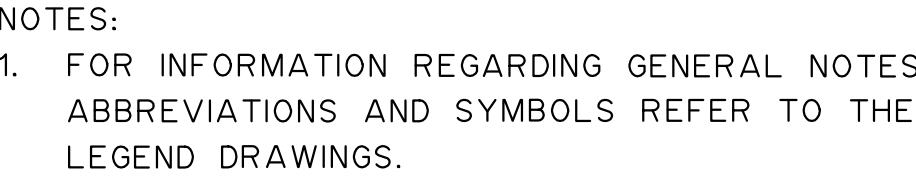
- .1 Asco 7000 Series. No alternates.

3. EXECUTION

3.1 OPERATION

- .1 Automatic start-up upon normal power failure.
- .2 Transfer when standby unit reaches 90% of rated voltage.
- .3 Retransfer to normal supply after time delay, when normal power is resumed.
- .4 Engine rundown period at "No "Load".
- .5 Engine shutdown/after rundown.
- .6 Operating sequence automatically reset.

END OF SECTION



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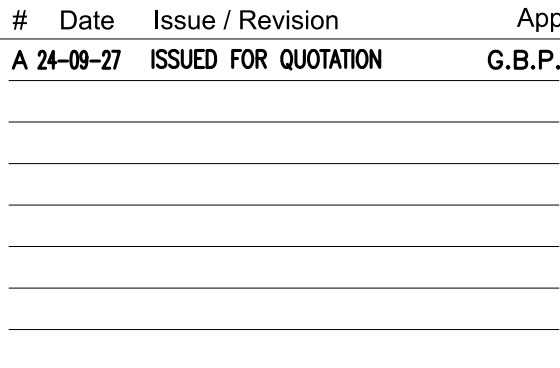
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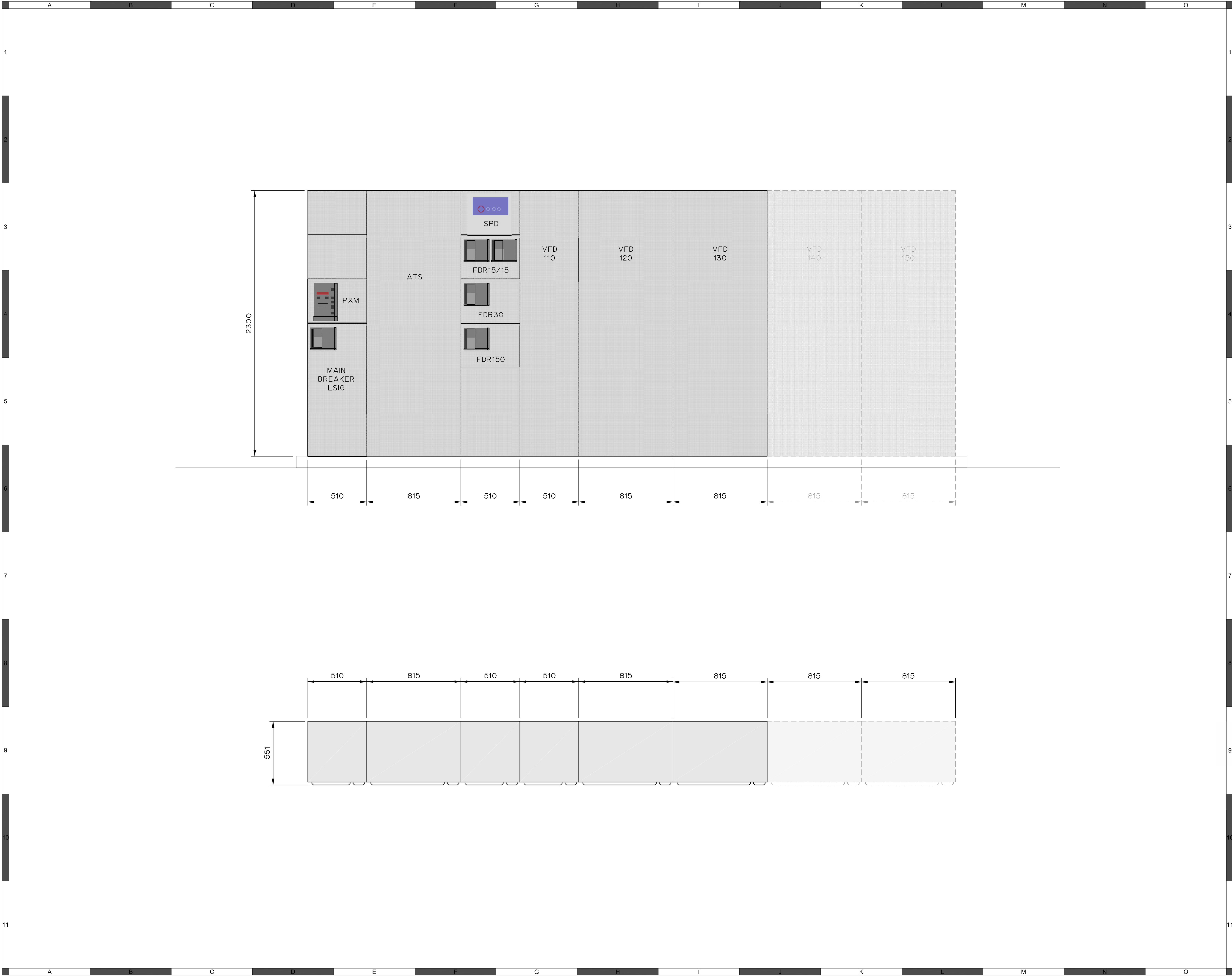


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Designed by	G.B.P.
Drawn by	Y.F.S.

FOOTHILLS OKOTOKS INTAKE PUMP STATION SINGLE LINE DIAGRAM

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GERARD B. PAPWORTH
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SEP 27, 2024

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A	24-09-27	ISSUED FOR QUOTATION	G.B.P.

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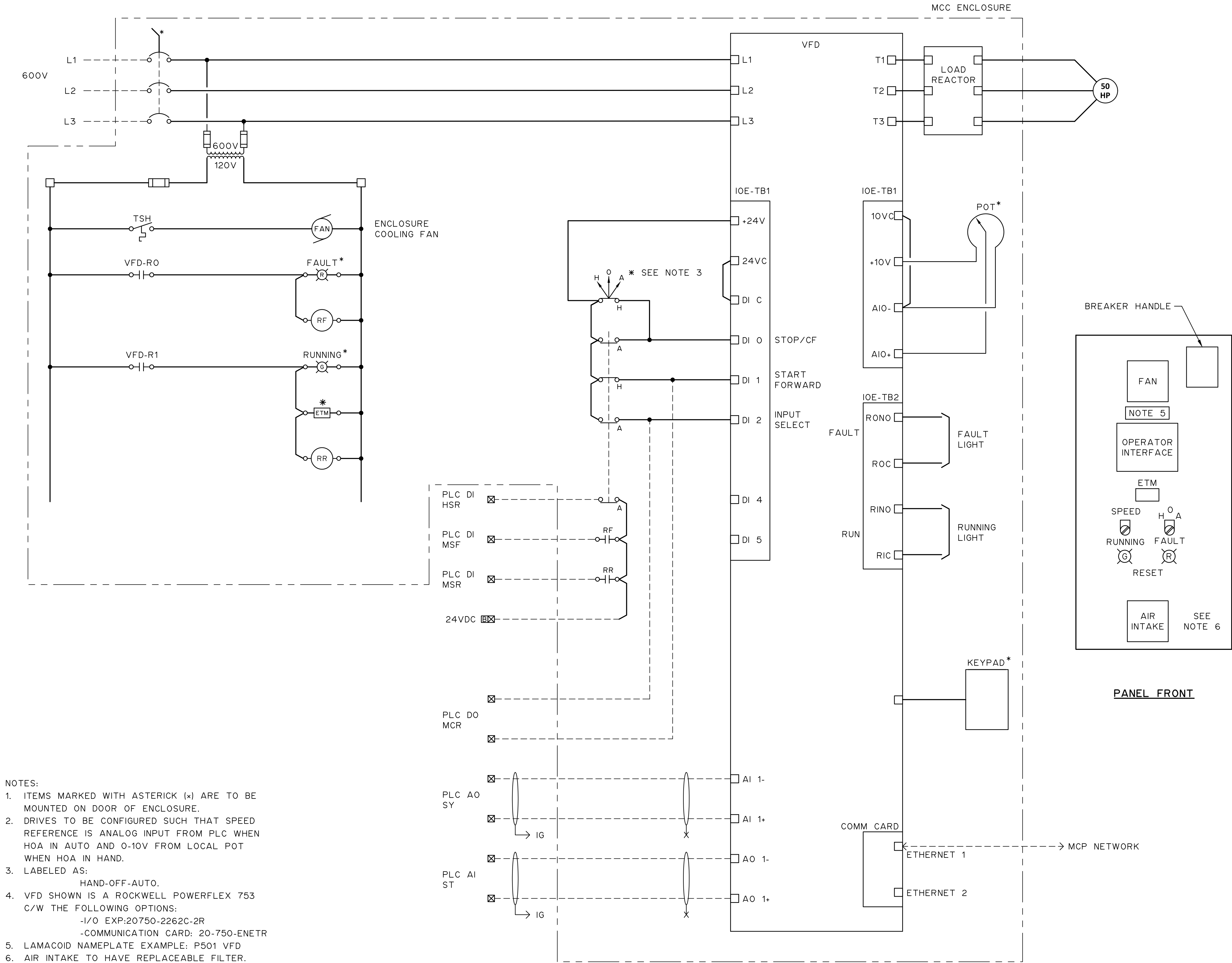
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FOOTHILLS OKOTOKS
INTAKE PUMP STATION
MCC LAYOUT

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Project Number	29121-005-09
Drawing Number	FORW-01-E-LAY-002
Revision	A

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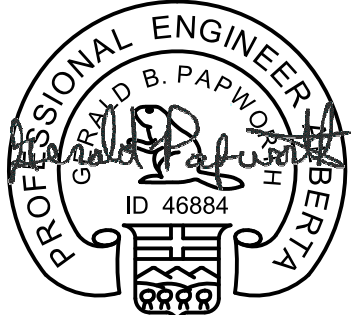
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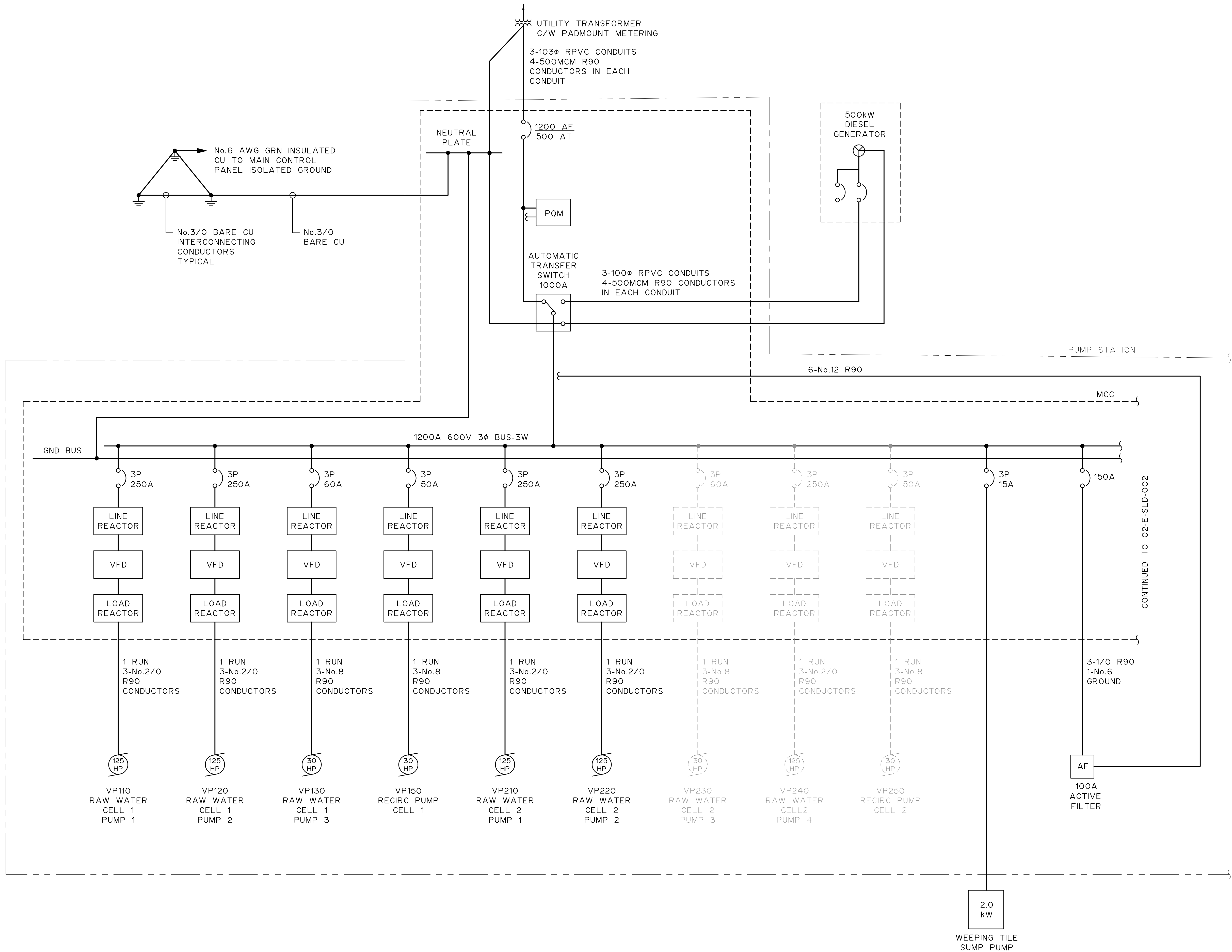
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FOOTHILLS OKOTOKS
INTAKE PUMP STATION
PUMP VFD SCHEMATIC TYPICAL

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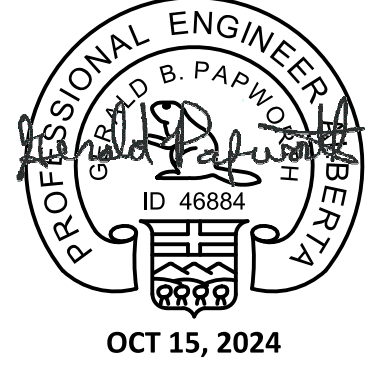


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B	24-10-15	ISSUED FOR QUOTATION REVISED G.B.P.	



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FOOTHILLS OKOTOKS
MIDLINE PUMP STATION
SINGLE LINE DIAGRAM 1 OF 2

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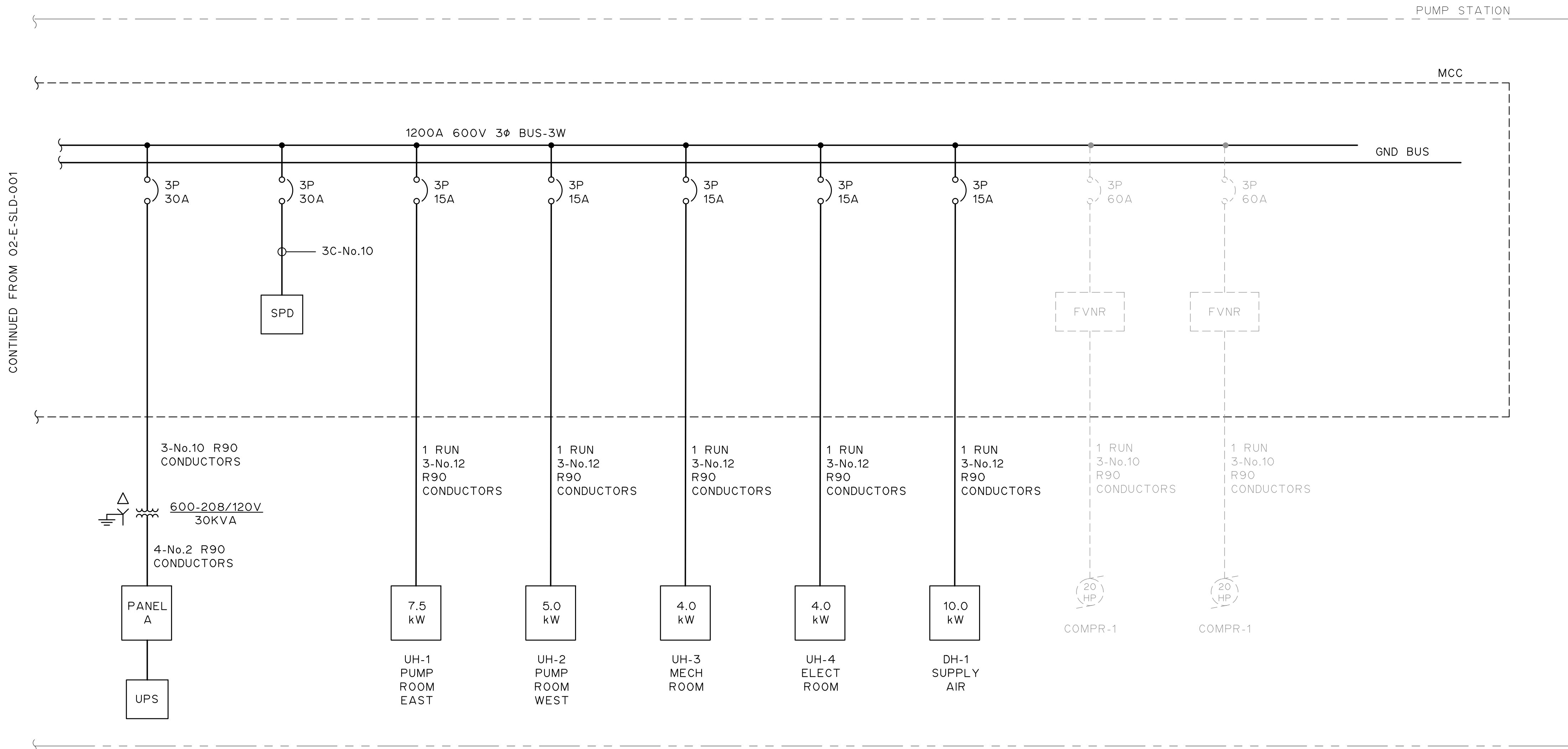
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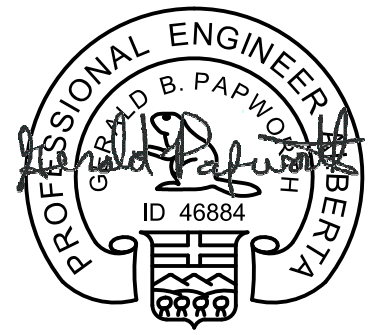
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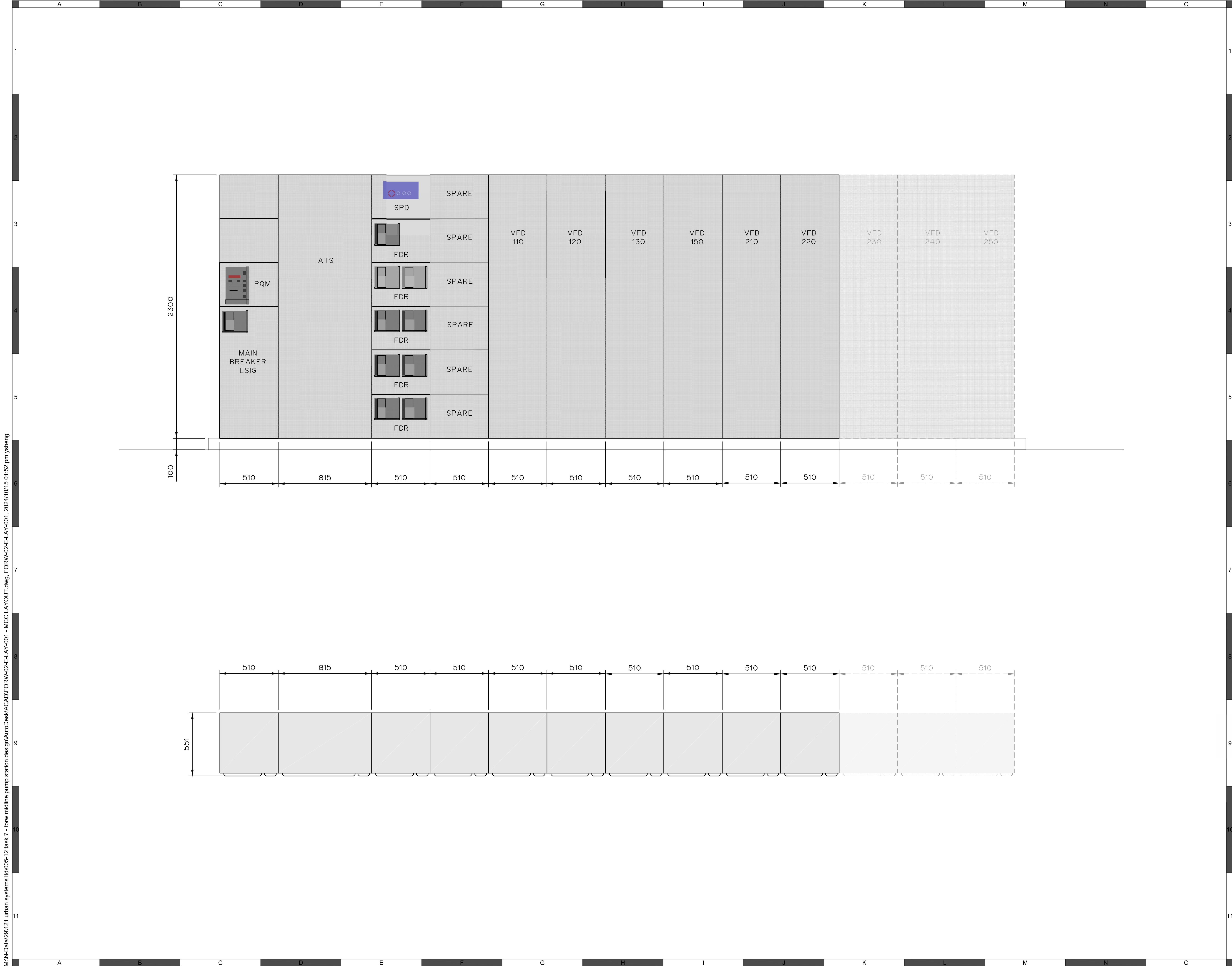
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MIDLINE PUMP STATION
SINGLE LINE DIAGRAM 2 OF 2**

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MIDLINE PUMP STATION
MCC LAYOUT**

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Drawing Number	FORW-02-E-LAY-001
Revision	A

M:\N-Data\29121 urban systems ltd\005-12 task 7 - low midline pump station design\AutoDesk\ACAD\FORW-02-E-LAY-001 - MCC LAYOUT.dwg, FORW-02-E-LAY-001, 2024/10/15 01:52 pm ysheng

NOT FOR CONSTRUCTION

