

Part 1 General

Part 2 Related Sections

- .1 27 05 13 – Communications Services
- .2 27 11 16 – Enclosures

2.2 GENERAL REQUIREMENTS

- .1 Cooperate with other contractor(s) and the Departmental Representative and provide start-up and commissioning services for the complete control system and associated field devices and wiring.

2.3 SUBMITTALS

- .1 Submittals to include:
 - .1 wiring diagrams,
 - .2 layout,
 - .3 Panel plate with ratings of the control panel (Short circuit current rating, HP, voltage, bear CSA/cUL etc.). The Panel plate shall be affixed onto the front door of the Control panel for easy identification.

Part 3 Products

3.1 PROGRAMMABLE LOGIC CONTROLLERS

- .1 General:
 - .1 All new PLC equipment;
 - .1 CPU – TBD (Select processor Model and memory based on the specified programming and functionality requirements).
 - .2 Analog Input – Isolated 120 VAC.
 - .3 Analog Output – 4-20 maDC Isolated Differential type.
 - .4 Discrete Input – Isolated 120 VAC.
 - .5 Discrete Output – Isolated 120 VAC.
 - .6 Power Supply – Size the power supply to meet loading requirements of this Section.
 - .7 Rack – TBD (number of slots to accommodate required modules plus two (2) spare slots.
 - .2 PLC cabinet to also include:
 - .1 CSA/NEMA Type 4 (minimum) Control Cabinet, 120 VAC, 1 ph, 12 A breaker. Bracing shall be a minimum of 5kA.
 - .2 PLC with I/O. Provide 20% spare IO.
 - .1 Cards shall be Isolated Relay Output Modules
 - .1 Provide 1 fuse per Output

- .2 Cards shall be Isolated Input Modules
 - .3 Provide 1 fuse per Input
 - .3 Cards shall be Isolated Analog Modules
 - .1 Provide 1 fuse per Analog device
 - .4 IO Reservation:
 - .1 4-20 mA Communication to Respective Instrumentation.
 - .2 Discreet I/O allowance for associated Control.
 - .5 All IO to be wired to terminals
 - .6 IO allowances shall include all IO points shown on the P&ID's
- .3 Provide 1 Breaker per PLC Card.
- .4 Provide 1 Breaker per Component.
- .5 Fiber-Ethernet Communications for Remote Monitoring, Switch shall be managed type.
 - .1 1 Fiber and 1 Ethernet port shall be reserved for communication with the site BMS.
 - .2 1 Port for Gateway
 - .3 1 Port for HMI
 - .4 1 Port for PLC
 - .5 1 Port for programming port mounted onto the PLC door (weatherproof)
 - .6 Fiber ports shall accept SFP modules for the appropriate Fiber and connector type. General contractor to coordinate type of onsite fiber with Integrator.
 - .7 Ethernet switch shall have 2 spare ports.
- .6 Design panel for Top and Bottom Entry.
 - .1 Panel Mounted Ethernet Port and Weatherproof cover.
 - .2 External GFCI Outlet with Weatherproof While-in-Use Cover, label as Laptop Only.
 - .3 Panel Mounted Alarm Horn (30 dB) and Silence Pushbutton on the HMI screen.
 - .4 HMI mounted onto the front door
 - .1 All Controls, Settings and Alarm Indication accessible on HMI screen.
 - .2 HMI Password Protected with Operator and Maintenance Levels.
- .7 Fiber Patch Panel, minimum 6 pairs, DIN rail mountable with pigtail splice kit for fusion splicing.
 - .1 Provide appropriately sized Fiber attenuators for Single mode fiber, if applicable.
- .8 24VDC power supply sized to provide 20% extra power.
 - .1 Panel Mounted 24VDC Control Power Indicating Light.
- .9 Programming
 - .1 Include providing Alarms and statuses to the site's BMS system
 - .2 Include providing Alarms and statuses to the Cloud

- .10 Acceptable Manufacturer/Integrator
 - .1 Ayawtech Automation
- .11 Unless otherwise specified, upgrades and modifications to existing PLC control panels shall utilize hardware components compatible with the existing PLC and programming modifications shall be made using existing installed software
- .12 All new processors are to be adequately sized to provide sufficient memory and processing capacity to handle the I/O, logic, communications, and data requirements for the new lift station based on the defined I/O mix and the process control narrative requirements.
- .13 Communication for the PLC network is Ethernet over copper and broadband radio.
- .14 Provide 20% spare I/O of each type to each panel assembly.
- .15 Provide all necessary racks, power supplies, cables, communication cards, and accessories.
- .16 Provide 10% spare slot capacity for each PLC panel assembly (minimum of two (2) slots).
- .17 Provide 25% spare power supply capacity for each PLC panel assembly.
- .18 Each new PLC panel assembly is to include a constant voltage regulating transformer suitably sized for the panel load equal to Sola Hevi-Duty MCR series and incoming power transient surge suppression equal to Sola Hevi-Duty STV100K series. Connect the surge suppressor dry contacts to a PLC input at each panel and notify the control system integrator/programmer.

Part 4 Execution

4.1 PERFORMANCE – GENERAL

- .1 Refer to Section 26 05 00
- .2 Refer to P&ID Drawings supplied under this Contract.

4.2 INSTALLATION

- .1 Provide hardware in accordance with the foregoing requirements in sufficient quantity to satisfy the performance requirements defined in this and other Divisions of the Specification.
- .2 Provide all necessary documentation to define the configuration of the control system including details for all hardware.
- .3 Program the system to provide functionality generally as described in the Process Control Narratives and to Commission and start up the system as defined herein.
- .4 Provide all documentation and training as defined herein.
- .5 Maintain existing plant operation during entire construction period. Refer to the requirements of Division 1.

END OF SECTION

INSTRUMENT SPECIFICATION NUMBER:	I-100
DEVICE:	Pressure & Differential Pressure Transmitter
TAG:	Refer to Electrical P&ID Drawings
SERVICE:	Tunnel Ambient Air
PROCESS CONNECTIONS:	1/8" for 3/16" ID tubing, or 5mm for 0.17" ID tubing, as required
RANGE:	As per Electrical P&ID Drawings
INACCURACY:	+/- 1% of span or lower
OUTPUT:	4 to 20mA DC
POWER SUPPLY:	Loop Powered 24VDC
CONSTRUCTION:	316 SST
ELECTRONIC ENCLOSURE:	Refer to Electrical Specifications Section 26 05 00
LOCAL DISPLAY:	Integral LCD Display for provided part numbers
WIRING METHOD:	Circuit and wiring method to comply with the latest edition of the Canadian Electrical Code, Class 2 requirements.
ACCESSORIES:	Bulkheads for pneumatic lines, 90 deg. elbows for vent line at exhaust vent
MANUFACTURER AND MODEL:	For Tunnel measuring ports: Greystone RPV Plates; Supply fan filter monitoring: Dwyer 616KD-B-00. Adjust zero and span for the filter. Dwyer A-360 DIN Rail option. Install Dwyer unit into box. Install bulkheads for pneumatic lines to box and label box with the appropriate instrument tag. For Outdoor measuring ports on exterior exhaust: Greystone OPV Weatherproof Enclosures. For Tunnel Differential Transmitters: Dwyer 616W-6B-LCD. Adjust zero and span as shown on the Electrical P&ID Drawings.

**INSTRUMENT
SPECIFICATION NUMBER:**

I-101

DEVICE:

Strobe

TAG

Refer to Electrical P&ID Drawings

POWER SUPPLY:

120VAC

CONSTRUCTION:

Pipe Mountable; ½" NPT

ELECTRONIC ENCLOSURE:

NEMA 4X

MANUFACTURER AND MODEL:

Federal Signal LP3P-120R

**INSTRUMENT
SPECIFICATION NUMBER:**

I-102

DEVICE:

Temperature Indicating Transmitter with RTD
Sensor

TAG:

Refer to Electrical P&ID Drawings

SERVICE:

Tunnel Ambient Air

RANGE:

-50°C to 50°C

INACCURACY:

plus or minus 0.5% of span or better

INDICATION:

N/A

OUTPUT:

4-20 mA DC

POWER SUPPLY:

Loop powered

ENCLOSURES:

NEMA 4X

RTD Probe: 5 mm dia x 100 mm L ambient air
probe.

**MANUFACTURER
AND MODEL:**

Endress+Hauser TST434 Series
or approved equal

**INSTRUMENT
SPECIFICATION NUMBER:**

I-103

DEVICE:

Door Sensor

SERVICE:

Tunnels

PRIMARY SENSORS:

Provide door release sensors and hatch limit switches in tunnels for: 1. New steel doors; 2. Non-steel doors; 3. Retrofit applications to existing doors.

CONTROL UNIT:

Tie into existing.

POWER SUPPLY:

24VDC

OUTPUTS:

Dry Contacts

ALARM HORN:

N/A

ENCLOSURE:

N/A

MANUFACTURER:

For New Doors and Frames, with Metal Door:
General Electric 1076C

For Existing Doors and Frames:
General Electric 1087TH-N

For New Doors and Frames, Non-metallic Doors:
General Electric 1075

INSTRUMENT SPECIFICATION NUMBER:	I-104
DEVICE:	Smoke Detector
SERVICE:	Tunnels
PRIMARY SENSORS:	Smoke detector for the HVAC control system only.
CONTROL UNIT:	NTBU43+000 Building PLC.
POWER SUPPLY:	120VAC
OUTPUTS:	Standard Features
ALARM HORN:	N/A
ENCLOSURE:	N/A
MANUFACTURER:	BRK 7010BA. Provide two 9VDC batteries for each unit. Provide two BRK RM2 Relays to be placed inside the PLC panel, (or each tunnel being monitored) for a total of eight relays.

END OF SECTION