

Part 1 General

1.1 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit commissioning plans and procedures, in writing, at least twenty (20) Working days prior to commissioning.

1.2 CLOSEOUT SUBMITTALS

- .1 Final Report:
 - .1 Include measurements, final settings, and test results.
 - .2 Include completed commissioning forms.
 - .3 Bear signature of commissioning technician and supervisor.
 - .4 Revise "As-Built" documentation, commissioning reports to reflect changes, adjustments and modifications as set during commissioning and submit to the Contract Administrator in accordance with Section 01 78 00 - Closeout Submittals.
 - .5 Recommend additional changes and/or modifications deemed advisable in order to improve performance, environmental conditions or energy consumption.

1.3 COMMISSIONING FORMS

- .1 The Contract Administrator shall provide a base set of standard commissioning forms. The Contractor will be required to fully complete all test forms and submit to the Contract Administrator.
- .2 Supplement the provided forms as required to make a complete commissioning report package.

1.4 COMMISSIONING

- .1 Carry out commissioning under direction of the Contract Administrator and in the presence of representatives of the Contract Administrator and the City of Winnipeg personnel.
- .2 Inform, and obtain approval from the Contract Administrator in writing at least fourteen (14) days prior to commissioning or each test. Indicate:
 - .1 Instrument(s) to be commissioned.
 - .2 Testing/commissioning procedures, anticipated results.
 - .3 Names of testing/commissioning personnel.
- .3 Correct deficiencies at no additional cost and re-test until satisfactory performance is obtained.
- .4 Acceptance of tests shall not relieve Contractor from responsibility for ensuring that complete systems meet every requirement of the Contract.

1.5 COMPLETION OF COMMISSIONING

- .1 Commissioning shall be considered as satisfactorily completed when the objectives of commissioning have been achieved and reviewed by the Contract Administrator.

Part 2 Products

2.1 NOT USED.

Part 3 Execution

3.1 STATUS PRIOR TO COMMISSIONING

- .1 Prior to commissioning, ensure that the following is completed:
 - .1 Installation all instruments, cabling, conduit, terminals, fuses, wire tags, cable tags, and identification lamacoids.
 - .2 Configuration of the instruments.
 - .3 Programming of the bridge PLC (by City of Winnipeg)
 - .4 Programming of the facility DCS controller and DCS HMI (by City of Winnipeg).
 - .5 Bridge PLC panels are cleaned of any materials and debris resulting from construction.

3.2 PROCEDURES

- .1 Provide a minimum of one (1) qualified technician to configure, test, and commission the proximity switches and sludge blanket level transmitters.
- .2 Test each instrument to the clarifier bridge PLC and facility DCS.
 - .1 Tests to be performed in conjunction with the City of Winnipeg personnel to verify alarm and status signals on the City's DCS controller and DCS HMI.
 - .2 Test both states of discrete points.
 - .3 Test, at minimum, three values for analog points.
 - .4 The 4-20mA output on the sludge blanket transmitters requires calibration of the zero and span based on loop impedance. Perform loop calibration for each individual transmitter 4-20mA loop to the bridge PLC analog input module.
- .3 Test each piece of instrument individually for complete functionality.
- .4 All deficiencies must be corrected by the Contractor at no additional cost.

3.3 CHECKLISTS, FORMS, AND REPORTS

- .1 Complete checklists, forms, and reports for each instrument, loop, and control device.
 - .1 Instrument Transmitter Loop Checklist (one checklist per transmitter).
 - .2 Instrument Switch Checklist (one checklist per transmitter).

3.4 DEMONSTRATION

- .1 Demonstrate to the Contract Administrator and/or the City of Winnipeg personnel operation of systems including sequence of operations under all potential conditions.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Process instrumentation.

1.2 REFERENCES

- .1 NEMA 250-2003, Enclosures for Electrical Equipment (1000 Volts Maximum).
- .2 Canadian Standards Association (CSA International).
 - .1 CSA-C22.1-2021, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

1.3 SUBMITTALS

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 – Submittal Procedures.
 - .1 Provide shop drawings for each instrument, indicating:
 - .1 Nameplate details.
 - .2 Voltage and current ratings
 - .3 Mounting methods and outline dimensions.
 - .4 Enclosure types and ratings.
 - .5 Wiring diagrams.
 - .6 Device instrument numbers.
 - .2 Manufacturer's Instructions:
 - .1 Include manufacturer's installation instructions for specified equipment and devices in O&M Manuals.

Part 2 Products

2.1 GENERAL

- .1 Control devices of each category to be of same type and manufacturer.
- .2 External trim materials to be corrosion resistant.
- .3 Operating conditions: 0 to +5°C with 5 - 95% RH (non-condensing) unless otherwise specified.
- .4 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

2.2 ULTRASONIC LEVEL TRANSMITTER, SENSOR (LIT-S7XX, LE-S7XX)

- .1 Acceptable Products:
 - .1 Pulsar Sludge Finder 2
 - .1 Power supply: 24 Vdc
 - .2 Quantity of transducer inputs: 1
 - .3 Analog output: 4-20mA
 - .2 Pulsar Viper Transducer VT100
 - .1 Measurement Range: 0.3 to 10 meters
 - .2 Wiper blade: Required
 - .1 Wiper blade material: Stainless Steel
 - .3 Cable length: 10 meters
 - .4 Ingress protection: IP68
 - .3 The supply of ultrasonic level transmitters for the City of Winnipeg has been standardized under NEWPCC Secondary Clarifiers 11-26 Sludge Level Detection – Trial Phase. No alternates or substitutes will be accepted.

2.3 PROXIMITY SENSOR (ZS-S7XX)

- .1 Parameters:
 - .1 Voltage: 120V AC
 - .2 Housing: Stainless steel (316L), threaded type
 - .3 Sensing Range: 10mm-30mm
 - .4 Output: Solid state, Normally Open
 - .5 Protection: IP67 and above
 - .6 Approvals: CSA listed or cUL certified

Part 3 Execution

3.1 INSTALLATION

- .1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.
- .2 Install field control devices in accordance with manufacturer's recommended methods, procedures and instructions.
- .3 Install in a manner to allow easy removal of the transducer and cable assembly for maintenance purposes.
- .4 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

- .5 Electrical:
 - .1 Complete installation in accordance with Section 26 05 01 - Common Work Results - Electrical.
 - .2 Provide complete conduit/cable system to link instrumentation and the control panel(s).
 - .3 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.
 - .4 Maximum conduit fill not to exceed 40%.
 - .5 Design drawings do not show conduit layout.

3.2 INSPECTION AND INSTRUCTION

- .1 Provide for a factory-trained representative who shall give instructions regarding the installation of the equipment.
- .2 The factory-trained representative shall visit the site as required to ensure that the installation work is being performed in a proper and workmanlike manner. Allow for a minimum of one (1) full working day.
- .3 The factory-trained representative along with the Contract Administrator and/or the City of Winnipeg personnel shall be present to supervise the commissioning, initial operation, and functional testing of the equipment. Provide a minimum of ten (10) working days prior to performing instrument commissioning.

3.3 IDENTIFICATION

- .1 Identify field devices with lamacoids. Install in a conspicuous location.

3.4 TESTING AND COMMISSIONING

- .1 Calibrate and test field devices for accuracy and performance in accordance with Section 40 80 11 - Automation Commissioning.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 C22.2 No.205-M1983(R2004), Signal Equipment.
- .2 International Electrotechnical Commission (IEC).
 - .1 IEC 61131, Programmable Controllers.

1.2 DEFINITIONS

- .1 DCS - Distributed Control System.
- .2 PLC - Programmable Logic Controller.

1.3 PROGRAMMING REQUIREMENTS

- .1 The City of Winnipeg will perform all programming on the Bridge PLCs and the facility DCS. The Contractor is not required to provide any PLC or DCS programming services.

1.4 DESIGN REQUIREMENTS

- .1 There are no PLC or DCS design requirements for the Contractor.

1.5 SUBMITTALS

- .1 All submittals to be in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product datasheets for:
 - .1 Analog 4-20 mA input module
 - .2 Discrete 120 Vac input module

Part 2 Products

2.1 PROGRAMMABLE LOGIC CONTROLLER COMPONENTS

- .1 On-board Inputs and Outputs:
 - .1 Discrete Input (DI):
 - .1 Channels: 16
 - .2 Voltage: 120 Vac.
 - .3 Current sinking: Required.
 - .4 Indicating LEDs: Channel status (ON / OFF) for each channel.
 - .5 Acceptable Products:
 - .1 Schneider Electric Modicon BMX DAI 1604,
 - .2 Schneider Electric BMX FTB 2010,

- .3 No alternates or substitutes will be accepted.
- .2 Analog Input (AI)
 - .1 Channels: 4
 - .2 Type: 4-20 mA, single ended
 - .3 Acceptable Products:
 - .1 Schneider Electric Modicon BMX AMI 0410,
 - .2 Schneider Electric BMX FTB 2010,
 - .3 No alternates or substitutes will be accepted.
- .3 Discrete Input (DI) and Analog Input (AI) module quantities as per the drawings and the Automation Bill of Material, 1-0101-ATLI-S002, included with this Tender.

Part 3 Execution

3.1 HARDWARE INSTALLATION

- .1 The City of Winnipeg will install the discrete and analog input modules into the Bridge PLCs.
- .2 The City of Winnipeg will update the firmware in the discrete and analog input modules.
- .3 The Contractor is required to wire the input channels on the discrete and analog input modules. The Contractor is not required to wire all spare channels – only the channels needed for the project.

END OF SECTION

Part 1 General

1.1 GENERAL REQUIREMENTS

- .1 The NEWPCC Bridge control panels will be modified as part of the Work.
- .2 All Control Panel modifications, with the exception of installing PLC modules into the PLC chassis, shall be performed by the Contractor, including but not limited to installation of DIN rail, relays, terminals, fuses, wiring, and labelling.
 - .1 The City of Winnipeg will install PLC modules into the PLC chassis.

1.2 SUBMITTALS

- .1 Submit product data for:
 - .1 DIN rail,
 - .2 Relays,
 - .3 Terminals,
 - .4 Fuses.

Part 2 Products

2.1 GENERAL

- .1 Construction of the control panel modifications is required, in accordance with the supplied Drawings.
- .2 Control devices of each category shall be of same type and manufacturer.

2.2 COMPONENTS

- .1 Unless written approval for use of unapproved components is received from the Contract Administrator, all materials shall be CSA or cUL approved.
- .2 Rails (DIN Rails):
 - .1 Rails used must be DIN Rail style NS 35 / TS 35 (35 mm), slotted.
 - .2 When used to mount terminals, rails shall be mounted on straight raisers (Rail support / Mounting feet) so as to raise them to the same height as the highest adjacent wiring duct.
 - .3 Raisers (Rail support / Mounting feet) shall not be used when rail hosts heavy components.
- .3 Terminals:
 - .1 Requirements:
 - .1 Mounting: TS-35 / NS-35 DIN rail.
 - .2 Voltage rating:
 - .1 600 V for general control circuits.

- .2 600 V for power circuits.
- .3 Manufacturer: Phoenix Contact or approved equal in accordance with B7.
- .4 Model: As indicated on the drawings.
- .2 Terminal blocks shall be designed for the size of the wires to be connected to them. Terminal blocks used for analog, digital, and power cables shall be identified and physically separated from each other.
- .3 Each terminal shall bear an identification number on both sides.
- .4 Drawings and templates supplied may not detail all hardware components such as labels, stoppers, rail lifters, end plates, separators, etc. The supplier must supply and install such components when required.
- .4 Grounding:
 - .1 All control panel components shall be adequately grounded in accordance with the component manufacturer, especially control system components.
 - .2 Firmly bond all panel mounted devices on or within the panels to ground. Attach a separate bonding conductor to all devices that are not firmly fastened to the panels with screws for such devices as case mounted instruments, meters, etc.
- .5 Wiring:
 - .1 Panel wiring shall be installed in a neat and orderly manner.
 - .2 All conductors shall be securely fastened to terminals at both ends; no splices are allowed inside the panel.
 - .3 No more than two (2) conductors may be terminated under each terminal screw. All internal panel conductors shall be connected to the same side of a terminal block, and external conductors to the opposite side. The only exception is for fused terminals which require connection to the field side for internal wiring.
 - .4 All wires and cables inside the control panels shall be identified on both ends with non-erasable markers.
 - .5 Identification shall follow the supplied documents, such as wiring diagrams.
 - .1 Label both ends of each wire.
 - .2 Utilize machine printed non-slip labels. Wrap-around or self-adhesive markers shall not be permitted.
 - .3 Wherever possible wire labels shall be positioned to be read from the panel opening without removal of wire duct covers or other wiring.
 - .6 Individual conductors or wires exiting a cable shall be identified using non-erasable markers.
 - .7 The routing of all analog, digital, power, and networking wiring and cabling inside the control panels shall be segregated as much as possible by the type of signal they are carrying.
 - .8 All wires shall be physically protected by wiring ducts with covers. The wiring ducts shall be of sufficient size to be filled to a maximum of 50% when all wires are inside.
 - .9 All analog twisted-pair wiring shall be 18 AWG shielded such as Belden No. 8760, or an approved equivalent in accordance with B7. Shield wires exiting the

- jacket must be covered with a black heat shrink, and the overall cable at the jacket end must also be covered with a heat shrink.
- .10 All 24 VDC or 120 VAC discrete signal wiring shall be 16 AWG TEW stranded conductor.
 - .11 All 120 VAC power wiring shall be 14 AWG TEW stranded conductor, minimum.
 - .12 All 24 VDC and 24 VAC power wiring shall be 12 AWG TEW stranded conductor, minimum, and as per the drawings.
 - .13 The sizes and colours of wires shall be in accordance with the CSA and the Canadian Electrical Code.
 - .14 Wiring Duct:
 - .1 All wires shall be run in narrow slot wiring duct such as Panduit or an approved equivalent in accordance with B7.
 - .2 Wiring Duct shall be installed on both sides of the panel and between the DIN rails.
 - .3 Wire or cable, connected to internal device or arriving from external device, shall be uncovered by Wiring Duct for a maximum of 10 cm.
 - .15 Wire ties shall be non-metallic.
 - .16 Wiring shall be arranged to be readily accessible for inspection and maintenance.
 - .17 The wiring arrangement shall not interfere with access to panel-mounted devices or spaces for future equipment.
- .6 Overcurrent Protection
- .1 Panel-mounted devices and all control circuits shall be protected by appropriately sized fuses or circuit breakers.

Part 3 Execution

3.1 COMPONENT INSTALLATION

- .1 Each component inside the control panel shall be identified with a nameplate corresponding to the Drawings.
- .2 All non-DIN rail mountable devices in the control panel shall be mechanically affixed to the back panel with either tapped or self-tapping screws.
- .3 All control devices shall be mounted so that any component can be replaced without removing the sub-panel or other components.
- .4 Components and/or auxiliary instruments mounted at the rear of the panel shall be readily accessible and their installation shall not be affected by, or interfere with the removal of any panel instrument.
- .5 Nameplates shall be made of lamacoid material with a white background and engraved black letters for internal and external components. Nameplates must resist harsh industrial conditions.

- .6 Supply and install all required fuses. Provide a minimum of two (2) spare fuses of each fuse size.
- .7 Control devices must be spaced adequately to allow for cooling, replacement, servicing, and wiring access.
- .8 Control devices shall be grouped according to voltage and function to reduce electrical noise.
- .9 Panel areas designated for future equipment shall be kept clear of stiffening members, rear-mounted equipment, wiring, and all other interferences.
- .10 Ample space shall be provided for the entrance of external cables into the panel and for routing the cables to terminating points within the panel.

3.2 IDENTIFICATION

- .1 Perform wire, terminal, and component identification for new components added using a computerized device. Handwriting is not acceptable.
- .2 Label new wires, terminals, and components as shown on drawings.
- .3 Install new label above each terminal block with terminal block name.

3.3 SPARE COMPONENTS

- .1 Supply two (2) spares of each fuse type and rating. Place in a clear plastic bag and attach to the panel door interior

END OF SECTION

Part 1 GENERAL

1.1 Submittals

- .1 Submit training proposal complete with hour-by-hour schedule including brief overview of content of each segment to the Contract Administrator, at least thirty (30) working days prior to anticipated date of beginning of training.

- .1 List name of trainers, and type of visual and audio aids to be used.

1.2 Quality Assurance

- .1 Provide competent instructors thoroughly familiar with all aspects of the instrumentation system installed in the facility.

- .2 Contract Administrator reserves right to approve instructors.

1.3 Instruction

- .1 Provide factory-trained representative to provide instruction and training to designated personnel in the configuration and operation of the level transmitters.

1.4 Training Materials

- .1 Provide equipment, visual and audio aids, and materials necessary for training.

- .2 Supply electronic (PDF) training manual.

- .3 Provide electronic (PDF) user manual(s) for level transmitter and level sensor.

- .4 Contract Administrator will provide number of trainee attendees.

1.5 Training Program

- .1 Operations Training:

- .1 Location: North End Sewage Treatment Plant, Secondary Clarifier Building, training boardroom.

- .2 Number of sessions: Two (2)

- .3 Duration: 90 minutes for each training session including classroom and field (Three (3) hours total)

- .4 Number of trainees: Coordinate with Contract Administrator prior to training.

- .5 Audience: City of Winnipeg Electrical and Instrumentation (E&I) and maintenance personnel.

- .6 Content:

- .1 Description of transmitter and sensor components.

- .2 Overview of transmitter configuration.

- .3 Overview of transmitter operation.

1.6 Monitoring Of Training

- .1 Contract Administrator to monitor training program and may modify schedule and content for the Contractor at no additional cost.

Part 2 PRODUCTS

2.1 General

- .1 Not Applicable.

Part 3 EXECUTION

3.1 Training

- .1 Provide on-site training to City of Winnipeg personnel, as indicated above.

END OF SECTION