

Part 1 General

1.1 GENERAL CONDITIONS

- .1 All Sections of General Conditions form a part of this Specification. They shall be read and fully adhered to exactly as if repeated here in full.
- .2 Refer to all other Divisions of the Specifications and these Documents to determine their effect upon the work of this Section.
- .3 All Sections of all Divisions of the Specifications and these Documents inclusive form part of the Contract Documents.

1.2 DESCRIPTION

- .1 This section specifies the General Provisions for the supply, delivery, installation, calibration and commissioning of the process control and instrumentation system, including all control and graphic panels, as specified herein and /or detailed on the drawings.
- .2 It is the intention of these specifications and drawings, to provide for a complete and fully operating control and instrumentation system, with facilities and services to meet the requirements described herein, and in complete accord with applicable codes and ordinances. The specifications do not purport to cover details entering into the design of the system which shall be the responsibility of the Contractor.
- .3 The work to be done shall include the provision of all labour, materials, tools and equipment as well as the application of a competent knowledge of construction, whether or not directly specified or shown on the plans, required for the installation testing and placing into service the complete control and instrumentation system, except when it is specifically mentioned that certain materials and/or labour are not part of the contract.
- .4 These specifications shall apply to and govern all trades doing control and instrumentation work and shall be read in conjunction with and form a part of the general specifications of the project.
- .5 The Control and Instrumentation work includes but is not limited to the following:
 - .1 Control panels
 - .2 Programmable Logic Controller (PLC) System
 - .3 Primary Elements for the measurement of flow, level, pressure, temperature, etc.
 - .4 Indicators and annunciators
 - .5 Uninterruptible power supplies (UPS)
 - .6 Control wiring and conduit
 - .7 Communication systems
 - .8 DCS System
 - .9 Spare Parts & Manuals

1.3 RELATED WORK

- .1 Training – 01 79 00
- .2 Commissioning - 01 98 13

- .3 Common Work Results – Integrated Automation – Section 25 05 00
- .4 Field Equipment Panels - Section 25 14 23
- .5 Process Controllers – Section 25 30 01
- .6 Instruments - Section 25 30 02
- .7 Instrument Index – Section 25 31 03
- .8 Asset List – Section 25 31 04
- .9 DCS System – Section 25 90 01
- .10 Local Area Network Definition (LANDef) – Section 25 90 02
- .11 PLC Input/Output List - 25 90 03
- .12 Electrical - Division 26.
- .13 The following Sections of Division 25 are included in Process Control and Instrumentation.

1.4 EQUIPMENT MANUFACTURERS

- .1 All equipment shall be manufactured by experienced manufacturers who can demonstrate in-use records for all equipment offered.
- .2 Requests for approval of alternative suppliers shall be submitted to the Contract Administrator. Refer to General Requirements – Division 1.
- .3 The majority of equipment shall be supplied by a single manufacturer, particularly where aesthetics are of concern, such as in panels.

1.5 CODES, PERMITS AND FEES

- .1 The work shall comply with the requirements of the current edition of the Canadian Electrical Code - Part 1, and all local provincial and municipal rules, laws and ordinances pertaining to the work.
- .2 Obtain the required construction permits, arrange for inspections and supply the Contract Administrator with approval certificates pertaining thereto including a certificate of final inspection.

1.6 REFERENCE STANDARDS

- .1 Unless otherwise specified, equipment shall conform to appropriate standards and recommendations of:
 - .1 The American Society of Mechanical Contract Administrators, hereinafter referred to as ASME Standards.
 - .2 The Instrument Society of America, hereinafter referred to as ISA.
 - .3 The Canadian Standards Association, hereinafter referred to as CSA.
- .2 All equipment shall be metric - SI Standard.

1.7 MANUALS

- .1 Refer to Division 01 78 00 , General Requirements for requirements for Operation and Maintenance Manuals.
- .2 Provide operating and maintenance brochures for all equipment and arrange for their insertion into the Operation and Maintenance Manuals. The brochures shall include all applicable, descriptive and technical data, maintenance and operating procedures, wiring diagrams, spare parts lists, service representatives, and suppliers for replacement parts. The brochures shall be neatly and orderly assembled in binders.
- .3 Requirements for operation and maintenance of process control and instrumentation equipment shall be as specified in various Sections of Division 25.

1.8 SHOP DRAWINGS

- .1 Refer to Division 01, General Requirements.
- .2 Provide layout drawings of instrument and control panels and schematic diagrams as well as detailed loop drawings of all devices listed in the instrumentation data sheets. The Contract Administrator's review of shop drawings shall be for general arrangement only and shall not relieve the Contractor from responsibility for errors, proper fitting, construction of the work and furnishing of materials.
- .3 Control drawings shall be updated as the work progresses and shall be submitted to the Contract Administrator as Drawings of Record when the work is completed.
- .4 Submit shop drawings for the following items:
 - .1 Control Panels
 - .2 Panel wiring schematics
 - .3 Loop Drawings (one drawing required per loop)
 - .4 Power supplies
 - .5 PLC and I/O enclosures
 - .6 PLC and I/O modules
 - .7 PLC terminals
 - .8 Control System Hierarchy
 - .9 Network Drawings
 - .10 Interconnection drawings, showing system equipment and field device connections
 - .11 PLC software documentation, which shall include as a minimum:
 - .1 I/O listing entailing a complete list of all system addresses, both used and spare, with a service description for each including mnemonics.
 - .2 Ladder diagram listing, complete with description headings, comments for each rung, and mnemonics for each element.
 - .3 Data table listing, identifying all preset values and their service.
 - .4 Written description of the program(s).

1.9 DRAWINGS OF RECORD

- .1 Refer to Division 1, General Requirements
- .2 Submit all control drawings and PLC programs for the instrumentation system.

1.10 COORDINATION OF WORK

- .1 Cooperate and coordinate with other trades on the project.
- .2 Make suitable arrangements with other trades to make provision for the control and instrumentation work and be responsible for the assurance that such provisions are satisfactory for the control and instrumentation work.
- .3 Check drawings and specifications of other trades for conflict and coordination with the control and instrumentation trade. If any conflicts are found, obtain a ruling from the Contract Administrator before proceeding.

1.11 AS-BUILT DOCUMENTATION

- .1 As work progresses, record on one (1) set of contract drawings, any change to conduit layout as well as any approved changes and deviations from the original contract and/or working drawings. At completion of work, submit to the Contract Administrator. Refer to section 26 05 00 for details.
- .2 In addition to the as-built contract drawings, submit as-built documentation for inclusion in the Maintenance Manuals as outlined in clause 7.
- .3 Provide as-built PLC/SCADA and/or HMI programming hard copy and back-ups (2 copies) on USB Stick to the Contract Administrator.
- .4 All software development packages and manufacturer's development manuals shall be turned over to the Contract Administrator.
- .5 No final contract payment shall be made until all as-built documentation has been accepted by the Contract Administrator.

1.12 WARRANTY

- .1 Warranty system assembly, installation, hardware, software, and communications operations for all parts and labour for a period of one year from date of project total performance.

Part 2 Products

2.1 MATERIALS

- .1 All materials shall be new and the best of their respective kind.
- .2 All materials shall bear the approval of the Canadian Standards Association (CSA).
- .3 All materials shall be suitable for full operation within non-hazardous environments (EEMAC 12) as indicated.
- .4 See subsequent clauses for specific equipment and instrument specifications.

2.2 POWER SUPPLY

- .1 Provide all necessary power supplies for controls and instruments.
- .2 Power wiring to field devices shall be #12 AWG.

2.3 CONTROL WIRING

- .1 Unless specified otherwise, all conductors for control wiring shall be copper with RW90, X-link insulation, 300 volts.
- .2 Neutral conductors shall be white, grounding conductors shall be green, DC conductors shall be blue and AC conductors shall be red.
- .3 Instrumentation wiring for analog signals shall be individually shielded - multipair cable #16 AWG (7x16) tinned copper.
- .4 Control wiring for level and pressure switches shall be #14 THHN Black.
- .5 Where dimensional details are required work with the applicable structural and architectural drawings.
- .6 The Contractor is responsible for correcting any work completed contrary to the intent of the drawings and specification and shall bear all costs for correcting same.

2.4 CONDUIT, WIRING AND CABLE

- .1 Supply and install all conduit, wiring, control and instrumentation cables for the control, instrumentation and low line voltage control for building services.
- .2 Conduit and wiring for power, lighting, miscellaneous electrical systems, power supplies to control instrumentation fed from panel boards, and building service panels including other components requiring line voltage power supply shall be supplied and installed as specified in Division 26 - Electrical.

Part 3 Execution

3.1 INSTALLATION

- .1 Install and interconnect all process control system equipment and components as indicated.
- .2 Install all equipment in accordance with the manufacturer's recommendations and in a manner that will ensure satisfactory operation upon completion.
- .3 Provide all labour and all necessary equipment including timbers, scaffolding, tools and rigging materials for installation of the equipment.
- .4 Contractor shall be responsible for coordinating all mechanical, electrical and other works for the equipment being installed.
- .5 Installation shall meet the minimum standards set forth by Standards and Practices for Instrumentation, Tenth Edition - 1989.
- .6 Use trained personnel to install systems and controls as per approved shop drawings and in accordance with manufacturer's recommendations.
- .7 Follow building lines with all piping and electrical wiring runs. Utilize proper separation and wiring techniques.
- .8 The in-line mechanical installation of certain items specified to be supplied in this section are specified to be installed in Division 46 – Water & Wastewater Equipment.

3.2 TESTING

- .1 Thoroughly test all control equipment, components, and systems for proper operation and report in writing to the satisfaction of the Contract Administrator.
- .2 Tests shall include:
 - .1 Complete operational test including interlocks, functions, features, options, etc., for all instrumentation, PLC, and computer system control operations.
 - .2 Operation of alarm initiating devices.
 - .3 Calibration of all instruments.
- .3 Supply all necessary test equipment and personnel to completely test the entire instrumentation and process control system.

3.3 START-UP AND COMMISSIONING

- .1 Upon completion of the installation, the Contractor shall be responsible for testing to determine correct system operation and sequences as intended in the Contract Documents. Process Instruments such as flow, level, pressure transmitters, etc., shall be checked for operation prior to process start-up, by manipulating operating controls like set points, auto-manual selectors, etc. Status and alarm contacts to be checked by manipulation or jumpering at the sensing element.
- .2 Check sheets for all instrumentation and PLC I/O to be filled out during the commissioning process and submitted to the Contract Administrator. See Section 01 98 13 for templates.
- .3 Results of tests are to be logged by the Contractor and submitted to the Contract Administrator. Any apparent defects shall be reported and corrected.
- .4 When preliminary checks have been completed and process equipment is operating or ready to operate, individual systems shall be calibrated in accordance with the latest ISA recommendation. After calibration and upon submittal of all PLC I/O and instrumentation check sheets the system shall be placed in operation in conjunction with the Contract Administrator and/or the City of Winnipeg's designated operating personnel.
- .5 In general, the start-up and commissioning shall be in accordance with Section 01 98 13 – General Commissioning Requirements.

3.4 TRAINING

- .1 Provide training on all system controlled by the automation system, include instruction on both automatic and manual operation
- .2 In general, the training shall be in accordance with Section 01 79 00 – General Training Requirements.

3.5 SPARE PARTS

- .1 The Contractor shall provide the following spare parts:
 - .1 Two (2) plug-in control relays of each type used complete with base.
 - .2 Two (2) plug-in time delay relays of each type used complete with base.
 - .3 Five (5) fuses of each type used.
 - .4 Five (5) indicating lights of each type used.
 - .5 One (1) push button assembly including contact blocks of each type used.

- .6 One (1) selector switch assembly including contact blocks of each type used.
- .7 One (1) spare PLC card of each type supplied.

END OF SECTION

Part 1 General

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1.2 SCOPE

- .1 This section covers the supply and installation of all field located motor control stations and control panels.

1.3 QUALITY ASSURANCE

- .1 Control equipment to CSA C22.2 No. 14-M1987.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 25 05 00 and include schematic, wiring diagrams, and mounting information.

Part 2 Products

2.1 OPERATOR CONTROL STATIONS

- .1 All enclosures and devices shall be rated EEMAC 12 in non-hazardous environments or EEMAC 3R in outdoor environments, unless otherwise noted.

2.2 PUSHBUTTONS

- .1 Heavy duty oiltight, operator flush, black, with 1-NO and 1-NC contacts rated at 10 A, 120 VAC, labels as indicated. Stop pushbuttons coloured red, provision for padlocking in depressed position.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley, or Siemens.

2.3 INDICATING LIGHTS

- .1 Heavy duty Oiltight, push to test LED type, lens colour as indicated, supply voltage: as required, labels as indicated.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley, or Siemens.

2.4 SELECTOR SWITCHES

- .1 Number of positions as required, labelled as indicated, heavy duty oiltight, operators as indicated, contact arrangement as indicated, rated 120 V (ac), 10 A.
- .2 Acceptable manufacturer shall be Telemecanique, Allen-Bradley, or Siemens.

2.5 CONTROL RELAYS

- .1 Number of poles as required, must be double throw type.
- .2 Removable relay cube from base
- .3 Acceptable manufacturer shall be Omron, Carlo Gavazzi

2.6 DC POWER SUPPLIES

- .1 Wattage as required by connected load plus minimum 50% spare capacity.
- .2 Acceptable manufacturer shall be Omron, Carlo Gavazzi, Weidmuller

2.7 TERMINALS

- .1 Provide Weidmuller "W" series terminals, number indicated plus 20% spare.
- .2 Terminals to be rated for connected load.
- .3 Double stack terminals will not be permitted unless written approval is obtained from the Contract Administrator.

2.8 GENERAL

- .1 Supply the control panels in accordance with the general arrangement and dimensions indicated on the appropriate drawings. Panels must be complete with all instruments, meters, switches, indication lights, relays, etc., as specified herein or as indicated.
- .2 Provide removable lamacoid nameplates having letters not smaller than 6 mm to identify equipment.

2.9 CONSTRUCTION

- .1 Minimum EEMAC 12 construction for all panels unless otherwise specified.
- .2 Unless otherwise specified fabricate floor mounted panels, indicated, of high grade, cold rolled smooth sheet metal steel no thinner than 3 mm thick with all doors and edges neatly turned and finished smoothly. Visible welding seams will not be accepted.
- .3 Construct rigid panels and racks with an angle iron or channel supporting frame, suitably braced and stiffened to prevent any deformation during shipping or installation, and provide a surface free

- from dents, warping or other deformation. Provide a four-sided channel iron mounting base with front recess.
- .4 Provide flush fitting, gasketed doors hung on piano type hinges with three point latches and locking-type handles (CSA Type 12 construction).
 - .5 Provide pans and rails for mounting terminal blocks, relays, wiring and other necessary devices.
 - .6 Use rear connected fittings to hold equipment and instrument cases on the panel, but where not possible; any front fixing required shall be only by means of chrome-plated, brass or stainless steel machine screws.
 - .7 Panel surfaces shall be thoroughly cleaned and degreased before painting. One primer coat shall be covered by two finished paint coats. Refer to Division 09 - Finishes.
 - .8 The surface finish shall be free of runs, drops, ridges, waves and laps. The paints shall be applied in such manner as to provide an even film covering corners and crevices. The interior finish shall be white and the exterior finished will be selected after award of the contract.
 - .9 Panel Accessories: a pocket, 250 mm wide x 150 mm high x 25 mm deep, to hold pertinent drawings and manuals on the lower half of the inside door.

2.10 INTERNAL WORKS

- .1 Provide an individual switch for disconnection and a fuse for isolation of all panel mounted instruments requiring a 120-volt supply.
- .2 Make all wiring connections in the shop from the equipment mounted on the panel to numbered terminal blocks conveniently located in the panel, including the power supply for all instruments. Conductors shall be extra flexible stranded copper of gauges sufficient to carry the required currents, and shall in no case be smaller than #16 AWG extra flexible.
- .3 Identify all wiring by means of plastic slip-on type or thermally printed heat-shrink type markers. Install all wiring neatly and laced or bunched into cable form using plastic wire clips, and where practical, contained in plastic wiring channels with covers.
- .4 Each terminal shall be clearly indelibly marked with the wire number connection to it. Each field connecting conductor shall be served by one terminal. Provide 20% spare unit terminals. Provide all necessary terminal block accessories such as manufactured jumpers and marking tape.
- .5 Mount all internally mounted equipment on DIN rail or mount on a rack and arrange for ease of access and removal when necessary.
- .6 Arrange all terminal blocks in the panel in groups such that all low level signals such as 4-20 mA DC are located in one area, followed by contact closure type signals (limit switches, etc.), that do not subsequently energize starters, etc. but are for status indication, and the remainder that contain powered circuits, are to be arranged in such a manner and location so as to prevent interference into the low level signal.
- .7 Submit proposed terminal block layout and identification scheme for review prior to manufacture.

- .8 Provide suitable spaces around the terminal blocks for incoming and outgoing conductors or cable assemblies, with a minimum space of 5cm between terminals and wire trough
- .9 Provide plastic cable troughs equal to Panduit complete with snap-on covers for containing the cables. Cables are not to be bunched and tied, but laid in.

2.11 PLC PANEL MANUFACTURER

- .1 Panel assembly, subcomponents and all internal components shall be CSA approved. Cabinet construction shall be performed by an established panel manufacturer who shall comply with all building codes, factory, and Department of Labour regulations and has CSA approval as manufacturer for all components of the work including control panels, MCCs, service entrance, etc. Local approvals for panel construction including CSA will not be accepted.
- .2 Acceptable panel manufacturer shall be Celco Controls Ltd, Manco Control Systems Inc, Tri-Star Automation.

2.12 STAND-ALONE VFD CABINETS

- .1 VFD Cabinets shall be as indicated on the drawings c/w the following:
- .2 EEMAC 12, rated enclosure, gasketed, 10 gauge, hinged lockable doors, c/w drip shield.
- .3 Lamacoid identification nameplates on all components
- .4 Extra flexible wire to door components
- .5 VFDs, load reactors and long lead filters (dv/dt) for the following motors:
 - .1 2 – 125HP mixing pump (D375-P, D376-P)
- .6 Push-to-test LED type pilot lights, selector switches, pushbuttons, ABB.
- .7 Panel finish shall be white epoxy paint for interior and ASA 61 light grey enamel for exterior.
- .8 Acceptable panel manufacturer shall be ABB.

2.13 SPARE PARTS

- .1 As specified in Section 25 05 00 – Common Work Results – Integrated Automation.

Part 3 Execution

3.1 INSTALLATION

- .1 Install pushbutton stations, control and relay panels, control devices as indicated and interconnect as indicated.

3.2 TESTS

- .1 Perform tests in accordance with Sections 25 05 00 and 26 05 00.
- .2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at a time and check out operation of section.

- .3 Upon completion of sectional test, undertake group testing.
- .4 Check out complete system for operational sequencing.
- .5 Submit one copy of test results to the Contract Administrator.

3.3 START-UP AND COMMISSIONING

- .1 Perform all panel start-up and commissioning in accordance with Section 25 05 00
- .2 Refer to Section 25 90 01 for specific DCS System integration start-up and commissioning requirements.

END OF SECTION

Part 1 General

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- .4 Utilize existing PLC Control panel and spare I/O in Digester Gallery Control Room. Additional I/O and an Ethernet Communication module will be required to be installed in the existing cabinet.

1.2 SCOPE

- .1 This section covers the supply and installation of the programmable controller.

1.3 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittals and include details on all CPU functions, programming, flow charts, operator menus, control sequences, schematics, component dimensions, data storage quantity, data storage speed, data storage back-ups, and program storage back-ups.

Part 2 Products

2.1 TYPICAL PLC

- .1 A typical PLC system shall be as shown on the drawings and shall be fully compatible with the existing digester gallery M340 PLC system and shall include,:
 - .1 I/O modules: discrete input, discrete output, analog input and analog output
 - .2 Remote monitoring hardware
 - .3 All necessary supporting hardware, e.g. PLC backplane, terminal strips, power supplies, etc.
 - .4 PLC programming
- .2 Environmental Conditions
 - .1 Temperature ratings:
 - .1 Storage temperature: -40 to 85°C
 - .2 Operating temperature: 0 to 60°C
 - .2 Humidity: 0 to 93% non-condensing
 - .3 Altitude: 2000 metres full operation
 - .4 Vibration and shock:
 - .1 Shock (half sine wave): °15g peak, 11 msec, 3 pulses/axis

- .2 Vibration: 10 to 57 Hz @ 0.075 mm d.a 57 to 150 Hz @ 1G
- .3 Free fall: 1m
- .5 RFI and EMF Protection:
 - .1 RFI/EMF susceptibility: 27 to 500 Mhz: 10 V/m
 - .2 Electrostatic discharge: 8 kV/ 4 kV contact
 - .3 Surge withstand: IEC 801-5 2000 V, shield to ground
- .6 Input/Output (I/O) Modules:
 - .1 General:
 - .1 All I/O modules shall be of the rack-mounted plug-in type modular design. Each I/O module shall be keyed to prevent module insertion into the wrong rack slot.
 - .2 LED indicators adjacent to each I/O point.
 - .3 All user wiring to the I/O modules shall be through a heavy duty terminal strip. Removable, push-in type terminal strip shall allow for module replacement without disturbing field wiring. Pressure type screw terminals shall be used to provide fast, secure wire connections.
 - .4 Malfunction of an I/O module shall not affect the operation of the remaining I/O modules or the CPU.
 - .5 CPU shall retain status of all I/O points of a failed I/O module.
 - .6 Isolation shall be provided between all internal logic and external power circuits. Isolation shall meet minimum specification of 1500V RMS.
 - .7 System shall contain one Ethernet communication module dedicated for communication with remote equipment such as VFD's
 - .2 Discrete Inputs:
 - .1 No. of modules: As required
 - .2 Description: Isolated Input Module
 - .3 Number of points: As required plus 20% or minimum 6 spare points, of each type of input card used, whichever is greater
 - .4 Operating voltage: 10-30VDC, 120VAC, as required by system
 - .5 Points per group: Isolated
 - .3 Discrete Outputs:
 - .1 No. of modules: As required
 - .2 Description: Relay (NO) Output Module
 - .3 Number of points: As required plus 20% or minimum 4 spare points, whichever is greater
 - .4 Points per group: Isolated
 - .5 Max. current/pt.: 2 Amp, Resistive
 - .4 Analog Input:
 - .1 No. of modules: As required
 - .2 Description: Analog Input Module (Uni-Polar)
 - .3 No. of channels: As required plus 20% or minimum 4 spare points, whichever is greater
 - .4 Operating current: 4 to 20 ma
 - .5 Isolation: 1000 VAC Channel to Bus
 - .6 Accuracy: 0.05% of full scale current

- .5 Analog Output:
 - .1 No. of modules: As required
 - .2 Description: Analog Output Module (Uni-Polar)
 - .3 No of channels as required plus 20% or minimum 2 spare points, whichever is greater
 - .4 Operating current: 4 to 20 ma
 - .5 Isolation: 2500 VDC Channel to Bus
 - .6 Accuracy: 0.2% of full scale current
- .6 Ethernet Communication Module
 - .1 Provide dedicated module for communication with remote I/O and remote Ethernet enabled devices such as VFDs
 - .2 Module shall be capable of 10/100Mbps
 - .3 Module shall be capable of Modbus TCP communication protocol

2.2 ACCESSORIES

- .1 For systems requiring a backplane, backplane shall be supplied to house the CPU, AC power supply, communication module, discrete input, discrete output, analog input, and analog output modules as required. Backplane shall include at minimum 2 spare slots.
- .2 Provide and maintain latest copy of ladder logic program on USB stick located in control panel.
- .3 Programmable Logic Controllers Acceptable Manufacturers/product group:
 - .1 Modicon M340 and associated I/O.

Part 3 Execution

3.1 INSTALLATION

- .1 Mount and install PLC I/O cards, expansion racks and all accessories into existing control panel located in Digester Gallery coordinate shutdown of Leachate Storage Tank equipment with City of Winnipeg staff prior to installation of required PLC modules.
- .2 Ensure all data in existing PLC is backed up and stored safely prior to control system shutdown and upgrades.
- .3 Complete PLC and control system installation, testing, start-up and commissioning shall be as described in Section 25 05 00.

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1.2 SCOPE

- .1 This section specifies the supply installation, field testing, and placing into operation of flow, pressure, temperature, level, turbidity, and other instruments of control and instrumentation.

1.3 RELATED WORK

- .1 Common Work Results – Integrated Automation - Section 25 05 00.
- .2 Field Equipment Panels - Section 25 14 23
- .3 Instrument Index – Section 25 31 03
- .4 Water and Wastewater Equipment – Division 46
- .5 Electrical – Division 26
- .6 Training – 01 79 00
- .7 Commissioning - 01 98 13
- .8 Process Controllers - Section 25 30 01

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittals.

Part 2 Products

2.1 INSTRUMENTS

- .1 Provide each instrument with mechanisms that are corrosion resistant.
- .2 Provide each instrument with mechanisms enclosed in a dustproof and a moisture proof case.
- .3 Provide all indicator and gauge dials finished in permanent white with black graduations and figures.
- .4 Potentiometric signals shall have a "live" zero or positive minimum value in the signal range.

- .5 Each component shall be carefully selected and designed for a long lifetime with ample margin to withstand transient and other surge voltages, which may occur in the circuits from any source in the power supply.
- .6 Each component and composite instrument shall be suitable for the location and installation position at the attitude designated on the drawings, e.g., horizontal, vertical or sloped position.
- .7 The Contractor shall provide all power supplies. Instruments shall be powered from the same control panel to which the measured signal is being transmitted, unless specifically noted otherwise. The power source to each instrument shall be individually fused, fuse size based on instrument power requirements.
- .8 Integrating counters and elapsed time meters shall show the total quantity that has passed through the meter and shall not require the use of a multiplier other than cipher additions. The integrators shall have at least seven figures.
- .9 All control panel mounted instruments shall be suitable for flush mounting and shall be furnished with bezel.
- .10 Unless otherwise indicated or specified, all analog signals shall be of the 4-20 mA DC type. This applies to both transmitting and receiving instruments.
- .11 All materials shall conform to the standards of the Canadian Standards Association (CSA).
- .12 For factory calibrated instruments, the factory calibration sheets shall be submitted in the O&M manual.
- .13 All instruments to be installed per Manufacturer's recommended installation guidelines.

2.2 RADAR LEVEL SENSOR/TRANSMITTERS

- .1 Provide radar level sensing systems suitable for wastewater applications as indicated to monitor level in Digester No.11
- .2 Surface mounted continuous level monitoring device to provide one 4-20 mA signal proportional to storage tank foam level.
- .3 Power input: 120 VAC.
- .4 Signal output: 4-20 mADC. Signal to be input to PLC.
- .5 Range: confirm with Contract Administrator prior to shipment.
- .6 Acceptable model: Rosemount 5601AE6P5C0RE000NNNA transmitter c/w 5609NNAN000NN74SPVNR antenna.
- .7 Radar level transmitter to be configured as per existing sensors at the NEWPCC, with the exception that the range may be different. Engage manufacturer's representative to configure and verify sensor operation on site.

2.3 MAGNETIC FLOW METERS

- .1 Provide magnetic flow meters suitable for wastewater applications as listed on the instrument index.

- .2 Magmeters to have following characteristics:
 - .1 CSA Class 1 Div II Groups A, B, C & D certified and F.M. approved
 - .2 Flanges: Carbon steel, flanged each end
 - .3 Liner: Polyurethane
 - .4 Electrodes: 316 stainless steel
 - .5 Enclosure: EEMAC 4X
 - .6 Product temperature: -10 to 50°C
 - .7 Ambient temperature: 10 to 50°C
 - .8 Power supply: 120 volt ac
 - .9 Signal output: 4-20 mA flow rate signal to the plant PLC
 - .10 Signal output: Pulse output flow totalizer signal to the plant PLC. Pulse duration to be of sufficient duration to ensure that PLC does not miss any pulses, and shall at minimum be 100mSec in duration. Provide one pulse/0.1cubic meters of flow. Operating Range: Confirm all operating ranges with Contract Administrator
 - .11 Accuracy: 0.2%
 - .12 Local display: instantaneous flow in litres per second and totalizer in cubic metres
 - .13 Programming: via local interface and HART protocol
 - .14 Capacitance back up for retention of settings and current values.
 - .15 Signal converter module c/w 10 metres of converter cable and any appurtenances as necessary for the operation of the unit.
 - .16 Operating pressure: 0-700 kPa
 - .17 Test pressure: 1400 kPa
 - .18 Grounding rings: As recommended by manufacturer's recommended installation guideline, and mandatory for PVC pipe.
 - .19 Acceptable manufacturer shall be Rosemount 8705, Krohne Enviromag 2000 c/w IFC 100 converter, Endress & Hauser Pro Mag 53W, ABB Process Master, Seimens Magflow Mag 5100W.

2.4 DIGESTER GAS MASS FLOW METER

- .1 Provide digester gas thermal insertion mass flow meter with integral transmitter and local display as follows:
 - .1 Service: The digester gas mass flow meter shall measure the flow of digester gas consisting of approximately 61 percent methane, 33 percent carbon dioxide, 5 percent water vapor, and 1 percent hydrogen sulfide. The biogas specific gravity is approximately 0.86.
 - .2 Pipe size is 200 mm
 - .3 The peak process gas production is estimated at approximately 506 ft³/min.
 - .4 Process connection shall be a 19 mm MNPT (3/4" NPT) with stainless steel ferrule.
 - .5 Turn down ratio of 3:1 to 100:1
 - .6 Instrument shall have an accuracy of ±1% reading ±0.5% full scale.
 - .7 Agency approval: FM, CSA/CRN: Class I, Division 1, Groups B, C, D; Class I, Division 2 Groups A – D.
 - .8 The flow element shall be made with a 316L /stainless steel body with Hastelloy-C22 thermowell sensors, 316 stainless steel compression fitting with stainless ferrule.
 - .9 Process connection: 19 mm MNPT
 - .10 Instrument rating: Flow transmitter enclosure shall be intrinsically safe NEMA 4X rating suitable for hazardous areas.

- .11 Input power: 120 VAC
- .12 Output power: dual 4 – 20 mA configurable to flow rate and temperature and pulse output for total flow.
- .13 Standard of acceptance: Fluid Components International LLC Model ST51 or approved equal in accordance with B7.

2.5 SYSTEM PRESSURE SENSOR/TRANSMITTER

- .1 Surface mounted continuous pressure monitoring device to provide 4-20 mA signal proportional to water pressure in pipe.
- .2 Power input: 24 VDC.
- .3 Power output: 4-20 mA signal and digital communication input to PLC.
- .4 Range: 0 to 700 kPa.
- .5 22-316 stainless steel flanges, vent and drain valve and isolating diaphragm.
- .6 B1-2 inch pipe/wall-mounting bracket.
- .7 C6-CSA NEMA 4X enclosure.
- .8 Acceptable manufacturer shall be Rosemount Smart Gauge Pressure Transmitter Model No.3051C or approved equal in accordance with B7.

2.6 PRESSURE SWITCHES

- .1 Provide pressure switches as follows:
 - .1 Environment: Meeting Class 1, Division 1 and 2 of the of the CEC
 - .2 Enclosure: Explosion Proof
 - .3 Voltage: 120 VAC
 - .4 Switch element: Hermetically sealed SPDT with narrow dead band
 - .5 Dead band: 0.3 – 0.6 kPa
 - .6 Ambient temperature: 10 - 40°C
 - .7 Range: 0 to 7.5 kPa
 - .8 Actuator seal: Stainless steel Type 316L
 - .9 Connection: ½ male SS
 - .10 Approvals: CSA
 - .11 High pressure switch to have a set point of 2.38 kPa
 - .12 High-High pressure switch to have asset point of 2.65 kPa
 - .13 Standard of acceptance: Ashcroft B7 Series or approved equal in accordance with B7

Part 3 Execution

3.1 INSTALLATION

- .1 Coordinate the work of this Section with the installation of the equipment specified in the relevant Sections of Divisions 23 and 46 and shown on the Mechanical and Electrical drawings.
- .2 Perform all work in compliance with the relevant sections of this Division.

3.2 FIELD INSTRUMENT MOUNTING

- .1 "Mounting" shall mean the positioning and fastening with proper brackets in the position required.
- .2 All equipment shall be mounted in accordance with manufacturer's recommendations.
- .3 Locations of all field instruments are subject to modification by the Contract Administrator who reserves the right to move any item up to 3 meters from the position shown, without change to the contract price, provided notice is given before the related work has commenced.
- .4 Exact locations of all field instruments shall be site determined by the Contractor to the satisfaction of the Contract Administrator to ensure proper operation of the device.
- .5 Employ any and all means of trade, skill, and workmanship to install all field instruments to the satisfaction of the Contract Administrator.

3.3 COMMISSIONING

- .1 Instrument manufacturer's qualified field service representative shall be onsite as required to perform instrument calibration, testing and commissioning and to instruct City of Winnipeg's representative in all aspects of instrument operation and maintenance.

END OF SECTION

Part 1 General

1.1 GENERAL CONDITIONS

- .1 All Sections of General Conditions form a part of this Specification. They shall be read and fully adhered to exactly as if repeated here in full.
- .2 Refer to all other Divisions of the Specifications and these Documents to determine their effect upon the work of this Section.
- .3 All Sections of all Divisions of the Specifications and these Documents inclusive form part of the Contract Documents.

1.2 SCOPE

- .1 Furnish all labour, materials, equipment and services necessary and required to supply, install, interconnect, test and commission modifications to the existing DCS system. Provide graphics representation of P&ID drawings and programming to City of Winnipeg standards. DCS modifications shall include creation of overview graphics, trend screens, pop-up screens and modifications to Alarm database. The DCS system is to interface to one Modicon M340 PLC, PLC programming by System Integrator. System Integrator to provide PLC addresses listed in the LANDef in continuous blocks for ease of programming.

1.3 RELATED WORK

- .1 Commissioning - 01 98 13
- .2 Common Work Results – Integrated Automation – Section 25 05 00
- .3 Process Controllers - Section 25 30 01
- .4 LANDef – Section 25 90 02

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 25 05 00.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 DCS modifications shall include creation of overview graphics, trend screens, pop-up screens and modifications to Alarm database on existing NEWPCC DCS system. The DCS system is to interface to one Modicon M340 PLC, PLC programming by System Integrator. System Integrator to provide PLC addresses listed in the LANDef in continuous blocks for ease of programming.
- .2 DCS system integrator to provide addresses and populate LANDef spreadsheet prior to commissioning.
- .3 Provide allowance for 20% additional points as may be required during system programming. Additional points will be as directed by Contract Administrator.

- .4 The DCS system shall include monitoring and interface of all equipment being added in this contract and connected to M340PLC.

2.2 DCS SYSTEM INTEGRATOR

- .1 ABB or approved equal in accordance with B7.

Part 3 Execution

3.1 INSTALLATION

- .1 Installation, testing, start-up and commissioning of DCS system as described in Section 25 05 00.
- .2 DCS system integrator shall allow for, as a minimum, the following site trips:
 - .1 Initial system start-up loop checks and data verification with PLC System integrator (5 days)
 - .2 System commissioning (5 days)
 - .3 2 future 1/2 day site trips for follow-up trouble shooting and minor system modifications during warranty period.
- .3 Refer to Process Narrative in Appendix C for specific plant operation.

END OF SECTION

CITY OF WINNIPEG
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Instrument Index

Rev No.	DEVICE TAG			DESCRIPTION		Installation Notes	P&ID DRAWING	Specification Section	Instrument Output	I/O SPECIFICATION			
	AREA	LOOP	TAG	Instrument Type	SERVICE					Analog Signal		Digital Signal	
										ENG. UNITS	Range	Signal #1	Signal #2
0	D	386	PIT	Pressure Transmitter	Digester #11 Pump Discharge Header	Installed in SS pipe	1-0101D-A0082-001	25 30 02 2.5	4-20mA	kPA	0-250		
0	D	382	FIT	Flow Transmitter	Digester #11 Flow	500mm-Magnetic Flow Meter, installed in SS pipe	1-0101D-A0082-001	25 30 02 2.3	4-20mA	m ³ /hr	0-2000	totalizer pulse	
0	D	130	LIT	Level Transmitter	Digester #11 Foam Level	Install in sleeve through digester roof	1-0101D-A0211-001	25 30 02 2.2	4-20mA	mm	0-1500		
0	D	142	FIT	Mass-Flow Transmitter	Digester #11 Gas Flow	200mm-Mass Flow Meter	1-0101D-A0211-001	25 30 02 2.4	4-20mA	kg/hr	0-1000	totalizer pulse	
0	D	***	PSH	Methane Gas LEL Transmitter	Digester Gallery #5			25 30 02 2.6	4-20mA	LEL	0-100		
0	D	242	PSH	Pressure Switch	SHT 5-8 Waste Gas Burner Line	Replace existing Pressure Switch	*NEP-1333A	25 30 02 2.6	SPDT Switch			High Pressure	
0	D	242	PSHH	Pressure Switch	SHT 5-8 Waste Gas Burner Line	Replace existing Pressure Switch	*NEP-1333A	25 30 02 2.6	SPDT Switch			High Pressure	

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REV. NO.	PLCCabinet	PLC Address	HMI TAG NAME	DEVICE TAG				DESCRIPTION	ALARM	TREND	HMI RW	DATA TYPE	I/O SPECIFICATION			
				AREA	LOOP	TAG	No.						ENG. UNITS	SCALE LOW-HIGH	STATUS	
															LO/0	HI/1
0	CP-D01			D	375	YS	3	Digester #11 Mixing Pump: VFD Auto Status			R	Bool				Auto
0	CP-D01			D	375	MN		Digester #11 Mixing Pump: VFD Auto Run Command			R	Bool				Run
0	CP-D01			D	375	MM		Digester #11 Mixing Pump: VFD Running Status			R	Bool				Running
0	CP-D01			D	375	RDY		Digester #11 Mixing Pump: VFD Ready Status			R	Bool				Ready
0	CP-D01			D	375	QF		Digester #11 Mixing Pump: VFD Fault Status	X		R	Bool				Fault
0	CP-D01			D	375	QF		Digester #11 Mixing Pump: VFD Fail to Run Alarm	X		R	Bool				Alarm
0	CP-D01			D	375	ST		Digester #11 Mixing Pump: VFD Speed Feedback		X	R	Real	%	0-100		
0	CP-D01			D	375	IT		Digester #11 Mixing Pump: VFD Current		X	R	Real	Amps	0-150		
0	CP-D01			D	375	SK		Digester #11 Mixing Pump: VFD Speed Command			R	Real	%	0-100		
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Hand Mode Command			W	Bool				Hand
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Hand Mode Status			R	Bool				Hand
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Auto Mode Status			R	Bool				Auto
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Off Mode Command			W	Bool				Off
0	CP-D01			D	375			Digester #11 Mixing Pump: DCS Off Mode Status			R	Bool				Off
0	CP-D01			D	375			Digester #11 Mixing Pump: Hand Speed Command			W	Real	%	0-100		
0	CP-D01			D	375			Digester #11 Mixing Pump: VFD Communication Failure	X		R	Bool				Alarm
0																
0	CP-D01			D	376	YS	3	Digester #11 Mixing Pump: VFD Auto Status			R	Bool				Auto
0	CP-D01			D	376	MN		Digester #11 Mixing Pump: VFD Auto Run Command			R	Bool				Run
0	CP-D01			D	376	MM		Digester #11 Mixing Pump: VFD Running Status			R	Bool				Running
0	CP-D01			D	376	RDY		Digester #11 Mixing Pump: VFD Ready Status			R	Bool				Ready
0	CP-D01			D	376	QF		Digester #11 Mixing Pump: VFD Fault Status	X		R	Bool				Fault
0	CP-D01			D	376	QF		Digester #11 Mixing Pump: VFD Fail to Run Alarm	X		R	Bool				Alarm
0	CP-D01			D	376	ST		Digester #11 Mixing Pump: VFD Speed Feedback		X	R	Real	%	0-100		
0	CP-D01			D	376	IT		Digester #11 Mixing Pump: VFD Current		X	R	Real	Amps	0-150		
0	CP-D01			D	376	SK		Digester #11 Mixing Pump: VFD Speed Command			R	Real	%	0-100		
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Hand Mode Command			W	Bool				Hand
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Hand Mode Status			R	Bool				Hand
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Auto Mode Status			R	Bool				Auto
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Off Mode Command			W	Bool				Off
0	CP-D01			D	376			Digester #11 Mixing Pump: DCS Off Mode Status			R	Bool				Off
0	CP-D01			D	376			Digester #11 Mixing Pump: Hand Speed Command			W	Real	%	0-100		
0	CP-D01			D	376			Digester #11 Mixing Pump: VFD Communication Failure	X		R	Bool				Alarm
0																
0	CP-D01			D	384	VX	1	Pressure sensor flushing solenoid: Solenoid Open Command			R	Bool				Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: Manual Open Command			W	Bool				Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: Manual Open Mode Status			R	Bool				Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Auto Mode Status			R	Bool				Auto
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Manual Close Command			W	Bool				Close

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				AREA	LOOP	TAG	No.						ENG. UNITS	SCALE LOW-HIGH	STATUS	
															LO/0	HI/1
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Manual Close Status			R	Bool				Close
0																
0	CP-D01			D	384	VX	2	Pressure sensor flushing solenoid: Solenoid Open Command								Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: Manual Open Command			W	Bool				Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: Manual Open Mode Status			R	Bool				Open
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Auto Mode Status			R	Bool				Auto
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Manual Close Command			W	Bool				Close
0	CP-D01			D	384			Pressure sensor flushing solenoid: DCS Manual Close Status			R	Bool				Close
0	CP-D01															
0				D	386	PT		Digester #11 Pump Discharge Header: Pressure Transmitter		X	R		kPA	0-250		
0	CP-D01			D	386	PT		Digester #11 Pump Discharge Header: High Pressure Alarm	X		R	Bool	kPA	130		Alarm
0	CP-D01			D	386	PT		Digester #11 Pump Discharge Header: High Pressure Alarm Reset			W	Bool				Reset
0	CP-D01			D	386			Digester #11 Pump Discharge Header: Low Pressure Alarm	X		R	Bool	kPA	59		Alarm
0	CP-D01			D	386			Digester #11 Pump Discharge Header Pressure Transmitter Flush Duty Cycle Off			R/W	Int	Min.	0-120		
0	CP-D01			D	386			Digester #11 Pump Discharge Header Pressure Transmitter Flush Duty Cycle On			R/W	Int	Sec.	0-300		
0																
0	CP-D01			D	379	ZB		Digester #11 Pump Discharge Header Isolation Valve: Valve Closed Status			R	Bool				Closed
0	CP-D01			D	379	ZD		Digester #11 Pump Discharge Header Isolation Valve: Valve Open Status			R	Bool				Open
0	CP-D01			D	379	YS		Digester #11 Pump Discharge Header Isolation Valve: Valve Remote Control Status			R	Bool				Remote
0	CP-D01			D	379	VD		Digester #11 Pump Discharge Header Isolation Valve: Valve Open Command			R	Bool				Open
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: Fail to Open Alarm	X		R	Bool				Alarm
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: Fail to Close Alarm	X		R	Bool				Alarm
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: Alarm Reset			W	Bool				Reset
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: Manual Open Command			W	Bool				Open
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: Manual Open Mode Status			R	Bool				Open
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: DCS Auto Mode Status			R	Bool				Auto
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: DCS Manual Close Command			W	Bool				Close
0	CP-D01			D	379			Digester #11 Pump Discharge Header Isolation Valve: DCS Manual Close Status			R	Bool				Close
0	CP-D01															
0				D	380	ZB		Digester #11 Pump Discharge Header Isolation Valve: Valve Closed Status				Bool				Closed
0	CP-D01			D	380	ZD		Digester #11 Pump Discharge Header Isolation Valve: Valve Open Status				Bool				Open
0	CP-D01			D	380	YS		Digester #11 Pump Discharge Header Isolation Valve: Valve Remote Control Status				Bool				Remote
0	CP-D01			D	380	VD		Digester #11 Pump Discharge Header Isolation Valve: Valve Open Command				Bool				Open
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: Fail to Open Alarm	X		R	Bool				Alarm
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: Fail to Close Alarm	X		R	Bool				Alarm
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: Alarm Reset			W	Bool				Reset
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: Manual Open Command			W	Bool				Open
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: Manual Open Mode Status			R	Bool				Open
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: DCS Auto Mode Command			W	Bool				Auto
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: DCS Auto Mode Status			R	Bool				Auto

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REV. NO.	PLCCabinet	PLC Address	HMI TAG NAME	DEVICE TAG				DESCRIPTION	ALARM	TREND	HMI RW	DATA TYPE	I/O SPECIFICATION				
				AREA	LOOP	TAG	No.						ENG. UNITS	SCALE LOW-HIGH	STATUS		
															LO/0	HI/1	
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: DCS Manual Close Command			W	Bool				Close	
0	CP-D01			D	380			Digester #11 Pump Discharge Header Isolation Valve: DCS Manual Close Status			R	Bool				Close	
0	CP-D01																
0	CP-D01			D	382	FT		Digester #11 Flow: Flow Rate		x	R	Real	m ³ /hr	0-2000			
0	CP-D01			D	382			Digester #11 Low Flow Alarm	X		R	Bool		<1300		Alarm	
0	CP-D01			D	382			Digester #11 Low Flow Alarm Reset			W	Bool				Reset	
0	CP-D01			D	382	FQ		Digester #11 Flow: Today's Flow Total		X	R	Real	m ³	0-50,000			
0	CP-D01			D	382			Digester #11 Flow: Yesterday's Flow Total		X	R	Real	m ³	0-50,000			
0	CP-D01			D	382			Digester #11 Flow: Flow Meter Failure	X			Bool				Alarm	
0	CP-D01																
0	CP-D01			D	130	LT		Digester #11 Foam Level: Foam Level		X	R	Real	mm	0-1500			
0	CP-D01			D	130			Digester #11 Foam Level: High Alarm	X		R	Bool				Alarm	
0	CP-D01			D	130			Digester #11 Foam Level: High High Alarm	X		R	Bool				Alarm	
0	CP-D01			D	130			Digester #11 Foam Level Transmitter Failure	X		R	Bool				Alarm	
0																	
0	CP-D01			D	142	FT		Digester #11 Gas Flow: Flow Rate		x	R	Real	m ³ /hr	0-2000			
0	CP-D01			D	142			Digester #11 Low Gas Flow Alarm	X		R	Bool				Alarm	
0	CP-D01			D	142	FQ		Digester #11 Gas Flow: Today's Flow Total		X	R	Real	m ³	0-50,000			
0	CP-D01			D	142			Digester #11 Gas Flow: Yesterday's Flow Total		X	R	Real	m ³	0-50,000			
0	CP-D01			D	142			Digester #11 Gas Flow: Flow Meter Failure	X			Bool				Alarm	
0																	
0	CP-D01							Digester #11 Mixing Pump Mode Command			W	Bool				Continuous	Duty Cycle
0	CP-D01							Digester #11 Mixing Pump Mode Status			R	Bool				Continuous	Duty Cycle
0	CP-D01							Digester #11 Mixing Pump: Continuous Mode - Speed Setting			W	Real	%	0, 75-100			
0	CP-D01							Digester #11 Mixing Pump: Continuous Mode - Speed Feedback			R	Real	%	0, 75-100			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - Low Speed Hours Setting			W	Real	Hours	0-24			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - Low Speed Hours Feedback			R	Real	Hours	0-24			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - Low Speed Pump Speed Setting			W	Real	%	0, 75-100			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - Low Speed Pump SpeedFeedback			R	Real	%	0, 75-100			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - High Speed Hours Setting			W	Real	Hours	0-24			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - High Speed Hours Feedback			R	Real	Hours	0-24			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - High Speed Pump Speed Setting			W	Real	%	0, 75-100			
0	CP-D01							Digester #11 Mixing Pump: Duty Cycle Mode - High Speed Pump Speed Feedback			R	Real	%	0, 75-100			
0	CP-D01							Duty Cycle Mode - Time Remaining in Current Cycle (Hours)			R	Int	Hours				
0	CP-D01							Duty Cycle Mode - Time Remaining in Current Cycle (Minutes)			R	Int	Minutes				
0	CP-D01							Duty Mode Active Cycle Indicator			R	Bool			Lo	Hi	
0																	
0	CP-D01							Digester #11 Duty Pump Command			W	Bool			D375-P	D376-P	
0	CP-D01							Digester #11 Duty Pump Status			R	Bool			D375-P	D376-P	
0																	
0	CP-D01							Digester #11 HeadSpace Pressure			W	Real	kpa	0-5			
0	CP-D01							Digester #11 HeadSpace Pressure High Level Alarm			W	Bool				Alarm	

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				AREA	LOOP	TAG	No.						ENG. UNITS	SCALE LOW-HIGH	STATUS	
															LO/0	HI/1

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PLC SYSTEM INPUT/OUTPUT LIST

NO.	REV. NO.	DEVICE TAG				DESCRIPTION		P&ID DRAWING	LOOP DRAWING	ENG. UNITS	SCALE LOW-HIGH	I/O SPECIFICATION				
		AREA	LOOP	TAG	No.	FUNCTION	SERVICE					STATUS		PLC CABINET	I/O POINT TYPE	I/O POINT NO.
												LO/0	HI/1			
1	0	D	375	YS	3	VFD Auto Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Not Auto	Auto	CP-D01	DI-E	Ethernet
2	0	D	375	MN		VFD Auto Run Command	Digester #11 Mixing Pump	1-0101D-A0082-001				Stop	Run	CP-D01	DO-E	Ethernet
3	0	D	375	MM		VFD Running Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Stopped	Running	CP-D01	DI-E	Ethernet
4	0	D	375	RDY		VFD Ready Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Not Ready	Ready	CP-D01	DI-E	Ethernet
5	0	D	375	QF		VFD Fault Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Fault	Not Fault	CP-D01	DI-E	Ethernet
6	0	D	375	ST		VFD Speed Feedback	Digester #11 Mixing Pump	1-0101D-A0082-001	%	0-100				CP-D01	AI-E	Ethernet
7	1	D	375	IT		VFD Current	Digester #11 Mixing Pump	1-0101D-A0082-001	Amps	0-150				CP-D01	AI-E	Ethernet
8	0	D	375	SK		VFD Speed Command	Digester #11 Mixing Pump	1-0101D-A0082-001	%	0-100				CP-D01	AO-E	Ethernet
9	0	D	376	YS	3	VFD Auto Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Not Auto	Auto	CP-D01	DI-E	Ethernet
10	0	D	376	MN		VFD Auto Run Command	Digester #11 Mixing Pump	1-0101D-A0082-001				Stop	Run	CP-D01	DO-E	Ethernet
11	0	D	376	MM		VFD Running Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Stopped	Running	CP-D01	DI-E	Ethernet
12	0	D	376	RDY		VFD Ready Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Not Ready	Ready	CP-D01	DI-E	Ethernet
13	0	D	376	QF		VFD Fault Status	Digester #11 Mixing Pump	1-0101D-A0082-001				Fault	Not Fault	CP-D01	DI-E	Ethernet
14	0	D	376	ST		VFD Speed Feedback	Digester #11 Mixing Pump	1-0101D-A0082-001	%	0-100				CP-D01	AI-E	Ethernet
15	1	D	376	IT		VFD Current	Digester #11 Mixing Pump	1-0101D-A0082-001	Amps	0-150				CP-D01	AI-E	Ethernet
16	0	D	376	SK		VFD Speed Command	Digester #11 Mixing Pump	1-0101D-A0082-001	%	0-100				CP-D01	AO-E	Ethernet
17																
18																
19	1	D	384	VX	1	Solenoid Open Command	Digester #11 Pump Discharge Header - Pressure sensor flushing solenoid	1-0101D-A0082-001				Closed	Open	CP-D01	DO	R0:0:5.3
20	1	D	384	VX	2	Solenoid Open Command	Digester #11 Pump Discharge Header - Pressure sensor flushing solenoid	1-0101D-A0082-001				Closed	Open	CP-D01	DO	R0:0:5.4
21	0	D	386	PT		Pressure Transmitter	Digester #11 Pump Discharge Header	1-0101D-A0082-001	kPA	0-1000				CP-D01	AI	R0:1:6.5
22	0	D	379	ZB		Valve Closed Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001				Not Closed	Closed	CP-D01	DI	R0:1:3.1
23	0	D	379	ZD		Valve Open Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001				Not Open	Open	CP-D01	DI	R0:1:3.2
24	0	D	379	YS		Valve Remote Control Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001				Local	Remote	CP-D01	DI	R0:1:3.3
25	0	D	379	VD		Valve Open Command	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001					Open	CP-D01	DO	R0:0:5.5
26	0	D	379	VB		Valve Close Command	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001					Close	CP-D01	DO	R0:0:5.6
27	0	D	380	ZB		Valve Closed Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001				Not Closed	Closed	CP-D01	DI	R0:1:3.4

CITY OF WINNIPEG
North End Water Pollution Control Centre
Rehabilitation of Digester No. 11 and Sludge Holding Tank No. 5 and 7 - BID OPPORTUNITY NO. 573-2012
PLC SYSTEM INPUT/OUTPUT LIST

NO.	REV. NO.	DEVICE TAG				DESCRIPTION		P&ID DRAWING	LOOP DRAWING	I/O SPECIFICATION							
		AREA	LOOP	TAG	No.	FUNCTION	SERVICE			ENG. UNITS	SCALE LOW-HIGH	STATUS		PLC CABINET	I/O POINT TYPE	I/O POINT NO.	
												LO/0	HI/1				
28	0	D	380	ZD		Valve Open Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001					Not Open	Open	CP-D01	DI	R0:I:3.5
29	0	D	380	YS		Valve Remote Control Status	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001					Local	Remote	CP-D01	DI	R0:I:3.6
30	0	D	380	VD		Valve Open Command	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001						Open	CP-D01	DO	R1:O:0.2
31	0	D	380	VB		Valve Close Command	Digester #11 Pump Discharge Header Isolation Valve	1-0101D-A0082-001						Close	CP-D01	DO	R1:O:0.2
32	0	D	382	FT		Flow Rate	Digester #11 Flow	1-0101D-A0082-001		m ³ /hr	0-2000				CP-D01	AI	R0:I:6.6
33	0	D	382	FQ		Flow Totalizer Pulse	Digester #11 Flow	1-0101D-A0082-001		m ³	1 m ³ /pulse				CP-D01	DI	R0:I:9.0
34	0	D	130	LT		Foam Level	Digester #11 Foam Level	1-0101D-A0211-001		mm	0-1500				CP-D01	AI	R0:I:6.7
35	0	D	142	FT		Flow Rate	Digester #11 Gas Flow	1-0101D-A0229-001		kg/hr	0-1000				CP-D01	AI	R0:I:10.0
36	0	D	142	FQ		Flow Totalizer Pulse	Digester #11 Gas Flow	1-0101D-A0229-001		kg	1 kg/pulse				CP-D01	DI	R0:I:9.1

