PART 1

GENERAL

1.1 RELATED SECTIONS

.1 The contractor is to ensure that all related work is co-ordinated among all specification sections, as well as between Division 11, 15 and Division 16, and that the tender price includes all related work. The referenced sections below are for guidance only and are not necessarily a complete list of related sections.

.1 Section 01810 – Commissioning.
.2 Section 09912 - Exterior Painting.
.3 Section 13831 - EMCS: Shop Drawings, Product Data and Review Process.
.4 Section 13832 - EMCS: Start-up and Checkout.
.5 Section 13833 - EMCS: Commissioning.
.6 Section 13834 - EMCS: Project Record Documents.
.7 Section 13835 - EMCS: Training.
.8 Section 13836 - EMCS: Identification.
.9 Section 13840 - EMCS: Local Area Network (LAN).
.10 Section 13841 - EMCS: Operator's Work Station (OWS).
.11 Section 13842 - EMCS: Building Controller Family of Controllers.
.12 Section 13844 - EMCS: Field Control Devices.
.13 Section 13845 - EMCS: Field Installation.
.14 Section 13846 - EMCS: Site Requirements, Applications and Systems Sequences of Operation.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI/ISA S5.5, Graphic Symbols for Process Displays.
.2 ANSI/IEEE 260.1, Letter Symbols for SI and Certain Other Units of Measurements (SI Units, Customary Inch-Pound Units and Certain Other Units).

.2 Canadian Standards Association (CSA)

.1 CAN/CSA-C22.2 No.0, General Requirements, Canadian Electrical Code, Part II.
.2 CAN/CSA-Z234.1, Canadian Metric Practice Guide.

.3 Electrical and Electronic Manufacturers Association (EEMAC)

.1 EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.

1.3 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

.1 Acronyms used in EMCS.

.1 AI - Analog Input
.2 AO - Analog Output
.3 Definitions:

.1 Point: a point may be logical or physical. Logical points are values calculated by system such as totals, counts, derived corrections i.e. as result of and/or statements in CDL's. Physical points are inputs or outputs which have hardware wired to controllers which are measuring or providing status conditions of contacts or relays providing interaction with related equipment (stop, start) or valve or damper actuators.

.3 Symbols and engineering unit abbreviations utilized in displays: to ANSI/ISAS 5.5.
.1 Printouts: to ANSI/IEEE 260.1.
.2 Refer also to Section 13836- EMCS: Identification.

1.4 PERMITS AND FEES

.1 In accordance with General Conditions of Contract.
.2 Submit certificate of acceptance from authority having jurisdiction to Engineer/Architect.

1.5 GENERAL DESCRIPTION

.1 Refer to control schematics, specifications, sequences of operation and related Divisions 11, 15 and 16 specifications for system architecture.
.2 The network design to be a fully distributed network, with each primary system having its own locally mounted dedicated controller. Any failure in the network shall not in any way affect the control of these primary systems. Connecting hardware points from one system to more than one controller is not acceptable. Any points associated with a system are to be connected to one dedicated controller. Each dedicated controller to have a locally mounted control and display device to allow the operator to view and adjust any point on the controller.
.3 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:
.1 Programmable Controllers MCU, LCU, TCU.
.2 Control devices as listed in I/O Summaries and/or shown on control drawings.
.3 OWS.
.4 Data communications equipment necessary to effect an EMCS data transmission system including gateway and LAN hardware and software for connection to LAN network.
.5 All field control devices.
.6 All wiring associated with the EMCS communication network as well as all control wiring and conduit associated with the EMCS at 50 volts or less. Wire and conduit above 50 volts AC by Division 16.
.7 All software complete with full documentation for software and equipment.
.8 Complete operating and maintenance manuals and field training of operators, programmers and maintenance personnel.
.9 Acceptance tests, technical support during commissioning, full documentation.
.10 Wiring interface co-ordination of equipment supplied by others.
.11 Miscellaneous work as specified in these sections and as indicated.
.4 BACnet compliance: full compliance to the BACnet standard (ANSA/ASHRAE) 135, BACnet – A Data communication Protocol for Building Automation and Control Networks is mandatory. Down to the field device level, the EMCS system must meet BACnet standards for system architecture and administration, and use open communication protocols and user friendly programming and graphics. Install the
EMCS installed to communicate at the supervisory layer to the WAN using the BACnet TCP/IP protocol implemented on Ethernet.

.5 The EMCS system for this facility to be accessible by designated personnel via the WAN for monitoring and programming purposes. The EMCS contractor to provide all the required hardware, software, gateways, etc., needed to permit connection of the EMCS to the WAN. This shall include all hardware, software, programming, start-up and commissioning required. The contractor to supply and install all required hardware and software on the WAN file server to allow for this remote operation monitoring and programming to take place. The contractor to supply and install all the required hardware and software on the operator workstation(s) located in the Owner’s facilities management department. In addition, a remote dial in access directly to the system shall be provided.

1.6 METRIC REFERENCES

.1 Conform to CAN/CSA-Z234.1.

.2 Provide required adapters between Metric and Imperial components.

1.7 STANDARDS COMPLIANCE

.1 All equipment and material to be from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.

.2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.

.3 Submit proof of compliance to specified standards with shop drawings and product data. Label or listing of specified organization is acceptable evidence.

.4 In lieu of such evidence, submit certificate from testing organization, approved by third party Engineer registered in Canada certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.

.5 For materials whose compliance with organizational standards/codes/specifications is not regulated by an organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.

.6 BACnet devices to bear BACnet testing laboratories BTL mark and listed on BACnet manufacturers association web site.

1.8 EXISTING CONTROL COMPONENTS

.1 Utilize any existing control wiring and/or piping as indicated.

.2 Field control devices that are usable in their original configuration may be re-used provided that they conform to applicable codes, standards, specifications. Do not modify
original design of any existing devices without written permission from Engineer/Architect. Provide for new, properly designed device where components are not certain as to reusability. Provide list of equipment so included in bid. Include unit price of all for this equipment.

.3 Within 30 days of award of contract, and prior to installation of any new devices, inspect and test all existing devices intended for re-use. Furnish test report listing each component to be re-used and indicating whether it is in good order or requires repair by Engineer/Architect.

.4 Non-functioning items:
   .1 Provide with report specification sheets or written functional requirements to support findings.
   .2 Engineer/Architect will repair or replace existing items judged defective yet deemed necessary for EMCS.
   .3 Assume responsibility for items repaired by Engineer/Architect.

.5 Submit written request for permission to disconnect any controls and to obtain equipment downtime before proceeding with work.

.6 Assume responsibility for existing controls to be incorporated into EMCS, to commence upon approval for disconnection of controls or equipment downtime.
   .1 Be responsible for items repaired by Engineer/Architect.
   .2 Be responsible for repair costs due to negligence or abuse of Owner's equipment.
   .3 Responsibility for existing devices to terminate upon acceptance of EMCS or applicable portions thereof.

.7 Remove existing controls not re-used or not required. Place in approved storage for disposition as directed.

1.9 EMCS CONTRACTOR QUALIFICATIONS

.1 EMCS contractor to:
   .1 Have local office for at least 5 years, staffed by trained personnel capable of providing instruction, routine maintenance, emergency service on systems,
   .2 Provide record of successful installations performed by Contractor after with similar computer-based systems.
   .3 Have access to local supplies of essential parts and provide 7 year guarantee of availability of spare parts after obsolescence.
   .4 Be able to provide trained personnel on site within 24 hours notice or provide instructions on maintenance and emergency service on system.

1.10 SYSTEM DESIGN RESPONSIBILITY

.1 Design and provide all conduit and wiring at 50 volts AC or less linking all elements of system, including future capability.
2. Supply sufficient programmable controllers of all types to meet project requirements. Quantity and points contents to be approved by Engineer/Architect prior to installation.

3. Location of controllers to be approved by Engineer/Architect prior to installation.

4. Provide utility and uninterruptible power supply to controllers.

1.11 LANGUAGE OPERATING REQUIREMENTS

1. Operator to interface to system in English through operator selectable access codes.

2. Use non-linguistic symbols for displays on graphic terminals wherever possible. All other information to be in English.

3. Operating system executive: primary hardware-to-software interface (specified as part of hardware purchase) with associated documentation to be in English.

4. System manager software: to include system definition point database, additions, deletions or modifications, control loop statements, use of high level programming languages, report generator utility and other OS utilities used for maintaining optimal operating efficiency. These functions to be in English.

5. EMCS operator: include, in English.

.1 All input and output commands and messages from operator-initiated functions and/or field related changes and/or alarms as defined in CDL's or assigned limits (i.e. all commands relating to day-to-day operating functions and not related to system modifications, additions, or logic re-definations).

.2 Graphic "display" functions, point commands to turn systems on or off, manually override automatic control of specified hardware points to be in English at all specified OWS. Point name expansions in English.

.3 Reporting function such as trend log, trend graphics, alarm report logs, energy report logs, maintenance generated logs.

1.12 MATERIALS DELIVERY SCHEDULE

1. Provide Engineer/Architect with "Materials Delivery Schedule" within 2 weeks after award of Contract.

PART 2 PRODUCTS

2.1 ACCEPTABLE SYSTEMS, MANUFACTURERS

1. Alerton, Delta, Automated Logic, Honeywell.

2. Proposed system to have communication capability utilizing BACnet Protocol.

3. Panel to be NEMA rated to suit environmental requirements.
.4 To have hinged doors equipped with standard keyed-alike cabinet locks, keyed to same key.

.5 Wiring within panels to be contained within properly sized rigid PVC slotted wall wire duct. All wiring within the wire duct to be concealed with a non-slip cover.

.6 Terminations for the connection of power wiring, communication wiring and field mounted devices to be at properly identified terminal blocks mounted within the control panel.

.7 All control panels to be provided with an internally mounted 120 volt duplex power receptacle.

.8 All control panels to be identified with permanently mounted Lamecoid tags to identify the control panel and the systems served by the control panel. Submit schedule of labels with shop drawing submission.

PART 3 EXECUTION

3.1 MANUFACTURER'S RECOMMENDATIONS

.1 Installation to be to manufacturer's recommendations. Provide printed copies of recommendations with shop drawings or product data.

3.2 PAINTING

.1 Painting to be in accordance with EEMAC 2Y.1, supplemented as follows:

.2 Clean and touch up marred or scratched surfaces of factory finished equipment to match original finish.

.3 Restore to new condition, finished surfaces which have been damaged too extensively to be primed and touched up to make good.

.4 Clean and prime exposed hangers, racks, fastenings, and other support components.

.5 Paint all unfinished equipment installed indoors to EEMAC 2Y.1.

END OF SECTION