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Robert W. Depke Roof Replacement
 Issued For Bid
 Lake County Bid 18103
 18-06-2018

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25 00 11 INTEGRATED AUTOMATION – GENERAL REQUIREMENTS – DIVISION 25 SUMMARY OF WORK

1 - GENERAL

1.01 General Conditions

- 1.01.1 The Specification shall be read as a whole by all parties concerned. Sectioning of the Specification is for convenience only; each section may contain less or more than the completed Work of any trade. The Contractor is solely responsible to understand the scope of Work, and make clear to Subcontractors the extent of their Work in this section.
- 1.01.2 All non-IP network cabling Work shall be done by Division 25 BAS Contractor in accordance with EIA/TIA 568C.
- 1.01.3 All conduit and pathways shall be installed in the Work shall be done accordance with ANSI/TIA/EIA-569B. All wiring shall be in conduit. All controls conduits shall be BLUE in color. All IP conduits shall be ORANGE in color.
- 1.01.4 Sections of these Specifications are not intended to delegate functions or to delegate Work and supply to any specific trade. The Work shall include all labor, materials, equipment and tools required for a complete and working installation as described in the Drawings and these Specifications.
- 1.01.5 Perform all Work as outlined herein and shown on the Drawings and outlined in the Specifications. Provide all materials, tools and labor to complete the installation and commission the Work, to the satisfaction of the Owner.
- 1.01.6 The Work shall be performed by skilled technicians under the direction of experienced project managers/coordinators, all of whom shall be properly trained and qualified for this Work.
- 1.01.7 Improper installation or erection of products or supplying and installing unapproved materials, due to failure in complying with the requirements outlined in the Contract Documents, authorizes the Owner to require removal and re-installation at no additional cost for the Work.
- 1.01.8 Contract Documents include all Specifications, Drawings and other Contract Documents prepared for the Work.
- 1.01.9 Where an instruction is given in a clause of these Specifications and it is not obvious to whom the instruction has been given, it shall be deemed to be an instruction given to the Contractor(s) responsible for the Work in this Division.
- 1.01.10 Where a list of items to be provided is given in the Specifications, the Contractor shall provide all items listed (i.e., the items listed in a series of subclasses).
- 1.01.11 In this Division *Provide* means to supply, install, connect and set system to operate to the satisfaction of the Controls Consultant. If commissioning is specified, Contractor shall commission system as specified, to fulfill the intended function to the satisfaction of the Owner.
- 1.01.12 Unless otherwise stated, all references in this Specification to the Contractor shall be to the BACnet Interface Device Contractor or Controls Contractor as defined in 25 00 02.
- 1.01.13 This Specification defines the minimum equipment and performance requirements for all BACnet Interface Devices provided in the Work.
 - 1.01.13.1 The Contractor shall not be allowed to deviate from his proposed system architecture, location of equipment and equipment Specification (as detailed in the Submittals) unless express written approval has been granted by the Controls Consultant.
- 1.01.14 If no application for deviation or substitution is made prior to installation, all Work and equipment not in compliance with this Specification or approved as an alternate, shall be rejected and shall be rectified at the Contractor's expense.
- 1.01.15 The Contract Documents shall be interpreted according to the laws of the Place of the Work. The following is the reference to the Place of the Work.
 - 1.01.15.1 Robert W. Depke Juvenile Justice Complex – Vernon Hills, IL.
- 1.01.16 The following Divisions contain BACnet Interface Devices that will be connected to the Owner's BACnet Intranet for the Work:
 - 1.01.16.1 Division 23.

1.02 Acceptable BAS Contractors

- 1.02.1 The following Contractors are acceptable Division 25 BAS Contractors:
 - 1.02.1.1 ALC Chicago Branch.

1.03 Contractor Work Responsibilities

- 1.03.1 Supply, install and commission a complete operating BACnet/IP-based Building Automation System (BAS) for the BACnet Interface Devices listed in the Contract Documents.
 - 1.03.1.1 See the individual Specification Sections for equipment that shall come complete with BACnet interfaces to be integrated into the BACnet Intranet network created for the Work.
 - 1.03.1.2 Provide all related auxiliary items required herein, including but not restricted to the following:
 - 1.03.1.2.1 Control, power and network wiring and conduit.
 - 1.03.1.2.2 Operating and Maintenance Manuals
 - 1.03.1.2.3 All other required equipment as outlined in this Division.
 - 1.03.1.3 The Contractor and the Owner's Controls Consultant will verify communications between the BACnet Interface Devices and the Owner's IP client.
 - 1.03.1.4 The Controls Consultant will set conventions for object names that will be applied to the BACnet Interface Devices.

1.04 Compliance With Code

- 1.04.1 Perform Work in accordance with national codes including all amendments up to tender closing date and other codes of state or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- 1.04.2 Meet or exceed requirements of:
 - 1.04.2.1 Contract Documents
 - 1.04.2.2 Specified standards, codes and referenced documents
- 1.04.3 Comply with the requirements of the latest edition of the applicable UL standards, the requirements of National, State or local Codes, and all other Authorities Having Jurisdiction. These codes and regulations constitute an integral part of these Specifications.
- 1.04.4 There is no requirement for any BACnet Interface Device to be a UL-listed product.
- 1.04.5 In case of conflict, applicable Codes take precedence over the Contract Documents. In no instance reduce the standard or scope of Work or intent established by the Drawings and Specifications by applying any of the codes referred to herein.

1.05 Permits, Fees And Inspections By Authorities

- 1.05.1 Apply for, obtain and pay for all permits, licenses, inspections, examinations and fees required before starting any Work. Submit any additional information requested by the Authorities Having Jurisdiction. These codes and regulations require the information on specific forms, fill in these forms with the required information.
- 1.05.2 Before starting any Work, submit the required number of copies of Drawings and Specifications to the Authorities Having Jurisdiction for their approval and comments. Comply with any changes requested as part of the Contract, but notify the Controls Consultant immediately of such changes, for proper processing of these requirements. Prepare and furnish any additional drawings, details or information as may be required.
- 1.05.3 Arrange for inspection of all Work by the Authorities Having Jurisdiction over the Work. For acceptance for Total Completion, the Contractor must furnish an unconditional Certificate of Acceptance from the Authority Having Jurisdiction.

1.06 RTUs and Decentralized Unitary HVAC Unit (AC-1) BACnet Interface Device Scope of Work

- 1.06.1 ALC Chicago shall supply, install and commission the following:
 - 1.06.1.1 Provide BACnet MS/TP connections to the RTUs BACnet MS/TP BACnet Interface Devices shown in the BACnet Single Line Diagram. Network these new devices to the existing BACnet MS/TP network in the Place of the Work.

25 00 01 INTEGRATED AUTOMATION – GENERAL REQUIREMENTS – DIVISION 25 BID SUBMITTAL CHECKLIST

1 - GENERAL

1.01 General Conditions

- 1.01.1 The intent of this section is to provide Bidder(s) with a clear understanding of what information the Bidder must submit.
- 1.01.2 Bidders shall submit written documentation (schedules, brochures and other documents required) by the date shown in the Bid Documents.

1.02 Submissions

- 1.02.1 Bidders shall complete the Submissions listed below in order for the Bid to be accepted.
 - 1.02.1.1 Pricing
 - 1.02.1.2 Network Architecture Block Diagrams Showing Panel Layouts
 - 1.02.1.3 Controls System Warranty
 - 1.02.1.4 Project Work Plan
 - 1.02.1.5 BAS Hardware Supplied
 - 1.02.1.6 Spare Parts List
 - 1.02.1.7 Inter-connection to equipment provided with integrated controls interface. Contractor is responsible for providing an acceptable BACnet Interface Device Object List for each device shown on the BACnet Single Line Diagram.
 - 1.02.1.8 Other items listed throughout the Contract Documents

2 - PRODUCTS

Not Used

3 - EXECUTION

Not Used

End of Section

- 1.06.1.2 Provide the required points and other services external to the RTUs BACnet MS/TP BACnet Interface Devices shown the Contract Documents.
 - 1.06.1.3 Install the BACnet/IP BACnet Interface Device and other points for the Decentralized Unitary HVAC Unit (AC-1). IP infrastructure is by ALC Chicago.
 - 1.06.2 ALC Chicago is responsible for mapping all RTUs and Decentralized Unitary HVAC Unit (AC-1) points and their present values to an existing LGR in the Place of the Work so the points from these devices are available for graphics creation under a separate Contract with the Owner.
 - 1.06.3 This Contractor shall participate in the commissioning process to verify communications and proper transmission of BACnet data between the RTUs and Decentralized Unitary HVAC Units Panel BACnet Interface Device and the Owner's Front End.
 - 1.06.4 Provide all related auxiliary items required herein, such as: wiring, conduit, Input/Output Hardware Object Lists, control sequence descriptions, Operating and Maintenance Manuals, thermowells, report software, metering devices and all other required devices as outlined in the Contract Documents.
 - 1.06.5 This Specification defines the minimum equipment and performance requirements for the BASs.
 - 1.06.5.1 The Contractor shall not be allowed to deviate from his proposed system architecture, location of equipment and equipment specification (as detailed in the Submittals) unless express written approval has been granted by the Controls Consultant.
 - 1.06.6 If no application for deviation or substitution is made prior to installation, all Work and equipment not in compliance with this Specification or approved as an alternate, shall be rejected and shall be rectified at the Contractor's expense.
- 1.07 Contractor Networking Scope of Work**
- 1.07.1 References to this Contractor in this section and for Work relating to the BACnet Interface Devices shall be by the BACnet Interface Device Equipment Supplier or the Controls Contractor hired by the BACnet Interface Device Equipment Supplier.
 - 1.07.2 All network cabling Work shall be done in accordance with TIA/EIA 568B. All conduit installed in the Work shall be done in accordance with TIA/EIA 569B.
 - 1.07.3 The Contractor shall assume that the Intranet at the Place of Work networks all buildings together using an IP infrastructure. Provide new or upgrade existing BACnet Annex J router to pass messages from the Place of Work to the Owner's server farm via the LAN connection on the BACnet Intranet.
 - 1.07.3.1 It shall be the Division 25 BAS Contractor's responsibility to configure each BACnet router.
 - 1.07.3.2 Each BACnet router shall be configured such that all network layer error messages are directed to a specific workstation using the BACnet ConfirmedTextMessage service.
 - 1.07.3.3 Division 25 BAS Contractor shall provide software to manage alarm transmission to the Front End. Division 25 BAS Contractor shall add an entry in the Recipient_List and create Notification Class objects to send alarm data to their Front End.
 - 1.07.4 The Contractor is expected to co-ordinate the Work with the Owner.
 - 1.07.4.1 ALC Chicago will provide all IP network drops to the BACnet/IP BACnet Interface Device in purple IP Cat 6a cable. See BACnet Single Line for details.
 - 1.07.4.2 The Owner will provide all communication media, connectors, repeaters, hubs, and routers necessary for the Intranet.
 - 1.07.4.3 The Owner will assign blocks of IP addresses and BACnet Interface Device instance numbers so there are no address duplications as future BASs are installed.
 - 1.07.4.4 It shall be the Contractor's responsibility to initially configure each router with routing tables containing all network numbers that are part of the IP subnet using the specified network numbering scheme for the Work.
 - 1.07.4.5 Contractor shall co-ordinate network numbering so BASs in all buildings can reside on the Owner's Intranet. The Owner will provide a list of acceptable network numbers for the Contractor.
 - 1.07.4.6 It shall be the Contractor's responsibility to initially configure each router with routing tables containing all network numbers that are part of the IP subnet using the specified network numbering scheme for the Work.
 - 1.07.4.7 Broadcasts are not allowed on the Intranet. There are existing BBMDs on the Intranet. This Contractor has a dedicated IP subnet. Configure any new BBMDs to prevent broadcast "storms".
 - 1.07.4.8 The Owner will provide credentials for the email account used to transmit alarms to a remote wireless device (e.g., cell phone).

25 00 02 INTEGRATED AUTOMATION – GENERAL REQUIREMENTS – DIVISION 25 PROCUREMENT DEFINITIONS

1 - GENERAL

1.01 Definitions

- 1.01.1 The following definitions apply throughout the Specification:
 - 1.01.1.1 References to the "*Contractor*", "*this Contractor*", "*BACnet Interface Device Contractor*" or "*Division 25*" in this Specification are to the RTUs and Decentralized Unitary HVAC Unit (AC-1) Contractor or Contractors and Equipment Suppliers, who all report to the General Contractor.
 - 1.01.1.1.1 The existing Building Automation System (BAS) at the Place of the Work is an ALC system. References in this specification to "*BAS Contractor*", "*Controls Contractor*" or to "*Division 25*" are to ALC Chicago.
 - 1.01.1.1.2 RTU Equipment Supplier is responsible for supplying and installing and networking the RTU BACnet MS/TP Interface Devices specified in this Division 25 Specification to an existing ALC BACnet/IP device that currently resides on the County BACnet Intranet.
 - 1.01.1.1.3 The Decentralized Unitary HVAC Unit (AC-1) Equipment Supplier is responsible for supplying the Decentralized Unitary HVAC Unit (AC-1) BACnet/IP Interface Device specified in this Division 25 Specification to a common BACnet/IP device that will reside on the County BACnet Intranet.
 - 1.01.1.1.4 ALC Chicago is responsible for providing the following:
 - 1.01.1.1.4.1 Additional points external to each RTU BACnet Interface Device. See Contract Documents for details.
 - 1.01.1.1.4.2 Installing, powering and networking to the Decentralized Unitary HVAC Unit (AC-1) BACnet/IP BACnet Interface Device in the IT Room. Install the device in an ALC-provided enclosure. Co-ordinate wall location with Owner.
 - 1.01.1.1.4.2.1 Map the BACnet/IP points to an ALC LGR so graphics, trends and alarms can be created. Graphics creation Work will be provided by ALC Chicago outside of the Contract Documents for this project.
 - 1.01.1.1.4.2.2 Install orange conduit and purple Cat 6a cable from the BACnet/IP device to the nearest switch. IP drop termination is by Owner.
 - 1.01.1.2 References to the "*Controls Consultant*" are to Appin Associates who is responsible for the BACnet Device Interface integration as outlined in this Specification.
 - 1.01.1.3 References to "*EXP*" are to the Engineers who are responsible for the design of the Work shown in the Contract Documents.
 - 1.01.1.4 References to "*Front End*" are to a BACnet-based proprietary graphics creation/configuration and device programming tool that runs on a computer that shall provide the required trending, alarming and scheduling requirements.
 - 1.01.1.4.1 There is no requirement for this Contractor to install a Front End for any BACnet Interface Device in the Work. This Work will be provided by ALC Chicago outside of the Contract Documents for this project.
 - 1.01.1.5 There is no requirement for this Contractor to provide any computer hardware or printers. This will be provided by the Owner.

2 - PRODUCTS

Not Used

3 - EXECUTION

Not Used

End of Section

- 1.07.4.9 The Owner will set conventions for object names, graphic layouts and colorization standards that will be applied to this BAS and all future BASs.
 - 1.07.4.10 The Owner has set up an Intranet of BASs to segment this traffic from the rest of the traffic at the Place of the Work. This Contractor shall work with the Owner's IT department to connect this BAS to the Intranet. Contractor is responsible for meeting all security requirements set out by the Owner. A user-ID and password can be assigned to allow the Contractor to remotely connect to the Owner's Intranet.
 - 1.07.4.11 Contractor shall co-ordinate selection of MAC addresses so there is no potential for duplication of addresses on the Owner's Intranet. Owner uses port binding with the MAC address as a security measure. Provide a list of the MAC addresses to be used so the Owner can verify that there are no duplicate MAC addresses.
- 1.08 BACnet Hardwired Points Scope of Work**
- 1.08.1 See EXP Contract Documents for additional ALC responsibilities.
- 1.09 Requirements for Control Panel Devices**
- 1.09.1 Level 0 Software Requirements
 - 1.09.1.1 References to "*Front End*" are to a BACnet-based proprietary graphics creation/configuration and device programming tool that runs on a computer that shall provide the required trending, alarming and scheduling requirements.
 - 1.09.1.1.1 There is no requirement to install a Front End for the BACnet Interface Device. This Work will be provided by ALC Chicago outside of the Contract Documents for this project.
 - 1.09.1.1.2 The RTUs and Decentralized Unitary HVAC Units Equipment Suppliers are responsible for providing information as outlined in this Division as Submittals so ALC Chicago can create graphics, trends, schedules and alarms using their Front End software.
 - 1.09.1.1.3 In addition, the Contractor shall provide all BAS programming, documentation, etc. supplied/developed in this project for installation on the existing Web Server provided by ALC Chicago.
 - 1.09.1.2 Contractor is responsible for providing an account and a password to the supplier of any BACnet/IP device provided as part of the Work so the supplier can view and change parameters of objects for that device. Access is restricted to the graphics, trends, alarms and schedules created for the device or devices provided in the Work. Contractor shall provide an audit log of any transactions for review by the Owner. Contractor is not responsible for any equipment damage or problems as a result of the actions taken by the Equipment Supplier.
 - 1.09.1.3 Contractor is responsible for providing up to 3 accounts and passwords to Owner. The Owner will provide the access rights for each account.
- 1.10 Execution Scope of Work**
- 1.10.1 Provide a Submittal of the BACnet Interface Device for review by Owner.
 - 1.10.1.1 References to this Contractor in this section and for Work relating to the RTUs and Decentralized Unitary HVAC Units BACnet Interface Device shall be by the RTUs and Decentralized Unitary HVAC Units Equipment Suppliers or the Controls Contractor hired by the RTUs and Decentralized Unitary HVAC Units Equipment Supplier.
 - 1.10.1.2 No equipment will be released to production without prior approval of the BACnet information.
 - 1.10.2 The Contractor shall run all BAS wiring Work in BLUE conduit.
 - 1.10.3 All other electrical and related Work not specified in other sections of this Specification is within the ALC Chicago's Scope of Work and is the responsibility of the ALC Chicago to provide.
 - 1.10.4 All electrical control wiring supplied in this Section, including interlock wiring below 50 V required for the Work, except where otherwise noted, shall be provided by the Contractor. Contractor shall provide wire and conduit to each BAS device. BAS devices shall be mounted in new device enclosures (tub).
 - 1.10.5 All wiring in "wet" locations shall be wired to satisfy watertight wiring requirements (see Specification and Contract Documents for additional details).
 - 1.10.6 The Contractor is responsible for providing equipment or protection of equipment that is suitable to the environment in the Work.
 - 1.10.7 Allow for in-situ approval of new devices if required by the Authority Having Jurisdiction.

- 1.10.7.1 This Contractor shall provide wire and conduit to all BACnet Interface Devices. This Contractor shall mount all BACnet Interface Device in a panel enclosure (tub) that is suitably sized for the BACnet Interface Device and the power supply.
- 1.10.7.2 Electrical subtrade to ALC Chicago shall provide power to all BACnet Interface Devices in the Work. Power wiring and control wiring from this point to the device requiring power shall be by ALC Chicago.
- 1.10.7.2.1 Power for the RTUs BACnet Interface Devices may not be required if the power for these devices comes from a single point of connection to the RTU. ALC Chicago shall allow for provision of power if power from the single point of connection is not available to the BACnet Interface Device.
- 1.10.8 The Contractor is responsible for providing equipment or protection of equipment that is suitable to the environment in the Work.
- 1.10.8.1 The Contractor is responsible for grounding all equipment following manufacturer's recommendations. Grounding will be reviewed during the commissioning Work.

1.11 Electrical Power for BACnet Interface Devices

- 1.11.1 ALC Chicago is responsible for providing power for all BAS devices requiring power.
- 1.11.2 All Work shall be done to NFPA 70 and state and local codes.

1.12 Decentralized Unitary HVAC Units Contractor Testing, Adjusting and Balancing (TAB) Scope of Work

- 1.12.1 Provide support to TAB for all BACnet Interface Devices requiring TAB services.
- 1.12.2 Follow equipment start-up procedures as recommended by Manufacturer unless otherwise specified.
- 1.12.3 TAB Subcontractor shall advise Division 25 BAS Contractor, Contractor, and Owner of any adjustments, changes, or additions required to systems.

1.13 Commissioning Scope of Work

- 1.13.1 ALC Chicago shall provide a complete commissioning and performance test in the presence of the Owner.
- 1.13.2 These Work requirements include but are not limited to:
 - 1.13.2.1 Interconnections to and commissioning the connections to the BACnet Interface Devices and any other equipment shown in the Contract Documents.
 - 1.13.2.2 Allow for on-site time to co-ordinate this Work with other trades
 - 1.13.2.3 Assisting the Mechanical Contractor with start-up of devices under BAS control.
- 1.13.3 ALC Chicago shall provide a written guarantee to the Owner, consistent with the project-specific General Conditions, stating that the Work provided under this Section is guaranteed against faulty material and workmanship for a period of one (1) year after Final Completion.
- 1.13.4 ALC Chicago is responsible for working with other trades (particularly Mechanical and Electrical) to co-ordinate Work and to resolve construction problems.
- 1.13.5 ALC Chicago is responsible for providing the necessary staff and equipment so the BAS shall be ready for the projected start-up date shown in the Contract Documents.
- 1.13.6 ALC Chicago shall allow for 16 hours of on-site commissioning as directed by the BAS Consultant. Travel time to sites shall not be counted as commissioning time.

1.14 Training Requirements

- 1.14.1 ALC Chicago shall instruct the Owners in all aspects of the operations of systems and equipment.
- 1.14.2 Provide training to cover operation of the building BAS and the software procedures to allow the Owner's personnel to add, modify, or create points, BAS loops or energy management programs. The instruction shall consist of both hands-on and classroom training at the project site. Training shall include a "Question Period" at the close of each session.
- 1.14.3 Supply tools, spare parts (if listed in this Specification), equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, troubleshooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- 1.14.4 Manufacturers shall provide demonstrations and instructions on all equipment and materials.
- 1.14.5 Use final version of Operating and Maintenance Manual, "As-Built" drawings, audio visual aids, etc. as part of instructional materials. Owner's training shall not start until these documents are completed and shall be completed just prior to the Certificate of Total Completion being granted.
- 1.14.6 Contractor commissioning and assistance provided to the Owner during the trial usage period shall not count as training time.

- 1.14.7 The duration of the training period shall not be less than four (4) hours of site specific instruction for the Work, and not limited to a consecutive period. All training shall take place during normal working hours and shall not exceed seven (7) hours per day. Travel time to sites or place of training shall not be counted as training time.
- 1.14.8 Co-ordinate all sessions with the Owner and/or his representatives. The Owner and/or the Contractor shall provide written notification at least three (3) working days prior to cancellation or postponement of the training session.
- 1.14.9 Commissioning and time spent with Contractor's staff by Owner's personnel shall not substitute for nor count as training. Owner's personnel shall be allowed to participate in the commissioning process.
- 1.14.10 Obtain Owner's acceptance of instruction in writing after instructions to Owner is completed.

1.15 Warranty Requirements

- 1.15.1 Suppliers of all Work including ALC Chicago shall provide a written guarantee to the Owner, consistent with the project-specific General Conditions, stating that the Work provided under this Section is guaranteed against faulty material and workmanship for a period of one (1) year after Final Completion.

2 - PRODUCTS

Not Used

3 - EXECUTION

Not Used

End of Section

BACnet Single Line Diagrams

Shown at the end of this Specification

2 - PRODUCTS

Not Used

3 - EXECUTION

Not Used

End of Section

25 00 13 INTEGRATED AUTOMATION - GENERAL REQUIREMENTS - ALL TRADES WORK RESPONSIBILITIES

1 - GENERAL

1.01 Related Sections

- 1.01.1 Other Trades Sections:

- 1.01.1.1 EXP Contract Documents.

1.02 Trade Responsibilities for BAS Administration (applies to all BACnet Device Types and all aspects of the Work)

- 1.02.1 This table in the Responsibility Matrix assigns responsibilities for the following items:

- 1.02.1.1 Provision of permits for BACnet Interface Devices.
- 1.02.1.2 Arranging for Special acceptance of for BACnet Interface Devices by the Authority Having Jurisdiction.
- 1.02.1.3 Provision of Submittals for BACnet Interface Devices.
- 1.02.1.4 Preparation of the Project Work Plan for BACnet Interface Devices.

- 1.02.2 Commissioning of BACnet Interface Devices.

1.03 BACnet Interface Device Scope of Work

- 1.03.1 The list of devices that make up the Work include the following. This is a brief summary of the Work requirements. See the individual Specification Sections for details:

- 1.03.1.1 RTUs
 - 1.03.1.1.1 The RTUs Equipment Supplier shall provide all BACnet Interface Devices as BACnet MS/TP devices.
 - 1.03.1.1.2 ALC Chicago is responsible for creating alarms and trends. Report the start of the generator as a critical alarm. The Owner will provide the Recipient List. Tie the RTUs to the existing building schedule.
- 1.03.1.2 Decentralized Unitary (AC-1) HVAC Units
 - 1.03.1.2.1 The Decentralized Unitary (AC-1) Equipment Supplier shall provide a proprietary protocol to BACnet/IP device to map the proprietary points to BACnet objects.
 - 1.03.1.2.2 ALC Chicago is responsible for creating alarms and trends. The Owner will provide the Recipient List. There is no scheduling requirement.

1.04 BACnet Interface Device Scope of Work for Trending, Alarming and Scheduling.

- 1.04.1 ALC Chicago is responsible for all trending, alarming and scheduling Work as shown in the EXP Contract Documents.

25 05 01 INTEGRATED AUTOMATION - COMMON WORK RESULTS - GENERAL

1 - GENERAL

1.01 General Conditions

- 1.01.1 The Specification shall be read as a whole by all parties concerned. Sectioning of the Specification is for convenience only; each section may contain less or more than the completed Work of any Trade. The Contractor is solely responsible to understand the scope of Work, and make clear to Subcontractors the extent of their Work in this Section.
- 1.01.2 Sections of these Specifications are not intended to delegate functions or to delegate Work and supply to any specific trade. The Work shall include all labor, materials, equipment and tools required for a complete and working installation as described in the Drawings and these Specifications.

1.02 General Requirements

- 1.02.1 Provide all remote sensing points and instruments as indicated and/or required for a fully functional BACnet Interface Devices that meet the Specification requirements.
- 1.02.2 All equipment shall be installed according to Manufacturers' instruction by factory trained journeymen.
- 1.02.3 All employees and Subcontractors of the Contractor must follow and abide by all rules and regulations set forth by local Workplace Safety and Health authorities.
- 1.02.4 See this Division 25 for more details on general installation requirements.
- 1.02.5 BAS devices and Front End software shall use English units in calculations, displays, etc.

1.03 Contract Drawings and Site Examination

- 1.03.1 Examine the Mechanical Drawings to ensure that the Work under this Contract can be satisfactorily carried out. Report any discrepancies to the Owner prior to submission of Bid.
- 1.03.2 Any Drawings supplied by the Owner are performance drawings, are diagrammatic in nature and are intended to convey the scope of Work and to indicate general arrangement and approximate location of apparatus, fixtures and pipe runs. The Drawings do not intend to show architectural and structural details.
- 1.03.3 Do not scale Drawings. Obtain accurate dimensions by site measurement.
- 1.03.4 Not all required offsets, fittings and accessories are shown in the Drawings. Investigate structural and finish conditions affecting this Work and arrange Work accordingly, providing such fittings, valves and accessories required to meet the conditions. Conserve head room and interfere as little as possible with the free use of space.
- 1.03.5 Examine the site and local conditions, and verify that the supplied equipment is suitable for its intended use in the new construction.
- 1.03.6 Visit and inspect the site of the Work to verify location and elevation of existing services which affect Work of this Contract (water, electrical, sanitary, ductwork, etc.) before proceeding with Work.

1.04 General Installation Requirements

- 1.04.1 Include in the Work all requirements of Manufacturers' devices as shown on the Shop Drawings.
- 1.04.2 Install all equipment and apparatus regarding wiring, maintenance, adjustment or eventual replacement with due allowance therefore.
- 1.04.3 Replace all Work unsatisfactory to the Owner without extra cost.
- 1.04.4 Terminations shall use standard conduit box with slot screwdriver compression connector block unless otherwise specified.
- 1.04.5 Leave space clear and install all Work to accommodate future materials and/or equipment as indicated and to accommodate equipment and/or materials supplied by other trades. Verify spaces in which Work shall be installed. Install pipe runs etc., to maintain maximum headroom and clearances, and to conserve space in shaft and ceiling spaces.
- 1.04.6 Ensure that all equipment, fixtures and devices requiring normal maintenance and/or cleaning are mounted such that they are fully serviceable. Provide necessary isolation, access doors, union type fittings and the like to facilitate service work.
- 1.04.7 Protect BAS devices or other equipment from sprinkler damage or from damage when equipment needs to be drained for servicing.
- 1.04.8 Electrical outlets, switches or other electrical equipment shall be moved to any point within a ten (10) foot radius when relocation is requested by the Owner before the Work has been substantially completed, without additional cost.

1.05 Work Responsibilities

- 1.05.1 See Responsibility Matrix for Work responsibilities.

Responsibility Matrix				
Work	Furnish	Install	Low Volt Wiring	Line Power
All BACnet MS/TP BACnet Interface Devices supplied by ALC or Equipment Supplier.	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
All BACnet Interface Device proprietary protocol to BACnet/IP BACnet Interface Device	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
Controls low voltage and communication wiring.	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
BACnet Interface Device conduits	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
BACnet Interface Device equipment, housings and enclosures.	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
BACnet Interface Device permits, Submittals, construction administration services, equipment commissioning and equipment startup.	Equipment Supplier or Controls Contractor hired by Equipment Supplier			ALC
Hardwired connections between the RTUs and fire alarm panel.		Div. 26		Div. 26
Front End upgrades to ALC Front End (under separate contract)		ALC		na

- 1.04.9 Branch circuit wiring shall be installed with circuits arranged exactly as shown on the Drawings. Cable runs shall be modified to suit the installation.
- 1.04.10 Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- 1.04.11 Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
- 1.04.12 All equipment, installation, and wiring shall comply with acceptable industry Specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.
- 1.04.13 All BAS devices, transducers and relays shall be installed in approved enclosures.
- 1.04.14 All field devices shall be properly calibrated and tested for performance and accuracy.
- 1.04.15 Alter the locations of materials and/or equipment that do not necessitate additional material as directed at no additional cost.
- 1.04.16 All hardware, interface and junction boxes shall be installed so they are easily accessible for maintenance. Hardware etc. that is installed in locations the Owner deems to be unsafe or inaccessible shall be relocated at the Contractor's expense.

1.05 Integration of BACnet Interfaces

- 1.05.1 See EXP Contract Documents for additional ALC responsibilities.

1.06 Manufacturers' Instructions

- 1.06.1 Unless otherwise indicated in the Drawings and Specifications, install or erect products in accordance with Manufacturers' instructions.
- 1.06.2 Notify Owner in writing of any conflict between Manufacturers' instructions and Contract Documents. Owner shall designate which document shall be followed.
- 1.06.3 Improper installation or erection of products due to failure in complying with these requirements authorizes the Owner to require removal and re-installation at no increase in Bid Price.

1.07 Workmanship

- 1.07.1 Workmanship shall be the best quality, executed by workers experienced and skilled in the respective duties for which they are employed. Contractor shall immediately notify the Owner if required Work is such as to make it impractical to produce required results.
- 1.07.2 Install equipment, ductwork, conduit, cables and piping in a manner to present a neat appearance and to function properly to the acceptance of the Owner.
 - 1.07.2.1 Install cable runs parallel and perpendicular in chases, behind furring or above ceilings.
 - 1.07.2.2 Install ducts and pipes parallel and perpendicular to building planes.
 - 1.07.2.3 Install piping and ductwork concealed in chases, behind furring or above ceiling.
 - 1.07.2.4 Install exposed system neatly and group to present a neat appearance.
- 1.07.3 Decisions as to the quality or fitness of workmanship in cases of dispute rest solely with the Owner, whose decision is final and binding on the Contractor.

1.08 Standard Of Material

- 1.08.1 Control devices of each category to be of same type and manufacturer.
- 1.08.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, shockproof, vibration proof, and heat resistant assembly, as required to suite the application.
- 1.08.3 Provide new material and equipment of first class quality, delivered, erected, connected and finished in every detail and supplied with the acceptance of the Owner. Assume responsibility of ensuring that equipment provided performs as specified.

1.09 Field Quality Control

- 1.09.1 All electrical Work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the National, State and Local codes and laws.

1.10 Equipment Power Protection

- 1.10.1 Provide power line filtering for all Level 0 equipment and BAS devices either internally or as an external component.
- 1.10.2 Provide an Uninterruptible Power Supply (UPS) for all BAS devices. Size UPS to maintain power to all BAS devices during the transfer from commercial to generator power. Power all BAS devices from emergency power circuits.

- 1.10.2.1 The UPS shall be a non-switching double conversion online type of UPS that continuously powers all the BAS devices. Switching UPSs are not allowed in the Work.

1.11 Sprinkler Proof Equipment

- 1.11.1 All electrical equipment installed in areas where sprinklers are also installed shall be constructed so that exposure to water from the sprinkler heads shall not impair the effectiveness of the BAS equipment.
1.11.2 Sprinkler proof or relocate all BAS devices that are within 3 m [10 ft.] of a backflow preventer, sprinkler head or water relief valve.

2 - PRODUCTS

Not Used

3 - EXECUTION

Not Used

End of Section

25 05 53 INTEGRATED AUTOMATION – COMMON WORK RESULTS - IDENTIFICATION

1 - GENERAL

1.01 General Conditions

- 1.01.1 All devices and equipment, whether installed by the Contractor or existing, that is used for monitoring or control by the BAS, shall be clearly identified by a permanently attached label, tag or nameplate as specified below. Locate identification in a conspicuous location.
1.01.2 Each inscription shall be in the Working Language, identifying the device type, point number and corresponding zone it controls. All labelling shall be consistent with the naming convention and methods approved by the Owner via the Shop Drawing process.
1.01.3 No labelling (hardware and software) shall begin until approved by the Owner.

2 - PRODUCTS

2.01 Labels

- 2.01.1 Labels shall be embossed plastic with 6 mm [¼ in] high letters unless specified otherwise. Allow for an average of twenty-five (25) letters per label.

2.02 Tags

- 2.02.1 Provide brass or lamacoid numbered tags, 32 mm [1¼ in] diameter with stamped numbers secured by brass jack chains, brass "S" hooks or one (1) piece nylon ties around the valve stem-on all valves that are controlled by the BAS. Rectangular waterproof luggage style tags are an acceptable alternate. Prepare an approved list detailing the valve location, tag numbers and purpose it serves. Mount one (1) copy of this list in a glazed frame where advised by the Owner and provide additional copies for the Operating and Maintenance Manuals.

2.03 Nameplates

- 2.03.1 Nameplates shall be engraved plastic laminate with bevelled edges, either screwed or riveted in place in accordance with the Contract Documents.
2.03.2 Lamacoid shall consist of a 3 mm [1/8 in] thick plastic engraving sheet with a white face and a black core.

NAMEPLATE SIZES	DIMENSIONS	LINES	LETTER HEIGHT
Size 1	10 mm x 50 mm	1	3 mm
Size 2	12 mm x 70 mm	1	5 mm
Size 3	12 mm x 70 mm	2	3 mm
Size 4	20 mm x 90 mm	1	8 mm
Size 5	20 mm x 90 mm	2	5 mm
Size 6	25 mm x 100 mm	1	12 mm
Size 7	25 mm x 100 mm	2 lines	6 mm high letters

2.04 Naming Conventions

- 2.04.1 Use device identification that is consistent with the established naming conventions at the Place of Work. Co-ordinate identification of equipment and systems supplied by other Divisions to ensure that identical naming conventions are used.
2.04.2 The BAS device system network shall support up to a 32 character Object Name consisting only of ASCII printable characters. The convention to be used for all Object Names is as follows:
2.04.2.1 Object Name format shall be in the form of LCB#-AAAAA-NN-AAAAAAAAAAAA, where "A" designates an alphanumeric character and "N" is a digit from 0 to 9. The underscore character is not allowed so all names are compliant with Domain Naming conventions.
2.04.2.2 The next three digits LCB# followed by a dash "-" designate the Lake Co Building Number. If less than three digits are used, the front of the Lake County Building Number must be padded with leading zeroes.

- 2.04.2.3 The next six alphanumeric characters AAAAAA followed by a dash "-", designate the equipment or system name. No spaces are allowed in the equipment/system name; however the name length may be shortened as required to no less than three alphanumeric characters.
2.04.2.4 The three digits NNN followed by a dash "-" designate the System Number. If less than three digits are used, the front of the System Number must be padded with leading zeroes.
2.04.2.5 The final thirteen alphanumeric characters AAAAAAAAAAAA designate the device or sensor connected to that system. No spaces are allowed in the device/sensor name; however the name length may be shortened as required to no less than six alphanumeric characters.

- 2.04.3 This naming convention applies to all objects provided by this Contractor as well as to all objects that are mapped from the BACnet devices provided by others in the Work.
2.04.4 If the Contractor's panel does not support a maximum 32 character object name, map all objects to a BAS panel that does support this requirement.

2.05 Identification Conventions

- 2.05.1 Co-ordinate with equipment identification systems defined in other Divisions of the Specification.
2.05.2 Provide apparatus (including electric motors) with proper nameplates affixed thereto, showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle, phase and horsepower of motors and the name of the Manufacturer and his address.
2.05.3 Identify all new and reused devices, sensors etc. Use lamacoid plastic plates of an approved size complete with bevelled edges having engraved white 3 mm [1/8 in] letters on black background giving the name of the equipment or equipment service and its number, e.g., "Main Circulating Pump P-1", "Radiation Valve V-1". Fix to equipment using pop rivets or sheet metal screws. Stick-on nameplates of any type are not acceptable under any circumstances.
2.05.4 Identify all conduits, cable junction boxes and pull boxes in the colour assigned by the Owner.
2.05.5 Identify locations of all control devices installed in the ceiling space on the T-bar or access door directly below it, with a dot or star in the Contractor's corporate colours.

2.06 Panel Identification

- 2.06.1 Each control device cabinet shall be identified using a Size six (6) lamacoid label.
2.06.2 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics
2.06.3 Identify equipment with Size three (3) labels engraved "ASSET INVENTORY No. []". Number as directed by the Owner.
2.06.4 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
2.06.5 Terminal cabinets and pull boxes: indicate system and voltage.
2.06.6 Transformers: indicate capacity, primary and secondary voltages.
2.06.7 Provide apparatus (including electric motors) with proper nameplates affixed thereto, showing the size, name of equipment, serial number and all information usually provided, which also includes voltage, cycle, phase and horsepower of motors and the name of the Manufacturer and his address.
2.06.8 Identify all new and reused devices, sensors etc. Use lamacoid plastic plates of an approved size complete with bevelled edges having engraved white 3 mm [1/8 in] letters on black background giving the name of the equipment or equipment service and its number, i.e., "Main Circulating Pump PU-1", "Radiation Valve V-1", "Air Handling Unit AHU-1", "Motor M-1", etc. Fix to equipment using pop rivets or sheet metal screws. Stick-on nameplates of any type are not acceptable under any circumstances.
2.06.9 Provide all valves that are new or re-used with brass numbered tags, 16 mm [5/8 in] diameter with stamped numbers secure be chains to the valve. Prepare an approved list detailing the valve location, tag numbers and purpose it serves. Mount one (1) copy of this list in a glazed frame where advised by the Owner and provide additional copies for the Operating and Maintenance Manuals.
2.06.10 Stencil on identification approved by Owner complete with flow arrows for all piping installed during the Work.

2.07 Panel Wiring Diagrams

- 2.07.1 Each BAS device shall have a permanent, non-fading, "As-Built" interconnection wiring diagram of the complete field installed system, with properly identified device model and catalogue number of each system component and device and list of the meaning of the alarm and other lights.
2.07.2 Clearly identify all I/O address numbers and associated BAS point name on each input and output.
2.07.3 The diagram shall be sealed by plastic laminate and affixed to the inside of the field device.
2.07.4 All device and junction box terminal strips shall be fully labelled to identify wiring connections.

2.08 Warning Labels

- 2.08.1 Warning labels shall use white lettering on a red background on a Size 7 Nameplate.

3 - EXECUTION

Not Used

End of section

25 15 11.01 INTEGRATED AUTOMATION – BACNET/IP DEVICE SOFTWARE

1 - GENERAL

Not Used

2 - PRODUCTS

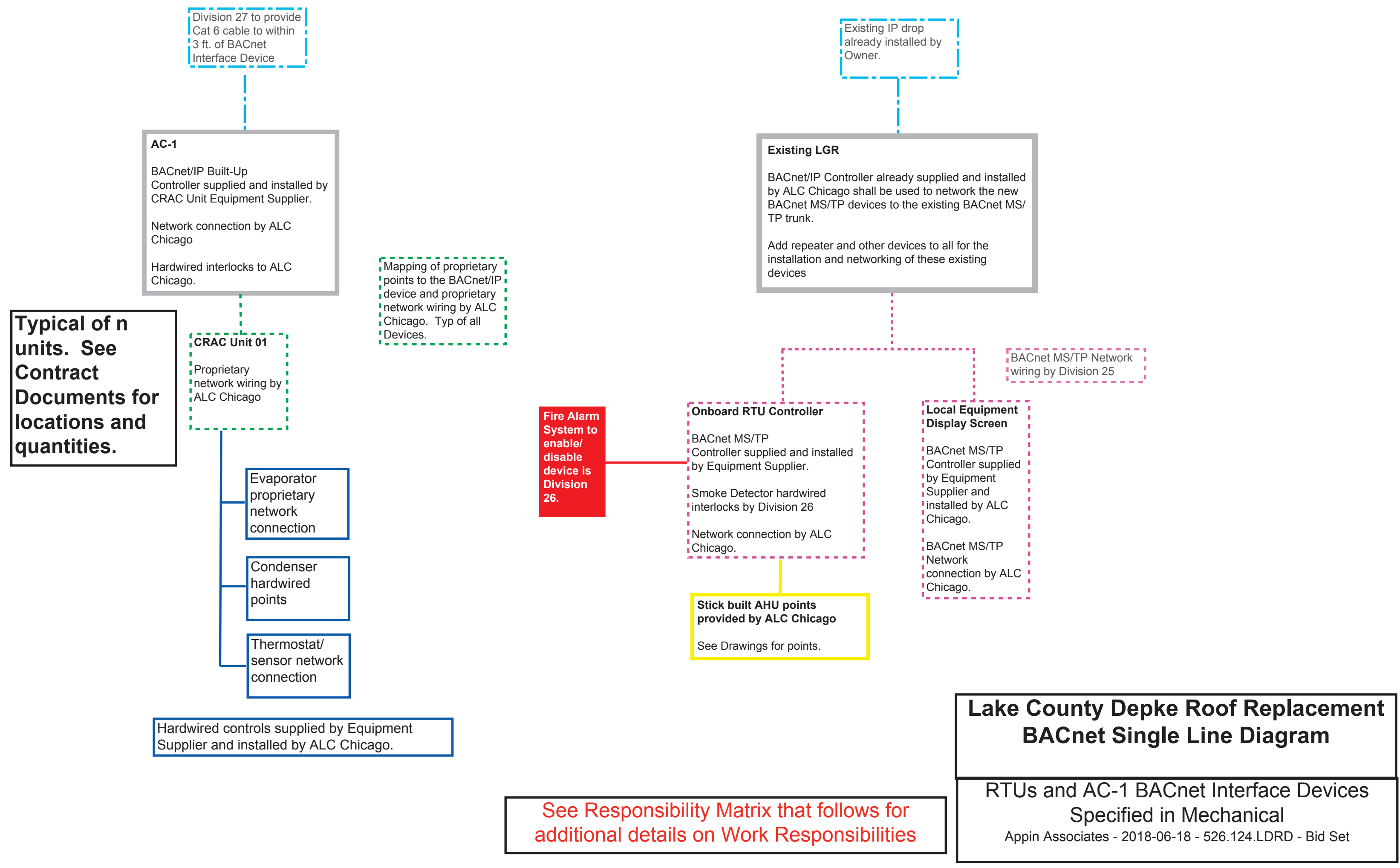
2.01 Level 0 BACnet/IP Device Software - General Requirements

- 2.01.1 RTUs Equipment Supplier shall provide the necessary software to the Owner to configure the RTU BACnet MS/TP BACnet Interface Devices.
2.01.2 Decentralized Unitary HVAC Unit (AC-1) Equipment Supplier shall provide the necessary software to the Owner to configure the Decentralized Unitary HVAC Unit (AC-1) BACnet/IP BACnet Interface Device.

3 - EXECUTION

Not Used

End of Section

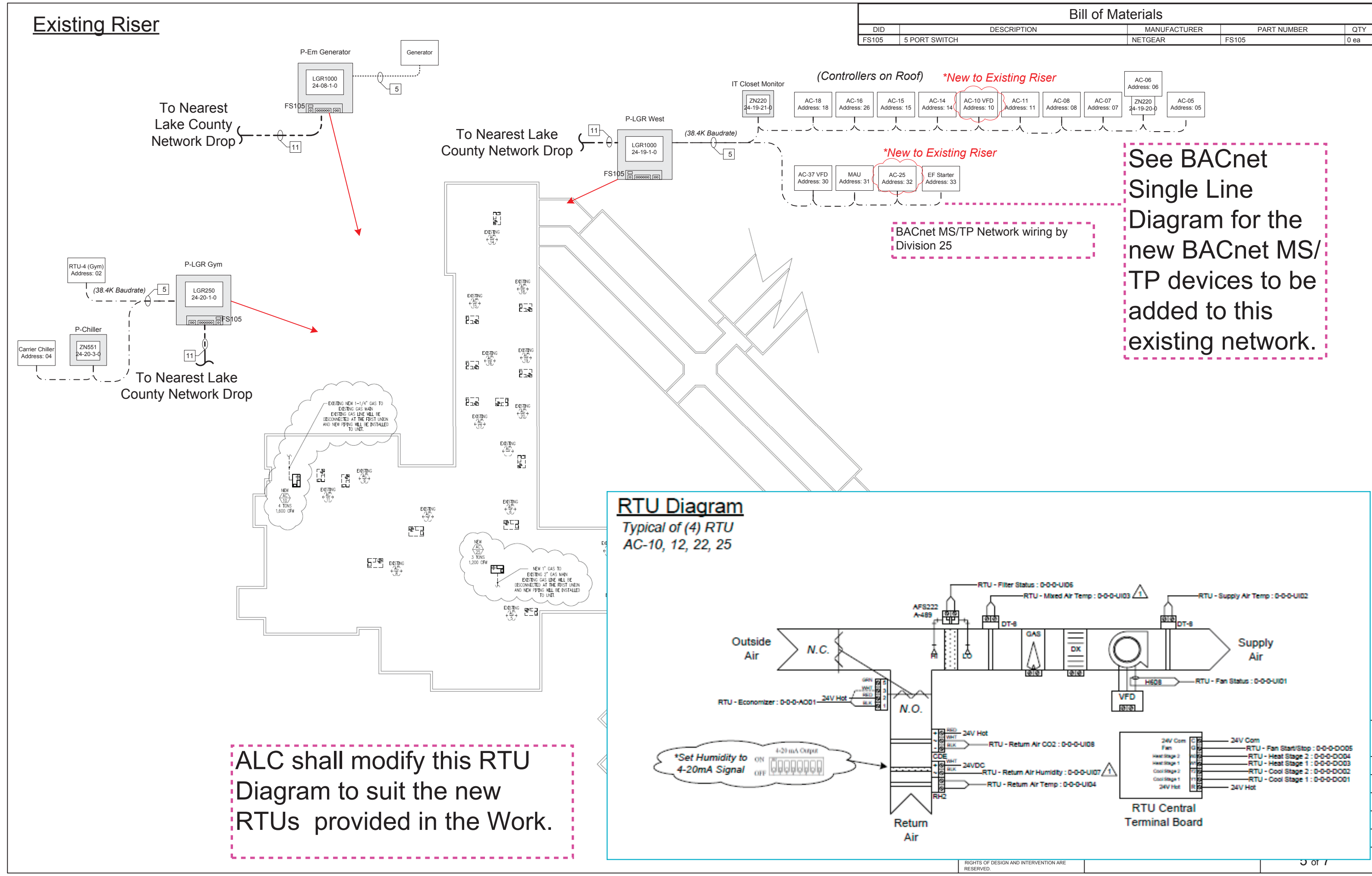


Lake County Depke Roof Replacement BACnet Single Line Diagram

RTUs and AC-1 BACnet Interface Devices Specified in Mechanical

Appin Associates - 2018-06-18 - 526.124.LDRD - Bid Set

See Responsibility Matrix that follows for additional details on Work Responsibilities



Lake County Depke Roof Replacement BAS-4