SECTION 281300 - ACCESS CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
B. Related Requirements:
C. Section 087100 “Door Hardware”
D. Section 260501 “General Electrical Requirements”
E. Section 260526 “Grounding and Bonding for Electrical Systems”
F. Section 260533 “Raceways and Boxes for Electrical Systems”
G. Section 260553 “Identification for Electrical Systems”
H. Division 27 “Communications”
I. Section 280000 “Security Design Criteria”
J. Section 280500 “Common Work Results for Security Systems”

1.2 SUMMARY

A. Section includes:
   1. Card reader.
   2. Biometric Reader
   3. Door control device.
   4. Fire/access power management system.
   5. Power supply.
   6. Interface to campus security system.
   7. Required cabling from door frame to interface to campus security system.
B. Related Requirements:
   Refer to Door Schedule and Drawings for location of doors requiring card readers.
C. Products Installed but Not Supplied Under This Section
   1. Card Reader
   2. Biometric Reader

1.3 REGULATORY REFERENCES

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. Where standards and publications are identified, they shall be the most current version.
   1. Electronic Industries Association Standards.
   2. National Fire Protection Association (NFPA) Publication 101 Life Safety Code and NFPA 70 National Electric Code.
   3. Underwriters Laboratories, Inc. UL 294 Access Control System Units and UL 1076 Proprietary Burglar Alarm Units and Systems.
   4. Americans with Disabilities Act (ADA)
   5. Occupational Health and Safety Association Requirements (OSHA)
   6. Applicable Federal, state, county and local laws, regulations, ordinances and codes.

B. In the event of conflicting requirements between the authorities cited above or between authorities cited and those specified, such disagreements shall be resolved by the Architect.

C. Nothing in this Section, including revocation of certain specific codes, standards, or specifications, shall relieve the Security Contractor of the responsibility for compliance with the codes, standards, or specifications which are generally recognized to be applicable to the Work specified herein.

1.4 SYSTEM DESCRIPTION

A. Work shall include all labor, materials, tools and equipment, and documentation required for a complete and working:
   1. Card-based Access Control System (ACS)
   2. Wire and cable as required to install all equipment as specified herein.

B. System shall consist of but not be limited to:
   1. Door Controllers
   2. Card Readers
   3. Biometric Readers
   4. Integrated Request-to-Exit (REX) devices
   5. Optical sensor Request-to-Exit (REX) devices (where applicable)
   6. Door Position Switches
   7. Non-LAN wire and cable as needed for complete system.
   8. Bonding to building grounding system provided by Division 26 Contractor.
   9. Conduit, boxes, and or raceway components provided by Division 26 Contractor.

C. Communications routing to main server/controller is via TCP/IP over Owner's Ethernet-based network for door controllers to connect to server.

D. Work detailed within Contract Documents has been specified to meet certain requirements for performance, appearance and costs. Some information, such as exact locations of field equipment, exact wire routing, and exact conduit requirements have been intentionally omitted. It shall be responsibility of Contractor to implement guidelines and requirements contained in Contract Documents and translate into a complete design package containing all elements necessary for a complete, operational and functionally integrated Access Control System.

E. Provide all Work as detailed in Contract Documents as a turnkey installation including all material, labor, warranties, freight and permits. Only items and requirements specifically stated to be provided by owner shall not be a requirement for this Section of Work.

F. Work By Owner

1. Prior to work by Security Contractor and under separate contract, Owner shall provide:
    a. LAN active network components (switches, routers) as required for Security system communications.
    b. Inter-building pathway, cable, and passive and active network components to allow communications with Facilities.
    c. IP-address allotment and management for ACS devices as needed.
2. Owner shall be responsible for:
    a. List of cardholders for initial ACS programming by contractor
    b. Provide scheduling of door, including:
    c. Alarm activations and distribution.
    d. Door lock and unlock.
    e. Cardholder validation by day and time.
    f. Delay time of door open alarm.
    g. Duration of lock activation upon credential authorization.
    h. Required card credentials, complete with Owner-required graphics and text.
    i. Ongoing card programming and cardholder data base maintenance.
3. Owner shall furnish:
    a. Card Readers
        1) Standard Reader: HID: R40 Black: 40NKS-00-002LCM
        2) Mullion Mount: HID R15 Black: 20NKS-00-002LCM
        3) Biometric Readers: Various types compatible with system.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product include:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for card readers.

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. A drawing legend sheet describing all symbols used on drawings and containing a description of each device, complete with manufacturer name and model number.

2. Include plans, elevations, sections, and mounting details, including elevations of security hardware layouts showing panel locations, power supply locations, conduits, surface raceways, and all or equipment to be mounted at each location.

3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

4. Include diagrams for power, signal, and control wiring.

a. System riser diagram with all devices, wire runs and wire designations.

b. Schematic block diagrams for each system showing all equipment (typicals), interconnects, data flow, etc.

c. Wiring diagrams for each subsystem defining interconnection of all inputs and outputs for all equipment. Diagrams shall indicate exact equipment counts.

d. Wiring diagram for fail-safe release of electric locking mechanicals.

5. Fabrication shop drawings for all custom equipment (if applicable).

C. Samples: For each exposed product and for each color and texture specified, card readers in size.

D. Product Schedule: For doors security including each door to be provided with door security and require components at that opening. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.7 CLOSEOUT SUBMITTALS

A. All information required in Pre-fabrication Submittals but revised to reflect “as installed” conditions.

B. General Description and Requirements

1. Submit Record Documentation in accordance with Engineer’s construction schedule and as specified herein.

2. Record Documentation shall consist of As-built Drawings and Operation and Maintenance Manuals.
3. Provide a letter of transmittal with Record Documentation identifying name of Project, Contractor's name, date submitted for review, and a list of items transmitted.
4. Prior to final acceptance of Work, submit two draft sets of As-built Drawing's portion of Record Documentation to Engineer. Draft copy shall be used during final acceptance testing by Engineer.
5. Update all record documentation to reflect changes or modifications made during final acceptance testing as required.

C. As-built Drawings

1. Produce all As-built Drawings using the latest version of AutoCad.
2. Incorporate as-built device locations into Northwestern University's master AutoCad file.
3. During systems installation and at all times when Work is actively in progress, maintain up-to-date and accurate As-built Drawings. This set of drawings shall be kept current at all times, including any recent changes, and shall be kept neat and shall not be used for installation purposes.
4. As-built Drawings shall, at a minimum, include following:
    a. Floor plan drawings indicating device locations, with device legends indicating manufacturers and model numbers for each device.
    b. Floor plan drawings indicating wire routing. Wire routing shall be delineated in straight line runs and be tagged with cable identification and terminal strip numbers to coincide with installation.
    c. Mounting details for all equipment and hardware.
    d. Functional block diagrams for each subsystem.
    e. Wiring details showing rack elevations, equipment wiring and terminations, and inter-rack wiring.
    f. Wiring diagrams for all custom circuitries including interfaces to various control output-controlled devices, i.e. overhead doors, automatic sliding doors, fire alarm system interface, BMS interface, etc.
    g. Typical point to point wiring diagrams for each piece of equipment and groups of equipment within system.
    h. Layout details for each riser location, including security panels, power supplies, junction boxes, conduit and any other security related equipment.

D. Operation and Maintenance Manuals

1. Operation and Maintenance Manuals shall apply to all security related devices, equipment and software modules.
2. Operation and Maintenance Manuals shall be formatted as required in 017823 "Operation and Maintenance Data"
3. Operation and Maintenance Manuals shall include, at a minimum, the following:
    a. Operational description of each subsystem.

b. Explanations of subsystem interrelationships. Explanations shall include operations of each subsystem and operations unique to interfaces between each of subsystems and possible conflicts that may occur with interfaces. Each explanation shall be identified, tagged, bound and indexed into a single binder.

c. Electrical schematics for each piece of equipment specified.

d. Power-up and power-down procedures for each subsystem.

e. Description of all diagnostic procedures.

f. A menu tree for each subsystem. Tree shall provide a graphical flow of commands within menu system.

g. Setup procedures for each component of subsystems.

h. A list of manufacturers' local representatives and subcontractors that have performed Work on Project. List shall include contact names; phone numbers and addresses for each.

i. Installation and service manuals for each piece of equipment.

j. Maintenance schedules for all installed components. Schedules shall include inspections and preventative maintenance schedules, and documentation of all repaired or replaced equipment.

1.8 QUALITY ASSURANCE

A. General:

1. Cable and Equipment Manufacturer(s) shall be company specializing in ACS equipment, cable, accessories and/or equipment with minimum of 5 years documented experience in producing products similar to those specified herein.

B. Contractor Qualifications

1. Work specified herein shall be responsibility of a single electronic security systems integration Contractor.

2. Contractor/ or sub-contractor shall be a Millennium certified installer, and document a minimum of five years' experience in Millennium Access fabrication, assembly and installation of systems of similar complexity as specified herein.

a. Documentation shall include names, locations and points of contact for at least three installations of type and complexity specified herein.

b. Contractor shall indicate type of each referenced system and certify that each system has performed satisfactorily in manner intended for a period of not less than 24 months.

3. Contractor shall have local in-house engineering and project management capabilities consistent with requirements of Work.

4. Contractor shall provide a team managed by a full-time project manager who is to be present on site at all times that Work is actively in progress.

5. Team and project manager shall stay the same throughout course of Project unless approved by Owner.

a. Project manager shall be person responsible for preparation of Operation and Maintenance Manuals, training programs and schedules and test protocols, documentation of system testing, maintenance of Record Documentation and coordination and scheduling of all subcontract labor (as applicable and as approved in advance by Engineer).

b. Engineer reserves right to approve Contractor's project manager.

6. By submitting a Bid, Contractor hereby certifies that it is qualified in all areas pertaining to, either directly or indirectly, Work.

7. In event Contractor becomes unable to complete Work in accordance with Contract Documents, or satisfaction of Owner or its representatives, due to a lack of understanding of equipment, systems or services required by Contract Documents, it shall be responsibility of Contractor to retain services of applicable manufacturers' representatives to complete Work in accordance with Engineer's construction schedule with no additional cost to Owner.

8. Contractor shall maintain, or establish and maintain, a fully staffed local office including a service center capable of providing comprehensive service to Access Control System.

a. Contractor shall provide factory-certified technicians and adequately equip its office to provide emergency service within 24 hours after being called, whether or not Owner elects to purchase a maintenance contract from Contractor.

9. Contractor shall provide factory-certified technicians with latest and most advanced training on each system.

a. Certified employees shall supervise installation of, commission, and maintain Work.

10. All installing personnel shall also be licensed as required by local and / or state jurisdictions. Contractor shall provide all licensing documentation as part of Bid.

11. Contractor shall ensure compliance with, and have a thorough understanding of, all local codes and contract conditions pertaining to this Project.

12. Contractor shall maintain an inventory of spare parts and or items critical to system operation and as necessary to meet emergency service requirements of Project within local service center. Spare parts shall include at a minimum:

a. Access Control

1) Door Controller Devices

2) I/O modules

3) Door position switches

4) Request-to-exit devices

5) Power supplies

C. General Arrangement of Contract Drawings:

1. The contract drawings attendant to this specification, indicate approximate locations of equipment and are conceptual and schematic in nature. The installation and locations of equipment and devices shall be governed by the intent of the design and of the security systems concepts presented by these specifications and contract

drawings, with due regard to actual site conditions; coordination with the work of other trades; manufacturers' recommendations; ambient factors affecting the equipment; and operations in the vicinity. The Contract Drawings are diagrammatic and conceptual and do not show all components, materials, offsets, bends, elbows, and other specific elements, which may be required for proper installation.

D. Contractor shall verify dimensions at site and be responsible for accuracy.

E. Conflicts:

1. Should there be conflicts between these specifications and their attendant drawings, between any other project specifications and drawings, between specifications or drawings and standards and codes, or any other pertinent conflicts related to the Security Contractor's work, such conflict shall be brought to the attention of the Architect at the Security Contractor's earliest opportunity. All Work associated with these conflicts shall be delayed until the Architect can provide comment and approval.

F. Mockups: Build mockups to demonstrate aesthetic effects to set quality standards for materials and execution.

1. Build mockup of typical opening as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site.

1.9 CONFIDENTIALITY REQUIREMENT

A. Work is critical to security of Northwestern University. All plans, specifications and or documentary material and information about Work are confidential information and must remain secure and confidential at all times. Confidential information must not be deliberately or inadvertently disclosed to anyone or than Contractor’s personnel and subcontractors who require disclosure to perform their portion of Work.

B. Contractor shall keep track of all confidential information at all times and shall ensure that all copies are accounted for at all times. Contractor shall not permit any persons to have access to confidential information of Work unless directly authorized by the appropriate University personnel.

1.10 WARRANTY

A. Contractor shall guarantee all materials, equipment, etc., one (1) year from date of substantial completion of this work. This guarantee shall include all labor, material and travel time.

B. Contractor/Integrator and/or manufacturer of each subsystem must also offer telephone-based Technical Support Capabilities (Live Operator) available 24- hours/7-days per week (“24/7”), and 24-hour turn-around (from receipt of item) for Repair or Replacement of failed components

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Millennium Group, Inc. No substitutions are allowed.

2.2 ACCESS CONTROL SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. System Description:

1. The Contractor shall be responsible for providing a complete and operational extension of the existing Access Control System, including all computer hardware, software, network equipment, wire, cable, terminal blocks, labor, management, engineering, training, testing and connection to not in contract work.

2. The Access Control System shall be capable of full interface and communication with the Owner's system. The Contractor shall provide all security system equipment required for extension of the local access control system. The system shall be able to allow or deny access on a local global authorization level.

2.3 COMPONENTS

A. Card and Biometric Readers: Install card and biometric readers as provided by Owner.

B. Power Supplies:

1. Life Safety Power and 12/24 vdc 7Ah battery: J7-250NLXEM4, or approved Life Safety Power cabinet configuration as required by size of installation.

2. Life Safety Power Managed Control Modules: M8P as need based on door load for supplies installed. Utilize on control board and lock power

3. Life Safety Power Battery Enclosure: E4-3BS1

4. Tripplite UPS: SU1500RTXL2UA

C. Access Controllers
   1. Millennium Enhanced Site Control Unit (ESCU): 149-101992
   2. Millennium Enhanced Door Control Device (EDCD): 149-101966.
   3. Millennium Elevator Control Unit (EC3): EC3-101200
   4. Millennium Elevator Control Device (ECD3): 149-101790

D. Door Position Switches
   1. Provide normally closed concealed door position switches, surface mount magnetic door position switches, and magnetic overhead door position switches to monitor open / closed status of doors as indicated on drawings.
   2. Contractor shall provide wire, and terminate door position switches. Coordinate concealed door position switch installation, wiring, termination, and locations with door and frame supplier.

E. Concealed Door Position Switch
   1. Minimum Specifications
      a. Gap: 3/8” between magnet and switch
      b. Configuration: Normally closed
      c. Mounting: Concealed within door and frame
   2. Acceptable Manufacturers: GE or approved equivalent.

F. Surface-Mount Overhead Door Position Switch
   1. Minimum Specifications
      a. Gap: 3” between magnet and switch
      b. Configuration: Normally closed
      c. Construction: Heavy Duty
      d. Mounting: Floor
   2. Provide armored cable from switch location to associated junction box in order to protect wire.
   3. Acceptable Manufacturers: GE or approved equivalent.

G. Request to Exit Motion Sensors
   1. Acceptable Manufacturers: GE or approved equivalent.
   2. Provide door header and ceiling mounted request to exit motion sensors with normally open alarm output contacts as indicated on the Drawings.
   3. Integrated Request-to-Exit (REX) devices provided by Division 8
   4. Door Header Mounted Request to Exit Motion Sensors (where applicable)
      a. Provide door header mounted request to exit motion sensors as indicated on the Drawings.
      b. Minimum Specifications

1) Detection technology: Passive infrared
2) Detection pattern: Narrow beam 35-degree cone
3) Output contact: Normally open contact is closed when sensing zone is entered or exited
4) Power requirements: 12-24 VDC
5) Mounting: Door header

c. Provide the manufacturer recommended power supply. The power supply shall be UL Class 2, power limited.

5. Ceiling Mounted Request to Exit Motion Sensors (where applicable)

a. Provide ceiling mounted request to exit motion sensors as indicated on the Drawings.

b. Minimum Specifications

1) Detection technology: Passive infrared
2) Detection pattern: Narrow beam 35-degree cone
3) Output contact: Normally open contact is closed when sensing zone is entered or exited.
4) Power requirements: 12-24 VDC
5) Mounting: Ceiling

c. Provide the manufacturer recommended power supply. The power supply shall be UL Class 2, power limited.

d. Acceptable Manufacturers: Detection Systems, Inc. DS150i series (No Exceptions).

H. Tamper Switches

1. Provide normally closed tamper switches to monitor secure status of all DCD and power supply equipment enclosures.
2. Acceptable Manufacturers: Ademco, GE or approved equivalent.
3. Include number of tamper switches in total alarm input figures.
4. Minimum Specifications:

a. Style: Plunger
b. Configuration: Normally closed when cabinet door is closed
c. Mounting: Fastened within cabinet with no access to fasteners when cabinet is closed

I. Electric Locking Mechanisms to be provided by Division 8.

J. Push-Button Switches

a. Provide industrial grade momentary or alternate contact, back lighted push buttons with stainless-steel switch enclosures. 12/24 VDC bi- color illumination suitable for either flush or surface mounting. Push-button switches shall be provided and sized for the mounting location.

1. Acceptable Manufacturers

a. Security Door Controls (SD) – 400 Series

b. Securitron Door Controls (SU) – PB Series

K. Fire/Access Power Management System:

1. Life Safety Power J7-250NLXEM4

L. Wire and Cable

1. In all cases, wire conductors and all cables utilized for the connection of the various components as specified herein, including those components provided by others, shall comply with or exceed the recommendations of the component manufacturers.

2. It shall be the Contractor's responsibility to perform all engineering calculations required to ensure that the proper cable sizes are provided, such that the specified equipment will perform as shown in the manufacturer's specifications. All engineering calculations shall be provided with the prefabrication submittals. It shall be the Security Contractors responsibility to obtain and verify the power requirement of NIC electrified hardware before carrying out any engineering calculations.

3. All wire and cable provided by the Contractor shall comply with all applicable codes and ordinances.

4. Wire and cable shall be Belden Corporation, Alpha, West Penn or equivalent.

5. Provide the following #12 THHN stranded unless different criteria is required:

a. Red- 12vdc Positive

b. Black- 12vdc Negative

c. Purple- 24vdc Positive

d. Grey- 24vdc Negative

e. Pink- 24vdc Positive Fire Alarm Switched

f. White/Red stripe- 12vdc Positive for Bio-metric readers

g. White/Black stripe- 12vdc Negative for Bio-metric readers

6. Millennium communication: (Different colored jackets required for multiple sites)

a. 1) Belden 8723

b. 2) WCW 4155105

c. 3) Equivalent to be approved by NU Lock Shop

7. Reader cable

a. Belden 8456 (#22/10 conductor for up to 300`)

b. WCW 425700 (#22/12 conductor for up to 300`)

c. Equivalent to be approved by NU Lock Shop

8. Locking Hardware Cabling

a. WCW 425400 (#22/6 conductor for up to 300`) Standard Locking Hardware

b. WCW 425700 (#22/12 conductor for up to 300`) Delayed Egress Locking Hardware

c. Equivalent to be approved by NU Lock Shop

9. Cable Interconnection System: Molex Inc. No substitutions (Male plug attached to device, Female plug attach to cabling)
   a. 4 pin plug system-#43020-0401/#43025-0400 (as per device)
   b. 6 pin plug system-#43020-0601/#43025-0600 (to be used on readers)
   c. 8 pin plug system-#43020-0801/#43025-0800 (as per device)
   d. Male pins-#43031-0007
   e. Female pins-#43030-0007

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Specific mounting locations, exact wire and cable runs, and conduit routing may not have been specified or delineated on Drawings. Coordinate all aspects of Work with the Architect.

3.2 INSTALLATION

A. General:
   1. Installation shall include the delivery, storage, setting in place, fastening to the building structure, interconnection of the system components, alignment, adjustment and all other work whether or not expressly described herein, which is necessary to produce tested and operational systems, as defined in Part 2 - Products.
   2. Installation shall be in accordance with the manufacturer's specifications unless specifically directed otherwise in this specification.
   3. In the installation of equipment and cables, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
   4. Equipment fastenings and supports shall be adequate to support their loads with a safety factory of at least three.
   5. The Contractor prior to the initiation of any related work shall promptly bring conflicts between the manufacturer's instructions and the specification to the attention of the Architect.
   6. Maintain minimum three feet of access in front of all DCD enclosures and power supplies.

B. Pre-installation Coordination
   1. Coordinate with Electrical Contractor that adequate conduit is provided and that equipment back boxes are adequate for system installation.

2. Coordinate with Electrical Contractor that adequate power has been provided and properly located for Security System equipment.
3. Coordinate with Door and Door Hardware supplier that doors and door frames are properly prepared for electric locking hardware and door position switches, and locations of all devices prior to installation
4. At a minimum, coordinate following with Owner:
    a. Locations of all LAN-connected devices and bandwidth requirements.
    b. LAN cable requirements at each device.
    c. VLAN/other network partitioning for ACS system.
    d. Owner-provided IP addresses for ACS devices.
    e. Network infrastructure requirements at ACS head-end.

C. Cable and Wire Installation:
1. All field wiring required for interconnection of the various security system components shall be installed in a conduit raceway, which is provided by others. Refer to the security conduit and electrical drawings for sizes, routing and terminations.
2. All cabling shall be U.L. listed for its intended application and shall meet or exceed the standards as recommended by the manufacturers of the components being interconnected. All cables used shall be 100% shielded unless manufacturer's recommendations dictate otherwise.
3. All conductors shall be run continuously between sensors, processors, junction boxes, terminal strips or panels, and other approved devices. Splices between such locations are not to be permitted. Necessary junctions shall be made using screw-type terminal blocks, or in accordance with manufacturer's requirements for equipment connections.
4. All conductors shall be color coded and tagged consistently. Marking shall be an approved permanent type utilizing an approved method.
5. All Electric door hardware and readers to be pinned and plugged on Molex system

D. Labeled Doors and Frames:
1. In no instance shall any UL labeled door or frame be drilled, cut, penetrated or modified in any way.
2. The Contractor shall be responsible for replacing any labeled door or frame that is modified without prior written approval from the Architect.
3. The Contractor shall pay special attention to the installation of security devices in doors and frames and coordinate this work where required.

E. ACS / Fire Alarm System
1. Interface ACS with fire alarm system to provide the following:
    a. Auxiliary monitoring of normally closed general fire alarm contacts from ACS file server / workstations.
    b. Auxiliary monitoring of normally closed system trouble alarm contacts from ACS file server / workstations.

c. Automatic release of fail-safe locking devices during a building fire alarm condition.

F. Equipment

1. Install Owner provided card and biometric readers.
2. Power Supplies must not exceed 80% draw.
3. Millennium board count must always match reader count, except for ADA or delayed egress operation.
4. Provide and install Door Control Device (DCD) equipment as indicated on Drawings and specified herein. Additional specific installation requirements are as follows:
   a. Provide as shown on Drawings.
   b. Configure security equipment as indicated in Drawings.
   c. Enclose wire and cable in raceways or bundle with wire exiting raceways to terminal strips or panel mounted devices.
   d. Space controllers according to manufacturer's requirements with 3" minimum between controllers and other devices on panel and 6" between controller front and door mounted devices. Ensure adequate space is allowed for device heat dissipation.
   e. Do not place controller or control devices on enclosure sides.
5. Provide and install Site Control Units (SCU) as shown on Drawings.
   a. Wire as required by manufacturer.
   b. Space controllers according to manufacturer's requirements with 3" minimum between controllers and other devices. Ensure adequate space is allowed for device heat dissipation.
6. Provide Elevator Control Units (ECU) as required in elevator control rooms. Coordinate installation with elevator contractor.
   a. Wire as required by manufacturer.
   b. Elevator master control connections to ECU by elevator contractor.
7. Elevator Control Device (ECD)
   a. Provide ECDs as shown on Drawings.
   b. Wire as required by manufacturer.
8. Card Readers
   a. Install card readers as shown on Drawings.
   b. Wire card reader LEDs to indicate valid and invalid card reads, and door locked and unlocked conditions. All card reader LED indicators shall operate identically throughout Project. LED shall be Magenta in secured state and shall be green on valid card read and while door is unlocked or elevator floor is enabled.
9. Electric Locking mechanisms
   a. Interface with electric locking as indicated on Security Drawings.

b. Provide lock control of electrified locking mechanisms through output contacts activated by DCD. Follow manufacturer's instructions, especially for suppression components.

10. Electrified Panic Devices
    a. Interface with electrified panic devices as indicated on Security Drawings. Provide all ACS wire and connections between ACS, power transfer device and electric locking mechanisms.
    b. Provide lock control of electrified panic devices through output contacts activated by DCD Follow manufacturer's instructions, especially for suppression components.
11. Door Position Switches
    a. Provide door position switches as shown on drawings.
    b. Coordinate with Electrical Contractor and Division 8 for pathway requirements.
12. Request to Exit Devices
    a. Provide request to exist devices as shown on drawings.
    b. Coordinate with Electrical Contractor and Division 8 for pathway requirements.

G. Furnish and install all ACS wire and cable with exception of building LAN/WAN cabling.

H. Provide and install code-compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where penetrations are made by or used for installation of ACS.

I. Provide and install power supplies as required by manufacturer to provide a complete functioning system.

J. Cable Installation
1. Utilize dedicated conduit to route Access Control cables from each door or device to Door Control Device. Refer to drawings. Refer to specification 260533 "Raceway and Boxes for Electrical Systems" for conduit color and other requirements.
2. Run all wire and cable continuous from device location to final point of termination. No mid-run cable splices shall be allowed.
3. Wire and cable within IDCs, power distribution cabinets and or security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to equipment within enclosure. Wire and cable shall be bundled and tied. Ties shall be similar to T&B TyRap cable ties.
4. Coordinate routing of wire and cable requiring isolation from power, radio frequency (RF), electromagnetic interference (EMI), telephone, etc. with Engineer.
5. Use of electrical tape for splices and connections shall not be acceptable.
6. Visually inspect all wire and cable for faulty insulation prior to installation.
7. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on Wire and Cable.
8. Make connections with solderless plugs or similar devices, mechanically and electrically secured in accordance with manufacturers' recommendations. Wire nuts shall not be an acceptable means of connecting wire and cable.

9. System cabling shall not loop back to the Site Controller Unit.

K. EDIT TO COORDINATE WITH PROJECT REQUIREMENTS. **[120 VAC power dedicated to security and on the generator backup will be provided by Division 26 Contractor for ACS System as indicated on the Drawings.] [Backup Millenium equipment on batteries and/or UPS].**

L. Connect to AC power and provide UL listed power supplies and transformers to distribute low voltage power to system components as required.

M. Labeling
1. Label all controls as necessary to agree with their function.
2. Mark all Wire and Cable in common at both ends using a permanent method such as self- laminating cable marking tape.
a. Tags shall be attached to wire and cable nylon cable ties in an accessible location so that they can easily be read.
b. Tags shall be installed when wire and cables are installed.
c. Labeling shall agree with Record Documentation.
d. Place wire identification numbers at each end of conductor involved by using sleeve type, heat shrinkable markers. Markers shall be installed so as to be readable from left to right or top to bottom.
e. Mark all connectors with common designations for mating connectors. Connector designations shall be indicated on record drawings.

N. Coil all spare conductors in device back box, panel raceway, or top of panel where raceway is not provided. Conductors shall be neatly bundled and tagged.

O. Fire Alarm Interface
1. Connect (hard wire) fail-safe electric and time delay locking mechanics to building fire alarm system for fail-safe release upon any fire alarm.
2. Interface with a single low voltage / low current normally closed dry contact from fire alarm system provided by fire alarm Contractor (verify exact locations). Contact shall open on any fire alarm condition.
3. Provide all additional UL listed fail-safe relays and power supplies necessary to interface to this contact and unlock all fail-safe doors.
4. Connect fail-safe relays and power supplies to standard building power. Connection of fail-safe devices to emergency or UPS power shall not be acceptable.

3.3 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by manufacturer's authorized service representative. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacture's authorized replacement parts and supplies.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units. May be waived by Northwestern Lock Shop.

3.5 SYSTEM ACCEPTANCE

A. Final acceptance testing of Work will be conducted.

B. Prior to any final acceptance testing, Contractor shall submit two sets of preliminary (draft) Record Drawings to Engineer. Preliminary Record Drawings are to be used by Engineer to conduct system final test.

C. Submit a paragraph-by-paragraph completion matrix indicating completion or delinquency for each item included in Specification and all subsequent addenda and bulletins as part of Work. Indicate completion of requirement by word “Completed” following each paragraph number. Indicate delinquency for requirement by words “To Be Completed” following applicable paragraph number. Should work on any item be under way, but not yet fully complete, indicate extent (or lack thereof) of completion to date, and proposed date of completion.

D. Deliver a report describing results of functional tests, burn-in tests, diagnostics, calibrations, corrections, and repairs including written certification to Engineer that installed complete Security System has been calibrated, tested, and is fully functional as specified herein.

E. Upon written notification from Contractor that Security System is completely installed, integrated and operational, and testing is completed, Engineer will conduct a final acceptance test of entire system.

F. During the course of final acceptance test by Engineer, Contractor shall be responsible for demonstrating that without exception, completed and integrated system complies with contract requirements.
    1. All physical and functional requirements of project shall be demonstrated and shown.
        a. Demonstration will begin by comparing “as built” conditions of Security System to requirements outlined in Specification, item by item.
    2. Functionality of various interfaces between systems will be tested.
    3. Installation of all field devices will be inspected by Engineer. This field inspection will weigh heavily on general neatness and quality of installations, complete functionality of each individual device, and mounting, back box and conduit requirements compliance.
    4. All equipment shall be on and fully operational during any and all testing procedures.
        a. Provide all personnel, equipment, and supplies necessary to perform all site testing.
        b. Supply at least two two-way radios for use during test

c. Upon successful completion of final acceptance test (or subsequent punch list retest) Engineer will issue a letter of final acceptance.

5. Engineer retains right to suspend and / or terminate testing at any time when system fails to perform as specified. In event that it becomes necessary to suspend test, all of Owner's / Engineer's fees and expenses related to suspended test will be deducted from Contractor's retainer. Furthermore, in event it becomes necessary to suspend test, Contractor shall work diligently to complete / repair all outstanding items to condition specified in Specification and as indicated on Drawings. Contractor shall supply Engineer with a detailed completion schedule outlining phase by phase completion dates and a tentative date for a subsequent punch list retest. During final acceptance test, no adjustments, repairs or modifications to system will be conducted without permission of Engineer.

END OF SECTION 281300

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