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**BuildingName**
**The Description of the Project**
**P00000000 0000**

**SPECIFICATION DIVISION 28**

NUMBER SECTION DESCRIPTION

**DIVISION 28 ELECTRONIC SAFETY AND SECURITY**
SECTION 281600 - SECURITY SYSTEMS

**END OF CONTENTS TABLE**

**DIVISION 28 ELECTRONIC SAFETY AND SECURITY**
**SECTION 281600 - SECURITY SYSTEMS**

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

*INCLUDE PARAGRAPH 1.1.A AND B IN EVERY SPECIFICATION SECTION. EDIT RELATED SECTIONS 1.1.B TO MAKE IT PROJECT SPECIFIC.*

A. Drawings and general provisions of the Contract, Standard General and Supplementary General Conditions, Division 1 Specification Sections, and other applicable Specification Sections including the Related Sections listed below, apply to this Section.

*IN 1 AND 2 BELOW, DELETE SUSTAINABLE DESIGN IF NOT APPLICABLE TO THE PROJECT. SELECT PROPER COMMISSIONING SPEC SECTION NUMBER APPLICABLE TO THE PROJECT.*

B. Related Sections:

1. Section 018113 - Sustainable Design Requirements
2. Section 019100/019110 - Commissioning
3. Section 017823 - Operation and Maintenance Manual
4. Section 260513 - Medium, Low & Control Voltage Cables
5. Section 260526 - Grounding and Bonding for Electrical
6. Section 260533 - Electrical Materials and Methods
7. Section 260800 - Electrical Acceptance Tests

### 1.2 SUMMARY

A. This Specification contains a combination of prescriptive and performance requirements. The Contractor is responsible for fully implementing the functions described in the Specifications and shown on the Drawings. This will require the Contractor to perform substantial work selecting system components, integrating system functions, and integrating new components with the existing campus wide security system and with equipment provided and installed by other Sections.

B. Security Contractor shall provide all materials, equipment, fabrication, installation and tests in compliance with applicable Codes and Authorities Having Jurisdiction.

C. Provide all necessary components of an Access Control and Monitoring System (ACMS) as described in the Specifications and as indicated on the Drawings.

D. Provide a complete system which is defined as all labor and materials required to complete the Work described herein and as indicated on the Drawings. Security Contractor shall provide all hardware, and programming for installation, connection and operation of the new equipment required to provide a fully functional system that integrates with the existing Campus Wide Security System.

E. Products, equipment, materials, systems, assemblies, and accessories as specified herein define the minimum standards. Documents do not undertake to show or list every item to be provided. Items not shown or listed but are clearly necessary for proper installation, operation and functioning of the equipment and systems shall be provided, installed, tested and certified at no additional cost to the owner.

F. Provide installation, testing, adjustment, configuration and initial programming for all equipment and systems.

G. Provide training to the Owner’s Representatives in the overall system layout, operation, and programming. Training will consist of review of on-site review of O&M manuals and record drawings.

H. Provide any interface relays, materials, enclosures, cabling, programming and testing required to interface Access Control

I. Provide any interface relays, materials, enclosures, cabling, programming and testing that may be required to interface with the Fire Alarm Control Panel (FACP).

## 1.3 RELATED SECTIONS

A. The drawings and the general provisions of the contract, including the current edition of the University of Michigan Standard General Conditions, apply to this section.

B. The applicable requirements of the Division 01

C. Applicable Division 28 specification sections as follows:

1. Section 260500: "Basic Electrical Requirements"
2. Section 260533: "Basic Electrical Materials and Methods"
3. Section 260513: "Cables and Wiring"
4. Section 262726: "Wiring Devices"
5. Section 262000: "Service and Secondary Distribution"
6. Section 260526: "Grounding"
7. Section 281300: "Access Control and Monitoring Systems"
8. Section 260800: "Electrical Acceptance Tests"

## 1.4 SECURITY CONTRACTOR REQUIREMENTS

A. The Security Contractor shall be responsible for coordinating the installation of all building electronic security devices specified in referenced Sections. Security Contractor shall meet the following minimum qualifications:

1. Possess all applicable Contractors' licenses.
2. Provide supervision by a person who has successfully installed similar systems by the same equipment manufacturers at three locations.

B. Perform all work in accordance with acknowledged industry and professional standards and practices, existing building conditions, and as specified herein.

C. Maintain a competent supervisor and supporting technical personnel, acceptable to the Owner, during the entire installation. A personnel change of the supervisor during the Project shall not be acceptable without prior written approval from the Owner's Representative.

D. Provide all required cables, cable support materials, conduit, backboxes, connectors, mounting hardware and trim materials for a completely functional/operational system.

E. Provide 120VAC power, conduit, and wiring per Division 26 requirements from existing power panels as directed by Owner.

F. Coordinate with the Owner’s Representatives regarding connection of the new system components to the Owner's Campus Security System via the Owner’s LAN and WAN networks. IP addresses and or DHCP naming conventions will be provided by Owner.

## 1.5 REFERENCES

A. Published specifications, standards, tests, codes, or recommended standards of trade, industry, or governmental organizations apply to work in these Sections, including:

1. ADA - Americans with Disabilities Act
2. ASCII - American Standard Code for Information Interchange
3. ASTM - American Society for Testing and Materials
4. EIA - Electronic Industry Association
5. IBC – International Building Code
6. NEMA - National Electrical Manufacturers’ Association
7. NFPA - National Fire Protection Association with University of Michigan amendments
8. NEC - National Electrical Code
9. UL - Underwriters Laboratories, Inc.
10. UL 294 - Access Control Systems,
11. UL 1076 - Proprietary Burglar Alarm Systems,
12. UL 1037 - Anti Theft Alarms and Devices

B. Electronic devices radiating “RF” energy shall comply with Federal Communication Commission regulations, particularly Part 15, and shall meet minimum Class “B”. Provide FCC certificate numbers indicating that products have been approved by the FCC.

## 1.6 QUALITY ASSURANCE

A. Where applicable, all equipment supplied by the Contractor shall be UL listed or listed by some other nationally recognized testing laboratory approved by the Owner.

B. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture.

C. All items of a given type shall be the products of the same manufacturer.

D. All items shall be of the latest technology; no discontinued models or products are acceptable.

E. No ‘beta’ products will be accepted.

F. Security Contractor shall be capable of performing service or maintenance work on the specified systems. Security Contractor's lead technician shall be factory-certified by the security system(s) manufacturer(s).

G. Security Contractor must be a SoftwareHouse authorized reseller. Security Contractor shall have installed the system bid for this project in at least two projects of similar size and scope.

H. The Security Contractor shall maintain a local office staffed with factory trained technicians and adequately equipped to provide preventative and emergency service.

I. Security Contractor shall possess all required licenses and permits.

J. The Manufacturer, or their Authorized Representative, shall confirm that within 100 miles of the Project site there is an established agency which: Stocks a full complement of parts. Offers service during normal working hours as well as (24 hour/7 days a week) emergency service on all equipment to be furnished. Will supply parts and service without delay and at reasonable cost.

K. In the event of a discrepancy between the Specifications and the Drawings, whichever is more stringent or calls for the highest quantity or quality of materials has precedence. Specifications and Drawings are complementary and what is required by one is as binding as if required by all.

## 1.7 SUBMITTALS

A. Submittals shall be provided for review and acceptance by the Owner's Representative prior to commencement of the work.

B. All security system submittals shall be complete and in a similar format for ease of review. The Owner reserves the right to reject any submittals determined to be incomplete.

C. The Security Contractor should not consider the Owner's review of submittals to be exhaustive or complete in every detail. Approval of submittals, including substitutions, indicates only the acceptance of intent to comply with the general design or method of construction and quality as specified. The functional requirements, operations, arrangements, and quantities must comply with the Contract Documents unless changes are specifically approved in writing. Submittal approval does not relieve the Security Contractor of responsibility for errors or omissions in dimensions, details, and sizes or for coordinating items with actual building conditions.

D. Work provided without approved submittals is done at the Security Contractor's risk and may be changed at no cost to the Owner.

E. Equipment Submittals shall include:

1. Bill of Material for all new equipment.
2. Manufacturer's name, brand name, and catalog number with UL listing identified.

3. Written approval from each manufacturer affirming that Security Contractor is certified and approved for systems installation and service for all systems in this Section.
4. Service information, including address of nearest representative
5. Note: When a cut sheet is supplied that shows multiple items, clearly identify the specified parts being used including any optional items.

F. Installation Submittals shall include:

1. To scale drawings in AutoCAD DWG format.
2. Elevation and mounting details showing all modules and components.
3. Point-to-point, and termination drawings for all work showing all devices and each conductor identified. “Typical” drawings will not be accepted.
4. Battery calculations for all batteries.
5. Voltage-drop calculations are required for all lock circuits.

G. Programming Submittals shall include

1. Device names and descriptions,
2. Complete written sequence of operations for all functions of the system.

## 1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Replace, at no expense to Owner, equipment and material damaged during storage and installation as directed by the Owner’s representative.

B. Products delivered to the job site shall be protected from water, dust, dirt, and foreign matter. All equipment shall be protected from water, dents, bumps, and scratching.

## 1.9 WARRANTY

A. Security Contractor and manufacturer guarantee installation, equipment, and all parts and labor for one year from written notification of acceptance. Security Contactor is required to submit a Service Level Agreement for the performance of warranty work, including response time, exceptions to warranty coverage, and the process to initiate warranty service call(s).

B. All warranty and service work shall be performed by personnel who have been trained and certified by equipment manufacturers and are experienced in the operation and maintenance of the installed systems.

C. The following Service Level Agreement identifies the expectations to be included in project.

1. Service Hours: Normal hours for service are Monday through Friday, 8:00 a.m. to 5:00 p.m., excluding recognized national holidays. Service calls commencing within these time frames, through to completion of the service call, will not be considered after-hours calls and will not be subject to premium rates.

2. Response Time – Normal Service: Service requests will be transmitted to the Security Contractor both by phone and e-mail. Service requests will be tagged as either Normal or Emergency. Normal requests for service transmitted to the Security Contractor prior to 10:00 a.m. Monday through Friday will be responded to by an on-site technician the same business day. Normal requests transmitted to the vendor after 10:00 a.m. will be responded to by an on-site technician by 12:00 p.m. the following business day.
3. Response Time – Emergency Service: Emergency service requests will be responded to by an on-site technician within 4 hours, regardless of the time of day transmitted or the day of week. Emergency service calls will be reimbursed to the Security Contractor at an additional fifty percent (50%) of his standard service rate.
4. Service Expectation: The Owner expects the Security Contractor to respond with a technician suitably trained and equipped to return the system to complete operation during the duration of the service call. Dispatching additional personnel, delivery of additional parts or return calls to correct the originally identified problem will not expose the Owner to additional charges. The service team will not leave the Owner's site without either returning the system to full operation or providing a documented acceptable explanation as to why the call cannot be completed. Technicians remaining on-site to complete calls after 5:00 p.m. will not expose the Owner to premium time charges.
5. Warranty service shall include the replacement of all parts and or components as required to restore normal system operation. In the event that system parts or components must be removed for repair the Security Contractor shall furnish and install temporary parts and or components as required to keep the system fully operational.

D. Owner's Responsibilities: Owner will allow unhindered access for the service technicians to areas where they will perform their work, and will promptly provide escorts if technicians need to work in areas where an Owner escort is required. Owner will provide power and telephone access for the technician to operate test equipment and power tools, and to allow the technician to communicate with their office or equipment manufacturers.

E. The Owner reserves the right to expand or add to the system during the warranty period using firm(s) other than the Security Contractor for such expansion without affecting the Security Contractor's responsibilities, provided that the expansion is done by a firm which is an authorized dealer or agent for the equipment or system being expanded.

F. Provide written notice to the Owner documenting any work performed during the warranty period.

## PART 2 - PRODUCTS

### 2.1 SECURITY SYSTEMS PRODUCTS

A. Refer to individual security system Sections for product details.

## PART 3 - EXECUTION

### 3.1 REQUIREMENTS

A. Coordinate all work including schedule and integration of work with other trades.

B. Coordinate work with Owner’s Representatives for all network connections.

C. All systems shall be complete and operational in all respects.

D. Provide installation of all wiring, raceway, conduit, and approved wireways for Division 28 work. Provide connection of power to security systems as required.

E. Wiring in wet or damp locations, including all underground conduits, shall be rated for wet applications.

F. Security Contractor shall consult manufacturer’s recommendations for cabling and conduit and use whichever is greater in size, quality, quantity, gauge, shielding and number of conductors at no additional cost to the Owner. All cables will be provided by the Security Contractor.

G. All security equipment in public areas shall be installed utilizing tamper proof mounting hardware. Provide a minimum of 2 driver bits or hand tools for each type of security fastener to the Owner. The standard type of security screw shall be a star configuration with a security center piece.

H. Cables are to be protected from excessive tension, abrasion, or damaging bends or kinks during installation. Care shall be taken not to bend, crush or kink cables.

I. Cables shall be combed straight and formed in a neat and orderly manner. Tie wraps are to be used for cable management, not support. Use tie wraps of the appropriate size and type. Do not over-tighten tie wraps.

J. Provide service loops at each termination point so devices can be dismounted for service and inspection.

K. Provide bracing for all equipment, including equipment racks and consoles.

L. Refer to individual security system Sections for additional installation requirements.

### 3.2 RECORD DOCUMENTS

A. As Built Drawings

1. Maintain a complete set of prints of Contract Drawings of the work forming a part of the security systems. As work is installed, carefully draw on prints, in colored pencil, actual location of work including depth of underground runs, if any, with dimensions from permanent structures. Wiring diagrams and details shall be included.

2. Upon completion of the Project, transfer this information to reproducible Drawings and updated CAD (AutoCAD DWG files) disks, and submit to the Owner, along with hand marked field record set.
3. The Security Contractor shall provide three bound sets of drawings and two CDROMs with all AutoCAD drawing files and corresponding PDF files.
4. Record Drawings shall include:
    a. Complete wiring diagrams for all components, including cable types and quantities, routings, floor plans indicating device locations, room numbers, conduit sizes.
    b. Complete elevation, mounting, and point-to-point and termination drawings for all devices. “Typical” drawings will not be accepted.
    c. A Master Legend/Spreadsheet on the drawings that identifies all devices, device location on the drawings, wire label verbiage, panel termination points and detail numbers. Each spreadsheet will be specific to the control panel. The legend/spreadsheet will also be place in each control panel for service support and termination assistance. For work in existing panels, provide information noted above for all additions and modifications.
    d. A complete written sequence of operations for all functions as installed and programmed for each system.
    e. A complete list of all equipment installed organized by building.

B. Operations and Maintenance Manuals

1. Provide operations and maintenance manuals Division 01 requirements and as follows
2. Operations:
    a. The operations section shall contain complete guidance and procedures for operation of the system and each subsystem including all required actions at each operator position, step by step instructions for system start-up and execution of all system functions and commands.
    b. Operation section shall include the following information:
        1) Detailed descriptions including step by step procedures for initialization, recovery and re start for each system.
        2) Complete operational descriptions for each system including all functions and features.
        3) Detailed descriptions for all programming and data base entry functions including step by step procedures, screen illustrations and flow charts.
        4) Copies of manufacturer operation manuals and instructions.
3. Maintenance
    a. The maintenance section shall contain complete guidance and procedures for routine maintenance of the system and each subsystem including manufacturer recommendations for preventative maintenance.

b. Maintenance section shall include the following information:
   1) The names, addresses and contact information for each manufacturer, local manufacturer representative and all subcontractors that performed work or furnished material for the project.
   2) Detailed descriptions of all user performed maintenance on all system components including inspection, periodic preventative maintenance, fault diagnosis and replacement of all modules.
   3) A summary of all TCP/IP addresses used and which system component they are associated with.
   4) Manufacturer data specification sheets for each piece of equipment, device and system.
   5) Manufacturer service and installation manuals for each piece of equipment, device and system.
   6) Manufacturer warranty certificates.
   7) Reduced copy of as built drawings.

**3.3 COMMISSIONING/ACCEPTANCE TESTING**

A. Perform Commissioning activities per Related Sections above.

B. There are two distinct types of tests for which the Security Contractor is responsible:

1. The first type is the Pre-Functional Performance Test. These tests ensure that all equipment, wiring, and systems are installed in accordance with the Specifications, Drawings, and manufacturers' requirements.
2. The second type of test is the Substantial Completion Test. These tests ensure that all equipment and systems operate in accordance with design intent. These are dynamic tests, and test the systems through all possible modes of operation.

C. Perform systems tests using personnel who have attended a manufacturer's training school for installation and testing of the systems as described above. Perform testing with the test instruments as required by the manufacturer; testing by means other than the manufacturer's procedures will not be acceptable unless agreed to by the Owner's Representative.

D. Upon completion of the installation of the security systems, the Contractor shall submit to the Owner Pre-Functional Performance Test reports including, but not limited to, the following information:

1. A complete list of all equipment installed, including serial numbers of major components.
2. Certification that all equipment is properly installed and functional, and it conforms with Contract Specifications and Drawings.
3. Test reports of all new and existing inputs and outputs, devices, and equipment.
4. Test technician's name, company, and dates of test.

E. Following review of the Pre-Functional Performance Test report by the University of Michigan project team, the Contractor shall schedule a substantial completion test with the University of Michigan projects team. A Substantial Completion Test shall include performance tests of each device, switch, control unit, power supply, battery standby unit, monitor panel, controller, and all other equipment and material required by the Contract. Tests will only be conducted at completed buildings, partial testing of buildings will not be performed by the University of Michigan project team. Owner will provide testing document.

F. At a minimum, perform tests to demonstrate that:

1. All systems are free from grounding and open circuits.
2. Each alarm-initiating device consistently functions as specified and produces the specified alarm actions.
3. An abnormal condition of any circuit or device required to be electrically supervised will result in activating the specified trouble or tamper alarm signal.
4. Doors lock and unlock at programmed times and allow access upon activation from a valid card.
5. The system is operable under specified trouble conditions.
6. All software functions properly as specified, and all equipment is fully programmed. The Security Contractor shall be responsible for programming system English-language descriptors as specified by the Owner’s representative.
7. System Record Drawings correspond with actual installation.

G. Final commissioning by Owner is required for final acceptance. Final commissioning is be scheduled simultaneous with punch list.

H. If retesting is required due to Security Contractor equipment failure, incorrect programming, omission, or error, the Security Contractor shall correct the problem, retest, and state in writing the system is ready for the Owner to witness a demonstration.

## 3.4 TRAINING

A. Provide a qualified service technician from the Manufacturer's staff to provide training.

***REVISE TRAINING REQUIREMENTS IN THE ARTICLE BELOW TO BE PROJECT SPECIFIC. SAMPLE TRAINING LANGUAGE IS PROVIDED, EDIT TO SUIT PRODUCT OR SYSTEM, INCLUDING DURATION. TRAINING IS NOT REQUIRED UNLESS THE PRODUCT OR SYSTEM IS COMPLEX, UNIQUE, OR NEW TO THE U-M PLANT MAINTENANCE DEPARTMENT. BECAUSE OF THE COST INVOLVED IN TRAINING DO NOT INDISCRIMINATELY SPECIFY TRAINING***

B. Train Owner's maintenance personnel on equipment operation, start-up and shutdown, trouble-shooting, servicing and preventative maintenance procedures. Review the data contained in the Operating and Maintenance Manuals with Owner's personnel. Training shall occur separate from startup activities.

1. Provide 2 hours of training minimum.

**END OF SECTION 281600**