

SECTION 28 31 00 – INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SYSTEM OVERVIEW

- A. This Section includes intrusion detection sensors, signal equipment, system controls, alarm displays, and alarm indicating devices.

1.2 SUMMARY

- A. This Section includes intrusion detection sensors, signal equipment, system controls, alarm displays, and alarm indicating devices. New and relocated devices shall be connected to the existing Interlogix building security system.
- B. Contractor shall be responsible to reprogram existing system as required to accommodate the revised room designations and numbering throughout the entire building. All devices shall be reprogrammed with revised numbering scheme. Coordinate all work with school district.
- C. **The contractor shall contract with the Owner's vendor to provide an extension to the existing security system. The Owner's vendor is Berkshire Systems Group, Inc. of Reading, PA. Contact Luke Hahn at (610) 775-1200.**

1.3 DEFINITIONS

- A. Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between the sensors and the communication link to central-control unit. May use multiplex cable on this system.
- B. LCD: Liquid-crystal display.
- C. LED: Light-emitting diode.
- D. PIR: Passive infrared.

1.4 FUNCTIONAL DESCRIPTION OF SYSTEM

- A. Description: Hard-wired or multiplexed, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.
- B. Supervision: System components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.
 - 1. Alarm Signal: Display at master control unit and actuate audible and visual alarm devices.

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2. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or control-unit failure.
 3. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or control unit.
- C. System Control: Master control unit shall directly monitor intrusion detection devices, perimeter detection units when applicable, control units associated with perimeter detection units when applicable, and connecting wiring.
- D. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.
- E. Operator Commands:
1. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
 2. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
 3. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
 4. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
 5. Protected Zone Test: Initiate operational test of a specific protected zone.
 6. System Test: Initiate system-wide operational test.
 7. Print reports.
- F. Response Time: Two seconds between actuation of any alarm and its indication at master control unit.
- G. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from master control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at master control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.
- H. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

1.5 SUBMITTALS

- A. Product Data: Include components and testing agency listing data.
- B. Shop Drawings: Include system wiring diagram. Show connections for all devices, components, and auxiliary equipment. Differentiate between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.
- C. System Operation Description: Include method of operation and supervision of each component and each type of circuit, and sequence of operations for manually and automatically initiated system inputs. Description must cover this specific project; manufacturer's standard descriptions for generic systems are not acceptable.
- D. Product Certificates: Signed by manufacturers of components certifying that products furnished comply with requirements.

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- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- F. Record of field tests of system.
- G. Maintenance Data: For products and system to include in maintenance manuals specified in Division 1. Include data for each type of product, including all features and operating sequences, both automatic and manual. Include user's software data and recommendations for spare parts and components to be stocked at Project site.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A certified technician accredited by the National Burglar and Fire Alarm Association, and who is an authorized service representative of central-control unit manufacturer.
- B. Manufacturer Qualifications: Central-control unit manufacturer or factory-authorized agency maintains a service center capable of providing training, parts, and emergency maintenance and repairs for overall system at Project site with eight hours' maximum response time.
- C. Testing Agency Qualifications: Comply with requirements specified in Division 1 Section "Quality Control." A current member firm of the National Burglar and Fire Alarm Association. Experienced in performing tests of intrusion detection systems.
 - 1. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar and Fire Alarm Association.
- D. Source Limitations: Obtain system components from central-control unit manufacturer who shall assume responsibility for system components and for their compatibility.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- F. Comply with NFPA 70.
- G. Comply with UL 1023.

1.7 SYSTEM SERVICE CONDITIONS

- A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - 1. Ambient Temperature for Indoor Components: 0 to 40 deg C.
 - 2. Relative Humidity for Indoor Components: 5 to 95 percent, noncondensing.

1.8 WARRANTY

- A. Warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, signed by manufacturer and Installer agreeing to replace intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

- C. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Interlogix. System to match other systems throughout the district.

2.2 EQUIPMENT

- A. Protection from Power Line Surges: Use integral surge suppressors listed in UL 1449 and complying with IEEE C62.41, Category B. Include the following features:

1. Suppression Level: 300 V.
2. Maximum Response Time: 5 nanoseconds.
3. Circuit: Multistage, using inductors and silicon-avalanche zener diodes or equivalent.
4. Indicator Lamp: Labeled neon or LED located on control unit and arranged to extinguish on failure of protection.
5. Fuses: Externally accessible.

- B. System- and Equipment-Interference Resistance: Not affected by radiated-radio-frequency interference and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHZ and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHZ. Coordinate below with Drawings or detailed device and component Specifications.

2.3 ELECTRICAL POWER

- A. Normal System Power Supply: 120 V, 60 Hz, from a local circuit breaker. Provide breaker lock. System control unit supplies power to components.
- B. Power Continuity: Batteries in power supplies of control units and individual system components maintain continuous system operation during outages of both normal and backup ac system supply.
1. Batteries: Rechargeable, valve-regulated, recombinant, sealed lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portion of system served, including audible trouble signal devices for up to four hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.
 2. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger recharges fully discharged battery within 24 hours.
- C. Annunciation: Central-control unit indicates, as a change in system condition, switching of system or component to backup power.

2.4 DOOR SWITCHES

- A. Description: Balanced-magnetic type complying with UL 634, door-mounting magnet part of magnetically operated switch installed on door frame. Bias magnet and sensitive reed switch resists compromise by introducing foreign magnetic fields. **Provide DPDT switches.**

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- B. Door Switch for Doors (Wood, Hollow Metal and Aluminum) - Flush-Mounted Units: Where not indicated to be furnished and installed by the door hardware installer, provide 1" diameter unobtrusive, flush with surface of door frame and door, wide gap detection.
- C. Door Switch for Doors (Wood, Hollow Metal and Aluminum) - Flush-Mounted Units: Furnished and installed by door hardware installer, wired by contractor.
- D. Door Switch for Overhead Door: Balanced-magnetic type listed for outdoor locations, with wide gap, door-mounting magnet and floor-mounting switch. Provide with flexible stainless-steel cable.
- E. Provide surface type wide-gap at roof hatches.
- F. Above all exterior doors, provide compatible microwave request-to-exit sensors. These sensors shall be wired into the system to shunt contacts when exiting the building, allowing the arming of exterior doors with free egress. Programming of the sensors shall be verified with the owner.
 - 1. Where sensors are provided for an access control system in addition to the intrusion detection system, provide additional relays and wiring as required to allow for interaction with both systems.

2.5 INTRUSION DETECTION DEVICES

- A. Comply with UL 639.
- B. Power Source: Powered from control panel.
- C. Detection Indicator: LED in unit housing, latch type where indicated.
- D. Sensitivity: Detect presence of an intruder within their zone patterns, but not outside their zone patterns.
- E. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to central-control unit.
- F. PIR Devices: Detect intrusion by monitoring infrared wavelengths emitted by human body within their protected zone and not to general thermal variations.
 - 1. Wall Mounted Unit - Wide angle mirror: 35' x 45' coverage area.
 - 2. Wall Mounted Unit - Long range curtain mirror: 70' x 10' coverage area.
 - 3. Ceiling-Mounted Unit Spot-Detection Pattern: Full 360-degree 60' diameter coverage area.
- G. Acoustical Devices: Detect intrusion by monitoring pattern of a steady-state sonic field produced by an ultrasonic transmitter. Changes in pattern are analyzed and those matching the profile of an intrusion initiate an alarm.
- H. Dual-Technology, PIR and Acoustical Devices: Require both methods to result in an alarm signal.
- I. Dual-Technology, PIR and Acoustical Devices: Require either or both methods, selectable, to result in an alarm signal. A control in device selects operating mode.

2.6 CONTROL UNITS

- A. Comply with UL 1023.

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- B. Cabinet: Lockable steel enclosure, arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for interconnecting cabinets and field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than 1 inch high. Identify individual components and modules within cabinets with permanent labels.
- C. Systems: Separate and independent alarm and supervisory systems in control units. Alarm-initiating zone boards consist of plug-in cards. Arrangements requiring removal of field wiring for module replacement are not acceptable.
- D. Timing Unit: Solid state, programmable, 365 day. Features include the following:
 - 1. Astronomic Control: For automatic adjustment of light switching at dawn and dusk.
 - 2. Confirmation: Relays, contactors, and other control devices have auxiliary contacts connected to provide confirmation signals to the system of on or off status of the equipment controlled. Software interprets such signals, displays equipment status, and initiates failure signals.
 - 3. Override Capability: Programmed shutdown of lighting and other items can be overridden by using override push buttons or by entering a command over a telephone data link.
- E. Control Modules: Types and capacities as required to perform unit functions. Visible and audible signals in central-control unit indicate alarm, supervisory, and trouble conditions for each zone. Each type of audible alarm has a distinct sound.
- F. Zones: Quantity of alarm and supervisory zones as indicated with capacity for expanding number of zones by a minimum of 25 percent. System must have a minimum of 2 partitions for separate alarmed areas.
- G. Power Supply Circuits: Units provide power for remote power-consuming detection devices. Circuit capacity is adequate for at least a 25 percent increase in load.
- H. Indicating Lights: Individual LED devices designate each zone. An LED test switch for each control unit section illuminates all LED devices on that section of the unit. Manual toggle test-switches or push test-buttons do not require a key to operate. Alarm and supervisory signals light a red LED for the associated zone. Trouble signals light an amber LED for the associated zone.
- I. Resetting: Controls permit silencing audible signals for individual zones but prevent resetting of alarm, supervisory, or trouble signals while the condition still exists.
- J. Alphanumeric Display and System Controls: Arrange for basic interface between human operator at central-control unit and system components, including annunciation and supervision. A display with a minimum of 80 characters displays alarm, supervisory, and component status messages. Arrange keypad to enter and execute control commands.
- K. Remote Telephone Access: System shall be completely accessible via IP communications, allowing status check, make changes, arm/disarm system, control up to 32 automatic devices such as heating, lighting, and locks (if programmed to perform these functions).

2.7 SECURE-ACCESS CONTROL STATIONS

- A. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

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2.8 ALARM DEVICES

- A. Inside and exterior audible alarms shall be accomplished through the Paging/Sound System speakers. Provide all necessary equipment and connections required. Coordinate installation with paging system supplier.

2.9 COMMUNICATOR

- A. Systems shall utilize same communicator as the fire alarm system, and shall be coordinated with the fire alarm system.

2.10 CONDUCTORS AND CABLES

- A. Stranded Copper: Size conductors as recommended by system manufacturer with a plenum rated jacket.

2.11 INTERCONNECTIONS

- A. Provide interconnection (relays and wiring) with Paging/Sound System so that an alarm is sounded using the building paging/sound system.
- B. Provide interconnection (relays and wiring) with the access control system to allow the presentation of a card to arm and disarm the building.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install system according to NFPA 70, applicable codes, and manufacturer's written instructions.
- B. Comply with UL 1641.
- C. Wiring Method: Install wiring in raceways, except in accessible indoor ceiling spaces and in hollow gypsum board partitions. Use cable in ceilings. Conceal raceways and wiring, except in unfinished spaces.
- D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess. Provide and use lacing bars and distribution spools.
- E. Number of Conductors: As recommended by system manufacturer for functions indicated.
- F. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- G. Connections: Comply with torque-tightening values specified in UL 486A.
- H. Identify components, conductors, and cables according to Division 26 "Electrical Identification." Color-code conductors, and apply wire and cable marking tape to designate wires and cables so media are identified and in coordination with system wiring diagrams.

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3.2 GROUNDING

- A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.3 FIELD QUALITY CONTROL

- A. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
- B. Pretesting: Align and adjust system and perform pretesting of all components, wiring, and functions to verify compliance with specified requirements. Correct deficiencies by replacing malfunctioning or damaged items with new items.
- C. Manufacturer's Field Services: Engage a factory-authorized service representative to inspect field-assembled components and perform system pretesting, testing, adjustment, and programming.
 - 1. Operational Tests: Schedule tests after pretesting has been successfully completed. Perform operational system tests to verify compliance with Specifications. Test all modes of system operation and intrusion detection. Methodically test for detection of intrusion and for false alarms in each zone of intrusion detection. Test for false alarms by simulating activities outside indicated detection patterns.
 - 2. Report: Prepare a written report of observations, inspection, and tests.
- D. Retesting: Correct deficiencies and retest until total system meets requirements of the Specifications and complies with applicable standards.
- E. Schedule testing with at least seven days' advance notice. Notify Architect and Owner.

3.4 ADJUSTING

- A. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting and reprogramming to suit actual occupied conditions. Provide up to two visits to Project for this purpose without additional cost.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to explain programming and operation of system and to train Owner's maintenance personnel on procedures and schedules for maintaining, programming, operating, adjusting, troubleshooting, and servicing system. Provide a minimum of four (4) hours' training in operation and maintenance.
- B. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION 28 31 00