

ADDENDUM NUMBER 1

GENERAL MITCHELL INTERNATIONAL AIRPORT
OFFICE SHELL BUILD-OUT
Site #290, Bldg. #205
5300 South Howell Avenue
Milwaukee, WI 53207

Project Number: A141-11001-02

Notice Number: 6964

Date of Addendum: October 16, 2014

This Addendum to the Contract Documents is issued to modify, explain or correct the original documents, dated September 22, 2014, and is hereby made part of the Contract Documents. Acknowledge receipt of this Addendum in the space provided on the Bid Form, or bid may be rejected.

BIDDING DOCUMENTS

CONTRACT DOCUMENTS AND SPECIFICATIONS

Specification Table of Contents

1. ADD specification section 27 51 10 – Paging/Public Address to table of contents for newly added section.
2. ADD specification 28 13 00 – Access Control to table of contents for newly added section.

Section 08 70 00 – Door Hardware:

3. Page 08 70 00-9, Under Article Hardware Groups, DELETE Hardware Group 5 and ADD Hardware Group 5 and Hardware Group 6 as follows:

HARDWARE GROUP 5

1-1/2 Pair	Existing BUTTS	
1	Existing CLOSER	
1	Existing STOP	
1	Existing KICKPLATE 8"	
1	New LOCK	Sargent Profile Series v.S2 10G77 Entry Lock x L Lever x SF Option x No Key Pad
1	New MEDECO CYLINDER	31T
1	New ELECTRIC STRIKE	6211 FS 24 VAC
1	New Push Button	Wire to location as directed in suite

Refer to Electrical Drawings and Specifications for wiring.

Electric strike to be wired for "fail secure" operation.

Comply with IBC 1008.1.9.8

Return removed / not reused hardware (Lock, Strike and Cylinder) to owner.

HARDWARE GROUP 6

1-1/2 Pair	Existing BUTTS	
1	Existing CLOSER	
1	New LOCK	Sargent Profile Series v.S2 10G77 Entry Lock x L Lever x SF Option x No Key Pad
1	New MEDECO CYLINDER	31T
1	Existing ELECTRIC STRIKE	
1	Existing Push Button	

Return removed / not reused hardware (Lock, Strike and Cylinder) to owner.

Section 27 51 10 – Paging/Public Address System:

4. ADD specification section 27 51 10 – Paging/Public Address System for clarification on extending and relocating existing paging speakers.

Section 28 13 00 – Access Control:

5. ADD specification section 28 13 00 – Access Control for clarification on extending and modifying existing system.

DRAWINGS

Sheet A0.02 – Schedules

1. Door & Borrowed Lite Schedule; ADD Door Number A154-1 located at the Maintenance Room A154 as follows:
 - a. Existing door and frame
 - b. Hardware Group HG-6

Sheet E1.02 – Security, IT Plan (Refer to architectural plans for door names)

2. REVISE cable tray size from 12"x4" to 12"x2" to match catalog number.
3. CLARIFICATION - See general note 1 regarding fire stopping required for penetrations in fire rated walls.
4. CLARIFICATION – See sheet note 9 regarding all drops to terminate in new patch panels.
5. CLARIFICATION – (1) New paging speaker to be added to TSA office. Existing speakers to be extended and relocated. See specification for speaker information.
6. REMOVE sheet note 4, card reader and door contact from door A148-1.
7. REMOVE door contact from door A142-1.
8. ADD sheet note 10 to door A148-1. Sheet note 10 to read as follows "Provide necessary rough-in for new electric strike with 24 VAC power supply. Johnson Controls to provide programming of wireless lockset to card access system. Location of push button to be located in field."
9. ADD following text to end of sheet note 6 "Johnson Controls to provide programming of card access system. Card reader shall match existing GMIA card readers."
10. ADD sheet note 4 next to door HA12-1.
11. ADD sheet note 11 to door A142-1. Sheet note 11 to read as follows "Provide new card reader. Wire back to existing electric strike. Johnson Controls to provide programming of card access system. Card reader shall match existing GMIA card readers."
12. ADD sheet note 12 to door A154. Sheet note 12 to read as follows "Johnson Controls to provide programming of wireless lockset to card access system."

End of Addendum No. 1

SECTION 27 51 10

PAGING/PUBLIC ADDRESS SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes modifying existing paging system by adding new and relocating existing speakers.
- B. The electrical contractor shall be responsible for the extension of all cables to the new equipment located as shown on the plans.
- C. All new equipment shall match existing equipment.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who is an authorized representative of the system manufacturer to perform Work of this Section.
- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
 - 1. The Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.
- C. Comply with NFPA 70.
- D. Comply with UL 50.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

Project No. A141-11001

1. Atlas-Soundolier; American Trading & Production Corp. Div.

2.2 SYSTEM REQUIREMENTS

- A. Coordinate the features of materials and equipment to form an integrated system. Match components and interconnections for optimum performance of specified functions.

2.3 EQUIPMENT

- A. General: Provide all equipment required to meet the systems intended functional performance.
- B. Recessed Ceiling Loudspeaker: AtlasC10A/SM191-78-8/164-8A
 1. Axial Sensitivity: 97 dB peak, 94 dB average.
 2. Frequency Response: 45Hz.- 19kHz
 3. Dispersion Angle: 105 degrees.
 4. Rated Output Level: 5 W.
 5. Matching Transformer: 70.7 Volt, .5, 1, 2, 4 watt taps.
- C. Wire and Cable: Jacketed, twisted-pair and twisted-multipair, untinned, solid copper conductors.
 1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
 2. Cable for Use in Plenums: Listed and labeled for plenum installation.
 3. Amplifier to first speaker, size per manufacturer's recommendation. 14/2 stranded bare copper conductors, unshielded with overall jacket. West Penn #226
 4. Speaker to speaker, size per manufacturer's recommendation. 18/2 stranded bare copper conductors, unshielded with overall jacket. West Penn #224

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install equipment to comply with manufacturer's written instructions.
- B. All paging system wiring shall be in conduit.
- C. Wiring Within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.
- D. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes, terminal cabinets, and equipment enclosures.
- E. Impedance and Level Matching: Carefully match input and output impedances and signal levels at audio signal interfaces. Provide matching networks where required.

- F. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.
- G. Line Matching Transformer Connections: Make initial connections using the 2 watt tap settings.

3.2 GROUNDING

- A. Ground cable shields and equipment 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. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the testing and adjustment of the system.

3.4 CLEANING

- A. Prior to final acceptance, clean system components and protect from damage and deterioration.

3.5 DEMONSTRATION

- A. Demonstration: Demonstrate the system in all operating modes and functions.

3.6 ON-SITE ASSISTANCE

- A. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels, resetting matching transformer taps, adjusting controls, and investigating possible need for any system revisions required to meet actual occupancy conditions.

END OF SECTION

SECTION 28 13 00

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.

1.2 SUMMARY

- A. Section Includes:
 - 1. Security access central-control station.
 - 2. One or more security access networked workstations.
 - 3. Security access operating system and application software.
 - 4. Security access controllers connected to high-speed electronic-data transmission network.
- B. Scope of Work:

Add furnishing and installation of card readers and related components at locations shown on security and IT Plan sheet E1.02 and noted below:

All locking hardware, provided by a general contractor.

Typical cables for each door:

18/6 – per card reader

16/2 – Lock output

22/2 – DPS (door position switch)

For delayed egress maglock on rear door pull an additional 18/6 conductor for access trigger, remote reset and countdown alarm.

Card readers to be Airport standard HID iClass RK40 reader/keypad unit in black finish. Johnson Controls, Inc. (JCI) must be used as the security contractor. E.C. will be responsible for making terminations to the reader per unit and at Owner's door access controller as well as any other devices required. JCI will be responsible for programming door functions into the door control software. All work to be done per GMIA standard Airport security specifications. Contractor is to provide and install all equipment as required to have doors operate as described below. JCI/E.C. may use materials from Owner's stock, but must provide replacement stock for items used. JCI to verify timeclock and lock operation requirements with Owner prior to programming.

E.C. is to terminate device cabling at the available open terminals at Owner's existing door access control panels (ACP). The following terminals are available (no additional panels will be needed):

ACP-38

Door A154-1

Johnson Controls to program new wireless lock set to existing card access system. Existing push buttons and electric strike to remain.

Door A148-1

Add airport standard push button at interior side of office. Push button to be wired to electric strike provided by hardware vendor. Push button to be located in field. Johnson Controls to program new wireless lock set.

Door HA12-1

Add new airport standard card reader on exterior side of door in place of existing push button. Provide new door position switch along with new push button for delayed egress. Johnson Controls to program new card reader.

Door A142-1

Add airport standard card reader and door position switch. Card reader at exterior side will control door. Johnson Controls to program new card reader.

Door Operation:

Door A154-1 (Maintenance Room A154 entry from corridor):

Door is locked by wireless lock and existing electric strike. Lock is controlled by card reader at corridor side and release button at office side. Lock can be programmed for hours of operation and personnel access as specified by Airport Security. When lock is de-energized, door functions as push or pull. When lock is energized, access is granted by swiping card. This door is a required exit door from the office area.

Door A148 -1 (Airport GIS Office entry from corridor):

Door is locked by wireless lock, and electric strike. Lock is controlled by card reader at corridor side and release button at office side. Lock can be programmed for hours of operation and personnel access as specified by Airport Security. When lock is de-energized, door functions as push or pull. When lock is energized, access is granted by swiping card.

This door is a required exit door from the office area.

Door HA12-1 (Corridor from Exterior Secured Air Operations Area):

Door is locked by electro-magnetic lock. Lock is controlled by card reader/keypad at both sides. In normal operation, lock will require a valid card/PIN combination to which will de-energize the overhead electro-magnetic lock. The door will have a flush mount DPS. The door is a required exit door and must be interconnected with the fire alarm in that area to allow for unlocking the door in the event of an alarmed emergency. In the event of an emergency that not alarmed, the door will have access-controlled egress per IBC 1008.1.4.4.

Door shall unlock from a manual unlocking device (interior release button) located 44 inches above the floor and within 5 feet of the secured door. General Contractor will provide code approved signage above manual unlocking device. When operated, the manual unlocking device shall result in direct interruption of the power to the overhead electro-

magnetic lock – independent of the access control system electronics – and the door shall remain unlocked for a minimum of 30 seconds. Activation of the building fire alarm system in that zone shall automatically unlock the door and remain unlocked until the fire alarm has been reset.

Door A142-1 (Airport TSA Office entry from Pedestrian Walkway):

Door is locked by electric strike. Electric Strike is controlled by card reader/keypad at corridor side. Release is by latch at office side. Lock can be programmed for hours of operation and personnel access as specified by Airport Security. When Electric Strike is de-energized, door functions as push or pull. When lock is energized, access is granted by swiping card and entering the associated PIN. This door is a required exit door from the office area. The door will have a flush mount DPS (door position switch).

1.3 DEFINITIONS

- A. CCTV: Closed-circuit television.
- B. CPU: Central processing unit.
- C. Credential: Data assigned to an entity and used to identify that entity.
- D. dpi: Dots per inch.
- E. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.
- F. GFI: Ground fault interrupter.
- G. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
- H. I/O: Input/Output.
- I. LAN: Local area network.
- J. Location: A Location on the network having a PC-to-controller communications link, with additional controllers at the Location connected to the PC-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.
- K. PC: Personal computer. Applies to the central station, workstations, and file servers.
- L. PCI Bus: Peripheral Component Interconnect. A peripheral bus providing a high-speed data path between the CPU and the peripheral devices such as a monitor, disk drive, or network.
- M. PDF: Portable Document Format. The file format used by the Acrobat document-exchange-system software from Adobe.
- N. RAS: Remote access services.

RF: Radio frequency.

- O. ROM: Read-only memory. ROM data are maintained through losses of power.
- P. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
- Q. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.
- R. UPS: Uninterruptible power supply.
- S. USB: Universal serial bus.
- T. WAN: Wide area network.
- U. WAV: The digital audio format used in Microsoft Windows.
- V. WMP: Windows media player.
- W. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.
- X. Windows: Operating system by Microsoft Corporation.
- Y. Workstation: A PC with software that is configured for specific, limited security-system functions.
- AA. WYSIWYG: What You See Is What You Get. Text and graphics appear on the screen the same as they will in print.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-
 - 1.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Diagrams for cable management system.
 - 2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
 - 3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
 - a) Workstation outlets, jacks, and jack assemblies.
 - b) Patch cords.
 - c) Patch panels.
 - 4. Cable Administration Drawings: As specified in "Identification" Article.
 - 5. Battery and charger calculations for central station, workstations, and controllers.
- C. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.
- D. Other Action Submittals:
 - 1. Project planning documents as specified in Part 3.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 include the following:
 - 1. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
 - 2. System installation and setup guides with data forms to plan and record options and setup decisions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 1. Cable installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.
- B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.
- C. 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.
- D. Comply with NFPA 70, "National Electrical Code."
- E. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Central Station, Workstations, and Controllers:
 - 1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F, and not more than 80 percent relative humidity, noncondensing.
 - 2. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
 - 3. Mark packing list with the same designations assigned to materials and equipment for recording in the system labeling schedules that are generated by software specified in "Cable and Asset Management Software" Article.
 - 4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by: 1.

Johnson Controls Inc.

2.2 CARD READERS, CREDENTIAL CARDS, AND KEYPADS

- A. Card reader shall be a Multi-technology contactless smart card reader and shall comply with the following 13.56MHz- related standards to ensure product compatibility and predictability of performance:
 - 1. ISO 15693
 - 2. ISO 14443A
 - 3. ISO 14443B
- B. Contactless smart card reader shall be configurable to read 13.56 MHz data simultaneously from one to, at minimum, two of the following cards:
 - 1. HID iClass Access Control Sector/Application data
 - 2. ISO 15693 card serial number (CSN)
 - 3. ISO 14443A card serial number (CSN): including MIFARE & DESFire
 - 4. ISO 14443B card serial number (CSN)
 - 5. Sony FeliCa IDm – Transit version readers only
- C. Contactless smart card readers shall provide priority processing for reading multi-technology (13.56 MHz & 125 kHz) credentials. When reading a multi-technology credential, the reader shall provide a selectable priority of which technology to process and transmit data to the access control system.
- D. The contactless smart card reader shall provide a 12-position weatherproof keypad featuring a waterproof silicon boot, vandal-resistant metal keycaps, and backlit keypad numbering.
- E. The contactless card reader keypad output shall provide a variety of keypad outputs to ensure compatibility with virtually any access control panel. Keypad output setting shall include:
 - 1. Buffer one key, no parity, 4 bit message
 - 2. Buffer one key, add compliment, 8 bit message (Dorado)
 - 3. Buffer six keys and add parity
 - 4. Buffer one key and add parity
 - 5. Buffer one to five keys (Standard 26 bit output)
 - 6. Buffer four keys and add parity
 - 7. Single Key buffering
 - 8. Local PIN Verify: (Requires User PIN code to be programmed into the iCLASS Credential by using the iCLASS Card Programmer .
- F. Contactless smart card reader shall provide universal compatibility with most access control systems by outputting card data in compliance with the SIA AC-01 Wiegand standard.
- G. Contactless smart card reader shall be available to provide clock and data output.
- H. Contactless smart card reader shall be designed for low current operation to enable migration from most legacy proximity applications without the need to replace existing access control panels and/or power supplies. Contactless smart card power requirements shall be:
 - 1. Operating voltage: 5-16 VDC, reverse voltage protected. Linear power supply recommended.
 - 2. Current requirements: 85 mA AVG, 169 mA PEAK @ 12 VDC
- I. Contactless smart card reader cabling requirements shall be:
 - 1. Cable distance (Wiegand or Clock & Data): 500 feet (150m)
 - 2. Cable type: 5-conductor #22 AWG
 - 3. Standard reader termination:" 18" (0.5m) cable pigtail.
- J. Contactless smart card reader shall be Genuine HID Global iCLASS Model RPK40, base P/N 6136A (Wiegand), 6133A (Clock and Data), 6134A (Transit).

K. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.
3. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
4. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
5. The card reader shall read proximity cards in a range from direct contact to at least 6 inches from the reader.

L. Keypads:

1. Entry-control keypads shall use a unique combination of alphanumeric and other symbols as an Identifier.

M. Keypad Mounting Method:

1. Keypads shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.

N. Keypad and Swipe-Reader Combination: Designed to require an entry on the keypad before presenting the credential card.

1. Keypad: Allow the entry of four numeric digits that are associated with a specific credential.

O. Communication Protocol: Compatible with local processor.

2.3 PUSH-BUTTON SWITCHES

A. Push-Button Switches: Momentary-contact back-lighted push buttons with stainless-steel switch enclosures.

B. Electrical Ratings:

1. Minimum continuous current rating of 10A at 120-V ac

C. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.

D. Enclosures shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.

E. Power: Push-button switches shall be powered from their associated controller, using dc control.

2.4 DOOR AND GATE HARDWARE INTERFACE

- A. Electric Door Strikes: Use end-of-line resistors to provide power-line supervision. Signal switches shall transmit data to controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and they shall report a forced entry. Power and signal shall be from the controller. Electric strikes are specified in Section 087000 "Door Hardware."
- B. Electromagnetic Locks: End-of-line resistors shall provide power-line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the controller. Electromagnetic locks are specified in Section 087000 "Door Hardware."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
- B. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with recommendations in SIA CP-01.
- B. Comply with TIA/EIA 606-A, "Administration Standard for Commercial Telecommunications Infrastructure."
- C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.
- D. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.3 CABLING

- A. Comply with NECA 1, "Good Workmanship in Electrical Construction."
- B. Install cables and wiring according to requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."
- C. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.
- D. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
- E. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and

small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

- F. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.4 CABLE APPLICATION

- A. Comply with TIA 569-B, "Commercial Building Standard for Telecommunications Pathways and Spaces."
- B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
- C. TIA 232-F Cabling: Install at a maximum distance of 50 ft..
- D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft..
- E. Card Readers and Keypads:
 - 1. Install number of conductor pairs recommended by manufacturer for the functions specified.
 - 2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from controller to the reader is 250 ft., and install No. 20 AWG wire if maximum distance is 500 ft..
 - 3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the controller.
 - 4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.
- F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 250 ft. .
- G. Install minimum No. 18 AWG ac power wire from transformer to controller, with a maximum distance of 25 ft..

3.5 GROUNDING

- A. Comply with Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."
- C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- D. Bond shields and drain conductors to ground at only one point in each circuit.
- E. Signal Ground:
 - 1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
 - 2. Bus: Mount on wall of main equipment room with standoff insulators.
 - 3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.6 INSTALLATION

- A. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch- high text and symbols as required. Push-button switches shall be connected to the controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.
- B. Install card readers, keypads, and push buttons.

3.7 IDENTIFICATION

- A. In addition to requirements in this article, comply with applicable requirements in Section 260553 "Identification for Electrical Systems" and with TIA/EIA 606-A.
- B. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.
- C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - 1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.
- D. At completion, cable and asset management software shall reflect as-built conditions.

3.8 SYSTEM SOFTWARE AND HARDWARE

- A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA 568-B.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA 568-B.1.
 - 2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall

be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.

3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
- C. Devices and circuits will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.10 STARTUP SERVICE

- A. Engage a factory-authorized service representative to supervise and assist with startup service.
 1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
 2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

3.11 PROTECTION

- A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured with an activated burglar alarm and access-control system reporting to a central station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

3.12 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain security access system. See Division 01 "Demonstration and Training."
- B. Develop separate training modules for the following:
 1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
 2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
 3. Security personnel.
 4. Hardware maintenance personnel.
 5. Corporate management.

END OF SECTION 28 13 00