

# Attachment C

## Section 27 62 00 – Electronic Access Control System

### Part 1 - General

#### 1.01 Scope

- A. This specification section covers the furnishing and installation of a new and complete, low-voltage, Electronic Access Control System (EACS).
- B. Contractor shall furnish and install access control hardware devices, mounting brackets, power supplies, switches, controls, consoles and other components of the system as required.
- C. Contractor shall furnish and install access control related software to allow this system expansion. Software includes required license addition for access control readers and electrified portals, workstations and required physical security system Integration.
- D. Furnish and install outlets, junction boxes, conduit, connectors, wiring, and other accessories necessary to complete the system installation. Requirements shall be in accordance with Division 26.
- E. Refer to Section 27 60 00 for additional project scope information.
- F. The Category 6 cabling and patch cords to each required network controller shall be provided by the structured cabling Contractor. Patch cords for the controllers at the network switches shall be installed by the Owner with participation by this Contractor. Patch cords from the controllers to the data jack shall be installed by this Contractor.

#### 1.02 Precedence

- A. Obtain, read and comply with General Conditions and applicable sub-sections of the contract specifications. Where a discrepancy may exist between any applicable sub-section and directions as contained herein, this section shall govern.

#### 1.03 Related Work

- A. Division 08 - Door Hardware
- B. Division 14 - General Elevator Requirements
- C. Section 27 60 00 – Physical Security General Requirements
- D. Section 27 64 00 – Video Surveillance System

#### 1.04 Definitions

- A. Definitions:
  - 1. ABA Track: Magnetic stripe that is encoded on track 2, at 75-bpi density in binary-coded decimal format.

2. Proximity Readers and Credentials: Readers and cards employing 125 KHz communication to validate when the card is presented within the proximity of the card reader.
3. Smart Card Readers and Contactless credentials: Readers and cards employing 13.56 MHz encrypted communication to validate when the card is presented within the proximity of the card reader.
4. Credential: Data assigned to an entity and used to identify that entity.
5. Trigger: Enables an action or a series of actions that are sent across any or all controllers, readers, contacts, or relays throughout the system. Triggers can be used to send commands to change the state of a door, multiple doors, contact states, relay states, shunt points, lockdowns or to activate predetermined overrides.
6. Pass-Through: The ability assigned to a person's credential that allows them to access a door even if in lockdown state.
7. Lockdown: An input or a credential that allows the system to be placed into a lockdown state.
8. Wiegand: Patented magnetic principle that originally used specially treated wires embedded in the credential card. Today Wiegand has become the communication standard for most reader heads.

A. Abbreviations:

1. ACS – Access Control System
2. API – Application Programming Interface
3. DHCP – Dynamic Host Configuration Protocol
4. DPDT – Double pole, double throw
5. IP – Internet Protocol
6. LAN – Local Area Network
7. NFC – Near Field Communications
8. NVR – Network Video Recorder
9. ODBC – Open Database Connectivity
10. RAM – Random Access Memory
11. SPDT – Single pole, double throw
12. SSL – Secure Sockets Layer
13. SSO – Single sign-on
14. TCP – Transport Control Protocol
15. UPS – Uninterruptible Power Supply
16. VMS – Video Management System

B. Refer to Section 27 60 00 for additional definitions.

1.05 Reference Standards and Codes

- A. IEC 60839-11-5:2020 - Open Supervised Device Protocol (OSDP)
- B. International Building Code (IBC) – Year adopted by authority
- C. National Fire Protection Code (NFPA) 101 – Year adopted by authority
- D. Refer to Section 27 60 00 for additional requirements.

1.06 Qualifications

- A. Lock installers for fire rated doors are to be trained and certified by the manufacturer via Intertek Qualified Personnel (IQP) Raceway and Hardware Installer Program on the proper installation and adjustment of fire, life safety, and security products in compliance with NFPA 80 including: hanging devices; locking devices; closing devices; and seals.
  - 1. Trained and qualified raceway installers are required to ensure modifications do not affect the integrity of fire doors. Doors must remain compliant with NFPA 80.
- B. Refer to Section 27 60 00 for additional requirements.

1.07 Pre-Construction Submittals

- A. The Contractor shall submit the access control hardware layouts which includes the number of controllers, sub-panels and other associated devices per location.
- B. The Contractor shall submit full power calculations which includes the anticipated power loads, number and type of power supplies including all power supply boards, number of 120VAC circuits required, battery backup including the quantities of batteries to meet requirements, PoE loads, fire alarm connection requirements, etc.
- C. Refer to Section 27 60 00 for additional requirements.

1.08 Construction Progress Submittals

- A. Refer to Section 27 60 00 requirements.

1.09 Closeout Submittals

- A. Refer to Section 27 60 00 for additional requirements.

**Part 2 - Products**

2.01 Electronic Access Control Software

- A. Cloud-based electronic access control platform, controllers, access control credential readers, and bridging hardware necessary to provide integrated access control for entry points.

1. Approved Manufacturers
  - a. Verkada Inc.
- B. Bridging to Fire Life Safety systems, video surveillance, and alarms.
- C. Verkada Command: Access Control Cloud-Based Management Software
  1. User Management and Permissions
    - a. Import Users via CSV or add users manually
    - b. Manage Users and Groups automatically with 3<sup>rd</sup> party IDPs via SCIM including (but not limited to) Okta, Azure AD, CyberArk
    - c. Control door access via user groups and Access Levels
    - d. Assign multi-format Credentials including cards, pins, and mobile Bluetooth access
    - e. Support bulk upload of User Photos for use in system display and card management
  2. Door and Peripheral Management
    - a. Catalog events including live and historical footage
    - b. Filter by events such as unlocks, door opens, and access granted or denied
    - c. Create custom lock / access control / unlock / card + pin code schedules
    - d. Programmable inputs and outputs
    - e. Support for elevators security via configurable outputs
  3. Video Integration
    - a. Associate existing Verkada cameras with doors
    - b. Add multiple cameras to see events from multiple angles
    - c. Video events associated with any individual
  4. Site Management
    - a. Manage admins on a site-by-site basis. Allow certain Users the ability manage one site and not another.
    - b. Support for different Admin roles within the management platform
  5. Alerting and Events
    - a. Configure real-time alerts via SMS or Email
    - b. Configurable alerts based on Door Held Open / Door Forced Open, Access Granted, Door Opens, Lockdowns, Offline, or Aux Trigger
    - c. Alerts can be configured to only dispatch on a configurable schedule

6. Lockdown Capabilities
  - a. Trigger a Lockdown via a wired button, wireless button, mobile app, or web
  - b. System supports configurable User Groups to trigger Lockdowns
  - c. System supports configurable User Groups for Access during Lockdowns
  - d. System supports configurable User Groups for resolving / disabling Lockdowns

7. Reporting
  - a. Standard reporting and export of data
  - b. System support Roll Call / Mustering Reporting

D. Verkada Pass App Touchless Entry via BLE

1. Verkada Pass App for either iOS or Android facilitates access control events through either tapping from inside the app or through Touchless Access via Bluetooth.

- a. No substitutions

- E. The ACS shall be provided with a 5-year software license agreement to last through the duration of the project. The Owner shall be able to receive all major and minor software updates at no additional cost for the duration of the project. At the completion of the project the Owner shall have the option to receive a final software update to the latest version before the project is paid in full.

F. Manufacturer:

1. Verkada Inc.

2.02 Door Controllers

A. AC41 4-Door Controller by Verkada Inc.

1. Description: access control hardware controller provides power and control for up to 4 sets of access control hardware. Provides fire alarm interface and auxiliary signal integration into the access control system.

2. Confirm OSDP capability prior to submittals.

3. Technical Specifications

- a. Power Consumption (at 10-14V):
  - i. No Readers: 1000mA
  - ii. 4 Wiegand Readers: 2200mA
- b. Power Supply: 160W PSU (capped at 100W for safety)
- c. Relays:

- i. Dry (External Power Supply): 6 Relays – 4 Door, 2 AUX at 500mA / 30VDC
  - ii. Wet (Powered by AC41): 12V - 700mA per relay max, 24V - 350mA per relay max
  - d. Inputs: Nominal 5VDC: 1Kohm to each input (resistors built-in)
  - e. Contact Sensors: 4 Contact Sensors: Nominal 5VDC, 1Kohm to each input (resistors built-in)
  - f. Dimensions:
    - iii. With Mount:
      - A) Length: 415.6mm / 16.36in
      - B) Width: 319.6mm / 12.58in
      - C) Height: 111.74mm / 4.4in
    - iv. Without Mount:
      - A) Length: 415.6mm / 16.36in
      - B) Width: 319.6mm / 12.58in
      - C) Height: 105.74mm / 4.16in
  - g. Weight: 8.5kg / 18.74lb
  - h. Operating Temperature: 0°C to 50°C / 32°F to 122°F
  - i. Operating Humidity: 5% to 90%
  - j. Compliance:
    - v. FCC, CE
    - vi. UL 294
    - vii. UL 62368-1/CSA C22.2
    - viii. CAN/ULC-60839-11-1:2016
    - ix. NDAA
  - k. Connectivity:
    - x. Ethernet: 100/1000Mbps RJ-45 cable connector for network connection
    - xi. USB: USB 2.0
  - l. Included Accessories:
    - xii. Setup guide
    - xiii. Screw pack
  - m. Mounting Hardware: Dry wall anchors (M8) and screws (M5)
  - n. Network Settings:
    - xiv. An Ethernet connection with DHCP must be used to connect the AC41 to the Local Area Network (LAN).
    - xv. Firewall settings: TCP port 443, UDP port 123 (NTP time synchronization)
- B. AC42 4-Door Controller by Verkada Inc.

1. Description: access control hardware controller provides power and control for up to 4 sets of access control hardware. Provides fire alarm interface and auxiliary signal integration into the access control system.
2. Confirm OSDP capability prior to submittals.
3. Technical Specifications
  - a. Power Consumption: 60W maximum
  - b. AC Power Input:
    - i. 100 to 240VAC
    - ii. 50 / 60Hz
    - iii. 1.5A maximum
  - c. AUX Power: 1x 12V @ 250mA
  - d. Inputs:
    - i. 2x REX dry inputs per door
    - ii. 1x DPI dry input per door
    - iii. 2x auxiliary dry inputs
  - e. Readers:
    - i. 1x reader port (Verkada/RS-485 or Wigand) per door
    - ii. Reader current consumption must be less than 250mA per reader.
    - iii. Maximum of 4 readers powered simultaneously.
  - f. Dry Relays:
    - i. Dry relay max pass-through power: 24VDC @ 2A (resistive load)
    - ii. 2x auxiliary dry relays
  - g. Wet Relays:
    - i. Wet relay switch-selectable power:
      - a. 12V operation: 700mA maximum
      - b. 24V operation: 350mA maximum
  - h. Contact Sensors:
    - i. 4x contact sensors
    - ii. Nominal 5VDC
    - iii. 1Kohm to each input (resistors built-in)
  - i. Dimensions:
    - i. With Mount:

- a. Depth: 116.25mm / 4.6in
    - b. Width: 321mm / 12.6in
    - c. Height: 417mm / 16.4in
  - j. Weight: 6.35kg / 13.9lb
  - k. Operating Temperature: 0°C to 50°C / 32°F to 122°F
  - l. Operating Humidity: 5% to 90%
  - m. Compliance:
    - i. FCC, CE
    - ii. UL 294
    - iii. UL 62368-1/CSA C22.2
    - iv. CAN/ULC-60839-11-1:2016
    - v. NDAA
  - n. Connectivity:
    - i. Ethernet: 100/1000Mbps RJ-45 cable connector for network connection
    - ii. USB: USB 2.0
  - o. Included Accessories:
    - i. Lock key
    - ii. Flat head screwdriver
  - p. Mounting Hardware: Mounting plate and 4 wood screws
  - q. Network Settings:
    - i. An Ethernet connection with DHCP must be used to connect the AC41 to the Local Area Network (LAN).
    - ii. Firewall settings: TCP port 443, UDP port 123 (NTP time synchronization)
- C. AC62 16-Door Controller by Verkada Inc.
1. Description: access control hardware controller provides power and control for up to 16 sets of access control hardware. Provides fire alarm interface and auxiliary signal integration into the access control system.
  2. Confirm OSDP capability prior to submittals.
  3. Technical Specifications
    - a. Power Consumption: 350W maximum
    - b. AC Power Input: 110-240VAC, 50-60Hz
    - c. Inputs:

- i. 2x REX dry inputs per door
  - ii. 1x DPI dry input per door
  - iii. 2x auxiliary dry inputs
- d. Readers:
  - i. 1x reader port (Verkada/RS-485 or Wiegand) per door
  - ii. 2x auxiliary reader ports (Verkada/RS-485)
  - iii. Reader current consumption must be < 250mA per reader
  - iv. Maximum of 16 readers can be powered simultaneously
- e. Relay Outputs:
  - i. 1x wet or dry relay per door
  - ii. Wet relay switch-selectable power:
    - A) 12V operation: 1A max
    - B) 24V operation: 0.5A max
  - iii. 2x auxiliary dry relays
  - iv. Dry relay max pass-through power: 24VDC @ 2A (resistive load)
- f. AUX Power:
  - i. 2x 12V @ 1A output
  - ii. 2x 24V @ 0.5A output
- g. Dimensions:
  - i. Length: 773mm / 30in
  - ii. Width: 499mm / 20in
  - iii. Height: 186mm / 7in
- h. Weight: 20kg / 44lb
- i. Operating Temperature: 0°C to 50°C / 32°F to 122°F
- j. Operating Humidity: 5% to 90%
- k. Compliance:
  - i. FCC Part 15 Class B
  - ii. ICES-3 Class B
  - iii. CE
  - iv. UKCA
  - v. RCM
  - vi. VCCI
  - vii. UL 294

- viii. CAN/ULC 60839-11-1
- ix. UL 62368-1
- x. CSA C22.2 No. 62368-1
- xi. IEC 62368-1
- xii. NDAA
- l. Connectivity:
  - i. Ethernet: 100/1000Mbps RJ-45 for network connection
  - ii. USB: USB 2.0
- m. Included Accessories:
  - i. Lock key
  - ii. Flat head screwdriver
- n. Mounting Hardware: Mounting plate and 6 screws (#12x1")

## 2.03 IO Controllers

### A. AX11 IO Controller by Verkada Inc.

#### 1. Description:

- a. Input/output controller which bridges up to 16 non-Verkada endpoint devices to a Verkada Command system.
- b. Provides 16 AUX inputs and outputs.
- c. Event Bridge: Bring door events with video analytics into Command while continuing to use existing 3<sup>rd</sup>-party access control or alarm system.
- d. Support for both Verkada (over RS-485) and 3rd party card readers (over Wiegand).
- e. 2x 12 Volt 4.5 Ah Sealed Lead Acid Rechargeable batteries for battery backup.

#### 2. Technical Specifications

- a. Power Consumption: 60W Max
- b. Power Supply: 110-240VAC, 50-60Hz
- c. Inputs: 16 Dry Inputs, Nominal 5VDC
- d. Relay Outputs:
  - i. 16 Dry Relays
  - ii. 1A/24VDC Contacts
- e. Aux Power:

- i. 16 inputs
- ii. 16 outputs
- iii. 2 External Outputs
- iv. 1A/12V Power Each
- v. 2A Combined Max
- f. Dimensions:
  - i. With Mount:
    - a. Length: 415.6mm / 16.36in
    - b. Width: 319.6mm / 12.58in
    - c. Height: 111.74mm / 4.4in
  - ii. Without Mount:
    - a. Length: 415.6mm / 16.36in
    - b. Width: 319.6mm / 12.58in
    - c. Height: 105.74mm / 4.16in
    - d. Weight: 8.3kg / 18.3lbs
- g. Operating Temperature: 0°C to 50°C / 32°F to 122°F
- h. Operating Humidity: 5% to 90%
- i. Compliance:
  - i. FCC
  - ii. CE
  - iii. UL 294
  - iv. UL 62368-1/CSA C22.2
  - v. CAN/ULC-60839-11-1:2016
  - vi. NDAA
- j. Connectivity:
  - i. Ethernet: 100/1000Mbps RJ-45 cable connector for network connection
  - ii. USB: USB 2.0
- k. Included Accessories:
  - i. Setup guide
  - ii. screw pack
- l. Mounting Hardware: Dry wall anchors (M8) and screws (M5)
- m. Network Settings:

- i. An Ethernet connection with DHCP must be used to connect the AX11 to the Local Area Network (LAN).
- ii. Firewall settings: TCP port 443, UDP port 123 (NTP time synchronization)

## 2.04 Multi-Format Card Readers

### A. 13.56 MHz Supported Credentials:

1. HID Seos, iClass SE, iClass SR and iClass with Secure Identity Object (SIO)
2. Mifare DESFire EV1/EV2/EV3, Classic
3. Able to read 37-bit card format support with no facility code.
4. NFC based credentials
5. 2.4 GHz based Bluetooth credentials
6. Apple Enhanced Contactless Polling (ECP) capable

### B. OSDP V2 enabled with secure channel.

1. The Contractor shall supply with (2) 120 Ohm end of line resistors for controller side and final reader side of the OSDP bus.

### C. Adjustable OSDP Baud rate from 9,600 to 115,200. The contractor shall set the card readers to communication at a minimum of 38,400 Baud rate. The default 9,600 is not acceptable.

### D. Wiegand enabled with OSDP V2 support with secure channel.

### E. Provide with integrated keypad where shown or required.

### F. Operating voltage: 12 VDC

### G. Current draw: 65mA average and 250mA peak @ 12VDC.

### H. Color: Black with Silver Bezel

### I. UL294 Outdoor and Indoor rated and IP66 rated with use of dielectric gel filled connectors.

### J. With attached pigtail

### K. Typical read range of 1.6" to 4".

### L. Provide adapter plate to mount on a single-gang mud ring as required.

### M. Firmware upgradable via OSDP, HID reader manager or pre-programmed cards.

### N. Provide the ability to transmit an alarm signal via OSDP or an integrated dry contact optical tamper switch if an attempt is made to remove the reader.

- O. An audio beeper and RGB light bar shall provide various tone and light sequences to signify: access granted, access denied, power up, and diagnostics.
- P. Card readers shall be HID Signo Model 40 for standard applications and Model 20 for mullion/jam applications.
- Q. No non HID Signo substitutions.

#### 2.05 HID Reader Manager

- A. The Contractor shall register the end user for the reader manager portal and application. If the Owner is already registered, the Contractor shall request access.
- B. The Contractor shall obtain the security keys from the reader manager portal and load them onto the card reader to allow the Contractor and Owner to manage the readers via Bluetooth without rebooting the reader.

#### 2.06 Badge Printing Software

- A. Verkada Badge Printing Software by Verkada Inc.

##### 1. Description:

- a. Verkada's badge printing software is a modern, simplified way to design and print employee and student badges. With badge printing, Verkada Access Control customers can now easily design, print and administer credentials across both physical badges and the Verkada Pass App, directly through Verkada Command.

##### 2. Key Features:

- a. **Simplified Badge Printing:** By embedding badge printing software within Verkada's user interface, customers can now manage the entire workflow with Verkada Command, saving time and software costs. Customers can design and print badges that leverage existing user profiles, active directory integrations, and of course, access control configurations — all from Verkada Command.
- b. **Printer Agnostic:** Verkada's badge printing solution is also printer agnostic and is compatible with most popular badge printers. Customers simply need to ensure that the badge printer driver is correctly installed on their computer and that their browser is able to recognize it. For customers without an existing badge printer, we have a recommended list of printers available on the Verkada Docs Page of our website.
- c. **Automated Profiles with SCIM:** Verkada's badge printing software extends the capabilities of Verkada Access Control and Automated user creation through Verkada's SCIM integration and bulk user import functionality. Verkada Access Control customers can automatically synchronize their user profiles from single sign-on service providers like Okta and Azure Active Directory to more easily manage and manage user credentials.

- d. Verkada Prox and NFC Cards: Verkada badge printing can print to any standard badge type supported on Verkada Access control — a full list is available on the Verkada website.

## 2.07 Access Control Badges

- A. Provide 500 smart card credentials with the following features:
  - 1. Operating Frequency: 13.56 MHz
  - 2. Microprocessor based
  - 3. 8k Byte application area
  - 4. Composite material printable on both sides.
  - 5. Standard CR-80 size, 30 mil thick.
  - 6. Sequential matching internal/external laser engraved numbering.
  - 7. 37-bit format with no facility code
  - 8. Provide with clear card holder and lanyard with clip for each card.
  - 9. Lifetime warranty.
  - 10. The credential shall be HID iCLASS Seos #5006PGGAN with 37-bit format number H10302.
    - a. No substitutions.

## 2.08 Voltage Regulator

- A. The Contractor shall provide voltage regulators to convert from, 24 VAC/DC power to 12 VDC power where required such as remote card readers where voltage drop from 12VDC is too great.
- B. Input: 24 VAC or 24 VDC
- C. Output: 12VDC up to 3A continuous load.
- D. Manufacturer:
  - 1. Altronix VR5T
  - 2. Or approved equal

## 2.09 Surge Protection for Low Voltage AC/DC power

- A. The Contractor shall provide a surge protector for all exterior devices being supplied by low voltage power. This does not include devices directly connected to a building where the risks of surges are negligible.
- B. There shall be a minimum of a 36" shielded cable from the surge protector to the device to allow for adequate clamping time.

- C. When protector is mounted in interior, dry or weather sealed enclosure:
  - 1. Nominal voltage rating of 24V AC/DC. Provide correct module per required voltage level if different from 24V.
  - 2. 20,000A surge current rating.
  - 3. Protects 2-pair per module.
  - 4. Accepts up to 10AWG cable
  - 5. Connect directly to ground.
  - 6. UL 497B listed
  - 7. Provide quantity of modules as required for the application.
  - 8. Provide base mounting plate as required for the application.
  - 9. Manufacturer:
    - a. Ditek DTK-2MB Mounting Base
    - b. Ditek DTK-2MHLP24B Surge Module
    - c. Or approved equal

#### 2.10 Power Supplies and Access Control Enclosures

- A. Provide a power supply/chargers and sub-assemblies to power various access controller boards, locking hardware and other access control or security system components. The Contractor shall select the appropriate enclosure, power supply and sub-assemblies for each application.
- B. Enclosures
  - 1. Shall be capable of accommodating power supplies, sub-assemblies and other manufactures access control controller boards when required.
  - 2. Wall mountable.
  - 3. Include a cam-lock and tamper switch.
  - 4. Include slotted finger duct management with cover, sufficient in size, to provide serviceability while concealing enclosure cables.
    - a. Color: Black.
    - b. Manufacturer and model: Panduit G1.5X1.5BL6 or equivalent.
- C. Power Supplies
  - 1. The Contractor shall provide an external power supply to source one fused 24VDC output for each electrified lock.
  - 2. 115 VAC input

3. 12VDC or 24VDC selectable outputs at:
    - a. 4 amp continuous power @ 12VDC or 24VDC.
    - b. 6 amp continuous power @ 12VDC or 24VDC.
    - c. 10 amp continuous power @ 24VDC.
  4. High capacity battery charging circuit.
  5. Form "C" supervision contacts for AC Low, AC Fail, and battery presence.
  6. Supervised Fire Disconnect.
  7. Low power Disconnect.
  8. Class 2 aux. output.
  9. UL 294 listed sub-assembly for access control.
- D. Batteries
1. The Contractor shall provide a minimum of (2) 12V, 7ah, sealed Absorbent Glass Mat (AGM) style batteries with F style terminals per 24VDC power supply and (1) 12V, 7ah per 12VDC power supply.
  2. Provide adequate battery backup as required by Authority Having Jurisdiction (AHJ) or a minimum of 4-hours.
  3. Manufacturer:
    - a. Interstate Power Patrol FAS1075
    - b. Power Sonic PS-1270
    - c. Or approved equal
- E. Sub-Assemblies
1. The Contractor shall provide all sub-assemblies to meet the project requirements
  2. Access Control Module
    - a. Independently controlled fused protected outputs:
      - i. Fail-Safe and/or Fail-Secure power outputs.
      - ii. Dry form "C" 5 amp rated relay outputs (fused).
      - iii. Any combination of the above
  3. Access Control System trigger inputs:
    - a. Normally open (NO) inputs.
    - b. Open collector sink inputs.

- c. Any combination of the above.
4. Fire Alarm Disconnect:
- a. Individually selectable for any or all outputs.
  - b. Latching or non-latch input FACP disconnect.
  - c. Normally open (NO), normally closed (NC) dry contact or polarity reversal from FACP signaling circuit trigger input.
  - d. LED indicates that the Fire Alarm Disconnect has been activated.
  - e. Form "C" relay output for auxiliary reporting.
5. Common monitoring features
- i. Network interface via LAN/WAN.
  - ii. Centralized dashboard for monitoring all power supplies. Provide appropriate hardware/software required.
  - iii. Remote reporting of status via email and/or SNMP trap messaging.
  - iv. AC, low battery and battery presence monitoring.
  - v. Alert messages of System Service required.
  - vi. System log.
  - vii. On demand determination of system status.
  - viii. Reset of individual outputs as required for remote diagnostics.
  - ix. Monitor enclosure temperature.
  - x. Static or DHCP IP address configuration.
  - xi. SSL Secure Sockets Layer encryption.
6. Voltage Regulator
- a. The Contractor shall provide a voltage regulator to provide constant 5VDC or 12VDC outputs for access control boards, modules or other applicable components as well as a voltage regulator for door hardwiring or controllers requiring 12VDC.
  - b. 24vdc Input.
  - c. Selectable 5 or 12VDC output.
  - d. Output rating of 6amp max.
  - e. Stackable with both Networkable and dual input power distribution modules for space savings.
7. Power supplies and sub-assemblies shall be manufactured by Altronix or approved equal:
- a. eflow4NB - 4amp 12vdc/24vdc power supply (UL listed Sub-assembly).

- b. eFlow6NB - 6amp 12vdc/24vdc power supply (UL listed Sub-assembly).
- c. eFlow104NB - 10amp 24vdc power supply (UL listed Sub-assembly).
- d. ACM8 - Eight (8) output, fused Access Control Module (UL listed Sub-assembly).
- e. ACMS8 – Dual input, eight (8) output, fused Access Control Module (UL listed Sub-assembly).
- f. Linq2 - Network Communication Module (UL listed Sub-assembly).
- g. Linq8PD - Dual input, eight (8) output, fused Network Communication Module (UL listed Sub-assembly).
- h. PDS8 - Dual input, eight (8) output, fused power distribution module (UL listed Sub-assembly).
- i. VR6 - Voltage Regulator (UL listed Sub-assembly).
- j. RSB2 – Rocker switches with mounting bracket.

## 2.11 Cabling

- A. Provide cabling per manufacturer’s recommendations and code requirements for riser rated, plenum, and non-plenum cable types.
- B. UTP data cabling required will be provided, installed, terminated and tested by the Division 27 structured cabling Contractor.
- C. UTP patch cables will be provided and installed by the Owner in the IDF and provided by Owner and installed by Contractor at the door. The EACS Contractor shall provide the Owner a list of patch cable lengths at the door side.
- D. Wiegand cables for electronic access-controlled doors shall be a composite bundled cable and include the following cables and conductor counts:
  - 1. Card reader, Wiegand – 6 conductor, 22 awg shielded.
  - 2. Lock power – 4 conductor, 18 awg unshielded.
  - 3. Door contact – 2 conductor, 22 awg unshielded. Furnish and install a second 22 awg, 2-conductor cable when the door contact connects to both the access control system and intrusion detection system.
  - 4. Request to exit and/or latch detection/spare – 4 conductor, 22 awg unshielded
  - 5. Manufacturer (Wiegand):
    - a. Belden (Wiegand) #658AFS
    - b. General Cable (Wiegand) #4EPL1S
    - c. Superior Essex (Wiegand) #AC-A1x-68
    - d. West Penn #AC251822B

- e. Or approved equal
- E. Cables for RS-485/OSDP in panel or in-panel controller shall be: 2 conductor stranded, twisted, 24 awg, 100% foil shield with 90% tinned copper braid shield with drain, 120 ohm nominal impedance.
  - 1. Manufacturer:
    - a. Belden #82841
    - b. Or approved equal
- F. Cables for controlled doors shall be 16-gauge, 2-conductor, unshielded, stranded cable per controlled door. The cable shall be white in color and plenum rated.
- G. Cables for intercom trigger wires, door release buttons, and panic/lockdown buttons shall be 18-gauge, four-conductor, unshielded, stranded cable. The cable shall be white in color and plenum rated.
- H. Cables for intercom trigger wires or door contacts shall be 18-gauge, four-conductor, unshielded, stranded cable. The cable shall be white in color and plenum rated.

#### 2.12 Door Contacts/Door Position Switches (DC)

- A. Door contact locations as indicated on plans. The Security Contractor shall be responsible for the connection of all door position devices to the access control system and other systems if sharing the same door position switch. Door position devices shall be integral to the door hardware whenever possible. The Contractor shall refer to the door hardware schedule and coordinate with the door hardware Contractor on locations and requirements.
- B. Sealed and potted magnetic reed switch in contact housing.
- C. Door contacts shall be appropriately sized for any established holes within door frames.
- D. Parts provided are basis of design. Determination of final part number is the responsibility of Contractor.
- E. Provide color that matches door as close as possible.
- F. Provide recessed switch whenever possible.
- G. Provide armored whip for surface mount contacts.
- H. Provide GRI (George Risk Industries, Inc.) 180 Series for recessed applications.
  - 1. Magnasphere
  - 2. Nascom
  - 3. Or approved equal.

- I. Provide GRI (George Risk Industries, Inc.) 4400 series for surface mount applications.
    - 1. Magnasphere
    - 2. Nascom
    - 3. Or approved equal.
  - J. Provide GRI (George Risk Industries, Inc.) MC-180 Series for hollow top channel applications.
    - 1. Magnasphere
    - 2. Nascom
    - 3. Or approved equal.
  - K. Provide GRI (George Risk Industries, Inc.) 4532 Series for overhead door applications.
    - 1. Magnasphere
    - 2. Nascom
    - 3. Or approved equal.
- 2.13 Request to Exit (REX) Devices
- A. The Security Contractor shall provide surface mount type REX devices at locations where indicated on plans.
  - B. Independent adjustable beam pattern.
  - C. Provide with mounting plate or wall mounting plate to mount over a single-gang backbox when required.
  - D. Provide white or black color that matches door as close as possible.
  - E. (2) Form C relay contacts each rated 1 A at 30 VAC or VDC for resistive loads.
  - F. DC Power draw: 39mA max @ 12 VDC.
  - G. Dimensions: 1.8”H x 6.75”W x 1.75”D.
  - H. Utilize contact closure REX hardware built into the handle or crashbar whenever possible.
  - I. Provide Bosch DS160/161
    - 1. Provide with TP160/161 mounting plate when mounted over a backbox.
    - 2. Or approved equals.

2.14 Electrified Hardware (EH)

- A. The Security Contractor shall be responsible for connecting all electrified hardware for the access control system at each specified location. This shall include providing centralized power supplies located next to or integral to the access control panels.
- B. The Contractor shall reference the door schedule for the specified lock type and the existing door hardware manufacturer for the correct model.

2.15 ADA Power Assist Door Operator Integration Relays

- A. The Contractor shall provide all necessary relays to interface to the ADA operators at access-controlled doors with ADA door operators. The ADA operator interface shall be managed by the access control system. Local “smart relays” are not allowed.
- B. Hardwired paddles
  - 1. Provide with a DPDT relay. Replace existing relay in paddle as necessary.
  - 2. Manufacturer:
    - a. Altronix RB1224
    - b. Or approved equal
- C. Wireless paddles
  - 1. Provide with DPDT wireless relay transmitter and receiver. Replace existing relay in paddle as necessary.
  - 2. Manufacturer:
    - a. Larco Atek 234475 transmitter and Larco Atek 233804 receiver
    - b. Or approved equal

2.16 Door Release Button, Under Counter

- A. SPDT, momentary push button
- B. Guard ring around button to prevent accidental activation
- C. Mount with button facing back of desk
- D. Coordinate exact mounting location after deck or counter is fully complete and the sitting position has been decided.
- E. Manufacturer:
  - 1. Alarm Controls TS-18
  - 2. Or approved equal

## 2.17 Panic/Duress/Lockdown Buttons

- A. Exact device type and style to be coordinated with Owner prior to approval or purchase. A selection of button options shall be presented to the Owner for review.
- B. Button shall be hardwired.
- C. Provide with a 1k/2k end of line (EoL) pre-built resistor pack. GRI (George Risk Industries, Inc.) 6644 series or approved equal.
- D. Buttons within a single space may be wired in parallel and be programmed as a zone.
- E. Manufacturer:
  - 1. Under desk – Honeywell 269R
  - 2. Wall push type – STI-USA Stopper Station #SS2432LD-EN
    - a. Blue, flush cover, latching with key to unlock, Text = LOCKDOWN. Coordinate exact text to use with Owner prior to purchase. Provide with appropriate power supply connection for illumination.
  - 3. Or approved equals

## 2.18 Master Badge Printers and Badging Stations

- A. The Contractor shall provide a color badge printer and badging station at the following locations:
  - 1. Printer shall be setup in rooms 550.
  - 2. Badging/enrollment station shall be setup in room 552.
- B. Provide a color badge station with the minimum following features:
  - 1. Resin Thermal Transfer printing at 300 dpi,
  - 2. Dual sided printing.
  - 3. 16.7 million colors and 256 shades per pixel
  - 4. 75 cards per hour @ YMCKK with transfer and dual-sided printing
  - 5. Accepts standard CR-80 card sizes
  - 6. Accepts card thicknesses from 0.03” – 0.05”
  - 7. 100 card capacity input card hopper
  - 8. USB and Ethernet with internal print server
  - 9. GSA FIPS-201 approved
  - 10. 3.2” touch screen display

11. Three-year printer warranty and lifetime print head warranty.
- C. The Contractor shall supply enough HDP film ribbons and other necessary supplies to be able to print 350 dual sided badges. Supplies shall be certified by HID Fargo.
- D. The badge printer shall be an HID Fargo HDP6600 Photo ID System.
  1. Or approved equal.
- E. Provide with a HD USB camera and tripod for face capture.
  1. 1080P video capture
  2. Minimum of 8 megapixel still capture
  3. Autofocus
  4. Logitech or approved equal

#### 2.19 Intercoms

- A. TD52 Video Intercom by Verkada Inc., two(2) total
- B. Description: audio-video PoE interior/exterior intercom with integrated camera, microphone, speaker, call button, and door controller.
- C. Technical Specifications:
  1. On-board Storage: 256GB
  2. Power Consumption:
    - a. With IR: 37 to 57V, 0.34 to 0.22A, 12.41W
    - b. Without IR: 37 to 57V, 0.25 to 0.16A, 9.39W
    - c. With Heater: 37 to 57V, 0.48 to 0.31A, 17.7W
  3. Power Input:
    - a. IEEE 802.3af PoE
    - b. IEEE 802.3at PoE+ (operating below -8.5°C / 16.7°F with IR enabled)
  4. Connectivity: Ethernet: 10/100Mbps RJ-45 cable connector for Network/PoE connection
  5. Operating Temperature:
    - a. 802.3af POE : -20°C to +50°C / -4°F to 122°F
    - b. 802.3at PoE+: -40°C to +50°C / -40°F to 122°F
  6. Operating Humidity: 0 to 90%
  7. Inputs/Outputs:

- a. 2x dry inputs
  - b. 1x dry relay, 30VDC @1A (resistive load)
  - c. 1x RS-485 port
8. Dimensions:
- a. Length: 238mm / 9.4in
  - b. Width: 128mm / 5in
  - c. Height: 44mm / 1.7in
9. Weight: 1.1kg / 2.3lb
10. Materials: Aluminum, steel, polycarbonate
11. Included Accessories:
- a. Flush mount adapter plate
  - b. t10 screwdriver
  - c. mounting hardware kit
  - d. grommet punch
12. Resistance:
- a. IK08
  - b. IP66
13. Compliance and Safety:
- a. FCC
  - b. ICES
  - c. NDAA
14. Camera Specifications:
- a. Sensor Resolution: 5MP (2688 x 1944 pixels)
  - b. Lens Type: Fixed
  - c. Image Sensor: 1/2.8" Progressive CMOS
  - d. IR Range: 15m / 50ft in low light
  - e. Iris: Fixed
  - f. Aperture: F2.0
  - g. Field of View:
    - i. Horizontal: 134°

- ii. Vertical: 100°
- iii. Diagonal: 169°
- h. Focal Length: 2.12mm

15. Audio Specifications:

- a. Audio Streaming: Two-way, fully duplex with echo cancellation and noise suppression.
- b. Audio Output:
  - i. 5W speaker
  - ii. 90dB SPL at 1m / 3.3ft
- c. Audio Input: 2 omnidirectional digital MEMs microphones
- d. Available Accessories:
  - i. Surface Mount: ACC-INT-SURF
  - ii. Rain Hood: ACC-INT-HOOD
  - iii. Trim Plate: ACC-INT-TRIM
  - iv. Angle Mount: ACC-INT-ANGLE
  - v. 2-Wire Converter: ACC-POE-2WIRE

2.20 Intercom Receivers

- A. Verkada Desk Station, two(2) total
- B. iPad-based application
- C. ACCX-TBL-STD-1 Stouchi Tablet Stand via Verkada
- D. ACCX-TBL-1 Apple iPad via Verkada
  - 1. Screen Size: 10.2in
  - 2. Connectivity: WiFi
  - 3. Storage: 64GB
- E. Verkada Desk Station App for iOS

2.21 Verkada Pass Application:

- A. Supported Operating Systems:
  - 1. iOS
  - 2. Android

## 2.22 Disconnecting Door Cord

- A. The Contractor shall furnish and install disconnecting door cords for all removable mullions.
- B. Polarized quick disconnecting plug
- C. Integrated stress relief chain
- D. Surface mountable
- E. Manufacturer:
  - 1. Honeywell Resideo 69 Disconnecting Door Cord

## 2.23 Door Loops (Power Transfer Loops)

- A. Provide new power transfer loops at the top of the doors for retrofit applications.
- B. Provide all necessary materials and labor to connect existing electrified panic hardware and new access control system where appropriate.
- C. Power transfer loop shall be armored stainless steel door loop with metal end caps.
- D. Minimum interior diameter of 3/8" and exterior diameter of 1/2".
- E. Field verify the lengths required for each door.
- F. Provide RCI #9508.
  - 1. Or approved equal.

## Part 3 - Execution

### 3.01 Installers

- A. Installation shall be performed by technicians that have successfully completed the Verkada Certified Engineer (VCE) program. For more information, visit [www.verkada.com/partners/trainings](http://www.verkada.com/partners/trainings).

### 3.02 Physical Security Systems and Intercom Integration

- A. The electronic access control system shall be integrated with the video surveillance system.
  - 1. The access control interface shall be via an Ethernet interface. Contact closure integration shall only be utilized if the system is existing and cannot be upgraded to Ethernet. The Contractor shall supply all necessary expansion boards if contact closure integration will be required.
  - 2. The access control/video surveillance integration shall be via a native IP interface.

- B. The Contractor shall provide any and all licensing to integrate the systems together including any additional items to be added to the yearly maintenance agreement.
- C. The following minimum features shall be included in the integration; the following list is not all inclusive or exhaustive. The integration shall be a turnkey solution:
  - 1. Call up live and/or recorded video from an alarm or event.
  - 2. Graphical maps showing camera icons.
  - 3. "Mouse over" camera viewing through the DVR/NVR browser and graphical maps.
  - 4. Playback controls for recorded video.
  - 5. Camera names brought in from the VMS.
  - 6. PTZ camera mouse control.
  - 7. Database entries for intrusion arm/disarm events on individual keypads.
  - 8. Database entries for intrusion alarm events.
  - 9. Graphical map symbols for intrusion keypads tied to camera views.
  - 10. Intrusion devices or zones tied to camera views.
  - 11. Alarm pop-ups and events shall include instructions and a sequence of operation to deal with events on the Intrusion Detection System, Video Management System and Electronic Access Control System.
  - 12. Intercom pop-ups when call button is pressed with the ability to unlock the door.
  - 13. Time syncing via common NTP server.
- D. The Contractor shall set up a meeting between the Owner, Consultant and manufacturer to determine the exact functionality of the integration before the integration starts.

### 3.03 System Programming

- A. The Contractor shall provide all programming necessary for a turnkey system.
- B. Programming shall include but not limited to setting all required IP addressing, setting passwords, firmware upgrades, adding the devices into the software, partitioning, area/zone creation, device naming, mapping, cross system integration, schedules, basic card holder groups, access levels, etc.
- C. The Contractor shall be responsible for schedules, card holder groups, access levels, etc required to make a building functional for certificate of occupancy requirements or basic facility use.

### 3.04 System Mapping

- A. The Contractor shall provide a satellite level screen shot map showing exterior devices. These maps shall include drill down links to access the building floor plans where all interior and exterior devices are shown. The overview satellite map shall show alarms signifying there is an alarm in the building to draw attention quickly to the correct building then floor plan.
- B. The maps shall have links to the other levels/sections as well as the global map.
- C. Integrated cameras shall show their approximate field of view.
- D. The floor plans shall include all access-controlled doors, controlled overhead doors and integrated devices.
- E. Alarm icons for lockdown, panic and other alarms.

### 3.05 System Partitioning, Zoning and Naming

- A. The Contractor shall program each facility to be in its own partition. Some facilities may require sub-partitions to control user access to certain areas. Each manufacturer may use different names for partitions, zones, areas, etc. Adapt as required.
- B. All devices, inputs, outputs and other applicable software/hardware entities shall be named by the Contractor which includes naming at the administration/interface level in addition to the user facing interface.
- C. As a basis to start, the following partition, zoning and naming shall be followed:
  - 1. Partition: Building name
    - a. Zone 1: Building name and zone name such as exterior, 1<sup>st</sup> floor, etc.
      - i. Device 1: Building name and floor/zone name - Door # or device name
      - ii. Device 2: Building name and floor/zone name - Door # or device name
      - iii. Repeat as required
    - b. Zone 2: Building name and zone name such as 2<sup>nd</sup> floor, etc.
      - i. Device 1: Building name and floor/zone name - Door # or device name
      - ii. Device 2: Building name and floor/zone name - Door # or device name
      - iii. Repeat as required
    - c. Repeat zones as required.
  - 2. Repeat Partitions as required.
- D. The Owner shall have the final say. The Contractor shall schedule a coordination meeting with the Owner and Consultant to coordinate actual project structure and naming prior to starting any programming.

### 3.06 Installation Procedures

- A. The Contractor shall cable all controlled or monitored doors, intercoms, etc. and terminate this cable in the access control panels no less than 3 weeks prior to substantial completion regardless of the status of the field devices such as door hardware, card readers, intercoms, etc.
- B. The Contractor shall program the access control system no less than 2 weeks prior to substantial completion so when field devices are installed and terminated, associated door hardware and full system functionality can be tested. Programming shall include all doors, associated inputs, outputs, and interoperability regardless of final field device status.
- C. The Contractor shall perform final connections and testing onsite when field devices such as electrified door hardware has been installed.

### 3.07 ADA Power Assist Door Operator Interface

- A. Certain electric locking mechanisms with card access shall be connected (hardwired) to the ADA Power Assist Door Operator pushbutton. In this scenario, card reader shall be interfaced to the ADA Door Operator pushbutton to approve activation of door motor based on card authorization or pre-programmed security schedule.
- B. Door motor/operator shall not be energized until authorized by the security system to prevent operation and eventual burn-out of the motor from hitting the button with the security system activated.
- C. The door shall allow free egress via push paddle regardless if the door is in a locked or unlocked state.
- D. The paddles and operators shall be tied through the access control system, so the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
- E. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.
- F. All logic and programming shall be controlled through the access control system. Local logic boards, smart relays, etc. shall not be utilized.

### 3.08 Door Release Buttons

- A. Door release buttons shall be tied through the inputs of the access control system.
- B. The button release shall be interfaced in a way that the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
- C. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

### 3.09 Intercoms and Remote Intercom Release

- A. Remote intercom release relays shall be tied through the inputs of the access control system.
- B. The intercom release shall be interfaced in a way that the actions appear in the device trees, are mappable, logged and can be scheduled or overridden.
- C. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

### 3.10 Panic/Duress Buttons

- A. Panic/Duress buttons shall be tied through dedicated inputs of the access control system.
- B. The buttons shall be interfaced in a way that the actions appear in the device trees, are mappable and logged.
- C. When a panic/duress button is activated an event to action shall occur notifying client workstations. These alarms shall be activated on a map with a clear red flashing icon. Any associated or integrated cameras shall pop-up.
- D. Additional actions may be required and shall be coordinated with the Owner and Consultant.
- E. Contractor shall provide all necessary cable, hardware, relays, I/O modules, interfaces, and system programming to support all necessary functionality.

### 3.11 Fire Alarm Interface

- A. Certain electric locking mechanisms shall be connected (hardwired) to the building fire alarm system for fail safe release upon any fire alarm. A single low voltage/low current normally closed dry contact from the fire alarm system shall be provided by others in each room with Security Control Panels. This contact shall open on any fire alarm condition.
- B. The access control system shall provide an output to the fire alarm system to release mag hold opens on alarm.
- C. The fire alarm system shall provide an output to the access control system to trigger various rules and actions in the access control system.
- D. All doors equipped with mag locks shall be connected to a fire alarm relay to release on fire alarm with the exception of holding rooms within courts.
- E. Knox box key switch integration shall release all maglocks at noted plan locations upon activation.
- F. All doors secured with a card reader in and out shall be connected to a fire alarm relay to release on fire alarm with the exception of Holding Room 265.

- G. The Contractor shall provide all additional UL listed failsafe relays and power supplies as necessary to interface to this contact and unlock all of these doors.
- H. The Contractor shall verify fail safe and fail secure locking requirements with the Architect, door hardware contractor/provider and the AHJ.

### 3.12 Magnetic Door Hold Open Interface

- A. Magnetic door hold opens identified to be controlled by the security system shall be interfaced to the access control system via I/O expansion modules.
- B. These shall be capable of being controlled by schedule or by override in the event of an emergency.
- C. Contractor shall provide all necessary cable, hardware, I/O modules, power supplies, interfaces, and system programming to support all necessary functionality.

### 3.13 Passwords

- A. The Contractor shall coordinate a secure project password with the Owner and Consultant. This password shall be documented by the Contractor and used for all devices.

### 3.14 Testing

- A. Refer to Section 27 60 00 for additional requirements.
- B. Prior to energizing or testing the system, ensure the following:
  - 1. All products are installed in a proper and safe manner per the manufacturer's instructions.
  - 2. Dust, debris, solder, splatter, etc., is removed.
  - 3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
  - 4. All products are neat, clean, and unmarred, and parts are securely attached.
- C. Contractor shall ensure that each device in the security system is functioning normally and in such a manner as to meet the functional and performance requirements in this specification.

### 3.15 Training

- A. Refer to Section 27 60 00 for additional requirements.
- B. Provide system operations, administration, and maintenance training by factory-trained personnel qualified to instruct.
  - 1. Contractor shall provide up to 6 hours of scheduled and dedicated training time in three (3) two (2) hour sessions for administration and investigation.

2. The Contractor shall provide up to 2 hours of dedicated training time for badge creation, printing and printer maintenance.
3. Provide printed training materials for each trainee, including product manuals, course outline, workbook or student guides, and written examinations for certification.
4. Provide hands-on training with operational equipment.
5. Training shall be oriented to the specific system being installed under this contract as designed and specified.
6. Contractor shall provide all necessary documentation of system operating parameters prior to scheduled training sessions.

### 3.16 Warranty

- A. Refer to Section 27 60 00 for additional requirements.

### 3.17 Installation Practices

- A. All services provided shall be professional and conform to the highest standards for industry practices. The Owner reserves the right to halt any installation due to poor workmanship. All work shall be defect free, and the installer shall replace, at their expense, any work found to be defective.
- B. The Owner reserves the right to halt any installation due to failure of Contractor to observe installation-free periods due to instructional or administrative requirements. To the maximum extent possible, the Owner will provide advance notice of such periods.
- C. Contractor is responsible for providing a complete and functional system.
- D. All manufactured items, materials, and equipment shall be applied, installed, connected, erected, used, and adjusted as recommended by the manufacturers, or as indicated in their published literature, unless specifically noted herein to the contrary.
- E. Contractor shall follow these standards and approved submittals for locations of power supplies. The Owner intends to limit the number and location of power supplies to facilitate more effective long-term support and maintenance of the system.
- F. Installation of locks on fire rated doors which require any modification or drilling of the door shall be done in accordance with the NFPA by a properly qualified and certified installer. The doors field WH-ETL labelling shall be properly updated.

### 3.18 Coordination

- A. Contractor shall provide up to 4 hours (up to two, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with sequence of operation, rule creation and coordination as requested by Owner or Consultant.

### 3.19 Aesthetics

- A. All cables and equipment terminating at panels frames shall be vertically straight, with no cables crossing each other, from twelve inches inside the ceiling area to the termination block.
- B. All cable bundles shall be combed and bundled to accommodate individual termination block rows and panels.
- C. For any given telecom room, a horizontal and vertical alignment for all mounting hardware will be maintained to provide a symmetrical and uniform appearance to the distribution frame.
- D. All surface-mounted devices shall be firmly secured level and plumb
- E. All rack mount equipment shall be securely installed.

### 3.20 Hardware Layout

- A. Hardware positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

### 3.21 Server Installation Practices

- A. Verify that the manufacturer approved server hardware, OS meets the Owner's IT standards prior to ordering.
- B. Coordinate server power, cooling, and mounting requirements with Owner prior to installation.
- C. Coordinate virus scan/security software requirements with Owner and manufacturer prior to installation.

### 3.22 Device Cabling/Wiring Installation Practices

- A. All external wire and cables shall be supported at least every five feet from the structure or as required to maintain not more than 12" cable sag between supports and without over tensioning the cables. Provide j-hooks as needed where cable tray or raceway is not available.
- B. This Contractor shall coordinate installation with Division 27 cabling Contractor to ensure there is at least 2-inches of physical separation between security cabling and voice/data cabling throughout cable path. Voice/data cabling Contractor has first claim to cable tray.
- C. All cables, regardless of length, shall be labeled within 18" of both ends with an identifier that is keyed to the door, room, or corridor number as identified.
- D. All cables shall have 6-foot service loops neatly coiled in the equipment room. During initial cable rough-in, this Contractor shall have sufficient slack to route anywhere within the equipment room.

- E. Cabling shall be adequately supported with Velcro wire wraps and horizontal support cable managers fastened to rack frame. Cables shall be dressed in a neat and orderly fashion. Any cabling or equipment installation that is deemed unacceptable by the Owner or Consultant shall be replaced or corrected by the Contractor at no additional cost. Plastic zip ties are not allowed.
- F. All cables are to run at right angles to the structure, placed above the ceiling in halls or corridors.
- G. Cables shall not run above red iron joist.
- H. Contractor shall make every effort to conceal wiring and other apparatus into walls, floors, and ceilings, assuming code and good engineering practice allows and suggests.
- I. Ties and straps shall be installed snugly without deforming cable insulation. Ties shall be spaced at uneven intervals not to exceed four feet. No sharp burrs shall remain where excess length of the cable tie has been cut.
- J. Contractor shall notify Owner immediately if obstruction or hazard is discovered in a pathway provided by others.
- K. Cable shall be stored and handled to assure that it is not stretched, kinked, crushed, or abraded in any way. Bend radiuses shall meet manufacturer specifications and/or recommendations. Cable shall not be installed in ambient temperatures or moisture conditions above or below the manufacturer's rating.
- L. No splices shall be installed in any cable.

### 3.23 Cable Termination

- A. Termination hardware (blocks and patch panels) positioning and layout shall be reviewed and approved by the Owner prior to construction. The review does not exempt Contractor from meeting any of the requirements stated in this document.

### 3.24 Elevator Interface

- A. The Contractor shall furnish and install an elevator interface box outside of the elevator equipment room when card readers are located with the elevator cab.
  - 1. The Contractor shall provide an elevator security junction box located outside of the Elevator Machine Room, for interface of security devices to be located within the elevator cab(s). This requirement complies with ANSI A17.1 code which prevents work within the Elevator Machine Room, other than specific elevator work.
  - 2. Security J-box shall include a keyed lockable door. Additionally, security J-box shall have proper terminal strips suitable for terminating all cables and mounting electronics within the J-box.

3. The Electrical Contractor shall provide 120VAC power to this enclosure as required to power the electronics.
  4. The Contractor shall provide any data cables to this enclosure as required.
  5. Electronics for video surveillance such as coax to IP converters may be placed within this enclosure.
  6. Coordinate exact location of elevator security junction box with the Elevator Contractor, Architect, and Consultant, prior to installation.
  7. Provide all cabling as required between the security system and elevator security J-box for all elevator interfaces.
  8. Provide all required interface points for connecting to elevator relays and travel cables.
  9. Cables entering the elevator security J-box and elevator equipment room shall be appropriately labeled by the Contractor, so that the Elevator Contractor can connect the appropriate wires to the elevator controllers. Wires should be individually labeled to separate them from other elevator functions and to assist the Elevator Contractor in making proper connection points.
  10. The Contractor shall refer to plans for elevator control functions specifics.
  11. The Contractor shall coordinate with the Elevator Contractor to ensure the appropriate cable is located within the elevator travel cable.
  12. Software level integration via IP is acceptable.
- B. Provide for Access Control System Interface and Programming, as follows:
1. Specific Elevator Operation
    - a. Elevator Cab 3
      - i. The contractor shall configure elevator cab 3 as a secured device requiring an access granted event before the elevator can be called at every floor's lobby.
      - b. The contractor shall provide the ability to disable/enable call buttons at any of the three cabs by way of schedules utilizing the card access system and Verkada's AX11 I/O controller, independently, as indicated on drawings.

### 3.25 Fire Stopping

- A. Fire stopping of openings between floors, fire-rated walls, and smoke-rated walls, created by others for This Contractor to pass cable through, shall be the responsibility of the This Contractor. Sealing material and application of this material shall be accomplished in such a manner that is acceptable to the local fire and building authorities having jurisdiction over this work.
- B. Any openings created by or for This Contractor and left unused shall be sealed up by This Contractor.

- C. This Contractor shall be responsible for creating a waterproof seal in and around any openings that This Contractor creates from the structure to the outside environment.

### 3.26 System Inspection

- A. Contractor shall coordinate with project representative for inspection after Contractor has completed testing of entire system.
- B. Contractor shall have trained Contractor representative and testing equipment on site during inspection to assist with spot verification of tests.

### 3.27 Labeling

- A. Contractor shall neatly label all security devices and cabling at both ends. All labels shall be on Project as-built drawings.

### 3.28 Documentation

- A. Upon completion of the installation, Contractor shall provide full documentation sets to the Consultant for approval as described in section 27 60 00. All documentation shall become the property of the Owner.
- B. Documentation shall include the additional specific items detailed in the subsections below:
  - 1. Contractor shall provide hard copy and electronic forms of the final test results.
  - 2. Contractor shall provide a document including the following:
    - a. Door label/identifier
    - b. Location of each drop by orientation/permanent landmark in the room
    - c. Contractor shall provide accurate as-built Construction Drawings. The drawings are to include cable routes and device locations.

### 3.29 Pre-Check out

- A. The Contractor shall demonstrate the following to Owner during system demonstration.
  - 1. The card readers are fully installed and functional.

### 3.30 Final Acceptance

- A. In addition to closeout requirements in section 27 60 00, This Contractor shall demonstrate the following before final approval.
  - 1. Owner training is complete.
  - 2. Punch list items are complete.
  - 3. As-built documentation is complete and submitted to Owner/Consultant.

3.31 Final Procedures

- A. Perform final procedures in accordance with section 27 60 00.

**End of Section**