

Attachment D

Section 27 64 00 – Video Surveillance System

Part 1 - General

1.01 Scope

- A. This specification section covers the furnishing and installation of a new and complete, low-voltage, Video Management System (VMS).
- B. Contractor shall furnish and install video surveillance hardware devices, mounting brackets, and other components of the system as required.
- C. Contractor shall furnish and install all video management system related software to allow this system expansion. Software includes required licensing cameras, devices, 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.

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 14 - General Elevator Requirements
- B. Section 27 60 00 – Physical Security General Requirements
- C. Section 27 62 00 – Electronic Access Control System

1.04 Definitions

- A. ACS – Access Control System
- B. API – Application Programming Interface
- C. CCD – Charge Coupled Device
- D. CCTV – Closed Circuit Television
- E. CMOS – Complementary Metal-Oxide Semiconductor
- F. DHCP – Dynamic Host Configuration Protocol
- G. DNS – Domain Name System

- H. DPDT – Double pole, double throw
 - I. FPS – Frames Per Second
 - J. IP – Internet Protocol
 - K. LAN – Local Area Network
 - L. LPR – License Plate Recognition
 - M. NFC – Near Field Communications
 - N. NVR – Network Video Recorder
 - O. ODBC – Open Database Connectivity
 - P. PoE – Power Over Ethernet
 - Q. RAM – Random Access Memory
 - R. SPDT – Single pole, double throw
 - S. SSL – Secure Sockets Layer
 - T. SSO – Single sign-on
 - U. TCP – Transport Control Protocol
 - V. UPS – Uninterruptible Power Supply
 - W. VMS – Video Management System
 - X. WDR – Wide Dynamic Range
 - Y. Refer to Section 27 60 00 for additional definitions.
- 1.05 Reference Standards and Codes
- A. Refer to Section 27 60 00 for additional requirements.
- 1.06 Qualifications
- A. Refer to Section 27 60 00 for additional requirements.
- 1.07 Pre-Construction Submittals
- A. Refer to Section 27 60 00 for additional requirements.
- 1.08 Pre-installation Procedures
- A. For in-use, existing facilities or retrofit projects, the Contractor shall assign all applicable electronics IP addresses and secure passwords prior to being delivered to the project or installed. Confirm password with Owner and Consultant prior to setting them.

1.09 Construction Progress Submittals

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

1.10 Closeout Submittals

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

1.11 General Summary

- A. System shall include IP cameras utilizing cloud-based storage as described in this section and on the drawings.
- B. The Category 6 cabling and patch cords to each camera shall be provided by the structured cabling Contractor. Patch cords for the IP cameras to the network switches shall be installed by the Owner with participation by this Contractor. Patch cords from the IP Camera to the data jack shall be installed by this Contractor.
- C. System installation shall include, but not be limited to, installation, programming, and configuration of system components as well as all associated software upgrades, patches, and maintenance for the first year.
- D. Contractor is responsible for meeting with Owner's representative at time of camera installation to verify exact placement and view of each camera to ensure coverage area is as intended.

1.12 Drawing Sheets

- A. All cameras are designated with a C symbol on the project drawings. PTZ (Pan Tilt Zoom) cameras are designated with PTZ text next to the C symbol.
- B. New cameras and Category 6 cabling shall be provided at each location with a label "#C##-#_"

1.13 Mounting and Installation

- A. Contractor shall provide the appropriate mounting hardware for all ceiling types and wall types where cameras shall be located. Plastic anchors are not allowed.
- B. Wall mounted 180/360 degree or multi-sensor cameras shall be mounted horizontally on a wall arm, gooseneck, parapet, pendant or other similar method.
- C. Exterior cameras shall be mounted on a wall arm/gooseneck.
- D. Cameras mounted in droptile shall have a tile support bridge with a steel support cable connected to structure to prevent tile sagging, theft and vandalism. Utilizing toggle bolts or other screw in anchors is not allowed.

1.14 Code and Standard Requirements

- A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association and any other codes as required by the AHJ.

- B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- C. Cameras shall meet the following standards:
 - 1. MPEG-4:
 - a. ISO/IEC 14496-10 AVC (H.264)
 - 2. Networking:
 - a. IEEE 802.3af (Power over Ethernet)
 - 3. Network Video:
 - a. ONVIF Profile S or better

Part 2 - Products

2.01 Substitutions

- A. No exceptions

2.02 Manufacturer

- 1. Manufacturer shall be Verkada Inc.
 - a. Headquarters: 405 E 4th Ave. San Mateo, CA 94401
 - b. Toll Free: (888) 829-0668
 - c. General: team@verkada.com
 - d. Sales: sales@verkada.com
 - e. Website: www.verkada.com
 - f. Non-Verkada Inc. products shall be limited to those identified as compatible within the product descriptions below.

2.03 Licensing

- A. Provide all required licenses for the specified system components.
- B. All system component licenses shall be 5-year licenses.

2.04 Cameras and Devices

- A. General:
 - 1. The contractor shall coordinate with the owner for IP addressing, network configuration, QoS and multicast network configuration.

2. The Contractor shall select the appropriate mounting hardware for the situation.
3. Multi-sensor 180 and 360 cameras shall have each sensor optimally calibrated independently to the conditions.
4. The contractor shall coordinate with the owner for IP addressing, network configuration and multicast network configuration.
5. All cameras regardless of manufacturer/model shall have a consistent user name and non-standard password set. This shall be documented and provided to the owner and consultant prior to inspections.

B. Camera Outlined

1. Interior and exterior versions shall reflect project plans and/or environment.
2. Onboard Storage: 512GB
- 3.

Camera Type	Model
1	Verkada CD42
2	Verkada CD52
3	Verkada CD62
4	Verkada CM41
5	Verkada CF81-E
6	Verkada CB62-E

2.05 Camera Analytics Plug-In

- A. The Contractor shall install and configure any analytic plug-ins required on the servers and client workstations as required.
- B. The Contractor shall furnish and install all licensing required to utilize the analytics and plug-ins.

2.06 Accessories

- A. ACC-MNT-2 Mounting Arm Kit by Verkada Inc.
 1. Description: Wall mounted extender arm with built-in 1.5" female NPT thread.
 2. Material: Aluminum Alloy
 3. Dimensions:
 - a. Length: 230.5mm / 9.07in
 - b. Width: 86mm / 3.39in
 - c. Height: 117mm / 4.61in

4. Color: White
 5. Weight: 700g / 24.69oz
- B. ACC-MNT-3 Wall Mounted L-Shaped Bracket Kit by Verkada Inc.
1. Description: Compact bracket for mounting camera perpendicular to wall.
 2. Material: Aluminum Alloy
 3. Dimensions:
 - a. Length: 170mm / 6.69in
 - b. Width: 150mm / 5.91in
 - c. Height: 110mm / 4.33in
 4. Color: White
 5. Weight: 577g / 20.35oz
- C. ACC-MNT-5 Mini Pendant Cap Mount Kit by Verkada Inc.
1. Description: Two-piece threaded cap for mounting a Mini camera to 3/4" NPT threaded drop pipe. Cap piece can be removed and mounted independently with its 1.5" male NPT thread.
 2. Material: Aluminum Alloy
 3. Dimensions:
 - a. Length: 100mm / 3.94in
 - b. Width: 100mm / 3.94in
 - c. Height: 102.8mm / 4.05in
 4. Color: Dark grey
 5. Weight: 240g / 8.47oz
 6. Included Accessories:
 - a. Fasteners
 - b. Set screw
 - c. Hex key
- D. ACC-MNT-6 Mini Camera Junction Box Mount Adapter by Verkada Inc.
1. Description: For mounting a Mini camera to a standard junction box.
 2. Material: Steel Mount Plate, Plastic Cover
 3. Dimensions:
 - a. Length: 130mm / 5.12in
 - b. Width: 130mm / 5.12in
 - c. Height: 7.5mm / 0.3in
 4. Color: Grey Mount Plate, White Plastic Cover
 5. Weight: 160g / 5.64oz
 6. Included Accessories:
 - a. Fasteners
- E. ACC-MNT-7 Angle Mount by Verkada Inc.
1. Description: Mounts fisheye and dome cameras 30° from wall for improved field of view.
 2. Material: Aluminum Alloy
 3. Dimensions:
 - a. Length: 155mm / 6.1in
 - b. Width: 149mm / 5.87in
 - c. Height: 82mm / 3.23in
 4. Color: White

5. Weight: 390g / 13.76oz
 6. Included Accessories:
 - a. Metal mount ring
 - b. 3x countersink screws
 - c. 3x thumbscrews
 - d. Rubber plug
- F. ACC-MNT-8 Pendant Cap Mounting Adapter Kit by Verkada Inc.
1. Description: Threaded cap adapter enables mounting of Indoor Dome Series, Outdoor Dome Series, Fisheye Series, and Multisensor Series cameras to hardware with 3/4" female NPT and 1.5" male NPT threads, including ACC-MNT-2 Mounting Arm Kit by Verkada Inc.
 2. Material: Aluminum Alloy
 3. Dimensions:
 - a. Length: 155mm / 6.1in
 - b. Width: 155mm / 6.1in
 - c. Height: 42mm / 1.65in
 4. Color: White
 5. Weight: 300g / 10.58oz
 6. Included Accessories:
 - a. Set screw
 - b. 3x thumbscrews.
- A. ACC-MNT-9 Pole Mount Adapter by Verkada Inc.
1. Description: For mounting a camera to a circular pole.
 2. Mounting Pole Diameter: 32mm to 152.4mm / 1.25in to 6in
 3. Material: Steel
 4. Dimensions:
 - a. Length: 160mm / 6.3in
 - b. Width: 160mm / 6.3in
 - c. Height: 68mm / 2.68in
 5. Color: White
 6. Weight: 742g / 26.17oz
 7. Included Accessories:
 - a. Adapter plate
 - b. 2x Metal strap set
 - c. Fasteners for compatible mounts
- B. ACC-MNT-10 Corner Mount by Verkada Inc.
1. Description: Versatile bracket for mounting a range of accessories and cameras on corners.
 2. Material: Steel
 3. Dimensions:
 - a. Length: 190mm / 7.48in
 - b. Width: 263mm / 10.35in
 - c. Height: 170mm / 6.69in
 4. Color: White
 5. Weight: 1,890g / 66.67oz
- C. ACC-MNT-11 Square Junction Box
1. Description: Square junction box for mounting Bullet Series cameras.

2. Material: Aluminum alloy
 3. Dimensions:
 - a. Length: 128mm / 5.04in
 - b. Width: 128mm / 5.04in
 - c. Height: 40mm / 1.57in
 4. Color: White
 5. Weight: 303g / 10.69oz
 6. Included Accessories:
 - a. 2x ¾in NPT plugs
 - b. 4x buttonhead screws
- D. ACC-CAM-SHIELD-1
1. Description: Weather shield for protecting Dome Series and Fisheye Series cameras.
 2. Material: Steel mount plate, polycarbonate visor
 3. Dimensions:
 - a. Length: 192mm / 7.56in
 - b. Width: 185mm / 7.28in
 - c. Height: 78mm / 3.07in
 4. Color:
 - a. Black mount plate
 - b. White and black visor
 5. Weight: 173g / 6.1oz
 6. Included Accessories:
 - a. Mounting fasteners

2.07 View Station

A. VX52 Video Surveillance Viewing Station by Verkada Inc.

1. Description:
 - a. The VX52 is a dedicated device that streams up to 300 camera feeds (30 cameras per page, up to 10 pages) to any display with ultra-low latency, crisp video playback, customizable Smart Tiles and layouts. Built on the powerful Apple TV 4K platform, the VX52 is the viewing platform of choice for customers with mission-critical real-time viewing requirements.
 - b. Administrator Managed Device – Admins can remotely manage the VX52, select video feeds and Smart Tiles to display as well as customize layouts. Non-admin viewers do not need accounts, cannot access historical footage, and cannot modify display settings.
 - c. Plug-and-Play by Design – Simply connect the device to your network via ethernet or WiFi and project on a display. The VX52 is ready to stream in minutes with zero configuration needed.
 - d. Stable and Resilient – Streams play continuously without interruption for both local and remote streaming. There is no need to reset the device or relaunch a browser or application, streams restart automatically after a power outage.

- e. Supported by Verkada – Admins configure the VX52 in Command, just like their cameras. The VX52 is backed by our industry-leading 10-year warranty and the dedicated Verkada customer support team.

2. Quantity: 2

2.08 POE Injectors

A. Power over Ethernet+ Injector

1. Manufacturer and Model: Verkada INJ-POE-PLUS
2. Key Features:
 - a. IEEE 802.3at compliant with 2-event classification
 - b. IEEE 802.3af backward compatible
 - c. Output power of 30W is guaranteed
 - d. Supports 10/100/1000Base-T applications
 - e. Compatible with IEEE 802.3af devices
 - f. Safe – low power devices receive only the power they need
 - g. Automatic Detection and Protection of non-standard Ethernet terminals
 - h. Compact design fits easily in WLAN Access Point and IP Cameras installations
3. Technical Specifications
 - a. Data Rates: 10/100/1000 Mbps
 - b. Power over Ethernet Output:
 - c. Pin Assignment and Polarity: Spare Pairs 7/8 (-) and 4/5 (+)
 - d. Output Power Voltage: 55 VDC
 - e. User Port Power: 30W (Guaranteed)
 - f. Input Power Requirements:
 - i. AC Input Voltage: 100VAC to 240VAC ($\pm 10\%$)
 - ii. AC Input Current: 0.67A @ 100VAC to 240VAC
 - iii. AC Frequency: 50 to 60Hz

B. Power over Ethernet++ Injector by Verkada Inc.

1. Manufacturer and Model: Verkada ACC-POE-60W
2. Key Features
 - a. IEEE 802.bt Type 3 compliant

- b. IEEE 802.3af/at backward compatible
 - c. Output power of 60W over 4-pairs
 - d. Supports 10/100/1000 Base-T applications
 - e. Safe: low-power devices receive only the power they need
 - f. Automatic detection and protection of non-standard Ethernet terminals
 - g. Compact design fits easily in WLAN access point and IP camera installations
3. Technical Specifications
- a. Data Rates: 10/100/1000 Mbps
 - b. Power over Ethernet Output:
 - i. Data Pairs:
 - a. 1/2 (-)
 - b. 3/6 (+)
 - ii. Spare Pairs:
 - a. 7/8 (-)
 - b. 4/5 (+)
 - iii. Output Voltage: 55 V nominal
4. Output Power Voltage: 55 VDC
5. User Port Power: 30W (Guaranteed)
6. Input Power Requirements:
- a. AC Input Voltage: 100 to 240V
 - b. AC Input Current: 1.5A
 - c. AC Frequency: 50 / 60Hz
- C. Ethernet with Power over Ethernet (PoE) UTP Extender
- 1. The Contractor shall provide Ethernet with PoE UTP extenders for out-of-distance cameras or Ethernet devices.
 - 2. Shall support IEEE 802.3af (PoE) and IEEE 802.3at (PoE+) on input and output.
 - 3. Extends UTP up to 350 meters or greater.
 - 4. 10Base-T or 100Base-TX, full-duplex with auto-negotiation.
 - 5. Multicast support.
 - 6. Mid-span extenders are forbidden.
 - 7. Manufacturer:

- a. Veracity Longspan with PoE
 - i. Provide specific models as required
 - ii. Provide with dedicated power supply as or when required.
 - b. Or approved equal
- D. Ethernet with Power over Ethernet (PoE) UTP Surge Suppressor
1. The Contractor shall provide and install a surge protector for all exterior mounted cameras. Cameras that are not attached to the building or reach above the building roof line shall have a surge protector at the camera side and interior termination side.
 2. There shall be a minimum of a 36" shielded patch cable from the surge protector to the device to allow for adequate clamping time.
 3. When protector is mounted in interior, dry or weather sealed enclosure:
 - a. Shielded RJ-45 jacks and ground stud
 - i. Connect ground directly to ground bar (TMGB/TGB) or building ground as close to the point of entry as practical.
 - ii. Do not use shielded cable on the output.
 4. Maximum supported data rate: 10,000Mb/s (10 Gigabit)
 5. Supports IEEE 802.3af (PoE)
 6. Max current rating of 30A per pair.
 7. UL 497B listed
 8. 110 punch down in and 110 punch down out.
 - a. 110 punch down in and RJ-45 out may be used when output is connected directly to a switch or device port only when approved in specific situations.
 9. Manufacturer:
 - a. 110 to 110 - Ditek DTK-110C6APOE
 - b. 110 to RJ-45 – Ditek DTK-110RJC6APOE
 - c. Or approved equal
- E. When protector is exposed to weather or moisture:
1. Shielded RJ-45 jacks and ground connection.
 - a. Connected ground connection directly to ground.
 - b. Do not use shielded cable on the output.
 2. Outdoor-rated NEMA 4X enclosure

3. Maximum supported data rate: 1,000Mb/s (1 Gigabit)
4. Supports IEEE 802.3af, 802.3at (PoE) and PoE+ up to 144 watts per port.
5. Max current rating of 20,000A per pair.
6. UL 497B listed
7. RG-45 in and RJ-45 out.
8. Provide with appropriate mounting kit.
9. Manufacturer:
 - a. Ditek DTK-MRJPOEX
 - b. Or approved equal

Part 3 - Execution

3.01 Integration with Physical Security Systems and Intercom

- A. The video surveillance system shall be integrated with the Physical Security Systems and Intercom/PA system via an Ethernet interface with the minimum follow features.
 1. Graphical floor plan maps showing icons of all cameras, intercoms and other integrated systems.
 2. Camera views associated with intercom stations and doors.
 3. Camera views linked to other camera views for seamless tracking of a subject throughout a facility.
 4. Device names brought in from the integrated systems.
 5. Database entries for all actions performed.
- 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. Refer to the individual specification sections for additional specific integration requirements.
- 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.

3.02 System Programming

- A. The Contractor shall provide all programming necessary for a turnkey system.
- B. Programming shall include setting all required IP addressing, setting passwords, firmware upgrades, adding the devices into the software, setting video streams,

motion detection areas, recording settings, device naming, mapping, cross system integration, etc.

3.03 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. Contractor shall create map entities for intercom cameras.

3.04 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.
- 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, 1st floor, etc.
 - i. Device 1: Building name and floor number– Camera or other device name
 - ii. Device 2: Building name and floor - Camera or other device name
 - iii. Repeat as required
 - b. Zone 2: Building name and zone name such as 2nd floor, etc.
 - i. Device 1: Building name and floor - Camera or other device name
 - ii. Device 2: Building name and floor - Camera or other device name
 - iii. Repeat as required
 - c. Repeat zones as required.
 - 2. Repeat Partitions as required.
- D. Camera Naming
 - 1. All cameras shall be named based on Owner direction.
 - 2. Multi-sensor cameras shall be named similar, and each sensor shall end with an identifier such as A, B, C and D so the images can be easily aligned in the client software by an end user.

- E. 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.

3.05 Camera Positioning Procedures

- A. The Contractor shall provide an initial aim, zoom, field of view adjustment, rotation and focus immediately after the camera is installed following the design intent on the drawings and camera schedule.
- B. The Contractor shall then take screen shots from the camera's web interface, label them based on the drawings device number and present them to the Owner and Consultant for an initial review and comment. The Contractor shall furnish a battery powered PoE injector to power up the camera to provide the initial aim/focus and screen shots and shall not rely on the Owner's network or PoE switches to be online or available.
- C. The Contractor shall then fine tune the cameras aim and field of view based on the Consultant's feedback and update the screen shots.
- D. After the cameras aim, zoom, field of view adjustment and focus are finalized by the Consultant, the Contractor shall submit the screen shots to the Owner to obtain their final sign-off or comments. If any comments are received, the Contractor shall make the adjustments necessary and take updated screen shots and submit for re-approval.
- E. The above will not happen at the same time and the Contractor shall plan on multiple trips to the project to make the adjustments.
- F. The Contractor shall include the final screen shots as part of the as-builts.

3.06 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.
- B. This secure password shall be set in the archiver default password field and each device in the video unit tab shall be set to use that set default.

3.07 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.

3.08 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 4 hours of scheduled and dedicated training time in two (2) four (4) hour sessions for administration and investigation.
 2. Contractor shall provide up to 2 hours of scheduled and dedicated training time for maintenance including lens and dome cleaning, focusing and positioning.
 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.

3.09 Warranty

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

3.10 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 video surveillance 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.

3.11 Coordination

- A. Contractor shall provide up to 8 hours (up to four, 2-hour sessions) of scheduled and dedicated coordination time to assist Owner with camera positioning/repositioning and coordination as requested by Owner or Consultant including post final signoff.

3.12 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.

3.13 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.

3.14 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 05 00 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.

3.15 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.

3.16 Elevator Interface

- A. The Contractor shall furnish and install an elevator interface box outside of the elevator equipment room when cameras are located within 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 access control 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 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 travel cables. 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 coordinate with the Elevator Contractor to ensure the appropriate cable is located within the elevator travel cable.

3.17 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.

3.18 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.

- C. Contactor shall verify with Project Representative the precise positioning of camera aim and shall make fine adjustments as requested.

3.19 Labeling

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

3.20 Camera Installation

- A. Contractor shall field verify all camera locations and positioning with Owner prior to installation.

3.21 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. Camera 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.

3.22 Pre-Checkout

- A. The Contractor shall demonstrate the following to Owner during system demonstration.
 - 1. The cameras are fully installed and functional.
 - 2. Camera adjustments are complete to the Owner's satisfaction including.
 - a. Aim/Zoom
 - b. Focus/Back Focus
 - c. Masking Zones
 - d. Motion Detection Zones
 - e. Pre-Sets/Tours

3.23 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.

3.24 Final Procedures

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

End of Section