**­­­PART 1 GENERAL**

**1.1 SUMMARY**

 A. Provide a complete camera positioning system, including engineering, components, installation, and commissioning.

**1.2 RELATED SECTIONS**

A. Section 260500 – Common Work Results for Electrical, for interface and coordination with building electrical systems and distribution.

 B. Section 280513 – Conductors and Cables for Electronic Safety and Security, for cabling between system servers, panels, and remote devices.

 C. Section 280528 – Pathways for Electronic Safety and Security, for conduit and raceway requirements.

 D. Section 281300 – Security Management System, for interface and coordination with electronic access control systems.

 E. Section 282323 – Video Surveillance System Infrastructure

**1.3 REFERENCES**

A. Reference Standards: Provide systems which meet or exceed the requirements of the following publications and organizations as applicable to the Work of this section:

1. Electronic Industry Association (EIA)

2. Federal Communications Commission (FCC)

3. National Television Systems Committee (NTSC)

4. Underwriters Laboratories Inc. (UL)

5. Institute for Electrical and Electronics Engineers (IEEE)

6. Open Network Video Interface Forum (ONVIF)

**1.4 SYSTEM DESCRIPTION**

A. The remote camera positioning system shall provide long range, high quality surveillance, using two camera sensor technologies for providing dual spectrum video imaging in visible and long wave infrared wavelengths. Each camera shall provide continuous zoom optics with supplemental digital zoom capabilities. The cameras shall be integrated onto a precision variable speed positioning system providing continuous 360-degree azimuth and 180-degree elevation range of motion. The dual spectrum camera positioner shall provide hybrid operation and include an integrated encoder for transmission of the camera images over standard Ethernet environments as well as support analog video and serial control channel. The dual spectrum camera positioner shall be powered using PoE++ over a single CAT5e or better cable.

**1.5 SUBMITTALS**

1. Manufacturer’s Product Data: Submit manufacturer’s data sheets indicating systems and components proposed for use, including instruction manuals.
2. Shop Drawings: Submit complete shop drawings including connection diagrams for interfacing equipment, list of connected equipment, and locations for major equipment components.
3. Record Drawings: During construction, maintain record drawings indicating location of equipment and wiring. Submit an electronic version of record drawings not later than Substantial Completion of the project.
4. Operation and Maintenance Data: Submit manufacturer’s operation and maintenance data, customized to the system installed. Include system and operator manuals.
5. Field Tests: Submit results of field-testing of every device including date, testing personnel, retesting date if applicable, and confirmation that every device passed field-testing.
6. Maintenance Service Agreement: Submit a sample copy of the manufacturer’s maintenance service agreement, including cost and services for a one-year period for Owner’s review. Maintenance shall include, but not be limited to; labor and materials to repair the system provide test and adjustments, and regular inspections.

**1.6 QUALITY ASSURANCE**

`A. Manufacturer: Minimum ten years' experience in manufacturing and maintaining networked camera positioning system IP video recording systems. Manufacturer shall provide technical assistance and support.

**1.7 DELIVERY, STORAGE, AND HANDLING**

A. Deliver materials in manufacturer labeled packages. Store and handle in accordance with manufacturer’s requirements, in a facility with environmental conditions within recommended limits.

**1.8 WARRANTY**

A. Manufacturer’s Warranty: The warranty period shall be thirty-six (36) months from the delivery date of the system under normal use and service.

**PART 2 PRODUCTS**

**2.1 GENERAL**

A. All equipment and materials incorporated shall be standard components that are regularly manufactured and used in the manufacturer's system.

B. All systems and components shall have been thoroughly tested and in actual use.

C. The specified product shall be manufactured by a firm whose quality system is in compliance with the I.S. EN ISO 9001:2008, QUALITY SYSTEM.

**2.2 SYSTEM CAPABILITIES**

A. The dual spectrum camera positioner specified herein shall provide an integrated visible and LWIR spectrum Camera positioning system.

1. The visible spectrum camera shall be an HD 1920x180 imager with 30x auto focus zoom optics and 12x digital zoom capability.

2. The thermal LWIR spectrum camera shall be a VGA 640x480 FPA with 6x zoom optics and 12x digital zoom capability.

B. The dual spectrum camera positioner shall incorporate H.264 and MJPEG compression and encoding technology for providing low bandwidth, low latency and high quality video images transported over standard Ethernet infrastructures.

C. The dual spectrum camera positioner shall provide hybrid capability delivering both Ethernet and analog composite video and RS422 serial connections for external system connections and control.

E. The dual spectrum cameras positioning drive system shall provide wide dynamic range speed capability of 0.05 to 45 degrees per second, with a minimum of 0.05 degree repeatability, 360 degree continuous pan rotation, and +90 to –90 degree tilt range.

F. The dual spectrum camera positioner shall include a web server allowing password protected administration/configuration capabilities along with full camera control and viewing functions.

G. The manufacturer of the dual spectrum camera positioner camera shall provide a software development kit (SDK) for allowing 3rd party developers all necessary tools for integrating the HD Camera Positioning System into the users control system environment.

H. The dual spectrum camera positioner shall include an advanced ID generation capability for indications of viewing direction, compass setting, azimuth/elevation position, location descriptors and user defined image/logo.

I. The dual spectrum camera positioner shall provide an operating temperature range of +75C to -34C compliant with NEMA TS2 temperature profile.

J. The dual spectrum camera positioner shall be designed for use in rugged and harsh operational environments conforming to NEMA TS2 requirements for power and shock and vibration.

K. The dual spectrum camera positioner shall provide IP67 or better ingress protection for both the visible and LWIR cameras and shall provide a lifetime warranty against any moisture related ingress into the camera head enclosures.

L. The dual spectrum camera positioner shall support ONVIF Profile S and provide any required ONVIF extension wsdl’s for providing a standardized interoperability capability for integration of both the visible and LWIR cameras to 3rd party system equipment.

M. The dual spectrum camera positioner shall be fully assembled, purged, pressurized and tested at the original manufacturing facility and shipped as a complete unit, ready for installation and commissioning.

**2.3 PERFORMANCE SPECIFICATIONS**

**A. VISIBLE SPECTRUM IMAGING SYSTEM**

1. Image Sensor: Progressive Scan CMOS
2. Image Size: Diagonal 6mm (1/3” type)
3. Image Resolution: 1920 horizontal x 1080 vertical pixels
4. Picture Elements (total) 1920 (H) x 1440 (V)
5. Sensitivity: Scene Illumination; F1.4 @ 50% Video

a. 0.4 Lux (0.04 fc) @ 1/30 shutter, color mode

b. 0.0025 Lux (0.00025 fc) @ 1/2 shutter, mono mode

1. Day/Night Operation: Adjustable (Auto, Color and Mono Modes) via removable IR cut filter
2. Optical Zoom Range: 30x, 4.4mm to 132mm minimum
3. Optical Zoom Speed: Three speeds, from approximately 3.5 seconds to 14 seconds full range
4. Maximum Lens Aperture: f/1.4 (wide) to f/4.6 (tele)
5. Horizontal Angle of View: Optical: 63.4° to 2.1°
6. Digital Zoom: 1x to 12x in 1x increments. The camera system shall support digital zoom limit setting
7. Minimum Focus Distance: 0.01m (w); 1.0m (t)
8. Auto Focus: Selectable Auto/Manual; Minimum Scene Illumination for Reliable Auto Focus shall be no more than 50% video output. Auto Focus Function shall provide 3 sensitivity levels selectable by user.
9. Low: Slower auto focus reaction provides more stability when viewing scenes with minimal changes.
10. Normal {default}: Auto focus reacts more conventionally to scene changes.
11. High: Auto focus reacts faster and more often to scene changes.
12. Manual Shutter: Selectable shutter speeds shall be from 1/2 to 1/30,000.
13. Auto Iris; Selectable auto/manual; Iris shall automatically adjust to compensate for changes in scene illumination to maintain constant video level output within sensitivity specifications.
14. Image Defog/Haze Analytics: Shall support Auto/Manual/Off Modes
	* + 1. Manual mode shall support 3 levels of defog/haze enhancement.
			2. Auto mode shall provide user configuration settings for strength level and color level. The auto defog/haze analytics shall apply the enhancement to maintain strength and color levels.
15. Electronic Image Stabilization (EIS): Shall support On/Off mode. EIS function shall automatically pause while PTZ functions are occurring and restore when no PTZ is occurring.
16. Wide Dynamic Range (WDR): 90db. Shall support On/Off mode. WDR On mode shall support user selectable settings of Normal, Combination, and Contrast.
17. Backlight Compensation (BLC): Shall support On/Off mode.
18. White Balance (WB): Shall support Auto/Manual Mode. Auto mode shall provide user selection of Normal, Sodium or Mercury lighting conditions. Manual mode shall provide
19. IR Correction: Shall support On/Off mode. On shall set auto focus algorithms for 850nm wavelength illumination.
20. Sharpness: Shall provide user control of increases or decreases in image sharpness through 4 user selectable settings of soft, normal, sharp and sharpest.
21. Noise Reduction (NR): Shall provide 4 user selectable levels.
	1. Normal: Automatically reduces frame noise without impact on overall image quality and sharpness
	2. Medium: Reduces frame noise with minimal impact on overall image quality and sharpness
	3. Strong: Reduces frame noise as much as possible while sacrificing image quality and sharpness
	4. Fixed: User adjustable frame noise reduction from Low to high setting.
22. Enhanced Intensity: Shall enhance darker areas of the image. Shall support Off/Enhanced/Whiteout Reduction modes with user adjustable level from Low to High.
23. **THERMAL LWIR SPECTRUM IMAGING SYSTEM**
	1. FPA Detector: Vox Uncooled Micro-bolometer
	2. Image Resolution: 640x480
	3. Pixel Size: 17µm
	4. Spectral Band: 8 - 14 µm
	5. Sensitivity (NEdT): <50 mK @ F1.0
	6. Frame Rate: 30Hz or 9Hz model dependent
	7. Digital Zoom: 12x
	8. Color Palettes: Support Monochrome and Color for enhanced viewing options including spectral heat variance and hot and cold spot highlights.
	9. Thermal optics: Shall be 6x continuous zoom with focal range of 25 - 150mm f/1.6
	10. HAFOV: The zoom optics field of view range shall be 24.8° to 4.2°
	11. Lens Type: Shall be Athermalized, Hard Carbon Coated
	12. Focus Type: Shall support both One-Shot Auto Focus and Manual [Near/Far] capability.
	13. One-Shot Auto Focus: Shall activate upon each PTZ stop command for automatic scene focusing.
	14. AGC Region of Interest: The thermal camera system shall have three user selections of scene for AGC control. Selection shall be full, center and lower areas.

**C. H.264/MJPEG ENCODING ENGINE**

* 1. The video encoding and profile management system shall utilize a dynamic architecture based on its encoding power for determining the video streams available. Use of this technology shall allow the following possible video stream configurations;
		1. H.264 Streams: (1) 1920x1080 @ 30fps, (1) 1280x720 @ 30 fps, (1) 720x480 @ 15 fps, (1) 720x480 @ 10 fps.
		2. MJPEG Streams: 1920x1080 @ 10 fps, 1280x720 @ 20 fps
		3. Analog Video Output: (1)
	2. Each video encoder channel shall provide the following configurable properties;
		1. Codec

 1. H.264 Base Profile

 2. H.264 Main Profile

 3. H.264 High Profile

 4. MJPEG

b. Resolution

 1. Visible Camera - 1920 x 1080, 1280 x 720, 720 x 480

 2. Thermal Camera – 640 x 480, 320 x 240

c. Frame Rate

 1. Video frame shall be adjustable from 30 fps to 1 fps in increments of 1 fps

d. Bite Rate control

 1. Variable Bit Rate

 2. Constant Bit Rate

e. Bit Rate

 1. Selectable from 64kbs to 8Mbs

f. GOV Length

 1. Selectable from 1 to 600 in increments of 1

3. Video Streaming Protocols; the camera system shall support the following streaming protocols:

a. RTSP/RTP; The RTSP communication shall occur over a TCP socket. RTP video packets shall be sent over UDP. This mode shall be available at all times for H264 and MJPEG encoded streams.

b. RTSP Interleaved; RTSP commands and the RTP video packets shall be transmitted over a single TCP connection. This mode shall be available at all times for H264 and MJPEG encoded streams.

c. HTTP tunneling; this mode shall use two separate TCP connections for sending and the other for received data from the client over port 80. This mode shall be available at all times for H264 and MJPEG encoded streams.

d. RTP multicast; this mode shall send RTP video packets to the user assigned multicast destination. This mode shall be required to be enabled or disabled. This mode shall be available for both H264 and MJPEG encoded streams.

4. Connection Types: Uni-cast, multi-unicast or multi-cast

5. Camera Video Latency: <135ms (4 frames maximum)

6. Network Protocol Layers: TCP, UDP, IPv4, IGMP, ICMP, DNS, DHCP, RTP, RTSP, NTP, HTTP, HTTPS, ARP, and ONVIF Profile S as a minimum

**C. POSITIONING DRIVE**

1. Pan Movement; 360 degrees continuous rotation
2. Pan Speed; Variable from 0.05 to 45 degrees/second using up to a minimum of 64 distinct speeds.
3. Pan Repeatability; +/- 0.05 degree precision
4. Pan Preset Speed; 180 degree movement 2.5 < Seconds
5. Tilt Movement; Minimum of +90 to –90 degrees
6. Tilt Speed; Variable from 0.05 to 45 degrees/second.
7. Tilt Repeatability; +/- 0.05 degree precision
8. Tilt Preset Speed; 180 degree movement < 2.5 Seconds
9. Proportional Zoom Control; Positioning control shall allow variable pan/tilt speeds based on zoom position. This shall scale the maximum pan/tilt speed, while maintaining variable speed capability, throughout the zoom range of the camera.
10. Holding Torque; The Positioner shall have sufficient holding torque to maintain operation under the following conditions:
	1. Capable of holding mechanical position and maintaining operation in up to 75mph wind and TS-2 vibration conditions at worst-case orientation into the wind, for each pan and tilt function
	2. Capable of moving to a position and maintaining operation in up to 75mph wind, at worst-case orientation into the wind, for each pan and tilt
11. Home Position: Shall be a user defined point where pan and tilt position is reported to be 0. This can be different from the mechanical home position.
	1. Home position commands include “get”, “set” and “go to”
12. The (IPCS) shall not have any exposed wiring from the positioning drive to the camera head enclosure.

**D. OPERATIONAL REQUIREMENTS**

1. Required camera control functions shall include the following features and capabilities as a minimum; these functions shall be exposed as part of the HD Camera Positioning System web server.

a. Day/night Mode; shall allow user control of Color, Mono and Auto modes of operation.

b. Shutter Speed; shall allow user control of shutter speed mode from 1/2 to 1/30,000 setting.

c. White balance; shall allow user control of auto or manual mode. If in manual mode, user shall be capable of adjusting red and blue color levels.

d. Maximum AGC Level; shall allow user selection of maximum AGC level of 0 dB up to 48db

e. Wide Dynamic Range; shall allow user control of setting mode to on or off.

f. Backlight Compensation; shall allow user control of setting mode to on or off.

g. Properties; Allows user to save and recall a specific user defined configuration camera property settings or return to factory default configuration.

h. Lens Properties; allow user control of the following features;

1. Focus; Auto or manual mode. If in manual mode, user shall be capable of adjusting focus near/far settings

2. Iris; Auto or manual mode. If in manual mode, user shall be capable of adjusting iris open/close settings

3. Speed; Allow user control of normal or fast zoom lens speed.

i. Zoom Lens Control; provide zoom control functions for the zoom lens as follows;

1. Continuous; Allows user to zoom in or out as necessary on a continuous basis.

2. Absolute; Allows user to select an explicit zoom level the lens should be set at.

3. Digital; Provide client side capability to digitally zoom up to 12x of the displayed image.

4. Synchronized Zoom Mode; Provide mode setting for synchronizing visible and thermal camera field of views. This mode can be disabled for providing independent control of the visible and thermal zooms.

2. Required positioning control functions shall include the following features and capabilities as a minimum;

a. Pan/Tilt Positioning

1. Movements; The HD Camera Positioning System positioning system shall allow continuous 360 degree azimuth (pan) rotation and +/- 90 degree elevation (tilt) movement.

2. Variable Speed; The HD Camera Positioning System shall provide variable speed azimuth and elevation capability using a minimum of up to 64 distinct speed settings ranging from 0.05 to 45 degrees/second.

3. Vector Positioning; The HD Camera Positioning System shall be capable of simultaneous pan and tilt movements.

4. Scalable Zoom; Variable speed pan/tilt ranges based off of zoom position. This adds the capability of limiting the maximum pan/tilt speed, while maintaining variable speed capability, throughout the zoom range of the camera.

b. Presets; Minimum of 512, with each preset consisting of a pan, tilt, zoom and focus, preset ID label and image freeze state. When a preset position is recalled the corresponding preset ID shall be displayed. The preset ID shall remain displayed until a pan, tilt, zoom or another preset command is received.

c. Preset Tours; Minimum 512 tours required, each tour shall consist of up to 512 pre-programmed presets, with individual dwell time and preset speed property per preset per tour.

1. Each Tour shall include direction (forward/backward) and recurrence (continuous, cycles or duration) properties for customizing tour operation.

2. Tours shall stop upon receipt of any pan/tilt positioning command.

3. Tour data shall be stored in non-volatile memory and shall not be lost if a power failure occurs.

d. Auto-Park Mode: Shall allow user to set a park [home] position, where the camera system will return to upon the following conditions;

1. Park properties shall consist of pan, tilt, zoom, and focus coordinates, timer value [1-999 seconds], and enable/disable mode.

2. An auto- park event shall occur when enabled using the following triggers;

a. Power recycles

b. Timer expiration. Timer resets upon each user command.

3. Visible Camera Privacy Masks; shall support Privacy Masks to conceal user-defined rectangular areas

a. Up to 8 Individual Masks can be programmed

b. Any or all of the 8 Privacy Masks can be placed within the cameras field of view

c. Privacy Masks can overlap adjacent Privacy Masks

d. The Privacy Mask(s) scale in size relative to the cameras zoom position

e. The Privacy Mask(s) move relative to the camera system pan and tilt position

f. Each Mask shall be able to be enabled or disabled

g. All Privacy Masks share the following properties: Color Selection, Transparency or Mosaic setting

4. Updates: The HD Camera Positioning System shall allow updates of firmware for new features via the Ethernet network communication channel. An internal HD Camera Positioning System web server shall be provided for performing this task.

5. The HD Camera Positioning System shall return to previous position and state of operation upon power loss and restoration.

6. The HD Camera Positioning System shall provide an IP67 sealed and pressurized camera enclosure and camera window heater blanket.

a. The enclosure shall be factory pressurized to 5 psi.

b. The HD Camera Positioning System shall be configurable for reporting low-pressure notification.

c. The enclosure shall provide standard Schrader valves for maintenance purposes.

d. The enclosures window heater blanket shall be microprocessor controlled, allowing configurable heating duty cycles and on/off temperature thresholds.

e. The camera window heater blanket shall be designed to keep the cameras outer window temperature above 00 C with outside ambient temperatures down to -400 C.

**F. COMMUNICATION PROTOCOLS AND FORMATS**

1. The HD Camera Positioning System shall include integrated video camera system communication drivers for flexibility and system interoperability. The HD Camera Positioning System camera system shall support both serial RS422 and Ethernet communication channels at a minimum, allowing field selection of the following protocol drivers as required;

a. Ethernet Channel (IP)

1. CohuT

2. NTCIP 1205

3. ONVIF Profile S

b. Serial RS422 Channel

1. Cohu Serial

2. Pelco D/P

3. NTCIP 1205

**G. ON-SCREEN DISPLAY (OSD)**

1. The HD Camera Positioning System shall provide OSD capabilities on both digital video and analog video outputs as defined below. The camera system shall support a minimum of 5 OSD elements for inclusion in each video stream. The available OSD elements shall include at a minimum;

1. Camera Title
2. Date/Time
3. PTZ Position
4. Compass Position
5. Sector Zone Title
6. Preset Title
7. Event Title
8. Maintenance Display
9. Logo Display

2. The displayed OSD element shall include the following configurable properties.

a. OSD Position; Top left, top right, bottom left, bottom right or customized [x, y coordinate]

* + 1. OSD Size; The displayed OSD size shall scale based on the video stream resolution and the OSD size property. The size properties shall include small [ 4% of Image Resolution], Medium [5% of Image Resolution] or Large [6% of Image Resolution]
	1. Logo; The camera system shall support multiple image files in .bmp format to be uploaded, allowing users to select a specific image file for displaying on video streams.

`**G. MAINTENANCE FUNCTIONS**

The camera system shall support maintenance features as defined below;

1. The camera system shall support querying of camera parameters via the Ethernet connection. The camera parameters shall consist of the following items

a. Serial number

b. Software revision

c. Assembly date

d. Camera Model Number

 2. Internal Temperature Monitoring and Reporting

3. Remote Software Upload/Updates via Ethernet

4. Camera Device Auto Discovery of IP address

5. Camera System Auto Re-connect

 6. Camera System Reset

7. Save and Restore camera system start-up configuration

1. **IP/NETWORK MANAGEMENT**

1. The HD Camera Positioning System shall provide at minimum the following network configuration properties;

a. IP Configuration: DHCP or Static IP address entry

b. Net mask address entry

2. Gateway address entry

3. Domain name entry

 4. DNS server entry

 **I. POWER INPUT**

1. The HD Camera Positioning System shall fully comply with Nema TS-2 standards and include independent laboratory test results confirming compliance with the following electrical operating conditions;

 a. Power; <70 Watts (exclusive of PT Heater Option)

b. Operating Voltage; The camera system shall provide flexible power input options as required by the installation to include;

 1. Power over Ethernet, LTPoE++™ @ 70W

 2. Optional 24Vac, +/- 12.5% (21.0 ~ 27.0 VAC; 50-60Hz)

2. Earth Ground; Continuity shall be provided through the shield of the CAT5e Ethernet/PoE++ cable, and the shield of the multi-conductor cable, to chassis ground of the Base Enclosure. Connecting either, or both, of these shields to earth ground at the control side shall apply earth ground to chassis ground of the Base enclosure.

**J. MECHANICAL SPECIFICATIONS**

1. Connectors; The camera system shall provide a 36” long shielded single CAT5e pigtail cable terminated into a shielded RJ45 connector for power and Ethernet data. The outer jacket shall be sunlight resistant industrial grade PVC suitable for outdoor use.

a. The camera system shall provide additional pigtail cable options for including digital I/O signals, analog video and serial RS422 control conductors as required.

2. Weight; 21.5 pounds (9.75 kg) maximum

3. Dimensions; 12.5” (317.5mm) x 12.1” (307.34) x 15.9 (403.86mm)

4. Construction; Powder Coated 6063 T5 aluminum; all internal and external parts corrosion protected, stainless steel fasteners. Faceplate shall be optically correct 0.197" thick borosilicate float glass.

5. Camera Mount; 6" Base plate with (4) 1/4-20 threaded holes 4.75 BC. Options for larger base plates with 7.00" BC shall be available.

**K. ENVIRONMENTAL REQUIREMENTS**

1. The HD Camera Positioning System shall fully comply with and include independent laboratory test results confirming compliance with the following environmental operating conditions;

a. IP67 Ingress Protection; The camera system shall have no moisture ingress and shall operate correctly after testing to MIL-STD-810G, Method 512.4 at a depth 1.0m for a minimum duration of 30 minutes.

2. Temperature; The system shall operate correctly in the temperature range of -34°C (-29.2°F) through +75°C (+167°F), tested across low and high voltage ranges.

3. Vibration; The camera PTZ functions shall operate nominally during and after vibration Per Nema-TS2 paragraphs 2.1.9, 2.2.3, 5-30Hz sweep @ 0.5g applied in each of 3 mutually perpendicular planes.

4. Shock; Per Nema-TS2 paragraphs 2.1.10, 2.2.4, 10g applied in each of 3 mutually perpendicular planes

5. Water Spray; Per IEC 60529+A1, 1999, Paragraph 14.2.6

6. Humidity; 0-100% Non-Condensing per MIL-STD-810G Test Method 520.3

**2.4 CERTIFICATIONS**

A. FCC Class A

B. IEC/CE CISPR 22 24

C. RoHs

 **2.5 WARRANTY INFORMATION**

A. Manufacturer’s Warranty: The warranty period shall be thirty six (36) months from the delivery date of the system under normal use and service.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

A. Examine areas to receive devices and notify adverse conditions affecting installation or subsequent operation.

B. Do not begin installation until unacceptable conditions are corrected.

**3.2 PREPARATION**

* + - * 1. Protect devices from damage during construction.

**3.3 INSTALLATION**

A. Install devices in accordance with manufacturer’s instruction at locations indicated on the floor drawings plans.

B. Perform installation with qualified service personnel.

C. Install devices in accordance with the National Electrical Code or applicable local codes.

D. Ensure selected location is secure and offers protection from accidental damage.

E. Location must provide reasonable temperature and humidity conditions, free from sources of electrical and electromagnetic interference.

**3.4 FIELD QUALITY CONTROL**

A. Test snugness of mounting screws of all installed equipment.

B. Test proper operation of all video system devices.

C. Determine and report all problems to the manufacturer’s customer service department.

**3.5 ADJUSTING**

A. Make proper adjustment to video system devices for correct operation in accordance with manufacturer’s instructions.

B. Make any adjustment of camera settings to comply with specific customer’s need.

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**3.6 DEMONSTRATION**

* + 1. Demonstrate at final inspection that video management system and devices functions properly.

END OF SECTION