**­­­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 dual spectrum night-vision system shall provide wide range, high quality surveillance, using two camera sensor technologies for providing dual spectrum video imaging in long wave infrared and visible wavelengths. Each camera shall provide fixed position optics with supplemental digital zoom capabilities. The cameras shall be integrated into a ruggedized aluminum enclosure with ingress protection ratings of IP66 or better. The dual spectrum night-vision system shall include an integrated encoder for transmission of both camera images over standard Ethernet environments, using a single IP address. The dual spectrum thermal vision system 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 IP cameras and 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 9001:2015, QUALITY SYSTEM.

**2.2 SYSTEM CAPABILITIES**

A. The dual spectrum night-vision system specified herein shall provide an integrated Thermal LWIR and visible spectrum camera and optics.

1. The visible spectrum camera shall be an HD 1920x180 imager with wide angle optics of 53 degrees.

2. The thermal LWIR spectrum camera shall be a VGA 640x480 FPA with fixed lens options to address horizontal fields of views between 73 degrees to 10 degrees.

B. The dual spectrum night-vision system 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 night-vision system 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 night-vision system 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.

I. The dual spectrum night-vision system shall provide an operating temperature range of +75C to -40C compliant with NEMA TS2 temperature profile.

J. The dual spectrum night-vision system 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 night-vision system shall provide IP66 or better ingress protection for both the visible and LWIR cameras.

L. The dual spectrum night-vision system shall support ONVIF Profile S for integration of both the visible and LWIR cameras to 3rd party system equipment.

**2.3 PERFORMANCE SPECIFICATIONS**

1. **THERMAL LWIR SPECTRUM IMAGING SYSTEM**
   1. FPA Detector: ASi Uncooled Micro-bolometer
   2. Image Resolution: 640x480
   3. Pixel Size: 17µm
   4. Spectral Band: 7.5 - 14 µm
   5. Sensitivity (NEdT): 40 mK @ F1.0
   6. Frame Rate: 30Hz or 9Hz model dependent
   7. Palettes: White hot or black hot.
   8. Thermal optics: Support the following fixed lenses 8.5, 14, 19 25, 35, 50 and 60mm
   9. Lens Type: Shall be Athermalized, Hard Carbon Coated
   10. Focus Type: Manual, Factory set to Infinity

**B. VISIBLE SPECTRUM IMAGING SYSTEM**

1. Image Sensor: Progressive Scan CMOS
2. Image Size: Diagonal 6mm (1/4” type)
3. Image Resolution: 1920 horizontal x 1080 vertical pixels
4. Lens: 3.5mm
5. Lens Aperture: f/1.4
6. Horizontal Angle of View: 530
7. Focus: Auto

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

* 1. The dual spectrum night-vision system shall include a two input video encoder which shall provide the following configurable properties;
     1. Codec

1. H.264

2. MJPEG

b. Resolution

1. Thermal Camera – 640 x 480, 384 x 248, 320 x 240, 192 x 144

2. Visible Camera - 1280 x 720, 960 x 540, 640 x 360, 320 x 180

c. Frame Rate

1. Thermal Camera – 30 fps

2. Visible Camera – 30, 25, 15 12.5 fps

d. Bite Rate control

1. Variable Bit Rate

2. Constant Bit Rate

e. Bit Rate

1. Thermal Camera – 64 Kb to 6 Mb

2. Visible Camera – 64 Kb to 6 Mb

f. GOV Length

1. Selectable from 1 to 120 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 over HTTP; 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. 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

**D. COMMUNICATION PROTOCOLS AND FORMATS**

1. The dual spectrum night-vision system shall include integrated video camera system communication drivers for flexibility and system interoperability. The dual spectrum night-vision system shall support Ethernet communication of the following protocol as required;

a. Ethernet Channel (IP)

1. ONVIF Profile S

`**G. MAINTENANCE FUNCTIONS**

The dual spectrum night-vision system shall support maintenance features as defined below;

1. The dual spectrum night-vision system shall support querying of camera parameters via the Ethernet connection. The camera parameters shall consist of the following items

a. System temperature

b. System up time

c. System load

d. ONVIF service URI

e. Product

f. Manufacturer

g. Hardware Id

h. Serial number

i. Software version

j. Build date

k. Media Type

l. MAC address

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 dual spectrum night-vision 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. DNS server entry

4. HTTPS Enable/Disable Mode

a. Provide the option to Request, Generate or Upload the HTTPS certificate

**I. POWER INPUT**

1. The dual spectrum night-vision system shall operate on the following electrical conditions;

a. Power; <10 Watts

b. Operating Voltage; PoE

**J. MECHANICAL SPECIFICATIONS**

1. Connectors; 18 pin AMP.

2. Weight; 5.7 pounds (2.6 kg) maximum

3. Dimensions; 5.3” (135mm) x 7.9” (202mm) x 6.7 (169mm)

4. Construction; Powder Coated aluminum

**K. ENVIRONMENTAL REQUIREMENTS**

1. IP66 Ingress Protection

2. Temperature; The system shall operate correctly in the temperature range of -34°C (-29.2°F) through +60°C (+140°F), and shall operate up to 74°C (165°F) for four hours or less.

**2.4 CERTIFICATIONS**

A. FCC Class A Part B

B. IEC/CE CISPR 22 24

C. IP66

**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