1 General
Provide all material, labor, engineering and operations necessary for the installation of a complete, operable video surveillance camera system as shown on the drawings and as specified herein. The application of this standard shall be utilized for all customer requested and university guided video surveillance camera systems.

2 Related Requirements
2.1 Division 27 – Communication

3 Reference
3.1 Abbreviations and Acronyms:
- B/W – Black and White camera mode
- EC – Electrical Contractor
- ECN – Engineering Computer Network
- EHPS – Environmental Health and Public Safety
- FM – Factory Mutual
- IBC – Indiana Building Code
- IEC – Indiana Electrical Code
- IFC – Indiana Fire Code
- IP – Internet Protocol
- ITIS – Information Technology Infrastructure Services
- IR – Infrared
- NFPA – National Fire Protection Association Codes and Standards
- NIC – Network Interface Card
- NVR/DVR – Network/Digital Video Recorder
- PIC – Purdue Information Connection
- PoE – Power over Ethernet
- PUPD – Purdue University Police Department
- TR – Termination Room
- UL – Underwriters Laboratories
- UR – University Residences
- VMS – Video Management System
- WDR – Wide Dynamic Range

4 Submittals
4.1 An action submittal for all video surveillance camera systems shall be submitted to EHPS for review and approval prior to system installation. The layout shall include the following:
- Cameras
- Camera view names

5 Quality Assurance
5.1 Contractor Qualifications:
- Work shall be performed by a contractor regularly engaged in the design and installation of video surveillance camera systems.

5.2 Regulatory Requirements:
- System design, installation and materials shall comply with the applicable regulating agencies and organizations, which include, but are not limited to the following:
  - UL
  - FM
  - Purdue University
  - Manufacturer installation instructions and best practices

5.3 System design, installation and materials shall comply with applicable codes, standards, and regulations, which include, but are not limited to the following:
- IBC
- IFC
- IEC
- NFPA

5.4 It is the contractor’s responsibility to notify the engineer, architect and owner in writing prior to installation if there is a conflict or discrepancy between the applicable codes, standards or regulations and the drawings or specifications.

5.5 The contractor shall assume full financial responsibility for compliance with all applicable codes, standards and regulations. This includes compliance for modification or extension of existing systems. All deficiencies shall be corrected at no additional cost to the Owner.

6 Products
6.1 All products, equipment and materials shall be new, listed and installed in accordance with the manufacturer’s instructions and its listing.
7 Power Sources

7.1 All cameras and related housings shall receive power via PoE (IEEE 802.3af).

7.1.1 Exception – if the power requirement exceeds the available switch port capacity and/or total available switch power (as verified with ITIS), then an approved PoE power supply shall be installed in the TR.

8 Camera Requirements

8.1 All cameras shall have drivers supported by the following VMS:
   - Milestone
   - OnSSI

8.2 Recommended camera manufacturers:
   - Hanwha
   - Axis
   - ACTi – for UR

8.3 Centrally managed exterior IP cameras shall have the following properties:
   8.3.1 Dome camera, with all appropriate adapters for wall mounting and shall be designed so that the camera is installed in the horizontal plane.
   8.3.2 No panoramic, spherical, or fisheye cameras are permitted.
   8.3.3 No video surveillance cameras that require a VMS software plugin to dewarp, flatten, or otherwise modify camera images are permitted.
   8.3.4 Equipped with an RJ-45 network jack
   8.3.5 Have remote focus capability
   8.3.6 Display color image in day mode
   8.3.7 Have a WDR of 100 dB minimum (or Axis Forensic WDR)
   8.3.8 Compression format Multi-codec shall support H.264 (MPEG-4, part 10)
   8.3.9 Support HTTP, and RTSP/RTP protocols
   8.3.10 Have a minimum illumination of 0.3 Lux @ F1.4 in color mode
   8.3.11 IR sensitive minimum illumination of 0 Lux in B/W mode (day/night camera only)
   8.3.12 Shall have day/night mode-capable cameras with automatic light level compensation such as auto-iris and/or electronic shutter.
   8.3.13 Capable of 5 MP images minimum per lens at 10 fps

8.4 Centrally managed interior IP cameras for ECN shall have the following properties:
   8.4.1 ECN cameras are customer ordered, and customer installed.

8.5 Centrally managed interior IP cameras for EHPS shall have the following properties:
   8.5.1 No panoramic, spherical, or fisheye cameras are permitted.
   8.5.2 No video surveillance cameras that require a VMS software plugin to dewarp, flatten, or otherwise modify camera images are permitted.
   8.5.3 Equipped with an RJ-45 network jack
   8.5.4 Have remote focus capability
   8.5.5 Display color image in day mode
   8.5.6 Have a WDR of 100 dB minimum (or Axis Forensic WDR)
   8.5.7 Compression format Multi-codec shall support H.264 (MPEG-4, part 10)
   8.5.8 Support HTTP, and RTSP/RTP protocols
   8.5.9 Have a minimum illumination of 0.3 Lux @ F1.4 in color mode
   8.5.10 IR sensitive minimum illumination of 0 Lux in B/W mode (day/night camera only)
   8.5.11 Shall have day/night mode-capable cameras with automatic light level compensation such as auto-iris and/or electronic shutter.
   8.5.12 Capable of 5 MP images minimum per lens at 10 fps
   8.5.13 Shall include all appropriate VMS licensing per camera.
   8.5.14 A minimum 3-year parts and labor warranty on cameras, lens, housing, and related components.

8.6 Centrally managed interior IP cameras for UR shall have the following properties:
   8.6.1 No panoramic, spherical, or fisheye cameras are permitted.
   8.6.2 No video surveillance cameras that require a VMS software plugin to dewarp, flatten,
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8.6.3 Equipped with an RJ-45 network jack
8.6.4 Have remote focus capability
8.6.5 Display color image in day mode
8.6.6 Have a WDR of 100 dB minimum (or Axis Forensic WDR)
8.6.7 Compression format Multi-codec shall support H.264 (MPEG-4, part 10)
8.6.8 Support HTTP, and RTSP/RTP protocols
8.6.9 Have a minimum illumination of 0.3 Lux @ F1.4 in color mode
8.6.10 IR sensitive minimum illumination of 0 Lux in B/W mode (day/night camera only)
8.6.11 Shall have day/night mode-capable cameras with automatic light level compensation such as auto-iris and/or electronic shutter.
8.6.12 Capable of 5 MP images minimum per lens at 10 fps
8.6.13 Shall include all appropriate VMS licensing per camera.
8.6.14 A minimum 3-year parts and labor warranty on cameras, lens, housing, and related components.

9 Recording Equipment
9.1 Departmentally managed Interior IP cameras shall have the following properties:
9.1.1 Purpose built server for surveillance recording and VMS management.
9.1.2 VMS shall be Milestone.
9.1.3 30 day minimum recording storage retention.
9.1.4 Capable of future system growth.
9.1.5 Minimum of 2 NICs installed, with 1 NIC reserved for exclusive PUPD use at all times.
9.1.6 Minimum of 2 PICs shall be installed at each NIC location, with 1 PIC reserved for exclusive PUPD use at all times.

10 Execution
10.1 All requests for video surveillance camera installations shall be coordinated through EHPS for functionality of the camera locations prior to design and purchase of equipment.
10.2 Final video surveillance camera placement and field of view shall be approved by EHPS.
10.3 All means and methods of live streaming are not permitted.
10.4 Exterior camera views are exclusive to PUPD.

11 Installation of Cameras
11.1 All cameras shall be installed in a neat and worker-like manner for a clean finished look.
11.2 Exterior Cameras
11.2.1 All cabling that connects a camera to a structure, pole, etc. shall be in a weatherproof raceway, and/or box. Exposed cabling is not permitted.
11.2.2 Fixed objects (i.e. trees, light poles, landscaping, etc.) shall not obstruct the view.

11.3 Interior cameras

11.3.1 Every reasonable effort shall be made through camera selection/placement to maintain a pixel concentration of no less than 45 pixels per still image. This is required to achieve successful facial recognition.

11.3.2 Fixed objects (i.e. light fixtures, fire suppression sprinklers, HVAC diffusers, return air grills, breaks in ceiling height, etc.) shall not obstruct the view.

12 Installation of Recording Equipment

12.1 Departmentally managed interior camera systems

12.1.1 Camera servers/clients are not permitted to be installed inside ITIS rooms.

12.1.2 The department requesting the system is responsible for direction on where the server and/or client is to be installed.

12.2 Centrally managed EHPS video surveillance camera system

12.2.1 The integrator is responsible for providing a turn-key installation of the recording server. This includes, but is not limited to:

- Scheduling the installation of the server with EHPS personnel at least seven business days in advance.
- Physical installation of server into existing equipment racks, including server rails and all necessary equipment for a professional look.
- Installation and configuration of the operating system and firewall.
- Configuration and migration into the existing Milestone VMS.

13 Closeout Activities

13.1 Preparation for VMS connection:

13.1.1 Verify that all cameras are installed in accordance with the drawings, specifications and all applicable codes.

13.1.2 PIC test reports shall be given to ITIS no less than fifteen business days prior to requesting VMS connection/system demonstration.

13.1.3 EC and/or Purdue Electronic Shop is responsible for coordinating ITIS approved PIC ID’s with the appropriate department for PIC activation. Allow seven business days for PIC activation.

13.1.4 All cameras shall be installed in final form, and roughly aimed prior to requesting installation onto the VMS with the appropriate department.

13.1.5 Coordinate with the appropriate department for specific video surveillance camera settings (resolution, frame rate, IP address) if needed.

13.2 VMS connection/system demonstration

13.2.1 Schedule connection/demonstration with the Owner at least seven days in advance.

13.2.2 The VMS connection/demonstration will be cancelled if the contractor has not completed the VMS preparation.

13.2.3 Finalize with owner any aiming/adjustment/settings of camera.

13.2.4 It is the responsibility of the EC and/or Purdue Electronics Shop to be present and able to access all video surveillance camera locations during the agreed upon date/time to finalize aim/adjustment of cameras.

13.3 System Acceptance

13.3.1 The Owner’s personnel shall be given instruction for operation of the VMS camera system immediately upon system acceptance.

- Exception – Training may not be required for existing centrally managed video surveillance camera systems. Verify with Owner to confirm.

13.3.2 Provide the closeout submittal to the Owner upon completion of the system acceptance. The following shall be supplied to EHPS:

- Furnish spares of each camera model installed on the project. The amount of spare cameras shall be 6% of the total, but not less than one device. This includes all adapters and mounting hardware.