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ADDENDUM NO. 1

Job Name: **Noblesville City Camera and Door Access Project**

Project Number: **24-800-036-3**

Date of Addendum: **1/10/2025**

This addendum forms a part of the contract documents and is issued in accordance with the instructions to bidders. Acknowledge receipt of this addendum by signing the addendum acknowledgement section of your proposal.

Meeting Minutes:

1. Minutes from the Pre-Bid meeting on **January 8, 2025,** for this project are included in this addendum as part of the Contract Documents.

Specifications:

1. **REVISE** Section 27 05 29 – Hangers and Supports for Communications Systems as follows:
    a. Add reference standards.
    b. Clarified J-hook requirements.
    c. Modified execution requirements.

2. **REVISE** Section 27 05 33.13 – Conduit for Communications Systems as follows:
    a. Modified general requirements.
    b. Modified product requirements.
    c. Clarified execution requirements.

3. **REVISE** Section 27 10 00 – Structured Cabling as follows:
    a. Add reference standards.
    b. Add submittal requirements for field test reports.
    c. Add acceptable manufacturers.
    d. Add copper cabling installation requirements.
    e. Modified field quality control requirements.

4. **REVISE** Section 28 10 00 – Access Control as follows:
    a. Add reference standards.
    b. Add submittal requirements.
    c. Clarified manufacturer requirements.
    d. Add accessories requirements.
    e. Clarified Azure Directory sync interval of 15 minutes.
    f. Clarified field quality control and closeout activities requirements.

5. **REVISE** Section 28 20 00 – Video Surveillance as follows:

a. Add reference standards.
b. Clarified manufacturer requirements.
c. Add requirements for additional XProtect access door licenses.
d. Add accessories requirements.
e. Clarified field quality control and closeout activities requirements.

Drawings:

1. No change.

Clarifications:

1. **Question:** If I am reading this correctly, are they only looking for Hanhwa cameras?
   Response: That's correct. Hanwha cameras, Milestone VMS, and Avigilon access control.

2. **Question:** Which of the two NVR locations within Forest Park (Hobbs Station and Inn) where are the following locations to be recorded on which NVR? Golf Pro Shop, South RR, Maintenance, Lodge.
   Response: Refer to Keyed Note 15. The Forest Park Pro Shop, Inn, South Restrooms, Lodge, and Maintenance shall all record at the Inn. Hobbs Station shall record at the NVR located within the office there.

3. **Question:** Which NVR is Riverside Cemetery to be recorded on?
   Response: Refer to Keyed Note 16. All cameras at Riverside Cemetery shall record at the City Hall NVR.

4. **Question:** Are Pelco cameras allowed on this project?
   Response: No, the Owner has standardized on Hanwha cameras for all new cameras.

5. **Question:** The pre-bid stated no substitutions. Having said that based on the spec, would Avigilon CCTV be considered as a substitute?
   Response: Please refer to Specification 28 20 00 – Video Surveillance. Hanwha is the only acceptable manufacturer of cameras for this project.

6. **Question:** The Milestone Access Control Integration license part numbers are below. These licenses work system wide so to quote this, bidders only need to know a total system wide, not per site. Openpath (Avigilon Alta) doesn't require licenses on their side for integration.

XPABL	XProtect Access Base License (BL)
XPADL	XProtect Access Door License (DL)

   Response: Include 25 door integration licenses in base bid. Refer to revised Section 28 20 00.

7. **Question:** Openpath offers 2 types of Azure AD integration. There is the basic, which is a 60-minute sync between systems, and the advanced, which is a 15-minute sync time. Which is acceptable?
   Response: Provide 15-minute sync time.

8. **Question:** Drawing E-414 (Context: Item 18 – Provide new camera pole with 18" x "60 concrete pole base with CAT6A OSP cable installed in 1" C to IDF. Section 002400 – Bid Package #1 – Electronic

Safety & Security 17. All work within Riverside Cemetery shall be above grade level. No excavation of any kind shall be permitted within the fenced area.) Is it okay to hang cable from camera pole to IDF pole overhead?
Response: Aerial cable is not acceptable. There is approximately 15 feet outside of the fenced area, and it's anticipated that underground conduit can be used without going inside of the cemetery fence.

9. **Question:** Are all network switches provided by city?
Response: Yes, all network switches are provided by the city.

END OF ADDENDUM 1

Project Name: Noblesville City Camera and Door Access Project
Organizer: RQAW
Topic: Pre-Bid Conference
Date: 01/08/2025
Invited: All interested bidders, Noblesville City IT Department
Attendees: Brian Brovont, RQAW; Dustin Barth, RQAW; James Hancock, RQAW; Adam Hedden, City of Noblesville; Misty Shearer, City of Noblesville; John Northcutt, Tech Electronics; Joe Burge, Hoosier Security; Bill Daugherty, Gibson Teldata; Kyle Polk, Hoosier Security; Allen Wilson, Taylored Systems; Greg Monts, Taylored Systems; Matt Lawton, Aptek; Lou Cover, Aptek; John Ambs, Aptek

Unless comments to the contrary are received within seven (7) days of the issue date of these minutes, the minutes will be assumed to be correct as written.

The following discussions/decisions were made during the meeting:

1. Reviewed pre-bid meeting agenda.
2. No questions were asked during the meeting; all bidders were instructed to send emails with any follow-up questions to Brian Brovont.

Action items from this meeting

1.

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Pre-Bid Meeting Agenda

Noblesville City Camera and Door Access Project

January 8, 2025

1. **Introductions:**
    a. Engineer – RQAW
    b. Construction Administrator – City of Noblesville, IT Department
    c. Owner – City of Noblesville
2. **Project Overview:**
    a. Consolidation of security systems across (17) individual sites consisting of multiple buildings into a unified platform and replacement of end-of-life system equipment as described in the Bid Documents, including but not limited to: replacement of existing video security cameras, network video recorders, access control systems and hardware, networking equipment, and provisioning existing equipment to new software systems.
        i. Key items to note:
            1. All bidders must be a “Silver” level or better dealer for Hanwha Vision America.
            2. There will be no substitutions allowed for the following:
                a. Access Control System: Avigilon Openpath
                b. Video Management System: Milestone Systems XProtect
                c. Cameras: Hanwha Vision
    b. Bid Packages:
        i. Bid Package #1: Electronic Safety & Security
            1. Contingency Allowance.
            2. Alternate One: Utilities Site Gate Access Control
3. **Documents:**
    a. Accessible through Eastern Engineering Planroom:
        i. Phone Number: (866) 884-4115
        ii. https://distribution.easternengineering.com/View/ViewJob.aspx?job_id=30480
    b. Project Manual and Project Technical Specifications dated December 24, 2024.
    c. Drawings prepared by RQAW Corporation dated December 24, 2024.
    d. Upcoming Addenda:
        i. Addendum 1 – Bid Questions, pre-bid attendee list & minutes – January 10, 2025.
        ii. Addendum 2 – Other questions/clarifications – January 16, 2025.
        iii. Any additional addenda have a target completion date of January 22, 2025.
4. **Bid Instructions:**
    a. Bid Questions to Brian Brovont, bbrovont@dccm.com – All questions due by January 20, 2025.
    b. Bids due on January 28, 2025.
    c. Deliver sealed bids to Clerk’s Office, Noblesville City Hall. Refer to section 00 11 16.
    d. Bid Form – Make sure everything is filled out and signed. Make sure to include form 96 and affidavit of compliance.
    e. Sub/Supplier list within 48 hours of bid for two apparent low bidders.
5. **Schedule:**
    a. Review preliminary schedule –
        i. Bid Award: February 11, 2025.

ii. Notice to Proceed: February 25, 2025.
iii. Start Construction Date: March 11, 2025.
iv. Substantial Completion Date: November 13, 2025.

6. **Miscellaneous:**
   a. Not Applicable
7. **Q&A**
   a. All questions related to design and project scope will be answered and distributed via addenda.

RQAW | DCCM
8770 North St., Ste. 110
Fishers, IN 46038
317.588.1798

Pre-Bid Meeting Attendance: Noblesville City Camera and Door Access Project

Name	Representing (Department, Division, etc.)	In Attendance (X)	Phone	E-mail
John Northcutt	Tech Electronics	X	(317) 420-4293	John.Northcutt@techelectronics.com
Joe Burge	Hoosier Security	X	317-760-3033	Burge@hoosiersecurity.com
Bill Daugherty	Gibson Telldata	X	317-802-2524	bdaugherty@tgibson.com
Kyle Polk	Hoosier Security	X	317-695-9068	Kyle.P@hoosiersecurity.com
Allen Wilson	Taylored	X	317-752-8887	awilson@taylored.com
Greg Mounts	Taylored Systems	X	317-508-3793	gmounts@taylored.com
Matt Lawton	Aptek	X	765-610-3191	Matt.Lawton@aptek-ssc.com
Lou Cover	Aptek	X	317-601-5226	Lou.Cover@Aptek-ssc.com
John Ahrs	Aptek	X	317-506-5100	john.ahrs@aptek-ssc.com

SECTION 27 05 29
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2023.
D. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition; 2022.
E. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
F. MFMA-4 - Metal Framing Standards Publication; 2004.
G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
I. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
J. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. TIA-569.
      b. NFPA 70.
      c. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of communications work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of four. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   6. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
   7. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit Supports: Straps and clamps suitable for conduit to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Noncontinuous Cable Supports: Suitable for cables to be supported, including but not limited to J-hooks, bridle rings, drive rings, and flexible harnesses/slings.
1. Applications:
a. Do not exceed 5 feet (1.5 m) between cable supports.
b. Maximum Number of Cables per Cable Support:
1) J-Hooks: 50, regardless of capacity.
c. Allowable Cable Types:
1) J-Hooks: Category 5e, Category 6, and Category 6A.
2. Cable Supports Installed in Spaces Used for Environmental Air: Plenum rated; listed and labeled as complying with UL 2043, suitable for use in air-handling spaces.
3. J-Hooks: Noncontinuous cabling support with removable top retainer clip.
a. Material: Use galvanized steel, factory-painted steel, or stainless steel.
b. Provide support surfaces with smooth, beveled edges and radius not less than minimum allowable bend radius of cables supported.
c. Provide multitiered J-hooks where required to support multiple cabling systems.

D. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
E. Metal Channel/Strut Framing Systems:
1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
2. Comply with MFMA-4.
3. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 14 gauge, 0.0747 inch (1.90 mm).
5. Minimum Channel Dimensions: 1-5/8 inch (41 mm) wide by 13/16 inch (21 mm) high.

F. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Single Conduit up to 1-inch (27 mm) Trade Size: 1/4-inch (6 mm) diameter.
b. Single Conduit Larger than 1-inch (27 mm) Trade Size: 3/8-inch (10 mm) diameter.
c. Trapeze Support for Multiple Conduits: 3/8-inch (10 mm) diameter.
d. Outlet Boxes: 1/4-inch (6 mm) diameter.

G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
2. Concrete: Use expansion anchors or screw anchors.
3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
4. Hollow Masonry: Use toggle bolts.
5. Hollow Stud Walls: Use toggle bolts.
6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
7. Sheet Metal: Use sheet metal screws.
8. Wood: Use wood screws.
9. Plastic and lead anchors are not permitted.
10. Powder-actuated fasteners are not permitted.
11. Hammer-driven anchors and fasteners are not permitted.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install hangers and supports in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.
E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.
F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
G. Equipment Support and Attachment:
    1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
    2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners in accordance with manufacturer's recommended torque settings.
I. Remove temporary supports.

END OF SECTION

SECTION 27 05 33.13
CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

1.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, manufacturers' instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Exterior, Direct-Buried: Use rigid PVC conduit or high-density polyethylene (HDPE) conduit.
   2. Where rigid polyvinyl chloride (PVC) conduit or high-density polyethylene (HDPE) conduit is provided, transition to schedule 80 rigid PVC conduit where emerging from underground.

D. Concealed Above Accessible Ceilings: Use galvanized steel electrical metallic tubing (EMT).

E. Interior, Damp or Wet Locations: Use galvanized steel electrical metallic tubing (EMT).

F. Exposed, Interior, Not Subject to Physical Damage: Use stainless steel electrical metallic tubing (EMT).

G. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel intermediate metal conduit (IMC).

1.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70 and TIA-569.

B. Provide conduit, fittings, supports, and accessories required for complete communications pathway.

C. Provide products listed, classified, and labeled as suitable for purpose intended.

D. Where conduit size is not indicated, size to comply with NFPA 70, TIA-569, and BICSI TDMM, but not less than applicable minimum size requirements specified. Where specified standards differ, comply with most stringent.

1.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
   4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

1.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:

1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
   a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

1.05 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression/gland or set-screw type.
      a. Do not use indenter type connectors and couplings.
   4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

1.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage.
B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   ~~1.~~2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
   ~~2.~~3. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
      a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

1.07 HIGH-DENSITY POLYETHYLENE (HDPE) CONDUIT

A. Description: NFPA 70, Type HDPE high-density polyethylene solid-wall conduit complying with ASTM F2160 and NEMA TC 7; list and label as complying with UL 651A; Schedule 40 unless otherwise indicated.
B. Joining Methods: Approved by HDPE conduit manufacturer.
~~B.~~C. Mechanical Fittings: Comply with ASTM F2176; list and label as complying with UL 651A.

1.08 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.
B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
~~A.~~C. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf (5.6 kN).
~~B.~~D. Foam Conduit Sealant:
   1. Removable, two-part, closed-cell foam, specifically designed for sealing conduit openings against water, moisture, gases, and dust.
   2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
   3. Rated to hold minimum of 10 ft (3.0 m) water head pressure.

~~C.~~E. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

PART 3 EXECUTION

2.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Install conduit in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.
C. Galvanized Steel Rigid Metal Conduit (RMC): Install in accordance with NECA 101.
D. Galvanized Steel Intermediate Metal Conduit (IMC): Install in accordance with NECA 101.
E. Galvanized Steel Electrical Metallic Tubing (EMT): Install in accordance with NECA 101.
F. Rigid Polyvinyl Chloride (PVC) Conduit: Install in accordance with NECA 111.
G. Conduit Routing:
    1. Conceal conduits unless specifically indicated to be exposed.
    2. Conduits in the following areas may be exposed, unless otherwise indicated:
        a. Electrical rooms.
        b. Communications rooms.
        c. Mechanical equipment rooms.
        d. Within joists in areas with no ceiling.
    3. Unless otherwise approved, do not route exposed conduits:
        a. Across floors.
        b. Across roofs.
        c. Across top of parapet walls.
        d. Across building exterior surfaces.
    4. Arrange conduit to provide no more than equivalent of two 90-degree bend(s) between pull points.
        a. The equivalent of three 90-degree bends between pull points is permitted only under conditions described in BICSI TDMM.
    5. Arrange conduit to provide minimum bend radii in accordance with BICSI TDMM.

H. Conduit Support:
    1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction.
    2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

~~H.~~I. Connections and Terminations:
    1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
    2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
    3. Use suitable adapters where required to transition from one type of conduit to another.
    4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
    ~~1.~~5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect cables.
    6. Secure joints and connections to provide mechanical strength and electrical continuity.

J. Penetrations:
    1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
    2. Make penetrations perpendicular to surfaces unless otherwise indicated.
    3. Provide sleeves and/or slots for penetrations as indicated or as required to facilitate installation.

4. Conceal bends for conduit risers emerging above ground.
5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 84 00.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed cables or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

~~I.~~L. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
   a. Where conduits enter building from outside.
   b. Where service conduits enter building from underground distribution system.
   c. Where conduits enter building from underground.
   d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
   a. Where conduits pass from outdoors into conditioned interior spaces.
   b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide grounding and bonding.

END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition; 2019.
B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
C. TIA-526-7 - Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, Adoption of IEC 61280-4-2 Edition 2: Fibre-Optic Communications Subsystem Test Procedures – Part 4-2: Installed Cable Plant – Single-Mode Attenuation and Optical Return Loss Measurement; 2015a (Reaffirmed 2022).
D. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant; IEC 61280-4.1 Edition 3.1, Fiber Optic Communications Subsystem Test Procedures- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement; 2023d.
E. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set; 2023.
F. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards; 2018d, with Addenda (2020).
G. TIA-569 - Telecommunications Pathways and Spaces; 2019e, with Addendum (2022).
H. TIA-606 - Administration Standard for Telecommunications Infrastructure; 2021d.
I. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises; 2019d, with Addendum (2021).
J. UL 444 - Communications Cables; Current Edition, Including All Revisions.
K. UL 1863 - Communications-Circuit Accessories; Current Edition, Including All Revisions.

~~1.01~~1.02 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
B. Field Test Reports.

~~1.02~~1.03 QUALITY ASSURANCE

A. Products: Listed, classified, and labeled as suitable for the purpose intended.

~~1.03~~1.04 WARRANTY

A. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
   1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
   2. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
   3. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F (0 to 60 degrees C) at relative humidity of 0 to 95 percent, noncondensing.
   4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
B. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. Conduit: See section 27 05 33.13.
B. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

2.03 COPPER CABLE AND TERMINATIONS

A. Manufacturers:
   1. CommScope: www.commscope.com/#sle.
   2. General Cable Technologies Corporation: www.generalcable.com/#sle.
   3. Siemon Company: www.siemon.com/#sle.
   4. Substitutions: See Project Manual.

~~A.~~B. Copper Horizontal Cable:
   1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
   2. Cable Type - Data: TIA-568.2 Category 6A UTP (unshielded twisted pair); 23 AWG.
   3. Cable Capacity: 4-pair.
   4. Cable Applications:
      a. Plenum Applications: Use listed NFPA 70 Type CMP plenum cable.
      b. Riser Applications: Use listed NFPA 70 Type CMR riser cable or Type CMP plenum cable.
      c. General Purpose Applications: Use listed NFPA 70 Type CM/CMG general purpose cable, Type CMR riser cable, or Type CMP plenum cable.
   5. Cable Jacket Color -Data Cable: Coordinate with Owner.

~~B.~~C. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

~~C.~~D. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
   1. Performance: 500 mating cycles.
   2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

2.04 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), BICSI N1, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
B. Comply with Communication Service Provider requirements.
C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

3.02 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:
   1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
   2. Do not over-cinch or crush cables.
   3. Do not exceed manufacturer's recommended cable pull tension.

4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
   1. At Distribution Frames: 120 inches (3000 mm).
   2. At Outlets - Copper: 12 inches (305 mm).

C. Copper Cabling:
   1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
   2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
   ~~1.~~3. Use T568B wiring configuration.

D. Wall-Mounted Racks and Enclosures:
   1. Install to plywood backboards only, unless otherwise indicated.
   2. Mount so height of topmost panel does not exceed 78 inches (1980 mm) above floor.

E. Identification:
   1. Use wire and cable markers to identify cables at each end.
   2. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

3.03 FIELD QUALITY CONTROL

A. See the Agreement for additional requirements.
B. Comply with inspection and testing requirements of specified installation standards.
~~A.~~C. Visual Inspection:
   1. Inspect cable jackets for certification markings.
   2. Inspect cable terminations for color coded labels of proper type.
   3. Inspect outlet plates and patch panels for complete labels.

~~B.~~D. Testing - Copper Cabling and Associated Equipment:
   1. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.

~~C.~~E. Testing - Fiber Optic Cabling:
   1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
   2. Multimode Backbone: Perform tests in accordance with TIA-526-14.
   3. Single Mode Backbone: Perform tests in accordance with TIA-526-7.

END OF SECTION

SECTION 28 10 00
ACCESS CONTROL

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
C. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

~~1.01~~1.02 SUBMITTALS

A. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.
C. Design Data: Standby battery/UPS calculations.
D. Evidence of qualifications for manufacturer.
E. Evidence of qualifications for installer.
F. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.
G. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
   1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.
H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

~~1.02~~1.03 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70.
   2. The requirements of the local authorities having jurisdiction.
   3. Applicable TIA/EIA standards.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with access control systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.
   1. Contract maintenance office located within 50 miles (60 km) of project site.

~~1.03~~1.04 WARRANTY

A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access Control Units:
   1. Avigilon; Alta Access Control.
B. Access Control Software:

1. Avigilon; Alta Cloud Based Access Control Software.

C. Readers and Keypads:
   1. Avigilon; Openpath Series.

D. Source Limitations: Substitutions are not permitted.

~~2.01~~2.02 ACCESS CONTROL SYSTEM REQUIREMENTS

A. Provide new access control system consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
   1. Integrate the existing Avigilon Openpath access controls at Finch Creek (approx. 5 card readers) and Federal Hill Commons (approx. 40 card readers) into the new citywide Avigilon Alta Cloud control platform.

B. System Battery Backup: Provide batteries/uninterruptible power supplies (UPS) as required for 90 minutes full operation.

C. Surge Protection:
   1. Provide equipment power surge protection where electrical distribution system surge protection is not provided.

D. Access Control Points:
   1. See article "ACCESS CONTROL POINT PERIPHERALS" below for device descriptions.

E. Interface with Other Systems:
   1. Provide products compatible with other systems requiring interface with access control system.
   2. Interface with electrically operated door hardware.
      a. Capable of locking/unlocking/releasing controlled doors.
   3. Interface with elevators.
      a. Capable of controlling access to elevator.
      b. Capable of controlling elevator access to designated floors.
   4. Interface with parking control gates.
      a. Capable of controlling gate access.
   5. Interface with intrusion detection system.
      a. Capable of affecting access for controlled doors for selected intrusion detection system events.
      b. Capable of affecting intrusion detection system status for selected access control system events.
   6. Interface with video surveillance system as specified in Section 28 20 00.
      a. Capable of affecting camera/video operation for selected access control system events.
   7. Interface with fire alarm system.
      a. Capable of affecting access for designated doors for selected fire alarm system events.

F. Provide products listed, classified, and labeled as suitable for the purpose intended.
   1. Access Control Units and Readers: Listed and labeled as complying with UL 294.

~~2.02~~2.03 ACCESS CONTROL UNITS AND SOFTWARE

A. Provide access control units and software compatible with readers to be connected.

B. Unless otherwise indicated, provide software and licenses required for fully operational system.

C. Access Control Unit - Basis of Design: Avigilon Core Series Smart Hub
   1. Control Capability: As required.

D. Access Control Cloud Services - Basis of Design: Avigilon Alta Premium.
   1. Capacity: Unlimited cardholders; unlimited doors, readers, and administrators; unlimited workstations; unlimited events (viewable for 365 days); 60 custom fields.

2. Communication: Supports TLS1.2+ authentication with AES256 encryption.
3. Features: Anti-passback; text/email event notifications; elevator control, reports, VMS integration, SSO integration with existing Microsoft Azure directory at 15 minute intervals.
4. Licensing: Provide 3-year license, with itemized cost to owner for renewal. Fees shall be based on six hundred (600) active credentials.

~~2.03~~2.04 ACCESS CONTROL POINT PERIPHERALS

A. Provide devices compatible with control units and software.
B. Provide devices suitable for operation under the service conditions at the installed location.
C. Readers and Keypads:
   1. General Requirements:
      a. Provide readers compatible with credentials to be used.
      b. Color: To be selected by Architect from manufacturer's available standard colors.
      c. Contactless Smart Card Readers:
         1) Utilize 13.56 MHz RF communication with compatible credentials.
         2) Utilize 64 bit authentication keys.
         3) Support ISO compliant credentials.
         4) Support data encryption.
      d. Proximity Readers:
         1) Utilize 125 kHz RF communication with compatible credentials.
   2. Combination Reader - Basis of Design: Avigilon Openpath Series
      a. Credentials Supported: Communicates with Bluetooth Low Energy (BLE) mobile credentials, 13.56 MHz smart cards, 125 kHz proximity cards, and near-field communication (NFC) credentials.
      b. Features:
         1) Keypad.
         2) Products:
            (a) Model OP-R2X-STND single gang.
            (b) Model OP-RKP-STND single gang, with keypad.
            (c) Model OP-VID-PRO-INT single gang, with intercom.
D. Door Locking Devices (Electric Strikes and Magnetic Locks): Comply with Section 08 71 00.

~~2.04~~2.05 ACCESSORIES

A. Provide components as indicated or as required for connection of access control system to devices and other systems indicated.
~~A.~~B. Unless otherwise indicated, credentials to be provided by Owner.
~~B.~~C. Provide cables as indicated or as required for connections between system components.
   1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP) complying with Section 27 10 00.
D. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install access control system in accordance with NECA 1 (general workmanship).
B. Install products in accordance with manufacturer's instructions.
C. Wiring Method: Unless otherwise indicated, use cables (not in conduit).
   1. Use suitable listed cables in wet locations, including underground raceways.
   2. Use suitable listed cables for vertical riser applications.
   3. Use listed plenum rated cables in spaces used for environmental air.
   4. Install wiring in conduit for the following:
      a. Where required for rough-in.

b. Where required by authorities having jurisdiction.
c. Where exposed to damage.
d. Where installed outside the building.
e. For exposed connections from outlet boxes to devices.

5. Conceal cables unless specifically indicated to be exposed.
6. Use power transfer hinges for concealed connections to door hardware.
7. Cables in the following areas may be exposed, unless otherwise indicated:
   a. Equipment closets.
   b. Within joists in areas with no ceiling.
8. Route exposed cables parallel or perpendicular to building structural members and surfaces.
9. Do not exceed manufacturer's recommended maximum cable length between components.

D. Install firestopping to preserve fire resistance rating of partitions and other elements~~, using materials and methods specified in Section 07 84 00~~.

~~E. Identify system wiring and components in accordance with Section 26 05 53.~~

3.02 FIELD QUALITY CONTROL

A. Prepare and start system in accordance with manufacturer's instructions.
B. Program system parameters according to requirements of Owner.
C. Test for proper interface with other systems.
~~B.~~D. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
   1. Provide four (4) hours of onsite administrative training, at a location of the Owner's choosing.
   2. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.04 MAINTENANCE

A. Provide trouble call-back service upon notification by Owner:
   1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION

SECTION 28 20 00
VIDEO SURVEILLANCE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.
B. IEEE 802.3 - IEEE Standard for Ethernet; 2022, with Amendment (2024).
C. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.
D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.
E. NECA 303 - Standard for Installing and Maintaining Closed-Circuit Television (CCTV) Systems; 2019.
F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.02 SUBMITTALS

A. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.
B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.
C. Design Data:
   1. Video storage capacity calculations.
D. Evidence of qualifications for installer.

1.03 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70.
   2. Applicable TIA/EIA standards.
B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with video surveillance systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.
   1. Hanwha Vision America "Silver" or better Dealer Level.
   2. Preference given for contract maintenance office located within ~~[~~50~~]~~ miles ~~([~~(80~~]~~ km) of project site. Provide distance from contract maintenance office to City Hall and estimated average response time for service technicians.
C. Maintenance Contractor Qualifications: Same entity as installer.

1.04 WARRANTY

A. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Video Recording and Viewing Equipment and Software:
   1. Milestone Systems; Milestone XProtect Expert VMS.
   2. Milestone Systems; Husky IVO NVR.
   3. Velasea; IronLink NVR.
B. Cameras:

1. Hanwha Vision America.

C. Source Limitations: Substitutions are not permitted.

2.02 VIDEO SURVEILLANCE SYSTEM

A. Provide new video surveillance system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
   1. Integrate the existing Milestone VMS servers at Finch Creek Park (approx. 15 cameras) and Federal Hill Commons (approx. 45 cameras).

B. System Description: IP system with connection to network (IP) cameras.
   1. Video Storage Capacity: Suitable for storing video from all cameras for 30 days.
      a. All cameras shall record on motion detection with a 15 second minimum pre-recording buffer and and 60 second post-recording buffer, unless noted otherwise.
      b. The evidence room and forensic labs entrance cameras shall record continuously, with a 365 day retention period.
      c. Redundant failover server located at City Hall shall be suitable for storing video for seven (7) days based on the largest site in the City network.
   2. Surge Protection:
      a. Provide surge protection for exterior cameras.
      b. Provide equipment power surge protection where electrical distribution system surge protection is not provided.

C. Cameras Required:
   1. See article "CAMERAS" below for product descriptions.

D. Video Recording and Viewing Equipment Required:
   1. See article "VIDEO RECORDING AND VIEWING EQUIPMENT" below for product descriptions.

E. Interface with Other Systems:
   1. Provide products compatible with other systems requiring interface with video surveillance system.
   2. Interface with access control system as specified in Section 28 10 00.
      a. Capable of affecting camera/video operation for selected access control system events.

F. Provide products listed, classified, and labeled as suitable for the purpose intended.

G. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B, consumer application.

2.03 VIDEO RECORDING AND VIEWING EQUIPMENT AND SOFTWARE

A. Provide video recording and viewing equipment compatible with cameras to be connected.
   1. Integrate all existing digital cameras that are not replaced into new video management system.

B. Network Video Recorders (NVRs):
   1. Supports connection of network (IP) cameras.
   2. Supports continuous and event-based recording.
   3. Network Video Recorder:
      a. Capacity: Channels as required per site, plus 25% spare capacity.
      b. Recording and Viewing Performance: 15 fps at 4 MP resolution, minimum.
      c. Storage Capacity: As required.
         1) Operating System Storage: RAID 1.
         2) Video Recording Storage: RAID 10.
      d. Network: Dual 1 Gigabit Ethernet.
      e. Features:
         1) Supports PTZ camera control.

2) Supports remote access via desktop and mobile device.
3) Failover server at City Hall shall support recording for 7 days, sized for the largest site in the network.
4) SSO integration with existing Microsoft Azure directory.

C. Computers:
1. Servers: Unless otherwise indicated, server hardware not furnished by video surveillance system manufacturer to be provided by Contractor as part of work of this section, meeting video surveillance system equipment manufacturer's minimum requirements.

D. Software:
1. Unless otherwise indicated, provide all software and licenses required for fully operational system. Provide 3-year licenses, and itemized list to Owner of licensing costs. Fees shall be based on (70) active VMS clients.
a. Fees shall include (25) XProtect Access Door Licenses (XPADL). These shall be provisioned at the Owner's direction during system programming and startup.
2. Video Management System:
a. Milestone Systems XProtect Expert VMS.

2.04 CAMERAS

A. Provide cameras and associated accessories suitable for operation under the service conditions at the installed location. Provide additional components (e.g. enclosures, heaters, blowers, etc.) as required.
B. Where not factory-installed, provide additional components (e.g. lenses, mounting accessories, etc.) as necessary for complete installation.
C. Network (IP) Cameras:
1. Signal-to-Noise Ratio: Not less than 50 dB.
2. Provide the following standard features:
a. Automatic electronic shutter.
b. Automatic gain control.
c. Automatic white balance.
d. Web-based interface for remote viewing and setup.
e. Password protected security access.
f. Integrated analytics, capable of object and attribute extraction.
3. Network (IP) Indoor/Outdoor Fixed Dome Camera - Basis of Design: Hanwha Vision Model XNV-C7083R (4 MP, Indoor/Outdoor, Vandal Dome)
a. Camera Type: True day/night with IR cut filter.
b. Image Sensor: 1/2.8" CMOS.
c. Resolution: Up to 4 megapixel (2592 x 1520).
d. Frame Rate: Up to 30 frames per second (fps) at all available resolutions.
e. Lens: 2.8 - 10 mm varifocal; auto iris, manual focus and zoom; f 1.4 - 3.0.
f. Video Streaming: Supports H.264 and H.264/MJPEG compression .
g. Power: Power over Ethernet IEEE 802.3 or 24 VAC as indicated or as required.
h. Features:
1) Supports alarm input/output.
2) Camera tampering detection.
3) Video motion detection capability.
4) Onboard analytics: Classified object type: Person/Face/Vehicle(Type: car/bus/truck/motorcycle/bicycle)/License plate Attributes: Vehicle(Type: car/bus/truck/motorcycle/bicycle) Support DetectionShot Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit), Motion detection Analytics events - Defocus detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear).

4. Network (IP) Outdoor Fixed Dome Camera - Basis of Design: Hanwha Vision Model XNV-C9083R (8 MP, Outdoor, Vandal Dome)
    a. Camera Type: True day/night with IR cut filter.
    b. Image Sensor: 1/1.8" CMOS.
    c. Resolution: Up to 8 megapixel (3840 x 1520).
    d. Frame Rate: Up to 30 frames per second (fps) at all available resolutions.
    e. Lens: 4.4 - 9.3 mm varifocal; auto iris, manual focus and zoom; f 1.3 - 2.15.
    f. Video Streaming: Supports H.264 and H.264/MJPEG compression .
    g. Power: Power over Ethernet IEEE 802.3 or 24 VAC as indicated or as required.
    h. Features:
        1) Supports alarm input/output.
        2) Camera tampering detection.
        3) Video motion detection capability.
        4) Onboard analytics: Classified object type: Person/Face/Vehicle(Type: car/bus/truck/motorcycle/bicycle)/License plate Attributes: Vehicle(Type: car/bus/truck/motorcycle/bicycle) Support DetectionShot Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit), Motion detection Analytics events - Defocus detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear).
5. Network (IP) Indoor/Outdoor Fixed Multi-directional Dome Camera - Basis of Design: Hanwha Vision Model PNM-C12083RVD (2x6 MP, Indoor/Outdoor, Multi-directional, Vandal Dome)
    a. Camera Type: True day/night with IR cut filter.
    b. Image Sensor: 1/2.8" CMOS x 2 Channel.
    c. Resolution: Up to 6 megapixel (3328 x 1872).
    d. Frame Rate: Up to 30 frames per second (fps) at all available resolutions.
    e. Lens: 3.54 - 6.69 mm varifocal; auto iris, manual focus and zoom; f 1.3 - 2.15.
    f. Video Streaming: Supports H.264 and H.264/MJPEG compression .
    g. Power: Power over Ethernet IEEE 802.3 or 24 VAC as indicated or as required.
    h. Features:
        1) Supports alarm input/output.
        2) Camera tampering detection.
        3) Video motion detection capability.
        4) Onboard analytics: Classified object type: Person/Face/Vehicle(Type: car/bus/truck/motorcycle/bicycle)/License plate Attributes: Vehicle(Type: car/bus/truck/motorcycle/bicycle) Support DetectionShot Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit), Motion detection Analytics events - Defocus detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear).
6. Network (IP) Indoor/Outdoor Fixed Multi-directional dome Camera - Basis of Design: Hanwha Vision Model PNM-C16013RVQ (4x4 MP, Indoor/Outdoor, Multi-directional, Vandal Dome)
    a. Camera Type: True day/night with IR cut filter.
    b. Image Sensor: 1/1.8" CMOS x 4 Channel.
    c. Resolution: Up to 4 megapixel (2592 x 1520).
    d. Frame Rate: Up to 30 frames per second (fps) at all available resolutions.
    e. Lens: 3.19 mm fixed focal; f1.2.
    f. Video Streaming: Supports H.264 and H.264/MJPEG compression .
    g. Power: Power over Ethernet IEEE 802.3 or 24 VAC as indicated or as required.
    h. Features:
        1) Supports alarm input/output.

2) Camera tampering detection.
3) Video motion detection capability.
4) Onboard analytics: Classified object type: Person/Face/Vehicle(Type: car/bus/truck/motorcycle/bicycle)/License plate Attributes: Vehicle(Type: car/bus/truck/motorcycle/bicycle) Support DetectionShot Analytics events based on AI engine - Object detection, Virtual line(Crossing/Direction), Virtual area(Loitering/Intrusion/Enter/Exit), Motion detection Analytics events - Defocus detection, Tampering, Fog detection, Audio detection, Sound classification, Shock detection, Virtual area(Appear/Disappear).

2.05 ACCESSORIES

A. Camera Mounting Supports: Where not factory installed, provide mounting supports necessary for installation.
B. Camera Poles:
1. Provide poles suitable for cameras, supports, and accessories to be installed.
2. Structural Design Criteria:
a. Wind Load: Include effective projected area (EPA) of cameras, supports, and accessories to be installed.
b. Dead Load: Include weight of proposed cameras, supports, and accessories.
3. Pole Configuration:
a. Material: Use steel or aluminum.
b. Shape: Use square or round, straight or tapered.
c. Finish: Match light poles.
d. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
4. Provide ground lug, accessible from handhole.
5. Provide the following:
a. Top cap.
b. Handhole.
c. Anchor bolts with leveling nuts or leveling shims.
d. Anchor base cover.

C. Provide components as indicated or as required for connection of video surveillance system to devices and other systems indicated.
D. Provide components as indicated or as required for system power and network connections.
E. Provide cables as indicated or as required for connections between system components.
1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP) complying with Section 27 10 00.

F. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install video surveillance system in accordance with NECA 1 (general workmanship) and NECA 303.
B. Install products in accordance with manufacturer's instructions.
C. Wiring Method: Unless otherwise indicated, use cables (not in conduit).
1. Use suitable listed cables in wet locations, including underground raceways.
2. Use suitable listed cables for vertical riser applications.
3. Use listed plenum rated cables in spaces used for environmental air.
4. Install wiring in conduit for the following:
a. Where required for rough-in.
b. Where required by authorities having jurisdiction.
c. Where exposed to damage.

d. Where installed outside the building.
e. For exposed connections from outlet boxes to cameras.

~~Conduit: Comply with Section 26 05 33.13.~~

5. Conceal all cables unless specifically indicated to be exposed.
6. Cables in the following areas may be exposed, unless otherwise indicated:
   a. Equipment closets.
   b. Within joists in areas with no ceiling.
7. Route exposed cables parallel or perpendicular to building structural members and surfaces.

D. Pole-Mounted Cameras:
1. Maintain the following minimum clearances:
   a. Comply with IEEE C2.
   b. Comply with utility company requirements.
2. Foundation-Mounted Poles:
   a. Install foundations plumb.
   b. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
   c. Tighten anchor bolt nuts to manufacturer's recommended torque.

Install firestopping to preserve fire resistance rating of partitions and other elements~~, using materials and methods specified in Section 07 84 00.~~

E. ~~Identify system wiring and components in accordance with Section 26 05 53~~.

3.02 FIELD QUALITY CONTROL

A. Prepare and start system in accordance with manufacturer's instructions.
B. Adjust cameras to provide desired field of view and produce suitable images under all service lighting conditions.
C. Program system parameters according to requirements of Owner.
D. Test for proper interface with other systems.
E. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.
B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
1. Provide eight (8) hours of onsite training, at a location of the Owner's choosing.
2. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

3.04 MAINTENANCE

A. Provide trouble call-back service upon notification by Owner:
1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION