



ADDENDUM #6 – This addendum forms part of the Contract Documents and modifies the original Contract Documents. All other parts of the Contract Documents remain unchanged. Offerors **must** acknowledge receipt of this addendum in the Proposal.

DOCUMENT 00 9113 – ADDENDUM #6

1.3 PROJECT INFORMATION

- A. Project Name: **Sandoval County Sheriff & Emergency Operation Center**
- B. Owner Project Number: **FY22-SCPW-05**
- C. Owner: **Sandoval County**
- D. Architect: **RMKM Architecture, P.C.**
- E. RMKM Architect Project Number: **1904**
- F. Date of Addendum: **28 February 2022**

1.4 NOTICE TO BIDDERS

- A. This Addendum is issued to all registered plan holders pursuant to the Instructions to Bidders and Conditions of the Contract. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.
- B. The Contractor shall acknowledge receipt of this **Addendum 06**. Please email Leslie Olivas at ldolivas@sandovalcountynm.gov and Mark Hatzenbuhler at mhatzenbuhler@sandovalcountynm.gov for acknowledgement and any additional questions.

1.5 REPLACEMENT SPECIFICATION SECTIONS

- A. Please use **replacement** Specification Section **03 5216 Lightweight Insulating Concrete** in this Addendum 6 to replace original.
- B. Please use **replacement** Specification Section **07 5423 Thermoplastic – Polyolefin (TPO) Roofing** in this Addendum 6 to replace original
- C. Please use **replacement** Specification Section **28 2300 Video Surveillance** in this Addendum 6 to replace original.

1.6 Questions / **Answers**

- A. In 07 5423 / 2.1 you call for roof-edge specialties that are listed in the FM Approval’s “Roof-Nav” and approved for windstorm classification, Class 1-105. The profile of the copings you show are not standard ES-1 profiles and to my knowledge have not been tested. **ANSWER: Please see attached revised Specification Section 07 5423. Please note that Roof Edge Metal is under specification section 07 7100.**
 - a. ARE YOU ASKING FOR THE PROFILES SHOWN ON THE DRAWINGS AND IF SO, DO YOU HAVE A SOURCE THAT HAS TESTED THESE SPECIFIC PROFILES

RMKM Architecture, P.C.

SIMMS TOWER - STUDIO 1100 - 400 GOLD AVENUE - SW - ALBUQUERQUE - NEW MEXICO – 87102 tel (505) 243-5454



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AND ASSEMBLIES? ANSWER: All edge securement products specified must comply with Section 1504.5 of the IBC, and each edge securement product must be tested for resistance in accordance with test methods RE-1, RE-2 and RE-3 of ANSI/SPRI ES-1, and per SPRI recommendations the testing must be conducted for each fabricator that produces the product. To provide for building code compliance of shop-fabricated edge metal flashings, the National Roof Contractors Association (NRCA) has conducted extensive testing using ES-1 of various edge metal flashing profiles that have been published for use by a metal fabricator. The metal fabrication shop awarded the contract for Section 077100 Roof Specialties shall procure certification and testing for each non-traditional profile that does not conform to any of the NRCA Roofing Manuals UL ES-1 Tested Assemblies for Shop-fabricated Edge Metal. Testing shall be performed at an ES Testing Service lab such as National ES Testing Services, INC · 382 Penwood Trail, PO Box 485, Dacula, GA 30019, telephone (404) 620-3153, or similar. Testing services costs are typically \$2500.00 per test and costs for code approval ES-1 certification must be included in the bid price for shop fabricated metal under Section 077100. Profiles shown in technical detail 16/A-503 and detail 19/A-503 of the bid document set using TPO coated metal shall be installed at minimum in conformance with NRCA Roofing Manual Construction Detail EE-3 UL-28 using embedded edge fascia securement type A and two rows hot dipped galvanized steel roof nails at the roof deck flange that shall be spaced 3-inches on center staggered 1/2-inch. These profiles may require ES-1 testing for local shop fabrication.

- B. In 07 5423 / 2.5 you call out Substrate Board, polyiso insulation, tapered insulation and Gyp Cover Board. Your plans call for TPO membrane adhered directly to aggregate Lightweight Concrete?
- a. PLEASE CLARIFY THE ROOF ASSEMBLY **ANSWER: New roof system shall be TPO or PVC single ply membrane fully adhered to new LWIC substrate, see revised Specification Section 07 5423.**
- C. 03 5216 / CAST IN PLACE PERLITE LIGHTWEIGHT CONCRETE – you are calling for the TPO roof membrane to be adhered directly to the Lightweight Concrete. Normally we adhere to Cell-Core Lightweight which is an air entrained product, not perlite aggregate. To adhere to perlite aggregate, you would need 225 PSI product. You are specifying 125PSI. That would be fine for Cell-Core, but not for the aggregate product. The manufacturer would have to conduct pull tests to confirm adhesion. If the testing fails, we could have serious issues.
- a. CAN YOU CHANGE THIS TO AIR ENTRAINED PRODUCT – CELL-CORE OR EQUAL? **ANSWER: Please refer to Replacement Section 035216 Lightweight Insulating Concrete perlite aggregate with new Section 035216 cellular lightweight insulating concrete. Lightweight perlite aggregate will not be acceptable for a roof substrate.**



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- D. There is a lot of confusion with the special systems contractors regarding the Video Surveillance.
- a. The Video Surveillance Specifications 282300 indicate that an “Allowance” contractor will provide a turn-key system. The prints state the cameras are CFCI. Is there an allowance contractor for Video Surveillance? **ANSWER: All references to security cameras on T-101 and T-102 on all keynotes calling for cameras are CFCI. Please see attached updated specification 28 2300.**

END OF ADDENDUM 06

SECTION 03 5216 - LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Cast-in-place cellular foam lightweight insulating concrete.
- 2. Sealing of metal decking joints and penetrations to prevent water leakage from above and air/moisture intrusion from below.

- B. Related Requirements:

- 1. Section 03 3000 "Cast-in-Place Concrete" for requirements for normal-weight concrete including concrete materials and mixes.
- 2. Section 05 3100 "Steel Deck" for steel deck closures at deck terminations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For lightweight insulating concrete.

- 1. Include plans, sections, and details showing roof slopes, thicknesses, and embedded insulation board.
- 2. Indicate locations of penetrations, perimeter terminations and curbs, control and expansion joints, and drains.
- 3. Indicate details for sealing of all side and end lap joints, penetrations and terminations of metal decking to prevent water leakage from above and air/moisture intrusion from below metal decking.

- C. Design Mixtures: For each lightweight insulating concrete mixture.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.

- B. Product Certificates: For the following:

1. Cementitious materials.
2. Lightweight aggregates.
3. Foaming agents.
4. Admixtures.
5. Molded-polystyrene insulation board.

- C. Evaluation Reports: For lightweight insulating concrete, from ICC-ES.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. NRDCA Installer Qualifications: A firm that has been evaluated by UL and found to comply with requirements of NRDCA's Lightweight Insulating Concrete Roof Deck Contractors Accreditation Program.
- C. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1.7 FIELD CONDITIONS

- A. Do not place lightweight insulating concrete unless ambient temperature is at least 40 deg F (4.4 deg C) and rising.
1. When air temperature has fallen or is expected to fall below 40 deg F (4.4 deg C), heat water to a maximum 120 deg F (49 deg C) before mixing so lightweight insulating concrete, at point of placement, reaches a temperature of 50 deg F (10 deg C) minimum and 80 deg F (27 deg C) maximum.
- B. Do not place lightweight insulating concrete during rain or snow or on surfaces covered with standing water, snow, or ice.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. FM Global Listing: Lightweight insulating concrete along with other roofing components shall comply with requirements in FM Global 4454 as part of a roof assembly, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable.

2.2 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents complying with ASTM C869/C869M, and the minimum amount of water necessary to produce a workable mix:
1. Manufacturers:
 - a. Celcore Incorporated.
 - b. Cellular Concrete LLC, Mearlcrete Division.
 - c. Elaszell Corporation of America.
 - d. Lite-Crete Inc.
 - e. Siplast.
 2. As-Cast Unit Weight: 34 to 42 lb/cu. ft. (545 to 673 kg/cu. m) at point of placement, when tested according to ASTM C138/C138M.
 3. Oven-Dry Unit Weight: 26 to 32 lb/cu. ft. (416 to 513 kg/cu. m), when tested according to ASTM C495.
 4. Compressive Strength: Minimum 190 psi (1310 kPa), when tested according to ASTM C495.
 5. Density: 22 psf (352 kg).

2.3 MATERIALS

- A. Cementitious Material: Portland cement, ASTM C150/C150M, Type I/II. Supplement with fly ash, ASTM C618, Class C or F.]
- B. Water: Clean, potable.
- C. Joint Filler: ASTM C612, Class 2, glass-fiber type; compressing to one-half thickness under a load of 25 psi (172 kPa).
- D. Galvanized Plain-Steel Welded Wire Reinforcement: ASTM A185/A185M, 2 by 2 inches (50 by 50 mm), W0.5 by W0.5, fabricated from galvanized-steel wire into flat sheets.
- E. Molded-Polystyrene Insulation Board: ASTM C578, Type I, 0.90-lb/cu. ft. (14.4-kg/cu. m) minimum density.
1. Provide units with manufacturer's standard keying slots or holes of 3 to 4 percent of board's gross surface area.
- F. Metal Deck Sealant Materials: Provide materials as manufactured by Carlisle Coatings and Waterproofing or comparable materials as approved by Architect in accordance with Section 01 2500 "Substitution Procedures".
1. Penetration Sealant: CCW A-1104 Butyl Sealant.
 2. Lap Joint Sealant: CCWLM-800XL Liquid Mastic.
 3. Deck Termination Sheet Membrane: CCW MiraDri 860/861 Self-adhering Sheet Membrane.

2.4 DESIGN MIXTURES

- A. Prepare design mixtures for each type and strength of lightweight insulating concrete by laboratory trial batch method or by field-test data method. For trial batch method, use a qualified independent testing agency for preparing and reporting proposed mixture designs.
 - 1. Limit use of fly ash to not exceed 25 percent of portland cement by weight.
- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement or cementitious material permitted by ACI 301 (ACI 301M).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine installation of metal deck to assure installation of metal deck closures have been installed on top of metal deck to provide a substrate for the sheet membrane waterproofing.
- B. Assure that metal deck is supported on underside at all penetrations.

3.2 PREPARATION

- A. Control Joints: Install control joints at perimeter of roof deck and at junctures with vertical surfaces, including curbs and walls for full depth of lightweight insulating concrete. Fill control joints with joint filler.
 - 1. Provide 1-inch- (25-mm-) wide control joints for roof dimensions up to 100 feet (30 m) in length; 1-1/2-inch- (38-mm-) wide control joints for roof dimensions exceeding 100 feet (30 m).
- B. Welded Wire Reinforcement: Place steel welded wire reinforcement with longest dimension perpendicular to steel deck ribs. Cut reinforcement to fit around roof openings and projections. Terminate reinforcement at control joints. Lap sides and ends of reinforcement at least 6 inches (150 mm).
- C. Sealing of Penetrations in Metal Deck: Seal all penetrations in metal deck with trowelable sealant and/or gasket sealant material.
- D. Sealing of Lap Joints in Metal Deck: Seal all side and end laps in metal deck with trowelable sealant.
- E. Sealing of Terminations of Metal Deck: Assure that metal deck closure strips have been installed on top of deck, and seal with trowelable sealant to make joint airtight. Install continuous strip of self-adhered sheet membrane extending out horizontally onto top of deck at least 4 inches (102 mm) and vertically against wall or parapet substrate to a minimum of 4 inches (102 mm) above top of lightweight concrete.

3.3 MIXING AND PLACING

- A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch (3 mm) over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and

tightly butt insulation boards. Allow slurry coat to set prior to placing remaining thickness of lightweight insulating concrete.

1. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch (25 mm).
- C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating. Place to depths and slopes indicated.
- D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- E. Begin curing operations immediately after placement, and air cure for not less than three days, according to manufacturer's written instructions.
- F. If ambient temperature falls below 32 deg F (0 deg C), protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to sample materials and perform tests and inspections.
- B. Testing of samples of lightweight insulating concrete obtained according to ASTM C172/C172M, except as modified by ASTM C495, shall be performed according to the following requirements:
1. Determine as-cast unit weight during each hour of placement, according to ASTM C138/C138M.
 2. Determine oven-dry unit weight and compressive strength according to ASTM C495. Make a set of at least six molds for each day's placement, but not less than one set of molds for each 5000 sq. ft. (465 sq. m) of roof area.
 3. Perform additional tests when test results indicate that as-cast unit weight, oven-dry unit weight, compressive strength, or other requirements have not been met.
 - a. Retest cast-in-place lightweight insulating concrete for oven-dry unit weight and compressive strength.
- C. Fastener Pull-out Testing:
1. Perform tests in accordance with ANSI/SPRI FX-1 2016.
 2. Fasteners pull-out test for roofing: resist a 40lb (178 N) pull-out when driven into cured insulating concrete.
 3. Perform roof fastener pull-out test for each 160 square meters (10 squares) or not less than 3 tests, whichever is greater, for each roof area.
 4. Patch test pull-out areas after fasteners are removed.
- D. Confirm that slopes are within industry tolerances and record drawing indicating slopes in inspection reports.
- E. Prepare test and inspection reports.

3.5 DEFECTIVE WORK

- A. Refinish, or remove and replace, lightweight insulating concrete if surfaces are excessively scaled or too rough to receive roofing according to roofing membrane manufacturer's written instructions, or fail to pass fastener pull-out tests.
- B. Remove and replace lightweight insulating concrete that fails to comply with requirements.

END OF SECTION 03 5216

SECTION 07 5423 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Fully adhered thermoplastic polyolefin (TPO) roofing systems applied over lightweight insulating concrete and plywood substrates.
2. Walkways.

- B. Related Requirements:

1. Section 01 4100 "Continuous Envelope Air Barrier".
2. Section 03 5216 "Lightweight Insulating Concrete" for roofing substrate.
3. Section 06 1053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
4. Section 06 1600 "Sheathing" for plywood substrates.
5. Section 07 2727 "Self-Adhering Water-Resistive Air barrier Membrane".
6. Section 07 6200 "Sheet Metal Flashing and Trim" for miscellaneous metal roof flashings and counter flashings, including TPO-clad steel sheet.
7. Section 07 9200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
8. Section 22 1400 "Facility Roof Drainage" for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening. Review requirements for adhesion testing to substrate prior to installation.
5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. For insulation and roof system component fasteners, include copy of o "SPRI's Directory of Roof Assemblies Listing"
- B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:
 1. Layout and thickness of insulation.
 2. Base flashings and membrane termination details.
 3. Flashing details at penetrations and at roof edge conditions.
 4. Roof plan showing orientation of roof membrane, fastening spacings and patterns for mechanically fastened portions of roofing system.
 5. Tie-ins with adjoining air barriers.
- C. Samples: For the following products:
 1. Roof membrane and flashings, of color selected by Architect.
 2. Walkway pads or rolls, of color selected by Architect.
- D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements. Include results of adhesion testing.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.
- B. Manufacturer Certificates:
 1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.
- C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.
- D. Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field Test Reports:
 1. Lightweight insulating concrete internal relative humidity test reports and adhesion test reports.

2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

F. Field quality-control reports.

G. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and listed in SPRI's Directory of Roof Assemblies for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect other roof materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof edge flashings, walkways, curbs, fasteners and other components of roofing system.
 2. Warranty Period: 30 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, membrane, curbs, fasteners and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897 and adhesion testing according to ASTM D7234, or other applicable ASTM Test.
1. Zone 1 (Roof Area Field): 34 lbf/sq. ft.
 2. Zone 2 (Roof Area Perimeter): 57 lbf/sq. ft.
 - a. Location: From roof edge to 9 feet inside roof edge.
 3. Zone 3 (Roof Area Corners): 86 lbf/sq. ft.
 - a. Location: 9 feet in each direction from each building corner.
 4. Fire/Windstorm Classification: Class 1A-75.
 5. Hail-Resistance Rating: FM Global Property Loss Prevention Data Sheet 1-34 SH.
 6. Adhesion Testing: Perform a minimum of 3 adhesion tests on each substrate material.
- D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.
- E. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 64 or initial SRI not less than 82 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

- F. ENERGY STAR Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- G. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

- A. TPO Sheet: ASTM D6878/D6878M, internally fabric- or scrim-reinforced, (no fleece-backed) TPO sheet.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated.
 - b. Firestone Building Products.
 - c. GAF.
 - d. Johns Manville; a Berkshire Hathaway company.
 - 2. Source Limitations: Obtain components for roofing system from roof membrane manufacturer or manufacturers approved by roof membrane manufacturer.
 - 3. Thickness: 80 mils (2.0 mm), nominal.
 - 4. Exposed Face Color: White.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 - 1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.
 - 2. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.
- C. Prefabricated Pipe Flashings: Provide prefabricated TPO boots for all penetrations, as recommended by roof membrane manufacturer.
- D. Roof Vents: Provide at 30 feet o.c, each way on all roof surfaces, except sloping roof surfaces, or as recommended by roof membrane manufacturer.
 - 1. Size: Not less than 4-inch (100-mm) diameter.
- E. Bonding Adhesive: Manufacturer's standard, water based.
- F. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets and other accessories as indicated or as required.

2.4 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.
 - 1. Size: Approximately 36 by 60 inches (914 by 1524 mm), or as indicated.
 - 2. Color: Contrasting with roof membrane, as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
 - 3. Verify that minimum lightweight concrete drying period recommended by roofing system manufacturer has passed.
 - 4. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than 75 percent, or as recommended by roofing system manufacturer, when tested according to ASTM F2170.
 - a. Test Frequency: One test probe per each 1000 sq. ft. (93 sq. m), or portion thereof, of roof deck, with not less than three test probes.
 - b. Submit test reports within 24 hours after performing tests.
 - 5. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.
 - 1. Submit test result within 24 hours after performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning Work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07 2419 "Water-Drainage Exterior Insulation and Finish System" and under Section 07 2727 "Self-Adhering Water-Resistive Air Barrier Membrane".

3.4 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. At vertical end walls of clerestory monitors, apply membrane in one piece without seams and termination bars and with mechanical fasteners only at perimeter.
- J. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.

3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- K. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.5 INSTALLATION OF BASE FLASHING

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions. Refer to Section 07 6200 "Sheetmetal Flashings and Trim".
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.6 INSTALLATION OF WALKWAYS

- A. Flexible Walkways:
 1. Install flexible walkways at the following locations:
 - a. Locations indicated on Drawings.
 - b. As required by roof membrane manufacturer's warranty requirements.
 2. Provide 3 inch (76 mm) clearance between adjoining pads.
 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Perform the following tests:
 1. High-Voltage Spark Testing: Testing agency shall survey entire roof area, flashings, and parapet walls to locate discontinuity in the roof membrane using an electrically charged metal "broom head."
 - a. Perform tests before overlying construction is placed.
 - b. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - 1) Cost of retesting is Contractor's responsibility.

- c. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.
- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.9 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: <Insert name of Owner>.
 - 2. Address: <Insert address>.
 - 3. Building Name/Type: <Insert information>.
 - 4. Address: <Insert address>.
 - 5. Area of Work: <Insert information>.
 - 6. Acceptance Date: _____.
 - 7. Warranty Period: <Insert time>.
 - 8. Expiration Date: _____.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

- a. lightning;
 - b. peak gust wind speed exceeding <Insert mph (m/sec)>;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 07 5423

SECTION 28 2300 - VIDEO SURVEILLANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes a video surveillance system consisting of cameras, digital video recorder/server, data transmission wiring, and a control station with its associated equipment. Contractor is responsible for the provision and installation a complete “turn-key” Video Surveillance system that meets or exceeds the specifications listed below. The system(s) outlined below and in the Technology CD plan set are the basis of design.

1.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
- B. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings and Cabling Administration Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Delete "Testing Supervisor" Subparagraph below if Contractor performs field quality control.
 - 4. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.5 QUALIFICATIONS

- A. Communications Cabling: The Contractor shall have (5) five years of documented experience performing cable placement, splicing, termination, connecting, and testing for each of the media types and (3) three years of applicable experience with the proposed system manufacturer. In the case of newer technologies

that do not have a (3) three year history, the Contractor shall have documented experience for at least half of the lifetime of the new technology. The approved contractor shall, at a minimum, maintain a ratio of one manufacturer or BICSI certified installer for every two non-certified installers assigned to the project.

- B. The contractor shall have on staff a BICSI Certified RCDD as a permanent employee. This staff member shall have been on staff for a minimum of (1) one year prior to the date of this projects release for bid.
- C. The contractor shall have on staff at least (1) one BICSI Certified Technician and this staff member shall have been a full time employee for no less than (1) one year prior to the date of this projects release for bid. A BICSI Certified Technician shall be employed as the on-site Field Supervisor for this project.
- D. The contractor shall provide resumes for the Project Manager, Supervisors and any skilled technicians or installers. Each resume shall include applicable certification documents provided by the manufacturer or BICSI.
 - 1. Project Manager, Supervisors, and Principal Skilled Technicians: minimum of (5) five years' experience in like work.
 - 2. Category 6 Unshielded Twisted Pair and Fiber Optic Cable Technicians: documented training, licensing, and/or certification for the types of media specified, as applicable as well as certification from the manufacturer of the solution chosen by the owner.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, qualified layout technician, installation supervisor, field inspector and company. The contractor shall provide resumes for the Project Manager, Supervisors and any skilled technicians or installers. Each resume shall include applicable certification documents provided by the manufacturer or BICSI.
 - 1. Project Manager, installation supervisor, and Principal Skilled Technicians: As a minimum be required to have no less than (5) five years' experience in like work.
 - 2. The Company/Contractor proposing shall provide historical data confirming the company has a minimum of (5) five years applicable experience.
 - 3. The Company/Contractor shall have a minimum of (3) three projects of similar size and type within the last (2) years. References for all submitted projects are required to assist with the evaluation.
- B. Category 6 Unshielded Twisted Pair and Fiber Optic Cable Technicians: Documented training, licensing, and/or certification for the types of media specified, as applicable as well as certification from the manufacturer of the solution chosen by the owner.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NECA 1.
- C. Comply with NFPA 70.
- D. Electronic data exchange between the video surveillance system and the access-control system shall comply with SIA TVAC.

1.9 PROJECT CONDITIONS

- A. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - 1. Control Station: Rated for continuous operation in ambient temperatures of 60 to 85 deg. F and a relative humidity of 20 to 80 percent, noncondensing.
 - 2. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned, temperature-controlled, interior environments shall be rated for continuous operation in ambient temperatures of 36 to 122 deg. F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
 - 3. Interior, Uncontrolled Environment: System components installed in non-air-conditioned, temperature-controlled interior environments shall be rated for continuous operation in ambient temperatures of 0 to 122 deg. F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3R, Type 4, Type 12, Type 12K enclosures.
 - 4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg. F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 85 mph and snow cover up to 24 inches thick. Use NEMA 250, Type 3, Type 3R, Type 3S, Type 4 and Type 4X enclosures.
 - 5. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 IP VIDEO SYSTEMS

- A. Manufacturers and Basis of Design: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Axis Communications
 - 2. Arecont Vision
 - 3. Owner and Consultant approved equal

B. Description:

1. System shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
2. System shall have seamless integration of all video surveillance and control functions.
3. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
4. System design shall include all necessary compression software for high-performance, dual-stream and MPEG-2/MPEG-4 video. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
5. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
6. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
7. Encoder/decoder combinations shall place video, audio, and data network stream that can be managed from multiple workstations on the user's LAN or WAN.
8. All system interconnecting cables, workstation PCs, and network intermediate devices shall be provided for full performance of specified system.

2.2 CAMERA-SUPPORTING EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: Retain option in first paragraph below if manufacturer's name and model number are indicated in schedules or plans on Drawings; delete option and insert manufacturer's name and model number if not included on Drawings.
1. Axis Communications
 2. Arecont Vision
 3. Owner and Consultant approved equal
- B. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
- C. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.
- D. Protective Housings for Fixed and Movable Cameras: Steel or 6061 T6 aluminum enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.
1. Tamper switch on access cover sounds an alarm signal when unit is opened or partially disassembled. Central-control unit shall identify tamper alarms and indicate location in alarm display.
 2. Camera Viewing Window: Polycarbonate, Lexan window, aligned with camera lens.
 3. Duplex Receptacle: Internally mounted.
 4. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.
 5. Built-in, thermostat-activated heater and blower units. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.
 6. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.

7. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.
8. Enclosure Rating: NEMA 250, Type 1, Type 3, Type 4X. Shall be designed and installed per manufacturers' guidelines and in accordance with environmental conditions.

2.3 COLOR MONITORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Vizio – 1080P
 2. Samsung – 1080P
 3. District and Consultant approved equal
- B. Screen Size (Diagonal Dimension): 24"-32".
- C. Vertical Resolution: 1080p.
- D. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, contrast, color, and tint controls.
- E. Degaussing: Automatic.
- F. Electrical: 120-V ac, 60 Hz.

2.4 NETWORK VIDEO RECORDER/SERVERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. BCDVideo – (HP)
 2. Owner or Consultant approved equal
- B. General
 1. Video Surveillance Server Technology
 2. The Video Surveillance Server shall be designed specifically for physical security and surveillance requirements.
 3. The Video Surveillance Server Platform shall be scalable and commodity based to ensure maximum compatibility and ease of use as well as superlative familiarity for IT personnel.
 4. All equipment and materials used in the video surveillance server platform shall be standard components that are regularly manufactured and available.
 5. All major components and disk drives shall be enterprise- or server-grade devices, and not commodity/desktop grade, ensuring maximum reliability and improved performance.
 6. The system shall have been thoroughly tested and proven in actual use with video surveillance, access control and video analytics systems for physical security.
- C. Video Surveillance Server Technology
 1. The Video Surveillance Server platform shall feature video surveillance-optimization technology designed specifically for video surveillance needs and physical security. The Video Surveillance Server Technology shall:

2. Be rated by the Surveillance Performance Index, hereafter referred to as SPI, and be certified for use with SPI.
3. The system should be in a standard Windows or Linux environment (options of Windows 7, Windows Server 2003, Windows 2008, or applicable Linux Distribution.)
4. Support eliminating the risk of halted recording and playback, by leveraging hot-swap components when possible.
5. Provide the storage needs of the surveillance project within the server or by making available external storage technology options that shall:
6. Leverage video optimization technology that supports write-intensive, non-sequential, large block recording to the video storage platform's storage.
7. Eliminate the risk of lost video through advanced RAID (Redundant Array of Independent Disk) protection.
8. The RAID level implemented shall allow the complete failure of at least one physical drive.
9. Support an internal or optional external CD/DVD read/write drive.
10. Eliminate the need for proprietary, appliance type servers and storage, and allow leverage of existing user knowledge and IT training through the use of commodity hardware
11. Reduce power consumption, heating and cooling, equipment needs and rack space by providing optimized capacity and optimal storage efficiency.

D. Video Surveillance Server Platform

1. The video surveillance server platform server component shall feature at a minimum:
2. U configurations for a VMS, access control or video analytics application environments with:
 - a. 1 Intel Xeon 2.3GHz 6core
 - b. Each Video Surveillance Server CPU must have an SPI rating of or higher.
 - c. ECC DDR2/DDR3 system memory
 - d. 8 Internal 1TB, 2TB, or 3TB SATA or SAS harddrives for video recording with support for RAID1, RAID5 and/or RAID6.
 - e. Hyper transport version 1, 2 or 3 system bus, or Quickpath Interconnect from 4.8 GT/s to 6.4 GT/s
 - f. Onboard Video Graphics hardware Matrox or ATI based with 8MB, 16MB, or more graphics memory with support for 1 VGA port and maximum 1280x1024 resolution
 - g. 1Gbps ports, with an optional upgrade to support additional 1Gbps or 10Gbps ports copper or fiber ports.
 - h. 1 495W, 100-240V, 60-50Hz.
 - i. Preloaded Windows OS (customer requirement of Microsoft Windows 7, Windows Server 2003, Windows Server 2008, or Linux).
 - j. Support an internal or optional external CD/DVD read/write drive.
 - k. Preloaded video-optimized OS.
 - l. Included rack mount kit.

E. Video Surveillance Server Platform Performance

1. The platform shall deliver recording while running one VMS application for at a minimum:
 - a. An SPI Load rating of 94.62
 - b. The SPI Load rating shall be certified

F. Operating System and Physical Security Application choices

1. The video surveillance server platform shall feature a choice of standard video management software (VMS), access control or video analytics applications preloaded (as required), and server operating system loaded on the system.
 2. The Operating system shall be optimized to provide optimal performance in a Surveillance/Access Control environment.
 3. Standard Microsoft Windows environments will be supported by the video surveillance server platform server component.
 4. Microsoft Windows 7 Professional, Microsoft Windows Server 2003 Standard / Enterprise Edition, Microsoft Windows Server 2008 Standard / Enterprise 32 or 64bit and Microsoft Windows Server 2008 R2 are available choices, preloaded and ready to run.
 5. Standard Linux environments will be supported by the video surveillance server platform server component.
 6. Debian Stable releases, Ubuntu LTS Releases, SUSE Linux Enterprise, Red Hat Enterprise Linux all in 32bit or 64bit are available choices, preloaded and ready to run.
- G. VMS software from industry leading vendors shall be available choices for pre-loading.
1. Available choices will include, but not be limited to:
 - a. Genetec Omnicast
 - b. OnSSI NetDVMS, Ocularis PS, Ocularis IS , Ocularis CS, and Ocularis ES
 - c. Milestone Systems XProtect Essentials, Professional, Enterprise and Corporate.
 - d. Axis Communications Axis Camera Station
- H. Video Surveillance Server Platform Administration and Management
1. Support for Unattended Operation
 2. The video surveillance server platform shall support unattended operation for at least multiple weeks to months, and shall also:
 - a. Not require frequent monitoring or adjustment for normal operations.
 - b. Be able to perform without shutting down for regular system maintenance.
 - c. Be able to operate unattended without operator supervision
 - d. Be able to maintain recording performance in 24x7x365 environments, without performance degradation.
 - e. Provide automated alerting and event notification of system issues with management frameworks in environments so equipped.
- I. Connectivity
1. The video surveillance server platform shall provide, at a minimum, support of 1Gbps (1 Gigabit Ethernet IP Network) infrastructure.
- J. Video Recording Standards
1. The video server platform shall support seamlessly various common standards, as supported by attached IP and megapixel cameras, as well as DVRs, NVRs, and servers.
 2. These may include CIF, 2CIF, QCIF, 4CIF, 8CIF, 720p, 1080p, megapixel with compression and standard graphics file formats including H.264, JPEG, MJPEG, MPEG, MPEG-1,-2,-4 & BMP in multiple real time/time lapse formats with and without the inclusion of audio.
 3. CCTV still, motion, full motion, time lapse, pan/tilt/zoom day/night/infrared digital and analog camera feeds with multiple FPS and resolution rates shall also be supported.
- K. Video Surveillance Server Platform Capacity

1. The Video Surveillance Server platform shall offer a capacity of 18000000 (18 Terabytes) with standard RAID (Redundant Array of Independent Disks) providing redundancy of data as well as RAID parity calculation offloading for performance.
2. The SPI Rating of the Video Surveillance Server platform shall be 94.62
3. Support for an internal or optional external CD/DVD read/write drive shall exist

L. Video Surveillance Server Platform Availability and Reliability

1. The Video Surveillance Server platform shall be always be in protected configurations for varied physical security environments.
2. All video surveillance server platform video storage drives must deliver a Mean Time Between Failure (MTBF) average of at least 1,000,000 (1 million) operational hours.
3. The video storage capacity shall be Enterprise Class SATA/SAS, low energy/high capacity disk drives with 1TB, 2TB, and or 3TB recording capacity.

M. Video Surveillance Server Platform System Architecture

1. The Video Surveillance Server Platform shall provide a standard, Rack Mountable architecture to ensure maximum compatibility with new and/or existing infrastructures.
2. The video storage platform shall provide optional redundant memory to offer maximum protection against equipment failure and data loss

N. Video Surveillance System Architecture

1. The video surveillance server platform shall support physical footprints in standard 19 inch rack mounting environments.
2. Server shall be 1U to 5U in form factor with multiple video drives
3. The system shall include a rack mount kit.

O. Environmental Requirements and Certifications

1. The video surveillance server platform shall operate within standard environmental conditions common for physical security systems, including security operations centers, command centers, wiring closets, and similar environments that house IT infrastructure technology.
2. Operating temperature range shall be 10 to 35°C (50 to 104°F).
3. Operating humidity range shall be 9% to 90% non-condensing.
4. Standard equipment certifications shall be applicable to the video surveillance server platform, including RoHS compliant 5/6, UL (USA), CUL (Canada), TUV (Germany) EN 6095/IEC 60950 Compliant, CB Report, CCC Certification.

P. Warranty and Support

1. All Video Surveillance Server platforms and components shall be supported through a comprehensive three to five year hardware warranty. Application software systems, such as VMS software, are covered separately by their manufacturer's warranty.
2. Coverage shall include telephone, web and email access to technical support

Q. Available upgrades shall include extended coverage and onsite assistance options.

2.5 SIGNAL TRANSMISSION COMPONENTS

- A. Cable: Category 6 UTP plenum rated cable. Comply with Section 27 1500 "Communications Horizontal Cabling."

PART 3 - EXECUTION

3.1 WIRING

- A. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" and Section 270528 "Pathways for Communication Systems".
- B. Wiring Method: Install cables in raceways unless otherwise indicated.
 - 1. Except raceways are not required in accessible indoor ceiling spaces and attics.
 - 2. Except raceways are not required in hollow gypsum board partitions.
 - 3. Conceal raceways and wiring except in unfinished spaces.
- C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- D. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- E. For **LAN connection, (fiber-optic and copper cabling)**, comply with Section 271300 "Communications Backbone Cabling" and Section 271500 "Communications Horizontal Cabling."
- F. Exterior camera; to utilize outdoor rated, 4 pair, Category 6 Game Changer OSP Cable by Paige or equivalent 22 AWG shielded twisted pair may be used for out of distance devices.
- G. Retain paragraph below only if required by manufacturer. Show independent-signal circuit-grounding methods and details on Drawings.
- H. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

3.2 VIDEO SURVEILLANCE SYSTEM INSTALLATION

- A. Install cameras with 84-inch- minimum clear space below cameras and their mountings, unless otherwise noted on plans.. Change type of mounting to achieve required clearance.
- B. Identify system components, wiring, cabling, and terminals according to Section 26 0553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:

1. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
 2. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
 - a. Verify operation of auto-iris lenses.
 - b. Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - c. Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object 50 to 75 feet away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - d. Set and name all preset positions; consult Owner's personnel.
 - e. Set sensitivity of motion detection.
 - f. Connect and verify responses to alarms.
 - g. Verify operation of control-station equipment.
 3. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
 4. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation.
- C. See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017300 "Execution" for requirements for correcting the Work.
- D. Video surveillance system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. Coordinate camera views and settings with customer to maximize bandwidth and server storage.
- 3.4 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain video-surveillance equipment.
1. Allow for 6 months of re-visited customer training.

END OF SECTION 28 2300