

SECTION 282300 - VIDEO SURVEILLANCE CONTROL AND MANAGEMENT SYSTEM

PART 1 – GENERAL

1.01 ADDENDUM 3

- A. This specification dated 04/26/19 replaces the previous version dated 03/20/19 in its entirety.

1.02 PROJECT SCOPE SUMMARY

- A. Provide all labor, materials, appliances, tools, equipment, facilities, and services necessary for and incidental to performing all operations of this Section, complete, as shown on the Design Drawings or specified herein. Work includes, but is not limited to, the following:
1. Furnish, install, integrate, configure, and commission;
 - a. IP Cameras – New cameras and replacement cameras shall utilize Systimax CAT6 network cabling (color green). Cabling shall be routed by conduit (1” min.) to the nearest existing cable tray for termination on the HAS network switch at the associated IDF as indicated on the drawings. Camera power shall be “Power over Ethernet” (POE) provided by an existing or new network switch as indicated on the drawings.
 - b. Equipment Cabinet – Provide new equipment cabinet, 208VAC@30A 3-Phase electrical circuits, cable management, and other accessories as required indicated on the drawings and specified in this manual.
 - c. Servers – Provide Blade Camera Servers and Database Servers in equipment cabinets in quantities as indicated on the drawings and specified in this manual. Servers shall include all Operating Systems, Software, and interconnect cabling required for a 100% fully functional System.
 - d. Storage Arrays - Provide Storage Arrays in equipment cabinets in quantities as indicated on the drawings and specified in this manual. Arrays shall include all Operating Systems, Software, and interconnect cabling required for a 100% fully functional System.
 2. Cameras shall be mounted, oriented, and adjusted to provide the best field of vision possible using the least amount of accessory equipment. All camera installations shall be done in such a manner as to maximize aesthetics, equipment, environmental protection, and equipment vulnerability.
 3. Unless otherwise specified, the finish and color of all cameras and housings shall be as provided by the manufacturer. Exact installation location for each device may require coordination with the City and/or its City Engineer.

4. Provide a transition plan based on areas of work or phases to migrate existing cameras from the existing digital recording system to the new digital recording system. The plan shall have the ability to control, monitor and retrieve live and stored video from either system such that they will both be functional simultaneously. Once the new system is commissioned and accepted by the owner, the existing system shall be decommissioned. The Transition Plan shall be submitted for approval prior to execution.

1.03 SECTIONS INCLUDES

- A. This section includes Specifications for Digital Video Surveillance System (DVSS) field devices, expansion to the existing video storage system, and system integration and programming as required by HAS IT Division.
- B. The Video Surveillance System (VSS) components shall include IP High Definition and IP Megapixel Cameras, MaxPro NVR (NVR) Recording Platform, MaxPro Video Management System (VMS), blade Database Servers, blade Camera Servers, and NVR Video Storage Arrays as shown on the drawings.
- C. Software licensing for the new cameras and new servers shall be included. Provide an additional 5% additional camera licenses for future use. Quantity of 5% refers to 5% of existing plus new cameras.
- D. The video monitoring and retrieval components shall be integrated with the Airport's existing Command, Control, and Communications center (C3). Operators in the C3 shall have the ability to view and retrieve video from any camera connected to the system, in accordance with these specifications, unless otherwise specified in the Design Drawings. Alarm events on the Access Control System (ACS) shall be integrated with NVR cameras as defined by the Houston Airport System.
 1. Provide for adequate time in your proposal to integrate every existing and new camera with the Access Control System for Alarm Video Call Up, PTZ Presets, and MaxPro Configuration Arrangements
 2. Also include Database Conversion for every existing and new camera as required.
 3. Request for additional funding for system integrations after project award will be denied.
- E. Provide all labor, materials, equipment, services, etc., necessary to furnish, install, integrate, configure, and commission a complete system to but not limited to:
 1. Cameras, housings, lenses, and associated equipment;
 2. Video system cabling and conduit;
 3. Blade Camera Servers with required software;
 4. Video Storage Arrays;
 5. Database and Video Management Software

6. Other associated equipment, as defined within this section.
- F. All IP Cameras shall conform to the ONVIF or PSIA specification to provide a common protocol for the exchange of information between network video devices including automatic device discovery, video streaming, intelligence metadata and compatibility with the HAS “Honeywell” recording system.
- G. These Specifications may include components that are not required. Use drawings to determine the quantities to be installed. Include in the original bid, all equipment, software, cabling, connectors, transformers, relays, etc., whether specified here or not, such that said bid fulfills the intent of these Specifications and renders these systems functional and fully operational.

1.04 REFERENCES

- A. Related Sections: The references and standards listed herein shall be considered part of this specification. Bidder and Contractor shall conform to the following references and standards:
 1. Section 270526: Telecommunication Grounding and Bonding
 2. Section 270528: Interior Communication Pathways
 3. Section 270553: Identification and Labeling of Communication Infrastructure
 4. Section 271100: Communication Cabinets and Equipment Rooms
 5. Section 271300: Backbone and Riser Media Infrastructure
 6. Section 271500: Horizontal Media Infrastructure
 7. Section 272100: Data Communication Network Equipment
 8. Section 272200: PC, Laptop, Servers and Equipment
 9. Section 275113: Audio Communication System
 10. Section 281300: Access Control System
 11. Section 232313: Video Surveillance Control and Management System
- B. Open Network Video Interface Forum (ONVIF) Ver. 2.10, or latest revision.
- C. Physical Security Interoperability Alliance (PSIA) Ver.1.0, IP Media Device specification, or latest revision.
- D. ANSI/TIA/EIA-250-C-1990 Electrical Performance for Television Transmission Systems, or latest revision.
- E. ANSI/ TIA -568-C.0 , Generic Telecommunications Cabling for Customer Premises, or latest revision
- F. ANSI/ TIA -568-C.1 Commercial Building Telecommunications Standard, or latest revision

- G. ANSI/ TIA -568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard, or latest revision
- H. ANSI/ TIA -568-C.3 Optical Fiber Cabling Components, or latest revision
- I. ANSI/ TIA /EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces, or latest revision
- J. ISO/IEC 11801 International Generic Telecommunications Cabling Standards, or latest revision.
- K. National Electric Code (NEC), 2017, or latest revision.
- L. Institute of Electrical and Electronic Engineers (IEEE), or latest revision.
- M. BICSI, Telecommunications Distribution Methods Manual (TDMM), latest revision
- N. BICSI, Electronic Safety and Security Design Reference Manual (ESSDRM), 2nd Edition.
- O. If there is conflicts between reference requirements and contract documents, contractor shall comply with the one establishing the more stringent requirements.

1.05 SUBMITTALS

- A. Shop Drawings and Product Data of the following apparatus, giving full fitness and other pertinent facts, shall be submitted and approved before equipment is ordered, built, or installed, including:
- B. Manufacturers Data: Submit product literature for each piece of equipment. Literature to include:
 - a. Catalog information for all devices and equipment.
 - b. ONVIF/PSIA Certificate of Conformity for all IP Video Cameras and Recording Software
 - c. Complete wiring (data and low voltage power) point-to-point diagrams for all systems and subsystems devices to be included with Operations and Maintenance (O&M) Manual.
 - d. Panel diagrams (elevation view) showing configurations of all control equipment, power supplies, input/output devices.
 - e. Functional block diagrams showing integrated relationship of all equipment, cabling, and termination points on one drawing.
- C. Any work which deviates from the drawings or specifications are considered alternates and must be submitted following section 013323

- D. Materials installed or work performed without approval shall be done at the risk of the Contractor and the cost of removal of such material or work which is determined to be unsatisfactory for any reason shall be at the expense of this Contractor.
- E. ACC Security Schedule in Excel (See Exhibit A)
- F. List of HAS naming conventions for logical devices and CCTV names (i.e. Facility (C), Geo (N), Level (1) = CNE-1001).and associated devices.
- G. Site Acceptance Test (SAT) Plan
- H. Test Equipment Calibration Certificates
- I. Test results
- J. Spare parts list and quantities
- K. Warranty list with equipment make, model, serial number, commission date, warranty start date, and, warranty end date. Also include RMA Procedure and contact information for warranty claims.
- L. Schedule of Unit Price Values
- M. As-builts to include but not limited to HAS' naming conventions, card readers, cameras, door numbers per layer, per floor. Submitted in latest Auto-CAD version.
- N. Installation and Operations Manual (IOM) consisting of approved product data sheets, manufacture installation manuals, manufacturer operator manuals, start-up and shut-down procedures, troubleshooting guide, as-built drawings in AutoCAD format (printed 11x17, and electronic in native format), equipment schedules with part number, serial number, warranty expiration dates, certificates of warranty's, contact information for installer and manufacturer. Neatly bind all information with index and tabs. The IOM shall be submitted and approved prior to final payment.

1.06 QUALITY ASSURANCE

- A. Follow Appendix B of National Electrical Code.
- B. Assure that the "as installed" system is correct and complete per construction documents: including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.
- C. Contractor Qualifications:

1. The Contractor shall submit references and other related evidence of installation experience for a period of three years prior to the issue date of this Specification.
2. ALL work shall be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes.
3. The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
4. Must be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC methods, standards and codes.
5. All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training courses.
6. The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.
7. The contractor who is installing the cabling infrastructure shall be a certified and currently registered Commscope/Systemax Premier Partner capable of issuing a numbered registration certificate for the entire cable system.
8. The contractor who is installing the cabling infrastructure shall have the following Systemax iPatch/imVision certifications:
 - SP/ND3360 - SYSTIMAX SCS 360 Solutions
 - SP/ND3321 - SYSTIMAX SCS Design & Engineering
 - SP/ND3361 - SYSTIMAX SCS Installation and Maintenance
 - SP/ND5510 - SYSTIMAX SCS Certified iPATCH Support Specialist (CISS)
9. Cable splicing personnel shall have a minimum of five years splicing experience and shall have completed a minimum of five major splicing projects.
10. Manufacturer's hardware experience: All components shall be produced by manufacturers who have been regularly engaged in the production of telecommunications cabling components of the types to be installed in this project for a period of five years.

- D. HAS retains the right to access and inspect all work during the entire duration of the project and any items that do not adhere to the standards, reference, contract, bid, or project documents will be corrected immediately at the expense of the contractor.

1.07 SHIPPING AND HANDLING

- A. Follow Section 01450.
- B. Clearly mark containers "For Security Material Only".

1.08 TRAINING

Provide training sessions as follows:

- A. Administrator Training – 1 session, 8 hours per session.
- B. User Level Training Classes – 3 sessions, 4 hours per session

1.09 UNIT PRICING

- A. Reference 004100

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. All products shall be procured not earlier than 6 months prior to installation as required to ensure delivery of current technology. Contractor shall warrant that all products will be supported by the contractor and manufacturer for a minimum time period as follows:
 - 1. All Cameras shall carry a minimum 3 year, complete warranty from date of commission. No charge shall be made to HAS for a warranty claim within the 3 year warranty period.
 - 2. All Servers and Server Equipment shall carry a minimum 5 year, complete warranty from date of commission. No charge shall be made to HAS for a warranty claim within the 5 year warranty period.
- B. Unless otherwise noted, all materials and equipment shall be new, of the type, capacity, and quality specified and free from defects. Material shall bear the label of, or be listed by the Underwriters' Laboratories (U.L.) unless of a type for which label or listing service is not provided.
- C. All equipment listed in this specification may not be required. It is the Contractors responsibility to determine exact equipment and quantities from the drawings and their site survey.
- D. For compatibility and ease of installation, materials shall be of same brand or manufacturer throughout for each class of material or equipment, wherever possible.
- E. All enclosures for all equipment shall be of metal throughout the system unless noted otherwise.

2.02 MANUFACTURERS

- A. The following CCTV manufacturers have been approved for use on this project. However, cameras shall be provided by a single manufacturer, once determined, to maintain architectural and maintenance continuity. The contractor must provide a separate price for each camera solution (4 separate solutions) based one of the listed manufacturers in a manner that all functional requirements are met and to ensure compatibility with the HAS recording system manufactured by “Honeywell”. HAS will have the final approval on the manufacture selected.
 - B. Unless otherwise noted in the Specifications, no substitutions will be accepted.
 - 1. Camera part numbers are listed in Section 2.04 below to establish a baseline product and not necessarily required.
 - 2. ONVIF/PSIA conformance is required for all IP cameras.
 - 3. All IP cameras shall have a minimum of two, H.264 video streams.
 - 4. A single manufacture is required for all cameras except 360 degree cameras.
 - 5. CCTV Components:
 - 6. Cameras shall be products by AXIS, unless otherwise noted.
 - 7. Camera lenses shall be products of AXIS, unless otherwise noted.
 - 8. Camera housings shall be products of AXIS, unless otherwise noted.
 - 9. Camera power supplies shall be products of Altronix or approved equal.
 - C. Video Streamers (Encoders)
 - 1. Where required video streamers shall be products of Axis or approved equal.
 - D. 360 Cameras
 - 1. Cameras shall be products of Honeywell HFD6GR1—6MP IR Fisheye or equivalent with HAS Prior Approval.
 - E. NVR Storage and Retrieval System:
 - 1. Servers shall be products of Dell or approved equal.
 - 2. Storage arrays shall be products of Dell or approved equal.
 - 3. NVR and VMS software shall be products of Honeywell, latest release.
 - F. INSTALLATION SERVICES
 - 1. Customer installation, implementation, and configuration services by HAS approved vendor.
- 1.010 Camera servers at HAS Admin Building MDF and Terminal C MDF
- A. Camera servers for this project are existing and not required.
 - B. The existing camera servers and digital storage are located at the HAS Administration Building, MDF Room and Terminal C MDF Room. They are redundant.

- C. Provide Honeywell Maxpro camera licensing as required at the HAS Administration Building, MDF Room and Terminal C MDF Room to support all has cameras installed as part of this project.
 - 1. Provide camera licenses in 32 camera increments.
 - 2. Do not exceed ten (10) 360 type cameras for each 32-camera license.
 - 3. Do not exceed sixteen (16) HD type cameras for each 32-camera license.

2.03 USER INTERFACE SOFTWARE:

- A. Contractor shall provide and install latest release of Honeywell MaxPro NVR (NVR) server application and Honeywell MaxPro VMS on all new servers and workstations. Contractor must also provide any ancillary software required such as database applications, client applications, utility applications, backup applications, fault tolerance, and fail over applications, etc. necessary for complete operation and maintenance.
- B. Contractor is responsible to furnish, install and/or upgrade server and workstation operating systems compatible with the NVR/VMS application where required.
- C. NVR/VMS must support H2.64, MPEG-4 and MJPEG video compression algorithms.

2.04 NVR Storage Hardware and Drives

- 1. Dell Isilon X210 Series Storage (44TB SATA +800GB SSD)

| Item | Hardware | Part Number | Qty |
|-------------|--|--|------------|
| 1 | PROMO MELLANOX 8 PORT QDR SWITCH | 851-0167-P | 2 |
| 2 | PROMO X210-11T+200G SSD/24G/2X10GE 2X1GE | X210-SATA-S03-P | 4 |
| 3 | PROMO 2 PWRCRD C14-C13,208V UNIVERSAL | 800-0012-P | 6 |
| 4 | 11TB+200GB SSD/ 3.5IN | 611-0005 | 4 |
| 5 | 10GBE DUAL-PORT SFP WITHOUT OPTICS | 613-0008 | 4 |
| 6 | 24GB RAM (NEXT GEN) | 612-0027 | 4 |
| 7 | PROMO CABLE, 1B QDR, QSFP-QSFP, 3M | 851-0209-P | 8 |
| 8 | PROMO 2 SFP+ OPTICS KIT - 10GBE | 851-0099-P | 4 |
| 9 | PROSUPPORT W/MISSION CRITICAL-HARDWARE | M-PSM-HW-IUE-001 | 1 |
| 10 | Software | Part Number | |
| 11 | TRK-ENTERP DESC | CONADV/SNAP/QTA | 1 |
| 12 | 200-0404-CF | INSIGHTIQ FOR ONEFS GEN5 =ID | 4 |
| 13 | M-PSM-SW-I-001 | PROSUPPORT W/MISSION CRITICAL-SOFTWARE | 1 |
| 14 | 201-0347-CF | SW: STARTER PROMO ENT BUNDLE T2 GEN5 =ID | 4 |
| 15 | M-PSM-SW-IUE-001 | PROSUPPORT W/MISSION CRITICAL-SOFTWARE | 1 |
| 16 | Deployment Service | Part Number | |
| 17 | PS-BD-ISNTRACKING | ISILON BASIC DEPLOYMENT TRACKING | 1 |
| 18 | PS-BAS-AD1N | INSTALLATION OF 1 ISILON NODE | 1 |
| 19 | PS-BAS-INIS2U | ISILON 2U INSTALLATION BASE | 1 |
| 20 | PSINST-ESRS | ZERO DOLLAR ESRS INSTALL | 1 |
| 21 | CE-VALPAKISIL | ISILON VALUEPAK | 1 |
| 22 | Total Freight (USD) | | 1 |

2. Reference sample quotation in Exhibit B for recent configuration and price. Provide current technological equivalent at time of installation. Submit for approval prior to procurement.

2.05 CAMERAS

High Definition IP Cameras Model Numbers:

| MFG | TYPE | DESCRIPTION | MODEL/PART# |
|-----------|------|-------------------|---|
| AXIS | 1 | (HD IP Fixed Int) | P3225-LV MKII 1080P |
| AXIS | 2 | (HD IP Fixed Ext) | P3225-LVE MKII 1080P |
| AXIS | 3 | (HD IP PTZ Ext) | Q6055-E outdoor PTZ 32X |
| AXIS | 4 | (HD IP PTZ Int) | M5525-E inside/outside 10X |
| Honeywell | 5 | (HD 360) | HFD6GR1 indoor/outdoor Fisheye IR IP camera |

2.06 CAMERA POWER SUPPLIES

- A. All IP Cameras will be power via a “Power over Ethernet” (POE) network switch in the IDF as indicated on the drawings.
- B. Outdoor power supplies shall be housed in a NEMA-4 rated enclosure, with integral transformer and fused power supply board, or PoE Injector.
- C. All power supply enclosures shall contain:
 1. Key lock
 2. Tamper switch
 3. Tamper switch control wire to access control field panel in IDF room
 4. Programming for tamper switch inputs to access control system

2.07 POE+ ETHERNET EXTENDER

- A. Reference 27 21 00

2.07 POE+ ETHERNET INJECTOR

- A. Reference 27 21 00

2.08 UTP BALUN

- A. UTP balun authorized for installations when cable distance is greater than 100 meters, but less than 300 meters.

- B. Balun shall be installed in IDF and at camera location.
- C. Provide power supply as required.
- D. Submit shop drawing for approval prior to installation.
- E. Product: NitekVB31AT or equal.

2.09 ELECTRICAL REQUIREMENTS

- A. Unless otherwise noted on the Design Drawings, terminate all equipment for this system to the new power supplies provided as part of this contract or the existing power supplies as shown on the drawings. Items requiring 120/208 VAC power as shown on the drawings shall be provided as part of this project and installed in accordance with Division 26.
- B. Check the adequacy of all existing power and wiring before making final connections and applying power to the equipment. If such wiring/service is not proper and/or adequate, notify the City and/or the City Engineer in writing, requesting specific correction of same. Should the Contractor fail to provide proper notification of wiring inadequacies to the City and/or the City Engineer, he shall be bound to correct problems from such inadequacies with no cost to the City

2.10 SPARE PARTS

- A. Provide 5% spare cameras of each type used with a minimum 1 of each type.
- B. Provide 10 camera power supplies.
- C. Provide 5% extra IP Camera Licenses

PART 3- EXECUTION

3.01 CAMERAS

- A. Digital cameras and/or streamers (encoders) shall be configured according to the following criteria:
 - 1. Video Display:
 - a. Live Viewing @ 15fps
 - 2. Image Size/Compression:
 - a. Standard Definition: (704x480, 4CIF)

- b. High Definition: (1920x1080)
 - c. H.264 low compression
 3. Background Recording:
 - a. Background recording on ALL cameras 24 hours per day 7 days per week @ 5fps
 - b. Retain all background recordings on-line for 30 days (720 hours)
 4. Alarm/Event Recording:
 - a. 25 event-activated recordings per camera per day
 - b. Event-activated recording rate @ 10fps
 - c. 60 seconds of pre-event record; 60 seconds post-event record
 - d. Retain all stored video from every camera on-line for 30 days (720 hours)
 5. User-Activated Recording:
 - a. 2 user-activated recordings per camera per day. If user activated recordings for the day are unused, they will be banked for future use if required.
 - b. User-activated recording rate @ 10fps
 - c. 60 seconds of pre-event record; 60 seconds post-event record
 - d. Retain all stored video on-line for 30 days (720 hours)
- D. Install cameras as shown on the Design Drawings. Wall or ceiling mounts shall be anchored/braced as required, at a height which shall allow for camera repositioning. Coordinate mounting heights and views with the City and/or the City Engineer.
- E. All exposed video cabling from wall to camera shall be neatly dressed and wrapped in black spiral plastic sheath.
- F. Label all cameras with VSS ID as programmed into the HAS software system. Label shall be minimum 14pt font. Use 3-layer engraved lexan label for all interior cameras. Use metallic die-tapped label for exterior cameras. Label shall be permanently affixed adjacent to the VSS housing. The label shall be visible and may not be attached to the camera housing.
- G. Label all new and existing VSS conduits in accordance with section 270553. For existing conduits, labels are required at conduit ends and junction boxes only.
- H. Label all new and existing VSS cables. Labels shall be vinyl wrap around heat shrink type that will not fade with minimum 8pt font. Cables shall be labeled inside each junction box, enclosure and at each end.
- I. Label all VSS equipment following in accordance with this section.
- J. Provide final termination of power to camera as required, and/or control cables, and terminate at the VSS monitoring equipment locations as designated by the Design Drawings. Inspect, test, and clean all camera equipment after installation.

- K. In order to ensure a complete, functional Dome, for bidding purposes, where information is not available from the Owner upon request, the worst-case condition shall be assumed.
1. Interfaces shall be coordinated with the Owner’s representative, where appropriate.
 2. All necessary backboxes, racks, connectors, supports, conduit, cable, and wire must be furnished and installed to provide a complete and reliable Dome installation. Exact location of all boxes, conduit, and wiring runs shall be presented to the Owner for approval in advance of any installation.
 3. All conduit, cable, and wire shall be installed parallel and square with building lines, including raised floor areas. Conduit fill shall not exceed forty percent (40%). All wires shall be gathered and tied up to create a neat and professional installation as determined by the HAS inspector.
- L. Provide for one adjustment after installation for each camera and lens as a part of the Bid and ensure that the cable guidelines are followed to allow maximum distance for relocation if necessary.
- M. Coordinate with Owner to obtain inspection and approval of all cable raceway prior to installation of cable.

3.02 VIDEO DISTRIBUTION QUALITY ASSURANCE

- A. Contractor shall test the video distribution channel from every new analog camera to the input of the streamer, distribution amplifier, or fiber modem (see figure).



Figure 3.02A

- B. A handheld video signal generator and waveform/vector/picture monitor shall be purchased, used to test all video channels, and turned over to the airport maintenance division when complete.
1. Handheld NTSC signal generator – Tektronix TSG95 or equal

2. Handheld waveform monitor – Tektronix WFM90D or equal
- C. The following test parameters shall be used to qualify the installation of the new camera and CCTV cable.
1. Adjust camera to optimal setting and observe peak-to-peak IRC level at the output of the camera. Record this as Level 1 on spreadsheet. Use UTP balun if applicable.
 2. Connect coaxial cable at camera and record peak-to-peak IRC level at end of coaxial transmission line in IDF closet as shown in figure 3.3A. Record this as Level 2 on spreadsheet. Use UTP balun if applicable.
 3. Determine % loss with the following formula:

$$\% Loss = 1 - \left(\frac{Level2}{Level1} \right)$$

4. If % Loss is greater than 20%, the installation is unacceptable. Contractor shall determine discrepancy and retest with Airport representative present.
 5. Submit table indicating test results for approval. If test results fail, contractor is responsible to do whatever steps are required to rectify the problem at their expense.
- D. Contractor shall test the video distribution channel (Category 6 Ethernet Cable) from every new IP camera to the input of the network switch in the IDF using a certified Category 6 Test Device.
1. Submit table indicating test results for approval. If test results fail, contractor is responsible to do whatever is required to rectify the problem at their expense.

3.03 VIDEO STREAMERS (applies to analog cameras only)

- A. 4 Fixed cameras may be installed per Honeywell HVE4.
- B. Label all cables according to camera ID

3.04 ACCEPTANCE TESTING AND COMMISSIONING

- A. On-Site Acceptance Testing and Commissioning Service:

1. Prepare the Acceptance Test Format for acceptance by the City and/or the City Engineer prior to commencement of acceptance testing. At a minimum, test must include: Camera views and NVR settings
2. Perform these on-site acceptance tests with witness by the City and/or the City Engineer, providing all personnel and equipment necessary to perform these tests.
3. Provide a hard copy of all system points tested, as well as a letter certifying 100% completeness and operation of this system, with each device listed and the results of its operational testing (passed or failed).
4. Upon completion of testing, the Contractor and the City and/or the City Engineer shall sign the Acceptance Test forms documenting system completion and acceptance. If acceptable by the City and/or the City Engineer, minor discrepancies will be resolved under project warranties.

3.05 COMMISSIONING SERVICES

- A. Program system and perform all required operational checks to ensure that the system is functioning in full accordance with these Specifications
- B. System programming should be complete meeting all user-defined requirements at time of system acceptance. Provide configuration, programming and optimization as follows
 1. Coordinate with designated HAS C3 personnel to confirm programming requirements for all new cameras. Programming shall include:
 - a. On-screen camera call-up ID and name.
 - b. Up to three (3) pre-set pre-position and “home” position(s) for all motorized cameras.
 - c. Association of alarm events generated by ProWatch (including AVPS and RDTS) with one or more cameras as required to initiate any or all of the following actions:
 - i. Automatic execution of a pre-position command of one or more cameras.
 - ii. Automatic display of one or more cameras, each on a designated monitor.
 - iii. Automatic adjustment of recording frame rate from background rate to alarm rate for each of the cameras receiving alarm events.
 - iv. Automatic display of a plan drawing (refer to “graphic display configuration below for additional details) which indicates the physical location of the camera(s) and associated alarm device(s).
 2. Coordinate with designated HAS C3 personnel to configure:
 - a. Background recording frame rate
 - b. Alarm recording frame rate
 - c. Pre and post alarm recording duration

- d. Record resolution
- e. Display resolution
3. Optimize distribution of video input signals among co-located camera servers to maximize storage and network efficiency
4. Documentation: Provide Excel file that reflects the following information for each camera:
 - a. Camera display name
 - b. Streamer location (IDF room number)
 - c. Streamer blade number
 - d. Streamer port number (for 4 port streamer blades)
 - e. Network switch port number (IDF)
 - f. Camera server location (MDF)
 - g. Network switch port number (MDF)
 - h. Camera server number Background recording frame rate
 - i. Alarm recording frame rate
 - j. Pre and post alarm recording duration
 - k. Record resolution
 - l. Display resolution
 - m. Associated ProWatch alarm input name(s)
5. Commissioning:
 - a. Utilizing Excel file described in Paragraph 4 above, participate with designated HAS C3 personnel during commissioning to confirm accurate and complete compliance with all requirements described in Paragraphs 1 through 4 above.
 - b. Coordinate with Contractor field personnel during commissioning to identify and document any deficiencies (including those associated with field installation).
 - c. Prepare punch list to reflect all deficiencies following each commissioning session
 - d. Participate with designated C3 personnel to confirm correction of each deficiency.
 - e. Obtain signed acceptance from designated C3 personnel for each camera following correction of any deficiencies.

EXHIBIT A

| CONSTRUCTION DRAWINGS | | | | | | | | | | | | | | HOUSTON AIRPORT SYSTEM | | | | | | | | | | |
|-----------------------|----------------|----------------------------|---------------|-------------------------------|---------------------------------|------------------|-------------------|-------------------|----------------|----------|-----------|--------|-------|------------------------|-------------------|-------------|-------------|-------------|----------------------|----------------------------|--------------------------|----------------------|-----------------------------|-------|
| ITEM NO. | CARD READER ID | CARD READER NAME | ASSOC CCTV ID | AC CABLE TERMINATION LOCATION | MOUNT DETAIL (RE: T-402 SC&SER) | CARD READER TYPE | DOOR HARDWARE SET | PROWATCH PANEL ID | PANEL POSITION | COMMENTS | CARD TYPE | DOOR # | DWG # | CLEARANCE CODE | SECURITY PRIORITY | FLOOR LEVEL | PORTAL TYPE | PORTAL NAME | DEVICE ID (PROWATCH) | ROOM LOCATION | CCTV ID (MAXPRO) PRIMARY | LOCATION DESCRIPTION | CCTV ID (MAXPRO) ALTERNATES | NOTES |
| 1 | CR1001AB | ADMIN MAN ENTRY DOOR | S3002 | MDF-L30 | L1-F2 | RK40 | 804 AT | L30-1 | 2B | | | A130A | T-107 | | | 1 | Door | | | ADMIN MAN ENTRY DOOR | | | | |
| 2 | CR1002 | MDF-L30 ROOM | S3003 | MDF-L30 | L1-F1 | RK40 | C207 | L30-1 | 2A | | | A133A | T-107 | | | 1 | DF | | | MDF-L30 ROOM | | | | |
| 3 | CR1003 | HANGAR BAY 2 SE ROLL-UP | S3007 | MDF-L30 | L1-F5 | RK40 | 001 | L30-1 | 3A | | | 102K | T-106 | | | 1 | OHD | | | HANGAR BAY 2 SE ROLL-UP | | | | |
| 4 | CR1004 | GSE SE ROLL-UP 1 | S3101 | DF-L31 | L1-F5 | RK40 | 001 | L31-1 | 2A | | | G101J | T-106 | | | 1 | OHD | | | GSE SE ROLL-UP 1 | | | | |
| 5 | CR1005 | GSE SE ROLL-UP 2 | S3105 | DF-L31 | L1-F5 | RK40 | 001 | L31-1 | 2B | | | G101G | T-105 | | | 1 | OHD | | | GSE SE ROLL-UP 2 | | | | |
| 6 | CR1006 | GSE SOUTH ROLL-UP 3 | S3109 | DF-L31 | L1-F5 | RK40 | 001 | L31-1 | 3A | | | G101E | T-105 | | | 1 | OHD | | | GSE SOUTH ROLL-UP 3 | | | | |
| 7 | CR1007 | GSE SOUTH DELIVERY DOOR | S3111 | DF-L31 | L1-F4 | RK40 | 735 | L31-1 | 3B | | | G101D | T-104 | | | 1 | DOOR | | | GSE SOUTH DELIVERY DOOR | | | | |
| 8 | CR1008 | GSE WEST ROLL-UP 4 | S3113 | DF-L31 | L1-F5 | RK40 | 001 | L31-1 | 4A | | | G101A | T-104 | | | 1 | OHD | | | GSE WEST ROLL-UP 4 | | | | |
| 9 | CR1009 | HANGAR BAY 1 SW ROLL-UP | S3204 | DF-L32 | L1-F5 | RK40 | 001 | L32-1 | 2A | | | 101F | T-104 | | | 1 | OHD | | | HANGAR BAY 1 SW ROLL-UP | | | | |
| 10 | CR1010 | CIRCULATION SOUTH ROLL-UP | S3203 | DF-L32 | L1-F5 | RK40 | 001 | L32-1 | 2B | | | E101D | T-109 | | | 1 | OHD | | | CIRCULATION SOUTH ROLL-UP | | | | |
| 11 | CR1011 | CIRCULATION SOUTH DELIVERY | S3202 | DF-L32 | L1-F4 | RK40 | 735 | L32-1 | 3A | | | E101C | T-109 | | | 1 | DOOR | | | CIRCULATION SOUTH DELIVERY | | | | |
| 12 | CR1012 | DF-L31 ROOM | S3110 | DF-L31 | L1-F1 | RK40 | C207 | L31-1 | 4B | | | G103A | T-105 | | | 1 | DF | | | DF-L31 ROOM | | | | |
| 13 | CR1013 | DF-L32 ROOM | S3201 | DF-L32 | L1-F1 | RK40 | C201 | L32-1 | 3B | | | E121A | T-108 | | | 1 | DF | | | DF-L32 ROOM | | | | |
| 14 | CCM-L30-01 | ADMIN SOUTH EVAC | S3004 | MDF-L30 | L1-F3 | NIA | 725 | L30-1 | 9-1 | | | A140A | T-107 | | | 1 | EVAC | | | ADMIN SOUTH EVAC | | | | |
| 15 | CCM-L30-02 | HANGAR BAY 2 EAST EVAC | S3006 | MDF-L30 | L1-F3 | NIA | 725 | L30-1 | 9-2 | | | 102L | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 EAST EVAC | | | | |
| 16 | CCM-L30-03 | HANGAR BAY 2 MECH YD EVAC | S3008 | MDF-L30 | L1-F3 | NIA | 725 | L30-1 | 9-3 | | | 102J | T-106 | | | 1 | EVAC | | | HANGAR BAY 2 MECH YD EVAC | | | | |
| 17 | CCM-L31-01 | GSE SE EVAC1 | S3102 | DF-L31 | L1-F3 | NIA | 725 | L31-1 | 9-1 | | | G101K | T-106 | | | 1 | EVAC | | | GSE SE EVAC1 | | | | |

EXHIBIT B

Draft Quote

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Quote Prepared By: NORTH AMERICA QUOTA HOUSE



EMC Corporation
176 South Street
HOPKINTON MA 01748
USA

Email:
Quote #: 6001909260 V01
Date: 16.03.2018
Valid Until:
Contract #:
Payment Terms: NET 30

| Item | Description | Qty | UOM | Total List Price (USD) | Discount | Extended Price (USD) | Months | Annual Maintenance Renewal Price (USD) | Renewal Price Validity Period | | | | | | | | |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--|-------------------------------------|-----------------|------------------------|-----------------|------------------------|--------------------|------------------------|------------------|------------------------|
| <table border="0" style="width:100%"> <tr> <td style="width:25%">Sold To:</td> <td>HOUSTON AIRPORT SYSTEM</td> <td style="width:25%">Ship To:</td> <td>HOUSTON AIRPORT SYSTEM</td> <td style="width:25%">Install At:</td> <td>HOUSTON AIRPORT SYSTEM</td> <td style="width:25%">End User:</td> <td>HOUSTON AIRPORT SYSTEM</td> </tr> </table> | | | | | | | | | | Sold To: | HOUSTON AIRPORT SYSTEM | Ship To: | HOUSTON AIRPORT SYSTEM | Install At: | HOUSTON AIRPORT SYSTEM | End User: | HOUSTON AIRPORT SYSTEM |
| Sold To: | HOUSTON AIRPORT SYSTEM | Ship To: | HOUSTON AIRPORT SYSTEM | Install At: | HOUSTON AIRPORT SYSTEM | End User: | HOUSTON AIRPORT SYSTEM | | | | | | | | | | |
| 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | | | | | | | | |
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| Bill To: | HOUSTON AIRPORT SYSTEM | Ship To: | HOUSTON AIRPORT SYSTEM | Install At: | HOUSTON AIRPORT SYSTEM | End User: | HOUSTON AIRPORT SYSTEM | | | | | | | | | | |
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| Bill To: | HOUSTON AIRPORT SYSTEM | Ship To: | HOUSTON AIRPORT SYSTEM | Install At: | HOUSTON AIRPORT SYSTEM | End User: | HOUSTON AIRPORT SYSTEM | | | | | | | | | | |
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| Item | Description | Qty | UOM | Total List Price (USD) | Discount | Extended Price (USD) | Months | Annual Maintenance Renewal Price (USD) | Renewal Price Validity Period |
|---|--|-----|-----|------------------------|---------------|----------------------|--------|--|-------------------------------|
| PROMO X210 | | | | | | | | | |
| ISILON X210 PROMO BUNDLE | | | | | | | | | |
| 851-0167-P | PROMO MELLANOX 8 PORT QDR SWITCH | 2 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| X210-SATA-S03-P | PROMO X210-11T+200G SSD/24G/2X10GE 2X1GE | 4 | EA | 56,480.00 | 32.79% | 37,957.85 | | | |
| 800-0012-P | PROMO 2 PWRGRD C14-C13,208V UNIVERSAL | 6 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 611-0005 | 11TB+200GB SSD/ 3.5IN | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 613-0008 | 10GBE DUAL-PORT SFP WITHOUT OPTICS | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 612-0027 | 24GB RAM (NEXT GEN) | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 851-0209-P | PROMO CABLE, 1B QDR, QSFP-QSFP, 3M | 8 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 851-0099-P | PROMO 2 SFP+ OPTICS KIT - 10GBE | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| M-PSM-HW-IUE-001 | PROSUPPORT W/MISSION CRITICAL-HARDWARE | 1 | EA | 20,332.80 | 32.79% | 13,664.83 | 36 | 6,073.26 | EOPS |
| Hardware Sub-total | | | | \$56,480.00 | 32.79% | \$37,957.85 | | | |
| Hardware Wty and Maint Sub-total | | | | \$20,332.80 | 32.79% | \$13,664.83 | | | |
| TRK-ENTERP DESC | CONADV/SNAP/QTA | 1 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| 200-0404-CF | INSIGHTIQ FOR ONEFS GEN5 =ID | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| M-PSM-SW-I001 | PROSUPPORT W/MISSION CRITICAL-SOFTWARE | 1 | EA | 0.00 | 0.00% | 0.00 | 36 | 0.00 | |
| P-R3-201601 | | | | | | | | | |

Draft Quote

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Quote Prepared By: NORTH AMERICA QUOTA HOUSE

Email: Quote #: 6001909260 V01
 Date: 16.03.2018
 Valid Until:
 Contract #:
 Payment Terms: NET 30



EMC Corporation
 176 South Street
 HOPKINTON MA 01748
 USA

| Item | Description | Qty | UOM | Total List Price (USD) | Discount | Extended Price (USD) | Months | Annual Maintenance Renewal Price (USD) | Renewal Price Validity Period |
|---|--|---|-----|---|---------------|--|--------|--|-------------------------------|
| Sold To: HOUSTON AIRPORT SYSTEM HOUSTON AIRPORT SYSTEM 16930 JFK BLVD HOUSTON TX 77032 USA | | Ship To: HOUSTON AIRPORT SYSTEM HOUSTON AIRPORT SYSTEM 16930 JFK BLVD HOUSTON TX 77032 USA | | Bill To: HOUSTON AIRPORT SYSTEM HOUSTON AIRPORT SYSTEM 16930 JFK BLVD HOUSTON TX 77032 USA | | Install At: HOUSTON AIRPORT SYSTEM HOUSTON AIRPORT SYSTEM 16930 JFK BLVD HOUSTON TX 77032 USA | | End User: HOUSTON AIRPORT SYSTEM HOUSTON AIRPORT SYSTEM 16930 JFK BLVD HOUSTON TX 77032 USA | |
| 201-0347-CF | SW: STARTER PROMO ENT BUNDLE T2 GEN5 =ID | 4 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| M-PSM-SW-IUE-001 | PROSUPPORT W/MISSION CRITICAL-SOFTWARE | 1 | EA | 0.00 | 0.00% | 0.00 | 36 | 0.00 | |
| Software Sub-total | | | | \$0.00 | 0.00% | \$0.00 | | | |
| Software Wty and Maint Sub-total | | | | \$0.00 | 0.00% | \$0.00 | | | |
| Basic Deployment | | | | | | | | | |
| PS-BD-ISNTRACKING | ISILON BASIC DEPLOYMENT TRACKING | 1 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| PS-BAS-ADTN | INSTALLATION OF 1 ISILON NODE | 1 | EA | 430.00 | 18.90% | 348.74 | | 348.74 | |
| PS-BAS-INIS2U | ISILON 2U INSTALLATION BASE | 1 | EA | 3,290.00 | 18.90% | 2,668.29 | | 2,668.29 | |
| PSINST-ESRS | ZERO DOLLAR ESRS INSTALL | 1 | EA | 0.00 | 0.00% | 0.00 | | 0.00 | |
| CE-VALPAKISIL | ISILON VALUEPAK | 1 | EA | 5,000.00 | 12.79% | 4,360.29 | | 4,360.29 | |
| Services Sub-total | | | | \$8,720.00 | 15.40% | \$7,377.32 | | | |

Configuration Sub-total

| | | | |
|--------------------|-------------|--------|-------------|
| Hardware Sub-total | \$56,480.00 | 32.79% | \$37,957.85 |
| Software Sub-total | \$0.00 | 0.00% | \$0.00 |

Draft Quote

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EMC Corporation
176 South Street
HOPKINTON MA 01748
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Email:
Quote #: 6001909260 V01
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|------|----------------------------------|-----|-----|------------------------|---------------|----------------------|--------|--|-------------------------------|
| | Prepaid HW Maintenance Sub-total | | | \$20,332.80 | 32.79% | \$13,664.83 | | | |
| | Prepaid SW Maintenance Sub-total | | | \$0.00 | 0.00% | \$0.00 | | | |
| | Services Sub-total | | | \$8,720.00 | 15.40% | \$7,377.32 | | | |
| | Configuration Total | | | \$85,532.80 | 31.02% | \$59,000.00 | | | |

Proposal Summary

| | | | |
|------------------|-------------|--------|-------------|
| Hardware Summary | \$56,480.00 | 32.79% | \$37,957.85 |
| Software Summary | \$0.00 | 0.00% | \$0.00 |
| Services Summary | \$8,720.00 | 15.40% | \$7,377.32 |

Draft Quote

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EMC Corporation
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| Sold To: | Bill To: | Ship To: | Install At: | End User: |
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| 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA | 16930 JFK BLVD HOUSTON TX 77032 USA |

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|--|--------------------------------|-----|-----|------------------------|----------|----------------------|--------|--|-------------------------------|
| | Prepaid HW Maintenance Summary | | | \$20,332.80 | 32.79% | \$13,664.83 | | | |
| | Prepaid SW Maintenance Summary | | | \$0.00 | 0.00% | \$0.00 | | | |
| Total Products and Services (USD) | | | | | | \$59,000.00 | | | |
| Total Freight (USD) | | | | | | \$315.30 | | | |
| Total Price (USD) | | | | | | \$59,315.30 | | | |

Notes:
Draft Quote is for information and discussion purposes only.

END OF SECTION 282300