SECTION 28 13 00 – ACCESS CONTROL AND ALARM MONITORING SYSTEM (ACAMS)

PART 1 - GENERAL

1.1 SUMMARY

A. The access control and alarm monitoring system (ACAMS) specified in this section shall be an extension to the existing GE Picture Perfect ACAMS currently deployed throughout the Los Angeles World Airports (LAWA).

B. The Security Systems Contractor shall include in the Bid all labor, materials, tools, plant, transportation, storage costs, software/licenses, installation, programming, configuration, testing, commissioning, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete and operational equipment / systems shown and described in the Specifications.

C. The Security Systems Contractor is responsible for providing and coordinating final equipment arrangements, locations, phased activities and construction methods that minimize disruption to operations and provide complete and operational systems.

D. The Security Systems Contractor shall coordinate interfaces to existing systems that are being extended in the Project in order to minimize disruption to the existing systems operations. Any systems outages shall be approved in advance and scheduled with LAWA.

E. This section specifies the minimum requirements for access control, door alarms, intrusion detection, and monitoring and control provision. Provisions for ACAMS shall follow TSA security regulations, CBP security regulations, LAWA PD airport security plan requirements, and LAWA security requirements as shown on drawings. Areas not intended for passenger access (i.e. back-of-house) shall be controlled via ACAMS. CBP perimeter and identified passenger processing, offices, and control rooms shall be controlled with ACAMS. TSA regulated portals shall be controlled with ACAMS per the LAWA PD airport security plan.

F. The standard access control panel deployed throughout the LAWA Airports is the General Electric (GE, now a United Technologies Corporation) *Micro/5*. LAWA ACAMS system is GE Picture Perfect Version 4.5.1. This ACAMS currently has links with the Airport Police Computer Aided Dispatch (CAD) to report an alarm condition detected at AOA access doors known as Title 49 CFR Part 1542.207 controlled doors. Security Systems Contractor is required to ensure all required ACAMS 1542.207 doors are programmed, tested and commissioned with the LAWA Airport Police Computer Aided Dispatch (CAD) System.

G. The Security Systems Contractor shall coordinate and cooperate with LAWA ATBS to set up the linkage between the CAD and Video systems.

H. Access control panels and electrified locking hardware power supplies shall be located in LAWA IT Rooms as indicated in the drawings.

I. The electronic access card format standard shall be the HID i-Class/PIV format. Access control card readers provided must be fully compatible with this format.

J. Related documents included in the specification requirements :
1. Division 1 – General Requirements, All Sections
2. Division 08 Openings:
   a. Section 08 11 13 – Hollow Metal Doors and Frames
   b. Section08 11 19 – Stainless Steel Doors and Frames
   c. Section 08 71 00 – Door Hardware
3. Division 27 Communications:
4. Division 28 Electronic Safety and Security
   a. Section 28 23 00 – Closed Circuit Television (CCTV) Surveillance System
   b. Section 28 31 00 – Fire Detection and Alarm

1.2 REFERENCES

A. Abbreviations and Acronyms

1.	ATBS	LAWA IMTG Office of Airport Technology & Business Systems
2.	ACAMS	Access Control and Alarm Monitoring System
3.	ANSI	American National Standard Institute
4.	ASCII	American Standard Code for Information Interchange
5.	AOA	Aircraft Operations Area
6.	BMS	Balanced Magnetic Switch
7.	CBP	U.S. Customs and Border Protection
8.	CCTV	Closed Circuit Television
9.	IDS	Intrusion Detection System
10.	O&M	Operation and Maintenance
11.	PoE	Power over Ethernet
12.	PTZ	Pan, Tilt, Zoom
13.	REX	Request to Exit
14.	SCP	Security Control Panel
15.	SJB	Security Junction Box

B. References
1. Comply with all applicable codes standards, regulations, and the most current issue of the following publications, including all amendments thereto of the issue that is current on the date of contract award. Applicable requirements of the following publications shall apply to the work under this specification as if fully written herein. Where conflicts exist between the Technical Specification and the referenced publications, local codes shall govern.
   a. IT Infrastructure Standards of Practice Volumes 1, 2, and 3
   b. Institute of Electrical and Electronic Engineers (IEEE)
   c. National Fire Protection Association (NFPA)

d. National Electrical Manufacturers Association (NEMA)
e. Underwriters Laboratories, Inc. (UL)
f. Federal, State and Municipal Building Codes and all other Authorities having jurisdiction
g. National Electrical Code (NEC)
h. American Society for Testing Materials Specification (ASTM)
i. Occupational Safety and Health Administration (OSHA)
j. National Electrical Safety Code (NESC)

2. Special attention shall be made to the following specific codes, standards, and publications where applicable:
   a. 49 CFR 1520 Protection of Sensitive Security Information
   b. 49 CFR 1540 Civil Aviation Security General Requirements
   c. 49 CFR 1542 Airport Security
   d. 49 CFR 1544 Aircraft Operator Security
   e. Refer to Exhibit 1 for Public Safety Systems

1.4 ADMINISTRATIVE REQUIREMENTS

A. SSI - Protection of Contract Documents. All ACAMS security system documents shall be considered Sensitive Security Information (SSI) and shall be handled as defined in 49 CFR, Part 1520.

1.5 SUBMITTALS

A. Action Submittals
   1. Comply with all LAWA submittal procedures given in other Sections. The following is in addition to or complementary to any requirements given elsewhere.
   2. Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities that the Bidder proposes to use in this project.
   3. Submit Manufacturers' Data:
      a. Security Control Panels
      b. Card Reader devices.
      c. REX devices and related interfaces
      d. Door alarm contacts and related interfaces
      e. Alarm horns, visual alarms and related interfaces
      f. Power supplies
      g. Any other equipment installed as part of the system
   4. Product submittals shall be provided and approved prior to the commencement of installation activities of the ACAMS.
   5. Submit all proposed labeling materials and nomenclature for approval.
   6. Shop Drawings:
      a. Provide shop drawings that are applicable and pertain to access control and alarm system provisions.

7. Installation drawings:
    a. Floor Plans
    b. Riser Diagrams
    c. Block diagrams
    d. Door Details
    e. Point Schedules
    f. Connection of all new access control and alarm equipment with new Security Control Panels (SCPs), including block diagrams and wiring diagrams
    g. Connection of new SCPs with the existing access control server, including block diagrams and wiring diagrams
    h. Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding
    i. Details of surge protection device installation
    j. Equipment mounting details
    k. Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems
8. Coordination Drawings:
    a. Indicate locations where space is limited for installation and access.
    b. Submit floor plans, elevations, and details indicating major equipment and end device locations. Indicate all floor, wall and ceiling penetrations.
    c. IT Rooms and MPOE: At least 30 days before beginning installation in each room, the Security Systems Contractor shall furnish a an enlarged floor plan of each IT Room showing the proposed mounting locations of ACAMS equipment, cable routings, and termination locations for all cable and equipment.
9. Theory of Operations
    a. Description, analyses, and calculations used in sizing equipment. Describe and show how equipment will operate as a system.
10. Test and Acceptance Plans
    a. Submit the following for review and approval prior to the performance of any testing:
        1) Performance and Functionality Verification Test Plan (including interfaces)
        2) Commissioning Test Plan
    b. Submit completed test and acceptance reports.
11. Training Plan and Syllabus
    a. Submit the training plan and syllabus for review and approval three weeks prior to scheduled training sessions:
    b. Training shall consist of two four-hour class room sessions reviewing the O&M manual, as-built drawings, and any other documentation necessary to maintain the new equipment installed. The two sessions shall accommodate LAWA staff shift schedules. Additionally, and separate from the classroom session, the contractor shall conduct two separate field walks with LAWA staff to identify locations of all installed devices and discuss installation, labeling, and configuration of the devices.

B. Project Record and Closeout Submittals
   1. Project Record Documents required include:
      a. Marked-up copies of Contract Drawings
      b. Marked-up copies of Shop Drawings
      c. Newly prepared Drawings
      d. Marked-up copies of Specifications, Addenda and Change Orders
      e. Marked-up Project Data submittals
      f. Record Samples
      g. Field records for variable and concealed conditions
      h. Record information on Work that is recorded only schematically
      i. As-built drawings
      j. Record drawings
      k. Electronic as-built that conform to LAWA LUSAD requirements
   2. As-built drawings:
      a. In addition to the Project Record Drawing requirements set forth in Division 01 – General Requirements, As-built drawings shall fully document and be fully developed and provided, and shall include, but not be limited to:
         1) Floor Plans.
         2) Riser Diagrams.
         3) Block diagrams.
         4) Point-to point wiring diagrams.
         5) Door Details.
         6) Point Schedules.
         7) Detail of connections to ACAMS readers, controllers and alarming points.
         8) Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding.
         9) Details of surge protection device installation.
         10) Equipment mounting details.
         11) Rack/Cabinet layout elevations and details, including heat and load calculations.
         12) Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems.
      b. Post changes and modifications to the Documents as they occur. Drawings will be updated electronically and submitted to LAWA in accordance with the schedule provided for this by LAWA. Do not wait until the end of the Project. Design Engineer will periodically review Project Record Documents to assure compliance with this requirement.
   3. Upon completion of the as built drawings, LAWA will review the as-built work with the Security Systems Contractor.
   4. If the as built work is not complete, the Security Systems Contractor will be so advised and shall complete the work as required.
   5. Project Record Drawings shall also be submitted in electronic format. Electronic drawing format shall be AutoCAD® Release 2014 or later. LAWA shall have the right

and capability to manipulate all electronic file drawings and documentation. Bind all external reference files so that each drawing opens up as a complete drawing with no missing XREFs.

C. Maintenance Material Submittals

1. Provide Owner with applicable Operations and Maintenance (O&M) manual(s) that describe the equipment installed under this contract. The O&M manual(s) shall, as a minimum, consist of an operations section, a maintenance section, and a drawings section when necessary.
   a. Special Or Non-Standard Installations: In situations where off-the-shelf items of equipment are combined into special or non-standard installations, provide separate sections containing complete operation related information for each non-standard or specialized configuration of equipment as installed.
   b. Drawings. Provide all drawings, illustrations, and equipment related reference materials not provided elsewhere within the manual(s). This documentation shall be assembled in the manner specified herein, shall be listed in Table of Contents, and shall contain the following information as a minimum:
      1) Mechanical drawings showing dimensions.
      2) Schematic drawings and diagrams for each item of equipment.
      3) Equipment schematic drawings.
      4) Contractor shall ensure that the latest project record drawings are incorporated in all final copies of manuals as part of the Completion of Work; and shall update these in all copies to reflect any changes made during Maintenance.
      5) Interface drawings.
      6) Other related documentation.

1.6 QUALITY ASSURANCE

A. Contractor Certification: The Security Systems Contractor or approved subcontractor shall be GE/UTC certified security systems installer for the specific type of ACAMS equipment being installed. The Security Systems Contractor shall offer proof of certification by submitting a copy of certification with the Bid.

B. The Security Systems Contractor’s Quality Assurance Inspector shall conduct a visual inspection of all installations to verify that the installations are in accordance with LAWA’s and manufacturer's specifications. Records of the inspections signed and dated by the Quality Assurance Inspector shall be submitted to LAWA.

C. LAWA shall be notified by the Security Systems Contractor of any inspection(s) and LAWA may elect to participate in any inspection(s). Relevant QC information shall be input into LAWA CMMS (refer to Paragraph 3.8).

1.7 SUBSTITUTION OF EQUIPMENT

A. Approval of alternate or substitute equipment or material in no way voids specification requirements.

B. Under no circumstances shall LAWA be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Security Systems Contractor submits to LAWA all evidence to support the contention that the item proposed for substitution is equal to the specified item. LAWA's decision as to the equality of substitution shall be final and without further recourse.

C. In the event that the Design Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Security Systems Contractor, or changes by the Security Systems Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Design Engineer is required to examine and evaluate any changes proposed by the Security Systems Contractor for the convenience of the Security Systems Contractor, then the Design Engineer's expenses in connection with such additional services shall be paid by the Security Systems Contractor and may be deducted from any moneys owed to the Security Systems Contractor.

D. All products identified, as a product with "no substitutions", shall be supplied as specified. Contractor shall be responsible for identifying any specified products that do not meet the necessary requirements for building a full and complete system at the time of bid. Contractor shall submit a list of these products with an engineered solution to the LAWA or persons appointed by the LAWA for review and approval prior to making any changes.

1.8 EQUIPMENT CERTIFICATION

A. Provide materials that meet the following minimum requirements:
   1. Electrical equipment and systems shall meet UL Standards and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
   2. Equipment shall meet all applicable FCC Regulations.
   3. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material is not acceptable and will be rejected.

4. The listing of a manufacturer as “acceptable” does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications.
5. Where applicable, all materials and equipment shall bear the label and listing of Underwriters Laboratory or Factory Mutual. Application and installation of all equipment and materials shall be in accordance with such labeling and listing.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for the final assembled unit.
1. All components of an assembled unit need not be products of the same manufacturer.
2. Constituent parts, which are alike, shall be from a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.

C. Components of equipment shall bear the manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment that serve the same function must be the same make and model.

E. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

F. Maximum standardization of components shall be provided to reduce spare part requirements.

1.9 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver system components properly packaged in factory-fabricated containers or packaging.

B. Handling: Handle equipment and components carefully to avoid breakage, impact, denting and scoring finishes. Do not install damaged equipment. Replace and return damaged units to equipment manufacturer.

C. Equipment delivered to the job site shall be opened and inspected immediately upon arriving and compared to the approved Shop Drawing submittal and checked for defects. If the equipment is not correct, the equipment shall be returned to the manufacturer immediately and a new order for the approved equipment shall be placed at no cost to the LAWA.

D. Equipment and components shall be protected from the prolonged exposure, weather, humidity, temperature variations, dirt, dust, or other contaminants. Non-active equipment installed in

construction area shall be covered and protected from debris or damage. Equipment damaged prior to system acceptance shall be replaced at no cost to the LAWA.

1.10 FIELD/SITE CONDITIONS

A. Inspections
   1. The Security Systems Contractor shall perform a detailed inspection of the site prior to submitting any technical data for approval.
   2. The Security Systems Contractor shall verify that the proposed equipment and methods of installation are compatible with the existing conditions and prepare a corresponding written report of their findings.
   3. LAWA shall be notified in writing if modifications of the existing building are required in order to accommodate the new equipment. These modifications shall be made only upon receiving written approval from LAWA.

B. General
   1. The Security Systems Contractor shall be responsible for acceptance testing to commission the ACAMS devices into the Campus Production system.
   2. Note that all programming and configuration of the Picture Perfect Software shall be done by LAWA.. The Security Systems Contractor shall submit a Disruption Notice to the Project Manager and ATBS notifying of any disconnection and/or reconnection of any ACAMS associated equipment that might be affected by this work. Disconnection and/or reconnection will not be allowed without ATBS approval of the Disruption Notice.
   3. The Security Systems Contractor shall provide all new conduit, Cat 6A UTP cable, optical fiber cable, innerduct, racks, cabinets, patch panels, cover plates, outlet boxes, related hardware, distribution, termination equipment, and any other appurtenances and equipment associated specifically with ACAMS. Refer to Division 27.
   4. The Security Systems Contractor shall obtain the approval of LAWA for the final layout of ACAMS equipment to be installed in IT Rooms prior to the installation of any materials or equipment. Shop drawings showing proposed room layouts shall be submitted for approval before beginning installation.
   5. The Security Systems Contractor shall furnish an adequate supply of technicians and materials at all times, and shall perform the work in the most appropriate, expeditious, and economical manner consistent with the interests of LAWA.
   6. The Security Systems Contractor shall be responsible to LAWA for the acts and omissions of its employees, subcontractors and their agents and employees, and other persons performing any of the work under a contract with the Security Systems Contractor.
   7. The Security Systems Contractor shall not unreasonably encumber the site with any material or equipment. Operations shall be confined to areas permitted by law, permits, and contract documents.

8. The Security Systems Contractor shall have an experienced Project Manager on site at all times when work is in progress on any project. The individual who represents the Security Systems Contractor shall be the single point of contact between the Security Systems Contractor and LAWA, and shall be responsible for the entire project. This representative shall be able to communicate with LAWA or designated representative whenever requested throughout the life of the project.
9. While working in the facility, the Security Systems Contractor shall not block any entrances, egresses, or other passageways that are necessary for normal, safe operation. It should be noted that the Security Systems Contractor is responsible to provide any lifts, hand trucks, etc. that it will need to transport its materials and equipment to and throughout the site.
10. The Security Systems Contractor shall protect all buildings, walls, floors, and property from damage resulting from the installation. Any and all damage to property shall be repaired by the Security Systems Contractor at its expense. If the Security Systems Contractor enters an area that has damage (not caused by the Contractor), the Security Systems Contractor shall immediately bring this to the attention of LAWA so the area can be appropriately noted.
11. Following each day's work, the Security Systems Contractor shall clean up the areas in which it has been working and dump all trash in the appropriate designated areas.
12. Deliver products to site under provisions of Division 01 - General Requirements.
13. Store and protect products under provisions of Division 01 - General Requirements.
14. Coordinate with LAWA, locations and requirements for equipment and product storage.

C. Site Conditions
   1. Environmental Requirements:
      a. Comply with all manufacturers' instructions and recommendations concerning environmental factors.
   2. Protection:
      a. Fragile Items:
         1) Handle any fragile items with care using protective coverings to avoid damage to sensitive instrument relays, and other devices, and to avoid contamination by dirt and debris.
      b. Weather and Construction Protection:
         1) During installation, provide adequate temporary dust and weather protection for all equipment. Reinstall covers each time any adjustments are made on the equipment.
   3. Existing Conditions:
      a. Security Systems Contractor shall inspect the site and identify all existing security provisions and conditions. This includes identifying any communications and/or ancillary equipment currently existing and/or in use. It shall be the Security Systems Contractor's responsibility to identify all existing provisions to be terminated to new, existing, or relocated systems.

b. All provisions shall be identified by the Security Systems Contractor and documented in the quality control inventory. Individual provision data such as provision type make and model, and serial number shall be obtained by the Security Systems Contractor at the time of demolition and documented in the quality control inventory.

1.11 WARRANTY

A. Warranty Requirements shall be in accordance with the Division 01 - General Requirements.
   1. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of one (1) year from Final Acceptance.
      a. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.
      b. The Security Systems Contractor shall be responsible for and make good, without expense to LAWA, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.
   2. Submit a copy of all manufacturer warranty information.

B. Spare Parts:
   1. The Contractor shall provide to LAWA an inventory of security equipment spare parts, materials, consumables, and any other system item in order to meet the specified warranty maintenance requirements and keep the security equipment in a continuous operational mode during the warranty period. The quantity of spare parts shall equal no less that 10% of the items provided and installed under this contract.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless otherwise specified, products for the ACAMS shall be consistent with and compatible with the established standards for LAWA ACAMS.

B. Latest technology available: Products shall be provided as specified. In the event the manufacturer(s) of specified products and materials have upgraded or replaced the specified products and materials with newer or improved technologies at the time of purchase, the newer or improved products or materials shall be provided unless they are incompatible with the rest of the ACAMS systems or so directed by LAWA (submit Request For Information if in

doubt). Latest technology products and materials shall be operationally and functionally equivalent or superior to the specified products and materials. Products and materials shall be purchased by the Security Systems Contractor in a timely manner to meet construction schedules, but shall not be purchased so far advanced of the date(s) of installation that they become technologically obsolete or replaced with newer technologies.

C. Provide and install required cabling, connectors, patch cords, resister packs, terminators, and all other miscellaneous items required for a fully functional System.

D. ACAMS commissioning shall be conducted in accordance with LAWA ACAMS Commissioning Flow Chart.

E. In addition to any acceptance testing requirements specified elsewhere, the ACAMS shall be fully tested and accepted, with test results recorded individual test reports for LAWA review and acceptance. All ACAMS devices and equipment shall be tested. Test and acceptance reports shall the following at a minimum.
   1. Card reader controlled doors, including but not limited to:
      a. Valid card read
      b. Invalid card read
      c. Valid request-to-exit
      d. Door forced open
      e. Door held open
      f. Door shunt
      g. Local alarm
   2. Alarm and monitor points
   3. ACAMS input and output interfaces
   4. ACAMS integration with CCTV cameras

2.2 SYSTEM DESCRIPTION

A. The security related provisions for new Security Doors include access control, intrusion detection and duress/assistance alarm equipment, video surveillance cameras and recording equipment, and security system monitoring and control. All security measures are to be applied to interior and/or exterior locations as shown on the drawings. Wherever possible, unless specified elsewhere in the Specifications or Drawings, materials, equipment and installation shall conform to existing LAWA Standards for ACAMS system.

B. The access control system for LAWA is a GE Picture Perfect system. Security Control Panels (SCPs) shall be located in identified IT Rooms as indicated in the drawings.

C. The SCPs shall communicate to the existing GE Picture Perfect CPU and software system for monitoring and control. Communications between the GE Picture Perfect Server shall be via the LAX MPLS data network utilizing Ethernet TCP/IP protocol.

D. Security system electrified door hardware is normally provided and installed by the door hardware Contractor. The Security Systems Contractor shall coordinate with the door hardware Contractor. It shall be the responsibility of the Security Systems Contractor to complete the low voltage electrical connections of the electrified door hardware.

E. Power supplies for electrified emergency egress panic door hardware is normally provided and installed by the door hardware contractor, and shall be installed as indicated in the Security Door Details. The Security Systems Contractor shall provide the electrical connections between the electrified emergency egress panic door hardware and their power supplies. The Security Systems Contractor shall coordinate with the door hardware contractor.

F. Doors, door frames and openings included under this contract as specified in the Division 08 specification sections shall be provided and installed by the door and door frame Contractor(s). The Security Systems Contractor shall coordinate with the door and door frame Contractor(s) for preparation of doors and frames for door position sensors, for wiring and conduit to and within frames, and for interfaces with door controllers for automatic door operators and overhead coiling doors. There are special operational and functional requirements for baggage door card reader control. Refer to these requirements given in this Specification.

G. The ACAMS integration with the CCTV Surveillance System shall include, but not be limited to: automated PTZ camera positioning upon ACAMS alarms and events, automated camera call-up and display to video monitors upon ACAMS alarms and events, automatically initiate and/or adjust digital recording upon ACAMS alarms and events. Contractor shall provide trigger information to the video contractor for each card reader or intrusion detection device.

H. Programming and configuration of GE Picture Perfect software shall be by LAWA . This scope of work shall include ACAMS programming and configuration. The installing Security Systems Contractor shall provide a Configuration Schedule detailing the parameters necessary to configure the devices. Security Contractor to work with ATBS to define the format of the Configuration Schedule.

I. Contractor shall verify Contact information for the LAWA designated ACAMS maintenance contractor prior to bid.

J. All ACAMS equipment requiring building power shall be connected to building UPS or Emergency power circuits, as indicated in the drawings. The security systems Contractor shall coordinate with the electrical Contractor.

K. All equipment shall be installed in accordance with this specification. Provide and install any and all equipment necessary to provide a complete and operating system, and meet the full intent of this design and other specifications within these construction documents. Any equipment such as consumables, terminators, or any other materials or equipment needed to install this system shall be considered ancillary and be provided as a part of this project. Security Systems Contractor shall provide cable for all security systems and integration of sub-systems. Cable shall be provided in accordance with manufacturer specifications for the equipment it is terminating to.

L. Contractor shall provide wiring, devices, programming, and configuration necessary to accomplish the following security requirements:

1. For elevators that access the Airplane Operations Area (AOA) and service other levels which passengers have access to, the ACAMS shall interface with the elevator controls in order to prevent accidental passenger access to the AOA. This shall be accomplished by one or more of the following:
    a. Interfacing the ACAMS control with the elevator weight sensor so that the elevator car does not proceed to the AOA level if there is a passenger in the elevator car.
    b. The elevator car only proceeds to the AOA level upon valid security badge access using the elevator car card reader with keypad.
    c. Programming the elevator car so that levels approved for passenger access have precedence over access to restricted levels.
2. For Federal Inspection Services (FIS) areas where the possibility of arriving international and domestic passengers co-mingling exists, ACAMS doors shall be interlocked so that doors leading to departure areas cannot open when the doors leading to FIS areas are open and vice versa. Per CBP requirements, All gates and associated doors leading into or out of the sterile corridor must be equipped with an interlocking access control system, which is integrated to ensure that international and domestic passengers do not co-mingle and that arriving international passengers do not by pass the CBP Processing Area.
3. Duress Alarm Systems shall be provided for all CBP Outbound Interview Rooms. Each CBP Outbound Interview Room shall be provided with a duress button, audio/visual alarm, latching module and keyed reset/disable control. Each keyed reset/disable control shall include one (1) green LED wired to illuminate when the key is in the active (not reset/disable) position. Each duress system shall be connected to the ACAMS system for alarm monitoring. Each Duress Alarm System shall include a latching module so as to provide an alarm output to the ACAMS which shall remain active (in the alarm condition) until it is reset by the keyed reset/disable control.

M. For any required “Knox Box” installation, Contractor shall provide a tamper switch with wiring to the ACAMS micro controller DI board and program for individual alarm point.

N. For baggage doors (portals) which serve as entry or exit points into or out of sterile and/or secure areas, the ACAMS shall interface with the baggage portal to require a valid card read in order to open the portal and start the baggage belt. LAWA Airport Police have approved a

standard baggage portal configuration and operation that shall be adhered to in any new or remodel installation of baggage portals (designer shall obtain design standards from ATBS). The standard sequence of operation is as follows:

1. An SJB shall be provided near to the baggage portal on the airside to house the WIU and necessary control relays. A Belden 8725 cable shall be provided in conduit from the SJB to the IT Room.
2. The card reader shall be stanchion or wall mounted near the baggage portal start/stop pushbuttons
3. A magnetic door position switch shall be provided that will indicate to the ACAMS system that the baggage portal is completely closed.
4. Relays shall be provided in the SJB to control the activation of start button and to provide alarms.
5. Audible and visual alarms shall be provided for indication of improper operation.
6. The ACAMS shall receive two signals from the baggage handling system that indicate that the baggage portal is open and that the belt is running.
7. The sequence of operation shall be as follows:
    a. A valid authorized LAWA identification badge is presented to the card reader.
    b. ACAMS sends a signal to the baggage handling system to enable the belt start button.
    c. The start button can be pushed and the baggage portal will open and the belt will start running.
    d. If the belt stops running and the baggage portal is open for more than 30 seconds, an alarm shall be sounded.

2.3 ACAMS EQUIPMENT

A. Access Control Panel (and associated components as required):
    1. GE M3000, with internal 12 VDC, 6 amp power supply (no substitutions)
    2. Include GE PXN plus CPU board
    3. Must be fully compatible with LAWA Picture Perfect Server Software at time of installation
    4. Provide and install one (1) 12 Volt, 12 Amp Hour sealed gel type battery for each GE M3000

B. Card Reader Interface Module
    1. GE 8RP model 110100501 (no substitutions).

C. Output interface module
    1. Provide and install a minimum of one (1) per M3000, and as required to support outputs as indicated in the specifications and drawings.
    2. GE DOR model 110078001 or 110071001, no substitutions.

D. Input interface module
   1. Provide and install a minimum of one (1) per M3000, and as required to support inputs as indicated in the specifications and drawings.
   2. GE DI model 110072003 (no substitutions).

E. Wiegand Interface Unit
   1. Provided and install as required to support card readers as indicated in the specifications and drawings.
   2. Install in SJBs located above (or near as approved by LAWA) ACAMS doors. SJB shall be mounted in a vertical orientation and be safely accessible using a 10ft. ladder. SJB door shall have minimum 90 degrees unobstructed door swing.
   3. GE model WIU-4 (no substitutions)

F. Power Supplies
   1. Wall Mount
      a. 24VDC Power
         1) A minimum of one (1) 24VDC, 10 Amp Power Supply shall be provided for each GE M3000 Access control Panel, with no more than eight (8) doors (including one (1) electric lock and one (1) alarm horn per door) powered from a single wall mount 24VDC Power Supply
         2) Each door shall be powered from a dedicated current protected output.
         3) Provide and install two (2) 12 Volt, 12 Amp Hour sealed gel type batteries for each 24VDC Power Supply. Batteries shall be sized to fit within power supply enclosure.
         4) Altronix AL1024ULACM, or approved equal. Ensure enclosure size accommodates required batteries.
   2. 12VDC Power
      a. Provide as required for 12 volt devices not powered by other sources
      b. Provide and install two (2) 12 Volt, 12 Amp Hour sealed gel type batteries for each 12VDC Device Power Supply
      c. Altronix, AL1012ULACM, or approved equal

G. Card Reader Compatibility
   1. Card Readers and Card Readers with Keypads shall be compatible with Federal Information Processing Standards Publication 201 (FIPS 201)
   2. Card Readers and Card Readers with Keypads shall be compatible with LAX HID issued identification and access control cards, and shall be compatible HID 13.56 MHz Contactless Smart Card technologies.

H. Card Reader
   1. HID model R40 (no substitutions)
   2. The firmware shall support both HID I class and PIV card formats
   3. Provide reader with terminal block terminations (not pigtail).

I. Card Reader with Keypad
   1. HID model RK40 (no substitutions)
   2. The firmware shall support both HID I class and PIV card formats
   3. Provide reader with terminal block terminations (not pigtail).

J. Door Position Switches (Alarm Contacts)
   1. Door Position Switches shall be compatible with the door style and door materials
   2. Door Position Switches shall be magnetic activated and shall be flush mounted wherever possible. Use of surface mounted switches require the approval of LAWA.
   3. Flush Mount
      a. GE 1078/1076 Series, or approved equal
   4. Surface Mount
      a. Surface mounted Door Position Switches shall be high security triple-biased devices.
      b. GE 2700 Series, or approved equal

K. Alarm Horns
   1. Alarm Horns shall be installed as indicated in the drawings
   2. Alarm Horns shall be installed at a min. height of 3" above the door frame and in a manner consistent with existing alarms horns installed in LAWA
      a. Alarm Horns shall be connected to the output interface module provided in the door's associated GE M3000 access control panel
   3. Interior Alarm Horns
      a. System Sensor MHW, or approved equal
   4. Exterior Alarm Horns
      a. System Sensor HRK, or approved equal

L. Audio/Visual Alarm Signals
   1. Audio/Visual Alarm Signals shall be installed as indicated in the drawings. Audio/Visual Alarm Signals shall be installed at a min. height of 3" above the door frame and in a manner consistent with existing alarms horns installed at LAX.
   2. Prior to the installation of the Audio/Visual Alarm Signals the Security Systems Contractor shall coordinate with LAWA and the CBP with respect to the selection of the color of the strobe lens and the tone and level of the audible alarm signal.
   3. The Security Systems Contractor shall demonstrate to LAWA and the CBP a functional Audio/Visual Alarm Signal device, including all available colored strobe lens options.
      a. Safety Technology, Inc. (STI) model SA5000 with back-box kit SUB-SA504, or approved equal.
   4. Visual alarms for baggage portals shall be Edwards Signaling 125XBRiRGA120A

M. Duress alarm buttons
   1. Mushroom Style
      a. Mushroom Style Duress Alarm Buttons shall be installed as indicated in the drawings
      b. Unless indicated otherwise, Mushroom Style Duress Alarm Buttons shall be wall mounted 42" AFF
      c. Mushroom Style Duress Alarm Buttons shall be latching when activated and require key reset
      d. Mounting plate shall be stainless steel
         1) Alarm Controls model KR-1-1, PBL-1-L2, or approved equal
   2. Covert Duress Alarm Style
      a. Covert Style Duress Alarm Buttons shall be installed as required.
      b. Wiring from the Covert Style Duress Alarm Button shall be installed in 3/16" flexible stainless steel tubing between the Alarm Button and the conduit connected junction box. The flexible tubing shall be routed and securely fastened to the underneath side of the desktop or work surface countertop.
      c. Honeywell 269R, or approved equal.
   3. Keyed reset/disable control
      a. Keyed Reset/Disable Controls shall be provided for CBP Search, Interview and Hold Rooms.
      b. Construction shall be stainless steel single gang wall plate.
      c. Shall include one (1) green LED, wired to illuminate when the key is in the active (not reset/disable) position.
      d. SDC model 701-U-L1, or approved equal.

N. SJB cabinet
   1. Each secure door shall have at least one SJB located on the secure side above each door through which all wiring for that door shall be routed. It shall be used for the mounting of the WIUs and also the Category 6A UTP terminations, and any other equipment as appropriate. If the door is a double door or there are multiple doors in one location, this box may be shared. Any such sharing requires prior approval by ATBS before installation. The boxes shall conform to:
      a. 16.00" x 16.00" x 6.62", NEMA Type 1, hinged door. Provide with perforated back panel and keyed cylinder lock. Lock shall be keyed the same as existing SJB cabinets in the terminal. Label SJB with black phenolic plate secured to the exterior of the enclosure. Label format shall read "[Door #-SJB-Micro #].
      b. Hoffman A16N16ALP, or approved equal
      c. Provide tamper switch to trigger on opening of SJB cabinet wired to DI board in ACAMS micro controller and program as an individual alarm point.

O. Wire and Cable
   1. Low voltage wire and cable shall be provided and installed as required. Provide individually shielded pair cable between Weigand board and ACAMS micro (Belden 8725 or equivalent).
   2. Wire and cable shall be selected, sized and used as appropriate for the device application in accordance with the device manufacturer's specifications, voltage and load, and distance of the wire/cable run.
      a. DI/DO wiring shall be 18/3 Alpha 2423C or equivalent.
      b. Lock power wiring shall be 16/3 Alpha 2433C or equivalent.
      c. Baggage door SJB shall be provided with a Belden 8725 back to the IT Room.
   3. Wire and cable runs shall be "home run".
   4. Mid run splices are not permitted.
   5. Wire and cable shall be Belden, West Penn, Contractors Wire and Cable, Alpha or approved equal.

P. ACAMS Workstations as required for Airport Police, CBP, and LAWA ATBS
   1. Provide and install ACAMS workstations, including but not limited to; computers, monitors, printers, operating system, and software licenses for fully functional GE Picture Perfect workstations.
   2. Contractor to confirm latest acceptable models with LAWA ATBS. The approved model will meet or exceed the following specifications:
      a. Two (2) Intel Xeon Quad Core E5405/2.00GHz, 4GB RAM, 2 80GB RAID1 SATA HD
      b. Two (2) nVidia Quadro FX570 Video Cards for Quad Monitor Support, DVD+/-RW, Gigabit NIC, Windows 7
   3. Displays for operator workstations shall be dual 24 inch LCD displays.

Q. Digital Encoders
   1. For use with all duress alarms, the Contractor shall provide new digital encoders and install them in IT Room cabinets. Encoders shall be Siqura A-80 or equivalent with MC10/11 rack mount chassis and power supply. Coordinate with LAWA for rack mounting location. Provide factory terminated Category 6 UTP patch cords from encoders to existing LAWA MPLS network switch. Size patch cords to avoid excessive slack in cables. Dress and secure patch cables neatly in cabinets.

2.4 MATERIALS

A. Color and Finish Selection:
   1. In all public areas and in all other areas visible from public areas or from the exterior of the building, colors and finishes shall match the custom color and finish samples on file with LAWA. In all other areas, applicable colors and finishes shall be selected by

LAWA from the manufacturer's standard color and finish schedule. For such areas, submit manufacturer's standard color and finish schedule(s).

2.5 UPS

A. All equipment will be powered by a UPS with a capability to support operations for at least ninety (90) minutes after supply power loss. All power will be obtained from emergency power sources.

2.6 FIRESTOPPING MATERIALS

A. Fire stopping for openings through fire-rated and smoke-rated walls and floor assemblies shall be listed or classified by an approved independent testing laboratory for "Through-Penetration Fire Stop Systems." The system shall meet the requirements of "Fire Tests of Through-Penetration Fire Stops" designated ASTM E814.

B. Inside of all conduits, the fire stop system shall consist of dielectric, water resistant, non-hardening, permanently pliable/re-enterable putty along with the appropriate damming or backer materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide and install and make fully operational all components required for a fully functional system.

B. System installation and construction methods shall conform to LAWA requirements, requirements of the State of California and all applicable building codes.

C. Security Systems Contractor shall install equipment to meet Seismic Zone 4 requirements of the State of California and as stated herein. Where undefined by codes and standards, Security Systems Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.

D. All equipment locations shall be coordinated with other trades and existing conditions. Coordinate work with other trades and existing conditions to verify exact routing of all cable tray, conduit, etc. before installation. Coordinate with all the Telecommunications,

Mechanical, Baggage Handling and Electrical Drawings. Verify with LAWA the exact location and mounting height of all equipment in finished areas.

E. The Security Systems Contractor shall use existing conduit and surface raceway where possible and practicable. All work shall be concealed above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, Engineer shall be notified before starting that part of the work. In areas with no ceilings, install only after LAWA and Design Engineer reviews and comments on arrangement and appearance.

F. Where required, the Security Systems Contractor shall be responsible for cutting, patching, coring and associated work for the system at no additional cost to LAWA. Cut and drill from both sides of walls to eliminate splaying. Patch adjacent existing work disturbed by installation of new work. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

G. All conduit and sleeve openings used by the Security Systems Contractor shall be waterproofed or fireproofed in compliance with State and Local Building and Fire Codes. Strict adherence to National, State, and Local Fire Codes, particularly fire stopping will be required.

H. The Security Systems Contractor shall patch all openings remaining around and inside all conduit, sleeves and cable penetrations devices to maintain the integrity of any fire rated wall, ceiling, floor, etc. The fire stop system shall consist of a dielectric, water resistant, non-hardening, permanently pliable/re-enterable putty along with the appropriate damming materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

I. All building conduits and sleeves installed and/or used under these Specifications shall be fire stopped, or re-fire stopped, upon cable placement through such passageways.

J. Fire stopping for Openings through Fire and Smoke Rated Wall and Floor Assemblies:
   1. Provide materials and products listed. The system shall meet the requirements of "Fire Tests of Through-Penetration Fire Stops" designated ASTM E814. To be used inside all conduits and sleeves. Caulk on exterior of conduit penetration.
   2. Provide fire stop system seals at all locations where conduit, fiber, cable trays, cables/wires, and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire stop seal between sleeve and wall for drywall construction.
   3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire stop system. The installation shall provide an air and watertight seal.
   4. The methods used shall incorporate qualities that permit the easy removal or addition of conduits or cables without drilling or use of special tools. The product shall adhere to

itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating. Typical rating:

a. Floors – three (3) hours
b. Corridor walls – two (2) hours
c. Offices – three-quarters (0.75) hour
d. Smoke partitions – three-quarters (0.75) – one (1) hour

5. Provide fire stop pillows for existing cable tray penetrations through firewalls.

K. Manufacturer's recommended installation standards must be closely followed (i.e. minimum depth of material, use of ceramic fiber and installation procedures). Provide and install any and all equipment necessary to provide a complete and operating system, and meet the full intent of this design and other specifications within these construction documents. Any equipment such as relays, consumables, terminators, or any other materials or equipment needed to install this system shall be considered ancillary and be provided as a part of this project. Contractor shall provide cable for all security systems and integration of sub-systems. Cable shall be provided in accordance with manufacturer specifications for the equipment it is terminating to.

3.2 EXAMINATION

A. Inspect the jobsite and survey the conditions to be encountered during performance of the work. This shall be accomplished prior to starting the work. Failure of Security Systems Contractor to become familiar with the site conditions shall not relieve Security Systems Contractor of responsibility for full completion of the work in accordance with the contract provisions.

B. Verify that all conduit, wires, cables, security equipment are installed and ready for connection and integration with the rest of the system. Reference Division 27 Sections for testing requirements.

C. Examine area to be protected and verify that environmental characteristics will not affect effective communication and interfacing. Report observed problems in writing.

D. Determine that power supplies, conduit, wires, cables, connections, and equipment are ready for installation and interfacing before attempting installation.

E. Check all power and communications cabling for continuity before making connections.

F. Visually inspect each piece of equipment, determine defects, and correct.

G. Make arrangements through LAWA and inspect locations where installation work will be performed. Verify that conditions found are in accordance with drawings and are acceptable for

Security Systems Contractor's installation work. Report any discrepancies in writing to LAWA, stating suggested means of correction. As may be required, inspect existing inside and outside cable plant to determine system runs and interface conditions. Coordinate with LAWA ATBS to establish interfaces.

3.3 INSTALLATION

A. Compliance:
   1. Install the equipment in accordance with the contract documents, all applicable codes and standards and the Manufacturer's written instructions. The installed system shall meet all applicable equipment and performance requirements.

B. Standardization:
   1. Standardize the installation practices and material to provide uniform materials and procedures to the maximum extent possible.

C. Locations:
   1. Locate pull boxes, wire-ways or other items requiring inspection, removal, or replacement conveniently and accessibly with reference to the finished facilities.
   2. Card Readers:
      a. Locate reader on latch side of door. For double doors, locate the reader on the active leaf side.
      b. For walls parallel with the door, mount the card reader within 12” of door or closer if needed to avoid confusion with an adjacent door.
      c. For walls perpendicular to the door and less than 36” from the door, mount the card reader outside of the door swing.
      d. Separate back-to-back card readers by 6” between the two readers to prevent interference between the two.
      e. When two ACAMS doors are side by side, locate the card readers to avoid confusion as to which card reader services which door. This may require exception from one or more of the requirements above.
      f. Card reader mounting heights shall be between 42” and 45” AFF to center of reader with consideration to nearby devices such as fire pull stations, light switches, etc…
      g. A card reader shall be provided and interfaced with the BHS for each bag belt conveyor and its associated security door(s) as indicated in the drawings, and in a manner consistent with LAWA PD airport security plan. The card reader shall be collocated with the bag belt conveyor’s start/stop control. The Security Systems Contractor shall coordinate with the BHS contractor.
   3. Horns:
      a. Alarm Horns shall be installed at a min. height of 3” above the door frame and in a manner consistent with existing alarms horns installed at LAX.
      b. Locate interior door alarm horns on less secure side unless the less secure side unless less secure side is an enclosed vestibule or stairwell.

c. Locate exterior door alarm horns on exterior side.

4. SJB:
   a. SJB shall be mounted in a vertical orientation and be safely accessible using a 10ft. ladder.
   b. SJB door shall have minimum 90 degrees unobstructed door swing.
   c. SJB shall be mounted above accessible ceiling or accessible via ceiling access panel. Where no ceilings are present, mount SJB a minimum of 8ft. AFF.
5. Micro Controllers:
   a. Locate ACAMS micro controllers on wall within telecommunication rooms.
   b. Provide 36” clearance from face of micro controller for service.
   c. Mount micro controller, associated wall mounted power supply, associated gutters on plywood backing as specified Division 27 specifications.

D. Electrical Service:
   1. Installation of electrical service to equipment shall conform to specific UBC Codes and Standards, NFPA 70, and other applicable requirements.

E. Electrical Equipment Inspection:
   1. Provide electrical equipment inspection in accordance with NEMA PB 2.1 Part VII.

F. Installation Requirements:
   1. Install all system components, including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and as shown, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.
   2. Install the security system equipment in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076, and the appropriate installation manual for each equipment type.
   3. All wiring, including low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be installed in rigid galvanized steel conduit conforming to UL 6 (when outdoors), or electric metallic tubing (EMT) when indoors. Minimum conduit size shall be 1-inch, except 3/4 inch from SJB to end device is allowed. All other electrical service work shall be as specified with electrical specifications and drawings that are part of the contract document and as shown. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.
   4. Detailed shop drawings shall be provided as part of the submittal process. The shop drawings shall include, but not be limited to exposed conduit and devices, including

hangars, brackets, back boxes and related equipment. Identify mounting locations of card readers, SJB, horn in relation to the designated door.

5. All equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall meet the requirements of ANSI C62.41. Fuses shall not be used for surge protection.
6. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit.
7. All cables and conductors, except fiber-optics, which serve as communications circuits from the existing access control server to field equipment, and between field equipment, shall have surge protection circuits installed at each end. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two wave-forms:
    a. A 10 microsecond rise time by 1000 microsecond pulse width wave-form with a peak voltage of 1500 volts and a peak current of 60 amperes.
    b. An 8 microsecond rise time by 20 microsecond pulse width wave-form with a peak voltage of 1000 volts and a peak current of 500 amperes.
8. Calibrate all equipment. Make calibration certifications available to LAWA upon request.
9. Inspect each component, determine obvious defects, and correct.
10. All Electrical service work (not low voltage) shall be in accordance with Division 26.
11. All Pathway, wiring and terminations shall be performed in accordance with Division 27, Section 0500 Basic Telecommunications.
12. Perform tests as recommended by manufacturer or as required to ensure the ACAMS equipment is operating properly and meets specified requirements.
13. Correct all deficiencies detected and retest affected components.
14. Record test data, tabulate, and write narrative describing tests, results, deficiencies found, corrective measures, and results of retesting. Certify that the security equipment has been tested and is ready for performance verification testing. Provide test certification and test data to LAWA for approval.
15. Service Loops
    a. Service loops shall be provided for all ACAMS cabling within the IT Rooms. Service loops shall be of sufficient length to facilitate relocating wall mounted ACAMS control panels and power supplies to the telecommunications equipment cabinets without splices. Service loops shall be coiled and contained in appropriately sized pull boxes or gutters.

3.4 IDENTIFICATION AND LABELING

A. All cables and patch cables shall have a permanent label attached at both ends.

B. The Security Systems Contractor shall confirm specific labeling requirements with LAWA ATBS prior to cable installation or termination.

C. All indoor cable and patch cable labels shall be pre-printed using BRADY TLS 2200 printer or equivalent and shall be placed loose on the patch cable near the connector end without heat shrinking labels. Labels shall use a three line format with the origination patch panel and port on the first line, the destination patch panel and port on the second line and the system or other descriptive information on the third line.

D. Marking:
   1. Equipment Name Plates: The following requirements shall apply:

      a. General: Attach a permanent, corrosion-resistant name plate to each equipment component showing the manufacturer's name, address, serial number and equipment rating. Each name plate shall be clearly visible on the exterior of equipment. Components located within equipment enclosures shall also be provided with name plates. SJBs shall be labeled with phenolic plates (black on white lettering) with the following naming format "[door #]-SJB-[micro #]", where the door number is the final door number assigned to the door by LAWA and micro number is assigned by LAWA.
      b. Location and Fastening: Provide nameplates to identify all equipment components. Provide each panel assembly with a name plate on the interior of equipment enclosures, indicating number of equipment and unit of assembly. Fasten name plates securely with slotted stainless steel screws. The use of adhesive for fastening name plates will not be permitted.
   2. Control and Display Labels:
      a. Use: Each control, display and any other item of equipment that must be located, identified, read or manipulated shall be appropriately and clearly labeled to permit rapid and accurate identification of its operating state of position.
      b. Orientation: Orient labels and information thereon horizontally so that they may be read quickly and easily. Vertical orientation shall be used only where space is limited.
      c. Label card readers with LAWA provided naming of devices.
   3. Locations: Locate labels so that there is no confusion as to which item they identify. Labels shall not obscure any other information required by the operator.Controls shall not obscure labels. The location of labels shall be consistent.

E. Use Permanent Room Numbers as indicated on the Room Finish Schedules for construction period identification of rooms and building spaces. All required shop drawings and submittals, including manuals and Project Record Drawings shall identify rooms and spaces using the Permanent Room Numbers. Permanent identification devices including signage, equipment nameplates, and panels shall use the Permanent Room Numbers.

3.5 STARTUP

A. The Security Systems Contractor shall not apply power to the system until after:
   1. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
   2. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   3. System wiring has been tested and verified as correctly connected as indicated.
   4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
   5. Power supplies to be connected to the system and equipment have been verified as the correct voltage, phasing, and frequency as indicated.
   6. Satisfaction of the above requirements shall not relieve the Security Systems Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of Contractor work/equipment.

3.6 QUALITY CONTROL, TESTING AND ACCEPTANCE

A. Test, Commission and Acceptance
   1. Conduct an Installation Test and total Acceptance Test upon completion of equipment installation. Testing shall be coordinated as necessary, to demonstrate that all interfaces have been successfully implemented.
   2. Installation and Acceptance Test Procedures and Reports:
      a. General: Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand-alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.
      b. All ACAMS devices and equipment / systems shall be tested. Test and acceptance reports shall include, but not be limited to:
         1) Card reader controlled doors, including but not limited to:
            a) Valid card read
            b) Invalid card read
            c) Valid request-to-exit
            d) Door forced open
            e) Door held open
            f) Door shunt
            g) Local alarm
         2) Alarm and monitor points

3) ACAMS input and output interfaces
4) ACAMS integration with CCTV cameras

c. Availability Tests: Installation and acceptance testing shall include conducting individual availability tests for each equipment item. Requirements for availability tests are as follows:
   1) Availability shall be determined in accordance with Quality Control procedures, except for the test duration as specified herein.
   2) The availability tests shall consist of the equipment being operated as a complete stand-alone entity with the exception that incomplete interfaces may be simulated. In all other respects, the equipment shall be operated in the mode that would normally prevail.
   3) The duration of each availability test, as a minimum, shall consist of a 5 day period with the availability ratios of 100% being met or exceeded over the total period.

d. System Commissioning:
   1) General: Security Systems Contractor shall be responsible for ensuring that the installation and related interfaces is completed and operational at least thirty (30) days prior to scheduled beneficial occupancy. In the event the installation and related interfaces is not completed and operational by the scheduled beneficial occupancy date, Security Systems Contractor shall establish and submit a security plan to LAWA that complies with Title 49 CFR Part 1542.207and related LAWA security requirements. The security plan shall be submitted to LAWA and TSA for approval. The security plan, revisions, and security measures to be deployed until such time the new security equipment is completed and operational shall be at Security Systems Contractor's expense.
   2) After all installation and acceptance test requirements specified have been complied with, the equipment shall be commissioned. After commissioning has been completed, LAWA will take possession of the equipment and utilize it in accordance with the conditions described in the contract documents.
   3) Prerequisites To System Commissioning:
      a) Outstanding work items that may exist, such as facility interfaces, project record drawings, and/or in-process change orders, shall be documented and submitted to LAWA for review prior to start of equipment commissioning. Documentation of outstanding work items shall take the form of punch lists of critical action items lists that describe the work, the expected completion schedule, and the impact upon operation. Depending upon the nature of the outstanding work item, LAWA may grant a waiver to accomplish partial commissioning of any of the equipment. Completion of waived outstanding work items shall then be assigned to the post-commissioning operations and maintenance.
      b) Preliminary testing of ACAMS devices, including but not limited to

access controlled door devices, control panels and alarm monitor devices, shall be conducted and witnessed by LAWA on a separate Picture Perfect server/workstation platform prior to activation and commissioning of the ACAMS devices on the existing LAWA production Picture Perfect server. The test Picture Perfect platform shall be provided by the Security Systems Contractor.

4) Commissioning Procedure
   a) The commissioning procedure shall be witnessed by LAWA. The commissioning procedure shall be conducted by Security Systems Contractor and shall consist of a detailed inspection, and physical accounting of each equipment item. An operational demonstration shall then be conducted in which the equipment shall function in the normal operational mode, and shall operate completely error-free in terms of hardware and software performance. Occurrence of any equipment failure shall terminate the demonstration. The demonstration shall restart and run for a period of time designated by LAWA after the failure has been corrected. Except for any outstanding work items as previously described, this shall complete the commissioning procedure.
   b) Contractor shall provide 60 days notification for all ACAMS doors which need to be commissioned as part of a change in condition which changes the security perimeter from one location to another (verify with LAWA and Airport Police). Notification shall include a plan drawing identifying the location of new ACAMS doors with scheduled dates for activation. Plan shall include any walls or barricades that will comprise the new perimeter location as well as show the walls, barricades (with dimensions), and/or ACAMS doors which will be removed as part of the change in security condition. In addition to a plan drawing, contractor shall provide a narrative identifying the changes taking place with scheduled dates and any measures that will be taken to establish or maintain airport security (i.e. guards, locks, barricades, etc…)
   c) Contractor shall provide 30 days notification for all ACAMS doors which need to be commissioned as part of a change in condition which does **not** create a change to the security perimeter from one location to another (verify with LAWA and Airport Police). Notification shall include a plan drawing identifying the location of new ACAMS doors with scheduled dates for activation. Plan shall include any new walls or barricades (with dimensions) as well as show any walls, barricades, and/or ACAMS doors which will be removed. In addition to a plan drawing, contractor shall provide a narrative identifying the changes taking place with scheduled dates and any measures that will be taken to establish or maintain airport security (i.e. guards, locks, barricades,

etc…)

3.7 CLEANING

A. Reference Division 27 Sections.

3.8 COMPUTERIZED MAINTENANCE

A. Information regarding all equipment including model, nomenclature, serial number, function, location, recommended preventative maintenance schedule and other pertinent data will be stored in the CMMS database. Security Systems Contractor shall include in their Bid the cost for collecting and inputting this data for all systems and equipment provided by this Contract into this database.

B. Asset tags shall be installed and recorded for all ACAMS micro controllers, workstations, and monitors installed.

3.9 CLOSEOUT ACTIVITIES – FINAL INSPECTION AND ACCEPTANCE

A. Completion of successful installation, final tests and commissioning, receipt of the test reports and as-built documentation including data input into the CMMS and successful performance of the installed equipment / system for a thirty (30) day period will constitute Final Acceptance.

3.10 MAINTENANCE

A. Maintenance Requirements shall be in accordance with the Division 01 - General Requirements.

END OF SECTION 28 13 00

SECTION 28 23 00 – VIDEO MANAGEMENT SYSTEM (VMS) (CCTV Cameras)

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies the minimum requirements for video surveillance camera equipment. The video surveillance systems and equipment specified in this section shall be an extension to the existing NICE video management system (VMS) currently deployed throughout the Los Angeles World Airport (LAWA). Refer to Section 28 23 13 for Video Surveillance Storage and Recording Management System. See LAWA's IT Infrastructure Standards of Practice Volume 1, Chapter 2 for infrastructure requirements.

B. Security Systems Contractor shall include in the Bid all labor, materials, tools, plant, transportation, storage costs, installation, programming, of interfaces configuration, testing, commissioning, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete and operational equipment / systems shown and described in the Specifications.

C. The Security Systems Contractor is responsible for providing and coordinating final equipment arrangements, locations, phased activities and construction methods that minimize disruption to operations and provide complete and operational systems.

D. The standard CCTV cameras to be installed throughout the airport are by Sony Electronics, Inc. These cameras communicate with the central video management system via Internet protocol (IP) Ethernet communication over the Airport multiprotocol label switching (MPLS) data network.

E. The installation of video surveillance cameras and related equipment shall include the use of both fixed and Pan/Tilt/Zoom (PTZ) color cameras.

F. LAWA Access Control and Monitoring System (ACAMS) have a linkage between alarms and video. If this functionality is selected for a location on the drawings then the Security Systems Contractor shall coordinate with LAWA IMTG for ACAMS related configuration and for video and mapping related linkages between these systems and the cameras.

G. Related Documents included in the Specification Requirements.
   1. Division 1 – General Requirements, All Sections (including but not limited to)
      Section 01 11 00 – Summary of Work
      Section 01 25 00 – Substitution Procedure

Section 01 31 00 – Administrative Requirements
Section 01 33 00 – Submittal
Section 01 40 00 – Quality Requirements
Section 01 43 00 – Quality Assurance
Section 01 64 00 – Owner Furnished Products
Section 01 77 13 – Preliminary Closeout Reviews
Section 01 77 16 – Final Closeout Review
Section 01 78 00 – Closeout Submittals

2. Division 14 Conveying Equipment Section:
   Section 13 21 50 – APTA Heavy Duty Transit Type Machine Room-Less Elevators
3. Division 27 Communications (including but not limited to):
   Section 27 05 00 - Basic Telecommunications Requirements
   Section 27 21 00 – Local Area Network
4. Division 28 Electronic Safety and Security
   Section 28 13 00 – Access Control and Monitoring System (ACAMS)
   Section 28 23 13 – Video Surveillance Storage and Recording Management System

1.2 PRICE AND PAYMENT PROCEDURES (NOT USED)

1.3 REFERENCES

A. ABBREVIATIONS AND ACRONYMS

ACAMS	Access Control and Alarm Monitoring System
AFF	Above Floor Finish
ANSI	American National Standard Institute
ASCII	American Standard Code for Information Interchange
AOA	Aircraft Operations Area
ATP	Acceptance Test Plan
AWG	American Wire Gauge
BMS	Balanced Magnetic Switch
CBP	U.S. Customs and Border Protection
CPU	Central Processing Unit
CCTV	Closed Circuit Television
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICEA	Insulated Cable Engineering Association
IDS	Intrusion Detection System
ISA	Instrument Society of America

LAX	IATA Symbol for the Los Angeles International Airport
LCC	Life Cycle Costs
LED	Light Emitting Diode
MHz	Megahertz
MRT	Mean Restoral Time – The mean interval between failure and restoral to operational status; includes MTTR travel time and response time
MTBF	Mean Time Between Failures – The mean interval that is the sum of MTTF and MRT
MTTF	Mean Time To Failure – The mean interval between placing a specific piece of equipment or system in service and its operational failure
MTTR	Mean Time To Repair – The mean interval during which the repair process is successfully performed
O&M	Operations and Maintenance
PoE	Power Over Ethernet
PTZ	Pan, Tilt, Zoom
QC	Quality Control
REX	Request to Exit
RFI	Radio Frequency Interference
SCC	Security Control Center
SCP	Security Control Panel
SJB	Security Junction Box
TBIT	Tom Bradley International Terminal
TSA	Transportation Security Administration
UBC	Uniform Building Code
UPS	Uninterrupted Power Supply
VDT	Video Display Terminal
VMS	Video Management System

B. CODES, STANDARDS, REGULATIONS AND REFERENCES

1. Comply with all applicable codes standards, regulations, and the most current issue of the following publications, including all amendments thereto of the issue that is current on the date of contract award. Applicable requirements of the following publications shall apply to the work under this specification as if fully written herein. Where conflicts exist between the Technical Specification and the referenced publications, local codes shall govern.
   a. American Standards Association (ASA)
   b. Institute of Electrical and Electronic Engineers (IEEE)
   c. National Fire Protection Association (NFPA)
   d. National Electrical Manufacturers Association (NEMA)
   e. Underwriters Laboratories, Inc. (UL)

f. Federal, State and Municipal Building Codes and all other Authorities having jurisdiction
g. National Electrical Code (NEC)
h. Insulated Power Cable Engineers Association Specification (IPCEA)
i. American Society for Testing Materials Specification (ASTM)
j. Occupational Safety and Health Administration (OSHA)
k. National Electrical Safety Code (NESC)
l. Refer to Exhibit 1 for Public Safety Systems

2. Special attention shall be made to the following specific codes, standards, and publications where applicable:
   a. ANSI B20.1 Conveyor Safety
   b. ASTM F.1468-93 Standard Practice For Evaluation
   c. Customs and Border Protection Airport Technical Design Standards for Passenger Processing Facilities, August 2006
   d. EIA 232-D Interface between Data Terminal Equipment and Data Circuit- Termination Equipment Serial Binary Data
   e. EIA RS-310-C Racks, Panel, and Associated Equipment
   f. 49 CFR 1520 Protection of Sensitive Security Information
   g. 49 CFR 1540 Civil Aviation Security General Requirements
   h. 49 CFR 1542 Airport Security
   i. 49 CFR 1544 Aircraft Operator Security
   j. 49 CFR 1546 Foreign Air Carrier Security
   k. 49 CFR 1548 Indirect Air Carrier Security. NFPA 72-D - Installations, Maintenance and Use of Proprietary Protective Signaling Systems
   l. NFPA 75 Protection of Electronic Computer Data Processing Equipment
   m. NFPA 77 Static Electricity
   n. NFPA 78 Lightning Protection Code
   o. Transportation Security Administration Recommended Security Guidelines for Airport Planning, Design and Construction, June 15, 2006
   p. UL 294 Access Control System Units
   q. UL 611 Central Station Burglar Alarm Units and Systems
   r. UL 634 Intrusion Detection Units
   s. UL 681 Installation and Classification of Mercantile and Bank Burglar Alarm Units
   t. UL 796 Electrical Printed-Wiring Boards
   u. UL 1076 Proprietary Burglar Alarm Units and Systems
   v. UL 1950 Information Technology Equipment, including Electrical Business Equipment References to codes and standards called for in the Specifications refer to the latest edition, amendments, and revisions to the codes and standards in effect on the date of these Specifications.

3. In addition the Security Systems Contractor shall comply with all applicable Security. Directives as issued by the TSA and CBP as appropriate. Verify latest standard applications with LAWA IT.

1.4 ADMINISTRATIVE REQUIREMENTS

A. SSI - Protection of Contract Documents. All CCTV security system documents shall be considered Sensitive Security Information (SSI) and shall be handled as defined in 49 CFR, Part 1520.

1.5 SUBMITTALS

A. Comply with all LAWA submittal procedures given in other Sections. The following is in addition to or complementary to any requirements given elsewhere.

B. Action Submittals:
   1. Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities that the Bidder proposes to use in this project.
   2. Submit Manufacturers' Data:
      a. Cameras
      b. Power supplies
      c. Patch panels
      d. Mounting Hardware
      e. Cables
      f. Conduit
      g. Fiber Media Converters
   3. Product submittals shall be provided and approved prior to the commencement of installation activities of the VMS.
   4. Submit all proposed labeling materials and nomenclature for approval.
   5. Shop Drawings - Provide shop drawings that are applicable and pertain to CCTV system provisions
   6. Installation drawings - See IT Infrastructure Standards of Practice Volume 3, Chapter 1:
      a. Floor Plans
      b. Riser Diagrams
      c. Block diagrams
      d. Camera Details
      e. Point Schedules
      f. Seismic Anchors
      g. Access Panels
      h. Camera Poles

i. Connection of all new CCTV cameras with their associated junction boxes including block diagrams and wiring diagrams
j. Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding
k. Details of surge protection device installation
l. Equipment mounting details
m. Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems

7. Coordination Drawings
   a. Indicate locations where space is limited for installation and access.
   b. Submit floor plans, elevations, and details indicating major equipment and end device locations. Indicate all floor, wall and ceiling penetrations.
   c. Telecommunications Rooms: At least 30 days before beginning installation in each room, the Contractor shall furnish a telecommunications room drawing showing the initial layout design and plans for the proposed mounting locations of VMS equipment, cable routings, and termination locations for all cable and equipment.
8. Theory of Operations
   a. Description, analyses, and calculations used in selecting equipment. Describe and show how equipment will operate as a system.
9. Test and Acceptance Plans
   a. Submit the following for review and approval prior to the performance of any testing:
      1) Performance and Functionality Verification Test Plan (including interfaces).
      2) Commissioning Test Plan.

C. Maintenance Manuals
   1. Operation and Maintenance Manuals: Manuals including maintenance instructions and other descriptive material as received from the manufacturers shall be provided that will enable LAWA personnel to maintain equipment and test equipment. This documentation shall include descriptions, specifications, theory of operation (where applicable), layout drawings (showing component types and positions), and back-panel and assembly wiring diagrams. In addition to hardcopies, electronic copies, in a LAWA approved format, shall be provided.
   2. Preventative Maintenance: Instructions shall be provided for preventive maintenance procedures that include examinations, tests, adjustments, and periodic cleaning. The manuals shall provide guidelines for isolating the causes of hardware malfunctions and for localizing faults. The manuals shall provide thorough instructions on the use of any specialized test equipment needed for hardware maintenance. In addition to hardcopies, electronic copies, in a LAWA approved format, shall be provided.
   3. Maintenance Schedule: A recommended schedule for preventative, routine, and emergency maintenance indicating frequency and required response time. Preventa-

tive maintenance services during peak activity periods shall be avoided. The Security Systems Contractor shall coordinate with LAWA to define peak activity periods. The Security Systems Contractor shall submit a finalized preventative maintenance schedule for LAWA IT approval.

D. Closeout Submittals
   1. Project Record Documents required include:
      a. Marked-up copies of Contract Drawings
      b. Marked-up copies of Shop Drawings
      c. Newly prepared Drawings
      d. Marked-up copies of Specifications, Addenda and Change Orders e. Marked-up Project Data submittals
      f. Record Samples
      g. Field records for variable and concealed conditions
      h. Record information on Work that is recorded only schematically
      i. As-built drawings
      j. Record drawings
      k. Electronic as-built and LAWA LUSAD requirements
   2. As-built drawings:
      See IT Infrastructure Standards of Practice Volume 3, Chapter 1.
   3. Post changes and modifications to the Documents as they occur. Drawings will be updated electronically and submitted to LAWA in accordance with the schedule provided for this by LAWA. Do not wait until the end of the Project. LAWA IT will periodically review Project Record Documents to assure compliance with this requirement.
   4. At every quarter, submit Project Record Documents for LAWA's records.
   5. Upon completion of the as built drawings, LAWA IT / Design Engineer will review the as built work with the Security Systems Contractor.
   6. If the as built work is not complete, the Security Systems Contractor will be so advised and shall complete the work as required.
   7. Project Record Drawings shall also be submitted in electronic format. Electronic drawing format shall be AutoCAD® Release 2014 or later. LAWA shall have the right and capability to manipulate all electronic file drawings and documentation.

1.6 QUALITY ASSURANCE

A. Contractor Certification: The Security Systems Contractor or approved subcontractor shall be NICE, Sony, and Axis certified security system installer for the specific type of VMS field equipment being installed. The Security Systems Contractor shall offer proof of certification by submitting a copy of certification with the Bid.

B. The Security Systems Contractor's Quality Assurance Inspector shall conduct a visual inspection of all installations to verify that the installations are in accordance with LAWA's and manufacturer's specifications. Records of the inspections signed and dated by the Quality Assurance Inspector shall be provided to LAWA and the Design Engineer.

C. LAWA IT and the Design Engineer shall be notified by the Security Systems Contractor of any inspection(s) and LAWA IT and the Design Engineer may elect to participate in any inspection(s). Relevant QA information shall be input into LAWA CMMS (refer to Paragraph 3.09).

1.7 SUBSTITUTION OF EQUIPMENT

A. Approval of alternate or substitute equipment or material in no way voids specification requirements.

B. Under no circumstances shall LAWA IT, or the Design Engineer be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Security Systems Contractor submits to LAWA IT all evidence to support the contention that the item proposed for substitution is equal to the specified item. LAWA's decision as to the equality of substitution shall be final and without further recourse.

C. In the event that LAWA IT and/or the Design Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Security Systems Contractor, or changes by the Security Systems Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if LAWA IT and the Design Engineer are required to examine and evaluate any changes proposed by the Security Systems Contractor for the convenience of the Security Systems Contractor, then the Design Engineer's expenses in connection with such additional services shall be paid by the Security Systems Contractor and may be deducted from any moneys owed to the Security Systems Contractor.

D. If the deviation is not approved by LAWA IT it remains the Security Systems Contractor's responsibility to provide what is required in the Contract Documents

1.8 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.9 FIELD / SITE CONDITIONS

A. General

1. The Security Systems Contractor shall inspect the jobsite and survey the conditions to be encountered during performance of the work. This shall be accomplished prior to starting the work. Failure of the Security Systems Contractor to become familiar with the site conditions shall not relieve Security Systems Contractor of responsibility for full completion of the work in accordance with the contract provisions.
2. The Security Systems Contractor shall employ the maintenance contractor with whom LAWA has a maintenance contract to perform the disconnection, connection, re- connection or configuration of VMS or other existing systems that might be affected by this Work.
3. Programming and configuration of the central VMS system shall be by LAWA. This scope of work shall include CCTV programming and configuration and creation of maps of the areas where new cameras are installed with all the camera icons and links placed on the maps.
4. The Security Systems Contractor shall provide all new UTP cable, optical fiber cable, innerduct, racks, cabinets, patch panels, cover plates, outlet boxes, related hardware, distribution, termination equipment, and any other appurtenances and equipment associated specifically with the VMS.
5. The Security Systems Contractor shall obtain the approval of LAWA IT for the final layout of VMS equipment to be installed in telecommunications rooms prior to the installation of any materials or equipment. Shop drawings showing proposed room layouts shall be submitted for approval before beginning installation
6. The Security Systems Contractor shall furnish an adequate supply of technicians and materials at all times, and shall perform the work in the most appropriate, expeditious, and economical manner consistent with the interests of LAWA.
7. The Security Systems Contractor shall be responsible to LAWA for the acts and omissions of its employees, subcontractors and their agents and employees, and other persons performing any of the work under a contract with the Security Systems Contractor.
8. The Security Systems Contractor shall not unreasonably encumber the site with any material or equipment. Operations shall be confined to areas permitted by law, permits, and contract documents.
9. The Security Systems Contractor shall have an experienced Project Manager on site at all times when work is in progress on any project. The individual who represents the Security Systems Contractor shall be the single point of contact between the Security Systems Contractor and LAWA, and shall be responsible for the entire project. This representative shall be able to communicate with LAWA or designated representative whenever requested throughout the life of the project.
10. While working in the facility, the Security Systems Contractor shall not block any entrances, egresses, or other passageways that are necessary for normal, safe operation. It should be noted that the Security Systems Contractor is responsible to provide any lifts, hand trucks, etc. that it will need to transport its materials and equipment to and throughout the site.

11. The Security Systems Contractor shall protect all buildings, walls, floors, and property from damage resulting from the installation. Any and all damage to property shall be repaired by the Security Systems Contractor at its expense. If the Security Systems Contractor enters an area that has damage (not caused by the Security Systems Contractor), the Security Systems Contractor shall immediately bring this to the attention of LAWA IT so the area can be appropriately noted.
12. Following each day's work, the Security Systems Contractor shall clean up the areas in which it has been working and dump all trash in the appropriate designated areas.
13. Deliver products to site under provisions of Division 01 - General Requirements.
14. Store and protect products under provisions of Division 01 - General Requirements.
15. Coordinate with LAWA IT, locations and requirements for equipment and product storage.

B. Site Conditions
   1. Environmental Requirements:
      a. Comply with all manufacturers' instructions and recommendations concerning environmental factors.
   2. Protection:
      a. Fragile Items:
         1) Handle any fragile items with care using protective coverings to avoid damage to sensitive instrument relays, and other devices, and to avoid contamination by dirt and debris.
      b. Weather and Construction Protection:
         1) During installation, provide adequate temporary dust and weather protection for all equipment. Reinstall covers each time any adjustments are made on the equipment.
   3. Existing Conditions:
      a. Security Systems Contractor shall inspect the site and identify all existing security provisions and conditions. This includes identifying any communications and/or ancillary equipment currently existing and/or in use. It shall be the Security Systems Contractor's responsibility to identify all existing provisions to be terminated to new, existing, or relocated systems.
      b. All provisions shall be identified by the Security Systems Contractor and documented. Individual provision data such as provision type make and model, and serial number shall be obtained by the Security Systems Contractor at the time of demolition and documented in the quality control inventory.

1.10 EQUIPMENT CERTIFICATION

A. Provide materials that meet the following minimum requirements:

1. Electrical equipment and systems shall meet UL Standards (or equivalent) and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
2. Equipment shall meet all applicable FCC Regulations.
3. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material is not acceptable and will be rejected.
4. The listing of a manufacturer as "acceptable" does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications.
5. Where applicable, all materials and equipment shall bear the label and listing of Underwriters Laboratory or Factory Mutual. Application and installation of all equipment and materials shall be in accordance with such labeling and listing.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for the final assembled unit.
   1. All components of an assembled unit need not be products of the same manufacturer.
   2. Constituent parts, which are alike, shall be from a single manufacturer.
   3. Components shall be compatible with each other and with the total assembly for intended service.

C. Components of equipment shall bear the manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment that serve the same function must be the same make and model.

E. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

F. Maximum standardization of components shall be provided to reduce spare part requirements.

1.11 WARRANTY AND MAINTENANCE

A. Warranty and Maintenance Requirements shall be in accordance with the Division 01 - General Requirements.

B. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of three (3) years from Final Acceptance.
   1. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.
   2. The Security Systems Contractor shall be responsible for and make good, without expense to LAWA, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.

C. Submit a copy of all manufacturer warranty information.

D. Spare Parts:
   1. The Security Systems Contractor shall provide to LAWA an inventory of security equipment spare parts, materials, consumables, and any other system item in order to meet the specified warranty maintenance requirements and keep the security equipment in a continuous operational mode during the warranty period. The quantity of spare parts shall equal no less than 10% of the items provided and installed under this contract.

PART 2 - PRODUCTS

2.1 GENERAL

A. Unless otherwise specified, products for the VMS shall be consistent with and compatible with the established standards for LAX VMS.

B. Latest technology available: Products shall be provided as specified. In the event the manufacturer(s) of specified products and materials have upgraded or replaced the specified products and materials with newer or improved technologies at the time of purchase, the newer or improved products or materials shall be provided unless they are incompatible with the rest of the VMS systems, or so directed by LAWA (submit Request For Information if in doubt). Latest technology products and materials shall be operationally and functionally equivalent or superior to the specified products and materials. Products and materials shall be purchased by the Security Systems Contractor in a timely manner to meet construction schedules, but shall not be purchased so far advanced of the date(s) of installation that they become technologically obsolete or replaced with newer technologies.

C. All cameras shall be IP camera technology and connect to LAWA provided communication IP switches as indicated in the specifications and drawings. The Security Systems Contractor shall be required to coordinate with LAWA. This includes, but is not limited to, MPLS assignments.

D. Where possible, all CCTV cameras shall be capable of being powered by power over Ethernet (PoE) technology. PoE power for cameras shall originate from the network switches.

E. All cameras shall use unshielded twisted pair (UTP) cable for signal transport. Camera video signals and power shall be via the same cable where possible. Cameras that require greater power than can be provided by the standard 802.3af PoE provided by LAWA network switches, shall be powered by centralized rack mounted high power PoE power injectors or centralized rack mounted CCTV power supplies where possible. In the event that a specific camera cannot be powered by PoE then a separate design proposal shall be submitted to LAWA IT for approval prior to installation.

F. If a CCTV camera is at a location which cannot conveniently be supported by an IP connection over Category 6A UTP cable, then fiber is an acceptable alternative communication mechanism. However, each such installation requires proper approval of approach and products by LAWA IT before installation. A minimum of a 12-strand singlemode fiber cable shall be provided to each camera (Corning MIC® Cable Plenum rated (OS2) E88-31131-29 / Riser rated (OS2) E81-31131-24 or approved equal. (For additional fiber counts use: LAN-89-EN, LAN-92-EN specifications for Riser and LAN-88-EN, LAN-91-EN for Plenum).

G. Category 6A cables, 23 AWG, shall be installed from each camera back to the Telecom Room. Provide a surface mount RJ-45 connector in a junction box near the camera to connect the network cable from the Telecom Room and a Category 6A jumper cable between the connector and the camera.

H. All Video related equipment requiring building power shall be connected to building UPS circuits.

I. Programming, configuration, and integration of the cameras into the existing VMS System shall be by LAWA. The installing Security Systems Contractor shall coordinate with LAWA IMTG for CCTV programming, configuration and integration in VMS of CCTV cameras, duress buttons and audio devices at no additional cost to LAWA.

J. Included in the programming and configuration shall be the assignments of the cameras to stakeholder user groups. The Security Systems Contractor shall coordinate with LAWA for the purpose of finalizing user groups, and shall include at no additional cost to the Owner up to four (4) camera assignments to site and user groups per camera. Contractor shall configure the camera to display the LAWA assigned camera VMS name in the camera view. All cameras will be configured using the LAWA assigned camera name per the LAWA naming convention.

K. Security Systems Contractor shall provide drawing files that show the camera locations to LAWA to import into the VMS. Security Systems Contractor shall provide Auto-CAD drawing files and remove all layers except the basic floor plan. Floor plans shall be such that the stakeholder can view an entire section for each level (i.e. north concourse - one drawing per level, south concourse - one drawing per level). Security Systems Contractor to work with LAWA to identify the most suitable amount of area per concourse/level that can be displayed on the monitor. Security Systems Contractor shall coordinate with LAWA IMTG to ensure that drawings imported provide stakeholders the ability to select cameras and view live images from the imported drawings/floor plan and that the floor plans reflect the areas effectively.

L. All equipment shall be installed in accordance with this specification. Provide and install any and all equipment necessary to provide a complete and operating system, and meet the full intent of this design and other specifications within these construction documents. Any equipment such as consumables, terminators, or any other materials or equipment needed to install this system shall be considered ancillary and be provided as a part of this project. Security Systems Contractor shall provide cable for all security systems and integration of sub-systems. Cable shall be provided in accordance with manufacturer specifications for the equipment it is terminating to.

2.2 VMS CAMERA EQUIPMENT

A. Camera Compatibility:
   1. Cameras shall be compatible with LAWA's VMS System

B. PTZ Dome Cameras, Interior:
   1. Mounting options shall include:
      a. Ceiling Surface Mount
      b. Ceiling Flush Mount
      c. Pendant Mount
      d. Wall / Column Mount
   2. Digital Video Compression methods supported shall include:
      a. H.264
      b. Motion JPEG
   3. Video Resolutions shall include:
      a. 4CIF
      b. 2CIF
      c. CIF
      d. QCIF

4. Frame Rate shall be capable of no less than thirty (30) images per second for all required. Digital Video Compression methods and all required Video Resolutions
5. Video Streams: A minimum of three (3) simultaneous video streams shall be supported
6. Preset Positions: A minimum of one-hundred (100) PTZ presets shall be supported
7. Pan Movement:
   a. 360° continuous pan rotation.
   b. 0.03° to 300° per second, minimum
8. Tilt Movement:
   a. 180°, minimum
   b. 0.03° to 300° per second, minimum
   c. Image shall auto-flip 180° at the bottom of the tilt travel
9. Zoom Capability: 4.7 ~ 84.6mm 18x optical zoom, minimum with 12x digital zoom minimum
10. Iris Control: Automatic with manual override
11. Auto Focus shall be supported
12. Dome: Dome color shall be "smoked" and shall induce a maximum light attenuation of 0.5 f-stop light loss
13. Sony SNC-WR600, or approved equal

C. PTZ Dome Cameras, Exterior:
1. Mounting options shall include:
   a. Wall / Column Mount
   b. Parapet Mount
2. Day / Night Functionality: Automatic Day / Night functionality shall be supported.
3. Minimum Illumination
   a. Color: 0.5 lux at 30 IRE
   b. Black and White: 0.008 lux at 30 IRE
4. Digital Video Compression methods supported shall include:
   a. H.264
   b. Motion JPEG
5. Video Resolutions shall include:
   a. 4CIF
   b. 2CIF
   c. CIF
   d. QCIF
6. Frame Rate shall be capable of no less than thirty (30) images per second for all required Digital Video Compression methods and all required Video Resolutions.
7. Video Streams: A minimum of three (3) simultaneous video streams shall be supported.
8. Preset Positions: A minimum of one-hundred (100) PTZ presets shall be supported, with a minimum accuracy of 0.5°.
9. Pan Movement:

a. 360° continuous pan rotation.
b. 0.05° to 450° per second, minimum

10. Tilt Movement:
    a. 220°, minimum
    b. 0.05° to 450° per second, minimum
    c. Image shall auto-flip 180° at the bottom of the tilt travel
11. Zoom Capability: 3.4 ~ 119mm 35x optical zoom, minimum with 12x digital zoom minimum:
    a. Iris Control: Automatic with manual override
    b. Auto Focus shall be supported
    c. Electronic Image Stabilization shall be supported
12. Dome: Dome color shall be "smoked" and shall induce a maximum light attenuation of 0.5 f-stop light loss.
13. Environmental Housing: Environmental Housing shall be suited for outdoor weather exposed conditions and shall include sunshield, fan and heater.
14. Typical applications: Sony SNC-WR602C, or approved equal. Roof top cameras, cameras overseeing the Central Transportation Area (CTA), cameras viewing the Airplane Operations Area (AOA), or cameras requiring long distance viewing: Sony SNC-WR632, and Sony SNC-WR632C for outdoor long distance, or approved equal.

D. Fixed CCTV Cameras, Interior:
1. Mounting options shall include:
    a. Ceiling Surface Mount
    b. Ceiling Flush Mount
    c. Wall Surface
    d. Wall / Column Mount
2. Digital Video Compression methods supported shall include:
    a. H.264
    b. Motion JPEG
3. Video Resolutions shall include:
    a. 4CIF
    b. 2CIF
    c. CIF
    d. QCIF
4. Frame Rate shall be capable of no less than thirty (30) images per second for all required Digital Video Compression methods and all required Video Resolutions.
5. Video Streams: A minimum of three (3) simultaneous video streams shall be supported.
6. Lens:
    a. Iris Control: Automatic with manual override
    b. Focus: Manual

c. Focal Length: 2.8 ~ 10.0 mm, minimum

7. Dome: Dome color shall be "smoked" and shall induce a maximum light attenuation of 0.5 f-stop light loss.
8. Sony model SNC-VM601, or approved equal.

E. Fixed CCTV Cameras, Exterior:

1. Mounting options shall include:
   a. Ceiling Surface Mount
   b. Ceiling Flush Mount
   c. Wall Surface
   d. Wall / Column Mount
2. Day / Night Functionality: Automatic Day / Night functionality shall be supported. a. Minimum Illumination
   1) 6mm:
      a) Color: 0.2 lux
      b) Black and White: 0.04 lux
   2) 12mm:
      a) Color: 0.3 lux
      b) Black and White: 0.05 lux
3. Digital Video Compression methods supported shall include:
   a. H.264
   b. Motion JPEG
4. Video Resolutions shall include:
   a. 4CIF
   b. 2CIF
   c. CIF
   d. QCIF
5. Frame Rate shall be capable of no less than thirty (30) images per second for all required. Digital Video Compression methods and all required Video Resolutions.
6. Video Streams: A minimum of three (3) simultaneous video streams shall be supported.
7. Lens:
   a. Iris Control: Automatic with manual override
   b. Focus: Manual
8. Focal Length: Coordinate focal length selection with the Owner or Owner's representative prior to installation:
   a. Close View: 2.5 ~ 6.0 mm, minimum
   b. Long View: 3.3 ~ 12.0 mm, minimum
9. Dome: Dome color shall be "smoked" and shall induce a maximum light attenuation of 0.5 f-stop light loss.
10. Environmental Housing: Environmental Housing shall be suited for outdoor weather exposed conditions.

11. Sony SNC-VM602R, or approved equal.
11. Sony SNC-VM601 for fixed indoor wide angle, or approved equal.

F. Elevator Cameras:
1. Mounting: Elevator cameras shall be ceiling flush mounted mini domes or corner mounted housings suitable for elevator applications and shall be mounted in the rear corner of the elevator cab to provide a full view of the interior of the elevator cab.
   a. Sony model SNC-VM601 with ceiling flush mount housing Sony YT-ICB600, or approved equal
2. Day / Night Functionality: Automatic Day / Night functionality shall be supported. a. Minimum Illumination
   1) Color: 0.4 lux at 50 IRE
   2) Black and White: 0.04 lux at 50 IRE
3. Digital Video Compression methods supported shall include:
   a. H.264
   b. JPEG
   c. MPEG
4. Video Resolutions shall include:
   a. 4CIF
   b. CIF
   c. CIF
   d. QCIF
5. Frame Rate shall be capable of no less than thirty (30) images per second for JPEG and MPEG, and no less than ten (10) images per second for H.264.
6. Video Streams: A minimum of three (3) simultaneous video streams shall be supported.
7. Lens:
   a. Iris Control: Automatic with manual override
   b. Focus: Manual
   c. Focal Length: Vari-focal, 2.9 to 8.0 mm, with horizontal viewing angles 94° to 34°
8. General purpose input and output ports:
   a. Inputs: Two (2) alarm input shall be provided, minimum
   b. Outputs: Two (2) auxiliary relay output shall be provided, minimum
9. Sony model SNC-VM601 (SNC-SC50N for corner mount applications), or approved equal.

G. Camera Power Supplies:
1. Exterior Environmental PTZ Dome Camera Power Supply:

a. Exterior Environmental PTZ Dome Camera Power Supply shall be fully compatible with, and fully support the power requirements of the Exterior PTZ Dome Cameras with environmental heater and blower.
b. Power supplies for Exterior Environmental PTZ Dome Cameras may be installed adjacent to, or in close proximity to the camera(s) and may be exempt from the requirement of centralized rack mounted power supplies, but only after specific case by case approval by LAWA.
c. The Security Systems Contractor shall coordinate with LAWA Electrical for the provisions of electrical power for Exterior Environmental PTZ Dome Cameras installed adjacent to, or in close proximity to the camera(s).

2. 802.3at PoE Power Injector: For cameras requiring 802.3at PoE power, provide and install rack mounted power injectors in the Security Rack(s) as required.
3. Provide with port configurations to support required cameras plus 25% spare capacity, with a minimum of 12 (twelve) ports per unit.
4. Shall provide 72 watts per port over four pairs.
5. PoE 802.3af backwards compatible.
6. Microsemi PowerDsine model PD-9500G, or approved equal.

H. Wire and Cable
1. Low voltage wire and cable shall be provided and installed as required.
2. Wire and cable shall be selected, sized and used as appropriate for the device application in accordance with the device manufacturer's specifications, voltage and load, and distance of the wire/cable run.
3. Wire and cable runs shall be "home run".
4. Mid run splices shall not be permitted.
5. Wire and cable shall be Belden, West Penn, Contractors Wire and Cable, or approved equal.

P. CCTV Workstations as required for TSA, CBP, LAWA OPS, Airport Police, and LAWA IT
1. Provide and install CCTV workstations, including but not limited to; computers, monitors, printers, operating system, and software licenses for fully functional VMS workstations.
2. Contractor to confirm latest acceptable models with LAWA IT. The approved model will meet or exceed the following specifications:
a) HP Z230 SFF Workstation, IntelCore i7-37703 48MHT4CGT2CPU, 12GB DDR3-1600 nECC 2x4GB+2x2GB RAM, 500GB 7200 RPM SATA 6G 1st HDD, Two NVIDIA NVS 510 2Gb GFX for Quad Monitor Support, 16X SuperMulti DVDRW SATA 1st ODD, Gigabit NIC, Windows 7 Professional 64bit OS
3. Displays for operator workstations shall be two (2) each 24inch LCD displays.
a) Obtain latest model numbers from LAWA.

4. Large screen display sizes and applications shall comply with the latest model numbers from LAWA.
5. Accessories:
   a) HP Thin USB Powered Speakers BFR-PVC Free
   b) Axis T8311 Joystick with USB Cable
   c) Printer shall be HP laser jet type CP4000 series, configured with the maximum amount of memory and network connectivity.

Q. Software Licenses: Provide all software licenses required for a fully functional system as specified and shown in the drawings, including but not limited to:
   1. Licenses needed to add the new CCTV cameras to the existing LAWA VMS.
   2. Operating system license(s).

2.3 MOUNTING HARDWARE

A. Wherever possible use mounting hardware from the camera manufacturer. Review each mounting arrangement with LAWA IT before procurement. If available, arrange for verification of CCTV camera mounting arrangement and final locations utilizing 3D modeling of the new condition.

2.4 MATERIALS

A. Color and Finish Selection:
   1. In all public areas and in all other areas visible from public areas or from the exterior of the building, colors and finishes shall match the custom color and finish samples on file with the Owner. In all other areas, applicable colors and finishes shall be selected by the Owner from the manufacturer's standard color and finish schedule. For such areas, submit manufacturer's standard color and finish schedule(s).

2.5 UPS

A. All equipment will be powered by a UPS with a capability to support operations for at least four (4) hours after supply power loss. All power will be obtained from emergency power sources.

2.6 FIRESTOPPING MATERIALS

A. Fire stopping for openings through fire-rated and smoke-rated walls and floor assemblies shall be listed or classified by an approved independent testing laboratory for

"Through- Penetration Fire Stop Systems. "The system shall meet the requirements of "Fire Tests of Through-Penetration Fire Stops" designated ASTM E814.

B. Inside of all conduits, the fire stop system shall consist of dielectric, water resistant, non- hardening, permanently pliable/re-enterable putty along with the appropriate damming or backer materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide and install and make fully operational all components required for a fully functional system.

B. System installation and construction methods shall conform to LAWA requirements, requirements of the State of California and all applicable building codes.

C. Security Systems Contractor shall install equipment to meet Seismic Zone 4 requirements of the State of California and as stated herein. Where undefined by codes and standards, Security Systems Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.

D. All equipment locations shall be coordinated with other trades and existing conditions. Coordinate work with other trades and existing conditions to verify exact routing of all cable tray, conduit, etc. before installation. Coordinate with all the Telecommunications, Mechanical, Baggage Handling and Electrical Drawings. Verify with LAWA IT and the Design Engineer the exact location and mounting height of all equipment in finished areas, such as equipment racks and telecommunications devices.

E. The Security Systems Contractor shall use existing conduit and raceway where possible and practicable. All work shall be concealed above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, LAWA IT shall be notified before starting that part of the work. In areas with no ceilings, install only after LAWA IT reviews and comments on arrangement and appearance.

F. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. There will be no priority schedule for trades. If, after installation

of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the material or equipment supplied or proposed that may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of LAWA IT and approval received before such alterations are made.

G. Provide easy, safe, and code mandated clearances at equipment racks and enclosures, and other equipment requiring maintenance and operation. All TR cabinets and racks shall be mounted a minimum of 36-inches from the wall or other cabinets, equipment or power panels.

H. Where required, the Security Systems Contractor shall be responsible for cutting, patching, coring and associated work for the system at no additional cost to the Owner. Cut and drill from both sides of walls to eliminate splaying. Patch adjacent existing work disturbed by installation of new work. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

I. All conduit and sleeve openings used by the Security Systems Contractor shall be waterproofed or fireproofed in compliance with State and Local Building and Fire Codes. Strict adherence to National, State, and Local Fire Codes, particularly fire stopping will be required.

J. The Security Systems Contractor shall patch all openings remaining around and inside all conduit, sleeves and cable penetrations devices to maintain the integrity of any fire rated wall, ceiling, floor, etc. The fire stop system shall consist of a dielectric, water resistant, non- hardening, permanently pliable/re-enterable putty along with the appropriate damming materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

K. All building conduits and sleeves installed and/or used under these Specifications shall be fire stopped, or re-fire stopped, upon cable placement through such passageways.

L. Fire stopping for Openings through Fire and Smoke Rated Wall and Floor Assemblies:
   1. Provide materials and products listed. The system shall meet the requirements of "Fire Tests of Through-Penetration Fire Stops" designated ASTM E814. To be used inside all conduits and sleeves. Caulk on exterior of conduit penetration.
   2. Provide fire stop system seals at all locations where conduit, fiber, cable trays, cables/wires, and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire stop seal between sleeve and wall for drywall construction.

3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire stop system. The installation shall provide an air and water-tight seal.
4. The methods used shall incorporate qualities that permit the easy removal or addition of conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating. Typical rating:
   a. Floors – three (3) hours
   b. Corridor walls – two (2) hours
   c. Offices – three-quarters (0.75) hour
   d. Smoke partitions – three-quarters (0.75) – one (1) hour

M. Provide fire stop pillows for existing cable tray penetrations through firewalls.

N. Manufacturer's recommended installation standards must be closely followed (i.e. minimum depth of material, use of ceramic fiber and installation procedures).

3.2 EXAMINATION

A. Inspect the jobsite and survey the conditions to be encountered during performance of the work. Failure of Security Systems Contractor to become familiar with the site conditions shall not relieve Security Systems Contractor of responsibility for full completion of the work in accordance with the contract provisions.

B. Verify that all conduit, wires, cables, security equipment are installed and ready for connection and integration with the rest of the system.

C. Examine area to be protected and verify that environmental characteristics will not affect effective communication and interfacing. Report observed problems in writing.

D. Determine that power supplies, conduit, wires, cables, connections, and equipment are ready for installation and interfacing before attempting installation.

E. Check all power and communications cabling for continuity before making connections.

F. Visually inspect each piece of equipment, determine defects, and correct.

G. Inspect locations where installation work will be performed. Verify that conditions found are in accordance with drawings and are acceptable for Security Systems Contractor's installation work. Report any discrepancies in writing to LAWA IT stating suggested means of correction. As may be required, inspect existing inside and outside cable plant to determine system runs and interface conditions. Coordinate with LAWA IT to establish interfaces.

3.3 PREPARATION (NOT USED)

3.4 INSTALLATION

A. Compliance:
   1. Install the equipment in accordance with the contract documents, all applicable codes and standards and the Manufacturer's written instructions. The installed system shall meet all applicable equipment and performance requirements.

B. Standardization:
   1. Standardize the installation practices and material to provide uniform materials and procedures to the maximum extent possible.
   2. Locations:
      a. Locate pull boxes, wire-ways or other items requiring inspection, removal, or replacement conveniently and accessibly with reference to the finished facilities.
   3. Electrical Service:
      a. Installation of electrical service to equipment shall conform to specific UBC Codes and Standards, NFPA 70, and other applicable requirements.
      b. Where possible for ceiling mounted and wall mounted CCTV install a suitable sized junction box and feed the CCTV camera via a three foot metallic flexible conduit to the mounting location. This is to ease subsequent camera repositioning. Review each mounting arrangement with LAWA IT before installation.
   4. Electrical Equipment Inspection:
      a. Provide electrical equipment inspection in accordance with NEMA PB 2.1 Part VII.
   5. Installation Requirements:
      a. Install all system components, including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and as shown, and shall furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified and shown. Control signal, communications, and data transmission line grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

b. Install the security system equipment in accordance with the standards for safety, NFPA 70, UL 681, UL 1037 and UL 1076, and the appropriate installation manual for each equipment type.

c. All wiring, including low voltage wiring outside the control console, cabinets, boxes, and similar enclosures, shall be installed in rigid galvanized steel conduit conforming to UL 6 (when outdoors), or electric metallic tubing (EMT) when indoors. Minimum conduit size shall be 1-inch, except 3/4-inch is allowed between last pull box and end device (flexible metal conduit for interior applications or liquid tight conduit for exterior or exposed applications). All other electrical service work shall be as specified with electrical specifications and drawings that are part of the contract document and as shown. Grounding shall be installed as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

d. Detailed shop drawings shall be provided as part of the submittal process. The shop drawings shall include, but not be limited to exposed conduit and devices, including hangars, brackets, back boxes and related equipment.

e. All equipment connected to alternating current circuits shall be protected from power line surges. Equipment protection shall meet the requirements of ANSI C62.41. Fuses shall not be used for surge protection.

f. All inputs shall be protected against surges induced on device wiring. Outputs shall be protected against surges induced on control and device wiring installed outdoors and as shown. All communications equipment shall be protected against surges induced on any communications circuit.

g. All cables and conductors, except fiber-optics, shall have surge protection circuits installed at each end. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following two wave-forms:
   1) A 10 microsecond rise time by 1000 microsecond pulse width wave-form with a peak voltage of 1500 volts and a peak current of 60 amperes.
   2) An 8 microsecond rise time by 20 microsecond pulse width wave-form with a peak voltage of 1000 volts and a peak current of 500 amperes.

h. Calibrate all equipment.

i. Inspect each component, determine obvious defects, and correct. j. All electrical service (not low voltage) work shall be in accordance Division 26.

k. Perform tests as recommended by manufacturer or as required to ensure the VMS equipment is operating properly and meets specified requirements.

l. Correct all deficiencies detected and retest affected components.

m. Record test data, tabulate, and write narrative describing tests, results, deficiencies found, corrective measures, and results of retesting. Certify that the security equipment has been tested and is ready for performance verification testing.

n. Service Loops: Service loops shall be provided for all VMS cabling within the Telecommunication Rooms.

o. The Security Systems Contractor shall be responsible to verify with LAWA IT the exact final location of each camera prior to installation. The Security Systems Contractor shall be responsible to coordinate with lighting, signage and other sub- contractors to avoid conflicts with intended field of view as indicated in the drawings.

1) If available, arrange for verification of CCTV camera mounting arrangement and final locations utilizing 3D modeling of the new condition.

2) If 3D modeling is not available, Contractor shall arrange for reviewing the proposed camera locations with LAWA IT on-site and provide a portable CCTV camera (with extension pole) to validate camera views, positions and mounting locations. This shall be performed when construction has advanced enough to view final major architectural features and potential obstructions.

3) Contractor shall provide Area Tilting and PTZ preset programming for each camera.

3.5 IDENTIFICATION AND LABELING

A. See IT Infrastructure Standards of Practice Volume 3, Chapter 1.

B. All cameras shall be labeled on the outside where the label is readable from 10 feet with the LAWA assigned VMS camera name.

C. The Security Systems Contractor shall confirm specific labeling requirements with LAWA IT prior to cable installation or termination.

D. All indoor cable and patch cable labels shall be pre-printed using BRADY TLS 2200 printer or equivalent and shall be placed loose on the patch cable near the connector end without heat shrinking labels. Labels shall use a three line format with the origination patch panel and port on the first line, the destination patch panel and port on the second line and the system or other descriptive information on the third line.

E. Marking:

1. Equipment Name Plates: The following requirements shall apply:

a. General: Attach a permanent, corrosion-resistant name plate to each equipment component showing the manufacturer's name, address, serial number and equipment rating. Each name plate shall be clearly visible on the exterior of equipment. Components located within equipment enclosures shall also be provided with name plates.

b. Location and Fastening: Provide nameplates to identify all equipment components. Provide each panel assembly with a name plate on the interior of equipment enclosures, indicating number of equipment and unit of assembly. Fasten name plates securely with slotted stainless steel screws. The use of adhesive for fastening name plates will not be permitted.

c. Control and Display Labels:
   1) Use: Each control, display and any other item of equipment that must be located, identified, read or manipulated shall be appropriately and clearly labeled to permit rapid and accurate identification of its operating state of position.
   2) Orientation: Orient labels and information thereon horizontally so that they may be read quickly and easily. Vertical orientation shall be used only where space is limited.
   3) Locations: Locate labels so that there is no confusion as to which item they identify. Labels shall not obscure any other information required by the operator. Controls shall not obscure labels. The location of labels shall be consistent.

d. Use Permanent Room Numbers as indicated on the Room Finish Schedules for construction period identification of rooms and building spaces. All required shop drawings and submittals, including manuals and Project Record Drawings shall identify rooms and spaces using the Permanent Room Numbers. Permanent identification devices including signage, equipment nameplates, and panels shall use the Permanent Room Numbers. Obtain LAWA assigned CCTV camera VMS names and label the CCTV camera housing with the assigned name. Additionally, the assigned camera name shall be configured on each camera to display on the VMS workstation.

3.6 FIELD QUALITY CONTROL / INSPECTIONS / TEST

A. General
   1. The Security Systems Contractor shall perform a detailed inspection of the site prior to submitting any technical data for approval.
   2. The Security Systems Contractor shall verify that the proposed equipment and methods of installation are compatible with the existing conditions and prepare a corresponding written report of their findings.
   3. LAWA IT shall be notified in writing if modifications of the existing building are required in order to accommodate the new equipment. These modifications shall be made only upon receiving written approval from LAWA IT.

B. Test, Commission and Acceptance

1. Conduct an Installation Test and total Acceptance Test upon completion of equipment installation. Testing shall be coordinated as necessary, to demonstrate that all interfaces have been successfully implemented.
2. Installation and Acceptance Test Plan and Reports:
   a Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand-alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.
   b Security Systems Contractor shall submit a Test Plan for Installation and Acceptance Tests and Commissioning for the review and approval of LAWA IT and the Design Engineer. The test plan for each phase shall detail the objectives of all tests. The tests shall clearly demonstrate that the system and its components fully comply with the requirements specified herein. The test plan shall be provided at least forty-five (45) days prior to the scheduled start of each test. Test plans shall contain at a minimum:
      1) Test equipment is to be identified by manufacturer and model
      2) Interconnection of test equipment and steps of operation shall be defined
      3) Expected results required to comply with specifications
      4) Record of test results with witness initials or signature and date performed
      5) Pass or fail evaluation with comments
3. Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand- alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.
4. In addition to any acceptance testing requirements specified elsewhere, cameras shall be fully adjusted and tested to provide optimal video pictures and signals. All camera adjustments and settings available shall be utilized and adjusted. All camera adjustments and settings shall be recorded in individual camera test reports for review and acceptance.
5. The Test Plan shall provide conformity to all specification requirements. Satisfactory completion of the test procedure is necessary as a condition of system acceptance.
6. Documentation verification, both interconnects and functionality shall be part of the test. Where documentation is not in accordance with the installed system interconnect and operating procedures, the system shall not be considered accepted until the system and documentation correlate.
7. The Security Systems Contractor shall cooperate with and provide LAWA representative(s) the opportunity(s) to participate in any or all of the tests.

8. Test Reports: The Security Systems Contractor shall submit for each test, a test report document that shall certify successful completion of that test. Submit for review and acceptance within seven (7) days following each test. The test report shall contain, at a minimum:
   a. Commentary on test results.
   b. A listing and discussion of all discrepancies between expected and actual results and of all failures encountered during the test and their resolution.
   c. Complete copy of test procedures and test data sheets with annotations showing dates, times, initials, and any other annotations entered during execution of the test.
   d. Signatures of persons who performed and witnessed the test.
9. Test Resolution: Any discrepancies or problems discovered during these tests shall be corrected by the Security Systems Contractor at no cost to LAWA. The problems identified in each phase shall be corrected and the percentage of the entire system re- tested determined by LAWA IT, before any subsequent testing phase is performed.
10. Adjustment, Correction, and Completion:
    a. Correct deficiencies and retest affected components.
    b. Make necessary adjustments and modification to system after obtaining approval of LAWA IT.
    c. Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by LAWA IT.
11. Recording:
    a. Describe actual operational tests performed and equipment used and list personnel performing tests.
    b. Record in tabular form all test results, deficiencies, and corrective measures.
12. Termination
    a. Performance verification test shall be terminated by LAWA when:
       1) Individual components, subsystems, or the integrated system fail to perform as specified.
       2) It is determined that system is missing components or installation is not complete.
    b. Upon termination, corrective work shall be performed and performance verification test rescheduled with LAWA.
    c. Retesting shall be performed by Security Systems Contractor at no additional expense.
    d. Security Systems Contractor shall continue to perform corrective actions and retest until system passes all tests to satisfaction of LAWA IT.
13. The Security Systems Contractor will not be responsible for failures caused by:

a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished and automatic shutdowns and restarts of systems performed as specified.
b. Failure of any LAWA furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
c. Failure of existing LAWA equipment provided failure was not due to Contractor furnished equipment, installation, or software.

14. Obtain specific approval from LAWA IT of all lens selection, camera field of view, point of focus, video quality and recording.
15. After all installation and acceptance test requirements specified have been complied with, the equipment shall be commissioned.

C. System Commissioning:
1. Video Commissioning shall be conducted in accordance with LAWA standard video commissioning policies and procedures. This will include verification of lens selection, verification of field of view, verification of image quality, verification of focus point and where required final adjustment of position of CCTV camera.
2. The Commissioning procedure shall be witnessed by LAWA. Security Systems Contractor shall provide a detailed inspection, and physical accounting of each equipment item. An operational demonstration shall then be conducted in which the equipment shall function in the normal operational mode, and shall operate completely error-free in terms of hardware and software performance. Occurrence of any equipment failure shall terminate the demonstration. The demonstration shall restart and run for a period of time designated by LAWA after the failure has been corrected.
3. Prerequisite to Commissioning: Outstanding work items that may exist, such as facility interfaces, project record drawings, and/or in-process change orders, shall be documented and submitted to LAWA for review prior to start of equipment commissioning. Documentation of outstanding work items shall take the form of punch lists of critical action items lists that describe the work, the expected completion schedule, and the impact upon operation. Depending upon the nature of the outstanding work item, LAWA IT may grant a waiver to accomplish partial commissioning of any of the equipment. Completion of waived outstanding work items shall then be assigned to the post-commissioning operations and maintenance.
4. Security Systems Contractor shall be responsible for ensuring that the installation and related interfaces are completed and operational at least thirty (30) days prior to scheduled beneficial occupancy. In the event the installation and related interfaces is not completed and operational by the scheduled beneficial occupancy date, Security Systems Contractor shall establish and submit a security plan to LAWA that complies with 49 CFR 1542 Airport Security and 49 CFR 1544. Aircraft Operator Securi-

ty as appropriates, and related LAWA security requirements. The security plan shall be submitted to LAWA and TSA for approval. The security plan, revisions, and security measures to be deployed until such time the new security equipment is completed and operational shall be at Security Systems Contractor's expense.

3.7 SYSTEM STARTUP

A. The Security Systems Contractor shall not apply power to the system until after:
   1. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
   2. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   3. System wiring has been tested and verified as correctly connected as indicated.
   4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
   5. Power supplies to be connected to the system and equipment have been verified as the correct voltage, phasing, and frequency as indicated.
   6. Satisfaction of the above requirements shall not relieve the Security Systems Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of Security Systems Contractor work/equipment.

3.8 CLEANING

A. Reference Specification Section 27 05 00.

B. Contractor shall ensure that camera lenses are maintained clean through acceptance and are protected from any subsequent construction dust from on-going construction activities near the camera.

C. Any camera lens or dome cleaning required shall be done by manufacturer approved techniques as not to scratch or otherwise damage the lens or dome coating in any way. Damage due to improper cleaning techniques by the Contractor shall require replacement of the damaged components.

3.9 COMPUTERIZED MAINTENANCE MANAGEMENT SYSTEM

A. Information regarding all equipment including model, nomenclature, serial number, func-

tion, location, recommended preventative maintenance schedule and other pertinent data will be stored in the CMMS database. Security Systems Contractor is required to input all camera, cabling, port information for all cameras installed. Security Systems Contractor shall include in their Bid the cost for collecting and inputting this data for all systems and equipment provided by this Contract into this database.

B. Asset tags shall be installed and recorded for all CCTV cameras, workstations, and monitors installed.

3.10 CLOSEOUT ACTIVITIES AND ACCEPTANCE

A. See It Infrastructure Standards of Practice Volume 3, Chapter 1.

B. Completion of successful installation, final tests and commissioning, receipt of the test reports and as-built documentation including data input into the CMMS and successful performance of the installed equipment / system for a thirty (30) day period will constitute Final Acceptance.

3.11 MAINTENANCE (NOT USED)

END OF SECTION 28 23 00

SECTION 28 23 13 VIDEO SURVEILLANCE, STORAGE, RECORDING AND MANAGEMENT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. SSI - Protection of Contract Documents. All CCTV security system documents shall be considered Sensitive Security Information (SSI) and shall be handled as defined in 49 CFR, Parts 15 and 1520.

B. Hardware and Software shall be of the current model and versions that are currently implemented at LAWA. Verify models and versions supported by LAWA within 6 months of installation.

C. Video Surveillance, Storage, Recording and Management Systems ("Video System") consist of communication systems including, but not limited to, cabling, and edge / network devices, Video Management System (VMS), Video Storage System, workstations, video/audio encoders, video decoders, video storage system, servers, cabling, connectors, software licenses, documentation, drawings, submittals, operation and maintenance, warranties.

D. Security Systems Contractor shall include in the Bid or proposal all labor, materials, tools, plant, transportation, storage costs, installation, programming, configuration, testing, commissioning, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete and operational equipment / systems shown and described in the Specifications.

E. Security Systems Contractor shall ensure each new camera on Video System that interfaces with LAWA Access Control and Monitoring System (ACAMS) has a linkage between alarms and video. Security Systems Contractor shall cooperate with the ACAMS contractor (Section 28 13 00) and LAWA video maintenance contractor to set up the linkage between the two systems and the camera.

F. Communications System:
   1. LAWA's network is an enterprise/service provider network that is built on MPLS (L3 VPN) technology using Cisco Cat 6500, 2800 and 3800 from a Layer 3 (L3) perspective. LAWA consists of four airports, namely, LAX, Ontario, Van Nuys and Palmdale and remote offices or trailers in each of the airport facilities. Among the four airports facilities, LAX, Ontario and Van Nuys are interconnected via three Metro Ethernet (ME) links with bandwidths of 100Mbps and 500Mbps. The remote facilities in each of the

geographical locations are connected to the core/distribution devices using one of the following methods: ME, T1 or ISDN. This network (intra-campus and inter- campus) is built with equipment, path and site redundancy at the core and distribution layers. The main data center resides in LAX campus; the backup data center, Ontario campus.

2. From the L3 VPN perspective, this network segregates the user groups and the different server groups by means of VRF (Virtual Routing and Forwarding instances). The existing Verves consist of the users, common services, application servers, voice, video, internet to name a few. All CE (customer edge) devices (whether L2 or L3) connect to the MPLS backbone via one of the PE (provider edge) devices that are equipped with virtual firewall modules.
3. Note: Security Systems Contractor shall perform a network load analysis to support the VMS/VSS designed system load and notify LAWA for correction of any deficiencies. Security Systems Contractor is responsible for confirming and verifying LAWA's remedies to meet Security Systems Contractor network requirements for a successful completion of the VMS/VSS project to be approved by LAWA in accordance with the System Acceptance Test Plan.

G. The Security Systems Contractor will engineer, procure, install, program, integrate, test and commission additional VSS system components needed to comprise a complete Surveillance Storage, Recording, Management System that will control, manage, display and record video streams for any new cameras.

H. Additionally, the System shall provide for the following capabilities:
   1. Allow the configuration of zone display/ recording or event triggering to display and record on different CIFs and frame per second based on LAWA's operational requirements to optimize the hard disk usage for recording.
   2. Allow Airport Response Coordination Center (ARCC) and other LAWA identified facilities Pan, Tilt, Zoom camera controls and other controls such as audio, ring down, panic button, and system alarms, etc.
   3. Provide seamless end-to-end operation by using cross-system integration to LAWA legacy systems using, but is not limited to, connector, Application Programming Interface and middleware, etc.
   4. Capability to interface to Oracle Identity Management in future implementation.
   5. Non-disrupt system operation for an availability of 99.99% supported by Security Systems Contractor supplied head end equipment.
   6. Optimize or recommend alternatives to improve existing Airfield Operation Area (AOA) with high resolution camera views and pan, tilt and zoom controls.
   7. Integrate The System to LAWA's Master Time Source for a unified time stamp for the video display/recording.
   8. If applicable, include capability for displaying the video by handheld devices or Airport Police mobile data terminal using LAWA supplied wireless network.

I. Related documents included in the specification requirements:
   1. Division 1 – General Requirements including but not limited to:
      Section 01 11 00 – Summary of Work
      Section 01 25 00 – Substitution Procedure
      Section 01 31 00 – Administrative Requirements
      Section 01 33 00 – Submittal
      Section 01 40 00 – Quality Requirements
      Section 01 43 00 – Quality Assurance
      Section 01 64 00 – Owner (LAWA) Furnished Products
      Section 01 77 13 – Preliminary Closeout Reviews
      Section 01 77 16 – Final Closeout Review
      Section 01 78 00 – Close Out Submittals
   2. Section 27 05 00 – Basic Telecommunication Requirements
   3. Section 27 11 00 – TR & MPOE Room Expansions
   4. Section 27 21 00 – Local Area Network
   5. Section 28 13 00 – Access Control and Monitoring System (ACAMS)

1.2 PRICE AND PAYMENT PROCEDURES (NOT USED)

1.3 REFERENCES

A. ABBREVIATIONS AND ACRONYMS

ACAMS	Access Control and Alarm Monitoring System
AD	Active Directory
AEOC	Airport Emergency Operations Center
AFF	Above Floor Finish
ANSI	American National Standard Institute
AOA	Aircraft Operations Area
AOC	Airport Operations Center
API	Application Program Interface
ARCC	Airport Response Coordination Center
ASCII	American Standard Code for Information Interchange
ATP	Acceptance Test Plan
AWG	American Wire Gauge
BMS	Balanced Magnetic Switch
CAD	Computer Aided Dispatch
CATV	Cable TV
CBP	U.S. Customs and Border Protection
CCTV	Closed Circuit Television

CIFS	Common Internet File System
COP	Common Operating Picture (situational awareness)
COTS	Commercial Off the Shelf
CPU	Central Processing Unit
DVMS	Digital Video Management System
EMI	Electromagnetic Interference
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICEA	Insulated Cable Engineering Association
IDS	Intrusion Detection System
IP	Internet Protocol
ISA	Instrument Society of America
IVS	Intelligent Video Analytics System
LAWA	Los Angeles World Airports
LAX	IATA Symbol for the Los Angeles International Airport
LCC	Life Cycle Costs
LED	Light Emitting Diode
MBPS	Mega-bits per second (video stream rate)
MHz	Megahertz
MPIO	Multi-Path Input/output
MRT	Mean Restoral Time – The mean interval between failure and restoral to operational status; includes MTTR travel time and response time
MTBF	Mean Time Between Failures – The mean interval that is the sum of MTTF and MRT
MTTF	Mean Time To Failure – The mean interval between placing a specific piece of equipment or system in service and its operational failure
MTTR	Mean Time To Repair – The mean interval during which the repair process is successfully performed
NAS	Network Attached Storage
NFS	Network File System
NTP	Network Time Protocol
NTSC	National Television System Committee
O&M	Operations and Maintenance
PACS	Physical Access Control System
PLC	Programmable Logic Controller
PoE	Power Over Ethernet
PSIM	Physical Security Information Management

PTZ	Pan, Tilt, Zoom
QC	Quality Control
REX	Request to Exit
RFI	Radio Frequency Interference
RTP	Real-time Transport Protocol
SAN	Storage Area Network
SAS	Serial Attached SCSI
SCC	Security Control Center
SCP	Security Control Panel
SJB	Security Junction Box
SNMP	Simple Network Management Protocol
SSCP	Security Screening Checkpoint
SSH	Secure Shell
TBIT	Tom Bradley International Terminal
TSA	Transportation Security Administration
UBC	Uniform Building Code
UPS	Uninterrupted Power Supply
VDT	Video Display Terminal
VMD	Video Motion Detection
VMS	Video Management System
VSS	Video Surveillance System

B. CODES, STANDARDS, REGULATIONS AND REFERENCES

1. Comply with all applicable codes standards, regulations, and the most current issue of the following publications, including all amendments thereto of the issue that is current on the date of contract award. Applicable requirements of the following publications shall apply to the work under this specification as if fully written herein. Where conflicts exist between the Technical Specification and the referenced publications, local codes shall govern.
   a. American Standards Association (ASA)
   b. Institute of Electrical and Electronic Engineers (IEEE)
   c. National Fire Protection Association (NFPA)
   d. National Electrical Manufacturers Association (NEMA)
   e. Underwriters Laboratories, Inc. (UL)
   f. Federal, State and Municipal Building Codes and all other Authorities having jurisdiction
   g. National Electrical Code (NEC)
   h. Insulated Power Cable Engineers Association Specification (IPCEA)
   i. American Society for Testing Materials Specification (ASTM)
   j. Occupational Safety and Health Administration (OSHA)

k. National Electrical Safety Code (NESC)

2. Special attention shall be made to the following specific codes, standards, and publications where applicable:
   a. ANSI B20.1 Conveyor Safety
   b. ASTM F.1468-93 Standard Practice For Evaluation
   c. Customs and Border Protection Airport Technical Design Standards for Passenger Processing Facilities, August 2006
   d. EIA 232-D Interface between Data Terminal Equipment and Data Circuit- Termination Equipment Serial Binary Data
   e. EIA RS-310-C Racks, Panel, and Associated Equipment
   f. 49 CFR 1520 Protection of Sensitive Security Information
   g. 49 CFR 1540 Civil Aviation Security General Requirements
   h. 49 CFR 1542 Airport Security
   i. 49 CFR 1544 Aircraft Operator Security
   j. 49 CFR 1546 Foreign Air Carrier Security
   k. 49 CFR 1548 Indirect Air Carrier Security. NFPA 72-D - Installations, Maintenance and Use of Proprietary Protective Signaling Systems
   l. NFPA 75 Protection of Electronic Computer Data Processing Equipment
   m. NFPA 77 Static Electricity
   n. NFPA 78 Lightning Protection Code
   o. Transportation Security Administration Recommended Security Guidelines for Airport Planning, Design and Construction, June 15, 2006 p. UL 294 Access Control System Units
   q. UL 611 Central Station Burglar Alarm Units and Systems
   r. UL 634 Intrusion Detection Units
   s. UL 681 Installation and Classification of Mercantile and Bank Burglar Alarm Units
   t. UL 796 Electrical Printed-Wiring Boards
   u. UL 1076 Proprietary Burglar Alarm Units and Systems
   v. UL 1950 Information Technology Equipment, including Electrical Business Equipment References to codes and standards called for in the Specifications refer to the latest edition, amendments, and revisions to the codes and standards in effect on the date of these Specifications.
3. Los Angeles World Airports (LAWA) Publications –
   See IT Infrastructure Standards of Practice Volumes 1, 2, and 3.
4. In addition the Security Systems Contractor shall comply with all applicable Security Directives as issued by the TSA.

1.4 ADMINISTRATIVE REQUIREMENTS (NOT USED)

1.5 ACTION SUBMITTALS

A. Comply with all LAWA submittal procedures given in other Sections. The following is in addition to or complementary to any requirements given elsewhere.

B. Action Submittals:

1. Submit a detailed bill-of-materials listing all manufacturers, part numbers, and quantities that the Bidder proposes to use in this project.
2. Submit Manufacturers' Data for all equipment supplied under this Section.
3. Product submittals shall be provided and approved prior to the commencement of installation activities of the Video System.
4. Submit all proposed labeling materials and nomenclature for approval.
5. Shop Drawings:
   a. Provide shop drawings that are applicable and pertain to CCTV Video System provisions
   b. Provide Interface Schedules and Diagrams. These documents must clearly identify Sensors and switches which cue video cameras, as well as the number of cameras activated, video recording activation logic, video monitor switching logic, interfaces between the access control system and other subsystems, distributed processing capabilities and function.
6. Installation drawings:
   a. Floor Plans
   b. Riser Diagrams
   c. Block diagrams
   d. Connection of all new CCTV cameras with their associated junction boxes including block diagrams and wiring diagrams
   e. Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding
   f. Details of surge protection device installation
   g. Equipment mounting details
   h. Rack Installation Details
   i. Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems
7. Coordination Drawings:
   a. Indicate locations where space is limited for installation and access.
   b. Submit floor plans, elevations, and details indicating major equipment and end device locations. Indicate all floor, wall and ceiling penetrations.
   c. Telecommunication Rooms: At least 30 days before beginning installation in each room, the Security Systems Contractor shall furnish a telecommunications room drawing showing the initial layout design and plans for the proposed mounting loca-

tions of VSS equipment, cable routings, and termination locations for all cable and equipment.

8. Theory of Operations
   a. Description, analyses, and calculations used in selecting equipment. Describe and show how equipment will operate as a system.

C. Test and Acceptance Plans
   1. Submit the following for review and approval prior to the performance of any testing:
      a. Performance and Functionality Verification Test Plan (including interfaces)
      b. Commissioning Test Plan

D. Closeout Submittals
   1. Project Record Documents required include:
      a. Marked-up copies of Contract Drawings
      b. Marked-up copies of Shop Drawings
      c. Newly prepared Drawings
      d. Marked-up copies of Specifications, Addenda and Change Orders
      e. Marked-up Project Data submittals
      f. Record Samples
      g. Field records for variable and concealed conditions
      h. Record information on Work that is recorded only schematically
      i. As-built drawings
      j. Record drawings
      k. Electronic as-built and LAWA LUSAD requirements
   2. As-built drawings:
      a. In addition to the Record Drawing requirements set forth in Division 01 – General Requirements, As-built drawings shall fully document and be fully developed and provided, and shall include, but not be limited to:
         1) Floor Plans
         2) Riser Diagrams
         3) Block diagrams
         4) Point-to point wiring diagrams
         5) Door Details
         6) Point Schedules
         7) Detail of connections to cameras, monitors, and workstations
         8) Details of connections to power sources, including primary and secondary power supplies, uninterrupted power supplies, and grounding
         9) Details of surge protection device installation
         10) Equipment mounting details
         11) Rack/Cabinet layout elevations and details, including heat and load calculations

12) Details of interconnection to data transmission media and data communication network including all hardwire and fiber optic systems

3. Post changes and modifications to the Documents as they occur. Drawings will be updated electronically and submitted to LAWA in accordance with the schedule provided for this by LAWA. Do not wait until the end of the Project. Design Engineer will periodically review Project Record Documents to assure compliance with this requirement.
4. At every quarter, submit Project Record Documents to Design Engineer for LAWA's records.
5. Upon completion of the as built drawings, LAWA and the Design Engineer will review the as built work with the Security Systems Contractor.
6. If the as built work is not complete, the Security Systems Contractor will be so advised and shall complete the work as required.
7. Project Record Drawings shall also be submitted in electronic format. Electronic drawing format shall be AutoCAD® Release 2014 or later. LAWA shall have the right and capability to manipulate all electronic file drawings and documentation.

1.6 QUALITY ASSURANCE

A. Security Systems Contractor Certification: The Security Systems Contractor or approved subcontractor shall be certified security system installer for the specific type of equipment / software being installed. The Security Systems Contractor shall offer proof of certification by submitting a copy of certification with the Bid.

B. The Security Systems Contractor's Quality Assurance Inspector shall conduct a visual inspection of all installations to verify that the installations are in accordance with LAWA's and manufacturer's specifications. Records of the inspections signed and dated by the Quality Assurance Inspector shall be provided to the Design Engineer.

C. LAWA and the Design Engineer shall be notified by the Security Systems Contractor of any inspection(s) and LAWA and the Design Engineer may elect to participate in any inspection(s). Relevant QA information shall be input into LAWA CMMS (refer to Paragraph 3.08).

1.7 SUBSTITUTION OF EQUIPMENT

A. Approval of alternate or substitute equipment or material in no way voids specification requirements.

B. Under no circumstances shall LAWA or the Design Engineer be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Security Systems Contractor submits to the Design Engineer and LAWA all evidence to support the contention that the item proposed for substitution is equal to the specified item. LAWA's decision as to the equality of substitution shall be final and without further recourse.

C. In the event that the Design Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Security Systems Contractor, or changes by the Security Systems Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Design Engineer is required to examine and evaluate any changes proposed by the Security Systems Contractor for the convenience of the Security Systems Contractor, then the Design Engineer's expenses in connection with such additional services shall be paid by the Security Systems Contractor and may be deducted from any moneys owed to the Security Systems Contractor.

1.8 DELIVERY, STORAGE AND HANDLING (NOT USED)

1.9 FIELD/SITE CONDITIONS

A. General

1. The Security Systems Contractor shall inspect the jobsite and survey the conditions to be encountered during performance of the work. This shall be accomplished prior to starting the work. Failure of the Security Systems Contractor to become familiar with the site conditions shall not relieve Security Systems Contractor of responsibility for full completion of the work in accordance with the Contract provisions.
2. The Security Systems Contractor shall employ the maintenance contractor with whom LAWA has a maintenance contract to perform the disconnection, connection, re- connection, programming or configuration of the existing Video System or other existing systems that might be affected by this Work.
3. Programming and configuration of the existing VSS system shall be by LAWA designated CCTV maintenance contractor. The installing Security Systems Contractor shall secure the services of LAWA designated CCTV maintenance contractor for existing VMS programming and configuration for this work at no additional cost to LAWA.
4. The Security Systems Contractor shall provide all new UTP cable, optical fiber cable, innerduct, racks, cabinets, patch panels, cover plates, outlet boxes, related hardware, distribution, termination equipment, and any other appurtenances and equipment associated specifically with the Video System. Coordinate with Section 27 05 00 contractor.
5. The Security Systems Contractor shall obtain the approval of LAWA IT or Design Engineer for the final layout of the Video System equipment to be installed prior to the instal-

lation of any materials or equipment. Shop drawings showing proposed room / rack layouts shall be submitted for approval before beginning installation.

6. The Security Systems Contractor shall furnish an adequate supply of technicians and materials at all times, and shall perform the work in the most appropriate, expeditious, and economical manner consistent with the interests of LAWA.
7. The Security Systems Contractor shall be responsible to LAWA for the acts and omissions of its employees, subcontractors and their agents and employees, and other persons performing any of the work under a contract with the Security Systems Contractor.
8. The Security Systems Contractor shall not unreasonably encumber the site with any material or equipment. Operations shall be confined to areas permitted by law, permits, and contract documents.
9. The Security Systems Contractor shall have an experienced Project Manager on site at all times when work is in progress on any project. The individual who represents the Security Systems Contractor shall be the single point of contact between the Security Systems Contractor and LAWA, and shall be responsible for the entire project. This representative shall be able to communicate with LAWA or designated representative whenever requested throughout the life of the project.
10. While working in the facility, the Security Systems Contractor shall not block any entrances, egresses, or other passageways that are necessary for normal, safe operation. It should be noted that the Security Systems Contractor is responsible to provide any lifts, hand trucks, etc. that it will need to transport its materials and equipment to and throughout the site.
11. The Security Systems Contractor shall protect all buildings, walls, floors, and property from damage resulting from the installation. Any and all damage to property shall be repaired by the Security Systems Contractor at its expense. If the Security Systems Contractor enters an area that has damage (not caused by the Security Systems Contractor), the Security Systems Contractor shall immediately bring this to the attention of the Engineer so the area can be appropriately noted.
12. Following each day's work, the Security Systems Contractor shall clean up the areas in which it has been working and dump all trash in the appropriate designated areas.
13. Deliver products to site under provisions of Division 01 - General Requirements.
14. Store and protect products under provisions of Division 01 - General Requirements.
15. Coordinate with LAWA, locations and requirements for equipment and product storage.

B. Environmental Requirements:

1. Comply with all manufacturers' instructions and recommendations concerning environmental factors.
2. Comply with all seismic requirements.

1.10 EQUIPMENT CERTIFICATION

A. Provide materials that meet the following minimum requirements:
   1. Electrical equipment and systems shall meet UL Standards (or equivalent) and requirements of the NEC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
   2. Equipment shall meet all applicable FCC Regulations.
   3. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material is not acceptable and will be rejected.
   4. The listing of a manufacturer as "acceptable" does not indicate acceptance of a standard or catalogued item of equipment. All equipment and systems must conform to the Specifications.
   5. Where applicable, all materials and equipment shall bear the label and listing of Underwriters Laboratory or Factory Mutual. Application and installation of all equipment and materials shall be in accordance with such labeling and listing.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for the final assembled unit.
   1. All components of an assembled unit need not be products of the same manufacturer.
   2. Constituent parts, which are alike, shall be from a single manufacturer.
   3. Components shall be compatible with each other and with the total assembly for intended service.

C. Components of equipment shall bear the manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment that serve the same function must be the same make and model.

E. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

F. Maximum standardization of components shall be provided to reduce spare part requirements.

1.11 WARRANTY

A. Warranty and Maintenance Requirements shall be in accordance with the Division 01 - General Requirements.

B. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of two (2) years from Final Acceptance.
   1. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.
   2. The Security Systems Contractor shall be responsible for and make good, without expense to LAWA, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.

C. Submit a copy of all manufacturer warranty information.

D. Spare Parts:
   1. The Security Systems Contractor shall provide to LAWA an inventory of security equipment spare parts, materials, consumables, and any other system item in order to meet the specified warranty maintenance requirements and keep the security equipment in a continuous operational mode during the warranty period. The quantity of spare parts shall equal no less that 10% of the items provided and installed under this contract.

PART 2 - PRODUCTS

2.1 GENERAL

A. Except as may be otherwise specified herein, the equipment and materials of this Section shall be equivalent to or better than products of the following manufacturers:
   1. Video Management System – Nice Systems Inc., Rutherford, NJ
   2. Video Storage System – Hewlett-Packard Company., Palo Alto, CA
   3. Video Encoder – Axis Communications Inc., Chelmsford, MA
   4. Audio/Video Encoders – Axis Communications
   5. Audio Encoders – SiquraVideo Decoders – Nice Systems Inc., Rutherford, NJ

B. Products shall be provided as specified. In the event the manufacturer(s) of specified products and materials have upgraded or replaced the specified products and materials with newer or improved technologies at the time of purchase, the newer or improved products or materials shall be provided. Latest technology products and materials shall be operationally and functionally equivalent or superior to the specified products and materials. Products and materials shall be purchased by the Security Systems Contractor in a timely manner to meet construction schedules, but shall not be purchased so far advanced of the date(s) of installation that they become technologically obsolete or replaced with newer technologies. No discontinued products shall be used.

C. Specific requirements regarding other types of substitutions and procedures for requesting substitutions are contained in DIV 01 Specifications 01 25 00 and 01 60 00. Document each request for substitution with complete data substantiating compliance of proposed substitution with Contract Documents, including an itemized list of specification requirements and whether or not the proposed device/equipment is in compliance. By making requests for substitutions, the Security Systems Contractor:
   1. Represents that the Security Systems Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
   2. Represents that the Security Systems Contractor will provide the same warranty for the substitution that the Security Systems Contractor would have for the device/equipment specified.
   3. Certifies that the cost data presented is complete and includes all related costs under this Contract except the Design Engineer's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent.
   4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

2.2 VIDEO MANAGEMENT SYSTEM

A. The Video Management System shall be an expansion of the existing VMS System and shall consist of a digital, networked, computer-controlled, virtual matrix switching system designed for CCTV applications. Video Management Capabilities include but are not limited to:
   1. The VMS application suite shall include applications for viewing and investigation of video, user policy setup, site setup and configurations, and an application for monitoring and providing alarms of failure or errors of any of the VMS components.
   2. The VMS shall be based on open architecture software and shall allow the use of any industry computer hardware, Network hardware, and data storage equipment (non- proprietary hardware). Systems requiring the use of proprietary hardware shall not be accepted.
   3. The VMS Application Suite shall be an entirely plug-and play IP based system which shall allow authorized users to monitor and playback video from multiple IP cameras and/or digitized analog cameras connected to the VMS simultaneously on the operators workstation and/or external monitors (analog and digital) on LAWA network.
   4. The software installed in both servers and workstations shall be similar in Graphical User Interface, therefore, an operator shall need to learn only one interface for both control and programming of the system and functions, offering the ability to remotely configure most system components from any server or workstation.
   5. The Graphical User Interface (GUI) shall provide a multi-channel display area containing access to a listing of all connected cameras, Site and terminal maps, and device tree, a navigator window, a control dialog display area, a toolbar, a display mode control area, a

function area, a video display control area and other image control areas. Each area shall contain the necessary controls to operate and setup the system.

6. The VMS Application Suite shall allow authorized users to monitor, record and playback audio from audio sources connected to the VMS.
7. The VMS Application Suite shall allow authorized users to acknowledge/ reject/reset alarms.
8. The VMS Application Suite shall provide dual monitor support.
   a. Channels, Groups, Alarm, Tours, Salvos and Maps shall be displayed on Monitor One
   b. Video layout pages shall be displayed on Monitor Two
9. The VMS Application Suite shall have the capability to graphically display camera states on the hierarchical list, the states shown shall include indication of:
   a. Loss of the video signal
   b. Trigger activated
   c. User event activated
   d. Association with audio channel
   e. Recording status (recording or not recording)
   f. Content analytics application associated with the camera
10. The VMS Application Suite shall allow the user to monitor and playback video on a full screen, a map, or a layout page displaying up to 25 cameras.
11. The user shall have the ability to monitor and playback video on a full screen, or on a camera layout page displaying a map.
12. The VMS shall allow the user the ability to define a homepage to be displayed in the local workstation. The homepage shall include a specific layout of video panes and pre-selected cameras either in live or playback modes.
13. The VMS shall support digital zoom on the workstation or external monitors (analog or digital). The user shall be able to perform the zoom magnification up to 20 times.
    a. The zoom feature shall be available on monitor and playback modes.
    b. The zoom feature shall provide Digital Pan-Tilt-Zoom (PTZ) functionality, allowing the user to Pan and Tilt within the zoomed image.
14. The VMS shall have the capability to allow the viewing of a video in live and playback modes and of alarm information on PDA using Windows platform. The Security Systems Contractor shall demonstrate the capability of this function only using LAWA provided wireless network.
15. The VMS shall enable the user to select to switch to previously displayed views, where a view contains both the layout and the channels selected with that layout.
16. The VMS shall have a motion detection capability to detect if an object enters a prede-fined area in the camera's Field of View.
17. The VMS shall allow operator's to write (copy) archived video to CD/DVD if allowed by user rights.

18. Performance:
    a. The VSS system shall be capable of supporting at least the number of CCTV cameras being added, plus 30%, 100 workstations in concurrent use, plus concurrent video offloading capabilities.
    b. The VMS client application shall launch and display the user's defined layout within 15 seconds of starting the application.
    c. Video shall be displayed at any workstation within one second of requesting a live video and five seconds for archived video stored on the VSS.
    d. Video shall be displayed in real time and neither the live nor the archive players shall have any noticeable delay in presentation at any time.
    e. The failover of an application server, provide user authentication and video indexing, shall be less than two seconds to a redundant server.
    f. The failover of an NVR server recording video shall take no longer than 30 seconds to switch to s redundant NVR.
    g. PTZ commands sent from a workstation to the cameras shall take no longer .3 seconds to reach the camera (actual performance of the camera, e.g. slewing 90°, is not included).
    h. The VMS shall be able to record streams of CIF or 4CIF at 15 frames per second simultaneously.
    i. The VMS shall be able to simultaneously record video streams of up to 1.2Mbps per standard PTZ camera and 500 Kbps per Fixed cameras.
    j. The Security Systems Contractor shall configure the VMS to remove all pixilation and image ghosting for encoded video from the encoders.
    k. Digitally zoom in and out of pre-recorded video in pause, playback or live video mode.
    l. Have instant reverse and synchronized playback.
    m. Allow operator to select time and date for playback and be able to retrieve the requested video in less than 10 seconds.
    n. Security Systems Contractor shall add new cameras to existing maps or will create new maps to display the location of the newly installed cameras associated with the System provided under this Contract. It shall include all the same capabilities of the current System.
    o. The VMS and its components shall include all the same hardware, versions, features, programming and functionality as currently configured in the existing System. This includes but is not limited to:
        1) Web Server Service.
        2) Level of Service mechanism to accommodate communication between the remote sites and the Head End.
        3) The viewing application shall provide capability to adjust video resolution and video frame rate.
        4) Workstation configuration options include (1) Best available, (2) Pre-defined

Bandwidth Limits, (3) User-defined Bandwidth Limits.

5) Capability to restrict User access to system resources.
6) Have the capability to restrict users during a pre-defined period.
7) Workstations provide support for PTZ keyboards and/or Joysticks to allow authorized users to control PTZ cameras. Workstations will have ability to create new PTZ presets, call up existing PTZ presets, and to predefine a home-preset for individual cameras and a predefined timeout after which a PTZ camera will return to a home preset.
8) Viewing application includes Tour feature.
9) Viewing application includes Salvo feature.
10) Viewing application includes Page, and Tour of Pages feature.
11) All workstation play back features as currently configures.
12) Web Server Service.
13) Level of Service mechanism to accommodate communication between the rmote sites and the Head End.
14) The viewing application shall provide capability to adjust video resolution and video frame rate.
15) Workstation configuration options include (1) Best available, (2) Pre-defined Bandwidth Limits, (3) User-defined Bandwidth Limits.
16) Capability to restrict User access to system resources.
17) Have the capability to restrict users during a pre-defined period.
18) Workstations provide support for PTZ keyboards and/or Joysticks to allow authorized users to control PTZ cameras. Workstations will have ability to create new PTZ presets, call up existing PTZ presets, and to predefine a home-preset for individual cameras and a predefined timeout after which a PTZ camera will return to a home preset.
19) Support management of alarms based on Video Motion Detection and 3rd party input such as API and Dry Contacts. Contains same functionality for Alarm management, notifications, and Alarm displays on local workstations.
20) Users shall have ability to define a set of presets for each PTZ camera, including presets that may be associated with an alarm.
21) As applicable, VMS capability of performing motion detection, and camera tampering detection, along with alarming upon such detection.
22) VMS shall enable setting for adjusting visual parameters of a camera, including Smoothness, Sensitivity and brightness levels.

p. VMS shall include Video Management though the Application Management (AMS) Server. It shall run on Microsoft Operating Server using Microsoft SQL Server. It shall be deployed at each physical site/station to allow autonomous operation of the station even if the communication to the Head-End is interrupted. This server provides for data consistency and integrity of all the VMS components. The VMS/AMS shall be configured identical to the current installed system.

q. VMS shall include Video Recording System (NVR) and Video Storage System. Additional recording capacity must be provided when cameras are added. Video and audio from all IP cameras and Encoders shall be recorded on the Video Storage System for long term storage, and on the NVR for only short term storage. Security Systems Contractor shall ensure all programming of these systems are identical to the current Systems installed at LAWA. This includes, but is not limited to:

1) The VMS shall provide both a Continuous Recording mode for uninterrupted recording and an Event Recording mode that starts recording only during alarm conditions.
2) The VMS shall be capable of recording pre-alarm and post alarm at a predefined resolution and frame rate.
3) The system shall be sized sufficiently to accommodate recording of all cameras at CIF or 4CIF, 15 fps and 30% compression rate for continuous video recording as well as event recording.
4) The system shall be capable of dual streaming to accommodate additional recording provisions that may be determined by LAWA in complying with the other stakeholder requirements.
5) The VMS NVR shall have the ability to centrally store data via IP over a LAN/WAN network to the Video Storage System (VSS).
6) The system shall support recovery from network disconnections, by transferring buffered video from the source VMS NVR to the VSS, once the network had been recovered.
7) The recovery of the video and audio buffer shall be done in parallel to the real-time transfer.
8) Only authorized users shall have the ability to search the VSS using an investigation application provided by VMS.
9) The VMS shall allow for different retention periods for tiered storage applications.
10) The video recording process shall ensure validity and authenticity of the captured images for acceptance as legal evidence in a court of law.
11) The Security Systems Contractor shall provide VMS applications for the standalone CCTV system that continues to work and record by itself in the event it is disconnected from the centralized VMS applications.
12) The NVR shall support 2 separate network interface cards (NICs).
13) The NVR shall include support for the following network segments:
14) Video collection network – the network in which video is collected, encoded and transported over an IP enabled network to the NVR.
15) Video viewing network – the network in which video is transmitted across an IP enabled network, to remote or local decoding devices, which display it on analog or digital displays.

16) The NVR at standalone and remote locations shall continue functioning autonomously should the network connectivity be interrupted to and from the Enterprise VMS location.
17) The VMS shall support video streaming from the NVR or directly from the encoding devices.
18) When streaming directly from the edge devices the workstation will receive a multicast stream directly from the encoding device for monitoring purposes. The NVR will register to the same multicast group for recording.
19) The VMS shall support multicast at SSM mode (source specific multicast). The VMS shall be able to configure different multicast addresses per recording channels.

2.3 VMS VIEWING WORKSTATIONS

A. The VMS viewing workstations and its components shall include all the same hardware, versions, features, programming and functionality as currently configured in the existing System at LAWA.

B. Workstations shall be HP Z200 Small form factor workstation or equivalent.

C. The VMS Viewing Workstations shall be HP Z200 Small form factor workstation or equivalent.

D. The VMS Viewing Workstations' specification shall meet or exceed the selected VMS vendor's minimum hardware requirements to support streaming of at least 32 concurrent video channels.

E. The VMS Viewing Workstations shall be capable of supporting multiple monitors.

F. The Viewing Workstations shall have a USB interface keyboard with joystick device enabling proportional pan/tilt, and zoom functions for PTZ cameras

G. VMS Viewing Workstation Requirements:
   1. Security Systems Contractor shall be responsible for notifying LAWA of discontinuation of computer hardware and software for the workstations announced by the Manufacturer and recommend a replacement to LAWA for approval.
   2. The VMS Viewing Workstations shall be provided with any equipment and software required to view/playback audio and video, and control PTZ camera.
   3. At the minimum the VMS Viewing Workstations shall comply with the following specifications:
      a. Processor: IntelCore i7 CPU, with 2.8GHz speed, and 16MB L2 Cache.

b. Hard drive: 500GB (7,200rpm) SATA II.
c. Memory storage: 2.0GB 2GB (2x1GB) DDR3-1333 ECC RAM.
d. Video card: 512 and higher Graphics with onboard processor.
e. 16X DVD+-RW medium.
f. Dual VGA monitor, supporting 1024x768 and 32 bit color resolution, or higher.
g. Operating systems: Latest operating system supported by LAWA within 6 months of installation.
h. At least two (2) 23-inch widescreen LCD's
i. Standard Keyboard and mouse
j. Standard PC speakers
k. Professional keyboard and/or generic joystick for PTZ camera control

2.4 VIDEO STORAGE SYSTEM

A. The Video Storage System and its components shall include all the same hardware, versions, features, programming and functionality as currently configured in the existing System at LAWA.

B. The Video Storage System consists of an online, digital networked, and computer controlled, system designed for CCTV applications. This System shall provide capabilities for short and long-term storage of video through the use of rack mounted units to be located in LAWA Datacenter.

C. Video Storage System hardware shall be HP IBRIX 9720 from Hewlett-Packard Company. Various COTS servers as may be required to run the VMS software that communicates with the storage system (to be defined by the Security Systems Contractor). Security Systems Contractor shall itemize the servers and describe their usage to support the storage system.

D. Software – must be identical as that being currently used at LAWA.

E. Configuration – must be identical to current LAWA Video Storage System configuration.

F. Performance, Scalability, Reliability and Management of the Video Storage System include, but are not limited to:
   1. Be based on Industry standard servers approved by LAWA IT to be used in LAWA's Datacenters.
   2. Be based on an open appliance, leveraging an Open Source operating system with full access to root.
   3. Support both Red Hat Linux and Windows operating systems.
   4. Support major file protocols (CIFS/NFS) concurrently.
   5. Have a high capacity single namespace of 16 Petabytes (PB).

6. Be capable to scale performance or capacity independently.
7. Provide for a minimum of 14 Months of disk based storage.
8. Be sized as required herein with capacities as per LAWA video recording requirements.
9. Be NAS based
10. Provide a non-hierarchical file system, with multi I/O writing capability of video and audio data across the storage array.
11. Support the data storage requirements of the VMS (bit rate, 4CIF, etc.)
12. Support the exporting of a single mount point across all NAS front end VMS servers (primary and redundant) of the same Common Internet File System (CIFS) share simultaneously.
13. Provide the capability for dynamic storage re-balancing by distributing files across disks.
14. Disk drives shall have a minimum size of 2 Terabytes (TB) per disk and minimum rotational speed of 7200 RPM.
15. Provide a modular, scalable and flexible platform for centralized storage supporting from TB's to PB's of storage.
16. Contain sufficient scalability so that the storage can grow appropriately to support higher resolution storage.
17. Have the capability for online file system expansion and shrinking.
18. Support dynamic assignment of additional nodes to a file system.
19. Provide architecture for both forward and backward compatibility.
20. Solution must have the ability to mix and match new and old technology and manage all data as one system.
21. Have the capability to add/offload data to other media types including tape drives via defined automated file migration utilities set under policy management.
22. Provide redundancy for all critical components.
23. Include dual power supplies.
24. Provide high availability (redundant) connectivity for all core servers.
25. Leverage hardware based RAID with RAID 6 double parity and hot spares.
26. System failover file services shall be less than 120 seconds.
27. Shall include proactive/preventive disk sparing.
28. Shall have non-disruptive storage retirement/refresh.
29. Shall provide Multi Path IO (MPIO) (dual paths from storage processors to disk enclosures).
30. Provide automatic NAS head failover/clustering.
31. Failover threshold must be less than 90 seconds.
32. Support partial file system offline features for disk integrity checks.
33. Provide the capability for continuous remote replication and data tiering.
34. Security Systems Contractor shall provide 20% spare disk drives
35. Provide system management capabilities through GUI, CLI, and Web Services.
36. Support Secure Shell (SSH access to the command line interface.

37. Have the ability to provide full root access for command line scripting of all GUI functionality.
38. Provide a single interface for system configuration and control to include: status monitoring, performance utilization, file system expansion, servers, and disk capacity.
39. Provide the capability for operational and performance monitoring via Simple Network Monitoring Protocol (SNMP).
40. Have the ability to provide full historical performance statistic information on all system resources.
41. Have the ability to manage multiple file systems from a single management console.
42. System allocation and reallocation must be simple, flexible and non-intrusive.
43. Support online patching of firmware and OS upgrades.
44. Provide non-disruptive upgrade capability to the storage subcomponents.
45. Include an interface which has the ability to power cycle system sub-components remotely.
46. Include a Network Time Protocol (NTP) client for time synchronization.
47. Provide security features to mitigate unauthorized access and/or modification of data and protect the confidentiality, integrity, and availability of the data.
48. Provide security features that enable access control and role based access for authorized views.

2.5 VIDEO ENCODERS

A. Video encoders and its components shall include all the same hardware, versions, features, programming and functionality as currently configured in the existing System at LAWA.

B. Video encoders shall be used to allow access to and control of existing analog cameras over IP while eliminating the need for analog monitors and VCRs. Encoders shall be available in standalone version to support 1 - 4 video channels, as well as rack mounted version supporting 16 – 84 video channels.

C. All encoders shall be rack mountable. The standalone encoders shall be installed within rack mountable Trays.

D. SUPPLIERS: Video Encoders shall be products from Axis Communications Inc., or equivalent as follows:

A/E, Tenant must obtain current ordering information from LAWA prior to specification bid
Audio Encoders for Enterprise VMS

Audio Encoders to Support encoding of 160 channels of Audio.	
Items/description	**Part no**
Siqura Audio Encoder Chassis	MC 10 AC-115/EB-2
Siqura Audio Encoder Module	A-80
Video Encoders for Standalone Systems	
Video Encoders to supporting encoding	
Items/description	**Part no**
AXIS Standalone Encoder (Q7404)	#291004
AXIS 6 Channel Blade (Q7406)	#289001
AXIS 1U Chassis (291 1U)	#267004
SONY 4 Channel Blade	SNT-EX154
SONY 1U Chassis	SNT-RS1U
Video Decoders for Video Wall	
Video Decoders to support monitoring capability on Video Walls. Wherever possible, decoders shall not be used. IP based video wall and audio systems shall be implemented. The IP based video wall and audio system shall be capable of accepting IP streams from IP cameras as well as audio and video encoders.	
Nice Video Decoder (4 channel)	NVD 5104
VMX License	NVD-5104-VMX

1. Standalone Video Encoders with integrated audio, PTZ and I/O control shall be AXIS Q7404 or equivalent.
2. Axis Q7414 or P7224 encoders are to be used for encoding audio and video signals.
3. Multi-channel Video Encoders with integrated PTZ and I/O control shall be AXIS Q7406 or equivalent
4. Multi-channel Video Encoders to support Pelco Coaxitron protocol shall be SONY SNT-EX154
5. Multi-channel Video/Audio encoders with integrated PTZ and I/O control shall be Axis or alternatively
6. Audio only encoders shall be Siqura MC10 with A-80 audio card. or equivalent
7. In applications requiring use of SONY Video blades, SONY SNT-RS1U chassis shall be used.
8. Encoder Module Back Plane shall be AXIS Q7900 or equivalent with redundant power supplies and be capable of holding fourteen (14) multi-channel encoder modules

9. In applications requiring 4 to 18 Video channels (1 to 3 encoder blades) the Axis 291 1U chassis or equivalent shall be used.
10. The Video Encoder shall meet the MPEG-4 standard ISO/IEC 14496-10 AVC (H.264).
11. The specified unit(s) shall be manufactured in accordance with ISO 9001 / EN 29001 / 14000. They shall also be compliant with 2002/95/EG RoHS and 2002/96/EG WEEE.
12. Video Encoder shall meet the following networking standards:
    - IEEE 802.1X (Authentication)
    - IPv4 (RFC 791)
    - IPv6 (RFC 2460)
    - QoS – DiffServ (RFC 2475)

E. In addition to Video encoding capability, encoders shall also support audio, alarm activation via digital input and output, and PTZ control via built-in Serial Ports.

F. The Video encoder shall operate on an open source Linux-based platform, and shall include a built-in web server.

G. The video encoder shall be fully supported by an open and published API, which shall provide necessary information for integration of functionality into third party applications

H. For each channel, the encoder shall provide at least three individually configured simultaneous video streams at 30 frames per second (NTSC) in all resolutions up to 720x480 pixels (NTSC) in Motion JPEG and H.264. Users will not directly access the encoder. It shall provide 40% or higher compression using H.264 codec. Encoders shall be capable of running two simultaneous video streams to allow for recording and viewing at different rates. It shall not incur a delay of greater than 250ms for encoded video sent to the VMS. The Video encoder shall for each channel:
   1. Use a dedicated video compression chip.
   2. Provide at least 64 MB memory for pre & post alarm recording.

I. Audio – Performance: The encoder shall not incur a delay of greater than 150ms for encoded audio sent to the VMS. The encoder shall record single channel audio. Shall utilize Audio encoding AAC with max 16Hz, 64kbit/s.

J. Video: The video encoder shall, for each channel, be able to deliver at least three individually configurable full resolution full frame rate video streams over IP networks. The encoder shall at least support CIF (352x240) and D1 (720x480) resolutions. The H.264 implementation shall include support for both Constant Bit Rate (CBR) and Variable Bit Rate (VBR), and shall support both unicast and multicast over RTP. The video encoder shall provide configurable compression levels and contain embedded de-interlacing filters.

K. Audio: The Audio module shall be able to decode and encode full duplex Audio. The Module shall support the use of at least 12V phantom powered balanced microphones and be equipped with an adjustable gain. The Audio encoder shall be equipped with a built in pre-amplifier.

L. The module shall support two-way full duplex audio functionality:
   A. Input sources : External microphone and External line device
   B. Output sources: External line device

M. The module shall support the following for encoding:
   1. AAC LC at 8/16/32 kHz, 8-128 Kbit/s
   2. G.711 PCM at 8 kHz, 64 Kbit/s
   3. G.726 ADPCM at 8 kHz, 32 or 24 Kbit/s

N. The module shall support the following for decoding:
   1. G.726 ADPCM at 8 kHz, 32 or 24 Kbit/s
   2. G.711 PCM at 8 kHz, 64 Kbit/s
   3. G.711 PCM at 16 kHz, 128 Kbit/s

O. Functionality The video encoder shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software. Optional components downloaded from the video encoder for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as VeriSign, Inc. Each encoder channel shall support up to 20 simultaneous unicast clients and unlimited number of clients using multicast H.264. The encoder shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server and the encoder shall use an individual IP address for each video channel. The encoder shall allow for automatic detection of the encoder based on UPnP and Bonjour when using a PC with an operating system supporting this feature.

P. The video encoder shall for each video channel shall provide the ability to control network traffic by limiting the maximum bandwidth to a selected value, and the capability to limit the frame rate per viewer to a selected value, as well as the duration of each viewing session. Support Quality of Service (QoS) shall be able to prioritize traffic.

Q. The video encoder shall provide the ability to control PTZ devices from third party manufactures via appropriate PTZ drivers for the existing cameras. Security Systems Contractor shall develop, if needed, drivers for the specified encoders to support all PTZ protocols currently being used at LAX including, but are not limited to, Pelco-P, Pelco-D, Pelco Coaxitron, Cohu, and Manchester. Provide at least 100 preset positions. Provide a guard tour func-

tionality which allows the PTZ device to automatically move between selected presets using an individual speed and viewing time for each preset. The encoder shall be equipped with an integrated event functionality, which can be triggered by:

1. External input
2. Video Motion Detection
3. Video loss
4. Schedule
5. Camera tampering

R. Response to triggers shall include:
   1. Notification, using TCP, SMTP or HTTP
   2. Image upload, using FTP, SMTP or HTTP
   3. Preset call up
   4. Activating external output

S. Event functions shall be configurable via the web interface. The encoder shall incorporate support for at least IP, HTTP, HTTPS, SSL/TLS, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, NTP and Bonjour. The encoder shall for each video channel:

T. Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.

U. To ensure accuracy, the video encoder shall accept external time synchronization from an Network Time Protocol (NTP) server.

V. Provide the ability to apply a privacy mask to the image.

W. Allow for the overlay of a graphical image, such as a logotype, into the image.

X. Encoder Physical Interfaces: The module shall be equipped with 1-12 serial ports, supporting the serial connectivity for PTZ control. The Video encoder shall be equipped with minimum 4 (in standalone unit) and maximum of 6 (in a Blade unit) BNC connectors for analog composite video input with each channel being capable of auto sensing NTSC/PAL. SONY encoders shall be used where Pelco Coaxitron protocol is required to support PTZ functionality for a specific site. The Audio encoders shall be equipped with 4-12 pins that can either be configured as digital (alarm) inputs or digital outputs, connected through a removable terminal block. These inputs shall be capable of responding to normally open (NO) or normally closed (NC) dry contacts.
   1. The module shall provide the following audio connectivity:

2. Line in/Mic in through 3.5mm jack
3. Line out through 3.5mm jack
4. Balanced microphone input through terminal block
5. Speaker out through terminal block – 0,5W RMS at 4Ω

Y. Management - The encoder shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the Video encoders' configuration. Support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II. Allow updates of the software (firmware) over the network, using FTP or HTTP. All customer-specific settings shall be stored in a non-volatile memory and shall not be lost during power cuts or soft reset. Provide a log file, containing information about all users connecting to the unit since last restart. The file shall include information about the connecting IP address and the time of connecting. Provide a connection list of all currently connected viewers. The file shall include information about the connecting IP address, time of connecting and the type of stream accessed. Be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the encoder's operational status and provide information about power, communication with receiver and encoder status. Be monitored by a watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected. The encoder chassis shall, through the multi-pin connectors, provide the video encoder with chassis id information and power supply and fan status information.

Z. Security - The video encoder shall for each video channel: Support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams. Restrict access to the built-in web server by usernames and passwords at three different levels. Support for restricting access to pre-defined IP addresses only (IP address filtering). Support IEEE 802.1X authentication. The SMTP implementation shall include support for SMTP authentication.

AA. Encoder Chassis - General: The encoder chassis shall comply with all the requirements mentioned in above sections. The encoder chassis shall be manufactured with an all metal casing. The rack mounted chassis shall be designed for installation in standard EIA 19" racks. The encoder chassis shall operate in a temperature range of 0°C to +45°C (32°F to +113°F) and a humidity range of 20–80% RH (non-condensing).

BB. Standalone Encoder: The Standalone encoder shall be used in applications requiring 2-4 channels within the same location where installation of rack mount encoder is not recommended. The encoder shall be equipped with four analog video inputs, one channel of audio and a 1000BASE-T Gigabit Ethernet interface. The encoder shall be equipped with one RS422/485

port per channel providing the ability to control third part PTZ and dome cameras and two I/O ports per channel, configurable as in- or output.

CC. Low Density Rack Mounted Chassis: The Low Density chassis shall be used in applications requiring 5-18 channels to the maximum of 72 video channels within the same location. The encoder chassis shall be equipped with an embedded universal power supply. The encoder chassis shall be equipped with a standard IEC connector for power 100 – 240 VAC, 50/60 Hz, max 80W.

DD. The encoder chassis shall provide three available card slots for video server blades. The encoder chassis shall provide embedded passive network switch functionality, and be equipped with a 1000BaseT Gigabit Ethernet port. The encoders chassis shall provide hot-swap of video server blades, whereby blades may be removed and/or inserted without the need to power off/restart the rack. The encoder chassis shall be equipped with three multi-pin connectors, providing connectivity for video server blades. The encoder chassis shall be equipped with one 1000BaseT Gigabit Ethernet-port, using a standard RJ-45 socket and shall support auto sensing of network speed. The encoder chassis shall, for each card slot, be equipped with a removable terminal block providing connectivity to I/O functions and serial data from the video server blade.

EE. High Density Rack Mounted Chassis: The high Density chassis shall be used in applications where more than 72 video channels need to be encoded in a same location. The encoder chassis shall provide 2 redundant hot-swap power supplies, whereby power may be removed and/or inserted without affecting operation of the rack. Each power supply shall be equipped with a standard IEC connector for power; 100 – 240 VAC, 50/60 Hz, max 480W.

FF. The encoder chassis shall provide hot-swap of 3 replaceable fan cassettes, whereby cassettes may be removed and/or inserted without affecting operation of the rack. The encoder chassis shall provide hot-swap of video server blades, whereby blades may be removed and/or inserted without the needs to power off/restart the rack. The encoder chassis shall provide 14 available card slots for blades. The encoder chassis shall, for each card slot, be equipped with a removable terminal block providing connectivity to I/O functions and serial data from/to the blade. The encoder chassis shall be equipped with multi-pin connectors, providing required connectivity between rack and blades. The encoder shall be equipped with four 1000BASE-T Gigabit Ethernet ports, using standard RJ-45 sockets and shall support auto sensing of network. The encoder chassis shall provide the ability to daisy-chain network functionality to use 1, 2, 3 or 4 Gigabit network ports selectable via dipswitches. The encoder chassis shall, for each card slot, be equipped with a removable terminal block providing connectivity to I/O functions on the blade (one per slot), configurable as digital (alarm) inputs or digital outputs. These inputs can be configured to respond to normally open (NO) or normally closed (NC) dry contacts. The encoder chassis shall, for each card slot, be equipped

with a removable terminal block providing connectivity to serial data from/to the blade (one per port).

2.6 VIDEO DECODERS

A. Video decoder shall be used to convert the network digitized video and audio streams back to analog signals which can then be connected to regular analog monitors, and video walls within command center. The decoder shall be TV sets(such as LCD), analog monitors, and video walls within command center. The decoder shall be, designed for commercial/industrial 24/7/365 use and based upon standard components and proven technology using open and published protocols.

B. Supplier: The Video Decoder shall be NICE NVD-5004 or equivalent The Decoder shall be rack mountable or alternatively installed within rack mountable trays. The decoder shall be equipped with one video output, providing analog and digital signals, one channel of audio. The unit shall be designed to decode Motion JPEG, MPEG-4, and H.264 video sources in resolutions up to 720X480 pixels (NTSC) at 30 frames per second. The decoder shall be equipped with a serial port, providing ability to send serial data to the encoding side. The unit shall be powered through power over Ethernet according to IEEE802.3af, class 3; 8-20 VDC, max 9W.

C. VIDEO: Video Decoder shall be able to deliver digital video with resolutions up to 1280x720 pixels (HDTV 720p), depending on the quality of the originally encoded video. The unit shall allow for scaling of video to at least 1280x720 pixels for optimized quality on LCD monitor.

D. AUDIO: The video decoder shall support simplex audio via external line devices. The Video decoder shall support:
   1. AAC LC
   2. G.711 PCM
   3. G.726 ADPCM

E. Performance: Video Decoder shall be able to deliver digital video with resolutions up to 1280x720 pixels (HDTV 720p), depending on the quality of the originally encoded video. The unit shall allow for scaling of video to at least 1280x720 pixels for optimized quality on LCD monitor.

F. Functionality: The video decoder shall be able to connect to at least 200 different video encoders or network cameras as defined when configuring the unit. Remote sources shall be addressed using either IP address or a DNS-name. The decoder shall provide the ability to

manually or automatically, using a selected dwell time, toggle between defined remote sources. It shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software. Optional components downloaded from the decoder for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as VeriSign, Inc. The unit shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server. The decoder shall allow for automatic detection of the video decoder based on UPnP and Bonjour when using a PC with an operating system supporting this feature. The decoder shall provide support for both IPv4 and IPv6. The decoder shall be equipped with one DVI-I connector for digital and analog video output plus one RCA connector for analog composite video output , with one RS-485/422 serial port and one pin that can be used to manually select/jump between defied and available video sources and with one 3.5 mm jack for line output.

G. Management: The decoder shall be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the Video encoders' configuration. It shall allow updates of the software (firmware) over the network, using FTP or HTTP. The decoder shall support use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II. All customer-specific settings shall be stored in a non-volatile memory and shall not be lost during power cuts or soft reset. The Unit shall be equipped with LEDs, capable of providing visible status information. LEDs shall indicate the encoder's operational status and provide information about power, communication with receiver and encoder status. Be monitored by a watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.

2.7 NETWORK SWITCHES

A. The Network Architecture shall include provisions for segregating Viewing Segment (local and remote workstations) from Collection Segment (Edge devices including IP Cameras and Encoders), Recording Segment (NVRs and Storage system), and Management Segment (AMS and Domain Servers). Network hardware and configuration shall be of the same hardware, software, versions, features, programming and functionality as currently configured in the existing CCTV Network Architecture at LAWA. Network shall deliver high performance by placing network switches in 3 different hierarchical Access, Distribution, and Core layers.

B. The Security Systems Contractor shall provision Access Control and filtering at the Distribution Layer.

C. The resource utilization of Network Switches shall be configured such that it will not exceed 50% of the rated bandwidth of any device when piping streaming data.

D. The Security Systems Contractor shall select and install appropriate network switches from amongst LAWA provided list of approved networking equipment for CCTV.

E. The Security Systems Contractor shall collaborate with LAWA to determine the correct configuration and shall configure the switch for connectivity to LAWA network.

2.8 WIRE AND CABLE

A. Low voltage wire and cable shall be provided and installed as required, except as otherwise indicated in the drawings and specifications. Wire and cable shall be selected and used as appropriate for the device application in accordance with the device manufacturer's specifications, voltage and load, and distance of the wire/cable run. Wire and cable runs shall be "home run". Mid run splices shall not be permitted. Wire and cable shall be Belden, West Penn, Contractors Wire and Cable, or approved equal.

2.9 SYSTEM SECURITY

A. System Security shall be identical to hardware, software, versions, features, programming, functionality, auditing, virus protection and detection as currently provided in the existing CCTV Video System at LAWA.

B. Security requirements in this section apply to all components and subcomponents of the Video System. All security configurations shall be in accordance with established LAWA security policies, and the Contractor shall collaborate with LAWA to utilize existing LAWA security management devices. The Security Systems Contractor shall apply communications security techniques to the extent necessary to deny information to unauthorized personnel and to effectively defend the system against interception, traffic analysis and deception.

C. The Security Systems Contractor shall provide IT Security that incorporates intrusion prevention through filtering methods to reduce the possibility of malicious traffic entering the system from external resources.

D. The Security Systems Contractor shall provide IT Security that enforces a policy that requires workstations and personal computers to invoke a password-protected screen saver after a system administrator-configurable period of user inactivity.

E. The Security Systems Contractor shall design each system component with an audit capability that performs an administrator-configurable notification action upon detection of a potential security violation.

F. The Network based access control list (ACL) shall be used to control access between secure network and other Airport resources. The Security Systems Contractor shall ensure ports, protocols, and services that are not required are denied at the network level and disabled at the system level.

PART 3 - EXECUTION

3.1 GENERAL

A. LAWA's overarching security strategy calls for the protection of people, property, aircraft, and efficient continuity of vital operations. This strategy requires implementation of a Video System intended to enhance the ability of LAWA and affiliated agency personnel to effectively deter, detect, delay, prevent, alert, protect, respond, and recover from any situation, threat, or incident involving passengers, employees, tenants, operations, aircrafts, and critical infrastructure in an effort to ensure their safety and security and enhance the existing operational capabilities.

B. The Security Systems Contractor shall design, procure, install, configure, test and commission the new system components, provide seamless integration with other existing security systems, and test all system components. The Security Systems Contractor shall provide training to LAWA end users and system administrators.

C. During the deployment phase the Security Systems Contractor shall provide Warranty and Operations and Maintenance support. Upon system acceptance by LAWA, the Security Systems Contractor shall ensure LAWA CCTV Maintenance Provider will maintain the new devices and software for a minimum of 2-years from date of acceptance at no additional cost to LAWA.

D. The Security Systems Contractor shall be responsible for management and performance of its subcontractors, ensuring that all tasks are completed on time.

E. To complete the scope of this project, the Security Systems Contractor or approved subcontractor shall be a certified on the installation and configuration of the Video System and its subsystems. The Security Systems Contractor shall provide a manufacturer's certification of not less than fifteen (15) years for the voice and data cabling. The Security Systems Contractor shall offer proof of certification by submitting a copy of certification with the proposal.

F. The Security Systems Contractor shall assess the deadline for project activities and furnish an adequate supply of technicians and materials at all times, and shall perform the work in the most appropriate, expeditious, and economical manner to meet the deadline to avoid delay to the project.

G. The Security Systems Contractor shall provide all services and equipment (overheads, administrative supports, office spaces, parking, labor, hardware, software, etc.,) necessary to

design, develop, implement, integrate, and test a complete digital, networkable, retrievable, Video System as defined in this specification.

3.2 EXAMINATION – SITE CONDITIONS

3.3 PREPARATION

A. Security Systems Contractor shall comply with all manufacturers' instructions and recommendations concerning environmental factors.

B. Fragile Items - Security Systems Contractor shall handle any fragile items with care using protective coverings to avoid damage to sensitive instrument relays, and other devices, and to avoid contamination by dirt and debris.

C. Electrostatic charge protection - Security Systems Contractor shall, during installation, provide adequate mechanisms to ensure proper grounding to avoid damage to equipment.

D. Security Systems Contractor shall inspect the site and identify all existing security provisions and conditions. This includes identifying any communications and/or ancillary equipment currently existing and/or in use. It shall be the Security Systems Contractor's responsibility to identify all existing provisions to be terminated to new, existing, or relocated systems.

E. The Security Systems Contractor shall provide LAWA with electrical load calculations for all Servers and devices along with uninterrupted power supply (UPS) requirements for every facility where new equipment shall be installed.

F. Power Schedule shall include the following information which is required by LAWA to ensure each facility can accommodate the new electrical power requirements of the new equipment being installed:
   1. Combined Power in Amps
   2. Combined Power in Watts
   3. Combined VA Rating
   4. AC Voltage requirement
   5. Power Receptacle requirements (single or three phase)
   6. Number of Power Receptacles required per Rack
   7. Combined power Receptacle requirement

G. The Security Systems Contractor shall ensure that adequate environmental controls have been installed within each installation site. The Security Systems Contractor shall provide LAWA with a complete calculation of the British thermal Units (Btu's) generated show-

ing; Thermal Btu/hour of each server or device. And combined Btu/hour for all the new equipment to be installed. The Security Systems Contractor shall ensure that adequate controls are in place to maintain:

H. Operating Temperature: 5°-to-35°C (40°-to-95°F).

I. Operating Humidity: 20%-to-80% (non-condensing).

J. Non-operating Temperature: -40°-to-70°C (-40°-to-158°F).

K. Equipment Racks: Within 15 days after award of the Contract, the Security Systems Contractor shall provide LAWA with exact number of racks needed to accommodate new servers and devices within Data Center. LAWA shall allocate enough space to install VMS/VSS racks in a secure location providing network connectivity between the different segments of the network connecting the Video System equipment.

L. Communications : Although LAWA will be responsible for provisioning, facilitating, and configuring the Security Network Infrastructure within its Communication System, the Security Systems Contractor shall be responsible to provide detailed information including but not limited to the location and number of the required network switches, Port density, Routing Protocols, Access Control Lists (ACL), Network Performance requirements, Device Schedules, and description of how these switches are to be connected. The Security Systems Contractor shall design a "process control network" specific to the Security Systems. This shall be configured as a dedicated VLAN on LAWA enterprise network infrastructure isolating it from existing LAWA "Business Network".

M. The Security Systems Contractor shall provide all of the connectivity requirements between the project locations, security workstations and head end devices, within 15 days from contract Notice to Proceed (NTP).

N. The Security Systems Contractor shall provide LAWA with detailed Single-Line diagrams showing the signal flow path between all the networking devices in the VMS/VSS design.

O. The Security Systems Contractor is responsible to provide network connectivity between the security devices within each facility such as Standalone locations, Telecom building and/or Data Center. LAWA will provide network connectivity between the facilities.

P. The Security Systems Contractor shall provide interconnectivity requirements between new Video System components and existing systems to accommodate sharing of the security information (Video, Audio, Alarm) and resources (camera controls). This connectivity

shall include but not limited to providing access between Video System infrastructure and different Command and Control Centers at the LAX airport such as AOC, AEOC, TBIT Terminal Operations Center, ARCC, and/or any other monitoring location identified by LAWA.

Q. The Security Systems Contractor shall provide network connectivity requirements between workstations, Edge devices, VMS, and VSS equipment throughout LAWA Campus. This connectivity is included but not limited to:

R. Network connectivity between Access Layer switches attached to the new and existing edge devices at Standalone locations, Telecom building, Admin West building, Badge building, TBIT and associated the Video System Distribution Later Switches in the Data Center and/or Physical location of AMS/NVR servers.

S. Network connectivity between the Distribution Layer Switches at the Data Center and Access Layer switches attached to the Security Workstations located in Standalone locations, Telecom building, Admin West building, Admin East building, Badge building, TBIT, other terminal buildings, and/or other locations identified by LAWA.

T. The Security Systems Contractor shall provide LAWA with design requirements for configuring multicast protocol for the security systems.

U. The Security Systems Contractor shall provide requirements to obtain and assign Static IP addresses from LAWA IT for all Servers, Workstations, encoders, and networking devices.

V. Video/Audio Encoders - Installation and Configuration processes for all existing and new encoders shall be standardized. Following tasks shall be accomplished to achieve standardization across all video/audio encoders.
   1. Review existing design and validate, recommending adjustments to design as needed
   2. Devise standardized configuration
   3. Plan for correcting existing configurations
   4. Establish processes for installing and/or configuring encoders to meet specification

W. VMS - Review existing design concepts and validate. Provide an OEM Certified Engineer to support/perform installation and configuration planning with LAWA. Establish processes for installing and configuring VMS to meet specifications.

X. Video Storage System - Review existing design concepts and validate. Provide an OEM Certified Engineer to support/perform Installation and configuration planning with LAWA. Establish processes for installing and configuring VSS to meet specifications.

Y. Security Systems Contractor shall conduct site walks and provide a list of observed deficiencies to LAWA for site improvement to add power, HVAC, Grounding, etc. prior to installation.

Z. Decommissioning and removal of existing legacy system components, including but not limited to, VCRs. All recovered equipment shall be turned over to LAWA.

AA. Provide calculations for new equipment installed under this project (power to equipment racks and UPS upgrade to be provided by LAWA/others).

BB. HVAC: Provide calculations for heat dissipated from existing and new equipment to determine any additional HVAC requirements for equipment rooms. Any mechanical enhancements are not included in this project.

CC. The Security Systems Contractor shall be responsible for the interface design and implementation with all internal and external interfaces, and shall plan for these activities

DD. The Security Systems Contractor shall implement a way to record the audio from various microphones and associate it with a primary security camera so that synchronized video and audio are available for playback.

EE. PTZ – The Security Systems Contractor shall ensure that the Video System meets the response time for alarms. When the VMS is notified of an alarm it will pop-up the fixed camera or positions a PTZ camera within one second.

FF. The Security Systems Contractor shall ensure that PTZ commands sent to camera from the VMS will perform as quickly as PTZ commands from the current PTZ keyboards. The camera shall receive the command within 250ms from the VMS.

GG. VMS to CAD - The Security Systems Contractor shall review the interface requirements for VMS to CAD, and plan the design/development activities necessary to create the required interfaces.

HH. ACAMS Integration for Alarms – when new cameras are installed to view specific doors, the Security Systems Contractor shall design and implement an interface to the ACAMS system. The interface shall accept alarms via a TCP/IP sockets interface. The VMS shall forward the alarm to CAD using the same TCP/IP sockets interface that CAD and ACAMS use today.

3.4 INSTALLATION (NOT USED)

3.5 IDENTIFICATION AND LABELING

A. See IT Infrastructure Standards of Practice Volume 3, Chapter 1.

B. The Security Systems Security Systems Contractor shall confirm specific labeling requirements with LAWA IT prior to cable installation or termination.

C. All indoor cable and patch cable labels shall be pre-printed using BRADY TLS 2200 printer or equivalent and shall be placed loose on the patch cable near the connector end without heat shrinking labels. Labels shall use a three line format with the origination patch panel and port on the first line, the destination patch panel and port on the second line and the system or other descriptive information on the third line.

D. Marking:
   1. Equipment Name Plates: The following requirements shall apply:
      a. General: Attach a permanent, corrosion-resistant name plate to each equipment component showing the manufacturer's name, address, serial number and equipment rating. Each name plate shall be clearly visible on the exterior of equipment. Components located within equipment enclosures shall also be provided with name plates.
      b. Location and Fastening: Provide nameplates to identify all equipment components. Provide each panel assembly with a name plate on the interior of equipment enclosures, indicating number of equipment and unit of assembly. Fasten name plates securely with slotted stainless steel screws. The use of adhesive for fastening name plates will not be permitted.
      c. Control and Display Labels:
         1) Use: Each control, display and any other item of equipment that must be located, identified, read or manipulated shall be appropriately and clearly labeled to permit rapid and accurate identification of its operating state of position.
         2) Orientation: Orient labels and information thereon horizontally so that they may be read quickly and easily. Vertical orientation shall be used only where space is limited.
         3) Locations: Locate labels so that there is no confusion as to which item they identify. Labels shall not obscure any other information required by the operator. Controls shall not obscure labels. The location of labels shall be consistent.
      d. Use Permanent Room Numbers as indicated on the Room Finish Schedules for construction period identification of rooms and building spaces. All required shop drawings and submittals, including manuals and Project Record Drawings

shall identify rooms and spaces using the Permanent Room Numbers. Permanent identification devices including signage, equipment nameplates, and panels shall use the Permanent Room Numbers.

3.6 QUALITY CONTROL / SYSTEM TESTING AND COMMISSIONING

A. General: Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand-alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.

B. In addition to any acceptance testing requirements specified elsewhere, the Video System shall be fully tested and accepted, with test results recorded individual test reports for review and acceptance. All Video devices and equipment shall be tested.

C. In addition to any acceptance testing requirements specified elsewhere, cameras shall be fully adjusted and tested to provide optimal video pictures and signals. All camera adjustments and settings available shall be utilized and adjusted. All camera adjustments and settings shall be recorded in individual camera test reports for review and acceptance.

D. Phases of Testing
   1. On-Site Performance Verification Testing
   2. On-Site Commissioning Testing

E. Test, Commission and Acceptance
   1. Conduct an Installation Test and total Acceptance Test upon completion of equipment installation. Testing shall be coordinated as necessary, to demonstrate that all interfaces have been successfully implemented.
   2. Installation and Acceptance Test Plan and Reports:
      a Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand-alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.
      b Security Systems Contractor shall submit a Test Plan for Installation and Acceptance Tests and Commissioning for the review and approval of LAWA IT and the Design Engineer. The test plan for each phase shall detail the objectives of all tests. The tests shall clearly demonstrate that the system and its components

fully comply with the requirements specified herein. The test plan shall be provided at least forty-five (45) days prior to the scheduled start of each test. Test plans shall contain at a minimum:

1) Test equipment is to be identified by manufacturer and model
2) Interconnection of test equipment and steps of operation shall be defined
3) Expected results required to comply with specifications
4) Record of test results with witness initials or signature and date performed
5) Pass or fail evaluation with comments

3. Installation and acceptance tests shall be conducted in the normal operational environment to the maximum extent possible. The tests shall represent operation in the normal mode in which each system will operate. If interfaces are incomplete, provide simulation of those interfaces so that the system may be tested as a complete and stand- alone entity. Perform all equipment repair and/or adjustment that may be required during acceptance testing.
4. In addition to any acceptance testing requirements specified elsewhere, cameras shall be fully adjusted and tested to provide optimal video pictures and signals. All camera adjustments and settings available shall be utilized and adjusted. All camera adjustments and settings shall be recorded in individual camera test reports for review and acceptance.
5. The Test Plan shall provide conformity to all specification requirements. Satisfactory completion of the test procedure is necessary as a condition of system acceptance.
6. Documentation verification, both interconnects and functionality shall be part of the test. Where documentation is not in accordance with the installed system interconnect and operating procedures, the system shall not be considered accepted until the system and documentation correlate.
7. The Security Systems Contractor shall cooperate with and provide LAWA representative(s) the opportunity(s) to participate in any or all of the tests.
8. Test Reports: The Security Systems Contractor shall submit for each test, a test report document that shall certify successful completion of that test. Submit for review and acceptance within seven (7) days following each test. The test report shall contain, at a minimum:
   a. Commentary on test results.
   b. A listing and discussion of all discrepancies between expected and actual results and of all failures encountered during the test and their resolution.
   c. Complete copy of test procedures and test data sheets with annotations showing dates, times, initials, and any other annotations entered during execution of the test.
   d. Signatures of persons who performed and witnessed the test.
9. Test Resolution: Any discrepancies or problems discovered during these tests shall be corrected by the Security Systems Contractor at no cost to LAWA. The problems

identified in each phase shall be corrected and the percentage of the entire system re- tested determined by LAWA IT, before any subsequent testing phase is performed.

10. Adjustment, Correction, and Completion:
    a. Correct deficiencies and retest affected components.
    b. Make necessary adjustments and modification to system after obtaining approval of LAWA IT.
    c. Completion: Performance verification test shall be complete when testing or re-testing of each component has produced a positive result and has been approved in writing by LAWA IT.
11. Recording:
    a. Describe actual operational tests performed and equipment used and list personnel performing tests.
    b. Record in tabular form all test results, deficiencies, and corrective measures.
12. Termination
    a. Performance verification test shall be terminated by LAWA when:
        1) Individual components, subsystems, or the integrated system fail to perform as specified.
        2) It is determined that system is missing components or installation is not complete.
    b. Upon termination, corrective work shall be performed and performance verification test rescheduled with LAWA.
    c. Retesting shall be performed by Security Systems Contractor at no additional expense.
    d. Security Systems Contractor shall continue to perform corrective actions and re-test until system passes all tests to satisfaction of LAWA IT.
13. The Security Systems Contractor will not be responsible for failures caused by:
    a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished and automatic shutdowns and restarts of systems performed as specified.
    b. Failure of any LAWA furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
    c. Failure of existing LAWA equipment provided failure was not due to Security Systems Contractor furnished equipment, installation, or software.
14. Obtain specific approval from LAWA IT of all lens selection, camera field of view, point of focus, video quality and recording.
15. After all installation and acceptance test requirements specified have been complied with, the equipment shall be commissioned.

C. System Commissioning:
   1. Video Commissioning shall be conducted in accordance with LAWA standard video commissioning policies and procedures. This will include verification of lens selection, verification of field of view, verification of image quality, verification of focus point and where required final adjustment of position of CCTV camera.
   2. The Commissioning procedure shall be witnessed by LAWA. Security Systems Contractor shall provide a detailed inspection, and physical accounting of each equipment item. An operational demonstration shall then be conducted in which the equipment shall function in the normal operational mode, and shall operate completely error-free in terms of hardware and software performance. Occurrence of any equipment failure shall terminate the demonstration. The demonstration shall restart and run for a period of time designated by LAWA after the failure has been corrected.
   3. Prerequisite to Commissioning: Outstanding work items that may exist, such as facility interfaces, project record drawings, and/or in-process change orders, shall be documented and submitted to LAWA for review prior to start of equipment commissioning. Documentation of outstanding work items shall take the form of punch lists of critical action items lists that describe the work, the expected completion schedule, and the impact upon operation. Depending upon the nature of the outstanding work item, LAWA IT may grant a waiver to accomplish partial commissioning of any of the equipment. Completion of waived outstanding work items shall then be assigned to the post-commissioning operations and maintenance.
   4. Security Systems Contractor shall be responsible for ensuring that the installation and related interfaces are completed and operational at least thirty (30) days prior to scheduled beneficial occupancy. In the event the installation and related interfaces is not completed and operational by the scheduled beneficial occupancy date, Security Systems Contractor shall establish and submit a security plan to LAWA that complies with 49 CFR 1542 Airport Security and 49 CFR 1544 Aircraft Operator Security as appropriates, and related LAWA security requirements. The security plan shall be submitted to LAWA and TSA for approval. The security plan, revisions, and security measures to be deployed until such time the new security equipment is completed and operational shall be at Security Systems Contractor's expense.

3.7 SYSTEM STARTUP

A. The Security Systems Contractor shall not apply power to the system until after:
   1. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
   2. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   3. System wiring has been tested and verified as correctly connected as indicated.

4. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
5. Power supplies to be connected to the system and equipment have been verified as the correct voltage, phasing, and frequency as indicated.
6. Satisfaction of the above requirements shall not relieve the Security Systems Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of Security Systems Contractor work/equipment.

3.8 CLEANING (NOT USED)

3.9 COMPUTERIZED MAINTENANCE

A. Information regarding all equipment including model, nomenclature, serial number, function, location, recommended preventative maintenance schedule and other pertinent data will be stored in the CMMS database. Security Systems Contractor is required to input all information such as cabling and port information for the devices installed. Security Systems Contractor shall include in their Bid the cost for collecting and inputting this data for all systems and equipment provided by this Contract into this database.

3.10 CLOSEOUT ACTIVITIES

A. Completion of successful installation, final tests and commissioning, receipt of the test reports and as-built documentation including data input into the CMMS and successful performance of the installed equipment / system for a thirty (30) day period will constitute Final Acceptance.

3.11 MAINTENANCE (NOT USED)

END OF SECTION 28 23 13

SECTION 28 31 00 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SUMMARY

A. This performance specification provides the minimum requirements for the Life Safety System. The work provided shall include, but not limited to furnishing all permits, equipment, materials, delivery, labor, documentation, testing and services necessary to design and furnish and install a complete, operational system Fire Alarm System.

B. At the time of bid, all exceptions taken to these Specifications, all variances from these Specification and all substitutions of operating capabilities or equipment called for in these Specification shall be listed in writing and forwarded to the Designer. Any such exception, variances or substitutions that were not listed at the time of bid and are identified in the submittal, shall be grounds for immediate disapproval without comment.

C. The contractor must prepare the appropriate fire alarm system design and shall submit all the required drawings, equipment specifications, riser diagrams, worst case voltage drop calculations, battery calculations, mounting details and equipment to the city of Los Angeles Fire Department for review and obtain the permit under a deferred approval.

D. Contractor is responsible for verifying existing fire alarm devices located within the terminal and providing connection to main fire alarm system for a complete working system.

E. The contractor shall be responsible to repair or replace damaged electrical conduit or wiring and shall maintain cleanliness in the fire control room during any given project.

1.2 REFERENCES

A. All work and materials shall conform to all applicable Federal, State and local codes and regulations governing the installation.

B. Fire alarm system, equipment, installation, and wiring materials and methods used shall comply with the following codes and standards:

1. System components proposed in this specification shall be UL listed for its intended use.
2. California State Fire Marshal Listed Components.
3. NFPA 72 - National Fire Alarm Code®, as amended by CA code.
4. NFPA 13 – Standards for the installation of fire sprinkler systems.

1.3 CONTRACTOR QUALIFICATIONS

A. All work in this Section shall be performed (furnished, installed and connected) by a qualified fire alarm contractor. The fire alarm contractor shall provide the following documentation to show compliance with the contractor qualifications within 14 days after notice of award of contractor.

1. Contractor's License: A copy of the contractor's valid State of California License. The contractor must be licensed in the state of project location and have been incorporated in the business in that state for a minimum of 5 years.
2. Proof of Experience: Proof that the fire alarm contractor has successfully installed similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable size and complexity. Provide a statement summarizing any pending litigation involving an officer or principal of /or the company, the nature of the litigation and what effect the litigation may carry as it relates to this work in the worst case scenario. Non-disclosure of this item, if later discovered, may result, at the LAWA's discretion, in the contractor bearing all costs and any cost related to associated delays in the progress of the work.
3. Insurance Certificates: Copy of fire alarm contractor's current liability insurance and state industrial insurance certificates in conformance with the contract document.
4. Service Capability: The fire alarm contractor shall have in-house Engineering, installation and service personnel with a maintenance office within 50 miles of the project location
5. Authorization Letters: Letters from the fire alarm equipment manufacturer stating that the fire alarm contractor is a Factory Authorized Distributor, and is trained and certified for the equipment proposed on this project and is licensed to purchase and install the software required to provide the specified functions.
6. Certifications:
    a. Provide a copy of the National Institute for Certification in Technologies (NICET) Technician Level 3 Certificate for the employee actively involved in this project.
    b. Documentation that the fire alarm contractor has on staff personnel factory-trained and certified for the equipment proposed for this project.
7. The Contractor shall be an EST Authorized Strategic Partner or contracted with LAWA's fire alarm maintenance contractor to install EST3 equipment. Proof of authorization shall be required.

1.4 SCOPE OF WORK

A. New EST3 fire control panel to add to existing FireWorks Graphical User Interface at CUP shall be installed. All new fire alarm equipment and devices shall be a product of GE, EST Life Safety & Communications.

B. The system supplied under this specification shall be a microprocessor-based direct wired, multi-priority peer-to-peer networked system. The system shall utilize independently addressed, microprocessor-based smoke detectors, heat detectors, and modules as described in this specification. It shall be complete with all necessary hardware, software and memory specifically tailored for this installation. It shall be possible to permanently modify the software on site by using a plug-in programmer.

C. The Contractor shall obtain and pay for all permits and related fees including any fees for after-hours testing and expedited plan check.

D. The Contractor will be responsible for providing all required professional Engineering stamps/certification and all required contractor's license requirements, which are required by the Authority Having Jurisdiction (AHJ).

E. The fire alarm systems shall be operational at all times unless an approved Fire Watch is in place. The system shall not be left out of service during weekends. The contractor shall be responsible for notifying the General Contractor 48 hours in advance of any fire watch in areas that will not be protected by the fire alarm system.

F. The Contractor shall guarantee for a period of one year upon completion and final acceptance by LAWA that all addressable control relay modules, SIGA-CRs, shall be properly installed so that the SIGA-CRs do not "hang-up" or stay on a tripped state after the fire alarm has been reset.

G. Provide and be responsible for fire-watch as required by the AHJ.

H. All smoke detectors in the Contractor's area of responsibility/construction area must be covered with a compatible smoke detector cover (plastic bags are not allowed) to prevent nuisance fire alarms and dirt accumulation on the detectors.

I. All covered active smoke detectors must have the covers removed at the end of each work day or a fire watch must be established in the affected area. All return air grills/registers in the Contractor's area of responsibility/construction area must be covered with the appropriate filter element to prevent dust from being introduced into the A/C ductwork and activating the associated duct smoke detectors. These filter elements must be inspected regularly and replaced if necessary.

J. Provide LAWA list of Fire Life Safety devices including locations that will be physically removed during construction.

K. A factory trained technician shall be on site to supervise the installation.

L. The Contractor shall be responsible to contract with the Existing LAWA Maintenance Contractor to program the Fire Works system at the Central Utilities Plant and to integrate with the existing EST3 system. The Contractor shall ensure current programming efforts are coordinated with other work and contractors.

M. The fire alarm scope of work shall consist of the following minimum requirements.

1. Control Panels and Annunciators

a. Fire Control Panels

(1) A new EST3 fire alarm control panel shall be provided. New panels will be connected to main EST3 panel located at new or existing fire control room. Additional related remote data gathering panels shall be provided at these locations as needed.

(2) All FACP, remote data gathering panels and annunciators shall complete the "network" between all areas of the building(s) allowing for common monitoring and control.

(3) A new matrix graphic annunciator will be provided in the new or existing fire control room as part of the project depicting the final terminal layout. The

contractor will be responsible for providing new LED's at the Matrix annunciator as follows:

i. Horizontal rows of LED's for each alarm zone (floor) arranged vertically in columns by Pull Station, Area Smoke/Heat Detector, Elevator Lobby Smoke Detector, Duct Smoke Detector, Elevator Shaft Smoke/Heat Detector, Sprinkler Water Flow, Sprinkler Valve Tamper Switch, Beam Smoke Detector (if applicable), Vesda or Air Sampling/Aspirating Smoke Detection System (if applicable) and Special Extinguishing System Zones.

ii. Emergency Generator Run & Fail (if applicable).

iii. Fire/Booster Pump Run & Fail (if applicable).

iv. Common Trouble and Power LED's.

v. Lamp Test Push Button.

2. Initiating Devices

a. All initiating devices shall be new addressable devices and shall be clearly and accurately labeled with the corresponding device addresses using an electronic label maker, e.g. "P-touch". Any conventional initiating devices utilized shall have individual addressable monitor modules provided for each conventional device for unique addressing and annunciation.

b. All initiating devices should be clearly and accurately labeled with the corresponding device addresses using and electronic label maker, such as a "P-Touch."

c. Smoke detectors shall be added as follows:

(1) All Mechanical, Electrical, Telephone, Elevator, Transformer, Generator or similar room.

(2) At each elevator lobby.

(3) Magnetically held open or automatic-closing doors.

(4) Roll doors and/or one-hour fire-resistive occupancy separations.

(5) Elevator Shafts if required per code.

(6) Storage areas.

(7) Smoke and combination Smoke/Fire Dampers.

i. Duct smoke detectors not required for dampers where the entire space served by the smoke damper is protected by a system of area smoke detectors.

(8) Above each fire alarm control panel or booster power supply.

(9) Beam pockets shall be covered as needed in order to meet current code requirements.

(10) Provide and install new smoke detectors in rooms designated with pre-action systems. Smoke detectors shall be compatible with pre-action panel designated in the sprinkler specification. All pre-action smoke detectors shall be appropriately labeled indicating zone assignments or similar designations with an electronic label maker such as a "P-Touch."

d. Manual pull stations shall be added as follows:

(1) At all exits from the building.

(2) At every exit from every level

(3) At each elevator lobby if required by AHJ.

(4) Additional manual pull stations shall be provided so that the travel distance to the nearest manual pull station will not be in excess of (200 ft) measured horizontally on the same floor.

(5) A conventional weatherproof Pull Station shall be provided with an individual addressable module per pull station for any exterior locations.

e. Duct Detectors shall be added as follows:

(1) Downstream of the air filters and ahead of any branch connections in air supply systems having a capacity greater than 944 L/sec (2000 ft3/min)

(2) At each story prior to the connection to a common return and prior to any recirculation or fresh air inlet connection in air return systems having a capacity greater than 7080 L/sec (15,000 ft3/min) and serving more than one story.

i. Return system smoke detectors shall not be required where the entire space served by the air distribution system is protected by a system of area smoke detectors.

(3) Smoke detectors shall not be required for fan units whose sole function is to remove air from the inside of the building to the outside of the building.

(4) Smoke and combination Smoke/Fire Dampers.

i. Duct smoke detectors not required for dampers where the entire space served by the smoke damper is protected by a system of area smoke detectors.

(5) Remote LED's w/ test stations shall be provided for all duct detectors located above ceilings or out of sight.

f. Heat Detectors shall be added as follows:

(1) Elevator Machine Rooms

(2) Elevator Shafts if required per code.

(3) All Kitchens with cooking and heating equipment.

(4) Trash Rooms

g. Sprinkler tamper and water flow switches shall be individually monitored as follows:

(1) Provide one (1) supervisory module circuit for each sprinkler valve supervisory and water flow switch.

(2) Tamper switches in fire pump room only may be grouped together as allowed per coded.

h. Vesda Laser Plus Detector shall be provided per plans as required.

3. Notifications Appliances

a. All notification appliances shall be new.

b. Speakers shall be added as follow:

(1) Shall be added throughout public and private spaces to achieve 15db above ambient as needed to maintain intelligibility in all areas during paging and meet current code requirements.

(2) Elevator Cabs and Stairwells for Paging Only.

(3) Elevator Lobbies

(4) Corridors

(5) Rooms and tenant spaces exceeding 1,000 square feet.

(6) Public Restrooms for intelligibility during paging.

c. Strobes shall be added as follows:

(1) Restrooms and Similar Uses: Public, Staff, locker rooms and dressing rooms.

(2) Corridor System and Similar Uses: Public, Staff and Service Corridors, Vestibules and Passageways.

(3) Occupied Rooms where Ambient Noise Impairs Hearing of the Fire Alarm and Similar Uses: Mechanical equipment rooms, Generator rooms.

(4) Lobbies and Similar Uses

(5) Rooms used for Sleeping and Similar Uses: Sleeping rooms and suites for persons with hearing impairments.

i. Strobes that are required in sleeping areas shall be located within 16’ of pillow and have a minimum intensity of 110cd. For strobes located less than 24” from ceiling the minimum intensity shall be 117cd.

(6) Any other area for common use.

(7) Additional strobes shall be added in ADA rooms as needed.

(8) Sized Per ADA coverage and NFPA72

(9) Combination Audible/Visual appliances may be used as needed.

(10) Areas having more than 2 strobes in the field of view shall be synchronized

i. Booster Power Supplies shall be distributed throughout the facility to provide the power necessary for all indicating devices. Power Supplies shall be initiated by Synchronized Signal Modules. Synchronization by means of a common pair of wires chaining power supplies shall not an acceptable means of synchronization between units. There must be accurate labels indicating what areas of the building each zone the booster power supply provides power to (for example, a booster power supply can supply power up to four zones. Each zone must be accurately identified with the building location. This is a big help in identifying the location of strobes when troubleshooting is required.). All labels shall be made with an electronic label maker and shall be located at the front panel of the booster power supply.

4. Fan and Damper control as follows:

a. Transmit signal to the building automation system per zone for smoke control operation of all fans and dampers identified in the smoke control sequence of operation. All other dampers and fans shall be non-managed and shutdown or closed by the fire alarm system.

b. Interface and provide fan shutdown control for all non-managed fans not identified in the smoke control sequence of operation. An addressable control relay shall be provided for each unit and each addressable control relay shall be clearly labeled with the correct logical address, using an electronic label maker, such as a "P-Touch."

c. Interface and provide non-managed smoke damper shutdown for all dampers not identified in the smoke control sequence of operation. Provide addressable control relays at each electrical panel where smoke dampers are powered.

5. Other device/controls shall be added as follows:

a. Primary, Alternate elevator recall and shunt trip shall be required for each elevator.

b. The fire alarm panel shall monitor individual Fire Pump and Emergency Generator "Run" & "Fail" status for each unit. Run & Fail Status shall report as Monitor points.

c. Interface with any door lock\card accesses release circuits. An addressable control relay shall be provided at each lock location obstructing the emergency exit path. Stairwell door locks may have one common control.

d. Provide and Interface with magnetic door holder release circuits. Provide addressable control relays as required. Sources of electrical power to the magnetic door release circuits must be correctly identified with labels made with an electronic label maker. These labels must be located right next to the addressable SIGA control relays of the magnetic door circuits.

e. Sources of electric power for the magnetic door holders must be properly identified in the as-built drawings and with labels that will be located next to the corresponding addressable SIGA-CR modules.

f. Magnetic door holders shall be provided as part of this section at elevator lobby doors and all cross-corridor doors and as required per code.

g. Fireman's phone jack shall be provided at all elevators, stairwells and elevator control rooms.

1.5 SEQUENCE OF OPERATIONS

A. General Alarm Operation: Upon alarm activation of any area smoke detector, duct smoke detector, heat detector, manual pull station, sprinkler waterflow, Vesda Detector, the following functions shall automatically occur:

1. The internal audible device shall sound at the control panel, annunciator or command center.

2. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.

3. All system activity/events shall be documented on the system printer.

4. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
5. The following notification signals and actions shall occur simultaneously: (At the Terminals, the strobes are activated and messages are transmitted manually by authorized personnel.)
    a. An evacuation message shall be sounded on fire floors (zones). The signal shall be a slow whoop tone. (Evacuation message is broadcast manually by authorized personnel in the Terminals.)
    b. Activate visual strobes on the fire floors (zones). The visual strobe shall stop operating when the "Alarm Silence" is pressed. (Strobes are activated when the evacuation microphone is keyed by authorized personnel in the Terminals.)
6. Provide selective paging to each individual floor (zone). In addition to the message/channels detailed above, a dedicated page channel shall be capable of simultaneously providing live voice instructions without interrupting any of the messages listed above shall be provided.
7. Transmit a signal to the building automation system to activate the automatic smoke control sequences.
8. If a fire originates in any place other than in the communication rooms, all HVAC units will shut down, except the DX units serving the IT, MPOE and telecom rooms. If a fire originates within the communication rooms, the associated DX units will shut down.
9. All stairwell/exit doors shall unlock throughout the building.
10. All self-closing fire/smoke doors held open shall be released.
11. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
12. All Sequence of Operations Matrices shall be in picture framed (min. size 11”x17”) mounted next to the fire alarm panel.
13. EST Fireworks
    a. Display the address of the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.
    b. Display color graphical representation of the area in which the alarm or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliening, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.
    c. Display a set of written operator instructions for each point.
    d. Log operator's comments for each event to history with time and date.
    e. Log all events and operator actions to history for future review.
14. Smoke evacuation louvers shall open.

B. Elevator Lobby / Equipment Room Detectors: Upon alarm activation of any elevator lobby smoke detector or equipment room detector the following functions shall automatically occur:
    1. Perform general alarm sequence above.

2. Elevator Lobby smoke detectors shall recall the elevators to primary floor
3. Elevator Lobby smoke detectors located on the primary recall floor shall recall the elevator the alternate floor.
4. Equipment room smoke detectors shall recall the elevator to the primary floor.
5. Activation of the Equipment room heat detector shall initiate the shunt trip in the associated elevator equipment room.

C. Supervisory Operation: Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, Vesda Detector, the following functions shall automatically occur:

1. The internal audible device shall sound at the control panel, annunciator or command center.
2. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
3. All system activity/events shall be documented on the system printer.
4. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
5. Transmit signal to the central station with point identification.
6. EST Fireworks
    a. Display the address of the supervisory or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the even list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.
    b. Display color graphical representation of the area in which the supervisory or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliening, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.
    c. Display a set of written operator instructions for each point.
    d. Log operator's comments for each event to history with time and date.
    e. Log all events and operator actions to history for future review.

D. Trouble Operation: Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:

1. The internal audible device shall sound at the control panel, annunciator or command center.
2. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
3. All system activity/events shall be documented on the system printer.
4. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
5. Transmit signal to the central station with point identification.

6. EST Fireworks

    a. Display the address of the trouble or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.

    b. Display color graphical representation of the area in which the trouble or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliening, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.

    c. Display a set of written operator instructions for each point.

    d. Log operator's comments for each event to history with time and date.

    e. Log all events and operator actions to history for future review.

E. Monitor Activation: Upon activation of any device connected to a monitor circuit (fire pump/emergency generator status, Vesda Detector), the following functions shall automatically occur:

1. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.

2. All system activity/events shall be documented on the system printer.

3. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

4. EST Fireworks

    a. Display the address of the monitor or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.

    b. Display color graphical representation of the area in which the monitor or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliening, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.

    c. Display a set of written operator instructions for each point.

    d. Log operator's comments for each event to history with time and date.

    e. Log all events and operator actions to history for future review.

5. Smoke evacuation louvers shall open.

1.6 SYSTEM DESIGN PARAMETERS

A. Standby power

1. The standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for twenty four (24) hours and capable of operating the system for five (5) minutes of evacuation alarm on all devices, operating at maximum load. The system shall include a charging circuit to automatically maintain the

electrical charge of the battery. The system shall automatically adjust the charging of the battery to compensate for temperature.

B. Voltage Drop

1. The point-to-point Ohm's Law voltage drop calculations of all alarm system circuits shall no exceed 10%.

C. Spare Capacity

1. The system shall be engineered to accommodate 20% spare capacity on each individual loop, and 20% spare on system power supplies.

D. Circuiting Guidelines

1. Initiating Device Circuits

a. Where necessary, conventional initiating device circuits (i.e. waterflow switches, valve supervisory switches, fire pump functions, etc.) shall be Class B (Style "A" or "B").

2. Notification Appliance Circuits

a. All notification appliance circuits shall be Class B (Style "Y"). The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

3. Signaling Line Circuits: Addressable Analog Devices

a. The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, intrusion detection modules and notification circuit modules shall be Class B (style 4).

b. Each addressable analog loop shall be circuited so device loading is not to exceed 80% of loop capacity in order to leave for space for future devices.

4. Signaling Line Circuits: Data & Audio for FACP & Annunciator Network

a. The signaling line circuit connecting network panel/nodes, annunciators, command centers, shall be Class A (style 7). The media shall be copper except where fiber optic cable is required.

1.7 SUBMITTALS

A. General

1. It is the responsibility of the contractor to meet the entire intent and functional performance required in these specifications.

2. The proposed equipment shall be subject to the approval of LAWA.

3. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications.

B. Equipment Submittal

1. Provide list of all types of equipment and components provided. This shall be incorporated as part of a Table of Contents, which will also indicate the manufacturer's

part number, the description of the part, and the part number of the manufacturer's product datasheet on which the information can be found.

2. Provide manufacturer's ORIGINAL printed data sheets with the printed logo or trademark of the manufacturer for all equipment. Photocopied and/or illegible product data sheets shall not be acceptable.
3. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification.
4. CSFM listing sheet for each component
5. Installer's NICET 3 Certification
6. Letter or Certificate from the fire alarm manufacturer stating that the fire alarm contractor is an authorized EST Strategic Partner of the specified product.
7. Submit a copy of the system supplier's training certification for the specified product issued by the manufacturer of the integrated life safety system.
8. Equipment submittals and other documentation shall be incorporated bound with the above information indexed and tabbed for quick reference.

C. Shop Drawings

1. A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:
    a. All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, address, date including revisions, and preparer's and reviewer's initials
    b. Complete system bill of material with peripheral device backbox size information, part numbers, device mounting height information
    c. Detailed system operational description. Any Specification differences and deviations shall be clearly noted and marked.
    d. A riser diagram that individually depicts all control panels, annunciators, addressable devices and notification appliances. Field addressable devices and notification appliances may be grouped together by specific type per loop or circuit if allowed by AHJ. All addressable devices, initiating and relay, must have the identifying addresses in all drawings. All annunciators and control panels, including booster power supply panels, must be clearly identified and accurately located in all drawings.
    e. Complete 1/8" = 1'-0 scale floor plan drawing locating all system devices and elevation of all equipment at the Fire Command Station. Floor plans shall indicate accurate locations for all control and peripheral devices as well as raceway size and routing, junction boxes, and conductor size, and quantity in each raceway. All notification appliances shall be provided with a candela rating and circuit address that corresponds to that depicted on the Riser Diagram. If individual floors need to be segmented to accommodate the 1/8" scale requirements, KEY PLANS and BREAK-LINES shall be provided on the plans in an orderly and professional manner. End-of-line resistors (and values) shall be depicted.

f. All drawings shall be reviewed and signed off by an individual having a minimum of a NICET 3 certification in fire protection Engineering technology, subfield of fire alarm systems.

g. Control panel wiring and interconnection schematics. The drawing(s) shall depict internal component placement and all internal and field termination points. Drawing shall provide a detail indicating where conduit penetrations shall be made, so as to avoid conflicts with internally mounted batteries. For each additional data-gathering panel, a separate control panel drawing shall be provided, which clearly indicated the designation, service and location of the control enclosure.

h. Any additional requirements if required by AHJ for approval.

i. Complete calculations shall clearly indicate the quantity of devices, the device part numbers, the supervisory current draw, the alarm current draw, totals for all categories, and the calculated battery requirements. Battery calculations shall also reflect all control panel component, remote annunciator, and auxiliary relay current draws.

j. System (Load & Battery) calculations shall be provided for each system power supply, each notification appliance circuit and each auxiliary control circuit that draws power from any system power supply.

1.8 OPERATING AND MAINTENANCE MANUALS

A. The manual shall contain a detailed narrative description of the system Architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations.

B. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied.

C. Minimum two (2) copies of the closeout documents shall be delivered to LAWA's representative at the time of system acceptance.

D. Provide the name, address and telephone of the authorized factory representative.

E. A filled out Record of Completion similar to those provided in NFPA 72.

F. A simplified set of fire alarm system operating instructions shall be installed next to the fire alarm panel.

1.9 AS-BUILT PROJECT DRAWINGS AND DATA

A. Drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Integrated Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

B. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the Designer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.

C. All drawings shall be provided in standard AutoCAD format. Submit to LAWA Project Manager 2 complete sets of drawings in CD drawn in AutoCAD dwg format and 2 full size sets of hard copy drawings printed in minimum 36”x24” paper size.

D. All initiating devices, addressable relay modules, fire alarm panels, and booster power supply panels shall be clearly labeled with the corresponding device or panel addresses on the As-built drawings. As-built drawings must be updated and submitted to LAWA Project Manager immediately upon the completion of the project.

E. Contractor must provide a complete device list on an Excel spreadsheet that shows all initiating and output devices and includes the following information at the minimum:
   1. Device addresses
   2. Device type
   3. Location of devices

F. All fire alarm device lists shall be updated and provided to LAWA Project Manager whenever the fire alarm system is modified.

G. A fire alarm device map shall be created at the end of each fire alarm installation/modification. A fire alarm device map shows point-to-point wiring from each data card to the last fire alarm device in the data loop. Each fire alarm device on the map has its associated device type, serial number, and address. All device maps shall be updated immediately after the completion of the fire alarm system modification.

H. The Contractor shall furnish the LAWA Project Manager a list of all fire alarm panels, and booster power supply panels with the appropriate detailed locations in the close-out documentation. This list shall be updated whenever fire alarm panels or booster power supply panels are added or deleted in a fire alarm system upgrade.

I. Contractor shall provide as-built Sequence of Operation matrix posted in picture frame (Min. size 11”x17”) next to the fire alarm panel in the Fire Control Room.

J. Contractor shall provide in a Binder two (2) complete sets of Fire Alarm Operating Instructions dedicated for the Fire Control Room as part of closeout documentation.

K. Contractor shall provide additional one (1) complete set of as-built drawings in the Fire Control Room.

1.10 WARRANTY

A. The contractor shall warranty all materials, installation and workmanship for one (1) year.

B. A copy of the manufacturer's warranty shall be provided with closeout documentation and included with the operation and installation manuals.

C. The System Supplier shall maintain a service organization with adequate spare parts stock within 50 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the LAWA notifying the contractor.

1.11 EXTRA MATERIALS

A. Provide10% of each type of manual stations (minimum of one for each type).

B. Provide six keys of each type.

C. Provide 10% of each type of smoke and heat detector (minimum of one for each type).

D. Provide 10% of each type of audible and visual indicating appliances (minimum of one for each type).

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. GE Security: EST Fire & Life Safety – EST3 to match existing system and network.

B. The Contractor shall be an EST Authorized Strategic Partner or contracted with LAWA's fire alarm maintenance contractor to install EST3 equipment. Proof of authorization shall be required.

2.2 GENERAL

A. All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approval agency for use as part of a protected premises (fire alarm) system.

B. The contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

C. All System components shall be the cataloged products of a single supplier. All products shall be UL listed by the manufacturer for their intended purpose.

D. All control panel assemblies and connected field appliances shall be both designed and manufactured by the same company, and shall be tested and cross-listed as to ensure that a fully functioning system is designed and installed.

E. All fire alarm devices shall be labeled clearly with the identifying addresses using P-touch labeler or similar labeling device. The use of marker is not acceptable.

F. Before demolition, notify LAWA Instrument shop by e-mail when the demolition is about to start to take a snapshot of the existing fire alarm panel.

G. Before demolition, all fire alarm conduits and devices should be clearly identified by the fire alarm contractor to prevent the accidental removal of active fire alarm system devices and data highway wiring.

H. All active smoke detectors in the construction area should be properly covered during work hours and remove at the end of the work day.

I. All active supply and return air diffusers/registers within the construction zone should be provided with construction filters to prevent construction dust from activating the duct smoke detectors.

2.3 FIRE ALARM CONTROL PANEL

A. General, EST3.

1. The fire alarm control panel or panels and all system devices (Audible-Visuals, Visuals, pull stations, smoke and heat detectors, etc. shall be GE Security (EST). All under one label "UL/UOJZ listed and approved" for the use of fire alarm systems in this area of the United States of America.

2. The operating controls shall be located behind locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified.

3. The main controller 3-CPU shall be supervised, site programmable, and of modular design supporting up to 64 network nodes. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional node of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes. When utilizing a network and multiple wiring faults occur, the network shall re-configure into many sub-networks and continue to respond to alarm events from every panel that can transmit and receive network messages.

4. The Main Controller Module shall control and monitor all local or remote peripherals. It shall support a large 168 character LCD, power supply, remote LCD and zone display annunciators, printers, and support communication interface standard protocol (CSI) devices such as color computer annunciators and color graphic displays.

5. Each controller shall contain a RS232 printer/programming port for programming locally via an IBM PC. When operational, each controller shall support a printer through the RS232 port and be capable of message routing.

6. The programmer shall be able to download all network and firmware applications from the configuration computer to all the network panels from a single location on the system.

7. The panels shall have the ability to add an operator interface control/display at each node that shall annunciate command and control system functions.

8. The system shall store all basic system functionality and job specific data in non-volatile memory. All site specific and operating data shall survive a complete power failure intact. Passwords shall protect any changes to system operations.

9. The control panel shall contain a standby power supply that automatically supplies electrical energy to the system upon primary power supply failure. The system shall include a charging circuit to automatically maintain the electrical charge of the battery.

B. Signaling Line Circuits

1. The main controller 3-CPU shall be supervised, site programmable, and of modular design supporting up to 125 detectors and 125 remote modules per addressable Signaling

line Circuit (SLC). The CPU shall support up to 10 SLC's per panel for a total system capacity of 2500 Intelligent Addressable points. The system shall be designed with peer-to-peer networking capability for enhanced survivability, with support for up to 64 nodes, each with up to 2500 points and an overall capacity of 160,000 points.

2. The system shall provide electronic addressing of analog/addressable devices.
3. The system shall have built-in automatic system programming to automatically address and map all system devices attached to the main controller.
4. The system shall use full digital communications to supervise all addressable loop devices for placement, correct location, and operation. It shall allow swapping of “same type” devices without the need of addressing and impose the “location” parameters on replacement device. It shall initiate and maintain a trouble if a device is added to a loop and clear the trouble when the new device is mapped and defined into the system.
5. The system shall have a UL Listed Detector Sensitivity test feature, which will be a function of the smoke detectors and performed automatically every 4 hours.

C. Integrated Digital Audio

1. The system shall be capable of delivering multi-channel audio messages simultaneously over copper and/or fiber media.
2. All audio messages and live pages shall originate at the one-way audio control unit.
3. The one-way audio control unit shall store pre-recorded audio messages digitally. These messages shall be automatically directed to various areas in a facility under program control.
4. The system shall support remote cabinets with zoned amplifiers to receive, amplify and send messages through speakers over supervised circuits.
5. The one-way emergency audio control shall provide control switches to direct paging messages as follows:
    a. "All Call" to direct the page message to all areas in the facility, overriding all other messages and tones.
    b. "Page to Evacuation Area" to direct the message to the evacuation area(s), overriding all other messages and tones.
    c. "Page to Alert Area" to direct page messages to the area(s) receiving the alert message and tones, overriding all other messages and tones.
    d. "Page to Balance Building" to direct page messages to the areas) in the facility NOT receiving either the evacuation area or alert area messages.
    e. "Page by Phone" switch to select the firefighter’s telephone system as the source for paging.
6. Audio Amplifiers (Multi-Channel)
    a. Provide as minimum one twenty (20) watt audio amplifier per paging zone.
    b. The system software shall be capable of selecting the required audio source signal for amplification.

c. To enhance system survivability, each audio amplifier shall automatically provide a local 3-3-3 1000 Hz temporal pattern output upon loss of the audio communications with the one-way audio control unit, during an alarm condition.

d. Audio amplifiers shall be power limited and protected from short circuits conditions on the audio circuit wiring.

e. Each amplifier shall include a dedicated, selectable 25/70 Vrms output.

f. Each amplifier shall also include a notification appliance circuit rated at 24Vdc @ 3.5A for connection of visible (strobe) appliances. This circuit shall be fully programmable and it shall be possible to define the circuit for the support of audible, visible, or ancillary devices.

D. DACT

1. The system shall provide off premise communications capability (DACT) for transmitting system events to multiple Central Monitoring Station (CMS) receivers.

2. The system shall capable of providing the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols.

3. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

E. User Interfere

1. Main Control & Display

a. The main display shall be a large 168 character LCD with normal, alarm, trouble, supervisory, disabled point and ground fault indicators.

b. The interface shall show the first and most recent highest priority system events without any operator intervention. All system events shall be directed to one of four message queues. Messages of different types shall never intermixed to eliminate operator confusion. A "Details" switch shall provide additional information about any device highlighted by the operator.

c. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet.

d. The internal audible signal shall have different programmable patterns to distinguish between alarm, supervisory, trouble and monitor conditions.

e. The annunciator shall contain the following controls:

(1) System Reset Switch with Indicator.

(2) System Alarm Silence Switch with Indicator.

(3) System Panel Silence Switch with Indicator.

(4) Programmable Switch with Indicator.

(5) Details Switch.

(6) System Message Queue Scroll Switches.

(7) 10-Digit Keypad to Enable/Disable System and Functions.

f. An authorized operator shall have the ability to operate or modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file.

g. An authorized operator shall be capable of performing test functions within the installed system.

2. Additional Annunciation & Control

a. The system shall be capable to receive, monitor, and annunciate signals from individual devices and circuits installed throughout the building.

b. Each zone, stairwell and elevator bank shall have a control switch to initiate paging. Each paging switch shall have an associated Green LED (zone indicating circuit on) and Yellow LED (zone indicating circuit trouble).

c. Manufacturers' standard control switches shall be acceptable if they provide the required operation, including performance, supervision and position indication. If the manufacturers' standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the LAWA is required.

F. Internal Modular Power Supply

1. System power supply(s) shall provide multiple power limited 24 VDC output circuits as required by the panel.

2. Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functions.

3. Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.

4. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately annunciate as battery trouble and identify the specific power supply affected.

5. All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.

6. All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 72 - The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside the each control panel the disconnect serves.

G. Reports

1. The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance programs. The system shall provide these reports via the main LCD, and shall be capable of being printed on any system printer.

2. The system shall provide a report that gives a sensitivity listing of all detectors that have less than 75% environmental compensation remaining. The system shall provide a report that provides a sensitivity (% Obscuration per foot) listing of any particular detector.

3. The system shall provide a report that gives a listing of the sensitivity of all of the detectors on any given panel in the system, or any given analog/addressable device loop within any given panel.
4. The system shall provide a report that gives a chronological listing of up to the last 1740 system events.
5. The system shall provide a listing of all of the firmware revision listings for all of the installed network components in the system.

2.4 ANNUNCIATORS

A. General

1. The system shall have the capacity to support 64 network annunciators or EST3 network panel nodes.

B. Remote LCD Annunciator, 3ANN.

1. Remote LCD annunciators shall display each and every point in the system and be sized with the same number of characters as in the main FACP display. Annunciators not capable of displaying each point will not be considered equal. Grouping points to “zones” will not be acceptable.
2. Network alphanumeric annunciators shall be located throughout the facility as indicated on the plans and in the fire safety director's office. This annunciator shall be an Integral part of the Peer to Peer Network for survivability. Systems that require a “host” Network Node to control remote annunciators shall not be considered acceptable.
3. Each annunciator shall contain a supervised, back lit, liquid crystal with a minimum of 8 line with 21 characters per line. Where required, the annunciator shall include additional zonal annunciation and manual control without additional enclosures. The annunciator shall support full ability to serve as the operating interface to the system and shall include the following features;
    a. Matched appearance with other system displays
    b. Each LCD Display on each node (cabinet) in the system shall be configurable to show the status of any or all of the following functions anywhere in the system:
        (1) Alarm
        (2) Supervisory
        (3) Trouble
        (4) Monitor
4. Each annunciator must be capable of supporting custom messages as well as system event annunciation. It must be possible to filter unwanted annunciation of trouble, alarm or supervisory functions on a by point or by geographic area. The annunciators shall be mounted in stand-alone enclosures or integrated into the network panels as indicated on the plans.

C. Graphic Annunciator, ENVOY.

1. The annunciator shall depict the graphical diagrams or matrix lamps as required per the contract drawings and AHJ.

2. It shall operate on nominal 24 V DC and is battery backed up.
3. All annunciator switches shall be system input points and shall be capable of controlling any system output or function.
4. The graphic annunciator shall be UL, ULC and CSFM Listed.
5. The graphic shall be backlit using high intensity LEDs.
6. The unit shall be semi-flush or surface mounted to match existing.
7. The main graphic door shall be tamper resistant and equipped with a key lock.
8. It shall be possible to update the graphic image in the field without replacing the entire graphic.

2.5 EXISTING FIREWORKS COMPUTER (CUP CONTROL ROOM)

A. Overview

1. The existing Fireworks computer at the CUP control room currently functions as the center point for all operational and administration functions required for the systems provided within the specification. The graphical workstation provides command control and monitoring of the systems provided by this specification. Individual point annunciation shall be provided. Grouping of initiating devices into zones shall not meet the intent of the specification.
2. The existing Fireworks computer at the CUP control room shall be modified to show the final graphic configuration. Custom graphics shall be created or existing graphics modified to show the final site plan of the facility followed by photo building profile and every level of building floor plan map. Additional floor plan sections within a level shall be provided to allow for each initiating device to be clearly shown on a detailed floor plan map

2.6 INTELLIGENT ADDRESSABLE DETECTORS

A. General

1. Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller.
2. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.
3. The System Intelligent Detectors shall be capable of full digital communications using both broadcast and polling protocol. Each detector shall be capable of performing independent fire detection algorithms. The fire detection algorithm shall measure sensor signal dimensions, time patterns and combine different fire parameters to increase reliability and distinguish real fire conditions from unwanted deceptive nuisance alarms.

Signal patterns that are not typical of fires shall be eliminated by digital filters. Devices not capable of combining different fire parameters or employing digital filters shall not be acceptable.

4. Each detector shall have an integral microprocessor capable of making alarm decisions based on fire parameter information stored in the detector head. Distributed intelligence shall improve response time by decreasing the data flow between detector and analog loop controller. Detectors not capable of making independent alarm decisions shall not be acceptable. Maximum total analog loop response time for detectors changing state shall be 0.75 seconds. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable.
5. The detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop PC or the SIGAPRO Signature Program/Service Tool.
6. Each detector shall have a separate means of displaying communication and alarm status. A green LED shall flash to confirm communication with the analog loop controller. A red LED shall flash to display alarm status.
7. The detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector.
8. Each smoke detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings.
9. Each detector microprocessor shall contain an environmental compensation algorithm, which identifies and sets ambient “Environmental Thresholds” approximately six times an hour. The microprocessor shall continually monitor the environmental impact of temperature, humidity, other contaminates as well as detector aging. The process shall employ digital compensation to adapt the detector to both 24 hour long-term and 4 hour short-term environmental changes. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 80% and 100% of the allowable environmental compensation value. Differential sensing algorithms shall maintain a constant differential between selected detector sensitivity and the “learned” base line sensitivity. The base line sensitivity information shall be updated and permanently stored at the detector approximately once every hour.
10. The intelligent analog detectors shall be suitable for mounting on any Signature Series detector mounting base.
11. The Fire alarm system shall have the ability to set individual smoke detectors for alarm verification. Detector in the alarm verification mode shall indicate, by point in a text format at the main control and at the remote LCD annunciators.

B. Photoelectric Smoke Detector, SIGA-PS.

1. Provide intelligent photoelectric smoke detectors SIGA-PS. The analog photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings.

2. The photo detector shall be rated for ceiling installation at a minimum of 30 ft (9.1m) centers and be suitable for wall mount applications.
3. The photoelectric smoke detector shall be suitable for direct insertion into air ducts up to 3 ft (0.91m) high and 3 ft (0.91m) wide with air velocities up to 5,000 ft/min. (0-25.39 m/sec) without requiring specific duct detector housings or supply tubes.
4. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 1.0% to 3.5%. The photo detector shall be suitable for operation in the following environment:
    a. Temperature: 32°F to 120°F (0°C to 49°C)
    b. Humidity: 0-93% RH, non-condensing
    c. Installation Attitude: no limit

C. Fixed Temp/Rate of Rise Heat Detector, SIGA-HRS.

1. Provide intelligent combination fixed temperature/rate-of-rise heat detectors SIGA-HRS. The heat detector shall have a low mass thermistor heat sensor and operate at a fixed temperature and at a temperature rate-of-rise. It shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm.
2. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of the data. Systems using central intelligence for alarm decisions shall not be acceptable.
3. The intelligent heat detector shall have a nominal fixed temperature alarm point rating of 135 degrees F (57 degrees C) and a rate-of-rise alarm point of 15 degrees F (9 degrees C) per minute.
4. The heat detector shall be rated for ceiling installation at a minimum of 70 ft (21.3m) centers and be suitable for wall mount applications.

D. Standard Detector Bases, SIGA-SB/SIGA-SB4

1. Provide standard detector mounting bases SIGA-SB suitable for mounting on North American 1-gang, 3½" or 4" octagon box and 4" square box. The base shall, contain no electronics, support all Signature Series detector types and have the following minimum requirements:
    a. Removal of the respective detector shall not affect communications with other detectors.
    b. Terminal connections shall be made on the room side of the base. Bases, which must be removed to gain access to the terminals, shall not be acceptable.
    c. The base shall be capable of supporting one (1) Signature Series SIGA-LED Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.

E. Relay Detector Bases, SIGA-RB / SIGA-RB4

1. Provide standard detector mounting bases SIGA-RB suitable for mounting on North American 1-gang, 3½" or 4" octagon box and 4" square box. The base shall support all Signature Series detector types and have the following minimum requirements:

a. Removal of the respective detector shall not affect communications with other detectors.

b. Terminal connections shall be made on the room side of the base. Bases, which must be removed to gain access to the terminals, shall not be acceptable.

c. The relay shall be a bi-stable type and selectable for normally open or normally closed operation.

d. The position of the contact shall be supervised.

e. The relay shall automatically de-energize when a detector is removed.

f. The operation of the relay base shall be controlled by its respective detector processor. Detectors operating standalone mode shall operate the relay upon changing to alarm state. Relay bases not controlled by the detector microprocessor shall not be acceptable.

g. Form "C" Relay contacts shall have a minimum rating of 1 amp @ 30 V DC and be listed for pilot duty.

F. Duct Detector, SIGA-SD

1. Provide intelligent addressable photoelectric duct smoke detectors SIGA-SD. The analog photoelectric detector shall utilize a light scattering type photoelectric smoke sensor to sense changes in air samples from its surroundings. The integral microprocessor shall dynamically examine values from the sensor and initiate an alarm based on the analysis of data. Systems using central intelligence for alarm decisions shall not be acceptable. The detector shall continually monitor any changes in sensitivity due to the environmental effects of dirt, smoke, temperature, aging and humidity. The information shall be stored in the integral processor and transferred to the analog loop controller for retrieval using a laptop.

2. The percent smoke obscuration per foot alarm set point shall be field selectable to any of five sensitivity settings ranging from 0.79% to 2.46%. The duct detector shall be suitable for operation in the following environment:

   a. Temperature: -20^{o}F to 158^{o}F (-29^{o}C to 70^{o}C)

   b. Humidity: 0-93% RH, non-condensing

   c. Air velocity: 100 to 4000 ft/min

3. Provide an air exhaust tube and an air sampling inlet tube, which extends into the duct air stream up to ten feet. The sampling tube can be installed with or without the cover in place and can be rotated in 45 degree increments to ensure proper alignment with the duct airflow.

4. Status LEDs shall remain visible through a clear assembly cover.

5. The unit shall contain a magnet-activated test switch.

6. One integral form C auxiliary alarm relay shall be provided. The relay contact shall be capable of being individually programmed from the control panel. The contact shall be rated for 2.0A at 30VDC

7. Provide Key-activated Remote Test station w/ integral remote alarm indicator SD-TRK where detectors must be accessed by ladder. (CSFM 7300-1657:226)

G. Vesda LaserPlus Detector shall be provided.

2.7 CONVENTIONAL INITIATING DEVICES

A. General

1. All initiating devices shall be UL Listed for Fire Protective Service.
2. All initiating devices shall be of the same manufacturer as the Fire Alarm Control Panel specified to assure absolute compatibility between the devices and the control panels, and to assure that the application of the initiating devices is done in accordance with the single manufacturer's instructions.

B. Weatherproof Pull Stations, MPSR1-S45W-GE

1. Provide single action, single stage MPSR series fire alarm stations with terminals for wire connections rated for outdoor use.
2. Key reset shall be provided with keys identical to those required for the specified fire alarm panels, booster power supplies and other locked fire alarm cabinets.
3. Finish the station in red plated surface to inhibit corrosion.
4. Compatible factory weatherproof box w/ gasket shall be provided in all locations.
5. Pull Stations shall be individually monitored by addressable monitor module.

C. Projected Beam Smoke Detector, EC-50R/100R

1. The projected beam type smoke detector shall be a 4-wire 12/24 V DC device used with UL listed separately supplied 4-wire control panels only.
2. The unit shall be listed to UL 268 and shall consist of an integrated transmitter and receiver.
3. The detector shall operate between a range of 15 and 330 ft.
4. The temperature range of the beam shall be -22 °F to 131 °F.
5. The beam detector shall feature automatic gain control, which will compensate for gradual signal deterioration caused by dirt accumulation on the lenses.
6. The unit shall include a wall mounting bracket.
7. Testing shall be carried out using a calibrated test filter.
8. Provide wall mounted, EC-LLT, test station at ground level. Test stations shall include Power and Alarm LEDs with a key activated test switch on a single gang plate. (CSFM 7260-1657:234)
9. The unit shall be individually monitored for alarm trouble by addressable monitor module.

2.8 INTELLIGENT ADDRESSABLE MODULES

A. General

1. Each remote device shall have a microprocessor with non-volatile memory to support its functionality and serviceability. Each device shall store as required for its functionality the following data: device serial number, device address, device type, personality code, date of manufacture, hours in use, time and date of last alarm, amount of environmental compensation left/used, last maintenance date, job/project number, current detector sensitivity values, diagnostic information (trouble codes) and algorithms required to process sensor data and perform communications with the loop controller.
2. Each device shall be capable of electronic addressing, either automatically or application programmed assigned, to support physical/electrical mapping and supervision by location. Setting a device's address by physical means shall not be necessary.
3. It shall be possible to address each Intelligent Signature Series module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes, which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:
    a. Temperature: 32^{o}F to 120^{o}F (0^{o}C to 49^{o}C)
    b. Humidity: 0-93% RH, non-condensing

B. Single Input Module, SIGA-CT1

1. Provide intelligent single input modules SIGA-CT1 for monitoring of PIV's, Fan Status, Tamper Switches, Flow Switches, Generator & Fire Pump Status, Pre-action System Alarm or Trouble or any other dry contact required to be monitored.
2. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.
4. The single input module shall support the following circuit types:
    a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
    b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
    c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
    d. Normally-Open Active Latching (Supervisory, Tamper Switches)

C. Dual Input Module, SIGA-CT2

1. Provide intelligent dual input modules SIGA-CT2 for monitoring of sets of PIV's, Fan/Damper Status, Tamper Switches, Flow Switches, Generator & Fire Pump Status, Pre-action System Alarm or Trouble or any other sets of dry contacts required to be monitored.
2. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.
4. The dual input module shall support the following circuit types:
    a. Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
    b. Normally-Open Alarm Delayed Latching (Waterflow Switches)
    c. Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
    d. Normally-Open Active Latching (Supervisory, Tamper Switches)

D. Signal Module, SIGA-CC1

1. Provide intelligent single input signal modules SIGA-CC1 for activation of booster power supplies, audible/visual circuits, speaker circuits or for monitoring and communication of phone jacks.
2. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes.
4. The single input signal module shall support the following operations:
    a. Audible/Visible Signal Power Selector (Polarized 24 V DC @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)
    b. Telephone Power Selector with Ring Tone (Fire Fighter's Telephone)
5. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone".

E. Synchronized Signal Module, SIGA-CC1S

1. Provide intelligent single input signal modules SIGA-CC1S for activation of booster power supplies and/or audible/visual circuits that require synchronization.
2. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation.
3. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes.
4. The single input signal module shall support the following operations:

a. Audible/Visible Signal Power Selector (Polarized 24 V DC @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)

b. Telephone Power Selector with Ring Tone (Fire Fighter's Telephone)

5. Provides UL1971 auto-sync output for synchronizing multiple notification appliance circuits

F. Control Relay Module, SIGA-CR

1. Provide intelligent control relay modules SIGA-CR for activation and/or shutdown of fans, dampers, door holder circuits, door locks, shunt trip, elevator recall or any other fail safe system requiring control or activation.

2. The Control Relay Module shall provide one form "R" dry relay contact rated at 2 amps @ 24 V DC to control external appliances or equipment shutdown.

3. The control relay shall be rated for pilot duty and releasing systems.

4. The position of the relay contact shall be confirmed by the system firmware.

5. All addressable control relay modules, SIGA-CRs, shall be clearly labeled with the appropriate addresses, using an electronic label maker such as a "P-Touch."

6. The addressable control relay module shall be suitable for mounting on North American 2 ½" (64mm) deep 1gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

G. Manual Pull Station, SIGA-270

1. Provide intelligent single action, single stage fire alarm stations SIGA-270. The fire alarm station shall be of metal construction with an internal toggle switch. Provide a locked test feature. Finish the station in red with silver "PULL IN CASE OF FIRE" English lettering.

2. The manual station shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

3. Provide compatible surface mount red box, 276B-RSB, at all surface mount locations. Standard electrical boxes are not acceptable.

2.9 NOTIFICATION APPLIANCES

A. General

1. All appliances shall be UL Listed for Fire Protective Service.

2. All strobe appliances or combination appliances with strobes shall be capable of providing the "Equivalent Facilitation" which is allowed under the Americans with Disabilities Act accessibly guidelines (ADA (AG)), and shall be UL 1971.

3. All appliances shall be of the same manufacturer as the Fire Alarm Control Panel specified to insure absolute compatibility between the appliances and the control panels, and to insure that the application of the appliances are done in accordance with the single manufacturers' instructions.

4. Any appliances, which do not meet the above requirements, and are submitted, for use must show written proof of their compatibility for the purposes intended. Such proof

shall be in the form of documentation from all manufacturers which clearly states that their equipment (as submitted) are 100% compatible with each other for the purposes intended.

B. Wall Strobes, Genesis G1 Series

1. Strobes shall provide synchronized flash outputs. The light output shall be an even "FullLight" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the Chime and meet the intent of UL Private Mode signaling.
3. The strobe shall have selectable 15, 30, 75 or 110 cd settings.
4. It shall be possible to change the strobe setting without removing the device from the wall
5. The strobe shall be a low profile design, finished in neutral white and shall not protrude more than 1" off the wall. In-out screw terminals shall be provided for wiring.
6. The strobe shall be suitable for wall mounting and shall mount in a standard North American 1gang box. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.

C. Ceiling Strobes, Genesis GC Series

1. Strobes shall provide synchronized flash outputs. The light output shall be an even "FullLight" pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the Chime and meet the intent of UL Private Mode signaling.
3. The standard ceiling strobe shall have selectable 15, 30, 75 or 95 cd settings.
4. The high output ceiling strobe shall have selectable 95, 115, 150 or 177 cd settings.
5. It shall be possible to change the strobe setting without removing the device from the ceiling.
6. The strobe shall be a low profile design, finished in neutral white and shall not protrude more than 1.6" off the ceiling. In-out screw terminals shall be provided for wiring.
7. The strobe shall be suitable for ceiling mounting and shall mount in a standard 4" square 2 1/8" (54 mm) deep electrical box. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.

D. Weatherproof Wall or Ceiling Strobes, Integrity CS405 Series

1. In and out screw terminals shall be provided for wiring.
2. Strobes shall provide synchronized flash.
3. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 60cd, or 110cd devices
4. Strobes shall mount in a North American 1-gang box. For weatherproof application provide weatherproof wall boxes for mounting.

E. Wall Speakers, Genesis G4 Series

1. It shall be a low profile design, finished in neutral white and shall not protrude more than 1” off the wall. In-out screw terminals shall be provided for wiring.
2. The low profile speaker shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.
3. Wattage setting shall be visible with the cover installed.
4. It shall be suitable for wall mounting and shall mount in a standard North American 4" x 2 1/8" square electrical box. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.

F. Wall Speaker-Strobes, Genesis G4 Series

1. Strobes shall provide synchronized flash outputs. The light output shall be an even “FullLight” pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the horn and meet the intent of UL Private Mode signaling.
3. The strobe shall have selectable 15, 30, 75 or 110 cd settings.
4. The high output strobe shall have selectable 95, 115, 150 or 177 cd settings.
5. It shall be possible to change the strobe setting without removing the device from the wall.
6. It shall be a low profile design, finished in neutral white and shall not protrude more than 1” off the wall. In-out screw terminals shall be provided for wiring.
7. The low profile speaker shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.
8. Wattage setting shall be visible with the cover installed.
9. It shall be suitable for wall mounting and shall mount in a standard North American 4" x 2 1/8" square electrical box. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.

G. Ceiling Speaker-Strobes, Genesis GC Series

1. Strobes shall provide synchronized flash outputs. The light output shall be an even “FullLight” pattern with no hot spots. Strobes using specular reflectors are not acceptable.
2. It shall be possible to flash the strobe at a temporal flash rate to match the horn and meet the intent of UL Private Mode signaling.
3. The standard ceiling strobe shall have selectable 15, 30, 75 or 95 cd settings.
4. The high output strobe shall have selectable 95, 115, 150 or 177 cd settings.

5. It shall be possible to change the strobe setting without removing the device from the ceiling
6. The low profile speaker shall provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.
7. Wattage and Candela setting shall be visible with the cover installed.
8. It shall be a low profile design, finished in neutral white and shall not protrude more than 1.6” off the ceiling. In-out screw terminals shall be provided for wiring.
9. The strobe shall be suitable for ceiling mounting and shall mount in a standard flush mounted 4" square 2 1/8" (54 mm) deep electrical box. All mounting hardware shall be captive and there shall be no mounting screws visible after the device is installed.

H. Wall Weatherproof Speakers, Integrity 757 Series

1. Provide 4" surface weatherproof re-entrant speakers at the locations as required.
2. Speakers shall provide 2w, 4w, 8w, and 15w power taps for use with 25V or 70V systems.
3. The re-entrant speakers shall utilize high efficiency compression drivers. Cone type drivers are not acceptable.
4. At the 15 watt setting, the speaker shall provide a 102 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480.

I. Weatherproof boxes (EST 757A-WB) shall be provided for outdoor mounting.

2.10 ACCESSORY EQUIPMENT

A. Multi-Voltage Control Relays, MR Series

1. General
   a. Provide remote control relays connected to supervised ancillary circuits for control of fans, dampers, door releases, etc.
   b. Relay contact ratings shall be SPDT and rated for 10 amperes at 115 VAC.
   c. A single relay may be energized from a voltage source of 24 VDC, 24 VAC, 115 VAC, or 230 VAC.
   d. A red LED shall indicate the relay is energized.
   e. A metal enclosure shall be provided.
2. MR-100 Series
   a. Relay contact ratings shall be SPDT and rated for 10 amperes at 115VAC.
3. MR-200 Series
   a. Relay contact ratings shall be DPDT and rated for 10 amperes at 115VAC.

B. Electromagnetic Door Holders, EST 1500 Series, CSFM 3550-1501:137

1. General - Electromagnetic door holders submitted for use must have written proof of their compatibility for the purposes intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purpose intended.
2. Wall Mounted, 1504/1505/1508/1509 Series
    a. Provide flush, semi-flush or surface wall mounted electromagnetic door holder/releases selectable to 24VAC/DC or 120VAC as directed by the Consulting Designer. Finish shall be brushed zinc.

C. Remote Booster Power Supplies, BPS6A/BPS10A, CSFM 7300-1657:229

1. Unit shall be a self-contained with 24VDC power supply and batteries housed in its own locked enclosure. Keys provided shall be identical to the keys provided for all other fire alarm equipment provided.
2. Power supply shall be available in both 10 Amp or 6.5 Amp models and 110VAC or 220VAC.
3. On board LED indicators for each resident NAC, battery supervision, ground fault and AC power.
4. The power supply shall provide four (4) independent 3Amp NACs. Each circuit can be configurable as an auxiliary output.
5. Configurable for any one of three signaling rates: 120SPM; 3-3-3 temporal; or, continuous.
6. Two independent and configurable inputs switch selectable to allow correlation of the two (2) inputs and the four (4) outputs.
7. NACs shall be configurable for either four Class B or two Class A circuits.
8. The unit shall be compatible with SIGA-CC1S for synchronization of multiple power supplies without inter-connect wiring.
9. Brackets shall be provided inside the enclosure to allow mounting the signaling modules. All signaling modules shall be listed to be located inside the booster power supply enclosure.
10. A selectable dip switch shall enable built in synchronization for horns and strobes which may be used to synchronize downstream devices, as well as other boosters and their connected devices. As-built drawings should also provide this information.
11. All circuit breakers and electrical panels providing AC power to the booster power supply panels must be properly identified using an electronic label maker and these labels shall be installed inside the front cover of the panels. As-built drawings should also provide this information.

D. Pre-Action/FM 200 Panel or Specialized Fire Suppression Panel

1. A sequence of operation in picture framed (min. size 11”x17”) shall be installed next to the pre-action or FM 200 panel.

2. A simple set of operating instructions in picture framed (min. size 11”x17”) shall be installed within three feet of the pre-action or FM 200 panel

3. All pre-action or FM 200 smoke detectors shall be appropriately labeled indicating zone assignments or similar designations with an electronic label maker such as a “P-Touch.”

4. A map (min. size 11”x17” plastic laminated) indicating the locations of all smoke detectors shall be installed next to the pre-action or FM 200 panel.

5. Update Fire Control Room existing sequence of operations to reflect the changes.

2.11 CONDUCTORS

A. The requirement of this section apply to all system conductors, including all signaling line, initiating device, notification appliance, auxiliary function, remote signaling, AC and DC power and grounding/shield drain circuits, and any other wiring installed by the Contractor pursuant to the requirements of these Specifications.

B. All circuits shall be rated power limited in accordance with NEC Article 760.

C. Installed in conduit or enclosed raceway.

D. All new system conductors shall be of the type(s) specified herein.

   1. All initiating circuit, signaling line circuit, AC power conductors, shield drain conductors and grounding conductors, shall be solid copper, stranded or bunch tinned (bonded) stranded copper.

   2. All signaling line circuits, including all addressable initiating device circuits shall be 18 AWG minimum multi-conductor jacketed twisted cable or as per manufacturer's requirements.

   3. All non-addressable initiating device circuits, 24 VDC auxiliary function circuits shall be 18 AWG minimum or per manufacturer's requirements.

   4. All notification appliance circuit conductors shall be solid copper or bunch tinned (bonded) stranded copper. Where stranded conductors are utilized, a maximum of 7 strands shall be permitted for No. 16 and No. 18 conductors, and a maximum of 19 strands shall be permitted for No. 14 and larger conductors.

   5. All audible notification appliance circuits shall be 14 AWG THHN minimum twisted pairs or per manufacturer's requirements.

   6. All visual notification appliance circuits shall be 14 AWG minimum THHN twisted pairs or per manufacturer's requirements.

   7. All wiring shall be color-coded throughout, to National Electrical Code standards.

2.12 CONDUIT RACEWAY

A. All systems and system components listed to UL864 Control Units for Fire Protective Signaling System may be installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.

B. The requirements of this section apply to all system conduits, raceways, electrical enclosures, junction boxes, pull boxes and device back boxes.

C. All system conduits shall be of the sizes and types specified.

D. All system conduits shall be EMT, 3/4-inch minimum, except for flexible metallic conduit used for whips to devices only, maximum length 6 feet, 3/4-inch diameter, minimum.

E. All system conduits, which are installed in areas, which may be subject to physical damage or weather, shall be IMC or rigid steel, 3/4-inch minimum.

F. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.

G. Existing conduit raceway system may be re-used where possible.

H. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or by fire damage, and so as not to interfere with existing building systems, facilities or equipment, and to facilitate service and minimize maintenance.

I. All conduits, except flexible conduit whips to devices, shall be solidly attached to building structural members, ceiling slabs or permanent walls. Conduits shall not be attached to existing conduit, duct work, cable trays, other ceiling equipment, drop ceiling hangers/grids or partition walls, except where necessary to connect to initiating, notification, or auxiliary function devices.

J. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back boxes shall be readily accessible for inspection, testing, service and maintenance.

K. All penetration of floor slabs and firewalls shall be sleeved (1” conduit minimum) fire stopped in accordance with all local fire codes.

L. All junction box covers shall be painted red.

PART 3 - INSTALLATION

3.1 INSTALLATION CONDITIONS

A. All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation.

B. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturer’s wiring diagram.

C. The Contractor shall be responsible to contract with the Existing LAWA Maintenance Contractor to program the Fire Works system at the Central Utilities Plant and to integrate with the existing EST3 system. The Contractor shall ensure current programming efforts are coordinated with other work and contractors.

3.2 INSTALLATION REQUIREMENTS

A. Concrete floors shall be X-rayed prior to core drilling.

B. All pull stations shall be mounted 48 inches above the finished floor, as measured on handle.

C. Pull stations currently mounted at the incorrect height shall be lowered accordingly when replaced.

D. All manual pull stations shall be flush mounted. Surface mounted pull stations shall be identified and requested prior to submittal. They shall only be allowed if approved by the Designer prior to installation. All surface mount pull station shall be provided w/ manufacturer's listed back box.

E. All new audio/visual devices shall be mounted at a minimum of 80 inches and no more than 96 inches above the finished floor, as measured on strobe center. Devices shall be mounted no less than 6 inches from the ceiling.

F. No area smoke detectors shall be mounted within 36 inches of any HVAC supply, return air register or lighting fixture.

G. No area smoke or heat detector shall be mounted within 12 inches of any wall.

H. All fire alarm devices shall be accessible for periodic maintenance. Should a device location not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Project Designer. Failure to bring such issues to the attention of the Project Designer shall be the exclusive liability of the installing Electrical Contractor.

I. End of Line Resistors shall be furnished as required for mounting as directed by the manufacturer.

J. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled so removal of the device is not required to identify the EOL device. All EOL resistors shall be clearly identified in shop and As-built drawings.

K. All addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as to their function.

L. Power-limited/Non-power-limited NEC wiring standards SHALL BE OBSERVED.

M. Auxiliary relays shall be appropriately labeled on the exterior to indicate "FIRE ALARM SYSTEM" and their specific function (i.e. FAN S-1 SHUTDOWN) to match existing.

3.3 TEST & INSPECTION

A. All fire alarm testing and inspection shall be in accordance with the requirements of Chapter 14 of the latest edition of NFPA 72 and applicable LAFD Fire Code.

B. The system shall be pre-tested and documented prior to the final inspection by the AHJ. The LAWA shall be notified of the pretest 48 hours in advance and shall witness this test if desired.

C. The pre-test shall include the following:

1. All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.

2. All wiring shall be tested for continuity, shorts, and grounds before the system is activated.

3. Proper operation and execution of all its sequences

D. Perform a magnahellic test on all new duct smoke detectors to verify proper installation. Provide a copy of all measurements to LAWA.

E. Perform 10% functional testing to all installed initiating devices. If 10% of the test sample failed, add additional 10% new initiating devices pick at random by AHJ for testing. If 20% of the initial test sample failed, add 20% new initiating devices pick at random by AHJ for testing. If 30% of the initial test sample failed, add 30% new initiating devices pick at random by AHJ for testing. If greater than 30% of the initial test sample failed, test 100% all installed initiating devices.

F. At the final test and inspection, a factory-trained representative of the system manufacturer shall demonstrate to the LAWA, his representative, and the local fire inspector all its sequence of operations and any additional tests required by the AHJ. In the event the system does not operate properly, the test may be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to LAWA and the fire inspector.

3.4 TRAINING

A. The System Supplier shall schedule and present a minimum of (2) 4 hour segments of documented formalized instruction for the building, detailing the proper operation of the installed System. One training segment shall be available at the completion of the project. The second training segment may be required within the warranty period. Training shall be for a minimum of 10 personnel. Multiple training sessions may be required to accommodate off-shift LAWA personnel.

B. The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

C. The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

D. Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

END OF SECTION 28 31 00