Information Management and Technology Group (IMTG)

IT Design Guidelines

Summary Document

1.1 GOALS

This Document serves as a reference for designers providing architectural, structural, electrical, mechanical, engineering, and Information Technology design for construction projects. Adherence to this Document and the referenced standards will result in IT infrastructure and systems that are reliable, scalable, secure, serviceable, and conform to industry best practices as learned over years of use.

1.2 GENERAL

A. Design Requirements

1. Regulations: All systems and equipment shall comply with applicable building, electrical, mechanical, and fire life safety codes, all LAWA requirements and standards, and the scope of project work.
2. Best Practices: LAWA follows BICSI methodologies and most of the ANSI/TIA standards.
3. Hazardous Material: There is a possibility that portions of IT projects may be in or cross through areas that may contain lead based-paint, asbestos containing materials (ACM's) and/or other materials classified as toxic or hazardous by LAWA or Federal regulations. The Contractor, and the Contractor's designer, must consider the impact of hazardous materials on this project.
4. Accessibility: IT rooms shall be accessible from a corridor, stairwell, and/or a service elevator. IT Rooms shall not be constructed so that access is through a tenant area.
5. Clearances: IT Equipment cabinets require a minimum of four feet of clearance to walls that are opposite cabinet doors, and three feet between rows of cabinets.
6. Products: Designs shall utilize systems and products that are/ have:
    a. Long-life, industrial quality.
    b. Readily-available products and components with service support available.
    c. Maintainable arrangements with multiple units.
    d. Readily available spare parts and materials that incorporate multiple equipment elements in key systems that can be provided for reduced capacity operation when portions are down for maintenance or failure.
7. Quality Control: The Design Consultant/Contractor shall perform a quality control review of all documents for completeness, constructability, coordination with all building trades.
8. Penetrations: Conduit and cable tray penetrations through floors, walls, and roofs shall be coordinated and identified on the architectural and structural construction drawings. Proper cross-referencing between drawings shall be provided. Details for protection of all penetrations of fire resistive construction are required on plans submitted for construction approval permit.
9. Equipment Protection and System Protection: Project specifications shall clearly indicate that all equipment and systems intended for a project shall be properly protected from damage, corrosion, and weather during shipment, in-transit storage, job-site storage, field/shop prep, installation, and checkout until the work is accepted by LAWA. Ends of piping, valves, and fittings shall be protected from abuse and the entry of moisture. Electrical equipment controls, and insulation shall be protected against moisture and water damage. LAWA may, at Contractor's risk and expense,

disallow or reject the installation of previously approved equipment, if it is later determined to have deteriorated considerably during the Contractor's custody, such as during shipment, storage, and/or installation.

10. Seismic Calculations: All IT cabinets shall be designed to resist code prescribed forces, based on an estimated 2,000 pound cabinet weight. Calculations shall be stamped by a California Professional Engineer and submitted for review by LAWA Planning and Development Group (PDG) and IMTG (Information Management and Technology Group). Raceway support calculations shall be provided as determined by permit.
11. Seismic Anchoring: All equipment including conduit, J-Hooks, cable tray, and equipment cabinets which exert force on the structure other than those forces produce by gravity, and equipment shall be designed to meet Code and detailed on the drawings and coordinated with a responsible California Professional Engineer.
12. Building Seismic Joints: All conduits, cable trays, etc. crossing a seismic joint shall be designed to accommodate the full joint movement in both directions.
13. IT Room Floor Loading: MPOE and IT rooms shall be rated for a minimum of 100 lbf/ft^2. Distributed Antenna System (DAS) rooms shall be rated at a minimum of 150 lbf/ft^2.
14. Water Sources: Except for dry-standing fire sprinkler pipes, there shall be no water or sewage pipes in IT rooms. Nor shall IT rooms be constructed adjacent to or under restrooms or restaurants. The immediate environment surrounding an IT room cannot contain equipment such as steam boilers, compressors, chilled/hot water pipes, elevator/escalator equipment, electrical co-generation equipment, or waste processing. IT rooms shall not be in a flood zone.
15. New Construction: Existing IT infrastructure and systems that are in the way of new construction shall be surveyed and documented from end-to-end and a cutover plan prepared with little or no downtime.
16. Renovation Projects: Existing IT infrastructure and systems that are in the way of new construction shall be surveyed and documented from end-to-end and a cutover plan prepared with little or no downtime. All cutover plans shall be approved by LAWA.
17. Generator: If a new generator is planned for the facility, then all IT room UPS's shall be connected to the generator. This applies to new construction and new MPOE, IT, and DAS rooms.
18. IT Outages Due to Construction: Information Technology infrastructure and systems that are directly or accidently affected by building construction shall be immediately investigated from end-to-end and restored to the original working condition. Hourly reports shall be provided to LAWA IMTG on restoration progress.
19. As-Built Drawings: All installations shall be provided with minimum of three sets of As-built drawings and CD's (AutoCAD drawings in DWG file electronic format, drawn in the latest AutoCAD version), warranty documents and maintenance manuals during closeout period prior to final acceptance by LAWA. All known and unknown communications pathways and cabling identified during construction shall be shown on the final as-built drawings.

B. Drawing Requirements

1. Plan Coordination: Work shall be coordinated with all disciplines to ensure that size and location of all required conduits, cable trays, junction boxes etc., are indicated on the plans.

2. Sectional Views and Elevations: Sectional views and elevations that clearly define the details and space constraints shall be developed from floor plans included within the construction drawings. All IT Rooms shall have an elevation drawing of each wall. Room locations shall be depicted in plan view with expanded details shown by part plan at a scale no less than 1/4" = 1' – 0".
3. Project and as-built Drawings: Documentation shall include the following as best details and explains the project.
   a. Site plan
   b. Floor plans
   c. Shop drawings
   d. Elevation drawings
   e. Riser drawings
   f. Maintenance Hole Butterfly Maps
   g. Plan Views
   h. System singleline diagrams
   i. Point-to-point Interconnect diagrams
   j. Isometric drawings
   k. Photographs
   l. As-built prints of the conduit installation with routing
   m. Final acceptance test data sheet
   n. Updated Material List with quantities, model numbers and serial numbers
   o. Equipment Specification Sheets
   p. Test reports
   q. Excel spreadsheets
   r. MS Project schedules
   s. Manufacturer manuals/data sheets/submittals on all equipment and materials used
   t. Manufacturer representatives and telephone numbers
   u. Operation manuals
4. Cutover Plans: Cutover plan diagrams shall be created that diagrammatically detail the step-by-step sequence of steps required for an infrastructure or IT system cutover. All cutover plans shall be approved by LAWA.
5. Warranties: Unless stated otherwise, warranties are one year in duration and start upon final acceptance by LAWA. Written warranties shall be registered in LAWA's name (not the contractor) and delivered to LAWA.

C. IT Infrastructure and System Commissioning

1. Definition: Commissioning is the comprehensive and systematic process of assuring that all IT systems are designed, installed, and tested to LAWA's requirements. Designers shall prepare the following elements for commissioning.
   a. Test Objectives
   b. Participating Stakeholders
   c. Test Types – Factory, Sub-Systems, System, Interfaces to other Systems
   d. Prerequisites for Testing
   e. Commissioning Plan/Procedures
   f. Schedule
   g. Acceptance Criteria
   h. Testing
   i. Test Results
   j. Repeat Testing as required
   k. Analysis

l. Test Report

D. Final Acceptance Requirements

1. Final Acceptance: Final acceptance of an IT system (including infrastructure) installation or upgrade requires the following to be completed as they are applicable:
   a. Punch list Completion
   b. Major Deliverables Verification
   c. Site Cleaning/Rubbish Removal
   d. As-Built Drawings/ Plans Submittal
   e. Electronic As-Built Files Submittal
   f. Equipment/ Material List Submittal
   g. O & M User Manuals Submittal
   h. Deliverables Received - Spare Equipment & Parts Delivery
   i. Keys Transfer
   j. Passwords Transfer
   k. Licensing
   l. Final Testing
   m. Test Reports/ Certificates Submittal
   n. Final Inspection
   o. O & M Training
   p. Users Training
   q. Contractors' Contacts
   r. Product Warranties
   s. Systems Warranties
   t. As-built Documentation
   u. Lessons Learned
2. Cable Management Records: WireCAD is used as the IT cable management system. Designers need to specify to contractors to obtain the required data in the required form. Contractors then send the project data to HEI Enterprises at the Contractor's expense for verification and importability into WireCAD. Refer to the IT Standards for specifics and the required spreadsheet templates.
3. Training: Designers shall account for the following training and training documentation for new and upgraded systems.
   a. Operations manuals
   b. Technical Staff training by Contractor and/or 3rd party
   c. User's manuals
   d. User Staff training
   e. Equipment training
   f. Application training
   g. Application configuration Booklets
   h. Confined space training where applicable

1.3 DEFINITION OF TERMS/ABBREVIATIONS

AOA	Airfield Operations Area.
ACAMS	Access Control and Alarm Monitoring System.
Backbone Segment	One cable that is terminated in two patch panels – one at each end.
BAS	Building Automation System

BER	Bit Error Rate.
BHS	Baggage Handling System
BICSI	Building Industry Consulting Service International.
CAT	Category, as in CAT 6A cable.
CATV	Cable TV.
CCTV	Closed Circuit TV.
Circuit	A collection of backbone segments that are cross-connected together to allow field equipment to communicate with head-end equipment – like workstations on one side of the airport communicating with servers on the other side.
CP	Consolidation Point. An intermediary point where more permanent horizontal cables are terminated to connect to cables that get moved a lot through moves, adds, and changes.
CPP	Copper Patch Panel.
Cross-Connect	The connection of two cables, patch panels, or pieces of equipment.
DAS	Distributed Antenna System. A network of antennas sharing a common infrastructure for wireless communications.
DAQ	Delivered Audio Quality.
EMI	Electromagnetic Interference.
Electrical Feet	A measure of cable length as opposed to regular linear measurements. If two IT rooms are physically spaced 100 meters apart but the cable routing adds another 8 meters due to ceiling obstructions, then the cable will fail TIA standards testing and cannot become certified.
Entrance Facilities	That place where outside plant connects to the backbone cabling in a building. Also the place where the Service Provider terminates its cables.
Field Device	A piece of equipment that needs to connects to an IT room. Examples include ACAMS card readers, cameras, paging microphones, speakers, monitors, work stations, elevator/escalator sensors, etc.
FLSS	Fire Life Safety System
FMCS	Facilities Monitoring and Control System
FPP	Fiber Optic Patch Panel.
HH	Underground Hand Holes.
Head-End Device	A piece of equipment, typically a server, that has applications that field devices interact with.
IMTG	Information Management and Technology Group is a Los Angeles World Airport (LAWA) entity that is responsible for LAWA's information technology planning, implementation, operation and maintenance.
IT	Information Technology.
IT Room	AKA Telecommunications (Telephone) Room. The space where backbone cables cross-connect to horizontal cables to serve work areas, and may have active equipment.
MEP	Mechanical, Electrical, and Plumbing.
MER	Message Error Rate.
MH	Maintenance Hole. Can be maintenance holes or hand holes.

MPOE	Minimum Point of Entry where a Service Provider enters a building. Also a space where backbone cables cross-connect to horizontal cables to serve work areas, and may have active equipment.
MTGBB	Main Telecommunications Grounding Busbar.
nm	Nanometers.
NEC	National Electric Code.
Netbotz	Active IT infrastructure monitoring system for IT room environments.
OTDR	Optical Time Domain Reflectometer.
PDG	Planning and Development Group is a Los Angeles World Airports entity that is responsible for airport capital funded project planning, engineering and construction standard development, and tenant project approval.
Structured Cabling	A structured cabling solution is where horizontal cabling, patch panels, and work area outlets are either manufactured by or approved by a manufacturer that will warrant a cable installation as a single entity for 15+ years if installed by technicians certified by the manufacturer. This is different from installing cable, patch panels, and outlets from different manufacturers where no one warrants the complete installation.
RSSI	Received Signal Strength Indicator.
TIA	Telecommunications Industry Association.
TR	Telecommunications (Telephone) Room. AKA IT Room.
Tenant IT Room	An IT room located within the tenant leasehold separate from LAWA facilities.
TGBB	Telecommunications Grounding Busbar.
TWC	Tenant Wiring Closet that serves as an intermediate point for connections between IT equipment in a tenant lease-hold and backbone cables. This can be an IT closet or wall-mount enclosure.
UG	Underground.
UPS	Uninterruptible Power Supply.
VRLA	Valve Regulated Lead-Acid
WAO	Work Area Outlet. A WAO is where the horizontal cable from the IT room terminates near field equipment like a work station. Field equipment plugs into WAO's to connect to equipment in the IT room.
WDM	Wave Division Multiplexing. Also known as CWDM (Coarse Wave Division Multiplexing) or DWDM (Dense Wave Division Multiplexing). A technology for increasing the efficiency of fiber cables by multiplying the number of available circuits.

1.4 MPOE'S/ENTRANCE FACILITIES

A. Minimum Points of Entry

1. MPOE - Location: New building main telephone rooms (MPOE's) should be located on a perimeter wall, near the center of the building, away from sources of EMI, and near access to the underground duct banks.

2. MPOE - Size: MPOE's shall be sized to accommodate a minimum of eight (8) LAWA IT equipment cabinets, three (3) Service Provider cabinets, and four (4) ½-size tenant cabinets (if applicable) for entrance facility equipment. These requirements are in addition to any space required for MEP, UPS, and Fire Protection equipment.
3. MPOE - Shape: MPOE rooms should be rectangular in shape more towards a square. However, depending upon the surrounding architecture the MPOE room may be long and narrow as long as the required minimum width of eleven (11) feet is maintained.
4. MPOE - Room Layout: "Square" rooms should have two rows of LAWA equipment cabinets. Long rectangular rooms will have one row of equipment cabinets that should be divided in the middle.
5. MPOE - Construction: Same building materials as surrounding architecture with the exception of ceilings. Floor loading for MPOE rooms shall be a minimum of 100 lb/ft^2. Floor covering shall be anti-static tile. Ceilings shall be a minimum of nine (9) feet from the floor, open and painted white. Suspended ceilings are not permitted. Windows are not permitted. Doors shall be 1-hour fire rated and be a minimum of 36" x 80".
6. MPOE - Fire Rating: MPOE's shall have a 1-hour fire rating.
7. MPOE - Dividers: There shall be a divider between the LAWA side, the Service Provider side, and the Tenant side (if applicable). Preferably, the divider are walls, but plastic-coated chain link is acceptable to conserve mechanical resources.
8. MPOE - Plywood Backboards: Painted, fire-rated plywood should cover all of the walls that are not directly adjacent to cabinets.
9. MPOE - Lighting: IT room lighting shall be installed so that it is in the aisle in front of the cabinets and in the aisle behind the cabinets and aisles between cabinets. Fifty percent (50%) of light fixtures shall be on stand-by power where available.
10. MPOE - Electrical: MPOE rooms shall have two fully-populated electrical panels – one for normal power and one for UPS power. Calculations for electrical service for MPOE equipment shall be based on a minimum average of 2.8 kW per cabinet or rack. MPOE electrical requirements shall be sized to include eight (8) LAWA equipment cabinets and three (3) Service Provider equipment cabinets. MPOE's shall be wired for UPS power for 120V and 208V as is required after a needs assessment.
11. MPOE - UPS: MPOE rooms shall have a Liebert UPS sized according to a 2.8 kW load per cabinet but in no case less than 30 KVA. Provide (1) 30kVA/24kW 120/208V-input (can also be 480V input), 3-phase UPS, model Liebert NX 38SB030C0CHX or most current equivalent Liebert model per calculated load. Include internal VRLA battery capacity rated to 10 minutes at full load w/ disconnect facility for maintenance. UPS shall be packaged in a single 24" wide cabinet with automatic continuous static transfer switch and internal manual bypass. Include seismic anchoring and (1) OC-485 Webcard to interface w/ SiteLink system. Connect 120/208V output to single wall- mounted panelboard.
12. MPOE – UPS Batteries: Provide (1) external VRLA battery cabinet providing for a total of (26) minutes at 24kW load, model Liebert 38BP030RHX1BNR or most current

equivalent Liebert model. Include DC cables so that 27" battery cabinet can be directly bolted to right side of UPS cabinet. Include seismic anchoring.

13. MPOE – UPS Bypass: Provide (1) external maintenance bypass cabinet, model Liebert 38MB0300CC6AL or most current equivalent Liebert model. Include interconnecting cables for bolting to left side of UPS. Cabinet shall be 27" wide with single rotary switch interlocked for make-before-break manual transfers. Include seismic anchoring.
14. MPOE - Telecommunications Ground: MPOE rooms shall contain the main telecommunications grounding busbar (MTGB) to which the electrical panel ground, building steel, and all other IT rooms are connected.
15. MPOE - Mechanical: Provide one (1) 8-ton Liebert PCW PW029 chilled water 8 ton unit or most current equivalent Liebert model, as the primary system, and one (1) 8-ton Liebert PDX PX029 direct expansion 8 ton unit or most current equivalent Liebert model, as the backup system, for air conditioning unless calculated loads determine that multiple combinations of Liebert PW017, PW029, PX018, PX023, or PX029 unit are required. If Service Provider equipment is included, then increase air conditioning by 3 ton. Required ceiling space shall be made available. On direct expansion models, the refrigeration system shall be split, with the compressor located in a remote or close-coupled condensing unit. The evaporator section shall be designed for above dropped-ceiling installation. Condensing units shall be designed for outdoor installation.
16. MPOE - Mechanical Monitoring: Provide SSW-2E Sitelink interface module (or equiv.) allowing for communication with UPS and Mechanical system for integration with Sitescan Web software via TCP/IP.
17. MPOE - Mechanical Testing: Testing shall include all cooling equipment to be tested by the manufacturers' representative(s).
18. MPOE - Mechanical Commissioning (Cx): Commissioning requirements shall include test and air balance, testing the interface with the BAS (Building Automation System) and the FLSS (Fire Life Safety System), testing of the HVAC system, and testing of the IT monitoring system.
19. MPOE - Fire Protection: MPOE's shall have a double interlock pre-action system. Pre-action valves, controls, etc., shall be outside of MPOE.
20. MPOE - Security Access: MPOE rooms shall have ACAMS access and door cylinders with cyber locks.
21. MPOE - Security Monitoring: MPOE rooms shall have Netbotz cameras within the room sufficient to cover all areas. Additionally, the Netbotz system shall monitor temperature, humidity, and have water alarms on the floor near mechanical equipment. Netbotz systems shall be networked into the existing system.
22. MPOE - IT Equipment Cabinets: Damac equipment cabinets shall be sized at 34-inches wide by 36-inches deep by 84-inches tall. These dimensions apply to LAWA, Service Provider, and tenant cabinets. Cabinet doors shall be split, perforated for ventilation, and lockable. Cabinets shall have light fixtures and built-in cable management. Cabinet rails shall be drilled and tapped for standard EIA spacing. Cabinets shall have a power distribution unit and a grounding busbar.

23. MPOE - Cable Trays: MPOE's shall have cable tray down the middle of the room centered over the tops of the equipment cabinets, across the room dividing the room in half, and around the room perimeter. MPOE layouts that have two rows of equipment cabinets shall have cable tray centered over each row.
24. MPOE - Cross-Connect Facilities: Copper cross-connects shall be on the plywood backboards.
25. MPOE - Outside Conduits: Passenger Terminal MPOE's shall have geographically-redundant Entrance Facility conduits that enter the facility from two different directions. Four conduits are required from each direction for a total of eight (8) conduits. LAWA office buildings shall have geographically-redundant Entrance Facility conduits that enter the facility from two different directions. Two conduits are required from each direction for a total of four (4) conduits.
26. MPOE - Outside Innerduct: A minimum of one of the outside conduits shall be filled with three (3), 3-inch, 3-cell, Maxcell fabric innerduct in each redundant pathway.
27. MPOE - Inside Conduits: MPOE's shall have a minimum of two (2) 4-inch EMT conduits connecting to each IT Room.
28. MPOE - Inside Innerduct: A minimum of one of the inside conduits to each IT Room shall be filled with three (3), 3-inch, 3-cell, Maxcell fabric innerduct.
29. MPOE – Telephone: MPOE's shall have one (1) wall-mount Cisco VoIP telephone installed near the center of the equipment cabinets.

1.5 IT ROOMS

A. LAWA IT Rooms

1. IT Room - Locations: IT Rooms shall be located near to the area of the IT system field equipment per industry best practice, i.e. BICSI.
2. IT Room - Stacking: Industry best practice is to locate IT Rooms vertically one above the other for the floors that they serve. It is understood that architectural design may not always accommodate this.
3. IT Room - Spacing - Single Floor: IT rooms that serve only the building floor on which they are located shall be spaced so as not to exceed 200 feet from the furthest field device that they connect to. Multiple IT rooms that only serve the floor on which they are located shall be spaced not to exceed 400 feet between IT Rooms. Designers shall use 200 foot radius circles on the floor plans with the circle's center located on the center of the IT Room when determining IT Room placement. This ensures that the furthest field device will be within the 100 meter Ethernet distance requirement.
4. IT Room - Spacing - Multiple Floors: IT rooms that serve multiple floors besides the floor on which it's located shall be decreased 25 radial feet between IT rooms for each additional floor served. For example,
   a. IT Rooms on the same floor, serving the same floor, are spaced not-to-exceed 400 feet apart.
   b. IT Rooms on the same floor, serving 1 additional floor above and/or below, are spaced 350 feet apart.
   c. IT Rooms on the same floor, serving 2 additional floors above and/or below, are spaced 300 feet apart.

d. IT Rooms on the same floor, serving 3 additional floors above and/or below, are spaced 250 feet apart.

5. IT Room - Size - Single Floor: IT Room's serving a single floor shall be sized to accommodate a minimum of six (6) LAWA IT equipment cabinets. These requirements are in addition to any space required for MEP, UPS, and Fire Protection equipment. Designers shall take this into account when calculating square footage.
6. IT Room - Size - Multiple Floors: IT Room's serving multiple floors shall be sized to accommodate an additional one (1) LAWA IT equipment cabinet for each additional floor served. These requirements are in addition to any space required for MEP, UPS, and Fire Protection equipment.
   a. For example, IT Rooms serving one floor require 6 cabinets. IT Rooms serving two floors require seven (7) cabinets. IT Rooms serving three floors require eight (8) cabinets, etc.
7. IT Room - Shape: IT Room rooms should be rectangular in shape more towards a square. However, depending upon the surrounding architecture the IT Room may be long and narrow as long as the required width is maintained.
8. IT Room - Room Layout: "Square" rooms should have two rows of LAWA equipment cabinets. Long rectangular rooms will have one row of equipment cabinets that should be divided in the middle.
9. IT Room - Construction: Same building materials as surrounding architecture with the exception of ceilings. Floor loading for IT rooms shall be a minimum of 100 lb/ft^2. Floor covering shall be anti-static tile. Ceilings shall be a minimum of nine (9) feet from the floor, open and painted white. Suspended ceilings are not permitted. Windows are not permitted. Doors shall be 1-hour fire rated and be a minimum of 36" x 80".
10. IT Room - Fire Rating: IT Room's shall have a 1-hour fire rating.
11. IT Room - Dividers: There shall be a divider between the LAWA side, the Service Provider side, and the Tenant side (if applicable). Preferably the dividers are walls, but plastic-coated chain link is acceptable to conserve mechanical resources.
12. IT Room - Plywood Backboards: Painted, fire-rated plywood should cover all of the walls that are not directly adjacent to cabinets.
13. IT Room - Lighting: IT room lighting shall be installed so that it is in the aisle in front of the cabinets and in the aisle behind the cabinets and aisles between cabinets. Fifty percent (50%) of light fixtures shall be on stand-by power where available.
14. IT Room - Electrical: IT Room rooms shall have two fully-populated electrical panels – one for normal power and one for UPS power. Calculations for electrical service for IT Room equipment shall be based on a minimum average of 2.8 kW per cabinet or rack. IT Room electrical requirements shall be sized to include six (6) LAWA equipment cabinets.
15. IT Room - UPS: IT Rooms shall have a Liebert UPS sized according to load but in no case less than 20 KVA. Provide (1) 20kVA/16kW 120/208V-input, 3-phase UPS, model Liebert NX 38SB020C0CHX or most current equivalent Liebert model per calculated load. Include internal VRLA battery capacity rated to 18 minutes at full load w/ disconnect facility for maintenance. UPS shall be packaged in a single 24" wide cabinet with automatic continuous static transfer switch and internal manual bypass. Include seismic anchoring and (1) OC-485 Webcard to interface w/ SiteLink system. Connect 120/208V output to single wall- mounted panelboard.
16. IT Room - Batteries: Provide (1) external VRLA battery cabinet providing for a total of (41) minutes at 16kW load, model Liebert 38BP020RHX1BNR or most current

equivalent Liebert model. Include DC cables so that 27" battery cabinet can be directly bolted to right side of UPS cabinet. Include seismic anchoring.

17. IT Room - Bypass: Provide (1) external maintenance bypass cabinet, model Liebert 38MB0200CC6AL or most current equivalent Liebert model. Include interconnecting cables for bolting to left side of UPS. Cabinet shall be 27" wide with single rotary switch interlocked for make-before-break manual transfers. Include seismic anchoring.
18. IT Room - Telecommunications Ground: IT Rooms shall contain telecommunications grounding bus bar (TGB) which are connected to the MTGB and the local electrical panel ground, building steel, and all other IT rooms.
19. IT Room - Mechanical: IT Rooms shall have Liebert PCW PW017 chilled water 5 ton unit or most current equivalent Liebert model, as the primary system, and Liebert PDX PX018 direct expansion 5 ton unit or most current equivalent Liebert model, as the backup system, for air conditioning unless calculated loads determine that a larger Liebert PW029, PX023 or PX029 unit is required.
20. On direct expansion models, the refrigeration system shall be split, with the compressor located in a remote or close-coupled condensing unit. The evaporator section shall be designed for above dropped-ceiling installation. Condensing units shall be designed for outdoor installation.
21. IT Room - Mechanical Monitoring: Provide SSW-2E Sitelink interface module (or equiv.) allowing for communication with UPS and Mechanical system for integration with Sitescan Web software via TCP/IP.
22. IT Room - Mechanical Testing: Testing shall include all cooling equipment to be tested by the manufacturers' representative(s).
23. IT Room - Mechanical Commissioning (Cx): Commissioning requirements shall include test and air balance, testing of the interface with the BAS (Building Automation System) and the FLSS (Fire Life Safety System), testing of the HVAC system, and testing of the IT monitoring system.
24. IT Room - Fire Protection: IT Room's shall have a double interlock pre-action system. Pre-action valves, controls, etc., shall be outside of IT room.
25. IT Room - Security Access: IT Rooms shall have ACAMS access and door cylinders with cyber locks.
26. IT Room - Security Monitoring: IT Rooms shall have Netbotz cameras within the room sufficient to cover all areas. Additionally, the Netbotz system shall monitor temperature, humidity, and have water alarms on the floor near mechanical equipment. Netbotz systems shall be networked into the existing system.
27. IT Room - IT Equipment Cabinets: Damac equipment cabinets shall be sized at 34-inches wide by 36-inches deep by 84-inches tall. These dimensions apply to LAWA, Service Provider, and tenant cabinets. Cabinet doors shall be split, perforated for ventilation, and lockable. Cabinets shall have light fixtures and built-in cable management. Cabinet roofs shall be solid and not have knock-outs for conduits. Cabinet rails shall be drilled and tapped for standard EIA spacing. Cabinets shall have power distribution units and a grounding bus bar.
28. IT Room - Cable Trays: IT Room's shall have cable tray down the middle of the room centered over the tops of the equipment cabinets, across the room, and around the room perimeter. IT Room layouts that have two rows of equipment cabinets shall have cable tray centered over each row.
29. IT Room - Cross-Connect Facilities: Cross-connects shall be on the plywood backboards.

30. IT Room - Conduits: IT Rooms shall have a minimum of two (2) 4-inch EMT conduits connecting to the MPOE.
31. IT Room - Innerduct: A minimum of one of the inside conduits to each IT Room shall be filled with three (3), 3-inch, 3-cell, Maxcell fabric innerduct.
32. IT Room – Telephone: IT rooms shall have one (1) wall-mount Cisco VoIP telephone installed near the center of the equipment cabinets.

B. Tenant IT Rooms

1. Tenants are required to build out IT Rooms within their assigned leasehold area(s).

C. Tenant Wiring Closets

1. Location: For new construction, TWC's should be separate rooms (approximately 6' x 8') adjacent to new LAWA IT rooms with four (4) ½-size Damac equipment cabinets.
2. Conduit: A minimum equivalent of two (2) 4-inch conduits shall be installed from the TWC room to the LAWA IT Room. A minimum equivalent of two (2) 2-inch conduits shall be installed from the tenant Armarac-type wall-mounted cabinet to the LAWA IT Room – assuming an actual room it not used.
3. Tenant Facilities: Tenants are responsible to extend infrastructure from the tenant leasehold to TWC.

D. DATA CENTERS

1. See IMTG for specific design requirements.

1.6 OUTSIDE PLANT

A. Maintenance Holes

1. Underground Utility Location: Utilities shall be located by contacting Dig Alert (811 or 800-227-2600 or www.digalert.org).
2. Underground Utility Location Identification: Orange is the uniform color code for utility flagging, painting, and identifying communications, alarms, signals, and CATV.
3. Maintenance Hole - Size: Maintenance Holes shall be sized a minimum of 72' W x 96' L x 84' H.
4. Maintenance Hole - Ratings: Maintenance Holes shall be rated for the area used. Maintenance Holes on the AOA shall be aircraft rated.
5. Maintenance Hole Construction: Maintenance Holes shall be poured concrete with round cover, drain/sump hole, and built-in ladder, cable racks, and cable pulling eyes. Ductbanks that have more than eight (8) conduits (4 entry and 4 exit) require a manhole. Maintenance holes with square covers shall have torsion-spring assisted openings.
6. Maintenance Hole - Spacing: Maintenance Holes shall be spaced not to exceed 400 feet apart.
7. Hand Hole - Size: Hand Holes shall be sized a minimum of 36" W x 60" L x 48 H.
8. Hand Hole - Ratings: Hand Holes shall be rated for the area used. Maintenance Holes on the AOA shall be aircraft rated.

9. Hand Hole - Construction: Hand Holes shall be poured concrete with drain/sump hole, and built-in ladder, cable racks, and cable pulling eyes. Hand Holes covers shall be rectangular with torsion spring assisted opening. Ductbanks that have less than eight (8) conduits (4 entry and 4 exit) may use a Hand Hole or a Maintenance Hole.
10. Hand Hole - Spacing: Underground Hand Holes shall be spaced not to exceed 400 feet apart.
11. Splicing: Splicing is permitted in Maintenance Holes within enclosures manufactured for the purpose. Splices are only for the necessity of breaking up long cable pulls. Splices shall be kept to an absolute minimum. Splice cases shall be waterproof and secured to mounting rails within the Maintenance Holes.
12. Junction Boxes: Junction Boxes are different from pull-boxes in that they contain cabling terminations and/or active equipment. The minimum size for junction boxes is 24-inches.
13. Junction Box Spacing. JB's shall be spaced not to exceed 150 feet apart.
14. GPS Coordinates: The location of all underground Maintenance Holes and Hand Holes shall be identified by two methods – XY coordinates utilizing the California State Plane Coordinate System, Zone V (CA83-IVF), and by Latitude/Longitude. Z values and invert elevations shall be provided in U.S. foot/inch measurements.
15. Documentation: All Maintenance Hole surveys shall have multiple pictures taken of each wall with a temporary sign taped to the wall showing the cardinal direction (north, south, east, and west). Maintenance Hole Surveys shall also have butterfly maps completed for each wall. Obtain template from IMTG Infrastructure division.

B. Cabinets

1. Outdoor - Cabinets: Outdoor enclosures enclosing equipment shall be NEMA 4 stainless steel and sized to house a fiber optic patch panel, copper patch panel, network switch, electrical panel, and UPS with battery backup sufficient for 2 hours. Hoffman-style sized at 72" x 72" x 12-18" are typical. Outdoor cabinets shall have a minimum equivalent of one (1) 4-inch conduit.
2. Outdoor - Pedestals: Outdoor enclosures enclosing active equipment shall be NEMA 4 stainless steel and sized to house a fiber optic patch panel, copper patch panel, network switch, electrical panel, and UPS with battery backup sufficient for 2 hours. Outdoor pedestals enclosing passive equipment shall be sized to have a minimum of 36-inchs of usable rack-mount rail space. Outdoor pedestals shall have a minimum equivalent of one (1) 4-inch conduit.
3.

C. Towers

1. Antenna - Towers: Antenna towers shall be constructed high enough for line-of-sight wireless connectivity to the next antenna. Antenna towers shall be triangular, self-supporting, galvanized structures without the need for guying. Antenna towers shall meet the ANSI/TIA 222-G (2014) Structural Standard for Steel Antenna Towers and Antenna Supporting Structures and shall be accompanied by a structural analysis report.

2. Antenna - Masts: Antenna masts shall be heavy duty galvanized steel.
3. Antenna - Elevations: Antennas shall be mounted so that the bottom of the antenna is a minimum of six (6) feet above the deck where people walk.
4. Antenna - Roof Mounts: Short antennas may be mounted to non-penetrating rectangular-base roof mounts that are secured with concrete blocks. The ballast weight requirement shall be as specified by the roof-mount manufacturer. Roof-mount base shall be wide enough to accommodate the entire concrete block so that blocks do not damage the roofing materials.
5. Antenna - Wall Mounts: Wall mounts and brackets to support masts and pipes shall be galvanized high strength steel. Mounts shall be anchored into building structural members.

D. Outdoor Conduit

1. Types: Galvanized rigid conduit shall be used for temporary communications pathways above ground, alongside buildings, or attached to fences. PVC Schedule 40 PVC.
2. Sizes: Conduit shall be sized for the required 40% fill. Conduits for underground communications ductbanks underground shall be a minimum of two (2) 4-inch.
3. Ductbanks: Main backbone ductbanks shall have sixteen (16) conduits arranged in a 4 x 4 row configuration. Branch duckbanks shall have a minimum of four (4) conduits arranged in a 2 x 2 row configurations. All conduits shall be encased in concrete.
4. Boring: Directional, auger (jack and bore), and impact (pneumatic and hydraulic) boring are allowed upon receiving required approvals. Auger boring requires casing sleeves to be installed.
5. Bend Radii: Minimum bend radius is 24-inches. This is for fiber optic cables and copper cables less than 200 pairs. Consult specific Service Providers for required bend radii for their cables.
6. Pull Ropes: All conduits shall have pull ropes either in the conduit or within the innerducts.
7. Ductbank Separation: Communications ductbanks shall be separated from other utilities by twelve (12) inches when running parallel and six (6) inches when crossing.
8. Labeling: Conduits entering a facility from underground shall be labeled as to its destination.

E. Outside Innerducts

1. HDPE Plastic: Unless required by a Federal Agency, HDPE innerduct is not to be installed in outside plant due to inefficient use of conduits.
2. Fabric: Three (3), 3-inch, 3-Cell, Maxcell fabric innerduct shall be installed within one of the 4-inch conduits in the ductbank.
3. Labeling: Fabric innerduct shall be labeled at each end as to origin and destination.
4. Splicing: Innerducts shall not be spliced together within conduits.
5. Pullropes: All empty innerducts shall contain pullropes that are tied off at each end.

F. Outside Cabling

1. Types: Outside plant fiber optic cables shall use Corning SMF28e+ glass with bend-insensitive additive code "H" (Ultra) and Corning Altos jacketing. Outside plant cables that are required to enter facilities beyond 50 feet shall use the above but with Corning Freedm® jacketing.
2. Slack Cable: Fifty (50) feet of slack cable shall be coiled up within every other Maintenance Holes. If a particular Maintenance Holes is too full, then the next adjacent Maintenance Holes shall contain the slack.
3. Quantity: A minimum of 288 strands of fiber shall be installed outdoors. Cable shall have an outer diameter of 1-inch or less to fit in the Maxcell innerduct.
4. Terminations: Fiber cables shall use "LC" ultra polish (LC-UPC) type fiber connectors.
5. Splices: All splices shall be fusion-spliced. Mechanical splices are not allowed.
6. Labeling: All cables shall be labeled within twelve (12) inches of each end. Within Maintenance Holes, all cables shall be labeled within twelve (12) inches of each entrance and exit conduit and on each cable slack loop. Fiber cables shall also be labeled within twelve (12) inches of entering and exiting splice cases.
7. Direct Burial: The direct burial of fiber optic (or copper) cable is not permitted.

G. Aerial

1. Aerial - Uses: Aerial pathways and cable installations are allowed for temporary installations to project trailers and for outlying facilities with prior approvals.
2. Aerial - Installations: Poles shall be of sufficient strength and size to withstand wind loading and maintain vertical clearances. Guying shall be used to offset transverse loading as required.
3. Aerial - Pole Depth Below Ground: A 12' pole shall have six (6) feet buried below ground. A 15' pole shall have seven (7) feet buried below ground. A 18' pole shall have eight (8) feet buried below ground.

1.7 INSIDE PLANT

A. Patch Panels

1. Rack-mount Fiber Patch Panels: FPP's installed within cabinets shall be sized for a minimum of 144/288 strands of fiber.
2. Wall-mount Fiber Patch Panel: Wall-mount FPP's shall be sized for a minimum of 144/288 strands of fiber. Wall-mount FPPS's shall stand off the wall by a minimum of 4-inches to coil up slack cable behind. FPP's shall also have an 8-inch wireway gutter all around the FPP for fiber jumpers – see existing installations.

B. Indoor Conduit

1. Types: EMT conduit shall be used for indoor pathways except where GRC is specified PVC conduit shall not be used indoors. Flexible or Sealtite conduit is used only for

field equipment pathway whips and crossing building expansion joints. Surface-mount and pole-mount raceways are acceptable for furniture.

2. Sizes: Conduit shall be sized for the required 40% fill. Conduit for fiber optic cable shall be a minimum of 2-inches. Conduits connecting IT Rooms to each other and to MPOE's shall be a minimum of two (2) 4-inch.
3. Coring: Coring within facilities is allowed after taking x-rays or using ground-penetrating radar to determine that the proposed coring area is free of utilities.
4. Bend Radii: Minimum bend radius is 24-inches. This is for fiber optic cables and copper cables less than 200 pairs. Consult specific Service Providers for required bend radii for their cables.
5. Sleeves: Through-the-wall or floor conduit sleeves should not extend more than 1" to 3" into the rooms. Conduit slots are allowed. Minimum slot size is 6" x 10". Slots should be flush against the wall.
6. Condulets: Condulets are discouraged. If required, only very large condulets designed for fiber cable are allowed in order to maintain an adequate 15x indoor the cable O.D. bend radii.
7. Pull Ropes: All conduits shall have pull ropes either in the conduit or within the innerducts.
8. Ductbank Separation: Communications conduits shall be separated from fluorescent light fixtures and other utilities by six (6) inches.
9. Labeling: Conduits shall be labeled on both ends as to the origin and destination.

C. Indoor Cabling

1. Types: Inside plant fiber optic cables shall use Corning SMF28e+ glass with bend-insensitive additive code "H" (Ultra) and Corning MIC jacketing. Inside plant cables that are required to exit facilities shall use Corning Freedm® jacketing.
2. Slack Cable: Twenty-five feet of slack cable shall be coiled up behind wall-mount patch panels and within equipment cabinets for rack-mount patch panels.
3. Terminations: Fiber cables shall use "LC" ultra polish (LC-UPC) type fiber connectors.
4. Splices: All splices shall be fusion-spliced. Mechanical splices are not allowed.
5. Labeling: All cables shall be labeled within twelve (12) inches of each end. Within Maintenance Holes, all cables shall be labeled within twelve (12) inches of each entrance and exit conduit and on each cable slack loop. Fiber cables shall also be labeled within twelve (12) inches of entering and exiting splice cases.

D. Infrastructure Testing

1. Equipment: All testing equipment shall be calibrated within a year of conducting tests and shall contain the most recent ANSI/TIA testing protocols for certifying the test results.
2. Fiber Preparation: All fiber cable connectors shall be cleaned and visually inspected with a 400x microscope prior to testing.

3. Fiber on the Reel: All fiber jobs where the fiber length was procured so that the entire reel of fiber will be used are required to have every fiber strand tested on the reel prior to installation.
4. OTDR: All outdoor cables shall have bidirectional OTDR testing of each fiber strand.
5. Power Meter: All outdoor cables shall have bidirectional power meter readings at both 1310 and 1550 nm.
6. End-to-End Circuits: All fiber optic circuits shall be tested bi-directionally from one end to the other end with both a power meter and an OTDR.
7. WDM: All WDM circuits shall be tested bi-directionally at 1550 nm.
8. Copper: All backbone copper cables shall be tested consistent with the cables' rating. For example, Category 3 cable shall be tested with a CAT 3 protocol, Category 5 cable shall be tested with a CAT 5 protocol.
9. CAT 6A: CAT 6A structured cabling solutions shall be tested and certified for CAT 6A performance with a tester designed for ANSI/TIA CAT 6A testing.

1.8 HORIZONTAL DISTRIBUTION

A. Conduit

1. Type: EMT.
2. Size: No less than ¾-inch EMT shall be used for horizontal distribution.
3. Junction Boxes: Minimum junction box size is 24" x 24". Junction box spacing shall not exceed 150 feet.
4. Consolidation Points: CP's may be used if they are readily accessible. CP's may be installed in an enclosure that fits in a 2' x 2' suspended tile grid if the enclosure opens towards the floor. CP's may not be installed in ceilings. CP's may be installed in column enclosures.
5. Cabling: A structured cabling solution is required in new facility construction. Structured cabling solutions shall use CAT 6A cable. Installations other than structured shall use CAT 6 cable.

B. Work Areas

1. Location: Work areas shall have a sufficient numbers of WAO's conveniently located to serve the needs of the space.
2. Outlet Boxes: Work area outlet boxes shall be a minimum of 4S deep (4-inch square), flush-mounted, and located adjacent to a power receptacle (if possible).
3. Cables: Three (3) horizontal cables are typically run to each WAO. Some areas like common use ticket and gate counters require a minimum of four (4) cables per WAO.
4. Labeling: WAO cables and outlet faceplates shall be labeled.
5. Jumpers: Copper jumpers shall be of sufficient length to allow the required movement of the connected field equipment.

1.9 IT SYSTEMS

A. ACAMS (Access Control and Alarms Monitoring System)

1. The ACAMS shall be an extension to the access control and alarms monitoring system currently deployed within the TBIT and throughout the Los Angeles International Airport (Airport).
2. The Contractor/Security Systems Designer shall coordinate with LAWA Airport Police to finalize the location of all access control points.
3. Configuration and Activation of ACAMS devices shall be performed by LAWA. The Contractor may hire a certified Security Systems installer of their choosing to provide and install the ACAMS field devices.
4. Equipment: LAWA currently has the UTC Picture Perfect system with Micro 5 controllers and HID R40 and RK40 readers. The Contractor shall contact LAWA IMTG for specific ACAMS reader, microcontroller, door contact, horn, Request-to-exit, workstation, power supply, and other associated equipment standards.
5. There are special operational and functional requirements for ACAMS control of baggage doors (portals). Refer to ACAMS Guide Specifications – Section 28 13 00.
6. All ACAMS equipment requiring building power shall be connected to building UPS or stand-by power circuits where available, as indicated in the drawings. The security systems Contractor shall coordinate with the electrical Contractor.

7. Asset tagging and inventory list: Contractor shall collect and record in a Microsoft Excel spreadsheet all information regarding all equipment including model, serial number, function, location. This inventory information shall be submitted to LAWA. LAWA will provide the Contractor with the spreadsheet format for inputting the data.
8. Quality Assurance: 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.
9. Qualifications:
   a. Installation Experience. Contractor shall have provided and completed installation services for at least five (5) facility sites similar to that which is to be provided for this project. The Contractor shall submit to the Owner a list of references conforming to the experience requirements.
   b. Certifications. Contractor shall be certified by the manufacturer(s) for installation of each product to be installed under this specification.
10. Sequencing: The systems installations shall be sequenced in a fashion to allow proper coordination with all project disciplines. The LAWA access control and CCTV systems are critical airport systems and no unscheduled downtime shall be allowed at any time during construction.
11. Warranty Period: Warranty. Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of two (2) years from Final Acceptance.
12. Spare Parts: 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 than 10% of the items provided and installed under the project.

Contractor/Security Designer may contact LAWA IMTG to determine if a smaller pool of spare parts is acceptable.

13. ACAMS Commissioning and Activation: ACAMS commissioning shall be conducted in accordance with LAWA ACAMS Commissioning Flow Chart. Contact LAWA IMTG for the current Commissioning Flow Chart.
14. Testing: ACAMS devices, cabling, and equipment shall be fully tested and accepted, with test results recorded individual test reports for review and acceptance. Contractor shall contact LAWA IMTG for the list of specific door and reader tests that must be performed.
15. Wire and Cable:
    a. Low voltage wire and cable shall be provided and installed.
    b. 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.
    c. Wire and cable runs shall be "home run". Mid run splices shall not be permitted.
    d. Wire and cable shall be Belden, West Penn, Contractors Wire and Cable, or approved equal.
    e. All terminations and wiring shall be labeled in accordance with LAWA ITG Infrastructure Standards of Practice.
    f. Service Loops: Service loops shall be provided for all ACAMS cabling within the Telecommunication Rooms. Service loops shall be of sufficient length to facilitate relocating wall mounted ACAMS control panels and power supplies to the Security racks without splices. Service loops shall be coiled and contained in appropriately sized pull boxes.

B. Advertising Systems

See LAWA Commercial Development Group.

C. Baggage Handling Systems (BHS)

1. Baggage Handling System drop doors (induction and egress points) are required to interface with LAWA's Access Control and Alarm Monitoring System (ACAMS). Designers shall contact IMTG for current interface requirements.
2. Designers and Contractors shall coordinate ACAMS requirements for these locations with Airport Police.
3. LAWA's Common Use System (TASS) can provide a Bag Service Message (BSM) feed that is integrated with the BHS. If a Common Use BSM feed is needed, Designers and Contractors shall contact IMTG for current BSM feed integration requirements.

D. BAS (Building Automation System) and FMCS (Facilities Monitoring and Control System) Integration

1. Monitoring: The BAS shall monitor and control all building mechanical systems and equipment. Each mechanical system shall be complete with factory controls, and shall be specified with accessory integration modules, hardware, computer cards, and software required for full and complete integration to the BAS. The BAS shall monitor mechanical equipment for failure alarms, and all operating set point variables shall be capable of being reset.
2. Control: The digital algorithms and pre-defined arrangements included in the BAS software to provide direct closed-loop control for the designated equipment and controlled variables. Inclusive of Proportional, Derivative and Integral control algorithms together with target values, limits, logical functions, arithmetic functions,

constant values, timing considerations and the like. BAS shall have web based monitoring and control capabilities.

3. Graphics: BAS shall include equipment graphical representation and floor plans showing layout of equipment and control points.
4. Integration: The BAS shall consist of networked controllers capable of stand-alone control and integrations with the existing building BAS.
5. Infrastructure: BAS components within and between facilities shall be connected with singlemode optical fiber.
6. Network: The BAS system shall ride on IMTG's existing network.
7. Head-End Equipment: Servers for the BAS system shall be located in the IMTG data center.
8. Lighting: Where required, Lutron lighting control systems shall use broadcast traffic.

E. CATV

1. Existing: Time Warner Cable is the current Service Provider for LAWA facilities. Distribution equipment residing in the facility MPOE's extend outward to IT Rooms for local connectivity.
2. Tenants: are responsible for extending infrastructure and cable from their leasehold to the TWC. Tenants are also responsible for ordering and procuring cable box equipment.

F. CCTV - Video Surveillance System (VSS)

1. The VSS shall be an extension of the existing CCTV system currently deployed throughout LAWA. This existing system is the Nice Vision Video Management System.
2. The standard CCTV cameras to be installed throughout the airport are by Sony Communications 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.
3. The installation of video surveillance cameras and related equipment shall include the use of both fixed and Pan/Tilt/Zoom (PTZ) color cameras.
4. LAWA Access Control and Alarm Monitoring System (ACAMS) has a linkage between alarms and video. If this functionality is selected for a location then the Security Systems Contractor shall cooperate with the LAWA or LAWA designated ACAMS contractor, and LAWA video maintenance contractor, to set up the linkage between the two systems and the camera.
5. Test and Acceptance Plans: 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.
6. Quality Assurance. 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.
7. Programming and configuration of the central VSS system shall be by LAWA and/or LAWA designated CCTV maintenance contractor. This scope of work shall include CCTV programming and configuration.

8. 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 VSS.
9. Warranty: Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of two (2) years from Final Acceptance.
10. Spare Parts:
    a. The Security Systems Contractor shall provide to LAWA an inventory of security equipment spare parts, materials, consumables, and any other system items 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 to no less than 10% of the items provided and installed under the contract or within the project.
11. 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 (Multi- Protocol Label Switching) assignments.
12. 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.
13. 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.
14. 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.
15. Category 6A cables, 23 AWG, shall be installed from each camera back to the Telecom Room.
16. Equipment: Security Systems Designer/Contractor shall contact LAWA IMTG for current PTZ and Fixed camera, encoder, duress button, power supply, equipment standards.
17. System Commissioning: 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.
18. Asset tagging and inventory list: Contractor shall collect and record in a Microsoft Excel spreadsheet all information regarding all equipment including model, serial number, function, location. This inventory information shall be submitted to LAWA. LAWA will provide the Contractor with the spreadsheet format for inputting the data.

G. Cell Phone Systems – Transmission Sites

See LAWA Commercial Development Group.

H. Common Use Systems

1. Definitions:
   a. Common Use Terminal Equipment (CUTE)
   b. Common Use Passenger Processing (CUPPS)
   c. Common Use Self Service (CUSS) Kiosks
   d. Boarding Pass Printers (BPP)
   e. Baggage Tag Printer (BTP)
   f. Boarding Gate Reader (BGR)
   g. General Purpose Printer (GPP)
   h. International Air Transportation Association (IATA)
   i. Shared Use Systems (SUS)
   j. Terminal Area Support System (TASS)
   k. Visual Docking and Guidance (VDGS)
2. Scope of Work: Provide a functional extension of the existing common use systems currently being used as operational in the Tom Bradley International Terminal (TBIT) and Terminal and will be supported by existing servers and software and include all of the Terminal Airport Support Systems (TASS) Resource Management System functionality and interfaces. All programming, system configuration and set up is propriety and is to be completed by the existing CUTE maintenance service provider, SITA (Societe Internationale de Telecommunications Aeronautiques). Contractor shall contact LAWA IMTG for current SITA contact information.
3. Systems workstations and peripherals will be deployed at all Common Use concourse gate check-in desks including, but not limited to, boarding pass printers and boarding gate readers.
4. General purpose printers and a functional extension of the existing common use systems shall be included in the work.
5. SITA CUTE Airport Connect is integrated with various LAWA systems via IBM WebSphere. This integrated platform provides multiple systems including:
   a. Electronic Visual Information Displays (EVIDS)
   b. Airline Data Feeds
   c. IATA Messaging
   d. Resource Management
   e. Baggage Information
   f. SUS workstations provide user access to Airport Connect (CUTE/CUPPS) as well as additional resources available through the WebSphere platform.
   g. Other Systems
6. Test Procedures/Tests: The Contractor shall prepare test procedures and reports for the Contractor's field test and the performance verification test.
7. Installation shall include provisioning of equipment, software, and programming, and systems support, associated with installation of the equipment for a fully functional extension of the existing SITA common use system.
8. The Contractor shall not install any new software types, versions or patches on the active (production) system or LAWA network, without approval from the IMTG Change Management Process.
9. Gate Agent Equipment Sets:
   a. SUS Workstations –HP Product, latest SITA certified model
   b. Specialty Keyboards- Access Product, latest SITA certified model with OCR AND MSR readers
   c. Boarding Pass Printers – IER 400 or latest SITA certified model

d. Boarding Gate Readers - Access Product, providing magnetic strip and OCR scanning, or latest SITA certified model
e. General Purpose Document Printers (8.5 x 11) –Okidata 430 or latest SITA certified model.

10. Baggage Input Console (BIC): BICs shall be generally be used for input of flight information by ramp operations at the bag claim drop locations. The BIC shall:
    a. Be a ruggedized specialty keyboard with illuminated display.
    b. Have a minimum 20 key elastomeric keyboard
    c. Communicate via an RS232 or RS485 interface
    d. Minimum operating temperature range: 0 to 150 degrees F
    e. Design selection: Com-Net Two-Tech Tugman ASM1228. Contact LAWA IMTG to confirm manufacturer and model.
11. Warranty: Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of two (2) years from Final Acceptance.

I. DAS (Distributed Antenna Systems)

1. Designers of DAS systems shall take into account the following in their design.
    a. Needs Assessment
    b. Requirements Gathering – Frequencies, Voice, Data, Video, Security, Public Safety, WiFi, Bandwidth, Equipment and pathway locations
    c. Surveys – RSSI, Spectrum,
    d. System Design – Equipment manufacturer, head-end, repeaters, antennas, iBwave RF propagation predictions, heat maps, design drawings, Bill of Materials
    e. Multiple Carrier Coordination – which Cellular Service Providers
    f. Carrier Requirements – Permission, re-transmission agreements, interference issues
    g. RFP
    h. Carrier Integration
    i. System Installation - deployment, staging and configuration
    j. Commissioning
    k. Final Acceptance
    l. Warranty
    m. Maintenance – PM routines, system monitoring

J. Dynamic Digital Signage Systems

Designers shall use Cisco DMS (Digital Media System) and should check with IMTG for the latest part numbers for their design.

K. EVIDS (Electronic Visual Information Display Systems)

1. Definitions:
    a. Electronic Visual Information Display System (EVIDS)
    b. Gate Information Display System (GIDS)
    c. Terminal Area Support System (TASS)
    d. Common Use Terminal Equipment (CUTE)
    e. Visual Docking and Guidance System (VDGS)
    f. Customs and Border Patrol (CBP)
    g. Ramp Information Display System (RIDS)
    h. Tug Driver Directional Signage (TDDS)

2. The EVIDS system is an extension of the existing EVIDS system currently operational in the Tom Bradley International Terminal (TBIT) and Terminal 3 and will be supported by existing servers and software and include all of the Terminal Airport Support Systems (TASS) Resource Management System functionality and interfaces. All programming, system configuration and set up, definition and development of new display content as required for accommodation of new display types for new gate configurations and aircraft types, and testing and commissioning of the EVIDS system expansion are included in the work. Work is propriety and to be completed by the existing EVIDS maintenance service provider, SITA (Societe Internationale de Telecommunications Aeronautiques). The contractor shall contact LAWA IMTG for SITA contact information.
3. Content for the displays shall be developed by the Contractor in EVIDS coordination workshops, with screen developments contributed to by LAWA representatives, Design Team representatives, and airline representatives.
4. Display types for the CBP areas of the project will require development of contents and control that is specific for CBP operations.
5. Work shall include physical display equipment installation, equipment mounting hardware and structural attachments as required for proper installation of displays.
6. Test Procedures/Tests: The Contractor shall prepare test procedures and reports for the Contractor's field test and the performance verification test.
7. Contractor shall coordinate the work of this section with that of other trades as required to ensure that the entire work of this project will be carried out in an orderly, complete and coordinated fashion. Specific coordination tasks include meetings and provision of shop drawings for support of display equipment by the following trades:
    a. Casework and millwork trades
    b. Electrical Power trades
    c. Telecommunication trades
    d. Structural trades
8. Contractor shall coordinate closely with LAWA IMTG and the existing EVIDS service provider so that EVIDS service is not interrupted during system installation.
9. Equipment: Contractor shall contact LAWA IMTG for current LCD and LED display standards.
10. Remote web accessed IP power reboot unit: At each EVIDS display location noted in the Visual Display Diagrams in the drawing set, the Contractor shall provide power reboot devices designed to allow authorized web access for the purpose of power on, power off rebooting electrical equipment. Prior to ordering product, procurement, Contractor shall coordinate with LAWA IT for exact product manufacturer.
11. Miscellaneous Hardware, Cabling and Wiring: Woven wrap around cable concealment sleeves shall be provided to conceal display cabling from public view. Design selection for products include:
    a. Roundit 2000
    b. Dura Wrap
    c. F6
12. Asset Tags and Equipment Inventory: Contractor shall acquire and apply LAWA asset tags to each major equipment item. A list of asset tag numbers and locations shall be submitted for review by LAWA IMTG. Contractor shall record asset inventory in a MS Excel spreadsheet and submit to LAWA IMTG. Contractor to work with LAWA to determine what information should be captured in the asset inventory spreadsheet.
13. Spare Parts: Contractor to contact LAWA IMTG to for spare parts quantities for each display type.

14. Warranty: Materials and workmanship shall meet or exceed industry standards and be fully guaranteed for a minimum of two (2) years from Final Acceptance.

L. Federal Agency Systems

Federal Agencies may have requirements that comply with or are different from these design standards.

M. Network Systems

LAWA uses Cisco network equipment and follows the Cisco network design redundant hierarchy. Designers shall consult IMTG for the latest network equipment part numbers.

N. Paging

1. Design: Designers shall provide "Turn-Key" paging system designs for both new and upgrades. A "Turn-Key" paging system means that the following will be designed and completed to the satisfaction of LAWA. Specific part numbers can be found in "Appendix A: LAWA IMTG Paging Standard".
2. Survey and Acoustical Engineering: Designers shall address the following elements in their design.
   a. Acoustical Survey
   b. Analysis with an acoustic analyzer and software
   c. Audio and visual paging design
      - Audio
      - Visual
      - Head-end
      - Paging Stations
      - Speakers
      - Ambient Noise Sensors
      - Cabling
   d. Recommendations on acoustical treatments
   e. Cutover procedures
   f. Test procedures
   g. Fabrication
   h. Assembly
   i. Wiring and professional cable harness
   j. Demolition of existing system equipment and cabling
   k. Removal and recycling
   l. Installation
   m. Coordination
   n. Supervision
   o. Manufacturer On-Site System Configuration
   p. 30 day on-site endurance testing
   q. Inspection
   r. System Acceptance
   s. Survey of End-Users
   t. Acoustical Analysis results as heat maps on floor plans
   u. Certification
   v. Equipment Specifications
   w. Configurations
   x. Ongoing software updates

y. Integration with ARCC (Airport Response Coordination Center), also known as DOC (Department Operation Center).

3. Emergency Visual Paging: 55-inch (minimum) monitors shall be installed within the Security Screening Checkpoints. Monitor quantity and locations shall be directed by LAWA Planning and the LAWA ADA Coordinator. Additionally, a separate dedicated monitor shall be installed adjacent to each FIDS bank of monitors – match existing.
4. Remote Reboot: Each visual paging monitor shall be plugged into an iBoot remote reboot module.
5. Cabling: Each visual paging monitor shall be cabled with three (3) CAT 6 horizontal cables.
6. Cameras: Each monitor shall contain a small goose-neck-mounted CCTV camera to provide feedback to the Department Operations Center of sent messages. Cameras shall be networked back into the system.

O. Radio

1. Design: LAWA has multiple analog and digital radio systems with associated head-end, repeater, hand-held, mobile, and other equipment. For all new systems and upgrades, designers shall provide the following design elements after consultation with LAWA stakeholders:
   a. System Architecture
   b. Site Drawings
   c. Antenna System Design
   d. Inter-modulation Study
   e. Power System Design
   f. Grounding Plan
   g. Alarming Plan
   h. Site Improvements Plan
   i. New Site Details Plan
   j. Implementation Plan
   k. Scope of Work
   l. Responsibilities Matrix
   m. Schedule
   n. Regulatory Review by:
      - FCC
      - FAA
      - Environmental
      - Health and Safety
   o. Operational Procedures
   p. Cutover Plans – with little or no downtime
   q. System Implementation Plans
2. Factory Acceptance: Designers shall prepare the following factory acceptance tests to be completed at the factory.
   a. Visual inspection Checklist
   b. Functional Tests – group calls & emergency calls across multiple sites
   c. Automatic switchover Tests

3. On-Site Testing: Designers shall also prepare the following functional acceptance tests to be completed on site.
   a. Repeat of factory tests
   b. Automatic switchover tests
   c. Manual switchover tests
   d. Coverage tests
   e. Signal measurements – RSSI, Bit Error Rate, and Message Error Rate
   f. Voice Quality tests – DAQ
   g. 30 to 60 days Burn-in Tests

P. Telephone Systems

LAWA uses Cisco VoIP system and associated equipment as the current standard.

In certain rooms or areas of the passenger terminals, an emergency phone may be planned for purpose of contacting ARCC (Airport Response and Communication Center) under duress situations. Blue Code IP5000 with FP1 (face plate) option shall be installed if the emergency phone is required. Cat 6a cable shall be installed from the emergency phone to the nearest IT room or closet. IMTG shall be contacted for the programming of the phone device before installation.

Q. UPS Systems

Existing: Legacy IT Rooms use APC rack-mounted UPS's sized for network switches to run on two hours on battery back-up with APC remote monitoring software StructureWare.
Existing/New Rack Mount Units: Existing/new Liebert UPS units shall be connected to Liebert SiteScan for remote monitoring.

R. WiFi Systems

LAWA uses Cisco WiFi controllers, access points and other associated equipment as the current standard. Designers shall consult IMTG for the latest WiFi equipment part numbers as well as installation specifications.

Appendix A - LAWA IMTG Paging Standard
Version 1.2

I. New and Upgrade Paging System Requirements
Designers/Contractors shall provide "Turn-Key" paging systems. A "Turn-Key" paging system means that the following will be completed to the satisfaction of LAWA:

A. Survey, Design, and Acoustical Engineering
1. Acoustical Survey
2. Analysis with an acoustic analyzer and software
3. Audio and visual paging design
4. Recommendations on acoustical treatments
5. Cutover procedures
6. Test procedures

B. Pre-installation
1. Fabrication
2. Assembly
3. Wiring and professional cable harness

C. Installation
1. Demolition of existing system equipment and cabling
2. Removal and recycling
3. Installation
4. Coordination
5. Supervision

D. Configuration and Testing
1. lED On-Site System Configuration,
2. 30 day on-site endurance testing

E. System Acceptance
1. Inspection
2. Intelligibility
3. Survey of End-Users

F. Documentation
1. Acoustical Analysis results as heat maps on floor plans
2. Certification
3. Equipment Specifications
4. AutoCAD (2011 or earlier) As-Built drawings – paper and electronic
5. Configurations
6. Instructional manuals

G. Training
1. Local technical Staff Training
2. End-User Training

H. Support

1. One year Warranty upon acceptance
2. Ongoing software updates

II. Equipment Listing

Please note that the equipment and part numbers will change every one to two years due to technology enhancements. As LAWA's standards and part numbers change, please obtain the updated information from LAWA IMTG.

A. System Head-End Equipment

IED	IED1200ACS-32	Globalcom Enhanced Announcement Control System - with 32 Zone license
IED	IED1112PS	Rack Power Supply System w/one Modular Supply
IED	IED1112PSM	Power Supply Module (For Redundancy)
IED	IED0591 R-85	Dell PowerEdge Server Rack-mount Raid 5 Includes KVM-LCD Tray (For FAS Database)

B. Peripheral Equipment

HP	8200	Workstation
IED	lED0590KDS	Atlas Sound Computer Keyboard Drawer Assembly with LCD Screen
IED	IED1502AI	2-Channel Balanced Input CobraNet Module
IED	IED1100TEL	VolP Telephone Interface Server

C. Microphones – Specified per Location

IED	IEDA528SRME-H	ACS Microphone Station 528 Rack-mount with Speaker
IED	IEDA528HDTE-H	ACS Microphone Station Digital Horizontal Desktop with Handheld and Expansion Board
IED	IEDA520FME-H	ACS Microphone Station 528 Handheld Expansion Station (For Gate Podium and Jetway Doors)

IED	IEDA528HFM-H	ACS Microphone Station Digital Horizontal Flush Mount with Handheld Microphone
IED	IEDA528F88	ACS Microphone Station 528 Flange Backbox (For Fire Marshall's Microphone Location)
IED	IEDA528HDT-G	ACS Microphone station Digital Horizontal Desktop Gooseneck (For Main Terminal Dispatch Microphone Locations)
IED	IEDA528HFM-H	ACS Microphone Station Digital Horizontal Flush Mount with Handheld
IED	IEDA528FBB	ACS Microphone station 528 Flange Backbox (Supervisor's Microphone Locations)
IED	IEDA528HDTE-H	ACS Microphone Station Digital Horizontal Desktop with Handheld and Expansion Board (Spare)

D. Noise Sensors

IED	IEDT9032NS	Titan Ambient Noise Sensor Collector – 32-Channel
IED	IED0540S-2	Ambient Sensor - 2-Gang Plate
IED	IED0540S-2	Ambient Sensor- 2-Gang Plate (Spares)

E. Amplifiers

IED	IEDT9160L	Titan Power Amplifier Mainframe 16-Channel plus Backup
IED	IEDT6472L	Titan 200 Watt X 2-Channel 70V Output Amplifier Card (Primary Amplifier Cards plus Two Backup Amplifier Cards)
IED	IEDT6472L	Titan 200 Watt X 2-Channel 70V Output Amplifier Card (Spares)
IED	IEDT6471L	Titan 400 Watt X 1.-Channel 70V Output Amplifier Card (Spares)

F. Speakers

Atlas Sound	FAP-62T	Flush Ceiling Mounted Speaker System
	Other Models	As required

G. Cabling

Panduit	CAT6/CAT6A	Microphone Cable
General	12 AWG	Speaker Cable

H. Monitors

Within Security Screening Check Points

Samsung	ME40A	42-inch LED monitor
Samsung	SBB-D16AX2/ZA	Set-Back Box Media Player

Outside of Security Screening Check Points

NEC	P462	46-inch monitor
NEC	OPS-PCAF-H	Computer
Module NEC	SB02AM	OPS Adapter
Peerless	SA763PU	Pull-out Monitor Bracket
Premier Mounts	ECM-3000	Triple Ceiling Mount Bracket

I. Network Switches

Cisco	4000	Ethernet Switch

J. UPS's

APC	SMT3000RM2U	Smart-UPS 3000 LCD with network card
APC	SMT5000RM4U	Smart-UPS 5000 LCD with network card

K. Miscellaneous

Rolls	DU30b	Mic Preamp/Audio Ducker
Antx	DS8-N	Telephone Auto Dialer

L. Software and Language Libraries

IED	IED0632	Software license - Prizm Flight Announcement System
IED	IED0632L- ENG-00	FAS Language library - English (NOT – FAS requires data/network feed from FIDS provider)
IED	lED0632l- SPA-00	FAS Language library - Spanish (NOTE - FAS requires data/network feed from FIDS provider)
IED	595D-CLIENT	Software configuration
IED	631	Software license for SQL 32 bit Enterprise
IED	675	Software license for database and core services
IED	676	Software license for VIS display DDC's
IED	633	Software license, T-CAS server
IED	633C	Software license, T-CAS client

M. Engineering

IED	lED0730	ACS Initial Setup/Configuration
IED	IED0595	Software Configuration for 591R & 591RU