SAN DIEGO INTERNATIONAL AIRPORT

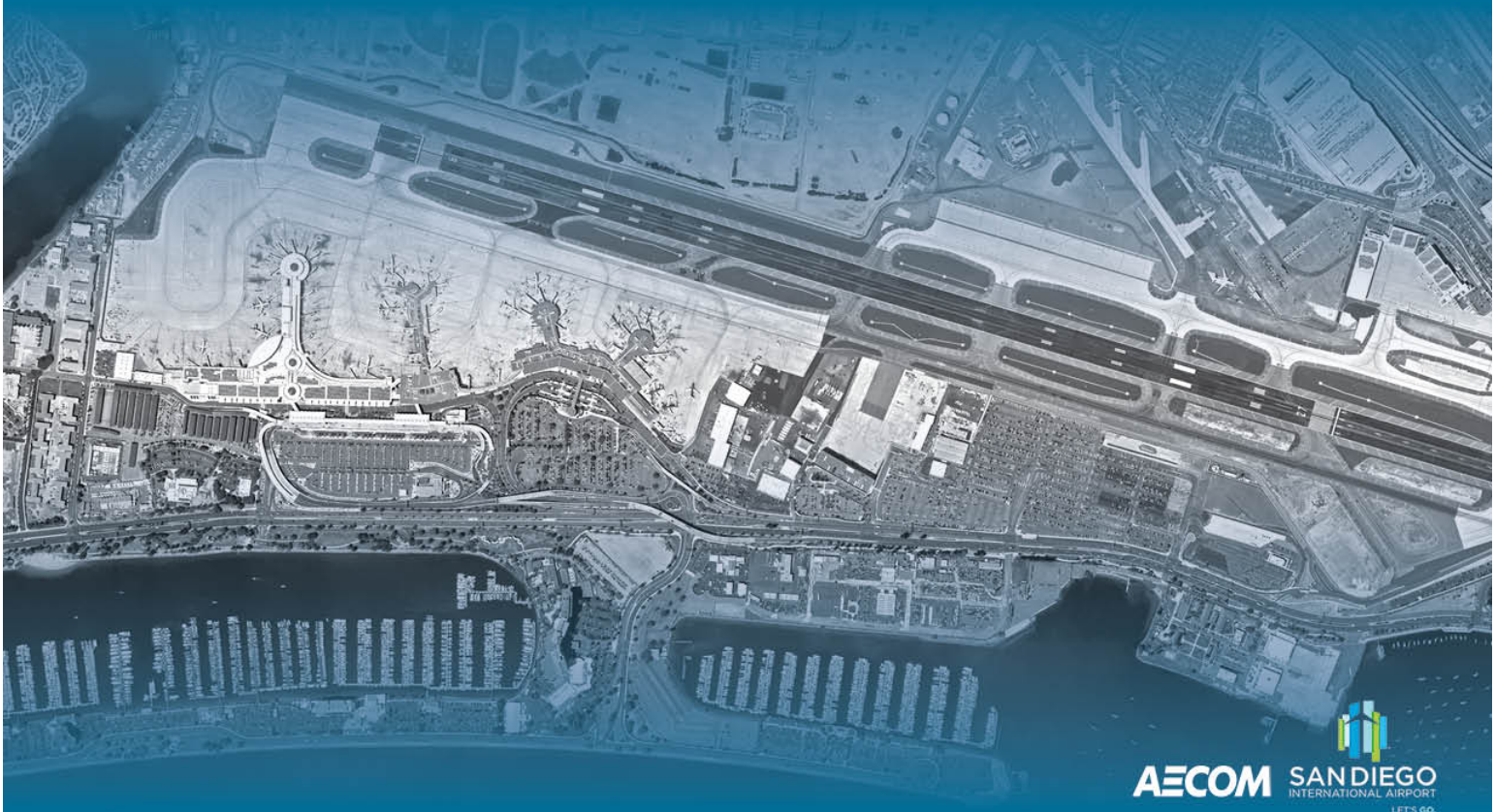
Terminal 1 Replacement Program

31 January 2019

Performance Specifications

Confidential Information

Draft



AECOM SAN DIEGO INTERNATIONAL AIRPORT LET'S GO.

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1.02 ABBREVIATIONS AND ACRONYMS

A. SDCRAA: San Diego County Regional Airport Authority.

1.03 INTRODUCTION

A. The objective of this document is to further define the performance characteristics for the Project Definition Document (PDD) identifying minimum criteria for the Design-Build Team to use as guidance in the design and construction of Terminal 1 Replacement Program (T1RP) at the San Diego International Airport (SDIA). The Design-Builder's design is to proceed and comply with these criteria.

1. The Performance Specifications (PS) are to serve as a supplement to the Project Definition Document (PDD). The Performance Specifications will complement the criteria and standards listed in the PDD and are intended to define the Owner's requirements in qualitative and performance terms. In cases when conflicting information is provided in any part of the PDD or PS including applicable codes and referenced industry standards the more stringent requirements and higher performance shall prevail.
2. Facility requirements will be stated in performance terms wherever possible for example: Exterior Enclosure in terms of weather resistance, durability and architectural theme etc., Interior Construction in terms of quality levels of finish materials etc., HVAC systems in terms of energy efficiency to meet the LEED Scorecard etc.
3. Where reference is made to specific material herein then those material references will be considered as "Preferred Material of Choice" by SDCRAA. The intent of listing these choices is to help in the decision making process. SDCRAA is open to any discussions where appropriate materials are recommended by the Design-Builder.
4. The Design-Builder shall consider and follow the PDD's, where not superseded, throughout all phases of the design process including:
   a. Preliminary/Schematic Design = 15% Complete Design Documents
   b. Design Development = 30% Complete Design Documents
   c. Construction Documents = 60%, 90% and 100% Complete Design Documents
5. The Design-Builder shall prepare and deliver the design and construction drawings using a Building Information Modeling (BIM) Technology.

PART 2 PROGRAM SUMMARY

2.01 BASIC FUNCTION

A. This project is a public facility consisting of an Airport Terminal Building including a common-use Terminal/Concourse, Landside, Airside and Utilities component.

B. This project also includes an Elevated Departure Roadway (EDR) and Remote Check-In Pavilions with Pedestrian Bridges.

2.02 AESTHETIC GUIDELINES

A. Exterior Design

1. The architectural theme for the T1RP should complement the architectural vision of the existing Terminal 2 West. The visual identification of the T1RP from Harbor drive and airport roads are of importance to SDCRAA. Therefore, the Design-Builder shall continue

the materials and colors palette of the existing terminal complex. The general criteria for the exterior design of the T1RP shall include the following design guidelines:

a. Blend harmoniously with the existing buildings in texture, materials and colors.
b. Respect the integrity of materials, scale, proportion, and massing of the existing Terminal 2 West.

2. The new Elevated Departure Roadway, connecting Pedestrian Bridges and departure roadway and curb structures shall be designed to maintain as much as possible the view of the San Diego Harbor from the T1RP.

B. Interior Design

1. Similar to the exterior design guidelines, the interior design should reinforce the architectural vision created for T1RP. The design facilitate intuitive way finding. Design all interior spaces to create an attractive, pleasant experience for airport visitors and employees. The general criteria for the interior design of the T1RP shall include the following design guidelines:
   a. Respect the integrity of materials, scale proportion and massing of the existing Terminal 2 West.
   b. Blend harmoniously with the existing terminal in texture and colors of materials.
   c. Create an exciting environment for the new concession core.
   d. Organize the interior design elements including colors and artwork to provide easy way finding throughout the terminal.

2.03 SPACES

A. Interior Spaces: The project includes spaces of the following types:

1. Customer contact: Elements where the public or airline passengers meet agents or employees or utilize airport amenities including ticket counters, baggage service counters, self-service check-in kiosks, security checkpoints, gate check-in counters, gate podiums, rental car counters, information booths, hotel and ground transportation boards, telephone kiosks and others.
2. Employee Work: Spaces intended primarily for SDCRAA workers and their support staff, including shops, storage and administration offices.
3. Proposed Airline Support Facilities: Leased spaces for airlines use including airline cargo, GSE MX, Provisioning, offices, storages, etc.
4. Public Spaces: Major public spaces for public and airline passengers use including but not limited to ticket lobby, baggage claim area, concourses, holdrooms, food / retail court, art exhibit, pedestrian bridges, food court with fixed seating, elevator lobbies in parking structure and others
5. Tenant: Leased spaces for airlines use including their ticketing offices, baggage service offices, operations areas and exclusive and common use club lounges. SP5 also include lease space for car rental companies and other tenants.
6. Concessions: Leased spaces for concessions that include the entire commercial revenue producing functions including food and beverage service, news and gifts and retail stores and similar other areas.
7. Occupant Services: Spaces for toilets, showers, and changing and dressing.
8. Storage: Rooms devoted to storage, including closets, storage rooms, secure storage, and concession support storage.
9. Circulation: Spaces functioning as corridors, lobbies, waiting areas, vestibules, stairs, and ramps.
10. Building Services: Spaces for maintenance equipment, trash collection, and loading dock.
11. Utility Equipment: Spaces for mechanical equipment, heating equipment, electrical equipment, communications equipment, elevator equipment, and utility tunnels.
12. Indoor Automotive: Spaces for parking private vehicles.

B. Exterior Spaces: The project includes spaces of the following types:

1. Outdoor "Customer": Spaces where employees meet the public or airline passengers, including curbside check-in counters, ground transportation booths and self-service kiosks.
2. Outdoor Public Spaces: Spaces with or without fixed seating, including passenger curbside drop-off (departure) curb) and passenger curbside pick-up (arrivals) curb).
3. Outdoor Landscaped Spaces: Spaces with or without fixed seating, public art display, softscaped and hardscaped areas.
4. Outdoor Building Services: Spaces for trash collection, trash removal, and delivery and loading.
5. Automotive: Spaces for parking private vehicles, access roads, driveways, passenger loading zone, and taxis and transit vehicles.
6. Airside Operations Areas: Airside spaces at the apron level for parking and circulation of aircraft, GSE vehicles, baggage trains (carts and tugs) and general ramp service vehicles.
7. Unused Outdoor Spaces: Spaces not primarily used for human activities, including road shoulders and medians.

END OF SECTION

SECTION DC 0: FACILITY DESIGN CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Owner: San Diego International Airport.

B. The construction consists, generally, of new buildings.

1.02 RELATED REQUIREMENTS

A. Section DC - Introduction and Program Summary

B. Section DC A - Substructure Criteria.

C. Section DC B1 - Superstructure Criteria.

D. Section DC B2 - Exterior Enclosure Criteria.

E. Section DC B3 - Exterior Doors Criteria

F. Section DC B4 - Roofing Criteria.

G. Section DC C - Interiors Criteria.

H. Section DC C2 - Interior Finishes Criteria.

I. Section DC C21 - Terminal Interior Signage

J. Section DC C31 - Information Fixtures Criteria

K. Section DC C32 - Storage Fixtures Criteria

L. Section DC C33 - Window Treatment Criteria

M. Section DC D11 - People Moving Criteria

N. Seciton DC D13 - Baggage Handling Systems

O. Section DC D2 - Fire Suppression Criteria

P. Section DC D3 - Plumbing Criteria

Q. Section DC D4 - HVAC Criteria

R. Section DC D6 - Electrical Criteria.

S. Section DC D7 - Telecommunications and Airport System Communications Requirements - General Pathways, Backbone and Horizontal Cabling Criteria

T. Section DC D71 - Voice and Data Systems Criteria

U. Section DC D72 - Terminal Wide Voice Paging System (TWVPS) Criteria

V. Section DC D73 - WiFi and Cell Phone Architecture Criteria

W. Section DC D74 - 800 MHZ Bi-Directional Trunked Radio System Criteria

X. Section DC D75 - Common Use Systems Equipment (CUSE) Criteria

Y. Section DC D76 - Self-Service Devices Criteria

Z. Section DC D77 - Electronic Content Systems Criteria

AA. Section DC D78 - Electronic Signage Criteria

AB. Section DC D79 - Other IT and Electrical Services

AC. Section DC D8 - Fire Protection and Alarm Criteria

AD. Section DC D81 - Enterprise and Operations Networks Active Architecture Criteria

AE. Section DC D91 - Video Management System (VMS) Criteria

AF. Section DC D92 - Security Access Controls Criteria

AG. Section DC D93 - Exit Lane Breach Control System Criteria

AH. Section DC D94 - Special Grounding Systems Criteria

AI. Section DC E1 - Equipment and Furnishings Criteria.

AJ. Section DC G8 - Exterior Signage

AK. Section DC H - Artwork Integration

AL. Section 01 30 50 - Design Procedures and Substantiation Requirements.

AM. Section 01 32 19 Reference Standards

AN. Section 01 70 00 Execution and Closeout Requirements

1.03 DEFINITIONS

A. Code: The code referred to herein consists the most current version of all applicable local, state, and federal regulations, including the following:

1. State of California Code of Regulation, Title 24 requirements, which incorporate and/or amend the following:
   a. CBC (CFC) - California Fire Code;
   b. CBC (CBC) - California Building Code;
   c. CBC (CMC) - California Mechanical Code;
   d. CBC (CPC) - California Plumbing Code
   e. CBC (CEC) - California Energy Code;
   f. CBC (CGBSC) - CalGreen/California Green Building Standards Code;
   g. CBC (CEBC) - California Existing Building Code;
   h. CBC (CRSC) - California Reference Standards Code.
2. City of San Diego regulatory requirements, which incorporate and/or amend the following:
   a. Zoning Ordinance.
   b. California Building Code (CBC), based on International Building Code with local amendments as published in the San Diego Municipal Code
   c. National Electrical Code, with local amendments (if any)
   d. California Mechanical Code, with local amendments (if any)
   e. California Plumbing Code, with local amendments (if any)
   f. California Energy Efficiency Standards (Title 24),
   g. California Fire Code.
3. National Fire Protection Association (NFPA)
   a. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
   b. NFPA 101 - Life Safety Code;
   c. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations;
   d. NFPA 780 - Standard for the Installation of Lightning Protection Systems.
4. See Section 01 42 19 Reference Standards for list of applicable regulations.
5. Occupancy: The project is a mixed occupancy, according to the code, which includes Group A (Assembly), B (Business), M (Mercantile), S (Storage), and U (Utility and Miscellaneous) occupancies.
6. Non-Regulatory Criteria Documents: In addition to specific regulatory requirements, the following documents are also incorporated into the definition of "the code" for the purposes of this project, except for administrative provisions contained therein; where referenced, the role of the code official described in the document will be performed by Owner.
   a. U.S. Green Building Council (USGBC) LEED v4 - for Building Design and Construction;
   b. USGBC LEED-CI - LEED Green Building Rating System for Commercial Interiors;
   c. WELL Building Standard™ (WELL)
   d. San Diego International Airport Facilities Criteria Document,
   e. San Diego International Airport Interior Design Standards,

f. San Diego International Airport Retail Tenant Criteria,
g. Requirements for Architects and Engineers performing services for the San Diego International Airport,
h. SDCRAA, Capital Improvement Program, Safety Manual,
i. SDCRAA, Capital Improvement Program, Owner controlled Insurance Program, Contractors and Subcontractors Information Manual,
j. SDIA Terminal 2 - East and West Facilities Conditions Assessment,
k. SDCRAA AMP2, Existing Condition Survey,

B. Communications: Services that provide voice and data transmission, sound reinforcement, and television reception and distribution.

C. Conveying Equipment: Mechanized means of conveying people and goods, comprising people-moving equipment, material handling equipment, and maintenance conveying equipment.

D. Demolition: Removal of unneeded and undesirable existing elements.

E. Electrical: Provision and distribution of electrical power to operate all electrically-operated devices, including those included under other services and those provided separately by the Owner; artificial lighting to illuminate spaces and tasks, both interior and exterior, without reliance on natural light; grounding systems, including lightning protection, and cathodic protection.

F. Electronic Safety and Security: Services that provide fire detection and alarm, access control, intrusion detection, and remote surveillance.

G. Equipment: Fixed elements usually having services connections. Equipment operated or used by occupants in the functioning of the project and but not comprising part of services systems is specified in the DCE series Sections. Equipment comprising part of services systems is specified in the DCD series Sections.

H. Exterior Enclosure: All non-structural vertical exterior elements, including openings and elements closing or covering openings, comprising the exterior skin, the structure supporting the skin unless part of the superstructure, weather barriers, balcony walls and railings, parapets, joint sealers, insulation, exterior ceilings and soffits, and wall mounted appurtenances, but not including the interior finish unless an integral part of the enclosure.

I. Fire Suppression: Automatic fire sprinklers, standpipes, and extinguishing systems.

J. Fixed Seating: All types of fixed seating, including audience seating, conference seating, lounge seating, pews, and benches.

K. Fixtures: Fixed elements used by occupants in the functioning of the project but not having services connections.

L. Food Service Equipment: Fixed equipment relating to commercial and institutional food service whether or not requiring services connections and movable equipment requiring services connections, including refrigeration, storage, food preparation, serving, cleaning, and exhaust hoods and fans. Not including residential appliances.

M. General Equipment: Equipment that could occur in buildings of any occupancy, such as fire protection specialties, loading dock equipment, solid waste handling equipment and chutes, anchorage systems for working on the roof, and built-in vacuum system.

N. HVAC: Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.

O. Information Fixtures: Fixed elements relating to communications but not part of communications services, such as signs and other identifying devices (including those mounted on the roof, exterior walls, or in the site), visual display surfaces, including projection screens, and fixed mountings and enclosures for communications equipment.

P. Integrated Automation: Integrated systems for centralized and/or remote monitoring and/or operation of services and non-services elements.

Q. Interior Finishes: All applied finishes on the interior of the building, including on the interior side of exterior wall elements; wall finishes, including wall bases, trim, corner guards and other protection; floor finishes, including recessed mats and grilles; suspended ceilings and soffits, applied ceiling finishes; stair finishes and other finishes.

R. Interiors: All elements necessary to subdivide and finish the enclosed space, including partitions, doors, interior windows and other openings, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.

S. Landscaping: Plants and turf throughout the site and indoors, and elements that contribute to their maintenance, such as irrigation.

T. Maintenance Conveying Equipment: Vertical and horizontal conveying equipment for moving people and goods for facility maintenance, such as swingstages and lifts for window washing.

U. Material Handling Equipment: Vertical and horizontal conveying equipment for moving goods and objects (and people, but only incidentally), such as freight elevators, vehicle elevators, dumbwaiters, and laundry chutes.

V. People-Moving Equipment: Vertical and horizontal conveying equipment primarily for moving people, such as elevators, escalators, moving walks, and lifts.

W. Plumbing: Means of delivery of water to points of utilization; automatic heating and conditioning of domestic water; and unattended removal of water, rainwater, and liquid waste.

X. Roofing: All elements forming weather barriers at the sloped or essentially flat weather-proof enclosure over the entire "top side" of the building, including all elements from the top of the deck up, roof coverings, gutters and downspouts, wearing surfaces, roof openings and elements that close openings, such as skylights, vents, and hatches, and roof mounted appurtenances.

Y. Security Zones:
   1. Public Access Zone: That area to which the public has free access, including public corridors, grounds, and parking lots.
   2. Reception Zone: The area to which the general public has access but beyond which access is restricted at all times.
   3. Operations Zone: The area to which only employees and visitors with a legitimate reason to be there have access.
   4. Secure Zone: The area to which access is always controlled and which is monitored continuously.
   5. High-Security Zone: Areas indicated in project program and areas named "vault", "secure file room", and "cash room".

Z. Services: Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.

AA. Shell: The superstructure, exterior enclosure, and roofing.

AB. Site Fixtures and Equipment: All kinds of elements installed outdoors, primarily fixed or permanently mounted, such as fences and other barriers, athletic fixtures and equipment, miscellaneous minor structures, site furnishings, and flagpoles (including those mounted on roof or exterior wall).

AC. Site Improvements: Pavements and surfacing, site fixtures and equipment, landscaping, and tunnels that are not part of substructure or a utility structure applicable to a single utility.

AD. Site Elements and Work: Modifications to the site, site improvements, and site portions of services (i.e. utilities).

AE. Storage Fixtures: Fixed storage elements, usually modular, and to some extent relocatable, including built-in cabinetry, wardrobe units, lockers, anchored utility shelving, mailboxes and other postal specialties except in post offices.

AF. Substantiation: Substantiation is any form of evidence that is used to predict whether the design will comply with the requirements or to verify that the construction based on the design actually does comply. During Preliminary Design, Design Development, and Construction Documents, requirements to submit substantiation are primarily intended to forestall use of designs or constructions that will not comply. At any time before completion of construction, substantiation is presumed to be only a prediction and may subsequently be invalidated by actual results.

AG. Substructure: Elements below grade and in contact with the ground.

AH. Superstructure: All elements of floor and roof construction above grade and within basements, and elements required for support, including structural frame and load-bearing walls, and including fireproofing and firestopping, and vapor retarders and air barriers when an integral part of the structure.

AI. Validation phase: 90-day period during which the design build team and Authority review the Program Definition Document and Performance Specifications and validate that programmatic needs are addressed before proceeding to design development. The design outcome of the validation phase informs the Guaranteed Maximum Price for construction negotiated between the Authority and design build team.

AJ. Window Treatment: Fixed elements that control view and natural light, for both exterior and interior openings, such as blinds, shades, shutters, curtain tracks (but not the curtains).

1.04 REFERENCE STANDARDS

A. See Section 01 42 19 - Reference Standards for applicable regulations and references.

PART 2 PRODUCTS (SEE OTHER SECTIONS)

2.01 DO NOT USE:

A. CFC-based refrigerants.

B. HCFC's or Halon.

C. Aluminum electrical conductors.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Code: Make all portions of the project comply with the code.

B. Provide built elements and site modifications as required to fulfill needs described in the project program and as specified.
   1. See DC - Introduction and Program Summary for aesthetic guidlines.
   2. The complete project comprises the following elements:
      a. Substructure (A): Elements below grade and in contact with the ground.
      b. Shell (B): The superstructure, exterior enclosure, and the roofing.
         1) Superstructure: All elements forming floors and roofs above and below grade, and the elements required for their support, insulation, fireproofing, and firestopping.
         2) Exterior Enclosure: All essentially vertical elements forming the separation between exterior and interior conditioned space, including exterior skin, components supporting weather barriers, and jointing and interfacing components; not including the interior skin unless an integral part of the enclosure.
         3) Roofing: All elements forming weather and thermal barriers at horizontal and sloped roofs and decks, and roof fixtures.
      c. Interiors (C): Interior construction, stairs, finishes, and fixtures, except fixtures associated with services and specialized equipment.
      d. Services (D): Mechanized, artificial, automatic, and unattended means of supply, distribution, transport, removal, disposal, protection, control, and communication.

e. Equipment and Furnishings (E): Fixed elements operated or used by occupants in the functioning of the project, including Hold Room seating layouts.
f. Demolition (F): Removal of unneeded and undesirable existing elements.
g. Sitework (G): Modifications to the site, site improvements, and utilities.

C. Provide permanently enclosed spaces for all functional areas shown in the project program, unless otherwise indicated.

D. Provide a physical enclosure that keeps out weather, unwelcome people, animals, and insects without requiring specific action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside.

E. Provide appropriately subdivided interiors with level floor areas, comfortable ceiling heights, essentially vertical walls, and finishes and fixtures suitable for the occupancy.

F. Exterior Surfaces Exposed to View: Surfaces visible from street or ground level, plus surfaces visible from windows of same building and adjacent existing buildings.

3.02 AMENITY AND COMFORT CRITERIA

A. Public Amenity: Conduct operations so as to cause minimum annoyance of the occupants, public and adjacent property owners and tenants.
1. Where existing structures on the site continue to be occupied, provide alternate means of access with physical barriers and directional signs acceptable to Owner.
2. Substantiation:
a. Construction Documents: Detailed demolition plan, including daily schedule.

B. Environmental Responsibility:
1. In addition to other requirements, provide design and construction that minimizes adverse effects on the exterior environment, enhances the quality of the indoor environment, and minimizes consumption of energy, water, construction materials, and other resources.
2. Achieve at least a Silver rating in accordance with USGBC LEED v4-BD+C Building Design and Construction rating system; selection of specific credits to achieve is the responsibility of Design-Builder unless otherwise indicated; comply with criteria specified in current rating system documentation as well as related criteria specified in other sections.
3. Substantiation: Formal USGBC Certification is required.
a. Validation Phase: LEED Checklist annotated to show specific credits to be achieved with brief description of how they will be achieved.
b. Design Development and Construction Documents:
1) LEED Checklist annotated to show status of design related to specific credits to be achieved.
2) Comprehensive checklist of certification documentation specified in LEED Reference Guide, annotated to show which forms of documentation have been submitted.
3) The documentation specified in LEED Reference Guide that is relevant to the degree of completion of the design; at subsequent design stages it will not be necessary to repeat submissions of the same documentation unless the design has changed.
4) Identification of credits for which substantiation of compliance with criteria will not be possible until completion.
5) At Completion: LEED Certification, by U.S. Green Buildings Council.
(a) Design-Builder shall submit application and pay applicable fees.
(b) Design-Builder shall provide all certification documentation and install certification plaque.

C. Thermal Performance: Design and construct to provide comfortable interior environment in accordance with the code and the following:
1. Summer Interior Design Conditions:
a. Daytime Setpoint: 73 deg F, plus or minus 2 deg F except as specified otherwise.

b. Unoccupied Setback: 78 deg F.
c. Interior Relative Humidity: 50 percent, maximum.

2. Winter Interior Design Conditions:
   a. Daytime Setpoint: 70 deg F, plus or minus 2 deg F except as specified otherwise.
   b. Interior Relative Humidity: 10 percent, minimum.
3. Electronic Equipment Rooms:
   a. Temperature Set Point: 68 deg F, plus or minus 2 deg F
   b. Humidity Setpoint: 50 percent, plus or minus 10%
4. Outside Air Design Conditions:
   a. Summer Outside Air Design Temperature: 83 84.1 deg F dry-bulb; 67.7 deg F wetbulb, mean daily range 13 deg F
   b. Winter Outside Design Temperature: 3841.4 deg F dry bulb
5. Energy Design Wind Speed: 25 mph.
6. Shell: Provide construction that will have thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:
   a. Section DC B2 Exterior Enclosure Criteria including for air, water, and thermal resistance.
   b. Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 98 percent of the days in the coldest 3 months of the year.
      1) Components That Have Surfaces Facing Both Interior and Exterior Environment: Condensation Resistance Factor (CRF) as required to meet requirement above, when tested in accordance with AAMA 1503.
      2) Substantiation:
         (a) Preliminary Design: Identification of major thermal resistant materials and systems.
         (b) Design Development: Detailed listing of design criteria and design analysis, prepared by licensed mechanical engineer.
         (c) Construction Documents: Product data on thermal materials and details of continuous thermal barrier.

D. Provide vestibules at major public entrances including vestibules at the entrance from the pedestrian bridges.

E. Water Penetration Resistance: Design and select materials to prevent water penetration into the interior of the building, under conditions of rain driven by 115 mph (51 m/s) wind speed.
   1. Substantiation:
      a. Preliminary Design: Identification of major water resistant assemblies.
      b. Design Development: Details of proven-in-use or proven-by-mock-up design.

F. Natural Light: Provide fenestration in shell as required to meet requirements for natural light in accordance with code, Section C and the following:
   1. LEED v.4 requirements for daylighting and views.
   2. Exterior Glazing: Design fenestration to maximize daylighting and energy savings without creating glare, using glass curtainwalls, punched windows, and clearstory and skylights. Use of skylights shall be limited to major public spaces and when used shall be accessible for cleaning.
   3. Glare Mitigation interior: Design fenestration to control glare within the building such as that monitors at ticketing counters, electronic gate information display, FIDS, advertising and other display remain legible under natural light conditions at any time during the day the majority of the year.
   4. Glare Mitigation, exterior: Design building enclosures such that the reflection from fenestration or other reflective materials do not interfere with the operation of the FAA control tower, apron control tower
   5. Substantiation:

a. Preliminary Design: Identification of spaces relying on natural light during daytime, preliminary analysis of energy savings glare prevention and maintenance accessibility.
b. Design Development: Drawings showing details of natural lighting elements and final analysis of glare prevention and maintenance accessibility.

G. Ventilation:
1. Natural Ventilation: Design and construct shell to provide natural ventilation in accordance with code.
a. Substantiation:
1) Construction Documents: Engineering design calculations and drawings prepared by licensed engineer.
2. Indoor Air Quality: Design and construct to comply with the code and the following:
a. Acceptable air quality as defined by ASHRAE Std 62.1.
b. Substantiation:
1) Design Development: Identification of methods to be used to comply with requirements; ventilation design calculations. Identification of unusual indoor contaminants or sources and methods to mitigate their effects on occupants.
2) Construction Documents: Specifications showing that construction materials are not contaminant sources and do not adversely affect air quality.
3) Commissioning: Field measured outside and supply air quantities for each space and its associated air handler.
4) Occupancy: Field testing to show compliance, after full occupancy.
3. Ventilation of Attics, Crawl Spaces, and Similar Semi-Enclosed Spaces: Design and construct shell to provide outside air movement through enclosed shell volumes in accordance with code.
4. Equipment Producing By-Product Heat: Ventilate housings and cabinets as required by equipment manufacturer and rooms and spaces as required to maintain specified environmental conditions.
5. Ventilation of Special Spaces: Provide outside air movement through enclosed shell space of the baggage screening room (EDS) in accordance with code and the following:
a. Minimum Ventilation Opening Area: Net 2.5 percent of total enclosed area, distributed to encourage uniform outside air movement through enclosed space. Provide heat exhaust for Baggage X-ray Machines.
b. Substantiation:
1) Preliminary Design: Identification of description of ventilation concept and required building elements.
2) Design Development: Drawings showing ventilation of open areas, and volumes being served.

H. Condensation Resistance: Prevent condensation from forming on interior elements under normal thermal and humidity conditions inside building.
1. Exception: Provide insulated drain pans and piping to remove condensation from cooling coils.

I. Odors: Eliminate, isolate, or exhaust odors produced by occupant functions and building services.

J. Sound Transmission and Vibration Resistance:
1. Shell: Design and construct the shell to limit sound transmission as follows:
a. Ambient Sound Level: Maintain ambient sound levels in perimeter spaces within Noise Criteria (NC) ranges specified in Section DC C - Interiors Criteria during normal hours of occupancy.
b. Exterior Noise Level: Maintain maximum average daytime and nighttime noise level from interior sound sources in accordance with local regulations, measured at the project property line.

c. Vibration Control: Use shell elements that will not resonate at frequencies that are characteristic of ambient exterior sound sources at the project site.
d. Substantiation:
1) Preliminary Design: Measurements of ambient site noise levels over full range of audible frequencies, identification of acoustic properties of major interior and exterior sound and vibration generators, and preliminary analysis prepared by an acoustical engineer.
2) Design Development: Acoustical analysis of enclosure assemblies prepared by an acoustical engineer.
3) Construction Documents: Acoustical analysis prepared by an acoustical engineer if different from Design Development.
4) Construction Documents: Drawings showing details required for acoustic performance.
5) Construction: Field tests of representative spaces to verify compliance with performance requirements.

2. Radio Frequency (RF) Requirements:
a. A minimum signal level of -80 dbm on the emergency radio frequencies shall be maintained within all areas of the building. This may be accomplished either through the use of RF transparent building materials or electronics.
b. Substantiation:
1) Design Development: RF information cut sheets if available of proposed materials....
2) Construction Documents: Design documentation cut sheets is available for materials that may interfere with electronics, as required
3) Construction: Field tests of RF signals throughout facility.

3. Services:
a. Maintain the sound transmission characteristics of assemblies through which services must pass.
b. Prohibited Plumbing Noises: All sounds of flushing and of liquid running through pipes ("bathroom sounds") are prohibited outside of the rooms housing toilets, bathtubs, and showers, with the exception of when doors to those rooms are open.
c. Equipment Noises: Noise level below that which will be objectionable, based on occupancy of spaces.
d. When services are located within assemblies that perform sound isolation functions, consider the noise produced by the service itself as one of the external sound sources.

4. Structure-Borne Sound and Vibration: Prevent transmission of perceptible sound and vibration from equipment that rotates, vibrates, or generates sound, by isolating such equipment from superstructure or by isolating equipment support foundations from building foundations.
a. Substantiation:
1) Construction Documents: Details of isolation methods.
2) Closeout: Measurement of sound transmitted through structure during functional performance testing and during full operation of all systems.

K. Convenience: Maintain existing entrances to remain open during construction period; protect from weather, keep clear of construction debris and stored materials, and maintain safe walking surfaces. Do not block or otherwise compromise means of egress.

L. Cleanliness:
1. Exterior Surfaces: Design and select materials to:
a. Prevent attraction and adherence of dust and air-borne dirt and soot, and minimize appearance of settled dust, dirt and jet fuel.
b. Be washed reasonably clean by normal precipitation.

c. Prevent precipitation from washing settled dust and dirt over surfaces exposed to view.

2. Services: Prevent accumulation of debris and dirt at conduit penetrations in IT rooms and at floor mounted equipment, such as air handlers, chillers, pumps, switchgear, and panelboards by one or more of the following methods.
   a. Provide minimum 4 inch (100 mm) thick, concrete housekeeping pads.
   b. Provide corrosion-resistant equipment stands.

M. Appearance:
1. Exterior Appearance: Design and select materials to provide exterior appearance with characteristics as follows:
   a. Compatible with adjacent buildings on same campus.
   b. Considering Owner's concept design and rendering.
   c. Concealing mechanical equipment, plumbing equipment, electrical equipment, and piping, conduit, and ducts from view from the street.
   d. Concealing rooftop mechanical equipment, plumbing equipment, electrical equipment, and piping, conduit, and ducts from view from the street, windows in the project that overlook the roof, and windows in adjacent buildings that overlook the roof.
   e. Substantiation:
      1) Schematic Design: Concept drawings of proposed solution indicating overall building configuration, massing, and scale including all major building elevations and their relationships to adjacent buildings on same campus.
      2) Design Development: Drawings and artist renderings and 3 D physical model showing all building elements that are part of the shell with sizes and locations to scale.
      3) Construction Documents: Details of building shell, annotated to show compliance with performance requirements.
2. Services Elements:
   a. Conceal services elements from view to greatest extent possible, with exposed portions of simple, neutral design and color.
      1) Exception: Standard designs of manufacturers, without consideration for appearance, may be used for fire suppression sprinkler heads.
      2) Exception: Exposed portions are acceptable in SU1, SU2, SV1, and SV3 areas.
      3) Where exposed portions are acceptable, do not obstruct or diminish clear dimensions of doorways, windows, other operable openings, access panels and cabinet doors, or passageways, stairs, and other exitways.
      4) Where exposed piping is acceptable, install it close to walls and overhead structure, parallel and square to finished construction, plumb and nominally horizontal (except where required to slope for drainage).
      5) Cover annular spaces around pipes, ducts, and conduits, where they pass through walls, ceilings, and floors with escutcheons or cover plates.
         (a) Exception: Escutcheons not required in SU1, SU2, SV1, and SV3 areas, provided annular spaces are filled completely.
      6) Mountings: On finished surfaces, use concealed attachments with cover plates, frames, or trim overlapping finishes.

3.03 HEALTH AND SAFETY CRITERIA

A. Life Safety: Maintain existing emergency exits required by code open during construction period, unless alternate means of egress acceptable to local authorities are provided.

B. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
1. Provide Type I-A construction as specified in the code.

2. For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
3. For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc., Factory Mutual, and Intertek (Warnock-Hersey), and other NRTL's recognized by US Department of Labor.
4. Maintain fire resistance of walls, floors, ceilings, and other fire-rated assemblies that services must pass through, in accordance with requirements of the section in which the fire-rated assembly is specified.
5. Provide fire-rated separations between equipment rooms and other spaces where required, and as specified by, the code.
6. Combustible pipes may be used only where buried if outside building.
7. Provide products which are fire rated for the specific locations where they are installed.
8. Substantiation:
    a. Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
    b. Construction Documents: Identifying numbers on the construction drawings.

C. Prevention of Accidental Injury: As required by code and as follows:
1. Use physical barriers to prevent access to areas that could be hazardous to workers or the public, in the design and during construction.
2. Safety Glazing: As defined by 16 CFR 1201; provide in locations required by code, glazed areas subject to human impact, glazed areas at grade, and doors.
3. Prevent ice and snow from falling off building elements onto pedestrians, building occupants, and vehicles.
4. Protect pedestrians, building occupants, and vehicles from objects accidentally dropped from elevated observation decks, balconies, or plazas.
5. Services: Avoid safety hazards wherever possible; where services must involve flammable materials or hazardous operations, comply with code.
6. Substantiation:
    a. Design Development, detailed description of design criteria, and structural analysis of load-resisting elements prepared by licensed structural engineer.
    b. Construction Documents: For load-resisting elements, structural design calculations and drawings sealed by licensed structural engineer.

D. Lightning Hazard: Design to prevent damage to occupants, structure, services, and contents due to lightning strikes.
1. Provide protection equivalent to that specified in NFPA 780; supplementary ground conductors and grounding electrodes are required only where the integral portions of the structure cannot perform those functions.
    a. See Section DC D6 - Electrical Criteria for design criteria for supplementary components.
2. Substantiation: If no supplementary components are to be used, provide the same substantiation as if a supplementary system was used, showing that a supplementary system is not required.

E. Health Hazards - In the Design:
1. Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces on a long-term basis.

F. Health Hazards - During Construction:
1. Perform construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
2. Use of explosives is not permitted.
3. Hazardous Construction Materials: Design and construct to comply with the requirements of the code and the following:

a. Whenever construction operations could result in worker contact with hazardous materials, follow recommendations of an American Board of Industrial Hygiene Certified Industrial Hygienist (CIH) employed by Design-Builder.

G. Physical Security: In addition to any provisions that may be required by law or code, design and construct both exterior and interior spaces to incorporate accepted principles of crime prevention through environmental design (CPTED), using natural (as opposed to technological) methods of providing surveillance, access control, and territorial reinforcement wherever possible.
   1. Definition of Elements at Ground Level: For purposes of physical security, any element within 20 feet (6 m) of the ground, grade, or adjacent paving.

H. Electric Shock Hazard: Provide equipment which protects personnel from electrical shock.
   1. Electrically-Operated Equipment and Appliances: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.

I. Explosion Hazard/ Blast Mitigation: Design and construct Project providing protection against explosion hazards. Provide blast mitigation as required by Project Programs.
   1. Shell: Design and construct shell to provide relief from explosion hazards so as to minimize effect on occupants and structural members.

J. Excess Pressure Hazard: Design pressurized components to withstand operational pressures without failure and to relieve or reduce excessive pressure to prevent failure.

K. Misuse: Minimize misuse that could result in damage to property, injury, or loss of life.

L. Vermin Resistance: Use components that are resistant to the entry of rodents and insects.

3.04 STRUCTURAL CRITERIA

A. Structural Performance: Design and select materials to support all loads without damage due to loads, in accordance with code.
   1. Existing Elements To Remain: Prevent movement or settlement of elements that are to remain.
      a. Cease operations immediately if structures that are to remain appear to be in danger; do not resume operations until danger has been removed or remedied.
      b. Coordinate demolition with grading so that final grades do not subside within one year after completion.
   2. If design method is not specifically prescribed by Code, design in accordance with ASCE 7.
   3. Design for wind in accordance with ASCE 7 for wind speed of 115 mph, Risk Category III, Exposure D.
   4. Design for seismic in accordance with ASCE 7 for Risk Category III.
   5. Design and provide shell elements to resist loosening or detachment in winds equivalent to the code design wind speed.
   6. Elements engineered by manufacturer or fabricator, rather than by engineer-of-record, shall comply with the following additional requirements:
      a. Manufacturer/fabricator employs structural engineer licensed in the state of California to design structural elements.
      b. Manufacturer/fabricator has minimum of 5 years experience in design and manufacture of similar structures.

B. Services Components and Their Supports: In accordance with code, but not less than by customary practice
   1. Minimum Safety Factor for Component Structural Elements: Two
   2. Anchors: Securely and positively attach all services components to superstructure.
   3. Supports for Piping, Conduit, Ducts, and Other Services Components: Attached to, and supported by, the superstructure, not to or by non-structural construction or sheet metal elements, so that they do not move or sag, using the following:

a. Supports that allow movement of the rigid linear elements (pipe, etc.) without undue stress on the piping, tubes, fittings, components, or the superstructure.
b. Intermediate supports mounted between structural members to limit distance between supports.
c. Supports capable of handling seismic forces in accordance with the code.
d. Mounting frames, bases, or pads, designed for ease of anchorage or mounting.
e. Rigid sway bracing at changes in direction of more than one-half of a right-angle for all pipes.

C. Concealed or Buried Components: Design cover or concealment so that components are not subjected to damaging stresses due to applied loads.

D. Systems and Elements Attached to or Supported by Superstructure or Substructure: Systems or elements, whether structural or nonstructural, attached to or supported by superstructure or substructure to be designed to accommodate elastic interstory building drifts due to wind and inelastic interstory building drifts due to seismic loading with performance as follows:
1. Wind: No damage or loss of function.
2. Seismic: No damage or loss of function, except minimal loss of air or weather tightness of building enclosure is acceptable.

E. Railing: Resistant to required forces in accordance with ASCE 7. Lateral displacement to not exceed 3/8" and not more than allowed by Code.

F. Construction Loads and Erection Stresses: Accommodate temporary construction loads and erection stresses during construction.

3.05 DURABILITY CRITERIA

A. Expected Service Life Span: Expected functional service life of the built portions of this project is 50 years. For service life of individual components, refer to the applicable section. The Design-Builder shall specify and select materials and equipment that will meet the required service life. The service life span is only for substantiation not for guarantee. Substantiation shall be based on the method of selecting materials, equipment and assemblies and on design detailing.
1. Shell: Same as building service life, except as follows:
a. Curtain Wall Assembly (excluding sealant) - 50 yrs
b. Metal Panel Assembly (excluding sealant) - 30 yrs
c. Cementitious Plaster Wall Assembly (excluding sealant) - 30 yrs
2. Ducts, Piping, and Wiring in All Services: Same as the service life of the building.
3. All Components Permanently Installed Underground or Encased in Concrete: Not less than service life of building.
4. Software and Firmware Integral to Operation of Services Equipment: Minimum 20 years functional life without reprogramming required.
5. Service life spans of individual elements that differ from the overall project life span are defined in other sections.
6. Manufacturer warranties are not considered adequate substantiation of expected service life span.
7. Substantiation: Since actual service life cannot be proven, substantiation for the estimated service life shall include material warranties, industry records and testing data.
a. 60% Construction Documents: Service life expectancy analysis, for selected
b. equipment elements for which life span is specified; including:
1) Length of effective service life„ with action required at end; e.g. complete replacement, partial replacement, refurbishment.
2) Conditions under which estimate will be valid; e.g. expected uses, inspection frequency, maintenance frequency, etc.
c. 60% Construction Documents: Replacement cost, in today's dollars, for selected major equipment elements that has a service life expectancy less than that of the

project; include both material and labor cost, but not overhead or profit; base costs on installing in existing building, not as a new installation.

d. 60% Construction Documents: Life cycle cost selected major equipment, over the specified project service life, excluding operating staff costs; include costs of: Replacement of each element not expected to last the life of the project; identify the frequency of replacement.
   1) Deduct salvage value of replaced elements.
   2) Calculate costs in today's dollars, disregarding the time value of money, inflation, taxes, and insurance.

B. Water Penetration Resistance:
   1. Shell: Design and select materials to prevent water penetration into the interior of shell assemblies, under conditions of rain driven by 115 mph (185 km/h) wind.
      a. Building envelope system shall be a barrier system, not allowing water penetration.
      b. Exception: Controlled water penetration is allowed if materials will not be damaged by presence of water or freezing and thawing, if continuous drainage paths to the exterior are provided, and water passage to the building interior is prevented.
      c. Substantiation: In addition to requirements specified for proven-in-use and proven-by-mock-up construction, drawings showing paths of water movement, with particular attention to changes in direction or orientation and joints between different assemblies. Joints and materials to be water-tight.
   2. Component Mountings: Where components are mounted to surfaces that are required to be moisture-resistant, seal mounting surface of components to finish surface so that moisture cannot penetrate under or behind component, using material that is not affected by presence of water, that is mildew-growth resistant, and that has a minimum service life of 10 years.

C. Vapor-Permeable Air and Weather Barriers: Air-barrier assembly including sheet flashing at openings and transitions and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
   1. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357
   2. Use method of sealing joints between elements that will be effective given available construction practices.
   3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly
   4. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions
   5. Comply with additional requirements of Section DC B2 Exterior Enclosure Criteria.

D. Corrosion Resistance: Prevent corrosion by using corrosion-resistant materials, by preventing galvanic action, by preventing contact between metals and concrete and masonry, and by preventing condensation on metals.
   1. Separation of Dissimilar Metals:
      a. Where different metals subject to galvanic action are exposed to weather or moisture, prevent direct contact between them.
      b. Piping Connections for Piping of Dissimilar Metals: Dielectric adapters.
   2. Aluminum: Prevent direct contact of aluminum with concrete or cementitious materials.
   3. Steel: Where permitted to be coated with other than zinc, zinc-alloy, or aluminum-zinc alloy, follow the recommendations of Society for Protective Coatings (SSPC) in regard to SP-6 or greater preparation and for coating with zinc-rich primer and coating with compatible urethane type high-performance coating.

4. Outdoor Metal Elements Except in Contact with Soil: The following are considered corrosion-resistant metals:
   a. Aluminum.
   b. Stainless steel, Type 316.
   c. Hot-dipped galvanized steel, with minimum zinc coating of 0.90 oz/sq ft (275 gm/sq m) total, both sides, or equivalent aluminum-zinc alloy coating.
   d. Cadmium-plated steel, with minimum coating of 12 micrometers.
5. Indoor Metal Elements Potentially Exposed to Moisture: The following are considered corrosion-resistant metals:
   a. All metals listed above for exterior exposure.
   b. Stainless steel, Type 304.
   c. Brass and bronze, but not copper.
   d. Cast iron, ductile iron, and malleable iron.
   e. At Architecturally Exposed Structural Steel (AESS), provide high-performance coating system consisting of zinc-rich epoxy primer, high-build epoxy intermediate coat, and polyurethane topcoat; minimum system thickness of 7 mils DFT. Provide full scale mockups of AESS including stepped samples showing intumescent fireproofing, when required by Code, primer, intermediate coat, and topcoat. Repair or replace mockups until smooth application is approved by the Owner. Approved mockup shall serve as basis for acceptance of Work in place
   f. Chrome-plated steel.
6. Underground Metal Elements: Provide supplementary protection sufficient to prevent corrosion completely for the service life of the element without maintenance, unless otherwise.
   a. Underground metal elements include, but are not limited to, pipes, tanks, conduits, ducts, structural members.
   b. 3 inches (150 mm) of concrete cover is considered to be permanent protection.
   c. Coatings or wrappings are not considered sufficient protection for the following types of elements:
      1) Underground elements subject to movement due to structural loads or thermal expansion or contraction.
      2) Metal elements buried in a soil environment known to cause corrosion on similar nearby structures.
      3) Metal elements buried in a soil environment in which stray DC electrical currents are present.
      4) Metal piping carrying petroleum products or other hazardous or toxic materials buried or otherwise installed without means of visual observation of entire exterior surface of piping.
      5) Metal tanks holding petroleum products or other hazardous or toxic materials buried or otherwise installed without means of visual observation of entire exterior surface of tank.
      6) Cathodic protection is not considered sufficient protection.

E. Weather Resistance: Design and select materials to minimize deterioration due to precipitation, sunlight, ozone, normal temperature changes, salt air, and atmospheric pollutants.
   1. Weather resistance requirements apply to all components exposed to the outdoor environment, including services, unless specifically excepted; equipment enclosures are considered the equivalent of the exterior enclosure.
   2. Deterioration includes corrosion, shrinking, cracking, spalling, delamination, abnormal oxidation, decay and rot.
   3. Surfaces Exposed to View: Deterioration adversely affecting aesthetic life span includes color fading, crazing, and delamination of applied coatings.
      a. Coating Performance: AAMA 2605 (10-year), minimum.

b. Coating Salt Spray Resistance: No deterioration when tested in accordance with ASTM B117 for 1000 hour exposure with 5 percent salt fog at 95 degrees F (35 degrees C).
c. Use one of the following:
1) Fluoropolymer coating (70 percent Kynar 500 (tm) or Hylar 5000(tm)), minimum three coats.

4. Joint Components and Penetration Seals: Capable of resisting expected thermal expansion and contraction; use overlapping joints that shed water wherever possible.
5. Transparent Elements (Glazing): No haze, loss of light transmission, or color change, during entire expected service life.
a. Test Criteria: Less than 1 percent change in haze, transmission, and color over 2 years exposure, when tested after natural exposure conditions or accelerated light and water conditions simulating natural exposure at project, in accordance with ASTM D 1003-2000; accelerated exposure documented with comparison to natural conditions.
6. Service Temperature: Low temperature equal to historically-recorded low; high temperature equal to that expected due to any combination of air temperature and heat gain from solar and other sources.
7. Freeze-Thaw Resistance: Adequate for climate of project.
8. Ozone Resistance: Do not use materials that are adversely affected by ozone.
9. Liquid Storage and Distribution Components: Prevent freezing during longest duration of low temperature anticipated, based on historical weather data; if necessary, provide automatically controlled supplemental heating.
10. Buried Water Piping: Minimum of 6 inches (15 mm) below lowest recorded level at which the ground freezes.
11. Services Passing From Inside to Outside: Openings through shell sealed as required to meet performance specified, and using materials specified, in Section DC B2 - Exterior Enclosure Criteria.
12. Substantiation:
a. Design Development: Details of proven-in-use materials and test reports.

F. Temperature and Humidity Endurance: Design equipment to endure temperature and humidity that will be encountered and to resist damage due to thermal expansion and contraction.

G. Moisture Vapor Transmission: Design to prevent deterioration of materials due to condensation of moisture vapor inside assemblies.
1. Use supplementary vapor retarder if necessary to meet requirements.
2. Use method of sealing joints between elements that will be effective given available construction practices.
3. Substantiation:
a. Design Development: Identification of building elements providing moisture barrier, materials to be used, and data showing performance if available for manufactured products.

H. Impact Resistance: Design and select materials to resist damage due to impact in accordance with code and the following:
1. Minimize damage from windborne debris propelled at up to 35 mph (56 km/h).
2. Design and select materials to resist damage from hail of size up to 1/2 inch (12 mm).
3. Minimize damage due to potential vandalism.
4. Natural Hazards: Design to resist damage from perching, nesting, and feeding birds.
5. Substantiation:
a. Design Development: Identification of building elements required to resist impact damage, including vehicular impact; quantification of impact criteria; materials to be used; and methods of substantiation.

I. Accidental Damage Resistance:
1. Minimize potential for damage to built elements due to accidents.

2. Existing Elements: Use physical barriers to protect existing elements to remain.
3. Accidental Water Leakage: Locate components that would be damaged by water leakage from pipes or through foundations or roof out of likely paths of water and at least 4 inches (100 mm) above floor level.
4. Buried Components: Minimum of 12 inches (300 mm) below surface of ground.
5. Underground Piping and Conduit: Watertight and rootproof.
6. Finishes on Exposed Components Subject to Touching by Occupants: Durable enough to withstand regular scrubbing using ordinary methods.
7. Equipment: Provide equipment which has been designed to prevent tampering.
8. Underground Piping: Protect heating piping and chilled water piping from accidental damage with a warning tape buried 12 inches (300 mm) above the pipe.

J. Wear Resistance: Design and select materials to provide resistance to normal wear-and-tear in accordance with code and the following:
1. Elements Within Reach of Pedestrians: Minimize degradation from rubbing and scratching caused by pedestrians.
2. Minimize degradation caused by windblown sand, acid rain, and UV.
3. Substantiation:
a. Design Development: Identification of building elements required to resist wear, quantification of wear criteria, materials to be used, and methods of substantiation.

K. Resistance to Biological Factors:
1. Animals: Do not use materials that are attractive to or edible by animals or birds.
2. Insects: Do not use materials that are edible by insects, unless access by insects is prevented.
3. Wood: When wood is used, provide at least the protection recommended by AWPA as contained in AWPA U1.

3.06 OPERATION AND MAINTENANCE CRITERIA

A. Space Efficiency: The construction will minimize floor area required while providing specified spaces and space relationships, plus circulation and services areas required for functions.
1. Substantiation: Areas and ratios measured and calculated in accordance with ANSI/BOMA Z65.1-current edition.
a. Preliminary Design: Calculation of Gross Building Area, Net Building Area, Public Areas, Airline Areas, organized by floor levels as listed in the Programmatic Documents. Calculate and net area of each space. Tabulate area calculations in clear and concise format to provide side by side comparison of programmed areas versus proposed areas and differences between each scheme.
b. Design Development: Calculation of Gross Building Area, Net Building Area, Public Areas, Revenue Producing and Non-Revenue Producing Areas organized by floor levels as listed in the Programmatic Documents. Calculate R/U Ratio, and net area of each space. Tabulate area calculations in clear and concise format to provide side by side comparison of previously accepted Preliminary Design areas versus final planned areas and differences between the two for each room.

B. Energy Efficiency: Design and construct to minimize energy consumption while providing function, amenity, and comfort specified, in accordance with the code.
1. Provide energy efficient design having at least 10 percent less energy consumption than that of an equivalent minimally-complying baseline building, demonstrated by comparing the actual Design Energy Cost to the Energy Cost Budget of a prototype building, both calculated in accordance with ASHRAE Std 90.1 I-P.

C. Water Consumption: Minimize water consumption, both inside and outside the building, as required by the LEED scorecard.

D. Waste (Trash/Rubbish) Removal: As described in the project program and as follows:
1. See LEED scorecard for requirements for solid waste disposal.

E. Ease of Operation and Use:

1. Intended operating personnel are personnel with a reasonable level of training for similar activities.
2. Provide facility, equipment, and systems that are easily operated by intended personnel.
    a. Space Around Components: Working clearances and access routes as required by code and as recommended by component manufacturer.
    b. Access: All mechanical and electrical equipment located to allow easy access. Provide access doors for equipment accessed through walls, partitions, or fixed ceilings.
    c. Valves and Other Control Devices: Accessible handles, switches, control buttons; valve handles on top/upper side; chain or other remote operators where located out of normal reach above floor level in SU1 and SU2 spaces.
3. Minimize the need for specialized training in operation of specific equipment or systems; identify all equipment and systems for which the manufacturer recommends or provides training programs.
4. Preparation for Use: Prepare services for use by testing appropriately for proper operation before start-up, eliminating operational anomalies, adjusting control systems for optimum operation, and demonstrating proper functioning.
    a. Perform detailed commissioning as recommended by recognized professional societies for all services systems, building envelope, doors, and non-services equipment included in contract.
5. Preparation for Operation: Provide assistance for the Owner's preparations for operation, as follows:
    a. Demonstration of all services to Owner personnel.
    b. Training Owner personnel in the operation of all service systems. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.

F. Ease of Maintenance:
1. Minimize the amount of maintenance required.
2. Warranty Service After Closeout: Provide removable access panels to allow cleaning.
3. Do not locate any equipment requiring maintenance on the roof, in crawl spaces, where access must be through attics or crawl spaces, or where access is not possible using removable panels or doors.
4. Light Levels: Provide adequate lighting for locating and maintaining equipment; emergency lighting for critical components.
5. Cleaning: Where not otherwise specified, design equipment mountings to allow easy cleaning around, and under, equipment, if applicable, without crevices, cracks, and concealed spaces where dirt and grease can accumulate and with raised, closed bases for equipment mounted on the floor.
6. Equipment Enclosures: Provide removable access panels to allow cleaning.
7. Provide equipment for complete window washing including equipment and utilities for maintenance of all exterior enclosure surfaces including glazed and metal panel areas.
    a. Provide for storage of window washing equipment including platforms and mechanized lifts.
    b. Provide equipment for cleaning for all areas that need to be maintained and/ or cleaned.
    c. Provide storage spaces / rooms for storage of maintenance equipment including lifts, platforms, cherry pickers etc.
8. Site Utilities: Record or mark locations of existing, abandoned, and new utility lines in such a manner that they can be easily located during and after completion of construction.
9. Piping Systems:
    a. Piping Other Than Gravity Drains: Provide means of isolating convenient portions of piping system, so that small portions may be shut down leaving the remainder in operation and so that drainage of the entire system is not required to enable repair of a portion of it.
    b. Piping: Entire systems drainable without disassembly of piping.

c. Above Ground Piping: Labeled to identify contents and direction of flow, each shut-off valve, each piece of equipment, each branch take off, and at 20 ft (6 m) maximum spacing on exposed straight pipe runs.
d. Equipment in Piping Systems: Each unit provided with a union or flanged connector at each pipe connection to allow easy removal.

10. Replaceability of Parts:
    a. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
    b. Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
    c. Parts Availability: Readily available from stocking distributors within 50 miles (80 km) of project location.
11. Exceptions: Elements that do not meet the specified requirements for ease of maintenance may be used, provided 1) they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole, 2) the service life expectancy analysis and life cycle cost substantiation specified for service life are provided, and 3) Owner's acceptance is granted.
12. Substantiation:
    a. 60% Construction Documents: Maintenance cost for first year of operation, based on use of maintenance contracts; estimate of the impact that aging materials will have on maintenance costs; description of maintenance activities included in estimated cost.
    b. 100% Construction Documents: Updated maintenance costs, based on final product selections.

G. Ease of Repair: Elements that do not meet the specified requirements for ease of repair will be used only if they meet the specified requirements for ease of replacement of elements not required to have service life span equal to that specified for the project as a whole; the service life expectancy analysis and life cycle cost substantiation specified for service life are provided; and Owner's acceptance has been granted.

H. Ease of Replacement:
1. Elements Not Required to have Expected Service Life Span Equal to that Specified for the Facility as a Whole: Make provisions for replacement without undue disruption of building operation.
2. Large Equipment: Provide doors and corridors large enough for removal of major pieces of equipment, such as, chillers and boilers.

I. Maintenance After Occupancy: Where maintenance service after occupancy is specified, such services are to be performed at no extra cost to Owner.
1. Individual maintenance contracts will be between maintenance organization and Owner.
2. Services will be included under Design-Builder's contract with Owner.
3. Maintenance Services: Examination at frequency consistent with reliable operation; cleaning, adjusting, and lubricating; replacement of parts whenever required, using parts produced by the original manufacturer.
4. Maintenance Organizations: Approved by manufacturer and Owner; transfer or assignment of contracts without prior written consent of Owner not allowed.

END OF SECTION

SECTION DC A: SUBSTRUCTURE CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Substructure comprises foundations, basements, floors on grade, and other substructure elements.

B. Foundations: Structures responsible for transferring dead loads, live loads, and environmental loads of completed building to the earth in such a way that the building is supported evenly and without minimal initial or long term movement.
   1. Standard Foundations: Spread footings below columns, linear spread footings below loadbearing walls, foundation walls not part of basements, caisson (pier) caps, and pile caps.
   2. Supplemental Foundations: All types of foundation elements required to supplement existing substructure to upgrade the capacities and performance of existing substructure as required by design.
   3. Other Foundations: All types of special foundation systems, including permanent shoring and underpinning, raft foundations, driven piles, rotary soil displacement piles, drilled piers (caissons), and permanent dewatering systems.

C. Basements: Space-enclosing elements below grade, including necessary excavation, structural walls and floor, and other elements of enclosure such as waterproofing and thermal insulation.
   1. Basement Excavation: Excavation, excavation supports that become a permanent part of substructure, backfill, and compaction of backfill for basement construction.
   2. Basement Walls: All elements of wall construction that occur below or partially below grade, including thermal insulation, waterproofing and dampproofing, and subdrainage.

D. Floors on Grade: Structural slabs, individual pavers, and framed flooring systems that are installed over fill or at excavated and compacted grade, including all depressions in the floor, such as trenches, pits, and sumps; also equipment bases, under floor and perimeter drainage, thermal insulation at floor edge, and moisture barriers installed integrally with floor system.

E. Other Substructure Elements: Grade beams, elevator pits, escalator pits, and sump pits.

F. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B2 - Exterior Enclosure Criteria: Acoustical criteria applicable to basements.

C. Section DC C - Interiors Criteria: Acoustical criteria applicable to basements.

D. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.03 REFERENCE STANDARDS

Current edition of:

A. ACI 201.2R - Guide to Durable Concrete;

B. ACI 302.1R - Guide for Concrete Floor and Slab Construction;

C. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers;

D. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric);

E. EPA/625/R-92/016 - Radon Prevention in the Design and Construction of Schools and Other Large Buildings; w/Addendum.

1.04 FIELD CONDITIONS

A. Portions of existing substructure will be removed to accommodate new substructure. Portions of existing substructure will be partially removed and reinstated to integrate with new substructure. Balance of existing substructure to be undisturbed..

B. New substructure shall not reduce the vertical or lateral load carrying capacity of existing substructure to remain.

C. Existing Utilities and Underground Construction: Coordinate design and construction of substructure with existing utilities and underground construction.

PART 2 PRODUCTS AND METHODS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide substructure as required to support the completed and occupied building safely and without adverse subsidence or other adverse movement.

B. Supplement existing substructure as required to upgrade the capacities and performance of existing substructure as required by design to support occupied building safely and without adverse subsidence or other adverse movement.

C. Provide floors on grade as required to enclose habitable spaces and support interior functions without adverse subsidence, structural cracking, or other adverse movement.

D. If geotechnical investigation indicates potential of liquefaction, provide substructure designed with adequate strength and performance considering liquefaction effects without damage due to liquefaction.

E. If geotechnical investigation indicates potential of liquefaction, provide floors on grade designed with adequate strength and life safety performance considering liquefaction effects without damage to other substructure or superstructure elements due to liquefaction, and which could be repaired with minimal disruption to ongoing occupancy activities and with a preplanned strategy acceptable to SDCRAA

F. Provide basement walls as required to enclose habitable space below grade.

G. Where space for excavations with sides sloped at minimum of 1:2 vertical to horizontal is not available, design retaining walls to resist soil and water pressure as well as live loads until permanent basement elements are constructed.

H. When excavation extends below bearing stratum for adjacent structures provide permanent underpinning as required..

I. Prevent deterioration of loadbearing stratum due to accumulation of water in excavation.

J. Where substructure is integral with elements defined within another element group, meet requirements of both element groups.

K. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

3.02 AMENITY AND COMFORT CRITERIA

A. Thermal Performance: Provide thermal resistance as necessary to maintain interior comfort levels specified and in accordance with code and the following:
   1. Average Thermal Transmittance: U-value of 0.15 IP, maximum, for portions of substructure in contact with earth and enclosing conditioned space.
   2. Average Thermal Transmittance: U-value of 0.15 IP, maximum, for portions of substructure in contact with earth and enclosing conditioned space.
   3. Thermal Resistance:
      a. R-value of 7.0, minimum, for portions above grade or within 18 inch below grade and enclosing conditioned space.

b. R-value of 5.0, minimum, for portions of floors on grade within 24 inch of exposed building exterior.

4. Condensation: None on interior surfaces under normal interior temperature and relative humidity conditions, during 97-1/2 percent of the days in the coldest 3 months of the year.
5. Floor Edge Heating: Maintain temperature of floor surface within 24 inch of exposed building exterior at not less than 70 degrees F under winter design conditions.
6. Vapor Retardation: Limit vapor transmission through floor construction to maximum rate of 0.1 perms at locations where impermeable applied interior finishes such as resilient flooring, wood flooring, or acrylic terrazzo are used.
   a. Use supplementary vapor retarder if necessary to meet requirements.
   b. Use method of sealing joints between vapor retarder elements that will be effective given available construction practices.
7. Substantiation:
   a. Preliminary Design: Identification of major thermal resistant materials and systems.
   b. Design Development: Detailed listing of design criteria and design analysis, prepared by licensed mechanical engineer.
   c. Construction Documents: Product data on thermal materials and details of construction to achieve required thermal performance.

B. Water Penetration Resistance: Prevent ground water penetration into the interior of the building, under any circumstances.
1. Waterproofing: Provide permanent waterproofing at portions of foundation that extend below water table and enclose habitable space, using any of the following methods:
   a. Permanent, waterproof barrier on exterior of basement construction, protected against damage from backfill.
   b. Permanent, waterproof barrier installed within air space of multi-layer construction.
   c. Basement materials and construction that are inherently watertight.
2. Waterproofing at Floors on Grade: Provide permanent waterproofing for floors on grade that could potentially come into contact with ground water. Acceptable methods are any of the following:
   a. Permanent, waterproof barrier beneath floor construction, protected against damage from floor installation.
   b. Permanent, waterproof barrier installed between separate layers of floor construction.
3. Drainage: Provide method of collecting and draining water away from exterior surfaces and from underside of elements that enclose habitable space.
4. Substantiation:
   a. Preliminary Design: Identification of major water resistant assemblies and drainage features.
   b. Design Development: Subsurface investigation to identify location of water table and identification of areas requiring water protection systems.
   c. Construction Documents: Details of proven-in-use or proven-by-mock-up design.
      1) Product data on specific water protection materials and systems; details of construction to achieve permanent water protection.

C. Water Accumulation: Prevent accumulation of water in crawl spaces or open areas adjacent to substructure.
1. Substantiation:
   a. Preliminary Design: Identification of dewatering methods to be used.
   b. Construction Documents: Details of proven-in-use or proven-by-mock-up design.

D. Acoustical Performance: Limit sound transmission through substructure as follows:
1. Ambient Sound Level: Maintain ambient sound levels in enclosed, occupied substructure spaces within noise criteria (NC) ranges specified in Section DC C - Interiors Criteria during hours of occupancy.
2. Vibration Resistance: Use substructure elements that will not resonate at frequencies that are characteristic of ambient underground sound and vibration sources at the project site.

3. Substantiation:
    a. Preliminary Design: Measurements of ambient site noise levels over full range of audible frequencies, identification of acoustic properties of major below grade sound and vibration generators, and preliminary analysis prepared by an acoustical engineer.
    b. Design Development: Acoustical analysis prepared by an acoustical engineer.
    c. Construction Documents: Acoustical analysis prepared by an acoustical engineer.

E. Floor Flatness (FF): Provide floors on grade engineered and constructed to achieve degree of flatness as follows, when measured in accordance with ASTM E1155 (ASTM E1155M):
1. Specified Overall Value (SOV): 35.
2. Minimum Localized Value (MLV): 24.

F. Floor Levelness (FL): Provide floors on grade engineered and constructed to achieve degree of levelness as follows, when measured in accordance with ASTM E1155 (ASTM E1155M):
1. Specified Overall Value (SOV): 25.
2. Minimum Localized Value (MLV): 17.

3.03 HEALTH AND SAFETY CRITERIA

A. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
1. For all elements required to have a fire resistive rating and which are not made of materials and systems specified as acceptable by the code, use proven-by-mock-up construction.
2. For proven-by-mock-up construction, acceptable testing agencies are Underwriters Laboratories Inc.
3. Substantiation:
    a. Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
    b. Construction Documents: Identifying numbers on the construction drawings.

B. Substance Exclusion: Prevent accumulation of harmful chemicals and gases in spaces below substructure and subsequent penetration into occupied spaces.
1. Radon: Prevent accumulation and penetration of radon by any of the following means:
    a. Airtight construction.
    b. Impermeable seals at service penetrations of enclosure elements.
    c. Active soil depressurization system in accordance with recommendations of EPA/625/R-92/016.
    d. Building pressurization in accordance with recommendations of EPA/625/R-92/016.
2. Methane: Prevent accumulation and penetration of methane using strategies acceptable to SDCRAA.
3. Substantiation:
    a. Preliminary Design: Identification of major radon resistant assemblies, chemical resistant assemblies, and ventilation features.
    b. Construction Documents: Details of proven-in-use or proven-by-mock-up design.
    c. Occupancy: Field testing to verify the absence of significant levels of harmful gases and chemicals after minimum of 6 months occupancy.

C. Vermin Resistance: Provide permanent protection against infestation of construction by ground dwelling termites and other vermin.

3.04 STRUCTURAL CRITERIA

A. Performance: Provide loadbearing substructure members as required by Code and designed to distribute dead loads, live loads, environmental loads, and special loads so that capacity of soil is not exceeded, to limit movements to levels acceptable to SDCRAA, to limit differential movements between new and existing construction to levels acceptable to SDCRAA, and to

prevent damage to existing construction. Pile installation to attenuate sound and vibration to levels acceptable to SDCRAA.

1. Walls: Not less than thickness of superstructure walls supported by foundation walls and not less than 8 in (200 mm).
2. Footings: Designed not to exceed the allowable soil bearing capacity. Minimum compressive strength of 4000 psi (20.6 MPa) and minimum thickness of 12 in (300 mm).
3. Grade Beams: Designed to adequately resist design loads. Minimum compressive strength of 4000 psi (20.6 MPa) and minimum dimensions of 12 in (300 mm).
4. Caissons and Drilled Piers: Designed with adequate friction resistance to support loading. Minimum compressive strength of 4000 psi (27.5 MPa) and minimum diameter of 24 in (600 mm).
5. Driven Piles or Rotary Soil Displacement Piles: Designed with adequate friction resistance to support loading. Predrill to extent possible without adverse effects on capacity or performance of the installed piles.
6. Pile, Pier, or Caisson Caps: Minimum compressive strength of 4000 psi (27.5 MPa) and minimum thickness of 24 in (600 mm).
7. Floors on Grade: Minimum compressive strength of 4000 psi (27.5 MPa) and minimum thickness of 5 in (125 mm). Adequate jointing to mitigate cracking to levels acceptable to SDCRAA.
8. Reinforcing Steel: Minimum yield strength not less than 60,000 psi (420 MPa).

B. Dead Loads: Accommodate loads from weights of building materials, construction itself, and all fixed service equipment.

C. Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads as prescribed by code or concentrated loads, whichever are more demanding structurally.
   1. Uniformly Distributed Loads: As required by code for building occupancy, project program, and construction.
   2. Concentrated Loads: As required by Code, project program and construction.

D. Environmental Loads: Accommodate loads from all environmental forces in accordance with code and the following:
   1. Lateral Soil Loads: Lateral pressure of soil adjacent to vertical substructure elements, including potential surcharge from fixed or moving loads and potential hydrostatic pressure.
      a. Increase lateral pressure assumptions if expansive soils have been identified by a geotechnical investigation, unless expansive soils are excluded from backfill.
      b. Increase lateral pressure assumptions as required for special soil conditions identified by a geotechnical investigation.
      c. Minimum Lateral Soil Load: 45 psf per ft of depth.
   2. Vertical Soil Loads: Full hydrostatic pressure applied over entire substructure area.
      a. Increase vertical pressure assumptions if expansive soils have been identified by a geotechnical investigation, unless expansive soils removed and replaced by nonexpansive soils to a minimum depth of 24 inch below horizontal substructure elements.
      b. Increase vertical pressure assumptions as required for special soil conditions identified by a geotechnical investigation.
   3. Wind: Vertical, horizontal, and overturning forces attributable to design wind speed.
   4. Seismic: Vertical, horizontal, and overturning forces attributable to code prescribed seismic loads.
   5. Blast: Vertical, horizontal, and overturning forces attributable to program requirements for blast mitigation.

3.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as building service life without any deterioration.

B. Corrosion Resistance of Underground Metal Elements: See Section DC 0 - Facility Design Criteria.

C. Salt Water Resistance: Provide substructure elements made of materials that will resist deterioration by exposure to salt water.
   1. Substantiation:
      a. Validation phase: Identification of major structural materials and systems.
      b. Construction Documents: Design details and specifications for corrosion resistant features.

D. Concrete Durability:
   1. Monolithic Concrete Floor Slabs on Grade: Composition and finishing as recommended by ACI 302.1R based on type of anticipated traffic and intended use.
   2. Substantiation:
      a. Validation phase: Identification of structural materials, material strengths, characteristics of wet concrete, material properties of cured concrete, concrete admixtures, concrete hardeners, natural aggregates, mineral aggregates, metallic aggregates, air content in concrete, concrete mix designs, concrete curing, and finishing with respect to the intended use of the floor slabs on grade.
      b. Construction Documents: Design details and specifications for concrete durability.

3.06 OPERATION AND MAINTENANCE CRITERIA

A. Provide substructure elements that will endure for the lifetime of the building without requiring maintenance.

END OF SECTION

SECTION DC B1: SUPERSTRUCTURE CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The superstructure comprises roofs and elevated floors and their supports.

B. Roofs: Roof construction, including canopies, and elements required for their support, insulation, fireproofing, and firestopping.

C. Elevated Floors: Floor construction above grade and within basements, including balcony, mezzanine, and ramp floors, floors elevated for access, stair construction if part of the structure, and roof areas intended for occupant live load; and the elements required for their support, insulation, fireproofing, and firestopping, as well as finishing, if an integral part of the floor construction.

D. Supplemental Superstructure: Structural elements required to supplement existing superstructure to upgrade the capacities and performance of existing superstructure as required by design

1.02 RELATED REQUIREMENTS

A. Section DC B2 - Exterior Enclosure Criteria: Weather resistance of exposed superstructure.

1.03 REFERENCE STANDARDS

Current edition of:

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; with Supplements and Errata.

B. ASTM C755 - Standard Practice for Selection of Vapor Retarders for Thermal Insulation;

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials;

D. ASTM E736 - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members;

E. ASTM E760 - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members;

F. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops;

G. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers;

H. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide structural elements, above grade and within basements, capable of supporting all anticipated loads without failure or damage and without damage or adverse effects on the structural performance of existing construction.

B. Do not use any electrically-operated or fuel-powered construction for support of floor or roof members.

C. Where superstructure elements also must function as elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

2.02 AMENITY AND COMFORT CRITERIA

A. Thermal Performance of Roofs, Including Elements on Top of Roof Deck:

B. Water Penetration Resistance: Where roof coverings as specified are not used over roofs provide supplementary waterproof construction providing equivalent protection.

C. Air Barrier Under Roof Deck: Provide continuous separate membrane that allows moisture vapor transmission while preventing air infiltration.

D. Vibration Resistance: Isolate structure from sources of vibration.
   1. External Sources: Existing vibration sources adjacent to and on site, including roadways.
   2. Internal Sources: Occupant or mechanical sources.

2.03 HEALTH AND SAFETY CRITERIA

A. Fire: Provide Class A system including members with combustibility, flame spread, and smoke generation characteristics not greater than allowed by Code.

B. Fire Resistance: Design and select materials to provide fire resistance in accordance with code and the following:
   1. Firestopping:
      a. Where fire resistance integrity of superstructure assemblies is impaired by subsequent installation of other construction elements, restore fire resistance using identical materials or other materials tested under ASTM E814 or UL 1479 unless otherwise required by Code.
      b. Provide firestopping that is rated at not less than the required fire resistance of the penetrated element.
      c. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
   2. Substantiation:
      a. Design Development: List of laboratory tested fire resistive assemblies to be used.
      b. Construction Documents: Identification of laboratory test numbers on the construction drawings for fire resistive assemblies to be used.

C. Explosion Hazard: Design for and provide resistance to forces generated by explosion hazards specified in Section DC 0 - Facility Design Criteria.

D. Electric Shock Hazard: When grounding of electrical systems is accomplished using structural members, design to prevent shock to occupants.

E. Slip Resistance:
   1. Roofs: Where roof structure is the finished roof weather surface, also comply with requirements for roofing.
   2. Exposed Structural Floors: Same as specified for floor finishes.
   3. Access Floor Panels: Same as specified for floor finishes.

2.04 STRUCTURAL CRITERIA

A. Structural Design: In addition to the requirements of Code, design to comply with ASCE 7.

B. Capacity and Structural Performance: Design and provide load-bearing structural members for new construction and supplemental structural elements for existing load-bearing structural members as required by design to provide capacities and structural performance required by Code and the program, but with not less than the following minimum design capacities. Reduction of live load is not allowed for specified live loads of 100 psf or greater. Specified live loads shall not be less than required for airport operations.

1. Roof at Terminal 1	20 psf (reducible) Code-minimum live load
a. Future Solar Array	Additional 20 psf (not reducible)
2. Roof of Bridges	20 psf (reducible) Code-minimum live load
3. Curbside Drop-off/Check-in	
a. Roof	20 psf (reducible)
b. Floors	125 psf
4. Slab on Grade	250 psf
5. Second Floor at Terminal 1	

a.	Ticketing Area	125 psf
b.	SSCP Area	100 psf
c.	Balance of Second Floor	100psf
6.	Airline Clubs	100psf
7.	Pedestrian Bridges	125 psf
8.	Maintenance lift	Coordinate requirements with SDCRAA
9.	Mechanical Rooms	Based on actual equipment, but not less < 150 psf
10.	Antenna Rooms	Based on actual equipment, but not less < 125 psf
11.	Kitchen	100 psf
12.	Dining	100 psf
13.	Public Spaces	100 psf
14.	Stairs	100 psf
15.	Escalators	100 psf
16.	Light Storage	Based on intended usage, but not less than 125 psf
17.	Heavy Storage	Based on intended usage, but not less than 250 psf
18.	Art Areas	Based on intended usage, but not less than 150 psf
19.	Telecom Rooms	Based on actual equipment, but not less < 250 psf
20.	Other Occupied Areas	Based on intended usage, but not less than 100 psf
21.	Planters	250 psf

C. Design-Build Team will coordinate with SDCRAA if load design greater than the code requirement is requested.

D. Dead Loads: Design to resist loads from weights of materials, construction, and fixed service equipment.

E. Live Loads:
   1. Floors: Resist uniformly distributed, concentrated, impact, and dynamic loads with code permitted live load reductions.
   2. Roofs: Resist uniformly distributed, concentrated, impact, and dynamic loads.

F. Environmental Loads:
   1. Wind: Wind speed of 115 mph, Risk Category III, Exposure D, Wind design pressures in compliance with provisions of ASCE 7.
   2. Snow: No snow loading to be considered.
   3. Rain: Resist loads from ponding rainwater considering drainage system to be blocked.
   4. Earthquake: In compliance with provisions of ASCE 7 for Risk Category III.

G. Special Loads: In addition to loads defined by Code, design for loads from moving machinery, elevators, vehicles, baggage handling systems, structure mounted airport operation systems, building maintenance systems, art work, interior landscaping, floor finishes, ceiling finishes, MEP systems, electrical systems, future systems, and structure mounted appurtenances and devices.

H. Construction Loads: Design to accommodate temporary construction related loads.

I. Structural Serviceability: Comply with most stringent requirements and recommendations of ASCE 7, Code, and the following:
   1. Mitigate occupant or mechanical induced vibrations to levels acceptable to SDCRAA such that vibrations from walking loads and normal activities will not be perceptible to the users of the various spaces to the point of being noticeable, annoying, or a topic of comment by the users.
   2. Attenuate vibration and sound in all directions from mechanical areas to levels acceptable to SDCRAA, including attenuation at roofs that might be converted to a future occupied floor.
   3. Cumulative differential vertical displacement of framing at expansion joints and movement joints to not exceed 1/4", but not more than required to prevent tripping hazards when crossing the joints.

4. Cumulative vertical deflection of framing at floor/roof edges to not exceed 1/2” due to live loading and superimposed dead loading, but not more than the limits imposed by other coordinated systems.
5. Cumulative vertical deflection of framing that supports escalators or framing adjacent to elevator hoistways to not exceed L/1666 due to elevator/escalator loading in combination with floor live loading, but not more than the deflection limits associated with proper performance of the vertical conveyance systems.
6. Cumulative vertical deflection of beams at Terminal 1 that support the end of pedestrian bridges to not exceed L/720, nor 1/2” due to total loading.
7. Interstory elastic drift of building due to wind to not exceed 0.25 percent of the floor-to-floor heights.
8. Interstory inelastic drift of building due to seismic to not exceed limits specified in ASCE 7.

2.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:
   1. Load-Bearing Structural Members: Minimum of 100 years with no anticipated deterioration.
   2. Protective Elements: Minimum 25 years.

B. Moisture Resistance of Load-Bearing Members: Use materials that are not damaged by contact with water or moisture vapor.
   1. Materials that will corrode in the presence of water may be used if protected from water.
   2. Materials that will rot or be damaged by fungus may be used if protected from water.

C. Vapor Retarder Under Deck: Continuous separate membrane located on the warm side of the dew point.
   1. Vapor Permeance: 1 perm (57 ng/Pa/s/sq m), maximum when tested in accordance with ASTM E96/E96M.
   2. Design and select materials in accordance with ASTM E 1745, Class A.

D. Impact Resistance of Load-Bearing Members: Use materials that are not easily damaged by common hand tools.

E. Applied Fireproofing Materials:
   1. In Locations where Concealed by Permanent Construction:
      a. Density: 15 lb/cu ft (240 kg/cu m), minimum.
      b. Impact Strength: Passing ASTM E760.
      c. Bond Strength: 430 psf (20.59 kPa), minimum, tested in accordance with ASTM E736.
   2. Interior Locations, Where Exposed to Air but Out of Reach of Occupants (Above 10 ft (3 m) from Floor):
      a. Density: 21 lb/cu ft (340 kg/cu m), minimum.
      b. Impact Strength: Passing ASTM E760.
      c. Bond Strength: 430 psf (20.59 kPa), minimum, tested in accordance with ASTM E736.
   3. Exterior Locations, Where Exposed to Air but Out of Reach of Occupants (Above 10 ft (3 m) from Ground):
      a. Density: 21 lb/cu ft (340 kg/cu m), minimum.
      b. Impact Strength: Passing ASTM E760.
      c. Moisture Resistance: Not affected by precipitation, wind, or freeze-thaw.
      d. Bond Strength: 430 psf (20.59 kPa), minimum, tested in accordance with ASTM E736.
   4. Exposed Locations on Exterior and Interior within Reach of Occupants (Below 10 ft (3 m):
      a. Density: 39 lb/cu ft (625 kg/cu m), minimum.
      b. Impact Strength: Passing ASTM E760.
      c. Moisture Resistance: Not affected by precipitation, wind, or freeze-thaw.

d. Bond Strength: 430 psf (20.59 kPa), minimum, tested in accordance with ASTM E736.

F. Portions of Superstructure Exposed on Exterior: Comply with requirements of Section DC B2 - Exterior Enclosure Criteria for water penetration, weather resistance, impact resistance, and wear resistance.
1. Exposed Roof Deck Surfaces: Comply with requirements for roofing weather barrier.
2. Exposed Exterior Structural Floor Surfaces: Comply with requirements for pavement finishes.
3. Plaza Deck Surfaces: Comply with requirements for roofing.

G. Exposed Interior Structural Floor Surfaces: Comply with requirements for floor finishes.

2.06 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Maintenance and Alteration:
1. Provide floors elevated for access, with removable panels, at:
a. Mainframe computer rooms.
b. Control rooms.

B. Elevated Floor Flatness (FF): Engineered and constructed to achieve degree of flatness as follows, when measured in accordance with ASTM E1155:
1. Specified Overall Value (SOV): 30.
2. Minimum Localized Value (MLV): 20.

C. Elevated Floor Levelness (FL): Engineered and constructed to achieve degree of levelness as follows, when measured in accordance with ASTM E1155:
1. Specified Overall Value (SOV): 20.
2. Minimum Localized Value (MLV): 13.

END OF SECTION

SECTION DC B2: EXTERIOR ENCLOSURE CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior enclosure comprises the essentially vertical separation between exterior and interior conditioned space, including exterior walls, exterior windows, exterior doors, other openings, exterior wall fixtures, and other exterior enclosure elements.

B. Exterior Walls: The supporting structure; the exterior skin, vapor retarders, air barriers, and insulation; glazed walls; the interior skin if an integral part of the wall; exterior screens and railings; parapets; exterior soffits unless they do not form a weather barrier; firestopping and draftstopping within wall and between wall and floors; and other exterior wall elements.

C. Exterior Windows and Other Openings: Windows, fixed glazing other than glazed walls, ventilation openings, protection devices for openings, and elements that form or complete the openings, unless an integral part of another element.

D. Exterior Doors: See Section DC B3 - Exterior Doors Criteria for additional requirements.

E. Exterior Wall Appurtenances: All elements attached to the outside of the exterior walls, unless consisting of equipment or services fixtures. Exterior wall appurtenances required are those defined in the project program, made necessary by the design.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B3 - Exterior Doors Criteria: Additional requirements for doors in exterior enclosure.

1.03 REFERENCE STANDARDS

Current edition of:

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections;

B. AMCA 511 - Certified Ratings Program for Air Control Devices;

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; with Supplements and Errata.

D. ASTM C755 - Standard Practice for Selection of Vapor Retarders for Thermal Insulation;

E. ASTM C1199 - Standard Test Method for Measuring the Steady State Thermal Transmittance of Fenestration Systems Using Hot Box Methods;

F. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus;

G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements;

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials;

I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen;

J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference;

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference;

L. ASTM E413 - Classification for Rating Sound Insulation;

M. ASTM E547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Differential;

N. ASTM E695 - Standard Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading;

O. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings;

P. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes;

Q. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles.

PART 2 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide an essentially vertical separation between exterior and interior conditioned space, that keeps out weather, uninvited people, and animals and insects, without unusual action by occupants, while providing convenient movement of occupants between inside and outside, desirable natural light, and views from inside to outside.

B. Fill, cover, close, or otherwise protect all openings in the exterior walls (other than doors) so that the entire exterior enclosure functions as specified, using windows and other opening elements as specified, without using components that must be installed at changes of season.

C. Parapets: Same requirements as associated walls, except thermal performance is not required if parapets are thermally isolated from exterior walls.

D. Where exterior enclosure elements also must function as elements defined within another element group, meet requirements of both element groups. If requirements of both cannot be met, conform to the more stringent requirements.

E. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

2.02 AMENITY AND COMFORT CRITERIA

A. Thermal Performance:
   1. Thermal performance requirements are not applicable to parapets or balcony walls not enclosing interior space.
   2. Provide continuous insulation over entire enclosure.
   3. Exterior Enclosure Average Thermal Transmittance: Solid/Opaque Enclosure: U-value of 0.07 IP, maximum, over entire Exterior Enclosure.
   4. Glazing and Frames, Glazed Enclosure: U-value of 0.60 Btu/sq. ft. x h x deg F, maximum, over entire glazed enclosure including framing and glazing.
   5. Minimum Condensation Resistance Factor of 60 when measured in accordance with AAMA 1503.
   6. Glazing, Winter U-Value: 0.30 maximum, at center of glass.
   7. Glazing, SHGC: 0.29 maximum
   8. Exterior Soffits and Ceilings: Same requirements as exterior walls.
      a. Exception: If the space between soffit and floor/roof above does not enclose conditioned space, thermal performance requirements do not apply.
   9. Substantiation:
      a. Construction, Glazed Doors and Windows: For standard manufactured products, certification of specified properties by NFRC or other testing agency acceptable to SDCRAA; for custom-fabricated elements certify based on calculated results, test reports.

B. Water Penetration Resistance:
   1. Full-size Laboratory Mock-Up Testing is required:
   2. Solid/Opaque Enclosure: Static pressure test in accordance with ASTM E331, at 2.86 psf (137 Pa) and 5.0 gal/sf/hr (3.4 L/sq m/min).

3. Manufactured Windows and Aluminum and Glass Entrance Doors: Cyclic static pressure test in accordance with ASTM E547, at 2.86 psf (137 Pa) and 5.0 gal/sf/hr (3.4 L/sq m/min).
4. Where interior skin is not integral part of exterior enclosure, test without interior skin installed.

C. Air Infiltration Resistance: Provide continuous separate membrane over entire exterior enclosure that allows moisture vapor transmission while preventing air infiltration.
1. Air Leakage Rate:
a. Solid/Opaque Enclosures:
1) Air Permeance, Product: Not more than 0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. M at 75 Pa) when tested according to ASTM E 2178.
2) Air Permeance, Assembly: Not more than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. M at 75 PA) when tested in accordance with ASTM E 2357
3) Water-Vapor Permeance: Not less than 10 perms in accordance with ASTM E 96/E 96M.
(a) Glazed Enclosures: ASTM E283. Maximum air leakage of 0.06 cfm/sq. ft. at static air pressure differential of 6.24 PSF.
(b) Allowable UV Exposure Time: Not less than nine months when tested according to ASTM G 155 (Accelerated Weathering).
2. Air and Weather Barrier, Product: Either 100 percent silicone or silyl-terminated polyether polymer (STPE) membrane
a. Flashing at 100 percent silicone system: Extruded silicone sheet set in continuous beads of compatible silicone sealant.
b. Flashing at silyl-terminated polyether polymer membrane system: Polyethylene facer on butyl rubber adhesive;
3. Operable Openings Intended to be Normally Closed: Maximum of 0.3 cfm/sq ft (5 cu m/h/sq m), measured in accordance with ASTM E283 at differential pressure of 1.57 psf (75 Pa).
4. Mechanical Ventilation Openings: Automatically closed when ventilation is not required. Unless ducted, maximum of 0.3 cfm/sq ft (5 cu m/h/sq m) of crack when closed, measured in accordance with ASTM E283 at differential pressure of 1.57 psf (75 Pa).
5. Substantiation:
a. Glazed Openings: For standard manufactured fenestration products, certification of specified properties by NFRC or other testing agency acceptable to SDCRAA; for other elements, test reports.

D. Airborne Sound Transmission Resistance, Outdoor-Indoor Transmission Class (OITC): When tested to ASTM E90, the Outdoor-Indoor Transmission Class shall be the more stringent of applicable code requirements or the following: not less than 28 for structural silicone glazed systems (SSG) and 27 for captured systems based upon 1 inch (25mm) insulating glass consisting of 6 mm outer and inner lites and ½ inch air space.

2.03 HEALTH AND SAFETY CRITERIA

A. Fire Resistance:
1. All Materials of Exterior Enclosure: Non-combustible, with exceptions permitted by code.
a. NFPA 285 Compliance: Exterior building enclosure systems shall utilize rainscreen systems tested for compliance with NFPA 285. Engineering judgements not permitted.
2. Elevations Facing Public Rights-of-Way: 1 hour fire rated when located within 15 feet of the edge of the right-of-way.
3. Elevations Facing Inside Property Lines: 1 hour fire rated when located within 15 feet m of the property line or adjacent construction.
4. Openings: Rating as required to maintain fire resistance rating of exterior wall in which they occur.

B. Emergency Escape: Provide minimum opening size as required by Code.

C. Wind-Borne-Debris: Design and construct glazed openings to resist Large and Small Missile impact and pressure cycling at design wind pressure as defined in ASTM E1996 for Wind Zone 4 - Additional Protection, without shutters or other auxiliary protection, or to meet equivalent or more stringent criteria required by code.

D. Physical Security: Design and construct to provide protection as follows:
   1. Doors: ASTM F476 or ASTM F842 as appropriate, different Grades of protection for different locations.

E. Prevention of Accidental Injury: Provide safety glass at exterior openings as required by Code. At typical conditions provide laminated glass consisting of two lites of minimum 3/16 heat-strengthened glass with 0.060 inch PVB interlayer at inboard lite of insulating units or heavier units as specified or as required by Code and design loads.

F. Vermin Resistance: Provide openable openings and ventilation openings with means of keeping insects, birds, and animals out.

2.04 STRUCTURAL CRITERIA

A. Design Loads:
   1. Wind: Design for wind in accordance with ASCE 7 for wind speed of 115 mph, Risk Category III, Exposure D.
   2. Seismic: Design for seismic in accordance with ASCE 7 for Risk Category III.
   3. Loads on Glass: Design glass in accordance with Code, as specified elsewhere, and to the following minimum criteria:
      a. Where applicable, design glass to resist occupant barrier (guard) loads specified by Code. Design for 60 minute duration of the barrier (guard) loads.
      b. Design glass subject to walking or standing loads in accordance with Code, but not less than 300 pound concentrated load distributed over 2 inch by 2 inch area, whichever is more stringent. Design to be adequate to support the specified loading considering at least two scenarios: no broken plies of laminated glass; one broken ply of the laminated glass. Consider 60 minute duration of the 300 pound load for scenario with no broken plies of glass and 10 minute duration for scenario with a broken ply of glass.

B. Wind Design: No damage when tested in accordance with ASTM E330/E330M at 1.5 times positive and negative design wind loads using 10 second duration of maximum load.

C. Displacements: No damage or loss of function due to wind. No damage and only minimal loss of air or weather tightness due to seismic. No loss of support of any element due to wind or seismic. Displacements due to wind or seismic to not exceed the following:
   1. Members Not Supporting Glass or Brittle Finishes: Maximum deflection of 1/175 of span and not more than 3/4 inch.
   2. Masonry: Maximum deflection of 1/720 of span and as required to avoid cracking.
   3. Masonry Veneer: Maximum deflection of 1/720 of span for the veneer and for the system that supports the veneer and as required to avoid cracking.
   4. Concrete Walls: Maximum deflection of 1/480 of shortest span between supports and not more than 1/2 inch and as required to avoid cracking.
   5. Glass: Maximum deflection not more than acceptable for adequate performance of the glass as determined by manufacturer and not more than the following:
      a. Supported on 4 Edges: Maximum deflection of 1/125 of shortest span and not more than 3/4 inch.
      b. Not Supported on 4 Edges: Maximum deflection of 1/150 of span for unsupported edge and 1/125 of shortest span for locations away from unsupported edge and not more than 3/4 inch at any location.
   6. Metal Wall Panel: Maximum deflection not more than acceptable for adequate performance as determined by manufacturer and not more than 1/120 of shortest span between supports or stiffening elements and not more than 1/2 inch.
   7. Members Supporting Glass:

a. Vertical Members with Spans up to 13'-6": Maximum deflection of 1/175 of span and not more than 3/4 inch.
b. Vertical Members with Spans Greater than 13'-6": Maximum deflection of 1/240 of span + 1/4".
c. Transverse Members: Maximum deflection of 1/240 of span and not more than 1/8".
d. Cumulative Deflection: Maximum cumulative deflection considering deflection of all members supporting glass to not exceed 1".

8. Interstory Building Drifts:
   a. Wind: Accommodate elastic interstory building drifts due to wind.
   b. Seismic: Accommodate inelastic interstory building drifts due to seismic.
9. Substantiation:
   a. Design Development: Design accomplished by an engineer experienced in the design of architectural elements and cladding. Engineers to be licensed to practice structural engineering in the state of California.
   b. Construction: Proven-by-mock-up construction, with laboratory test of full-scale mock-up.

D. Lintels: Constructed to span openings and support loads imposed by exterior wall; maximum deflection of 1/360 of span, vertically and horizontally.

E. Railings: Resistant to required forces in accordance with ASCE 7. Lateral displacement to not exceed 3/8" and not more than allowed by Code.

F. Anchorage of Wall Fixtures: Design wall fixtures to be supported from building structural frame rather than from exterior wall.

2.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:
1. Wall Primary Weather-Barrier Elements: Minimum 50 years functional and aesthetic service life, excluding joint sealers.
2. Transparent Elements (Glazing): Same as other wall primary weather-barrier elements, except accidental breakage is considered normal wear-and-tear.
3. Joint Sealers in Exterior Skin: Life span expectancy equal to that specified for primary weather barriers.
   a. Exception: Lesser life span, with minimum of 20 years, is acceptable providing the joint surface does not exceed 1 percent of the face surface of the jointed area and the joint design provides secondary water-shedding design.
4. Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
5. Substantiation: As specified for expected service life span in Section DC 0 - Facility Design Criteria, including service life analysis and life cycle cost analysis.

B. Temperature Endurance: Allow for daily expansion and contraction within and between elements caused by temperature range from most extreme low temperature to 70 degrees F (39 degrees C) greater than the most extreme high temperature, in any year, without causing detrimental effect to components and anchorage.

C. Water Penetration Resistance:
1. Drain water, moisture, and condensation entering assemblies to the exterior.
   a. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.
   b. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.
2. Air Intake and Exhaust Openings: Minimize rainwater penetration and protect adjacent interior spaces from damage from water.
   a. Maximum Water Leakage: 0.01 oz/sf (3.0 ml/sq m) under most extreme conditions.

b. Test Air Velocity: For exhaust openings: 0; for intake openings: normal operational velocity.
c. Substantiation:
1) Construction: Identify air velocity; show AMCA 511 certified water penetration ratings.

3. When Mock-Up Test is Specifically Required: Static pressure test in accordance with ASTM E331, at 2.86 psf (137 Pa) and 5.0 gal/sf/hr (3.4 L/sq m/min).
4. When Mock-Up Test is Specifically Required: Cyclic static pressure test in accordance with ASTM E547, at 2.86 psf (137 Pa) and 5.0 gal/sf/hr (3.4 L/sq m/min).
5. Where interior skin is not integral part of exterior enclosure, test without interior skin installed.

D. Moisture Vapor Transmission Resistance: Provide continuous separate membrane over entire exterior enclosure, located on the warm side of the winter dew point.
1. Vapor Permeance: Not less than 10 perm when tested in accordance with ASTM E96/E96M.
2. Design and select materials in accordance with ASTM E1677, including appendixes, and ASTM C755.

E. Weathering Resistance:
1. Surface Finish of Exterior Building Enclosure Components: Minimum warranted service life of 20 years without color deterioration.
2. Surface Finish of Exterior Wall Fixtures: Minimum service life of 10 years without color deterioration, except for flags.

F. Impact Resistance:
1. Precast Concrete and Metal Siding: Resistant to permanent damage to supporting structure and exterior skin when tested in accordance with ASTM E695 and a test weight of TBD by Authority.

G. Glass Breakage:
1. Type and thickness in accordance with ASTM E1300 combined with other applicable factors; minimum thickness 6 mm for each lite; probability of breakage of 8/1000 for vertical glass and 1/1000 for sloped or horizontal glass.

H. Integral Interior Surfaces: Comply with requirements for interior finish.

2.06 OPERATION AND MAINTENANCE CRITERIA

A. Expected Service Life Span:
1. Operating Components: Remaining operable for 10 years under normal exposure conditions for the project site.

B. Ease of Use:
1. Operators for Moving Parts: Electric motor- or pneumatically-operated.

C. Prevention of Misuse: Provide mechanical ventilation openings without moving parts on exterior of building or where accessible to occupants.

D. Ease of Cleaning: Design glazed openings to permit the exterior surface to be cleaned from inside or outside without removing window sash.

END OF SECTION

SECTION DC B3: EXTERIOR DOORS CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior doors comprise all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, including exterior doors include doors of all sizes and uses, operable grilles and screens, gates, and other exterior door opening elements.

B. Other Exterior Door Opening Elements: All components required to complete the openings, including lintels, sills, flashings, and joint sealers, unless an integral part of another element.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC B2 - Exterior Enclosure Criteria: Additional requirements applicable to doors located in exterior enclosure.

1.03 REFERENCE STANDARDS

Current version of the following:

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections;

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors;

C. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus;

D. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements;

E. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen;

F. ASTM E413 - Classification for Rating Sound Insulation;

G. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches;

H. BHMA A156.3 - American National Standard for Exit Devices;

I. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks;

J. BHMA A156.12 - American National Standard for Interconnected Locks;

K. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000;

L. NAAMM HMMA 862 - Guide Specifications for Commercial Security Hollow Metal Doors and Frames.

PART 2 PRODUCTS

2.01 EXTERIOR DOORS

A. Main Entrance Doors:
   1. Use the following:
      a. Glazed aluminum doors at locations shown.

B. Other Pedestrian Doors:
   1. Provide weather stripping, thresholds, and door seals.
   2. Use one of the following:
      a. Aluminum-framed glazed entrance doors at typical entrances not equipped with automatic sliding doors.
      b. Hollow steel doors at back-of-house openings.

C. Other Large Doors:
   1. Use one of the following:
      a. Overhead coiling steel doors at locations shown on drawings.

D. Hardware for Swinging Doors :
   1. Use satin, stainless steel finish at typical door hardware.
   2. Use fire rated hardware on fire rated doors.
   3. Hinges: Ball-bearing butt hinges or continuous hinges.
   4. Exit Devices: Unless specifically indicated as one type, mortise type, rim type, or concealed vertical rod type.
   5. Locksets: Unless specifically indicated as one type, mortise, interconnected lockset and deadbolt, or unit type.
   6. Door Closers: Unless specifically indicated as one type, surface overhead frame-mounted type or surface overhead door-mounted type.
   7. Door Stops: Unless specifically indicated as one type, floor-mounted type, wall-mounted type, or overhead door/frame mounted type.
   8. Door Hold-Opens: Unless specifically indicated as one type, overhead door/frame mounted type.

E. Glazing in Doors: Glass and plastic.
   1. Type: Double pane insulated glass units.
   2. Use one of the following:
      a. Fully tempered glass at outboard lites.
      b. Laminated glass at inboard lites.

2.02 OTHER EXTERIOR DOOR OPENING ELEMENTS

A. Concealed Flashings:
   1. Use one of the following:
      a. Stainless steel flashing at typical locations.

B. Joint Sealers: Same as specified for exterior enclosure.

C. Do not use:
   1. Different metals subject to galvanic action in direct contact with each other.
   2. Aluminum in direct contact with concrete or cementitious materials.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Secure all openings in the exterior wall that function to allow the entrance and exit of people, vehicles, and goods, so that the entire exterior enclosure functions as specified, using doors as specified, without using components that must be installed at changes of season.

B. Where exterior door elements also must function as elements defined within another element group, meet requirements of both element groups.

C. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, and DC B2 - Exterior Enclosure Criteria.

3.02 AMENITY AND COMFORT CRITERIA

A. Accessibility and Convenience:
   1. Door Handles and Knobs: As required by code; where code and other requirements allow an option exit devices are preferred.
   2. Mode of Operation: Self-closing, with manual hold-open, unless otherwise indicated.
      a. Main Entrances: Power-assisted or Power-operated.
      b. Service Entrances: Manual or Power-assisted.
      c. Other Large Doors: Power-operated.

B. Thermal Performance:

1. Maximum Thermal Transmittance of Any Individual Component: U-value of 0.30 Btu/sq ft/hr/deg F when tested in accordance with ASTM C1363.
2. Exception to Condensation Resistance Requirement: Minimum CRF of 35 of when measured in accordance with AAMA 1503.
3. Provide thermal performance without using supplementary storm doors.

C. Air Infiltration Resistance: Maximum of 0.20 cfm/ft of crack length, measured in accordance with ASTM E283 at differential pressure of 1.57 psf.
   1. Substantiation:
      a. Design Development: Details of method of weather sealing; test reports on door/frame assemblies.

D. Water Penetration Resistance: If so desired, provide justification for exemption of door openings from water penetration requirements of Sections DC 0 - Facility Design Criteria and DC B2 - Exterior Enclosure Criteria.
   1. Substantiation:
      a. Design Development: Details of method of weather sealing; test reports on door/frame assemblies.

E. Sound Transmission Resistance:
   1. Sound Transmission Class: STC values as follows, when measured in accordance with ASTM E90 and classified in accordance with ASTM E413:
      a. Main Entrance Doors: STC 33.
      b. Other Pedestrian Doors: STC 36.
      c. Service Doors: STC 36.

F. Appearance:
   1. Doors at Building Entrances: Match windows and window framing.

3.03 HEALTH AND SAFETY CRITERIA

A. Emergency Egress:
   1. Provide exit doors minimum 36 inches wide.

B. Fire Resistance:
   1. Doors Required by Code to be Fire Resistive: Fire resistance rating as required by code, for fire resistance rating of exterior wall in which doors occur, tested in accordance with a method acceptable to local authorities.

C. Physical Security:
   1. Doors non-removable from outside without use of key.
   2. At Locations Not Facing a Street: No glazing.
   3. Secure each exterior door using a "fail-secure" method that allows entrance plus exit from inside using only one motion.
      a. Exceptions: The following must not allow entrance:
         1) Emergency exit doors that are not used for entrance (Exit Only function).
      b. Keys: Type as required to minimize unauthorized entry.
      c. Lock Functions: Appropriate to the location and function and as follows:
         1) Entrance Doors: Public Entry/Exit ("nightlatch").
         2) Service Entry Doors: Always-Locked, with Deadbolt.
         3) Exit Doors from Fire Exits: Exit Only.
      d. Lock Function Definitions: As described in BHMA A156.2 (F36-F48, F75-F94, F107-F109), BHMA A156.3 ("X" prefix), BHMA A156.5 ("E" prefix), BHMA A156.12 (F95-F106), and BHMA A156.13 (F01-F25); type of lock required may also be governed by other criteria.
         1) Always-Locked, with Deadbolt: F98.
         2) Entry, with Deadbolt: F20.
         3) Exit Only: F13 or X01 with deadlocking latchbolt, with no outside trim, no thumbturn or other unlocking feature inside, no holdback or dogging.

4) Public Entry/Exit ("nightlatch"): X02 (unless key entry is required), X03 with dogging, X04, X09 with dogging, or E012.
5) Store Door (must be unlocked during occupied hours): F91 or F14.

4. Forced Entry: Provide doors capable of resisting forced entry equivalent to:
   a. Locks and Lock Cylinders: BHMA A156.5 Security Grade 1.
   b. Exception for Automatic Sliding Doors: Provide means of securing while allowing controlled entry and unlimited emergency exit.

D. Glazing in Doors: Comply with requirements for safety glazing, security, and forced entry specified in Sections DC 0 - Facility Design Criteria and DC B2 - Exterior Enclosure Criteria.

3.04 STRUCTURAL CRITERIA

A. Door Frames: Constructed to span door opening with maximum deflection vertically and horizontally of 1/360 of span.

3.05 DURABILITY CRITERIA

A. Service Life Span of Operating Components: Remaining operable for 20 years under normal exposure conditions for the project site.

B. Water Penetration Resistance: Design openings and components of openings to positively drain water to exterior of the building.
   1. Top of Openings: If wall construction does not provide its own methods of drainage, use separate flashing to prevent water from entering opening components or the interior of the building.
   2. Bottom of Openings: Integral or separate sill or flashing to prevent water running over or draining out of opening components from entering the wall construction below or the interior of the building.

C. Physical Endurance:
   1. Doors, Frames, and Hardware: ANSI/SDI A250.4 Level A using hardware specified.
   2. Doors, Frames, and Anchors: NAAMM HMMA 862 endurance test requirements.

D. Wear Resistance:
   1. Door Surfaces: Scuff-resistant in areas where foot impact is likely; highly scratch-resistant in areas where hand contact is likely.
   2. Door Handles and Knobs: Highly scratch-resistant and of finish that will minimize appearance changes due to wear; satin or brushed finish and no plated or coated finishes.

E. Flexible Seal Materials: Minimize deterioration due to operation of doors and aging.

F. Swinging Doors: Control door swing to prevent damage due to impact, to either door or element impacted.

3.06 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Use and Repair: Provide doors that will be easy to use by occupants, easy to repair or service, and with operating components easy to replace.

END OF SECTION

SECTION DC B4: ROOFING CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roofing comprises all elements forming weather and thermal barriers at the sloped or essentially flat weather-proof enclosure over the entire "top-side" of building and over exposed floor superstructure, including plaza decks, balconies, and other exposed floors; including roof coverings, closures for roof openings, roof fixtures, and other roof elements, not including the structural supporting elements of the roof.

B. Roof Coverings: All weather-resistive components, including the primary weather barrier, vapor retarders, insulation, wearing surfaces, water collectors and conductors, trim and accessories.

C. Roof Openings: Skylights, ventilation openings, access openings, and other elements necessary to close roof openings, and elements associated with those openings.

D. Roof Appurtenances: All elements attached to the roof, unless equipment or services or specified elsewhere, and mounting brackets or frames for roof mounted services and equipment; roof fixtures required are those required by the program, those made necessary by the design, and the following:
   1. Screens for concealment of services and equipment.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

PART 2 PRODUCTS

2.01 ROOF COVERINGS

A. Roof Coverings In General:
   1. Use one of the following:
      a. Single Ply, highly reflective and having a Solar Reflectance Index (SIR) which shall meet 2016 California Energy Code and the Cool Roof Rating Council (CRCC). Roof material shall have an Solar Reflective Index (SRI) value, as calculated by ASTM E1980, of 78 or higher for low-sloped roofs (less than or equal to 2:12) and 29 or higher for steep-sloped roofs (greater than 2:12).
      b. Other product complying with requirements, based on specified substantiation.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide a weather-proof enclosure over the entire "top-side" of building that also excludes unwelcome people, animals, and insects without requiring specific action by occupants, while shedding water and preventing uncontrolled water infiltration, withstanding anticipated loading conditions, providing required access, and permitting the entry of desirable natural light.

B. Substantiation:
   1. Post-Construction: Roof inspection conducted in the spring after completion of roofing, and when chance of snow has also passed.

C. Where roofing elements also must function as elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria and the following: 1) Comply with the prescriptive envelop criteria per table 143-A of the 2016 California Energy Code.

3.02 AMENITY AND COMFORT CRITERIA

A. Run-Off: Direct water run-off to storm drains without splashing or dripping.

B. Noise Reduction:

1. Noise of Precipitation: Design and select materials that dampen the sound of precipitation on the roof to maintain interior ambient sound levels as specified.

C. Appearance:
   1. Concealment of Services and Equipment: Provide permanent concealment of rooftop items using substantial construction other than screens.
   2. Color: Compatible with energy efficiency design.
   3. Cleanliness: In addition to requirements of Section DC 0 - Facility Design Criteria for cleanliness of exterior surfaces, if roofing surfaces are exposed to view, use surface materials that will conceal dirt.
   4. Ponding: Arrange drainage of roof so no ponding will occur, regardless of whether roofing material will withstand ponding of water or not.

3.03 HEALTH AND SAFETY CRITERIA

A. Fire Resistance: In addition to fire resistance specified in Section DC 0 - Facility Design Criteria, provide materials that will prevent:
   1. Roof surface catching fire due to external fire sources.
   2. Roof coverings catching fire due to internal fire sources.
   3. Substantiation:
      a. Design Development: Identification of assemblies or methods used.
      b. Construction Documents: Fire rating identification numbers recognized by code authorities, on the construction drawings.

B. Prevention of Accidental Injury:
   1. Ladder Safety: Comply with ANSI A14.3.
   2. Roof Worker Safety: Design to provide safe design and safety measures as required by code and the following:
      a. Provide permanent access to all areas of the roof in the form of stairs or fixed ladders.
      b. Provide permanently installed supports for equipment used for cleaning windows and other glazed areas of the shell.

C. Physical Security: Consider the roof area and all roof openings unsupervised.

D. Provide fall protection system for entire roof perimeter.

3.04 STRUCTURAL CRITERIA

A. Self-Supporting Elements: Same requirements as for superstructure.

B. Rainwater Load: As required by Code.

C. Roof Component Wind Resistance: In accordance with ASCE 7 for wind speed of 115 mph, Risk Category III, Exposure D.
   1. Wind Uplift Pressure: Same pressure as specified by Code for structural members, but not less than 60 psf (2.9 kPa).
   2. Wind Uplift: Where roof covering has a lower air transmission rate than the roof superstructure, provide means of preventing blow-off or ballooning due to low negative pressure over roof.
   3. Substantiation:
      a. Design Development: Identification of assemblies or methods used.
      b. Construction Documents: Detailed design and information on the construction drawings.
      c. Post-Construction: Reports of windstorms involving winds of over 25 mph (40 km/h) within one year after completion of each roofing element, including wind speed, direction, duration, and results of inspection of roofing.

D. Roof Covering Substrate: Sufficiently rigid or dense to support water barrier in a manner that prevents puncture due to traffic on roof.

E. Glass Design: Type, size, and thickness as required to comply with ASTM E1300 and AAMA GDSG-1, "Glass Design for Sloped Glazing", as applicable.

F. Structural Sealant Glazing Systems: Comply with ASTM C1184, including non-mandatory Appendix, and AAMA TSGG "Two-Sided Structural Glazing Guidelines for Aluminum Framed Skylights."

G. Roof Fixtures:
   1. Mounting Brackets and Frames for Equipment and Services: Complying with design requirements for superstructure.
   2. Screens: Complying with design requirements for exterior walls.
   3. Anchorage: Design roof fixtures to be supported from building structural frame or structural deck, but not sheet metal deck.

3.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as for facility as a whole, except as follows:
   1. Roof Covering Weather-Barriers: Minimum 20 years, fully functional.
   2. Sealed Double Glazing Seals: Minimum 5 years.
      a. Substantiation: Manufacturer warranty.
   3. Surfaces Exposed to View: Minimum 20 years aesthetic service life; in addition, deterioration includes color fading, crazing, and delamination of applied coatings.
   4. Aesthetic Life Span: Significant degradation of appearance during the functional life span is not acceptable.
   5. Manufacturer Approval of Design: Where roof covering manufacturer recommends or requires certain design features for satisfactory performance or for warranty, with manufacturer's requirements.
   6. Manufacturer Warranty: Non-pro-rated, No Dollar Limit (NDL) warranty for entire system.
      a. Materials: 20 years, minimum.
      b. Installation and Workmanship: 20 years, minimum.
      c. Exception: Warranty not required for wood shingles and wood shakes.
   7. Installer Warranty: 2 years, minimum, in addition to manufacturer’s warranty.
   8. Substantiation:
      a. Validation phase: Material type, expected functional life span, expected changes in appearance over life span, and manufacturer warranty available.
   9. Design Development: Material type and specification, expected functional life span, and manufacturer warranty available.
   10. Construction Documents: Quality assurance program to be implemented to ensure complete and correct installation of weather-barrier elements.
   11. Construction: Actual manufacturer warranty.

B. Water Penetration Resistance: None, under conditions of rain driven at 50 mph (80 km/h), unless water paths are completely accessible.
   1. Water Barrier Type Roof Coverings, including metal roof assemblies: Use a water barrier that is lapped for positive run-off, a monolithic jointless membrane, or a membrane with heat-sealed joints.
      a. Minimum Slope:
         1) Field of Roof: 1/4 inch per foot (1:48).
         2) Water Conductors: 1/8 inch per foot (1:100).
      b. Fasteners Penetrating Water Barrier: Prohibited, unless fasteners are located under overlapping material.
      c. Shingles, Tiles, and Other Traditional Lap-Type Roof Coverings: If proven-in-use overlap dimensions are used, mock-up testing is not required.
      d. Roof Fixtures: Maintain integrity of roofing water penetration resistance at points of fixture and mounting attachment to supporting structure.
      e. Substantiation:

1) Construction: Water flood tests of roof areas that can accumulate rainwater if primary drains are blocked, up to depth for which structure is designed.
2) Construction: Reports of first 3 significant rainfalls after completion of each roofing element, including rainfall amount and intensity, wind speed and direction, and results of inspection of roof and underside.

C. Moisture in Unconditioned Attics and Similar Spaces: Unless a moisture-vapor-tight barrier is provided between attic and conditioned space, provide gravity exhaust with free area of 1.0 sq ft (0.1 sq m) for each 150 sq ft (14 sq m) of attic floor area.

D. Weathering Resistance: Provide weather-exposed roof coverings and other components that comply with weather resistance specified in Section DC 0 - Facility Design Criteria and the following:
1. Minimization of Deterioration Due to Weather: For weather-barrier materials, minimization means no deterioration that adversely affects water penetration resistance at any time during the specified service life span.
2. Minor Instances of Glazing Not Used for View: Haze, light transmission, and color change limitations are waived.
3. Roof Fixtures:
a. Surface Finish: Minimum service life of 10 years without color deterioration.
b. Screens: Complying with durability requirements specified for exterior walls.
c. Mounting Brackets and Frames for Services and Equipment: Complying with durability requirements specified for exterior walls.
d. Substantiation:
1) Design Development: Identification of proven-in-use assemblies; in addition to substantiation items specified for proven-in-use assemblies, provide, for minimum of 3 existing applications, date of installation of roof covering; maintenance, repair, and replacement history; recommended inspection and maintenance program; detailed evaluation of similarities and differences of historical application from proposed application; estimated life span of similar assembly if constructed today.
2) Design Development: As specified for service life span in Section DC 0 - Facility Design Criteria, including service life analysis and life cycle cost analysis.

3.06 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Replacement: As specified in Section DC 0 - Facility Design Criteria for elements not required to have expected service life span equal to that specified for the facility as a whole.

END OF SECTION

SECTION DC C: INTERIORS CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interiors comprise all elements necessary to subdivide and finish space enclosed within the shell, including applied interior surfaces of the exterior enclosure; interior doors, windows, and other openings and coverings; interior fixtures attached to interior construction to add functionality to enclosed spaces, except for elements classified as equipment or services fixtures.

B. Partitions: All types of space dividers, including demountable and operable partitions.
   1. Fixed Partitions: Solid, stationary space dividers that are opaque and extend full height.

C. Interior Openings: Doors, windows, louvers, vents, expansion joint covers.
   1. Interior Doors: All interior doors, including hardware and frames, except for elevator doors.
   2. Interior Windows: All interior fixed and operable windows, including frames and casings.
   3. Other Interior Openings: Interior utility openings such as hatches and access panels, louvers and vents, expansion joint covers, and elements forming or completing interior openings, including sills, jambs, heads, and operating hardware.

D. Stairs and Ramps: Those interior and exterior stair and ramp elements not a part of superstructure or exterior enclosure, comprising the following elements:
   1. Structure supporting stairs, unless an integral part of superstructure.
   2. Tread and riser construction, unless an integral part of superstructure.
   3. Railings for interior stairs.
   4. Integral stair finishes.

E. Interior Finishes: All functional and decorative applied interior finishes, including secondary support structures, for ceilings, walls, floors, doors, and other field finished elements.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC C2 - Interior Finishes Criteria: Additional requirements for ceilings, interior finishes, and interior doors.

C. Section DC C31 - Information Fixtures Criteria: Additional requirements for information fixtures.

D. Section DC C32 - Storage Fixtures Criteria: Additional requirements for storage fixtures.

E. Section DC C33 - Window Treatment Criteria: Additional requirements for window treatments.

F. Section DC D4 - HVAC Criteria: Louvers and vents associated with ductwork.

G. Section DC D6 Electrical Criteria for lighting levels

H. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.03 REFERENCED STANDARDS

Current edition of:

A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications;

B. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings;

C. ASTM E413 - Classification for Rating Sound Insulation;

D. IES (LH) - Lighting Handbook;

E. IES RP-5 - Recommended Practice for Daylighting Buildings.

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Interiors: Provide appropriately finished interiors for all spaces indicated in the program, equipped with interior fixtures as required to function properly for specific occupancies.

B. Interior Partitions: Provide physical separation between spaces, constructed to achieve fire ratings required by code, appropriate security between adjacent spaces, and visual, acoustical, olfactory, and atmospheric isolation as necessary to maintain desirable conditions in each space.

C. Interior Doors: Provide doors between adjacent spaces where required by the program or where proper functioning of adjacent spaces requires movement of people or objects between them.
   1. See Section DC C2 - Interior Finishes Criteria for criteria.

D. Interior Windows: Provide interior windows between adjacent spaces where required by the program or where proper functioning of adjacent spaces requires limited visual or physical connection between them.

E. Other Interior Openings:
   1. Ventilation Openings: Provide interior openings between adjacent spaces when required for air movement, louvered where required for visual privacy, baffled where required for acoustical isolation, and equipped with automatic fire dampers where separations are fire-rated.
   2. Access Openings: Provide interior openings where required for maintenance access to mechanical services and other concealed systems, designed to be as unobtrusive as possible.
   3. Joint Covers: Provide covers for interior expansion joints that protect joints from debris and provide safe and durable support for anticipated traffic.

F. Interior Finishes: Provide finishes for interior surfaces that are appropriate for the functions of each space.
   1. See Section DC C2 - Interior Finishes Criteria for criteria.

G. Interior Fixtures: Provide interior fixtures that are necessary for the proper functioning of each space.

H. Where interiors elements also must function as elements defined within another element group, meet requirements of both element groups.

I. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

3.02 AMENITY AND COMFORT CRITERIA

A. Access: Provide access to all primary interior spaces from Circulation spaces (SC Spaces) (no access to any primary interior space exclusively through another primary interior space).

B. Provision of Natural Light:
   1. Light Levels: Maximize natural lighting in interior spaces while maintaining performance of other criteria, unless otherwise indicated.
   2. Ambient natural lighting in primary spaces of intensity adequate for essential tasks when measured on a typical overcast winter day in midafternoon.
   3. Minimum light levels not less than those recommended in IES (LH) for the types of tasks to be anticipated in the space.
   4. Visual Comfort: Provide ambient natural light in primary spaces that is free of excessive direct or reflected glare, as defined in IES RP-5.
   5. Daylight Control: Provide local devices to enable occupants to control brightness and glare from direct daylighting.
   6. Substantiation:

a. Design Development: Engineering calculations for representative spaces, predicting anticipated daylighting levels under specified conditions.
b. Construction Documents: Engineering design calculations and drawings sealed by licensed lighting engineer.
c. Construction Documents: Details of lighting control mechanisms.
d. Construction: Field test of lighting levels verifying compliance with performance requirements.

C. View: Provide views to the building exterior or interior atria from most locations within primary interior spaces.
1. Views are required from the following types of spaces:
a. Customer Contact (SP1 Spaces).
b. Occupant Work (SP2 Spaces).

D. Ambient Noise: Provide interiors that maintain ambient sound levels within primary spaces at levels recommended in ASHRAE (HVACA), when adjacent spaces are occupied and are being used normally.
1. Noise Isolation: Design and construct interior construction to achieve CalGreen values or the following minimum noise isolation class (NIC) values, whichever is more stringent, between adjacent spaces, when tested in accordance with ASTM E336 and classified in accordance with ASTM E413, based on specified NC values:
a. Spaces of Like Function and Similar NC Value: NIC 36.
b. Quiet Space (NC Values of 20-30) and Moderately Noisy Space (NC Values of 30-40): NIC 45.
c. Quiet Space (NC Values of 20-30) and Noisy Space (NC Values of 40-50): NIC 50.
d. Quiet Space (NC Values of 20-30) and Very Noisy Space (NC Values of 50-60): NIC 55.
e. Moderately Noisy Space (NC Values of 30-40) and Noisy Space (NC Values of 40-50): NIC 42.
f. Moderately Noisy Space (NC Values of 30-40) and Very Noisy Space (NC Values of 50-60): NIC 45.
g. Noisy Space (NC Values of 40-50) and Very Noisy Space (NC Values of 50-60): NIC 42.
h. Exceptions:
1) Adjacent Offices Requiring High Speech Confidentiality: NIC 50.
2) Spaces to be treated on a case by case basis based on space utilitzation. Field NIC ratings and laboratory STC ratings for occupied spaces shall be definited in the basis of design documents.
2. Substantiation:
a. Design Development: The acoustical engineer shall work with the mechanical engineer to develop and/or approve of the HVAC system components to meet industry standards regarding sound and vibration transmissions as it applies to the various airport uses, methods and conditions.
b. Construction Documents: See Design Development.
c. Construction: Field test of acoustical conditions, verifying compliance with performance requirements.

E. Impact Noise: Provide floor-ceiling construction, including floor structure, floor finish, and ceiling finish, to insulate primary spaces from undesirable impact noise when adjacent spaces are occupied and are being used normally.

F. Acoustical Reverberation: The construction will provide for sound quality in all public spaces. Provide interiors with acoustics where speech/paging through loudspeaker system is clearly comprehensible.

G. Odor Control: Prevent unpleasant odors generated within a space from affecting occupants of adjacent spaces, by providing physical isolation of the spaces, separate ventilation, or a combination of isolation and ventilation.

1. The following spaces will be physically isolated and will have dedicated make-up and exhaust systems:
   a. Commercial kitchen.
   b. Trash collection.
   c. Trash removal or incineration.
2. The following spaces will be physically isolated and will have dedicated exhaust. Make-up air and space conditioning may be accomplished from general building HVAC systems where practical:
   a. Toilet rooms
   b. Locker and changing rooms
   c. Janitor closets
3. The following spaces will achieve an odor control by maintaining a negative space pressurization in relation to other spaces through the use of general building HVAC systems. Dedicated exhaust air systems or phyusical isolation is not required. Odor control of recirculated air shall be accomplished by activated carbon filtration in all air handling systems.
   a. Food concession with no cooking
   b. Dining areas with no cooking
4. The following spaces will be physically isolated with dedicated exhaust systems. No separate make-up air or space conditioning.
   a. Confined loading docks

H. Convenience:

I. Appearance: Provide interiors, public artwork, interior landscaping, signage and advertising that are pleasing in appearance and do not detract from the primary functions performed in each space.

3.03 HEALTH AND SAFETY CRITERIA

A. Fire Resistance: Design and select materials to provide fire resistance in accordance with code.
   1. See other sections for minimum performance values for other elements.
   2. Substantiation:
      a. Design Development: Identification of assemblies required to have fire resistance rating and method to be used to achieve rating.
      b. Construction Documents: Identifying numbers placed on the construction drawings.

B. Safety: Design and provide interior construction to protect building occupants in accordance with code and the following:
   1. Egress: Provide egress from all interior spaces in accordance with code.
   2. Heights: Protect building occupants from falling from elevated interior observation decks, balconies, bridges and walkways.
   3. Tripping: Protect building occupants from tripping hazards due to uneven floor surfaces or abrupt changes in floor elevation of more than 1/8 inch.

C. Physical Security:
   1. At interior construction separating tenants from public circulation spaces, the construction will provide materials and systems within an enclosure system that provides for a secure tenants space using interior construction standards.

3.04 STRUCTURAL CRITERIA

A. Structural Performance: Provide interior construction and fixtures to support without damage all loads required by code.
   1. Special Loads: In addition to loads defined by code, provide for adequate support of wall-mounted or ceiling-mounted furnishings and equipment in spaces where such equipment is required by program or is likely to be installed after construction because of intended function.

a. Adequate support is defined as the ability to sustain 150 percent of design loads without damage to building or equipment.

2. Substantiation:
   a. Design: Detailed listing of design criteria and preliminary analysis, prepared by a structural engineer licensed in California.
   b. Construction Documents: Detailed design analysis by structural engineer licensed in California.

B. Seismic Loads: The seismic Importance Factor used in the design shall be in accordance with the CBC and seismic "I" = 1.25.
   1. Fire-rated Ceiling Assemblies
   2. Non-fire rated Ceiling Assemblies

3.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as building service life, except as follows:
   1. Interior Doors and Other Operable Elements: Minimum 15 years functional and aesthetic service life.
   2. Interior Windows: Minimum 15 years functional and aesthetic service life with normal operation without requiring replacement of any parts.
   3. Interior Ceiling Finishes: Minimum 15 years functional and aesthetic service life; including suspended ceilings.
   4. Interior Floor Finishes: Minimum 30 years functional and aesthetic service life; except for carpet and VC file. Carpet and VC tile to have minimum of 15 years functional and aesthetic service life.
   5. Interior Wall Finishes: Minimum 15 years functional and aesthetic service life.
   6. Other Interior Construction: Minimum 15 years functional and aesthetic service life.
   7. Substantiation: As specified in Section DC 0 - Facility Design Criteria, including service life analysis and life cycle cost analysis.

B. General Durability: Provide interior construction and fixtures that are suitable in durability for the degree and type of traffic to be anticipated in each space and ordinary cleaning and maintenance operations.
   1. At steam rooms, laundry rooms, toilet rooms, shower rooms, trash collection rooms, and janitorial closets, provide interior construction that will allow harsh chemical cleaning without damage.

C. Humidity Endurance: At interior spaces exposed to high humidity, such as swimming pool enclosures, provide interior construction that will withstand continuous or intermittent exposure without significant changes in dimension.

D. Ultraviolet Resistance: In interior spaces exposed to direct sunlight, provide interior construction and fixtures that are inherently resistant to fading and discoloration.

E. Vandal Resistance: In spaces accessible to the public and not subject to continuous surveillance, provide interior construction and fixtures that are inherently vandal resistant or designed to be difficult to access or damage.

3.06 OPERATION AND MAINTENANCE CRITERIA

A. Cleaning: The construction will provide interior construction and fixtures that will not be damaged by ordinary cleaning and maintenance operations.

B. Ease of Operation and Maintenance
   1. All interior spaces shall be easily accessible for operation and maintenance with standard ladders or mechanized man lift.
   2. All plumbing chases at public toilet rooms must be easily accessible for maintenance and repair.
   3. Light fixtures relamping: Fixtures shall not be placed in extra-high ceiling. If fixtures are located above 15 feet, or if placed above floor obstructions, a "Maintenance Operations Plan" must be approved prior to design approval.

4. Light fixture controls in public contact and public spaces: Light fixture controls to be provided for fixtures in these areas that enable the lighting fixtures to shut off when minimum light levels are reached from natural daylighing and turn on if natural daylighting provides less than the minimum light level required. Lighting control devides to be installed in areas that are accessible to maintenance personnel, but protected from the general public.

END OF SECTION

SECTION DC C2: INTERIOR FINISHES CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior finishes comprise the following elements:
   1. Wall finishes, including those applied to the interior face of exterior walls and to the vertical faces of superstructure elements.
   2. Floor finishes, except for access floors.
   3. Suspended ceilings and soffits.
   4. Applied ceiling finishes.
   5. Stair finishes, except for integral stair surfaces.
   6. Finishes applied to other interior surfaces.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC C - Interiors Criteria

C. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS

2.01 MAJOR PUBLIC CONTACT SPACES AND PUBLIC SPACES

A. Floors:
   1. Provide Terrazzo finished floors in high interest public areas (except for concourse circulation space and holdrooms). The terrazzo floor shall be highly resistant to wear from pedestrian traffic, electric passenger carts and maintenance vehicles, including man lifts. Basic materials shall be epoxy matrix with marble or glass aggregate. Provide contrasting colors in the terrazzo floor to create an interesting design pattern, which compliments the interior architecture and wayfinding. Provide stainless steel or zinc divider strips and expansion joints at appropriate spacing to accommodate expansion and contraction of the floor material and underlayment without cracking of the terrazzo.
   2. Provide high quality porcelain tiles with contrasting bands in the concourse to match existing porcelain tiles in existing concourse in color and size. The porcelain tiles shall be highly resistant to breakage and to wear from pedestrian traffic, electric passenger carts and maintenance vehicles, including man lifts. Provide durable stainless steel expansion joint covers at structural expansion joints.
   3. Provide carpeted floor at holdrooms. Provide a glue-down carpet of durable construction that is resistant to staining, cleanable and easily replaceable. Select a color that does not show soiling easily and complements the color scheme of the terminal. Preference is given to the selection of an acceptable carpet from the manufacturer's standard selection over custom colors and patterns.

B. Walls/ Partitions/ Column Covers:
   1. Provide a hard and durable material for walls and partitions. The wall and partition finish shall be highly resistant to impact from heavy pedestrian traffic and baggage carts (Smart Carts). The durable finish shall extend to a wainscot height of 4 feet or shall be carried to a height of 8 feet. Finishes surfaces must be easily cleanable and be highly resistive to impacts. Consider polished granite natural stone or other stone. Ceramic tile of equal hardness shall be acceptable at walls subject to impact from pedestrian traffic and baggage carts. Provide heavy-duty corner guards or a similar detail to protect corners and walls that are flush with the finish of the wall and extend down to the floor in high abuse areas. Corner detail must be attached to the wall structural component.
   2. Provide hard and durable materials for column covers resistant to wear, cleanable, easily repaired and maintainable. The construction and the finish shall be highly resistant to impact from heavy pedestrian traffic and baggage carts. Corners of column cover

enclosures shall be protected by heavy duty corner guards or similar detail that is flush with the enclosure and secured to structure. When signage elements are attached to column covers they must be secured to solid backing or structure. In the concourse consider matching existing column cover finish and design.

3. Provide glass partitions at the Security Screening Check Point (SSCP) complying with the DOT/FAA/TSA requirements for materials and construction.

C. Ceilings:
   1. Provide ceilings and soffits of durable material resistant to airborne dust accumulation, easily cleaned and maintainable with normal maintenance equipment and materials. Provide a ceiling system that has acoustical properties improving the sound quality of the space and the speech/paging quality. Refer to Section C Interiors Criteria for criteria on sound quality and noise suppression. Provide a ceiling that is easily accessible without the use of special tools and without damage to the ceiling system or finish for cleaning access and for access to mechanical, electrical, plumbing, fire protection, communication or other systems located above the ceiling. Speakers, cameras, signage, and EVIDS attached to the ceiling shall be supported by solid backing behind ceiling panels.

D. Doors and Frames:
   1. Provide hollow metal steel doors and frames with a gage thickness able to withstand high use and impact from pedestrian traffic and carts. Finish of the doors shall be resistant to impact and wear. Doors with access control shall be able to accommodate a wide variety of security devices and concealed wiring. Frames at access control doors shall be factory prepped.
   2. Provide glass doors and hollow metal frames where required. The glass shall consist of security glazing per code.

E. Door Hardware:
   1. Provide high quality hardware from a brand name manufacturer. Surface mounted closers on the doors to be mounted on the face of the door opposite the Public Area side. Finish on hardware to be brushed stainless steel. Provide 18" high stainless steel kickplates on the doors. Rated pair of doors shall have concealed coordinators and astragals.

F. Stairs:
   1. Open public stairs: Provide terrazzo or ceramic tile stair tread and risers with abrasive nosings and contrasting striping as required by code. Provide guardrails and handrails consisting of security glass panels and stainless steel tubing or other profiles.
   2. Enclosed Stairs and Exit stairs: Provide concrete filled metal pan or steel checker plate construction. Tread surfaces shall have a slip resistant surface and shall have nosings/contrasting striping per code. Risers, stringers and handrails shall be painted steel. Finish to be a smooth durable painted surface resistant to wear.

2.02 EMPLOYEE WORK SPACES

A. Floors:
   1. Provide carpet at Employee Work Space floors. The carpet shall be glue down carpet tile, of durable construction, cleanable, readily available and easily replaceable. Provide carpet color / pattern that conceals soiling and complements the color scheme of the terminal. Carpet type from manufacturer's standard selection in lieu of custom carpets is preferred.

B. Walls/ Partitions:
   1. Provide drywall as a wall and partition finish. Paint drywall with brand paints to achieve a satin finish. Color palette shall include basic and accent paints and complement the color scheme of the terminal. Use vinyl wall coverings in selected areas.
   2. Walls shall be constructed with acoustical performance described in Section C. Wall shall extend minimum 6 inches above ceiling grid and shall have acoustic blankets on the top.
   3. Provide wall base of durable material resistant to wear.

C. Ceilings/ Soffits:

1. Provide 2 ft. x 2 ft. suspended lay-in acoustical tile with concealed spline at ceilings and soffits. Ceiling tile must be easily removable without special tools for maintenance and cleaning.
2. Provide suspended gypsum board ceilings (hard ceilings) where desirable by design. Avoid placing electrical, HVAC, life safety devices requiring maintenance access in gypsum board ceiling. Where gypsum board ceilings are used, provide permanent access panels in ceiling.

D. Doors and Frames:
1. Provide hollow metal painted steel frames. Provide wood doors or painted steel doors. Doors with access control shall be able to accommodate a variety of security devices, including concealed wiring. Their frames shall be factory prepped for magnetic or electric lock.

E. Door Hardware:
1. Provide quality hardware from a brand name manufacturer. Surface mounted closers shall be mounted on the face of the door opposite the public area side. Finish on hardware to be brushed stainless steel. Provide 18" stainless steel kickplates at the bottom of doors in high traffic areas. Rated pair of doors shall have concealed coordinators and astragals.

F. Glazing:
1. Provide fenestration with low emissivity glazing. Use shading devices such as "mechoshades" or similar means to reduce solar heat gain and to reduce glare.

G. Locker Rooms and Toilet Rooms
1. Locker room floors shall be a hard, low maintenance, durable monolithic finish, such as resinous epoxy flooring.
2. Employee toilets room walls and floors shall be porcelain or ceramic tile. Wall tile shall extend to a minimum height of 6 feet.
3. Employee toilet room stall partitions and doors shall be high-pressure plastic laminate with solid phenolic cores. Doors and panels shall be minimum 3/4 inch thick. The stall partitions shall be floor mounted. Provide heavy-duty partition latch and hinge hardware.
4. All toilet and shower accessories including but not limited to waste receptacles, grab bars, mirrors, shelves, paper towels dispensers, sanitary napkin dispensers and disposals, diaper disposals, toilet issue dispensers, coat hooks, etc. shall conform to SDCRAA Standards. All accessories mounted to walls shall be secured to structure or solid backing. Accessories mounted to toilet partitions shall be mounted back-to-bac
5. Lavatory counter top shall be quartz material.

2.03 UTILITY SPACES

A. Floors:
1. Provide sealed concrete floor finish in Utility Equipment Spaces. Where required by design provide floor drains.

B. Walls/ Partitions:
1. Provide walls with durable, impact resistant materials including concrete or concrete block. Corners of walls partitions and column enclosures shall be protected by steel corner guards at the pedestrian/equipment height.
2. In Baggage make-up rooms provide impact protection at walls and columns from baggage tugs. Provide heavy duty steel guard rails, or rubber/neoprene bumpers and concrete curbs at the bottom of walls and columns for impact protection.

C. Ceilings/ Soffits:
1. Ceilings shall be exposed to structure above and unpainted except where required to control the environment in the space or a portion of the space. Ceilings where required shall be standard 2 ft. x 4 ft. suspended lay-in acoustical tile ceilings.

D. Doors and Frames:

1. Provide man-doors and frames of painted hollow metal steel with gage thickness able to withstand high use. Doors and frames susceptible to damage from tugs shall be protected by heavy duty steel channels, guard rails and concrete curbs. When security access control is required, doors and frames shall be able to accommodate a wide variety of security devices, including concealed wiring. Frames shall be factory prepped for magnetic or electric locks.
2. Provide high speed roll-up vehicle doors at equipment rooms requiring access by vehicles or for the installation and removal of mechanical or security equipment. Such doors shall be of gage thickness and construction able to withstand high use.

E. Door Hardware:
1. Provide high quality hardware from a brand name manufacturer. Surface mounted closers shall be mounted on the face of the door opposite of the public area side. Finish on the hardware to be brushed stainless steel. Provide 18" high stainless steel kickplates at the bottom of doors in high traffic areas. Roll-up doors shall be operated by electric motor.

F. Toilet Rooms
1. Employee toilet room stall partitions and doors shall be steel with baked enamel paint finish. The stall partitions shall be floor mounted. Provide heavy-duty partition latch and hinge hardware.

2.04 TENANT SPACES: THE FOLLOWING FINISH QUALITY RECOMMENDATIONS ARE FOR SHELL AND CORE CONSTRUCTION ONLY. FOR FINISH QUALITY STANDARDS OF TENANT BUILD-OUT REFER TO THE CURRENT SDCRAA RETAIL TENANT CRITERIA.

A. Floor:
1. If applicable, provide concrete floors with smooth trowel finish at core and shell.
2. Provide terminal/transition strips where edges of terrazzo meet unfinished floors.

B. Walls/ Partitions:
1. Airline ticket offices and other similar leased space shall have no drywall on the inside the studs. Only exposed studs on the inside to facilitate electrical and plumbing work by future tenant.
2. Airline operations spaces at apron level shall have no drywall inside the studs or concrete block.
3. Tenant space demising wall shall be gypsum board/metal studs extending from the floor to the underside of the structure above. Temporary walls fronting an occupied or public space shall be finished on tenant side with drywall and the other side with finish matching adjacent surfaces.

C. Ceilings:
1. No ceilings to be provided in unfinished Tenant Spaces.

D. Doors and Frames:
1. Provide hollow metal steel exit /entrance doors and frames along the perimeters of the Tenant Spaces as required for egress by code. When security access control is required, doors and frames shall accommodate a wide variety of security devices, including concealed wiring. The frames for access control doors shall be factory prepped for electric or magnetic lock.

E. Door Hardware:
1. Provide high quality hardware from a brand name manufacturer. Surface mounted closers shall be mounted on the face of the door opposite the public area side. Finish on hardware shall be brushed stainless steel. Provide 18" high stainless steel kickplates at bottom of doors. Provide panic hardware at exit doors as required by code.

2.05 CONCESSION SPACES: THE FOLLOWING FINISH QUALITY CRITERIA ARE FOR SHELL AND CORE CONSTRUCTION ONLY. FOR FINISH STANDARDS OF TENANT BUILD-OUT REFER TO THE CURRENT SDCRAA RETAIL TENANT CRITERIA.

A. Floor:

1. Provide concrete floors with smooth trowel finish at core and shell. Provide terminal/transition strips where edges of terrazzo meet unfinished floors. Where required by design, provide floor drains.

B. Walls:
1. Concession Space demising or shell wall shall be gypsum board/metal studs extending from the floor to the underside of the structure above except at Level 3. Temporary walls fronting an occupied or public space to be finished on tenant side with drywall and the other side with finish matching adjacent surfaces.

C. Ceilings:
1. No ceilings are to be provided in unfinished Tenant Spaces.

D. Doors and Frames:
1. Provide hollow metal steel exit /entrance doors and frames along the perimeters of the concession Spaces as required for egress by code. When security access control is required, doors and frames to accommodate a wide variety of security devices, including concealed wiring. The frames for access control doors shall be factory prepped for electric or magnetic lock.

E. Door Hardware:
1. Provide high quality hardware from a brand name manufacturer. Surface mounted closers on the doors to be mounted on the face of the door opposite the public area side. Finish on hardware shall be brushed stainless steel. Provide 18: high stainless steel kickplates at bottom of doors. Provide panic hardware at exist doors as required by code

2.06 PUBLIC AND EMPLOYEE SERVICES

A. General:
1. All public toilet rooms shall comply with the requirement listed below and the current SDCRAA Interior Standards.

B. Floors and Walls:
1. At floors, use porcelain tile with an integral cove base or epoxy terrazzo with an integral cove base. At walls, use ceramic or porcelain tile. At a minimum, the height of the wall tile should align with the top of toilet partitions. Include a curved stainless steel wall panel similar to those currently in Terminal 2 West in each toilet room entry where possible.
2. Locker room floors shall be a hard, low maintenance, durable monolithic finish, such as resinous epoxy flooring.
3. Employee toilets room walls and floors shall be porcelain or ceramic tile. Wall tile shall extend to a minimum height of 6 feet.

C. Ceilings:
1. Use 2 ft. x 2 ft. ceiling tile with a scratch resistant face throughout.

D. Toilet Stall Partitions:
1. Public toilet room partitions and doors shall be solid surface and stainless steel panels. The stall partitions shall be floor mounted and ceiling braced for strength. Stainless steel partition support shall have a coved base. Provide heavy-duty partition latch and hinge hardware. All partitions shall have the minimum standard gap between doors and partitions and between partitions and adjacent walls. Walls finishes near toilets partitions should not be high gloss or mirror type reflective.
2. Employee toilet room stall partitions and doors shall be steel with baked enamel paint finish. The stall partitions shall be floor mounted. Provide heavy-duty partition latch and hinge hardware.

E. Doors and Frames:
1. No doors shall be provided at entry/exit doors to public toilet rooms, except at family/companion toilet rooms.

2. Public and employee toilet room wet wall chase access doors and frames shall be painted hollow metal steel. Finish of the doors shall be resistant to impact and to other anticipated wear from pedestrian traffic and carts.
3. Door/frames in shower rooms family toilet rooms and Janitor's closet shall be painted hollow metal steel. Finish of the doors shall be resistant to impact and other anticipated wear from pedestrian traffic and carts. Janitor closet doors shall be wide enough to accommodate janitor carts.

F. Accessories:
1. All toilet and shower accessories including but not limited to waste receptacles, grab bars, mirrors, shelves, paper towels dispensers, sanitary napkin dispensers and disposals, diaper disposals, toilet issue dispensers, coat hooks, etc. shall conform to SDCRAA Standards. All accessories mounted to walls shall be secured to structure or solid backing. Accessories mounted to toilet partitions shall be mounted back-to-back.
2. Lavatory counter top shall be quartz material.

2.07 CARGO SPACES

A. Floors:
1. Provide sealed concrete at floors.

B. Walls/ Partitions:
1. Provide painted drywall or concrete block walls as appropriate at Storage Space walls and Partitions. Walls shall extend to the underside of structure above if there is no finish ceiling in the space or for security reasons. Secure to structure or provide solid backing for security shelving, equipment supports, signage, etc. Provide coved vinyl base.
2. Provide heavy duty corner guards at corners of walls to a minimum height of 4 feet.

C. Ceilings:
1. Ceilings shall be mainly exposed structure. Ceilings when provided for environmental controls shall be 2 ft. x 4 ft. suspended lay-in acoustical tile.

D. Doors and Frames:
1. Provide painted hollow metal steel exit /entrance doors and frames along the perimeters of the Storage Spaces as required for egress by code. When security access control is required, doors and frames shall accommodate a wide variety of security devices, including concealed wiring. The frames for access control doors shall be factory prepped for electric or magnetic lock. Doors swinging into Public Areas from rooms and spaces shall be recessed into the room or space and not swing directly into public circulation.
2. Provide high quality hardware from a brand name manufacturer. Surface mounted closers on the doors shall be mounted on the face of the door opposite the public area side. Finish on hardware shall be brushed stainless steel. Provide stainless steel kickplates at bottom of doors.

2.08 CIRCULATION SPACE (NON PUBLIC) - MAJOR SERVICE CORRIDORS

A. Floors:
1. Heavy duty resilient floor finish.

B. Walls:
1. Armor plated, stainless steel finish construction up to 5 ft. and/or continuous bumper rails to protect walls from impact from equipment and pulled or motorized carts. Drywall with epoxy paint above 5 ft. Corners of walls shall be protected by heavy duty stainless steel corner guards.

C. Ceilings/ Soffits:
1. Ceilings shall be exposed to structure above except where required for aesthetics or to control the environment in the space. Provide ceilings and soffits of a durable material resistant to airborne dust accumulation, easily cleaned and maintainable.

D. Building Services
1. Floors:

a. Building Services Space floors shall be sealed concrete.

2. Walls/ Partitions:
   a. Provide a hard durable material resistant to wear and impact at Building Services Space walls and partitions. Drywall is not an acceptable finish, unless used 8 ft. above finished floor. Use concrete block or fiberglass wall panels. Walls shall extend to the underside of the structure. Protect wall corners with heavy-duty corner guards.
   b. Base shall be of hard, durable material resistant to wear and be easily maintainable.
3. Ceilings:
   a. Ceilings shall exposed to structure.
4. Doors and Frames:
   a. Man-doors and frames to be painted hollow metal steel with a gage thickness able to withstand high-use and impact from maintenance equipment/vehicles, trash collection equipment, forklifts, etc. Doors and frames highly susceptible to damage from direct impacts from GSE equipment shall also be protected by concrete filled bollards or steel guard rails.
   b. Roll-up doors shall be motorized.
   c. Finish of the doors shall be resistant to impact, scratching, scraping or other anticipated wear from maintenance, trash collection, GSE and other equipment.

2.09 UTILITY EQUIPMENT

A. Floors:
   1. Provide sealed concrete.

B. Walls/ Partitions:
   1. Provide hard durable materials in mechanical, electrical and elevator equipment rooms. Drywall will be acceptable in telecommunication rooms. Wall corners shall be protected by heavy-duty corner guards.

C. Ceilings:
   1. Ceilings shall be mainly exposed structure. Ceilings when provided for environmental controls shall be 2 ft. x 4 ft. suspended lay-in acoustical tile.

D. Doors and Frames:
   1. Combination of Man-doors and frames shall be hollow metal steel with a gage thickness able to withstand high-use and impact from maintenance equipment/vehicles, trash collection equipment, forklifts, etc.. Doors and frames highly susceptible to damage from direct impacts from GSE equipment shall also be protected by concrete curbs or a combination of bollards and guard rails.
   2. Roll-up doors shall be motorized.
   3. Finish of the doors shall be resistant to impact, scratching scraping or other anticipated wear from maintenance, trash collection, GSE and other equipment.

E. Door Hardware:
   1. Provide high quality hardware from a brand name manufacturer. Surface mounted closers shall be mounted on the face of the door opposite the public area side. Finish of hardware shall be brushed stainless steel. Provide stainless steel kickplates at bottom of doors.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide appropriately finished interiors for all spaces required by the program.

B. Substantiation:
   1. Design Development: Identification of all criteria applicable to each finish; manufacturer's product data showing compliance. Material selection boards; catalog cuts
   2. Construction Documents: Detailed schedule of finish locations; manufacturer's product data.
   3. Shop drawing and material submittals

C. Where interior finishes are integral with elements defined within another element group, meet requirements of both element groups.

D. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria and Section DC C - Interiors Criteria - Interiors Criteria.

3.02 AMENITY AND COMFORT CRITERIA

3.03 HEALTH AND SAFETY CRITERIA

A. Slip Resistance: For spaces subject to floor wetting, including entry lobbies, provide floor finishes with inherent slip resistance under wet conditions in accordance to code.

3.04 DURABILITY CRITERIA

A. The durability of finish materials shall be in accordance with specified years of functional and aesthetic service life as described in Section C Interiors Criteria.

END OF SECTION

SECTION DC C2 1: TERMINAL INTERIOR SIGNAGE CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The construction will provide understandable and appropriate wayfinding and operations signage for all interior spaces to facilitate efficient and safe circulation to all areas.

B. Areas comprising interior signage include:
   1. Terminal Building

C. Terminal signage comprises the following categories. The Performance Specifications are for each category, where applicable.
   1. Directional (terminal interior, ticketing/check-in, concourses and walkways, holdrooms, retail and food/beverage areas, baggage claim, non-public areas)
      a. Signs in each program space, listing destinations with appropriate arrows.
      b. Signs will primarily be overhead, but also mounted to or suspended from ceilings, wall mounted, or under special conditions, floor-mounted.
      c. Secondary directional signs may be wall-mounted.
      d. Provide directional signs at all decision points and for both arriving and departing passengers.
   2. Digital directory map kiosks with LCD display (terminal interior, ticketing/check-in, concourses baggage claim,
      a. Cabinets, either freestanding floor-mounted or wall-mounted displaying a static terminal map with the overall airport map as an inset.
      b. Provide at least seven static map directory kiosks.
      c. Provide design for maps and production art.
   3. Identification (terminal interior, ticketing/check-in, concourses and walkways, holdrooms, baggage claim, restrooms, amenities,, non-public areas)
      a. Signs in each program area that identify destinations within the terminal, which include the following:
         1) Ticketing / Check-in
         2) Gates
         3) Restrooms
         4) Concessions - Food and Retail
         5) Airline Clubs
         6) Baggage Claim
         7) Ground Transportation
         8) All doors, function rooms and departments -door numbers only and compliance with FMD requirements
         9) Stairways-stairway numbers only
         10) Not a destination
         11) Other ancillary Airport destinations as necessary
   4. Regulatory (terminal interior, ticketing/check-in, concourses and walkways, holdrooms, retail and food/beverage areas, baggage claim, restrooms, amenities,, non-public areas)
      a. Signs in each program area that limit behavior, such as Authorized Personnel Only.
      b. Provide a unified design format for such signs.

5. Informational (terminal interior, ticketing/check-in, concourses and walkways, holdrooms, retail and food/beverage areas, baggage claim, restrooms, amenities,, non-public areas)
    a. Signs in each program area that provide information about the use of terminal, such as USO Located in Terminal 2.
    b. Provide a unified design format for such signs.
6. Accessibility-related (terminal interior, ticketing/check-in, concourses and walkways, hold rooms, retail and food/beverage areas, baggage claim, restrooms, amenities,, non-public areas)
    a. Signs, required and otherwise, that make the terminal easy to use for persons with disabilities.
    b. Signs required by Americans with Disabilities Act (ADA) and California Title 24.
    c. Visual paging system in at least three locations.

D. The construction will meet or exceed all applicable codes and accessibility signage guidelines such as Americans with Disabilities Act (ADA) and California Title 24.

E. The construction will provide a program of sign elements coordinated in appearance and use of language and messaging, and consistent in placement.

F. Signage language and messages will be in English.

G. The construction will make use of international and accepted travel-related pictograms where possible.

H. Design: Sign designs may be drawn from the San Diego International Airport Comprehensive Sign Program or designed to match existing Terminal 2 West signs, when code compliance can be assured, or be a hybrid of the two. The sign background will be black. Where signs are needed that do not appear in the Comprehensive Sign Program, the construction may provide new designs similar in appearance and detail to the Comprehensive Sign Program.
    1. Sign wording, destination names, use of pictograms, arrow style and other visual and content details will be simple and consistent from sign to sign.

I. Sign placement and organization: The construction will provide coordinated directional and identification signs located along walkways and concourses, in holdrooms and other terminal areas to provide direction to all destinations and amenities, including:
    1. A system of overhead directional signs.
    2. Wall and/or floor mounted map directories.
    3. Gate identification signs.
    4. Passenger boarding bridges gate number signs.
    5. Restroom and other amenities' signs.
    6. Secondary and miscellaneous signs to facilitate efficient use of the terminal.

J. Sign design: Sign wording, destination names, use of pictograms, arrow style and other visual and content details will be simple and consistent from sign to sign.

K. Dynamic Signs: The construction will provide electronic programmable and changeable (dynamic) signs for display of updatable information.

3.02 AMENITY AND COMFORT

A. Legibility: Messages on primary directional signs will be of consistent size with existing Terminal 2 with a font size goal of a minimum of 3".

B. Contrast: sign messages will provide a minimum 70% contrast with sign backgrounds, measured in Light Reflectance Value (LRV).

C. Placement: Primary directional signs will be placed so that in most cases, a user can see a sign in the distance while reading a sign nearby.

3.03 HEALTH AND SAFETY

A. Overhead clearance: All overhead signs will to be at least 9'- 0" above the finished floor. As unless overhead ceiling does not allow. At low ceilings a .7'-6" height is acceptable.

B. The construction will provide adequate support connections between all overhead sign elements and the facility.
   1. Structural design will be provided by the signage contractor as each manufacturer has a unique system for structural components and hanging apparatus.
   2. Substantiation:
      a. Design: Detailed listing of design criteria and prepared by a structural engineer licensed in California...
      b. Construction Documents: Structural criteria in 100% specifications by structural engineer licensed in California

3.04 STRUCTURE

A. Structural Performance: The construction will provide engineered signage construction and elements.
   1. Substantiation:
      a. Design Development: Detailed listing of design criteria, prepared by a structural engineer licensed in California...
      b. Construction Documents: Structural criteria in 100% specifications by structural engineer licensed in California as each signage manufacturer is different.
      c. Adherence to the intent of the Specifications document of the Comprehensive Sign Program.

B. Facility Structural Performance: The construction will provide hidden structural backing within walls and ceiling engineered to support all signage elements. if required by each sign type.
   1. Substantiation:
      a. Design Development: Structural substrates which will support significant sign loads will be provided design criteria and preliminary analysis, prepared by a structural engineer licensed in California..
      b. Construction Documents: Detailed design analysis by structural engineer licensed in California for significant signs loads.
      c. Adherence to the intent of the Specifications document of the Comprehensive Sign Program.

3.05 DURABILITY

A. Service Life Span: Same as building service life, except as follows:
   1. Overhead Signage Elements: Minimum 15 years functional and aesthetic service life.
   2. Wall and floor-mounted Signage Elements: Minimum 5 years functional and aesthetic service life.
   3. Wear Resistance: The construction will provide sign elements that are suitable in durability for the degree and type of traffic to be anticipated in each space.
      a. Public areas: high-traffic; hard use.
      b. Non-public areas: low traffic; medium use.
      c. Substantiation:
         1) Adherence to the intent of the Specifications document of the Comprehensive Sign Program.
   4. Ultraviolet Resistance: In interior spaces exposed to direct sunlight, the construction will provide sign elements that are inherently resistant to fading and discoloration.
   5. Vandal Resistance: In spaces accessible to the public and not subject to continuous surveillance, the construction will provide sign elements that are inherently vandal resistant or designed to be difficult to access or damage.

3.06 OPERATION AND MAINTENANCE

A. Cleaning: Provide sign elements that will not be damaged by ordinary cleaning and maintenance operations.

B. Maintenance access: internally illuminated signs will have easy access to internal structure for ease of re-lamping and maintenance.

C. All signs must be constructed so that they are easy to open, repair and maintain. Sign faces must be easily removable for future maintenance and replacement.

END OF SECTION

SECTION DC C3 1: INFORMATION FIXTURES CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Information fixtures comprise the following:
   1. Identifying devices, such as signs, dimensional letters, plaques, and directories.
   2. Visual display surfaces, such as marker boards, chalkboards, tack boards, magnetic boards, projection screens and other projection surfaces.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC C - Interiors Criteria.

C. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies; 2014.

PART 2 PRODUCTS

2.01 IDENTIFYING DEVICES

A. Identifying Devices:
   1. Use one of the following:
      a. Dimensional characters at TBD by Authority.
      b. Building directories at TBD by Authority.

B. Room and Function Label Signs:
   1. Use one of the following:
      a. Individual, 3-dimensional plastic characters at TBD by Authority.

C. Directional Signs:
   1. Use one of the following:
      a. Framed plastic panel signs with raised characters and graphics at TBD by Authority.

2.02 VISUAL DISPLAY SURFACES

A. Erasable Surfaces:

B. Tackable Material:

C. Visible Surfaces of Tackable Surfaces:

D. Projection Surfaces:

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide information fixtures that are necessary for direction to and identification of functions and spaces as required by the program.

B. Signage:
   1. Room or function labels applied to doors or walls immediately adjacent to doorways.
      a. Room Label Signs: Provide room label signs for all primary spaces.
   2. Signs that provide guidance to, or information about, building functions or spaces, including directional signs.
      a. Directional Signs: Provide directional signs at all building entrances.
   3. Large decorative or architectural signs, including three dimensional graphics.

4. Building directories with replaceable information strips.

C. Visual Display Surfaces: Configuration and surface area as indicated in the project program.
   1. Erasable surfaces:
   2. Tackable surfaces, for standard push pin use:
   3. Magnetic surfaces:
   4. Projection surfaces:
      a. Coordinate the surfaces and equipment provided with the room/space design, lighting, and sound reinforcement equipment, for optimum viewing at all normal seating locations, without hot spots, loss of resolution, excessive dimming of image, or difficulty of hearing.

D. Where information fixtures are integral with elements defined within another element group, meet requirements of both element groups.

E. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria, and Section DC C - Interiors Criteria.

3.02 AMENITY AND COMFORT CRITERIA

A. Accessibility:
   1. Provide identification devices that comply with ADA Standards for accessible design.

3.03 HEALTH AND SAFETY CRITERIA

A. Fire Retardance:
   1. Projection Surfaces: Free-hanging and tensioned fabric screens flame retardant in accordance with code.

B. Forced Entry Resistance: If fixtures are located in Public Access Zone defined in Section DC 0 - Facility Design Criteria, provide doors and exposed assemblies tested for applicable criteria in accordance with ASTM F476 Grade 10, minimum.

3.04 OPERATION AND MAINTENANCE CRITERIA

A. Ease of Use:
   1. Language of Identifying Devices: All text in English, French, Spanish, and others TBD by Authority.

END OF SECTION

SECTION DC C3 2: STORAGE FIXTURES CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storage fixtures comprise the following elements:
   1. Closed material and utensil storage, such as cabinetry, casework.
   2. Fixed shelving.
   3. Other storage elements.

1.02 RELATED REQUIREMENTS

A. Section DC C - Interiors Criteria: Criteria that apply to all relevant interior elements of the facility.

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

PART 2 PRODUCTS

2.01 STORAGE FIXTURES

A. Casework:
   1. Use one of the following:
      a. Manufactured wood casework and display shelving with stain or paint finish.
      b. Manufactured plastic laminate clad casework and display shelving.

B. Utility Storage Shelving:
   1. Use one of the following:
      a. Metal frame and panel shelving with baked enamel finish.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide storage fixtures attached to interior construction that are necessary for proper functioning of spaces required by the project program.

B. Closed Material and Utensils Storage: Provide modular storage cabinets and countertops with capacity adequate to accommodate required functions in spaces as follows:
   1. SP2 (Occupant work).
   2. SP3 (Equipment utilization).
   3. SP6 (Meeting and instruction).
   4. SU1 (Maintenance facilities).
   5. SU2 (Utility equipment).

C. Open Material Storage: Provide storage racks or utility shelves for material storage adequate for anticipated needs in spaces as follows:
   1. SP3 (Equipment utilization).
   2. SS (Storage).
   3. SU1 (Maintenance facilities).

D. Where storage fixtures are integral with elements defined within another element group, meet requirements of both element groups.

E. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria and Section DC C - Interiors Criteria.

3.02 AMENITY AND COMFORT

A. Accessibility:
   1. Provide storage fixtures that comply with ADA Standards for accessible design.

B. Convenience:
   1. Closed Material and Utensil Storage: Provide floor-mounted cabinets equipped with full-extension drawers, extension shelves, rotating corner storage shelves, and doors that open a full 180 degrees.
   2. Closed Material and Utensil Storage: Provide wall-mounted cabinets equipped with adjustable shelving and doors that open a full 180 degrees.

C. Appearance:
   1. Cabinetry: For closed storage fixtures, provide elements that are designed to complement interior finishes, with concealed hinges and door and drawer pulls integrated into cabinet fronts.
   2. Countertops and Work Surfaces: Provide light-colored or metallic surfaces that are seamless and tightly jointed.

3.03 STRUCTURAL CRITERIA

A. Seismic Loads: Provide storage racks and shelving units that have been engineered and installed to withstand seismic forces as specified in Section DC 0 - Facility Design Criteria.

END OF SECTION

SECTION DC C3 3: WINDOW TREATMENT CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Window Treatment: Fixed, non-furnishing accessories for control of light, solar heat gain, privacy, and view at interior and exterior windows, including blinds, shades, shutters, and curtain tracks.

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section DC C - Interiors Criteria: Criteria that apply to all relevant interior elements of the facility.

C. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS

2.01 WINDOW TREATMENTS

A. Use one of the following:
   1. Window blinds throughout the project.
   2. Window shades throughout the project.
   3. Interior shutters throughout the project.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Provide window treatments attached to interior construction that are necessary for adequate control of light, glare, privacy, and views for spaces with interior and exterior windows.

B. Where window treatments are integral with elements defined within another element group, meet requirements of both element groups.

C. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria and Section DC C - Interiors Criteria.

END OF SECTION

SECTION DC D1 1: PEOPLE-MOVING EQUIPMENT CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. People-moving equipment are conveying systems and devices that are primarily intended to move people between levels, or from one area to another, and which may secondarily convey materials, comprising the following elements:
   1. Elevators: All components for passenger and service elevators, including items such as shaft rails, pit ladders, exhaust louvers, and car and hoistway doors.
      a. Passenger Elevators: Rated for passenger service and generally wider than deep.
      b. Service Elevators: Rated for passenger service but suitable for carrying maintenance and delivery carts and large furniture and equipment; dedicated service elevators are not considered passenger elevators for the purpose of calculating total passenger elevator capacity.
      c. Traction Elevators: Hoisting machine, hoist ropes, car frame and enclosure, counterweight, guide rails and roller guides, power and operational controls, signal fixtures, hoistway entrances, door operator equipment and safety devices.
      d. Hydraulic Elevators: Power unit and control valves, hydraulic cylinder and plunger, controller, car platform and frame, car enclosure, guide rails, signal fixtures, hoistway entrances, door operator equipment and safety devices.
   2. Lifts: Devices for moving passengers vertically or diagonally between adjacent levels, that operate independent of a fully enclosed shaft, and comprise the following elements:
      a. Vertical Wheelchair Lifts: Driving mechanism, guide rails, car frame and platform, operating devices and control equipment, access doors, and safety devices
   3. Escalators: Reversible electric stairways for moving passengers between levels, comprising the truss for supporting all dead and live loads, as well as the drive machine, balustrades, and all operating parts and safety mechanisms.

1.02 REFERENCE STANDARDS

A. Local and/or State laws applicable for the San Diego area
B. ASME A17.1 - Safety Code for Elevators and Escalators
C. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks
D. ASME A17.5 - Elevator and Escalator Electrical Equipment
E. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors
F. NFPA 70 - National Electrical Code
G. NFPA 72 - National Fire Alarm Code
H. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 GENERAL

A. Elevator and Escalator components installed as part of this Contract shall be new, compliant with the requirements of Code and this Section.
B. Elevator and Escalator equipment shall be designed and fabricated to fit within the designed hoistways and wellways.

3.02 BASIC FUNCTION

A. The construction will provide conveying systems required by the program or necessary to fulfill basic project functions.

B. Where conveying systems are integral with elements defined within another element group, the construction will meet requirements of both element groups.

C. In addition to the requirements of this section, the construction will comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

D. If the project has more than one level, the construction will provide passenger elevators to provide access to every habitable floor. Provide redundancy in the number of elevators to allow for downtime and repair.
   1. At intermediate levels not served by elevators, the construction will provide ramps or wheelchair lifts to connect such levels to at least one level with passenger elevator access.
   2. The construction will provide elevator capacity as required to comply with convenience levels in this Section.
   3. If some levels are connected by escalators, the construction will provide passenger elevators with capacity reduced in proportion to anticipated escalator traffic.

E. If the project has more than one level, provide at least one dedicated freight elevator to provide access to every floor for movement of materials, supplies, furniture, and equipment.
   1. Provide dedicated freight elevators connected with dedicated corridors to serve all concession areas, concession storage and loading docks.
   2. At intermediate levels not served by elevators, the construction will provide ramps to connect such levels to at least one level with freight elevator access.

F. The construction will provide escalators in any of the following situations:
   1. Where large numbers of people must be moved up or down public floors in predictable surges or more or less continuously public spaces as described below:.
      a. Major public spaces for public and airline passengers use including but not limited to ticket lobby, baggage claim area, concourses, holdrooms, food retail court, art exhibit, pedestrian bridges, food court with fixed seating, elevator lobbies in parking structure and others.

3.03 AMENITY AND COMFORT CRITERIA

A. Accessibilty
   1. The construction will provide at least one accessible passenger elevator complying with code that serves every habitable level.
   2. The construction will provide passenger elevators that comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and as follows:
      a. Public Passenger Cars with Center-Opening Doors (8,000 lbs load capacity): Minimum interior clear dimensions of 120 inches deep and 96 inches wide, with controls located on front wall, both sides.
      b. Passenger Cars other than public use with Side-Opening Doors (4,000 lbs): Minimum interior clear dimensions of 54 inches deep and 80 inches wide, with controls located on front wall.
      c. Freight Cars (Concession Supplies, 4,000 lbs load capacity: Minimum interior clear dimensions of 94 inches deep and 68 inches wide.
      d. Freight Car (Maintenance, 6,000 lbs load capacity): Freight car shall be able to transport an existing maintenance scissors lift with the following specifications:
         1) Model: #100027 JLG Scissor Lift Model 2646E
         2) Weight: 4,400 lbs
         3) Overall length: 8'-3"
         4) Overall width: 46"
         5) Overall height (lowered): 7'-9"
         6) Height of Controls: Top button not higher than 48 in from finished floor.
   3. If required by design, the construction will provide wheelchair platform lifts, where permitted, that are accessible and operable without assistance by persons in wheelchairs and that comply with requirements of ANSI/ASME A18.1-2005.

B. Convenience
   1. Location of vertical conveying system (when required by other requirements):
      a. Not more than 100 feet from primary building entrance.
      b. As close to centrally positioned as possible, for maximum convenience and minimum travel times.
      c. Where conveying systems are zoned and require transfers for a single vertical journey, entry and exit points will be located not more than 100 feet apart.
   2. Elevators
      a. Interval: Maximum of 25-30 seconds of average waiting time for elevators.
      b. Average Travel Time: Maximum of 60 seconds.
      c. Minimum of 2 cars in any area of passenger elevators for public use. Service or freight elevators can serve as a redundant elevator.
      d. Location: Where conveying systems are zoned and require transfers for a single vertical journey, entry and exit points will be located not more than 100 feet apart.

C. Sound Levels: The construction will maintain ambient sound levels in spaces that include or are adjacent to operating conveying systems within levels specified in Section DC - Interiors Criteria.

D. Appearance
   1. Elevators:
      a. Provide cabs as light and open in appearance as possible. Maximize transparency and glass/glazing for passenger elevators.
      b. Glass in hoistways and elevator cabs shall not be used when hoistways are located on exterior walls.
   2. Escalators
      a. Balustrades shall be glass, with brushed stainless steel surfaces below the balustrades.
      b. All steps / treads shall be black, with paint applied using the powder coat process.

3.04 HEALTH AND SAFETY CRITERIA

A. Fire Resistance: Where people-moving equipment passes through fire resistant floor construction, provide fire resistance in conformance with code and below. Where a hoistway is indicated as glass, fire ratings for the hoistway need not be maintained.
   1. Elevator Hoistways: Not less than 2 hour rating.
   2. Elevator Doors: Not less than 1-1/2 hour labeled fire protection rating
   3. Number of elevator per hoistway: Not more than two (2), unless otherwise indicated.
   4. Escalators shall be enclosed in materials defined as either noncombustible or limited-combustible by the building Code.
   5. Substantiation
      a. Design Development: Proposed systems and source of fire resistance ratings.
      b. Construction Documents: Identification of specific rated assemblies.

B. Heat and Smoke Detection: Heat and smoke detection are to be provided in all motor and pit areas interlocked to building management system.

C. Elevator Safety
   1. Design elevator in full compliance with the Seismic Requirements of Code.

D. Escalator Safety
   1. Design escalators in full compliance with the Seismic Requirements of Code.
   2. Escalator Transitions:
      a. Provide minimum of three (3) flat steps at the upper and lower landings, unless otherwise indicated.
      b. Provide upper transition radius of 8’-6” [2600mm], unless otherwise indicated.
      c. Provide lower transition radius of 6’-6¾” [2000mm], unless otherwise indicated.
   3. Escalators with 40” step widths shall be designed with a dynamic brake load of 320 pounds per exposed step along the incline.

4. Safety Zones: Area at each end of the device as measured from the edge of the newel which shall be kept completely free of obstacles. Safety zone length shall measure no less than 4 times the device width.
5. Step Width:
   a. Escalators: 40” [1000mm]
6. Balustrade Height: Not less than 39 inches high.
7. Escalator Step Demarcation: Provide yellow painted demarcation lines along the sides and rear of the step.
8. End Demarcation Lighting: Below ends of escalators, the construction will provide green hazard lighting extending not less than 16 in from comb plates, provided by a minimum of 2 fluorescent lamps that are switched on automatically when unit is in operation.
9. Safety Lighting: At escalators, the construction will provide continuous illumination immediately adjacent to walking surfaces, and immediately below handrails.

3.05 STRUCTURAL CRITERIA

A. Comply with structural requirements of code and the following:
   1. Elevator Guide Rails:
      a. Heavy-duty, T-section guide rails, not less than 15 lb/ft rails for both cars and counterweights.
      b. Provide seismic fishplates as required by Code.
   2. Elevator Car Frames: All welded construction
   3. Escalator Structural Systems: Engineered to withstand dead load of the truss and equipment, plus live load of not less than 100 lbf/sq ft applied to full width and length.
   4. Escalator Trusses:
      a. Unless otherwise indicated, provide all welded construction.
      b. If trusses are too large to be brought into position as a single segment, individual truss sections may be bolted together at the joints.

3.06 DURABILITY CRITERIA

A. Expected Service Lifespan: Provide people-moving equipment with functional service life the same as specified for the project, assuming continuing professional maintenance and period replacement of wearing parts.

B. Wear and Abuse Resistance: Comply with requirements for exposed surface finishes specified in Section DC C2 - Interior Finishes Criteria, unless otherwise indicated.
   1. Provide durable materials that will reliably resist scratches and other damage that can be reasonably expected due to traffic and use.
   2. Provide brushed stainless steel, vandalproof fixtures.
   3. Elevators:
      a. Doors and Door Frames: Brushed stainless steel
      b. Car Interiors: Glass panels with brushed stainless steel frames.
      c. Control Panels: The construction will provide control and annunciator panel surfaces at passenger elevators that are clad with brushed stainless steel.
      d. Railing: Brushed stainless steel railings at the side and rear of each car. Provide and additional railing for service elevators approximately 8” above the cab finished floor.
   4. Escalators: Cladding and decking materials of brushed stainless steel.

C. Substantiation
   1. Preliminary Design: Life spans are not contractually bound beyond the specified warranty.
   2. Design Development: Life cycle cost analysis, including replacement cost and frequency of replacement for major components, energy costs for operation of equipment and systems, costs for routine maintenance, and anticipated cost escalation factors

3.07 MECHANICAL / ELECTRICAL CRITERIA

A. Traction Elevators:
   1. Traction machines shall be the AC gearless type.

2. Steel hoisting and governor ropes shall be used. Belts, chains or other means shall not be permitted.
3. Oil buffers shall be used regardless of speed.
4. Type B safeties shall be used regardless of speed.
5. Motors shall be rated for a minimum of 120 starts per hour and shall be provided with a soft start drive.
6. Regenerative drives shall be utilized.

B. Hydraulic Elevators:
1. Hydraulic pump units shall be the dry-type. Submersible pump units shall not be used.
2. Motors shall be rated for a minimum of 120 starts per hour and shall be provided with a soft start drive.

C. Escalators:
1. Regenerative braking shall be utilized.
2. Provide an audio passenger information system.
3. Provide anti-slide knobs on decking where required
4. Step/Tread Demarcation Light: Provide green hazard light below the steps/treads at both ends of each escalator. Lights shall automatically be switched on when the device is operational.
5. Safety Lighting: Provide skirt lighting along full width of the escalator.
6. Step chain rollers shall be located outside the chain.
7. Landing plates shall be stainless steel, designed to be removed with special tools, and sized to be handled by a single person.

3.08 OPERATION CRITERIA

A. Operation of all people-moving equipment shall fully comply with ASME A17.1.

B. Elevators:
1. Capacity: Passenger elevator capacity shall match contract indicated value, but shall be not less than 4,000lb.
2. Capacity: Dedicated Freight Elevator Duty: Operating characteristics as follows:
   a. Minimum Load Capacity: 6000 lb.
3. Speed: Shall not vary by more than 5% regardless of direction or load
   a. Traction Elevators: 200 FPM minimum
   b. Hydraulic Elevators: 100 FPM minimum
4. Passenger Elevator Operating System:
   a. Light Service: Single automatic operation
   b. Single Elevators: Selective collective operation
   c. Two Elevator Banks: Duplex collective operation
   d. Multiple Car Banks: Programmable group automatic operation
      1) Group automatic operation
         (a) Available Operating Modes: Patterns for light, normal (balanced), up peak, and down peak traffic.
         (b) Operating Mode Selection: Automatic, based on time of day or predetermined level of call intensity.
      2) Other requirements
         (a) Automatic load weighing factored into car assignments.
         (b) Fully automatic responses to light, normal (balanced), up peak, and down peak traffic demands.
         (c) Passenger grouping by destination.
5. Operating Features for all elevators:
   a. Provide Phase I and Phase II operation in accordance with Code.
   b. Provide keyswitch in each car for independent operating service.
   c. Provide keyswitch in each car to enable hoistway access.
   d. Provide keyswitch in each car for taking the car out of service.

e. Where elevators are provided with emergency or standby power, provide power indicator light as required per Code.
f. Card Key controlled floor buttons in all elevator cars for access to particular floors, as follows: Card key will be required for access to non-public areas.
g. Key switch at Airline club floor for priority call service.
h. Key-controlled out of service feature.
i. Automatic load weighing bypass.
j. False car call canceling.

C. Escalators:
1. Speed
a. Escalator Speed: 100 FPM, fully reversible. Minimum Theoretical Capacity: 5000 persons per hour.
2. Maintenance Speed: 25 FPM, maximum
3. Sleep Mode:
a. Provide sleep-mode functionality which shall bring the device to a low speed (10FPM, minimum) when the escalator is not in use.
b. Operation shall fully comply with ASME A17.1-2016, §6.1.4.1.2.
c. A variance from the State of California may be required for such operation.
4. Safety Devices: Provide all safety devices mandated by ASME A17.1 and local/state law.

D. Ease of Use: Provide equipment that operates automatically or in response to passenger input without intervention by operators.

E. Minimization of Misuse: The construction will provide conveying systems with features and mechanisms that will prevent or minimize unsafe conditions or inconvenience attributable to vandalism, pranks, or deliberate sabotage.
1. Substantiation:
a. Design Development: Description of features intended to minimize misuse of conveying systems.
b. Construction Documents: Detailed specifications for proposed features and mechanisms intended to minimize misuse of conveying systems.
c. Construction: Product data from manufacturers that verifies the features and mechanisms intended to minimize misuse of conveying systems.

3.09 MAINTENANCE CRITERIA

A. System Maintenance: Provide full protective maintenance on the specified equipment for a period of twelve (12) months from the date of final acceptance.
1. Substantiation:
a. Design Development: Maintenance impact analysis, including scope of maintenance effort anticipated during expected functional and aesthetic service life of project.
b. Construction Documents: Proposed maintenance contract, for SDCRAA's review.

B. Warranty: Provide one year manufacturer’s warranty to repair, restore, or replace elevator, escalator, and moving walkway work that fails in materials or workmanship which develops one year from date of final acceptance of all work.

END OF SECTION

SECTION DC D13: BAGGAGE HANDLING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

B. The extent of the baggage handling systems work is defined to include all labor, materials, equipment, and supervision required to design, furnish, fabricate, and install the baggage handling systems. Furnish and install all necessary equipment to provide complete, operable, and maintainable systems, which includes, but is not limited to: conveyor bed sections, drives, take ups, sideguards, shrouding, floor supports, ceiling hangers and headers, stainless steel panels and conveyor trim, warning beacons and audio messages, draft curtains, controls and control panels, electrical equipment and materials, catwalks, platforms and access ladders, and guard rails as required to complete the systems.

C. While traditional Baggage Handling System (BHS) conveyor technologies are the basis for this document, the DB team can propose other systems and technologies sufficient to meet or surpass the intended operational needs of the facility. Such alternate technologies and any products proposed to support these different BHS solutions must be approved by the Authority. The DB team will be responsible to demonstrate reliability of such technology and its component products in existing airport BHS operations comparable to the new T1 facility, to the satisfaction of the Authority. Reference Section 3.04 New Equipment Demonstration herein.

1.02 REFERENCES

A. Reference Standards:

1. Comply with the requirements of the reference standards noted herein, except where more stringent requirements are listed herein or otherwise required by the Contract Documents. The publications of the codes and standards listed below form a part of this specification section to the same extent as if bound herein. The publications are referred to in the text by basic designation only.
2. All electrical work shall be in accordance with the latest applicable municipal electrical code and N.E.C., whichever is more stringent.
3. All work shall be in accordance with the latest applicable municipal building code and I.B.C., whichever is more stringent.

B. Additional Codes and Standards:

1. Federal Safety and Health Laws:
   a. All equipment and accessory items furnished and installed under this contract shall be governed at all times by applicable provisions of the Federal laws, including, but not limited to, the latest revisions of the following:
      (1) William Steiger Occupational Safety and Health Act of 1970, Public Laws 91 596.
      (2) Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
      (3) Part 1926 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
2. Referenced Documents:
   a. American Welding Society (AWS): AWS A2.4:2012-(or latest edition), AWS C1.1M/C1.1:2012-(or latest edition), AWS D1.1/D1.1M:2015-(or latest edition), and AWS D1.2/D1.2M:2014-(or latest edition).

b. American Gear Manufacturers Association Standards: ANSI/AMGA 6013-A06-(latest edition), ANSI/AMGA 6034-B92-(latest edition), and ANSI/AMGA 6035-A02-(latest edition).

c. American National Standards Institute (ANSI): A1264.1-(latest edition), C33.1-(latest edition), Z535.1-(latest edition), ANSI/IEEE C2-(latest edition), and A14.3-(latest edition).

d. American Society of Mechanical Engineers (ASME): B20.1-(latest edition) and B29 Series (latest edition).

e. American Society for Testing and Materials (ASTM): ASTM A36-(latest edition), ASTM A1011/A1011M-(latest edition), ASTM A307-(latest edition), and ASTM A563-(latest edition).

f. National Institute of Standards and Technology (NIST): Handbook H 28-(latest edition).

g. Conveyor Equipment Manufacturers Association (CEMA): ANSI/CEMA B105.1-(latest edition) and ANSI/CEMA 402-(latest edition).

h. National Fire Protection Association (NFPA): NFPA No. 70 2014 National Electrical Code National Fire Code, or latest adopted issue.

i. National Electrical Manufacturers Association (NEMA): ICS - Industrial Controls and Systems-(latest edition) and MG 1-(latest edition) Motors and Gear Motors.

j. Underwriters Laboratories (UL): UL 508A – Industrial Control Panels, UL 62 – Flexible Cords and Cables, and UL 187 - Standard for X-ray Equipment (Electrical).

1.03 SYSTEMS DESCRIPTION

A. General:

1. The Baggage Systems Work consists of design and installation of baggage handling equipment sufficient to meet the performance requirements detailed herein. Baggage System components shall be new, in compliance with the requirements herein. Contractor shall provide components that comply with the requirements of these specifications. All subsystems shall be considered as complete systems with interface to the overall system for testing purposes.

2. The work of this section includes furnishing all materials, equipment, labor, supervision, tools, and items necessary for the construction, installation, connection, testing, and operation of all conveyor mechanical and electrical work for this Project, as described in this section of the specifications.

3. Baggage Handling Systems products and technologies not covered in this document may be proposed for use in this project subject to approval of performance specifications applicable for such equipment. Contractor shall submit proposed specification documentation for review and approval by SDCRAA.

B. Refer to the Project Definition Document for proposed systems.

C. Performance – Reference section 2.01 PERFORMANCE herein.

1.04 SUBMITTALS

A. Simulation:

a. Overall Baggage System and HBS Simulations: Provide simulation scenarios of the Overall Baggage System to verify the operation of the system, submitting graphic simulations and resulting data for review by the project team. Simulations are to be flight schedule based, developed by Airport and BHS Contractor. Once the simulations are complete and any issues have been resolved, a report of the overall system and the second report focusing on the complete outbound baggage system and the CBIS/CBRA system for TSA. Submit simulations during the Contractor's design / engineering process,

prior to finalizing the design for the Baggage System so that any necessary adjustments to the system can be made. For the overall BHS, simulations shall demonstrate and analyze, but are not limited to, the throughput of the system, quantity of equipment, merging operations, cascade/headend operations, and dieback situations. For the CBIS/CBRA, simulations shall validate the requirements for the baggage EDS zone, image analysis zone, and reconciliation area, and that each subsystem can feed each EDS at maximum throughput (the throughput of the EDS). Baggage loads for system are provided herein and flight schedule information will be provided upon request. The simulations shall be run for the following scenarios:

(1) HBS running at EDS maximum capacity of bags per hour per EDS unit.

(2) Peak day with system running at full capacity.

(3) Typical day with current baggage volumes.

(4) Ten (10) year baggage volumes forecast.

(5) Current baggage volumes with equipment failure(s).

(6) Ten (10) year baggage volumes forecast with equipment failures (99% availability).

B. Product Data: Submit product data and cut sheets in an orderly bound form in one submittal for all mechanical and electrical components provided for this Work.

C. Shop Drawings: Submit shop drawings in an orderly bound form per system or subsystem for all mechanical and electrical components provided for this Work.

D. Structural engineered and stamped shop drawings, details, and calculations for all supports, attachments, additional steel members necessary for support, and seismic bracing of conveyor and catwalk equipment. Contractor shall coordinate vibration isolation with requirements herein and provide information on the isolators in the structural submittal. Shop drawings, details, and calculations shall be stamped by a registered structural engineer, licensed in the location of installation, and shall be engineered for seismic and structural loading.

E. Power: Submit a summary of power load requirements for each system to verify the feeder size.

F. Submit an overall Description of Operations for the overall Baggage System, describing the overall function of the complete system, which shall include, but is not limited to, a description of E-Stop, motor overload, circuit breaker shut down zones, and bag flows for the different operational scenarios of the system in the Description of Operations submittal.

G. Submit a Description of Operations for each MCP and the associated system or subsystem of all systems and operations for interim and final configurations, describing every function of the complete system or subsystem, which shall include all controls. Submittals shall be complete and include all systems identified herein. Submit Description of Operations with the associated electrical shop drawings. After approval, no variations from the submittal data will be permitted except by written consent of the Owner.

H. Contractor shall submit Test Plan(s) and Commissioning Plan(s) for each system(s) for compliance with the requirements herein. The Plan(s) must be submitted by the Contractor for the Owner's representative's review and approval 120 days prior to testing of the system(s). Refer to Part 3 for Test Plan requirements herein.

I. As-Built Drawings: Prior to project closeout, submit revised layout and assembly drawings showing all field changes to the approved configuration.

J. O&M Manuals: Prior to project closeout, submit complete O&M Manuals with the latest information, product data, as-built drawings, latest submittals, description of operations, equipment operations, and equipment maintenance requirements.

1.05 QUALITY ASSURANCE

A. Baggage System Contractor Qualifications:

1. Supplier: Belt conveyor and make-up device designer/manufacturer who has successfully completed the engineering, manufacturing, installation, and successful commissioning of at least three airport Baggage Handling System/Checked Baggage Inspection System projects within the past five years of similar or greater scope and complexity as herein specified and in compliance with PGDS requirements, and who has an established, stable organization for service and spare parts.
2. Electrical/Controls Designer: Electrical/Controls Designer responsible for the final design of the Baggage System controls shall have not less than five years of experience in the design of similar airport baggage sortation, conveyor, recirculating device, and Supervisory Control Systems; successfully completed the design of at least three airport baggage sortation, conveyor, and recirculating device systems of similar scope; and successfully completed the design of at least three interfaces between the baggage systems and EDS units, as specified herein.
3. Mechanical Installer: If the Baggage System equipment is to be installed by an entity other than the Supplier, the Installer and Supervisory personnel shall comply with the following requirements. Qualified personnel shall install the equipment with factory-trained and certified supervisors. Supervisory personnel shall each have at least 5 years of successful experience with the installation of airport conveyors and recirculating devices of the type specified herein.
4. Electrical Installer: The electrical equipment installer shall have not less than five years continuous experience in the installation of similar systems, as specified herein; including systems utilizing PLC operated motor control panels and controls, as specified herein.
5. Controls Assembler: The electrical control panel and control station assembler shall have not less than five years continuous experience in the assembly of PLC operated motor control panels. Motor control panels and control stations shall be assembled in an UL Listed shop.
6. Structural Engineer: The Baggage System Structural Engineer shall be responsible for the engineering of all Baggage System support steel, header steel, and seismic bracing, as required herein. The Structural Engineer shall be registered in the location of installation.

B. Standards:

1. The equipment covered by these specifications shall be designed, assembled and tested in accordance with the latest applicable standards of the National Electrical Manufacturers Association (NEMA) or International Electrotechnical Commission (IEC), the Institute of Electrical and Electronic Engineers (IEEE), the American National Standards Institute (ANSI), the Conveyor Equipment Manufacturer's Association (CEMA), and Underwriters Laboratories (UL). All materials furnished shall be new, free from defects and UL-approved where such approval is granted to the equipment to be furnished. In addition to the above requirements, all applicable equipment shall conform to the most recently published applicable federal specifications and applicable OSHA specifications.
2. Acceptance standards for weld performance and application shall be in accordance with the specifications for structural welding AWS D 1.1-88 and other applicable AWS specifications.

1.06 COORDINATION

A. Work of Other Trades and Existing Conditions:

1. The General Contractor and/or the Baggage System Contractor shall coordinate with all other trades on the project for the installation of the Baggage System equipment and verify that right-of-ways for the equipment are preserved. They shall coordinate all wall and floor

openings associated with the Baggage System for proper clearances in accordance with the requirements of the Contract Documents. They shall also coordinate with the Special Systems Designer/Installer to ensure proper network connectivity of the Baggage System with other networked systems (e.g. Baggage Messages Services, Gate Management, etc.).

2. The Baggage System Contractor shall field verify all existing conditions prior to the development of any shop drawings.

1.07 DEMOLITION AND SALVAGE

A. General:

1. Owner shall have first right of salvage for all items to be demolished and shall identify all items wanted by Owner. Owner shall have a minimum of 24 hours after 48 hours minimum advance notice to identify items required by Owner. Items that are identified by Owner, but are not removed by the Owner, shall be delivered to the Owner within perimeter of Airport in coordination with the Owner. Contractor shall remove all mechanical and electrical items, raceways and wiring abandoned as a result of the various work items, unless otherwise noted. All raceways, wiring, associated fittings scheduled for demolition shall become the property of the Contractor, after the Owner has salvaged what items they require, and shall be removed from the premises. Do not reinstall existing raceways and wiring unless specifically indicated. The identified demolition items shall be recorded for both Owner items and Contractor items and the record shall be delivered to the Owner. Items to be demolished shall not be abandoned in place and shall be removed to the source.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General: Methods of storage of conveyor materials shall protect the materials from weather, rust, air-born grit and other construction debris. Deteriorated, including rusted equipment shall not be installed.

1.09 WARRANTY

A. Warranty Period:

1. The warranty period for the Baggage Handling System shall commence upon Beneficial Occupancy of any system or subsystem from the date of Beneficial Occupancy of the last system or subsystem to be turned over to the Owner.

2. The warranty period for the entire Baggage Handling System shall extend for a period of one (1) year from the date of Beneficial Occupancy of the last system or subsystem with the Owner's option to enter into two one (1) year extensions. This shall include any system or subsystem that had previously been accepted for beneficial occupancy and its warranty had commenced per paragraph 1, above.

3. The warranty work shall be performed by the Baggage Handling System Contractor/ Manufacturer and/or Installer. Warranty work shall not be performed by a party not involved with the installation.

1.10 OPERATIONS & MAINTENANCE

A. General:

1. For each system or subsystem, while the system or subsystem is being tested, commissioned, or is operational, but has not been turned over to the Owner, the Baggage System Contractor shall be responsible for all preventive and required maintenance until the system or subsystem is turned over to the Owner. Records of all preventive and required maintenance performed prior to turn over shall be kept and submitted to the Owner when the system or subsystem is turned over.

2. The Owner may, at their option, enter into contract with the Baggage System Contractor for Operations and Maintenance activities, which shall include, but is not limited to

preventative maintenance, repairs, and operational bag jam clearing in future years beyond the scope of this specification.

PART 2 PRODUCTS

2.01 PERFORMANCE

A. General:

1. This specification sets the performance criteria of the systems. Contractor shall be solely responsible for the detailed design, fabrication, and installation of the systems to satisfy the requirements herein.
2. Materials shall be of the quality specified herein, new, free from defects, of the best commercial/industrial grade, and approved by a nationally recognized testing laboratory wherever published standards exist. Materials shall be standardized and of the same make and manufacturer throughout the project, wherever possible.
3. Steel and Connection Standards: Steel and connections shall meet the following standards:
   a. Structural plates shall conform to ASTM A 36.
   b. Hot rolled sheets and coils shall conform to ASTM A 569.
   c. Structural steel shapes shall conform to ASTM A 36.
   d. All welding electrodes shall conform to AWS A 5.2. Use the standard code for arc and gas welding in building construction as a guide to general procedure and qualification of welders.
   e. All fasteners shall conform to ASTM A 307 Class 2A thread fit for bolts and Class 2B thread fit for nuts. All fasteners shall be zinc plated or equivalent. All fasteners shall be locked with locknuts or lock washers.
   f. All bearings and bolts shall be of standard sizes and the amount of different sizes shall be minimal, where possible.

B. Checked Baggage Inspection System (CBIS):

1. The inline Checked Baggage Inspection System (CBIS) shall be capable of screening bags at a throughput rate determined in conjunction with approval by TSA for the required number and type of in-line Explosives Detection Systems (EDS) equipment to be provided for the new Checked Baggage Inspection System (CBIS). The expected opening day peak rate is 3370 bags per hour based on the assumption that 5 CTX-9800 EDS units will be provided. It shall be the responsibility of the DB Team to produce and obtain approval for all TSA submittals required per TSA's PGDS (version to be determined by TSA) for the CBIS design, and for passing the commissioning tests required by TSA in order for the completed Baggage Handling System to go live and be turned over for the beneficial use of the owner.

C. System Throughput Rates and Speeds:

1. Conveyor Inputs: Input conveyors at ticket counters, curbsides, and bag stripping areas shall be set at 90 feet per minute, unless noted otherwise.

D. System Reliability:

1. Subsystem Availability (SA): Each subsystem of the baggage system shall have an availability of not less than 99.5% to be calculated on a monthly basis. Subsystem Availability (SA) shall be defined as follows, where n = subsystem number:

$$SAn = \frac{STn - RTn}{STn}$$

   a. Scheduled Operating Time (ST) shall be the scheduled time that the baggage handling system is available for baggage processing as defined herein.

b. Repair Time (RT) shall be the interval of time between initiation of repairs due to failure and return of the baggage system to operation.

2. System Availability (A): The overall baggage system shall have a system availability of not less than 96.0% to be calculated on a monthly basis for the first sixty (60) days of full operation. Within the first sixty (60) days, the system shall reach and maintain an average System Availability of not less than 99.0% to be calculated on a monthly basis. System Availability (A) shall be defined as follows, where N = the total number of subsystems:

$$A = \frac{SA1 + SA2 + SA3 + \ldots.}{N}$$

3. The maximum allowable downtime in a single operating day shall not be more than 15 minutes on one subsystem. The accumulative downtime for all subsystems in a single operating day shall not exceed 20 minutes.

4. Baggage system network equipment, PLC's, and any other control equipment within any master/slave pair shall not have more than one failure per month for any one unit.

5. Baggage system control systems shall have an availability of not less than 99.9% to be calculated on a monthly basis. The maximum allowable downtime in a single operating day shall not be more than 2 minutes for a single event. The maximum downtime where both master/slave pair fail simultaneously shall not exceed 10 minutes in a year.

E. Description of Operation:

1. Outbound Baggage Systems:

a. Ticket Counter Conveyors:

(1) Ticket Counter System Start at Load Conveyor: Each system shall be started through a START pushbutton in each of the control stations along each loading belt. These START pushbuttons shall be enabled by a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate the beacons and audible warning subsystems along the associated conveyor system and in the make-up areas, as required by code. After a predetermined time delay (adjustable 10 to 60 seconds), the security/fire door shall open, the system shall start, and the visual and audible warning subsystems shall shut off. Once the security door is open and the limit switch indicating door fully open has enabled the baggage system activation, the baggage system shall start. The "Start" pushbuttons at the load conveyors shall activate the transport conveyors in a sequenced order starting from the downstream end. However, the load conveyors and the conveyor immediately downstream of the security door shall start immediately when the security door is fully opened. If bags that are transported on these immediately started conveyors reach the end of the conveyor immediately downstream of the security door and the downstream conveyors have not started yet due to sequenced start-up, the conveyor shall headend and cascade stop the conveyors until the downstream conveyors start. A start photoeye shall activate the start beacon in the make-up area, prior to starting the make-up system. Beacons along the associated conveyor system, in the stripping area, and make-up areas; as required by code, shall also be activated. Baggage system shall also be started by any of the "Jam Reset/Start" pushbuttons on the system provided that the security door has been opened via an associated security access control system reader and the limit switch indicating door fully open has enabled the baggage system activation. Control stations at Ticket Counters shall be spaced no more than fifty feet (50') apart.

(a) A security access card reader/key pad will be furnished and installed by the SACS Contractor, at locations indicated on the baggage system and security system drawings. Refer to “Interface with Security Access Control System - Outbound and Curbside Systems” identified herein for operational requirements.

(b) If security system is not functioning, a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational.

(2) Ticket Counter System Start Downstream of Security Door: Each system shall be able to be started through any “Jam Reset/Start” pushbutton along the system, but shall not start the conveyor at and upstream of the security door, unless the security door is fully open. Any “Jam Reset/Start” pushbuttons shall activate the transport conveyors in a sequenced order starting from the downstream end. A start photoeye shall activate the start beacon in the make-up area, prior to starting the make-up system. Beacons along the associated conveyor system, in the stripping area, and make-up areas; as required by code, shall also be activated.

(3) Ticket Counter System Restart at Load Conveyor: Restarting the system due to stoppage from emergency stop pushbuttons, jam detection shutdowns, or overloads shall be accomplished by accessing a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate the Start-up Warning system sequence prior to the system restarting, as required by code.

(4) Ticket Counter System Stop (Auto): Automatic stopping of each system shall be accomplished through a “last bag” photosensor located at the discharge end of each loading belt as shown on the drawings. Each time the system is started and when a bag interrupts the photosensor beam, the timing logic shall be reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line have reached their destination, the timing logic shall time out and the transport conveyor shall stop and the security door shall close.

(5) Ticket Counter Belt Stop: Provide “Belt Stop” pushbuttons in the control stations at the ticket counter load conveyors. “Belt Stop” pushbuttons when pressed shall immediately stop the conveyors at and upstream of the security door and shall close the security door immediately.

(6) Ticket Counter System Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the lighted maintained contact emergency stop (E STOP) pushbuttons which are to be located adjacent to the belt conveyors. E STOP push-buttons shall be located at a maximum of fifty foot intervals along the conveyors. If a control station containing an E-Stop is more than fifty feet away, an additional E-Stop control station must be provided to comply with this requirement. E Stop pushbuttons shall be provided in every control station containing a Start/Jam Reset push button.

(b) E-Stop Activation Upstream of the Security Door: When an E Stop pushbutton is depressed; the entire associated BHS E-Stop shut down zone shall be stopped, including the security door in that zone. Any upstream belts feeding into the affected E-Stop zone shall cascade stop. When the pushbutton is depressed, the red light shall be illuminated on the actuated emergency stop pushbutton. After clearing the emergency

condition, the E-Stop pushbutton shall be deactivated by pulling the pushbutton out to the deactivated position and then the ticket counter security door in that zone shall close. To restart the system, the Security Access Control System card reader must be accessed and then when access is accepted, the system shall be restarted by pressing any “Start” pushbutton at the ticket counter. The Start-up Warning system shall activate as required prior to the system restarting.

(c) E-Stop Activation Downstream of the Security Door: When an E Stop pushbutton is depressed; the entire BHS E-Stop shut down zone shall be stopped, including the security door, if within the E-Stop zone. Any upstream belts feeding into the affected E-Stop zone shall cascade stop. When the pushbutton is depressed, the red light shall be illuminated on the actuated emergency stop pushbutton. After clearing the emergency condition, the E-Stop pushbutton shall be deactivated by pulling the pushbutton out to the deactivated position and then the ticket counter security door in that zone shall close, if stopped by the E-Stop pushbutton. The system downstream of the security shall be restarted by pressing any “Start/Jam Reset” pushbutton on that system. If the security door is closed, reopening the security door and restarting conveyors upstream of the door requires that the Security Access Control System card reader must be accessed and then when access is accepted, the system shall be restarted by pressing any “Start” pushbutton at the ticket counter. The Start-up Warning system shall activate as required prior to the system restarting.

(7) Ticket Counter System Stop (Fire Emergency):

(a) Furnish and install circuitry, dry contacts or control relays as required for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system; the PLC programming shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located inside the baggage motor control panel. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) Circuitry shall be designed to immediately stop all conveyors on the input side of the security/fire doors, and after a 10 second delay, the conveyors on the discharge side of the security/fire door shall stop and the door shall descend.

(c) System restart shall be accomplished through the system start-up procedure.

b. Curbside Conveyors:

(1) Curbside System Start: Each system shall be started through a START pushbutton in each of the control stations along each loading belt. These START pushbuttons shall be enabled by a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate the beacons and audible warning subsystems along the associated conveyor system and in the make-up areas, as required by code. After a predetermined time delay (adjustable 10 to 60 seconds), the security/fire door shall open, the system shall start, and the visual and audible warning subsystems shall shut off. Once the security door is open and the limit switch indicating door fully open has enabled the baggage system activation, the baggage system shall start. The “Start” pushbuttons at the load

conveyors shall activate the transport conveyors in a sequenced order starting from the downstream end. However, the load conveyors and the conveyor immediately downstream of the security door shall start immediately when the security door is fully opened. If bags that are transported on these immediately started conveyors reach the end of the conveyor immediately downstream of the security door and the downstream conveyors have not started yet due to sequenced start-up, the conveyor shall headend and cascade stop the conveyors until the downstream conveyors start. A start photoeye shall activate the start beacon in the make-up area, prior to starting the make-up system. Beacons along the associated conveyor system, in the stripping area, and make-up areas; as required by code, shall also be activated. Baggage system shall also be started by any of the "Jam Reset/Start" pushbuttons on the system provided that the security door has been opened via an associated security access control system reader and the limit switch indicating door fully open has enabled the baggage system activation.

(a) A security access card reader/key pad will be furnished and installed by the SACS Contractor, at locations indicated on the baggage system and security system drawings. Refer to "Interface with Security Access Control System - Outbound and Curbside Systems" identified herein for operational requirements.

(b) If security system is not functioning, a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational.

(2) Curbside System Restart: Restarting the system due to stoppage from emergency stop pushbuttons, jam detection shutdowns, or overloads shall be accomplished by accessing a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate the Start-up Warning system sequence prior to the system restarting, if required by code. Systems shall not start up under any circumstances without activating the Start-up Warning system sequence, if required by code.

(3) Curbside System Stop (Auto): Automatic stopping of each system shall be accomplished through a "last bag" photosensor located at the discharge end of each loading belt as shown on the drawings. Each time the system is started and when a bag interrupts the photosensor beam, the timing logic shall be reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line have reached their destination, the timing logic shall time out and the transport conveyor shall stop.

(4) Curbside System Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the lighted maintained contact emergency stop (E STOP) pushbuttons which are to be located adjacent to the belt conveyors. E STOP push-buttons shall be located at a maximum of fifty foot intervals along the conveyors. If a control station containing an E-Stop is more than fifty feet away, an additional E-Stop control station must be provided to comply with this requirement. E Stop pushbuttons shall be provided in every control station containing a Start/Jam Reset push button.

(b) E-Stop Activation Upstream of the Security Door: When an E-Stop pushbutton is depressed; the entire associated BHS E-Stop shut down zone shall be stopped, including the security door in that zone. Any

upstream belts feeding into the affected E-Stop zone shall cascade stop. When the pushbutton is depressed, the red light shall be illuminated on the actuated emergency-stop pushbutton. After clearing the emergency condition, the E-Stop pushbutton shall be deactivated by pulling the pushbutton out to the deactivated position and then the curbside security door in that zone shall close. To restart the system, the Security Access Control System card reader must be accessed and then when access is accepted, the system shall be restarted by pressing any "Start" pushbutton at the curbside. The Start-up Warning system shall activate as required prior to the system restarting.

(c) E-Stop Activation Downstream of the Security Door: When an E-Stop pushbutton is depressed; the entire BHS E-Stop shut down zone shall be stopped, including the security door, if within the E-Stop zone. Any upstream belts feeding into the affected E-Stop zone shall cascade stop. When the pushbutton is depressed, the red light shall be illuminated on the actuated emergency-stop pushbutton. After clearing the emergency condition, the E-Stop pushbutton shall be deactivated by pulling the pushbutton out to the deactivated position and then the curbside security door in that zone shall close, if stopped by the E-Stop pushbutton. The system downstream of the security shall be restarted by pressing any "Start/Jam Reset" pushbutton on that system. If the security door is closed, reopening the security door and restarting conveyors upstream of the door requires that the Security Access Control System card reader must be accessed and then when access is accepted, the system shall be restarted by pressing any "Start" pushbutton at the curbside. The Start-up Warning system shall activate as required prior to the system restarting.

(5) Curbside System Stop (Fire Emergency):

(a) Furnish and install circuitry, dry contacts or control relays as required for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system; the PLC programming shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located inside the baggage motor control panel. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) Circuitry shall be designed to immediately stop all conveyors on the input side of the security/fire doors, and after a 10 second delay, the conveyors on the discharge side of the security/fire door shall stop and the door shall descend.

(c) System restart shall be accomplished through the system start up procedure.

c. Checked Baggage Inspection System (CBIS):

(1) All originating bags shall be screened and only cleared bags shall be sent to the outbound make-up devices for transport to the aircraft. Transfer bags will be screened at the point of origin and will not be input into this system, unless noted otherwise. A pre-screening transfer input shall be provided for situations where transfer bags require screening.

(2) Oversize Baggage: If an outbound bag is larger than dimensions allowed for conveyance on standard conveyor, the bag is deemed an "Oversize" bag and shall be delivered to the Outbound Oversize Baggage check-in counter, and

sent directly to the Oversize Baggage Screening Room for inspection. The maximum dimensions of bags allowed through standard and oversize conveyors shall be determined in discussion with SDCRAA Stakeholders. Checked baggage exceeding maximum oversize dimensions shall be deemed "non-conveyable" and delivered manually to TSA screening and on to airside baggage handlers by routes to be defined by the Contractor and approved by TSA and SDCRAA.

(3) EDS Out-of-Gauge (OOG): Bags traveling on standard conveyors that exceed maximum dimensions allowed in the EDS shall be detected by a Bag Dimensioning Array (BMA) upstream of the EDS lines and diverted to an OOG line for delivery to the Alarm line entering the Checked Baggage Resolution Area (CBRA). The maximum dimensions of bags allowed through the EDS units shall be determined in discussion with TSA and SDCRAA Stakeholders.

(4) Level 1 EDS Machine: The EDS unit shall process the bag and the status of the bag (Cleared, Alarmed, or EDS Unknown) provided by the EDS shall be tied to the unique bag ID and the information shall be sent to a database in the baggage Supervisory Control System. Bags that have been processed by Level 1 EDS shall be routed by the baggage system as follows:

(a) Cleared Bags: Bags that are "Cleared" by the Level 1 EDS unit shall be allowed at the OSR Decision Point to continue on to the Clear Bag Insertion Point conveyor for transportation to the make-up device.

(b) Alarmed Bags: Bags that are "Alarmed" by the Level 1 EDS unit shall be directed to stop at the Alarmed Bag Removal Point conveyor, unless cleared by OSR while in route.

(c) Unknown Bags: Bags that are identified as "EDS Unknown" by the Level 1 EDS unit shall be directed to stop at the Alarmed Bag Removal Point conveyor for review in CBRA.

(5) Level 2 Remote On-Screen Resolution (OSR): Level 2 On-Screen Resolution Monitoring will be performed at the Remote Resolution Station which allows monitoring of suspect bag images only from the Level 1 EDS unit on the same conveyor line. System shall allow at least 45 seconds of travel time for Level 2 On-Screen Resolution review of the suspect bag flow coming out of the Level 1 EDS units before it reaches the Level 2 OSR Decision Point. Remote Resolution Station equipment will be provided by the TSA. Remote Resolution Station equipment will be located at the Baggage Inspection Table. When the On-Screen Resolution is complete, the status of the bag along with the associated unique ID number will be sent to the baggage system Supervisory Control System for updating the BHS/EDS Database.

(6) Level 3 Checked Baggage Resolution Area (CBRA): Bags that remain alarmed after Level 2 On-Screen Resolution Monitoring shall be directed to stop at the Baggage Removal Point (BRP) on the conveyor line. When a bag stops at the Baggage Removal Point, the associated Bag Status Display shall display the appropriate status information for that bag. When a bag is to be moved from a BRP, to a Baggage Inspection Table (BIT), the user shall access the associated Bag Status Display at the BRP to send the bag's status information to the Bag Status Display at the intended BIT. Once the bag has been moved to the BIT and the EDS Secondary Viewing Station (SVS) is ready to receive an image, the user shall request the image for the SVS by accessing the BSD at the BIT and pressing "Send BAIT" on the touch screen display. This shall transfer the bag's ID to the EDS interface to request the bag's image to be displayed at the associated SVS.

(a) Bag Status Display at the Baggage Removal Point (BRP):

((1)) Displays shall be set up in accordance with the applicable PGDS (PGDS v6 or later).

(b) Bag Status Display at the Baggage Inspection Table (BIT):

((1)) Displays shall be set up in accordance with the applicable PGDS (PGDS v6 or later).

(7) Contractor shall obtain a copy of the Installation and Integration Manuals from the EDS vendor for the EDS units provided by TSA.

(8) CBIS/CBRA Start: Each system shall be able to be started through any "Jam Reset/Start" pushbutton along the system, but shall not start the conveyor at and upstream of any security door, unless the security door is fully open. Any "Jam Reset/Start" pushbuttons shall activate the transport conveyors in a sequenced order starting from the downstream end. A start photoeye shall activate the Start-up Warning systems along the associated conveyor system and in the make-up area prior to starting the system.

(9) CBIS/CBRA Restart: Restarting the system due to stoppage from E-Stop pushbuttons shall be done by pressing any "Jam Reset/Start" pushbutton along the system after the activated E-Stop pushbutton has been reset. Restarting the system due to stoppage from time out shall be done by pressing any "Jam Reset/Start" pushbutton along the system. Restarting the system due to stoppage from a jam condition shall be done by pressing a "Jam Reset/Start" pushbutton at the jam condition, at the next upstream "Jam Reset/Start" control station, or at the next downstream "Jam Reset/Start" control station in that system after the jam condition has been cleared. Restarting the system due to stoppage from circuit breaker trips, overloads, or other system faults shall be done by pressing the "Start" pushbutton on the motor control panel. Restarting the system shall activate the Start-up Warning system sequence prior to the system restarting. Systems shall not start up under any circumstances without activating the Start-up Warning system sequence.

(10) CBIS/CBRA Stop (Auto): Automatic stopping of each system shall be accomplished through a "last bag" photosensor located at the upstream end of the system. Each time the system is started and when a bag interrupts the photosensor beam, the timing logic shall be reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line have reached their destination, the timing logic shall time out and the transport conveyor shall stop.

(11) CBIS Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the lighted maintained-contact emergency-stop (E-Stop) pushbuttons which are to be located adjacent to the belt conveyors. E-Stop pushbuttons shall be located at a maximum of fifty foot intervals along the conveyors. If a control station containing an E-Stop is more than fifty feet away, an additional E-Stop control station must be provided to comply with this requirement. E-Stop push buttons shall be provided in every control station containing a "Jam Reset/Start" pushbutton. Zoning of E-Stop shut down shall be as identified herein.

(b) When an E-Stop button is depressed, the entire shut down zone as identified herein shall be stopped, including all upstream belts feeding the affected section. When the button is depressed, the red light shall be illuminated on the actuated emergency-stop push-button. After clearing the emergency, the system may be restarted by resetting the actuated

emergency pushbutton and then pressing any “Jam Reset/Start” pushbutton on that system. The Start-up Warning system shall activate as required prior to the system restarting, as described herein.

(12) CBIS Stop (Fire Emergency):

(a) Furnish and install circuitry, dry contacts or control relays as required for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system; the PLC programming shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located inside the baggage motor control panel. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) System restart shall be accomplished through the system start-up procedure.

(13) In the CBRA, the operation will follow applicable PGDS (PGDS v6 or later) requirements utilizing Baggage Removal Point - Baggage System Displays (BRP-BSD) and Baggage Inspection Table - Baggage System Displays (BIT-BSD) to properly transfer baggage information to and from the three independent EDS units.

(14) Fail safe operation conveyor shall to be provided immediately downstream of the Alarmed Bag Removal Point conveyor. If a suspect bag or an unknown bag is seen on the Fail Safe conveyor immediately after the Alarmed Bag Removal Point conveyor, the fail-safe shall be activated, stopping the Fail Safe conveyor and the Clear Bag Insertion Point conveyor, requiring manual intervention and not allowing the bag or bags to be transported to the make-up device. The bag or bags shall be moved to one of the Baggage Inspection Tables in the CBRA.

(15) Image Quality Test Mode: Each of the EDS conveyor lines (SS#) shall be programmed to operate in an Image Quality Test Mode which shall be activated by a selector switch in the control station at the EDS entrance queue conveyor on the load side of the conveyor. When the selector switch is placed in the “IQ Test” position, the EDS entrance and EDS exit conveyors shall stop. The Image Quality Test Bag will be placed on the EDS entrance queue conveyor and the “Insert Test Bag” pushbutton in the control station at the EDS exit queue conveyor on the load side of the conveyor shall be pressed to transport the test bag into the EDS unit and when processed, the test bag shall be fed onto the EDS exit queue conveyor and stop when it breaks the photoeye beam at the downstream end of the EDS exit queue conveyor. When the test bag is manually removed from the EDS exit queue conveyor, an “Exit Reset” pushbutton shall be pressed to reset the operation. This shall allow the Image Quality Test Bag to be re-run or allow the subsystem to be taken out of Image Quality Test Mode. When IQ Testing is complete, the “IQ Test” selector switch shall be switched to the “Auto” position, which shall set the subsystem to automatic operation allowing bags to continue to be screened. Image Quality Test Mode shall functionally stop the normal flow of bags into the EDS without losing track of bags that are already in the system.

(16) A Baggage Reinsertion Line shall be provided, downstream of the end of the Alarm bag line in the CBRA. Contractor shall provide a lift-up gravity roller bed or similar technology approved for this installation by TSA, which can be lowered to convey bags to be reinserted for rescreening at Level 1 (EDS). This link between Alarm and Reinsert lines bridges across the entrance into the

CBRA workspace, and shall provide 4'-0" clear walking passage when raised. When bags arrive in CBRA with an EDS faulted condition and no image associated with the bag, the Restart conveyor can be started and the gravity roller bed can be lowered to manually transfer such bags onto the Reinsert line for delivery upstream of the EDS matrix. Alternate technology to provide the same functionality may be proposed in lieu of the lift-up gravity roller bed for approval of TSA and SDCRAA Stakeholders.

(17) Bags that are Out-of-Gauge (OOG) for the EDS units shall bypass the EDS lines based on detection by the BMA and be tracked to CBRA as OOG bags for manual screening, as they must be screened manually and may not be reinserted to Level 1 screening.

(18) Oversize bags will be sent from the Ticket Lobby on Oversize conveyor lines that deliver bags to an Oversize Screening Room on Level 1 for manual TSA screening. Baggage cleared at screening tables shall be transferred to a cleared bag line that shall deliver bags to a 20'-0" minimum indexing make-up belt for pick-up by baggage handlers. Configuration of the Oversize Screening Room and Oversize make-up shall be determined in discussions with, and with approval of TSA and SDCRAA.

(19) Baggage that exceeds maximum Oversize Baggage dimensions shall be deemed Non-Conveyable, along with items that are not placed on conveyors by policy (animals in kennels, etc.). Contractor shall determine routes for manual transfer (portering) of Non-Conveyable items to TSA screening and location for pick-up by baggage handlers. If screening of Non-Conveyables is conducted at the Oversize Screening Room, layout of that space will include designating locations for delivery of items to be screened and those that have been cleared. Routes and locations for screening and cleared item pick-up shall be determined in discussions with, and with approval of TSA and SDCRAA.

d. Cleared Conveyors (including Indexing Make-up Belt):

(1) Cleared Conveyors Start: The Cleared Conveyors (including Indexing Make-up Belt) shall be started through any "Jam Reset/Start" pushbutton along the Indexing Make-up Belt, but shall not start the conveyor at and upstream of any security door, unless the security door is fully open. Any "Jam Reset/Start" pushbuttons shall activate the Cleared Conveyors (including Indexing Make-up Belt). A start photoeye shall activate the Start-up Warning systems along the associated conveyor system and in the make-up area prior to starting the system.

(2) Cleared Conveyors Restart: Restarting the system due to stoppage from E-Stop pushbuttons shall be done by pressing any "Jam Reset/Start" pushbutton along the system after the activated E-Stop pushbutton has been reset. Restarting the system due to stoppage from time out shall be done by pressing any "Jam Reset/Start" pushbutton along the system. Restarting the system due to stoppage from a jam condition shall be done by pressing a "Jam Reset/Start" pushbutton at the jam condition, at the next upstream "Jam Reset/Start" control station, or at the next downstream "Jam Reset/Start" control station in that system after the jam condition has been cleared. Restarting the system due to stoppage from circuit breaker trips, overloads, or other system faults shall be done by pressing the "Start" pushbutton on the motor control panel. Restarting the system shall activate the Start-up Warning system sequence prior to the system restarting. Systems shall not start up under any circumstances without activating the Start-up Warning system sequence.

(3) Cleared Conveyors Stop (Auto): Automatic stopping of each system shall be accomplished through a “last bag” photosensor located at the upstream end of the system. Each time the system is started and when a bag interrupts the photosensor beam, the timing logic shall be reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line have reached their destination, the timing logic shall time out and the transport conveyor shall stop.

(4) Cleared Conveyors Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the lighted maintained contact emergency stop (E Stop) pushbuttons which are to be located adjacent to the belt conveyors. E Stop pushbuttons shall be located at a maximum of fifty foot intervals along the conveyors. If a control station containing an E-Stop is more than fifty feet away, an additional E-Stop control station must be provided to comply with this requirement. E Stop push buttons shall be provided in every control station containing a “Jam Reset/Start” pushbutton. Zoning of E-Stop shut down shall be as identified herein.

(b) When an E Stop button is depressed, the entire shut down zone as identified herein shall be stopped, including all upstream belts feeding the affected section. When the button is depressed, the red light shall be illuminated on the actuated emergency stop push button. After clearing the emergency, the system may be restarted by resetting the actuated emergency pushbutton and then pressing any “Jam Reset/Start” pushbutton on that system. The Start-up Warning system shall activate as required prior to the system restarting, as described herein.

(5) Cleared Conveyors Stop (Fire Emergency):

(a) Furnish and install circuitry, dry contacts or control relays as required for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system; the PLC programming shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located inside the baggage motor control panel. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) System restart shall be accomplished through the system start up procedure.

e. Transfer Conveyors:

(1) Transfer System Start at Load Conveyor: Each system shall be started through a START pushbutton in each of the control stations along each loading belt. Pushing the START pushbutton shall activate the beacons and audible warning subsystems along the associated conveyor system and in the make-up areas, as required by code. After a predetermined time delay (adjustable 10 to 60 seconds), the system shall start, and the visual and audible warning subsystems shall shut off. The “Start” pushbuttons at the load conveyors shall activate the transport conveyors in a sequenced order starting from the downstream end. A start photoeye shall activate the start beacon in the make-up area, prior to starting the make-up system. Beacons along the associated conveyor system, in the stripping area, and make-up areas; as required by code, shall also be activated. Baggage system shall also be started by any of the “Jam Reset/Start” pushbuttons on the system provided that the security door has been opened via an associated security access control system reader and

the limit switch indicating door fully open has enabled the baggage system activation.

(2) Transfer System Restart at Load Conveyor: Restarting the system due to stoppage from emergency stop pushbuttons, jam detection shutdowns, or overloads shall activate the Start-up Warning system sequence prior to the system restarting, as required by code.

(3) Transfer System Stop (Auto): Automatic stopping of each system shall be accomplished through a “last bag” photosensor located at the discharge end of each loading belt as shown on the drawings. Each time the system is started and when a bag interrupts the photosensor beam, the timing logic shall be reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line have reached their destination, the timing logic shall time out and the transport conveyor shall stop and the security door shall close.

(4) Transfer Belt Stop: Provide “Belt Stop” pushbuttons in the control stations at the ticket counter load conveyors. “Belt Stop” pushbuttons when pressed shall immediately stop the conveyors at and upstream of the security door and shall close the security door immediately.

(5) Transfer System Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the lighted maintained-contact emergency-stop (E-STOP) buttons which are to be located adjacent to the belt conveyors. E-Stop pushbuttons shall be provided in every control station containing a Start/Jam Reset push button.

(b) When an E-Stop button is depressed, the entire shut down zone as identified herein shall be stopped, including all upstream belts feeding the affected section. When the button is depressed, the red light shall be illuminated on the actuated emergency-stop pushbutton. After clearing the emergency, the system may be restarted by resetting the actuated emergency pushbutton and then pressing any “Start/Jam Reset” pushbutton on that system or by pressing the “Start” pushbutton at the ticket counter. The Start-up Warning system shall activate as required prior to the system restarting.

(6) Transfer System Stop (Fire Emergency):

(a) Furnish and install circuitry, dry contacts or control relays as required for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system; the PLC programming shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located inside the baggage motor control panel. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) Circuitry shall be designed to immediately stop all conveyors on the input side of the security/fire doors, and after a 10 second delay, the conveyors on the discharge side of the security/fire door shall stop and the door shall descend.

(c) System restart shall be accomplished through the system start-up procedure.

2. Inbound Baggage Systems:
   a. Claim System:
      (1) System Start: Each system is started through a START pushbutton in each of the control stations at the load conveyor in the bag stripping areas. This START pushbutton shall be enabled by a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate a beacon on a box sign, which shall be provided by the BHS Contractor, and audible warning chimes inside the baggage claim device as specified herein. Beacons and audible warning subsystems along the associated conveyor system and in the stripping area, as indicated on the drawings, shall also be activated. After a predetermined time delay (adjustable 10 to 60 seconds), the security/fire door shall open, the system shall start, and the visual and audible warning subsystems shall shut off.
         (a) A security access card reader/key pad will be furnished and installed by the SACS Contractor, at locations indicated on the baggage system and security system drawings. Refer to “Interface with Security Access Control System - Inbound Systems” identified herein for operational requirements.
         (b) If security system is not functioning, a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational.
      (2) System Restart: Restarting the system due to stoppage from emergency - stop pushbuttons, jam detection shutdowns or overloads shall activate the Startup Warning system sequence prior to the system restarting. Systems shall not start up under any circumstances without activating the Startup Warning system sequence.
      (3) System Stop (Auto):
         (a) Automatic stopping of each system shall be accomplished through a LAST BAG photosensor located at the discharge end of each loading belt. Each time the system is started and when a bag interrupts the photosensor beam, a timing device is reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line has reached the baggage claim device (adjustable 0.5 - 15 minutes), the timing device shall time out, and all belt conveyors in the system shall stop, and the security/fire door shall descend. For the security system interface, an additional timer (adjustable 10 to 60 seconds) shall be activated once the LAST BAG timer has timed out. This timer shall be set to allow enough time for the security/fire door(s) to close after the conveyor system has shut down. When this timer times out, a pulse shall be sent to the Security Access Control System to deactivate the security shunt. Coordinate interface requirements and installation with Security Access Control System supplier and installer.
         (b) The claim device shall also be controlled by a timer activated by the LAST BAG photosensor. Once this photosensor has been interrupted, a timing device shall be activated which shall start the claim device after sufficient time for baggage to reach the device. The device shall start up ten seconds prior to baggage delivery. When the last bag has been detected by the photosensor, a timing device (adjustable up to 45 minutes), shall control the running time of the claim device.

(4) System Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the maintained contact emergency stop (E STOP) pushbuttons that are to be located on the claim device or adjacent to the belt conveyors. E STOP stations shall be located at a maximum of fifty-foot intervals along the conveyors.

(b) When an E STOP pushbutton is depressed, the entire respective system shall be stopped, including all upstream belts feeding the affected section. When the button is depressed, a red light shall be illuminated on all associated emergency stop pushbuttons and the actuated emergency stop pushbutton shall flash. After clearing the emergency, the system may be restarted by resetting the actuated E STOP pushbutton. The system may only be restarted from the station containing the activated emergency stop pushbutton and shall activate the Startup Warning system sequence prior to the system restarting, as described herein.

(c) The security/fire door shall remain open when the system stops due to emergency stop, jam or overload detection.

(5) System Stop (Fire Emergency):

(a) Furnish and install circuitry and dry contacts as specified herein for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system, which shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located where shown on the contract drawings. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) Circuitry shall be designed to immediately stop the claim device and the doors shall descend.

(c) System restart shall be accomplished through the system start up procedure.

b. Oversize Claim System:

(1) System Start: Each system is started through a START pushbutton in each of the control stations at the load conveyor in the bag stripping areas. This START pushbutton shall be enabled by a security access card reader/key pad, furnished and installed by the Security Access Control System (SACS) Contractor. Once the activation of the baggage system has been approved, pushing the START pushbutton shall activate a beacon on a box sign, which shall be provided by the BHS Contractor, and audible warning chimes inside the baggage claim device as specified herein. Beacons and audible warning subsystems along the associated conveyor system and in the stripping area, as indicated on the drawings, shall also be activated. After a predetermined time delay (adjustable 10 to 60 seconds), the security/fire door shall open, the system shall start, and the visual and audible warning subsystems shall shut off.

(a) A security access card reader/key pad will be furnished and installed by the SACS Contractor, at locations indicated on the baggage system and security system drawings. Refer to “Interface with Security Access Control System - Inbound Systems” identified herein for operational requirements.

(b) If security system is not functioning, a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational.

(2) System Restart: Restarting the system due to stoppage from emergency - stop pushbuttons, jam detection shutdowns or overloads shall activate the Startup Warning system sequence prior to the system restarting. Systems shall not start up under any circumstances without activating the Startup Warning system sequence.

(3) System Stop (Auto):

(a) Automatic stopping of each system shall be accomplished through a LAST BAG photosensor located at the discharge end of each loading belt. Each time the system is started and when a bag interrupts the photosensor beam, a timing device is reset. After a time interval sufficient to ensure that all bags in transit on the conveyor line has reached the baggage claim device (adjustable 0.5 - 15 minutes), the timing device shall time out, and all belt conveyors in the system shall stop, and the security/fire door shall descend. For the security system interface, an additional timer (adjustable 10 to 60 seconds) shall be activated once the LAST BAG timer has timed out. This timer shall be set to allow enough time for the security/fire door(s) to close after the conveyor system has shut down. When this timer times out, a pulse shall be sent to the Security Access Control System to deactivate the security shunt. Coordinate interface requirements and installation with Security Access Control System supplier and installer.

(b) The claim device shall be a 20'-0" minimum length indexing display conveyor controlled to advance the belt only with the arrival of each new item at the display. If the belt fills a blocks a photoeye at its downstream end, the upstream belts will cascade stop until bags on the display are removed, clearing the belt full photoeye.

(4) System Stop (Emergency):

(a) Each system may be stopped anytime during the normal operation by depressing one of the maintained contact emergency stop (E STOP) pushbuttons that are to be located on the claim device or adjacent to the belt conveyors. E STOP stations shall be located at a maximum of fifty-foot intervals along the conveyors.

(b) When an E STOP pushbutton is depressed, the entire respective system shall be stopped, including all upstream belts feeding the affected section. When the button is depressed, a red light shall be illuminated on all associated emergency stop pushbuttons and the actuated emergency stop pushbutton shall flash. After clearing the emergency, the system may be restarted by resetting the actuated E STOP pushbutton. The system may only be restarted from the station containing the activated emergency stop pushbutton and shall activate the Startup Warning system sequence prior to the system restarting, as described herein.

(c) The security/fire door shall remain open when the system stops due to emergency stop, jam or overload detection.

(5) System Stop (Fire Emergency):

(a) Furnish and install circuitry and dry contacts as specified herein for interface with the Fire Detection System, furnished and installed within this contract. In the event of a fire, a signal shall be sent to the baggage system from the fire detection system, which shall stop all conveyors and claim devices. Dry contacts for Fire Detection System interface shall be located where shown on the contract drawings. Coordinate interface requirements with the Fire Detection System supplier and installer.

(b) Circuitry shall be designed to immediately stop the claim device and the doors shall descend.

(c) System restart shall be accomplished through the system start up procedure.

F. Mechanical Design:

1. General:

a. The Baggage System Contractor shall be responsible for the detail design, fabrication, and installation of the systems to satisfy the requirements herein.

b. The drawings depict certain dimensional constraints necessary for coordination with the building structure and for design preference. Otherwise, the physical arrangement shall be left to the discretion of the designer. Verify all given dimensions and to obtain all other required dimensions from actual field measurements. Actual lengths and quantities of conveyor sections and system engineering shall be the responsibility of the designer/manufacturer in accordance with good design practice for airport baggage handling systems.

2. Baggage Characteristics (Contractor shall be responsible to confirm the following criteria with SDCRAA):

a. The equipment for standard bags shall be capable of conveying baggage of various sizes and shapes with dimensions not to exceed 34” high or 34” wide. Lengths of baggage, in general, shall not exceed 54”. Baggage larger than 34” high, 34” wide, or 54” long shall be considered oversize baggage and not placed into the baggage system. Bags that are 54” long shall not be wider than 24” and bags that are 34” wide shall not be longer than 31” to fit through power turns and diverters.

b. The minimum size of bags to be conveyed on the conveyors is 4 inches in height by 12 inches in width by 12 inches in length. Any bag smaller in any dimension than this minimum size must be placed in a tub. Bags that are less than 15 pounds shall be placed in tubs.

c. The maximum weight per piece of luggage shall be assumed to be 120 lbs.

d. Baggage with sharp protrusions, hooks or loose straps will be conveyed in special carriers (standard tubs) provided by BHS Contractor, in this Contract. Submit proposed size of tubs for review and approval by SDCRAA. Provide a minimum of 700 tubs.

3. Conveyor Clearances and Configuration:

a. Conveyor Clearances:

(1) All conveyor lines shall be engineered and installed to have a minimum of 36" baggage clearance for standard size bags, unless noted otherwise on drawings.

b. Maximum Angles:

(1) Standard Size Conveyor Angles:

(a) For conveyor transporting standard sized baggage, the maximum angles of inclines and declines shall not exceed 18 degrees from the horizontal for non-bag tracking conveyors and 12 degrees from horizontal for bag tracking conveyors, unless noted otherwise on baggage system contract drawings. In some locations, angles greater than 18 degrees may be required and at these locations noted on the drawings, the slope shall not exceed the angle noted on the contract drawings and special belting is required as identified herein. If conveyor angles are required to be greater than 18 degrees and are not noted on the Baggage System Contract Drawings as being greater than 18 degrees, the Baggage System Contractor shall submit a request for information identifying the location(s) with detailed drawing information

explaining the conditions to the Owner's representative for review of the situation.

(2) Spiral Turns (Bag Tracking) Angles:

(a) For Spiral Turns utilizing Bag Tracking, the elevation change of the spiral turn shall not exceed 24" in 90 degrees (4" per 15 degrees of rotation), unless noted otherwise on baggage system contract drawings. If Spiral Turn angles are required to be greater than 24" in 90 degrees and are not noted on the Baggage System Contract Drawings as being greater than 24" in 90 degrees, the Baggage System Contractor shall submit a request for information identifying the location(s) with detailed drawing information explaining the conditions to the Owner's representative for review of the situation.

(3) Spiral Turns (Non-Bag Tracking) Angles:

(a) For all other Spiral Turns, the elevation change of the spiral turn shall not exceed 30" in 90 degrees (1" per 3 degrees of rotation), unless noted otherwise on the baggage system contract drawings. If Spiral Turn angles are required to be greater than 30" in 90 degrees (non-bag tracking) and are not noted on the Baggage System Contract Drawings as being greater than 30" in 90 degrees, the Baggage System Contractor shall submit a request for information identifying the location(s) with detailed drawing information explaining the conditions to the Owner's representative for review of the situation.

(4) Flat and Spiral Turns on Oversize Conveyor Lines:

(a) 90 degree turns shall not be allowed in Oversize conveyors, unless they occur in a location that is immediately accessible in a staffed area, and with acceptance and approval of SDCRAA Stakeholders. Contractor may propose exceptions with wider between-guard measurements at turns, and tapered transitions designed to accommodate the largest Oversize items, subject to approval of SDCRAA.

(b) In lieu of 90 degree turns, Contractor's design shall utilize 45 degree turns separated by straight conveyor sections, or other angles up to 60 degrees. Contractor shall demonstrate that configuration proposed will accommodate largest Oversize items, subject to approval of SDCRAA.

(c) For Oversize Spiral Turns, the elevation change of the spiral turn shall not exceed 9" in 45 degrees (1" per 5 degrees of rotation), or equivalent elevation change for other sized spirals (6" elevation change in 30 degrees, maximum 12" elevation change in 60 degrees, etc.).

4. Conveyor Speeds:

a. Belt speeds shown on the drawings or schedules are intended to be a general guide. Input conveyor speeds shall be approximately 90 feet per minute and the speed of each downstream section shall be incrementally increased as appropriate for the installation to promote the successful transfer of bags from section to section. The speed of conveyors discharging bags to claim devices shall be as recommended by the claim device manufacturer. Actual belt speeds shall be determined by the supplier in accordance with good design practice for airport baggage handling systems. Baggage System Contractor shall design the systems to minimize the number of different horsepower ratings and size of reducers to maximize use of spare parts.

5. Conveyor Load Carrying Capacity:
    a. Live load is to be 40 lbs. per lineal foot at 90 fpm loading belts and proportionately less as belt speeds effect bag spacing to a minimum of 25 lbs. per lineal foot. Live load of receiving conveyors after a merge shall include the proportional weight to speed for the receiving conveyor line and the load being transferred from the merge unit. All jog accumulating (indexing), load, and unload conveyors shall be designed for a live load of 60 lbs. per lineal foot.
6. Quality Assurance:
    a. All materials and components furnished shall be new and free from defects and rust. Used equipment, whether reconditioned or refurbished, shall not be installed for permanent work.
    b. Standardization shall be applied to the greatest extent practicable. Supply equipment of the same type and from the same manufacturer when multiple applications are required.
7. Operating Conditions:
    a. Normal operations shall be considered to be 20 hours per day, 365 days per year. All components shall operate satisfactorily within a temperature range of 20 deg. F to 120 deg. F, with a relative humidity of 0 to 100 percent. In spaces subject to exterior environmental conditions, all components shall operate satisfactorily within a temperature range of -30 deg. F to 120 deg. F, with a relative humidity of 0 to 100 percent.
8. Maintainability:
    a. Equipment components requiring inspection and servicing shall be readily accessible. Suitable doors or removable enclosures in the building shall be furnished and installed within this contract for this purpose. On the conveyor, access holes in frames or guards are acceptable but shall be held to a minimum number and size, and shall not create protrusions or discontinuities detrimental to the baggage being conveyed or produce a safety hazard.
    b. Components shall be easily disconnected and removed from the equipment without the necessity for extensive disassembly. Components other than power turns, spiral turns, merges, and full conveyor sections shall be designed for removal and replacement by two maintenance workers in a period not to exceed two hours. All components shall allow scheduled routine maintenance to be performed by two maintenance workers in a period not to exceed two hours.
    c. Conveyors shall be designed so that no scheduled preventive maintenance task requires more than two hours of full system or subsystem shutdown, three hours of reduced system operation or any combination of both in excess of three hours. Greasing bearings or other similar preventative maintenance tasks shall not require more than 15 minutes, maximum, to access the component. Provide remote grease ports and grease port manifolds in accordance with the requirements identified herein at the locations identified herein and as necessary to comply with preventative maintenance requirements stated herein.
    d. All components and assemblies (i.e., rollers, pulleys, drive units, etc.) shall be designed for easy disconnection and removal from the conveyor system without the necessity for extensive disassembly or repositioning of the conveyor system.
9. Motors and Efficiency:
    a. Motors shall be in accordance with the requirements of the Energy Policy Act (EPAct) and Energy Independent and Security Act (EISA) efficiency standards. Motors shall be by one manufacturer throughout this Work, unless motors are part of a pre-assembled specialty piece of equipment that is purchased as a complete unit, such

as Vertical Sorters. Motors for standard conveyors, recirculating devices, etc. are not to be construed as pre-assembled specialty pieces of equipment.

10. Brake Motors:
    a. Provide brake motors on all declines and other conveyors where bag coasting must be controlled and clutch/brakes are not provided, especially where bag tracking is required and immediately upstream of a queuing or indexing operation. Brake motor locations shall be submitted for review and acceptance. Brake motors used on bag tracking conveyors shall be evaluated for travel distance after initial braking due to power generation from the motor that can keep the brake energized. Brakes may need to be wired separately from motor.
11. Clutch/Brakes:
    a. Provide clutch/brakes on all queue, indexing conveyors, and bag tracking conveyors; except where variable frequency drives are provided. Clutch/brake locations shall be submitted for review and acceptance.
12. Variable Frequency Drives:
    a. Provide variable frequency drives (VFDs) on all queuing and spacing conveyors, and on all merge conveyors. VFDs shall be located on or adjacent to the conveyor it is associated with, but it shall not impact the operation or maintenance access. VFD locations shall be submitted for review and acceptance.
13. Drive Horsepower:
    a. Size conveyor drives so that starts can be made under full load conditions. Contractor shall identify horsepower requirements for each conveyor drive.
14. Belt Conveyor:
    a. Select all supports to minimize noise and vibration. Securely fasten each floor or overhead support to the ceiling overhead beams or the floor by methods approved by the Owner's representative.
    b. Smooth, flush butt joints shall be provided.
    c. It shall be the Contractor's responsibility to coordinate the design of the conveyors and its appurtenances with all attachments thereto including but not necessarily limited to new catwalks, catwalk access, conveyor electrical systems, and adjacent devices installed under this contract.
    d. Finger guards shall be provided on all conveyors that are in tenant work areas, accessible to tenant personnel; in public areas, and accessible to the public.
    e. Provide skirting on all load and unload conveyors in all tenant staffed areas and other areas as shown on the baggage system drawings. Skirting shall cover all rotating components. Provide flared sideguard(s) on adjacent downstream conveyor. Skirting is not required where guardrail is provided adjacent to the conveyor.
15. Stairs and Platform Crossovers:
    a. Stairs shall be in compliance with OSHA requirements and shall have non-slip walking surfaces. Platforms shall be constructed of metal grating or channel system capable of supporting maintenance personnel with tools (50 pounds per square foot, maximum). All walk surfaces shall have non-slip surfaces. Hinged safety gates shall be provided at any ladder where the vertical drop is 6'-0" or more; or where there is a potential hazard of maintenance staff backing into a declining ladder while working on a drive assembly, working at a bag jam point, working on other maintenance points along the conveyor, etc. Refer to the submittal requirements herein.

16. Ladders:
    a. Ladders shall be ship ladder type wherever possible. Ladders shall be rated for 300 pounds. Wherever ship ladders are not possible and vertical ladders are necessary, the locations shall be identified and submitted for review and approval. Ship and vertical ladders shall have a hinged safety gate at the top of the ladder and shall swing toward the catwalk side of the access. Hinged safety gates shall be provided at any ladder where the vertical drop is 6'-0" or more; or where there is a potential hazard of maintenance staff backing into a declining ladder while working on a drive assembly, working at a bag jam point, working on other maintenance points along the conveyor, etc. Refer to the submittal requirements herein.
17. Vibration:
    a. The conveyor equipment shall not produce or induce objectionable vibrations into the building structure. Vibration levels induced by the system and its components shall be minimized to the greatest extent possible by installation of vibration isolation devices as identified herein. In no situation shall vibration be injurious to the system or the building structure or be harmful or annoying to passengers and employees.
    b. Furnish and install vibration isolation devices or techniques on suspended and floor supported conveyor systems to meet this requirement. Devices shall be as specified herein.
18. Noise:
    a. The conveyor equipment shall not generate noise which would be annoying or harmful to passengers and/or employees in public and operations areas. Noise requirements defined herein are based upon measurements indicating an ambient noise level of 50 dB in public areas, and 60 dB in non-public areas. The baggage handling system equipment shall not increase the ambient noise level more than 15 dB. The total noise levels shall not exceed 70 dB above the frequency of 4000 CPS or below 100 CPS (a harmonic condition could occur that would result in a cumulative noise level, due to the physical installation of other equipment in the area).
    b. Test Conditions shall be as follows:
        (1) The baggage handling system equipment shall be turned off.
        (2) All other equipment (i.e., HVAC equipment) shall be on and outside noise sources shall be normal, including aircraft and mobile ground equipment operating.
        (3) Noise level readings shall be taken throughout a zone five feet above the floor using a standard ASA sound level meter set to the "A" weighted network.
        (4) After the ambient noise level has been determined, the baggage handling system equipment shall be turned on and the total noise level shall be measured at the same points throughout the zone that the ambient levels were measured.
19. Conveyor Openings:
    a. Where conveyor penetrates the floor or other walking/ working surfaces, the gap between the equipment and the edge of the opening shall be secured so that no person or tools can fall through the gap. The materials used to secure the gap shall be easily removable.

G. Electrical Design:
1. System Power Provisions:
    a. Source for systems: 480 VAC, 3 phase, 60 Hz power will be furnished and installed by others within the General Building Contract to each motor control panel (MCP). Amperage requirements vary with each system.

b. Conveyor motor control panels and the connection of the feeder to the panel shall be furnished and installed by the Baggage System Contractor. Supply each system from the feeder, furnished and installed by others within the General Building Contract. Provide 120 VAC, single phase and 24 VDC control power required for BHS operation from the 480 VAC power. Show on the shop drawings the electrical power requirements (amperage) at each of the MCP's. Beyond each provided feeder, furnish and install services, feeders, and fused disconnects for branch circuits to each Control Panel as specified and furnish and install panel boxes, wireways, conduits, conductors, transformers, fuses, equipment and materials required to complete the electrical power distribution for the operation of the system. If additional power is required, the Owner or the Owner's representative shall be informed immediately upon discovery.

c. Each system shall be independent and shall be provided with its own Motor Control Panel, unless noted otherwise on the Baggage System Contract Drawings.

d. Radio Interference: Equipment provided or its installation shall not cause interference with communications within the airport or between the airport and aircraft or ground vehicles. Electrical and electronic equipment, including inter-connecting wires and cables shall be designed to operate without malfunction in the presence of normal electromagnetic emissions generated by other equipment installed or used at the airport. The normal airport environments shall include various electrical motors and controls, power tools (including welders), radar, automotive vehicles, communications equipment, etc. Provide isolation transformers and line suppression, if required.

e. Submit a summary of power load requirements for each system to the Owner to verify the feeder size. Refer to submittal requirements.

2. Motor Control Panels:

a. Control panels shall consist of floor mounted code gauge sheet steel painted enclosures with hinged doors with key locks. A main disconnect switch or circuit breaker shall be furnished and installed inside housing with operating handle arranged to open or close with doors of control panels in closed position. Each starter and each control device shall be provided with a nameplate for maintenance purposes.

(1) System Status Indicators:

(a) Each motor control panel face shall include the following pushbuttons, key switches, and indicator lights for the following conditions:

((1)) Illuminated maintained contact push/pull mushroom head Emergency Stop pushbuttons shall be Red.

((2)) "Power On" pushbutton shall be Green.

((3)) "Power Off" pushbutton shall be Red.

((4)) "Lamp Test" pushbutton shall be Black.

((5)) "Bag Counter Reset" keyswitch.

((6)) "Jam Counter Reset" keyswitch.

((7)) Green indicator (one per system controlled) - indicates "Control Power On".

((8)) Red indicator (one per motor control panel) - indicates E STOP pushbutton has been activated.

((9)) Amber indicator (one per motor control panel) - indicates bag jam condition.

((10)) Blue indicator (one per motor control panel) - indicates motor overload trip condition.

((11)) Amber indicator (one per motor control panel) - indicates motor circuit breaker trip condition.

((12)) Orange indicator (one per motor control panel) - indicates fire detection system interface activation.

((13)) Amber indicator (one per motor control panel) - indicates baggage system activation enabling via interface with security access control system.

((14)) Amber indicator (one per motor control panel) - indicates “Hand” and/or “Off” condition for any “Hand-Off-Auto” in the subsystem.

(b) Motor control panel faces shall be provided with a message display indicating fault conditions.

(c) Motor control panel faces shall be provided with an 18” (minimum) square static system map indicating the system configuration, showing the controls locations, and screened facility layout. Map shall be acceptable to the Owner.

3. Special Control Functions:

a. Security/Fire Doors:

(1) Provide connection to limit switches and/or other monitoring devices on security/fire doors and additional contacts, as necessary, for monitoring of door open and door closed positions, and operational status of the door. These contacts shall be used for monitoring purposes by the baggage system and the Security Access Control System.

(2) Provide photosensor at security/fire door to detect presence of baggage. If baggage is detected, the conveyor belt shall advance to deliver the bag. If baggage is still detected, the warning system shall sound. This photosensor shall not function in this manner when the fire detection system interface is activated.

(3) Doors that are strictly fire doors and do not provide a security function, as indicated in the door schedule on the drawings, shall function the same as security doors at all times, except in the event of a fire, when they shall operate as indicated herein in the “Description of Operation” for each type of baggage system. Fire doors shall be provided with fusible links and labeled for the required fire rating by UL or an approved testing laboratory as described herein.

b. Interface with Fire Detection System:

(1) Provide contacts, circuitry, and programming to stop the conveyor systems upon direction from the Fire Detection System. See “Descriptions of Operations” for control sequences. Coordinate with Fire Detection System for interface programming and connection requirements.

c. Interface with Security Access Control System:

(1) Outbound Baggage Systems: A security access card reader/key pad will be furnished and installed by the Security Access Control System Contractor, at each START control station indicated on the baggage system drawings. The card reader/key pad(s) shall enable the START pushbuttons along the load conveyor in the input area. The baggage system or subsystem associated with that security station shall not be activated until the card reader/key pad has been accessed and approved. When access is approved, the system shall be started by pressing the START pushbutton. If security system is not functioning,

a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational. Dry contacts shall be furnished and installed in a junction box at location(s) indicated on the baggage system and security system drawings, for interface with the security system. Provide contacts, circuitry, and programming as specified herein or shown on the drawings for security access control system start up approval, shut down, and security door status. The security door status interface shall be set up to identify when each security door is in its open position while the baggage system is in operation, when each security door is in the closed position and the baggage system is deactivated, when each security door is open but the baggage system is not in operation, and when there is a fault condition with each security door and it is not operating properly. At a minimum, fault conditions of each door and the door open/system deactivated condition shall be sent to the security system for monitoring. Coordinate with Security Access Control System for interface programming and connection requirements.

(2) Inbound Baggage Systems: A security access card reader/key pad will be furnished and installed by the Security Access Control System Contractor, at each START control station indicated on the baggage system drawings. The card reader/key pad(s) shall enable the START pushbuttons along the load conveyor in the bag stripping area. The baggage system or subsystem associated with that security station shall not be activated until the card reader/key pad has been accessed and approved. When access is approved, the system shall be started by pressing the START pushbutton. If security system is not functioning, a jumper in the MCP shall be provided for operation during SACS down time only. Jumper shall not be operational when SACS is operational. Dry contacts shall be furnished and installed in a junction box at location(s) indicated on the baggage system and security system drawings, for interface with the security system. Provide contacts, circuitry, and programming as specified herein or shown on the drawings for security access control system start up approval, shut down, and security door status. The security door status interface shall be set up to identify when each security door is in its open position while the baggage system is in operation, when each security door is in the closed position and the baggage system is deactivated, when each security door is open but the baggage system is not in operation, and when there is a fault condition with each security door and it is not operating properly. At a minimum, fault conditions of each door and the door open/system deactivated condition shall be sent to the security system for monitoring. Coordinate with Security Access Control System for interface programming and connection requirements.

d. Hold In Circuit:

(1) PLC logic shall be designed in the PLC program to ensure that all timers shall stop and not time out whenever a system is stopped, so that no baggage can generate false alarms or become stranded between the load belt and the bag room or claim device. On a jam in the subsystem, it does not make any difference if the subsystem times out. Once the jam is cleared and the Jam Reset PB is pressed to clear the jam, the subsystem shall restart. Therefore, the PLC logic is not an issue for the subsystem with the jam. The issue arises with the upstream subsystems. If there are no bags on the upstream subsystems, those subsystem can be allowed to time out. When the first bag head-end stops on an upstream subsystem because the subsystem is stopped, an auto-start signal should be sent to the subsystem and the upstream subsystems. Timers should reset as long as the head-end condition is active.

Subsystems should be programmed like this and a testing scenario developed, because just testing the jammed subsystem PLC logic is not adequate.

(2) On an E-Stop in the subsystem, if there are no bags head-end stopped on an upstream subsystem or blocking an auto-start photoeye, releasing the E-Stop should not start the subsystem, even if there are bags on the subsystem. Having a subsystem start solely by the resetting of an E-Stop is not allowed. When the first bag head-end stops or blocks an auto-start photoeye on an upstream subsystem because the subsystem is stopped, an auto-start signal should be sent to the subsystem and the upstream subsystems timers should reset as long as the head-end condition is active. Subsystems should be programmed like this and a testing scenario developed, because just testing the E Stopped subsystem PLC logic is not adequate.

(3) General: If someone presses the E-Stop, they are responsible to restart the system, unless there is an auto-start signal from an upstream subsystem. None of the systems shall overcome personnel actions of using an E-Stop.

e. Jam Sensors:

(1) Jam photosensors and associated timers shall be positioned at the discharge end of all conveyors feeding power turns and inclines, except where power turn is located in public view behind check in counters. Jam photosensors and associated timers shall be provided for every two sections of horizontal and decline conveyor, each section of incline conveyor, and discharge end of decline conveyors feeding an adjacent conveyor section of a different slope. If baggage blocks the photosensor for a timed interval exceeding the set point of the timer (adjustable 0-10 seconds), that conveyor plus the adjacent downstream conveyor shall stop and all related upstream conveyors shall stop in a cascade shut down progressing upstream as bags block the photosensor of each section of conveyor. At power turns, spiral turns, queue conveyors, and short conveyors, where applicable, the shutdown operation shall be the same as identified above, except that the conveyor section upstream of the conveyor section shall also stop. Additionally, an alarm shall sound on the associated motor control panel (MCP), and an amber JAM light shall be lit on each associated loading belt pushbutton station, at the appropriate point on the System Status OIT located on the front panel of the affected MCP, and on the Fault Monitoring PC, where provided. The MCP shall have a button for silencing the alarm. Each jam photosensor shall be provided with adjacent amber JAM RESET illuminated pushbutton in the associated control station. After the jam has been cleared, actuation of any JAM RESET pushbutton on the associated system shall turn off all indicator lights and restart the stopped conveyors with the Startup Warning sequence. If the bag jam shut down does not affect the public area, the Startup Warning system shall not be activated in the public area.

(2) Additionally, jam detection circuitry shall only function when the respective conveyor is running; i.e., if a conveyor stops running and, as a result, a bag blocks a jam photosensor, no false jam indication shall be generated.

(3) Photosensors and reflector shall be securely and rigidly installed and located in areas not subject to misalignment by transported baggage bumping the unit.

(4) RESET push-buttons at make-up devices, claim devices, and in staffed areas shall be keyed.

f. Public Accessible Emergency Stop Reset: At all E STOP pushbutton stations located in areas accessible to the public, the reset function shall be key operated in addition to resetting the pushbutton.

g. Control Stations: Provide a control station enclosure at each conveyor section with a bag jam photosensor, mounted on the conveyor frame as required herein. Jam reset, E Stop, and other associated pushbuttons and selector switches shall be installed in these enclosures. Other control stations may be required besides bag jam reset control stations. Along the conveyor sections, size each control station enclosure appropriately for the number of pushbuttons and switches to be installed. E-Stops, jam resets, and other required pushbuttons and switches for each conveyor section shall be grouped together as appropriate, unless noted otherwise on the drawings or herein. Separate control stations may be required for E stops as required herein. Every control station with an E-Stop shall also contain a "Start" or "Jam Reset/Start" pushbutton to restart the system after the E-Stop has been deactivated. Jam Reset control stations shall be located adjacent to the associated jam photosensor, unless the jam photosensor is not easily accessed from the floor, a platform, or catwalk. In this case, the location shall be coordinated with the Owner's representative. Each control station with a "Jam Reset/Start" push-button shall also have an E-Stop and a Jam indicator light. A jam shall only be reset by the closest Jam Reset pushbutton and the next upstream and downstream Jam Reset pushbuttons.

(1) Control Station Illuminated maintained contact push/pull mushroom head Emergency Stop pushbuttons shall be Red.

(2) Control Station Jam Reset/Start pushbuttons shall be Green (keyed in staffed areas).

(3) Control Station Jam indicator lights shall be Amber.

(4) Input Control Station Illuminated maintained contact push/pull mushroom head Emergency Stop pushbuttons shall be Red.

(5) Input Control Station Malfunction/Belt Full indicator lights shall be Amber.

(6) Input Control Station Security Door Not Open/Bag on Belt indicator lights shall be Blue.

(7) Input Control Station Start pushbuttons shall be Green.

(8) Input Control Station Stop pushbuttons shall be Black.

(9) Input Control Station Malfunction indicator lights shall be Amber.

(10) Input Control Station Bag Advance pushbuttons shall be Green.

(11) Input Control Station Bag Dispatch pushbuttons shall be Green.

h. Emergency Stops, Motor Overloads, and Circuit Breakers: E Stops, motor overloads, and circuit breakers shall be zoned for shut down. Zones shall be wired in series. If the Highest priority zone is taken off line (due to e-stop, circuit breaker trip, or overload trip) it shall also take Zones of lesser priority off line that are up-stream. Zones of lesser priority (those upstream) shall not take Zones of Higher priority (those downstream) off line. Description of zones shall be in the Description of Operations submittal. Refer to submittal requirements.

i. E-Stop Zoning: When one or more E-Stops are activated on a subsystem, the E-Stop zone associated with that system will cease to run until the E-Stop(s) have been deactivated and the system has been restarted. Restart after E-Stop deactivation shall be from any JAM RESET/START pushbutton in that subsystem or by Auto Start, whichever occurs first. E-Stop deactivation (mushroom head pulled out) shall place the subsystem in "Ready to Start" mode. E-Stop zoning shall conform to the following conditions:

(1) E-Stops along the system inside the recheck area shall stop all of the conveyors in the recheck area for that system.

(2) E-Stops at a Claim Device shall stop the claim device and the associated security/fire doors.

j. System Start up: System activation from a stopped condition in a staffed area shall activate the startup sequence of the warning system as described herein prior to the systems operating. Systems shall not start up under any circumstances without activating the startup warning system procedures. Start-up warning system shall be in accordance with ANSI B-20.1.

k. Tall Bag Indicator: Tall bags shall be detected by a photosensor mounted on the downstream control station of each inbound stripping belt or out of public view for outbound baggage conveyors where necessary. If bags that are too tall to pass through the system are detected, the belt at the photosensor and all upstream sections shall stop and a local alarm shall sound until silenced by the reset pushbutton. Provide a tall bag reset pushbutton in the nearest control station.

l. Jam Counters: Jam counter shall be programmed for every jam photoeye and a jam counter for the sum of all jam photosensors. Provide a keyed jam counter reset switch on the face of each motor control panel.

m. Belt Tachometers: Provide a digital pulse generator geared to the conveyor shaft of each section of transport and queue conveyors requiring tracking. These tachometers shall be used for tracking bags to the diverters in the system. Tachometers shall interface with PLC system.

n. Timers: All timer functions shall be within the PLC programming, unless required otherwise for the operation or noted on the drawings.

o. Automated Bag Tag Reader Array (ATR) with Radio Frequency Identification (RFID) Tag System: Provide ATR arrays with 10 scanner heads, minimum, as indicated in the PDD, with all equipment and components necessary for a complete bar code reader system capable of reading IATA bar code standards and requirements and/or user's bar code standards and requirements, as stated herein. RFID reader with all equipment and components necessary for a complete RFID bag tag reader system capable of reading IATA RFID bag tag standards and requirements, as stated herein, and shall be coordinated with the RFID bag tag printers for CUPPS and ticket counter bag tag printers. Reader system shall interface with the sortation controllers to transfer information on bag tags to the EDS and sortation allocation controller. Readers shall be capable of determining a bag's sort code at a minimum rate of 60 bags per minute with expansion capability of 80 bags per minute.

p. Bag Measurement Array: Provide one or more bag size dimensioner(s) on a rigid frame over the conveyor bed where shown on Baggage System Contract Drawings or as necessary for determining out-of-gauge bags for the EDS units.

4. Supervisory Control Systems: Redundant Servers (Host and Virtual) for control of the system shall be provided. VMWare or equal virtual machines shall be provided to reduce amount of physical equipment required. One set of redundant physical host server(s) with a workstation shall be located in Terminal 1. The second set of redundant physical host server(s) shall be located in T2W, adjacent to the Baggage Control Room (BCR) in the existing server room, unless space is not available. If space is not available, BHSC shall propose alternate location for SDCRAA review and approval. Workstations, monitors, printers, casework, etc. for system monitoring and control shall be located in T2W Baggage Control Room along with the existing supervisory control system for T2W BHS. Equipment quantities in Baggage Control Room to be determined by Baggage Handling System Contractor (BHSC), but must be acceptable and approved by SDCRAA. Physical and virtual equipment hardware and software shall be as specified herein. For this system in the Baggage Control Room, a minimum of three SCS Workstations, one printer, and two 40" wall mounted displays along with all necessary components to support this

equipment shall be provided. This equipment shall be coordinated with existing equipment in the Baggage Control Room. Existing equipment may need to be relocated within the room to accommodate the new equipment, which shall be done under this Contract, unless determined otherwise by SDCRAA. Any relocations shall be identified to SDCRAA for approval.

2.02 MECHANICAL COMPONENTS

A. *As noted above, this document details components of traditional BHS conveyor products. If the DB team chooses to propose alternate BHS technologies, then product specifications for additional parts and components shall be proposed by the DB team subject to the approval of the Authority.*

B. Slider Bed Belt Conveyors:
   1. Description: Steel frame slider bed conveyors for normal and high speed operations.
   2. Drives: See electrical section for other requirements.
      a. Motors:
         (1) The conveyors shall be driven by motors that conform to A.I.E.E. and N.E.M.A. standards. These motors shall be equipped with two groove minimum, taper lock type hub, V belt sheaves. Motors shall be sized for maximum load and belt speed requirements under continuous operation (minimum size 1 H.P.), and shall be capable of withstanding shock caused by frequent starting and stopping under full load where applicable. If overrun is critical to system control operation, motors shall be equipped with automatically applied brakes to prevent overrun after the motors have been de energized. All motors shall utilize a “T Frame” base and be provided with overload protection of each leg in the control panel. Bolts for mounting of motors shall be welded to motor mount frame for easy replacement of motors.

         (2) Conveyor motors shall be in accordance with IEEE, NEMA, Energy Policy Act (EPAct) Efficiency Standards, and Energy Independent and Security Act (EISA) standards for motors. Motors shall meet NEMA (EPAct and EISA) efficiency ratings and shall be wired for operation with 230/460 volt, 3-Phase, 60 Hz current, Class B insulation and operable in an ambient temperature up to 40°C. All motors shall be copper wound NEMA “B” TEFC with a service factor of 1.15. Speed under full load shall be constant at approximately 1800 RPMs.

         (3) On all conveyor sections with frequent start/stop operations, such as indexing belts, all motors shall be a continuous running NEMA “B” design coupled with an electromagnetic clutch brake arrangement.

         (4) The D.C. power supply for the clutch/brake units shall embody separate, adjustable torque/voltage outputs for both the clutch and the brake.

         (5) Motors for all VFDs shall be inverter ready type that are suitable for VFD operation, shall meet applicable EPAct and EISA required efficiency ratings, and shall be wired for operation with 230/460 volt, 3-phase, 60 Hz current, Class F insulation, and operable in an ambient temperature up to 40°C. All motors shall be copper wound NEMA “B” TEFC with a service factor of 1.15.

         (6) Motorized Pulleys: Motorized (Drum Motor) Pulleys shall be provided where shown in the Baggage System Contract Drawings or as approved by the Owner. Motor shall be wired for operation with 230/460 volt, 3-phase, 60 Hz current, and operable in an ambient temperature up to 40°C. Pulley shall be lagged and lagging shall be as recommended by the pulley manufacturer for the application. An adjustable horizontal take-up assembly shall be provided and shall be in compliance with the requirements for take-up units and other pulleys herein. Approximate locations for the take-up assemblies are shown in the Baggage System Contract Drawings, but actual placement shall be engineered by the

Contractor and submitted for review in the shop drawing submittals. Motorized (Drum Motor) Pulleys shall be sized appropriately for the intended application.

(7) Clutch/Brakes shall have anti-seize or some other application applied to the unit as recommended by the manufacturer prior to assembly with motor to prevent rust corrosion and allow for easy removal of clutch/brake from motor.

(8) Variable Frequency Drives shall be as specified herein. All VFD driven conveyors shall have a motor to final drive ratio that results in top design speed with the motor running at no less than 55Hz and no more 72Hz. The design horsepower shall take into account that horsepower is proportional to Hz Running/ Hz Rated while operating below 60Hz and no greater than nameplate operating above 60Hz.

b. Reducers:

(1) Shaft mounted Reducers: All shaft mounted reducers shall be shaft mounted, taper bushing type, double reduction speed reducers with two groove minimum V belt sheaves.

(2) In line Reducers: Reducers shall utilize “C Face” motor and be taper bushing type with two groove minimum V belt sheaves.

(3) Right Angle Reducers: Reducers shall utilize “C Face” motor.

(4) Reducers are to be sized for Class II applications as a minimum. Reducers used on inclines where rollback would be critical, shall be equipped with a motor brake or “Backstop” device.

(5) All sheaves shall be groove type, for “A” section V-belts, “3VX” section V-belts, “AX” Cog V-belts, or equal, with Type QD split bushing or tapered split bushing.

c. Drive Sections:

(1) All drive units shall be equipped with removable belt/chain guards. Drip pans are required for all reducers and motors.

(2) All conveyor sections shall have mounted-type intermediate drive assemblies. Where maintenance access to an intermediate drive assembly is difficult or not possible, an end drive assembly can be used provided that the configuration and location has been accepted by the Owner. Contractor shall submit recommended locations for end drives for approval. End drives are acceptable on queue conveyors.

(3) All lubrication points shall be easily accessible.

3. Pulley Assemblies:

a. Pulley and Shaft Requirements: All pulleys and shafts shall be sized either as indicated herein or per ANSI/CEMA B105.1, latest revision. Pulleys and shafts sized per ANSI/CEMA B105.1, latest revision shall comply with all applicable ANSI/CEMA requirements and the requirements specified herein, unless in conflict with ANSI/CEMA. Baggage System Contractor shall indicate on their submittals which method used for sizing pulleys and shafts.

b. Power Pulleys:

(1) All power pulleys for intermediate type drives shall be lagged with a minimum 3/8” thick vulcanized lagging of 50 60 durometer and be trapezoidal faced and equipped with taper lock hubs and 1 7/16” minimum diameter C1018 C.R.S. shafts mounted in eccentric locking type precision and ground flange type ball bearing units. Pulleys and shaft sizes are determined by maximum belt pull, and there are four classes which are as follows:

(a) Light Duty (250 pounds maximum belt pull) consists of a 6 3/4" minimum diameter drive pulley with a 1 7/16" minimum diameter shaft. Where used, roller chain shall be RC 60.

(b) Normal Duty (500 pounds maximum belt pull) consists of an 8 3/4" minimum diameter drive pulley with a 1 11/16" minimum diameter shaft. Where used, roller chain shall be RC 60 or larger.

(c) Intermediate Duty (1,000 pounds maximum belt pull) consists of a 10 3/4" minimum diameter drive pulley with a 1 15/16" minimum diameter shaft. Where used, roller chain shall be RC 60 or larger.

(d) Heavy Duty (1,500 pounds maximum belt pull) consists of a 12 3/4" minimum diameter drive pulley with a 2 3/16" minimum diameter shaft. Where used, roller chain shall be RC 80 or larger.

c. End Drive Power Pulleys:

(1) Power pulleys for end type drives or power take offs shall be lagged with a minimum 3/8" thick vulcanized lagging of 50 60 durometer, and be 6" diameter (minimum) trapezoidal faced and equipped with taper lock hubs and 1 7/16" minimum diameter C.R.S. shafts mounted in eccentric locking type precision and ground flange ball bearing units. End type drive units shall not be used for conveyors exceeding 25' in length.

d. Head and Tail Pulleys:

(1) All non-powered head and tail pulleys shall be of steel, trapezoidal faced, equipped with taper lock type hubs and 1 7/16" minimum diameter AISI 1018 C.R.S. shafts mounted in eccentric locking type precision and ground flange type ball bearing units. All head and tail pulleys shall be 6" in diameter minimum x 10 gauge wall. Pulleys shall be of a single piece steel construction and have steel end discs attached to the rim by continuous welding. Slider bed shall be arranged to keep the gap between the end section and the end pulley to a minimum. All head and tail pulleys used for belt tracking shall be equipped with jacking bolts to facilitate adjustment.

(2) All pulleys are to be statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 500 rpm. Rollers of eccentric material, such as standard pipe, are to be statically balanced when operating speeds exceed 200 rpm, and dynamically balanced when speeds exceed 400 rpm. Rollers made of seamless tubing may be used without balancing at speeds up to 1000 rpm, providing straightness is held to close limits and excessive welding flash is not present; for speeds in excess of 1000 rpm, dynamic balance is required.

e. Return Idlers:

(1) The return rollers shall be a minimum of 2 1/2" diameter, 12 gauge steel equipped with an 11/16" hex axle.

(2) All hex shaft return idler rollers shall be equipped with sealed, permanently lubricated, caged, semi precision type ball bearings. Return idlers shall be located on centers not to exceed ten feet, with spacing being reduced in areas where belting may drag against the floor or conveyor structure. The shafts shall be mounted to the conveyor bed with adjustable retainers for proper belt tracking.

f. Snub Pulleys:

(1) All snub pulleys shall be a minimum of 3 1/2" in diameter, steel, trapezoidal faced, and equipped with taper lock type hubs and 1 7/16" minimum diameter C1018 C.R.S. annealed and machined steel shafts mounted in eccentric locking

type precision and ground flange type ball bearing units. All snub rollers used for belt tracking shall be equipped with jacking bolts to facilitate adjustment.

g. Take Ups:

(1) All take up pulleys shall be a minimum of 4" in diameter, steel, trapezoidal faced and equipped with taper lock hubs and 1 7/16" minimum diameter AISI 1018 C.R.S. shafts mounted in eccentric locking type precision and ground flange type ball bearing units. Pulleys shall be mounted on threaded take up devices with steel guides and a minimum of 6" adjustment. All conveyors shall be provided with take ups for field adjustment of a minimum of 2% of the conveyor bed length. Take ups shall be an integral part of the drive frames on all intermediate drive conveyors.

(2) All conveyor sections in excess of 50' in length operating in tunnels or outside of the building subject to extreme temperature and humidity' changes shall be equipped with automatic take up devices.

(3) All take ups used in heavy duty or high speed applications shall be the same as above except shall be of 6" diameter with 1 7/16" diameter shafts.

h. Bearings:

(1) All bearings shall be greaseable, sealed, self-aligning, anti-friction type. In areas of difficult maintenance access, remote polypropylene lubrication lines with zerk mounted in top horizontal surface of sideguard as specified herein shall be provided for easy maintenance within the immediate vicinity of the bearings, unless noted otherwise. Lubrication lines for conveyor in public view shall be concealed from view but shall be located for easy access. Along catwalks and where conveyor equipment is not accessible, the lubrication ports shall be remoted to accessible locations with zerk mounted in top horizontal surface of sideguard within the immediate vicinity of the bearings. Bearings shall be mounted on the outside of the conveyor frame unless clearance restrictions prohibit.

(2) All exposed bearings in work areas shall be equipped with bearing covers and meet OSHA requirements for employee safety. Bearing covers shall be provided on all conveyors that are in tenant work areas, accessible to tenant personnel; in public areas, and accessible to the public.

(3) Bearings shall have a minimum L 10 life of 30,000 hours based on the service and loading of conveyors and on the manufacturer's published data showing load rating of each bearing used.

(4) Bearings shall be greased when installed per manufacturer's recommendations.

(5) All lubrication points shall be easily accessible. Bearings that are blocked, covered, or inaccessible without removing shrouding or trim shall require remote lubrication lines.

(6) All bearings in public areas that are covered by shrouding shall be piped to a remote manifold location that is easily accessible.

(7) Remote lubrication lines shall be and polypropylene, translucent, ¼" OD minimum tubing with brass zerk fittings. Remote lubrication lines shall be filled with lubrication approved by the manufacturer.

4. Belting:

a. All belting shall have a strength equal to or greater than 120 PIW American Style or 10n/mm European Style. Belting shall be of the types identified below.

b. All belting for level transport, feeder lines, or incline and decline conveyors up to 7 degrees and exposed to public view shall have a black to gray cover and bare x bare or bare x friction surface.

c. All belting for level transport, feeder lines, or incline and decline conveyors up to 7 degrees and not exposed to public view shall be bare x bare or bare x friction surface.

d. Belting for all incline and decline conveyors with 7 degrees to 18 degrees slope shall be longitudinal grooved x bare or friction surface; or diamond type x bare or friction surface. All Diamond Top belting shall be “siped” diamond pattern.

e. Belting on incline and decline conveyors greater than 18 degrees shall be longitudinal grooved x bare or friction surface; or diamond type x bare or friction surface.

f. Belting on queue conveyors shall be longitudinal grooved x bare or friction surface.

g. Load/unload queue conveyors shall be bare x bare or bare x friction surface.

h. Load/unload conveyors shall be bare x bare or bare x friction surface.

i. The width of all belts shall equal the between guard dimension of the respective conveyor minus three (3) inches.

j. Belts for Power Turns shall be as recommended by the power turn manufacturer and the belting manufacturer for baggage systems.

k. Belting for Spiral Turns shall be gripping, heavy-duty type, and as recommended by the spiral turn manufacturer and the belting manufacturer for baggage systems.

l. Belt Lacing: Each conveyor belt shall be furnished and installed in one piece and spliced at one location. All belt lacing shall be Clipper type or approved equal and sized as required for belt thickness and type per the belt manufacturer’s recommendation for each application.

m. Belt lengths shall be cut to allow for take-up adjustment of approximately 1/2 the take-up range, after initial installation and testing.

5. Static Components:

a. Beds: Sturdy slider bed construction is required. The bed shall be constructed of #11 gauge steel with a strong and well braced frame consisting of a minimum of 5” x 1 1/2” x #11 gauge formed channel frame rails with cross braces and a maximum of 3’ 4” centers on transport lines and 2’ 6” centers on the loading belts. Butt type coupling joints shall be employed with the joints epoxy filled and ground smooth. Cross braces shall be located so as not to contact the belt run under normal circumstances. Bed widths are as shown on the drawings.

(1) End brackets for head and tail pulley shaft bearings shall be constructed of a minimum of #11 gauge steel. Mounting of these bearings directly to the conveyor framework shall not be accepted.

(2) Adjacent conveyors shall be bolted together. Welding shall not be permitted as an assembly technique.

b. Noseovers: At all transitions from incline to horizontal or horizontal to decline, the bend shall be constructed in the same manner as slider bed construction. The bed shall have a 10’ 0” radius breakover slider bed as a design objective, unless noted otherwise on the drawings. Bends may have a 5’ 0” radius minimum where a smaller radius is required due to space limitations. For return belt idling, noseovers shall be equipped with a snub roll.

c. Skirting:

(1) Skirts shall be bolted to the top of the frame rails on the loading side(s) of the conveyor and shall consist of #14 gauge or heavier sheet metal approximately 6” deep with a toe space, where applicable.

(2) Provide skirting on all load and unload conveyors in tenant staffed areas, and as shown on the baggage system drawings. Provide flared sideguard(s) on adjacent downstream conveyor, as detailed in the baggage system drawings.

d. Sideguards: Guards shall be a hot rolled steel formed channel 21” high x #14 gauge steel with stiffeners (bracing) on a maximum of 3’ 4” centers on transport lines and 2’ 6” centers on the loading belts. Unless otherwise noted, guards shall be required on both sides except where baggage is being loaded at which point only one guard shall be required.

(1) The top rail of all sideguards shall be formed with a ¾” double break to eliminate exposed sharp edges and snag points.

(2) Butt type coupling joints shall be employed on all sideguards exposed to the commodity flow.

(3) In conveyor tunnels and where space is limited, alternate ten foot sections of guarding on aisle or catwalk side of conveyor shall be removable to facilitate baggage removal when the system is inoperable. Such guarding shall be designed for quick and easy removal. The sideguards and slider bed conveyor design shall not require the removal of electrical equipment, bearings or return roller mounting brackets in order to remove the sideguards. See drawings for extent of requirement.

e. Protective Guarding:

(1) Protective Under Bed Guarding:

(a) All drive units shall be completely enclosed by expanded metal screen, either hinged at one end or with quarter turn fasteners at both ends, and of minimum 14 gauge steel.

(b) All guards shall comply with applicable OSHA standards and shall have an expanded metal screen to allow belt inspection without removal of the guard. All expanded metal screen shall have a maximum size opening of 1/2 inch. Paint the screen OSHA yellow.

(c) Provide removable expanded metal screen on the return belt side of all conveyors from 1’-4” to 8’-0” above finish floor or catwalks.

(d) Paint all such guarding, including the pipe guard around load areas, with OSHA yellow enamel.

(e) Underguarding shall be in accordance with ASME B 20.1, OSHA, and local code requirements.

(2) End Roll/Pulley Guarding: Finger guards shall be provided on all end rolls and pulleys not covered by shrouding that are in tenant work areas, accessible to tenant personnel; in public areas, accessible to the public, and as shown on the Baggage System Contract Drawings.

f. Supports: Floor type supports shall be vertically adjustable and of sturdy design. Bracing between the vertical support legs and the conveyor bed frame shall be provided to ensure rigidity of the installed conveyor. Such supports shall be at a maximum of 5 foot centers for loading and unloading conveyors, and a maximum of 10 foot centers elsewhere. Supports are to be anchored to the floor using fastening methods in keeping with the floor construction. Supports shall be constructed from 12-gauge material or heavier.

g. Hangers: Ceiling hangers shall be limited to a maximum load of 750# each. Hangers shall be spaced at a maximum of 10 foot centers, and, in general, shall be located at the discretion of the Installer except where specific requirements are shown on the drawings. All hanger connections shall be double nutted, if bolted, or have similar safeguards to avoid loosening from vibration. Vibration isolators shall be by Mason Industries, Inc. or approved equal.

h. Padding: Provide 1-inch thick foam rubber pipe insulation on all conveyor supports, conveyor edges, or any other new or existing equipment located less than 6'-8" above catwalks and above conveyor where catwalk is not provided adjacent to the conveyor.

i. Painting:

(1) All structural parts, except those surfaces coated with a galvanized coating, and those that would normally be unpainted (such as rollers, shafts, sprockets, bearings, chains, nameplates, etc.) shall be painted with two shop coats of rust inhibiting enamel. This includes all support structure, bed underside, drive structure and pulley guards, etc. Paint the chain guards OSHA "yellow".

(2) The conveyor bed surface or the interior surface of sideguards shall be electrostatic powder coated as described below or as approved equal.

(a) Electrostatic Powder Coating Application: All surfaces to be painted shall be thoroughly cleaned of rust, scale, oil, grease, grit, welding flash, and other forms of dirt. Paint shall be an epoxy-type powder coat. Paint shall be applied as an electrostatic spray to a film thickness of 1.5 – 2.5 mils and cured at a minimum of 350 degrees Fahrenheit for 10 minutes. Finish shall conform to ASTM D3363 with a hardness of 3H, and shall conform to ASTM D3359B, with an adhesion and cross hatch rating of 5B PASS.

j. Shrouding:

(1) Shrouding shall be provided for conveyor equipment located in public areas as shown on the drawings. The shrouding shall be formed stainless steel, minimum 12 gauge, Type 304 with #4 brushed finish running longitudinally. All connections shall be smooth and flush without openings.

(2) Shrouding shall be provided for conveyor equipment located in the CBIS and CBRA as shown on the drawings and shall extend from the sideguard height to the floor. The shrouding shall be formed steel, minimum 12 gauge, painted to match the conveyor bed frame. All connections shall be smooth and flush without openings. Removal of shrouding for maintenance access shall be accomplished by one person taking no more than 5 minutes.

(3) All joints between stainless steel sections shall be uniform with adjacent surfaces properly aligned. Tolerances of joint width and surface alignment shall not exceed 1/16" per foot, which shall not be accumulative. Joints shall align properly, where joint meet and are parallel with each other.

(4) Where stainless steel shrouding requires a laminated substrate for stiffness, the substrate shall be laminated on all surfaces for stabilization and moisture control to prevent warp age.

k. Conveyor Identification: Each conveyor section shall be permanently and indelibly marked with its respective number as shown on Baggage System Contractor's shop drawings. Each conveyor number shall be carefully and neatly painted or stenciled in a contrasting color, nominally 4" high, in a conspicuous location on the conveyor drive. Temporary markings on the conveyors or other equipment shall be made with a medium which is readily removable with water or a readily available commercial

solvent, such that they may be removed without requiring refinishing of the surface on which they appear.

6. Queue and Short Conveyors:
   a. On all queuing and short conveyors, where belt tracking is difficult to control, special belting or other means shall be furnished and installed to control belt alignment.
   b. Conveyor sections 5' 0" or shorter in length may be driven from an adjacent conveyor section, except for queue conveyors which require an individual drive unit.
   c. Queue conveyors shall be 42" in length, unless noted otherwise on the drawings. Refer to equipment schedules in the Baggage System Contract Drawings for length of queues.
7. Power Turns and Spiral Turns:
   a. Turns shall be steel frame construction and shall be sized with 7' 3" approximate radius from center to inside face of outside sideguard ("C" size) or as shown on the drawings. Turns shall be sized so that the side guards of the turn match in width with the side guards of adjacent conveyors, unless noted otherwise on drawings. At the ticket counters where the conveyor turns to penetrate the backwall, the power turn shall be sized with 4' 11" approximate radius from center to inside face of outside sideguard ("B" size) or as shown on the drawings and the width shall match the width between sideguards of the adjacent downstream conveyor. Belt speed of turns, as measured on the centerline, shall be at least as fast as the input conveyor and the same speed or slower than the output conveyor.
   b. Power turns shall comply with the items listed below:
      (1) Belt shall be as recommended by the Power/Spiral Turn manufacturer and the belting manufacturer.
      (2) Provide grease zerks in chain cover for chain lubrication.
      (3) Sideguards: Where two or more turns are adjacent to each other, the sideguards shall be ordered from the manufacturer for the condition to reduce the gap between the end rolls. These ordered components shall be tracked properly to ensure that they are installed in the proper location and configuration.
      (4) All power turns with the sideguards removed shall have a Finger Guard type chain cover installed.

C. Sloped Plate Recirculating Devices:
1. Description: Rotating, inclined plane display devices, consisting of a stationary curb and top with a canted moving surface for baggage display constructed of linked flights and capable of operation in the configuration shown on the drawings.
2. Load Rating: Devices shall be capable of a minimum live load of 125# per peripheral foot, starting fully loaded.
3. Speed: Devices shall rotate at a constant peripheral speed not less than 80 FPM or greater than 100 FPM and coordinated with the input velocity of the feed conveyors. Rotation of all claim devices shall be in the same direction, unless noted otherwise on drawings (clockwise or counter clockwise).
4. Flights:
   a. Flights and closure panels shall be fabricated from heavy gauge stainless steel. No sharp or protruding edges shall be acceptable. Fabrication shall be to close tolerance to avoid gaps capable of trapping fingers, baggage or otherwise constituting a safety hazard. Where flights are designed to bear on adjacent flights, means shall be employed to avoid deterioration, grinding and residue from such

contact which would mark or stain baggage. Flights shall be fabricated for the direction of rotation and shall not produce a catch point for bags at the turns.

b. Flights shall be approximately 60 inches in length and set at a slope not less than 18 degrees or exceeding 22 3/4 degrees.

5. Curb: Perimeter curb shall be of formed stainless steel sections fastened with concealed fasteners or countersunk, button head or oval head matching screws. Joints shall be true and edges shall be finished. No protrusions or sharp edges shall be acceptable. Curb shall provide an adequate toe space. The back of the toe space shall be finished with a rubber base mounted with ½" plywood backing on claim devices and a 14 gauge metal skirt with ½" plywood backing on make-up devices to prevent debris from accumulating under the device.
6. Baggage Stop: A railing mounted to the floor and independent of the claim and make-up devices will be furnished and installed within the General Contract at the points where baggage is indexed onto the claim and make-up devices. The purpose of this rail shall prevent injury to passengers from claiming bags or to baggage handlers making up bags at the point where baggage is sliding down to the curb from the feed conveyor.
7. Bumper: Perimeter bumper shall be a black, resilient non marking material. The bumper shall be configured to avoid gaps or open unprotected condition at the curb, which would be hazardous.
8. Frame, Track and Drive: Frame shall be constructed of structural steel, primed and enameled except for wearing surfaces. Drive chain guideways and wheel tracks shall have tight, well aligned joints or liners for smooth, noise free operation. Drive lugs or sprockets engaging the drive chain shall be smooth and quiet. Drives shall be protected with overload and jam protection. Frame and track shall be grounded. Drive shall be designed for operation from a 480 VAC, 3 phase, 60 Hz power source. Each drive shall be controlled with a VFD to provide a soft start. The drive shall be sized to permit start up under full load conditions. Motors shall be as specified for conveyor sections. VFD type shall be as specified herein.
10. Deck: Raised platform consisting of a 3/4 inch fire resistant plywood deck capable of supporting 75 pounds per square foot and covered with a finish furnished and installed within the General Contract, and surrounded with special stainless steel trim in accordance with the drawings. Provide access hatches with lockable latches, flush with surface, for finish, and sized per manufacturer's requirements at locations shown on the Baggage System Contract Drawings.
11. Feed:
    a. Feed conveyor components at the threshold of the claim device (exposed to public view) shall be constructed of stainless steel.
    b. Side guards and trim for the feed conveyors at the openings in the claim devices' top cover shall be of special stainless steel design as shown on the drawings.
    c. Transition Plate: Provide stainless steel transition plate or Ultra High Molecular Weight (UHMW) polyethylene adhered to steel substrate transition plate at gap between feed conveyor and device as detailed in the Baggage System Contract Drawings.
12. Safety Rail: In areas inside the devices where a deck is not provided, a continuous channel shall be installed along the top edge of the rotating pallets to prevent accidental injury from the rotating device. Rail shall not interfere with maintenance access to device.
13. Skirting: Provide continuous 14 gauge, minimum, skirting around all make-up devices, flush with toe space from base of unit to floor or work surface. Skirting shall be rigidly mounted to make-up device, but shall be removable for maintenance access.

2.03 ASSOCIATED EQUIPMENT AND MATERIALS

A. Draft Curtains:

1. Draft curtains shall be provided where shown on the drawings and shall be flexible strip doors with two staggered layers of 8" x 1/16" strips - color "Black".

B. Curbing and Guardrails:

1. Steel tube guardrails shall be provided as shown on the baggage drawings for protection of conveyor sections, drive assemblies, and electrical hardware vulnerable to damage by tug/cart movements. (Concrete curbing, if required, will be furnished and installed within the General Contract).

C. Coiling Doors:

1. Security and fire doors are required as shown on the drawings and shall be 1-1/2 hour fire rated minimum, electrically operated coiling/rolling type. Door models shall be selected to conform to the limited space available inside the claim devices and within doghouses where applicable. All exposed surfaces visible to the public shall be stainless steel, type 304 with #4 brushed finish. Accessibility to all motors, operators, emergency operators, door attachments, guide attachments, hoods, etc. shall be from the secured side of the door only, unless noted otherwise.
2. Operation: Shall be by motor operator. Power supply shall be provided through the associated baggage system and controls shall be coordinated with the baggage system. Manual operation is not allowed. Door activation shall only be through the associated baggage system, refer to "Description of Operations" as specified in this section for operational sequence requirements.
3. Curtains: At locations not visible to the public, provide interlocking slats of cold roll formed galvanized steel. At locations visible to the public, provide interlocking slats of stainless steel. Gauge to be as recommended by manufacturer to withstand applicable impact from the baggage system or other forces. Endlocks shall be attached to the slats to maintain curtain alignment and prevent lateral slat movement in accordance with manufacturer's recommendations. Curtain shall be reinforced with a bottom bar consisting of two steel angles or a box shape.
4. Guides: Shall be roll formed steel shapes or structural steel angles as recommended by the manufacturer. Attachment to jamb shall be in accordance with manufacturer's recommendations.
5. Brackets: Shall be steel plate to support the barrel, counterbalance, and hood, and shall be equipped with self-aligning lubricated ball bearings.
6. Counterbalance: Shall be helical torsion springs housed in a steel pipe barrel, supporting the curtain with a maximum deflection of .03 inches per foot of width. Counterbalance shall be adjustable by means of an adjusting tension wheel.
7. Hood: Shall be 24 gauge galvanized primed steel minimum. Hood shall be equipped with thermally controlled internal galvanized steel flame baffle when required.
8. Locking: Gearing shall be self-locking.
9. Fire Rated Doors: Where a fire rated door is required herein or as indicated on the drawings, the door shall be rated as indicated, but it shall not close automatically when a fire is detected unless specifically required by code or noted otherwise. The door shall operate as indicated in "Description of Operations" in this specification section. Fire doors shall be labeled by "Underwriter's Laboratory" or other testing laboratory acceptable to local code authorities. Fire doors shall be provided with fusible links that if in the event of a fire and the fire is present at the door location, the door will close. If the door closes due to the fusible link, the conveyor section(s) at the door shall stop immediately. All other doors and conveyor sections shall function as indicated in the "Description of Operations".

10. Motor Operation: Shall include 120 volt AC, single phase, high torque motor; reduction gearing; solenoid break; emergency operation; overload protection; and prewiring terminal block. Door shall be activated by the associated baggage system, refer to “Description of Operations” in this section for system sequence. Emergency operation shall be activated a security access control system card reader, furnished and installed within this contract, or a key operation if the card reader is not provided.
11. Controls: Provide limit switches or photosensors to identify when door is closed, partially open, and fully open. Switches shall be heavy duty, industrial type. Photosensors shall be as specified herein. Limit switches or photosensors shall be monitored by the associated baggage system and security access control system through the baggage control system. Coordinate baggage system and security access control system for controls interface requirements.

2.04 ELECTRICAL AND CONTROLS COMPONENTS

A General:

1. *Standards detailed hereafter apply to standard BHS conveyor systems. Where alternate technologies are proposed the DB team shall propose other standards for electrical and controls components subject to approval by SDCRAA. However, the DB team must demonstrate that proposed products and systems have a proven track record of use in installations acceptable to this facility, have replacement parts that meet industrial standards, are available for maintenance and modifications to the system installed, and compatible with other facility maintenance and controls systems. Any proprietary systems that rely on special contracts for ongoing maintenance must be justified.*
2. Materials shall be of the quality specified herein, new, free from defects, of the best commercial/industrial grade, and approved by a nationally recognized testing laboratory wherever published standards exist. Each type of material shall be of the same make and manufacturer throughout the project. Materials shall comply with NEC or Local Code requirements, whichever are more stringent. Components shall be UL labeled or ETL labeled.
3. Contractor shall provide either NEMA or IEC components, as listed herein, but shall provide either NEMA or IEC components for any type of component throughout the Work (no intermixing of components), unless noted otherwise or with approval by the Owner’s representative.

B. Motor Control Panels:

1. General:
   a. Panels shall be designed and arranged by a control company with a minimum history of 5 years experience of previous work in conveyor systems. Control panels shall be provided fully designed and manufactured ready to install for field connected wiring. Baggage System Contractor shall install panels secured to floor to withstand earthquake conditions of 1.5 times panel force. Provide fluorescent light fixture(s) inside each motor control panel to properly light electrical equipment and tagging, which shall turn on when MCP door is opened.
   b. Control Device Identification: MCP component identification shall be provided so that all relays, timers, starters, overloads, fuses, etc. can be readily identified when the MCP door is opened. In addition to all prime manufacturers' nameplates, all electrical and mechanical control items mounted in or on panels or pushbutton stations shall be further identified in the system by permanently attached corrosion proof, etched, engraved, or stamped identification plates. Dymo type labels are not acceptable.

2. Enclosure:
    a. All motor control panels and surface mounted control station enclosures shall be NEMA Type 12, except those exposed to direct rain, which shall be Type 3 or 4 Weatherproof.
3. Main Power Shutoff:
    a. Fused Shutoff: Shall be a heavy duty, 480Volts, 3 Phase, fused switch. Fuses shall be up to 600A - RK1 fuses. Shutoff shall be installed inside housing with operating handle arranged for connect or disconnect with doors of control panel in closed position. Size for added 30% code motor load.
    b. Circuit Breaker Shutoff: Shall be 3-pole, 480-volt, molded case, sizes as shown, 65,000 A.I.C. symmetrical at 480 volts AC. Provide SPDT auxiliary switch on each branch circuit breaker. Install main breaker with operator through and interlock with panel door. Main circuit breaker shall be sized for the associated panel with required spare capacity factored in. Circuit Breaker Frame minimum size is 150 Amp.
4. Motor Circuit Protectors:
    a. Motor circuit protectors shall be Magnetic Only Motor Circuit Protectors, 480Volts, 3-Pole, 15,000 A.I.C. minimum, and sized as required for intended load. Provide a shunt trip for VFDs when external Dynamic Brake Resistor is required. Circuit breakers shall coordinate with RK1 fuses or circuit breaker in main and shall be an UL approved coordination.
5. NEMA Starters:
    a. NEMA Starters: Motor starters shall be NEMA Rated, 3-Pole, 480V, 120V Starter Coil Voltage, magnetic across-the-line contactors, each with a holding contact and auxiliary contacts as required. Motor starters shall each have three manual-reset, thermal-overload relays. Reversing motor starters shall have electrical and mechanical interlocks. Starters shall incorporate thermal overload protection in all phases. Overload shall be set at 100%. Minimum starter size shall be NEMA size “0”.
6. Group Fusing for IEC Starters:
    a. Group Fusing: Fuse blocks shall be rated for 600Volt, 3-Pole, and sized as required for intended load. Fuse block, fuses, and associated components shall coordinate with RK1 fuses or circuit breaker in main and IEC starter, and shall be an UL approved coordination. Components and installation shall comply with NEC or Local Code requirements, whichever are more stringent.
7. IEC Starters:
    a. Motor starters shall be UL approved for group motor installations and protected by group fusing in accordance with UL and NEC requirements. Short circuit protective device size shall comply with NEC requirements for group motor installations of this type. Starters shall be 3-Pole, 480V, 120V Starter Coil Voltage, with auxiliary contacts as required. Installation shall conform to NEC requirements.
8. Relays:
    a. Control Relays: Shall have a 120-volt AC coil rating, and each relay shall have a minimum of eight NO/NC contacts rated at 600 volts, 10 amps. Provide surge suppressors on control relays.
    b. Fire Alarm Interface Control Relay: Relay socket shall accept both 120VAC and 24VDC relays to allow flexibility for future interface.
    c. All timing functions shall be accomplished in the programming. Timer relays are not acceptable, unless specifically required for an operation.

9. Pushbuttons, Selector Switches, Pilot Lights: All pushbutton stations in public view shall be flush mounted with stainless steel cover plates. Adequate maintenance access is required at all control stations.
10. Programmable Logic Controllers:
    a. System shall have Processor with 20% spare memory minimum, 120 volts AC Power Supply input, 6 month minimum battery backup for memory, 20% spare I/O capacity minimum, remote I/O communications capability, peer to peer communications, interface to fiber optic and broadband communication networks for airport wide connectivity capability, communication port configured for programming or user defined ASCII connection, low voltage and 120 volt I/O Modules, Programmer unit, Mounting Bases, and all appurtenant equipment necessary for a complete operating system.
11. Terminal Blocks: Provide 20% spare capacity in terminal strips. Terminals shall be used as contact points for system operation and interface with other systems. Identify each contact for its system or interface connection.
12. Transformers: 480/120 volt, Single Phase, 60 Hz, size with 15% spare capacity, dry type, core and coil type transformer with terminal board and secondary fuse kit.
13. System Maps: Provide and install Mylar Conveyor overviews on the front face of control panels.
14. 24VDC Power Supplies: Input - 120Vac; Output - 24Vdc, 1.2 amps; Line Regulation - +/- .05% for 10% input change; Load Regulation - +/- .05% for 50% load change; Output Ripple - 3mv + .05% of output voltage peak-to-peak maximum; Remote Sensing - overload protection at 3 amperes; Temperature 0 degrees C - 90 degrees C.
15. Power Filters:
    a. Control Power: Power filter(s) shall be provided for each MCP to protect the PLC and remote base from power surges and outages. One or more of the power filters in each motor control panel shall also protect the message center, DC Power Supplies, and VFDs. Multiple PLC's, remote bases, or other power filter required equipment within a MCP can be filtered by one power filter, provided that the load is within the rating of the power filter. If the load is greater than the rating, multiple power filters shall be provided.
    b. VFD 480 VAC – 3 Phase Power: Power filter shall be sized appropriately to filter the 480VAC, 3 Phase power to the VFD's. Power filter units shall be coordinated with the VFD manufacturer. In both "Delta" and "Un-Bonded Wye" cases, a "Wye" TVSS unit will be severely damaged in the event of a ground fault. Terminating the neutral to the grounding part in the MCP when the fourth wire is not pulled to the panel is recommended by the local supplier, but it shall be verified by the Contractor with the supplier or manufacturer. The power filter shall be provided upstream of the VFD's and shall filter the power to all of the VFD's in the panel to protect the VFD's and fuses. If the load is greater than the power filter rating, multiple power filters shall be provided. The VFD power filter alarm contacts shall be monitored by existing SCS Fault Monitoring and the flush mounting kit shall not be used.
16. Power Distribution Blocks: 600V, 3 pole.
17. Three Phase Voltage Source and Phase Reversal Protection:
    a. Provide monitoring for protection against loss of three phase voltage source and phase reversal. Signal from relay shall shut the associated baggage system down and identify a fault condition in the fault monitoring system.

C. Variable Frequency Drives (VFD):

1. VFDs shall ramp up from “0” rpm to “designed belt speed” in a “S” style to full speed and shall stop in the same manner. A minimum service factor of 1.5 shall be provided. Actual service factor shall be determined by the Contractor for the specific requirements of the conveyor section being driven. Drive shall be coordinated with the motor for the specific application and housed in a NEMA rated panel on the side of the conveyor near the motor. Drives shall have the following adjustments:
   a. “Zero” to “Full Speed” (0% to 100% of rated motor speed) – Allow belt speed to be set to desired speed.
   b. Time from “Stop” to “Full Speed” – Allow for soft starting of belt, so baggage does not roll or slip on belt.
   c. Time from “Full Speed” to “Stop” – Allow for soft stopping of belt, so baggage does not roll or slip on belt.
   d. VFD for EDS Interface Requirements: VFD operation shall be in accordance with EDS Manufacturer’s requirements.
      (1) Programmable acceleration (over a time variable in 0.1m/sec steps).
      (2) Programmable deceleration (over a time variable in 0.1m/sec steps).
      (3) Single start/stop signal (forward motion is required).
   e. VFD for Vertical Sorter Requirements: VFD operation shall be in accordance with Vertical Sorter Manufacturer’s requirements.
2. Consolidated Motor Starter/VFD: Drive shall be coordinated with the motor for the specific application and mounted on the side of the conveyor near the motor.
3. Individual VFD: If a consolidated motor starter/VFD is not used, Variable Frequency Drive shall be coordinated with the motor for the specific application and housed in a NEMA rated custom motor starter panel with the individual motor starter on the side of the conveyor near the motor.

G. Photoelectric Cell Sensors:

1. General: Self-contained, infra-red visible beam with a range of 6” to 30 feet. The unit shall include mounting brackets, cable and reflector. All components shall be UL Listed.
2. All photosensors used for jam detection, over height bag detection, etc., shall be Retroreflective Type devices
3. Construction: Sensor heads shall be molded from thermoplastic polyester with a lexan top view window. Lenses shall be acrylic and hardware shall be stainless steel. The units shall be gasketed. Operating temperature range shall be -40 to 150°F.
4. Connection: Integral standard 4 conductor quick disconnect cable fitting. Connect to fitting with matching connector and flex conduit and wire. Connecting cable and fittings shall be UL listed.
5. Mounting Bracket: Special by manufacturer with curved mounting slots and two 5/16” mounting bolts.
6. Photosensors shall be mounted on structural members attached to the machinery structure so that minimal vibration is transmitted to these units. No more than two penetrations per sensor (one each for the photosensor and the reflector) shall be allowed in conveyor sideguards; each penetration shall not exceed 1 1/2” in diameter and shall be beveled to remove sharp edges.

H. Tachometers:

1. Tachometers: The digital pulses shall be low-level (24 VDC) and interface to the PLC through low-level input modules.

I. Control Stations:

1. Control stations shall be multi pushbutton/selector station with labels for each operation. Enclosure shall be a NEMA type 4/13 pushbutton station. All control stations other than START and E STOP stations for conveyor sections in public view shall be located on adjacent conveyor sections out of public view and labeled for the conveyor section being controlled.

J. Pushbuttons, Selector Switches, Pilot Lights:

1. Pushbutton Stations: All pushbutton stations in public view shall be flush mounted with stainless steel cover plates. Adequate maintenance access is required at all control stations.
2. All pushbutton switches used for E STOP applications shall be of the maintained contact, push to stop, illuminated red mushroom head type. Other pushbutton switches shall be momentary contact type. START pushbuttons shall be green, illuminated, extended head with guard type. Normal stop buttons (where used) shall be red, extended head type. JAM RESET pushbuttons shall be amber, illuminated, extended head type. OVER HEIGHT RESET pushbuttons shall be white, illuminated, extended head with guard type. FIRE ALARM INTERFACE TEST pushbuttons shall be black, non-illuminated, flush head type. LAMP TEST pushbuttons shall be black, non-illuminated, flush head type. ALARM SILENCE pushbuttons shall be yellow, non-illuminated, flush head type.

K. Limit Switches:

1. 6-amp, 120-volt, NEMA Type 1 enclosure with roller lever. Allen-Bradley 801-ASC21 or approved equal. Limit switches at security and fire doors shall be mounted properly for door open and door closed operations.

L. Disconnect Switches:

1. At each motor furnish and install a heavy duty, 480V, 3 Phase, NEMA 1 Disconnect Switch with auxiliary contact to report status of disconnect to PLC for system monitoring. For motors with clutch/brakes, the disconnect shall shut off motor and clutch/brake simultaneously and have an auxiliary contact to report status of disconnect to PLC for system monitoring. Disconnects and assembly shall be lockable, UL listed, and comply with NEC or Local Code requirements, whichever are more stringent. Mount motor disconnect switch on trunk of conveyor below belt line adjacent to motor. Label disconnect switch with black phenolic, white incised ¾" letters.
2. Disconnect Switches for Motors with VFDs: For motors with VFDs, provide a disconnect switch with a "Break before Main Break" auxiliary contact to signal VFD activate "Coast to Stop" operation to safely shut down the VFD prior to the motor being disconnected. For motors/VFDs not requiring a quick disconnect, type shall be Hubbell "Circuit-Lock HBLDS3VFD Disconnect with Early Break Auxiliary Contacts" or approved equal.
3. Quick Disconnect Switches for Motors with VFDs: For motors with VFDs, provide a disconnect switch with a "Break before Main Break" auxiliary contact to signal VFD activate "Coast to Stop" operation to safely shut down the VFD prior to the motor being disconnected. For motors/VFDs requiring a quick disconnect, type shall be Hubbell "Circuit-Lock HBL2430SW Disconnect with Early Break Auxiliary Contacts" or approved equal.

M. Warning Lights (Beacon):

1. System Start up: Light shall be a rotating, 120 volt AC, flat base mounting fixture with a red lens.
2. Jam Detection/Emergency Stop: Light shall be a rotating, 120 volt AC, flat base mounting fixture with a yellow lens.

N. Warning Light (Lantern): Warning Light with globe and guard.

O. Warning Horn: Horns shall be 120 volts AC, 103 dB at 10' with adjustable volume.

P. Warning Buzzer: At each claim device furnish and install a minimum of two audible alarms located within the device. Chime/buzzer shall be 120 volts AC, 65 to 70 dB at 10'.

Q. Control Station Buzzer: At each control station with a START pushbutton in public areas, furnish and install a buzzer in the control station. Buzzer shall be 60/250 volts AC with 120 volt AC supplied to the unit to provide 55 to 60 dB at 2'.

R. Uninterruptible Power Supply for PLC: Furnish and install one UPS to provide a minimum of 15 minutes of power to the PLCs during a power outage, prior to emergency power activation. Each UPS shall have a maintenance bypass switch.

S. Electrical Power Conditioners: Furnish and install power regulators, as required, to ensure that the power to the control systems is properly conditioned.

T. Wire and Cable:

1. All conductors shall be copper and in accordance with NEC or Local Code requirements, whichever are more stringent. Low voltage (less than 90 volts) control wiring shall be installed in separate wireways and not combined with power or control (greater than 90 volts) wiring. Control wiring shall be installed in separate wireways and not combined with power wiring. Control wiring shall be terminated, where necessary, in junction boxes on terminal boards, make wire numbers on terminal strips. The term “conductor” as used in these specifications shall be considered as any wire cord, cable, rod, buss, fuse, or similar product designed for the transmission of electrical energy.

2. Conductors for Motor Control Only - Exterior to Motor Control Panels:

   a. Individual conductors shall be Type THHN/THWN-2 for all wet and dry indoor locations and shall be Type XHHW-2 for exterior locations. Conductors shall be 600-volt insulation, stranded copper, Class “B” stranding, no solid conductors allowed. All power conductors shall be 12 AWG, minimum. All control wiring shall be No. 14 AWG, minimum. Grounding conductors: #6 AWG and larger: stranded copper, bare soft drawn as required. #8 AWG and smaller: stranded copper with green insulation.

   b. Power cord sets shall be Type STOOW for all wet and dry indoor locations. Conductors shall be 600-volt insulation, stranded copper, Class “B” stranding, no solid conductors allowed. All power conductors shall be 12 AWG, minimum. All control wiring shall be No. 14 AWG, minimum. Grounding conductors: #6 AWG and larger: stranded copper, bare soft drawn as required. #8 AWG and smaller: stranded copper with green insulation. This cord type is not required to be installed in conduit. It shall either be secured to the conveyor such that it is not loose, hanging, or coiled outside of an electrical enclosure or device; or install in an approved open wireway/cable tray.

3. Conductors Motor Control Only: Interior to Motor Control Panels:

   a. Conductors shall be Type MTW, 600-volt insulation, stranded copper, Class “B” stranding, no solid conductors allowed. Motor feeders shall be sized as required. All power conductors shall be 12 AWG, minimum. Control wire shall be 14 AWG, minimum.

4. Conductors for All Area Except Motor Control: Conductors shall be 600-volt. Wiring shall be run in conduit, except where specified or indicated otherwise, and conductors shall not be less than No. 12 AWG except for control wiring in conduit, which may be NO. 14 AWG and fire alarm wiring, which may be No. 16 AWG. Wire shall be furnished in types to conform to the following:

   a. Thermoplastic Type THWN (for fire alarm circuit only): Type THWN shall bear Underwriter Laboratories approval. Conductors shall be solid. Wire shall meet the requirement of IPCEA Standards S-61-402 Copper.

b. Thermoplastic Type THHN/THWN-2: Type THHN/THWN-2 wire shall bear Underwriters Laboratories approval. Conductors shall be stranded having IPCEA Class “B” stranding. Wire shall meet the requirements of IPCEA Standards S-61-402 Copper.

c. S.O. Cord: Shall be 600-volt, heavy-duty, Type W, as manufactured by ITT, or approved equal. Size as required. This cord type is not required to be installed in conduit. It shall either be secured to the conveyor such that it is not loose, hanging, or coiled outside of an electrical enclosure or device; or install in an approved open wireway/cable tray.

d. Cord sets shall be Type STOOW for all wet and dry indoor locations. Conductors shall be 600-volt insulation, stranded copper, Class “B” stranding, no solid conductors allowed. All power conductors shall be 12 AWG, minimum. All control wiring shall be No. 14 AWG, minimum. Grounding conductors: #6 AWG and larger: stranded copper, bare soft drawn as required. #8 AWG and smaller: stranded copper with green insulation. This cord type is not required to be installed in conduit. It shall either be secured to the conveyor such that it is not loose, hanging, or coiled outside of an electrical enclosure or device; or install in an approved open wireway/cable tray.

e. VFD Power Cabling: Shall be 600-volt, heavy-duty, shielded cable with drain wire. Size as required. Type shall be as recommended by the VFD manufacturer.

f. Ground Wire: Ground wire shall be insulated copper with green insulation.

5. Color Coding: Baggage system phase wire colors to be: for 277/480-volt--Phase A, brown; Phase B, orange; Phase C, yellow. For 120-volt wire in control panel, red. For 480-volt wire in control panel, black. All panel wires shall have wire numbers at both ends of the wire. For DC voltage, all wire shall be blue with wire numbers both inside and outside of panels. For 120-volt AC outside of the control panel, wire may be any color except brown, orange, yellow, or blue; neutral shall be white; the color of the wire must be consistent between panels and devices, and must be identified by wire numbers. Verify conductor color code with local electrical inspector. Where colors are not available (No. 4 and larger, or by special permission of the Owner), all wires shall be identified within panel boards, cabinets, switchboards, and other accessible locations, using vinyl marking tape with color to match coding of phase wires. Wire markings shall be Brady number tape or sleeve-type number markers.

6. Electric Tape: All taping of electrical connections shall be done with #M Scotch No. 33 plus all-weather vinyl plastic tape, or equal.

2.05 SCANNING EQUIPMENT

A. Automated Bag Tag Reader with RFID Bag Tag Reader:

1. The Laser Bag Tag Reader shall be standard off the shelf components and capable of reading information on a baggage tag for standard baggage as defined herein within the width of the conveyor.

2. Laser bar code readers shall be capable of reading bag tags conforming to IATA Resolution 740 and user’s requirements and standards. The reader system shall meet IATA Recommended Practice 1740d. All bar codes will be USS Interleaved 2 of 5 for both IATA 10 Digit and user’s 10 Digit bar code bag tags.

3. Reader shall provide serial RS 232C, RS 422, and/or RS 485 port signal levels, bit serial ASCII data format, and baud rate between 1200 and 38,400 baud.

4. Individual scanner heads shall be capable of reading a tag having two bar codes oriented orthogonally bi-directional. Bags may have up to three (3) tags in order to provide the required routing information. Reader shall be capable of reading the tags and assimilate the data for use by the supervisory computer system.

5. The reader assembly shall consist of a frame containing 10 scanner heads or cameras with a minimum of 6 scanner heads or cameras optically encircling the conveyor and providing 360 degree read capability with the remaining scanner heads before and after the 6 scanner heads/cameras and overhead in line with the conveyor per the manufacturer's standard bag tag reader array configuration. The reader shall read a minimum of 90% of all bags for proper sortation to their intended destination under the circumstances that the quality of printed tags meets IATA and industry standards. Reader arrays shall be equipped with data reconstruction software. Multiplexers and photoeyes shall be redundant.
6. Bag Tag 10 Head Bar Code Reader Arrays shall be latest technology.
7. Provide a complete radio frequency identification system for reading RFID bag tags, including, but not limited to: dual antenna array, interrogator, software, and all cabling necessary for connection to supervisory computer system. System shall be a passive or active tag system, but it shall be acceptable to the Owner and Airline users. Baggage System Contractor shall submit their preference for a RFID supplier at time of bid for Owner and Airline user review. Connection to supervisory computer system for selected bag identification shall be via RS 232C, RS 422, RS 485, Ethernet TCP/IP, or approved equal protocol.
    a. RFID system shall be in accordance with IATA standards and shall be coordinated with RFID printers used in CUPPS and Ticket Counter Bag Tag Printers.

B. Manual Encoding Station:
1. Provide standard off the self, NEMA 12 rated, UL Approved, FCC Class A, manual encoding console equipment with alphanumeric keypad; text display; 1Mb of memory, minimum; RS 232, RS 422, and RS 485 serial connection capability for interface with computer system. Provide standard off the self, UL Approved, FCC Class A, hand held bar code scanner capable of reading bag tags conforming to IATA Resolution 740 and user's requirements and standards. Scanner shall be coordinated and interface with manual encoding console. The console and scanner shall operate satisfactorily within a temperature range of 32 degrees to 122 degrees F (0 degrees to 50 degrees C) with a relative humidity (non-condensing) of 10% to 90%.

C. Bag Measurement Array:
1. Provide one or more bag size dimensioner(s) on a rigid frame over the conveyor bed where shown on Baggage System Contract Drawings or as necessary for determining out-of-gauge bags for the EDS units. Quantity of dimensioner units at each location shall be determined by the manufacturer and the Contractor to provide necessary redundancy and accuracy. Bag size demensioner unit shall meet the following requirements: 110VAC, 1.5 Amp; Temperature Range 32-104 F (0-40 C); Relative Humidity 10%-90% non-condensing; Serial Communications RS232, RS485, RS422, or 20mA Current Loop; Two aux ports selectable for RS232, RS422, or RS485; RS232 Modem Port; Baud Rate Selectable up to 115K; NEMA 12 (I.P. 54) Enclosure; Visual Diagnostics LEDs for power, idle, laser on, photoeye, tach, trigger out, serial port 1-4 status, auxiliary input, 3 processor status LEDs; Connections for power, photoeye, tach input, parallel I/O, 4 serial ports; FCC (Class A Device) Compliance; Class IIIB 30 nW Laser type; visible laser diode 690 nM.

2.06 SUPERVISORY CONTROL SYSTEM

A. ***Manufacturers and models listed below sets standards for equipment that is commonly available. Where alternate systems are proposed the DB team must demonstrate that controls products have replacement parts that meet industrial standards and are available for maintenance and modifications to the system installed, are compatible with other facility maintenance and controls systems, and are acceptable for use with TSA requirements for the CBIS. Any proprietary systems that rely on special contracts for ongoing maintenance must be justified.***

B. All computer/network system hardware shall be standard off the shelf components. Custom hardware or interface devices are not acceptable. The system shall be designed to operate satisfactorily within a temperature range of 50 degrees to 90 degrees F (10 degrees to 32 degrees C) with a relative humidity (non-condensing) of 20% to 90%. A CD-RW/DVD-ROM unit shall be provided in each computer and server for program loading, program updates, and saving of current system updates. Program updates and transfer shall be accomplished through the CD-RW/DVD-ROM units or VPN connection. Interface with the PLC network shall be through Fast and/or Gigabit Ethernet, or other approved protocol. Interfaces with external devices, manual encoding stations, and remote computers/displays shall be through Fast and/or Gigabit Ethernet or other approved protocol. Supervisory Control System including computers, servers, and other associated equipment shall be capable of installation in standard 19" vertical rack frames. Provide a minimum of 20% spare memory. Hard drive space for each computer or server shall be capable of storing all necessary program software, applications, and achieves required for that computer or server and have sufficient spare capacity as recommended/required by the manufacturer. Computers, servers, and pertinent equipment shall be industrially hardened with the minimum requirements listed below. The minimum required hardware and software is as follows:

1. Physical Servers:
    a. Processor: Processor 10 core, minimum. Processor Cache: 22.00 MB, minimum. Processor Speed: 3.6 GHz, maximum depending on processor, or approved equal.
    b. Maximum Memory: 3.0 TB with 128 GB DDR46.
    c. Memory Slots: 24 DIMM.
    d. Drive Type: 8 or 12 LFF SAS/SATA/SSD 8, 10, 16, 18 or 24 SFF SAS/SATA/SSD 6 SFF rear drive optional or 3 LFF rear drive optional and 2 SFF rear drive optional 20 SFF NVMe optional NVMe support via Express Bay will limit maximum drive capacity.
    e. Power Supply: 2 - 800W Flexible Slot.
    f. Expansion Slots: 8, minimum.
    g. Network Controller: 1 Gb Ethernet Adapter 4-ports per controller.
    h. Storage Controller: Coordinated with processor and other components.
    i. System Fans: Hot-plug redundant fans, standard.
    j. Form Factor: 2U.
    k. Antivirus Software: Latest standard antivirus software.
    l. Operating System: Latest standard operating system. OS must be acceptable to SDCRAA.
    m. OS Media Kits: Latest standard operating system media kit, must be acceptable to SDCRAA.
    n. SQL Server: Latest standard SQL server. Software must be acceptable to SDCRAA.
    o. OPC Server: Latest standard OPC server. Software must be acceptable to SDCRAA.
    p. Graphic Display Software.
    q. High Availability Virtualization Technology Software for hot backup redundancy. For the servers, provide high availability virtualization technology software synchronizing two standard windows servers to create a single windows application environment to achieve hot-backup redundancy with automatic and transparent switchover. This virtual server shall look and act like any other server, but shall have the resiliency of two physical servers providing redundancy. At a minimum, the servers shall be

comprised of two similarly configured hardware and software components to provide redundancy.

s. VNC software.

2 Storage Area Network (SAN):

a. Dual processor, 16–44 cores, or approved equal.

c. Memory: 1TB minimum.

d. Storage: 8 x 450GB SAS hard drives, set up as RAID5 for redundancy and capacity, in total 5TB of usable space, minimum.

e. Networking: 2 x 10GbE (SFP+) and 2 x 1GbE (RJ45) up to 1 additional NICs on dual CPU: 2 x 10GbE (SFP+), 2 x 1GbE (RJ45) or 4 x 1GbE (RJ45).

f. Power Supply: Dual 800W 100/240 VAC @ 50/60 Hz (auto-sensing).

g. Antivirus Software: Standard antivirus software.

3 SCS Workstation Computers:

a. Processor: Latest generation processors, must be acceptable to SDCRAA.

b. Memory: 32 GB memory.

c. Network Controller: 1 Gb Ethernet Adapter 4-ports per controller.

d. Storage: 512 GB PCIe® NVMe™ M.2 SSD, minimum, or approved equal.

e. Secondary storage: 2 TB HDD storage, minimum.

f. Expansion slots: 1 PCIe x4; 1 PCIe x16; 2 PCIe x1; 1 M.2.

g. External I/O Ports: 2 USB 2.0; 4 USB 3.1, minimum.

h. Memory card device: 3-in-1 memory card reader

i. Graphics: Graphics card and software appropriate for the operation, must be acceptable to SDCRAA.

j. Wireless technology: Integrated Bluetooth ® 4.2 and Wireless LAN 802.11 a/b/g/n/ac featuring Dual-band (2.4GHz and 5GHz) 2x2 technology or approved equal.

k. Keyboard and mouse: USB wired keyboard and USB wired optical mouse.

l. Operating system: Latest standard operating system. OS must be acceptable to SDCRAA.

m. Antivirus Software: Latest standard antivirus software. Software must be acceptable to SDCRAA.

n. Software: Latest standard software for operations. Software must be acceptable to SDCRAA.

o. PDF printer for generating PDF's.

p. VNC software.

C. Monitors:

1. Workstation monitors shall be, at a minimum, Two 21.5 Inch Monitor with Adjustable Stand, Wide Screen, VGA/DVI/DP, 1920 x 1080 Screen Resolution; or approved equal.

2. 40" System Status Display monitors shall be, at a minimum, 40" LED monitors, 1920 x 1080 resolution, 0.485 mm display pixel, 700 cd/m2 brightness, 1200:1 static and 300:1 dynamic contrast ratio, 178° horizontal and 178° vertical viewing angle, 9 ms typical response time, 1 HDMI, 1 VGA in, 1 VGA out, 2 DisplayPort, anti-static, anti-glare, plug and play, I/O ports, 120VAC, 32 deg. F to 104 deg. F (0 deg. C to 40 deg. C) with a relative humidity (non-condensing) of 5% to 95% operating temperature.

D. Printers:

1. Printers shall be, at a minimum, laser printer, 1200 by 1200 DPI, 32 PPM, Ethernet Networked. Printers are to be networked to the computers for printing reports and system status.

E. USB Ports: All USB ports shall be USB 3.0 Ports and backward compatible with USB 2.0 and USB 1.1.

F. Software:

1. Provide standard off the shelf software wherever possible and beneficial to the Work. Operating platform software shall be as identified above or approved equal. Virtual Server software, if utilized, shall be standard VM software with High Availability and shall be acceptable to SDCRAA. MDS graphic display software for fault identification shall be standard MDS/SCADA software and shall be acceptable to SDCRAA. Database software shall be standard Database software and shall be acceptable to SDCRAA.

G. Network Switches:

1. Switches shall be managed, rack mountable with Ethernet 10/100 ports and 2 Small Form-Factor Pluggable (SFP) based Gigabit Ethernet ports. Switches shall be in a redundant configuration and shall be configured in coordination with the Airport's I.T. department, so that Airport networks are not impacted.

H. Network Firewalls:

1. Firewalls shall be rack mountable with Failover capability. Firewalls shall be in a redundant configuration and shall be configured in coordination with the Airport's I.T. department, so that Airport networks are not impacted. Firewalls shall be provided for outside network connections, such as VPN connections.

I. VPN Access: VPN access shall be coordinated with SDCRAA.

J. IP Addressing:

1. IP address ranges shall be coordinated with the Owner prior to implementation.

K. Uninterruptible Power Supply:

1. Furnish and install one UPS to provide a minimum of 15 minutes of power to the Supervisory Control System during a power outage, prior to emergency power activation. Each UPS shall have a maintenance bypass switch.

L. Electrical Power Conditioners:

1. The Contractor shall furnish and install power regulators, as required, to ensure that the power to the control systems is properly conditioned.

M. Metal Rack Casework:

1. Vertical Frames: Provide standard 483 mm (19") vertical rack frames complete with enclosure panels, doors, and trim. Finishes to be determined by the Owner. Contractor shall submit examples of finishes for approval. Quantities to be determined by Baggage System Contractor. Refer to Baggage System Contract Drawings for extent of enclosures. Vertical rack shall have lockable doors on front and back of unit, and fan and exhaust unit with filters.

N. Baggage Status Displays:

1. Baggage Removal Point BSD:

a. Provide a 304.8 mm (12") minimum touch screen display, LCD Touch Monitors with small form factor thin profile PCs and mounting bracket, or approved equal. Components must be acceptable to TSA and SDCRAA. Refer to Description of Operations herein for performance requirements.

2. Baggage Inspection Table BSD:
    a. Provide a 381 mm (15”) minimum touch screen display, LCD Touch Monitors with small form factor thin profile PCs and mounting bracket, or approved equal. Components must be acceptable to TSA and SDCRAA. Refer to Description of Operations herein for performance requirements.

PART 3 EXECUTION

3.01 GENERAL

A. The work of the DB team includes all design and coordination between trades for the construction of this facility. Prior to construction it will be the responsibility of the DB team to coordinate all aspects of the BHS and CBIS work in design development with the aid of modeling or other methods. The DB team may consider modifications to the form or layout of the facility and/or BHS design but all major modifications must meet the approval of the Authority.

B. Prior to the work of this section, carefully inspect the work of all other trades and sections and verify that all such work is complete to the point where the work may properly commence.

C. Workmanship: The Work shall be of acceptable quality and be performed by workmen skilled in their trade. Remove and replace lesser-quality work as directed at no additional cost to the Owner. The Owner shall be the judge of the required quality of workmanship.

3.02 EXAMINATION

A. Examine conditions under which baggage system work will be installed.

B. Notify Owner in writing of unsatisfactory conditions.

C. Inspection: Work under this contract shall be subject to inspection by the Owner’s representative to ensure conformity with the drawings, specifications and contract terms. Cooperate with the Owner’s representative and provide assistance at all times for the inspection of the electrical work performed under this contract. Remove covers, operate equipment, conduct insulation tests, or perform all reasonable work, which in the opinion of the Owner’s representative, would be necessary to determine the quality and adequacy of the work performed.

3.03 INSTALLATION

A. Install the conveyor equipment true and properly aligned, complete in all details, in accordance with the specifications and manufacturers’ recommendations, and as indicated on the drawings.

B. Finish all joints smooth and free from snags and protrusions, which, could damage baggage or otherwise cause the system to jam.

C. All rollers and bearings shall be easily accessible for removal. Assemble all equipment in a manner to facilitate routine maintenance.

D. All stairways, catwalks, cross-overs, handrails, fences, working platforms, etc., shall be painted OSHA yellow.

E. Installation Tolerances:
    1. Gaps between end rolls shall not exceed 1” with ½” being a design objective.
    2. Uneven joints in sideguards shall be epoxy filled and ground smooth to eliminate all snag points.

3.02 PHOTOELECTRIC CELLS:

A. Fasten all photoelectric cells and mounting hardware with hex head bolts and Esna stop nuts. Mount photoelectric cells associated with conveyor belt systems no more than one and a half (1.5) inches above the belt surface. Provide necessary openings on sideguards of belt

conveyors. All openings in sideguards shall be ground smooth, to prevent bag damage. Mount photocell reflectors in such a way as to protect them from damage from bags, etc.

3.03 PROGRAMMING

A. Each system shall be programmed by the conveyor supplier or approved representative to function as specified herein. A print out of the programming shall be provided to the airport authority for their use. Refer to submittal requirements identified herein.

B. Contractor shall accomplish and provide all programming of the programmable logic controllers, message centers, and displays. Hardcopy of programming shall be submitted for review and approval. Installation of programming as identified herein shall not be started without approved submittals.

C. Programming shall include synonyms, labels, and comments for all inputs, outputs, and relays.

D. PLC logic shall provide a sequenced start of all motors, to eliminate any power “inrush”.

E. Programming of PLCs and message centers shall cover all operational events.

F. A final draft printed copy (letter size) of the PLC, message center, and display programs shall be provided along with a final draft copy of all of the programming computer files prior to start-up. A final printed copy (letter size) of the PLC, message center, and display programs shall be provided along with a final copy of all of the programming computer files in the O&M Manuals. Refer to submittal requirements herein.

G. Contractor shall provide two copies of the online and offline programming software for the PLCs provided with this system.

H. Contractor to provide a complete set of back-up/rebooting/install CDs for each computer.

I. Software Documentation: Provide latest commercially available nonproprietary software wherever possible and applicable, unless application requires customized programming. Beta software is not acceptable. All software proprietary information shall be provided to the Owner prior to Final Acceptance, but shall not indemnify the Baggage System Contractor for technical defects that occur with the software. Program source codes with Non-Disclosure Agreement and software licenses for this Work shall be owned by the Owner. Applications including, but not limited to, PLC programs, reports, and fault monitoring displays, developed from the software, either non-proprietary or proprietary, shall not be construed as proprietary and shall be owned by the Owner for their use and distribution as necessary for future additions and modifications. If a Non-Disclosure Agreement is not acceptable, then proprietary program source codes shall be placed in escrow for the Owner’s access.

3.04 NEW EQUIPMENT DEMONSTRATION

A. This section applies to any equipment and/or technology outside those listed in this BHS specification section. The Authority is open to innovative and creative BHS solutions outside of traditional Baggage Handling System (BHS) conveyor technologies which the DB Team can propose. However, such new technologies shall be subject to approval of the Authority. The DB team shall be responsible to demonstrate reliability of such technology and its component products in existing airport BHS operations comparable to the new T1 facility. For alternate BHS concepts the DB team must demonstrate that the proposed technology is applicable to this facility design, including simulation of projected baggage flow. Proposal of alternate technologies must address specific application to this installation. Examples of such issues include, but are not limited to, the following: (1) Some technologies have greater space requirements which must be coordinated with facility space programming. (2) Baggage handling concepts such as make-up slides or robotic loading may rely on just-in-time delivery to make-up, which requires temporary storage of bags elsewhere.

B. Pre Installation Demonstration and Testing of New Equipment Types:

1. Any new concept of new Baggage Handling System equipment that the Contractor recommends for the system(s) must first be thoroughly demonstrated prior to the

Owner/Representative's consideration of actual approval or implementation and consistent with substitution request requirements.

2. By mutual agreement between Owner/Representative and the Contractor, the demonstration and/or testing of the new concept of equipment can be achieved through:
   a. Thorough demonstration at the Contractor's Manufacturing Facilities.
   b. Field demonstration at one or more sites that the Contractor has already implemented/installed the new concept equipment, if available.
3. Specific demonstration and testing requirements for the new concept or equipment will be developed by the Owner's Representative.
4. The specific demonstration and testing requirements will identify such requirements as: Number of test cycles, number of hours of "run time", material processing rates, physical characteristics of material to be processed, Mean Time Between Failures, Mean Time to Repair, serviceability, etc.

3.05 CONTRACTOR INTERNAL TESTING:

A. Testing Process:
   1. Contractor Internal Testing.
   2. Owner Commissioning.
   3. TSA TRR Testing.
   4. TSA iSAT.

B. Testing prior to Commissioning:
   1. Contractor shall test the operation and functionality of all controls and PLC programming.
   2. After installation of the complete system(s), Contractor shall test the completed system(s). All testing and "debugging" shall be complete prior to the demonstration of the system(s) during commissioning. The testing shall include:
      a. Complete inspection of all mechanical aspects of the system(s).
      b. Inspect the system(s) and make adjustments to belt and controls as required.
      c. Checkout of the operational controls and safety devices of the system(s) using bags, totes, or boxes.
      d. Test the capability to handle the required sizes and weights of baggage through the system(s) without jamming or toppling of baggage.
      e. Test the capability to handle the required maximum baggage handling rates of the system(s) in total, using all components/units required to achieve the required rates as specified. The operating speed of each component of the system(s) will be measured using a standard device in the presence of the Owner's Representatives and be recorded on the Equipment Description list. Any component not operating within 2 percent of design speed shall be reworked to bring it up to design speed.
      e. Test the sortation of the system to properly sort 100% of the bags using test bags identified in section 3.05.E. Quantity of bags shall be sufficient for 15 minutes of operation at the systems design throughput. All tests shall be conducted with real bags only.
      f. Contractor shall provide at least 40 hours of continuous operation under no-load conditions followed by a complete system(s) inspection for necessary corrections, belt adjustments. Such adjustments may include the requirement for retraining of the belts, re tensioning of the belts and any required shorting of belting material required to meet the maximum take-up adjustment of 2%, as defined under the Section regarding Take-Up Pulleys. The 40 hours of testing shall be conducted a minimum elapsed time of two 20-hour days to a maximum of five 8-hour days.

g. Contractor shall perform a load test for each system complying with the load requirements identified herein. Load test shall be performed on the final complete system. Contractor shall provide the load test demonstration immediately following the Contractor's 40 hour no-load test, before the system can cool down, for each system to be witnessed by the Owner's Representative as part of the commissioning effort, but can be performed prior to actual commissioning.

h. Contractor shall test all interfaces with other systems. Contractor shall coordinate interface testing with all parties involved.

i. The following tests, at a minimum, shall be performed:

(1) Static Inspection:

(a) Mechanical.

(b) Electrical.

(c) Motor Control Panel.

(2) Dynamic Inspection:

(a) Mechanical.

(b) Electrical.

(3) Functional Inspections:

(a) E-Stops.

(b) Bag Jams.

(c) Other Controls.

(d) Basic Functions.

(4) Run-In Period.

C. Test Plan:

1. The Contractor shall provide a Test Plan for each system(s), which shall, at minimum, incorporate the requirements listed above in the Post Installation Testing (Contractor's Internal Testing) section in this Specification.

2. The Contractor is required to develop a Test Plan for each system identify and demonstrate all System Control Functions and in coordination with other applicable building systems (e.g. Fire Alarm, Security Access Control, etc.). The Test Plan is to list each Control Station, Control Devices, etc., and its related control function that is to be demonstrated/tested in a checklist format with "Pass" and "Fail" check boxes, date, and recorder's initials for each item. Items that fail during a test shall be retested after corrections are made and another checklist shall be used in the test recording of the previously failed items. Contractor shall provide Owner with all checklists produced during testing.

3. The Test Plan shall also include the recording of the following information per system(s) Conveyor/Device during the inspection and testing of the system(s). All actual speeds and motor currents shall be measured with the system(s) in a "no-load" condition, i.e., all conveyors of a system running, but without product. Contractor shall complete all recording in the Test Plan.

a. Main Feeds:

(1) Fuse size per phase.

(2) Actual amperage per phase.

b. Transformers:

(1) Fuse size per phase.

(2) Actual amperage per phase.

c. Conveyor/Device Speed:
   (1) Actual center line speed of conveyor/device.
d. Motor Name Plate Data:
   (1) Manufacturer.
   (2) Horsepower.
   (3) Nameplate Current.
   (4) Voltage.
   (5) Phase.
   (6) RPM.
   (7) Frame Size.
   (8) Type.
   (9) Hertz.
   (10) NEMA Design.
   (11) Service Factor.
   (12) Insulation Class.
   (13) Insulation Type.
e. Fuse size per phase.
f. Actual amperage per phase.
g. Overload heater size or designation.

4. Final dynamic and static test results shall be included in the final O & M Manuals for reference information.
5. The material to be used for the Load and Rate Test, plus personnel to handle it, shall be provided by the Contractor. The Contractor shall have all personnel identified by the Owner as Owner's Representatives "on site" during all periods of the system(s) Inspection and Testing. All tests shall be conducted with real bags only, and at the Owner's/Representative's option with laded cartons to supplement available baggage. Contractor shall identify a list of items in the test plan.
6. The Contractor shall provide all necessary testing, measuring, and recording devices required to demonstrate the operational characteristics and performance of the equipment to the satisfaction of the Owner/Representative. At a minimum, the required test equipment shall include: Clamp-on type ammeter, direct read F.P.M. digital readout Tachometer, etc.
7. Rate Test will be run with average length (30"-36") bags. It is the intent of the Specifications that the maximum Processing Rate(s) per minute is for average length bags, not for all 54" maximum length bags per minute.
8. The System Rate Test shall require the demonstration of the system's ability to process the specified items per minute for 15 consecutive minutes.

D. Test Failure:

1. A failure during any test period shall be defined as any design characteristic or malfunction of the Contractor furnished equipment or materials that damages baggage or reduce any operating rate below those specified. Conditions resulting from improper loading of baggage or loading baggage of sizes not included the Specification requirements will not be considered as failures.

E. Test Bags:

1. For all internal testing and commissioning, the following bag sizes and types (smoothed walled and fabric bags) shall be used. Contractor shall coordinate with SDCRAA for any additional bag types that are required for testing.

Bag Type	L - in.	W - in.	H - in.
Upright	27	19	10
Carry-on upright	24	15	9
Rectangular Duffle	22	12	12
Expandable Upright	22	16.5	10
Expandable upright	21.5	17	9
Expandable upright	21.5	14	9
Upright	27	19	10
Rectangular Duffle	22	12	12
Semi-hard shell	28	23	8.5
Semi-hard shell	27	20.5	8.5
Garment bag (folded dimension)	22	21	7
Large Duffle	35	16	15
Duffle	30	15	10
Small duffle	17	9	7
Cooler	30	18	18
Long Case	43	16	6
Long Case	52	16	6

3.06 TSA TESTING AND APPROVAL FOR USE

A. Contractor shall be responsible for all testing and commissioning requirements for TSA regarding not only the CBIS but the full Outbound BHS, according to the applicable PGDS (PGDS v6 or later) with tests stipulated by TSA's testing agent with a Site Specific Test Plan (SSTP) which TSA will provide for this installation. At minimum the Contractor shall be required to conduct testing in the following order, demonstrating passing tests before proceeding to the next level:

1. Conduct all SSTP tests internally with successful results
2. Demonstrate all SSTP tests to the Owner's Representative.
3. Demonstrate all SSTP tests to TSA's Site Lead for the Project.
4. Conduct final SSTP at the direction of TSA's commissioning agent.

3.07 OWNER COMMISSIONING:

A. Contractor shall demonstrate all of the tests identified in section 3.05, above, to be witnessed by the Owner and the Owner's representative(s) after the Contractor has completed their internal testing. Provide test plans for Owner Commissioning as per section 3.05.C, herein, Test bags shall be per section 3.05.E. herein.

B. For baggage screening, the Owner may require additional commissioning tests beyond the TSA testing requirements, including but not limited to: testing for CBIS performance concerns that may impact overall throughput for the airport; testing for areas of the BHS that are not the focus of other testing; testing for equipment or technology new to this facility; additional system tests for alternate BHS technologies new for this facility.

3.08 TRAINING:

A. Contractor shall provide a minimum of 40 hours of training. Contractor shall submit a training syllabus for concurrence by the Owner at least thirty (30) days prior to start of training. Training shall not start until the syllabus and the training schedule is mutually agreed upon between the

Owner and Contractor. The training period shall be a minimum of 40 hours, and provided for all shifts. Training sessions shall be videotaped and the tapes turned over to the Owner. At a minimum, Contractor shall provide the following training:

(1) Operations training: Training shall include “classroom” and “hands on” programs covering cover the operational functions of all systems and all pertinent sections of the Operations and Maintenance Manual.

(2) Maintenance Training: Training shall include “classroom” and “hands on” programs covering actual troubleshooting, adjustment of equipment, and component removal and replacement.

(3) Mechanical Training – Training in the operations and maintenance (including removal, replacement, and set up) of the equipment shall be provided for the systems.

(4) Electrical Training – Training in the operations and maintenance (including removal, replacement, and set up) of the equipment shall be provided for the systems.

(5) Electronic Technicians Training – Training on PLCs and PLC Programming.

3.09 CLEANING:

A. Contractor shall completely clean baggage system equipment prior to turning it over to the Owner and shall protect the equipment from dirt and debris after it has been cleaned until it is turned over to the Owner for use.

B. Prior to startup of the belt conveyors, polish and buff the bed surface smooth and free of sharp edges, dirt, paint and grease. Apply a coating of talc powder between the surfaces of the bed and the belt.

3.10 SPARE PARTS:

A. Spare Parts may be purchased after installation of the systems based on the recommended and critical spare parts list submitted. The Baggage System Contractor shall submit to the Owner’s Representative, at the time that the system(s) design engineering has been completed (both electrical as well as mechanical), a list of all parts used in the development of the system(s). This complete listing of system(s) parts will then be used by the Owner/Representative to develop a listing of parts to be purchased as Spare Parts for the support of the system(s). This list must include the following:

1. Name of part.
2. Complete description of part.
3. Each specific location that the listed part is used in the system(s).
4. Total number of parts in the system(s).
5. Manufacturer of the part.
6. Manufacturer’s part number.
7. Source of supply.
8. Baggage System Contractor recommended quantity of spares per each item.
9. Price per unit.
10. Lead time or availability of part.

C. The listing of the above information regarding parts must be provided for each system.

D. Identify recommended and critical spare parts on the parts list and their prices for components that are not locally available and require shipping.

E. Spare parts shall be deliverable within 24 hours’ notice, except for long lead items.

F. As part of the recommended and critical spare parts list, the following items must be included at a minimum.

1. Gear Reducers: Provide one gear reducer of each type installed.
2. Pulleys: Provide one pulley of each type installed.
3. Bearings: Provide one bearing of each type installed.
4. Belting: Provide one 45 Degree Power Turn belt, one 90 Degree Power Turn belt, and one 90 Degree Spiral Turn belt of each size of Spiral Turn installed.
5. Motor Circuit Protector: Provide one Motor Circuit Protector of each type installed.
6. Motor Starter: Provide one Motor Starter of each type installed.
7. Relays: Provide one Relay of each type installed.
8. PLC: Provide one PLC component of each type installed.
9. 24VDC Power Supply: Provide one 24VDC Power Supply of each type installed.
10. Power Filters: Provide one Power Filter of each type installed.
11. VFDs: Provide one VFD of each type installed.
12. Photoelectric Cell Sensors: Provide one Photoelectric Cell Sensor of each type installed.
13. Tachometers Shaft Encoders: Provide one Tachometers Shaft Encoder of each type installed.
14. Pushbuttons: Provide five Selector Switches Pushbuttons of each type installed.
15. Selector Switches: Provide five Selector Switches of each type installed.
16. Pilot Lights: Provide five Pilot Lights of each type installed.
17. Limit Switches: Provide five Limit Switches of each type installed.
18. Disconnect Switches: Provide one Disconnect Switch of each type installed.
19. Warning Lights, Horns, and Buzzers: Provide one Warning Light, Horn, and Buzzer of each type installed.
20. Network Switches: Provide one Network Switch of each type installed.
21. Firewall Switches: Provide one Firewall Switch of each type installed.
22. Baggage Removal Point – Baggage Status Display: Provide one Baggage Status Display of each type installed.
23. Baggage Inspection Table – Baggage Status Display: Provide one Baggage Status Display of each type installed.

3.11 ACTIVATION:

A. Cutovers:

1. Baggage System Contractor shall provide 16 hours of on-site mechanical, electrical, and programming support for two (2) consecutive days immediately following a cutover of a subsystem. Time of support shall be coordinated with hours of operation. Programming may be performed on-line, provided that on-site staff can support programming efforts.

B. Live Bag Operation:

1. Baggage System Contractor shall provide 16 hours of on-site mechanical, electrical, and programming support for 30 consecutive days immediately following live bag operation in Checked Baggage Inspection System (CBIS). Time of support shall be coordinated with hours of operation. Programming may be performed on-line, provided that on-site staff can support programming efforts.

END OF SECTION

SECTION DC D2: FIRE SUPPRESSION CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire suppression comprises the following elements:

B. Fire Sprinkler and Extinguishing Systems: Elements which automatically extinguish fires; automatic fire suppression is required for the entire building.

C. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 REFERENCE STANDARDS

A. NFPA 13 - Standard for the Installation of Sprinkler Systems; (current edition).

B. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; (current edition).

C. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection; (current edition).

D. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances; (current edition).

E. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems; (current edition).

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide code-required fire suppression regardless of type or coverage specified.

B. Fire Sprinklers: Types as indicated for specific spaces and areas.
   1. Design and construction in accordance with code and NFPA 13.
   2. Provide wet pipe sprinkler systems unless otherwise indicated or required by code.

C. Water Source: Provide water supply as required by NFPA 14.
   1. Determine minimum water supply requirements for each sprinkler system using the hydraulic calculation method defined by NFPA 13.
   2. Provide fire pump designed in accordance with NFPA 20, if determined to be required during hydraulic calculation procedure.
   3. Provide water from a public service main.
   4. Substantiation:
      a. Preliminary Design: Identification of water source.
      b. Design Development: Water supply for each system on the drawings.

D. Where fire protection elements also must function as elements defined within another element group, meet the requirements of both element groups.

E. Where services elements are located outside the building in the site area, meet applicable requirements of Section DC G20 - Site Services Criteria.

F. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

G. Substantiation:
   1. Validation phase: Description of systems required, sources, input-side capacities, and means of distribution.
   2. Preliminary Design: Fire protection areas identified.
   3. Design Development: Fire protection zones indicated on drawings, with riser locations identified.
   4. Design Development: Engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements.

5. Design Development: System equipment locations indicated on drawings, and manufacturer's product data indicating products to be used.
6. Construction Documents: Complete system details.
7. Construction and Closeout: Functional performance testing.

2.02 AMENITY AND COMFORT CRITERIA

A. Leakage: Provide systems that are leak-free.

B. Accessibility: Provide clearances around system components for service and use.
   1. Provide fire department connections as required by code.

C. Appearance:
   1. Provide concealed sprinklers factory-painted to match the interior finish for all front of house and common areas.
   2. Provide recessed, upright, or sidewall sprinklers in other areas as required by NFPA 13 and local fire code.
   3. Provide fire department connections with bright-chrome finish.

2.03 HEALTH AND SAFETY CRITERIA

A. Path of Egress: Provide systems which safeguard path of egress.

B. Fire Source: Provide system materials which do not contribute to the spread of the fire.

C. Fire Spread: Provide systems to limit spread of fire from storage area to office area.

D. Chemical Exposure or Use: Provide systems which limit exposure of occupants to extinguishing agents.

2.04 STRUCTURAL CRITERIA

A. Seismic Design:
   1. Provide a sprinkler system which allows movement where differential movement is anticipated. System shall meet seismic requirements of NFPA 13 and local fire code.
   2. Provide sprinkler system supports capable of supporting twice its installed wet weight.

2.05 DURABILITY CRITERIA

A. Expected Service Life Span:
   1. Provide a sprinkler system which will last a minimum of 10 years in service without major repairs or operating expense when maintained as specified in NFPA 25.
      a. Substantiation:
         1) Preliminary Design: Identification of the system type to be installed.
         2) Design Development: Identification of a similar system in use in an existing facility for 3 years and consisting of components from the same manufacturers.
   2. Sprinkler Heads, Valves, and Other Inlet and Outlet Components: Same as building service life.
   3. Pumps and Other Operating Components: Minimum 20 years.

B. Corrosion Resistance: Use corrosion resistant materials; ferrous metal is not considered corrosion resistant unless it is hot dipped galvanized, chrome plated, or coated with rust inhibitive paint.

C. Vandalism: Provide systems which are tamper-resistant.

2.06 OPERATION AND MAINTENANCE CRITERIA

A. Capacity: As required by code.

B. Ease of Use: Provide easy access to and working clearances around system components.

C. Ease of Service:
   1. Spare Sprinkler Heads: Provide additional sprinkler heads as required by code to service the system.

D. Unauthorized Use: Provide systems which minimize activation and use by unauthorized persons.

E. Maintenance:

END OF SECTION

SECTION DC D3: PLUMBING CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plumbing elements comprise the following:
   1. Water Supply: Water sources and storage.
      a. Water source for fire suppression systems.
   2. Domestic Water: All elements required to distribute water to fixtures, including piping and equipment for water cooling, heating and storage.
      a. Water Distribution: Piping within the building, serving fixtures. specialties, and equipment.
      b. Plumbing Equipment: Pumps, tanks, filters, and treatment equipment.
   3. Sanitary Waste: All elements required for removal of sanitary waste, including piping, venting, discharge and disposal, and equipment.
   4. Rain Water Drainage: All elements required for drainage of rain water from building areas in which it may accumulate and drainage of clear wastes from building services; not including gutters and downspouts or subdrainage.
   5. Plumbing Fixtures: All fixtures necessary for sanitation, occupancy, and use, that are connected to water supply or drainage; not including water heating or conditioning equipment or kitchen appliances.
      a. Fixtures Required: As specified by code and indicated in the basis of design
         1) Lavatories: One in each bathroom.
         2) Lavatories: At public and private restrooms and bathrooms.
            (a) Group lavatories may be used wherever 4 or more lavatories would be required in a single room; 18 inches (460 mm) of group lavatory perimeter qualifies as a substitute for one lavatory.
         3) Kitchen Sinks: Single compartment; one in each kitchen.
         4) Drinking Fountains: Minimum of one on each floor and within 10 feet (3 m) of each restroom.
         5) Showers: One in each shower compartment.
         6) Utility Sinks: One in each janitor's closet.
         11) Utility Water Supply: One in each SU1 space.
         12) Outdoor Supplies: Not more than 50 feet (15 m) apart on building facade and one on each facade of building.
   6. Other Plumbing Elements: Services elements required for:
      a. Supplementary Drinking Water: For breakrooms and kitchens, pet relief area.

B. Utility Sources and Outlets:
   1. Water Source: Existing public utility.
      a. City of San Diego
   2. Rain Water Drainage Outlet: Existing public utility storm drainage system independent of sanitary sewer.

C. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; (current edition).

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide water supply necessary for building occupancy and use.

B. Provide delivery of domestic water to points of utilization.

1. Provide hot and cold domestic water to plumbing fixtures as required.

C. Provide water supply for fire sprinkler system and standpipes.

D. Provide drainage for disposal of waste as required by the code and for the following:
   1. Fixtures and equipment which have a waste connection or a domestic water connection.
      a. Waste connections are not required on icemakers, refrigerators with icemakers, exterior hose bibbs, and coffee makers.
   2. Emergency Drainage: Floor drains located in:
      a. Basements.
      b. Laundry rooms.
      c. Rooms where waterproof membrane is specified or installed under floor finish.
      d. Plumbing chase.
   3. Cleaning Drainage: Floor drains located in:
      a. Kitchens.
      b. Restaurant and bar service areas.
      c. Food storage rooms.
      d. Walk-in freezers and coolers.
      e. Hose-down areas.
   4. Indirect Drainage: Floor drains to receive piping from:
      a. Equipment drain pans.
      b. Condensate drains.
      c. Other equipment that produces clear wastes.
      d. Other equipment specified to have indirect drain.

E. Provide drainage for disposal of rain water and clear wastes, as required by the code.
   1. Drainage of roofs must be accomplished without the use of roof drains.
   2. Drainage of roof areas that do not drain naturally without ponding, including built-in gutters.
   3. Clear wastes include condensate drainage and HVAC cooling water.
   4. Drainage for outdoor areas that are completely surrounded by construction that prevents natural drainage (e.g. areaways) or that are so sloped as to result in accumulation of water or ponding.
   5. Drainage of interior areas where ground water may accumulate naturally, including sump pits and elevator pits.

F. Provide plumbing fixtures necessary for occupancy, use, and sanitation.

G. Provide services for other plumbing elements indicated.

H. Equipment That is Not Part of Services Systems: Specified in the project program and in Sections DC E1 through DC E19.

I. Where plumbing elements must also function as elements defined within another element group, meet the requirements of both element groups.
   1. Services elements within food service spaces shall also comply with requirements of Section DC E11 - Food Service Equipment Criteria.
   2. Where services elements are located outside the building in the site area, meet applicable requirements of Sections DC G2 - Site Services Criteria.

J. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

K. Substantiation:
   1. Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
   2. Design Development: Engineering calculations showing input- and output-side capacities and loads and sizes of distribution elements.
   3. Construction Documents: Complete system details.

4. Construction and Closeout: Functional performance testing, as specified in Section 01 3050.

2.02 AMENITY AND COMFORT CRITERIA

A. Hot Water Supply:
   1. Provide pressure balanced shower valves which limit the water temperature to 120 degrees F (49 degrees C).
   2. Provide a master thermostatic mixing valve which limits the hot water supply temperature to 120 degrees F (49 degrees C).

B. Noise:
   1. Design to prevent noise due to air trapped in piping systems.
   2. Provide water hammer arrestors as shown on drawings to eliminate noise produced by the domestic water fixtures.
   3. Locate risers in dedicated and sound attenuated chases.
   4. Minimize noise produced by fixtures.

C. Convenience:
   1. Water Heaters:
      a. Locate water heaters in utility room.
      b. Do not locate water heaters above ceilings or where the public has access to them.
   2. Fixture Heights: As specified in code.
   3. Fixture Configurations: As specified in code.
   4. Maneuvering Space: Provide comfortable space between and around fixtures.
   5. Maneuvering Space: Provide space between and around fixtures as required by code.
      a. 20 inches (500 mm) to walls or partitions measured from the centerline of the fixture.
      b. 20 inches (500 mm) in front of the fixture.
   6. Water Connections: Hot water on the left side of fixtures and cold water on the right side of fixtures.
   7. Faucets: Single action operation in the following locations.
      a. Lobby restrooms.
      b. Kitchen.
      c. Restrooms.
      d. Private restrooms.
   8. Install floor drains flush with the surface on which they are installed, out of pedestrian traffic patterns wherever possible.
   9. Do not locate floor drains and floor cleanouts in doorways or directly in traffic paths.

D. Condensation:
   1. Insulate horizontal and vertical rain water piping, including the underbody of roof drains, using material of sufficient insulating value to prevent condensation.

E. Odors:
   1. Locate odor producing elements in areas separate from human occupancy in dedicated equipment rooms.
   2. Do not locate sanitary waste vent openings where odors are noticeable by occupants or by occupants of adjacent properties or where odor-bearing air may enter building spaces.
      a. Do not terminate vents within 10 feet (3 m) horizontally of doors, windows, air intake or exhaust openings, or other openings in the exterior enclosure, unless vent termination is at least 3 feet (1 m) above the top of the opening.
      b. Do not locate vent openings under overhangs.
      c. Do not locate vent openings closer than 10 feet (3 m) to lot line.
      d. Extend vent pipes at least 6 inches (150 mm) above the surface of roofs.
         1) Exception: Where roof areas are to be occupied for normal building functions, extend vent pipes at least 7 feet (2200 mm) above the roof surface.
      e. Extend vent pipes at least 12 inches (305 mm) above overflow level of the highest fixture served by the vent.

f. Provide an automatic means of priming traps which may evaporate enough water to break the trap seal allowing sewer gases to enter the building.

3. Connect fixtures to prevent entry of sewer gases into occupied spaces.
4. Provide traps for all indoor drains connected to rain water drainage system.
5. If rain water drainage system connects to sanitary sewer system, provide a trap at the connection.

F. Water Conditioning: Provide water supply with conditioning equipment to remove odors and hardness.

G. Appearance:
1. Do not locate rain water leaders or downspouts where they are visible from the outside of the building.
2. Vents: Conceal vents from view.
3. Fixtures:
a. Smooth, corrosion-resistant, non-absorbent, with no crevices to collect dirt.
b. Aesthetically pleasing and easy and comfortable to use; high style appearance is very important.
c. Color: White, except where metal fixtures are required.

2.03 HEALTH AND SAFETY CRITERIA

A. Health: Provide potable water.
1. Public utility water can be considered to be potable.
2. Maintain the safety of the potable water source at all times.
3. Do not connect the potable water source to any non-potable water source.
4. Keep animals and vermin out of open pipes, tanks, and other system components.
5. Keep other contaminants out of the distribution systems, equipment, and water source.
6. All openings and edges around the sides and bottom of each fixture permanently sealed with waterproof material.
7. Do not locate indirect drains in toilet rooms, unventilated or inaccessible rooms, or in air distribution or return plenums.
8. Provide a backflow prevention device in the sewer discharge to prevent back-up into plumbing fixtures and floor drains.

B. Waste Disposal: Connect each fixture to sanitary drainage system for proper disposal of waste and harmful materials.

C. Pressure Control: Control pressures to protect the building, fixtures, equipment, and occupants from harm.
1. Maximum Water Distribution Working Pressure: 80 psi (550 kPa).
2. Pressure Reduction: Use pressure reducing valves or regulators.
3. Air Removal: Remove air trapped in water distribution system.
4. Water hammer arrestor: Use water hammer arrestors.

D. Excess Pressure Hazard: Include devices to reduce accidental excess pressure to acceptable level, with maximum overpressure of 10 percent over specified system operating pressure, for the following items:
1. Water heaters.
2. Hot water storage tanks.
3. Booster pumps.
4. Hot water recirculating pumps.

E. Prevention of Sewer Gas Leaks:
1. Prevent entry of sewer gases from the sanitary sewer into building's sewer system.

F. Protection of Potable Water Supply: As required by code.

G. Toxic Materials:
1. Lead: Do not use lead or lead-containing materials in potable water systems.

H. Waste Drainage: Provide food handling equipment, food storage equipment, commercial dishwashing, drinking fountains, and water coolers with indirect waste pipe for drainage.

I. Burn Hazards:
   1. Maximum Fixture Discharge Temperature: 120 degrees F (49 degrees C).
   2. Maximum Exposed Surface Temperature: 95 degrees F (35 degrees C).
   3. Protect wheelchair occupants from hot water pipes and drains.

J. Fire Hazards:
   1. Do not use combustible piping materials inside the building.

K. Vermin Resistance: Provide grated coverings for rain water drains to prevent entry of rodents, insects and birds.

L. Hazard Labeling: Clearly label domestic hot water, domestic cold water, rain water drainage, and sanitary waste and vent systems indicating the nature of contents and direction of flow.
   1. Conform to requirements of ASME 13.1.

M. Hazardous Material Drainage: Prevent damage to public utility drainage systems by removing or neutralizing hazardous materials before discharging.

N. Flammable or Toxic Wastes: Provide means of safely disposing of:
   1. Gasoline.
   2. Diesel fuel.
   3. Oil.
   4. Anti-freeze (glycol solution).
   5. Acetone.
   6. Pesticides.

O. Supplementary Drinking Water:
   1. Provide sanitary and sealed water for human consumption.
   2. Provide water from natural sources, such as springs or wells.

2.04 STRUCTURAL CRITERIA

A. Rain Water Drains:
   1. Locate drains to avoid ponding loads in excess of structural capacity.
   2. Prevent inadvertent ponding by protecting drain openings from clogging, using raised strainers with minimum height of 4 inches (102 mm) wherever possible and flat gratings in all other locations.

B. Hub-and-Spigot Pipe Joint Support: Support joints so they do not separate under weight of pipe or live loads.

C. Insulated Pipes: Prevent compression of insulation by using pipe shields or saddles or dense insulation inserts.

D. Fixtures:
   1. Anchored to support weight of fixtures and a minimum of 400 pounds (180 kg) without failure or stress on the connecting pipes.
   2. Wall Mounted Fixtures: Carriers concealed inside fixture and in wall or floor.

2.05 DURABILITY CRITERIA

A. Expected Service Life Span: Same as service life of building unless otherwise indicated.
   1. Piping, Wiring, and Flues: Same as the service life of the building.
   2. Shut-Off Valves and Similar Components: Same as service life of building.
   3. Electrically- and Fuel-Operated Equipment: Minimum 20 years.
   4. Other Moving Components: Minimum 20 years.
   5. Plumbing Fixtures: Same as building service life.
   6. Faucet Valves: 20 years.
      a. Substantiation: Manufacturer's unconditional warranty.
   7. Flushing Mechanisms: 20 years.

a. Substantiation: Manufacturer's unconditional warranty.

B. Water Penetration: Reinforce weather barrier around roof and deck drains using extremely durable, permanently watertight material; one acceptable method is using 4 pound (1.8 kg) sheet lead, extending minimum of 10 inches (250 mm) from center of drain.

C. Moisture: Do not locate water heaters where leakage would cause damage to surrounding building materials, unless drip pans piped to floor drains are provided.

D. Condensation:
1. Provide insulation on cold water pipes, fittings, valves, and equipment to limit condensation.
2. Prevent condensation from forming on or dripping from sanitary drain piping, floor drain bodies, drinking fountain or water cooler waste piping, condensate piping, and p-traps.

E. Temperature Changes: Provide method of allowing thermal expansion of domestic water in the hot water system.
1. Provide expansion tanks with bladders.

F. Wear Resistance:
1. Shutoff Valves: Resistant to corrosion, breakage, and scratching due to continual contact with water, human usage, and cleaning with abrasive materials.
2. Fixtures, Trim and Accessories: Resistant to corrosion, breakage, scratching, burning, fading and chipping due to continual contact with water, human usage, and cleaning with abrasive materials.
a. Acid resistant finish at lavatories.

G. Shock Resistance: Do not use cast iron components where thermal or mechanical shock is expected.

H. Freeze Protection: Protect piping from freezing with heat tracing, where applicable.

I. Joint Durability: Provide watertight joints.

J. Electrical Component Protection:
1. Do not route piping through electrical rooms, switchgear rooms, transformer vaults, and elevator equipment rooms unless it is absolutely necessary.
a. Where piping must be routed near electrical equipment, shield the electrical equipment with drip pans which drain to the nearest floor drain.
2. Substantiation: See tests specified under Operation and Maintenance.

K. Equipment Protection:
1. Domestic Water Distribution System: Provide a filtration device upstream of equipment which may be damaged by debris in the distribution system.

L. Maximum Discharge Temperature into Sewer: 120 degrees F (49 degrees C).

M. Abuse: Protect rain water drainage conductors and leaders by placing in dedicated locations.

N. Resistance to Corrosive Wastes:
1. Where corrosive wastes can be neutralized or diluted below harmful levels, removal is not required; otherwise, provide appropriate interceptors to remove corrosive wastes, including solids.
2. Neutralizing Devices: Automatically operating, using water or neutralizing medium to render basic materials, acidic materials, and other chemical wastes harmless.
a. Construct the drainage system upstream of the neutralizing devices using materials which are resistant to the specific corrosive elements entering the system.
b. Corrosive agents entering the sanitary drainage system which must be neutralized or removed:
1) Hydrochloric acid.
2) Sulfuric acid.
3) Caustic solutions.
3. Oil Interceptors: Located as indicated in program.

4. Sediment Interceptors: Located at each floor drain where significant amount of sand is likely to be tracked in by occupants or blown in by wind.

2.06 OPERATION AND MAINTENANCE CRITERIA

A. Fixture Functions:
   1. Lavatories: Standard spout, with integral overflow.
   2. Urinals: Siphon jet flushing action.
   3. Showers: With single-action hot-cold mixing valve.
   4. Kitchen Sinks: Swivel spout, water spray nozzle.
   5. Drinking Fountains: With hand operation, foot operation; chilled water service.
   6. Utility (Mop or Janitor's) Sinks: Filling of standard rolling mop bucket required; spout designed to support full bucket of water.

B. Water Consumption:
   1. Water Closets: 1.2 gallons (4.5 liter) per flush, maximum, with complete waste removal in one flush.
   2. Urinals: 0.5 gallon (2.0 liter) per flush, maximum, with complete waste removal in one flush.
   3. Lavatory Faucets in Public Restrooms: 0.25 gallon (1 liter) per use.
   4. Lavatory Faucets in Other Areas: 0.25 gallon (1 liter) per use.
   5. Shower Heads: 2.0 gallons (7.5 liter) per minute, maximum.
   6. Drinking Fountains: 2.5 gallons (9.5 liter) per minute.

C. Capacity of Water Service: Provide adequate water flow and pressure to supply peak demand requirements. Comply with requirements specified in the code and the following.
   1. Size the water supply to exceed code by 10 percent.
   2. Water Delivery: If the water source has insufficient flow or pressure, provide means of increasing to required level.
      a. Use booster pumps or elevated storage tanks.
      b. Substantiation:
         1) Design Development: Identification of pressure and flow requirements (design conditions) for the building; verification of source availability at design conditions.
         2) Construction Documents: Equipment to be used to deliver water at design conditions; submit pump curves.
         3) Construction: Test of system flow and pressure; submit report verifying performance.
   3. Water Flow:
      a. Maximum Velocity: 8 fps (2.4 m/s) at the design flow rate.
   4. Water Supply Pressures:
      a. Water Pressure/Flow At Fixtures: 8 psi (55.2 kPa), minimum, except as otherwise required by code.
         1) Showers: 20 psi (138 kPa), minimum.
         2) Blowout Water Closets: 25 psi (172 kPa), minimum.
         3) Flush Valves at Water Closets and Urinals: 15 psi (103 kPa), minimum.
      b. Service Main Working Pressure: 100 psi (690 kPa) at 75 degrees F (24 degrees C).
      c. Water Distribution Working Pressure: 80 psi (550 kPa) at 75 degrees F (24 degrees C).
      d. Pressure Classification: Provide pipe, pipe components, and equipment with a pressure classification of 125 psi (862 kPA).
   5. Substantiation:
      a. Preliminary Design: Analysis and documentation of water supply source and flow conditions.
      b. Design Development: Piping design calculations and entrance locations.

c. Construction: Prior to installation of plumbing fixtures and prior to concealment of piping, air and water tests of piping systems at 110 percent of operating pressure, maintaining pressure for 2 hours to demonstrate system is watertight.
d. Construction: Functional tests of fixtures and equipment.
e. Occupancy: Observation of function during full occupancy simulating extreme conditions.

D. Waste Pipe Sizing:
1. Size piping as required by code.
2. Building Drain: 4 inches (100 mm) diameter, minimum.
3. Buried Piping Below Slabs: 3 inches (75 mm) diameter, minimum.
4. Pipes 3 inches (75 mm) in Diameter and Smaller: Sloped at 1/4 inch per foot (1:50), minimum, downward in the direction of flow.
5. Pipes 4 inches (100 mm) in Diameter and Larger: Sloped at 1/4 inch per foot (1:50), minimum, downward in the direction of flow.
6. Substantiation:
a. Preliminary Design: Analysis and documentation of sewer discharge method and locations.
b. Design Development: Drainage design calculations and documentation of piping outlets.
c. Construction: Air and water pressure tests of piping systems; functional tests of drains and equipment under simulated full occupancy loads.
d. Occupancy: Observation of function during full occupancy simulating extreme conditions.

E. Rain Water Drainage Capacity: As specified in the code and as follows:
1. Design Rainfall Rate: Short storm intensity of 1 inch (25 mm) in any 5 minute period.
2. Secondary Drainage: Required for roofs and exterior structural decks that do not drain naturally. Provide secondary roof drains connected to a secondary drainage system.
3. Rain Water Drainage Capacity:
a. Roof Areas of 10,000 sq ft (930 sq m) and Less: Minimum of two roof drains.
b. Roof Areas of 10,000 sq ft (930 sq m) or More: Minimum of four roof drains.
c. Areaways and Courtyards: Drainage is not required for areas with less than 100 square feet (9 sq m) open to the sky.
4. Drainage Outlets: As specified above and as follows:
a. Secondary Drainage: Drain to completely redundant drain piping system.
b. Scuppers: Drain to grade adjacent to building, rain water drainage system, street gutter, or dry well located in landscaped area.
c. Parking and Service Garages: Drain floor drains into rain water drains, not into sanitary sewer.
d. Areaways and Courtyards: Drain to rain water drainage system, sump pit with pump, dry well located in landscaped area, or water retention pond.
5. Substantiation:
a. Preliminary Design: Analysis and documentation of rain water discharge methods and locations.
b. Design Development: Drainage design calculations and documentation of piping outlets.
c. Construction: Air pressure test to verify continuity of piping; functional tests of each drain.
d. Occupancy: Field observation of performance during at least two storms.

F. Maintenance of Drainage:
1. Sanitary Drainage:
a. Where sewer discharge is higher than item to be drained, provide a means of lifting the waste for drainage.

1) Method of Lifting Waste: Provide a grinder pump ejector or sewage pump and vented sump to lift waste to the sanitary sewer for drainage.

b. Fittings, Joints, and Offsets: As required to ensure optimal flow through horizontal and vertical piping and at changes of direction.

c. Transitions Between Horizontal Piping and Vertical Risers:

1) Sanitary Waste: Sanitary tees, wyes, or wyes and eighth bends.

2) Vents: Wyes, wyes and eighth bends, and short radius fittings.

2. Rain Water Drainage:

a. Pipes sloped at 1/8 inch per foot (1:100), minimum, downward in direction of flow.

G. Energy Efficiency:

1. Circulation Heat Loss: Provide insulation to limit heat loss of domestic hot water to a maximum of 2 degrees F (1 degree C) in any 100 feet (30 meters) of pipe, when water is running, and maximum of 2 degrees F (1 degree C) per hour, when water is standing.

2. Equipment Heat Loss: Provide insulation on the following equipment to limit domestic hot water heat loss to maximum of 2 degrees F (1 degree C) per hour, without energy input:

a. Water softeners.

b. Storage tanks.

c. Water heaters.

d. Hot water expansion tanks.

H. Minimization of Cleaning:

1. Grease Interceptors: Located at drains specifically intended for disposal of grease, as indicated in program.

2. Sediment Interceptors: Located at each floor drain where significant amount of sand is likely to be tracked in by occupants or blown in by wind.

I. Ease of Cleaning:

1. Use wall-mounted fixtures in public restrooms, for ease of cleaning floors.

2. Provide adequate access for cleaning each fixture and the areas around it.

3. Floor Drains: At low points in floor and flush with finish floor surface.

4. Cleanout Plugs: Flush with floor surface.

5. Drain equipment which produces or collects clear waste, such as condensation from cooling coils. Provide piping for the clear waste to the nearest floor drain.

6. Indirect Waste Pipes Over 1 inch (25 mm) Diameter: Provide a means to catch and remove solid materials 1/2 inch (12.7 mm) and larger, such as a strainer.

7. Oil Interceptors: Located as shown on drawings.

J. Ease of Maintenance and Repair:

1. Do not locate underground piping beneath electrical service, equipment, or footings.

2. Provide a shutoff valve at the utility service main and the service entry point.

3. Provide devices at each branch take-off which allow insertion of measurement devices to monitor flow and pressure levels in the water distribution system.

4. Isolation of Piping Segments and Equipment: Provide a means of isolating the following:

a. Each building from main water service. Provide a shut-off valve located inside a valve box whose removable access cover is at grade level.

b. Water meter from building piping.

c. Each tenant space from building service, excluding locations where there is only one fixture with its own isolation valves.

d. Each water branch from main service.

e. Each vertical riser from piping below.

f. Each water branch to fixtures or equipment from main vertical riser.

g. Piping lower than the supply, to prevent unnecessary draining in the case of disconnection.

h. Each plumbing fixture, storage tank, and item of equipment, so that removal of one will not necessitate shutdown of others.

i. Individual fixtures and equipment. Provide an isolation device within 3 feet (900 mm) of pipe connection to item.

5. Provision for Drainage of Water Distribution Piping:
   a. Slope Piping Toward Drain: 1/4 inch per 10 feet (1:500).
   b. Provide a system drain at the lowest point in the system.
   c. Provide an adequately sized drain for the volume of water inside the distribution system.
   d. Drain valve (or fixture shut-off valve) located at each low point.
6. Provision for Cleaning of Drainage Piping: Provide a cleanout as required by code and as follows:
   a. At the upstream end of each horizontal sanitary drainage pipe, for cleaning in direction of flow.
   b. At the dead end of each dead-end pipe.
   c. Pipe 3 inches (75 mm) and Smaller: At intervals of 50 foot (15 m), maximum.
   d. Pipe 4 inches (100 mm) to 6 inches (150 mm): At intervals of 80 foot (24 m), maximum.
   e. Pipe 8 inches (200 mm) and Larger: At intervals of 100 foot (30 m), maximum.
   f. Clearance: As required by code to allow for cleaning and rodding of pipe.
7. Interceptors That Must be Manually Cleaned:
   a. Designed for minimum of 2 months operation between cleanings.
   b. Located close to or in the same area as drains that receive the harmful wastes, for supervision and maintenance by occupants creating the waste.
   c. Removable waste container, with spare.
   d. Substantiation:
      1) Design Development: Manufacturer's maintenance schedule and recommended methods.
8. Plumbing Fixtures:
   a. Faucet valves easily removable and replaceable as a single unit.
   b. Each pipe connection to each fixture provided with a stop valve, for easy disconnection from water service.
   c. Provide access to all concealed connections, such as floor and wall cleanouts and slip-joint connections.
   d. Electrically-Powered Fixtures: Battery-power operation not allowed.

END OF SECTION

SECTION DC D4: HVAC CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. HVAC: Artificial means of maintaining interior space comfort and air quality, including heating, cooling, ventilation, and energy supply.

B. The HVAC system consists of the following elements used to maintain occupant comfort:
   1. Energy Supply: Elements which provide energy.
   2. Heat Generation: Elements required to heat building.
      a. Heat generation elements comprise furnaces, boilers, heat exchangers, heat pumps, and unit heaters.
   3. Refrigeration: Elements necessary to generate the cooling required.
      a. Refrigeration elements comprise water chillers, cooling towers, condensing units, packaged terminal air-conditioners, packaged terminal heat pumps, auxiliary equipment, and evaporative coolers (swamp coolers).
   4. Air Distribution: Elements required to supply, return, and exhaust air associated with heating or cooling the building.
   5. Hydronic Distribution: Elements required to distribute water and other liquids for heating or cooling.
      a. System(s) required include low temperature water system, medium pressure water system, high temperature water system, chilled water system, and low temperature water system and chilled water system.
      b. Configuration - All Systems: Reverse return.
      c. Configuration - Heating Water: Reverse return.
      d. Configuration - Chilled Water: Reverse return.
   6. Not used.
   7. Refrigerant Distribution: Elements required to distribute refrigerant for heating or cooling.
   8. HVAC Controls: Elements required to monitor and control HVAC equipment and systems.
   9. Smoke Control Systems: Elements required to control smoke in the event of a fire and to remove smoke after the fire is extinguished.
   10. Humidification and Dehumidification Equipment.
   11. Energy Recovery Equipment.
   12. Other HVAC elements required to maintain occupant comfort.

1.02 REFERENCE STANDARDS

A. 40 CFR 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks; current edition.

B. AABC MN-1 - AABC National Standards for Total System Balance; (current edition).

C. AHAM DH-1 - Dehumidifiers; (current edition).

D. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; (current edition).

E. AHRI 310/380 - Packaged Terminal Air-Conditioners and Heat Pumps; (current edition).

F. AHRI 340/360 - Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment; (current edition).

G. AHRI 550/590 - Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle; (current edition).

H. AHRI 365 - Commercial and Industrial Unitary Air-Conditioning Condensing Units; (current edition).

I. AHRI 880 (I-P) - Performance Rating of Air Terminals; (current edition).

J. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; (current edition).

K. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; (current edition).

L. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; (current edition).

M. ASHRAE Std 55 - Thermal Environmental Conditions for Human Occupancy; (current edition).

N. ASHRAE Std 62.1 - Laboratory Method of Testing to Determine the Sound Power in a Duct; (current edition).

O. ASHRAE Std 13256-1 - Water-Source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-Air and Brine-to-Air Heat Pumps; (current edition).

P. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; (current edition).

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide natural and artificial means of controlling temperature, relative humidity, velocity and direction of air motion in the interior spaces enclosed by the shell, and reduction of airborne odors, particulates, and contaminant gases.
   1. Design HVAC to provide 100 percent redundant systems.
   2. Entering Chilled Water Temperature: 45 degrees F (7.2 degrees C).
   3. Leaving Chilled Water Temperature: 55 degrees F (12.8 degrees C).
   4. Entering Heating Water Temperature: 180 degrees F (82 degrees C).
      a. Heating Water Reset: Reset temperature based on outside air temperature.
   5. Leaving Heating Water Temperature: 160 degrees F (71 degrees C).
   6. Cooling Leaving Air Temperature: 55 degrees F (12.8 degrees C).
   7. Heating Leaving Air Temperature: 105 degrees F (40 degrees C).
   8. Entering Condenser Water Temperature: 95 degrees F (35 degrees C).
   9. Leaving Condenser Water Temperature: 85 degrees F (30 degrees C).
   10. Entering Air Temperature: 77 degrees F (25 degrees C), wet-bulb; 88 degrees F (48 degrees C), dry-bulb.

B. Provide natural gas for use by HVAC, plumbing, and process equipment as follows:
   1. System Capacity: Provide a fuel supply line (pipe) with capacity to serve the facility plus 50 percent reserve capacity.

C. Provide the necessary equipment and infrastructure to deliver heat to the conditioned spaces.

D. Provide the necessary equipment to generate the cooling required to maintain building comfort.
   1. Tonnage: XXXX tons (XXX kW).
   2. Chilled Water Flow: XXX gpm (XX L/s).
   3. Evaporator Pressure Drop: XX feet of water (XX kPa).
   4. Evaporator Fouling Factor: 0.0005 sq ft deg F hr/Btu (0.0001 sq m deg C/W).
   5. Condenser Water Flow: XX gpm (XX L/s).
   6. Condenser Pressure Drop: XX feet of water (20 kPa).
   7. Condenser Fouling Factor: 0.0005 sq ft deg F hr/Btu (0.0001 sq m deg C/W).

E. Distribute air to maintain the required space conditions.
   1. Maximum Air Velocity:
      a. For 10 Inches W.G. (2500 Pa) Duct Pressure Class: 2000 feet per minute (10 m/s).
      b. For 8 Inches W.G. (2000 Pa) Duct Pressure Class: 2000 feet per minute (10 m/s).
      c. For 6 Inches W.G. (1500 Pa) Duct Pressure Class: 2000 feet per minute (10 m/s).
      d. For 4 Inches W.G. (2000 Pa) Duct Pressure Class: 2000 feet per minute (10 m/s).
      e. For 3 Inches W.G. (750 Pa) Duct Pressure Class: 1800 feet per minute (9 m/s).
      f. For 2 Inches W.G. (500 Pa) Duct Pressure Class: 1500 feet per minute (8 m/s).
      g. For 1 Inch W.G. (250 Pa) Duct Pressure Class: 1500 feet per minute (8 m/s).

h. For 0.5 Inches W.G. (125 Pa) Duct Pressure Class: 1000 feet per minute (5 m/s).

F. Smoke Control: Provide a system to evacuate smoke after fire has been extinguished.

G. Distribute heating water and cooling water to maintain the required space conditions.
1. Site Steam Distribution Pressure: N/A.
2. Site Condensate System Pressure: 30 psig (210 kPa).
3. Site Chilled Water:
   a. System Pressure: 30 psig (210 kPa).
   b. Distribution Temperature: 45 deg F (7.2 deg C).
4. Site Heating Water:
   a. System Pressure: 30 psig (210 kPa).
   b. Distribution Temperature: 180 deg F (82 deg C).
5. Site Dual Temperature:
   a. System Pressure: 30 psig (210 kPa).
   b. Chilled Water Distribution Temperature: 45 deg F (7.2 deg C).
   c. Heating Water Distribution Temperature: 180 deg F (82 deg C).
6. Building Systems:
   a. Steam System Pressure: N/A.
   b. Steam Velocity: N/A.
   c. Condensate System Pressure: 30 psig (210 kPa).
   d. Heating Water System Pressure: 125 psig (860 kPa), maximum.
   e. Chilled Water System Pressure: 125 psig (860 kPa), maximum.
   f. Water Velocity: 5 feet per second (1.5 meters per second), maximum.

H. Provide the elements necessary to control the building's indoor environment.
1. Provide a programmable thermostat for each zone to maintain the required space conditions and local, packaged control for each major piece of HVAC equipment. A building control system is not required.
2. Zoning and Space Temperature Control:
   a. Dedicated terminal unit and thermostat for each separated space.
   b. Dedicated terminal unit and thermostat for each corner space.
   c. Maximum Interior Zone Size - Cooling Mode: 1500 square feet (139 square meters).
   d. Maximum Interior Zone Size - Heating Mode: 1500 square feet (139 square meters).
   e. Maximum Exterior Zone Size - Cooling Mode: 300 square feet (28 square meters).
   f. Maximum Exterior Zone Size - Cooling Mode: 300 square feet (28 square meters).

I. Provide monitoring of major pieces of HVAC equipment.

J. Monitor the following equipment:
1. Air terminals.
2. Air handlers.
   a. On-off status.
   b. Entering air temperature.
   c. Leaving air temperature.
   d. Entering chilled water temperature.
   e. Leaving chilled water temperature.
   f. Entering heating water temperature.
   g. Leaving heating water temperature.
   h. Supply fan airflow.
   i.. Return fan airflow.
   j. Exhaust fan airflow.
   k. Outside airflow.
   l. Filter static pressure.
3. Chillers.
   a. On-off status.
   b. Entering chilled water temperature.

c. Leaving chilled water temperature.
d. Entering condenser water temperature.
e. Leaving condenser water temperature.
f. Percent of full load.
g. Chilled water flow.
h. Condenser water flow.
i. Safety controls.

4. Boilers.
a. On-off status.
b. Percent of full load.
c. Safety controls.

5. Cooling Towers.
a. On-off status.
b. Entering condenser water temperature.
c. Leaving condenser water temperature.
d. Percent of full load.
e. Fan status.
f. Condenser water flow.
g. Freeze protection status.

6. Packaged terminal air-conditioning units.
7. Fan coil units.
8. Unit ventilators.
9. Furnace: On-off status.
10. Pumps: On-off status.

K. Control the following equipment:

1. Air terminals.
2. Air handlers.
a. Start-stop.
b. Entering air temperature.
c. Leaving air temperature.
d. Entering chilled water temperature.
e. Leaving chilled water temperature.
f. Entering heating water temperature.
g. Leaving heating water temperature.
h. Outside airflow.
i. Filter static pressure.
j. Supply fan airflow.
k. Return fan airflow.
l. Exhaust fan airflow.

3. Chillers.
a. Start-stop.
b. Entering chilled water temperature.
c. Leaving chilled water temperature.
d. Entering condenser water temperature.
e. Leaving condenser water temperature.
f. Percent of full load.
g. Chilled water flow.
h. Condenser water flow.
i. Safety controls.

4. Boilers.
a. Start-stop.
b. Water pressure.
c. Leaving water pressure.

d. Percent of full load.
e. Safety controls.

5. Cooling towers.
   a. Start-stop.
   b. Entering condenser water temperature.
   c. Leaving condenser water temperature.
   d. Percent of full load.
   e. Fan status.
   f. Condenser water flow.
   g. Freeze protection status.
6. Packaged terminal air-conditioning units.
7. Fan coil units.
8. Unit ventilators.
9. Furnace: Start-stop.
10. Pumps: Start-stop.

L. Where HVAC elements also must function as elements defined within another element group, meet the requirements of both element groups.

M. Where services elements are located outside the building in the site area, meet applicable requirements of Section DC G2 - Site Services Criteria.

N. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

O. Substantiation:
1. Proposal: Description of systems required, sources, input-side capacities, and means of distribution.
2. Preliminary Design: Estimated HVAC loads and design criteria; plans indicating occupancy types with special HVAC requirements shown.
3. Design Development: Design calculations; documents showing zoning, air handlers, air terminals, equipment locations, equipment sizes, and air distribution; sample manufacturer data showing capacity available.
4. Construction Documents: Complete system details.
5. Construction: Manufacturer's data showing performance, certified by independent testing agency.
6. Construction: Testing, adjusting, and balancing report indicating initial airflow, final airflow, initial temperature, and final temperature of each conditioned space. Measurement of parameters during summer when the outside air temperature is within 10 percent of the summer design conditions and during the winter when the outside air temperature is within 10 percent of the winter design conditions.
7. Construction: Report conforming to the requirements of AABC Test & Balance Procedures.
8. Construction and Closeout: Functional performance testing.

2.02 AMENITY AND COMFORT CRITERIA

A. Space Temperature Setpoint: As specified in Section DC 0 and as follows:
1. Computer Room: 72 deg F (22 deg C), plus or minus 0.5 deg F (0.3 deg C).
2. Uninterruptible Power Supply Room: 70 deg F (21 deg C), plus or minus 2 deg F (1 deg C).

B. Space Temperature Control: Coordination of air distribution system's design and installation with zoning and space temperature requirements.
1. Maintain winter effective temperature as defined by ASHRAE Std 55 between 68 degrees F (20 degrees C) and 74 degrees F (23.5 degrees C).
2. Maintain summer effective temperature as defined by ASHRAE Std 55 between 73 degrees F (23 degrees C) and 79 degrees F (26 degrees C).
3. Vertical Air Temperature Difference: Comply with requirements of ASHRAE Std 55.

a. Substantiation:
1) Measure dry-bulb temperature as specified in ASHRAE Std 55.

C. Humidity Control:
1. Maintain relative humidity between 30 and 60 percent in habitable spaces.
2. Provide monitoring and control of humidification equipment.
3. Provide dehumidification equipment in areas of high humidity.
4. Provide humidification equipment in computer rooms, in museum artifact storage and display areas, and in library rare book storage and display areas.
a. Maintain relative humidity between 20 and 60 percent in these spaces.
5. Capacity:
a. Humidifiers: 100 pounds (45 kg) of steam per hour).
b. Dehumidifiers: 15 pints (7 L) of moisture per day; rated in accordance with AHAM DH-1.
6. Substantiation:
a. Closeout: Measurement of temperature and humidity in each occupied space.
1) One measurement in the summer (outdoor air temperature above TBD by Authority) and one measurement in the winter (outdoor air temperature below TBD by Authority), within first year of occupancy.

D. Air Movement:
1. Provide an air distribution system that limits the air velocity to 50 fpm (0.25 m/s), maximum.
2. Adjustments: Provide an air distribution system which allows relocating supply diffusers, adjusting direction of airflow from supply diffusers, adjusting dampers, and changing the thermostat setpoint.
3. Substantiation:
a. Occupancy: Measure air movement at work station in accordance with ASHRAE Std 55 in areas where more than 10 percent of the occupants are uncomfortable and adjust air distribution system to make occupants comfortable.

E. Acoustical Performance:
1. Air Distribution Background Noise: Provide systems which comply with the acoustical requirements of Section DC C - Interiors Criteria.
2. Equipment: Provide equipment with sound ratings which comply with testing and rating requirements of AHRI 880 (I-P).
a. Substantiation:
1) Design Development: Equipment acoustical performance data.
2) Construction: Tested and rated air terminals.

F. Indoor Air Quality: Provide sufficient ventilation to obtain acceptable indoor quality, determined using the Ventilation Rate Procedure of ASHRAE Std 62.1.
1. Substantiation:
a. Design Development: Engineering analysis.
b. Occupancy: Field testing and survey of occupants.

G. Fuel Leakage: Provide leak-free fuel distribution systems.
1. Provide containment of No. 2 diesel fuel oil as required by 40 CFR 280.
2. Provide double-wall containment of No. 2 diesel fuel oil distribution system and comply with requirements of 40 CFR 280.
3. Monitoring and Leak Detection:
a. Provide tank monitoring as required by 40 CFR 280.
1) Inventory control.
2) Manual tank gauging.
3) Tank tightness testing.
4) Automatic tank gauging.
5) Vapor monitoring.

6) Ground-water monitoring.
7) Interstitial monitoring.
8) Other monitoring methods.

b. Provide pipe monitoring as required by 40 CFR 280.
1) Automatic line leak detectors.
2) Line tightness testing.

H. Convenience: Provide a central location to monitor and control each zone setpoint.

I. Cleanliness:
1. Provide filtration of the air distributed to the occupied spaces.
2. Filter Efficiency: MERV 13, minimum, in accordance with ASHRAE Std 52.2.

J. Appearance:
1. Diffuser Shape: Provide square diffusers.
2. Diffuser Face: Provide perforated face diffusers.
3. Linear Diffusers: Provide single slot linear diffusers.
4. Diffuser Color: Provide diffusers with ceiling matching color.

2.03 HEALTH AND SAFETY CRITERIA

A. Life Safety: Provide interconnection and coordination of HVAC controls with other life safety systems.

B. Fire Sources:
1. Provide products which are rated for the specific locations where they are installed.
2. Provide distribution elements constructed from incombustible materials.

C. Fire Spread: Provide interlocks to prevent operation or start-up of air distribution elements when fire or smoke detection systems are in alarm condition.

D. Systems Safety:
1. Fuel System Design Pressure: 125 psig (850 kPa), minimum.
2. Natural and LP Gas: Comply with ICC International Fuel Gas Code.
a. Natural Gas System Working Pressure: 5 psig (34 kPa), maximum.
b. Natural Gas Entrance into Facility: Locate the service meter at least 3 feet (1 m) from ignition sources.
c. Liquefied Petroleum System Working Pressure: 10 psig (69 kPa), maximum.
3. Diesel Fuel: Comply with ICC International Mechanical Code.
a. System Working Pressure: 5 psig (34 kPa), maximum.
4. Boiler Design: Design boilers to conform to construction standards of ASME Boiler and Pressure Vessel Code, Section IV, Rules for Construction of Heating Boilers, or Section I, Rules for Construction of Power Boilers.
a. Operating Water Pressure and Temperature: 160 psig (1100 kPa) at 250 degrees F (120 degrees C).
5. Condensing Units: Construct condensing units to ASHRAE Std 15, Safety Standard for Refrigeration Systems.
6. Chillers: Construct chiller pressure vessels to comply with ASME Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels, including both coolers and condensers.
7. Hydronic Systems: Provide pressure relief valves to prevent over pressurizing the systems.
8. Air Coils: Provide air coils with pressure ratings of 450 psig (3100 kPa) and which exceed the pressure rating of the system in which they are installed.
9. Substantiation:
a. Preliminary Design: Identification of each piece of equipment requiring fuel or operating under pressure.
b. Design Development: Distribution system and equipment connections shown on drawings.

c. Construction: Functional performance testing; proper fuel supply, combustion, and venting.

E. Burn Hazards: Provide boilers and furnaces which safeguard people, property and equipment from the following potential hazards:
1. Exposure to open flames.
2. Exposure to hot surfaces.

F. Bacterial Growth: Provide humidifiers which do not promote the growth of microorganisms.

G. Accident Prevention:
1. Cooling Towers: Provide safe access to all parts that must be serviced, including railings at edges of platforms and cages on ladders.
2. Where maintenance personnel could be exposed to chemicals during routine maintenance and repair, furnish all personal safety equipment and clothing necessary for adequate protection.

H. Emergency Power: Provide emergency power in accordance with code plus the following equipment:
1. Air handler serving the computer room.
2. Smoke control system fans.
3. Chillers.
4. Boilers.
5. Cooling towers.

I. Electrical Shock Prevention:
1. Electrically Operated Equipment: Tested and listed by UL.
2. Provide a means of disconnecting power at each piece of equipment.
3. Provide a disconnect switch at each powered induction unit and electric reheat coil.

J. Smoke Control: Coordinate control of ventilation fans, supply fans, return fans, exhaust fans, and dampers with smoke control system.

K. Refrigerants:
1. Comply with the requirements of ASHRAE Std 15.
2. Prevent release of refrigerant to atmosphere.
3. Prevent exposure of occupants to hazardous refrigerants.
4. Substantiation:
a. Construction: Measurement of refrigerant concentration in mechanical equipment rooms where refrigerants are located.

L. Accidental Explosion: Provide ventilation to prevent build-up of explosive gases as follows:
1. Uninterruptible Power Supply Room: 2 cfm per sq. ft. (10 L/s per sq m).

2.04 STRUCTURAL CRITERIA

A. Seismic Protection:
1. Provide fuel distribution system with the ability to flex where differential movement is anticipated.
2. Provide fuel distribution system supports capable of supporting twice its installed weight.

2.05 DURABILITY CRITERIA

A. Expected Service Life Span:
1. HVAC:
a. Shut-Off Valves: Minimum 10 years.
b. Dampers, Louvers, Registers, Grilles: Same as service life of building.
c. Main Heat Generation and Cooling Equipment: Minimum 20 years.
d. Secondary Equipment: Minimum 10 years.
2. Energy Supply System: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.

3. Air Distribution System: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
4. Hydronic Distribution Systems: Provide a heating water and chilled water system which will last a minimum of 10 years in service without major repairs or operating expense.
5. HVAC Control System: Provide a system which will last a minimum of 10 years in service without major repairs or operating expense.
    a. Substantiation:
        1) Design Development: Identification of a similar system in use in an existing facility for 3 years and manufactured by the existing controls system manufacturer.
        2) Design Development: Identification of a system manufactured by Siemens.

B. Aesthetic Life Span: Provide units exposed within the occupied space which will not fade, chip, or peel for a minimum of 10 years.

C. Temperature Endurance:
1. Equipment: Provide equipment designed for ambient temperatures ranging from 50 degrees F to 122 degrees F (10 degrees C to 50 degrees C).
2. Chimneys and Flues: Provide flues designed for flue gas temperature of 400 degrees F (204 degrees C).

D. Erosion Control: Provide a means of removing air from cooling water and heating water distribution systems to prevent erosion. Design systems in a manner to prevent cavitation.

E. Corrosion Control: Drain condensate from cooling coils to prevent corrosion of associated equipment.

F. Underground Piping Corrosion Control: See Section DC 0 - Facility Design Criteria.

G. Pipe Stress and Strain Control: Provide pipe loops, bends, expansion joints, and flexible pipie connectors to reduce stress and strain due to expansion and contraction.

H. Vandalism:
1. Energy Supply: Protect the service meters from unauthorized access.
2. Control System: Protect the system field panels from unauthorized access.

I. Accidental Damage:
1. Protect service meters from accidental damage by installing bollards to stop vehicles.
2. Protect ductwork from accidental damage.
3. Exposed Units within Occupied Spaces: Heavy gage, galvanized sheet steel, painted casing.
4. Protect thermostats from accidental damage.

2.06 OPERATION AND MAINTENANCE CRITERIA

A. HVAC Reliability:
1. Chillers: Provide multiple chillers to deliver design load capacity.
    a. For 2 Chillers: Size each at 60 percent of design load capacity.
    b. For 3 Chillers: Size each at 50 percent of design load capacity.
    c. For 4 Chillers: Size each at 40 percent of design load capacity.
2. Boilers: Provide multiple boilers to deliver design load capacity.
    a. For 2 Boilers: Size each at 60 percent of design load capacity.
    b. For 3 Boilers: Size each at 50 percent of design load capacity.
    c. For 4 Boilers: Size each at 40 percent of design load capacity.
3. Cooling Towers: Provide multiple cooling towers to deliver design load capacity.
    a. For 2 Cooling Towers: Size each at 60 percent of design load capacity.
    b. For 3 Cooling Towers: Size each at 50 percent of design load capacity.
    c. For 4 Cooling Towers: Size each at 40 percent of design load capacity.
4. Pumps: Provide multiple pumps to deliver design flow requirements.
    a. For 2 Pumps: Size each at 100 percent of design flow.
    b. For 3 Pumps: Size each at 50 percent of design flow.

c. For 4 Pumps: Size each at 33.3 percent of design flow.
d. Provide a stand-by pump for each chiller, boiler, and condenser water pump.

5. Substantiation:
   a. Preliminary Design: Identification of design strategies to minimize HVAC disturbances.
   b. Design Documents: Identification of equipment that requires redundancy.
   c. Construction: Functional performance testing.
   d. Occupancy:
      1) If equipment is damaged or malfunctions within one year after completion, reporting of the cause of equipment damage or malfunctions.
      2) Corrective Action: Provide corrective measures necessary to eliminate equipment damage and malfunctions.
      3) Corrective Action Report: Identification of corrective measures implemented to protect HVAC equipment. Verify that HVAC equipment is operating properly and without damage.

B. Energy Efficiency:
1. Chillers:
   a. Energy Efficiency Ratio (EER): 8, calculated as specified in AHRI 550/590 (I-P).
   b. Integrated Part Load Value (IPLV): 10, calculated as specified in AHRI 550/590 (I-P).
2. Condensing Unit Integrated Part Load Value (IPLV): 10, calculated as specified in AHRI 365 (I-P).
3. Condensing Unit Energy Efficiency Ratio (EER): 8, minimum, at standard rating conditions specified in AHRI 365.
4. Packaged Terminal Air-Conditioners - Heat Pumps:
   a. PTAC Heating Coefficient of Performance (COP): 3, minimum, calculated as specified by AHRI 310/380.
   b. PTAC Cooling Energy Efficiency Ratio: 10, minimum, at standard rating conditions specified by AHRI 310/380.
5. Water-Source Heat Pump Coefficient of Performance (COP): 3.8 W per W, minimum, calculated as specified by ASHRAE Std 13256-1.
6. Water-Source Heat Pump Energy Efficiency Ratio (EER): 9.3 Btuh per W, minimum, at standard rating conditions specified by ASHRAE Std 13256-1
7. Ground Water-Source Heat Pump Coefficient of Performance (COP): 3.4 W per W, minimum, calculated as specified by ASHRAE Std 13256-1.
8. Ground Water-Source Heat Pump Energy Efficiency Ratio (EER): 11 Btuh per W, minimum, at standard rating conditions specified by ASHRAE Std 13256-1.
9. Water-Source Heat Pump Coefficient of Performance (COP): 3.4 W per W, minimum, calculated as specified by ASHRAE Std 13256-1.
10. Water-Source Heat Pump Energy Efficiency Ratio (EER): 11 Btuh per W, minimum, at standard rating conditions specified by ASHRAE Std 13256-1.
11. Air-Source Heat Pump Integrated Part Load Value (IPLV): 8.3 kW per ton of refrigeration, minimum, calculated as specified by AHRI 210/240 or AHRI 340/360.
12. Air-Source Heat Pump Seasonal Energy Efficiency Ratio (SEER): 10 W per W, minimum, at standard rating conditions specified by AHRI 210/240 or AHRI 340/360.
13. Unitary Air-Conditioner Integrated Part Load Value (IPLV): 10kW per ton of refrigeration, minimum, calculated as specified by AHRI 210/240 or AHRI 340/360.
14. Unitary Air-Conditioner Seasonal Energy Efficiency Ratio (SEER): 10 Btuh per W, minimum, at standard rating conditions specified by AHRI 210/240 or AHRI 340/360.
15. Energy Recovery Units:
   a. Sensible Heat Recovery: 95 percent, minimum.
   b. Latent Heat Recovery: 95 percent, minimum.
16. Control System: Provide the following control functions or features:
   a. Holiday scheduling.

b. Night setback.
c. Outside air economizer.
d. Waterside economizer.
e. Boiler staging.
f. Boiler optimization.
g. Chiller staging.
h. Optimum start.
i. Optimum stop.
j. Chilled water temperature reset.
k. Heating water temperature reset.
l. Cooling tower staging.
m. Variable speed pumping.
n. Demand limiting and load shedding.

17. Substantiation:
    a. Preliminary Design: Efficiency of proposed equipment.
    b. Design Development: Manufacturers published efficiency for equipment selected for this project.
    c. Construction: Equipment with manufacturers label listing efficiency certified by independent testing agency.

C. Pump Efficiency: Match pump pressure and flow characteristics with the pressure and flow characteristics of the distribution system.
    1. Substantiation:
        a. Preliminary Design: Identification of the type of pump to be used.
        b. Design Development: Calculations showing the hydronic distribution water flow and pressure requirements and pump data supporting pump selection.
        c. Construction: Calculations showing the hydronic system pressure requirements; manufacturer's pump curve for each pump used.

D. Fan Efficiency:
    1. Propeller Fans: Do not use propeller fans at static pressure above 1 inch water gage (250 Pa).
    2. Fans: Match fan pressure characteristics to the air distribution system pressure characteristics including the system effect factors; pressure characteristics based on AMCA 210 fan ratings and system characteristics based on engineering calculations.
    3. Substantiation:
        a. Preliminary Design: Identification of the type of fan to be used.
        b. Design: Calculations showing the air distribution pressure characteristics and data supporting the selection of the fan.
        c. Construction: Calculations showing the air distribution systems pressure characteristics; AMCA seal and ratings on each fan used.

E. Air Distribution Efficiency: Provide duct construction in accordance with SMACNA HVAC Duct Construction Standards, based on the following:
    1. Supply Duct Pressure Class: 2 inches w.g. (500 Pa).
    2. Return Duct Pressure Class: 2 inches w.g. (500 Pa).
    3. Outside Air Duct Pressure Class: 2 inches w.g. (500 Pa).
    4. Exhaust Duct Pressure Class: 2 inches w.g. (500 Pa).
    5. Transfer Duct Pressure Class: 2 inches w.g. (500 Pa).
    6. Duct Pressure Class: 2 inches w.g. (500 Pa) for ducts between the supply fan and the terminal boxes. All other duct applications 1 inch w.g. (250 Pa)
    7. Duct Seal Class A for Duct Pressure Classes 4 inches w.g. (1000 Pa) and above.
    8. Duct Seal Class B for Duct Pressure Classes 3 inches w.g. (750 Pa), and 2 inches w.g. (500 Pa).
    9. Duct Seal Class C for Duct Pressure Class 1 inch w.g. (250 Pa), and 0.5 inches w.g. (125 Pa).

10. Substantiation:
    a. Design Development: Identification of ducts to be tested; all duct systems.
        1) Allowable Leakage Rate: Definition of leakage rates for each system to be tested.
            (a) Duct Pressure Class TBD by Authority and Duct Seal Class TBD by Authority; Leakage Rate: TBD by Authority cfm per 100 square feet (TBD by Authority L/s per square meter).
    b. Construction: Verification of mock-up leakage rate.
        1) Remedial Action: Replacement of duct whose leakage rate exceeds the allowable leakage rate requirements.

F. Electric Power Conservation: Provide random start function to prevent simultaneous start-up of multiple units that would increase peak demand.

G. Ease of Use:
1. Design access to and working clearances around heating equipment as recommended by the manufacturer.
2. Air Distribution: Provide terminal units with individual controls adjustable by occupant of space.
3. Locate fuel piping system mains in dedicated piping chases.
4. Control System:
    a. Locate field panels in electrical closets.
    b. Locate the central controller in the maintenance office.
    c. Provide a system which is user programmable.
    d. Provide field panels which are independent and do not need the central controller to continue functioning.

H. Ease of Service:
1. Provide shut-off valves as required by code.
2. Air Distribution: Provide units which are modular in design.
3. Hydronic Distribution: Provide manholes and valves at branch take-offs for each building, and at 500 foot (150 m) intervals to stop in case of breakage.
4. Control System: Provide a system of modular design.

I. Ease of Cleaning:
1. Equipment: Provide units with removable access panels to allow cleaning.

J. Allowance for Change and Expansion: Provide a building control system which is expandable to meet future needs.
1. Interchangeability of Parts: Allow for new devices made by a different manufacturer than the original installation.
2. Spare Capacity: Provide sensors and points required to perform as specified and add 50 percent more points.
3. Spare Capacity: Provide sensors and points required to perform as specified and add 30 points more than required.
4. Spare Capacity: Provide a central controller with field panel slots to perform as specified and add 50 percent more slots in the central controller.
5. Spare Capacity: Provide a central controller with field panel slots to perform as specified and add 5 open slots in the central controller.
6. Spare Capacity: TBD by Authority.

K. Owner Personnel Training:
1. Operational: Minimum of 8 hours, for 1 person, for each separate system.
2. Maintenance: Minimum of 8 hours, for 1 person, for each separate system.

END OF SECTION

SECTION DC D6: ELECTRICAL CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical: Provision and distribution of electrical power to operate all electrically-operated devices, including those included under other services and those provided separately by the Owner; artificial lighting to illuminate spaces and tasks, both interior and exterior, independent of reliance on natural light; and grounding systems.

B. Electrical Energy Supply and Generation: Utility power sources, engine-generator systems, battery power systems, uninterruptible power supply systems, unit power conditioners and photovoltaic systems.
   1. Electrical Power Source: Existing public utility.

C. Service and Distribution: Distribution equipment, automatic throw-over switches, medium voltage padmount transformers, medium voltage metalclad switchgears, low voltage distribution transformers, motor control equipment, service and feeder wiring (conductors and raceways), monitoring, safety and control equipment, and other elements required for a complete functional system.
   1. Main Electrical Service: Connect to the existing Airport 12KV medium voltage electrical distribution system via automatic throw-over switches (located outdoors), medium voltage metalclad switchgears inside electrical rooms in the T1building, load interrupt switches, medium voltage service distribution transformers and low voltage switchboards in T1 building. The service transformers will convert distribution voltage to the building's utilization voltage.
   2. Distribution Circuit Configuration: 12KV primary selective circuit arrangement.

D. Branch Circuits: Branch circuit wiring and receptacles and other branch circuit wiring systems, comprising the following elements:
   1. Branch circuit breakers.
   2. Conductors and cable from panelboards to fixtures, wiring devices, and mechanical equipment.
   3. Raceways and boxes.
   4. Wiring devices, including, but not limited to, receptacles, floor boxes and plates, wall switches, wall dimmers, remote control switching devices, and wall plates.

E. Interior Lighting: Comprising the following elements:
   1. Luminaires for general illumination.
   2. Accent lighting.
   3. Built-in task lighting at powered furniture.
   4. Emergency lighting.
   5. Illuminated exit signs.

F. Exterior Area Lighting : General lighting of exterior spaces including walkways, exterior walls and parking areas, and apron lights; comprising exterior luminaires, poles, standards, or other means of mounting the luminaires, power supply, and controls.

G. Special Grounding Systems: Elements for lightning protection, fence grounding, and raised access floor grounding.
   1. Lightning Protection. Extend existing lightning system to new T1 buildout. Provide lightning protection to administration building and parking structure.

H. Cathodic Protection: Supplementary corrosion prevention using cathodic protection; see Section DC 0 - Facility Design Criteria for elements for which cathodic protection is a permitted measure.

I. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 REFERENCE STANDARDS

A. ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings; current edition, Including All Addenda.

B. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; current edition.

C. IEEE 142 - IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems; current edition.

D. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings; current edition.

E. IEEE 493 - IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems; current edition.

F. IEEE 739 - IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities; current edition.

G. IEEE 1100 - IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment; current edition.

H. IEEE C57.12.00 - IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers; current edition.

I. IES (LH) - Lighting Handbook; 10th edition, current edition.

J. IES RP-8 - Roadway Lighting; current edition.

K. NACE SP0169 - Control of External Corrosion on Underground or Submerged Metallic Piping Systems; current edition.

L. NACE SP0285 - External Corrosion Control of Underground Storage Tank Systems by Cathodic Protection; current edition.

M. NACE TM0497 - Measurement Techniques Related to Criteria for Cathodic Protection on Underground or Submerged Metallic Piping Systems; current edition.

N. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

O. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. NFPA 780 - Standard for the Installation of Lightning Protection Systems; current edition.

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide electrical power with the appropriate characteristics to operate all electrically operated devices, including those in other services.
   1. Capacity: Calculated in accordance with NFPA 70.
   2. General Receptacle System Voltage: 120 volts/1-phase/60Hz.
      a. Provide 120volt/1phase/60 Hz or 208V 1-phase receptacles with the appropriate NEMA configuration, as required for convenience receptacles.
      b. Provide 120 volt/1-phase/60 Hz or 208 volt/1-phase/60Hz receptacles with the appropriate NEMA configuration, as required for equipment in the following rooms:
         1) Copier room.
         2) Battery charging areas.
         3) Maintenance area.
         4) Plumbing chases
      b. Equipment Voltage: Provide 480 volt/3-phase/60 Hz electrical power to the following equipment:
         1) Air handler fans.
         2) Pre-Conditioned air.
         3) Chilled water pumps.
         4) Heating water pumps.

5) Passenger Loading Bridges.
6) Moving Walks.
7) Elevators/Escalators.
8) Motors over 1/2hp and above.
9) Voltage Regulation: Within 5 percent of design voltage at all branch receptacles.

3. Primary Electrical Energy Generation:
   a. Provide capacity at least 50 percent more than the connected load.
   b. As required by code and for the following:
      1) Emergency egress Lighting: Duration as required by code..
      2) Apron Lights: Duration as required by code..
      3) Fire Detection and Alarm System: Duration as required by code.
      4) Public Address System: Duration as required by code.
      5) Uninterrupted Power Supply
   c. Generator Set Start Up: Fully on line as required by code.
4. Service Transformers (Medium Voltage): In accordance with code plus 50 percent spare capacity.
   a. Kilo volt ampere (kVA) Rating: Provide transformers with preferred ratings according to IEEE C57.12.00.
   b. Primary Voltage: 12KV (Airport Utility Medium Voltage Distribution).
   c. Secondary Voltage: As required to serve building switchgear and electrical loads.
   d. Connection Method: Delta connection.
5. Main Switchboards and distribution boards: In accordance with code plus 10 percent spare capacity.
6. Low Voltage Distribution Transformers: As required to serve building circuits and equipment plus 10 percent spare capacity.
7. Branch Circuit Panelboards: In accordance with code plus 10 percent spare capacity.
8. Utility Revenue Meters: Meter incoming electrical service on the low-voltage side of the service transformer (secondary metering).

B. Emergency Power: Provide emergency power as required by code including the following:
1. Systems and areas as required by code.
2. Emergency/Egress Lighting: Duration as required by code.
3. Warning Lights: Duration as required by code.
4. Computers (identified by Airport Authority)/Security Data Racks.
5. Apron Lighting. Duration as required by code/Airport Standard.

C. Standby Power: Provide standby power as required by code including the following:
1. Security Lights: Duration as required by code.
2. Electrical Room Lights: Duration as required by code.
3. Heating, Ventilating, and Air Conditioning Equipment:
   a. Pumps and auxiliary equipment: Duration: As required by code.
   b. Air handlers serving LAN, Computer and UPS Rooms: Duration as required by code.
4. Elevators: See Section DC D11 - People-Moving Equipment Criteria for requirements.
5. Fire Detection and Alarm System: Duration as required by code.
6. Central Control Station and Lighting: Duration as required by code.
7. Public Address System: Duration as required by code.
8. Communications System: Duration as required by code.
9. Interior Lighting: Duration as required by code.
10. CCTV cameras, Access Control System.
11. Restroom handsfree fitting valve control.
12. Sewer system.
13. Passenger Boarding Bridges.

D. Standby Generator:
   a. Electrical Characteristics: 460 volts/3 phase/60 Hz.

b. Generator Fuel Supply: Diesel.
c. Generator Reliability: 100 percent.
d. Power Quality: Compatible voltage, wave shape, and frequency with the primary power source.
e. Run Time: 8 hours at 100 percent load.

E. Uninterruptible Power Supply: Provide uninterruptible power supply (UPS) system as follows:
1. One UPS to supply critical loads including the following:
a. TSA Designed Computer System (including servers and workstations).
b. Telephone and Communication System (including routers and switches).
c. Security System Controls.
d. Enforcement System.
e. Processing Booth Equipment.
f. CCC Power and Lighting.
g. Que lighting.
h. Fire Alarm Panel.
i. HVAC Controls supporting critical areas.
j. Emergency Lighting.
k. CCTV cameras, Access Control System
2. Minimum duration of 30 minutes.
3. Minimum one hour battery backup at 50% load.
4. Configuration: Parallel redundant with automatic transfer from UPS power to normal power.
5. UPS System shall consist of the following major components:
a. Rectifier/charger.
b. Inverter.
c. Input and output transformers.
d. Static bypass switch.
e. Input and output circuit breakers.
f. External maintenance bypass circuit breakers.
g. Battery cabinets or racks.
h. Batteries.
6. Redundant Capacity: 25 percent.
7. Substantiation:
a. Proposal: Listing of input/output voltage, types of load covered, and generic equipment characteristics.
b. Design Development: Single-line drawings, power supply equipment sizes and types, equipment room sizes.
c. Construction Documents: Riser diagrams, calculations, equipment operating parameters.

F. Distribution: Distribute electric power for equipment circuits, lighting circuits, receptacle circuits, electrical utilization devices.
1. Branch Circuits: Provide adequate electrical power and safe and efficient distribution from panelboards to lighting, wiring devices, equipment, and appliances, based on the project program, requirements of other sections, and as follows:

G. Lighting: Provide artificial means of lighting interior and exterior spaces.
1. Interior Lighting: Provide artificial lighting for all interior spaces that is adequate in quality and distribution for the performance of tasks typical for the type of space and the characteristics of the intended population, regardless of the availability of natural light.
a. Provide lighting controls to reduce artificial light level when natural light is present, while maintaining specified light levels.
b. Accent Lighting: In addition to general and task illumination, provide lighting on architectural features, displays, and artwork in focal areas to produce luminances that are within the range of 5:1 with respect to ambient background.

c. Portable lamps (not permanently attached to the building or other building furnishings) may not be used to accomplish required artificial lighting.

2. Exterior Lighting: Provide artificial lighting for exterior spaces, as required by the project program, that is adequate in quantity, quality, and distribution for the performance of tasks typical for the type of outdoor space and the characteristics of the intended user population.

H. Grounding: Provide grounding systems that:
1. Provide protection from lightning strikes; scope and design of protection as defined in Section DC 0 - Facility Design Criteria.
2. Reduce static electricity and transient and induced current in raised access flooring and electronic equipment cabinets, racks, and supports.
3. Comply with applicable recommendations of IEEE 142 and IEEE 1100.

I. Where electrical elements also must function as elements defined within another element group, meet the requirements of both element groups.

J. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria - Facility Design Criteria; SDIA Electrical Distribution System Infrastructure Policies and General Procedures,

2.02 CALCULATIONS

A. Provide the following electrical calculations:
1. Fault Current Calculations.
2. Overcurrent Protective Device Coordination Study.
3. Arc Flash Calculations and Study.
4. Load Calculations: Calculation estimates acceptable at various stages of design. Update calculations with available information of determined load as it becomes available.
5. Generator Sizing Calculations.
6. Voltage Drop Calculations.
7. Harmonic Distortion Calculations.
8. Lightning Protection Calculations.

2.03 AMENITY AND COMFORT CRITERIA

A. Artificial Light Levels: Provide maintained ambient illuminance values for various activities based on the primary visual tasks to be accommodated and that are within the ranges specified in the IES Lighting Handbook, except for the following:
1. Emergency Lighting: In addition to exit signs and means of egress lighting, provide emergency illumination of not less than 1 fc (10 lux) for a minimum of 1 hour in spaces as follows:
a. Computer room.
b. Lobby.
c. Control room.
d. Emergency generator room.
e. Retail space.
f. Telephone room.
g. Supply room.
h. Restrooms.
2. Interior Lighting: Provide maintained average illuminance values for all spaces that are based per Illumination Engineering Society of North America (IESNA) and as identified in Program Definition Document.
3. Exterior Area Lighting: Provide lighting to match the existing lighting level provided by Apron lighting.
4. Provide shop drawings, samples, mock-ups and computer software lighting calculations for indoor and outdoor lighting levels.

B. Artificial Light Quality: Provide luminous environment in each space that is designed to complement the functions and the character of the space.
   1. Interior Lighting:
      a. Distribution: In keeping with geometry of space and location of visual tasks.
      b. Visual Comfort: Provide lighting systems with the following characteristics:
         1) VCP: Visual Comfort Probability (VCP) of not less than 70.
         2) Luminance Ratio: Maximum luminance of luminaire does not exceed average luminance by ratio of more than 5:1 at 45, 55, 65, 75, and 85 degrees from nadir for crosswise and lengthwise viewing.
         3) Maximum luminances of luminaires crosswise and lengthwise do not exceed the following values:
            (a) 45 degrees above nadir: 7710 cd/sq m.
            (b) 55 degrees above nadir: 5500 cd/sq m.
            (c) 65 degrees above nadir: 3860 cd/sq m.
            (d) 75 degrees above nadir: 2570 cd/sq m.
            (e) 85 degrees above nadir: 1695 cd/sq m.
   2. Exterior Area Lighting:
      a. Glare Minimization: Provide exterior area lighting that minimizes the incidence of discomfort glare and avoids disability glare under all normal conditions of use, in accordance with IES recommendations.
      b. Color: Provide LED light sources throughout project that render automobile colors with reasonable accuracy.

C. Lighting Cutoff:
   1. Configure exterior area lighting to avoid spill light on adjacent areas that are not within airport property and are not specific to purpose of the exterior lighting.
   2. Configure exterior area lighting to minimize illumination of building facade and building windows, in particular.
   3. Configure lighting to minimize illumination of the airport runway.

D. Sound and Noise:
   1. Provide generator exhaust silencer ratings of the industrial (12-18dB(A)) type.
   2. Provide generator enclosures of the sound attenuated type.
   3. Provide uninterruptible power supply systems noise generation of no more than 69 dBA measured at 5 feet (1.5 m).
   4. Provide unit power conditioner audible noise generation of no more than 58 dBA measured at 5 feet (1.5 m).
   5. Do not locate transformers near sound sensitive areas. See Section C for interior space sound level requirements.
   6. Provide transformers with noise generation 3 dBA less than the sound levels listed in IEEE 241.

E. Convenience:
   1. Provide convenience receptacles at intervals no greater than 10 feet (3 m) along the base of all wall areas.
   2. Locate metering and monitoring facilities in a single location not in a mechanical equipment room.
   3. Provide means of reading power meters and demand meters from inside the building.
   4.Provide demand meters to tenants emon-dmon meters
   4. Provide an interface between the electrical monitoring and the building automation system including the following:
      a. Switchboard Monitoring:
         1) Power Analysis Values:
            (a) Output voltage of each phase; line-to-line and line-to-neutral.
            (b) Output current; each phase and ground.
            (c) Real power; per phase.

(d) Reactive power; per phase.
(e) Apparent power; per phase.
(f) Power factor; per phase.
(g) Frequency.

b. Energy Readings of:
1) Real accumulated energy.
2) Reactive accumulated energy.
3) Apparent accumulated energy.
4) Bi-directional readings.

c. Real-Time Readings of:
1) Crest factor; per phase.
2) Demand, per phase;
3) Displacement Power factor, per phase.
4) Fundamental voltages; per phase.
5) Fundamental real power; per phase.
6) Harmonic power.
7) Unbalance; current and voltage.
8) Phase rotation.

d. Demand Readings:
1) Demand current; per phase and peak.
2) Average power factor; 3-phase total.
3) Demand real power; 3-phase total.
4) Demand apparent power; 3-phase total.
5) Demand reactive power; 3-phase total.
6) Coincident reading.
7) Predicted Demands.

F. Appearance:
1. Do not locate switchboards, transformers, and panelboards in corridors, lobbies, or stairwells.
2. Conceal electrical conduit in walls and behind ceilings in the occupied spaces. See Section D for additional requirements.
3. Conceal grounding conductors and ground terminals wherever possible.
4. Character of Lighting Fixtures: Coordinated with architecture and other building systems and appropriate to finish level.
5. Provide emergency lights which appear to be normal space luminaires.
a. Exception: Mechanical and electrical rooms may have self-contained emergency lights.
7. Provide exterior area lighting that is compatible with overall project appearance and coordinated with site layout and building organization.
a. Luminaire Mounting:
1) Installation on poles, wall mounting brackets, architectural fixtures, or suspended cables:
2) Maximum height of wall mounted lights (wall packs) 12 ft (3.5 m).
3) Style compatible with building design.
4) Material and finish compatible with exterior building elements.
b. Luminaire Design:
1) Light distribution by direct or indirect methods.
2) Optical control by reflectors or refractors.
3) Material and finish of housing compatible with mounting.
8. Appearance: Conceal all portions of cathodic protection systems.

2.04 HEALTH AND SAFETY CRITERIA

A. Fire Hazard:

1. Locate electrical energy generation equipment away from storage areas and flammable materials.
   a. Generators and Fuel Supplies: Located in code required fire rated rooms.
2. Provide branch circuit elements in compliance with code and that are UL listed or labeled.
   a. Provide elements that have their flame spread and smoke developed ratings printed on them.
3. Fire Resistant Construction: Provide lighting elements throughout the project that are made of incombustible materials in compliance with code and that are UL listed or labeled, with flame spread and smoke developed ratings printed on product.

B. Lightning Hazard: See Section DC 0 - Facility Design Criteria for portions of the project that must be protected and coordinate protection elements with other built elements.
1. Provide protection equivalent to that specified in NFPA 780; supplementary ground conductors and grounding electrodes are required only where the integral portions of the structure cannot perform those functions.
2. Maximum Ground Resistance: 10 ohms, between any individual down conductor and ground.
3. Ground Resistance Measurement Methods: As described in NFPA 780, Annex E, or IEEE 81.

C. Fence Grounding Capacity:
1. Non-metallic fences are not required to be grounded.
2. Fences that are electrically continuous with metal posts embedded at least 24 inches (610 mm) into the ground, with or without concrete encasement, will be considered adequately grounded.
3. Fences that are grounded in accordance with requirements for lightning protection will be considered adequately grounded.
4. Maximum Ground Resistance: 10 ohms, between any point on fence and ground; minimum 2 grounding points for any section of fence.

D. Electrical Hazards: Design in accordance with all NFPA standards that apply to the occupancy, application, and design.
1. Control access to spaces housing electrical components and allow access only by qualified personnel.
2. Provide electrical distribution equipment with locking cabinets, doors, and panels when it is located in public areas.
3. Comply with NFPA 70 requirements for hazardous locations applications.

E. Accidental Explosion: Ventilate electrical energy generation equipment to prevent the build-up of explosive gases.

F. Intrusion: Protect electrical energy generation and service and distribution equipment from unauthorized access and vandalism.

G. Protection from Breakage:
1. Locate electrical energy generation equipment away from high traffic areas, building occupants, public, and vehicular traffic.
2. Locate service and distribution equipment in closets and electrical rooms.

2.05 STRUCTURAL CRITERIA

A. Seismic Design:
1. Provide electrical energy generation elements with flexible joints where differential movement is anticipated.
2. Provide electrical energy generation equipment supports capable of supporting twice equipment's normal weight.
3. Provide service and distribution elements with the ability to move where differential movement is anticipated.

B. Wind Resistance: Provide mounting systems for exterior lighting that are capable of withstanding 3-second wind gusts in excess of 90 mph (40 m/s).

2.06 DURABILITY CRITERIA

A. Expected Service Life Span:
   1. Electrical:
      a. Power Distribution Equipment: Same as building service life.
      b. Power Generation Equipment: Minimum 20 years.
      c. All Components of Life Safety-Related Systems: Minimum 20 years.
      d. Control Components, Except Wiring: Minimum 10 years.
   2. Lighting Fixtures: Minimum 15 years.
   3. Lightning Protection and Special Grounding Systems: Same as building service life.
   4. Expected Service Life Span: Provide UPS systems which will last a minimum of 20 years in service without major repairs or operating expense.
   5. All Grounding Systems: Life of the building without requiring any more maintenance than annual inspection and minor repairs not more frequently than annually.
      a. Lightning Protection Elements: Minimum quality demonstrated by listing or labeling by UL.
      b. Lightning Protection Strike (Air) Terminals: Sheet metal elements less than 3/16 inch (4.8 mm) thick are likely to be damaged (punctured) by direct lightning strikes and may not be used as strike (air) terminals.
   6. Exterior Area Lighting: Provide a system which will last a minimum of 25 years in service without major repairs.

B. Minimum Outdoor Operating Temperature: Provide lighting systems that operate at temperatures as low as -20 degrees F (-30 degrees C).

C. Transformer Insulation Class: As follows:
   1. Service Transformers: Insulation Class 105 degrees C.
   2. General-Purpose Transformers: Insulation Class 105 degrees C.

D. Electronic Equipment Protection: Provide a signal reference grid or plane for the entire raised floor area as high-frequency ground for electronic equipment.
   1. Comply with recommendations of IEEE 1100.
   2. Conductor Maximum Impedance: 23 ohms per 12 inches (305 mm) of ground conductor at frequency of 1 kHz.
   3. Ground: Multi-point bonding to all metallic objects crossing grid, including structural elements within 6 feet (1820 mm) of grid.

E. Moisture Resistance:
   1. Water-resistant equipment includes transformers, raceways, enclosures, panelboards, and switchgear.
   2. Provide electrical energy generation equipment which is resistant to moisture.
   3. Regardless of whether exposure to moisture is likely or not, design lighting equipment to be resistant to moisture.
   4. Enclosures: As required to protect equipment from environment in which it is installed, complying with NEMA 250 and:
      a. Areas to be Hosed-Down, or Equivalent, Exterior or Interior: Type 4X.
      b. Exterior, Exposed to Weather and Wind: Type 4X.
      c. Exterior Not exposed to Weather and Wind: Type 3R.
      d. Interior, Other Locations: Type 1.

F. Corrosion Resistance: Provide electrical energy generation equipment which is resistant to corrosion.

G. Corrosion Prevention by Cathodic Protection: Designed and constructed in accordance with NACE SP0169 and NACE SP0285; either galvanic anode or impressed current system.

1. Design of Protected Elements: In addition to requirements specified elsewhere, as specified in NACE SP0169 and NACE SP0285, including coatings.
2. Measurement Techniques: As specified in NACE TM0497.
3. Substantiation:
   a. Design Development: Identification of elements required to be protected using either coatings, wrappings, or cathodic protection; method of protection to be used.
   b. Design Development: If cathodic protection is to be used, engineering analysis and design criteria prepared by NACE-certified Corrosion Specialist or Cathodic Protection Specialist.
   c. Construction Documents: Details of cathodic protection system.
   d. Commissioning: Tests to verify achievement of cathodic potential or polarization required by design; documentation of operating parameters in accordance with applicable NACE standard.
   e. Closeout: Maintenance instructions; include copy of applicable NACE design standards.
   f. Occupancy: After one month of full occupancy and activation of all services and again at the end of one year, tests to determine if AC or DC currents or potentials exist between buried metal elements and the ground; addition, replacement, or enhancement of cathodic protection as necessary to achieve protective effect.

H. Impact Resistance:
1. Provide electrical energy generation equipment with a protective housing.
2. Provide service and distribution equipment with industrial grade enclosures.
3. Provide poles for parking lot area lighting that are located to avoid damage by automobiles, mounted to bases that are structurally capable of withstanding moderate impact, or protected by bollards or similar structures.

I. Vandal Resistance - Exterior Area Lighting:
1. Parts not easily removed without the use of special tools.
2. Luminaires mounted at minimum height of 12 ft (3.5 m) above grade.
3. Lenses of tempered glass, high impact acrylic, polyacrylate, or polycarbonate.
4. Metal gratings for protection of optical assemblies.

2.07 OPERATION AND MAINTENANCE CRITERIA

A. Power Quality:
1. Uninterruptible Power Supply Systems:
   a. Current Distortion: Less than 10 percent total harmonic distortion with included filter.
   b. Overload Rating, Percent of Full Load For Any Combination of Linear and Non-Linear Loads:
      1) 125 percent continuously.
      2) 100 percent for 30 minutes.
      3) 50 percent for 1 hour.
   c. Harmonic Content of Output Waveform:
      1) Maximum 4 percent RMS for nonlinear load.
      2) Maximum 2 percent RMS for any linear load.
      3) Maximum 5 percent RMS for nonlinear load.

B. Load Characteristics:
1. Maximum Harmonic Current Distortion: Plus or minus 2 percent of design current.
2. Transient Suppression: Limit voltage transients below damage curve of the electrical system and connected equipment.
3. Noise Protection: Limit frequency excursions between 90 to 110 percent of design frequency.
   a. Protect the circuits as indicated on the drawings.
      1) Receptacles serving personal computer terminals.
      2) Receptacles serving network servers.

3) Power supply to fire alarm panel.
4) Power supply to telephone system.

4. Surge Protection: Voltage excursion limit of 2 times design voltage.
   a. Provide protection of the circuits as indicated on the drawings.
      1) Receptacles serving personal computer terminals.
      2) Receptacles serving network servers.
      3) Power supply to fire alarm panel.
      4) Power supply to telephone system.
      5) Power supply in the laboratory.
      6) Entire building service.
      7) Motors over 5 horsepower.

D. Energy Efficiency:
   1. Comply with requirements of IEEE Standard 739.
   2. Comply with requirements of ASHRAE Std 90.1 I-P.
   3. Interior Lighting Controls: Provide level of control of lighting appropriate to type of space and Owner's requirements for energy conservation.
      a. Daylighting Controls: Provide separate lighting circuits for spaces or zones adjacent to fenestration.
         1) Controls: Daylight sensing controls, multiple-step dimming throughout project.
      b. Occupancy Controls: Provide lighting circuits for private offices that are controlled by devices that do not require action by occupants.
         1) Controls: Occupancy sensor and programmable timing control throughout project.
   4. Exterior Area Lighting Controls: Provide luminaire control of lighting appropriate to type of area, daylight sensing controls, on-off switches programmable timing, comply with T24, airport requirements for energy conservation.
   5. Light Sources: LED lamps.

E. Ease of Use:
   1. Configuration: Design wiring and protective devices so that outages caused by local overloads do not affect unrelated areas or systems.
   2. Branch-Circuit Panelboards:
      a. Provide a dedicated panelboard for lighting which is separate from panelboards serving equipment and sensitive electronic equipment.
      b. Provide one for each tenant unit, located inside unit.
   3. Motor Control: Provide motor control centers for each group of 5 motors. Provide motors with the appropriate protective, control, and indicating devices.
   4. Locate monitoring read-out at one central location.
   5. Voltage Regulation: Within 3 percent of design voltage at all branch receptacles.

F. Availability: Provide an electrical system which is available to deliver power at least 99 percent of the time.

G. Allowance for Change and Expansion:
   1. Spare Capacity - System Wide:
      a. Load: 20 percent, minimum.
      b. Rated Capacity: 20 percent, minimum.
      c. Number of Additional Circuits: 20 percent, minimum.
   2. Future Capacity - System Wide: 40 percent, minimum.
      a. Load: 40 percent, minimum.
      b. Rated Capacity: 40 percent, minimum.
      c. Number of Additional Circuits: 40 percent, minimum.
   3. Spare Capacity:
      a. Generator Systems: 50 percent over total load.
      b. Battery Systems: 25 percent over total load.
      c. Power Conditioners: 10 percent over total load.

4. Provide space for the addition of transformers in the future.
5. Branch Circuits: Provide branch circuit wiring with sufficient capacity to accommodate future growth and renovation without major rewiring.
    a. All Circuits: Limit design loads to 50 percent of capacity permitted by code.
    b. Lighting Circuits: Limit design loads to 50 percent of capacity permitted by code.
    c. Receptacle Circuits: Limit design loads to 50 percent of capacity permitted by code.
    d. Appliance Circuits: Limit design loads to 50 percent of capacity permitted by code.
    e. Equipment Circuits: Limit design loads to 50 percent of capacity permitted by code.

H. Ease of Cleaning:
1. Interior Lighting: Provide luminaires that do not collect dirt rapidly and are readily cleanable.
    a. Luminaire Categories: Provide luminaires of IES Category I, II, or V, for minimum dirt accumulation and LDD factors.
2. Exterior Area Lighting: Provide luminaires of IES Category I, for minimum dirt accumulation and LDD factors.

I. Ease of Maintenance:
1. Relamping:
    a. Provide luminaires designed for easy relamping with special tools.
    b. Locate luminaires to be practically accessible for maintenance, such that only standard equipment/means such as ladders will be required to maintain or inspect the luminaire.
2. Uninterruptible Power Supply Systems: Provide the following functions:
    a. Maintenance Bypass: Provide a maintenance switch to transfer UPS loads to the standby generators.
    b. Internal maintenance bypass.
    c. Emergency power off.
    d. Input isolation transformer.
    e. Maintenance bypass cabinet
    f. Maintenance bypass transformer.
    g. SNMP communications capability.
    h. Remote monitor panel.
    i. Alarm status contacts.
3. Service and Distribution Equipment:
    a. Select equipment which is segmented into modules to ease replacement of component failures.
    b. Wherever equipment is located in cabinets or enclosures, provide doors or removable panels sized to allow easy removal and replacement.
    c. Provide infrared (IR) windows to main distribution switchboard and distribution boards. IR window shall be suited to the arc flash rating of equipment. Provide alternative to IR windows for airport authority consideration if application of IR window listing/rating will not be appropriate with consideration to the determined arc flash rating of the equipment.
4. GFCI protection of receptacles provided at waiting area seating: Provide GFCI circuit breaker over current protection to branch circuit.

2.07 TESTING AND ADJUSTMENT CRITERIA

A. Operational Test:
1. Test all overcurrent protective devices (circuit breakers), receptacles, system control and data acquisition systems, emergency power switching system, metering system, and all other electrical equipment.
2. Ground Fault System: Measure system neutral insulation resistances.
3. Secondary Grounding Resistance: Provide ground continuity test between main ground system and equipment frame, system neutral and/or derived neutral point.

4. All test shall be performed by an independent testing firm and test findings submitted in a report format.

END OF SECTION

SECTION DC D7: TELECOMMUNICATIONS AND AIRPORT SYSTEMS COMMUNICATION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

C. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The construction will provide a common infrastructure (backbone) for all communication services unless specified otherwise. These services will require the use of Category 6/6a copper (as delineated below) and a single mode fiber backbone as the common signal carrier:
   1. Voice and Data (D7010): Infrastructure for voice and data transmission for SDCRAA, including CAT 6/6a copper and a single mode fiber backbone.
   2. Terminal Wide Voice Paging System (D7020): For digital interfaces the standard is Cat 6 cable.
   3. Electronic Signage (D7070): requires Cat 6 cable.
   4. Common Use Systems Equipment (D7050): requires Cat 6 cable.
   5. All Security Systems require Cat 6 for network connectivity.
   6. Wi-Fi (D7030) requires Cat 6a cabling.

B. The Performance Criteria in this document also applies to the following sections:
   1. D7000 Telecomm and Airport Systems
   2. D7010 Voice, Data and Display Systems
   3. D7020 Public Address System (PA)
   4. D7030 WiFi and Cell Phone Architecture
   5. D7040 800 MHZ Bi-Directional Trunked Radio System
   6. D7050 Common Use Systems Equipment (CUSE)
   7. D7055 Self-Service Devices
   8. D7060 Electronic Content Systems
   9. D7070 Electronic Signage
   10. D7095 Other IT and Electrical Services
   11. D8000 Security Systems Network Active Architecture
   12. D8010 Enterprise and Operations Networks Active Architecture (Owner Procurement)
   13. D9010 Video Management System (VMS)
   14. D9020 Security Access Controls
   15. D9030 Exit Lane Breach Control System

C. Design Criteria:
   1. Computer Equipment Room (CER) General Criteria:
      a. The CER functions as the central collection point(s) for the integration between existing SDCRAA technology infrastructure and systems and the voice and data provisioning requirements for the new Terminal. The technology provisioning for the new Terminal will also require additional distribution rack rooms (RRs) to ensure that the maximum horizontal distribution distance does not exceed SDCRAA standards.
      b. Telecommunication rooms will be in compliance with TIA/EIA, BICSI and SDCRAA standards.

c. Size rooms in accordance with SDCRAA IT Infrastructure Standards Construction Manual.
d.
e. Minimum Spare Distribution Capacity Allowance for Change and Expansion, applicable to all systems/networks:
   1) 25 percent patch panels
   2) 50 percent fiber strands
   3) 50 percent pathways
   4) 100 percent innerduct
   5) 25 percent spare copper riser pairs
   6) 25 percent network switch ports (copper ports)
f. Backbone distribution:
   1) Backbone trunk fiber and copper: Design Builder will provide singlemode (SM) and Cat 3 copper backbone trunk cable as determined by provisioning requirements, between RRs, with primary and secondary pathways. This work shall include termination and testing.
   2) Primary backbone will be installed in conduit. Secondary backbone will be installed in cable tray, which may also be used for horizontal cabling when sized appropriately.
   3) Design Builder will provide duct banks and fiber optic cabling to serve the new Terminal building.
   4) For tenant services, the Design Builder shall provide two vacant 2" conduits from rack rooms to each tenant space.

D. 99.9% uptime is required for all systems installed.
   1. Once the Design Builder is ready for commissioning, the system shall run under regular program load for 30 days. The system will not be accepted if there is greater than 0.1% downtime of components or if critical programming deficiencies

3.02 AMENITY AND COMFORT:

A. Accessibility: Systems will comply with requirements of local and national authorities for facilities for the disabled.

3.03 AMENITY AND COMFORT: (NOT USED)

3.04 HEALTH AND SAFETY: (NOT USED)

3.05 STRUCTURAL CRITERIA:

A. Design Builder shall design infrastructure to comply with Seismic Design Category D, IBC section 1704, and manufacturer's installation instructions.

3.06 DURABILITY:

A. All fiber and copper backbone cables shall be warranted for a minimum 25 years.

B. All category horizontal cable shall be warranted for a minimum of 25 years

3.07 OPERATION AND MAINTENANCE: (NOT USED)

3.08 PRODUCTS:

A. Backbone cabling infrastructure must be provided by a contractor who is certified by the manufacturer of the cabling.

B. Products and materials shall be new and fit the intended purpose.

C. Damaged or defective products and components shall be replaced by the Design Builder at no additional cost to SDCRAA. Fiber cabling is to be tested prior to and after installation.
   1. Submit a cable test plan prior to performing testing.
   2. Provide copies of all fiber test reports and OTDR calibration certificates.

D. Cabling and termination hardware damaged prior to system acceptance shall be replaced by the Design Builder at no additional cost to SDCRAA.

E. Miscellaneous materials required for a complete and operational cabling system shall be provided by the Design Builder.

F. All communication materials shall be subject to final approval by SDCRAA.

G. The Design Builder shall provide all optical fiber and UTP jumpers and patch cords for backbone cross connects and network port connections. Those jumpers and patch cords shall be factory manufactured, not field fabricated.

3.09 LEED REQUIREMENTS: (NOT USED)

3.10 EXISTING SYSTEMS:

A. Refer to the PDD for instruction on attaching to existing SDCRAA systems.

3.11 REFERENCE DOCUMENTS:

A. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services
      c. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

END OF SECTION

SECTION DC D7 1: VOICE AND DATA SYSTEMS CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria: Criteria that apply to all relevant elements of the facility.

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

C. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION:

A. The construction will provide common infrastructure (backbone and horizontal) for conveying data between devices within the new terminal building, and between the new terminal building and other airport facilities.

B. The Design Builder will provide primary and redundant connections in separate locations to the duct banks. Refer to the utilities sections for additional information.

C. The construction shall provide for rooms to house headend equipment and additional rooms to house distribution electronics. These rooms shall be provided such that no network outlet or device shall be greater than 250’ in wire length from the serving switch or originating patch panel. This overall length is referred to as the “permanent link” and shall not include work area cords.

D. Active LAN telecommunication outlets (ports) shall be provided in the following spaces:
   1. Telecommunications rooms, number to be determined by Design Builder.
   2. Each interior room (office). Provide ports per the SDCRAA Information Technology Infrastructure Standards Construction Manual. These ports are designated for workstation use - any dedicated ports for displays or other equipment are not included in this count.
   3. Ticket counter locations: refer to the PDD and to Authority direction based on ticketing lobby programming.
   4. Gate locations: ports for all installed equipment (including but not limited to computers, display monitors, paging microphones, et cetera) with minimum 50% spare cables.
   5. Security checkpoint: per TSA Checkpoint Design Guidelines.
   6. Outlets required for dedicated equipment (such as electronic displays, cameras, access control field units, et cetera) shall be provided.
      a. Electronic displays: provide 25% spare cables (based on total count of display bank)
      b. Cameras shall be provided with 100% spare/future use cables, e.g., two cables for each camera.
      c. Coordinate with SDCRAA for other spare requirements during the design phase.
   7. Where voice and data products also must function as products defined within another Section, the construction will meet the requirements of both Sections.
   9. Communications equipment rooms shall be constructed in accordance with SDCRAA IT Infrastructure Standards Construction Manual.
   10. Construct cable trays and conduit in accordance with Section D7000 and per SDCRAA standards.

3.02 AMENITY AND COMFORT:

A. Accessibility: Systems shall comply with requirements of local authorities for facilities for the disabled.

3.03 HEALTH AND SAFETY: (NOT USED)

3.04 STRUCTURAL CRITERIA:

A. Raceways, cable trays, ladder, and equipment shall be installed in accordance with Seismic Design Category D, IBC Section 1704, and manufacturer's instructions.

3.05 DURABILITY: (NOT USED)

3.06 OPERATION AND MAINTENANCE:

A. Ease of Maintenance: Accessibility and maintainability is critical in all environments.

3.07 PRODUCTS:

A. Communications infrastructure equipment, materials, and installations shall be compliant with SDCRAA IT Infrastructure Standards Construction Manual.

B. Dedicated Battery Backup Power: per SDCRAA IT Infrastructure Standards Construction Manual.

3.08 LEED REQUIREMENTS: (NOT USED)

3.09 EXISTING SYSTEMS: (NOT USED)

3.10 REFERENCE DOCUMENTS:

A. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services
      c. Section D7000 - Telecommunications And Airport Systems Communication Requirements - General Pathways, Backbone And Horizontal Cabling
      d. SDCRAA IT Infrastructure Standards Construction Manual

END OF SECTION

SECTION DC D7 2: PUBLIC ADDRESS SYSTEM (PA) CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. Code of Federal Regulations (CFR) 47 Chapter I (Telecommunications), Part 15 (Radio Frequency Devices)

B. American National Standards Institute/Telecommunications Industry Association/Electronics Industry Alliance (ANSI/TIA/EIA)
   1. EIA-160 Sound Systems
   2. EIA-219 Audio Facilities for Radio Broadcasting Systems

C. National Fire Protection Association (NFPA), NFPA 70 National Electrical Code (NEC)
   1. Article 640 - Audio Signal Processing, Amplification, and Reproduction Equipment

D. National Association of Broadcasters Engineering Handbook

E. Sound System Engineering (Don and Carolyn Davis, Howard W. Sams, publisher)

F. Audio Systems Design and Installation (G.H. Philip Giddings)

G. SDCRAA Information Technology Infrastructure Standards Construction Manual

H. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services
      c. Section D7000 - Telecommunications

PART 2 PRODUCTS

2.01 GENERAL

A. The PA system shall be the product of the incumbent PA system, which is IED. Install all headend equipment (amplifiers, announcement control system equipment) in dedicated four-post cabinets.

B. The PA system shall be capable of combining individual zones (circuits) into zone groups, and have a message prioritization capability. The system shall have at least one ambient noise sensor in each zone that will facilitate the ability to automatically adjust the volume to compensate for changing noise levels. Speaker technology selected and deployed shall be appropriate to the acoustic and architectural environment and shall be subject to approval by SDCRAA.

C. Speaker cabling shall be installed in conduit separate from any other cabling except ambient sound sensor cabling, if allowed by manufacturer.

D. Voice paging microphone cabling, being Cat-6, may be installed in common raceway.

E. Grounding: Preclude ground loops, noise, and surges from adversely affecting system operation.

F. Surge Protection: Meet the requirements of Section DC D7.

G. Provide additional amplifiers or microphone circuit boards in active chassis.

H. NETWORK
   1. The PA will operate on a dedicated VLAN.

I. HEADEND
1. Provide a new headend and announcement control system in the new terminal, which provides the following functions:
   a. Speaker zone assignments to zone groups
   b. Ambient noise thresholds for each zone
   c. Volume control to selected zones in response to ambient noise level changes
   d. Microphone station primary page assignments to zone groups
   e. Telephone input zone group assignments
   f. Audible monitoring with a monitor speaker and 20-button paging microphone station in the PA headend communications room (that room which houses headend equipment)
   g. Signal routing
   h. Message queuing
   i. System diagnostics and reporting
   j. Logged status and alerts with the ability to export delimited text files to the SDCRAA building management system
   k. System muting on activation of fire alarm, with override of mute available from the Fire Command Center
   l. Audio switching modules shall consist of solid state switching circuits
   m. PA headend equipment shall be mounted in lockable cabinets with fan kits.
      1) Provide solid blank inserts on all unused rack spaces.

J. INTEGRATED POWER AMPLIFIER UNITS
1. New equipment shall be provided for all new speaker zones.
2. Software based routing, control, and supervision of all networked elements of the voice paging system
3. In addition, Contractor-provided amplifiers shall have the following characteristics:
   a. Shall be 70V system, IED DNA series.
   b. Provide backup amplifier switch (IED 1544BAS or equal) for each amplifier, and provide one four-channel backup/standby amplifier per amplifier rack/room; that is CobraNet or Dante network audio (coordinate with SDCRAA)
   c. Fault reporting
   d. Primary and secondary 1GB Ethernet ports
   e. Four channels per amplifier, 600W each. Two ambient sound sensor inputs per channel.
   f. Integrated digital signal processing on each channel
      1) Failover control - DSP programs fail over as well.
      2) Level
      3) Page routing
      4) Automatic BGM ducking
      5) EQ (7-channel parametric plus high-pass and low-pass)
      6) Signal delay
      7) Automatic level control (based on ambient analysis)
      8) Electrical (minimum)
         (a) Frequency response: ±1 db
         (b) Total harmonic distortion (THD)<0.2% @ 2kHz
         (c) Signal to noise ratio, unweighted, 20Hz – 20kHz: >85dB
      9) Audio connections shall be screw-type compression
      10) Provide full bandwidth signals to speakers that have a single, full range audio input.
      11) Provided with adequate self-cooling and over-temperature fault reporting.
      12) Adjustable volumes controlled by:
         (a) Software means from the amplifier and head end control;
         (b) A schedule maintained by the head end control; and

(c) An ambient noise analysis system via noise sensors.

K. ANNOUNCEMENT CONTROL SYSTEM
1. 32 channels (16 record, 16 playback) messaging server, simultaneous operation.
2. Solid state drive
3. Provide rack-mount redundant power supply
4. The ACS manages requests for live, delayed, and prerecorded messages (simple or assembled), record and playback of ad hoc messages, text-to-speech, mute actions, and two-way full duplex intercom.
5. Records live messages and plays back to zones that were busy during recording.
6. Recorded announcements can be initiated by contact closure, mic paging stations, network commands, or VOIP interface.
7. Message scheduling.
8. Built-in interface with VOIP system via SIP and PBX trunking; support for G.711, G.722, and RTP protocols.
9. Up to 240 mic stations per unit
10. Supervision and logging for endpoints on the PA network, built-in email and SMS notification.
11. Provide number of units required for terminal (to accommodate channel capacity necessary)
12. Storage for up to 250 hours of pre-recorded messages
13. 8 optically isolated logic inputs, 8 relay outputs
14. Two line level audio inputs
15. Message queueing
16. Provide manufacturer's programming software
17. Provide all integration and programming
18. Provide training to SDCRAA staff

L. AMBIENT NOISE ANALYSIS SYSTEM
1. User adjustable, continuous operation.
2. Inputs to power amplifier
3. Provide sensors, cable, pathway, programming and integration.
4. Furnish and install the necessary inputs (sensor collectors), sensors, and software configuration to enable the announcement control system (ACS) Ambient Noise Analysis Systems to control the audio level associated with the connections as indicated on the drawings. Provide ambient sound sensors on all zones. Some zones may require two ambient sound sensors.
5. Ambient noise analysis system shall control audio levels in response to ambient or background noise levels.
6. Provide all programming - each zone shall be analyzed and programmed.
7. Parameters governing the manner in which the system responds to noise and adjusts the program signal will be set individually for each output channel.

M. SPEAKERS
1. Provide speakers in areas with regular height acoustic ceilings (up to 13') with a maximum SPL falloff of 3dB from center to edge of coverage. This will usually equate to a speaker grid of about 12'.
2. In areas without regular ceilings (open and reverberant spaces), speakers shall be selected that provide clarity and which do not create reverberation in the space. Design Builder will utilize passive and active line array speakers, or resonant-mode audio panels. Voice paging design will be submitted to SDCRAA for approval. Coordinate with the architect and acoustic engineer to minimize reverberation and reflection.
3. Contractor shall ensure that only the latest versions of the manufacturer's recommended loudspeakers shall be furnished. The manufacturer and Design Builder shall ascertain that each loudspeaker furnished does not "squawk" or "rattle" when energized with one-third octave bands of pink noise at a nominal input power of two watts.

4. Contractor will be required to verify available mounting depth and clearance at each loudspeaker enclosure location. Where available depth is insufficient, furnish a reduced-depth version of the specified loudspeaker enclosure (or alternate unit) as approved on shop drawings showing affected locations and proposed enclosure dimensions and clearances.
5. No speakers above/behind ceiling elements: speaker grills must have “line of sight” to the room.
6. Paint all baffles, trim rings, and surface mounted loudspeakers/enclosures, including those with color noted, to match adjacent ceiling or fascia. Painting can be done at the factory or other controlled environment using spray or powder-coat process. Painting with brush or roller on-site is not acceptable. Contractor will verify all finishes with SDCRAA. All speaker grilles will provide a minimum of 70% clear opening after painting or coating.
7. Where loudspeakers are installed in exterior locations, provide manufacturers or custom gaskets, covers, sealant, or other accessories as required to ensure a weather-resistant installation.
8. Mounting hardware and grill trims suitable for wall or ceiling application.
    a. All loudspeakers and loudspeaker enclosures shall have secondary support from the building structure. Such devices installed into a T-bar/channel style ceiling shall have a load support.
    b. Seismic support: Minimum (5/64 inch cable diameter) zinc galvanized loop hanger or equivalent with a safe working load of 23 to 100 pounds.
    c. Transformer: 70.7 volt with taps appropriate for the space, with a front mounted tap selector switch to include transformer bypass setting for 8-ohm direct-coupled operation

N. MICROPHONE STATIONS

1. Microphone Station, digital, flush mounted where appropriate, and in self-contained enclosures (portable tabletop stations), or on counters or walls, with handheld microphone.
    a. Pushbuttons shall consist of a keypad and a series of “soft-key” menu buttons with variable functionality based on displayed information. An LCD or other dynamic display and LED indicators shall indicate functions.
    b. Each microphone station shall include analog-to-digital converters and other hardware/software as required to transmit audio and control information using standard Ethernet protocol over Category 6 UTP cable. Remote powering of digital microphone stations shall be provided via in-line Power over Ethernet capability (IEEE 802.3af compliant).
    c. Install announcement microphone stations as described in the following guidelines. Submit detailed shop drawings for review indicating typical and custom/special mounting configurations.
        1) Verify exact location and mounting of all microphone stations with SDCRAA prior to installation.
        2) All announcement microphone stations shall be easily removable for servicing or replacement.
        3) All announcement microphone stations shall be installed to enable LCD or other dynamic displays to be easily readable and provide ease of operation for pushbutton keypads.
        4) Except for portable tabletop stations, permanently install all announcement microphone stations to prevent tampering and theft.
        5) Furnish and install manufacturer’s flush/surface mounted back boxes, manufacturer’s angled back boxes, and/or compatible standard gang outlet boxes as required for announcement microphone station installation.
        6) Furnish and install manufacturer’s locking door wall box for locations that require stations to be secured or protected. Wall box and door shall have a factory powder coated finish, color as directed by SDCRAA.

7) Use manufacturer furnished screws and other installation hardware, or matching similar hardware as required.
8) Ground all announcement microphone station backboxes as recommended by manufacturer to prevent problems due to electrostatic discharge.
9) Announcement microphone stations shall be furnished with vertical or horizontal configurations as required for installation conditions.
10) For stations to be installed at ticket, check-in, gate, and ticket lift counters, coordinate mounting requirements (dimensions, depth, and wiring pathway) with counter manufacturer or installer. Install stations at or above the working surface of the counters in compliance with ADA.
11) Provide spare homerun network cable at each microphone station location.

O. COMMUNICATIONS CABLING
1. Provide communication cables in D7010. The construction will use one of the following:
a. Backbone Cable: Single mode, fiber optic cable.
b. Campus Subsystems: Copper. Category 6 unshielded twisted pair cables
c. Distribution Cable: Copper. Category 6 unshielded twisted pair cables
d. Audio Control Cable: as required
e. Speaker Cable: Use stranded 12AWG pair.

P. POWER SUPPLIES
1. As specified in Section DC D6 - Electrical Criteria and as follows:
a. Dedicated Battery Backup Power: One hour runtime for all voice paging equipment at 25% utilization.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Voice Paging System is the primary method the airlines and the airport use to convey information to passengers in and around the terminal buildings. The information distributed by the PA can be flight related, of a general nature, or safety related. The Terminal 1 voice paging system will match the existing PA (which is an Innovative Electronic Design (IED) digital public address system that is in good condition) or whichever system is incumbent at the time of installation. Music generation is not in contract.

B. Visual paging will be separate from the PA, and will be manually input on a computer running flight information management system (FIMS) software. Messages are then displayed on dedicated displays in various locations throughout SAN, and this functionality will be extended to the new terminal. There is no integration between the PA and the visual paging functions of the FIMS.

C. Definitions:
1. Zone: a series of speakers powered by a single amplifier channel. A circuit. May be incorporated into multiple zone groups.
2. Zone group: A logical collection of multiple zones, or a single zone, tied to a particular space, group of spaces, or function.

D. The following apply for the procurement of the voice paging system:
1. The current Innovative Electronic Designs (IED) PA will be retained in the existing terminals. The PA system in the new terminal will be an IED system. It shall be provided with separate announcement control system dedicated to Terminal 1.
2. The PA shall be zoned such that information for a specific area of the Terminal may be broadcast only in that area. The system shall be designed with zone sizes and quantities to appropriately configure the system for maximum functionality.
a. Design Builder recommended zone groups shall be included in early designs for SDCRAA review and approval.
b. TSA supervisory areas shall have microphone stations programmed for override of PA active pages.

c. All microphone stations shall be IP-based, and shall be full-function (e.g. 20-button versus 4-button).

E. The Design Builder shall provide the following:
1. Paging to all public areas of the Terminal, and paging from any VOIP telephone station in addition to the microphone stations. Provide appropriate bridges or inputs.
2. Provide analog-digital converters for background audio.
3. Microphone stations shall be provided at these locations
a. Ticket counters
b. Gate podium
c. Ticket lift podium
d. TSA checkpoint supervisor
e. Fire command room
f. Baggage service offices
g. Curbside counters
h. Security Operations Center
i. Zone groups (comprising multiple amplifier zones/circuits as necessary): At a minimum, these will be provided in the following public spaces (sterile and otherwise):
1) Public circulation areas (including ticketing/checkin)
2) Escalator risers (may be combined with adjacent circulation zone)
3) Elevator vestibules (may be combined with adjacent circulation zone)
4) Hold rooms - each shall have a distinct zone group
5) Concession area circulation (not inside tenant spaces)
6) Baggage claim areas
7) Curbside
8) Security checkpoint (dedicated zone/zone group)
9) Aircraft parking position: each gate to have its own zone. Speakers here may be exterior horns.
10) Ramp level baggage handling areas.
4. Ambient noise sensor(s) in each speaker zone. Where zones are large, use multiple noise sensors. These are not required for aircraft parking positions or ramp level baggage areas.
5. Cable pathways, conduit, supports, boxes, back boxes, cabling, fiber optic cable, network patch cables, cable termination and testing per Section D7010.
6. Programming and tuning, including delay calculation and programming where necessary.
7. Paging power amplifiers.
8. Testing
9. Commissioning, including adjustment, optimization, and speech transmission index testing and reporting.

F. Substantiation:
1. Preliminary Design: Outline description of systems, intersystem interfaces, and functions provided.
2. Design Development: Details of each type of input and output device; capacities of systems; manufacturer data; speaker zones and types; architectural details for all speaker types/installation types.
3. Construction Documents: Detailed layout of input and output device locations.
4. Closeout: Complete functional performance testing, adjustment, and optimization, as specified in Section 00830, under Commissioning.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems shall comply with requirements of local authorities for facilities for the disabled.

3.03 HEALTH AND SAFETY

A. The voice paging system is not part of the life safety system.

3.04 STRUCTURE

A. Speaker Supports
   1. Speakers in suspended ceiling systems shall be considered lighting fixtures under ASCE 7-02 Table 9.6.3.2.
   2. Speaker support and bracing shall meet seismic attachment requirements.

3.05 OPERATION AND MAINTENANCE

A. Transmission Capacity:
   1. Sound Communication over the network: 100 megabits per second full duplex; RJ45 connectors
   2. Substantiation:
      a. Closeout: Continuity and performance testing.
      b. Intelligibility testing
      c. Reliability testing: 30 days free of errors.

B. Ease of Maintenance:
   1. Connections between each sound input/output station and hub in communications closets.

C. Training: Provide manufacturer's standard training by a person authorized by the manufacturer to conduct maintenance and operations training.

3.06 EXISTING SYSTEMS

A. Terminal wide voice paging system is by Innovative Electronic Designs, Inc. The Design Builder will provide an IED system for the proposed Terminal 1.

END OF SECTION

SECTION DC D7 3: WIFI ARCHITECTURE CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

B. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D – Services

1.03 SUBMITTALS

A. Design Phase:
   1. Submit credentials and relevant certifications of the survey Design Builder to SDCRAA for approval.
   2. Products and predictive analysis/heat maps.
   3. Design documents.

A. Construction Phase:
   1. Site survey to reconcile predictive analysis with installation conditions. Perform this site survey when all glazing and walls are complete and prior to installation of ceiling tile. Transmit results to SDCRAA for approval.

PART 2 PRODUCTS

2.01 GENERAL

A. SAN uses standard and consistent products for WiFi. Systems in the new Terminal will be limited to those in use in Terminal 2 and approved by SDCRAA. The current WiFi system in place at SAN is the product of Aruba Networks.

B. Contractor will furnish and install all equipment.

C. Wi-Fi antenna selection and placement (where applicable) will be based upon the Design Builder's predictive heat map analysis and active site survey analysis activities.

D. The Design Builder is responsible for the following:
   1. Coordinate with SDCRAA for WAP and antenna placement.
   4. Any WAP relocations needed to ensure Wi-Fi coverage will be the responsibility of the Design Builder and shall be coordinated with the Authority.
   5. Provide cable pathways, conduit, supports, boxes, back boxes, and cabling.
   6. Terminate, test, and certify cable.
   7. Install the Wi-Fi Access Points and antennas.

E. Wi-Fi Radio support frequencies: 2.4GHz/5GHz

F. Device network support: IEEE 802.11 a/b/g/n/ac/ax, or current technology as directed by SDCRAA.

G. Number of Wi-Fi access points will be based upon site survey analysis, and the capabilities of access points at the time of construction.
   1. Add any new wireless backbone infrastructure, cable trays and modifications to communication rooms required to support the design.

H. Back bone Communication Cabling:
   1. Provide communication cabling as stated in D7000

I. Horizontal cabling for WiFi: Minimum Category 6a.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Design Builder shall provide wireless access points (WAPs), and shall provide pathways, cabling, and mounting hardware necessary for the WAPs. Design Builder will also provide

B. Provide a WiFi system that provides a minimum average bandwidth of 110 megabits per second (Mbps) upload/download per user in public areas (pre and post security), or as directed by SDCRAA.

C. Provide a WiFi system that provides a minimum average bandwidth of 50 Mbps upload/download in airport operational areas or as directed by SDCRAA.

D. The DB shall provide a predictive heat map analysis during the design phase for WiFi and DAS. During the construction phase, the DB shall provide a site survey analysis after interior framing is complete but before the ceilings are hung and closed up. Submit to SDCRAA and make all required adjustments to optimize system. Redo sight survey for approval by SDCRAA.

E. In addition to the requirements of this section, the construction will comply with all applicable requirements of Section 0 - Facility Design Criteria, Section D - Services, and Section D7000 - Telecomm and Airport Systems.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems shall comply with requirements of local authorities for facilities for the disabled.

3.03 OPERATION AND MAINTENANCE

A. Ease of Maintenance:
   1. Accessibility and maintainability is critical in all environments.

END OF SECTION

SECTION DC D7 4: DISTRIBUTED ANTENNA SYSTEMS (CELLULAR DAS, 800MHZ TRUNKING RADIO) CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 DESCRIPTION

A. Provide a separate and distinct distributed antenna system (DAS) for 800MHz trunking radio and for multicarrier cellular. Each system is an extension of existing systems present in Terminal 2.

1.03 REFERENCE DOCUMENTS

A. In addition to the requirements of this section, the construction will comply with all applicable requirements of Section 111 - Facility Performance, Section D - Services, and Section D7 - Telecommunications.

B. HKTA 1046 Method of Measurement for Radio Transmitter for use in the Land Mobile Service.

C. CISPR 16-1 Specification for radio disturbance and immunity measuring apparatus and methods Part 1 Radio disturbance and immunity measuring apparatus.

D. ETSI EN 300 086-1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment with an internal or external RF connector intended primarily for analogue speech; Part 1 Technical characteristics and methods of measurement.

E. ETSI EN 300 296-1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1 Technical characteristics and methods of measurement

F. ITU-R Recommendation SM.1045 “Frequency tolerance of transmitters”.

G. Code of Federal Regulations (CFR) 47 Chapter I (Telecommunications), Part 15 (Radio Frequency Devices)

H. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

I. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS

2.01 SUBMITTALS

A. Multi-carrier Distributed Antenna System Study:
   1. Description and calculations of coverage area with emphasis on mitigation of dead zones.

B. System Design shall contain the following:
   1. Field study, spectral analysis and intermediation studies within the building are to be performed to ensure Wi-Fi and cellular DAS systems do not cause interference to the 800MHz mission-critical system. Submit report with findings.
   2. Description and calculations of coverage area with emphasis on mitigation of dead zones.
   3. Connection diagrams.

4. Descriptions and calculations that show how the head end control equipment will operate with the antennas and amplifiers as a system to meet the performance requirements.
5. Detailed description of the operating software, upgrade capabilities, backup equipment, system memory/processor requirements, functions, and interfaces.
6. Preliminary system configuration settings.

C. The Construction Design shall include the following:
1. Block diagrams indicating system architecture, component manufacturers and model numbers, wiring types, and proposed connections to new and existing equipment.
2. Detailed hardware descriptions and specifications
3. Manufacturers detailed parts list.
4. Communications room modifications and equipment locations.
5. Ground buses, ground conductors, and ground bonds.
6. Cable pathways (new and existing).
7. Equipment rack elevations, detailing exact composition of each equipment slot, overall dimensions of the system equipment, finishes, and required clearances.
8. Core drilling and other penetration locations.
9. Mounts and placement.
10. Pathway support designs. Load and seismic calculations.
11. Fire stopping designs.

D. Closeout: Complete functional performance testing as specified in Section 00830, under Commissioning.

2.02 THE FOLLOWING 800 MHZ SYSTEM COMPONENTS AND INFRASTRUCTURE SHALL BE PROVIDED BY THE DESIGN BUILDER:

A. Provide a radio signal booster system that will correct for a reduction in the radio signal to a level below that required to assure the 97% area in-building coverage reliability needed for public safety communications.

B. Communications are talk-in and talk-out for a portable subscriber unit, worn at the hip, speaker-mic on the lapel.

C. No measurable signal outside the building which could induce simulcast distortion.

D. The 800 MHZ Life Safety Radio System shall have priority in all cases over the Wi-Fi and Wireless Cellular Network.

E. Antenna pathways, cable pathways, conduit, supports, boxes, back boxes, cabling, fiber optic cable, and network switches.

F. Cable terminations.

G. Head end upgrade including expansion of rooms and ancillary equipment such as HVAC cooling and electrical panels.

2.03 800MHz SYSTEM DESCRIPTION

A. The signal booster system (bi-directional amplifier [BDA]) shall be designed to operate in the 800 megahertz (MHz) band, specifically 806-809 MHz/851-854 MHz. Coordinate with SDCRAA for equipment selection.

B. The signal booster system shall be designed to provide a minimum code required RF signal levels at any point within the Terminal.

C. If study shows basis for need, the equipment in the Main Communications Room shall include RF to fiber convertors, which converts the RF signal into an optical signal. The fiber will be routed from the communication room(s) to the terminal areas identified in the system drawings designed by the Contractor and approved by SDCRAA, where it shall interface to the BDA.

D. The radio signal booster system shall consist of a 2-way bi-directional amplifier system for an in-building antenna system.

2.05 CELLULAR DAS SYSTEM DESCRIPTION

A. Cellular DAS is owned and operated by SDCRAA. The headend equipment is located in Terminal 2. Provide BDAs, antennas, and all appurtenances for the extension of the Cellular DAS system into all portions of the new Terminal. All equipment shall be compatible with the MIMO architecture in use at SAN.

B. Provide a cellular DAS system in the new Terminal that provides minimum of -60dBm signal strength throughout the Terminal building.

C. Submit implementation plan and technical designs to the Authority for approval prior to beginning work.

D. Provide cellular DAS field equipment and headend equipment to support multicarrier operations.

E. Coordinate with the Authority for implementation of next-generation improvements in cellular DAS, including 5G implementation and the possible inclusion of small cell networks in addition to multicarrier cellular DAS.

2.04 BI-DIRECTIONAL AMPLIFIER (BDA) SYSTEMS

A. Provide separate BDA systems for 800MHz and cellular DAS.

B. The bi-directional amplifier subsystems shall consist of a bi-directional amplifier, AC power supply, backup power supply and electrical transient voltage surge suppression.

B. The bi-directional amplifier unit shall be an Automatic Gain Adjusting, or OLC (Output Level Control), type where the gain is automatically set over a wide operating range.

C. The bi-directional amplifier unit shall contain:
   1. A gain block (a wide band, linear amplitude amplifier).
   2. Frequency selective filters/cavities placed at the amplifier's input and output ports.
   3. A special output level control (OLC) circuit.
   4. A power supply/regulator.

D. A distributed heliax antenna system with antenna drops shall be used to route the RF signal between the bi-directional amplifier and the in-building antennas.

E. If additional BDA are required, provide dedicated fiber backhaul to the head-end.

F. The manufacturer shall provide a chart of control voltages with the unit.

G. Decoupled RF test points shall be provided to permit performance testing or alignment while the bi-directional amplifier is in operation.

H. Since no frequency conversion occurs in a bi-directional amplifier, the RF output shall not be close coupled to the RF input to prevent feedback saturation.

2.05 IN-BUILDING ANTENNA SYSTEMS

A. The in-building antenna systems shall consist of a sufficient number of unity gains, omni-directional antennas distributed within the building to meet the design criteria at all locations within the building.

B. Coaxial cable splitters to divide the radio signal into appropriate branch circuits and coaxial cable to connect the antennas to the bi-directional amplifiers through the splitters.

C. The antennas shall be surface mounted or can be mounted in the space above a non-metallic drop ceiling or in a storage/equipment closet.

D. Each splitter shall be mounted in a separate junction box located so as to be easily accessible for maintenance while maintaining security from unauthorized tampering.

2.06 RADIATORS

A. Control the amount of radiation and signals inside the area served by selecting appropriate coaxial cables (i.e. heliax) or antennas as radiator elements.

B. Radiating cable provides coverage that can be easily controlled and is especially applicable to underbuilding areas, utilidor, stairwells, and corridors. Provide unity gain antennas for uniform building coverage.

C. The preferred method for signal radiation is discrete antennas. If radiators are proposed in select locations, they shall be approved by the Authority.

2.07 FIBER OPTIC BACKBONE

A. Use fiber backbone provided as part of the project. Provide connections and equipment to utilize both primary and secondary fiber backbone. Fiber backhaul is to connect RF-to-fiber converter in Terminal 2 to the location of where the amp and far-end RF-to-fiber converter will be mounted in the new terminal.

2.08 ENVIRONMENTAL

A. Interior environments:
   1. Controlled: 60°F to 100°F dry bulb, and 20 to 90 percent relative humidity, noncondensing.
   2. Uncontrolled: 0°F to 130°F dry bulb and 10 to 95 percent relative humidity, noncondensing.
   3. Exterior environments:
   4. Minus 30°F to 140°F dry bulb and 0 to 100 percent relative humidity, condensing.
   5. Conditions specified in UL 294 for outdoor use equipment.
   6. Provide convection cooling if exposed to direct sunlight.

B. Hazardous environments: Rated and installed according to Chapter 5 of the NFPA 70.

2.09 ELECTRICAL REQUIREMENTS

A. Antenna: power handling of 50W per connector maximum.

B. The access points shall support both line and power over Ethernet and local power supply thus avoiding the need to run AC cables to remote-point installation locations where AC power is not available.

2.10 QUALITY ASSURANCE

A. Manufacturer Qualifications: 10 years' experience.

B. Contractor Qualifications: Manufacturer certified contractor and technician installers.

C. Technician Installers Qualifications: Manufacturer certified technician installers.

2.11 POWER SUPPLIES

A. As specified in Section DC D6 - Electrical Criteria and as follows:
   1. Dedicated uninterruptible power supply
      a. Battery Backup Power: 4-hours

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Design Builder will provide an extension to the existing bi-directional amplification infrastructure which supports in-building coverage of the airport's 800 megahertz (MHz) trunked radio system. The new extension system shall be 100% compatible with the existing system and shall comply with NFPA Fire and Life Safety Requirements. The system will use bi-directional amplifiers fed by single mode (SM) fiber from the existing radio room located in Terminal 2. Within the new terminal, leaky coax and antenna drops will deliver 2-way bi-directional signal.

B. The Design Builder's extension to the existing 800 MHz system shall provide 97% area coverage in the new terminal and in the parking lot or structure.

C. The trunked radio system shall meet SDCRAA standards for DAS.

D. The Cellular DAS system will provide at least -60dBm signal strength throughout the building, using amplifiers and antennas provided by the Design Builder. It will be served out of the existing headend equipment in Terminal 2.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems shall comply with requirements of local authorities for facilities for the disabled.

3.03 OPERATION AND MAINTENANCE

A. Ease of Maintenance:
   1. Connections between each sound input/output station and hub in communications closets.
   2. Authority Personnel Training: As specified in Section 00830.

END OF SECTION

SECTION DC D7 5: COMMON USE SYSTEMS EQUIPMENT (CUSE) CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

C. All equipment and supporting infrastructure that handles credit card transactions shall be compliant with the Payment Card Institute (PCI) Data Security Standard (DSS) version 3.2, or the current PCI DSS version at the time of procurement.

1.02 REFERENCE DOCUMENTS

A. IATA RP 1797 - Common Use Terminal Equipment

B. IATA RP 1722C and resolution 722 c/d/e

C. IATA RP 1770a

D. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition

E. Related Sections include the following:
   1. Section D7000 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone And Horizontal Cabling
   2. Section D7010 - Voice, Data, and Display Systems
   3. Section D7055 - Self-Service Devices
   4. Section D7060 - Electronic Content Systems
   5. Section D8010 - Enterprise and Operations Network Active Architecture
   6. In addition to the requirements of this document, the construction shall comply with the following:
      a. Project Definition Document, including but not limited to the following:
         1) Section 0 - Facility Design Criteria
         2) Section D - Services

PART 2 PRODUCTS

2.01 CUSE WORKSTATION

A. The CUSE workstation shall have the minimum hardware configuration required by the CUSE integrator to facilitate the operation of their common use application. The workstation shall also be provisioned with the latest operating system compatible with the latest CUSE application.

2.02 BAG TAG AND BOARDING PASS PRINTERS

A. Shall be dual technology comprising of radio frequency identification (RFID) and bar/QR codes and shall be capable of producing tags and tickets that use both technologies.

B. Design Builder shall comply with SDCRAA standards for checked luggage self-tagging in the new terminal.

2.03 BOARDING GATE AND TICKET LIFT OPERATIONS

A. Provide dual technology ticket readers (RFID and QR code).

2.04 KEYBOARDS

A. Keyboards for use at the Ticket check-in counters and gate podiums shall meet or exceed the minimum requirements delineated by the CUSE provider, and shall include credit card readers (mag strip and EMV/chip readers).

B. Provide adjustable, heavy-duty keyboard stands with adjustable mouse platforms.

2.05 DOCUMENT PRINTER

A. The document printer shall meet or exceed the minimum requirements delineated by the CUSE provider.

2.06 TICKET READERS AT CHECK IN COUNTERS

A. The ticket reader shall be a peripheral device and not an integrated function to the workstation keyboard.

2.07 CUSE DESKS AND CABINETS

A. CUSE check in and/or ticketing casework as well as equipment cabinets shall be provided by the Design Builder.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Common Use Systems Equipment (CUSE) for the new terminal will be an extension of the existing CUSE system currently in use at SAN at the time of construction. This applies not just to headend and control systems, but also to ancillary equipment including but not limited to boarding pass and baggage tag printers.

B. An Ethernet gigabit network shall be provided as described in Section D8010 - Enterprise and Operations Networks Active Architecture, to transport CUSE information throughout the new terminal.

C. Category station cables shall be provided from the telecom rooms to all CUSE locations as described in Section D7010 - Voice, Data, and Display Systems.

D. All network cable shall be minimum as specified in the Contract Documents and the SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

E. All passenger ticket counter positions, gate check-in counters, and ticket-lift podiums shall be equipped with CUSE equipment.

F. Common use self-service kiosks will be located as indicated on architectural plans. Refer to Section D7055 - Self-Service Devices.

3.02 AMENITY AND COMFORT

A. Accessibility: The Common Use System devices will comply with requirements of local authorities for facilities for the disabled where those elements have the capability to be interactive with the traveling public.

B. All self-service kiosks will be fully ADA compliant.

C. Provide anti-fatigue mats at all agent positions. Coordinate with the Authority for material selection.

3.03 OPERATION AND MAINTENANCE

A. Provide maintenance and operational training as required by SDCRAA.

3.04 LEED REQUIREMENTS

A. All CUSE hardware shall have power save and conservation modes made available for use.

3.05 EXISTING SYSTEMS

A. The airport's current system is SITA. The system provided by the Design Builder will be the same as the system that is installed at Terminal 2 at the time of procurement.

END OF SECTION

SECTION DC D7 6: SELF SERVICE DEVICES CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

C. All equipment and supporting infrastructure that handles credit card transactions shall be compliant with the Payment Card Institute (PCI) Data Security Standard (DSS) version 3.2, or the current PCI DSS version at the time of procurement.

1.02 REFERENCE DOCUMENTS

A. United States Americans with Disabilities Act

B. International Civil Aviation Organization Document Number: Circular 274-AT/114

C. Access to Air Transport by Persons with Disabilities.

D. International Standards Organization Document Number: ISO 9999:2007: Assistive Products for Persons with Disability - Classification.

E. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

F. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS

2.01 CUSS KIOSKS

A. Provide self-service kiosks with baggage scales, ticket and bag tag printers.
   1. Provide a baggage scale for each unit. Scales shall have two displays. The DB will provide calibration and certification with California Division of Measurement Standards.
   2. Provide ticket and bag tag printers that include both optical and RFID technology.

B. Indoor units: NEMA Type 2 providing protection against minor liquid splashes and drips and against dust and falling dirt.
   1. Provide NEMA 12 enclosures for any equipment installed in the baggage makeup/transfer area.

C. Outdoor: NEMA Type 3 suitable for operation outdoors and in extreme weather.

2.02 POWER SUPPLIES

A. Dedicated Battery Backup Power: For:
   1. Alarm notification, 15 minutes.
   2. Emergency communications, 15 minutes.

2.03 COMMUNICATION CABLING

A. Provide communication cables as specified in D7000 and D7010, and provide category cabling as required by the SDCRAA IT Standards Construction Manual.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Design Builder will provide common use self-service (CUSS) kiosks in the check-in lobby to allow passengers to obtain boarding passes and proceed to security screening without going to the ticket counters. Design Builder will also provide baggage scales at each kiosk.

B. The Design Builder will provide a system that is a product of and compatible with the incumbent CUSE system at the airport at the time of procurement.

C. Self-service may be a one-step or two-step process as directed by the Authority. Design Builder will coordinate with the Authority to provide all necessary equipment for the desired configuration.

D. The Design Builder will also provide:
   1. Cable pathways, cable terminations, conduit, supports, boxes, back boxes, cabling, fiber optic cable.
   2. Head end upgrade including expansion of rooms and ancillary equipment such as HVAC cooling and electrical panels as needed.
   3. Procurement of hardware, software and software upgrades as needed from respective vendor(s).

3.02 AMENITY AND COMFORT

A. Accessibility: Systems will comply with requirements of local authorities for facilities for the disabled. All self-service kiosks will be ADA compliant.

3.03 OPERATION AND MAINTENANCE

A. Ease of Maintenance:
   1. Accessibility and maintainability is critical in all environments.

3.04 EXISTING SYSTEMS

A. Existing head end CUSS system is by SITA. Coordinate with Authority for existing head end and field equipment type at the time of construction.
   1. CUSS Head end. Integrate with existing CUSS head end control equipment.
   2. Head end controls shall provide the following:
      a. Signal routing
      b. Assemble flight announcement message configuration
      c. System diagnostics and reporting
      d. Logged status and alerts with the ability to export delimited text files to the airport's building management system.

END OF SECTION

SECTION DC D7 7: VIDEO BACKWALL SYSTEM CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

B. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS

2.01 RIBBON-VIDEO WALL HEADEND SYSTEM

A. Displays shall be a 24/7 Commercial rated LCD/LED displays with an extreme narrow bezel and internal back up automatic fail over image ability. Display shall include:
   1. LAN connectivity for monitoring, adjusting and remote control
   2. Minimum size 55”
   3. Very narrow bezel
   4. IPS panel
   5. Automatic fail over image media method
   6. 3 year warranty

B. The video playback software shall be included with all licenses in the Owner’s name.
   1. Utilizes API for interfaces to systems and external sensors or other trigger devices
   2. Auto failover management
   3. Multi frame CPU Synchronization
   4. Basis of Design: Cnario Digital Signage Suite or approved equal.

C. Video Extenders shall be:
   1. 4K UHD ready
   2. HDCP Compliant
   3. EDID Manager
   4. Batch purchase items to ensure video system timing is maintained
   5. Shall be copper or fiber with automatic reconnection abilities for signal interruption.

D. Display Mounts:
   1. Precision alignment of profile mounted displays
   2. Easy removal and maintenance of displays
   3. Swing out style mount with display mounting plate adapter
   4. Basis of Design: RPV mounts or approved equal.

E. If copper cabling is used for video extender cabling, it shall be Cat6A STP including all rated terminations at patch panels, jacks and patch cables utilized for connectivity

F. Premise wiring distribution system (PWDS) components:
   1. Provide PWDS from communication room equipment to field device
   2. Provide Patch panels matched to required cable types
   3. Provide field jacks and interconnect cables at the correct rating for the type of signal
   4. Provide racks and cabinets

5. Provide grounding and seismic kits as required
6. Follow SDCRAA standards

G. Network Switches and Routers:
1. Provide all network switches and routers as required
2. Provide 25% spare port capacity
3. Provide all network SFP's for equipment

H. Server for Content Management and Playback:
1. Multiple channel player units
2. I7 with Windows 10 OS
3. Up to 12 channel frames
4. Coordinate with video wall provider and Owner

I. 99.9% uptime is required.
1. Once the Design Builder is ready for commissioning, the system shall run under regular program load for 30 days. The system will not be accepted if there is greater than 0.1% downtime (of individual displays) or critical programming deficiencies.

B. Unlimited scalability, centralized control.

C. Installation and programming will be supervised by the video system manufacturer.

D. Seamless synchronization over multiple displays and display groups.

E. Integrated with airport operations, provide custom scripts in coordination with SDCRAA.

F. Provide programming for automation based on scenarios, schedules, or other event triggers. Airline branding and content will automatically scale to cover different check-in positions, triggered by personnel login on common use ticket/service counters.
1. Determine this integration and programming in conjunction with SDCRAA and the video wall engine manufacturer.

G. Provide GUI for manual operation.

H. Train airport staff on the use, programming, and maintenance of the system.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The design builder shall provide a continuous dynamic video wall system behind the ticketing counters that will display airline branding, customer messaging and information. The video wall shall be designed, mocked up, installed, commissioned and warranted by the Design Builder (DB). The video wall shall include an enterprise server based playback system that provides synchronized video playback across the entire wall(s) of displays. System shall utilize a Gen Lock subsystem between all the servers to provide synchronization.

B. The DB shall provide a system infrastructure capable of providing 4K UHD video delivery in the future.

C. The DB shall provide a complete system infrastructure including communication rooms, cabinets, racks, premise wiring distributing system, patch panels, fiber optic light interface units, copper and fiber patch cables, normal and backup power, copper and fiber optic cabling, and video extenders for a fully functioning system.

D. The DB shall provide all raceways, J- boxes, conduit, rated terminations, casework, servers, network switches, network components with 10Gbit backbone as required, content delivery system servers, video extenders, software for playback/customer control surface and monitoring of the system, displays, cabling, mounts, electrical infrastructure, licenses, warranty, installation, training and ancillary equipment as required for a fully functioning system

E. Each display shall be fed by a single channel from the playback server system and display full resolution HDM 1920 x 1080 progressive video.

F. Displays shall be profile mounted and made to operate continually in this position without any other enhancements.

G. Displays shall be mounted with the proper gaps maintained throughout the installation to not void warranty of the display. Mounting system maintain this gap after it has been opened for servicing, without major re-adjustments.

H. The system shall be integrated with custom software and hardware into the Owner's common use/resource management system for dynamic display monitor and content assignment between the airline carriers.

I. The content on these displays shall be enhanced by an extension of the airport's existing flight information management system (FIMS), weather and other data sources as directed by the Owner. Coordinate and integrate these data feeds as required.

J. The locations and specifications for the displays will be determined by SDCRAA stakeholders during the design process. The display devices shall be approved by SDCRAA. At minimum, the design shall address the following:
   1. Design Builder shall identify locations, quantity, and type of displays based on stakeholder direction. The design and construction shall include all associated mounts, brackets, video extenders, and converters.
      a. Viewing angle: Provide analysis of the viewing angle for each display at each location to ensure the proposed display is appropriate given the viewing angle at the installation location.
      b. Expandable: Displays shall be modular to allow future expansion.
      c. Graphic capabilities: Displays shall be capable of displaying graphics, logos, basic animation, and text with multiple font styles and sizes. Location and stakeholder requirements shall determine graphics capabilities for each device.
      d. Commercial grade: Displays shall be capable of, and warranted for, continuous 24-hour operation for 365 days per year in varied environmental conditions. Environmental requirements:
         a) Confirm displays and enclosures will meet the manufacturer's recommended conditions for operating the displays at the proposed locations.
         b) Displays shall meet the requirements of Chapter 5 of the NFPA 70 and any applicable requirements to ensure safe operation and maintenance.

K. In addition to freestanding digital signage installations, the Design Builder will provide a continuous "ribbon" video backwall behind the ticketing counters. The Design Builder will provide basic content generation in coordination with SDCRAA, and shall provide integration services for airline branding and data content, flight information and other "airport-owned" data content.

L. Structural criteria:
   1. DB shall design casework and provide mounts sized and rated for the weight of the displays to be installed. Installation shall comply with Seismic Design Category D, IBC section 1704, and manufacturer's installation instructions.
   2. DB shall utilize mount system designed to align the displays on all axes. Provide mount system that allows the display to be handled according to manufacturer requirements, by the handles on the back of the unit.
   3. DB shall design and provide structural support for the display mount system. Consider power, data and video extender rough in during design and implementation. DB shall provide mockup 6 position mockup unit of the wall for final comments and enhancements before finalizing the design.

3.02 OPERATION AND MAINTENANCE

A. Accessibility and maintainability is critical in all environments.

END OF SECTION

SECTION DC D7 8: ELECTRONIC SIGNAGE CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services
      c. Section D7000 - Telecomm and Airport Systems
      d. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.
      e. Relevant State and Federal standards:
         1) Americans with Disabilities Act Standards for Accessible Design, current edition.

PART 2 PRODUCTS

2.01 DISPLAYS

A. E-Ink, LCD, LED, or OLED that conform to SDCRAA visibility standards

2.02 COMMUNICATION METHODS

A. Ethernet, RS232, or Ethernet interface with media converters.

2.03 MOUNTS

A. Type and orientation will depend on stakeholder selection of displays.
   1. Security fasteners to prevent tampering where displays are at accessible locations.
   2. Tool-free position adjustment (up/down, left/right, and tilt) is preferred at (all) (inaccessible) locations.
   3. Adjustable mount to allow access to sign inputs and controls.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION:

A. The design builder shall provide a mix of interior and exterior electronic displays. The content of these displays will be driven by an extension of the airport's existing flight information management system (FIMS), the Design Builder-provided parking facility vehicle counting system, and the Design Builder provided ribbon video wall headend system.

B. Contractor work includes, but is not limited to, providing:
   1. Casework
   2. Electronic displays and mounts
   3. Video extenders and media converters, if needed
   4. Cable pathways, conduit, supports, boxes, back boxes, and cabling as described in other sections.
   5. Data terminations
   6. Electrical power and pathway
   7. All necessary specialty hardware and adapters

C. The locations and specifications for the displays will be determined by SDCRAA stakeholders during the design process. The display devices shall be approved by SDCRAA. At minimum, the design shall address the following:

1. Design Builder shall identify locations, quantity, and type of displays based on stakeholder direction. The design and construction shall include all associated mounts, brackets, video extenders, and converters.
    a. Viewing angle: Provide analysis of the viewing angle for each display at each location to ensure the proposed display is appropriate given the viewing angle at the installation location.
    b. Expandable: Displays shall be modular to allow future expansion.
    c. Graphic capabilities: Displays shall be capable of displaying graphics, logos, basic animation, and text with multiple font styles and sizes. Location and stakeholder requirements shall determine graphics capabilities for each device.
    d. Commercial grade: Displays shall be capable of, and warranted for, continuous 24-hour operation for 365 days per year in varied environmental conditions. Environmental requirements:
        1) Confirm displays and enclosures will meet the manufacturer's recommended conditions for operating the displays at the proposed locations.
        2) Displays shall meet the requirements of Chapter 5 of the NFPA 70 and any applicable requirements to ensure safe operation and maintenance.
        3) Exception: OLED monitors may not be warranted for 24/7 operation. Coordinate with Authority during design process to establish requirements for scheduled power down or pixel exercising to provide acceptable warranty for the Authority.

D. Work to be accomplished:
    1. Ascertain final quantity and location of required hardware to support the content throughout the terminal and adjacent or adjoining spaces. Refer to architectural or wayfinding.
        a. Cable pathways, conduit, supports, boxes, back boxes, cabling, fiber optic cable, and network switches
            1) Data cabling and pathway shall be provided by the Design Builder in accordance with Section D7010 Voice, Data, and Display Systems.
        c. Headend upgrade, including any necessary expansion of rooms and ancillary equipment such as HVAC cooling and electrical panels
        d. Software and software upgrades including any additional license requirements as dictated by SDCRAA.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems shall comply with requirements of local authorities for facilities for the disabled.

3.03 STRUCTURAL CRITERIA

A. Design Builder shall design casework and provide mounts sized and rated for the weight of the displays to be installed. Installation shall comply with Seismic Design Category D, IBC section 1704, and manufacturer's installation instructions.

3.04 OPERATION AND MAINTENANCE:

A. Accessibility and maintainability is critical in all environments.

END OF SECTION

SECTION DC D7 9: OTHER IT AND ELECTRICAL SERVICES CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. SDCRAA Information Technology Infrastructure Standards Construction Manual, current edition.

B. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The construction will provide Energy/Building Management systems, specified elsewhere in Electrical and Mechanical Sections, which will have points of connection to the Facilities Monitoring System.
   1. Energy/Building Management Systems as described in Section (D3070): Elements for the remote control, remote monitoring and remote data gathering of electrical and lighting systems, HVAC systems, and passenger moving conveyances. BMS interfaces shall be IP based and telecom port locations identified.
   2. The work of this Section is to provide Network connectivity to these devices and systems. Other sections provide for integration and programming of BMS points into the Automated Infrastructure Monitoring and Management System (AIMMS).

END OF SECTION

SECTION DC D8: FIRE PROTECTION AND ALARM CRITERIA

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electronic safety and security services comprise:
   1. Fire Detection and Alarm: Elements required to detect fires and communicate fire location to occupants, facility management, and public fire fighting agencies.

B. Products: Where specific products are required or allowed, use products complying with the additional requirements specified elsewhere.

1.02 REFERENCE STANDARDS

A. NFPA 101 - Life Safety Code, current edition

B. NFPA 72 - National Fire Alarm and Signaling Code; current edition.

PART 3 DESIGN CRITERIA

2.01 BASIC FUNCTION

A. Provide addressable and intelligent fire alarm head-end system compatible with Terminal Network Fire Alarm system.

B. Fire Detection and Alarm: Provide automatic and manual alarm systems as required by code, project and jurisdictional requirements. Provide code-compliant systems regardless of requirements herein.
   1. Functions:
      a. Detection, Alarm, Notification Methods: In accordance with NFPA 72.
      b. Evacuation Plan: Multiple smoke zones and alarm notification of any zone or combination of zones in addition to general evacuation of entire premises.
      c. Detection:
         1) Air Handling Units Over 2,000 cfm: Minimum of one detector in both supply and return.
         2) Upon detection of fire or smoke condition, automatic notification of occupants.
      d. Alarms:
         1) Means for occupants to communicate same types of alarm as automatic system does.
         2) Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.
         3) Visual alarms, in locations required by code and public toilets and corridors.
         4) Separate audible and visual signals for alarms and trouble notification in corridors.
      e. Fire Protection Controls:
         1) Provide connections between alarm and detection system and fire suppression system activation sensors.
         2) Upon Alarm: Shut down or deactivate the following:
            (a) HVAC air distribution.
            (b) Fire-rated door hold-opens.
      f. Audible and visual trouble notification of operations staff, for alarm zone failures, annunciator zone failures, ground faults, backup power failure, water supply equipment failures.

C. Provide protected premises alarm, supervisory, and trouble signal transmissions to monitoring stations on and off sites are required (similar to existing facility fire/life safety monitoring).

D. Integrated systems performing all functions as required, subject to requirements of code for separated, independent systems for building as well as network communication to Terminal building network communication.

E. Where fire detection and alarm elements also must function as elements defined within another element group, the construction will meet the requirements of both element groups.

F. Substantiation:
   1. Design Development: Details of each type of input and output devices; capacities of system; manufacturer data.
   2. Construction Documents: Detailed layout of input and output device locations and voltage drop calculations.
   3. Closeout: Complete functional performance testing as specified in the local fire code, under Commissioning.

G. In addition to the requirements of this section, comply with all applicable requirements of Section DC 0 - Facility Design Criteria and Section DC D2 - Fire Suppression Criteria.

2.02 AMENITY AND COMFORT CRITERIA

A. Accessibility: Comply will requirements of local, State, and federal authorities for facilities for the disabled.

2.03 HEALTH AND SAFETY CRITERIA

A. Detection, Alarm, Notification Methods: In accordance with NFPA 72 and NFPA 101.

B. Evacuation Plan: Provide alarm notification of any zone or combination of zones in addition to general evacuation of entire premises.

C. Detection:
   1. Air Handling Units over 2,000 cfm: provide duct smoke detectors in both supply and return.
   2. Upon detection of fire or smoke condition, automatic notification of occupants, building operation's staff, owner's central emergency staff, private monitoring service, and applicable public emergency authorities shall be provided as required.

D. Alarms:
   1. Means for occupants to communicate same types of alarm as automatic system does.
   2. Manual stations as required along means of egress paths.
   3. Audible Alarms: Minimum of 15 dB over ambient noise, audible throughout common areas and means of egress.
   4. Visual alarms, in all areas as required.
   5. Separate audible and visual signals for alarms and trouble notification in corridors.

E. Fire Protection Controls:
   1. The construction will provide connections between alarm and detection system and fire suppression system activation sensors.
   2. Upon Alarm: Shut down or deactivate the following:
      a. HVAC air distribution.
      b. Fire-rated door hold-opens.
      c. Locks restricting exit through doors constituting means of egress.
      d. Other interface functions as required.

F. Audible and visual trouble notification of operation's staff, for alarm zone failures, annunciator zone failures, ground faults, backup power failure, water supply equipment failures.

G. Error and Failure Prevention: Addressable system; "tamper" sensors at sensitive points; products of only one manufacturer or certified by manufacturer as compatible.

H. Substantiation:
   1. Construction or Closeout: Functional performance tests approved by code authorities.

2.04 OPERATION AND MAINTENANCE CRITERIA

A. Capacity: As required by code.

B. Power Supplies:
   1. Building power with power line conditioner for all systems.

2. Dedicated Battery Backup Power: For:
   a. Fire alarm panel and system 48 hours supervisory and 30 minutes alarm.
   b. Emergency communications, 12 hours.

C. Ease of Use:
1. One centralized monitoring display for all systems is required.
2. In addition, distributed local fire alarm annunciation panels shall be provided at strategic locations and points of emergency response personnel entry in facility.

END OF SECTION

SECTION DC D8 1: ENTERPRISE AND OPERATIONS NETWORKS ACTIVE ARCHITECTURE CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. In case of a conflict between referenced requirements, the DB shall comply with the one establishing the more stringent requirements.

B. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services
      c. SDCRAA Information Technology Infrastructure Standards Construction Manual.

PART 2 PRODUCTS

2.01 THE AUTHORITY USES CISCO NETWORK EQUIPMENT.

A. All switches provided by the DB will be Cisco.

B. Provide 25% spare port capacity for all switches on the same LAN; the total number of ports required for use at installation in a given room, plus 25%.

C. Provide SFP interfaces as required for switches.

D. Coordinate with SDCRAA for switch selection and for programming parameters.

E. All DB procured devices that require integration into the LAN must be compatible with existing Authority Cisco equipment. The DB may be required to substantiate this compatibility at the discretion of the Authority.

2.02 VOICE OVER INTERNET PROTOCOL TELEPHONES

A. Voice over Internet Protocol (VOIP) telephones shall be the product of Cisco.
   1. Two-line desk phones will be Cisco 7821 or current product.
      a. LCD screen (396x162 pixel)
      b. Wideband audio
      c. POE class 1
      d. Two programmable line keys.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The SDCRAA Enterprise local area network (LAN) is the equipment, components and devices necessary to manage the flow of data from airport systems and the accurate conveyance of that data to various operator interfaces.

B. The LAN comprises temperature and humidity sensitive equipment that requires facilities which supply the environmental conditions necessary to ensure the continuous operation of its data processing components. Those environmental requirements are detailed in section D7000 - Telecommunications and Airport Systems and in SDCRAA Information Technology Infrastructure Standards Construction Manual.

C. The LAN is fully integrated from field devices to application architecture head-ends to operator interface terminals and devices.

3.02 OPERATION AND MAINTENANCE

A. The LAN is a system wholly owned and operated by the SDCRAA Information Technology department.

B. Provide Cisco Smart Net three year warranty for all network switching equipment furnished as part of the work. The Authority may opt to pro-rate the warranty from Beneficial Occupancy so that the warranty expires concurrent with other Smart Net warranties held by the Authority.

END OF SECTION

SECTION DC D9 1: VIDEO MANAGEMENT SYSTEM (VMS) CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. Code of Federal Regulations (CFR) 47 Chapter I (Telecommunications), Part 15 (Radio Frequency Devices)

B. SDCRAA Information Technology Infrastructure Standards Construction Manual

C. ONVIF (Open Network Video Interface Forum) profiles as applicable to video surveillance cameras, storage, and control systems.

C. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS

2.01 CAMERAS

A. All cameras will be fully compatible with the Authority's existing Vicon VMS.

B. All cameras will be capable of remote focusing and zoom (when applicable).

C. Integrated domed pan/tilt/zoom (PTZ)
   1. PTZ:
      a. Image Sensor: Progressive Scan,
      b. Lens: 4.7 – 94mm (20x optical zoom)
      c. Day/Night: Automatic IR cut filter
      d. Min Illumination: Color: 0.35 lux; B/W: 0.013 lux at 50 IRE
      e. Shutter time: 1/33000s to 1/3s
      f. Pan/Tilt/Zoom: Pan: 360° endless
         1) Tilt: 180°
         2) 20x optical zoom and 16x digital zoom
         3) E-flip, 256 presets, Tour recording, Guard tour, Control queue,
         4) On-screen directional indicator
         5) Video Compression: H.264 Baseline and Main Profile (MPEG-4 Part 10/AVC), Motion JPEG
         6) Resolutions: 1920x1080 (HDTV 1080p) to 320x240
         7) Frame Rate: H.264: Up to 25/30 fps (50/60 Hz) in all resolutions
         8) Motion JPEG: Up to 60 fps (60 Hz) in all resolutions, dual stream.
         9) Video Streaming: Multiple, individually configurable streams in H.264 and Motion JPEG, Controllable frame rate and bandwidth
         10) Image settings: Wide dynamic range (WDR), Highlight compensation, Manual shutter time, Compression, Color, Brightness, Sharpness, White balance, Exposure control, Exposure zones, Backlight compensation
         11) Network Security: Password protection, IP address filtering, HTTPS, SSL
         12) Supported protocols: IPv4/IPv6, TCP/IP, UDP, HTTP, RTP, RTSP, QoS, DHCP, uPnP, ARP, HTTPS, RTCP, FTP, Zeroconf, Bonjour
         13) Power: Power over Ethernet, 12VDC, 24VAC
      g. Outdoor PTZ, in addition to above:

1) IP66 rating

D. Fixed dome camera
   1. Indoor Fixed Camera
      a. Image Sensor: Progressive Scan, RGM CMOS 1/3.2”
      b. Lens: Varifocal, Remote focus and zoom, P-Iris control, IR corrected, Megapixel Resolution 3-9mm, 39°-99° horz FOV, Motorized zoom.
      c. Day/Night: Automatic IR cut filter
      d. Min Illumination: Color: 0.3 lux, B/W: 0.05 lux
      e. Shutter time:1/8000s
      f. Angle Adjustment: 360 degree pan, 160 degree tile, 340 degree rotation
      g. Video Compression: H.264, Motion JPEG
      i. Resolutions: 2592x1944 (5MP) to 160x90
      j. Frame Rate: 5MP capture mode - 12fps in all resolutions 3MP capture mode - 20fps in all resolutions 2MP capture mode - 30fps in all resolutions
      k. Video Streaming: Multiple, individually configurable streams in H.264 and Motion JPEG, Controllable frame rate and bandwidth
      l. Image settings: Compression, Color, Brightness, Sharpness, Contrast, White balance, Exposure control, Exposure zones, Backlight compensation, Fine tuning of behavior at low light, Wide Dynamic Range-Dynamic Contrast Rotation 0°, 90°, 180°, 270°, including Corridor Format
      m. Network Security: HTTPS encrypted configuration, SSL, multi-level password protection
      n. Supported protocols: IPv4/IPv6, TCP/IP, UDP, HTTP, RTP, RTSP, QoS, DHCP, uPnP, ARP, HTTPS, RTCP, FTP, Zeroconf, Bonjour
      p. Power: Power over Ethernet
      t. Outdoor fixed dome camera in addition to above:
         1) IP66- and NEMA 4X-rated, IK10 impact-resistant casing with aluminum base and dehumidifying membrane
      u. Fixed cameras will be suitable for wall, ceiling, or pedestal mounting as required for the camera location.

E. Camera housings
   1. All cameras and lenses will be enclosed in a tamper resistant housing.
   2. Outdoor housing: Cameras located outdoors will be housed in environmental housings or weather resistant housings.
      a. Condensation-free environment for camera operation to keep the viewing window free of fog, snow, and ice.
      b. Dust- and water-tight, and fully operational in 100 percent condensing humidity.
      c. Equipped with supplementary camera mounting blocks to position the camera to maintain the proper optical centerline.
      d. Equipped with a sunshield.
      e. A mounting bracket to adjust the center the weight of the housing and camera assembly.
      f. Watertight glands for cabling to the camera and heaters.
      g. All electrical and signal connections required will be supplied.
      h. Indoor camera housing: Housings will be designed to provide a tamper resistant enclosure for indoor camera operation.

F. Panoramic cameras
   1. Multi-imager:
      a. Four separate imagers on moveable track and independent gimbles
      b. Single IP address.
      c. Minimum 1080p resolution per imager, higher if required for scene/target resolution.
      d. Varifocal lenses.

e. Power over Ethernet

2. Single imager panoramic camera with dewarping:
   a. 12 MPx imager, minimum.
   b. 185° horizontal and vertical field of view
   c. Power over Ethernet

G. Fixed thermal cameras
   1. SAN uses SightLogix thermal cameras as part of its perimeter intrusion detection system.
   2. Where the fenced airport perimeter is reconstructed, or as directed by the Authority, the DB will provide SightLogix Thermal SightSensor long-range detection cameras and all appurtenances and infrastructure. Coordinate with the Authority and with SightLogix for imager selection and provide integration into existing SightLogix system.
   3. Other fixed thermal cameras, not associated with the PIDS and to be used where directed by the Authority:
      a. Uncooled microbolometer with imager size of 640x480 pixels, and lens focal length as required for the target scene.
      b. If paired with visual light camera in same unit, visual imager shall be 1080p minimum with varifocal lens.
      c. Provide power supplies and cable required for camera power, if not PoE.

H. Cable/terminations
   1. Use category cables as indicated in the SDCRAA IT Infrastructure Construction Manual
   2. Provide two category cables to each camera. Terminate at the camera backbox on a biscuit jack.
   3. Terminate the category cables on a patch panel.
   4. Contractor will provide certain cameras, when directed by the Authority, that use fiber optic cable and separate power cables. Other than the means of data transmission and power, the cameras will be the same as the dome cameras.

I. Camera mounts
   1. Furnish mounting brackets, plates, hardware, ancillary mounting hardware and appurtenances. The camera support shall be capable of supporting the installed equipment, plus wind and ice loading.
      a. Wall mount
         1) Adjustable mounting plate for +/- 90° of pan, and +/- 45° of tilt.
         2) Anodized aluminum.
         3) Parapet mount: Roof mounts to utilize a parapet mount.
            (a) Constructed of steel with a corrosion-resistant finish.
            (b) Bolt hole pattern to match the pan/tilt base.
            (c) Fasten to inside of parapet.
            (d) Rotatable through 360°.
         4) Camera pole: Outdoor cameras not mounted to the building will be on poles.
            (a) Straight steel pole or straight aluminum pole with corrosion-resistant, UV-resistant powder coat finish.
            (b) Aluminum poles will be anodized
            (c) Color to be specified by the Authority.
            (d) Withstand maximum wind loading of 80-mph continuous wind, the total pole deflection with camera and pan/tilt mount will not exceed 0.1° in any direction.
            (e) Mounting plate at the top.
            (f) Cabling will be contained within the pole.
            (g) Ancillary equipment (i.e., signal transmission equipment, power supplies, or other) in enclosures at base of camera pole.

(h) Poles located near roadways or other vehicle traffic areas will be mounted on top of 3-foot-high concrete bollard that will act as camera pole foundation and will protect pole from vehicles.

J. Electrical requirements
   1. Input power: Operate on Power over Ethernet except where directed by Authority.

2.02 VIDEO MANAGEMENT WORKSTATION

A. Design Builder will provide video management workstations in the backup SOC on Level 1, at the TSA Checkpoint (exact location to be coordinated with TSA) and in the TSA Supervisor's office.

B. Workstations will be the product of the VMS manufacturer, or (if permitted by the Authority) equivalent to VMS manufacturer's recommended configuration, and will include all software, licenses, video cards, input devices, and two 27" (nominal) monitors with adjustable (vertical, horizontal, depth) mounts, and a 1500VA (nominal) UPS with network connection. Integrate UPS with building management system for remote monitoring.
   1. Requirements for workstation in backup SOC, in addition: workstation will have four monitors and be provided with full operator capabilities for the Authority PSIM.

C. Coordinate workstation locations and installation methods with casework designs in the backup SOC and the checkpoint supervisor's office (or other location designated by TSA).

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Terminal 1 shall use the existing Vicon VMS. It should be understood that wherever the term "system" appears in this document, it is a reference to the activities and materials required to augment the existing VMS system to accommodate the requirements of the new Terminal. This system has these primary objectives:
   1. Monitoring the activities in the Terminal and other areas per the PDD.
   2. Providing specific views.
   3. Recording and storing video at 15 frames per second, for a period of 7 days at the serving rack room NVR, and for 90 days at full frame rate and resolution in the Terminal 2 Server Room. Design Builder to submit a storage analysis encompassing all cameras installed as part of the contract work. Provide all video storage hardware, in the rack rooms and in the Terminal 2 Server Room, and will provide all licenses. Coordinate with SDCRAA for storage architecture: other configurations than the one enumerated above may be allowed or preferred by the time of construction.
   4. Facilitate camera call-up when the access control system (ACS) has an alarm condition from an ACS door or from another peripheral alarm source.
   5. Provide inputs and integration into existing physical security information management system (PSIM).

B. The Design Builder will provide surveillance cameras and appurtenances at locations per the PDD and as directed by SDCRAA.

C. The DB will be responsible for coordination with the Authority to ensure replacement coverage of operational areas (areas not closed because of construction) for cameras removed from service because of demolition.

E. Any existing camera or camera view taken out of service as a result of Terminal construction will be replaced by a new camera. Coordinate with the Authority for camera selection.

F. Design Builder will provide all materials and labor for a functional system.

G. The Design Builder shall provide all cabling, conduit and boxes necessary for the installation of new cameras.

H. General System Parameters

1. The Design Builder is responsible for the procurement of the Ethernet switchgear. The Authority uses Cisco hardware as its equipment standard.
2. Cameras will be IP based.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems will comply with requirements of local authorities for facilities for the disabled.

3.03 STRUCTURE

A. Camera Supports
   1. Cameras in suspended ceiling systems shall be considered lighting fixtures under ASCE 7-02 Table 9.6.3.2.
   2. Camera support and bracing shall meet seismic attachment requirements.

3.04 DURABILITY

A. Moisture Resistance and Thermal Compatibility: Provide materials that will resist degradation and failure of signals under ambient conditions expected.

3.05 OPERATION AND MAINTENANCE:

A. Ease of Maintenance:
   1. Connections between each camera data outlet and patch panel in communications closets shall not exceed 250'. Field patch cables shall not exceed 42".
   2. All cameras, where possible, need to be mounted so as to be accessible from an 8-foot step ladder.
   3. Cameras shall not be mounted in such a fashion as to be inaccessible in a reasonable manner.

B. Personnel Training: As specified in Section 00830.

C. Environment:
   1. Interior Environments
      a. Controlled: 60°F to 100°F dry bulb and 20 to 90 percent relative humidity, noncondensing.
      b. Uncontrolled: 0°F to 130°F dry bulb and 10 to 95 percent relative humidity, noncondensing.
      c. Exterior Environments:
         1) Minus 30°F to 130°F dry bulb and 10 to 100 percent relative humidity, condensing.
         2) Conditions specified in UL 294 for outdoor use equipment.
            (a) Hazardous environments: Rated and installed according to Chapter 5 of the NFPA 70

3.06 EXISTING SYSTEMS:

A. The existing Digital Video Management System is the Vicon platform.

B. The existing ACS is Identiv. Design Builder to provide integration of VMS function with the ACS for alarm callup.

C. The existing PSIM is Proximex. Design Builder to provide all integration of new cameras and video equipment into the PSIM.

D. Coordinate and confirm all existing systems with the Authority during the design phase.

END OF SECTION

SECTION DC D9 2: SECURITY ACCESS CONTROLS CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. American National Standards Institute (ANSI)
   1. ANSI A156.23 Electromagnetic Locks

B. Federal Communications Commission
   1. FCC Part 68 and 15B
   2. Federal Communication Commission Technical Specification Part 76

C. Code of Federal Regulations (CFR)
   1. 14CFR 107.14 Access Control Systems

D. Underwriters Laboratories Inc. (UL):
   1. UL 294 Standard for Safety for Access Control System Units

E. SDCRAA IT Infrastructure Standards Construction Manual

F. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D - Services

PART 2 PRODUCTS

2.01 GENERAL

A. Request to exit (REX): REX shall be used for signaling access control system standalone access controller or reader interface to open door lock and bypass alarm function.
   1. Coordinate with the Authority for use of pushbutton and passive infrared request to exit devices. Provide request to exit rim devices where required by code for egress doors and integrate with mag locks per code.

C. Audio/Visual Signal Device
   1. Provide a surface mounted audio/visual indicator at each access controlled door on both sides per the SDCRAA IT Infrastructure Standards Construction Manual.
      a. Devices shall activate upon door alarm condition creating an audio and visual indication.
      b. Devices can be silenced remotely via the ACS.
      c. Devices must be White, 4-wire for individual control of the horn and strobe with no “FIRE” markings on it. Provide blue lens on strobe.
      d. Strobe shall be 15 candela, horn shall be 90dBA at one meter.

D. Card readers shall provide audio/visual indicator for use at access controlled doors, and shall be the current model approved by the Authority: Hirsch Identiv ScrambleProx or as directed by SDCRAA.

E. Electronic locks:
   1. Security portals are will be controlled by one of the following:
      a. In general, the Authority uses magnetic locks. Coordinate with and receive approval from the Authority should the need for other types of electronic locks arise.
      b. Provide request to exit rim devices where required by code for egress doors and integrate with mag locks per code.

c. The AHJ (Fire Department) has determined that all electronically locked doors shall be equipped with egress hardware suitable for the occupancy rating of the space, whether these doors are in the path of egress or not. This will require the installation of power transfer hinges and electrified latchsets and rim devices.

F. Communication Cabling:
1. The construction will use the common infrastructure (backbone) as the primary network for conveying data for Access Control network communication.
2. The Design Builder will provide all cabling necessary between switches and controllers, between switches and power supplies, and between controllers/power supplies and field equipment (card readers, locks, position sensors, strobes, et cetera).

G. Power Supplies (for controllers and powered equipment at doors):
1. The ACS door controller panels and power supplies shall have uninterruptible power that is fed from the emergency circuit power distribution.
2. The uninterrupted power shall support 90-minute operation of the door panels and locks. All ACS UPS equipment will be on emergency (generator) power as well.
3. Access controlled doors are not connected to the fire alarm system.
4. Power supply channels (doors) shall be individually PTC protected.

H. Provide a Velocity workstation in the backup Security Operations Center. This workstation shall be the manufacturer's standard capable of all administrator and operational functions. Provide a UPS with minimum 15-minute runtime and network connectivity.

I. Install items per manufacturer's recommendations, including, but not be limited to, cable handling, bending, and pulling requirements or limits; termination methods and materials; and use of specific tools and disposables.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The Design Builder will provide authentication-based electronic access control to secure areas of the airport.
1. The portal card access hardware shall interface with the existing Identiv/Hirsch access control headend, currently running Velocity Version 3, but DB will provide equipment compatible with whatever version the Authority is running at the time of construction.
2. This installation shall consist of access control field panels, remote components, and communications devices, with fully distributed processing (no degraded mode of operation), that can be centrally programmed, monitored, and controlled.
3. The equipment shall include proximity card readers with integral pin pads, audible/visual signal devices, various types of locking hardware, and any other peripheral hardware required.
4. Refer to SDCRAA IT Infrastructure Standards Construction Manual.
5. Provide electrical door hardware for installation of access control as required for functionality and compliance with AHJ requirements.
6. Integrate automatic electronic defibrillator cabinets with the ACS for annunciation and provide integration for callup on the PSIM at the Security Operations Center (SOC).

B. The construction will interface with existing access control systems, intrusion detection systems, video management systems, baggage handling systems, and fire life safety where required by code.

C. General System Parameters
1. The system shall use industry standard, commercially available components and active and passive devices to meet the specifications while maintaining compliance with the Identiv installation. The access control system in Terminal 1 shall be Identiv.
2. The cable distribution system shall comply with the requirements of other sections and alarm monitoring workstations.

3. Electronic equipment shall use solid state and integrated circuitry to the maximum extent possible.
4. Equipment and devices shall be able to operate in areas of high EMI/RFI emissions. Specifically, equipment shall be unaffected and fully functional in the airport environment, which includes radio and radar emissions from ground radios, and airport and aircraft equipment.
5. Any area in or adjacent to the Terminal construction zone that will be modified by this project will require that all security elements for that area be upgraded to the standard listed in this and Section D9010.
6. The system will use dual-authentication card reader/PIN pads, but all installations will be compatible with an upgrade to tri-authentication (biometric) readers.

D. The construction will provide access control and infrastructure at locations per the PDD.

E. Provide security services approved by the Authority for any SIDA door that is taken off line but is still accessible to general public or to sterile-badged (non-SIDA) employees.

F. The DB shall provide a covert duress alarm system at the security screening checkpoint.
1. Provide duress buttons and footrails per the TSA Checkpoint Security Design Guide and in coordination with SDCRAA and TSA representatives.
3. Duress switches shall initiate the following functions:
   a. Alarm annunciation is routed to the SSC and shall indicate from which lane the alarm was initiated at.
   b. Alarm trigger to the video management system
      1) Monitor callup at the TSA supervisor's office and the SOC in the airport communications center.
      2) Full frame rate and resolution recording on designated checkpoint cameras.
   c. The covert duress alarm system shall be designed by the DB and shall be submitted to the Authority for approval.
   d. Refer to the TSA Checkpoint Design Guide for other standards.

3.02 AMENITY AND COMFORT

A. Accessibility: Systems will comply with requirements of local authorities for facilities for the disabled.

3.03 HEALTH AND SAFETY

A. Fire Safety Functions: In accordance with code and instructions from Authority fire department. Design Builder is responsible for all coordination.

3.04 DURABILITY

A. Moisture Resistance and Thermal Compatibility: Provide materials that will resist degradation and failure of signals under ambient conditions expected.

3.05 OPERATION AND MAINTENANCE

A. Ease of Maintenance
1. Equipment that requires adjustment, periodic service or maintenance shall be easily accessible.

3.06 EXISTING SYSTEMS

A. The portal card access hardware shall interface with the existing ACS head end, provided by Identiv/Hirsch, which is a modular networkable system that provides the capability for complete integration of the security system components. Card reader with pin pad shall read existing Authority credentials in order to ensure system operation.

END OF SECTION

SECTION DC D9 3: EXIT LANE BREACH CONTROL SYSTEM CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC D7 - Telecommunications and Airport Systems Communication Requirements - General Pathways, Backbone and Horizontal Cabling

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

1.02 REFERENCE DOCUMENTS

A. American National Standards Institute (ANSI)
   1. ANSI A156.23 Electromagnetic Locks

B. Federal Communications Commission
   1. FCC Part 68 and 15B
   2. Federal Communication Commission Technical Specification Part 76

C. Code of Federal Regulations (CFR)
   1. 14CFR 107.14 Access Control Systems

D. Underwriters Laboratories Inc. (UL):
   1. UL 294 Standard for Safety for Access Control System Units

E. In addition to the requirements of this document, the construction shall comply with the following:
   1. Project Definition Document, including but not limited to the following:
      a. Section 0 - Facility Design Criteria
      b. Section D – Services

F. SDCRAA Information Technology Infrastructure Standards Construction Manual

PART 2 PRODUCTS

2.01 GENERAL

A. Contractor shall coordinate with the Authority for acceptable manufacturer and model of Breach Control systems. Breach control systems will be integrated with building architecture for function and appearance.

B. The construction will use the common infrastructure (backbone) described in Section DC D7, as the primary network for conveying data.

C. ENVIRONMENTAL REQUIREMENTS
   1. Interior environments:
      a. Controlled: 60 to 100 degrees F dry bulb, and 20 to 90 percent relative humidity, noncondensing.
      b. Uncontrolled: 0 to 130 degrees F dry bulb and 10 to 95 percent relative humidity, noncondensing.
      c. Equipment and devices shall be able to operate in areas of high EMI/RFI emissions. Specifically, equipment shall be unaffected and fully functional in the airport environment, which includes radio and radar emissions from ground radios, and airport and aircraft equipment, especially from aircraft operating on ramp areas.
      d. The building HVAC system shall be designed to condition this space in compliance with the requirements of the breach management systems' vendor.

D. ELECTRICAL REQUIREMENTS
   1. Input power: Operate on 120 volt 60 Hz AC sources.
   2. Voltage tolerance: +/- 10%.
   3. UL listed.
   4. FCC limits for a Class A for computing device, Subpart B of Part 15 of FCC rules
   5. UPS with 15 minute battery backup.

E. SYSTEM COMPONENTS
1. Microwave and photoelectric cells, VMS IP cameras, and custom millwork.
a. Three directional motion technologies: Directional Doppler microwave, optical detectors and digital video management integrated into the system and allow simultaneous audio alarms to direct persons away from the exit lane and to alert security personnel. Also monitor and count the number of persons that exit the sterile area and use computerized video playback to record any person or object detected by the system entering the sterile area via the exit lane.

F. SYSTEM OPERATION
1. Pre-Alarm Message: The system shall announce a pre-alarm message to persons entering a monitored area on the public side of the exit lane. The monitored area shall be adjusted to meet the requirements of the checkpoint area.
a. Visible alarm with blue flashing lights on the public side of the exit lane.
b. The pre-alarm audible message shall consist of a voice stating, “Please move away from the exit” or other message determined by the Authority.
c. Breach Alarm: Persons proceeding through the exit lane from the public side of the checkpoint shall activate the breach alarm. The breach alarm shall trigger a visual with flashing blue lights and an audible message with a voice announcing “You have entered a restricted area, please leave through the exit now!” Activation of this warning shall be considered a true alarm. The true alarm shall annunciate locally and will be provisioned to alert at the SOC and/or other locations designated by the Authority. This alarm shall be provisioned to trigger an auxiliary video system that plays the previous 15 seconds of activity prior to the alarm and four seconds after the alarm was detected. The video system “loops” the video; replaying the event until the alarm is either reset manually or automatically (manual or automatic reset is an Administrator-level defined feature).
d. Exit Breach Detection Systems shall be programmed and configured by the DB to perform the following functions:
1) Deter entry into the sterile area by unscreened persons approaching from the public side of the checkpoint.
2) Detect persons/articles passing through the exit lane from the public area.
3) Alert the checkpoint security supervisor and/or law enforcement officers of unauthorized entry of persons/articles. Coordinate with SDCRAA for notification locations and provide all integration to achieve notifications.
4) Provide a recording and capability to produce a picture of person(s) or objects that breach the sterile area.
5) Lock-down the sterile area during an alarm event via the lock-down of the exit lane doors. The system shall be configured to meet the checkpoint configurations.
6) System will have an override/lockout system to disable an exit lane for cleaning.
7) System shall comply with local emergency egress code requirements.

G. INSTALLATION
1. Install per manufacturer’s recommendations, including, but not limited to, cable handling, bending, and pulling requirements or limits; termination methods and materials; and use of specific tools and disposables.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. Design builder shall provide an Exit Lane Breach Control System that prevents undetected entrance of personnel or objects into the sterile side of terminal facilities at these locations:
1. Where occurs on architectural plans.

B. The work includes, but is not limited to, providing the following:

1. Video, microwave, photoelectric sensors, or control units integrated into a complete standalone monitoring and control package. Design Builder shall provide an integrated system that performs all functions.
2. Communications conduit system, data and video wiring, terminations, and interface hardware required to extend monitoring and control of the exit lane breach equipment to the Security Operations Center, and other locations as designated by the Authority.
3. DB shall configure, test, and commission the system.

C. Data Communications Functions: As required to accomplish security functions.
1. Connection between breach controls and access control system.
2. Connection between access control end point devices and access control head end devices.

D. Contractor is to add cameras required, in accordance with video management system (VMS) performance criteria, to support breach management, video playback, and monitoring functions.

3.02 AMENITY AND COMFORT:

A. Accessibility: Systems will comply with requirements of local authorities for facilities for the disabled.

3.03 HEALTH AND SAFETY

A. Fire Safety Functions: In accordance with code and other Sections.

3.04 EXISTING SYSTEMS

A. The exit control equipment shall interface with the existing ACS head end and with the VMS and the existing PSIM.

END OF SECTION

SECTION DC D9 4: SPECIAL GROUNDING SYSTEMS CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS

2.01 LIGHTNING PROTECTION CONDUCTORS

A. The construction will use one or more of the following:
   1. Stranded copper cable.
   2. Solid copper strip.
   3. Stranded aluminum cable.
   4. Solid aluminum strip.

B. The construction will not use any of the following:
   1. A mixture of materials.
   2. Copper conductors on aluminum surfaces.
   3. Aluminum conductors on copper surfaces or where subject to runoff from copper surfaces.
   4. Exposed copper where contact with corrosive gases is possible.
   5. Metal services piping.
   6. Aluminum for any component in contact with earth.

2.02 LIGHTNING PROTECTION GROUNDING TERMINALS

A. The construction will use one or more of the following:
   1. Solid copper ground rods.
   2. Concrete encased electrodes located in or near footings.
   3. Ground ring electrode in direct contact with earth.
   4. Ground ring electrode encased in footings.
   5. Electrolytic Electrodes

B. The construction will not use any of the following:
   1. Grounding plates, unless no other method is effective.

2.03 LIGHTNING PROTECTION STRIKE (AIR) TERMINALS

A. The construction will use one or more of the following:
   1. Solid aluminum.
   2. Hollow tubular aluminum.

B. The construction will not use any of the following:
   1. Hollow tubular copper.
   2. Solid copper.

2.04 METAL FENCE GROUNDING

A. The construction will use one or more of the following:
   1. Solid copper ground rods.

B. The construction will not use any of the following:
   1. Aluminum for any component in contact with earth.
   2. Copper conductors on aluminum surfaces.
   3. Aluminum conductors on copper surfaces or where subject to runoff from copper surfaces.

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The construction will provide grounding systems that:

1. Provide protection from lightning strikes; scope and design of protection as defined in Section DC 0 - Facility Design Criteria.
2. Provide protection from shock due to overhead power transmission lines accidentally contacting metal fences.
3. Reduce static electricity and transient and induced current in electronic equipment cabinets, racks, and supports.
4. Comply with applicable recommendations of IEEE 142-1991 and IEEE 1100-2005 or latest adopted editions.

B. Where special grounding systems and elements must also function as elements defined within another element group, the construction will meet requirements of both element groups.

C. In addition to the requirements of this section, the construction will comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

3.02 AMENITY AND COMFORT

A. Appearance: Concealed grounding conductors and ground terminals wherever possible.

3.03 HEALTH AND SAFETY

A. Lightning Protection System Minimum Capacity:
1. Maximum Ground Resistance: 10 ohms, between any individual down conductor and ground
2. Substantiation: As specified in Section 111.

B. Fence Grounding Capacity:
1. Non-metallic fences are not required to be grounded.
2. Fences that are electrically continuous with metal posts embedded at least 24 inches into the ground, with or without concrete encasement, will be considered adequately grounded.
3. Fences that are grounded in accordance with requirements for lightning protection will be considered adequately grounded.
4. Maximum Ground Resistance: 10 ohms, between any point on fence and ground; minimum 2 grounding points for any section of fence.

3.04 DURABILITY

A. Expected Service Life Span of All Grounding Systems: Life of the building without requiring any more maintenance than annual inspection and minor repairs not more frequently than annually.
1. Substantiation:
a. Design Development: Maintenance analysis.
b. Closeout: Maintenance schedule and instructions.

B. Lightning Protection Elements: Minimum quality demonstrated by listing or labeling by UL.

C. Lightning Protection Strike (Air) Terminals: Sheet metal elements less than 3/16 inch thick are likely to be damaged (punctured) by direct lightning strikes and may not be used as strike (air) terminals.

3.05 OPERATION AND MAINTENANCE

A. Substantiation:
1. Design Development: Engineering analysis of actual grounding requirement and method of accomplishment.

3.06 METHODS OF CONSTRUCTION

A. The following existing special grounding elements will be preserved:
1. Existing grounding system as much as possible.

B. The construction will use one of the following methods:
1. Industry accepted methodologies.

C. The construction will not use:

1. Proprietary equipment or methodologies.

END OF SECTION

SECTION DC E1: EQUIPMENT AND FURNISHINGS CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The facility design will accommodate the equipment and furnishings required by the SDCRAA, which are specified in the project program and below.

B. Equipment and furnishings comprise the following elements:
   1. Equipment: Mechanized, plumbed, and electrical devices, other than equipment that is part of a service system (HVAC, electrical, etc.), and permanently installed fixtures not covered by another Section.
   2. Furnishings: Movable (loose) furniture and fittings, without electrical or plumbing connections.
   3. The following equipment and furnishings will be provided by the Design-Builder:
      a. All permanently installed equipment and furnishings.
      b. Electrically-operated equipment with a permanently wired connection.
      c. Items requiring a water supply or drainage connection.
      d. Items requiring an air distribution or exhaust connection.
      e. Aircraft and GSE Utilities and Other Services (D and D9)
      f. Items required by the code.
      g. Equipment for complete baggage handling systems as specified in Section DC D13 Baggage Handling Systems
      h. Passenger Loading Bridges for each gate.
   4. The following general equipment and furnishings will be provided by the SDCRAA:
      a. All loose (movable) equipment and furnishings.
      b. Electrically-operated equipment with a cord-and-plug connection.
      c. Items indicated as Not in Contract (NIC).
   5. The following security screening equipment will be provided by the TSA though SDCRAA:
      a. At SSCP:
         1) Primary and secondary magnetometers (metal detectors)
         2) Baggage x-ray screening devices
         3) Explosive trace detection devices
         4) Anti passback equipment at passenger exits
         5) All other TSA screening apparatus and interior office and break room FF&E.
      b. At outbound baggage screening room:
         1) EDS screening devices
         2) Explosive trace detection devices
         3) All OSR computers and FF&E not including seats which the JV will provide
      c. Items required for security checkpoints at loading docks for inflow of goods and people:
         1) Magnetometers
         2) X-ray screening devices
         3) Explosive trace detection devices
   6. Where equipment or furnishing elements also must function as elements defined within another element group, meet requirements of both element groups.

7. In addition to the requirements of this section, the construction will comply with all applicable requirements of Section DC 0 - Facility Design Criteria.

3.02 AMENITY AND COMFORT

A. Appearance:
   1. Services Connections to Equipment: Concealed behind or under items or their housings.

3.03 HEALTH AND SAFETY

A. Accident Prevention:
   1. The construction will comply will the requirements of 29 CFR 1910, regulations of Occupational Safety and Health Administration.
   2. The construction will prevent accidental pinching, crushing, and cutting of operator limbs, fingers, and toes in or by moving parts of equipment by using intelligent design or guards or other protection, without reliance on self-protective operation by operator.

3.04 DURABILITY

A. Service Life Span
   1. Equipment: Same as for building.
   2. Furnishings: 10 years

B. Substantiation
   1. Design Development: Identification of actual products to be used.

C. Weather Resistance: Items located outdoors will comply with requirements of Section DC 0 - Facility Design Criteria.

D. Vandal Resistance: Parts not easily removed without the use of tools.

3.05 E. OPERATION AND MAINTENANCE

A. Ease of Maintenance: Not requiring any routine measures to maintain operation or finishes, other than washing with soap and water.

B. Ease of Repair: Serviceable parts and access panels easily removable with common tools.

C. Ease of Equipment Service: As specified in Section DC 0 - Facility Design Criteria and the following:
   1. Parts Having Service Life Less Than That Specified for Element: Easily replaceable, without de-installation or de-mounting of the entire element, component, or equipment item.
   2. Valves: Easily replaceable internal parts, eliminating necessity of removal of entire valve for repair.
   3. Parts: Readily available from stocking distributors within 50 miles of project location.
   4. Substantiation:
      a. Construction Documents: Identification of parts normally replaced during routine maintenance and parts replaced only when damaged or unexpectedly worn out; location of stocking distributors.

END OF SECTION

SECTION DC G8: EXTERIOR SIGNAGE CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section DC 0 - Facility Design Criteria

B. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION

A. The construction will provide understandable and appropriate wayfinding and operations signage for all exterior passage from the back of the arrival roadway curb to the terminal to facilitate efficient and safe circulation to all the arrival curb areas for pedestrians at the curbsides and along the pedestrian path from parking, beginning at the parking garage, but not within the parking garage.

B. Areas comprising exterior signage include:
   1. Building exterior
   2. Commercial and public curbsides
   3. Gate identification - airside

C. Exterior signage comprises the following categories. The Performance Specifications are for each category, where applicable.
   1. Directional
      a. Signs in each program area, listing destinations with appropriate arrows.
      b. Secondary directional signs may be wall-mounted.
      c. Provide directional signs at all decision points.
   2. Identification (arrival curbside and walkways, amenities, non-public areas)
      a. Signs in each program area that identify destinations within the site.
         1) Ticketing / Check-in
         2) Passenger Drop-off and Pick-up
         3) Pedestrian Bridge
         4) Baggage Claim
         5) Ground Transportation and sub-areas such as Shared Ride Vans, etc.
         6) Parking Zones
         7) Bus and shuttle stops
         8) Major terminal identification sign on building
         9) Other as necessary
   3. Regulatory (arrival curbside and walkways, amenities, non-public areas)
      a. Signs in each program area that provide information about the use of terminal.
      b. Provide unified design formats for such signs.
   4. Informational (arrival curbside and walkways, amenities, non-public areas)
      a. Signs in each program area that provide information about the use of terminal.
      b. Provide unified design formats for such signs.
   5. Accessibility-related (curbsides and walkways, amenities, non-public areas)
      a. Signs, required and otherwise, that make the site, curbside and parking easy to use for persons with disabilities.
      b. Signs required by Americans with Disabilities Act (ADA) and California Title 24.

D. The construction will meet or exceed all applicable codes and accessibility signage guidelines such as Americans with Disabilities Act (ADA) and California Title 24.

E. The construction will provide a program of sign elements coordinated in appearance and use of language and messaging, and consistent in placement.

F. Signage language and messages will be in English.

G. The construction will make use of international and accepted travel-related pictograms where possible.

H. Design: sign designs may be drawn from the San Diego International Airport Comprehensive Sign Program or designed to match existing Terminal 2 West signs, when code compliance can be assured, or be a hybrid of the two. The sign background color will be black. Where signs are needed that do not appear in the Comprehensive Sign Program, the construction may provide new designs similar in appearance and detail to the Comprehensive Sign Program.

I. Sign placement and organization: the construction will provide coordinated directional and identification signs located along curbsides, within parking areas and site and exterior areas to provide direction to terminal entrance, baggage claim and amenities, including:
   1. A system of overhead directional signs within the parking structure.
   2. Wall and/or ground-mounted map directories.
   3. Secondary and miscellaneous signs to facilitate efficient use of the parking, site and exterior.

J. Sign design: Sign wording, destination names, use of pictograms, arrow style and other visual and content details will be simple and consistent from sign to sign.

K. Dynamic Signs: The construction will have electronic programmable and changeable (dynamic) signs for display of updatable information.

3.02 AMENITY AND COMFORT

A. Legibility: Messages on primary vehicular directional signs will have minimum font size of 6"; pedestrian directional signs 4"

B. Contrast: Sign messages will provide a minimum 70% contrast with sign backgrounds, measured in Light Reflectance Value (LRV).

C. Placement: Primary directional signs will be placed so that in most cases, a user can see a sign in the distance while reading a sign near by.

D. Digital directory map kiosks with LCD display

3.03 HEALTH AND SAFETY

A. The construction will provide adequate support connections between all overhead sign elements and the facility.
   1. Adequate support is defined as the ability to sustain adequate design loads without damage to building or sign element.
   2. Substantiation:
      a. Design Development: Detailed listing of design criteria and preliminary analysis, prepared by a structural engineer licensed in California.
   3. Construction Documents: Detailed design criteria by structural engineer licensed in California. Each manufacturer designs his own signs differently, we provide design criteria

3.04 STRUCTURE

A. Structural Performance: The construction will provide engineered signage construction and elements.
   1. Substantiation:
      a. Design Development: Detailed listing of design criteria and preliminary analysis, prepared by a structural engineer licensed in California.
      b. Construction Documents: Detailed design criteria by structural engineer licensed in California.
      c. Adherence to the intent of the Specifications document of the Comprehensive Sign Program.

B. Facility Structural Performance: The construction will provide hidden structural backing within walls and ceiling engineered to support all signage elements.

1. Substantiation:
    a. Design Development: Detailed listing of design criteria and preliminary analysis, prepared by a structural engineer licensed in California.
    b. Construction Documents: Detailed design analysis by structural engineer licensed in California.

C. Electrical Power Source: The construction will provide concealed source of power to signage elements if required.

3.05 DURABILITY

A. Service Life Span: Same as building service life, except as follows:
    1. Overhead Signage Elements: Minimum 15 years functional and aesthetic service life.

B. Wear Resistance: The construction will provide sign elements that are suitable in durability for the degree and type of traffic to be anticipated in each space.

C. Ultraviolet Resistance: Provide sign elements that are inherently resistant to fading and discoloration.

D. Vandal Resistance: In spaces accessible to the public and not subject to continuous surveillance, the construction will provide sign elements that are inherently vandal resistant or designed to be difficult to access or damage.

E. Weather Resistance: Sign elements will be resistant to degradation by weather.

3.06 OPERATION AND MAINTENANCE

A. LED illumination will be used for illuminated signs, if used. LEED requirements require non illuminated.

B. Cleaning: Provide sign elements that will not be damaged by ordinary cleaning and maintenance operations.

C. Maintenance access: Internally illuminated signs will have easy access to internal structure for ease of re-lamping and maintenance.

D. All signs must be constructed so that they are easy to open, repair and maintain. Sign faces must be easily removable for future maintenance and replacement.

END OF SECTION

SECTION DC H: ARTWORK INTEGRATION CRITERIA

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 01 30 50 - Design Procedures and Substantiation Requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 DESIGN CRITERIA

3.01 BASIC FUNCTION:

A. The Design - Builder shall integrate SDCRAA furnished Artwork into the construction of the Terminal Building and install selected opportunities of Artwork in collaboration with the artist and as directed by SDCRAA and as further defined in the Airport Art Master Plan for San Diego International Airport:

B. The Design - Builder shall work cooperatively with the artist during the design process and design and construct the support systems for the Artwork. Support system shall include but not be limited to:
   1. Feeders for power to a disconnect adjacent to artwork. Artists to wire all power to or in artwork. Provide conduit for, voice/data and video conduit onlyfor audio / visual adjacent to electronic artwork.
   2. Special accent lighting if required in writing from the artist
   3. Structural supports in ceiling, floors and walls per the loads and points specified by the artist in writing.
   4. Pads, pedestals, landscaping for exterior sculptures

3.02 AMENITY AND COMFORT:

A. Accent lighting: In addition to the general lighting provide accent lighting of artwork in focal area as directed by SDCRAA or its artist.

B. Coordination with PA system.

C. Substantiation:
   1. Design Development: System support design and calculations.
   2. Construction Documents: Details of support systems

3.03 HEALTH AND SAFETY:

A. Floor artwork has to meet slip resistance per code.

3.04 STRUCTURE:

A. The construction will design primary and secondary framing members to support the artwork.

B. The construction will provide hidden structural backing within walls and ceiling that are engineered to support all suspended or attached artwork.

C. The artist will provide all dead loads to the designer and dimensioned locations

D. Substantiation:
   1. Design Development: Preliminary design analysis and calculations by structural engineer licensed in California.
   2. Construction Documents: Final analysis, calculations and details by structural engineer licensed in California.

3.05 DURABILITY:

A. Service life span of support systems same as for building.

3.06 OPERATION AND MAINTENANCE:

A. Lamp replacement: Long-life lamps or LED for internal artwork illumination.

B. Maintenance access: Mechanical or electrical support systems shall have easy access for re-lamping and maintenance.

END OF SECTION

SECTION 01 30 50: DESIGN PROCEDURES AND SUBSTANTIATION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for design of the facility, based on the design criteria specified.

B. Substantiation requirements.

1.02 DEFINITIONS

A. Substantiation: All forms of evidence that are used to predict whether the design will comply with the requirements or to verify that the construction based on the design actually does comply. During Preliminary Design, Design Development, and Construction Documents, requirements to submit substantiation are primarily intended to forestall use of designs or constructions that will not comply. At any time before completion of construction, substantiation is presumed to be only a prediction and may subsequently be invalidated by actual results. The term substantiation is used to distinguish these forms of evidence from traditional submittals commonly required during the construction phase.

B. Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as proposed and functioning as specified.

C. Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in full-scale mock-up using the same materials and design as proposed and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).

1.03 REFERENCE STANDARDS

A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

1.04 SUBMITTALS

A. Substantiation Submittal Procedures:
   1. Recipient: SDCRAA's designated project manager.
   2. Number of Copies: 2 copies for SDCRAA's use and records; SDCRAA will return not more than one additional copy.
   3. Resubmissions: Clearly identified as such, with all changes made since the original submittal clearly marked.

B. SDCRAA's Review of Substantiation: Unless otherwise indicated, SDCRAA will make formal acceptance of substantiation submittals.
   1. If a submittal is not acceptable SDCRAA will notify Design-Builder promptly.
   2. Allow minimum of 15 working days for review of major "end of period" submittals.

C. Substantiation Schedule: Prepare and maintain a complete schedule of substantiation items, showing:
   1. Contents, for each item:
      a. Anticipated and actual item, with Section and paragraph number and drawing identification, if any.
      b. Anticipated submittal date, or time period(s) during which submittal is required.
      c. Actual submittal date.
      d. Action taken or other status.
      e. Identification of future re-submission requirement, if any.
   2. If desired, schedule may be incorporated into overall progress schedule, provided substantiation data can be reported separately from other progress information.
   3. Submission: To SDCRAA, within 30 days after notice to proceed.

4. Form: Computer database format for SDCRAA's use in tracking submittals; database structured so SDCRAA's added information will not be overwritten or deleted by incorporation of updated data from Design-Builder.
5. Updates: To SDCRAA, monthly in hard copy.

1.05 QUALITY ASSURANCE

A. Qualifications of Testing/Inspection Agencies Performing Substantiation:
1. Qualified and equipped to perform applicable tests/inspection.
2. Regularly engaged in testing and inspection activities on a commercial basis.
3. Independent of Design-Builder and Design-Builder's contractors' organizations.
4. Authorized to operate in California and in the City of San Diego.
5. Acceptable to SDCRAA.
6. Substantiation: Submittal of qualifications, based on ASTM E329.and ASTM E548.

B. Reports: Written report of each test/inspection; including complete details of conditions, methods, and results, signed by responsible individual.

PART 2 PRODUCTS

2.01 DESIGN-BUILDER FURNISHED PRODUCTS

A. In addition to requirements specified in other sections, provide products and elements that comply with the following.

B. Where "no substitutions" is indicated, use only the product (or one of the products) specified.

C. Reference Standards: Where products or workmanship is specified by reference to a document not included in the Contract Documents, comply with the requirements of the document, except where more stringent requirements are specified.
1. Date of Issue: As indicated in each instance except where a specific date is established by code.
2. Copies on Site: Keep copies of referenced standards that prescribe installation or workmanship standards on site until completion.

PART 3 EXECUTION

3.01 DESIGN

A. During Preliminary Design, the design criteria and the design itself must be refined, finalized, and documented.

B. SDCRAA will appoint representatives of the following departments to provide details of functional needs:
1. User groups.
2. Airlines
3. Operations staff.
4. Maintenance staff.
5. SDCRAA's commissioning agent.
6. Public Art departments
7. Safety and Security
8. Real Estate

C. Design Documentation: Record all design and performance criteria that will be of use during occupancy and operation of the project, including all items specified for maintenance manuals, below.
1. Design Criteria Documentation Included in Construction Documents: Organized logically (from the point of view of operations staff) and placed in a prominent location in drawing sets.
2. Maintenance Manuals where requested in these specifications
3. Drawings: Prepared using BIM and AutoCAD 2013, using SDCRAA's specified drawing and layering conventions. If these conventions are not appropriate for the project, approval of an alternate convention is required.

4. Mock-Ups: Where necessary to clarify design intent and obtain approvals, construct full-scale mock-ups, including but not limited to exterior walls, exposed concrete elements, and floor finishes.

3.02 PROGRESS DOCUMENTATION

A. Progress Schedule: As specified in the Conditions of the Contract.
   1. Submit updated schedule whenever adjustments that change the Contract Times or Milestones are approved.

B. Progress Documentation for SDCRAA Information:
   1. During Construction and Closeout: Photographs and graphic displays sufficiently detailed to allow individual departments to identify the status of the construction of their new spaces.

C. Progress Documentation for SDCRAA's Project Record:
   1. During Construction: Weekly digital photographic record of each portion of the work, taken from consistent locations, distances, and angles and as required by construction activities and its completion..
   2. During Construction: Time-lapse video record of site activity from a single vantage point located so as to view most of the site; views taken at one hour intervals from just before ground breaking until completion of enclosure and again during site finishing activities until Substantial Completion.
   3. During Closeout: Detailed digital photographic record of each interior room and space, each exterior elevation, the roof, and all site areas.
   4. Photographs and Videos: Include the date taken, a short title of the view, and the compass orientation in each view; data must be in the actual photograph or frame, rather than added after printing.

3.03 ELEMENTS AND PRODUCTS

A. In addition to requirements specified in other Sections, provide products and elements that comply with the following.

B. Elements Made Up of More Than One Product:
   1. Where an element is specified by performance criteria, the project will use construction either proven-in-use or proven-by-mock-up, unless otherwise indicated.
      a. Proven-In-Use: Proven to comply by having actually been built to the same or very similar design with the same materials as specified and functioning as specified.
      b. Proven-by-Mock-Up: Compliance reasonably predictable by having been tested in fullscale mock-up using the same materials and design as specified and functioning as specified. Testing need not have been accomplished specifically for this project; when published listings of independent agencies include details of testing and results, citation of test by listing number is sufficient (submittal of all test details is not required).
      c. The Design-Builder may choose whether to use elements proven-in-use or proven-by mock- up, unless either option is indicated as specifically required. SDCRAA has the sole discretion to accept or reject the proposed method.
         1) Where test methods accompany performance requirements, those test methods will be used to test the mock-up.
   2. Where a type of product is specified, without performance criteria specifically applicable to the element, the project will use the type of product specified.
   3. Where more than one type of product is specified, without performance criteria specifically applicable to the element, the construction will use one of the types of products specified.
   4. Where a type of product is specified, with applicable performance criteria, the construction will use either the type of product specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.

5. Where more than one type of product is specified, with applicable performance criteria, the construction will use either one of the types of products specified or another type of product that meets the performance criteria as proven-in-use or proven-by-mock-up.
6. Where neither types of products nor performance criteria are specified, the construction will use products that will perform well within the specified life span of the building.

C. Products:
1. Where a product is specified only by a manufacturer name and model number/brand name, the construction will use only that model/brand product.
2. Where the properties of a product are specified by description and/or with performance criteria, the construction will use products that comply with the description and/or performance criteria.
3. Where manufacturers are listed for a particular product, the construction will use a product made by one of those manufacturers that also complies with other requirements.

3.04 PERFORMANCE OF SUBSTANTIATION

A. In addition to the requirements stated in other sections, provide the following substantiation of compliance at each stage of the project:
1. If a substantiation requirement is specified without an indication of when it is to be submitted, submit or execute it before the end of Construction Documents.

B. Submit complete sets of documents containing all substantiation at end of the following periods:
1. Preliminary Design period.
2. Design Development period.
3. Construction Documents period.

C. Proven-In-Use: Where elements proven-in-use are used to comply with performance requirements:
1. During Design Development, identify proven-in-use elements proposed for use, including building name, location, date of construction, owner contact, and description of design and materials in sufficient detail to enable reproduction in this project.

D. Proven-By-Mock-Up: Where elements proven-by-mock-up are used to comply with performance requirements:
1. During Design Development, identify proven-by-mock-up elements proposed for use, with test report including date and location of test, name of testing agency, and description of test and mock-up.
2. Mock-up testing need not have been performed specifically for this project, provided the mock-up is substantially similar in design and construction to the element proposed.

E. Design Analyses (including Engineering Calculations):
1. Where a design analysis or calculation is specified without identifying a particular method, perform analysis in accordance with accepted engineering or scientific principles to show compliance with specified requirements, and submit report that includes analysis methods used and the name and qualifications of the designer.
2. Where engineering design is allowed to be completed after commencement of construction, substantiation may be in the form of shop drawings or other data.
3. Submit design analyses at the end of Design Development unless otherwise indicated.
4. Where design analysis is specified to be performed by licensed design professional, use a design professional licensed in the State in which the Project is located.

F. Substantiation for Products:
1. Where actual brand name products are not identified by either the SDCRAA or the Design-Builder, identify the products to be used.
2. During Preliminary Design or Design Development:
   a. For each product type, provide descriptive or performance specifications; early submittals may be brief specifications, but complete specifications are required prior to completion of construction documents.
   b. For each product type, identify at least one manufacturer that will be used.

c. For major manufactured products that are commonly purchased by brand name, and any other products so indicated, provide manufacturer's product literature on at least one actual brand name product that meets the specifications, including performance data and sample warranty.

3. During Construction:
   a. Identify actual brand name products used for every product, except commodity products specified by performance or description.
   b. Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
   c. Provide manufacturer's product literature for each brand name product.
   d. Provide the manufacturer's certification that the product used on the project complies with the contract documents.
4. Before End of Closeout:
   a. Provide copies of all manufacturer warranties that extend for more than one year after completion.

G. Regardless of whether substantiation is specified or not, the actual construction must comply with the specified requirements and may, at the SDCRAA's discretion, be examined, inspected, or tested to determine compliance.
1. Substantiation submittals will not be approved or accepted, except to the extent that they are part of documents required to be approved or accepted in order to proceed to the next stage of design or construction. However, approval or acceptance of substantiation will not constitute approval or acceptance of deviations from the specified requirements unless those deviations are specifically identified as such on the submittal.
2. The SDCRAA accepts the responsibility to review substantiation submittals in a timely manner and to respond if they are unacceptable.

END OF SECTION

SECTION 01 42 19: REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to current version of referenced standards. The following documents form part of the validation phase to the extent they are referenced elsewhere herein.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

C. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

PART 2 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

2.01 AAMA -- AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections;

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix);

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

2.02 AASHTO -- AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

A. AASHTO GTN - Guide on Evaluation and Abatement of Traffic Noise;

B. AASHTO GDPS - Guide for Design of Pavement Structures; with supplement (if any).

C. AASHTO GDPS-3 - Guide for Design of Pavement Structures, Volume 2;

D. AASHTO GDHS - A Policy on Geometric Design of Highways and Streets;

E. AASHTO LRFD - Bridge Design Specifications, Customary U.S. Units.

2.03 AATCC -- AMERICAN ASSOCIATION OF TEXTILE CHEMISTS & COLORISTS

A. AATCC Test Method 16 - Test Method for Colorfastness to Light;

B. AATCC Test Method 134 - Electrostatic Propensity of Carpets.

2.04 ACI -- AMERICAN CONCRETE INSTITUTE INTERNATIONAL

A. ACI 201.2R - Guide to Durable Concrete.

B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete;

C. ACI 301 - Specifications for Structural Concrete.

2.05 ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium);

B. ANSI A108.1 - American National Standard for Installation of Ceramic Tile;

C. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar;

D. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar;

E. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation;

F. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation;

G. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation;

H. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile;

I. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100);

J. ANSI MH29.1 - Safety Requirements for Industrial Scissors Lifts;

K. ANSI MH30.1 - Performance and Testing Requirements for Dock Leveling Devices;

L. ANSI S1.4 - American National Standard Specification for Sound Level Meters; with Amd.S1.4A and subsequent;

M. ANSI Z245.5 - American National Standard for Baling Equipment -- Safety Requirements for Installation, Maintenance, and Operation.

2.06 ASCE -- AMERICAN SOCIETY OF CIVIL ENGINEERS

2.07 ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals;

B. ASHRAE Guideline 0 - The Commissioning Process;

C. ASHRAE Guideline 1.1 - The HVAC&R Technical Requirements for the Commissioning Process;

D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems;

E. ASHRAE Std 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter;

F. ASHRAE Std 55 - Thermal Environmental Conditions for Human Occupancy;

G. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality;

H. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings;

I. ASHRAE Std 90.2 - Energy-Efficient Design of Low-Rise Residential Buildings; including All Addenda.

2.08 ASME -- THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A. ASME A13.1 - Scheme for the Identification of Piping Systems;

B. ASME A17.1 - Safety Code for Elevators and Escalators;

C. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts;

D. ASME A39.1 - Safety Requirements for Window Cleaning; including all addenda;

E. ASME A120.1 - Safety Requirements for Powered Platforms and Traveling Ladders and Gantires for Building Maintenance;

F. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers;

G. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

2.09 ASSE -- AMERICAN SOCIETY OF SANITARY ENGINEERING

A. ASSE 1011 - Hose Connection Vacuum Breakers.

2.10 ASTM A SERIES -- ASTM INTERNATIONAL

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

2.11 ASTM B SERIES -- ASTM INTERNATIONAL

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

2.12 ASTM C SERIES -- ASTM INTERNATIONAL

A. ASTM C755 - Standard Practice for Selection of Water Vapor Retarders for Thermal Insulation.

2.13 ASTM D SERIES -- ASTM INTERNATIONAL

A. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

2.14 ASTM E SERIES -- ASTM INTERNATIONAL

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials;

B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements;

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials;

D. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings;

E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials;

F. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen;

G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference;

H. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference;

I. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings;

J. ASTM E413 - Classification for Rating Sound Insulation;

K. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members;

L. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members;

M. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems;

N. ASTM E966 - Standard Guide for Field Measurement of Airborne Sound Insulation of Building Facades and Facade Elements;

O. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings;

P. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.

2.15 ASTM F SERIES -- ASTM INTERNATIONAL

A. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies;

B. ASTM F1642 - Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings.

2.16 AWI -- ARCHITECTURAL WOODWORK INSTITUTE

A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada.

2.17 AWPA -- AMERICAN WOOD-PRESERVERS' ASSOCIATION

A. AWPA U1 - Use Category System: User Specification for Treated Wood.

2.18 DBIA -- THE DESIGN BUILD INSTITUTE OF AMERICA, INC.

A. DBIA 101 - An Introduction to Design-Build;

B. DBIA 203 - The Design-Build Process Utilizing Best Value of Qualifications-Based Selection.

2.19 GA -- GYPSUM ASSOCIATION

A. GA-600 - Fire Resistance Design Manual.

2.20 ICC -- INTERNATIONAL CODE COUNCIL, INC.

A. ICC (IBC) - International Building Code;

B. ICC (IEC) - International Electrical Code Administrative Provisions;

C. ICC (IECC) - International Energy Conservation Code;

D. ICC (IFC) - International Fire Code;

E. ICC (IMC) - International Mechanical Code;

F. ICC (IPC) - International Plumbing Code.

2.21 IEEE -- INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System;

B. IEEE 142 - IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems;

C. IEEE 241 - IEEE Recommended Practice for Electric Power Systems in Commercial Buildings;

D. IEEE 493 - IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems;

E. IEEE 739 - IEEE Recommended Practice for Energy Management in Industrial and Commercial Facilities;

F. IEEE 1100 - IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment.

2.22 IES/IESNA -- ILLUMINATING ENGINEERING SOCIETY

A. IES (LH) - Lighting Handbook;

B. IES RP-5 - Recommended Practice for Daylighting Buildings;

C. IES RP-8 - Roadway Lighting.

2.23 IWBA -- INTERNATIONAL WELL BUILDING INSTITUTE

A. The WELL Building Standard® -- a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing, through air, water, nourishment, light, fitness, comfort, and mind.

2.24 NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum);

B. NEMA MG 1 - Motors and Generators.

2.25 NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION

A. NFPA 1 - Fire Code;

B. NFPA 13 - Standard for the Installation of Sprinkler Systems;

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems;

D. NFPA 17 - Standard for Dry Chemical Extinguishing Systems;

E. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection;

F. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems;

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 72 - National Fire Alarm and Signaling Code;

I. NFPA 101 - Life Safety Code;

J. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations;

K. NFPA 780 - Standard for the Installation of Lightning Protection Systems;

L. NFPA 1144 - Standard for Reducing Structure Ignition Hazards from Wildland Fire;

M. NFPA 5000 - Building Construction and Safety Code;

2.26 SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.

A. SMACNA (ASMM) - Architectural Sheet Metal Manual;

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

2.27 TIA -- TELECOMMUNICATIONS INDUSTRY ASSOCIATION

A. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set;

B. TIA-569-D - Telecommunications Pathways and Spaces.

2.28 USGBC -- U. S. GREEN BUILDING COUNCIL

A. USGBC LEED v4-BD+C - LEED v4 for Building Design and Construction;

B. USGBC LEED-CI - LEED Green Building Rating System for Commercial Interiors.

PART 3 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

3.01 CFR -- CODE OF FEDERAL REGULATIONS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design;

B. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

C. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

D. 28 CFR 35 - Nondiscrimination on the Basis of Disability in State and Local Government Services; Final Rule; Department of Justice; current edition.

E. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice; current edition.

F. 29 CFR 1910 - Occupational Safety and Health Standards; current edition.

G. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

H. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

I. 36 CFR 1192 - Americans with Disabilities Act Accessibility Guidelines for Transportation Vehicles; Final Guidelines; Architectural and Transportation Barriers Compliance Board; current edition.

J. 49 CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.

3.02 FAA -- FEDERAL AVIATION ADMINISTRATION

A. FAA AC 150/5300-13A - Airport Design

B. FAA AC 150/5300-12C Measurements, Construction and Maintenance of Skid-Resistant Pavement

C. FAA AC 150/5320-5D - Airport Drainage Design

D. FAA AC 150/5320-6E - Airport Pavement Design and Evaluation

E. FAA AC 15/5320-15 Airport Industrial Waste (Storm Water Run-off)
F. FAA AC 150/5340-1L - Standards for Airport Markings
G. FAA AC 150/5340-30 - Design and Installation Details for Airport Visual Aids
H. FAA AC 150/5360-14 Access to Airports by Individuals with Disabilities
I. FAA AC 15/537-10A Standards for Specifying Construction of Airports
J. FAA AC 150/5380-7 Pavement Management System
K. FAR Part 1: Definitions and Abbreviations
L. FAR Part 77: Objects Affecting Navigable Air Space
M. FAR Part 108: Airplane Operator Security queueing at screening areas
N. DOT/FAA/AR-00/52 - Recommended Security Guidelines for Airport Planning Design and Construction; current edition
O. U.S. Department of Homeland Security - U.S. Customs and Border Protection – Airport Technical Design Standards

3.03 FEMA -- U.S. FEDERAL EMERGENCY MANAGEMENT AGENCY

A. FEMA (MAPS) - FEMA Map Service Center; U.S. Federal Emergency Management Agency; www.fema.gov/business/nfip.

3.04 FHWA -- FEDERAL HIGHWAY ADMINISTRATION

3.05 GSA -- U.S. GENERAL SERVICES ADMINISTRATION

A. GSA PBS-P100 - Facilities Standards for the Public Buildings Service; General Services Administration.

PART 4 STATE AND LOCAL REGULATIONS

4.01 STATE OF CALIFORNIA

A. California Building Code (CBC),
B. California Electrical Code
C. California Mechanical Code
D. California Plumbing Code
E. California Energy Code
F. California Fire Code

4.02 CITY OF SAN DIEGO

A. Zoning Ordinance
B. California Building Code (CBC), based on International Building Code with local amendments as published in the San Diego Municipal Code
C. National Electrical Code, with local amendments (if any)
D. California Mechanical Code, with local amendments (if any)
E. California Plumbing Code, with local amendments (if any)
F. California Energy Code
G. CalGreen/California Green Building Standards Code
H. California Fire Code

4.03 SAN DIEGO AIRPORT NON-REGULATORY CRITERIA DOCUMENTS

A. See DC 0 - Facility Design Criteria for list of documents.

END OF SECTION

SECTION 01 70 00: EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Temporary Facilities and Controls

C. Cleaning and protection.

D. Starting of systems and equipment.

E. Demonstration and instruction of SDCRAA personnel.

F. Closeout submittals

G. Commissioning

H. General requirements for maintenance service.

1.02 TEMPORARY FACILITIES AND CONTROLS

A. SDCRAA will provide the following: See General and Special Conditions of the Design - Build contract.

B. The following will be provided for the use of the SDCRAA: See General and Special Conditions of the Design - Build contract.

C. Vehicular Access and Parking: Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
   1. Parking for Construction Workers: By Design-Builder.

D. Security: Construction operations will include protection of the work, existing facilities, and SDCRAA's operations from unauthorized entry, and vandalism.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by SDCRAA.
   3. Substantiation: Design-Builder shall submit his proposed methods for minimizing dust.

G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers. Hammer drills will need to be used to set anchors in the daytime and conduct demolition.
   2. Indoors: Limit conduct of especially noisy interior work to 11 PM to 5 AM. However at low periods of activity during the day, coordinated construction operations will be allowed and include enclosures erected to contain the construction operations.

H. Waste Control: Construction operations will include waste storage and removal as required to maintain site in clean and orderly condition.
   1. Waste Removal Service: Daily; including dumpsters.

I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work. Provide pest control service only if required to control pests.

J. Project Identification Sign: By Design-Builder to SDCRAA's design.

K. Removal of Temporary Facilities, Utilities, and Controls: Prior to Substantial Completion; including clean up, restoration of existing facilities used to original condition, restoration of permanent facilities used to specified condition, and repair of damage.

PART 3 EXECUTION

2.01 GENERAL

A. Pre-Construction Survey: To be prepared by SDCRAA; control and reference points will be indicated.

B. Health and Safety:
   1. Use of explosives is not permitted.
   2. Removal, abatement, handling, and disposal of hazardous materials will comply with 29 CFR 1926 and state and local regulations.

C. Final Cleaning: By SDCRAA.

2.02 COMMISSIONING

A. Commissioning: Placing the project into full and proper operation, including starting and adjusting equipment and systems, functional performance testing, otherwise demonstrating compliance with Contract Documents, correcting defects, and obtaining permits.
   1. Follow the recommendations of:
      a. ASHRAE Guideline 1 - The HVAC Commissioning Process.
      b. PECI Model Commissioning Plan and Model Commissioning Guide Specifications.
   2. Prerequisites: Design criteria documentation and recording of all changes to Contract Documents.
   3. Unless otherwise indicated, Design-Builder is responsible for all commissioning activities.
   4. Commissioning activities may take place at any time after completion of the element to be commissioned.
   5. All commissioning activities must be complete before the end of Closeout, unless specifically excepted.
   6. Maintenance Manuals: Ready for use during applicable commissioning activities.

B. Functional Performance Testing: Testing will cover all functions of system, all components of system, and interfaces between systems, including all modes of operation, conditional controls, and reactions to emergency conditions.
   1. Description in Commissioning Plan: Each function to be tested described separately.
   2. Systems Composed of More Than One Item of Equipment: Individual components tested for proper operation and interconnection before beginning system testing (e.g. "point-to-point" testing).
   3. See substantiation requirements in other Sections for specific items to be tested and tests required.
   4. Testing Agency Qualifications: As specified in this section under Quality Requirements.
   5. SDCRAA will witness tests and prepare defect reports.
   6. Detailed test reports will be by Design-Builder, showing test criteria, methods, and results.

C. Commissioning Plan: Contract will include preparation of a complete plan and schedule of all commissioning activities, including those by SDCRAA and code authorities; include all field tests and inspections, functional performance tests, demonstrations, and permit inspections and tests.
   1. Contents: For each commissioning activity indicate:
      a. Entity performing activity.
      b. Prerequisites, such as type of design information required, prior testing, etc.; identify in schedule as separate tasks.
      c. Functions to be tested or inspected.
      d. Methods of test or inspection, conditions required, and other procedures; if methods are not specified, identify methods that will demonstrate compliance with Contract Documents with satisfactory repeatability by others.

e. Equipment required.
f. Results required.

2. Commissioning activities will be scheduled at the optimum time, to avoid unnecessary uncovering of work, retesting due to inadequate preparation, and duplication of effort.
3. If desired, schedule may be incorporated into overall progress schedule or substantiation schedule, provided commissioning tasks can be reported separately from other progress information.
4. Submission: To SDCRAA; within 30 days after notice to proceed.
5. Form: Computer database format for SDCRAA's use in tracking submittals; database structured so SDCRAA's added information will not be overwritten or deleted by incorporation of updated data from Design-Builder.
6. Updates: To SDCRAA monthly in hard copy.

D. Commissioning Reports: A report will be submitted for each commissioning activity that involves inspection, observation, or testing of construction, on a standard form that identifies the project.
1. Timing: Submitted within 7 calendar days after completion of the activity; for activities that are prerequisites for other activities to be witnessed by SDCRAA, satisfactory report submitted prior to start of witnessed activity.
2. Contents:
a. Identification of activity, including 'element/system involved, date/time.
b. Entity performing activity; other persons present.
c. Prerequisites required and accomplished.
d. Procedures or methods of testing.
e. Results required and results achieved.

E. SDCRAA-Conducted Commissioning Activities:
1. SDCRAA will assign a staff member to manage the commissioning process beginning during Preliminary Design and to perform the following commissioning activities:
a. Review of design criteria documentation for completeness.
b. Review of Design-Builder's commissioning plan and specifications.
c. Review of qualifications of Design-Builder's testing agencies.
2. SDCRAA, SDCRAA's staff, or consultants will perform the following commissioning activities:
a. Inspection just prior to Substantial Completion, including preparation of SDCRAA's punchlist.
b. Inspection prior to final payment.

2.03 CLOSEOUT SUBMITTALS

A. Maintenance Manuals: Contract will include assembly of system design information, operation and maintenance data, and copies of warranties into manuals, organized by functional system (e.g. plumbing, HVAC, etc.) or material type (e.g. flooring, wall finishes, etc.) as appropriate using specification numbers where applicable.
1. Binders: 3-ring, D-ring, with hard cover, project title on spine, Table of Contents in each volume, and stiff dividers with labeled tabs; contents divided into logical binders not more than 3 inches thick.
2. Directory: Names, addresses, telephone numbers, of all design and construction entities, including subcontractors and suppliers, with names of products supplied.
3. Software-Operated Systems and Equipment: Detailed program documentation, a general review of the programming approach, description of use on this project, and description of possible user-modifications.
4. Drawings: Bound into manuals, folded to size of binder.
5. Product Listing: Manufacturer's brand name for each major product actually installed, in alphabetical order by generic product name, cross-referenced to specification numbers and Table of Contents of manuals.
6. Warranties: Photocopies of originals.

7. Videotapes of training sessions.
8. See Section X01 for additional requirements for contents of operation and maintenance data.

B. Project Record Documents: During construction construction personnel will maintain on site one set of all documents forming the contract, including drawings, recording all changes made by addenda, by formal modifications, and in performing the work, for SDCRAA's future reference.
   1. Storage: Separately from documents used for construction, in location where they can be kept clean and safe from fire and damage.
   2. Changes to be Recorded Include:
      a. Actual measured locations (horizontal and vertical) of foundations and concealed utilities and appurtenances, referenced to visible permanent appurtenances.
      b. Field changes of dimension and detail and details not on original documents.
      c. Actual products used, in specification, with brand name or model number.
      d. Submittal Copy of Drawings: All marks copied to a clean set of prints.

C. Final Site Survey: Pre-construction survey updated after completion of foundations, verifying location and level of permanent benchmarks and control points, utility access points, and principal improvements.

D. Spare Parts and Extra Materials: As specified for specific products; delivered to location on project site designated by SDCRAA; with receipt from SDCRAA.

E. Maintenance Supplies and Tools: As specified for specific products; delivered to location on project site designated by SDCRAA; with receipt from SDCRAA.

2.04 DEMONSTRATION AND TRAINING

A. Training: Contract will include training of SDCRAA's personnel in operation and maintenance of equipment, consisting of:
   1. Training is required for all software-operated systems, HVAC systems and equipment, plumbing equipment, electrical systems and equipment, conveying systems, and other electrically operated equipment.
      a. Provide supplemental training within 6 months for operations that are seasonal in nature.
      b. Training time for major pieces of equipment (i.e. boilers, chillers, etc) will be a minimum of 40 man hours.
   2. Instruction in operation, control, adjustment, shut-down, servicing, troubleshooting, and maintenance, for each equipment item for which training is specified.
   3. Instruction in care, cleaning, maintenance, and repair of materials, for:
      a. Each item for which training is specified.
      b. Roofing, waterproofing, other weather-exposed or moisture protection products.
      c. Finishes, including flooring.
      d. Fixtures and fittings.
      e. Items as specified in other Sections.
   4. Major Software-Operated Systems: Training by software manufacturer at their facility for minimum of one SDCRAA staff members, with take-home training materials.
   5. Training Location: If not otherwise specified, training will be conducted in a classroom on site, with videotapes made for future use.
   6. Minimum Qualifications of Trainers: Knowledgeable about the project and the equipment and trained by the manufacturers.
   7. Maintenance Manuals: Ready for use in training.

2.05 OPERATION AND MAINTENANCE

A. Operation and Maintenance: Design-Builder will be responsible for the following:
   1. Preparation of maintenance plan for SDCRAA's use, including description of maintenance activities, tools, and supplies required.

2. Periodic maintenance service as specified, for one year from the date of Substantial Completion, for the following:
   a. Roofing.
   b. Elevators.
   c. Escalators.
   d. Baggage Handling Systems.
   e. Loading Bridges.
   f. Air System.
   g. 400 Hz Power system.
   h. Potable Water systems.
   i. Loading Dock Equipment.
   j. Building Maintenance Equipment.
   k. HVAC systems filters, lubrication, belt checks and controls.
   l. HVAC systems pumps.
   m. Fire pumps.
   n. Telecommunication Backbone and LAN
3. Services will be included under Design-Builder's contract with SDCRAA.
4. Individual operation and maintenance contracts will be between maintenance organization and SDCRAA.
5. Maintenance Services: Examination at frequency consistent with reliable operation; cleaning, adjusting, and lubricating; replacement of parts whenever required, using parts produced by the original manufacturer.
6. Maintenance Organizations: Approved by manufacturer and SDCRAA; transfer or assignment of contracts without prior written consent of SDCRAA not allowed.

B. Post-Occupancy Survey: Conducted by SDCRAA, of actual occupants after minimum of 90 days of full occupancy and operation and again after the first year after date of occupancy.
   1. See Agreement and Conditions of the Contract for terms of provisions relating to results of post occupancy survey.
   2. Purpose of Survey: Subjective evaluation of function and quality of occupants' spaces and project as a whole. Survey questions will include:
      a. Were the final design and features communicated to you before construction began?
      b. Have the functional needs you identified as important been provided?
      c. Was the progress of construction of the new building communicated to you on a regular basis?
      d. Is the room temperature in your work area comfortable? Is the performance of the heating/air conditioning system acceptable?
      e. Does the amount of direct lighting in your work area meet your needs and expectations?
      f. Does the amount of outside natural light into your work area meet your expectations based on the design and location of your work area?
      g. Is noise from other work areas or outside sources not objectionable in your work area?
      h. Does the performance of the equipment you use in your work area meet your expectations? (Excluding owner-provided equipment.)
      i. Does the appearance of the building both inside and outside project the appropriate image to the community and our customers?
      j. Is the building user-friendly? Have features been placed where they are convenient and readily accessible?
      k. Does the quality of construction meet your expectations? Do finishes, trim, and painting demonstrate the expected level of quality?
      l. Were you provided with an appropriate level of orientation regarding the features of the new building before move-in?

m. Is the number of corrective repairs or warranty claims during the first 90 days of occupancy less or more than you would expect with a major new facility?
n. How would you rate the new building, overall, on a scale of 1 to 10 (lowest to highest), realizing that it would be impossible to completely please everyone?

END OF SECTION