DEPARTMENT OF THE ARMY

FACILITIES STANDARDIZATION PROGRAM

STANDARD DESIGN

ROTARY WING AND TILT-ROTOR AIRCRAFT MAINTENANCE HANGAR

(TOE and TDA)

JULY, 2025

US Army Corps of Engineers
Mobile District

ROTARY WING AND TILT-ROTOR AIRCRAFT MAINTENANCE HANGAR
(TOE and TDA)

STANDARD DESIGN

July, 2025 Initial Publication: Updated wash rack and electrical requirements; updated CAB and subordinate unit requirements; consolidated requirements for TOE and TDA organizations.

Record of Changes (changes are indicated by \1\ ... /1/)

Change No.	Date	Location

US Army Corps of Engineers
Mobile District

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1 GENERAL REQUIREMENTS

1.1 SUMMARY:

1.1.1 This document establishes the criteria for the programming and design of aircraft maintenance hangars for TOE and TDA Flight and Maintenance Aviation organizations.

1.2 REFERENCES:

Department of the Army Pamphlet 415-28, Guide to Army Real Property Category Codes

Army Standard for Aviation Maintenance Hangar Complex: TOE Rotary Wing Aviation Units, 4 Jun 2021

Army Standard for Aviation Maintenance Hangar Complex: TDA Rotary Wing Aviation Units, 11 May 2022Army Regulation 95-2, Airspace, Airfields/Heliports, Flight Activities, Air Traffic Control, and Navigational Aids

AR 750-1 Army Materiel Maintenance Policy

ER 1110-3-113, Department of the Army Facilities Standardization Program

FM 3-04.111 Aviation Brigades

AR 190-11 Physical Security of Arms, Ammunition, and Explosives, Appendix G

AR 190-13 The Army Physical Security Program

AR 190-51 Security of Unclassified Army Property (Sensitive and Nonsensitive)

UFC 1-200-01 DoD Building Code

UFC 1-200-02 High Performance and Sustainable Building Requirements

UFC 3-201-01 Civil Engineering

UFC 3-101-01 Architecture

UFC 3-110-03 Roofing

UFC 3-120-10 Interior Design

UFC 3-260-01 Airfield and Heliport Planning and Design

UFC 3-260-02 Pavement Design for Airfields

UFC 3-301-01 Structural Engineering

UFC 3-201-01 Civil Engineering

UFC 3-400-02 Design: Engineering Weather Data

UFC 3-401-01 Mechanical Engineering

UFC 3-410-01 Heating, Ventilating, and Air Conditioning Systems

UFC 3-420-01 Plumbing Systems

UFC 3-420-02FA Compressed Air

UFC 3-490-06 Elevators

UFC 3-530-01 Interior and Exterior Lighting Systems and Controls

UFC 3-535-01 Visual Air Navigation Facilities

UFC 3-570-01 Cathodic Protection System

UFC 3-575-01 Lightning and Static Electricity Protection Systems

UFC 3-580-01 Telecommunications Interior Infrastructure Planning and Design

UFC 3-600-01 Fire Protection Engineering for Facilities

UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings

UFC 4-010-06 Cybersecurity of Facility-Related Control Systems

UFC 4-021-01 Design and O&M: Mass Notification Systems

UFC 4-211-01 Aircraft Maintenance Hangars

UFC 4-215-01 Armories and Arms Rooms

SDDCTEA Pamphlet 55-17, Better Military Traffic Engineering

Applicable United Facility Guide Specifications (UFGS)

International Building Code (IBC)

International Plumbing Code (IPC)

National Electric Code (NEC)

NFPA 409, Standard on Aircraft Hangars

Installation Design Guide by project site.

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1.3 STANDARDIZATION:

1.3.1 The Center of Standardization for Aircraft Maintenance Hangars (AVN-COS) is the U.S. Army Corps of Engineers District, Mobile (CESAM). In accordance with ER 1110-3-113, the AVN-COS maintains Army rotary wing and tilt-rotor standard designs (SD) and must be consulted during the programming, design, and construction of all projects with primary facilities categorized under Facility Category Codes (FCC) 211 10. Adherence to Standard Design plans and criteria are mandatory and supersede UFGS and 4-series UFC criteria. Lessons learned, VE Studies summaries and design files related to the various Standard Designs are available through the COS.

1.3.2 Designers should coordinate with COS before design is initiated to obtain copies of mandatory compliance checklists and lessons learned.

1.3.3 If target unit requirement is not accurately captured in the Army Standard/Standard Design and/or RPLANS requirement, coordinate with AVN-COS for input and assistance with planning of required waiver per AR420-1.

1.3.4 Adapt-Build Models: An Adapt - Build Model for Standard Design Hangars *may* be available upon request from the Center of Standardization. Each model package contains an approximately 65% design which may include a Building Information Model (BIM), 2D CAD files, reports and analyses, and specifications. This design exemplifies a technically acceptable product and incorporates mandatory functional and operational requirements for similar (although not exact) facilities.

The materials provided are intended as a reference for analysis and design completion under the direction of the various designers - of - record; the final design and construction product is the responsibility of those designers, including but not limited to verification of design assumptions, loads and criteria; adherence to the installation architectural theme; building code compliance; and correctness of the engineering systems provided.

The Center of Standardization assumes no liability for the model design concept provided and, to the extent it is used by a design agent, that agent is responsible for all aspects of the design as finalized. It is left to the design agent's discretion if, and how, the sample files provided are used to satisfy the requirements of the final project.

This model is not intended to modify or override specific requirements of any project scoping document, including a 1391, and, under all circumstances, it is incumbent upon the design agent to adhere to the site - specific scope and functional and operational requirements specified within the project programming documents.

1.4 APPLICABILITY:

1.4.1 This standard design includes spaces categorized as FCC 211 10, 211 13, 211 14, 211 16, 211 17, 211 20, 141 79 and 113 70 as defined by DA PAM 415-28 (Reference 3). Depot Maintenance Facilities are not covered by this Standard Design.

1.5 HANGAR FACILITIES, GENERAL:

1.5.1 Army Aviation facilities are to be designed and constructed in a manner consistent with the design and construction practices used for civilian sector projects that perform similar functions. For example, a Company Operations Facility has the similar function as an office/warehouse in the civilian sector; therefore, the design and construction practices should be consistent with the design and construction of an office/warehouse building.

1.5.2 Hangar facilities are designed to permit 24-hour operation.

Comparison of Military Facilities to Civilian Facility

Military Facility	Civilian Facility
Aircraft Maintenance Hangar (HGR)	Aircraft Maintenance Hangar

1.5.3 FACILITY DESIGN LIFE: It is the Army's objective that their facilities have a 25-year useful design life (before a possible reuse/re-purpose or renovation requirement, to include normal sustainment, restoration, modernization activities) and a 50-year building replacement life. Accordingly, the design and construction should provide an appropriate level of quality to ensure the continued use of the facility over that time period with the application of reasonable preventive maintenance and repairs that would be industry-acceptable to a major civilian sector project owner.

1.5.3.1 LCCAs are to be performed for life spans indicated per UFC 1-200-02.

1.5.4 ACCESSIBILITY REQUIREMENTS: Able-bodied soldiers occupy and manage the TOE and TDA flight organization Hangar Complex with support from a small number of able-bodied civilian personnel while Sustainment organizations such as the AMCOM LRC-A and ACLC are primarily occupied and managed by a civilian workforce with some military supervision present. In accordance with the DoD Deputy Secretary of Defense Memorandum Subject: Access for People with Disabilities, October 31, 2008, maintenance hangar standard designs are intended to be accessible to persons with disabilities to the maximum extent that is reasonable and practicable without degrading the facility's military and sustainment utility.

1.6 ORGANIZATION TYPES

1.6.1 Table Of Organization and Equipment (TOE): TOE organizations are comprised of a standardized set of personnel and equipment and are typically associated with units that occur in greater numbers within the Army.

1.6.2 Table of Distribution and Allowances (TDA): TDA organizations are comprised of a unique set of personnel and equipment and are typically associated with a single organization.

1.7 LEVELS OF MAINTENANCE:

1.7.1 AR 750-1 and Department of the Army pamphlet (DA PAM) 750-1 outline the concepts, roles, responsibilities, and authority requirements of the Army maintenance program. Field-level and Sustainment-level maintenance (two-level maintenance) come under the Army national maintenance program (NMP). The CAB commander has command and control (C2) authority for field-level maintenance, both light and

heavy while AMCOM has authority over sustainment, both forward and intermediate, and depot-level maintenance,.

1.7.2 FIELD MAINTENANCE (FM): Field maintenance is performed by CAB personnel assigned to the aviation maneuver and aviation maintenance companies (AMC). Flight company personnel perform authorized maintenance procedures within their capability. Aviation field maintenance is characterized by “on-system maintenance”, generally replacing components or performing component repair and returning them to the user.

Field maintenance is divided into field Light and field Heavy activities.

1.7.2.1 Aircraft maintenance activities are conducted on the aircraft parking apron, in the aircraft maintenance bay and in the allied/special shops.

1.7.2.2 Flight company maintenance activities primarily focus on operational inspections (pre-flight, post flight, and daily) and unscheduled maintenance. Crew chiefs and aviation maintenance personnel also perform aircraft launch and recovery operations, maintenance operational checks (MOCs), vibration analysis, and maintain aircraft logbooks.

1.7.2.3 Aviation maintenance companies provide maintenance support to the aviation maneuver company’s assigned aircraft. The aviation maintenance company performs field Light activities, according to the maintenance allocation chart (MAC).

1.7.2.4 The aviation maintenance company manages the battalion/squadron maintenance program, operates a centralized tool room, and performs scheduled maintenance services.

1.7.2.5 The aviation maintenance company troubleshoots airframe and component malfunctions, performs maintenance and repair actions, removes and replaces aircraft components, and performs maintenance test flights (MTFs) and MOCs.

1.7.2.6 The aviation maintenance company provides sustainment support by processing, requesting, and storing Class IX (air) aircraft repair parts and managing the battalion/squadron Class IX (air) PLL.

1.7.2.7 Aviation maintenance company maintainers operate and, in conjunction with the CAB ground vehicle TEMF, maintain the battalion/squadron Ground Support Equipment (GSE).

1.7.2.8 The Aviation Support Company (ASC) assigned to the Aviation Support Battalion (ASB) provides up to field Heavy maintenance in support of Battalion aviation maintenance companies. This generally consists of the same type of maintenance activities but with a greater capacity. The ASB is primarily responsible for performance of Phase maintenance and repairs on specialized components and systems such as communications, attack aircraft targeting systems and night vision goggles.

1.7.3 SUSTAINMENT MAINTENANCE (SM):

1.7.3.1 Sustainment maintenance is the Army strategic support. At this level, maintenance supports the supply system by economically repairing or overhauling components. Maintenance management concentrates on identifying the needs of the Army supply system and managing programs to meet the supply system demands. Sustainment maintenance support is divided and primarily performed by three separate entities: the original equipment manufacturers (OEMs) and their CFSRs; Army sustainment facilities such as Logistics Readiness Center-Aviation (LRC-A) located at fixed-bases in the continental United States; and by the national maintenance (NM) source of repair (SOR).

Sustainment maintenance is divided into sustainment Forward and sustainment Intermediate activities.

Sustainment level maintenance is primary performed at Logistics Readiness Center-Aviation (LRC-A) and Depots.

1.7.3.2 Refer to the TOE and TDA Army Standards for detailed explanations of the various maintenance levels and their relationships.

1.8 CAB ORGANIZATION:

COMBAT AVIATION BRIGADE (CAB): A CAB is a multi-functional brigade-sized unit that fields military rotary wing and tilt-rotor aircraft. CABs are organized as either a Light CAB, Heavy CAB, Theatre Enabling CAB, or Heavy Lift CAB. Each CAB is comprised of Flight and Maintenance Battalions in various quantities:

1.8.1 ATTACK RECONNAISSANCE BATTALION (ARB): The ARB consists of Battalion HQ elements, a Headquarters and Headquarters Company (HHC), three (3) Attack Reconnaissance Companies each equipped with AH-64 (Apache) helicopters, a Gray Eagle Company equipped with MQ-1C ER (Gray Eagle) UAS aircraft, an Aviation Maintenance Company, and a Forward Support Company (FSC). For an ARB hanger, the programmed spaces are organized to support operation and maintenance of the three (3) Attack/Recon (AH-64) Company aircraft and the Aviation Maintenance Company and maintenance support contractors. The Gray Eagle company is typically

assigned as a division-level asset and generates its own allowance for Maintenance Hangar space. Refer to the Fixed Wing Army Standard for typical Gray Eagle Company hangar criteria.

1.8.2 ASSAULT HELICOPTER BATTALION (AHB): The AHB consists of Battalion HQ elements, a Headquarters and Headquarters Company (HHC), two (2) Assault Helicopter Companies each equipped with UH-60 (Blackhawks), one (1) Heavy Lift Helicopter Company equipped with CH-47 (Chinook), an Aviation Maintenance Company, and a Forward Support Company (FSC). Additionally, the AHBs of the 10th, 82nd, and 101st CABs have an organic Pathfinder Company. For an AHB hangar, the programmed spaces are organized to support operation and maintenance of the three (3) aviation maneuver company aircraft, and the Aviation Maintenance Company and maintenance support contractors.

1.8.3 ASSAULT HELICOPTER BATTALION WITH MEDEVAC(AHB-M). The AHB-M consists of Battalion HQ elements, a Headquarters and Headquarters Company (HHC), one or two (2) Assault Helicopter Companies each equipped with UH-60 (Blackhawks), one (1) Heavy Lift Helicopter Company equipped with CH-47 (Chinook), one (1) Medical Air Ambulance Company with HH-60 aircraft, one (1) Aviation Maintenance Company, and a Forward Support Company (FSC). For an AHB-M hangar, the programmed spaces are organized to support operation and maintenance of the four (4) aviation maneuver company aircraft and the Aviation Maintenance Company and maintenance support contractors.

1.8.4 HEAVY LIFT BATTALION (HL): The Heavy Lift Battalion consists of Battalion HQ elements, a Headquarters and Headquarters Company (HHC), four (4) Heavy Lift Helicopter Companies equipped with CH-47 (Chinook), one (1) Aviation Maintenance Company, and a Forward Support Company (FSC). For a HL hangar, the programmed spaces are organized to support operation and maintenance of the four (4) aviation maneuver company aircraft and the Aviation Maintenance Company and maintenance support contractors.

1.8.5 AVIATION SUPPORT BATTALION (ASB): The ASB consists of Battalion HQ elements, a Headquarters and Headquarters Company (HHC), a Brigade Signal Company, a distribution company, and an aviation support company. For an ASB hangar, the programmed spaces are organized to support operation and maintenance of the Aviation Maintenance Company and maintenance support contractors.

1.9 MASTER PLANNING CONSIDERATIONS:

1.9.1 The hangar complex is typically located on an Army Airfield (AAF) or Army Heliport (AHP) and adjacent to an Aircraft Parking Apron. Site selection and real property master planning must comply with all safety, obstruction, and airspace boundaries as stipulated by UFC 3-260-01 and UFC 4-211-01. The hangar complex is typically part

of the outer boundary of the AAF/AHP Restricted Area. Mandatory and safety distances between exterior elements must be taken into consideration from project inception to ensure adequate exterior acreage is provided.

1.9.2 Externally, the hangar complex typically includes the following: covered storage for aircraft ground support equipment (AGSE), covered storage for associated support Items of equipment (ASIOE), a hazardous material (HAZMAT) storage building, a POL storage building, aircraft washing apron with associated utility control building, and hangar access apron. A separate fire pump building with water storage tank(s) is often required to supply the hangar fire suppression system with adequate water pressure and water supply.

1.9.3 HANGAR SITING

1.9.3.1 Site the hangar complex immediately adjacent to the aircraft mass parking apron on Army Airfields (AAF) or Army Heliports (AHP) without penetrating controlled airspace or obstruction clearances.

1.9.3.2 The outer boundary of the hangar complex typically abuts the Rotary Wing and Tilt-Rotor Aircraft Parking Apron FCC 113 20, Hover Taxi lanes FCC 112 21, and Taxiways FCC 112 31. This assures safe and efficient transition from the power-on components of an AAF/AHP (primary landing surface (i.e., runway or helipad) and aircraft parking) to non-power ingress/egress to the hangar.

1.9.3.3 The Hangar must be connected to the mass parking apron by a Hangar Access Apron which extends the full width of the Aircraft Maintenance Bay. Provide Access Apron between the edge of the Parking Apron and the Hangar in accordance with UFC 3-260-01. Increasing access apron depth to 125 feet is recommended where land area is available.

1.9.3.4 Provide clear space and fire separation distance around the hangar in accordance with UFC 4-211-01, specifically NFPA 409 and IBC.

1.9.3.5 Site selection and real property master planning for all Hangar Complexes must comply with all safety, obstruction, and airspace boundaries as stipulated by Army Regulation 95-2 and implemented by the Transportation Systems Mandatory Center of Expertise (TS MCX) for DCS G-3, HQDA. The major components of a hangar complex and minimum site requirements for any hangar project include the primary facility FCC 211 10, Hangar Access Apron FCC 113 40, and Aircraft Wash Rack FCC 113 70. Siting must comply with UFC 3-260-01 Airfield and Heliport Planning and Design and UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

1.9.3.6 Each hangar within the maintenance hangar complex is provided standalone HAZMAT and POL Storage Buildings, Ground Support Equipment (GSE) Covered Storage, and Associated Items of Equipment (ASIOE) Covered Storage where applicable.

1.9.4 VEHICLE PARKING

1.9.4.1 The design must incorporate POV parking, organizational parking, access drives, and emergency vehicle lanes.

1.9.5 CLEARANCES AND SEPERATION

1.9.5.1 As part of a larger airfield complex, each hangar design must address functional, NFPA 409, IBC, and AT/FP setbacks and airfield security continuity.

1.10 SPACE PLANNING CRITERIA:

1.10.1 The maximum allowable gross areas for Maintenance Hangars within the complex, including utility spaces for communication, electrical and mechanical equipment, are listed in the following tables. For TOE and TDA organizations generating a requirement for a hangar not covered by a current Standard Design, coordinate with the Center of Standardization in developing a conceptual program for the intended using activity.

1.10.2 BUILDING AREA:

1.10.2.1 Gross Area: Gross areas of facilities must be computed according to UFC 3-101-01.

Gross Area Limitations: Maximum gross area limits indicated in Table 2.1 are based on the current Army Standard for Aviation Maintenance Hangar Complex: TOE Rotary Wing and Tilt-Rotor Aviation Units and Army Standard for Aviation Maintenance Hangar Complex: TDA Rotary Wing Aviation Units. Gross Area for hangars in harsh climate areas may be modified as follows:

- Increase maximum allowable area shown NMT 5%,
- Aircraft parts, GSE and ASIOE covered storage may be enclosed and conditioned,
- Additional covered or enclosed storage may be provided for unit equipment sensitive to exposure. This additional area counts against the 5% increase listed above.

A smaller overall gross area is permissible provided all established net area program requirements are met.

Table 2.1 STANDARD DESIGN ALLOWABLE AREAS:

HANGAR TYPE	MAXIMUM ALLOWABLE AREA	SUPPORTED UNITS
TOE Organizations		
Attack up to 24 aircraft	118,000 GSF	ATK BN
Assault w/o MEDEVAC; 3 flight companies	143,000 GSF	AHB
Assault w/ MEDEVAC; up to 3 flight companies	147,000 GSF	AHB-M in Heavy CAB
Assault w/ MEDEVAC; 4 flight companies	220,000 GSF	AHB-M in Light CAB
Medium ASB	127,000 GSF	ASB in Heavy CAB
Large ASB	176,000 GSF	ASB in Light CAB
Extra-Large ASB	225,000 GSF if (1) hangar; 276,000 GSF if (2) hangars	ASB in HL CAB
TDA Sustainment Organizations		
5 modules	114,000 GSF	LRC-A
6 modules	127,000 GSF	LRC-A
7 modules	140,000 GSF	LRC-A
8 modules	153,000 GSF	LRC-A
9 modules	169,000 GSF	LRC-A
10 modules	182,000 GSF	LRC-A

Net Area: Net area requirements for functional spaces are indicated on the Standard Design drawings.

1.10.3 HANGAR OCCUPANCIES BY TENANT ORGANIZATION:

Table 2.2 ASSUMED PERSONNEL OCCUPANCY, TOE MILITARY:
Includes personnel assigned to the Flight Companies and the Aviation Maintenance Company and assigned contractors

Unit	Aircraft	Unit Personnel
Attack Reconnaissance BN, Heavy (ARB)	AH-64	225 Military, 2 Contractor
Attack Reconnaissance Squadron (ARS)	AH-64	225 Military, 2 Contractor

Assault Helicopter BN (AHB)	UH-60, CH-47	275 Military, 2 Contractor
Assault Helicopter BN w MEDEVAC (AHB-M)	UH-60, CH-47, HH-60	453 Military, 3 Contractor
Aviation Support BN (ASB)	No Assigned Aircraft	277 Military, 2 Contractor

1.10.4 Occupancy numbers for TDA flight and maintenance organization hangars are determined as discussed in the TDA Army Standard.

1.11 FUNCTIONAL AREAS:

1.11.1 The hangar is part of a larger complex supporting the flight or maintenance organization mission. Each hangar facility is designed to support company, flight, and maintenance operations of aircraft within the Army fleet. Hangars are sized to accommodate assigned personnel and activities. Not all spaces listed below will occur in every hangar: TDA maintenance organizations will not have Flight Company or Operations spaces or example.

1.11.2 AIRCRAFT MAINTENANCE BAY. The Aircraft Maintenance Bay is a high bay, enclosed, heated and ventilated work area for the inspection, service, repair, and modification of the assigned rotary-wing aircraft. Direct aircraft access from the mass Aircraft Parking Apron to the maintenance bay is provided by a Hangar Access Apron and a large aircraft door opening. The maintenance bay contains multiple aircraft maintenance modules of a standardized size as indicated in the relevant Army Standard. Each contiguous group of modules is enclosed by a five (5) foot safety corridor free of any storage or equipment. The safety corridor must be continuous and must provide an unobstructed passage to required egress doors. An additional five (5) foot structural zone is located between safety corridor(s) and the maintenance bay rear and side walls to accommodate structural elements, storage cabinets, life safety equipment, mechanical and electrical equipment.

1.11.3 MAINTENANCE OPERATIONS - ADMINISTRATION. Administrative spaces are required for scheduling, supervising, quality control, and support of maintenance activities.

1.11.4 MAINTENANCE OPERATIONS - SUPPORT. Maintenance Support functional areas include Repair Section, Special Tools Room, Crew Chief Workroom(s), and Maintenance Test Pilot Office(s).

1.11.5 MAINTENANCE OPERATIONS - SHOPS. Repair shops are required for airframe and component repair/replacement where the repair activity cannot be conducted

directly on the aircraft. Each shop requires specialized equipment and associated utilities as well as specific environmental and physical provisions.

1.11.6 MAINTENANCE OPERATIONS - TECH SUPPLY. Aircraft parts supply is required to maintain, store, and issue Class IX (air) repair parts, PLL, bench stock, and shop stock.

1.11.7 AVIATION UNIT OPERATIONS – FLIGHT OPERATIONS. Dedicated Aviation Operations areas are required for assigned pilots and air crew members to develop mission and flight plans. Aviation Operation spaces include Flight Planning, Secure Planning Room, Flight Operations, Secure Storage, Pilot Workrooms, and Briefing Room. These spaces are typically located away from the maintenance areas.

1.11.8 AVIATION UNIT OPERATIONS – COMPANY ADMINISTRATION AND READINESS MODULE. Company admin and readiness spaces are required in the hangar for company administration and unit storage.

1.11.9 SECURE STORAGE. Secure storage spaces are required for aircraft mounted systems, communication equipment, and personnel weapons.

1.11.10 MEDEVAC READY AREA. In units with MEDEVAC mission, a MEDEVAC ready area is required in hangars supporting 24/7 medical evacuation mission. The ready area includes sleeping, break, storage and kitchenette areas for limited food preparation. This space requires a permanent emergency generator to supply power in case of outages.

1.11.11 FACILITY SUPPORT SPACES (COMMON AREAS). Facility support spaces are required to support the common building activities to include conference/training rooms, break rooms, latrines, facility storage, and utility spaces.

1.11.12 Refer to the room data sheets for detailed requirements by space type.

1.12 RENOVATIONS.

1.12.1 Comply with all safety and life-safety related criteria when renovating or re-purposing existing hangar(s) including, but not limited to: Fire Protection, Occupant Loads and Egress, and UFC mandated aircraft minimum safety clearances. Follow all other criteria of this standard to the maximum extent practical for the renovation. The intent of meeting all criteria is to provide for future hangar flexibility to maintain alternate and emerging aviation platforms. If meeting those additional criteria is not technically or financially feasible for a renovation project addressing a specific aircraft platform, then it is only necessary to meet the mission requirements for that specific platform and all safety and life-safety criteria as stated above.

2 CIVIL SITE AND UTILITIES REQUIREMENTS

2.1 MANDATORY TCX REVIEW:

2.1.1 The designer is required to submit all design drawings, specifications, calculations, and design analysis of the Maintenance Hangar Complex to the Transportation Systems Center of Expertise (TCX) for review at the completion of the Concept Design Phase. Interim Design Submittal comments from the TCX must be incorporated into the design to obtain final government approval of construction documents. The designer of record must contact the TCX as early as possible to establish a design and review schedule to minimize impact on the project schedule. Points of contact for the TCX are as follow:

2.1.1.1 Office: Transportation Systems Center of Expertise

2.1.1.2 Address: 1616 Capitol Ave., Omaha, NE 68102

2.1.1.3 Website: https://transportation.erdc.dren.mil/tsmcx/contact.aspx

2.1.1.4 Phone: (402) 995-2399

2.2 GENERAL:

2.2.1 Site features typically include an aircraft access apron, aircraft wash rack with permanent utilities for aircraft corrosion control, vehicular/equipment hardstand, storage buildings, covered storage, and site improvements. Hangar projects may also include other airfield or heliport pavement areas such as parking aprons, maintenance parking aprons, taxiways, and helipads.

2.2.2 The project site should be developed for efficiency and to convey a sense of unity or connectivity with the adjacent buildings and with the Installation as a whole.

2.3 ANTI-TERRORISM / FORCE PROTECTION, SPECIAL SETBACKS & PERIMETER CONTROLS:

2.3.1 Anti-terrorism/Force Protection features must comply with UFC 4-010-01.

2.3.2 Airfield Security: The Hangar Complex is part of the outer boundary for the AAF/AHP restricted area. Personnel or vehicular traffic from other than assigned units on the AAF or AHP are not allowed entry into the restricted area without express authorization from Airfield Operations. All pedestrian and vehicular traffic are under the strict control and surveillance by Air Traffic Control when entering aircraft operational areas. Hence, a security line is established commencing from perimeter structures and encompassing all operational areas of the AAF/AHP to include aircraft parking, navigational aids (NAVAIDS), and airfield service buildings and/or areas.

Airfield security fencing must be continuous. This entire restricted area is also designated as a foreign object damage (FOD) control area.

2.3.3 Security Fencing: Minimum requirement is a security fence at the site perimeter consisting of 7-foot high chain link fabric plus a single outrigger with 3-strand barbed wire, designed in accordance with STD 872-90-03, FE-6, Chain-Link Security Fence Details.

2.3.4 Evaluate each project holistically and in part for security requirements in accordance with UFC 4-010-01. Typically, the aircraft maintenance bay portion of the complex is treated as a low occupancy building and is exempt from all provisions of the DoD Minimum Antiterrorism Standards.

2.4 ACCESSIBILITY:

2.4.1 Provide ABA compliant access from the POV parking lot to the building.

2.4.2 Provide two (2) ABA compliant vehicle parking stalls within the POV parking lot for visitor parking.

2.4.3 Provide handicapped vehicle parking signage and pavement markings.

2.5 PRIMARY FACILITY SITING AND LAYOUT:

2.5.1 Distance from the center of runway, glide slope, distance from the taxiway, aircraft parking apron, access apron dimensions, must all be considered in determining the facility orientation and setback distances.

2.5.2 Criteria in UFC 3-260-01, Airfield and Heliport Planning and Design must be used for geometric layout, design and construction of runways, helipads, taxiways, aprons, and aircraft wash racks.

2.6 PARKING:

2.6.1 PRIVATELY OWNED VEHICLE (POV) PARKING:

2.6.1.1 Provide POV parking spaces for 70% of assigned unit personnel and 100% of assigned contractor personnel (10 spaces minimum). See Tables 2.2 for unit personnel count. Provide five (5) additional parking spaces for official-use organizational vehicle parking within the POV parking lot. Handicap parking will be provided in accordance with Paragraph 2.4.

2.6.1.2 Provide Low–emitting and fuel–efficient POV parking in accordance with LEED Guidelines. Parking spaces are to be 9 feet (2.7) by 18.5 feet (5.6) with a 2.5 foot (0.7) bumper overhang. Parking lot aisles are to be 26 feet (8) wide.

2.6.2 SEPARATE ORGANIZATIONAL VEHICLE PARKING:

2.6.2.1 Not required.

2.7 SITE CIRCULATION:

2.7.1 ENTRANCE DRIVES:

2.7.1.1 Provide primary and secondary entrance drives to connect POV parking area to existing roads.

2.7.1.2 Provide 28 foot (2.6) wide entrance drives.

2.7.1.3 SERVICE DRIVES:

2.7.1.4 Provide service drives to all mechanical and electrical rooms.

2.7.1.5 Provide 28-foot (8.5) wide service drive to hardstand and Aircraft Parts Supply area.

2.7.2 EMERGENCY VEHICLE/FIRE ACCESS LANES:

2.7.2.1 Provide suitable exterior fire apparatus access on at least two complete sides of the building in accordance with UFC 4-211-01.

2.7.2.2 Provide direct access to the flight line through security gates. Gates must be provided at each end of the hangar for vehicle entrance/exit to the Hangar Access Apron.

2.7.3 DROP-OFF LANES:

2.7.3.1 Drop-off lanes will not be used.

2.7.4 SHIPPING AND RECEIVING:

2.7.4.1 Aircraft parts and supplies will be received and shipped from the Aircraft Parts Supply Room. Provide adequate pavement for truck delivery, off-loading, and turning around.

2.7.5 Non-Vehicular Walks:

2.7.5.1 Construct non-vehicular pedestrian of Portland cement concrete having a minimum nominal thickness of 4 inches. Design joint patterns in accordance with American Association of State Highway and Transportation Officials (AASHTO) standards and must be uniform and symmetrical. Do not exceed 1.25 length to width

ratio for non-reinforced pavements. Locate walks paralleling buildings beyond the eave drip line and at least 5 feet from the foundation.

2.7.5.2 Pedestrian Sidewalks: Provide pedestrian walks from the main entrances and all required building exits. Pedestrian walks must connect the building to the hardstand and POV parking. Sidewalks must be a minimum of 6 feet wide.

2.8 HARDSTAND:

2.8.1 Provide hardstands to accommodate unit assigned trailers, shop vans, ground support equipment (GSE), prefabricated or site-built POL and HAZMAT Storage Buildings, Waste Fuel and Waste Oil Tanks. All hardstand areas must be rigid concrete pavement capable of withstanding container handling equipment and unit support vehicles. The hardstand area is typically within a security fence area.

2.9 AIRFIELD PAVEMENTS:

2.9.1 Hangar Access Apron (FCC 113 40): Provide a Hangar Access Apron between the aircraft maintenance bay entrance and the Rotary Wing and Tilt-Rotor Parking Apron or taxiway. The Hangar Access Apron size is based on the hangar design and orientation to the RW Parking Apron or operational Taxiway. The minimum width of the Access Apron must be equal to the width of the aircraft maintenance bay. The minimum length of the Access Apron is indicated in UFC 3-260-01. Increasing access apron depth to 125 feet is recommended where land area is available.

2.9.2 Aircraft Wash Rack (FCC 113 70): Provide a dedicated Aircraft Wash Rack for the Maintenance Hangar. The Aircraft Wash Rack is a combination of one or more contiguous rigid paved aprons served with utilities for aircraft washing and cleaning as a function of or in preparation for conducting maintenance and repair activities. Wash racks should be located adjacent to the Hangar and contiguous to the RW Parking or Access Aprons.

2.9.2.1 Size and quantity of Wash Aprons:

Wash Rack Aprons shall be sized as follows:

- Tilt-Rotor Aprons to be 104 feet wide by 120 feet deep;
- Cargo Aprons to be 80 feet wide by 120 feet deep. This accommodates H60, H64 and H47 aircraft.

Provide wash aprons in quantities as follows:

- For a light Field Maintenance activity, provide a Tilt-Rotor wash apron for the first increment of 24 assigned aircraft and an additional Cargo wash apron for each additional increment of 30 assigned aircraft;

- For a heavy Field Maintenance activity, provide a Tilt-Rotor wash apron for the first increment of 100 supported aircraft and Cargo wash aprons for each additional increment of 100 supported aircraft.
- For a Sustainment Maintenance activity (LRC-A), provide a Tilt-Rotor wash apron for each hangar.

At maximum, no hangar should have more than one tilt-rotor wash apron and one cargo wash apron.

2.9.2.2 Wash Rack Utilities:

Provide each wash apron with all utilities listed in UFC 3-260-01. Utilities are to be permanently installed and served from either a Utility Controls Building or the hangar.

Each wash rack is to have drainage directed to an oil-water separator.

2.9.2.3 Overhead Coverage of Wash Racks: Overhead coverage for wash racks may be provided in areas of high UV exposure. Size overhead cover to maintain all required aircraft clearances in wash rack. Provide permanent lighting as part of overhead cover suitable for tasks performed.

2.9.3 Rotary Wing and Tilt-Rotor Parking Apron (FCC 113 20): Provide aircraft parking spaces for 75% of unit assigned aircraft for general parking.

2.9.4 Aircraft Maintenance Parking Apron (FCC 113 30): Provide aircraft parking spaces for 15% of unit assigned aircraft for maintenance operations checks and aircraft awaiting maintenance. Any fraction must be rounded to the next whole number to determine the total number of parking spaces.

2.9.5 Airfield Paving and Marking: The aviation facility pavement and markings, except as stated below, are to be designed using UFC 3-260-01 and UFC 3-260-02.

2.10 MISCELLANEOUS SITE STRUCTURES:

2.10.1 Dumpster Enclosure Area: Provide a screened concrete dumpster pad at an appropriate location in accordance with DPW Standards, including containment curbs, for storage of a minimum of two truck-operated trash containers. If required by Base standards, provide additional space for recycling container(s). The selected location must consider the ease of access by building users, visibility, and access for dumping and removal.

2.10.2 Mechanical/Electrical Equipment Service Yards: Provide as needed at an appropriate location and in accordance with UFC 04-010-01. Yards will be paved to prevent Foreign Object Debris (FOD) transfer to the flight line.

2.10.3 Used Oil Storage Tank: Provide one 250-gallon above-ground used engine oil storage tank. Tank must be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location must comply with NFPA 30. Locate Oil Storage Tank adjacent to the Waste Fuel Storage Tank.

2.10.4 Waste Fuel Storage Tank: Provide one 250-gallon above-ground waste fuel storage tank. Tank must be constructed of non-corrosive material. Provide secondary containment in compliance with applicable federal and state environmental regulations. Tank construction and location must comply with NFPA 30. Locate Waste Fuel Storage Tank adjacent to the Used Oil Storage Tank.

2.10.5 Site Furnishings: Provide outdoor furnishings including trash and recycling receptacles, seating, bicycle racks, and bollards in coordination with the installation design guide. Where the climate is acceptable, provide outdoor break areas with tables, seating, and shading devices.

2.10.6 Protection of Structures:

2.10.6.1 Provide 8-inch diameter x 5'-4" high, concrete-filled, schedule 80 galvanized steel pipe bollards, painted safety yellow, around the perimeter of above-ground tanks, covers, and outbuildings where subject to vehicular impact.

2.11 SITE UTILITIES:

2.11.1 Designer of Record must coordinate with Department of Public Works for site utility capacity and tie in requirements.

2.11.2 The site infrastructure will have at least a 50-year life expectancy with industry-accepted maintenance and repair cycles.

2.12 SITE ELECTRICAL:

2.12.1 APRON LIGHTING: Comply with UFC 3-530-01 per UFC 4-211-01 3-7.10.1

2.12.2 AIRFIELD LIGHTING: Comply with UFC 3-535-01, Visual Air Navigation Facilities, and design criteria for the types of lighting fixtures, colors, spacing, controlling, and location of lights.

2.13 LANDSCAPING/HARDSCAPING:

2.13.1 Provide low-maintenance ground coverings, greenery, and hardscaped areas in accordance with recommendations of Installation Design Guide.

3 STRUCTURAL REQUIREMENTS

3.1 GENERAL:

3.1.1 Comply with UFC 1-200-01 (General Building Requirements), UFC 3-301-01 (Structural Engineering), and UFC 4-211-01 (Aircraft Maintenance Hangars) except as clarified by this Standard Design document.

3.2 DESIGN LOADS:

3.2.1 Use UFC 3-301-01, Structural Engineering, for structural-specific design and loading requirements. Use UFC 4-211-01, Aircraft Maintenance Hangars for facility-type specific design and loading requirements.

3.2.2 Wind Loads:

3.2.2.1 Wind load on the main wind force resisting system of aircraft hangars must be determined in accordance with UFC 3-301-01 and any base specific requirements.

3.3 FOUNDATIONS:

3.3.1 Maintenance Hangar, exterior Storage and Support Buildings:

3.3.1.1 Site-Built structure foundation systems are site specific and must be designed based upon known geotechnical considerations as stated in the project geotechnical report. Design the hangar foundations as recommended by the geotechnical investigation.

3.3.1.2 The aircraft maintenance bay and the office/shop area are to be designed as separate structures sharing a common foundation. The movement of the maintenance bay structural framing must not be perceptible to occupants in the office/shop areas. This applies to motion caused by wind, cranes, door operations, aircraft movement or similar loads except for seismic forces.

3.3.1.3 The GSE and ASIOE Storage Sheds are roofed structures not fully enclosed for storing Ground Support Equipment (GSE) or Associated Support Items of Equipment (ASIOE). The structure foundations are to be isolated from the adjacent PCC hardstand and shed slab-on-ground.

3.4 SUPERSTRUCTURE:

3.4.1 General Configuration:

3.4.1.1 Isolate the Hangar Maintenance Bay superstructure from the Office/Shop/Admin superstructure using a building isolation joint. The Office/Shop/Admin areas must be isolated from the adjacent Maintenance Bay by a masonry or concrete wall having a

fire resistance rating of at least one hour. This wall will extend from the ground floor to the roof of the adjacent Office/Shop/Admin areas.

3.4.1.2 The framing system selected for the hangar maintenance bay must provide a column free maintenance bay and aircraft doorway opening, except as shown on the Standard Design Floor Plan.

3.4.1.3 Locate structural bracing so as not to impair functionality of shop areas. Exposed structural bracing are not permitted in office areas without prior COS approval.

3.5 AT/FP REQUIREMENTS:

3.5.1 The Maintenance Bay structure is typically treated as a "low occupancy building" for considerations of UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings.

3.5.2 Treat the Office/Shop/Admin structure as a "primary gathering building".

3.5.3 Verify through analysis that collapse of the low occupancy portion of the building will not result in the collapse of the primary gathering portions of the building in accordance with Standard 7, Structural Isolation, of UFC 4-010-01.

3.6 AIRCRAFT MAINTENANCE BAY DOORS:

3.6.1 Provide a Vertical Lift Fabric Door System or a Horizontal Steel Sliding Door System in accordance with UFC 4-211-01, Aircraft Maintenance Hangars.

3.7 DESIGN AND CONSTRUCTION DOCUMENTATION:

3.7.1 The construction drawings must clearly and fully disclose all relevant design loading and stability assumptions. Elements which function as stability bracing must be clearly noted. The members which are braced must be noted as being laterally unstable until the time the stability bracing is installed. All instances where the installation of multiple secondary elements is required for the proper stability of a primary element or when a bracing element in turn requires stability bracing must be clearly noted.

3.8 MODULAR OR PRE-ENGINEERED BUILDINGS:

3.8.1 The structural design of Pre-Engineered Metal Buildings (PEMB) may be delegated to a PEMB designer. The PEMB designer must submit design calculations and designs for review. The Designer-of-Record must state on construction drawings all required loading and deflection limits for equipment mounted to frame and for exterior materials with limited movement capacity such as plaster, brick, etc.

4 ARCHITECTURAL REQUIREMENTS

4.1 GENERAL:

4.1.1 Building design and construction must comply with the latest UFC 1-200-01 DoD Building Code, UFC 3-600-01 Fire Protection Engineering for Facilities, UFC 3-101-01 Architecture, UFC 4-211-01 Aircraft Maintenance Hangars, UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings and established Installation Design Guides.

4.1.2 Design Approach: Design the hangar in harmony with the surrounding architecture as appropriate. Incorporate into the design continuous thermal, air, and moisture barriers in the building envelope necessary for energy efficiency and to prevent mold growth.

4.1.3 Covered Entrance: Provide covered entrances at the main and stair entrances. Material used must be compatible with the exterior material used on building elevations.

4.1.4 Maximize the use of diffused day lighting in the admin/shop core. Provide daylighting in the maintenance bay while controlling day and nighttime glare in accordance with UFC 4-211-01.

4.1.5 Stack utility support vertically where possible and where required by other UFCs.

4.1.6 Design the hangar in conformance to the Installation Design Guide (IDG) and in accordance with applicable codes and regulations.

4.1.7 Materials: Provide durable and easily maintainable materials. Do not use exterior materials that require periodic repainting or similar refinishing processes. Material exposed to weather must be factory prefinished, integrally colored or provided with intrinsic weathering finish.

4.1.8 Nondestructive Emergency Access System (KNOX Box): Provide one KNOX box near the main entrance for emergency department access at a location designated by the installation Authority Having Jurisdiction (AHJ).

4.1.9 Sunshade Overhang and Light Shelf: Use overhanging roof or sunshade to reduce direct solar heat gain on exterior glazing. Use of light shelf is encouraged to project additional day lighting into the building interior.

4.1.10 Bird Intrusion Prevention: Provide long-term permanent passive system to mitigate bird nesting and intrusion in accordance with UFC 4-211-01. If bird nettings is used, netting is to cover the entire bottom surface of the roof trusses and all vertical

surfaces between the top of the CMU or Concrete perimeter walls and the roof truss bottom chords.

4.1.11 ACCESSIBILITY:

4.1.11.1 For multi-story hangar, provide one accessible passenger elevator. Refer to Material Handling / Conveying Equipment Section for detailed criteria.

4.1.11.2 Provide accessible building entrance at ground level and at least one additional emergency egress exit.

4.1.11.3 Provide ABA clearances and door accesses in the hangar.

4.1.11.4 Provide ABA accessible restrooms for both sexes on each floor. Accessible shower stalls are required in quantities appropriate to contractor staffing levels.

4.1.11.5 Provide an ABA accessible drinking fountain on each floor.

4.2 EXTERIOR ENCLOSURE:

4.2.1 ACOUSTIC AND THERMAL CRITERIA:

4.2.1.1 Exterior walls, roof, floor/ceiling assemblies, doors, windows and interior partitions must be designed to provide for attenuation of external noise sources such as airfields and internal maintenance activities in accordance with applicable criteria, but no less than STC 49 for exterior walls.

4.2.2 ROOFS:

4.2.2.1 Design in accordance with the Installation Design Guide, UFC 3-110-03, and UFC 4-211-01. The highest roof obstruction is to comply with lateral clearance criteria as defined in UFC 3-260-01. Reference openings section for skylight criteria.

4.2.2.2 Roof Fall Protection: Provide fall protection in accordance with UFC 3-110-03 and UFC 4-211-01. Provide fall protection for service staff on the roof consist of either an extension of the parapet (preferable), guardrails, or permanent tie-off points.

4.2.2.3 Roof Mounted Equipment: For roof mounted equipment, provide permanent access walkways and platforms to protect roof. Roof mounted equipment on pitched roof systems is unacceptable. Screen roof mounted equipment on membrane roof systems completely by the roof parapet.

4.2.2.4 Radio Antenna Platform: Provide 10 feet by 10 feet radio antenna platform with multiple mounting anchors that can support 250 lb./sf live load.

4.2.2.5 Roof Access: Roof access is required by either an interior stair extended to the roof or access door from the catwalk in the Hangar Bay. A roof walkway that leads to the 10 x 10 radio antenna platform is also required.

4.2.2.6 Trim and Flashing: Provide gutters, downspouts, and fascia in accordance with UFC 3-110-03. Exposed finishes must color match to the visible building surfaces and included as a manufacturer's assembly. Manufacturer of wall panels must provide wall trim, etc.

4.3 OPENINGS:

4.3.1 DOORS AND FRAMES, GENERAL:

4.3.1.1 Provide insulated exterior doors for entries to all spaces other than where storefront doors are specified. Provide appropriate weather-stripping and threshold. Doors must be designed for minimum R-30 with double air seal.

4.3.1.2 Doors and frames must comply with applicable structural, AT/FP and physical security standards. Doors must be minimum Level 3, physical performance Level A, Model 2. Frames must be minimum 12-gauge, with continuously welded mitered corners and seamless face joints.

4.3.1.3 Comply with applicable codes for Fire-rated openings and the requirements of the labeling authority.

4.3.1.4 Doors and frames must comply with ASTM A653 and must be factory primed A60 galvannealed.

4.3.2 HANGAR DOOR SYSTEM:

4.3.2.1 Maintenance Bay Aircraft Access Opening: The aircraft access opening minimum clear height is 28 feet. The access opening width must provide the minimum horizontal aircraft clearances in accordance with UFC 4-211-01. The aircraft access opening must be column free except as indicated on the standard design drawings. When intermediate columns are provided, aircraft clearances must be in accordance with UFC 4-211-01. Column design must allow for unobstructed bridge crane operation above the entire maintenance module area. Columns must not be placed within the maintenance modules or safety corridors.

4.3.2.2 Maintenance Bay Aircraft Doors: Provide maintenance bay door clearances in accordance with UFC 4-211-01. Doors may be either Motorized Vertical Lift or Horizontal Rolling type. For motorized vertical lift type, provide manual operation in the event of power failure. For the horizontal rolling type, provide capability to disengage the motor and capability to connect to tug(s) for opening and closing of doors. Each horizontal rolling door leaf must be independently powered and

operable. Motorized vertical lift or horizontal rolling doors must be configured such that no less than 50% of the aircraft maintenance modules in the bay (or portion of bay) served are accessible at any given time.

Provide personnel access doors in the horizontal sliding doors or between vertical lift doors; personnel doors to allow reentry from flight line without key unless required by Risk Assessment requires access control. See structural paragraph for additional hangar door requirements.

Minimum Door Height is 29 feet.

4.3.3 STOREFRONTS: Provide aluminum storefront entrances and framing with Architectural Class 1 anodized or 3-coat high performance organic coating, fully glazed, with wide stile entrance for entry into lobbies or corridors. Provide doors complete with frames, framing members, sub-frames, transoms, sidelights, trim, applied muntins, and accessories. Framing systems must have thermal-break design. Storefront systems must be capable of withstanding area wind loads, thermal and structural movement required by location and project requirements and must comply with applicable codes and criteria and AT/FP requirements.

4.3.4 CURTAIN WALL SYSTEMS: Curtain wall systems if used, must be capable of withstanding area wind loads, thermal and structural movement required by location and project requirements, and must comply with applicable codes and criteria and AT/FP requirements.

4.3.5 WINDOWS: Provide insulated, high efficiency window systems, with thermally broken frames complying with applicable codes and criteria. Design windowsills to discourage bird nesting. Design glazed openings susceptible to accidental human impact in accordance with the applicable IBC, Consumer Product Safety Commission (CPSC), or similar code safety requirements in model building codes. Security window sash and bars may be used only at ground floor locations of supply and repair parts rooms and warehouses.

4.3.6 GLAZING: In considering the use of high-performance glazing, the designer should carefully evaluate the solar gain/heat loss values and thermal performance levels. Force protection issues must also be considered in the glazing design at locations where exposure to threat is indicated. The needs for natural daylight, thermal efficiency, value, and security should be balanced.

4.3.7 CLERESTORIES AND SKYLIGHTS: The use of translucent systems in clerestories or skylights is acceptable to provide natural lighting to interior spaces. Integrate openings with building envelope for continuity of thermal, air, and moisture barriers. The panels exterior finishes must resist the effect of UV degradation and weathering. Skylights are not allowed over the maintenance bay.

4.4 INTERIOR ELEMENTS:

4.4.1 ACOUSTICAL REQUIREMENTS: To isolate potential noises from the maintenance bay, shops, and between rooms, each space has been assigned a minimum STC rating to be achieved. Apply the STC room rating listed on the room data sheets to the entire room assembly to include walls, openings, utility penetrations, HVAC ductwork, and floor/ceiling assemblies. Interior partitions at a minimum must achieve STC of 40. At a minimum, floor/ceiling assemblies must achieve STC of 50 or IIC of 55. Sound conditions must not exceed levels as recommended by ASHRAE handbook criteria.

4.4.2 MAINTENANCE BAY:

4.4.2.1 Hangar Maintenance Bay Walls: The interior face of the wall finish from the required minimum specified in UFC 4-211-01 to the top of each wall must be prefinished moisture resistant metal liner panels.

4.4.2.2 Utility Pedestals: Provide pedestals in the maintenance bay as shown in the standard design drawings. Utility Pedestals will provide power, data, water, and compressed air as required to service each aircraft maintenance module. Refer to plumbing and electrical sections for utility pedestal requirement.

4.4.2.3 All aircraft maintenance modules must be provided with a hose bib and drainage for limited aircraft washing. The washing capability is not intended to replace the exterior aircraft wash rack but is intended to allow the washing of aircraft during inclement weather.

4.4.2.4 Slope the maintenance bay floor slab from the rear wall of the maintenance bay to a continuous floor trench located just inside the safety lane adjacent to the hangar aircraft doors. The elevation of the floor slab and the floor slope must be in accordance with UFC 4-211-01. Do not exceed 1/8”/Foot slope at any point within maintenance bay.

4.4.3 VAULT REQUIREMENTS:

4.4.3.1 Arms Vault and Aircraft Mounted Systems Vaults: Provide vaults to accommodate storage of arms and associated equipment for each company. Design and construct vaults in accordance with the physical security requirements contained in UFC 4-215-01 and AR 190-11 for Category II arms. The arms vault door and door frame must be a GSA-approved Class 5 armory door per GSA Federal Specification AA-D-600D (4). Provide a full height Dutch-door day gate with the armory door at the company arms vault. The arms vault will be provided with an approved Intrusion Detection System (IDS).

4.4.4 CORRIDORS:

4.4.4.1 Maintenance Bay Access Corridors: Corridors connecting directly to the Aircraft Maintenance Bay must be a minimum of eight (8) feet in width. Other corridors must have a minimum width of 6'-8".

4.4.4.2 Corridors must comply with UFC 4-211-01, paragraph 3-7.1. NFPA hazard classification zone separation per UFC 4-211-01 is required.

4.4.5 PARTITIONS: Design Interior spaces and structures such that the interior layout may be modified in the future in accordance with changes in unit composition or mission.

4.4.6 INTERIOR DOORS:

4.4.6.1 Comply with applicable codes and criteria. Metal doors must be minimum Level 3, physical performance Level A, Model 2; factory primed.

4.4.6.2 Hollow Metal Door and Frames: Fire-rated and Smoke Control Doors and Frames must comply with applicable codes, criteria and requirements of labeling authority. STC ratings must be of the sound classification required and must include the entire door and frame assembly.

4.4.6.3 Provide insulated acoustically-rated metal doors at utility rooms, janitor closets, and stairwell doors.

4.4.6.4 Provide rated insulated metal doors between maintenance bay(s) and the admin core.

4.4.6.5 Overhead Doors: See room data sheet for size and location of overhead doors. Overhead doors must be insulated and motorized with manual chain override for non-power operation. Provide controls for power operations on both sides of doors.

4.4.6.6 Vision Panels: Provide narrow vision panels or sidelights for all doors except doors serving Shops, Secure Planning Room, Aviation Operations Secure Storage, Company Secured Consumable Storage, Restrooms, Janitors Room, Facility Storage, Recyclable Storage, and Utility rooms. Glazing type and size must conform to all applicable codes and criteria.

4.4.7 DOOR HARDWARE:

4.4.7.1 All hardware must be consistent and must conform to ANSI/BHMA standards for Grade 1. Provide closers for all exterior doors, all doors opening to corridors and fire rated doors as required by codes. Install exit devices on all building egress doors.

4.4.7.2 Finish Hardware (Master Keying System/Cores): Coordinate all requirements for hardware keying with the Contracting Officer. Match existing Installation keying system on the installation.

4.4.7.3 Fire and Exit Door Labeling: Install fire door hardware in accordance with applicable codes. Exit devices installed on fire doors must have a visible label bearing the marking "Fire Exit Hardware". Other hardware installed on fire doors, such as locksets, closers, and hinges must have a visible label or stamp indicating that the hardware items have been approved by an approved testing agency for installation on fire rated doors. Install smoke-control door hardware assemblies in accordance with applicable codes.

4.4.7.4 Auxiliary Hardware: Provide other hardware as necessary for a complete installation. All doors must latch and be lockable.

4.4.7.5 Door Stops: Provide wall or floor stops for all interior and exterior doors that do not have overhead holder/stops.

4.4.7.6 Electronic Keycard Access System: Wire and equip all exterior personnel doors and frames to accept GFGI Electronic keycard access system. The infrastructure including conduits and boxes will be CFCI. Locate the main access system unit in flight operations.

4.5 ACCESSORY STRUCTURES:

4.5.1 Fire Protection Pump House (Category Code 89144): If a Pump House is included, the exterior appearance is to match the hangar and adjacent buildings.

4.5.2 Secured Covered Storage:

4.5.2.1 Ground Support Equipment (GSE) Covered Storage: Provide fenced and gated exterior covered storage to secure and shelter ground support equipment from weather. Locate the GSE structure with direct access to the Hangar Access Apron but not interfere with airfield operations. Provide weatherproof lighting and weatherproof general-purpose receptacles with ground fault protection.

4.5.2.2 Associated Items of Equipment (ASIOE) Covered Storage: Provide fenced and gated exterior covered storage to secure and shelter ASIOE equipment such as maintenance stands, mobile cranes, aircraft maintenance trailers, aircraft blade boxes, and other unit equipment. The ASIOE structure should be located outside the airfield security fence, but within a fenced secure area. The ASIOE covered storage does not require direct access to the Hangar Access Apron. Provide weatherproof lighting and weatherproof general-purpose receptacles with ground fault protection.

4.5.3 Storage Buildings and Tanks:

4.5.4 Flammable/Petroleum, Oil, and Lubricants (POL) Storage Building: Provide a building to store oil, lubricants, and flammable solvents for daily use. Size this storage facility at 200 square feet. Provide an access apron at the entry of this building. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC and local codes to eliminate the need for automatic sprinkler protection. Locate the POL Storage Building outside the clear space of the hangar building, but readily accessible to shop personnel.

4.5.5 Hazardous Material Storage Building: Provide a building for the temporary storage of used lubricants, flammable solvents, dry sweep, etc. Size this storage facility at 200 square feet. Provide an access apron at the entry of this building. Provide secondary containment in compliance with applicable federal and state environmental regulations. Compliance with UFC 3-600-01, NFPA 30, and 29 CFR 1910.106 is mandatory. Maintain minimum separation distance from other buildings in accordance with the IBC and local codes to eliminate the need for automatic sprinkler protection. Locate the Hazardous Material Storage Building outside the clear space of the hangar building, but readily accessible to shop personnel.

5 FINISHES AND INTERIOR SPECIALTIES REQUIREMENTS

5.1 MANDATORY REVIEWS:

5.1.1 Designer is to submit a preliminary CID package to Huntsville Center for procurement review at concept design submission (35%) and a completed CID package at Construction Documents (100%) review.

5.1.1.1 Contact Stephanie Hardin (Stephanie.R.Hardin@usace.army.mil) - (256) 895-1512 at Huntsville Center to coordinate submission requirements and budgets.

5.2 GENERAL:

5.2.1 Provide design and finishes in accordance with UFC 3-120-10 and UFC 4-211-01.

5.3 STRUCTURAL INTERIOR DESIGN (SID) ELEMENTS:

5.3.1 FLOORS:

5.3.1.1 Lobby/Entrances/Vestibules: Ceramic tile / porcelain tile, recessed walk-off mat at main entry. Resilient flooring at secondary entrances.

5.3.1.2 Other auxiliary spaces: Unless otherwise noted, Sealed Concrete

5.3.2 BASES:

5.3.2.1 Within the hangar, other than Aircraft Maintenance Bay, Aircraft Parts Supply (Tech Supply), Mechanical Rooms, Fire suppression Rooms, and Electrical rooms, all other rooms, spaces and areas must receive rubber base for floor/wall transition.

5.3.2.2 Restrooms/Showers/Locker rooms must receive Ceramic tile, porcelain tile cove base.

5.3.3 WALLS:

5.3.3.1 Maintenance Bay: The interior face of the wall finish from the required minimum specified in UFC 4-211-01 to the top of each wall must be prefinished moisture resistant metal liner panels.

5.3.4 CEILINGS:

5.3.4.1 Lobby, Entry and Vestibules: Acoustical Ceiling Tile with hold-down clips or Painted Gypsum Board.

5.3.4.2 Auxiliary Spaces not specifically listed in the Room Data tables: Acoustical Ceiling Tile or Painted Gypsum Board.

5.3.5 VERTICAL AND HORIZONTAL MILLWORK AND CASEWORK:

5.3.5.1 Countertops in common break rooms and toilet rooms and window stools are to be solid quartz, polymer or solid polyester resin composition. 1/2-inch thickness minimum.

5.3.6 WALL PROTECTION:

5.3.6.1 Provide integral finish high impact resistant wall protection corner guards, bumper guards, door frame guards in corridors, shops, and tech supply and where subject to mobile cart / vehicle damage.

5.3.6.2 Chair Rail: Provide chair rails in training rooms, briefing room, multi-purpose/conference room, and break rooms.

5.3.7 TOILET AND PRIVACY PARTITIONS:

5.3.7.1 Provide solid phenolic resin toilet partitions with a plastic laminate finish for durability. Partitions must be anchored to solid reinforcement in the walls using full length wall brackets and should be supported overhead and secured to the floor (including miscellaneous metal bracing above the ceiling.)

5.3.8 TOILET ACCESSORIES:

5.3.8.1 Furnish and install the items listed below and all other toilet accessories necessary for a complete and usable facility.

5.3.8.2 All toilet accessories (except partitions) must be type 304 stainless steel with satin finish.

5.3.8.3 Toilet accessories must conform to the requirements of the ABA.

- Toilet Rooms:

  5.3.8.3..1 Glass mirrors on stainless steel frame and shelf – at each lavatory

  5.3.8.3..2 Liquid soap dispenser – at each lavatory

  5.3.8.3..3 Combination recessed mounted paper-towel dispenser/waste receptacle

  5.3.8.3..4 Sanitary napkin disposal at each female and unisex toilet

  5.3.8.3..5 Lockable double toilet paper holder – at each water closet.

  5.3.8.3..6 Sanitary toilet seat cover dispenser – a minimum of one per toilet room

  5.3.8.3..7 Grab bars – as required by ABA

- Showers:

5.3.8.3..1 Shower curtain rod - extra heavy duty.

5.3.8.3..2 Shower curtain – white anti-bacterial nylon/vinyl fabric shower curtain.

5.3.8.3..3 Soap dish and hair product shelf

5.4 COMPREHENSIVE INTERIOR DESIGN (CID) ELEMENTS

5.4.1 GENERAL FURNITURE AND EQUIPMENT REQUIREMENTS:

5.4.1.1 All FF&E provided for project is to comply with ECB 2021-8 "2021 Implementation of the USACE Interior Design Standard Nomenclature" and updates and accompanying document "4_15_2021_Furniture_Item_Descriptions_For_Nomenclature_Effort.pdf" available from Whole Building Design Guide:

https://www.wbdg.org/FFC/ARMYCOE/POLICY/4_15_2021_Furniture_Item_Descriptions_For_Nomenclature_Effort.pdf

Standard Design and Nomenclature Documents provide required salient features for all CID element categories. If project requires a unique item, coordinate with COS and Huntsville Center POC to determine required features.

5.4.1.2 Standardized identification and nomenclature used on drawings is to be maintained and used for construction documents by design agent. Do not use alternate item codes or nomenclatures. If a project requires a unique item or if existing equipment is to be relocated, add a Function Specific code per guidelines in document.

5.4.1.3 FF&E is sourced through three acquisition channels: Contractor furnished, contractor installed (CFCI); government furnished government installed (GFGI); and tenant furnished tenant installed (TFTI). Intended Acquisition and Installation source is shown for each piece of FF&E in the equipment schedule.

5.4.1.4 Incorporate all furniture, fixtures and equipment listed on the equipment plans into the project. Provide all utility connections to support each furnishing and equipment. Coordinate furnishings with utility/data/voice outlets such that they are readily accessible.

5.4.1.5 Provide furniture design for all spaces. Coordinate with unit and DPW for any existing furniture and equipment to be relocated/re-used.

5.4.2 STORAGE CABINETS AND SHELVING:

5.4.2.1 Lockable Tool Storage: All-welded cabinet with removable bins, heavy-gauge steel doors with 14-gauge steel construction, 3-point locking system, capacity of 1450 lbs. per shelf.

5.4.2.2 Industrial Shelving Units: Pre-engineered bulk storage rack, for bulk items, with heavy duty 14-gauge steel beams. Shelves of solid decking. 18 Gauge Extra Heavy-Duty Box W shelves deliver 1300 lbs. capacity per shelf for storing motors, pumps, and other heavy equipment.

5.4.2.3 Shelving Unit: Each shelf must be able to support 350 lbs.

5.4.2.4 Flammable Storage Cabinet: Double wall 18-gauge steel, 350 lbs. shelf capacity, adjustable shelf. Meeting NFPA, OSHA and FM Standards.

5.4.3 PROJECTION SYSTEMS:

5.4.3.1 Projector Screens: Provide size as indicated on the Room Data tables. The retractable screen must be motorized and must have matte white surface with high contrast and black border finish.

5.4.3.2 Projector Mount: Provide structurally supported threaded end pipe to support the ceiling mounted project screen. Provide power and communication outlets at each projector mount.

5.4.3.3 Flat Screen Displays: Provide wall backing for flat screen displays as indicated on the room data sheets. Where flat screen displays are required, provide wall mounting support with power and data connections.

5.4.3.4 Audio/Visual Control System: AV control system must have connectivity and controllability of unclassified video teleconferencing. Provide voice functionality with the AV system., lighting, speakers, microphones, screens, and projectors.

5.4.3.5 Provide dedicated power and communication outlets for each IT equipment listed.

5.4.4 MISCELLANEOUS FURNISHINGS:

5.4.4.1 Map Board: Provide single map board sized per unit/installation requirements. Frame map board with a removable plexiglass overlay for dry erase marker use. Plexi-glass overlay must be easily removable for map replacement.

5.4.4.2 Static Dissipative Floor Mats: 3 feet wide by the length of the workbenches. Mats must be grounded for maximum effectiveness.

5.4.4.3 Lectern: adjustable tilt writing surface, open cabinet with adjustable shelf, locking cabinet doors, dual wheel casters, powered. Include microphone, light, slide out shelf. Wood veneer and trim.

5.4.4.4 Mail Center: Provide 20 mail slots per company.

5.4.4.5 Bulletin Boards: Provide size as indicated in the Room Data tables. Bulletin boards must have natural cork with wood frame.

5.4.4.6 Dry Erase Marker Board: Provide size as indicated on the Room Data tables. Marker Boards must be porcelain enamel steel writing surface, magnetic with aluminum frame and continuous marker tray.

5.5 GOVERNMENT-FURNISHED GOVERNMENT-INSTALLED EQUIPMENT (GFGI)

5.5.1 Coordinate with Government on GFGI item requirements and provide suitable structural support or brackets for projectors, TVs, or other GFGI equipment. Provide all utility connections and space with required clearances for all GFGI, CFCI, and TFTI items. All computers and related hardware, copiers, faxes, printers, video projectors, and TVs are GFGI or TFTI.

5.6 SIGNAGE AND DIRECTORIES:

5.6.1 Room Signage: Provide signage and directories in accordance with UFC 4-211-01 and UFC 3-120-01.

5.7 LOCKERS

5.7.1 TA-50 Lockers:

5.7.1.1 Authorization: Inclusion of space requirement for TA-50 lockers in RPLANS allowance and/or a 1391 is only authorized upon written confirmation from both the Battalion commander and the Garrison commander.

5.7.1.2 Where TA-50 locker space is authorized, provide locker rooms and individual equipment (TA-50) lockers for all personnel in Flight and Aviation Maintenance companies. Provide permanently installed, individual steel lockable lockers sized 42" (w) x 24" (d) x 78" (h) to allow each soldier to securely store current TA-50 as well as future Soldier Systems equipment. Provide lockers with size and appearance like that shown below. TA-50 lockers must be single tier, heavy duty, all welded ventilated type and meet the following minimum requirements:

5.7.1.3 All tops, bottoms and shelves must be constructed of minimum 16-gauge thick cold rolled sheet steel. All sides, intermediate partitions and backs must be

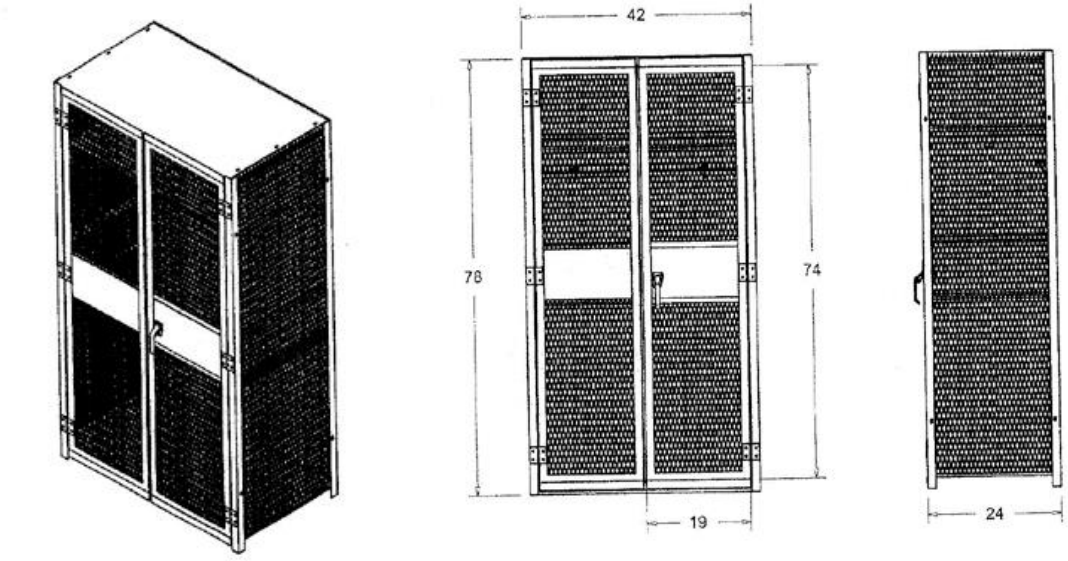
constructed of minimum 14 gauge flattened expanded metal or perforated metal with a minimum free area of 50%, welded to angle iron frames. Frames must be constructed of minimum 1" X 1" X 1/8" angle iron steel. Thickness of metal and details of assembly and supports must provide strength and stiffness.

5.7.1.4 Double doors must have a three-point three-sided cremone latch and must be pad-lockable. Doors must be hinged with minimum five knuckle heavy duty steel pin butt hinges welded to both door and locker frame – provide three hinges per single tier door.

5.7.1.5 Each locker must include: one aluminum number plate (numbered in sequential order), one full width shelf located 12" from the top with clothes hangar rod and three locker hooks mounted below.

5.7.1.6 Lockers must be galvanized and coated with a high-quality durable finish with color to be manufacturer's standard tan or gray.

5.7.1.7 Locker must be anchored to concrete floor in accordance with manufacturer's



recommendations.

5.7.2 Shower Lockers:

5.7.2.1 Provide minimum 15"(w) x 18"(d) x 36"(h) double tier steel lockers on a 3:1 ratio of lockers per shower. Locker body must be a minimum thickness of 24 gauge and one-piece door frame must be a minimum thickness of 16 gauge. Provide sloping tops.

6 FIRE PROTECTION REQUIREMENTS

6.1 GENERAL:

6.1.1 Provide a fire protection system in accordance with UFC 3-600-01 Fire Protection Engineering for Facilities and UFC 4-211-01 Aircraft Maintenance Hangars. The fire protection system design may require the need for a separate Fire Pump Building and Water Storage Tanks. The final site arrangement of these features may vary by location and must be refined by the designer of record and approved by the COS, DPW, and the airfield manager.

6.1.2 Do NOT follow NFPA 409 except where specifically required in UFC 4-211-01. Chapters 5 and 7 of UFC 4-211-01 do not apply to Army Hangars, however, if project is at a joint facility, inquire with base leadership as to which standards to follow. Contracting Officer must approve direction for other than Army Standard.

6.2 FIRE SUPPRESSION ROOM:

6.2.1 Provide a centralized room on the ground floor for fire protection equipment (Hi-EX foam tank, pumping equipment, riser control valves, wet-pipe system piping and valves, and the fire water service main. Room must provide 1-hour fire barrier protection. Fire water pumps are typically located in an external Fire Pump Building adjacent to any required Ground Fire Water Storage Tank(s).

7 PLUMBING REQUIREMENTS

7.1 GENERAL:

7.1.1 Provide plumbing design in accordance with UFC 4-211-01 – paragraph 3-5.5 and applicable sub paragraphs, UFC 4-211-01 – paragraph 6-5.3, UFC 3-420-01 PLUMBING SYSTEMS, and the International Plumbing Code (IPC). Plumbing fixture counts are specified in the Standard Design. For conflicts between UFC requirements and the International Plumbing Code, the UFC requirements apply. UFC 4-211-01 requirements override UFC 3-420-01 and IPC requirements.

7.2 DOMESTIC HOT WATER SYSTEM:

7.2.1 Heating System: Locate the main water heating equipment within a mechanical room, on the ground floor level only. Instantaneous water heaters are permissible for remote fixtures. Size system storage and recovery for delivery of hot water at every shower head and other fixture requiring hot water must comply with applicable provisions of UFC 3-420-01. Determine the energy source for the domestic water heating system by Life Cycle Cost Analysis.

7.2.2 Solar Water Heating: If life-cycle cost effective, provide solar water heating or other renewable energy source in accordance with UFC 1-200-02.

7.3 DRAINS:

7.3.1 Drains: Provide floor drains as required in UFC 3-420-01 except as modified by UFC 4-211-01 as applicable to Army projects.

7.3.1.1 Provide a floor drain in the Arms room near the door for draining a unit-provided portable dehumidification unit.

7.3.1.2 Refer to paragraph 7.4.6.1 for drains at emergency eyewash and shower units.

7.3.2 Hangar Floor Trench Drains: Trench drains primarily serve to remove fluids spills and prevent puddles from forming on the hangar floor. Provide trench drains in the hangar bay to comply with NFPA 409 floor drainage requirements, except as modified by UFC 4-211-01, for the removal of hazardous fuels and fire suppression system discharges. Locate trench drains just inside of safety lane parallel to the hangar door(s). Provide trench drain across the width of the hangar door with the drains sloping into it. Track drains for the hangar door(s) must drain into this trench drain system as well. See “Hangar Door Surface Drains” below. Route outlet drains, sized for a minimum of 1500 GPM, from the bottom of the trench low point(s) to an oil water separator or to effluent capture tanks and provide diverter valve with monitoring and controls as indicated in UFC 4-211-01, Paragraph 6-2.2 and all sub paragraphs.

7.3.3 Hangar Door Surface Drains: For a horizontal sliding hangar door assembly, the rail support system must include surface drains as required in UFC 4-211-01, paragraph 3-10.2 and all sub paragraphs.

7.4 PLUMBING FIXTURES:

7.4.1 Sinks and Lavatories:

7.4.1.1 Janitors Sink: Provide corner floor mounted terrazzo mop receptor in each janitor's closet. Provide mop receptor with stainless steel rim guards and service faucet with vacuum breaker and pale hook. Provide both hot and cold water to the sink.

7.4.1.2 Break Room Sink: Provide 18-gauge double bowl stainless steel sink in all Break areas. Faucet must be single control goose neck type. Provide both hot and cold water to the sink.

7.4.1.3 Lavatories:. Countertop lavatories must be under mount vitreous china or integral to the countertop. Faucets must be low flow, sensor-controlled type. Coordinate the use of battery power or hard-wired electrical supply faucets with the base requirements.

7.4.1.4 Shop Sink: Provide single compartment stainless steel sink in the Allied Shops. Compartment size must be 24" long, 21" wide and 14" deep with a single 18" wide drain board. Sink must be constructed of 16-gauge 304 stainless steel. Provided foot operated faucet with hot and cold water. Drain from shop sinks must not be connected to main sanitary. Connection shop sinks to an oil/water separator or storage tank.

7.4.1.5 Hand Wash Sink: Provide a 36" semi-circular 3 station hand wash fountain in hangar with foot operated control bar. Supply hand wash fountain with tempered water.

7.4.2 Urinals: Provide wall-mounted, water-saving, sensor-flush type fixture with a maximum flow rate of 0.125 gallons per flush cycle. Coordinate the use of battery power or electrical supply faucets with the base requirements.

7.4.3 Water closet: Provide tank-less, sensor-flush type with a maximum flow rate of 1.25 gallons per flush cycle. Provide wall-mounted fixture unless directed differently by base design standards. Coordinate the use of battery power or electrical supply faucets with the base requirements.

7.4.4 Showers: Provide balance shower fitting with valve cartridge, integral stops, single operator lever handle.

7.4.5 Drinking Fountain: Provide hi-lo drinking fountains with bottle fill capability.

7.4.6 Emergency Showers and Eyewashes:

7.4.6.1 Provide eye wash and emergency eye wash/shower in the hangar, shop, and bench stock areas. Locate emergency eye wash and showers stations in accordance with OSHA standard 1910.151(c) and ANSI Z358.1. Do not locate showers in hangar's 5 foot safety lanes. Tankless water heaters may be used to supply tempered water to emergency eye wash and showers stations. Floor drains are required at emergency shower locations. Coordinate with Base Environmental office for specific guidance related to floor drains. Since hazardous materials are used in the aircraft maintenance process, floor drains must be tied to either the station's industrial sewer or to a collection system that will capture and hold these materials for proper disposal. Comply with UFC 3-420-01 Appendix C Design Guidance for Emergency Shower and Eyewash Stations. Note that Maintenance Bay and Shops are not considered "water-reactive hazardous materials storage and handling area(s)" nor are "highly corrosive chemicals" typically employed in these spaces.

7.4.6.2 In Aircraft Maintenance Bay provide stations as close to the hazard as possible, within 10 to 20 feet for highly corrosive chemicals, but not more than 10 seconds or 100 feet of unobstructed travel way, whichever is lesser. Where fixed stations cannot be installed within required travel distances due to large door openings, obstructions, etc., make provisions for unit-supplied portable stations.

7.4.6.3 In shop areas where chemicals, oils, solvents, or debris can be sprayed or blown into the eyes or spilled on clothing, provide the emergency shower and eyewash stations near to the exits. See room data sheet for locations where emergency shower and eyewash are required.

7.4.6.4 Hazardous Material Storage Building: Provide a station in each space adjacent to the exit.

7.4.7 Hose Bibbs: Provide hose bibbs equally spaced around building perimeter, at each utility stand in maintenance bay and at GSE and ASIOE covers.

7.5 COMPRESSED AIR:

7.5.1 Provide an energy efficient compressed air system consisting of compressors, receiver, refrigerated air dryer, filters, and distribution piping in accordance with UFC 3-420-02FA, and having a free air delivery capacity required by the functions performed within the building areas (125 CFM minimum) at 125 psig. Determine required capacity in accordance with the Compressed Air & Gas Handbook (CAGH) published by the Compressed Air & Gas Institute (CAGI). Compressors with greater than 125 SCFM capacity must be rotary screw type.

7.5.2 Provide Contractor Furnished Contractor Installed air compressor with a minimum 600-gallon receiver, an integral compressed air dryer capable of producing a 50-degree F dew point, an isolation valve, filters, and a pressure regulator. All pressure containing parts, devices, components of the system must comply with ASME BPVC Section VIII where applicable.

7.5.3 Provide compressed air outlets (drops) with quick disconnect couplings in all maintenance modules and all shop areas. Each drop must include an isolation valve, filter and pressure regulator, condensate trap with drain cock. Size each compressed air drop to accommodate 20 SCFM at 100 psig. Provide compressed air drops at locations identified on the room data sheets. In Aircraft Maintenance Bay, provide two compressor drops at each aircraft utility pedestals. ALSE shop requires clean and dry air.

8 HEATING, VENTILATING AND AIR CONDITIONING REQUIREMENTS

8.1 GENERAL:

8.1.1 Comply with the requirements of UFC 4-211-01, UFC 3-410-01, and other applicable UFCs referred to therein. Additional criteria specific to aircraft hangar mechanical systems is included herein.

8.2 DESIGN:

8.2.1 Design heat gain and loss calculations, as a minimum, in accordance with the ASHRAE Handbook of Fundamental and ASHRAE Standard 183. Computer load calculations must be provided and must include complete input and output summaries. Pre-approved computer load analysis programs are as listed in UFC 3-410-01. Base the Inside design conditions on the data shown in INDOOR DESIGN DATA TABLE below. Outdoor design conditions must comply with the requirements in the applicable UFC.

8.3 HANGAR FLOOR AREAS:

8.3.1 DESIGN:

8.3.1.1 Install heating equipment in accordance with UFC 4-211-01. For the hangar floor areas, consider heating and ventilating units, radiant heating, or some combination of the two. Where overhead radiant heating is provided, design and installation system to comply with applicable provisions of NFPA 409. In colder climates, consider supplemental heating at the floor level or under slab radiant floor heating in the hangar bay aircraft modules. Coordinate system selection with the user. Base the system selection on energy compliance, life cycle cost, reliability, operating considerations, and the maintenance capabilities and resources of the user. Consider all viable alternative systems meeting the functional requirements of the hangar bays.

8.3.2 OVERHEAD RADIANT HEAT SYSTEMS:

8.3.2.1 Overhead radiant heat systems may be either low or high intensity radiant heating. Provide radiant heaters with shielding that shield the heating element or flame from optical flame detectors or heat detectors as required to prevent activation of optical flame detectors or heat detectors and accidental release of the fire suppression system.

8.3.3 SNOW/ICE-MELTING SYSTEM:

8.3.3.1 A snow/ice-melting system at the hangar door tracks, when rolling hangar doors are used, must be installed when outside design temperature is +15°F (-4°C) or lower and when historical snow accumulation data supports the requirement.

8.4 ADMINISTRATIVE AREAS:

8.4.1 DESIGN:

8.4.1.1 Design conditioning for the administration areas in accordance with UFC 3-401-01 Mechanical Engineering. The HVAC distribution system serving the administration areas must be served by an air-handling unit dedicated to the administration areas only. The design for these spaces should including flexible zoning, such that the system can be modified to address future changes to the mission and occupant densities. Administrative areas must be temperature-controlled by the DDC system compatible with the existing base systems. Temperature set point adjustment must be accomplished via DDC System by authorized personnel.

8.4.1.2 INDOOR DESIGN DATA TABLE: Indoor design conditions should be as follows:

Admin and conditioned shops:

Cooling:	occupied	78° F	50% relative humidity (not directly controlled)
	unoccupied	82° F	50% relative humidity (not directly controlled)
Heating:	occupied	68° F	30% relative humidity (minimum)
	unoccupied	50° F	30% relative humidity (minimum)

Arms vault(s):

Cooling:	occupied	78° F	50% relative humidity (directly controlled)
	unoccupied	78° F	50% relative humidity (directly controlled)
Heating:	occupied	68° F	30% relative humidity (minimum) **
	unoccupied	50° F	30% relative humidity (minimum) **

Telecomm Room(s)

Cooling:	all	72° F	50% relative humidity (not directly controlled)
Heating:	all	55° F	30% relative humidity (minimum) **, ***

Hangar bay(s):

Cooling:	occupied	80° F	unconditioned, humidity uncontrolled
	(no greater than 10° F above ambient by ventilation)		
	unoccupied	80° F	unconditioned and uncontrolled
Heating:	occupied	55° F *	humidity uncontrolled
	unoccupied	40° F	humidity uncontrolled

* Where local maintenance procedures require higher temperatures for curing of finishes or other process needs, provide local override to increase space temperature for process requirements. Override must be timed to return the space scheduled temperature after a finite adjustable time period. Coordinate with users.

** Where relative humidity in the space is expected to fall below 20%.

*** Humidification may be supplied off of main system.

8.4.2 COMMUNICATION ROOMS AND ARMS VAULT:

8.4.3 Provide dedicated ductless split-type DX equipment for each Communication Room and Arms Vault. Coordinate with the user on defining internal loads in the Communication Rooms and Arms Vault.

8.5 SHOP AREAS:

8.5.1 Design conditioning for shop and bench stock areas in accordance with UFC 3-401-01. The air distribution systems serving the shop area must be a dedicated air-handling unit to these spaces. Return air from this area must not be mixed, re-circulated or transferred into the administration spaces.

8.6 BUILDING EXHAUST AND HANGAR VENTILATION/ EXHAUST SYSTEMS:

8.6.1 Provide building exhaust systems at heat sources, restrooms, locker/shower rooms, break rooms, shop space, and contamination sources, i.e., printer/ copy areas. Exhaust systems will operate continuously while the building is occupied. Route exhaust air through an Energy Recovery Unit if it is shown to be Life Cycle Cost Effective or as required by ASHRAE 189.1. Exhaust systems must comply with NFPA 90A.

8.6.2 In the hangar, local ventilation should be considered where contaminants are generated; however general ventilation is required in accordance with UFC 4-211-01 paragraph 3-5.3.1.5. Any under floor pits, duct, and tunnels ventilated, exhausting 30 air-changes per hour and controlled by a continuous detection system in accordance

with NFPA 409. For Fuel Cell Maintenance Hangars at Joint Bases, comply with Service specific requirements as applicable.

8.6.3 Ventilation may be operated in economizer cycles for increased thermal comfort where climatic conditions are appropriate. Natural air movement through locating louvers and dampers near the ceiling and floor should be evaluated for life cycle cost effectiveness versus a fan powered economizer cycle. Evaporative cooling is not allowed in Army hangar maintenance bays.

8.6.4 Shop spaces have unique ventilation and exhaust requirements. Refer to room data sheets on drawings for requirements by space.

8.6.5 If a dust collection system is required by the user in Blade Repair and Composite Repair shop spaces, designers must retain the services of an Industrial Hygienist certified by the American Conference of Governmental Industrial Hygienists to assist in determining the design requirements for these systems. The Design Analysis shall include the report of the Industrial Hygienist and shall follow as closely, as practicable, recommendations made by the Industrial Hygienist, except where they conflict with the requirements of the UFCs. Such conflicts must be thoroughly reviewed and adjudicated by the Designer of Record, the project Certified Industrial Hygienist, and the Government's Subject Matter Expert.

8.7 DESIGN CONDITIONS:

8.7.1 WEATHER DATA, INDOOR DESIGN CONDITIONS:

8.7.1.1 Base the design on weather data from UFC 3-400-02 for outdoor design conditions. Indoor design conditions must conform to Indoor Design Data from UFC 4-211-01.

8.8 HIGH HUMIDITY AREAS:

8.8.1 In geographical areas of high humidity, to prevent mold formation in buildings, air conditioning systems must be designed to maintain space humidity at reasonable levels. Include the following considerations in the design of the air conditioning systems.

8.8.1.1 Avoid over sizing of direct-expansion cooling equipment.

8.8.1.2 Design single zone systems and multi-zone systems to maintain an indoor design condition of 50% relative humidity.

8.8.1.3 Size cooling coils for the greater of the cooling load calculated at the design dry bulb temperature condition or the design humidity condition.

8.8.1.4 Where fan coil units are used, provide a non-permeable wall covering behind the unit.

8.8.1.5 Provide ventilation air from a separate dedicated air handling unit.

8.8.1.6 Do not condition outside air through fan coil units.

8.8.1.7 Avoid the use of direct expansion cooling coils in air handling units with constant running fans that handle outside air.

9 ELECTRICAL REQUIREMENTS

9.1 GENERAL:

9.1.1 Design facility power in accordance with UFC 3-501-01, UFC 4-211-01 and NFPA 70. Provide a 3-phase wye-connected, underground secondary service rated at 480VAC with sufficient capacity for future growth. Careful coordination will be required to size incoming service appropriately based upon the type and number of aircraft. Two service entrances may be utilized dependent on the overall load size of the facility. Use 480VAC for mechanical equipment and larger building specific loads, such as 400HZ. Generally, use 277VAC for lighting. Use dry type step down transformers to provide 208Y/120VAC service for miscellaneous loads. Specific load requirements for the hangar and shop areas will vary by airframe type and specific shop equipment and will vary by specific hangar type design. Utilize an appropriate diversity factor for sizing specialized systems in the hangar and shop areas; 400Hz and 28VDC conversion equipment, shop machine equipment, exterior equipment/trailers, etc. See Table 6-2 in UFC 4-211-01 for Ground Service Baseline Requirements sizing. See appendices for typical 400Hz and 28VDC aircraft service points.

9.2 HAZARDOUS LOCATIONS AND CLASSIFICATION:

9.2.1 Define and design hazardous classified spaces in accordance with UFC 4-211-01 and NFPA 70 Article 513.

9.3 POWER DISTRIBUTION:

9.3.1 Provide power connections to support all mechanical and building equipment. Provide power receptacles per NFPA 70 and in conjunction with all proposed equipment and proposed furniture layouts. Coordinate the furniture type and layout with the electrical design. Provide a minimum of one duplex receptacle for every 12 feet of wall in all admin spaces with a minimum of one per wall. No more than six duplex receptacles or three quad receptacles per circuit. Power circuits must not serve receptacles in multiple spaces or rooms. Provide additional power requirements as specified in the following sections and in the room data sheets.

9.3.2 400Hz System: Provide a fixed 200Y/115VAC, 400HZ power system sized per UFC 4-211-01 Table 6-2 to support aircraft maintenance functions in the hangar bay. Integrate the system with the building power system and complete with all cables and connectors required to interface with the aircraft. No conversion carts are allowed. Design the system to provide access points to each aircraft parking space without any cables or equipment passing thru the five-foot clear zone around the perimeter of the hangar bay floor. Provide permanently mounted pedestals per UFC 4-211-01 section 6-7.1.1.

9.3.3 270VDC/28VDC System: Provide a fixed 270VDC/28VDC power system sized per UFC 4-211-01 Table 6-2 to support aircraft maintenance functions in the hangar bay. Integrate the system with the building power system and complete with all cables and connectors required to interface with the aircraft. Combination 400Hz/270VDC converter units may be utilized. No conversion carts are allowed. Design the system to provide access points to each aircraft parking space without any cables or equipment passing thru the five-foot clear zone around the perimeter of the hangar bay floor. Provide permanently mounted pedestals per UFC 4-211-01 section 6-7.1.1.

9.3.4 Aircraft Maintenance Hangar Bay: Provide one GFI 120V/20A quad receptacle for every 25 feet of wall minimum. Provide additional receptacles and disconnects as needed to support additional equipment and/or workbenches.

9.3.5 Shop Areas: Provide a local dedicated panel to power all equipment and receptacles in each shop. Provide a minimum of one 120V/20A quad receptacle every 15 feet of wall length. Provide additional receptacles and disconnects as needed to support additional equipment and/or workbenches illustrated in the Standard Design.

9.3.6 Covered Storage Areas: Provide 120V/20A general receptacles

9.3.7 Exterior Hardstands: Provide 240V/3/30A receptacles to support A92 tool containers or mobile shops. Receptacles require a specific plug configuration; coordinate with COS.

9.4 LIGHTING:

9.4.1 Lighting design and levels must be IAW UFC 3-530-01 and UFC 3-535-01. The building perimeter, hangar apron and hangar maintenance bay(s) lighting must be compatible with any future security cameras and security requirements as applicable. Provide interior lighting and controls in accordance with UFC 3-530-01. Utilize daylighting where applicable to conserve energy in the hangar, shops, etc.

9.5 LIGHTNING PROTECTION:

9.5.1 Provide a lightning protection system based on a risk assessment analysis in accordance with NFPA 780. Design the lightning protection system for the facility IAW UFC 3-575-01. Provide a ground counterpoise around the building perimeter for grounding incoming service, building steel, telephone service, piping, lightning protection, aircraft static grounding grid, and facility internal grounding requirements (e.g., shop areas).

9.6 GROUNDING:

9.6.1 Provide a grounding system for the facility IAW UFC 4-211-01 and UFC 3-575-01. Provide additional grounding based on project-specific requirements and UFC 3-580-01. Provide aircraft grounding points in the Hangar Bay (OH) IAW UFC 3-575-01 Paragraph 2-2.3.2 for a general-purpose hangar (grid with 50 ft max spacing). Provide an equipment grounding bar around the perimeter of shops or one at each workbench. Provide ground straps in shops/labs where required by function connected to the building grounding system.

9.7 CATHODIC PROTECTION:

9.7.1 Provide cathodic protection systems for the facility utilities and supporting fire protection systems IAW UFC 3-570-01.

10 COMMUNICATION AND SECURITY SYSTEMS

10.1 GENERAL:

10.1.1 Comply with UFC 4-211-01. Coordinate all telecommunications with COR and NEC during the design process. NEC must be informed of required inspections before walls are closed or ceilings are closed that house class pathways. At least a minimum 5 business days must be given for scheduling purposes. A Communications QA must be assigned to the project to provide with assisting in the Quality Assurance. The Contractor must assume responsibility for ensuring that the communications systems is constructed IAW with all applicable criteria listed in the military criteria list. An electronic copy of all test results must be provided to NEC. An As-built copy of communication pathways must be turned over at the time the building is turned over.

10.2 TELECOMMUNICATION SYSTEMS:

10.2.1 Connect the facility to the Installation wide area network system (WAN) and voice system. Design telecommunications systems in accordance with UFC 3-580-01. An acceptable building telecommunications cabling system encompasses, but is not limited to, copper and fiber optic (FO) entrance cable, termination equipment, copper and fiber backbone cable, copper and/or fiber horizontal distribution cable, workstation outlets, racks, cable management, patch panels, cable tray, cable ladder, grounding, and labeling. Provide voice/data outlets to support all workstations, workbenches, and equipment based on functional purpose of the various spaces within the facility and as modified by user special operational requirements and as modified by room data sheets. Provide each utility space, such as mechanical, electrical and telecommunications rooms with at least one wall mounted telecommunications outlet, with a wall mounting lug face plate near the entrance door. Provide additional telecommunications requirements as specified in the following sections and in the room data sheets.

10.2.2 Outside Plant Telecommunications Systems: Connect the project's facilities to the Installation telecommunications (voice and data) system through the outside plant (OSP) underground infrastructure per UFC 3-580-01 requirements. Connect to the OSP cabling system from each facility main cross connect located in the main telecommunications room or telecommunications equipment room to the closest OSP access point. Components include the physical cable plant and the supporting structures. Items included under OSP infrastructure encompass, but are not limited to, maintenance hole and duct infrastructure, copper cable, fiber optic cable, cross connects, terminations, splices, cable vaults, and copper and FO entrance facilities.

10.2.3 Telecommunications Rooms: Provide telecommunications rooms to support three different networks; unclassified NIPR network, unclassified Logistics Information System (LIS) network, and classified SIPR network. Provide one telecommunications

entrance room (TER) and additional telecommunications rooms (TR) for unclassified NIPR network and voice equipment to support cabling infrastructure throughout the facility. Provide a minimum of one TR on each floor located near the center of the building and stacked between floors. Provide TRs as required per UFC 3-580-01 square footage requirements. Provide one telecommunications entrance for each facility located in the TER. TIA/EIA-569 compliant Telecommunications Enclosures (TE) may be used in hangar areas where the horizontal cable distance exceeds 295 feet. Provide additional TRs, preferably stacked, to support the User's LIS network. Provide the first floor LIS room with a 4 inch conduit to the V-SAT location adjacent to the building. Coordinate proposed VSAT location with User. See section 3.9 (C) for classified SIPR network telecommunications room requirements.

10.2.4 Logistics Information System (LIS): Provide a complete separate network as described in 3.9 (B). Provide one (1) LIS drop for every NIPR drop in spaces where LIS network is indicated in the room data sheets. LIS drops may be collocated in the same outlets as NIPR drops and utilize the same pathways, but will terminate in the LIS TR.

10.2.5 Wireless Access Points: In addition to providing standard voice/data outlet configuration throughout the facility per UFC 3-580-01, provide wireless access point (WAP) outlets to support GFGI Power Over Ethernet (PoE) WAP coverage of the hangar bay and apron. Each WAP outlet must consist of one (1) NIPR and one (1) LIS drop.

10.3 SECURE COMMUNICATIONS:

10.3.1 Provide a secure communications system in the facility IAW USAISEC Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNET).

10.3.2 Provide SIPRNET rooms in accordance with ICD/ICS 705 Technical Specifications for Construction and Management of Sensitive Compartmented Information Facilities (current version).

10.3.3 Install SIPR drops where indicated in room data sheets. Rooms indicated are not authorized for open storage. Provide a Protective Distribution System (PDS) to distribution classified cabling throughout the facility. The SIPRNET building infrastructure must use Category 6 UTP copper cables with red cable jacket and red outlet modules unless otherwise directed by the local NEC. Terminate cables in the SIPRNET room and at the outlet in accordance with UFC 3-580-01 criteria for data cables. Separation requirements with all classified runs/drops must be IAW USAISEC Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNET).

10.4 ELECTRONIC SECURITY SYSTEMS (ESS):

10.4.1 Provide the design and infrastructure for the installation of GFGI systems unless directed otherwise by project specific requirements; Secure Access Systems (SAS), Intrusion Detection Systems (IDS), and Closed-Circuit Television (CCTV) in compliance with UFC 4-211-01.

10.4.2 Secure Access Systems (SAS):

10.4.2.1 Design the SAS to provide coverage of the building perimeter doors outside the airfield fence line, all motorized gates, and where indicated in the room data sheets. Coordinate with the Installation Physical Security anticipated locations of devices and provide raceways, door prep, and back boxes for installation of a secure access system per Army Installation Design Standards paragraph 3.5.11, “Locks and Locking Devices”. Provide a programming workstation in the PC office. Coordinate the homerun terminations location with NEC and Unit Physical Security.

10.4.3 Intrusion Detection System (IDS):

10.4.3.1 Design the IDS to provide coverage for spaces where indicated in the room data sheets. Coordinate with the Installation Physical Security anticipated locations of devices required for a complete IDS system. Design raceways, back boxes, and power requirements for installation of a complete system.

10.4.4 Closed Circuit Television (CCTV):

10.4.4.1 Design the CCTV system to provide complete coverage of the hangar apron, wash rack, maintenance check pads and each module inside the hangar bay. Provide additional coverage where indicated in the room data sheets. Coordinate with the Unit Physical Security the anticipated locations of devices required for a complete CCTV system. The design must be for an IP based system. Provide raceways, back boxes, power conductors, and fiber optic cables for installation of a complete system. Provide a monitoring station in the PC and QC offices and Flight Ops. Coordinate the homerun terminations location with NEC and Unit Physical Security.

10.5 AUDIO/VISUAL SYSTEMS & INFRASTRUCTURE:

10.5.1.1 Provide the infrastructure to support all GFGI Audio/Video systems where indicated in the room data sheets; projectors, sound systems, video teleconferencing, etc. Coordinate with the architectural and interior designs.

10.6 CABLE TELEVISION:

10.6.1 Provide a completely operational CATV cabling system in compliance with UFC 4-211-01 including, but not limited to, all necessary raceways, cabling, terminations, jacks and faceplates. Provide CATV where indicated in the room data sheets. The horizontal cable for the CATV system will be RG-6 with "F" type connectors on the

terminal end. Terminate the CATV cabling on splitters in the telecommunications room, or in a location indicated by the Network Enterprise Center (NEC). CATV riser cable will be RG-11 type. Locate splitters on the CATV backboard in the telecommunications room, or in a location indicated by the NEC. Provide CATV drops where indicated in the room data sheets. Homerun all CATV all drops to the CATV backboard. Coordinate service requirements to the building with the local CATV service provider. At a minimum provide one 2" empty conduit stubbed out five feet from the building to facilitate the CATV service entrance.

10.7 PUBLIC ADDRESS (PA) SYSTEM:

10.7.1 Provide a PA system in compliance with UFC 4-211-01.

10.8 FIRE ALARM & DETECTION:

10.8.1 Provide a fire alarm and detection system in compliance with UFC 4-021-01, UFC 4-211-01, UFC 3-600-01 and NFPA 72. The system must be fully addressable and compatible with the local Installation wide Fire Alarm Systems.

10.9 MASS NOTIFICATION SYSTEMS:

10.9.1 Provide a Mass Notification System in accordance with UFC 4-021-01 Design and O&M: Mass Notification Systems. The system must be fully compatible with and integrated with the local Installation wide Mass Notification System.

10.10 CYBERSECURITY:

10.10.1 Provide controls systems which meet or exceed the requirements of UFC 4-010-06; Fire Alarm and Mass Notification (FAMNS), Utility Monitoring Control System (UMCS), etc.

11 MATERIAL HANDLING / CONVEYING EQUIPMENT REQUIREMENTS

11.1 OVERHEAD CRANES:

11.1.1 GENERAL:

11.1.1.1 Design bridge cranes and supports to resist all structural loads. Cranes are to be braced to resist seismic loads per ASCE 7 and IBC.

11.1.1.2 Overhead Crane Controls: Provide static reversing, adjustable frequency controllers for the hoist, bridge and trolley electric drives. Provide dynamic braking for all electric drives. Speed control must be infinitely variable type for the hoist, bridge and trolley functions. The hoist, bridge and trolley brakes must set only after the associated controller decelerates the motor to a controlled stop. All motors must run smoothly, without torque pulsations at the lowest speed and be energized at a frequency not exceeding 60 HZ at the highest speed. The hoist controller must enable the drive motor to develop full torque continuously at zero speed.

11.1.1.3 Acceleration and deceleration must be smooth. On deceleration, resistors or reactors must be inserted into the motor's high speed leads prior to de-energization of the high speed contactor. Provide the bridge and trolley motor control systems with a drift point between OFF and the first speed control point in each direction. Do not use definite purpose contactors. All contactors must be NEMA rated. Feed control circuits from a single phase, air cooled, double wound transformer with a grounded metal screen between the primary and secondary windings of the transformer

11.1.1.4 Crane Speeds: Provide cranes with the following rated load speeds (plus or minus 15%):

- Hoist

  11.1.1.4..1 Maintenance Bay: Two-Speed 5 and 16 fpm

  11.1.1.4..2 Shops: Two-Speed 5 and 32 fpm

- Trolley – 65 fpm
- Bridge – 125 fpm

11.1.1.5 Provide runway stops at limits of crane bridge travel.

11.1.1.6 Radio Controls: Suspend the pendant pushbutton station from an independent festooned messenger track system, operating the length of the bridge. Locate the pendant pushbutton station 4 feet above the finished floor. Clearly mark all controls

for identification of functions. Provide directional contactors with both mechanical and electrical interlocks.

11.1.2 AIRCRAFT MAINTENANCE BAY:

11.1.2.1 Provide one (1) 10-ton overhead bridge crane per every group or increment of 4 maintenance modules. If maintenance bay is divided by structural lines, provide at least one bridge crane per section. Provide cranes with a minimum Duty Service Class C.

11.1.2.2 Based on typical crane manufacturer maximum span of 100 feet and minimum coverage depth for modules of 110 feet, cranes will be supported from the roof structure above using a minimum of three (3) continuous runway beams.

11.1.2.3 Where multiple cranes are installed over the same bay area, design each crane hoist to reach the centerline of exterior maintenance modules in the event one crane hoist becomes disabled.

11.1.2.4 The crane system and supporting structure must be designed to support both fully loaded crane hoists at a minimum spacing of 32'-0".

11.1.2.5 Floodlights: Provide four US Lighting Tech Daytona Tunnel Lighting induction fixtures, 200W, 5,000 Kelvin (or equivalent), mounted evenly spaced along the bridge. Lights must be switched on independently of the crane power, on a switch mounted on the crane column, near the crane disconnect, so that the lights can operate even when the crane power is turned off.

11.1.2.6 See room data sheet for hook height requirement.

11.1.3 POWER PLANT/POWER TRAIN SHOP:

11.1.3.1 Provide one (1) 2-ton overhead crane in each of power plant and powertrain shop. In a combined power plant/powertrain shop, provide one (1) 2-ton overhead crane to service both shops. Crane must be a minimum Duty Service Class C Provide loaded hook coverage over open maintenance work area (exclusive of admin or worktables and chairs along walls and tool storage caged areas).

11.1.3.2 See room data sheet for hook height requirement.

11.2 ELEVATORS/CONVEYING SYSTEMS:

11.2.1 PASSENGER ELEVATOR:

11.2.1.1 Comply with requirements of UFC 3-490-06. The elevator must have a minimum rated load capacity of 3500 lb. (1588 kg).

11.2.1.2 Size doors and interior dimensions to accommodate a fully extended emergency medical services (EMS) gurney and four average size adults.

11.2.1.3 Provide required clearance for Hoistway Entrapment Protection.

11.2.1.4 Elevator Finishes:

- Provide satin no. 4 stainless steel finish for all elevator interior walls, ceiling, doors and fixtures. Provide resilient flooring. Furnished removable hanging protective pads and fixed hooks in all elevators to facilitate conversion to use for moving freight.

12 ENERGY CONSERVATION REQUIREMENTS

12.1 GENERAL:

12.1.1 Incorporate energy conservation in accordance with UFC 1-200-02 High Performance & Sustainable Building Requirements and on criteria and goals established by Department of Army at the time of specific project development.

12.1.1.1 The government is required by Public Law 102-486, Executive Order 12902, and Federal Regulations 10 CFR 435 to design and construct facilities in an energy-conserving manner while considering life cycle cost over the life of the facilities. Building systems are to be designed using a 40-year Life cycle per UFC 1-200-02.