Army Standard for Aviation Maintenance Hangar Complex: Fixed-Wing Aviation Units Supersedes the 11 August 2021 Army Standard

2024-12

Description:

The Aviation Maintenance Hangar Complex supports the maintenance, repair, and sustainment of manned and unmanned aircraft and associated equipment as well as the planning and conduct of flight operations, aircrew and maintainer training, and the deployment and redeployment of aviation units. While the Hangar Complex is part of the overall Airfield Complex, not all portions of the airfield are covered under this standard.

Applicability:

- The planning, design, and construction of facilities within the Hangar Complex is covered under multiple Army standards, based on the type of unit (Table of Organization and Equipment or TOE vs. Table of Distribution and Allowances or TDA) and type of assigned aircraft.

  The **Fixed Wing Aviation Unit Maintenance Hangar Army Standard** applies to organizations operating and/or maintaining manned and unmanned Fixed Wing aircraft.

- Architectural criteria of this Army Standard (module sizes, dimensions of aircraft circulation corridors, blade tip separation, telecom requirements, etc.) apply to Army Reserve Component aviation maintenance facilities. Planning criteria for sizing and organizing these facilities is controlled and approved by the Office of the Chief of Army Reserve or the current versions of NG PAM 415-12 or successor publications.
- While criteria in this Army Standard (architectural and planning) may inform facility decisions within Army Special Operations, plans for facilities supporting the Special Operations Aviation Regiment and other special operations aviation elements are controlled and approved by the Headquarters, Army Special Operations Command, and the command's Deputy Chief of Staff – Engineering. Due to their unique mission and equipment, there are significant differences from the level of the flight units to the level of depot maintenance and research and development (R&D), much of which is accomplished within the Special Operations community.
- Also, while criteria in this Standard may inform facility decisions within Army Test and Evaluation Command (ATEC), plans for facilities supporting ATEC are controlled and approved by ATEC. In addition to hangars, there are a variety of facility types specially designed to support Research & Development. These include Aircraft and Flight Equipment (R&D) Building, Astronautical and Geophysical (R&D) Building, Guided Missile (R&D) Building, Detection Equipment (R&D) Building, Electrical Equipment (R&D) Building, and Electronic Equipment (R&D) Building.
- The primary source for determining unit allowances is the Real Property Planning and Analysis System (RPLANS).

Waivers:

- Approval for exceptions and waivers from Army Standards must be requested inaccordance with the AR 420-1. As the proponent, DCS G4 must validate and approve the request.
- Waiver requests to an Army Standard must be received in sufficient time to allow the Facility Design Team to complete review and development of recommendations or courses of action for the Army FacilitiesStandardization Committee to consider prior to implementation into project design.
- All waivers approved by Headquarters, Department of the Army (HQDA) shall be documented in installation master plans.
- Late submissions and/or project delays are NOT sufficient stand-alone justification for accelerated review or other dispensation to meeting the ArmyStandard contained herein.

Planning Criteria:

Army Standards are not intended to provide broader design criteria such as space allocation, functional layouts, or basic layouts more appropriately contained in the supporting and conforming Standard Design. Nor are they intended to rigidly define collective facility authorizations more appropriately adjudicated by the Army Requirements Group.

This Army Standard, associated Standard Designs, and approved Army space criteria are applied together in an iterative and co-dependent way to provide a standardized but adaptable approach to facility standardization. Each serves a different purpose to ensure mandatory functions and operability are provided uniformly and at the right size. The primary source for determining authorized allowances, in every instance, is the Real Property Planning and Analysis System (RPLANS) which incorporates current criteria approved by the Army Requirements Group.

The Army Standard	
The Guidance section provides instructions and definitions necessary for the mandatory requirements contained in the tabular section of the Army Standard. As such, they are used in conjunction with the Army Standard to ensure the intent and embedded functionality will meet the Army's mandatory requirements set forth by this standard.	
Item	Mandatory Criteria
Site Selection & Planning	1. Aircraft maintenance bays of the hangars shall be sited with direct access to aircraft mass parking apron on Army Airfields (AAF) or Army Heliports (AHP) without physical penetration of controlled airspace or obstruction clearances.
	2. Hover/taxilanes will be provided with direct access from the hangar access apron to the mass parking apron, to allow power-on operations. Hangar access to parking will be through peripheral taxilanes, or interior taxilanes to the parking spots. Movement from hangar to parking spot (including maintenance apron parking spots) will not need to cross taxiways (as separate from taxilanes) or runways.
	See Guidance Section below
	1. All operational areas of an AAF/AHP are a Restricted Area. The hangar

Physical Security and Safety Zone	buildings serve as an outer boundary for the AAF/AHP Restricted Area. Entry into the Hangar buildings or any other portion of the AAF/AHP [operational area] by anyone other than assigned personnel requires prior authorization by airfield operations. Authorization for these personnel will be confined to specific areas. Movement from the privately operated vehicle parking lot to the unit hangars and the aircraft parking apron will be controlled by the aviation units. Movement from aircraft parking aprons to taxiways and runways is monitored and controlled by Air Traffic Control.
	2. Hangars and fences shall be combined to provide a physical barrier controlling access to aircraft and flight operations areas. This barrier shall preclude unauthorized pedestrian and vehicular traffic from gaining access to the flight line. There should be a continuous Security Line composed of either building walls or fencing that provides a continuous physical barrier controlling access to parking apron, circulation and hover taxilanes, taxiways, and landing surfaces.
	3. Fences will include NLT one 20-foot-wide vehicle gate with separate pedestrian gate as stipulated by the AAF/AHP master plan.
	See Guidance Section below
Hangar Functions and Types	1. Aircraft hangars (facility Category Code or CC 21110 when many functional areas are present) are composed of CC 21114 aircraft maintenance bays, CC 21116 hangar shop space with maintenance administration area and back shops, CC 21113 Aircraft Parts Storage for storage of aircraft repair parts and associated aircraft equipment, CC 14112 Aviation Unit Operations with company operations for flight and aviation maintenance companies, and flight ops planning and briefing areas.
	2. Aviation maintenance has two echelons: Field and Sustainment. This Army Standard deals with Field and limited Sustainment Maintenance for Flight TOEs and TDAs with assigned pilots and fixed-wing (FW) aircraft. Note that Army maintenance of fixed-wing aircraft depends, in large part, on contractors. These contractors both work in Army hangars located where fixed-wing aircraft are assigned and perform component and sustainment maintenance in contractor facilities not located on Army bases.
	3. TOE and TDA fixed-wing flight organizations will be facilitated to perform light and heavy Field Maintenance on assigned aircraft. Facilities for fixed-wing flight organizations are planned to be occupied by those organizations, irrespective of the actual contractual arrangements between the unit, the unit's higher headquarters, and Aviation Missile Command. If a TOE flight unit or a TDA flight organization has a mix of fixed-wing and rotary-wing aircraft, it will be handled on a case-by-case basis without the need for a waiver of either the TDA rotary-wing standard or the fixed-wing standard.
	4. Fixed-wing organizations are not provided Sustainment Maintenance through the Army system; LRC-As are not planned and sized to perform Sustainment Maintenance on fixed-wing Aircraft. Instead, their Sustainment Maintenance is handled by Original Equipment Manufacturers (OEM) and other contractor arrangements. These functions can either be performed within the Field Maintenance Hangar, or components of the aircraft or entire aircraft can be sent to non-Army locations.

	5. Maintenance facilities for rotary-wing aircraft assigned to TOE organizations, rotary-wing aircraft assigned to TDA organizations, and for Tactical Unmanned Aerial Vehicles (TUAV) are covered under separate standards.
	6. Maximum flight line frontage for a single hangar is not limited. Consider available land area within existing Area Development Plans, potential required modifications to existing pavements due to cross slope across hangar site, existing and planned utilities and transition surface clearances.
	See Guidance Section below
Primary Facility Scope and Capacity	1. A separate hangar is allowed for every fixed-wing TOE flight battalion, fixed-wing TOE separate company, or fixed-wing flight TDA. If a unit is deployed across more than one site, a hangar is authorized for each site that has aircraft. Note that in a situation where a unit is split across two locations, the distribution of aircraft may not be established within the organizational documents. In this case, planners are authorized to make an assumption to establish this distribution.
	2. A Gray Eagle Company is authorized a hangar NTE 60,000 GSF. All following information relative to sizing hangar functional areas applies to manned fixed-wing organizations, not Gray Eagle.
	3. Allowance for hangars for a fixed-wing Flight Organization is a function of the sum of the allowances for aircraft hangar bays, shop areas (including shop admin space), aircraft parts storage, and aviation unit operations.
	See Guidance Section below
Maintenance Operations -- Aircraft Maintenance Bays (facility CC 21114, also functional area within CC 21110)	1. Under this Army Standard, aircraft are allowed one of three module sizes for maintenance and repair of airframes. The large module is 120' deep and 106' wide. This size accommodates the C-37, HADES, C-31, EO-5 (RC-7), C-27, C-147, C-20, C-23, UV-18, and C-41A. The small module is 84' deep and 70' wide. This size module accommodates the UC-35, C-12, C-26, and UV-20. The UAS module is 42’ deep and 70’ wide. This size module accommodates the MQ-1C ER Group 4 UAS.
	2. Fixed-wing flight units perform light and heavy field maintenance in their unit hangar. Fixed-wing aircraft are allowed aircraft maintenance modules to support 30% of the assigned aircraft. This corresponds to the light Field Maintenance function allowing maintenance modules for 20% of assigned aircraft, corresponding with the TOE unit allowance for light Field Maintenance, plus additional aircraft maintenance modules to support another 10% of assigned aircraft to correspond to the heavy Field Maintenance function from the Aviation Support Battalion. Plan maintenance modules for 30% of assigned aircraft. When this calculation leads to a fractional number of modules, the answer is rounded up. In addition to aircraft maintenance modules, select fixed-wing aircraft for missions such as Very Important Person (VIP) transport or electronic intelligence gathering may be authorized overhead

	cover to keep them in the shade, on a case-by-case basis.
	3. Units with a mix of large and small aircraft must always get large modules for a minimum of 30% of the large aircraft assigned, and the total unit gets modules (both large and small) for 30% of all aircraft. For example, a unit with five large and five small aircraft need a total of three maintenance modules: The five large aircraft need 1.5 modules rounded up to 2, and since the unit needs a total of 3 modules, there is an additional requirement for a third small module for a total of three.
	4. The total number of aircraft maintenance modules will be used in other calculations related to component repair shops. Note that performance of heavy Field Maintenance will mean aircraft in those hangar bays will be in the shop for a longer period than jobs in the shop that performs light Field Maintenance.
	5. The large fixed-wing module size of 120' deep x 106' wide provides 5' to the right and left of the wingtips plus 10' to the front and back.
	6. The small fixed-wing module size of 84' deep x 70' wide provides 5' to the right and left of the wingtips plus length sufficient to accommodate UH-60 and AH-64 helicopters.
	7. The UAS fixed-wing module size of 42' deep x 70' wide provides 5' to all sides to accommodate MQ-1C ER Group 4 UAS.
	8. Provide a five-foot (5') safety corridor around each contiguous group of aircraft maintenance modules. This area is to be kept clear of equipment and furniture.
	9. Provide another additional five-foot (5') foot structural corridor around each group of contiguous maintenance modules. Miscellaneous items such as eye wash stations can be kept in the space between the columns in this area.
	10. Provide water, power, compressed air, drainage, and data connectivity to all maintenance modules.
	11. Provide limited wash capability in each aircraft maintenance module with drainage into the interior maintenance bay trench drain, then through an oil-water separator.
	See Guidance Section below
Overhead Lift in Aircraft Maintenance Bay Modules (facility CC 21114, functional area within CC 21110)	1. For Gray Eagle Hangars, provide overhead lift rated at 5 tons with access to all aircraft maintenance modules, through incorporating bridge crane(s) in the facility. All working maintenance modules across the entire facility must be provided with lift capability.
	2. For manned fixed-wing facilities, provide overhead lift rated at 10 tons with access to all aircraft maintenance modules, through incorporating bridge crane(s) in the facility. All working maintenance modules across the entire facility must be provided with lift capability. The overhead lift hook height shall be a minimum of 31' or 10’ higher than the highest portion of the aircraft requiring lifting to ensure the facility meets the minimum requirements to perform aircraft maintenance.
	3. All hangars for manned fixed-wing aircraft get at least one 10-ton overhead

	bridge crane. In cases where hangars have >4 aircraft maintenance modules, provide at least one crane for every four (4) aircraft maintenance modules, i.e., 5 - 8 modules get two (2) cranes, 9 - 12 modules get three (3) cranes, etc.
Maintenance Operations -- Shops (CC 21116, functional area within CC 21110)	1. The shop facilities include Shop Administration, Maintenance Support space, and Component Repair Shops (previously described in a variety of ways including Basic Shops, Special Shops, and Allied Shops), Aviation Life Support Equipment (ALSE) Shops, and Tech Supply. Many functional area calculations are the same between light and heavy Field Maintenance.
	See Guidance Section below
Maintenance Operations -- Shops (CC 21116) – Shop Administration	1. This space accommodates office space for contractor equivalents of Shop Section headquarters, Airframe Maintenance Platoon, Quality Control/Quality Assurance, Production Control, and Global Combat Support System – Army (GCSS-Army) Enterprise Aviation (EAVN) and Aircraft Notebook (ACN), or other sustainment information system equipment room, etc.
	2. The allowance for admin and shop control in a manned fixed-wing Flight Organization will be based on an estimated 9 admin and shop control personnel per each aircraft maintenance module. The estimated number of admin and shop control personnel will be multiplied by NMT 100 NSF per PN. This allowance includes both soldiers and civilian personnel.
	3. Add 1,000 NSF for Production Control workroom and sustainment information system equipment.
	See Guidance Section below
Maintenance Operations -- Shops (CC 21116) -- Maintenance Support	1. The maintenance support area of the shop is supporting space for the types of maintenance typically performed in aircraft maintenance modules or on the hardstand. This includes support space for aircraft specific maintenance personnel, a tool room for special tools, and workrooms for crew chiefs.
	2. Provide 1,200 NSF maintenance workroom space for each airframe-specific repair section within a maintenance company.
	3. Provide a tool room with a base area of 300 NSF plus an additional 400 NSF for each different family of aircraft assigned or supported (i.e. C-12 and RC-12 are considered the same family).
	4. Provide crew chief workrooms with a base area of 1,000 NSF for each flight company.
	See Guidance Section below
Maintenance Operations -- Shops (CC 21116) - Component Repair Shops	1. The basic format for sizing most shop areas is an allocation for a base quantity, plus some number of square feet times the number of aircraft maintenance modules in the hangar, with a final check that the shop is at least as big as a minimum factor.
	2. Provide a Structural Repair Shop for sheet metal repair space (used by 15G personnel, or civilian equivalent) with a base quantity of 500 NSF plus 75 NSF per maintenance module, with a minimum of 1,000 NSF.
	3. Provide a Composite Repair space (used by 15G personnel, or civilian

	equivalent) with a base area of 750 NSF.
	4. Provide a PPE decontamination suite for robing and disrobing for technicians wearing protective equipment with a base area of 300 NSF. This space serves the Composite Shop.
	5. Provide an Aircraft mounted systems vault with a base area of 300 NSF. This arms room should meet any arms room requirements in accordance with the current AR 190-11 Physical Security of Arms, Ammunition and Explosives or its successor publications. This will also provide sufficient space for secure storage of any communications security (COMSEC) equipment needing a higher level of security than other communications equipment. This vault is not intended for storage of ammunition or cleaning of weapons.
	6. Provide a Tire and Hub Shop (used by 15G personnel, or civilian equivalent) with a base area of 300 NSF.
	7. While 15H personnel are often involved in maintaining Aviation Ground Support Equipment (AGSE in the Army, GSE in DoD terms), that function for flight organizations is accomplished in another space, typically the organization's vehicle maintenance Facility. In flight organizations without organic vehicle maintenance, provide an AGSE shop with a base area of 600 NSF.
	8. While rotary-wing maintenance organizations include component repair functions (such as powerplant, powertrain, pneudraulics, electrical/avionics, machine shop, and welding), for fixed-wing these functions will be provided by off-base activities that maintain civilian Beechcraft, De Havilland, Fokker, Gulfstream, and other aircraft that are civilian designs.
	See Guidance Section below
Maintenance Operations Shops (CC 21116)--Aviation Life Support Equipment (ALSE) Repair	1. Provide an ALSE shop with a base area of 1,500 NSF for each flight organization. 2. Provide an additional 120 NSF for units with over-water mission, documented on a case-by-case basis.
	3. Provide 5 NSF of ALSE locker space for each assigned pilot, by MOS or civilian equivalent.
	4. Provide 5 NSF of ALSE locker space for each assigned non-pilot member of aircrew, by MOS SQI "F" on the end of an enlisted MOS or civilian equivalent.
	See Guidance Section below
Maintenance Operations -- Aircraft Parts Storage (CC 21113) Tech	1. Provide conditioned humidity-controlled Aircraft Parts Supply with a base area of 2,600 NSF. Provide an additional 250 NSF for each flight company more than 3 in a Flight Battalion.

Supply & Contractor Logistics Support (CLS)	2. Comply with special requirements for humidity control IAW AR 710-2.
	See Guidance Section below
Maintenance Operations - Overhead Protection (CC 14179) Aviation Ground Support Equipment (AGSE) and Associated Items of Equipment (ASIOE)	1. Provide covered but not enclosed storage for storage of Associated Support Items of Equipment (ASIOE) aircraft components (pods, tanks, aircraft storage containers, etc.) with a base area of 2,000 GSF for each flight battalion.
	2. Provide covered but not enclosed storage for storage of Aviation Ground Support Equipment (AGSE) with a base area of 3,000 GSF.
	3. Select manned fixed-wing aircraft may be provided overhead protection if they have VIP airlift paint jobs, electronic gear that may be harmed by storing the aircraft in direct sunlight, or other factors. Such cases will be adjudicated on a case-by-case basis.
Aviation Unit Operations (CC 14112) -- Flight Ops & Pilot Work Areas	1. Flight operations area for Gray Eagle is included in the 60,000 GSF authorization.
	2. The number of pilots is the total of 15A, 15B, & 15C commissioned officers in grades O1 – O6 and 155x warrant officers in grades W1– W5 within the flight organization.
	3. Provide pilot workroom space with a base area of 21 NSF per pilot not assigned permanent workspace (see below).
	4. Provide a flight planning room with a base area of 10.5 NSF per pilot assigned.
	5. Provide a secure planning room with a base area of 6 NSF per pilot.
	6. Provide conference rooms for each flight company with a base area of 6.0 NSF per pilot.
	7. Provide a pilot briefing room with a base area of 15 NSF per seat plus an additional 25% of in-room circulation for a total of 19 NSF per seat. Provide one seat for each pilot assigned to the organization.
	8. Provide permanent workspace for designated flight operations personnel with a high administrative workload. Soldiers matching these criteria and assigned workspace in a private office are allotted 110 NSF; those assigned to an open office workspace are allotted 50 NSF.
	9. Provide a flight operations workroom with a base area of 500 NSF plus 50 NSF for each 15P Flight Operations personnel assigned over 5.
	10. Provide a secure flight operations storage room with a base area of 150 NSF within and accessible only from the flight planning space.
	See Guidance Section below
	1. Provide each Company Commander, Executive Officer, First Sergeant, and

Aviation Unit Operations (CC 14112) -- Company Headquarters	Operations Officer a 110 NSF private office.
	2. Provide Arms Vault space for each flight company with a base area of 400 NSF and for each aviation maintenance company with a base area of 430 NSF.
	3. Provide Unit Storage (Supply Room) for each flight company with a base area of 400 NSF and for each aviation maintenance company with a base area of 430 NSF.
	4. Provide Non-Sensitive Secure Storage for each flight company with a base area of 180 NSF and for each aviation maintenance company with a base area of 200 NSF.
	5. Provide Chemical Biological Radiological Nuclear (CBRN) Storage for each flight company with a base area of 100 NSF and for each aviation maintenance company with a base area of 110 NSF.
	6. Provide Communications Storage for each flight company with a base area of 100 NSF and for each aviation maintenance company with a base area of 110 NSF.
	7. Provide Training Space for each flight and maintenance company with a base area of 150 NSF.
	See Guidance Section below
Fire Suppression (CC's 21110 / 21114 / 21116 / 21113 / 14112)	1. Aircraft hangars shall use a fire suppression design in accordance with UFC 3-600-01 and UFC 4-211-01.
	2. Aircraft maintenance modules will not use water systems as the primary suppression system without waiver approval.
	3. Maximize protecting of personnel, minimizing risk to personnel within hangars during dispensing.
	4. Maximize protection of airframes, trying to minimize loss of airframes resulting from dispensing and cleanup.
	5. Design system to provide fastest return of airframes to a mission ready status after discharge.
	6. Minimize use of water in terms of total quantity and in terms of the percent of content of the agents used.
	7. Minimize infrastructure cost.
Power (CC's 21110 / 21114 / 21116 / 21113 / 14112)	1. Primary service to all hangars shall be 480v AC, three-phase, with Y-ground.
	2. Provide power for the type and quantity of aircraft supported or assigned.
Gross Square Feet of Building	1. For manned fixed-wing hangars, Net square feet of CC 21114 Hangar Bay (including maintenance modules, safety clearances, and structural space) & NSF CC 21116 Shops & NSF 21113 Aircraft Parts Storage & NSF 14112 Aviation Unit Operations = Total NSF of Facility.

	2. This result is the target NSF to support the unit mission. This is also the target NSF of a corresponding standard design if the unit in question is common enough to be worthy of a standard design. Floor space at 80% of this number should be treated as the minimum space to accomplish the mission; a unit should get Not Less Than (NLT) this quantity of space. There is also a planned ceiling of 120% of this space. If a standard design provides over 120% of the calculated space for a unit, any planned construction for that unit should be based on either creating a new standard design (if the unit type is common enough for that to be worthwhile) or creating a design unique to the unit supported.
	3. Not only should the total space be within +/- 20%, but the quantity of hangar bay must either be >= 80% of the authorized hangar bay in square feet, or the hangar bay must be able to accommodate at least 80% of the aircraft (by type) requiring hangar space. For example, if the unit has 25 Blackhawks it needs light field maintenance modules for 5 ea. Blackhawks (25 Blackhawks * 20% = 5 maintenance modules), and they have four modules smaller than those specified for the CH-47 in the standard but that can accommodate Blackhawks, then those 4 ea. Blackhawk modules meet the minimum mission standard even though they occupy <80% of the required hangar bay.
	See Guidance Section below
Aircraft Wash Apron (CC 11370)	1. Provide each aircraft hangar with an external wash apron or aprons (wash rack in UFC 3-260-01).
	2. These apron(s) need only provide access for non-power on operations (i.e., it will be moved to the apron by a tug rather than under the aircraft's power.)
	3. Wash Aprons shall be sized per Standard Design/COS guidance.
	4. Provide wash aprons in quantities as indicated in Standard Design/COS guidance.
	5. Comply with UFC 3-260-01 for wash apron/rack utilities.
	6. At no time will the capacity for the Wash Apron be sized to serve as a recovery point (deployment, operation, or exercise) or Rinse Facility.
	See Guidance Section below
Hangar Access Apron (CC 11340)	1. For Gray Eagle, provide a 100’ long by 160’ wide hangar access apron (1,777.78 SY) plus two 40’ deep by 65’ wide run-up stalls, one on each side of the access apron (577.78 SY total) for a total hangar access apron of 2,355.55 SY
	2. For manned fixed-wing aircraft hangars, provide a continuous concrete surface from parking apron or taxiway to the hangar door sized to be commensurate in width with the door and NLT 125' in depth.
	3. For manned fixed-wing aircraft, when a hangar door does not have immediate access to the parking apron or a circulation taxilane, a circulation pathway (not for power-on) will be provided with a direct path to a hover/taxilane or an operational taxiway.
	4. While no allowance will be calculated for pavements on the side of hangars, if

	these exist on a given airfield then they constitute a valid requirement. These typically provide access to the flight line for ground support equipment, material handling equipment, fuel trucks, maintenance shop trailers and vans, and other equipment the size of a vehicle.
	5. Comply with UFC 3-260-01, latest edition, for all apron and circulation pathway dimensions.
Telecommunications	1. Telecommunications infrastructure will meet the USAISEC Technical Guide for Installation Information Infrastructure Architecture (I3A) and ANSI/TIA/EIA 568 and 569 requirements.
	2. Telecommunications Rooms (TR) shall be provided for the voice and data network in accordance with the I3A Guide and ANSI/EIA/TIA-569-8.
	3. Outside plant connectivity will be in accordance with Army I3A guidance. Telecommunications lines will be underground from the installation's telecommunications system to the main distribution equipment located in the telecommunications equipment room. Fiber optic cabling shall be sized to support the common user systems and hangar critical systems.
	4. Size all Telecommunications Rooms based on the building configuration, operational and security requirements as determined by the appropriate engineering and certification authority.
	5. Telecommunications outlets (voice and data) shall be provided in accordance with I3A technical guide based on functional purpose of the various spaces within the facility as modified by user special operational requirements.
Secret Internet Protocol Router Network (SIPRNET) Room	1. Provide a SIPRNET room in accordance with the USAISEC Technical Guide for the Integration of SIPRNET) and AR 380-5.
Energy Policy Act of 2005 / Executive Order 134323	1. Facilities shall be designed in compliance with requirements for federal facilities IAW the Energy Policy Act of 2005 and Executive Order 134323.
Sustainable Design Development	1. Facilities shall be designed to meet current sustainable development and design policy requirements as established by the Department of the Army.
Accessibility	1. The Architectural Barriers Act, Americans with Disabilities Accessibility Guidelines (ADAAG) will be met. While soldiers occupying the facility are able bodied, some contractors providing maintenance support may not be.

Guidance Section

General:

The following guidance for application of the Aircraft Maintenance Hangar (HGR) Complex Army Standard is provided for design agent use in coordination with the Garrison DPW. All design agents shall incorporate the key mandatory design features described herein in close coordination with the USACE designated Center of Standardization for Aviation Facilities (Vertical) (AVN COS). All Army aviation facility projects must be reviewed by the AVN COS and Transportation Systems Mandatory Center of Expertise.

1. This section of the Army Standard is a necessary component for determining the application and implementation of this standard. The AVN COS, in coordination with the Aviation Facilities Design Team (FDT), is the final arbitrator for any conflicts or inconsistencies in the application of these standards as well as a mandatory reviewer prior to submission of any waiver requests by the installation. Citing project execution delays is insufficient justification for expedited review or other accelerated dispensation for deviating from meeting the Army Standards contained herein. Late submissions must be substantiated by unforeseen and documented life safety, health and welfare, or compelling mission imperatives that cannot be met without an approved waiver.
2. The HGR Complex is a major reach operations facility with functional, operational, and spatial relationships critical to meeting mission planning, rehearsal, training, deployment, and operations that are embedded in the operational layout of the facility. When there is a critical need for spatial or land use consideration for siting and implementing this Army Standard, guidance is provided to minimize or preclude functional and operational impacts on the obstruction and safety requirements for Army Airfields and Heliports (AAF/AHP).
3. Aviation facilities need substantial airspace and land area for safe and efficient operation and to accommodate future growth or changes in mission support. Facilities in direct support of aircraft operations and maintenance should have sufficient land area for expansion as equipment and technology fielding are implemented for Future Force Structure changes.
4. The installation mission area proponent responsible for developing the scope and requirements for Army aviation facilities is usually assigned to the Aviation Division, Directorate of Plans, Training and Mobilization (DPTM) of the garrison staff or the Operations Section (G/S-3) of the senior aviation organization. At locations where there is no DPTM or G/S-3 office, facility planners must coordinate with the commander of the aviation unit(s) to be supported. The DPTM, as primary mission area proponent, is responsible for integrating mission support requirements for aviation facilities, aircraft operations, aviation safety and air traffic control.
5. Where applicable, the minimum acceptable functional and operational capability is established by a Threshold requirement. The Army's maximum level of commitment to addressing the flexibility to adapt to future requirements is set by the Objective requirement. These same parameters are used by other Army activities in the doctrinal, organizational, training, and material domains and are adopted herein to simplify coordination and preclude misinterpretation when synchronizing requirements across the Army. The parameters also provide definition for design flexibility and achievement of MILCON (Military Construction) objectives and benefits when applying this standard.
6. Space modules, criteria, or components of the HGR Complex shall be used to develop space allowances and/or requirements before consideration for development of unique or specialized space allowances from those set forth in this Army Standard. When space modules, criteria,

and/or components are not used, the Functional Proponent, ICW the Aviation Facilities FDT and AVN COS, will review and validate functional or operational requirements prior to the development of any unique or specialized space allowance(s) and before incorporating into a project programming document or facility design.

General Design Philosophy:

This standard aligns with the concept of Multi-Domain Operations to provide intelligent, robust and secure Multi-Domain Power Projection Capabilities. This 21st century facility approach provides continuity of operation under attack or disaster conditions and the ability to be rapidly restored to full operation following adverse events, as well as the capacity for cost-effective incorporation of emerging technologies.

1. The HGR Complex is a major component of the AAF/AHP. Functional, operational, and spatial relationships critical to meeting mission requirements are embedded in the layout and spatial relationships of the facilities that comprise an HGR Complex. By definition, the use of the term complex in this standard refers to multiple facility types that are "packaged" to meet the Warfighter mission objectives while optimizing the hangar footprint. When there is a critical need for spatial or land use consideration for siting and implementing this Army Standard, guidance is provided to minimize or preclude functional and operational impacts on the hangar complex and AAF/AHP operational safety and obstruction clearance requirements.
2. The HGR Complex represents a consolidation of multiple facility types or functional/mission areas: Aircraft hangars (facility Category Code or CC 21110 when many functional areas are present) are composed of CC 21114 aircraft maintenance modules, CC 21116 hangar shop space with maintenance administration area and back shops, CC 21113 Aircraft Parts Storage for storage of aircraft repair parts and CC 14179 Overhead Cover for Associated Items of Equipment (ASIOE) and Aviation Ground Support Equipment (AGSE), CC 14112 Aviation Unit Operations with company operations for flight and aviation maintenance companies, and flight ops planning and briefing areas. Associated facilities to the Hangar are Hangar Access Apron CC 11340 and Maintenance Apron Rotary Wing Aircraft Parking Apron FCC 11320, Hover/Taxi lanes FCC 11221, and Taxiways FCC 11221. The HGR maximizes and builds upon the increased connectivity being developed for battle command, collective training, situational awareness, and situational understanding as well as the embedded/distributed training architecture.
3. At the same time, technological insertions that will affect facility adequacy are pre-programmed at prescribed intervals. To reduce repetitive construction modification of facilities to accommodate change, the HGR adopts an adaptive, multipurpose design philosophy to reduce reliance on construction and the disruption to Soldier and unit training and readiness it entails.
4. The HGR Army Standard simultaneously resolves past issues, current needs, and the capability to accommodate future requirements. These facilities are critical elements for reducing the support footprint for deployed forces in the Area of Operations, enabling reach operations, implementing the Army's force design to provide intelligent, robust, and secure Multi-Domain Power Projection Capabilities.
5. This Army Standard represents a 21st Century facility standard to simultaneously address past issues, current and future requirements. There are instances where a band of acceptability is allowed in the application and implementation of these standards. The range of acceptability is determined through a Warfighter Review process and deviation from this standard will also consider implications on future requirements embedded herein, and the potential impact of follow-on or retrofit construction activities on readiness as well as current situation.

6. For the purposes of this Army Standard, the term Aviation Line Company refers to company sized aviation units within an aviation battalion whose primary mission is to operate aircraft to meet assigned missions. This term does not apply to command & control or headquarters companies, air traffic control companies, signal or intelligence analyses companies or maintenance companies regardless of whether aircraft are assigned to the company.
7. Additional design considerations are:

- Make maximum use of natural light so that facilities remain usable during periods of lost utility support;
- Economy of construction is a design prerequisite;
- Facilities must be durable to withstand the rigors of multiple users;
- Prefabricated construction components and/or modular construction is encouraged provided facility durability requirements are satisfied.

Maintenance Echelons:

1. Army aviation maintenance has two echelons: Field and Sustainment. See ATP 3-04.7 Army Aviation Maintenance, dated Sep 2017, Section I-Two Level Maintenance, pg. 2-1.
2. These two echelons define a spectrum of tasks to accomplish a wide variety of work, and sometimes an organization within one or the other echelon can conduct maintenance tasks at one end or the other of that spectrum.
3. Field Maintenance includes light Field Maintenance and heavy Field Maintenance.
4. Light field maintenance concentrates on tasks that take hours to days, that require little specialized equipment, that require only common Military Occupational Specialty (MOS) skills, and this type of maintenance includes a smaller quantity of component repair and a larger quantity of component replacement. This level of maintenance can paint 12” x 12” areas. These tasks are mostly non-scheduled maintenance; some phase maintenance is conducted but this is done more for the purpose of maintaining MOS proficiency on component repair and less on maximizing the efficiency of maintenance accomplished. All parts, equipment, and personnel performing this type of maintenance must be transportable on vehicles organic to the flight battalion.
5. Heavy field maintenance concentrates on tasks that take days to weeks, or that require specialized equipment, or specialized skills, or some combination of these. This type of maintenance includes more component repair. This type of maintenance can also support painting entire rotor blade sets. This type of organization can own more equipment and spare parts than can light field maintenance. Rather than being able to move their parts, equipment, and personnel by organic vehicles these organizations can expect additional transportation assets from outside the maintenance company of the support battalion of the aviation brigade and can therefore store larger quantities of repair parts, tools, etc. In the event a TOE flight unit does not have a supporting TOE unit performing heavy field maintenance, this level of support will be provided by a supporting TDA maintenance organization addressed in the Rotary Wing TDA Standard.
6. Fixed wing aviation organizations (TOE and TDA) have their Field Maintenance support provided by contractors, not military personnel. The concept for fixed wing maintenance is that the unit will be allowed space in the unit hangar to support all Field Maintenance, both heavy and light. While Army-designed rotary wing aircraft have their component repair functions performed in Army facilities, Army fixed-wing aircraft are almost all civilian models,

sometimes with some military modifications such as chaff/flare dispensers or with integration of sensors and signals intercept equipment onto the airframe. Maintenance support for these aircraft can be found at airfields around the world, so the Army depends on component repair and support from these civilian sources rather than performing this function in Army shops.

7. Sustainment Maintenance for fixed wing aircraft will also be provided by civilian contractors, using either non-Army facilities (especially for component repair) or Army facilities for recurring maintenance.

Concept for Supporting Maintenance with Facilities:

1. Fixed Wing organizations (TOE and TDA) will be provided with a hangar for performing light and heavy Field Maintenance. That facility is described and prescribed in this Standard.
2. The hangar for a fixed-wing flight organization will be provided Aircraft Maintenance Modules for 30% of assigned aircraft.
3. This hangar also provides facility space for maintenance support teams to provide sustainment maintenance. Typically, this is maintenance on the airframe and required component maintenance involves shipping the component to another location for maintenance or rebuild.
4. TOE Rotary Wing organizations are not covered by this Standard; they are covered by the TOE Rotary Wing Standard. TOE Units with a mix of Fixed Wing and Rotary Wing Aircraft are not covered in this Standard and will be handled on a case-by-case basis.
5. For TDA organizations, only Fixed Wing are covered by this Standard. TDA Rotary Wing flight or maintenance organizations are covered by the TDA Rotary Wing Standard.

Level	Maint Activity Type	Maintenance Activity Type	Painting & Engine Test	Cbt Avn Bde	Novosel	Non-Novosel RW TDA	Non-CAB RW TOE	Non-CAB FW TOE		FW TDA	DoD Group 4, Former Army Tier III, Gray Eagle	DoD Group 3, Former Army Tier II, Hunter / Shadow
Sustainment	**Sustainment Rear, aka Depot (CCAD)**	**Sustainment Rear, aka Depot (CCAD) –** Sustainment Rear: New Production, Modification to New Model Letter, Zero Hour Rebuild, use and retention of any fixed equipment which either is now or has in the past made work more efficient. Perform MWO & Reset if it maximizes efficiency or if Hubs and Spokes are not capable of providing support. Extra expertise in battle damage repair.	**Paint Multiple Aircraft, Engine Test**	**Corpus Christi Army Depot - Avn Maint**	**Corpus Christi Army Depot - Avn Maint**	**Corpus Christi Army Depot - Avn Maint**	**Corpus Christi Army Depot - Avn Maint**	**Beechcraft / Gulfstream?**	**Beechcraft / Gulfstream?**	**Beechcraft / Gulfstream?**	**General Atomics?**	**AAI Corp?**
Sustainment	**Sustainment Intermediate (Hub)**	**Sustainment Intermediate (Hub):** Reset (main distinction), Back Up Heavy†, Back Up Phase, some fixed equipment too specialized to use efficiently at Sustainment Forward, Perform More Complex MWO. **Hangar 5% of Supported Aircraft at Home Station (Hub duplicates Spoke) and 10% of TOE without ASB** on Base + **Hangar 2.5% of TOE Aircraft in Supported Area**; reset averaging 90 days mean this provides space to reset of aircraft every year.	**Paint 1 Aircraft per Process Station (3 Stations), Engine Test**	Log Red. Ctr - Avn Hub (JBLM, Cavozos, Campbell, Liberty, Europe, Korea, Hawaii)	Sustainment: Intermediate Hub Aviation Maintenance (ACLC)	Log Red. Ctr - Avn Hub (JBLM, Cavozos, Campbell, Liberty, Europe, Korea, Hawaii)	Log Red. Ctr - Avn Hub (JBLM, Cavozos, Campbell, Liberty, Europe, Korea, Hawaii)					
Sustainment / Field	**Sustainment Forward (LRC-A)**	**Sustainment Forward (LRC-A):** Back Up Heavy†, Back Up Phase, Perform simple MWO's to Maximize Efficiency Using Fixed Equipment with Efficient Workload. **Hangar 5% of all Supported Aircraft + Additional 10% of TOE Flight Bn / Co or TDA Flight Organization not supported by TOE Avn Spt Bn or Element.**	**No Engine Test**	Log Red. Ctr. - Avn on CAB Base	Sust Fwd Aviation Maintenance (ACLC)	Log Red. Ctr. - Avn on CAB or Non-CAB Base	Log Red. Ctr. - Avn on CAB or Non-CAB Base					
Field	**Field Heavy (B Co ASB)**	**Field Heavy (B Co ASB):** Back up Non-Scheduled Light *; Perform Non-Scheduled Heavy †; Perform Phase. **Hangar 10% Supported Aircraft.**	**No Engine Test**	Cbt Avn Bde, Avn Spt Bn, B Co.	Field Heavy Aviation Maintenance (ACLC)	Field Heavy Maintenance Support	Field Heavy Maintenance Support	Field Heavy FW TOE Avn Maint	Field Heavy FW TOE MI Avn Maint	Field Heavy TDA FW Avn Maint	Field Heavy Support Also Within UAS Co.	
Field	**Field Light (D Co. Flt Bn)**	**Field Light (D Co. Flt Bn):** Non Scheduled Maintenance Light*, Perform Limited Phase for Individual Training. **Hangar 20% Assigned Aircraft.**	**No Engine Test**	Cbt Avn Bde, Flight Bn, D Co.	TDA Instructional Flight Activities (ACLC)	TDA RW Flight Activities (- Novosel)	Non-CAB Non-SOAR RW TOE Flight Bn / Co	TOE FW Avn Flight Bn / Co	TOE FW MI Flight Bn / Co	TDA FW Avn Flight Bn / Co	CAB UAS Company (Gray Eagle)	BCT / SOF / Atk Bn TUAS Plt (Shadow)

* Light = Tasks take hours to days, little specialized equipment, common MOS skills, little component repair, all parts and equipment can feasibly be moved by vehicles organic to a D Company.

† Heavy = Tasks take days to weeks, or require specialized equipment, or specialized skills, or a combination of these. Lots of component repair. Feasible to move equipment and parts by an ASB augmented with reasonable additional transportation assets. Augmenting transportation assets would not exceed the ASB's organic transportation assets.

Review of Aviation Standards

TOE Rotary Wing and Tilt Rotor Standard	TDA Standard	Fixed Wing Standard	TUAS Standard	TOE Rotary Wing and Tilt Rotor Standard	TDA Standard	Fixed Wing Standard	TUAS Standard

Application Guidance

6. Site Selection and Planning:
   Site selection and real property master planning for all Active Component HGR Complexes (and Reserve Component complexes when applicable) shall comply with all safety, obstruction, and airspace boundaries as stipulated by AR 95-2 and implemented by the Transportation Systems Mandatory Center of Expertise (TS MCX) for DCS G-3, HQDA. All spatial relationships between the landing surface and operational areas of the Army Airfield/Army Heliport (AAF/AHP), and airspace boundaries of the domestic or host nation aviation authority will be met. These operational, safety, and environmental (noise) clearance areas or boundaries ensure that facility siting will not be in violation of clearance areas which could render the facility inoperable.

   Master planning of the land use areas must also ensure that expansions of operational capabilities are maintained while the encroachment from activities on and off post is minimized.

   The prescribed sequence of analyses for HGR Complex siting begins with primary and secondary landing surfaces to ensure horizontal and vertical operational clearances are applied. When installations are precluded from meeting these stipulations, alternatives considered, and their associated limitations shall be documented in the installation Real Property Master Plan with a summary forwarded to HQ IMCOM (IMAH-PW) for Army wide implications assessment.

   Ideally, aircraft maintenance modules should be provided in the same hangar as the other aviation maintenance and operations spaces such as flight and maintenance company headquarters, maintenance admin space, component repair and similar shop functions, and storage for parts and associated items of equipment. This may be impossible in some airfield configurations; in which case they should be very close to the maintenance hangar bays.

   If a planner must move functions away from the hangar bay because of site limitations, the feasibility of locating aviation company headquarters and readiness modules in separate facilities should be analyzed first, then aviation flight operations and finally maintenance shop and shop admin spaces.

7. Physical Security and Safety:
   The HGR Complex is 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 to this area without express authorization from airfield operations. All pedestrian and vehicular traffic is under strict control and surveillance by Air Traffic Control when entering aircraft operational areas. Hence, a Security Line is established commencing from the hangar line and encompassing all operational areas of the AAF/AHP to include aircraft parking, navigational aids (NAVAIDS), and airfield service buildings and/or areas. This entire Restricted area is also designated a NO HAT area as well as a Foreign Object Debris (FOD) control area. Secondary consideration is for personnel safety and physical security of equipment commensurate with the increasing value of technology used by Soldiers and units.

8. Hangar Functions and Types:
   Aircraft hangars (facility Category Code or CC 21110 when many functional areas are present) are composed of CC 21114 aircraft maintenance modules, CC 21116 hangar shop space with maintenance administration area and back shops, CC 21113 Aircraft Parts Storage for storage of aircraft repair parts and associated aircraft equipment, CC 14112 Aviation Unit Operations with company operations for flight and aviation maintenance companies, and flight ops planning and

briefing areas. Aviation maintenance has two echelons: Field and Sustainment. This Army Standard deals with Field Maintenance. Different criteria are applied to light Field Maintenance and heavy Field Maintenance.

9. Primary Facility Scope and Capacity (FCC 21110):
   Hangar allowances are calculated for TOE and TDA fixed wing organizations under this Army Standard. The allowance for a hangar for manned fixed wing aircraft is a function of the sum of the allowances for aircraft hangar modules, shop areas, aircraft parts storage, and aviation unit operations. The allowance for a Gray Eagle Company is NTE 52,100 GSF.

10. Maintenance Operations -- Aircraft Maintenance Bay (facility CC 21114, also functional area within CC 21110):
    The term aircraft maintenance bay is a structural term that includes all the maintenance modules within the hangar.

    A maintenance module is designed to fit one aircraft, plus a 5' buffer on the front, back, and each side of the aircraft. The one size maintenance module provides the design flexibility needed due to future force structure changes and the possibility of future aircraft and legacy aircraft mix within the units.

    An additional 5' safety zone wraps each group of contiguous modules.

    Finally, a 5' structural zone follows the demising walls of an entire maintenance bay or internal structural line dividing a bay into multiple zones, each of which is a group of modules plus safety zones.

    The Net Square Feet of Hangar Bay are the sum of the maintenance modules plus safety zones plus structural zone.

Overview of Fixed Wing Aircraft & Size of Hangar Maintenance Module			
Extra-Large Module (C-130J): Design Acft 113' L x 133' W Module Depth 113' + 15' (rear) + 10' (front) = 138' Deep Module Width 133' + 7.5' (½ 15' left) + 7.5' (½ 15' right) = 148' Wide			
Large Module: Design Aircraft 100' L (HADES) x 96' W (C-31) Module Depth 100' + 10' (front) + 10' (rear) = 120' Deep Module Width 96' + 5' (½ 10' on left) + 5' (½ 10' on right) = 106' Wide			
Civilian Aircraft	**Military Designation**	**Length**	**Wingspan**
Gulfstream V	C-37	96.40	93.45
Bombardier Global 6500	HADES	**99.43**	94.00
Fokker F27	C-31 Troopship	82.25	**95.17**
DHC-7 Series 102	EO-5 (RC-7)	80.65	93.00
Alenia C-27J	C-27 Spartan	74.50	94.17
DHC-8 Series 300	C-147	84.25	90.00
Gulfstream III	C-20 Gulfstream	83.08	77.83
	C-23 Sherpa	58.00	74.75
	MV-22 Osprey	57.33	84.58
DHC-6 300 / 400 Twin Otter	UV-18	65.00	65.00
C-212 Aviocar	C-41A	53.15	66.54
	A-10 Thunderbolt II	53.30	57.50
Small Module: Design Aircraft 65' L (UH-60) x 55' W (C-12) Module Depth to Accommodate Helicopters = 84' Deep Module Width 60' + 5' (½ 10' on left) + 5' (½ 10' on right) = 70' Wide			
Civilian Aircraft	**Military Designation**	**Length**	**Wingspan**
Sikorsky S-70		**64.83**	53.67
Citation V Ultra	UC-35 Cessna	48.92	52.17
Citation V (Encore)	UC-35 Cessna	48.92	52.17
Beechcraft Super King Air	C-12 Huron	43.75	**54.50**
Beechcraft Super King Air	RC-12 Huron	43.75	**54.50**
Metro III / Metro 23	C-26 Metroliner	42.17	46.25
Pilatus PC-6 Porter	UV-20 Chiricahua	36.08	52.06
Ayers Turbo-Thrush		29.16	44.33
Embraer EMB 314	A-29 Super Tucano	37.33	36.54
Beechcraft Texan II	AT-6 Texan II	33.33	33.42
UAS Module: Design Aircraft 28' L x 59' W (MQ-1C ER) Module Depth 32' + 5' (½ 10' at front) + 5' (½ 10' at rear) = 42' Deep Module Width 60' + 5' (½ 10' on left) + 5' (½ 10' on right) = 70' Wide			
Civilian Aircraft	**Military Designation**	**Length**	**Wingspan**
	MQ-1C ER	**27.44**	**58.30**

11. <u>Maintenance Operations -- Shops (CC 21116, functional area within CC 21110):</u>
The shop facilities include Shop Administration, Maintenance Support space, Component Repair Shops, Special Shops, Aviation Life Support Equipment (ALSE) Shops, and Tech Supply. Separate areas within the shop are calculated based on the estimated number of aviation maintenance administrative and shop control personnel, the count of maintenance modules, and

other factors. This leads to the number of Net Square Feet (NSF) dedicated to Shop space. This quantity includes workspace and circulation within the section or shop. The quantity of shop space will be summed with Aircraft Maintenance and other types of space into a total NSF requirement for the hangar, which is then adjusted to Gross Square Feet (GSF) including circulation space (horizontal between shops and vertical between floors), latrines, mechanical rooms, electrical rooms, communications and server rooms, janitor closets, etc.

12. Maintenance Operations -- Shops (CC 21116) -- Shop Administration:
Fixed Wing Aviation maintenance organization (except for Gray Eagle) are staffed by contractors, so detailed data on the breakout between supervisory staff and maintenance mechanics is probably proprietary and critical to the competitiveness of bids and proposals. Because of this, the size of the Shop Administration Area is based on the number of maintenance modules and not a count of administrative staff.

For manned Fixed Wing Flight Organizations, the number of shop admin personnel is seven (7) times the number of maintenance modules. This is the average across the various flight Battalions and Squadrons of a CAB, rounded to a whole number.

The 1,000 NSF for Production Control accommodates space for Production Control workroom, Sustainment Information System (SIS) equipment room, etc.

13. Maintenance Operations -- Shops (CC 21116) -- Maintenance Support:
Maintenance support space provides work areas for aircraft specific repair sections who need space for storage of tools and bench stock and to conduct various work assignment meetings. In TOE rotary wing units this space typically accommodates soldiers in MOS's such as 15R AH-64 Attack Helicopter Repairer, 15T UH-60 Helicopter Repairer, 15U CH-47 Helicopter Repairer. In the case of fixed wing units, it accommodates corresponding crew-chief type contractors when they are not working in the aircraft bay areas or out on the hardstand.

Provide 1,200 NSF of workroom space for each type of airframe maintained. Type of airframe means per family of airframes -- C-12's, RC-12's, and UC-12s are all considered a single type of airframe.

Provide a base tool room space of 300 NSF plus an additional 400 NSF for each different type of aircraft assigned or supported.

In the event a unit is assigned A92 Tool Sets, provide accommodations for daily operations and use (e.g. personnel accessibility and circulation, commercial power).

Provide 1,000 NSF of crew chief workroom space for each flight company. A flight company is defined as a company with assigned aircraft. Each hangar shall be planned for a minimum of one flight company.

14. Maintenance Operations Shops (CC 21116)-Component Repair Shops:
Shop space allowances for fixed wing organizations are significantly different from those supporting rotary wing aircraft because component repair of components of fixed wing aircraft are typically repaired by contractors who are not located on an Army base. Fixed wing organizations do perform structural repair in the hangar.

15. Aviation Life Support Equipment (ALSE) Shops:
ALSE shops include lockers for both pilots and non-pilot flight crew. Provide a locker for all pilots and non-pilot flight crew in the organization. Method for identifying pilots and non-pilot

flight crew is explained under flight operations.

16. Maintenance Operations- Aircraft Parts Storage (CC 21113) Tech Supply & Contractor Logistics Support (CLS):
    Supply and logistics space allowances are generally categorized along maintenance levels. Provide conditioned humidity-controlled Aircraft Parts Supply within the hangar structure.

    Flight organizations with more than three flight companies generate an allowance for additional Aircraft Parts Supply.

    The AVN COS shall review any request for increased space allocation above what is called out in this standard.

17. Maintenance Operations- Overhead Protection (CC 14179)-Aviation Ground Support Equipment:
    There is no specific MOS for personnel who maintain or operate AGSE in Flight Organizations. Often, 15H personnel maintain this equipment, but this relationship is not fixed by training or duties of the specialty. AGSE will be serviced in the flight organization's vehicle maintenance shop.

    LRC-As and flight organizations without dedicated vehicle maintenance perform maintenance on AGSE organically and are authorized AGSE shop space.

    Aviation Unit Operations (CC14112) Flight Operations & Pilot Work Areas:
    Permanent workspace is included for designated flight operations personnel with high administrative workloads. This includes:

    Commissioned officers in MOS's 15A, 15B, and 15C and grades O1 - O6 less those assigned to Battalion, Brigade, or EAB C2F SRC's Warrant officers in MOS's 152x, 153x, 154x, & 155x with SQI's B (Aviation Safety Officer), C (Instructor Pilot), F (Senior Instructor Pilot/Instrument Flight Examiner), H (Standardization Instructor Pilot), & I (Aviation Mission Survivability or AMS Officer) in grades W1 - W5 less those assigned to Battalion, Brigade, or EAB C2F SRC's.

Each soldier matching these criteria is allotted 110 NSF of workspace.

15P E1-E9 assigned to Battalion Tactical CP or Flight Companies are provided space in the Flight Operations workroom and office.

Work area in each flight company pilot workroom for a single fixed wing or UAS pilot is 33.5 NSF for a desk area plus 8.5 NSF of in-room circulation for a total of 42 NSF, based on the sizing of planning rooms in EAB C2F. This is a hot desk area, and workspace equal to 1/2 the total strength of pilots assigned to the company is provided. This comes to 21 NSF per company pilot not assigned permanent workspace as Flight Operations or Shop Admin personnel.

A flight planning room will be provided to accommodate 1/4 of pilots assigned to Flight Companies: Provide 10.5 NSF per pilot.

A secure planning room will be provided to accommodate 1/7th of all pilots assigned to Flight Companies: Provide 6 NSF per pilot.

A pilot briefing room will be provided. It is sized using the same criteria as the EAB C2F 150 person briefing room -- 15 NSF per seat plus an additional 25% of in-room circulation for a total of 19 NSF per seat. One seat is provided for each pilot assigned to the organization. Design with moving partitions to separate into multiple smaller spaces.

Non-pilot aircrew or aircraft flight crew are enlisted soldiers with an "F" SQI as the final digit in their MOS who are in grades E1-E9. These soldiers do not generate pilot space, except they get ALSE lockers.

18. Aviation Unit Operations (CC 14112) Company Headquarters:
A company is generally identified based on the presence of an O3 or O4 with the duty title of "Commander" plus an E8 with an M identifier (which may be replaced by a P, S, or V) and the duty title "First Sergeant". Some fixed-wing units also have an Executive and/or an Operations Officer. There will often be a 92Y or 74D also present. Flight companies are those with aircraft and pilots assigned. Aviation maintenance companies are those with aviation tool sets assigned. There is also space for equipment maintenance and inventory, the conduct of small classes, etc. Companies other than flight companies or aviation maintenance companies (e.g. Headquarters and Headquarters Company (HHC), and Ground Forward Support Company (FSC)) do not get CC 14112 Aviation Unit Operations Company Headquarters but should use CC 14185 Company Headquarters for their requirements.

19. Secure Storage:
The Aircraft Mounted Systems vault serves three separate requirements: Sensitive Secure Storage for controlled portions of aircraft mounted systems removed from aircraft for maintenance purposes, Non-Sensitive Secure Storage (e.g., high value, pilferable, serial numbered items other than arms) for aircraft mounted systems, and Telecommunications Secure (COMSEC) Storage of organic aircraft mounted equipment as defined by the AR 190-series. Secure storage for individual and crew served weapons not mounted on aircraft are provided in separate arms room space when Flight Companies are consolidated in the hangar. Non-sensitive secure storage space for non-aircraft mounted systems is similarly provided in the Company Headquarters space.

20. Recapitulation of Net Square Feet:
Calculate the total Net Square Feet of each hangar as a sum of the various functional areas. This provides an estimate for the adjustment from Net to Gross Square Feet. The most current version of the Standard Design is the source for sizing supporting spaces included under Gross but not Net Square Feet, and planning adjustments from Net Square Feet to Gross Square Feet.

- Total NSF of CC 21114 Aircraft Maintenance Bay= NSF of Aircraft Maintenance modules + Safety Corridor + Structural Corridor.
- Total NSF of CC 21116 Maintenance Operations Shops = NSF Shop Administration + NSF Maintenance Support + NSF Component Repair Shops + NSF Aviation Life Support Equipment Repair
- Total NSF of CC 21113 Aircraft Parts Storage = NSF of Aircraft Parts Storage
- Total NSF of CC 14179 Overhead protection= NSF of Aviation Ground Support Equipment + Associated Items of Equipment (ASIOE)
- Total NSF of CC 14112 Aviation Unit Ops = NSF of MEDEVAC Ready Area and Storage + NSF of Flight Ops and Pilot Work Areas + NSF of Aviation Unit Ops Company Headquarters.
- Adjustments from Net - to - Gross Square Feet will be different across these four categories, and in some cases will occur independently of these NSF.
- The definitive source of the adjustment from net-to-gross is the Standard Design. To establish unit allowances in RPLANS, the factors for net-to-gross should be NLT 3,030 SF + 6.5 SF per Occupant + 20% aircraft maintenance bays + 42% other areas (shops, aviation unit ops) + 15% parts storage.

- The number of planned building occupants for Fixed Wing Flight Operations units will be equal to the number of personnel assigned to flight missions and aviation maintenance in the TOE or TDA, but not less than 40 personnel per aircraft maintenance module (the average for Assault, Attack, and GSAB rounded to a whole number) in order to account for contractor personnel.

  Note that there is an acceptable band where a hangar >80% and <120% of what is calculated as needed by a unit will be judged capable of supporting the unit mission. One caveat to this is that the hangar bay area must either be >80% of the area required for hangar bay, or the unit must be able to hangar over 80% of the number of aircraft calculated as needing maintenance modules. The reason for this is that excess hangar bay can be used to fulfill a need for parts storage, shops, or administrative space, albeit at a loss of efficiency and quality. An aircraft cannot be moved into Aviation Unit Operations or Shop space for repair. Having 100% of the total square feet of hangar needed, but only being able to accommodate 60% of the aircraft needing maintenance modules means the hangar fails to meet the mission. One exception to this rule is that if an existing hangar can accommodate at least 80% of the aircraft requiring maintenance modules, then this hangar can meet mission.

- Facility constructed gross area shall not exceed 105% of space allocation set forth in this document to accommodate site, construction, or environmental factors.

21. Aircraft Wash Apron (CC 11370) (wash rack in UFC 3-260-01):
    This is a rigid pavement area for aircraft washing and cleaning as a function of or in preparation for conducting maintenance and repair. It is located immediately adjacent to the hangar in order to optimize connections to required utilities. It will be sized IAW Standard Design and provided with permanent utilities per UFC 3-260-01 if allowed portable systems are not available. Environmental considerations in accordance with current law require dealing with detergent, oil, and particulate waste by-products IAW AR 200-1 and AR 200-2. The apron shall be designed to ensure wastewater containment (except spray), collection, and processing through an oil-water separator before entering any storm water system.

22. Hangar Access Apron (FCC 11340):
    Hangar access aprons provide a stabilized circulation path between the hangar and the parking area of an aviation facility. Hangar access aprons size is predicated on the hangar design and orientation to the nearest operational taxiway or hover/taxi lane. Width of the apron should be a continuous concrete pad across the entire hangar door width. Depth is dependent upon obstruction clearance requirements but nominally NLT 125 feet deep. Situations where the hangar is adjacent to a taxiway for large fixed-wing aircraft (C-5, C-17, etc.) may require a deeper hangar access apron.. When using an individual access design, the hangar access apron normally abuts the mass parking apron and its associated hover/taxi lane. When a hangar design has its doors facing perpendicular to the runway centerline, a circulation pathway NLT 65-foot-wide shall connect the Hangar Access Apron with the nearest taxiway or hover/taxi lane. The minimum length of the circulation pathway is based on obstruction clearance dimensions. Comply with the requirements of the current version of UFC 3-260-01.

23. Aircraft Parking Apron (FCC 11320):
    The aircraft parking area is addressed in UFC 3-260-01. The aircraft parking area is normally a unit support function. A modular approach should be used for determining the scope of this area which is comprised of parking pads, and hover/taxi lanes. The parking areas should be designed and constructed as a continuous mass parking area of concrete composition and must be separated from the nearest fixed or mobile object as discussed in Chapter 6 of UFC 3-260-01. The size of the aircraft parking apron will be based on the type of aircraft, parking module size and parking arrangement, also discussed in Chapter 6 of this UFC.

Mooring and Grounding Points for Mass Parking Areas and Hardstands. Provisions will be made to moor aircraft at AAF and AHP through the use of tie-down anchors installed for this purpose in parking areas and hardstands.

Additional discussion on mooring points is found in Attachment 12 in UFC 3-260-01.

24. Telecommunications:
Telecommunications infrastructure will meet I3A and ANSI/TIA/EIA requirements. Data outlets will be provided per the I3A technical guide based on functional purpose of the various spaces within the facility as modified by operational requirements, with wireless access points provided in the maintenance and repair Shops. Provide a dedicated secure communication room constructed in accordance with the provisions of the Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNET) to accommodate future Secure Internet Protocol Routing Network (SIPRNET) access. The telecommunications infrastructure, cabling and outlets will be allocated IAW the following references:

- Project specific USAISEC Information Technology Facility Design Criteria
- USAISEC Technical Guide for Installation Information Infrastructure Architecture (I3A)
- USAISEC Technical Guide for the Integration of Secret Internet Protocol Router Network (SIPRNET)
- National Security Agency (NSA), Department of Defense (DoD), Defense Information Systems Agency (DISA), and Department of the Army (DA) policies, practices, and memorandum for information assurance, security, and protection
- UFC 3-580-01 Telecommunications Building Cabling Systems Planning/Design

Facilities must connect to the Installation telecommunications (voice and data) system through the outside plant (OSP) underground infrastructure per I3A guidance.

Telecommunications rooms and telecommunications entrance facilities must be provided for unclassified network and voice equipment and cabling infrastructure throughout the facilities.

Provide a SIPRNET room.

25. Connectivity & Distribution:
Outside plant connectivity shall be provided in accordance with the Army I3A guidance. The HGR facilities shall be connected to a distribution node with single mode fiber optic cabling and shall be considered as an Area Distribution Node (AON) for engineering purposes. The fiber optic cabling shall be sized to support the common user systems and HGR critical systems. For planning purposes, 12 strands of fiber shall provide connectivity to the installation fiber backbone. Adjustments will be made during actual project design development.

Reference Criteria:

- American with Disabilities Act Accessibility Guidelines (ADAAG)
- IBC - International building code
- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 101 Life Safety Code
- NFPA 409 Standard on Aircraft Hangars

- Uniform Federal Accessibility Standards (UFAS) Federal Standard 795
- Energy Policy Act 2005 (EPACT05)
- Energy Act 2020 (EA 2020)
- Army Sustainable Design and Development Policy Update
- AR 95-2, Air Traffic Control, Air Space, Airfield Flight Facilities and Navigational Aids
- AR 190-16, Physical Security
- AR 190-51, Security of Unclassified Army Property
- AR 210-20, Real Property Master Planning for Army Installations
- AR 380-5, Department of Army Information Security Program
- AR 405-70, Utilization of Real Property
- AR 420-1, Army Facilities Management
- DA PAM 415-28, Facility Guide to Army Real Property Category Codes
- UFC 1-200-01 Design: General Building Requirements
- UFC 3-260-01, Airfield and Heliport Planning and Design
- UFC 3-260-02, Airfield Pavement Design
- UFC 3-260-05A, Marking of Army Airfield Heliport Operational and Maintenance Facilities, with Change 1
- UFC 3-535-01, Visual Air Navigation Facilities
- UFC 3-600-01, Design: Fire Protection Engineering for Facilities
- UFC 4-010-01, DoD Minimum Antiterrorism Standards for Buildings
- UFC 4-211-01, Aircraft Maintenance Hangars
- UFC 4-211-02 Aircraft Corrosion Control and Paint Facilities
- UFC 5-535-01, Airfield Lighting and Navigational Aids
- ER 1110-3-113, Engineering and Design, Department of the Army Facilities Standardization Program
- ETL 1110-3-491, Sustainable Design for Military Facilities
- D/CID 6/4, Personnel Security
- USAISE, Technical Criteria for the Installation Information Infrastructure Architecture (IA3)