DEPARTMENT OF THE ARMY
ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
600 ARMY PENTAGON
WASHINGTON, DC 20310-0600

DAIM-ZA

FEB 2 4 2013

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Army Standard for Aircraft Maintenance Hangar (HGR) Complex

1. The enclosed Army Standard for HGR Complex is hereby approved for implementation. The Army Standard applies to Active and Reserve Component facilities on Army Installations. Only the Assistant Chief of Staff for Installation Management has authority to approve exceptions to this standard. Waivers from the Army Standard must be approved in accordance with Army Regulation 420-1, "Army Facilities Management," latest edition.

2. The Army Standard is mandatory for Military Construction (MILCON) Army projects in the FY14 program and beyond. Designs based on the Army Standard and the U.S. Army Corps of Engineers (USACE) Army Standard Design Criteria will be developed consistent with MILCON Business Process. It is mandatory for Sustainment, Restoration and Modernization (SRM) Army projects in FY14 and beyond.

3. Installation Status Report-Infrastructure and Real Property Planning and Analysis System methodologies will be updated to reflect the Army Standard in coordination with the POCs listed below.

4. The HGR Facilities Design Team (FDT) co-chairs are: CW4 Patrick Francis, HQDA-G4, Aviation, patrick.a.francis3.mil@mail.mil, (703) 614-0733; and Ms. Roberta M. Preston, OACSIM, DAIM-ODO, Roberta.m.preston2.civ@mail.mil, (571) 256-8143. The USACE Center of Standardization FDT representative is. Mr. Zach Weber, USACE SAM, zachary.s.weber@usace.army.mil, (251) 694-4027.

Encl

MICHAEL FERRITER
Lieutenant General, GS
Assistant Chief of Staff
for Installation Management

DAIM-ZA
SUBJECT: Army Standard for Aircraft Maintenance Hangar (HGR) Complex

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Army Standard for Aircraft Maintenance Hangar (HGR) Complex

Date:
18 November 2013

Supersedes the 13 April 2012 Army Standard

Description: Aircraft Maintenance Hangar (HGR) complex for the maintenance, repair, deployment, training, and sustainment of manned and unmanned aircraft.

Applicability:

- The HGR Army Standard applies to the planning, design, and construction of all active Army Tables of Organization and Equipment (TOE) aircraft maintenance and repair requirements worldwide.
- This Army Standard applies to Reserve Component TOEs when fielded as stand alone, dedicated hangar facilities.
- This Army Standard shall also apply equally to Tables of Distribution and Allowance (TDA) hangars not specifically cited above and shall be used to the maximum extent in order to maximize the benefits of standardization and preclude the need to develop a separate Army Standard for TDA application.
- While this standard is based on the Combat Aviation Brigade (medium) (CAB), the criteria is applicable to all aircraft maintenance and repair facilities.
- Separate Aviation Company are based on 10 aircraft rotary wing units.
- The primary source for determining authorized allowances is the Facility Planning System (FPS) contained in the Real Property Planning and Analysis System (RPLANS).

Waivers:

- Only the Assistant Chief of Staff for Installation Management has authority to approve exceptions to the Army Standard.
- Waivers from Army Standards must be requested in accordance with the AR 420-1 and the Army Facilities Standardization Program Charter, latest edition.
- All waiver requests to this Army Standard require COS conflict resolution prior to submission by the Garrison Commander.
- Garrison Army Standard waiver request submissions 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 Facilities Standardization Committee to consider prior to implementation into project design.
- All Headquarters, Department of the Army (HQDA) approved waivers shall be documented in installation master plans thereby serving as the installations modified standards for the facility type affected.
- Late submissions and/or project delays are NOT sufficient stand alone justification for accelerated review or other dispensation to meeting the Army Standard contained herein.

The Guidance section provides instructions and definitions necessary for the application of the mandatory requirements contained in the tabular section of the Army Standard. As such, they

are used in conjunction with the Army Standard in order to ensure the intent and embedded functionality contained herein will meet the Army's mandatory requirements set forth by this standard.

Army standards and criteria for Hangar Complexes are issued in two categories: manned and unmanned. Unless otherwise specified, the data contained herein are applicable to both categories of hangars.

ARMY STANDARD

Item	Mandatory Criteria
Site Selection & Planning	1. The HGR complex shall be sited immediately adjacent to the 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 for direct access to the mass parking apron for power-on operations. 3. Operational control systems for UAS operations must be sited based on AAF/AHP spectrum and obstruction clearance analyses.
Physical Security and Safety Zone	All operational areas of an AAF/AHP constitute a Restricted Area. The HGR Complex serves as an outer boundary for the AAF/AHP Restricted Area. Entry into the HGR Complex or any other portion of the AAF/AHP by other than assigned personnel requires prior authorization approved by airfield operations and confined to specific areas. All movement in and around aircraft operational areas are monitored and controlled by Air Traffic Control. 1. A physical barrier (fence) with controlled access to the adjacent aircraft parking apron shall preclude unauthorized pedestrian and vehicular traffic to the flightline. 2. Security Line shall begin at the hangar wall facing the next building along the flightline thereby providing a continuous physical barrier to the parking apron, circulation taxiways, hover/taxilanes, and all landing surfaces. 3. Fences will include a 15 foot wide vehicle and separate pedestrian gate as stipulated by the AAF/AHP master plan.
Space Allocation Authority	Primary facility/building sizing will be based on Army doctrine, HQDA approved missions statements, manning documents (e.g., OTOE, TDA, TDA Augmentation), and contractor support when provided as Government Furnished Facilities and authorized by the Functional Proponent.
Hangar Footprint	Aircraft hangars are composed of a maintenance/repair bay and admin core work areas. 1. For General Support Aviation Battalions (GSAB), Attack Reconnaissance Battalions (ARB), Assault Battalions (Aslt Bn), Air Cavalry Squadrons (ACS), (Attack, Assault, Calvary = AAC) and Separate Aviation Companies (Sep Avn CO)), provide a

	consolidated hangar combining Company and Flight Operations space. 2. For Aviation Support Battalions (ASB), provide a dedicated multi-echelon hangar for maintenance and repair separate from Company Operations (use Army Standard for Company Operations Facilities – COF (FCC 141 85). 3. No aircraft hangar shall exceed 850'frontage (width of hangar when facing flightline). 4. For Unmanned Aircraft Systems (UAS) assigned to Brigade Combat Teams (BCT) with <15' wingspan or rotor disc diameter (UAS Class I & II), use the Tactical Equipment Maintenance Facility (TEMF) Army Standard. 5. For UAS assigned to Combat Aviation Brigades (CAB) Grey Eagle or Shadow or rotor disc diameter (UAS Class I & II), and UAS use the UAS Hangar (HGR) contained in this Army Standard. 6. (Depot or Theater only) For Security or Storage Hangars, provide a separate hangar building FCC 211 50.
Primary Facility Scope and Capacity	Aircraft hangars will be provided in one of four (4) manned and 1 unmanned size configurations (see *Guidance Section* below for specific application): (GSAB) – NMT 163,500 NSF AAC (ARB, ASLT, ACS) – NMT 136,500 NSF ASB HGR – NMT 157,500 NSF Sep Avn Co (special ops) – NMT 40,000 NSF UAS HGR – NMT 52,100 NSF Basis of allocation: – (Aviation Units only) One (1) hangar per aviation battalion or Separate Aviation Company (EAC) with organic aircraft maintenance capability as indicated above. – (Aviation Units without Organic Maintenance Capability) Consolidate requirements in another unit hangar ensuring physical separation of the admin core space from the host unit. – (BCTs only) One UAS maintenance building per battalion (Bn) in the BCT TEMF Complex with assigned UAS with <15' wingspan or rotor disk. – Space allowance quantified by FPS based on the inherent maintenance capability of the unit or combined requirements of the consolidated equivalent. – NSF includes all functional spaces (unit, admin, shops, circulation, storage, mechanical, ect.)
Hangar Floor Work Area & Aircraft Maintenance Modules (FCC 211 10 & 211 15)	1. All hangars will use the following structural bay modules for repair and maintenance. 84' D x 64' W – Utility, Attack, and Reconnaissance (UAR) Aircraft Maintenance Module 110' D x 70' W – Cargo Aircraft Maintenance Module 130' W x 40' D – UAS (small) Consolidated Aircraft Maintenance

	Module (Shadow or Fire Scout) 66' W x 45' D – UAS (large) Aircraft Maintenance Module (Sky Warrior) TBD – Fixed Wing Aircraft (manned) 2. All battalion-sized aviation units (except ASB); Provide aircraft maintenance modules or repair bays for 20% of assigned airframes for each airframe type. Any fraction will be rounded off to the next whole module. 3. ASB; Provide aircraft maintenance modules or repair bays for 10% of assigned aircraft to be supported for each airframe type. Any fraction will be rounded off to the next whole module. 4. Separate Aviation Companies ; provide aircraft maintenance modules or repair bays for 10% of assigned airframes for each airframe type. Any fraction will be rounded off to the next whole module. 5. Security and Storage hangars will have NMT 18,600 NSF. 6. All bays will have direct access (in/out) accessibility and free of intermediate support columns. 7. Provide power, compressed air, and data connectivity to all repair bays. 8. A five (5) foot safety corridor will be provided around the entire perimeter of the aircraft maintenance bay free of any storage or equipment other than life safety equipment or appliances. 9. Provide limited wash capability in one maintenance bay per type aircraft (AH/UH/OH or CH-47) per hangar with drainage into the interior maintenance bay trench drain and through an oil-water separator. 10. Provide power and data connectivity to Admin Core Module for command/control, mission planning/operations, and training support. See *Guidance Section* below
Overhead Lift (FCC 211 10)	All aircraft maintenance hangars shall provide overhead lift with accessibility to all aircraft maintenance modules. Lift capacity shall be positioned to cover the entire aircraft maintenance module area . Basis of allocation: – (AAC) Provide 2-10-ton bridge cranes – (GSAB and ASB) Provide 1-10-ton bridge crane above cargo modules and 2- 10-ton cranes over UAR Modules – Separate Aviation Co. Provide 1-10-ton bridge crane – (UAS Hangar Only) One 5-Ton overhead crane
Admin Core Module	1. Admin & shop control, tool storage, parts storage (shop stock), bench repair, arms vault (aircraft mounted weapons), COMSEC vault, non-sensitive secure storage, multipurpose training/break room, latrines, and utility room functions will be consolidated in an Admin Core Module of the hangar as stipulated in the *Guidance Section* below.

	2. (Aviation Line Companies only) Admin Core will also provide Company Admin and Supply space in-lieu of a Company Operations Facility. 3. Provide and Maintenance Administrative Area within the Admin Core to provide management and oversight of maintenance and repair activities. Basis of allocation: – (ARB, Aslt, & ACS Only) – NMT 3,700 NSF – (GSAB Only) – NMT 3,400 NSF – (ASB Only) – NMT 4,700 NSF – Sep Avn CO – NMT 1,100 NSF – (UAS Company Only) – NMT 3,900 NSF
Allied Shops (FCC 211 10 & 211 15)	The following allowances for allied shops will be provided in the Admin Core of hangars: Basis of allocation: – (ARB, Aslt, & ACS Only) – NTE 7,600 NSF – (ARB and ACS Only) – Add NMT 3,600 NSF for Armament & Target Acquisition Systems – (GSAB Only) – NTE 7,500 NSF – (ASB Only) – NTE 19,300 NSF – Sep Avn CO– NTE 2,400 NSF – Security and Storage Hangars – NTE 500 NSF – UAS Company – NTE 11,250 NSF
Other/Special Shops (FCC 211 10 & 211 15)	The following allowances for other/special shops are provided in the Admin Core of hangars: Basis of allocation: – (ARB, Aslt, & ACS only) – NTE 3,900 NSF – (GSAB Only) – NTE 3,600 NSF – (ASB only) – NTE 3,500 NSF – Sep Avn CO– NMT 600 NSF – (UAS Companies only) – NTE 600 NSF
Aviation Life Support Equipment (ALSE) Shop	The following allowances for ALSE are provided in the Admin Core of hangars: Basis of allocation: – (ARB, Aslt, & ACS only) – NTE 1,800 NSF – (GSAB Only) – NTE 1,800 NSF – (ASB only) – NTE 600 NSF – Sep Avn CO– NMT 600 NSF
Secure Storage (FCC 211 10 & 211 15)	Secure storage is provided in the Admin Core of hangars on the following basis: Basis of allocation: – (Except UAS Company) 300 NSF – Sensitive (e.g., Arms Room Aircraft Mounted Systems) Secure Storage – (All) 300 NSF – Avionics Equipment Storage

	– (All) 300 NSF – Non-Sensitive Secure Storage (Aircraft Mounted Systems) *See Guidance Section* below
Tech Supply (Aircraft Parts Supply) (Class IX Air) (FCC 211 10 & 211 13)	1. Provide accommodations for daily operations and use of deployable repair parts storage system (ISU 90, or other legacy containerized equipment). Provide a conditioned loading dock and receiving area, personnel accessibility, circulation, and commercial power). 2. Provide supply offices and issue counter with interior access to the shop and admin section of the hangar facility. (AAC, ASB, GSAB only) 3. Aircraft parts supply space is provided inside the hangar on the following basis: Basis of allocation: – Parts issue counter and supply offices – NTE 600 NSF Tech supply and receiving area; – ARB, Aslt, & ACS – NTE 600 NSF – GSAB – NTE 600 NSF – ASB – NTE 12,000 NSF – Separate Aviation Co. – NMT 200 NSF – UAS Companies only – NTE 600 NSF
Aircraft Mobile Shops (ASB Only)	1. Provide accommodations for use of SPAMs (Shelter Portable Airmobile) and IFTE/EETF (Improved Flight Test Equipment/Enhanced Electronic Test Facility) vans in the Admin Core for daily operations and use (e.g., loading dock, personnel accessibility, circulation, and commercial power). 2. Additional space exceeding the allowance for Allied and Special Shops (FCC 211 10) shall be justified by Army approval documentation as stipulated in the *Guidance Section* below.
Tool Storage Allowance (Other Than ASB) (FCC 211 10 & 211 15)	1. All HGRs (Except ASB) provide NMT 500 NSF for units **not** assigned A92 (Aviation Standardized Tool Set) Tool Sets; 2. All HGR (Except ASB) **When** A92 Tool Sets are assigned to the maintenance/repair unit, provide accommodations for daily operations and use (e.g., loading dock, personnel accessibility, circulation, and commercial power) in lieu of the 500 NSF allowance. 3. ASB provide NMT 1,500 NSF regardless of A92 assignment.
Flight Operations Area (FCC 211 10 & 211 15)	The Flight Operations Area allowances are provided in the Admin Core of hangars and separate from Company Operations when aviation line company consolidation applies: Basis of allocation: – (ARB, Aslt, & ACS only) – NMT 4,700 NSF – (GSAB Only) – NMT 8,200 NSF – Sep Avn CO – NMT 1,500 NSF – (UAS Companies only) – NMT 2,000 NSF

Contractor Logistics Support (FCC 211 10)	Provide Contractor Logistics Support (CLS) space based on the following allowances Basis of allocation: – (ARB, Aslt, & ACS only) – Total CLS NMT 1,620 NSF – (GSAB Only) – Total CLS NMT 1,620 NSF – (ASB only) – Total CLS NMT 2,620 NSF – (UAS Only) – Total CLS NMT 576 NSF – Sep Avn CO – Total CLS NMT 400 NSF
Ready Room (FCC 211 10)	(MEDEVAC Units only) A Ready Room w/ Kitchenette NTE 3,500 NSF will be provided. Open sleeping area for NMT 9 individuals capable of partitioning into a 60-40 configuration for male and female crew members. Kitchenette provides limited food preparation and dining area. See *Guidance Section* below
Company Admin & Supply	1. (Aviation Line Companies) Provide NLT 2,800 NSF and NMT 5,200 NSF of Company Admin & Supply space per company assigned to ARB, Aslt Bn, Air Cav Sqdn, GSAB, or Sep Avn CO. 2. (ASB Hangar only) Provide a standard Company Operations Facility within 150 feet of the ASB hangar.
Readiness Module (Limited) (Aviation Line Companies only)	Provide a Readiness Module for Soldier equipment storage at 32 NSF per Soldier assigned to the aviation unit. Soldier equipment lockers shall use the same locker authorized for the Company Operations Facility Readiness Module when Soldier flight equipment is stored by the Aviation Life Support Equipment (ALSE) Shop.
Wash Apron (FCC 113 70)	1. Provide a wash apron for non-power on access sized to the largest aircraft supported by each hangar. 2. Provide NLT 80' W x 110' L for each hangar supporting CH-47 airframes and NMT 140'W x 100'D for each hangar (two UH-60) other than those with assigned CH-47. 3. Fixed Wing (manned) wash apron – TBD 4. Provide power, water, & compressed air service. 5. 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 (FCC 113 40)	1. Provide continuous concrete surface from parking apron to hangar door sized the hangar door opening and commensurate obstruction clearance from closest power-on activity. 2. When the hangar door does not have direct access to the parking apron or a circulation taxiway, a circulation pathway (non-power-on) will be provided with the most direct path to an operational taxiway or hover/taxilane NLT 65 feet wide.
Aircraft Parking Apron (FCC 113 20)	Aircraft Parking Aprons will be a contiguous concrete hardstand to include interior circulation hover/taxilanes and taxiways. Parking pad dimensions are

	All Rotary Wing Aircraft other than CH-47 – 100' L x 80' W CH-47 Aircraft – 150' L x 100' W Fixed Wing Aircraft – TBD Basis of allowance: – (All aviation battalion-size units and Separate Aviation Companies (EAC) other than ASB) 75% of assigned airframes for each type (general parking) – (All aviation battalion-size units and Separate Aviation Companies (EAC other than ASB) 15% of assigned airframes (maintenance operations checks) – (ASB only) NMT 14,000SY
Fire Suppression (FCC 211 10 & 211 15)	Aircraft hangars shall use a fire suppression design, UFC 3-600-01, which the Army will adapt NFPA 409. At no time will water systems be used as the primary suppression system without waiver approval. – Maximum protection of personnel (least risk to personnel within hangars during dispensing) – Maximum protection of airframes (least potential lost of airframes resulting from dispensing and cleanup) – Fastest return of airframes to operational/mission ready state after discharge – Minimal use of water (least use of water system (quantity and content) from dispensing through cleanup) – Least infrastructure/lifecycle sustainment requirements – Maximum protection of the facility (least replacement impact)
Power (FCC 211 10 & 211 15)	1. Primary service to all hangars shall be 480VAC, three-phase, with Y-ground.
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 Room. A Telecommunications Room (TR) shall be provided for the voice and data network. There shall be a minimum of one TR on each floor and one (1) per 10,000SF area, designed in accordance with the I3A Guide and ANSI/EIA/TIA-569-B. 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. 4. Fiber optic cabling shall be sized to support the common user systems and hangar critical systems. 5. All Computer Rooms are sized based on the building configuration and sized based on operational and security requirements as determined by the appropriate engineering and certification authority. 6. 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	Provide a SIPRNET room in accordance with the USAISEC Technical Provide a SIPRNET room in accordance with the USAISEC Technical Guide for the Integration of SIPRNET) and AR 380-5.
Energy Policy Act 2005 (EPACT 05) / Executive Order 13423 (E.O. 13423)	Facilities shall be designed in compliance with requirements for federal facilities IAW EPACT 05 and E.O. 13423.
Sustainable Design Development	Facilities shall be designed to meet current sustainable development and design policy requirements as established by the Department of the Army.
Accessibility	The Architectural Barriers Act, Americans with Disabilities Accessibility Guidelines (ADAAG) will be met.

GUIDANCE

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 Facility 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 formal 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 as the Modular Force transitions to the Future Force of the 2015 Army.

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 materiel domains and are adopted herein to simplify coordination and preclude misinterpretation when synchronizing requirements across the Army. They also provide definition for design flexibility and achievement of MILCON (Military Construction) Transformation 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:

1. Army Transformation depends on the capability to rapidly project forces from homestation. This places significant demands on installations and how functional and operational requirements are "packaged" to maximize maintaining, repairing, training, mission planning and rehearsal, deploying, and sustaining combat power capabilities. At the center of these functional and operational requirements is the Combat Aviation Brigade (CAB).

2. 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 a 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 landuse 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.

3. The HGR Complex represents a consolidation of up to twelve (12) facility types or functional/mission areas: hangar primary facility FCC 211 xx, Aircraft Component Maintenance Shop FCC 211 20 (ASB only), Aircraft Parts Storage Building FCC 211 13 (ASB only), AVIONICS Shop FCC 211 17 (ASB only), Hangar Access Apron FCC 113 40, Aircraft Wash

Apron FCC 113 70, Aircraft Parts Supply (FCC 211 10 & 211 13), Unit Flight Operations FCC 141 12, and Company Operations FCC 141 85 (aviation line companies only). Associated facilities to the Hangar are Rotary Wing Aircraft Parking Apron FCC 113 20, Hover / Taxilanes FCC 112 21, and Taxiways FCC 112 31. 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.

4. At the same time, technological insertions that will affect facility adequacy are pre-programmed at prescribed intervals. In order 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.

5. The HGR Army Standard simultaneously resolves past issues, current needs, and the capability to accommodate future requirements (e.g., such as support for the ARH, LUH, UH-60M, and CH-47F airframes). 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 as a brigade-centric, expeditionary Army.

6. Design criteria to support fixed wing aircraft and the Joint Heavy Lift Helicopter have been identified for follow-on development in order to support Aerial Exploitation Battalions and 2020 Army requirements respectively. However, projects in support of fixed wing aircraft or other than CAB(M) units will use this Army Standard before developing separate criteria. Deviations from this Army Standard or the companion Army Standard Design to support fixed wing aircraft or units not addressed herein are still subject to mandatory waiver procedures established under the Army Facilities Standardization Program.

7. The HGR Army Standard represents the first generation of standards to simultaneously address past issues, current needs, and future requirements. As such, there are instances where a band of acceptability *is allowed* in the application and implementation of these standards. However, 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. The baseline organization for this standard is the medium sized Combat Aviation Brigade (CAB) as the greater preponderance of Army Aviation Transformation fielding.

8. 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 or not aircraft are assigned to the company.

Specific MILCON Transformation Design Consideration:

- 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

- Pre-fabricated construction components and/or modular construction is encouraged as long as facility durability requirements are satisfied

Application Guidance.

1. 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.

2. 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 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 into 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 Damage (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.

3. Hangar Footprint. Hangars are configured in three (3)sizes for manned aircraft and one (1) for unmanned aircraft.

a. Interior space allocation modules for manned aircraft are provided in one of two sizes (AH/UH/OH and CH). Unmanned space allocation modules are provided in three sizes (Shadow, Fire Scout, and Warrior). Allocation modules are to be used in determining aircraft position and movement within the hangar and shall not be used to deviate from fixed hangar footprints specified by this Army Standard or the companion Army Standard Design without approved waiver.

b. For Security or Storage hangars who's primary purpose is to provide controlled access to aircraft with limited maintenance capability, a separate building will be provided. They do not require all of the features provided in HGR complexes since only daily maintenance and preventative inspections/checks are authorized. External parking for operational aircraft is limited to the capacity of the hangar. Therefore, security and storage hangars have low-bay

ceilings and no overhead lift capacity unless specifically justified and approved at the project level as a waiver to this Army Standard. All requests for waiver approval will be forwarded to the Functional Proponent for Aviation logistics, HQDA G-4(Avn) prior to implementation in design. Only approved waivers may be applied to any project.

4. Primary Facility Scope and Capacity (FCC 211 10). Structural Aircraft Maintenance Modules are combined with Admin Core Modules into five HGR sizes: Avn Bn, ASB, Separate Aviation Company (EAC), UAS (small), and UAS (large). Functional requirements and associated space allowances are based on the unit or units to be supported within the hangar. Consolidated hangars (more than one unit within a single hangar structure) should be limited to units with like type maintenance capabilities (e.g., unit versus sustainment). The maintenance level to be performed is determined by the inherent maintenance capability of the organization or activity.

a. Hangar Work Area or Hangar Floor. Overall aircraft dimensions to be supported, landing gear configuration or type, and number of main rotor blades or wing span determine which aircraft maintenance modules to apply. Hangar floor space is determined by multiplying the authorized number of aircraft maintenance spaces times the aircraft space module for each type of aircraft. Then the required aircraft modules and fire access space and a 5 foot wide perimeter safety corridor are added to the hangar floor work area.

b. Aircraft Maintenance Modules. Aircraft modules are provided by functional airframe categories (e.g., utility, attack, cargo, UAS (small), and UAS (Large)). The structural aircraft maintenance module represents repair bays sized by airframe category and associated safety areas or corridors. The aircraft maintenance module is optimized for Army two-level (2LM) maintenance and repair throughput. Contract teams may be required from either the nearest or supporting Sustainment Brigade or the National Maintenance Point/Center (National Maintenance Program – Corpus Christi Army Depot) to perform upper echelon maintenance and repair functions within the HGR. Typically, this is accomplished in the Aviation Support Battalion (ASB) facility. As such, lower throughput flow, and priority use of one repair bay with appropriate capabilities is authorized for higher echelon maintenance contact teams in the ASB HGR.

- All Separate Aviation Company (EAC) are provided with a minimum of one module for each airframe type assigned and up to 20% of the total number of assigned aircraft for each airframe type.
- All battalion-sized organizations (except the ASB) are provided 20% of the total number of assigned aircraft for each airframe type.
- In all cases, any fraction of a module allowance will be rounded to the next whole module. For example, 20% of 17 UH-60s = 3.4 or 4 utility helicopter modules.
- All ASB are provided 10% of the total number assigned aircraft to be supported for each airframe type.
- (Depot and Theater only) Security and Storage Hangars will be provided NMT 18,600 NSF of clear span floor area (155' W x 120' deep).
- Width of the module is determined by the base airframe for the category (e.g., UH-60 for all airframes other than CH-47) with blades at 90 degrees to aircraft centerline for rotary wing aircraft and by wingspan rounded to the next five (5) foot) increment. Ten (10) feet is then added to the width dimension for component removal, fire access and maintenance support equipment clearance in and around the maintenance work area.

- The length of the module is derived from the longest blade tip-to-blade tip (main and tail combined) or fuselage length plus 10 feet (as was calculated for the module width).
- The method of calculation for determining aircraft maintenance modules is provided for clarity and is not subject to modification or optimization.

c. Circulation Corridor or Access Lanes. The throughput for a repair bay is based on an aircraft occupying space for repair activities 4-hours or greater in duration. When a circulation corridor is used, it allows for ingress/egress to the HGR and movement to the structural aircraft maintenance module. When a corridor is used, doors are provided only for the circulation corridor. No individual repair bay doors are provided with a circulation corridor configuration.

- Aircraft circulation corridor and fire access lanes (when used within a hangar) shall be NLT 65 feet wide or when aircraft repair bays do not have direct access to hangar doors.
- Hangars with direct outside access for all bays are preferred so that circulation corridors are not required.
- In each case, proximity to operational (power-on) taxiways and the parking apron will dictate aircraft parking and circulation patterns for hover/taxilanes or taxiways thereby affecting hangar layout and orientation in relationship to the primary landing surface (e.g., runway).

d. Aircraft Separation. Blade tip separation from the other fixed objects, blades, or structures is 10 feet. While an aircraft is being towed designers shall consider aircraft rotors to be wind locked and clearance requirements from this position. Each aircraft maintenance module has a built-in separation of five (5) feet. This allows multiple modules to be placed side-by-side and eliminates the need for intermediate safety corridors thereby simplifying design. Exterior modules gain 10 foot separation in combination with the five (5) foot safety corridor along the perimeter of the hangar floor work area.

e. Extreme Weather Protection. The Aircraft Maintenance Module also provides a limited contingency for inclement weather protection (e.g., tornados, hurricanes, microburst, etc). For example, the rotary-wing module which supports multi-bladed aircraft (UH-60A) is based on the main rotor blade 90 degrees to the centerline. By turning the main rotor blade 45 degrees to centerline, approximately 40 to 50 percent (or more) of the assigned aircraft can be provided with temporary covered storage. In the case of a two-bladed aircraft, the space provided for auxiliary lift or component removal can be used in the same manner with an estimated storage capability of 50 to 65 percent (or more) of the assigned aircraft. These estimates assume that sufficient time will be available to manually maneuver aircraft into positions allowing for maximum coverage under the roof.

f. Units not assigned to a CAB complex shall be provided sustainment level maintenance and repair support as locally determined and implemented by agreement (e.g., installation DOL).

5. Admin Core Module Allowance (FCC 211 10 & 211 15). The Admin Core Module is the nucleus for allied shops, special shops, unit flight operations, company admin and supply (aviation line units only), production/quality control , Soldier Equipment storage (aviation line companies only), and additional missions such as Embedded Training, mission planning/rehearsal, and reach operations nodes.

Threshold: Space previously provided as a separate facility are now consolidated (e.g., shops, supply, arms storage) in the Admin Core Module for Aviation Line Companies.
Objective: 125% of FPS allowance is allowed when additional shop and/or administrative requirements are documented (e.g., Force Development Update for augmentation not contained or included in FPS calculations).

a. Admin Core Module. The Admin Core Module of the HGR is optimized for containerized mission systems such as the Authorized Stockage List Mobility System (ASLMS), Shelter Portable Airmobile (SPAM) (ASB Only), and Improved Flight Test Equipment/Enhanced Flight Test Equipment (IFTE/EFTE) vans (ASB Only), and Standardized Aviation Tool Set (A92) to expedite deployment timelines. The Admin core also provides space for multiple functions or tasks such as distributed training, pre-deployment preparation and staging, and for scheduled, repetitive New Equipment Training as Technology Spin-outs are fielded to units. Spatial and functional relationships between areas within the admin core are optimized to support maintenance and repair throughput. Deviation from adjacencies contained in the HGR Standard Design must be reviewed and concurred with by the AVN COS prior to implementation.

b. Flight Operations. Aviation units are required to conduct flight operations, flight planning, mission planning and rehearsal, aircraft services, flight dispatch, and aviation life support equipment service/repair/maintenance. This space is provided in the hangar admin core module. Normally, a separate aviation unit operations building will not be provided for CABs. However, some Separate Aviation Companies (EAC) may be stationed away from CABs or AAF with Airfield Operations and may consider a separate building for unit operations and Airfield Advisory Services under FCC 141 12. In such cases, the administration space requirements contained herein will apply.

c. Maintenance Administration. Maintenance admin functions include production control, quality control, records management, logistics and supply records, and training support. Space in the Admin Core Module is provided for these functions.

d. Associated Support Items of Equipment (ASIOE). Provide additional storage space for ASIOE. Maintenance platforms or stands, mobile cranes, shop vans and ground power units have a significant bearing on the external layout of HGR complexes and pavement design requirements. This equipment will be collocated at the HGR with appropriate security safeguards in lieu of parking in unit TEMFs. Adequate space to accommodate these requirements will be provided while ensuring that safety clearances are not violated.

e. Company Operations (Admin & Supply) (GSAB, ARB, Aslt Bn, and ACS). For aviation line companies in these battalion formations, company admin and supply along with Soldier equipment storage is provided in the Admin Core Module in lieu of providing a separate Company Operations Facility (COF). Allowances includes offices (CO, XO, 1SG), platoon office (NMT 572 NSF), conference/mission planning room (NMT 600 NSF), Distributed Training room (NMT 572 NSF), and NMT 650 NSF of consolidated storage (unit supply, communications, NBC, etc). Headquarters, Headquarters companies are consolidated together in a CAB UNICOF.

6. Maintenance and Repair Shops. Hangar shop space is provided in three categories; allied (common for all airframes), special (unique mission requirements), and other shop space

(functional tasks support required by code or regulatory requirements, or for efficiency of maintenance/repair operations). The allied shop space includes areas such as aircraft parts storage, repair areas, storage areas, flammable storage, technical shops, and unit (aircraft) TOE storage. Additional or special shop space may be required for specialized mission equipment repair and storage (such as, weapons and target acquisition equipment repair, medical equipment and supplies for MEDEVAC units, or special kit maintenance, repair of storage); or the additional requirements of a medium helicopter company, or a combination of all three. The same factors which determined the hangar bay module also affect hangar shop space allowances along with the number of engines and mission equipment packages (for example, medical, armament, and extended fuel tanks) associated with the aircraft to be supported.

7. Secure Storage: The secure storage contained within the Admin Core Module serves three separate requirements: Sensitive Secure Storage (weapons and ammo/munitions) for aircraft mounted systems, 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 a separate arms room when Aviation Line Companies are consolidated in the hangar. Non-sensitive secure storage of non-aircraft mounted systems is similarly provided in the Company Admin & Supply space separate from aircraft systems.

a. Secure storage for aircraft mounted systems in a HGR has a primary intended use for the storage of issue and turn-in of aircraft mounted weapons & equipment as primary subcomponents of the assigned vehicle.

b. Space allowances are based on weapon type (e.g., M240G, M230 Chain Gun), their targeting and acquisition systems, thermal weapons sights (TWS), and ancillary equipment as delineated by OTOE, MTOE, and/or TDA Augmentation.

c. Non-Sensitive Secure Storage for aviation night vision and other serial numbered or high cost equipment is provided at 300 NSF per HGR. Allowances in excess of 300 NSF for Non-Sensitive Secure Storage will be based on the projects physical security risk assessment by the local installation and review by the AVN COS. This space may be co-located but separate from Aviation Life Support Equipment (ALSE). However, the preferred spatial relationship for ALSE is immediately adjacent to Flight Operations given the close relationship and work flow between these two spaces.

d. The secondary purpose for secure storage space within the HGR is to provide temporary storage of equipment removed in order to perform repair.

8. Contractor Logistics Support (CLS) Allowance. Increased reliance on advanced and emerging technologies will require expansion of Army use of CLS.

Threshold: The CLS allowance for manned aircraft line battalions is NLT 400 NSF. The ASB Threshold is 1,200 NSF.

Objective: Army projections for fielding high tech systems like autonomous sensors, unmanned vehicles, etc, primarily fielded to CABs are expected to approach 1,200 NSF and

represents the NTE allowance for aviation CLS support for other than the ASB. The ASB is authorized NMT 2,200 NSF of CLS space without prior approval from the Functional Proponent.

a. Army equipment has already been and will continue to be fielded with CLS as a standard maintenance and repair philosophy. As such, CLS space allowances are provided in the HGR. Space allocation for the *Objective* requirement shall be based on FPS calculation.

b. Requests for additional space allocations will be reviewed by the AVN COS and approved by the Army Functional Proponent **before** incorporation into programming and design documentation.

9. Aircraft Parts Supply (Class IX (Air)). The application guidance herein addresses how Supply allowances will be incorporated into HGR projects. Supply and logistics space allowances are generally categorized along maintenance levels and should be provided either within the hangar structure or immediately adjacent to the hangar commensurate with the maintenance level to be performed. For example, Aircraft Parts Supply is provided in each HGR while Aircraft Parts Storage associated with ASB functions are also provided a separate building (Facility Category Code 211 13) consisting of 8,000 NSF enclosed, 4,000 NSF covered storage). The ASB allocation includes storage of shipping containers, and other materiel transportation, shipping, and/or handling requirements. The ASB storage area will also serve as the central locations for HAZMAT pharmacy storage and disposal for each CAB when commercial vendors are not utilized. When two or more units occupy a single facility or structure, each unit is authorized the corresponding supply and logistic space.

Threshold: Units **not** equipped with or **not** scheduled to receive ASLMS (Authorized Stockage List Mobility System) van, as determined by The Army Modernization Plan, shall use FPS allowances for Daily Supply.
Objective: CABs and other units equipped with or scheduled to receive ASLMS shall us the HGR Army Standard Design in conjunction with FPS calculations to determine total space allowance and special attributes (e.g., docks) needed.

a. Not all Army organizations will employ the containerized ASLMS. In other cases, materiel fielding and available assets continue to require use of legacy containerized vans. When legacy items are used, the provisions for ASLMS will continue to apply. When ASLMS is issued to a unit, special consideration for exterior accessibility, circulation area for rapid deployment preparation, and proximity to interior tool storage must be considered. ASLMS provides the primary workspace and space allocation trade-offs must be considered as compared to calculated space derived solely from FPS.

b. The AVN COS shall review any requests for increased space allocation for either the Threshold or Objective allowance stipulated herein.

When addressing containerized systems to be used on a daily basis in conjunction with the FCC 211 10 or 211 15 primary facilities, a secondary requirement for loading docks must be considered. However, the Army fielding of dedicated containerized systems with dedicated transporters is not complete. At the time of design, a decision on whether to provide loading docks must be made. In all cases when daily use is identified, provisions for these vans to abut the primary HGR shall be made as follows:

Threshold: Units **not** equipped with or **not** scheduled to receive ASLMS (Authorized Stockage List Mobility System) van, as determined by The Army Modernization Plan, shall provide at grade access to vans. Power and communications are optional but allowed.
Objective: All units equipped with or scheduled to receive ASLMS shall provide loading docks with power and communications connectivity.

10. Aircraft Mobile Shop Allowance (ASB Only). The application guidance herein addresses how Aircraft Mobile Shop allowances will be incorporated into HGR projects.

Threshold: Units **not** issued equipped with or **not** scheduled to receive SPAMs (Shelter Portable Airmobile) or IFTE/EETF (Improved Flight Test Equipment/Enhanced Electronic Test Facility) vans, as determined by The Army Modernization Plan, shall be limited to space allowances for Allied and Special Shops as calculated by FPS.
Objective: CABs and other units equipped with or scheduled to receive SPAMs, IFTEs, and/or EETFs shall use the HGR Army Standard Design in conjunction with FPS calculations to determine total space allowance and special attributes (e.g., docks) needed.

a. Not all Army organizations will employ the SPAM, IFTE, or EETF vans. When SPAM, IFTE, or EETF vans are issued to a unit, special consideration for exterior accessibility, circulation area for rapid deployment preparation, and proximity to interior tool storage must be considered. SPAMs, IFTEs/EFTEs provide adjunct workspace and space allocation is additive to Allied and Special Shop allowances described herein.

b. The AVN COS shall review any requests for increased space allocation for either the Threshold or Objective allowance stipulated herein.

c. As was the case for Aircraft Parts Supply above, when containerized systems are to be used on a daily basis in conjunction with the FCC 211 10 or 211 15 primary facility, consideration of loading docks applies.

11. Ready Room (MEDEVAC units only). A Ready Room consists of three components: a dispatch and flight following office, shift crew sleeping area, and a small kitchenette to facilitate 24 x 7 operations. The dispatch and flight following office houses a flight planning table, dispatcher's desk, and radio equipment to monitor air ambulance flight operations. The open bay sleeping area for NMT 8 individuals capable of partitioning into a 60-40 configuration for male and female crew members. The kitchenette provides limited food preparation (e.g., range top, microwave, refrigerator, sink, dishwasher, and cabinetry) and dining area for NMT 9 persons.

12. Unmanned Aircraft Systems (UAS) Maintenance/Storage. The smaller class UAS are co-located with the parent brigade organization closer to the training complex thereby maximizing "on-station" time for training productivity.

Threshold: At a minimum, all Class I (manpack) and Class II (generally, 12' wing span/rotor disk or smaller) assigned to BCTs shall be stored and maintained with the TEMF unit with immediate proximity or direct access to the training area will include the capability to launch and recover UAS from the tank trail or range road whenever landuse and obstruction clearances allow.

Objective: For CABs or other aviation units, UAS maintenance and storage is provided as a component of a HGR complex on an AAF/AHP.

a. The Army will field four classes of UAS. UAS operated and maintained at the HGR are considered small and light enough to eliminate the need for some considerations normally afforded manned aircraft.

b. Larger class UAS (Class III & IV) require obstruction clearances similar to manned aircraft and are located at Army Airfields/Heliports.

13. Aircraft Wash Apron (FCC 113 70). The Aircraft Wash Apron is a rigid pavement area for aircraft washing and cleaning as a function of or in preparation for conducting maintenance and repair activities. At no time will the capacity for aircraft washing and cleaning serve as a substitute for use of an Aircraft Rinse Facility. The requirement for an Aircraft Rinse Facility is **not** adjunct to or a component of a Hangar. At no time will this capability serve as a substitute for an Aircraft Rinse Facility whose primary mission is to support aircraft returning from deployments, operations, and/or exercises. The Wash Apron is located immediately adjacent to the 211 10 primary facility in order to maximize compressed air, water, and electrical service connections. A wash apron includes the prepared surface, stabilized shoulders, lighting and lateral clear zones. Separate Aviation Company (EAC) use a 70 feet wide by 74 feet deep apron. No wash apron is provided for Security and Storage hangars. Environmental considerations in accordance with environmental law must be provided for detergent and oil particulate waste by-products IAW AR 200-1 and AR 200-2. The apron shall be designed to ensure waste water collection is contained (except spray) and centrally distributed to an oil-water separator before entering any storm water system.

14. Hangar Access Apron (FCC 113 40). 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/taxilane. 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. When using an individual access design, the hangar access apron normally abuts the mass parking apron and its associated hover/taxilane. 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/taxilane. The minimum length of the circulation pathway is based on obstruction clearance dimensions.

15. Aircraft Parking Apron (FCC 112 10 & 112 20). The aircraft parking area is normally a unit support function and is divided into two major types of parking aprons, fixed and rotary. A modular approach should be utilized for determining the scope of this area which is comprised of parking pads, and hover/taxilanes. 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, as discussed in Chapter 6 of UFC 3-260-01.

a. Rotary Wing Pads. Individual parking modules for rotary-wing aircraft are based on the type of aircraft. The module size for all rotary-wing aircraft except the CH-47 is 100 ft long by 80 ft wide. The module size for the CH-47 aircraft is 150 ft long by 100 ft wide.

b. Parking Arrangement. Rotary-wing aircraft are parked in a single lane perpendicular to the hover/taxilane.

c. Hover/Taxilanes. Taxilane widths for interior hover/taxilane widths for rotary-wing aircraft will be 120 feet for all aircraft. Peripheral hover/taxilane widths will be 85 feet for all aircraft. All the parameters of aircraft performance (e.g., propwash, landing gear type and configuration, ground handling speeds) and the associated safety clearances determine the width of the hover/taxilanes. The depth of the hover/taxilanes is dependent on the depth of the parking apron relative to the landing surface. Additionally, a hover/ taxilane should be provided on the exterior sides of the parking apron for unobstructed movement of aircraft, whenever feasible.

d. 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. Moored parking spaces will be provided for 75 percent of each authorized aircraft by type. The combined total of apron parking space and hangar parking space (15% of each assigned aircraft type for Maintenance Operational Checks) provides parking for all mission ready aircraft based on the projected Operational Ready status of each airframe type. Additional parking spaces with mooring points may be added as necessary to ensure wind protection for all aircraft. The location of these additional mooring points can be on pavements other than parking aprons. Each rotary-wing aircraft parking space will have six mooring points spaced in a rectangular configuration. Additional discussion on mooring points is found in Attachment 12 in UFC 3-260-01.

16. 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 as indicated on the facility drawings for future use.

17. 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 (ADN) 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: Use the latest editions of the following criteria:

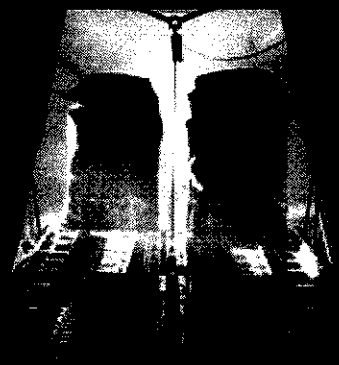
- American with Disabilities Act Accessibility Guidelines (ADAAG)
- IBC – International building code
- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 101 Life Safety Code
- NFPA 409 Standard on Aircraft Hangars
- Support facility Annex #95, Tactical Unmanned Air Vehicle
- Uniform Federal Accessibility Standards (UFAS) Federal Standard 795
- Energy Policy Act 2005 (EPACT05)
- Executive Order 13423 (E.O. 13424), Strengthening Federal Environmental Energy and Transportation Management
- Army SDD LEED NC Silver Policy
- 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 (Sensitive and Nonsensitive)
- 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 415-15, Army Military Construction Program Development and Execution
- AR 420-1, Army Military Construction Program Development and Execution
- AR 420-90, Fire Prevention and Protection
- 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 4-214-02, Standard Definitive Design for Tactical Equipment Maintenance 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)

Aviation Hangar Complex

Date 6 November 2013

CW5 Patrick Francis

COL Brian J Tempest
Readiness Director, G4
Headquarters, Department of the Army



Facility Design Team (FDT)

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  ACSIM (Co-Chair)
- Ms. Linda Tuttle
  ACSIM (RPLANS)
- Mr. Thomas Habitzreuther
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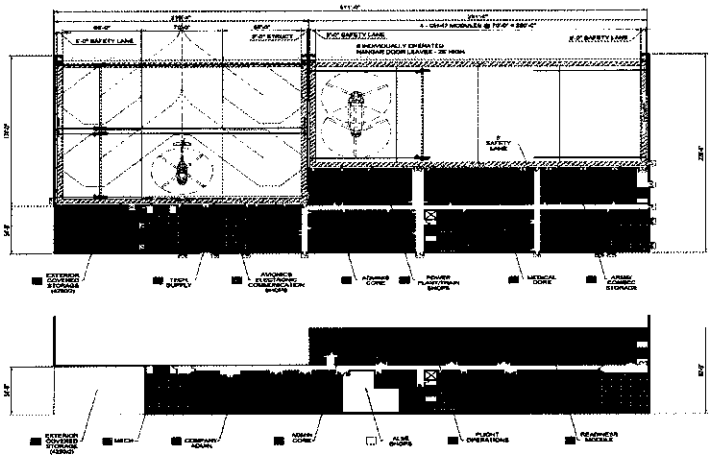
- Mr. Richard Ladzinski
  HQ IMCOM
- Mr. Don Smith, Mr. Zachary Weber, Ms. Kathy Prochnow
  COS
- FT Rucker
- PEO-AV
- FT Eustis

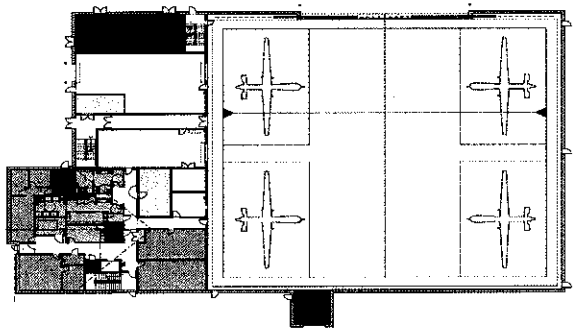
RECAP

- On 18 Apr 13 the Aviation Facility Design Team (FDT) briefed the Aviation Complex to the Facility Design Group (FDG) which the FDG approved. Highlights of the brief included: hangar size reduction due to the aircraft maintenance module ratio analysis, cost savings resulting from the maintenance overhead lift requirement analysis, and the need for additional aircraft hangar CATCODES.
  - The Army Standard requirement to provide 35-Ton overhead lift capacity in the Cargo Aircraft maintenance module was reduced to a 10-Ton overhead lift capacity. Cost savings of ~$250K in structure construction and ~$110K on initial cost per crane were estimated. This cost savings applies to both the GSAB and ASB Hangars.
  - Reduction in size of the Unmanned Aircraft Systems (UAS) hangar from 134,400 sq ft to 52,100 sq ft with an initial cost savings of $13.99M per hangar.

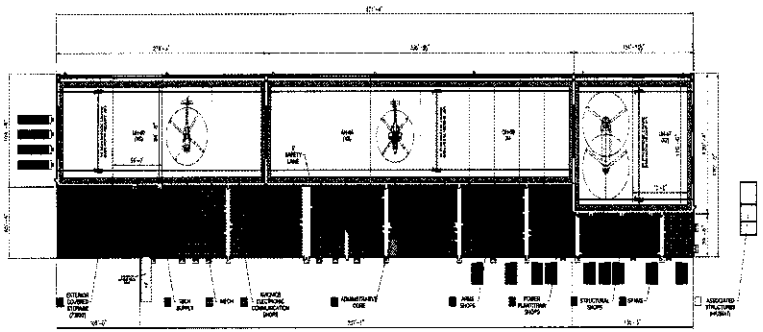
Hangar Types



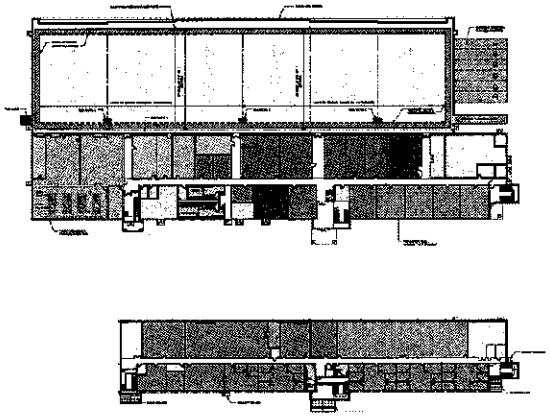
GSAB



UAS



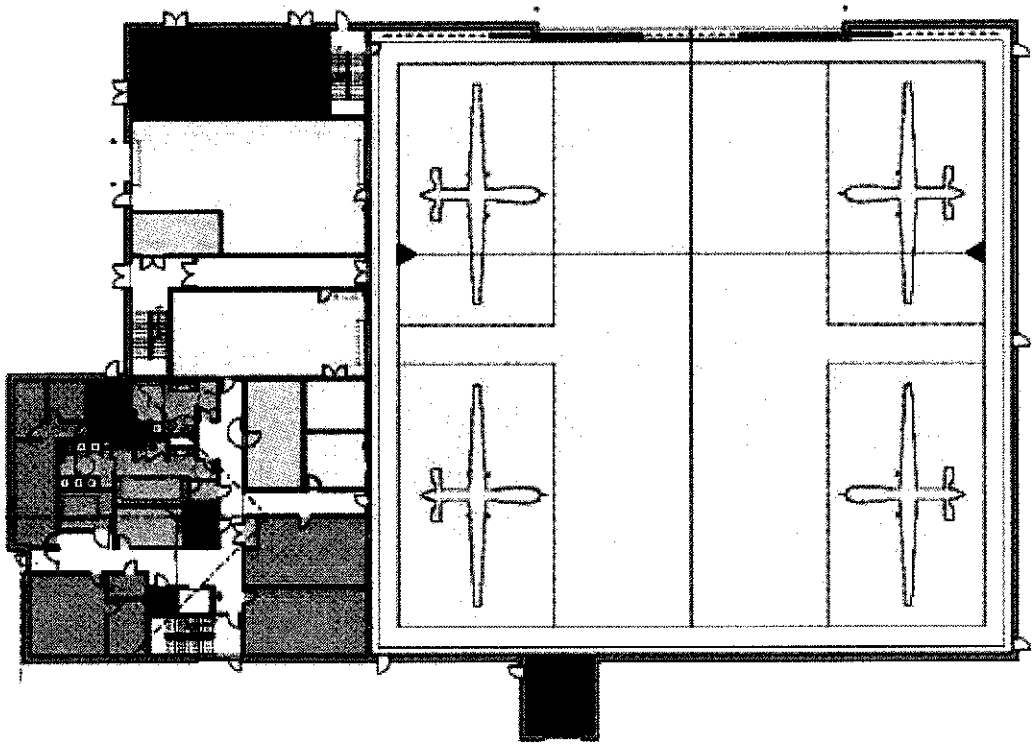
ASB



AAC

UNMANNED Aircraft SYSTEM

PROPOSED UAS MAINTENANCE HANGAR



UNMANNED AIRCRAFT SYSTEM HANGAR

Requirements:

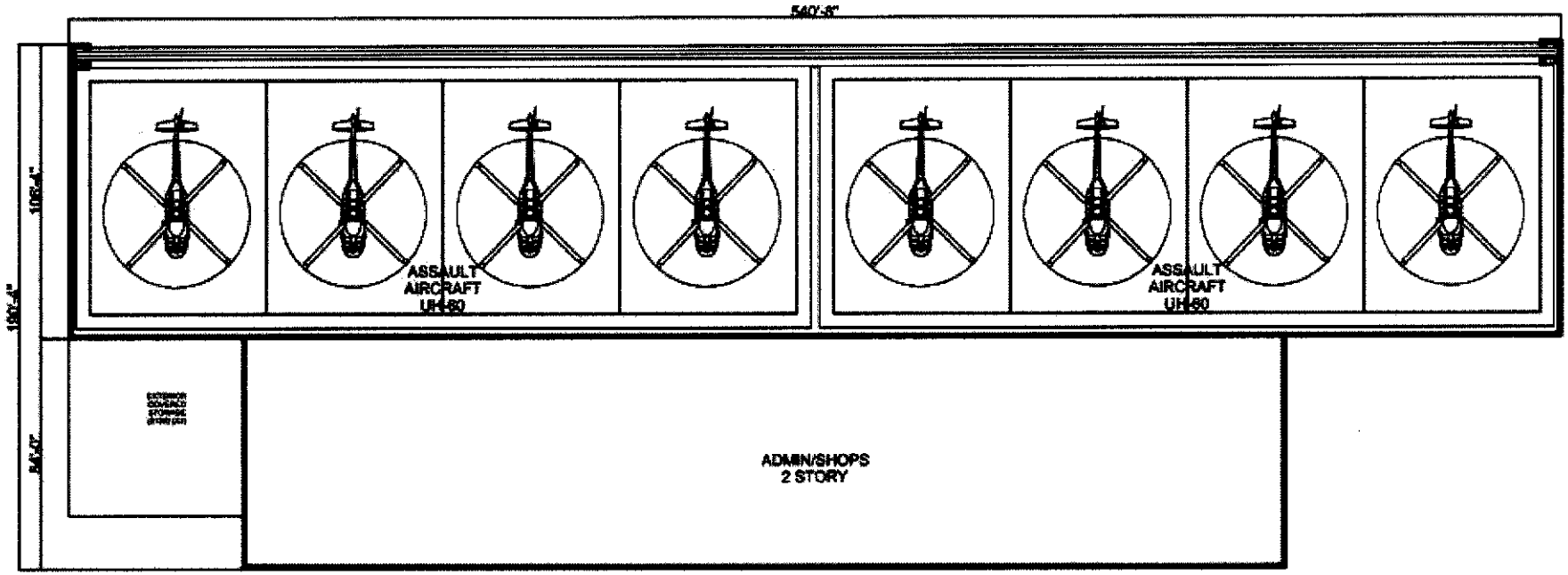
- TOE Personnel - 128
- Assigned TOE Equipment – 9 Gray Eagle Aircraft
- Aircraft Hangar Bay: 4 Gray Eagle modules
- Aircraft Storage Building: Space for 9 Aircraft Storage Containers
- Gray Eagle Site Equipment Support: Ground Control Stations, Data Terminals, Take-Off and Landing Equipment
- Two Story Admin Core: Allied Shop, Tool Storage Aircraft Maintenance Offices, Contractor Support Offices, Common Company Spaces, Company Operations Offices and Storage, Flight Operations & Planning Space
- Lifting Capacity: 1 -5Ton Bridge
- Army Standard: NTE 134,400 NSF

Standard Design: NMT 52,100 GSF

- Aircraft Hangar Bay, Allied Shop & Storage - 29,598 SF
- Aircraft Maintenance & Contractor Support Offices - 2,200 SF
- Common Areas: Break Room, Restrooms, Utilities - 3,700SF
- Common Company Space: Briefing, Training and Conference Room - 1,840 SF
- Company Operations Areas: Unit Storage, Arms Vault, Commanders/First Sergeant/XO Suite, TA Gear Storage - 5,200 SF
- Flight Operations, Planning Space & Simulator - 1,800 SF

ATTACK/ASSAULT/CAVALRY (AAC) MAINTENANCE HANGAR

PROPOSED ASSAULT STANDARD DESIGN MAINTENANCE HANGAR



ASSAULT HANGAR Requirements:
TOE Personnel: 221
TOE Equipment: Based on Combat Aviation Brigade Type:
Assault Aircraft: 30 UH-6 Blackhawk

•HANGAR BAYS REQUIRED (25%) = 8* UH-60 BAYS (84'X64')
*(7.5 BAYS REQUIRED ROUNDED UP TO 8)

•Allied Shops: Electronics, Power Train, Power Plant, Structural, Pneudraulics, with incorporated Flight Operations/COF
•Other: Contractor Logistic Support (CLS), Logistic Assistant Representatives (LARS), Tech Supply, Special Tools Storage, Secure Storage

Lifting Capacity – 2 10-Ton Bridge Cranes

CURRENT ATTACK/ASSAULT/CAVALRY STANDARD DESIGN SOLUTION

AAC HANGAR	132,991	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
TOTAL	135,931	GSF

ALTERNATE ASSAULT STANDARD DESIGN SOLUTION

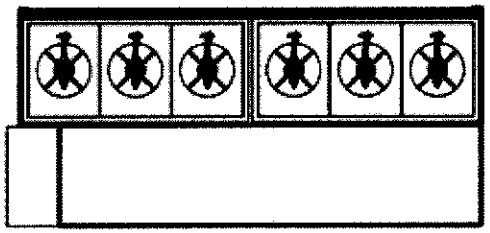
AAC HANGAR	121,052	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
TOTAL	122,192	GSF

ANALYSIS:
10% DECREASE IN BUILDING FOOTRPINT/COST
LENGTH INCREASE FROM 436' to 540-8" (104'-8" LONGER)

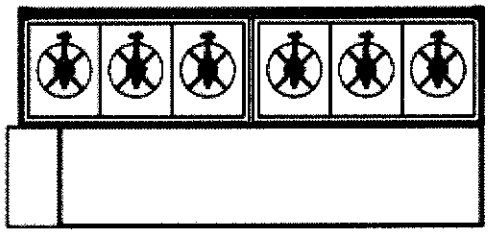
ATTACK/ASSAULT/CAVALRY (AAC) MAINTENANCE HANGAR

SUMMARY OF AAC

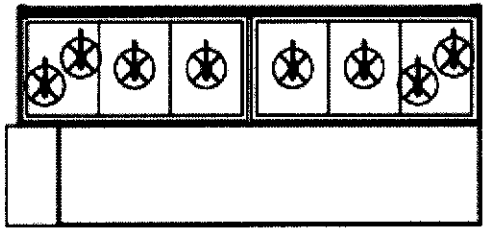
ASSAULT HANGAR



ATTACK HANGAR



CAVALRY HANGAR



PROPOSED

1 ASSAULT (2) + 2 ATTACK/CAVALRY
110,470 GSF+ (2X) 113,470 GSF = 337,410 GSF

RESULTANT:

72,498 GSF (19.5%) REDUCTION VS CURRENT STANDARD LAYOUT
100' SHORTER THAN CURRENT STANDARD DESIGN
$16,700,000 SAVINGS

CATCODE/ RPLANS

- Real Property Inventory (RPI) must be adjusted to accommodate for different hangar types instead of its current depiction.

  Aviation Unit Maintenance (AVUM 21110), Aviation Intermediate Maintenance (AVIM 21112), depot (21150)

- The different hangar types should be accounted for as follows;

  Aviation Support Battalion (ASB)

  General Support Aviation Battalion (GSAB)

  Attack Reconnaissance Battalion (ARB)

  Assault Battalion

  Cavalry Squadron

  UAS (Already has a separate CATCODE assigned)

  Fixed Wing

- National Guard aviation maintenance facility has CATCODE assigned indentifying hangar type and function.

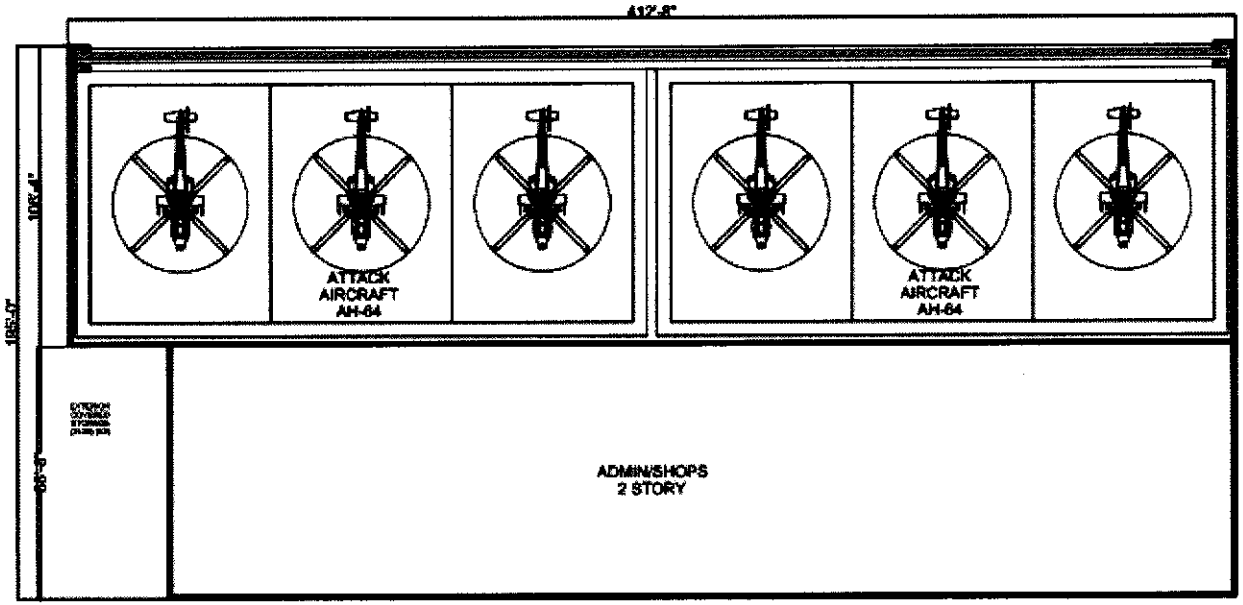
Questions and/or Guidance

FIRE SUPPRESSION

- The Army Standard references UFC 3-600-01, Design: Fire Protection Engineering for Facilities
- UFC 3-600-01 requires that general-purpose maintenance hangars "passive fire protection and life safety requirements must comply with NFPA 101 and NFPA 409, Standard on Aircraft Hangars."
- The Army currently has no other specific guidance for fire protection systems for UAS or rotary-wing maintenance hangars.
- The new CAB hangars construction at Fort Carson were granted a waiver by USACEHQ to design the fire protection systems in accordance with Air Force ETL 02-15. The FY14 AAC Hangar at JBLM and the FY12 UAS Hangar at Fort Riley were also included in the waiver to use ETL 02-15.
- The FY14 UAS Hangar at Fort Bliss is using AF ETL 02-15.
- No Army Hangars in design are following Navy Fire Protection guidance.

ATTACK/ASSAULT/CAVALRY (AAC) MAINTENANCE HANGAR

PROPOSED ATTACK/CAVALRY STANDARD DESIGN MAINTENANCE HANGAR



ATTACK HANGAR Requirements:
TOE Personnel: 221
TOE Equipment: Attack Aircraft: 24 AH-64 Apache

•HANGAR BAYS REQUIRED (25%) = 6 UH-60 BAYS (84'X64')

•Allied Shops: Electronics, Power Train, Power Plant, Structural, Pneudraulics, with incorporated Flight Operations/COF
•Special Shops: Armament Shops
•Other: Contractor Logistic Support (CLS), Logistic Assistant Representatives (LARS), Tech Supply, Special Tools Storage, Secure Storage

Lifting Capacity– 2 10-Ton Bridge Cranes

CURRENT ATTACK/ASSAULT/CAVALRY STANDARD DESIGN SOLUTION

AAC HANGAR	132,991	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
Total	135,931	GSF

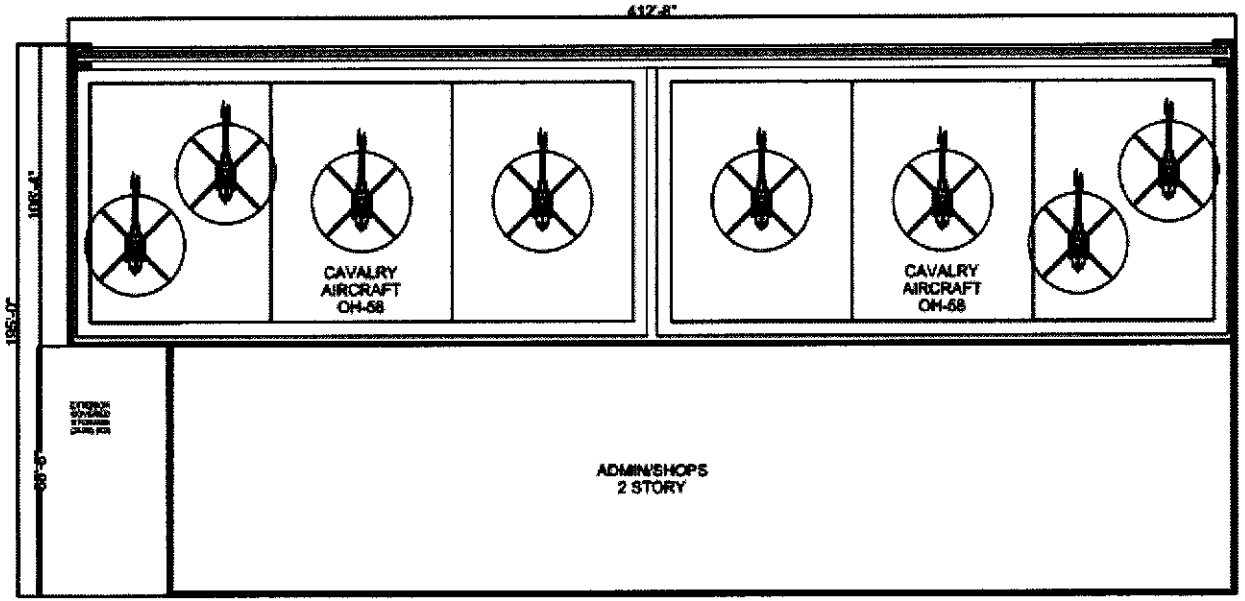
ALTERNATE ASSAULT STANDARD DESIGN SOLUTION

AAC HANGAR	109,294	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
Total	112,234	GSF

ANALYSIS:
17.5% DECREASE IN BUILDING FOOTRPINT/COST
LENGTH DCCREASE FROM 436' to 412-8" (23'-4" Shorter)

ATTACK/ASSAULT/CAVALRY (AAC) MAINTENANCE HANGAR

PROPOSED AAC STANDARD DESIGN MAINTENANCE HANGAR



ATTACK HANGAR Requirements:
TOE Personnel: 221
TOE Equipment: Cavalry Aircraft: 30 OH-58 Kiowa

•HANGAR BAYS REQUIRED (25%) = 4* UH-60 BAYS (84'X64')
•7.5 rounded up to 8 – 2 OH-58 aircraft permitted per 1 UH-60 Bay

•Allied Shops: Electronics, Power Train, Power Plant, Structural, Pneudraulics, with incorporated Flight Operations/COF
•Special Shops: Armament Shops
•Other: Contractor Logistic Support (CLS), Logistic Assistant Representatives (LARS), Tech Supply, Special Tools Storage, Secure Storage

Lifting Capacity– 2 10-Ton Bridge Cranes

CURRENT ATTACK/ASSAULT/CAVALRY STANDARD DESIGN SOLUTION

AAC HANGAR	132,991	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
Total	135,931	GSF

ALTERNATE ASSAULT STANDARD DESIGN SOLUTION

AAC HANGAR	109,294	GSF
AAC HGR EXT. COVERED STORAGE	4,000/2	GSF
AAC HGR ASSOCIATED BLDG	940	GSF
Total	112,234	GSF

ANALYSIS:
17.5% DECREASE IN BUILDING FOOTRPINT/COST
LENGTH INCREASE FROM 436' to 412-8'(23'-4" Shorter)