DEPARTMENT OF THE ARMY
DEPUTY CHIEF OF STAFF, G-9
600 ARMY PENTAGON
WASHINGTON, DC 20310-0600

DAIN-ZA (420-1nn1)

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Army Standard for Aviation Maintenance Hangar Complex, Tactical Unmanned Aircraft System Aviation Units

1. The enclosed Army Standard (hereinafter 'standard') for the Aviation Maintenance Hangar Complex, Tactical Unmanned Aircraft System Aviation Units is hereby approved for implementation. The Army Standard applies to Active Component facilities for Tactical Unmanned Aircraft System aviation units on Army Installations. Waivers from the standard can only be approved by the DCS, G-9.

2. The standard is mandatory for Military Construction (MILCON) Army projects in the FY25 program and beyond. USACE Center of Standardization will develop and maintain Standard Designs consistent with this standard and MILCON business processes. This standard also applies to the maximum extent practical to projects that fall under authority of repair of facilities, United States code, Title 10, section 2811.

3. Installation Status Report-Infrastructure quality and functionality assessments 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 Maintenance Hangar Facility Design Team members are CW5 Scott Bostic, DCS, G-4, DALO-MPV, scott.j.bostic.mil@army.mil; LTC Charlton J. Mosley, DCS, G-9, DAIN-ODR, charlton.j.mosley.mil@army.mil and Ms. Susan Nachtigall, USACE/Combat Readiness Support Team, CEMP-CI, susan.d.nachtigall@usace.army.mil. The USACE Center of Standardization FDT Representative is Mr. Daniel Bush, CESAM, daniel.e.bush@usace.army.mil.

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Encl

JASON T. EVANS
Lieutenant General, GS
Deputy Chief of Staff, G-9

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Army Standard for Aviation Maintenance Hangar Complex: Tactical Unmanned Aircraft System (TUAS) Unmanned Aircraft (UA) Maintenance Hangar

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 Tactical Unmanned Aircraft System (TUAS) Unmanned Aircraft (UA) Maintenance Hangar is part of the overall Airfield Complex, not all portions of the airfield are covered under this standard. The four individual standards identified below collectively address the scope of the rescinded 2013 Aircraft Maintenance Hangar Complex standard.

Applicability:

- 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 Maintenance Hangar Army Standard** applies to the planning, design, and construction of aviation maintenance facilities for organizations or portions of organizations that operate manned and unmanned Fixed Wing aircraft. The **TDA Rotary Wing Aviation Maintenance Army Standard** applies to Active Army TDA organizations operating and/or maintaining Rotary Wing manned aircraft. The **TOE Rotary Wing Aviation Maintenance Hangar Army Standard** applies to TOE manned Rotary Wing aviation units. The **Tactical Unmanned Aircraft System (TUAS) Unmanned Aircraft (UA) Maintenance Hangar Army Standard** applies to the planning, design, and construction of aviation maintenance facilities for Active Army Group 3 TUAV's. Group 3 TUAV's are defined by the Department of Defense (DoD) as having a nominal operating altitude <18,000 feet, a maximum weight <1,320 pounds, and a maximum speed of <250 knots. They are operated by soldiers in a Military Occupational Specialty specifically designating them as UAV operators. Currently, the RQ-7 Shadow is the Army's only aircraft operationally fielded in this category. Unmanned fixed wing aircraft roughly the size of manned aircraft (e.g., the Gray Eagle) are not covered by this Standard; they are covered within the Fixed Wing Standard.
- TUAV's in DoD Group 1, such as Raven, and operated by infantry, armor / cavalry, Special Forces, or Artillery soldiers rather than by soldiers in a designated UAV specialty, are not included in this standard and are assumed to be stored and maintained in some combination of organizational storage, company operations facility, and tactical equipment maintenance facilities.

- This Standard does not apply to Reserve Component TUAV maintenance facilities. Instead, planning criteria are governed by the current versions of NG PAM 415-12 and AR 140-483 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 Ranger Regiment and Special Forces Groups are controlled and approved by the Headquarters, Army Special Operations Command, and the command's Deputy Chief of Staff – Engineering.
- While criteria in this Army Standard (architectural and planning) may inform facility decisions within Army Test and Evaluation Command (ATEC), plans for facilities supporting ATEC are approved by the ATEC Headquarters and their associated G-4.
- 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 in accordance with the AR 420-1. As the proponent, DCS G4 must validate and approve the request.
- 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 waivers approved by Headquarters, Department of the Army (HQDA) shall be documented in installation master plans and, as applicable, must serve as the installation's modified standards for the facility type and unit 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 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 contained herein will meet the Army's mandatory requirements set forth by this standard.

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 / Criteria. 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.

Item	Mandatory Criteria
Site Selection & Planning	1. Aircraft maintenance bays of TUAS UA maintenance hangars shall be sited with direct access to a suitable UAV runway without physical penetration of controlled airspace or obstruction clearances. The facility should be in controlled airspace. 2. Taxilanes will be provided with direct access from the hangar access apron to the UAV runway, to allow power-on operations. 3. Layout of TUAS UA maintenance hangars, hangar access aprons, towways, and TUAS UA runways will be planned in accordance with ETL 1110-3-510, either the version dated 31 May 2013 or some approved successor of that criteria. Operations of TUAS UA's will be deconflicted with operations of large UA's and manned aircraft. *See Guidance Section below*
Hangar Functions and Types	1. TUAS UA maintenance hangars (facility Category Code or CC 21115) are composed of a variety of functional areas including UA storage and maintenance bays, shop space with maintenance administration area, limited parts storage for aircraft repair parts and associated aircraft equipment, and unit operations with flight ops, flight planning, and briefing areas. Since these functional areas are very small compared to conventional aircraft, the parts of the facility do not correspond to facility category codes such as CC 21113 for parts storage. 2. TUAS UA maintenance is handled as two levels, either organic within the TUAS platoon, or through evacuation from Army facilities to the system manufacturer. Manufacturer field service representatives may also come to the platoon hangar to repair aircraft and components. A single TUAS UA maintenance hangar will be allowed for every parent Unit Identification Code (UIC), i.e., a UIC ending in -AA.

	3. Single TUAS platoons currently occur in the Engineer Battalion of the Brigade Combat Team, the Ranger Regiment's Special Troops Battalion, and the Group Support Battalion within Special Forces Groups. Since each of these units is a parent UIC, each of the single TUAS platoons within each of these types of units will be allowed a stand-alone platoon sized TUAV hangar. Multiple platoon-sized facilities should be collocated and adjoined when appropriate, ensuring appropriate separation between unit spaces for physical security. 4. Air Attack / Reconnaissance Squadrons also have three organic TUAS platoons, one to each of the three Attack Reconnaissance line troops. Being a parent organization with a -AA UIC, an Air Reconnaissance Squadron will be allowed a 3-platoon TUAS UA maintenance hangar. 5. Maintenance facilities for rotary wing aircraft assigned to TOE organizations, for rotary wing aircraft assigned to TDA organizations, and for fixed wing aircraft, are covered under separate standards. Note that the TUAS UA maintenance hangar for an Attack / Reconnaissance Squadron will be in addition to a TOE Rotary Wing Hangar for the manned aircraft assigned to the squadron. *See Guidance Section below*
Primary Facility Scope and Capacity	1. A 3-platoon TUAS UA maintenance hangar, without TA-50 storage, will be allowed 25,949 GSF. A 1-platoon TUAS UA maintenance hangar, without TA-50 storage, will be allowed 15,825 GSF. The standard also describes a two-platoon version if there is a decision to construct such a facility, e.g., combining two platoons into a single facility at a base with two BCT's. This is 20,886 GSF, without TA-50 storage. 2. Allowances for hangars are a function of the sum of the allowances for TUAS UA maintenance hangar bays, shop areas, flight operations and pilot work areas, and a Net-to-Gross adjustment. 3. GSF (Gross Square Feet) Deviation: Facility constructed Gross Area shall not exceed 105% of space allocation set forth in this document to accommodate site, construction, or environmental factors. *See Guidance Section below*

Maintenance Operations -- TUAV Maintenance Bays	1. Platoons under this standard are provided space to store assembled and flight ready TUAS UA's. 2. A 3-platoon hangar is allowed 10,223 NSF of maintenance bays, a 2-platoon hangar is allowed 7,053 NSF, and a 1-platoon hangar is allowed 3,880 NSF. 3. Provide power, compressed air, and data connectivity within the bays. *See Guidance Section below*
Overhead Lift in Aircraft Maintenance Bay Modules	1. There is no requirement for overhead lift to be built inside the building. Units may invest in floor mounted lifting equipment. 2. Platoons do not have any maintenance tasks on the overall Tactical Unmanned Aerial System or TUAS (ground stations, generators, shelters, etc.) that require removing vehicle mounted shelters from vehicles. Many maintenance tasks for TUAS are accomplished within the CC 21410 Vehicle Maintenance Shop of the unit to which the TUAS Platoon is assigned.
Maintenance Ops -- Shops	1. This space accommodates shop administration functions for the TUAS platoons, as well as space for the field service representatives of the manufacturer. It also provides maintenance support space for storage of small tools and secure storage 2. A 3-platoon hangar is allowed 926 NSF of shop administration, a 2-platoon hangar is allowed 676 NSF, and a 1-platoon hangar is allowed 426 NSF. *See Guidance Section below*
Aviation Unit Ops -- Flight Ops & Pilot Work Areas	1. This area provides office space for platoon leaders, platoon sergeants, flight safety and standardization personnel, and workspace for pilots planning missions in the platoon area. It also includes a briefing room, a separate training room (with storage), a simulator room separate from the training room, a flight operations room, and a flight planning room separate from the pilot work rooms in the platoon areas. 2. A 3-platoon hangar is allowed 5,160 NSF, a 2-platoon hangar is allowed 4,199 NSF, and a 1-platoon hangar is allowed 3,238 NSF.

	See Guidance Section below
Aviation Unit Ops - TA-50 Storage	1. TUAS Platoons are organic to other companies -- either line flight troops in Aviation Attack / Reconnaissance Squadrons, or Military Intelligence Companies in Brigade Combat Teams, Special Forces Groups, and the Ranger Regiment. 2. Since TUAS Platoons are organic to these other companies, they drive Readiness Module space (including TA-50 storage, supply room, arms room, CBR defense equipment room, communications room) within their company's Company Operations Facility. 3. If, for some reason, the TUAS Platoon's need for TA-50 storage has not been included in the requirement for the platoon's company, they need a 2,071 NSF TA-50 storage room plus 320 SF Net-to-Gross adjustment for a total of 2,390 GSF for three platoons. For two platoons, it is 1,355 NSF plus 209 SF Net-to-Gross adjustment for a total of 1,554 GSF. For one platoon, it is 957 NSF plus 148 Net-to-Gross adjustment for a total of 1,105 GSF. Note that the TUAS Platoon does not have 92Y personnel assigned to run an arms room or a supply room, nor 74D personnel to run a Chemical Biological Radiological defense room. This is an optional space that can be added to a requirement with the approval of the higher headquarters with a corresponding decrement of the Readiness Module in the CC 14185 COF. If the parent company is accommodated within CC 14112 Aviation Unit Operations or CC 21110 Aircraft Maintenance Hangar, no decrement is necessary. *See Guidance Section below*
Fire Suppression	1. TUAS UA maintenance hangars shall use a fire suppression design IAW UFC 3-600-01, which the Army adapted from NFPA 409. It will also meet the requirements of UFC 4-211-01 for fire suppression. 2. This UFC draws a distinction on firefighting requirements based on the total quantity of fuel that will be found in equipment housed inside the facility. Note that the Shadow only holds about 9.7 gallons, so 12 Shadows are well below the 240-gallon limit putting the TUAS UA hangar in the same category as a hangar for manned aircraft. Access from the TUAS UA hangar to a runway for manned aircraft may still cause the need to design fire safety for the facility along the lines of a hangar for manned aircraft. For Army, there are additional fire

	protection considerations based on SF in UFC 3-600-01 para 4-3.4.8. (7,500 sf) 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	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.
Recapitulation of Net and Gross Square Feet of Building	1. Net - to - Gross adjustment for the building includes circulation, vestibules, printer room, SIPR Net room, TER room, recycle area, latrines, shower and locker area, break room, mother's room, mechanical room, boiler room, electrical room, fire suppression equipment room, air compressor room, and structural and miscellaneous spaces. 2. A 3-platoon facility gets a Net-to-Gross adjustment of 9,373 SF. A 2-platoon facility gets a Net-to-Gross adjustment of 8,696 SF. A 1-platoon facility gets a Net-to-Gross adjustment of 8,019 SF. Keep in mind that adding the optional TA-50 storage room also added an additional 320 SF of Net-to-Gross adjustment. *See Guidance Section below*
Hangar Access Apron (CC 11340)	1. Provide a continuous paved surface from TUAV runway or taxiway to the hangar door sized to be commensurate in width with the door and commensurate in depth with geometry to tow from the outside of the doors to the 15' wide towway giving access to the TUAV runway.

	2. Provide a continuous paved surface from TUAV runway or taxiway to the hangar door sized to be commensurate in width with the door and commensurate in depth with geometry to tow from the outside of the doors to the 15' wide towway giving access to the TUAV runway. 3. Typical construction includes aircraft inside the hangar oriented with the wingspan perpendicular to the runway, and without direct access from the aircraft maintenance module to the outside. In the event direct access from the maintenance module is planned, evaluate whether the long axis of the maintenance modules should be parallel or perpendicular to the runway; the site plan with access and circulation should be based on accommodating the largest reasonable number of TUAS platoons, at least one or two more than are currently supported. *See Guidance Section below*
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-569-8. 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. 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.

	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. *See Guidance Section below*
Secret Internet Protocol Router Network (SIPRNET) Room	Provide a SIPRNET room in accordance with the USAISEC Technical Guide for the Integration of SIPRNET) and AR 380-5. *See Guidance Section below*
Energy Policy Act of 2005 / Executive Order 134323	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	Facilities shall be designed to meet current sustainable development and design policy requirements as established by the Department of the Army.
Handicapped Accessibility	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 format 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 TUAS UA Maintenance Hangar facility is key to accomplishing individual and small team training in the “crawl” and (early portions of) “walk” phases of the “crawl, walk, run” training model. This facility needs land and airspace to conduct this training, but siting of the facility must preclude functional and operational impacts on the obstruction and safety requirements for Army Airfields and Heliports (AAF/AHP).

3. TUAS UA facilities need substantial airspace for safe and efficient operation and to accommodate future growth or changes in mission support. Facilities in direct support of UA operations and maintenance of Group 3 aircraft 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). TUAS organizations may be embedded in either aviation units or ground combat elements, it is vital that the installation’s plan to accommodate TUAS’s within both aviation branch reconnaissance units and non-aviation branch military intelligence companies. 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 of both full-sized manned and unmanned aircraft and unmanned small tactical UAV.

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: The Army follows a “Crawl, Walk, Run” sequence where training passes through levels of increasing difficulty.

1. In active combat operations (outside of a permissive environment like a forward support base in a counterinsurgency) or in the “Run” stage of training, a TUAS platoon doesn’t really need facilities. Such a platoon needs to be able to engage in split-based operations with a distance between the Mission Planning & Control (MP&C) Section (able to coordinate and liaise with the Brigade MI Company and Brigade S-2) and the Launch & Recovery (L&R) Section. The two sections must be able to communicate with each other. The MP&C Section must be able to plan and communicate the plan to the L&R Section (possibly while one or both are moving.) The L&R Section should be able to pull off the road, rapidly assemble and prepare to launch a UAV, and launch it from an unprepared surface on a soccer field sized area, i.e., clearance from objects similar to an airfield, in a limited period. Control of the TUAS UA can be retained by the L&R Section or handed off to the MP&C Section. Either way, the Shadow flies the mission, is recovered by the L&R Section where it is broken down into storage configuration, and then the L&R Section displaces again. No facilities would be needed to support operations of this type.

2. This “Run” stage of training means that UAVs are assembled and disassembled repeatedly, with a risk of damaging the aircraft each time it is assembled or disassembled. The “Run” stage means that ground control stations are powered using tactical generators, increasing the requirement for maintaining these generators. “Run” operations mean that only a handful of assigned operators are operating TUAV’s, vs. driving vehicles, performing security, operating generators, etc. The “Run” stage creates communications and coordination challenges not only between the two sections of the platoon but also between platoon elements, the MI company, and Brigade (or possibly supported battalion) S-2.

3. The TUAS UA Maintenance Hangar is planned to support the “Crawl” and early stages of “Walk” training, not the “Run” stage. The key goal is to be able to concentrate on individual operators getting flight hours to maintain individual flight qualifications. In support of this goal, the facility allows aircraft to be left assembled allowing both more flight hours per airframe and less damage due to frequent assembly and disassembly. The platoon headquarters, MP&C, and L&R Sections are co-located to simplify intercommunication between these elements, practice handing off mission information or aircraft control, etc. Shelters can be powered using permanent power, saving wear and tear on organic tactical generators. Competent airmanship amongst the TUAS UA pilots is the foundation of operational capability for the platoon. Expeditionary skills will still need to be developed in other training environments as the platoon progresses to a fast “Walk” and finally begins to “Run,” but airmanship amongst the pilots is critical to achieving any other goals.

4. Technological insertions that will affect facility adequacy must be 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.

5. The HGR Army Standard represents a 21st Century facility standard 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."

6. Currently, TUAS platoons are subordinate elements of other companies, typically either Military Intelligence companies or Reconnaissance Aviation troops. For this reason, this standard does not include a company headquarters, and TUAS platoons are not considered flight companies. This standard will need modification if TUAS platoons are consolidated into companies.

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 if facility durability requirements are satisfied.

Maintenance Echelons:

- Army aviation maintenance has two echelons: Field and Sustainment. ATP 3-04.7 Army Aviation Maintenance Sep 2017, Section I-Two Level Maintenance 2-1.
- 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.
- Maintenance for typical Army equipment involves both Field level and most Sustainment level maintenance being performed within Army facilities. Usually, Field level is accomplished by soldiers, with some Field level and most Sustainment level accomplished by civilians, possibly contractors, but not necessarily personnel from the original manufacturer. In the case of TUAS UA's, Sustainment maintenance is conducted by field service representatives, typically from the original manufacturer, working within the Field level facility or off post.

Concept for Supporting Maintenance with Facilities:

- The TUAV Hangar is designed to support maintenance of the TUAS UA's and some elements of the TUAS. Many elements of the TUAS (e.g., prime movers, generators) are maintained in the battalion's Tactical Equipment Maintenance Facility or TEMF within CC 21410.
- Manned Aircraft and Unmanned Aircraft roughly the size of a manned aircraft (i.e., the Gray Eagle) are not covered by this Standard.

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 TUAV runway and any portion 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. Hangar Functions and Types. TUAS UA maintenance hangars (facility Category Code or CC 21115) are composed of TUAS UA aircraft maintenance and storage modules, very limited maintenance admin and shop space, very limited parts storage, and platoon offices with flight ops planning and briefing areas. These areas do not meet the definitions of similar areas within a CC 21110 facility (e.g., 21113, 21114, 21116, 14112) because they are not necessarily in proximity to a flight operations area for manned aircraft, and the size of these areas in a 21115 facility are so much smaller that they preclude future use by full-sized aircraft and are therefore not interchangeable with CC's 21113, 21114, 21116, 14112, etc.

3. Primary Facility Scope and Capacity (FCC 21115). Hangar allowances are calculated for battalions with assigned TUAS platoons. Allowance for TUAS UA Maintenance Hangar is a function of the number of TUAS platoons, and current battalions include either 3 platoons (one within each Aviation Attack / Reconnaissance Troop of an Air Reconnaissance Squadron) or 1 platoon (within the Military Intelligence Company of Brigade Engineer Battalions, Special Forces Group Support Battalions, or the Ranger Military Intelligence Battalion.) Based on a specific situation on the ground, an installation may choose to consolidate more than one TUAS platoon, from different battalions, into a single facility. If this is done, the facility will be designed to give each platoon the ability to secure that platoon's space and equipment. Note that, unlike hangars for manned aircraft, TUAS platoons are organic to other types of companies and are not part of a TUAS company. For this reason, TUAS hangars do not include company headquarters, as do other types of hangars including those used by the non-tactical Gray Eagle, which is a separate company within an Aviation Brigade.

4. Maintenance Operations – TUAS UA Maintenance Bay The term aircraft maintenance bay is a structural term that includes all the maintenance modules within the hangar, plus safety and structural off-sets. Due to the characteristics of current TUAS UA's, and various restrictions on their operation during inclement weather (which also includes temperature extremes), it is planned that all TUAS UA's will be stored fully assembled every night during a period of intense flight operations, both to speed up the process of certifying pilots and to decrease wear and tear on aircraft experienced during assembly and disassembly.

5. Maintenance Operations -- Shops. The UA shop facilities for a TUAS platoon are much smaller than those for large aircraft and are not interchangeable with shops for larger aircraft. For this reason, they are not categorized under CC 21116 shops.

6. Aviation Unit Operations -- Flight Operations & Pilot Work Areas. This area provides workspace for platoon leaders, platoon sergeants, safety and standardization personnel, and non-dedicated workspace (i.e., "hot desk" space) for TUAS UA pilots

planning missions in the platoon area. It also includes a briefing room, a separate training room (with storage), a flight operations room, and a flight planning room separate from the platoon areas. Counting the six leadership / flight operations personnel in a platoon plus assuming four of the 13 regular pilots would be actively planning a mission, this space averages 172 (1-platoon) – 324 (3-platoon) NSF/person.

7. Aviation Unit Operations – TA-50 Storage. Combat Aviation Brigades do not employ TA-50 storage rooms in the same way Brigade Combat Teams (BCT's) use them. Aviation soldiers store their TA-50 in barracks rooms, family housing, or off-post. In the case of TUAS platoons in BCT's, these platoons are organic to companies that, themselves, are authorized Company Operations Facility Readiness Module for all assigned personnel, including the TUAS platoon.

8. Hangar Access Apron (FCC 113 40). Hangar access aprons provide a stabilized circulation path between the hangar and the towway allowing access to the UAV runway. Hangar access apron's size is predicated on the hangar design and orientation to the nearest operational towway and thence to the runway. Width of the apron should be a continuous concrete pad across the entire hangar door width but at least 32'. Length is dependent upon obstruction clearance requirements and the geometry to transition from the far sides of the doorway to the 15' towway width, but at least 15'. When using an individual access design, the hangar would normally extend perpendicular to the TUAS UA runway because of the short length of the runway relative to the hangar bay. When a hangar design has its doors facing perpendicular to the runway centerline, a circulation pathway NLT 15-feet-wide plus two 10' shoulders (not necessarily paved) shall connect the Hangar Access Apron with the TUAS UA runway. The minimum length of the circulation pathway is based on obstruction clearance dimensions.

9. 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.

10. Secret Internet Protocol Router Network (SIPRNET) Room. Provide a SIPRNET room as indicated on the facility drawings for future use.

11. 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: 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
- 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 SOD 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 4-211-01, 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)