179th Airlift Wing

BRAC ANALYST VISIT SUPPORTING MATERIALS

Updated 22 June 2005

Supercedes File Dated 14 June 2005

103-06A – RH7 – State Input (Ohio)
Regional Hearing – June 27, 2005 – Buffalo, NY
BRAC COMMISSION – FY 2005
COFF:_____ DISPOSITION: Permanent

Reference Slide #1

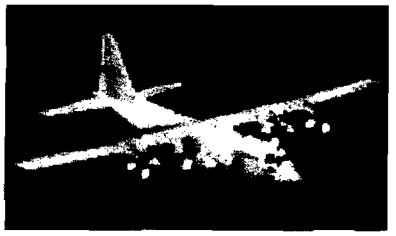
Fact Sheet – Ohio ANG Flying Wings
179th Airlift Wing, Mansfield, OH

Major Command: Air Mobility Command (AMC), Scott Air Force Base, Illinois

Mission: Provide theater airlift support for military operations, and other services such as civil engineering, transportation, medical, security police, food services, mortuary, and more.

Aircraft Information: **Type:** C-130H2 Hercules **Inventory:** 8 **Value:** $240,000,000.

Manning: **Authorized:** 979 **Assigned:** 1042 **Total:** 106.4% **Full Time:** 240



General Assets:
Total acres approx. 230
Number of buildings 33
Total square footage 292,863 SF
Total replacement cost of buildings - $92.928M
Airport Costs: $49,904

Economic Impact:

Annual Payroll	$25,500,000
Indirect Jobs Created	$9,300,000
Operating Funds	$16,600,000
Total	$51,400,000

Military Construction

1997 - Medical Training/Dining Hall: $3.1M
1998 - Jet Fuel Storage Complex: $4.1 M
2001 - Security Forces Operations Building: $2.7M
2003 - Air Operations/Communications Building: $6.6M
2004 - Transportation Complex: $3.3M
2005 Upgraded/Hardened Main Gate Facility: $690K

Deployments: Operations Enduring Freedom & Iraqi Freedom, and Joint Forge (Germany)

Awards and Accomplishments:

Year	Inspection/Award	Reason or Results
2005	ESOHCAMP Inspection	Outstanding – Best Seen in ANG
2004	Health Services Inspection (HSI)	Excellent Rating
2003	Deneke Award	Outstanding ANG Civil Engineer
2002	CMSgt Edward Wilbert Award	Outstanding Fire Dept of the Year
2002	James D. Weaver Award	Outstanding Fulltime Medical Technician
2002	ANG Environmental Quality Award For Recycling	Best ANG Recycling Program
2002	ANG Services Flt of the Year	Superior Performance
2002	Initial Readiness Inspection	Excellent
2002	Unit Compliance Inspection	Excellent
2002	Aircrew Stan/Eval Inspection	Excellent
2002	ANG Laboratory Tech of the Year	Outstanding Performance
2002	ANG Pharmacy Tech of the Year	Outstanding Performance
2001	AF Outstanding Unit Award	Outstanding Performance
2001	ANG Metcalf Trophy	Outstanding Mission Accomplishment
2000	Tappan Award	Outstanding Ohio Flying Unit
2000	EORI @ Ramstein AB, GE	Top rating
2000	Health Services Inspection	Highest Air Force rating
2000	IG Exercise (IGX)	Top rating
1999	Tappan Award	Outstanding Ohio Flying Unit

Geographically Separated Units: None

Reference Slides #25, 27, 37

18 April 2005

White Paper

Main Issues to Discuss:

- The BRAC Red Team believes the Air Force presentations give the perception that in many cases the Air Force is using BRAC only to move aircraft and gain MILCON funding rather than reducing excess infrastructure.
- Discussion within the Red Team has produced several potential routes to dispel such a perception and gain a more favorable reception for the Air Force package.

Causes of the Perception:

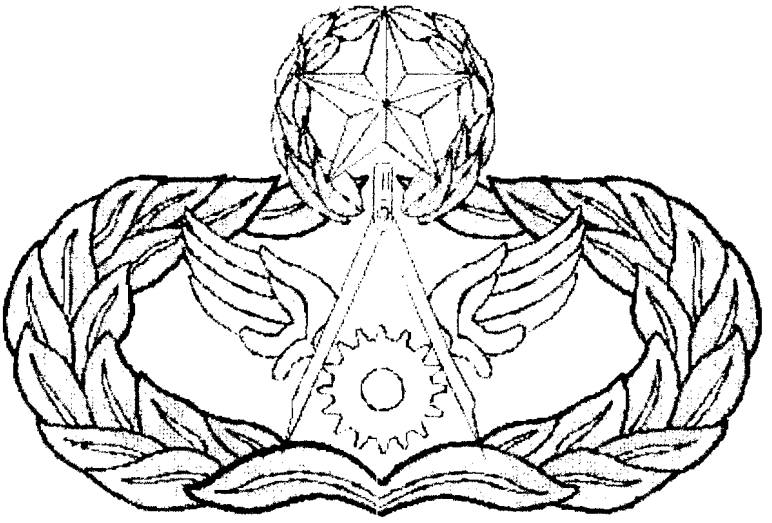
- Air Force goals for BRAC 2005 appear to focus on operational requirements rather than reduction of excess infrastructure capacity under the BRAC Law.
    - Military value analysis has uniquely been done by platform as opposed to by installation or supporting function—which results in multiple military values for the same installation and the need to override military value results.
    - Military capacity has been redefined to be the difference between current and optimum squadron sizes rather than functional support capabilities.
    - Proposals appear to use BRAC to determine where FYDP aircraft changes should be implemented and use BRAC funds to make the changes without including associated savings under BRAC.
    - Many of the aircraft changes are already reflected in the FYDP and any resulting savings have been taken.
        - BRAC actions should result in savings in installation and personnel costs.
        - As currently reflected, most Air Force actions do not result in savings and do not require the BRAC provisions.
- Proposals show personnel position savings while allegedly not reducing overall end strength.
- Even though number of aircraft is coming down, Expeditionary Combat Support (ECS) groups are left almost everywhere with no defined mission.
    - Perception supported by answers to questions: ECS groups are used to maintain "end strength" in search of missions.
- In many cases, military value is being overridden by Air Sovereignty Alert requirements, Active Reserve Component (ARC) mix, and recruiting demographics—need to show how these are tied to the Force Structure Plan and/or the Final Selection Criteria.

Potential Solutions:

- Given that each installation has multiple military value rankings, it is imperative that recommendations that are inconsistent with the ranking of installations for the platform in question be fully justified.
- The underlying rationales for the Air Force's method of determining military value and capacity (including optimal squadron sizes) need to be carefully articulated and well supported.
- If the moves are accomplished under BRAC, all savings and costs must be reflected under BRAC—other mission and personnel requirements should be paid for outside BRAC (can use BRAC savings).
- Provide better explanation of the role of Expeditionary Combat Support (ECS) units.
    - All savings must be part of BRAC—savings can then be applied to other missions.
    - Create a chart that shows:
        - what functions or MOSs ECSs cover,
        - how an ECS is allocated,
        - when they deploy,
        - what mission the ECS is charged with,
        - how ECSs support Homeland Defense,
        - and explains why DoD needs to have ECSs at numerous bases.
- Provide better explanation for need for Homeland Defense Air Sovereignty Alert (ASA) Facilities.
    - Explain what the ASA sites are and why BRAC is required to make changes—why are they a new mission?
    - Create a chart that lays out the requirements for coverage.
    - Ensure that NORTHCOM agrees with sites and are on the same page.
- Recommendations citing maintenance of ARC mix need to be supported by documentation that explains why the ARC mix is important and how maintaining the proper mix supports the Force Structure Plan and/or Final Selection Criteria.
- Recommendations citing more suitable recruiting demographics in one location over another need to be linked to a supporting document with recruiting data across all installations.
- Closing leased facilities could improve Air Force story—recommend including these facilities on your closure list. Plus, by doing so, you will be consistent with other Services since they are including leased facilitates on their closure lists.
- Justifications for Ellsworth AFB, SD and Grand Forks AFB, ND need to be stronger as these are closures in close proximity to each other with little other regional military presence. There also needs to be stronger rationales for other associated realignments.

Reference Slides #28, 54, 55, 61, 62, 63

ANG Standard Facility Requirements



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ANGH 32-1084

30 November 2003

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This handbook implements and supplements Air Force Handbook (AFH) 32-1084, *Standard Facility Requirements Handbook*, for the Air National Guard (ANG). It contains guidelines and information for facility requirements in support of Air National Guard missions. Space allowances for facilities are authorized in accordance with the criteria in this handbook. Installations will use the facility space allowances listed herein by Real Property category codes to assign occupancy and to program new and replacement facilities.

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Chapter 1. GENERAL

1.1 Purpose

This handbook is a compilation of standards, references, and detailed technical guidance provided to assist in the facility programming process.

The guidelines and criteria contained in this handbook are applicable to the Air National Guard (ANG) and implement Department of Defense (DoD) construction criteria directives. Guidance for criteria not included in this handbook can be found in AFH 32-1084, *Standard Facility Requirements Handbook*, and must be validated by ANG/CEP.

1.2 Facility Space Allowances

1.2.1 Fundamentals. The criteria listed in this handbook are the basis for space allowances at ANG facilities. Space requirements for each facility, existing or planned, will be programmed and justified by the base civil engineer (BCE) on the basis of the authorized ANG unit strength (i.e., the strength of the unit(s) assigned, not the resident wing or other tenants) and the quantity and type of equipment, materials, and supplies required.

ANG/CEP will validate all space allowances.

1.2.2 Specificity. Facility space allowances for commonly used category codes are listed in these four tables, located after this handbook's text sections:

Table 1, *ANG Combat Readiness Training Center Facility Requirements Programming Guide*
Table 2, *ANG Civil Engineering RED HORSE Facility Requirements Programming Guide*
Table 3, *ANG Civil Engineering Regional Training Site (RTS)*
Table 4, *ANG Civil Engineering Regional Equipment Operators Training Site (REOTS)*

Additional guidance, descriptions, and explanations of selected category codes are provided later in this handbook. Less common category codes that do not appear in this publication may be approved by ANG/CEP.

Where necessary, Air National Guard Engineering Technical Letters (ANGETLs) supplement this handbook with specific and detailed instructions for base civil engineers.

1.2.3 Computation. All facility space allowances are expressed in terms of gross area, unless noted otherwise. Gross area is computed to the outside of enclosure walls. For these computations:

a. Include full area for any area used for intended purposes, to include (but not limited to): basements; above-grade floors; all permanently affixed mezzanines; mechanical equipment (heating/utility) rooms; penthouses; enclosed passages, walks, porches, and balconies; and totally enclosed, raised loading platforms.

b. Include half area for covered (but not fully enclosed) slabs, entries, passages, walks, porches, and balconies, as well as covered/uncovered, below-grade loading facilities.

c. Exclude areas for roof overhangs; utility tunnels; exterior or interior stairs and elevator shafts; exterior uncovered walks, ramps, stoops, and paved terraces; generally enclosed space (if used for

storage, it counts as 'full' scope); and door pockets for hangar-type facilities. Also exclude mezzanines that provide utility, mechanical, or other direct support requirements for the facility.

d. Overhead factors (shown as a percentage in breakout tables of larger facilities in later sections of this handbook) represent space dedicated to circulation, mechanical/electrical rooms, restrooms/latrines, wall thickness, telecom closets, and janitor closets.

1.3 Composite and Joint-Use Facilities

Composite and/or multi-story facilities are encouraged. Each functional area will be within authorized scope and fully justified on the basis of assigned equipment and/or personnel.

Composite facilities units with like category codes can be programmed for the use of two units, the use of different functions (different category codes) within the same unit, or other combinations of units and function. General guidance regarding functions (category codes) is as follows:

1.3.1 Same Category Code. These facilities consist of shared ANG facilities with the same function. Space requirements are calculated by adding more space for equipment, libraries, storage, and files to the basic personnel space needed by one unit. Additional space for offices, classrooms, restrooms, hallways, etc., can seldom be justified.

For a dual unit, an increase of 10 percent is normally made to the basic authorization for a single unit, under the assumption that units do not drill on the same weekend.

1.3.2 Different Category Code. These facilities consist of shared ANG facilities with different functions. Their space requirements are calculated by adding the scope authorizations for different category codes.

1.4 Multi-Service, Joint-Use Facilities

Where the ANG is co-located with another government agency, joint-use projects will be programmed to the maximum extent practicable. Facilities such as medical training, dining halls, fuel storage, operation centers, communication centers, small arms ranges, munitions storage facilities, warehousing, vehicle maintenance, civil engineer storage, security forces storage, LOX/LIN storage, and fire stations will be considered for joint use.

a. Justification must be provided for constructing separate facilities.

b. Programming procedures for joint-use facilities are provided by AFI 32-1012.

c. Where joint use of facilities is possible, a significant percentage of decrease in space should be considered due to areas of common use (such as classrooms, restrooms, utility rooms, etc.).

1.5 Functional Criteria Guidance

Specific justification is required for each proposed facility. Emphasis will be placed on the following considerations to ensure the maximum use of resources:

a. Readiness. Facilities will be constructed to make the greatest contribution to unit readiness and to promote economy and efficiency.

b. Existing Facilities. In consideration of economy and efficiency, maximum use will be made of existing facilities to partially or fully satisfy proposed facility requirements.

c. Flexibility. Facilities will be designed to accommodate occupancy by new units, reorganized units, and units with new missions, with minimal additional construction.

d. Economical Design. Facilities will be designed with consideration for their life-cycle cost (which includes initial construction, as well as maintenance thereafter).

e. Standards of Construction. New facilities will generally be of permanent construction, and the quality of construction will be consistent with the corresponding lifecycle cost analysis. However, new facilities at training areas and facilities of undetermined useful life may be of permanent, semi-permanent, or temporary construction.

f. Other Facilities. Other facilities required on an infrequent basis (and for which criteria are not specifically provided herein) will be established using the criteria for similar facilities, adjusted to the actual mission requirements as validated by ANG/CEP.

g. Administrative Space. Wherever possible, administrative space should consist of open, pre-wired workstations, with only the minimum essential number of enclosed offices constructed. Open office design and use of systems furniture will be considered. Interior construction should provide flexibility for future interior renovations.

h. Administrative Support Space. Includes area(s) adequate to house any computer equipment, filing systems, copy/reproduction machinery, telephone and LAN systems and publication libraries related to the function.

i. Storage. Facilities will include adequate space for the storage of equipment in the proper locations (home station, mobilization station, central storage, etc.).

j. Special-Use Space. Includes classrooms, conference rooms, auditoriums, locker rooms, area(s) for vending and physical training, and any other space that may be appropriate for the function.

k. Service Support Space. Includes janitor and storage areas, mechanical and electrical rooms, and loading docks / receiving areas.

l. Consistency. New construction and modification of facilities must be consistent with the approved General Plan / Master Plan and with Anti-Terrorism / Force Protection (AT/FP) criteria.

m. Airfield Criteria. See UFC 3-260-1, *Airfield and Heliport Planning and Design*, for airspace and airfield criteria.

n. Redundant Space. Space shall not be constructed in more than one location for the performance of the same function by an individual or unit, unless specifically justified and authorized by ANG/CEP.

o. Weather Extremes. For purposes of these criteria, ***severe winters*** are those with 30 or more days per year of 10 degrees Fahrenheit or lower, or with an average January temperature of 20 degrees Fahrenheit or lower (as determined from two 10-year weather data bases); ***heavy snowfall*** is more than 24 inches / 610 millimeters annually; and ***extreme heat*** means an average daily maximum temperature above 88 degrees Farenheit / 31 degrees Celsius for 30 or more days per year.

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Chapter 2. CATEGORY GROUP 11 AIRFIELD PAVEMENTS

2.1 General Criteria

The airfield is that portion of an air base used for aircraft taxiing, takeoffs, landings, servicing, and parking. The designation 'airfield pavements' applies to runways, taxiways, aprons, arm/disarm pads, paved shoulders, and paved overruns.

Requirements for items in this group for ANG units located at Air Force bases or other DoD installations are determined in the same manner as for active units (use UFC 3-260-1, *Airfield and Heliport Planning and Design*). Adherence to these requirements at other locations is not always possible, due to the multiplicity of situations under which the ANG operates.

Where ANG units are located at civil airports, Federal Aviation Administration (FAA) Advisory Circular criteria AC150/5300-13 will normally be used for the construction of runways and taxiways, and for associated work, as well as for airfield clearance criteria.

2.1.1 Environmental Concerns. When planning and siting munitions storage/maintenance and airfield pavements, consider storm water runoff and the control of pollutants being discharged into storm water (including de-icing operations) to maintain compliance with storm water and discharge permit requirements. Also comply with applicable requirements under both the federal Clean Water Act (CWA) and AFI 32-7041, as well as with all federal, state, and local storm water permit requirements.

2.1.2 Explosives Safety. When planning aircraft hangars, shelters, and support facilities where personnel or explosives are involved, ensure that explosives safety standards DoD 6055.9-STD and AFM 91-201 are considered. These standards are designed to protect facilities and personnel from the damaging effects resulting from the accidental or unintended detonation of munitions and explosives.

2.1.3 Pavement Thickness. Airfield pavements support aircraft under six major weight categories: heavy, modified heavy, medium, light, shortfield, and auxiliary. Requirements for heavy, modified heavy, medium, and light loadings are based on a mix of aircraft traffic, whereas requirements for shortfield load conditions and auxiliary airfields are based on F-15, C-17, or C-130 aircraft only.

Specific design criteria for airfield pavements are contained in UFC 3-260-1.

Additions or extensions to existing pavement are normally constructed to match the strength of the existing pavement (if adequate for the programmed mission and aircraft) or to the appropriate standard. If the existing pavement is inadequate, strengthen as necessary.

2.2 Commercial Airport Criteria

ANG installations on commercial airports or at FAA-controlled airfields must apply FAA criteria AC150/5300-13 to facilities such as runways and taxiways that are jointly used by military and civilian aircraft. Facilities for military use only (such as aircraft parking aprons, arresting barriers, arm/disarm aprons) must apply Air Force / DoD criteria.

2.3 Runway Criteria

2.3.1 Category Code 111-111, Runway. The runway is the paved surface provided for normal aircraft takeoffs and landings. This category code also includes the runway's grading and drainage, its lateral safety zones, and its clear zone (see UFC 3-260-1, Chapter 3).

Runway length shall be sufficient to accommodate all aircraft programmed or those that may use the base. Performance curves for each aircraft are contained in the performance data section of the 'Dash One' (-1) series of the aircraft's technical orders; the aircraft's design loads are found in its specific Standard Aircraft Characteristics Book.

Runway length is based on the aircraft's takeoff or landing, whichever requires the greater distance. The designer of the runway shall coordinate with the ANG/OPS community on the most accurate and economical methods to determine individual runway lengths, based on the aircraft each base supports. The authorized width of a runway also depends on the aircraft programmed for the base.

Special consideration must be made for BAK-14 arresting barriers on runways.

Aircraft Type	Minimum Runway Length	Runway Width
A-10, F-15, F-16, F-22, C-130; trainer aircraft	8,000 FT / 2,438.4 M	150 FT / 45.7 M
C-5, C-17, KC-10, KC-135	10,000 FT / 3,048.0 M	150 FT / 45.7 M

2.3.1.1 Runway Clear Zone. Runway clear zones are ground areas required at both ends and alongside each runway. Essentially unpaved safety borders/buffers surrounding the extended runway, they possess a high potential for accidents and their use is restricted to be compatible with aircraft operations. Quite often, this compatibility results in the waivered construction of taxiways, aprons, pads, or other necessary structures within the designated 'clear' zone. Projects should be programmed to eliminate all airfield waivers.

See Chapter 3 of UFC 3-260-1 for runway clear zone layout configurations, and Attachment 4 of the same document for permitted land uses within the clear zone.

Clear Zone Length	Clear Zone Width
3,000 FT / 914.4 M *	3,000 FT / 914.4 M **

* From each end of the runway, measured along the extended runway centerline (a full-length runway overrun would extend 1,000 FT / 304.8 M into the clear zone at both ends of the runway).

** Centered on – and measured at right angles to – the extended runway (runway overrun).

2.3.2 Category Code 111-115, Paved Overrun. The runway overrun is an extension of the runway pavement (excluding shoulders) designed for possible short landings, unobstructed run-out of aircraft arresting systems, or any other extended takeoff run or landing rollout situation that would exceed the length of the basic runway.

Approach lighting systems located in the overrun area should be semi-flush mounted.

Runway Type	Overrun Length	Overrun Width
Heavy, modified heavy, medium-light, auxiliary	1,000 FT / 304.8 M (at each end of runway)	Equal to runway
Assault field	300 FT / 91.4 M (at each end of runway)	Equal to runway

2.3.3 Category Code 116-116, Assault Field. A special paved strip provided to train cargo aircraft crews in airlifting operations within a limited space, i.e., a 'short' field.

Aircraft Type	Minimum Runway Length	Runway Width
C-130, C-17	3,500 FT / 1,066.8 M (4,000 FT / 1,219.2 M preferred)	60 FT / 18.3 M (75 FT / 22.9 M, no taxiways)

2.4 Taxiway Criteria

2.4.1 Category Code 112-211, Taxiway. Taxiways are the pavements provided for the ground movement of aircraft. They connect the parking and maintenance areas of the airfield with the runways, as well as provide access to hangars, docks, and various parking aprons and pads.

Main taxiways are normally aligned parallel to runways to facilitate aircraft ground movement during takeoffs and landings on the runway; connecting runways should take the most direct/economical route.

Runway / Taxiway Class	Taxiway Width
Heavy, modified heavy, med-light, auxiliary	75 FT / 22.9 M
Assault field	50 FT / 15.2 M, with 70 FT / 21.3 M turning radius
Towed aircraft only	Lesser of 50 FT / 15.2 M, outside landing gear width + 10 FT / 3.1 M

2.5 Apron Criteria

2.5.1 Category Code 113-321, Apron. Aprons are paved areas provided for aircraft parking, servicing, loading, and unloading. Apron space is required for operational aircraft, alert aircraft, and cargo aircraft.

Active duty AF criteria should be followed, but omit apron space for transient aircraft unless an exception is approved by ANG/CEP. (Adherence to this requirement is not always possible, due to the multiplicity of situations under which the ANG operates.)

a. Apron Size/Configuration. There is no standard apron size. Aprons are individually designed to support certain aircraft and missions at specific installations. Detailed dimensions are determined by the size, type, and number of aircraft that require parking and maneuvering space, the type of activity the apron serves, the physical characteristics of the project site, and the objectives of the installation master plan. Aircraft size, taxi lane widths, and required wingtip separations are the basis for design.

b. Apron Allowances. A proper apron allowance is the amount of space required to afford maximum operational efficiency with the minimum amount of paving. The following paragraph describes a method for estimating apron requirements.

c. Estimating New Apron Requirements. For broad planning purposes, multiply the wingspan of the selected aircraft by its length, then multiply the product by a factor of 5.3 (4.4 for fighter-type aircraft) to determine the apron requirement for a single unit of the aircraft chosen. For example:

C-130 = 132.6 FT (wingspan) x 99.5 FT (length) = 13,194 SF x 5.3 (factor) = 69,928 SF / 7,770 SY
= 40.4 M x 30.3 M = 1,226 SM x 5.3 = 6,496 SM

Apron requirement for 10 C-130 aircraft = 10 x 7,770 SY / 6,496 SM = 77,700 SY / 64,960 SM

Do not use this method to estimate the number of aircraft – especially large aircraft – that can park on an existing apron. Many variables (such as length, width, and taxi lane locations) determine an existing apron's suitability to support specific aircraft types. At existing bases, develop a conceptual parking plan for the anticipated mix of aircraft types to determine the total apron area requirements.

The following table presents approximate planning factors in square yards / square meters (SY / SM) for new aprons with regard to different numbers of various aircraft types, based on the most efficient parking layout (contact ANG/CEP for specifics):

Aircraft	PAI 4	PAI 6	PAI 8	PAI 10	PAI 12	PAI 15	PAI 18	PAI 24
A-10						19,920 / 16,665	23,305 / 19,420	32,270 / 26,890
F-16, RF-16						8,500 / 7,107	10,200 / 8,500	14,110 / 11,760
F-15						14,250 / 11,914	17,100 / 14,240	23,665 / 19,720
C-130J-30	17,575 / 14,645		52,730 / 43,940		87,875 / 73,230			
C-5			163,235 / 136,030		293,825 / 244,855			
C-17			86,810 / 72,340					
KC-135			63,190 / 52,655	84,250 / 70,210		101,100 / 84,530		
KC-10			106,740 / 88,950	124,540 / 103,780				
HH-60G		8,130 / 6,775						

Note: All planning factors are approximate and include deductions for authorized covered spaces, but no allowance for BAI or transient aircraft – exact space to be determined by ANG/CEP-approved parking plan.

d. Aprons for Operational Aircraft. Operational aircraft are parked on mass aprons, strip aprons, or (where authorized) on dispersed stubs. To determine how many operational aircraft require apron space, begin with 100 percent of the primary aircraft inventory (PAI) as established by official documents, then subtract 1) the number of aircraft (such as alert aircraft) parked on separate aprons, 2) the number of aircraft in maintenance hangars or docks under normal maintenance schedules, and 3) any aircraft parked elsewhere on existing pavement of a suitable nature and location.

Pavement for backup aircraft inventory (BAI) will be provided on a case-by-case basis.

e. Aircraft Parking. On a typical mass apron, aircraft are parked in rows and spaced according to the dimensions referenced in the table below, which permits the aircraft to move in and out of parking slots under their own power:

Aircraft *	Wingspan	Length	Height	Min. space between wings when parked **
A-10	57.5 FT / 17.6 M	53.3 FT / 16.3 M	14.9 FT / 4.6 M	10.0 FT / 3.1 M
B-52	185.0 FT / 56.4 M	156.6 FT / 47.8 M	40.8 FT / 12.5 M	25.0 FT / 7.7 M
C-5	222.7 FT / 67.9 M	247.8 FT / 75.6 M	65.1 FT / 19.9 M	25.0 FT / 7.7 M
C-17	170.0 FT / 51.9 M	173.0 FT / 52.8 M	55.1 FT / 16.8 M	25.0 FT / 7.7 M
C-130	132.6 FT / 40.5 M	99.5 FT / 30.4 M	38.5 FT / 11.8 M	20.0 FT / 6.1 M
C-130J-30	132.6 FT / 40.5 M	112.8 FT / 34.4 M	38.5 FT / 11.8 M	20.0 FT / 6.1 M
HH-60G	53.7 FT / 16.4 M	64.9 FT / 19.8 M	17.5 FT / 5.4 M	53.7 FT / 16.4 M
KC-10	165.3 FT / 50.4 M	182.1 FT / 55.5 M	58.1 FT / 17.7 M	50.0 FT / 15.3 M
KC-135	130.8 FT / 39.9 M	136.2 FT / 41.6 M	41.7 FT / 12.8 M	50.0 FT / 15.3 M
C-137	145.7 FT / 44.4 M	147.7 FT / 45.1 M	41.8 FT / 12.8 M	20.0 FT / 6.1 M
E-3	145.7 FT / 44.4 M	152.9 FT / 46.6 M	42.2 FT / 12.9 M	20.0 FT / 6.1 M
E-4	195.7 FT / 59.7 M	231.8 FT / 70.7 M	64.3 FT / 19.6 M	20.0 FT / 6.1 M

Aircraft *	Wingspan	Length	Height	Min. space between wings when parked **
F-15	42.8 FT / 13.1 M	63.8 FT / 19.5 M	19.2 FT / 5.9 M	10.0 FT / 3.1 M
F-16	32.8 FT / 10.0 M	47.6 FT / 14.5 M	16.4 FT / 5.0 M	10.0 FT / 3.1 M
F-22	44.5 FT / 13.6 M	62.1 FT / 19.0 M	16.6 FT / 5.1 M	10.0 FT / 3.1 M
'Alert' aircraft	all	all	all	50.0 FT / 15.3 M
Not listed above	< 110.0 FT / 33.6 M	any	any	10 FT / 3.1 M to 25 FT / 7.7 M
Not listed above	110.0 FT / 33.6 M >	any	any	25 FT / 7.7 M to 50 FT / 15.3 M

* Dimensions vary for different models and configurations of aircraft.
** Does not apply during contingencies; see current aircraft Technical Order.

Setback distances for peripheral or through taxilanes are set to the largest wingspan of frequently using aircraft, i.e., if C-130s taxi past a ramp of F-16s, base the taxilane on the C-130's wingspan.

Parking arrangements should occupy the least amount of pavement possible per parked aircraft. As an example, changing the apron parking arrangement for 8 aircraft from 4 rows of 2 aircraft to 2 rows of 4 aircraft can reduce pavement requirements by 20 percent. (See Chapter 6 of UFC 3-260-1 for various aircraft parking layouts.)

Another factor to consider when developing aircraft parking plans is aircraft exhaust wake velocity. Check the particular aircraft performance guide for exhaust velocity and temperature ranges to assess safe distances for nearby facilities and personnel.

f. Taxi Lanes. Apron interior and peripheral taxi lanes must exceed the required width for aircraft parked in the area if larger aircraft must taxi through en route to docks, hangars, or pads. Confine such width variation to the fewest taxi lanes possible.

Peripheral taxi lanes are not provided along the rear edge of aprons unless required for access to docks or hangars, or to meet a critical need for alternate circulation routes for aircraft operating on the apron. On peripheral taxi lanes, aircraft are expected to taxi along the outer 75 FT / 22.9 M of pavement; therefore, wing overhang areas beyond this strip are not paved.

Min. Wingtip Clearance for Taxiing . . .	Wingspan less than 110 FT / 33.6 M	Wingspan 110 FT / 33.6 M or more
In taxi lanes, apron interior or peripheral	30 FT / 9.2 M	50 FT / 15.3 M
In lanes, between parked aircraft	20 FT / 6.1 M	30 FT / 9.2 M
In lanes, between parked aircraft (transient)	25 FT / 7.7 M	30 FT / 9.2 M

g. Hangar Access Aprons/Taxiways. Hangar access aprons provide access to the hangars from the parking apron and allow free movement of aircraft to the various hangar maintenance facilities. Hangar access aprons should be provided as a supporting item for each authorized hangar, and sized for the type of hangar and aircraft to be accommodated.

Generally, hangar access aprons should be as wide as the hangar doors and extend from the edge of the apron to the hangar door. Hangar access should be coded as 'taxiway'.

h. Other Apron Variables. These include such items as the arrangement of refueling outlets, explosives clearances, required clearances to fixed or mobile objects (see UFC 3-260-1, Chapter 6), and the siting or placement of blast deflectors.

2.5.1.1 Alert Pad. Often referred to as an 'alert apron', the alert pad is an exclusive paved area where armed aircraft can park with immediate, unimpeded access to a runway. Once an alert has been declared, these aircraft must be on the runway and airborne on short notice; locating the alert pad adjacent to a runway end will allow the alert aircraft to proceed directly from the apron to the runway threshold without interruption from other traffic. Alert pads are authorized in conjunction with alert shelters, where operationally justified.

Alert pads must be situated close to the runway threshold to allow alert aircraft to be airborne within the time constraints stipulated in their mission statements. Their preferred location is on the side of the runway opposite normal traffic patterns to allow aircraft on the alert pads the necessary direct and unimpeded runway access.

a. Pad Size. Alert pads should be sized to collectively park all the aircraft potentially on alert. Pad dimensions should vary with the length and wingspan of the aircraft to be served, and with the munitions carried by the aircraft. Minimum wingtip clearances are also to be observed at all times.

b. Tiedown and Grounding Points. Tiedown/mooring eyes and electrical grounding points must be provided on each alert pad, as described in UFC 3-260-1, Attachment 12.

c. Clear Zone. Alert pads must not be located within the runway clear zone.

d. Airspace Imaginary Surfaces. Aircraft parked on alert pads must not project into airspace imaginary surfaces.

e. Alert Pad Access/Egress. Alert pads/aprons should be designed for either taxi-in/out or push-back parking. Taxi-in/out parking is preferred, since alert aircraft can quickly taxi into position under their own power; however, back-in parking requires less paved area.

f. Dedicated Taxiway. Provide a single, non-intersected, dedicated taxiway from each alert pad to its adjacent runway so alert aircraft can, when needed, move directly to a takeoff position with no traffic interruption.

g. Munitions Safety. Armed aircraft on alert pads should be located to minimize any damage from the unexpected discharge or explosion of munitions. Explosives safety site plans must be prepared in advance, in accordance with UFC 3-260-1, Attachment 10.

2.6 Shoulder Criteria

2.6.1 Category Code 116-642, Paved Shoulders. The shoulders of runways, aprons, taxiways, and airfield pads are paved to protect the shoulder areas against jet blast, reduce maintenance of the unpaved shoulder area, support aircraft outrigger gear, or accommodate snow removal equipment, aircraft service vehicles, and emergency vehicles. Unprotected (unpaved) shoulders without vegetation that are continually exposed to jet blast will release soil, stones, and other debris which can cause severe damage when ingested by jet engines.

a. Runway Shoulders. Unprotected areas adjacent to runways and overruns are susceptible to erosion caused by jet blast. Shoulders minimize the probability of serious damage to an aircraft in the event the aircraft leaves the runway pavement.

Paved shoulders are required adjacent to all runways. The minimum paved shoulder width allows the runway edge lights to be placed within the paved portion of the shoulder, and also reduces the potential of foreign object damage (FOD) to aircraft. The unpaved shoulder should be graded to prevent water from 'ponding', i.e., accumulating on the adjacent paved area (shoulder and runway); the dropoff next to the paved area will prevent accumulating turf from creating ponds, as well.

Runway Function	Total Shoulder Width *	Paved Shoulder Width *
General use	200 FT / 61 M	25 FT / 7.7 M
Trainer aircraft	200 FT / 61 M	10 FT / 3.1 M
Fighter aircraft	200 FT / 61 M	10 FT / 3.1 M
Paved assault field	200 FT / 61 M	10 FT / 3.1 M

* Along each side of the runway and the entire length of paved overruns.

b. Taxiway Shoulders. Shoulders are provided along a taxiway to support and allow an aircraft to recover if it should leave the paved taxiway. Paved shoulders prevent erosion caused by jet blast or prop wash, support the occasional aircraft that may wander off the taxiway, support vehicular traffic, and reduce maintenance of unpaved shoulder areas.

Shoulders for fixed-wing taxiways may be paved or unpaved, depending on the agency, class of runway, and type of aircraft. Airfields that support wide-bodied aircraft may require soil stabilization beneath outer engines. See UFC 3-260-1, Table 5.1, for fixed-wing taxiway shoulder criteria, including widths and grading requirements to prevent 'ponding' (the accumulation of storm water).

Paved shoulders are also required adjacent to rotary-wing taxiways to prevent blowing dust and debris due to prop wash. Criteria for rotary-wing taxiway shoulders (including layout, width, cross slopes, and grading requirements) are presented in UFC 3-260-1, Table 5.3.

Taxiway Function	Total Shoulder Width	Paved Shoulder Width
General use	50 FT / 15.3 M	25 FT / 7.7 M
Trainer aircraft	50 FT / 15.3 M	10 FT / 3.1 M
Fighter aircraft	50 FT / 15.3 M	10 FT / 3.1 M
Paved assault field	25 FT / 7.7 M	10 FT / 3.1 M
Helicopters *	50 FT / 15.3 M	25 FT / 7.7 M

* ANG helicopters normally share the 'general use' taxiway, i.e., same as C-130 aircraft.

c. Apron Shoulders. Paved shoulders are provided around the perimeter of an apron to protect against jet blast and foreign object damage (FOD), support blast deflectors, and provide space to store support equipment; to prevent ponding on the edge of the shoulder, the adjacent turf should be graded to promote drainage. Criteria for apron shoulders are presented in UFC 3-260-1, Table 6.1.

Apron Function	Total Shoulder Width	Paved Shoulder Width
C-5, E-4, Boeing 747-series (along entire apron)	50 FT / 15.3 M	50 FT / 15.3 M
Other fighter, cargo, tanker aircraft (entire apron)	50 FT / 15.3 M	25 FT / 7.7 M
Jet blast deflector (between deflector and apron edge)	50 FT / 15.3 M	- varies -

d. Pad Shoulders. Pad shoulders are constructed of existing soils, thoroughly compacted and covered with turf or a soil binder.

2.7 Pad Criteria

Pads are relatively small paved areas that serve specific functions such as dangerous cargo loading, helicopter parking, aircraft power check, and aircraft warm-up and holding.

2.7.1 Category Code 116-661, Arm/Disarm Pad. Used for both the arming of aircraft immediately before takeoff and the disarming ('safing') of any weapons retained or not expended upon the aircraft's return, arm/disarm pads should be located adjacent to runway thresholds and sited such that armed aircraft are oriented towards the least populated areas or towards revetments.

a. Pad Size. Each arm/disarm pad should be capable of servicing four aircraft at the same time. Pad dimensions may vary with the length and wingspan of the aircraft to be served. Typical layouts of arm/disarm pads are shown in Figures 6.20, 6.21, 6.22, and 6.23 of UFC 3-260-1.

Arm/disarm pads to handle more than 4 aircraft simultaneously must be operationally justified.

b. Tiedown and Grounding Points. No tiedown/mooring eyes or electrical grounding points are required on arm/disarm pads.

c. Inhabited Building Distance Clear Zone. As a general rule, an "inhabited building distance clear zone" (IBDCZ) of ±5° of arc on each side of the heading of the parked aircraft and 5 MI / 8 KM to its front – both measured from the aircraft's nose – should be maintained. No occupied building is to be in this clear zone (nor should any other building, if possible, to prevent damage from accidental weapon firing). In addition, no aircraft or vehicles should be parked within the IBDCZ.

The IBDCZ may cross a runway, taxiway, or runway approach so long as any passing aircraft will be visible to the arm/disarm quickcheck crews, who can then suspend their operations while the aircraft is within the clear zone.

If an adequate clear zone cannot be achieved, use earth revetments or sloped surfaces as a barrier.

d. Electromagnetically Quiet Location. Before construction of any arm/disarm pad, local field measurements must be taken to ensure the location is electromagnetically quiet. To avoid potential electromagnetic interference from taxiing aircraft, the pads should be located on the side of a runway opposite the parallel taxiway.

e. Ammunition/Explosives Safety Standards. Criteria for ammunition and explosive safety standards are discussed in UFC 3-260-1, Attachment 10.

2.7.2 Category Code 116-662, Hazardous Cargo Pad. Paved areas for loading and unloading explosives and other potentially dangerous cargo from aircraft, hazardous cargo pads are required at facilities where the existing aprons cannot be used for the loading and unloading of such items without violating quantity-distance safety criteria. At ANG bases, hazardous cargo pads will be specifically authorized by CEP.

Hazardous cargo pads require explosives site planning, as discussed in UFC 3-260-1, Attachment 10.

a. Pad Size. At aviation facilities used by small cargo aircraft, the hazardous cargo pad is circular, as shown in UFC 3-260-1, Figure 6.25. At aviation facilities used by large cargo aircraft, at aerial ports of embarkation (APOE), and at aerial ports of debarkation (APOD), the hazardous cargo pad is semi-circular (as shown in UFC 3-260-1, Figure 6.26) and adequate for aircraft up to and including C-5 dimensions.

The hazardous cargo pad geometric dimensions shown in Figures 6.25 and 6.26 of UFC 3-260-1 are minimum requirements, and the actual pad may be larger if the design aircraft cannot maneuver on a minimally sized pad.

b. Tiedown and Grounding Points. Tiedown/mooring eyes and electrical grounding points must be provided on each hazardous cargo pad. These are discussed at greater length in UFC 3-260-1, Attachment 12.

c. Access Taxiway. An access taxiway will be provided for access from the primary taxiway to the hazardous cargo pad. The taxiway should be designed for aircraft to taxi onto the hazardous cargo pad under their own power.

d. Access Road. Consideration should be given to providing a paved roadway to the hazardous cargo pad for access by trucks and other vehicles.

e. Utilities. The following must be considered for hazardous cargo pads:

Telephone service	Airfield lighting
Apron lighting	Water/fire hydrants

2.7.3 Category Code 116-664, Unsuppressed Power Check Pad. An 80 FT x 120 FT (24.4 M x 36.6 M) paved area used in performing full power checks of jet engines, the basic aircraft power check pad is authorized for bases where suppressed pads are not required. It includes a thrust anchor (or anchors) for aircraft serviced by the pad, as well as paved shoulders and a blast deflector to protect the surrounding area from jet blast. It may also include floodlighting for night operations; a water supply to wash away fuel spills; oil separators, a holding tank, and adequate treatment of fuel-washdown drainage before its discharge to a sanitary or storm sewer; and communication with both the maintenance control room and the base telephone system.

Locate the power check pad to satisfy DoD 6055.9-STD and AFM 91-201 explosives safety standards.

2.7.4 Category Code 116-665, Power Check Pad (with Noise Suppressor). The prime facility on which operational checks of jet engines are performed, this type of power check pad usually supports Hush House sound suppressors, which are supplied – with associated devices – as government-furnished equipment (GFE). Optional features listed above (floodlighting, water supply, oil separators, holding tank, treatment of fuel-washdown drainage, and communications capability) may also be provided (see HQ AFMC/CEPR *Hush House Site Planning Bulletin*).

An unsuppressed pad is generally used as a backup or interim facility to the noise-suppressed pad if there is an operational requirement and the noise contour allows it.

2.7.5 Category Code 116-666, Warm-Up/Holding Pad. A paved area adjacent to a taxiway at or near the end of a runway, a warm-up pad (also referred to as a 'holding apron') provides a parking location off the taxiway for aircraft that must hold their position during indeterminate delays. This allows other departing or arriving aircraft unencumbered access to the taxiway/runway.

The most advantageous position for a warm-up pad is adjacent to the end turnoff taxiway, between the runway and its parallel taxiway. However, other design considerations such as airspace and navigational aids may make this location undesirable; if so, the warm-up pad should be located at the end of – and adjacent to – the parallel taxiway. See UFC 3-260-1, Figures 6.9 through 6.16, for illustrations of various warm-up pad layouts.

a. Pad Size. The warm-up/holding pad will be able to simultaneously accommodate two of the largest aircraft assigned to the facility, as described in the table under category code 113-321, Apron (see paragraph 2.5.1e, Aircraft Parking).

b. Tiedown and Grounding Points. No tiedown/mooring eyes or electrical grounding points are required on warm-up/holding pads.

2.7.6 Category Code 116-672, Aircraft Wash Rack. This pad is used for the cleaning of aircraft exterior surfaces. Both covered and uncovered wash racks will be justified on a case-by-case basis.

If the wash rack is not part of a larger facility (fuel cell or corrosion control), a separate corrosion control utility storage building (category code 211-161) up to 100 SF / 9.3 SM may be authorized to hold cleaning supplies and equipment.

2.8 Aircraft Arresting System Criteria

Aircraft arresting systems consist of engaging devices and energy absorbers. Engaging devices are net barriers, disc supported pendants (hook cables), and cable support systems that allow the pendant to be raised to the battery position or retracted below the runway surface. Energy absorbers can be ship anchor chains, rotary friction brakes, and/or rotary hydraulic systems.

The arresting system is government-furnished equipment, as discussed in AFI 32-1043, *Managing Aircraft Arresting Systems*.

Current AAS configurations include MA-1A BAK-13 (rotary hydraulic system) BAK-14
BAK-9 (rotary friction brake) 61QSII (BAK-15)
BAK-12 (rotary friction brake) Dual BAK-12 systems

2.8.1 Category Code 116-922, Aircraft Arresting System (AAS).

a. Authorized Number. Two aircraft arresting systems are authorized at each facility (one at each end of the most used runway) if fighters are assigned.

b. Procurement. Aircraft arresting systems are centrally procured. The requirements for arresting systems are first submitted by each MAJCOM to HQ AFCESA/CESC for validation. The arresting systems are then distributed according to the validated requirements [see AFI 32-1043 for details].

c. System Siting. Criteria for the placement of aircraft arresting systems are as follows:

MA-1, -1A	Overrun area, 50 FT / 15.3 M to 100 FT / 30.5 M from threshold
BAK-9	First 1,000 FT / 304.8 M of runway, or in overrun area (see above)
BAK-12, -13, -14	950 FT / 289.6 M to 2,500 FT / 760 M down runway from threshold

d. Design, Installation, and Repair. Detailed information regarding the planning, installation, and repair of an aircraft arresting system or arresting system complex is found in AFI 32-1043, *Managing Aircraft Arresting Systems*. The configuration and location of arresting system installations will also be determined in accordance with AFI 32-1043, while the system design will conform with criteria in Section 3 of the appropriate 35E8-series Technical Order and the typical installation drawings.

e. Runway Pavement. Condition of the 200 FT / 66.7 M of pavement on either side (approach and departure) of the arresting system pendant is critical. Protruding objects and undulating surfaces are detrimental to successful tailhook engagement and must not be allowed. The maximum permissible longitudinal surface deviation here is ± 0.125 IN / ± 3.2 MM in 12 FT / 3.7 M; consequently, no change in pavement type or interface between rigid and flexible pavements is permitted within this area.

f. Pavement Repair. Rigid inlays will not be used as a repair material beneath the cable in a flexible runway system because of the high hook skip potential that results when the flexible pavement consolidates and exposes the leading edge of the rigid pavement.

g. Joint-Use Airfields. Arresting systems installed on joint-use civil/military airfields to support military aircraft are sited in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5220-9, *Aircraft Arresting Systems for Joint Civil/Military Airports*, which may be obtained from the following source:

U.S. Department of Transportation
General Services Section, M-443.2
Washington DC 20590

h. Disagreements. Any disagreements between the responsible local officials regarding aircraft arresting systems must be referred to the next higher level for resolution.

i. Operating Agency. When an aircraft arresting system is installed at a joint-use civil airfield for the primary use of U.S. military aircraft, the FAA acts for – and on behalf of – the DoD service component in 'operating' the equipment; however, the Civil Engineering Technical Services Center, Minot ND, performs AAS services for ANG.

Chapter 3. CATEGORY GROUP 12
PETROLEUM DISPENSING AND OPERATING FACILITIES

3.1 General Criteria

This chapter contains the major criteria and standards for petroleum dispensing and operating facilities at ANG installations nationwide, each of which must receive, store, distribute, and dispense the fuel and lubrication products necessary to achieve its assigned mission.

3.1.1 Category Code 121-111, Petroleum Operations Building. The petroleum operations building is a centralized facility for the management and control of all base functions related to the handling of petroleum products, including their receipt, storage, and issue. The building also includes a laboratory for conducting prescribed tests to ensure the aircraft fuel products conform to military specifications.

The size of the facility depends on the number of personnel assigned to manage fuels. The factors that determine total facility size are listed in the following table:

	Authorized Area (SF)		
Petroleum Operations Function	16-23 Personnel	24-31 Personnel	32+ Personnel
Fuels Chief - NCOIC	150	150	150
Secretary / Administration	100	100	100
Fuels Control Center / Dispatch	150	150	150
Ready Room / Operations & Maintenance	190	265	360
Training / Break Room	350	500	650
Laboratory	250	250	250
Personal Lockers (M/F)	115	175	220
Restrooms / Showers (M/F)	275	325	350
Mechanical / Electrical / Communications	150	170	190
Circulation / Walls	240	260	300
Janitor Closet	30	30	30
Total Petroleum Operations Area	**2,000 SF / 186 SM**	**2,375 SF / 221 SM**	**2,750 SF / 256 SM**

3.1.2 Category Code 121-122, Hydrant Fueling System. A hydrant fueling system, which includes a minimum of two operating storage tanks, provides all the equipment and controls necessary to deliver clean, dry fuel to fueling points in the aircraft parking apron. Fueling positions (pits) will be provided at all authorized aircraft parking positions.

A hydrant fueling system is required for aircraft with a total tank capacity of 20,000 GL / 75,700 LT or more, or for any aircraft – regardless of tank capacity – if a complete economic analysis shows the annual cost of owning and operating a hydrant fueling system is less than that of a truck fueling system.

3.1.3 Category Code 121-124, Hydrant Fueling Building. The hydrant fueling building houses all the pumps, filter separators, valves, piping, and controls required for operation of the hydrant fueling system. This facility should be fully enclosed and occupy an area of approximately 1,300 SF / 121 SM.

3.1.4 Category Code 123-335, Vehicle Fueling Station ('Base Service Station'). Provided to service government-owned vehicles and equipment, the facilities and equipment are similar to commercial service stations, with separate storage and dispensing facilities for each type of fuel issued.

One centralized fueling station shall be provided at each ANG installation. Two canopied dispensing pedestals for ground fuels will be provided for each increment of 150 motor vehicles authorized to be served; at least one pedestal will dispense motor gas and one will dispense diesel fuel.

A minimum storage capacity of 5,000 GL / 18,930 LT is authorized for each grade of fuel, unless need for a greater capacity is validated and approved by ANG/CEP.

Compressed natural gas service stations are generally skid-mounted equipment, versus real property.

3.1.5 Category Code 124-134, Operating Storage (Diesel). This tank is provided to store diesel fuel immediately before it is dispensed into vehicles or equipment. An above-ground tank is required, which shall conform to all local, state, and federal environmental regulations.

3.1.6 Category Code 124-135, Operating Storage (Jet Fuel). These tanks (minimum of two) are provided to store jet fuel immediately before it is dispensed into aircraft or refueling service vehicles. Above-ground tanks – which shall conform to all local, state, and federal environmental regulations – are preferred, with their size based on mission support requirements.

Minimum mission-based total storage requirements are as follows:

Aircraft	Storage Quantity (BL)	Storage Quantity (GL)
F-15 (up to 24 PAI)	4,800	200,000
Other fighter types (up to 24 PAI)	2,400	100,000
C-130J (up to 10 PAI)	2,400	100,000
KC-135 (up to 10 PAI)	10,000	420,000
C-141, C-17 (up to 10 PAI)	7,000	300,000
C-5, KC-10 (up to 10 PAI)	13,000	550,000

3.1.7 Category Code 124-137, Operating Storage (Motor Gas). This tank is provided to store motor gas immediately before it is dispensed into vehicles or equipment. An above-ground tank is required, which shall conform to all local, state, and federal environmental regulations.

3.1.8 Category Code 125-977, Pump Station (Liquid Fuel). This facility – located within the jet fuel storage complex – houses all the pumps, filter separators, valves, piping, and controls required to receive, issue, and transfer fuel into and out of the operating storage tanks.

The pump station should be fully enclosed and occupy an area of approximately 1,200 SF / 112 SM.

3.1.9 Category Code 126-925, Liquid Fuel Truck Fill Stand. Truck fill stands are provided at all ANG bases where jet fuel products are stored and dispensed as a means of transferring aviation fuel from the storage tanks into fuel servicing vehicles (refuelers) and tank trucks.

A minimum of two truck fill stands will be provided, to be located within the jet fuel storage complex. The need for any additional fill stands must be justified to DESC (Defense Energy Support Center), based on mission and operational requirements.

The stands may be covered to protect personnel from the elements (ice, snow, rain, wind, etc.), as well as minimize the amount of liquids that enter the containment area and must then be processed by the collection system. The covering would also provide an enhanced level of personnel safety and environmental protection.

3.1.10 Category Code 126-926, Liquid Fuel Truck Unloading Stand. Truck unloading stands are provided at all ANG bases where jet fuel products are dispensed as a means of unloading aviation fuel from commercial tankers or servicing vehicles.

A minimum of two truck unloading stands will be provided, to be located within the jet fuel storage complex. The need for any additional unloading stands must be justified to DESC (Defense Energy Support Center), based on mission and operational requirements.

The stands may be covered to protect personnel from the elements (ice, snow, rain, wind, etc.), as well as minimize the amount of liquids that enter the containment area and must then be processed by the collection system. The covering would also provide an enhanced level of personnel safety and environmental protection.

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Chapter 4. CATEGORY GROUP 13 COMMUNICATIONS, NAVIGATIONAL AIDS, AIR TRAFFIC CONTROL, AND AIRFIELD LIGHTING

4.1 General Criteria

Installation of ground-based aids to air traffic control, air navigation facilities, and airfield lighting at civil airports is normally accomplished by the Federal Aviation Administration (FAA) and the local airport authority, with FAA responsible to provide and program for these facilities. In exceptional instances where little or no commercial or civil air traffic exists at a base and no additional traffic is generated by other military services, the installation of terminal navigational aids such as VHF omni-directional range (VOR) and tactical air navigation (TACAN) will be considered.

ANG does not normally have the capability or financial responsibility for operating or maintaining permanently installed navigation aid systems. The need for a terminal navigational aid should be fully documented and submitted to ANG/C4 for review and assistance.

4.1.1 Category Code 130-142, Fire Crash/Rescue Station. Located on the flight line for quick response to aircraft emergencies, the fire crash/rescue station includes space for apparatus bays, an alarm room, sleeping quarters, recreation/dining areas, administration areas, equipment maintenance and storage areas, and facilities to maintain physical fitness.

Fire crash/rescue stations are manned and equipped at three levels of flight operations coverage: 'primary' (all flight operations), 'support' (ANG flight operations only), and 'training' (for that purpose). The tables that follow are divided into those three categories, with the first two – 'primary' and 'support' -- presented as working templates to apply against different manning levels at various bases, case by case; because the manning levels for training are constant, the 'training' table has been completed.

[NOTE: The fire crash/rescue station is not to be confused with the category code 730-142 'community' fire station, which is normally located near family housing areas.]

- Primary (All Flight Operations) Level -

'Primary' Station Function	Authorized Area (SF)	Remarks
Alarm Center (24-hour manning)	300	
Restroom	40	
Bedroom	40	
Telecommunications	50	
Emergency Response Center	150	
Subtotal	580	
Apparatus (# bays, # pieces of equipment)		675 SF / piece x # pcs + 400 SF

'Primary' Station Function (cont'd)	Authorized Area (SF)	Remarks
Administration Area		
Vestibule/Entrance/Reception	150	
Fire Chief's Office	150	
Fire Chief's Conference Room	100	
Assistant Chief's Office (with bedroom)	170	
Assistant Chief / Tech Services Office	120	
HAZMAT/Safety Office	120	
Handicapped Restrooms (M/F)	100	
Admin Storage / Miscellaneous	100	
Subtotal		
Training Area		
Training/Break Room		20 SF / person x # persons (max)
Chief of Training Office	120	
Testing Room	100	
Computer Simulation	100	
Physical Fitness	750	
Subtotal		
Living Area		
Bedrooms		110 SF / person x # persons
Restrooms/Showers (M/F)		20 SF / person x # persons (max)
Janitor's Closet	50	
Personal Lockers		10 SF / person x # persons
Physical Therapy	100	
Laundry	100	
Subtotal		
Recreation/Dining Area		
Recreation Room		250 SF (min) + 10 SF / shift person
Day Room		200 SF (min) + 10 SF / shift person
Kitchen	200	
Kitchen Storage		25 SF / shift x # shifts
Dining Area		10 SF / shift person
Vending	20	
Subtotal	985	
Maintenance/Repair/Support/Storage		
Agent (AFFF) Storage	100	
Hose Storage & Drying	100	
Fire Extinguisher Maintenance & Repair	120	
SCBA Maintenance & Repair	120	
Protective Clothing Lockers		6 SF / person x # persons
Protective Clothing Laundry & Disinfecting Area	160	
General Storage	150	
Medical Storage	50	
Subtotal		
Circulation Subtotal		
Circulation		25% of Circulation Subtotal
Building Subtotal		
Mechanical/Electrical/Communications Room		5% of Building Subtotal
Grand Total		
Total 'Primary' Station Area (rounded)	SF / SM	

- Support (ANG Flight Operations Only) Level -

'Support' Station Function	Authorized Area (SF)	Remarks
Alarm Center (manned)	200	
Restroom	40	
Telecommunications	50	
Emergency Response Center	150	
Subtotal	440	
Apparatus (# bays, # pieces of equipment)		675 SF / piece x # pcs + 400 SF
Administration Area		
Vestibule/Entrance/Reception	100	
Fire Chief's Office	150	
Fire Chief's Conference Room	100	
Assistant Chief's Office	120	
Tech Services Chief's Office	120	
HAZMAT/Safety Office	120	
Handicapped Restrooms (M/F)	100	
Storage / Miscellaneous	75	
Subtotal	885	
Training Area		
Training/Break Room		20 SF / person x # persons
Chief of Training Office	120	
Testing Room	100	
Computer Simulation	100	
Physical Fitness	750	
Subtotal		
Living Area		
Restrooms/Showers (M/F)		20 SF / person x # persons
Janitor's Closet	50	
Personal Lockers		10 SF / person x # persons
Laundry	100	
Subtotal		
Recreation/Dining Area		
Recreation/Day Room		250 SF (min) + 10 SF / shift person
Kitchen	100	
Kitchen Storage		25 SF / shift x # shifts
Dining Area		10 SF / shift person
Vending	20	
Subtotal		
Maintenance/Repair/Support/Storage		
Agent (AFFF) Storage	100	
Hose Storage & Drying	100	
Fire Extinguisher Maintenance & Repair	100	
SCBA Maintenance & Repair	100	
Protective Clothing Lockers		6 SF / person x # persons
Protective Clothing Laundry & Disinfecting Area	160	
General Storage	100	
Medical Storage	35	
Subtotal		
Circulation Subtotal		
Circulation		25% of Circulation Subtotal
Building Subtotal		
Mechanical/Electrical/Communications Room		5% of Building Subtotal
Grand Total		
Total 'Support' Station Area (rounded)	____ SF / ____ SM	

[See notes, next page.]

Note: 12 F/T personnel, 27 UTA personnel (10% overage = 30 UTA max).
12 F/T personnel split between 2 shifts, 8 hours / day (no overnights, no UTA weekends).
'Support' station provides ANG flight operations coverage only.

- Training Level -

'Training' Station Function	Authorized Area (SF)	Remarks
Alarm Room (unmanned)	100	Unmanned
Subtotal	100	
Apparatus (3 bays, 6 pieces of equipment)	4,450	675 SF / piece x 6 pcs + 400 SF
Administration Area		
Fire Chief's Office	150	
Assistant Chief's Office	120	
Tech Services Chief's Office	120	
Admin Storage / Miscellaneous	50	
Subtotal	440	
Training Area		
Training/Break Room	600	20 SF / person x 30 persons
Chief of Training Office	120	
Testing Room	100	
Physical Fitness	750	
Subtotal	1,570	
Living Area		
Restrooms/Showers (M/F)	600	20 SF / person x 30 persons
Janitor's Closet	50	
Personal Lockers	300	10 SF / person x 30 persons
Vending Area	20	
Subtotal	970	
Maintenance/Repair/Support/Storage		
Hose Storage & Drying	100	
Fire Extinguisher Maintenance & Repair	100	
SCBA Maintenance & Repair	100	
Protective Clothing Lockers	180	6 SF / person x 30 persons
Protective Clothing Laundry & Disinfecting Area	160	
General Storage	50	
Medical Storage	20	
Subtotal	710	
Circulation Subtotal	3,490	
Circulation	873	25% of Circulation Subtotal
Building Subtotal	9,113	
Mechanical/Electrical/Communications Room	456	5% of Building Subtotal
Grand Total	9,569	
Total 'Training' Station Area (rounded)	**9,600 SF / 892 SF**	

Note: No F/T personnel, 27 UTA personnel (10% overage = 30 UTA max).
'Training' station provides no flight operations coverage; used for training only.

4.1.2 Category Code 131-111, Communications Facility. The communications facility provides a centrally located system for both intra-base and off-base communications.

If an ANG unit is a tenant on an active-duty installation, the space authorizations are reduced when non-training functions are provided by the host base; if services are contracted out, the space authorizations for those functions are also to be reduced accordingly. Additional space is authorized if a regional operations support center (ROSC) is located on an installation.

Uninterruptible power supply (UPS) systems are considered unit equipment and will be funded through supply funding channels; however, the electrical service to the UPS and back-up power for the ROSC can be included as real property installed equipment.

Authorizations for the electrical service to the UPS and back-up power for the base network control center (BNCC) must be approved by ANG/CEP, based on mission requirements.

The following table presents a breakdown of the communications facility by function, authorized personnel, and related space requirements:

Comm Facility Function	Auth. Pers	ANG Unit (SF)	ANG Tenant (SF)	Remarks
Flight Commander (O-5, O-6)	1	225	225	
Conference Room (10 people)		225	225	
Administration (2 pers @ 90 SF)	2	180	180	
Storage & Supply Room		100	100	
Plans Chief (E-8)	1	100	100	
Plans Staff (3 pers @ 90 SF)	3	270	270	
Computer Staging/Storage	1	400	400	
ADPE Storage		200	200	Equip. for disposition
Mission Systems Chief (E-9)	1	125	125	
Systems Support	3	350	270	Incl. equip/tool storage
Telephone Maintenance	3	350	270	Incl. equip/tool storage
Radio Maintenance *[note 1]*	2	400	180	Incl. equip/tool storage
LMR Management (E-8)	1	100	100	
Computer Maintenance	3	350	270	Incl. equip/tool storage
PMI UTC Storage *[note 2]*		400	400	PMI UTC pkgs only
Secure Storage Room (Crypto)	1	100	100	TS-cert. open storage
BCTF Telephone Switch		750	0	
Information Systems Chief (E-9)	1	125	125	
BNCC[3]	10	1,250	1,250	
Mail & Distribution	1	120	120	
Information Support	1	200	200	
Publishing	1	100	100	
Data Supervisor (E-8)	1	100	100	
Data Communication/Distribution	1	200	200	
Media Storage		250	150	
Cmptr Trng [Class]Room (50 pers)		800	800	Training for entire base
Break Area		175	175	
Personnel Lockers		225	225	Includes A/V lockers
Subtotal	38	8,170	6,860	
Overhead Factor (30%)		2,451	2,058	
Total Comm Area		10,621	8,918	
Total Comm Area (rounded)		**10,600 SF / 985 SM**	**8,900 SF / 827 SM**	*[note 3]*

Comm Facility Function (cont'd)	Auth. Pers	ANG Unit (SF)	ANG Tenant (SF)	Remarks
ROSC Function				[note 4]
Classified Equipment Area		350		
Unclassified Operation Support Ctr		350		
Power Transfer Area		100		
Operations Area (12 pers @ 90 SF)	12	1,080		
ROSC Superintendent (E-9)	1	125		
Comm Distribution Area		100		
Subtotal	13	2,105		
Overhead Factor (30%)		632		
Total ROSC Area		2,737		
Total ROSC Area (rounded)		**2,700 SF / 250 SM**		

1. Authorized for 6-pack / test equipment / bench stock (in-house repair); if ANG tenant, training space only (150 SF / 14 SM).
2. Mobility bag storage to be located within Base Supply (category code 442-758).
3. Space authorization for communications units with up to 40 personnel.
4. Back-up power only to ROSC UPS, a/c, and lighting; authorization of BNCC back-up power based on mission requirements.

4.1.3 Category Code 136-661, Approach Lighting. Approach lighting is designed to form the sensory coupling between electronic, precision low-approach guidance and the visual reference of runway lighting for the landing of aircraft.

Approach lighting at commercial airports is normally provided by the FAA, although upgrades to meet Air Force criteria may be considered by ANG.

Air Force criteria will be used where ANG owns and operates the airfield. [See AFI 32-1044 for details.]

4.1.4 Category Code 136-664, Runway Lighting. Runway lighting at commercial airports is normally provided by the FAA, although upgrades to meet Air Force criteria may be considered by ANG.

Air Force criteria will be used where ANG owns and operates the airfield. [See AFI 32-1044 for details.]

4.1.5 Category Code 136-666, Special Airfield Lighting.

a. Basic FAA standard 4-box configuration (or other FAA follow-up configurations) may be used on civil airports. [See FAA Handbook 6850.2, *Visual Guidance Lighting Systems.*]

b. Lighted runway distance-remaining signs and lighted runway/taxiway signs will comply with FAA criteria at civilian airports and with military standards at the respective service airfields.

4.1.6 Category Code 136-667, Taxiway Lighting. Taxiway lighting may be provided for primary taxiways. Reflectors may be installed as an interim measure in place of lighting on the primary taxiway, or permanently installed on secondary or seldom-used taxiways. [See AFI 32-1044 for details.]

Chapter 5. CATEGORY GROUP 14
LAND OPERATIONAL FACILITIES

5.1 General Criteria

Land operational facilities include those needed for explosive ordnance disposal (EOD), aerospace pararescue and recovery functions, audio-visual activities, base operations, crew readiness, squadron operations, deployment processing, air traffic control, and range observation, each of which carries its own, unique category code.

5.1.1 Category Code 141-165, Explosive Ordnance Disposal (EOD) Facility. EOD personnel must have continuing proficiency training in applying EOD tools and techniques, and in the handling, setup, and detonation of explosives and the operation of explosively driven tools. They may also be required to train base personnel in explosive ordnance reconnaissance.

Where authorized, the EOD facility requires an administrative office, a training room suitable for classes/briefings containing up to (and including) 'SECRET' information, an equipment bay (with roll-up door) for special-purpose clothing and equipment storage, a workshop, and latrine facilities. In addition, EOD must have access – either on base or at a nearby DoD facility – to a demolition range (2.5 LB NEW limit). The EOD facility must also be located an 'inhabited building' distance from any explosive site, in accordance with AFM 91-201 (paragraph 5.3).

Classified information will be stored by the EOD facility; firearms will be stored in the Security Forces armory; and hazardous or explosive materials will be kept in above-ground magazine storage facilities (category code 422-258) or storage igloos (category code 422-264), in accordance with AFM 91-201 and DoDD 6055.9-STD, as well as with all federal, state, and local laws.

When possible, the EOD area should be co-located with Base Engineer Maintenance Facility (category code 219-944).

EOD Function	Authorized Area (SF)	Remarks
Flight Chief Office	150	
Staff Workspaces	450	5 persons
Secure Training Room	450	Max rating 'SECRET'
Maintenance and Secure Storage Area	1,900	Mobility
Laundry	75	
Net Area	3,025	
Overhead Factor (30%)	908	
Total EOD Area	3,933	
Total EOD Area (rounded)	**3,900 SF / 362 SM**	

5.1.2 Category Code 141-185, Aerospace Pararescue and Recovery Hangar. This facility is for the support of units with an airborne pararescue mission.

A typical ANG pararescue unit consists of 6 HH-60 helicopters, 4 HC-130 aircraft, and 80 personnel. The space requirement for the helicopter hangar – which may be co-located with another hangar – is 7,700 SF / 716 SM (based on 5 assigned aircraft) or 13,000 SF / 1,208 SM (for 6 assigned aircraft).

	Auth.		

Pararescue Admin Function	Pers	Authorized Area (SF)	Remarks
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 persons
Superintendent (E-9)	1	125	
First Sergeant	1	125	
Administration	4	360	
Director of Operations (O-4)	1	175	
Current Operations	3	270	
Plans / Intelligence	3	400	*[note 1]*
Standards/Evaluation DOV	1	125	
Training	6	540	
Testing, Distance/Unit Learning		225	2-4 persons testing
Scheduling	3	270	
Director of Logistics (O-4)	1	175	
Logistics Management	4	360	
Medical Director	1	125	
Medical Administration	3	270	
Flight Chiefs (O-4s)	3	525	
Flight Rooms	36	900	*[note 2]*
Class/Multi-purpose Room		800	Holds 1/2 unit at one time (40 pers)
SERE (Search, Evasion, Resistance, Escape)	4	360	
Subtotal	76	6,580	
Total Pararescue Admin Space		**6,580 SF / 611 SM**	

1. Must provide for secure storage and supernet; Intelligence requires a planning area and computer space.
2. One room for each flight (A, B, C), 12 pers @ 25 SF per room; rooms for mission brief/debrief, weapons cleaning.

Pararescue Support Function	Auth. Pers	Authorized Area (SF)	Remarks
Medical Training Support Equipment		200	
Controlled Substance/Medications Office	1	230	
Medical Supplies		400	Storage of controlled substances
Laundry Area *[note 3]*		400	4 commercial washers, dryers
Drying Room		500	
SCUBA Equipment Storage / Wash Room		800	
Parachute Riggers	4	1,000	*[note 4]*
Parachute Drying Tower		300	*[note 5]*
Parachute Storage		1,000	2.5 chutes / pers (w/ reserve) = 300
Supplies Storage / Supply Office	1	600	10% bench strg overage allowance
Mission Alert Equipment Storage		800	
Equipment Staging / Mission Buildup		1,200	*[note 6]*
Individual Equipment Storage		6,000	80 persons @ 100 SF / 9.3 SM
Bulk Equipment Storage / Mobility Bay		2,000	
Watercraft Equipment Storage	1	2,000	12 infl Zodiacs, 2 high in racks
LGC Communications	2	500	
Life Support	3	600	Only non-flying PJ personnel
Fuel Storage		140	*[note 7]*
Covered Outside Storage		2,500	Pallets, ISUs, RAMZ, ATV acc
Climbing & Rappelling Wall / Helo Mockup			Req per AF msg re Pararescue trng
Subtotal	12	20,940	
Total Pararescue Support Space		**20,940 SF / 1,945 SM**	

Total Pararescue Admin Space (76 persons)	6,580 SF /	611 SM
Common Area Factor (30%)	1,974 SF /	183 SM

Total Pararescue Support Space (12 persons)	20,940 SF / 1,945 SM
Common Area Factor (20%)	4,188 SF / 389 SM
Total Pararescue Area (99 persons)	33,682 SF / 3,129 SM
Total Pararescue Area (rounded)	**33,000 SF / 3,131 SM**

3. Includes space for hanging of down clothing and other cold-weather gear.
4. This shop packs Zodiacs and ATVs for air drops (900-1,600 lbs.): one location eases cleaning, packing, maintenance.
5. PJs are only element that require fresh-water rinsing and hang-drying of wet equipment and parachutes.
6. Area used for flights to prepare and inspect mission gear (parachutes, rucksacks, weapons, etc.).
7. Exterior, walled area with open-top concrete/brick construction storage for Zodiac and ATV fuel.

5.1.3 Category Code 141-383, Audio/Visual Facility. Provides space for the production, filing, and presentation of audio/visual materials, graphic arts, and visual aid products used in training, conferences, briefings, and similar activities.

The audio/visual library provides space for customer service, administration, audio/visual equipment storage/maintenance/training, and a previewing room. The graphic arts facility provides space for an artist or illustrator, work and production areas, copy/reproduction, composition and lettering, copy camera equipment, tools and accessories, display, master artwork, and reference materials and catalogues, as well as specialized drafting equipment, tools, and accessories.

Audio/Visual Function	Auth. Pers	Auth. Area (SF)	Remarks
Support Branch Chief (E-8)	1	100	
Customer Service Area (2 pers @ 90 SF)	2	180	
Storage & Supply Room		100	
Photo Support (3 pers @ 90 SF)	3	270	
Video Teleconference Room		450	
Multimedia Studio		600	Incl. production, editing, CCTV distribution center
Graphics	1	150	
Equipment Storage		150	
Connectivity Room		100	
Subtotal	7	2,100	
Overhead Factor (20%)		420	A/V lockers/restrooms under cat code 131-111
Total A/V Area		2,520	
Total A/V Area (rounded)	**2,500 SF / 232 SM**		

Note: Additional 175 SF / 16.3 SM authorized for units with combat camera equipment for UTC storage.
Mobility bag storage included in Base Supply (category code 442-758).
When possible, Audio/Visual Facility should be co-located with Communications Facility (category code 131-111).

5.1.4 Category Code 141-453, Base Operations. The space requirement for this item is included under Squadron Operations (category code 141-753), and is part of the squadron operations authorized space. Where ANG operates the airfield, a separate area for base operations may be justified – case-by-case – for operational need.

5.1.5 Category Code 141-459, Crew Readiness. Air defense crews and aircraft are in a continuous alert status to support the air defense or high-threat-area defense mission. Crew facilities must be near alert aircraft so crews can be airborne within the required time after the order to 'scramble'.

Air alert crews and supporting ground crews are on duty for 24 uninterrupted hours, during which time they require housing and support facilities to ensure good morale and effective performance of their

mission. The support facility also needs a separate room for operational support to allow operational materials to remain ready for use in a room that is securable when not in use.

This facility provides space for operations, crew quarters, and recreation for fighter, tanker, and airlift forces: operational areas include administrative space, operational offices, a mission planning area, and a briefing room; crew quarters include sleep and study rooms, bathrooms, a laundry, a lounge, a kitchen, and a dining room; recreational space includes exercise and game rooms. Space requirements for air defense or high-threat areas are provided for 4 aircrew members and 4 crew chiefs (male or female), with a private sleeping room, study room, and restroom for each.

The fighter aircraft crew readiness facility must be located to comply with explosives safety standards.

Alert Crew Readiness Function	Auth. Pers	Auth. Area (SF)	Remarks
Individual Bedroom / Study Area / Restroom	12	1,800	150 SF / pers
Ready Room / Break Room / Briefing Room		1,050	
Exercise Room (with M/F restrooms)		950	
Kitchen		200	
Food Storage		75	25 SF / rotation
Dining Area	10	100	10 SF / pers
Vending Area		20	
Laundry Room		100	
Personal Lockers (M/F)		120	5 SF / pers x 24 pers
Operations Area			
SOF Office	1	500	
Operations Office	1	120	
Mission Planning / Storage	1	150	
Subtotal	25	5,185	
Overhead Factor (25%)		1,296	
Total Alert Crew Readiness Area		6,481	
Total Alert Crew Readiness Area (rounded)	**6,500 SF / 604 SM**		

5.1.6 Category Code 141-753, Squadron Operations. Each flying squadron requires a facility for the planning, briefing, administration, and critique of combat crews. Space for USAF Command Post (category code 141-461) and Base Operations (category code 141-453) is included, but not duplicated.

Facility functions include weapons and tactics, intelligence, briefing and debriefing, air advisor, flying safety, standardization and evaluation, flight planning, chemical ensembles storage, flight records, life support (to include night vision goggles), physical training, scheduling, general training (CFT, EPT, etc.), and group or wing operations.

Aircraft / Mission	Authorized Area (SF)
A-10, F-15(15-24 PAA)	24,000
C-130 (8-12 PAA)	22,000
C-5, C-17 (8-12 PAA)	24,700
HC-130, MH-60G (4, 6 PAA) [rescue]	21,500 *
KC-135 (10 PAA)	21,600
KC-10 (10 PAA)	24,700
B-52 (8 PAA)	33,000
F-16 with RECCE/TARS pods	add 200 **

* Add 22,700 SF for CONUS operations, or 25,850 SF for Alaskan ops.
** Requirement may be satisfied by PPIF or other facility.

F-16 Aircraft	Authorized Area (SF)
Admin area	5,000
Operational & support area-Includes 3,250 secure area	15,000
Command Post Area	1,700
Base Ops	1,600
Survival Equipment Shop	4,000
*Includes circulation, latrines and other overhead factors	
Total F-16 Squadron Operations	**27,300**

5.1.7 Category Code 141-786, Deployment Processing Facility. A typical deployment processing facility provides training space for receiving and processing personnel and baggage; baggage pallet buildup; counseling; passenger processing, briefing, and holding; miscellaneous space such as rest rooms; and a vending area. Space is also required for both a cargo deployment and a personnel deployment function (CDF, PDF), to include a Deployment Control Center (DCC), Transportation Control Unit (TCU), and a Deployment Processing Unit (DPU).

An 8,000 SF deployment processing facility is authorized at any installation charged with deploying personnel and equipment in support of deployment tasking. When located on another military installation, the unit will use the host facilities (unless operationally justified to ANG/CEP).

5.1.8 Category Code 149-962, Air Traffic Control Tower. Every airfield is authorized an air traffic control tower, necessary for the safe and efficient conduct of flight operations.

a. Functional Requirements. The tower consists of the control tower cab, a training and crew briefing room, a tower simulator (used for training), mechanical rooms, the chief air traffic control officer's (CATCO) office, an administration area, a back-up generator, utility support, extensive communications support, a catwalk around the outside of the tower cab, an intercom system, a security system, and an elevator. An access road and parking lot for organizational and non-organizational vehicles must also be provided.

b. Spatial Requirements. Space requirements are generally dictated by the site survey and statement of intent (SOI) that define some site-specific design parameters, and depend primarily on the height requirements of the tower and the standard floor layout.

c. Special Features. Consult the HQ AFCEE/DGA *Design Guide for Air Traffic Control Towers* for details on special features and spatial requirements of the air traffic control tower. Among the considerations are panels for the remote control of airfield lighting (FAA AC-1501/153345-3C); bright radar indicator tower equipment (BRITE) terminals; instrument consoles; a light gun; communication and flight tracking consoles; special heating, ventilation, and air conditioning needs; electrical power and grounding requirements; and fire detection and suppression systems/capabilities.

In addition to an airfield's main air traffic control tower, each air-to-ground range will require its own, smaller (225 SF / 20.9 SM) control tower. A radio equipment room (100 SF / 9.3 SM) may be included in the range tower structure, or be developed as a stand-alone building adjacent to the tower. [See Aircraft Range, category code 179-481.]

ATC Tower Function	Authorized Area (SF)	Remarks
Tower Control Cab	540	Top floor
Mechanical Room	640	Eighth floor
Simulator/Training Room	640	Seventh floor
Upper Electronics Equipment Room	640	Sixth floor

Lower Electronics Equipment Room	640	Fifth floor
Administrative Area	640	Fourth floor
Administrative Area	640	Third floor
Telephone Room	640	Second floor
Generator / Elevator Machinery Room	640	First (ground) floor
Total ATC Tower Area	**5,660 SF / 526 SM ***	

* Space may be provided next to the tower, if the tower height is not necessary.

[See notes, next page.]

Note: Tower consists of the floors listed below the tower control cab, based on site conditions.
Tower height is determined at the time of the site survey.
The number of "administrative" floors is dependent upon tower height; all floors not otherwise identified are finished out for administrative use, as needed.
Available space per floor (after removing elevator, internal stairway, landings, and cable ducts) is approximately 350 SF / 32.5 SM.
Unisex restrooms (located on alternate floors) each occupy 28 - 35 SF / 2.6 - 3.3 SM.
Additional floors required to obtain correct height for "line of sight" do not count against authorized area.

5.1.9 Category Code 149-967, Observation Tower. Each aircraft firing range will require one or two observation towers, as specified by the range layout. [See Aircraft Range, category code 179-481.]

Chapter 6. CATEGORY GROUP 17 TRAINING FACILITIES

6.1 General Criteria

ANG training facilities encompass those needed to support marching/concert bands, flight simulators, communications and electronics training, aeromedical evacuation and medical training, combat arms training and maintenance, aerial port training, small arms ranges, and aircraft ranges, as well as the command structures necessary for their operation.

6.1.1 Category Code 171-158, Band Center. Provides space to operate and administer a band, which includes studios, individual practice rooms, a music library, lockers, restrooms, a secure storage area for musical instruments and supplies, and administrative space.

Note that all bands have 36 authorized personnel.

Band Admin Function	Authorized Area (SF)	Remarks
Commander (O-5)	225	
Commander's Conference Room	225	12-15 pers
First Sergeant	150	
Administration	400	
Supply / Instrument Repair	1,400	
Rehearsal Hall	1,500	
Ensemble Practice Area	900	
Small Ensemble Area	150	
Individual Practice Rooms	150	3 rooms @ 50 SF / 4.6 SM
Library	400	
Break Room	150	
Personal Lockers	180	36 pers @ 5 SF / .5 SM
Net Area	5,830	
Overhead Factor (20%)	1,166	
Total Band Admin Area	6,996	
Total Band Admin Area (rounded)	**7,000 SF / 650 SM**	

Note: Mobility bags – if authorized – will be stored at Base Supply (see category code 442-758).

6.1.2 Category Code 171-212, Flight Simulator Training Facility. Used for all flight simulation training including aircrew combat training system (ACTS), the facility houses administration and records, classrooms, restrooms, trainer maintenance, supply storage, counseling space, a technical library, and secure storage space.

The scope and authorization of this facility will be determined by ANG/CEP, based on mission and the equipment assigned. Its space may be co-located with Squadron Operations (category code 141-753), or it may be a separate structure (note that EPT/CPT is a part of the Squad Ops category code).

6.1.3 Category Code 171-443, Reserve Forces General Training Support Facility. This facility supports various ANG mission support units not otherwise defined, including – but not limited to – services flights, weather flights, honor guard, airlift control flight (ALCF), tanker airlift control element (TALCE), etc., and encompasses office and administrative areas, storage space, administrative support space, and classrooms.

Additional space requirements for mobility equipment storage, training mockups, work areas, or other requirements unique to a particular unit will be separately determined.

Support Unit	Auth. Pers	Function Space (SF / SM) Admin	Storage	Personnel	Training
Weather Flight	13-18	1,800 / 167			
	19-30	2,700 / 251			
Services Flight	6-20	1,600 / 149	1,400 / 130		
	21-30	2,200 / 204	1,500 / 139		
	31-40	2,800 / 260	1,600 / 149		
Airlift Control Flight			1,600 / 149	2,100 / 195 *	
Honor Guard Flight		500 / 46	1,000 / 93		1,000 / 93

* Deduct 500 SF / 46 SM if co-located with Aerial Port, Squad Ops, or similar facility.

6.1.4 Category Code 171-445, Reserve Forces Operational Training Facility. Designated as common for ANG units; includes space for the wing commander and staff, environmental manager, administration, public affairs, safety, the support group commander, judge advocate, public relations, accounting and finance, logistics plans, a chaplain, the historian, personnel, publications distributions, social actions, counseling, family support, recruiting, comptroller, conference area, and classrooms.

For RED HORSE (Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineering) applications, this facility provides primary space for squadron administration in support of the unit; includes space for the commander, first sergeant, and mission support.

Reserve Forces Operational Training Facility Function	Auth. Pers	Auth. Area (SF)	Remarks
Wing Staff			
Wing Commander	1	300	
Vice Commander	1	250	
First Sergeant	1	125	
Admin/Personnel	3	180	
Community Manager	1	125	
Conference Room		300	
Support Group Staff			
SG Commander	1	250	
Executive Officer	1	175	
First Sergeant	1	125	
Student Flight Advisor	1	100	
Admin/Personnel	1	100	
Conference Room		225	
Financial Management			
Chief Financial Officer	1	225	
Financial Assistant	2	225	
Accounting	6	360	
Pay	5	300	
Admin/Reception		200	Maximum 10 pers
Consultation Room		100	Maximum 5 pers

Reserve Forces Operational Training Facility Function (cont'd)	Pers	Auth. Area (SF)	Remarks
Mission Support Flight			
MSF Commander	1	225	
Recruiting and Retention	3	300	
Director of Personnel	1	225	
NCOIC of Personnel	1	125	
Admin/Personnel	2	120	
Enlistments and Separations	4	280	
Personnel Systems and Readiness	3	220	
Base Career Advisor	2	200	
Career Progression	2	120	
Customer Service	4	280	
HRO Remote Designee	1	100	
Education & Training OIC/NCOIC	2	225	
Education & Training Office	3	180	
Testing Room		375	Maximum 15 pers
Diversity Training			
OIC/NCOIC	2	225	
Family Services			
Volunteer	2	120	
Storage		60	
Chaplain's Office			
Chaplains	3	550	
Admin/Personnel	3	180	
Social Actions			
OIC/NCOIC	2	225	
Admin/Personnel	2	120	
Judge Advocate			
Legal Officers	2	400	
Admin/Personnel	2	120	
Public Affairs			
OIC/NCOIC	2	225	
Admin/Personnel	2	120	
LGX / Plans			*[note 1]*
LGX	3	550	
Plans	2	200	
Safety Office			
OIC	1	225	
OSH Manager	1	125	
Explosives Safety	2	120	
Admin/Personnel	2	120	
Wing History Office			
Historian	2	185	
Storage		100	
Environmental Management Office			
Environmental Manager	2	230	
Miscellaneous			
Auditorium		3,500	Maximum 250 pers *[note 2]*
Projection/Storage		100	
Copier/Fax Room		120	
Break Room		200	
Subtotal	90	14,760	
Overhead Factor (30%)		4,428	
Total Reserve Forces Operational Training Facility Area		19,188	
Total Training Facility Area (rounded)		**19,200 SF / 1,784 SM**	

1. Mobility Control Center is part of the Deployment Processing Facility (category code 141-786).
2. The auditorium should be subdividable to allow multiple activities when the entire room is not needed: for double units, additional space is justified on a case-by-case basis.

RED HORSE Function	Auth. Pers	Auth. Area (SF)	Remarks
Squadron Command			
Commander (O-6)	1	225	Full-time
First Sergeant (E-8)	1	125	Part-time
Admin/Reception		200	Maximum 10 pers
Conference Room		300	
Safety NCO	1	125	
Environmental Manager	1	150	
Medical Staff			*[note 1]*
Squadron Physician (O-5)	1	200	Part-time
Nurse Assistant	1	125	
Hearing Testing Room	1	100	
Treatment Room		225	
Support Services			
Admin Officer (O-4)	1	125	Part-time
Recruiting and Retention (E-7)	1	100	Full-time
Financial Management NCO (E-6)	1	125	Part-time
NCOIC Admin/Training (E-7)	1	125	Part-time
Admin/Personnel	2	120	
Personnel Specialist	1	100	
Personnel Systems/Readiness	3	220	
Education & Training NCO (E-7)	1	125	Full-time
Testing Room		375	Maximum 15 pers
Copier/Fax Room		120	
Break Room		200	
Family Services			
Volunteer	2	120	
Social Actions	1	100	
Storage		60	
LGX / Plans			
LGX & Plans OIC (O-4)	1	150	Part-time
LGX Staff (E-7, E-6)	2	200	E-7 full-time, E-6 part-time
Plans Staff	2	200	
Miscellaneous			
Auditorium / Multi-purpose Room		3,500	*[note 2]*
Projection/Storage		100	
Subtotal	26	7,940	
Overhead Factor (30%)		2,382	
Total RED HORSE Area		10,322	
Total RED HORSE Area (rounded)	**10,400 SF / 966 SM**		

1. Decrease scope by 845 SF when medical staff is co-located with base.
2. The auditorium should be subdividable to allow multiple activities when the entire room is not needed.

6.1.5 Category Code 171-447, Reserve Forces Comm/Electronics Training Facility. Provides space for operations and maintenance, administration, shops, and classroom functions; space authorizations for other uses will be handled on a case-by-case basis.

Communications and electronics unit types include combat communications group (CCG), combat communications squadron (CCS), air control squadron (ACS), air support operations center (ASOC), air support operations squadron (ASOS), air traffic control squadron (ATCS), engineering installation squadron (EIS), and others.

- Combat Communications Group -

CCG Admin Function	Auth. Pers	Authorized Area (SF)	Remarks
Commander (O-6)	1	250	
Commander's Conference Room		225	12-15 pers
Vice Commander (O-5)	1	225	
Director of Operations (O-5)	1	225	
Telecommunications Manager (E-9)	1	100	
Operations Admin/Support/Storage	1	150	
Operations Engineering	2	180	
Communications Focal Point (CPF)		250	9-10 pers / shift
Director of Logistics (O-5)	1	225	
Logistics Management Officer (O-4)	1	175	
Logistics NCOIC (E-9)	1	100	
Logistics Support	3	270	
Logistics Admin/Support/Storage	1	150	
Director of IM/Personnel (O-5)	1	225	
Personnel NCOIC (E-7)	1	100	
Personnel Admin/Support/Storage	1	150	
Training	1	120	Includes storage
Training Admin/Support/Storage	1	150	
AF Advisor (O-5)	1	225	
Chaplains (O-4 and O-5)	2	240	Requires private counseling area
Plans Officer (O-4)	1	175	
Recruiter Support/Storage		60	
Mailroom/Reproduction		150	
Maintenance Control Officer (O-4)	1	175	
Maintenance Controllers	8	720	
ATC Officer (O-4)	1	175	
AT Controllers	3	270	
Current Ops	3	270	
Operations OIC (O-4)	1	175	
Operations Manager (E-9)	1	100	
Tech Controllers	2	180	
Subtotal	44	6,275	
Break Room		120	
Classroom / Multi-purpose Area		871	44 pers @ 19.8 SF / 1.8 SM
Personal Lockers		220	44 pers @ 5 SF / .5 SM
Subtotal	44	7,486	
Overhead Factor (30%)		2,246	
Total CCG Admin Area		9,732	
Total CCG Admin Area (rounded) *	**9,750 SF / 906 SM**		

* Add 4,000 SF / 372 SM for Group Headquarters with UTC 6KMM9.

- Combat Communications Squadron -

CCS Admin Function	Auth. Pers	Authorized Area (SF)	Remarks
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 pers
First Sergeant	1	125	
Recruiting	1	150	Includes storage space
Ground Safety	1	90	
Info Management (3 pers) / Personnel (1 pers)	4	360	
Mission Support Flight Chief (O-4)	1	175	
Reproduction		150	
Testing (6-7 pers)		150	
Training	1	90	
Readiness / Disaster Preparedness	1	90	
Air Force Advisor (E-7) [GSU only]	1	100	
Family Support [GSU only]		180	2 volunteers
Controlled Crypto Items (CCI) Maintenance	2	300	
CCI Storage		150	
CCI Secure Area		200	Only GSA 3-pos. lock required
Communications Center / COMSEC Vault	3	700	Cert. for open 'SECRET' storage
Record Communications Office (E-7)	1	180	Includes record storage space
Voice Communications Office (E-7)	1	100	
UDCC/CFP	8	400	8 pers / shift
Chief, Maint / Chief, Combat Support (O-4)	1	175	
Logistics Plans	1	90	
Maintenance Control	1	90	
Quality Control	3	270	
Base Level Systems Flight Chief (O-4)	1	175	
Base Level Systems Information Manager (IM)	2	180	
Base Level Systems Manager (E-9)	1	100	
Base Level Systems Superintendent (E-8)	1	100	
Network Systems Flight Chief (O-4)	1	175	
Network Systems Flight Manager (E-9)	1	100	
Network Systems Flight Superintendent (E-8)	1	100	
Network Systems Information Manager (IM)	1	90	
Satellite Systems Office	1	90	
Wideband Systems Office	1	90	
CCS Subtotal	45	6,055	
Break Room		150	
Classroom / Multi-purpose Area		1,983	130* pers @ 15.25 SF / 1.4 SM
Personal Lockers		550	110 pers @ 5 SF / .5 SM
Overhead Factor (30%)		2,621	
Total CCS Admin Space		**11,359 SF / 1,055 SM**	

* Includes 5 Supply, 6 Vehicle Maint, and 9 AGE / Power Production personnel who are located in other facilities.

- Combat Communications Squadron (cont'd) -

CCS Shop Function	Auth. Pers	Authorized Area (SF)	Remarks
Record Communications Shop	12	600	
Record Communications Storage		90	
Voice Communications Shop	17	720	
Voice Communications Storage		90	
Network Control Shop	9	1,500	
Network Control Storage		150	
Satellite Systems Shop	8	750	
Satellite Systems Storage		90	
Wideband Systems Shop	19	1,250	
Wideband Systems Storage		120	
Subtotal	65	5,360	
Overhead Factor (20%)		1,072	
Total CCS Shop Space		**6,432 SF / 598 SM**	

Total CCS Admin Space (45 pers)	11,359 SF / 1,055 SM
Total CCS Shop Space (65 pers)	6,432 SF / 598 SM
Total CCS Area (110 pers)	17,791 SF / 1,653 SM
Total CCS Area (rounded)	**17,800 SF / 1,654 SM**

- Co-located Combat Communications Group / Combat Communications Squadron -

Co-located CCG and CCS Admin Function	Auth. Pers	Authorized Area (SF)	Remarks
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 pers
First Sergeant	1	125	
Recruiting	1	150	Includes storage space
Ground Safety	1	90	
Info Management (3 pers) / Personnel (1 pers)	4	360	
Mission Support Flight Chief (O-4)	1	175	
Reproduction		150	
Testing (6-7 pers)		150	
Training	1	90	
Readiness / Disaster Preparedness	1	90	
Air Force Advisor (E-7) [GSU only]	1	100	(if authorized)
Family Support [GSU only]		180	2 volunteers
Controlled Crypto Items (CCI) Maintenance	2	300	
CCI Storage		150	
CCI Secure Area		200	Only GSA 3-pos. lock required
Communications Center / COMSEC Vault	3	700	Cert. for open 'SECRET' storage
Record Communications Office (E-7)	1	180	Includes record storage space
Voice Communications Office (E-7)	1	100	
UDCC/CFP	8	400	8 pers / shift
Chief, Maint / Chief, Combat Support (O-4)	1	175	
Logistics Plans	1	90	
Maintenance Control	1	90	
Quality Control	3	270	
Base Level Systems Flight Chief (O-4)	1	175	
Base Level Systems Information Manager (IM)	2	180	

Base Level Systems Manager (E-9)	1	100	
Base Level Systems Superintendent (E-8)	1	100	
Co-located CCG and CCS Admin Function (cont'd)	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Network Control Office	1	90	
Network Systems Flight Chief (O-4)	1	175	
Network Systems Flight Manager (E-9)	1	100	
Network Systems Flight Superintendent (E-8)	1	100	
Network Systems Information Manager (IM)	1	90	
Satellite Systems Office	1	90	
Wideband Systems Office	1	90	
CCG Subtotal	44	6,275	
CCS Subtotal	45	6,055	
Break Room		270	
Classroom / Multi-purpose Area		2,462	174* pers @ 14.15 SF / 1.3 SM
Personal Lockers		770	154 pers @ 5 SF / .5 SM
Combined CCG/CCS Subtotal	89	15,832	
Overhead Factor (25%)		3,958	
Total CCG/CCS Admin Space		**19,790 SF / 1,839 SM**	

* Includes 5 Supply, 6 Vehicle Maint, and 9 AGE / Power Production personnel who are located in other facilities.

Co-located CCG and CCS Shop Function	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Record Communications Shop	12	600	
Record Communications Storage		90	
Voice Communications Shop	17	720	
Voice Communications Storage		90	
Network Control Shop	9	1,500	
Network Control Storage		150	
Satellite Systems Shop	8	750	
Satellite Systems Storage		90	
Wideband Systems Shop	19	1,250	
Wideband Systems Storage		120	
Subtotal	65	5,360	
Overhead Factor (20%)		1,072	
Total CCG/CCS Shop Space		**6,432 SF / 598 SM**	

Total CCG/CCS Admin Space (89 pers)	19,790 SF / 1,839 SM
Total CCG/CCS Shop Space (65 pers)	6,432 SF / 598 SM
Total CCG/CCS Area (154 pers)	26,222 SF / 2,437 SM
Total CCG/CCS Area (rounded)	**26,200 SF / 2,434 SM**

- Air Control Squadron -

ACS Admin Function	Auth. Pers	Authorized Area (SF)	Remarks
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 pers
First Sergeant	1	125	
Ground Safety	1	90	
Info Management (3 pers) / Personnel (1 pers)	4	360	
Reproduction		150	
Testing (6-7 pers)		150	
Training	1	90	
Readiness / Disaster Preparedness	1	90	
Medical Services	1	90	
Airbase Defense/Security	1	90	
Intelligence Support Management (O-4)	1	100	
TTY/Crypto Operations Secure Area	5	450	Only GSA 3-pos. lock required
Communications Center / COMSEC Vault	1	700	Cert. for open 'SECRET' storage
Logistics Plans	1	90	
Maintenance Control	3	270	
Quality Control	3	270	
Comm Computer Systems Chief (O-4)	1	175	
Comm Electronics Systems Manager (E-9)	1	100	
Comm Systems Superintendent (E-8)	1	100	
Ground Radar Systems Superintendent (E-8)	1	100	
MCE Battle Management (O-4)	7	775	
Ground Radar Operations Superintendent (E-8)	1	100	
Ground Radar Operations	19	1,500	
Subtotal	56	6,415	
Break Room		150	
Classroom / Multi-Purpose Area		1,983	130* pers @ 15.25 SF / 1.4 SM
Personal Lockers		520	104 pers @ 5 SF / .5 SM
Subtotal	56	9,068	
Overhead Factor (30%)		2,720	
Total ACS Admin Space		**11,788 SF / 1,095 SM**	

* Includes 3 Supply, 6 Vehicle Maint, 15 AGE / Power Production, and 3 Services personnel who are located in other facilities.

ACS Shop Function	Auth. Pers	Authorized Area (SF)	Remarks
Ground Radar Systems Maintenance Shop	12	1,000	
Ground Radar Systems Maintenance Storage		100	
Computer Systems Maintenance Shop	10	900	
Computer Systems Maintenance Storage		150	
Secure Comm Systems Maintenance Shop	3	450	
Secure Comm Systems Maintenance Storage		150	
Satellite Systems Maintenance Shop	11	1,000	
Satellite Systems Maintenance Storage		100	
Wideband Systems Maintenance Shop	12	1,000	
Wideband Systems Maintenance Storage		150	
Subtotal	48	5,000	
Overhead Factor (20%)		1,000	

Total ACS Shop Space		**6,000 SF / 557 SM**

- Air Control Squadron (cont'd) -

Total ACS Admin Space (56 pers)	11,788 SF / 1,095 SM
Total ACS Shop Space (48 pers)	6,000 SF / 557 SM
Total ACS Area (104 pers)	17,788 SF / 1,652 SM
Total ACS Area (rounded)	**17,800 SF / 1,654 SM**

- Air Support Operations Center (97-person unit) -

ASOC Function, 97-person unit	Auth. Pers	Authorized Area (SF)	Remarks
OFFICE AREAS Module 1 – Administration			
Commander's Office		250	
Commander's Conference Room		375	
First Sergeant's Office		150	
Administration Office		200	
Subtotal		975	
Module 2 – Operations			
Director of Operations' Office		135	
Operations Superintendent's Office		135	
Training & Evaluation Area		600	Two rooms
Flight Operations Suite		500	
ASOC Info Sys Analysis / Tech Controllers		600	
ASOC Mobility/Logistics Office		135	
Subtotal		2,105	
Module 3 – Common Areas			
Vault / Classified Storage Room		200	
Mission Planning Room		325	
Mission Briefing Room		420	
Multi-Purpose Room		2,150	Room is partitionable
Library		225	
Subtotal		3,320	
Module 4 – Maintenance			
ASOC Communications Officer's Office		135	
ASOC Computer Switch / COMSEC Office		135	
ASOC Quality Assurance Office		135	
Maintenance Officer's Office		135	
Maintenance Superintendent's Office		135	
Job Control Office		135	
Material Control Office		225	
ASE/Vehicle Maintenance Office		225	
Radio Maintenance Office		325	
Subtotal		1,585	
NON-OFFICE AREAS Common			
Break Room		500	
Subtotal		500	
Maintenance			
ASOC 209 System Maintenance Bay		600	
ASOC SAT Communications Maintenance Bay		500	
ASE/Vehicle Work Center		400	
Radio Maintenance Work Center		800	

Bench Stock Supply Room		360	
Battery Room		190	
ASOC Function, 97-person unit (cont'd)	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Mobility Readiness Spare Parts Storage		320	
Unit Mobility Bag Storage		920	
Radio Maintenance Field Equipment Storage		320	
Portable Radio Storage Area		190	
Maintenance Bay Access		1,120	
Radio Maintenance Vehicle Bays		1,680	
Vehicle Maintenance Bays		1,400	
Subtotal		8,800	
Total ASOC Building Space		17,285	
Overhead Factor (20%)		3,457	
Total ASOC Area		20,742	[based on 97 pers]
Total ASOC Area (rounded) – 97 pers		**20,700 SF / 1,924 SM**	

- Air Support Operations Squadron (72-person unit) -

ASOS Function, 72-person unit	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
OFFICE AREAS Module 1 – Administration			
Commander's Office		250	
Commander's Conference Room		375	
First Sergeant's Office		150	
Administration Office		200	
Subtotal		975	
Module 2 – Operations			
Director of Operations' Office		135	
Operations Superintendent's Office		135	
Theater Airlift Liaison Officer's Office		135	
Training & Evaluation Area		785	Two rooms
Scheduling Area		360	Four workstations
Flight Commander's Office		450	
Flight Operations Suite		950	
Subtotal		2,950	
Module 3 – Common Areas			
Vault / Classified Storage Room		300	
Mission Planning Room		325	
Mission Briefing Room		420	
Multi-Purpose Room		2,150	Room is partitionable
Library		225	
Subtotal		3,420	
Module 4 – Maintenance			
Maintenance Officer's Office		135	
Maintenance Superintendent's Office		135	
Job Control Office		135	
Material Control Office		225	
ASE/Vehicle Maintenance Office		225	
Radio Maintenance Office		325	
Subtotal		1,180	
NON-OFFICE AREAS Common			

Break Room		500	
Subtotal		3,485	
ASOS Function, 72-person unit (cont'd)	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Maintenance			
ASE/Vehicle Work Center		400	
Radio Maintenance Work Center		800	
Bench Stock Supply Room		360	
Battery Room		190	
Mobility Readiness Spare Parts Storage		320	
Unit Mobility Bag Storage		680	
Radio Maintenance Field Equipment Storage		320	
Portable Radio Storage Area		190	
Maintenance Bay Access		1,120	
Radio Maintenance Vehicle Bays		1,680	
Vehicle Maintenance Bays		1,400	
Subtotal		7,460	
Total ASOS Building Space		16,485	
Overhead Factor (20%)		3,297	
Total ASOS Area		19,782 SF / 1,838 SM	[based on 72 pers]
Total ASOS Area (rounded) – 72 pers		**29,100 SF / 2,703 SM**	

- Air Traffic Control Squadron (70-person unit) -

ATCS Admin Function, 70-person unit	Auth. Pers	Authorized Area (SF)	Remarks
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 pers
First Sergeant (E-7)	1	125	
Safety (E-6)	1	90	
Commander's Admin (E-6)	1	90	
Reproduction, Supplies, etc.		150	
Training NCOIC (E-7)	1	90	
Testing		150	
Personnel NCOIC (E-7)	1	90	
Logistics Plans NCOIC (E-7)	1	90	
Maintenance/Operations Admin	1	90	
Chief, ATC Operations (O-4)	1	175	
Chief, ATC Training (E-6)	1	90	
ATC Superintendent (E-9)	1	100	
Mobile Tower Chief (E-8)	1	100	
Mobile Tower Controllers	11	440	
Mobile RAPCON Chief (E-8)	1	100	
Mobile RAPCON Controllers	18	720	
Terminal Instrument Procedures - TERPS (E-6)	1	200	Map cases, drawing boards, etc.
Maintenance Supervisor (E-8)	1	100	
Maintenance Control (E-8)	1	100	
Quality Control (E-8)	1	100	
Radar Maintenance NCOIC (E-7)	1	100	
Radio Maintenance NCOIC (E-7)	1	100	

METNAV Maintenance NCOIC (E-7)	1	100	
Subtotal	49	3,940	
ATCS Admin Function, 70-person unit (cont'd)	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Break Room		150	
Classroom / Multi-Purpose Area		1,440	80* pers @ 18 SF / 1.7 SM
Personal Lockers		400	80 pers @ 5 SF / .5 SM
Subtotal	49	5,930	
Overhead Factor (30%)		1,779	
Total ATCS Admin Space		**7,709 SF / 716 SM**	

* Includes 3 Supply, 21 Shop, and 7 AGE / Power Production personnel.

ATCS Shop Function	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Radar Maintenance Shop	7	700	
Radar Maintenance Storage		100	
Radio Maintenance Shop	9	900	
Radio Maintenance Storage		100	
METNAV Maintenance Shop	3	300	
METNAV Maintenance Storage		50	
Wire Maintenance Shop	2	200	
Wire Maintenance Storage		50	
Subtotal	21	2,400	
Overhead Factor (20%)		480	
Total ATCS Shop Space		**2,880 SF / 268 SM**	

Total ATCS Admin Space (49 pers)	7,709 SF / 716 SM
Total ATCS Shop Space (21 pers)	2,880 SF / 268 SM
Total ATCS Area (70 pers)	10,589 SF / 984 SM
Total ATCS Area (rounded)	**10,600 SF / 985 SM**

- Engineering Installation Squadron (102-person unit) -

EIS Admin Function	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Commander (O-5)	1	225	
Commander's Conference Room		225	12-15 pers
First Sergeant	1	125	
Unit Administration	2	180	
Reproduction, Supplies, etc.		150	
Information Management	1	90	
Personnel	1	90	
Systems Telecom Engineering Mgr (STEM)	1	90	
Training NCOIC	1	90	
Testing Area		150	
Recruiter	1	90	
Ground Safety	1	90	
Disaster Preparedness	1	90	
Engineering Management Chief (O-4)	4	700	
Engineering Management Superintendent (E-8)	2	200	
Engineering Management	6	540	
Installations Chief (O-4)	1	175	
Installations Support Section	2	180	

Installations Wire Chief (O-4)	1	175	
Wire Maintenance NCOIC (E-9)	1	125	
EIS Admin Function (cont'd)	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Installations Electronics Chief (O-4)	1	175	
Radio/Wideband Maintenance NCOIC (E-8)	1	100	
Outside Plant Maintenance NCOIC (E-8)	1	100	
Workload Control Superintendent (E-9)	1	125	
Workload Control	1	90	
Logistics Chief (O-4)	1	175	
Logistics	1	90	
Logistics Plans/Mobility	2	180	
Quality Chief (E-8)	1	100	
Quality Assurance	3	270	
Subtotal	41	5,185	
Break Room		150	
Classroom / Multi-Purpose Area		1,710	114* pers @ 15 SF / 1.4 SM
Personal Lockers		510	102 pers @ 5 SF / .5 SM
Subtotal	41	7,555	
Overhead Factor (30%)		2,267	
Total EIS Admin Space		**9,822 SF / 912 SM**	

* Includes 3 Supply and 9 Vehicle Control/Maintenance personnel who are part of the EIS.

EIS Shop Function	**Auth. Pers**	**Authorized Area (SF)**	**Remarks**
Radar Maintenance Shop	10	900	
Radar Maintenance Storage		175	
Ground Radio Maintenance Shop	10	900	
Ground Radio Maintenance Storage		175	
Cable/Antenna Systems Maintenance Shop	21	1,890	
Cable/Antenna Systems Maintenance Storage		400	
Wideband Maintenance Shop	7	630	
Wideband Maintenance Storage		150	
Outside Plant Maintenance Shop	13	1,170	
Outside Plant Maintenance Storage		260	
Subtotal	61	6,650	
Overhead Factor (20%)		1,330	
Total EIS Shop Space		**7,980 SF / 741 SM**	

Total EIS Admin Space (41 pers)	9,822 SF / 912 SM
Total EIS Shop Space (61 pers)	7,980 SF / 741 SM
Total EIS Area (102 pers)	17,802 SF / 1,653 SM
Total EIS Area (rounded) – 102 pers	**17,800 SF / 1,653 SM**

- Information Warfare Aggressor Squadron (104-person unit) -

Information Warfare Aggressor Squadron Function	Auth. Pers	Auth. Area	
Comm-Electronics Training (IWAS) Command			
Commander (O-5)	1	225	
Commander's Conference Room		225	
First Sergeant	1	125	
Unit Training Manager	1	90	
Information Management, Personnel	2	300	
Director of Operations (O-5)	1	125	
Operations Superintendent	1	125	
JAG (O-4)	1	125	
Aggressor Operations Flight			
AOF Flight Commander (O-4)	1	100	
AOF Superintendent	1	100	
AOF Information Management	1	90	
AOF Alpha Team	6	270	
AOF Bravo Team	6	270	
AOF Charlie Team	6	270	
AOF Classified Classroom		324	
AOF Storage		350	
Computer Systems Vulnerability Flight			
CSV Flight Commander (O-4)	1	100	
CSV Alpha Team	7	315	
CSV Bravo Team	7	315	
CSV Charlie Team	6	270	
CSV Delta Team	6	270	
CSV Info Technology Assessment & Testing Lab		572	
CSV Storage		350	
Computer Network Operations Flight			
CNO Flight Commander (O-4)	1	100	
CNO Information Management	1	90	
CNO Alpha Team	8	360	
CNO Bravo Team	8	360	
CNO Charlie Team	8	360	
CNO Delta Team	8	360	
CNO Assessment Lab		704	
CNO Storage		350	
Computer Information Programs Flight			
CIP Flight Commander (O-4)	1	100	
CIP Information Management	1	90	
CIP Operations Training OIC (O-4)	1	100	
CIP Operations Training Office	2	180	
CIP Standards/Evaluation OIC (O-4)	1	100	
CIP Plans, Prgms, Sched & Logistics OIC (O-4)	1	100	
CIP Plans, Prgms, Sched & Logistics NCOIC	1	100	
CIP Plans, Prgms, Sched & Logistics Info Mgmnt	1	90	
CIP IT Range Management OIC (O-4)	1	100	
CIP IT Range Management NCOIC	1	90	

Intel Vault / SCIF			
Combined Intel Vault and SCIF	3	1,400	
Information Warfare Aggressor Squadron Function (cont'd)	**Auth.**	**Auth. Area (SF)**	**Remarks**
Common Areas			
Computer Applications Classroom #1		352	
Computer Applications Classroom #2		352	
Computer Applications Classroom #3		352	
Computer Applications Classroom #4		352	
Multi-purpose Room / Mission Brief/Conf Room		1,664	
Break Room		500	
Library		225	
Storage, Training Aids		250	
Mobility Storage		400	
Subtotal	104	14,887	
Overhead Factor (30%)		4,466	
Total IWAS Area		19,353	
Total IWAS Area (rounded) – 104 pers	**19,400 SF / 1,802 SM**		

6.1.6 Category Code 171-449, Reserve Forces Aeromedical Evacuation Training Facility.

Provides space for the training and operation of AE units, with areas designated for the commander, chief nurse, aircrew briefing, classrooms, locker rooms, medical and mobility storage, unit administration, training, and the control center.

Auth. Pers	Admin Space (SF / SM)	Mobility Storage (SF / SM) *	Total Area (SF / SM)
80-120	9,100 / 845	4,000 / 372	13,100 / 1,217
121-140	12,000 / 1,115	4,000 / 372	16,000 / 1,487

* Authorization allowed for enclosed storage of mobility assets.

6.1.7 Category Code 171-450, Reserve Forces Medical Training/Administration Facility.

Provides 10,000 SF / 929 SM of space for medical training and administration, with areas designated for the commander, chief nurse, physical and dental exams, immunization, classrooms, nurses station, bio-environmental engineering and environmental health, and medical administration to support a unit (maximizes joint use of active component facilities).

Exclusive use of 4,000 SF / 372 SM for admin and support space (labs) is authorized when sharing medical facilities with other DoD military components.

- Flying Units -

Medical Admin Function	Auth. Pers	Authorized Area (SF)	Remarks
Aero Medical Physician's Office	1	220	
Conference Room		180	
Health Services Administrator's Office	1	180	
Physician's Office (4)	4	300	
Clinic Administration	6	360	
Administrative Office	3	140	
Optometry Admin	1	100	
Medical Material Office	3	240	

BioEnvironmental Engineering Office	1	140	
Patient Affairs Office	3	180	
Medical Admin Function (cont'd)	**Pers**	**Authorized Area (SF)**	**Remarks**
Aeromedical Physician's Office	1	140	
Hospital/Clinic Services Office	6	360	
Environmental Health Office	1	140	
Dental Office	1	100	
Nursing Services	8	480	
Mental Health Office	4	240	
Outpatient Records	2	160	
Medical Record Storage		60	
Dental Records	1	80	
Training Room / Break Room / Waiting Room		1,100	
Personal Lockers		365	
Subtotal	47	5,265	
Overhead Factor (30%)		1,580	
Total Medical Admin Space		**6,845 SF / 636 SM**	

Note: Environmental Manager space charged to category code 171-445 (Reserve Forces Operations and Training).

Medical Training Function	**Pers**	**Authorized Area (SF)**	**Remarks**
Examination Room (4)	4	320	
EKG Room (2)	2	160	
Optometry Exam	1	120	
Dental Exam (2)	2	200	
Dental X-Ray Darkroom		120	
Audio Testing and Admin	2	150	
Immunization Room	2	160	
Pharmacy	2	160	
BEE Laboratory	2	120	
Equipment Staging		135	
Clinical Laboratory	4	220	
Environmental Health Laboratory	2	160	
Biomedical Equipment Maint and Storage	1	120	
Medical Material Storage		180	
Sterile Supply		100	
Dirty Linen		40	
Subtotal	24	2,465	
Overhead Factor (30%)		740	
Total Medical Training Space		**3,205 SF / 298 SM**	

Total Medical Admin Space (47 pers)	6,845 SF / 636 SM
Total Medical Training Space (24 pers)	3,205 SF / 298 SM
Total Medical Facility Area (71 pers)	10,050 SF / 934 SM
Total Medical Facility Area (rounded)	**10,000 SF / 929 SM**

- Tenants on Active Duty Installation (Co-located Facility) -

Medical Tenant Function	Auth. Pers	Authorized Area (SF)	Remarks
Aero Medical Physician's Office	1	220	
Conference Room		180	
Health Services Administrator's Office	1	180	
Physician's Office (4)	4	300	
Clinic Administration	6	360	
Administrative Office	3	140	
Medical Material Office	3	240	
BioEnvironmental Engineering Office	1	140	
Patient Affairs Office	3	180	
Dental Office	1	100	
Nursing Services	8	480	
Mental Health Office	4	240	
Outpatient Records	2	160	
Medical Record Storage		60	
Dental Records	1	80	
Subtotal	38	3,060	
Overhead Factor (30%)		918	
Total Medical Tenant Area		3,978	
Total Medical Tenant Area (rounded)		**4,000 SF / 372 SM**	

Note: Environmental Manager space charged to category code 171-445 (Reserve Forces Operations and Training).

- Geographically Separated Unit (GSU) -

Function	Auth.	Authorized Area (SF)	Remarks
Administrative Area		220	
Patient Records Storage		75	
Dental Records Storage		75	
Medical Material Storage		160	
BEE/EH Records		48	
Subtotal		578	
Overhead Factor (30%)		173	
Total GSU Area		751	
Total GSU Area (rounded)		**750 SF / 70 SM**	

Note: Only authorized if unit is assigned medical staff or if medical examinations are conducted onsite.

- Combat Readiness Training Center (Co-located Facility) -

CRTC Medical Function	Auth. Pers	Authorized Area (SF)	Remarks
Patient Administration		240	
Patient Records		50	
Laboratory Area		80	
Physician's Office (3)		280	
Examination Room (3)		280	
Treatment Room		300	
Medical Storage / Pharmacy		240	
Sterile Supply		100	
Audio Booth Testing		100	
Optometry		200	
EKG Room		100	
Dental Officer		100	
Dental Administration/Records		100	
Dental Exam/X-Ray		200	
Dirty Linen Storage		40	
Restrooms		180	
Mechanical/Corridors		840	
Subtotal		3,430	
Overhead Factor (30%)		1,029	
Total CRTC Medical Area		4,459	
Total CRTC Medical Area (rounded)		**4,500 SF / 418 SM**	

6.1.8 Category Code 171-471, Range Control House. [also consolidates category codes 171-472 (Range Supplies and Equipment Storage) and 171-473 (Range Target Storage and Repair)] This facility is designated for operations maintenance, workshop/repair, and storage, as related to an air-to-ground range (category code 179-481, Aircraft Range). The area is also used to store tools, equipment, and miscellaneous supplies, as well as repair targets.

Auth. Personnel	Authorized Area (SF / SM)
4 - 15	3,900 / 362
16 - 35	4,700 / 437
36 +	5,000 / 465

6.1.9 Category Code 171-475, Combat Arms Training Simulator (CATS) Facility. Provides space to install the laser-based, electronic training system for combat arms re-qualification.

Not a standalone structure, this 1,000 SF / 93 SM single room is designed for five (5) firing positions, with associated space for instructor(s), a carbon dioxide (CO_2) storage rack, etc.

The CATS facility should be co-located with the Security Forces training facility or the CATM on the range; in addition, it must be air conditioned and capable of being blacked out (no windows).

6.1.10 Category Code 171-476, Combat Arms Training and Maintenance (CATM) Facility. Used in conjunction with the Small Arms Range System (category code 179-475) with up to 21 firing stations, the CATM facility contains space for classroom instruction, program administration, weapons maintenance, and miscellaneous storage.

CATM Function	Auth. Pers	Authorized Area (SF)	Remarks
Superintendent / NCOIC	1*	100	
Instructors	6	390	65 SF / 6 SM per instructor
Admin Processing/Storage Area		60	
Classroom	20	700	Sized with 24" x 36" table per person
Weapons Maintenance Area		100	
Weapons Cleaning/Degreasing		0	Use area in security forces building
Range Supplies and Equipment Storage		0	Located with small arms range
Subtotal		1,350	
Overhead Factor		50	
Total CATM Area		1,400	
Total CATM Area (rounded)	**1,400 SF / 130 SM**		

* The full-time workforce is traditionally one person.

Note: No restrooms, mech/elec/comm., etc., because CATM is not intended as a stand-alone facility.
See category code 171-475 for CATS authorization and notes.
See category code 179-475 for small arms range authorization and notes.
See category code 730-835 for security forces authorization and notes.

a. Classroom. A demonstration/performance classroom, it must contain sufficient space to provide each student a chair and a table work surface of at least 24" x 36" / 610mm x 910mm (or 34" x 45" / 860mm x 1140mm for those attending machine gun or mortar training).

The classroom should contain a raised instructor's platform, aisle space for instructor access to individual tables, and provisions for videocassette equipment, 16mm movie projections, slide tape presentations, and overhead projection of viewgraphs.

b. Administrative Space. Provided for program administrators and combat arms personnel.

c. Weapons Maintenance Shop. Provides space for workbenches, hand tools, power tools, equipment, and spare parts storage. (Include a lavatory with potable water in the immediate area.)

d. Miscellaneous Storage. Provides space to store administrative supplies, training aids, classroom equipment, tools, and other miscellaneous items. (The size of this area is directly related to the type and quantity of training the CATM section conducts.)

6.1.11 Category Code 171-873, Aerial Port Training Facility. Provides for training the cargo and administrative functions of an aerial port flight / aerial port squadron, i.e., an aerial port flight comprised of C-130, C-17, and/or C-5 aircraft requires separate areas in which to (tower) dry and (folding room) pack cargo parachutes, pack and store training loads and supplies, and conduct administrative functions and classroom training.

Aircraft Type	Authorized Space (SF / SM)
C-5, C-130	14,200 / 1,316
C-17	17,700 / 1,641

Those facilities that store a modular airborne firefighting system (MAFFS) are authorized an additional 1,000 SF / 93 SM of covered, unheated space.

6.1.12 Category Code 171-875, Munitions Loading Crew Training Facility. Provides a separate-use space or facility at fighter bases for F-15, F-16, and A-10 aircraft 'hands-on' and classroom training of weapons loading personnel. It must have a fire suppression system, heating, and ventilation, and is normally attached to an aviation maintenance hangar.

Munitions Loading Crew Training Function	Auth. Pers	Auth. Area (SF)	Remarks
Aircraft Practice Loading Bay		7,500	
Classroom		440	For 20 pers
Loading Standardization Office (LSO)	4	360	
Subtotal	4	8,300	
Overhead Factor (15%)		1,245	[*]
Total Munitions Loading Crew Training Area		9,545	
Total Loading Crew Training Area (rounded)	**9,600 SF / 892 SM**		

* Increased to 30% when not connected with another facility.

6.1.13 Category Code 179-475, Small Arms Range System. Required to conduct firearms qualification and proficiency training with individual firearms such as rifles and handguns, each range must meet the requirements and specifications contained in AFI 32-2226.

For ANG purposes, this facility is an outdoor range system of 21 firing positions, designed and constructed with overhead baffles, side walls or berms, and a backstop or containment trap, all of which combine to prevent direct fired rounds and low-angled ricochets from leaving the immediate range area.

6.1.14 Category Code 179-481, Aircraft Range. Ranges are required to provide training in bombing, firing rockets and missles, and the use of automatic weapons. Types of ranges include air-to-air, air-to-ground, and ground-to-air.

The range must be a vacant area that can be used without endangering life or property. Area improvements normally required before use as a range are control facilities for scoring targets, minimum access facilities, and temporary communications facilities.

An aircraft range system consists of an outdoor impact range and basic support facilities that encompass the following category codes:

Category Code	Nomenclature	Auth. Pers	Authorized Area (SF / SM)
149-962	Air Traffic Control Tower, one per site		225 / 20.9
	- optional radio equipment room		100 / 9.3
149-967	Observation Tower (as required for range operations)		
171-471	Range Control House	4 - 15	3,900 / 362.3
		16 - 35	4,700 / 436.6
		36 +	5,000 / 464.5
214-425	Vehicle Maintenance Shop		[*]
214-428	Vehicle Operations Parking Shed		[*]
214-467	Refueling Vehicle Shop		750 / 69.7
219-947	Civil Engineer Storage Shed		1,000 / 93.0
422-258	Above-Ground Magazine Storage		600 / 55.7
442-257	Base Hazardous Materials Storage		300 / 27.9
730-839	Traffic Check House (case by case)		100 / 9.3
740-674	Fitness Center		300 / 27.9

* See corresponding category code description for computation.

149-962, Air Traffic Control Tower. Each air-to-ground range requires a smaller (225 SF / 20.9 SM) control tower to be used exclusively for the directing of air traffic over the range. A radio equipment room (100 SF / 9.3 SM) may be included in the structure, or developed as an adjacent stand-alone building.

149-967, Observation Tower. Each air-to-ground range requires one or two observation towers (as specified by the range layout).

171-471, Range Control House. Up to 5,000 SF / 464.5 SM for operations maintenance, workshop/repair, and minor storage, as related to the air-to-ground range. Also used to store tools, equipment, and miscellaneous supplies, as well as repair targets.

214-425, Vehicle Maintenance Shop. Applies only if no comparable host support is available; space to be computed and justified on a case-by-case basis.

214-428, Vehicle Operations Parking Shed. Provides enclosed parking for essential vehicles (in northern climes).

219-947, Civil Engineer Storage Shed. Provides covered storage space for installation and maintenance equipment, supplies, and tools necessary to support an air-to-ground range that do not need warehouse storage but do need protection from the weather.

422-258, Above-Ground Magazine Storage. For smoky surface-to-air missiles (SAMs), triple-A burst simulators, and other approved pyrotechnics such as smoke generators; must satisfy quantity-distance (QD) criteria and be sited as approved by DDESB.

442-257, Base Hazardous Materials Storage. Required for the storage of hazardous materials that cannot be stored in base supply and equipment sheds or warehouses.

730-839, Gate House. Controls entry to all restricted (and selected controlled) areas, if justified.

740-674, Fitness Center. Used for daily physical training, conditioning, and recreation.

Chapter 7. CATEGORY GROUP 21 MAINTENANCE FACILITIES

7.1 General Criteria

Hangars and docks provide space for scheduled inspections, landing gear retraction tests, the weighing of aircraft, major maintenance on fuel systems, airframe repairs, and ensuring Technical Order (TO) compliance and making related modifications.

All maintenance facilities must be located in accordance with explosives safety standards.

7.1.1 Category Code 211-111, Maintenance Hangar. Maintenance hangars do not include shops or administrative areas. Requirements beyond the maintenance floor area include limited space for a tool crib, parts storage, a latrine, and a utility room.

Aircraft / Mission	Authorized Space (SF / SM)
F-15, F-16, A-10 (up to 18 PAI)	28,000 / 2,601
C-130 (up to 12 PAI)	28,000 / 2,601
C-17 (up to 12 PAI)	39,800 / 3,697
C-5 (up to 12 PAI)	70,000 / 6,503
KC-135 (up to 10 PAI)	28,000 / 2,601
KC-10 (up to 10 PAI)	43,000 / 3,995

Note: If PAI exceeds number shown, see Table 7.1 of AFH 32-1084.
MH-60G requirements included under Aerospace Pararescue and Recovery Hangar (category code 141-185).

[See General Purpose Aircraft Maintenance Shop (category code 211-152) and AMU Shop (category code 211-154) for shop and administrative requirements as an addition to a hangar.]

7.1.2 Category Code 211-152, General Purpose Aircraft Maintenance Shop. Provides space for specialized maintenance activities such as fabrication/sheetmetal shop, egress shop, machine shop, welding shop, wheel and tire shop, environmental shop, electrical systems shop, pneumatic/hydraulic shop, battery shop, and composite shop.

The facility also includes space for work, administration, classrooms, tool cribs, bench stock, latrines, lockers, storage, security supplies, and repairable parts.

Aircraft / Mission	Authorized Space (SF / SM)
F-15, F-16, A-10	19,100 / 1,774
C-130, KC-135, C-5, C-17 *	22,600 / 2,010

* C-17 requires additional 7,000 SF / 650 SM for composite material shop.

Aircraft Maintenance Shop Function	Authorized Area (SF) Fighter, Attack Aircraft	Bomber, Cargo, Tanker
Field Maintenance Offices	700	500
Structural/Sheetmetal	2,000	2,500
Egress Shop	1,500	0
Machine Shop	2,000	2,000
Metal Processing (Welding)	2,000	2,000
Wheel & Tire Shop	1,500	2,000
Classroom	1,300	1,000
Tool Crib (Metal Control)	1,000	2,000
Environmental Shop	600	400
Electric Systems Shop	500	1,500
Pneudralic Shop	1,000	1,500
Battery Shop	400	500
Lockers	400	400
Composite Material / Fiberglass Shop	1,000	500
ISO Phase	0	2,000
Subtotal	15,900	18,800
Overhead Factor (20%)	3,180	3,760
Total Shop Area	19,080	22,560
Total A/C Maint Shop Area (rounded)	**19,100 SF / 1,774 SM**	**22,600 SF / 2,099 SM**

7.1.3 Category Code 211-153, Non-Destructive Inspection Shop. Provides space for field-level, non-destructive inspection of aircraft components, a process that investigates the quality, integrity, properties, and dimensions of materials and components without damaging or impairing their serviceability through the use of optic, magnetic, eddy-current, ultrasonic, radiographic, infrared, ultraviolet, and spectrometric devices.

Inspection spaces include a joint oil-analysis program (JOAP) lab, X-ray room, film developing room, tool crib and parts storage, locker space, penetrant storage, magnetic particle lines, and office areas.

The NDI shop should be co-located with the engine shop or other such facility, and joint use with the host or other military components is encouraged.

Aircraft / Mission	Authorized Space (SF / SM)
F-15, F-16, A-10, C-130, KC-135	3,000 / 279
C-5, C-17	4,000 / 372

7.1.4 Category Code 211-154, Aircraft Maintenance Unit (AMU) Shop. Provides space for supervision, administration, training, dispatch, analysis, scheduling, debriefing, ready room, arm/disarm crew shelter, flightline-assigned Dash-21 equipment, flightline vehicles, tool kit, tool room and bench stock, maintenance and storage of non-powered support equipment, and locker space.

Aircraft Type	Gross AMU Area (SF / SM)
F-15	10,000 / 929
F-16, A-10	8,000 / 743
C-5	9,200 / 855
C-17	9,300 / 864
C-130	8,900 / 827
KC-135	9,200 / 855

7.1.5 Category Code 211-157, Jet Engine Inspection and Maintenance Shop. Provides space for scheduled inspections, routine maintenance, and operational-level repair of aircraft engines. Major functions performed in the shop include disassembly, inspection, repair, replacement, technical order compliance adjustment, and assembly of engine components.

Separate areas for the storage of spare engines, covered storage for engine trailers, a bearing and inspection shop, parts storage and a tool crib, parts cleaning, a propeller shop (if required), and office administration are also provided.

Space is authorized for both three-level and two-level maintenance operations, the difference being that three-level maintenance is conducted entirely by the local unit, whereas two-level maintenance requires depot involvement.

Aircraft / Mission	3-Level Auth Area (SF / SM)	2-Level Auth Area (SF / SM)
Fighter aircraft (24 PAI)	13,000 / 1,208 *	10,000 / 929 *
KC-135E (10 PAI)	10,000 / 929	7,000 / 650
KC-135R (10 PAI / 16 PAI)	4,000 / 372 or 6,000 / 557	4,000 / 372
C-5 (12 PAI)	6,000 / 557	6,000 / 557
C-17 (12 PAI)	10,000 / 929	10,000 / 929
XX-130 (8-12 PAI)	13,000 / 1,208	9,000 / 836

* Includes 2,000 SF / 189 SM of unheated, covered storage for engines, trailers.

7.1.6 Category Code 211-159, Aircraft Corrosion Control Facility. Provides an environmentally controlled area to wash aircraft, as well as hangar space for corrosion treatment, corrosion repair, paint stripping, and the repainting of entire aircraft. This facility also provides space for the corrosion control shop, which includes preparation and drying areas, abrasive blasting rooms, booths for mixing and/or applying paint, tool storage, lockers, and administrative areas.

Corrosion control shops are additionally required to support small aircraft components, aerospace ground equipment, vehicles, weapons and munitions, and avionics shops.

Aircraft / Mission	Hangar Space (SF / SM)	Shop Space (SF / SM) *	
Fighter aircraft	7,500 / 697	1,500 / 139	9,000 / 836
XX-130, KC-135	- not authorized -	1,500 / 139	[**] + 1,500 / 139
C-17	39,800 / 3,697	1,700 / 158	41,500 / 3,855
C-5	80,700 / 7,497	2,500 / 232	72,500 / 6,732

* Add 1,600 SF / 149 SM for plastic media stripping booth (if authorized by ANG/CEP).
** Task can be performed in hangar or fuel cell hangar.

7.1.7 Category Code 211-161, Corrosion Control Utility Storage Building. This facility – normally situated adjacent to the wash racks, corrosion control shop, or strip/paint hangar – is a separate building used to store cleaning supplies, cleaning tools, paint, corrosion and stripping supplies, tools, etc.

A maximum area of 800 SF / 74 SM is authorized.

7.1.8 Category Code 211-179, Fuel System Maintenance Dock. Provides covered, protected space for aircraft fuels systems maintenance, and contains heating, plumbing, electricity, compressed air systems, mechanical ventilation, fume sensing and alarm systems, fire extinguishing systems, and wash-down drainage trenches.

Normally one per base, but additional docks may be authorized if there is a demonstrable requirement.

Aircraft / Mission	Hangar Space (SF / SM)	Shop Space (SF / SM)	Total Auth Area (SF / SM)
Fighter aircraft	7,500 / 697	1,500 / 139	9,000 / 836 [*]
XX-130	28,000 / 2,601	1,700 / 158	29,700 / 2,759 [*]
KC-135	28,000 / 2,601	2,500 / 232	30,500 / 2,833
C-17	39,800 / 3,698	2,500 / 232	42,300 / 3,930
C-5	39,800 / 3,698	3,500 / 325	43,300 / 4,023

* Add up to 4,000 SF / 372 SM of concrete pad to store C-130 and fighter aircraft fuel tanks.

7.1.9 Category Code 211-193, Test Stand Support Facility. Provides an 800 SF / 74.3 SM ready room for A-10 aircraft where engines can be prepared or modified without return to the main engine shop.

[Used in conjunction with category code 116-664, Power Check Pad.]

7.1.10 Category Code 214-425, Vehicle Maintenance Shop. Maintains all authorized government-owned – not GSA or leased – vehicles (GOVs) assigned to a base. Provides space and facilities for lubrication, inspection, general repair, and replacement of major assemblies (such as above-ground vehicle hoists), as well as welding, upholstery, testing, cleaning, and minor parts fabrication. Also houses support functions such as maintenance control and analysis sections, tool room, parts room, locker rooms, and offices.

Vehicle Equivalents	Number of Bays	Authorized Space (SF / SM) *
10 - 30	2	3,600 / 335
31 - 50	2	4,600 / 427
51 - 100	3	6,200 / 576
101 - 200	4	7,000 / 650
201 - 300	5	7,800 / 725
301 - 400	6	8,600 / 799
401 - 500	7	9,400 / 873
501 - 600	8	10,200 / 945
601 - 700	9	11,000 / 1,022
701 - 800	10	11,800 / 1,096

* Includes 1,800 SF / 167 SM for wash bay.

Note: Do not include refueler vehicles; see Refueling Vehicle Shop (category code 214-467).
Includes space for Vehicle Operations Administration functions (category code 610-121).
Joint facility authorized for co-located units, based on total number of vehicles (excluding refueler vehicles).

Again, note that the table of vehicle equivalents (above) does not include GSA or leased vehicles.

7.1.11 Category Code 214-428, Vehicle Operations Parking Shed. Provides space for essential vehicles in areas of heavy snowfall or extreme heat (see paragraph 1.5o).

For heavy snowfall areas, fully enclosed sheds will be authorized; only sunshades are authorized for areas subject to extreme heat.

Vehicle Equivalents	Authorized Space (SF / SM)
5 - 50	2,500 / 232
51 - 150	4,000 / 372
151 - 250	6,000 / 557
251 - 350	8,000 / 743
351 - 450	10,000 / 929
451 or more	[Contact ANG/CEPD]

7.1.12 Category Code 214-467, Refueling Vehicle Shop. AFOSH STD 127-20 prohibits servicing or repairing fuel servicing tank units and hydrant hose trucks in maintenance shops with other vehicles; therefore, the refueling vehicle shop is a separate, complete maintenance and repair bay that includes a work area, mechanical and ventilation rooms, an office, supplies and parts storage, and tool storage.

This facility is normally co-located with Vehicle Maintenance Shop (category code 214-425).

Type of Unit	Authorized Space (SF / SM) *
Flying	1,500 / 139
Non-flying	750 / 70

* Add 550 SF / 51 SM (for utility and restroom) if shop is a stand-alone facility.

7.1.13 Category Code 215-552, Weapons and Release Systems Shop. Provides space for the overhaul and repair of fighter aircraft weapons release and gun systems that include (but are not limited to) bomb racks, weapons pylons, ejection racks, aircraft gun systems, etc. Also provides shop and tool space for the maintenance/upkeep of weapons loading tools and equipment, as well as dispatch to the flight line.

Besides normal shop space, the facility encompasses a gun and/or ejector unit cleaning room, maintenance offices, a dispatch office, and a bench stock room, plus storage space for test equipment, alternate mission equipment (AME), spare gun systems, and mobility equipment.

Weapons Elements Admin Function	Auth. Pers	Auth. Area (SF)	Remarks
NCOIC	1	125	
Weapons Element Superintendent / 1SGT	1	125	
Administration	2	180	
Testing Room		150	
Quality Assurance	1	100	
Safety	1	100	
Maintenance Control (MOC) – E-9	1	125	
Armament Management NCOIC	1	100	
Weapons Load Management NCOIC	1	100	
Break Room		200	
Subtotal	9	1,305	
Overhead Factor (20%)		261	

Total Weapons Elements Admin		**1,566**	

Weapons Elements Support Function	Auth. Pers	(SF)	Remarks
Gun Services Shop	7	800	
Gun Cleaning Shop	2	250	
Tool Crib	2	200	
Weapons Release Shop	11	1,100	
Weapons Loading Shop	33	3,000	
Locker Room (M)		1,000	Includes lockers, shower, latrine
Locker Room (F)		500	Includes lockers, shower, latrine
Subtotal	55	6,850	
Overhead Factor (20%)		1,370	
Total Weapons Elements Support		**8,220**	

Weapons Elements Storage	Auth.	Auth. Area (SF)	Remarks
Weapons Release Storage Space		6,000	Up to 24 PAI
Total Weapons Elements Storage		**6,000**	

Total Weapons Elements Admin Space (9 pers)	1,566 SF / 145 SM
Total Weapons Elements Support Space (55 pers)	8,220 SF / 764 SM
Total Weapons Elements Storage Space	6,000 SF / 557 SM
Total Weapons Elements Area	15,786 SF / 1,467 SM
Total Weapons Elements Area (rounded)	**15,800 SF / 1,468 SM**

- HH-60 & HC-130 Aircraft -

Rescue Weapons Elements Admin Function	Auth. Pers	Auth. Area (SF)	Remarks
Weapons NCOIC	1	125	Up to 5 HH-60 and 4 HC-130
Weapons Load Management NCOIC	1	125	
Armament Management NCOIC	1	100	
Subtotal	3	350	
Overhead Factor (30%)		105	
Total Rescue Weapons Elements Admin		**455**	

Rescue Weapons Elements Support Function	Pers	Auth. Area (SF)	Remarks
Gun Services Shop		550	
Gun Cleaning Shop		200	
Tool Crib		100	
Subtotal	11	850	
Overhead Factor (20%)		170	
Total Rescue Weapons Elements Support		**1,020**	

Rescue Weapons Elements Storage	Auth.	Auth. Area (SF)	
Weapons and Associated Storage Space		400	
Overhead Factor (20%)		80	
Total Rescue Weapons Elements Storage		**480**	

Total Rescue Weapons Elements Admin Space (3 pers)	455 SF / 42 SM
Total Rescue Weapons Elements Support Space (55 pers)	1,020 SF / 95 SM
Total Rescue Weapons Elements Storage Space	480 SF / 45 SM
Total Rescue Weapons Elements Area	1,955 SF / 182 SM
Total Rescue Weapons Elements Area (rounded)	**2,000 SF / 186 SM**

7.1.14 Category Code 216-642, Conventional Munitions Maintenance Shop. Includes missile maintenance bays, other inspection/processing bays, parts/tool storage, restrooms, locker space, a trailer maintenance bay, a paint bay, and covered storage; see category codes 422-257 and 422-264 (Base Hazardous Materials Storage, Storage Igloo) for munitions storage.

The facility must be sited to comply with the quantity-distance (QD) separation criteria established in AFM 91-201, *Explosives Safety Standards*.

Admin Area	FT Authorized Pers				Authorized Area (SF)				Remarks
					F-15	F-16	A-10	HH-60	
Flight Chief (NCOIC)	1	1	1	1	125	125	125	125	
Conference Room					125	125	125	125	
Production Chief	1	1	1	1	90	90	90	90	
Material Chief	1	1	1		90	90	90	0	
System Chief	1	1	1		90	90	90	0	
Munitions Control / CAS B	1	1	1	1	600	600	600	300	
Classroom	33	51	91	20	693	995	1,530	440	
Break Room					200	200	200	200	
Personal Lockers					165	255	455	125	
Admin Area Subtotal	38	56	96	23	2,178	2570	3,350	1,405	
Overhead Factor (30%)					653	771	992	422	
Total Admin Area					**2,830**	**3,341**	**4,342**	**1,827**	

Maintenance Area	FT Authorized Pers				Authorized Area (SF)				Remarks
	F-15	F-16	A-10	HH-60	F-15	F-16	A-10	HH-60	
Paint Bay	1	1	1	1	500	500	500	500	
Missile Maint Bay (2 each)	2	2	2		2,480	2,480	2,480	0	
Trailer Maint (w/ 200 SF tool rm)	2	2	2	1	1,200	1,200	1,200	600	
ALS/ULS Proc/Insp 30MM Munits	2	2	2		800	800	800	0	
Practice Process BDU Proc/Insp	1	1	1		900	900	900	0	
Maintenance Area Subtotal	8	8	8	2	5,880	5,880	5,880	1,100	
Overhead Factor (10%)					588	588	588	110	
Total Maintenance Area					**6,468**	**6,468**	**6,468**	**1,210**	

Storage Area	F-15	F-16	A-10	HH-60	Authorized Area (SF)				
					F-15	F-16	A-10	HH-60	
Munits Support Equip Strg (inert)	1	1	1	1	4,000	4,000	4,000	1,000	
Storage Area Subtotal	1	1	1	1	4,000	4,000	4,000	1,000	
Overhead Factor (10%)					400	400	400	100	
Total Storage Area					**4,400**	**4,400**	**4,400**	**1,100**	

	F-15	F-16	A-10	HH-60
Total Admin Area (SF)	2,830	3,341	4,342	1,827
Total Maintenance Area (SF)	6,468	6,468	6,468	1,210
Total Storage Area (SF)	4,400	4,400	4,400	1,100
Munitions Maint Shop Subtotal (SF)	13,698	14,209	15,210	4,137
Total Munitions Maintenance Shop Area (rounded)	**13,700 SF / 1,273 SM**	**14,200 SF / 1,319 SM**	**15,200 SF / 1,412 SM**	**4,100 SF / 381 SM**

7.1.15 Category Code 217-712, Avionics Shop. Major items that require shop and storage space include storage racks for serviceable equipment and equipment awaiting maintenance or parts, coding devices, technical data and code books, and pod lifting devices, cradles, and storage racks. Some storage space provides physical security and corrosion protection for delicate electronic equipment; if possible, combine maintenance and storage facilities to share the secure storage area.

The Avionics Shop accommodates organizational and intermediate-level maintenance activities for airborne communication, camera, bombing system, and TSEC/COMSEC equipment (which includes secure voice, IFF, SIF, data link pods, etc.).

Aircraft / Mission	Authorized Space (SF / SM)
KC-135 (10 PAI)	5,400 / 502
C-17 (12 PAI)	5,400 / 502
C-130E/H (up to 12 PAI)	6,400 / 595
Fighter aircraft (up to 24 PAI)	12,700 / 1,180
C-5 (12 PAI)	15,000 / 1,394

7.1.16 Category Code 217-713, ECM Pod Shop and Storage. This function (normally added to category code 217-712, Avionics Shop) contains maintenance areas and storage for pods and associated equipment, as well as for LANTIRN, RECCE, HARM, etc.; authorized only when specific pods are assigned at an installation for the following missions:

Mission	Authorized Space (SF / SM)
ECM Pod Shop/Storage (fighters)	[see next table]
RECCE/TARS Pod Shop/Storage (fighters)	2,500 / 232
HARM Pod Storage (fighters)	1,000 / 93
Air Defense ECM Facility	1,000 / 93
LANTIRN/LITENING (fighters)	2,500 / 232 *
C-130XX, HC-130, KC-135, C-17	2,700 / 251

* Add 1,200 SF / 112 SM of covered space for mobile set.

Function	Authorized Space (SF) per Number of Sets of ECM Pod Support Equipment			
	1 Set	2 Sets	3 Sets	4 Sets
Maintenance	1,950	3,480	5,010	6,540
Storage	2,850	5,700	8,550	11,400
Total Area	**4,800 SF / 446 SM**	**9,180 SF / 853 SM**	**13,560 SF / 1,260 SM**	**17,940 SF / 1,667 SM**

Note: Each set of pod support equipment maintains 18 ECM pods.

7.1.17 Category Code 218-712, Aircraft Support Equipment (ASE) Shop/Storage Facility. [Formerly 'Aerospace Ground Equipment (AGE) Facility'] The ASE shop inspects, maintains, repairs, and services both powered and non-powered equipment that directly supports aircraft, as well as powered-munitions ASE (if assigned).

The facility normally includes maintenance stalls with workbenches, hoists, indoor wash rack (in cold weather climates), tool crib, bench stock, sealed lead acid battery servicing area, engine exhaust extraction system, administrative space, and personnel locker space.

Auth. Pieces Support Equipment	Authorized Area Admin / Shop (SF / SM) *	Covered Storage (SF / SM) **	Open Storage (SY / SM) ***
0 - 50	2,500 / 232	2,000 / 186	40 / 33
51 - 100	3,500 / 325	3,000 / 279	60 / 50
101 - 150	4,500 / 418	4,000 / 372	85 / 71
151 - 200	5,500 / 511	5,000 / 465	115 / 96
201 - 250	6,500 / 604	6,000 / 557	145 / 121
251 - 300	7,500 / 697	7,000 / 650	175 / 146
301 - 350	8,500 / 790	8,000 / 743	205 / 171
351 - 400	9,500 / 873	9,000 / 836	235 / 196
401 – 450	10,500/ 975	10,000/ 929	265/ 222
451 or more	Contact ANG/CEPD	Contact ANG/CEPD	Contact ANG/CEPD

* Denotes maximum totally enclosed shop areas.
** For severe weather or heavy snow locations, may include minimal heat.
*** Use ASE Storage Yard (category code 852-273).

Note: Includes powered and non-powered equipment.
Co-located units authorized joint facility, based on sum of all authorized ASE items.
Do not count munitions trailers as ASE; put in Conventional Munitions Shop (category code 216-642).

7.1.18 Category Code 218-852, Survival Equipment Shop. The shop – which may be co-located with Life Support in Squadron Operations (category code 141-753) – works on parachutes, flotation equipment (life rafts, life preservers, emergency escape slides), and the repair and manufacture of fabric items. Parachutes and flotation equipment must be periodically inflated, inspected, and repacked; survival items and accessories are concurrently inspected.

Special provision must be made for the storage of explosives, in accordance with AFM 91-201.

Aircraft / Mission	Authorized Space (SF / SM)
Fighter aircraft	3,100 / 288
C-130, EC-130	4,200 / 390
HC-130	6,000 / 557
C-5, C-17, KC-135	5,300 / 492

7.1.19 Category Code 218-868, Regional Precision Measurement Equipment Lab (PMEL). This facility provides field-level maintenance and calibration of test, measurement, and diagnostic equipment (TMDE) for assigned units. PMEL personnel calibrate and certify TMDE at regular intervals; they also provide emergency assistance on TMDE, as required.

The laboratory requires an environment controlled for temperature, humidity, and dust; calibration and repair activity must also be free of interfering vibration.

PMEL Function	Authorized Area (SF)	Remarks
Administrative Offices	250	
Technical Library	230	
Calibration and Repair	7,000	Incl. radiac range, dimensional measurement lab
Scheduling/Receiving	1,711	
Equipment Cleaning	98	
Multi-purpose Room	250	Serves as conference/break/training room
Air Lock	54	
Subtotal	9,593	
Overhead Factor (30%)	2,878	

Total PMEL Area	12,471	
Total PMEL Area (rounded)	**12,500 SF / 1,161 SM**	

7.1.20 Category Code 219-943, Civil Engineer Pavement and Grounds Facility. A building (8,000 SF / 743 SM) normally comprised of three work centers, each with its own small (100 SF / 9.3 SM) office: 'pavements' (maintains paved surfaces; constructs and repairs airfield, roadway, and parking areas), 'equipment operations' (handles use of construction and special purpose equipment, such as backhoes, dump trucks, airfield sweepers, and bulldozers), and 'grounds' (base landscaping, maintenance of road signs and fencing).

7.1.21 Category Code 219-944, Civil Engineer Maintenance Facility. The primary production center of civil engineering, its activities include structures (metals, carpentry, masonry, etc.), electrical (interior/exterior), power production, utilities (plumbing, water and waste, etc.), liquid fuels, entomology, HVAC (heating, ventilation, air conditioning, refrigeration, EMCS, etc.), and others. Each activity needs the space, layout, and equipment of this facility for shop, administrative, and training functions.

Normally co-located with Civil Engineer Administration (category code 610-127).

Operations and Maintenance	Auth. Pers UTC	Other	Authorized Area (SF)	
Work Control (4 @ 90 SF)	4		360	Positions filled from shop
Material Control (2 @ 90 SF)	2		180	
Shop Supervisors (6 @ 45 SF)	6		270	
Tool Room / Bench Stock			370	
Subtotal	12	0	1,180	
Electrical, Int/Ext (4 @ 60 SF)	4		240	
Power Production (4 @ 60 SF)	4		240	
HVAC (5 @ 60 SF)	5		300	
Pavements / Const Eqpt (6 @ 60 SF)	6		360	
Structures (5 @ 60 SF)	5		300	
Utils, Plmbg/Wtr/Waste (6 @ 60 SF)	6		360	
Liquid Fuels (3 @ 60 SF)	3		180	
Entomology (2 @ 60 SF)	2		120	
Subtotal	35	0	2,100	
Mobility Equip Stg / Pallet Buildup			1,500	3 pallets x 250 SF + 750 SF
Mobility Bag Storage			1,135	63 personnel x 3 bags x 6 SF
Subtotal	0	0	2,635	
Subtotal O & M Area	47	0	5,915	
Overhead Factor (20%)			1,185	
Total CE O & M Area	**7,100 SF / 660 SM**			

Note: Assumes 63 Prime BEEF personnel.
Add 20 SF / 1.9 SM per S-Team member.
Excludes CRTCs and locations with Title 5 BOS.
Includes mobility storage for Prime BEEF.
Add 4,000 SF / 372 SM for CEMIRT team.

7.1.22 Category Code 219-947, Civil Engineer Storage Building. This 4,000 SF / 372 SM, unheated, enclosed facility is necessary to provide storage for certain items of equipment and supplies needed for installation operations and maintenance that do not require regular warehouse storage, yet must be protected from the weather (e.g., lumber, construction materials, etc.).

A geographically separated unit (GSU) is authorized one 1,000 SF / 93 SM building.

Chapter 8. CATEGORY GROUP 42 EXPLOSIVES FACILITIES

8.1 General Criteria

The quantity and type of explosives storage facilities at an installation will vary with operating requirements, the quantity and type of munitions to be stored or handled, site characteristics, and the type of storage structures preferred (or required) at the storage site.

8.1.1 Category Code 422-258, Above-Ground Magazine Storage. The above-ground magazine varies in size, depending on the volume of munitions to be stored. This is the preferred method of storing explosives if adequate surrounding land area is available to meet safety requirements.

Mission	Authorized Space (SF / SM)
Air Defense	2,000 / 186
Tanker/Airlift (no WRM)	1,000 / 93
Tanker/Airlift (with WRM)	*

* See category code 422-264 for authorized igloos.

Magazine Content (F-15, F-16)	Authorized Space (SF)
Practice Storage (built-up BDUs)	1,440
Combined Storage (1.3, 1.4 munitions)	1,500
Training Missile Storage	1,000
20mm Ammunition	1,200
Total Magazine Area (F-15, F-16)	**5,140 SF / 476 SM**

Magazine Content (A-10)	Authorized Space (SF)
Practice Storage (built-up BDUs)	1,440
Combined Storage (1.3, 1.4 munitions)	1,500
Training Missile Storage	1,000
30mm Ammunition	1,800
Total Magazine Area (A-10)	**5,740 SF / 533 SM**

8.1.2 Category Code 422-264, Storage Igloo. Igloo magazines are used to store all types of explosives, and are preferred for mass detonating explosives where moisture condensation is not a problem. They are earth covered, of either concrete or steel-arch construction, and required if an adequate safety buffer of surrounding vacant land is not available.

Mission	Authorized Space (SF / SM)
Air Defense	8,600 / 799
General Purpose Fighter	3,600 / 334
Tanker/Airlift (with WRM)	1,800 / 167

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Chapter 9. CATEGORY GROUPS 44, 45 STORAGE FACILITIES: COVERED, OPEN, SPECIAL PURPOSE

9.1 General Criteria

Storage facilities provide space to keep, service, dispense, and dispose of a myriad of goods and materials, ranging from the hazardous (such as flammable liquids) to the 'everyday' (e.g., personnel uniform items).

9.1.1 Category Code 442-257, Base Hazardous Materials Storage. Provides adequate and properly configured space to store hazardous materials prior to their use, as well as the temporary storage of hazardous waste before proper disposal. This category code is divided into the four functions below:

a. Hazardous Materials (HAZMAT) Pharmacy. Each installation is required to establish a HAZMAT pharmacy program to positively control the procurement, storage, distribution, reuse, and disposal of identified hazardous items such as paints, oil, solvents, corrosives, other chemicals, and bottled gases (compressed gas cylinders are tracked by the HAZMAT pharmacy, but stored under a simple roof structure). Tenant ANG units with a host-provided HAZMAT pharmacy are not authorized a separate facility.

Mission requirements and weapons systems supported will determine the HAZMAT pharmacy's actual size; general authorization is given in the following table:

HAZMAT Pharmacy Function	Authorized Area (SF)
Administration / Customer Service	250
Materials Handling/Storage	1,195
Subtotal	1,445
Overhead (15%)	217
HAZMAT Pharmacy Area	1,662
Total HAZMAT Pharmacy Area (rounded)	**1,700 SF / 158 SM**

The specific size of a HAZMAT pharmacy will be determined by ANGRC Environmental and Engineering, based on the installation's hazardous waste generation storage requirements.

b. Hydrazine Storage and Servicing Facility. Provides space for the regional servicing and storage of hydrazine fuel containers at installations with F-16 aircraft equipment emergency power units that operate on hydrazine; 800 SF / 74.3 SM authorized.

c. Hydrazine Storage Facility. Provides space for the storage of hydrazine fuel containers with no servicing requirement at installations with F-16 aircraft equipment emergency power units that operate on hydrazine; 200 SF / 18.6 SM is authorized.

d. Central Hazardous Waste Accumulation Point. A single, central space on an installation for hazardous waste accumulation is included under category code 452-252, Base Supply Open Storage.

9.1.2 Category Code 442-258, Cryogenics (LOX/LIN) Storage. All bases with a requirement for liquid oxygen (LOX) for aircrews' breathing purposes will possess either a LOX generating/storage capability or a LOX storage capacity to satisfy the requirement. The decision to rely on a generating/storage capability or on storage capacity and commercial suppliers will be based on individual base analyses to determine the best procedure to ensure meeting the requirements of each base.

The normal source for breathable LOX within the United States, its territories, and possessions will be by procurement from commercial suppliers wherever they are available to meet quantity and specification requirements. In these instances, base storage capacity will be sufficient to provide 30 days' peacetime requirement or 15 days' 'alert' – whichever is greater – plus war reserve material (WRM) and enough storage to permit receipt of resupply in economical quantities from suppliers.

In every instance, a minimum of at least two tanks (which are centrally procured equipment items) will be provided in multiples of 400, 2,000, or 5,000 gallons – 1,515, 7,571, or 18,927 liters, respectively – to ensure continuous operation and permit periodic purging and decontamination of the tanks.

LOX generating and storage facilities require fencing for safety protection.

See AFI 23-201 *Fuels Management* and AMC for liquid nitrogen (LIN) storage facility design requirements. Provide canopies over tank(s) in areas of snow and ice to ensure safe footing for personnel, and in areas of extremely hot weather to minimize boil-off losses.

9.1.3 Category Code 442-628, Base Supplies and Equipment Shed. Authorized for flying locations only, this facility is used to store base supplies, equipment, and material which does not require closed warehouse space but must be protected from the weather because of the nature of the material or the manner in which it is packed. Lumber storage exclusive of that stored by the BCE may also be included, as may space for receiving and shipping activities.

Shed storage space of 2,500 SF / 232 SM is authorized, constructed without complete side or end walls; see Table 1 for CRTC and Table 2 for RED HORSE authorizations.

9.1.4 Category Code 442-758, Base Supply and Equipment Warehouse. Warehouse functions include bulk and bin storage of materials, receiving, shipping, packing, crating, equipment storage and issue, general supply, base issue supply point, personnel clothing storage and issue, and contracting functions. Space for mobility storage not already identified elsewhere may be included in this facility or separate one(s); however, space will not be duplicated.

The total scope of the host base supply facility may be increased when the warehouse is required to support either other units on base or geographically separated units (GSUs) that have a separate mission but receive supply support from the host base.

Normally co-located with Base Supply Administration (category code 610-122).

Mission	Total Area Authorized (SF / SM)
Fighter aircraft	23,200 / 2,155
C-130, KC-135, KC-10	19,900 / 1,849
C-17	30,200 / 2,806
C-5	34,700 / 3,224

Organization	Total Area Authorized (SF / SM)
Air Control Squadron (ACS)	15,600 / 1,450
Air Traffic Control Squadron (ATCS)	9,000 / 836
Combat Communications Group (CCG)	2,150 / 200
Combat Communications Squadron (CCS)	15,600 / 1,450
Engineering Installation Squadron (EIS)	9,000 / 836

9.1.5 Category Code 452-252, Base Supply Open Storage. A paved area used to store materials authorized for open storage. Surface improvement of the area is required to facilitate the operation of materials-handling equipment.

The size of the area is determined by its overall dimensions, with no deductions for interior trackage and permanent roads. Exterior lights and fencing may be installed as required to deter theft.

This category code also includes the hazardous waste central collection capability; satellite collection is addressed by the facility that generates the hazardous waste. The central collection point is usually a concrete pad (with utilities), upon which to mount a commercially available, prefabricated shed for the storage of small amounts of hazardous waste until they are removed/manifested from the base.

9.1.6 Category Code 452-255, Civil Engineer Open Storage. The Base Civil Engineer's activity requires fenced, lighted, and paved open storage space for construction materials and equipment that can withstand exposure to the elements. The storage yard is usually a part of the CE complex (which includes the maintenance shop, storage buildings and sheds, and the pavement and grounds building), and is often integrated with the CE vehicle subpool (established under criteria for category code 852-261, Vehicle Parking Operations).

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Chapter 10. CATEGORY GROUP 61 ADMINISTRATIVE FACILITIES

10.1 General Criteria

Administrative space requirements normally include private offices (supervisory), conference/training space, open office areas (staff), administrative support areas (reproduction, workspace, files storage, publications/technical libraries), bathrooms, lockers, break areas, utility space, and receiving areas.

10.1.1 Category Code 610-121, Vehicle Operations Administration. This space requirement is included under Vehicle Maintenance Shop (category code 214-425).

10.1.2 Category Code 610-122, Base Supply Administration. Base supply administrative functions include management and systems, material management, operations support, supply customer training, contracting office, traffic management office (TMO), squadron commander, and orderly room.

Normally co-located with Base Supplies and Equipment Warehouse (category code 442-758).

Flying Unit Admin Function	Pers.	Authorized Area (SF)	Remarks
Commander	1	150	
Commander's Conference Room		225	Sized for 12-15 pers
First Sergeant	1	100	
Orderly Room	4	360	
Chief of Supply	1	150	
Base Contracting Supervisor	1	120	
Base Contracting Administration	4	360	
Computer Operations	4	360	
Document Control	1	120	
TMO Supervisor	1	100	
SATO	1	90	
Unit Deployment Managers	3	270	
Management Systems Supervisor	1	120	
Management Systems	10	900	
Freight & Passenger	6	540	
Material Storage & Distribution	7	630	
RSP Administration	4	360	
IEU Administration	4	360	
Training/Break Room		1,295	Sized for max. of 70 pers
Personal Lockers (M/F)		350	Five (5) SF/UTA pers
Subtotal	54	6,960	
Overhead Factor (30%)		2,088	
Total Flying Unit Admin Area		9,048	
Total Flying Unit Admin Area (rounded)	**9,100 SF / 845 SM**		

Note: A typical base supply unit is composed of 25 full-time and 70 UTA personnel.
Some of the 'administrative' functions above may be physically located in the warehouse area, or may be 'contiguous' to the other administrative functions.
Should any of the above functional areas be located in another facility (e.g., Base Contracting, SATO, etc.), they will carry the Base Supply Admin category code with them, which will reduce the overall Base Supply Admin authorization accordingly.

Geographically Separated Unit (GSU) Admin Function	Auth. Pers.		Remarks
Chief of Supply	1	150	
Base Contracting Administration	4	360	
Storage		75	
Personal Lockers (M/F)		25	Five (5) SF/UTA pers
Subtotal	5	610	
Overhead Factor (30%)		183	
Total GSU Admin Area		793	
Total GSU Admin Area (rounded)		**800 SF / 74 SM**	

Note: A typical GSU base supply unit is composed of 1 full-time and 5 UTA personnel.

10.1.3 Category Code 610-127, Civil Engineer Administration. Contains the principal administrative offices of the Base Civil Engineer's (BCE's) organization, i.e., the Commander / BCE's office, the deputy BCE's office, areas for squadron administration, engineering, operations, resources, etc. Also contains a drafting area, several conference rooms, and various administrative support areas.

Co-located with Civil Engineer Maintenance Facility (category code 219-944).

Civil Engineer Admin Function	Auth. Pers UTC	Other		Remarks
Commander / BCE (O-5)	1		225	
Commander's Conference Room			225	
First Sergeant	1		125	
Operations Officer / Deputy BCE	1		125	
Admin / Lobby / Waiting Area		1	340	State-funded secretarial pers
Chief of Operations / Facility Mgr.	1		125	
Real Estate (1 @ 125 SF, 50 SF stg.)		1	175	State pers (federally funded)
Training (1 @ 90 SF, 50 SF stg.)		1	140	Non-UTC federally funded pers
Testing Room (6 pers cap @ 25 SF)			150	
Engineering (2 @ 90 SF, 50 SF stg.)	2		230	
Drafting (4 @ 90 SF)	4		360	
Reproduction / Plans / Storage			400	
ABO (1 @ 90, 5 @ 45 SF; 50 SF stg.)	6		365	
Classroom			1,295	Sized for 70 personnel
Personal Lockers (63 @ 5 SF)			315	
Break Area			100	
Subtotal	16	3	4,695	
Overhead Factor (30%)			1,405	
Total CE Admin Area			**6,100 SF / 567 SM**	

Note: Assumes 63 Prime BEEF personnel. Includes mobility storage for Prime BEEF.
Add 100 SF / 9.3 SM per S-team member. Add 4,000 SF / 372 SM and 6 personnel for CEMIRT team.

10.1.4 Category Code 610-128, Base Personnel Office. This space requirement is normally included under Reserve Forces Operational Training (category code 171-445).

10.1.5 Category Code 610-129, Weapons Systems Maintenance Management Facility. Accommodates the offices of the named activity, composed of the following units:

Maintenance Control
Plans, Scheduling, and Documentation
Material Control
Quality Control, Records, and Analysis
Chief of Maintenance (and administrative staff)

Aircraft Type	Authorized Space (SF / SM)
Fighter aircraft	9,000 / 836
C-130, KC-10, C-17, C-5	7,400 / 687
KC-135	11,400 / 1,059

WSMM Function, Fighter Aircraft	F/T	UTA	Net Area (SF)	Remarks
Commander (O-6)	1	1	250	
Commander's Conference Room			250	Sized for 12-15 pers
First Sergeant		1	125	
Orderly Room / Administration	1	2	200	
Lobby / Waiting Area			100	
Admin Storage Area			50	
Media Center			50	Copy machine, fax, etc.
ISSA Manager (O-4)	1	1	175	
Training Manager	1	3	270	
Testing Room			400	Maximum 25 pers
Quality Assurance Officer (O-4)		1	175	
Quality Assurance Supervisor (E-9)	1	1	125	
Quality Assurance	4	7	500	
Programs & Mobility	2	2	200	
Production Analysis	2	6	540	
Plans & Scheduling	2	4	360	
Tech Order Distribution Center	1	2	240	
Maintenance Officer (O-4)	1	1	175	
MOC Supervisor (E-8)		1	100	
Maintenance Operations Control	3	13	600	
Wing Weapons Standardization		5	425	
Classroom / Training Room			1,060	Sized for 55 pers
Break Room			150	
Personal Lockers (M/F)			275	Sized for 55 pers
Handicapped Restrooms (M/F)			100	
Subtotal	20	51	6,895	
Overhead Factor (30%)			2,069	(Circulation, restrooms, mech., elec.)
Subtotal			8,964	
Total Fighter Area (rounded)	**9,000 SF / 836 SM**			

WSMM Function, Tanker Aircraft	Pers Assigned F/T	Pers Assigned UTA	Net Area (SF)	Remarks
Commander (O-6)	1	1	250	
Commander's Conference Room			250	Sized for 12-15 pers
First Sergeant		1	250	AGS and MXS
Orderly Room / Administration	1	8	800	AGS, MXS, and LSF
Lobby / Waiting Area			100	
Admin Storage Area			50	
Media Center			50	Copy machine, fax, etc.
ISSA Manager (O-4)		1	175	
Training Manager	1	3	270	
Testing Room			400	Maximum 25 pers
Quality Assurance Officer (O-4)		1	175	
Quality Assurance Supervisor (E-9)	1	1	125	
Quality Assurance	3	5	400	
Production Analysis	1	2	180	
Tech Order Distribution Center	1	2	240	
LSF Officer (O-4)	1	1	175	
LSF Supervisor (E-9)	1	1	125	
Maintenance Operations Control	2	10	500	
Plans & Scheduling	2	5	450	
Programs & Mobility	2	2	200	
Engine Management	1	2	200	
AGS Officer (O-5)	1	1	225	
Assistant AGS Officer (O-4)		1	175	
AGS Chief (E-9)	1	1	125	
Maintenance Officer (O-5)	1	1	225	
Assistant Maintenance Officer (O-4)		1	175	
Maintenance Chief (E-9)	2	2	250	
Maint Section Supervisor (E-8)	3	3	300	Accessories, FAB, and Avionics (1 each)
Munitions	1	1	100	
Classroom / Training Room			1,140	Sized for 60 pers
Break Room			200	
Personal Lockers (M/F)			300	Sized for 60 pers
Handicapped Restrooms (M/F)			100	
Subtotal	27	58	8,730	
Overhead Factor (30%)			2,619	(Circ., restrooms, mech., elec., comm., etc.)
Subtotal			11,349	
Total Tanker Area (rounded)	**11,400 SF / 1,059 SM**			

WSMM Function, Airlifter Aircraft	Pers Assigned		Net Area (SF)	
Commander (O-6)	1	1	250	
Commander's Conference Room			225	Sized for 12-15 pers
First Sergeant		1	125	
Orderly Room / Administration	1	2	200	
Lobby / Waiting Area			100	
Admin Storage Area			50	
Media Center			50	Copy machine, fax, etc.
Executive Officer (O-4)	1	1	175	
Training Manager	1	1	125	
Testing Room			400	Maximum 25 pers
Quality Assurance Officer (O-4)		1	175	
Quality Assurance Supervisor (E-9)	1	1	125	
Quality Assurance	4	6	450	
Programs & Mobility	2	2	200	