BY ORDER OF THE SECRETARY OF THE AIR FORCE

AIR FORCE MANUAL 32-1084

26 FEBRUARY 2016

Civil Engineering

FACILITY REQUIREMENTS

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-publishing website at **www.e-Publishing.af.mil** for downloading and ordering.

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: AF/A4CFC

Certified by: AF/A4CF
(Mr. Robert M. Gill, GS-15)

Supersedes: AFH32-1084, 20 April 2012

Pages: 435

This Manual supplements AFI 32-1024, *Standard Facility Requirements.* It provides guidance for determining space allocations for Air Force facilities and may be used to program new facilities or evaluate existing spaces. It provides facility space allowance guidance by category code (CATCODE). These criteria are used in assigning occupancy of existing facilities and in programming new facilities. This Manual is applicable to all active duty, civilian, Air Force Reserve (AFR) personnel and units; particularly Air Force commanders and managers, who plan, program, review, certify, and approve Air Force facilities. Civil Air Patrol may adopt this guidance at the discretion of the applicable installation commander, per AFI 10-2701. This Manual does not authorize the use of appropriated funds, non-appropriated funds, or private funds for the construction or conversion of facilities. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through appropriate functional chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at **https://www.my.af.mil/afrims/afrims/afrims/rims.cfm**. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

SUMMARY OF CHANGES

Revises AFMAN 32-1084, 20 April 2012 to incorporate the Compliance Statements recommended for edit, rewrite, and reduction. This was due to the Publication Assessment for Reform. All changes accepted has been incorporated in this revision. In addition, the current reference (AFMAN 32-1094) to the Air Force Criteria for Precision Measurement Equipment Laboratory design and Construction has been replaced with FC 4-218-01F. This document has been substantially revised and should be completely reviewed. Revisions include incorporating the list of *Offices of Primary Responsibility* (OPR) previously found in AFI 32-1024, *Standard Facility Requirements* within this document and updating office symbols. The Air Force Category Code designations have been replaced using the Real Property Classification System (RPCS), and each facility-type is described using a new format. Where applicable, office spaces have been realigned with rank-based standards. Space management priorities have been cross-referenced with industry standards (e.g., OSCRE [Open Standards Consortium for Real Estate] and BOMA [Building Owners and Managers Association]) for use in future Asset Management databases. The standard facility requirements for most Air Force missions have been updated, however, facility requirements for newer, unique or future weapon systems are unknown or under development at the time of this document's publication and therefore not included in this revision. Contact the lead MAJCOM or OPR for standard facility requirements not contained in this Manual.

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Chapter 1

OVERVIEW

1.1. Description. This Manual is a tool to assist commanders, their management and technical staff in programming the acquisition of facilities and in managing the inventory of real property facilities. This Manual also aids all base personnel in correctly identifying classes of real property and assigning correct category codes, ensuring that real property documentation is as accurate as possible.

1.2. Application. This Manual applies to Air Force Active and Reserve facilities. The Air Force Reserve Command Handbook (AFRCH) 32-1001, *Standard Facility Requirements*, supplements space standards for Air Force Reserve facilities. The Air National Guard Handbook (ANGH) 32-1084, *ANG Standard Facility Requirements*, defines space standards for Air National Guard facilities. This Manual takes precedence over Air Force design guides for developing space requirements for Air Force facilities.

1.2.1. This Manual contains guidance for the type, number, and size of facilities to support Air Force and Air Force Reserve missions. The guidance contained in this Manual pertains to all Air Force facilities at military installations in the United States and, to the extent practicable, in other locations worldwide.

1.2.2. Use this guidance as a baseline in the planning and design of construction projects: new facilities in the military construction (MILCON) program; minor construction projects; nonappropriated fund (NAF) projects; Sustainment, Restoration, and Modernization (SRM); and major alterations to existing facilities.

1.2.3. **Application to Existing Facilities.** Additionally, use this manual as a baseline in determining the appropriate allocation of space within existing facilities. The configuration of existing spaces may preclude the exact application of the space standards contained in this document, but space planning should adhere as closely to this guidance as possible. Consider all available existing space when establishing a space deficiency and a justification for programming action.

1.2.4. **Facilities Not Defined.** Standard facility requirements have not been determined for some facility types. In those cases, project programming or space allocations are accomplished based on requirements analysis, input from the facility type OPRs identified in **Attachment 2**, **Table A2.2** of this Manual, and justification through established project approval procedures. As requirements are established, they are added to this Manual.

1.2.5. **Adding New Facilities to and/or Updating the Manual.** AFI 32-1024 addresses the procedures for adding new facilities and for updating facilities already included in this Manual.

1.2.6. **Approved Weapons Systems Requirements Plans.** Follow unique facility requirements as approved in Weapons Systems Requirements Plans. Discrepancies between weapons systems criteria and this Manual should be resolved by the appropriate host command civil engineer (MAJCOM/A7).

1.3. Requirements.

1.3.1. **Mandatory Requirements.** Although there is considerable flexibility in most of the guidance provided in this Manual, treat those sections identified as based on law, applicable Codes, Executive Orders, DoD Directives, Federal Regulations, Air Force Policy, and other governing standards accordingly. Any deviations require MAJCOM approval.

1.3.2. **General Requirements.** Facility requirements are developed under a wide variety of procedures and techniques. While the steps involved may vary with the nature of the facility requirement, there are basic criteria to consider for all design projects. This Manual contains criteria which serve as guidance in the planning and programming of high quality facilities that are durable, functional, sustainable, economical, safe, aesthetically pleasing, and have reasonable operating and maintenance costs. Space requirements in this Manual apply to all building and construction alternatives including permanent construction, semi-permanent construction, temporary construction, mobilization construction, relocatable buildings, leases, and portable buildings.

1.4. Limitations.

1.4.1. Projects should not be approved or disapproved solely on the basis of this Manual. Do not initiate improvement of existing facilities for the sole purpose of meeting this Manual. Existing facilities or existing situations which meet current criteria (prior to implementation of this Manual) should remain unchanged. All new requirements, and particularly those which exceed this guidance, require full explanation and justification where directed herein, and in accordance with other applicable DoD and Service programming/budget directives to ensure understanding by the reviewing officials.

1.4.2. Although this Manual may be used as a reference document for procurement activities such as contracting for professional design services and Green Procurement, do not use it as a reference document in military or federal specifications, for procurement of material, or in other similar procurement activities. Listing a facility in this Manual does not provide automatic justification for programming the facility or for including it on the base master plan.

1.5. How to Use the Manual.

1.5.1. **General Guidance.** This Manual provides general guidance for developing facility requirements. Its companion document, AFI 32-1024, *Standard Facility Requirements,* describes the facility requirement system, assigns responsibilities, and explains how new and revised guidance criteria are initiated and processed for publication. Both this document and AFI 32-1024 emphasize the importance of anticipating mission requirements and taking timely actions to establish and revise guidance and criteria for facilities needed to fulfill mission objectives.

1.5.2. **Organization.** This Manual is organized into chapters by broad category of facility. Within each chapter, each specific facility type is discussed in terms of general description, requirements determination, scope determination, dimensions, and design considerations. Where appropriate, tables are included for various size alternatives based on different weapon systems or different sized populations served. Technical details that might have significant impact on cost are included here, but technical guidance for design is not. Each facility type is organized by category code.

1.5.3. **Facility Type Descriptions.** For each type of facility, the Facility Analysis Category (FAC), the Category Code (CATCODE), the office symbol of the Office of Primary Responsibility (OPR), and the Office of Collateral Responsibility (OCR) are listed. For example:

Figure 1.1. Example Facility Type Description.

FAC: 1234
CATCODE: 123456
OPR: AF/A7CPA
OCR: MAJCOM/A7

1.1.1. Description. A general description of the facility type is provided in this section.

1.1.2. Requirements Determination. This section provides the basis for determining the functions of the facility and the major subcomponent spaces as they relate to the mission. See paragraph 1.5.4.

1.1.3. Scope Determination. The scope section contains the data required to make the initial determination about the overall size of the facility.

1.1.4. Dimensions. This section contains information about any specific dimensions required to be included. Often this section makes reference to a design guide.

1.1.5. Design Considerations. The intent of this section is to point out any key cost drivers for the facility that would impact the programmed amount for new construction or renovation. It is not intended as a repository for the contents of a design guide.

1.5.4. **Requirements Determination.** Facility requirements are developed under a wide variety of procedures and techniques. Use this Manual only as one step in determining facility requirements. Requirement determination is a process that:

1.5.4.1. Establishes one OPR as the requesting organization for establishing the facility requirement.

1.5.4.2. Acquires a full understanding of the proposed facility functions by a) analyzing the relationship of the functions to mission objectives, operational concepts, or other programs, b) acquiring detailed information from experts on published material and functions, c) initiating special research and investigation into any aspect of functions requiring clarification, and d) observing, if possible, actual operations comparable to the operations in question.

1.5.4.3. Explores the possibility of combining or integrating the proposed facility requirements with other existing or proposed facility requirements.

1.5.4.4. Translates functional requirements into design and planning criteria by investigating factors such as a) the number of personnel and types of organizations using the facility; b) time, workload, and scheduling requirements; c) environmental control requirements; d) effects of climate, site location, and master plan requirements; e) major

equipment or material requirements; f) hazardous considerations; g) costs including both initial costs and operating and maintenance costs (e.g., life-cycle costs); h) criteria used by other governmental or civilian organizations for comparable facilities; i) accessibility for persons with disabilities; and j) compliance with the most current Air Force Sustainable Design and Development (SDD) and Antiterrorism/Force Protection (AT/FP) policies.

1.6. Facility Planning Considerations. The following is a partial list of considerations for facility planning as they impact space requirements, and ultimately cost. For more information on facility planning, refer to the Air Force Planner's Handbook.

1.6.1. **Design Quality.** The Air Force is committed to excellence in the design and development of its sites and buildings. For the Air Force, this means an integrated approach that achieves the highest quality of aesthetics in meeting the requirements of the building's users and accomplishing the mission, while at the same time delivering a building that is cost effective to maintain throughout its useful life.

1.6.2. **Flexibility, Adaptability, and Expansion.** Air Force buildings undergo many changes during their lifetime. As missions change and priorities change, Air Force departments are created, expanded, and abolished. As a consequence, requirements for space and services change frequently and space is reconfigured often. The flexibility to accommodate continual change needs to be built in to the building design from the outset and respected in subsequent alterations.

1.6.3. **Sustainability and Energy Performance.** Refer to **paragraph 1.8** of this chapter for environmental policies and practices, **paragraph 1.14** for site planning considerations, and **paragraph 1.15** for installation planning considerations.

1.6.4. **Operations and Maintenance.** Systems and materials should be selected on the basis of long-term operations and maintenance costs, as those costs tend to be significantly higher over time than first costs. The design of the facility operating systems should ensure ease and efficiency of operation and allow for cost effective maintenance and repair during the facility's useful life.

1.6.5. **Life-Cycle Costing (LCC).** LCC is an important economic analysis used in the selection of alternatives that impact both pending and future costs. It compares initial investment options and identifies the least costly alternatives over a twenty year period. LCC is mandated by law and is defined in 10 CFR, Part 437, *Federal Energy Management and Planning Programs*. The Air Force OPR for LCC is the Air Force Civil Engineer Support Agency (AFCESA).

1.6.6. **Historic Buildings.** To the extent feasible, the Air Force seeks to achieve the rehabilitation of historic structures through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values. The Air Force OPR for Historical Buildings is the Air Force Center for Engineering and the Environment (AFCEE)/Technical Support, Built Infrastructure Division (TDB).

1.6.7. **Accessibility.** Persons with disabilities are entitled to use many facilities on military installations. It is DoD and Air Force policy to make buildings accessible to persons with disabilities unless the building is to be used only by able-bodied military personnel. Accessibility guidance has been clarified in an OSD policy letter dated October 31, 2008

adopting the Architectural Barriers Act of 1968, with amendments, as it applies to DoD facilities. The Air Force OPR for accessibility is AFCEE/TDB. A copy of the policy letter can be obtained through the AFCEE/TDB office or on their website at **www.afcee.af.mil**.

1.6.8. **Telecommunications Infrastructure.** A total integration of all building systems provides for current operations as well as for future changes. A technology infrastructure should be planned in each building to accommodate power systems including normal; emergency and uninterrupted power; mechanical systems and controls; fire detection and suppression systems; security systems; video and television systems; communications systems, including voice and data; lighting controls; plumbing services; and special utility services, such as gas or exhaust systems. The intent is not to provide infinite amounts of space for these systems, but to recognize their dimensional characteristics and the ability to service system components. Ensure the infrastructure provides adequate spare capacity and integrates the utility entrance facilities, equipment rooms, backbone pathways, horizontal distribution pathways, and workstation outlets for each system. In part, floor-to-floor heights are determined by the depth of space required for the technology infrastructure, including structural, mechanical, electrical, and communications systems. Size telecommunications closets per Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) 569-A-5, *Commercial Building Standards for Telecommunications Pathways and Spaces*, Table 7.2-1. Also see UFC 3-580-01, *Telecommunications Building Cabling Systems Planning and Design*.

1.6.9. **Security/Facility Hardening/Antiterrorism/Force Protection.** Designing and constructing safe and secure cost effective buildings has always been one of the Air Force's primary goals. Each building system and element should support risk mitigation and reduce casualties, property damage, and the loss of critical functions. Designs should include the ability to increase security in response to a heightened threat, as well as reduce security if changes in risk warrant it. Space for facilities requiring additional hardening and antiterrorism measures are captured in the Net-to-Gross multiplier (see **paragraph 1.10.3**). Consult UFC 3-340-01, *Design and Analysis of Hardened Structures to Conventional Weapons Effects* for facility hardening space requirements, and UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings* and UFC 4-010-02, *DoD Minimum Standoff Distances for Buildings* for antiterrorism space requirements.

1.6.10. **Fire Protection Space.** Space for fire protection is captured in the Net-to-Gross multiplier (see **paragraph 1.10.3**). Ensure complete automatic sprinkler protection is provided in all new and renovated DOD facilities. Additionally, ensure all new and renovated facilities comply with the requirements of the National Fire Protection Association (NFPA) 101, *Life Safety Code.* See UFC 3-600-01, *Fire Protection Engineering for Facilities*.

1.7. National Codes and Standards. The Air Force requires that each building constructed or altered by the Air Force shall, to the maximum extent feasible, be in compliance with nationally recognized model building codes and with other state and local codes. The technical requirements of these nationally recognized codes supplement other Air Force requirements mandated by federal laws and executive orders, as well as other criteria noted within this document that has been established to meet mission needs and their unique requirements. Refer to UFC 1-200-01, *General Building Requirements*.

1.8. Environmental Policies and Practices. The Air Force is committed to incorporating principles of sustainable design and energy efficiency into all of its building projects. Sustainable design seeks to locate, design, construct, and operate buildings to reduce negative impact on the environment and the consumption of natural resources. Sustainable design improves building performance while keeping in mind the health and comfort of building occupants. It is an integrated, synergistic approach, in which all phases of the facility lifecycle are considered. The result is an optimal balance of cost, environmental, societal, and human benefits while meeting the mission and function of the intended facility or infrastructure.

1.8.1. **Requirements.** Refer to SDD Guidance available through AFCEE/TDB and UFC 4-030-01, *Sustainable Development* for the most current policies and regulations.

1.8.2. **Sustainable Development Defined.** Sustainable Development means to plan, program, site, design, construct, renovate, operate, maintain, deconstruct, and remove facilities in ways that efficiently use energy, water, and materials; improve and protect built and natural environments; and provide long-term benefits for occupant health, productivity, and comfort. Sustainable Development is also known by such terms as "green", "high performance", or "environmentally friendly."

1.8.3. **Leadership in Energy and Environmental Design (LEED) Certification.** Current Air Force SDD policy supports the principles of LEED and requires all new MILCON projects be designed and built to achieve LEED Silver, with a percentage set aside for actual LEED Certification. LEED is a third-party certification program developed by the United States Green Building Council (USGBC) and is a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED focuses on sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. See the latest Air Force SDD policy for current guidance.

1.8.4. **Protect and Conserve Water.** Current executive orders as well as the Energy Independence and Security Act require agencies to reduce water consumption. Therefore, each Air Force facility bases water management plans for new MILCON projects on FEMP guidance. Among these, the key strategies are reducing potable water consumption and minimizing the impact of wastewater systems.

1.8.5. **Compliance with the National Environmental Protection Agency (NEPA).** NEPA is a prime driver in the Air Force planning process and is formalized in the Environmental Impact Analysis Process (EIAP). NEPA requires federal agencies to address environmental values in their decision-making processes by considering the environmental impacts of their proposed actions and weighing reasonable alternatives to those actions. To comply with this requirement, the Air Force must prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS) for projects that may have significant effects on the environment. Responsibilities are outlined in AFI 32-1024, para. 2.4.

1.8.6. **Exceptions.** The application of some United States (US) or Continental United States (CONUS) environmental policies is not applicable in all situations. In such instances, consult the Overseas Environmental Baseline Guidance Document and Final Governing Standards (OEBGD/FGS) for guidance in overseas locations not covered by US or CONUS environmental policies.

1.9. Definitions.

1.9.1. **Net Organizational Space.** Net Organizational Space is a term defined as space used by occupying organizations in a facility that includes office spaces, administrative support areas, organizational special purpose spaces, and accompanying circulation space. Structural elements, openings for vertical cables, and vertical penetrations built for private use of the organization for new facilities are captured in the multipliers, and included in the measurement for existing buildings.

1.9.2. **Special Purpose Space.** Special Purpose Space is defined as space which may be required to meet specific or special organizational functional needs. Special Purpose Space in Administrative Facilities/Areas is described in **Chapter 6**.

1.9.3. **Net Building Area.** The Net Building Area is the total of all Net Organizational Spaces plus all the shared Special Purpose Spaces used by all organizations.

1.9.4. **Usable vs. Net.** For the purposes of this Manual, these terms are often used interchangeably and should not be confused to mean separate space definitions. Net Organizational Space for one organization is the same thing as the Total Usable Space for that organization.

1.9.5. **Major Vertical Penetrations.** Major vertical penetrations include stairs, elevator shafts, flues, pipe shafts, vertical ducts, and the like. Also included are atria, lightwells, and similar penetrations above the finished floor. Structural columns, openings for vertical electrical cable or telephone distribution, and openings for plumbing lines are not considered major vertical penetrations.

1.9.6. **Common Areas.** Common areas are those areas that are available to all occupants (organizations) such as washrooms, janitorial closets, electrical rooms, telephone rooms, mechanical rooms, elevator lobbies, and public corridors. This may vary based on the configuration of each floor. Common areas are used to figure both Usable and Rentable Space. BOMA refers to this as Core Building Services.

1.9.7. **Gross Building Area.** Gross building area, or constructed area, is the total constructed area of a building. It is measured to the outside finished surface of permanent outer building walls, without any deductions. Non-enclosed roof areas are counted at 0.5 (See **Table 1.2**).

1.9.7.1. Calculate the following spaces as full area: basements, above grade floors, mezzanines; service and equipment rooms; boiler plant and heater rooms; penthouses; enclosed passages, walks, porches, balconies, stairs and loading facilities; and raised and covered loading platforms.

1.9.7.2. Calculate the following spaces as half area: covered (but not enclosed) walkways, ramps, porches and balconies; covered and uncovered open stairs; uncovered raised loading platforms; covered ground level and covered/uncovered below grade loading facilities.

1.9.7.3. Exclude the following spaces: roof overhangs, utility tunnels, exterior uncovered walks, ramps, and paved terraces; and enclosed crawl and utility spaces with an average ceiling height of less than 2.1 m (7 ft) that are not considered half scope.

1.9.8. **Rentable Space.** Rentable Space is typically a figure used to assess a tenant's space charges. For simplified programming purposes, Rentable Space is figured by adding 5% to the Net Building Space, or total Usable Space. For definitive measurement, it includes Usable Space in addition to a prorated share of common and circulation areas. Rentable Space does not include major vertical penetrations and exterior walls. See BOMA Z65.1 for measurement guidance for Rentable Space. ***NOTE:*** The Air Force in 2009 adopted the BOMA net usable square feet (NUSF) protocol for all space designed and built under the '610' classification. This NUSF is now required on all drawings and records and is being retroactively calculated for all CONUS facilities with administrative space.

1.10. Space Allowances and Multipliers.

1.10.1. **General.** Space allowances for some of the facilities mentioned in this Manual are established by DoD. For all other facilities, the sizes and scopes are guidance and may be exceeded as detailed below:

1.10.1.1. **Exceeding Allowances.** AFI 32-9002, *Use of Real Property Facilities*, provides guidance to the MAJCOMs on exceeding allowances. When the Air Force Civil Engineer (AF/A7C) approval is needed per the 32-series policy directives, the approval request fully explains and documents the need to exceed published allowances. When the projects or actions do not require AF/A7C approval, increases beyond the scopes shown may be made when approved by the MAJCOM Civil Engineer.

1.10.2. **Circulation Multipliers.** Although typically used in administration buildings, other facilities may also require additional space for circulation. A multiplier of up to 10% may be added to authorized net Facility Specific Special Purpose Spaces for circulation (see **Table 1.1**). For programming administrative facilities/areas, see **Chapter 6**.

1.10.3. **Net-to-Gross Multiplier.** Regardless of facility type, the initial programming of a facility involves adding the sum of required net space and converting it to a gross area for the purposes of estimating project cost. A maximum Net-to-Gross multiplier of 25% should be added to Net Building Area to reach the gross building area. This "Net-to-Gross multiplier" captures the following space: sustainability features, mechanical and electrical space, anti-terrorism/force protection, fire protection, circulation, and unusual construction. Justify overages in allowable Gross Building Area Totals that occur due to additional space needed for one or more of those captured in the Net-to-Gross multiplier on DD Form 1391, *FY____ Military Construction Project Data.*

1.11. Space Programming. Programming is the research and decision-making process that identifies the scope of work to be designed. The programming of space for renovation or a new facility uses the space allocations in this Manual and specific guidance from applicable OPRs, where necessary, along with various multipliers (defined above) to determine the Gross Building Area. The Gross Building Area may then be used as an aid in establishing budgets and overall pricing. See UFC 3-701-09, *DoD Facilities Pricing Guide*.

1.11.1. **Space Programming for Administration Facilities.** Programming guidance for administration facilities is covered in **Chapter 6** and UFC 4-610-01 *Administration Facilities*.

1.11.2. **Space Programming for Facilities other than Administration.** **Table 1.1** is provided to aid in programming a new facility or to renovate existing construction for a facility whose primary purpose is other than administration. It is meant as a guide and may not be all inclusive. The programmer should research other approved tools that may exist for space planning.

1.11.2.1. Non-administrative facilities may include office, special purpose, and assembly spaces. See **Chapter 6** of this Manual for allowances on these spaces.

Table 1.1. Space Programming Process for a New Facility (Primarily Non-Administrative)[1, 2].

Required Spaces	Data Source
Total Administrative Areas +	Calculated per Chapter 6
Facility Specific Special Purpose Spaces +	As directed per CATCODE
Circulation Multiplier (10% of Special Purpose Space)	
Net Building Area	Total of all Net Spaces
Net-to-Gross Multiplier (25%)	Unless otherwise directed
Total	Gross Building Area
NOTES: 1. Use the Net Building Area planning figure provided for the specific CATCODE, plus any additional administrative space requirements. 2. This table is not to be used for those CATCODE that provide Gross Building Area totals.	

1.12. Space Management. The Air Force has adopted industry standard models for the purposes of measuring and managing space. Although the programmer may not be required to use these models when programming a new facility, he or she may be required to use these standards when documenting existing space for potential renovation or for accurately documenting existing space for inclusion in the Air Force real property inventory.

1.12.1. **Measurement.** To ensure an accurate, consistent inventory of Air Force space, the methods and standards by which those spaces are measured require consistency. For this purpose, the Air Force has adopted the BOMA Z65.1 standard for measurement of new and existing space. The BOMA standard is a method by which space is measured and tabulated. It includes definitions such as Gross Building Area, Rentable Area, and Usable Area. It also contains detailed instructions on how to perform the actual measurements for various building types. The OPR for BOMA is AFCEE/TDB.

1.12.2. **Classification.** To ensure an accurate, consistent inventory of Air Force space, the methods and standards by which those spaces are classified require consistency. For this purpose, the Air Force has adopted the OSCRE (Open Standards Consortium for Real Estate) standard for classifying and managing its inventory of new and existing space. Classification of space is normally used to determine, and ultimately categorize, available space in an existing facility. It may also be done *after* programming a new facility, or when renovating an existing one, for the purposes of adding that new space to the total inventory. The OPR for OSCRE is AFCEE/TDB.

1.12.3. **BOMA/OSCRE Relationship.** The BOMA and OSCRE standards are interdependent. Simply put, BOMA measures the space that OSCRE classifies into detailed, manageable "Levels." The OSCRE levels start with general space types and become more specific. Refer to **Table 1.2** for an example.

Table 1.2. BOMA/OSCRE Relationships Example (Level 1 only).

BOMA	Gross Building Area=Usable + 25% or Rentable + 20%												
					Rentable=Usable + prorated space or 5%								
							Usable						
									Net Organizational				
OSCRE (Level 1 of 3)	Non-enclosed Roof (0.5)	Exterior Wall	Interior Parking	Vertical Penetration	Core Building Services (Common Areas)	Primary Circulation	Personnel Service/ All Organizational Spaces	Shared Special Purpose Areas	Administrative Offices	Organizational Special Purpose Spaces	Special Purpose Space Circulation	Administrative Support/Storage	Secondary/Organizational Circulation

1.13. Determining Space Requirements.

1.13.1. **Space Requirements based on Military Strength.** Unless otherwise noted, the space requirements shown throughout this Manual are based upon the documented projected military strength or the base population of the installation at the anticipated time of project completion or beyond. Short duration spikes in military strength or base population should not be used as the basis for justifying larger facilities than is reasonable for the long-term, steady-state population.

1.13.1.1. Military Strength includes permanent party, supporting agencies, and transients as described below. Military strength in this usage applies to those who are to be served by the facility, which may include personnel of other Services.

1.13.1.1.1. When the installation regularly serves a substantial number of military transients (such as technicians, trainees, or students), the average daily strength, based on a firm projection of the total yearly load of such transients, may be added to the projected military strength of the installation.

1.13.1.1.2. Judgment is called for in instances where transients impact the facility size; transient population should not be used simply to justify more space than is reasonable.

1.13.1.1.3. When the transient load is clearly seasonal rather than continuous year round, base the average daily strength on a firm projection of the total seasonal load.

1.13.1.2. When a number of installations or concentrations of military personnel are located close to one another, such as in a metropolitan area, the total number of facilities provided in the area is related to, and governed by, the aggregate military strength in that area.

1.13.2. **Space Requirements based on Base Population.** Base populations as they apply to some of the facilities in this Manual are varied and complex. Facilities that depend on base populations for space allocation need to be determined on a case by case basis.

1.14. Site Planning Considerations.

1.14.1. **Site Analysis.** Accomplish a complete site survey for all new construction projects and for alterations that involve work outside the existing building lines.

1.14.1.1. All construction projects on air bases refer to UFC 3-260-01, *Airfield and Heliport Planning and Design*, and Title 14 CFR Part 77, *Objects affecting the Navigable Airspace*, to determine design requirements, height limitations, and permit/approval requirements. Use UFC 3-260-1 for describing and projecting potential violations of imaginary surfaces.

1.14.1.2. To address aircraft safety (BASH, visual obscurants and noise issues related to land development around airfields), the Air Force developed the AICUZ program. The purpose of the AICUZ program is to promote land use and development patterns, both on and off base, that are compatible with airfield operations. Refer to AFI 32-7063, *Air Installation Compatible Use Zone Program;* AFH 32-7084, *AICUZ Program Manager's Guide;* Title 14 CFR Part 77, *Objects Affecting the Navigable Airspace;* and AFPAM 91-212, *Bird/Wildlife Aircraft Strike Hazard (BASH) Management Techniques*.

1.14.2. **Existing site Features and Vegetation.** Existing natural features on the site should generally be preserved and used as a starting point for the overall site design. Efforts should be made to preserve existing vegetation, particularly healthy trees and plant specimens. The Air Force promotes the protection and integration of existing vegetation and natural terrain into site design. See UFC 3-201-02, *Landscape Architecture*.

1.14.3. **Optimize Energy Use.** Current executive orders as well as the *Energy Independence and Security Act of 2007* (EISA2007) require agencies to install cost-effective energy conservation measures in their facilities. The key strategies are conserving energy, encouraging the use of non-grid source energy, and protecting the atmosphere.

1.14.4. **Energy Conservation.** The use of site design to aid energy conservation and sustainability is encouraged. Solar orientation of the building and well-placed plant material can be used to increase heat gain in the winter and reduce heat gain during the summer.

1.14.5. **Sustainable Site Planning.** The Air Force promotes practices that are environmentally beneficial and conserve resources. Design and construction strategies should reduce stormwater runoff and polluted site water runoff. To the maximum extent feasible, ensure all Air Force MILCON projects incorporate the features of Low Impact Development (LID). Refer to UFC 3-210-10, *Low Impact Development*.

1.14.6. **Utilities.** Consideration should be given to the size and placement of major utilities that may be inside, attached to, or near (on-site) any Air Force MILCON projects.

1.14.7. **Site Security.** Air Force facilities should be safe and secure, yet still be accessible, welcoming, and effective workplaces. Customize security countermeasures in each case, based on established principles, criteria, risk analysis, and site conditions. Refer to UFC 4-010-01.

1.14.8. **Site Circulation.** Site circulation design for Air Force projects varies greatly depending on the context, which can range from tight urban sites to suburban campuses or isolated rural settings. However, the basic criteria remain the same in all situations: Site design should consider pedestrian access, vehicular access (including parking), fire apparatus access, and service vehicle access. See also UFC 3-210-02, *POV Site Circulation and Parking.*

1.15. Installation Planning Considerations. Integration of the facility into the base general plan should be accomplished and may have an impact on supporting utilities or other cost factors of the facility. Refer to AFI 32-7062, *Air Force Comprehensive Planning*, AFPAM 32-1010, *Land Use Planning*, Area Development Planning Bulletin, and the Planners Handbook for additional guidance.

1.16. Energy Policies and Practices

1.16.1. **Responsibilities.** Refer to AFPD 90-17, *Energy Management*, and AFI 90-1701, *Energy Management*, for current policies and guidance.

1.16.1.1. In accordance with AFI 90-1701 para 1.2.13.6.2, AF/A7C ensures AFIs written within their area of responsibility are consistent with Air Force energy goals and objectives.

1.16.2. **Optimize Energy Use.** Current Executive Orders, the Energy Policy Act of 2005 (EPAct 2005), and EISA 2007 require agencies to install cost-efficient energy conservation measures in their facilities. The key strategies are conserving energy, encouraging the use of non-grid source energy and protecting the atmosphere.

1.17. Energy Management. MAJCOMs, ANG, and DRUs must take energy management responsibilities and activities into consideration when exercising custody and control over real property. (T-1). See AFPD 90-17, *Energy Management*, and AFI 90-1701, *Energy Management*, for requirements and details.

1.17.1. Considerations include, but are not limited to, energy standard compliance for newly purchased appliances, energy audit findings, green house gas monitoring, SAF/IEE review and approval requirement for waivers to standards, and general infrastructure energy program management requirements.

1.18. Energy and Water Evaluations.

1.18.1. **Audits.** Per AFPD 90-17 and AFI 90-1701, energy managers shall complete, for each calendar year, a comprehensive energy and water evaluation for approximately 25 percent of the facilities of each agency in a manner that ensures that an evaluation of each such facility is completed at least once every four years. (T-1).

1.19. Energy Security. In accordance with AFPD 90-17, MAJCOMs, ANG, and DRUs evaluate the energy security of all their missions and bases.

Chapter 2

FACILITY CLASS 1, OPERATION AND TRAINING

2.1. Category Group 11, Airfield Pavements.

2.1.1. Overview.

2.1.1.1. **General Description.** The Airfield is the portion of the base used for airfield operations, i.e., take offs, landings, servicing, parking, etc. The designation of airfield pavements applies to runways, taxiways, aprons, pads, paved shoulders, and paved overruns; it is a paved surface designed for the landing and take-off of fixed-wing aircraft that can also accommodate rotary-wing aircraft. The surface is usually concrete or asphalt. Runway lighting is not included here, but is captured under **Category Group 13**, Communications, Navigation Aids and Airfield Lighting. Additional information is provided in AFI 32-1042, *Standards for Marking Airfields*, for standards for marking airfield pavements and obstructions; AFI 32-1044, *Visual Air Navigation Systems* for lighted signs required for runways, taxiways, and aprons; and ETL 04-2, *Standard Airfield Pavement Marking Schemes* on dimensions, colors, and layout details for standard airfield pavement marking schemes.

2.1.1.2. **Environmental Considerations.** When planning airfield pavements, consider stormwater runoff and control of pollutants being discharged into stormwater to maintain compliance with the stormwater and discharge permit requirements, including deicing operations. Comply with requirements under 33 USC § 1251 - 1387, *Clean Water Act* (CWA), AFI 32-7041, *Water Quality Compliance*, and federal, state, and local stormwater permit requirements.

2.1.1.3. **Explosives Safety Considerations.** When planning aircraft support facilities where personnel or explosives are involved, ensure explosives safety standards (DoD 6055.9-Std, *DoD Ammunition and Explosives Safety Standards* and AFMAN 91-201, *Explosives Safety Standards*) are considered. These standards are designed to protect facilities and personnel from the damaging effects of explosions involving munitions and explosives.

2.1.1.4. **Pavement Thickness Requirements.** Pavement design criteria and standards are discussed in detail in UFC 3-260-02, *Pavement Design for Airfields.* Airfield pavements have six design types based on mission and aircraft load criteria defined as light, medium, heavy, modified heavy, auxiliary, and assault landing zone. Airfield pavements are further grouped into four traffic areas based on operational use defined as Types A, B, C, and D. Refer to Chapter 3 and Figures 3-1, 3-2, and 3-3 of UFC 3-260-02 for further discussion of airfield pavements and traffic areas. Additional design criteria are contained in UFC 3-260-01, *Airfield and Heliport Planning and Design* and ETL 09-1, *Airfield Planning and Design Criteria for Unmanned Aircraft Systems (UAS),* for dimensions, geometry, and pavement design.

2.1.2. **Runways. FAC: 1111**

CATCODE: 111111
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.2.1. **Description.** The runway is the paved surface provided for normal aircraft landings and take offs. Runways are classified as either Class A or Class B based on the intended aircraft use per Table 3-1 of UFC 3-260-01. Relative characteristics of Class A and Class B runways are presented in Table 3-2 of UFC 3-260-01. For landing zone operations, a special paved or aggregate surface strip is provided (see Take off and Landing Zone [**CATCODE 116116]**). For normal helicopter operations, a square pad is provided (see Pad, Helicopter [**CATCODE 116663]**). In addition to the actual paving of the runway (**CATCODE 111111**), **CATCODE 116663** includes grading and drainage of the runway, runway shoulders, lateral safety zones, and clear zone (see UFC 3-260-01 and UFC 3-260-02). The following are descriptions for the types of runways:

2.1.2.1.1. **Primary Instrument.** The primary runway is equipped with navigational aids (NAVAIDS) for restricted visibility operations. The primary runway is the runway oriented in the direction of maximum wind coverage. Terrain conditions or populated areas on the extended runway centerline may make minor deviations necessary.

2.1.2.1.2. **Crosswind.** A runway oriented so that its centerline intersects the primary instrument runway at an angle greater than 15 degrees. Refer to UFC 3-260-01, paragraphs 3-4.3, 3-5, and 3-6 for further discussion.

2.1.2.1.3. **Instrument.** A runway which has NAVAIDS, lighting, and markings for restricted visibility operations. The two basic types of instrument runways are precision instrument runways and non-precision instrument runways.

2.1.2.1.3.1. **Precision Instrument Runway.** A precision instrument runway has an instrument landing system (ILS), microwave landing system (MLS), or precision approach radar (PAR) as NAVAIDS. These systems provide electronic glide slope information to the pilot.

2.1.2.1.3.2. **Non-Precision Instrument Runway.** A non-precision instrument runway has a VOR (VHF Omnidirectional Range), VOR-DME (distance measuring equipment), TACAN (tactical air navigation), NDB (non-directional beacon), LOC (localizer), LOC-DME, LDA (localizer directional aid), or SDF (simplified direction facility) as NAVAIDS providing azimuth and range information only (no glide slope information). Refer to AFI 32-1044, AFI 32-1042, and ETL 04-2 for additional information on identifying runway lighting and marking requirements.

2.1.2.1.4. **Alternate Combat Runway (ACR).** An ACR is used to launch and recover aircraft while bomb-damaged main runways are under repair. The requirement for an ACR applies only to air bases in high threat areas without a secondary runway. An ACR can be used as a Minimum Operating Strip (MOS) during airfield damage repair operations with the following features:

2.1.2.1.4.1. **Lighting.** Lighting may be provided by emergency or expedient lighting sets. See AFH 10-222 V7, *Emergency Airfield Lighting Systems*, for additional guidance.

2.1.2.1.4.2. **Arresting System.** Arresting capability may be provided by mobile aircraft arresting system (MAAS). See Aircraft Arresting Systems (**CATCODE 116922)**. Permanent anchoring foundations may be installed.

2.1.2.2. **Requirements Determination.** Most Air Force missions can safely operate with only one runway. New crosswind or parallel runways are authorized only under the conditions described below. These restrictions also apply to existing secondary runways; therefore, an existing secondary runway should not be widened, lengthened, or extensively rehabilitated or strengthened unless the retention of a secondary runway is essential to the mission.

2.1.2.3. **Scope Determination.** Steps for determining runway requirements are:

2.1.2.3.1. **Step 1.** Determine the basic runway requirement. Each Air Force installation assigned an aircraft flying mission is authorized a runway. Length, width, and other design parameters depend on the assigned aircraft; however, it should also support other operations. For rotorcraft runway requirements, reference UFC 3-260-01.

2.1.2.3.2. **Step 2.** Determine the need for a crosswind runway. A crosswind runway may be considered when wind coverage on the primary runway is less than 90 percent or when the beam wind component on the primary runway is greater than 21 kph (11 knots) during periods of restricted visibility. Wind coverage studies to determine runway orientation are addressed in Appendix B, section 4, of UFC 3-260-01. A crosswind runway must not be planned or programmed unless authorized by AF/A3O-A. Reference the methodology included in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13, *Airport Design*, to determine the percentage of time and the extent of reduced visibility required when the beam wind component exceeds 21 kph (11 knots) before authorization for a crosswind runway may be requested.

2.1.2.3.3. **Step 3.** Determine the need for a secondary runway based on air traffic volume. A secondary runway is a runway in addition to the primary instrument runway. A secondary runway may be parallel or crosswind. A second runway parallel to the primary runway may be required if aircraft operations exceed practical capacities. Follow the procedure below to determine whether traffic volume makes a secondary runway necessary:

2.1.2.3.3.1. **Traffic Mix.** Determine the traffic mix (the percent of each type of aircraft) using the airfield by comparing flight data over the previous three years. Refer to FAA AC 150/5060-5, *Airport Capacity and Delay*). **Table 2.1** indicates the mix number, based on percentages of aircraft types.

Table 2.1. Aircraft Mix Percentages.

Mix Number	Percent Type A	Percent Type B	Percent Type C	Percent Types D & E
1	0	0	10 (9-11)	90
2	0	30 (27-33)	30	40
3	20 (18-22)	40	20	20
4	60 (54-66)	20	20	0
NOTES: Type A: Four-engine jet and larger. Type B: Two- and three-engine jet, four-engine piston, and turboprop. Type C: Executive jet and transport type twin-engine piston. Types D and E: Light twin-engine piston and single-engine piston.				

2.1.2.3.3.2. **Instrument Meteorological Conditions (IMC).** Determine the percent of time IMCs prevail at that location. IMCs are in effect when the ceiling is lower than 300 m (1,000 ft) or visibility is less than 4.8 km (3 mi).

2.1.2.3.3.3. **Instrument Flight Regulations (IFR) Percentages.** Use air traffic data for the past three years to determine the percent of time aircraft operate under IFR conditions. Aircraft may operate under IFR conditions during clear weather to build pilot proficiency.

2.1.2.3.3.4. **Calculations.** Use the more restrictive of **paragraph 2.1.2.3.3.2** and **2.2.1.3.3.3** with the traffic mix percent of item **paragraph 2.1.2.3.3.3** to determine the need for a secondary runway. A secondary runway is necessary when any of following situations exceed the parameters of **Table 2.2**:

2.1.2.3.3.4.1. The Practical Annual Capacity (PANCAP) is exceeded in any two consecutive years.

2.1.2.3.3.4.2. The Practical Hourly Capacity (PHOCAP) is reached or exceeded for at least 20 hours in one year as shown in **Table 2.2**.

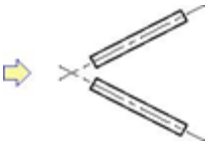
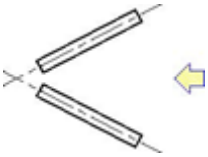
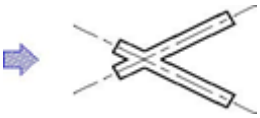
2.1.2.3.3.4.3. Aircraft are delayed by five minutes during two adjacent, normal, peak hours each week during a year.

2.1.2.3.3.5. PHOCAP may reach 54 operations during visual meteorological conditions (VMC) weather conditions and 44 operations during IMC for the following traffic mix: 20 percent four engine jet and larger; 40 percent two and three engine jet, four engine piston and turboprop; 20 percent small jet and twin engine piston; and 20 percent light wing and single engine piston. PANCAP may reach 180,000 operations for a single runway for the same traffic mix. The factors involved in identifying capacities include aircraft mix, frequency of IFR operation, runway occupancy time, and air traffic separation.

2.1.2.3.4. **Advance Planning.** Advance planning is necessary due to lead time requirements and the time required to develop supporting documentation. To project traffic loads three to five years in the future, use growth factors of five percent per year or the average air traffic growth of the individual air base over the past three years. Include proposed mission changes in the traffic projection. A detailed engineering analysis may be used to further justify the need for a secondary runway.

2.1.2.3.5. **Design Factors.** Secondary runways may not require the same pavement load bearing capacity if there is a reasonable spread in aircraft mix. Landing aids are restricted to visual aids: Runway edge, threshold and endlighting precision approach path indicator (PAPI), and short approach lighting system (SALS). Since instrument landing aids are not authorized, the runway is authorized for visual use only if meteorological conditions and traffic volumes clearly show that a second instrument runway is mission-essential for the based aircraft. See AFI 32-1044 and UFC 3-535-01, *Visual Air Navigation Systems*, for further information.

Table 2.2. Runway Capacities for Long-Range Planning Purposes.

Runway Configuration Layout	Description	Mix	PANCAP1	PHOCAP	
				IFR	VFR2
A	Single runway (arrivals = departures)	1	215,000	53	99
		2	195,000	52	76
		3	180,000	44	45
		4	170,000	42	45
B	Close parallels (IFR dependent)	1	385,000	64	198
		2	330,000	63	152
		3	295,000	55	108
		4	280,000	54	90
C	Independent IFR approach-departure parallels	1	425,000	79	198
		2	390,000	79	152
		3	355,000	79	108
		4	330,000	74	90
D	Independent IFR arrivals and departures	1	430,000	106	198
		2	390,000	104	152
		3	360,000	88	108
		4	340,000	84	90
K1 	Open V, dependent operations away from intersection	1	420,000	71	198
		2	335,000	70	136
		3	300,000	63	94
		4	294,000	60	84
K2 	Open V, dependent operations toward intersection	1	235,000	57	108
		2	220,000	56	86
		3	215,000	50	66
		4	200,000	50	53
L1 	Two intersecting at threshold	1	375,000	71	175
		2	310,000	70	125
		3	275,000	63	83
		4	255,000	60	69
L2	Two intersecting in middle	1	220,000		
		2	195,000		
		3	195,000		
		4	190,000		

NOTES:
1. PANCAP: The maximum number of aircraft operations at an Air Force base in a year. This figure considers traffic reductions due to weather below minimums, noise abatement curfews, air shows, and other air traffic closures that normally occur during the year.
2. PHOCAP: The maximum number of aircraft operations in an hour. PHOCAP is determined primarily by air traffic separation.

2.1.2.4. **Runway Dimensions.** Geometric criteria for runway pavements are specified in Table 32 of UFC 3-260-01.

2.1.2.4.1. **Runway Width.** The authorized width of a runway depends on the aircraft programmed for the base. See **Table 2.3** for authorized widths.

2.1.2.4.2. **Runway Length.** Ensure runway length is sufficient to accommodate all aircraft programmed for the base. Performance curves for each aircraft are in the performance data section of the "Dash One" series of the aircraft technical orders. Length is based on the take off or landing phase, whichever gives the greater length. The designer of the airfield runway coordinates with the respective MAJCOM/A3 to determine the most accurate and economical methods of determining the requirements for individual runway lengths based on the aircraft each base supports. See **Table 2.4** for authorized runway lengths.

2.1.2.4.3. **Shoulders.** Shoulders can be both paved and unpaved and are located on each side of the runway. See **Table 2.5** for authorized shoulder widths.

Table 2.3. Runway Widths.

Aircraft Type	Runway Width
B-52	91.5 m (300 ft)
Fighter Aircraft Including Trainers	45.7 m (150 ft)
Landing Zones (LZ)1	The minimum C-130 short field runway width is 18.3 m (60 ft) but only if there are turnarounds of at least 22.6 m (74 ft) in diameter or existing taxiways are provided. Otherwise, the minimum width is 22.9 m (75 ft). The C-17 requires a minimum runway width of 27.4 m (90 ft).
Helicopter	22.9 m (75 ft) or a pad with a width 1.0 to 2.0 times the length of the largest helicopter using the facility.
Other Aircraft	45.7 m (150 ft)
ACR	27.4 m (90 ft)
NOTE: 1. Engineering Technical Letter (ETL) 09-6, C-130 and C-17 Landing Zone (LZ) Dimensional, Marking, and Lighting Criteria, and Chapter 7 and Table 7-2 in UFC 3-260-01 for more LZ criteria	

Table 2.4. Runway Lengths.

Category	Runway Length
Landing Zone	The minimum length for a C-17 and C-130 landing zone runway is 1,067 m (3,500 ft), not including overruns. See UFC 3-260-01 and ETL 09-6 for length based on pressure altitude, Runway Condition Reading (RCR), and operating aircraft weights.
Alternate Combat Runway (ACR)	The length of an ACR is 2,300 m (7,500 ft). The ACR facility is a paved strip, 2,300 m (7,500 ft) long, with 91 m (300 ft) paved overruns on each end, and 11 m (36 ft) wide access taxiways. It may be superimposed on a secondary runway, taxiway, or parking apron that meets the desired criteria. There is no specific CATCODE assigned to ACR facilities. Use the code which most closely relates to adjacent pavement. For example, if the ACR is a separate runway, use CATCODE 111111; or if it is superimposed on a taxiway, use CATCODE 112211. Refer to UFC 3-260-01 for additional design criteria.
Helicopter Pad	Generally, a square pad is provided for normal helicopter take off/landing operations. However, for specific types of operations or extensive operations, a runway 490 m (1,600 ft) long may be authorized.

Table 2.5. Shoulder Widths.

Category	Shoulder Widths (Paved and Unpaved)
Class B	60 m (200 ft)
Landing Zone (LZ)1	3 m (10 ft)
ACR	1.2 m (4 ft)
Class A	15.2 m (50 ft)
Helicopter Strips	7.5 m (25 ft)
NOTE: 1. See ETL 09-6.	

2.1.3. **Paved Overrun. FAC: 1113**

CATCODE: 111115
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.3.1. **Description.** The runway overrun is an extension of the runway (excluding shoulders) to allow for the possibility of short landings and possible aircraft overruns.

2.1.3.2. **Requirements Determination.** Overruns are provided for all runways. See **CATCODE 111111**.

2.1.3.3. **Scope Determination.** See **CATCODE 111111**.

2.1.3.4. **Dimensions.** See **Table 2.6** for paved overrun dimensions, or Table 3-4 of UFC 3-260-01.

2.1.3.5. **Design Considerations.** Flexible pavements are generally satisfactory for paved portions of overruns or other areas not specifically required to have a rigid pavement surfacing. Flexible pavement is defined in Chapter 10 of UFC 3-260-02 and paragraph 3-10 of UFC 3-260-01. Paving requirements for overruns are provided in paragraph 8, Special Areas, in Chapter 10 of UFC 3-260-02.

Table 2.6. Paved Overrun Dimensions.

Category	Length (on each end)	Width
Heavy, Modified Heavy, Medium-Light Load, and Auxiliary Runways	300 m (1,000 ft)	Same as width of runway
Landing Zone and ACR	90 m (300 ft)	Same as width of runway

2.1.4. **Taxiway. FAC: 1121**

CATCODE: 112211
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.4.1. **Description.** Taxiways are the pavements provided for the ground movement of aircraft. Taxiways connect the parking and maintenance areas of the airfield with the runways and provide access to hangars, docks, and various parking aprons and pads. Taxiways are normally parallel to runways to facilitate aircraft ground movement on the taxiways during landings and take offs on the runway.

2.1.4.2. **Requirements Determination.** Provided for all runways. (See **CATCODE 111111**). Consult UFC 3-260-01 for widths, grades, configuration, and clearance distances and UFC 3-260-02 for pavement design requirements.

2.1.4.3. **Scope Determination.** See **CATCODE 11111**.

2.1.4.4. **Dimensions.** See **Table 2.7** and **2.8**. Geometric criteria for taxiways are specified in Table 5-1 of UFC 3-260-01.

2.1.4.4.1. **Taxiway Width.** Taxiway widths of 15.2 m (50 ft) and 22.9 m (75 ft) are standard for Class A and B runways, respectively, with exceptions noted in **Table 2.7** below.

Table 2.7. Taxiway Widths.

Category	Taxiway Widths
Landing Zone1	9 m (30 ft) with a turning radii of 21.3 m (70 ft) for C-130 and 18.5 m (50 ft) for C-17, with turning radii of 21.5 m (70 ft) and 27.5 m (90 ft), respectively. See Note 2.
ACR	10.7 m (35 ft); C-17 - 18.5 m (60 ft)
Rotary Wing	15 m (50 ft)
Taxiways s Supporting Towed Aircraft Only	Outside gear width of towed mission aircraft plus 3 m (10 ft)
NOTES: 1. See ETL 09-6. 2. C-17 aircraft can execute "star turns" which require forward and reverse taxi within 27.5 m (90 ft). However, for normal 180-degree turn maneuvers, the C-17 turn radius is 35 m (116 ft).	

2.1.4.4.2. **Taxiway Shoulders.** Taxiway shoulder widths of 7.5 m (25 ft) and 15.2 m (50 ft) are standard for Class A and B airfields, respectively, with exceptions noted in **Table 2.8**. Airfields supporting wide-bodied aircraft may require soil stabilization beneath outer engines.

Table 2.8. Taxiway Shoulders.

Category	Taxiway Shoulders
Landing Zone, Auxiliary Airfield, and Helicopter	7.5 m (25 ft)
ACR	1.2 m (4 ft)

2.1.4.5. **Design Considerations.**

2.1.4.5.1. **Taxiway Pavement Strength.** All taxiways are built of heavy-load, medium-load, light-load, landing zone-load, or ACR pavement, as specified in this chapter. The strength of pavement in segments of a taxiway system varies according to the requirements of the critical aircraft. For example, on a base supporting heavy bomber, cargo, and fighter aircraft, the principal taxiways are heavy-load pavement; at aircraft facilities restricted to cargo or fighter aircraft by their dimensions and location, taxiways are medium-load strength. Refer to UFC 3-260-02 for technical design criteria.

2.1.4.5.2. **Treatment of Shoulders.** For Class A airfield taxiways, the entire 7.5 m (25 ft) shoulder width is paved. For Class B airfields, shoulders are paved depending on the intended use. For fighter and trainer aircraft, the first 3 m (10 ft) is paved. For cargo mission taxiways, the first 7.5 m (25 ft) is paved. For taxiways intended for B-52 operations or for C-5, E-4, and 747 aircraft where vegetation cannot be established, pave the full 15 m (50 ft).

2.1.5. **Apron. FAC: 1131**

CATCODE: 113321
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.5.1. **Description.** Aprons are paved areas provided for aircraft parking, servicing, and loading. Apron space is necessary for operational aircraft; alert aircraft; transient aircraft; the loading and unloading of cargo aircraft; mission support aircraft (Base Flight); aircraft undergoing depot maintenance; and aircraft access to hangars, docks, and shelters.

2.1.5.2. **Requirements Determination.** Aprons are individually designed to support specific aircraft and missions at a particular installation. The actual dimensions of an apron are based on the number of authorized aircraft, maneuvering space, and type of activity the apron serves. See Chapter 6 of UFC 3-260-01for further guidance.

2.1.5.2.1. **Cargo Loading.** Air Mobility Command (AMC) aircraft are authorized an apron for terminal operations. Apron size is determined by the type of cargo aircraft involved, the volume of traffic, the nature of the loading and unloading operation, and associated equipment and facilities.

2.1.5.2.2. **Commercial Aircraft.** Commercial aircraft operations under Air Force contract are provided an additional apron for terminal operations. Apron size is based on individual projects and missions but does not exceed the size required to operate ten large commercial aircraft.

2.1.5.2.3. **Hazardous Cargo.** Aircraft carrying hazardous cargo do not use the apron. Separate facilities, such as Dangerous Cargo Pad (**CATCODE 116662**), serve this need.

2.1.5.2.4. **Mission Support Aircraft (Base Flight).** All assigned mission support aircraft are provided apron space.

2.1.5.2.5. **Transient Aircraft.** Transient aircraft such as courier aircraft, personnel airlifts, administrative flights, AMC aircraft, and en route aircraft delayed by bad weather are provided an apron. The apron is designed to accommodate the average daily number of transient aircraft requiring parking space. The average daily number is determined from base records from previous years. A maximum of 16,700 m^2 (20,000 yd^2) is permitted at new bases where the demand cannot be predicted.

2.1.5.3. **Scope Determination.** A proper apron allowance is the amount required to afford maximum operational efficiency with a minimum amount of paving. The paragraphs below describe the basis for calculating apron allowances for various types of operations. **Paragraph 2.1.5.3.4** describes a method for estimating apron requirements for broad planning purposes. High threat areas may require additional pavement to meet aircraft dispersal requirements.

2.1.5.3.1. **Access to Hangars, Docks, and Shelters.** Apron configuration is influenced by the size of the door openings and by the dimensions and turning radius of the largest aircraft using the buildings. A mass apron or a taxiway configuration is

used, depending on access requirements. To avoid building non-usable pavement, design for adequate wingtip clearances of any obstacles near the apron.

2.1.5.3.2. **Assigned Aircraft.** Assigned aircraft consist, at a minimum, of the Primary Assigned Aircraft (PAA) inventory established from the funded flying program for the base. Many bases have other aircraft inventory that require a parking apron. This inventory varies by base and depot repair cycles. These aircraft may be annotated as backup inventory, ready reserve, or attrition reserve. Account for the monthly average of these non-primary assigned aircraft remaining on station in determining apron requirements.

2.1.5.3.3. **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, proceed as follows: Begin with 100 percent of the assigned aircraft as established by official documents (see exceptions in **paragraph 2.1.5.3.3.3** for AMC aircraft); subtract the number of aircraft located on separate aprons, such as alert aircraft; subtract the number of aircraft located in maintenance hangars or docks under normal maintenance schedules; and finally, subtract aircraft that are parked elsewhere on existing paving of a suitable nature and location. Other factors affecting the size and configuration of aprons for operational aircraft follow:

2.1.5.3.3.1. **Aircraft Parking Arrangements.** On a typical mass apron, aircraft are parked in rows and spaced according to the dimensions given in **Table 2.9**, **2.10**, **2.11**, and **2.13** (***NOTE:*** Additional criteria can be found in Army ETL 1110-3-394, *Engineering and Design – Aircraft Characteristics for Airfield-Heliport Design and Evaluation*, and in Chapter 6 of UFC 3-260-01). This spacing permits aircraft to move in and out of parking places under their own power. Parking arrangements should be studied carefully to achieve the parking layout that requires the least amount of pavement per parked aircraft. One example of the possibilities for economy is changing the parking arrangement on an apron for eight aircraft from four rows of two aircraft to two rows of four aircraft, resulting in reduced pavement requirements by 20 percent.

2.1.5.3.3.2. **Parking for Fighter Type Aircraft.** Some aircraft are often parked at an angle. This is an efficient way to achieve adequate clearance to dissipate the temperature and velocity of jet blast to levels that do not endanger aircraft or personnel; that is, about 38°C (100°F) and 56 kph (35 mph). To achieve adequate dissipation of heat and blast, some aircraft require a wider lane than shown in **Figure 2.1** (below). To achieve a safe lane width, obtain the minimum safe distance to the rear of a jet engine operating at 80 percent power from the appropriate aircraft technical order. If this distance exceeds 38.1 m (125 ft), minimize pavement requirements by parking aircraft so that two rows of aircraft blast into a common lane, with alternate lanes of minimum taxiway width. See paragraph 6-13 of UFC 3-260-01 and ETL 07-3, *Jet Engine Thrust Standoff Requirements for Airfield Asphalt Pavements*, for additional information on jet engine thrust standoff requirements.

2.1.5.3.3.3. **Parking for Air Mobility Command (AMC) Aircraft Tanker Aircraft.** Parking for all large AMC Aircraft (e.g., C-17, KC-10, and like-size aircraft) requires apron parking spots for 75 percent of the difference between PAA and the number of covered maintenance spaces. CONUS parking spots should be sized for the AMC Generic Aircraft (e.g., C-17 Wing Span, KC-10 Length, KC-10 Height). This provision specifically does not apply to C-5 and C130 aircraft. This provision does not limit authorization for additional apron parking required to support transient, back-up inventory, or other mission-needs as described above. The load-bearing pavement extends 11.4m (37.5 ft) beyond the centerline of the aircraft (the same as the peripheral taxiway). Any pavement beyond is shoulder pavement.

2.1.5.3.4. **Estimating New Apron Requirements.** For broad planning purposes, use the following method to estimate new apron requirements. Multiply the wingspan of the selected aircraft by its length. Multiply the product by a factor of 5.3 (use a factor of 4.4 for fighter type aircraft). ***EXAMPLE:*** To estimate apron requirements for ten (10) C-17 aircraft, multiply 51.8 m x 52.7 m x 10 aircraft x 5.3 factor = 145,000 m^2 of apron needed. This is a planning tool for sizing new aprons only and should not be used to estimate the number of aircraft (specifically, 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 aircraft parking plan to determine the apron square meter requirements.

2.1.5.4. **Dimensions.**

2.1.5.4.1. **Parking Dimensions.** **Table 2.9** presents the minimum geometric criteria for fixed-wing apron design. When designing new aprons for AMC bases hosting C-5, C-17, KC-10, and KC-135 aircraft, provide 15.3 m (50 ft) of wingtip separation. ***EXCEPTION:*** When you are rehabilitating an existing apron, provide the maximum wingtip separation the existing apron size allows (up to 15.3 m [50 ft] but not less than 7.7 m [25 ft]). This additional separation is both desirable and permitted.

2.1.5.4.2. At non-AMC bases, the maximum separation which can reasonably be provided for these aircraft is desirable. At a minimum, ensure these separations always meet current aircraft Technical Order (TO) requirements.

Table 2.9. Aircraft Block Dimensions.

Aircraft1	Wingspan		Length		Height		Min. Distance Between Wings, Parked Aircraft6	
	m	ft	m	ft	m	ft	m	ft
B-1	22.7 to 41.7	77.8 to 136.7	46	150.7	10.3	33.6	6.1	20.03
B-2	52.1	172	20.9	69	5.1	17.0	See MAJCOM	
B-52	56.4	185	47.8	156.6	12.4	40.8	7.7	25.03
C-5	67.9	222.7	75.6	247.8	19.9	65.1	7.7 to 15.3	25 to 50
C-9	28.5	93.4	36.4	119.3	8.4	27.5	3.1	10.0
C-17	51.8	170	52.7	173	16.8	55.1	7.7 to 15.3	25 to 50
C-21	12	39.5	14.8	48.6	3.7	12.25	3.1	10.0
C-27J (JCA)	28.7	94.16	22.7	74.48	9.7	31.82	6.1	20.0
C-130	40.4	132.6	30.4	99.5	11.7	38.5	6.1	20.0
C-130J	40.4	132.6	32.34	106.1	12	39.4	6.1	20.0
KC-135	39.9	130.8	41.5	136.2	12.7	41.7	15.3	50.04
KC-10	50.4	165.3	55.5	182.1	17.7	58.1	15.3	50.04
E-3	44.4	145.7	46.6	152.9	12.9	42.2	6.1	20.0
E-4	59.7	195.7	70.7	231.8	19.6	64.3	6.1	20.0
T-1A	13.3	43.5	14.7	48.4	4.1	13.8	3.1	10.0
T-3A	10.6	35	7.3	24.8	2.4	7.8	3.1	10.0
T-6	10.2	33.5	10.2	33.4	3.26	10.7	3.1	10.0
T-37	10.3	33.8	8.9	29.3	2.8	9.2	3.1	10.0
T-38	7.7	25.3	14.1	46.3	3.9	12.9	3.1	10.0
T-41	10.9	35.8	8.2	26.9	2.7	8.8	3.1	10.0
T-43	28.4	93	30.5	100	11.3	37.0	3.1	10.0

NOTES:

1. Dimensions vary for different models and configurations of aircraft.
2. Setback distances for peripheral or through taxi lanes should be based on the largest wingspan of aircraft that frequently uses the taxiway. Example: If E-4s taxi past a ramp of KC-10, taxilane should be based on the wingspan of the E-4.
3. See paragraph 2.1.6.4.5.3.
4. Tankers require a 15.2 m (50 ft) separation from wingtip to wingtip to accommodate fuel load change requirements. (See paragraph 2.1.5.4)
5. For aircraft not listed, the minimum wingtip clearance is 3 - 7.7 m (10 - 25 ft) for wingspans < 33.5 m (110 ft) and 7.7 - 15.3m (25 - 50 ft) for wingspans 33.5 m (110 ft) or more.

Aircraft1	Wingspan		Length		Height		Min. Distance Between Wings, Parked Aircraft6	
	m	ft	m	ft	m	ft	m	ft
6. The criteria within Table 2.10 do not apply during contingencies. In these cases, refer to the current aircraft Technical Order. In locations where the mix of aircraft changes during contingencies, consider the use of universal aircraft servicing pit locations to maximize hydrant utilization and reduce turn times.								

Table 2.10. Wingtip Clearances for Taxiing Aircraft[1].

Minimum Clearance Where Taxi Lanes are Marked on the Pavement	Aircraft with Wingspans		Aircraft with Wingspans	
	≥33.5 m	≥110 ft	<33.5 m	<110 ft
	m	ft	m	ft
Wingtip clearance of moving aircraft taxiing on peripheral or through length of apron taxi lanes	15	50	9	30
Wingtip clearance on each side of moving aircraft taxiing in lanes between parked aircraft	9	30	6	202
NOTES: 1. Another factor requiring evaluation when developing aircraft parking plans is aircraft exhaust wake velocity. Check the particular aircraft performance guide for wind velocity and temperature ranges to assess safe distances for nearby aircraft facilities. 2. For transient aircraft, the minimum clearance is 7.6 m (25 ft).				

Table 2.11. Angled Aircraft Parking, Aircraft Dimensions and Separation Distances.

Aircraft1	Wing Space		Length		Height		Dimension C2		Dimension D2	
	m	ft	m	ft	m	ft	m	ft	m	ft
A-10	17.5	57.5	16.2	53.3	4.5	14.9	14.3	47.0	29.3	96.0
ATA	see MAJCOM									
F-5	8.5	28	15.8	51.7	4.0	13.2	12.2	40.0	16.5	54.0
F-15	13	42.8	19.4	63.8	5.9	19.2	16.5	54.0	22.9	75.0
F-16	10	32.8	14.5	47.6	5.0	16.4	12.2	40.0	18.6	61.0
F-22A	13.6	44.5	18.9	62.1	5.1	16.6	16.8	55.0	24.4	80.0
F-35A	10.7	35	15.7	51.5	4.3	14.2	13.7	45.0	19.8	65.0
F-117	13.2	43.4	19.8	65.1	3.8	12.4	Note 3		Note 3	
NOTES: 1. Dimensions vary between different models and configurations of aircraft. 2. See Figure 2.1 for parking layout and dimensions C and D. 3. Not known at time of publication. Contact AF/A4L.										

2.1.5.4.3. **Taxi Lanes.** 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 this width variation to the fewest taxi lanes possible.

2.1.5.4.4. **Peripheral Taxi Lanes.** 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 where the apron is designed for aircraft with wingspans up to 33.5 m (110 ft), the aircraft are expected to taxi along the outer 15.24 m (50 ft) of pavement. Where the apron is designed for aircraft with wingspans of 33.5 m (110 ft) or more, the peripheral taxi lane is the outer 22.9 m (75 ft) of pavement. Therefore, wing overhang areas beyond the paved shoulder are not normally paved, but they may require stabilization to prevent damage from jet blast.

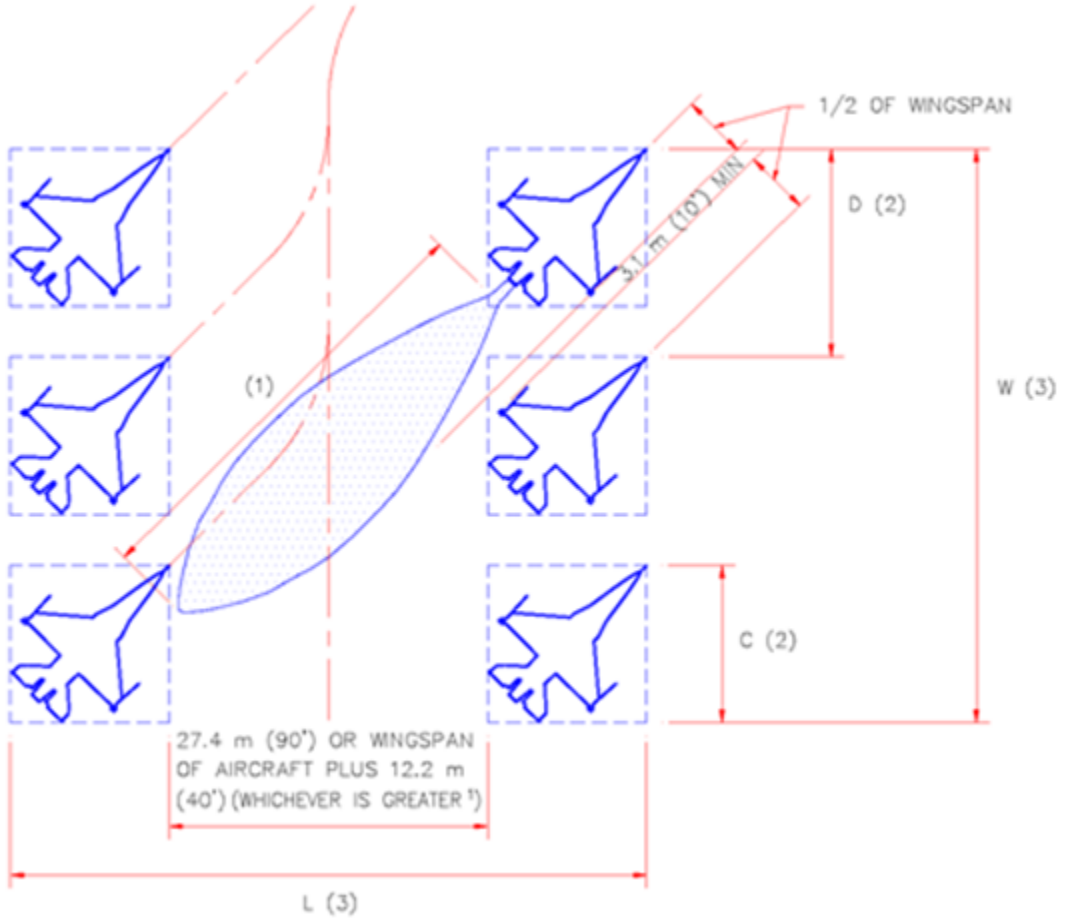
2.1.5.4.5. **Air Combat Command (ACC) Alert Area Parking Criteria.** Alert Pad Apron layout criteria are provided in paragraph 6-13 of UFC 3-260-01. Ensure the established, day-to-day, ACC alert parking areas conform to the standards stated below as well as those outlined in **Table 2.12**, which shows the distance from the nose or wingtip of the parked aircraft to the centerline of the egress taxiway, measured perpendicular to the taxiway centerline.

2.1.5.4.5.1. Nose or wingtip to centerline criteria are based on the largest aircraft taxied along the egress taxiway regardless of the type of aircraft being parked.

2.1.5.4.5.2. Desired distances are reduced, as required, down to, but not below, the specified minimum when space is limited due to a lack of ramp area.

2.1.5.4.5.3. The wingtip clearance between parked alert aircraft is 15.2 m (50 ft). Distances are measured along a line perpendicular to the aircraft centerline to provide a 15.2 m (50 ft) wingtip passing clearance when aircraft exit the parking spot.

Figure 2.1. Angled Parking of Typical Jet Fighter Aircraft[5].



NOTES:

1. See paragraph 2.1.5.3.3.2 for additional criteria.
2. See Table 2.11 for Dimensions C and D.
3. Find dimensions W and L as follows:
W = D*(NW -1) + C
L = C*(NL - 1) + IT
Where:
W = Width of operational parking apron.
L = Length of operational parking apron.
C = Block dimension of aircraft.
D = 1.414 (wingspan + 3.1 m (10 ft)).
NW = Number of aircraft per row in width of apron.
NL = Number of aircraft per row in length of apron.
IT = 27.4 m (90 ft) or wingspan plus 12.2 m (40 ft) if greater than 27.4 m (90 ft). (Also consider safe distance for jet blast which may be a greater distance.)
4. Aircraft with forward-firing munitions should be reviewed as to safety concerns and a Commander's Risk Assessment performed according to AFMAN 91-201.
5. The criteria in Figure 2.1. are minimums. Further separation is permitted and desired.

Table 2.12. Nose-to-Centerline Distances.

Aircraft Types	Desired Separations		Minimum Separations	
	m	ft	m	ft
B-52 or B-52 mixed force B-1 B-2	45.7	150.0	38.1	125.0
KC-135	38.1	125.0	30.5	100.0
KC-10	30.5	100.0	22.9	75.0

2.1.5.4.6. **ACC Waivers.**

2.1.5.4.6.1. ACC Numbered Air Force (NAF) Director of Operations may grant waivers to the 15.2 m (50 ft) wingtip clearance when sufficient ramp area is unavailable. In no case may the wingtip clearance be waived to less than 9.1 m (30 ft).

2.1.5.4.6.2. If the distance between the nose or wingtip and the egress taxiway centerline is below the desired distance stated in **Table 2.12**, increase the NAF minimum waiverable wingtip distance, 9.1 m (30 ft), by 0.31 m (1 ft) for each 0.31 m (1 ft) reduction in nose-to-taxiway centerline distance. For example, the B-52 nose-to-taxiway centerline of 43 m (140 ft) is 3.1 m (10 ft) below the desired distance; therefore, the minimum NAF waiverable wingtip distance is 12.2 m (40 ft). If the B-52 nose-to-centerline distance is 39.6 m (130 ft) or less, the minimum wingtip clearance of 15.2 m (50 ft) would be required.

2.1.5.4.7. **Apron for Helicopters.**

2.1.5.4.7.1. Parking space is provided for helicopters as follows: for six or more assigned helicopters, provide apron space for 80 percent of the total assigned helicopters; for fewer than six assigned helicopters, provide apron space for all. Apron dimensions are based on the separation distances for parked helicopters given in **Table 2.13** or the US Army rotary wing criteria presented in Chapter 6 of UFC 3-260-01.

2.1.5.4.7.2. For a rough estimate of the apron area needed, obtain the block area each helicopter occupies by multiplying its operating length by its operating width, then multiply each block area by 13.

2.1.5.4.7.3. The apron is usually part of, or contiguous to, the main airfield apron. Helicopter Pads (**CATCODE 116663**) are built for isolated operations.

Table 2.13. Helicopter Apron Parking.

Helicopter Type1	Operating Length		Operating Width		Minimum Distance Between Centerline of Parked Aircraft2		Minimum Interior and Perimeter Taxi Lane Width3	
	m	ft	m	ft	m	ft	m	ft
CH/HH-53B/C	26.9	88.3	22.0	72.3	44.0	144.5	55.1	180.7
HH-1H	17.4	57.1	14.7	48.3	29.5	96.7	44.2	145.0
UH-1N 57	17.5	57.3	14.6	48.0	29.3	96.0	43.9	144.0
UH/TH-1F/P	17.4	57.1	14.6	48.0	29.3	96.0	43.9	144.0
HH-60	19.8	64.9	16.4	53.7	32.7	107.4	40.9	134.2
HH-47	30.1	98.9	18.3	60.0	36.6	120.0	45.7	150.0
CV-22	17.5	57.3	25.9	85.0	38.9	127.5	74.7	245.04

NOTES:
1. Dimensions vary between different models and configurations of helicopters.
2. Distances represent two rotor diameters between center lines of parked aircraft, except for
CV-22.
3. Widths represent two and one-half rotor diameters for wheeled helicopters and three-rotor diameters for skid-mounted helicopters.
4. For CV-22, interior, or secondary peripheral taxilane width, including rotor tip clearance is 51.8 m (170 ft). Through, or primary peripheral taxilane width, including rotor tip clearance is 74.7 m (245 ft.). Centerlines of peripheral taxilanes are positioned 7.62 m (25 ft) inward from the apron boundary marking. See UFC 3-260-01, Figure 6.38.

2.1.5.5. **Design Considerations.** All aprons are built of heavy, modified heavy, medium, light load, and auxiliary-load pavement as described in Chapter 3 of UFC 3-260-02. Apron shoulders are constructed of existing soils, thoroughly compacted, and covered with turf or a soil binder. Paved shoulders are authorized as indicated under Paved Shoulders (**CATCODE 116642**).

2.1.5.5.1. Hangar access aprons and floors are designed to support a maximum aircraft load of 163,000 kg (360,000 pounds) for heavy and modified heavy-load pavements and a maximum load of 118,000 kg (260,000 pounds) for a medium-load pavement. This pavement is capable of supporting the basic, empty weight of all aircraft undergoing maintenance, including the largest aircraft. (The basic empty weight is the weight of the aircraft stripped of cargo, ammunition, and all but entrapped fuel.)

2.1.5.5.2. Pavement for alert hangar and shelter floors are designed for either light-load, medium-load, modified heavy-load, or heavy-load as specified earlier in this chapter.

2.1.5.5.3. Layout of aircraft parking locations and taxi lanes should consider aircraft taxiing routes when an aircraft is refueled. Refueling operations should not prevent an aircraft from leaving the parking apron.

2.1.5.5.4. Other factors include the arrangement of refueling outlets, explosives clearances, required clearances to fixed or mobile objects (see UFC 3-260-01), and the siting of blast deflectors.

2.1.6. **Takeoff and Landing Zone (LZ): FAC: 1111**

CATCODE: 116116
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.6.1. **Description.** The Landing Zone (LZ) is used to train crews of cargo aircraft (C-130 or C-17) to conduct airlift operations in the type of airfield environment found at forward operating locations or actual contingency operations. LZs can be prepared (paved) or semi-prepared (unpaved) surfaces consisting of soil, stabilized soil, or airfield matting. LZs are typically shorter and narrower than standard runways.

2.1.6.2. **Requirements Determination.** See **paragraph 2.1** (Airfield Pavements) of this chapter and Chapter 3 of UFC 3-260-02.

2.1.6.3. **Scope Determination.** See ETL 09-6.

2.1.6.4. **Dimensions.** See paragraph 8 of ETL 09-6.

2.1.6.5. **Design Considerations.** Lighting is provided as described under Special Airfield Lighting (**CATCODE 136666**). Technical design criteria are contained in UFC 3-260-02 and ETL 08-14, *Structural Evaluation Procedure for Stabilized Soil-Surfaced Airfields*, and Taxiway Lighting (**CATCODE 136667**). Additional guidance for lighting is given in AFI 32-1044 and paragraph 11 of ETL 09-6. See Chapter 7 of UFC 3-260-01 for geometric criteria and land use guidelines for areas near landing zones constructed for C-130 and C-17 aircraft.

2.1.7. **Paved Shoulders. FAC: 1165**

CATCODE: 116642
OPR: AFCESA/CEO
OCR: N/A

2.1.7.1. **Description.** 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.

2.1.7.2. **Requirements Determination.** At minimum, pave shoulders to extend at least 0.6 m (2 ft) beyond the edge lights. For apron edges requiring fire hydrants, widen the paved shoulder to within 4.6 m (15 ft) of the hydrant to allow paved access for firefighting vehicles. See **paragraph 2.1.7.4** below.

2.1.7.3. **Scope Determination.** Consult UFC 3-260-01 and ETL 07-3 for further guidance.

2.1.7.4. **Dimensions.** See paragraph 3-9 and Table 3-2 of UFC 3-260-01. Wider paved shoulders are authorized as follows:

2.1.7.4.1. **Runways and Helipads.** A minimum 3.1 m (10 ft) paved shoulder is necessary on all runways used by fighters, trainers, and B-52 aircraft. A 7.5 m (25 ft) paved shoulder is necessary for cargo mission runways, except where the runway width exceeds 45 m (150 ft). In these cases, pave shoulders to provide a combined hard surface width (runway and paved shoulders) of not less than 60 m (200 feet) with at least 0.6 m (2 ft) of paved surface beyond the edge lights. For rotary wing runways and helipads, provide 7.5 m (25 ft) paved shoulders.

2.1.7.4.2. **B-52s.** Provide paved shoulder 15.2 m (50 ft) wide along the apron perimeter taxi lanes.

2.1.7.4.3. **Jet Transport, Cargo, or Tankers.** Provide paved shoulders 7.6 m (25 ft) wide along the entire apron. Allow 15.2 m (50 ft) shoulders on aprons for C-5, E-4, and Boeing 747 aircraft.

2.1.7.4.4. **Dispersed Parking of B-52s, KC-135 - Stubs and Strips.** Provide paved shoulders 15.2 m (50 ft) around the perimeter of the aprons.

2.1.7.4.5. **Jet Blast Deflectors.** Where deflectors are installed off the apron, provide a paved shoulder between the deflector and the apron edge.

2.1.7.4.6. **Taxiways at B-52 Bases.** Provide paved shoulders 15.2 m (50 ft) wide on both sides of all 22.9 m (75 ft) wide taxiways throughout their length.

2.1.7.4.7. **Taxiways at Jet Cargo or Jet Tanker Bases.** Provide paved shoulders 7.6 m (25 ft) wide on both sides of all 22.9 m (75 ft) wide taxiways throughout their length. For C-5, E-4, and Boeing 747 aircraft, paved shoulders 15.2 m (50 ft) wide are permitted only when vegetation cannot be established to prevent erosion at those bases and on those taxiways designated for such traffic.

2.1.7.4.8. **Taxiways at Bases Supporting Aircraft Other Than B-52s, Jet Cargo or Jet Tankers.** A paved shoulder 7.6 m (25 ft) wide is authorized on the outside of taxiway turns of 45 degrees or more.

2.1.7.5. **Design Considerations.** See paragraph 3-9 of UFC 3-260-01.

2.1.8. **Pad, Arm and Disarm. FAC: 1131**

CATCODE: 116661
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.8.1. **Description.** 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. Consideration should be given to containment of runoff of potential spills; however, design pads to promote positive drainage. See apron grading criteria in Chapter 6 of UFC 3-260-01, *Airfield and Heliport Planning and Design*.

2.1.8.2. **Requirements Determination.**

2.1.8.2.1. **Tactical Fighter or Tactical Combat Crew Training Missions.** Bases having tactical fighter or tactical combat crew training missions require arm/disarm pads; one near each end of each runway. The pads are used for arming aircraft immediately before take off and for disarming (safing) weapons retained or not

expended after the aircraft's return. The pads are sited so that armed aircraft head in the direction of least populated areas or toward revetments.

2.1.8.2.2. **Personnel Shelter.** A personnel shelter is necessary for weapons loaders and quick check crews stationed at the pad. This requirement is described further under Aircraft Organizational Maintenance Shop (**CATCODE 211154**).

2.1.8.2.3. **Special Operations Aircraft.** Bases with Special Operations Aircraft require arm/disarm pads. The pads are used for munitions upload prior to a mission and disarming (safing) guns which malfunction.

2.1.8.3. **Scope Determination.** The pad size and location is based on an analysis of the base and aircraft assigned and validated by the MAJCOM. The allowable scope is the minimum necessary for aircraft parking and access. For further guidance, see paragraph 6-10 of UFC 3-260-01.

2.1.8.4. **Dimensions.** Each pad is capable of servicing four to six aircraft at a time. The dimensions of the pad vary with length and wingspan of the aircraft to be served. See UFC 3-260-01 for applicable dimensions and separations.

2.1.8.5. **Design Considerations.** Pads are built of heavy, medium, or light-load pavement. Shoulders are constructed of existing soils and thoroughly compacted and covered with turf or a soil binder. Paved Shoulders (**CATCODE 116642**) are authorized in areas receiving jet blast. Locate pads to satisfy explosives safety standards found in AFMAN 91-201.

2.1.9. **Pad, Dangerous Cargo, Load/Unload. FAC: 1131**

CATCODE: 116662
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.9.1. **Description.** Dangerous cargo pads are paved areas for loading and unloading explosives and other hazardous cargo from aircraft.

2.1.9.2. **Requirements Determination.** The pad is necessary at installations where explosives or other dangerous materials are loaded frequently on cargo aircraft and where existing aprons cannot be used without violating quantity-distance (Q-D) safety criteria.

2.1.9.3. **Scope Determination.**

2.1.9.3.1. For installations other than aerial ports of embarkation/debarkation (APOE/APOD), a circular pad with a 33.5 m (110 ft) radius and 3,530 m^2 (4,225 yd^2) is authorized.

2.1.9.3.2. APOE/APODs that store or process in-transit explosives require two pads to accommodate C-5, C-17, and Boeing 747 aircraft. Additional pads are necessary where there is an unusual volume of activity. Details are as follows:

2.1.9.3.2.1. Area for each pad is approximately 7,440 m^2 (8,900 yd^2). See UFC3-260-01, Figures 6-25 and 6-26.

2.1.9.3.2.2. Siting and configuration of the pads are based on 13,600 kg (30,000 pounds) of net explosive weight (NEW) of class/division 1.1 explosives.

2.1.9.4. **Dimensions.** See paragraph 6-12 of UFC 3-260-01.

2.1.9.5. **Design Considerations.** See UFC 3-260-01for additional design considerations.

2.1.9.5.1. Locate the pad to satisfy explosives safety standards, DoD 6055.9-Std and AFMAN 91-201.

2.1.9.5.2. Use medium-load pavement for the pad and its access taxiway. Install tie down anchors and grounding points in the pad. Paved Shoulders (**CATCODE 116642**) are authorized. Provide blue, flush-type taxiway lights around the edge of the pads in accordance with AFI 32-1044 and UFC 3-535-01.

2.1.9.5.3. Provide revetments where required by Q-D safety criteria or where their installation produces a net reduction in construction and land acquisition costs.

2.1.10. **Pad, Helicopter. FAC: 1112**

CATCODE: 116663
OPR: AFCESA/CEO
OCR: AF/A4L

2.1.10.1. **Description.** Helicopter pads are relatively small paved areas that support vertical takeoff, landing, taxiing, and parking operations for rotary-wing aircraft.

2.1.10.2. **Requirements Determination.** Provide pavement for helicopter use alone where an operational apron or pad is not available.

2.1.10.3. **Scope Determination.** Factors for determining the number of helicopter pads authorized is discussed further in paragraph 2-7.3 of UFC 3-260-01.

2.1.10.4. **Dimensions.** See Apron (**CATCODE 113321**) for apron dimensions. Provide a pad sized to support the intended use of the facility. Limited-use VFR helipads are 15 m x 15 m (50 ft x 50 ft), and standard VFR/IFR helipads are 30 m x 30 m (100 ft x 100 ft). At minimum, provide a pad with a width 1.0 to 2.0 times the length of the largest helicopter using the facility.

2.1.10.5. **Design Considerations.** All helicopter pavement, whether for takeoff, landing, taxiing, or parking, is listed as "pad, helicopter" and constructed for light load.

2.1.11. **Pad, Power Check (With or Without Sound Suppressor). FAC: 1131**

CATCODE: 116664
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.11.1. **Description.** An aircraft power check pad is a paved area used for performing full-power engine diagnostic testing of aircraft engines while the aircraft is held stationary.

2.1.11.2. **Requirements Determination.** This facility is authorized for bases having jet aircraft when suppressed pads are not required.

2.1.11.3. **Scope Determination.** See paragraph 6-9 of UFC 3-260-01.

2.1.11.4. **Dimensions.** Power checked pads may be either rectangular, square, or circular shaped. See UFC 3-260-01for specific pad layout and dimensions.

2.1.11.5. **Design Considerations.** Locate the pad to satisfy explosives safety standards, DoD 6055.9-Std and AFMAN 91-201. Unsuppressed power check pads should be located near maintenance hangars but at a location where full power engine diagnostic testing of jet engines can be performed with minimal noise exposure to inhabited areas both on and off the installation. A power check pad includes a thrust anchor or anchors for aircraft serviced by the pad, paved shoulders, and a blast deflector to protect the surrounding area from jet engine blast (see UFC 3-260-01, Appendix B, Section 15, *Aircraft Trim Pad and Thrust Anchor for up to 267 Kilonewtons [60,000 Pounds] Thrust*, and ETL 01-10, *Design and Construction of High-Capacity Trim Pad Anchoring Systems*). The facility may also include floodlighting for night operations, a water supply to wash down fuel spills, oil/ water separators, a holding tank, treatment of fuel wash-down drainage before discharge to a sanitary or storm sewer, and communication with the maintenance control room and the base telephone system.

2.1.12. **Pad, Power Check with Noise Suppressor. FAC: 1131**

CATCODE: 116665
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.12.1. **Description.** The power check pad with noise suppressor is the prime facility on which operational checks of jet engines are performed. This facility usually supports Hush House sound suppressors. An unsuppressed pad is generally used as a backup or interim facility.

2.1.12.2. **Requirements Determination.** The suppressor and associated devices are supplied as items of government furnished equipment. Warner Robins Air Logistics Center (WR-ALC) is designated as inventory manager responsible for equipment programming, procurement, and criteria used in programming and constructing support items. For additional information see *Hush House Site Planning Bulletin;* available digitally at: **www.afcee.af.mil**.

2.1.12.3. **Scope Determination.** See *Hush House Site Planning Bulletin* and paragraph 6-9 of UFC 3-260-01.

2.1.12.4. **Dimensions.** See *Hush House Site Planning Bulletin* and paragraphs 6-9 in UFC 3-260-01.

2.1.12.5. **Design Considerations.** See *Hush House Site Planning Bulletin* and paragraphs 6-9 in UFC 3-260-01.

2.1.13. **Pad, Warm-up/Holding. FAC: 1131**

CATCODE: 116666
OPR: AFCESA/CEO
OCR: AF/A4L

2.1.13.1. **Description.** The warm-up/holding pad is a paved area adjacent to the taxiway at or near the end of a runway. The intent of a warm-up pad is to provide a parking location, off the taxiway, for aircraft which require hold due to indeterminate delays and allows other departing aircraft unencumbered access to the runway.

2.1.13.2. **Requirements Determination.** A warm-up/holding pad is authorized for each end of a runway.

2.1.13.3. **Scope Determination.** See paragraphs 6-8 in UFC 3-260-01 for further guidance.

2.1.13.4. **Dimensions.** Sized to accommodate two of the largest aircraft assigned to the base, observing wingtip clearances given in Table 6-1 of UFC 3-260-01, and to provide a minimum of 7.62 m (25 ft) of blast-resistant pavement behind the tail of an aircraft to prevent damage from jet blast.

2.1.13.5. **Design Considerations.** The pad is constructed of light-load or medium-load pavement, with or without paved shoulders, as applicable. Consult paragraphs 6-8.2 and 6-8.3 in UFC 3-260-01 for location and siting consideration.

2.1.14. **Pad, Compass Calibration. FAC: 1161**

CATCODE: 116667
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.14.1. **Description.** The calibration pad is a paved area where aircraft are positioned during calibration of the magnetic standby compass and the magnetic azimuth detector.

2.1.14.2. **Requirements Determination.** Reference paragraph 6-11 of UFC 3-260-01 or the criteria provided in FAA Advisory Circular 150/5300-13, (Appendix 4) for additional guidance.

2.1.14.3. **Scope Determination.** Generally, the circular pad is sized for the assigned aircraft and its calibration equipment. Locate the pad in an area of minimum magnetic disturbances, away from transmission lines, vehicular traffic, and facilities containing ferrous metals.

2.1.14.4. **Dimensions.** See Figure 6-24 of UFC 3-260-01.

2.1.14.5. **Design Considerations.** The pad is constructed of light-load or medium-load pavement, with or without paved shoulders, as applicable. Refer to paragraphs 6-11.3 and 6-11.4 in UFC 3-260-01 for location and siting consideration.

2.1.15. **Pad, Aircraft Washrack. FAC: 1163**

CATCODE: 116672
OPR: AF/A4L
OCR: AFCESA/CEO

2.1.15.1. **Description.** Aircraft washracks are paved areas provided at all installations to clean aircraft in conjunction with periodic maintenance and to prevent corrosion.

2.1.15.2. **Requirements Determination.** Each Air Force base having assigned aircraft requires a Corrosion Control Facility (**CATCODE 211159**). Washrack pads are an economical way to supplement the capability of the Corrosion Control Facility, particularly in warmer climates or at remote sites. Pads may also be covered to provide relief from heat and rain conditions.

2.1.15.3. **Scope Determination.** The size and configuration of an aircraft washrack is determined by the type of mission aircraft expected to use it. At mixed mission facilities, it may be possible to accommodate several smaller (fighter) aircraft on one larger aircraft washrack pavement. A separate utility storage building, Corrosion Control Utility Storage (**CATCODE 211161**), is also needed for aircraft cleaning supplies and equipment. A utility storage building of 22.3 m^2 (240 ft^2) is allowed, if justified. See paragraphs 6-14 of UFC 3-260-01 for additional information on aircraft washracks.

2.1.15.4. **Dimensions.** The dimensions of the largest aircraft plus the clearances shown in Table 6-4 of UFC 3-260-01 determine the minimum washrack pavement dimensions.

2.1.15.5. **Design Considerations.** See Figures 6-31 through 6-34, 6-36, and 6-37 of UFC 3-260-01.

2.1.16. **Aircraft Arresting Systems. FAC: 1461**

CATCODE: 116922
OPR: AFCESA/CEO
OCR: WR-ALC/642 CBSG

2.1.16.1. **Description.** Aircraft arresting systems consist of engaging devices and energy absorbers. Engaging devices are net barriers, such as MA-1A and BAK-15; disc-supported pendants (hook cables); and cable support systems, such as BAK-14 and the Aerazur Type H, that raise the pendant to the battery position or retract it below the runway surface. Energy absorbing devices are ships' anchor chains; rotary friction brakes, such as the BAK-9 and BAK12; rotary hydraulic systems, such as the BAK-13; tearing strap modules, such as Textile Brake Systems; and soft ground systems, such as the Engineered Material Arresting System (EMAS).

2.1.16.2. **Requirements Determination.**

2.1.16.2.1. All Aircraft arresting systems, except the Soft Ground Arrestor System (SGAS) (also known as the Engineered Material Arrestor System), are centrally procured. Except for the SGAS, requirements for arresting systems are determined and submitted by each MAJCOM to AFCESA/CEO for validation. WR-ALC budgets for, procures, and distributes arresting systems according to validated requirements. See AFI 32-1043, *Managing, Operating, and Maintaining Aircraft Arresting Systems*, for details. SGAS systems may be used to enhance safety where the standard 305 m (1,000 ft) overrun cannot be provided. In such cases, ensure the SGAS is designed, funded, and installed as part of the facility to accommodate the aircraft intended to use the runway. In most cases, the arrestor bed is designed to stop an overrunning aircraft departing the runway at 70 knots within the available distance. See FAA Advisory Circular 150/5220-22A, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*.

2.1.16.2.2. **Required Facilities.**

2.1.16.2.2.1. The energy absorber governs the facilities for the aircraft arresting system. The type and model of energy absorber determines the runout of the engaging device. The runway pavement, or the 300 m (1,000 ft) overrun pavement for runout, is designed for the loadbearing characteristics specified in

paragraph 2.1 (Airfield Pavements) of this chapter.

2.1.16.2.2.2. Aircraft arresting systems installed within the shoulder area of runways or within the unpaved overrun area require a paved service road to the equipment installation site, both from the runway or overrun, as well as from another location that does not require access from operational pavements such as the runway. Construct all below-grade structures located within the shoulder area of the runway or within the overrun area to support the wheel loads for runway, taxiway, or apron shoulder areas required by UFC 3-260-01. Support ramps are constructed to lead up to exposed vertical surfaces of fairlead beams and tape tubes to allow an aircraft to roll over them smoothly.

2.1.16.2.2.3. Ensure BAK-12 arresting gear that is installed on grade has an "airfield friendly" structure built over it to protect the equipment from environmental degradation. Design should be in compliance with typical installation drawings, the applicable 35E8-2 series TO, and the requirements detailed within UFC 3-260-01. Ensure shelters and pits contain adequate ventilation to avoid confined space permit entry requirements, and on-grade shelters have windows located so operators can see the arrestment area and directly across the runway.

2.1.16.2.2.4. Do not install any arresting system where the runout conflicts with any other arresting system or any obstacle such as elevated airfield lights or signs. In cases where these criteria cannot be met, establish a waiver according to UFC 3-260-01 and/or the applicable TO, as appropriate.

2.1.16.2.2.5. Minimum runout distances (not including the distance from the nose wheel to the aircraft tail hook) applicable to the various arresting systems are:

2.1.16.2.2.5.1. MA-1 or MA-1A with anchor chain: 260 m (850 ft).

2.1.16.2.2.5.2. BAK-12, 1.68 m (66 in) Reel: 290 m (950 ft) or 370 m (1,200 ft).

2.1.16.2.2.5.3. BAK-14 or Type H cable retraction system: These are engaging devices only; the runout is dependent upon the type of energy absorber used.

2.1.16.2.2.5.4. Mobile Aircraft Arresting System (MAAS): 300 to 370 m (1,000 to 1,200 ft).

2.1.16.2.2.5.5. BAK-15 (commercial designation, 61QSIIM), net arresting system: Runout is dependent upon type of energy absorber used.

2.1.16.2.2.5.6. Textile Brake SystemL A one-time use energy absorber in either a uni-directional (MB 100.10.C, 271 m [889 ft]) or bi-directional (MB 60.9.9.C, 305 m [1,000 ft]) configuration.

2.1.16.3. **Scope Determination.** See AFI 32-1043 and paragraphs 3-16 of UFC 3-260-01.

2.1.16.4. **Dimensions.** See AFI 32-1043, UFC 3-260-01, and UFC 3-535-01.

2.1.16.5. **Design Considerations.**

2.1.16.5.1. **Critical Areas.** The 60 m (200 ft) preceding the approach side of the engaging device is a critical area. Protruding objects and undulating surfaces are detrimental for successful engagements. No changes in pavement type are allowed in this area within the center 22.9 m (75 ft) of the runway.

2.1.16.5.2. **Siting.** Siting criteria for arresting systems depend on the type of installation and the arresting system. The 38E8 Series TOs and AFI 32-1043 provide general guidance. Typical installation drawings are available from AFCESA/CEO or WR-ALC (642 CBSG/GBEB) upon request. Criteria for siting systems are as follows:

2.1.16.5.2.1. **Operational Systems.** The best location for an operational arresting system, such as BAK-12, is 450 to 540 meters (1,500 to 1,800 feet) from the threshold.

2.1.16.5.2.2. **Emergency Systems.** Locate unidirectional arresting systems and barriers (nets) in the overrun area of the runway. Do not locate unidirectional systems or net barriers closer than 11 m (35 ft) from the threshold of the runway.

2.1.16.5.3. **Equipment Location.** Equipment location and associated requirements conform to criteria established in AFI 32-1043.

2.1.16.5.4. **Mobile Aircraft Arresting System (MAAS).** The MAAS is not intended for permanent or long term installation. However, all necessary foundations, anchors, and utility support may be installed to support recurring MAAS installation in support of exercises or air shows. MAJCOMs have the responsibility to determine these requirements. Ensure equipment location and associated requirements conform to criteria established in AFI 32-1043.

2.1.16.5.5. **Joint-Use Airfields.** Arresting systems on joint use civil/military airfields are sited in accordance with FAA Advisory Circular 150/5220-9A, *Aircraft Arresting System on Civil Airports* and local agreements (see AFI 32-1043, Attachment 5, *Sample Letter of Agreement with the Federal Aviation Administration*). Systems are normally installed underground.

2.1.17. **Jet Blast Deflector. FAC: 1464**

CATCODE: 116945
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.1.17.1. **Description.** Jet blast deflectors are equipment to shield parked aircraft, taxiing aircraft, vehicles, personnel, and pavements from jet blast effects.

2.1.17.2. **Requirements Determination.** Jet blast deflectors are installed where continual jet engine run-up interferes with the parking or taxiing of aircraft, the movement of vehicles, and the activities of maintenance personnel, or where jet run-up causes the erosion of a pavement shoulder not protected by stabilization or concrete surfacing.

2.1.17.3. **Scope Determination.** Size and configuration are selected to satisfy aircraft taxiing, parking, and jet blast requirements. See paragraphs 6-19.1 and Appendix B, Section 8, of UFC 3-260-01.

2.1.17.4. **Dimensions.** A deflector is generally 2.4 to 3.7 m (8 to 12 ft) tall and located 21 to 37 m (70 to 120 ft) aft of the jet engine nozzle, but not less than 15.2 m (50 ft) from the tail of the aircraft.

2.1.17.5. **Design Considerations.** Two blast deflector types are commonly used. One is a concave, single curved, corrugated metal surface, with or without baffles, fastened and braced to a concrete base to withstand the force of the jet blast and deflect it upward. The most widely deployed model of this type when used for F-15, F-16, and F-22 aircraft is the GS-12 Deflector manufactured by Blast Deflector, Inc. The second is a rectangular metal frame anchored to the ground at an angle, with multiple horizontal curved vanes to deflect the jet blast upwards. Other deflector types may be used.

2.2. Category Group 12, Liquid Fueling and Dispensing Facilities.

2.2.1. **Overview.** This section contains the general criteria and standards for petroleum dispensing and operating facilities for Air Force installations worldwide. Each base is provided adequate facilities for receiving, storing, distributing, and dispensing the fuel products necessary for its assigned mission. See UFC 3-460-01, *Petroleum Fuel Facilities*, and UFC 3-460-03, *Operation and Maintenance: Maintenance of Petroleum Systems,* for additional information and guidance.

2.2.1.1. **Waiver Process.** Changes in criteria require approval from the DoD Fuel Facility Engineering Panel, which sets DoD fuel system criteria. Submit requests for waivers through AFCESA/CEO.

2.2.1.2. Projects for facilities storing or handling bulk fuel supplied by Defense Energy Support Center (DESC) are normally programmed through the appropriate MAJCOM.

2.2.2. **General Guidance.**

2.2.2.1. **Security.** AFI 31-101, *The Air Force Installation Security Program,* requires all dispensing and operating facilities to have security protection. See criteria elsewhere and herein on Lights (**CATCODE 812926**), Fences (**CATCODE 872247**), and Security Alarms (**CATCODE 872841**). Other security aids such as sensors and other detection devices are provided as feasible. Dispensing and operating facilities in controlled areas, such as liquid fuel storage areas, do not require separate protection.

2.2.2.2. **Environmental.** Provide all liquid fuel storage, distribution, and dispensing facilities with positive methods to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Ensure spill containment complies with Section 311(j) of the CWA and with Spill Prevention Control and Countermeasures (SPCC) requirements contained in Part 112 of Title 40 of the Code of Federal Regulations (CFR). Provide control devices such as leak detection and automatic tank gauging as an integral component of the facility. Ensure fuels facilities comply with local, state, federal, and host nation environmental law as applicable.

2.2.2.3. **Explosives Safety Considerations.** Explosives safety standards, DoD 6055.9-Std and AFMAN 91-201, establish minimum separation standards for fuel storage and dispensing activities. Ensure these standards are met when constructing fuel facilities.

2.2.3. **Petroleum Operations Building. FAC: 1444**

CATCODE: 121111
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.3.1. **Description.** The petroleum operations building is a centralized facility for the management and control of all base functions related to the handling of petroleum products.

2.2.3.2. **Requirements Determination.** See **paragraph 2.2.1**.

2.2.3.3. **Scope Determination.** The size of the facility depends on the number of personnel assigned to manage fuels. See **Table 2.14** for Petroleum Operations building sizes.

Table 2.14. Petroleum Operation Building Sizes.

Personnel	Gross Area	
	m2	ft2
1 to 50	255	2,750
more than 50	358	3,850

2.2.3.4. **Dimensions.** The petroleum operations building includes a laboratory for conducting prescribed tests. The smaller building requires approximately 30 m^2 (315 ft^2) of laboratory space for equipment and working area; the larger building requires 33 m^2 (352 ft^2). This space requires year-round environmental control. The petroleum operations building should be located adjacent to the refueler vehicle parking area.

2.2.3.4.1. The petroleum operations building also requires (1) a ready room for fueling operators; (2) administrative offices; (3) a fuels control center; (4) men's toilet and locker room and women's toilet and locker room; (5) conference room and classroom; (6) a vehicle checkpoint and operator maintenance room; and (7) an emergency shower and eyewash in the work area in accordance with AFOSH Std 91-38, *Hydrocarbon Fuels* and ANSI Z358.1-2004, *American National Standard for Emergency Eyewash and Shower Equipment.*

2.2.3.4.2. The 23 m^2 (250 ft^2) vehicle checkpoint operator maintenance room may be in a separate building if it is operationally desirable or if adding the room onto an existing petroleum operations building is impractical. The room contains working space for a vehicle maintenance inspector, storage space for small replacement parts, and benches and equipment for vehicle operators to use in performing minor repair work.

2.2.3.4.3. An additional bulk storage operations building of approximately 42 m^2 (450 ft^2) is necessary to provide office space and latrine for bulk fuel storage personnel, if this building is immediately adjacent to the storage facility. If a site is

not available adjacent to the storage facility, provide the bulk storage operations building adjacent to the primary storage area.

2.2.3.5. **Design Considerations.** Installations with waterfront unloading facilities require a small storage building on-shore near the facilities for pollution control activities. Requirements are given under Liquid Fuel Off-Shore Unloading Facility (**CATCODE 163311**) and UFC 3-460-01.

2.2.4. **Aviation Fuel Dispensing. FAC: 1211**

CATCODE: 121115
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.4.1. **Description.** Contact OPR for latest requirements and guidance. See Hydrant Fueling System (**CATCODE 121122**).

2.2.4.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.4.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.4.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.4.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.5. **Hydrant Fueling System. FAC: 1211**

CATCODE: 121122
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.5.1. **Description.** A hydrant fueling system provides all the necessary equipment and controls to deliver clean, dry fuel to fueling points in the aircraft parking apron. The system includes a minimum of two Operational Storage Tanks (**CATCODE 124131**), but it does not include bulk storage. Bulk storage is programmed under Category Group 41, Liquid Fuel Storage.

2.2.5.2. **Requirements Determination.** Hydrant fueling systems are not authorized for bases where the property is not owned by the Air Force, except where the Air Force has operational control of real property at a joint base, where terms of the lease do not allow for long term Air Force tenure, or for other than main air bases. A hydrant fueling system is necessary for the following aircraft:

2.2.5.2.1. Aircraft with a total tank capacity exceeding 76,000 liters (20,000 gallons).

2.2.5.2.2. Aircraft, regardless of tank capacity, if a complete economic analysis shows that the annual cost of owning and operating a hydrant fueling system is less expensive than a truck fueling operation.

2.2.5.2.3. Tactical aircraft, regardless of tank capacity, in support of combat turnaround requirements.

2.2.5.2.4. Tactical aircraft in hardened shelters, docks, or specially designed hangars; that is, fuel loop system to aircraft shelter.

2.2.5.3. **Scope Determination.** Where hydrant fueling systems are justified, provide fueling positions at all aircraft parking positions and at all cargo loading positions. Provide connections compatible with the aircraft design and necessary flow rates.

2.2.5.4. **Dimensions.** The MAJCOM Fuels Engineer and MAJCOM Fuels Management section determine the hydrant system size based on base specific mission requirements and airframe specific upload rates.

2.2.5.5. **Design Considerations.**

2.2.5.5.1. For system design guidance, characteristics, and capacities, consult Section 4 of UFC 3-460-01. Ensure Types III, IV, and V fueling systems standard designs are used. Design criteria for fueling systems are established by the DoD Fuel Facility Engineering Panel. Process waivers for changes through AFCESA/CEO.

2.2.5.5.2. Ensure all fueling and tank systems comply with local, state, and federal requirements in respect to fuel vapor emissions, as required by AFI 32-7040. For fuel spills compliance consult AFI 32-7041 and AF Policy Letter, *Oil/Water Separators Operations, Maintenance and Construction* , 21 Oct 94.

2.2.6. **Hydrant Fueling Building. FAC: 1262**

CATCODE: 121124
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.6.1. **Description.** See Hydrant Fueling System (**CATCODE 121122**).

2.2.6.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.6.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.6.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.6.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.7. **Vehicle Fueling Station. FAC: 1231**

CATCODE: 123335
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.7.1. **Description.** These facilities (also called Base Service Stations) are provided for fueling 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.

2.2.7.2. **Requirements Determination.**

2.2.7.2.1. **Base Civil Engineer (BCE) Facility.** At bases where the Base Civil Engineer compound is more than one mile from the base service station, a separate Civil Engineer fueling station is authorized.

2.2.7.2.2. **Aircraft Support Equipment (Aerospace Ground Equipment, [AGE]).** Remote fueling stations for AGE vehicles may be provided where it is not practical to drive such equipment to the vehicle fueling station (base service station).

Normally this is limited to locations having more than ten pieces of equipment when the distance to the motor pool area is over one mile.

2.2.7.2.3. For programming purposes operating tanks are included as part of the facility they serve. **CATCODE 124135** is used for inventory purposes for these tanks.

2.2.7.3. **Scope Determination.** At stations where high volumes of fuel issues require constant replenishment, provide a minimum of two tanks per grade of product, and ensure the tanks are 45,000 liters (12,000 gallons) or larger capacity to accommodate commercial tank truck deliveries. Provide one fuel fill stand for each grade of product. For facilities with fewer than 100 assigned vehicles, provide a minimum of one 38,000 liter (10,000 gallon) tank and one commercial type dispensing pump and meter per tank. Above ground tanks are preferred if clearance criteria is available.

2.2.7.3.1. **BCE Facility.** Provide one commercial-type dispensing pump and meter for each tank. Provide a minimum of one 19,000 liter (5,000 gallon) storage tank for each type of fuel issued.

2.2.7.3.2. **AGE Facility.** A single storage tank with a capacity of 3,800 liters (1,000 gallons) per each ten pieces of AGE or an underground tank up to 45,000 liters (12,000 gallons) may be provided for each type of fuel issued. Provide a commercial type dispensing pump and meter for each tank.

2.2.7.4. **Dimensions.** At locations where base bulk ground fuels stocks are maintained at the vehicle fueling station, provide a dispensing pump, meter, and hose or loading arm to load ground fuel delivery vehicles. See **paragraph 2.2.7.3** and UFC 3-460-01.

2.2.7.5. **Design Considerations.**

2.2.7.5.1. Operating tanks for vehicle fueling stations should be above ground where possible. If underground tanks are required to meet distance criteria, ensure they are double wall horizontal cylindrical type tanks of steel or fiberglass and equipped with a leak monitoring and detection system. Size tanks in accordance with **paragraph 2.2.7.3**.

2.2.7.5.2. Ensure all vehicle fueling stations comply with local, state, and federal requirements in respect to fuel vapor emissions, as required by AFI 32-7040 and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in this Manual. At locations where no fuel vapor emission requirement exists and a new system (or modification to an existing system) is being installed, include necessary piping for a vapor recovery system in the installation (or modification). Design vehicle service stations to accommodate the Automated Fuels Service Station hardware. A consolidated station for vehicles and support equipment, such as AGE, should be considered where practical.

2.2.7.5.3. Provide secondary containment with holding capacity equal to the largest single compartment of the tank trucks to be loaded at fueling stations.

2.2.7.5.4. Compressed natural gas service stations are generally skid mounted equipment versus real property. For criteria on connection to base natural gas systems contact AFCESA/CEO.

2.2.7.5.5. Operating fuel storage tanks are provided wherever dispensing facilities are remote from bulk storage tanks. These tanks provide a means of storing fuel immediately prior to issue into aircraft or vehicles. Construct operating storage tanks above ground at CONUS locations. In all cases, above-ground tanks are preferred wherever airfield clearance criteria permit and where survivability issues are not a concern.

2.2.8. **Operating Storage, Aviation Gas. FAC: 1241**

CATCODE: 124131
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.8.1. **Description.** Contact OPR for latest requirements and guidance.

2.2.8.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.8.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.8.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.8.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.9. **Operating Storage, Aviation Lubricant. FAC: 1241**

CATCODE: 124132
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.9.1. **Description.** Contact OPR for latest requirements and guidance.

2.2.9.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.9.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.9.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.9.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.10. **Operating Storage, Diesel. FAC: 1243**

CATCODE: 124134
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.10.1. **Description.** Contact OPR for latest requirements and guidance. See Vehicle Fueling System (**CATCODE 123335**).

2.2.10.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.10.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.10.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.10.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.11. **Operating Storage, Jet Fuel. FAC: 1241**

CATCODE: 124135
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.11.1. **Description.** Contact OPR for latest requirements and guidance.

2.2.11.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.11.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.11.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.11.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.12. **Operating Storage, Motor Gas. FAC: 1243**

CATCODE: 124137
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.12.1. **Description.** Contact OPR for latest requirements and guidance. See Vehicle Fueling System (**CATCODE 123335**).

2.2.12.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.12.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.12.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.12.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.13. **Operating Storage, Solvents. FAC: 1244**

CATCODE: 124138
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.13.1. **Description.** Contact OPR for latest requirements and guidance.

2.2.13.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.13.3. **S cope Determination.** For general guidance see UFC 3-460-01.

2.2.13.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.13.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.14. **Operating Storage, Special Fuels. FAC: 1244**

CATCODE: 124139
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.14.1. **Description.** Special Fuels include Liquefied Petroleum Gas (LPG), Compressed Natural Gas (CNG), and hydrazine. See UFC 3-460-01 for facility guidance. Contact AFCESA/CEO prior to design of special fuels facilities.

2.2.14.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.14.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.14.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.14.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.15. **Pipeline, Liquid Fuels. FAC: 1251**

CATCODE: 125554
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.15.1. **Description.** Pipelines are a distribution system and are usually the most economical method of transferring fuel.

2.2.15.2. **Requirements Determination.** Establish the requirement on the basis of an economic analysis that compares pipeline costs with alternate delivery systems (e.g., truck, barge, or rail).

2.2.15.3. **Scope Determination.** Separate fuel pipelines are provided for each different grade of fuel, except for cross country pipelines and offshore unloading lines. For these applications, a single pipeline is provided for all light products (JP-4, aviation gasoline (avgas), motor gasoline (mogas), and No. 2 diesel), and another single pipeline is for all heavy products (Nos. 4, 5, and 6 fuel oil; Bunker C; and Navy Special).

2.2.15.4. **Dimensions.** Size fuel pipelines in accordance with the requirements of UFC 3-460-01.

2.2.15.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.16. **Pump Station, Liquid Fuels. FAC: 1262**

CATCODE: 125977
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.16.1. **Description.** Pump stations or fuels pumphouses contain pump systems that are used to transfer fuel from Bulk Fuel storage to operating storage or transfer fuel from one installation to another.

2.2.16.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.16.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.16.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.16.5. **Design Considerations.** For general guidance see UFC 3-460-01.

2.2.17. **Liquid Fuel Truck Fill Stand. FAC: 1261**

CATCODE: 126925
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.17.1. **Description.** Truck liquid fuel fill stands are necessary as a means of loading fuel from the storage tanks into fuel servicing vehicles and tank trucks.

2.2.17.2. **Requirements Determination.** Truck fill stands are provided at all Air Force installations where bulk petroleum products are stored and dispensed. See UFC 3-460-01.

2.2.17.3. **Scope Determination.** The number of fill stands required depends upon the number of trucks requiring simultaneous loading. This is determined by the command having jurisdiction from a study of the mission and operation requirements.

2.2.17.4. **Dimensions.** See UFC 3-460-01.

2.2.17.4.1. A minimum of one outlet for each grade of fuel is necessary.

2.2.17.4.2. Where two or more truck loading stands are located in a straight line, provide a minimum of 20 m (65 ft) between outlets.

2.2.17.5. **Design Considerations.** See UFC 3-460-01.

2.2.18. **Liquid Fuel Stand, Unloading. FAC: 1261**

CATCODE: 126926
OPR: AF/A4LE
OCR: AFCESA/CEO, AFPET/PTOT

2.2.18.1. **Description.** Bulk fuel storage facilities may be supplied with fuel by tank truck, tank car, or both. Offload facilities include direct offload, drop tank, and packaged skid. See UFC 3-460-01 for guidance.

2.2.18.2. **Requirements Determination.** For general guidance see UFC 3-460-01.

2.2.18.3. **Scope Determination.** For general guidance see UFC 3-460-01.

2.2.18.4. **Dimensions.** For general guidance see UFC 3-460-01.

2.2.18.5. **Design Considerations.** At facilities with pipeline or water transport as their principal supply source, provide tank truck or tank car deliveries as a secondary supply source. Tank truck deliveries are the most common method. However, special transportation considerations or changing circumstances may make the use of rail facilities desirable. Therefore, at an activity with railroad service, arrange a tank truck receiving facility so that the system can be easily and economically extended to the existing rail spur.

2.2.19. **Fire Crash/Rescue Station. FAC: 1411**

CATCODE: 130142
OPR: AFCESA/CEXF
OCR: AFCESA/CEO

2.2.19.1. **Description.** See Fire Stations (**CATCODE 730142**).

2.2.19.2. **Requirements Determination.** See **CATCODE 730142** and UFC 4-730-10, *Fire Stations*.

2.2.19.3. **Scope Determination.** See **CATCODE 730142** and UFC 4-730-10.

2.2.19.4. **Dimensions.** See **CATCODE 730142** and UFC 4-730-10.

2.2.19.5. **Design Considerations.** See UFC 4-730-10 and paragraphs 2-10.6.3 in UFC 3-260-01.

2.3. Category Group 13, Communications, Navigation Aids and Airfield Lighting.

2.3.1. General Guidance.

2.3.1.1. Air Force Communications and Information Systems are established to support air operations and Air Force provisioned portion of the Global Information Grid (GIG). For additional information on communications electronics system and planning guidance, see AFI 33-104, *Base-Level Planning and Implementation*.

2.3.1.2. All new and existing communications facilities are evaluated to determine what physical protection features are needed to ensure communications survivability. Requirements, such as blast protection, security devices, unconventional warfare protection, etc., are determined by the Air Force Network Integration Center (AFNIC). Project planners are required to obtain assistance from their wing communications and information systems planner and Systems Telecommunications Engineering Manager-Base Level (STEM-B) and/or STEM-C (MAJCOM), because the threat analysis, the protection requirements, and, hence, the appropriate survivability measures, vary from site to site. (T-1). Backup generators (depending on size) should comply with local, state, and federal requirements with respect to air emissions, as required by AFI 32-7040.

2.3.1.3. AFMAN 91-201 contains standards on protecting explosives from the hazards of electromagnetic radiation. Apply these standards when constructing communications and navigational aids that expose electro explosives devices (EED).

2.3.1.4. AFI 32-1065, *Grounding Systems*, contains standards on electrical grounding requirements.

2.3.1.5. See AFI 32-1063, *Electric Power Systems*, for primary power and back-up power requirements.

2.3.2. Telecommunications Facility. FAC: 1311

CATCODE: 131111
OPR: Air Force Network Integration Center (AFNIC)
OCR: N/A

2.3.2.1. **Description.** This facility provides a central location for the common user communications system for intra- and inter-base communications as well as other required communications (exclusive of hardware for navigational aids).

2.3.2.2. **Requirements Determination.** Organizations developing requirements for new facilities should request pre-technical assistance from the supporting engineering and installation Command, Control, Communications, and Computers (C4) organizations in accordance with AFI 33-104. During the technical assistance, communications engineers identify the special purpose space requirements for the proposed equipment and facility. For new installations, the Base Private Branch Exchange (PBX) Switching Center (commonly referred to as the base telephone switch) may be leased from a telephone company or it may be government owned. HQ USAF or DoD will determine whether leased or government wired telephone equipment/facilities are used.

2.3.2.3. **Scope Determination.** Size of the telecommunications facilities varies with the type of operation and equipment used. Define space requirements in accordance with site

concurrence procedures defined in AFI 33-104. The space required to accommodate telecommunications equipment varies with the design and manufacture of the equipment.

2.3.2.4. **Dimensions.** The wing communications unit, the STEM-B, and/or STEM-C (MAJCOM) will provide assistance to develop the floor plans and engineering drawings for the equipment, to include the telephone switching equipment room; inside and outside plant test, maintenance, repair, and supply rooms; switchboard room; plant-in-place records and publications room; emergency power room; DISN operations area; an operators lounge; and data communications and networking hardware, to include wiring, data routers, computer file servers, and wire and/or fiber optic patch panels, etc., as required on a case-by-case basis. (T-1).

2.3.2.5. **Design Considerations.** Various types of cable from the base transmitter and receiver, as well as other base communications systems, are normally fed through this structure. Control of all ground point-to-point contact and air to ground point-to-point contact (such as radio, telephone, teletype, DISNET, etc.) may be exercised from this facility. The building may include space for:

2.3.2.5.1. **Telephone Exchange 1 (PBX Switching Center).** The switching center is composed of switchboard positions, electromechanical and/or electronic switching equipment, emergency power plant, terminal equipment, distributing frames, relay racks, inside cable, wiring, cable vault, Uninterruptible Power Supply (UPS), back-up generator, and other operating appliances.

2.3.2.5.2. **Defense Switched Network (DSN) Equipment.**

2.3.2.5.3. **Administrative Functions.** Includes space for the communications officer and assistants, intra-base radio management, the base message distribution center, crypto storage vault, crypto accounting, commercial communications offices, storage space for record communications, magnetic tape, data cards, message paper, and message tape. See **Chapter 6** of this Manual for administrative space standards.

2.3.2.5.4. **Maintenance Functions.** Includes space for Chief of Maintenance/Chief of Systems Flight, training of systems/support flight personnel, training of maintenance and operations personnel, and programming personnel. See **Chapter 6** of this Manual for office and training space standards.

2.3.2.5.5. Weather communications equipment where applicable.

2.3.2.5.6. Additional equipment required in the base Communications/Computer Facility/Base Network Control Center (BNCC); data communications and networking hardware, to include wiring, data routers, computer file servers, wire and/or fiber optic patch panels, etc.

2.3.2.5.7. Maintenance functions require protected parking for general purpose and specialized government owned vehicles and a cable yard.

2.3.3. **Military Affiliate Radio System (MARS) Facility. FAC: 1311**

CATCODE: 131114
OPR: AFNIC (MARS)
OCR: N/A

2.3.3.1. **Description.** The MARS facility houses a MARS station. The mission, its functions, and operating procedures are prescribed in AFI 33-106, *Managing High Frequency Radios, Personal Wireless Communication Systems, and the Military Affiliate Radio System*.

2.3.3.2. **Requirements Determination.** There are two types of stations:

2.3.3.2.1. **Military MARS Stations.** These stations consist of unmanned base MARS stations. MAJCOMs and bases should support military MARS stations in the same manner as other Air Force communications facilities when activated. The base unit of assignment oversees equipment maintenance.

2.3.3.2.2. **Auxiliary MARS Stations.** Installations are authorized to establish auxiliary MARS stations for special missions such as United States Air Force Reserve, Air National Guard, Civil Air Patrol, and base morale, welfare, and recreation.

2.3.3.3. **Scope Determination.** The size of the MARS stations varies with the type of mission, function, operation and equipment used.

2.3.3.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.3.3.5. **Design Considerations.** Contact OPR for latest design guidance.

2.3.4. **Communications Receiver Facility. FAC: 1311**

CATCODE: 131115
OPR: Air Force Flight Standards Agency (AFFSA)
OCR: AFNIC

2.3.4.1. **Description.** This facility consists of antennae for a communications receiver site only.

2.3.4.2. **Requirements Determination.**

2.3.4.2.1. Very High Frequency/Ultra High Frequency (VHF/UHF) Air Traffic Control (ATC) radio equipment is usually at one or two remote locations either on or off base. Transmitters may all be located on one site with receivers located at a second site, physically separate to minimize interference. They may also be collocated in one building at a single "transceiver" site. Collocated sites are to be used whenever possible. Primary Air Traffic Control (ATC) radio equipment may be remotely controlled using telephone keying and audio lines or small capacity microwave radio systems from the control tower, Radar Approach Control (RAPCON), etc. The transmitter-receiver site consists of a building, usually constructed of concrete masonry units, with appropriate interior accommodations for routing electrical, telephone, and equipment cables. Ports are provided in the building for entry/exit of power, telephone, and coaxial cables. The site is normally equipped with an emergency power generator located either in the building or in a nearby exterior building. The generator is usually diesel powered and activated manually or automatically upon primary power failure. The power generator room/outbuilding has special ventilation, electrical, fuel safety, and environmental considerations. Land immediately adjacent to the building is necessary for the installation of wooden poles or metal towers to support VHF/UHF antennas.

2.3.4.2.2. Physical security equipment required includes safety and emergency lighting, obstruction lighting, security fencing, and controlled area signs as indicated in AFI 31-101. Work space may be required along with storage space for paint, flammable materials, and fuel tanks.

2.3.4.2.3. **High Frequency (HF) Point/Point and Ground/Air Sites.** Unlike VHF/UHF sites, which are closely tied to base ATC facilities (control tower, RAPCON, etc.), HF systems are often operated at the receiver or transmitter site or in a separate facility and may be remotely connected to the transmitter facility. Some HF radio stations are user-operated or operator-operated transceiver facilities in command posts or other on-base locations, and do not have specific radio facilities. Antennas are often located alongside base buildings or on rooftops and vary in nature. Some multi-HF transceiver sites may be operated locally (in conjunction with radio equipment) or remotely from another location. The size of the transceiver building and its associated antenna farm varies significantly based upon the number of radio levels involved, the mission of the station (point/point, air/ground, etc.), and azimuths of the antennas (or rotating antennas). Antennas should be located away from high tension power lines, metal fences (depending upon the type of antenna), and away from noise generating devices or machinery. Collocated (transceiver) HF sites are considerably larger than the VHF/UHF sites, but the split site HF sites are the largest, and may be separated by up to 40 km (25 miles) to minimize electromagnetic interference between sites. Ensure associated buildings are able to accommodate large numbers of high power radio transmitters/receivers, emergency power source, maintenance, and supply areas.

2.3.4.3. **Scope Determination.** The size of the antenna "farm" varies with the scope and complexity of air operations at each base, the character of the facility (i.e., a transmitter site only, a receiver site only, or a collocated transmitter/receiver site), and the technical complexity of the facility (quantity of radios, operating frequencies, use of duplexers, electromagnetic compatibility, etc.). Each facility is generally tailored to its specific mission, incorporating technical, functional, environmental, geographical, and local considerations.

2.3.4.4. **Dimensions.** Varies (see **paragraph 2.3.4.3**). For latest information and drawings, plans, utility, siting and electronic requirements, consult AFFSA.

2.3.4.5. **Design Considerations.** Consult the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide.*

2.3.5. **Communications Transmitter/Receiver Facility. FAC: 1311**

CATCODE: 131116
OPR: AFFSA
OCR: AFNIC

2.3.5.1. **Description.** This facility consists of antennas for a collocated communications transmitter/receiver site.

2.3.5.2. **Requirements Determination.** See Communications Receiver (**CATCODE 131115**).

2.3.5.3. **Scope Determination.** See **CATCODE 131115**.

2.3.5.4. **Dimensions.** See **CATCODE 131115**.

2.3.5.5. **Design Considerations.** Contact OPR for latest design guidance.

2.3.6. **Communications Transmitter Facility. FAC: 1311**

CATCODE: 131117
OPR: AFFSA
OCR: AFNIC

2.3.6.1. **Description.** This facility consists of communications antennas for a transmitter site only.

2.3.6.2. **Requirements Determination.** See Communications Receiver (**CATCODE 131115**).

2.3.6.3. **S cope Determination.** See **CATCODE 131115**.

2.3.6.4. **Dimensions.** See **CATCODE 131115**.

2.3.6.5. **Design Considerations.** Contact OPR for latest design guidance.

2.3.7. **Radio Relay Facility (includes LMR Repeater facilities and microwave relay sites). FAC: 1311**

CATCODE: 131118
OPR: AFFSA
OCR: AFNIC

2.3.7.1. **Description.** This facility supports equipment for sites used to relay communications between point-to-point wideband communications, or for relay of land mobile radio signals over local areas.

2.3.7.2. **Requirements Determination.** Radio relay/repeater facilities consist of radio facilities (buildings and outdoor equipment) necessary to support the relay of radio communications information. These facilities are unattended, where practical, and require only periodic inspection and maintenance by specialized crews. Local conditions, however, may require some of these sites to be attended.

2.3.7.3. **Scope Determination.** Building size is determined by the amount of equipment to be installed.

2.3.7.4. **Dimensions.** See **paragraph 2.3.7.3**.

2.3.7.5. **Design Considerations.** The radio relay installation normally includes the following construction items:

2.3.7.5.1. **Communications Equipment Building.** Humidity and temperature control may be required. Additional space for emergency sleeping quarters and the storing of emergency rations and additional spare parts may be required where climatic conditions warrant.

2.3.7.5.2. **Power.** Primary power, backup power (see AFI 32-1063) and associated fuel facilities as required. (See AFI 32-7044, *Storage Tank Compliance* for environmental requirements.)

2.3.7.5.3. **Antenna Supports.** Separate concrete foundations may be required depending on equipment and building design.

2.3.7.5.4. **Access Road and Parking Area.**

2.3.7.5.5. **Fencing.** A four-strand barbed wire perimeter fence is normally required. Local security agencies may specify a more secure fence. See AFI 31-101.

2.3.7.5.6. **Manned Locations.** Manned locations require space for secure storage of test equipment, latrines, maintenance, training, and work center administration.

2.3.7.5.7. **Security and Safety.** Security and safety lighting is necessary.

2.3.8. **General guidance.**

2.3.8.1. HF radio facilities comprise all communication networks employed by the Air Force for the exchange of information between and among surface installations and airborne vehicles, or any combination thereof (i.e., point-to-point or air/ground/air communications). Facilities include Air Force components of the Defense Communications System (DCS) as well as unilateral communications.

2.3.8.2. The HF radio complexes provide a variety of communication services (radio, teletype, voice, analog, radio, phone patch, data) for a variety of functions (administrative, logistic, weather, operations, intelligence, common user, command and control, etc.) for all command levels on a global basis.

2.3.8.3. The USAF Aeronautical Station complex normally consists of three separate buildings for the communications terminal, transmitter, and receiver. The relay control center may be collocated with the base telecommunications facility or with the transmitter or receiver building. Facilities may be located on or off base, with microwave or cable facilities connecting them.

2.3.8.4. Command and Control facilities normally consist of a single building with adjacent antenna farms. The building is normally isolated from the central area of the base or may be located at an off-base site.

2.3.8.5. See AFI 32-1063 for primary power, back-up power, and associated fuel facilities.

2.3.8.6. Humidity and temperature controls are necessary in the communications terminal and command and control facilities; they may be required at the transmitter/receiver buildings.

2.3.8.7. The type and quantity of security fencing and perimeter lighting is determined by local security forces during site surveys. Consideration for transmission line security by hardening transmission line ducts, where applicable, may be necessary.

2.3.8.8. Roads and parking lots are necessary.

2.3.8.9. AFI 32-1065 contains standards on electrical grounding requirements.

2.3.9. **Air Communications (AIRCOM) Relay Center Facility. FAC: 1311**

CATCODE: 131134
OPR: AFFSA
OCR: AFNIC

2.3.9.1. **Description.** This facility is established to pass traffic from one subscriber or tributary to another by automatic, semi-automatic, or manual means, or by connecting circuits electronically between subscribers or tributaries for direct transmission.

2.3.9.2. **Requirements Determination.** The facility consists of a radio operations room, relay equipment room, technical control room, crypto room, maintenance room, teletype room, and relay operations administrative room. A microwave relay room is also required in many situations.

2.3.9.3. **Scope Determination.** The size of the relay building is determined by the communications-electronics engineering agency to meet specific requirements when not collocated with the base telecommunications facility. An incinerator is necessary in the immediate vicinity of the record communication/crypto area.

2.3.9.4. **Dimensions.** See **paragraph 2.3.8** and **2.3.9.3**.

2.3.9.5. **Design Considerations.** Contact OPR for latest design guidance.

2.3.10. **AIRCOM Receiver Facility. FAC: 1311**

CATCODE: 131136
OPR: AFFSA
OCR: AFNIC

2.3.10.1. **Description.** The receiver building and transmitter building are located on separate sites and may be located on or off base.

2.3.10.2. **Requirements Determination.** See **paragraph 2.3.8** above.

2.3.10.3. **Scope Determination.** See **paragraph 2.3.8** above.

2.3.10.4. **Dimensions.** See **paragraph 2.3.8** above.

2.3.10.5. **Design Considerations.** Each facility requires 40.4 ha (100 acres) of land and a minimum separation of 6.5 km (4 mi). Each facility requires a building for technical equipment and buildings for power units, and may require living quarters at off-base sites. Contact OPR for additional guidance.

2.3.11. **AIRCOM Transmitter Facility. FAC: 1311**

CATCODE: 131137
OPR: AFFSA
OCR: AFNIC

2.3.11.1. **Description.** See description for AIRCOM Receiver Facility (**CATCODE 131136**) and **paragraph 2.3.8**.

2.3.11.2. **Requirements Determination.** See **paragraph 2.3.8** above.

2.3.11.3. **Scope Determination.** See **paragraph 2.3.8** above.

2.3.11.4. **Dimensions.** See **paragraph** **2.3.8** above.

2.3.11.5. **Design Considerations.** See **paragraph** **2.3.10.5** and contact OPR for additional design guidance.

2.3.12. **High Frequency AIRCOM Microwave Relay Facility. FAC: 1311**

CATCODE: 131138
OPR: AFNIC
OCR: N/A

2.3.12.1. **Description.** The microwave relay system is an essential link in the aeronautical station system. This system provides the control link between the transmitter, receiver, and communications terminal.

2.3.12.2. **Requirements Determination.** Where cable systems are not feasible because of distance and terrain, or they are not an operational requirement, microwave facilities are provided as a primary means of communication. The microwave inter-site system may be required due to:

2.3.12.2.1. The prohibitive cost of constructing pole lines in some areas which have sufficient cable lines to meet the communications demand between aeronautical station facilities;

2.3.12.2.2. The frequency of weather related cable system outages; or

2.3.12.2.3. The high vulnerability of cable systems to sabotage and enemy actions, especially in areas overseas.

2.3.12.3. **Scope Determination.** See **paragraph** **2.3.8** above.

2.3.12.4. **Dimensions.** See **paragraph** **2.3.8** above.

2.3.12.5. **Design Considerations.** Contact OPR for additional design guidance.

2.3.13. **Microwave Repeater. FAC: 1311**

CATCODE: 131139
OPR: AFNIC
OCR: N/A

2.3.13.1. **Description.** Terrain or distance limitations may require a Microwave Repeater to ensure the reliable and high quality performance of the microwave system.

2.3.13.2. **Requirements Determination.** See **paragraph** **2.3.8** above.

2.3.13.3. **Scope Determination.** See **paragraph** **2.3.8** above.

2.3.13.4. **Dimensions.** See **paragraph** **2.3.8** above.

2.3.13.5. **Design Considerations.** Contact OPR for additional design guidance.

2.3.14. **Antenna Support Structure. FAC: 1321**

CATCODE: 132134
OPR: AFNIC
OCR: AFCESA/CEO

2.3.14.1. **Description.** This structure consists of steel towers or wooden pole structures used to support fixed ground antennas and transmission lines.

2.3.14.2. **Requirements Determination.** The structure is necessary to provide a means to support antennas used to control air traffic and communicate with aircraft. Contact OPR for latest requirements and guidance.

2.3.14.3. **Scope Determination.** This includes power and communication circuits, ducts, manholes, transformers, control and protective devices, and associated equipment.

2.3.14.4. **Dimensions.** Factors involved in determining dimensions include type of structure used, type of base, type of soil, amount of load supported, and required guying. Contact OPR for latest requirements and guidance.

2.3.14.5. **Design Considerations.** Contact OPR for latest design guidance.

2.3.15. **Remote Control Circuits. FAC: 1341**

CATCODE: 134119
OPR: AFFSA
OCR: AFNIC, AF/A3O-A

2.3.15.1. **Description.** This facility houses electrical power and communication control circuits, control devices, and associated equipment from the base control tower or radar facility to navigational aids and communication facilities.

2.3.15.2. **Requirements Determination.** This facility is necessary to provide a means to control air traffic and communicate with aircraft.

2.3.15.3. **Scope Determination.** This includes power and communication circuits, ducts, manholes, transformers, control and protective devices and associated equipment. Program this category code by indicating the number of circuits and the cost of each. Special items should be noted, estimated separately, and included in the overall cost of the project.

2.3.15.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.3.15.5. **Design Considerations.** See UFC 3-260-01 and the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* for additional information and guidance.

2.3.16. **Fixed Radar Approach Control (RAPCON) (GCA Fixed) Facility. FAC: 1331**

CATCODE: 134336
OPR: AFFSA
OCR: AFNIC, AF/A3O-A

2.3.16.1. **Description.** This facility provides surveillance and precision radar service at permanent Air Force bases that do not have approach control authority.

2.3.16.2. **Requirements Determination.** This facility replaces the semi-mobile Ground Control Approaches (GCA) and includes the organic support space described under RAPCON Support Building (**CATCODE 134341**).

2.3.16.3. **Scope Determination.** See **Chapter 2** of the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* and UFC 3-260-01 for additional information and guidance.

2.3.16.4. **Dimensions.** This facility is a one-story, 268 m^2 (2,884 ft^2) building.

2.3.16.5. **Design Considerations.** See Section 2.1.3 of the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* for information on siting and proximity of RAPCON facilities.

2.3.17. **RAPCON Vault (GCA Vault). FAC: 8927**

CATCODE: 134338
OPR: AFFSA
OCR: AFNIC, AF/A3O

2.3.17.1. **Description.** The vault furnishes an underground location for the transformer power line connectors, etc., that provide electrical power to the RAPCON and GCA facilities.

2.3.17.2. **Requirements Determination.** See RAPCON Support Building (**CATCODE 134341**).

2.3.17.3. **Scope Determination.**

2.3.17.3.1. **Semi-Fixed Facility.** A semi-fixed facility is a fiberglass shelter 7.3 m by 9.5 m (24 ft by 31 ft), 69 m^2 (744 ft^2), mounted on concrete foundations. It is a removable asset but not transportable. Radar and communication data is routed into the shelter by microwave/cable. Although the shelter is an efficient operations facility, a support building is necessary to provide a complete facility.

2.3.17.3.2. **USAF Mobile Facilities.** Mobile facilities are trailer-mounted shelters containing all antennas, radars, voice communications, and operations equipment. The shelters can be temporarily set up on existing terrain. For long-term employment, a pad adjacent to the runway is required. Due to space limitations and potential isolation, a separate support facility is necessary. Siting of the mobile facility and support facility may require a waiver from the standard airfield criteria. See Chapter 6 on relocatable facilities of AFI 32-1021, *Planning and Programming Military Construction (MILCON) Projects,* and Section 13 of UFC 3-260-01 for further information on deviations from criteria for airfield support facilities.

2.3.17.4. **Dimensions.** Consult *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* for additional guidance.

2.3.17.5. **Design Considerations.** For latest information and drawings, plans, utility, siting, and electronic requirements, consult AFFSA.

2.3.18. **RAPCON Support Building (GCA/RAPCON Support Building). FAC: 1331**

CATCODE: 134341
OPR: AFFSA
OCR: AFNIC, AF/A3O

2.3.18.1. **Description.** Mobile and semi-fixed facilities require an operations/maintenance crew and an alert/maintenance facility providing support space for the workers who normally operate the equipment up to 24 hours per day.

2.3.18.2. **Requirements Determination.** This facility includes space for training/study, rest and duty standby, administration, maintenance shop, test equipment storage, kitchen, and latrine. Consult the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* and UFC 3-260-01 for additional information and guidance. See AFI 32-1063 for primary power and backup power and AFI 32-1065 for standards on electrical grounding requirements.

2.3.18.3. **Scope Determination.**

2.3.18.3.1. The semi-fixed support facility is located adjacent to the relocatable fiberglass shelter, providing space for 8 to 12 workers and containing 102 m^2 (1,100 ft^2). It includes an enclosed walkway between the operations shelter and the support building when practicable. The facility does not contain active radar elements because data is routed into it by microwave or cable. Therefore, the shelter and support building should be located to take advantage of existing base support items such as utilities, access roads, and parking areas.

2.3.18.3.2. The mobile support facility is located adjacent to the mobile RAPCON vans and provides space for six to ten workers, requiring 89 m^2 (960 ft^2). If utility connections cannot be made to existing base utilities, install a septic tank and underground potable water storage tank.

2.3.18.3.3. Siting of the mobile support facility requires a deviation from the standard airfield criteria, but siting of the semi-fixed support facility does not. Obtain a waiver to site the mobile facility from the MAJCOM. See Chapter 6 (on relocatable facilities) of AFI 32-1021 and Section 13 of UFC 3-260-01 for further information on deviations from criteria for airfield support facilities.

2.3.18.4. **Dimensions.** See **paragraph 2.3.18.2** and **2.3.18.3** above.

2.3.18.5. **Design Considerations.** Consult the latest *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* and UFC 3-260-01 for additional information and guidance.

2.3.19. **Instrument Landing System (ILS) Glide Slope. FAC: 1341**

CATCODE: 134351
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.19.1. **Description.** The ILS is the standard navigation aid that utilizes fixed radio beams to provide aircraft final approach guidance in instrument conditions.

2.3.19.2. **Requirements Determination.** The ILS consists primarily of an ALSF-1 or an ALSF2 used where CAT-I, CAT-II, and CAT-III operations are necessary. See Chapter 3 and Table 2-1A of UFC 3-535-01 and AFI 32-1044 for additional information and requirements. An approach lighting system is necessary in conjunction with the ILS to ensure a safe transition from the instrument phase to the visual phase (see Approach Lighting, **CATCODE 136661**).

2.3.19.2.1. The basic components of the ILS system are:

2.3.19.2.1.1. A localizer radio beam to furnish azimuth approach guidance to the runway, and

2.3.19.2.1.2. A glide path radio beam to furnish vertical descent approach guidance to the runway.

2.3.19.2.2. The basic components of the Category II ILS system are:

2.3.19.2.2.1. A localizer radio beam to furnish azimuth approach guidance to the runway;

2.3.19.2.2.2. A glide-path radio beam to furnish vertical descent approach guidance to the runway;

2.3.19.2.2.3. Two marker beacons (inner and outer) to provide accurate radio fixes along the approach course (TACAN distance measuring equipment (DME) fixes satisfy the outer marker requirement.);

2.3.19.2.2.4. An approved touchdown zone lighting system;

2.3.19.2.2.5. Centerline lighting system;

2.3.19.2.2.6. High intensity runway edge lighting;

2.3.19.2.2.7. All-weather runway markings;

2.3.19.2.2.8. Runway Visual Range (RVR) (For operations below 1,600 RVR or 0.5 km [1/3 mi], two transmissometers are necessary to provide visibility information at the approach and rollout end of the runway.); and

2.3.19.2.2.9. **Remote Monitoring.** Remote monitoring is needed for the following elements: Glide slope, localizer and marker beacons, and approach lighting system.

2.3.19.3. **Scope Determination.** See UFC 3-260-01and UFC 3-535-01.

2.3.19.4. **Dimensions.** See UFC 3-260-01and UFC 3-535-01.

2.3.19.5. **Design Considerations.** The permanent system includes an approved localizer and an approved glide path unit. The AN/GRN-29 includes both the localizer and glide path units and satisfies Category I or II ILS requirements. The AN/GRN-31 (glide slope) and an AN/GRN-30 (localizer) are also sited on a shelter hardstand of approximately 27 m^2 (32 yd^2).

2.3.20. **ILS Localizer. FAC: 1341**

CATCODE: 134353
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.20.1. **Description.** The AN/GRN-30 localizer is collocated with the ILS glide slope.

2.3.20.2. **Requirements Determination.** See ILS Glide Scope (**CATCODE 134351**), UFC 3-260-01and UFC 3-535-01.

2.3.20.3. **Scope Determination.** See UFC 3-260-01and UFC 3-535-01.

2.3.20.4. **Dimensions.** See UFC 3-260-01and UFC 3-535-01.

2.3.20.5. **Design Considerations.** See UFC 3-260-01and UFC 3-535-01.

2.3.21. **ILS Marker Beacon. FAC: 1341**

CATCODE: 134355
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.21.1. **Description.** The markers are used with the ILS and low powered markers of approximately two watts output, operating on a frequency of 75 megahertz and radiating similar vertical, fan-shaped field patterns.

2.3.21.2. **Requirements Determination.** See ILS Glide Scope (**CATCODE 134351**), UFC 3-260-01, and UFC 3-535-01.

2.3.21.3. **Scope Determination.** See UFC 3-260-01and UFC 3-535-01.

2.3.21.4. **Dimensions.** See UFC 3-260-01and UFC 3-535-01.

2.3.21.5. **Design Considerations.**

2.3.21.5.1. The outer marker is located on the extended runway centerline directly beneath the point established for aircraft interception of the glide slope.

2.3.21.5.2. The latest solid state marker beacon, AN/GRN-32, is housed in a cabinet mounted on a 0.9 m by 2.1 m (3 ft by 7 ft) staging platform, or on a pole. The AN/GRN-32 uses a yagi antenna and does not require a counterpoise. The AN/GRN-32 minimum plot size is 6.1 m^2 (20 ft^2).

2.3.22. **Radar Turntable. FAC: 1341**

CATCODE: 134373
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.22.1. **Description.** This is a motorized turntable that provides a rapid, all-weather capability to rotate one or two trailer vans to permit aligning the precision approach radar (PAR) unit for service to another runway.

2.3.22.2. **Requirements Determination.** See UFC 3-260-0.

2.3.22.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

2.3.22.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.3.22.5. **Design Considerations.** The cable ducting, turntable, motor, and allied support construction are provided through the communications-electronics implementation plan (CEIP) and MILCON programming action. An Air Force standard design has been established and may be obtained from AFNIC.

2.3.23. **Precision Approach Radar (PAR). FAC: 1341**

CATCODE: 134374
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.23.1. **Description.** Primary radar equipment (PAR) is used to provide the azimuth, elevation, and range of an aircraft during final approach.

2.3.23.2. **Requirements Determination.** Fixed base PARs are either an AN/FPN-62 or AN/GPN-22. If dual runway coverage is needed, the AN/FPN-62 requires a turntable (turntable included in SFEL FA-3-01A). See Radar Turntable (**CATCODE 13437**) and AFI 32-1044.

2.3.23.3. **Scope Determination.** The AN/GPN-22 does not require a turntable. Mobile facilities also provide PAR service. The MPN-14K requires a turntable to provide dual runway coverage. The TPN-19 does not require a turntable. See UFC 3-260-01 for additional guidance.

2.3.23.4. **Dimensions:** Contact OPR for latest requirements and guidance.

2.3.23.5. **Design Considerations:** For fixed PAR, the radar data is transmitted from the radar, located near the runway, to the approach control. A transformer vault, ducting, and a foundation turntable or hardstand may be required as support structures.

2.3.24. **RAPCON Center: FAC: 1331**

CATCODE: 134375
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.24.1. **Description:** A terminal air traffic control facility using radar and non-radar capabilities, the RAPCON Center provides approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility. It can provide radar ATC service to one or more civil and/or military airports in a terminal area.

2.3.24.2. **Requirements Determination:** This facility may provide services of a ground controlled approach (GCA), i.e., Airport Surveillance Radar (ASR) and Precision Approach Radar (PAR) approaches. Consult the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* and UFC 3-260-01 for additional information and guidance.

2.3.24.3. **Scope Determination.** A normal, one-base RAPCON facility requires a one-story facility of 561 m^2 (6,034 ft^2). Additional equipment requirements or the need to provide services to more than one base may be justification for expansion to a second story of 348 m^2 (3,750 ft^2). The RAPCON should not house radio transmitters or receivers (other than emergency alternate use). Primary and alternate radios should be located at separate transmitter and receiver sites.

2.3.24.4. **Dimensions.** See **paragraph 2.3.24.3** above.

2.3.24.5. **Design Considerations.** RAPCON and GCA services can be provided from fixed, semi-mobile, or mobile facilities. See UFC 3-260-01.

2.3.25. **Airport Surveillance Radar (ASR). FAC: 1341**

CATCODE: 134376
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.25.1. **Description.** ASR is approach control radar used to detect and display an aircraft's position in the terminal area. It provides range and azimuth information.

2.3.25.2. **Requirements Determination.** An airfield may have an AN/GPN-12 or AN/GPN-20 fixed ASR providing medium range 110 km (60 nautical miles) radius primary radar coverage and 370 km (200 nautical miles) radius secondary radar coverage. Airfields may also have an AN/GPN-30 Digital Airport Surveillance Radar (DASR). The DASR is a new terminal air traffic control radar system that replaces current analog systems with new digital technology.

2.3.25.3. **Scope Determination.** See UFC 3-260-01. Contact OPR for further guidance on the AN/GPN-30.

2.3.25.4. **Dimensions.** See UFC 3-260-01. Contact OPR for further guidance on the AN/GPN-30.

2.3.25.5. **Design Considerations.** The AN/GPN-12 and AN/GPN-20 are provided with prefabricated shelters for housing transmitter and receiver equipment. The radar antenna is mounted on a steel tower adjacent to the shelter. The radar data is transmitted to the RAPCON operations room either by cable or microwave. Contact OPR for further design guidance on the AN/GPN-30.

2.3.26. **Radio Beacon Facility. FAC: 1341**

CATCODE: 134422
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.26.1. **Description.** These facilities are non-directional aids used to provide homing, fixing, and air navigation assistance to aircraft with suitable automatic direction finding (ADF) equipment installed.

2.3.26.2. **Requirements Determination.** (Medium Power Low Frequency Beacon [AN/URN-5 or Equivalent]). This facility is designed to meet all requirements for a low-frequency homing beacon facility for area coverage and terminal approach purposes, and is used for air route support where extreme ranges are not mandatory. Medium power beacons often are used to mark compulsory reporting points on airways or otherwise establish routes not specifically associated with an air base.

2.3.26.3. **Scope Determination.** See UFC 3-260-01.

2.3.26.4. **Dimensions.** See UFC 3-260-01.

2.3.26.5. **Design Considerations.** The AN/URN-5 has a power output that is variable from 25 to 400 watts. This equipment is furnished either with or without shelter. When the shelter is provided, a foundation and appropriately sized emergency power building are needed. When the equipment is authorized for permanent installation, construction of a suitable building is required. Where shelters or existing buildings are not available or suitable, radio homing beacons require building construction.

2.3.27. **TACAN Air Navigation Station. FAC: 1341**

CATCODE: 134465
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.27.1. **Description.** A TACAN is a short range, UHF, line-of-sight air navigation system that provides continuous, accurate slant-range distance and bearing information. The information is presented to the pilot in two dimensions, distance and bearing, to and from a selected ground station. The TACAN station theoretically produces an infinite number of signals similar to the spokes of a wheel.

2.3.27.2. **Requirements Determination.** TACAN stations may be used as either terminal or enroute aids. The maximum service range is approximately 360 km (195 nautical miles) at high altitude. Therefore, the installation may be on or off base. When used as a terminal aid, the TACAN should be installed on base adjacent to the runway, as close to the runway centerline as criteria specified in UFC 3-260-01 permits. For an on-base installation, the maximum angle of convergence between the runway centerline and TACAN final approach course is 30 degrees at a point 900 m (3,000 ft) from the runway threshold. See AFI 32-1044 for additional guidance.

2.3.27.3. **Scope Determination.**

2.3.27.3.1. **Fixed TACAN Air Navigation Station (AN/FRN-45).** The AN/FRN-45 Solid State TACAN modification replaces the outmoded tube-type TACANs. House them in the existing TACAN buildings. They also utilize the existing backup power generators and the existing antenna and tower structure. The AN/FRN-45 TACAN is designated to provide the same service with solid state reliability.

2.3.27.3.2. **Mobile TACAN Stations (AN/TRN-26 and AN/TRN-41).** The AN/TRN-26 is a highly mobile TACAN system. It is designed on the building block concept for quick reaction TACAN service at locations where weight and cube are critical. The AN/TRN-26 has the capability to be housed in a mobile van or operate freestanding for short durations, when under field conditions. It has the capability to operate with commercial power or generator power. When properly sited, it is designed to provide the same service as a fixed based TACAN.

2.3.27.3.2.1. The AN/TRN-41 is a light-weight air-dropable TACAN set to be used by Air Force combat control teams as a navigational aid (NAVAID) for aircraft operating in contingency or forward areas. It operates without hardstand or shelter. It is intended to be used in VMC (Visual Meteorological Conditions) and is not equipped with the monitors required for use during Instrument Flight Rules (IFR) weather conditions.

2.3.27.4. **Dimensions.** See UFC 3-260-01.

2.3.27.5. **Design Considerations.** See UFC 3-260-01.

2.3.28. **NAVAID Tower. FAC: 1341**

CATCODE: 134473
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.28.1. **Description.** Varying types of towers are used to provide bases with radio and radar antennas used with different navigational aids. The towers are usually made of metal, open latticework construction, furnished with concrete hardstand bases, ladders with safety guards, and platforms/catwalks to permit the mounting of necessary antennas and routine maintenance.

2.3.28.2. **Requirements Determination.** See UFC 3-260-01 and AFI 32-1044.

2.3.28.3. **Scope Determination.** See UFC 3-260-01.

2.3.28.4. **Dimensions.** See UFC 3-260-01.

2.3.28.5. **Design Considerations.** See UFC 3-260-01.

2.3.29. **Fixed VHF Omni-Range (VOR) Station. FAC: 1341**

CATCODE: 134482
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.29.1. **Description.** The VOR system is a ground-based, short range, line-of-sight radio NAVAID producing a theoretically infinite number of signals emanating from the station (similar to spokes of a wheel) that provides the pilot with bearing information only.

2.3.29.2. **Requirements Determination.** VOR stations may be used as either terminal or enroute NAVAIDS. When used as a terminal aid, the VOR may be installed on base adjacent to the runway, as close to the runway centerline as criteria specified in UFC 3-260-01 permits. It may also be installed on the extended runway centerline as a Final Approach Fix (FAF), in accordance with criteria specified in AFI 13-204, *Functional Management of Airfield Operations*; AFJMAN 11-226, *United States Standard for Terminal Instrument Procedures (TERPS)*; AFI 11-230, *Instrument Procedures;* and FAA Handbook 8260.3B, *US Standard for Terminal Instrument Procedures (TERPS)*. For on-base installations, the maximum angle of convergence between the extended runway centerline and VOR final approach course is 30 degrees at a point 900 m (3,000 ft) from the runway threshold. Where practical, the VOR should be installed as part of an on-base VORTAC facility (see **paragraph 2.3.30**). This follows the Air Force policy for reducing monetary expenditures for land acquisition and remote location maintenance.

2.3.29.3. **Scope Determination.** See UFC 3-260-01.

2.3.29.4. **Dimensions.** See UFC 3-260-01.

2.3.29.5. **Design Considerations.** The AN/FRN-44 Solid State VOR modification replaces the outmoded tube type VORs. If possible, house them in the existing VOR buildings. They also utilize the existing backup power generators, and the Alford Loop type antenna. The AN/AFN-44 VOR is designed to provide the same service with solid state reliability.

2.3.30. **TVOR-RACAN, Fixed (VORTAC, Fixed). FAC: 1341**

CATCODE: 134511
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.30.1. **Description.** Navigation aids consisting of collocated TACAN and VOR facilities are known as VORTACs. They provide bearing information on both VHF and UHF bands plus compatible DME. This enables aircraft equipped with either TACAN or VOR/DME to make use of the navigational guidance.

2.3.30.2. **Requirements Determination.** Air Force policy requires that TACAN and VOR stations located on the same base and permanently required to support operational missions should be collocated and operated as VORTACs. This enables pairing of facility frequencies according to an established schedule and allows substantial maintenance savings and other ancillary cost savings.

2.3.30.3. **Scope Determination.** VORTAC facilities are usually made up of facilities whose antennas are vertically stacked and thus identically located, but antennas located within 30 m (100 ft) of one another are considered collocated, for terminal use. For other than terminal use, antennas are considered to be collocated when within 600 m (2,000 ft) of one another.

2.3.30.4. **Dimensions.** See UFC 3-260-01.

2.3.30.5. **Design Considerations.** If used as a terminal aid for instrument approach procedures, align both the VOR and TACAN radials of the VORTAC in the same direction. When collocated, the AN/FRN-45 TACAN and the AN/FRN-44 VOR become the AN/FRN-43 VORTAC.

2.3.31. **Wind Direction Indicator. FAC: 1341**

CATCODE: 134678
OPR: AFFSA
OCR: AFNIC, AFWA, AF/A3O, AFCESA/CEO

2.3.31.1. **Description.** This is a lighted visual aid to indicate the direction of the wind and thus enable the pilot to select the proper runway for landing. A visual wind indicator is especially essential if radio contact with the control tower is lost and the pilot cannot receive oral information and instructions for landing the aircraft. The wind direction indicator is either a lighted wind cone or a wind sock.

2.3.31.2. **Requirements Determination.** See UFC 3-260-01 and AFI 32-1044.

2.3.31.3. **Scope Determination.** See UFC 3-260-01.

2.3.31.4. **Dimensions.** See UFC 3-260-01.

2.3.31.5. **Design Considerations.** See UFC 3-260-01.

2.3.32. **Beacon Light. FAC: 1362**

CATCODE: 136635
OPR: AFFSA
OCR: AFNIC, AF/A3O, AFCESA/CEO

2.3.32.1. **Description.** The airport beacon is the internationally recognized lighted signal indicating an airfield. The beacon generally is mounted on the highest structure on the installation.

2.3.32.2. **Requirements Determination.** Airfield lighting facilities may be provided according to UFC 3-535-01.

2.3.32.3. **Scope Determination.** Centerline measurements should be used in programming for runway, taxiway, and approach lighting. For example, runway lights programmed for a runway 3,250 m (10,650 ft) long are shown as 3,250 m (10,650 linear feet) of runway lights and not as 6,500 m (21,300 ft). Instruction for providing airfield lighting is contained in AFI 32-1044. Guidance on design and installation of airfield lighting is in UFC 3-535-01.

2.3.32.4. **Dimensions.** See UFC 3-535-01.

2.3.32.5. **Design Considerations.** See UFC 3-535-01.

2.3.33. **Approach Lighting. FAC: 1361**

CATCODE: 136661
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.33.1. **Description.** This facility is designed to help the pilot transition from the instrument phase of approach to its visual phase provided by runway lighting for aircraft landings.

2.3.33.2. **Requirements Determination.** Consult AFI 32-1044 for information on visual air navigational facilities, AFI 32-1065 for standards on electrical grounding requirements, and AFI 32-1063 for primary power and back-up power requirements.

2.3.33.3. **Scope Determination.** See **CATCODE 136635** and ETL 09-6.

2.3.33.4. **Dimensions.** See UFC 3-535-01.

2.3.33.5. **Design Considerations.** See UFC 3-535-01.

2.3.34. **Obstruction Lighting. FAC: 1362**

CATCODE: 136662
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.34.1. **Description.** Objects that penetrate clearance planes, established in UFC 3-260-01, are lighted as obstructions to air navigation as provided in AFI 32-1044 and UFC 3-535-01.

2.3.34.2. **Requirements Determination.** See **CATCODE 136635**.

2.3.34.3. **S cope Determination.** See **CATCODE 136635**.

2.3.34.4. **Dimensions.** See UFC 3-535-01.

2.3.34.5. **Design Considerations.** See UFC 3-535-01.

2.3.35. **Runway Lighting. FAC: 1361**

CATCODE: 136664
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.35.1. **Description.** Runway lighting includes runway edge, threshold, and end lights as well as distance markers.

2.3.35.2. **Requirements Determination.** See **CATCODE 136635**.

2.3.35.3. **Scope Determination.** See **CATCODE 136635**.

2.3.35.4. **Dimensions.** See UFC 3-535-01.

2.3.35.5. **Design Considerations.** See UFC 3-535-01.

2.3.36. **Special Airfield Lighting. FAC: 1362**

CATCODE: 136666
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.36.1. **Description.** This CATCODE applies to any of the three lighting systems described below.

2.3.36.1.1. **Runway Touchdown Zone Lights.** These lights are designed to supplement the conventional runway lights, currently located immediately off the edge of the runway pavement, to facilitate landing under IFR conditions.

2.3.36.1.2. **Runway Centerline Lights (Category II and III).** These lights supplement the runway lights to facilitate both landing and takeoff under IFR conditions. For details of the system, see UFC 3-535-01.

2.3.36.1.3. **Visual Glide Slope Indicator (VASI, PAPI, PLASI) System.** This system enables the pilot to intercept and hold to the proper glide slope, by visual means, during the last portion of his descent. See AFI 32-1044.

2.3.36.2. **Requirements Determination.** See **CATCODE 136635**.

2.3.36.3. **Scope Determination.** See **CATCODE 136635**.

2.3.36.4. **Dimensions.** See UFC 3-535-01.

2.3.36.5. **Design Considerations.** See UFC 3-535-01.

2.3.37. **Taxiway Lighting. FAC: 1361**

CATCODE: 136667
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.37.1. **Description.** Taxiway lighting, including edge, centerline, hold and runway exit lighting, and guidance signs, may be provided for all regularly used taxiways.

2.3.37.2. **Requirements Determination.** See **CATCODE 136635**.

2.3.37.3. **Scope Determination.** See **CATCODE 136635**.

2.3.37.4. **Dimensions.** See UFC 3-535-01.

2.3.37.5. **Design Considerations.** See UFC 3-535-01.

2.3.38. **Airfield Lighting Vault. FAC: 8927**

CATCODE: 136668
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.3.38.1. **Description.** The Airfield Lighting Vault is an above ground facility housing regulators, controls, and other equipment necessary to provide power and control for airfield light systems (e.g., approach lighting system, runway, taxiway, and special lighting).

2.3.38.2. **Requirements Determination.** See **CATCODE 136635**.

2.3.38.3. **Scope Determination.** See **CATCODE 136635**.

2.3.38.4. **Dimensions.** See UFC 3-535-01.

2.3.38.5. **Design Considerations.** See UFC 3-535-01.

2.4. Category Group 14, Land Operational Facilities.

2.4.1. **Airfield Fire and Rescue Station. FAC: 1411**

CATCODE: 141101
OPR: AFCESA/CEXF
OCR: AFCESA/CEO

2.4.1.1. **Description.** See Fire Stations (**CATCODE 730142**), UFC 4-730-10, and UFC 3-260-01.

2.4.1.2. **Requirements Determination.** See **CATCODE 730142**, UFC 4-730-10, and UFC 3-260-01.

2.4.1.3. **Scope Determination.** See **CATCODE 730142**, UFC 4-730-10, and UFC 3-260-01.

2.4.1.4. **Dimensions.** See **CATCODE 730142**, UFC 4-730-10, and UFC 3-260-01.

2.4.1.5. **Design Considerations.** See **CATCODE 730142**, UFC 4-730-10, and UFC 3-260-01.

2.4.2. **Explosive Ordnance Disposal (EOD) Facility. FAC: 1444**

CATCODE: 141165
OPR: AFCESA/CEXD
OCR: AFCESA/CEO

2.4.2.1. **Description.** The EOD facility supports EOD personnel who provide a 24-hour emergency management response capability to aircraft recovery operations, explosive-related incidents, and weapons of mass destruction or other terrorist-related events.

2.4.2.2. **Requirements Determination.** Space requirements are based on individual unit staffing, operations, and tasked equipment and vehicles. Obtain additional information and guidance from MAJCOM. See AFI 32-3001, *Explosive Ordnance Disposal (EOD) Program.*

2.4.2.3. **Scope Determination.** Ensure the EOD facility meets requirements for storage of hazardous and explosive materials, classified information, and firearms according to DoD 6055.9-Std, AFMAN 91-201, and other federal, state, and local laws. Mobility and other unit general purpose vehicles require storage in a secure, covered, and lighted area. The Demolition and Burn Facility (**CATCODE 831173**) requires an EOD proficiency training range.

2.4.2.4. **Dimensions.** See **Table 3.13** for EOD space requirements.

2.4.2.5. **Design Considerations.** See AFI 32-3001 for design guidance and siting information.

2.4.3. **Aircraft Shelter. FAC: 1466**

CATCODE: 141181
OPR: AF/A3O-A
OCR: AF/A4L

2.4.3.1. **Description.**

2.4.3.1.1. **Ready Aircraft Shelter.** This shelter is for fighter or tactical aircraft with an alert commitment.

2.4.3.1.2. **Alert Aircraft Shelter.** This is a shelter for aircraft with an alert commitment to be airborne within prescribed time limits.

2.4.3.2. **Requirements Determination.** Shelters are authorized for 75 percent of unit-equipped aircraft assigned to tactical air defense missions. Shelters needed for tactical aircraft not assigned to air defense are based on individual missions and locations. See UFC 3-260-01 for additional information. Obtain additional guidance from MAJCOM sources.

2.4.3.3. **Scope Determination.**

2.4.3.3.1. **Ready Aircraft Shelter.** This structure has minimal insulation and utilities. Doors are installed front and rear with no specific opening speed. Rear doors are necessary for engine exhaust. These shelters are usually created on existing aprons and are not intended for maintenance purposes. This shelter protects aircraft parked on the apron in a ready condition and during operational checks on electronic equipment. This shelter is necessary to protect equipment from dust, moisture, and high winds.

2.4.3.3.2. **Alert Aircraft Shelter.** Unlike shelters for ready aircraft, shelters for alert aircraft may be insulated and heated. Typically, each site supports up to six aircraft (four on alert and two spares). Each aircraft on alert status should be sheltered in a hangar or hangar substitute, with or without doors, depending on local climate and operational conditions. Spare aircraft are not required to be sheltered unless local climate or other conditions warrant. As a general rule, Air Sovereignty Alert (ASA) facilities north of the 38th parallel should have fully enclosed facilities with shelters for all aircraft, including spares (cold weather location), and facilities south of the 38th parallel may use ramp parking spaces for spare aircraft (hot weather location). Ensure all shelters have minimal insulation and sufficient lighting. At least one of the alert shelters should be fully enclosed, to include doors, to provide an appropriate work

area for aircraft maintenance. Include lightning protection and grounding requirements IAW DoD and service directives for all new facilities to support flight line maintenance activities. Ensure shelter design and siting comply with DoD and service directives safety standards. See *ACC Air Sovereignty Alert Site Template* (August 2008) for further information.

2.4.3.4. **Dimensions.** Shelters are sized based on the aircraft being supported. See **Table 3.2** of this Manual for aircraft separation inside shelters.

2.4.3.5. **Design Considerations.**

2.4.3.5.1. Shelters are intended to be pre-engineered, concrete masonry unit (CMU) block, or tilt-up concrete panel construction. A hybrid design may also be considered. Ensure doors on alert aircraft shelters have fully automatic openers. Ensure doors are power-operated with manual override features at each end of the shelter. Ensure the door operating speed provides full opening within 60 seconds of activation. Provide a minimum of two personnel doors which meet emergency exit criteria per NFPA and Life Safety Codes. All architectural features should be consistent with local base standards and Base Architectural Compatibility Plan. Comply with all local codes for wind, snow, and seismic loads. Refueling operations require a drainage system capable of handling a fuel spill.

2.4.3.5.2. Provide minimal heat (50°F) and ventilation. Provide air compressors and other real property installed equipment (RPIE) and real property similar equipment (RPSE) per local requirements, and limited temporary hazard materials storage and cryogenics (liquid oxygen [LOX], Nitrogen) storage. Each shelter requires an eyewash/shower facility.

2.4.3.5.3. Alert aircraft are considered to be loaded with explosives (loaded) and, therefore, require site planning in accordance with DoD 6055.9-Std and AFMAN 91-201. Site shelters for alert aircraft away from explosive munitions according to the Q-D safety provisions of AFMAN 91-201. Aircraft with forward-firing munitions may need a commander's risk assessment for siting purposes.

2.4.3.5.4. **Electrical.** Provide electrical converters that generate adequate technical power for aircraft maintenance/start-up requirements throughout all hangar/shelter facilities. F-15 and F-16 aircraft require 250Vdc. F-22 and F-35 aircraft require 270Vdc. Provide sufficient lighting to allow minimal flight-line level maintenance and servicing of aircraft. Emergency/back-up generators are needed for shelter door operations as a minimum and should support the entire ASA site. Back-up power should be accomplished by series smaller, load shedding, commercially available generators. Use non-diesel (or dual fuel) generators when possible (propane or natural gas). Include lightning protection IAW DoD and service directives for all new facilities to support flight line level maintenance activities. Refueling operations require provisions for Class 1, Division 1 hazardous locations below floor/grade level 5.

2.4.3.5.5. **Fire-Protection.** Comply with fire protection criteria per NFPA and Life Safety Codes. Ensure permanent, fully enclosed shelters have proper fire/safety equipment, meet National Electrical Code (NEC) and comply with UFC 3-600-1,

ETLs 02-15, *Fire Protection Engineering Criteria - New Aircraft Facilities* and 01-4, *Fire Protection Engineering Criteria – Protective Aircraft Shelters (PAS)*, and NFPA standards in order to support flight line level maintenance activities. Refueling operations require an automatic foam-water fire suppression system.

2.4.4. **Hardened Aircraft Shelters. FAC: 1465**

CATCODE: 141182
OPR: AF/A3O-A
OCR: AF/A4L

2.4.4.1. **Description.** Hardened aircraft shelters provide protective cover for tactical aircraft in high-threat areas.

2.4.4.2. **Requirements Determination.** Site and construct these shelters to meet explosives safety standards of DoD 6055.9-Std and AFMAN 91-201. See UFC 3-260-01 for additional information.

2.4.4.3. **Scope Determination.** Additional space for maintenance functions may be authorized in one or two shelters per squadron. Air Force-directed programs have additional provisions for tank, rack, and pylon storage; weapon storage security system; in-shelter refueling; and pilot telebriefing.

2.4.4.4. **Dimensions.** Hangar size is based on assigned aircraft. First and second generation Tactical Air Base Hardened Aircraft Shelters (TAB-VEES), one aircraft each. Third generation and others may shelter more than one aircraft.

2.4.4.5. **Design Considerations.** The shelter is usually constructed out of steel-lined, 460 mm (18 in) thick Portland cement concrete. Obtain additional information from USAFE/A7 and PACAF/A7.

2.4.5. **Aerospace Pararescue and Recovery Facility (Guardian Angel Rescue Squadron [RQS]). FAC: 2111**

CATCODE: 141185
OPR: ACC/A8R
OCR: N/A

2.4.5.1. **Description.** Facilities are for support of Combat Rescue Officer-led Pararescue/Survival Evasion Resistance Escape (SERE) Specialist units with an operational rescue mission. Facilities operate on a continuous alert status for worldwide deployment of rescue personnel by a wide variety of methods.

2.4.5.2. **Requirements Determination.** Guardian Angel personnel require a facility for continuous alert status, protection of weapon system equipment, and mission training.

2.4.5.3. **Scope Determination.** See **Table 2.14** for space criteria for the Guardian Angel RQS facility. Space requirements are based on a model facility for a 160-person unit. With MAJCOM approval, actual space requirements may be adjusted to accommodate variations in missions, personnel, and equipment.

2.4.5.4. **Dimensions.** The facility consists of two functional areas (operations and warehouse), and miscellaneous areas. See **Table 2.14**.

2.4.5.5. **Design Considerations.** Obtain additional information from MAJCOM sources.

Table 2.15. Guardian Angel Pararescue Space Requirements.

Functional Areas	Net Building Area	
	m2	ft2
Operations (Office)		
Commanders (Type C)1	14	150
CSS (Type F/per person)1	5.9	64
CEM (Type D)1	11	120
CCF (Type D)1	11	120
Safety (Type D)1	11	120
Stan Eval (Type D)1	11	120
Schedule and Training	98	1050
Flight Offices (3 ea/Type D)1	33	360
Flight Room (20 personnel/Type F)1,2	119	1,280
Mass Briefing/Training Room	178	1,917
War Readiness	129	1,393
Intel Vault	186	2,000
DO (Type D)1	11	120
ADO (3 ea/Type E)1	22	240
Operations Super (Type D)1	11	120
Medical Technician	19	208
Flight Surgeon	20	215
Break Room3	43	461
Weapons Vault/Armory	194	2,084
Radio Maintenance	33	350
Technical Order Library3	30	320
Aircrew Flight Equipment	166	1,782
Technical Med Training Room	37	400
Supply Receiving & Storage Area3	223	2,400
Medical Material/Equipment Storage Area	153	1,650
Parachute Maintenance & Storage Area	300	3,225
Parachute Drying Tower (100 ft High)	116	1,250
MFF Build Up Bay	106	1,150
SCUBA Maintenance & Storage Area	177	1,900
Aquatic Simulator4	186	2,000
Warehouse		
Individual Equipment Storage Area (Open Bay Climate Controlled)	1,115	12,000
Watercraft/Bulk Equipment Storage Area	1,115	12,000
Secure Wash rack/Equipment Drying Area	19	200
Covered Storage	372	4,000
Miscellaneous		
Physical Training Area (Climbing tower, etc.)3	84	900

Functional Areas	Net Building Area	
	m2	ft2
Toilet/Showers/Laundry Area	167	1,800
NOTES: 1. See Chapter 6 of this Manual – Table 6.2 and Table 6.2.1 2. Open office space. There are three flight rooms per squadron. 3. See Chapter 6 of this Manual – Table 6.3. Requirement must be validated. 4. Required pool depth is 6 m. Contact OPR for latest design guidance and specifications.		

2.4.6. **Aerial Delivery Facility. FAC: 2184**

CATCODE: 141232
OPR: AF/A3O-A
OCR: N/A

2.4.6.1. **Description.** This is the primary facility supporting an aerial delivery facility or aerial port detachment.

2.4.6.2. **Requirements Determination.** This facility is necessary for training and operations of tactical airlift-support functions.

2.4.6.3. **Scope Determination.** The facility has space for parachute packing and maintenance, rigging of supplies for air drop or extraction, pallet buildup and storage, communications equipment, maintenance classrooms, administration, and storage (including mobility storage). Outside storage space is necessary for parking of special-purpose vehicles and requires adequate turning radii for maneuvering. Related facilities include Air Freight Terminal (**CATCODE 141782**) and Air Passenger Terminal (**CATCODE 141784**).

2.4.6.4. **Dimensions.** An average aerial delivery facility needs 3,100 m^2 (33,400 ft^2) of indoor facilities and 510 m^2 (5,500 ft^2) of open storage area. An average aerial port detachment needs 2,330 m^2 (25,100 ft^2) of indoor facilities and 325 m^2 (3,500 ft^2) of open storage. An aerial delivery facility/port detachment needs a 25 ft x 25 ft x100 ft drying tower attached to the facility.

2.4.6.5. **Design Considerations.** Ensure this facility is near the flight line and provides an unrestricted view of all tactical airlift aircraft on the ramp. Storage facilities may be required for hazardous materials such as ordnance if not available elsewhere. Locate to satisfy explosives safety standards in relationship to other flight line explosives storage and operating facilities.

2.4.7. **Audiovisual Facility. FAC: 1441**

CATCODE: 141383
OPR: AF/A3O-A
OCR: SAF/PA

2.4.7.1. **Description.** This facility provides space for production, filing, and presentation of audiovisual materials, graphic arts, and visual aid products used in training, conferences, briefings, and similar activities.

2.4.7.2. **Requirements Determination.** Audiovisual libraries are governed by AFI 33-117, *Multimedia Management*. Submit additional space requests related to unusual missions to AF/A3O-A through individual MAJCOMs.

2.4.7.3. **Scope Determination.** The audiovisual library provides space for customer service, administration, audiovisual equipment storage, maintenance, training, and a previewing room. The graphic arts facility provides space for an artist or illustrator, work and production, copying, reproduction, composing and lettering, copy camera equipment, supply storage, product display, master art work, reference materials and catalogues, and specialized drafting equipment, tools, and accessories.

2.4.7.4. **Dimensions.** Space requirements are based on **Table 2.16**.

2.4.7.5. **Design Considerations.** Additional electrical utilities may be necessary to provide flexibility in illumination requirements and equipment support.

2.4.8. **Television Production Facility. FAC: 1441**

CATCODE: 141389
OPR: AF/A3O-A
OCR: SAF/PA

2.4.8.1. **Description.** This facility provides a production capability for training, education, managerial, and other programs. It contains a large soundproofed studio, set construction and storage, scenery storage, television cameras, video and audio control booth, video and audio equipment, tape library, movie and slide projection equipment storage, and extensive electronic support and test equipment.

2.4.8.2. **Requirements Determination.** Refer to AFI 35-101, *Public Affairs Policies and Procedures.*

2.4.8.3. **Scope Determination.** Offices are needed for script writers, directors, producers, customer support, and supervision. Also include space for support functions such as graphics, maintenance, and supply storage. Space allocations are shown in **Table 2.16**. The studio may require additional ceiling height to accommodate specialized equipment, sets, or other equipment. Overseas areas with limited commercial television may seek additional space through their MAJCOM.

2.4.8.4. **Dimensions.** See **Table 2.16**.

2.4.8.5. **Design Considerations.** Extensive electrical and electronic support for illumination, equipment, air conditioning, and ventilation may be required. Studio and electrical equipment require extensive air conditioners and ventilation. Special fire detection and suppression equipment may be necessary. Electronic processing of classified materials requires a facility design governed by AFI 33-201, *Communications Security (COMSEC),* and appropriate Air Force/Navy/Army Guide (AFNAG) publications.

Table 2.16. Audiovisual and Television Facility Space Requirements.

Facility	Class	Issues1	Authorized Persons	Net Building Area	
				m2	ft2
Audiovisual Library	A	1,000 to 2,000		210	2,260
	A	750 to 1,000		172	1,850
	B	500 to 750		126	1,360
	B	180 to 500		102	1,100
	C	<180		62	670
Customer Service Areas2				11	120
Graphic Arts	A		1 to 3	60	650
	B		4 to 7	93	1,000
	C		8 to 12	149	1,600
	D		13 or more3	186	2,000
Television Production Facilities4	A		14 to 20	557	6,000
	B		21 to 27	743	8,000
	C		28 to 40	1,115	12,000

NOTES:
1. Issues are the number of film orders, equipment loans, and training classes per month.
2. Customer service areas apply to each facility whether separate or combined.
3. An additional 5.95 m2 (64 ft2) is provided for each graphic specialist or technician in excess of 15 individuals.
4. This is for Television Production Facility, CATCODE 141389. An additional 18.6 m2 (200 ft2) may be authorized for each video film recorded, using high-volume video tape dubbing or duplication or requiring tape-to-film transfer capability.

2.4.9. **Base Operations (Airfield Management, Weather, etc.).**

FAC: 1412
CATCODE: 141453
OPR: AFFSA/A3AS, AFWA/A5/8
OCR: AF/A3O-W, AF/A3O-A

2.4.9.1. **Description.** This facility provides space for numerous functions essential for daily airfield operations and should be located near aircraft parking areas and runways.

2.4.9.2. **Requirements Determination.**

2.4.9.2.1. The airfield management function requires space to support the following functions. (These facilities are authorized under AFI 13-213, *Airfield Management*.)

2.4.9.2.1.1. **Airfield Manager, Deputy/NCOIC, and Administration Staff Offices.** The Airfield Manager's office should be suitable to hold daily meetings with a number of contractors. The office should be able to hold a small conference table that can also be used for conducting airfield design reviews, waiver validations, etc. This office should be of sufficient size to hold numerous airfield construction/design plans in storage as required by AFI 13-213. Refer to **Chapter 6** of this Manual for approved office types and sizes.

2.4.9.2.1.2. **Airfield Management (AM) Operations (AMOPS) Section.** This section is the focal point for coordinating AM activities to include airfield construction and repair projects, apron, taxiway and runway closures, quiet hours, prior permission required/official business only requests, snow/ice removal operations, and aircraft in-flight/ground emergencies. AMOPS sections also provide flight planning assistance to aircrews.

2.4.9.2.1.3. **Airfield Management Drivers Training Classroom.** This classroom should be suitable for conducting local airfield drivers training and/or simulator training. Refer to **Chapter 6** for authorized classroom space standards.

2.4.9.2.1.4. **Planning Room.** Locate this room near the AMOPS but separate it from other work areas for aircrew to conduct mission planning briefings, review airfield status displays, charts/maps, etc.

2.4.9.2.1.5. **Aircrew Lounge.** A separate section suitable for aircrews awaiting aircraft servicing, passenger or cargo on/off load, etc., is necessary. A distinguished visitor lounge and snack bar may also be necessary if not located in the vicinity of base operations. Refer to **Chapter 6** for authorized break room/lounge space standards.

2.4.9.2.1.6. **Equipment Storage Room.** Include space for an outside storage area for storage of AM equipment, such as airfield friction measuring equipment, Bird Aircraft Strike Hazard(BASH)/wildlife program support equipment and airfield construction marking equipment (cones, measuring wheels, tape, construction Xs, portable lights, etc.).

2.4.9.2.1.7. **Flight Information Publications (FLIP) Storage Room/Navigational Services.**

2.4.9.2.1.8. **Emergency Power/Back-up Generator Room.**

2.4.9.2.1.9. **Munitions Storage Room.** It should be in close proximity to the AMOPS and capable of storing munitions and pyrotechnics such as a shotgun, Very pistol, shotgun shells, etc.

2.4.9.2.1.10. **Break Room.** See **Chapter 6**, **Table 6.3** for typical special purpose space requirements.

2.4.9.2.2. The weather operations function requires space for three elements (in some instances, all or some of these functions may be performed under a combined element).

2.4.9.2.2.1. **Staff Weather Element.** The Weather Flight (WF) Commander (or Officer-in-Charge [OIC] or Detachment Commander [DetCo]) (Type C office)

and Non-Commissioned OIC (NCOIC) (Type E office) perform both operational and staff weather functions. This requires work space for the New-Tactical Forecast System (N-TFS) or Joint Environmental Toolkit (JET), which includes communications/data management, one to two server/client workstations, and one to two desktop computers (Type F office). Refer to **Chapter 6** of this Manual for approved office types and sizes.

2.4.9.2.2.2. **Mission Weather Element (MWE).** This element requires work space for the N-TFS or JET, which includes communications/data management; two to four server/client workstations; weather radar (WSR-88D) Open Principal User Processor Terminal (some MWE also have a Unit Control Position); desktop computers for receipt and display of satellite and radar data; and an aircrew briefing area and office space for the flight commander (Type D office), instructor meteorologist (Type E office), and NCOIC (Type E office).

2.4.9.2.2.3. **Airfield Services Element (ASE).** This element is responsible for direct interface with supervisors of flying, the servicing operational weather squadron (OWS), and other operational users on the parent/host installation. This element requires work space for the N-TFS or JET, which includes communications/data management; two to four server/client workstations; weather radar (WSR-88D) Open Principal User Processor Terminal (some ASEs also have a Unit Control Position); desktop computers for receipt and display of satellite and radar data; and an aircrew briefing area and office space for the flight commander (Type D office), instructor meteorologist (Type E office), and NCOIC (Type E office).

2.4.9.3. **Scope Determination.** See **Table 2.17** below.

2.4.9.4. **Dimensions.** See **Table 2.17** below.

2.4.9.5. **Design Considerations.**

2.4.9.5.1. The Air Traffic Control Tower (**CATCODE 141962**) may be in the same building. This is highly desirable for economy of effort and improved communication. Locate to satisfy explosives safety standards in relationship to other flight line explosives storage and operating facilities.

2.4.9.5.2. In accordance with AFMAN 15-111, *Surface Weather Observations*, ensure Weather technicians, unless otherwise specified, are physically within five statute miles (SM) of the center of the aerodrome. Additionally, for meteorological observations, the observing location is defined as the "point of observation." Points of observation are locations where the various elements of the observation are evaluated (see AFMAN 15-111). At automated weather observing locations, the point of observation is the location of the primary sensor group and the discontinuity sensor group. However, at manual observing locations and during augmentation of automated weather observations, the point of observation may coincide with the weather observing location. If this is the case, the normal operating location is in Base Operations (**CATCODE 141453**) or another suitable facility which provides consistent visually determined values. Either location should be as free from man-made obstructions as possible. Generally, locations with windows facing the runway

complex that provide direct access to a view of the runway and approach zones and have appropriate safety features satisfy this requirement. Weather observing locations in base operations are normally combined with the base weather station for cost efficiency. ***NOTE:*** The Federal Interdepartmental Committee for Meteorological Services, Subcommittee for Aviation Meteorological Service (SC/AMS) defines the ideal site for representative weather observations for aircraft arrivals and departures.

2.4.9.5.3. Locate to satisfy explosives safety standards in relationship to other flight line explosives storage and operating facilities. Noise attenuation measures are necessary due to the proximity of this facility to the runway. Factors to consider in site selection are climatology, available structures, length of weather equipment cable runs, and communications requirements

2.4.9.5.4. Obtain further information from Air Force Flight Standards Agency, Director of Airfield/ATC Standards (AFFSA/A3A). Obtain further information for weather forecasting and observation information portion of base operations through AFWA/A5/8 or MAJCOM A3 weather staff.

2.4.9.5.5. Underground connectivity to weather sensing equipment (on and off the airfield) supporting the airfield, Non-Secure Internet Protocol Router Network (NIPRNet) connections to the Global Information Grid (GIG) and weather observing equipment, Worldwide Class A DSN/land line connections, and direct/dedicated phone lines to air traffic control facilities supporting the installation.

2.4.9.5.6. The requirement for emergency power is determined under AFI 32-1063. Provide stable electrical power 220 VAC and 110 VAC/60 Hz with backup power capability.

Table 2.17. Base Operations Space Requirements (Airfield Management, Weather, etc).

Function Area	Net Building Area	
	m2	ft2
Airfield Manager (Type D)	11.15	120
Deputy/NCOIC Airfield Mgmt (Type E)	7.43	80
Administration1,2 (Type F)	5.95/person	64/person
Airfield Mgmt Operations Section1,2	--	--
Airfield Mgmt Drivers Training Classroom1,2	--	--
Flight Planning Room	39	425
Aircrew Lounge1,2	--	--
Storage	22	247
FLIP Room/Navigation Services	93	1,000
Emergency Power/Back-up Generator	8	93
Equipment	8	93
Munitions Storage Room	8	93
Break Room/Area1,2	7.43	80
Staff Weather Element1,2,3,4 (Type E)	7.43	80
Mission Services Weather Element1,2,3,44 (Type E)	7.43	80
Airfield Service Element1,2,3,4 (Type E)	7.43	80

Function Area	Net Building Area	
	m2	ft2
Weather NCOIC1,3 (Type E)	7.43	80
Weather CC (WF, OIC & Det)/Meteorologist1,3 (Type D)	11.15	120
NOTES: 1. Refer to Chapter 6 of this Manual for approved office types and sizes. 2. Number of personnel requires user justification. 3. No space requirement formulas or tables have been developed for weather operations. Space requirements vary with the number of personnel, the mission, and any special requirements. This also applies to Battlefield Weather organizations (not Battlefield Weather Squadron headquarters) on Army installations (for each brigade combat team [BCT] or equivalent), on Army airfields, or supporting Army corps, division, brigade, and regiment headquarters functions. 4. Additional space may be needed for more than one staff meteorologist, flight commander, or flight NCOIC on USAF and Army installations. 5. For AMC bases, add the Intelligence space requirements into the Base Operations.		

2.4.10. **Ordnance Control Point. FAC: 1444**

CATCODE: 141455
OPR: AF/A4MW
OCR: N/A

2.4.10.1. **Description.** This facility provides space for one or two people with appropriate equipment for munitions movement control.

2.4.10.2. **Requirements Determination.** This facility is necessary only at installations that expend ordnance in such large quantities that a control point is needed close to the flight line. The facility should be programmed only if the magnitude, nature, and diversity of ordnance handling justify it and if other facilities cannot provide the required space.

2.4.10.3. **Scope Determination.** This facility should be near a roadway used for moving munitions. It is normally adjacent to a paved area which can be used as a staging area. A view of most of the flight line is also highly desirable.

2.4.10.4. **Dimensions.** This facility is 251 m^2 (2,700 ft^2).

2.4.10.5. **Design Considerations.** Locate facility to comply with explosive safety standards. Provide lightning protection except when it would interfere with safety of flight operations. An electrical grounding system may be required as determined by the using organization.

2.4.11. **Air Force Intelligence, Surveillance and Reconnaissance Agency (AFISRA) Operations Facility. FAC: 1444**

CATCODE: 141456
OPR: AFISRA
OCR: AF/A2, AF/A5RI

2.4.11.1. **Description.** These facilities support Air Intelligence Agency operations. Sensitive Compartmented Information Facility (SCIF) and non-SCIF facilities are for

operations, administrative functions, maintenance functions, communications centers, and security measures.

2.4.11.2. **Requirements Determination.** The size and type of the facility is based on mission security requirements. Contact AFISRA for specific guidance.

2.4.11.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

2.4.11.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.4.11.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.4.12. **Crew Readiness. FAC: 1412**

CATCODE: 141459
OPR: AF/A3O-A
OCR: N/A

2.4.12.1. **Description.** This facility provides space for operations, crew quarters, and recreation for strategic bomber and tanker forces.

2.4.12.2. **Requirements Determination.**

2.4.12.2.1. **Strategic Bomber and Tanker Alert Crew Facilities.** Air alert crews and supporting ground crews are on duty from 24 to 168 hours. The facility needs a separate room for operational support so that operational materials can remain ready for use in a room that can be secured when not in use. Operational areas include administrative, operational study and mission planning areas, a projection room, and a briefing room. Crew quarters include sleep and study rooms, bathrooms, laundry, lounge, kitchen, and dining rooms. Recreational space includes a library and a hobby, exercise, and game room.

2.4.12.2.2. **Tactical Air Defense Forces and High-Threat Area.** Tactical air defense crews are on duty 24 to 48 hours. Tactical air defense facilities in high-threat areas include operational areas (if the crew exceeds six persons), crew quarters, and recreational space. Operational functional requirements are determined by MAJCOM/A3O-A. Crew quarters include sleep, study, kitchen, dining, and bathroom facilities. Recreational space includes only a lounge and game room. Site crew facilities near alert aircraft so that crews can be airborne within the required time after the scramble order.

2.4.12.3. **Scope Determination.**

2.4.12.3.1. **Table 2 18** shows space requirements for strategic bomber and tanker alert crews in net square feet based on three crew sizes: small crews (fewer than 50 personnel), medium crews (50 to 80), and large crews (more than 80). Net floor area is defined in **Chapter 1** of this Manual. Central bathrooms in crew quarters have a separate net area.

2.4.12.3.2. Space requirements for air defense or high-threat areas are provided for four to six crew members, male and female. Each member has a private sleeping and study room. The kitchen/dining room may be omitted if other dining facilities are available.

2.4.12.3.3. Compatible component areas may be combined into one or more multi-purpose rooms to reduce space requirements.

2.4.12.4. **Dimensions.** See **Table 2.18**.

2.4.12.5. **Design Considerations.** Crew readiness facilities are conventionally constructed; blast hardening is not required for CONUS locations. Hardened structures are authorized for high-threat areas. Because these facilities are close to the flight line, noise attenuation measures and fuel vapor and exhaust filtration are necessary. Utility systems should include sufficient redundancy to stay operational 24 hours per day, during equipment maintenance and contingencies. Locate facility to comply with explosive safety standards. Obtain further guidance through MAJCOM/A3O/A7.

Table 2.18. Alert Crew Facility Space Requirements.

Function1	Net Building Area					
	Small Crew (< 50)		Medium Crew (50 to 80)		Large Crew (> 80)	
	m2	ft2	m2	ft2	m2	ft2
Strategic Bomber and Tanker Forces						
Operational						
Administrative2,3 (Type F)	5.95/ person	64/ person	5.95/ person	64/ person	5.95/ person	64/ person
Operational Study	19	200	19	200	19	200
Mission Planning4	19	200	37.2	400	55.8	600
Project Room	9	100	13.9	150	18.6	200
Briefing5	1.9	20	1.9	20	1.9	20
Crew Quarters						
Lounge5,6	1.9	20	1.9	20	1.9	20
Kitchen/Dining7,8	279	3,000	362	3,900	502	5,400
Recreational						
Library3	9	100	9	100	19	200
Hobby3	19	200	37	400	56	600
Exercise3	28	300	28	300	28	300
Game Room3	1.4	15	1.4	15	1.4	15
Tactical Air Defense Forces and High-Threat Areas						
Operational (if more than 6 persons)	Determined on an individual basis					
Crew Quarters						
Sleep/Study Rooms5	9.3	100	N/A		N/A	
Kitchen Dining9	33	350	N/A		N/A	
Bathroom (total)2	14	150	N/A		N/A	
Recreational3						
Lounge6	22	240	N/A		N/A	
Game Room3	30	320	N/A		N/A	

Function1	Net Building Area					
	Small Crew (< 50)		Medium Crew (50 to 80)		Large Crew (> 80)	
	m2	ft2	m2	ft2	m2	ft2

NOTES:
1. In remodeled existing facilities, a private room of 9.3 m2 (100 ft2) of net area should be provided for each crew member. Where this is not possible, some or all of the sleep/study rooms may be 18.6 m2 (200 ft2), double-occupancy rooms. A semi-private bathroom may be provided between two double-occupancy rooms. (Sleep/study rooms for more than two crew members are not allowed.) Provide each crew member assigned to a double-occupancy room 3.7 m2 (40 ft2) of net area of additional study space. This additional space may be provided in a multi-purpose room.
2. See Chapter 6 of this Manual for approved office types and sizes.
3. Number of personnel/or validity of requirement require user justification.
4. Room size increases according to the number of four-person tables.
5. This is on a per-person basis.
6. Lounge space is designed for six crew members. An additional 0.5 m2 (5 ft2) may be added to lounge space for every additional crew member.
7. The dining area allowance is based on the number of chairs needed to accommodate 1.8 times the personnel of small crews, 1.6 times the personnel of medium sized crews, and 1.4 times the personnel of large crews.
8. Kitchen and dining room may be omitted if existing base dining facilities are nearby. Recreational components may be omitted when existing base facilities are close enough that crew members using the facilities can respond to alerts within the given time limits.
9. Provide one water closet for every three persons and one shower and one lavatory for every five persons. Laundry space is included in the 0.8 m2 (9 ft2) per person allowance.

2.4.13. **USAF Command Post. FAC: 1412**

CATCODE: 141461
OPR: AF/A3O-AO
OCR: AFCESA/CEO

2.4.13.1. **Description.** Command posts are the focal point for emergency action, flight following, and operational reporting functions. They may include weather, intelligence, communications, and staff offices.

2.4.13.2. **Requirements Determination.** The facility is authorized under AFI 10-207, *Command Posts*. It is intended to promote maximum efficiency in resource control and management by consolidating command and control elements of all units. Relocating individual functions such as weather, intelligence, communications, and staff offices to one of these facilities should be justified in terms of efficiency and economy. Obtain further guidance through MAJCOM/A3O/A7.

2.4.13.3. **Scope Determination.** Space requirements are determined by the number of building occupants and the size and number of special purpose rooms. Space criteria for administrative facilities apply. Command posts may include space for base operations, maintenance training, maintenance analysis, quality control, records storage, and appropriate functions.

2.4.13.3.1. **High-threat areas.** Storage space should be allocated for chemical and biological filtering equipment, food and water, chemical detection equipment, mobility equipment, chemical-warfare defense ensembles, pressurized air locks, and other shelter-essential equipment in high-threat areas.

2.4.13.3.2. **Headquarters (MAJCOM) and Wing Command Posts.** Provide space for entry control point personnel.

2.4.13.3.3. Components of the USAF command post are not reported under **CATCODE 141461** unless they are in the USAF command post. For example, intelligence offices located in the Group Headquarters (**CATCODE 610243**), and weather offices located in Base Operations (**CATCODE 141453**) are not reported under **CATCODE 141461**.

2.4.13.4. **Dimensions.** Refer to **Chapter 6** of this Manual for office and special purpose space standards.

2.4.13.5. **Design Considerations.** An uninterruptible power supply (UPS) is necessary to maintain operational capability. Semi-hardened, splinter-protected, and hardened construction criteria may apply.

2.4.14. **Squadron Operations. FAC: 1412**

CATCODE: 141753
OPR: AF/A3O-A
OCR: N/A

2.4.14.1. **Description.** This building is a main control point for all unit flight and flying training tasks including planning, briefing, administration, and critique of combat crews. The Squadron Operations provides an organized operation facility for each flying squadron to carry out its mission.

2.4.14.2. **Requirements Determination.** Each squadron needs an operational building for administration, scheduling, training, briefing, personal equipment maintenance, and storage for aircrews. High-threat areas require additional design considerations to ensure facility and personnel survivability during hostile events. The North Atlantic Treaty Organization (NATO) may have additional criteria for tactical and transport airfields. Submit projects for unlisted missions, squadron types, or additional space requirements through the MAJCOM/A3/A7 to AF/A3O-A.

2.4.14.3. **Scope Determination.** Provide space for the commander and staff. Crew training records are prepared and updated with other required squadron records. Space is required for aircrew flight equipment systems maintenance and the care, storage, and issue of flying clothing and equipment for each crew member. Equipment includes parachutes, survival kits, life rafts, anti-exposure suits, arctic clothing, life preservers, transceiver radios, mobility equipment, helmets, and oxygen masks. Space is necessary for an operations officer to direct flight operations and also for intelligence, mission planning, computers, radar and navigation, cruise control, photos and maps, briefing room, locker area, and radio and electronic countermeasures.

2.4.14.3.1. **Aircrew Flight Equipment Shop.** This shop works on parachutes, flotation equipment, and the repair and manufacture of fabric items. Flotation

equipment includes life rafts, life preservers, and emergency escape slides carried aboard aircraft that may make over water flights. Facility provides space for parachute inspection, packing, washing, drying, repair, chemical cleaning and fabrication. It also provides space for survival/flotation equipment storage (if required), inspection, inflation, and repacking.

2.4.14.3.1.1. Provide space for parachutes and flotation equipment that are periodically inflated, inspected, and repacked and where survival items and accessories are concurrently inspected.

2.4.14.3.1.2. A large room equipped with long tables for inspecting and repacking parachutes is the core of the survival equipment shop. The number of tables needed largely determines the space requirement for the shop (see **Table 2.20**). Provide the following spaces:

2.4.14.3.1.2.1. Personnel parachute inspection and packing room;

2.4.14.3.1.2.2. Deceleration/Drone parachute inspection and packing room (if required);

2.4.14.3.1.2.3. Parachute washing room and drying tower;

2.4.14.3.1.2.4. Sewing room with space for repair and manufacture of fabric, canvas, leather survival equipment, and locally manufactured products;

2.4.14.3.1.2.5. Storage areas for survival equipment and flotation equipment (if required);

2.4.14.3.1.2.6. Flotation room for inspection, inflation, and repacking of rubberized survival equipment and accessories; and

2.4.14.3.1.2.7. Chemical use room for cleaning parachute components, repairing anti-exposure suites, and gluing rubberized items. Ensure hazardous materials storage complies with local, state and federal requirements and other guidance as defined in **Chapter 3**, **paragraph 1.3.1** and **1.8.6**.

2.4.14.3.2. **Search and Rescue.**

2.4.14.3.2.1. Search and Rescue Aircrew professional gear consists of cold/hot weather clothing, publications, checklists, protective gloves, preflight equipment, rain gear, spare boots, uniforms, etc. Spatial requirements for storage of this equipment are 40 square feet per aircrew member assigned. (***EXAMPLE:*** 20 PAI unit @1.5 crew ratio = 150 aircrew members x 40 sf^2 = 6,000 ft^2 total ([20x(1.5x5)=150 150x40=6,000]). See **Table 2.21**.

2.4.14.3.2.2. Search and Rescue Aircrew Alternate Insertion and Extraction (AIE) Equipment Storage, Cleaning, Rinsing, Inspection, and Drying (SCRID) requires 300 ft^2 covered area to clean; rinse, inspect, and "flat dry" recently utilized equipment. Ensure the area is able to house at least two industrial wash basins, and two 10-foot long tables for flat drying recently rinsed equipment. See **Table 2.21**.

2.4.14.4. **Dimensions.** **Table 2.19** lists space requirements for squadron operations. See **Table 2.19** and **2.20** for centralized aircrew flight equipment space requirements and **Table 2.21** for Search and Rescue space requirements. Additional space may be authorized in high-threat areas for chemical and biological filters in the mechanical room, donning and doffing areas in air locks, chemical warfare defense ensemble (CWDE), and aircrew ensemble locker rooms, crew quarters, and subsistence supplies.

2.4.14.5. **Design Considerations.**

2.4.14.5.1. Locate to satisfy explosives safety standards in relationship to other flight line explosives storage and operating facilities. Special Q-D standards apply to hardened facilities; see AFMAN 91-201.

2.4.14.5.2. Buildings used by fighter squadrons and fighter interceptor squadrons require special construction for storage areas used for personnel parachutes packed with ballistic deployment devices. Ensure these storage areas meet the requirements of AFI 31-101 for non-nuclear munitions. These requirements include masonry walls, steel doors, and heavy screening on door grills, windows, and duct openings.

2.4.14.5.3. Design buildings in high-threat areas to operate during hostile events. Special design considerations may be necessary such as hardening exterior walls, chemical warfare filtration, over-pressurization, and additional storage space.

Table 2.19. Space Requirements for Squadron Operations.

MISSION	Gross Area1,2,3	
	m2	ft2
Fighter, Tactical Bomber	1,230	13,260
Air Rescue, Aerial Tracking	539	5,800
Tactical Airlift (C-130E)	2370	25,500
Tactical Fighter (24 PAA)4	1,300	14,000
Airlift	2,010	21,636
Missile Squadrons5	See Note 5	
Special Operations Squadrons6	1,858	20,000
Combat Search and Rescue Helicopter Unit (15PAA)6	2,601	28,000
Combat Search and Rescue Refuel/Tanker Unit (9PAA)6	1,858	20,000
Guardian Angel Rescue Squadron	5,574	60,000
Heavy Bomber (16 PAA)	1,200	12,900
Tanker	2,740	29,513
Airborne Early Warning, Weather Recon	780	8,400
Subsistence Supplies	37	400
Chemical Warfare Filters (Mechanical Room)	46	500
Mobility Storage	37	400
Airlocks/Donning & Doffing (each)	70	750
Logistics Support	1,200	12,900
High-Threat Area Additives:		
Crew Quarters (in banks)	56	600

MISSION	Gross Area1,2,3	
	m2	ft2

NOTES:
1. Gross area for training squadrons varies due to size and mission. Consult AETC for definitive guidance.
2. Gross floor credit for semi-hardening is 20% of gross area.
3. Refer to Chapter 6 of this Manual for approved office types and sizes.
4. Based on previously defined space F-16 (18 PAA) and F-15 (PAA) Fighter aircraft requirements.
5. Criteria are developed between MAJCOM and AF/A3O-A or on an individual basis.
6. Space is determined by individual analysis and validated by the appropriate MAJCOM.

Table 2.20. Centralized Aircrew Flight Equipment Requirements.

Area Names	Net Building Area									
	2 Squadrons		3 Squadrons		4 Squadrons		5 Squadrons		6 Squadrons	
	m2	ft2	m2	ft2	m2	ft2	m2	ft2	m2	ft2
Wing Aircrew Flight Equipment Office1,2	--	--	--	--	--	--	--	--	--	--
Aircrew Training2	149	1,600	149	1,600	149	1,600	149	1,600	149	1,600
Centralized Aircrew Flight Equipment Shop	840	9,040	968	10,420	1,096	11,800	1,224	13,180	1,353	14,560
Support Areas	230	2,480	261	2,810	296	3,190	326	3,505	353	3,795
Associate Reserve Requirements 3	325	3,500	372	4,000	418	4,500	465	5,000	511	5,500

NOTES:
1. Number of personnel requires user justification.
2. Refer to Chapter 6 of this Manual for approved office types and sizes.
3. Associate reserve squadron requirements include space for storage and support areas.

Table 2.21. Additional Space Requirements for Aircrew Flight Equipment with Former Survival Equipment Function.

Number of Tables		Gross Area1			
Personnel Parachutes2	Deceleration Parachutes3	With Flotation Equipment		Without Flotation Equipment	
		m2	ft2	m2	ft2
2	1	663	7,135	563	6,065
5	2	1,070	11,510	874	9,410
9	5	1,650	17,783	1,400	15,045

NOTES:

1. Space needs for units supporting aircrew flight equipment differ depending on mobility requirements. Consider whether a unit has full, partial, or no mobility requirements in determining equipment storage and servicing needs.

2. Determine the number of tables for a single unit shop (or for each unit in a multi-unit shop). Justify space allowances for personnel parachutes not based on the following equation:

$$\text{Number of tables for personnel parachutes} = \frac{\text{Number of personnel parachutes on base} \times 3}{88 \text{ work days per IPI} \times 8 \text{ hours per day}}$$

Where:

4 = The average number of hours required to inspect and repack each ACES II personnel parachute.

IPI = The inspection and repacking interval -120 days.

If supporting Combat Controllers or Pararescue, add 65 m2 (700 ft2) per table to the gross area for the square parachute packing table.

3. Space allowances for deceleration parachutes is based on the following equation:

$$\text{Number of tables for deceleration parachutes} = \frac{\text{Number of deceleration parachutes used per month} \times 1.02}{22 \text{ work days per month} \times 8 \text{ hours per day}}$$

Where:

The number of deceleration parachutes used per month = the base average for a 6 month period, extrapolated to the end position time period.

1.02 = a factor to compensate for alerts, generations, other exercises, and for deceleration parachutes returned wet or repacked more than 60 days ago.

If supporting B-52 deceleration chutes, add 64 m2 (688 ft2) per table to the gross area to support the 27.4 m (90 ft) long packing table.

If supporting Drones, add 161 m2 (1,731 ft2) per table to the gross area to support the 53.9 m (177 ft) long packing table.

Table 2.22. Additional Search and Rescue Space Requirements.

Area Names	Net Building Area			
	Search and Rescue Helicopters (15 PAA)		Search and Rescue HC-130 (9 PAA)	
	m2	ft2	m2	ft2
SAR Professional Gear Storage1,2	551	5,940	198	2,138
Aircrew Alternate Insertion Extraction gear storage1,2	133	1,440	74	800

NOTES:
1. Helicopter method computed: 39.6 ft2/member. Example:
7.5 crew members per PAI unit, @15PAA = 150 aircrew members x 39.6 ft2 = 5940 ft2 total.
2. HC-130 method computed: 39.6 ft2/member. Example:
6 crew members per PAI unit, @ 9PAA = 54 aircrew members x 39.6 ft2= 2138 ft2 total.

2.4.15. **Weather Facilities.**

2.4.15.1. **General.** Weather operations are supported by two types of facilities. Operational buildings (or building space) in Category Group 141 are necessary to provide an observing site. Operational structures in Category Group 149 consist of installed equipment and supporting structures.

2.4.16. **Surface Weather Observing Facility. FAC: 1412**

CATCODE: 141629
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.16.1. **Description.** An observing site is a designated location on an airfield where weather elements are observed and reported.

2.4.16.2. **Requirements Determination.**

2.4.16.2.1. The Federal Interdepartmental Committee for Meteorological Services, Subcommittee for Aviation Meteorological Services (SC/AMS) established standards for observing sites to ensure representative weather observations for aircraft arrivals and departures. The ideal site is at the airport reference point, the geometric center of the airport landing area. An observing site should be as close to the airport reference point as possible and, except in unusual cases, no more than 3.2 km (2 mi) away. The observing site should allow appropriate exposure of observing sensors and visual observation of weather elements that affect the airfield. Site selection considerations include climatology, available structures, length of weather-equipment cable runs, and communications requirements.

2.4.16.2.2. At airfields requiring continuous weather observations, the observing site is classified as a representative observation site (ROS) and staffed by an observer dedicated to that task alone. The ROS may be in an existing Air Traffic Control Tower (**CATCODE 149962**) or in a separate building or existing building space

identified as a Surface Weather Observing Facility (**CATCODE 141629**). The ROS should provide an unrestricted view of the most frequently used runway and its approaches and at least half of each quadrant of the natural horizon.

2.4.16.2.3. At airfields that do not require continuous weather observations, the observing site is normally located in Base Operations (**CATCODE 141453**) or in another existing building designated as a Surface Weather Observing Facility (**CATCODE 141629**). In both locations, ensure windows face the runway complex, and the observer has direct access to a point that provides a view of the runway and approach zones. The observing point or platform and its access should have appropriate safety features. Base operations sites incorporated with the base weather station are the most cost-effective.

2.4.16.3. Scope Determination.

2.4.16.3.1. **Functional Requirements.** Space for an observing site includes an observers' work area; installed weather communications equipment to compute, display, and record weather data; weather equipment maintenance; and supplies.

2.4.16.3.2. **Spatial Requirements.** Space requirements vary according to local operational requirements. An ROS requires a space at least 6.1 m x 6.1 m (20 ft x 20 ft). In the control tower, the ROS may share space in the tower cab or occupy a room on a lower floor. (See Air Traffic Control Tower, **CATCODE 149962**).

2.4.16.4. **Dimensions.** See **paragraph 2.4.16.3** above.

2.4.16.5. **Design Considerations.**

2.4.16.5.1. Requires 220 VAC/115 VAC, 60 Hz service with backup power and UPS. See AFI 32-1063.

2.4.16.5.2. Provide connectivity with on- and off-base weather sensors; base LAN connectivity to the GIG and connected weather sensors; dedicated land lines to base operations; air traffic control facilities; and a DSN Class A worldwide phone line.

2.4.17. **Operational Weather Squadron (New Requirement). FAC: 1444**

RPCS: 141XX1
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.17.1. **Description.** This facility provides space for command, 24-hour war fighter reach back operations, planning, and training for Operational Weather Squadrons (OWS).

2.4.17.2. **Requirements Determination.** PAD 97-10 drove the stand-up of OWSs worldwide. These squadrons provide airfield aviation forecasts; weather watches, warnings, and advisories; and flight weather briefings to all Air Force and Army locations in their area of responsibility. Space for administration, weather operations, and forecasting areas are needed for the New Tactical Forecast System (NTFS), which includes Communications/Data management, Weather Station Terminals, and Staff Weather Officer Terminals; Weather Radar (WSR-88D) Open Principal User Processor Terminal (some weather stations should also have a Unit Control Position); desktop computers for receipt and display of satellite and radar data; and spatial requirements as

outlined below. Obtain further information through AFWA/A5/8 or MAJCOM A3 weather staff.

2.4.17.3. **Scope Determination.** **Table 2.23** lists space requirements for OWS operations. Space is needed for a command section, operations management, operations areas, information systems and management, training classrooms, storage space for hazardous materials (HAZMAT), locker/shower rooms, multi-purpose room, fitness facilities, and supplies. Operations are 24 hours per day, 7 days per week, and training includes management and upgrade of new personnel accessions.

2.4.17.4. **Dimensions.** See **Table 2.23**.

2.4.17.5. **Design Considerations.**

2.4.17.5.1. Requires 220 VAC/115 VAC, 60 Hz service with backup power and UPS. See AFI 32-1063.

2.4.17.5.2. Provide connectivity with on- and off-base weather sensors; base LAN connectivity to the GIG and connected weather sensors; dedicated land lines to base operations; air traffic control facilities; and a DSN Class A worldwide phone line.

2.4.17.5.3. Locate to satisfy explosives safety standards in relationship to other explosives storage and operating facilities. Noise attenuation measures are necessary if located in close proximity to runway(s) or industrial area(s).

Table 2.23. Operational Weather Squadron Space Requirements.

	Small Sq (~ 75)		Large Sq (~ 200)	
Offices	Office Type (see Tables 6.3/6.4)	Qty	Office Type (see Tables 6.3/6.4)	Qty
Commander	C	1	C	1
Superintendent	D	1	D	1
First Sergeant	D	1	D	1
Director of Operations	D	1	D	1
Operations Superintendent	D	1	D	1
Flight CC/NCOIC	D	5	D	10
System Management Personnel	F	4	F	8
Operations Center	F	12	F	30
Information Management/Client Support Administrators	F	Varies	F	Varies
Administration Support	see Tables 6.3/6.4		see Tables 6.3/6.4	
Special Purpose Spaces	m2	ft2	m2	ft2
Lobby	User justified		User justified	
Training Laboratory	User justified		User justified	
Classified Processing Area	User justified		User justified	
Training Classrooms (3 each)	Table 6.4		Table 6.4	
Conference Room	Table 6.4		Table 6.4	
Multi-purpose room	93	1,250	279	3,000
Break Room	see Table 6.3		see Table 6.3	

	Small Sq (~ 75)		Large Sq (~ 200)	
Fitness Area, Showers, and Lockers1,2	58	620	153	1,650
Supply room	19	200	38	400
Information System Server Room	37	400	74	800
Individual Combat Equipment Storage room3	59	638	158	1,700
Utility/Garage Space	37	400	74	800
CCI and Equipment Maintenance Room	19	200	28	300
Exterior Areas				
HAZMAT Storage	9	100	18	200
Antennae Farm	46	500	93	1,000
Squadron Pavilion1	74	800	149	1,600
NOTES: 1. User justified. 2. Based on 25 ft2 /per person allowance. Plan space for assumed 33% of population. 3. 10 ft2 secure storage cage for each person. Plan space for assumed 85% manning.				

2.4.18. **Battlefield Weather Squadron (New Requirement). FAC: 1444**

RPCS: 141XX2
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.18.1. **Description.**

2.4.18.1.1. The Battlefield Weather (BW) squadron provides space for command, operations, planning, training, and maintenance (equipment and vehicle) activities, as well an armory for Battlefield Weather forces supporting modular Army operations.

2.4.18.1.2. The BW detachment provides operational, administrative, maintenance, and storage space for BW organizations below squadron level. The term “detachment” refers to any below-squadron BW organization. This can include, but is not limited to, BW detachments, operating locations, and liaison offices operating on Army installations.

2.4.18.2. **Requirements Determination.** Obtain further information through AFWA/A5/8 or MAJCOM A3 weather staff.

2.4.18.2.1. PAD 06-05, Tactical Air Control Party (TACP), Air Support Operations Center (ASOC), and BW Integration with the Modular Army drove the stand-up of BW squadrons on Army installations. The facility should be programmed if the Army cannot fulfill their required facility obligations per AFJI 15-157, *Weather Support for the US Army*. Allocate space for the NTFS, which includes Communications/Data management, Weather Station Terminals, and Staff Weather Officer Terminals; Weather Radar (WSR88D) –Open Principal User Processor Terminal (some weather stations also have a Unit Control Position); desktop computers for receipt and display of satellite and radar data; and spatial requirements as outlined below.

2.4.18.2.2. The BW detachment requirements are based on the number of personnel assigned to the organization and the span of their operational responsibility. Though the guidance listed in **Table 2.24.1** falls into two categories, small (~15 personnel) and large (~25 personnel), modify/assess specific space requirements for portions of the structures to accommodate actual manning as noted.

2.4.18.3. **Scope Determination.** **Table 2.24** lists space requirements for BW squadron operations. **Table 2.24.1** provides space requirements for BW detachment operations. Space is required for a command section, operations management, operations areas, training classrooms, multipurpose/seminar, storage for CWDE, individual combat equipment, HAZMAT, CCI, tactical meteorological equipment, combat support equipment, subsistence supplies, weapons, locker/shower rooms, fitness facilities, and equipment and vehicle maintenance bays.

2.4.18.4. **Dimensions.** See **Chapter 6** of this Manual and **Table 2.24** and **2.24.1** below.

2.4.18.5. **Design Considerations.**

2.4.18.5.1. Requires 220 VAC/115 VAC, 60 Hz service with backup power and UPS. See AFI 32-1063.

2.4.18.5.2. Provide connectivity with on- and off-base weather sensors; base LAN connectivity to GIG and connected weather sensors; dedicated land lines to base operations; air traffic control facilities; and a DSN Class A worldwide phone line.

2.4.18.5.3. Locate to satisfy explosives safety standards in relationship to other explosives storage and operating facilities. Noise attenuation measures are necessary if located in close proximity to runway(s) or industrial area(s).

Table 2.24. Battlefield Weather Squadron Space Requirements.

	Small Sq (~ 50)		Large Sq (~ 120)	
Offices	Office Type (see Tables 6.3/6.4)	Qty	Office Type (see Tables 6.3/6.4)	Qty
Commander	C	1	C	1
Superintendent	D	1	D	1
First Sergeant	D	1	D	1
Director of Operations	D	1	D	1
Operations Superintendent	D	1	D	1
Flight CC/NCOIC	D	4	D	8
System Management Personnel	F	4	F	8
Operations Center	F	5	F	11
Information Management/Client Support Administrators	F	Varies	F	Varies
Administration Support	see Tables 6.3/6.4		see Tables 6.3/6.4	
Special Purpose Spaces	m2	ft2	m2	ft2
Lobby	User justified		User justified	
Classroom	see Table 6.4		see Table 6.4	

	Small Sq (~ 50)		Large Sq (~ 120)	
Conference Room	see Table 6.4		see Table 6.4	
Multi-purpose room	93	1,000	186	2,000
Mission Planning/Briefing Room1	37	400	74	800
Flight Operations Suite	178	1,900	353	3,800
Break Room	see Table 6.3		see Table 6.3	
Fitness Area, Showers, and Lockers2,3	116	1250	279	3,000
Supply Room	19	200	38	300
Individual Combat Equipment Storage Room (100 ft2 cages)4	372	4,000	948	10,200
CCI & Equipment Maintenance Room	19	200	28	300
Tactical Meteorological Equipment Storage	111	1,200	232	2,500
CCI Equipment Storage	19	200	19	200
Armory5	28	300	56	600
Exterior Areas				
HAZMAT Storage	9	100	14	150
Covered Military Vehicle/Trailer Storage6,3	268	2,880	557	6,000
Military Vehicle Wash Rack3	49	525	49	525
Military Vehicle Maintenance Bays7	84	900	130	1,400
Antennae Farm	46	500	93	1,000

NOTES:
1. Mission Planning room includes a/v equipment, white board, map worktables, etc.
2. Based on 25 ft2 /per person allowance.
3. User justified.
4. 10’x10’ secure storage cage for each person. Plan space for assumed 85% manning.
5. For combined armory, weapons cleaning/maintenance area, use 15 ft2 /per person.
6. Vehicle storage based on approximately 240 ft2 per HMMMV. (12 HMMMVs in a small squadron and 25 HMMMVs in a large squadron. Includes 50 ft2 secured covered storage containers for each HMMMV for tactical gear and equipment.)
7. Includes bench stock, supplies and work tables.

Table 2.24.1. Battlefield Weather Detachment Space Requirements.

	Small Sq (~ 15)		Large Sq (~ 25)	
Offices	Office Type (see Tables 6.3/6.4)	Qty	Office Type (see Tables 6.3/6.4)	Qty
Detachment Commander	D	1	D	1
Detachment Superintendent/NCOIC	D	1	D	1
Director of Operations	D	1	D	1
OIC, Detachment Operations	E	1	E	1
NCOIC, Detachment Operations	E	1	E	1
Operations Center	F	3	F	5
Information Management/Client Support Administrators	F	1	F	1
Administration Support	see Tables 6.3/6.4		see Tables 6.3/6.4	
Special Purpose Spaces	m2	ft2	m2	ft2
Lobby	User justified		User justified	
Conference Room	See Table 6.4		See Table 6.4	
Multi-Purpose Room	39	425	53	575
Mission Planning/Briefing Room1	37	400	37	400
Flight Operations Suite	70	750	133	1,430
Break Room	see Table 6.3		see Table 6.3	
Fitness Area, Showers, and Lockers2,3	35	375	58	625
Individual Combat Equipment Storage Room4	84	900	139	1,500
CCI Storage and Equipment Maintenance Room	19	200	19	200
Tactical Meteorological Equipment Storage	56	600	84	900
Armory5	21	225	36	375
Exterior Areas				
HAZMAT Storage	9	100	9	100
Military Vehicle Wash Rack3	49	525	49	525
Military Vehicle Maintenance Bays7	130	1,400	130	1,400
Vehicle Covered Parking Area6,3	134	1,440	223	2,400
Antennae Farm	46	500	46	500

NOTES:
1. Mission Planning room includes a/v equipment, white board, map worktables, library, maps, operational materials storage, etc.
2. Based on 25 ft /per person allowance.
3. User justified.
4. Provide one secure storage cage 60 ft2 per person
5. For combined armory, weapons cleaning/maintenance area use 15 ft2 /per person. Place adjacent to weapons armory.

	Small Sq (~ 15)	Large Sq (~ 25)
6. Vehicle storage based on approximately 240 ft2 per HMMMV. (6 HMMMVs in small detachments, 6 HMMMVs in large detachments. Includes 50 ft2 secured covered storage containers for each HMMMV for tactical gear and equipment.) 7. Includes bench stock, supplies, and work tables. Recommended dimensions are 20 ft wide by 70 ft long.		

2.4.19. **Air Force Combat Weather Center (AFCWC) (New Requirement). FAC: 1444**

CATCODE: 141XX3
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.19.1. **Description.** This facility provides space for the training, testing, and exploitation mission of the AFCWC. Additionally, the facility provides support for the unit's Weather System Support Cadre (WSCC) personnel providing maintenance and logistics support for deployed Air Force weather teams. Its operations center normally provides worldwide weather support 8-12 hours per day, 5 days per week, but increases to 24/7 operations during contingencies. AFCWC also performs pre-deployment training for weather personnel and extensive weather equipment testing operations.

2.4.19.2. **Requirements Determination.** AFCWC was established to enhance the effectiveness of Air Force, Army, special operations, joint, and combined combat and BW team operations through investigation, integration and development, test and evaluation, and exploitation and training for new and existing tactical weather systems and processes. Obtain further information through AFWA/A5/8.

2.4.19.3. **Scope Determination.** Space is needed for a command section, operations management, operations area (indoor and outdoor), information systems and management (classified and unclassified), training areas (indoor and outdoor), storage space for tactical weather systems, spares, maintenance tools and HAZMAT, locker/shower rooms, and supplies.

2.4.19.4. **Dimensions.** See **Table 2.25** below.

2.4.19.5. **Design Considerations.**

2.4.19.5.1. Facility requires DSN Class A worldwide/land line connections, NIPRNet and SIPRNet drops, and cablevision or satellite television capability to receive and obtain National Weather Service (NWS) broadcasts. Facility requires allocation of permanently assigned frequencies for three pieces of equipment employed in the mission of the AFCWC. Typical frequency ranges are 413-415 UHF and 9345 MHz.

2.4.19.5.2. Requires 220 VAC/115 VAC, 60 Hz service with backup power and UPS.

2.4.19.5.3. Locate to satisfy explosives safety standards in relationship to explosives storage and operating facilities. Noise attenuation measures may be required if facility is located in the close proximity to the runway(s) or industrial area(s). Facility requires 8 ft x 4 ft x 6 ft (included in above table) storage cage to store helium canisters used for training with the Digicora III. The requirement for emergency power is determined under AFI 32-1063.

Table 2.25. Air Force Combat Weather Center Space Requirements.

Function		Net Building Area	
		m2	ft2
Interior Areas			
Administration1	Commander (Type C)	14	150
	Superintendent (Type D)	11	120
	First Sergeant (Type D)	11	120
	Administrative Suite	5.95/person	64/person
	Information Management/Client Support Administrator	5.95/person	64/person
Operations	Director of Operations (Type D)1	11	120
	Division Chiefs (Type E) 1	7.4/person	80/person
	Operations Center	228	2,300
	CCI and Equipment Maintenance Room	16	170
	Training Area2	93	1,000
Common Areas	Lobby2	19	200
	Warehouse	380	4,000
	Conference Room2	47	500
	Break Room with Kitchen2	14	150
	Showers/Locker Rooms2	28	300
Exterior Areas	Equipment Set-up Area/Antenna Farm	855	90,000
NOTES: 1. See Chapter 6 of this Manual, Tables 6.2 and 6.2.1 2. See Chapter 6 of this Manual, Tables 6.3 and 6.4			

2.4.20. **Air Force Weather Agency (AFWA)/System Operations Center. (New Requirement)**

FAC: 1444
CATCODE: 141XX4
OPR: AFWA/A5/A8
OCR: 1st Weather Group, 2nd Weather Group

2.4.20.1. **Description.** AFWA is a Field Operating Agency, reporting to United States Air Force Director of Weather, Deputy Chief of Staff Air and Space Operations (USAF/A3O-W). Covering the globe and space, the Air Force Weather Agency is the Air Force's global weather production center. The center produces and delivers terrestrial and space weather products and services to Air Force and Army warfighters, Unified Commands, National Programs, and the National Command Authorities. The Agency supplies weather products, training tools, and fields equipment to Air Force Operational Weather Squadrons and Combat Weather Flights and provides 24-hour technical assistance on all standard weather systems and equipment.

2.4.20.2. **Requirements Determination.** AFWA and the Global Weather Operations Center was established to enhance the effectiveness of Air Force, Army, special

operations, joint, and combined combat and BW team operations through investigation, integration and development, test and evaluation, and exploitation and training for new and existing tactical weather systems and processes. Obtain further information through AFWA/A5/8.

2.4.20.3. **Scope Determination.** Space is needed for a command section, the AFWA A-Staff, and the 1st and 2nd Weather Groups. The facility also requires areas for a Sensitive Compartmented Information Facility; weather production facility for making broadcasts and audio/video products for the Armed Forces Network; 24/7 AFWA operations center; a worldwide technical help desk; and computer operations facility.

2.4.20.4. **Dimensions.** See **Table 2.26** below.

2.4.20.5. **Design Considerations.**

2.4.20.5.1. Facility requires DSN Class A worldwide/land line connections, NIPRNet and SIPRNet drops, and cablevision or satellite television capability to receive and obtain NWS broadcasts. In addition, the facility is linked to the Joint Worldwide Intelligence Communications System (JWICS) that provides classified data to joint warfighters worldwide.

2.4.20.5.2. Requires 220 VAC/115 VAC, 60 Hz service with backup power and UPS. This facility is serviced by two 3,000 kVA and one 2,500 kVA transformer yielding a total capacity of 8,500 kVA. It is also serviced by a 2,250 kVA UPS. Back-up generator power is provided by base generators.

2.4.20.5.3. Locate to satisfy explosives safety standards in relationship to explosives storage and operating facilities. Noise attenuation measures may be required if facility is located in the close proximity to the runway(s) or industrial area(s). The requirement for emergency power is determined under AFI 32-1063.

Table 2.26. AFWA and AFWA Operations Center General Spatial Requirements.

Function	Net Building Area	
	m2	ft2
Interior Areas		
General Office space1,2,3	6,083	65,479
Contractor Space1,2,3	1,995	21,475
Operations Space	213	2,288
Computer Room Space	1,578	16,989
SCIF2,3	939	10,111
Mechanical2	939	10,105
Electrical Switchgear	320	3,446
Storage/Dock2,3	604	6,506
Conference room2,3	312	3,360
Snack Bar2,3	97	1,046
Training Classroom	97	1,046
Break Room2,3	97	697
Atrium2,3	482	5,192
Auditorium2,3	416	4,475

Function	Net Building Area	
	m2	ft2
NOTES: 1. See Chapter 6 of this Manual, Tables 6.2 and 6.2.1 2. See Chapter 6 of this Manual, Tables 6.3 and 6.4 3. User Justified.		

2.4.21. **Base Photo Laboratory. FAC: 1441**

CATCODE: 141743
OPR: AF/A3O-A
OCR: N/A

2.4.21.1. **Description.** The photo laboratory provides photography and other visual services to support management, information, and operational functions of base organizations, including tenants.

2.4.21.2. **Requirements Determination.** Work performed in the laboratory includes still photography and processing in color and black-and-white film, still-film printing in black and white, and production of slides, viewgraphs, photostats, and diazos. A laboratory supporting an upper-echelon headquarters may provide additional services such as still-film printing in color. A laboratory supporting an armament-recording function processes and prints 70 mm strike photograph film and processes motion picture gun-camera film. The laboratory does not perform photographic tasks that are the responsibility of reconnaissance laboratories, special mission laboratories, or the Audiovisual Facility (**CATCODE 141383**).

2.4.21.3. **Scope Determination.**

2.4.21.3.1. Three sizes of laboratories are designated: Type A for ten to 19 personnel, Type B for five to nine personnel, and Type C for one to four personnel. **Table 2.27** shows the space requirements for each type.

2.4.21.3.2. The laboratory may be combined with **CATCODE 141383** to create an audiovisual services center.

2.4.21.3.3. A graphic arts shop may be combined with a base photo laboratory if the shop cannot be incorporated in **CATCODE 141383**. Combining the graphic arts shop with the laboratory reduces the graphic arts space requirements by at least 15 percent by consolidating support space. Graphic arts shop space in a photo laboratory is identified under **CATCODE 141383**.

2.4.21.4. **Dimensions.** See **Table 2.27** below.

2.4.21.5. **Design Considerations.**

2.4.21.5.1. Silver recovery equipment or apparatus should be included as an equipment item in the process operation to meet CWA requirements. If it is not included, provide collection and recovery facilities as an initial stage to any collection, treatment, and disposal (of silver) process.

2.4.21.5.2. Ensure all photo laboratory facilities control potential water, air, and hazardous waste pollutants generated by photographic processing and film

destruction. If redesigning or modifying the process is not possible, provide adequate collection, treatment, and disposal facilities as integral components of the photo laboratory to meet compliance requirements contained in all applicable federal, state, and local environmental laws, and other guidance as defined in **paragraph 1.3.1** and **1.8.6**. If hazardous chemicals are used, an approved eye wash and emergency shower may be required. Contact installation ground safety for assistance.

2.4.21.5.3. A review by the base fire marshal is necessary to determine if special fire protection is needed due to the chemicals and other potentially flammable materials used during processing.

Table 2.27. Photo Laboratory Space Requirements.

Function	Gross Area					
	Type A		Type B		Type C	
	m2	ft2	m2	ft2	m2	ft2
Base Photo Laboratory (CATCODE 141743)	437	4,700	276	2,975	183	1,975
Armament recording additive	28	+300	28	+300	28	+300
For MAJCOM, Center, or Numbered Air Force (NAF)	46	+500	46	+500	46	+500
Reconnaissance Photo Lab(CATCODE 141745)						
Group or Command					6,500	70,000
Strategic Reconnaissance Sq (Wing Level)					7,430	80,000
Strategic Reconnaissance Sq (HQ or NAF)					5,570	60,000

2.4.22. **Reconnaissance Photo Laboratory. FAC: 1441**

CATCODE: 141745
OPR: AF/A5RI
OCR: N/A

2.4.22.1. **Description.** See Base Photo Laboratory (**CATCODE 141734**).

2.4.22.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

2.4.22.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

2.4.22.4. **Dimensions.** See **Table 2.26** above.

2.4.22.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.4.23. **Air Freight Terminal. FAC: 1412**

CATCODE: 141782
OPR: AF/A4LE
OCR: AF/A3O

2.4.23.1. **Description.** This facility provides space for receiving, sorting, and accumulating conveyable and non-conveyable cargo, pallet buildup and netting, peacetime war readiness material pallet storage, retrograde processing, special cargo processing, packing and crating, administration, and miscellaneous uses such as rest rooms and crew lounges.

2.4.23.2. **Requirements Determination.** An air freight terminal is authorized at installations charged with receiving and shipping material by air. Obtain additional information through AMC/A4/A7.

2.4.23.3. **Scope Determination.** The terminal includes an outdoor, Paved Processing Space (**CATCODE 452258**). Air Force courier stations are preferably located in air freight terminals. Temporary secure storage of classified material and equipment is also authorized. This terminal may also include a Central Post Office (**CATCODE 730443**), a Surface Freight/Packing and Crating Facility, and a Traffic Management Facility (see **CATCODE 141784**).

2.4.23.4. **Dimensions.** The space requirement for an air freight terminal is determined by each individual project. Severe climatic conditions may require covering functions normally conducted outside. This requirement is determined on an individual basis. The aerial port of embarkation (APOE) and the aerial port of debarkation (APOD) require additional space for border clearance (customs, immigration, and agricultural inspection) activities. Outside storage is necessary for parking special-purpose vehicles and ensure it accommodates adequate turning radii for maneuvering.

2.4.23.5. **Design Considerations.** Locate facility to comply with explosive safety standards.

2.4.24. **Air Freight/Passenger Terminal. FAC: 1412**

CATCODE: 141783
OPR: AF/A4LE
OCR: AF/A3O-A

2.4.24.1. **Description.** See Air Freight Terminal (**CATCODE 141782**) and Air Passenger Terminal (**CATCODE 141784**).

2.4.24.2. **Requirements Determination.** See **CATCODEs 141782** and **141784**.

2.4.24.3. **Scope Determination.** See **CATCODEs 141782** and **141784**.

2.4.24.4. **Dimensions.** See **CATCODEs 141782** and **141784**.

2.4.24.5. **Design Considerations.** See the *AMC Passenger Terminal Facility Design Guide.*

2.4.25. **Air Passenger Terminal. FAC: 1412**

CATCODE: 141784
OPR: AF/A4LE
OCR: AF/A3O-A

2.4.25.1. **Description.** The air passenger terminal expedites arriving and departing air-passenger traffic. It affords passengers orderly and convenient progress from the ground

side of the terminal, through the terminal, to the aircraft, and back again. The air side of the terminal should efficiently handle military and civilian aircraft carrying passengers.

2.4.25.2. **Requirements Determination.** Air passenger terminals are for Air Force bases designated as APOE or APOD and for bases with noncombatant repatriation activities. A conceptual planning study and AMC/A4/A7 approval are necessary before sizing any new terminal or terminal addition operated by AMC. The following references provide additional guidance for this requirement:

2.4.25.2.1. FAA Publications:

2.4.25.2.1.1. AC 150/5360-9, *Planning and Design of Airport Terminal Facilities at Non-hub Locations.*

2.4.25.2.1.2. AC 150/5060-5, *Airport Capacity and Delay*.

2.4.25.2.1.3. AC 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*.

2.4.25.2.2. **Chapter 6** (Administrative) of this Manual.

2.4.25.2.3. AMCI 24-101 Vol.24, *AMC Passenger Terminal Force Protection.*

2.4.25.2.4. UFC 4-010-02, *Minimum Standoff Distances for Buildings*.

2.4.25.3. **Scope Determination.** Functional requirements for passenger terminals include basic functions, items required by APOEs and APODs, and additional services. The extent of many requirements depends on the facility category. These facilities may also support mobility processing functions.

2.4.25.3.1. Basic functions include a passenger check-in area for checking and issuing passenger-flight documentation, baggage check-in, flight information, lobby, non-public outbound baggage area, public and non-public inbound baggage areas, a terminal administration area for terminal management and operations, a traffic management office, customer service branch, passenger reservations center, passenger service center, security inspection area, sterile departure lounge, rest rooms, and passenger terminal access (terminal curb, taxi, bus, and vehicle parking areas). Air Mobility Command units refer to *AMC Passenger Terminal Design Guide*.

2.4.25.3.2. Requirements for APOEs and APODs include border clearance (customs, immigration, and agriculture inspection) activities.

2.4.25.3.3. Additional services may include a lounge for dependents, nursery, cafeteria, snack bars, base exchange, baggage lockers and cart storage, outbound lounge and waiting areas, Commercial Travel Office (CTO) and travel services, personal vehicle shipment processing, Red Cross, travelers' aid, special category lounge, bank, barbershop, automated post office, commercial flight crew area, employee lounge and lockers, maintenance shop, and United Service Organization (USO).

2.4.25.3.4. Category IA passenger terminals are designed for a mix of military aircraft and occasional narrow body (B727, B757, or MD-80) aircraft and wide body (DC-10, B767, MD-11, B747, or L-1011) aircraft. Facility requirements for category IA terminals include all basic functions, plus a lounge for dependents, nursery,

baggage-checking lockers, a waiting area, commercial telephone service, traffic management office (TMO), CTO, and a special-category lounge. The maximum figure may include any needed combination of the services (see **Table 2.28**).

2.4.25.3.5. Category IB passenger terminals include the same aircraft mix as category IA terminals. The functional requirements include all basic functions plus a lounge for dependents, nursery, baggage-checking lockers, waiting areas, commercial telephone service, TMO, CTO, border clearance, baggage-cart storage, and special-category lounge. The maximum figures may include any needed combination of the additional services.

2.4.25.3.6. Category II passenger terminals accommodate one or more civilian narrow bodies and a mix of military aircraft. Functional requirements may include all basic, APOE/APOD, and additional requirements.

2.4.25.3.7. Category III passenger terminals accommodate one civilian wide body, two or more civilian narrow bodies, and a mix of military aircraft. Functional requirements may include all basic, APOE/APOD, and additional requirements.

2.4.25.3.8. Category IV passenger terminals accommodate two civilian wide bodies, one or more civilian narrow bodies, and a mix of military aircraft. Functional requirements may include all basic, APOE/APOD, and additional requirements.

2.4.25.3.9. An aircraft passenger loading bridge (jetway) should be considered for commercial wide body aircraft.

2.4.25.3.10. Ensure the Traffic Management Facility is large enough and capable of providing: (1) a customer service area for the administration of service associated with arranging passenger/personal property movements for inbound/outbound personnel; (2) shipping, receiving, and storing of military supplies/cargo; (3) a safe industrial equipment working area and secure cargo holding area; (4) a CTO administration/working area; and (5) ensure the facility is logistically located in an area that will ease access to rail/truck/air modes of shipments.

2.4.25.3.11. Surface Freight/Packing and Crating Facility provides space for receiving, sorting, accumulating and processing conveyable and non-conveyable inbound and outbound freight. The processing area should provide sufficient space to prepare, package, process, and temporarily store freight of all kinds, including classified and hazardous, compatible and non-compatible. Floor space should be adequate for the safe operation of power saws, banding and wrapping equipment, etc., as well as for a tool crib and storage of lumber, cardboard boxes, and other bench stock items. This facility is normally collocated with, or in close proximity to, the Warehouse Supply and Equipment Warehouse (**CATCODE 442758**). Space requirements should include sufficient room to safely operate materials handling equipment, as well as for loading docks with dock levelers for loading and off-loading commercial/military trucks.

2.4.25.4. **Dimensions.** Space requirements are shown in **Table 2.28**. To calculate allowable terminal space, choose the four months when the greatest number of total passengers (inbound plus outbound) passed through the terminal (do not count exercise troops not processed through the terminal). Identify 35 peak, 3-hour passenger loads for

arrivals, and 35 peak, 3-hour passenger loads for departures during the four months. Rank order the 3-hour loads. Using the 35th peak-period number from both lists, add the arrivals and departures to get the design peak 3-hour load. All new terminals and terminal additions operated by AMC require a conceptual planning study and AMC/A4/A7 approval before being sized.

2.4.25.5. **Design Considerations.** Open storage space should be provided around the facility for baggage handling, an Aircraft Support Equipment Storage Yard (**CATCODE 852273**), Non-organization Vehicle Parking (**CATCODE 852262**) for privately owned vehicles, and concessions (Category Groups 74 and 75). For additional guidance, see the *AMC Passenger Terminal Facility Design Guide.*

Table 2.28. Air Passenger Terminal Space Requirements.

Category1	Design Peak 3-Hr Passenger Load	Minimum Gross Area		Maximum Gross Area	
		m2	ft2	m2	ft2
IA	Under 100	372	4,000	650	7,000
IB2	101 to 250	651	,001	1,860	20,000
II2	251 to 500	1,861	20,001	4,370	47,000
III	501 to 1,000	4,371	47,001	7,430	80,000
IV2	1,001 to 2,000	7,431	80,001	14,100	152,000
NOTES: 1. Space above the minimum is based on additional services provided as outlined in paragraph 2.4.26.3. 2. See Table 2.1. in the AMC Passenger Terminal Facility Design Guide for examples of the approximate space requirements for Type IV, II, and IB terminals.					

2.4.26. **Deployment Processing Facility. FAC: 1412**

CATCODE: 141786
OPR: AF/A4LE
OCR: N/A

2.4.26.1. **Description.** This facility provides space for receiving and processing personnel and baggage.

2.4.26.2. **Requirements Determination.** A deployment processing facility is needed at any installation charged with deploying personnel and equipment in support of deployment taskings. AFI 10-403, *Deployment Planning and Execution*, establishes procedures to deploy units with a mobility commitment. Six deployment work centers are included for passenger and equipment processing.

2.4.26.3. **Scope Determination.** A typical facility provides space for receiving and processing personnel and baggage, baggage pallet build-up, counseling, passenger processing, briefing, holding, miscellaneous space such as restrooms, and a vending area. In addition, space is required for a Cargo Deployment Function (CDF) and Personnel Deployment Function (PDF) to include a Deployment Control Center (DCC), Transportation Control Unit (TCU), Air Passenger Terminal (APT), Air Cargo Terminal (ACT), and Sub-Motor Pool (SMP). See AFI 10-402, Vol. 1, *Mobilization Planning and*

Personnel Readiness, and AFI 10-403. An Airlift Control Element (ALCE) may also be required.

2.4.26.4. **Dimensions.** The minimum gross area required for passenger processing is 5.6 m^2 (60 ft^2) per passenger handled at peak workload. The minimum gross area required for control functions associated with execution of mobility operations (DCC, TCU, DPU, APT, ACT, SMP) is 7.4 m^2 (80 ft^2) per person. The placement and arrangement of the work center may be varied to satisfy local needs.

2.4.26.5. **Design Considerations.** Ensure adequate access and egress for passenger busses, cargo trucks, and handling of mobility A, B, and C bags and personal bags. The APT and ACT do not have to be collocated, but should be close to improve command, control, and communication.

2.4.27. **Material Processing Depot. FAC: 4411**

CATCODE: 141821
OPR: AF/A4LE
OCR: N/A

2.4.27.1. **Description.** This facility houses all functions and the automated material handling systems associated with centralized processing for the supply and transportation mission of an Air Logistics Center.

2.4.27.2. **Requirements Determination.** This facility is authorized only at Air Logistics Centers or by MAJCOM direction. Obtain additional information through AFMC/A4.

2.4.27.3. **Scope Determination.** It provides space for the following:

2.4.27.3.1. Storage packaging and corrosion control;

2.4.27.3.2. Shipment packing – centralized packing for all off-base shipments;

2.4.27.3.3. Surface shipping – sorting packaged shipments, temporary holding, accumulating loads, and loading carriers; and

2.4.27.3.4. **Central receiving.** This includes:

2.4.27.3.4.1. Off-loading carriers and processing surface terminal receipts;

2.4.27.3.4.2. Consolidation breakout – opening and segregating incoming shipments;

2.4.27.3.4.3. Material processing – verifying the condition and quantities of items received, assigning warehouse locations, and processing receipts for a variety of transactions; and

2.4.27.3.4.4. On-base distribution sorting – breaking out ordered items, sorting property by stockroom or warehouse, and loading carriers for on-base deliveries.

2.4.27.4. **Dimensions.** Space requirements are based on a detailed analysis of the work load and operation at individual material processing depots.

2.4.27.5. **Design Considerations.** The vertical stacking abilities and computer-controlled, electro-mechanical devices may require additional design considerations for floor loading, fire sprinkler delivery volumes and layout, electrical power supply, and environmental control.

2.4.28. **Aircraft Sunshelter. FAC: 9999**

CATCODE: 146601
OPR: AFCESA/CEO
OCR: AF/A3O-A

2.4.28.1. **Description.** See AF/ILE memos: *Aircraft Sunshades* (16 Nov 2000) and *Aircraft Sunshades—Classification Revisited* (29 Apr 2002).

2.4.28.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

2.4.28.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

2.4.28.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.4.28.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.4.29. **Weather Instruments and Structures.**

2.4.29.1. **General Requirements.** Weather instruments and structures consist of installed weather equipment, such as weather radars, manned and unmanned weather sensors/equipment and supporting towers, and construction. Ensure equipment sited on or near the airfield complies with airfield clearance criteria (see AFIs 32-1042, 32-1044, and 32-7063, AFJMAN 32-1083, and UFC 3-260-01). Weather instruments are categorized as terrestrial –Wing Measuring Set (AN/FMQ-13), Automatic Meteorological Station (AN/FMQ-19), Fixed Base Automatic Meteorological Station (AN/FMQ-22), Automatic Surface Observing System (ASOS), Radar Meteorological Set-Next Generation Radar (NEXRAD, WSR-88D), Mark IVB (UMQ-13– or space sensors – Radio Solar Telescope Network (RSTN), Solar Observing Optical Network (SOON, AN/FMQ-7), Improved Solar Observing Optical Network (ISOON), and Next Generation lonosonde (NEXION, DPS 4-D), Receiving Set, Satellite (RSS, TMQ-54). Commonly required construction items include the following:

2.4.29.2. Underground power and communications lines installed in trenches, conduits, or ducts. The lines connect equipment system components in outlying areas to the devices for computing, displaying and recording weather data that are usually located in the weather observation site (**CATCODEs 141453** and **141629**). The length of underground lines varies according to the locations of various elements and airfield configurations. Typical installations require 1,500 to 3,000 lineal meters (5,000 to 10,000 lineal ft) of underground lines.

2.4.29.3. Concrete pads of various specifications and sizes to support equipment or anchor masts and platforms used to elevate equipment.

2.4.29.4. Aviation obstruction lights as required by AFIs 32-1042, 32-1044, and 32-7063, UFC 3-260-01, and UFC 3-535-01.

2.4.29.5. Emergency backup power and UPS may be required by system specifications and mission needs statements. See AFI 32-1063 for further guidance.

2.4.29.6. Ensure weather equipment located on or near airfield movement areas is frangible as required by UFC 3-260-01. Weather equipment and sensors located away from airfields or air traffic landing/take off zones do not need to comply with the frangible requirement but do need to comply with aviation/air traffic marking and clearance regulations as governed by UFC 3-260-01 and FAA/ICAO regulations and requirements.

2.4.29.7. Obtain further information through AFWA/A5/8 or MAJCOM weather staff.

2.4.30. **Wind Measuring Set (AN/FMQ-13). FAC: 1341**

CATCODE: 149621
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.30.1. **Description.** Consists of a transmitter/sensor, indicator, and recorder that provide wind direction and speed for air traffic control operations, weather observations, and forecasting.

2.4.30.2. **Requirements Determination.** One transmitter is authorized at each facility; however, some airfields require two or more transmitters if the aerodrome has two or more instrumented approaches or has terrain anomalies. One indicator is needed for each location requiring wind information. (Typical locations are the weather observation site, tower, RAPCON, and fire department). Each airfield requires one recorder. Obtain further information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.30.3. **Scope Determination.** Quantitative requirements are locally determined. There is no standard facility requirement. Site the transmitter where it best measures winds representative of the touchdown area of a runway or helipad. A concrete pad and underground cabling are needed to support the mounting mast for the equipment. The recorder is mounted in the Weather Observation Site (**CATCODE 141629**, **141453**, or **149962)**. The recorder provides a permanent record of wind speed and direction. The indicator is mounted in the weather observation site and in aircraft control facilities such as RAPCON and air traffic control tower.

2.4.30.4. **Dimensions.** Quantitative requirements are locally determined. There is no standard facility requirement.

2.4.30.5. **Design Considerations.**

2.4.30.5.1. Locate equipment to comply with airfield/aviation safety and explosive safety standards.

2.4.30.5.2. **Communications Requirements.** Underground cabling to connect air traffic control facilities, fire department, and Weather Observation Site.

2.4.30.5.3. **Power Requirements.** Reliable/stable 115 VAC, 60 Hz, 20 A service. The requirement for emergency power is determined under AFI 32-1063.

2.4.31. **Automatic Meteorological Station (AN/FMQ-19) (New Requirement). FAC: 1341**

CATCODE: 149XX1
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.31.1. **Description.** Consists of a primary suite of weather sensors and processor(s) capable of collecting, measuring, and reporting the following parameters for air traffic control operations: Wind speed and direction, temperature and dew point, visibility, cloud height, present weather, precipitation amount, lightning, and freezing precipitation. For airfields requiring additional weather sensors, one or more additional discontinuity sensor suites may be installed. A discontinuity sensor suite consists of weather sensors and processor(s) capable of collecting, measuring, and reporting the following parameters: Wind speed and direction, visibility, and cloud height.

2.4.31.2. **Requirements Determination.** One Field Data Collection Unit (FDCU) is authorized at each facility; however, some airfields require two or more FDCUs if the aerodrome has two or more instrumented approaches or has terrain anomalies. One Operator Interface Devices (OID) is required for each location. Typical locations are the weather station and Meteorological Equipment and Navigational Aids (METNAV). One Terminal Data Acquisition Unit (TDAU) is required for each airfield. Obtain further information through AFWA/A5/8 or MAJCOM A3 weather staff.

2.4.31.3. **Scope Determination.** The weather sensors are sited where they best measure vital weather data representative of the touchdown area of a runway or helipad. Locate the primary sensor suite and the discontinuity suite approximately 152 m (500 ft) from centerline of the runway and approximately 229 m to 305 m (750 ft to 1,000 ft) from the designated runway threshold. The sensor suite should be parallel to the runway with the closest sensor 152 m (500 ft) from the centerline. Locating sensors more than 152 m (500 ft) from the centerline of the runway provides data less representative of the runway and could have a negative effect on aviation operations. A concrete pad and underground cabling and conduit are needed to support the mounting masts for the equipment, communication, and power requirements and FDCU. The TDAU is located in the Weather Observation Site (**CATCODE 141629**, **141453**, or **149962)**. The TDAU provides a permanent record of all weather data reported from the FDCUs. The OID is mounted in the weather observation site, airfield maintenance facilities and in aircraft control facilities such as RAPCON and the air traffic control tower.

2.4.31.4. **Dimensions.** Quantitative requirements are determined through the results of site surveys and coordinated with the use of Project Support Agreements (PSA). The standard facility requirement should also be outlined and coordinated through the PSA vehicle. A typical site primary sensor location needs an area 20 ft x 40 ft long to accommodate the space needed for the concrete pads and grounding system. If additional sensors are needed for discontinuity requirements, the space requirements may be smaller.

2.4.31.5. **Design Considerations.**

2.4.31.5.1. **Communications Requirements.** Underground cabling, either copper twisted or fiber optics, which will connect the FDCU to the TDAU; underground cabling, either copper twisted or fiber optics, which connect the Runway Lighting Intensity Monitor (RLIM) to the TDAU; additional cabling, either copper twisted or fiber optics, may be required to connect the OID located at air traffic control facilities, weather stations, RAPCONs and METNAV facilities.

2.4.31.5.2. **Power Requirements.** Reliable/stable, dedicated 120 VAC, 60 Hz, 30 A service for the outdoor primary and discontinuity sensor suite FDCUs; reliable/stable, dedicated 120 VAC; 60 Hz, 20 A service for the TDAU located at the weather station; the OIDs 120 VAC load circuit. The requirement for emergency power is determined under AFI 32-1063.

2.4.31.5.3. Locate equipment to comply with airfield/aviation safety and explosive safety standards.

2.4.32. **Fixed Base Automatic Meteorological Station (AN/FMQ-22) (New Requirement). FAC: 1341**

CATCODE: 149XX2
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.32.1. **Description.** A weather system consisting of an integrated suite of meteorological instruments and information technology assets designed to automatically gather surface weather observations, which can be augmented by trained weather personnel. The system is capable of collecting, measuring, and reporting the following parameters: Wind speed and direction, temperature and dew point, visibility, cloud height, present weather, precipitation amount, and lightning detection for air traffic control operations, weather observations, and forecasting.

2.4.32.2. **Requirements Determination.** One sensor suite is authorized at each facility. If an airfield requires two or more sensor suites, or if the aerodrome has two or more instrumented approaches or has terrain anomalies, then this system may not be appropriate. One Observation personal computer (PC) is needed for each location requiring weather information. Typical locations are the weather station or the Air Traffic Control Tower. Obtain further information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.32.3. **Scope Determination.** Site the weather system where it best measures vital weather data representative of the touchdown area of a runway or helipad. Locate the sensor suite approximately 152 m (500 ft) from centerline of the runway and approximately 229 m to 305 m (750 ft to 1,000 ft) from the designated runway threshold. Locating the system more than 152 m (500 ft) from the centerline of the runway provides data less representative of the runway and therefore could have a negative effect on aviation operations. Concrete pads and underground cabling and conduit are needed to support the mounting masts for the equipment, communication/power requirements and anchoring pads for the guy wires. The Observation PC is located in the Weather Station

(**CATCODE 141629**, **141453**, or **149962)**. The Observation PC provides a permanent record of all weather data reported from the sensor suite.

2.4.32.4. **Dimensions.** Quantitative requirements are determined through the results of site surveys and coordinated with the use of PSA. The standard facility requirement should also be outlined and coordinated through the PSA vehicle. A typical site location needs an area of 36 ft x 36 ft long to accommodate concrete pads, guy wire anchoring pads, and grounding system.

2.4.32.5. **Design Considerations.**

2.4.32.5.1. **Communications Requirements.** Underground cabling, either copper twisted or fiber optics, which connects the sensor suite to the Observation PC.

2.4.32.5.2. **Power Requirements (includes backup power and UPS).** Reliable/stable, dedicated 120 VAC, 60 Hz, 20 A service for the outdoor sensor suite. The Observation PC requires a 120 VAC load circuit. The requirement for emergency power is determined under AFI 32-1063.

2.4.32.5.3. **Special Features.** Locate equipment to comply with airfield/aviation safety and explosive safety standards.

2.4.33. **Automated Surface Observing System (ASOS) (New Requirement). FAC: 1341**

CATCODE: 149XX3
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.33.1. **Description.** The ASOS provides automated aviation weather observations 24/7, updates observations every minute, and continuously reports significant weather changes as they occur. ASOS is capable of attended and unattended operation, and continuously conducts self-tests for electronic, mechanical, and sensor related issues and provides isolation of failures of the subsystems and components. The system provides current weather information, automatically generating Aviation Routine Weather Reports (METAR) and Aviation Selected Special Weather (SPECI) reports to local, area, and national reporting levels when conditions warrant.

2.4.33.2. **Requirements Determination.** ASOS is a Tri-Agency program managed by the NWS, the FAA, and the DoD. The Air Force Weather Agency is DoD's and Air Force's executive agent for 44 of the 1,003 government systems. The ASOS is designed to support weather forecast activities and aviation operations and, at the same time, support the research needs of the meteorological, hydrological, and climatological communities. Obtain further information through AFWA/A5/8 or MAJCOM A3 weather staff.

2.4.33.3. **Scope Determination.** The basic ASOS consists of one Acquisition Control Unit (ACU) and a Data Collection Package (DCP), sensors, wind mast, concrete mounting pads, cabling rails for the associated cabling, Ground to Air (GTA) radio, Operator Interface Device (OID), and Video Display Unit (VDU). The ACU/DCP collects, processes, and disseminates the data to local, area, and national levels. The OID and VDUs are located per user requirements to support local mission.

2.4.33.4. **Dimensions.** The ASOS primary sensor group physically requires a 75 ft x 59 ft area clear of ground obstructions, reflective surfaces, and light sources. The remote sensor site (dual cabinet with a discontinuity) requires an additional 41 ft 5 in x 75 ft area clear of ground obstructions, reflective surfaces, and light sources. The sensor groups require a crushed rock walkway three feet deep around the rail system to mitigate plant growth. Under the ACU/DCP cabinet a 2 ft x 4 ft concrete pad is installed for maintenance access area.

2.4.33.5. **Design Considerations.**

2.4.33.5.1. **Communications Requirements.** USAF ASOS has a dial in/out capability of METAR/SPECI observations to an NWS gateway and the ASOS Operations and Monitoring Center (AOMC). Dual cabinet systems require a low band UHF radio link to transfer information. The ASOS also provides automatic reporting with a GTA radio (117.975 to 136.975MHz) and requires telephone lines for weather reporting and access. Future connection to the Air Force GIG is planned in FY12.

2.4.33.5.2. **Power Requirements.** Stable/reliable 240/115 VAC, 30 A service. The requirement for emergency power is determined under AFI 32-1063.

2.4.34. **Radar Meteorological Set – Next Generation Radar (NEXRAD), (WSR-88D). FAC: 1341**

CATCODE: 149627
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.34.1. **Description.** The WSR-88D provides range azimuth and elevation data on precipitation areas within 400 km (240 mi) and produces images that can make up a mosaic of real-time weather data for the entire nation, a region, or a single view of weather data for one particular location. This Tri-Agency managed system provides critical national, regional, and local weather data for forecasting and warnings through the NWS, FAA, DoD, and the Air Force. The data provides aviation weather awareness and warnings to aircrews for severe weather avoidance.

2.4.34.2. **Requirements Determination.** The Weather Surveillance Radar, 1988, Doppler (WSR-88D), is a U.S. Government Tri-Agency managed system (Department of Transportation, Department of Commerce, and DoD) consisting of 159 radars located in the CONUS and Pacific and European areas. The Air Force, through its executive agent AFWA, has responsibility for 26 of the 159 radars. Obtain further requirements determination information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.34.3. **Scope Determination.** The Doppler weather surveillance radar consists of three shelters containing a transmitter-receiver and electronic control amplifier, display console with power supply, and associated equipment. The antenna is sited to provide maximum separation and minimum obstruction by buildings, terrain, and power lines. The WSR-88D radar set user display consists of an open principal user processor (OPUP) approximately the size of a standard desktop computer (SDC). Some units/locations have an OPUP with a 2 ft x 4 ft x 6 ft equipment rack along with three to 11 SDC workstations.

2.4.34.4. **Dimensions.** The three shelters are located around the radar tower with two requiring environmental controls for the equipment. One shelter contains a backup power generator. The antenna is sited to provide maximum separation and minimum obstruction by buildings, terrain, and power lines. Obtain further information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.34.5. **Design Considerations.**

2.4.34.5.1. **Communications Requirements.** Specific to location but requires connections to the GIG and commercial/Class A phone lines. Contact AFWA/A8F or NWS Radar Operations Center for specific communications requirements.

2.4.34.5.2. **Power Requirements (includes backup power and UPS).** Reliable/stable 120/208 VAC, 60 Hz, 3-phase, 4-wire electrical power with automatic switching to back-up power. Ensure one of the shelters on site contains an 80 kW generator for emergency power. Another shelter, the Transition Power Maintenance Shelter, should be self-contained, environmentally controlled, consisting of a cabinet containing a bank of batteries, a work area containing tools, and a work bench.

2.4.35. **Radio Solar Telescope Network (RSTN) (New Requirement). FAC: 1341**

CATCODE: 149XX4
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.35.1. **Description.** RSTN consists of manned sites that have the Radio Interference Measuring Set (RIMS), AN/FRR-95 and the Solar Radio Spectrograph (SRS), A/F24U-10. The RSTN monitors the solar disk from sunrise to sunset to detect solar radio frequency bursts and monitors the radio spectrum using sweep and discrete frequency radiometers 24/7. This data generates warnings and advisories that allow the warfighter to discriminate between solar-induced effects and electronic jamming on missile-warning radars, satellite operations, and space surveillance systems.

2.4.35.2. **Requirements Determination.** Obtain further requirements determination information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.35.3. **Scope Determination.**

2.4.35.3.1. **RIMS Antenna Requirements.** RSTN's three RIMS antennas are mounted on two separate support towers or risers. The RIMS 28 ft antenna is supported by an approximate 38 ft tall riser mounted on a 20 ft x 18 ft x 2.5 ft concrete slab fastened by 36 stainless steel mount bolts. The total weight of system is 37,175 lbs. The concrete mount slab needs to be reengineered if the equipment is moved, due to different soil conditions. RIMS 3 ft and 8 ft antennas are mounted on a single 14.1 ft support riser mounted on a 9 ft x 8 ft x 2 ft concrete slab fastened by 12 galvanized steel mount and leveling bolts. Total weight of system is 10,114 lbs. The concrete slab needs to be redesigned if equipment is moved to a new location, due to different soil condition.

2.4.35.3.2. **SRS Antenna Requirements.** The SRS has two antennas, one low band and one high band. The low band antenna requires 34 ft x 21 ft of space, is 20 ft high, and requires a 10 ft x 10 ft x 2 ft concrete pad plus four anchors for the hoops and two for tie downs. The maximum length of the cable is 152 m (500 ft) (distance from building to antenna). The SRS high band antenna is approximately 20 ft high and also requires a 10 ft x 10 ft x 2 ft concrete pad. The maximum length of its cable is 137 m (450 ft) (distance from building to antenna).

2.4.35.3.3. **RSTN Support Building.** The RSTN's support building requires a minimum of 2,500 ft^2 of space which contains ten each 24 in x 30 in x 72 in electronic equipment racks; two each 21 in x 31 in x 68 in equipment racks; five each 17 in x 24 in uninterrupted power supplies; room for three desk top PCs; and one each 17 in x 17 in dehydrator. The building requires an inside temperature of 50°F to 90°F and 20 – 75 percent non-condensing humidity. The 2,500 ft^2 provides space for operation, administration, and maintenance personnel.

2.4.35.4. **Dimensions.** The secured site area is 174 m (570 ft) x 174 m (570 ft). The site area requires a security fence around the perimeter. Buildings and antennas are required to have lightning protection.

2.4.35.5. **Design Consideration.**

2.4.35.5.1. **Communications Requirements.** RSTN requires a dedicated communication line connected to the GIG and DSN Class A worldwide phone line.

2.4.35.5.2. **Power Requirements (includes backup power and UPS).** Stable/reliable 300 A single phase and 50 A, 3-phase 208 V power and 115 VAC. RSTN requires backup power and an UPS. The requirement for emergency power is determined under AFI 32-1063.

2.4.36. **Solar Observing Optical Network (SOON), (AN/FMQ-7) (New Requirement). FAC: 1341**

CATCODE: 149XX5
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.36.1. **Description.** The SOON is a manned optical telescope, solar observing system that collects and sends solar data to space weather forecast centers. The SOON monitors solar activity 24/7. The solar observations provide essential information about the size, brightness, energy, and location of eruptive events on the solar disk, providing warnings and advisories for solar proton events and geomagnetic activity. These proton events affect high altitude and manned space flight, as well as auroral and polar region radar, communications systems, and national and regional electric power grids.

2.4.36.2. **Requirements Determination.** The SOON provides the world's only 24/7 ground-based optical solar observing system. The system is critical for forecasting solar events that affect communications, manned space flight, and power grids. Obtain further requirements determination information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.36.3. **Scope Determination.** The front of the SOON building faces away from the equator, with no East or West obstructions. The operations building consists of a 15 m (50 ft) x 7.6 m (25 ft) structure with an additive front sloped section 4.6 m (15 ft) x 2.4 m (8 ft). The facility area has two seismic pads outside and one inside the building. Ensure the building is environmentally controlled to maintain 60°F to 89°F and 30 to 60 percent relative humidity (non-condensing). The inside of the building contains a seismic pad, optical telescope, computers, monitors, UPS, and multiple electronics racks. The SOON administration building is 23 m (75 ft) x 12 m (40 ft). The SOON maintenance and storage building is 23 m (75 ft) x 12 m (40 ft).

2.4.36.4. **Dimensions.** Secured site area is 67 m (220 ft) x 67 m (220 ft). These dimensions do not include the parking area.

2.4.36.5. **Design Consideration.**

2.4.36.5.1. **Communications Requirements.** Requires a dedicated communication line connected to the GIG and DSN Class A worldwide landlines.

2.4.36.5.2. **Power Requirements.** Each SOON requires 7,000 watts total electrical power consisting of 4,500 watts on a 208 V, 60 Hz single phase circuit and 2,500 watts on a 110 V, 60 Hz circuit and a backup power system to include an UPS. The requirement for emergency power is determined under AFI 32-1063.

2.4.36.5.3. **Special Features.** The front of the SOON building faces away from the equator, with no East or West obstructions.

2.4.37. **Improved Solar Observing Optical Network (ISOON) (New Requirement). FAC: 1341**

CATCODE: 149XX6
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.37.1. **Description.** ISOON is a 24/7 remote monitored optical telescope, solar observing system that collects and sends solar data to space weather forecast centers. The solar observations provide essential information about the size, brightness, energy, and location of eruptive events on the solar disk providing warnings and advisories for solar proton events and geomagnetic activity. These proton events affect high altitude and manned space flight, as well as auroral and polar region radar, communications systems, and national and regional electric power grids.

2.4.37.2. **Requirements Determination.** Obtain further requirements determination information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.37.3. **Scope Determination.** The operations building consists of a 6 m (20 ft) x 6 m (20 ft) structure with an additive front sloped section 4.6 m (15 ft) x 2.4 m (8 ft). The facility area has two seismic pads outside and one inside the building. The ISOON maintenance and storage building consists of a 6 m (20 ft) x 6 m (20 ft) structure. Ensure these buildings are environmentally controlled to maintain 60°F to 89°F and 30 to 60 percent relative humidity (non-condensing). The operations building contains a seismic pad, the telescope, a Sun work station, UPS, and two electronics racks.

2.4.37.4. **Dimensions.** The secured area is 46 m (150 ft) x 46 m (150 ft).

2.4.37.5. **Design Consideration.**

2.4.37.5.1. **Communications Requirements.** A dedicated communication line connected to the GIG and DSN Class A worldwide capable landlines.

2.4.37.5.2. **Power Requirements.** Each ISOON requires 7,000 watts total electrical power consisting of 4,500 watts on a 208 V, 60 Hz single phase circuit and 2,500 watts on a 110V, 60 Hz circuit and a backup power system to include an UPS. The requirement for emergency power is determined under AFI 32-1063.

2.4.37.5.3. **Special Features.** The front of the ISOON building faces away from the equator, with no East or West obstructions.

2.4.38. **Next Generation Ionosonde (NEXION), (DPS 4-D) (New Requirement). FAC: 1341**

CATCODE: 149XX7
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.38.1. **Description.** NEXION is an unmanned ionosonde facility that supports activities to sense and report ionospheric information for comprehensive and ongoing environmental analysis and mission impact assessment. NEXION is vertical incidence radar used to obtain information about the ionosphere directly overhead and consists of 30 systems worldwide and one test system. NEXION provides a 24/7 remote monitoring capability of the ionosphere by analyzing the signals reflected from the ionosphere and providing data to AFWA via the NIPRNet to be ingested into the new generation of Global Assimilation of Ionospheric Measurements (GAIM).

2.4.38.2. **Requirements Determination.** This facility supports activities and equipment to sense and report ionospheric information 24/7 to support and maintain battlespace awareness. Obtain further information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.38.3. **Scope Determination.** A NEXION site consists of a support building consisting of approximately 5 m^2 (50 ft^2), four receiving antennas placed in a triangular 60 degree configuration 60 m (197 ft) apart with #2 and #3 antennas aligned to magnetic north, and the #1 antenna centered between antennas #2 and #3 but physically located 34.64 m (114 ft) to the west of antenna #4. See **Figure 2.2** for alignment and placement. Distance between the transmit tower and receiver antennas is 30 m (98.4 ft) minimum separation. The transmit antenna requires 15.24 m (50 ft) clearance between the transmit antenna and potential obstructions such as trees, shrubs, etc. The transmit antenna is approximately 100 ft high. NEXION collects local ionosphere measurements using a transmitter that sweeps through the medium and high frequency radio bands (0.5-30 MHz). Each NEXION system consists of one desktop 4-D system (with monitor and key board), four active crossed loops turnstile receive antennas, and one transmit tower with two orthogonal radiating elements.

2.4.38.4. **Dimensions.** A NEXION antenna field requires approximately one acre of land for the system. The support building requires environmental controls with a

Heating, Ventilating, and Air Conditioning (HVAC) system and contains a desktop 4-D system with keyboard and monitor and a UPS with associated system equipment.

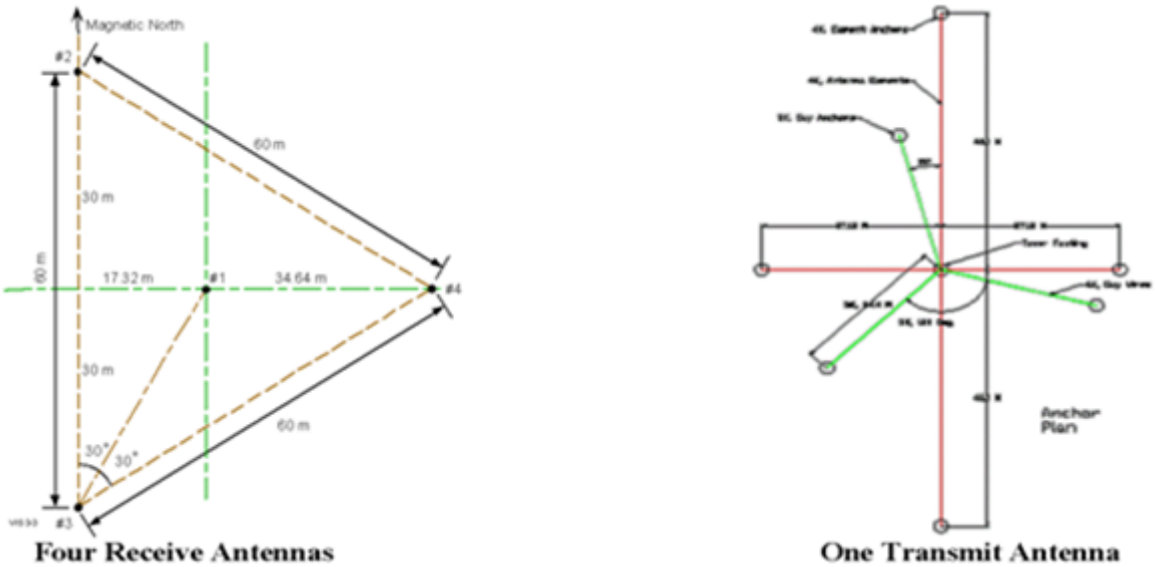
2.4.38.5. **Design Consideration.**

2.4.38.5.1. **Communications Requirements.** NEXION requires NIPRNet connections to the GIG and DSN Class A phone lines.

2.4.38.5.2. **Power Requirements.** Locate a master power switch or emergency cut-off switch for the NEXION unit near the main entrance that is labeled and protected by a cover to prevent accidental shut-off. The system also requires automatic voltage control for the power source feeding the NEXION DPS-4D unit with a UPS system. The requirement for emergency power is determined under AFI 32-1063.

2.4.38.5.3. **Special Features.** NEXION sites require non-metallic fencing to preclude electronic interference. Site/facility security ensures only authorized personnel with a need-to-know are granted physical access to computing facilities that house the NEXION DPS-4D unit. The facility requires controlled access during working hours and should be locked during non-work hours. A fire suppression system is necessary with a local and remote fire activation and alarm capability.

Figure 2.2. NEXION Antenna Layout.



2.4.39. **Mark IVB (UMQ-13) (NEW Requirement). FAC: 1341**

CATCODE: 149XX8
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.39.1. **Description.** MARK IVB (UMQ-13) is a 24/7 unmanned meteorological satellite (METSAT) direct readout (DRO) system. Four versions are fielded or in development. The legacy baseline system has a 17 ft geostationary and 10 ft dual polar/geostationary L-S band METSAT antennas, both domed. Depending on site obstructions, the 10 ft antenna may require a tower. Primary indoor processing equipment

includes the satellite data acquisition system (SDAS), ingest data processor/server, maintenance computer, and network data server. Users worldwide access the network data server directly via NIPRNet common user communications using MARK IVB Forecaster Application Software (FAS), which also provides robust imagery analysis capability. SIPRNet users also employ FAS to access data re-hosted on Mirrored Data Servers (MDS) located at data centers. Six DRO systems located throughout the world provide global geostationary coverage and extensive polar coverage. The V1 upgrade (scheduled for initial operational capability in November 2009) adds X-Band and dual L-S band polar ingest capability by incorporating a domed 3 meter X-L-S band antenna mounted on a 20 ft tower, an X-band RF receiver and upgraded server H/W and S/W. It is being fielded at legacy MARK IVB sites. The V2 upgrade is a polar-only system with dual 3 ft or 4.6 ft (site selectable) L-S and 3 meter X-L-S band antennas, and indoor equipment common with the equivalent V1 suite (i.e., geostationary antenna indoor equipment is removed). The V3 upgrade, IOC TBD, is a polar-only system with a single 3 ft or 4.6-ft site selectable L-S band antenna and the required suite of common indoor equipment.

2.4.39.2. **Requirements Determination.** The MARK IVB provides real-time METSAT imagery and model input data that directly supports all DoD services' wartime mission execution, resource protection, and training missions worldwide; national agencies, and other U.S. Government agencies including the U.S. Forest Service and the NWS. Obtain further information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.39.3. **Scope Determination.** The geostationary antennas require an unobstructed equator-facing view to the site's primary and secondary assigned geostationary METSAT. The polar antennas require a 360 degree unobstructed view (5 degree elevation angle threshold, 0 degree objective). The indoor equipment requires a normal temperature controlled electronic equipment environment.

2.4.39.4. **Dimensions.** The legacy antenna equipment requires an approximately 46 m (150 ft) x 21 m (70 ft) fenced compound. The V1 requires an approximately 67 m (220 ft) x 21 m (70 ft) fenced compound. The V2 requires an approximately 40 m (130 ft) x 15 m (50 ft) fenced compound. The V3 requires an approximately 6.1 m (20 ft) x 6.1.m (20 ft) fenced compound.

2.4.39.5. **Design Considerations.**

2.4.39.5.1. **Communications Requirements.** One 12-strand dedicated single-mode fiber optic cable is needed from the MARK IVB antenna location to the indoor equipment location. The site network server and the user computer hosting FAS software require common user access to NIPRNet. Classified data users and the MDS software host require common user access to SIPRNet. Additionally, the MDS host requires NIPRNet connectivity to MARK IVB site(s) and a TGS (or alternative cross-domain) path to the high side server provided by the MDS site.

2.4.39.5.2. **Special Features.** Site/facility security requires that only authorized personnel are granted physical access to antenna sites. Site/facility security requires that only authorized personnel with a need-to-know are granted physical access to computing facilities that house the MARK IVB indoor processing equipment which includes COMSEC equipment. The computing facility should be locked and alarmed

with features sufficient to meet unattended COMSEC storage requirements. A fire suppression system is needed for the indoor equipment with a local and remote fire activation and alarm capability.

2.4.39.5.3. **Power Requirements.** MARK IVB power requirements are specified in **Table 2.29** below. The requirement for emergency power is determined under AFI 32-1063.

Table 2.29. MARK IVB Power Requirements.

Type	V-Ph-Hz	Rated A	kVA	kW	Comments
Tracking Antenna	208-3-50/60	30	10.81	8.65	
Pointing Antenna	208-3-50/60	30	10.81	8.65	
Racks (via UPS)	230-S-50	50	10	8	
Tracking Radome ECU	400-3-50	30		16.63	3 ton (36,000 BTU) cooling, 13 kW heater
Pointing Radome ECU	400-3-50	45		22.17	4 ton (48,000 BTU) cooling, 13 kW heater
Rack Room ECU	(site provided)			33.26	5 ton (60,000 BTU) cooling, 20 kW heater1
X-band Antenna	208/230-S-50/60	20	4.16	3.33	
X-band Radome ECU	(site provided)			16	3 ton (36,000 BTU) cooling,10 kW heater1
Total rated kW				116.7	
Total rated kVA			145.88		
NOTES: 1. May vary by site-representative values.					

2.4.40. **Receiving Set, Satellite (RSS), TMQ-54 (New Requirement). FAC: 1341**

CATCODE: 149XX9
OPR: AFWA/A5/A8, MAJCOM/A3W
OCR: MAJCOM/A6

2.4.40.1. **Description.** RSS, TMQ-54 is a 24/7 unmanned METSAT DRO system. It is a polar METSAT only system with a 1 m (3 ft) or 1.4m (4.6 ft) (site selectable) L-S band antenna. Primary indoor processing equipment includes a data acquisition system (DAS) and network data server. Users worldwide access the network data server directly via NIPRNet common user communications using MARK IVB FAS, which also provides robust imagery analysis capability.

2.4.40.2. **Requirements Determination.** The RSS provides real-time METSAT imagery that directly supports all DoD services' wartime mission execution and resource protection for the contingency theater(s) to which it is deployed. Obtain further

requirement determination information through AFWA/A5/8 or MAJCOM/A3 weather staff.

2.4.40.3. **Scope Determination.** The antenna requires a 360 degree unobstructed view (5 degree elevation angle). The indoor equipment requires a normal temperature controlled electronic equipment environment.

2.4.40.4. **Dimensions.** The antenna requires an approximately 1.5 m (5 ft) x 1.5 m (5 ft) area. A concrete or asphalt pad is desirable but not required. Depending on site obstructions, roof mounting or a tower may be required.

2.4.40.5. **Design Considerations.**

2.4.40.5.1. **Communications Requirements.** A custom 61 m (200 ft) power/data cable provided with the system is needed from the RSS antenna location to the indoor equipment location. The site network server and the user computer hosting FAS software require common user NIPRNet access.

2.4.40.5.2. **Power Requirements.** The RSS requires 120 VAC, 60 Hz, 5.4 A, or 240 VAC, 50/60 Hz, 2.7 A input power to the indoor equipment. The antenna is serviced by a custom 61 m (200 ft) power/data cable provided with the system. A power conditioner and UPS are also provided with the system. The requirement for emergency power is determined under AFI 32-1063.

2.4.40.5.3. **Special Features.** Site/facility security requires that only authorized personnel are granted physical access to antenna sites. Site/facility security requires that only authorized personnel with a need-to-know are granted physical access to computing facilities that house the RSS indoor processing equipment which includes COMSEC equipment. The computing facility should be locked and alarmed with features sufficient to meet unattended COMSEC storage requirements. A fire suppression system is needed for the indoor equipment with a local and remote fire activation and alarm capability.

2.4.41. **Air Traffic Control Tower. FAC: 1413**

CATCODE: 149962
OPR: AFFSA
OCR: AF/A3O-AO

2.4.41.1. **Description.** The air traffic control tower is necessary for the safe and efficient conduct of flight operations and consists of the control tower cab, a training and crew briefing room, mechanical rooms, Airfield Operations flight office, Commander's office, administration, back-up generator, utility support, extensive communication support, catwalk around the outside of the cab, intercom system, security system, and an elevator in new facilities. A Surface Weather Observing Facility (**CATCODE 141629**) or Base Operations (**CATCODE 141453**) may also be included in this facility. Provide an access road and parking lot for non-organizational and organizational vehicles.

2.4.41.2. **Requirements Determination.** Each airfield is authorized an air traffic control tower. See *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* for further guidance. For the latest information and drawings, plans, utility, siting, and electronic requirements, consult AFFSA.

2.4.41.3. **Scope Determination.** Space requirements are generally dictated by the site survey and statement of intent (SOI) that defines some site-specific design parameters. Consult Chapter 1 of the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide* for additional guidance.

2.4.41.4. **Dimensions.** Space requirements depend primarily on the height requirements of the tower and the standard floor layout. See **Table 2.30** and Parts 3 and 4 of the *Air Traffic Control Tower and Radar Approach Control Facility Design Guide.*

2.4.41.5. **Design Considerations.** The vertical stacking abilities and computer-controlled, electro-mechanical devices may require additional design considerations for floor loading, fire sprinkler delivery volumes and layout, electrical power supply, and environmental control. Provisions should be made for panels for remote control of airport lighting. Special protection or siting may be required in high-threat areas. A method of emergency egress may be required; contact the installation fire chief for assistance. See section 17, *Air Traffic Control Siting Criteria*, of UFC 3-260-01, for additional information.

Table 2.30. Air Traffic Control Tower Space Requirements.

Function	Net Building Area	
	m2	ft2
Lobby	4.27	46
Elevator1	as needed	
Elevator Machine Room	as needed	
Mechanical and Electrical Room	as needed	
Simulator Classroom	32.52	350
Administration2,3	5.95/person	64/person
Airfield Operations Flight Office (Type D)2	11.15	120
Training Room3,4	--	--
Equipment Rooms	as needed	
Ready/Break Room	28	300
Control Tower Cab	50	540
Toilets (alternating floors)	2.6 to 3.3	28 to 35
Communications/Power Closet	as needed	
Weather Observation Site (if space is available)	28	300
Stairs	as needed	
Parking spaces (largest duty shift)	0.5 x number of people	

NOTES:
1. Equip towers with a cab floor level of 50 ft or more above the ground floor with an elevator.
2. See Chapter 6 of this Manual for approved office types and sizes.
3. Number of personnel requires user justification.
4. See Chapter 6, Tables 6.3 and 6.4.

2.5. Category Group 15, Waterfront Operational Facilities.

2.5.1. Liquid Fuel Unloading Pier. FAC: 1511

CATCODE: 151155
OPR: AF/A4LE, AFPET/PTOT
OCR: AFCESA/CEO

2.5.1.1. **Description.** Waterfront unloading facilities for the delivery of petroleum products by ship or barge.

2.5.1.2. **Requirements Determination.** At installations where the delivery of petroleum products by ship or barge is feasible and economically advantageous, waterfront unloading facilities may be provided. A separate unloading pier or wharf may be provided if shore conditions permit.

2.5.1.3. **Scope Determination.** The pier includes mooring equipment, hose connections, pipe manifolds, valving, hose derricks and racks, and fire protection equipment. Facilities that are intended for barge receipts include a product filtration system. See UFC 4-151-10 *General Criteria for Waterfront Construction;* UFC 4-152-01, *Design: Piers and Wharves;* and UFC 4-159-03, *Design: Moorings*.

2.5.1.4. **Dimensions.** See UFC 3-460-01.

2.5.1.5. **Design Considerations.**

2.5.1.5.1. Design piping systems to permit tankers to unload in the shortest reasonable time. This normally does not exceed 24 hours. Size piping in accordance with the requirements outlined in UFC 3-460-01.

2.5.1.5.2. Provide a safe, navigable channel access and mooring that has sufficient depth at mean low water (MLW) to provide a floating keel and vessel propulsion at all times.

2.5.1.5.3. Provide a vessel ground cable. Permanently connect the cable to shore piping and equip it with an explosion-proof open/close switch. Equip the cable end with a screw clamp for securing to the vessel hull.

2.5.1.5.4. Provide a product recovery system to collect liquid spilled from hose end pipe sections during connect-disconnect operations.

2.5.1.5.5. Provide a capability to contain and recover marine spills at the berth. The capability may be contracted out, or provided by Air Force or DoD owned equipment physically positioned on station.

2.6. Category Group 16, Harbor and Coastal Operational Facilities.

2.6.1. Liquid Fuel Off-Shore Unloading Facility. FAC: 1631

CATCODE: 163311
OPR: AF/A4LE, AFPET/PTOT
OCR: AFCESA/CEO

2.6.1.1. **Description.** This facility consists of a submerged sea unloading pipeline with tanker mooring facilities.

2.6.1.2. **Requirements Determination.** Under some circumstances it may be advantageous to use an offshore unloading facility.

2.6.1.3. **Scope Determination.** See UFC 4-151-10, UFC 4-152-01, and UFC 4-159-03.

2.6.1.4. **Dimensions.** See UFC 3-460-01.

2.6.1.5. **Design Considerations.**

2.6.1.5.1. Securely anchor the underwater pipeline to the bottom and ensure it extends from the shore out to the mooring area. Size the pipeline according to the same conditions outlined above for piers and wharves.

2.6.1.5.2. Provide tanker mooring buoy(s) at the end of the pipeline in water deep enough for the safe maneuvering and berthing of the size tankers expected to use the facility.

2.6.1.5.3. A conventional five-point mooring is normally provided. The use of single point mooring buoys is not permitted without prior approval from AFCESA/CEO.

2.6.1.5.4. Wherever waterfront fuel loading or unloading facilities are provided, facilities for control of fuel spills are necessary. This includes a storage building, approximately 93 m^2 (1,000 ft^2), to store a small boat and fuel spill containment booms. Necessary quick boat launching capability is also required. Locate the storage structure as close to the fuel loading or unloading facilities as possible. Use Petroleum Operations Building (**CATCODE 121111**) for reporting purposes. Ensure the facilities comply with local, state, and federal requirements in respect to fuel vapor emissions, as required by AFI 32-7040, and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

2.7. Category Group 17, Training Facilities.

2.7.1. **General Guidance.** The following guidance applies to all facility requirements described in this chapter that involve lecture or seminar classrooms, and all classroom requirements identified under operational facilities described elsewhere in this manual.

2.7.1.1. The term "classroom" is included in the official nomenclature of only two facilities: Technical Training Classroom (**CATCODE 171621**) and Flying Training Classroom (**CATCODE 171211**). However, most of the facilities listed in this chapter include some classroom space. Classrooms are also included in some "non-training" facilities (see list in **paragraph 2.7.1.3**). Many training programs include instruction outside of the classroom and, therefore, classrooms designated for particular programs are often available for part-time use by other programs. The latter may include segments of major training programs or any of the variety of smaller training programs that require intermittent use of space.

2.7.1.2. To achieve maximum utilization of existing classroom space and to ensure that any space acquisitions are thoroughly justified, training program managers should coordinate their plans and schedules so as to define a base-wide facility requirement for lecture and seminar classrooms. To determine the base-wide requirements and deficiencies, a three-step approach should be used:

2.7.1.2.1. Step One establishes the desired learning environment. This involves a detailed analysis of curricula, student loads, group sizes, training schedules, security requirements, telecommunications requirements, and desired student proximity.

2.7.1.2.2. Step Two translates this desired learning environment into specific facility requirements. This involves determining the ideal combination of rooms and students per room which provides the highest rate of occupancy compatible with the training to be accomplished.

2.7.1.2.3. Step Three establishes facility deficiencies. This involves identifying all facility assets and defining their capabilities for satisfying the requirements established under the preceding steps.

2.7.1.3. In identifying facility assets under step three above, do not overlook lecture classroom space that may be available for part time use in certain "non-training" facilities such as Aerial Delivery Facility (**CATCODE 141232**), Squadron Operations (**CATCODE 141753**), Base Supply Administration (**CATCODE 610122**), Base Personnel Office (**CATCODE 610128**), Depot Operations Logistical Facility (**CATCODE 610675**), Security Forces Operations (**CATCODE 730835**), and Education Center (**CATCODE 730441**). Conference room space in various headquarters facilities (**CATCODE 6102XX**) should also be considered.

2.7.1.4. Space allowances for lecture classrooms are given in **Table 6.4** in **Chapter 6**. The criteria apply to rooms furnished with fixed tablet arm chairs or chairs and narrow tables occupying comparable space. The instructor station contains only enough space for small portable training aids. For types of instruction that require more area per seat than **Table 6.4** allows, space criteria are established on the basis of individual training programs. In the interest of economy, space per seat should be the minimum compatible with the desired learning environment.

2.7.2. **Band Center. FAC: 1713**

CATCODE: 171158
OPR: SAF/PA
OCR: N/A

2.7.2.1. **Description.** This facility provides space for the operation and administration of a band and its musical units.

2.7.2.2. **Requirements Determination.** Each Air Force Band is divided into several musical units that rehearse and perform simultaneously. The band center includes the following.

2.7.2.2.1. **Acoustically Treated Rehearsal Studios and Individual Practice Rooms.** All required band elements should be able to practice at the same time in different rooms. The size of each rehearsal studio is to be determined by the number of participants, type of music to be rehearsed, and additional space as required to achieve proper acoustical feedback. Do not design studios as a performance space to accommodate spectators.

2.7.2.2.2. **Music Library.** This is a secure storage area for musical instruments and supplies; separate lockers, dressing rooms, and restrooms for men and women; and an acoustically treated room for an arranger.

2.7.2.2.3. **Administrative Space.** This space has separate offices for the commander, deputy commander (if authorized), band manager, first sergeant, operations section, and administrative support personnel. Consult **Chapter 6** on approved office types and sizes.

2.7.2.2.4. **Acoustically Treated Training Room.** Requirements implemented through the new Career Field Education and Training Plan (CFETP) rely on machines and interactive computers to measure rhythmic and pitch accuracy, utilizing headphones, microphones, and listening devices. Auditions for program accessions and testing for upgrade training also require this room to be acoustically treated.

2.7.2.3. **Scope Determination.** Space requirements are determined by the number of performing groups and the size of the band. Reference AFI 35-101, *Public Affairs Policies and Procedures*, for further information.

2.7.2.4. **Dimensions.** Minimum space requirements are shown in **Table 2.31** below.

2.7.2.5. **Design Considerations.** Contact OPR for the latest guidance on design considerations.

Table 2.31. Space Requirements for Band Facilities.

Band Size	Gross Area	
	m2	ft2
11-piece Band	743	8,000
30-piece Band	1,770	19,000
45-piece Band	2,320	25,000
USAFA Band	2,790	30,000
USAF Band	5,570	60,000

2.7.3. **Flight Training Classroom. FAC: 1711**

CATCODE: 171211
OPR: 19AF/A3
OCR: AETC/A3F/A5R, AF/A3O-AT

2.7.3.1. **Description.** This facility provides classrooms required by flying training programs listed in the Air Force *Education and Training Course Announcements (ETCA)* database (formerly AFCAT 36-2223, *USAF Formal Schools Catalog*) located at **https://etca.randolph.af.mil**. Classrooms identified under this category code are separate from those directly associated with Flight Simulator Training (**CATCODE 171212**), UPT/UNT Flight Training (**CATCODE 171213**), Physiological Training (**CATCODE 171214**), and Squadron Operations (**CATCODE 141753**).

2.7.3.2. **Requirements Determination**. Contact OPR.

2.7.3.3. **Scope Determination.** The required number of classroom seats and number and size of classrooms required for flying training are determined under guidance in **paragraph 2.7.1** above.

2.7.3.4. **Dimensions.** See **Chapter 6**, **Table 6.4** for classroom space requirements.

2.7.3.5. **Design Considerations.** The facility may include space for support activities directly related to classroom operations. Criteria under Technical Training Support Space (**CATCODE 171627**) also apply to flying training classroom support space.

2.7.4. **Flight Simulator Training. FAC: 1721**

CATCODE: 171212
OPR: 19AF/A3, AETC/A3ZA
OCR: AETC/A3F/A5R, AMC/A3TR, AF/A3O-AT

2.7.4.1. **Description.** This facility houses aircraft flight simulators, and other special training devices. It also includes space for administration and records, classrooms, toilet facilities, trainer maintenance, and storage.

2.7.4.2. **Requirements Determination.** Flight simulator training facility requirements are normally determined during the weapon systems' conceptual and definition phases and revised as required by later revisions in the system.

2.7.4.3. **Scope Determination.** Flight simulator training facilities are normally sized according to the type of simulator installed and vary considerably in floor area from one system to another. **Table 2.32** and **2.32.1** are examples of typical simulator training facilities and can be used for initial planning purposes before specific simulator systems and their associated space requirements are identified.

2.7.4.4. **Dimensions.** The Net Building Area facility requirement for flight simulator training is the sum of the following requirements.

2.7.4.4.1. Space is necessary for the simulator itself as determined by Standard Aircraft Flight Simulator Characteristics (Orange Book), Contract End Item (CEI)/Facility Contract End Item (FCEI), or Facility Design Criteria specifications for the specific simulator system under consideration.

2.7.4.4.2. Required space includes, but is not limited to, a simulator maintenance office, supply, and storage space; administration space; instructor office and counseling space; technical library; and security storage space. See **Chapter 6** for administrative space standards

2.7.4.5. **Design Considerations.** Ensure design requirements include Air Force Occupational Safety and Health Standard AFOSH Std 91-118, *Training Systems Fire Protection*, and ETL 01-18, *Fire Protection Engineering Criteria - Electronic Equipment Installations*, at a minimum.

Table 2.32. Space Requirements for Flight Simulator Training.

	1 Bay		2 Bay1		3 Bay2,3	
	m2	ft2	m2	ft2	m2	ft2
Net Building Area	708	7,620	1,310	14,130	1,840	19,820
Gross Area Total (Net-to-Gross Multiplier of 1.25%)	885	9,525	164	17,663	2,300	24,775
NOTES: 1. When 4 simulator bays are needed, double the area for a 2 bay simulator. 2. When 5 simulator bays are needed, add the area for a 3 bay and a 2 bay simulator. 3. When 6 simulator bays are needed, double the area for a 3 bay simulator.						

Table 2.32.1. Additional Space Requirements for Additional Aircrew Training Devices (ATD) within Flight Simulator Facilities Training (KC-10 BOT; KC-135 BOWST; KC-10 FTD, etc).

	1 Bay		2 Bay		3 Bay	
	m2	ft2	m2	ft2	m2	ft2
Net Building Area	242	2,600	483	5,200	585	6,300
Gross Area Total (Net-to-Gross Multiplier of 1.25%)	303	3,250	604	6,500	731	7,875

2.7.5. **Physiological Training. FAC: 1722**

CATCODE: 171214
OPR: 19AF/A3
OCR: AETC/A3F/A5R, AF/A3O-AT

2.7.5.1. **Description.** Functions performed in this facility include training air crew members and passengers in subjects such as physiological effects of high altitude flying, acceleration effects, spatial disorientation training, night vision, rapid decompression, emergency escape, oxygen equipment, and pressure suits adjustment. See AFI 11-403, *Aerospace Physiological Training Program*.

2.7.5.2. **Requirements Determination.** All requests for construction of physiological training buildings require approval by the Office of the Surgeon General, United States Air Force (AF/SG), including the designation of those installations at which pressure suit, egress, fighter aircrew conditioning program, and advanced spatial disorientation training are conducted.

2.7.5.3. **Scope Determination.** Specialized equipment installed in physiological high altitude training buildings includes sixteen or twenty-man low-pressure chambers, vacuum pumps, compressors, rapid decompression valves, emergency procedures trainers, ejection seat trainers, reduced oxygen breathing devices, fighter aircrew conditioning program equipment, virtual reality parachute trainer, oxygen cylinders, regulators and masks, pressure suits and helmets with related equipment, pressure breathing consoles, night vision trainers, spatial disorientation trainers, high pressure (hyperbaric) chambers, high pressure storage tanks, compressors, and related communications, recording, and medical equipment.

2.7.5.4. **Dimensions.** For the basic building where no pressure suit or ejection seat training is given, 823 m^2 (8,862 ft^2) space is authorized. For buildings housing the Advanced Spatial Disorientation Training Device, include an additional environmentally controlled space of 37.162 m^2 (400 ft^2) with a ceiling height of 14 ft, plus 6 m^2 (64 ft^2) for the operating console.

2.7.5.5. **Design Considerations.** Contact OPR for the latest guidance on design considerations.

2.7.6. **Range Supplies and Equipment Storage. FAC: 1731**

CATCODE: 171472
OPR: Headquarters Air Force Security Forces Center, Combat Arms Branch (AFSFC/SFXW)
OCR: 575 CBSS/Small Arms Program Office, Warner Robins Air Logistics Center (WR-ALC), AFCEE/TDR, AFCESA/CEOA

2.7.6.1. **Description.** This building provides secure storage for miscellaneous range supplies, tools, and equipment. Use prefabricated metal, reinforced concrete, reinforced masonry, or wooden construction. Depending on location, type, and value of items stored, this facility may be combined with the target storage and repair building.

2.7.6.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

2.7.6.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

2.7.6.4. **Dimensions.** Size requirements vary; however, 19 to 28 m^2 (200 to 300 ft^2) of space is normally required.

2.7.6.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.7. **Range Target Storage and Repair. FAC: 1731**

CATCODE: 171473
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.7.1. **Description.** This facility provides space for the secure storage and repair of targets used at combat arms ranges.

2.7.7.2. **Requirements Determination.** Special weapons ranges for the M240B machine gun, 40 mm grenade launchers, shot guns, or other special weapons may require separate target storage/repair facilities. These facilities are authorized when existing space is inadequate to provide this support.

2.7.7.3. **Scope Determination.** Items stored include target mechanisms, targets, and target construction and repair material. Repair space contains tables and workbenches.

2.7.7.4. **Dimensions.** Space requirements are as follows: 25 m (82 ft) indoor or outdoor rifle range, pistol range of 28 m^2 (300 ft^2), and a multipurpose range of 37 m^2 (400 ft^2).

2.7.7.5. **Design Considerations.** Provide an electrical power source for operating power tools.

2.7.8. **Indoor Small Arms Range. FAC: 1718**

CATCODE: 171475
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.8.1. **Description.** Indoor small arms range. See ETL 11-18, *Small Arms Range Design and Construction.*

2.7.8.2. **Requirements Determination.** Regions subject to snow accumulation and extended periods of continuous sub-freezing temperatures should have indoor ranges.

2.7.8.3. **Scope Determination.**

2.7.8.3.1. The number of firing positions establishes the width of the firing line. All small arms (rifle, pistol, and shotgun) ranges require a minimum of fourteen positions on the firing line. Add additional positions in increments of seven firing positions. The width of the firing positions is at least 1.52 m (5 ft) center-to-center. The firing line is located on a stable horizontal surface that is at least 4.3 m (14 ft) wide, clear distance, for the length of the firing line. For special weapons, Combat Arms personnel specify the number of firing positions and the width of each position based upon training requirements.

2.7.8.3.2. **Range Control Booth.** The control booth is a control center where the chief range officer can observe and control the entire range. See ETL 11-18 for guidance on range control booths.

2.7.8.4. **Dimensions.** See ETL 11-18.

2.7.8.5. **Design Considerations.**

2.7.8.5.1. The goal of the new Air Force small arms training philosophy is to increase the current 25 meter standard target distance and expand the diversity of training that can be accomplished on the range. Ranges should be designed to allow the greatest target distance possible within the available land at the site (e.g., 50 m, 100 m, 300 m, 1,000 m). The desired target distance is at, or as close as possible, to the sight zero distance for the weapon.

2.7.8.5.2. Design the range to control heavy metals and/or dust produced at both the 21 muzzle, ejection port of the weapon, bullet trap, and from the ventilation exhaust to ensure compliance with local, state, and federal regulations. Review NMCPHC-TM 6290.10, *Indoor Firing Ranges Industrial Hygiene Technical Guide,* and AFMAN 48-155, *Occupational and Environmental Health Exposure Controls*. ETL 11-18 for additional guidance.

2.7.8.5.3. Ensure the ventilation system controls exposure to lead and heavy metals in accordance with 29 CFR 1910.1025, *Lead*. See ETL 11-18 for additional guidance.

2.7.8.5.4. See 11-18 for additional design criteria.

2.7.9. **Combat Arms (CA) Building. FAC: 1718**

CATCODE: 171476
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.9.1. **Description.** This building supports the activities of a CA section.

2.7.9.2. **Requirements Determination.** This contains space for classroom instruction, program administration and weapons maintenance, weapons cleaning and degreasing, alarmed weapons and ammunition storage, latrine facilities, and miscellaneous storage. It is used in conjunction with a ground weapons range system.

2.7.9.3. **Scope Determination.** The basic facility supports a Small Arms Range System, (**CATCODE 179475)** with up to 21 firing points. The minimum net space requirement is 167 m^2 (1,800 ft^2). (See ETL 11-1.) Facility components and net space criteria are:

2.7.9.3.1. **Classroom.** This is a demonstration/performance classroom. It requires sufficient space to provide each student attending handgun, rifle, shotgun, or submachine gun training with a chair and a table work surface of at least 610 mm x 915 mm (24 in x 36 in). Provide space for each student attending machine gun or mortar training with a work surface of at least 865 mm x 1145 mm (34 in by 45 in). The minimum size classroom is 84 m^2 (900 ft^2).

2.7.9.3.2. **Administrative Space.** It provides space for program administrators and combat arms personnel. See **Chapter 6** for further guidance on administrative space standards. This Manual supersedes other references for developing administrative space requirements for Air Force facilities.

2.7.9.3.3. **Weapons Simulator Room.** This room is specifically designed for commercially purchased projection-based weapons simulators. A five-lane system requires a room approximately 10.7 m x 5.3 m (35 ft x 17.5 ft). A ten-lane system requires approximately 10.7 m x 10.7 m (35 ft by 35 ft). The room should have at least a 2.7 m (9 ft) ceiling height and no windows.

2.7.9.3.4. **Weapons Maintenance Shop.** The weapons maintenance shop requires space for workbenches, hand tools, power tools, equipment, and spare parts storage. A range that supports fewer than 5,000 weapons requires a 28 m^2 (300 ft^2) shop. An installation that supports over 5,000 weapons requires 37 m^2 (400 ft^2). Provide a lavatory with potable water in the immediate area.

2.7.9.3.5. **Weapons Cleaning/Degreasing Room.** This room accommodates workbenches, degreasing tanks, and spray hoods. Special design requirements include exhaust and ventilation air, vapor-proof electrical fixtures, compressed air service, and solvent-resistant wall and ceiling finishes. The minimum space requirement is typically about 12 m^2 (130 ft^2). A lavatory with potable water should be in the immediate area.

2.7.9.3.6. **Alarmed Weapons and Ammunition Storage Room.** The vault provides secure storage for all weapons for which the CA section is responsible and a less-than-30-day supply of each type of ammunition is used on the range. A gross floor area of 14 m^2 (151 ft^2) is usually adequate. Ensure room construction satisfies the

requirements of DoD 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives*, AFI 31-101, and UFC 4-020-01, *Security Engineering: Project Development (FOUO)*, for construction materials and specifications. In general, vault construction should provide a minimum ten minutes of forced entry delay. Typical vault construction features walls, floors, and roofs of 200 mm (7.9 in) concrete reinforced with two layers of number 4 rebar on 225 mm (9 in) centers, fitted with a class V door.

2.7.9.3.7. **Latrines (Sanitary Facilities).** Provide facilities for both men and women. Provide additional cold water hand-washing stations at the entrance to the CA building and at the firing range. The size of sanitary facilities depends upon the class size at that particular installation. Typically, the women's latrine need only accommodate about one-fourth the number of people as the men's latrine. Because instructors have daily contact with lead/heavy metals and may transfer these contaminants by casual contact, hand-washing stations, showers, changing areas, laundry facilities, and lockers should be provided for instructors to remove lead contamination.

2.7.9.3.8. **Miscellaneous Storage.** This provides space for storage of 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 CA section conducts.

2.7.9.3.9. **Student Weapons Cleaning Area/Room.** This provides space for students to clean their weapons after completion of firing. It may be an outside covered area or a room large enough to accommodate cleaning tables/benches and cleaning materials for normally expected student loads. If a room is provided, ensure it is well-ventilated.

2.7.9.3.10. **Range Target Storage and Repair Building.** This facility provides space for the secure storage and repair of targets. Provides an electrical power source for operating power tools.

2.7.9.4. **Dimensions.** See **Chapter 6** for administrative space standards and ETL 11-18 for operational and special purpose space requirements.

2.7.9.5. **Design Considerations.** A facility supporting a small arms range system of more than 21 firing points requires a proportionately larger classroom and latrine than provided above. Likewise, a facility supporting more than one range system or type of range requires a larger weapons and ammunition storage room. See ETL 11-18 for additional information and guidance.

2.7.10. **Field Training Facility. FAC: 1711**

CATCODE: 171618
OPR: AETC/A5T
OCR: N/A

2.7.10.1. **Description.** Explanation of Terms:

2.7.10.1.1. **Field Training Detachment (FTD).** An AETC detachment established to provide maintenance-oriented technical training on specific systems and their aerospace ground equipment at an operational location. An FTD may be located at a base on a temporary or permanent basis. The requirements of the training mission determine whether an FTD is equipped with a full or partial MTS.

2.7.10.2. **Mobile Training Set (MTS).** A portable set of system training equipment consisting of trainers, training aids, and operational equipment designed for use in the field primarily for support of maintenance training.

2.7.10.3. **Requirements Determination.** FTD facilities are normally provided by the host command and, where possible, should:

2.7.10.3.1. Use existing facilities to house an FTD;

2.7.10.3.2. Be adjacent to the maintenance complex but away from noise centers such as engine test or taxiway areas;

2.7.10.3.3. Have all classrooms on the ground floor when the FTD requires an MTS; and

2.7.10.3.4. Satisfy peculiar training requirements resulting from trainer configuration, radiation or electromagnetic hazards, electrical, pneumatic/hydraulic, or environmental control requirements.

2.7.10.4. **Scope Determination.**

2.7.10.4.1. Classroom space requirements for FTDs without an MTS are determined by considering the quantitative and qualitative Trained Personnel Requirements (TPR).

2.7.10.4.2. Classroom requirements for FTDs with assigned MTSs vary considerably according to the weapons system and the number of trainers assigned. Requirements for planning purposes can be determined from the ETCA database located at **https://etca.randolph.af.mil/**.

2.7.10.4.3. Each FTD, in addition to classroom space, also requires office space, a technical order and instructor room, student lounge, storage space, and toilet facilities. Specific requirements vary with the size of the detachment and nature and amount of the assigned equipment.

2.7.10.4.4. Outlined FTD facility requirements are valid for planning purposes only. A facility surveillance visit is conducted by the responsible training center to coordinate detailed requirements before moving an FTD to a new location. New systems require close coordination and cooperation between the contractor, the System Program Office (SPO), the using command(s), and AETC to assure satisfactory and timely requirements.

2.7.10.5. **Dimensions.** See **Chapter 6**, **Table 6.4** for classroom space requirements.

2.7.10.6. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.11. **Technical Training Classroom. FAC: 1711**

CATCODE: 171621
OPR: AETC/A5T
OCR: 2AF

2.7.11.1. **Description.** This facility provides space for technical training courses prescribed in the ETCA database located at **https://etca.randolph.af.mil** and conducted at AETC Training Wings.

2.7.11.2. **Requirements Determination.** The technical training classrooms are used to conduct lectures and demonstrations with the aid of computers, audiovisual, and portable training equipment suitable for table-top demonstrations.

2.7.11.3. **Scope Determination.** Classroom furniture consists of sets of chairs and tables. Reverse projection rooms between classrooms should be identified and included in this category as part of the area, where required.

2.7.11.4. **Dimensions.** See **Chapter 6**, **Table 6.4** for classroom space requirements.

2.7.11.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.12. **Technical Training Laboratory/Shop. FAC: 1712**

CATCODE: 171623
OPR: AETC/A5T
OCR: 2AF

2.7.12.1. **Description.** This category code identifies existing space or programmed requirements in support of technical training courses prescribed in the ETCA database and conducted at AETC Training Wings. Some specific examples are missile maintenance, electronics, weather, aircraft systems, and aerospace ground equipment.

2.7.12.2. **Requirements Determination.** The laboratory houses training which uses various types of large, stationary training equipment to support demonstration and hands-on, systems operations and maintenance training. Examples of equipment used are aircraft egress trainers, landing gear, missiles, flight control systems, and engine and metals fabrication trainers.

2.7.12.3. **Scope Determination.** Base the space requirements and room dimensions on the size and required operational areas of the training equipment as well as providing adequate space to conduct the actual training and equipment maintenance.

2.7.12.4. **Dimensions.** See **paragraph 2.7.12.3** above.

2.7.12.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.13. **High-Bay Technical Training. FAC: 1712**

CATCODE: 171625
OPR: AETC/A5T
OCR: 2AF, 19AF

2.7.13.1. **Description.** This facility provides space for technical training courses prescribed in the ETCA database and conducted at AETC Training Wings.

2.7.13.2. **Requirements Determination.** Some technical training courses use equipment and instructional aides of such large size that standard training room facilities are neither adequate nor feasible. Aircraft, missile silos, missiles, heavy equipment, fire trucks, simulators, and special mock-ups are just a few of the many items used in training that require high-bays, hangars, or rooms larger than 110 m^2 (1,200 ft^2) and/or ceilings exceeding 3.7 m (12 ft). Use this category code to identify space in support of technical training courses that exceed criteria of the other technical training category codes.

2.7.13.3. **Scope Determination.** Base space requirements and room dimensions on **CATCODE 171621** criteria plus space for large equipment and training aids.

2.7.13.4. **Dimensions.** See **CATCODE 171621**.

2.7.13.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.14. **Technical Training Support. FAC: 1711**

CATCODE: 171627
OPR: AETC/A5T
OCR: 2AF, 19AF

2.7.14.1. **Description.** Document facility space required to directly support technical training at the AETC Training Wings under this category code.

2.7.14.2. **Requirements Determination.** Calculate the administrative area per instructor for a one shift operation. Instructors on multiple shifts utilize the same area. See **Chapter 6** for further guidance on administrative space standards. In addition to the above, provide the following area:

2.7.14.2.1. Adequate maintenance area to support training equipment;

2.7.14.2.2. A training supply and storage area;

2.7.14.2.3. An instructor study or lounge;

2.7.14.2.4. A student study or Learning Resource Center;

2.7.14.2.5. A break area or student lounge (one per floor); and

2.7.14.2.6. Special purpose space not identified by other category codes.

2.7.14.3. **Scope Determination.** See **Table 6.3** and **6.4** in **Chapter 6**.

2.7.14.4. **Dimensions.** See **Table 6.3** and **6.4** in **Chapter 6**.

2.7.14.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.15. **Target Intelligence Training. FAC: 1711**

CATCODE: 171712
OPR AETC/A2OI
OCR: N/A

2.7.15.1. **Description.** A secure area used by operational intelligence personnel for mission planning, briefings/debriefings, and aircrew training.

2.7.15.2. **Requirements Determination.** The facility also houses various electronic intelligence/communications systems, intelligence reference library, and general classified storage.

2.7.15.3. **Scope Determination.** Storage area is necessary for at least two mobility boxes and other equipment. Space requirements vary according to the type and size of the unit, the type and number of electronic intelligence systems employed, and the level of security required.

2.7.15.4. **Dimensions.** See **Table 6.3** and **6.4** in **Chapter 6**.

2.7.15.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.16. **Safety Education Facility. FAC: 1711**

CATCODE: 171813
OPR: AF/AFSC/SEM
OCR: N/A

2.7.16.1. **Description.** This facility is necessary to support safety education programs operated under AFIs 91-202, *The US Air Force Mishap prevention Program*, 91-207, *The US Air Force Traffic Safety Program*, and 91-301, *Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program*.

2.7.16.2. **Requirements Determination.** These programs provide students with essential knowledge to improve attitudes toward safe practices, provide information used as a basis for more responsible behavior, and improve driving practices. It provides commanders with an effective way to reduce private and government vehicle accidents, injuries, deaths, and property damages. Additionally, they decrease operating costs by increasing local and overseas vehicle operating education and orientation to improve drivers' attitudes and techniques. Standard equipment includes an electronic console with electrical control box, tape deck, and connecting student responders and slide projectors (16 mm and 35 mm).

2.7.16.3. **Scope Determination.**

2.7.16.3.1. **Classroom.** The space is categorized as a lecture classroom and is furnished with either fixed tablet armchairs or sets of chairs and narrow tables. The space per seat may not exceed that established by **Table 6.4** in **Chapter 6**. The number of seats corresponds to the ideal class size which varies by individual base. The ideal class size is one that best satisfies training objectives, while making optimum use of building, personnel, and equipment resources. The capabilities of the multimedia consoles should be recognized: Model 640 - 40 students; Model 660 - 60 students, and Model 1400 - 40 students. Student chairs should be tiered and adequate aisle space maintained. Ensure the classroom is properly ventilated and equipped with a dimmer switch to control overhead lighting.

2.7.16.3.2. **Projection Booth (Soundproof).** This includes space for the aforementioned standard equipment and space for software storage and equipment maintenance. Provisions should be made for a 60 cycle, 120 watt power source for operating the multimedia education trainer. Approximately 23 m^2 (250 ft^2) should suffice.

2.7.16.3.3. **Administrative Space.** Space is provided for the program administrator and instructors (normally two persons). If the Base Vehicle Operations Office wishes to locate its Drivers Training and Licensing Section in this facility (rather than in Vehicle Operations Administration [**CATCODE 610121]**), additional office space may be provided. Administrative space criteria in **Chapter 6** apply.

2.7.16.3.4. **Student Break Lounge.** See **Table 6.3** in **Chapter 6**.

2.7.16.4. **Dimensions.** See above guidance and **Chapter 6** for administrative criteria.

2.7.16.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

2.7.17. **NCO Professional Military Education (PME) Center. FAC: 1711**

CATCODE: 171815
OPR: AU/A5/A8
OCR: N/A

2.7.17.1. **Description.** This facility supports Enlisted Professional Military Education **(**EPME) courses operated under AFI 36-2301, *Professional Military Education*. Ensure EPME facilities project an atmosphere of professionalism and excellence in which students can achieve educational objectives. These facilities should also create an environment where instructors can provide first-rate education in a quality Air Force setting.

2.7.17.2. **Requirements Determination.** Historically, the development and operation of EPME centers have been largely controlled by the individual commands. In the process, commands have established individual preferences concerning the nature of the facilities they want to provide. Air Force supports the command's role in this area and issues this guidance not to dictate development, but to indicate Air Force approval of the described requirements and provide desirable minimum space requirements.

2.7.17.3. **Scope Determination.** Facility components and associated space criteria follow. In all components, the basic determinants of net space requirements are the size of the student body (which dictates the number of classrooms), size of the staff, and the curricula. A summary of all EPME space requirements is shown in **Table 2.33**.

2.7.17.3.1. **Education Areas:**

2.7.17.3.1.1. **Seminar Rooms.** Instructors and students use these rooms as the primary area for academic discussions and case study analysis. Adequate space to allow free circulation while working on case projects, making presentations, and doing small group cluster work is essential. Include space in the seminar room for student study materials, coats, lesson aids, etc. The classroom is also typically equipped with an array of equipment to include a lectern/podium, computers, large graphics monitors, videotape recorder and cameras, overhead projectors, projection screens, marker boards, and flip charts. In addition to being wired to support LAN connectivity and closed-circuit TV (CCTV) capability, classroom should also be acoustically rated to minimize sound transmission between seminars. Average seminars are comprised of 12-14 students plus the instructor. See **Table 6.4** in **Chapter 6** for classroom space standards.

2.7.17.3.1.2. **Auditorium.** Schools with two or more seminars should have an

auditorium. This is the central meeting place for the student body to participate in large group discussions. In addition, the auditorium supports presentations by guest lecturers, dignitaries, and various special EPME-related ceremonies. The auditorium should include appropriate lighting controls to include adjustable lighting in the audience seating area as well as the speaker platform. The audience should have an unobstructed view of the raised speaker platform and projection screen. In addition to a projection booth, a quality sound system, projection screen, and lighted podium are also considered standard. Seating should include retractable desktops for note taking. The auditorium should be designed to accommodate the maximum class load plus an additional seating capacity of 20 percent for staff, distinguished visitors, and other invited groups. See **Table 6.4** in **Chapter 6** for auditorium space standards.

2.7.17.3.1.3. **Projection/Audiovisual Booth.** EPME facilities use high-technology projection equipment to enhance student learning. This is typically designed to accommodate rear-screen projection (optional), securable storage for high-value equipment, and adequate shelving for audiovisual tapes, supplies, etc. Additional equipment usually includes video projectors, cameras, computers, CCTV capability, wireless microphones, speakers, and teleconferencing equipment. For planning purposes, the average net area is 23 m^2 (250 ft^2).

2.7.17.3.1.4. **Guest Speaker/ Distinguished Visitor (DV) Waiting Room.** Provide a comfortable, private area for guest speakers to perform last minute preparations and relax prior to their presentations. Ensure this area presents a professional appearance. These areas should normally include CCTV and phone service. For planning purposes, the average net area is 14 m^2 (150 ft^2).

2.7.17.3.1.5. **Learning Resource Center.** This area usually includes the school library, computer work stations, videotape review stations, and research space. It is also wired for LAN connectivity. Some locations, such as the Senior Noncommissioned Officer Academy (SNCOA), may require additional space for dedicated computer laboratories. Also, it is not essential that this space be all in one room. Although planned workstation requirements vary, calculate the net area on the basis of 37 m^2 (400 ft^2) plus 9.3 m^2 (100 ft^2) for each seminar greater than four (e.g., a six-seminar school would earn 55.6 m^2 [600 ft^2]).

2.7.17.3.2. **Interaction Areas.** These areas are important for student social interaction and the display of unique accomplishments of distinguished airmen. These essential attributes support the mission requirement to inspire commitment to the profession of arms.

2.7.17.3.2.1. **Heritage Room.** Provides important pictorial and static displays of unique enlisted contributions to airpower as well as locally-significant historical information. Include space to allow display case access, etc. This room ties directly to the effective educational goal regarding commitment to the profession of arms. The area should occupy a significant, highly visible space. For planning purposes, the average net area is 23 m^2 (250 ft^2).

2.7.17.3.2.2. **Student Lounge.** This lounge should provide a comfortable, attractive setting for student interaction. In addition to serving as a student break

area, this area is commonly used for events such as course icebreakers and pre-graduation socials. The lounge should include a sink and space for a refrigerator and microwave. It should also be wired for CCTV. Minimum net area is 11.6 m^2 (125 ft^2) per seminar (this roughly equates to one-fourth the area of the classrooms).

2.7.17.3.3. **Administrative Areas.** These areas provide for personnel administration activities and student educational support services, as well as a receiving area for new students and visitors.

2.7.17.3.3.1. **Reception Area.** This high-visibility area is the first part of the EPME center visited by most students, guests, and DVs. This area should establish the professional tone for the entire facility. Ideally, it is located near the facility entrance, but if this is not practical or possible, it should be located near the command section. For planning purposes, the average net area is 13.9 m^2 (150 ft^2).

2.7.17.3.3.2. **Administrative Area.** In addition to supporting the administrative staff, this area should accommodate high traffic and be designed with enough open space to allow easy access to support equipment. It should be sized to accommodate typical support equipment such as file cabinets, FAX machines, copiers, etc. See **Chapter 6** for administrative space standards.

2.7.17.3.3.3. **Student Service Area.** Ideally, this area is located in conjunction with the Administrative Area, and designed to provide necessary space for student processing and customer service. For planning purposes, the average net area is 9.3 m^2 (100 ft^2) plus 2.3 m^2 (25 ft^2) for each seminar greater than four (e.g., an eight-seminar school would earn 19 m^2 [200 ft^2]).

2.7.17.3.3.4. **Commandant/Program Manager's Office.** This office should present a professional appearance and reflect the importance of this enlisted position. Furnishings typically include a conference table for small group consultations as well as hosting of dignitaries. This office is a C size office (13.94 m^2 /150 ft^2).

2.7.17.3.3.5. **Director Offices.** Larger PME operations include a Director of Operations and a Director of Resources. The nature of these functions dictates a private office of sufficient size for small group work, peer discussions, school management activities, and subordinate as well as student counseling. This office is a D size office (11.15 m^2 /120 ft^2).

2.7.17.3.3.6. **Instructor Offices.** These should be of sufficient size and privacy to provide for student counseling sessions, one-on-one instructor training, storage of research/lesson support materials, computer stations, and seating for two (counseling/consultation). Where separate locker rooms cannot be provided, adequate space for uniform storage/changing should be included in the office space. Ideally, these offices should be as close to classrooms as possible. This office is an E size office (7.43 m^2 /80 ft^2).

2.7.17.3.3.7. **Instructor Lounge.** This area supports the staff and instructors as a private break/discussion area. The lounge should provide a comfortable, attractive

setting for staff interaction and include a sink and space for a refrigerator and microwave oven. It should also be wired for CCTV. See **Table 6.3** in **Chapter 6** for break room/lounge space standards.

2.7.17.3.3.8. **Computer/Test Analysis Room.** This securable area provides room for storage of sensitive test items and computerized workstations including scanner equipment and printers. For planning purposes, the average net area is 17 m^2 (180 ft^2).

2.7.17.3.3.9. **Conference Room.** Schools of four seminars or larger require a conference room. These rooms are typically equipped with a large CCTV monitor, podium, projection equipment, computer station, variable lighting, and some type of separate sound system. These areas are used to host internal and outside conferences, as well as conduct continued in-service faculty training. See **Table 6.4** in **Chapter 6** for conference room space standards. Provide 15 percent overflow seating for visitors.

2.7.17.3.3.10. **Locker Rooms.** This is a highly desirable option where possible. Instructor-led and supervised physical fitness programs require regular use of changing/shower facilities for the faculty. This area supports those requirements, and is especially important where fitness center facilities are not in close proximity to the school. If possible, shower capability should be included. Minimum size should be based on size and demographics of staff.

2.7.17.4. **Dimensions.** See **paragraph 2.7.17.3** and **Chapter 6** of this Manual.

2.7.17.5. **Design Considerations.**

2.7.17.5.1. An EPME center requires one or more adjoining outdoor areas for the following described activities. The areas are identified by Training Area (**CATCODE 939449**).

2.7.17.5.1.1. One outdoor area supports the physical fitness program prescribed by the particular PME level, which usually involves various activities such as volleyball and aerobic activity. The required size of the area varies according to the size of the student body and program schedules; a typical area for 30 students contains about 470 m^2 (560 yd^2). Indoor physical conditioning is conducted in the base gymnasium.

2.7.17.5.1.2. An outdoor formation area with access to a stationary flag pole and room for open ranks inspections of students is necessary to support program requirements. Size should be based on the size of the student body.

2.7.17.5.1.3. Classrooms and study areas require protection from outside noise so that a proper learning environment is maintained. Consider this requirement in the facility design and location and in the control of the surrounding activities.

2.7.17.5.2. **Dormitory Requirements.** Base the design, construction, and renovation of dormitories on existing criteria. Most EPME housing (i.e., Noncommissioned Officer Academy [NCOA] and SNCOA) is supported exclusively as dedicated transient VA Lodging operated by the host base Services Squadron. Whenever

practical, students should be housed as close to the PME academic facility as possible.

Table 2.33. Functional Space Requirements for PME Facilities.

Area	Net Building Area m2 (ft2)	Additive Net Area	Comments
Education Areas			
Seminar Rooms			See Table 6.4
Auditorium1			See Table 6.4
Projection/Audiovisual Booth	23 m2 (250 ft2)		
Guest Speaker/DV Waiting Lounge	14 m2 (150 ft2)		
Learning Resource Center	37 m2 (400 ft2)	+9.3 m2 (100 ft2) per each additional seminar over four	
Interaction Areas			
Heritage Room	23 m2 (250 ft2)		
Student Lounge	11.6 m2 (125 ft2)		
Administrative Areas			
Reception Area	14 m2 (150 ft2)		
Administrative Area1	5.95/Person (64/Person)		
Student Service Area	9.3 m2 (100 ft2)	+ 2.3 m2 (25 ft2) per each additional seminar over four	
Commandant/Program Manager's Office2	13.94 m2 (150 ft2) Type C office		Privacy required
Director Offices2	11.15 m2 (120 ft2) Type D office		Privacy required
Instructor Offices2, 3	7.43 m2 (80 ft2) Type E office		Privacy required
Instructor Lounge3, 1			
Computer/Test Analysis Room	17 m2 (180 ft2)		Securable
Conference Room2, 1		+15% for visitors	Usually required for schools of four seminars or more
Locker Room	no set limit; base on staff size		

NOTES:
1. See Chapter 6, Tables 6.3 and 6.4.
2. Refer to Chapter 6 of this Manual for approved office types and sizes.
3. Number of personnel requires user justification.

2.7.18. **Weapons (Munitions) Load Crew Training Facilities. FAC: 1711**

CATCODE: 171875
OPR: AF/A4LW
OCR: N/A

2.7.18.1. **Description.** Responsibility for the weapons loading crew training rests with the Operations Group or Maintenance Group Commanders. The purpose of the training is to ensure that loading crews acquire and maintain the knowledge and physical proficiency necessary to perform their functions in a safe and efficient manner.

2.7.18.2. **Requirements Determination.** The training is conducted in a lecture classroom and on an aircraft parked either in a facility dedicated to load crew training or in available covered aircraft maintenance space (dock or hangar) designated for training use. It is recommended that bomber aircraft have dedicated load-training facilities; however, where not practical, inside facilities should be provided to the maximum extent possible during periods of extreme inclement weather. Responsibility for the munitions loading crew training rests with the Squadron Commander and munitions supervision.

2.7.18.3. **Scope Determination.**

2.7.18.3.1. Adequate office and classroom space with appropriate heating and cooling are required in the academic and practical training area. Additional storage space for weapons training aids, support equipment, and tool kits may be required. Facility assets and deficiencies are determined under procedures given in **paragraph 2.7.1**. Space requirements are determined under **Table 6.3** and **6.4** in **Chapter 6** of this Manual and the guidance in **paragraph 2.7.1.4**. As per **paragraph 2.7.1.4**, space requirements can be increased to provide needed storage and handling space for training aids (munitions items). When the classroom adjoins the dock or hangar containing the training aircraft, the training aids can usually be stored in the larger space.

2.7.18.3.2. The need to provide covered space for the training aircraft under **CATCODE 171875** is determined on the basis of a study that encompasses (a) the feasibility of conducting the training outdoors and (b) the possibility that training requirements can be satisfied through part-time occupancy of space in existing covered aircraft maintenance space or in space to be acquired to meet a deficiency in covered maintenance space. Design requirements for space occupied either full- or part-time for training include provision of interior environmental conditions that support and enhance execution of the training mission. The space requirement for facility acquisitions under **CATCODE 171875** is established by the dimensions of the selected training aircraft plus minimum clearances necessitated by safety, training, and storage needs.

2.7.18.4. **Dimensions.** See **paragraph 2.7.18.3** and **Table 6.3** and **6.4** in **Chapter 6** of this Manual.

2.7.18.5. **Design Considerations.** This facility should be located in close proximity to the operational parking apron to facilitate towing of designated aircraft utilized for load crew training. If operation of an aircraft's Auxiliary Power Unit (APU) is needed during load crew training, include facility design considerations to properly purge the APU exhaust, provide adequate ventilation and fire protection, and provide sound abatement for adjacent training classrooms or office areas.

2.7.19. **Small Arms Range System. FAC: 1750**

CATCODE: 179475
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.19.1. **Description.** This facility is a requirement at each Air Force installation to conduct firearms qualification and proficiency training with individual firearms such as rifles and handguns.

2.7.19.2. **Requirements Determination.** Each range type and/or configuration has different requirements. Data concerning range requirements and specifications are contained in AFI 36-2226, *Combat Arms Program*, and ETL 11-18.

2.7.19.3. **Scope Determination.** See ETL 11-18 for further information on range types, combination ranges, range configuration, site selection, and range geometric design.

2.7.19.4. **Dimensions.** See ETL 11-18.

2.7.19.5. **Design Considerations.** See ETL 11-18. Environmental Assessments are needed in the selection, construction, and operation of all range facilities. See AFI 32-7061.

2.7.20. **Machine Gun Range. FAC: 1758**

CATCODE: 179476
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.20.1. **Description.** This facility supports training of personnel assigned duties as machine gunners.

2.7.20.2. **Requirements Determination.** The design of this range differs according to the type machine guns for which training is to be conducted. Range requirements and specifications are contained in AFI 36-2226 and ETL 11-18.

2.7.20.3. **Scope Determination.** See ETL 11-18 for further information on range types, combination ranges, range configuration, site selection, and range geometric design.

2.7.20.4. **Dimensions.** See ETL 11-18.

2.7.20.5. **Design Considerations.** See ETL 11-18. Environmental Assessments are needed in the selection, construction, and operation of all range facilities. See AFI 32-7061.

2.7.21. **Grenade Launcher Range. FAC: 1761**

CATCODE: 179477
OPR: AFSFC/SFXW
OCR: 575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/CEOA

2.7.21.1. **Description.** The range consists of a cleared open area containing an impact and roll-out area, surrounding clear zones, and appropriate targets. It permits firing of 40 mm low velocity grenades fired from grenade launchers such as the M79, M203, M320, and MK19/47.

2.7.21.2. **Requirements Determination.** A four-position range is normally adequate. Obtain design guidance from AFSFC/SFXW.

2.7.21.3. **Scope Determination.** See ETL 11-18 for further information on range types, combination ranges, range configuration, site selection, and range geometric design.

2.7.21.4. **Dimensions.** See ETL 11-18.

2.7.21.5. **Design Considerations.** Environmental assessments under AFI 32-7061 are needed in the selection, construction, and operation of all range facilities.

2.7.22. **Range, Aircraft. FAC: 1793**

CATCODE: 179481
OPR: AF/A3O-AR
OCR: AFCEE/TDR

2.7.22.1. **Description.** Ranges are needed to provide training in bombing, firing rockets and missiles, and the use of automatic weapons. Types of ranges include air-to-air, air-to-ground, and ground-to-air.

2.7.22.2. **Requirements Determination.** The range is a vacant area that can be used without hazard to life or property. Improvements to areas normally required prior to use as a range are control facilities for scoring targets, minimum access facilities, and communications facilities.

2.7.22.3. **Scope Determination.** Information concerning the quantities of land required and facilities to be provided for an individual or consolidated range is contained in AFI 13-212, *Range Planning and Operations*.

2.7.22.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.7.22.5. **Design Considerations.** See ETL 11-18. Environmental Assessments are needed in the selection, construction, and operation of all range facilities. See AFI 32-7061 for further information.

2.7.23. **Fire Fighter Training Facility. FAC: 1795**

CATCODE: 179511
OPR: AFCESA/CEXF
OCR: AFCESA/CEO

2.7.23.1. **Description.** This facility supports the recurrent proficiency training of fire suppression personnel permitting realistic live training fires in structures, aircraft, and selected weapons systems.

2.7.23.2. **Requirements Determination.**

2.7.23.2.1. Facility requires a mockup of a typical mission assigned aircraft located in a bermed enclosure commensurate with the typical aircraft fuel load. A stabilized area around the spill area is necessary to permit all weather multidirectional access, including drive-around capability by the largest assigned vehicle. A Standardized Design, Crash Fire Rescue Training Facility-3J (jet fueled) or 3P (propane fueled) is available from AFCESA/CEO.

2.7.23.2.2. Mockup and spill area for three dimensional fires is necessary.

2.7.23.2.3. A non-combustible facility is needed for structural fire training. This facility should be multiple stories, three to four stories preferred, with multiple height roofs.

2.7.23.2.4. A drafting pit and fire hydrant should be included as well as a fuel dispensing system connected to a storage tank and servicing connection. Liquid propane is the primary fuel.

2.7.23.2.5. Adequate pollution control devices required to meet local, state, and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** should be in place including, but not limited to, double lined fire training facility and closed loop, no discharge facility.

2.7.23.3. **Scope Determination.** Site new, renovated, or expanded facilities according to ETL 91-4, *Site Selection Criteria for Fire Protection Training Areas*. Locate facilities to comply with explosives safety standards.

2.7.23.4. **Dimensions.** Contact OPR for latest requirements and guidance.

2.7.23.5. **Design Considerations.** Use AFI 32-7041 as a reference for planning, programming, design, construction, and operation/maintenance.

Chapter 3

FACILITY CLASS 2, MAINTENANCE FACILITIES

3.1. Category Group 21, Maintenance Facilities.

3.1.1. General Criteria.

3.1.1.1. Hangars and docks provide space for scheduled inspections, landing gear retraction tests, aircraft weighing, major maintenance on fuel systems, airframe repairs, and technical order (TO) compliance and modifications.

3.1.1.2. Review fire detection and suppression requirements before mission or aircraft change or facility renovation. Reference UFC 3-600-01; ETL 02-15, *Fire Protection Engineering Criteria-New Aircraft Facilities*; and ETL 98-8, *Fire Protection Engineering Criteria-Existing Aircraft Facilities*.

3.1.1.3. Ensure aircraft maintenance facilities comply with local, state, and federal requirements in respect to air emissions, as required by AFI 32-7040. Locate facilities to comply with explosives safety standards. Special consideration may be needed for storage of explosives components such as egress seats, aircraft gun systems, and aircrew flight equipment shops. See **Chapter 1** of this Manual for additional facility compliance requirements.

3.1.1.4. This chapter covers facility requirements for common Air Force maintenance facilities. However, some facility requirements, such as those for newer, unique, or future weapon systems, were unknown or under development at the time of this document's publication and, therefore, are not included. Contact the lead MAJCOM or OPR for standard facility requirements not contained in this Manual.

3.1.2. Hangar, Maintenance. FAC: 2111

CATCODE: 211111
OPR: AF/A4L
OCR: N/A

3.1.2.1. **Description.** Maintenance hangars provide space for aircraft maintenance, tool rooms, aircraft weighing and other maintenance and inspection activities.

3.1.2.2. **Requirements Determination.** Hangars support aircraft maintenance, repair, and inspection activities that are most efficiently done under complete cover. One maintenance space may be provided in a hangar sized for the largest aircraft assigned to the base. Separate studies are used to determine hangar requirements to accommodate C-5, E-3A, E-4, and KC-10 aircraft. See UFC 3-260-01 for additional information on aircraft maintenance areas, support areas, and orientation of facilities.

3.1.2.3. **Scope Determination.** Determine the square footage requirements for maintenance hangars by the method described below for computing covered maintenance spaces.

3.1.2.3.1. Calculate the number of authorized covered maintenance spaces by using the procedures in **Table 3.1** or **paragraph 3.1.2.3.6**. (Computation for Special

Missions), or both. Dock space described under Large Aircraft Maintenance Dock (**CATCODE 211173**), Medium Aircraft Maintenance Dock (**CATCODE 211175**), Small Aircraft Maintenance Dock (**CATCODE 211177**), and Fuel System Maintenance Dock (**CATCODE 211179**) may be used to meet the space requirements.

3.1.2.3.2. To determine the most efficient combination of facility use and aircraft positioning, use templates representing the aircraft (see **CATCODE 113321** for aircraft dimensions) and floor plans of existing and proposed docks and hangars made to the same scale. Arrange the templates in various combinations to find the arrangement that most efficiently conserves space and permits maintenance operations. Do not overlook tail heights, the height and width of door openings, structural protuberances in facilities, and the turn radius of tow vehicles connected to aircraft.

3.1.2.3.3. One additional covered work space is authorized if the corrosion control workload exceeds the covered work space allocated under **Table 3.1** and/or for special missions. An excessive corrosion control workload occurs with some combinations of numbers and types of aircraft, environmental and climatic factors, and the availability of scheduled depot maintenance. Provide the additional space as a single aircraft space because of isolation requirements stipulated in TO 42A-1-1, *Safety, Fire Precaution, and Health Promotion Aspects of Painting, Doping, and Paint Removal.* Contact OPR for latest version of TO 42A-1-1.

3.1.2.3.4. To determine the interior dimensions of dock and hangar bays, use the dimensions of the largest aircraft that occupies the bay plus the minimum clearances shown in **Table 3.2**. To compute the gross area of the hangar, multiply the interior dimensions by a factor of 1.15.

3.1.2.3.5. Provide space for Contractor Operated Maintenance Base Supply (COMBS). Determine space requirements by the existing contract. Locate the facility in close proximity to the flight line and ensure the facility contains areas for receiving, inspection, storing, parking material, issuing, support equipment maintenance, and office functions.

3.1.2.3.6. **Computation for Special Missions.** The formula in **Table 3.1** applies only to units with repetitive flying hour programs or relatively constant monthly operations in non-arctic conditions. To calculate the number of authorized covered spaces for Air Force Materiel Command (AFMC) and for installations in arctic climates, use the following formula:

$$S = H \times A / 176$$

Where:
S = Spaces authorized
H = Average number of hours in dock per aircraft, based on maintenance experience or development and test experience data for new aircraft
A = Average number of aircraft programmed for maintenance each month
176 = Hours per month (22 x 8)

3.1.2.3.7. **Generic Hangar Facilities for AMC Tanker Aircraft.** For large Air Mobility Aircraft (e.g., C-17, KC-10, and like-size aircraft, excluding C-5), maintenance facilities should be designed to maximize current and future utility. Wherever feasible, design maintenance facilities for generic aircraft use. A generic aircraft facility is defined as being suitable for an aircraft with a C-17's wing span, a KC-10's length, and a KC-10's height. Contact AMC/A7 for additional guidance and approval source documentation.

3.1.2.3.8. Special purpose space may be authorized when justified.

3.1.2.4. **Dimensions.** See **Table 3.1** and **3.2** below.

3.1.2.5. **Design Considerations.**

3.1.2.5.1. Ensure siting of new hangars complies with UFC 3-260-01. See **paragraph 3.1.1.2.** through **3.1.1.3** above.

3.1.2.5.2. Floors of maintenance hangars should allow aircraft loadings as specified in **Chapter 2** of this Manual. Ensure door openings are wide and tall enough for aircraft to be pulled into and out of the facility.

3.1.2.5.3. Some aircraft utilize an Auxiliary Power Unit (APU) for engine start. Any area where the APU is operated should be checked to prevent damage to overhead infrastructure. If an APU is to be used inside of a facility, considerations should be made for ventilation of the exhaust gases.

3.1.2.5.4. Space may be required within the covered aircraft maintenance area for portable maintenance aid docking stations and/or maintenance support workstations and equipment. The amount of hardware at any particular covered aircraft maintenance area depends on the planned maintenance activities. For example, within the hangar, if one or two bays are used for completing scheduled aircraft inspections, then appropriate communication is required for supporting the docking stations and/or workstations. This is determined during the site-specific facility planning.

3.1.2.5.5. **Security Requirement.** Secured space is needed for the storage of classified components temporarily removed from aircraft. Alarm classified secure areas in accordance with applicable local security directives.

3.1.2.5.6. See ETL 09-1, *Airfield Planning and Design Criteria for Unmanned Aircraft Systems* (UAS) for dimensions, geometry, and pavement design.

Table 3.1. Requirements for Covered Aircraft/Helicopter Maintenance Space.

Factors1							
System	Factor	System	Factor	System	Factor	System	Factor
B-1	0.3	C-21	0.25	E-4	0.3	T-43A	0.15
B-52	0.15	C/KC-135	0.15	F-5E/F	0.25	UH-1	0.25
C-5	0.16	C-130	0.15	F-15	0.25	CH-3	0.25
C-9	0.18	KC-10	0.25	F-16	0.27	HH-53	0.25
C-12F	0.1	E-3A	0.15	F-22	0.33	HH-60	0.25
C-17	0.2	F-35	0.27	T/A-37	0.25		

Factors1							
System	Factor	System	Factor	System	Factor	System	Factor

NOTES:
1. Not all Air Force weapons systems are shown above. For weapon systems not shown consult your MAJCOM/A4M.
2. Formula: Multiply the Number of Aircraft by the Factor for Type = Required Covered Spaces. See Figure 3.1 for an example.

Figure 3.1. Example Calculations for Required Covered Spaces.

Example Authorized Aircraft	Number x Factor	Required Covered Spaces
B-52	16 x .15 = 2.4	2 large
KC-135	10 x .15 = 1.5	2 medium
F-16	6 x .27 = 1.62	2 small

NOTES:
For guidance on the number of spaces to be provided in hangars and fuel systems maintenance docks, see criteria under CATCODE 211111 and 211179, respectively. Maintenance spaces are otherwise provided in docks shown in CATCODE 211173, 211175, and 211177.

Table 3.2. Aircraft Separation Dimensions Inside Hangars.

Minimum Clearances from Hangar Elements1,2						
Aircraft Element	Door		Walls		Roof Framing	
	m	ft	m	ft	m	ft
Wing Tip - under 30.5 m (100 ft) span	3	10	3	10	-	-
Fuselage - under 30.5 m (100 ft) span	3	10	3	10	3	10
Wing Tip - over 30.5 m (100 ft) span	3	10	4.6	15	-	-
Fuselage - over 30.5 m (100 ft) span	3	10	4.6	15	3	10
Tail - Vertical	2.1	7	-	-	3	10
Tail - Horizontal	3	10	3	10	3	10
Helicopter Rotor Blade	3	10	3	10	3	10

NOTES:
1. Clearances between aircraft components should be at least 3 m (10 ft) where two or more aircraft are housed. Evaluate existing hangars for the above clearances and waivers requested in accordance with UFC 3-260-01, Attachment 2 (Waiver Processing Procedures), for facilities that do not provide the minimum clearances. The above clearances are also applicable to alert and hardened aircraft.
2. For KC-10 general purpose maintenance hangars, provide 10 m (32 ft) of clearance from the tail of the KC-10 aircraft to the hangar door. The engine maintenance stand for the number two engine extends aft 5 m (17 ft) beyond the tail of the KC-10 aircraft.

3.1.3. **Shelter, Aircraft Weapons Calibration. FAC: 2112**

CATCODE: 211147
OPR: AF/A4L
OCR: N/A

3.1.3.1. **Description.** This facility provides space for boresighting and harmonization of fire control and reconnaissance equipment.

3.1.3.2. **Requirements Determination.** Most maintenance hangars and docks are inappropriate because the structure interferes with the radar or lacks a clear target area nearby. This facility is necessary to calibrate fire control systems.

3.1.3.3. **Scope Determination.** A shelter is authorized for every 18 aircraft (F-22, F-15, F-16, and/or A-10).

3.1.3.4. **Dimensions.** Contact OPR for additional guidance.

3.1.3.5. **Design Considerations.** The shelter is open in warm climates and closed in cold climates. The shelter needs an open area for an optical target area.

3.1.4. **Shop, Aircraft General Purpose. FAC: 2112**

CATCODE: 211152
OPR: AF/A4L
OCR: N/A

3.1.4.1. **Description.** The shop provides space for specialized maintenance activities such as metals technology, aerospace systems shops, egress shop and reclamation operations on crash damaged aircraft and equipment. The shop also has space for work, administration, telecommunications, tool cribs, bench stocks, lockers, storage, and security of supplies and reparable parts. Reclamation and fabrication activities may require an open storage yard for aircraft, aircraft parts, and equipment awaiting repairs (see **CATCODE 452252**).

3.1.4.2. **Requirements Determination.** This facility provides for specialized and general aircraft maintenance functions. The electrical and environmental systems (E&E) element encompasses aircraft and related E&E maintenance, inspection, repair, and servicing functions. It may also be a holding area for aircraft cryogenic servicing carts. It normally includes work benches, bench stock, battery servicing area (two separate areas, if Ni-Cad and lead acid batteries both require servicing), cryogenics maintenance area, generator and constant speed drive (CSD) test stand area (if required), life raft bottle servicing area, tool crib, administrative space, and personnel locker space.

3.1.4.2.1. **Egress Shop.** The Egress facility should be enclosed and separated from other inhabited buildings or areas whenever possible, for off-equipment egress maintenance. The location of the facility requires approval by the fire department, Security Forces, and Civil Engineering. Ensure this facility is large enough to accommodate the average number of egress components requiring maintenance and storage at any one time. Consider explosives storage, maintenance, and grounding capabilities when maintaining Advanced Concept Ejection System (ACES) II units. See AFI 21-112, *Aircrew Egress Systems*, for additional information on egress facilities. The egress shop contains:

3.1.4.2.1.1. **Administration.** Sufficient space is necessary to support technical order storage and management, Core Automated Management System (CAMS) input (or equivalent), time change management, and general administrative processes. See **Chapter 6** of this Manual for additional administrative space standards.

3.1.4.2.1.2. **Maintenance.** ACES II seat maintenance requires room for repacking drogue chutes as well as simultaneous canopy maintenance for F-16 aircraft. Consolidated tool kits (CTK) and support equipment storage should also be placed in this area.

3.1.4.2.1.3. **Storage.** This area is solely utilized for explosives. No maintenance can be performed in this area in accordance with AFMAN 91-201. Size varies depending upon weapon system.

3.1.4.3. **Scope Determination.** **Table 3.3** lists total gross space requirements for general purpose maintenance shops based on the mission. **Table 3.4** for specific egress shop requirements). These shops may be in one building or several buildings. Dispersing the shops allows use of space in suitable existing buildings such as hangars. However, when possible and within funding constraints, the E&E functions should be collocated as closely as possible within the same building. Actual space requirements depend on the mission and size of related E&E support equipment and the working area required to perform assigned functions.

3.1.4.4. **Dimensions.** See **Table 3.3** and **3.4** (below).

3.1.4.5. **Design Considerations.**

3.1.4.5.1. Floor space and door openings should allow movement and repair of the largest item to be repaired in each shop. See **Table 3.2** (above).

3.1.4.5.2. Special ventilation and floor drainage is necessary for, but not limited to, the following E&E maintenance areas: Battery servicing, life-raft servicing, cryogenic cart maintenance, and generator and CSD test stand areas. An emergency eye wash station and shower are mandatory near the battery servicing area. A waste oil disposal system to reclaim petroleum based oils and synthetic oils, is needed. Consider providing a storage area for shop support equipment (e.g., portable hoists, jacks, refrigerant and ODC recovery systems, and cryogenic vacuum and purge carts). Provide a fire suppression system, ventilation systems (to accommodate fiberglass, plastic, welding, and plating shop operations), a compressed air source in each shop providing 1,030 kPa (150 psi) of air, a monorail crane hoist system, a multi-phase (110, 240 and 480 voltage) electrical system as required, and air conditioning to protect Computer Numerically Controlled industrial plant equipment as required.

3.1.4.5.3. Locate facilities to comply with UFC 3-260-01. See **paragraph 3.1.1.2.** through **3.1.1.3** for general maintenance facility criteria.

Table 3.3. Space Requirements for General Purpose Maintenance Shops.

Mission	Gross Area	
	m2	ft2
1 Fighter or Reconnaissance Wing	3,160	34,000
2 Fighter or Reconnaissance Wings	4,180	45,000
1 Airlift Wing (C-130)	3,620	39,000
1 Heavy Bomber Squadron	4,460	48,000
1 Tanker Wing	4,560	48,000
1 Airlift Wing (C-5)	7,430	80,000
1 Pilot Training Wing	3,900	42,000
1 Navigator Training or Airlift Training Wing	4,270	46,000
1 Special Operations Wing1	See Note 1	
1 Combat Search and Rescue Unit1	See Note 1	
NOTES: 1. Space is determined by individual analysis and validated by the appropriate MAJCOM/A4M.		

Table 3.4. Space Requirements for Egress Shops.

Weapon System1	Admin2,3		Maint. Seats4		Canopies4		Storage Seats4		Canopies4	
	Net Area									
	m2	ft2	m2	ft2	m2	ft2	m2	ft2	m2	ft2
Fighter Shop	5.95/ person	64/ person	2: 56	600	1:93	1,000	8: 37	400	4: 28	300
Fighter Shop	5.95/ person	64/ person	2: 56	600	N/A		8: 37	400	N/A	
Bomber Shop	5.95/ person	64/ person	4: 56	500	N/A		2: 9.3	100	N/A	
Multi MDS	5.95/ person	64/ person	2: 56	600	2:139	1,500	10: 46	500	4: 56	600
NOTES: 1. Spatial needs for units supporting egress systems differ depending on total PAA and type MDS aircraft. The above figures are based on fighter shops using two 4.6 m (15 ft) tables to perform maintenance on ACES II seats. The above space requirements are based on the average maintenance capability. If seat/canopy maintenance capabilities needs to increase/decrease from the above average computations, space requirements increase/decrease accordingly. 2. Refer to Chapter 6 of this Manual for approved office types and sizes. 3. Number of personnel require user justification. 4. The first figure in the m2 column is the number of seats or canopies, the second figure is the allowable area in square meters.										

5. Tool and support equipment storage is figured in the computation. Simultaneous canopy maintenance should be performed on units providing canopy maintenance. All multi-mission design series (MDS) units have ACES II seats.

3.1.5. **Nondestructive Inspection (NDI) Laboratory. FAC: 2112**

CATCODE: 211153
OPR: AF/A4L
OCR: N/A

3.1.5.1. **Description.** This facility provides space for field level NDI of aircraft components. Optic, penetrant, magnetic, eddy current, ultrasonic, radiographic, infrared, ultraviolet, and spectrometric devices inspect materials and components for quality, integrity, properties, and dimensions without damaging them. This facility consists of testing facilities, equipment storage, supply storage, analysis and report offices, and laboratory space.

3.1.5.2. **Requirements Determination.** All bases required to have a full, nondestructive testing facility are authorized 370 m^2 (4,000 ft^2) for a laboratory. Undergraduate pilot training (UPT) bases and bases with F-15s assigned are authorized space for an X-ray exposure room that can accommodate an entire aircraft. Consult TO 33B-1-1, *Nondestructive Inspection Methods, Basic Theory*, for additional and detailed NDI facility requirements. Contact OPR for the most current version of TO 33B-1-1.

3.1.5.3. **Scope Determination.** Space requirements depend on the size of required equipment and the working area required to perform the functions. Facilities at UPT bases require approximately 300 m^2 (3,200 ft^2) and for F-15 bases, 490 m^2 (5,298 ft^2), in addition to the space authorized in **Table 3.3** (above). Ensure the design includes sufficient space for the aircraft, provides specified clearances, and provides shielding in X-ray exposure rooms.

3.1.5.4. **Dimensions.** See **paragraph 3.1.5.2** and **3.1.5.3** above.

3.1.5.5. **Design Considerations.** The facility requires air conditioning for storage of X-ray film and operation of the oil analysis spectrometer. The shop may be in any existing building that can be modified to provide air conditioning, adequate ceiling heights, and a room of 56 m^2 (600 ft^2) or more for the X-ray exposure room. A lead shielded opening should be provided in the wall between the X-ray exposure room and the control room to allow for passage of X-ray equipment control cables.

3.1.6. **Shop, Aircraft Maintenance, Organizational. (Aircraft/Helicopter Maintenance Unit [A/HMU])**

FAC: 2112
CATCODE: 211154
OPR: AF/A4L
OCR: AF/A4O-A

3.1.6.1. **Description.** This building is a main control point for all A/HMU maintenance activities, administration, task training, equipment storage, and tool storage. A/HMUs are responsible for servicing, inspecting, maintaining, and launching/recovering assigned aircraft; maintaining/storing required aircraft maintenance equipment/tools; and ensuring

all mobility requirements are met. There is normally one A/HMU for each assigned Operations Squadron (OS). A/HMUs may include the following sections: Production, Aircraft, Specialist, Scheduling, Weapons, Debrief and Support. Additional space could be required for aircraft field service representatives.

3.1.6.2. **Requirements Determination.** Each A/HMU needs an operational building for administration, scheduling, training, briefing, and aircraft equipment/tool storage. Equipment/tool storage may be in a separate building.

3.1.6.2.1. Submit projects for unlisted missions, A/HMU types, or additional space requirements through the MAJCOM/A4/A7 to AF/A4O-A.

3.1.6.3. **Scope Determination.**

3.1.6.3.1. Provide space for the NCOIC, OIC, administration, debrief, training, field service representatives, Air Force Engineering and Technical Services (AFETS), scheduling, production, section flight chiefs (Production, Aircraft, Specialist, Scheduling, Weapons, Debrief, and Support), and staff. Space is also required for test/support equipment and tools to support all mission taskings. Equipment includes aircraft test equipment, maintenance tools, mobility pallets (ISU 70/90s), and -21 equipment. Specific mission requirements may require additional storage space to be validated through the MAJCOM/A4/A7 to AF4O-A.

3.1.6.3.2. Helicopter units with weapon mission requirements, are provided an additional General Purpose Maintenance facility. Recommended square footages provided are for a Primary Assigned Aircraft (PAA) Squadron. Spatial requirements include: Weapons vault for weapons storage of 93 m^2 (1000 ft^2); weapons maintenance area of 557 m^2 (6000 ft^2); avionics vault of 28 m^2 (300 ft^2); avionics maintenance area of 23 m^2 (250 ft^2); engine maintenance of 297 m^2 (3200 ft^2); and helicopter blade repair area of 237 m^2 (2550 ft^2).

3.1.6.3.3. Squadrons in a severe winter environment need additional space for covered storage of non-powered support equipment. Severe winter environments have at least 30 days per year at minus 23°C (-10°F) or lower or have an average January temperature of minus 7°C (+20°F) or lower as determined from two 10-year (or greater) weather databases. Additional covered spaces required are 760 m^2 (8,200 ft^2) for a bomber squadron and 780 m^2 (8,400 ft^2) for a tanker squadron.

3.1.6.3.4. An annex to the loading shop, consisting of a permanent shelter approximately 22 m^2 (240 ft^2), is necessary at bases where tactical aircraft use arm/disarm pads (**CATCODE 116661**). One is located beside each pad and provides between-flight shelter for crews stationed there to arm and de-arm weapons and quick-check taxiing aircraft. Process waiver requests if siting violates airfield criteria in UFC 3-260-01.

3.1.6.4. **Dimensions.** **Table 3.5** lists space requirements for the A/HMU functions. Additional space may be authorized in high-threat areas.

3.1.6.5. **Design Considerations.** Locate next to assigned aircraft parking apron, and maintenance hangar. Special Q-D standards apply to hardened facilities. See AFMAN 91-201.

Table 3.5. Space Requirements for Aircraft/Helicopter Maintenance Unit (A/HMU)

MISSION	Gross Area1,2,3,6,7	
	m2	ft2
KC-135 (12 PAA)	1,167	12,555
C-17 (12 PAA)	1,276	13,735
C-5 (11 - 12 PAA)	1,328	14,295
KC-10 (12 - 15 PAA)	1,182	12,715
C-130 (14 PAA)	1,691	18,205
F-16 (18 PAA)	885	9,520
F-15 (18 PAA)	1,078	11,600
Special Operations Squadrons4	1,523	16,394
Combat Search and Rescue Helicopter Unit (15 PAA)4,5	2,800	30,144
Combat Search and Rescue HC-130 Unit (9 PAA)4	1,526	16,427

NOTES:
1. An additional 19 m2 (200 ft2) is authorized for each pararescue person.
2. Criteria are developed between MAJCOM and AF/A3O-A or on an individual basis.
3. Gross area for training squadrons varies due to size and mission. Consult AETC for definitive guidance.
4. Space is determined by individual analysis and validated by the appropriate MAJCOM.
5. Includes 1,301 m2 (14,000 ft2) requirement for gun vault storage/maintenance, engine maintenance, and avionics vault/maintenance (see paragraph 3.1.6.3.2).
6. Refer to Chapter 6 of this Manual for approved administrative space standards. Number of personnel requires user justification.
7. Includes common use and maintenance areas.

3.1.7. **Shop, Jet Engine Inspection and Maintenance. FAC: 2116**

CATCODE: 211157
OPR: AF/A4L
OCR: N/A

3.1.7.1. **Description.** This shop maintains and stores aircraft engines, gas turbine compressors, and engine accessories. Major functions performed in the shop are disassembly, inspection, repair, replacement, technical order compliance, and assembly of engine components. A typical shop has a high-bay, direct engine maintenance work area with overhead crane; a direct and indirect support area for non-powered support equipment; accessories such as after burners, thrust reversers, compressor balancing, and modules; parts supply; tool room; training room; spare engines; cleaning room; bearing room; computer room; and administrative support.

3.1.7.2. **Requirements Determination.** This facility is necessary to provide maintenance for aircraft jet engines.

3.1.7.3. **Scope Determination.** Use the following formula to determine space requirements:

Figure 3.2. Calculating Space Requirements for Jet Inspection and Maintenance Shop.

X = A x B x C x D / E

Where:

X = Total space requirements

A = Support space (see Table 3.6.)

B = Work flow, average flow days per engine (see Table 3.6.)

C = Workload, one-half the number of installed engines in authorized aircraft (USAF PD, include Queen Bee workloads)

D = Engine work space area (double the engine length times quadruple the engine width, see Table 3.6.)

E = Average number of workdays per month (22 days)

Use the formula for each type of engine to be maintained, and add the results to determine the shop's total space requirements. Example: for the J85 engine, divide the product of A(2), B(16), C(102), and D(13) by E(22) for an X value of 1,930 m2 (20,770 ft2).

3.1.7.4. **Dimensions.** See **paragraph 3.1.7.3** above.

3.1.7.5. **Design Considerations.** Locate facilities to comply with explosives safety standards. The engine maintenance areas require a ceiling height that accommodates the installation of a bridge crane system and monorail system with a minimum overhead clearance of 4.58 m (15 ft) as measured from the floor level to the bottom of the hoist hook. The work bays should be set up in the shop under the bridge crane to adequately perform engine maintenance and module separation/installation. Adequate space is needed in front of engine stands to allow for maneuvering and transferring of engines from trailers to stands.

Table 3.6. Space Requirements for Jet Engine Intermediate Maintenance Shop.

Type Engine1,2,3	Support Factor	Flow Days	Gross Area (D)	
	(A)	(B)	m2	ft2
TF30	2.0	15	65	695
TF33 (B-52)	0.8	14	38	410
TF33 (other)	1.4	20	41	438
TF34	1.4	17	37	396
TF39	0.8	24	105	1,129
TF41	6.4	6	24	253
F100 (F-16)	3.3	9	48	515
F100 (F-15)	2.3	9	48	515
F110 (F-16)	1.9	16	48	515
F110 (F-15)	1.3	16	48	515
F101	3.0	6	39	420
type - F-117	3.0	9	75	792

Type Engine1,2,3	Support Factor	Flow Days	Gross Area (D)	
	(A)	(B)	m2	ft2
J33	2.0	14	26	275
J57	1.2	14	34	367
J60	2.0	12	10	107
J69	3.0	10	5	56
J75	1.2	15	53	570
J79	1.2	15	43	459
J85	2.0	16	13	140
T53	3.0	8	6	61
T56	1.2	12	31	332
T58	3.0	11	7	71
T64	3.0	12	9	92
T76	2.0	16	28	305
T400	3.0	7	16	170
Gas Turbine Compressors under 1,270 mm (50 inches) long.	4.0	variable	variable	
Gas Turbine Compressors over 1,270 mm (50 inches) long.	3.0	variable	variable	
NOTES: 1. In addition to the basic formula, use the following factors to adjust space requirements for units organized as a standard 72 PAA wing. These factors provide smaller units sufficient overhead and trim larger units of excessive space. Use a multiplication factor of 1.3 for units less than 72 PAA, and 0.85 for those units greater than 72 PAA. A 72 PAA engine shop should generally include 10 work bays; a 24 PAA should generally have 4 work bays. 2. For units organized as composite wings, use the basic formula for each engine type in the unit. The multiplication factors for PAA size do not apply. 3. For engine types not shown, contact MAJCOM/A4M for latest guidance.				

3.1.8. **Aircraft Corrosion Control. FAC: 2113**

CATCODE: 211159
OPR: AF/A4L
OCR: N/A

3.1.8.1. **Description.** This facility provides hangar space for corrosion treating, corrosion repairing, paint stripping, and repainting of an entire aircraft and an environmentally controlled area to wash aircraft. This facility also provides space for the corrosion control shop, which includes preparation and drying areas, abrasive blasting rooms, paint booths for mixing and/or applying paint, tool storage, lockers, and administrative areas. Corrosion control shops are also required to support small aircraft components, aerospace ground equipment, vehicles, weapons and munitions, and avionics shops.

3.1.8.2. **Requirements Determination.** The number and size of corrosion control facilities is the minimum size required to accommodate the largest aircraft serviced and

workload required to support the total Air Force corrosion control concept. A hangar provides enclosed space for aircraft washing and for inspecting the aircraft for corrosion damage. Additionally, the facility can accommodate surface preparation and repainting of the aircraft. Some installations, such as depot-type operations, AETC pilot training bases, and MAJCOM regional corrosion prevention and control facilities, may need a strip/repaint hangar in addition to an aircraft corrosion control hangar. The corrosion control shops are necessary to provide an enclosed area for corrosion treatment, inspections, stripping, and painting of aircraft components and other associated support equipment.

3.1.8.3. **Scope Determination.**

3.1.8.3.1. Corrosion control is both a base and a depot responsibility. Specific workloads vary from base to base, but the minimum required facilities include a wash rack, shop space for complete corrosion treatment, painting removable aircraft parts, ground support equipment, and a corrosion-approved facility to perform aircraft maintenance painting.

3.1.8.3.2. Complete aircraft corrosion control and strip and repaint facilities are authorized only at AFMC depots, AETC bases, and at regional support bases as determined by MAJCOM needs. Mid-life scuff and complete repaint is necessary to support each base. At centralized and/or regional support bases, the MAJCOMs may use this facility to supplement depot painting requirements. The required size for this centralized or regional complete strip-and-repaint facility is the minimum size required to accommodate the largest aircraft supported. Due to the unique purpose of these facilities, do not link the centralized or regional facility to the maximum number of covered facilities as described in **CATCODE 211111**.

3.1.8.3.3. Base facility requirements emphasize prevention and detection. Since freedom from dirt, oil, and other contaminants is important in this regard, base facilities are primarily designed for cleaning and maintaining protective coating/corrosion control systems.

3.1.8.4. **Dimensions.** Determine the required interior dimension of an aircraft bay by the largest aircraft dimensions and the required structural clearances listed in **Table 3.2** (above). The corrosion control shops may require up to 530 m^2 (5,700 ft^2) for medium size aircraft. Minimum requirements for an F-15 facility is 492 m^2 (5,292 ft^2) and an F-22 facility is 495 m^2 (5,330 ft^2). Bases with a large number of aircraft (above 40 large or medium aircraft assigned) or in a severely corrosive area are authorized, with proper justification, a corrosion control hangar and a wash hangar. Minimum aircraft separation is 3 m (10 ft) on each side to facilitate maintenance stands.

3.1.8.5. **Design Considerations.**

3.1.8.5.1. Corrosion control facilities need hot and cold water, electric power, and compressed air. Base corrosion control operations require collection, treatment, and disposal facilities for oils, alkalis, salts, hydroxides, paint stripping agents, paint residue, and other substances generated by aircraft cleaning. For detailed information on corrosion control operations see TO 1-1-691, *Aircraft Weapons System Cleaning & Corrosion Control*, and TO 1-1-8, *Application of Organic Coatings*.

3.1.8.5.2. Locate the abrasive blasting rooms away from the paint booths to eliminate contamination.

3.1.8.5.3. Ensure siting of new hangars complies with UFC 3-260-01. See **paragraph 3.1.1.2.** through **3.1.1.3** for general maintenance facility criteria.

3.1.9. **Corrosion Control Utility Storage. FAC: 4423**

CATCODE: 211161
OPR: AF/A4L
OCR: N/A

3.1.9.1. **Description.** This facility is a separate storage building for storing cleaning supplies, cleaning tools, paint, corrosion and stripping supplies, tools, etc., and is normally adjacent to the wash, corrosion control shop, and/or strip/paint hangars.

3.1.9.2. **Requirements Determination.** A separate storage building is necessary for safety and fire prevention.

3.1.9.3. **Scope Determination.** The required size for the storage building is the minimum size required to accommodate the corrosion work area.

3.1.9.4. **Dimensions.** See **paragraph 3.1.9.3** above.

3.1.9.5. **Design Considerations.** Ensure the storage buildings maintain temperatures between 10°C (50°F) and 27°C (80°F) and meet all federal, state, and local requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in this Manual.

3.1.10. **Large Aircraft Maintenance Dock. FAC: 2111**

CATCODE: 211173
OPR: AF/A4L
OCR: N/A
(NOTE: Criteria below is also used for Medium Aircraft Maintenance Dock (CATCODE 211175), Small Aircraft Maintenance Dock (CATCODE 211177), and Fuel System Maintenance Dock (CATCODE 211179).

3.1.10.1. **Description.** This facility has space for an aircraft parking bay and support space for heating, plumbing, latrines, ventilation, compressed air, and fire detection and suppression. The fuel system maintenance dock may need additional fire detection and suppression. Maintenance docks provide protected space for aircraft maintenance. They contain heating, plumbing, electricity, and compressed air systems and are usually insulated. Docks used for fuel systems maintenance also include mechanical ventilation, fume sensing and alarm, fire extinguishing systems, and wash down drainage trenches.

3.1.10.2. **Requirements Determination.** Before planning an additional fuel systems maintenance dock, consider the possibility of converting an existing aircraft maintenance dock if remaining aircraft maintenance dock space could support other aircraft maintenance requirements.

3.1.10.3. **Scope Determination. CATCODE 211111** and **Table 3.1** provide the required number of dock spaces for aircraft maintenance, including fuel systems maintenance. The normal requirement for Fuel Systems Maintenance Docks (**CATCODE 211179**) is one per base. However, some base missions have a

demonstrable requirement based on workload records, PAA, weather conditions, and projections for additional docks. These may come out of the base total dock allowance (**Table 3.1**) or be added to it, depending on workload requirements.

3.1.10.4. **Dimensions.** See **Table 3.1** and **3.2**.

3.1.10.5. **Design Considerations.** Ensure siting of new hangars complies with UFC 3-260-01. See **paragraph 3.1.1.2.** through **3.1.1.3** for general maintenance facility criteria.

3.1.11. **Test Cell. FAC: 2114**

CATCODE: 211183
OPR: AF/A4L
OCR: WR-ALC/579 CBSS

3.1.11.1. **Description.** This is a reinforced concrete structure that houses a thrust bed and test equipment designed for the specific facility or the standard test stand.

3.1.11.2. **Requirements Determination.** Only depot test cells need ready rooms. For assistance in determining the proper unit, contact the appropriate Air Logistics Center.

3.1.11.3. **Scope Determination.** The size of the test cell depends on the type of engine to be tested. This facility generally does not accommodate an aircraft. The Jet Engine Intermediate Maintenance Shop, (**CATCODE 211157**), may require a test cell for support. The thrust capacity of the cell depends on the engines to be tested.

3.1.11.4. **Dimensions.** Obtain additional information through WR-ALC/579 CBSS.

3.1.11.5. **Design Considerations.** Obtain additional information through WR-ALC/579 CBSS.

3.1.12. **Test Stand (/Hush House) Facility. FAC: 2118**

CATCODE: 211193
OPR: AF/A4L
OCR: WR-ALC/579 CBSS

3.1.12.1. **Description.** A test stand and/or hush house consists of technical equipment procured with aircraft appropriations and real property constructed with military construction appropriations.

3.1.12.2. **Requirements Determination.** Test and/or hush house stands are authorized by an applicable Table of Allowance (TA). Hush houses and test stands, where approved, are government furnished equipment. WR-ALC/579 CBSS is designated inventory manager and is responsible for equipment programming and procurement and for establishing criteria used in programming and constructing support items in the military construction program.

3.1.12.3. **Scope Determination.** Space requirements depend on the type of aircraft or engine to be tested. Construction includes modifying an existing aircraft parking apron, utility support, installing technical equipment, and a test stand and/or hush house. Installed equipment remains equipment; it is not real property. (***NOTE:*** Hush House sound suppressers are equipment items associated with **CATCODE 116665**.)

3.1.12.4. **Dimensions.** The parameters of **Table 3.1** apply. If the test stand is farther than 910 m (3,000 ft) from the shop and tests more than 25 engines each month, a ready room of 74 m^2 (800 ft^2) may be programmed. In the ready room, engines are prepared for the test stand, thus allowing more engines to be tested on the stand in a short time.

3.1.12.5. **Design Considerations.** Test stands and/or hush house require utility support and foundations. Foundation design should consider the vibrations encountered in this type of facility. Ensure siting considers the impact of high noise levels and resonant harmonics on adjacent facilities. See the *Hush House Site Planning Bulletin* for further guidance.

3.1.13. **Shop, Missile Assembly. (Missile Assembly Shop/Integrated Maintenance Facility [IMF])**

FAC: 2121
CATCODE: 212212
OPR: AF/A4LW
OCR: ACC/A4W

3.1.13.1. **Description.** This shop provides space for transferring and preparing missiles for operational use, performing organizational level maintenance involving component and subsystem replacement, and performing organizational or bench level maintenance support for certain components. It also supports electrical testing and the evaluation of individual missiles and empty/loaded launcher systems. The maintenance facility consists of drive-through work bays, office space, a tool room, a ready room, and latrines. The drive-through work bays should have a smooth approach and apron area.

3.1.13.2. **Requirements Determination.** This facility is necessary to perform organizational maintenance on missile weapon systems. Obtain additional information from ACC/A4W.

3.1.13.3. **Scope Determination.** Requirements are unique to each type of weapons system and space requirements can be obtained through acquisition contracts.

3.1.13.4. **Dimensions.** Contact OPR for latest requirements and guidance.

3.1.13.5. **Design Considerations.**

3.1.13.5.1. The facility requires space for a hydraulic unit and emergency electric power generator. Also equip facilities with surge protection.

3.1.13.5.2. The shop requires a transverse mounted hoist for support equipment handling.

3.1.13.5.3. Consult AFMAN 91-201for Q-D safety criteria controls design and siting of the shop.

3.1.13.5.4. Facility should accommodate simultaneous loading of launchers and pylons. Ensure missile shops comply with local, state, and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in respect to fuel vapor emissions, as required by AFI 32-7040.

3.1.13.5.5. Equip facility with lightning protection and electrical grounding system according to DoD 6055.9-Std and AFMAN 91-201.

3.1.13.5.6. Refer to AFMAN 91-201 for additional guidance on personnel and propagation protection between operating bays. Substantial Dividing Walls (SDW) between operating bays to support concurrent operations as per the criteria in AFMAN 91-201. Provide separate facilities if SDW criteria in AFMAN 91-201 cannot be met.

3.1.13.5.7. Provide low pressure air (0-150 pound-force per square inch gauge [psig]) and high pressure air (0-3500 psig). The facility may also require 120VAC, 400Hz, 3-phase power dependent on assigned missile systems as described in UFC 3-520-01, *Interior Electrical Systems*, and AFMAN 91-201.

3.1.14. **Shop, Tactical Missile, Glide Weapon Maintenance. FAC: 2121**

CATCODE: 212213
OPR: AF/A4LW
OCR: ACC/A4W

3.1.14.1. **Description.** This facility accommodates missile and glide munitions assembly and disassembly inspection, testing, and repair. This facility consists of individual drive-through work bays, a test cell room for electrical and resistance checks of rocket motors, and an administrative area for office space, ready and training rooms, a tool and test equipment support room, supply and equipment storage, and a latrine.

3.1.14.2. **Requirements Determination.** This facility is necessary to perform organizational maintenance on missile weapon systems. The following documents should be utilized to determine the scope of the facility: Unit Committed Munitions List (UCML)—A list that identifies munitions required by a unit to support war plans (primary munitions) and contingency operations (support munitions); AFI 11-212, *Munitions Requirements for Aircrew Training*; the Air Force Standard for Non-Expendable Air Munitions Training Authorizations; test plans; and beddown plans.

3.1.14.3. **Scope Determination.** The shop has a minimum of three work bays, 9.1m x 15.2 m (30 ft x 50 ft), depending on mission requirements. For example, one bay for air-to-air missile systems, one for air-to-ground missiles, and one for glide weapons systems. Compatibility between the various missile and glide weapon systems has to be considered when determining the total number of required work bays. All bay doors are 3 m (10 ft) high and 5 m (17 ft) wide. An adjoining administrative area consists of approximately 232 m^2 (2,500 ft^2). The proposed Unit Manning Document (UMD) and guidance in this Manual should be used to determine specific personnel administrative space. See **Chapter 6** for additional guidance on administrative space standards.

3.1.14.4. **Dimensions.** See **paragraph 3.1.14.3** above.

3.1.14.5. **Design Considerations.**

3.1.14.5.1. Include a 1,810 kg (4,000 lb) transverse-mounted hoist in each bay. AFI 31-101 requires high security hasps or Internal Locking Devices (ILD) on all bay doors with the intrusion system.

3.1.14.5.2. Ensure shops requiring a drive-through paint spray booth comply with environmental standards.

3.1.14.5.3. Consult AFMAN 91-201for Q-D safety criteria controls design and siting of the shop.

3.1.14.5.4. Facility is equipped with lightning protection and electrical grounding system according to DoD 6055.9-Std and AFMAN 91-201.

3.1.14.5.5. Refer to AFMAN 91-201 for additional guidance on personnel and propagation protection between operating bays. Provide SDWs between operating bays to support concurrent operations as per the criteria in AFMAN 91-201. Provide separate facilities if SDW criteria in AFMAN 91-201 cannot be met.

3.1.14.5.6. Low pressure (0 to 150 psig) and high pressure (0 to 3,500 psig) air is needed. 115 VAC, 60 Hz, single-phase and 115 VAC 400 Hz, 3-phase power is needed.

3.1.14.5.7. Environmental controls for humidity and temperature are necessary to assure proper protection for weapon systems and test equipment. HVAC for office, training, and bays is required.

3.1.15. **Vehicle Maintenance Shop. FAC: 2141**

CATCODE: 214425
OPR: AF/A4LE
OCR: N/A

3.1.15.1. **Description.** The shop provides space and facilities for lubrication, inspection, general repair, and replacement of major assemblies; painting, welding, upholstery, testing, cleaning, and minor parts fabrication. It also houses support functions such as vehicle management and analysis, tool rooms, parts rooms, hazardous material/waste rooms, locker rooms, and offices.

3.1.15.2. **Requirements Determination.** Vehicle maintenance shops maintain all government owned vehicles and vehicular equipment assigned to a base, including vehicles of tenant organizations. Vehicle maintenance has to procure tires from Supply and requires special levels in the shop due to lack of storage within Supply. Shop operations are usually supported by a government operated parts store or contractor operated parts store (COPARS) established under AFI 23-302, *Vehicle Management*. The parts store usually occupies space in the shop or in a nearby building. Any changes or modifications to contractor operated facilities should be coordinated with the local contracting office. COPARS are not typical for parts support, but still exist in some units. Obtain additional information through your applicable MAJCOM/A4RE and AF/A4LE.

3.1.15.3. **Scope Determination.** **Table 3.7** through **3.7.5** show space requirements for six types of vehicle maintenance shops. See Tables 4-12 and 4-13 of UFC 4-730-10 for fire department vehicle maintenance bay and equipment storage requirements. Vehicle management's parking area requirement is 10% of the assigned vehicle fleet for each facility.

3.1.15.4. **Dimensions.** See **Table 3.7** through **3.7.5** and Tables 4-12 and 4-13 of UFC 4-730-10.

3.1.15.5. **Design Considerations.** Above-ground vehicle hoists are preferable to in-ground hoists. Fire protection requirements may require review of fire detection and suppression systems. Air and water pollution equipment is required (IAW AFMAN 48-155 and AFOSH Std 91-20 *Vehicle Maintenance Shops*). Consider vehicle bay height and vehicle entry width to allow for current generation of aircraft loaders and other large vehicles. Also give consideration to shop approach angles to allow for vehicle turning radius.

Table 3.7. Space Requirements for Vehicle Maintenance Support Core.

Total Assigned Vehicles	Gross Area	
	m2	ft2
0 to 250	465	5,000
251 to 500	557	6,000
501 to 700	650	7,000
701 to 900	743	8,000
901 to 1,100	790	8,500
1,101 to 1,200	836	9,000
1,201 to 1,300	883	9,500

Table 3.7.1. Vehicle and Vehicular Equipment Maintenance.

Total Assigned Vehicles	Gross Area	
	m2	ft2
0 to 75	390	4,200
76 to 150	585	6,300
151 to 225	780	8,400
226 to 300	975	10,500
301 to 375	1,170	12,600
376 to 450	1,370	14,700

Table 3.7.2. Space Requirements for Customer Service Center.

Total Assigned Vehicles	Gross Area	
	m2	ft2
0 to 250	111	1,200
251 to 500	149	1,600
501 to 700	186	2,000
701 to 900	223	2,400
901 to 1,100	260	2,800
1,101 to 1,200	297	3,200
1,201 to 1,300	334	3,600

Table 3.7.3. Space Requirements for Allied Trades.

Total Assigned Vehicles	Gross Area	
	m2	ft2
0 to 250	186	2,000
251 to 500	232	2,500
501 to 700	279	3,000
701 to 900	325	3,500
901 to 1,100	372	4,000
1,101 to 1,200	418	4,500
1,201 to 1,300	465	5,000

Table 3.7.4. Material Handling Equipment Maintenance.

Total Assigned Vehicles	Material Handling Equipment	
	Gross Area	
	m2	ft2
0 to 20	232	232
21 to 40	381	381
41 to 60	530	530
61 to 80	604	604
81 to 100	678	678
101 to 120	753	753
121 to 140	827	827
141 to 160	975	975

Table 3.7.5. Space Requirements for Refueling Vehicle Maintenance[1].

Total Assigned Vehicles	Gross Area	
	m2	ft2
0 to 10 (2 Bays)	325	3,500
11 to 20 (3 Bays)	395	4,250
21 plus (4 Bays)	465	5,000
31 to 40 (5 Bays)	534	5,750
NOTES: 1. Do not include hose carts when computing total number of refueling vehicles assigned. 2. Include assigned hydrant servicing vehicles when computing total number of refueling vehicles assigned.		

3.1.16. **Vehicle Operations Heated Parking. FAC: 4415**

CATCODE: 214426
OPR: AF/A4LE
OCR: AFCESA/CEO

3.1.16.1. **Description.** This facility provides a covered and heated environment for certain assigned vehicles. The space includes vehicle parking stalls, vehicle maneuvering lanes, mechanical room, and other necessary management support functions.

3.1.16.2. **Requirements Determination.** The space requirement is the minimum space required to efficiently accommodate the selected vehicles. Heated parking buildings are needed for motorized aircraft and fuel servicing vehicles at installations where winters are severe. Severe winters are those with 30 or more days per year of -12°C (10°F) or lower or with an average January temperature of -7°C (20°F) or lower as determined from two 10-year (or longer) weather databases.

3.1.16.3. **Scope Determination.**

3.1.16.3.1. To determine the required space, develop a parking plan that reflects typical vehicle dimensions and turning radii. For planning purposes, determine the total vehicle equivalents for the vehicles selected and multiply by 18.6 m^2 (200 ft^2). This is the same as multiplying each vehicle's length by its width and multiplying by two. If the parking plan has a center aisle, multiply each vehicle equivalent by 14 m^2 (150 ft^2). For a shed-type structure with no interior access lanes, use 9.3 m^2 (100 ft^2) for 1.0 vehicle equivalent. Other facility category codes such as Base Engineer Pavement and Grounds Facility (**CATCODE 219943**), Ambulance Shelter (**CATCODE 510264**), and Fire Station (**CATCODE 730142**) recognize the requirement to provide covered parking space for special purpose vehicles under the respective category code.

3.1.16.3.2. The number of vehicles that require parking in heated buildings varies with the flying mission and type of operation. The maximum allowance is 40 percent of the fuel servicing vehicles for motorized aircraft assigned to the installation. Not more than four large refueling units (such as the R-9 or R-11 type) should be parked in a single structure.

3.1.16.3.3. Maintain 2.4 m (8 ft) separation between parked vehicles and 30 m (100 ft) separation between this building and nearby structures.

3.1.16.4. **Dimensions.** See **paragraph 3.1.16.3** above.

3.1.16.5. **Design Considerations.** An installation that warrants more than four units may define a single structure as a two hour rated fire wall separating every four bays. The wall should have few penetrations, and these should have two hour fire ratings. These facilities may have special criteria for mechanical, electrical, fire protection, ventilation, and water pollution control systems to reduce the hazards associated with fuel operations.

3.1.17. **Vehicle Operations Parking Shed. FAC: 4425**

CATCODE: 214428
OPR: AF/A4LE
OCR: AFCESA/CEO

3.1.17.1. **Description.** This facility provides an enclosed shed for essential vehicles.

3.1.17.2. **Requirements Determination.** Unheated sheds are needed for essential vehicles in areas of heavy snowfall (an average annual snowfall of more than 610 mm [24 in]), or abnormally high heat (an average daily maximum temperature above 31°C [188°F]). The provision of sheds for loaded refueling vehicles requires AF/A4LE approval.

3.1.17.3. **Scope Determination.** The space requirement is the minimum required to accommodate essential vehicles. Planning is based on 9.3 m^2 (100 ft^2) per 1.0 vehicle equivalent. See AFI 23-302 for additional guidance. For refueling vehicles, allow no more than four refueling vehicles per shed and provide 2.4 m (8 ft) of separation between vehicles. Maintain 30 m (100 ft) of separation between storage sheds and adjoining structures.

3.1.17.4. **Dimensions.** See **paragraph 3.1.17.3** above.

3.1.17.5. **Design Considerations.** Provide adequate natural ventilation, floor drainage, and automatic dry pipe, closed head, sprinkler protection to further reduce hazards related to fuel spillage. Consider discharging floor drains to an oil water separator.

3.1.18. **Refueling Vehicle Shop. FAC: 2141**

CATCODE: 214467
OPR: AF/A4LE
OCR: AFCESA/CEO

3.1.18.1. **Description.** The refueling shop provides space and facilities for lubrication, inspection, general repair, overhaul, and replacement of major assemblies, testing, cleaning, and minor parts fabrication. This facility is used to perform maintenance on and store refueling vehicles. These vehicles are used for fuel transport, such as JP-8 and diesel fuel.

3.1.18.2. **Requirements Determination.** Refueling maintenance shops maintain all fuel servicing vehicles assigned to a base. Obtain waivers to these criteria from AFCESA/CEO or AF/SEF. AFOSH Std 91-20 prohibits servicing or repairing fuel servicing tank units and hydrant hose trucks in maintenance shops with other vehicles. Because of the number of fueling vehicles and fueling carts normally assigned to an Air Force base, regulations require a separately sited maintenance and repair facility.

3.1.18.3. **Scope Determination.** Refer to **Table 3.7.5** for space requirements. Make allowances for sufficient maintenance space around the vehicle; recommend 2.4 m (8 ft) minimum clearance. The R-11 refueling vehicle is 11.6 m (38 ft) long, 2.7 m (8 ft 10 in) wide, and 2.6 m (8 ft 6 in) high. Allow adequate space for a driveway and the R-11's turning radius of 15.2 m (50 ft).

3.1.18.4. **Dimensions.** See Scope Determination above. Additionally, the facility should have the following:

3.1.18.4.1. Entry/waiting room with customer seating;

3.1.18.4.2. Supervisor’s office with easy access to the maintenance area (see **Chapter 6** of this Manual for approved office standards);

3.1.18.4.3. Separate men's and women's restroom facilities. Each should have appropriate lockers and showers for personnel assigned to the facility. Provide separate unisex public restroom that is accessible from entry/waiting area;

3.1.18.4.4. Maintenance bays with sufficient room to accommodate the largest refueling vehicles;

3.1.18.4.5. Area for storage of tool boxes and shared tools; and

3.1.18.4.6. Space for jack/floor tools located adjacent to service bays with room for jack stands, lifts, hoists, etc.

3.1.18.5. **Design Considerations.**

3.1.18.5.1. Give special consideration to forced ventilation and exhaust extraction systems.

3.1.18.5.2. Static grounding stations are necessary for refueling equipment within the facility.

3.1.18.5.3. Provide explosion-proof electrical outlets, light fixtures, and other electrical features within the facility.

3.1.18.5.4. Provide automatic fire detection and suppression.

3.1.18.5.5. This facility should be remotely located due to its potential fire hazard.

3.1.18.5.6. Additionally, the facility and surrounding parking area should be designed to provide for secondary containment in an event of a fuel spill.

3.1.18.5.7. Provide above-ground vehicle hoists or crane monorail system.

3.1.19. **Weapons Release Systems Shop. FAC: 2151**

CATCODE: 215552
OPR: AF/A4LW
OCR: ACC/A4W

3.1.19.1. **Description.** This facility provides space for off equipment overhaul and repair of aircraft gun systems and weapons release systems that include, but are not limited to, bomb ejection racks, weapons pylons, and missile rotary launchers. The facility includes a maintenance area with work benches, gun and/or ejector unit cleaning room, maintenance offices, dispatch office, bench stock room, and storage space for alternate mission equipment (AME), mobility equipment, test sets, and support equipment.

3.1.19.2. **Requirements Determination.** The facility maintains aircraft weapons release systems, gun systems, and associated equipment. For support of aircraft with gun systems installed, the facility requires a secure room/vault for storage of aircraft guns. Obtain additional information from AF/A4LW through ACC/A4WM.

3.1.19.3. **Scope Determination.** Space requirements are as follows.

3.1.19.3.1. Single wing of aircraft not equipped with multiple ejector racks (MER): 980 m^2 (10,530 ft^2).

3.1.19.3.2. Single wing of aircraft equipped with MER: 1,070 m^2 (11,500 ft^2).

3.1.19.3.3. Storage space, including office space for four people: 560 m^2 (6,000 ft^2).

3.1.19.3.4. Additional space for storage of mobility support equipment (when authorized) in high threat areas.

3.1.19.3.5. Twelve PAA B-52 bomber units tasked with Heavy Stores Adapter Beams and cluster racks: 557 m^2 (6,000 ft^2), with an additional 465 m^2 (5,000 ft^2) for

each subsequent 12 PAA B-52 unit added. This facility includes a 9,070 kg (10 ton) monorail hoist.

3.1.19.3.6. Twelve PAA B-1B conventionally tasked unit: 465 m^2 (5,000 ft^2), with an additional 279 m^2 (3,000 ft^2) for each subsequent 1 PAA added. This facility requires a 9,070 kg (10 ton) monorail hoist and floor capable of 1,720 kPa (250 psi) tire footprint, 22,700 kg (50,000 pound) trailer weight, and drive-through capability with 3.65 m x 3.65 m (12 ft x 12 ft) overhead doors.

3.1.19.3.7. Twelve PAA B-1 unit: See requirements in **paragraph 3.1.19.3.6** above.

3.1.19.3.8. F-22 and F-35 fighter units require larger AME storage space than legacy fighters. Refer to each aircraft's facilities requirements plan or document to properly size the AME storage area. Factor-in additional storage space for large containers/crates frequently used to ship AME and gun systems managed under the two-level maintenance concept.

3.1.19.4. **Dimensions.** See **paragraph 3.1.19.3** above.

3.1.19.5. **Design Considerations.**

3.1.19.5.1. Locate facilities to comply with explosives safety standards (see DoD 6055.9 Std and AFMAN 91-201 for further guidance).

3.1.19.5.2. Adequate ventilation is necessary in the weapons cleaning room.

3.1.19.5.3. Provide floor drains in maintenance areas as required. The floor drain in the cleaning room should be connected to an oil-water separator.

3.1.19.5.4. Provide explosion-proof fixtures as required.

3.1.19.5.5. A minimum clear ceiling height may be required in the maintenance and storage areas to allow for fire protection systems and/or installation of an overhead monorail hoist.

3.1.19.5.6. Provide sufficient compressed air outlets throughout the maintenance area.

3.1.19.5.7. Test equipment may have special electrical requirements. Provide grounding, surge protection, and lightning protection system.

3.1.19.5.8. Facilities storing aircraft guns require a secure room/vault with high security locks; size is dependent on number of assets stored and caliber of weapons.

3.1.19.5.9. An intrusion detection and alarm system may be required in accordance with AFI 31-101.

3.1.19.5.10. Large (garage-type) roll-up or sliding doors may be required to facilitate entry of equipment into the maintenance and storage areas.

3.1.19.5.11. This facility should be located in close proximity to the operational parking apron and be accessible to vehicles transporting weapons release and gun system components to and from the flight line.

3.1.20. **Surveillance and Inspection Shop. FAC: 2153**

CATCODE: 215582
OPR: AF/A4LW
OCR: ACC/A4W

3.1.20.1. **Description.** This facility accommodates the initial assembly, inspection, test bench, and minor maintenance of various conventional munitions and their respective components. The maintenance facility consists of drive-through work bays, office space, a tool room, a ready room, and latrines.

3.1.20.2. **Requirements Determination.** The following documents should be utilized to determine the scope of the facility: The UCML; AFI 11-212; the Air Force Standard for Non-Expendable Air Munitions Training Authorizations; test plans; beddown plans; and AFCAT 21-209, Volume 1, *Ground Munitions*.

3.1.20.3. **Scope Determination.** The shop has a minimum of two work bays, approximately 9.1 m x 15.2 m (30 ft x 50 ft), depending on mission requirements. Compatibility between the various munitions has to be considered when determining the total number of required work bays. An adjoining administrative area consists of approximately 137 m^2 (1,500 ft^2). The proposed UMD and guidance in this Manual should be used to determine specific personnel administrative space. (See **Chapter 6** of this Manual for additional guidance on administrative space requirements.)

3.1.20.4. **Dimensions.** See **paragraph 3.1.20.3.** above and **3.1.20.5** below.

3.1.20.5. **Design Considerations.**

3.1.20.5.1. Cranes or hoists, along with specific safety devices, may be required depending on specific munitions requirements.

3.1.20.5.2. Provide high security hasps or ILD on all bay doors with the intrusion system as required by AFI 31-101.

3.1.20.5.3. Q-D safety criteria in AFMAN 91-201 control siting of this facility.

3.1.20.5.4. AFMAN 91-201 contains additional guidance, especially regarding personnel and propagation protection between operating bays. Provide SDWs between operating bays to support concurrent operations and ensure they meet the criteria in AFMAN 91-201.

3.1.20.5.5. Provide lightning protection and electrical grounding system according to DoD 6055.9-Std and AFMAN 91-201.

3.1.20.5.6. Low pressure (0 to 150 psig) is necessary. 115 VAC, 60 Hz, single-phase and 115 VAC 400 Hz, 3-phase power is necessary. Emergency electric power generator is necessary per AFI 32-1063.

3.1.20.5.7. Environmental controls for humidity and temperature are necessary to assure proper protection for weapon systems and test equipment. Provide HVAC for office, training, and bay areas.

3.1.20.5.8. Roll-up bay doors should be a minimum 3 m (10 ft) high and 4.80 m (16 ft) wide.

3.1.21. **Conventional Munitions Shop. FAC: 2162**

CATCODE: 216642
OPR: AF/A4LW
OCR: ACC/A4W

3.1.21.1. **Description.** This facility is used to perform maintenance operations including assembly, disassembly, corrosion control, testing and troubleshooting, repair, and time compliance technical orders (TCTO) on various munitions components and containers. The maintenance facility consists of drive-through work bays, office space, tool room, atraining and ready room, and latrines.

3.1.21.2. **Requirements Determination.** Provide a Conventional Munitions Shop at bases required to conduct maintenance operations as specified in **paragraph 3.1.21.1** above. Obtain additional information from AF/A4LW through ACC/A4MC. The following documents should be utilized to determine the scope of the facility: The UCML, AFI 11-212, the Air Force Standard for Non-Expendable Air Munitions Training Authorizations, test plans, and beddown plans.

3.1.21.3. **Scope Determination.** The number of bays and bay dimensions are dependent on mission requirements. Usually a minimum of three 9.1 m x 15.2 m (30 ft x 50 ft) work bays are required. Separate bays should be provided to support munitions involving different explosives hazards. Compatibility between the various munitions has to be considered when determining the total number of required work bays. For example, one bay for 20 mm operations, one bay for BDU-33/MK-106 operations, and one bay for general maintenance. An adjoining administrative area consists of approximately 232 m^2 (2,500 ft^2). The proposed UMD and guidance in **Chapter 6** of this Manual should be used to determine specific personnel administrative space.

3.1.21.4. **Dimensions.** See **paragraph 3.1.21.3** above.

3.1.21.5. **Design Considerations.**

3.1.21.5.1. A 1,810 kg (4,000 lb) transverse-mounted hoist may be required in each bay.

3.1.21.5.2. Provide high security hasps or ILDs on all bay doors with the intrusion system if required by AFI 31-101.

3.1.21.5.3. Q-D safety criteria in AFMAN 91-201 control siting of this facility.

3.1.21.5.4. Provide lightning protection and electrical grounding system according to DoD 6055.9-Std and AFMAN 91-201.

3.1.21.5.5. See AFMAN 91-201 for additional guidance on personnel and propagation protection between operating bays.

3.1.21.5.6. Provide SDWs between operating bays to support concurrent operations as per the criteria in AFMAN 91-201. Provide separate facilities to support concurrent operations if substantial dividing wall criteria in AFMAN 91-201 cannot be met.

3.1.21.5.7. Low pressure (0 to 150 psig) and high pressure (0 to 3,500 psig) air is necessary. 115 VAC, 60 Hz, single-phase and 115 VAC 400 Hz, 3-phase power is necessary. Emergency electric power generator is necessary per AFI 32-1063.

3.1.21.5.8. Environmental controls for humidity and temperature are necessary to assure proper protection for weapon systems and test equipment. Provide HVAC for office, training, and bay areas.

3.1.22. **Avionics Shop. FAC: 2171**

CATCODE: 217712
OPR: AF/A4L
OCR: WR-ALC/752 CBSG

3.1.22.1. **Description.** This shop accommodates organizational and intermediate level maintenance activities for the following aircraft equipment and accessories: Airborne communications, cameras, bombing systems, and tactical support element/communications security (TSEC/COMSEC) equipment. TSEC/COMSEC equipment includes equipment for secure voice, identification friend or foe (IFF), selective identification feature (SIF), data link pods, etc.

3.1.22.2. **Requirements Determination.** Obtain additional information from the MAJCOM and AF/A4L.

3.1.22.3. **Scope Determination.**

3.1.22.3.1. Major items that require shop and storage space are storage racks for serviceable equipment and equipment waiting for maintenance or parts; coding devices; technical data and code books; pod lifting devices, cradles; and storage racks.

3.1.22.3.2. For Pod Storage Requirements see **Table 3.9**, Note 2.

3.1.22.4. **Dimensions.** See **Table 3.8**.

3.1.22.5. **Design Considerations.** Ensure shops have intrusion detection and alarm systems. Ensure avionics pod shops comply with local, state, and federal requirements in respect to air emissions, as required by AFI 32-7040. Locate facilities to comply with explosives safety standards. Some storage space provides physical security and corrosion protection for delicate electronic equipment. Combine maintenance and storage facilities so that they can share the secure storage area if possible. Ensure shop design complies with facility design instructions to minimize radiation exposure as outlined in paragraph 3.2.of AFI 48-148, *Ionizing Radiation Protection.*

Table 3.8. Space Requirements for Avionics Shops[1, 2, 3].

Mission	Gross Area	
	m2	ft2
Air Refueling Wing	641	6,900
Bomb Wing	2,137	23,000
Airlift Wing (C-17)5	1,765	19,000
Airlift Wing (C-5)	2,787	30,000
Airlift Wing (C-5, C-17)5	3,252	35,000
Airlift Wing (C-130)	929	10,000
FIS	1,175	12,650
Fighter Wing	1,579	17,000
UPT Wing	929	10,000
Mobility Wing	See MAJCOM	
Composite Wing	See MAJCOM	
Special Operations Squadron	See Note 4	
Combat Search and Rescue Unit	See Note 4	

NOTES:
1. This includes offensive avionics system test equipment and electronic countermeasure (ECM) equipment.
2. Communications and navigation require additional secure storage. Navigation requires 9.3 m2 (100 ft2). Communications without data link pods require 9.3 m2 (100 ft2). ECM pod secure storage requirements are 177 m2 (1905 ft2) for 1 to 12 pods and 254 m2 (2734 ft2) for 13 to 24 pods.
3. Authorized post-attach command and control systems (PACCS) function requires an additional 372 m2 (4,000 ft2).
4. Space is determined by individual analysis and validated by the appropriate MAJCOM.
5. Based on previous calculations for C-141 avionics shop. Refine space requirement by individual analysis.

3.1.23. **ECM Pod Shop and Storage. FAC: 2171**

CATCODE: 17713
OPR: AF/A4L
OCR: ACC/A4MA

3.1.23.1. **Description.** This facility performs organizational and intermediate maintenance and provides secure storage of pods and associated equipment.

3.1.23.2. **Requirements Determination.** The maintenance shop provides a controlled environment to inspect, maintain, and repair pods and associated equipment. Equipment includes powered and non-powered aircraft generation equipment (AGE), test benches, and bench stock. (See **paragraph 3.1.23.5**)

3.1.23.3. **Scope Determination.** The storage area for pods and associated equipment provides physical security and optimum system availability for bench maintenance and aircraft loading, using approved lifting and transporting AGE. Major items of equipment that require space are a pod lifting device (overhead crane, A-frame with hoist, or hydraulic crane); pod cradles or storage racks for serviceable pods; pod cradles or storage

bins for pod systems waiting for parts; MJ1A bomb lift pod adapters; and pod dollies. See **Table 3.9** for space requirements.

3.1.23.4. **Dimensions.** See **Table 3.9** below.

3.1.23.5. **Design Considerations.** The preferred location is near avionics maintenance and the flight line. Combining maintenance and storage facilities is desirable. Maintain the pod maintenance area at 26°C ± 1°C (78°F ± 2°F) and between 35 and 65 percent humidity. Maintain the pod storage area between 16°C (60°F) and 29°C (85°F) with 65 percent maximum humidity. Dual Power requirements are needed: 400 Hz, 115 VAC (3-phase) and 50-60 Hz, 110 VAC. Separate overhead power distribution busses with emergency power disconnect are necessary. Directly incorporate intrusion detection/security breach alert systems with Security Forces to ensure swift response. Ensure building architecture incorporates measures to provide for and protect SECRET information/assets. Ensure shop design complies with facility design instructions to minimize radiation exposure as outlined in paragraph 3.2. of AFI 48-148.

Table 3.9. Space Requirements for Pod Shops.

Function	Number of Sets of Pod Support Equipment1,2							
	1		2		3		4	
	Gross Area							
	m2	ft2	m2	ft2	m2	ft2	m2	ft2
Maintenance	181	1,950	323	3,480	465	5,010	608	6,540
Storage	368	3,961	736	7,922	1,104	11,883	1,472	15,844
Total Gross Area	549	5,911	1,059	11,402	1,569	16,893	2,080	22,384

NOTES:
1. Each set of pod support equipment maintains 25 electronic countermeasure (ECM) pods.
2. For additional pod storage space for Centralized Repair Facilities see Table 3.7, Note 2.

3.1.24. **Air Force Communications Service Maintenance Facility. FAC: 2171**

CATCODE: 217742
OPR: AFNIC
OCR: N/A

3.1.24.1. **Description.** This facility provides space for production and repair, material control, cleaning room, screen room, training, technical orders, film, tool and AGE storage, administration, latrines, and a mechanical equipment room.

3.1.24.2. **Requirements Determination.** The building provides shop space for the centralized field repair of communications and electronics (C-E) equipment. The facility supports communications units in a 1,600 km (1,000 mi) radius of the shop. The radius may be increased to include more units if repair time is not a factor. Obtain additional information through AFNIC and MAJCOMs.

3.1.24.3. **Scope Determination.** Each assigned area normally services the same type of C-E equipment, so the assigned components, tools, and test equipment vary only slightly from area to area. Space requirements are based on the number of reparable units processed per month: 285 m^2 (3,064 ft^2) is authorized for facilities that process 2,000 to 2,500 units per month, and 379 m^2 (4,080 ft^2) is authorized for facilities that process 2,501 to 4,000 units per month. More space may be authorized for facilities that process more than 4,000 units per month.

3.1.24.4. **Dimensions.** See **paragraph 3.1.24.3** above.

3.1.24.5. **Design Considerations.** C-E maintenance facilities comply with local, state, and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in respect to air emissions, as required by AFI 32-7040.

3.1.25. **Meteorological Equipment Shop. FAC: 2171**

CATCODE: 217752
OPR: AFWA
OCR: AF/A3O-W

3.1.25.1. **Description.** This facility provides space for the basic shop, administrative and training functions, and mockup bench sets for unique mission equipment or systems, such as Defense Meteorological Satellite Program, AN/FMQ-7 Solar Optical Telescope, and AN/FRR-95 Radio Solar Telescope.

3.1.25.2. **Requirements Determination.** The building provides shop space for maintaining meteorological equipment. Obtain additional information from AF/A3O-W and MAJCOMs.

3.1.25.3. **Scope Determination.** Meteorological shops vary from 372 m^2 (4,000 ft^2) to 790 m^2 (8,500 ft^2). Additional space may be provided where bench sets are authorized for specific systems. Justify the additional space in the project submittal with a detailed analysis of space occupied by equipment and personnel.

3.1.25.4. **Dimensions.** See **paragraph 3.1.25.3** above.

3.1.25.5. **Design Considerations.** Give consideration for special security measures or other pertinent features on a case-by-case basis, such as cipher locks, secure compounds, raised floors, and storage areas.

3.1.26. **Aircraft Support Equipment Shop/Storage Facility. FAC: 2181**

CATCODE: 218712
OPR: AF/A4L
OCR: WR-ALC/642 CBSG

3.1.26.1. **Description.** This facility encompasses powered and non-powered AGE maintenance, inspection, repair and servicing functions, and powered munitions AGE, if assigned. It also maintains and holds powered AGE in readiness.

3.1.26.2. **Requirements Determination.** The AGE shop inspects, maintains, repairs, and services powered and non-powered AGE directly supporting aircraft and powered munitions AGE, if assigned. It normally includes maintenance stalls with work benches,

an indoor wash rack, tool crib, bench stock, sealed lead acid battery servicing area, engine exhaust education system, administrative space, and personnel locker space.

3.1.26.3. **Scope Determination.** **Table 3.10** lists space requirements for maintenance shops and standby storage facilities. These space requirements include total covered and open storage. Open storage is identified as Aircraft Support Equipment Storage Yard (**CATCODE 852273**) and is measured in square yards. Additive to the space requirements in **Table 3.10** are requirements for maintenance and storage of munitions trailers and equipment that are maintained in or near the weapon storage areas. Requirements for munitions AGE are to be obtained from MAJCOM/A4 and A7. For powered munitions trailer maintenance and storage facilities, allow 192 m^2 (230 yd^2) per authorized trailer for each facility.

3.1.26.4. **Dimensions.** See **Table 3.10**.

3.1.26.5. **Design Considerations.**

3.1.26.5.1. Standby storage facilities are necessary for AGE awaiting dispatch after repair. Depending on climate, the facility may be a heated or unheated building, AGE Storage Yard (**CATCODE 852273**), or a combination of these. Separate sub-pool standby storage facilities are authorized where AGE operating locations are widely dispersed. Equipment Fueling Stations (**CATCODE 123335**) are necessary for servicing powered AGE.

3.1.26.5.2. A separate area for LOX handling equipment is needed. When powered munitions trailers are assigned, there is a separate maintenance shop normally at or near the munitions storage area. It includes maintenance stalls with work benches, an indoor wash rack, tool crib, bench stock, administrative space, and personnel locker space. When powered munitions trailers are assigned, there is an enclosed storage facility near the trailer maintenance shop to house trailers not in use.

3.1.26.5.3. Office areas require sound insulation, and portions of this facility may need special ventilation and/or exhaust evacuation. Corrosion control is normally performed in a Corrosion Control Facility (**CATCODE 211159**). Include an environmental protection, eye wash, and an emergency shower near the battery shop.

3.1.26.5.4. Special ventilation and floor drainage with oil/water separation is necessary in the maintenance area. An overhead hoist to support a minimum of 2,720 kg (6,000 pounds), electrical power (120 VAC, 240 VAC, and 480 VAC), compressed air source (0-120 psig), and waste oil disposal system to reclaim petroleum based oil, synthetic oil, and hydraulic fluid are required. Consider a storage area for shop support equipment (e.g., portable hoists, hacks, refrigerant recovery system, antifreeze recycle).

3.1.26.5.5. A separate oil free area is necessary for LOX handling equipment. Ensure the floor is concrete. Electrical power (120 VAC and 220 VAC) is needed in the area. Ensure this area is covered and should preferably be inside a facility. Refer to **CATCODE 213335** for fuel storage tank authorization.

3.1.26.5.6. For the powered munitions trailer maintenance facility, electrical power (120 VAC, 220 VAC, and 440 VAC) and compressed air (0-827 kPa [0-120 psig])

are necessary. Space receptacles for 440 VAC power to allow for operation of trailers in and around the facility. A 9,070 kg (10 ton) overhead hoist for trailer support equipment should be considered. Ensure the wash rack includes hot and cold water.

3.1.26.5.7. AGE facilities comply with local, state, and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in respect to air emissions, as required by AFI 32-7040.

3.1.26.5.8. Locate facilities to comply with explosives safety standards.

Table 3.10. Space Requirements for AGE Shop/Storage Facility.

Number of Authorized Pieces of AGE	Gross Area					
	Shop		Covered Storage1		Open Storage1	
	m2	ft2	m2	ft2	m2	yd2
Up to 100	502	5,400	480	5,170	48	57.4
101 to 150	641	6,900	721	7,760	72	86.3
151 to 200	748	8,050	962	10,350	96	115
201 to 250	855	9,200	1,200	12,940	120	143.8
251 to 300	962	10,350	1,440	15,530	144	172.3
301 to 350	1,070	11,500	1,680	18,110	168	201.3
351 to 400	1,180	12,650	1,920	20,700	192	230
401 to 450	1,280	13,800	2,160	23,290	216	258.8
451 to 500	1,360	14,605	2,400	25,880	240	287.5
501 to 550	1,410	15,180	2,640	28,460	264	316.3
551 to 600	1,460	15,755	2,880	31,050	288	345
601 to 650	1,520	16,330	3,130	33,640	313	373.8
651 to 700	1,570	16,905	3,370	36,230	337	402.5
701 to 750	1,620	17,480	3,610	38,810	361	431.3
751 to 800	1,680	18,055	3,850	41,400	385	460
801 to 850	1,730	18,630	4,090	43,990	409	488.8
851 to 900	1,780	19,205	4,330	46,580	433	517.5
901 to 950	1,840	19,780	4,570	49,160	457	546.3
951 to 1,000	1,890	20,355	4,810	51,750	481	575
NOTES: 1. Total storage includes covered and open storage. Total open and covered storage space may not exceed the numbers listed.						

3.1.27. **Precision Measurement Equipment Laboratory (PMEL). FAC: 2171**

CATCODE: 218868
OPR: AF/A4LF
OCR: WR-ALC/562 CBSG (AFMETCAL)

3.1.27.1. **Description.** This facility provides intermediate-level maintenance and calibration of test, measurement, and diagnostic equipment (TMDE) for assigned units. PMEL personnel calibrate, certify and repair TMDE at regular intervals and provide emergency assistance on TMDE as required (see AFI 21-113, *Air Force Metrology and Calibration [AFMETCAL] Management*).

3.1.27.2. **Requirements Determination.** TO 00-20-14 lists bases authorized PMELs.

3.1.27.3. **Scope Determination.** See **Table 3.11** and **3.12**.

3.1.27.4. **Dimensions.** See **Table 3.11** and **3.12**.

3.1.27.5. **Design Considerations.** Obtain PMEL design information from FC 4-218-01F, Air Force Criteria for Precision Measurement Equipment Laboratory Design and Construction. Obtain operational information from the 562d Combat Sustainment Group (AFMETCAL)/WR-ALC through AF/A4LF. TO 00-20-14 contains day-to-day operational guidance for PMELs.

3.1.27.5.1. The laboratory requires tight environmental controls for temperature, humidity, and dust and a calibration and repair area free from interfering vibration. These environmental constraints vary. Ensure new and modified facilities conform to the specifications in FC 4-218-01F.

3.1.27.5.2. All PMELs require certification per AFI 21-113. There are two major operational criteria for certification: 1) temperature and humidity remain in tolerance at least 90 percent of the time, measured over a 12 month period, and 2) the facility meets the requirements of FC 4-218-01F.

Table 3.11. PMEL Type A-F Space[1].

Workload per Year (Items):	Type A0-3600		Type B3601-5000		Type C 5001-7200	
	m2	ft2	m2	ft2	m2	ft2
Scheduling/Receiving2	69	740	86	924	121	1,300
Equipment Cleaning2	9	98	9	98	16	175
Calibration/Repair2	207	2,230	260	2,800	362	3,900
Workload per Year (Items):	Type D7201-10000		Type E10001-20000		Type F20001-100000	
	m2	ft2	m2	ft2	m2	ft2
Scheduling/Receiving2	159	1,711	238	2,567	334	3,593
Equipment Cleaning2	16	175	24	263	34	368
Calibration/Repair2	482	5,185	723	7,778	1,012	10,889

NOTES:
1. Area requirements are based on the typical PMEL. Add square footage if the equipment in Table 3.12 resides in the PMEL facility.
2. Scheduling/receiving/equipment storage areas are estimated at one-third the calibration/repair requirement.

Table 3.12. Space Requirements for PMEL Facilities.

Functions	Net Building Area	
	m2	ft2
Vestibule1,2		
Lobby/Waiting1,2		
Reception1,2		
Break Room1,2		
Office Space1		
Conference Room/Training1,2		
Technical Library	21.3	229
Scheduling/Receiving3		
Equipment Storage	18.6	200
Equipment Cleaning3		
Air Lock	5	54
Calibration/Repair3		
68 Degree F Room4,5	55.7	600
Shield Room4	18.6	200
Night Vision Calibration4	9.3	100
Aircraft/Wheel Load Scales4 (P/Ns 654000/804000 or equivalent: 2400 lbs)	8.2	88
Force Gage/Load Cell/Dynamometers4 (P/N C99728 or equivalent: 1400 lbs)	2.6	28
Torque Multiplier Calibration System4	7.4	80
Tensiometer Calibration System4,6 P/N 774000 or equivalent: 4800 lbs)	5.9	64
Bullion Balance4	2.8	30
Fiber Optic Calibration System4	4.5	48
High Voltage Calibrator4	3.3	35
Hoist (F-15 Rock)4	1.7	18
North-Seeking Gyro Pad4	1.5	16
Photometric Bench4	18.2	196
Surface Plate (2 x 3 ft)4 (326 lbs)	6.7	72
Surface Plate (3 x 6 ft)4 (965 lbs)	10	108
Surface Plate (4 x 8 ft)4 (3920 lbs)	13	140
Temp Bath Hood4	1.7	18
Transportable Field Calibration Unit Storage4	9.3	100
Portable Automatic Test Equipment Calibrator Storage4	9.3	100

NOTES:
1. Refer to Chapter 6 of this Manual for administrative space standards.
2. Number of personnel requires user justification.
3. Size varies depending on inventory supported and type of facility. See Table 3.11.
4. Installation specific requirement.
5. 600 ft2 minimum.
6. Requires a 9.5 ft minimum ceiling height.

3.1.28. General Criteria.

3.1.28.1. **Description.** The Base Civil Engineer (BCE) is responsible for a wide variety of design, construction, operation, maintenance, and environmental planning functions on base facilities and utilities systems. In addition, the BCE is responsible for the EOD, Emergency Management, and fire protection functions on an installation.

3.1.28.2. **Requirements Determination.** The BCE complex should provide a professional, functionally integrated environment for personnel performing management, training, administrative, design, and planning tasks and for personnel performing functions such as carpentry, metal working, electrical, pavements and grounds, and other skilled labor tasks. Additional information may be obtained from AFCESA/CEO and AFCEE/TDB. Refer to **CATCODE 213335** for fueling station and pump authorizations.

3.1.28.3. **Scope Determination.** **Table 3.13** provides general guidelines to the space required for each function of the BCE complex, based on the size and resources of the organization.

3.1.29. **Base Engineer Pavements and Grounds Facility. FAC: 2191**

CATCODE: 219943
OPR: AFCESA/CEO
OCR: AFCEE/TDB

3.1.29.1. **Description.** The pavements and grounds division usually has three work centers: pavements, equipment operations, and grounds.

3.1.29.1.1. The pavement work center maintains paved surfaces and repairs and constructs airfields, roadways, and parking areas.

3.1.29.1.2. The equipment operations work center operates construction and special purpose equipment such as backhoes, dump trucks, airfield sweepers, and bulldozers.

3.1.29.1.3. The grounds work center is responsible for base landscaping including mowing, pruning, and trimming grass and shrubs in the common areas of the base. The work center also maintains perimeter fencing and road signs on the base.

3.1.29.2. **Requirements Determination.** **Table 3.13** provides planning factors to determine gross area requirements for a consolidated pavements, equipment operations, and grounds work center. For separated functions, apply the factors and add additional space requirements for functions such as latrines and break rooms at each location.

3.1.29.3. **Scope Determination.** See **paragraph 3.1.28** above.

3.1.29.4. **Dimensions.** See **paragraph 3.1.28** above.

3.1.29.5. **Design Considerations.** In cold climates, add additional space requirements for snow removal function.

3.1.30. **Base Engineer Maintenance Shop. FAC: 2191**

CATCODE: 219944
OPR: AFCESA/CEO
OCR: AFCEE/TDB

3.1.30.1. **Description.** This facility is the primary production center of BCE activities including carpentry, masonry, liquid fuels, plumbing, heating, refrigeration, electrical, metal, Energy Management and Control Systems (EMCS), hospital maintenance, entomology, and others. Each element needs the space, layout, and equipment for shop, administrative, and training activities.

3.1.30.2. **Requirements Determination.** This facility is an integral part of the BCE complex. Additional information may be obtained from AFCESA/CEO and AFCEE/TDB.

3.1.30.3. **Scope Determination.** **Table 3.13** shows space requirements. Allow additional space for unique mission requirements and for BCE activities in high threat areas to accommodate war-related offices and equipment.

3.1.30.4. **Dimensions.** See **paragraph 3.1.28** above.

3.1.30.5. **Design Considerations.** See **paragraph 3.1.28**; ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6** in this Manual.

3.1.31. **Base Engineer Covered Storage Facility. FAC: 4421**

CATCODE: 219946
OPR: AFCESA/CEO
OCR: AFCEE/TDB

3.1.31.1. **Description.** This facility provides environmentally controlled storage space and related operating space for the supplies and material the BCE organization uses in its day-to-day operation, maintenance, and construction facilities. The facility is used for supplies and materials that cannot withstand storage in sheds or yards. A typical storage facility provides storage space in bins, on shelves, on racks, or an automated storage system; support areas such as office space, break, lunch or meeting room space; restrooms; and shipping and receiving space. Three types of storage facilities store material and equipment and are accountable to the BCE, a designated representative, or the counterpart to the BCE in base tenant organizations. These three storage facilities are the Base Engineer Covered Storage Facility (**CATCODE 219946**), Base Engineer Storage Shed (**CATCODE 219947**), and Base Civil Engineer Open Storage (**CATCODE 452255**).

3.1.31.2. **Requirements Determination.** The BCE has the following seven basic storage areas.

3.1.31.2.1. **Holding Area.** The holding area is a secure storage area for material associated with work orders or job orders. Materials are stored until the job starts.

3.1.31.2.2. **Stores.** Provides storage for materials on hand for day-to-day work orders and job orders. Stores keep such things as bench stock for base supply and storage areas for a contractor operated civil engineering supply store (COCESS). CE may have other stores to stock materials needed by craft workers and customers. These stores include self help stores, "U-Fix-It" stores, and stores with centralized bench stock. Any changes or modifications to contractor operated facilities should be coordinated with the local contracting office.

3.1.31.2.3. **Tool Crib.** A tool crib stores and issues tools for worker's tool kits.

3.1.31.2.4. **Residual Storage Area.** A residual storage area stores items left over from job orders and work orders that may have future use and are not normally stocked in COCESS or bench stock supplies.

3.1.31.2.5. **Bulk Storage.** This area stores large, unwieldy items issued with work or job orders such as sand and gravel.

3.1.31.2.6. **Appliances.** Refer to the *Air Force Family Housing Guide*.

3.1.31.2.7. **Prime Base Emergency Engineering Force (BEEF)/Mobility Assets.** The BCE may be required to store mobility bags, a home station training kit, and camouflage netting and may require a mobility staging area and space for repairing assigned equipment (including tents) and space for building team equipment into deployable packages.

3.1.31.3. **Scope Determination.** The BCE activity usually requires 0.09 m^2 (1 ft^2) of environmentally controlled storage space for each square meter of zonal maintenance space. In regions that experience severe winters (other than arctic areas), the BCE may need 0.11 m^2 (1.2 ft^2) of storage space for each square foot for zonal maintenance space. In arctic regions, the requirement can be combined with **CATCODE 219947** and, in part, **CATCODE 452255**. Support areas should be sized to maximize storage space while allowing adequate support for day-to-day administrative and personnel activities in the warehouse. **Table 3.13** lists established planning factors for environmentally controlled warehouse gross space for BCE organizations. To estimate space for shipping and receiving, consider the type, number, and flow of items. Plan for 0.46 m^2 (5.0 ft^2) of combined storage (**CATCODEs 214945**, **214946** and **214947**) for each square meter of zonal maintenance space.

3.1.31.4. **Dimensions.** See **Table 3.13**.

3.1.31.5. **Design Considerations.**

3.1.31.5.1. **Expanding Available Storage Capability.** Several alternatives are available for expanding insufficient storage space. The first alternative is to redesign the warehouse layout and install equipment that increases storage capacity. The second alternative is to use vertical space for a mezzanine (if ceiling height permits). Free standing mezzanines can double the usable storage space by creating space above existing storage or administrative areas. A third alternative is to use staging containers for orders that are 100 percent material complete but not scheduled to start for several months. Staging containers weighing up to 907 kg (2,000 lbs) can be stacked four high away from the active section of the warehouse. Collapsible staging containers provide an alternative to storing oddly shaped and sized items for special work orders. A fourth alternative is to construct or acquire another facility.

Table 3.13. Space Requirements for Base Civil Engineer Facilities.

Functions	Net Building Area	
	m2	ft2
Administration Area1,2		
Command Section /Administration Support	See Chapter 6, Tables 6.3, 6.4, and 6.9.	
Programs Flight		
Flight Chief Office (Type D)	11.15	120
Secretary/Administration (Type F)2	5.95/person	64/person
Programmer Workspaces (Type F)2	5.95/person	64/person
Design engineer/Engineer Assistant Workspaces (Type F)2	5.95/person	64/person
Construction Manager Workspaces (Type F)2	5.95/person	64/person
SABER Workspaces (Type F)2	5.95/person	64/person
Maintenance Engineering Superintendent Office (Type E)2	7.43	80
Maintenance Engineering Workspaces (Type F)2	5.95/person	64/person
Vault/Storage Room	28	300
Damage Control Center (DCC)	28	300
Conference Room2	See Chapter 6, Tables 6.3 and 6.4	
Asset Management Flight		
Flight Chief Office (Type D)2	11.15	120
Secretary/Administration (Type F)2	5.95/person	64/person
Environmental Program Manager Workspaces (Type F)2	5.95/person	64/person
Housing Operations and Management3		
Operations Flight		
Flight Chief Office (Type D)2	11.15	120
Deputy Flight Chief Office (Type E)2	7.43	80
Secretary/Administration (Type F)2	5.95/person	64/person
Utility Maintenance Superintendent Office (Type E)2	7.43	80
Infrastructure Superintendent Office (Type E)2	7.43	80
Heavy Repair Superintendent Office (Type E)2	7.43	80
Heavy Repair Element		
Vertical Zone4	883	9,500
Horizontal Zone4	372	4,000
Facility Maintenance Element		
Facility Maintenance	279	3,000
Customer Service/Work Controller Office (Type F)3,2	5.95/person	64/person
Infrastructure Element		
Electrical Distribution Zone4	112	1,200
EMCS Zone4	28	300
Power Production Zone4	139	1,500

Functions	Net Building Area	
	m2	ft2
Liquid Fuels4	37	400
Entomology4	167	1,800
Logistics Management		
Material Control Section2	110	1,180
Stock Storage Area (GOCESS/COCESS)	1,487	16,000
Vehicle Control Officer Office (Type E)2	7.43	80
Readiness and Emergency Management Flight		
Flight Chief Office (Type D)2	11.15	120
Secretary/Administration (Type F)2	5.95/person	64/person
Readiness Staff Workspaces (Type F)2	5.95/person	64/person
Training NCO Office (Type E)2	7.43	80
Logistics Office (Type E)2	7.43	80
HAZMAT Centralization Room (12-15 people)	37	400
Training Classroom (2 classrooms)	See Chapter 6, Table 6.4	
Projection Room	11	120
Inside Demonstration Room	47	500
Student Break Room	See Chapter 6, Table 6.4	
Secure Storage Area	46	500
NBC Control Center	28	300
Vehicle Storage	28	300
Warehouse Storage and Mobility Processing5	465	5,000
EOD Flight		
Flight Chief Office (Type D)2	11.15	120
Flight Superintendent Office (Type E)2	7.43	80
EOD Staff Workspaces (Type F)2	5.95/person	64/person
Training Room7	42	450
EOD Operation Control Center	20	225
Physical Fitness Room8	23	250
Classified Storage Area	14	150
Maintenance and Secure Storage Area	176	1,900
Industrial Storage Area/Hazmat Pharmacy	14	150
Mobility Professional Gear Storage Area6	112	1,200
BSERV Storage	25	270
Primary Weapon Vault/Storage	14	150
ARTS platform	18	200
Laundry8	7	75
Toilets/Showers8	28	300

NOTES:
1. See Base Engineer Administration (CATCODE 610127) and Table 6.9.
2. See Tables 6.2 through 6.4 in Chapter 6.
3. See Family Housing Management Office (CATCODE 610119) and Table 6.6.

Functions	Net Building Area	
	m2	ft2
4. This is an average zone/facility size. Each Squadron should adjust these sizes based on local requirements. 5. Sizing may vary depending on local storage or mobility processing requirements. 6. Per UTC assigned. 7. Per 10 assigned personnel. 8. Validate requirement.		

3.1.32. **Base Engineer Storage Shed. FAC: 4422**

CATCODE: 219947
OPR: AFCESA/CEO
OCR: AFCEE/TDB

3.1.32.1. **Description.** This facility provides covered storage for installation and maintenance equipment and supplies that do not need warehouse storage but do need protection from the weather. Items stored in this facility usually include steel, vitreous clay, concrete pipe, roofing material, crating material, and certain plumbing and electrical supplies. See **paragraph 3.1.28** for further information.

3.1.32.2. **Requirements Determination.** See **paragraph 3.1.28** in this Manual.

3.1.32.3. **Scope Determination.** The size is approximately equal to the size of the Base Engineer Maintenance Shop (**CATCODE 219944**). In arctic regions, the ratio of shed space to shop space can vary from 0.0 to 4.0, depending on the amount of shed space allowance transferred to Base Engineer Covered Storage Facility (**CATCODE 219946**), and on the amount of Base Civil Engineer Open Storage (**CATCODE 452255**) transferred to covered storage or sheds. Plan for 0.46 m^2 (5.0 ft^2) of combined storage (**CATCODEs 214945**, **214946** and **214947**) for each square meter of zonal maintenance space.

3.1.32.4. **Dimensions.** See **Table 3.13** in this Manual.

3.1.32.5. **Design Considerations.** See **paragraph 3.1.28** in this Manual.

Chapter 4

FACILITY CLASS 4, SUPPLY

4.1. Category Group 41, Liquid Storage - Fuel and Nonpropellants.

4.1.1. Storage Requirement.

4.1.1.1. Calculate the total requirement for liquid fuel storage on the basis of programming guidance furnished by Defense Energy Support Center (DESC) and requirements established in the Inventory Management Plan. Program tankage in standard size tanks using guidance in UFC 3-460-01.

4.1.1.2. Storage tanks for base liquids and liquid fuel, such as described in this chapter, require security protection under policies given in AFI 31-101. Areas containing these tanks are protected by lights (**CATCODE 812926**), fences (**CATCODE 872274**), and security alarms (**CATCODE 872841**). See criteria provided in this Manual for the individual category codes. Additional security aids such as sensors and other detection devices are provided as feasible. Storage areas may include dispensing and operating facilities, such as described under Liquid Oxygen Storage (**CATCODE 442258**).

4.1.1.3. Projects for facilities storing or handling bulk fuel supplied by DESC are normally programmed through the appropriate MAJCOM to DESC for funding/MILCON program management. Locate facilities to comply with explosives safety standards.

4.1.2. **Number and Size of Tanks.** Base the determination of the number of tanks to be used for a particular storage requirement following requirements and Jet Fuel Storage (**CATCODE 411135**).

4.1.2.1. A minimum of two bulk tanks are necessary, regardless of the storage quantity, due to fuels quantity control measures.

4.1.2.2. Three or more tanks are necessary for all requirements over 31,800 m^3 (200,000 barrels).

4.1.2.3. Individual capacity of any tank may not exceed 15,900 m^3 (100,000 barrels) unless authorization is obtained from AFCESA/CEO**.**

4.1.3. Use of Aboveground and Underground Tanks.

4.1.3.1. Use aboveground tanks for bulk storage of petroleum products within CONUS unless special authorization for underground tanks is obtained from the DoD Fuel Facility Engineering Panel through the Air Force representative from AFCESA/CEO. The use of underground tanks is normally limited to small size operating tanks, storage at highly essential overseas bases, and war reserve storage. Provide control devices such as leak detection and automatic tank gauging as an integral component of all tanks. See section 8.5 of UFC 3-460-01 for secondary containment requirements for aboveground tanks.

4.1.3.2. Underground tanks include completely buried tanks, semi-buried, and cut and cover tanks, and surface-installed and mounded-over tanks.

4.1.4. **Types of Tanks.**

4.1.4.1. Aboveground covered floating pan tanks in capacities of 159 m^3 (1,000 barrels) or greater IAW UFC 3-600-01.

4.1.4.2. Aboveground cone roof tanks for low volatile products in all capacities. These are also used for highly volatile products in capacities under 1,000 barrels.

4.1.4.3. Horizontal aboveground cylindrical tanks for operating storage of all types of products, usually in small-capacity tanks. Do not use tanks of this type in capacities of 151 m^3 (40,000 gallons) or more.

4.1.4.4. Vertical underground tanks, when authorized, for all types of products, regardless of the volatility.

4.1.4.5. Horizontal underground tanks for all types of products, usually in small-capacity tanks. They are provided for operating tanks serving vehicle service stations, for alcohol storage tanks, and for operating tanks at truck fill stands where required. Use double wall construction for all underground storage tanks and do not use tanks of this type in capacities of 189,000 liters (50,000 gallons) or more.

4.1.5. **Siting Requirements and Pollution Control.**

4.1.5.1. In planning storage areas, the criteria given in UFC 3-460-01 on siting clearances and dikes should be followed.

4.1.5.2. Provide all liquid fuel storage facilities with positive methods to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Use tanks with cone roofs and internal floating pans for above-ground storage of all types of jet fuel and for volatile petroleum products having a flashpoint under 38°C (100°F). Enclose all aboveground storage tanks 2.5 m^3 (55 gal) capacity and larger within a diked area in accordance with Section 311(j) of the CWA, requirements set forth in 40 CFR part 12, and UFC 3-460-01. Make provisions for removing water from diked areas through a drain pipe with a lock-type shutoff valve. Ensure the valve remains closed at all times except when draining water from the diked basin. Additionally, ensure a designated/authorized person is physically present at all times in the immediate area when the dike drain valve(s) is in the open position.

4.1.6. **Diesel Fuel Storage. FAC: 4111**

CATCODE: 411134
OPR: AFPET/PTOT
OCR: AFCESA/CEO, AF/A4LE

4.1.6.1. **Description.** On-base tankage levels for peacetime operating stock (POS) in CONUS and overseas are provided on the basis of programming guidance provided by AF/A4LE.

4.1.6.2. **Requirements Determination.** Fuel storage requirements should be obtained from either the base or MAJCOM/A4 office. From actual experience or planned ground fuel consumption and resupply, total bulk ground fuel tankage can be determined in a manner similar to that stated for jet fuel storage (**CATCODE 411135**). See AFI 32-7044,

UFC 3-460-01 and 40 CFR 280, *Underground Storage Tanks*, for specific guidance and requirements. See **Category Group 41** at the beginning of this chapter.

4.1.6.3. **Scope Determination.**

4.1.6.3.1. **Tank Farms.** Where motor gasoline is delivered by tank car, provide intermediate storage tanks of no less than 45,000 liter (12,000 gallon) capacity at the tank farm. Provide truck loading stations at the intermediate storage area.

4.1.6.3.2. **Exchange Service Stations.** Storage capacity of 45,000 liters may be provided for each product. At bases where high volumes of fuels are dispensed, provide a minimum of two tanks per grade of product, and the tanks should be 45,000 liters or larger capacity to accommodate commercial tank truck deliveries.

4.1.6.3.3. **Civil Engineer Facilities.** Storage capacity of 19,000 liters (5,000 gallons) per type of fuel may be provided in the Civil Engineer compound.

4.1.6.4. **Dimensions.** See **paragraph 4.1.6.3** above. Bulk tankage for ground fuels requires tanks of no less than 45,000 liter capacity per type of fuel, either single or manifolded together.

4.1.6.5. **Design Considerations.** There should be at least one 19 liter/second (300 gallon per minute [gpm]) bottom-loading fillstand with a temperature compensated meter per type of fuel. The primary and secondary methods of fuel receipt (tank truck, rail) should be taken into consideration when determining total tankage, location, and off-loading requirements for each product. At isolated stations, specified supply levels may be inadequate. In such instances, higher levels may be justified.

4.1.7. **Jet Fuel Storage. FAC: 4111**

CATCODE: 411135
OPR: AFPET/PTOT
OCR: AFCESA/CEO, AF/A4LE

4.1.7.1. **Description.** See **paragraph 4.1.1** above.

4.1.7.2. **Requirements Determination.** The total tankage required for jet fuel is the sum of the peacetime and war reserve tankage requirements. This may be adjusted up or down by DESC based on additional distribution needs or nearby available war reserve fuel.

4.1.7.3. **Scope Determination.** POS authorization is the amount of fuel required to sustain peacetime operation in support of military demands to be maintained at a Defense Fuel Support Point (DFSP). Peacetime requirement is based on the number and types of aircraft assigned to the base for the longest time period. The computation information for the POS calculation is in DoD 4140.25-M Volume II, *DoD Management of Bulk Petroleum Products, Natural Gas, and Coal*, available on the Defense Link website.

4.1.7.4. **Dimensions.** See **paragraph 4.1.1** above.

4.1.7.5. **Design Considerations.** See **paragraph 4.1.1** above.

4.1.8. **Storage Special Fuel. FAC: 4111**

CATCODE: 411139
OPR: AFPET/PTOT
OCR: AFCESA/CEO, AF/A4LE

4.1.8.1. **Description.** The storage of liquid chemicals in bulk is authorized when the action results in procurement, transportation, and handling economies, and bulk storage can be accomplished without danger or deterioration losses.

4.1.8.2. **Requirements Determination.** Under the circumstances described above, bulk chemical storage is authorized for any Air Force activity that annually consumes at least one tank truckload of any one chemical, or approximately 19,000 liters (4,000 gallons). Determine the method of commercial peacetime delivery of bulk chemicals to an installation in advance to provide adequate unloading facilities and to determine the quantity of the storage required.

4.1.8.2.1. Base peacetime bulk storage requirements on tankage necessary to maintain a 15-day stock level, based on an average 15-day consumption rate, but in no case may tankage be less than a standard 30,000 liter (8,000 gallon) tank if deliveries are made by tank truck, or less than a standard 45,000 liter (12,000 gallon) tank if deliveries are made by tank car. Since the minimum tankage requirement in practically every instance is substantially in excess of 15-day stock level, no additional tankage should be required to meet peak loads. If cleaning and maintenance of the facility is necessary, supply should be temporarily handled in drums.

4.1.8.2.2. Within tankage availability, one full railroad tank car or tank truckload may be shipped, although this may temporarily raise stocks above a 15-day level.

4.1.8.2.3. Any overseas war chemical reserves may be stored in underground tanks when this results in economies and acceptable sources of supply are thus developed.

4.1.8.3. **Scope Determination.** Tankage requirements for any activity may not exceed the sum of the peacetime requirement plus the wartime requirement. Use underground storage tanks only when required by health and safety reasons or mission requirements. Tankage requirements should be fully justified in MAJCOM budget estimates and supported by mathematical calculations showing the savings to be derived from storing chemicals in bulk.

4.1.8.4. **Dimensions.** All tank sizes are limited to standard size of 30,000 liter (8,000 gallon) and 45,000 liter (12,000 gallon) capacities.

4.1.8.5. **Design Considerations.** Ensure storage tanks for Jet Propellant Thermally Stable (JPTS) fuel are epoxy lined, and all piping and plumbing are either aluminum or stainless steel. Manual isolation valves should be either stainless steel or carbon steel type with electrolysis nickel internal coating. Coordinate any program changes to JPTS tankage with ACC/A4RM.

4.2. Category Group 42, Ammunition Storage

4.2.1. Overview.

4.2.1.1. **Basis for Requirements.** The quantity and type of explosives storage facilities required at an installation varies with the following conditions:

4.2.1.1.1. Operating requirements (i.e., the number and type of functions, operations, or specialized munitions activities to be performed);

4.2.1.1.2. The quantity and type of munitions to be stored or handled, such as war readiness materiel (WRM) munitions, operating and training munitions, combat munitions, munitions for specialized activities such as area reserve storage and redistribution, and munitions airlift;

4.2.1.1.3. Site characteristics such as physical limits and expansion capabilities of the ammo storage area, type and arrangement of existing storage facilities, and objectives of the base master plan; and

4.2.1.1.4. The type of proposed storage structures preferred or required at the storage site.

4.2.2. **Security Criteria for Facilities Protecting Arms, Ammunition, and Explosives (AA&E).** Refer to the following documents for further information: *U.S. Air Force Installation Force Protection Guide*; MIL HDBK 1013/1A, *Design Guidelines For Physical Security of Facilities;* MIL HDBK 1013/10, *Design Guidelines For Security Fencing, Gates, Barriers, and Guard Facilities*; DODI 2000.16, *DoD Antiterrorism (AT) Standards*; UFC 4-010-01, AFMAN 32-1071, Volumes 1, 2, and 3, *Security Engineering Manuals (FOUO)*; and DoD 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives*.

4.2.2.1. Ensure facilities used to store AA&E meet the following minimum requirements.

4.2.2.1.1. Walls should consist of 200 mm (8 in) of concrete reinforced with No. 4 reinforcing bars. Place the reinforcing bars 225 mm (9 in) on center both horizontally and vertically and staggered on each face to form a grid approximately 113 mm (4.5 in) square. Walls may also be constructed of 200 mm (8 in) concrete blocks with No. 4 reinforcing bars threaded through the blocks. Fill all block cavities with mortar or concrete. Walls require horizontal joint reinforcement at every course, or at a minimum, 200 mm (8 in) of brick interlocked between inner and outer courses.

4.2.2.1.2. Design ceilings and roofs to meet the load and structural safety requirements of the spans. The slabs should offer security equal to that provided by the walls. Reinforcing bar spacing, using No. 4 reinforcing bars, should form a grid where the area of any opening does not exceed 0.062 m^2 (96 in^2). If the ceiling or roof is of concrete pan-joist construction, the thinnest portion may not be less than 150 mm (6 in). The reinforcing grid requirements for flat slab construction apply. Ensure roof structures and ceilings of existing facilities provide an equal or greater degree of security than the windows and doors.

4.2.2.1.3. Design and construct floors to meet load and structural safety requirements. Ensure floors are a minimum of 15 cm (6 in) of concrete construction reinforced with 150 mm x 150 mm (6 in x 6 in) W4xW4 mesh or equivalent bars. For the purposes of security, the ceiling standard applies where the floor slab acts as the ceiling of an underlying room or area.

4.2.2.1.4. Doors should be 4.5 cm (1-3/4 in) solid or laminated wood with 12 gauge steel plate on the outside face, or standard 44 mm (1-3/4 in) hollow metal industrial type construction, with a minimum of 2 mm (14 gauge) steel skin plate, internally reinforced vertically with continuous steel stiffeners, spaced 150 mm (6 in) maximum on center. Ensure door bucks, frames, and keepers are rigidly anchored and have anti-spread space filler reinforcement to prevent disengagement of the lock bolt by prying or jacking of the door frame. Design and install the frames and locks for both interior and exterior doors to prevent the removal of the frame facing or the built-in locking mechanism sufficiently to disengage the lock bolt from the outside when the door is locked. Construction requirements for door frames and thresholds are as exacting as for the doors. A Class 5 steel vault door with a built-in three position dial type changeable combination lock may be used in lieu of other doors or locks.

4.2.2.1.5. Ensure door hinges are fixed pin security hinge type or equivalent. Peen the exposed hinge pins by spot welding or some other means to prevent removal. Hinge mounting screws may not be exposed to the outside of the room.

4.2.2.1.6. Provide exterior and interior lighting for all arms storage rooms or buildings.

4.2.3. **Pertinent Documents.**

4.2.3.1. Munitions levels are described in the following documents or publications.

4.2.3.2. **Levels for War Readiness Materiel.** The War Consumables Distribution Objectives (WCDO) lists the number and type of munitions items (along with other war consumables such as POL, chaff, film, etc.) that are desired to be prepositioned at the listed base. Subject to command guidance, this document provides the basis for WRM munitions storage guidance.

4.2.3.3. **Operating and Training Levels.** Each active air base has a requirement to store and maintain certain day-to-day usage munitions and residue generated during explosives operations. These normally include training munitions per AFI 11-212; AFCAT 21-209, Volume 1; AFCAT 21-209 Volume 2, *Demolition Munitions*; *Air Force Standard for Non-Expendable Air Munitions Training Authorizations*; and current operational plans (OPLAN).

4.2.3.4. Nuclear weapons storage facilities are additive to those required for other explosives storage and are computed on the assigned and projected weapons requirements using applicable criteria in 11N series TOs, AFMAN 91-201, and DoD S-5210.41-M, Vols. 1-3.

4.2.3.5. Basic reference documents for facility planning purposes consist of: AFI 32-1021, AFMAN 91-201, and pertinent TOs of the 11A, 11C, 11N, and 11P series.

4.2.4. **General Guidance.**

4.2.4.1. Explosives are normally stored in a secure area reserved exclusively for explosives storage as defined in AFMAN 91-201 and AFI 21-201, *Conventional Munitions Maintenance Management*.

4.2.4.2. **Requirements Determination.** An installation's explosive storage requirements are based on the unit's mission, support, training, and OPLAN requirements. The manner in which this requirement is met is in accordance with pertinent TOs of the 11A, 11C, 11N, and 11P series as well as AFMAN 91-201. Supplemental documentation may include master storage plans and Storage Capability Reports.

4.2.4.2.1. **Calculating Storage Requirements.** Storage space requirements involve several factors unique to each individual installation. These factors may include Q-D limitations of existing storage facilities, availability of existing facilities, possible re-warehousing of existing stock, Net Explosive Weight (NEW) of items to be stored, physical size of the item to be stored, length of time the item is expected to be stored, frequency of replacement stockage, regulatory requirements as to type of facility, and storage configuration. The general guidance provided in **Figure 4.1** provides only some of the factors to be considered in calculations.

4.2.4.3. **Scope Determination.** Explosives safety criteria applicable to all aspects of planning for explosives facilities are contained in AFMAN 91-201. Consider Q-D class and storage compatibility groups for all items. Base all planned and programmed facility requirements on a site plan which has been reviewed and approved under procedures given in AFMAN 91-201. Equip explosives storage and operating facilities with lightning protection which may necessitate grounding and bonding as required by AFMAN 91-201. Where two or more commands occupy an installation, integrate the explosives storage facilities to the maximum extent possible in accordance with the restrictions/requirements of AFMAN 91-201 and as specified in AFI 32-1065.

4.2.4.4. **Dimensions.** See **paragraph 4.2.4.5** below.

4.2.4.5. **Design Considerations.** Planning and land acquisition for explosives storage should ensure the following.

4.2.4.5.1. Each existing and proposed facility is always able to store a reasonable weight of explosives (i.e., at or near design capacity of the structure or the capacity as originally sited) without violating Q-D criteria given in AFMAN 91-201.

4.2.4.5.2. The multi-mission concept of base development is met or maintained. See AFI 32-1021 for additional guidance.

4.2.4.5.3. In planning storage requirements at overseas locations, consider host country Q-D criteria in providing protection to their exposures. However, follow AFMAN 91-201 criteria in connection with all planning and operations involving exposures of U.S. personnel and property (equipment, buildings, etc.) to explosives hazards, unless otherwise specifically authorized to deviate from this procedure.

4.2.4.5.4. Developing storage requirements involves joint efforts by munitions, explosives safety, and civil engineering offices. Munitions offices develop explosives

storage facility requirements including basic floor space requirements, determine special functional requirements, and justify the need to build or modify facilities. Using this information, civil engineering offices will, in coordination with explosives safety, perform site selection, develop site plans and land requirements, establish design specifications, and forward completed plans for explosives safety review as required by AFMAN 91-201. (T-1). The foregoing applies to all facilities being sited that affect Q-D criteria in any way or that involve manufacturing, processing, storing, handling, using, and disposing of explosives. When major modifications to explosives facilities or to associated structures within inhabited building distance of explosives facilities are planned, forward a change to the site plan in accordance with AFMAN 91-201.

4.2.4.5.5. Planning for explosives storage areas gives recognition to other facilities used in processing, handling, maintaining, using, and disposing of weapons such as Explosives Ordnance Disposal (**CATCODE 141165**), Weapons and Release Systems Shop (**CATCODE 215552**), Surveillance and Inspection Shop (**CATCODE 215582**), Conventional Munitions Shop (**CATCODE 216642**), and Demolition and Burning Facility (**CATCODE 831173**).

4.2.4.5.6. Design all structures used in the storage of high explosives to resist the effects of accidental explosions approved by the Department of Defense Explosive Safety Board (DDESB) and the United States Army Corps of Engineers (USACE), which meet the criteria for explosive storage.

4.2.4.5.7. An environmental assessment is needed, in accordance with AFI 32-7045.

4.2.4.5.8. Because of the potentially damaging effects of explosives mishaps, separate facilities should be provided for explosives operations based on the type of hazards involved.

4.2.4.5.9. Numbers such as AD 33-15-63 refer to USACE drawings, which are available from the USACE Huntsville Division, 106 Wynn Drive, Huntsville, Alabama, 35805-1957.

4.2.5. **Rocket Check Out and Assembly Storage. FAC: 4221**

CATCODE: 422256
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.5.1. **Description.** This facility is an explosives operating and storage building. Explosives use and storage provisions are outlined in AFMAN 91-201.

4.2.5.2. **Requirements Determination.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.5.3. **Scope Determination.** See **paragraph 4.2.4** above.

4.2.5.4. **Dimensions.** The complete facility is 1,040 m^2 (11,160 ft^2), but the size varies with the weapons used. See **Figure 4.1**, **4.1.1**, and **4.1.2** below.

4.2.5.5. **Design Considerations.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.6. **Above Ground Magazine Storage, Types A, B, and C. FAC: 4221**

CATCODE: 422258
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.6.1. **Description.** N/A.

4.2.6.2. **Requirements Determination.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.6.3. **Scope Determination.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.6.4. **Dimensions.** The magazine varies in size from 167 m^2 to 613 m^2 (1,800 ft^2 to 6,600 ft^2), depending on the volume of munitions to be stored.

4.2.6.5. **Design Considerations.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.7. **Storage Igloo. FAC: 4221**

CATCODE: 422264
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.7.1. **Description.** Igloo magazines are used to store all types of explosives and are preferred for mass detonating explosives where moisture condensation is not a problem.

4.2.7.1.1. The Munitions Storage Module (MSM), also known as the Hayman Igloo, is a pre-engineered, reinforced concrete panel. Vertical walls and a flat roof maximize storage space. A 7.9 m (26 ft) wide door adds efficiency to warehousing operations. Variable length, in increments of 6 m (20 ft up to 80 ft), provide flexibility to meet requirements. The design has been approved by The Department of Defense Explosives Safety Board (DDESB) for siting as a standard igloo maximum NEW of 500,000 pounds.

4.2.7.2. **Requirements Determination.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.7.3. **Scope Determination.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.7.4. **Dimensions.** See **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4** for general guidance.

4.2.7.5. **Design Considerations**. Design drawings are available from USACE. Additional guidance is available online at **http://www.wbdg.org/design/ammo_magazines.php**.

4.2.8. **Inert Spares Storage. FAC: 4421**

CATCODE: 422265
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.8.1. **Description.** The building is of type "N", unprotected non-combustible reconstruction, and is used to store inert items.

4.2.8.2. **Requirements Determination.** See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.8.3. **Scope Determination.** See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.8.4. **Dimensions.** See required floor space formula in **Figure 4.1.1**.

4.2.8.5. **Design Considerations.** See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.9. **Module Barricaded Storage. FAC: 4221**

CATCODE: 422271
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.9.1. **Description.** This facility provides the field storage of large quantities of explosives in minimum land areas where steel-arch, earth-covered igloos are not employed.

4.2.9.2. **Requirements Determination.** It is intended for use primarily in austere areas or other locations specifically approved under AFMAN 91-201. See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.9.3. **Scope Determination.** A light shed-type metal roof may be utilized over individual cells, where necessary. Do not use unnecessarily heavy structures or flammable materials. Modular storage is only approved for certain munitions items such as High Explosive (HE) bombs, similarly cased High Detonation (HD) 1.1 munitions, 20 mm and 30 mm ammunition in metal shipping containers, and Cluster Bomb/Dispenser Units (CBU) in authorized nonflammable shipping containers (see DoD 6055.9-Std).

4.2.9.4. **Dimensions.** See AFMAN 91-201 for further guidance.

4.2.9.5. **Design Considerations.** See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.10. **Storage Igloo Steel Arch/Underpass. FAC: 4221**

CATCODE: 422273
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.10.1. **Description.** The steel-arch, earth-covered igloo has a concrete floor, foundations, side arches, and rear and front walls. The structures provide protection against propagating explosions between adjacent storage spaces within the common mound. The steel arch type is normally more economical to construct than the reinforced concrete igloo. This is especially true where the cost of additional land area and a connecting road net required to construct a multiple igloo complex is considered.

4.2.10.2. **Requirements Determination.** For storage of large volumes of explosives above 113,000 kg (250,000 pounds) NEW, igloos approved as standard according to DoD 6055.9-Std, are mandatory. See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.10.3. **Scope Determination.** Igloos are usually constructed based on DDESB approval as standard structures, such as AW 33-15-64 (USACE drawing), for storage of explosives. USACE drawings are available from the USACE Huntsville Division, 106 Wynn Drive, Huntsville, Alabama, 35805-1957.

4.2.10.4. **Dimensions.** Igloos may be constructed in variable lengths of 0.6 m (2 ft) increments and widths up to 9.1 m (30 ft).

4.2.10.5. **Design Considerations.** The arch is constructed of heavy gauge corrugated steel plates, and the double leaf doors are of heavy blast resistant steel. See AFMAN 91-201 for further guidance.

4.2.11. **Ancillary Explosives Facility. FAC: 1494**

CATCODE: 422275
OPR: AF/A4LW
OCR: AFSC/SEW

4.2.11.1. **Description.** This designation may be applied to pads, locations, revetments, and facilities (excluding aircraft parking) of such size and quantity as required for use such as that shown below**:**

4.2.11.1.1. Classification Yard – A group of railroad tracks used for receiving, dispatching, and switching rail cars containing explosives.

4.2.11.1.2. Holding Yard – An area (group of railroad tracks, motor vehicle parking facility, etc.) used to hold explosives-laden carriers for limited periods.

4.2.11.1.3. Inspection Station – Facility used to accommodate trucks or rail cars during the time incoming vehicles and their explosives cargo are inspected.

4.2.11.1.4. Interchange Yard – Area used for the interchange of explosives-laden trucks, trailers, or rail cars between the common carrier and Air Force (DoD) activities.

4.2.11.1.5. Loading Dock – A ground level or elevated structure used for transferring explosives between any two modes of transportation (motor vehicles, rail cars, etc.).

4.2.11.1.6. Ready Explosives Facility – A facility or designated area, usually near the flight line, where munitions and components are temporarily positioned awaiting transfer to aircraft (often called a flight line "holding area," "point," or "transfer point").

4.2.11.1.7. Bomb Preload Station – The station consists of equipment used to preload bombs on bomb racks and supporting site improvements. Typical equipment includes a gantry and conveyer operation lines to inspect, assemble, and load bombs on bomb racks. There are various types of stations, and the amount of equipment required depends on unit missions.

4.2.11.2. **Requirements Determination.** See general guidance under **paragraph 4.2.1**, **4.2.2**, **4.2.3**, and **4.2.4**.

4.2.11.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

4.2.11.4. **Dimensions.** Contact OPR for latest requirements and guidance.

4.2.11.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Figure 4.1. Example A: Explosive Weight Limited Items (EWL).

Computing Explosives Storage Requirements:
EWL items have a high explosive weight to total weight ratio. The number of this type of item that may be stored in any one facility is limited by the total allowable NEW for any given facility or location. This is based upon the limits imposed by explosives Q-D criteria to existing and programmed facilities or other exposures and/or maximum net explosives weight permitted for the particular explosives class or facility design. To determine the number of storage structures required, use the following formula:

A / B = C, and D / C = Number of Storage Structure Locations

Where:
A = Total allowable NEW for any single location.
B = NEW of one type of EWL item to be stored (from references in paragraph 4.2.3.)
C = Number of EWL items to be stored in a single location.
D = Total number of each type of EWL item authorized (from published documents).

Example:
To store: 8,000 items of type M117, 340 kg (750 pound) bombs.
Total allowable NEW for any single location = 45,000 kg (100,000 pounds).
NEW of one item = 175 kg (386 pounds).

A / B = C 45,000 kg / 175 kg = 257

D / C = Number of storage 8,000 / 257 = 31.1 (31 rounded) structure locations.

Figure 4.1.1. Example B: Cube Limited (CL) Items.

Computing Explosives Storage Requirements:

CL items are bulky with a low explosive weight ratio. The number that may be stored in any one facility is normally limited by their size and gross weight. However, give full consideration to limits imposed by Q-D criteria, storage compatibility criteria, and lot separation requirements. To determine the number of storage structures required, use the following formula for each grouping of compatible items to be stored. (See TO 11A-1-61 for storage drawings for some high density magazine loading guidance.)

PF x N = TC

Where:

PF = Package Cubic Meters (m3) Listed Per Item (from federal stock class [FSC] 1300)

N = Total number of each type of CL items

TC = Total cube of each type of CL items

TC / SH = SF

Where:

SH = Planned stack height for each type of CL item

SM = Preliminary floor space requirement in square meters

SM x 1.38 = AFS

Where:

1.38 = Factor to allow for aisle space

AFS = Actual floor space required

AFS / TF = Number of structures required.

Where:

TF = Total floor space available in type of structure selected for storage

Example:

To Store: 350,000 rounds of 20 mm ammo

Cube for 100-round T-46 Ammo Box = 0.037 m3 (1.3 ft3 from FSC 1300)

Cube for one round of ammo = 0.00037 m3 (0.013 ft3)

Stack height (selected) = 1.9 m (6.25 ft)

Floor space available in selected storage structure = 74 m2 (800 ft2)

PF x N = TC 0.00037 m3 x 350,000 = 129.5 m3

TC / SH = SM 129.5 m3 / 1.9 m = 68 m2

SM x 1.38 = AFS 68 m2 x 1.38 = 94 m2

AFS / TF = Number of 94 m2 /74 m2 = 1.27 (2.0 rounded) structures required structures required.

Figure 4.1.2.Example C: Storage Involving EWL and CL Factors.

Computing Explosives Storage Requirements:

To store 5,500 items of type M117, 340 kg (750 lb) bombs
Cube for bomb body (from FGS 1300) = 0.217 m3 (7.67 ft3)
Stack height (selected) = 1.8 m (6.0 ft)
NEW of bomb = 175 kg (386 pounds)
Maximum explosive weight per structure = 113,000 kg (250,000 pounds) (unless otherwise limited by A-D or structure design).

PF x N = TC	0.217 m3 x 5,500 = 1,194 m3
TC / SH = SM	1,194 m3 / 1.8 m = 663 m2
SM x 1.38 = AFS	663 m2 x 1.38 = 915 m2
A / B = C	113,000 kg / 175 kg = 646 bombs
D / C = Number of storage structure locations	5,500 / 646 bombs = 8.5 (9.0 rounded) storage structure locations

4.3. Category Group 44, Supply Storage Facilities (Covered Storage).

4.3.1. General Criteria.

4.3.1.1. **Description.** The term "LRS facilities" applies to facilities required to store material and equipment under the accountability of the LRS or counterparts in base tenant organizations. They are Hazardous Storage (**CATCODE 442257**), Supply and Equipment (**CATCODE 442628**), Warehouse Supply and Equipment (**CATCODE 442758**), and Open Storage Supply (**CATCODE 452252**).

4.3.1.2. **Requirements Determination.** The four CATCODEs above are not to be used to identify sheds, warehouses, and yards that are used to store organizational storage items for which accountability rests with using organizations. The space criteria given in this Manual for operating buildings, shops, and so forth, are intended to provide storage space for the material and equipment used in daily operations as well as operating space. The facility code of the operating building applies to such storage space whether it occupies space in the operating building or in a separate building. An exception to this occurs when an activity's storage requirement represents a significant part of its total facility requirement and, therefore, has been recognized by the establishment of a separate facility and facility code. Where there is evidence that organizational storage needs are not adequately recognized in current criteria, the activity identifying the need should initiate corrective action under procedures given in AFI 32-1024.

4.3.1.3. **Computing Supply Storage Requirements.**

4.3.1.3.1. Space requirements for the four facilities listed in **paragraph 4.3.1.1** are computed from the space factors given in **Table 4.1** and **4.2**, from the additional criteria given below, and in the descriptions of the individual facilities. The factors used in **Table 4.1** and **4.2** represent space requirements for normal authorized stock levels to support all assigned aircraft and all assigned active military personnel and civilian employees.

4.3.1.3.2. Space for Mobile Readiness Spare Packages (MRSP) is additive to that computed under **Table 4.1** and **4.2** (below). Total space requirements in any appropriate combination of warehouse, shed, or open yard are given in **Table 4.3**, below.

4.3.1.3.3. Additional storage space is authorized for storing the property in the equipment account. This additional space is 10 percent of the space computed in accordance with **paragraph 4.3.1.3.1**.

4.3.1.3.4. When existing warehouses have clearances between the floor and the bottom of the ceiling joist or truss of 5.5 m (18 ft) or more, use double-deck construction within the existing facility before programming a new facility or an addition to the existing facility. The effects of double-decking on the building fire protection system should be recognized.

Table 4.1. Space Requirements for LRS Storage - Factors for Aircraft.

Category of Aircraft	Warehouse Space/Aircraft		Shed Space/Aircraft		Open Storage Space/Aircraft	
	Gross Area					
	m2	ft2	m2	ft2	m2	yd2/ft2
Bombers						
Fighter	65	700	4.6	50	25	30/270
Heavy	209	2,250	6.5	70	28	33/297
Cargo						
Tactical	49	525	2.8	30	18	22/198
Strategic	279	3,000	9.3	100	37	44/396
Other						
Duel Usage: Tactical and Strategic	Consult ACC/A4 for requirements					
Special Operations Squadron	See Note 8					
Combat Search and Rescue Unit	See Note 8					
Refuelers	49	525	2.8	30	18	22/198
Fighter/Attack	Consult ACC/A4 for requirements					
Helicopter	23	250	0.5	5	5	6/54
Utility	23	250	0.5	5	5	6/54
Trainer	28	300	0.7	8	9	11/99

NOTES:
(All notes are General Notes)
1. Compute space requirements for a specific Mobile Distribution System (MDS) using the category which most closely relates to the MDS. The number of aircraft is the total of PAA aircraft plus the number of Backup Aircraft Inventory (BAI) aircraft normally on hand.
2. Refer to Chapter 2, AFJMAN 23-210, Joint Service Manual (JSM) for Storage and Materials Handling when developing storage space requirements.
3. Ensure supplies stored in warehouses make maximum use of attainable cube. This is equally applicable to items stored in bins, pallet racks, or bulk areas.
4. Allow additional space for operational flexibility. This generally is 15 percent of net available area (see paragraph 2-6f, AFJMAN 23-210).
5. Add the floor space created by a mezzanine to normal floor space square footage to determine space requirements versus assigned when the facility is equipped with a mezzanine or a mezzanine is planned.
6. When high-rise bins or racks are used in a facility, reduce the square footage requirements by 25 percent for each 1.2 m (4 ft) of vertical shelving that exceeds the normal 2.1 m (7 ft). The percentage adjustment should only apply to the square footage /square meters of the area where the bins or racks (high-rise) exceed 2.1 m (7 ft). (Example: If bin/rack height is 3.4 m (11 ft), it equals a 25 percent reduction. If bin/rack height is 4.6 m (15 ft), it equals a 50 percent reduction because property that is stacked twice the normal height only requires half the square footage.)
7. Include a statement on DD Form 1391 that maximum attainable cube is being used.
8. Space is determined by individual analysis and validated by the appropriate MAJCOM.
9. Refer to Chapter 6 (Administrative) of this Manual for approved office types and sizes.

Table 4.2. Space Requirements for LRS Storage – Factors for Persons (Gross Area).

Base Personnel Population1,2,3	Warehouse Space Per Person		Shed Space Per Person		Open Storage Space Per 200 Persons	
	m2	ft2	m2	ft2	m2	ft2
Up to 4,000	1.39	15	0.19	2	10.31	111
1st additional 2,000	0.93	10	0.14	1.5	6.22	67
2nd additional 2,000	0.46	5	0.05	0.5	4.18	45
Over 8,000	0.28	3				

NOTES:
1. Includes all employees whose work is logistically supported by the LRS.
2. Refer to Chapter 6 (Administrative) of this Manual for approved office types and sizes.
3. Number of personnel requires user justification.

Table 4.3. Space Requirements for Mobile Readiness Spares Packages (MRSP)[1, 2].

Type of Aircraft Squadron	Gross Area	
	m2	ft2
Bomber		
Fighter	372	4,000
Heavy	557	6,000
Cargo		
Tactical	325	3,500
Strategic	743	8,000
Special Operations Squadron	See Note 3	
Combat Search and Rescue Unit	See Note 3	
Refuelers	139	1,500
Fighter/Attack/	139	1,500
Helicopter	93	1,000
Type of Non-flying Squadrons or Units		
Combat Communication Squadron (CCS)	70	750
Tactical Air Control Squadrons/Elements		
CRC	372	4,000
CRP	102	1,100
ASOP	74	800
TACC	372	4,000
FACP	111	1,200
TACP	93	1,000
RED HORSE Squadrons:	167	1,800
Photo Processing Interpretation Facility (PPIF)	167	1,800
(WS 428/430/TER - included in total above)		
Analytical Photogrammetric Positioning System (APPS)	56	600

NOTES:
1. When MRSP is maintained on 463L pallets for mobility, authorized space may be increased up to 50 percent.
2. Refer to Chapter 6 (Administrative) of this Manual for approved office types and sizes.
3. Space is determined by individual analysis and validated by the appropriate MAJCOM.

4.3.2. **Hazardous Storage. FAC: 4423**

CATCODE: 442257
OPR: AF/A4LE
OCR: AFSC/SEW

4.3.2.1. **Description.** This facility stores hazardous materials that cannot be stored in supply and equipment sheds or warehouses (**CATCODEs 442628** and **442758**). The guidance on storage criteria and fire safety is given in Air Force Interservice Manual 24-204(I), *Preparing Hazardous Materials for Military Air Shipments*, and AFJMAN 23-210, *Joint Service Manual (JSM) for Storage and Materials Handling*. Standards for hazardous waste containment buildings are contained in 40 CFR 264 and 265, Subpart

DD. Consult AFCEE *Facility Planning and Design Guide: HAZMART* (*Hazardous Material Pharmacy*) for additional information and guidance.

4.3.2.2. **Requirements Determination.** Space requirements vary with the availability of other suitable storage facilities as indicated above. Flammable/combustible liquids and compressed gases are stored in this facility. Standard sheds and warehouses may be used when available, and no serious fire or safety hazards result. This facility is a single purpose structure preferably of non-combustible construction, one story in height without basement or crawl space, and detached or separated from other buildings by at least 15 m (50 ft). This space requirement is included in **CATCODE 442758** and/or **CATCODE 442628** and is computed as described in **paragraph 5.4.1.3** when standard facilities are used. As indicated in safety requirements limit the size of single facilities to 1,860 m^2 (20,000 ft^2). See Note 1 in **Table 4.4**.

4.3.2.3. **Scope Determination. CATCODE 442257** applies only to the specially designed storage facility and not to standard structures that are used to store hazardous material. Furthermore, the category code does not apply to small outbuildings used to store an activity's working supply of hazardous materials. Such outbuildings are properly reported under the category code of the activity's operating building or shop. See notes in **Table 4.4**.

4.3.2.4. **Dimensions.** See **Table 4.4**.

4.3.2.5. **Design Considerations.** See AFCEE *Facility Planning and Design Guide: HAZMART*. Ensure hazardous materials storage complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

Table 4.4. Space Requirements, Hazardous Materials Pharmacy[1,2,3].

Base Personnel/ Population	Warehouse Space		Administration Office		Safety Storage or Shed Space		Open Storage
	Gross Area						
	Per Person4		Per Person5		Per Person4		
	m2	ft2	m2	ft2	m2	ft2	
Up to 2,000	Note 6		5.95	64	Note 6		Note 7
First additional 2,0004	0.046	0.5	5.95	64	0.023	0.25	
Second additional 2,0004	0.023	0.25	5.95	64	0.009	0.1	
Over 6,0004	0.009	0.1	5.95	64	0.009	0.1	

NOTES:

1. This facility is used to store, issue, reissue, and collect hazardous materials that cannot be stored in supply and equipment sheds or warehouses (CATCODE 442628 and 442758) and other hazardous materials centrally controlled under the hazardous material pharmacy concept. These hazardous materials are generally defined as all items on Federal Standard 313C Table I regardless of hazard (Federal Stock Class 68XX, 7930, 80XX [8020 excluded], 9150 and 9160), items on Table II defined as hazardous, and other items requiring control for environmental, health, or safety reasons (e.g., Federal Stock Class 6135 and 6140 for batteries, radioactive material, items containing mercury). The guidance on storage criteria and fire safety is given in AFJMAN 24-204 and AFJMAN 23-210.

2. To conform to hazardous material storage requirements it is recommended that eight separated storage areas be used: reuse-reutilization, flammable, corrosive, reactive, oxidizer, poison, acid, and combustible.
3. This space projection meets storage, distribution, collection, reissue, and satellite hazardous waste accumulation point (72 hours limit when full) minimum requirements and is based on the following two assumptions: (1)The LRS provides courtesy storage for oils and lubricants; and (2) civil engineering hazardous materials are provided segregated storage in the CE warehouse.
4. Multiply this figure by the base population.
5. Multiply this figure by the maximum number of persons on any one shift, not by base population. The resulting figure is the gross area required to accommodate office, customer service areas, hallways, lockers, latrine, and mechanical room. See Chapter 6 of this Manual for authorized office types and sizes.
6. For a base population of up to 2,000, recommended warehouse space is 260 m2 (2,800 ft2) and safety storage or shed space is 93 m2 (1,000 ft2).
7. LRS allocates securable open storage space as required.

4.3.3. **Medical War Reserve Materiel (WRM) Storage Facility. FAC: 5306**

CATCODE: 442515
OPR: AF/SGMF
OCR: N/A

4.3.3.1. **Description.** This facility provides storage and assembly space for medical WRM assets. It includes warehouse space for palletized assets and space for other storage requirements, administrative functions, etc.

4.3.3.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

4.3.3.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

4.3.3.4. **Dimensions.** Contact OPR for latest requirements and guidance.

4.3.3.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

4.3.4. **Base Supplies and Equipment Shed. FAC: 4422**

CATCODE: 442628
OPR: AF/A4LE
OCR: N/A

4.3.4.1. **Description.** Shed space is necessary to store supplies, equipment, and material not requiring closed warehouse space but requiring covered protection from the weather because of the nature of material or manner in which they are packed. It may also include lumber storage exclusive of that stored by Civil Engineering. Space for receiving and shipping activities may be included.

4.3.4.2. **Requirements Determination.** Shed storage space is constructed without complete side and end walls. See **paragraph 4.3.1.3** for computing space requirements.

4.3.4.3. **Scope Determination.** See **paragraph** **4.3.1** for restrictions on the use of **CATCODE 442628**.

4.3.4.4. **Dimensions.** Contact OPR for latest requirements and guidance.

4.3.4.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

4.3.5. **Warehouse Supply and Equipment. FAC: 4421**

CATCODE: 442758
OPR: AF/A4LE
OCR: N/A

4.3.5.1. **Description.** Warehouse space is needed for bulk and bin storage of materials for which maximum protection from the weather is authorized.

4.3.5.2. **Requirements Determination.** Warehouse space includes:

4.3.5.2.1. Supplies and equipment needed to support base operations and fuels operations;

4.3.5.2.2. Receiving, storage issue, inspection, pickup and delivery activities;

4.3.5.2.3. Warehouse offices exclusive of offices in Supply Administration (**CATCODE 610122**);

4.3.5.2.4. Flyaway or Mobility Kit Storage are for mobility readiness and contain spare parts, special equipment, and supplies needed to maintain aircraft for short periods of time away from their home base;

4.3.5.2.5. Dangerous material, exclusive of explosives and ammunition, whose storage accommodations satisfy guidance given in AFJMAN 24-204 and AFJMAN 23-210;

4.3.5.2.6. Property in the equipment account (see **paragraph** **4.3.1.3.3**);

4.3.5.2.7. **Mobility Bags.**

4.3.5.2.7.1. Installation supporting units tasked with mobility commitments are authorized storage space for mobility bags. This space is additive to that listed under **Table 4.1**, **4.2**, and **4.3** (above).

4.3.5.2.7.2. Compute space at 0.85 m^3 (3 ft^3) per bag if the type of bag to be stored has been approved by the Air Force.

4.3.5.2.7.3. Ensure commands store bags in a manner to utilize the maximum attainable stacking heights in warehouses. The best space utilization can be obtained by storing in bulk or on pallet racks.

4.3.5.2.7.4. Mobility bag storage is the responsibility of the LRS. While actual storage may be decentralized to other organizations if they have existing facilities available to store the bags, do not build facilities at decentralized locations in order to accommodate mobility bag storage. Further, there is no objection to commanders issuing bags to personnel with mobility assignments in lieu of storing bags within the unit on a centralized or decentralized basis.

4.3.5.3. **Scope Determinations.** In addition to the space provided under **paragraph 4.3.1.3**, overseas installations that are en-route or turnaround-stations for AMC airlift aircraft and employ the AMC Forward Supply Support System require additional warehouse space. The storage consists of aircraft items, such as built-up engines, radomes, recovery kits, and so forth, that are peculiar to the AMC mission design and series of aircraft and that are not normally stocked by the host base. Total item requirements, and thus warehouse space requirements, vary with traffic, but the average requirement is approximately 700 m^2 (7,500 ft^2).

4.3.5.3.1. See **paragraph 4.1** for restrictions on the use of **CATCODE 442758**. The additive storage requirements in **Table 4.5** may be authorized at the discretion of the MAJCOM.

4.3.5.4. **Dimensions.** Space requirements are computed under **paragraphs 4.3.1.3**.

4.3.5.5. **Design Considerations:** Contact OPR for latest requirements and guidance.

Table 4.5. Additive Storage Requirements.

Items	Type Storage	CATCODE	Basis of Authorization
External aircraft fuel tanks/racks/ adapters/pylons(MERs/TERs/BRUs)	Shed	442628	Aircraft supported
Base level self-sufficiency spares (BLSS) segregated from POS	Semi-hardened warehouse	442758	Aircraft supported
Base Defense Weapons	Warehouse	442758	Base population
Chaff	Warehouse	442758	Mission
Base Decontaminants	Warehouse	442758	Base population
Defense Reutilization Marketing Offices (DRMO) Holding Area	Warehouse Open storage	442758452255	Base population
Film	Controlled warehouse	442758	Mission
Fire fighting agents	Warehouse	442758	Base population
Material/equipment for support of personnel not included in Table 4.3. (supported embassies, consulates, etc.)	Warehouse	442758	Population
NATO airfield spare parts	Warehouse	442758	Tasking mission
Nine-month supply of computer forms/paper	Warehouse	442758	Systems supported
Prime BEEF/RED HORSEmaterial/equipment	Warehouse Open storage	442758452255	Organization supported
Special projects support (ACC prepositioned material, LOX plant spares depot, etc.)	Warehouse	442758	Actual use
WRM oils/deicing fluid	Warehouse	442758	Aircraft supported

Items	Type Storage	CATCODE	Basis of Authorization
BCE warehouse	Warehouse	442758	Aircraft supported
Chemical Warfare Defense (CWD) equipment (when stored by LRS)	Warehouse	442758	Base population

4.3.6. **Warehouse, Forms and Publications, Base. FAC: 4421**

CATCODE: 442768
OPR: AFDPO
OCR: N/A

4.3.6.1. **Description.** This facility stores and distributes forms and publications. The service facility should provide dry, heated, and reasonably dust-free space.

4.3.6.2. **Requirements Determination.**

4.3.6.2.1. Bulk and bin storage space for forms and publications is needed. Space used for storing tabulating paper and cards used in automatic data processing operation requires special temperature and humidity controls.

4.3.6.2.2. Where approved, equipment space for mechanized initial distribution and mechanized storage equipment is provided.

4.3.6.2.3. Operating space is needed for activities related to receiving, shipping, packaging, distribution, and counter service. Where shipment and receipt of bulk quantities are necessary, the facility requires convenient access to a covered loading ramp or dock.

4.3.6.3. **Scope Determination.**

4.3.6.3.1. Base storage requirements on normal authorized levels for departmental forms and publications and augment in those instances where worldwide/command-wide support is necessary, and where commands require storage of command forms and publications.

4.3.6.3.2. Space requirements vary from 186 to 929 m^2 (2,000 to 10,000 ft^2), depending on the size and type of activities served. Storage space for normal and reserve stocks of tabulating paper forms and card forms require between 93 to 279 m^2 (1,000 to 3,000 ft^2) of temperature and humidity controlled space.

4.3.6.3.3. Space requirements for Publication Distribution Offices (PDO) operating major command distribution centers or worldwide support centers (such as AFMC's) are determined on an individual basis.

4.3.6.3.4. Where PDOs require less than 186 m^2 (2,000 ft^2) of space, the function may be located in the base or other operating headquarters, and the space reported under the appropriate headquarters category code.

4.3.6.4. **Dimensions.** See **paragraph 4.3.7.3**.

4.3.6.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

4.3.7. **Housing Supplies and Storage Facility (Furnishings Management Warehouse). FAC: 4421**

CATCODE: 442769
OPR: AFSVA/SVO/SVX, AF/A1I
OCR: AF/A7CH

4.3.7.1. **Description.** This facility, commonly called the Furnishings Management Warehouse, provides storage space to meet requirements that are related to the operation and occupancy of military family housing.

4.3.7.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

4.3.7.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

4.3.7.4. **Dimensions.** Contact OPR for latest requirements and guidance.

4.3.7.5. **Design Considerations.** For design guidance, see the *Air Force Housing Support Facilities Guide*, and UFC 4-711-01, *Family Housing.*

4.3.8. **Cryogenics Storage (Liquid Oxygen Storage). FAC: 4122**

CATCODE: 442258
OPR: AFCESA/CEO
OCR: AF/A4LE

4.3.8.1. **Description.** This facility provides storage of liquid oxygen tanks.

4.3.8.2. **Requirements Determination.** All Air Force installations with a requirement for liquid oxygen for breathing purposes for aircrews require a liquid oxygen generating/storage capability or liquid oxygen storage capacity to satisfy the requirement. (For Oxygen Generating Plant, see **CATCODE 229986**.) The decision to rely on storage capacity and commercial suppliers or organic Air Force generating capability is based on an individual base analysis to determine the most practical procedure which provides assurance of meeting the requirements.

4.3.8.3. **Scope Determination.** The normal source of supply for liquid oxygen for breathing purposes for Air Force bases within the United States, its territories, and possessions is by procurement from commercial sources wherever suitable sources of supply are available to meet quantitative and specification requirements. In these instances, ensure base storage capacity is sufficient to provide for 30 days peacetime requirement or 15 days alert, whichever is greater, plus WRM, plus sufficient storage to permit receipt of resupply in economical quantities from suppliers. In every instance, provide a minimum of at least two tanks in multiples of 1,500, 7,600, or 19,000 liters (400, 2,000, or 5,000 gallons) to ensure continuous operation and permit periodic purging and decontamination of the tanks. These tanks are centrally procured.

4.3.8.4. **Dimensions.** See **paragraph 4.3.8.3**.

4.3.8.5. **Design Considerations.** See AFI 23-201 for facility design requirements. Provide canopies in areas of snow and ice and, to minimize boil-off losses, in areas of extremely hot weather. The facility requires security protection. Ensure control of

hazardous materials complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

4.4. Category Group 45, Open Storage - General Purpose.

4.4.1. Open Storage Supply. FAC: 4521

CATCODE: 452252
OPR: AF/A4LE
OCR: N/A

4.4.1.1. **Description.** This facility is an improved or paved area used to store materials authorized for open storage.

4.4.1.2. **Requirements Determination.** At bases where mission generates a sufficient volume of wrecked or damaged aircraft and/or equipment to require a continuing reclamation activity, there may be a requirement for a storage yard.

4.4.1.3. **Scope Determination.** The open yard is used to park aircraft and equipment being disassembled, to maneuver ground equipment used in the reclamation operation, and to store parts and equipment temporarily pending disposition. At bases where this requirement exists, the area of the open storage yard, as provided under **Table 4.2**, may be increased by 1,250 m^2 (1,500 yd^2). 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.

4.4.1.4. **Dimensions.** Space requirements are given in **Table 4.1** and **4.2** and in **paragraph 4.4.1.3**.

4.4.1.5. **Design Considerations.** See **paragraph 4.4.1** for restrictions on the use of **CATCODE 452252**. Surface improvement of the area is necessary to facilitate the operation of materials-handling equipment.

4.4.2. Base Civil Engineer Open Storage

FAC: 4521
CATCODE: 452255
OPR: AFCESA/CEO
OCR: N/A

4.4.2.1. **Description.** The BCE activity requires fenced, lighted, and paved open storage space for construction materials and portable equipment that can withstand exposure to the elements. The storage yard is usually an integral part of the BCE complex which includes the maintenance shop, storage buildings and sheds, and the pavement and grounds building. It is often integrated with CE's vehicle sub-pool, which is established under criteria for Vehicle Parking Operations (**CATCODE 852261**).

4.4.2.2. **Requirements Determination.** Standard space requirements are proportional to the size of the Base Engineer Maintenance Shop (**CATCODE 219944**), permitted under **Table 3.12**, that is, approximately 418 m^2 (500 yd^2) of open storage for each 93 m^2 (1,000 ft^2) of shop space, or 0.42 m^2 (4.5 ft^2) of yard space for each square meter (m^2) of shop space. In arctic areas as much as 0.28 m^2 (3.0 ft^2) of the 0.42 m^2 (4.5 ft^2) allowance

can be transferred to either Base Engineer Covered Storage Facility (**CATCODE 219946**) or Base Engineer Storage Shed (**CATCODE 219947**), or prorated.

4.4.2.3. **Scope Determination.** See **paragraph 4.4.2.2** and **Table 3.13** in **Chapter 3.**

4.4.2.4. **Dimensions.** See **paragraph 4.4.2.2** and **Table 3.13** in **Chapter 3.**

4.4.2.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

4.4.3. **Open Storage, Air Freight/Traffic Management, Surface Freight. FAC: 4521**

CATCODE: 452258
OPR: AF/A4LE
OCR: N/A

4.4.3.1. **Description.** This facility supports and normally adjoins the Air Freight Terminal (**CATCODE 141782**) and the Traffic Management Facility (**CATCODE 610142**). It consists of a fenced, paved, and lighted storage yard and provides space for material and handling and moving equipment that can withstand the elements. It also provides space for similar requirements generated by Defense Courier Stations collocated with terminals (see criteria under Post Office, **CATCODE 730443**).

4.4.3.2. **Requirements Determination.** The required size of the Covered Facilities (**CATCODEs 141782** and **610142**) and yards are determined on an individual basis. Normally, activities need yard space equal to about 40 percent of their covered storage space. However, the requirement can vary considerably, dependent on mission, assignment, and climatic conditions.

4.4.3.3. **Scope Determination.** See **paragraph 4.4.3.2**.

4.4.3.4. **Dimensions.** See **paragraph 4.4.3.2**.

4.4.3.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Chapter 5

FACILITY CLASS 5, HOSPITAL AND MEDICAL

5.1. Medical and Medical Support, Research and Training Facilities.

5.1.1. **General Space Planning Criteria.** Medical and medical support facilities are typically sized in accordance with DoD Medical Space Planning Criteria. An electronic copy of the DoD Medical Space Planning Criteria can be viewed from the following link: **http://www.tricare.mil/ocfo/ppmd/criteria.cfm**. Medical research and training facilities are sized on a case-by-case basis. Health Facilities Division Planning, Design, Construction (PDC) Branch, AFMSA/SG8F, develops space requirements for all medical facility projects. OASD(HA)/PPMD approves medical facility project scope for medical MILCON and Base Realignment and Closure (BRAC) projects. Contact the appropriate PDC Branch portfolio manager for assistance with medical and medical support facility space planning requirements. Refer to UFC 4-510-01, *Design: Medical Military Facilities* for additional guidance.

5.2. Category Group 51, Medical Centers and Hospitals.

5.2.1. This Category Group includes the following facilities in addition to the most common Medical and Medical Support Facilities listed below: Medical Command and Administration (**CATCODE 510125**), Medical/Dental Education and Training (**CATCODE 510126**), Pathology (**CATCODE 510143**), Pharmacy (**CATCODE 510147**), Physical Therapy (**CATCODE 510148**), Radiology (**CATCODE 510149**), Environmental Health (**CATCODE 510175**), Food Service (**CATCODE 510212**), Ambulance Shelter (**CATCODE 510264**), Nursing Services (**CATCODE 510275**), Aeromedical Staging Facility (**CATCODE 510278**), Obstetrical Service (**CATCODE 510342**), Air Force Clinic (**CATCODE 510411**), Surgical Service (**CATCODE 510672**), Hospital Central Sterilization (**CATCODE 510712**), and Patient Welfare (**CATCODE 510915**).

5.2.2. **Composite Medical Facility (CMF). FAC: 5100**

CATCODE: 510001
OPR: AFMSA/SG8F
OCR: N/A

5.2.2.1. **Description.** These facilities provide general and specialized medical, psychiatric, obstetrical, or surgical care for four or more authorized inpatients on a 24 hour basis, with both inpatient and outpatient services.

5.2.2.2. **Requirements Determination.** See **paragraph 5.1.1**.

5.2.2.3. **Scope Determination.** See **paragraph 5.1.1**.

5.2.2.4. **Dimensions.** See **paragraph 5.1.1**.

5.2.2.5. **Design Considerations.** Pharmacy, clinic, ambulance, and administrative space within the hospital are included in this Facility Analysis Category. Classified as a Health Care Occupancy facility under the NFPA Life Safety Code.

5.2.3. **Regional Medical Center. FAC: 5100**

CATCODE: 510101
OPR: AFMSA/SG8F
OCR: N/A

5.2.3.1. **Description.** These facilities support both increased surgical capabilities and a surgical graduate education program, not required in smaller hospitals. Classified as a Health Care Occupancy facility under the NFPA Life Safety Code.

5.2.3.2. **Requirements Determination.** See **paragraph 5.1.1**.

5.2.3.3. **Scope Determination.** See **paragraph 5.1.1**.

5.2.3.4. **Dimensions.** See **paragraph 5.1.1**.

5.2.3.5. **Design Considerations.** See **paragraph 5.1.1**.

5.2.4. **Aerospace Medicine. FAC: 5500**

CATCODE: 510175
OPR: AFMSA/SG8F
OCR: N/A

5.2.4.1. **Description.** Integrates Aerospace Medicine functions in a single facility. Includes space for Flight Medicine Clinic, Physical Exams Section, Public Health and Bioenvironmental Engineering; may also include Health Promotions and Medical Readiness.

5.2.4.2. **Requirements Determination.** See **paragraph 5.1.1**.

5.2.4.3. **Scope Determination.** See **paragraph 5.1.1**.

5.2.4.4. **Dimensions.** See **paragraph 5.1.1**.

5.2.4.5. **Design Considerations.** May be a stand-alone facility or be incorporated in the main base medical treatment facility.

5.3. Category Group 53, Medical and Medical Support Facilities.

5.3.1. This Category Group includes Blood Processing Laboratory (**CATCODE 530155**), Drug Abuse Detection Laboratory (**CATCODE 530156**), Radiology Health Laboratory (**CATCODE 530311**), Occupational Environmental Health Laboratory (**CATCODE 530411**), Clinical Laboratory Epidemiological (**CATCODE 530511**), Materials Services (Medical Logistics) (**CATCODE 530602**), and Medical Food Inspection (**CATCODE 530634**). See **paragraph 5.1.1** above for additional information and guidance.

5.4. Category Group 54, Dental Clinics.

5.4.1. **Dental Clinic. FAC: 5400**

CATCODE: 540243
OPR: AFMSA/SG8F
OCR: N/A

5.4.1.1. **Description.** Includes space for dental treatment, ancillary services, and administrative and support functions.

5.4.1.2. **Requirements Determination.** See **paragraph 5.1.1**.

5.4.1.3. **Scope Determination.** See **paragraph 5.1.1**.

5.4.1.4. **Dimensions.** See **paragraph 5.1.1**.

5.4.1.5. **Design Considerations.** See **paragraph 5.1.1**.

5.5. Category Group 55, Dispensaries and Clinics.

5.5.1. This Category Group also includes Medical Aid Station (**CATCODE 550147**) and Outpatient Ambulatory Care Clinic (**CATCODE 550101**). See **paragraph 5.1.1** above for additional information and guidance.

5.5.2. **Occupational Health Clinic. FAC: 5100**

CATCODE: 550145
OPR: AFMSA/SG8F
OCR: N/A

5.5.2.1. **Description.** Provides medical services to the military and civilian industrial work force at AFMC bases.

5.5.2.2. **Requirements Determination.** See **paragraph 5.1.1**.

5.5.2.3. **Scope Determination.** See **paragraph 5.1.1**.

5.5.2.4. **Dimensions.** See **paragraph 5.1.1**.

5.5.2.5. **Design Considerations.** Includes space for outpatient medical care, ancillary services, and administrative and support functions. May be consolidated with Aerospace Medicine functions.

Chapter 6

FACILITY CLASS 6, ADMINISTRATIVE

6.1. Category Group 61, Administrative and Administrative Support Spaces.

6.1.1. **Introduction and Program Considerations.** This chapter identifies program requirements for Administrative and Administrative Support Spaces. These spaces support the administrative affairs of a military establishment and should be programmed and designed such that it enhances the main mission or functions of an organization. In addition to the area requirements, administrative and support spaces should be programmed and designed so that these facilities can be flexible, cost-effective, and create an atmosphere that increases morale, productivity, and collaboration. This Manual provides the data needed when programming Air Force projects using UFC 4-610-01, *Administrative Facilities*. Space authorizations listed herein may be used to establish space requirements for new administrative facilities, administrative relocations, or administrative space in renovated facilities. Use this manual for administrative facilities or for administrative areas that are part of facilities that are not primarily administrative.

6.1.1.1. **Administrative Design Standards and Office Space Measurements.** Consult UFC 4-610-01 for definitions and general design criteria.

6.1.1.2. **Establishing User Requirements.** When using the criteria given, project planners and facility designers should analyze the types and numbers of building occupants. Justify the number of offices based on the number of authorized full time equivalents (FTE) in an approved manning document. Ensure justifications for additional personnel are accompanied by approved plans. This should be followed by an analysis of special purpose space requirements taking into account the types of activities being housed and efficient (maximized) usage of the space. Justifications for all special purpose space such as conference rooms, auditoriums, training, and computer rooms should include information on the number of people, recurrence of use, the amount of equipment, and size of equipment that requires floor space. Adjustments in both areas may be necessary to satisfy the criteria, but require justification. At installations, justifications should be vetted through CE Asset Management officials.

6.1.2. **Office Areas**. Office areas are generally located in areas designated for administrative work and administrative support functions. Offices located within special purpose areas should not be counted as Office Space. Offices are typically divided into two main categories: “private” and “open”. Administrative Support Space should be programmed for all offices. Consult AFRCH 32-1001 and ANGH 32-1084 for variances applicable to Reserve and Guard facilities.

6.1.2.1. **Private Offices**. Private offices are assigned to individuals based on rank and/or duty assignment. These offices are intended to provide visual and sound privacy required in the course of the occupant’s duties. These offices typically have full height walls or partitions from finished floor to finished ceiling. Calculate the required space by determining the number and types of open offices (office types A-D) needed. Refer to **Table 6.2** for allowable space for private offices.

6.1.2.2. **Open Offices**. Open offices are programmed and designed to incorporate modular workstations and are typically occupied by general administrative and/or functional support staff. Calculate the required space by determining the number and types of open offices (office types E-H) needed. Refer to **Table 6.2.1** for allowable open office area.

6.1.2.2.1. **Command Suites**. A command suite is an office area configuration that typically houses a private office for a Commander, private offices for key staff, open offices for support staff, a waiting area, and administrative support space.

6.1.2.3. **Administrative Support Space**. This space supports the administrative functions and includes all such functions not included in personal office space. For Air Force facilities, it includes circulation in and around office areas and space for working office storage, copiers, working files, printers, scanners, shredders, safes, and facsimile machines.

6.1.2.4. **Special Purpose Spaces**. Special purpose space is defined as space which may be required to meet specific or special organizational functional needs. The type, size, and quantity of special purpose space are project specific. Refer to **Table 6.3** for typical special purpose spaces. In facilities with multiple organizations, provide shared special purpose spaces for efficiency.

6.1.2.4.1. **Assembly Spaces**. Assembly spaces are also special purpose spaces that include spaces that may be used for conferences, meetings, and training. Refer to **Table 6.4** for assembly space calculations.

6.1.2.5. **Circulation Space**. This is space used to traverse in and around all the administrative space types above. Use the multipliers below to establish programming estimates of the space needed.

6.1.3. **Categories of Administrative Space.** Categories of space have been established to define space calculations common to administrative facilities for programming purposes.

6.1.3.1. The Net Administrative Area includes all of an organization's office, administrative support, and administrative circulation. A per person average of this can be used when programming, analyzing, or estimating space for relocations or space in renovated facilities.

6.1.3.2. The Net Organization Space is the space defined for a distinct organization that is part of a shared facility. It includes the Net Administrative Area, special purpose space, and circulation for that organization. This is also called Usable Space and can be helpful when establishing the relative percentage of a shared facility that should be attributed to an organization.

6.1.3.3. The Average Net Square Foot (ft^2) Per Person is a calculation of the Net Administrative Area divided by the number of persons/offices.

6.1.3.4. The Rentable Space is the prorated area of the overall building shared by an organization, excluding major vertical penetrations and exterior walls. This can be calculated by multiplying the relative percentage of a shared facility attributed to an organization by the gross area of the building.

6.1.3.5. Net Building Area includes Shared Special Purpose space and Shared Special Purpose space circulation.

6.1.3.6. The Gross Building Area includes the entire building measured to the outside walls. To estimate Gross Building Area for administrative facilities, multiply the Net Administrative Area for all organizations by the programming multipliers below. The multipliers below include lobbies, restrooms, shared circulation, shared special purpose spaces, and other common shared building functions/spaces.

6.1.4. **Metrics.** Net Administrative Area Metrics for Programming Administrative Spaces (without detailed justification):

6.1.4.1. Use an average maximum of 120 ft^2 per person (minimum 90 ft^2 per person) for Net Administrative Area. ***NOTE:*** The minimum 90 ft^2 per person space standard is typically used for relocations or renovation projects. The mix of office types (sizes A-H) may have to be revised to meet these limitations.

6.1.4.2. For Administrative Support Space, use a maximum of 40 ft^2 per person, and a minimum of 20 ft^2 per person.

6.1.4.3. A maximum Circulation multiplier up to 10% may be added to Net Administrative Area and Special Purpose (Organizational and Shared) space.

6.1.4.4. A maximum Net-to-Gross multiplier of 25% should be added to Net Building Area to reach the gross building area.

6.1.4.5. **Conference Rooms.** For organizations up to 49 personnel, provide one team room for up to 10 persons. For organizations with 50-99 personnel, provide a conference room for up to 25 persons and one team room for up to 10 persons. For organizations with 100-149 personnel, provide a conference room for up to 50 persons and two team rooms for up to 10 persons each. For organizations of over 150 personnel, provide an additional 10-person conference room capacity and one additional team room for up to 10 persons for each additional 100 personnel in the organization. Additional conference/team space may be justified with projections that demonstrate the space is occupied at least 50% of the time during duty hours on an annual basis.

6.1.5. **Multipliers.** These are used by programmers to estimate the next level of space required.

6.1.5.1. Circulation Multipliers are added to Special Purpose (Organizational and Shared) space to account for the space needed to circulate in, and around theses spaces.

6.1.5.2. Net-to-Gross Multipliers are added to account for the shared space such as restrooms, mechanical, lobbies, vestibules, janitor, etc. It is intended to estimate and program the size of an entire building to the outside walls for facilities that are primarily administrative.

6.1.5.3. Rentable Space may be estimated by adding 5% to the Net Organization Space, or the actual prorated areas to be shared by the organization, excluding major vertical penetrations and exterior walls. Rentable to Gross add 20%. Actual Rentable Space should be calculated based on design or actual building configuration.

6.1.6. **Programming Methods.** There are three methods shown here with progressive levels of accuracy. The method used depends on the availability of programming information (Rank-Based Programming requires the most information). The three methods are: Rapid Programming Method (**paragraph 6.1.6.1**), Private/Open Office Method (**paragraph 6.1.6.2**), and Rank-Based Programming Method (**paragraph 6.1.6.3**).

6.1.6.1. **Rapid Programming.** Rapid programming is used for estimating space requirements quickly based on an estimated number of occupants and special purpose space. For primarily administrative facilities, use the Net-to-Gross Multipliers below to determine the gross building area. Note that some CATCODE facilities in the 610-series have a specific authorized gross building area.

Table 6.1. Rapid Programming Method.

Space Type	ft2 Factor/Multiplier1
All offices (Net Organizational Space)2	Max 120 ft2 /person
Special Purpose Space	
Add Special Purpose Space circulation	10%
Net Administrative Area	
Shared Special Purpose Space	
Shared Special Purpose circulation	10%
Net Building Area	
Net to Gross Multiplier	25%
Gross Building Area	
NOTES: 1. Use 90 ft2 per person minimum for relocations or renovation projects. 2. Includes Administrative Support Space and Office Circulation.	

6.1.6.2. **Private/Open Office Method.** The private/open office programming method is used for calculating space requirements based on the number of occupants, the mix of private and open offices, and special purpose space.

Table 6.1.1. Private/Open Office Method.

Space Type	ft2 Factor/Multiplier1
Number of required Private Office spaces +	150 ft2 /person
Number of required Net Open Office spaces +	64 ft2 /person
Administrative Support space +	20-40 ft2 /person
Administrative Space Circulation Multiplier +	Max 10%
Net Administrative Area	Max 120 ft2 /person
Required Special Purpose Space +	As Required
Special Purpose Space Circulation Multiplier +	Max 10%
Total = Net Organizational Space +	
Shared Special Purpose Space	As Required
Shared Special Purpose circulation	Max 10%

Space Type	ft2 Factor/Multiplier1
Net Building Area	
Net-to-Gross Multiplier +	Max 25%
Total = Total estimated Gross Building Area	
NOTES: 1. These space limitations may be exceeded by 10% for relocation into un-renovated, existing space to accommodate the required spaces. If the resulting space allocation exceeds 110% of the available space or the Net Administrative Area per person or if the resulting space allocation is below 90 ft2 per person; renovate the existing space; reconfigure the existing space; or program a new project.	

6.1.6.3. **Rank-Based Programming Method.** The rank-based programming method is used for calculating space requirements based on the number of occupants, the detailed office-type (private or open) for each occupant, and special purpose space. This information is then used to establish the net administrative area**.** For facilities that are primarily administrative, use the Net-to-Gross Multiplier to determine the full building scope.

Table 6.1.2. Rank-Based Programming Method.

Space Type	ft2 Factor/Multiplier1
Net Private Office spaces (sizes A thru D) +	See Table 6.2
Net Open Office spaces (sizes E thru H) +	See Table 6.2.1
Net Administrative Support space +	20-40 ft2/person
Administrative Space Circulation Multiplier +	Max 10%
Net Administrative Space1	Max 120 ft2/person
Net Special Purpose Space (Tables 6.3/6.4) +	As Required
Special Purpose Circulation Multiplier +	Max 10%
The total Usable Space1 for an Organization	
Sum of all Net Administrative area for all Organizations +	
Shared Special Purpose Spaces (Tables 6.3/6.4) +	As Required
Shared Special Purpose Space Circulation Multiplier +	Max 10%
Net Building Area +	
Net-to-Gross Multiplier	Max 25%
Total = Total estimated Gross Building Area	
NOTES: 1. Use 90 ft2 per person minimum for relocations or renovation projects.	

Table 6.2. Rank-Based Private Office Area Space Programming[1].

Rank (or Equivalent)	Occupant/Visitor Load	Type	Min Net2		Max Net	
			m2	ft2	m2	ft2
Commander: Center/Wing/ Deputy	Occupant plus up to four visitors, and a meeting area for five.	A	27.8	300	32.5	350
Commander: Group/Deputy Group; Also, Staff Judge Advocate	Occupant plus up to two visitors, and a meeting area for three.	B	14.9	160	23.2	250
Commander: Squadron/Deputy Squadron/Flight; Command Chief Master Sergeant, Contracting Chief/ Deputy Reserve Judge Advocate /PhD (Tenured Faculty)	Occupant plus up to two visitors.	C	13	140	13.9	150
Flight Chief/First Sergeant; Also, Civilian Personnel Chief / Military/ Civilian Equal Opportunity Chief / Public Affairs Chief / Safety Chief/ Superintendent / Manager	Occupant plus one visitor.	D	9.3	100	11.1	120
NOTES: 1. Consult AFRC references for variances in their requirements 2. Minimum needed to accommodate occupant load and furnishings.						

Table 6.2.1. Open Office Space Programming[1].

Function	User	Type	Min Net2		Max Net	
			m2	ft2	m2	ft2
Section Chief	Typically includes Executive Officers, supervisors, Historians, JA Staff, Group Staff, Squadron, or equivalent that can justify additional workspace above the standard workstation.	E3	6	65	7.4	80
Standard	Standard	F	4.5	48	5.95	64
Limited Administrative	Limited functions including hoteling/telework [shared] workers, reservists, contractors, or equivalent (25-50% of full-time equivalent)	G	2.8	30	3.3	36
Task Station	Focused/limited task workstations for reservists, contractors, students, or equivalent (less than 25% of full-time equivalent)	H	1.8	20	2.3	25
NOTES: 1. Consult AFRC references for variances in their requirements 2. Minimum needed to accommodate occupant load and furnishings. 3. Office Type E may be a private office if justified by job description.						

Table 6.3. Typical Special Purpose Spaces Programming.

Description	Planning Factors1,2
Vestibule	User justified
Lobby	User justified
Copy Rooms	1/50 occupants – 14 m2 (150 ft2) ea
Storage Rooms	User justified
File Rooms	User justified
Waiting Areas	1.8 m2 (20 ft2) per person justified
Reception Desk	User justified
Shipping/Receiving	User justified
Mail Room	User justified
Coffee Bar	User justified
Break Rooms (Kitchen/Vending)	16% Occupants x 1.7 m2 (18 ft2) (min 9.3m2 [100 ft2])
SCIFs	User justified
Trash/Recycling	User justified – refer to current SDD Policy/LEED guidelines
NOTES: 1. Base actual space requirements on functional analysis. There are no specific space limitations. 2. These only require justification if the requirement exceeds what is normally included in the gross area multiplier.	

Table 6.4. Typical Assembly Space Programming.

Description	Planning Factors
Team/Meeting/Mini Conference Room (6-10 persons)1	1.4 m2 (15 ft2) per person justified
Conference Room (up to 49)1	1.8 m2 (20 ft2) per person justified
Conference Room (50+)1	1.8 m2 (20 ft2) per person justified + 14m2 (150 ft2) speaker area
Classroom (up to 25)	2.8m2 (30ft2) per person including instructor area
Classroom (25-50 typical, up to 75)	2.3m2 (25ft2) per person including instructor area
Assembly/Auditorium Spaces (50+)	1.4 m2 (15 ft2) per person + 18.6m2 (20ft2) instructor area
NOTES: 1. See paragraph 6.1.4.5.	

Figure 6.1. Rapid Programming Method Example[1].

Space Description	Qty	Factor	Subtotal	Total Area (ft2)
Net Administrative Area2	175	120ft2 per person		21,000
Special Purpose Space			5,000	
Special Purpose Space Circulation3		10%	500	
Total Special Purpose Space				5,500
Total Net Organization Space				26,500
Shared Special Purpose Space			800	
Shared Special Purpose Circulation3		10%	80	
Total Shared Special Purpose Space				880
Total Net Building Area				27,380
Net-to Gross Multiplier		25%		6,845
Total Gross Building Area				34,225
Validate:				
Net Administrative Area ft2 per person =				120

NOTES:
1. Rapid programming method is based on Max Net Office Area Per Person, for a building that is primarily an administrative facility housing two organizations with 175 personnel and 5,800 ft2 of Special Purpose Space (including 800 ft2 of Shared Special Purpose Space).
2. Net Average of the Administrative Area (including all types of offices, admin support, and admin circulation) should not exceed 120ft2 per person.
3. Circulation multiplier cannot exceed 10%.

Figure 6.2. Private/Open Office Method Example[1].

Space Description	Qty	ft2 Factor/ Multiplier	Subtotal	Total Area (ft2)
Open Office Space	101	64		6,464
Private Office Space	74	150		11,100
Administrative Support Space (circulation included)	175	20		3,500
Circulation Multiplier		0%		-
Total Net Administrative Area2		Max 120 ft2/person		21,064
Special Purpose Space			5,000	
Special Purpose Space Circulation3		10%	500	
Total Special Purpose Space				5,500
Total Net Organizational Space				26,564
Shared Special Purpose Space			800	
Shared Special Purpose Circulation3		10%	80	

Space Description	Qty	ft2 Factor/ Multiplier	Subtotal	Total Area (ft2)
Total Shared Special purpose Space				880
Total Net Building Area				27,444
Net-to-Gross Multiplier		25%		6,861
Total Gross Building Area				34,305
Validate:				
Net Administrative Area ft2 per person =				120

NOTES:
1. The private/open office method is based on Max Net Office Area Per Person, for a building that is primarily an administrative facility housing two organizations with 175 personnel and 5,800 ft2 of Special Purpose Space (including 800 ft2 of Shared Special Purpose Space).
2. Net Average of the Administrative Area (including all types of offices, admin support, and admin circulation) should not exceed 120ft2 per person.
3. Circulation multiplier cannot exceed 10%.

Figure 6.2.1. Rank-Based Programming Method Example[1].

	Space Type	Qty	Factor	Total Area (ft2)
Space Description (Organization 1)				
1. Open Office Space	Supervisor (E)	5	80	400
	Standard (F)	20	64	1,280
	Admin (G)	20	36	720
	Task (H)	15	25	375
Total Open Offices		60		2,775
2. Private Office Space	Wing/CC (A)	1	350	350
	Group/CC (B)	8	250	2,000
	Sq/CC (C)	16	150	2,400
	First Sgt. (D)	16	120	1,920
Total Private Offices		41		6,670
Total All Offices		101		9,445
3. Administrative Support Space		101	20	2,020
Office Areas Subtotal		101		11,465
4. Circulation Multiplier			6%	688
Net Administrative Area			Max 120 ft2/person	12,153
5. Special Purpose Space	Break Room	101	16% x 18 ft2/person	291
	Team Room		15 ft2/person	300
	Conference	-	20 ft2/person	-

	Space Type	Qty	Factor	Total Area (ft2)
	Conference	50	20ft2/person+150 ft2	1,150
	Classroom(1)	25	30 ft2/person	750
	SCIF			1,896
Sum of Special Purpose Space				4,387
6. Special Purpose Space Multiplier			10%	439
Total of Special Purpose Space				4,826
Total Net Organization 1 Space			101	16,979
Space Description (Organization 2)				
1. Open Office Space	Supervisor (E)	4	80	320
	Standard (F)	15	64	960
	Admin (G)	12	36	432
	Task (H)	12	25	300
Total Open Offices		43		2,012
2. Private Office Space	Wing/CC (A)	1	350	350
	Group/CC (B)	5	250	1,250
	Sq/CC (C)	10	150	1,500
	First Sgt. (D)	15	120	1,800
Total Private Offices		31		4,900
Total All Offices		74		6,912
3. Administrative Support Space		74	20	1,480
Office Areas Subtotal		74		8,392
4. Circulation Multiplier			6%	504
Net Administrative Area			Max 120 ft2 /person	8,896
5. Special Purpose Space	Break Room	74	16% x 18 ft2/person	213
	Team Room	-	15 ft2/person	-
	Conference	20	20 ft2/person	400
	Conference	-	20ft2/person+150 ft2	-
	Classroom(1)	-	30	-
	SCIF			1,896
Sum of Org 2 Special Purpose Space				2,509
6. Special Purpose Space Multiplier		10%		-
Total of Special Purpose Space				2,509
Total Net Organization 2 Space				11,405
7. Total Net Organizational Space		175		28,384
8. Shared Special Purpose Spaces	Recycling			600
	Storage			200
Net Shared Special Purpose Spaces				800

	Space Type	Qty	Factor	Total Area (ft2)
Shared Special Purpose Space Circulation		10%		80
Total Shared Special Purpose Space				880
Total Net Building Area		175		29,264
9. Net-to-Gross Multiplier		25%		7,316
Total Gross Building Area				36,580
Validate:				
Net Administrative Area ft2 per person=	Org 1			120
Net Administrative Area ft2 per person=	Org 1			120
Net Administrative Area ft2 per person=	Org 1 & 2			120
NOTES: 1. The Rank-base programming method is based on a Max Net Office Area Per Person, for a building that is primarily an administrative facility housing two organizations with 175 personnel and 5,800 ft2 of Special Purpose Space (including 800 ft2 of Shared Special Purpose Space).				

6.1.7. **Tenant Administrative Offices.** Air Force or non-Air Force tenant organizations or activities that require administrative office space on an Air Force installation are provided such space under AFI 25-201, *Support Agreements Procedures*, or other type agreements. The category code and nomenclature assigned to such space is determined as follows.

6.1.7.1. Administrative-type facilities that are specifically developed or provided for an Air Force tenant activity are assigned the category code appropriate to the activity**.**

6.1.7.2. When the Air Force tenant is not, or cannot be, provided with its own administrative-type facility, or the space required is too small to warrant the use of a separate category code, the space is provided under the category code of the wing or group headquarters that is responsible for operating the installation. The amount of tenant space thus provided should constitute a small percentage of the total space occupied under the wing or group headquarters category code. When an individual tenant requires a substantial amount of space, it may be desirable to ask AF/A7C to establish new or revised facility requirements. Such requests should be made only with respect to specific activities and organizations; codes for general activities, such as "Tenant Office" are not approved. For unique headquarters, a request to revise Specified Headquarters (**CATCODE 610287**), may be in order.

6.1.7.3. All non-Air Force tenants (except Air Force Plants) are provided administrative space under Non-Air Force Administrative Offices (**CATCODE 610811**), which applies to the space used for all types of administrative activities. Non-Air Force tenants include organizations such as Army, Navy, Marine, Coast Guard, DoD Agencies, other governmental agencies, private contractors, or other private organizations. Air Force Plant Administrative Offices are identified under **CATCODE 610123**.

6.2. Judge Advocate Facilities. Adequate facilities are needed for the proper administration and supervision of the Air Force's legal needs. Typical unique special purpose spaces include courthouse and legal libraries. See *AF Legal Facilities Design Guide* for facility design guidance.

Table 6.5. Typical Special Purpose Space Requirements for Judge Advocate (JA) Facilities.

Type of Space	Equivalent for JA Facilities	Office Type(see Tables 6.3/6.4)	
Private Office Space			
Center/Wing Commander	(None)	A	
Group Commander	Staff JA	B	
Squadron Commander	Area Defense Counsel/Assistant JA/Circuit Prosecutor/Trial Judiciary1	C	
First Sergeant	Attorneys	D	
Open Office Space			
Supervisors/Equiv	Supervisors/Equiv	E	
Standard	Court reporters, paralegals, staff, etc.	F	
Limited Administrative	Site specific	G	
Task Station	Site specific	H	
Special Purpose Spaces – also see Tables 6.3 and 6.4		m2	ft2
Waiting Room		See Table 6.3	
Reception Area		User justified	
Library		User justified	
Conference Room		See Table 6.4	
Courtroom		111	1,200
Courtroom Support Spaces		User justified	
Discussion Room (for personnel/private and sensitive discussions)3		6	64
NOTES: 1. When designated by AF/JA. 2. See AF Legal Facilities Design Guide for description of spaces. 3. 1 per 10 organizational personnel. No more than 4 discussion rooms are authorized per installation.			

6.2.1. **Area Defense Counsel Office (ADC). FAC: 6100**

CATCODE: 610111
OPR: AF/JA
OCR: N/A

6.2.1.1. **Description.** The ADC is an independent, tenant office servicing installations. The office is usually manned by one or two JAs and an administrative staff who provide private counsel to military members.

6.2.1.2. **Requirements Determination.** In order to prevent perception of command influence, do not combine law centers and ADC offices unless designated by AF/JA. At locations designated by AF/JA, collocate a circuit defense counsel office with the ADC office and include additional office and administrative space.

6.2.1.3. **Scope Determination.** See **Table 6.5**.

6.2.1.4. **Dimensions.** See **Table 6.5**.

6.2.1.5. **Design Considerations.** Special Purpose Space required includes a waiting room/reception area, library, professional staff offices, administrative offices, and a conference room. See *AF Legal Facilities Design Guide*, for facility design guidance.

6.2.2. **Law Center. FAC: 6100**

CATCODE: 610112
OPR: AF/JA
OCR: N/A

6.2.2.1. **Description.** This facility contains the office of the installation staff JA and a courtroom.

6.2.2.2. **Requirements Determination.** Space required includes offices for the staff JA, assistant staff JAs, a reserve JA, court reporters, and administrative personnel; library; waiting room; conference room for use by staff personnel; and a courtroom. At locations designated by AF/JA, a circuit prosecutor and/or trial judiciary office is collocated with the law center and requires additional office and administrative space.

6.2.2.3. **Scope Determination.** See **Table 6.5**.

6.2.2.4. **Dimensions.** The courtroom portion of the facility functionally consists of a courtroom, 111 m^2 (1,200 ft^2) minimum, the judge's chamber with a private toilet, jury deliberation room with a private toilet, two witness waiting rooms so that victims and government witnesses may be separated from accused and defense witnesses, and an administrative area.

6.2.2.5. **Design Considerations.** Locate the witness waiting area to preclude the possibility of witnesses mixing with the judge, court or board members, or spectators. See *AF Legal Facilities Design Guide* for facility design guidance.

6.3. Other Administrative Facilities.

6.3.1. **Family Housing Management Office**

FAC: 6100
CATCODE: 610119
OPR: AF/A7CH
OCR: N/A

6.3.1.1. **Description.** This facility accommodates the family housing management office of the BCE organization.

6.3.1.2. **Requirements Determination.** The facility includes sufficient reception space to accommodate incoming personnel and their families, space for display of information on available community housing, toilet facilities for both sexes, and other special

requirements. The customer service area should have sufficient space to provide a waiting room for children (e.g., tables, chairs, playpen, etc.). The Housing Officer (branch chief) and Referral Officer each require a private office (Type D) to conduct tenant-landlord counseling. Housing referral counselors and clerks should have semi-private areas to provide personalized customer service.

6.3.1.3. **Scope Determination.** The given category code is used whether the office is located in the main office building of the Base Engineer Administration (**CATCODE 610127**) or elsewhere. See the *Air Force Housing Support Facilities Guide* and UFC 4-610-01 for design and programming criteria.

6.3.1.4. **Dimensions.** See **Table 6.6**.

6.3.1.5. **Design Considerations.** The office is usually the first stop for arriving personnel and, therefore, a prominent location that is also convenient to other family service and military processing facilities is desirable. However, an existing office should not be considered for relocation to a better operating location unless other valid justification exists; for example, inadequacies in the office working space or structural condition.

Table 6.6. Authorized Spaces for Family Housing Management Offices.

Offices	Office Type(see Tables 6.3/6.4)	
Flight Chief	D	
All others	E-H	
Special Purpose Spaces	m2	ft2
Customer/Family Waiting Room	User justified	
Display Area	User justified	
Counseling Rooms	9.3	100
Reception Space	User justified	
Storage	User justified	

6.3.2. **Vehicle Operations Facilities. FAC: 6100**

CATCODE: 610121
OPR: AF/A4LE
OCR: N/A

6.3.2.1. **Description.** This facility includes vehicle management offices and administrative space, dispatch office, an isolated taxi dispatch office, driver evaluation and testing classroom, a driver's ready room, vehicle records keeping section, lockers, and secure storage space for operator care items.

6.3.2.2. **Requirements Determination.** This facility is necessary for the management, operation and control of the base support fleet and U-Drive-It vehicle fleet. Reference AFI 24-301, *Vehicle Operations*, and AFI 23-302.

6.3.2.3. **Scope Determination.** **Figure 6.3** is an example of the space requirements for a vehicle operations administration building. This is based on supporting a fleet of 1,500 vehicles as broken out in the notes to the table. This is an example only; the size of the

facility depends upon fleet size and local mission and operational requirements. For additional guidance see **paragraph 6.1.7** of this chapter.

6.3.2.4. **Dimensions.** See **Figure 6.3**.

6.3.2.5. **Design Considerations.** Collocate the facility with the Vehicle Parking Operations area (**CATCODE 852261**) and Vehicle Maintenance Shop (**CATCODE 214425**) and situate it so that the dispatcher has visual coverage of the parking area and the entry and exit point.

Figure 6.3. Example of Authorized Spaces for Vehicle Operations Administration. 1

Offices	Office Type(see Tables 6.3/6.4)	
Vehicle Operations Officer	D	
Vehicle Operations Superintendent	D	
Vehicle Operations Administration	F (per person)	
Vehicle Operations Support (Shift Supervisor)	F	
Special Purpose Spaces	m2	ft2
Vehicle/Taxi Dispatch	37.2	400
Guard Station	8.4	90
Drivers Ready Room (Lounge)	51.1	550
Break Room	See Table 6.3.	
Lockers	18.6	200
Fleet Management (4)	40	432
Conference/Training Room	See Table 6.4.	
Equipment Support	16.7	180
Operator Care/Cleaning	62.2	670
Storage	43.7	470
Vehicle Records Keeping Section	User justified	
Driver Evaluation And Testing Classroom	User justified	
Command and Control	User justified	
NOTES: 1. This is based on a unit supporting a fleet of 1,500 vehicles. Units of a different size should justify these quantities, in m2, ft2, or space types.		

6.3.3. **Supply Administration. FAC: 6100**

CATCODE: 610122
OPR: AF/A4LE
OCR: N/A

6.3.3.1. **Description.** This facility houses the main administrative offices of the Supply organization.

6.3.3.2. **Requirements Determination.** Include space for all assigned personnel whose primary duties are performed at a desk, excluding Fuels Management branch personnel, data processing, and section/work centers directly involved in the management and handling of property. Special Purpose Spaces may include a classroom to support supply

customer training. The need and justification for a separate classroom and its seating requirements should be established under the general space criteria given in **paragraph 6.1.7** of this chapter and **Table 6.7**.

6.3.3.3. **Scope Determination.**

6.3.3.3.1. Included in this category code are offices for the Logistics Readiness Squadron (LRS), Deployment and Distribution Flight, Materiel Management Flight, and Vehicle Management Flight. Specific sections are broken out in USAF PAD 08-01 1 May 08. This excludes data processing, retail sales, repair cycle support, section/work center personnel, vehicle operations facilities, Cargo Movement/Personal Property/Small Air Terminal and Passenger Movement facilities, and the Fuels Management Flight because they are included in other total space requirements (**CATCODEs 442758**, **610121**, **610142,** and **610711**).

6.3.3.3.2. Space requirements exclude the space occupied by supply computers, telecommunications, and operating personnel. This space is reported under **CATCODE 610711**. Operating personnel are defined as computer operators, input/output or production controllers, and customer or field engineers. Remaining computer support offices, such as remote locations, and supply systems office are included in supply administration.

6.3.3.4. **Dimensions.** See **Table 6.7**.

6.3.3.5. **Design Considerations.** This facility is usually adjacent to, or an integral part of, Warehouse Supply and Equipment (**CATCODE 442758**).

Table 6.7. Authorized Spaces for Supply Administration.

Offices	Office Type (see Tables 6.3/6.4)
Fuels Management branch personnel, data processing, and section/work centers directly involved in the management and handling of property	E-H
Deployment and Distribution Flight, Materiel Management Flight, and Vehicle Management Flight. (Specific sections are broken out in HQ USAF PAD 08-01 1 May 08.)	D-H
Data processing, retail sales, repair cycle support, section/work center personnel, vehicle operations facilities, Cargo Movement/Personal Property/Small Air Terminal and Passenger Movement facilities, and the Fuels Management Flight because they are included in other total space requirements. (CATCODE 610711, 442758, 610121 and 610142)	E-H
Operating personnel such as computer operators, input/output or production controllers, and customer or field engineers (reported under CATCODE 610711)	F-H
Special Purpose Spaces	
Classroom to support supply customer training	See Table 6.4

6.3.4. **Air Force Plant Administration Office. FAC: 6100**

CATCODE: 610123
OPR: AFCEE/TDB
OCR: N/A

6.3.4.1. **Description.** See **paragraph 6.1.7** under "Tenant Administrative Offices."

6.3.4.2. **Requirements Determination.** See **paragraph 6.1.7** of this chapter.

6.3.4.3. **Scope Determination.** See **paragraph 6.1.7** of this chapter.

6.3.4.4. **Dimensions.** See **paragraph 6.1.7** of this chapter.

6.3.4.5. **Design Considerations.** See **paragraph 6.1.1** of this chapter.

6.3.5. **Base Engineer Administration. FAC: 6100**

CATCODE: 610127
OPR: AFCEE/TDB
OCR: N/A

6.3.5.1. **Description.** This facility contains the principal administrative offices of the BCE's organization.

6.3.5.2. **Requirements Determination.** Space requirements for this facility include the commander's, deputy commander's, and first sergeant's offices; and squadron administration functions, programs, operations, resources, and asset management flights. The facility also contains a drafting room, vault, and conference rooms. It does not contain the family housing management office, which is captured under **CATCODE 610119**.

6.3.5.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.3.5.4. **Dimensions.** See **Table 6.8**.

6.3.5.5. **Design Considerations.** See **paragraph 6.1.1** of this chapter.

Table 6.8. Authorized Spaces for Civil Engineer Administration Facility.

Offices	Office Type (see Tables 6.3/6.4)	
Commander	C	
Deputy, Flight Chiefs	D	
All others	E-H	
Special Purpose Spaces	m2	ft2
Drawings Vault	User justified	
Computer, Telecommunications	User justified	
Break Room	See Table 6.3	
Lockers	User justified	
Conference Room	See Table 6.4	
Customer Service	User justified	
Storage	User justified	
Unit Command and Control	User justified	

6.3.6. **Base Personnel Office. FAC: 6100**

CATCODE: 610128
OPR: AF/A1
OCR: N/A

6.3.6.1. **Description.** This office houses the military and civilian personnel administration function and, where appropriate, the education services function. Military personnel management activities cover the following areas: personnel systems management administration, career control, records section, quality control, personal affairs, processing, and career assistance and counseling. Civilian services include administration, affirmative employment, positions classification and position management, systems management, employee and labor management relations and training, and resources management.

6.3.6.2. **Requirements Determination.** Space requirement for the office includes the sum of military and civilian personnel management space requirements as determined in **Table 6.9** and **Table 6.10**. Military criteria are based upon military population as shown in **Table 6.9**. Military population supported by the office may include personnel that are stationed off base. The given areas should be prorated according to the actual population supported.

6.3.6.3. **Scope Determination.** Special Purpose Space requirements include a classroom for training/orientation; equipment area for desktop computers, printers, and various filing and storage cabinets; a reception lobby and waiting area; group activity lounge; and counseling rooms. An Education Center (**CATCODE 730441**) may be collocated with the base personnel office using the center's space criteria. See **paragraph 6.1.1** of this chapter.

6.3.6.4. **Dimensions.** See **Table 6.9 and 6.10**.

6.3.6.5. **Design Considerations.** Establish a separate and private office (for both Employee Relations functions and Labor Relations specialists) so that confidentiality in these areas is not compromised.

Table 6.9. Base Personnel Office Space Requirements.

Military Population	Net Area	
	m2	ft2
3,000	1,022	11,000
5,000	2,230	24,000
10,000	2,601	28,000

Table 6.10. Authorized Spaces for Personnel Office Facility.

Offices	Office Type (see Tables 6.3/6.4)	
Military or Civilian Personnel Officer	C	
Deputies, Flight Chiefs, Employee Relations, and Labor Relations	D	
Section Chiefs	E	
All others	F-H	
Special Purpose Spaces	m2	ft2
Employment Office/Customer Service	User justified	
File Room	User justified	
Reception/Waiting	User justified	
Group Activity Lounge	See Table 6.4.	
Private Individual Counseling Room	18	190
Private Group Counseling Room	13	140
Training/Orientation Room	See Table 6.4	
Training Group/Activity Room	See Table 6.4	
Civilian Personnel Officer	User justified	
Reference Library	User justified	

6.3.7. **Weapons Systems Maintenance Management Facility. FAC: 6100**

CATCODE: 610129
OPR: AF/A4LW
OCR: N/A

6.3.7.1. **Description.** This facility accommodates the offices of the named activity, which is composed of the following units: maintenance control; plans, scheduling, and documentation; material control; quality control, records, and analysis; and Chief of Maintenance and administrative staff.

6.3.7.2. **Requirements Determination.** The facility also may include a classroom for training personnel in maintenance control management procedures. The need for

classroom and the number of seats required are established under guidance in **Chapter 2**. The space per seat may not exceed criteria in **Chapter 2**.

6.3.7.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.3.7.4. **Dimensions.** See **Table 6.11**.

6.3.7.5. **Design Considerations.** See UFC 4-610-01.

Table 6.11. Authorized Spaces for Weapons Systems Maintenance Management Facility.

Offices	Office Type (see Tables 6.3/6.4)
Chief of Maintenance	D
Section Chiefs	E
All others	F-H
Special Purpose Spaces	
Training Classroom	See Table 6.4

6.3.8. **Cargo Movement/Personal Property/Small Air Terminal and Passenger Movement Facilities. FAC: 6100**

CATCODE: 610142
OPR: AF/A4LE
OCR: N/A

6.3.8.1. **Description.** These facilities house the administrative offices of the traffic management personal property sections (inbound, outbound, non-temporary storage, direct procurement method, and quality control), passenger section, surface freight section, packaging and crating section, and the contract commercial travel office (CTO). Non-Aerial Port locations are authorized Cargo Movement/Personal Property/Small Air Terminal and Passenger Movement sections. Aerial Port locations are authorized Cargo Movement/Personal Property and Passenger Movement sections.

6.3.8.2. **Requirements Determination.** The facility is necessary for the administration, shipping, and receiving by rail and truck of military supplies, household goods, personal effects, and movement of personnel by air and surface modes of transportation.

6.3.8.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.3.8.4. **Dimensions.** See **Table 6.12**.

6.3.8.5. **Design Considerations.** Customs Sterile Holding Area (authorized for overseas areas only), requires an area to accommodate locally generated cargo, with controlled access. Security fencing at least 2 m (6.56 ft) in height, topped with at least three strands of barbed wire affixed to outriggers is necessary, with floor to ceiling fencing preferred. Depending on the type of cargo, some locations require an outside Customs Holding Area which does not need to be covered, but does require a hard-stand and fenced. Space requirements vary from base to base depending on the mission and type of cargo. Each overseas command has different directives. Contact respective MAJCOM POC for current guidance.

Table 6.12. Authorized Spaces for Traffic Management Facility.

Offices	Office Type (see Tables 6.3/6.4)	
Traffic Management Officer	D	
Section Chiefs	E	
All others	F-H	
Special Purpose Spaces	m2	ft2
Customs Sterile Holding Area	User justified	
Shipping	User justified	
Receiving	User justified	
Computer/Communications	User justified	
Material Handling, Crating	User justified	

6.3.9. **Orderly Room in Dormitory. FAC: 6100**

CATCODE: 610241
OPR: AF/A1
OCR: AF/A7CH

6.3.9.1. **Description.** The squadron orderly room space is normally located in the building that serves as the squadron's principal place of work and the space is identified under the category code of that facility. However, if a squadron elects to locate its squadron orderly room in a dormitory, the space used as the squadron orderly room should still be categorized under **CATCODE 610241**.

6.3.9.2. **Requirements Determination.** Orderly room space should not be duplicated in other squadron-occupied facilities. Also, the use should be confined to office space and should not include any common use, service, and storage space properly coded as dormitory space or other type space.

6.3.9.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.3.9.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.3.9.5. **Design Considerations.** See UFC 4-610-01.

6.4. Headquarters Facilities. Headquarters facilities accommodate the staff offices that constitute an organization headquarters. The facilities are provided only for official designated headquarters and only for headquarters that contain a substantial number of assigned personnel. Space requirements for individual headquarters are developed from their official organization charts and unit manning documents

6.4.1. **Wing /Group Headquarters.**

6.4.1.1. A wing or group headquarters that does not carry base operating responsibilities usually contains staff offices for the commander and vice commander and their information and safety divisions. Office space is also provided for the deputy commanders for operations (or missions) and material and their various divisions such as intelligence, communications, operations plans, supply, and maintenance. See **Table 6.2** for office space authorizations for wing commanders, group commanders, and officials in equivalent positions.

6.4.1.2. A wing or group headquarters with the additional responsibility of operating a base usually includes additional staff offices such as administrative services, accounting and finance, and the base procurement activity. The latter activity involves procurement and contracting of supplies, equipment, services, and construction for the entire base and for logistically-supported off-base units. It requires space for the Contracting Squadron Commander, Deputy for Business Operations (DBO), and contract specialists, as well as office support space such as conference and bid opening rooms. There are also other staff offices, many of which are normally housed in their own operational facilities, identified in the subparagraphs below. These spaces are not to be duplicated in the wing or group headquarters category code if already covered by allocations of space in their respective category code.

6.4.1.2.1. Various administrative facilities listed in **paragraph 6.3**;

6.4.1.2.2. Various medical or hospital facilities (**CATCODE 510XXX**);

6.4.1.2.3. Data Processing Installation facility (**CATCODE 610711**);

6.4.1.2.4. Security Forces Operations facility (**CATCODE 730835**);

6.4.1.2.5. Various chapel or religious facilities (**CATCODE 73077X**);

6.4.1.2.6. Central Post Office (**CATCODE 730443**);

6.4.1.2.7. Elements of the Force Support Squadron in dining halls, commissaries, exchange facilities, clothing sales, laundry and dry-cleaning plants, TLF facilities, and billeting desk and operations;

6.4.1.2.8. Elements of the personnel service activity located in various recreation and welfare facilities; and

6.4.1.2.9. Base operating headquarters sometimes provide space for office personnel assigned to Air Force tenants.

6.4.2. **Group Headquarters. FAC: 6100**

CATCODE: 610243
OPR: AFCEE/TDB
OCR: N/A

6.4.2.1. **Description.** Group Headquarters facilities may accommodate the staff offices of the headquarters for the following types of organizations: operational groups, support groups, logistics groups, or any other group officially designated as such under the Air Force Wing structure.

6.4.2.2. **Requirements Determination.** See **paragraph 6.4.1**.

6.4.2.3. **Scope Determination.** Some group headquarters contain very few personnel and, to avoid unnecessary refinement in space reporting, their space requirements can be combined with other on-base headquarters. See **paragraph 6.1.1** of this chapter.

6.4.2.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.2.5. **Design Considerations.** See UFC 4-610-01.

6.4.3. **Wing Headquarters. FAC: 6100**

CATCODE: 610249
OPR: AFCEE/TDB
OCR: N/A

6.4.3.1. **Description.** This facility accommodates the staff offices of the headquarters for operational wings, air base wings, or training wings.

6.4.3.2. **Requirements Determination.** See **paragraph 6.1.1** of this chapter.

6.4.3.3. **Scope Determination.** See **paragraph 6.1.1** this chapter.

6.4.3.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.3.5. **Design Considerations.** See UFC 4-610-01.

6.4.4. **Headquarters Center. FAC: 6100**

CATCODE: 6102481
OPR: AFCEE/TDB
OCR: N/A

6.4.4.1. **Description.** This facility accommodates the staff offices of the various center organizations. These include AFMC Centers, AETC Training Wings, and miscellaneous centers under USAF, AMC, and ACC.

6.4.4.2. **Requirements Determination.** See **paragraph 6.4.1**.

6.4.4.3. **Scope Determination.** Examples of staff organizations follow:

6.4.4.3.1. AFMC Centers which often include offices of safety, plans and requirements, executive services, Comptroller, contract management, and other directorates, in addition to the commander's office;

6.4.4.3.2. Air Force Headquarters (**CATCODE 610282**);

6.4.4.3.3. Major Command Headquarters (**CATCODE 610284**);

6.4.4.3.4. Numbered Air Force Headquarters (**CATCODE 610285**);

6.4.4.3.5. Named/Numbered Division Headquarters (**CATCODE 610286**);

6.4.4.3.6. Named divisions including the various divisions under AFMC's Air Force Acquisition Logistics Division; and

6.4.4.3.7. Numbered divisions including air divisions, strategic aerospace divisions, and aerospace defense divisions. The headquarters of many numbered divisions contain very few personnel and, in the interest of avoiding unnecessarily detailed reporting, their space requirements can be combined with that of other on-base headquarters.

6.4.4.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.4.5. **Design Considerations.** See UFC 4-610-01.

6.4.5. **Air Force Headquarters. FAC: 6100**

CATCODE: 610282
OPR: AFCEE/TDB
OCR: N/A

6.4.5.1. **Description.** This category code applies to building space occupied by the staff offices of HQ USAF, including Direct Reporting Units (DRU) and Field Operating Agencies (FOA). See AFI 32-9010 for space allocations.

6.4.5.2. **Requirements Determination.** See **paragraph 6.4.1**.

6.4.5.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.4.5.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.5.5. **Design Considerations.** See UFC 4-610-01.

6.4.6. **Major Command Headquarters. FAC: 6100**

CATCODE: 610284
OPR: AFCEE/TDB
OCR: N/A

6.4.6.1. **Description.** This category code applies to building space occupied by the headquarters staff offices including field extensions.

6.4.6.2. **Requirements Determination.** See **paragraph 6.4.1**.

6.4.6.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.4.6.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.6.5. **Design Considerations.** See UFC 4-610-01.

6.4.7. **Numbered Air Force Headquarters. FAC: 6100**

CATCODE: 610285
OPR: AFCEE/TDB
OCR: N/A

6.4.7.1. **Description.** This category code applies to building space occupied by the headquarters staff offices including field extensions.

6.4.7.2. **Requirements Determination.** See **paragraph 6.4.1**.

6.4.7.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.4.7.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.7.5. **Design Considerations.** See UFC 4-610-01.

6.4.8. **Named/Numbered Division Headquarters. FAC: 6100**

CATCODE: 610286
OPR: AFCEE/TDB
OCR: N/A

6.4.8.1. **Description.** Named divisions include the various divisions under AFMC's Air Force Acquisition Logistics Division. Numbered divisions include air divisions, strategic aerospace divisions, and aerospace defense divisions. The headquarters of many numbered divisions contain very few personnel and, in the interest of avoiding unnecessarily detailed reporting, their space requirements can be combined with that of other on-base headquarters.

6.4.8.2. **Requirements Determination.** See **paragraph 6.4**.

6.4.8.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.4.8.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.8.5. **Design Considerations.** See UFC 4-610-01.

6.4.9. **Specified Headquarters. FAC: 6100**

CATCODE: 610287
OPR: AFCEE/TDB
OCR: N/A

6.4.9.1. **Description.** This is a "collector" category code that accommodates miscellaneous major headquarters not otherwise identified. On bases where these headquarters are a tenant, the availability of the code reduces the amount of tenant space that might otherwise be assigned to the base operating wing or group headquarters. The category code should not be used for any headquarters not listed above. Requests for additions or deletions should be submitted to AFCEE/TDB with supporting information.

6.4.9.2. **Requirements Determination.** See **paragraph 6.4**.

6.4.9.3. **Scope Determination.** The facility accommodates the staff comprising the headquarters of the following organizations:

6.4.9.3.1. AFMC's named laboratories and Satellite Control Facilities;

6.4.9.3.2. Named Services including Aerospace Audio-visual, Aerospace Rescue and Recovery, and Defense Commissary Agency;

6.4.9.3.3. AETC Numbered Technical School;

6.4.9.3.4. AETC School, Institute, or College located at Maxwell AFB and elsewhere;

6.4.9.3.5. USAF School of Aerospace Medicine;

6.4.9.3.6. Health Care Science School;

6.4.9.3.7. USAF Military Training School; and

6.4.9.3.8. AF Wright Aeronautical Laboratories.

6.4.9.3.9. Air Logistics Center Headquarters space requirement are excluded and are provided under Depot Operations Logistical Facility (**CATCODE 610675**).

6.4.9.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.4.9.5. **Design Considerations.** See UFC 4-610-01.

6.5. Specialized Administrative Facilities.

6.5.1. Document Staging Facility. FAC: 6100

CATCODE: 610311
OPR: AF/A4LE
OCR: N/A

6.5.1.1. **Description.** This facility is used to store, maintain, and service non-current official Air Force records with a retention period of eight years or less. It is also used to consolidate shipment of records with longer retention periods that are destined for a Federal Records Center.

6.5.1.2. **Requirements Determination.** The facility is established under AFI 33-364, *Records Disposition—Procedures and Responsibilities,* and is a requirement of each installation, including its off-base activities, that have an annual accumulation of 2.83 m^3 (100 ft^3) or more of official Air Force records with a retention period of two years or more.

6.5.1.3. **Scope Determination.** Under 36 Code of Federal Regulations (CFR), Chapter XII, the size of the facility may not exceed 465 m^2 (5,000 ft^2) of storage space and contains less than 708 m^3 (25,000 ft^3) of records. (Larger facilities constitute "Agency Records Centers" and require approval from the Archivist of the United States through SAF/CIO A6P.) Warehouse storage space is preferred, but ensure it provides adequate heat, light, and ventilation for the comfort of servicing personnel. Staging areas used to store classified, For Official Use Only, Privacy Act information, or other types of protected information, require special safeguards.

6.5.1.4. **Dimensions.** The required size of the facility is determined on an individual basis based on storing between 0.057 m^3 and 0.085 m^3 (2 ft^3 and 3 ft^3) of files per square meter (square foot) of floor area. Facilities smaller than 93 m^2 (1,000 ft^2) that are located within a base headquarters building can be reported under the building's category code.

6.5.1.5. **Design Considerations.**

6.5.1.5.1. The facility should normally be a single-story building, at or above grade level, of Type I-A to Type II-B construction as defined in UFC 3-600-01 and the International Building Code (IBC).

6.5.1.5.2. Ensure a structural engineer establishes a floor load limit. Post the load limit in a conspicuous place and do not exceed this limit.

6.5.1.5.3. The records staging area should be equipped with an anti-intrusion alarm system, or equivalent, to protect against unlawful entry.

6.5.1.5.4. Enclose records areas in four-hour fire resistant construction not exceeding 3,700 m^2 (40,000 ft^2) per fire area.

6.5.1.5.5. Provide a complete facility automatic wet pipe sprinkler system.

6.5.1.5.6. Storing hazardous cellulose nitrate film requires special facilities not covered by the above standards (see NFPA 40, *Standard for the Storage and Handling of Cellulose Nitrate Film,* and NFPA 232, *Standard for the Protection of Records*).

6.5.1.5.7. Archival materials require a significantly higher level of protection than temporary records, such as environmentally controlled and filtered storage space. Ensure fire safety criteria is the same as that for records centers, except that fire detection equipment is incorporated into the archival storage areas in accordance with NFPA 72, *National Fire Alarm Code.* Fire divisions in the archival storage areas may be reduced in size to reflect a management decision on the maximum amount of archives subject to damage or loss from fire.

6.5.1.5.8. For electronic and microfilm records storage, the relative humidity ranges from 20 to 40 percent with an optimum of 30 percent. Avoid rapid and wide-ranging temperature and humidity changes and do not exceed a five percent change in a 24-hour period. Temperature may not exceed 21°C (70°F). Use a storage temperature of 2°C (35°F) or below for color films.

6.5.1.5.9. Solid particles, which may abrade microfilms or react with the image, should be removed by mechanical filters from the air supplied to housings or rooms used for archival storage. Mechanical filters of dry media type having an arrestance, or cleaning efficiency, of not less than 85 percent (as determined by the stain test described in American Society of Heating, Refrigerating and Air-Conditioning Engineers [ASHRAE] Standard 52.2) are preferable.

6.5.1.5.10. Gaseous impurities such as peroxides, oxidizing agents, sulfur dioxide, hydrogen sulfide, and others are to be removed by suitable washers or absorbers. Do not store archival microfilms in the same room with non-silver gelative films or in rooms with shared ventilation systems, as gasses emitted by the other films may damage or destroy the images in the silver archival films.

6.5.2. **Depot Operations Logistical Facility. FAC: 6100**

CATCODE: 610675
OPR: AF/A4LE
OCR: N/A

6.5.2.1. **Description.** This facility accommodates the Air Logistics Center (ALC) commander and staff, including the directorate of plans and programs and all administrative functions of the following directorates: material management, maintenance, distribution, procurement, and production.

6.5.2.2. **Requirements Determination.** Analyze facility population and provide justification for all spaces.

6.5.2.2.1. Excluded are administrative and staff offices within the base operating headquarters (group, wing, and so forth) that are properly reported under other administrative category codes. Also excluded are servicing offices located in ALC operational facilities (production facilities, research, development, test facilities, and depot storage facilities).

6.5.2.2.2. Servicing offices are defined as those offices occupied by personnel whose primary functions pertain solely to the operation being performed in the building. Functions include first echelon supervision, inspection, material control, work order

processing, workload scheduling, certain phases of quality control, and similar duties. Servicing office space is reported under the basic facility being serviced.

6.5.2.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter.

6.5.2.4. **Dimensions.** See **paragraph 6.1.1** of this chapter.

6.5.2.5. **Design Considerations.** See UFC 4-610-01.

6.5.3. **Data Processing Installation. FAC: 6104**

CATCODE: 610711
OPR: AF/A4LE
OCR: AFNIC

6.5.3.1. **Description.** The data processing installation (DPI) accommodates base-level automated data processing equipment (ADPE) and the related operational and support functions. The ADPE is used at base level for two programs:

6.5.3.1.1. Standard Base Supply System (SBSS); and

6.5.3.1.2. Base Level Data Automation Standardization Program (BLDASP), which supports base personnel, finance and accounting, civil engineering, aircraft maintenance, and other base activities.

6.5.3.2. **Requirements Determination.** Analyze facility population and provide justification for all spaces.

6.5.3.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter and below.

6.5.3.3.1. An 808 m^2 (8,700 ft^2) DPI is needed at the following bases to support additional automated data processing programs: Andrews, Davis-Monthan (ACC mission), Eglin, Elmendorf, Nellis, Randolph, and Travis. Space requirements for parts of the center supporting SBSS and BLDASP operations are determined under guidance in preceding paragraphs. Facility requirements at two AFMC installations (separate from the six described above) consist of the basic requirement plus additional requirements to support the Aerospace Guidance and Metrology Center at Newark AFB and the Military Aircraft Storage and Disposition Center (MASDC) at Davis-Monthan AFB. Space requirements are determined by AFMC under the guidance provided for Logistical Systems Operations Centers. Base level programs supported by MASDC include only SBSS - not BLDASP.

6.5.3.3.2. DPIs at selected ACC bases require an additional 28 m^2 (300 ft^2) in the field engineer office (normally 21 m^2 [225 ft^2]) to accommodate a "blue suit" maintenance function.

6.5.3.3.3. DPIs serving the base supply complex require additional space for one of two possible configurations for remote processing stations: RPS-1, 17 m^2 (185 ft^2); RPS-2, 28 m^2 (300 ft^2) for the equipment plus 8 m^2 (80 ft^2) for storage.

6.5.3.3.4. Information on component areas of the four standard DPIs appear in notes of **Table 6.13**. See **paragraph 6.5.6** and **Table 6.16** for space requirements generated by remote job entry terminal system (RJETS).

6.5.3.3.5. Facility requirements at designated AFMC installations (Wright-Patterson AFB and all Air Logistics Centers) consist of the basic requirement described above plus additional requirements associated with Logistical Systems Operations Centers.

6.5.3.3.5.1. The center provides automated data processing support for most of AFMC's operating directorates and for interactions with systems managed by DoD, DLA, and other Air Force agencies. ADPE titles supported (besides SBSS and BLDASP) include Air Force Wholesale Logistics System, Maintenance Analysis and Structural Integrity Information Systems, Automatic Test Equipment and Numerical Control, and other titles.

6.5.3.4. **Dimensions.** See **Table 6.13** and **6.14**.

6.5.3.5. **Design Considerations.** Features of the DPI are a raised computer room floor, vapor barriers, special air-conditioning, telecommunications, electrical, security control systems, and, usually, an intrusion alarm system. The make/model and quantity of ADPE and size of the staff varies from center to center and, thus, project space requirements are individually determined by AFMC.

Table 6.13. Data Processing Installation Component Areas Allowance.

Main Components (Important Sub-components)	SBSS		BLDASP		Consolidated		Large Consolidated	
Offices	Office Type (see Tables 6.3/6.4)		Office Type (see Tables 6.3/6.4)		Office Type (see Tables 6.3/6.4)		Office Type (see Tables 6.3/6.4)	
	m2	ft2	m2	ft2	m2	ft2	m2	ft2
Office/Admin Support	36.2	390	118.9	1,280	144.9	1,560	144.9	1,560
Administration	-	-	46.5	500	46.5	500	46.5	500
Systems Monitor	11.1	120	47.4	510	59.5	640	59.5	640
Special Purpose Spaces								
Computer room	104.5	1,125	116.1	1,250	185.8	2,000	232.2	2,500
Tape library	7.9	85	27.8	300	27.8	300	27.8	300
Telecommunications	16.7	180	16.7	180	22.3	240	22.3	240
Field Engineer	20.9	225	20.9	225	27.9	300	27.9	300
Customer Service	User justified							
Production Control	User justified							
Supply/Storage	User justified							
Break Room	User justified							
Training Room	User justified							
Building Utility Support	118.8	1,275	170.5	1,835	201.1	2,165	201.1	2,165
NOTES: 1. The listed sub-components are environmentally controlled space.								

Table 6.14. Authorized Spaces for Data Processing.

Offices	Office Type (see Tables 6.3/6.4)	
Director of Computer Operations	C	
Deputy, Flight Chiefs	D	
All others	F-H	
Special Purpose Spaces	m2	ft2
Computer, Telecommunications	380.1 to 2,973	4,100 to 32,000
SBSS and BLDASP operations	User justified	
Conference/Training Room	See Table 6.4	

6.5.4. **Printing Plant. FAC: 6103**

CATCODE: 610717
OPR: SAF/CIO A6P
OCR: N/A

6.5.4.1. **Description.** The Congressional Joint Committee on Printing authorizes these plants to provide direct printing, duplicating, and copier program management support to the Air Force mission. Each plant supports all base and tenant activity printing requirements.

6.5.4.2. **Requirements Determination.** Analyze facility population and provide justification for all spaces.

6.5.4.3. **Scope Determination.** This plant may support other DoD agencies, MWR or Non-reprographics management (in-house, commercial procurement, base copier program management, etc.) office space, a customer service area, and separate customer conference area. The production functions require space for a lithographic camera (including separate darkroom), negative stripping, plate processing, electrostatic plate making, offset press, electrostatic duplicator equipment, paper cutting, collating, folding, stitching, drilling, padding, hand assembling, and job distribution. Ensure the plant has warehouse space for storing paper, inks, chemicals (developers, toners, replenishers, fixers, cleaners, etc.), and bindery supplies (switcher wire, padding compound, etc.). The printing plant may also include a micrographics service center which would include a work review/quality assurance area, camera room, and processing area.

6.5.4.4. **Dimensions.** Space requirements depend upon the equipment type, size and configuration, volume of work, and type of reproduction required. Space required is determined by adding the equipment footprint and a normal working perimeter.

6.5.4.5. **Design Considerations.**

6.5.4.5.1. Some reproduction equipment generates excessive heat. Therefore, the plant requires adequate air conditioning, and paper is to be stored in a dehumidified atmosphere. The plant requires OSHA-approved hazardous material storage cabinets as well as a staging area for hazardous waste awaiting removal.

6.5.4.5.2. Plants require a vault for classified material storage.

6.5.4.5.3. DoDI 5330.3 and AFI 33-395, *Document Automation and Production Service (DAPS)*, implement Congressional policy on the operation of government printing activities. MAJCOM, DRU, and FOA A6s appoint a DAPS liaison to coordinate issues with DAPS Regional Managers and the Air Force-DAPS Program Manager (SAF/A6X). Base/wing commanders will designate an individual within the Communications Squadron to serve as base/unit liaison to DAPS. (T-1).

Table 6.15. Authorized Spaces for Printing Plant.

Offices	Office Type (see Tables 6.3/6.4)
Printing Management Officer	D
Section Chiefs	E
All others	F-H
Special Purpose Spaces	
Lithographic camera (including separate darkroom), negative stripping, plate processing, electrostatic plate making, offset press, electrostatic duplicator equipment, paper cutting, collating, folding, stitching, drilling, padding, hand assembling, and job distribution	User justified
Warehouse space for storing paper, inks, chemicals (developers, toners, replenishers, fixers, cleaners, etc.), and bindery supplies (switcher wire, padding compound, etc.)	User justified
Computer/Communications	User justified
Printing plant (may also include a micrographics service center which would include a work review/quality assurance area, camera room, and processing area)	User justified

6.5.5. **Duplicating Center. FAC: 6103**

CATCODE: 610718
OPR: SAF/CIO A6P
OCR: N/A

6.5.5.1. **Description.** The duplicating center provides direct duplicating, commercial procurement, and copier program management support to the Air Force mission. Each center supports all base and tenant activity duplicating requirements. It may, as agreed, support other DoD agencies, MWR, or Nonappropriated Fund activities. Each center requires reprographics management office space and a customer service area. The production functions require space for electrostatic plate making, offset press, electrostatic duplicator equipment, collating, stitching, drilling, hand assembling, and job distribution. Each plant requires space for storing paper, inks, developers, toners, cleaners, and bindery supplies.

6.5.5.2. **Requirements Determination.** Analyze facility population and provide justification for all spaces.

6.5.5.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter and **CATCODE 610717**.

6.5.5.4. **Dimensions.** See **Table 6.15** for space requirements.

6.5.5.5. **Design Considerations.** Some reproduction equipment generates excessive heat. Therefore, the center requires adequate air conditioning, and paper is to be stored in a dehumidified atmosphere. The center requires OSHA-approved hazardous material storage cabinets as well as a staging area for hazardous waste awaiting removal.

6.5.6. **Remote Job Entry Terminal System (RJETS**). RJETS are located at small active installations under the jurisdiction of the Air Force, the Air Force Reserve, and the Air National Guard. A RJETS system communicates with host Air Force RPS II at the computer support base. The RPS II is usually located in DPIs (**CATCODE 610711**). Space requirements for RJETS equipment and operations vary according to equipment configuration type. See **Table 6.16**.

Table 6.16. Authorized Spaces for Job Entry Terminal System (RJETS).

Offices	Office Type (see Tables 6.3/6.4)	
RJETS Chief's office	E	
All others	F-H	
Special Purpose Spaces	m2	ft2
Service engineer and operator files and desks and all equipment configurations	16.7	180
RJETS equipment	37.2	400
Punch card equipment input/output area	4.6	50

6.5.7. **Social Actions Facility. FAC: 6100**

CATCODE: 610911
OPR: AF/A1S
OCR: N/A

6.5.7.1. **Description.** This facility supports the Air Force Social Actions Program (AFI 36-2706, *Military Equal Opportunity (MEO) Program*).

6.5.7.2. **Requirements Determination.** Each installation requires a Social Actions facility. The facility should be in a central location with access and convenience to the Wing Staff offices, enlisted dormitory facilities, and other base offices that may refer personnel to the social actions office.

6.5.7.3. **Scope Determination.**

6.5.7.3.1. Provide lecture/seminar classrooms with room dividers used primarily for Equal Opportunity/Human Relations instruction. Other uses include training, committee meetings, councils, and associated forums involved in social action work. Rooms should be specifically designated to accommodate “state of the art” audio-visual equipment modeled after base education classrooms. Ensure adequate space for use of audio-visual aids and experimental training exercises.

6.5.7.3.2. For each authorized Social Actions position, provide a Type D office. Provide one Type C office for mediation. See **Table 6.17**.

6.5.7.4. **Dimensions.** See **Table 6.17**.

6.5.7.5. **Design Considerations.**

6.5.7.5.1. Sound proofing is necessary between administrative offices and consultation areas.

6.5.7.5.2. The facility requires special consideration to provide features that promote accomplishment of program objectives. This involves providing an environment that visitors perceive as non-threatening and one that encourages free access and expression. From a design standpoint, this means that counseling rooms require floor-to-ceiling walls to ensure privacy. The interior design should create an environment that has a non-institutional character.

Table 6.17. Authorized Spaces for Social Action Facility.

Offices	Office Type (see Tables 6.3/6.4)	Qty
Chief/Director	C	1
Deputy, Flight Chiefs	D	1
All others	F-H	2
Special Purpose Spaces	m2	ft2
Lecture/seminar classrooms for 30 max	See Table 6.4	
Counseling/Meditation Rooms	13.9	150
Break Room	See Table 6.3	
Storage	User justified	
Equal Employment Opportunity (EEO) Discussion Room1	5.9	64
NOTES: 1. 1 per 10 organizational personnel. No more than 4 discussion rooms are authorized per installation.		

6.5.8. **Emergency Management (EM). FAC: 6100**

CATCODE: 610913
OPR: AFCESA/CEX
OCR: N/A

6.5.8.1. **Description.** This facility supports the base EM function that operates under the Air Force's EM program and AFI 10-2501, *Air Force Emergency Management (EM) Program Planning and Operations*. The function provides the planning, management, training, and operations to prepare all personnel to protect Air Force resources from the effects of attacks and/or disaster situations, restore primary mission assets, and fulfill the humanitarian disaster relief responsibilities of commanders. The function includes maintaining stores of specialized disaster response equipment. Activities of the Base EM Office extend to tenant units including the National Guard and Air Force Reserve forces. In overseas areas, the function serves as a standby facility similar to EOD/Fire Department functions. See applicable supplements to AFI 10-2501.

6.5.8.2. **Requirements Determination.** Analyze facility population and provide justification for all spaces. Space requirements at bases that conduct extensive training in chemical warfare training generally exceed normal requirements.

6.5.8.3. **Scope Determination.** See **paragraph 6.1.1** of this chapter and **Table 6.18**.

6.5.8.4. **Dimensions.** See **Table 6.18**.

6.5.8.5. **Design Considerations.** Facility components and requirements include the following:

6.5.8.5.1. **Classrooms.** This component contains benches and tables that are used for lecture and audio/visual instruction and equipment. Two classrooms are necessary especially in overseas areas where different courses of instruction are conducted during normal duty days. Installations that can justify regular attendance of more than 20 students (60 students maximum) can provide more classroom space.

6.5.8.5.2. **Control Center**. This component supports communications equipment, plotting/status boards/maps/charts, and may be manned by two individuals. The component coordinates disaster activities and dispatches the Readiness Support Team.

6.5.8.5.3. **Secure Storeroom.** The secure storeroom is needed for disaster response equipment such as protective clothing, chemical detection and decontamination equipment, and radiation monitoring sets. The storeroom includes dressing space for certain team members who use protective clothing and gear. It requires climate control to prolong the shelf life of material and equipment sensitive to temperature extremes.

6.5.8.5.4. **Decontamination/Shower Area and Latrine.** This component requires separate male and female areas. Each should contain two showers, two commodes, and two sinks/wash basins. In addition, include two urinals for the male latrine.

6.5.8.5.5. **Demonstration Yard.** An open yard is needed to demonstrate decontamination and monitoring equipment. It is preferably located adjacent to the preparedness office.

6.5.8.5.6. **Student Lounge.** This component supports from 20 to 60 students and includes vending machines in addition to furniture.

6.5.8.5.7. **Standby Area.** This component supports from 5 to 10 persons and includes beds, lockers, tables, chairs, and food preparation area.

6.5.8.5.8. **Mask-Confidence Training.** Bases also require a mask-confidence training facility convenient to the classrooms. The EM facility should be provided NBC/conventional protection. In overseas areas, minimum requirements include revetments and provision for collective protection.

Table 6.18. Authorized Spaces for EM Facility.

Offices	Office Type (see Tables 6.3/6.4)	
Program Director	D	
All others	F-H	
Special Purpose Spaces	m2	ft2
Mask-confidence Training	55.7	600
Computer, Telecommunications	User justified	
Student Lounge		300-900
Decontamination Shower/Latrines	User justified	
Classrooms (for 20 person ea, 60 person max)	See Table 6.4	
Standby Area	92.9	1,000
Secure Storeroom	139.3	1,500
Control Center (min)	74.3	800

6.5.9. **Air Force Office of Special Investigations (AFOSI). FAC: 6100**

CATCODE: 610915
OPR: SAF/IG
OCR: AFOSI/

6.5.9.1. **Description.** There are two types of AFOSI units: Regions and Detachments. Regional offices include units that are aligned with MAJCOMs and field investigation squadrons that align with NAF located overseas. Regional offices exercise command and control over detachments and act as directorates at the MAJCOM and NAF headquarters. A detachment can be a special unit, an investigative unit, or a combination of both.

6.5.9.2. **Requirements Determination.** AFOSI (Logistics Division) assists in the planning of AFOSI facilities and makes final determinants on the requirements of proposed projects in accordance with the AMC *Air Force Office of Special Investigations Facilities Design Guide.* Contact OPR for additional information and guidance.

6.5.9.3. **Scope Determination.** See **paragraph 6.1.7** of this chapter, **Table 6.19** and the AMC *Air Force Office of Special Investigations Facilities Design Guide.*

6.5.9.4. **Dimensions.** See the AMC *Air Force Office of Special Investigations Facilities Design Guide.*

6.5.9.5. **Design Considerations.** See the AMC *Air Force Office of Special Investigations Facilities Design Guide.*

Table 6.19. Authorized Spaces for the AFOSI Regional Facility.

Functional Area:	Net Building Area	
Offices (see Tables 6.3/6.4)	Office Type	
Commander	C	
Vice Commander	D	
Branch Chiefs	E	
All others	F-H	
Special Purpose Spaces	m2	ft2
Visitor Waiting1,2	18.6	200
Secure Visitor Waiting1,2	User justified	
Conference Room1,2	27.9	300
Polygraph/Interview Rooms (ea.)	11.1	120
Observation Room	5.6	60
Evidence Vault	18.6	200
Weapons Vestibule and Vault	1.4	15
Secure Storage Room2	37.1	400
Computer Room2	16.7	180
Computer Crime Lab	11.1	120
Forensic Science Lab	11.1	120
Electrical Lab	18.6	200
Fabrication Lab	27.9	300
Photographic Lab	23.2	250
Garage (one vehicle)	23.2	250
Break Room2	See Table 6.3	
File Room2	7.4	80
Reproduction	11.1	120
Mail handling	5.6	60
Conference Room2,3	See Table 6.4	
Operations/Training Room2,3	See Table 6.4	
Visitor waiting Area2,3	13.9	150
Secure Visitor Waiting Area2,3	11.1	120
Polygraph/Interview Rooms3	11.1	120
Observation Room3	9.3	100
Showers3	User justified	
Evidence Vault3	18.6	200
Weapons Vestibule and Vault3	16.3	175
Secure Storage Room3	9.3	100
Computer Room3	11.1	120

NOTES:
1. Space requirements for Regional units, Special Detachments, and Investigative Detachments.
2. Also see Table 6.3.
3. Space Requirements for the AFOSI Investigative Detachment Facility.

6.6. Category Group 69, Administrative Structures Other Than Buildings.

6.6.1. Troop Shelter. FAC: 7383

CATCODE: 690625
OPR: AFCESA/CEXX
OCR: N/A

6.6.1.1. **Description.** This facility is a protective shelter used in forward basing areas to house personnel and equipment.

6.6.1.2. **Requirements Determination.** Requirements are established under HQ USAF-directed programs. Additional information can be found on the Theater Construction Management System (TCMS). TCMS is a web-based automated construction planning, design, management, and reporting system that is used by military engineers for contingency construction activities. Its primary purpose is to support OCONUS requirements. It combines state-of-the-art computer hardware and software with Army Facilities Component System (AFCS) design information to support and enhance the accomplishment of engineer mission activities in the theater of operation or other mission arenas. TCMS can be accessed at **http://www.tcms.net/.**

6.6.1.3. **Scope Determination.** This shelter, which varies in length, width, and height, is constructed from components of the aircraft steel arch shelter. The shelter can be used for the following purposes: personnel shelter, equipment storage, explosives storage, and vehicle maintenance excluding space identified under Refueling Vehicle Hardened Shelter (**CATCODE 214429**).

6.6.1.4. **Dimensions.** See TCMS.

6.6.1.5. **Design Considerations.** Contact the OPR for further design guidance.

Chapter 7

FACILITY CLASS 7, HOUSING AND COMMUNITY

7.1. Category Group 71, Family Housing.

7.1.1. **General Information.** Requirements criteria (including general descriptions, requirements determinations, scope determinations, dimensions, and design considerations) for family housing facilities appear in AFI 32-6001, *Family Housing Management;* AFI 32-6002, *Family Housing Planning, Programming, Design and Construction;* UFC 4-711-01, *Family Housing;* the *Air Force Family Housing Guide;* and the *Air Force Housing Support Facilities Guide*.

7.1.1.1. **Family Housing Facilities.** Facilities covered by the aforementioned guidance include: Family Housing (**CATCODEs 711111** through **711312**); Mobile Home Court Support Facility (**CATCODE 713352**); Trailer Court Parking (**CATCODE 713366**); Attendant Dining Hall (**CATCODE 714122**); Attendants Sanitary Facilities (**CATCODE 714124**); Attendants Quarters (**CATCODE 714128**); Family Housing Detached Facilities (**CATCODEs 714431** and **714433**); Family Housing Maintenance Facility (**CATCODE 219944**); and Housing Supply and Storage Facility (**CATCODE 442769**). (***NOTE:*** AFI 32-6001 is currently in the process of being combined with AFI 32-6003, *General Officer Quarters*, and AFI 32-6005, *Unaccompanied Housing Management*, into one AFI 32-6011, *Housing Management and Operations*. AFI 32-6011 is currently in coordination for signature. Estimated completion date unknown.)

7.2. Category Group 72, Unaccompanied Personnel Housing (UPH).

7.2.1. **Overview.** The Air Force Dormitory Master Plan (DMP) provides the Air Force with a comprehensive investment planning tool for future project programming of unaccompanied housing requirements across the Air Force. The Air Force DMP integrates facility condition assessments, functional adequacy analysis, scoring, anti-terrorism/force protection (AT/FP) analyses, and dormitory campus area development planning to produce a consolidated Air Force position for long-term dormitory investment. Dormitory construction projections are based on detailed phasing plans that take into account each of these factors in a weighted calculation. Master Plans are developed for each level in the Air Force corporate process: Installation, MAJCOM, and HQ USAF. The DMP includes a functional analysis that compares each facility to the new Air Force standards defined for each grade in the Air Force *Unaccompanied Housing Design Guide*. Consult the applicable DMP and Air Force *Unaccompanied Housing Design Guide* prior to project programming of unaccompanied housing requirement.

7.2.1.1. **Determining Requirements.** As stated in **paragraph 7.2.1**, UPH requirements are determined by the DMP. See the *Air Force Unaccompanied Housing Design Guide* for further information and guidance.

7.2.1.2. **Definition of Unaccompanied Personnel.** Unaccompanied Personnel either have no dependents or are geographically separated from all dependents. At locations where dependents are not authorized, all permanent party personnel are considered involuntarily separated and are included when calculating permanent party UPH requirements.

7.2.1.3. **Adequacy Standards.** Lodging adequacy standards and assignments are provided in AFI 34-246, *Air Force Lodging Program.* Permanent party UPH assignment and adequacy standards are provided in AFI 32-6005, *Unaccompanied Housing Management.*

7.2.1.4. **Support Areas**.

7.2.1.4.1. Gross areas given in **Table 7.1** are new construction and major renovation programming allowances (not existing facility space adequacy standards) for dormitories and Officers Quarters (OQ). They include support space such as lounges, vending machines, central office, laundry, linen supply, housekeeping equipment, personal item storage, and general-purpose storage.

7.2.1.4.2. Squadron orderly rooms may be located in dormitories and reported as Orderly Room in Dormitory (**CATCODE 610241**). As indicated in the requirements criteria for this facility, space thus coded should be limited to office space and should not include any of the dormitory support space in **7.2.1.4.1**.

7.2.1.4.3. Visiting Quarters (VQ). Consult AFI 34-246 and AFSDG 4-724-01, *Air Force Services Facilities Design Guide, Design: Visiting Quarters* for the latest guidance on support areas.

7.2.2. **Recruits Dormitory. FAC: 7218**

CATCODE: 721311
OPR: AF/A7CH
OCR: 2AF/TTOC

7.2.2.1. **Description.** Housing facilities to accommodate Basic Military Training (BMT).

7.2.2.2. **Requirements Determination.** Living space allowances and accommodations in new dormitories are established by OSD (E-1 Basic Trainee line of **Table 7.1**). Consult the applicable DMP and *Air Force Unaccompanied Housing Design Guide*.

7.2.2.3. **Scope Determination.** BMT trainees are housed in Recruit Housing and Training (RH&T) facilities in an open-bay configuration with approximately 50 trainees per bay. RH&T dormitory furnishings are limited to bunk beds and lockers for personal gear. See **Table 7.1** for Space Allowances.

7.2.2.4. **Dimensions.** See **Table 7.1**.

7.2.2.5. **Design Considerations.** Ensure the design includes requirements, scope, and costs identified in the Air Force DMP criteria defined in the *Air Force Unaccompanied Housing Design Guide,* and base or MAJCOM standards.

7.2.3. **Dormitory Airman Permanent Party/Permanent Change of Station (PCS)-Student. FAC: 7210**

CATCODE: 721312
OPR: AF/A7CH
OCR: MAJCOM/A7

7.2.3.1. **Description.** Housing facilities to accommodate Permanent Party/PCS-Student enlisted military personnel.

7.2.3.2. **Requirements Determination.** Living space allowances and accommodations are established by OSD (Grades E-1 to E-4 line of **Table 7.1**). Consult the applicable DMP and *Air Force Unaccompanied Housing Design Guide.*

7.2.3.3. **Scope Determination.** Program to provide sufficient dormitory rooms to house all unaccompanied personnel in grades E-1 to E-4 with fewer than three years in service (YOS) on base. Unaccompanied personnel in grades E-1 to E-4 (fewer than 3 YOS) are considered space required. Unaccompanied personnel in grades E-4 (more than 3 YOS) to E-9 are considered space available. One exception is noted below in **paragraph 7.2.3.3.1**.

7.2.3.3.1. Regardless of location, if the installation's Housing Requirements and Market Analysis (HRMA) (or equivalent for Japan and Korea) reflects a deficit of adequate and affordable off-base housing to support any portion of unaccompanied E-4 (more than 3 YOS) through E-9 personnel at that installation, then the affected personnel may be considered space required. Ensure the HRMA fully justifies the lack of housing for E-4 (more than 3 YOS) through E-9 personnel. At these installations, program to house the affected grades (as identified in the HRMA) on base at the appropriate standard provided in **Table 7.1**. As a related ***NOTE:*** Air Force assignment standards (AFI 32-6005) stipulate that all space available personnel may only be authorized one room per person.

7.2.3.4. **Dimensions.** See **Table 7.1**.

7.2.3.5. **Design Considerations.** Design includes requirements, scope, and costs identified in the Air Force DMP, criteria defined in the *Air Force Unaccompanied Housing Design Guide* and base or MAJCOM standards.

7.2.4. **Technical Training/Pipeline Student Housing. FAC: 7210**

CATCODE: 721313
OPR: AF/A7CH
OCR: MAJCOM/A7

7.2.4.1. **Description.** These dormitory facilities are utilized to house students who are recent graduates of BMT.

7.2.4.2. **Requirements Determination.** Consult the applicable DMP and *Air Force Unaccompanied Housing Design Guide.*

7.2.4.3. **Scope Determination.** Although many concepts in Pipeline Student Housing are similar to Permanent Party Unaccompanied Housing, there are differences in their physical layout and construction. The general concepts applicable to Permanent Party UPH also apply to Pipeline Student Housing unless specifically altered by the *Air Force Unaccompanied Housing Design Guide*. Normally, Pipeline Student Housing is constructed in increments of 100 rooms. The optimum size depends on the squadron size at each installation.

7.2.4.4. **Dimensions.** See **Table 7.1**.

7.2.4.5. **Design Considerations.** Design includes requirements, scope, and costs identified in the Air Force DMP, criteria defined in the *Air Force Unaccompanied Housing Design Guide,* and base or MAJCOM standards.

7.2.5. **Dormitory, Unaccompanied NCO. FAC: 7210**

CATCODE: 721314
OPR: AF/A7CH
OCR: MAJCOM/A7

7.2.5.1. **Description.** Permanent party enlisted Unaccompanied Housing for E-5 to E-6 Non-Commissioned Officers (NCO) and E-7 to E-9 Senior Non-Commissioned Officers (SNCO) personnel.

7.2.5.2. **Requirements Determination.** Consult the applicable DMP and the *Air Force Unaccompanied Housing Design Guide*.

7.2.5.3. **Scope Determination.** Consult the *Air Force Unaccompanied Housing Design Guide* for latest requirements and guidance.

7.2.5.4. **Dimensions.** See **Table 7.1**.

7.2.5.5. **Design Considerations.** Design includes requirements, scope, and costs identified in the Air Force DMP criteria defined in the *Air Force Unaccompanied Housing Design Guide,* and base or MAJCOM standards.

Table 7.1. Space Allowances for Dormitories and Officers Quarters – New Construction and Major Alteration[1].

Grade Rank	Recommended Net Living Area Per Person		Max Gross Bldg Area Per Person	
	m2	ft2	m2	ft2
Grade E-1 Basic Trainee2,3	6.7 min	72 min	12.3	132
Grade E-1–E-3 Tech Trainee /Pipeline Student	9.1 min	98 min	25.2	269
Grade E-1 through E-44	12	129	33	355
Grade E-45 through E-6	30.7	330	33	355
Grade E-7 through E-9	42.8	460	66	710
Grade 0-1 and 0-3	42.8	460	66	710
Grades 0-4 and up	46.5	500	66	710

NOTES:
1. Table 7.1 does not establish assignment standards and should only be used for construction programming criteria.
2. Open Bay, maximum 60 persons.
3. For E-1 Basic Trainee, net area is one equal share of the open bay room measured inside of the peripheral walls.
4. E-4 with less than 3 YOS uses the “Dorms-4-Airmen” 4 Bedroom Module.
5. E-4 with more than 3 YOS.

7.2.6. **Dormitory Visiting Airman Quarters. FAC: 7212**

CATCODE: 721315
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.6.1. **Description.** These facilities provide lodging for enlisted personnel for short durations of occupancy using assignment policies contained in AFI 34-246.

7.2.6.2. **Requirements Determination.** VQ military construction projects comply with the design and construction guidance that establishes the absolute size for the net living area in **Table 7.1**. Commands desiring a waiver from these absolute planning factors must submit a fully justified request, formatted as a normal Congressional reprogramming action, and an economic analysis to Headquarters, Air Force Services through the Headquarters, Air Force Services Agency. (T-1). Headquarters, Air Force Services Agency, Lodging Branch (AFSVA/SVOL) will provide the number and types of rooms (standard and accessible guest rooms and suites) based on usage data. (T-1).

7.2.6.3. **Scope Determination.** Base the final determination of the project scope on the results of an independent Project Validation Assessment (PVA) performed through Headquarters Air Force Services Agency. The PVA validates the site selection, determines the overall number of room types, support areas, guest services to be provided, and identifies any companion appropriated fund (APF) projects necessary to provide a complete and usable facility. All guest rooms are single occupancy for all ranks (except under surge conditions) and include sleeping/living areas and private shower rooms. Refer to the Architectural Barriers Act guidelines to determine number of accessible rooms required. See AFSDG 4-724-01 to determine actual numbers of rooms.

7.2.6.4. **Dimensions.** See **Table 7.2**.

7.2.6.5. **Design Considerations.** While VQs are not considered dormitories, the design principals are the same. Consult AFSDG 4-724-01 for the latest guidance.

Table 7.2. Space Allowances for Visiting Quarters – Net Area Standards.

Room Type	With Shower		With Shower/Tub	
	m2	ft2	m2	ft2
Standard Guest Room	27.2	293	27.5	296
Accessible Guest Room	30.2	325	N/A	N/A
Suite	55.5	597	55.9	602
Accessible Suite	56.3	606	N/A	N/A

7.2.7. **Dining Hall in Airmen Dormitory. FAC: 7220**

CATCODE: 721215
OPR: AF/A1S
OCR: AFSVA, AF/A7CH, MAJCOM/A7

7.2.7.1. **Description.** See Airmen Dining Facility, Detached (**CATCODE 722351**).

7.2.7.2. **Requirements Determination.** This facility is authorized only when justified by operational needs. AF/A7CH must approve the initiation of construction programming

action. Coordinate facility requirements with AFSVA, 10100 Reunion Place, Suite 502, San Antonio, TX 78216-4138.

7.2.7.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.2.7.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.2.7.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.2.8. **Fast Food Service Facility. FAC: 7220**

CATCODE: 722345
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.8.1. **Description.**

7.2.8.1.1. **Storage Area.** The storage area includes refrigeration and storage space for semi-perishable subsistence and a receiving area. This is approximately 35 percent of the total facility (without a seating area).

7.2.8.1.2. **Kitchen Area.** The kitchen area contains food preparation and support space, staff locker area, expendable storage, an office, and a janitor's closet. This is approximately 30 percent of the total facility (without a seating area).

7.2.8.1.3. **Serving Area.** The serving area includes the counter area to serve walk-in customers and a window service area to accommodate drive-through customers. This is approximately 10 percent of the total facility (without a seating area).

7.2.8.1.4. **Customer Area.** The customer area includes the patron waiting space, patron restrooms, and entry vestibules. This is approximately 15 percent of the total facility (without a seating area).

7.2.8.1.5. **Mechanical Room.** The mechanical room is approximately 10 percent of the total facility (without a seating area).

7.2.8.1.6. **Dining Area.** The dining area is optional. For space computations see **paragraph 7.2.8.4**.

7.2.8.2. **Requirements Determination.** The various elements that comprise a fast food service facility and their sizing are based on a study performed at the location being considered. The evaluation of need will be reviewed by the MAJCOM/A1 with an information copy to AFSVAFB, 10100 Reunion Place, Suite 502, San Antonio, TX 78216-4138.

7.2.8.3. **Scope Determination.** See **paragraph 7.2.8.2**.

7.2.8.4. **Dimensions.** The industry standard for a nationally franchised fast food facility is approximately 260 m^2 (2,800 ft^2) gross area, excluding a seating area. If a seating area is required, then the seating capacity desired, times 1.4 m^2 (15 ft^2) per person, should be added to the basic facility.

7.2.8.5. **Design Considerations.** See UFC 4-722-01, *Dining Facilities,* and the *USAF Dining Facilities Design Guide.*

7.2.9. **Airmen Dining Facility, Detached. FAC: 7220**

CATCODE: 722351
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.9.1. **Description.**

7.2.9.1.1. **Receipt and Issue Area.** The receipt and issue area includes refrigeration and dry storage space used to store perishable and semi-perishable food prior to processing or use, a receiving platform including garbage and trash areas, and an issue point. The space does not accommodate food preparation.

7.2.9.1.2. **Kitchen Area.** The kitchen area contains food preparation and support space including the kitchen proper, a dishwashing room, utensil wash, a refrigerated holding area for perishable food during processing, staff toilets and locker area, office, training room, storage room for expendables, and janitor's closet.

7.2.9.1.3. **Serving Area.** The serving area includes space for the food serving line(s) and cashier(s).

7.2.9.1.4. **Dining Room Area.** The dining room area includes patron seating, aisles, patron restrooms, a protected entrance way, office, and storage room. A patron seating plan that uses a combination of tables, chairs, and booths set in a mixture of 2-, 4-, and 6-person dining configurations should be used. This mix aids in the turnover rate and produces less dead seats. Dead seats occur in a floor plan that uses all of one type of seating (i.e., 4-person tables and most of the customers dine in groups of two, producing two dead seats at a four person table). This seating concept is unique to each location's clientele.

7.2.9.2. **Requirements Determination.** Space requirements vary according to required serving capacity which is determined under instructions in **paragraph 7.2.9.3**.

7.2.9.2.1. The following categories of personnel may be included in calculating serving requirements: a) total personnel in subsistence in-kind status; b) personnel of foreign governments per agreement; c) the three-year historical average use of base dining facilities by enlisted personnel who receive Basic Allowance for Subsistence (BAS).

7.2.9.2.2. Personnel in temporary duty status, assigned officers, and civilians, while authorized to use this dining facility and pay applicable surcharges, are not included in this serving requirements calculation.

7.2.9.2.3. Valid future increases in the number of authorized patrons (a, b, and c), based on mission changes, should be considered.

7.2.9.2.4. Installations in designated isolated locations (per DFAS-DER 7010-1, *General Accounting and Finance System at Base Level*) may increase the gross area by 28 percent. Refer to DoD FMR, Volume 12, **Chapter 19**, *Food Service Program*, as an additional source for serving space requirements. Serving requirements are given in **Table 7.3** , and space allowances are given in **Table 7.4** and **7.5**.

7.2.9.3. **Scope Determination.**

7.2.9.3.1. **Computing Dining Facility Requirements:** A deficiency in dining capacity exists whenever the total serving capacity required for the installation exceeds the sum of the rated serving capacity of all existing dining facilities. The rated serving capacity of existing facilities is determined as follows:

7.2.9.3.1.1. First determine the total area of the seating area; that is, the parts of the dining room reserved for tables and chairs, and divide by 1.4 m^2 (15 ft^2) per seat. This establishes the normal seat capacity.

7.2.9.3.1.2. To determine the existing serving capacity, multiply the number of seats by the turnover rate of three customers per seat in a set meal period.

7.2.9.3.1.3. This is the turnover for the meal period, regardless of the length of the period. (***EXAMPLE:*** Assume a seating area of 139 m^2 (1,500 ft^2) and divide that by 1.4 m^2 (15 ft^2), as explained above. The result is 100. Next, multiply this number by the turnover rate of 3. The rated capacity is determined to be 300 persons.)

7.2.9.3.1.4. To compute the total serving requirement, multiply the total E-1 to E-9 base population by the appropriate factor in **Table 7.3**. Officers, E-5s to E-9s, and civilians should not be included in the serving requirement when planning, except in overseas or remote locations where support is authorized.

7.2.9.3.2. The Air Force criteria are based on DoD space allowances. Assistance in developing dining facility designs based on Air Force criteria, including functional layouts of component areas, should be obtained from AFSVA.

7.2.9.3.3. Projects for a given serving capacity that exceed Air Force space allowances for the same capacity must be approved by AF/A7CH.

7.2.9.4. **Dimensions.** See **Table 7.3** and **7.4**.

Table 7.3. Serving Requirement Enlisted Personnel Dining Facilities[1].

Type of Mission and Operation	Percent Enlisted Personnel to be Served During Meal Period
Training	
Basic and Recruit Training	95
Mobilization and Annual Training	95
Advanced Individual Training	90
Service Schools, Recruit Reception Stations	85
Permanent Party	
Remote Locations	90
Air Installations, Support Units	70
Personnel Transfer and Overseas Processing Centers	50
Confinement2	110
NOTES:	

Type of Mission and Operation	Percent Enlisted Personnel to be Served During Meal Period
1. Serving Requirement. The maximum number of enlisted personnel to be served during a meal period should be determined by multiplying the normal unaccompanied Enlisted personnel housing capacity by the appropriate percentage(s) provided above. However, enlisted personnel on separate rations should not be included in the serving requirement when planning new dining facilities. Officers and civilians should not be included in the serving requirement when planning, retaining, or modernizing enlisted personnel dining facilities, except in overseas or remote locations where support is authorized. 2. The percentage of 110 should be applied against the maximum facility capacity for administrative, confinement, and security personnel, to determine the serving requirement.	

Table 7.4. Space Allowances for Enlisted Personnel Dining Facilities (Detached).

Serving Requirement - Number of Enlisted Personnel to be Served	Gross Area Not Including Mechanical1		Mechanical Room Gross Area2		Total Gross Area	
	m2	ft2	m2	ft2	m2	ft2
81 to 150	492	5,300	93	1,000	585	6,300
151 to 400	827	8,900	102	1,100	929	10,000
401 to 650	1,200	12,900	102	1,100	1,302	14,000
651 to 1,000	1,600	17,200	112	1,200	1,712	18,400
NOTES: 1. Building Gross Area except mechanical and vestibule entries. 2. Mechanical Room and vestibule entries gross area.						

7.2.10. **Officers Dining Facility-Detached. FAC: 7220**

CATCODE: 722356
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.10.1. **Description.** Do not initiate programs for the construction of new officer dining facilities or major modification of existing dining facilities for officers' use without advance approval by MAJCOM/A1S. The possibility of serving officers in existing airmen dining facilities, without detriment to the service for airmen, should be explored.

7.2.10.2. **Requirements Determination.** Space requirements are the same as for airmen dining facilities.

7.2.10.3. **Scope Determination.** See **paragraph 7.2.9.3**.

7.2.10.4. **Dimensions.** See **paragraph 7.2.9.3** and **Table 7.3**.

7.2.10.5. **Design Considerations.** See UFC 4-722-01 and the *USAF Dining Facilities Design Guide.*

7.2.10.5.1. **Dining Facility Storage Annex.** Some existing facilities, designed under earlier space criteria, do not contain as much storage space as current criteria would provide. Where this condition significantly impairs operational efficiency, a storage

annex may be provided, preferably adjacent to the dining facility. Annex space uses either **CATCODE 722351** or **722356**, as appropriate, with two units of measure, square meters (ft^2) and persons (in this case, one person). Include the latter unit to ensure the facility's acceptance in the computer system. The space provided in existing dining facilities and their existing or proposed storage annexes may not exceed the dining facilities serving capacity provided under **paragraph 7.2.8**, and **7.2.9**. Submit all proposed acquisitions of space or facilities to serve as storage annexes to AFSVA for review. The preceding instructions do not apply to annexes to Dependent Boarding School Dining Facility (**CATCODE 730781**), which are reported under **CATCODE 730783**.

Table 7.5. Space Allowances for Generic Flight Line Dining Facility.

Serving Requirement - Number of Enlisted Personnel to be Served	Gross Area Not Including Mechanical1		Mechanical Room Gross Area2		Total Gross Area	
	m2	ft2	m2	ft2	m2	ft2
80 to 1513	716	7,700	93	1,000	809	8,700
151 to 250	See Note 4					

NOTES:
1. Building gross area except mechanical and vestibule entries.
2. Mechanical Room and vestibule entries gross area.
3. Consists of a standard 80 to 151 person dining facility shown in Table 7.4, plus 223 m2 (2,400 ft2) for a carry out flight kitchen.
4. To achieve 151 to 250 person capacity, add more seating space to the 80-151 person dining facility generic kitchen.

7.2.11. **Central Preparation Kitchen. FAC: 7233**

CATCODE: 723385
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.11.1. **Description.** This facility is a production operated kitchen in which food is prepared, either partially or completely, for use in nearby appropriated fund dining facilities or in which foil pack meals are produced for missile site-feeding.

7.2.11.2. **Requirements Determination.** Evaluation of need is reviewed by the MAJCOM/A1S involved and AFSVA. Base the sizing of the various elements that compose a central preparation kitchen on a study performed at the location being considered.

7.2.11.3. **Scope Determination.** The facility can be established where it can service three or more dining facilities which serve a combined total of at least 1,500 average weighted rations per day or where it supports a frozen foil pack requirement of at least 500 foils per day.

7.2.11.4. **Dimensions.** See **paragraph 7.2.11.3**.

7.2.11.5. **Design Considerations.** See **paragraph 7.2.11.3**.

7.2.12. **Flight Kitchen. FAC: 7233**

CATCODE: 723388
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.12.1. **Description.** The Flight Kitchen is used to prepare meals to be served aboard aircraft and meals for ground support personnel unable to consume their meal in a dining facility. It contains space to store, prepare, and cook food and to assemble and issue the prepared meals. A location convenient to the flight line is desirable.

7.2.12.2. **Requirements Determination.** Forward requests for Air Force approval through AFSVA for technical review.

7.2.12.3. **Scope Determination.** Space allowances are given in **Table 7.6**. These allowances vary at individual bases with the type of meal (i.e., sandwiches or foil pack meals) most in demand. The space allowances cited will not be exceeded except with the approval of AF/A7CA.

7.2.12.4. **Dimensions.** See **Table 7.6**.

7.2.12.5. **Design Considerations.** See section 3D.12 in the *USAF Dining Facilities Design Guide.* Assistance in functional layout is available upon request from AFSVA.

Table 7.6. Space Allowances for Flight Kitchens.

Total Flight Meals per Month	Gross Area	
	m2	ft2
0 - 750	Prorate at 0.05 m2 / meal	Prorate at 0.5 ft2 / meal
751 - 1,500	95	1,025
1,500 - 2,500	116	1,250
2,501 - 3,000	139	1,500
3,001 - 4,000	186	2,000
4,001 - over	Prorate at 0.05 m2 / meal	Prorate at 0.5 ft2 / meal

7.2.13. **Officers Quarters (OQ). FAC: 7240**

CATCODE: 724415
OPR: AF/A7CH
OCR: MAJCOM/A1/A7

7.2.13.1. **Description.** These facilities provide lodging for officers and comparable grade civilian employees for short durations of occupancy using assignment policies contained in AFI 34-246.

7.2.13.2. **Requirements Determination.** Consult the *Air Force Unaccompanied Housing Design Guide* for information and guidance. MAJCOM/A7 reviews permanent party quarters actions, and MAJCOM/A1 reviews visiting OQ actions.

7.2.13.3. **Scope Determination.** Space allowances and accommodations for the construction of new OQs and the major alteration of existing facilities are given in **Table 7.1**.

7.2.13.4. **Dimensions.** See **Table 7.1**.

7.2.13.5. **Design Considerations.** Ensure the design includes requirements, scope, and costs identified in the Air Force DMP criteria defined in the *Air Force Unaccompanied Housing Design Guide* and base or MAJCOM standards.

7.2.14. **Visiting Officers Quarters. FAC: 7241**

CATCODE: 724417
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.2.14.1. **Description.** These facilities provide lodging for officers and comparable grade civilian employees for short durations of occupancy using assignment policies contained in AFI 34-246.

7.2.14.2. **Requirements Determination.** See Dormitory Visiting Airmen Quarters (**CATCODE721315**).

7.2.14.3. **Scope Determination.** See **CATCODE 721315**.

7.2.14.4. **Dimensions.** See **Table 7.2**.

7.2.14.5. **Design Considerations.** See **CATCODE 721315**.

7.2.15. **Cadet Quarters. FAC: 7240**

CATCODE: 724433
OPR: AF/A7CH
OCR: AETC/A1/A7

7.2.15.1. **Description.** Cadet quarters house USAF Academy cadets, Officer Training School (OTS) cadets (OTS, Maxwell AFB), and Reserve Officer Training Corps (ROTC) cadets.

7.2.15.2. **Requirements Determination.** ROTC housing requirements (number of cadets) are established by AF/A1D based on requests submitted by AETC.

7.2.15.3. **Scope Determination.** Space criteria for USAF cadet quarters are provided in special instructions.

7.2.15.4. **Dimensions.** The space allowances for OTS and ROTC cadet quarters are the same as that indicated in **Table 7.1** for enlisted grades E-2, E-3, and E-4 (fewer than 3 YOS), except that the accommodations for ROTC cadets may consist of rooms or open bays.

7.2.15.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3. Category Group 73, Personnel Support and Services Facilities.

7.3.1. **Fire Station. FAC: 7311**

CATCODE: 730142
OPR: AFCESA/CEXF
OCR: AFCESA/CEO

7.3.1.1. **Description.** This facility houses the fire protection apparatus, equipment, operating supplies/agents, and administrative/maintenance/operations personnel of the base fire department.

7.3.1.2. **Requirements Determination.** The basic fire station consists of an apparatus room, general purpose/dayrooms, training classroom, kitchen/dining area, sleeping quarters, physical conditioning room, personnel locker room/space, equipment maintenance area (including breathing apparatus servicing), fire fighting agents and operating supply storage, and station office. Consult the *Air Force Fire Station Design Guide* and UFC 4-730-10, *Fire Stations,* for additional information and guidance. For administrative space follow the allowances in **Chapter 6** of this Manual. These standards override any administrative space allowance shown in the UFC.

7.3.1.3. **Scope Requirements.** The space criteria presented below provides an example of a large and small fire station. These examples represent typical local operations space requirements. Each base (MAJCOM) should develop its own space criteria and design solution appropriate to local functions, operating patterns, size requirements, site constraints, and desired architectural character. Reference the *Air Force Fire Station Design Guide*.

7.3.1.4. **Dimensions.** See UFC 4-730-10.

7.3.1.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3.2. **Education Center. FAC: 7351**

CATCODE: 730441
OPR: AF/A1PT
OCR: MAJCOM/A1/A7

7.3.2.1. **Description.** Education Service Centers (ESC) provide facilities for the academic and professional development of officers, airmen, and DoD civilian employees in support of Air Force and national goals.

7.3.2.2. **Requirements Determination**. Minimum allowance determinations should include, but not be limited to, the following considerations: installation military and civilian population, staff, number and size of on-base institutions, average annual enrollments, program variety, and overall use of ESCs. Allowance determinations should, in any event, ensure execution of quality programs.

7.3.2.3. **Scope Determination.**

7.3.2.3.1. ESCs should make use of joint-use facilities, of existing classrooms, or other suitable facilities on an installation, to the maximum extent practicable. Joint use of classrooms or other suitable facilities may be necessary to support the on-base education programs when space in the ESC is insufficient to satisfy recognized needs.

7.3.2.3.2. All newly constructed Education Centers should provide office space for personnel managing base-level functions of the Education and Training Flight – education, Professional Military Education (PME), On-the-Job Training (OJT), base training, classification and training, formal training, civilian training, academic and military testing, labs for science and computers, distance learning delivery, and base library. Also include classrooms for these activities.

7.3.2.3.3. Space allowances for overseas bases should be adjusted to reflect Status of Forces Agreements (SOFA) and the logistics requirements of education contracts.

7.3.2.3.4. Additional space requirements must be submitted from MSSQ/CC/MSE and BCE through MAJCOM/A1/A7 to AF/A1PT/A7C. (T-1).

7.3.2.4. **Dimensions**. See **Chapter 6** for classroom size allowances.

7.3.2.5. **Design Considerations.** ESCs should be located in or very near major on-base enlisted housing areas. Provisions should be made to accommodate a Branch Library in accordance with the criteria for Base Library (**CATCODE 740675**) when justified by installation requirements, except when the library is included in same facility.

7.3.3. **Central Post Office. FAC: 7344**

CATCODE: 730443
OPR: SAF/CIO A6
OCR: N/A

7.3.3.1. **Description.** The Central Post Office requires space for a lobby, postal finance section, mail processing area, postal directory section, accountable mail area, registered mail section, postal administration, postal supply storage, and custodian of postal effects (COPE) areas. Make a separate space allocation for non-postal administrative functions and for storage of non-postal supplies and equipment.

7.3.3.2. **Requirements Determination.** Criteria, Applicability and Justification:

7.3.3.2.1. See DoDD 5101.11, *DoD Executive Agent for the Military Postal Service (MPS)*.

7.3.3.2.2. Space criteria shown in **Table 7.7** represent the basic central post office gross area and provide general guidance. Additional space may be provided if a central post office serves specialized functions, such as:

7.3.3.2.2.1. Major and subordinate headquarters, commands, personnel centers, training centers, military service schools, hospitals, supply depots, or other high volume mailers;

7.3.3.2.2.2. Activities generating a high volume of accountable mail that requires secure overnight storage;

7.3.3.2.2.3. Postal Directory;

7.3.3.2.2.4. Nonresident schools;

7.3.3.2.2.5. Carrier delivery to family housing units; and

7.3.3.2.2.6. Self Service Postal Units installed within the lobby of the facility.

7.3.3.2.3. **Special Features:**

7.3.3.2.3.1. Each postal facility requires sufficient docking space defined as a docking platform or ramp providing adequate area for the maneuvering of two trucks at one time for postal facilities with a direct support mission and three trucks at one time for postal facilities with a general support mission. However, when docking space is not available, make maximum utilization of conveyer

systems. Loading docks require sufficient overhang of room to permit loading and off loading of mail without its being exposed to inclement weather.

7.3.3.2.3.2. Each postal facility requires toilet facilities or access to toilet facilities in the same building for both sexes. Provide both hot and cold water.

7.3.3.2.3.3. Install Intrusion Alarm Devices (IAD) in postal facilities that are not operational on a 24-hour basis.

7.3.3.2.3.4. Postal facilities require adequate parking space for customer parking and unit mail clerks' vehicles. Limited parking space may create traffic problems and mail processing delays.

7.3.3.2.3.5. Equip postal facilities with open counters to afford a more pleasant and efficient working environment. Construct the postal finance service counters in modules that have adequate space for postal equipment, expendable postal supplies, and separate, lockable cash drawers for USPS stamp funds and money order funds.

7.3.3.2.4. Installation population is the unit of measure for CONUS/overseas direct support post offices. The number of personnel receiving general support is the unit of measure for overseas postal facilities with a general support mission (Air Mail Terminals, etc.).

7.3.3.3. **Scope Determination.**

7.3.3.3.1. Space allowances for central post offices are given in **Table 7.7**. Space for general support facilities is 1.9 m^2 (20 ft^2) net floor space for every 1,000 personnel receiving general support. Allocate the space as follows:

7.3.3.3.1.1. Mail Processing Section: 1.4 m^2 (15 ft^2) per 1,000 population: and

7.3.3.3.1.2. Registry Section: 0.5 m^2 (5 ft^2) per 1,000 population.

7.3.3.3.2. See **Table 7.7** for space criteria for Military Postal Finance Units or Sections.

7.3.3.3.3. Branch post offices, not exceeding 139 m^2 (1,500 ft^2) gross area, may be provided as required at large military installations to serve concentrations of personnel when service from the central post office is impractical.

7.3.3.4. **Dimensions.** See **Table 7.7** and **7.8**.

7.3.3.5. **Design Considerations.**

7.3.3.5.1. Allocate additional space for non-postal supplies and equipment. The space criteria for "postal supply" applies only to storage space for United States Postal Service (USPS) supplies, which include expendable and non-expendable items required to be on hand at military post offices (MPO) for their operation.

7.3.3.5.2. Make a separate space allocation for non-postal administrative functions. The space criteria for "postal administration" apply only to daily postal operations such as claims, complaints, and compiling reports.

7.3.3.5.3. Base the space criteria for a COPE section on the total population served by all postal facilities operated under the COPEs supervision. Deduct space allocation for a COPE section from the mail processing section of postal facilities serving a population of 2,500 or more.

7.3.3.5.4. Base postal Finance section or unit space allocations on the number of postal finance clerks required to meet the customer workload. Data included in space computations for a postal finance section or unit applies to (a) customer service lobby, (b) postal finance, (c) mail holding area, and (d) postal administration.

7.3.3.5.5. Postal Service Centers (PSC) may be combined with, or separate from, a central or branch post office. Base space criteria for PSCs on a combination of population served and the number of receptacles installed (**Table 7.7**). When the PSC is combined with a central or branch post office, add the additional authorized space to the gross area figures shown. At CONUS installations, the number of receptacles may not exceed the number of assigned PCS unmarried military, unaccompanied married military, and civilian personnel on TDY status, multiplied by a factor of 1.25. At overseas locations, use the number of assigned PCS military and civilian personnel multiplied by a factor of 1.25. The above factors compensate for the vacancy period required before reassigning a receptacle.

7.3.3.5.6. Enclose the registry section in a separate room or wire mesh cage to provide security against unauthorized entry.

7.3.3.5.7. **Waiver Process, Coordination and Sources of Information.** Determinations of specific total requirements and space provisions for specialized functions, as listed in **paragraph 7.3.3.2.** through **7.3.3.5.6** above, should be coordinated with the USPS Regional Postmaster General. Coordination should occur during the initial planning stage and annotated on the project DD Form 1391.

7.3.3.5.8. Air Force Courier Station.

7.3.3.5.8.1. The station supports operations of the Armed Forces Courier Service and is provided at locations designated by the service. Stations are generally located where large amounts of courier material and cryptographic supplies and equipment are received for movement to and from overseas, or where supplies and equipment are generated or stored. The facility contains an administrative area, a vault, and, where needed, a loading platform. Provide vault security features as required.

7.3.3.5.8.2. The station is preferably located in Air Freight Terminal (**CATCODE 141782**). This consolidates interfacing functions, facilitates material handling, and reduces security hazards.

7.3.3.5.8.3. Due to the limited number of stations required, a separate category code has not been established. Since the activity is associated with Air Force, the space is properly reported as Air Force Headquarters (**CATCODE 610282**). The vault is designated as administrative special purpose space.

Table 7.7. Space Allowances for Post Offices.

Installation Population1	Air Post OfficeCentral Post Office		Postal Service Center2 Per Receptacle Area			
	Gross Area3		CONUS4		Overseas5	
	m2	ft2	m2	ft2	m2	ft2
Up to 500	37	400	0.06	0.6	0.06	0.6
501 to 1,000	56	600	0.06	0.6	0.06	0.6
1,001 to 2,500	163	1,755	0.06	0.6	0.05	0.5
2,501 to 4,500	272	2,925	0.06	0.6	0.05	0.5
4,501 to 7,500	418	4,500	0.06	0.6	0.04	0.45
7,501 to 11,500	588	6,325	0.06	0.6	0.037	0.4
11,501 to 16,500	766	8,250	0.06	0.6	0.037	0.4
16,501 to 22,500	941	10,125	0.06	0.6	0.037	0.4
22,501 to 28,500	1,160	12,525	0.06	0.6	0.037	0.4
28,501 to 34,500	1,390	14,925	0.06	0.6	0.037	0.4
34,501 to 40,500	1,610	17,325	0.06	0.6	0.037	0.4
40,501 to 46,500	1,830	19,725	0.06	0.6	0.037	0.4
46,501 to 52,500	2,060	22,125	0.06	0.6	0.037	0.4
52,501 to 58,500	2,280	24,525	0.06	0.6	0.037	0.4

NOTES:
1. Installation population is defined as active duty military personnel assigned to the military installation in the CONUS and active duty military personnel, including dependents, and civilian employees served by the overseas post office providing direct support.
2. A PSC may be provided, when justified, for individual post office receptacle holders to pick up mail instead of bulk distribution to the various elements on a military installation.
3. Add mechanical equipment room space and loading platforms to the gross areas shown, as required, when determining a single gross area figure for each facility.
4. CONUS includes the 50 states and all other geographical areas in which the USPS operates.
5. Use 0.06 m2 (0.60 ft2) gross area per receptacle when the PSC is geographically separated from the central post office.

Table 7.8. Space Allowances for Military Postal Finance Sections/Units.

Space	Number of Postal Finance Clerks											
	1		2		3		4		5		6	
	Net Area											
	m2	ft2	m2	ft2	m2	ft2	m2	ft2	m2	ft2	m2	ft2
Lobby	7	80	23	250	32	350	47	500	60	650	65	700
Postal Finance	9	100	19	200	28	300	37	400	47	500	56	600
Mail Holding Area	7	70	9	100	14	150	14	150	14	150	19	200
Postal Admin Area	0	0	0	0	7	75	7	75	7	75	7	75
Total Area	23	250	51	550	81	875	105	1,125	128	1,375	147	1,575

7.3.4. **Laundry - Dry Cleaning, Base. FAC: 7342**

CATCODE: 730551
OPR: AF/A1S
OCR: AFSVA

7.3.4.1. **Description.** Laundry and dry cleaning facilities.

7.3.4.2. **Requirements Determination.** Air Force policy requires that necessary laundry and dry cleaning services be obtained from the most effective and economical source. Laundry and/or dry cleaning facilities will be equipped and operated only when a determination has been made by the Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installation and Environment (SAF/MI) that adequate commercial capabilities are not available at reasonable cost and within a reasonable distance, or that the services are not available from other DoD or government facilities. A reasonable distance is considered to be under 161 kilometers (100 miles), the maximum economical transportation distance to a servicing facility.

7.3.4.3. **Scope Determination.** Base the size of the requested plant facility on **Table 7.9** and the average military population served (including average military population(s) of other DoD installations/bases receiving services from the plant facility), dependents of military members, retired military members and their dependents, average transient population (annual total divided by 12), DoD civilians and their dependents in overseas areas, and all other categories of customer population approved/authorized by competent authorities to use the plant facility.

7.3.4.4. **Dimensions.** See **Table 7.9**.

7.3.4.5. **Design Considerations.** Some existing laundry and dry cleaning facilities, designed under earlier space criteria, may not contain employee locker rooms and break rooms or as much storage space, maintenance room, and cash customer retail store space. Where these conditions significantly impair operational and customer service efficiency, adequate annexes or facility expansions may be provided.

Table 7.9. Space Allowances – Laundry and Dry Cleaning Plants[1].

Persons Served2,3	Gross Area	
	m2	ft2
2,001 to 4,000	790	8,500
7,001 to 10,000	1,020	11,000
15,001 to 30,000	4,180	45,000

NOTES:
1. Includes a common core area (offices, employee restrooms, break room, locker rooms, supply rooms) but does not include base linen exchange facility, cash customer retail store, or boiler plant. Ensure the height of plant production areas, supply rooms, maintenance room, and boiler plant is a minimum of 8.5 m (28 ft) from floor to top of the peripheral exterior wall. Each restroom includes, as a minimum, one shower stall. Each facility requires a cash customer retail store, sized to include customer self-service turn-in and retrieval area and a counter area to service both walk-in and, possibly, drive-through customers. Supply room, linen exchange room, and maintenance room are double decked (containing a second floor for storage of parts and light bulk supplies). Include a storage room for explosive, hazardous and/or toxic chemicals designed IAW current Air Force criteria. Excluded areas (i.e., base linen exchange facility, customer retail store, boiler plant and mechanical room space) as required, should be added to the gross areas shown when determining a single gross area figure for each facility.
2. If total population served exceeds 30,000, increase plant size using a straight line projection based on actual personnel served.
3. For intermediate numbers, use the next smaller plant and two-shift operations.

7.3.5. **Clothing Store. FAC: 7343**

CATCODE: 730717
OPR: AAFES
OCR: N/A

7.3.5.1. **Description.** The retail outlet provides space for customers to select clothing and try it on to ensure proper fit and appearance. Stocks are maintained and retail outlets established at installations selected and approved by the Army and Air Force Exchange Service (AAFES) based on an evaluation of potential sales volume and distances to other clothing stores.

7.3.5.2. **Requirements Determination.** Space requirements, including retail sales and storage space, are given in **Table 7.10**. These criteria should only be used as a guide, and specific criteria should be obtained from AAFES/FS-S.

7.3.5.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.5.4. **Dimensions.** See **Table 7.10**.

7.3.5.5. **Design Considerations.** Military clothing stores are operated by AAFES and, at some installations, are integrated with Exchange Sales Store (**CATCODE 740388**). Contact AAFES, 3911 S. Walton Walker Blvd., Dallas, TX 75236-1598 for specific design criteria.

Table 7.10. Space Allowances for Clothing Stores.

Military Strength	Gross Area	
	m2	ft2
300 to 599	186	2,000
600 to 1,499	307	3,300
1,500 to 2,999	390	4,200
3,000 to 4,999	476	5,120
5,000 to 9,999	595	6,400
10,000 and up	622	6,700

7.3.6. **Base Chapel. FAC: 7361**

CATCODE: 730771
OPR: AF/HC
OCR: N/A

7.3.6.1. **Description.** These facilities provide spaces for community worship, individual meditation, religious education, pastoral counseling, spiritual support, interpersonal relationships, religious guidance, and related functions.

7.3.6.2. **Requirements Determination.** For additional guidance, refer to the *USAF Religious Facility Design Guide*.

7.3.6.2.1. The number of chapels at an installation, as well as the size of each chapel, is based upon the population of the installation. This population figure includes military strength assigned to or residing at the installation, as well as family members and civilian personnel dependent upon the installation for religious support. Attendance trends and projected changes in the installation population and mission are relevant in determining the number and size of the chapels at an installation.

7.3.6.2.2. Availability and location of government provided housing, traditional or anticipated, composition of the particular chapel communities, and the percentage of the installation's population residing in civilian communities (CONUS only), are variables to be considered in the chapel planning process.

7.3.6.2.3. In addition to space for worship, Chapels normally include provisions for individual and group counseling, clergy-congregation relationships, sacramental rites and ceremonies, religious observances, and other activities normally associated with the Chaplain Corps. Religious facilities should be constructed with all appropriate safety and accessibility features required of Air Force facilities.

7.3.6.3. **Scope Determination.** The *USAF Religious Facility Design Guide* provides guidelines to be used in conjunction with other command and installation requirements for determining spatial allowances for chapel facilities. Specific and unique chapel facility spatial requirements may be justified on the basis of local installation needs. See AFI 52-101 for additional guidance.

7.3.6.4. **Dimensions.** Most chapels are constructed with a seating capacity of approximately 300, and normally it is not recommended that a chapel exceed 400 seats. Requirements for larger or smaller chapels may be established by validated local needs. Installations with a population of 500 or less are not normally authorized a free-standing

chapel, although an area for worship, or the requirements of religious practices and needs, may be provided in a multipurpose facility with spaces for services, meditation, office(s), and storage.

7.3.6.5. **Design Considerations.**

7.3.6.5.1. Provide reasonable separation of meeting areas to enable simultaneous activities such as, the conduct of worship services while counseling, religious instruction, or meetings occur.

7.3.6.5.2. Office space must be arranged to facilitate counseling and protect the clergy-parishioner relationship. Privileged communication requires both visual and acoustical confidentiality (see AFI 52-101 and UCMJ Rules of Evidence, Rule 503).

7.3.6.5.3. Chapels should be designed and constructed by those with professional experience in providing aesthetics that are conducive to worship and meet the religious needs of multi-faith users.

7.3.7. **Religious Education Facilities. FAC: 7362**

CATCODE: 730772
OPR: AF/HC
OCR: N/A

7.3.7.1. **Description.** Religious education facilities used for religious education classes and related chapel activities of the various faith groups represented within the installation community.

7.3.7.2. **Requirements Determination.** Religious education facilities include classrooms for all age groups, infant through adult, and other identified needs. Normally a kitchen, administrative offices, reception areas, restrooms, storage spaces (for kitchen, administrative, custodial and religious education materials; tables and chairs; and multi-media and sound equipment), and maintenance rooms are in the facilities. Ensure facilities include features that support users who are physically challenged.

7.3.7.3. **Scope Determination.** The *USAF Religious Facility Design Guide* provides guidelines to be used in conjunction with other command and installation requirements for determining spatial allowances for religious education facilities. Specific and unique facility spatial requirements may be justified on the basis of local installation needs.

7.3.7.4. **Dimensions.** The total area of religious education facilities is calculated in addition to (independent of) other chapel facilities, and is based upon the total installation population (military and civilian personnel and their family members).

7.3.7.5. **Design Considerations.** See *USAF Religious Facility Design Guide*.

7.3.8. **Chapel Center. FAC: 7361**

CATCODE: 730773
OPR: AF/HC
OCR: N/A

7.3.8.1. **Description.** The chapel center is a chapel combined with a chapel activities facility to form a single comprehensive complex

7.3.8.2. **Requirements Determination.** Refer to **CATCODEs 730771** and **730772**.

7.3.8.3. **Scope Determination.** The *USAF Religious Facility Design Guide* provides guidelines to be used in conjunction with other command and installation requirements for determining spatial allowances for a chapel center. Specific and unique facility spatial requirements may be justified on the basis of local installation needs.

7.3.8.4. **Dimensions.** Refer to **CATCODEs 730771** and **730772**.

7.3.8.5. **Design Considerations.** Give careful attention to aesthetics and practicality in the process of joining these facilities into a single comprehensive complex.

7.3.9. **Hospital Chapel. FAC: 7361**

CATCODE: 730774
OPR: AF/HC
OCR: AFMSA/SG8F

7.3.9.1. **Description.** The hospital chapel is designed to provide chaplain service to patients, visitors, and hospital personnel.

7.3.9.2. **Requirements Determination.** Hospital chapel facilities are determined in accordance with medical space planning criteria. Medical support facilities are sized in accordance with DoD Medical Space Planning Criteria. An electronic copy of the DoD Medical Space Planning Criteria for hospital chapels can be viewed at **http://www.tricare.mil/ocfo/ppmd/criteria.cfm**. Health Facilities Division Planning, Design, Construction (PDC) Branch, AFMSA/SG8F, develops space requirements for all medical facility projects; OASD(HA)/PPMD approves medical facility project scope for medical MILCON and BRAC projects. Contact the appropriate PDC Branch portfolio manager for assistance with medical support facility space planning requirements.

7.3.9.3. **Scope Determination.** See *USAF Religious Facility Design Guide*, AFI 52-101, UFC 4-510-01, and the DoD Medical Space Planning Criteria for additional guidance.

7.3.9.4. **Dimensions.** See **paragraph 7.3.9.3**.

7.3.9.5. **Design Considerations.** Hospital chapel facilities are not counted against the spatial requirements of other installation chapel facilities.

7.3.10. **Rectory. FAC: 7110**

CATCODE: 730775
OPR: AF/HC
OCR: AF/A7CH

7.3.10.1. **Description.** This requirement necessitates space within the chaplain's assigned quarters to provide individual and group pastoral counseling, religious instruction, and hosting small chaplain service gatherings.

7.3.10.2. **Requirements Determination.** In specialized settings a chaplain is needed to provide essential chaplain service with 24-hour accessibility. Contact OPR for latest requirements and guidance.

7.3.10.3. **Scope Determination.** Include space for a residence with appropriate living space for a chaplain and, when applicable, the chaplain's family; an additional area for

religious instruction and counseling; a large gathering room; and an office. See *USAF Religious Facility Design Guide*, AFI 52-101, and UFC 4-510-01 for additional guidance.

7.3.10.4. **Dimensions.** See **paragraph 7.3.10.3**.

7.3.10.5. **Design Considerations.** Based on established cadet needs, rectories are authorized at the USAF Academy.

7.3.11. **Dependent Boarding School Dining Hall. FAC: 7353**

CATCODE: 730781
OPR: DODEA
OCR: AF/A1S/1PT

7.3.11.1. **Description.** Student dining halls are necessary to support authorized overseas dependent boarding schools. Student dining hall requirements are predicated upon 100 percent of the available student dormitory spaces.

7.3.11.2. **Requirements Determination.** The construction of elementary and secondary schools, including required student dormitories and dining halls at Air Force installations in overseas areas are programmed by the DoD Dependent Schools Office.

7.3.11.3. **Scope Determination.** Dining hall support consists of outbuildings used for storage purposes. Space criteria for dining halls given under **CATCODE 722351** include all operating and storage space requirements. Total space in a dependent boarding school dining hall, **CATCODE 730781**, and its detached storage facility may not exceed that permitted by **Table 7.2**.

7.3.11.4. **Dimensions.** Space allowances for student dining halls are provided under guidelines for Airmen Dining Hall (**CATCODE 722351**).

7.3.11.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3.12. **Dependent Boarding School Dormitory. FAC: 7353**

CATCODE: 730782
OPR: DODEA
OCR: AF/A7CH, AF/A1PT

7.3.12.1. **Description.** Student dormitories are necessary to support authorized overseas dependent boarding schools.

7.3.12.2. **Requirements Determination.** Requirements for student dormitory spaces vary with the capacity of the existing high school, the local projected school enrollment, and the projected enrollment of the geographical area served by the school. Base dormitory space requirements on 100 percent of the programmed boarding school enrollment as determined by the responsible Area School Superintendent.

7.3.12.3. **Scope Determination.** Dormitory support consists of the types of storage space described under item Housing Supply/Storage Facility (**CATCODE 442769**). Space allowances criteria given under **CATCODE 442769** also apply to dependent dormitory supply/storage requirements.

7.3.12.4. **Dimensions.** Compute the gross dormitory floor area provided per student in accordance with guidance governing Airmen Dormitory (**CATCODE 721312**).

7.3.12.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3.13. **Dependent School Detached Support. FAC: 7353**

CATCODE: 730783
OPR: DODEA
OCR: AF/A1PT

7.3.13.1. **Description.** This code applies to direct classroom school support space. Direct classroom support includes space in buildings detached from the main school building which house support functions such as administrative offices, gymnasium, storage, and auditorium.

7.3.13.2. **Requirements Determination.** No information is available at time of publication. Contact OPR for latest requirements and guidance.

7.3.13.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.13.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.13.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3.14. **Dependent Elementary School. FAC: 7352**

CATCODE: 730784
OPR: DODEA
OCR: AF/A1PT

7.3.14.1. **Description.** The dependent elementary school accommodates children in the primary and elementary grades, usually 1-6 or 1-8, depending on the school's academic organization and/or the size of the student body.

7.3.14.2. **Requirements Determination.** Space used for dependent kindergarten school, **CATCODE 730788**, may also be added to and included within this category when kindergarten is an integral part of the elementary school facility and is not separately identifiable.

7.3.14.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.14.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.14.5. **Design Considerations.** Ensure designs recognize the need for flexibility so that facilities can be adapted to a changing educational program with minimum requirement for additional capital investment. Where feasible within the educational program, general purpose classrooms should be configured in a manner that enable implementation of multiple level, cooperative, individualized, and team teaching by utilizing acoustically appropriate movable walls in lieu of fixed partitions. Where such schemes are used, ensure to provide appropriate means of personnel circulation between spaces when movable walls and partitions are in the closed position.

7.3.15. **Dependent High School. FAC: 7352**

CATCODE: 730785
OPR: DODEA
OCR: AF/A1PT

7.3.15.1. **Description.** The dependent high school accommodates children in the upper or secondary grades, usually grades 9-12 or 10-12, depending on the school's academic organization and/or the size of the student body.

7.3.15.2. **Requirements Determination.** No information is available at time of publication. Contact OPR for latest requirements and guidance.

7.3.15.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.15.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.15.5. **Design Considerations.** See **paragraph 7.3.14.5**.

7.3.16. **School, Dependent Intermediate. FAC: 7352**

CATCODE: 730786
OPR: DODEA
OCR: AF/A1PT

7.3.16.1. **Description.** The dependent intermediate school accommodates children in the middle grades which may encompass any combination of grades between 5 and 9.

7.3.16.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.3.16.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.16.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.16.5. **Design Considerations.** See **paragraph 7.3.16.5**.

7.3.17. **School, Dependent Kindergarten. FAC: 7352**

CATCODE: 730788
OPR: DODEA
OCR: AF/A1PT

7.3.17.1. **Description.** The dependent kindergarten school provides for the education of children the year before they enter the first grade.

7.3.17.2. **Requirements Determination.** This category code is used when the kindergarten facility is separate from, and easily identifiable from, the elementary school facility. Where the kindergarten is an integral part of the elementary school facility, include the space thus used under Dependent Elementary School (**CATCODE 730784**).

7.3.17.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.17.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.17.5. **Design Considerations.** See **paragraph 7.3.14.5**.

7.3.18. **Installation Corrections Facility. FAC: 7312**

CATCODE: 730831
OPR: AFSFC/SFO
OCR: N/A

7.3.18.1. **Description.** This facility provides space for administration and custodial supervision of pre-trial detainees and post-trial inmates, normally 180 days or less, including those inmates pending a transfer to other corrections facilities.

7.3.18.2. **Requirements Determination.** Refer to AFI 31-205, *The Air Force Corrections System*, and the *American Correctional Association Planning and Design Guide for Secure Adult and Juvenile Facilities* for specific requirement criteria.

7.3.18.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.18.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.3.18.5. **Design Considerations.** Since this facility houses inmates, it must include means to make the facility secure from escape. Note, the National Fire Protection Association Life Safety Code (i.e., NFPA 101) applies.

7.3.19. **Security Police Control and Identification (Visitor Control Center). FAC: 7313**

CATCODE: 730832
OPR: AFSFC/SFO
OCR: N/A

7.3.19.1. **Description.** This facility is adjacent to the main entrance of all Air Force installations. Installations with more than one major entrance may require additional buildings; especially consider vendor, visitor, and contractor access. The facility is used as a focal point for processing visitors into the installation. Visitor requests for entry are validated and visitors issued temporary entry credentials.

7.3.19.2. **Requirements Determination.** The building consists of a waiting area/lobby adjacent to a service counter, administrative support space, and storage area. The facility includes climate control, drinking water, telecommunications, and public restrooms as well as an adjacent vehicle parking area which doesn't allow direct access onto installation.

7.3.19.3. **Scope Determination.** The size of the facility varies with the base population, mission, average daily visitor processing, and functions of the visitor center. At a minimum, two personal work-spaces should be available at the reception desk to process/produce visitors' passes. Equipment for the production of a visitor's pass includes a stand-alone computer, digital camera, visitor's pass printing machine, and paper printer.

7.3.19.4. **Dimensions.** A 167 m^2 (1,800 ft^2) facility should be sufficient for an average installation which has only one visitor center for the processing of visitors only.

7.3.19.5. **Design Considerations.** Facilities providing a 24-hour reception point require more space than a facility providing only visitor processing.

7.3.20. **Security Forces Operations. FAC: 7313**

CATCODE: 730835
OPR: AFSFC/SFO
OCR: N/A

7.3.20.1. **Description.** This facility is the command center for the direction of security, law enforcement, police services, investigation, training, information and personnel security, resource protection, and confinement operations. It should serve as a primary armory and may serve as the site for unit supply if adequate space is available. The facility includes Base Defense Operations Centers (BDOC), control centers such as Central Security Control (CSC), and the Law Enforcement Desk (LED).

7.3.20.2. **Requirements Determination.**

7.3.20.2.1. The BDOC may include or be collocated with, adjacent to, or separate from the CSC and LED, depending on mission requirements. The BDOC may also include the Emergency Communications Center (ECC) with appropriate Fire Dispatch capability. The BDOC should be semi-hardened. The CSC, LED and battle staff room should also be semi-hardened.

7.3.20.2.2. The CSC should be large enough to house communications equipment, base and area maps, sensor system annunciation and display equipment, auxiliary power equipment, workstations for two security controllers and a supervisory element, adequate free floor space for electronic equipment, heating and air conditioning, noise attenuation features, restrooms, and support for flight operations.

7.3.20.2.3. A guard mount room is necessary for briefing, inspecting, and dispatching personnel. Ensure the room is large enough to accommodate the maximum number of personnel present for duty.

7.3.20.2.4. Provide sufficient space for the storage of military and personally owned firearms, as well as munitions and explosives. Ensure free floor space for access to weapons racks. The armory should include windows for the issue of equipment and office space. Ensure the armory meets security requirements of AFI 31-101, DoD 5100.76-M, and MIL HDBK 1013/1A. For more guidance contact AFSFC/SFO.

7.3.20.2.5. Ensure a weapons cleaning room located adjacent to the armory includes tables for cleaning weapons and a clearing barrel. An outside area protected from inclement weather may also be required for clearing barrels.

7.3.20.2.6. Include an issue/turn-in room large enough to accommodate the largest flight assigned to the unit, along with a space for clearing barrels, adjacent to the armory.

7.3.20.2.7. The investigations section includes office space, one secure room for the storage of evidence and found property, a waiting room, and interview/interrogation rooms with two-way mirrors and a sink with countertop and running water for drug testing.

7.3.20.2.8. The training section includes office space for the training staff and the OJT monitor, storage space for training aids, a learning resource center, and a lecture classroom. Ensure the classroom is large enough to accommodate the largest flight assigned to the unit and the classroom should, ideally, include room partitions to allow for smaller classrooms. Base space requirements for the classroom on **Chapter 6** of this Manual.

7.3.20.2.9. The quality control section includes office space and a separate testing room for staff.

7.3.20.2.10. The scheduling section requires office space for one or two assigned personnel. Refer to **Chapter 6** of this Manual for approved office types and sizes.

7.3.20.2.11. The pass and registration section includes office space, a waiting area, a customer service area, and facilities for photographing personnel. Whenever possible this function should be located in the Military Personnel Flight.

7.3.20.2.12. The Security Forces administration branch includes office space for assigned personnel and a waiting area. Refer to **Chapter 6** on approved special purpose space and office types and sizes.

7.3.20.2.13. The LED area, if separate from the BDOC, should accommodate three individuals, base and area maps, a communications console, alarm annunciation equipment, a communications recording device, two computer terminals, and temporary evidence storage. The LED includes an access control system and a bullet-resistant customer service window. Two detention cells should be located adjacent the LED for the temporary detention of apprehended individuals waiting to be processed. Install an observation window to give the desk sergeant an unobstructed view of the detention cells. Cells should be a minimum of 4.5 m^2 (48 ft^2) each, and toilet facilities are not required. In lieu of two-way mirrors, incorporate CCTV monitoring of interview/interrogation rooms, with DVD-R capability for recording.

7.3.20.2.14. Include an alarm room in facilities which employ the use of a centralized alarm monitoring function separate from the control centers. In some situations, collocation may be necessary.

7.3.20.2.15. Interview/interrogation rooms, utilized by law enforcement patrols, are located adjacent to the LED. The rooms include space for a table and two or three chairs, and a two-way mirror.

7.3.20.2.16. Include a supply section for storage, issue, and turn-in of Security Forces equipment and daily office supplies. The section includes a service counter and storage racks and bins. Additional storage for mobility equipment, individual bags, and unit equipment is included in the supply section. A loading dock and warehouse doors are necessary to accommodate the movement and storage of equipment pallets.

7.3.20.2.17. When an installation commander determines a need exists to establish a corrections facility, the facility includes at least two cells, each with toilets and wash basin, shower facility, dormitory-style sleeping space for at least four post-trial inmates, dayroom/recreation space, and an armory. Specific design and space criteria are in AFI 31-101.

7.3.20.2.18. Missile operations require the following additional facilities:

7.3.20.2.18.1. Missile Security Control (MSC) operates as the command center for security operations in the missile wing complex. The MSC has space for maps of the entire missile complex, missile site security status boards, two communications consoles, two security controllers, and an office for supervision. Refer to **Chapter 6** on approved office types and sizes.

7.3.20.2.18.2. A keys and code control center operates as the central repository for keys and codes used in the missile field. The office is divided into two separate areas and includes safes, shredders, and a controller. Include office space for a supervisor. Refer to **Chapter 6** of this Manual for approved office types and sizes.

7.3.20.2.18.3. A vehicle operations center is necessary with facilities to provide a secure area for parking campers and convoy vehicles. The center includes a vehicle washing facility consisting of an open garage with water hoses.

7.3.20.2.18.4. Additional office space for the scheduling and dispatching of camper teams, on-duty element leader and supervisors, missile training, quality control, armory operations, operations, convoy commanders, briefing room, secure storage for convoy equipment, and administrative functions may be provided by expanding the basic facility. Refer to **Chapter 6** for approved office types and sizes.

7.3.20.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.3.20.4. **Dimensions.** See **paragraph 7.3.20.2**.

7.3.20.5. **Design Considerations.**

7.3.20.5.1. A secure room with automatic start generators is necessary to provide emergency power to the base defense control centers, which includes BDOC, CSC, LED, and other key sections. Include a UPS to maintain uninterrupted power during a commercial power outage.

7.3.20.5.2. An indoor maintenance stall for performing first echelon maintenance on Security Forces vehicles includes a workbench, tools and equipment storage, and exhaust vents.

7.3.20.5.3. Provide enough parking for patrol/security vehicles, visitors, and assigned personnel.

7.3.21. **Reserve Fire Team Facility. FAC: 1446**

CATCODE: 730836
OPR: AFSFC/SFO
OCR: N/A

7.3.21.1. **Description.** This facility accommodates one or two four-man security teams at all nuclear weapons sites. This facility may also serve as an alternate CSC housing communications and alarm annunciation equipment.

7.3.21.2. **Requirements Determination.** Contact OPR for latest requirements and guidance. The facility requires a day room for recreation and OJT, an efficiency kitchen, restroom facilities, storeroom, and a garage with a mechanically operated door.

7.3.21.3. **Scope Determination.** The building's walls, doors, windows, and roof are hardened to provide protection against small arms fire. Firing ports (required at points throughout the facility to provide a 360 degree field of fire), heating, and air conditioning are also provided.

7.3.21.4. **Dimensions.** The basic facility with a one-stall garage is 118 m^2 (1,275 ft^2). When a second support team is added, another garage stall is needed, increasing the size of the facility to 146 m^2 (1,575 ft^2). Ensure the garage accommodates second-generation armored response vehicles.

7.3.21.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.3.22. **Security Entry Control Building. FAC: 1498**

CATCODE: 730837
OPR: AFSFC/SFO
OCR: N/A

7.3.22.1. **Description.** The entry control facility (ECF) is designed to assist Security Forces in controlling entry to and from critical restricted areas.

7.3.22.2. **Requirements Determination.** An ECF is necessary at all nuclear weapon storage and alert aircraft areas and at other restricted areas as critical mission requirements dictate. Contact OPR for latest requirements and guidance.

7.3.22.3. **Scope Determination.** The ECF includes the entry control building and the personnel and vehicle entrapment areas which are connected to the security fence surrounding the area. The personnel entrapment areas include turnstiles at each end. The gate house is constructed to protect the occupants from small arms fire. Ensure bullet resistant windows provide unobstructed vision of the vehicle and personnel entrapment areas. The hardened walls include gunports which provide a 360 degree field of fire. Include a restroom within the facility along with a secure room for storing a limited amount of small arms and ammunition and an issue window in an exterior wall within the fenced area. The vehicle entrapment area serves both inbound and outbound traffic lanes. Gates have positive locking devices which are remotely controlled from inside the ECF. Lighting requirements are specified in AFI 31-101. Ensure the facility satisfies safety requirements in AFMAN 91-201.

7.3.22.4. **Dimensions.** The ECF facility accommodates at least two individuals, controls for mechanically operated gates, exchange badge racks, and controls for the pedestrian turnstiles. A minimum of 19 m^2 (200 ft^2) is needed, and additional area may be dictated by mission requirements. Ensure the vehicle entrapment area is large enough to accommodate the largest vehicle requiring access to the area. Limit the pedestrian entrapment area to allow access to only one individual at a time. Consider future integration of advanced entry control systems, including card readers, entry booths, and additional hardware when determining space requirements.

7.3.22.5. **Design Considerations.** Intrusion alarms may terminate at this facility at some locations. A limited amount of small arms and ammunition may be maintained at this facility for issue to security forces during emergency conditions.

7.3.23. **Master Surveillance and Control Facility (MSCF). FAC: 1498**

CATCODE: 730838
OPR: AFSFC/SFO
OCR: N/A

7.3.23.1. **Description.** This facility contains alarm annunciation equipment, video processing and display equipment, entry control system processing equipment, communications equipment, area and perimeter lighting controls, backup power equipment, operator workstations and consoles, and map displays.

7.3.23.2. **Requirements Determination.** An MSCF is necessary for each site supporting priority resources and utilizing electronic sensor equipment/systems. For security reasons, the MSCF is an underground facility. If an underground facility is not feasible, the facility may be constructed at ground level in compliance with the requirements in AFI 31-101. Contact OPR for latest requirements and guidance.

7.3.23.3. **Scope Determination.** For ground level MSCFs, the building walls, doors, windows, and roof are hardened to provide protection against small arms fire. Include firing ports (required at points throughout the facility to provide 360 degree fields of fire), heating, air conditioning, and a restroom.

7.3.23.4. **Dimensions.** Provide adequate space for two personnel, required equipment, and to allow for servicing of equipment when necessary. Whenever feasible, free floor space should be provided around each console and equipment rack.

7.3.23.5. **Design Considerations.** Maintain environmental conditions between 18.3°C and 26.7°C (65°F and 80°F) and between 40 and 60 percent relative humidity. It should be adequately sound proofed to attenuate noise from printers, equipment fans, and other noise generating equipment.

7.3.24. **Traffic Check House. FAC: 1498**

CATCODE: 730839
OPR: AFSFC/SFO
OCR: N/A

7.3.24.1. **Description.** This facility controls entry to all entrances to Air Force installations, restricted areas, and selected controlled areas.

7.3.24.2. **Requirements Determination.** Include traffic check houses at installation entry points. Facility requirements include positioning buildings between the entrance and exit lanes of traffic. Contact OPR for latest requirements and guidance.

7.3.24.3. **Scope Determination.** The facility position should provide for 360 degree visibility, and should never have less than 180 degrees. Facilities should protect assigned personnel from small arms fire and fragmentation of explosive devises. Provide protection by constructing the building with slurry infiltrator concrete or an equivalent strength material for permanently sited facilities.

7.3.24.4. **Dimensions.** Traffic check houses at installation entry points should be 19 m^2 (200 ft^2) at a minimum for the main gate and 9 m^2 (100 ft^2) at a minimum at other secondary entrances. Space requirements vary according to the security requirements of the area and the installation, the volume of traffic, number of inbound lanes, and other factors. For controlled area entry points, 3.4 m^2 (36 ft^2) is adequate. When these facilities include a restroom and alarm terminals, 11 m^2 (122 ft^2) is necessary. Portable buildings should have interior walls lined up to a height of 1.2 m (4 ft) with a ballistic protection material such as Kevlar. Use concrete islands extending 1.5 m (5 ft) from the exterior

wall of the facility along with protective barriers to protect entry controllers from vehicles that may leave designated lanes of traffic near the facility. A 1.2 m (4 ft) ceiling overhang and tinted windows are necessary.

7.3.24.5. **Design Considerations.** Intrusion alarms may terminate at the facility and assigned personnel may monitor the alarmed activities and control entry.

7.3.25. **Security Forces Military Working Dog Kennel. FAC: 1445**

CATCODE: 730841
OPR: AFSFC/SFO
OCR: N/A

7.3.25.1. **Description.** This facility is a roofed structure containing a series of individual indoor and outdoor kennels with solid dividers between them and support space consisting of rooms for food preparation, dog treatment, tack storage, and office space.

7.3.25.2. **Requirements Determination.** The facility is necessary to house and care for military working dogs.

7.3.25.3. **Scope Determination.** See the *Design Guide for Military Working Dog Facilities*, for further guidance. This guide can be obtained by contacting AFSFC/SFOD, DoD Canine Program Management Office, Lackland AFB, TX.

7.3.25.4. **Dimensions.** Space factors are provided in **Table 7.11**. Include a training area of approximately 46 m x 46 m (150 ft x 150 ft). The training area is surrounded by a fence and contains an obedience course as outlined in AFI 31-202, *Military Working Dog Program.*

7.3.25.5. **Design Considerations.** Design details vary with climate. Kennel facilities require adequate ventilation, cooling, heating, and minimal noise levels. The facility should be located in an area that is conducive to rest for the dogs and yet accessible to existing utilities. Do not locate kennels near runways, taxiways, engine test cells, small arms ranges, or other areas where the time weighted overall average sound pressure level for any 24 hour period exceeds 75 adjusted decibels.

7.3.26. **Security Forces Military Working Dog Kennel Support Facility. FAC: 1445**

CATCODE: 730842
OPR: AFSFC/SFO
OCR: N/A

7.3.26.1. **Description.** This category code identifies separate buildings that contain all or part of the required support space not provided in Security Police Kennel, Canine (**CATCODE 730841**). **CATCODE 730842** is used to identify existing facilities or to program new facilities that cannot be readily added to existing and otherwise adequate kennels.

7.3.26.2. **Requirements Determination.** See **CATCODE 730841** and the design guide noted in **paragraph 7.3.25.3** above.

7.3.26.3. **Scope Determination.** The total support space provided in kennels (**CATCODE 730841**) and support facilities (**CATCODE 730842**) combined should not exceed the net amounts indicated in **Table 7.11** above the proportional amounts for

kennels numbering between 8 and 32. The number of kennels can be varied to meet base requirements.

7.3.26.4. **Dimensions.** See **paragraph 7.3.26.3**.

7.3.26.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.11. Space Requirements for Security Forces Military Working Dog Facility.

Number of Kennels	Gross Area		Approximate Net Area Support Space	
	m2	ft2	m2	ft2
1 to 4	100	1,080	93	1,000
5 to 8	156	1,680	93	1,000
32	369	3,976	251	2,700

7.4. Category Group 74, Indoor Services Facilities.

7.4.1. Overview.

7.4.1.1. **Use of Criteria.** The criteria given in this chapter are established by the Air Force and have evolved from DoD criteria. They apply to appropriated and nonappropriated fund (NAF) projects. Additional guidance concerning NAF project requirements can be found in **paragraph 7.4.1.9** and **7.4.1.10**. Projects may involve the construction of new facilities or the conversion or enlargement of existing facilities of permanent, semi-permanent, or temporary construction. Improvement and enlargement of existing facilities solely to attain these standards is not authorized.

7.4.1.2. **Change in Use.** When an existing building is changed to a recreational facility, the authorized space allowance stated in this chapter may be increased by not more than 20 percent, when necessary, to effect economical and efficient use of the existing building.

7.4.1.3. **Space Allowances.** Space allowances given in this chapter do not include the required mechanical equipment space.

7.4.1.4. **Community Center Enclosed Malls and Covered Walkways.** When elements of a community shopping center, such as the exchange main retail store, exchange service outlets, commissary, credit union and bank, are combined in a common structure and connected by a covered mall, do not deduct space occupied by the mall or space occupied by public toilets and janitor closets located off the malls from space allowances for the respective elements. Likewise, where such elements are in close proximity to each other and are connected by a covered walkway, space occupied by the covered walkway will not be deducted from space allowances for the respective elements. These described spaces are instead identified under Enclosed Mall (**CATCODE 740111**) and Covered Walkway (**CATCODE 852287**).

7.4.1.5. **Justifying Requirements.** Carefully determine the requirements for exchange, welfare, or recreational facilities, giving consideration to pertinent factors such as tenure of the installation, number of assigned military to be served, capabilities of existing facilities at nearby installations or in local communities, climatic conditions affecting the use of the proposed facilities, and the impact on morale.

7.4.1.6. **Population Basis.** The population basis for determining facility and space requirements is expressed variously in this chapter according to individual facilities. The population basis "military strength" is specified in the overview in **Chapter 1** of this Manual. Other terms, such as "total customer base", are as defined in the text or table related to the individual facility. In applying the foregoing terms to overseas installations (excluding those in Hawaii), civilian employees (United States and other than host country nationals) are counted as military members in the term "military strength", and the dependents of such employees are counted as military dependents in applicable criteria. A PVA should ultimately be the determining factor for programming facility and space requirements.

7.4.1.7. **Multi-Service Use.** Consider use by multi-military services in the local area instead of only considering military personnel assigned to the installation.

7.4.1.8. **Use Restrictions.** No welfare or recreational project is approved when it creates future requirements for military construction or real estate, either by diverting inventories or facilities intended for operational purposes, or by occupying sites in conflict with higher priority use under the installation master plan.

7.4.1.9. **Waivers and Exceptions.** The criteria established in this chapter are considered ample, under normal circumstances, to provide adequate facilities. Where there is an evident need for greater allowances or for facilities not listed in this chapter, SAF/IEI must approve waivers or exceptions to the criteria. Procedures to be followed on NAF projects appear in AFI-32-1022, *Planning and Programming Nonapproprated Fund Facility Construction Projects*.

7.4.1.10. **NAF Project Requirements.** The guidelines provided in this Manual are for preliminary programming purposes only. Actual scopes for NAF Services projects are determined through approved PVAs. This study establishes the project cost and scope based upon market demand and financial viability.

7.4.2. **Branch Bank. FAC: 7347**

CATCODE: 740153
OPR: SAF/FMPB
OCR: N/A

7.4.2.1. **Description.** Banking facility.

7.4.2.2. **Requirements Determination.** Banking facilities are established under DoD FMR, Volume 5, Chapter 34. Normally, only one bank is permitted on an Air Force base except where more than one bank existed prior to May 1, 2000, or where a waiver has been granted IAW DoDI 1000.11.

7.4.2.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.4.2.4. **Dimensions.** Space requirements for individual banks are determined by the total customer base the bank serves (see Note 1, **Table 7.12**).

7.4.2.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.12. Space Allowances for Banks.

Total Customer Base1	Gross Area	
	m2	ft2
Up to 1,000	139	1,500
1,001 to 2,000	221	2,375
2,001 to 3,000	302	3,250
3,001 to 4,000	337	3,625
4,001 to 5,000	372	4,000
5,001 to 6,000	406	4,375
6,001 to 7,000	441	4,750
7,001 to 9,000	517	5,560
9,001 to 11,000	592	6,375
11,001 to 13,000	668	7,190
13,001 to 15,000	743	8,000
15,001 to 17,000	929	10,000
17,001 to 20,000	1,210	13,000
Over 20,000	Determined by Engineer Study	
NOTES: 1. Active duty military personnel assigned to an installation and stationed within a commuting area not served by another military banking office plus civilian employees of the installation.		

7.4.3. **Credit Union. FAC: 7347**

CATCODE: 740155
OPR: SAF/FMPB
OCR: N/A

7.4.3.1. **Description.** Although credit unions are private organizations not under the control of the DoD, a Federal credit union facility may be established on any military installation for the convenience of the installation personnel, military and civilian and their dependents, and other personnel as permitted in the approved by-laws of the credit union. Membership normally includes all assigned DoD personnel.

7.4.3.2. **Requirements Determination.** Only one credit union is permitted on an Air Force base except where more than one credit union existed prior to May 1, 2000, or where a waiver has been granted IAW DoDD 1000.11, *Financial Institutions on DoD Installations*. Where more than one credit union already exists, each is entitled to the benefits defined in this regulation as if it were located on a separate base. A complete credit union facility includes reception and lobby space, teller space, interview space, operating (machine and/or record) space, record holding space, management office space, vault (fire and security) space, employee lounge space, and meeting rooms (conference room).

7.4.3.3. **Scope Determination.** Credit union facilities are established under DoD FMR Volume 5, Chapter 34. When a credit union is authorized to construct its own building, at its own expense, on government-owned land, the space criteria limitations herein do not apply.

7.4.3.4. **Dimensions.** Space requirements are determined for individual credit unions by the characteristics of their business operations. These characteristics are expressed under five categories in **Table 7.13**. Extrapolation should be used to determine the factor where the variable of a credit union exceeds any of the five categories. **Table 7.14** should also be extrapolated when the total factors from **Table 7.13** exceed the factors shown in this table. The total of all credit union facilities on an Air Force base may not exceed the space allowances specified in **Table 7.14**, as extrapolated, except that a ten percent increase is permitted to allow for future business expansion.

7.4.3.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.13. Factors for Credit Union Space Allowances.

	Variable	Factor
1. Members	0-1000	1
	1,000-2,500	2
	2,501-7,500	3
	7,501-12,000	4
	12,000-20,000	5
	over 20,000	6
2. Assets in Dollars	0-100,000	1
	100,001-500,000	2
	500,001-1,500,000	3
	1,500,001-5,000,000	4
	over 5,000,000	5
3. Transactions Per Day	0-99	1
	100-299	2
	300-499	3
	500-749	4
	750-999	5
4. Accounting	Machines	1
	Manual	2
5. Employees	2-5	1
	6-9	2
	10-13	3
	14-17	4
	18-21	5
	22-25	6
	over 25	7

Table 7.14. Space Allowances for Credit Unions.

Factor Totals	Gross Area	
	m2	ft2
Minimum	74	800
5	93	1,000
6	121	1,300
7	158	1,700
8	204	2,200
10	260	2,800
12	325	3,500
14	399	4,300
16	483	5,200
18	576	6,200
19	669	7,200
20	762	8,200
21	855	9,200
22	958	10,200
23	1,040	11,200
24	1,130	12,200
25	1,230	13,200

7.4.4. **Airman and Family Readiness Center (A&FRC). FAC: 7372**

CATCODE: 740253
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1

7.4.4.1. **Description.** The A&FRC assists commanders in their responsibility for the readiness of all DoD personnel and their families through financial and family counseling/education, relocation information, and employment/transition assistance.

7.4.4.2. **Requirements Determination.** Functional space requirements, shown in **Table 7.15**, are for an example facility. Programmers should work with base and MAJCOM/A1 and manpower representatives to determine specific functional requirements for the proposed A&FRC (i.e., some functions shown in the table below may not be required at all bases).

7.4.4.3. **Scope Determination.** Increase of space requirements, above the minimum guidelines shown in **Table 7.15**, may be justified according to larger base populations, mission, and A&FRC requirements.

7.4.4.4. **Dimensions.** See **Table 7.15** and UFC 4-730-01, *Family Service Centers, with Change 1*, for additional guidance.

7.4.4.5. **Design Considerations.** See AFI 36-3009, *Airman and Family Readiness Centers*, and UFC 4-730-01. The Career Focus/Spouse Employment, Transition Assistance, Personal Financial Management, Air Force Aid Society, Readiness NCO/NCOIC, Personal and Work Life, Survival Benefits Program (SBP), Casualty, School Liaison Officer, and Special Needs Advocacy need private offices because of

confidential discussions/consultations with clients or work with confidential information. Some installations have combined Casualty Assistance Representative and Survivor Benefits Counselor functions; however, at installations where the functions are separate, separate offices are authorized. The Discovery Center (this is in lieu of a Computer Room listed in the UFC) provides intake, initial self-assessment as well as print and computer-based resources for customer use. A Discovery Center typically has computers, printers, scanners, and copier.

Table 7.15. Space Requirements for A&FRC.

Offices	Office Type (See Tables 6.2/6.2.1)	Qty
Section Chief	C	1
Lead Community Readiness Consultant	D	1
Administration	F	1
Information and Referral Specialist (collocated with Discovery Resource Center below)	F	1
Personal Financial Management Program	E	1
Air Force Aid Society	E	1
Reserve Family Readiness Program	F	1
Personal and Work Life Program	E	1
Professional Volunteers	F	Varies
Career Focus/Spouse Employment Program	E	1
Volunteer Resource Program	F	1
Transition Assistance Management Program1	E	Varies
Relocation Assistance Program1	F	Varies
Relocation Assistance Coordinator	F	1
Special Needs Coordinator	E	1
School Liaison	E	1
Survivor Benefits Counselor	E	1
Casualty Assistance Representative (not needed if combined with Survivor Benefits Counselor)	E	0-1
Readiness NCO	E	1
Administrative Support	See Table 6.3	
Storage Rooms	User justified	
Folding Table Storage Room	User justified	
Special Purpose Spaces	m2	ft2
Conference Room	See Table 6.4	
Break Room	See Table 6.3	
Discovery Resource Center	G	# of Stations User justified
Classroom	See Table 6.4	
Teaching Kitchen	19	200
Waiting Areas	See Table 6.3	
Relocation Assistance Loan Closet	37	400
Relocation Assistance Food Pantry	19	200

Offices	Office Type (See Tables 6.2/6.2.1)	Qty
Relocation Assistance Airmen's Attic	37	400
Red Cross Program	37	400
NOTES: 1. Area required per staff member.		

7.4.5. **Thrift Shop. FAC: 7340**

CATCODE: 740255
OPR: SAF/FMPB
OCR: MAJCOM/A1

7.4.5.1. **Description.** This facility is a "second-hand store" operated by a private organization where military members buy and sell used apparel and used household furniture, furnishings, and equipment.

7.4.5.2. **Requirements Determination.** Space allowances are given in **Table 7.16**. For installations with military strength greater than 2,000, the space requirement varies according to the on-base population.

7.4.5.3. **Scope Determination.** To find the maximum space requirements, multiply the appropriate **Table 7.16** scope by the population adjustment factor given in **Table 7.16.1** that corresponds to the installation's on-base population.

7.4.5.4. **Dimensions.** See **paragraph 7.4.5.3**.

7.4.5.5. **Design Considerations.** Contact OPR for additional information on design criteria.

Table 7.16. Space Allowances for Thrift Shops.

Total Customer Base1,2	Gross Area3	
	m2	ft2
Up to 2,000	130	1,400
2,001-4,000	186	2,000
4,001-6,000	251	2,700
6,001-8,000	316	3,400
8,001-10,000	372	4,000
10,002-12,000	418	4,500
12,001-14,000	456	4,905
Over 14,000	497	5,350
NOTES: 1. Total customer base is defined as active duty military personnel assigned to the installation plus 50% of dependent personnel and 10% of retired military supported by the installation. 2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii). 3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to the authorized scope for these facilities (including Alaska and Hawaii).		

Table 7.16.1. Space Allowances for Thrift Shops – Adjustment Factor.

Population Percentage1	Adjustment Factor
0-51	0.7
52-75	0.8
76-90	0.95
91-100	1
NOTES: 1. Percentage of the installation's total military strength that live on-base in dormitories, in family housing, and retired military supported by the installation.	

7.4.6. **Commissary Store. FAC: 7349**

CATCODE: 740266
OPR: Defense Commissary Agency (DeCA)
OCR: N/A

7.4.6.1. **Description.** This facility is comprised of the following areas: retail sales, non-perishable warehouse, meat preparation, produce preparation, frozen storage, chilled storage, administrative areas, and other miscellaneous areas required in commissary operations.

7.4.6.2. **Requirements Determination.** Commissaries are established under the provisions of DoDD 5105.55, *Defense Commissary Agency (DeCA*).

7.4.6.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.4.6.4. **Dimensions.** Space requirements are based on average monthly sales and are established by DeCA/DF, Fort Lee VA 23801-6300.

7.4.6.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.7. **Base Package Store. FAC: 7346**

CATCODE: 740269
OPR: AAFES
OCR: N/A

7.4.7.1. **Description.** Established under AFI 34-219, *Alcoholic Beverage Program.* The base package store sells authorized customers alcoholic beverages at retail prices and provides for the transfer (wholesale) of alcoholic beverages to clubs.

7.4.7.2. **Requirements Determination.** Contact OPR for latest requirements and guidance. See **paragraph 7.4.11**, *Exchange Facilities,* of this Manual.

7.4.7.3. **Scope Determination.** For overseas installations, facility space is based on accommodating a two and a half month supply of merchandise. Space requirements are determined by AAFES.

7.4.7.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.7.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.8. **Rod and Gun Club. FAC: 7414**

CATCODE: 740315
OPR: AF/A1S
OCR: AFSVA

7.4.8.1. **Description.** The building includes an operator's office, storage and sales areas, gun and ammunition maintenance, projector area, toilets, and lounge.

7.4.8.2. **Requirements Determination.** Land and building requirements are given in **Table 7.17**. The land and building space allocations may be used in one facility or divided between facilities. Land areas shown are the recommendations of the National Shooting Sports Foundation and National Rifle Association.

7.4.8.3. **Scope Determination.** **Table 7.17** shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting and design on need as documented by a professional, in-depth market survey. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii). DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.8.4. **Dimensions.** See **Table 7.17**.

7.4.8.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.17. Space Allowances for Rod and Gun Clubs.

Total Customer Base1	Land Area					
	Skeet Range		Trap Range		Facility Gross Area	
	m	ft	m	ft	m2	ft2
Up to 100	None		None		none	
101 to 10,000	335 x 732	1,100 x 2,400	335 x 549	1,100 x 1,800	369	3,950
10,001 to 15,000	335 x 732	1,100 x 2,400	335 x 576	1,100 x 1,890	399	4,300
15,001 to 20,000	335 x 732	1,100 x 2,400	335 x 604	1,100 x 1,980	423	4,550
20,001 to 25,000	335 x 732	1,100 x 2,400	335 x 631	1,100 x 2,070	446	4,800
25,001 to 30,000	335 x 732	1,100 x 2,400	335 x 658	1,100 x 2,160	474	5,100
30,001 to 40,000	335 x 777	1,100 x 2,550	335 x 686	1,100 x 2,250	492	5,300
40,001 and above	335 x 823	1,100 x 2,700	335x 713	1,100 x 2,340	511	5,500
NOTES: 1. Total customer base is defined as military strength plus 5 percent of dependent population and 15 percent of retired strength served. Verify the total customer base with a PVA.						

7.4.9. **Recreation Center (Community Center). FAC: 7417**

CATCODE: 740316
OPR: AF/A1S
OCR: AFSVA

7.4.9.1. **Description.** This facility serves as a center of recreation to enhance the life of the military community through recreation and leisure-time activities. Several activities may be provided in a single facility including social, recreation, and community activities; single airmen activity center; education and vocational classes; technological center; competitive activities; family activities; information, ticket, and tour operations, and so forth. Functions such as hobby shops, libraries, and other activities may be included at small installations to enhance economy of operations and construction, and user convenience.

7.4.9.2. **Requirements Determination.** Deduct space allocated to specific functions at these sites from the allowable space allowance for the same function listed elsewhere. Consolidation of functions is recommended at larger installations to enhance economy of construction, energy savings and convenience. The gross floor areas for the centers may not exceed the space allowances listed in **Table 7.18**.

7.4.9.3. **Scope Determination.** **Table 7.18** shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting and design on need as documented by a professional, in-depth market survey. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to the authorized scope for these facilities (including Alaska and Hawaii). DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii). Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.9.4. **Dimensions.** See **Table 7.18**.

7.4.9.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.18. Space Allowances for Community Centers.

Total Customer Base1	Gross Area2,3	
	m2	ft2
Up to 250	Accommodate in other facilities	
251 to 5004	372	4,000
501 to 2,000	1,180	12,700
2,001 to 4,000	1,840	19,800
4,001 to 5,000	2,580	27,800
5,001 to 10,000	5,120	55,600
10,001 to 15,000	7,740	83,400
For each additional 5,000	2,580	27,800

NOTES:
1. Total customer base is defined as active duty personnel assigned to the military installation, plus 10 percent of their dependents. Verify the total customer with a validated PVA Study.
2. Mechanical equipment room space, as required, should be added to the gross areas when determining a single gross area figure for each facility.
3. Gross areas may be provided in more than one facility, provided the total maximum authorized area is not exceeded.
4. Gross area should be combined with other recreation facilities when possible.

7.4.10. **Aero Club. FAC: 7414**

CATCODE: 740317
OPR: AF/A1S
OCR: AFSVA

7.4.10.1. **Description.** An Armed Forces aero club is a recreational flying activity approved under pertinent regulation that is located on or near a military installation and used by authorized personnel.

7.4.10.2. **Requirements Determination.** The activity requires hangar space for aircraft maintenance and for aircraft storage during inclement weather. It also requires multipurpose space for administration, training, classrooms, operations, scheduling, safety meetings, and flight planning. Space allowances, based on the number of aircraft operated by the club, are given in **Table 7.19**.

7.4.10.3. **Scope Determination.** **Table 7.19** shows authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope can be influenced by PVA studies. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to the authorized scope for these facilities (including Alaska and Hawaii). DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii). Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.10.4. **Dimensions.** See **Table 7.19**.

7.4.10.5. **Design Considerations.** Base the design on commercial standards for general aviation aircraft hangars.

Table 7.19. Space Allowances for Aero Club Facilities.

Number of Aircraft	Gross Area1			
	Hangar Space		Multipurpose Space	
	m2	ft2	m2	ft2
1	84	900	46	500
2 to 5	214	2,300	93	1,000
6 to 10	353	3,800	111	1,200
11 to 15	492	5,300	139	1,500
16 to 20	632	6,800	158	1,700
For each additional 5 aircraft, add	139	1,500	35	375
NOTES: 1. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area figure for each facility.				

7.4.11. **Exchange Facilities**. AFI 34-219 contains space allowances for all exchange and subordinate exchange facilities.

7.4.11.1. **Subordinate Exchange Facilities.** Provide subordinate exchange facilities operated for the convenience of separate specialized activities and established as an integral part of these activities, such as snack facilities in bowling centers and operations building; outlets in air terminals; snack and retail facilities; service outlets for hospitals; barber shops in clubs; dining facilities in dependent schools, colleges and academic buildings; and snack facilities in theaters out of space allowances authorized for the separate specialized activities themselves.

7.4.11.2. **Military Strength in Overseas Commands.** In computing the military strength figure for an overseas command, add the number of civilian employees (United States and other than host country nationals), excluding dependents, paid from appropriated or nonappropriated US dollar funds and afforded full exchange service privileges.

7.4.11.3. **Exchange Central Facilities.** These facilities support exchange activities at a number of installations within a certain geographical area. AAFES determines the need for the facilities and space requirements. The facilities may be located in buildings of temporary construction, relocatable buildings, or available semi-permanent or permanent structures.

7.4.11.4. **Shopping Centers.** Plan major exchange facilities, where feasible, as elements of the installation's community shopping center. (See guidance in **paragraph 7.4.1.4** on designation of space consisting of covered/enclosed malls and walkways integrated with shopping center elements.)

7.4.11.5. **Overseas Area Community Shopping Centers.** An area community shopping center may be provided in overseas commands where a group of military installations are located within a geographical area with a radius of up to 40 kilometers (25 miles). The shopping center should preferably be located at one of the installations in the center of the area and obviate the need for other comparable main exchange facilities at that installation. The main retail store at the area community shopping center should feature complete selections of merchandise, thus permitting the retail stores at the served installations to feature limited selections (items of necessity and general convenience).

7.4.11.6. **Base Package Stores.** See Base Package Store (**CATCODE 740269**).

7.4.11.7. **Construction from Private Funds.**

7.4.11.7.1. Construction of exchange facilities may be accomplished from private funds by private individuals or commercial concerns subject to approval by the Secretary of the Air Force (SAF) where pertinent contracts specify that title thereto passes to the government and stipulate conditions and restrictions which will prevent any future conflict with military requirements and eliminate any future obligations against appropriated funds. The requirement for passage of title does not apply to portable or relocatable buildings.

7.4.11.7.2. Provide air and water pollution control facilities.

7.4.11.8. **Relocatable Buildings.** Operate and maintain relocatable buildings provided from AAFES nonappropriated funds for temporary exchange facilities entirely from AAFES nonappropriated funds. Title to relocatable buildings provided from AAFES funds remains with AAFES.

7.4.12. **Exchange Amusement Center. FAC: 7346**

CATCODE: 740379
OPR: AAFES
OCR: N/A

7.4.12.1. **Description.** An amusement center combines coin operated games and refreshments. It usually includes a game area (i.e., pool tables, pinball and skill games), food and drink vending machines, a limited snack counter (in larger activities), and restrooms. An amusement center may be provided as an independent activity or operated in conjunction with a branch exchange, food court, or snack bar.

7.4.12.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.4.12.3. **Scope Determination.** AAFES determines space requirements.

7.4.12.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.12.5. **Design Consideration.** Contact OPR for latest requirements and guidance.

7.4.13. **Exchange Food Court, Snack Bar. FAC: 7331**

CATCODE: 740381
OPR: AAFES
OCR: N/A

7.4.13.1. **Description.** A food court or snack bar may be provided in conjunction with the exchange main retail store, preferably as an element of the community shopping center. Additional food courts or snack bars may be located in other areas where service is needed.

7.4.13.2. **Requirements Determination.** Contact OPR for latest requirements and guidance. AAFES determines space requirements.

7.4.13.3. **Scope Determination.**

7.4.13.3.1. **Food Court at Area Community Shopping Centers-Overseas.** A food court may be provided as an element of an overseas area community shopping center.

7.4.13.3.2. **Exchange Snack Stand.** At installations having a military strength of 3,000 or more, exchange snack stands may be provided to supplement exchange food services.

7.4.13.3.3. **Flight Line Snack Bar.** In addition to other authorized food service facilities, each airfield is authorized one flight line snack bar in, or adjacent to, the air terminal building.

7.4.13.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.13.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.14. **Branch Exchange. FAC: 7346**

CATCODE: 740382
OPR: AAFES
OCR: N/A

7.4.14.1. **Description.** See **paragraph 7.4.11**, Exchange Facilities of this Manual.

7.4.14.2. **Requirements Determination.** AAFES determines the number of branch exchanges and space requirements.

7.4.14.3. **Scope Determination.** At installations having a military strength of 2,500 or more, branch exchanges, located to provide convenient exchange coverage of the installation, may be provided. Branch exchanges may be used for any of the authorized exchange activities or service outlets as required.

7.4.14.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.14.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.15. **Exchange Service Station. FAC: 7345**

CATCODE: 740383
OPR: AAFES
OCR: N/A

7.4.15.1. **Description.** This category code applies to the following facilities:

7.4.15.1.1. **Car Care Center.** This facility is designed for the sale of gasoline, oil, automotive accessories, minor automotive repairs, and services such as lubrication, tire and battery service, and vehicle safety inspection. Gasoline may or may not be sold at this facility.

7.4.15.1.2. **Gasoline Station.** This facility is designed for the sale of gasoline, oil, and automotive accessories. (It does not provide stalls for repairs and other services.)

7.4.15.1.3. **Carwash Facility.** This facility may be designed for either mechanical car washing or for coin-operated manual washing by customers.

7.4.15.2. **Requirements Determination.** AAFES determines space requirements.

7.4.15.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.4.15.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.15.5. **Design Considerations.** Canopies to protect pump islands from inclement weather may be provided without deduction from space allowances. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters.

7.4.16. **Exchange Laundry and Dry Cleaning Plants. FAC: 7342**

CATCODE: 740384
OPR: AAFES
OCR: N/A

7.4.16.1. **Description.** Laundry and dry cleaning plants operated under the exchange service are normally limited to the performance of other than appropriated fund laundering and dry cleaning.

7.4.16.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.4.16.3. **Scope Determination.** AAFES determines space requirements. On installations where both appropriated fund and nonappropriated fund facilities are to be provided, the total space may not exceed the criteria established for appropriated fund facilities in **Table 7.9**.

7.4.16.4. **Dimensions.** See **paragraph 7.4.16.2** and **Table 7.9**.

7.4.16.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.17. **Exchange Maintenance Shop. FAC: 7387**

CATCODE: 740385
OPR: AAFES
OCR: N/A

7.4.17.1. **Description.** This facility accommodates exchange maintenance shops and space for the local repair of exchange equipment and fixtures

7.4.17.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.4.17.3. **Scope Determination.** AAFES determines the total space that may be provided for installation exchange maintenance shops and for the local repair of exchange equipment and fixtures.

7.4.17.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.17.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.18. **Exchange Administration. FAC: 7387**

CATCODE: 740386
OPR: AAFES
OCR: N/A

7.4.18.1. **Description.** This facility accommodates the main administrative offices of an installation's exchange, area exchange, or regional exchange operations.

7.4.18.2. **Requirements Determination.** Space requirements are determined on the basis of the number of occupants under criteria for administrative space in **Chapter 6** of this Manual.

7.4.18.3. **Scope Determination.** The code does not apply to administrative space required for an individual facility, such as a main or branch exchange. Such space is provided out of the space allowance for the individual facility. The requirement for Exchange Central Administrative Facilities is identified under code **CATCODE 740396**. See related guidance in **paragraph 7.4.11.3**.

7.4.18.4. **Dimensions.** See **Chapter 6** of this Manual.

7.4.18.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.19. **Exchange Retail Warehouse**

FAC: 7388
CATCODE: 740387
OPR: AAFES
OCR: N/A

7.4.19.1. **Description.** This facility provides warehouse space for the installation's main retail store.

7.4.19.2. **Requirements Determination.** The space requirements are based on a percentage of the space authorized for the installation's main retail store, **CATCODE 740388**.

7.4.19.3. **Scope Determination.** In CONUS the warehouse space may not exceed 33 percent of the authorized retail store space. In Alaska, Hawaii, and overseas, it may not exceed 50 percent.

7.4.19.4. **Dimensions.** See **paragraph 7.4.19.3**.

7.4.19.5. **Design Considerations.** Where practicable, locate the installation exchange warehouse contiguous to the exchange main retail store to reduce the cost of moving stock from the warehouse to the main store sales area.

7.4.20. **Exchange Sales Store (Main Exchange). FAC: 7346**

CATCODE: 740388
OPR: AAFES
OCR: N/A

7.4.20.1. **Description.** The exchange main retail store comprises sales area, stock area, and office space, as required.

7.4.20.2. **Requirements Determination.** Space requirements at individual installations are determined from an analysis performed by the AAFES, which is based on DoD criteria involving population and environmental factors. At some large or geographically spread out bases branch exchanges are permitted. See **CATCODE 740382** for branch exchange criteria.

7.4.20.3. **Scope Determination.**

7.4.20.3.1. Stores that experience abnormally high customer patronization and thus project an abnormally high sales volume may be provided up to 20 percent more space than the average store. When the high volume store is being developed in an existing building, an additional 10 percent increase is authorized if necessary to make efficient and economical use of existing space. The 20 percent increase permitted by **paragraph 7.4.1.2** does not apply.

7.4.20.3.2. **Auto Parts Sales Stores.** Auto parts sales stores may be operated independently or in conjunction with other retail outlets, car care centers, or garages. AAFES determines the total floor areas for auto parts sales.

7.4.20.3.3. **Exchange Food Stores - Overseas.** Food retail sales outlets may be provided in conjunction with other exchange retail outlets, food courts, and snack bars, or as independent sales stores. AAFES determines the total space provided for the sales outlets.

7.4.20.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.20.5. **Design Consideration.** Contact OPR for latest requirements and guidance.

7.4.21. **Exchange Service Outlet. FAC: 7346**

CATCODE: 740389
OPR: AAFES
OCR: N/A

7.4.21.1. **Description.** Special sales and service outlets are authorized exchange activities for which distinct space criteria have not been specified herein. Typical examples of these activities are automobile repair garages, toy lands, taxicab and bus service, flower shops, baggage check points, bookstores, furniture stores, medical services (optometrist, dental, pharmacy, etc.), and in overseas areas exclusively, steam bath facilities, new car sales points, and stock investment offices.

7.4.21.2. **Requirements Determination.** Contact OPR for latest requirements and guidance. Facilities for exchange special sales and service outlets may be provided when the following conditions are met:

7.4.21.2.1. When it has been firmly established that no appropriated funds are to be expended for an AAFES project and that no future obligation of appropriated funds are involved in the maintenance and operation of this facility. Utilities services are provided in overseas areas without reimbursement. Exception to this provision requires prior approval from the Deputy Under Secretary of Defense, Installations and Environment. Reference AFI 32-1022, **Table 3.3,** and **Attachment 2**, for Cat C Revenue-generating activities that may qualify for some APF maintenance/repair work.

7.4.21.2.2. Where the use of an existing building is involved, the space to be occupied is the minimum needed for efficient operations, and this space is surplus to all other than exchange and recreation facility needs of the same priority.

7.4.21.2.3. Where the facility is to be provided through new construction from private funds and the provisions for the use of private funds have been complied with.

7.4.21.2.4. Where the facility is to be provided through new construction from nonappropriated funds and the project has been fully authorized.

7.4.21.2.5. Space occupied by special sales and service outlets is not deducted from other space allowances provided by these criteria.

7.4.21.3. **Scope Determination.** Outlet facilities may be provided for the basic services indicated below, normally as adjuncts of the main retail store, including beauty shops. When a service outlet is being installed in an existing building, the space allowances may be increased by 20 percent or 9.3 m^2 (100 ft^2), whichever is greater, if such increase is necessary to effect economical and efficient use of the existing building.

7.4.21.4. **Dimensions.** See **paragraph 7.4.21.3**.

7.4.21.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.22. **Transient Lodging Facility. FAC: 7441**

CATCODE: 740433
OPR: AF/A1S
OCR: AFSVA, AF/A7CH

7.4.22.1. **Description.** Temporary lodging facilities (TLF) required to provide short-term temporary housing. Refer to AFI 34-246 for assignment policies.

7.4.22.2. **Requirements Determination.** TLFs are necessary when an official determination has been made that there is a continuing demand for such facilities and that the lack of such facilities imposes unacceptable hardships or inconvenience on their authorized users.

7.4.22.2.1. These determinations and a determination as to the number of living units required are developed from an analysis of the following data concerning requirements, on-base facilities, and off-base facilities within 16 km (10 mi) commuting distance of the installations involved.

7.4.22.2.1.1. A survey of private accommodations, including hotel/motel facilities, prevailing year-round rates (low, peak and average), and military discount rates which exist or could be obtained, and associated or related food service facilities.

7.4.22.2.1.2. Information as to the feasibility of government leasing of suitable private facilities and the cost of leasing.

7.4.22.2.1.3. The extent and nature of on-base accommodations (including messing facilities).

7.4.22.2.1.4. A review of monthly PCS traveler data for the past three years to identify saturation points. Separate the numbers of accompanied versus unaccompanied personnel to determine total potential customers and which seasons/months the TLF use is highest and lowest. Where applicable, gather data on base hospital outpatients and civilian/military friends and relatives of patients in Air Force hospitals. This data is available from base lodging managers using the property management system.

7.4.22.2.1.5. A statement as to why available or obtainable facilities cannot meet TLF requirements.

7.4.22.2.2. It is Air Force policy that the number of living units to be provided at individual installations may not exceed the average number of guests or number of families in PCS status during the six most active months of the year. The number of units and two bedroom/one bedroom mix shall be provided by AFSVA/SVOL. (T-1). Reference the Architectural Barriers Act guidelines to determine number of accessible rooms required.

7.4.22.3. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as

documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by PVAs, performed through Headquarters Air Force Services Agency. Refer to AFI 34-205, *Services Nonappropriated Fund Facility Projects*, and contact MAJCOM Director of Services or AFSVA/SVXF for current PVA criteria and guidelines. Support space is additive to that in living units. It may include circulation space and space to support the administrative, lounge, recreational, mechanical, and service requirements of the facility. The space varies depending on the number of living units, building configuration, and availability of adjacent facilities to support required functions. Where support space is provided in a detached structure or detached module, the facility is reported as Transient Lodging Support Building (**CATCODE 740459**).

7.4.22.4. **Dimensions.** It is Air Force policy to provide kitchenettes in all TLFs included in programs for new construction. These space criteria do not apply to living units in facilities built or acquired prior to October 1, 1972 or to units in leased commercial facilities. Reference **Table 7.20** and the *United States Air Force Temporary Lodging Facilities Design Guide*.

7.4.22.5. **Design Considerations.** TLFs are designed to residential (i.e., Air Force family housing) construction standards and are to be architecturally compatible with the base environment. TLF units include kitchen facilities and accommodate a family of five. Facilities may be acquired by new construction, conversion, change in use of existing buildings, or leasing privately owned facilities. Consult the *United States Air Force Temporary Lodging Facilities Design Guide* for further guidance.

Table 7.20. Space Allowances for TLFs.

TLF Unit	Net Living Area		Gross Living Area	
	m2	ft2	m2	ft2
One Bedroom	55.9	602	88.1	948
Two Bedroom	73.3	790	114.1	1,228
Two Bedroom Accessible	80.5	867	120.8	1,300

7.4.23. **Transient Lodging Support Facility. FAC: 7443**

CATCODE: 740459
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A7

7.4.23.1. **Description.** This facility houses various support functions for TLFs whenever these functions are not, or cannot be, incorporated with the main structures. Support functions may include administration, employee lounges, mechanical equipment space, or service space such as laundry rooms and custodial supply rooms.

7.4.23.2. **Requirements Determination.** Space and functional requirements vary according to the number of living units and the availability of other suitable support space.

7.4.23.3. **Scope Determination.** See **CATCODE 740433**.

7.4.23.4. **Dimensions.** See **CATCODE 740433**.

7.4.23.5. **Design Considerations.** See the *United States Air Force Temporary Lodging Facilities Design Guide*.

7.4.24. **Open Mess, Airmen. FAC: 7333**

CATCODE: 740612
OPR: AF/A1S
OCR: AFSVA

7.4.24.1. **Description.** This is a collocated club serving both officers and enlisted, where officers and enlisted have separate functional areas such as separate bars, cashiers counters, lounges, dining areas, entrances, and (if practical) parking lots.

7.4.24.2. **Requirements Determination.** These facilities share a kitchen, party rooms, and a ball room. See **Table 7.21.1**, and Officer Open Mess (**CATCODE 740618**).

7.4.24.3. **Scope Determination.** Contact AFSVA/SVXF for latest requirements and guidance. The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities. The scope may also be influenced by PVAs.

7.4.24.4. **Dimensions.** See **Table 7.21** and **7.21.1**.

7.4.24.5. **Design Consideration.** Contact OPR for latest requirements and guidance.

7.4.25. **Consolidated Open Mess. FAC: 7333**

CATCODE 740615
OPR: AF/A1S
OCR: AFSVA

7.4.25.1. **Description.** This is a club serving both officers and enlisted, where officers and enlisted share all functional areas such as cashiers counter, lounge, dining areas, entrance, and parking lot with the exception of having separate bars.

7.4.25.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.4.25.3. **Scope Determination.** Contact AFSVA/SVXF for latest requirements and guidance. The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities. The scope may also be influenced by PVAs.

7.4.25.4. **Dimensions.** See **Table 7.21** and **7.21.1**.

7.4.25.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.21. Space Allowances for Consolidated Clubs.

Total Customer Base1	Gross Area2	
	m2	ft2
Up to 50	See Note 3	
51 to 150	279	3,000 – Extra Small Club
151 to 250	279 + 1.90 (P-150)	3,000 + 20 (P-150) – Extra Small Club
251 to 500	465 + 1.30 (P-250)	5,000 + 14 (P-250) – Extra Small Club
501 to 750	790 + .65 (P-500)	8,500 + 7 (P-500) – Extra Small Club
751 to 1,000	1,020 + .65 (P-750)	11,000 + 7 (P-750) – Extra Small Club
1,001 to 2,000	1,180 + .46 (P-1,000)	12,750 + 5 (P-1,000) – Small Club
2,001 to 3,000	1,650 + .37 (P-2,000)	17,750 + 4 (P-2,000) – Small Club
3,001 to 4,000	2,020+ .33 (P-3,000)	21,750 + 3.5 (P-3,000) – Medium Club
4,001 to 5,000	2,350 + .30 (P-4,000)	25,250 + 3.25 (P-4,000) – Medium Club
5,001 to 6,000	2,650 + .28 (P-5,000)	28,500 + 3 (P-5,000) – Large Club
6,001 to 8,000	2,930 + .26 (P-6,000)	31,500 + 2.75 (P-6,000) – Large Club
8,001 to 10,000	3,440 + .23 (P-8,000)	37,000 + 2.5 (P-8,000) – Large Club
10,001 to 12,000	3,900 + .21 (P-10,000)	42,000 + 2.25 (P-10,000) – Large Club
12,001 to 14,000	4,320 + .19 (P-12,000)	46,500 + 2 (P-12,000) – Large Club

NOTES:
1. Total customer base is defined as active duty officers, enlisted, or combined active duty officers and enlisted, as appropriate, assigned to the military installation, plus 50 percent of their spouses, plus 50 percent of the retired military supported by the facility. (Consideration should be given to increasing the total customer base at installations with consistently large numbers of TDY personnel or conducting PCS moves.) Verify the total customer base using a validated PVA Study.
2. Mechanical equipment room space required should be added to the gross area shown when determining a single gross area for each facility.
3. Provide in other facilities at 4.1 m2 (44 ft2) gross area per person.

7.4.26. **Enlisted Open Mess. FAC: 7333**

CATCODE: 740617
OPR: AF/A1S
OCR: AFSVA

7.4.26.1. **Description.** This club serves enlisted personnel.

7.4.26.2. **Requirements Determination.** **Table 7.21** and **7.21.1** provide maximum authorized scope only, not the scope that may be approved.

7.4.26.3. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities. Space requirements, however, may be increased per a PVA study. Contact AFSVA/SVXF for latest requirements and guidance.

7.4.26.4. **Dimensions.** Space allowances for enlisted clubs are provided in **Table 7.21.1**.

7.4.26.5. **Design Consideration.** For overseas installations, increase the total customer base by 25 percent before selecting the formula from the appropriate table. This increases the authorized space to accommodate the higher facility use which is normal overseas. DoD civilians assigned to overseas installations are to be counted as active duty strength for facility sizing purposes (including Alaska, and Hawaii).

7.4.27. **Officer Open Mess. FAC: 7333**

CATCODE: 740618
OPR: AF/A1S
OCR: AFSVA

7.4.27.1. **Description.** This club serves officer personnel.

7.4.27.2. **Requirements Determination.** **Table 7.21** and **7.21.1** provide maximum authorized scope only, not the scope that may be approved.

7.4.27.3. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities. Space requirements, however, may be increased per a PVA study. Contact AFSVA/SVXF for latest requirements and guidance.

7.4.27.4. **Dimensions.** See **Table 7.21** and **7.21.1**.

7.4.27.5. **Design Consideration.** For overseas installations, increase the total customer base by 25 percent before selecting the formula from the appropriate table. This increases the authorized space to accommodate the higher facility use which is normal overseas. DoD civilians assigned to overseas installations are to be counted as active duty strength for facility sizing purposes (including Alaska, and Hawaii).

Table 7.21.1. Space Allowances for Officer/Enlisted/Collocated Clubs.

Total Customer Base1	Gross Area2	
	m2	ft2
Up to 50	Note 3	Note 3
51 to 150	279	3,000 – Extra Small Club
151 to 250	279 + 1.40 (P-150)	3,000 + 15 (P-150) – Extra Small Club
251 to 500	418+ 1.11 (P-250)	4,500 + 12 (P-250) – Extra Small Club
501 to 750	697 + .93 (P-500)	7,500 + 10 (P-500) – Extra Small Club
751 to 1,000	929+ .74 (P-750)	10,000 + 8 (P-750) – Extra Small Club
1,001 to 2,000	1,110 + .37 (P-1,000)	12,000 + 4 (P-1,000) – Small Club
2,001 to 3,000	1,490 + .35 (P-2,000)	16,000 + 3.75 (P-2,000) – Small Club
3,001 to 4,000	1,830 + .33 (P-3,000)	19,750 + 3.5 (P-3,000) – Small Club
4,001 to 5,000	2,160 + .30 (P-4,000)	23,250 + 3.25 (P-4,000) – Medium Club
5,001 to 6,000	2,460 + .28 (P-5,000)	26,500 + 3 (P-5,000) – Medium Club
6,001 to 8,000	2,740 + .26 (P-6,000)	29,500 + 2.75 (P-6,000) – Large Club
8,001 to 10,000	3,250 + .23 (P-8,000)	35,000 + 2.5 (P-8,000)

Total Customer Base1	Gross Area2	
	m2	ft2
10,001 to 12,000	3,770 + .21 (P-10,000)	40,000 + 2.25 (P-10,000)
12,001 to 14,000	4,130 + .19 (P-12,000)	44,500 + 2 (P-12,000)
14,001 to 16,000	4,510 + .16 (P-14,000)	48,500 + 1.75 (P-14,000)
16,001 to 18,000	4,830+ .14 (P-16,000)	52,000 + 1.5 (P-16,000)
18,001 to 20,000	5,110 + .12 (P-18,000)	55,000 + 1.25 (P-18,000)

NOTES:
1. Total customer base is defined as active duty officers, enlisted, or combined active duty officers and enlisted, as appropriate, assigned to the military installation, plus 50 percent of their spouses, plus 50 percent of the retired military supported by the facility. (Consideration should be given to increasing the total customer base at installations with consistently large numbers of TDY personnel or conducting PCS moves.) Verify the total customer base using a validated PVA study.
2. Mechanical equipment room space required should be added to the gross area shown when determining a single gross area for each facility.
3. Provide in other facilities at 4.1 m2 (44 ft2) gross area per person.
4. Example follows for scope computation for officers' club.
a. Assume total customer base is 900.
b. Use formula from appropriate line “751-1000” in “total customer base” column in table.
Then authorized scope = 929 + .74 (P-750).
c. Substitute total customer base, 900, for P. Then, authorized scope = 929 + .74 (900-750).
d. Compute: Authorized Scope = 929 + .74 (150) = 1040 m2 (11,200 ft2)

7.4.28. **Arts and Crafts Center. FAC: 7411**

CATCODE: 740664
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.28.1. **Description.** This facility serves as the center for arts and crafts. Where practical, the center should be combined with the auto hobby shop.

7.4.28.2. **Requirements Determination.** Space allowances are given in **Table 7.22**.

7.4.28.3. **Scope Determination.** **Table 7.22** shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.

7.4.28.3.1. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.28.3.2. For overseas installations, increase the total customer base by 25 percent before selecting the appropriate formula from the table. This increases the authorized space to accommodate the higher facility use which is normal overseas.

7.4.28.3.3. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).

7.4.28.4. **Dimensions.** See **Table 7.22**.

7.4.28.5. **Design Consideration.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.22. Space Allowances for Arts and Crafts Centers.

Total Customer Base1	Gross Area2	
	m2	ft2
0 to 100	Accommodate in other facilities	
101 to 250	93 + .62 (P - 100)	1,000 + 6.67 (P - 100)
251 to 500	185+ .37 (P - 250)	2,000 + 4.0 (P - 250)
501 to 1,000	279 + .19 (P - 500)	3,000 + 2.0 (P - 500)
1,001 to 3,000	372 + .09 (P - 1,000)	4,000 + 1.0 (P - 1,000)
3,001 to 5,000	557+ .07 (P - 3,000)	6,000 + 0.75 (P - 3,000)
5,001 to 7,000	697 + .06 (P - 5,000)	7,500 + 0.60 (P - 5,000)
7,001 to 10,000	808+ .04 (P - 7,000)	8,700 + 0.45 (P - 7,000)
10,001 to 15,000	934 + .03 (P - 10,000)	10,050 + 0.35 (P - 10,000)
15,001 to 20,000	1,110 + .02 (P - 15,000)	11,800 + 0.25 (P - 15,000)
20,001 to 25,000	1,210 + .01 (P - 20,000)	13,050 + 0.15 (P - 20,000)
25,001 to 30,000	1280 + .005 (P - 25,000)	13,800 + 0.05 (P - 25,000)
30,001 and over	1,310 + .001 (P - 30,000)	14,050 + 0.01 (P - 30,000)
NOTES: 1. Total customer base is defined as active duty military personnel assigned to the installation, plus 40 percent of their dependents. Verify the total customer base using a validated PVA study. 2. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility. 3. Substitute total customer base for "P" and compute similar to method outlined for clubs.		

7.4.29. **Hobby Shop Automotive (Auto Hobby Shop). FAC: 7412**

CATCODE: 740665
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.29.1. **Description.** This facility serves to support off-duty automotive skills activities. Where practical, the center should be combined with the Arts and Crafts Centers.

7.4.29.2. **Requirements Determination.** Space allowances are shown in **Table 7.23** and are based upon 46 m^2 (500 ft^2) per automobile. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding

atmosphere, ground, or waters. Include a containment area for old engines and waste fluids/recyclable fluids.

7.4.29.3. **Scope Determination.** Table 7.23 shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.

7.4.29.3.1. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.29.3.2. For overseas installations, increase the total customer base by 25 percent before selecting the appropriate formula from the table. This increases the authorized space to accommodate the higher facility use which is normal overseas.

7.4.29.3.3. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).

7.4.29.4. **Dimensions.** See **Table 7.23**.

7.4.29.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.23. Space Allowances for Hobby Shop Automotive (Auto Hobby Shop).

Total Customer Base1	Gross Area2,3,4	
	m2	ft2
0 to 25	none	
26 to 100	93	1,000
101 to 250	139	1,500
251 to 1,000	186	2,000
1,001 to 3,000	372	4,000
3,001 to 5,000	557	6,000
5,001 to 7,000	743	8,000
7,001 to 10,000	929	10,000
10,001 to 15,000	1,160	12,500
15,001 to 20,000	1,580	17,000
20,001 to 30,000	2,230	24,000
30,001 to 40,000	2,790	30,000

NOTES:
1. Total customer base consists of military strength plus 10 percent of dependent population. Verify the total customer base using a validated PVA study.
2. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.
3. Gross areas are based on 46 m2 (500 ft2) per automobile for fully enclosed automotive/skill development centers. (For example, 1,000 ft2 equates to 2 autos at 500 ft2 per automobile)
4. Outside automotive work stalls either covered, open, or shielded are not chargeable to the authorized space.

7.4.30. **Recreation Site Lodging. FAC: 7442**

CATCODE: 740666
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.30.1. **Description.** This facility provides space for private, semi-private, and/or dormitory-type sleeping quarters to support outdoor activities and recreation areas. Lodging may be provided at off-base recreation sites or at on-base recreation sites located in remote parts of large reservations.

7.4.30.2. **Requirements Determination.** Determine the number of authorized users for individual installations based on a survey and analysis which establishes the average number of users requiring lodging in the recreation area during an average week of the season. Ensure the determination of the number of users takes into account the limitations of the recreation area. Users include active duty and retired military personnel and their dependents.

7.4.30.3. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in-depth market survey as mentioned in **paragraph 7.4.30.2**. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities.

7.4.30.3.1. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.30.3.2. Provide air and water pollution control facilities.

7.4.30.4. **Dimensions.** The total area of lodging per installation recreation area may not exceed that derived by multiplying the projected user requirement by a space allowance per person corresponding to that provided in barracks for enlisted grades E-2 through E-4.

7.4.30.5. **Design Considerations.** Additional guidance concerning off-base recreation area acquisition and development is contained under Category Group 75 in this chapter.

7.4.30.5.1. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to the authorized scope for these facilities (including Alaska and Hawaii).

7.4.30.5.2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).

7.4.31. **Indoor Miscellaneous Recreation Building. FAC: 7417**

CATCODE: 740668
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.31.1. **Description.** This building accommodates a miscellaneous indoor recreation activity, which is defined as any indoor recreational or welfare activity not normally or properly accommodated in any of the other facilities in basic facility category 740. Buildings supporting miscellaneous outdoor activities are reported under Miscellaneous Outdoor Recreation Facility (**CATCODE 750581**).

7.4.31.2. **Requirements Determination.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.31.3. **Scope Determination.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.31.4. **Dimensions.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.31.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.32. **Multipurpose Recreation Building. FAC: 7417**

CATCODE: 740669
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.32.1. **Description.** This facility provides space for recreational activities having no space allowances at installations with military strengths of less than 500, where separate buildings are not authorized.

7.4.32.2. **Requirements Determination.** Multipurpose recreation buildings should be considered for larger installations where appropriate for economies of construction, operation, energy savings, and user convenience. Large installations require a study of actual installation needs to determine space requirements.

7.4.32.3. **Scope Determination.** Determine the size of the building using **Table 7.24**. Space allotment for the various activities within the building may be determined locally. **Table 7.24** shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.32.4. **Dimensions.** See **Table 7.24**.

7.4.32.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.24. Space Allowances for Multipurpose Recreation Buildings.

Total Customer Base1	Gross Area2	
	m2	ft2
Up to 49	Accommodate in other facilities	
50 to 100	650	7,000
101 to 200	743	8,000
201 to 300	836	9,000
301 to 400	975	10,500
401 to 500	1,160	12,500
NOTES:		

Total Customer Base1	Gross Area2	
	m2	ft2
1. Total customer base is defined as active duty military personnel assigned to the military installation. Verify the total customer base using a validated PVA study. 2. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.		

7.4.33. **Bowling Center. FAC: 7415**

CATCODE: 740671
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.33.1. **Description.** Recreational bowling facility.

7.4.33.2. **Requirements Determination.** Facilities for bowling may not exceed the space and lane allowances shown in **Table 7.25**. However, local demand varies; therefore, the market should be surveyed prior to building a center. The scope can be influenced by PVA study. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.33.3. **Scope Determination.** Refer to UFC 4-740-01NF, *Design: Bowling Center*, for additional information and guidance.

7.4.33.4. **Dimensions.** Refer to UFC 4-740-01NF.

7.4.33.5. **Design Considerations.** Refer to UFC 4-740-01NF.

Table 7.25. Space Allowances for Bowling Centers.

Total Customer Base1,2,3	No. of Lanes		Gross Area4,5,6,7,8,9			
	All Locations		m2		ft2	
Up to 250	2		297		3,200	
251 to 1,000	4		580		6,250	
1,001 to 1,800	6		864		9,300	
1,801 to 2,500	8		1070		11,500	
2,500 to 3,200	10		1300		14,000	
3,201 to 3,800	12		1,500		16,000	
	No. of Lanes		Gross Area CONUS		Gross Area Overseas	
	CONUS	Overseas	m2	ft2	m2	ft2
3,801 to 4,900	14	16	1,800	20,000	2,043	22,000
4,901 to 6,300	16	20	2,200	24,000	2,700	29,000
6,301 to 7,700	18	24	2,800	30,000	3,500	38,000
7,701 to 9,800	24	32	3,900	42,000	4,300	46,000
9,801 to 12,600	30	40	4,800	52,000	5,200	56,000
NOTES: 1. Total customer base is defined as all eligible personnel defined in AFI 34-262, Services Programs and Use Eligibility. (Consideration should be given to increasing the total customer base at installations with consistently large numbers of TDY personnel or						

Total Customer Base1,2,3	No. of Lanes	Gross Area4,5,6,7,8,9	
	All Locations	m2	ft2

conducting PCS moves.) Verify the total customer base using a validated PVA.

2. For each increment increase of 700 total customer base above 12,600, two additional lanes totaling 232 m2 (2,500 ft2) gross area may be provided. Additional lanes should not be provided for any increase below a full increment and no additional lanes should be provided at military installations in the 48 contiguous states without a complete and full study of the needs and economic factors involved.
3. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
4. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.
5. CONUS includes space for equipment and storage. For each increment of four lanes, an additional 185 m2 (2,000 ft2) gross area may be added for a game room for amusement games, billiards and pool, as well as food service, offices, and maintenance area.
6. Overseas includes space for equipment and storage. For each increment of four lanes, an additional 232 m2 (2,500 ft2) gross area may be added for a game room for amusement games, billiards and pool, as well as food service, offices, and maintenance area.
7. Table shows maximum authorized scope only, not the scope that may be approved. The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system which encourages economy in scope and composite facilities.
8. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).

7.4.34. **MWR Supply and NAF Central Storage. FAC: 7447**

CATCODE: 740672
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.34.1. **Description.** Outdoor Recreation and Equipment Center supports a program that may, contingent upon the size of an installation and its geographical location, require multiple facilities under this category code (i.e., an Outdoor Recreation Center, Equipment Check-out) and possibly a marina support component. However, in the interest of operational efficiency and construction economy, components are collocated whenever possible. The facility or facilities may be located on-base or at off-base recreation areas.

7.4.34.2. **Requirements Determination.** At some locations, in the interest of operational efficiency, a marina operation may be supported out of the Outdoor Recreation and Equipment Center. For bases having waterfront areas with boating activities (including space for equipment storage, checkout and repair), this may be incorporated into the Outdoor Recreation and Equipment Center or developed as a free

standing facility. (Ensure the marina operation also provides for water pollution control and small boat pump-out capability.)

7.4.34.3. **Scope Determination.** See **Table 7.26**.

7.4.34.4. **Dimensions.** For Outdoor Recreation equipment loan/rental, see **Table 7.26**. For Marina Support Components, see **Table 7.27**.

7.4.34.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.26. Space Allowances for Outdoor Recreation Equipment Load/Rental Components.

Total Customer Base1	Gross Area	
	m2	ft2
Up to 1,000	325	3,500
1,001 to 2,000	465	5,000
2,001 to 4,000	697	7,500
4,001 to 8,000	929	10,000
8,001 to 12,000	1,160	12,500
12,001 to 20,000	1,490	16,000
20,001 to 50,000	1,905	20,500
NOTES: 1. Total customer base consists of active duty military strength plus 25 percent of the dependent population. Verify the total customer base using a validated Needs Assessment Study.		

Table 7.27. Space Allowances for Marina Support Components.

Total Customer Base1	Gross Area2	
	m2	ft2
Up to 100	None	
101 to 1,000	325	3,500
1,001 to 3,000	539	5,800
3,001 to 5,000	785	8,450
5,001 to 7,000	975	10,500
7,001 to 10,000	1,180	12,650
10,001 to 15,000	1,450	15,600
15,001 to 20,000	1,740	18,700
20,001 to 25,000	1,930	20,800
25,001 to 30,000	2,040	22,000
30,001 to 40,000	2,190	23,600
NOTES: 1. Total customer base consists of active duty military strength plus 15 percent of the dependent population. Verify the total customer base using a PVA. 2. Does not include docks, marina slips, and walkways which are subject to special consideration. This is a special facility, required only at outdoor recreation areas that have waterfront facilities available for boating activities.		

7.4.35. **Gymnasium (Fitness Center). FAC: 7421**

CATCODE: 740674
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.35.1. **Description.** The Air Force Fitness Center facilitates the readiness, fitness, and morale of Air Force members by providing effective, efficient, and pleasant spaces for individual and group exercise, unit physical training (PT), team and individual sports, testing, training/education, and necessary support.

7.4.35.2. **Requirements Determination.** Ensure the Fitness Center provides spaces for the following functions: fitness equipment spaces, unit PT and group exercise, fitness testing, fitness training, team and individual sports (intramural, extramural, varsity), administrative, support, and health and wellness. The Health and Wellness Center (HAWC) is a core space at main operating bases but not on Reserve installations and may be collocated with the Fitness Center. Consideration is given to providing this type facility for installations with a total customer base of 251 or more. Programs for bases or stations with a total customer base of 250 or less should be provided as a part of multipurpose recreation facilities, **CATCODE 740669**. For further guidance reference see UFC 4-740-02, *Fitness Centers* and the *Air Force Services Facilities Design Guide, Design: Fitness Centers.*

7.4.35.3. **Scope Determination.** Scope determination for the Fitness Center and HAWC are shown in the notes section of **Table 7.28**.

7.4.35.4. **Dimensions.** See **Table 7.28**.

7.4.35.5. **Design Considerations.** See UFC 4-740-02.

Table 7.28. Space Allowances for Fitness Centers and Health and Wellness Centers.

Allowable Area Computation Table					Gross Area				
Base Name: Home Town AFB									
Maximum Area Allocation for Fitness Center and HAWC					FC Auth		Max HAWC Auth		Min
Category	Population Bracket		ft2	m2	ft2	m2	ft2	m2	BB Court
Small	0	1,000	55,029	5,112	51,029	4,741	4,000	371	1
Medium 1	1,001	2,000	62,229	5,781	57,229	5,317	5,000	465	1
Medium 2	2,001	3,000	69,429	6,450	64,429	5,985	5,000	465	1
Medium 3	3,001	4,000	76,629	7,119	71,629	6,654	5,000	465	2
Medium 4	4,001	5,000	83,829	7,788	78,829	7,323	5,000	465	2
Large	5,001	6,000	91,029	8,457	85,029	7,899	6,000	557	2
Mega 1	6,001	7,000	98,236	9,126	92,236	8,569	6,000	557	2
Mega 2	7,001	8,000	103,236	9,591	97,236	9,033	6,000	557	2
Mega 3	8,001	9,000	108,236	10,055	102,236	9,498	6,000	557	2

Mega 4	9,001	10,000	113,236	10,520	107,236	9,962	6,000	557	2
Mega 5	10,001	11,000	118,236	10,984	112,236	10,427	6,000	557	2
Mega 6	11,001	12,000	123,236	11,449	117,236	10,891	6,000	557	3
Mega 7	12,001	13,000	128,236	11,913	122,236	11,356	6,000	557	3
Mega 8	13,001	14,000	133,236	12,378	127,236	11,820	6,000	557	3
Mega 9	14,001	15,000	138,236	12,842	132,236	12,285	6,000	557	3
Mega 10	15,001	16,000	143,236	13,307	137,236	12,749	6,000	557	3
Mega 11	16,001	17,000	148,236	13,771	142,236	13,214	6,000	557	3
Mega 12	17,001	18,000	153,236	14,236	147,236	13,678	6,000	557	3
Mega 13	18,001	19,000	158,236	14,700	152,236	14,143	6,000	557	3
Mega 14	19,001	20,000	163,236	15,165	157,236	14,607	6,000	557	3
Mega 15	20,000	21,000	168,236	15.629	162,236	15,072	6,000	557	3
Mega 16	21,000	22,000	173,236	16,094	167,236	15,536	6,000	557	3
Mega 17	22,000	23,000	178,236	16,558	172,236	16,001	6,000	557	3
Mega 18	23,000	24,000	183,236	17,023	177,236	16,465	6,000	557	4
Mega 19	24,000	25,000	188,236	17,487	182,236	16,930	6,000	557	4
Mega 20	25,000	26,000	193,236	17,952	187,236	17,394	6,000	557	4
Mega 21	26,000	27,000	198,236	18,416	192,236	17,859	6,000	557	4
Mega 22	27,000	28,000	203,236	18,881	197,236	18,323	6,000	557	4
Mega 23	28,000	29,000	208,236	19,345	202,236	18,788	6,000	557	4
Mega 24	29,000	30,000	213,236	19,810	207,236	19,252	6,000	557	4

NOTES:
1. The population used to calculate allowable area is as follows and requires verification using a valid PVA study:
a. 100 percent of Assigned Military Personnel – includes Air Force and other U.S. Military personnel, full-time Air Force Reserve and Air National Guard assigned to the installation. Include the number of military personnel from interservice support agreements with other U.S. and foreign/NATO services.
b. 50 percent of Family Members ages 13 years or older – includes all spouses, and children 13 years or older for those included in the Assigned Military personnel category. If the actual number is not available from the installation, the number may be calculated from the total family member population.
c. 100 percent DoD civilians assigned overseas – this category applies only if the base is overseas or in Alaska or Hawaii. Include DoD, NAF, AAFES, and DoDEA personnel. Do not include personnel as DoD civilians if they are counted as Family Members.
d. 100 percent of PCS members, students, or members TDY – when the installation regularly serves a substantial number (100 or more) of military transients greater than 30 consecutive days, the average daily strength, based on a firm projection of the total yearly load of such transients, may be added to the base population.
e. 100 percent of Host Nation Military or NATO Alliances – at PACAF and USAFE installations, assigned military members of host nations or NATO alliances may be added to the base population.
2. A minimum of two racquetball courts are authorized. Additional courts constructed as additives to fitness centers count against the total space authorization.
3. For populations less than 250, combine with community activity center, CATCODE 740669.
4. Space for mechanical equipment, rest rooms, and circulation has been added by a factor of 35 percent.
5. Shows maximum authorized scope only, not the scope that may be approved.
6. Due to higher utilization of overseas facilities, consider adding up to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
7. For populations over 7,000, the installation should determine whether it is more cost effective and manpower-efficient to build one large complex or multiple smaller sized facilities.

7.4.36. **Base Library. FAC: 7416**

CATCODE: 740675
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.36.1. **Description.** This facility provides space for use, housing, and issuance of print, non-print, telecommunications, and electronic materials at each base for the support of the primary mission of the base, professional military education, voluntary education, lifelong learning, and for unstructured leisure use.

7.4.36.2. **Requirements Determination.** The base library supports a program that may, contingent upon the base mission, encompass or require three separate facilities under this category code (i.e., a main library, a branch library, and a library service center). Include space and infrastructure to support a fully equipped internet center for customer

use. Include adequate storage for removable media and computer peripherals. Libraries do not house fast food establishments other than small coffee cafes operated by AAFES, a NAF concessionaire, or Services Clubs.

7.4.36.3. **Scope Determination.** Space allowances are given in **Table 7.29** for Main Libraries and **Table 7.30** for Library Service Centers. These allowances may be increased by ten percent when the facility is designated a command reference center. AFI 34-270, *Air Force Library and Information System (AFLIS)*, establishes policies and procedures for the organization, administration, and operation of Air Force libraries. Space allowances for branch libraries, where justified, are specific, and a table is not required. Refer to UFC 4-740-20, *Libraries*, for space requirements in library functional areas.

7.4.36.3.1. **Branch Libraries.** When justified by the requirements of a particular installation, branch libraries, not exceeding 372 m^2 (4,000 ft^2) in gross area, may be provided in support of an education center or for each 3,000 increment of military strength over 10,000. Where troop concentrations permit consolidation, the gross area authorized for each 3,000 increment of military strength over 10,000 may be combined into one branch library. These space allocations are in addition to the space criteria for main libraries.

7.4.36.3.2. **Library Service Centers.** When justified by the requirements of a particular area or command, a library service center may be authorized. Building size is to be determined by the maximum quantity of library materials to be on hand at any one time, i.e., the number of books or other items held in reserve plus the number of items on hand to be processed for distribution. Space allowances are shown in **Table 7.29**.

7.4.36.4. **Dimensions.** See **Table 7.29** and **7.30**.

7.4.36.5. **Design Considerations.** See UFC 4-740-20.

Table 7.29. Space Allowances for Base Libraries (Main Libraries).

Total Customer Base1,2	Gross Area3,4	
	m2	ft2
Up to 500	232.3 m2 (2,500 ft2) located in other facilities	
501 to 1,500	418	4,500
1,501 to 2,500	581	6,250
2,501 to 4,000	743	8,000
4,001 to 6,000	975	10,500
6,001 to 8,000	1,110	12,000
8,001 to 12,000	1,670	18,000
12,001 to 16,000	1,930	20,800
16,001 to 20,000	2,230	24,000
20,001 to 26,000	2,790	30,000
26,001 to 32,000	3,340	36,000
32,001 to 40,000	4,090	44,000
40,001 to 50,000	5,020	54,000
50,001 to 60,000	5,950	64,000

Total Customer Base1,2	Gross Area3,4	
	m2	ft2
NOTES: 1. Total customer base consists of military strength plus 40 percent of dependent population. 2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii). 3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii). 4. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.		

Table 7.30. Space Allowances for Base Libraries (Library Service Centers).

Library Materials to be Housed (Volumes, Audiovisual, Periodicals, Mailing Supplies)	Gross Area	
	m2	ft2
Up to 40,000	557	6,000
40,001 to 60,000	929	10,000
60,001 to 80,000	1,210	13,000
80,001 to 100,000	1,490	16,000
100,001 to 120,000	1,770	19,000
120,001 to 140,000	2,040	22,000
140,001 to 160,000	2,230	24,000
160,001 to 180,000	2,420	26,000
180,001 to 200,000	2,600	28,000

7.4.37. **Indoor Skating Rink. FAC: 7418**

CATCODE: 740678
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.37.1. **Description.** This facility serves as a roller/ice skating rink requiring a hard surface floor with potential for multipurpose use.

7.4.37.2. **Requirements Determination**. See notes section of **Table 7.31**.

7.4.37.3. **Scope Determination.** Minimum rink size should be 929 m^2 (10,000 ft^2) with additional space as required for support functions. **Table 7.31** gives the recommended size based upon total customer base.

7.4.37.4. **Dimensions.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.37.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.31. Space Allowances for Roller/Ice Skating Rinks.

Total Customer Base1,2	Gross Area3,4,5,6	
	m2	ft2
Up to 2,000	929	100,007
2,001 to 20,000	1,390	150,008
20,001 and up	1,860	200,008

NOTES:
1. Total customer base is defined as active duty military personnel assigned to the installation plus 50 percent of dependent personnel. Verify the total customer base using a validated PVA.
2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
4. Exclusive of mechanical room space.
5. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.
6. The scope can be influenced by PVA. Contact MAJCOM Director of Services for current criteria and guidelines.

7. Plus additional space for support functions.
8. Includes space for support functions.

7.4.38. **Red Cross Office. FAC: 6100**

CATCODE: 740717
OPR: AF/A1D
OCR: AF/A1S, AFSVA, MAJCOM/A1S

7.4.38.1. **Description.** The Red Cross Director and his staff provide counsel and act as the investigating agency for military dependents in judging hardship discharges.

7.4.38.2. **Requirements Determination.** Space allowances are determined under the administrative space criteria given in **Chapter 6** of this Manual. There are no DoD criteria for the facility; therefore, projects are approved as exceptions to criteria.

7.4.38.3. **Requirements Determination.** Contact OPR for latest requirements and guidance.

7.4.38.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.38.5. **Design Considerations.** Office space for the Red Cross may be included in the base headquarters or in a similar administrative building. Collocation with the Airman and Family Readiness Center (**CATCODE 740253**), is desirable.

7.4.39. **Restaurant Fund CWF Facility. FAC: 7417**

CATCODE: 740732
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.39.1. **Description.** This facility requirement is generated by programs and activities associated with nonappropriated fund entities established under AFJI 34-122, *Civilian Nonappropriated Funds and Morale, Welfare, and Recreation Activities,* established to operate revenue producing activities primarily for base civilian employees. A portion of the profit from the restaurant fund revenue producing activities is used to provide a source of income for the installation civilian welfare fund.

7.4.39.1.1. AFJI 34-122 provides guidance on acceptable programs and facility descriptions. There are no standard programs except that certain activities are prohibited by AFJI 34-122. For example, civilian nonappropriated funds may not be used to finance approved facilities and services normally provided from appropriated funds. Also excluded from fund support are the special interest clubs or groups established under AFI 34-223 *Private Organizations (PO) Program*, to serve purposes other than those for which civilian nonappropriated funds are primarily intended.

7.4.39.2. **Requirements Determination.** Facility requirements to support approved activities are developed by the base restaurant fund council. The major commander approves facility requirements for base restaurant funds.

7.4.39.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.4.39.4. **Dimensions.** Refer to **Table 7.32**.

7.4.39.5. **Design Considerations.** At overseas installations (excluding Hawaii, Alaska, and the Panama Canal Zone), approved activities exclude any activity normally supported by joint-use military/civilian employee facilities. Most base restaurant fund and base civilian welfare fund facility acquisitions involve space or facilities excess to military requirements.

Table 7.32. Space Allowances for Base Restaurants.

Number of Civilian Employees	Gross Area	
	m2	ft2
500 to 700	455	4,900
701 to 1,000	808	8,700
1,001 to 1,500	1,160	12,500
1,501 to 2,000	1,460	15,700
2,001 to 2,500	1,780	19,200
2,501 to 3,000	2,120	22,800
3,001 to 3,500	2,510	27,000
3,501 to 4,000	2,830	30,500
4,001 to 4,500	3,150	33,900
4,501 and up	3,440	37,000

7.4.40. **Civilian Fund CWF Facility. FAC: 7417**

CATCODE: 740733
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.40.1. **Description.** See Restaurant Fund MWR Facility (**CATCODE 740732**).

7.4.40.2. **Requirements Determination.** Facility requirements to support approved activities are developed by the base civilian welfare fund council. Installation commanders approve facility requirements for base civilian welfare funds.

7.4.40.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

7.4.40.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.40.5. **Design Considerations.** See **CATCODE 740732**.

7.4.41. **Base Restaurant. FAC: 7332**

CATCODE: 740735
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.41.1. **Description.** This facility identifies space occupied by a restaurant or food court or by restaurant-operated snack bars, vending machines, or other food service related activity.

7.4.41.2. **Requirements Determination.** Space allowances for restaurants and food courts are established by DoD. (To economize on the use of category codes, **CATCODE 740735** is also used to identify existing space at overseas bases occupied by foreign national civilian canteens. In inventory records, this usage is normally indicated by the presence of an outgrant symbol.)

7.4.41.3. **Scope Requirements.** The total scope of base restaurant operations, including satellite operations, should be a minimum of 4,646 m^2 (50,000 ft^2) for bases with a civilian population of at least 10,000. The actual scope will be determined by a PVA conducted by the MAJCOM.

7.4.41.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.4.41.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.4.42. **Base Theater. FAC: 7431**

CATCODE: 740873
OPR: AAFES
OCR: N/A

7.4.42.1. **Description.** The theater has three basic functions. It is used to show moving pictures and to present live stage productions. It is also used as an auditorium where commanders can assemble their personnel for group instruction. Such activities as graduation exercises, organizational meetings, character guidance lectures, troop information programs, officer and airmen calls, and general meetings of clubs are held regularly in this facility.

7.4.42.2. **Requirements Determination.** Space allowances for theaters are given in **Table 7.33**. All theaters include a stage.

7.4.42.3. **Scope Determination.** Designs have been developed by AAFES for a snack stand to be located in the Base Theater. Drawings for site adaptation can be obtained from AAFES.

7.4.42.4. **Dimensions.** See **Table 7.33**.

7.4.42.5. **Design Considerations.** Seating capacity is influenced by the number of military families living on or near base; the distance to, and availability of, adequate off-base recreational facilities; and the base military strength.

Table 7.33. Facility Requirements for Theaters.

Military Strength	Number of Theaters	Capacity
Up to 300	Accommodate in other facilities	
301 to 1,000	1	325.2 m2 (3,500 ft2)
1,001 to 2,000	1	350 seat w/dressing room
2,001 to 3,000	1	500 seat w/dressing room
3,001 to 7,000	1	1,000 seat w/dressing room
7,001 to 10,000	1	500 seat w/o dressing room
	1	1,000 seat w/dressing room
10,001 to 15,000	2	500 seat w/o dressing room
	1	1,000 seat w/dressing room
15,001 to 20,000	3	500 seat w/o dressing room
	1	1,000 seat w/dressing room
20,001 to 25,000	2	500 seat w/o dressing room
	1	1,000 seat w/dressing room

7.4.43. Youth Center.

FAC: 7417
CATCODE: 740883
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.43.1. **Description.** Youth Centers may be established to accommodate the youth activities, youth support, and school age (before and after school) programs for youth members of military and DoD civilian families.

7.4.43.2. **Requirements Determination.** This facility provides spaces for before and after school care, informal recreation, indoor sports, lessons, meetings, parties, video and television watching, and other youth functions. Separate areas for the before and after school program and teen center may be provided. Contact MAJCOM Director of Services for current criteria and guidelines.

7.4.43.3. **Scope Determination.** Space allowances are given in **Table 7.34** for programs without before and after school programs located in the Youth Center. Space allowances for before and after school programs are given in **Table 7.34.1**. However, these tables only reflect the actual usage space for the youth/children. Incorporate additional area for

administration work spaces, office storage, corridors, restrooms, etc. More detailed and complete information and space requirements are found in UFC 4-740-06, *Youth Centers*.

7.4.43.4. **Dimensions.** See **Table 7.34** and **7.34.1**.

7.4.43.5. **Design Consideration.** See UFC 4-740-06.

Table 7.34. Space Allowances for Youth Centers – Youth Population[1].

Youth Population2	Gross Area3,4	
	m2	ft2
Up to 250	Accommodate in other facilities	
251 to 600	622	6,700
601 to 1,200	836	9,000
1,201 to 2,400	1,050	11,340
2,401 to 7,200	1,720	18,500
For each additional 600, add	215	2,310

NOTES:
1. Environmental adjustment factor: This table provides maximum allowances when no such facilities are provided by the local community. Consider facilities provided by the local community in justifications for youth centers.
2. Establish youth population by obtaining the number of youth 6-18 years of age of the active duty assigned to the installation from AF/A1 or AF/A1S.
3. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.
4. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by architectural programming studies. Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.34.1. Space Allowances for Youth Centers – School Age Program Enrollment[1].

School Age Program Enrollment2	Gross Area3,4,5,6	
	m2	ft2
0-12	Accommodate in other facilities	
13-24	39-78	420-840
25-36	78.1-117	841-1260
37-48	117-156	1261-1680
49-60	156-195	1681-2100
61-72	195-234	2101-2520
73-84	234-273	2521-2940
85-96	273-312	2941-3360
97-108	312-351	3361-3780
For each additional group of 12 children	39	420

NOTES:
1. Environmental adjustment factor – This table provides maximum allowances when no such facilities are provided by the local community. Consider facilities provided by the local community in justifications for youth centers.
2. Establish youth population by obtaining the number of youth 6-18 years of age of the active duty assigned to the installation from AF/A1 or AF/A1S.
3. Mechanical equipment room space as required should be added to the gross areas shown when determining a single gross area for each facility.
4. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by architectural programming studies. Contact MAJCOM Director of Services for current criteria and guidelines.
5. If the before and after school program is housed in a separate facility and has enrollment over 48 children, make provisions for administrative space.
6. If the before and after school program space is going to double function for part-day pre-school, ensure each room has an exterior exit and toilets in or near the room.

7.4.44. **Child Development Center. FAC: 7341**

CATCODE: 740884
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.4.44.1. **Description.** Child Development Centers may be established to provide child care for children from the ages of six weeks through five years of age for full-day, part-day, and hourly service.

7.4.44.2. **Requirements Determination.** Development of the facility space program should take into consideration the demand for care for each age group to determine the number and distribution of care room types, the anticipated proportion of full- versus part-day care, and the existing child care facilities on base and their adequacies or inadequacies relative to current and future needs. For planning criteria see UFC 4-740-14, *Design: Child Development Centers*. Any criteria not specifically addressed in the Air Force guidance is established by the reference manual, *National Health and Safety Performance Standards: Guidelines for Out-of-Home Child Care Programs*, by the American Public Health Association and the American Academy of Pediatrics.

7.4.44.3. **Scope Determination.** Estimate the number of children that can be served in child development center annexes. Subtract this number from the projected need. If child care services comparable in quality, cost, and service to those in the child development center are available in the civilian community or through family care homes on base, these should also be considered in projecting unmet needs. Other functions to be accommodated include administrative support oversight of family day care, information and referral services, and special needs care.

7.4.44.4. **Dimensions.**

7.4.44.4.1. **Sizing Parameters.** The minimum size should accommodate no fewer than 48 children. Base space allowance per child on an average of 7.9 m^2 (85 ft^2), not including mechanical or administrative space, including space for the family day care administrative office and lending program, which should be added to the gross total for the facility. Limit facility size to no more than 305 children per site. See UFC 4-740-14.

7.4.44.4.2. **Experience Data.** The capacity of the facility should be based on historical data experience when available. Waiting lists should be reviewed and updated to project unmet need. Consider expected changes in mission. Where no experience data is available, use the DoD formula for projecting need in AFI 34-248, *Child Development Centers*, or consult AF/A1S for need data.

7.4.44.5. **Design Considerations.** See UFC 4-740-14.

7.5. Category Group 75, Outdoor Morale, Welfare, and Recreation Facilities,

7.5.1. **Overview.**

7.5.1.1. **General Criteria** The Air Force Fitness Centers and sports complexes are designed to obtain maximum voluntary participation in the most commonly recognized fitness and sports programs. In the interest of good play, ensure the fields and courts are regulation size and design.

7.5.1.2. The criteria given in this chapter are established by the DoD and apply to both appropriated and nonappropriated fund projects. They are considered ample to satisfy the requirements of typical fitness and sports programs. Where there is an evident need for greater allowances or for facilities that are not listed in this chapter, guidance given in AFI 32-1022 (NAF projects), AFI 32-1032 (O&M projects), and AFI 32-1021 (MILCON/P-341 projects), or waivers and exceptions to criteria should be followed. Consult this chapter's previous sections for criteria on dining halls, kitchen facilities, visiting officer quarters, and temporary lodging facilities. MAJCOM/A1S reviews actions of these facilities.

7.5.1.3. Guidance given in **paragraph 7.4.1**, relative to population basis also applies to the criteria given in this section.

7.5.1.4. Night lighting may be provided as required for the athletic fields and recreation courts described in this section.

7.5.2. **Athletic Field, Baseball. FAC: 7522**

CATCODE: 750172
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.2.1. **Description.** One regulation baseball field with superimposed regulation football field may be provided at installations with a military strength of 1,000 or more.

7.5.2.2. **Requirements Determination.** Junior baseball fields and soccer fields may be provided for family members, ages 6 to 19, according to **Table 7.35**.

7.5.2.3. **Scope Determination.** See **Table 7.35**

7.5.2.4. **Dimensions.** See UFC 4-750-02N.

7.5.2.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.35. Athletic Fields.

Family Member Population1 (Ages 6-19)	Number of Fields1,2,3,4		Number of Softball Fields	
	Football/Soccer	Baseball	Auth Customers	Softball
Up to 999	4	4	Up to 1,000	4
1,000 to 1,499	6	4	1,001-2,000	6
1,500 to 1,999	8	5	2,001-3,000	7
2,000 to 2,499	10	6	3,001-4,000	10
2,500 to 3,249	11	7	4,001-5,000	12
3,250 to 3,999	12	8	5,001-6,000	14
4,000 to 4,749	14	9	6,001-7,000	16
4,750 to 5,499	16	10	7,001-8,000	16

NOTES:
1. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
2. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.
3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
4. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.

7.5.3. **Athletic Field, Football/Soccer. FAC: 7522**

CATCODE: 750175
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.3.1. **Description.** Football/Soccer field.

7.5.3.2. **Requirements Determination.** Football/Soccer fields may be provided for family members, ages 6 to 19, according to **Table 7.35**.

7.5.3.3. **Scope Determination.** See **Table 7.35**.

7.5.3.4. **Dimensions.** See UFC 4-750-02N.

7.5.3.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.4. **Athletic Field, Track. FAC: 7523**

CATCODE: 750177
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.4.1. **Description.** Installation athletic field running track.

7.5.4.2. **Requirements Determination.** A 400 meter running track is authorized at installations.

7.5.4.3. **Scope Determination.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.4.4. **Dimensions.** See UFC 4-750-02N.

7.5.4.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.5. **Athletic Field, Softball. FAC: 7522**

CATCODE: 750178
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.5.1. **Description.** Installation Softball field.

7.5.5.2. **Requirements Determination.** **Table 7.35** may be used as a guide to determine the requirement for softball fields.

7.5.5.3. **Scope Determination.** See **Table 7.35**.

7.5.5.4. **Dimensions.** See UFC 4-750-02N.

7.5.5.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.6. **Athletic Field, Standard. FAC: 7522**

CATCODE: 750179
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.6.1. **Description.** Athletic field, Standard.

7.5.6.2. **Requirements Determination.** At installations with a military strength exceeding 1,000, stands may be provided with a maximum seating capacity equivalent to one-third of the installation's military strength.

7.5.6.3. **Scope Determination.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.6.4. **Dimensions.** See UFC 4-750-02N.

7.5.6.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.7. **Tennis Court. FAC: 7521**

CATCODE: 750347
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.7.1. **Description.** Tennis court.

7.5.7.2. **Requirements Determination.** See notes in **Table 7.36**

7.5.7.3. **Scope Determination.** Allowances are given in **Table 7.36**.

7.5.7.4. **Dimensions.** See UFC 4-750-02N.

7.5.7.5. **Design Consideration.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.36. Allowances for Athletic Courts1, 2, 3, 4.

Authorized Customers5	Tennis Courts	Volleyball Courts	Basketball Courts	Badminton Courts
Up to 1,000	5	3	2	1
1,001-2,000	6	6	3	2
2,001-3,000	7	9	4	3
3,001-4,000	8	12	5	4
4,001-5,000	9	15	6	5
5,001-6,000	10	18	7	6
6,001-7,000	11	21	8	7
7,001-8,000	12	24	9	8
8,001-9,000	13	27	10	9
9,001-10,000	14	30	11	10

NOTES:
1. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.
2. The scope may also be influenced PVA. Contact AFSVA/Fitness & Sports for current criteria and guidelines.
3. Due to higher utilization of overseas facilities, consider adding up to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
4. For every 1,000 personnel over 10,000, increase field and court allowance in accordance with a valid PVA.
5. The population used to calculate allowable area is as follows and requires verification using a valid PVA.
a. 100 percent of Assigned Military Personnel – includes Air Force and other U.S. military personnel, full-time Air Force Reserve, and Air National Guard assigned to the installation. Include the number of military personnel from interservice support agreements with other U.S. and foreign/NATO services.

b. 50 percent of Family Members ages 13 years or older – includes all spouses, and children 13 years or older for those included in the Assigned Military personnel category. If the actual number is not available from the installation, the number may be calculated from the total family member population.
c. 100 percent DoD civilians assigned overseas – this category applies only if the base is overseas or in Alaska or Hawaii. Include DoD, NAF, AAFES, and DoDEA personnel. Do not include personnel as DoD civilians if they are counted as Family Members.
d. 100 percent of PCS members, students, or members TDY – when the installation regularly serves a substantial number (100 or more) of military transients greater than 30 consecutive days, the average daily strength, based on a firm projection of the total yearly load of such transients, may be added to the base population.
e. 100 percent of Host Nation Military or NATO Alliances – For PACAF and USAFE installations, assigned military members of host nations or NATO alliances may be added to the base population.

7.5.8. **Recreational Court. FAC: 7521**

CATCODE: 750349
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.8.1. **Description.** See notes in **Table 7.36**.

7.5.8.2. **Requirements Determination.** See notes in **Table 7.36**.

7.5.8.3. **Scope Determination.** Allowances are given in **Table 7.36**.

7.5.8.4. **Dimensions.** See UFC 4-750-02N.

7.5.8.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

7.5.9. **Outdoor Recreation Pavilion. FAC: 7531**

CATCODE: 750371
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.9.1. **Description.** The outdoor recreation pavilion is a covered, open-sided facility used to support recreation areas such as parks, playgrounds, picnic areas, beaches, etc.

7.5.9.2. **Requirements Determination.** Space allowances given in **Table 7.37**, may be utilized in varying numbers and sizes of pavilions.

7.5.9.3. **Scope Determination.** See Notes 3 and 4 in **Table 7.37**.

7.5.9.4. **Dimensions.** Allowances are given in **Table 7.37**.

7.5.9.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

Table 7.37. Space Allowances for Outdoor Recreation Pavilions.

Military Population1,2	Gross Area3,4,5	
	m2	ft2
Up to 1,000	74	800
1,001 to 3,000	125	1,350
3,001 to 7,000	242	2,600
7,000 to 10,000	297	3,200
10,001 to 15,000	372	4,000
15,001 to 20,000	455	4,900
20,001 to 25,000	520	5,600
25,001 to 30,000	585	6,300
30,001 to 40,000	678	7,300

NOTES:
1. Military population is defined as active duty military assigned to the facility plus 50 percent of their dependents. Verify the total customer base using a validated PVA study.
2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
3. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.
4. The scope can be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.
5. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).

7.5.10. **Golf Clubhouse. FAC: 7413**

CATCODE: 750422
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.10.1. **Description.** The clubhouse component contains space for an office, storage and issue of golf clubs and related equipment, locker rooms, a snack bar and lounge, a pro shop sales area, and restrooms. The equipment building component, which may be incorporated with the clubhouse or developed as a separate building, is mostly used for storing powered golf carts. The equipment maintenance building located on a golf course to house and store grounds maintenance equipment and supplies, is carried and reported as Golf Equipment Building (**CATCODE 750423**). The clubhouse and equipment building components are carried and reported as **CATCODE 750422**. For courses that have 18 holes or more, provide allowances for course snack bars and latrines in addition to other buildings on the course.

7.5.10.2. **Requirements Determination.** See Notes in **Table 7.38**.

7.5.10.3. **Scope Determination.** See Notes 3, 4, and 5 in **Table 7.38**.

7.5.10.4. **Dimensions.** See **Table 7.38**.

7.5.10.5. **Design Considerations.** See UFC 4-750-01NF, *Design: Golf Clubhouses.*

Table 7.38. Golf Facilities.

Military Population1,2,3,4,5	Golf Course5,6 Number of Holes	Clubhouse Component5		Maintenance Building (Equipment Building)5,7	
		Gross Area			
		m2	ft2	m2	ft2
2,000-4,000	9	464-650	5,000-7,000	465-650	5,000-7,000
4,001-8,000	18	557-1,110	6,000-12,000	650-929	7,000-10,000
8,001-14,000	27	929-1,390	10,000-15,000	743-929	8,000-10,000
14,001 and up	36	1,300-1,860	14,000-20,000	929-1,110	10,000-12,000

NOTES:
1. Military population consists of military strength plus 20 percent of their dependents and 40 percent of retired military personnel supported by the facility. Verify the total customer base using a validated PVA study.
2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
4. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth comprehensive market research and analysis.
5. The scope can be influenced by PVA studies. Refer to AFI 34-205, Services Nonappropriated Fund Facility Projects, and contact MAJCOM Director of Services or AFSVA/SVXF for current PVA criteria and guidelines.
6. A pitch-and-putt course is considered the equivalent of a golf course of the same number of holes.
7. Based on industry data, the approximate square footage needed for cart storage facilities is determined by dividing the number of carts to be stored by a factor of 0.014.

7.5.11. **Golf Equipment Building. FAC: 7413**

CATCODE: 750423
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.11.1. **Description.** See **CATCODE 750422**.

7.5.11.2. **Requirements Determination.** See Notes in **Table 7.38**.

7.5.11.3. **Scope Determination.** See Notes in **Table 7.38**.

7.5.11.4. **Dimensions.** See **Table 7.38**.

7.5.11.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.12. **9-Hole Golf Course. FAC: 7513**

CATCODE: 750426
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.12.1. **Description.** See **CATCODE 750422**.

7.5.12.2. **Requirements Determination.** See Notes in **Table 7.38**.

7.5.12.3. **Scope Determination.** See Notes in **Table 7.38**.

7.5.12.4. **Dimensions.** See **Table 7.38**.

7.5.12.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.13. **18-Hole Golf Course. FAC: 7513**

CATCODE: 750427
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.13.1. **Description.** See **CATCODE 750422**.

7.5.13.2. **Requirements Determination.** See Notes in **Table 7.38**.

7.5.13.3. **Scope Determination.** See Notes in **Table 7.38**

7.5.13.4. **Dimensions.** See **Table 7.38**.

7.5.13.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.14. **Golf Driving Range. FAC: 7514**

CATCODE: 750429
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.14.1. **Description.** Golf driving range.

7.5.14.2. **Requirements Determination.** Each Air Force installation is authorized a driving range of the required size.

7.5.14.3. **Scope Determination.** See Notes 3, 4, and 5 in **Table 7.38**.

7.5.14.4. **Dimensions.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.14.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.15. **Miscellaneous Outdoor Recreational Facility. FAC: 7542**

CATCODE: 750581
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.15.1. **Description.** This facility accommodates miscellaneous outdoor recreation activity. This activity is defined as any type not normally conducted in, or supported by, any of the other facilities described in this chapter or listed under basic category 750. (Parcours trail, described below, is an exception.) The designation applies to both the outdoor facility and its related buildings.

7.5.15.1.1. **Parcours Trail.** This facility is identified under **CATCODE 750581**. It is an outdoor exercise course (trail) designed and equipped to help people of differing fitness levels to develop and maintain good physical condition. The course is normally 2.4 to 3.2 km (1.5 to 2.0 mi) long and contains approximately 20 exercise stations. The allowance is "as needed", providing the land is available and is not needed for any foreseeable operational purpose.

7.5.15.1.2. **RV Storage Lot**. This facility is identified as part of **CATCODE 750581**. The facility typically consists of a paved or graveled parking area delineated into separate slots, a security perimeter fence, a manual or automated controlled access gate, and security lighting, along with access roads and related parking. The scope is also influenced by the Services NAF construction allowance "as needed", providing the land is available and is not needed for any foreseeable operational purpose.

7.5.15.1.3. **Artificial Climbing Wall**. This facility is identified as part of **CATCODE 750581**. The facility typically consists of a prefabricated scaffold and panel system attached to an internal or external facility wall (ensure this meets manufacturer's specifications), a free standing internal scaffold and panel structure, or a poured and sculpted in-place concrete-like structure. Ensure access to restrooms.

7.5.15.1.4. **Ropes Course.** This facility is identified as part of **CATCODE 750581**. The facility typically consists of massive treated wooden poles set in the ground (similar in size to telephone poles) and connected by cables. They are generally sited in out-of-the-way locations to lessen the trespass potential. Requires access roads, related parking, picnic table-style seating, trash receptacles, and access to permanent or portable toilet facilities.

7.5.15.1.5. **Paintball Field.** This facility is identified as part of **CATCODE 750581**. The facility typically consists of large areas that may or may not be enclosed by tall, fine mesh fencing, a number of semi-permanent "obstacles" (e.g., large concrete or plastic piping, small "buildings." etc.) used by players for protection or concealment, a safe zone for testing and unloading paintball markers, and sun protected shaded area. Requires access roads, related parking, picnic table-style seating, trash receptacles, and access to permanent or portable toilet facilities.

7.5.15.1.6. **Bicycle Motocross (BMX) Track.** This facility is identified as part of **CATCODE 750581**. The facility typically consists of a large area with mounded, shaped, and groomed dirt features used for bicycle racing events. A starting gate structure and timing/announcing booth may be included. Requires access roads, related parking, picnic table-style seating, trash receptacles, bicycle maintenance areas, and access to permanent or portable toilet facilities.

7.5.15.1.7. **Skateboard and Bike Park.** This facility is identified as part of **CATCODE 750581**. The facility typically consists of an open or fenced smoothly paved area with semi-permanent or cast-in-place elements such as ramps and half-pipes used by skateboarders and bicyclists to perform tricks and stunts. Requires access roads, related parking, picnic table-style seating, trash receptacles, and access to permanent or portable toilet facilities.

7.5.15.2. **Requirements Determination**. See specific facility type above.

7.5.15.3. **Scope Determination**. The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by a PVA study. The allowance is "as needed", providing the land is available and is not needed for any foreseeable operational purpose.

7.5.15.4. **Dimensions**. See specific facility type above.

7.5.15.5. **Design Considerations**. See specific facility type above.

7.5.16. **Civilian Welfare Fund Outdoor Facility. FAC: 7542**

CATCODE: 750582
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.16.1. **Description**. This category code identifies land and site improvements used for outdoor recreation, such as picnic pavilions and tennis and basketball courts but excluding civilian fund operated golf courses and driving ranges. Identify the latter facilities under **CATCODE 750426**, **750427**, and **750429**.

7.5.16.2. **Requirements Determination**. Contact OPR for latest requirements and guidance.

7.5.16.3. **Scope Determination**. Contact OPR for latest requirements and guidance.

7.5.16.4. **Dimensions**. Contact OPR for latest requirements and guidance.

7.5.16.5. **Design Considerations**. Contact OPR for latest requirements and guidance.

7.5.17. **Riding Stables. FAC: 7444**

CATCODE: 750583
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.17.1. **Description**. This facility is established to provide buildings and fenced land area to keep and care for horses NAF-owned or privately owned by military and dependent personnel as defined in **Table 7.39**.

7.5.17.2. **Requirements Determination**. See **Table 7.39**.

7.5.17.3. **Scope Determination**. See Notes 3 and 4 in **Table 7.39**.

7.5.17.4. **Dimensions**. Contact OPR for latest requirements and guidance.

7.5.17.5. **Design Considerations**. Contact OPR for latest requirements and guidance.

Table 7.39. Space Allowances for Riding Stables.

Military Population1,2	Number of Stalls2,3,4,5	Gross Area2,3,4,5,6	
		m2	ft2
Up to 100	None		
101 to 1,000	5	195	2,100
1,001 to 3,000	7	232	2,500
3,001 to 5,000	12	334	3,600
5,001 to 7,000	16	437	4,700
7,001 to 10,000	21	548	5,900
10,001 to 15,000	29	715	7,700
15,001 to 20,000	37	892	9,600
20,001 to 25,000	43	1,050	11,250
25,001 to 30,000	50	1,190	12,800
30,001 to 40,000	60	1,650	17,800

NOTES:
1. Military population is defined as active duty military personnel assigned to the installation plus 25 percent of dependent population. Verify the total customer base using a validated PVA study.
2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
3. Shows maximum authorized scope only, not the scope that may be approved. Base the scope used for programming, budgeting, and design on need as documented by a professional, in-depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities.
4. The scope may also be influenced by PVA. Contact MAJCOM Director of Services for current criteria and guidelines.
5. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
6. Contact the local extension service, horse clubs, or organizations for the minimum paddock area for horses.

7.5.18. **Family Camp Grounds (FAMCAMP). FAC: 7541**

CATCODE: 750611
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S

7.5.18.1. **Description.** FAMCAMPs are designated facilities and areas located on or near Air Force installations which support family camping activities for authorized transient personnel.

7.5.18.2. **Requirements Determination.** The USAF FAMCAMP Program is applicable to installations in North America only. Base FAMCAMPs on market demand which has been validated by a PVA study. Factors to consider in determining a requirement include average daily transient population, access to the interstate highway system, availability of

other public or private campgrounds, and their distance from the nearest existing FAMCAMP.

7.5.18.2.1. Parking spaces for camping vehicles with adjoining grounds should occupy a space of 186 m^2 to 279 m^2 (2,000 ft^2 to 3,000 ft^2) for each camp site. Each site should contain a parking space, tent area, picnic table, and cooking grill.

7.5.18.2.2. A tent camping area should be provided. Camp sites should be a minimum of 12 m (40 ft) apart to ensure a degree of privacy and located away from the recreational vehicle campers.

7.5.18.2.3. Include a general purpose building, as required, of 46 m^2 (500 ft^2) minimum or 2.3 m^2 (25 ft^2) per site, whichever is larger, with toilets, lavatories, showers, service sink, laundry room with washers and dryers, and office/staff area.

7.5.18.2.4. Provide a sanitary station at each camping vehicle parking space for the deposit of sewage from vehicle holding tanks.

7.5.18.2.5. Watering stations are necessary at each camping vehicle parking space to supply potable water to vehicle storage tanks.

7.5.18.2.6. Provide water and electrical outlets at each camping vehicle parking space.

7.5.18.2.7. Include a children's play area.

7.5.18.3. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by the PVA study.

7.5.18.4. **Dimensions.** See **paragraph 7.5.18.2**.

7.5.18.5. **Design Consideration.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.19. **Indoor Swimming Pool. FAC: 7422**

CATCODE: 740677
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.19.1. **Description.** See Consolidated Swimming Pool (**CATCODE 750812**).

7.5.19.2. **Requirements Determination.** See Notes in **Table 7.40**.

7.5.19.3. **Scope Determination.** See Note 5 in **Table 7.40** and **paragraph 7.5.18.3**.

7.5.19.4. **Dimensions.** See **Table 7.40**.

7.5.19.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.20. **Swimmers Bath House. FAC: 7385**

CATCODE: 750811
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.20.1. **Description.** A bathhouse should include a check-in area, equipment storage area, lifeguard room, office, showers, toilet facilities, and dressing room areas, including wall lockers for both male and female swimmers.

7.5.20.2. **Requirements Determination.** A bathhouse is normally required only at outdoor recreation areas that have an outdoor swimming pool or beach facilities.

7.5.20.3. **Scope Determination.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.20.4. **Dimensions.** See Note 4, **Table 7.40**. One bathhouse, not to exceed 372 m^2 (4,000 ft^2) gross area, may be provided with each 25-meter outdoor swimming pool. One bathhouse of 604 m^2 (6,500 ft^2) gross area may be provided with each 50-meter outdoor swimming pool.

7.5.20.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.21. **Consolidated Swimming Pool. FAC: 7512**

CATCODE: 750812
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.21.1. **Description.** This is an installation swimming pool serving both officers and enlisted, where officers and enlisted share all functional areas.

7.5.21.2. **Requirements Determination.** See Note 4 in **Table 7.40**.

7.5.21.3. **Scope Determination.** See Note 5 in **Table 7.40**.

7.5.21.3.1. One installation swimming pool may be enclosed to allow for year-round use. The building should not exceed 1,320 m^2 (14,200 ft^2) gross area for a 25-meter swimming pool with locker rooms, and should not exceed 2,120 m^2 (22,800 ft^2) gross area for a 50-meter swimming pool exclusive of the locker rooms.

7.5.21.3.2. Allowances for indoor and outdoor swimming pools are in **Table 7.40**. Wading and splash pools are not included in the water area shown in **Table 7.40** but may be added to each outdoor swimming pool.

7.5.21.3.3. Space should also be added for diving areas for indoor and outdoor pools. Provide a minimum safety deck width of 3.7 m (12 ft) indoors and 4.6 m (15 ft) outdoors around each pool except at the diving board end, where 4.6 m (15 ft) is the standard indoors and 6.1 m (20 ft) is the standard outdoors.

7.5.21.4. **Dimensions.** See **Table 7.40**.

7.5.21.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

Table 7.40. Allowances for Indoor and Outdoor Swimming Pools.

Military Population1,2	Number of Pools3,4,5	
	25-Meter 21 m x 25 m (68 ft x 82 ft 2 in)	50-Meter 21 m x 50 m (68 ft x 164 ft)
	Water Area	Water Area
Up to 250	See Note 6	
251 to 3,000	1	None
3,001 to 6,000	1	17
6,001 to 10,0004	2	1

NOTES:
1. Military population is defined as active duty military personnel assigned to the military installation, plus 70 percent of their dependents. Verify the total customer base using a validated PVA Study.
2. DoD civilians assigned to overseas facilities are to be counted as active duty strength for facility sizing purposes (including Alaska and Hawaii).
3. Because of higher utilization of overseas facilities, consider adding 5 to 10 percent to authorized scope for these facilities (including Alaska and Hawaii).
4. One 25-meter outdoor swimming pool with a 372 m2 (4,000 ft2) gross area bathhouse may be provided for each increment of 5,000 military population over 10,000. In lieu of a 25-meter outdoor swimming pool, one 50-meter outdoor swimming pool with a 604 m2 (6,500 ft2) gross area bathhouse may be provided for each increment of 10,000 military population over 10,000. For military installations exceeding 20,000 military population, a second indoor swimming pool with bathhouse may be provided.
5. Table 7.40 shows maximum authorized scope only, not the scope that may be approved. The scope used for programming, budgeting, and design is limited by very specific financial considerations and is based on need as documented by a professional, in-depth comprehensive market research and analysis, and may also be influenced by PVA studies and the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. Contact MAJCOM Director of Services for current criteria and guidelines.
6. One swimming pool not to exceed 116 m2 (1,250 ft2) of water surface area and a 74 m2 (800 ft2) gross area bathhouse may be provided as required.
7. Outdoor swimming pool only.

7.5.22. **Airmen Swimming Pool. FAC: 7512**

CATCODE: 750813
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.22.1. **Description.** See Consolidated Swimming Pool (**CATCODE 750812**).

7.5.22.2. **Requirements Determination.** See notes in **Table 7.40**.

7.5.22.3. **Scope Determination.** See Note 5 in **Table 7.40** and **paragraph 7.5.21.3**.

7.5.22.4. **Dimensions.** Contact OPR for latest requirements and guidance.

7.5.22.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.23. **NCO Swimming Pool. FAC: 7512**

CATCODE: 750815
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.23.1. **Description.** See Consolidated Swimming Pool (**CATCODE 750812**).

7.5.23.2. **Requirements Determination.** See notes in **Table 7.40**.

7.5.23.3. **Scope Determination.** See Note 5 in **Table 7.40** and **paragraph 7.5.21.3**.

7.5.23.4. **Dimensions.** See **Table 7.40**.

7.5.23.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.24. **Officers Swimming Pool. FAC: 7512**

CATCODE: 750817
OPR: AF/A1S
OCR: AFSVA, MAJCOM/A1S, AFCESA/CEO

7.5.24.1. **Description.** See Consolidated Swimming Pool (**CATCODE 750812**).

7.5.24.2. **Requirements Determination.** See Notes in **Table 7.40**.

7.5.24.3. **Scope Determination.** See Note 5 in **Table 7.40** and **paragraph 7.5.21.3**.

7.5.24.4. **Dimensions.** See **Table 7.40**.

7.5.24.5. **Design Considerations.** Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.25. **Off-Base Recreation Areas.**

7.5.25.1. **Establishing Requirement.** Prior to establishing any new off-base recreation areas, review existing on-base outdoor recreation resources to ensure they are utilized to their full potential. If this review indicates that on-base resources are not adequate or available, and private or public facilities cannot meet the requirement, the installation should examine possible joint operation agreements with other military installations in the area that have existing on-/off-base outdoor recreation areas. If this attempt proves negative, the installation may initiate action to develop an off-base recreation area within the following guidelines:

7.5.25.1.1. Installations determine if long term, annually renewable leases (up to 50 years) at nominal cost could be consummated with a public agency (federal, state, city, county, etc.) within any of the 50 states.

7.5.25.1.2. If public agency leases are not available, private leases may be considered. These should be considered only if costs are not excessive (CONUS, Hawaii and Alaska only). Fee acquisition of land for outdoor recreation areas is not authorized without written approval of SAF/MIIR and AFSVA/SVP.

7.5.25.1.3. Hold permanent construction of off-base sites to an absolute minimum. Use portable facilities to the maximum extent feasible.

7.5.25.1.4. Requests for establishment of off-base recreation sites must be approved by AFSVA/SVP. (T-1). Ensure acquisition of real property for outdoor recreation is IAW AFI 32-9001. Document facility requirements at off-base sites in the base Recreation Program Planning folder prepared IAW AFI 34-101, Volume I.

7.5.25.2. **Scope Determination.** The scope used for programming, budgeting, and design is limited by very specific financial considerations and by market need as documented by a professional, in depth comprehensive market research and analysis. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may also be influenced by PVA studies. Contact MAJCOM Director of Services for current criteria and guidelines.

7.5.25.3. **Facility Allowances.** Two types of facilities may be provided at off-base recreation areas, Lodging and Support Facilities.

7.5.25.3.1. **Lodging Facilities.** See criteria under **CATCODE 740666**.

7.5.25.3.2. **Support Facilities.** This includes any recreational structures that are needed to ensure safe and efficient use of a site's recreational capabilities. Standard facilities, such as Recreation Pavilions (**CATCODE 750371**), should be identified under the appropriate code, and the total scope (on-base and off-base) may not exceed the allowances in this Manual. Other support facilities should be identified under Miscellaneous Recreation Building (**CATCODE 740668**) or Miscellaneous Outdoor Recreation Facility (**CATCODE 750581**).

Chapter 8

FACILITY CLASS 8, UTILITY AND GROUND IMPROVEMENTS

8.1. Category Group 81, Electricity.

8.1.1. Overview.

8.1.1.1. This category group covers all components (transmission, generation, substation, primary and secondary distribution lines, transformers, protective and control devices, and associated equipment) of an electrical power system for a base or a portion of a base.

8.1.1.2. The category code numbers used here are for accounting purposes and for separate programming of new or replacement electrical plants, facilities, or distribution work. Where feasible, any specific category code items may also include programming for support utilities such as emergency generators and extensions of the base primary and secondary distribution system necessary to serve the prime item. Refer to the following documents for guidance in electrical facilities and electrical work in facilities.

8.1.1.2.1. AFI 32-1044, *Visual Air Navigation Systems* and UFC 3-535-01, *Visual Air Navigation Systems.*

8.1.1.2.2. AFI 32-1062, *Electrical Power Plants and Generators.*

8.1.1.2.3. AFI 32-1063, *Electric Power Systems.*

8.1.1.2.4. AFI 32-1065, *Grounding Systems*.

8.1.1.3. The following documents complement AFI 32-1063.

8.1.1.3.1. *UFC 3-550-01, Exterior Electrical Power Distribution.*

8.1.1.3.2. UFC 3-520-01, *Interior Electrical Systems.*

8.1.1.3.3. AFJMAN 32-1082, *Facilities Engineering Electrical Exterior Facilities.*

8.1.1.3.4. AFJMAN 32-1083, *Facilities Engineering Electrical Interior Facilities.*

8.1.1.3.5. AFI 32-1064, *Electrical Safe Practice.*

8.1.1.4. Provide all electrical power generating facilities with positive methods to preclude discharge of environmental pollutants. This should preferably be accomplished by control of fuel used. Where such control is not feasible, provide collection, treatment, and disposal facilities as an integral component of the electrical power generating facility.

8.1.1.5. Construct electrical facilities, including transmission and distribution lines, in compliance with explosives safety standards of DoD 6055.9-Std and AFMAN 91-201.

8.1.2. **Electric Power Generation Plant. FAC: 8111**

CATCODE: 811145
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.2.1. **Description.** The plant provides government owned generation of prime or standby electric power in cases where no commercial power is available to meet the

operational requirements of the base. The item includes generators, prime movers, fuel storage and supply, switch gear, transformation if required, and complete building space requirements.

8.1.2.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.2.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.2.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.2.5. **Design Considerations.** The unit of capacity is kilowatt.

8.1.3. **Emergency Electric Power Generator Plant. FAC: 8112**

CATCODE: 811147
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.3.1. **Description.** The plant provides an engine driven, electrical generating unit for emergency power supply to specified critical base facilities. It includes switchgear, cooling systems, operating fuel storage, and associated auxiliary equipment.

8.1.3.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.3.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.3.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.3.5. **Design Considerations.** Housing for the unit may also be included in this item if not otherwise provided. The unit of quantity is kilowatts.

8.1.4. **Electric Power Station Building. FAC: 8910**

CATCODE: 811149
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.4.1. **Description.** See Electric Power Generation Plant (**CATCODE 811145**).

8.1.4.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.4.3. **Scope Determination.** For most planning, programming and budgeting purposes, the electric power station or power plant building is included in **CATCODE 811145**. However, when it is necessary or desirable to identify the building as separate from the power generation system, **CATCODE 811149** may be used for this purpose.

8.1.4.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.4.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.1.5. **Electrical Distribution/Transmission Systems.**

8.1.5.1. The system needs to distribute the energy delivered by a commercial utility, another governmental agency, or a prime generating plant for supply of the base electrical power requirements. Refer to UFC 3-550-01 for further information.

8.1.6. **Primary Overhead Distribution Line. FAC: 8121**

CATCODE: 812223
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.6.1. **Description.** The primary overhead distribution line is a component of the base electrical distribution system and covers equipment of the overhead primary or higher voltage circuits of this system.

8.1.6.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.6.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.6.4. **Dimensions.** The unit of measure is linear meter of electrical circuit. Contact OPR for latest requirements and guidance.

8.1.6.5. **Design Considerations.** The preferred primary CONUS distribution voltage is 12,470/7,200 volts.

8.1.7. **Secondary Overhead Distribution Line. FAC: 8121**

CATCODE: 812224
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.7.1. **Description.** The above-ground electrical distribution secondary lines are components of the base electrical distribution system. The system covers lines for distributing electrical power at voltages suitable for direct connection to lights, motors, or other appliances requiring electrical power.

8.1.7.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.7.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.7.4. **Dimensions.** The unit of measure is linear meter of electrical circuit. Contact OPR for latest requirements and guidance.

8.1.7.5. **Design Considerations.** Typical voltages on these lines are 120/240, 120/208, and 277/480 volts. Overhead lines are typically insulated copper.

8.1.8. **Primary Distribution Line Underground. FAC: 8123**

CATCODE: 812225
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.8.1. **Description.** The primary underground distribution is a component of the base electrical distribution system and has the same function as the electrical distribution primary line above ground.

8.1.8.2. **Requirements Determination.** Only use underground construction when authorized by the requiring command in coordination with the host command.

8.1.8.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.8.4. **Dimensions.** The unit of measure is linear meter of electrical circuit. Contact OPR for latest requirements and guidance.

8.1.8.5. **Design Considerations.** Ensure underground primary and secondary lines are insulated copper or aluminum cables.

8.1.9. **Secondary Distribution Line Underground. FAC: 8123**

CATCODE: 812226
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.9.1. **Description.** The secondary underground distribution line is a component of the base electrical distribution system and has the same function as the electrical distribution secondary lines, above ground.

8.1.9.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.9.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.9.4. **Dimensions.** The unit of measure is linear meter of electrical circuit. Contact OPR for latest requirements and guidance.

8.1.9.5. **Design Considerations.** Ensure underground primary and secondary lines are insulated copper or aluminum cables.

8.1.10. **Electric Switching Station. FAC: 8132**

CATCODE: 813228
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.10.1. **Description.** Refer to Electric Substation (**CATCODE 813231**), below, for information on where substation transformers are furnished by others or are not required. Identify voltage and designate switch capacity as the number of primary distribution feeders.

8.1.10.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.10.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.10.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.10.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.1.11. **Electric Substation. FAC: 8131**

CATCODE: 813231
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.11.1. **Description.** The main electrical substation is the point of supply for a base or portion of a base electrical distribution system. It is usually the dividing point between government owned facilities and those of a utility company.

8.1.11.2. **Requirements Determination.** When transformers are not required, a substation sometimes is designated as a switching station; in this case, capacity may be designated as the number of primary distribution feeders.

8.1.11.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.11.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.11.5. **Design Considerations.** Capacity and unit of designation is kilovolt amperes (kVA). Supply a substation by one or more feeders. Each substation should be located as near as feasible to the center of its load.

8.1.12. **Electrical Aircraft Outlets. FAC: 8999**

CATCODE: 812921
OPR: AF/A4L
OCR: AFSC/SEW

8.1.12.1. **Description.** The electrical aircraft outlet system consists of a varying number of power outlets in the hangars, ramps, and aprons as required to provide necessary 60 Hz power for energizing rectifiers and motor generator sets to furnish 400 Hz and low voltage DC power.

8.1.12.2. **Requirements Determination.** The power is used primarily for starting jet engines and testing electrical equipment of fighter aircraft; however, an outlet may be used to provide power for any authorized requirement.

8.1.12.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.1.12.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.12.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.1.13. **Exterior Area Lighting. FAC: 8122**

CATCODE: 812926
OPR: AFCESA/CEO
OCR: AFSC/SEW

8.1.13.1. **Description.** This category code applies to street lighting, apron floodlighting, aircraft alert apron safety lighting, and security lighting.

8.1.13.1.1. **Street Lighting.** The required lighting is determined by the amount of pedestrian and vehicular traffic or the hazard involved. Estimates are based on linear feet of cable or wire, number of standards or poles, transformers, luminaries, and necessary connection.

8.1.13.1.2. **Apron Flood Lighting.** For each mission the amount of apron space, or number of aircraft positions, requiring floodlights is limited to the amount or number that receive active use during normal night time operations. Individually justify the requirements for each apron space, area, or aircraft position. Design guidance on apron floodlighting is given in AFMAN 32-1076.

8.1.13.1.3. **Aircraft Alert Apron Safety Lighting.** Safety lighting is necessary at alert aircraft parking areas (aprons and stubs) to ensure safe movement of taxiing

aircraft during an alert aircraft response. The lighting fixtures are installed and focused to illuminate taxi streams in the center of the alert aircraft parking areas. The fixtures are also directed toward nearby areas where traffic intersects during an alert aircraft response.

8.1.13.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.1.13.3. **Scope Determination.** See UFC 3-550-01.

8.1.13.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.1.13.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.2. Category Group 82, Heat and Refrigeration.

8.2.1. Overview.

8.2.1.1. **Heating, Ventilating, and Air Conditioning Facilities.** Requirements are computed in accordance with UFC 3-410-01FA, *Heating, Ventilating, and Air Conditioning, with Change 3*. All heating facilities are provided with positive methods to preclude discharge of environmental pollutants. This is preferably accomplished by control of fuel used. Where such control is not feasible, provide collection, treatment, and disposal facilities as an integral component of the heating facility. Follow local, state, and federal regulations, and ensure design of pollution control systems is in accordance with the most stringent of the three. See UFC 4-024-01, *Security Engineering: Procedures for Designing Airborne Chemical, Biological, and Radiological Protection for Buildings;* UFC 3-420-02F, *Compressed Air, with Change 1;* UFC 3-430-01FA, *Heating and Cooling Distribution Systems;* UFC 3-430-02FA, *Central Steam Boiler Plants, with Change 1;* and UFC 3-430-11, *Boiler Control Systems,* for additional guidance. Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201.

8.2.1.2. **Gas Mains.** Compute requirements for gas main distribution according to UFC 3-430-09, *Exterior Mechanical Utility Distribution, with Change 1*.

8.2.1.3. Facilities covered under Facility Group 82 are: Coal Yard (**CATCODE 821112**), Heating Fuel Oil Storage (**CATCODE 821112**), Heating from Central Plant (**CATCODE 821113**), Heating Facility Building (**CATCODE 821117**), Steam Plant Industrial (**CATCODE 821155**), Steam Facility Building (**CATCODE 821156**), Hot Water Pump Station (**CATCODE 822248**), Condensate Return Pump Station (**CATCODE 822268**), Heat Gas Source (**CATCODE 823111**), Gas Compressor (**CATCODE 823243**), Gas Storage (**CATCODE 823244**), Gas Vaporizer (**CATCODE 823248**), Gas Meter Facility (**CATCODE 824462**), Gas Odorizer Facility(**CATCODE 824466**), Gas Valve Facility (**CATCODE 824468**), Air Conditioning Plant 25 to 100 Tons (**CATCODE 826122**), Air Conditioning Plant Over 100 Tons (**CATCODE 826123**), and Chilled Water Exterior Distribution Line (**CATCODE 827111**). Contact AFCESA/CEO or AFCEE/TD for further information and guidance.

8.3. Category Group 83, Sewage and Waste.

8.3.1. **Industrial Waste Treatment and Disposal Facility. FAC: 8312**

CATCODE: 831155
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.1.1. **Description.** This facility provides for the treatment and disposal of waterborne wastes generated by existing industrial type operations at Air Force installations (e.g., corrosion control, plating, maintenance, photo processing, etc.). This category code will be used for new treatment facilities, to upgrade existing treatment methods, and for new rehabilitated industrial facilities. Provide wastewater treatment as an integral component of any new industrial facility.

8.3.1.2. **Requirements Determination.** Contact OPR for latest requirements. Additional guidance is provided in UFC 3-240-02N, *Wastewater Treatment System Augmenting Handbook;* UFC 4-832-01N, *Design: Industrial and Oily Wastewater control;* AFI 32-7041; the CWA; and state and local regulations.

8.3.1.3. **Scope Determination.** Contact OPR for latest requirements. Additional guidance is provided in UFC 3-240-02N, UFC 4-832-01N, AFI 32-7041, the CWA, and state and local regulations.

8.3.1.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.3.1.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters.

8.3.2. **Industrial Waste Fuel Spill Collection. FAC: 8313**

CATCODE: 831157
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.2.1. **Description.** This facility consists of a collection basin (where floatable material is collected, separated, and removed), a diversion chamber installed within a drain line or channel, and inlet and outlet piping.

8.3.2.2. **Requirements Determination.** Ensure the facility is able to collect and separate spilled fuel and oil carried by surface water drainage from large paved aprons used for aircraft refueling, truck and tanker unloading, and similar activities. It is separate from **CATCODE 831155**, described above.

8.3.2.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.3.2.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.3.2.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of, DoD 6055.9-Std and AFMAN 91-201. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters.

8.3.3. **Sewage Treatment and Disposal. FAC: 8311**

CATCODE: 831165
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.3.1. **Description.** See UFC 3-240-09FA, *Domestic Wastewater Treatment*.

8.3.3.2. **Requirements Determination.** Determining requirements are in UFC 3-240-09FA.

8.3.3.3. **Scope Determination.** See UFC 3-240-09FA.

8.3.3.4. **Dimensions.** See UFC 3-240-09FA.

8.3.3.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.3.4. **Waste Treatment Building. FAC: 8910**

CATCODE: 831168
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.4.1. **Description.** See UFC 3-240-09FA.

8.3.4.2. **Requirements Determination.** Determining requirements are in UFC 3-240-09FA.

8.3.4.3. **Scope Determination.** See UFC 3-240-09FA.

8.3.4.4. **Dimensions.** See UFC 3-240-09FA.

8.3.4.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters.

8.3.5. **Demolition and Burn Facility. FAC: 8926**

CATCODE: 831173
OPR: AFCESA/CEO
OCR: AFSC/SEW; AFCEE/TD

8.3.5.1. **Description.** This facility is an open range, used to dispose of unserviceable air munitions, incendiaries, or chemical material by burning, demolition, or other means. It consists of a pit, trench, or other device to provide fragment and missile abatement and a surrounding cleared area.

8.3.5.2. **Requirements Determination.** Guidance for siting this facility is outlined in AFMAN 91-201 and AFI 32-7042.

8.3.5.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.3.5.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.3.5.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.3.6. **Industrial Waste Main. FAC: 8321**

CATCODE: 832255
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.6.1. **Description.** See UFC 3-240-07FA, *Sanitary and Industrial Wastewater Collection: Gravity Sewers and Appurtenances,* and UFC 3-240-08FA, *Sanitary and Industrial Wastewater Collection: Pumping Stations and Force Mains.*

8.3.6.2. **Requirements Determination.** Determine requirements according to UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067, *Water Systems*.

8.3.6.3. **Scope Determination.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.6.4. **Dimensions.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.6.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.3.7. **Sanitary Sewage Mains. FAC: 8321**

CATCODE: 832266
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.7.1. **Description.** See UFC 3-240-07FA and UFC 3-240-08FA.

8.3.7.2. **Requirements Determination.** Determine requirements according to UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.7.3. **Scope Determination.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.7.4. **Dimensions.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.7.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.3.8. **Sanitary Sewage Pump Station. FAC: 8326**

CATCODE: 832267
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.3.8.1. **Description.** See UFC 3-240-07FA and UFC 3-240-08FA.

8.3.8.2. **Requirements Determination.** Determine requirements according to UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.8.3. **Scope Determination.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.8.4. **Dimensions.** See UFC 3-240-07FA, UFC 3-240-08FA, and AFI 32-1067.

8.3.8.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.3.9. **Solid Waste Disposal Facility. FAC: 8331**

CATCODE: 833354
OPR: AFCESA/CEN
OCR: AFCESA/CEO, AFCEE/TD

8.3.9.1. **Description.** See AFI 32-7042.

8.3.9.2. **Requirements Determination.** Determine requirements according to UFC 3-240-07FA, UFC 3-240-08FA, UFC 3-240-14N, *Solid Waste Disposal* and AFI 32-7042.

8.3.9.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.3.9.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.3.9.5. **Design Considerations.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Ensure facility design complies with local, state and federal requirements and other guidance as defined in **paragraph 1.3.1** and **1.8.6**.

8.4. Category Group 84, Water.

8.4.1. **Water Facilities.** Site facilities in compliance with explosive safety standards of DoD 6055.9-Std and AFMAN 91-201. Refer to AFI 32-1067; AFI 32-7041; UFC 3-230-07A, *Water Supply: Sources and General Considerations*; UFC 3-230-08A, *Water Supply: Water Treatment*; UFC 3-230-09A, *Water Supply: Water Storage*; UFC 3-230-10A, *Water Supply: Water Distribution*; UFC 3-230-11A, *Water Supply for Special Projects*; and UFC 3-230-13A, *Water Supply: Pumping Stations* for requirements guidance for water facilities.

8.4.2. **Water Supply Treatment Facility. FAC: 8412**

CATCODE: 841165
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.2.1. **Description.** See UFC 3-230-08A.

8.4.2.2. **Requirements Determination.** Determine requirements according to UFC 3-230-08A.

8.4.2.3. **Scope Determination.** See UFC 3-230-08A.

8.4.2.4. **Dimensions.** See UFC 3-230-08A.

8.4.2.5. **Design Considerations.** See UFC 3-230-08A.

8.4.3. **Water Tank Storage. FAC: 8413**

CATCODE: 841427
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.3.1. **Description.** See UFC 3-230-09A.

8.4.3.2. **Requirements Determination.** Determine requirements according to UFC 3-230-09A.

8.4.3.3. **Scope Determination.** See UFC 3-230-09A.

8.4.3.4. **Dimensions.** See UFC 3-230-09A.

8.4.3.5. **Design Considerations.** See UFC 3-230-09A.

8.4.4. **Water Distribution Mains. FAC: 8421**

CATCODE: 842245
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.4.1. **Description.** See UFC 3-230-10A.

8.4.4.2. **Requirements Determination.** Determine requirements according to UFC 3-230-10A.

8.4.4.3. **Scope Determination.** See UFC 3-230-10A.

8.4.4.4. **Dimensions.** See UFC 3-230-10A.

8.4.4.5. **Design Considerations.** See UFC 3-230-10A.

8.4.5. **Fire Protection Water Mains. FAC: 8432**

CATCODE: 843314
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.4.5.1. **Description.** See UFC 3-600-01, *Fire Protection Engineering for Facilities*, and UFC 3-230-10A.

8.4.5.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.5.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.5.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.5.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.6. **Fire Hydrants. FAC: 8929**

CATCODE: 843315
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.4.6.1. **Description.** See UFC 3-600-01.

8.4.6.2. **Requirements Determination.** Ensure supply for fire protection is available within specified distances of all building, structures, open storage, material, parked motor vehicles and aircraft, fuel handling points, etc., as prescribed in UFC 3-600-01 and UFC 3-230-10A. The following exceptions may be made.

8.4.6.2.1. Where location of facilities makes installation of a permanent water supply system unfeasible from an engineering standpoint.

8.4.6.2.2. For isolated areas normally requiring such protection but where infrequent use does not warrant permanent installation of a water supply system.

8.4.6.2.3. For designated ammunition and similar ordnance material, and underground fuel storage areas, which may be isolated; where explosives are in properly designed magazines or stores in an orderly manner in open dumps in accordance with prescribed ordnance material safety standards.

8.4.6.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.6.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.6.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.7. **Water Fire Pumping Station. FAC: 8434**

CATCODE: 843316
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.4.7.1. **Description.** See UFC 3-600-01.

8.4.7.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.7.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.7.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.7.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.8. **Fire Protection Water Storage. FAC: 8435**

CATCODE: 843319
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.4.8.1. **Description.** See UFC 3-600-01.

8.4.8.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.8.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.8.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.8.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.9. **Water Supply Storage, Non-Potable. FAC: 8442**

CATCODE: 844367
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.9.1. **Description.** See UFC 3-230-09A.

8.4.9.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.9.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.9.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.9.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.10. **Water Supply Non-Potable. FAC: 8441**

CATCODE: 844368
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.10.1. **Description.** See UFC 3-230-09A.

8.4.10.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.10.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.10.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.10.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.4.11. **Water Pump Station Non-Potable. FAC: 8452**

CATCODE: 845201
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.4.11.1. **Description.** See UFC 3-230-10A.

8.4.11.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.4.11.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.4.11.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.4.11.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.5. Category Group 85, Roads and Other Pavements.

8.5.1. **Road Bridge. FAC: 8513**

CATCODE: 851142
OPR: AFCESA/CEO
OCR: AFCEE/TD, AFSC/SEG

8.5.1.1. **Description.** See UFC 3-250-01FA, *Pavement Design for Roads, Streets, Walks, and Open Storage Areas*, and UFC 3-250-18FA, *General Provisions and Geometric Design For Roads, Streets, Walks, and Open Storage Areas.*

8.5.1.2. **Requirements Determination.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.1.3. **Scope Determination.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.1.4. **Dimensions.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.1.5. **Design Considerations.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.2. **Curbs and Gutters (and Street Inlets). FAC: 8999**

CATCODE: 851143
OPR: AFCESA/CEO
OCR: N/A

8.5.2.1. **Description.** Curbs and gutters and attendant underground drainage systems are authorized along streets and around off-street parking areas to aid in control and collection of surface storm water.

8.5.2.2. **Requirements Determination.**

8.5.2.2.1. Curbs and combination curbs and gutters or shallow paved gutters are not authorized at installations on which the Air Force is a tenant under lease-hold agreements (such as municipal fields and fields in foreign countries, 99 year leases excluded), except as required to control erosion and drainage or as required in extensions of existing like facilities.

8.5.2.2.2. Curbs and gutters are not provided in isolated areas (such as ammunition storage areas, bulk fuel storage areas) or open storage and other facilities far removed from the principal industrial activity on the main part of the base.

8.5.2.3. **Scope Determination.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.2.4. **Dimensions.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.2.5. **Design Considerations.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.3. **Road (Street). FAC: 8511**

CATCODE: 851147
OPR: AFCESA/CEO
OCR: AFCEE/TD, AFSC/SEG

8.5.3.1. **Description.**

8.5.3.1.1. Highways on Air Force bases are either roads or streets depending on the area in which they are located. In open areas they are roads. In built-up areas they are streets.

8.5.3.1.1.1. Open areas are areas within the site limits of the base, but outside its built-up areas, designed for training, maneuver, ammunition storage, bulk fuel storage, or other incidental purposes.

8.5.3.1.1.2. Built-up areas are within the site limits of a base and contain

buildings, reasonably spaced and arranged for administration, housing, warehousing, and storage plant or depot purposes. Street intersections usually occur at intervals of 400 meters (1/4 mile) or less.

8.5.3.1.2. Roads and streets are categorized as primary (P), secondary (S), tertiary (T), and patrol roads (PR).

8.5.3.1.2.1. **Primary (P).** Base roads and streets serving as main distributing arteries for all traffic originating outside and within a base are designated Primary. They provide access to, through, and between various functional areas. They are planned and designed to accommodate large volumes of traffic composed of all types of vehicles required to operate regularly within the base for the anticipated life of the highway.

8.5.3.1.2.2. **Secondary (S).** Base roads and streets supplementing the primary system by providing access to, between, and within various functional areas are designated Secondary. They are usually planned and designed to accommodate a reasonable volume of comparatively light weight vehicles, and an occasional passage of the maximum size vehicle expected to operate regularly on base.

8.5.3.1.2.3. **Tertiary (T).** Roads and streets providing access from other roads and streets to individual units or facilities of a functional area are designated Tertiary. They are planned and designed according to traffic anticipated at the individual facility they serve.

8.5.3.1.2.4. **Patrol Road (PR).** Roads planned and designed for use in surveillance or in patrolling areas for security purposes of light traffic.

8.5.3.2. **Requirements Determination.**

8.5.3.2.1. For planning and design purposes, roads and streets are divided into classes depending on topography, land use, speed, volume, and composition of traffic. Class A roads and streets are multi-lane (four or more lanes) and may be divided or undivided. Class B, C, D, and E roads are two-lane. There is seldom any requirement for Class A roads and streets on Air Force bases. See UFCs 3-250-01FA and 3-250-18FA.

8.5.3.2.2. For programming purposes, show roads and streets by category (P, S, T, or PR) followed by the class (A, B, C, D, E, or F).

8.5.3.3. **Scope Determination.** Volume and composition of traffic determines the geometric requirement for roads and streets. Wheel load, tire pressure, wheel configuration, and frequency of operation determine structural requirements. Type, volume, character, frequency, and composition of traffic are related to size, type, and mission of the base.

8.5.3.4. **Dimensions.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.3.5. **Design Considerations.** See UFCs 3-250-01FA and 3-250-18FA.

8.5.4. **Vehicle Parking Operations. FAC: 8521**

CATCODE: 852261
OPR: AFCESA/CEO
OCR: AF/A4LE

8.5.4.1. **Description.** This facility provides parking space for organizational vehicles at two types of locations: The main pool, normally adjacent to Vehicle Operations Administration (**CATCODE 610121**), and authorized sub-pools at the operating site or adjacent to the operating location of designated activities whose function requires 24 hour access to a substantial number of their assigned vehicles. Obtain authorization to establish a sub-pool from the transportation office. (The term sub-pool does not apply to any parking space identified by other category codes, space reserved for a few organizational vehicles in non-organizational parking areas [see **CATCODE 852262**], on-street parking spaces, or in an activity's storage yard).

8.5.4.2. **Requirements Determination**. Typical organizations requiring sub-pools are CE, hospital, communications, security forces, aircraft maintenance, and vehicles exempt from pooling by DoD or Air Force. Vehicle operators use pool and sub-pool space to perform daily and weekly maintenance on their equipment.

8.5.4.2.1. Pools and sub-pools require a paved or stabilized surface. The vehicle operations central pool requires floodlighting, a security fence at least 1.8 m (6 ft) high, and one or more controlled paved entrances. These features are provided at sub-pools only when the operation presents a special need for safeguarding and night lighting.

8.5.4.2.2. One of the major sub-pools is operated by CE. The facility is usually a part of the CE complex and usually adjoins the Base Civil Engineer Open Storage, (**CATCODE 452255**) and the Base Engineer Pavement and Grounds Facility (**CATCODE 219943**). Due to the type of vehicles parked in this sub-pool, facilities for washing, consisting of washracks and steam cleaning equipment, are necessary. Provide one open washrack space for each 25 assigned vehicles.

8.5.4.3. **Scope Determination**. Determine the quantity required at the main pool and at individual sub-pools with the following steps.

8.5.4.3.1. Using the base Vehicle Authorization List, identify all vehicles for which the Base Transportation Officer is responsible.

8.5.4.3.2. Subtract all vehicles that are regularly parked at open locations other than the pools and sub-pools described above. Also subtract those regularly parked (or to be parked) in buildings and sheds such as Base Engineer Pavements and Grounds Facility (**CATCODE 219943**), Vehicle Operations Heated Parking (**CATCODE 214426**), Vehicle Operations Parking Shed (**CATCODE 214428**), Fire Station (**CATCODE 730142**), and Ambulance Shelter (**CATCODE 510264**).

8.5.4.3.3. Among the remaining vehicles, identify those assigned to the main pool and each sub-pool. Then, refer to **Table 8.1** to obtain the required amount of vehicle parking space.

8.5.4.3.4. Refer to **CATCODE 123335** if a vehicle fueling station is to be collocated with the main pool or sub-pools.

8.5.4.4. **Dimensions**. Space requirements are given in **Table 8.1**.

8.5.4.5. **Design Considerations**. See UFCs 3-250-01FA and 3-250-18FA. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Consult AFI 32-7041 for additional guidance on wastewater and storm water collection, treatment and disposal compliance.

Table 8.1. Parking Space Requirements for Vehicle Operations Parking.

Vehicle Space Factors	Gross Area	
	m2	yd2
50-100	3,180	3,800
101-150	4,870	5,825
151-250	8,110	9,700
251-350	11,400	13,600
351-450	14,600	17,500
451-650	21,100	25,250
651-850	27,200	32,500
851-1,000	34,700	41,500

8.5.5. **Non-Organizational Vehicle Parking. FAC: 8521**

CATCODE: 852262
OPR: AFCESA/CEO
OCR: N/A

8.5.5.1. **Description.** It is the policy of the DoD to provide off-street parking at military installations instead of building wider streets that would accommodate on-street parking. Where facilities are located near each other, parking areas should be combined and reduced to the extent consistent with normal operations.

8.5.5.2. **Requirements Determination.** Authorized parking spaces for selected facilities are listed in **Table 8.2**. Base parking spaces for facilities not listed on a special traffic analysis at the installation, taking into account the availability of public or government furnished transportation and group car riding. Parking spaces for listed facilities, whether existing or programmed, may be increased where special traffic analyses substantiate the need. The analyses for listed and unlisted facilities should be verified by the MAJCOM and should then be attached to the appropriate project documents as part of the justification. Facilities with multiple functions may provide parking for each function limited to the amounts listed in **Table 8.2**.

8.5.5.3. **Scope Determination.**

8.5.5.3.1. Use a space allowance of 29 m^2 (35 yd^2) per vehicle. This allowance includes maneuvering space for parking the vehicle and for normal interior lanes. Design facilities for 90 degree parking whenever practicable.

8.5.5.3.2. Ensure vehicle parking areas are surfaced and have sufficient slope to control drainage. Surfacing may be either flexible or rigid pavement with the final determination based on the least life cycle cost.

8.5.5.3.3. Vehicle parking areas located at installations having severe winters may be provided with exterior type electrical outlets for connection of vehicle engine heating devices. For purposes of these criteria, severe winters are those with temperatures of -23°C (-10°F) or lower for 30 or more days per year, or with an average January temperature of -7°C (+20°F) or lower, as determined from two 10-year (or greater) weather data bases. The outlets are programmed as components of the electrical secondary distribution lines, Overhead (**CATCODE 812224**) or Underground (**CATCODE 812226**).

8.5.5.4. **Dimensions.** See **Table 8.2**.

8.5.5.5. **Design Considerations.** See UFCs 3-210-02, *POV Site Circulation and Parking*, 3-250-01FA and 3-250-18FA. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Consult AFI 32-7041 for additional guidance on wastewater and storm water collection, treatment, and disposal.

Table 8.2. Parking Space Guidelines for Non-Organizational Vehicles.1

Facility	Number of Parking Spaces
Administration, Headquarters, and Office Buildings	60% of assigned personnel
Bank and Credit Union, when not in a Community Shopping Center	2% of authorized customers served
Cafeteria, Civilian, when not in a Community Shopping Center	15% of seating capacity
Central Food Preparation Facilities	38% of military and civilian food service personnel, largest shift
Chapels	30% of seating capacity
Child Development Centers	10% of children, 80% of staff
Commissary Stores, Food Sales, when not in a Community Shopping Center	Contact DeCA for parking requirements
Community Shopping Center, including such elements as Main Exchange, Miscellaneous Shops, Restaurant, Commissary Stores, Food Sales, Bank, Theater, Post Office	4% of authorized customers served
Dormitories	70% of design capacity
Enlisted Personnel Dining Facilities	38% of military and civilian food service operating personnel, largest shift, plus 8% of enlisted personnel (patron parking) to be served during a meal period
Exchanges, Main, when not in a Community Shopping Center	25% of authorized customers served
Family Housing	2.5 spaces per living unit

Field House, combined with Football and Baseball Facilities	1% of military strength
Fire Stations	100% of positions per shift
Guard Houses, Brigs, Military Police Stations	30% of guard and staff strength
Fitness Center	Total parking may not exceed 1% of military strength served
Laundries and Dry Cleaning Plants	38% of civilian employees, largest shift
Libraries:	
Central	1 space for each 46 m2 (500 ft2) of gross floor area
Branch	8 spaces
Maintenance Shops	40% of assigned personnel, largest shift
Medical Facilities	See UFC 4-510-01,Design: Medical Military Facilities
Officers' Quarters	100% of living suites
Schools, Dependent:	
Without Auditorium	2 spaces per classroom
With Auditorium	2 spaces per classroom, plus 15% of auditorium seats
Security Offices (at gates) for installations of:	
100 to 2,000 population	5 spaces
2,001 to 4,000 population	10 spaces
4,001 to 6,000 population	15 spaces
6,001 to 10,000 population	20 spaces
10,001 and over	To be based on a special study
Service Clubs	2% of enlisted personnel or officer strength served
Swimming Pools	20% of design capacity
Temporary Lodging Facilities	90% of bedrooms
Theaters, when not in a Community Shopping Center	25% of seating capacity
Warehouses	1 space for each 46 m2 (500 ft2) gross area of office area, plus 1 space per 4 persons assigned to storage activities
NOTES: 1. This table provides the parking standards for various functions and activities which may require adjustment to meet circumstances at individual locations.	

8.5.6. **Refueler Vehicle Parking. FAC: 1164**

CATCODE: 852269
OPR: AF/A4LE
OCR: AFCESA/CEO

8.5.6.1. **Description.** This facility is intended to provide parking space for all assigned refueling units and hose trucks.

8.5.6.2. **Requirements Determination.** A paved area is necessary to support continuous operation of loaded refueling units and hydrant hose trucks that provide fuel and oil to aircraft and facilities.

8.5.6.3. **Scope Determination.**

8.5.6.3.1. **Separation from Buildings and Aircraft Aprons.** The optimum separation between refueling storage areas and surrounding buildings is 30 m (100 ft). Use 30 m (100 ft) in planning new areas and, where conformance does not require extensive relocations or ground improvements, in developing existing areas. At existing storage areas, smaller separation distance may be established based on an evaluation of the size, nature, and importance of nearby exposed buildings. The minimum permissible separation between storage areas and buildings is 15 m (50 ft); between storage areas and aircraft parking aprons the minimum is 30 m (100 ft).

8.5.6.3.2. **Criteria for Parking Area Configuration.**

8.5.6.3.2.1. Provide 7.6 m (25 ft) on-center separation between parked vehicles. Also, establish a configuration that permits vehicles to enter parking positions in a single turn and exit in a single turn. (The most widely used refueling unit is the R-11 type, which measures 11.6 m x 2.7 m [38 ft x 8 ft 10 in] and has a 32 m [106 ft] turning radius.)

8.5.6.3.2.2. Select the configuration (i.e., the parking and access lane widths, and the parking angles) that requires the fewest square yards of pavement per parking position. The per-position scope is determined by dividing the total paved area by the total parking positions. The maximum permissible access lane width is 15.2 m (50 ft).

8.5.6.4. **Dimensions.** See information in **paragraph 8.5.7** and Refueling Vehicle Shop (**CATCODE 214467**).

8.5.6.5. **Design Considerations.** Design pavement for fuel resistant surface. Use rigid pavement for initial construction and tar rubber concrete for overlays. Design for proper surface drainage. Under circumstances described under Petroleum Operations Building (**CATCODE 121111**), a 23 m^2 (250 ft^2) vehicle checkpoint and operator maintenance building may be located in the yard. A heated two-bay facility with internal washrack may be constructed for locations with heavy snowfall and/or winter design temperatures less than 7°C (20°F) for 30 days or more. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Consult AFI 32-7041 for additional guidance on wastewater and storm water collection, treatment and disposal compliance.

8.5.7. **Private Vehicle Parking Compound. FAC: 8521**

CATCODE: 852271
OPR: AFSFC/SFO, AFCESA/CEO
OCR: N/A

8.5.7.1. **Description.** This facility is a fenced storage yard with a stabilized surface and floodlighting. It is used to store privately owned vehicles and recreational equipment and abandoned and impounded vehicles. The facility may be developed as two yards at separate locations or a combined yard. In either case, separately fence and lock the yard area used for abandoned or impounded vehicles so that only security forces have access.

8.5.7.1.1. This facility helps alleviate various problems created by the Air Force members living in family quarters, dormitories and officer quarters. Because of the limited amount of off-street parking space, particularly in family housing areas, these vehicles often crowd yards and streets, and create visual blight and safety hazards. The hazards affect both moving vehicles and pedestrians, particularly children. Another problem is the vulnerability of boats, recreational trailers, and inactive second cars to theft, pilferage, and vandalism. This problem is magnified at bases where entire units are sent on extended temporary duty (TDY), such as airlift mission bases.

8.5.7.2. **Requirements Determination.** The required size of the compound is determined by individual installations based on experience in impoundment requirements and the base commander's estimate as to how many privately owned vehicles and pieces of equipment should be removed from objectionable parking locations to achieve a satisfactory reduction in the problems described above.

8.5.7.3. **Scope Determination.** The scope used for programming, budgeting, and design of auto stripping yards, pay parking lots, and recreation vehicle storage lots are limited by very specific financial considerations and by market need as documented by a professional, in-depth market survey. The scope is also influenced by the Services NAF construction prioritization system, which encourages economy in scope and composite facilities. The scope may be influence by needs assessment studies. Contact MAJCOM Director of Services for current criteria and guidelines.

8.5.7.4. **Dimensions.** Varies.

8.5.7.5. **Design Considerations.** See UFCs 3-210-02, 3-250-01FA and 3-250-18FA. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. Consult AFI 32-7041 for additional guidance on wastewater and storm water collection, treatment and disposal compliance.

8.5.8. **Aircraft Support Equipment (AGE) Storage Yard. FAC: 1164**

CATCODE: 852273
OPR: AF/A4L
OCR: AFCESA/CEO

8.5.8.1. **Description.** This facility is necessary for standby storage of powered and non-powered AGE that have been repaired and are awaiting dispatch. The area is paved and, where necessary for efficient operations or safeguarding, fenced and lighted.

8.5.8.2. **Requirements Determination.** The requirement applies to yards adjoining Aircraft Support Equipment Shop/Storage (**CATCODE 218712**) or at dispersed sub-pool locations. The storage yards are part of the total AGE standby storage requirement which

may include heated and unheated buildings or sheds. For reasons of economy, yards are the preferred facility wherever climate and operational factors permit.

8.5.8.2.1. Yard space requirements (in square meters) are provided out of the total space allowances for standby storage facilities given in **Table 3.10** in **Chapter 3** of this Manual.

8.5.8.2.2. The above-mentioned requirements do not apply to spacing and/or placing fueling vehicles in structures designed for servicing equipment of this nature.

8.5.8.3. **Scope Determination.** To determine the area required, a factor of 334 m^2 (400 yd^2) per vehicle may be used as a guide. This factor is predicated on the use of the F-6 type semi-trailer with M-52 type tractor.

8.5.8.4. **Dimensions.** See **paragraph 8.5.8.2.1**.

8.5.8.5. **Design Considerations.** See UFC 3-250-18FA. Facility design includes, as an integral component, provisions to preclude discharge of pollutants to the surrounding atmosphere, ground, or waters. In particular, consider oil-water separators with integral grit chamber for storm water runoff from AGE parking areas. Additionally, ensure storm water pretreatment complies with all applicable regulations, permits such as the National Pollutant Discharge Elimination System (NPDES) Permit Program, and the base's Storm Water Pollution Prevention Plan." Consult AFI 32-7041 for additional guidance on wastewater and storm water collection, treatment and disposal compliance.

8.5.9. **Sidewalk. FAC: 8524**

CATCODE: 852289
OPR: AFCESA/CEO
OCR: AFCEE/TD

8.5.9.1. **Description.** On permanent air bases, a smooth, hard surfaced walk may be authorized for pedestrian traffic.

8.5.9.2. **Requirements Determination.** Program new walkways as appropriate within 3400 appropriation minor construction limits or in conjunction with the military construction program in amounts required to support new construction.

8.5.9.3. **Scope Determination.** See UFCs 3-250-01FA and 3-250-18FA for detailed guidance.

8.5.9.4. **Dimensions.** Widths of such walks are 1.2 m (4 ft) minimum and increase in increments of 0.6 m (2 ft) to meet local traffic requirements.

8.5.9.5. **Design Considerations.** Normally, walks should be constructed of Portland cement concrete or asphaltic concrete.

8.6. Category Group 86, Railroad Facilities

8.6.1. **Railroad Trackage. FAC: 8601**

CATCODE: 860617
OPR: AFCESA/CEO
OCR: N/A

8.6.1.1. **Description.** Railroad trackage is necessary to serve the warehouse area and bulk fuel storage area. Spur track is necessary for switching and storing empty cars while awaiting pickup.

8.6.1.2. **Required Determination.** Railroad trackage requires standard gauge, clearance, and weight of rail as specified in interstate regulations. Ensure it connects with the common carrier delivering shipments to the base. Provide sidings for holding and unloading freight cars as required.

8.6.1.3. **Scope Determination.** Amount of railroad trackage to be constructed is determined by the proximity of common carrier lines, volume of traffic, and grade requirements imposed by accepted railroad practices.

8.6.1.4. **Dimensions.** See UFC 4-860-01FA, *Railroad Design and Rehabilitation,* for additional guidance and information.

8.6.1.5. **Design Considerations.** See UFC 4-860-01FA.

8.7. Category Group 87, Ground Improvement Structures.

8.7.1. Fencing.

8.7.1.1. **General.** A fence serves as a legal and physical demarcation of a boundary. It is an obstruction which requires jumping, climbing, or cutting through to gain entry. From a security and law enforcement point of view, such actions would be regarded as unauthorized entry. Signs are displayed at appropriate and regular intervals on the exterior boundary of the fence line or on posts immediately adjacent to the exterior boundary, describing the type of area and conditions for entry. This combination of fencing and signs is intended to discourage trespass or unauthorized entry to legal entry points.

8.7.1.2. The type of fence installed for any given use depends upon the degree of prevention of unauthorized entry desired. For example, if the security operation requires a continuous surveillance of the fence line, the most substantial barrier available (Type A below) should be utilized. On the other hand, a sturdy multiple strand wire fence serves as an adequate physical and legal barrier along the unwatched boundary of a base area. In every case, use the most economical type of fence that satisfies the need of the security operation. Make all practical use of natural and structural features to reduce the amount of fencing required, provided they constitute an obstruction equal to the barrier of which they are a part.

8.7.1.3. Among the factors which affect the selection of the type of security fencing to be used are:

8.7.1.3.1. Permanency of the need;

8.7.1.3.2. Degree of prevention or deterrence of unauthorized entry desired;

8.7.1.3.3. Physical layout of the installation or area and its immediate environs;

8.7.1.3.4. Topography and climate;

8.7.1.3.5. Nearness and nature of adjacent populated or built-up areas;

8.7.1.3.6. Adjacent land use;

8.7.1.3.7. Existing fencing or barriers;

8.7.1.3.8. Degree of military control exercised in the areas immediately adjacent; and

8.7.1.3.9. Local threat assessment, considering both criminal and terrorist threats.

8.7.1.4. Determinations and recommendations are made by the installation Resource Protection Executive Committee. See AFI 31-101.

8.7.1.5. The majority of requirements for fencing can be satisfied by the types of fences described below, singly or in any combination. Fences and barriers for contingency operations, including base defense, are specified in UFC 4-020-01.

8.7.1.5.1. Type A - Chain link, 50 mm (2 in) square mesh, woven 9 gauge (3.76 mm or 0.148 in) steel wire fabric, 2.1 m (7 ft) high, surmounted by 3 strands of barbed wire, angled outward at 45 degrees for a total height of 2.4 m (8 ft). Typical uses are for nuclear weapon storage areas, aircraft parking areas, areas containing resources of high mission or monetary value, and as a barrier between flight line activities and cantonment and base or immediately contiguous housing areas. In each instance, except for NATO sites where a coated (metal or vinyl coating) steel wire is used, the steel core is 9 gauge (3.76 mm or 0.148 in), not including the coating. Coated steel wire purchased or installed before January 1, 1980 is considered to meet requirements as long as the core wire is 11 gauge (3.05 mm or 0.1205 in).

8.7.1.5.1.1. Type A1 - Chain link, 2.1 m (7 ft) high, surmounted by 6 strands of barbed wire, 3 on each side of a "Y"-shaped outrigger, for a total height of 2.4 m (8 ft). Typical uses are for nuclear weapon storage areas and alert aircraft areas.

8.7.1.5.1.2. Type A2 - Chain link, 1.8 m (6 ft) high, surmounted by 3 strands of barbed wire, angled outward for a total height of 2.1 m (7 ft). Typical uses are for areas containing high mission or monetary value and as a barrier between flight line activities and the base cantonment or housing area.

8.7.1.5.2. Type B - Barbed wire, 3-strand, 1.2 m (4 ft) high. Typical uses are extension of flight line area barriers, perimeter boundary for isolated portions of installations, livestock barrier, and area boundary for on-base bulk material storage areas. Fence used for livestock barrier may be designed to higher standards if necessary to satisfy the requirements of local and state law.

8.7.1.5.3. Type B - Barbed wire, 4-strand, 1.2 m (4 ft) high. The fence is provided for livestock barrier at the boundaries of livestock grazing lands that adjoin airfield operational areas if justified under Boundary Fence (**CATCODE 872245**).

8.7.1.5.4. Type C - Concertina Wire. In normal use one coil provides a barrier 0.9 m (3 ft) in diameter. Concertina wire should be used in multiple stacked coils. It is primarily considered an expedient for short term use or pending the erection of permanent type fencing.

8.7.1.6. Requirements for fencing by type of installation and application are stated in AFMAN 31 series for restricted areas, AFI 31-101 for controlled areas, and DoD 5100.76-M for base defense. Details on installation of Type A fencing are found in USACE Specification, which guides Air Force construction.

8.7.2. **Boundary Fence. FAC: 8721**

CATCODE: 872245
OPR: AFSFC/SFO
OCR: AFCESA/CEO

8.7.2.1. **Description.** As a general rule the perimeter of Air Force installations is delineated by some type of fencing.

8.7.2.2. **Requirements Determination.**

8.7.2.2.1. In exceptional cases the entire installation may have a uniform degree of security importance, however, as a practical matter, all areas, materials, and facilities within an installation are not of equal security priority. In effect, extensive security effort protecting Air Force real property per se is not warranted. Notwithstanding the use of fencing for resource protection purposes, the need for unmistakable installation boundary delineation becomes all the more acute as military bases become lucrative targets for dissident individuals or groups seeking entry for private or political motives. Therefore, economical and realistic satisfaction of an installation commander's legal and moral responsibilities for the protection of property under his command can be satisfied by the use of Type A2 fence, described above.

8.7.2.2.2. The type of fence required at the boundaries of livestock grazing land that adjoin airfield operational areas requires special study and determination. Evaluate the effectiveness of Type B, 3-strand fence in confining livestock on a case-by-case basis. If a survey reveals that locally existing and properly installed 3-strand fence is providing satisfactory confinement under conditions (including livestock pressures) similar to that prevailing or foreseen at the airfield in question, such fencing should be used for new installation and replacement. If there is clear evidence that a stronger fence is needed, Type B, 4-strand fencing may be installed. With either 3- or 4-strand fences, provide, as required, hinged rigid steel gates with break-away features for emergency type vehicles.

8.7.2.3. **Scope Determination.** See **paragraph 8.7.1**.

8.7.2.4. **Dimensions.** See **paragraph 8.7.1**.

8.7.2.5. **Design Considerations.** See **paragraph 8.7.1**.

8.7.3. **Security Fence, Vehicle Security Barriers. FAC: 8721**

CATCODE: 872247
OPR: AFSFC/SFO
OCR: AFCESA/CEO

8.7.3.1. **Description.** As differentiated from **CATCODE 872245**, a security fence is needed to enhance security or protective efforts established in response to Restricted or Controlled Areas.

8.7.3.2. **Requirements Determination.** The specific type of fencing required for Restricted Areas will be stated in Security Standards described in AFI 31-101. (T-1). Fencing for Controlled Areas will be stipulated by instructions and directives developed

by the functional area concerned (e.g., for non-nuclear explosives); refer to AFI 31-101. (T-1).

8.7.3.3. **Scope Determination.** See AFI 31-101.

8.7.3.4. **Dimensions.** See AFI 31-101.

8.7.3.5. **Design Considerations.** See AFI 31-101.

8.7.4. **Interior Fence. FAC: 8721**

CATCODE: 872248
OPR: AFSFC/SFO
OCR: AFCESA/CEO

8.7.4.1. **Description.** This designation is used for fences whose primary function is clearly neither boundary nor security control as described above. For example, fences that primarily promotes personnel or traffic safety, operating efficiency, or protection of environment.

8.7.4.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.7.4.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.7.4.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.7.4.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.7.5. Security Alarm System.

FAC: 8999
CATCODE: 872841
OPR: AFSFC/SFO
OCR: AFCESA/CEO

8.7.5.1. **Description.** Intrusion detection alarm systems consist of electronic monitoring devices, detection devices, and associated transmission lines, power supplies, and signaling equipment. They are designed to provide relatively complete detection of human intrusions into protected facilities. A system of this type may be employed to detect intrusion or forcible attacks in rooms, structures, or missile facilities.

8.7.5.2. **Requirements Determination.** Physical security standards in AFI 31-101 and AFI 91 series specify mandatory requirements. Aside from the mandatory requirements, additional requirements for the systems must be based on local requirements that are approved by the parent MAJCOM.

8.7.5.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.7.5.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.7.5.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.8. Category Group 88, Fire and Other Alarm Systems.

8.8.1. **Overview.**

8.8.1.1. **Installed Fire Protection Systems.** Fire protection systems are designed to detect the presence of fire and to activate both facility/area and fire alarm/communication center alarms. Systems may also be designed to suppress, contain, or control the fire once detected. These systems provide protection to physical facilities, their occupants, contents, structures, mobile and stationary equipment, water-front facilities, outside storage, shore protection for ships and craft, and external protection for aircraft. The following systems are installed in compliance with design/application criteria in UFC 3-600-01and other applicable ETLs and publications.

8.8.2. **Closed Head Automatic Sprinkler System. FAC: 8999**

CATCODE: 880211
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.2.1. **Description.** The system provides for the automatic detection and suppression of fire throughout designated areas, buildings, structures, and exposures; sounds an evacuation alarm; and transmits a signal to the fire alarm/communications center. Systems may be either wet (water filled) or dry (compressed air filled).

8.8.2.2. **Requirements Determination.** Wet systems require a pressure maintenance pump and dry systems require an air maintenance system. The sprinkler heads on these systems are each sealed with a fusible plug/element.

8.8.2.3. **Scope Determination.** See UFC 3-600-01.

8.8.2.4. **Dimensions.** See UFC 3-600-01.

8.8.2.5. **Design Considerations.** See UFC 3-600-01.

8.8.3. **Open Head Deluge Systems. FAC: 8999**

CATCODE: 880212
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.3.1. **Description.** This system, presently installed in many older, pre-1978, large hangar facilities, is not authorized for use in new construction except as permitted in UFC 3-600-01. The sprinklers on this type of system are all open.

8.8.3.2. **Requirements Determination.** See UFC 3-600-01.

8.8.3.3. **Scope Determination.** See UFC 3-600-01.

8.8.3.4. **Dimensions.** See UFC 3-600-01.

8.8.3.5. **Design Considerations.** See UFC 3-600-01.

8.8.4. **Pre-Action Sprinkler System. FAC: 8999**

CATCODE: 880216
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.4.1. **Description.** This is a dry sprinkler system which includes an automatic detector system which detects the fire and releases water into the sprinkler system

normally using a deluge valve. The individual sprinkler heads are all sealed with a fusible plug/element.

8.8.4.2. **Requirements Determination.** There are two actions required for water to be released from this type of system: (1) activation of the heat detection system and (2) the individual fusing/opening of a sprinkler head.

8.8.4.3. **Scope Determination.** See UFC 3-600-01.

8.8.4.4. **Dimensions.** See UFC 3-600-01.

8.8.4.5. **Design Considerations.** See UFC 3-600-01.

8.8.5. **AFFF Pre-Action Sprinkler System. FAC: 8999**

CATCODE: 880217
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.5.1. **Description.** The system is found in older (pre-1998) hangar-type facilities. The system includes sprinkler system, detection system, underwing nozzles, agent storage, and proportioning system (but not additional water pumps), and/or storage (see **CATCODEs 843314**, **843316**, and **843319**).

8.8.5.2. **Requirements Determination.** See UFC 3-600-01.

8.8.5.3. **Scope Determination.** See UFC 3-600-01.

8.8.5.4. **Dimensions.** See UFC 3-600-01.

8.8.5.5. **Design Considerations.** See UFC 3-600-01.

8.8.6. **High Expansion Foam System. FAC: 8999**

CATCODE: 880218
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.6.1. **Description.** Since 1998, this system has been a requirement in all new and renovated hangar facilities. It is also used for special applications involving flammable liquids and gasses.

8.8.6.2. **Requirements Determination.** See UFC 3-600-01.

8.8.6.3. **Scope Determination.** See UFC 3-600-01.

8.8.6.4. **Dimensions.** See UFC 3-600-01.

8.8.6.5. **Design Considerations.** See UFC 3-600-01.

8.8.7. **Automatic Fire Detection System. FAC: 8999**

CATCODE: 880221
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.7.1. **Description.** This system provides for the automatic detection of fire throughout designated areas, buildings, structures, or equipment. The system sounds an

evacuation alarm and transmit a coded alarm signal to the fire alarm/communications center. The item consists of necessary automatic detection devices, circuits or tubing, connected circuitry, control panels, signal indicator, trouble signals, test devices, power supply, emergency power supply, alarm transmitter and other necessary features.

8.8.7.2. **Requirements Determination.** See UFC 3-600-01.

8.8.7.3. **Scope Determination.** See UFC 3-600-01.

8.8.7.4. **Dimensions.** See UFC 3-600-01.

8.8.7.5. **Design Considerations.** See UFC 3-600-01.

8.8.8. **Manual Fire Alarm System, Interior. FAC: 8999**

CATCODE: 880222
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.8.1. **Description.** Manual fire and evacuation alarm systems are installed to provide means to notify building occupants of the presence of fire/emergency and transmit a coded alarm signal to the fire alarm/communications center.

8.8.8.2. **Requirements Determination.** See UFC 3-600-01.

8.8.8.3. **Scope Determination.** See UFC 3-600-01.

8.8.8.4. **Dimensions.** See UFC 3-600-01.

8.8.8.5. **Design Considerations.** See UFC 3-600-01.

8.8.9. **Manual Fire Alarm System, Exterior. FAC: 8999**

CATCODE: 880223
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.9.1. **Description.** This system is for area wide fire/emergency reporting and may use either voice or coded signal. The system may be part of the base internal wire and telephone system or may be radio operated. It includes initiating signal boxes, circuits, and central station receiving equipment, cabinets and consoles, antennas, and power supply equipment. This system is programmed, installed, and maintained as an Air Force communication function.

8.8.9.2. **Requirements Determination.** New coded systems are only authorized in special locations, in accordance with UFC 3-600-01.

8.8.9.3. **Scope Determination.** See UFC 3-600-01.

8.8.9.4. **Dimensions.** See UFC 3-600-01.

8.8.9.5. **Design Considerations.** See UFC 3-600-01.

8.8.10. **Carbon Dioxide Fire System. FAC: 8999**

CATCODE: 880231
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.10.1. **Description.** This system provides for automatic detection of fire and actuation of agent discharge. The system may be either total flooding or application type. The system consists of necessary piping, nozzles, and controls.

8.8.10.2. **Requirements Determination.** Carbon dioxide systems are not authorized for use in new construction except as permitted in UFC 3-600-01.

8.8.10.3. **Scope Determination.** See UFC 3-600-01.

8.8.10.4. **Dimensions.** See UFC 3-600-01.

8.8.10.5. **Design Considerations.** See UFC 3-600-01.

8.8.11. **Protein Foam/Water Deluge System. FAC: 8999**

CATCODE: 880232
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.11.1. **Description.** See UFC 3-600-01.

8.8.11.2. **Requirements Determination.** The system, presently installed in some large hangar facilities, is not authorized for new construction.

8.8.11.3. **Scope Determination.** See UFC 3-600-01.

8.8.11.4. **Dimensions.** See UFC 3-600-01.

8.8.11.5. **Design Considerations.** See UFC 3-600-01.

8.8.12. **Other Fire Systems. FAC: 8999**

CATCODE: 880233
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.12.1. **Description.** Systems under this heading include but are not limited to "water mist systems" and "alternative gaseous systems" (FM 200, NOVEC 1230, INERGEN, N100, FE-13, and FE-25).

8.8.12.2. **Requirements Determination.** Contact OPR for latest requirements and guidance.

8.8.12.3. **Scope Determination.** Contact OPR for latest requirements and guidance.

8.8.12.4. **Dimensions.** Contact OPR for latest requirements and guidance.

8.8.12.5. **Design Considerations.** Contact OPR for latest requirements and guidance.

8.8.13. **Halon 1301 Fire System. FAC: 8999**

CATCODE: 880234
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.13.1. **Description.** Halon 1301 systems are no longer authorized for use in new construction and should be replaced in accordance with UFC 3-600-01, ETL 01-18, *Fire Protection Engineering Criteria - Electronic Equipment Installations,* and ETL 95-1, *Halon 1301 Management Planning Guidance, with Change 1*.

8.8.13.2. **Requirements Determination.** See UFC 3-600-01, ETL 01-18, and ETL 95-1.

8.8.13.3. **Scope Determination.** See UFC 3-600-01, ETL 01-18, and ETL 95-1.

8.8.13.4. **Dimensions.** See UFC 3-600-01, ETL 01-18, and ETL 95-1.

8.8.13.5. **Design Considerations.** See UFC 3-600-01, ETL 01-18, and ETL 95-1.

8.8.14. **Dry Chemical Systems. FAC: 8999**

CATCODE: 880235
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.14.1. **Description.** This system provides for automatic detection of fire and the actuation of agent discharge. The system is normally used for local application but may be used for special hazard total flood systems. The system consists of piping, nozzles, agent storage tanks, detection devices, actuation and alarm devices, transmitters, and controls.

8.8.14.2. **Requirements Determination.** See UFC 3-600-01.

8.8.14.3. **Scope Determination.** See UFC 3-600-01.

8.8.14.4. **Dimensions.** See UFC 3-600-01.

8.8.14.5. **Design Considerations.** See UFC 3-600-01.

8.8.15. **Foam Systems (Tank Farm). FAC: 8999**

CATCODE: 880236
OPR: AFCESA/CEO
OCR: AFCESA/CEXF

8.8.15.1. **Description.** This system provides for the manual actuation of agent discharge. The system is used to protect large fuel tanks and may be either sub-surface or over-the-top type system. The item consists of piping, nozzles, foam makers, agent storage tanks, and controls.

8.8.15.2. **Requirements Determination.** See UFC 3-600-01.

8.8.15.3. **Scope Determination.** See UFC 3-600-01.

8.8.15.4. **Dimensions.** See UFC 3-600-01.

8.8.15.5. **Design Considerations.** See UFC 3-600-01.

8.9. Category Group 89, Miscellaneous Utilities

8.9.1. Energy Management and Control Systems (EMCS). FAC: 8999

CATCODE: 890271
OPR: AFCESA/CEO
OCR: N/A

8.9.1.1. **Description.** These systems are provided for facilities and utility systems when an economic study indicates that potential savings in operating and maintenance costs amortize the cost of the system within ten years and meet the requirements of the DoD's Energy Conservation Investment Program (ECIP). **CATCODE 890271** deals with EMCE central station equipment (i.e., equipment located in the Master Control Room). **CATCODE 890272** deals with EMCS Field Equipment (i.e., field interface devices such as multiplex panels, sensors, controls, etc.). **CATCODE 890273** deals with EMCS data lines (i.e., communication links between EMCS and the field panels).

8.9.1.2. **Requirements Determination:** Contact OPR for latest requirements and guidance.

8.9.1.3. **Scope Determination:** Contact OPR for latest requirements and guidance.

8.9.1.4. **Dimensions:** Contact OPR for latest requirements and guidance.

8.9.1.5. **Design Considerations:** Contact OPR for latest requirements and guidance.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPORTING INFORMATION

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Prescribed Forms

There are no new forms prescribed by this directive.

Adopted Forms

AF Form 332, *Base Civil Engineer Work Request*

AF Form 813, *Request for Environmental Impact Analysis*

AF Form 847, *Recommendation for Change of Publication*

DD Form 1354, *Transfer and Acceptance of DoD Real Property*

DD Form 1391, *FY____ Military Construction Project Data*

Abbreviations and Acronyms

A—Ampere

A/HMU—Aircraft/Helicopter Maintenance Unit

AAFES—Army and Air Force Exchange Service

ACC—Air Combat Command

ACES—Advanced Concept Ejection System

ACT—Air Cargo Terminal

ACU—Acquisition Control Unit

ADPE—Automated Data Processing Equipment

AETC—Air Education and Training Center

AF/SG—Office of the Surgeon General, United States Air Force

AFNIC—Air Force Network Integration Center

AFCAT—Air Force Catalog

AFCEE—Air Force Center for Engineering and the Environment

AFCESA—Air Force Civil Engineer Support Agency

AFCWA—Air Force Combat Weather Center

AFETS—Air Force Engineering and Technical Services

AFFSA—Air Force Flight Standards Agency

AFI—Air Force Instruction

AFISRA—Air Force Intelligence, Surveillance, and Reconnaissance Agency

AFJI—Air Force Joint Instruction

AFMAN—Air Force Manual

AFMC—Air Force Materiel Command

AFNAG—Air Force / Navy / Army Guide

AFOSH—Air Force Occupational and Environmental Safety, Fire Protection and Health Standards

AFPET—Air Force Petroleum Agency

AFRC—Air Force Reserve Command

AFRCH—Air Force Reserve Command Handbook

AFSDG—Air Force Services Facilities Design Guide

AFSFC—Air Force Security Forces Center

AFSVA—Air Force Services Agency

AFWA—Air Force Weather Agency

AGE—Aerospace Ground Equipment

AICUZ—Air Installation Compatible Use Zone

AIRCOM—Air Communications

ALC—Air Logistics Center

ALCE—Airlift Control Element

AM—Airfield Management

AMC—Air Mobility Command

AME—Alternate Mission Equipment

AMOPS—Airfield Management Operations Section

ANG—Air National Guard

ANGH—Air National Guard Handbook

ANSI—American National Standards Institute

AOMC—Air Operations and Monitoring Center

APF—Appropriated Fund

APOD—Aerial Port of Debarkation

APOE—Aerial Port of Embarkation

APT—Air Passenger Terminal

APU—Auxiliary Power Unit

ASE—Airfield Services Element

ASHRAE—American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASOC—Air Support Operations Center

ASOS—Automated Surface Observing System

ASR—Airport Surveillance Radar

AT/FP—Anti-Terrorism/Force Protection

ATC—Air Traffic Control

AVGAS—aviation gasoline

BAK—Barrier Arresting Kit

BAS—Basic Allowance for Subsistence

BASH—Bird/Wildlife Aircraft Strike Hazard

BCE—Base Civil Engineer

BDOC—Base Defense Operations Centers

BLDASP—Base Level Data Automation Standardization Program

BMT—Basic Military Training

BNCC—Base Network Control Center

BOMA—Building Owners and Managers Association

BRAC—Base Realignment and Closure

BW—Battlefield Weather

C4—Command, Control, Communications, and Computers

CAC—Community Activity Center

CAMS—Core Automated Management System

CATCODE—Category Code

CA—Combat Arms

CBUs—Cluster Bomb/Dispenser Units

CCTV—Closed-Circuit TV

CDF—Cargo Deployment Function

CE—Civil Engineering

C-E—Communications-Electronic

CEI—Contract End Item

CEIP—Communications-Electronic Implementation Plan

CFETP—Career Field Education and Training Plan

CFR—Code of Federal Regulations

CL—Cube Limit

CNG—Compressed Natural Gas

COCESS—Contractor Operated Civil Engineering Supply Store

COMBS—Contractor Operated Maintenance Base Supply

COMSEC—Communications Security

CONUS—Continental United States

COPARS—Contract Operated Parts Store

COPE—Custodian of Postal Effects

CSC—Central Security Control

CTO—Commercial Travel Office

CWA—Clean Water Act

CWDE—Chemical Warfare Defense Ensemble

DAS—Data Acquisition System

DBO—Deputy for Business Operations

DCC—Deployment Control Center

DCP—Data Collection Package

DDESB—Defense Explosives Safety Board

DESC—Defense Energy Support Center

DISA—Defense Information Systems Agency

DISNET—Defense Information Systems Network

DME—Distance Measuring Equipment

DMP—Dorm Master Plan

DoD—Department of Defense

DPI—Data Processing Installation

DRMO—Defense Reutilization Marketing Offices

DRO—Direct Readout

DRUs—Direct Reporting Units

DSN—Defense Switched Network

EA—Environmental Assessment

ECC—Emergency Communications Center

EEDs—Electro Explosives Devices

EIA/TIA—Electronics Industries Alliance/Telecommunications Industry Association

EIAP—Environmental Impact Analysis Process

EIS—Environmental Impact Statement

EMCS—Energy Management and Control System

EOD—Explosive Ordnance Disposal

EPME—Enlisted Professional Military Education

ESC—Education Service Center

ETL—Engineering Technical Letter

EWL—Explosives Weight Limited

FAA—Federal Aviation Administration

FAC—Facility Analysis Category

FCEI—Facility Contract End Item

FDCU—Field Data Collection Units

FEMP—Federal Energy Management Program

FOAs—Field Operating Agencies

FSC—Federal Stock Class

FTD—Field Training Detachment

FTE—Full Time Equivalent

GAIM—Global Assimilation of Ionospheric Measurements

GCA—Ground Control Approach

GIG—Global Information Grid

GTA—Ground to Air

HAWC—Health and Wellness Center

HAZMAT—Hazardous materials

HD—High Detonation

HE—High Explosive

HMMWV—Highly Mobile Multipurpose Wheeled Vehicle

AFSVA/SVOL—Headquarters, Air Force Services Agency, Lodging Branch

HRMA—Housing Requirements and Market Analysis

HVAC—Heating, Ventilating, and Air Conditioning

Hz—Hertz

IAD—Intrusion Alarm Devices

IBC—International Building Code

IFR—Instrument Flight Regulations

ILD—Internal Locking Devices

ILS—Instrument Landing System

IMC—Instrument Meteorological Conditions

IMF—Integrated Maintenance Facility

JPTS—Jet Propellant Thermally Stable

JWICS—Joint Worldwide Intelligence Communications System

kVA—Kilovolt Amperes

kW—Kilowatt

LAN—Local Area Network

LCC—Life-Cycle Costing

LDA—Localizer Directional Aid

LED—Law Enforcement Desk

LEED—Leadership in Energy and Environmental Design

LID—Low Impact Development

LOC—Localizer

LOX—Liquid Oxygen

LPG—Liquefied Petroleum Gas

LRS—Logistics Readiness Squadron

LZ—Landing Zone

MAAS—Mobile Aircraft Arresting System

MAJCOM—Major Command

MARS—Military Affiliate Radio System

MCP—Military Construction Program

MER—Multiple Ejector Racks

METNAV—Meteorological Equipment and Navigational Aids

METSAT—Meteorological Satellite

MILCON—Military Construction

MIL-HDBK—Military Handbook

MLS—Microwave Landing System

MLW—Mean Low Water

Mogas—Motor Gasoline

MOS—Minimum Operating Strip

MRSP—Mobile Readiness Spare Packages

MSCF—Master Security Control Facility

MSM—Munitions Storage Module

MTS—Mobile Training Set

MWE—Mission Weather Element

NAF—Nonappropriated Fund

NAVAID—Navigational Aid

NATO—North Atlantic Treaty Organization

NCOIC—Noncommissioned Officer in Charge

NCO—Noncommissioned Officer

NDB—Non-Directional Beacon

NDI—Nondestructive Inspection

NEPA—National Environmental Policy Act

NEW—Net Explosive Weight

NFPA—National Fire Protection Association

NIPRNet—Non-Secure Internet Protocol Router Network

NTFS—New Tactical Forecast System

NTFS—New Tactical Forecast System

NWS—National Weather Service

OCR—Office of Collateral Responsibility

OEBGD/FGS—Overseas Environmental Baseline Guidance Document and Final Governing Standards

OIC—Officer in Charge

OID—Operator Interface Devices

OJT—On-the-Job Training

OPUP—Open Principal User Processor

OSCRE—Open Standards Consortium for Real Estate

OSD—Office of the Secretary of Defense

OTS—Officer Training School

OWS—Operational Weather Squadrons

PAA—Primary Assigned Aircraft

PANCAP—The maximum number of aircraft operations at an Air Force base in a year

PAPI—Precision Approach Path Indicator

PAR—Precision Approach Radar

PBX—Base Private Branch Exchange

PC—Personal Computer

PCS—Permanent Change of Station

PDF—Personnel Deployment Function

PDO—Publication Distribution Office

PHOCAP—The maximum number of aircraft operations in an hour.

PMEL—Precision Measurement Equipment Laboratory

POS—Peacetime Operating Stock

PSA—Project Support Agreements

PSIG—Pound-Force Per Square Inch Gauge

PT—Physical Training

PVA—Project Validation Assessment

Q-D—Quantity Distance

RAPCON—Radar Approach Control

RH&T—Recruit Housing and Training

RIMS—Radio Interference Measuring Set

RLIM—Runway Lighting Intensity Monitor

ROS—Representative Observation Site

ROTC—Reserve Officer Training Corps

RPCS—Real Property Category System

RQS—Rescue Squadron

RSTN—Radio Solar Telescope Network

RVR—Runway Visual Range

SALS—Short Approach Lighting System

SBSS—Standard Base Supply System

SCIF—Sensitive Compartment Information Facility

SDC—Standard Desktop Computer

SDD—Sustainable Design and Development

SDF—Simplified Direction Facility

SDW—Substantial Dividing Walls

SERE—Survival Evasion Resistance Escape

SGAS—Soft Ground Arrestor System

SIMS—Services Information Management System

SIPRNet—Secret Internet Protocol Network

SMP—Sub-Motor Pool

SNCO—Senior Non-Commissioned Officers

SOI—Statement of Intent

SOON—Solar Observing Optical Network

SPO—System Program Office

SRM—Sustainment, Restoration, and Modernization

SRS—Solar Radio Spectrograph

STEM-B—Systems Telecommunications Engineering Manager-Base Level

STEM-C—Systems Telecommunications Engineering Manager-MAJCOM

TAB-VEE—Tactical Air Base-Hardened Aircraft Shelter

TACAN—Tactical Air Navigation

TACP—Tactical Air Control Party

TA—Table of Allowance

TCU—Transportation Control Unit

TDAU—Terminal Data Acquisition Unit

TIA/EIA—Telecommunications Industry Association/Electronics Industries Alliance

TLF—Temporary lodging facilities

TMDE—Test, Measurement, and Diagnostic Equipment

TPR—Trained Personnel Requirements

UCML—Unit Committed Munitions List

UFC—Unified Facilities Criteria

UMD—Unit Manning Document

UPH—Unaccompanied Personnel Housing

UPS—Uninterruptible Power Supply

UPT—Undergraduate Pilot Training

USACE—United States Army Corps of Engineers

USAF—United States Air Force

USGBC—United States Green Building Council

USPS—United States Postal Service

VDU—Video Display Unit

VHF/UHF—Very High Frequency/Ultra High Frequency

VMC—Visual Meteorological Conditions

VOR-DME—Distance Measuring Equipment

VOR—VHF Omni-directional Range

VQ—Visiting Quarters

WR-ALC—Warner Robins Air Logistics Center

WRM—War Readiness Material

YOS—Years of Service

Terms

Building Definitions—The definitions provided below are used in this Manual and used by the Military Departments and DoD Components to describe the levels and types of construction of most DoD buildings and related facilities.

Building System and Subsystems—A building system is an assembly of dimensionally and functionally pre-coordinated subsystems which, when combined, produces an essentially complete and functional building. A subsystem is one of many building components designed and manufactured to be combined and integrated with other types of subsystems to produce an entire building system.

Industrialized Buildings—Buildings in which major components and some subsystems are constructed at a factory, transported to the job site and erected. An example is factory construction of individual walls with the plumbing and electrical wiring already installed.

Manufactured Buildings—Buildings constructed from whole building modules that are constructed at a factory, transported to the job site and connected to other modules to form an entire structure. An example is multistory unaccompanied personnel housing in which each living unit is factory constructed with walls, floors, ceilings plumbing, and electrical wiring.

Mobilization and Emergency Construction—Buildings and facilities designed and constructed to serve a specific mobilization or emergency requirement. Buildings should be austere to minimize construction time and maximize conservation of critical materials. Maintenance factors and longevity should be secondary considerations.

Permanent Construction—Buildings and facilities designed and constructed to serve a life expectancy of more than 25 years, should be energy efficient, and should have finishes, materials, and systems selected for low maintenance and low life cycle cost.

Pre-Engineered Buildings—Buildings constructed entirely from a manufacturer's system of standard stock items. Pre-engineered buildings often rely on a modular dimension system and can be constructed in a wide range of configurations and sizes.

Portable Buildings—Buildings designed to be easily moved intact.

Relocatable Buildings—Buildings designed to be dismantled to facilitate relocation and normally purchased as equipment to fill a temporary requirement.

Semipermanent Construction—Buildings and facilities designed and constructed to serve a life expectancy of more than five years but less than 25 years, should be energy efficient, and should have finishes, materials, and systems selected for a moderate degree of maintenance using the life cycle approach.

Temporary Construction—Buildings and facilities designed and constructed to serve a life expectancy of five years or less using low cost construction, and with finishes, materials, and systems selected with maintenance factors being a secondary consideration.

Interior Taxilane—A taxilane which provides a secondary taxi route to an individual parking position or a hangar and is not intended or used as a primary taxi route for through traffic.

Peripheral Taxilane—A taxilane located along the periphery of an apron and intended as a primary taxi route.

Through Taxilane—A taxilane providing a route through or across an apron which is intended as a primary taxi route for access to other taxilanes, aprons, taxiways or the runway.

Attachment 2

FACILITY REQUIREMENTS SYSTEM

A2.1. The DoD Real Property Classification System (RPCS). The RPCS is a hierarchical scheme of real property types and functions that serves as the framework for identifying, categorizing, and analyzing, DoD's inventory of land and facilities around the world. This scheme is comprised of a 5-tier structure represented by numerical codes, with 1-digit codes being the most general and 6-digit codes representing the most specific types of facilities.

A2.2. Category Codes. At the most detailed level, numerical codes, commonly known as CATCODE, represent each type of facility in the Air Force's inventory. CATCODE are generally similar but not identical between the Military Departments. Because of these differences, and to allow consistent macro-level analysis and planning across all of the Military Departments, DoD established a higher-level facility classification that groups facilities with similar functions and units of measure from each Military Departments into common Facility Analysis Categories (FAC). FACs are represented by a 4-digit code. Successively larger groupings of facility types are represented by 3-, 2-, and 1-digit numerical classifications.

A2.3. Real Property Classification System (RPCS) Structure. The RPCS structure is numerically consistent between the 1-digit level and the 4-digit level. For example, the Facility Class represented by the code "1" for "Operation and Training facilities" consists of the 2-, 3-, and 4-digit codes that also begin with the numeral 1. Likewise, the Category Group represented by the code "11" for "Airfield Pavements" consists of the 3- and 4-digit codes that also begin with 'l1." The exception to this rule is FAC 9999, "Not real property," which has no two-or three-digit counterparts. (See **Table A2.1**) Further information on the DoD Real Property Classification System can be viewed on the Office of the Deputy Under Secretary of Defense, Installations and Environment Web site: **http://www.acq.osd.mil/ie/fim/programanalysis_budget/tool_metrics/RPCS/rpcs.shtml.**

A2.3.1. The names for each level in the RPCS are as follows, with **Table A2.1** providing an example of the hierarchy:

Facility Class (FC)1-digit level
Category Group (CG) 2-digit level
Basic Category (BC)3-digit level
Facility Analysis Category (FAC)4-digit level
Category Code (CATCODE)5- and 6-digit level

A2.3.2. **Table A2 2** provides a complete list of all the Air Force RPCS codes broken down by CATCODE, FAC, CATCODE Title, OPR, OCR and location within the Manual, if applicable.

Table A2.1. RPCS Hierarchy.

FC	FC Title	CG	CG Title	BC	BC Title	FAC	FAC Title	UM	CAT CODE	CATCODE Long Name
1	Operation & Training									
		11	Airfield Pavements							
				111	Airfield Runways					
						1111	Fixed-Wing Runway Surfaced	SY		
									111111	RUNWAY
NOTE: 1. Due to variations with Military Departments CATCODE numbering , the first 4 digits of some CATCODEs do NOT match										

Table A2.2. Air Force Real RPCS Codes.

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
111111	1111	Runway	AFCESA/CEO	AF/A3O-A	2
111115	1113	Overrun, Paved	AFCESA/CEO	AF/A3O-A	2
111411	1114	Runway, Unsurfaced	AFCESA/CEO	AF/A3O-A	2
112211	1121	Taxiway	AFCESA/CEO	AF/A3O-A	2
113321	1131	Apron	AFCESA/CEO	AF/A3O-A	2
116116	1111	Takeoff and Landing Zone (Short Field Takeoff and Landing)	AFCESA/CEO	AF/A3O-A	2
116555	1111	Sac Alert Take-Off Strip	AFCESA/CEO	AF/A3O-A	N/A
116642	1165	Shoulder, Paved	AFCESA/CEO	N/A	2
116661	1131	Pad, Arm and Disarm	AF/A4L	AFCESA/CEO	2
116662	1131	Pad, Dangerous Cargo, Load/Unload	AF/A4L	AFCESA/CEO	2
116663	1112	Pad, Helicopter	AFCESA/CEO	AF/A4L	2
116664	1131	Pad, Power Check	AF/A4L	AFCESA/CEO	2
116665	1131	Pad, Power Check W/Noise Suppressor	AF/A4L	AFCESA/CEO	2
116666	1131	Pad, Warm-up, Holding	AFCESA/CEO	AF/A4L	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
116667	1161	Pad, Compass Calibration	AF/A4L	AFCESA/CEO	2
116668	1162	Pad, Launching	AFSPC	AFCESA/CEO	N/A
116672	1163	Pad, Aircraft Washrack	AFCESA/CEO	AF/A4L	2
116922	1461	Aircraft Arresting Systems	AFCESA/CEO	WR-ALC /642 CBSS	2
116933	1463	Firing In Butt	AF/A4LW	AFCESA/CEO	N/A
116945	1464	Jet Blast Deflector	AFCESA/CEO	AF/A3O-A	2
121111	1444	Petroleum Operations Building	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
121115	1211	Aviation Fuel Dispensing	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
121122	1211	Hydrant Fueling System	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
121124	1262	Hydrant Fueling Building	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
122111	1221	Marine Fuel Dispensing System	AF/A4LE	AFCESA/CEO , AFPET/PTOT	N/A
123335	1231	Vehicle Fueling Station	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124131	1241	Operating Storage, Aviation Gas	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124132	1241	Operating Storage, Aviation Lubricant	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124134	1243	Operating Storage, Diesel	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124135	1241	Operating Storage, Jet Fuel	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124137	1243	Operating Storage, Motor Gas	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2
124138	1244	Operating Storage, Solvents	AF/A4LE	AFCESA/CEO , AFPET/PTOT	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
124139	1244	Operating Storage, Special Fuels	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
125554	1251	Pipeline, Liquid Fuels	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
125977	1262	Pump Station, Liquid Fuels	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
126925	1261	Liquid Fuel Truck Fill Stand	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
126926	1261	Liquid Fuel Stand, Unloading	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
130142	1411	Fire Crash/Rescue Station	AFCESA/CEXF	AFCESA/CEO	2
131111	1311	Telecommunications Facility	AFNIC	N/A	2
131114	1311	Military Affiliate Radio System	AFNIC	N/A	2
131115	1311	Communications Receiver Facility	AFFSA	AFNIC	2
131116	1311	Communications-Transmitter/Receiver Facility	AFFSA	AFNIC	2
131117	1311	Communications Transmitter Facility	AFFSA	AFNIC	2
131118	1311	Radio Relay Facility	AFFSA	AFNIC	2
131119	1441	American Forces Radio and Television Station	AFFSA	AFNIC	N/A
131132	1312	Satellite Communications Ground Terminal	AFFSA	AFNIC	N/A
131133	1311	Communications, Scatter	AFFSA	AFNIC	N/A
131134	1311	AIRCOM Relay Center	AFFSA	AFNIC	2
131135	1311	Automatic Switching Center	AFFSA	AFNIC	N/A
131136	1311	AIRCOM Receiver Facility	AFFSA	AFNIC	2
131137	1311	AIRCOM Transmitter Facility	AFFSA	AFNIC	2
131138	1311	High Frequency AIRCOM Microwave Relay	AFNIC	N/A	2
131139	1311	Microwave Repeater	AFNIC	N/A	2
131143	1311	Gap Filler	AFNIC	N/A	N/A
131200	1311	Space Operations Facility	AFNIC	AFSPC	N/A
132131	1321	Silo Hardened HF Antenna	AFNIC	AFSPC	N/A
132133	8526	Pad, Equipment	AFCESA/CEO	AFNIC	N/A
132134	1321	Antenna Support Structure	AFNIC	AFCESA/CEO	2
133314	1331	UHF Direction Finding	AFNIC	N/A	N/A

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
134101	1341	Wind Measuring Equipment	AFWA	N/A	N/A
134102	1341	Automatic Meteorological Station	AFWA	N/A	N/A
134119	1341	Remote Control Circuits	AFFSA	AFNIC, AF/A3O-A	2
134335	1341	Ground Control Intercept	AFFSA	AFNIC, AF/A3O-A	N/A
134336	1331	Ground Controlled Approach, Fixed	AFFSA	AFNIC, AF/A3O-A	2
134338	8927	Ground Controlled Approach Vault	AFFSA	AFNIC, AF/A3O-A	2
134341	1331	Ground Controlled Approach RAPCON Support Building	AFFSA	AFNIC, AF/A3O-A	2
134351	1341	Instrument Landing System Glide Slope	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134353	1341	Instrument Landing System Localizer	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134355	1341	ILS Marker Beacon	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134373	1341	Radar Turntable	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134374	1341	Precision Approach Radar	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134375	1331	Radar Approach Control Center	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134376	1341	Airport Surveillance Radar	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134422	1341	Radio Beacon Facility	AFFSA	AFNIC, AF/A3O-A,AFCESA/C	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
				EO	
134465	1341	Tactical Air Navigation Station, Fixed	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134473	1341	Navigational Aid Tower	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134482	1341	Low Power Terminal VHF Omni-Range	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
134484	1341	High Power VHF Omni-Range	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	N/A
134511	1341	TVOR-RACAN, Fixed	AFFSA	AFNIC, AF/A3O-A, AFCESA/CEO	2
134678	1341	Wind Direction Indicator	AFFSA	AFNIC, AF/A3O-A, AFCESA/CEO	2
135583	1351	Telephone Duct Facility	AFNIC	AF/A3O-A, AFCESA/CEO	N/A
135586	1351	Telephone Pole Facility	AFNIC	AF/A3O-A, AFCESA/CEO	N/A
135587	9999	MAR Cable	AFNIC	AF/A3O-A, AFCESA/CEO	N/A
136635	1362	Light, Beacon	AFFSA	AFNIC, AF/A3O-A,AFCESA/CEO	2
136661	1361	Light, Approach	AFCESA/CEO	AF/A3O-A	2
136662	1362	Obstruction Light	AFCESA/CEO	AF/A3O-A	2
136664	1361	Light, Runway	AFCESA/CEO	AF/A3O-A	2
136666	1362	Special Airfield Lighting	AFCESA/CEO	AF/A3O-A	2
136667	1361	Taxiway Lighting	AFCESA/CEO	AF/A3O-A	2
136668	8927	Airfield Light Vault	AFCESA/CEO	AF/A3O-A	2
141101	1411	Airfield Fire and Rescue Station	AFCESA/CEXF	AFCESA/CEO	2
141154	1444	Crash Boat Crew Station	AF/A3O-A	N/A	N/A
141165	1444	Explosive Ordnance Disposal	AFCESA/CEXD	AFCESA/CEO	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
141172	9999	GM AUTONAV Facility	AFA4LW	N/A	N/A
141173	1403	Missile Erector Enclosure	AFA4LW	N/A	N/A
141175	1457	Guided Missile Launch Control	AFA4LW	N/A	N/A
141177	1455	Guided Missile Shelter	AFA4LW	N/A	N/A
141181	1466	Aircraft Shelter	AF/A3O-A	AF/A4L	2
141182	1465	Hardened Aircraft Shelter	AF/A3O-A	AF/A4L	2
141183	2111	Alert Hanger, Fighter Aircraft	AF/A3O-A	AF/A4L	N/A
141184	7383	Ready Shelter Facility	AF/A3O-A	AF/A4L	N/A
141185	2111	Aerospace Pararescue and Recovery Facility	ACC/A8R	N/A	2
141232	2184	Aerial Delivery Facility	AF/A3O-A	N/A	2
141383	1441	Audiovisual Facility	AF/A3O-A	SAF/PA	2
141385	1441	Motion Picture Laboratory	AF/A3O-A	SAF/PA	N/A
141387	1441	Film Storage Vault	AF/A3O-A	SAF/PA	N/A
141389	1441	Television Production Facility	AF/A3O-A	SAF/PA	2
141391	1311	Radar Transmitter and Computer Building	AFNIC	AF/A3O-A	N/A
141392	1402	Radar Transmitter Building (BMEWS)	AFNIC	AF/A3O-A	N/A
141393	1402	Scanner Building (BMEWS)	AFNIC	AF/A3O-A	N/A
141411	1402	Radome Tower Building	AFNIC	AF/A3O-A	N/A
141421	1402	Radar Tower Building	AFNIC	AF/A3O-A	N/A
141432	9999	SLBM RDR Building	AFNIC	AF/A3O-A	N/A
141446	1402	Combat Center Building	AFNIC	AF/A3O-A	N/A
141447	1402	Direction Center Facility	AFNIC	AF/A3O-A	N/A
141449	1402	Direction/Combat Center Facility	AFNIC	AF/A3O-A	N/A
141453	1412	Base Operations	AFFSA/A3AS, AFWA/A5/8	AF/A3O-W, AF/A3O-A	2
141454	1444	Special Operations	AF/A3O-AS	N/A	N/A
141455	1444	Ordnance Control Point Ops	AF/A4MW	N/A	2
141456	1444	Air Force Intelligence, Surveillance and Reconnaissance Agency (AFISRA) Operations Facility.	AFISRA	AF/A2, AF/A5RI	2
141459	1412	Crew Readiness	AF/A3O-A	N/A	2
141461	1412	USAF Command Post	AF/A3O-A	AFCESA/CEO	2
141481	1402	Aircraft Control And Warning Operations Building Dewline	AF/A3O-AO	AFNIC	N/A
141489	1402	Aircraft Control and Warning Operations Building	AF/A3O-AO	AFNIC	N/A
141626	1412	Weather Rawinsonde	AF/A3O-W	AFWA, AFNIC	N/A

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141627	1412	Weather Instrument Shelter	AF/A3O-W	AFWA, AFNIC	N/A
141629	1412	Surface Weather Observing Facility	AFWA/A5/A8MAJCOM/A3W	MAJCOM/A6	2
141XX1	1444	Operational Weather Squadron (New Requirement).	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
141XX2	1444	Battlefield Weather Squadron (New Requirement).	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
141XX3	1444	Air Force Combat Weather Center (AFCWC) (New Requirement).	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
141XX4	1444	Air Force Weather Agency (AFWA) /System Operations Center.	AFWA/A5/A8	1st Weather Group, 2nd Weather Group	2
141635	1412	Rocketsonde Control Building	AF/A3O-W	AFWA, AFNIC	N/A
141649	1444	Air Force Global Weather Center	AF/A3O-W	AFWA, AFNIC	N/A
141743	1441	Base Photo Laboratory	AF/A3O-A	N/A	2
141745	1441	Reconnaissance Photo Laboratory	AF/A5RI	AF/A3O-A	2
141747	1441	WS-430B Photo Processing and Interpretation Facility Support Building	AF/A5RI	AF/A3O-A	N/A
141753	1412	Squadron Operations	AF/A3O-A	N/A	2
141763	1442	Technical Laboratory	AFRL	N/A	N/A
141764	1442	Integration Support Facility	AFRL	N/A	N/A
141765	1442	Depot Quality Control Laboratory	AF/A4L	AFRL	N/A
141766	1442	Technical Laboratory Liquid Fuels Analysis	AF/A4LE	AFPET/PTOT, AFRL	N/A
141782	1412	Terminal, Air Freight	AF/A4LE	AF/A3O-A	2
141783	1412	Air Freight/Passenger Terminal	AF/A4LE	AF/A3O-A	2
141784	1412	Air Passenger Terminal	AF/A4LE	AF/A3O-A	2
141785	1412	Fleet Service Terminal	AF/A4LE	AF/A3O-A	N/A
141786	1412	Deployment Processing Facility	AF/A4LE	N/A	2
141787	1443	Consolidation/Containerization Point	AF/A4LE	N/A	N/A
141821	4411	Material Processing Depot	AF/A4LE	N/A	2
141911	1457	Missile Operations Building	AF/A4LW	N/A	N/A
141912	1403	Re-Entry Vehicle Building	AFSPC	AF/A3O-S	N/A
141913	4122	Special Fuel Facility	AF/A4LE	AFSPC, AF/A3O-S,	N/A

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				AFPET/PTOT	
141914	1452	Missile Guidance Facility	AFSPC	AF/A3O-S	N/A
141915	1403	Missile Transfer Building	AFSPC	AF/A3O-S	N/A
146601	9999	Aircraft Sunshelter	AFCESA/CEO	AF/A3O-A	2
149411	1499	Bunker	AFCESA/CEX	AFCESA/CEO	N/A
149511	1331	Pilotless Aircraft Guidance Station	AF/A5RI, JUAS	AF/A5RC	N/A
149512	1451	Missile Launch Facility	AFSPC	AF/A3O-S	N/A
149514	1452	Missile Guidance Station	AFSPC	AF/A3O-S	N/A
149621	1341	Wind Measuring Set (AN/FMQ-13)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX1	1341	Automatic Meteorological Station (AN/FMQ-19) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX2	1341	Fixed Base Automatic Meteorological Station (AN/FMQ-22) (New Requirement)	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	2
149XX3	1341	Automated Surface Observing System (ASOS) (New Requirement)	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	2
149622	1341	Ceilometer Rotating Beacon	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	N/A
149623	1341	Transmissometer, ANGMQ-10	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	N/A
149624	1341	Temperature-Humidity Measuring Set	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	N/A
149625	1341	Digital Wind Measuring System	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	N/A
149626	1341	Lightning Warning Set	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	N/A
149627	1341	Radar Meteorological Set, Next Generation Radar (NEXRAD), (WSR-88D)	AFWA/A5/A8,MAJCOM/A3W	MAJCOM/A6	2
149XX4	1341	Radio Solar Telescope Network (RSTN) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX5	1341	Solar Observing Optical Network (SOON), (AN/FMQ-7) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX6	1341	Improved Solar Observing Optical Network (ISOON) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2

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149XX7	1341	Next Generation Ionosonde (NEXION), (DPS 4-D) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX8	1341	Mark IVB (UMQ-13) (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149XX9	1341	Receiving Set, Satellite (RSS), TMQ-54 (New Requirement)	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	2
149629	1341	Cloud Detection Radar	AFWA/A5/A8, MAJCOM/A3W	MAJCOM/A6	N/A
149711	1453	Missile Shaft Access	AF/A4LW, AFSPC	AF/A5RW	N/A
149811	1454	Tunnel	AF/A4LW,AFSPC	AF/A5RW	N/A
149962	1413	Air Traffic Control Tower	AFFSA	AF/A3O-A	2
149965	1499	Radar Tower	AFFSA	AF/A3O-A	N/A
149967	1734	Observation Tower	AFFSA	AF/A3O-A	N/A
149968	1499	Special Tower	AFFSA	AF/A3O-A	N/A
151153	1511	Cargo Pier	AFCESA/CEO	N/A	N/A
151155	1511	Liquid Fuel Unloading Pier	AF/A4LE	AFCESA/CEO, AFPET/PTOT	2
152111	1512	Wharf	AFCESA/CEO	N/A	N/A
154452	1541	Waterfront Improvements	AFCESA/CEO	N/A	N/A
159353	1443	Warehouse, Transit Cargo	AF/A4LE	N/A	N/A
163212	9999	Buoy	AFCESA/CEO	N/A	N/A
163311	1631	Liquid Fuel Off-Shore Unloading Facility	AF/A4LE, AFPET/PTOT	AFCESA/CEO	2
164211	1641	Harbor and Coastal Marine Improvements	AFCESA/CEO	N/A	N/A
171141	4427	Armory, Air Force Academy	AFSFC/SFX	USAFA	N/A
171152	1711	Academic Lecture Hall	AETC	2AF, 19AF, AU, USAFA	N/A
171155	7601	Academic Exhibit Facility	AFHRA	AF/HO	N/A
171157	1715	Natatorium And Physical Education	AETC	2AF, 19AF, AU, USAFA	N/A
171158	1713	Band Center	SAF/PA	N/A	2
171211	1711	Flight Training Classroom	19AF/A3	AETC/A3F/ A5R, AF/A3O-AT	2
171212	1721	Flight Simulator Training	19AF/A3, AETC/A3ZA	AETC/A3F/ A5R, AMC/A3TR, AF/A3O-AT	2

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171213	1711	UPT/UNT Flight Training	19AF/A3	AETC/A3F/ A5R,AF/A3O-AT	N/A
171214	1722	Physiological Training	19AF/A3	AETC/A3F/ A5R,AF/A3O-AT	2
171356	6100	Technical and Professional Library	AETC	2AF, 19AF, AU, USAFA	N/A
171393	1712	Celestial and Planetarium Navigational Training	19AF/A3	AETC/A3F/ A5R, AF/A3O-AT	N/A
171443	1714	Reserve Forces General Training Support	AFRC	N/A	N/A
171445	1714	Reserve Forces Operational Training	AFRC	N/A	N/A
171447	1711	Reserve Forces Communications & Electronics Training	AFRC	N/A	N/A
171449	1711	Reserve Forces Aeromedical Evacuation Training	AFRC	N/A	N/A
171450	1714	Reserve Component Medical Training	AFRC	N/A	N/A
171471	1731	Range Control House	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	N/A
171472	1731	Range Supply and Equipment Storage	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2
171473	1731	Range Target Storage and Repair	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2
171475	1718	Range, Small Arms, Indoor	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2

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171476	1718	Combat Arms	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2
171611	1712	Cryptologic Training [USS]	AETC	N/A	N/A
171617	1732	Training Aids Shop	AETC	2AF, 19AF	N/A
171618	1711	Field Training Facility	AETC/A5T	N/A	2
171619	1412	Runway Supervisory Unit	AETC	AF/A3O-A	N/A
171620	1711	Runway Control Structure	AETC	AF/A3O-A	N/A
171621	1711	Technical Training Classroom	AETC/A5T	2AF	2
171623	1712	Technical Training Laboratory/Shop	AETC/A5T	2AF, 19AF	2
171625	1712	High-Bay Technical Training Facility	AETC/A5T	2AF, 19AF	2
171627	1711	AETC Technical Training Support	AETC/A5T	2AF, 19AF	2
171628	1711	Launch Operations Training Facility	AFSPC	N/A	N/A
171712	1711	Target Intelligence Training	AETC/A2OI	N/A	2
171813	1711	Safety Education Facility	AFSC/SEM	N/A	2
171815	1711	NCO Professional Military Education Center	AU/A5/A8	N/A	2
171822	6100	Recruit Processing	AETC/RS	N/A	N/A
171833	1711	Basic Military Training	AETC	2AF	N/A
171844	1711	Officer Training	AETC	2AF, 19AF	N/A
171851	1711	Air University Professional/Technical Education	AU/A5/A8	N/A	N/A
171853	1711	US Air Force Academy Training	USAFA	N/A	N/A
171873	1712	Aerial Port Training Facility	AETC/A5T	AF/A3O-A	N/A
171875	1711	Weapons (Munitions) Load Crew Training	AF/A4LW	N/A	2
179219	1790	Parachute Swing Training	AETC/A3ZA, 19AF	N/A	N/A
179371	1790	Training Aids	AETC/A5	N/A	N/A
179475	1750	Small Arms Range System	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
179476	1758	Machine Gun Range	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2
179477	1761	Grenade Launcher Range	AFSFC/SFXW	575 CBSS/ WR-ALC, AFCEE/TDR, AFCESA/ CEOA	2
179481	1793	Range, Aircraft	AF/A3O-AR	AFCEE/TDR	2
179511	1795	Firefighter Training Facility	AFCESA/CEXF	AFCESA/CEO	2
211111	2111	Hangar, Maintenance	AF/A4L	N/A	3
211116	2115	Hangar, Maintenance Depot	AF/A4L	WR-ALC/ 402 AMXG	N/A
211147	2112	Shelter, Aircraft Weapons Calibration	AF/A4LW	AF/A4L	3
211152	2112	Shop, Aircraft General Purpose	AF/A4L	N/A	3
211153	2112	Shop, Nondestructive Inspection	AF/A4L	N/A	3
211154	2112	Shop, Aircraft Maintenance, Organizational	AF/A4L	N/A	3
211157	2116	Shop, Jet Engine Inspection and Maintenance	AF/A4L	N/A	3
211159	2113	Aircraft Corrosion Control	AF/A4L	N/A	3
211161	4423	Corrosion Control Utility Storage	AF/A4L	N/A	3
211173	2111	Large Aircraft Maintenance Dock	AF/A4L	N/A	3
211174	2111	Consolidated Aircraft Maintenance	AF/A4L	N/A	N/A
211175	2111	Medium Aircraft Maintenance Dock	AF/A4L	N/A	3
211177	2112	Small Aircraft Maintenance Dock	AF/A4L	N/A	3
211179	2111	Fuel System Maintenance Dock	AF/A4LE	AF/A4L	3
211183	2114	Test Cell	AF/A4L	N/A	3
211193	2118	Test Stand	AF/A4L	N/A	3
211251	2116	Shop, Turbine Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A

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211252	2116	Shop, RAM/AIR Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
211253	2116	Shop, Alternator Drive Overhaul and Test Depot	AF/A4L	WR-ALC/402 AMXG or WR-ALC 579 CBSS	N/A
211254	2116	Shop, Aircraft and Engine Access Overhaul Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
211256	2116	Shop, Engine Test and Storage Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
211271	2116	Shop, Instrument Overhaul Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
212212	2121	Shop, Missile Assembly	AF/A4LW	ACC/A4W	3
212213	2121	Shop, Tactical Missile, Glide Weapon Maintenance	AF/A4LW	ACC/A4W	3
212215	2121	Missile Run-Up Shop	AF/A4LW	ACC/A4W	N/A
212216	2121	Shop, Missile Service	AF/A4LW	ACC/A4W	N/A
212217	2123	Shop, Missile Warhead Assembly and Maintenance	AF/A4LW	ACC/A4W	N/A
212218	2121	Missile Warhead Maintenance Shop	AF/A4LW	ACC/A4W	N/A
212219	2123	Shop, Missile Battery	AF/A4LW	ACC/A4W	N/A
212220	2123	Integrated Maintenance Facility	AF/A4LW	ACC/A4W	N/A
212252	2123	Shop, Pilotless Aircraft	AF/A4LM	JUAS COE	N/A
213332	1552	Boat Storage	AFCESA/CEO	N/A	N/A
213363	2133	Shop, Marine Maintenance	AFCESA/CEO	N/A	N/A
213436	2132	Marine Railway	AFCESA/CEO	N/A	N/A
214422	2145	Vehicle Service Rack	AF/A4LE	N/A	N/A
214425	2141	Vehicle Maintenance Shop	AF/A4LE	N/A	3
214426	4425	Vehicle Operations Heated Parking	AF/A4LE	AFCESA/CEO	3
214428	4425	Vehicle Operations Parking Shed	AF/A4LE	AFCESA/CEO	3
214429	2141	Refueling Vehicle Hardened Shelters	AF/A4LE	AFCESA/CEO	N/A

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214467	2141	Shop, Refueling Vehicle	AF/A4LE	AFCESA/CEO	3
214469	2146	Transporter/Erector Test Facility	AF/A4LW	AFSPC/A4MI	N/A
214501	2145	Vehicle Maintenance Shelter	AF/A4LE	N/A	N/A
215552	2151	Shop, Weapons and Release Systems	AF/A4LW	ACC/A4W	3
215553	2152	Shop, Aircraft Weapons Overhaul Depot	AF/A4LW	WR-ALC/ 782 CBSG	N/A
215554	2152	Shop, Ordnance Equipment, Depot	AF/A4LW	WR-ALC/ 782 CBSG	N/A
215555	2152	Shop, Cartridge Overhaul Depot	AF/A4LW	WR-ALC/ 782 CBSG	N/A
215582	2153	Shop, Surveillance and Inspection	AF/A4LW	ACC/A4W	3
216642	2162	Shop, Conventional Munitions	AF/A4LW	ACC/A4W	3
217712	2171	Shop, Avionics	AF/A4L	WR-ALC/ 752 CBSG	3
217713	2171	ECM Pod Shop and Storage	AF/A4L	ACC/A4MA	3
217722	2171	Shop, ICBM/Tactical Air Control Communications Electronics	AF/A4L	AFSPC	N/A
217735	2172	Shop, Electrical Overhaul and Test Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
217736	2172	Radome Overhaul and Test Depot	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
217742	2171	Air Force Communications Service Maintenance Facility	AFNIC	N/A	3
217752	2171	Shop, Meteorological Equipment	AFWA	AF/A3O-W	3
217762	2171	Shop, Navigational Aids	AFFSA	AF/A3O-AO	N/A
217812	2172	Shop, Range Warning System Communications-Electronics	AFNIC	AF/A3O-AR	N/A
218712	2181	Aircraft Support Equipment Shop/Storage Facility	AF/A4L	N/A	3
218827	2191	Shop, Furniture Repair Overseas	AFCESA/CEO	N/A	N/A
218842	2183	Shop and Shelter For Locomotives	AFCESA/CEO	N/A	N/A
218852	2184	Shop, Survival Equipment (See CATCODE 141753, Squadron Operations)	AF/A3O-A	AF/A4L	2

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
218868	2171	Precision Measurement Equipment Lab	AF/A4LF	WR-ALC/ 562 CBSG (AFMETCAL)	3
218882	7343	Recruit Tailoring Shop	AAFES	2AF	N/A
219943	2191	Base Engineer Pavements and Grounds Facility	AFCESA/CEO	AFCEE/TDB	3
219944	2191	Base Engineer Maintenance Shop	AFCESA/CEO	AFCEE/TDB	3
219945	2191	Base Engineer Hospital Maintenance Shop	AFMSA	AFCESA/CEO	N/A
219946	4421	Base Engineer Covered Storage Facility	AFCESA/CEO	AFCEE/TDB	3
219947	4422	Base Engineer Storage Shed	AFCESA/CEO	AFCEE/TDB	3
221221	2211	Production Aircraft	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221222	2211	Production Engines	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221223	2211	Aircraft Production Support	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221224	9999	Aircraft Production ,NUC/P	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221225	9999	Aircraft Production ,OVAL	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221226	9999	Aircraft Production ,Engine COMP	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221227	2211	Aircraft Production Engine Test Facility	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A

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221228	2211	Aircraft Production Final Assembly & Checkout	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221229	2211	Aircraft Production Component Manufacture	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
221231	2211	Aircraft Production Engine Overhaul Facility	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
222222	2221	Production Missiles	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
222224	2221	Guided Missile Production Facility (Engines)	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
222225	2221	Guided Missile Production Facility (Component Parts)	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
222226	2221	Guided Missile Production Facility (Assembly)	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
222227	9999	Guided Missile Production Facility, SL/MTR MFG	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
226226	2261	Production Armament Explosives	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
226227	2261	Propellants, Fuels, Oxidizers	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
227227	2271	Production Electronics and Communication Equipment	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A

CAT-CODE	FAC	CATCODE TITLE	OPR	OCR	Ch.
227228	2271	Production Space Systems	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
228228	2281	Production Miscellaneous Items and Equipment	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
228229	2221	Plant Cartographic & Geophysic	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
228231	6103	Plant Lithographic Distribution Production	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
228232	9999	Production Heavy FORG	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
228233	9999	Production Heavy EXTRU	AF/A4L	WR-ALC/ 402 AMXG or WR-ALC/ 579 CBSS	N/A
229982	2291	Asphalt Plant	AFCESA/CEO	AFCEE/TDB	N/A
229984	2291	Concrete Plant	AFCESA/CEO	AFCEE/TDB	N/A
229986	8921	Oxygen Generating Plant	AFCESA/CEO	AFCEE/TDB	N/A
229987	2291	Rock Crusher Plant	AFCESA/CEO	AFCEE/TDB	N/A
310911	3101	Physics, Science Laboratories	AFRL	N/A	N/A
310912	3101	Sonic, Science Laboratories	AFRL	N/A	N/A
310913	3101	Astrophysics Science Laboratories	AFRL	N/A	N/A
310914	3101	Personnel Research, Science Laboratories	AFRL	N/A	N/A
310915	3101	Chemistry Science Laboratories	AFRL	N/A	N/A
310916	3101	Ground Electronics Science Laboratories	AFRL	N/A	N/A
310917	3101	Nucleonics, Science Laboratories	AFRL	N/A	N/A
310919	3101	Geophysics Science Laboratories	AFRL	N/A	N/A
310921	3102	Medical, Science Laboratories	AFRL	N/A	N/A
310922	3101	Human Engineering Science Laboratories	AFRL	N/A	N/A

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310923	3101	Solar Science Laboratories	AFRL	N/A	N/A
310924	3101	Radiation, Science Laboratories	AFRL	N/A	N/A
310925	3101	Aerospace Environment Science Laboratories	AFRL	N/A	N/A
310926	3101	Dynamics Equipment Science Laboratories	AFRL	N/A	N/A
310927	3101	Meteorology, Science Laboratories	AFRL	N/A	N/A
310928	3101	Civil Engineering Science Laboratories	AFRL	N/A	N/A
310929	3101	Biological Science Laboratories	AFRL	N/A	N/A
310931	3101	Laser, Science Laboratories	AFRL	N/A	N/A
310932	3101	Avionics, Science Laboratories	AFRL	N/A	N/A
310933	3101	Materials, Science Laboratories	AFRL	N/A	N/A
310943	3101	Nuclear Engineering Test Lab	AFRL	N/A	N/A
311112	3111	Aircraft Dynamic Research Laboratory	AFRL	N/A	N/A
311114	3111	Aircraft Dynamic Research Engineering	AFRL	N/A	N/A
311115	3111	Aircraft Dynamic Research Test	AFRL	N/A	N/A
311171	3111	Aircraft Research Laboratory	AFRL	N/A	N/A
311173	3111	Aircraft Research Engineering	AFRL	N/A	N/A
311174	3111	Aircraft Research and Testing	AFRL	N/A	N/A
312472	3121	Missile And Space Research Laboratories	AFRL	N/A	N/A
312476	3121	Missile And Space Research Engineering	AFRL	N/A	N/A
312477	3121	Missile And Space Research Testing	AFRL	N/A	N/A
312941	3121	Satellite Control Station	AFRL	N/A	N/A
315222	3151	Armament Research Ballistic Laboratory	AFRL	N/A	N/A
315236	3151	Armament Research Engineering	AFRL	N/A	N/A
315237	3151	Armament Research Testing	AFRL	N/A	N/A
315944	3151	Weapons Guidance Laboratory	AFRL	N/A	N/A
316333	3161	Ammunition, Explosives, and Toxics Laboratory	AFRL	N/A	N/A
316335	9999	Ammunition, Explosives, and Toxics ENG	AFRL	N/A	N/A
316337	3161	Ammunitions & Explosives Test Facility	AFRL	N/A	N/A
317311	3171	Electronic Research Laboratory	AFRL	N/A	N/A
317315	3171	Electronic Research and	AFRL	N/A	N/A

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		Engineering			
317316	3171	Electronic Research and Testing	AFRL	N/A	N/A
317932	3171	Avionics Research Laboratory	AFRL	N/A	N/A
318612	3181	Propulsion Research Lab, Air Breathing	AFRL	N/A	N/A
318614	3181	Propulsion Research Lab, Non Air Breathing	AFRL	N/A	N/A
318615	3181	Propulsion Research Lab, Electric	AFRL	N/A	N/A
318632	3181	Propulsion Research Lab, Fuel and Lubricants	AFRL	N/A	N/A
319441	3111	Equipment Research Laboratory	AFRL	N/A	N/A
319442	3101	Equipment Research Engineering	AFRL	N/A	N/A
319443	3181	Equipment Research Testing	AFRL	N/A	N/A
319946	3191	Material Research Test Laboratory	AFRL	N/A	N/A
319951	3151	Test Track Building	AFRL	N/A	N/A
319995	4414	Research Equipment Storage	AFRL	N/A	N/A
321123	3211	Prototype Model Construction and Assembly	AFRL	N/A	N/A
371475	3712	Missile Instrumentation Station	AF/A4LW	N/A	N/A
371484	3712	Missile Radar Station	AF/A4LW	N/A	N/A
371485	3712	Missile Theodolite Station	AF/A4LW	N/A	N/A
371486	3712	Missile Communications Station	AF/A4LW	N/A	N/A
371923	3713	Test Range Complex	AF/A3O-AR	N/A	N/A
390125	3901	Aerodynamics Wind Tunnel, Subsonic	AF/A4L	N/A	N/A
390127	3903	Aerodynamics Wind Tunnel, Supersonic	AF/A4L	N/A	N/A
390128	3903	Aerodynamics Wind Tunnel, Transonic	AF/A4L	N/A	N/A
390129	3901	Aerodynamics Wind Tunnel, Hypersonic	AF/A4L	N/A	N/A
390155	9999	Gas Dynamics Wind Tunnel, HYPSON	AF/A4L	N/A	N/A
390157	3901	Gas Dynamics Wind Tunnel, Supersonic	AF/A4L	N/A	N/A
390171	3901	Aircraft Research Testing	AFRL	AF/A4L	N/A
390221	3901	Armament Research Storage	AFRL	AF/A4LW	N/A
390224	3901	Armament Research Testing, Structural	AFRL	AFNIC	N/A
390311	3901	Electronic Research Radar	AFRL	AFNIC	N/A

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390381	3901	Electronic Research Navaid	AFRL	AFFSA	N/A
390531	3901	Missile Launch Test Facility	AF/A4LW	N/A	N/A
390551	3901	Missile Landing Test Facility	AF/A4LW	N/A	N/A
390562	3901	Missile Storage, Fuel	AF/A4LE	AF/A4LW	N/A
390611	3901	Propulsion Engine Testing, Fuel Systems	AF/A4LE	N/A	N/A
390612	3901	Propulsion Engine Test Stand	AF/A4L	N/A	N/A
390614	3904	Propulsion Engine Test Cell	AF/A4L	N/A	N/A
390719	3901	Test Track Building	AF/A4L	N/A	N/A
390915	3901	Research Communication Station Complex	AFNIC	N/A	N/A
411123	4111	Demineralized Water Storage	AFCESA/CEO	AF/A4LE	N/A
411127	4111	Water/Alcohol Storage	AFCESA/CEO	AF/A4LE	N/A
411128	4111	Special Liquids Storage	AFCESA/CEO	AF/A4LE	N/A
411131	4111	Aviation Gas Storage	AFPET/PTOT	AF/A4LE, AFCESA/CEO	N/A
411132	4121	Aviation Lubricant Storage	AFPET/PTOT	AF/A4LE, AFCESA/CEO	N/A
411134	4111	Diesel Fuel Storage	AFPET/PTOT	AF/A4LE, AFCESA/CEO	4
411135	4111	Jet Fuel Storage	AFPET/PTOT	AF/A4LE, AFCESA/CEO	4
411137	4111	Storage Mogas	AFPET/PTOT	AF/A4LE, AFCESA/CEO	N/A
411138	4121	Storage Solvents	AFPET/PTOT	AF/A4LE, AFCESA/CEO	N/A
411139	4111	Storage Special Fuels	AFPET/PTOT	AF/A4LE, AFCESA/CEO	4
422253	4221	Storage, Multi-Cubicle Magazine	AF/A4LW	AFSC/SEW	N/A
422256	4221	Storage, Rocket Checkout And Assembly	AF/A4LW	AFSC/SEW	4
422257	4221	Storage Segregated Magazine	AF/A4LW	AFSC/SEW	N/A
422258	4221	Storage Magazine Above Ground Type A, B, and C	AF/A4LW	AFSC/SEW	4
422259	4221	Missile Storage Facility	AF/A4LW	AFSC/SEW	N/A
422264	4221	Storage Igloo	AF/A4LW	AFSC/SEW	4
422265	4421	Inert Spares Storage	AF/A4LW	AFSC/SEW	4
422271	4221	Storage, Module Barricaded	AF/A4LW	AFSC/SEW	4
422273	4221	Storage Igloo Steel Arch Underpass	AF/A4LW	AFSC/SEW	4
422275	1494	Ancillary Explosives Facility	AF/A4LW	AFSC/SEW	4
423111	4231	Liquid Propellant Ammo	AF/A4LW	AFSC/SEW	N/A

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		Storage			
432283	4321	Cold Storage, Base	AFSVA/SVO, AFA1S	AFCESA/CEO	N/A
441257	4413	Hazardous Storage Depot	AF/A4LE	AFSC/SEW	4
441628	4412	Shed Supplies and Equipment Depot	AF/A4LE	N/A	N/A
441758	4411	Warehouse Supplies and Equipment Depot	AF/A4LE	N/A	N/A
442257	4423	Hazardous Storage	AF/A4LE	AFSC/SEW	4
442258	4122	Liquid Oxygen Storage	AFCESA/CEO	AF/A4LE	4
442515	5306	Medical Storage For War Readiness Material	AFMSA/SG8F	N/A	4
442628	4422	Supply and Equipment Base	AF/A4LE	N/A	4
442758	4421	Warehouse Supply and Equipment	AF/A4LE	N/A	4
442765	4321	Warehouse, Troop Subsistence	AFSVA/SVO, AFA1S	AF/A4LE	4
442768	4421	Warehouse, Forms and Publications, Base	AFDPO	N/A	4
442769	4421	Housing Supplies and Storage Facility	AFSVA/SVO/ SVX, AF/A1l	AF/A7CH	4
451134	4511	Open Storage, Depot	AF/A4LE	N/A	N/A
452252	4521	Open Storage Supply	AF/A4LE	N/A	4
452255	4521	Base Civil Engineer Open Storage	AFCESA/CEO	N/A	4
452258	4521	Open Storage, Air Freight/Traffic Management Surface Freight	AF/A4LE	N/A	4
452775	4521	Open Storage, Research And Development	AFRL	N/A	N/A
510001	5100	Composite Medical Facility	AFMSA/SG8F	N/A	5
510101	5101	Regional Medical Center	AFMSA/SG8F	N/A	5
510125	5100	Medical Command and Administration	AFMSA/SG8F	N/A	5
510126	5100	Medical/Dental Education and Training	AFMSA/SG8F	N/A	5
510143	5302	Pathology	AFMSA/SG8F	N/A	5
510147	5100	Pharmacy	AFMSA/SG8F	N/A	5
510148	5100	Physical Therapy	AFMSA/SG8F	N/A	5
510149	5100	Radiology	AFMSA/SG8F	N/A	5
510175	5500	Aerospace Medicine	AFMSA/SG8F	N/A	5
510176	5100	Environmental Health	AFMSA/SG8F	N/A	5
510212	5100	Food Service	AFMSA/SG8F	N/A	5

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510264	5307	Ambulance Shelter	AFMSA/SG8F	N/A	5
510275	5100	Nursing Services	AFMSA/SG8F	N/A	5
510278	5100	Aeromedical Staging Facility	AFMSA/SG8F	N/A	5
510342	5100	Obstetrical Service	AFMSA/SG8F	N/A	5
510411	5500	Air Force Clinic	AFMSA/SG8F	N/A	5
510672	5100	Surgical Service	AFMSA/SG8F	N/A	5
510712	5100	Hospital Central Sterilization	AFMSA/SG8F	N/A	5
510915	5100	Patient Welfare	AFMSA/SG8F	N/A	5
530155	5302	Blood Processing Laboratory	AFMSA/SG8F	N/A	5
530156	5302	Drug Abuse Detection Laboratory	AFMSA/SG8F	N/A	5
530311	5302	Radiology Health Laboratory	AFMSA/SG8F	N/A	5
530411	5302	Occupational Environmental Health Laboratory	AFMSA/SG8F	N/A	5
530511	5302	Clinical Laboratory Epidemiological	AFMSA/SG8F	N/A	5
530602	5306	Materials Services (Medical Logistics)	AFMSA/SG8F	N/A	5
530634	5304	Medical Food Inspection	AFMSA/SG8F	N/A	5
540242	5302	Area Dental Laboratory	AFMSA/SG8F	N/A	5
540243	5400	Dental Clinic	AFMSA/SG8F	N/A	5
550101	5501	Outpatient Ambulatory Care Clinic	AFMSA/SG8F	N/A	5
550145	5100	Occupational Health Clinic	AFMSA/SG8F	N/A	5
550147	5500	Medical Aid Station	AFMSA/SG8F	N/A	5
610111	6100	Area Defense Council Office	AF/JA	N/A	6
610112	6100	Law Center	AF/JA	N/A	6
610119	6100	Family Housing Management Office	AF/A7CH	N/A	6
610121	6100	Vehicle Operations Facilities	AF/A4LE	N/A	6
610122	6100	Supply Administration	AF/A4LE	N/A	6
610123	6100	Air Force Plant Administration Office	AFCEE/TDB	N/A	6
610127	6100	Base Engineer Administration	AFCEE/TDB	N/A	6
610128	6100	Base Personnel Office	AF/A1	N/A	6
610129	6100	Weapon System Maintenance Management Facility	AF/A4LW	N/A	6
610142	6100	Cargo Movement/Personal Property/Small Air Terminal and Passenger Movement Facilities	AF/A4LE	N/E	6
610144	6100	Munitions Maintenance Administration	AF/A4LW	N/A	6
610241	6100	Orderly Room In Dormitory	AF/A1	AF/A7CH	6

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610243	6102	Headquarters, Group	AFCEE/TDB	N/A	6
610249	6100	Wing Headquarters	AFCEE/TDB	N/A	6
610281	6100	Headquarters Center	AFCEE/TDB	N/A	6
610282	6100	Headquarters Air Force	AFCEE/TDB	N/A	6
610284	6100	Headquarters Major Command	AFCEE/TDB	N/A	6
610285	6100	Headquarters Numbered Air Force	AFCEE/TDB	N/A	6
610286	6100	Headquarters Named/Numbered Division	AFCEE/TDB	N/A	6
610287	6100	Headquarters Specified	AFCEE/TDB	N/A	6
610311	6100	Documentation Staging Facility	AF/A4LE	N/A	6
610332	1445	Farm Facility	AF/A7CAI	N/A	N/A
610675	6100	Logistics Facility Depot Operations	AF/A4LE	AFMC	6
610711	6104	Data Processing Installation	AF/A4LE	AFNIC	6
610717	6103	Printing Plant	SAF/A6X	N/A	6
610718	6103	Duplicating Center	SAF/A6X	N/A	6
610811	6100	Administrative Office, Non Air Force	AFCEE/TDB	N/A	N/A
610911	6100	Social Actions Facility	AF/A1S	N/A	6
610913	6100	Disaster Preparedness (Emergency Management)	AFCESA/CEX	N/A	6
610915	6100	Air Force Office of Special Investigations	SAF/IG	AFOSI	6
690252	6900	Bill Board	AFCEE/TDB	N/A	N/A
690432	6900	Base Flag Pole	AFCEE/TDB	N/A	N/A
690625	7383	Troop Shelter	AFCESA/CEXX	N/A	6
690792	6900	Covered Review Stand	AFCEE/TDB	N/A	N/A
690795	6900	Open Review Stand	AFCEE/TDB	N/A	N/A
690798	5304	Kennel, Stray Animals	AFMSA/SG8F	N/A	N/A
711111	7110	Family Housing Capehart	AF/A7CH	N/A	7
711121	7110	Family Housing Wherry	AF/A7CH	N/A	7
711131	7110	Family Housing Lanham	AF/A7CH	N/A	7
711142	7110	Family Housing Appropriated FY 70 and After	AF/A7CH	N/A	7
711143	7110	Family Housing Appropriated FY 50-69	AF/A7CH	N/A	7
711144	7110	Family Housing Appropriated Pre FY 1950	AF/A7CH	N/A	7
711151	7110	Family Housing Surplus Commodity	AF/A7CH	N/A	7
711161	7110	Family Housing Deutchmark	AF/A7CH	N/A	7
711171	7110	Family Housing Yen	AF/A7CH	N/A	7

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711181	7110	Family Housing Other	AF/A7CH	N/A	7
711191	7110	Family Housing Relocatable	AF/A7CH	N/A	7
711211	7110	Rent Guarantee Family Housing	AF/A7CH	N/A	7
711221	7110	Family Housing Leased	AF/A7CH	N/A	7
711231	7110	Family Housing USA	AF/A7CH	N/A	7
711311	7141	Family Housing W/Attached Garage	AF/A7CH	N/A	7
711312	7141	Family Housing Attached Carport	AF/A7CH	N/A	7
713352	7145	Mobile Home Court Support Facility	AF/A7CH	N/A	7
713366	7130	Trailer Court Parking	AF/A7CH	N/A	7
714122	7146	Attendants Dining Hall	AF/A7CH	N/A	7
714124	7234	Attendants Sanitary Facilities	AF/A7CH	N/A	7
714128	7146	Attendant Quarters	AF/A7CH	N/A	7
714431	7141	Garage, Family Housing, Detached	AF/A7CH	N/A	7
714432	7141	Family Housing Detached Carport	AF/A7CH	N/A	7
714433	7142	Family Housing Detached Storage	AF/A7CH	N/A	7
721123	7312	Federal Prison Facility	AFSFC/SFO	N/A	N/A
721215	7220	Dining Hall In Airman Dormitory	AF/A1S	AFSVA, AF/A7CH MAJCOM/A7	7
721311	7218	Recruits Dormitory	AF/A7CH	2AF/TTOC	7
721312	7210	Dormitory Airman Permanent Party/PCS-Student	AF/A7CH	MAJCOM/A7	7
721313	7210	Technical Training Student Housing	AF/A7CH	MAJCOM/A7	7
721314	7210	Dormitory, Unaccompanied NCO	AF/A7CH	MAJCOM/A7	7
721315	7212	Dormitory Visiting Airman Quarters	AF/A1S	AFSVA, MAJCOM/A7	7
722345	7220	Fast Food Service	AF/A1S	AFSVA, MAJCOM/A7	7
722351	7220	Airman Dining Hall - Detached	AF/A1S	AFSVA, MAJCOM/A7	7
722356	7220	Dining Hall, Officer, Detached	AF/A1S	AFSVA, MAJCOM/A7	7
723155	7231	Dayroom Lounge	AF/A7CH	MAJCOM/A7	N/A
723242	7232	Unaccompanied Personnel Housing Automobile Garage	AF/A7CH	MAJCOM/A7	N/A

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723385	7233	Kitchen, Central Preparation	AF/A1S	AFSVA, MAJCOM/A7	7
723388	7233	Flight Kitchen	AF/A1S	AFSVA, MAJCOM/A7	7
723392	7234	Sanitary Latrine	AFCESA/CEO	N/A	N/A
724415	7240	Officers Quarters	AF/A7CH	MAJCOM/A1/ A7	7
724417	7241	Visiting Officer's Quarters	AF/A1S	AFSVA, MAJCOM/A7	7
724433	7240	Cadet Quarters	AF/A7CH	MAJCOM/A1/ A7	7
725513	7250	Civilian Camp	AF/A1S	AFSVA, MAJCOM/A7	N/A
725517	7250	Camp Troop	AF/A1S	AFSVA, MAJCOM/A7	N/A
730142	7311	Fire Station	AFCESA/CEXF	AFCESA/CEO	7
730145	1411	Fire Observation Tower and Comm Center	AFCESA/CEXF	AFCESA/CEO	N/A
730147	4421	Fire Hose House	AFCESA/CEXF	AFCESA/CEO	N/A
730151	7381	Forestry Guard Station	AF/A7CAI	N/A	N/A
730182	7321	Bakery	AF/A1S	AFSVA	7
730186	7321	Pastry Kitchen	AF/A1S	AFSVA	7
730275	7384	Bus Shelter	AF/A4LE	AFCESA/CEO	N/A
730277	7341	Bus Station	AF/A4LE	AFCESA/CEO	N/A
730441	7351	Education Center	AF/A1PT	MAJCOM/A1/ A7	7
730443	7344	Post Office	SAF/CIO A6	N/A	7
730551	7342	Laundry-Dry Cleaning, Base	AF/A1S	AFSVA	7
730652	7342	Base Dry Cleaning	AF/A1S	AFSVA	N/A
730711	7342	Base Laundry	AF/A1S	AFSVA	N/A
730713	7342	Laundry Depot	AF/A1S	AFSVA	N/A
730717	7343	Clothing Store	AAFES	N/A	7
730724	7322	Ice plant	AF/A1S	AFSVA	N/A
730725	7322	Ice cream plant	AF/A1S	AFSVA	N/A
730771	7361	Chapel, Base	AF/HC	N/A	7
730772	7362	Religious Education Facility	AF/HC	N/A	7
730773	7361	Chapel Center	AF/HC	N/A	7
730774	7361	Hospital Chapel	AF/HC	AFMSA/SG8F	7
730775	7110	Rectory	AF/HC	AF/A7CH	7
730781	7353	Dependent School Dining Hall	DODEA	AF/A1S/1PT	7
730782	7353	Dependent School Dorm	DODEA	AF/A7CH, AF/A1S/1PT	7
730783	7353	Dependent Detached Sport	DODEA	AF/A1PT	7

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		School			
730784	7352	School, Dependent Elementary	DODEA	AF/A1PT	7
730785	7352	Dependent High School	DODEA	AF/A1PT	7
730786	7352	Dependent Intermediate School	DODEA	AF/A1PT	7
730788	7352	School, Dependent Kindergarten	DODEA	AF/A1PT	7
730789	7371	School, Dependent Nursery	DODEA	AF/A1PT	N/A
730831	7312	Correction Facility	AFSFC/SFO	N/A	7
730832	7313	Visitor Control Center	AFSFC/SFO	N/A	7
730833	7313	Security Police Central Control	AFSFC/SFO	N/A	N/A
730834	1498	Security Police Defensive Fighting Position	AFSFC/SFO	N/A	N/A
730835	7313	Security Police Operations	AFSFC/SFO	N/A	7
730836	1446	Reserve Fire Team Facility	AFSFC/SFO	N/A	7
730837	1498	Security Police Entry Control Building	AFSFC/SFO	N/A	7
730838	1498	Master Surveillance And Control Facility	AFSFC/SFO	N/A	7
730839	1498	Traffic Check House	AFSFC/SFO	N/A	7
730841	1445	Security Police Kennel Canine	AFSFC/SFO	N/A	7
730842	1445	Security Police Kennel Support Building	AFSFC/SFO	N/A	7
730911	5303	Mortuary	AFMSA/SG8F	N/A	N/A
738401	7384	Inclement Weather Shelter, Below Ground	AFCESA/CEO	N/A	N/A
740111	7346	Enclosed Mall	AAFES	N/A	N/A
740153	7347	Bank Branch	SAF/FMPB	N/A	7
740155	7347	Credit Union	SAF/FMPB	N/A	7
740253	7372	Airman and Family Readiness Center (formerly: Family Support Center)	AF/A1S	AFSVA, MAJCOM/A1	7
740255	7340	Thrift Shop	SAF/FMPB	MAJCOM/A1	7
740262	7346	Store, Book	AAFES	N/A	N/A
740266	7349	Store, Commissary	DeCA	N/A	7
740267	7346	Cadet Store	AAFES	N/A	N/A
740269	7346	Base Package Store	AAFES	N/A	7
740270	5304	Animal Clinic	AFMSA/SG8F	N/A	N/A
740315	7414	Rod and Gun Club	AF/A1S	AFSVA	7
740316	7417	Recreation Center (Community Center)	AF/A1S	AFSVA	7
740317	7414	Aero Club	AF/A1S	AFSVA	7
740379	7346	Exchange Amusement Center	AAFES	N/A	7
740381	7331	Exchange Cafeteria Snack Bar	AAFES	N/A	7
740382	7346	Exchange Branch	AAFES	N/A	7

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740383	7345	Exchange Service Station	AAFES	N/A	7
740384	7342	Exchange Laundry and Dry cleaning Plant	AAFES	N/A	7
740385	7387	Exchange Maintenance Shop	AAFES	N/A	7
740386	7387	Exchange Administration	AAFES	N/A	7
740387	7388	Exchange Retail Warehouse	AAFES	N/A	7
740388	7346	Exchange Sales Store	AAFES	N/A	7
740389	7346	Exchange Service Outlet	AAFES	N/A	7
740396	7387	Central Exchange Administration	AAFES	N/A	N/A
740397	7388	Central Exchange Warehouse	AAFES	N/A	N/A
740398	7387	Central Exchange Support Facility	AAFES	N/A	N/A
740443	7441	Transient Lodging Facility, Appropriated	AF/A1S	AFSVA, AF/A7CH	7
740455	7441	Transient Family Aerial Port	AF/A1S	AFSVA, AF/A7CH	N/A
740457	7441	Transient Lodging Facility, NA	AF/A1S	AFSVA, AF/A7CH	N/A
740459	7443	Transient Lodging Support Facility	AF/A1S	AFSVA, AF/A7CH	7
740612	7333	Open Mess, Airmen	AF/A1S	AFSVA	7
740613	7333	Open Mess, Cadet	AF/A1S	AFSVA	N/A
740615	7333	Consolidated Mess	AF/A1S	AFSVA	7
740617	7333	Enlisted Open Mess	AF/A1S	AFSVA	7
740618	7333	Officer Open Mess	AF/A1S	AFSVA	7
740657	8929	Master Television Antenna	AF/A1S	AFSVA, MAJCOM/A1S	N/A
740664	7411	Arts and Crafts Center	AF/A1S	AFSVA, MAJCOM/A1S	7
740665	7412	Hobby Shop Automotive	AF/A1S	AFSVA, MAJCOM/A1S	7
740666	7442	Recreation Site Lodging	AF/A1S	AFSVA, MAJCOM/A1S	7
740668	7417	Miscellaneous Recreation Building, Indoor	AF/A1S	AFSVA, MAJCOM/A1S	7
740669	7417	Multi Purpose Recreation Building	AF/A1S	AFSVA, MAJCOM/A1	7

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				S	
740671	7415	Bowling Center	AF/A1S	AFSVA, MAJCOM/A1S	7
740672	7447	MWR Supply and NAF Central Storage	AF/A1S	AFSVA, MAJCOM/A1S	7
740673	7421	Field House	AF/A1S	AFSVA, MAJCOM/A1S	N/A
740674	7421	Gymnasium	AF/A1S	AFSVA, MAJCOM/A1S	7
740675	7416	Base Library	AF/A1S	AFSVA, MAJCOM/A1S	7
740677	7422	Swimming Pool, Indoor	AF/A1S	AFSVA, MAJCOM/A1S	7
740678	7418	Skating Rink, Indoor	AF/A1S	AFSVA, MAJCOM/A1S	7
740681	7417	Cadet Social Center	AF/A1S	AFSVA, MAJCOM/A1S	N/A
740717	6100	Red Cross Office	AF/A1D	AF/A1S, AFSVA, MAJCOM/A1S	7
740731	7346	Public Shopping Center	AF/A1S	AFSVA, MAJCOM/A1S	N/A
740732	7417	Restaurant Fund MWR Facility	AF/A1S	AFSVA, MAJCOM/A1S	7
740733	7417	Civilian Fund MWR Building	AF/A1S	AFSVA, MAJCOM/A1S	7
740735	7332	Restaurant, Base	AF/A1S	AFSVA, MAJCOM/A1S	7
740873	7431	Theater, Base	AF/A1S	AFSVA, MAJCOM/A1S	7

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740883	7417	Youth Center	AF/A1S	AFSVA, MAJCOM/A1S	7
740884	7371	Child Development Center	AF/A1S	AFSVA, MAJCOM/A1S	7
744701	7447	Morale Welfare Recreation Pet Kennel	AF/A1S, AFMSA/SGSF	AFSVA, MAJCOM/A1S	N/A
750172	7522	Athletic Field, Baseball	AF/A1S	AFSVA, MAJCOM/A1S	7
750175	7522	Athletic Field, Football/Soccer	AF/A1S	AFSVA, MAJCOM/A1S	7
750177	7523	Athletic Field, Track	AF/A1S	AFSVA, MAJCOM/A1S	7
750178	7522	Athletic Field, Softball	AF/A1S	AFSVA, MAJCOM/A1S	7
750179	7522	Athletic Field, Standard	AF/A1S	AFSVA, MAJCOM/A1S	7
750211	7524	Stadium	AF/A1S	AFSVA, MAJCOM/A1S	N/A
750347	7521	Court, Tennis	AF/A1S	AFSVA, MAJCOM/A1S	7
750349	7521	Court, Recreation	AF/A1S	AFSVA, MAJCOM/A1S	7
750371	7531	Recreation Pavilion	AF/A1S	AFSVA, MAJCOM/A1S	7
750422	7413	Golf Clubhouse	AF/A1S	AFSVA, MAJCOM/A1S	7
750423	7413	Golf Equipment Building	AF/A1S	AFSVA, MAJCOM/A1S	7
750426	7513	Golf Course, 9 Hole	AF/A1S	AFSVA, MAJCOM/A1	7

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750427	7513	Golf Course, 18 Hole	AF/A1S	AFSVA, MAJCOM/A1S	7
750429	7514	Golf Driving Range	AF/A1S	AFSVA, MAJCOM/A1S	7
750581	7542	Miscellaneous Outdoor Recreation Facility	AF/A1S	AFSVA, MAJCOM/A1S	7
750582	7542	Civilian Outdoor Recreation Facility	AF/A1S	AFSVA, MAJCOM/A1S	7
750583	7444	Riding Stables	AF/A1S	AFSVA, MAJCOM/A1S	7
750611	7541	Family Camping Area	AF/A1S	AFSVA, MAJCOM/A1S	7
750612	7385	Family Camping Support Facility	AF/A1S	AFSVA, MAJCOM/A1S	N/A
750663	7235	Privately Owned Vehicle Washrack	AF/A1S	AFSVA, MAJCOM/A1S	N/A
750811	7385	Swimmers Bath House	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CEO	7
750812	7512	Swimming Pool, Consolidated	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CEO	7
750813	7512	Airman Swimming Pool	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CEO	7
750815	7512	NCO Swimming Pool	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CEO	7
750817	7512	Officer Swimming Pool	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CE	7

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				O	
750819	7447	Swimming Pool Water Treatment	AF/A1S	AFSVA, MAJCOM/A1 SAFCESA/CEO	N/A
750835	7532	Theater, Outdoor	AF/A1S	AFSVA, MAJCOM/A1 S	N/A
760111	7601	Museum Building	AF/HO	USAFM/MU	N/A
760511	7603	Cemetery	AF/A1S	AFSVA, MAJCOM/A1 S	N/A
760512	7602	Monuments/Memorials	AF/HO	USAFM/MU	N/A
811144	8910	Total Energy Plant Building	AFCESA/CEO	AFSC/SEW	N/A
811145	8111	Electric Power Generation Plant	AFCESA/CEO	AFSC/SEW	8
811147	8112	Emergency Electric Power Generation Plant	AFCESA/CEO	AFSC/SEW	8
811149	8910	Electric Power Station Building	AFCESA/CEO	AFSC/SEW	8
812223	8121	Primary Distribution Line Overhead	AFCESA/CEO	AFSC/SEW	8
812224	8121	Secondary Distribution Line Overhead	AFCESA/CEO	AFSC/SEW	8
812225	8123	Primary Distribution Line Underground	AFCESA/CEO	AFSC/SEW	8
812226	8123	Secondary Distribution Line Underground	AFCESA/CEO	AFSC/SEW	8
812921	8999	Electrical Aircraft Outlets	AF/A4L	AFSC/SEW	8
812926	8122	Exterior Area Lighting	AFCESA/CEO	AFSC/SEW	8
812928	8541	Traffic Lights	AFCESA/CEO	AFSC/SEW	N/A
813228	8132	Electric Switching Station	AFCESA/CEO	AFSC/SEW	8
813231	8131	Electric Substation	AFCESA/CEO	AFSC/SEW	8
821111	8526	Coal Yard	AFCESA/CEO	AFSC/SEW	8
821112	1244	Heating Fuel Oil Storage	AFCESA/CEO	AFSC/SEW	8
821113	8910	Heating From Central Plant	AFCESA/CEO	AFSC/SEW	8
821115	8211	Heating Plant 750/3500 MBTU	AFCESA/CEO	AFSC/SEW	8
821116	8211	Heating Plant 3500 MBTU and Over	AFCESA/CEO	AFSC/SEW	8
821117	8910	Heating Facility Building	AFCESA/CEO	AFSC/SEW	8
821155	8211	Steam Plant Industrial	AFCESA/CEO	AFSC/SEW	8
821156	8910	Steam Facility Building	AFCESA/CEO	AFSC/SEW	8
822245	8221	Hot Water Mains	AFCESA/CEO	AFSC/SEW	8
822248	8924	Hot Water Pump Station	AFCESA/CEO	AFSC/SEW	8

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822265	8221	Steam Heating Mains	AFCESA/CEO	AFSC/SEW	8
822268	8924	Condensate Return Pump Station	AFCESA/CEO	AFSC/SEW	8
823111	8231	Heat, Gas, Source	AFCESA/CEO	AFSC/SEW	8
823243	8910	Gas Compressor	AFCESA/CEO	AFSC/SEW	8
823244	8232	Gas Storage	AFCESA/CEO	AFSC/SEW	8
823248	8910	Gas Vaporizor	AFCESA/CEO	AFSC/SEW	8
824462	8910	Gas Meter Facility	AFCESA/CEO	AFSC/SEW	8
824464	8241	Gas Mains	AFCESA/CEO	AFSC/SEW	8
824466	8910	Gas Odorizer Facility	AFCESA/CEO	AFSC/SEW	8
824468	8910	Gas Valve Facility	AFCESA/CEO	AFSC/SEW	8
826122	8261	Air Conditioning Plant 25 To 100 Tons	AFCESA/CEO	AFSC/SEW	8
826123	8261	Air Conditioning Plant Over 100 Tons	AFCESA/CEO	AFSC/SEW	8
827111	8271	Chilled Water Exterior Distribution Line	AFCESA/CEO	AFSC/SEW	8
831145	8311	Domestic and Industrial Waste Water Treatment	AFCESA/CEO	AFCEE/TD	N/A
831155	8312	Industrial Waste Treatment and Disposal	AFCESA/CEO	AFCEE/TD	8
831157	8313	Industrial Waste Fuel Spill Collection	AFCESA/CEO	AFCEE/TD	8
831165	8311	Sewage Treatment and Disposal	AFCESA/CEO	AFCEE/TD	8
831168	8910	Waste Treatment Building	AFCESA/CEO	AFCEE/TD	8
831169	8314	Sewage Septic Tank	AFCESA/CEO	AFCEE/TD	N/A
831171	8926	Radioactive Waste Burial Site	AFCESA/CEO	AFCEE/TD	N/A
831172	8926	Disposal Radioactive Waste	AFCESA/CEO	AFCEE/TD	N/A
831173	8926	Demolition and Burn Facility	AFCESA/CEO	AFCEE/TD	8
832255	8321	Industrial Waste Main	AFCESA/CEO	AFCEE/TD	8
832266	8321	Sanitary Sewage Main	AFCESA/CEO	AFCEE/TD	8
832267	8316	Sanitary Sewage Pump Station	AFCESA/CEO	AFCEE/TD	8
833354	8331	Solid Waste Disposal Facility	AFCESA/CEO	AFCEE/TD	8
833356	8331	Solid Waste Repository	AFCESA/CEO	AFCEE/TD	N/A
833358	2145	Garbage Container Washrack	AFCESA/CEO	AFCEE/TD	N/A
833360	8333	Solid Waste Disposal Facility	AFCESA/CEO	AFCEE/TD	N/A
833361	8334	Hazardous/Waste Landfill	AFCESA/CEO	AFCEE/TD	N/A
841161	8421	Water Supply Mains	AFCESA/CEO	AFCEE/TD	N/A
841162	8411	Commercial Water Supply	AFCESA/CEO	AFCEE/TD	N/A
841163	8411	Water Surface Supply	AFCESA/CEO	AFCEE/TD	N/A
841165	8412	Water Supply Treatment Facility	AFCESA/CEO	AFCEE/TD	8
841166	8414	Water Well	AFCESA/CEO	AFCEE/TD	N/A
841169	8910	Water Supply Building	AFCESA/CEO	AFCEE/TD	N/A
841423	8713	Water Storage Dam	AFCESA/CEO	AFCEE/TD	N/A

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841425	8443	Water Storage Reservoir	AFCESA/CEO	AFCEE/TD	N/A
841427	8413	Water Tank Storage	AFCESA/CEO	AFCEE/TD	8
842245	8421	Water Distribution Mains	AFCESA/CEO	AFCEE/TD	8
842246	8929	Water Hydrants	AFCESA/CEO	AFCEE/TD	N/A
842249	8422	Water Pump Station, Potable	AFCESA/CEO	AFCEE/TD	N/A
843314	8432	Fire Protection Water Mains	AFCESA/CEO	AFCEE/TD	8
843315	8929	Fire Hydrant	AFCESA/CEO	AFCEE/TD	8
843316	8434	Water Fire Pumping Station	AFCESA/CEO	AFCEE/TD	8
843319	8435	Fire Protection Water Storage	AFCESA/CEO	AFCEE/TD	8
844367	8442	Water Supply Storage, Non-Potable	AFCESA/CEO	AFCEE/TD	8
844368	8441	Water Supply Non-Potable	AFCESA/CEO	AFCEE/TD	8
845201	8452	Water Pump Station Nonpotable	AFCESA/CEO	AFCEE/TD	8
845362	8910	Water Supply Non-Potable Building	AFCESA/CEO	AFCEE/TD	N/A
845363	8451	Water Supply Main Non-Potable	AFCESA/CEO	AFCEE/TD	N/A
851142	8513	Road Bridge	AFCESA/CEO	AFCEE/TD, AFSC/SEG	8
851143	8999	Curbs And Gutters	AFCESA/CEO	AFCEE/TD	8
851145	8511	Driveway	AFCESA/CEO	AFCEE/TD	N/A
851147	8511	Road	AFCESA/CEO	AFCEE/TD, AFSC/SEG	8
851201	8512	Road Unsurfaced	AFCESA/CEO	AFCEE/TD, AFSC/SEG	N/A
852201	8522	Vehicle Parking Surfaced	AFCESA/CEO	AFCEE/TD	N/A
852261	8521	Vehicle Parking Operations	AFCESA/CEO	AF/A4LE	8
852262	8521	Vehicle Parking Non Organizational	AFCESA/CEO	AFCEE/TD	8
852267	8521	Vehicle/Equipment Parking Research and Development	AFCESA/CEO	AFCEE/TD	N/A
852269	1164	Vehicle Parking Refueling	AF/A4LE	AFCESA/CEO	8
852271	8521	Private Vehicle Parking Compound	AFSFC/SFO, AFCESA/CEO	AFCEE/TD	8
852273	1164	Aircraft Support Equipment Storage Yard	AF/A4L	AFCESA/CEO	8
852282	8525	Walkway Bridge	AFCESA/CEO	AFCEE/TD	N/A
852287	8524	Covered Walkway	AFCESA/CEO	AFCEE/TD	N/A
852289	8524	Sidewalk	AFCESA/CEO	AFCEE/TD	8
852301	8523	Vehicle Staging Area, Surfaced/Unsurfaced	AF/A4LE	AFCESA/CEO	N/A
853101	8531	Vehicle Parking Garage	AFCESA/CEO	AFCEE/TD, AFSC/SEG	N/A
860612	8611	Railroad Bridge	AFCESA/CEO	N/A	N/A

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860616	7384	Railroad Shelter Personnel	AFCESA/CEO	N/A	N/A
860617	8601	Railroad Trackage	AFCESA/CEO	N/A	8
871183	8321	Storm Drainage Disposal	AFCESA/CEO	AFCEE/TD	N/A
871185	8924	Storm Drainage Pumping Station	AFCESA/CEO	AFCEE/TD	N/A
871187	8712	Retaining Wall	AFCESA/CEO	AFCEE/TD	N/A
872245	8721	Fence Boundary	AFSFC/SFO	AFCESA/CEO	8
872247	8722	Fence Security/Vehicle Barriers	AFSFC/SFO	AFCESA/CEO	8
872248	8721	Fence Interior	AFSFC/SFO	AFCESA/CEO	8
872841	8999	Security Alarm System	AFSFC/SFO	AFCESA/CEO	8
872845	1499	Security Guard Tower	AFSFC/SFO	AFCESA/CEO	N/A
872911	1495	Revetment Pre-Engineered	AFSFC/SFO	AFCESA/CEO	N/A
880211	8999	Closed Head Automatic Sprinkler	AFCESA/CEO	AFCESA/ CEXF	8
880212	8999	Open Head Deluge System	AFCESA/CEO	AFCESA/ CEXF	8
880216	8999	Pre-Action Sprinkler System	AFCESA/CEO	AFCESA/ CEXF	8
880217	8999	Aqueous Film Forming Foam Pre-Action Sprinkler System	AFCESA/CEO	AFCESA/ CEXF	8
880218	8999	High Expansion Foam System	AFCESA/CEO	AFCESA/ CEXF	8
880221	8999	Automatic Fire Detection System	AFCESA/CEO	AFCESA/ CEXF	8
880222	8999	Manual Fire Alarm System, Interior	AFCESA/CEO	AFCESA/ CEXF	8
880223	8999	Manual Fire Alarm System, Exterior	AFCESA/CEO	AFCESA/ CEXF	8
880231	8999	Carbon Dioxide Fire System	AFCESA/CEO	AFCESA/ CEXF	8
880232	8999	Foam Fire System	AFCESA/CEO	AFCESA/ CEXF	8
880233	8999	Other Fire System	AFCESA/CEO	AFCESA/ CEXF	8
880234	8999	Halon 1301 Fire System	AFCESA/CEO	AFCESA/ CEXF	8
880235	8999	Dry Chemical System	AFCESA/CEO	AFCESA/ CEXF	8
880236	8999	Foam System	AFCESA/CEO	AFCESA/ CEXF	8
890111	9999	Storage And Plant Refrigeration Equipment	AFCESA/CEO	AFCEE/TD	N/A
890121	8261	Air Conditioning Plant 5 To 25 Tons	AFCESA/CEO	AFCEE/TD	N/A

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890123	8910	Air Conditioning Central Plant	AFCESA/CEO	AFCEE/TD	N/A
890124	9999	Air Conditioning From Central Plant	AFCESA/CEO	AFCEE/TD	N/A
890125	8261	Air Conditioning Plant Less Than 5 Tons	AFCESA/CEO	AFCEE/TD	N/A
890126	9999	Air Conditioning Window Units	AFCESA/CEO	AFCEE/TD	N/A
890127	8929	Solar Collection System	AFCESA/CEO	AFCEE/TD	N/A
890134	8921	Compressed Air Plant	AFCESA/CEO	AFCEE/TD	N/A
890136	8910	Compressed Air Plant Building	AFCESA/CEO	AFCEE/TD	N/A
890144	8930	Compressed Air Distribution	AFCESA/CEO	AFCEE/TD	N/A
890151	8929	Tramway Aerial	AFCESA/CEO	AFCEE/TD	N/A
890152	8526	Loading And Unloading Area	AFCESA/CEO	AFCEE/TD	N/A
890153	8929	Load/Unloading Conveyor	AFCESA/CEO	AFCEE/TD	N/A
890154	8929	Load/Unloading Gantry Crane	AFCESA/CEO	AFCEE/TD	N/A
890156	8928	Load/Unloading Pit	AFCESA/CEO	AFCEE/TD	N/A
890158	8928	Load/Unloading Platform	AFCESA/CEO	AFCEE/TD	N/A
890161	8929	Support Structures	AFCESA/CEO	AFCEE/TD	N/A
890171	8951	Miscellaneous Storage Tank	AFCESA/CEO	AFCEE/TD	N/A
890181	8999	Utility Line Ducts	AFCESA/CEO	AFCEE/TD	N/A
890185	8931	Utilidor	AFCESA/CEO	AFCEE/TD	N/A
890187	8927	Utility Vault	AFCESA/CEO	AFCEE/TD	N/A
890197	8923	Weight Scale	AFCESA/CEO	AFCEE/TD	N/A
890267	8999	Pneumatic Tube	AFCESA/CEO	AFCEE/TD	N/A
890269	8999	Cathodic Protection	AFCESA/CEO	AFCEE/TD	N/A
890271	8925	Energy Management and Control System Central Station	AFCESA/CEO	AFCEE/TD	8
890272	8999	EMCS Field Equipment	AFCESA/CEO	AFCEE/TD	N/A
890273	8999	EMCS Data Links	AFCESA/CEO	AFCEE/TD	N/A
890311	8929	Non-Recoverable Support Facility, Relocatable	AFCESA/CEO	AFCEE/TD	N/A
911125	9110	Land Donation, Private	AF/A7CAI	N/A	N/A
911127	9110	Land Donation State And Local Government	AF/A7CAI	N/A	N/A
911142	9110	Land Fee Condemnation	AF/A7CAI	N/A	N/A
911146	9110	Land Fee Purchase	AF/A7CAI	N/A	N/A
912261	9120	Land, Public Domain, Executive Order	AF/A7CAI	N/A	N/A
912262	9120	Land, Public Domain, Public Land Order	AF/A7CAI	N/A	N/A
912268	9120	Land, Public Domain, Permit	AF/A7CAI	N/A	N/A
912269	9120	Land, Public Domain, Note	AF/A7CAI	N/A	N/A
913384	9130	Land, License, General Use	AF/A7CAI	N/A	N/A
913393	9130	Land, Permit, General Use	AF/A7CAI	N/A	N/A

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914263	9140	Land, Public, Executive Order	AF/A7CAI	N/A	N/A
921164	9210	Land, Easement Clearance, Temp	AF/A7CAI	N/A	N/A
921167	9210	Land, Easement Restrictive	AF/A7CAI	N/A	N/A
921168	9210	Land, Easement Right Of Way, Temp	AF/A7CAI	N/A	N/A
921174	9210	Land Easement Clearance, Perpetual	AF/A7CAI	N/A	N/A
921177	9210	Land Easement Restrictive, Perpetual	AF/A7CAI	N/A	N/A
921178	9210	Land, Easement Right Of Way, Perpetual	AF/A7CAI	N/A	N/A
922274	9220	Land, Lease, State and Local	AF/A7CAI	N/A	N/A
922276	9220	Land, Lease Subject To Recapture	AF/A7CAI	N/A	N/A
922278	9220	Land, Lease, Private Enter	AF/A7CAI	N/A	N/A
922292	9220	Land, Lease and Supplement	AF/A7CAI	N/A	N/A
922294	9220	Land, In-Lease Mineral	AF/A7CAI	N/A	N/A
922298	9220	Land, In-Lease Other	AF/A7CAI	N/A	N/A
922355	9220	Foreign Land Lease Under 99 Yr	AF/A7CAI	N/A	N/A
922357	9220	Foreign Land Lease 99 Years	AF/A7CAI	N/A	N/A
923322	9230	Foreign Land Agreement Base	AF/A7CAI	N/A	N/A
923346	9230	Foreign Land Commandeered	AF/A7CAI	N/A	N/A
923366	9230	Foreign Land Requisitioned	AF/A7CAI	N/A	N/A
923376	9230	Foreign Land Miscellaneous	AF/A7CAI	N/A	N/A
931115	9311	Building Improvements	AF/A7CAI	N/A	N/A
932581	9391	Revetments	AF/A7CAI	N/A	N/A
932681	9321	Site Preparation	AF/A7CAI	N/A	N/A
933364	9391	Removal Of Hazard	AF/A7CAI	N/A	N/A
934277	9391	Erosion Control	AF/A7CAI	N/A	N/A
939445	9321	Training Area	AF/A7CAI	N/A	N/A
939512	9391	Aircraft Accident Emergency Alarm System	AF/A7CAI	N/A	N/A
939565	9999	Collateral Equipment	AF/A7CAI	N/A	N/A
941101	9411	Contaminated Facility Or Area	AF/A7CAI	N/A	N/A