

Chapter 1

GENERAL REQUIREMENTS

1.1. Purpose of This Manual. This manual provides standardized airfield, heliport and airspace criteria for the geometric layout, design, and construction of runways, helipads, taxiways, aprons, and related permanent facilities to meet sustained operations.

1.2. Scope. This manual prescribes dimensional and geometric layout criteria for safe standards for airfields, landing zones, heliports and helipads, and related permanent facilities, as well as the navigational airspace surrounding these facilities. Criteria in this manual pertain to all Department of Defense (DoD) military facilities in the United States, its territories, trusts, and possessions, and unless otherwise noted, to DoD facilities overseas on which the United States has vested base rights. For DoD facilities overseas, there may be more applicable governing authority from agencies such as host nation, International Civil Aviation Organization (ICAO), or NATO. Procedures for pavement structural design and pavement marking are beyond the scope of this manual. Tenant organizations on civil airports will use these criteria to the extent practicable; otherwise, Federal Aviation Administration (FAA) criteria will apply.

1.2.1. Terminal Instrument Procedures (TERPS). Modifications to existing facilities and construction of new facilities must be closely coordinated with the Major Command (MAJCOM - Air Force), U.S. Army Aeronautical Services Agency (USAASA) and USAASDE, and Naval Flight Information Group (NAVFIG), to ensure instrument flight procedures' compliance with TERPS. The criteria in this manual do not address instrument flight procedures. TERPS evaluations and processes are described in AFJMAN 11-226/TM 95-226/OPNAVINST 3722.16C, *United States Standard for Terminal Instrument Procedures (TERPS)*. TERPS provides additional criteria to be considered when designing or modifying airfields and facilities on airfields that are used under Instrument Flight Rules (IFR).

1.2.2. Objects Affecting Navigable Airspace. Modifications to existing facilities and construction of new facilities must consider navigable airspace. The criteria for determining obstructions to navigable airspace have been identified in this manual. The designer must consult this manual during the design process to identify obstructions to airspace. For facilities outside the U.S. and its trust territories, host nation criteria apply. If the criteria in this manual are more stringent, this manual should be used to the maximum extent practical.

1.2.3. Navigational Aids (NAVAIDS) and Lighting. NAVAIDS and airfield lighting are integral parts of an airfield and must be considered in the planning and design of airfields and heliports. NAVAID location, airfield lighting, and the grading requirements of a NAVAID must be considered when locating and designing runways, taxiways, aprons and other airfield facilities. Table A17.1 in Attachment 17 includes a list of design documents governing NAVAIDS and lighting and the agency where siting and design information can be obtained.

1.2.4. Vertical-Short Takeoff and Landing (V-STOL) Aircraft (V-22). At shore establishments, the V-22 will be considered a fixed-wing aircraft, and the runway planned according to critical field length. If operational requirements allow for reduced loads and a vertical takeoff pad is desired, contact the appropriate agency aviation office who can provide airfield safety waivers. This manual does not cover design criteria for V-STOL aircraft. Information on the V-22 (Osprey) aircraft may be obtained by contacting:

LANTDIV Code 15
1510 Gilbert Street
Norfolk, VA 23511-2699

OR
NAVAIRSYSCOM (AIR-8.OY)
1421 Jefferson Davis Highway
Arlington VA 22243-5120

1.3. References. Attachment 1 contains a list of documents referenced in this manual.

1.4. Application of Criteria:

1.4.1. Existing Facilities. The criteria in this manual are not intended to apply to existing facilities located or constructed under previous standards. These facilities can continue to be used without impairing operational efficiency and safety. Existing airfield facilities need not be modified nor upgraded to conform to the criteria in this manual. If there is a change in mission which results in a reclassification of the facility, an upgrade to current standards is required. Upgraded facilities must be maintained at a level that will sustain compliance with current standards.

1.4.2. Modification of Existing Facilities. When existing airfield facilities are modified, construction must conform to the criteria established in this manual unless waived in accordance with paragraph 1.8.. Modified facilities must be maintained at a level that will sustain compliance with current standards.

1.4.3. New Construction. The criteria established in the manual apply to all new facilities. All new construction will comply with criteria established within this manual unless the appropriate waivers are obtained as outlined in Attachment 2.. New facilities must be maintained at a level that will sustain compliance with current standards.

1.4.4. Metric Application. Geometric design criteria established in this manual are expressed in SI units (metric). These metric values are based upon aircraft specific requirements rather than direct conversion and rounding. This results in apparent inconsistencies between metric and inch-pound (English) dimensions. For example, 150-foot-wide runways are shown as 46 meters, 150-foot-wide aircraft wash racks are shown as 45 meters. Runways need the extra meter in width for aircraft operational purposes; wash racks do not. SI dimensions apply to new airfield facilities, and where practical, to modification of existing airfield facilities, unless waived in accordance with paragraph 1.8. Inch-pound measurements are included in the tables and figures in this manual only to permit reference to the previous standards. To avoid changes to existing airfield obstruction maps and compromises to flight safety, airfield and heliport imaginary surfaces and safe wingtip clearance dimensions are shown as a direct conversion from inch-pound to SI units.

1.4.5. AFRC and ANG Installations. AFRC and ANG installations on municipal airports or FAA-controlled airfields must apply FAA criteria to facilities such as runways and taxiways that are jointly used by civilian and military aircraft. Facilities that are for military use only, such as aircraft parking aprons, must apply Air Force/DoD criteria.

1.5. Service Requirements. When criteria differ among the various Services, the criteria for the specific Service are noted.

1.6. Theater-of-Operations. Standards for theater-of-operations facilities are contained in: Army FM 5-430-00-2/Air Force Joint Pamphlet (AFJPAM) 32-8013, Volume 2, *Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations*.

1.7. Security Considerations for Design. Regulatory requirements for security of assets can have a significant impact on planning and design of airfields and heliports. The arms, ammunition, explosives and electronic devices associated with aircraft, as well as the aircraft themselves, require varying types and levels of protection. Operational security of the airfield is also a consideration.

1.7.1. Integration of Security Measures. Protective features such as barriers, fences, lighting, access control, intrusion detection and assessment must be integrated into the airfield planning and design process to minimize problems with aircraft operations and safety requirements. This is discussed further in Chapter 2. The protective measures should be included in the design based on risk and threat analysis or should comply with security-related requirements.

1.7.2. Security-Related Requirements. Detailed discussion of security-related requirements is beyond the scope of this manual. Designer should refer to the following applicable security regulations for planning and design guidance:

1.7.2.1. AFI 31-101, *The Physical Security Program*

1.7.2.2. OPNAVINST 5513.14B, *Physical Security and Loss Prevention*

1.7.2.3. MIL-HDBK-1013/1, *Design Guidelines for Physical Security of Facilities*

1.7.2.4. MIL-HDBK-1013/10, *Design Guidelines for Security Fencing, Gates, Barriers and Guard Facilities*

1.7.2.5. (U)AR 50-51, *Nuclear Weapons Security, (Confidential)*

1.7.2.6. AR 190-11, *Physical Security of Arms, Ammunition and Explosives*

1.7.2.7. AR 190-51, *Security of Army Property at Unit and Installation Level*

1.7.2.8. DA PAM 190-51, *Risk Analysis for Army Property*

1.8. Waivers to Criteria. Each DoD Service component is responsible for setting administrative procedures necessary to process and grant formal waivers. Waivers to the criteria contained in this manual will be processed in accordance with Attachment 2. If a waiver affects instrument approach and departure procedures as defined in TERPS (AFJMAN 11-226/TM 95-226/OPNAVINST 3722.16C), the DoD Service component processing the waiver must also coordinate its action with the applicable TERPS approving authority.

1.9. Notice of Construction. The FAA must be notified of all construction that affect air navigation at DoD airfields in the United States and its territories. FAA Form 7460-1, **Notice of Proposed Construction or Alteration** (<http://www.faa.gov/arp/ace/faaforms.htm>), must be submitted to the Federal Aviation Administration at least 30 days prior to the start of construction, in accordance with Federal Aviation Regulations, Part 77, *Objects Affecting Navigable Airspace*, subpart B. Airspace surface penetrations will be noted. Applications may be obtained and are filed with the regional FAA office. For Army, Army National Guard and Army Reserves, process the form in accordance with Chapter 8 of AR 95-2, *Air Traffic Control, Air Space, Airfield Flight Facilities and Navigational Aids*. For DoD facilities overseas, similar requirements by the host country, NATO, or ICAO, may be applicable.

1.10. Zoning. Existing and new facilities should encourage local municipalities to adopt compatible Land Use Zoning to protect air space on and off airfield facilities.

1.11. Construction Phasing Plan. A construction phasing plan, as discussed in Attachment 15, should be included in the contract documents.

1.12. Associated Design Manuals. The planning and design of airfields and heliports is intricate and may require additional criteria, such as pavement design and pavement marking, not addressed in this manual. Additional manuals which the designer/planner may need to consult are listed in Table 1.1.

1.13. Use of Terms. The following terms, when used in this manual, indicate the specific requirements:

- 1.13.1. *Will or Must* -- Indicates a mandatory and/or required action.
- 1.13.2. *Should* -- Indicates a recommended, advisory, and/or desirable action.
- 1.13.3. *May or Can* -- Indicates a permissible action.

Table 1.1. Associated Design Manuals.

<i>Pavement Design, General</i>	
Air Force	AFJMAN 32-1014, <i>Pavement Design for Airfields</i>
Army	TM-5-825-1, <i>General Provisions for Airfield/Heliport Pavement Design</i> TM-5-825-3-1, <i>Rigid Pavement Design for Airfields, Elastic Layered Method</i> TM-5-825-2-1, <i>Flexible Pavement Design for Airfields (Elastic Layered Method)</i>
Navy/Marines	MIL-HDBK 1021/2, <i>General Concepts for Airfield Pavement Design</i>
FAA	AC 150/5320-6, <i>Airport Pavement Design and Evaluation</i>
<i>Hangar Pavement Design</i>	
Navy/Marines	MIL-HDBK 1028/1A, <i>Aircraft Maintenance Facilities</i>
<i>Rigid Pavement Design</i>	
Air Force	AFJMAN 32-1014, <i>Pavement Design for Airfields</i>
Army	TM 5-825-3, <i>Rigid Pavements for Airfields</i>
Navy/Marines	MIL-HDBK 1021/4, <i>Rigid Pavement Design for Airfields</i>
FAA	AC 150/5320-6, <i>Airport Pavement Design and Evaluation</i>
<i>Flexible Pavement Design</i>	
Air Force	AFJMAN 32-1014, <i>Pavement Design for Airfields</i>
Army	TM 5-825-2, <i>Flexible Pavement Design for Airfields</i>
Navy/Marines	DM 21.3, <i>Flexible Pavement Design for Airfields</i>
FAA	AC 150/5320-6, <i>Airport Pavement Design and Evaluation</i>
<i>Surface Drainage</i>	
Air Force	AFM 88-5, CH1 (AFI 32-1016), <i>Surface Drainage Facilities for Airfields and Heliports</i>
Army	TM 5-820-1, <i>Surface Drainage Facilities for Airfields/Heliports</i>
Navy/Marines	MIL-HDBK 1005/3, <i>Drainage Systems</i>
FAA	AC 150/5320-5, <i>Airport Drainage</i>
<i>Airfield Lighting</i>	
Air Force	AFMAN 32-1076, <i>Visual Air Navigation Facilities</i>
Army	TM 5-811-5, <i>Army Aviation Lighting</i>
Navy/Marines	MIL-HDBK 1023/1, <i>Airfield Lighting</i> NAVAIR 51-50AAA-2, <i>General Requirements for Shore Based Airfield Marking and Lighting</i>
FAA	MIL-HDBK 1024/1, <i>Aviation Operational and Support Facilities</i> AC 150/5300-13, <i>Airport Design</i>

Table 1.1. Associated Design Manuals (Continued).

Explosives	
Air Force	AFMAN 91-201, <i>Explosives Safety Standards</i>
Army	AR 385-64, <i>Ammunition and Explosives Safety Standards</i>
Navy/Marines	NAVSEA OP-5, <i>Ammunition and Explosives Ashore, Safety Regulations for Handling, Storing, Production, Renovation, and Shipping</i>
Pavement Marking	
Air Force	AFI 32-1042, <i>Standards For Marking Airfields</i> ETL 94-01, <i>Standard Airfield Pavement Marking Schemes (AFJM 32-1015)</i>
Army	TM 5-823-4, <i>Marking of Army Airfield-Heliport Facilities</i>
Navy/Marines	NAVAIR 51-50AAA-2
FAA	AC 150/5340-1, <i>Marking of Paved Areas on Airports</i>
Subsurface Drainage	
Air Force	AFM 88-5, CH2 (AFJMAN 32-1016), <i>Drainage and Erosion Control - Subsurface Drainage, Facilities and Airfield Pavements</i>
Army	TM 5-820-2, <i>Drainage and Erosion Control, Subsurface Drainage Facilities for Airfield Pavements</i>
Navy/Marines	DM 21.06, <i>Airfield Subsurface Drainage and Pavement Design</i>
FAA	AC 150/5320-5, <i>Airport Drainage</i>
Drainage and Erosion Control Structures	
Air Force	AFM 88-5, CH3 (AFJMAN 32-1016), <i>Drainage and Erosion Control Structure for Airfields and Heliports</i>
Army	TM 5-820-3, <i>Drainage and Erosion Control Structures for Airfields and Heliports</i>
Navy/Marines	MIL HDBK 1005/3, <i>Drainage Systems</i>
FAA	AC 150/5320-5, <i>Airport Drainage</i>
Theater of Operations	
Air Force	AFJPAM 32-8013, Vol 2 (32-1027V1), <i>Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations--Road Design</i>
Army	FM 5-430-00-2
Area Lighting	
Army	TM 5-811-5, <i>Army Aviation Lighting</i>
Navy/Marines	MIL-HDBK 1023/1, <i>Airfield Lighting</i> NAVAIR 51-50AAA-2, <i>General Requirements for Shore Based Airfield Marking and Lighting</i>
FAA	IES-RP-14-1987, <i>IES Recommended Practice for Airport Service Area Lighting</i>

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