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UNIFIED FACILITIES CRITERIA (UFC)

DESIGN: AVIATION OPERATION AND SUPPORT FACILITIES

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DESIGN: AVIATION OPERATION AND SUPPORT FACILITIES

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U.S. ARMY CORPS OF ENGINEERS (Preparing Activity)

NAVAL FACILITIES ENGINEERING COMMAND

AIR FORCE CIVIL ENGINEERING SUPPORT AGENCY

Record of Changes (changes indicated by **1**\ ... /**1**/)

Change No.	Date	Location

FOREWORD

The Unified Facilities Criteria (UFC) system is prescribed by MIL-STD 3007 and provides planning, design, construction, sustainment, restoration, and modernization criteria, and applies to the Military Departments, the Defense Agencies, and the DoD Field Activities in accordance with USD(AT&L) Memorandum dated 29 May 2002. UFC will be used for all DoD projects and work for other customers where appropriate.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Support Agency (AFCESA) are responsible for administration of the UFC system. Defense agencies should contact the preparing service for document interpretation and improvements. Technical content of UFC is the responsibility of the cognizant DoD working group. Recommended changes with supporting rationale should be sent to the respective service proponent office by the following electronic form: Criteria Change Request (CCR). The form is also accessible from the Internet sites listed below.

UFC are effective upon issuance and are distributed only in electronic media from the following sources:

- Unified Facilities Criteria (UFC) Index http://65.204.17.188//report/doc_ufc.html.
- USACE TECHINFO Internet site http://www.hnd.usace.army.mil/techinfo/index.htm.
- NAVFAC Engineering Innovation and Criteria Office Internet site http://criteria.navfac.navy.mil.
- Construction Criteria Base (CCB) system maintained by the National Institute of Building Sciences at Internet site http://www.nibs.org/ccb.

Hard copies of UFC printed from electronic media should be checked against the current electronic version prior to use to ensure that they are current.

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CHAPTER 1

INTRODUCTION

1-1 **PURPOSE AND SCOPE**. This UFC is comprised of two sections. Chapter 1 introduces this UFC and provides a listing of references to other Tri-Service documents closely related to the subject. Appendix A contains the full text copy of the previously released Military Handbook (MIL-HDBK) on this subject. This UFC serves as criteria until such time as the full text UFC is developed from the MIL-HDBK and other sources.

This UFC provides general criteria for the design of aviation operation and support facilities.

Note that this document does not constitute a detailed technical design, maintenance or operations manual, and is issued as a general guide to the considerations associated with design of economical, efficient, and environmentally acceptable aviation operation and support facilities.

1-2 **APPLICABILITY**. This UFC applies to all DoD Agencies and contractors preparing for designs of aviation operation and support facilities.

1-2.1 **GENERAL BUILDING REQUIREMENTS**. All DoD facilities must comply with UFC 1-200-01, *Design: General Building Requirements*. If any conflict occurs between this UFC and UFC 1-200-01, the requirements of UFC 1-200-01 take precedence.

1-2.2 **SAFETY**. All DoD facilities must comply with DODINST 6055.1 and applicable Occupational Safety and Health Administration (OSHA) safety and health standards.

NOTE: All **NAVY** projects, must comply with OPNAVINST 5100.23 (series), *Navy Occupational Safety and Health Program Manual*. The most recent publication in this series can be accessed at the NAVFAC Safety web site: www.navfac.navy.mil/safety/pub.htm. If any conflict occurs between this UFC and OPNAVINST 5100.23, the requirements of OPNAVINST 5100.23 take precedence.

1-2.3 **FIRE PROTECTION**. All DoD facilities must comply with UFC 3-600-01, *Design: Fire Protection Engineering for Facilities*. If any conflict occurs between this UFC and UFC 3-600-01, the requirements of UFC 3-600-01 take precedence.

1-2.4 **ANTITERRORISM/FORCE PROTECTION**. All DoD facilities must comply with UFC 4-010-01, *Design: DoD Minimum Antiterrorism Standards for Buildings*. If any conflict occurs between this UFC and UFC 4-010-01, the requirements of UFC 4-010-01 take precedence.

APPENDIX A

MIL-HDBK 1024/1
AVIATION OPERATION AND SUPPORT FACILITIES

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* CCB Application Notes:                                            *
*                                                                   *
* 1. Character(s) preceded & followed by these symbols (. -) or (+ ,)  *
*    are super- or subscripted, respectively.                       *
*    EXAMPLES:  42m.3-  =  42 cubic meters                          *
*               CO+2,   =  carbon dioxide                           *
*                                                                   *
* 2. All degree symbols have been replaced with the word deg.       *
*                                                                   *
* 3. All plus or minus symbols have been replaced with the symbol +/-. *
*                                                                   *
* 4. All table note letters and numbers have been enclosed in square   *
*    brackets in both the table and below the table.                *
*                                                                   *
* 5. Whenever possible, mathematical symbols have been replaced with   *
*    their proper name and enclosed in square brackets.             *
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MIL-HDBK-1024/1
15 FEBRUARY 1994

MILITARY HANDBOOK

AVIATION OPERATIONAL AND SUPPORT FACILITIES

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ABSTRACT

Basic guidance for the planning, engineering, and design of Navy aviation operational and support facilities is presented for use by facility planners, engineers, and architects. Subject guidance addresses building layouts, utility requirements, and functional relationships between spaces.

FOREWORD

This handbook was developed to provide guidance on the planning, engineering, and design for Naval aviation operational and support facilities, and uses, to the maximum extent possible, national and institute standards in accordance with Naval Facilities Engineering Command (NAVFACENGCOM) policy. Source data and material used in the preparation of this handbook include current Department of Defense (DOD) and Department of Transportation directives, technical manuals, field studies, observations, and reports of research and development which promote standardization and provide optimum support facilities.

Recommendations for improvement are encouraged from within the Navy, other Government agencies, and the private sector and should be furnished on the DD Form 1426 provided inside the back cover and forwarded to: Commanding Officer, Southern Division, Naval Facilities Engineering Command, Code 4041, P.O. Box 190010, North Charleston, SC 29419-9010; Telephone (803) 743-0423.

THIS HANDBOOK SHALL NOT BE USED AS A REFERENCE DOCUMENT FOR PROCUREMENT OF FACILITIES CONSTRUCTION. IT IS TO BE USED IN THE PURCHASE OF FACILITIES ENGINEERING STUDIES AND DESIGN (FINAL PLANS, SPECIFICATIONS, AND COST ESTIMATES). DO NOT REFERENCE IT IN MILITARY OR FEDERAL SPECIFICATIONS OR OTHER PROCUREMENT DOCUMENTS.

SUPPORT FACILITIES CRITERIA MANUALS

Criteria Manual	Title	PA
MIL-HDBK-1024/1	Aviation Operational and Support Facilities	SOUTHDIV
MIL-HDBK-1024/3	Oxyacetylene and Nitrogen and Breathing Oxygen Facilities	WESTDIV
MIL-HDBK-1024/4	Ships Support Facilities (Proposed)	PACDIV
MIL-HDBK-1024/5	Logistics Support Facilities (Proposed)	CHESDIV

AVIATION OPERATIONAL AND SUPPORT FACILITIES

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Section 1: INTRODUCTION

1.1 Scope. This military handbook, MIL-HDBK-1024/1, contains guidance for (Navy and Contract) planners, engineers, and architects on the planning, engineering, and design of Department of the Navy aviation operational and support facilities. This is supplementary guidance to be used in conjunction with Base Electronic Systems Engineering Plans (BESEPs), Intrusion Detection Systems Engineering Plans (IDSEPs), Base Exterior Architecture Plans (BEAPs), and other DOD and Department of Transportation material for the planning and construction of Naval aviation operational and support facilities and the preparation of DD 1391 Military Construction and Step II Special Project Submissions. It is assumed that general architectural and engineering standards are known or available to the planner. Navy criteria concerning basic and detailed construction and engineering criteria are not addressed in this handbook and are a prerequisite for facility planning.

1.2 Purpose of Criteria. Subject guidance will be used for planning individual projects, preparing engineering documentation, and preparing contractual documents for construction. It is intended to present the basis for standardization of practices and identify a common baseline to be used as a guide during the planning of new facilities or the modification of existing facilities.

1.3 Predesign Programming. Naval aviation is a highly dynamic field which depends on state-of-the-art computer technology and the design of Navy aviation operational and support facilities requires close coordination between the designer and other parties. Consider a predesign programming session at the host activity to establish specific requirements for the proposed facility. Responsibilities involved in predesign stages are as follows:

1.3.1 Chief of Naval Operations (CNO). The CNO is the Director of Naval Communications, who sponsors and supports Naval communications facilities through the Naval Telecommunications Command and other commands. The CNO, as the user, states the needs of the operating and supporting facilities for research and development, improved equipment, new equipment, spare and repair parts, consumables, training, maintenance, personnel facilities, and any other requirements of the user. In many instances, the CNO is responsible for supporting the Defense Informations Systems Agency (DISA), which is the sponsor for the nation's world-wide Defense Communications System (DCS). CNO, Code OP-N885F2, is the governing body or Operations Navy (OPNAV) sponsor for Naval Air Traffic Control (ATC), Air Navigation Aids and Landing Systems (NAALS) programs, operations, and funding. CNO is responsible for formulating policies, directives, procedures and guidelines which govern planning, programming and implementation of the NAALS ATC program and associated equipment for use at naval aviation shore facilities. CNO is responsible for validating Operational Requirements, approving Operational Capability Improvement Requests (OCIRs), representing the Navy in interagency agreements with the Federal Aviation Administration (FAA) and other Department of Defense

(DOD) components and appropriating funds for NAALS acquisition, research, development, testing, evaluation, operations, and maintenance.

1.3.2 Naval Facilities Engineering Command (NAVFACENGCOM). NAVFACENGCOM is responsible for design, development, and construction of the facilities ancillary to and/or required for support or housing of electronic equipment and operating personnel. NAVFACENGCOM provides technical guidance and direction in shore facility engineering from project inception to completion. In support of ATC electronic facilities construction, NAVFACENGCOM works closely with Naval-in-Service Engineering, East Coast Division (NISE-EAST), Charleston, SC. NISE-EAST is responsible for preparing preliminary and final Military Construction (MILCON) BESEPs and assisting the user with submitting site approval requests using Request for Projects Site Approval (NAVFAC Form 11010/31) to ensure that facilities projects are sited per the activity master plan to ensure compliance with applicable safety and environmental criteria. During the design phase, NISE-EAST is responsible for assisting NAVFACENGCOM with preparing project engineering documentation: required facilities information, TEMPEST and security requirements, and technical data necessary for initial project planning and design and providing NAVFAC with a brief overall description and design concepts of proposed projects to permit evaluation of the proposed installation. In addition, NISE-EAST is responsible for reviewing DD 1391, supporting NAVFACENGCOM and the architectural-engineer (A-E) during the project design phases and attending predesign, 35 percent, 100 percent, and other required design review conferences.

1.3.3 Naval Air Systems Command (NAVAIRSYSCOM). Naval aviation facility requirements are driven by a multitude of Navy and Marine Corps aircraft, weapons system, airborne electronics systems and related ground-based aeronautical equipment, training, and material support. NAVAIRSYSCOM works with the respective program entities to identify unique aviation and operational support facilities requirements. As the Navy lead field activity for national airspace system modernization, NISE-EAST is responsible for planning and management support for worldwide Navy and Marine Corps ATC, NAALS community in the areas of radar air traffic control facilities/center and fleet area control and surveillance facilities (FASFAC) design and installation and air-to-ground/crash/landline communication system modernization. Responsibilities include radar air traffic control facility (RATCF) electronic system design, engineering, and installation including instrument flight rules (IFR) room, control tower cabs, FASFAC, airport surveillance radar (ASR), precision approach radar (PAR), air traffic control radar beacon system (ATCRBS), radar ranges, communication control systems, radar video display systems, HF/UHF/VHF air-to-ground communications systems, microwave systems, fiber optic systems, flight data transmission systems and ancillary equipment when being installed as an integrated system. Naval Command, Control and Ocean Surveillance Center In-Service Engineering (NISE), West Detachment, Vallejo, CA is responsible for facility electronic system design, engineering, and installation for stand-alone Navy ATC NAALS installation. NAVAIRSYSCOM has fiscal authority, program management authority

and material support responsibility for Navy and Marine Corps NAALS and associated equipment for use on naval shore aviation facilities.

1.3.4 Space and Naval Warfare Systems Command (SPAWARSYSCOM). SPAWARSYSCOM exercises technical control of design, development, procurement, and installation of the electronic equipment for an electronic facility at a shore activity. SPAWARSYSCOM provides technical guidance and direction in shore electronic engineering from project inception to completion, except in special cases where the electronic systems or equipment is specifically assigned to another command.

1.3.5 Maintenance Authority. SPAWARSYSCOM exercises technical control through regional and district offices, whose responsibilities include installation and maintenance engineering of electronic equipment that is beyond the capacity of station forces. Regional and district offices represent SPAWARSYSCOM for electronic engineering control during facility design development. NISE-EAST represents NAVAIRSYSCOM for electronic engineering control and development of ATC electronic facilities design of RATCFs. In a similar capacity, NISE West Detachment Vallejo is responsible for developing electronic facilities design for Navy ATC NAALS and related equipment.

1.3.6 Designer. The designer (planner, engineer, and architect) enters design development at the predesign programming stage and after the operational requirements have been established. The designer plans the facility to satisfy the operational requirements set forth in this handbook, MIL-HDBK-1024/1, and in the BESEP, IDSEP, and BEAP, and prepares project drawings and specifications under the control of NAVFAC and the guidance of SPAWARSYSCOM. Requirements for projects that do not directly involve electronic equipment may not require a BESEP. While maintaining close liaison with the NAVFAC command responsible for the project, the designer is responsible for coordinating technical matters with the sponsors and users of the project.

1.3.6.1 Base Electronic Systems Engineering Plan (BESEP). The BESEP is primarily a technical planning and management document, with sufficient installation detail provided to enable evaluation of operational impact (signal flow, site, etc.) on user activities. It is a basic technical document governing electronics and other affected phases of shore electronics planning and implementation. It translates a sponsor or user statement of operational need, which shall be referenced in the BESEP, into a technical description of shore electronics systems and facilities required to meet this need. It provides required information on electronic systems, equipment and devices to be used, their pertinent technical parameters, physical characteristics, environmental and interface requirements, and system performance objectives. The BESEP identifies the minimum installation criteria (red/black ground system, etc.) to be applied. Methods of verifying systems performance and compliance with identified installation requirements

are included. See SPAWARS Instruction 2804.1, Policy and Procedures Concerning Base Electronic Systems Engineering Plan.

1.3.6.2 Intrusion Detection Systems Engineering Plan (IDSEP). NISE-EAST is directed by Commander Naval Investigative Service Command (COMNISCOM), OP-09, to prepare IDSEPs for electronic sensor system (ESS)/intrusion detection system (IDS) installations when a MILCON is required. The reference document for the IDSEP is Section 6.0 of SPAWARS Instruction 2804.1 and is equivalent to a MILCON BESEP. The scope of the IDSEP is specific only to detailed requirements for design of the facility in order to accommodate ESS/IDS and related electronic equipment.

1.4 Policy Statement. Design of aviation operational and support facilities should be based on operational requirements and guidance contained in this handbook, MIL-HDBK-1024/1. Operational facilities should incorporate the user's requirements, provide the most effective support possible, and accommodate the best safety, habitability, energy conservation, maintenance, and training characteristics. Operational requirements should take precedence over other criteria such as convenience or cost should compromises be required. Documents such as the BESEP, applicable NAVFAC publications, and other pertinent Navy and DOD documents shall be governing sources for establishment of requirements.

Section 2: GENERAL DESIGN CRITERIA

2.1 Facility Planning. Plan for the design and construction of facilities discussed herein in accordance with NAVFAC P-80, Facility Planning Criteria for Navy and Marine Corps Shore Installations, MIL-HDBK-1190, Facility Planning and Design Guide, and NAVFAC Instruction 11010.44, Shore Facilities Planning Manual.

2.2 Site Considerations

2.2.1 Site Suitability. Basic considerations for site selection include terrain characteristics and meteorological conditions. Locate facilities requiring technical adequacy for radiation, reception, visibility, etc., following the requirements established by the governing agency or command responsible for the project. Ensure site selection considerations are fully understood and incorporated into the design. Site considerations for electronic facilities are contained in MIL-HDBK-1012/1, Electronic Facilities Engineering.

2.2.2 Separation of Structures. Comply with MIL-HDBK-1008, Fire Protection for Facilities Engineering, Design, and Construction for separation of structures.

2.2.3 Access and Parking. Provide paved access drives and parking lots for attended facilities in accordance with NAVFAC DM-5.04, Pavements. Access drives and parking facilities for unattended facilities may be gravel or crushed shell except where access to the facility is from runways and taxiways. In these cases, pave a sufficient portion of the access drives and parking lots to avoid the scattering of gravel onto the operational surfaces. At facilities adjacent to runways and taxiways, provide parking space off the operational surface for a maintenance vehicle. Locate the parking space to avoid interference with the operation of any facilities in the area. Ensure roadway and vehicle parking surfaces within the airfield operations area are flush with the surrounding ground surface.

2.2.3.1 Parking. The number of parking stalls required at each facility varies dependent upon the function, location, and size of the user command. Consider double work shifts and shift changes when determining the required number of parking stalls. Criteria for establishing the required number of parking stalls based on the type of facility and size of the work force are provided in MIL-HDBK-1190. Provide geometric layout and design for parking lots and stalls in accordance with Army TM 5-822-2/Air Force Manual 88-7, Chapter 5, General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas, and NAVFAC Definitive Drawing No. 1404837, Parking Area Criteria for Vehicles. In addition to requirements established in these reference documents, conform to the following restrictions:

a) Parking of privately owned vehicles (POV's) within level three and level two restricted areas is prohibited.

b) Parking of POV's within 15 feet of any building is prohibited.

c) Parked vehicles within either the 20-foot minimum outside security zone or the 30-foot minimum inside security zone associated with restricted area security fencing is prohibited.

2.2.3.2 Access for Fire Department Apparatus. Consult local authorities having jurisdiction for criteria regarding access to the area and clearance around the buildings for fire apparatus maneuvering. The equipment expected to respond to an emergency will control these decisions. See National Fire Protection Association (NFPA) 1141, Fire Protection in Planned Building Groups.

2.2.4 Site Drainage. Provide drainage design in accordance with MIL-HDBK-1005/3, Drainage Systems. Metallic pipe and reinforced concrete pipe are inappropriate at some sites. Establish requirements for use of metallic pipe and reinforced concrete pipe early in facility planning. Consider drainage swales with minimal velocities to avoid damage of ground planes. Do not use storm drain pipes through an antenna ground plane. Refer to MIL-HDBK-1012/1.

2.2.5 Protection of Fixed Objects. Provide barriers to protect electrical transformers, generators, fuel tanks, fire hydrants, etc., from damage due to vehicles and moving equipment.

2.2.6 Airfield Safety. Consider safety clearances when siting facilities in or near aviation operational areas. Refer to NAVFAC P-80.3, Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations, Appendix E: Airfield Safety Clearances and Title 14, CFR Part 77, Objects Affecting Navigable Airspace. Objects located within runway clear zones shall be fabricated for low impact resistance in accordance with FAA Engineering Report ER-530-81-04, Structural/Mechanical Design Requirements for Low Impact Resistance for Microwave Landing System Structures (MLS/LIRS). Objects penetrating the airspace surfaces described in NAVFAC P-80.3 and Title 14, CFR Part 77 require a waiver of clearance criteria. The point of contact for waiver of Navy criteria is NAVAIRSYSCOM, Code AIR-09Y1. The point of contact for waiver of FAA criteria is the Chief, Air Traffic Division of the FAA Regional Office having jurisdiction over the area within which the construction will be located. Provide obstruction marking or lighting for facilities located in or near aviation operational areas in accordance with FAA Advisory Circular AC 70/7460, Obstruction Marking and Lighting.

2.2.6.1 Objects Located on Airfield. Location of any objects within airfield clear zones and/or airspace surfaces will be made by NISE-EAST with NAVAIRSYSCOM concurrence.

2.2.6.2 Objects in Violation of Airfield Safety Criteria. Objects that must be located in violation of NAVFAC P-80 and NAVFAC P-80.3 criteria shall be located to result in the minimum violation possible compatible with the

function of the object. Construct objects in violation of NAVFAC P-80 and NAVFAC P-80.3 with lightweight and low impact resistant materials in accordance with FAA ER-530-81-04. Ensure footings and bases for such objects are flush with the ground surface and the height of the object is the minimum necessary. A waiver request indicating key points of contact, along with the associated BESEP, shall be submitted to NAVAIRSYSCOM, Code AIR-09Y1 for any facility in violation of any NAVFAC airfield safety criteria.

2.3 Architectural and Structural Requirements. Place design emphasis on fire resistance, minimal maintenance and repair cost, and ease of facility expansion or modification. Electronic communications equipment housed in the building varies with the mission of the installation. Design facility exterior in accordance with the BEAP or local command architectural guidance.

2.3.1 Acoustics. Provide means to manage building acoustics by proper selection of construction assemblies and finishes. Refer to pages 4.7 through 4.45 of Time Saver Standards for Architectural Design Data and NAVFAC DM-1.03, Architectural Acoustics. Analyze and control the acoustical properties of construction assemblies by modifying room acoustics through control of reverberation (absorption) and attenuating structure-borne sound from exterior sources, interior sources between rooms, and equipment generating sound (isolation). Provide the following room noise levels:

Area	Room Criteria (RC)
Air Traffic Control Operations and Instrument Flight Rules Control, Conference, Training, Projection, and Bunk Rooms	30
Private Offices	35
Open Offices, Lobbies, Ready Rooms and Waiting Areas	40
Restrooms, Corridors, Computer and Electronic Equipment Rooms	45
Cargo and Materials Handling and Vehicle Areas, Mechanical, Electrical, and Generator Rooms, Remote and Unattended Facilities	50

2.3.2 Handicapped Employees. Provide barrier-free access to civilian work spaces and other spaces intended for public access. Design facilities to locate handicapped access spaces on first floor only unless the size of the facility's administration and other accessible areas requires a second floor. Areas hazardous to handicapped persons need not be accessible. Comply with current criteria in Uniform Federal Accessibility Standards (UFAS). Refer to MIL-HDBK-1190.

2.3.3 Structural Design. Design in accordance with MIL-HDBK-1002 series, Structural Engineering. Base an economical structural system on facility size, projected load requirements, quality of local available materials, local labor and construction materials, and local wind, snow, seismic, geologic, and permafrost conditions. Design structural systems to support roof-mounted and/or suspended loads, when required.

2.3.3.1 Lateral Loads. Design buildings and towers (antenna supports) to withstand wind and seismic loads appropriate to the region in which they are to be constructed. Refer to MIL-HDBK-1002/2, Structural Engineering - General and NAVFAC P-355, Seismic Design for Buildings. Seismic analysis of Government-furnished buildings and antenna supports is not required.

2.3.3.2 Antenna Supports. Before undertaking unique antenna support designs, consider the use of existing commercial products suitable for the purpose. Navy standard designs for UHF/VHF and ASR antenna supports are available. See Figure 1 and Figure 2.

2.3.4 Construction Materials. Design attended facility buildings using styles and materials as approved by the ordering authority. Unless otherwise directed, design unattended facility buildings using concrete, concrete masonry, pre-engineered metal, or premanufactured metal or fiberglass-reinforced plastic. NAVFAC policy requires materials, equipment, and construction methods that provide maximum overall economy consistent with functional and aesthetic requirements, reasonable comfort, and sound architectural and engineering practices. Materials, equipment, and methods used should result in low costs consistent with economic maintenance for the required use and life expectancy of the facility. Refer to MIL-HDBK-1001/2, Materials and Building Components.

2.3.4.1 Reflective Surfaces. To prevent mirrorlike reflections from building surfaces to aircraft in flight, provide roofs and other external surfaces with a specular reflectance compatible with the location of the building on the airfield. If the building is so located that glare may be an operational hazard, provide the critical surfaces of that building with a light reflectance of not more than 10, measured at an angle of 85 degrees in accordance with American Society for Testing and Materials (ASTM) D 523, Standard Test Method for Specular Gloss.

2.3.5 Floors. Construct ground level floors with reinforced concrete on a compacted subgrade in accordance with MIL-HDBK-1001/2. Elevated floor systems are directly related to the type of structural system selected. Ensure the finished floor elevation is at least 4 inches above the adjacent site finished grade elevation.

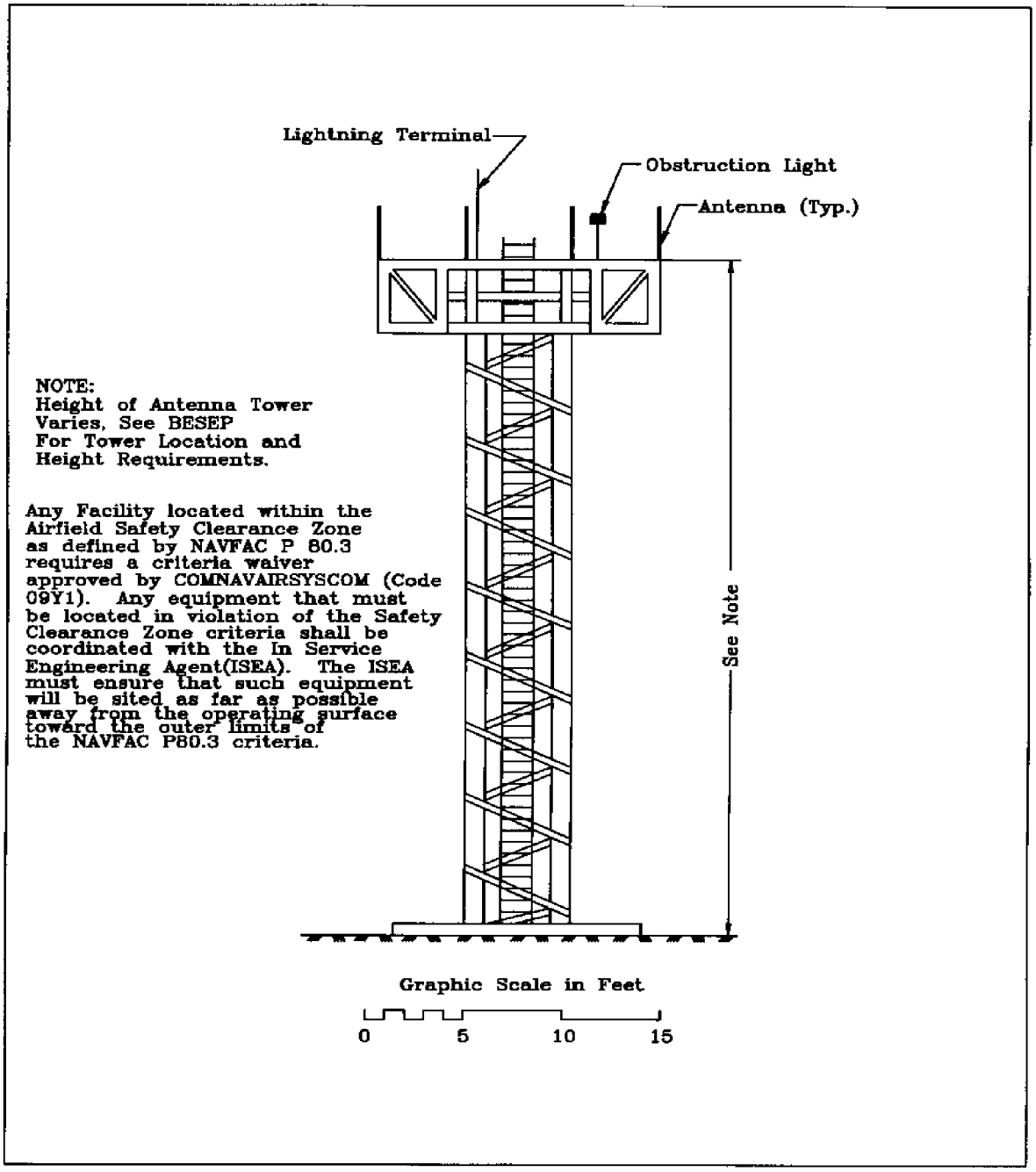


Figure 1
Radio Antenna Tower

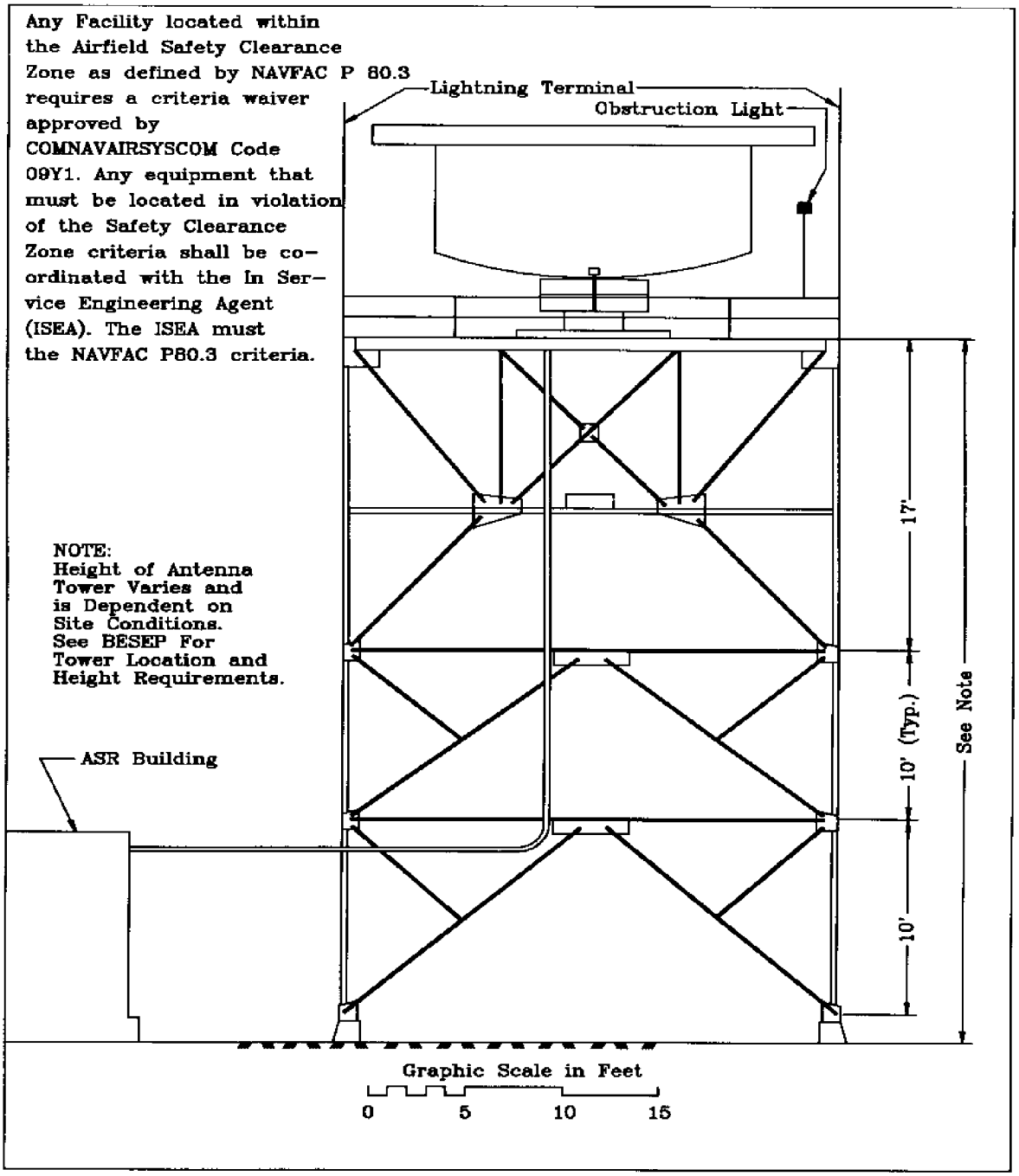


Figure 2
ASR Antenna Tower

2.3.5.1 Permanent Floors. Consider the placement of cables and wiring for electronic equipment when selecting floor construction. Install an equipotential plane conforming to MIL-HDBK-419, Volume 1, Grounding, Bonding, and Shielding for Electronic Equipment and Facilities Applications, in the floor of electronic facility spaces. The preferred method of placing cables and wiring is given in the BESEP for the facility.

2.3.5.2 Access Flooring. Provide access flooring to meet the requirements of NFPA 75, Protection of Electronic Computer/Data Processing Equipment, Military Specification MIL-F-29046, General Specifications for Raised Flooring, and MIL-HDBK-1008. Provide a bolted grid (stringer) or a rigid grid system. Provide seamless vinyl or laminated plastic finishes. Keep air supply panels and similar inserts flush with the flooring surface. Specify installation procedures to conform with MIL-HDBK-419, Volumes 1 and 2. Provide depressed structural framing and slabs in areas where access flooring occurs to result in uniform, continuous finish floor levels between adjacent floor spaces. Provide a raised floor installation above a level permanent floor when it is not economical or practical to depress the structural framing and slab. Refer to NAVFAC guide specification NFGS-10270, Access Flooring.

2.3.6 Roofing. Provide roof system and insulation to meet the requirements of MIL-HDBK-1001/5, Roofing and Waterproofing. Determine thermal resistance of roof insulation by design criteria and life cycle costs. Refer to American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), Handbook Fundamentals, NAVFAC P-442, Economic Analysis Handbook, and TM 5-802-1, Life Cycle Cost Analysis Handbook.

2.3.7 Walls

2.3.7.1 Thermal Insulation and Vapor Retarders. Locate vapor retarders with care in view of the thermal differentials associated with buildings. Do not use vinyl wall covering and impervious paint in the interior surface of exterior walls in humid areas (as defined in MIL-HDBK-1190) unless calculations show that condensation will not occur in the wall. Special purpose rooms such as computer rooms normally require stringent air conditioning requirements. Provide adequate insulation and vapor transmission barriers to minimize the loads on the mechanical system. Properly insulate ceiling decks of spaces below supercooled computer rooms and perimeter walls to prevent condensation.

2.3.7.2 Exterior Walls. Construct exterior walls of concrete (cast-in-place or precast), brick, concrete masonry units, or other system appropriate to the structural system and the function of the building. If concrete masonry units are used for exposed exterior surfaces, provide coatings on exterior masonry surfaces to prevent moisture penetration above and below grade. Provide insulation in exterior walls to meet the criteria for types and thermal properties in accordance with the appropriate section of MIL-HDBK-1001/2. Refer to NFGS-04200, Unit Masonry and NFGS-03300, Cast-in-Place Concrete.

2.3.7.3 Interior Walls. Construct interior walls of concrete masonry or gypsum wallboard on metal studs. Provide moisture resistant gypsum wallboard when used in restroom and showers. Refer to NFGS-09250, Gypsum Board. Provide fire-rated interior walls in accordance with MIL-HDBK-1008 and NFPA 101, Life Safety Code.

2.3.8 Interior Finishes. Refer to MIL-HDBK-1001/2. Provide interior finishes in accordance with pars. 2.3.8.1 through 2.3.8.10. Coordinate interior finishes with the user.

2.3.8.1 Sealed Concrete Floors. Provide sealed concrete floors for remote and unattended facilities, mechanical, electrical, and janitor rooms, cargo and materials handling, and vehicle parking areas. Refer to NFGS-03300.

2.3.8.2 Resilient Flooring. Provide resilient flooring for administrative, training, conference, lobby, ready rooms, bunk, restroom (remote buildings only), and similar spaces. Refer to NFGS-09660, Resilient Tile Flooring and NFGS-09665, Sheet Vinyl Flooring.

2.3.8.3 Ceramic Tile Flooring. Provide ceramic tile flooring for restroom and showers. Refer to NFGS-09310, Ceramic Tile, Quarry Tile, and Paver Tile.

2.3.8.4 Carpet Flooring. Provide carpet for office, computer, and similar spaces. Provide anti-static carpet for electronic equipment areas. Refer to NFGS-09680, Carpet.

2.3.8.5 Masonry Finish Walls. Consider exposed masonry walls for remote and unattended facilities, mechanical, electrical, and janitor rooms, cargo and materials handling, and vehicle parking areas. Coordinate requirements for painted walls with facility user. Refer to NFGS-09900, Painting.

2.3.8.6 Painted Finish Walls. Provide painted walls for administrative, training, conference, computer, lobby, ready rooms, bunk, restrooms, and similar spaces. Refer to NFGS-09900.

2.3.8.7 Ceramic Tile Finish Walls. Provide a ceramic tile wall finish for shower rooms. Refer to NFGS-09310.

2.3.8.8 Exposed Structure Ceilings. Provide exposed structure ceilings for remote and unattended facilities, mechanical, electrical, and janitor rooms, cargo and materials handling, and vehicle parking areas.

2.3.8.9 Acoustical Tile Ceilings. Provide non-combustible acoustical tile ceilings in administrative, training, conference, computer, lobbies, bunks, ready rooms, and similar spaces. Provide moisture resistant ceiling tile in restrooms. Refer to NFGS-09500, Acoustical Treatment.

2.3.8.10 Shower Ceilings. Provide veneer plaster on moisture resistant gypsum wallboard or gypsum plaster on metal lathe ceilings in showers. Refer

to NFGS-09100, Metal Support Systems, NFGS-09200, Lathing, NFGS-09212, Plastering and Stuccoing, and NFGS-09215, Veneer Plaster.

2.3.9 Doors. Provide doors and door hardware in accordance with pars. 2.3.9.1 through 2.3.9.8. Refer to Military Bulletin MIL-BUL-34, Engineering and Design Criteria for Navy Facilities. Provide fire-rated doors in accordance with NFPA 80, Fire Doors and Windows and NFPA 101.

2.3.9.1 Exterior Doors. Provide insulated, self-closing, swinging exterior steel doors with steel frames. Provide storefront type entrances with steel or aluminum framing at main building entrances. Provide heavy-duty doors and door hardware in flightline areas.

2.3.9.2 Interior Doors. Provide heavy-duty, self-closing, swinging interior doors.

2.3.9.3 Overhead Doors. Provide manually or electrically operated overhead doors. Refer to NFGS-08331, Rolling Service and Fire Doors and NFGS-08360, Sectional Overhead Doors. Provide electrically operated overhead doors with limit switches and provision for manual operation. Control doors by momentary contact type push buttons located near the door. Install safety devices to prevent injury to personnel and equipment. Insulate overhead doors and provide bottom waterproof seal and weatherstripping. Do not use rolling doors to enclose heated spaces. Consider vertical lift or folding doors to enclose heated spaces when sectional doors are not appropriate. Refer to NFGS-08367, Vertical Lift Metal Doors.

2.3.9.4 Door Hardware. Refer to NFGS-08710, Finish Hardware. Consult public works and base fire departments for exterior hardware required for access to mechanical rooms, electrical rooms, sprinkler control rooms, and fire alarm annunciator panels. Do not provide hardware on the exterior of emergency exit doors.

2.3.9.5 Hinges. Provide heavy-duty stainless steel hinges, minimum 1-1/2 pair per door leaf. Provide ball-bearing type for doors with closers or subject to high use, and non-removable pins for exterior doors.

2.3.9.6 Locksets. Provide heavy-duty cylindrical type locksets with minimum six-pin cylinders. Provide electronic cipher door locks at secured locations indicated. Review keying system with the user and provide type required (master, grandmaster or great-grandmaster), either new or integrated with user's existing system.

2.3.9.7 Exit Devices (Panic Hardware). Provide single exit doors with locksets in lieu of double doors with exit devices (panic hardware) unless exit devices are required by NFPA 101. Provide a removable mullion (vertical divider member) with a pair of rim-type exit devices for exterior double doors when single doors are not feasible.

2.3.9.8 Closers. Comply with manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arm. Hold-open devices are not permitted.

2.3.10 Windows. Provide weatherproof and stain resistant, aluminum-framed (steel-framed for industrial type facilities), factory finished windows. Provide exterior windows with insulated glazing where required for noise, thermal or solar protection. Provide tinted glazing for solar protection. Provide glazing, window frames, and frame anchors to withstand the required wind pressures. Refer to NFGS-08510, Steel Windows, NFGS-08520, Aluminum Windows, NFGS-08529, Aluminum Storm Windows, and NFGS-08800, Glazing. Install windows in fire-rated partitions in accordance with NFPA 80.

2.3.10.1 Service Windows. When located in fire-rated partitions, provide fire-rated service windows or service windows with automatic fire shutters. Refer to NFPA 80 and NFPA 101.

2.3.11 Ladders. Design ladders in accordance with American National Standards Institute ANSI A14.3, Safety Requirements for Fixed Ladders. Provide fall protection and safety devices in accordance to ANSI A14.3.

2.3.12 Pre-engineered, Premanufactured Buildings. Consider pre-engineered metal or premanufactured metal or fiberglass-reinforced plastic buildings for remote and unattended facilities and for temporary construction. See Figure 3.

2.4 Mechanical Engineering

2.4.1 Energy Conservation. Design climate-controlled facilities for energy efficiency. Consider isolated ventilation or air conditioning systems for equipment with high heat loads or that require more critical temperature or humidity control than would otherwise be required for the remainder of the occupancy.

2.4.2 Equipment Selection. Select adequately sized air conditioning equipment for personnel comfort applications to remove the sensible and latent heat loads generated within these areas. Computer rooms and electrical equipment rooms produce predominantly sensible heat and require specially designed units. Refer to MIL-HDBK-1012/1. Ensure mechanical systems do not interfere with electronic equipment or radiated signals.

2.4.3 Heating and Air Conditioning. Provide heating and air conditioning in accordance with NAVFAC DM-3.03, Heating, Ventilating, Air Conditioning and Dehumidifying Systems, MIL-HDBK-1190, and MIL-HDBK-1012/1. Provide duct smoke detectors and controls in accordance with MIL-HDBK-1008.

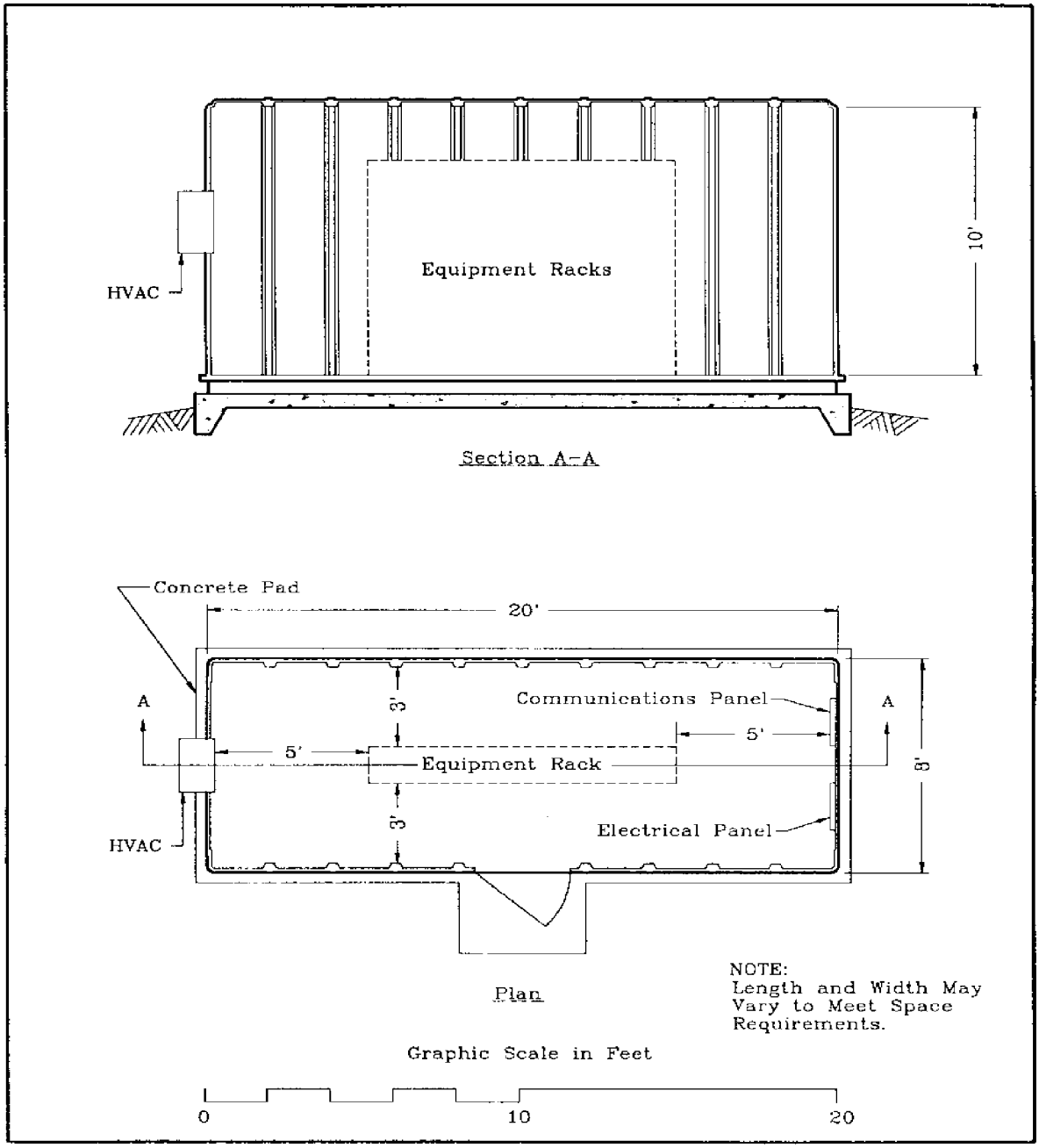


Figure 3
Prefabricated Building

2.4.4 Ventilation. Refer to MIL-HDBK-1012/1, NAVFAC DM-3.03, and NAVFAC DM-28.04, General Maintenance Facilities. Design ventilation systems in accordance with the following:

a) Provide outside air ventilation requirements in accordance with ASHRAE Standard 62, Ventilation for Acceptable Indoor Air Quality and MIL-HDBK-1012/1.

b) Ensure restroom facilities are exhausted at a minimum of 2 cfm/square feet and not less than 25 cfm total. Provide exhaust fans which operate when restroom is occupied. Interlock exhaust fan with light switch for restrooms equipped with dedicated exhaust systems.

c) Do not provide exhaust fans for the ventilation of electronic equipment rooms. Accomplish ventilation through the use of thermostatically controlled intake fans providing a filtered air supply to the equipment room. Maintain positive air pressure in electronic equipment rooms to reduce the infiltration of dust and other foreign matter through door jambs and other openings. Consider high efficiency (60 to 90 percent) filtration where dust and other particulate/pollution can cause malfunctioning of equipment. When intake air is from a salt-laden environment, route intake air through the dehumidifying system to remove moisture suspended salts.

d) Ventilate uninterrupted power supply (UPS) rooms in accordance with MIL-HDBK-1012/1.

2.4.4.1 Battery Shops. Provide recessed air supply and exhaust vents in the ceiling of lead acid and nickel-cadmium battery shops. Slope the ceiling surface to provide a single high point at the exterior wall of the building. Locate the exhaust vent at the highest ceiling point and discharge the exhaust through the exterior wall. Do not recess other items in the battery shop ceilings. Design battery shop ventilation systems in accordance NFPA 70, National Electrical Code and the following:

a) Provide one air change per hour for nickel-cadmium battery shops. Increase the air change rate when outdoor air can be used to limit the shop temperature to 85 degrees F.

b) Provide three air changes per hour for lead acid battery shops. Increase the air change rate when required for mechanical ventilation cooling. Provide a non-sparking wheel and locate the fan motor out of the air stream. Design the ventilation system to provide negative static pressure by exhausting 10 percent more air than supplied. Provide 100 percent outside air supply.

2.4.5 Outside Weather Conditions. Obtain summer and winter outside weather conditions from NAVFAC P-89, Engineering Weather Data, or ASHRAE Handbook of Fundamentals.

2.4.6 Inside Design Conditions

2.4.6.1 Personnel Comfort. Provide the following:

Cooling	75 to 78 degrees F dry bulb 50 percent relative humidity (minimum)
Heating	68 degrees F (minimum)

2.4.6.2 Computer and Electronic Rooms. Maintain computer and electronic spaces at a year-round temperature of 70 to 74 degrees F and relative humidity of 40 to 50 percent. Consult the facility BESEP for specific requirements. Individual equipment may require less restrictive space conditions. In this case, the least restrictive condition should be used.

2.4.6.3 Storage Areas. Maintain storage areas at 40 degrees F minimum to prevent freezing.

2.4.7 Plumbing. Provide plumbing for facilities in accordance with NAVFAC DM-3.01, Plumbing Systems. Ensure that plumbing work not covered by Navy criteria meets the requirements of the National Plumbing Code Handbook.

2.4.7.1 Battery Shops. Provide the following in lead acid and nickel-cadmium battery shops:

a) Acid and alkali resistant floor drains.

b) Emergency shower and eyewash facilities within 25 feet of the battery handling areas. Provide potable water for the showers and eyewash stations. Provide a collection, holding, and treatment system for the shower wash water before it is discharged into the sanitary sewer.

c) Acid and alkali resistant dump sinks. Provide separate, gravity operating, collection, holding, and treatment system for each type of waste. Do not discharge acid or alkali waste into the sanitary sewer system.

d) Acid and alkali resistant base cabinet sinks.

e) Hose, hose bibbs, and hose rack for flushing neutralized spilled electrolytes.

f) Acid and alkali resistant spill containment system with sufficient volume to contain 110 percent of the largest electrolyte container or battery plus water for flushing neutralized spilled electrolyte.

2.4.8 Water and Sanitation. Unattended facilities are not normally provided with water and sanitation facilities (sink and toilets). However, provide water and sanitary facilities at unattended facilities where a significant amount of maintenance is anticipated and sanitary facilities are

not available in the vicinity. Consider the use of chemical toilets and bottled water.

2.4.9 Fire Protection

2.4.9.1 Electronic Equipment Areas. Design per MIL-HDBK-1008. Within buildings protected by an automatic sprinkler system, provide a preaction system in areas having mission essential or high monetary value electronic equipment. Provide automatic and manual actuation of the preaction system. Provide controls to discontinue electric power to electronic equipment upon water flow. Provide manual disconnect of electric power to air traffic control equipment. Provide separation from other areas with fire-rated partitions. Provide smoke detection, at ceilings and in sub-floor areas, connected to building fire alarm system. Refer to par. 2.5.10. Areas containing only word processing equipment and personal computers are not within the scope of this paragraph.

2.4.9.2 Emergency Generator Protection. Refer to MIL-HDBK-1008.

2.4.9.3 Portable Fire Extinguishers. Provide portable fire extinguishers for facilities in accordance with MIL-HDBK-1008.

2.4.9.4 Underfloor Spaces. Provide types of cable which allow exclusion of fixed extinguishing systems. Refer to MIL-HDBK-1008.

2.4.9.5 Automatic Sprinkler Systems. Provide automatic sprinkler systems in accordance with MIL-HDBK-1008. Install sprinkler systems in accordance with NFPA 13, Installation of Sprinkler Systems.

2.4.9.6 Standpipe System. Refer to MIL-HDBK-1008 for standpipe system requirements.

2.4.9.7 Halon Fire Protection Systems. The use of Halon is not permitted.

2.4.9.8 Hydrants. Provide hydrants and required water supply. Consider eliminating fire hydrants at remote and unattended facilities. Consult public works and base fire departments for requirements. Refer to MIL-HDBK-1008.

2.4.9.9 Elevators. Provide fire protection criteria for design and construction of elevators in accordance with subpars. a) through e) below, ANSI A17.1, Safety Code for Elevators and Escaltors, and NFPA 13. If there is a conflict of criteria, subpars. a) through e) take precedence over NFPA 13 and ANSI A17.1.

a) Provide wet-pipe, intermediate temperature automatic sprinkler heads in the elevator pit. (Note: intermediate temperature sprinkler heads are in the 175 to 225 degrees F range, with the preference being 212 degrees F). Ensure the operation of sprinklers in the pit does not cause shutdown of the main power supply to the elevators.

b) Provide wet-pipe, intermediate temperature (preference being 212 degrees F) automatic sprinkler heads in the elevator machine room. Provide a control valve, check valve, and a water flow switch in the branch line supplying the sprinklers in the elevator machine room. Locate the control valve, check valve, and water flow switch in an accessible location outside the elevator machine room. Provide a water flow switch that, when activated, causes the main power supply to elevators controlled from that elevator machine room to be automatically disconnected with no time delay.

c) Automatic sprinklers are not required at the top of the elevator hoistway except where a roped hydraulic or a holeless hydraulic elevator has been installed, or where a hydraulic elevator's pressurized supply line runs at points above the first landing level. If automatic sprinklers are installed at the top of the elevator hoistway, their activation does not require shutdown of the main power supply to the elevators.

d) Provide a warning light and an audible signal in the cab of each elevator. Ensure the warning light is a minimum of 3 inches in height and 4 inches in width. Mount the warning light prominently in, above or adjacent to the car's operating panel. Do not obscure the light by the elevator's protective pads. Provide a warning light that cannot be read when not illuminated. When illuminated, the warning light reads: "DANGER! FIRE!" "EXIT THE ELEVATOR NOW." Provide an audible alarm, such as a bell, buzzer or electronic tone, that is louder than any other audible signal being used in the cab. Supply power to both the warning light and the audible warning device from the elevator's main controller.

e) Activate the warning sign and audible warning device simultaneously by a 135 degree F, rate-compensated heat detector mounted in the elevator machine room. Mount the heat detector adjacent to the sprinkler head, or equidistant between sprinkler heads when there is more than one sprinkler head in the elevator machine room. Do not connect the heat detector to the building's fire alarm system.

2.4.10 Noise and Vibration Control. Design mechanical systems and equipment to limit noise and vibration in accordance to NAVFAC DM-3.10, Noise and Vibration Control for Mechanical Equipment.

2.5 Electrical Engineering

2.5.1 General Requirements. Design in accordance with MIL-HDBK-1004 series, Electrical Engineering. Ensure electrical work not covered by Navy criteria meets requirements of NFPA 70.

2.5.2 Distribution Panels. Install distribution panels for technical use in electronic equipment rooms and other spaces containing technical equipment.

2.5.3 Incoming Power. Provide incoming power through an isolation transformer and an entrance switch. Provide power to only one facility through the isolation transformer. Distribute power to an essential and non-essential bus, if required. Connect the emergency generator, if required, to the essential bus through an isolation switch and automatic switch gear. Provide either single or three phase power as required.

2.5.4 Separate Buses. Provide electrical power for electronic, air traffic control, computer, and other technical equipment on a separate bus from electrical power for facility mechanical and building systems.

2.5.5 Lightning Protection. Design facilities for lightning protection. Refer to NFPA 78, Lightning Protection Code, and MIL-HDBK-1004/6, Lightning Protection, for minimum standards.

2.5.6 Lighting. Design lighting in accordance with MIL-HDBK-1190. Consider natural lighting sources.

2.5.6.1 Interior Lighting. Provide fluorescent interior lighting with radio frequency shielding and suppression filters. Calculate lighting levels using zonal cavity method.

2.5.6.2 Exterior Lighting. Provide high pressure sodium vapor exterior lighting. Calculate lighting levels using point-by-point method.

2.5.7 Emergency Electrical Power

2.5.7.1 Emergency Generator. Provide emergency generators with electronic line monitoring equipment and automatic starting and switching capability. When used in conjunction with an UPS, provide generator output at least 1.5 times the output rating of the UPS. Ensure emergency generator is capable of supplying the rated load within 15 seconds of a power failure. Provide the following for emergency generators:

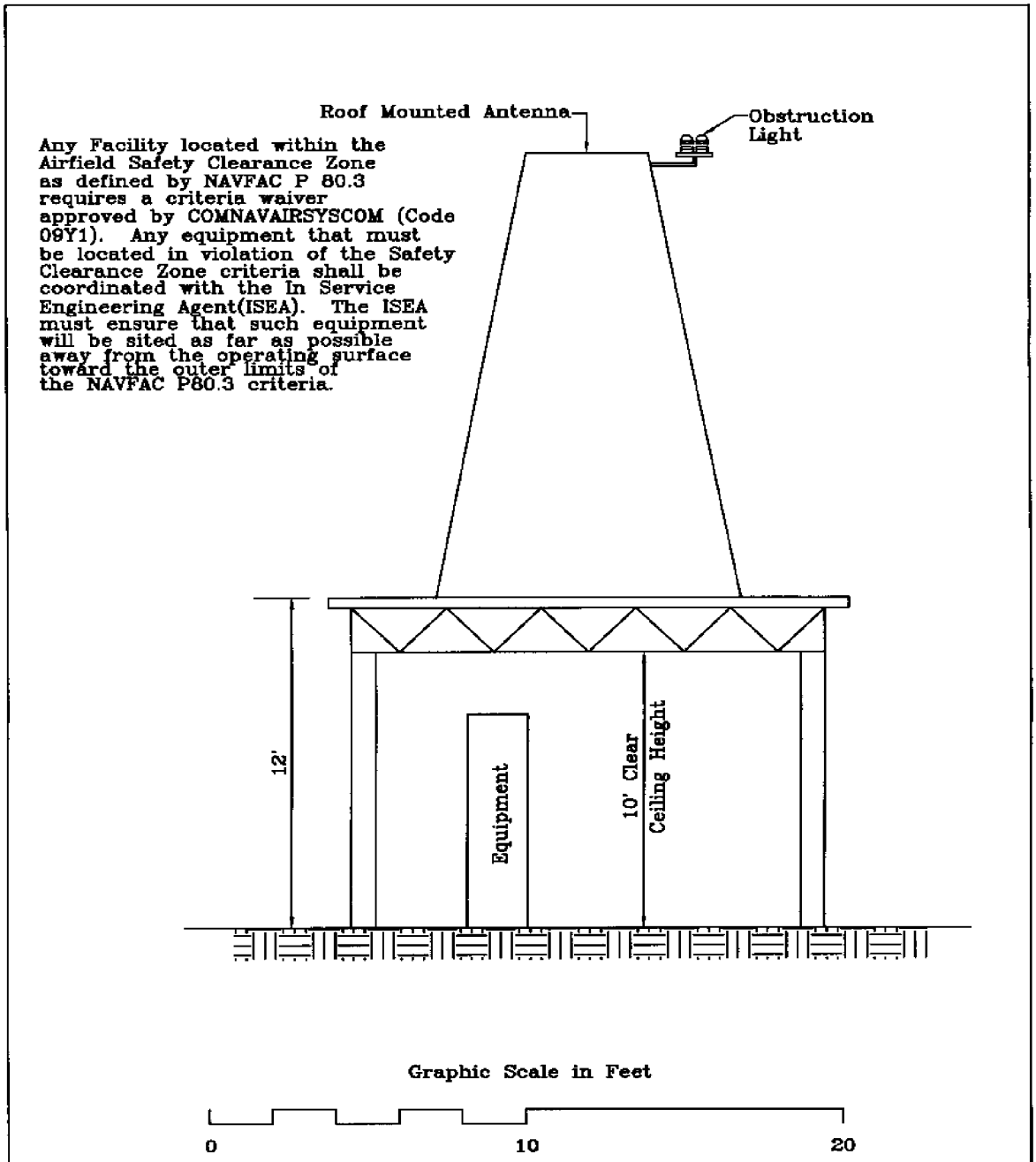
a) An isolation switch to bypass the emergency generator during generator maintenance.

b) An automatic battery charger for maintenance of generator starting batteries.

c) An isolated mounting slab for the generator to reduce noise and vibration transmission.

d) See Figure 4. Provide the following when an indoor emergency generator is required:

(1) A separate generator room with an independent ventilation system.



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(2) An engine exhaust system connected to the exterior of the facility with an exterior muffler. Configure the exhaust system to prevent rainwater or condensation from entering the engine manifold.

(3) Adequate engine cooling by a radiator duct or externally mounted radiator.

Consider a premanufactured building to house an indoor generator. See Figure 5. Consider an outdoor unit in mild climate conditions. Consider a below ground generator vault for units which shall be sited within airfield clear zones or primary surfaces.

2.5.7.2 Emergency Generator Fuel Storage. Design fuel storage for diesel or jet fuel powered generators in accordance with NAVFAC DM-22, Petroleum Fuel Facilities, state and local regulations, and the following:

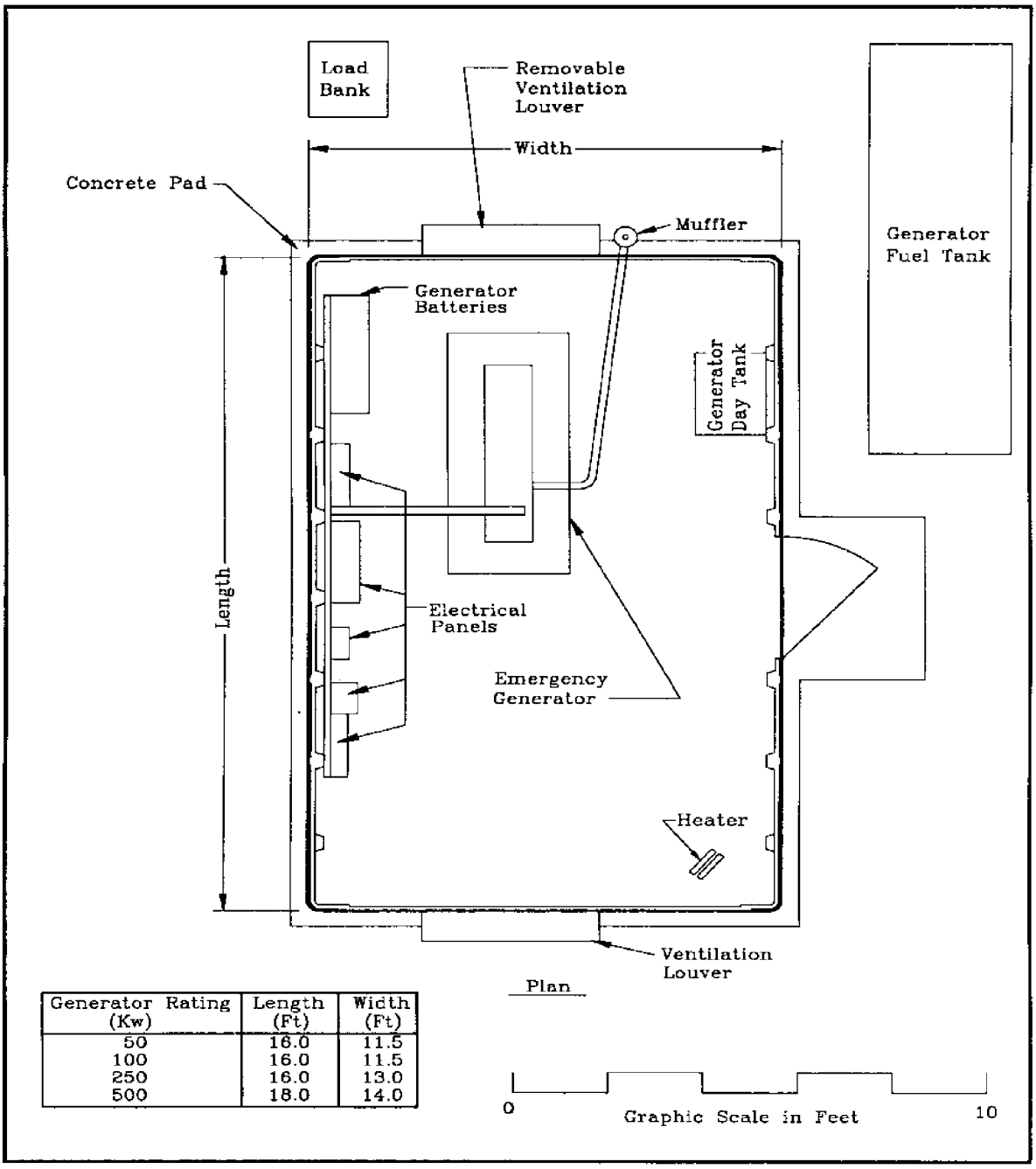
a) Above Ground Storage Tanks: Title 40, CFR Part 112, Oil Pollution Prevention; Title 40, CFR Part 113, Liability Limits for Small Onshore Storage Facilities, Subpart A, Oil Storage Facilities; and Title 40, CFR Part 114, Civil Penalties for Violation of Oil Pollution Prevention Regulations.

b) Underground Storage Tanks: Title 40, CFR Part 280, Underground Storage Tanks Technical Requirements.

Provide fuel storage capacity for 24 hours of continuous generator operation. Provide separation between fuel storage tanks and adjacent buildings, parking aprons, and property lines in accordance with NAVFAC DM-22. Provide double wall storage tanks and piping.

2.5.8 Uninterrupted Power Supply (UPS). Provide an UPS in electronic facilities and air traffic control installations for critical technical loads and the specific requirements of the ordering authority. The UPS will be government furnished. Install the UPS in accordance with MIL-HDBK-1004/1, Electrical Engineering - Preliminary Design Considerations and MIL-HDBK-1012/1.

2.5.9 400-Hertz (Hz) Power. When required by the ordering authority, provide 400-Hz solid state converter in accordance with NFGS-16306, 400-Hertz (Hz) Solid State Frequency Converter. Design in accordance with MIL-HDBK-1004/5, 400-Hz Medium-Voltage Conversion/Distribution and Low-Voltage Utilization Systems. De-rate 400-Hz cables and locate in separate non-magnetic raceway system. Refer to MIL-HDBK-1012/1.



Generator Rating (Kw)	Length (Ft)	Width (Ft)
50	16.0	11.5
100	16.0	11.5
250	16.0	13.0
500	18.0	14.0

Figure 5
Prefabricated Indoor Emergency Generator Room Layout

2.5.10 Fire Alarm and Detection Systems. Provide fire alarm and detection system capable of providing maximum protection for personnel, equipment and buildings. Refer to MIL-HDBK-1008 for design criteria and application requirements. Include a master fire control panel monitoring the different fire zones of the facility. Install fire alarm and detection system in accordance with NFPA 101.

2.5.10.1 Signal Transmission. Provide fire alarm and detection systems which transmit the following signals:

a) Local Signal. Sounds local alarm to permit occupants to initiate first aid fire fighting and/or to evacuate.

b) Remote Signal. Transmits alarm to fire department or other designated central alarm location to implement emergency action.

c) System Signal. Activates automatic fire extinguishing systems where appropriate. Provide automatic extinguishing systems with equipment to transmit local and remote signals when the system activates.

2.5.10.2 Electronic Equipment Spaces. Provide smoke detection systems in electronic equipment areas to transmit local and remote signal as well as activate extinguishing system where provided. Include automatic supervision of alarm circuits. Provide manual fire alarm systems capable of transmitting the same signals. Areas containing only word processing equipment and personal computers are not within the scope of this paragraph.

2.5.10.3 Raised Floor Cable Spaces. Provide automatic detection systems per MIL-HDBK-1008.

2.5.10.4 Remote and Unattended Facilities. Provide manual and automatic fire alarm and detection systems at remote and unattended facilities. Provide local and remote signaling systems.

2.5.10.5 Occupied Buildings. Provide occupied buildings with fire alarm and detection systems per MIL-HDBK-1008. Follow par. 2.5.10.2 for occupied buildings which house electronic equipment.

2.5.11 Communications Systems. Provide voice, data, and equipment control communications systems in accordance with MIL-HDBK-1004/7, Wire Communications and Signal Systems. Consider fiber optic systems in facilities requiring extensive internal communications systems for electronic equipment.

2.6 Physical Security

2.6.1 General Requirements. Physical security is concerned with limiting, controlling, or preventing personnel access to specific areas. A sound physical security program is the result of good planning. The best and most economical programs are those incorporated in the facility's design and

construction. The facility configuration and location; the use of barriers, protective lighting, type of construction, IDS, closed circuit television (CCTV), and security fencing; and the guard communication network shall be coordinated with the user to ensure conformance with the installation security plan. The mode of operation, level of security, and designer's responsibility for particular security elements will be designated in the BESEP and IDSEP.

2.6.2 Exterior Physical Security. External security requirements in most cases depend on the internal security measures provided in the facility design and on the type of protection required. Normally, external considerations, including building location and orientation and the use of protective barriers and lighting, are developed as part of the facility's security plan and specified in the BESEP. Defense Intelligence Agency DIAM 50-3, Physical Security Standards for Construction of Sensitive Compartmented Information Facilities, MIL-HDBK-1013/1, Design Guidelines for Physical Security of Fixed Land-Based Facilities, and MIL-HDBK-1013/10, Design Guidelines for Security Fencing, Gates, Barriers, and Guard Facilities, should be the primary criteria sources for design of the required facilities.

2.6.2.1 Perimeter Fencing. Use chain-link fencing for permanent areas. Use general-purpose barbed tape obstacle for temporary installations or where the terrain does not allow construction of chain-link fencing. Dual perimeter barriers are described in DIAM 50-3. Ensure the type of fencing selected does not interfere with any radiated signal of the facility. Alternative fence configurations are discussed in MIL-HDBK-1013/1. The following requirements are the minimum for normal protection:

a) Unless otherwise specified, locate the perimeter security fence at least 30 feet from enclosed structures (except guard shelters). Provide a clear zone not less than 20 feet wide immediately outside the fence. Keep this area devoid of buildings, parking areas, poles, guy line anchors, shrubs, trees, sign boards, and any other object that could conceal personnel. Grass is permissible, provided it is kept mowed. Provide a similar clear zone at least 30 feet wide immediately inside the fence. Ensure this area meets the requirements of the exterior clear zone, except for the installation of approved guard shelters and protective lighting poles.

b) Unless otherwise specified, provide barriers consisting of sensored fencing with 3/4-inch vehicle restraining cable attached to the fence.

c) Ensure chain-link fencing conforms to Federal Specification RR-F-191, Wire Fencing (Chain-Link Fabric). Provide a fence with a total height of 8 feet; 7-foot-high fence fabric plus top guard. Provide 9 gauge fabric with openings not greater than 2 inches. Provide a 45-degree outrigger maximum 18 inches long. Attach three evenly spaced strands of 12 gauge barbed wire to the outriggers. Ground fence fabric and barbed wire strands.

d) Protect utility openings, covers, sewers, culverts, tunnels, and other subsurface routes which penetrate the fence line in accordance with MIL-HDBK-1013/1 and MIL-HDBK-1013/10.

e) Keep the number of gates and perimeter entrances to the minimum required for safe and efficient operation.

f) Provide guard shelters when required by the IDSEP.

2.6.2.2 Security Lighting. Install lighting inside the perimeter security fence in a manner to illuminate the fence completely and to prevent an intruder from using the light poles and guy wires to gain access to the area. Provide illumination in accordance with the lighting requirements of MIL-HDBK-1013/1 and the following:

a) Illuminate areas shadowed by structures.

b) Ensure that failure of one lamp in a circuit will not affect other lamps in the same circuit.

c) Provide overlapping light distribution to minimize reductions in illumination levels upon lamp failure.

d) Protect components of the system from vandalism.

e) Provide lights on buildings.

f) Provide an emergency power generator within the security area. Provide emergency power source adequate to sustain protective lighting of critical areas and structures for 8 hours. Provide generator- or battery-powered lights at key control points in case a failure disables the secondary power supply.

g) Install special-purpose lighting (such as fog penetration) when climatic or other local factors dictate.

h) Provide additional lighting for (CCTV) security surveillance, as necessary.

2.6.2.3 Intrusion Detection Systems (IDS). Provide IDS when required by the level of security assigned to the facility. Refer to NAVFAC DM-13.02, Commercial Intrusion Detection Systems (IDS). The IDSEP or user command shall provide specific IDS requirements.

2.6.2.4 Closed Circuit Television (CCTV). Provide CCTV when required to supplement security guard personnel, assist in threat assessment and surveillance. Refer to MIL-HDBK-1013/1.

2.6.3 Interior Physical Security

2.6.3.1 Delay Times. Guidelines for selecting and designing facility components to meet specified delay times are provided in MIL-HDBK-1013/1. Procedures for determining delay times, if not specified by the IDSEP or the user command, are given in MIL-HDBK-1013/1.

2.6.3.2 Building Layout. Portions of the building requiring special security consideration will be identified by the IDSEP or by the user command.

2.6.3.3 Wall Construction. Design secure area wall using 4 inches of reinforced concrete or 8 inches of solid masonry, without windows, and with controlled access. Refer to DIAM 50-3 and MIL-HDBK-1013/1.

2.6.3.4 Roof and Floor Construction. Provide at least 4 inches of reinforced concrete for roof and floor construction. Hardening methods for other types of construction are provided in MIL-HDBK-1013/1. False ceilings or raised floors provide a means of concealment. False ceilings or floors are considered part of the protected area to which they are attached; therefore, ensure the true walls, floors, and ceilings meet the applicable requirements. Provide at least one quick-remove access panel, 18 by 18 inches, for each 400 square feet of false ceiling or floor area.

2.6.3.5 Exterior Doors. Provide entry and exit doors of secure areas as specified in the IDSEP or DIAM 50-3. Provide exterior doors with delay times commensurate with those of the structure in which they are installed.

2.6.3.6 Windows, Air Vents, and Ducts. Windows, ducts, and other openings that breach the facility perimeter require protection as specified in DIAM 50-3 and MIL-HDBK-1013/1. Openings which exceed the man passable size of 96 square inches require protection.

2.6.3.7 Roof Doors and Hatches. Secure roof doors and hatches with internal padlocks and hasps meeting the provisions of MIL-P-43607, Padlock, Key Operated, High Security, Shrouded Shackle. Alternatively, provide roof doors with a cylindrical case or bored lockset. Mount such locksets, when installed, with the lock cylinder to the exterior.

2.6.3.8 Cipher Locks. If required for control of routine access, install an electrically controlled and operated latch mechanism for interior doors. Ensure radio frequency (RF) emissions meet the requirements of Military Standard MIL-STD-461, Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference, for Class II-A equipment. Ensure mechanisms do not mate or interface with other locksets. Add separate surface-mounted night latches or specialty hardware to the door to accommodate the electrically operated mechanism. Do not use key-operated bypass cylinders.

2.6.4 Vaults. Vaults or vault construction will be specified by the IDSEP or the user command. Specific criteria for construction and installation are given in DIAM 50-3 and MIL-HDBK 1013/1.

2.6.4.1 Safety and Emergency Devices. Equip vault doors with an emergency escape device and the following:

a) Illuminated light switch.

b) Emergency light (if the vault is otherwise unlighted).

c) Interior alarm switch or other device (such as a telephone) to permit a person in the vault to communicate with a vault custodian, guard, or guard post.

d) Instructions on obtaining release permanently affixed to the inside of the door or prominently displayed elsewhere inside the vault.

e) Bank vault ventilator approved by Underwriters Laboratories, Inc. (UL), if the vault is not otherwise served by forced air ventilation.

2.6.4.2 Fire Protection. Equip the vault with at least one portable, hand-held, carbon dioxide fire extinguisher UL approved.

2.7 Safety and Health

2.7.1 General Requirements. Design occupied buildings with maximum consideration given to safety and health. Refer to Title 29, CFR, Part 1910, Occupational Safety and Health Standards, with particular emphasis on noise control for hearing conservation and safety standards for toxic and hazardous substances. Provide suitable facilities for quick drenching or flushing of the eyes and body within the work area for immediate emergency use where any person may be exposed to injurious corrosive materials.

2.7.2 Human Engineering. Consider safety in relation to operational function, accessibility for maintenance and repair, physical layout for traffic, interface with other equipment, and environmental factors, such as lighting, temperature, and humidity. Refer to MIL-STD-882, System Safety Program Requirements, and MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.

2.7.3 Electromagnetic Hazards. Many facilities discussed herein contain equipment that radiates an electromagnetic signal. Consider the effect of electromagnetic radiation (EMR) on personnel (HERP), ordnance (HERO), and fuel (HERF) when planning and designing facilities housing EMR emitting equipment. Provide safety measures to eliminate or reduce hazardous conditions. Refer to MIL-HDBK-1012/1.

2.7.4 Fire Protection. Refer to MIL-HDBK-1008 and NFPA 232, Protection of Records for design criteria and guidance. Use MIL-HDBK-1008 as a minimum standard to determine types of fire protection required as well as specific criteria to use.

2.7.4.1 Classifications. MIL-HDBK-1008 provides guidance for classification of occupancy and occupancy hazard classification. Classification of occupancy is a function of the intended use of the building and is one of seven major occupancy classification groups. Occupancy hazard classification is a function of the quantity and combustibility of the contents. The principal hazard classifications are light, ordinary, and extra.

2.7.4.2 Windowless Buildings. A number of facilities, or portions of facilities, discussed herein may be classified as windowless buildings. Provide additional fire protection and life safety measures for windowless buildings in accordance with MIL-HDBK-1008 and NFPA 101.

2.7.5 Life Safety. Provide life safety systems in accordance with NFPA 101 and MIL-HDBK-1008.

2.8 Design Standards. The information and references herein are presented as a guide for the designer. It is intended that the requirements presented herein be considered a minimum and that they take precedence over requirements of the references or from other sources. However, if in the best judgement of the designer, a more restrictive requirement is appropriate, the more restrictive requirement may be applied after consulting with the user.

Section 3: AIR NAVIGATION AIDS/AIRCRAFT LANDING SYSTEMS

3.1 Air Navigation Aids

3.1.1 Function. Air navigation aid facilities are for fixed ground station electronic equipment which transmits bearing, identification, and distance information to properly equipped aircraft. Air navigation aid facilities consist of the following:

3.1.1.1 Very High Frequency (VHF) Omni-Directional Range (VOR). The VOR facility is a VHF, fixed ground-based station which continuously transmits bearing, identification, and with proper equipment, distance information to properly equipped aircraft. See Facility Plate 133-25 (Sheets 1 through 4 of 4).

3.1.1.2 Tactical Air Navigation (TACAN). The TACAN facility is an ultra high frequency (UHF) ground-based station which continuously transmits bearing, identification, and distance information to properly equipped aircraft when interrogated. See Facility Plate 133-25 (Sheets 1 through 4 of 4).

3.1.1.3 Very High Frequency (VHF) Omni-Directional Range/Tactical Air Navigation (VORTAC). The VORTAC facility is a VHF/UHF fixed ground-based station which continuously transmits bearing, identification, and distance information to properly equipped aircraft when distance measuring equipment (DME) is installed. See Facility Plate 133-25 (Sheets 1 through 4 of 4).

3.1.2 Location. Locate the air navigation aid facility, if possible, in an area adjacent to the intersection of the primary runways. Locate the facility a minimum of 750 feet from the centerline of runways, and a minimum of 250 feet from centerline taxiways. When the facility is located off the airfield, consider selecting a site with one or more flight path courses providing an approach to the primary runway. Refer to FAA AC 150/5300-13, Airport Design, and FAA Order 6820.10, VOR, VOR/DME, and VORTAC Siting Criteria.

3.1.3 Architectural and Structural Requirements. Provide the following:

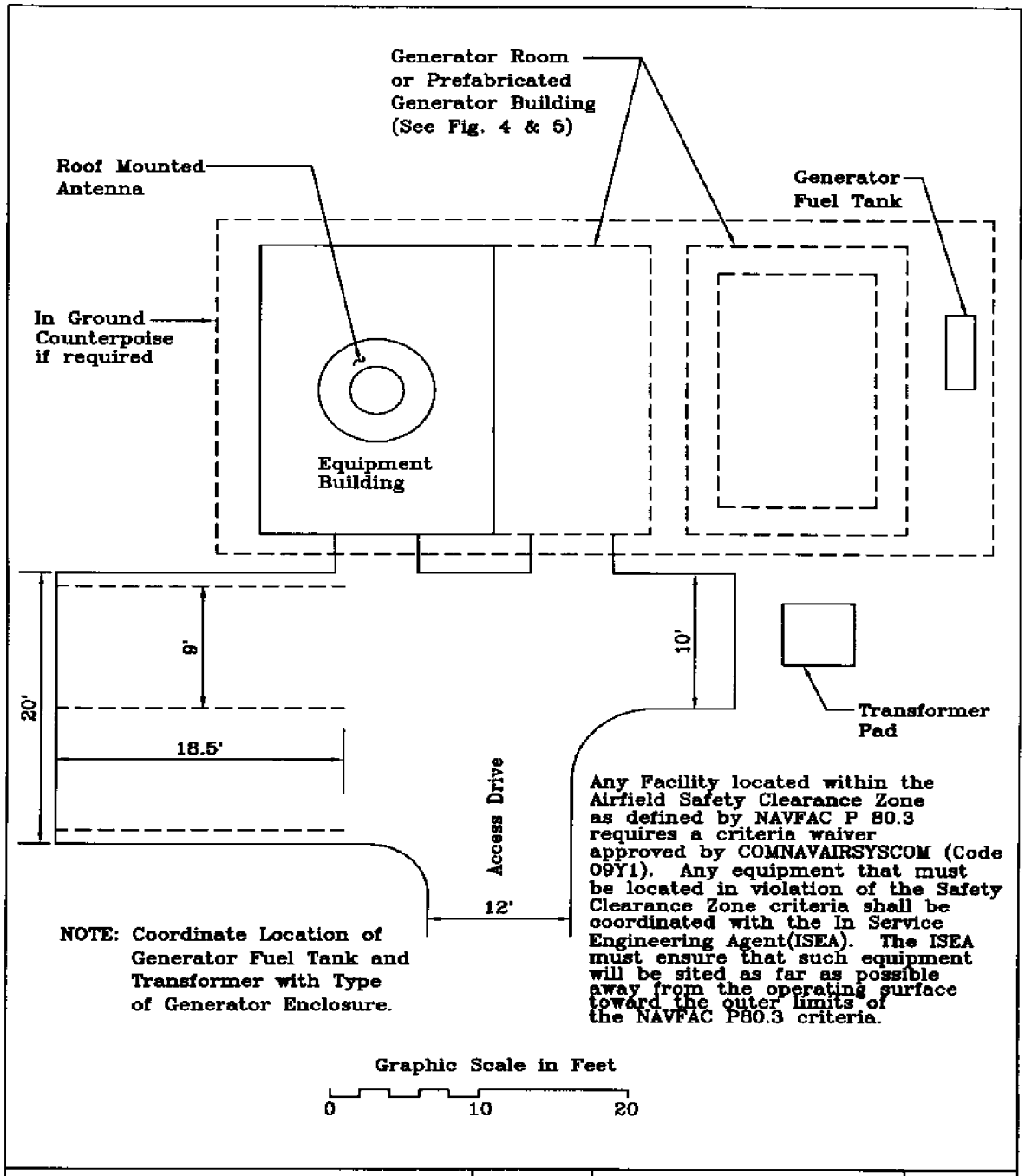
a) Adequate space for equipment and equipment maintenance.

b) Clear ceiling height of 10 feet.

c) Work bench.

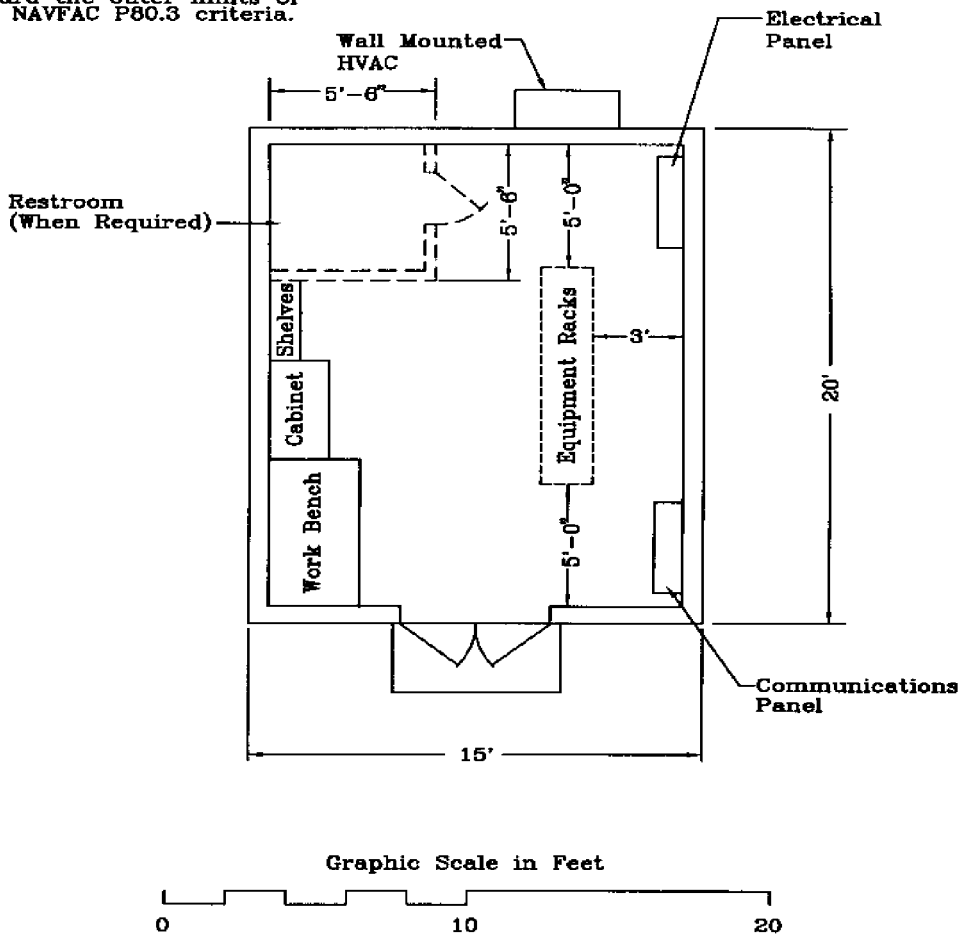
d) Restroom (refer to par. 2.4.8).

3.1.3.1 Structure. Provide sufficient roof area to accommodate VOR and VORTAC roof mounted antenna counterpoise. Consider an extended roof overhang or an antenna tower to accommodate a large antenna counterpoise.

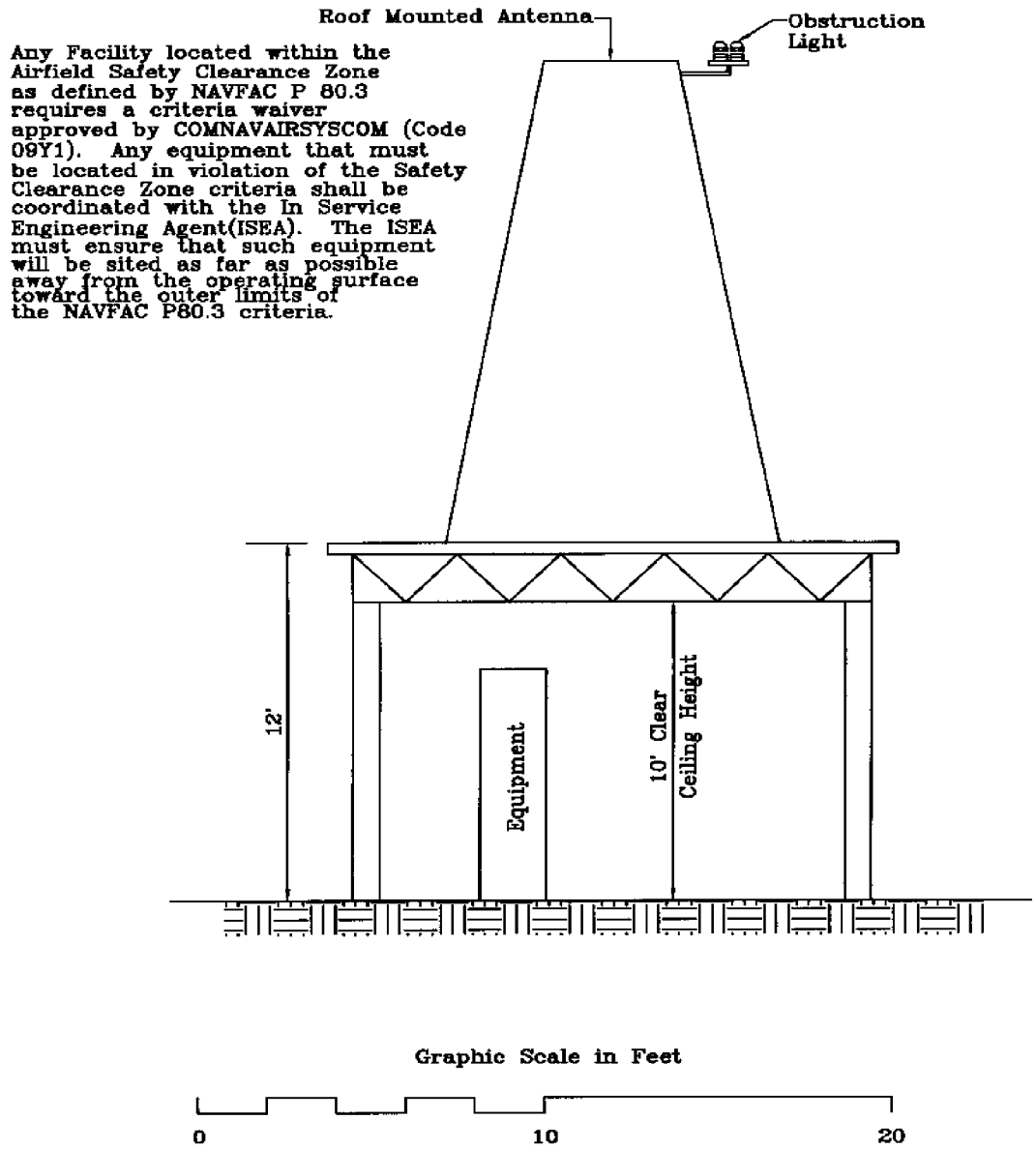


TITLE	DATE	FACILITY PLATE	SHEET
VOR Facility Site Plan	11/92	133-25	1 Of 4

Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.



TITLE	DATE	FACILITY PLATE	SHEET
VOR Building Layout	11/92	133-25	2 Of 4



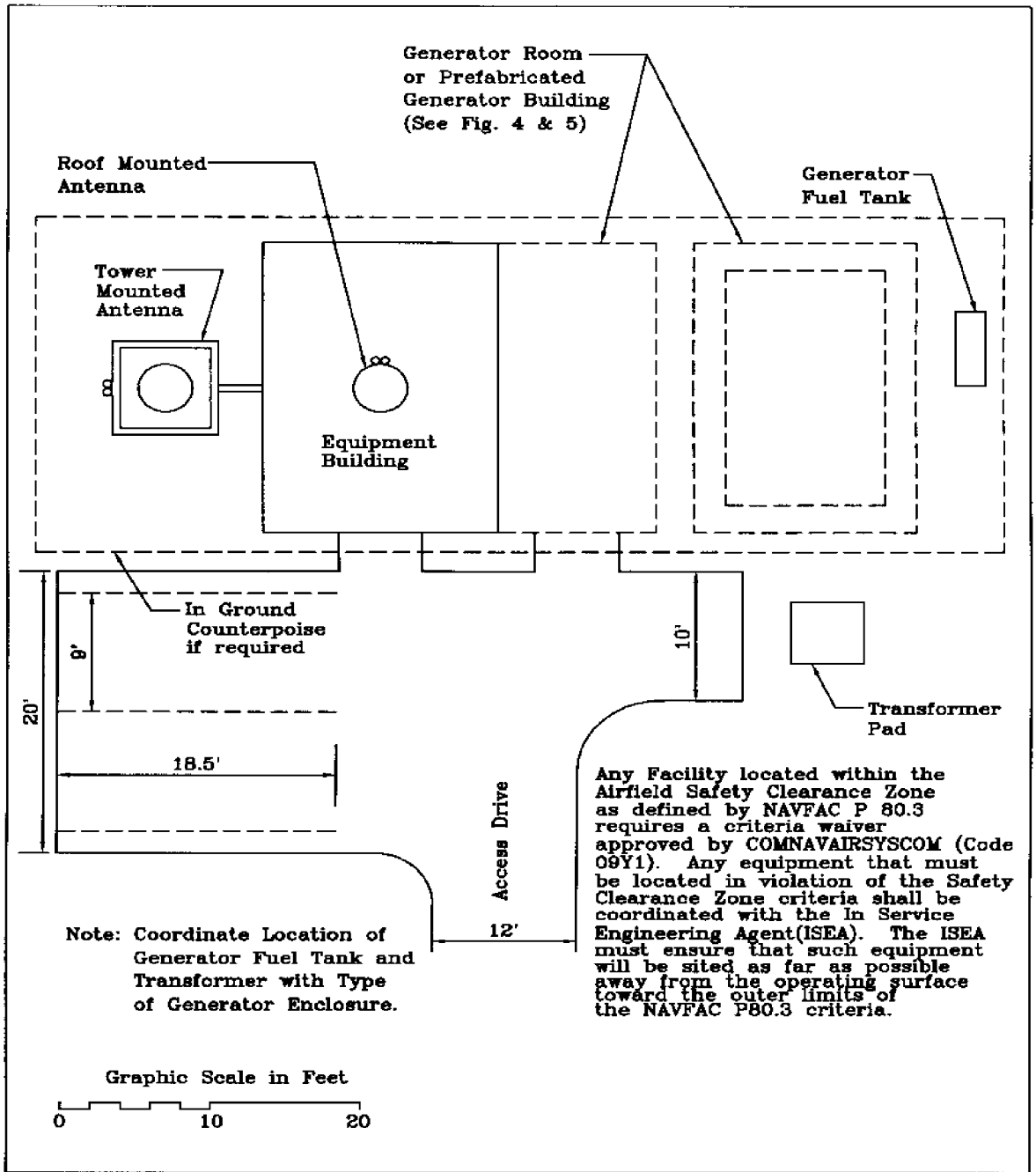
TITLE	DATE	FACILITY PLATE	SHEET
VOR Building Section	11/92	133-25	3 Of 4

	VOR
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HRx1000):	
(Inside Design Temperature = 70 Degs. F)	
Outside Design Temperature -5 Degs. F	30
+5 Degs. F	26
+15 Degs. F	22
+25 Degs. F	18
Air Conditioning Requirements (BTU/HRx1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	31
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	0.5
Estimated Demand	0.5
Power;	
Connected Load	20.5
Estimated Demand	14.4
Air Conditioning;	
Connected Load	9.0
Estimated Demand	9.0
Total;	
Connected Load	30.0
Estimated Demand	23.9
Emergency Generator (KW)	20.0
Areas (SF):	
Gross area including mechanical equipment room	300

General Notes:

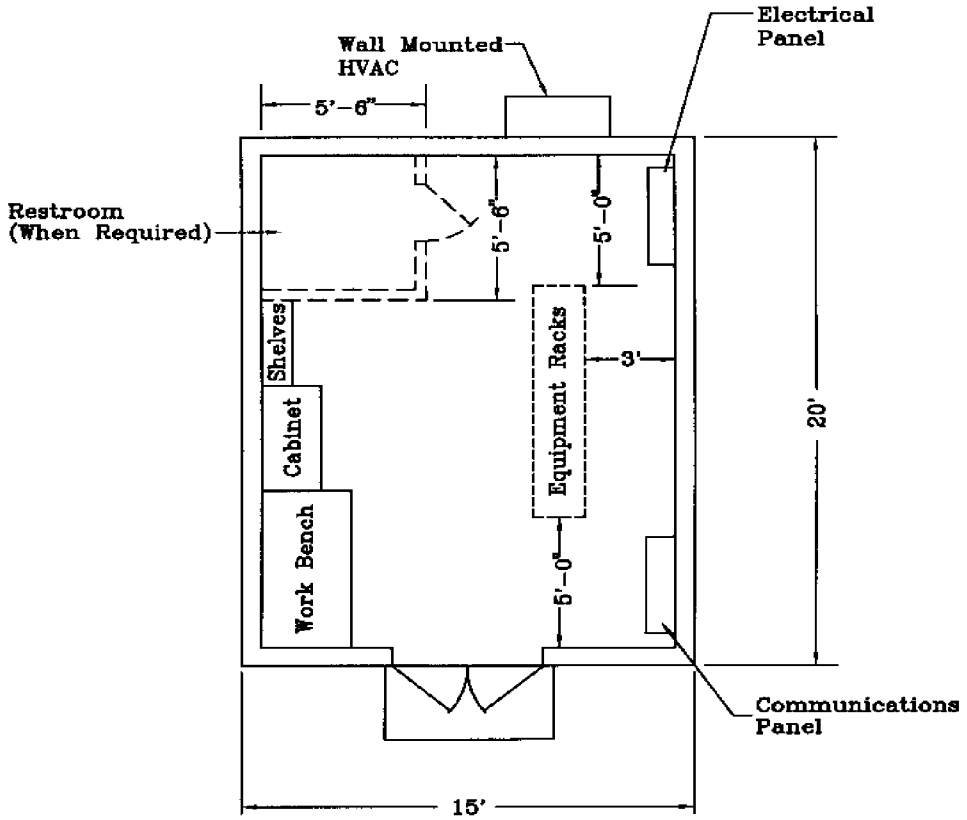
Plumbing cold water requirements are for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
VOR Facility Design Notes	11/92	133-25	4 OF 4



TITLE	DATE	FACILITY PLATE	SHEET
TACAN Facility Site Plan	11/92	133-25	1 Of 4

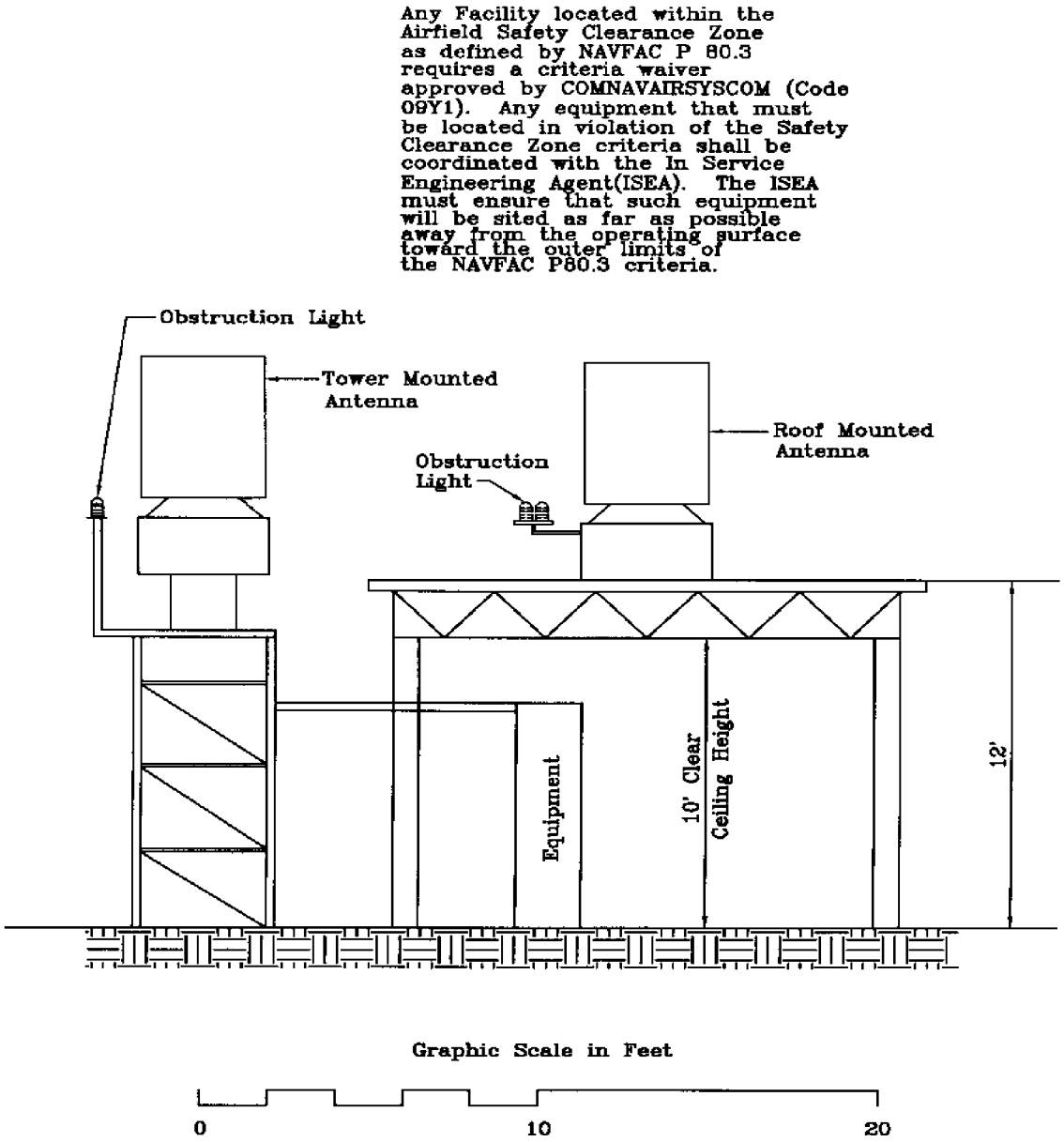
Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.



Graphic Scale in Feet

0 10 20

TITLE	DATE	FACILITY PLATE	SHEET
TACAN Building Layout	11/92	133-25	2 Of 4



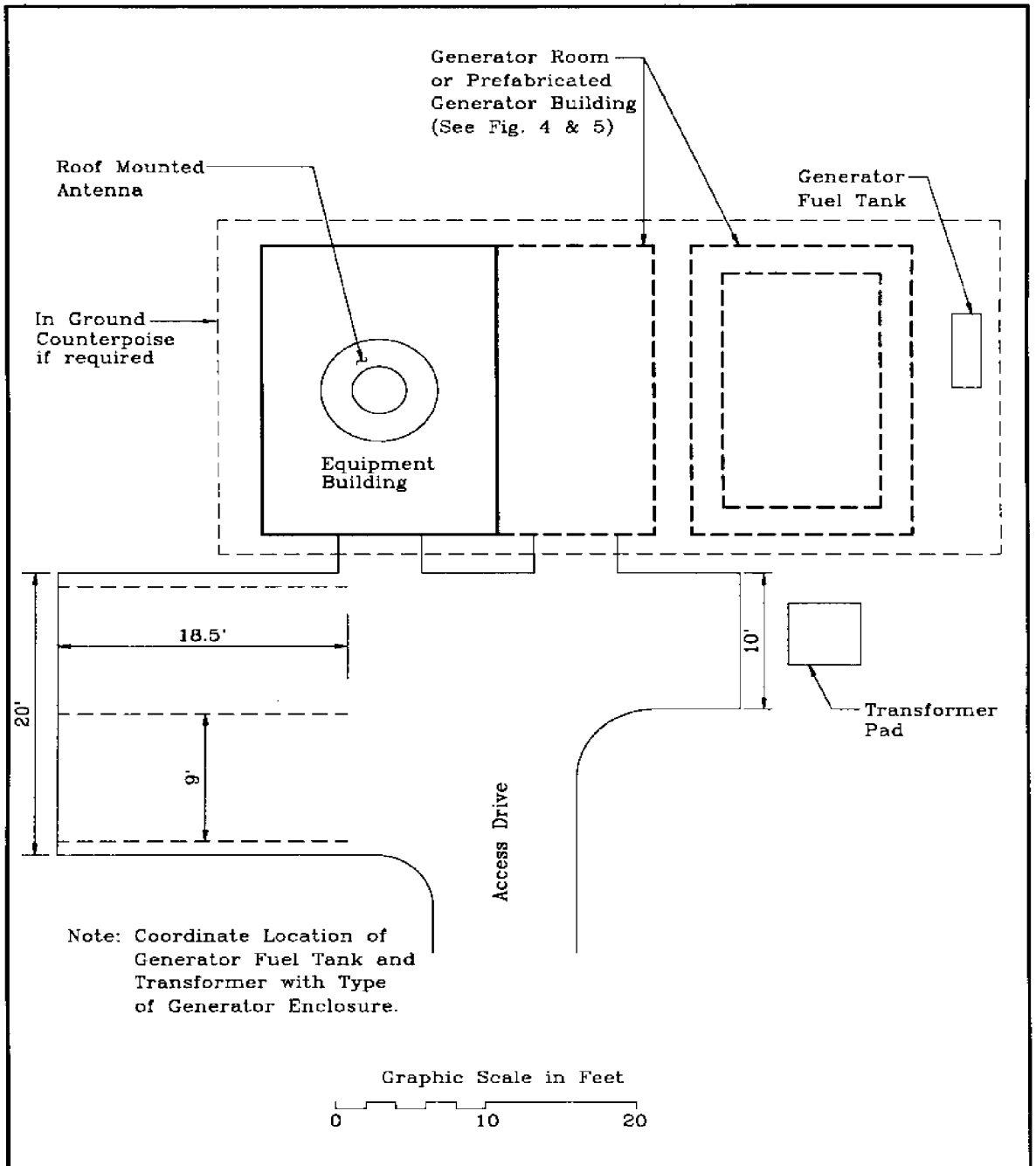
TITLE	DATE	FACILITY PLATE	SHEET
TACAN Building Section	11/92	133-25	3 Of 4

	TACAN
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HRx1000):	
(Inside Design Temperature = 70 Degs. F)	
Outside Design Temperature -5 Degs. F	30
+5 Degs. F	26
+15 Degs. F	22
+25 Degs. F	18
Air Conditioning Requirements (BTU/HRx1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	31
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	0.5
Estimated Demand	0.5
Power;	
Connected Load	20.5
Estimated Demand	14.4
Air Conditioning;	
Connected Load	9.0
Estimated Demand	9.0
Total;	
Connected Load	30.0
Estimated Demand	23.9
Emergency Generator (KW)	20.0
Areas (SF):	
Gross area including mechanical equipment room	300

General Notes:

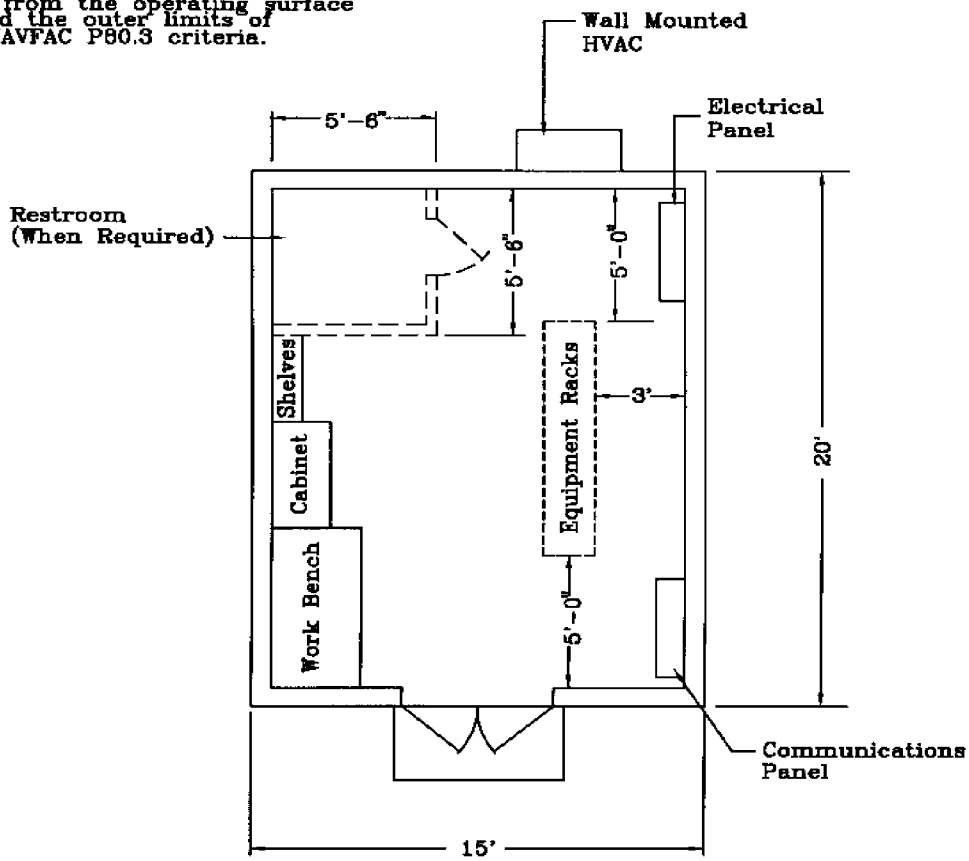
Plumbing cold water requirements are for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
TACAN Facility Design Notes	11/92	133-25	4 OF 4



TITLE	DATE	FACILITY PLATE	SHEET
VORTAC Facility Site Plan	11/92	133-25	1 Of 4

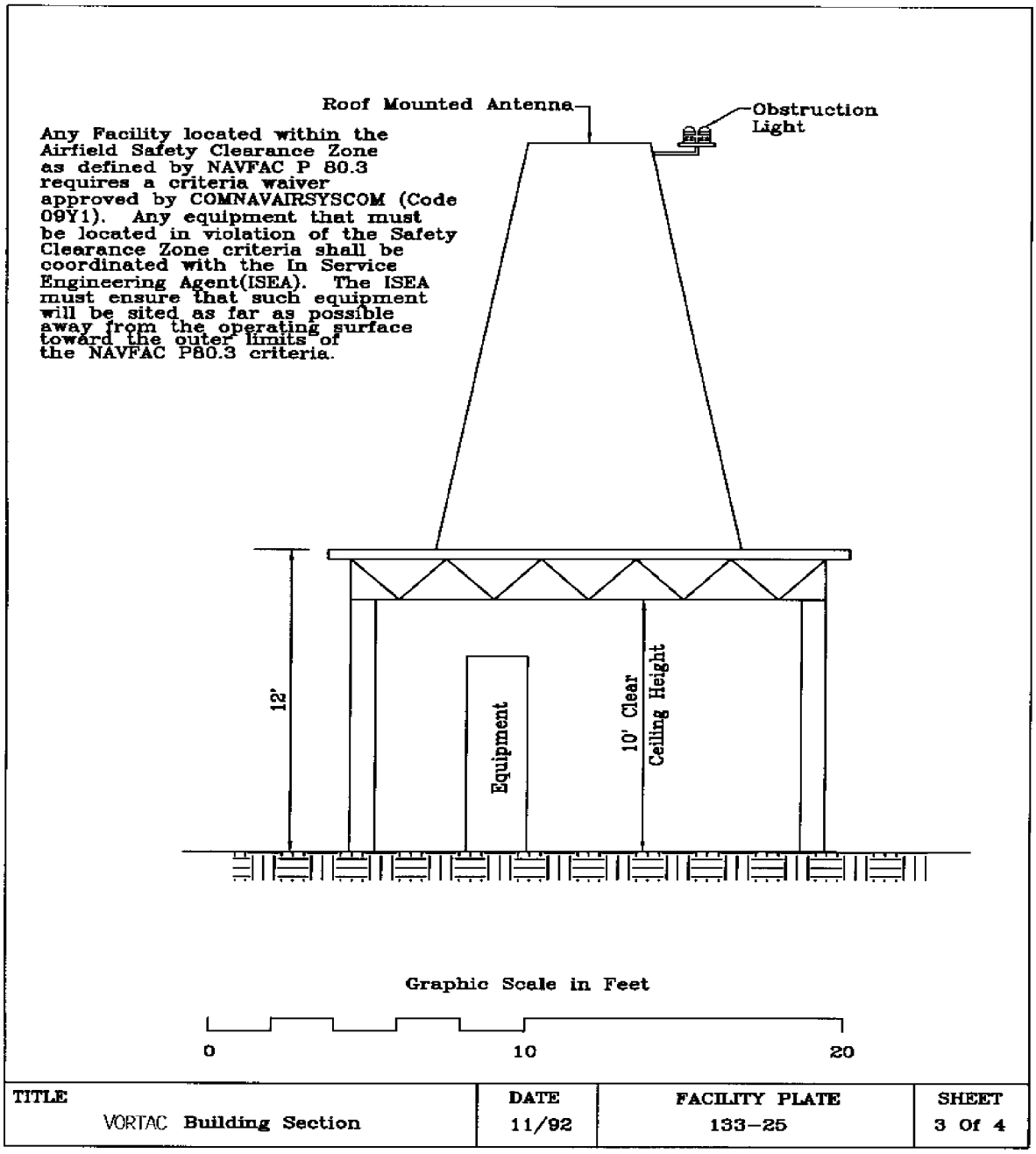
Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.



Graphic Scale in Feet

0 10 20

TITLE	DATE	FACILITY PLATE	SHEET
VORTAC Building Layout	11/92	133-25	2 Of 4



TITLE	DATE	FACILITY PLATE	SHEET
VORTAC Building Section	11/92	133-25	3 Of 4

	VORTAC
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HRx1000):	
(Inside Design Temperature = 70 Degs. F)	
Outside Design Temperature -5 Degs. F	30
+5 Degs. F	26
+15 Degs. F	22
+25 Degs. F	18
Air Conditioning Requirements (BTU/HRx1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	31
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	0.5
Estimated Demand	0.5
Power;	
Connected Load	20.5
Estimated Demand	14.4
Air Conditioning;	
Connected Load	9.0
Estimated Demand	9.0
Total;	
Connected Load	30.0
Estimated Demand	23.9
Emergency Generator (KW)	20.0
Areas (SF):	
Gross area including mechanical equipment room	300

General Notes:

Plumbing cold water requirements are for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
VORTAC Facility Design Notes	11/92	133-25	4 OF 4

3.1.3.2 Windows. Do not provide windows.

3.1.3.3 Premanufactured Building. Consider the use of a premanufactured building as described in par. 2.3.12.

3.1.4 Electrical Requirements. To avoid potential interference with radar transmissions locate power, communications, and control cables underground within 1,000 feet from the facility. Ensure electrical systems do not interfere with radar transmissions.

3.1.4.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the entire facility.

3.1.5 Security. VOR, TACAN, and VORTAC facilities are normally located within the airfield restricted area. This siting typically meets the minimum security measures for external security. When the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

3.1.6 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

3.2 Aircraft Landing Systems

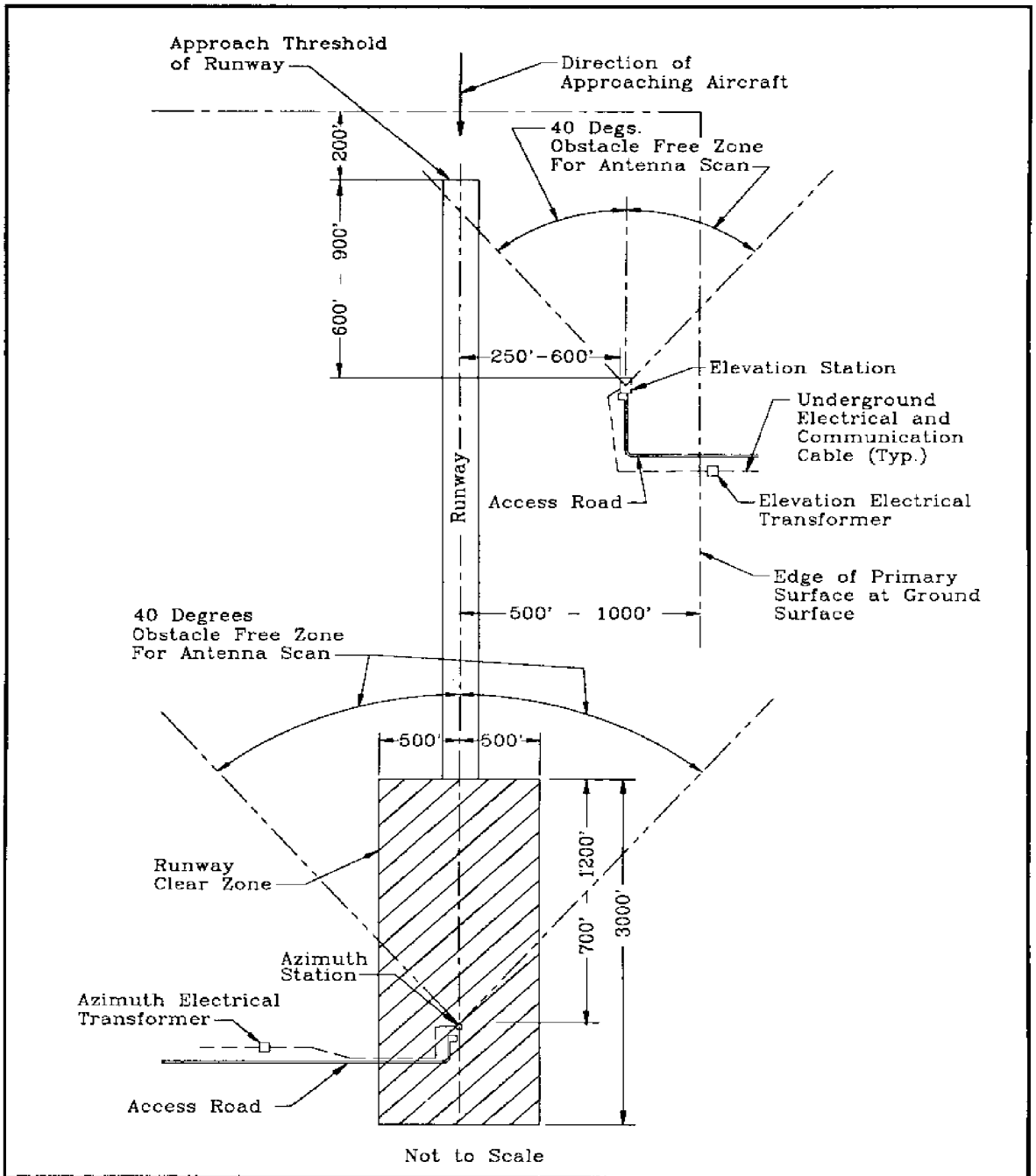
3.2.1 Microwave Landing System (MLS)/Instrument Landing System (ILS)

3.2.1.1 Function. The MLS and ILS buildings are facilities that contain electronic equipment used in precision instrument approaches.

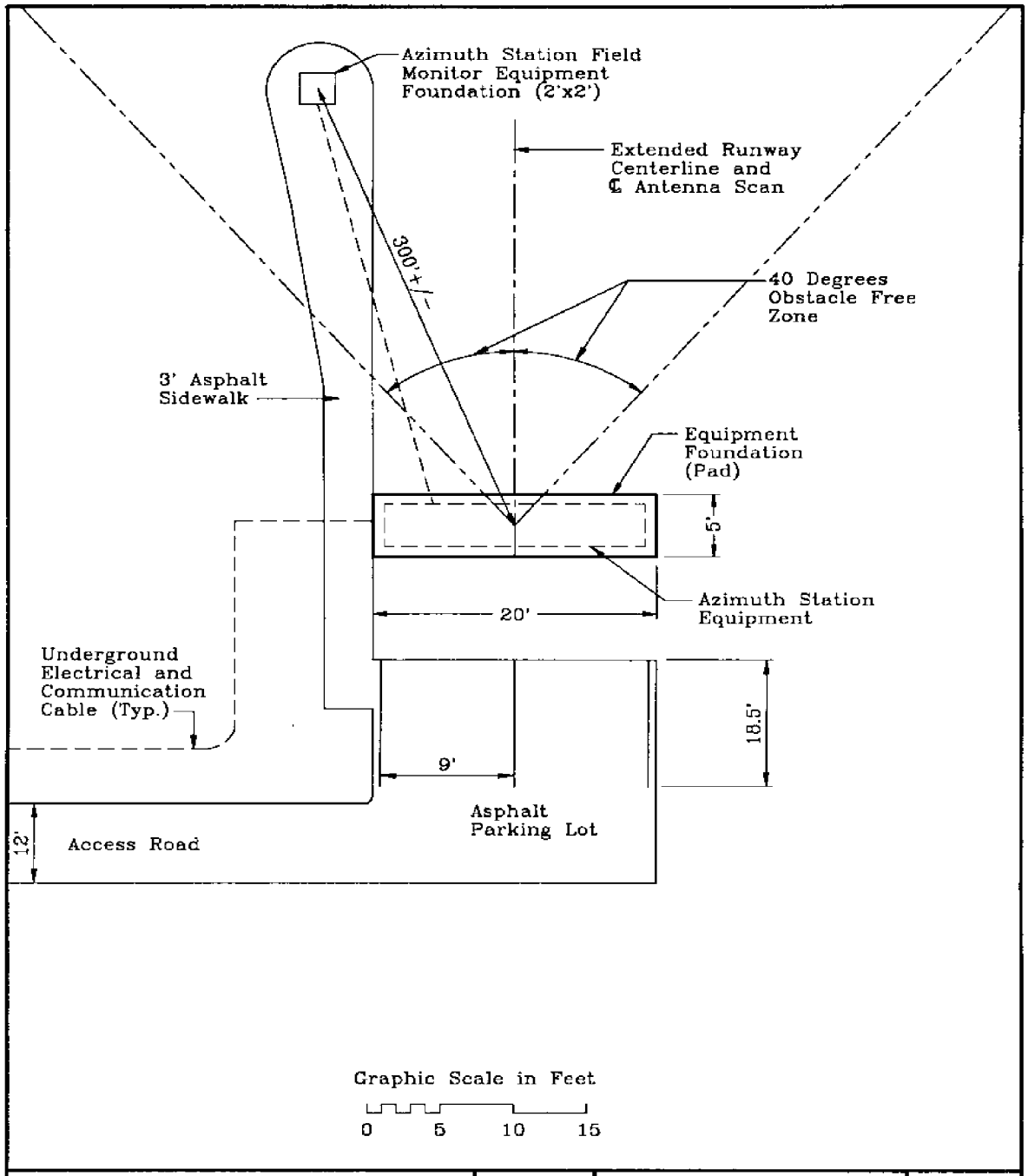
3.2.1.2 Microwave Landing System (MLS). The MLS provides azimuth, distance, elevation, and guide path position to aircraft on a precision approach to the MLS instrumented runway. The MLS operates in a narrow band microwave frequency. See Facility Plate 134-40 (Sheets 1 through 4 of 4).

3.2.1.3 Instrument Landing System (ILS). The ILS provides azimuth, distance, elevation, and glide path position to aircraft on a precision approach to the ILS instrumented runway. The ILS operates in the VHF and UHF radio bands. See Facility Plate 134-40 (Sheets 1 through 6 of 6).

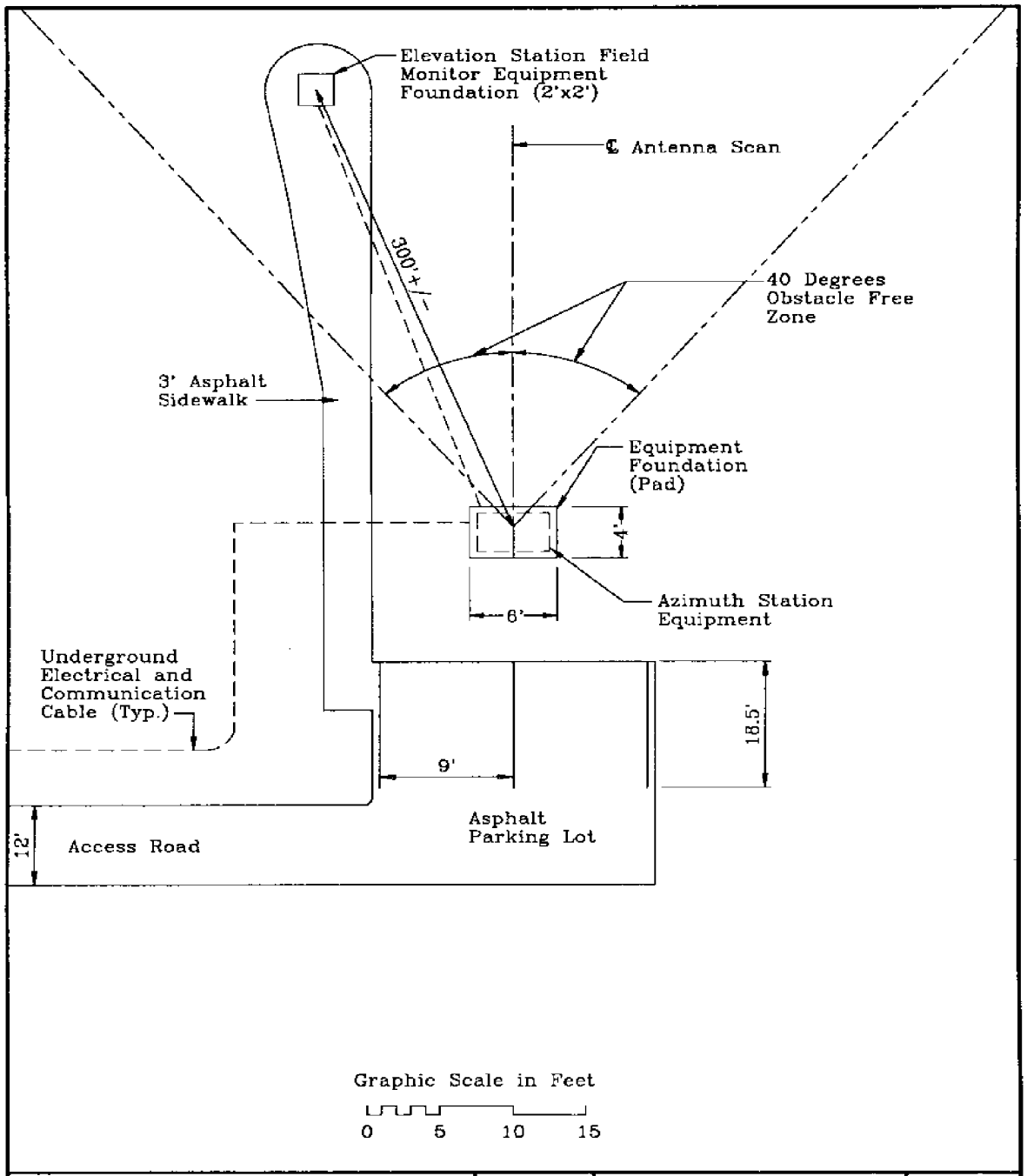
3.2.1.4 Location - MLS Transmitters. Locate azimuth transmitter on the extended runway centerline, 700 to 1,200 feet from the end of runway. Locate elevation transmitter 600 to 900 feet set back from runway approach threshold, offset 250 to 600 feet from runway centerline on the runway side opposite of taxiways.



TITLE	DATE	FACILITY PLATE	SHEET
MLS Facility: Site Plan	11/92	134-40	1 Of 4



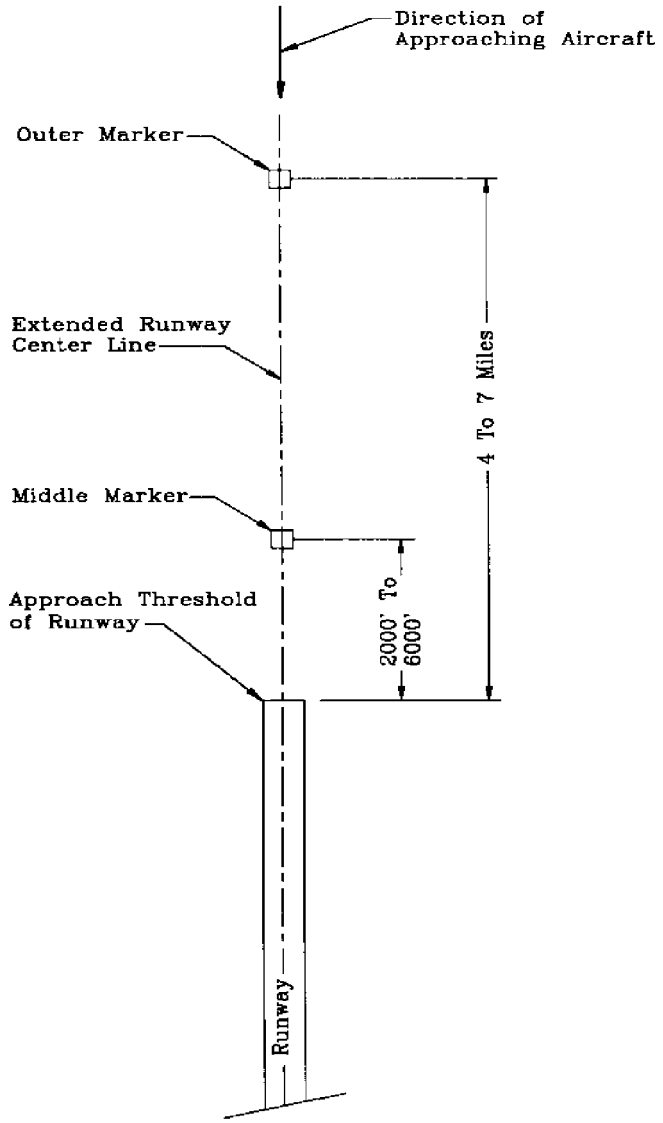
TITLE	DATE	FACILITY PLATE	SHEET
MLS Facility: Azimuth Station Site Plan	11/92	134-40	2 Of 4



TITLE	DATE	FACILITY PLATE	SHEET
MLS Facility: Elevation Station Site Plan	11/92	134-40	3 Of 4

	MLS
Plumbing Requirements (G.P.M.):	None
Heating Requirements (MBH):	None
Air Conditioning Requirements (MBH):	None
Electrical Requirements (KVA):	
Azimuth Station;	
Connected Load	24.8
Elevation Station;	
Connected Load	12.5

TITLE	DATE	FACILITY PLATE	SHEET
MLS Facility Design Notes	7/92	134-40	4 OF 4



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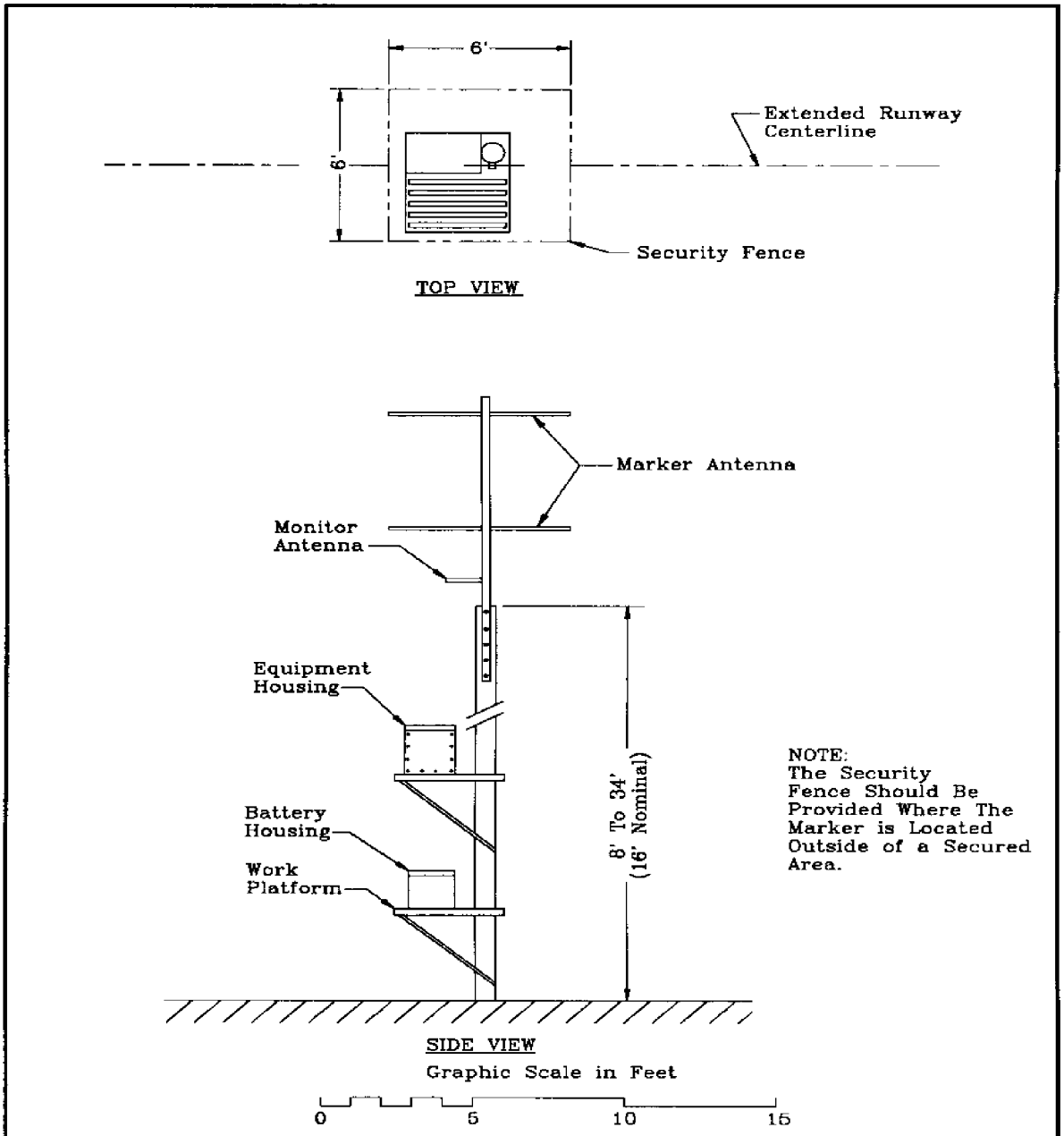
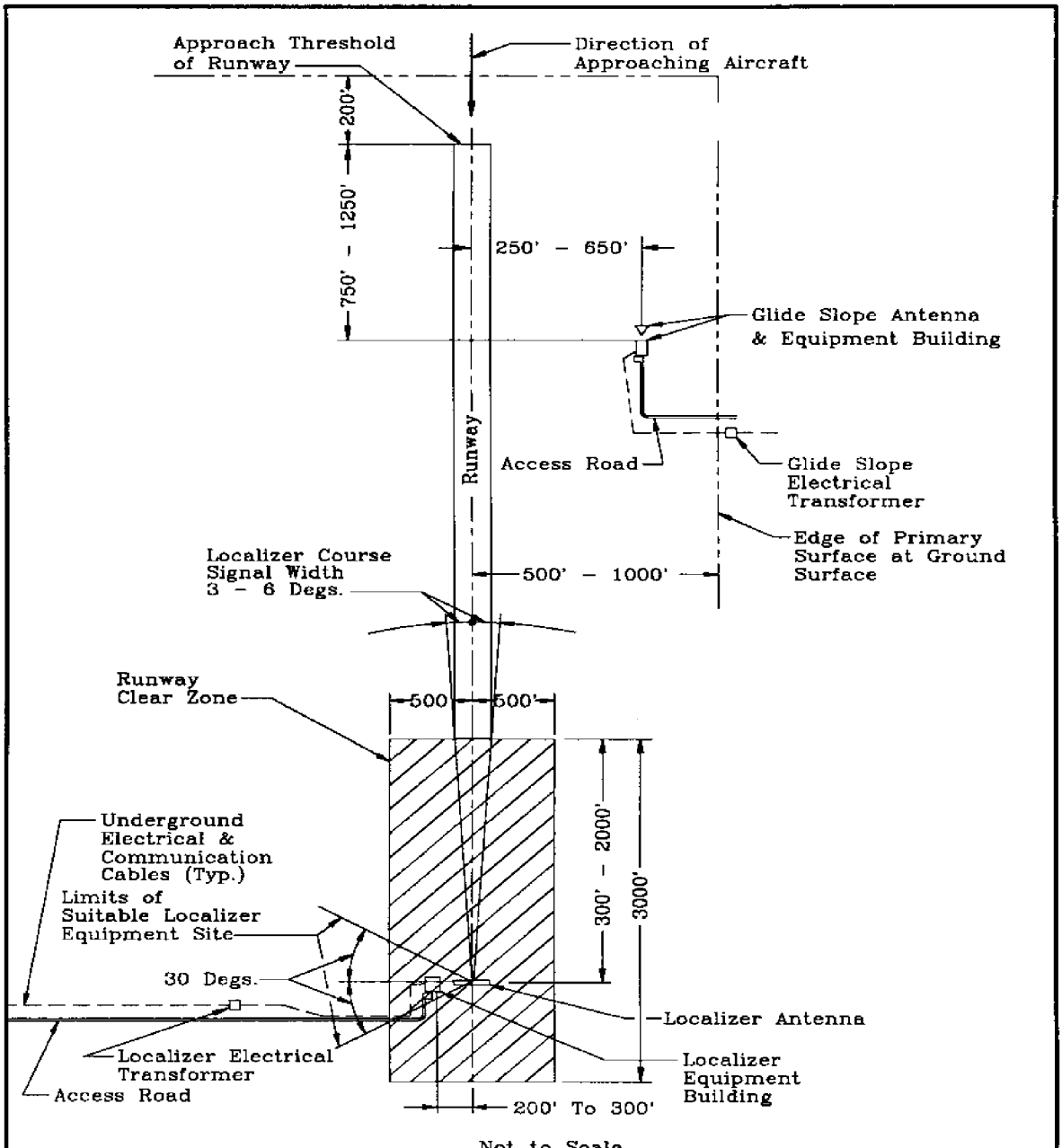
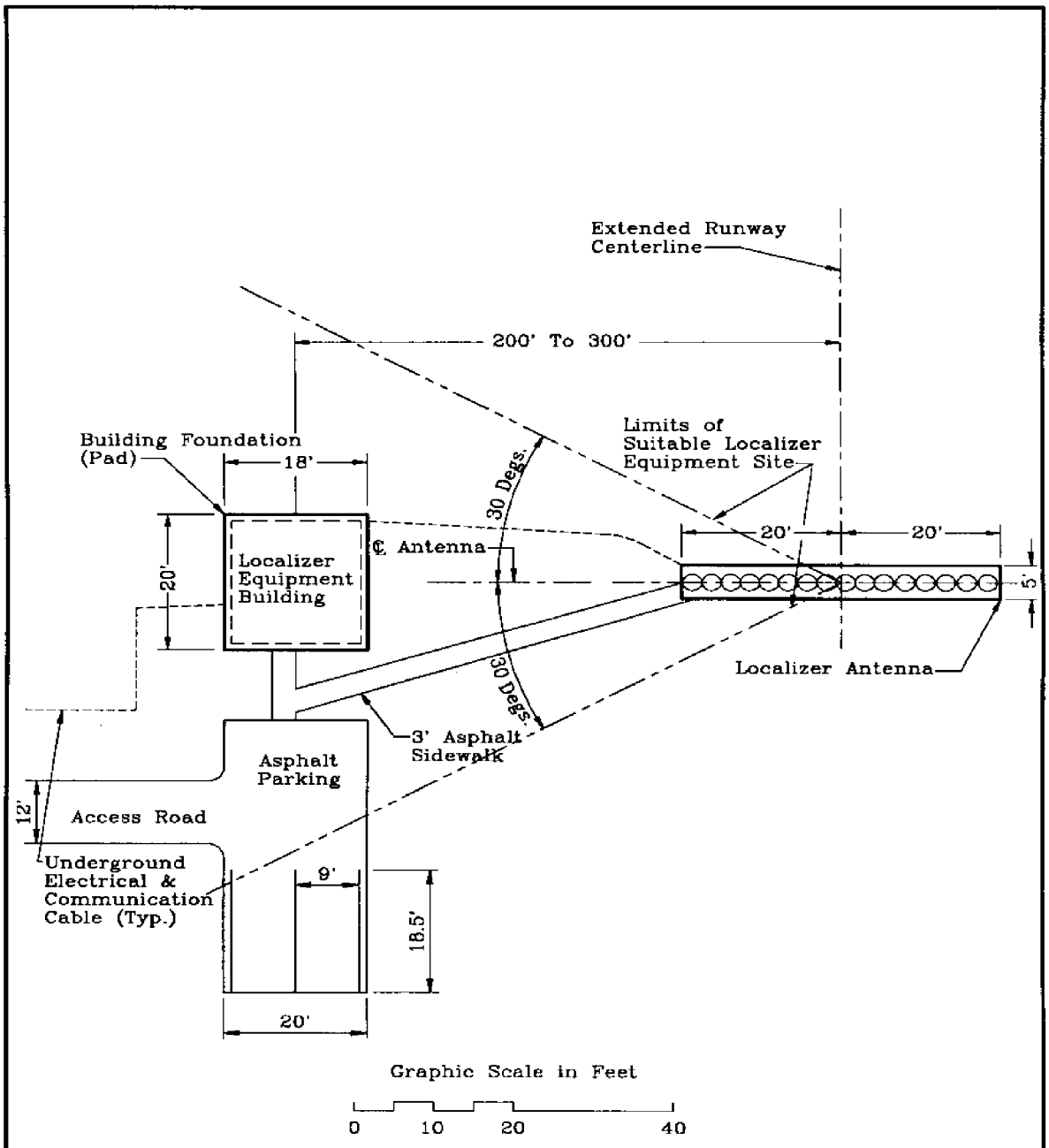
TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility: Marker Siting	11/92	134-40	1 Of 6



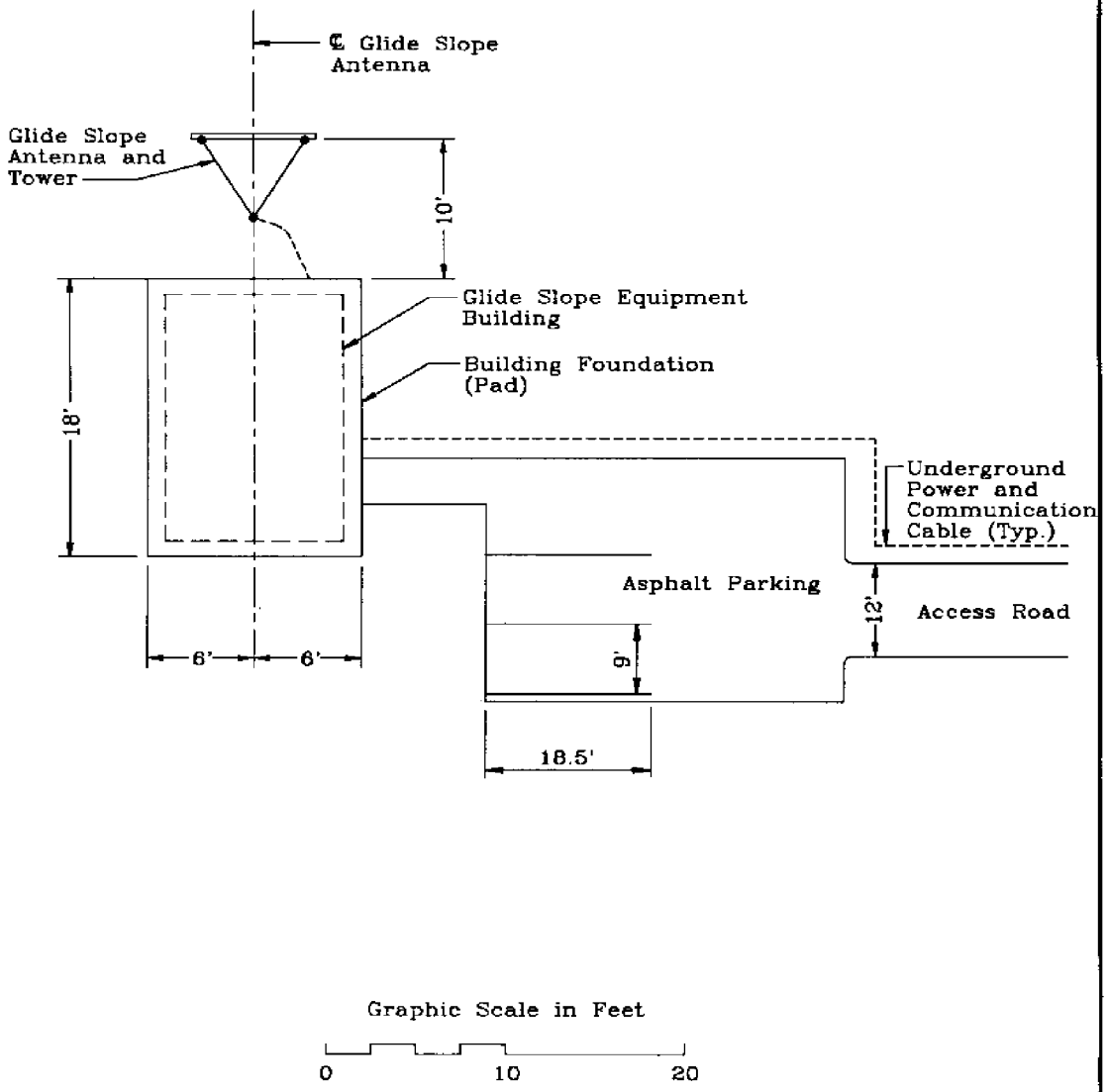
TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility: Outer and Middle Markers	11/92	134–40	2 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility: Runway Site Plan	11/92	134-40	3 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility: Localizer Equipment and Antenna Site Plan	11/92	134-40	4 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility: Glide Slope Equipment and Antenna Site Plan	11/92	134-40	5 Of 6

	ILS
Plumbing Requirements (G.P.M.):	None
Heating Requirements (MBH):	None
Air Conditioning Requirements (MBH):	None
Electrical Requirements (KVA):	
Localizer Station;	
Connected Load	24.8
Glide Slope Station;	
Connected Load	12.5

TITLE	DATE	FACILITY PLATE	SHEET
ILS Facility Design Notes	11/92	134-40	6 OF 6

3.2.1.5 Location - ILS Transmitters. Provide separate facilities for glide slope antenna transmitter equipment, for localizer antenna transmitter equipment and for marker antenna equipment. Refer to FAA Order 6750.16, Siting Criteria for Instrument Landing Systems and FAA AC 150/5300-13.

3.2.1.6 Structure. MLS and ILS transmitter equipment is provided in a self-contained structure by the system supplier. Provide concrete foundations to mount equipment structures. Ensure MLS and ILS structures are frangible. Refer to FAA ER-530-81-04.

3.2.1.7 Mechanical. No mechanical systems are required.

3.2.1.8 Electrical. Provide underground power, communications, and control cables, beginning at a point 1,000 feet outside of the MLS and ILS facilities. Locate electrical equipment which is not frangible, such as transformers, outside the runway clear zone or primary surface. Ensure electrical systems do not interfere with radio transmissions.

3.2.1.9 Emergency Electrical Power. MLS and ILS equipment is supplied with backup battery power. No emergency generator is required.

3.2.1.10 Lighting. No site lighting is required. Obstruction lighting is provided with the equipment.

3.2.1.11 Site Work. Design site work to meet the criteria in FAA Order 6750.16 and par. 2.2.

3.2.1.12 Security. MLS and ILS facilities are normally located within the airfield restricted area which would typically meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, additional measures will be required to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

3.2.1.13 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

3.2.2 Precision Approach Landing System (PALS)/Precision Approach Radar (PAR)

3.2.2.1 Function. The PALS and PAR buildings house radar systems used to guide aircraft on final approach.

3.2.2.2 Precision Approach Landing System (PALS). The PALS is an unattended, self-contained radar system. The PALS detects azimuth, elevation, and range information of aircraft on final approach to PALS instrumented runways. This information is displayed in the Military Terminal Radar Approach Control Facility (MTRACON). See Facility Plate 134-40 (Sheets 1 through 4 of 4).

3.2.2.3 Precision Approach Radar (PAR). The PAR is an unattended self-contained radar system. The PAR detects azimuth, elevation, and range information of aircraft on final landing approach to PAR instrumented runways. This information is displayed in the MTRACON. The PAR can be mounted on a fixed base or on a turntable. See Facility Plate 134-40 (Sheets 1 through 8 of 8).

3.2.2.4 Location. Locate PALS and PAR sites adjacent to the instrumented runway or runway intersection. Refer to NAVELEX 0101,107; Naval Shore Electronics Criteria.

3.2.2.5 Structure. The PALS and PAR systems are housed in a transportable shelter provided by the system manufacturer. Provide the following:

a) Reinforced concrete foundations for PALS antenna tower.

b) Reinforced concrete platform for the fixed mounted PAR.

c) Reinforced concrete foundations to support the turntable mounted PAR frame. Provide concrete anchor blocks for turntable stop anchors bolts.

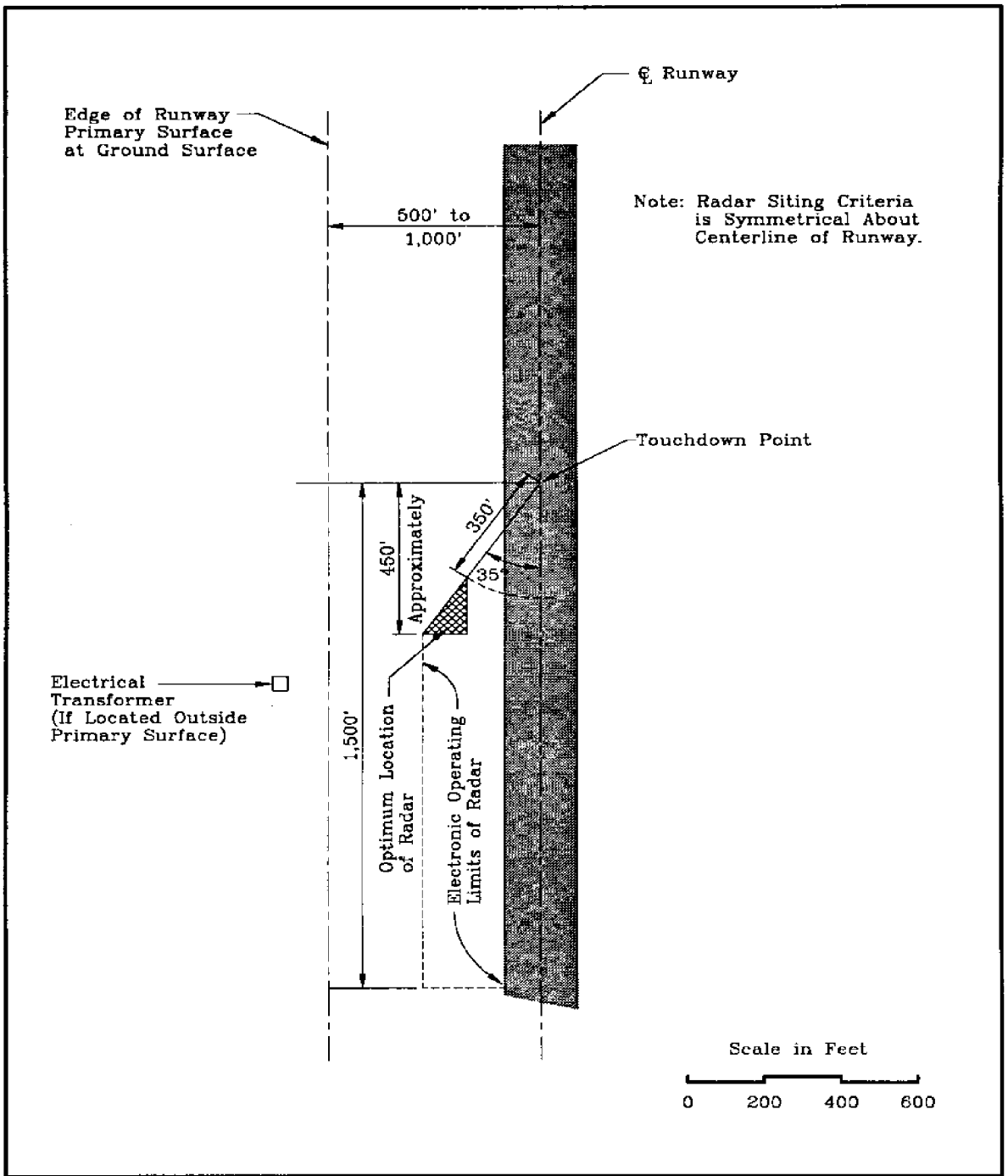
3.2.2.6 Mechanical Requirements. No mechanical systems are required.

3.2.2.7 Electrical Requirements. Provide underground power, communications, and control cables at a point 1,000 feet from the radar set. Ensure electrical systems do not interfere with radio and radar transmissions.

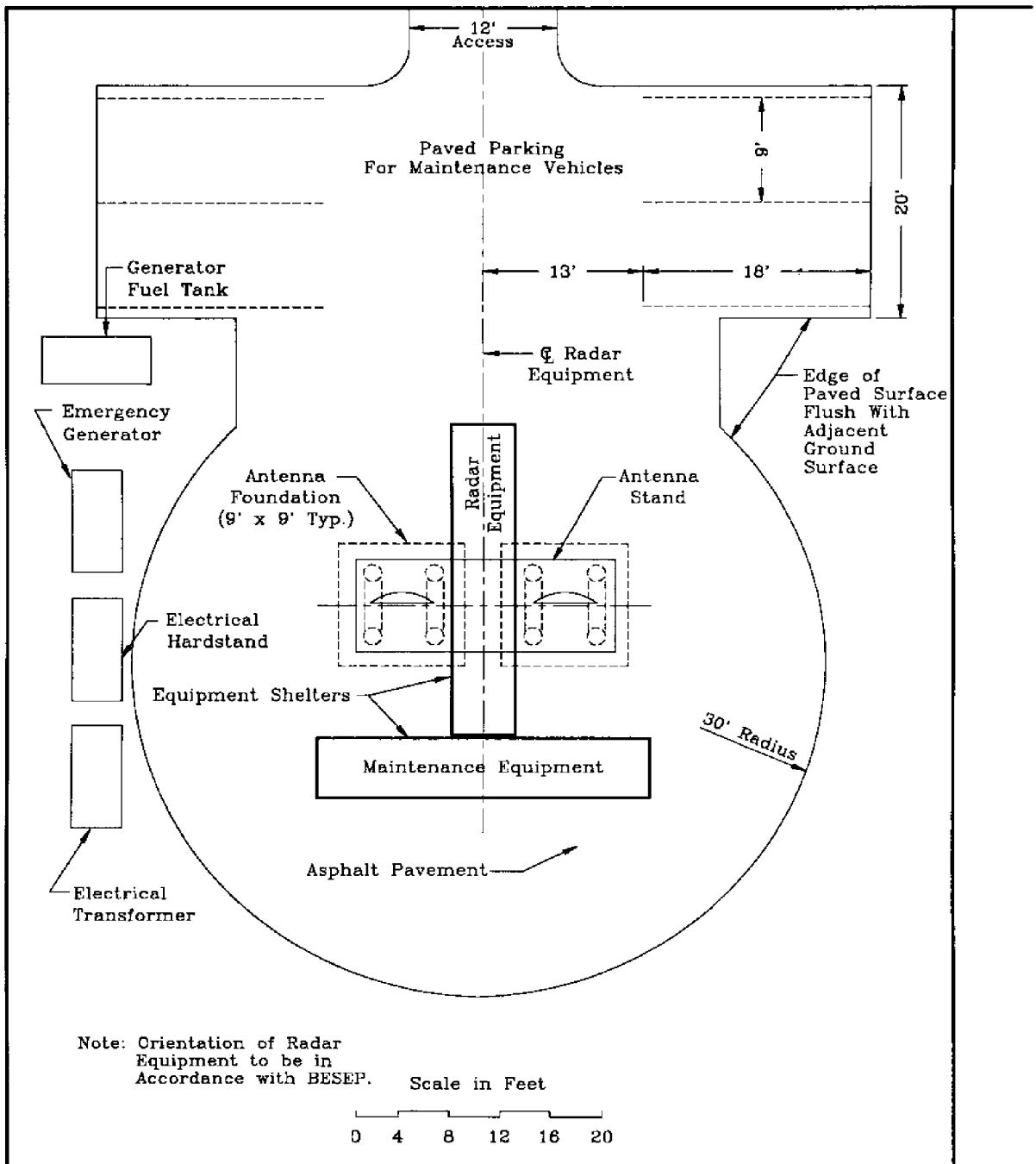
3.2.2.8 Emergency Electrical Power. Provide an emergency generator system as described in par. 2.5.7. Provide emergency power to the entire facility.

3.2.2.9 Lighting. No site lighting is required. Obstruction lighting is provided with the equipment.

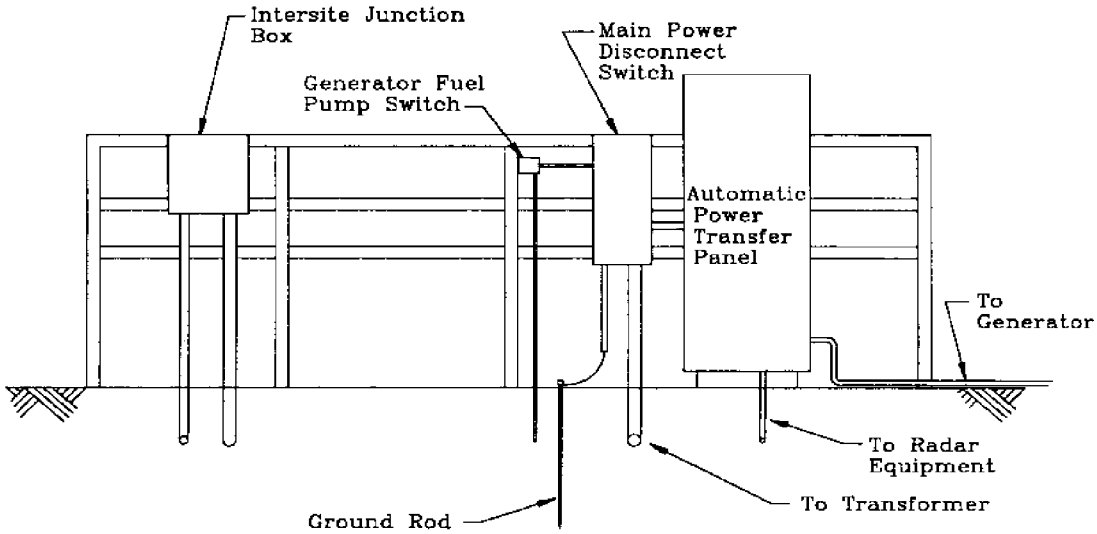
3.2.2.10 Paved Equipment Areas. Design paved equipment areas for the maximum anticipated vehicle wheel load. Consider concrete pedestals to distribute concentrated loads from equipment supports. Refer to NAVFAC DM-5.04.



TITLE	DATE	FACILITY PLATE	SHEET
PALS Facility Siting Criteria	11/92	134-40	1 Of 4



TITLE	DATE	FACILITY PLATE	SHEET
PALS Facility Site Plan	11/92	134-40	2 Of 4



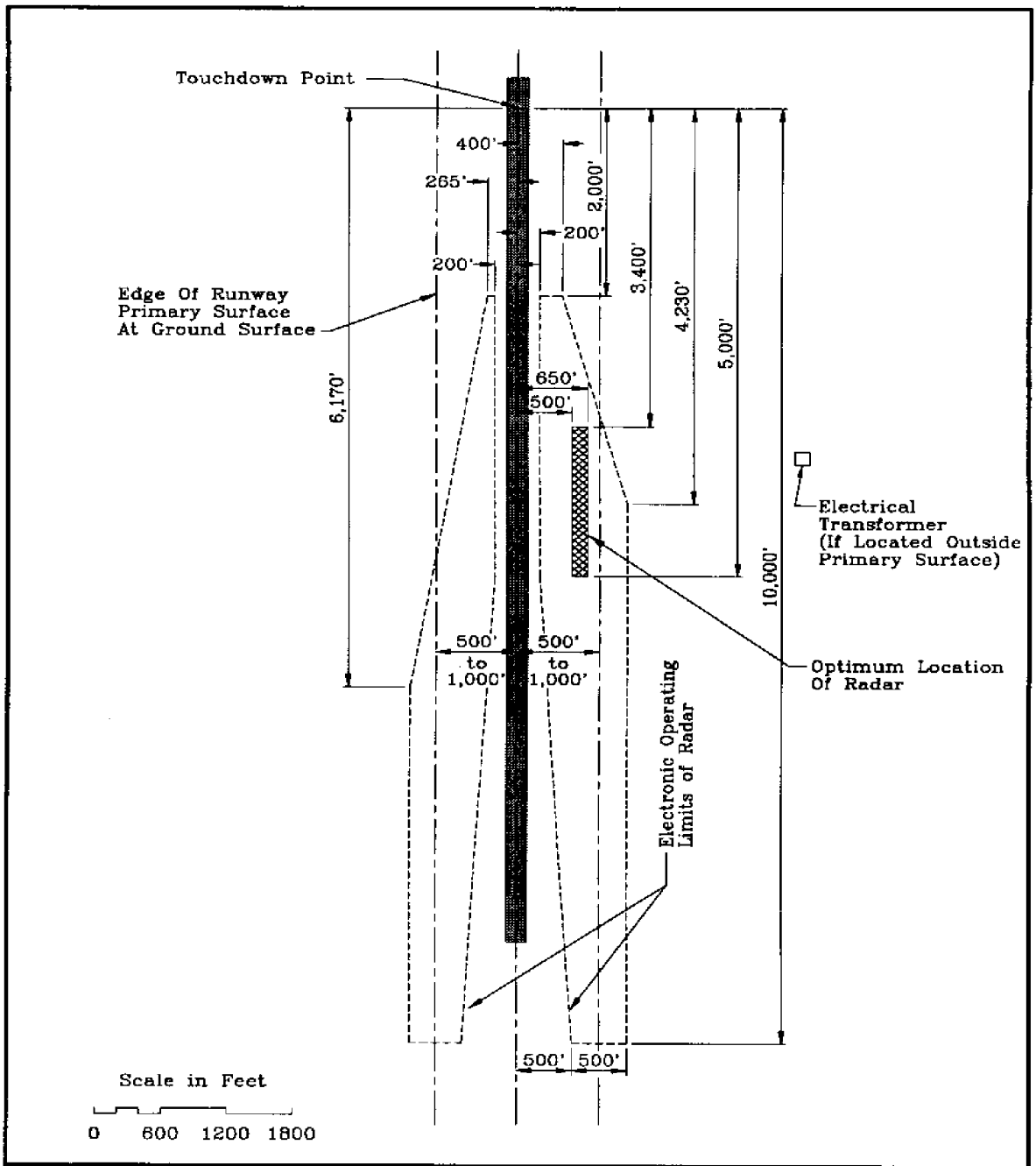
ELEVATION

Not To Scale

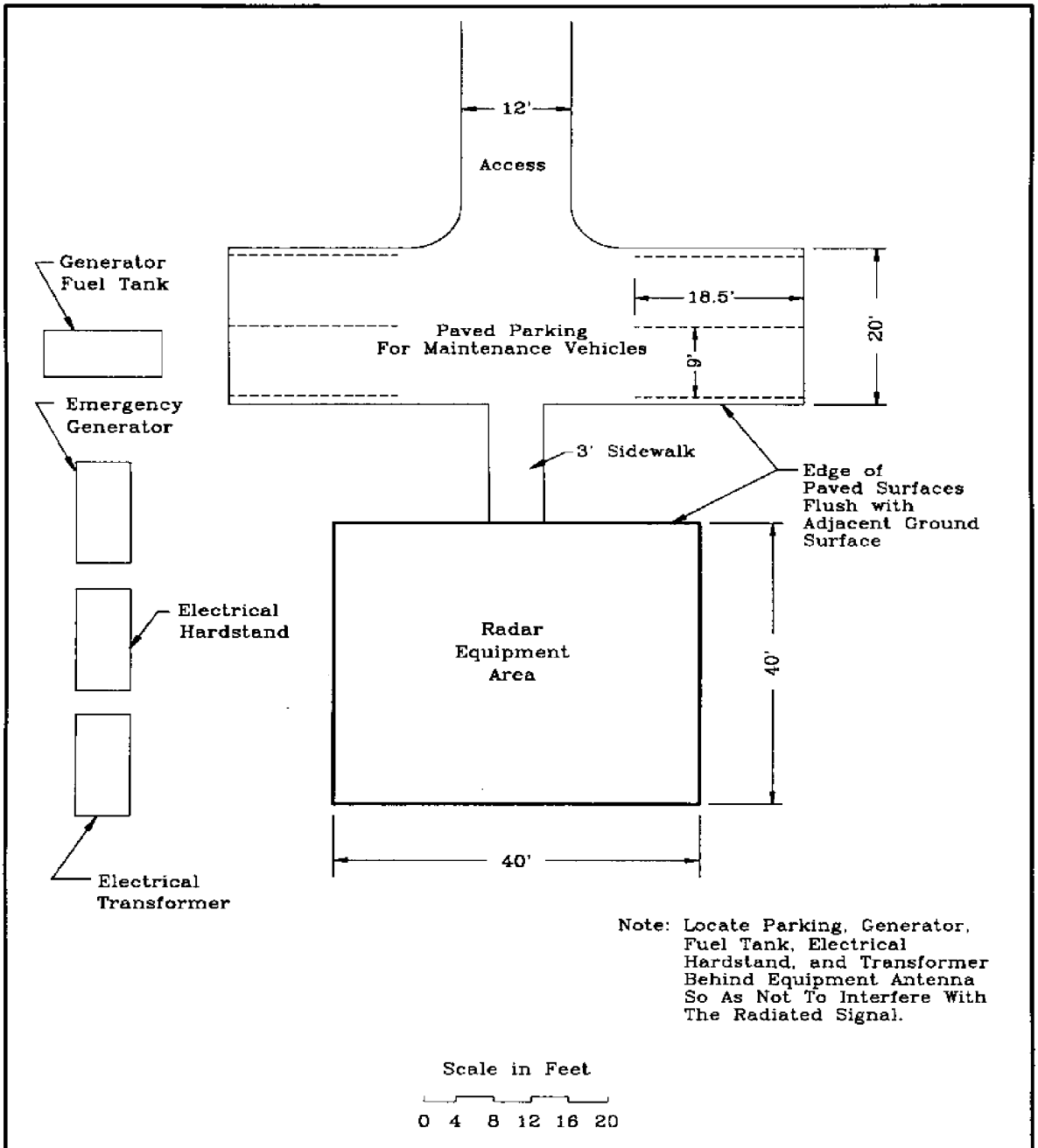
TITLE	DATE	FACILITY PLATE	SHEET
PALS Facility Electrical Hardstand	11/92	134-40	3 Of 4

	PALS
Plumbing Requirements (G.P.M.):	None
Heating Requirements (MBH):	None
Air Conditioning Requirements (MBH):	None
Electrical Requirements (KVA):	
Total;	
Connected Load	30.0
Estimated Demand	30.0
Emergency Generator (KW)	30.0

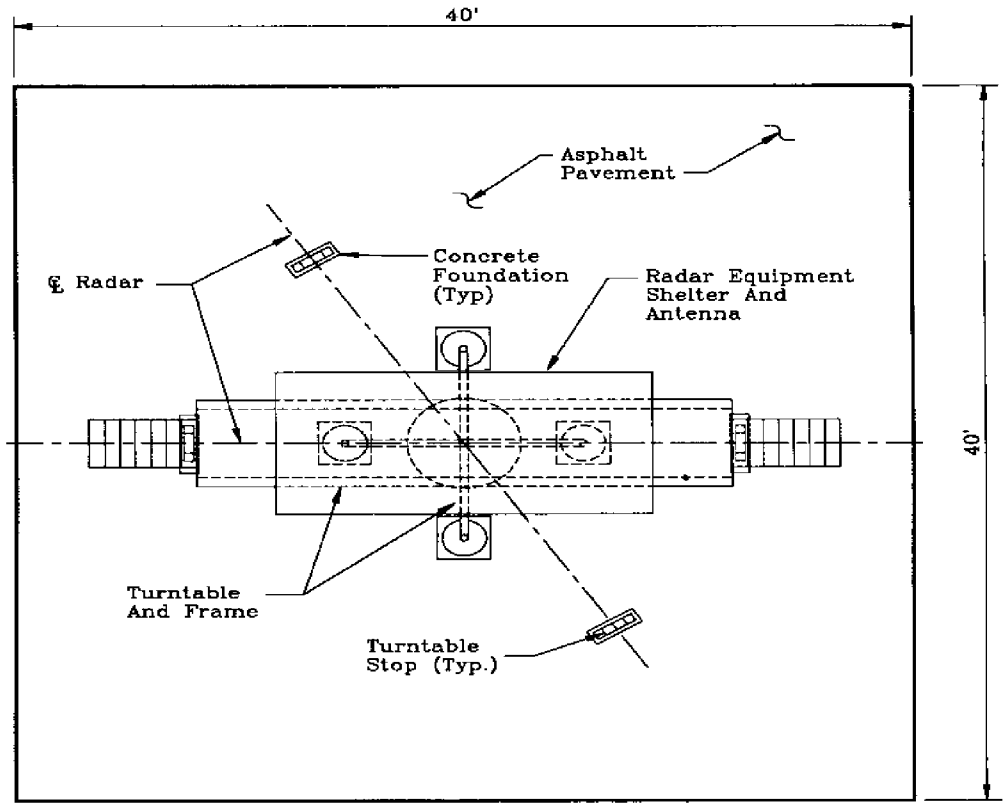
TITLE	DATE	FACILITY PLATE	SHEET
PALS Facility Design Notes	11/92	134-40	4 OF 4



TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility Siting Criteria	11/92	134-40	1 Of 8



TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility Site Plan	11/92	134-40	2 Of 8



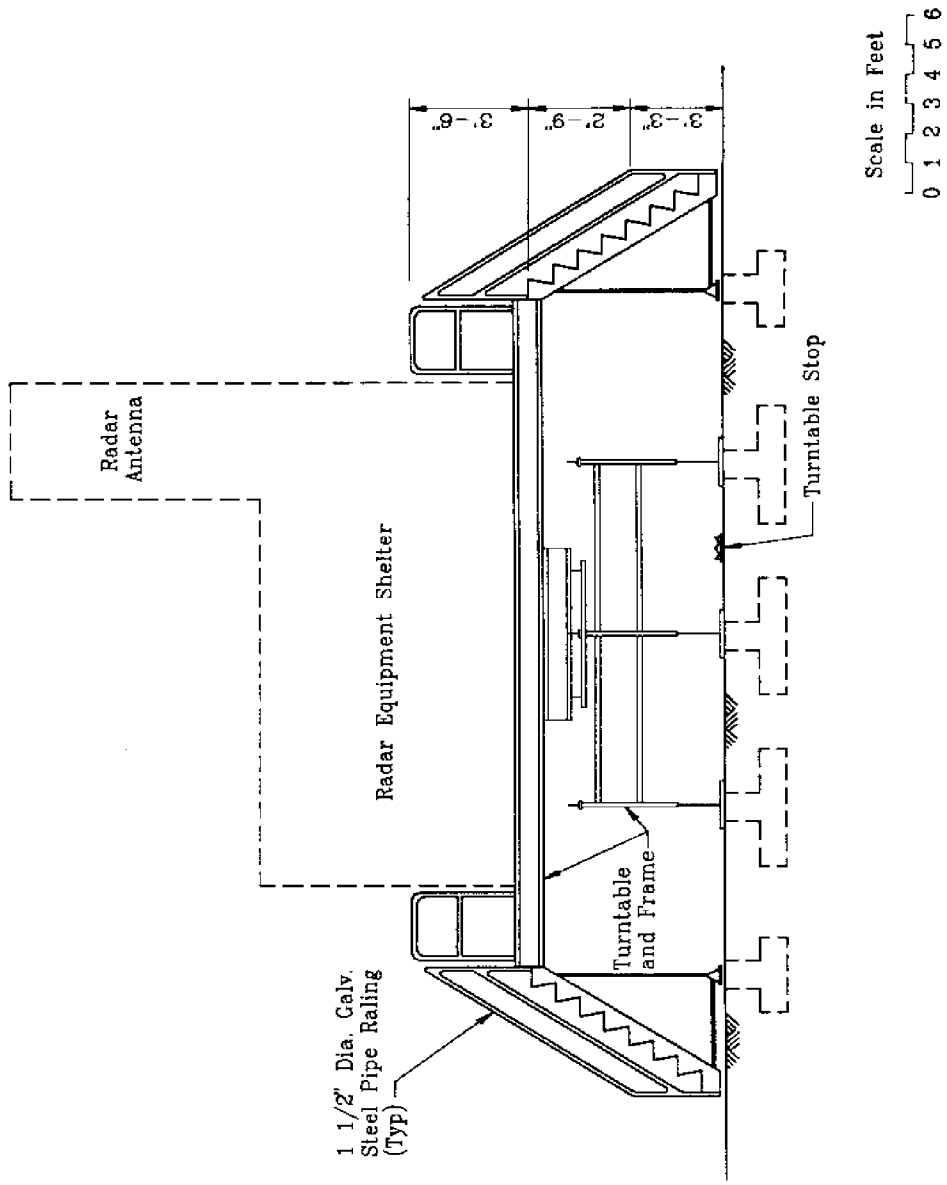
Note: Orientation of Radar Equipment to be in Accordance with BESEP.

Turntable & Turntable Control Equipment Provided by Radar Manufacturer.

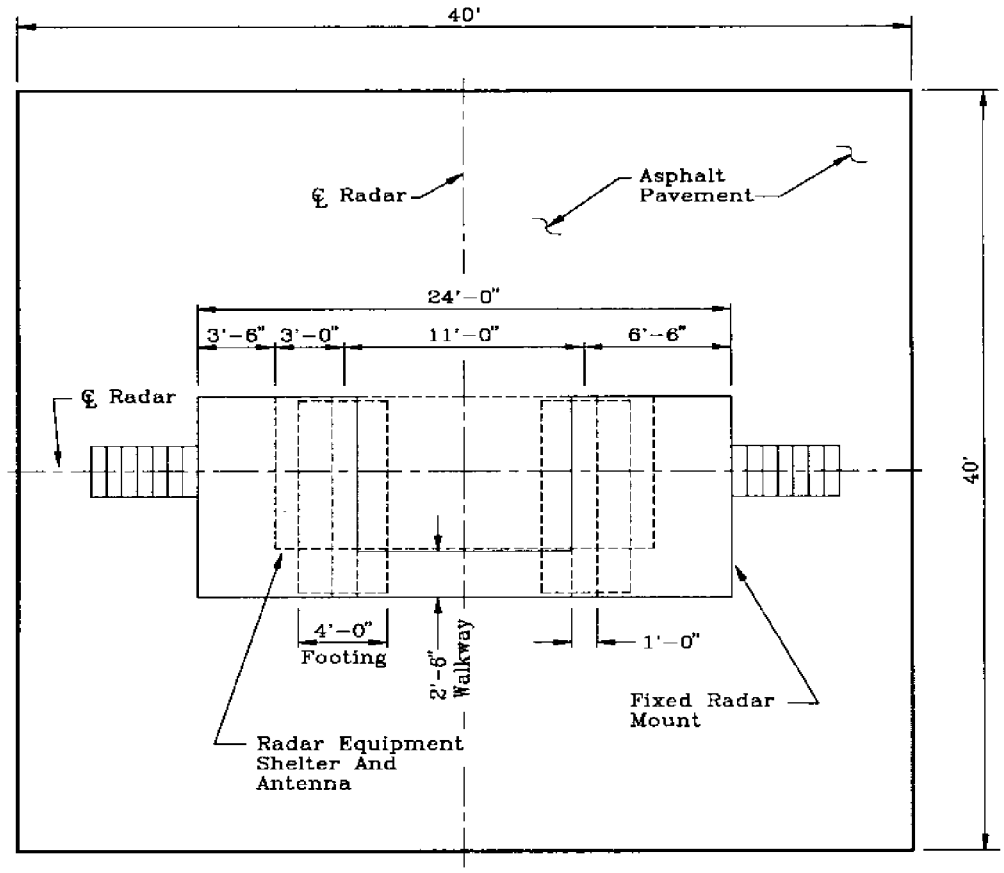
Scale in Feet

0 2 4 6 8 10

TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility: Turntable Mounted Radar Plan	11/92	134-40	3 Of 8



TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility: Turntable Mounted Radar Elevation	11/92	134-40	4 Of 8

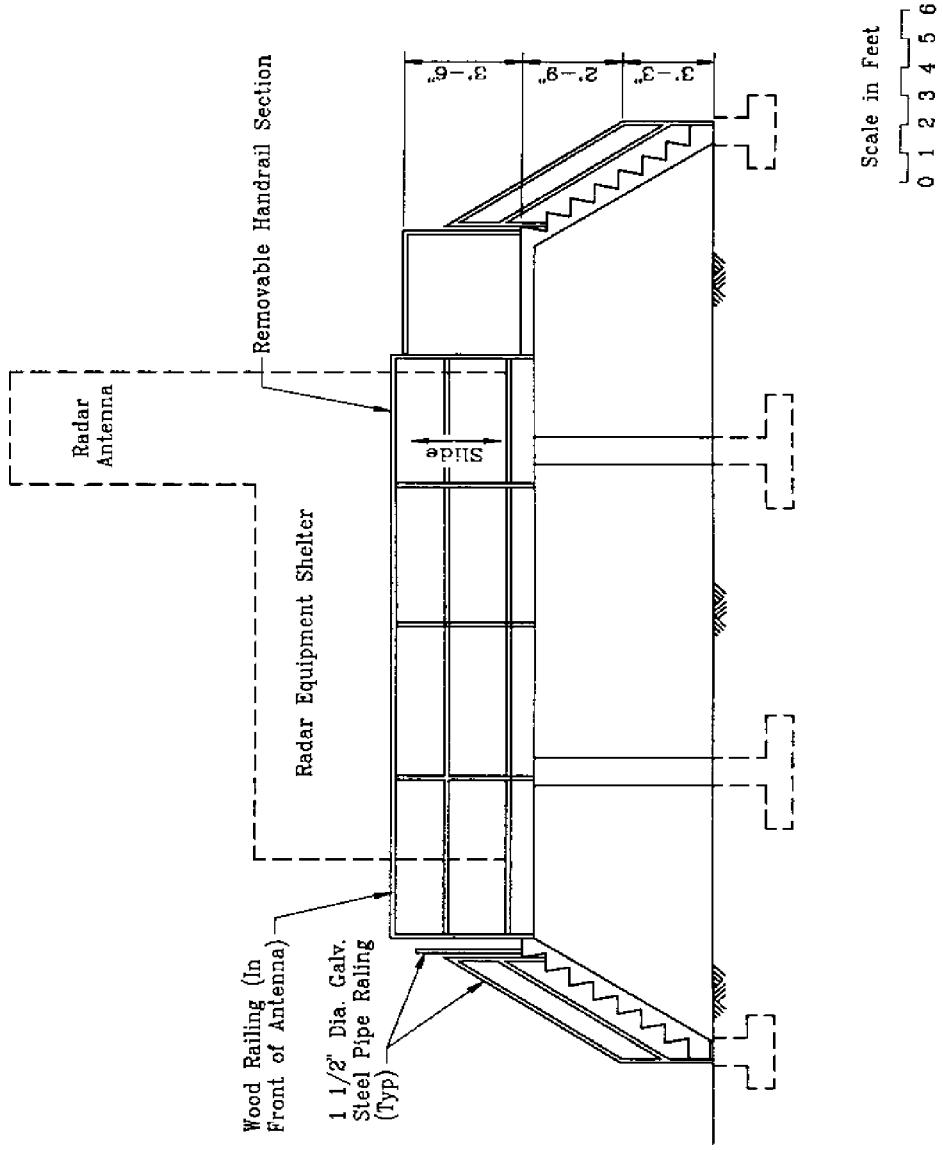


Note: Orientation of Radar Equipment to be in Accordance with BESEP.

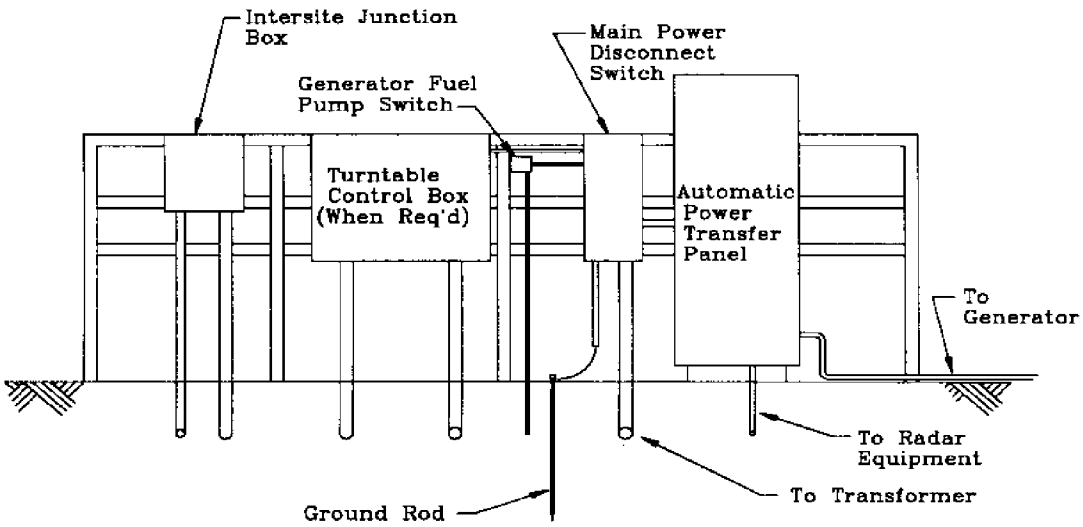
Scale in Feet

0 2 4 6 8 10

TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility: Fixed Mounted Radar Plan	11/92	134-40	5 Of 8



TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility: Fixed Mounted Radar Elevation	11/92	134–40	6 Of 8



ELEVATION

Not To Scale

TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility Electrical Hardstand	11/92	134-40	7 Of 8

	PAR
Plumbing Requirements (G.P.M.):	None
Heating Requirements (MBH):	None
Air Conditioning Requirements (MBH):	None
Electrical Requirements (KVA):	
Total;	
Connected Load	30.0
Estimated Demand	30.0
Emergency Generator (KW)	30.0

TITLE	DATE	FACILITY PLATE	SHEET
PAR Facility Design Notes	11/92	134-40	8 OF 8

3.2.2.11 Security. PALS and PAR facilities are normally located within the airfield restricted area which typically meet the minimum security measures for external security. When the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

3.2.2.12 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

Section 4: AIR SURVEILLANCE RADAR SYSTEMS

4.1 Function. Air surveillance radar facility buildings provide housing for electronic radar equipment used to detect and display location information about in-flight aircraft. These facilities are unattended.

4.2 Radar Systems. This section describes the facilities which support the radar systems discussed in pars. 4.2.1 and 4.2.2.

4.2.1 Airport Surveillance Radar (ASR). The ASR is an electronic radar system used to obtain the range and azimuth of an aircraft. When equipped with an ATCRBS, the ASR obtains altitude and identification of the aircraft. Information obtained by the ASR and ATCRBS is displayed in the MTRACON, the air traffic control tower with ground controlled approach or a joint control facility (JCF). The ASR is used to control aircraft on overflight, approach, and departure flight paths at a terminal facility. See Facility Plate 133-75 (Sheets 1 through 3 of 3).

4.2.2 Air Route Surveillance Radar (ARSR). The ARSR is an electronic radar system used to obtain the range and azimuth of an aircraft. When equipped with an ATCRBS, the ARSR obtains altitude and identification of the aircraft. Information is displayed in the FACSFAC or JCF. The ARSR is used to control airspace and enroute aircraft beyond the limits of an ASR. See Facility Plate 133-76 (Sheets 1 through 3 of 3).

4.3 Location. Locate the ASR and ARSR building adjacent to the radar facility antenna tower. Locate the ASR facility no less than one-half mile from the closest runway to be served. The ASR facility at Range Airspace Surveillance Sites (RASS) may be located further away. Locate the facility to minimize obstruction to radar transmissions. Refer to NAVELEX 0101,107; FAA Order 6310.6, Primary/Secondary Terminal Radar Siting Handbook; and FAA Order 6340.15, Primary/Secondary En Route Radar Siting Handbook.

4.4 Architectural and Structural Requirements. Provide the following:

a) Adequate space for equipment and equipment maintenance.

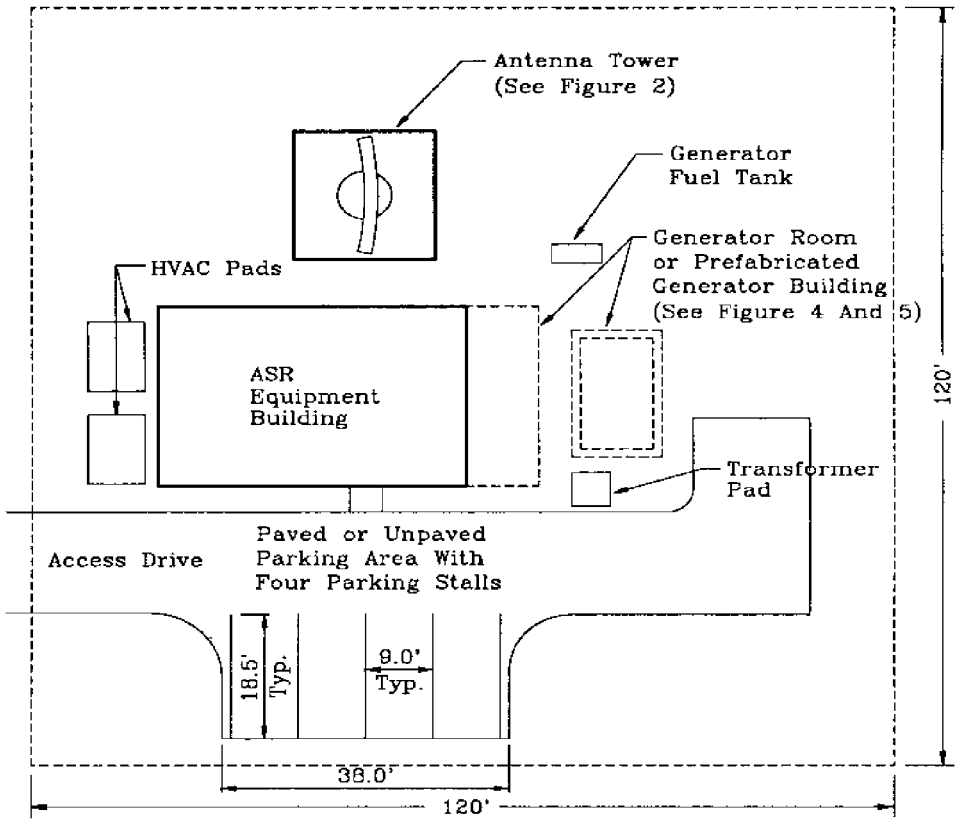
b) Clear ceiling height of 10 feet.

c) Work bench.

d) Restroom (refer to par. 2.4.8).

4.4.1 Structure. Design roof structural system to support cable trays and radar equipment wave guides.

4.4.2 Floors. Provide vinyl tile flooring in equipment room. Refer to par. 2.3.8.2.



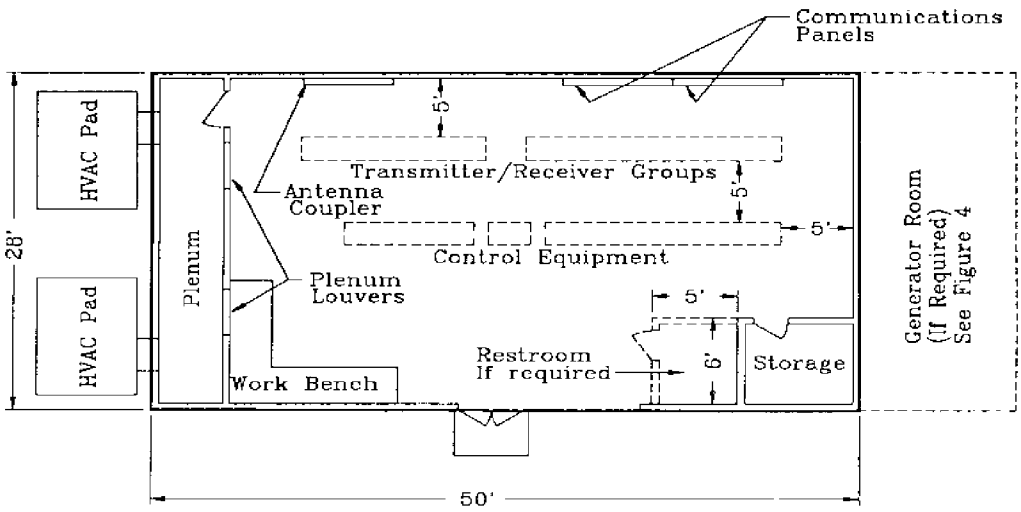
NOTE

Location of building and tower on site is dependent on equipment type and site conditions.
Coordinate location of transformer and generator fuel tank with type of generator enclosure.

Graphic Scale in Feet

0 20 40

TITLE	DATE	FACILITY PLATE	SHEET
ASR Facility Site Plan	11/92	133-75	1 Of 3



PLAN

Scale in Feet

0 2 4 6 8 10 20

TITLE	DATE	FACILITY PLATE	SHEET
ASR Building Layout	11/92	133-75	2 Of 3

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+)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),
*                                                                            *
*                                                                  ASR       *
*                                                                            *
*    Plumbing Requirements  (G.P.M.):                                        *
*      Water;                                                                *
*        Cold                                                       8        *
*        Hot                                                       None      *
*                                                                            *
*        Fire Protection Requirements                                        *
*        Not Included                                                        *
*                                                                            *
*    Heating Requirements  (BTU/HR x 1000):                                  *
*      (Inside Design Temperature = 70 Degs. F)                              *
*      Outside Design Temperature              -5 Degs. F          99        *
*                                              +5 Degs. F          86        *
*                                             +15 Degs. F          73        *
*                                             +25 Degs. F          35        *
*                                                                            *
*    Air Conditioning Requirements (BTU/HR x 1000):                          *
*      Based on 91 Degs. D.B.   76 Degs. W.B. Outside Design Conditions;     *
*      100% Outside Air                                                      *
*            Cooling Load                                               240  *
*                                                                            *
*      Heat rejected to conditioned spaces by energized test.                *
*                                                                            *
*      Equipment & parts under repair not included.                          *
*                                                                            *
*    Electrical Requirements  (KVA):                                         *
*      Lights;                                                               *
*         Connected Load                                               5.0  *
*         Estimated Demand                                             3.5  *
*                                                                            *
*      Power;                                                                *
*         Connected Load                                              88.0  *
*         Estimated Demand                                            61.6  *
*                                                                            *
*      Air Conditioning;                                                     *
*         Connected Load                                              26.0  *
*         Estimated Demand                                            18.2  *
*                                                                            *
*      Total;                                                                *
*         Connected Load                                             119.0  *
*         Estimated Demand                                            83.3  *
*                                                                            *
*                                                                            *
*    Emergency Generator  (KW)                                        75.0  *
*                                                                            *
*    Areas  (SF):                                                            *
*      Gross area including mechanical                                       *
*      equipment room                                                1,400   *
*                                                                            *
*    General Notes:                                                          *
*      Plumbing cold water requirements are for the restroom, when required. *
                                          *
*                                                                            *
/))))))))))))))))))))))))))))))))))))))0)))))))0))))))))))))))))))))))0))))))))1
* TITLE                              * DATE  *   FACILITY PLATE    *  SHEET *
*          ASR Facility Design Notes  * 11/92 *       133-75        * 3 OF 3 *
.))))))))))))))))))))))))))))))))))))))2)))))))2))))))))))))))))))))))2))))))))-
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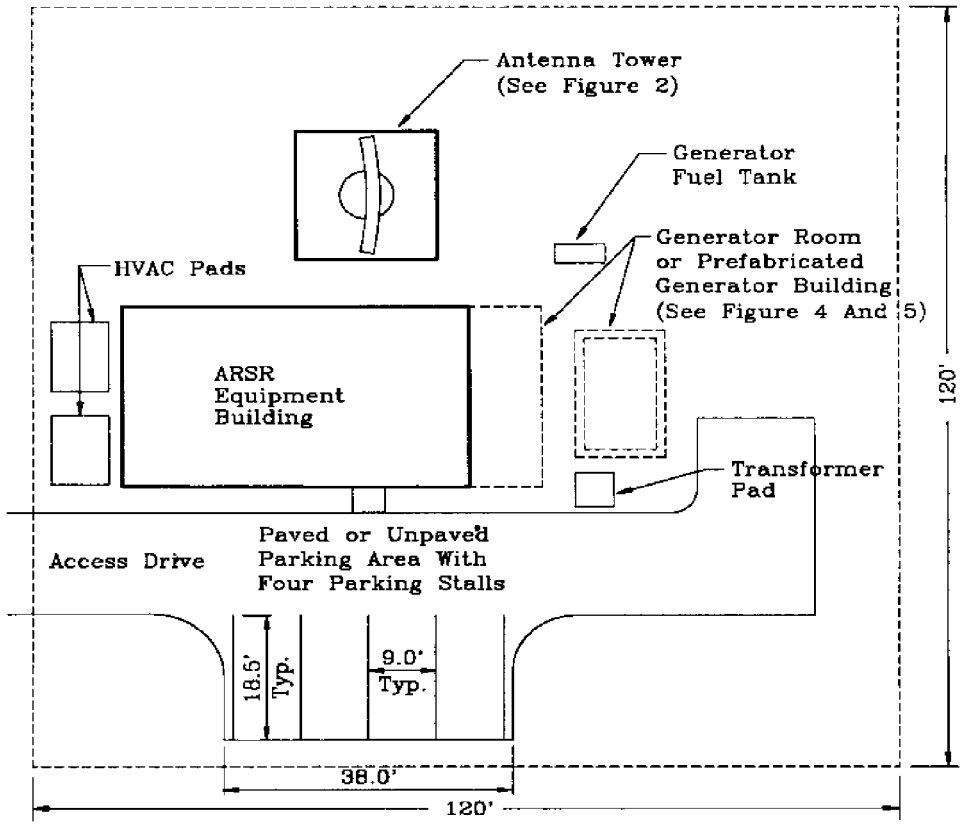


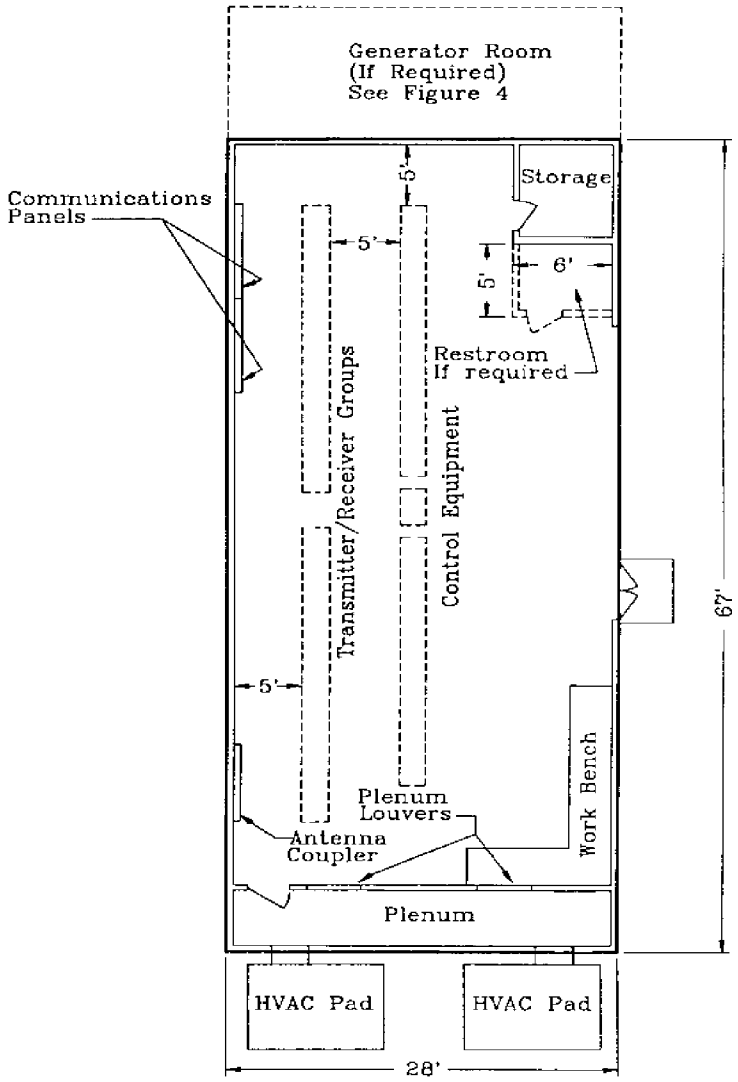
NOTE

Location of building and tower on site is dependent on equipment type and site conditions.
Coordinate location of transformer and generator fuel tank with type of generator enclosure.

Graphic Scale in Feet

0 20 40

TITLE	DATE	FACILITY PLATE	SHEET
ARSR Facility Site Plan	11/92	133-76	1 Of 3



PLAN

Scale in Feet

0 2 4 6 8 10 20

TITLE	DATE	FACILITY PLATE	SHEET
ARSR Building Layout	11/92	133-76	2 Of 3

	ARSR
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 70 Degs. F)	
Outside Design Temperature -5 Degs. F	133
+5 Degs. F	115
+15 Degs. F	98
+25 Degs. F	47
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	322
Heat rejected to conditioned spaces by energized test.	
Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	6.7
Estimated Demand	4.7
Power;	
Connected Load	117.9
Estimated Demand	82.5
Air Conditioning;	
Connected Load	34.8
Estimated Demand	24.4
Total;	
Connected Load	159.4
Estimated Demand	111.6
Emergency Generator (KW)	100
Areas (SF):	
Gross area including mechanical equipment room	1,876

General Notes:

Plumbing cold water requirements are for the restroom, when required.

TITLE	DATE	FACILITY PLATE	SHEET
ARSR Facility Design Notes	11/92	133-76	3 OF 3

4.4.3 Ceilings. Provide acoustical tile ceilings. Refer to par. 2.3.8.9.

4.4.4 Windows. Do not provide windows.

4.5 Mechanical Requirements. Design mechanical systems to meet the criteria in pars. 2.4, 4.5.1, and 4.5.2. Ensure mechanical systems do not interfere with radar transmissions.

4.5.1 Heating. Provide a minimum temperature of 70 degrees F.

4.5.2 Air Conditioning. Provide two separate air conditioning systems, each capable of handling the entire load independently. One unit will function as a secondary backup unit should the primary unit fail. Provide the following:

a) Separate thermostat controls for each unit.

b) Interlocked primary and secondary units to prevent simultaneous operation.

4.6 Electrical Requirements. To avoid potential interference with radar transmissions locate power, communications, and control cables underground within 1,500 feet from the antenna site. Ensure electrical systems do not interfere with radar transmissions.

4.6.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the entire radar facility.

4.6.2 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use the anticipated load to determine the size of the UPS.

4.7 Security. Air surveillance radar facilities are normally located within restricted areas which would typically meet the minimum security measures for external security. When the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

4.8 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

Section 5: COMMUNICATIONS FACILITIES

5.1 Function. Communications facilities contains remote electronic communications and linking equipment used for ground-to-air communications with tactical and transient aircraft, to control aircraft departures and arrivals, and for communications with other agencies involved in air traffic control or aviation support. Communications facilities consist of the following buildings:

5.1.1 Radio Receiver Building. The receiver building contains receiver and repeater equipment, antenna coupling equipment, and maintenance and test equipment. See Facility Plate 131-35 (Sheets 1 through 3 of 3).

5.1.2 Radio Transmitter Building. The transmitter building contains transmitting equipment, antenna coupling equipment, and maintenance and test equipment. See Facility Plate 131-50 (Sheets 1 through 3 of 3).

5.1.3 Collocated Radio Transmitter and Receiver Building. The collocated transmitter and receiver building contains transmitting equipment, antenna coupling equipment, receiver and repeater equipment, and maintenance and test equipment. See Facility Plate 131-35/50 (Sheets 1 through 3 of 3).

5.1.4 Remote Data Link Building. The remote data link building provides housing for a suite of communications linking equipment. Equipment suites typically include satellite communications, radio, and television microwave. See Facility Plate 131-20 (Sheets 1 through 3 of 3).

5.2 Location. Locate radio communications buildings in antenna field to provide minimum length of cable from antenna to radio communications equipment. Refer to the BESEP and consider planned expansion of airfield systems when locating communications facilities. Refer to NAVELEX 0101, 107 and FAA Order 6580.2, Remote Communications Facility Siting Criteria Handbook.

5.3 Architectural and Structural Requirements. Provide the following:

a) Adequate space for equipment and equipment maintenance.

b) Clear ceiling height of 10 feet.

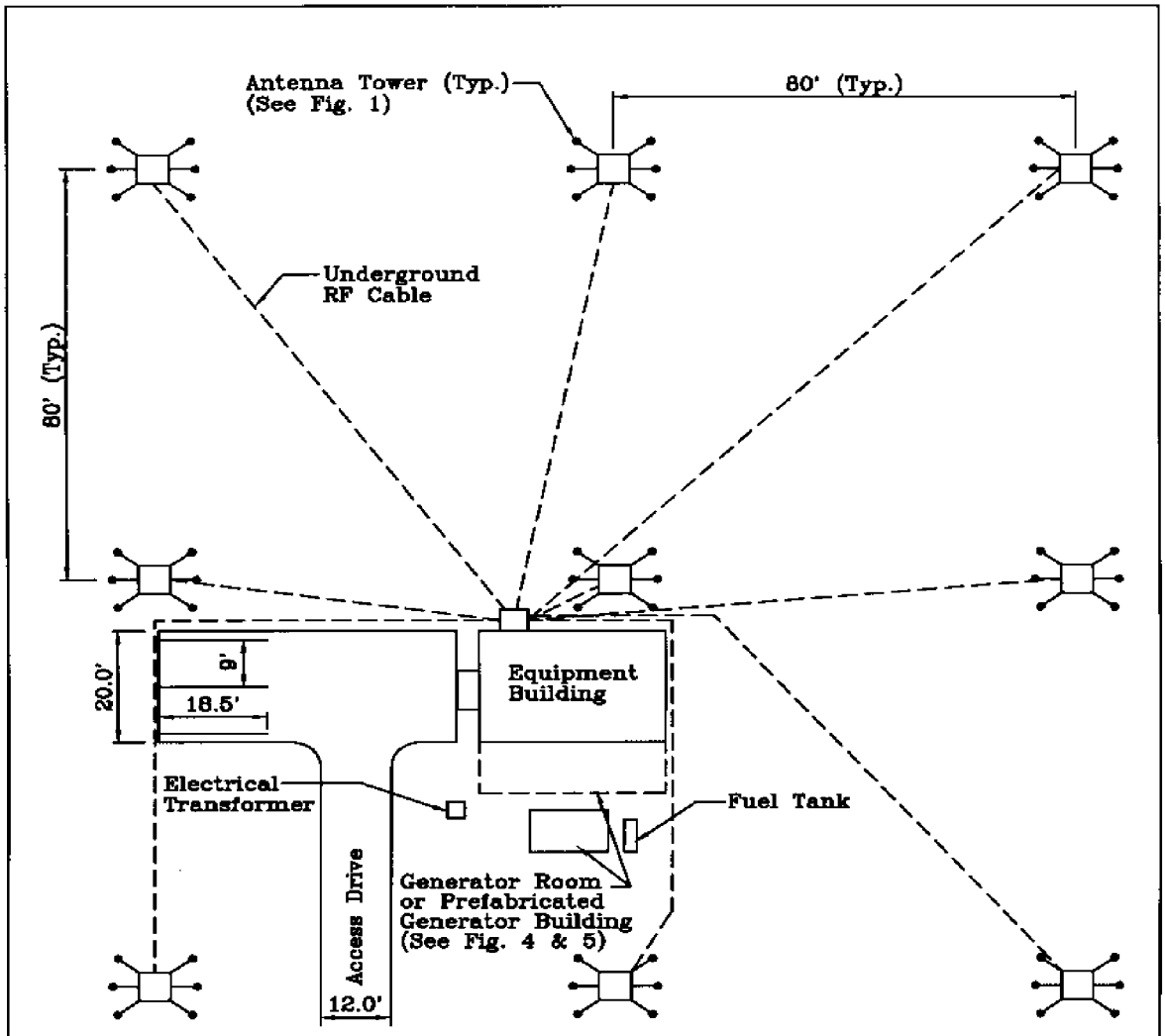
c) Work bench.

d) Restroom (refer to par. 2.4.8).

e) Floor trenches with covers or suspended cable trays.

5.3.1 Structure. Design roof framing system to support roof-mounted antennas and suspended cable trays, when required.

5.3.2 Windows. Do not provide windows.



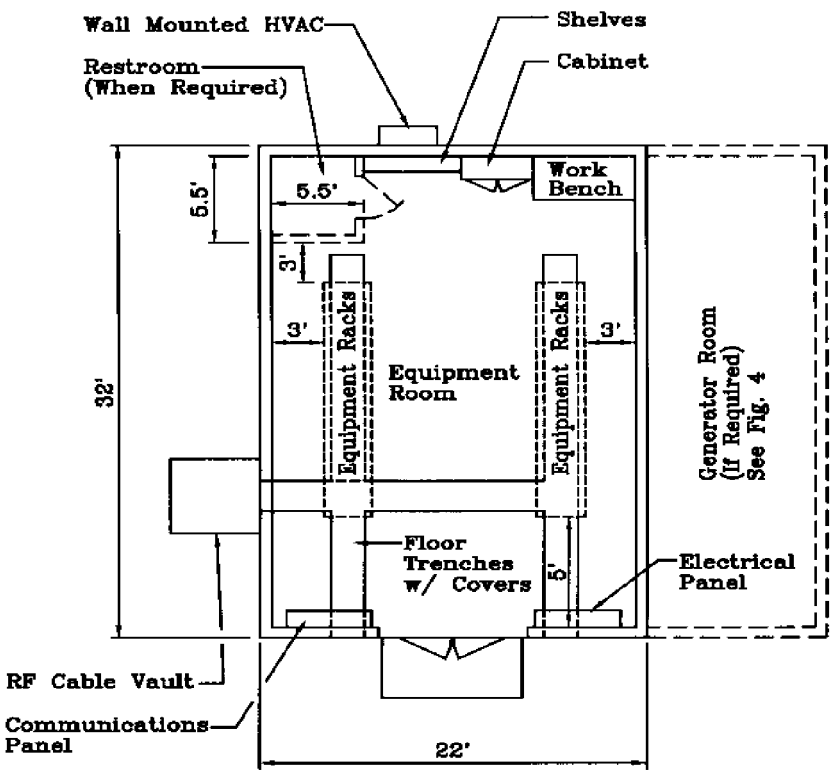
Notes:
1. Number of Antenna Towers to be in accordance with BESEP.
2. Coordinate location of Generator Fuel Tank and Transformer with type of Generator Enclosure.

Graphic Scale in Feet

0 10 50

Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

TITLE	DATE	FACILITY	PLATE	SHEET
Radio Receiver Facility Site Plan		11/92	131-35	1 Of 3



Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

Graphic Scale in Feet

0 10 20 30

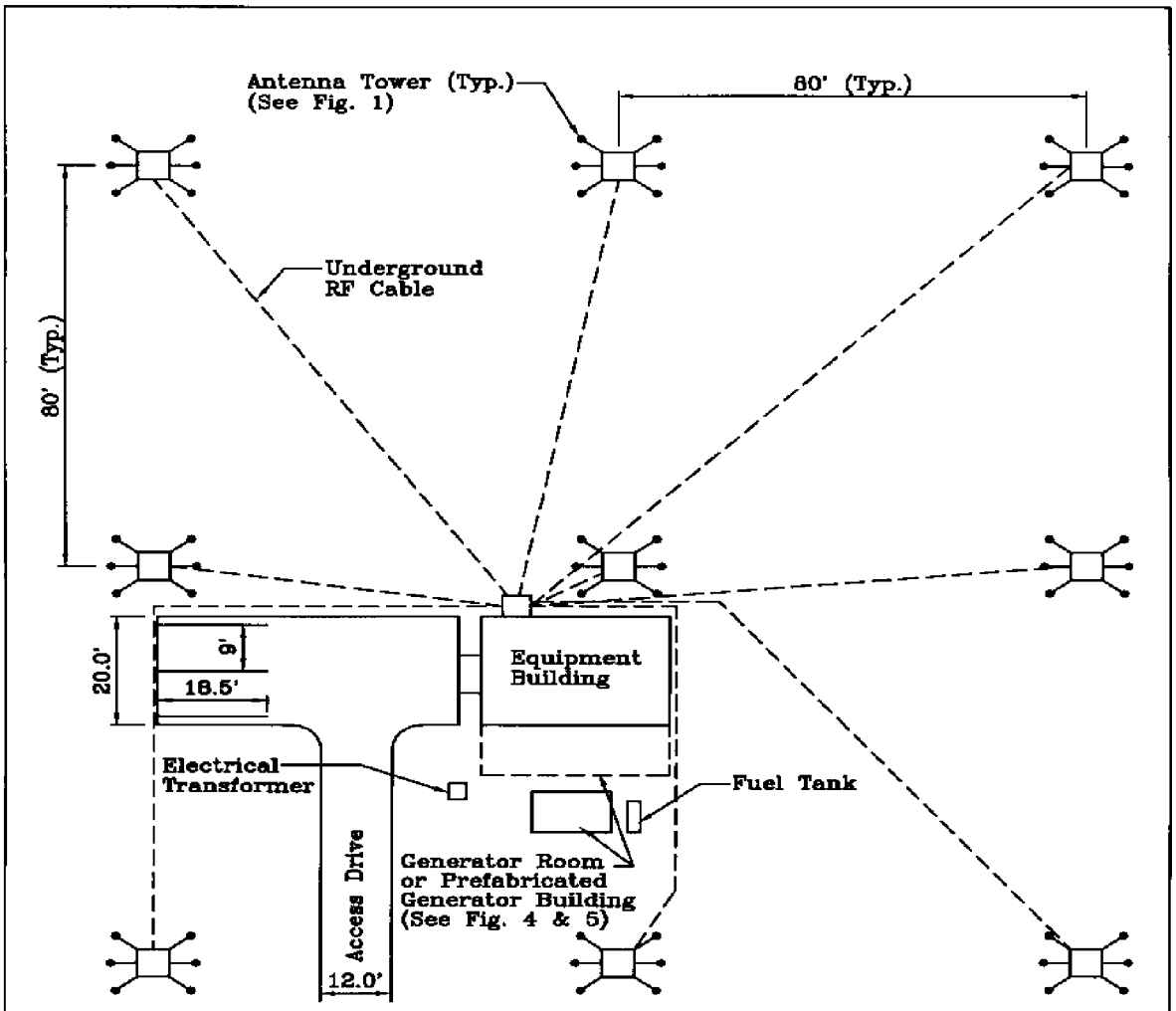
TITLE	DATE	FACILITY PLATE	SHEET
Radio Receiver Building Layout	11/92	131-35	2 Of 3

	RECEIVER
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 40 Degs. F)	
Outside Design Temperature -5 Degs. F	25
+5 Degs. F	20
+15 Degs. F	14
+25 Degs. F	9
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	78
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	2.0
Estimated Demand	2.0
Power;	
Connected Load	21.0
Estimated Demand	14.0
Air Conditioning;	
Connected Load	13.0
Estimated Demand	13.0
Total;	
Connected Load	36.0
Estimated Demand	29.0
Emergency Generator (KW)	25.0
Areas (SF):	
Gross area including mechanical equipment room	704

General Notes:

Plumbing cold water is for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
Radio Receiver Facility Design Notes	11/92	131-35	3 OF 3



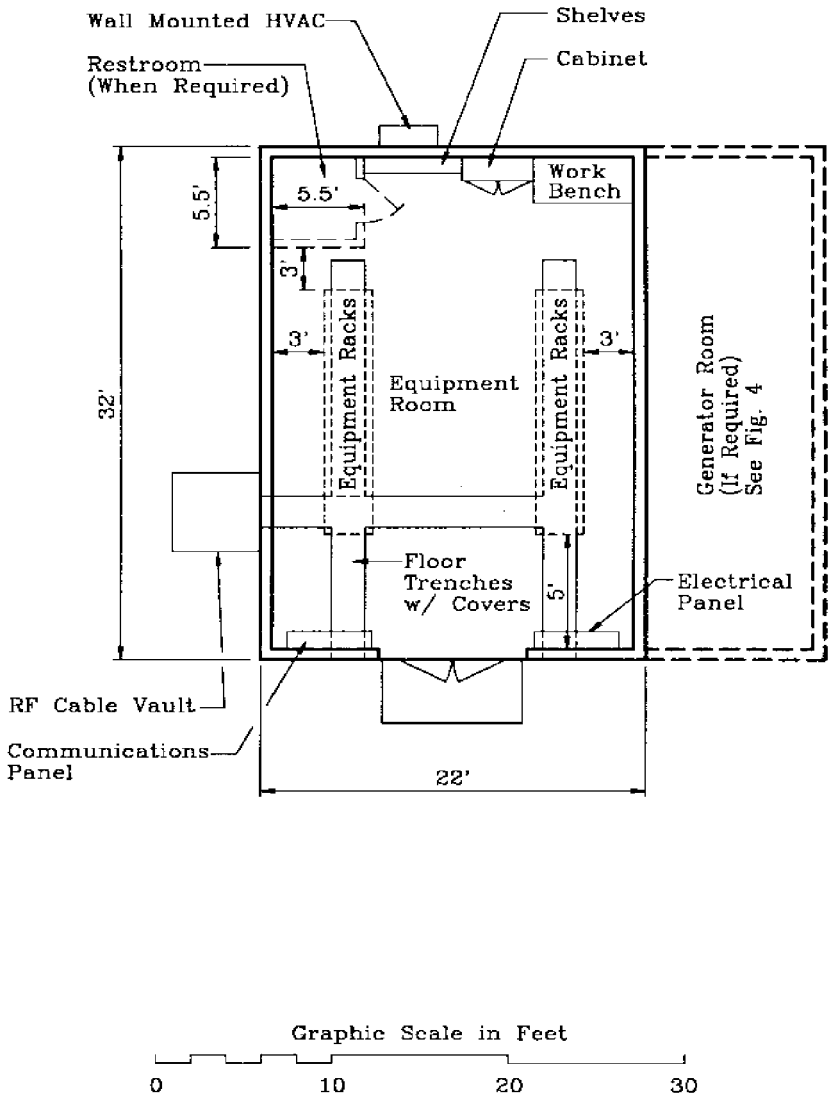
Notes:
1. Number of Antenna Towers to be in accordance with BESEP.
2. Coordinate location of Generator Fuel Tank and Transformer with type of Generator Enclosure.

Graphic Scale in Feet

0 10 50

Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

TITLE	DATE	FACILITY PLATE	SHEET
Radio Transmitter Facility Site Plan	11/92	131-50	1 Of 3



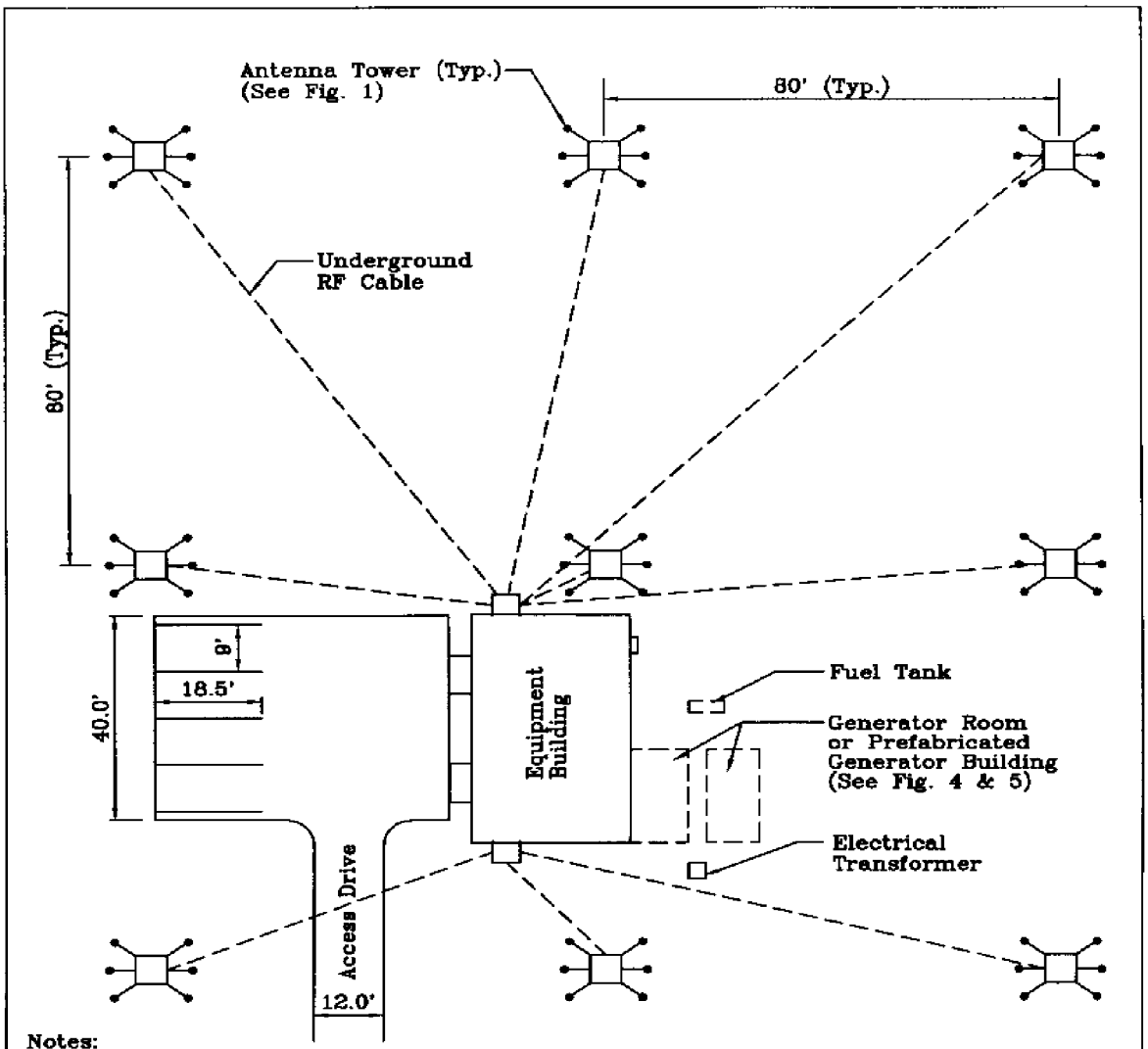
TITLE	DATE	FACILITY PLATE	SHEET
Radio Transmitter Building Layout	11/92	131-50	2 Of 3

	TRANSMITTER
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 40 Degs. F)	
Outside Design Temperature -5 Degs. F	25
+5 Degs. F	20
+15 Degs. F	14
+25 Degs. F	9
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	78
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	2.0
Estimated Demand	2.0
Power;	
Connected Load	21.0
Estimated Demand	14.0
Air Conditioning;	
Connected Load	13.0
Estimated Demand	13.0
Total;	
Connected Load	36.0
Estimated Demand	29.0
Emergency Generator (KW)	25.0
Areas (SF):	
Gross area including mechanical equipment room	704

General Notes:

Plumbing cold water is for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
Radio Transmitter Facility Design Notes	11/92	131-50	3 OF 3



Notes:
1. Number of Antenna Towers to be in accordance with BESEP.
2. Coordinate location of Generator Fuel Tank and Transformer with type of Generator Enclosure.

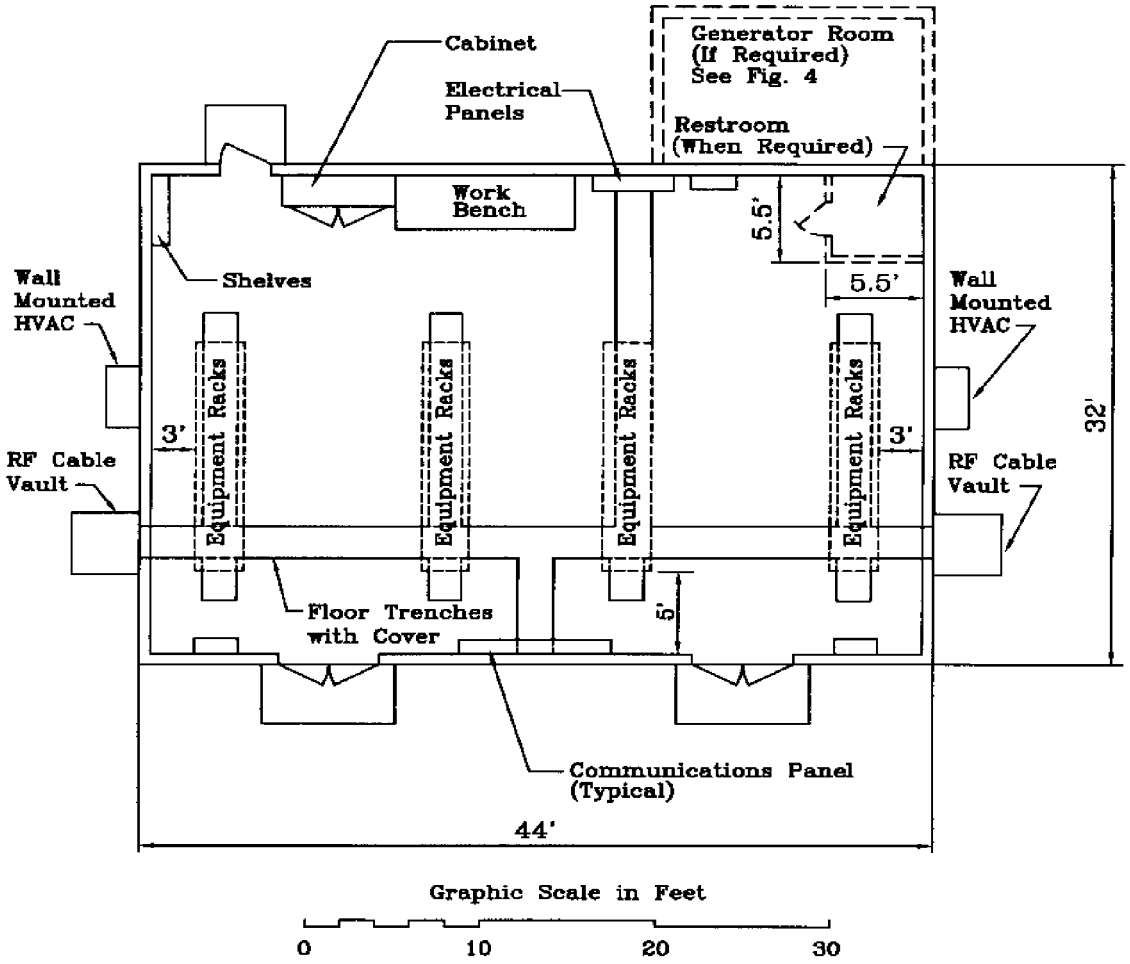
Any Facility located within the Airfielf Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA).

Graphic Scale in Feet

0 10 50

TITLE	DATE	FACILITY PLATE	SHEET
Collocated Radio Transmitter And Receiver Facility Site Plan	11/92	131-35/50	1 Of 3

Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

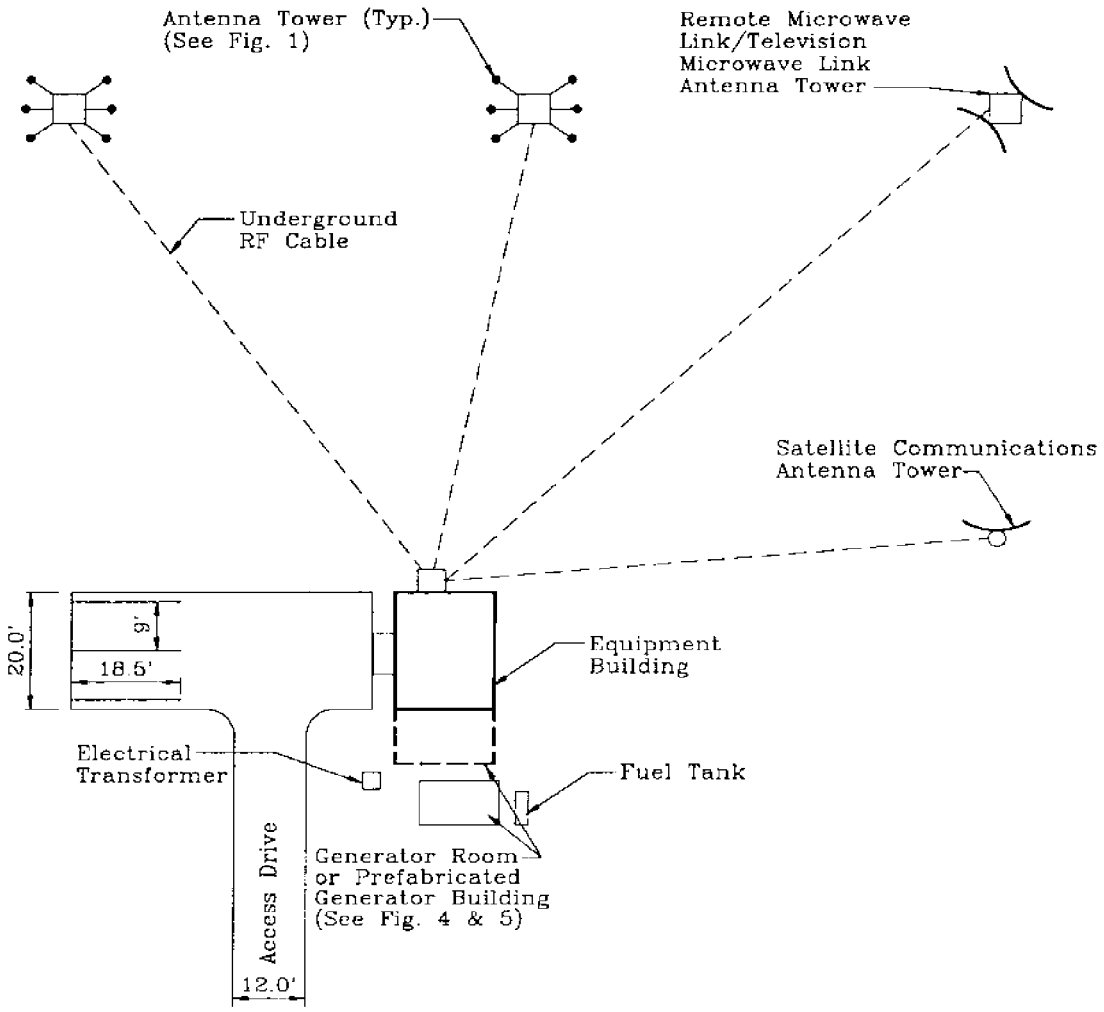


TITLE	DATE	FACILITY PLATE	SHEET
Collocated Radio Transmitter And Receiver Building Layout	11/92	131-35/50	2 Of 3

	Collocated Transmitter and Receiver
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 40 Degs. F)	
Outside Design Temperature -5 Degs. F	36
+5 Degs. F	28
+15 Degs. F	20
+25 Degs. F	12
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	147
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	4.0
Estimated Demand	2.6
Power;	
Connected Load	41.0
Estimated Demand	26.7
Air Conditioning;	
Connected Load	54.0
Estimated Demand	35.1
Total;	
Connected Load	99.0
Estimated Demand	64.4
Emergency Generator (KW)	50.0
Areas (SF):	
Gross area including mechanical equipment room	1,408

General Notes:
Plumbing cold water is for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
Collocated Radio Transmitter And Receiver Facility Design Notes	7/92	131-35/50	3 OF 3

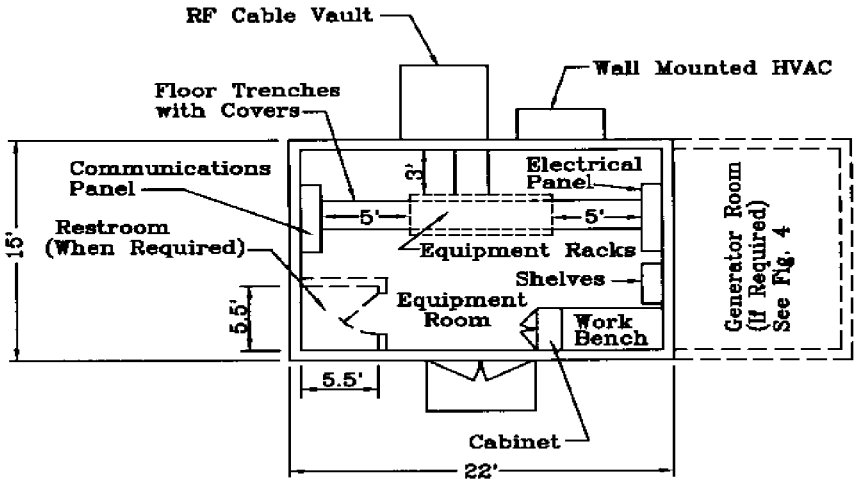


Notes:
1. Arrangement, Number and Type of Antenna Towers to be in Accordance with BESEP.
2. Coordinate Location of Generator Fuel Tank and Transformer with Type of Generator Enclosure.

Graphic Scale in Feet

0 10 50

TITLE	DATE	FACILITY PLATE	SHEET
Remote Data Link Facility Site Plan	11/92	131-20	1 Of 3



Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

Graphic Scale in Feet

0 10 20 30

TITLE	DATE	FACILITY PLATE	SHEET
Remote Data Link Building Layout	11/92	131-20	2 Of 3

	Data Link
Plumbing Requirements (G.P.M.):	
Water;	
Cold	8
Hot	None
Fire Protection Requirements Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 40 Degs. F)	
Outside Design Temperature -5 Degs. F	13
+5 Degs. F	10
+15 Degs. F	7
+25 Degs. F	5
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	39
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	1.0
Estimated Demand	1.0
Power;	
Connected Load	10.5
Estimated Demand	6.8
Air Conditioning;	
Connected Load	14.5
Estimated Demand	9.4
Total;	
Connected Load	26.0
Estimated Demand	17.2
Emergency Generator (KW)	15.0
Areas (SF):	
Gross area including mechanical equipment room	330

General Notes:

Plumbing cold water is for restrooms, when required.

TITLE	DATE	FACILITY PLATE	SHEET
Remote Data Link Facility Design Notes	11/92	131-20	3 OF 3

5.3.3 Premanufactured Buildings. Consider using a premanufactured building as described in par. 2.3.12.

5.4 Electrical Requirements. To avoid potential interference with radio communications, locate power, communications, and control cables underground within 1,000 feet of the antenna field. Ensure facility electrical systems do not interfere with radio communications.

5.4.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the entire communications facility.

5.5 Security. Communications facilities are normally located within restricted areas which would typically meet the minimum security measures for external security. When the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

5.6 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

Section 6: AIR TRAFFIC CONTROL FACILITIES

6.1 Military Terminal Radar Approach Control Facility (MTRACON)

6.1.1 Function. The MTRACON building contains equipment used for controlling air traffic and is staffed by air traffic controllers and air operations, administrative, and maintenance support personnel. The ASR, PAR, PALS, transmitting and receiving sites, and navigation aids (NAVAIDS), which are remotely located, are monitored and controlled in the MTRACON. The MTRACON contains an IFR control room which includes the radar display consoles and communications control equipment. An adjacent terminal equipment room houses automation central (or terminal) equipment, maintenance positions and audio/video tape recorders. An office for the FAA liaison officer is required at joint operated Navy/FAA terminal radar approach control facilities.

6.1.2 Location. Locate the MTRACON building adjacent to the air traffic control tower and aircraft operations building where siting requirements permit.

6.1.3 Architectural and Structural Requirements. See Facility Plate 133-72 (Sheets 1 through 3 of 3). Provide the following:

a) Removable, modular, access flooring in the IFR and terminal equipment rooms with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. See par. 2.3.5.2.

b) A 9-foot clear ceiling height above accessible flooring.

c) Built-in workbenches and shelving in the terminal equipment room.

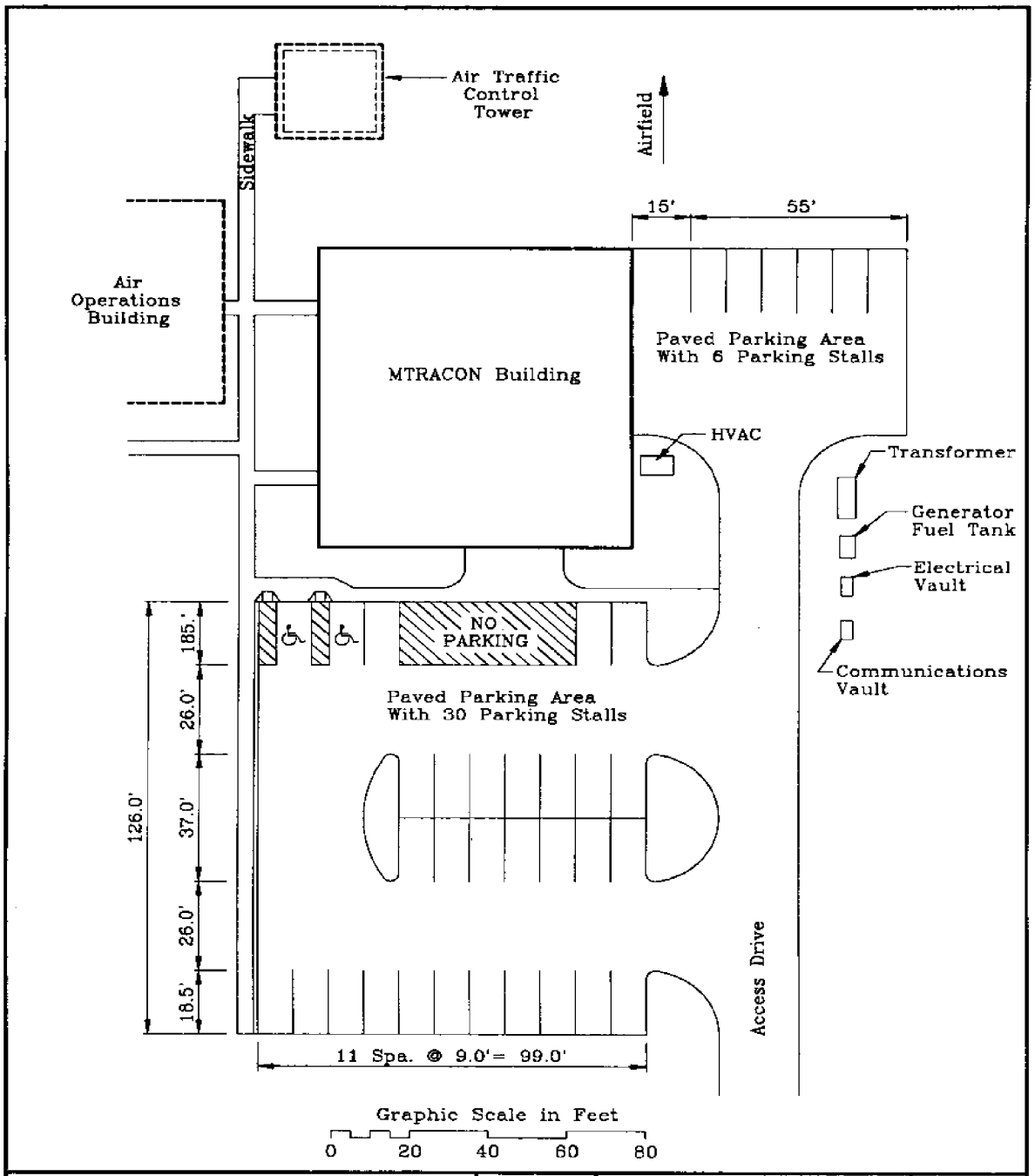
d) Facility and restroom areas readily accessible by the physically handicapped.

e) Interior and exterior acoustical treatment to attain the room criteria described in par. 2.3.1. Soft textured acoustical wall panels in the IFR control room.

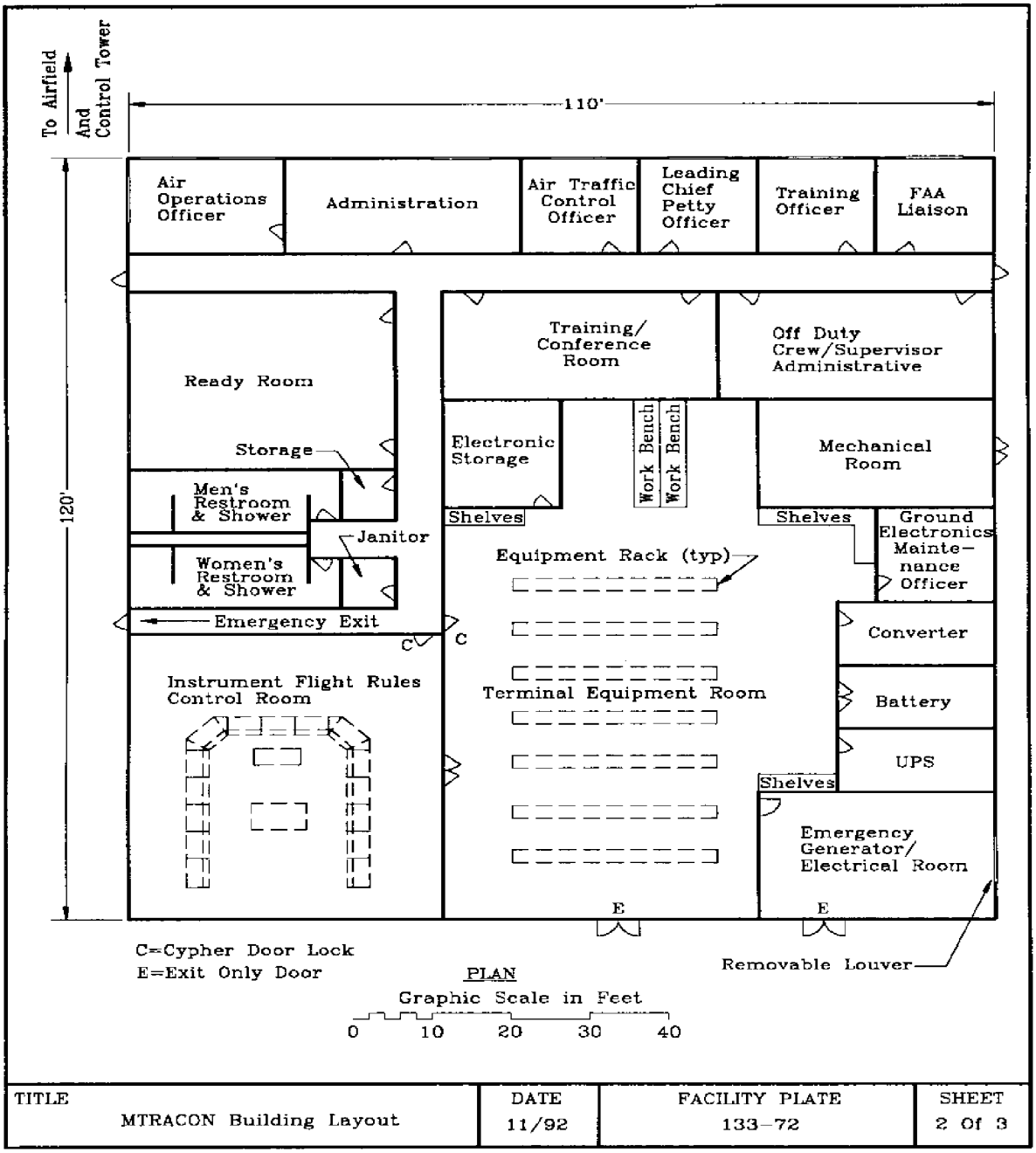
f) Cable troughs or conduits between the air traffic control tower and the MTRACON for intrafacility cabling. The exact dimensions of the cable trough or size and number of conduits are specified in the BESEP.

6.1.3.1 Windows. Do not provide windows in IFR or terminal equipment rooms. Provide insulated glazing for noise reduction in administrative areas. Refer to par. 2.3.10.

6.1.4 Electrical Requirements



TITLE	DATE	FACILITY PLATE	SHEET
MTRACON Facility Site Plan	11/92	133-72	1 Of 3



TITLE	DATE	FACILITY PLATE	SHEET
MTRACON Building Layout	11/92	133-72	2 Of 3

	MTRACON
Plumbing Requirements (GPM):	
Water;	
Cold	65
Hot	
Recovery Rate (100 Deg. Rise)	30
Storage (Gal.)	40
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	110
+5 Degs. F	100
+15 Degs. F	80
+25 Degs. F	65
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	523
Heat rejected to conditioned spaces by energized test.	
Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	44.0
Estimated Demand	31.0
Power;	
Connected Load	116.0
Estimated Demand	81.0
Air Conditioning;	
Connected Load	124.0
Estimated Demand	87.0
Total;	
Connected Load	284.0
Estimated Demand	199.0
Emergency Generator (KW)	150.0
Areas (SF):	
Gross area including mechanical equipment room	13,200
General Notes:	

TITLE	DATE	FACILITY PLATE	SHEET
MTRACON Facility Design Notes	11/92	133-72	3 OF 3

6.1.4.1 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use the anticipated load to determine the size of the UPS.

6.1.4.2 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in the IFR and terminal equipment rooms.

c) Mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

6.1.4.3 400-Hz Power. Provide 400-Hz power in accordance with par. 2.5.9 when required by the BESEP.

6.1.5 Lighting. Design lighting in accordance with par. 2.5.6. Provide dimmer adjustable red lights in the IFR room.

6.1.6 Security. The MTRACON is normally located within restricted areas which typically meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. Security at the main building entrance usually requires a single entry point with visitor control. Remote locks, video cameras, card readers, and/or key pads may be required by COMNISCOM as components of the IDS. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6. Provide the following:

a) Electronic cipher door locks at interior entrance doors to IFR and terminal equipment rooms.

b) Exterior doors in emergency generator/electrical and terminal equipment rooms with no access hardware on the outside.

6.1.7 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

6.2 Fleet Area Control and Surveillance Facility (FACSFAC)

6.2.1 Function. The FACSFAC building houses the Navy Tactical Data System/Advanced Combat Direction System (NTDS/ACDS) equipment and personnel to provide a variety of services to air, surface, and subsurface units. These services are provided to both military and civilian users and include radar

surveillance and various forms of air traffic control in warning and other special airspace areas. Other services include surface operating area management, ground controlled intercept, operating area scheduling, and range control. The FACSFAC normally operates continuously.

6.2.2 Location. Locate the FACSFAC building as a stand-alone facility.

6.2.3 Architectural and Structural Requirements. See Facility Plate 133-73 (Sheets 1 through 3 of 3). Provide the following:

a) Removable, modular, access flooring in the operations, NTDS/ACDS system, and the equipment/maintenance rooms with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

b) Interior and exterior acoustical treatment to attain the room criteria described in par. 2.3.1. Soft textured acoustical wall panels and movable sound absorbent partitions in the operations room.

c) A clear ceiling height of 14 feet (finished floor to ceiling) in the operations area.

d) A tiered seating area in projection auditorium.

e) RF shielding throughout the crypto room. Refer to MIL-HDBK-1195, Radio Frequency Shielded Enclosures and NAVFAC Instruction 11010.44. Shielding requirements shall be confirmed by Naval Electronics Systems Security Engineering Center (NESSEC).

f) Facility and restroom areas readily accessible by the physically handicapped.

6.2.3.1 Windows. Do not provide windows in operations, NTDS/ACDS system, and equipment/maintenance rooms. Provide insulated glazing for noise reduction in administrative areas. Refer to par. 2.3.10.

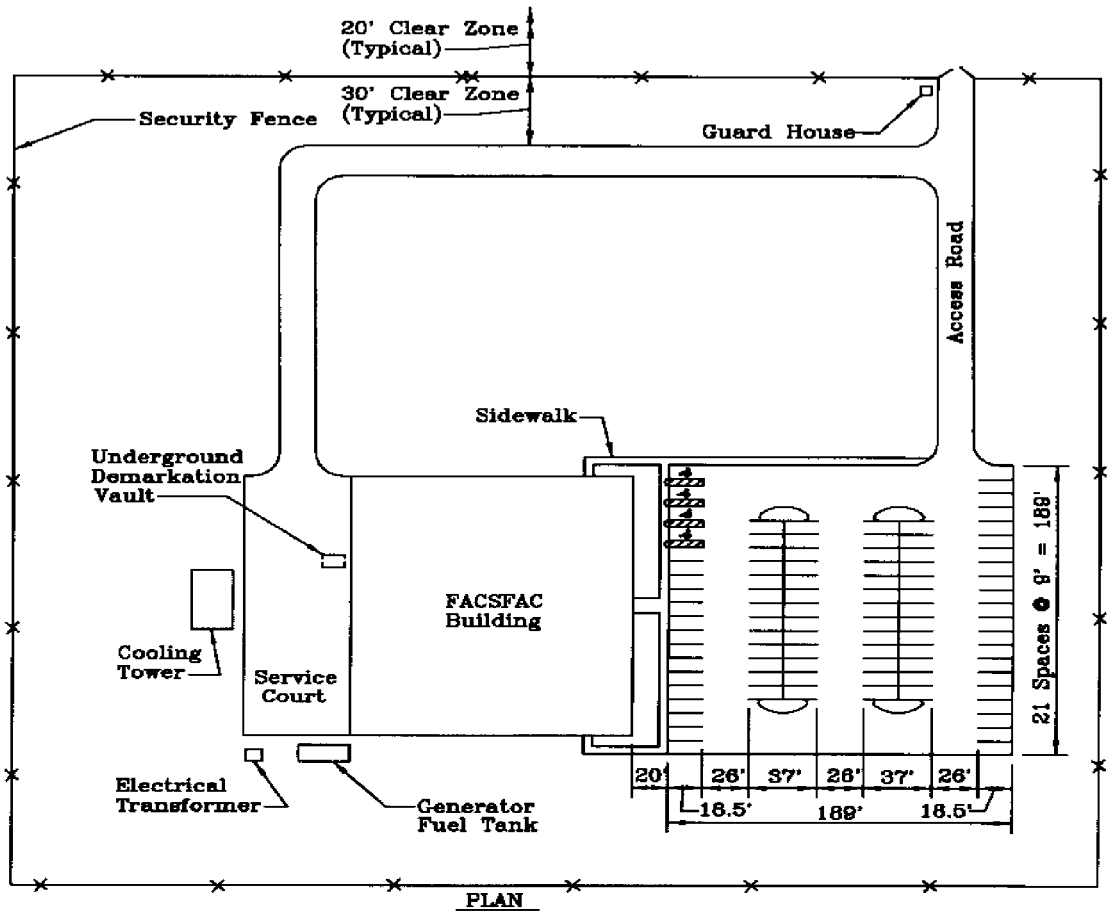
6.2.4 Mechanical Requirements. Design the mechanical system to meet the criteria in pars. 2.4, 6.2.4.1, and 6.2.4.2. Provide the following:

a) Automatic thermostatic control.

b) A four-pipe chilled/hot water distribution system with separate air handlers for each zone or dehumidifying system to work in conjunction with the air conditioning system.

c) Capability for future expansion of the HVAC system. Use piping designed for low friction and velocity losses at the maximum flows expected.

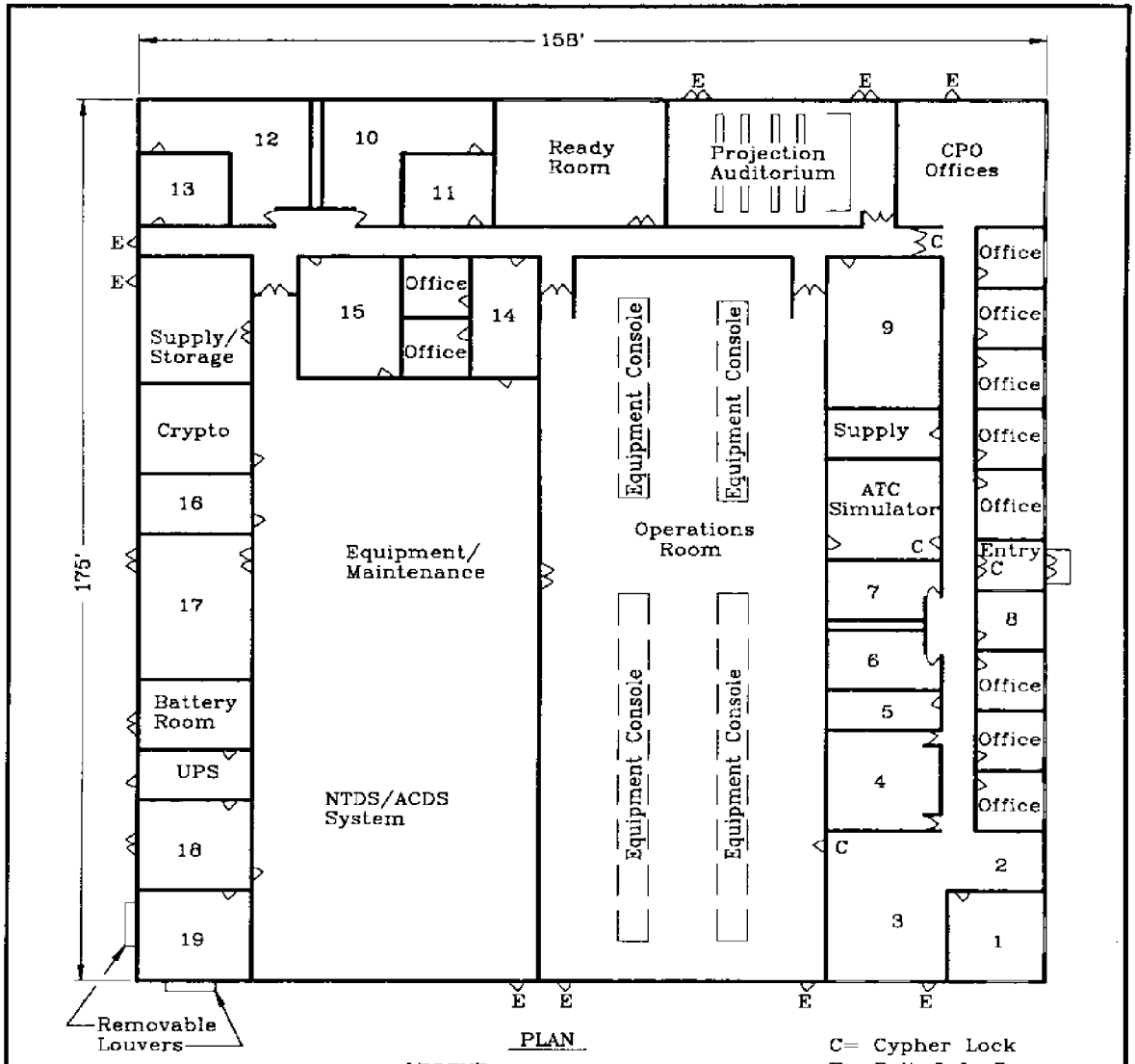
d) Chilled water for NTDS/ACDS system in accordance with BESEP.



Any Facility located within the Airfielf Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA).

Graphic Scale in Feet
0 25 50 75 100

TITLE	DATE	FACILITY PLATE	SHEET
FACSFAC Facility Site Plan	11/92	133-73	1 Of 3


158'
175'
12
10
13
11
Ready Room
Projection Auditorium
CPO Offices
Office
Office
Office
Office
Office
Entry
Office
Office
Office
Supply/ Storage
15
Office
Office
14
Crypto
16
17
Battery Room
UPS
18
19
Equipment/ Maintenance
NTDS/ACDS System
Equipment Console
Equipment Console
Operations Room
Equipment Console
Equipment Console
9
Supply
ATC Simulator
7
6
5
4
3
2
1
8
Removable Louvers
PLAN
C= Cypher Lock
E= Exit Only Door
LEGEND:
1 Commanding Officer's Office
2 Commanding Officer's Secretary
3 Administrative Personnel
4 Conference Room
5 Janitor/Storage
6 Men's Restroom
7 Women's Restroom
8 Security
9 Scheduling
10 Women's Restroom/Shower
11 Women's Bunk
12 Men's Restroom/Shower
13 Men's Bunk
14 Engineering Office
15 Equipment Calibration Room
16 Demarcation
17 Mechanical Room
18 Electrical Room
19 Emergency Generator Room
Graphic Scale in Feet
0 10 20 30 40
TITLE
FACSFAC Building Layout
DATE
11/92
FACILITY PLATE
133-73
SHEET
2 Of 3

	FACSFAC
Plumbing Requirements (GPM):	
Water;	
Cold	56
Hot	
Recovery Rate (100 Degs. Rise)	75
Storage Gal	160
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	380
+5 Degs. F	330
+15 Degs. F	300
+25 Degs. F	230
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	1095
Heat rejected to conditioned spaces by energized test.	
Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	90
Estimated Demand	63
Power;	
Connected Load	418
Estimated Demand	293
Air Conditioning;	
Connected Load	377
Estimated Demand	264
Total;	
Connected Load	885
Estimated Demand	620
Emergency Generator (KW)	400
Areas (SF):	
Gross area including mechanical equipment room	27,650
General Notes:	

TITLE	DATE	FACILITY PLATE	SHEET
FACSFAC Facility Design Notes	11/92	133-73	3 OF 3

6.2.4.1 Air Conditioning. Provide the following:

a) Two parallel piped air cooled chillers, each designed for 60 percent of the total building cooling load. Alternate operation of chillers automatically on a regular basis when load is less than 60 percent. Consider cold storage to minimize power peaks.

b) One chilled water circulation pump for each chiller plus a manifold spare pump. Design chiller circuitry so that the pump shall operate and water flow before the chiller is energized. The spare pump may be manually operated. Provide secondary chilled water loops with three-way valves at coils in each circuit to result in constant flow through chiller.

c) Divide the building into three cooling zones: administrative areas, operations areas, and the equipment areas. Provide separate air handlers and ducting systems for each zone. Provide sound attenuaters for supply duct work. Consider more than one air handler for large zones.

d) Provide two air handlers for the operations, the NTDS/ACDS, and terminal distribution rooms. Design air handler controls to regulate the units as primary and secondary with each unit alternating as the primary. Provide air handlers capable of controlling humidity, equipped with electric heat, and specifically designed for computer room applications. Refer to MIL-HDBK-1012/1.

6.2.4.2 Heating. Provide fuel oil or gas operated boiler heating system designed to accommodate the largest heating load anticipated. Provide two circulation pumps, each designed for 100 percent of the total building heating load. Design the pump controls to regulate the pumps as primary and secondary with each pump alternating as the primary.

6.2.5 Electrical Requirements

6.2.5.1 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use anticipated load to determine the size of UPS.

6.2.5.2 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in operations, the NTDS/ACDS, and equipment rooms.

c) Building mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

6.2.5.3 400-Hz Power. Provide 400-Hz power for the NTDS/ACDS in accordance with par. 2.5.9.

6.2.6 Security. The FACSFAC is normally located within restricted areas which meet the minimum security measures for external security. When the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area. Provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. Security at the main entrance usually requires a single entry point with visitor control. Remote locks, video cameras, card readers, and/or key pads may be required by COMNISCOM as components of the IDS. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6. Provide the following:

a) Electronic cipher door locks at access points to operations room.

b) Exterior doors in the operations, the NTDS/ACDS, equipment/maintenance, and mechanical/electrical rooms with no access hardware on the outside.

c) CCTV.

d) Security fencing and guard post for facilities located outside the secure area of the Naval installation.

e) Personnel identification, visitor check-in, and control system to control ingress and egress.

6.2.7 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

6.3 Joint Control Facility (JCF)

6.3.1 Function. The JCF is a high density (air traffic) facility which collocates approach control responsibilities for two or more air stations or a combination of an approach control facility and a FACSFAC or Range Operations Center (ROC) under one roof. The JCF normally operates continuously.

6.3.2 Location. Locate the JCF adjacent to the air operations building when siting criteria permits. An air traffic control tower may be sited with the JCF.

6.3.3 Architectural and Structural Requirements. See Facility Plate 133-74 (Sheets 1 through 7 of 7). Provide the following:

a) Removable, modular, access flooring in the operations, the NTDS/ACDS, and the equipment/maintenance rooms with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

b) Interior and exterior acoustical treatment to attain the room criteria described in par. 2.3.1. Soft textured acoustical wall panels and movable sound absorbent partitioning in the operations room.

c) A clear ceiling height of 14 feet (finished floor to ceiling) in the operations area.

d) A tiered seating area in projection auditorium.

e) RF shielding throughout the crypto room. Refer to MIL-HDBK-1195 and NAVFAC Instruction 11010.44. Shielding requirements shall be confirmed by NESSEC.

f) Facility and restroom areas readily accessible by the physically handicapped.

g) Cable troughs or conduits between the air traffic control tower and the JCF for intrafacility cabling. The exact dimensions of the cable trough or size and number of conduits are specified in the BESEP.

6.3.3.1 Windows. Do not use windows in operations, NTDS/ACDS system, and equipment/maintenance rooms. Provide insulated glazing for noise reduction in administrative areas. Refer to par. 2.3.10.

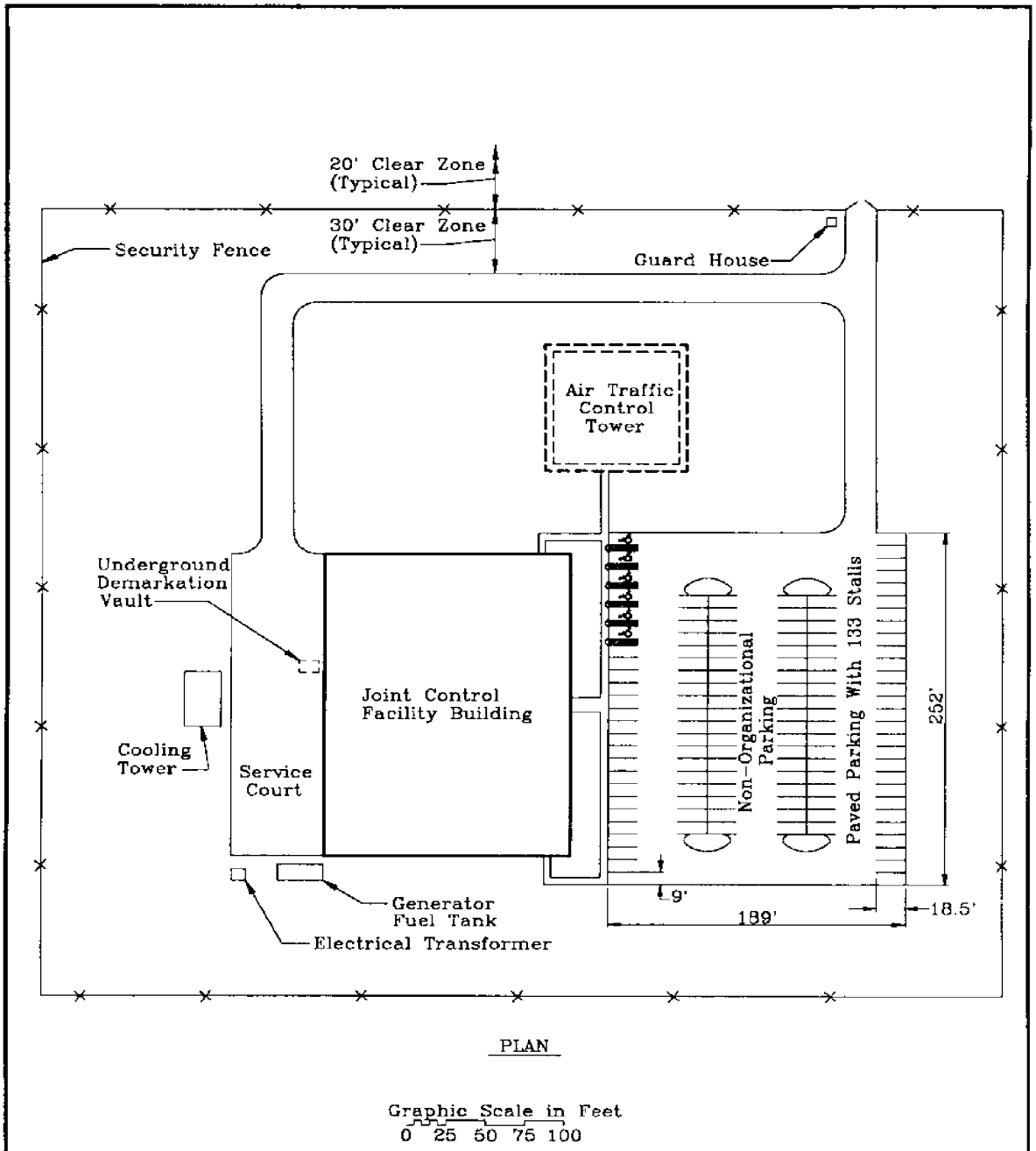
6.3.4 Mechanical Requirements. Design the mechanical system to meet the criteria in pars. 2.4, 6.3.4.1, and 6.3.4.2. Provide the following:

a) Automatic thermostatic control.

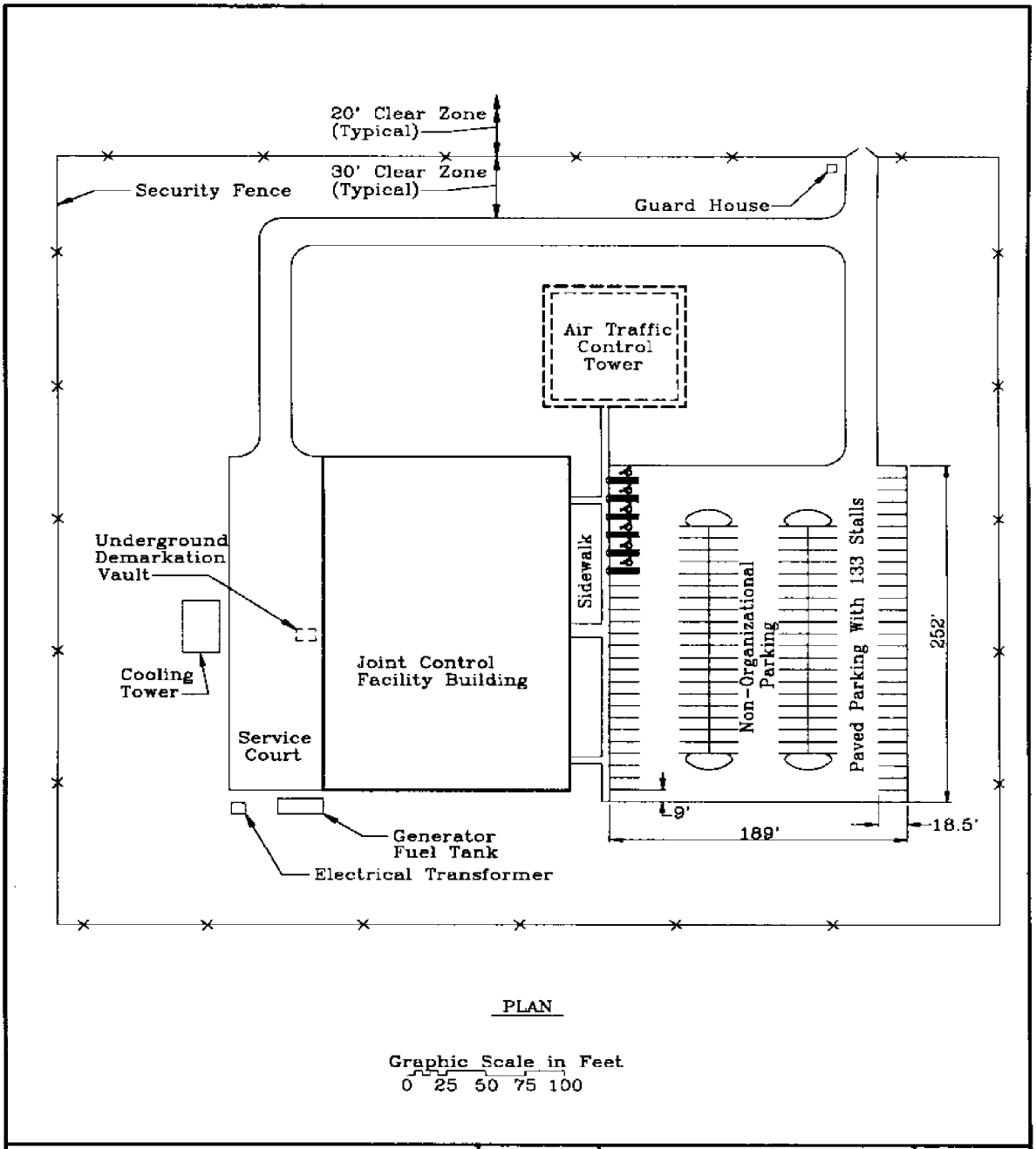
b) A four-pipe chilled/hot water distribution system with separate air handlers for each zone or dehumidifying system to work in conjunction with the air conditioning system.

c) Capability for future expansion of the HVAC system. Use piping designed for low friction and velocity losses at the maximum flows expected.

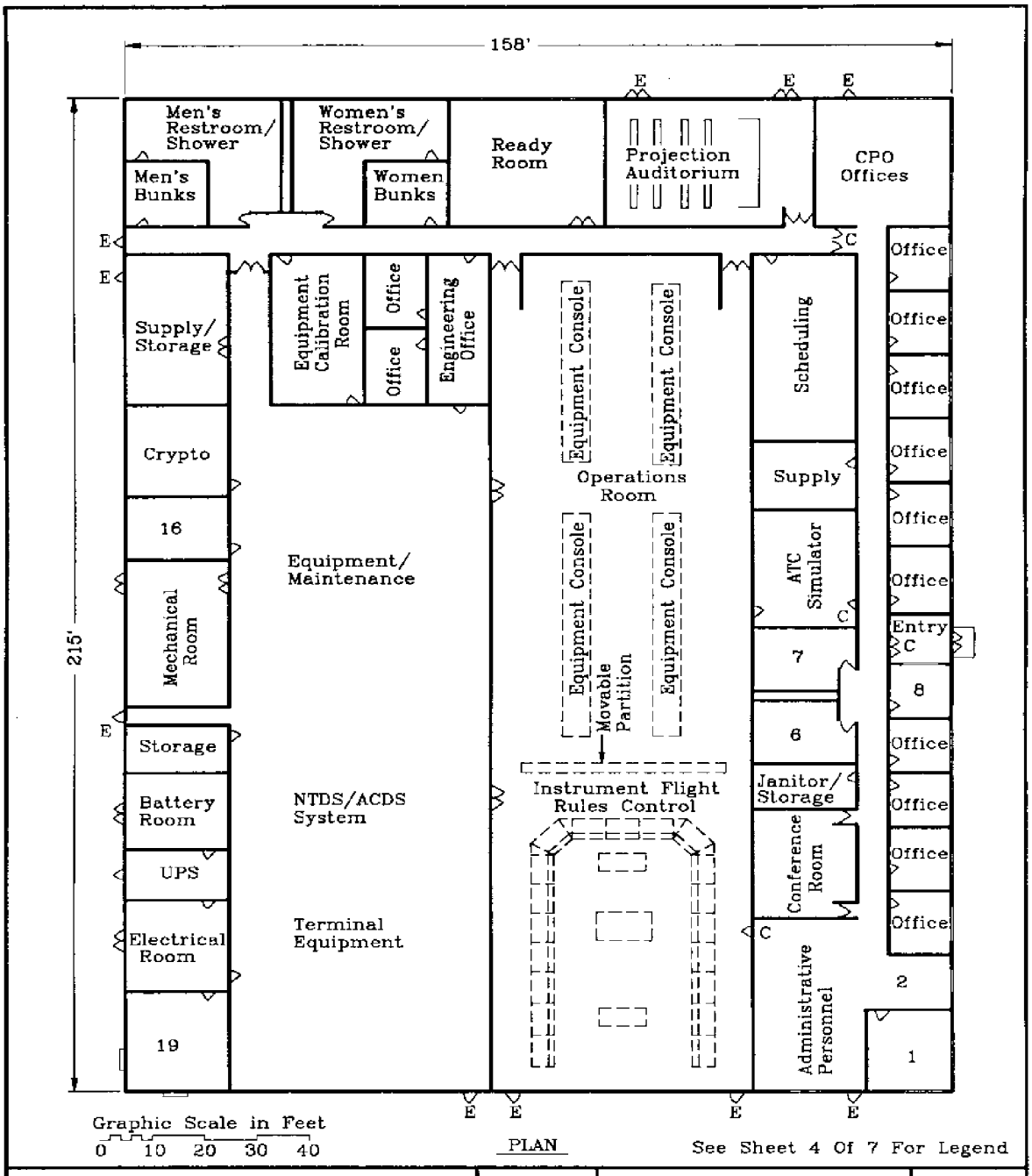
d) Chilled water for the NTDS/ACDS in accordance with the BESEP.



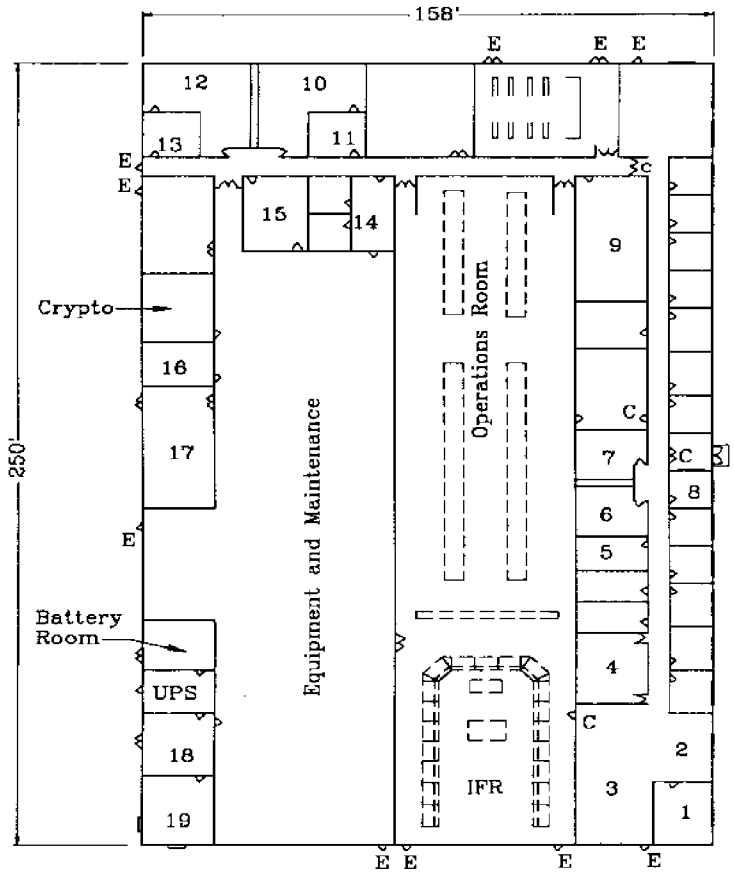
TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (Medium Density) Site Plan	11/92	133-74	1 Of 7



TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (High Density) Site Plan	11/92	133-74	2 Of 7



TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (Medium Density) Building Layout	11/92	133-74	3 Of 7



PLAN

C= Cypher Lock
E= Exit Only Door

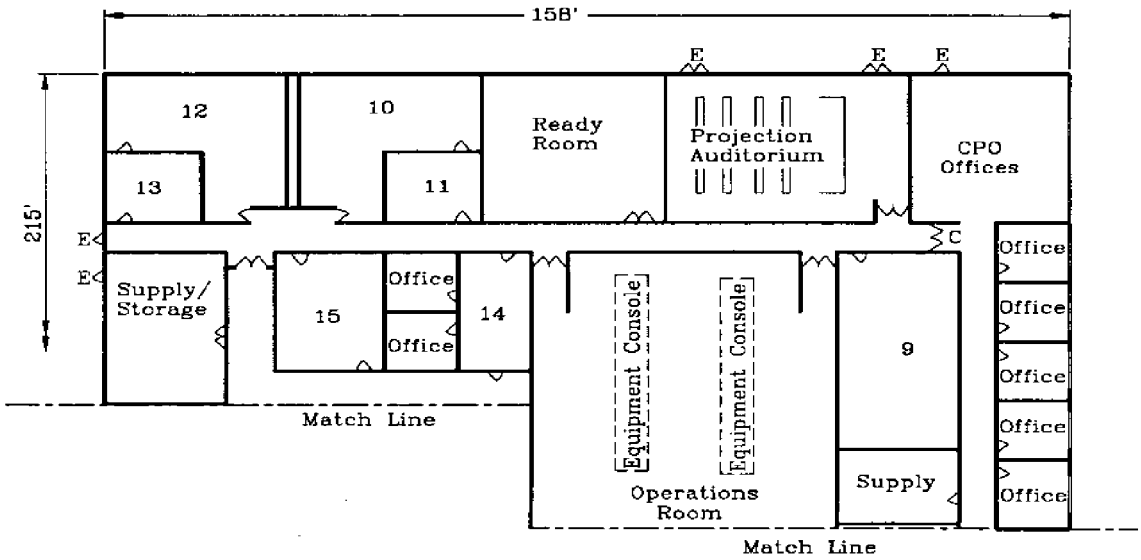
LEGEND:

1 Commanding Officer's Office
2 Commanding Officer's Secretary
3 Administrative Personnel
4 Conference Room
5 Janitor/Storage
6 Men's Restroom
7 Women's Restroom
8 Security
9 Scheduling
10 Women's Restroom/Shower
11 Women's Bunk
12 Men's Restroom/Shower
13 Men's Bunk
14 Engineering Office
15 Equipment Calibration Room
16 Demarcation
17 Mechanical Room
18 Electrical Room
19 Emergency Generator Room

Graphic Scale in Feet

0 25 50

TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (High Density) Building Layout	11/92	133-74	4 Of 7

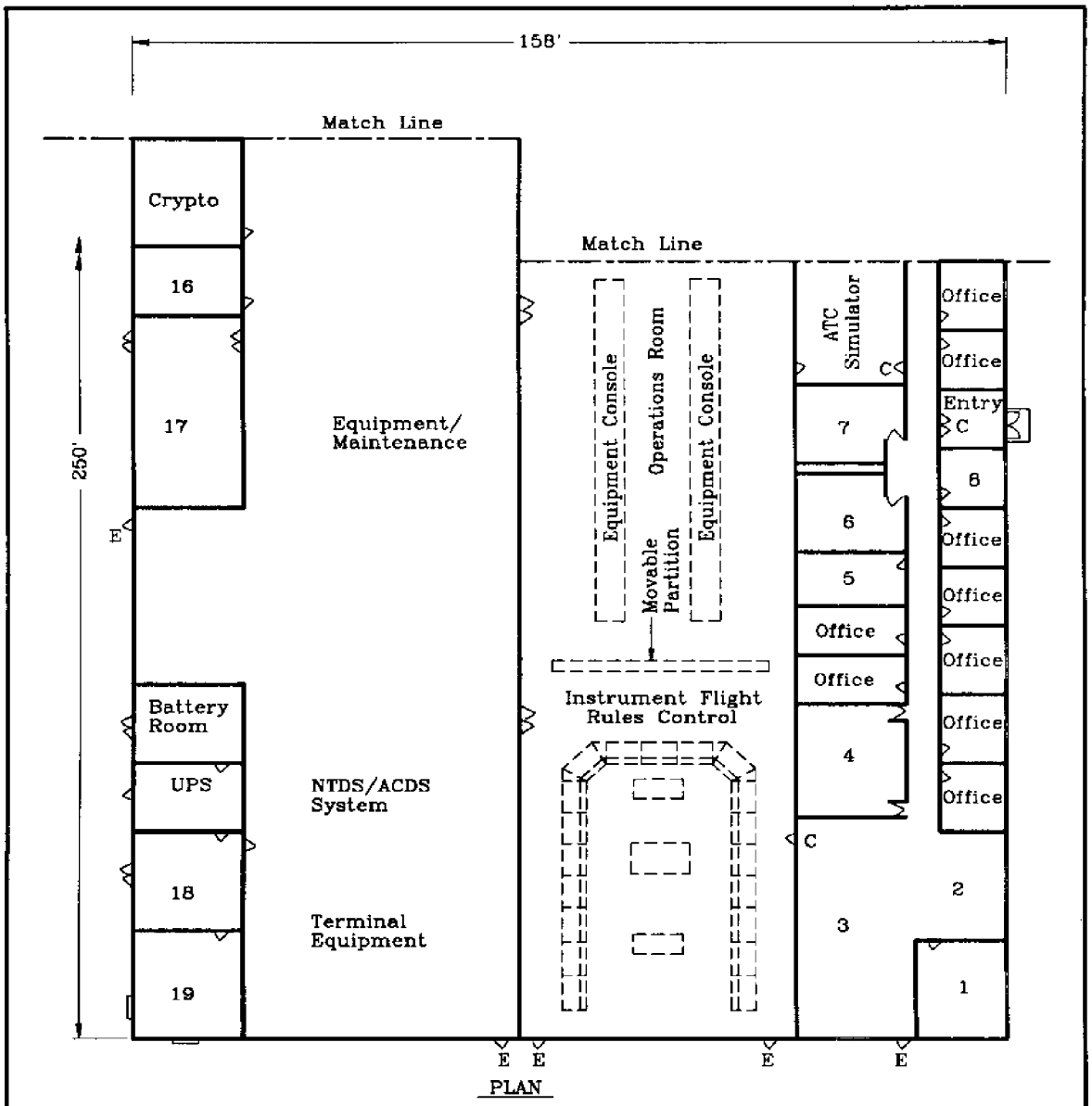


PLAN

Graphic Scale in Feet
0 10 20 30 40

Note: See Sheet 4 Of 7 For Legend

TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (High Density) Building Layout - Part 1	11/92	133-74	5 Of 7



TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility (High Density) Building Layout – Part 2	11/92	133–74	6 Of 7

	Joint Control Facility	
Plumbing Requirements (GPM):	Medium Density	High Density
Water;		
Cold	74	74
Hot		
Recovery Rate (100 Degs. Rise)	100	100
Storage (Gal.)	160	160
Fire Protection Requirements		
Not Included		
Heating Requirements (BTU/HR x 1000):		
(Inside Design Temperature = 72 Degs. F)		
Outside Design Temperature -5 Degs. F	490	600
+5 Degs. F	430	530
-15 Degs. F	380	460
-25 Degs. F	295	360
Air Conditioning Requirements (BTU/HR x 1000):		
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions;		
Cooling Load	1620	2140
Heat rejected to conditioned spaces by energized test.		
Equipment & parts under repair not included.		
Electrical Requirements (KVA):		
Lights;		
Connected Load	90	90
Estimated Demand	63	63
Power;		
Connected Load	514	610
Estimated Demand	360	427
Air Conditioning;		
Connected Load	377	784
Estimated Demand	264	550
Total;		
Connected Load	981	1484
Estimated Demand	687	1040
Emergency Generator (KW)	400	600
Areas (SF):		
Gross area including mechanical equipment room	33,970	39,500

TITLE	DATE	FACILITY PLATE	SHEET
Joint Control Facility Design Notes	11/92	133-74	7 OF 7

6.3.4.1 Air Conditioning. Provide the following:

a) Two parallel piped air cooled chillers, each designed for 60 percent of the total building cooling load. Alternate operation of chillers automatically on a regular basis when load is less than 60 percent. Consider cold storage to minimize power peaks.

b) One chilled water circulation pump for each chiller plus a manifold spare pump. Design chiller circuitry so that the pump shall operate and water flow before the chiller is energized. The spare pump may be manually operated. Provide secondary chilled water loops with three-way valves at coils in each circuit to result in constant flow through chiller.

c) Divide the building into three cooling zones: administrative areas, operations areas, and the equipment areas. Provide separate air handlers and ducting systems for each zone. Provide sound attenuaters for supply duct work. Consider more than one air handler for large zones.

d) Provide two air handlers for the operations, the NTDS/ACDS, and terminal distribution rooms. Design the air handler controls to regulate the units as primary and secondary with each unit alternating as the primary. Provide air handlers capable of controlling humidity, equipped with electric heat, and specifically designed for computer room applications. Refer to MIL-HDBK-1012/1.

6.3.4.2 Heating. Provide fuel oil or gas operated boiler heating system designed to accommodate the largest heating load anticipated. Provide two circulation pumps, each designed for 100 percent of the total building heating load. Design the pump controls to regulate the pumps as primary and secondary with each pump alternating as the primary.

6.3.5 Electrical Requirements

6.3.5.1 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use anticipated load to determine the size of UPS.

6.3.5.2 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in operations, the NTDS/ACDS, and equipment rooms.

c) Building mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

6.3.5.3 400-Hz Power. Provide 400-Hz power for the NTDS/ACDS in accordance with par. 2.5.9.

6.3.6 Lighting. Design lighting in accordance with par. 2.5.6. Provide dimmer adjustable red lighting in the IFR room.

6.3.7 Security. The JCF is normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. Security at the main building entrance usually requires a single entry point with visitor control. Remote locks, video cameras, card readers, and/or key pads may be required by COMNISCOM as components of the IDS. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6. Provide the following:

a) Electronic cipher door locks at access points to operations room.

b) Exterior doors in operations, the NTDS/ACDS, equipment/maintenance, and mechanical/electrical rooms with no access hardware on the outside.

c) CCTV.

d) Security fencing and guard post for facilities located outside of the secure area of the Naval installation.

e) Personnel identification, visitor check-in, and control system to control ingress and egress.

6.3.8 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

6.4 Air Traffic Control Tower

6.4.1 Function. The air traffic control tower building houses equipment and personnel for visual flight rules (VFR) control of aircraft approaching and departing the terminal area or airport and aircraft and vehicular movement on the runways, taxiways, and other operation areas.

6.4.2 Tower Location and Height. Locate the air traffic control tower building on the edge of the airfield, situated to have an unobstructed line-of-sight to the aircraft approach areas, runways, taxiways, aircraft parking areas, and other operational areas over which aircraft movements are to be controlled. Provide a tower location and height to result in the tower cab eye level line of site intersecting airport traffic surfaces at a vertical

angle of 35 minutes or greater. Refer to FAA Order 6480.4, Airport Traffic Control Tower Siting Criteria and par. 2.2.6.

6.4.3 Architectural and Structural Requirements. See Facility Plate 141-70 (Sheets 1 through 6 of 6). The air traffic control tower is categorized as low or high density based on air traffic volume. Refer to FAA Order 6480.7, Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design. Consider the use of prefabricated modular construction for tower and tower cab. Provide the following:

a) Removable, modular, access flooring in the tower cab with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

b) Interior and exterior acoustical treatment to attain the room criteria described in par. 2.3.1.

c) Clear span roof structure (no interior columns) in tower cab.

d) Roof hatch to provide access to the roof from the cab floor.

e) Floor hatch to allow moving equipment between the cab and the top elevator landing.

f) Walkway around the exterior of the control cab to facilitate washing cab windows.

g) Traction type elevator. Refer to NAVFAC DM-3.09 Elevators, Escalators, Dumbwaiters, Access Lifts, and Pneumatic Tube Systems, and par. 2.4.9.9.

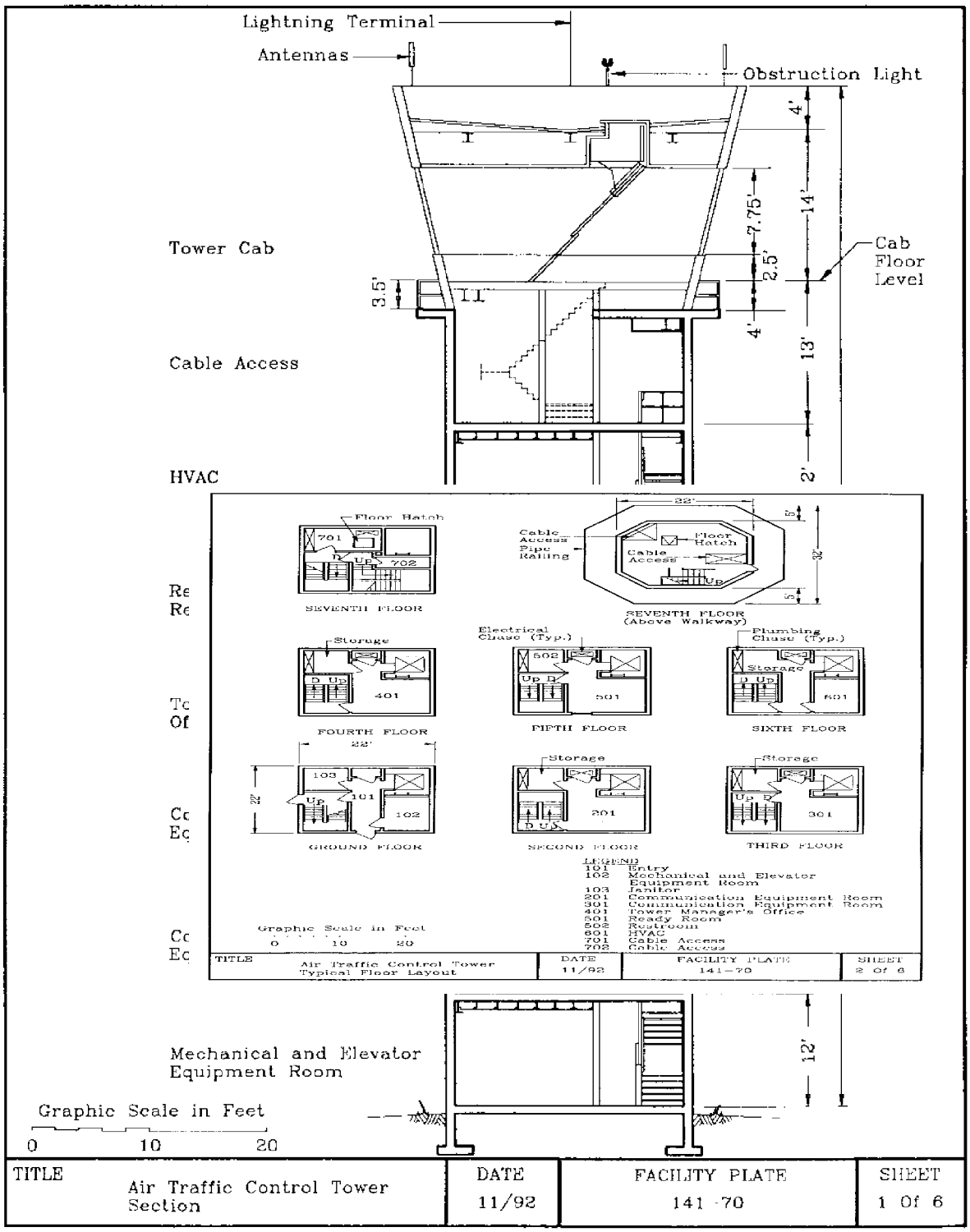
h) Pressure relief system to equalize interior and exterior atmospheric pressures during high wind conditions.

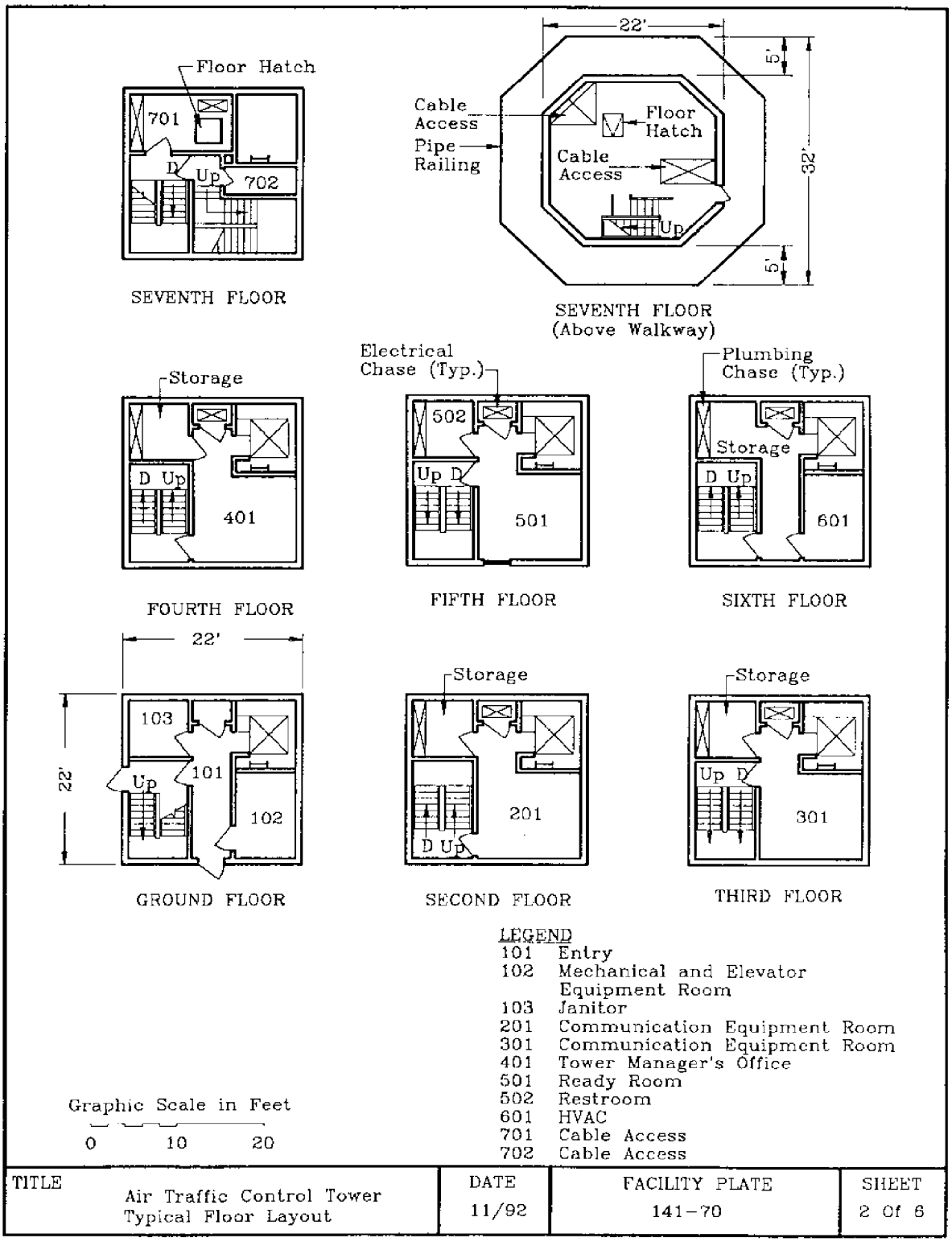
i) Electrically operated, retractable covers for cab windows at sites prone to hurricane and typhoon conditions.

j) A 2,000-pound capacity, remote controlled, electric hoist in the tower cab. Suspend hoist from tower cab roof framing.

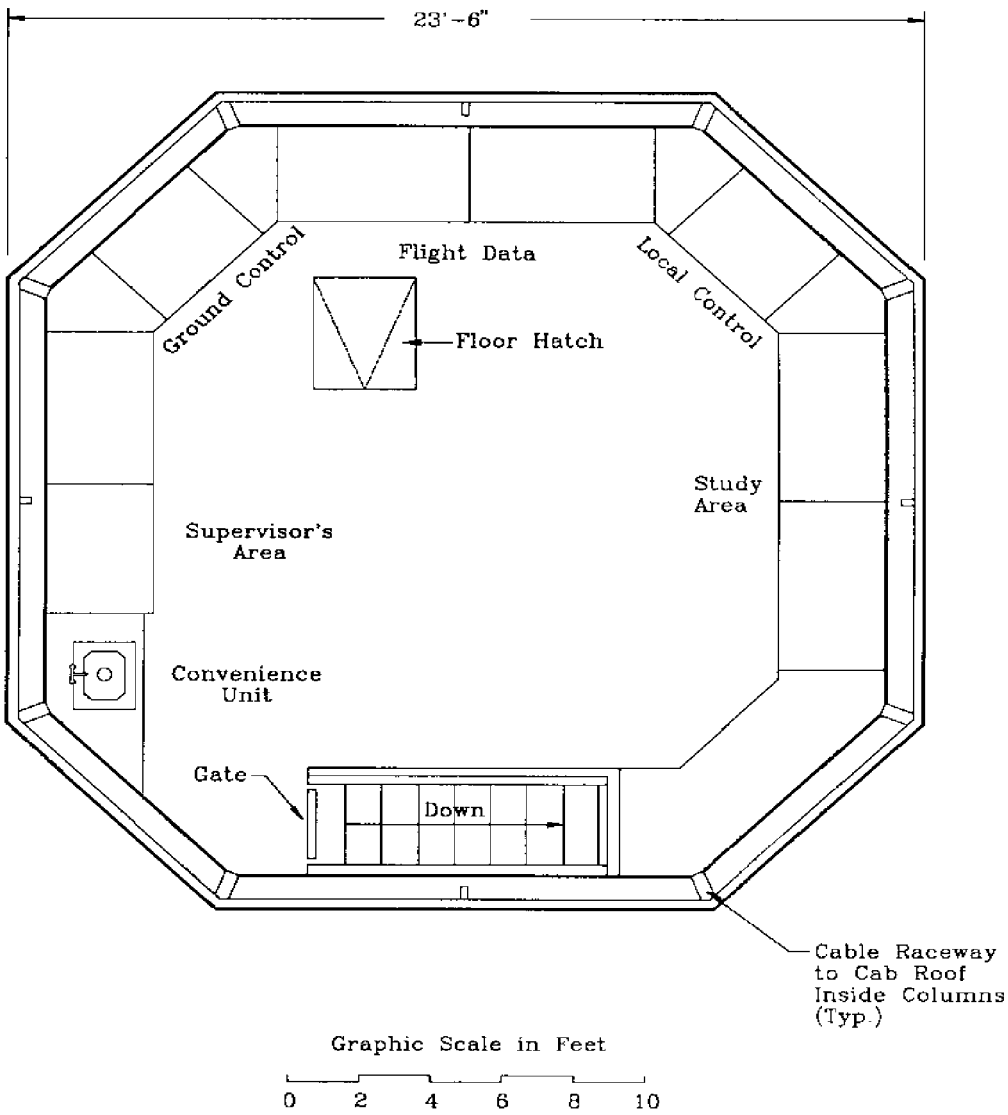
k) A cable raceway to cab roof through tubular cab roof columns.

6.4.3.1 Interior Walls. Provide fire-rated walls for stair enclosure, plumbing and electrical chases.

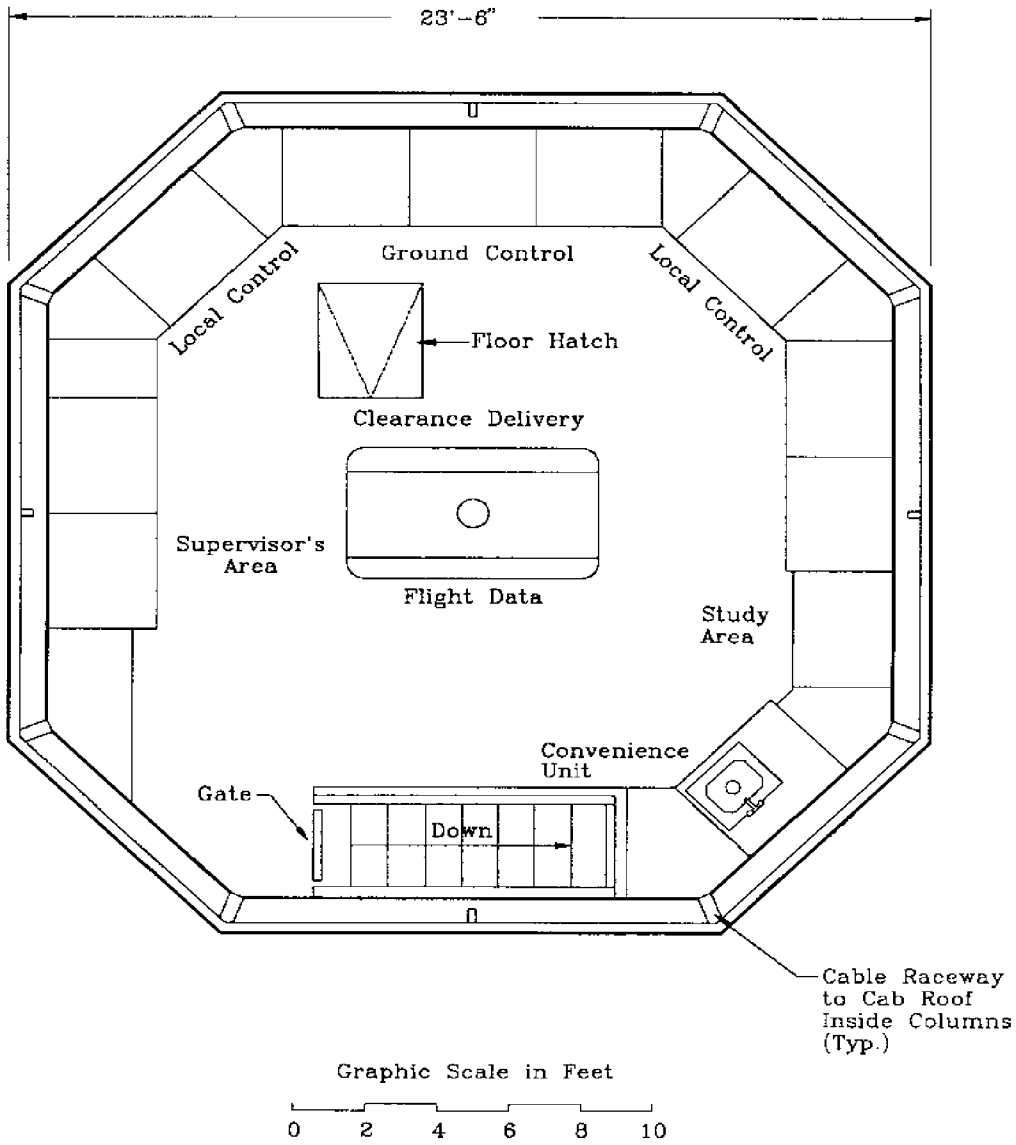

Lightning Terminal
Antennas
Obstruction Light
Tower Cab
Cab Floor Level
Cable Access
HVAC
Mechanical and Elevator Equipment Room
Graphic Scale in Feet
0 10 20
TITLE
Air Traffic Control Tower Section
DATE
11/92
FACILITY PLATE
141-70
SHEET
1 Of 6
Floor Hatch
SEVENTH FLOOR
SEVENTH FLOOR (Above Walkway)
Cable Access Pipe Railing
Electrical Chase (Typ.)
Plumbing Chase (Typ.)
FOURTH FLOOR
FIFTH FLOOR
SIXTH FLOOR
GROUND FLOOR
SECOND FLOOR
THIRD FLOOR
LEGEND
101 Entry
102 Mechanical and Elevator Equipment Room
103 Janitor
201 Communication Equipment Room
301 Communication Equipment Room
401 Tower Manager's Office
501 Ready Room
502 Restroom
601 HVAC
701 Cable Access
702 Cable Access
Graphic Scale in Feet
0 10 20
TITLE
Air Traffic Control Tower Typical Floor Layout
DATE
11/92
FACILITY PLATE
141-70
SHEET
2 of 6



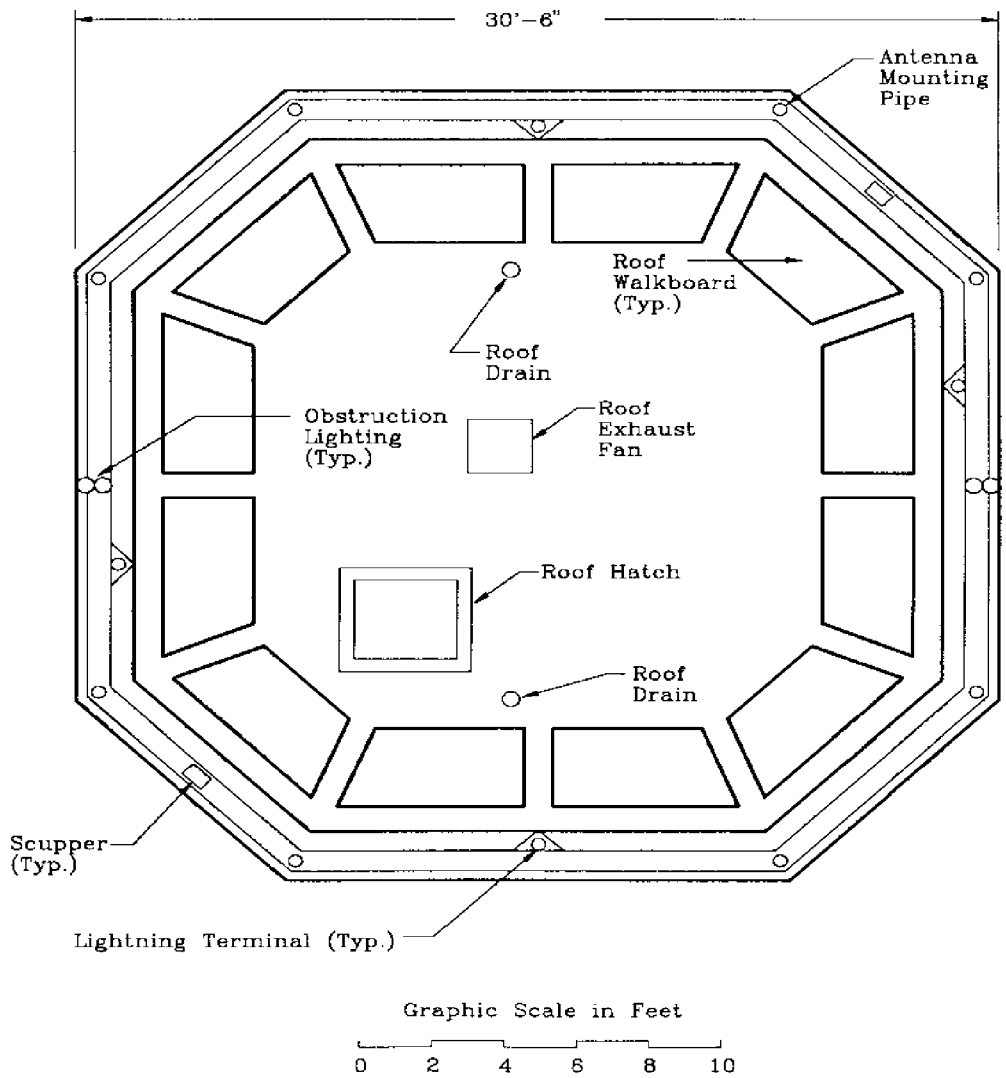
TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Typical Floor Layout	11/92	141-70	2 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower (Low Density) Tower Cab Layout	11/92	141-70	3 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower (High Density) Tower Cab Layout	11/92	141-70	4 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Cab Roof Plan	11/92	141-70	5 Of 6

	Air Traffic Control Tower
Plumbing Requirements:	
Water;	
Cold G.P.M.	12
Hot	
Recovery Rate (100 Degs. Rise) G.P.M.	20
Storage Gal	20
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	215
+5 Degs. F	185
+15 Degs. F	160
+25 Degs. F	130
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	185
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	12.0
Estimated Demand	11.0
Power;	
Connected Load	62.0
Estimated Demand	56.0
Air Conditioning;	
Connected Load	13.0
Estimated Demand	12.0
Total;	
Connected Load	87.0
Estimated Demand	79.0
Emergency Generator (KW)	60.0
Areas (SF):	
Gross area including mechanical equipment room	3,940

TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Facility Design Notes	11/92	141-70	6 OF 6

6.4.3.2 Windows. Do not use windows in tower structure. Provide tower cab with heat-absorbing insulated window units in accordance with NFGS-08800. Provide units with a light transmissivity of not less than 85 percent, heat transmission (U value) of 0.60 maximum, and free of parallax or other optical distortion. Provide spare window units interchangeable with any other similar unit in the tower cab. Provide window shades for tower cab windows. Refer to FAA Specification FAA-E-2470.

6.4.4 Mechanical Requirements. Use peripheral strip cooling diffusers to reduce solar impact to the personnel and wall diffusers to control tower cab temperatures.

6.4.5 Electrical Requirements

6.4.5.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Consider a common generator when the air traffic control tower is sited adjacent to the air operations building, MTRACON, FACSFAC, JCF, or tower base building. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in the tower cab and communications equipment rooms.

c) Building mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

6.4.5.2 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use anticipated load to determine the size of UPS.

6.4.6 Lighting. Design lighting in accordance with par. 2.5.6. Provide dimmer adjustable white ceiling lights in tower cab. Provide down lighting over work areas on separate switch.

6.4.7 Fire Protection. Refer to MIL-HDBK-1008, Fire Protection for Facilities, Engineering, Design, and Construction, and NFPA 101. Consult local fire prevention agency to determine if air traffic control tower meets height criteria to be classified as a "High Rise Building."

6.4.8 Security. Air traffic control towers are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6. Provide an electronic

cipher door lock at the first floor entrance with an intercom and remote lock release in the tower cab.

6.4.9 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

6.5 Air Traffic Control Tower Base Building

6.5.1 Function. The air traffic control tower base building provides housing for equipment and personnel to support IFR control of aircraft on approach to or departure from the terminal radar facility or airport. Other functions include ground controlled approach (GCA) or PAR for landing aircraft during inclement weather and limited visibility.

6.5.2 Location. Locate adjacent to the air traffic control tower.

6.5.3 Architectural and Structural Requirements. See Facility Plate 141-71 (Sheets 1 through 3 of 3). Provide the following:

a) Removable, modular, access flooring in the IFR and terminal equipment rooms with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

b) A 9-foot clear ceiling height above accessible flooring.

c) Built-in workbenches and shelving in the terminal equipment room.

d) Facility and restroom areas readily accessible by the physically handicapped.

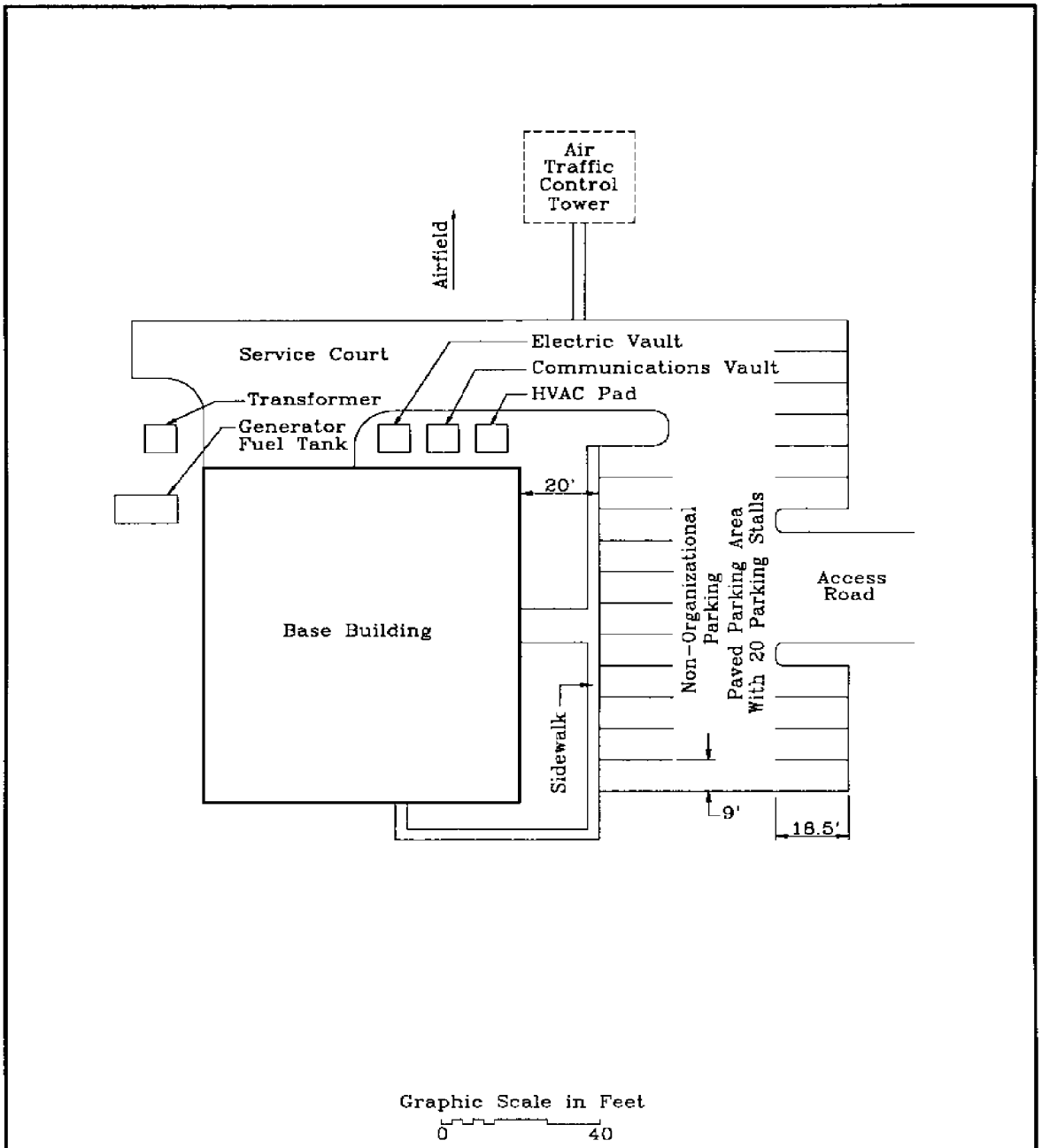
e) Interior and exterior acoustical treatment to attain the room criteria described in par. 2.3.1.

f) Cable troughs or conduits between the air traffic control tower and the base building for intrafacility cabling. Exact dimensions of the cable trough or size and number of conduits are specified in the BESEP.

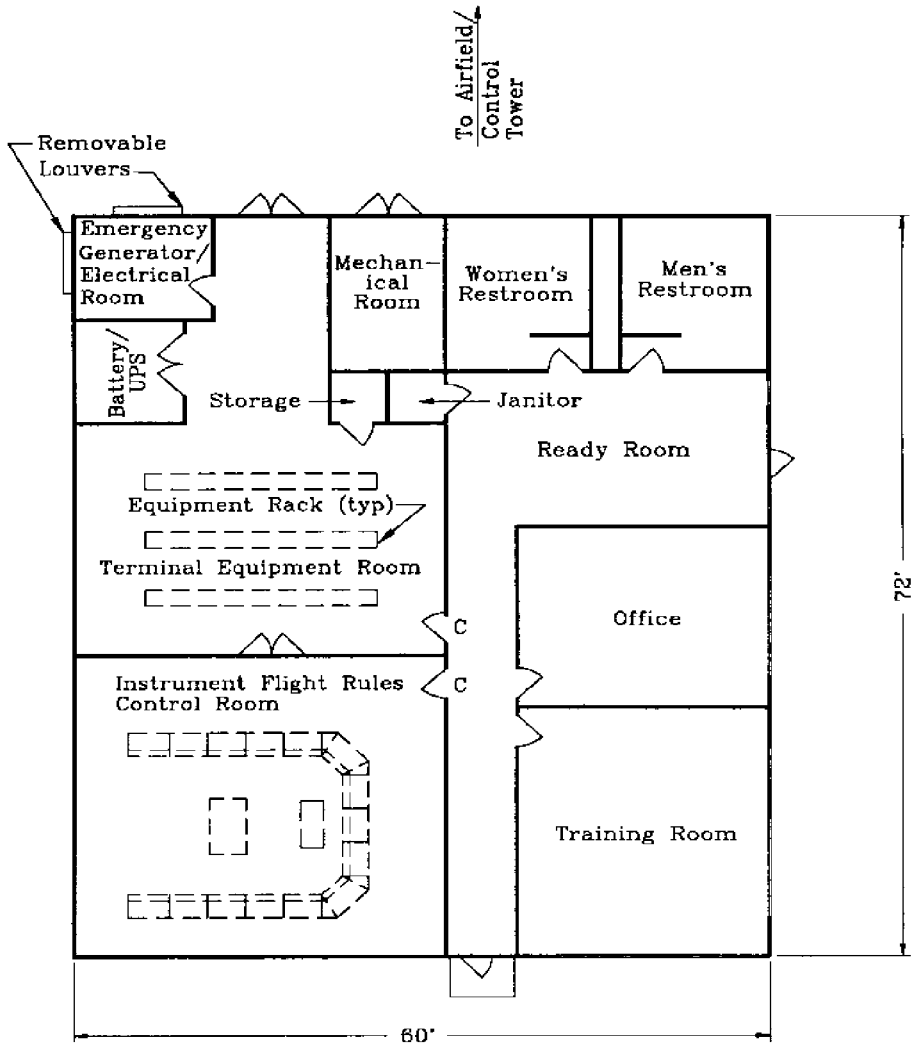
6.5.3.1 Windows. Do not provide windows in IFR or terminal equipment rooms. Provide insulated glazing for noise reduction in administrative areas. Refer to par. 2.3.10.

6.5.4 Electrical Requirements

6.5.4.1 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use the anticipated load to determine the size of the UPS.



TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Base Building Facility Site Plan	11/92	141-71	1 Of 3



C= Cypher Lock

Graphic Scale in Feet

0 10 20 30

TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Base Building Layout	11/92	141-71	2 Of 3

	Base Building
Plumbing Requirements:	
Water;	
Cold G.P.M.	62
Hot	
Recovery Rate (100 Degs. Rise) G.P.M.	17
Storage Gal	40
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 70 Degs. F)	
Outside Design Temperature -5 Degs. F	95
+5 Degs. F	85
+15 Degs. F	75
+25 Degs. F	65
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	275
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	15
Estimated Demand	11
Power;	
Connected Load	65
Estimated Demand	46
Air Conditioning;	
Connected Load	100
Estimated Demand	70
Total;	
Connected Load	180
Estimated Demand	127
Emergency Generator (KW)	125
Areas (SF):	
Gross area including mechanical equipment room	4,320

TITLE	DATE	FACILITY PLATE	SHEET
Air Traffic Control Tower Base Building Facility Design Notes	11/92	141-71	3 OF 3

6.5.4.2 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in IFR and terminal equipment rooms.

c) Building mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

6.5.4.3 400-Hz Power. Provide 400-Hz power in accordance with par. 2.5.9 when required by the BESEP.

6.5.5 Lighting. Design lighting in accordance with par. 2.5.6. Provide dimmer adjustable red lights in IFR control room.

6.5.6 Security. Air traffic control tower base buildings are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6. Provide the following:

a) Electronic cipher door locks at interior entrance doors to IFR and terminal equipment rooms.

b) Exterior doors in IFR and terminal equipment rooms with no access hardware on the outside.

6.5.7 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

Section 7: METEOROLOGICAL FACILITIES

7.1 Function. Meteorological buildings provide housing for meteorological, radio and computer equipment, and personnel which provide the shore establishment and operating forces with environmental information for air, surface, and subsurface operations. Facilities are attended for 24-hour operations. Meteorological buildings comprise two basic categories: fleet weather centrals and fleet weather facilities.

7.1.1 Fleet Weather Central. The fleet weather central building provides housing for equipment and personnel which coordinates with the fleet weather facilities within its assigned area of responsibility to insure quality and continuity of services. The fleet weather central is assigned more extensive scientific, operational, and geographic responsibilities than a facility, such as computer center operations, engineering assistance, optimum track ship routing, wind and high seas warnings, and expanded communications responsibility for fleet radio facsimile and teletype broadcast. See Facility Plate 137-10 (Sheets 1 through 3 of 6).

7.1.2 Fleet Weather Facility. The fleet weather facility building provides housing for equipment and personnel to provide environmental information for local operations. See Facility Plate 137-10 (Sheets 4 through 6 of 6).

7.2 Location. The location of the meteorological building is established by the ordering authority and defined by instructions from Naval Oceanographic Office I.C. (NAVOCEANO). Normally, these buildings will be located at a Naval installation in the operations complex.

7.3 Architectural and Structural Requirements. See Facility Plate 137-10 (Sheets 1 through 6 of 6). Provide the following:

a) Removable, modular, access flooring in the computer and operations rooms with 18 inches of clearance provided between floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

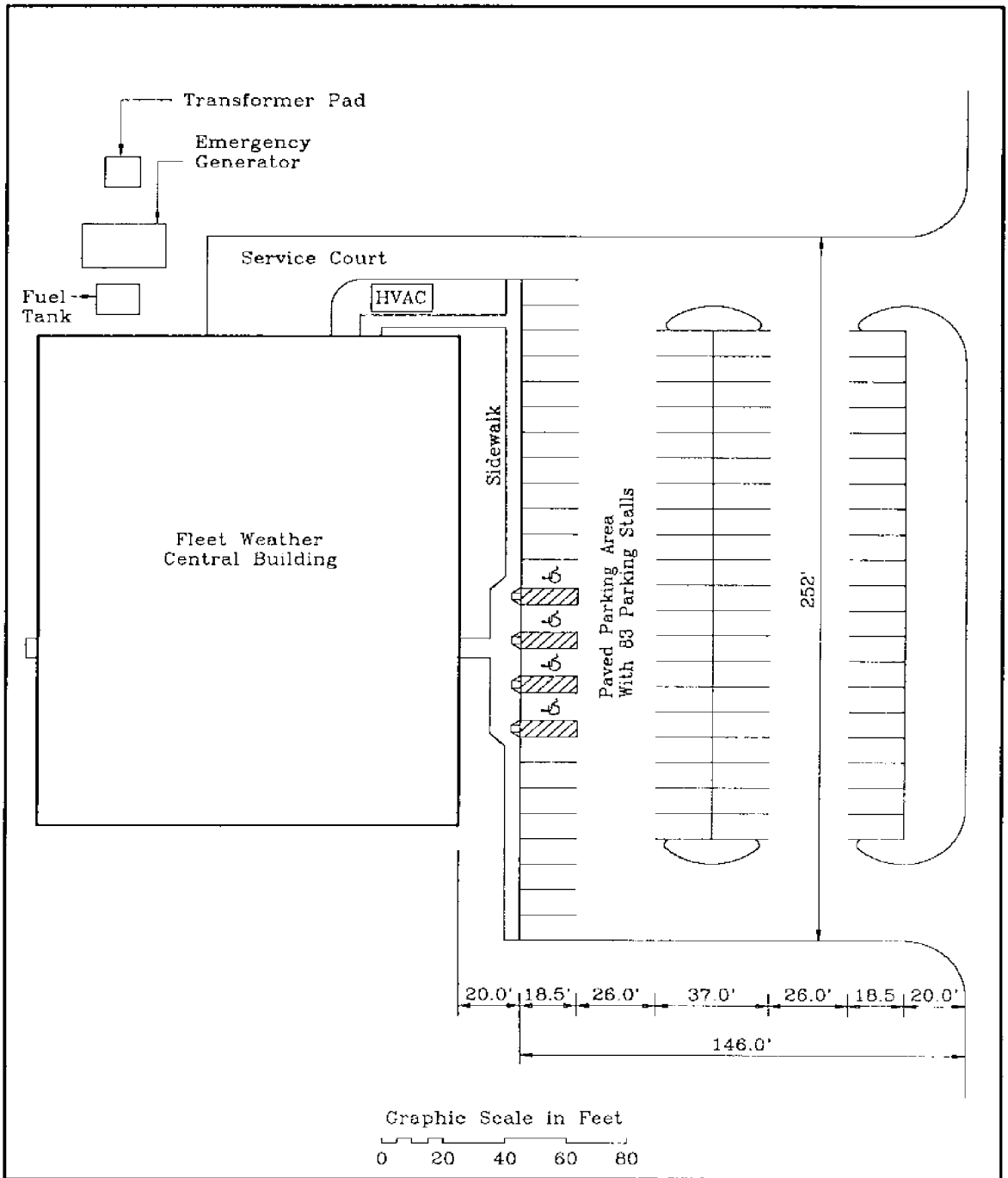
b) Service counters at electronic display and reception/weather information areas.

c) Central passage corridors a minimum of 6 feet wide and clear of obstructions.

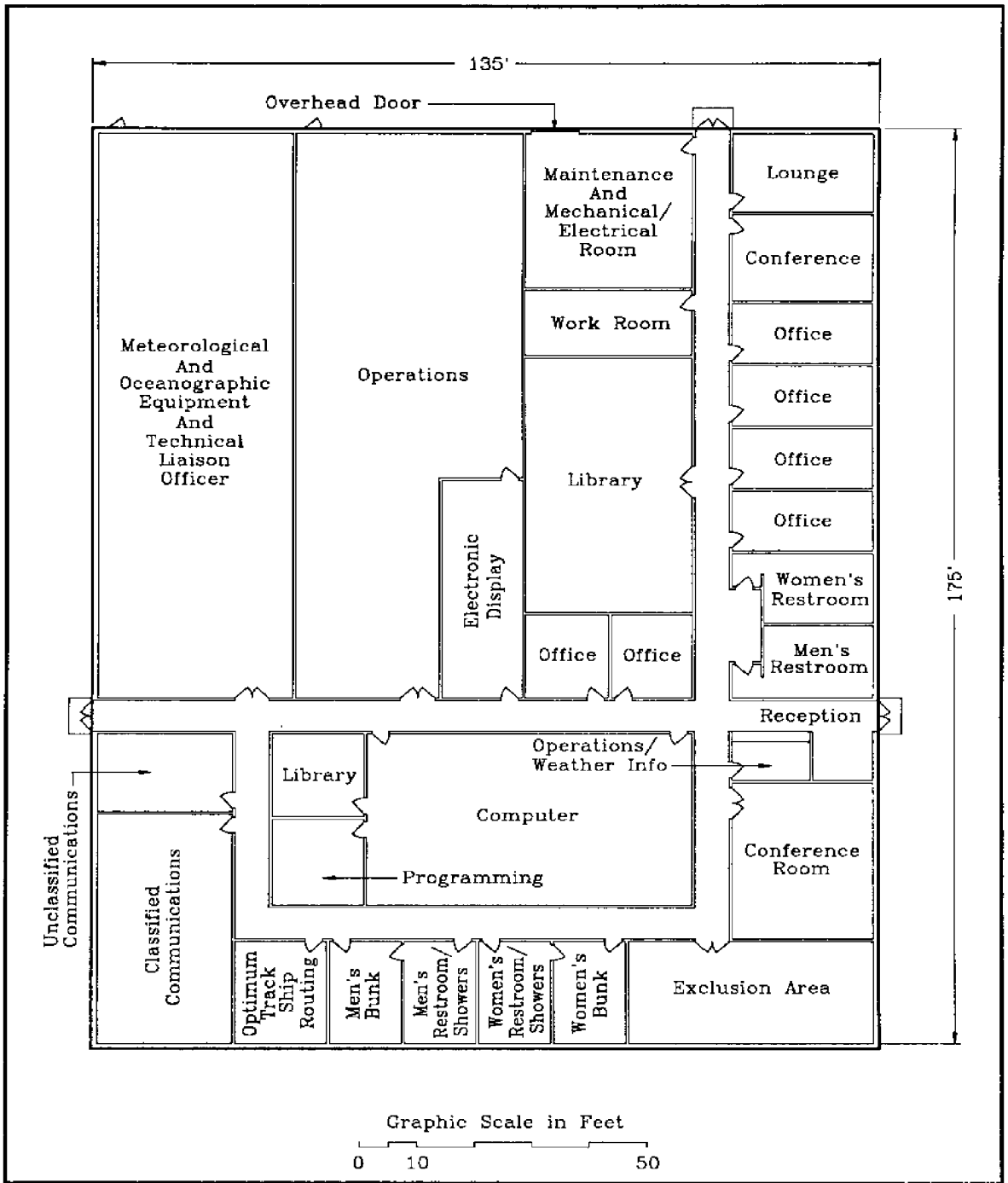
d) Clear ceiling height of 9 feet above finished floor.

e) Facility and restrooms readily accessible by the physically handicapped.

7.3.1 Overhead Doors. Provide manually operated overhead door for maintenance and mechanical/electrical room.



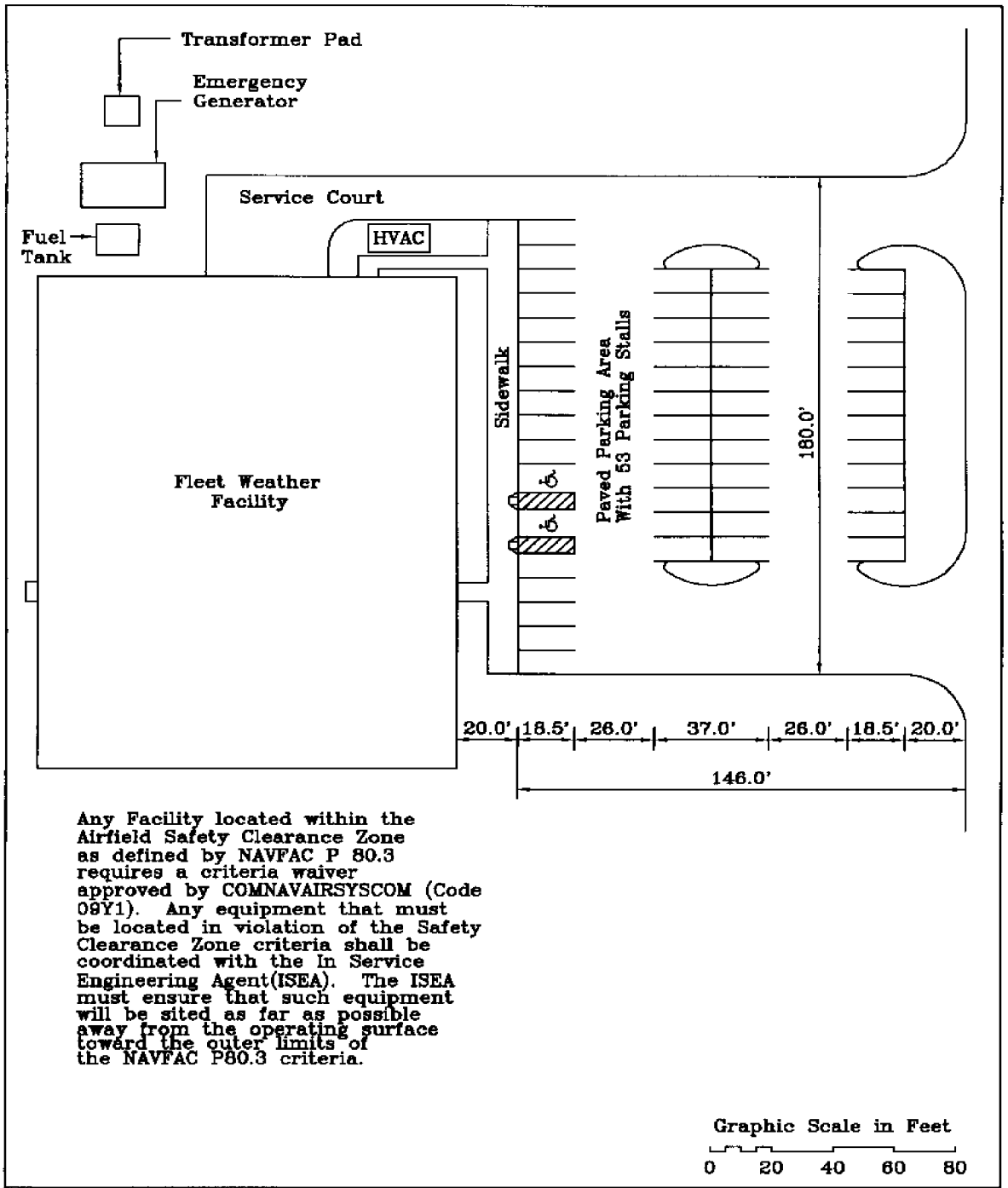
TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Central Facility Site Plan	11/92	137-10	1 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Central Facility Building Layout	11/92	137-10	2 Of 6

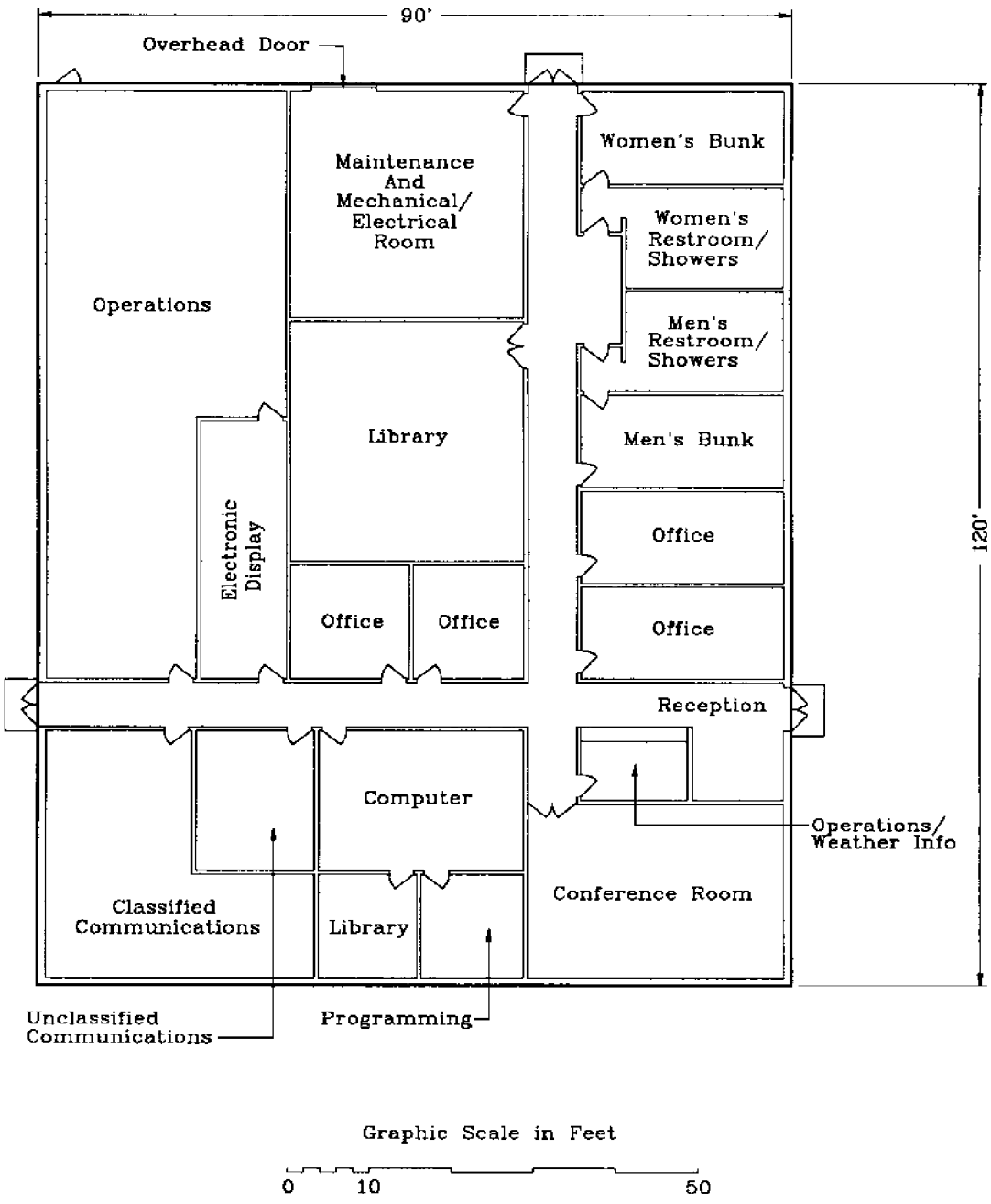
	Fleet Weather Central
Plumbing Requirements: G.P.M.	
Water;	
Cold	79
Hot	
Recovery Rate (100 Degs. Rise)	44
Storage (Gal)	130
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	350
+5 Degs. F	305
+15 Degs. F	260
+25 Degs. F	215
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	1012
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	79.0
Estimated Demand	63.0
Power;	
Connected Load	83.0
Estimated Demand	67.0
Air Conditioning;	
Connected Load	371.0
Estimated Demand	297.0
Total;	
Connected Load	533.0
Estimated Demand	427.0
Emergency Generator (KW)	175.0
Areas (SF):	
Gross area including mechanical equipment room	23,625
General Notes:	

TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Central Facility Design Notes	11/92	137-10	3 OF 6



Any Facility located within the Airfield Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA). The ISEA must ensure that such equipment will be sited as far as possible away from the operating surface toward the outer limits of the NAVFAC P80.3 criteria.

TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Facility Site Plan	11/92	137-10	4 Of 6



TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Facility Building Layout	11/92	137-10	5 Of 6

	Fleet Weather
Plumbing Requirements: G.P.M.	
Water;	
Cold	60
Hot	
Recovery Rate (100 Degs. Rise)	35
Storage (Gal)	130
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	180
+5 Degs. F	155
+15 Degs. F	135
+25 Degs. F	110
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	480
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	36.0
Estimated Demand	29.0
Power;	
Connected Load	45.0
Estimated Demand	36.0
Air Conditioning;	
Connected Load	176.0
Estimated Demand	141.0
Total;	
Connected Load	257.0
Estimated Demand	206.0
Emergency Generator (KW)	100.0
Areas (SF):	
Gross area including mechanical equipment room	10,800
General Notes:	

TITLE	DATE	FACILITY PLATE	SHEET
Fleet Weather Facility Design Notes	11/92	137-10	6 OF 6

7.4 Electrical Requirements

7.4.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Exterior security lighting and security systems.

c) Electronic equipment in operations, computer, and communications rooms.

d) Building mechanical systems supporting electronic equipment.

7.4.2 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use the anticipated load to determine the size of the UPS.

7.5 Security. Meteorological facilities are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

7.6 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

Section 8: SPECIAL SUPPORT FACILITIES

8.1 Air Operations Building

8.1.1 Function. The air operations building houses the administration of flight operational activities with supporting functions including, but not limited to, airfield control, flight support, flight planning, flight scheduling, safety, transient aircraft services, weather station, search and rescue, and administrative functions.

8.1.2 Location. Locate the air operations building on the edge of the airfield adjacent to the air traffic control tower and the MTRACON facility where siting requirements permit. Refer to MIL-HDBK-1021/1, Airfield Geometric Design and par. 2.2.6.

8.1.3 Architectural and Structural Requirements. See Facility Plate 141-40 (Sheets 1 through 4 of 4). Provide the following:

a) Service counters at flight clearance and weather briefing areas.

b) Central passage corridors a minimum of 6 feet wide and clear of obstructions.

c) Hydraulic passenger elevator with removable protective padding for transporting equipment. Refer to NAVFAC DM-3.09 and par. 2.4.9.9.

d) Access/exit stairs.

e) Facility and restrooms readily accessible by the physically handicapped.

8.1.3.1 Windows. Provide insulated glazing for noise reduction in administrative areas. Refer to par. 2.3.10.

8.1.4 Electrical Requirements

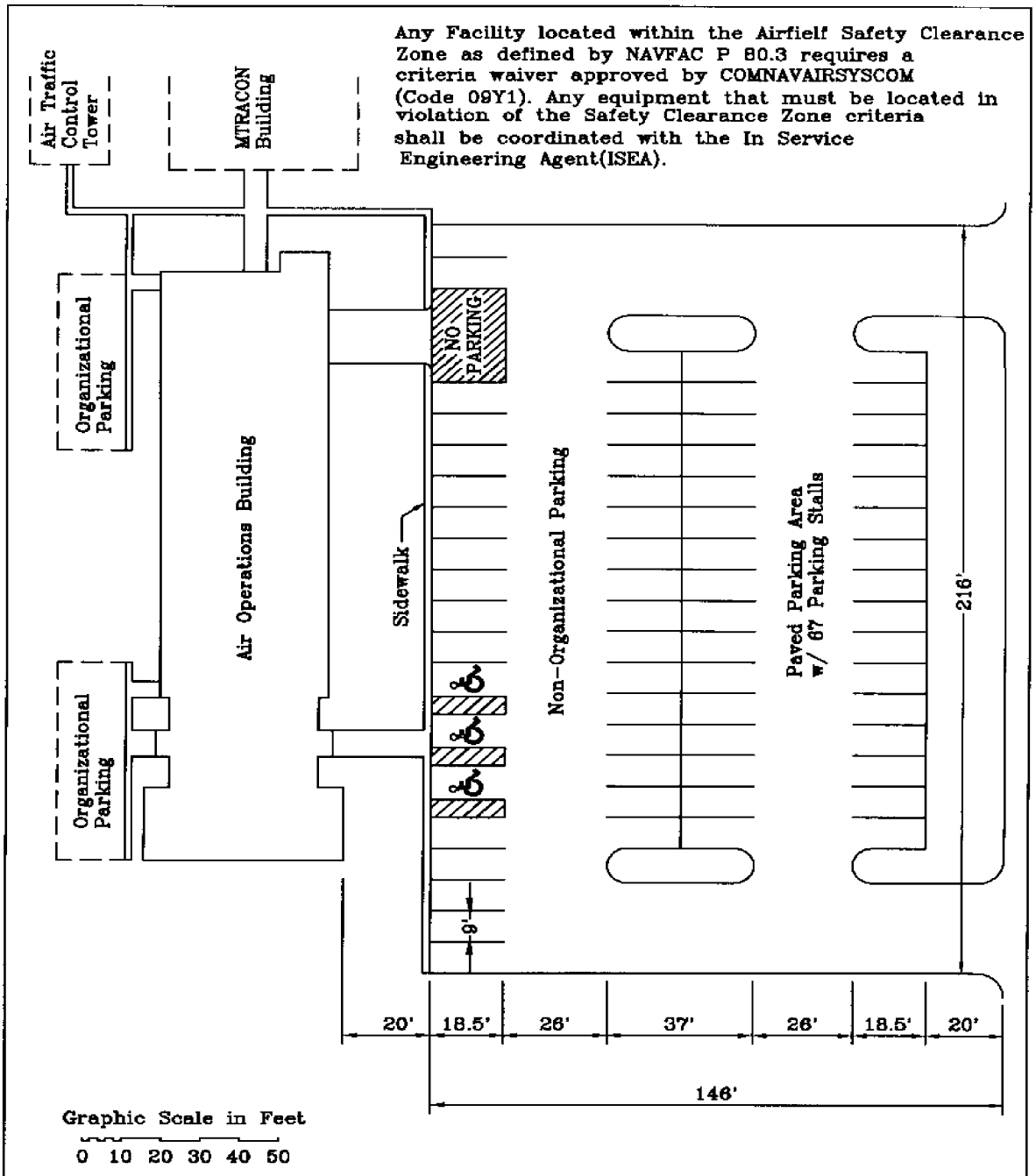
8.1.4.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

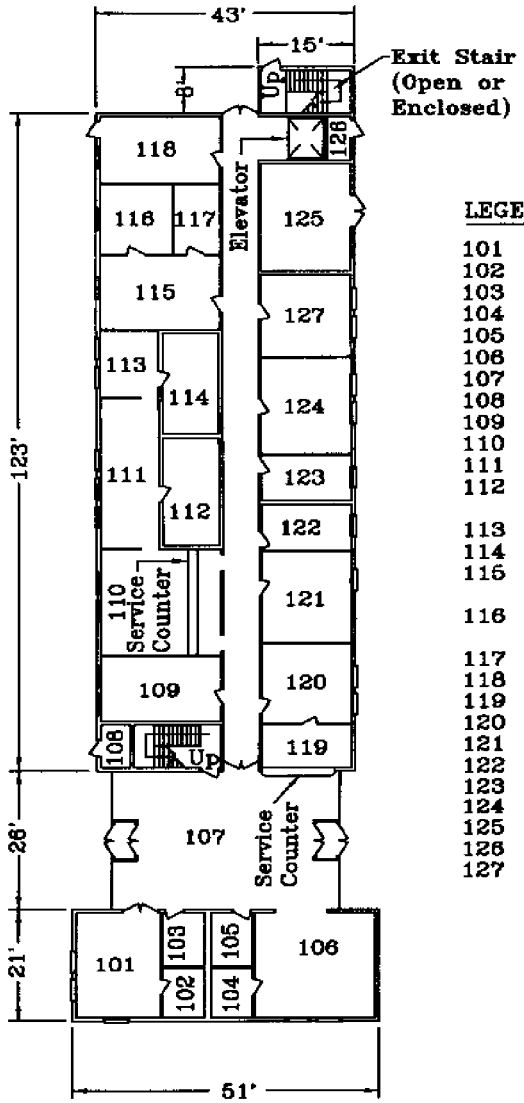
b) Exterior security lighting.

c) Electronic equipment designated as mission critical.

d) Building mechanical systems supporting mission critical electronic equipment.



TITLE	DATE	FACILITY PLATE	SHEET
Air Operations Building Facility Site Plan	11/92	141-40	1 Of 4



FIRST FLOOR PLAN

LEGEND

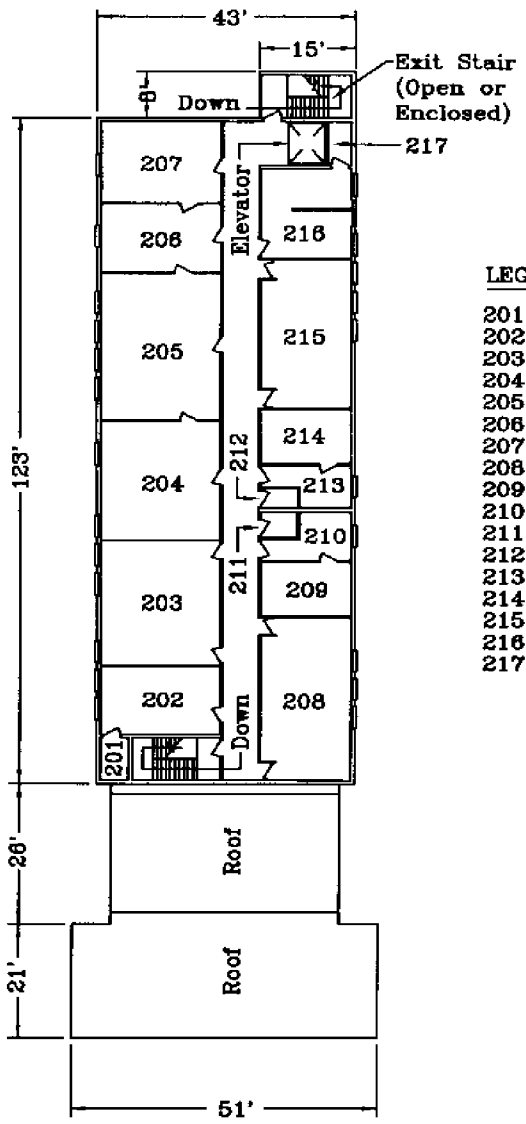
101 Official Waiting
102 Restroom
103 Woman's Restroom
104 Janitor
105 Men's Restroom
106 Snack Room
107 Lobby
108 Helium
109 Air Operations Duty
110 Weather/Briefing
111 Observer
112 Anti-Submarine Warfare Environmental Prediction System
113 Communications
114 Naval Environmental Data Network
115 Naval Weather Service Environmental Detachment - Administration
116 Naval Weather Service Environmental Detachment - Officer-In-Charge
117 Storage
118 Line Ops Office
119 Flight Clearance
120 TTY Dispatch
121 Flight Planning
122 Women's Restroom
123 Men's Restroom
124 Crew Room
125 Mech. Room
126 Elevator Equip. Room
127 Search And Rescue Office

Graphic Scale in Feet

0 10 20 30 40 50

Any Facility located within the Airfielf Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA).

TITLE	DATE	FACILITY PLATE	SHEET
Air Operations Building First Floor Layout	11/92	141-40	2 Of 4



SECOND FLOOR PLAN

LEGEND

201 Storage
202 Aviation Safety
203 Flight Support
204 Flight Schedules
205 Air Operations Admin
206 Asst. Air Operations Officer
207 Air Operations Officer
208 Briefing Room
209 Men's Lockers
210 Men's Rest./Shower
211 Janitor/Storage
212 Janitor
213 Women's Rest./Shower
214 Women's Lockers
215 Training
216 Leading Chief Petty Officer/Records
217 Storage

Graphic Scale in Feet

0 10 20 30 40 50

TITLE	DATE	FACILITY PLATE	SHEET
Air Operations Building Second Floor Layout	11/92	141-40	3 Of 4

	Air Operations
Plumbing Requirements (GPM):	
Water;	
Cold	89
Hot	
Recovery Rate (100 Degs. Rise)	45
Storage (Gal)	200
Fire Protection Requirements	
Not Included	
Heating Requirements (BTU/HR x 1000):	
(Inside Design Temperature = 72 Degs. F)	
Outside Design Temperature -5 Degs. F	400
+5 Degs. F	345
+15 Degs. F	295
+25 Degs. F	245
Air Conditioning Requirements (BTU/HR x 1000):	
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions; Cooling Load	540
Heat rejected to conditioned spaces by energized test. Equipment & parts under repair not included.	
Electrical Requirements (KVA):	
Lights;	
Connected Load	42.0
Estimated Demand	34.0
Power;	
Connected Load	19.0
Estimated Demand	16.0
Air Conditioning;	
Connected Load	92.0
Estimated Demand	74.0
Total;	
Connected Load	153.0
Estimated Demand	124.0
Emergency Generator (KW)	30.0
Areas (SF):	
Gross area including mechanical equipment room	12,637
General Notes:	

TITLE	DATE	FACILITY PLATE	SHEET
Air Operations Building Facility Design Notes	11/92	141-40	4 OF 4

8.1.5 Security. Air operations buildings are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements shall be designated in the IDSEP. Refer to par. 2.6.

8.1.6 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

8.2 Fleet Reconnaissance Photographic Laboratory

8.2.1 Function. The fleet reconnaissance photographic laboratory supports photo reconnaissance squadrons assigned to fleet support stations. The laboratory provides administrative and technical space for processing aerial film, preparation of mosaics, and application of photogrammetry and photographic intelligence. The laboratory provides housing for processing equipment, film, supplies, camera and equipment repair, and training, and may also provide passport and permit photographic services.

8.2.2 Location. Locate the fleet reconnaissance photographic laboratory as a stand-alone facility adjacent or in proximity to the operational reconnaissance squadron.

8.2.3 Architectural and Structural Requirements. See Facility Plate 141-65 (Sheets 1 through 3 of 3). Provide the following:

a) Floor drainage for equipment in processing, reproduction, enlarging and finishing areas.

b) Light-trap doors for darkrooms.

c) Secure film storage vaults.

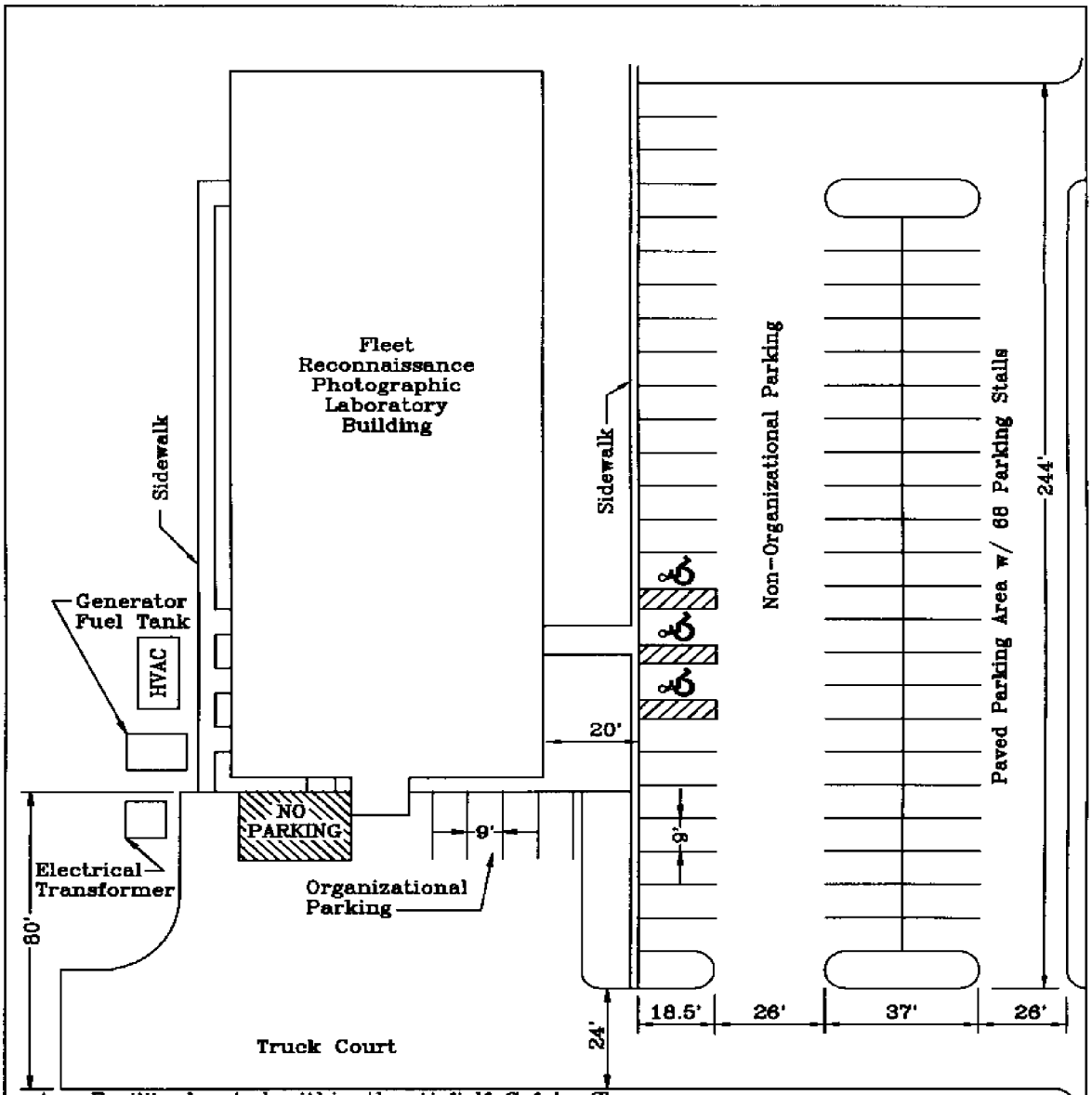
d) Built-in furnishings including counters, storage compartments, and shelving. Provide counter and shelf finishes resistant to photographic processing chemicals.

e) Eye and body wash stations.

f) Facility and restroom areas readily accessible by the physically handicapped.

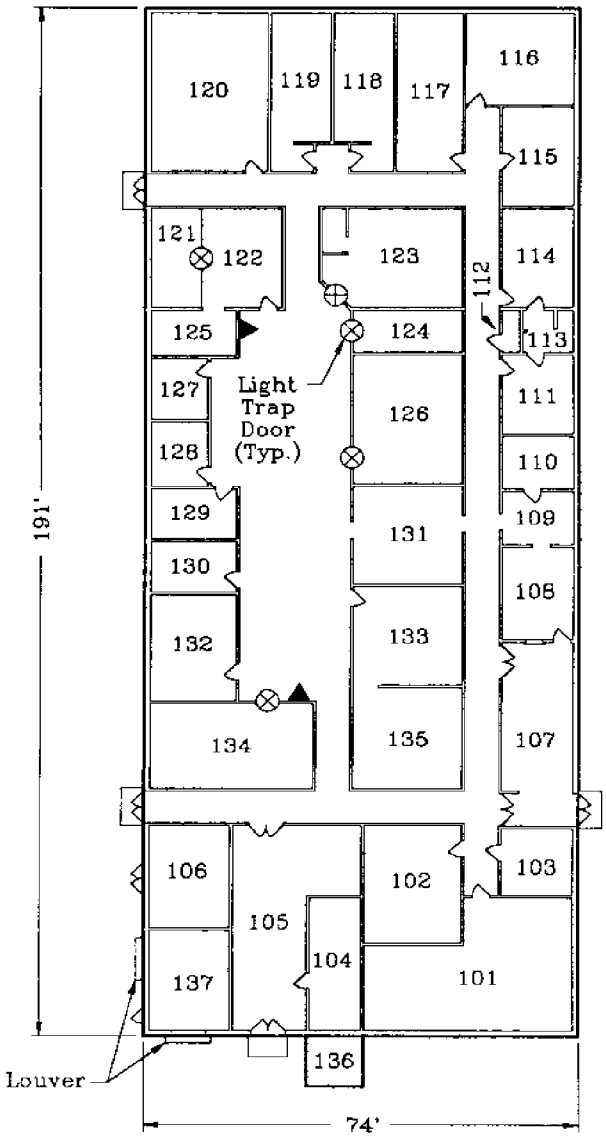
8.2.3.1 Floors. Provide the following:

a) Floors in storage areas designed for the weight of the storage canisters.



Any Facility located within the Airfielf Safety Clearance Zone as defined by NAVFAC P 80.3 requires a criteria waiver approved by COMNAVAIRSYSCOM (Code 09Y1). Any equipment that must be located in violation of the Safety Clearance Zone criteria shall be coordinated with the In Service Engineering Agent(ISEA).

TITLE	DATE	FACILITY PLATE	SHEET
Fleet Reconnaissance Photographic Laboratory Facility Site Plan	11/92	141-65	1 Of 3



LEGEND

101 Copy Studio
102 Portrait Studio
103 Storage Room
104 Supply Refrigerator
105 Supply Room
106 Mechanical/Electrical Room
107 Reception/Lobby
108 Job Control
109 Filing
110 Vault
111 Admin. Office
112 Janitor Room
113 Restroom
114 O in C Office
115 Women's Bunk
116 Lounge
117 Men's Bunk
118 Women's Restroom/Showers
119 Men's Restroom/Showers
120 Conference/Projection Room
121 Color Printing
122 Color Finishing
123 EH-38 Processing
124 C-41 Processing
125 Color Print BC-24
126 Black & White Print Room
127 Training Darkroom
128 Black & White Processing
129 Quality Control
130 3-M Office
131 Passport Studio
132 Training & PPO
133 Equipment Maintenance
134 E-6 Processing
135 Camera Repair
136 Hazardous Waste Containment
137 Emergency Generator/ Electrical Room

▲ Eye and Body Wash Station

Graphic Scale in Feet

0 10 50

TITLE	DATE	FACILITY PLATE	SHEET
Fleet Reconnaissance Photographic Laboratory Building Layout	11/92	141-65	2 Of 3

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+)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),
*                                                                              *
*                                                  Photographic Laboratory     *
*                                                                              *
*    Plumbing Requirements  (G.P.M.):                                          *
*      Water;                                                                  *
*                                                                              *
*        Cold                                                     64           *
*        Hot                                                                   *
*           Recovery Rate (100 Degs. Rise)                       260           *
*           Storage  (Gal)                                       160           *
*        Fire Protection Requirements                                          *
*        Not Included                                                          *
*                                                                              *
*    Heating Requirements  (BTU/HR x 1000):                                    *
*      (Inside Design Temperature  =  70 Degs. F)                              *
*      Outside Design Temperature     -5 Degs. F                935           *
*                                     +5 Degs. F                800           *
*                                    +15 Degs. F                745           *
*                                    +25 Degs. F                680           *
*                                                                              *
*    Air Conditioning Requirements (BTU/HR x 1000):                            *
*      Based on 91 Degs. D.B.   76 Degs. W.B. Outside Design                   *
*            Conditions; Cooling Load                          1000            *
*                                                                              *
*      Heat rejected to conditioned spaces by energized test.                  *
*      Equipment & parts under repair not included.                            *
*                                                                              *
*    Electrical Requirements  (KVA):                                           *
*      Lights;                                                                 *
*         Connected Load                                         80.0          *
*         Estimated Demand                                       64.0          *
*                                                                              *
*      Power;                                                                  *
*         Connected Load                                         32.0          *
*         Estimated Demand                                       26.0          *
*                                                                              *
*      Air Conditioning;                                                       *
*         Connected Load                                        292.0          *
*         Estimated Demand                                      234.0          *
*                                                                              *
*      Total;                                                                  *
*         Connected Load                                        404.0          *
*         Estimated Demand                                      324.0          *
*                                                                              *
*    Emergency Generator  (KW)                                  80.0          *
*                                                                              *
*    Areas  (SF):                                                              *
*      Gross area including mechanical                                         *
*      equipment room                                         14,134           *
*                                                                              *
*    General Notes:                                                            *
*                                                                              *
*                                                                              *
/)))))))))))))))))))))))))))))))))))))))))))))0)))))))0)))))))))))))))))))0))))))))1
* TITLE                                  * DATE  *  FACILITY PLATE  *  SHEET *
*       Fleet Reconnaissance Photographic* 11/92 *      141-65      * 3 OF 3 *
*       Laboratory Facility Design Notes *       *                  *        *
.)))))))))))))))))))))))))))))))))))))))))))))2)))))))2)))))))))))))))))))2))))))))-
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b) Chemical resistant floor covering in storage, supply, finishing, and processing areas.

8.2.3.2 Light-Trap Doors. Provide revolving or similar light-trap doors specifically designed for film developing areas.

8.2.4 Mechanical Requirements

8.2.4.1 Heating and Air Conditioning. Design thermostatically controlled heating and air conditioning systems to provide the following conditions:

a) Temperatures:

Film Processing Areas	70 to 80 degrees F
Printing/Finishing Operation	70 to 75 degrees F

b) Relative Humidity:

Film Processing Areas	50 percent maximum
Printing/Finishing Operation	50 to 60 percent

8.2.4.2 Ventilation. Provide the following:

a) Filtered air intake and interior return vents.

b) Minimum air movement, approximately 15 feet per minute, within ventilation system to prevent agitation of settled dust.

c) Ventilation within film processing and chemical storage areas in accordance with Industrial Ventilation: A Manual of Recommended Practice.

8.2.4.3 Plumbing. Provide the following:

a) Filtered and thermostatically temperature controlled water for processing area and categorized for developers, machine washing, and machine processing.

b) Acid resistant waste lines.

c) Waste lines from processors and sinks routed to silver nitrate recovery area.

8.2.5 Electrical Requirements

8.2.5.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads required by NFPA-101.

b) Air conditioning, ventilation, processing equipment, and supply refrigerators.

c) Exterior security lighting.

8.2.6 Security. Fleet reconnaissance photographic laboratories are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements shall be designated in the IDSEP. Refer to par. 2.6.

8.2.7 Hazardous Waste Storage. Provide space for hazardous materials containers in the supply room. Provide storage for hazardous wastes in a covered outdoor, water sealed concrete contaminant. Design the containment to hold a spill equal to the largest container plus 10 percent and the waste containers. Provide a fence and signs stating "Hazardous Waste Storage."

8.2.8 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

8.3 Anti-Submarine Warfare Operations Center (ASWOC)

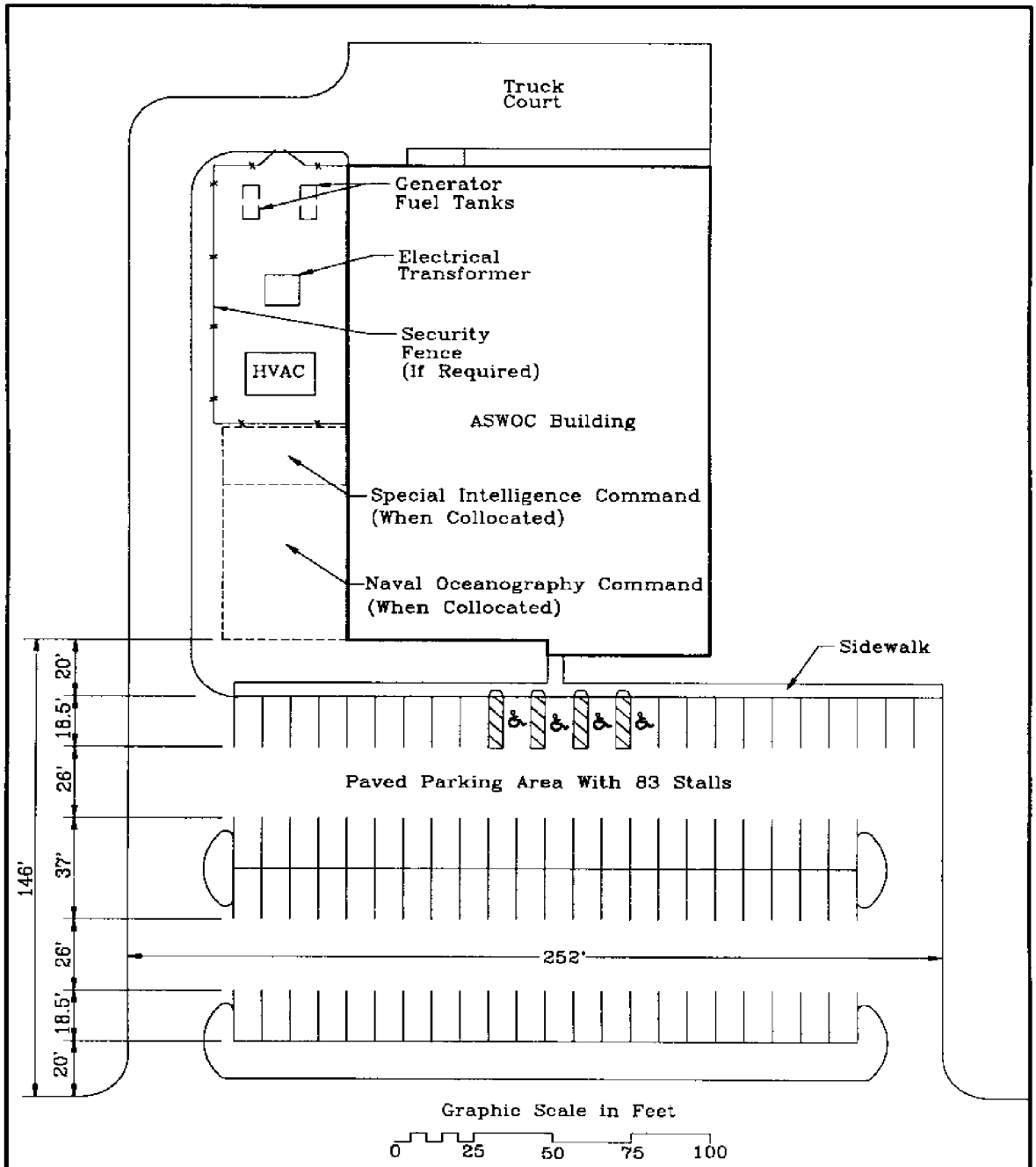
8.3.1 Function. The ASWOC building houses the Navy Command and Control Systems (NCCS) which provide the anti-submarine warfare (ASW) sector commander with the facilities and capabilities to plan and execute assigned missions, which include ASW, anti-surface warfare (ASUW), over the horizon targeting (OTHT), maritime surveillance, mining, search and rescue, drug enforcement operations, special projects, power projection, battle group/amphibious task force/convoy support, and flight crew training. ASWOCs operate across the entire threat environment from peacetime surveillance through low intensity conflict/regional contingency operations to general war.

8.3.2 Location. Locate the ASWOC building adjacent to the Naval Oceanography Command (NAVOCEANCOM) and Special Information Command (SPINTCOM) activities and as close as possible to the patrol squadron hangar. Locate within 1,000 feet of a suitable site for a AN/SMQ-11 antenna.

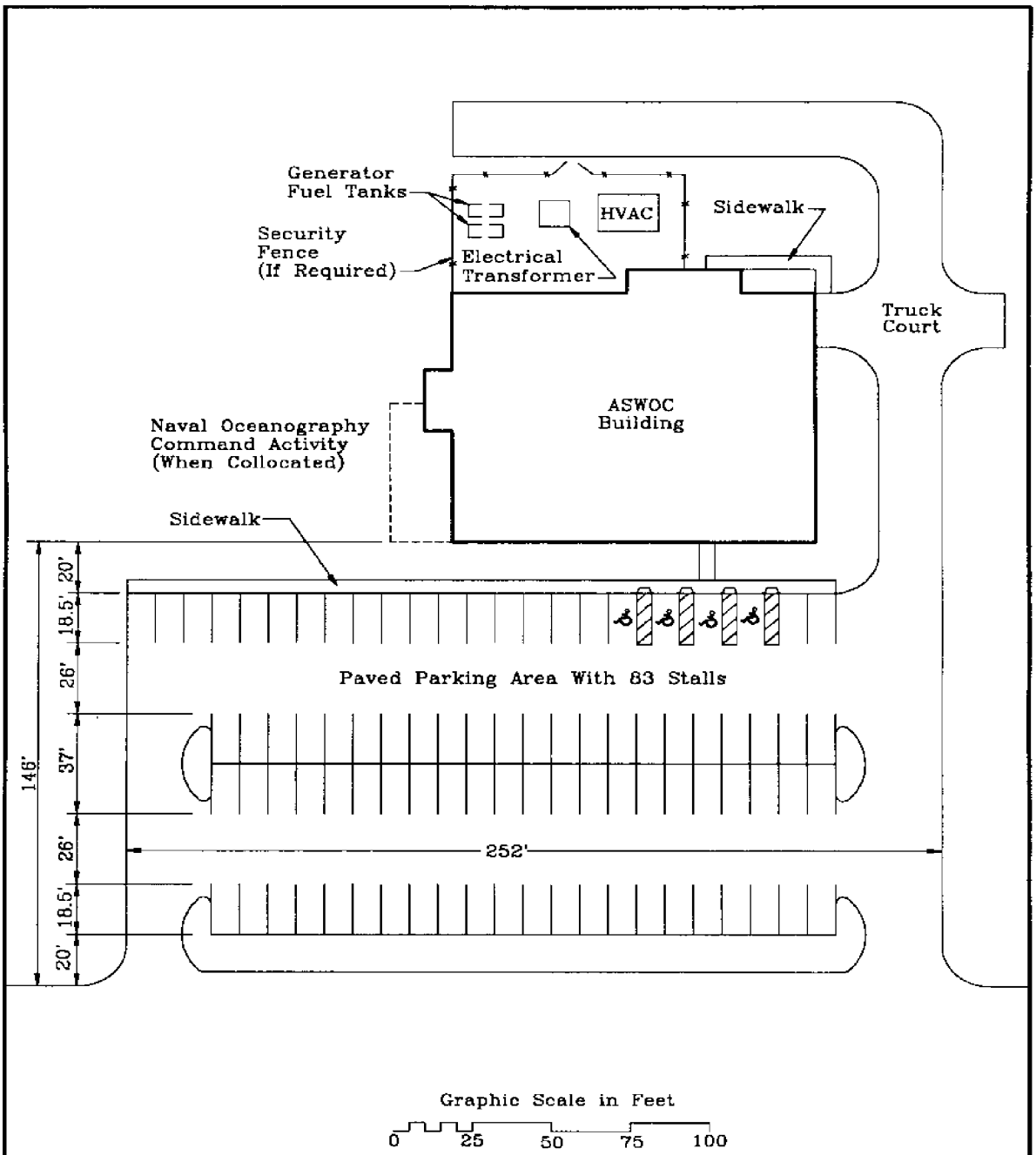
8.3.3 Architectural and Structural Requirements. See Facility Plate 141-42 (Sheets 1 through 7 of 7). Provide the following:

a) A one- or two-story building.

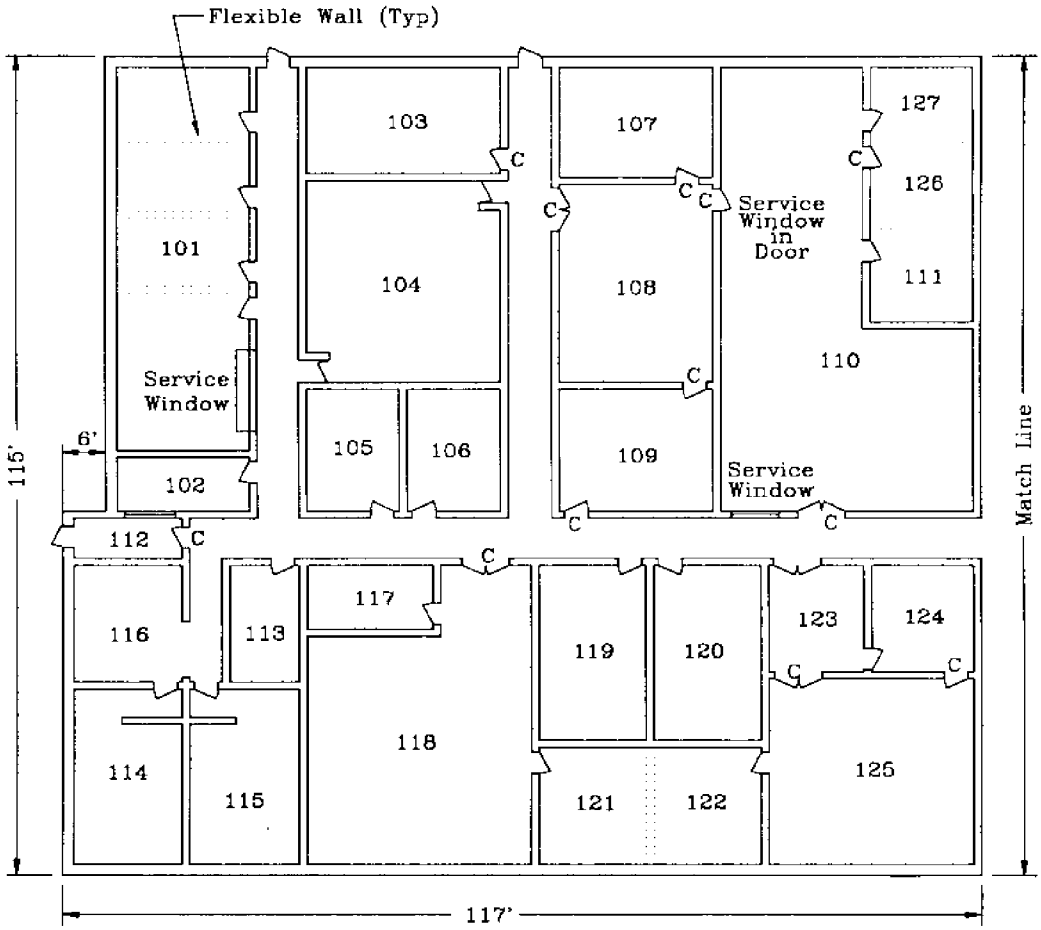
b) Blast hardened construction. Refer to NAVFAC P-397, Structures to Resist the Effects of Accidental Explosions; DM-2.08, Blast Resistant Structures; and MIL-HDBK-1013/1.



TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Single-Story Facility Site Plan	11/92	141-42	1 Of 7



TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Two-Story Facility Site Plan	11/92	141-42	2 Of 7



LEGEND

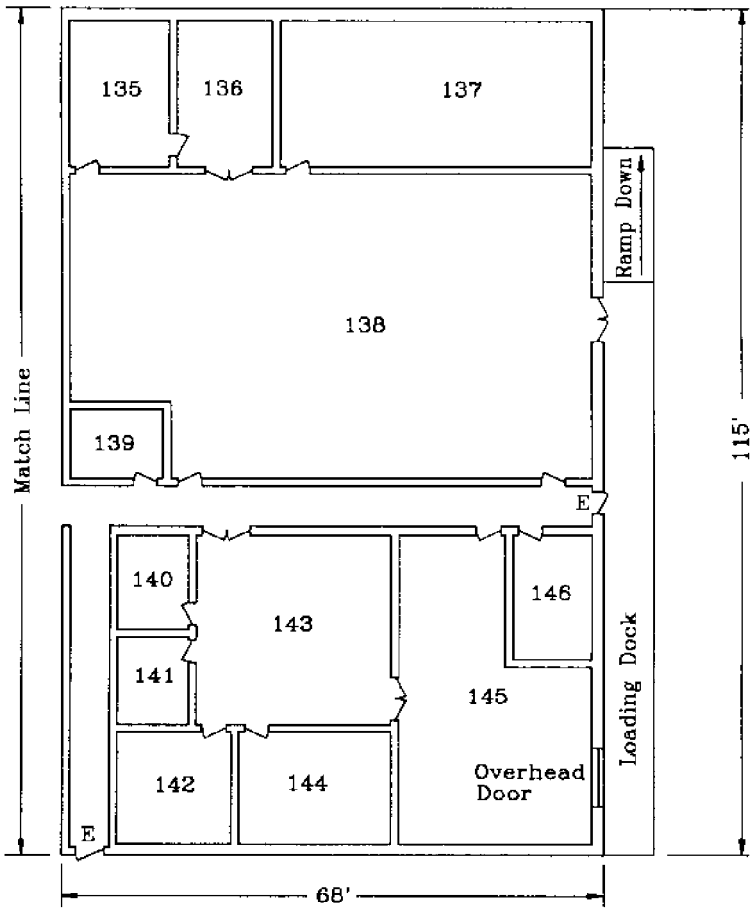
C=Cypher Door Lock

101 Administration
102 Duty Officer
103 Intelligence Officer
104 Conference Room
105 Officer-in-Charge
106 Command Task Group Operations
107 Special Information Drop
108 Operations Control
109 Mission Control/Evaluation
110 ASWOC Support Communications
111 Communications Officer
112 Waiting Area
113 Janitor/Storage
114 Men's Restroom
115 Women's Restroom
116 Mess/Lounge
117 Analysis Admin
118 Analysis
119 Brief/Debrief
120 Brief/Debrief
121 Tape
122 Tape
123 Automatic Data Processing Alcove
124 Automatic Data Processing Administration
125 Automatic Data Processing
126 Classified Materials
127 ASWOC Support Communications Maintenance

Scale in Feet

0 10 20 30 40 50

TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Single-Story Building Layout Part A	11/92	141-42	3 Of 7



C=Cypher Door Lock
E=Exit Only

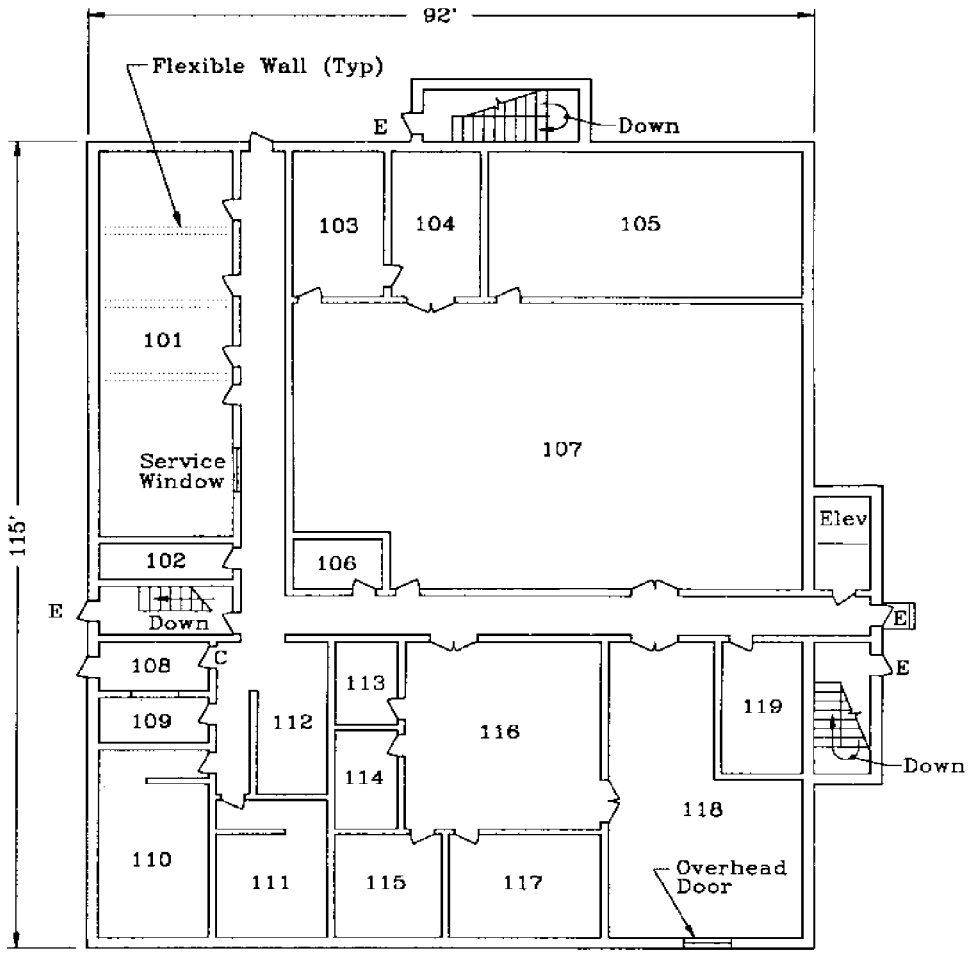
LEGEND

135 Battery Room
136 UPS Room
137 Electrical Room
138 Mechanical Room
139 Telephone Room
140 Maint. Officer
141 Tech. Library
142 Test Equipment
143 Maintenance
144 Storage
145 Supply
146 Mulcher

Scale in Feet

0 10 20 30 40 50

TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Single-Story Building Layout Part B	11/92	141-42	4 Of 7



C=Cypher Door Lock
E=Exit Only

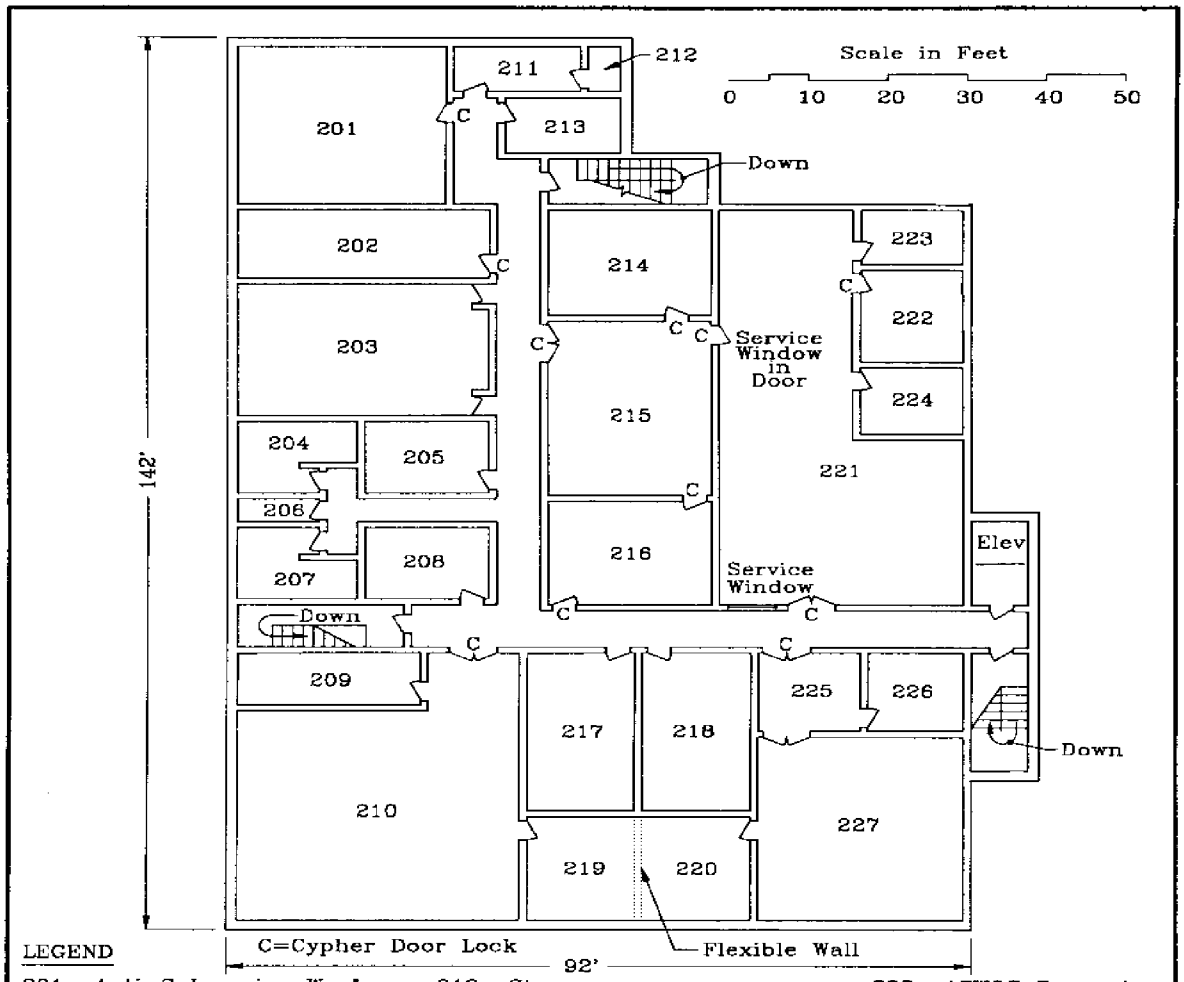
LEGEND

101	Administration		
102	Janitor/Storage	111	Women's Restroom
103	Battery Room	112	Mess/Lounge
104	UPS Room	113	Maint. Officer
105	Electrical Room	114	Tech. Library
106	Telephone Room	115	Test Equipment
107	Mechanical Room	116	Maintenance
108	Waiting Room	117	Storage
109	Duty Officer	118	Supply
110	Men's Restroom	119	Mulcher

Scale in Feet

0 10 20 30 40 50

TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Two-Story Building Layout Lower Level	11/92	141-42	5 Of 7



LEGEND

201	Anti-Submarine Warfare	212	Storage	223	ASWOC Support Communications
202	Intelligence Officer	213	Office		Maintenance
203	Conference Room	214	Special Information Drop	224	Communications Officer
204	Men's Restroom	215	Operations Control	225	Automatic Data Processing Alcove
205	Command Task Group Operations	216	Mission Control/Evaluation	226	Automatic Data Processing Administration
206	Utility/Storage	217	Brief/Debrief	227	Automatic Data Processing
207	Women's Restroom	218	Brief/Debrief		
208	Officer-in-Charge	219	Tape		
209	Analysis Admin	220	Tape		
210	Analysis	221	ASWOC Support Communications		
211	Tech Library/Training	222	Classified Materials		

TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Two-Story Building Layout Upper Level	11/92	141-42	6 Of 7

	Type	
Plumbing Requirements: G.P.M.		
Water;	Single-Story	Two-Story
Cold	65	65
Hot		
Recovery Rate (100 Degs. Rise)	45	60
Storage Gal	100	65
Fire Protection Requirements		
Not Included		
Heating Requirements (BTU/HR x 1000):		
(Inside Design Temperature = 72 Degs. F)		
Outside Design Temperature -5 Degs. F	485	650
+5 Degs. F	420	570
-15 Degs. F	360	485
-25 Degs. F	300	400
Air Conditioning Requirements (BTU/HR x 1000):		
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions;		
Cooling Load	825	1015
Heat rejected to conditioned spaces by energized test.		
Equipment & parts under repair not included.		
Electrical Requirements (KVA):		
Lights;		
Connected Load	64.0	74.0
Estimated Demand	52.0	59.0
Power;		
Connected Load	289.0	245.0
Estimated Demand	191.0	196.0
Air Conditioning;		
Connected Load	302.0	372.0
Estimated Demand	242.0	298.0
Total;		
Connected Load	605.0	691.0
Estimated Demand	485.0	553.0
Emergency Generator (KW) (Two Required)	600.0 Ea.	600.0 Ea.
Areas (SF):		
Gross area including mechanical equipment room	21,275	23,644

General Notes:

TITLE	DATE	FACILITY PLATE	SHEET
ASWOC Facility Design Notes	11/92	141-42	7 OF 7

c) RF shielding throughout the facility. Refer to MIL-HDBK-1195 and NAVFAC Instruction 11010.44. Shielding requirements shall be confirmed by NESSEC.

d) High altitude electromagnetic pulse (HEMP) hardening for the rectangular area bounded by Analysis, Intelligence Officer, ASWOC Support Communications (ASCOMM), automatic data processing (ADP), and the UPS room. Use stainless steel for 100 dB protection. Refer to DM-12.02, High Altitude Electromagnetic Pulse Protection for Ground-Based Facilities.

e) Built-in furnishings including counters, benches, service windows, and storage racks.

f) Passage corridors a minimum of 5 feet, 6 inches wide and clear of obstructions.

g) Removable, modular, access flooring in the operations control, mission control and evaluation, ADP and analysis rooms with 18 inches of clearance provided between the floor panels and subfloor to accommodate wiring and insulated piping. Refer to par. 2.3.5.2.

h) Hydraulic passenger elevator with removable protective padding for transporting equipment (two-story facility only). Refer to NAVFAC DM-3.09 Elevators, Escalators, Dumbwaiters, Access Lifts, and Pneumatic Tube Systems, and par. 2.4.9.9.

i) Access/exit stairs.

j) Facility and restroom areas readily accessible by the physically handicapped.

8.3.3.1 Windows. Do not use windows unless specifically requested for administration areas.

8.3.4 Mechanical Requirements. Design a thermostatically controlled heating and air conditioning system to meet the criteria in pars. 2.4 and 8.3.4.1.

8.3.4.1 Ventilation. Provide ventilation for UPS and battery rooms in accordance with par. 2.4. Provide ozone removal for analysis room by ventilation to atmosphere.

8.3.5 Electrical Requirements

8.3.5.1 Uninterrupted Power Supply (UPS). Provide non-redundant UPS in accordance with par. 2.5.8. Use anticipated load to determine the size of the UPS.

8.3.5.2 Emergency Electrical Power. Provide two 600 kW emergency generators (primary and backup) with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads as required by NFPA-101.

b) Electronic equipment in the operations control, mission evaluation and control, ADP, analysis, and communications rooms.

c) Building mechanical systems supporting electronic equipment.

d) Exterior security lighting and security systems.

8.3.6 Security. ASWOCs are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements shall be designated in the IDSEP. Refer to par. 2.6. Provide the following:

a) Secured access restrictors in HVAC ducting.

b) Classified material mulching machine.

c) External and internal surveillance television cameras and monitors.

d) Electronic cipher door locks at entry doors.

8.3.7 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

8.4 Air Cargo Terminal

8.4.1 Function. The air cargo terminal houses equipment and personnel for handling and movement of material including, but not limited to, receipt of packages, control documentation, palletization, holding for shipment, aircraft loading and unloading, package sorting, and loading on trucks. Air cargo terminals, to the maximum degree feasible, are mechanized and, where justified, automated, and computer controlled.

8.4.2 Location. Locate the air cargo terminal as a stand-alone facility or combined with the air passenger terminal on the apron line in reasonable proximity to the air operations building. Refer to MIL-HDBK-1021/1 and par. 2.2.6.

8.4.3 Architectural and Structural Requirements. The facilities are designated as small or medium/large buildings. See Facility Plate 141-12 (Sheets 1 through 5 of 5). Provide the following:

a) Forklift charging stations.

b) Ball bearing pallet platform in medium/large building.

c) Clear ceiling height of 16 feet in cargo handling area with overhead doors open.

d) Dust pickup, conveying, and collection system in carpentry shop.

e) Weighing scales.

f) Overhead hoist (capacity determined by user).

g) Compressed air system (capacity determined by user).

h) Built-in furnishings including counters, benches, and storage racks.

i) Administration and personnel spaces with one-hour fire separation from cargo/work areas.

j) Facility and restroom areas readily accessible by the physically handicapped.

k) Additional area to accommodate storage of malfunctioning equipment.

8.4.3.1 Structure. Design roof framing system to support suspended equipment and overhead hoist.

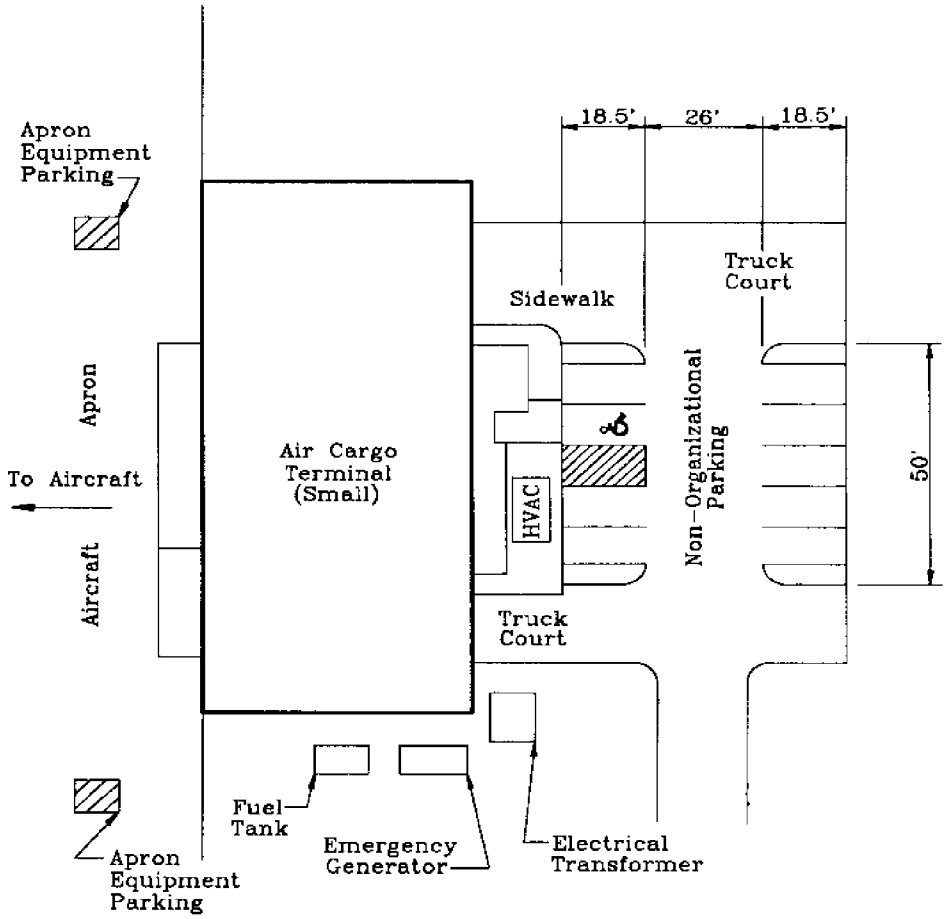
8.4.3.2 Wire Mesh Partitions. Construct wire mesh partitions with doors for security cage. Refer to NFGS-10605, Wire Mesh Partitions.

8.4.3.3 Interior Doors. Provide insulated doors between personnel spaces and cargo handling areas.

8.4.3.4 Overhead Doors. Provide electrically operated overhead doors.

8.4.3.5 Pre-engineered Buildings. Consider using a pre-engineered metal building. Refer to NFGS-13121, Pre-engineered Metal Buildings (Rigid Frame).

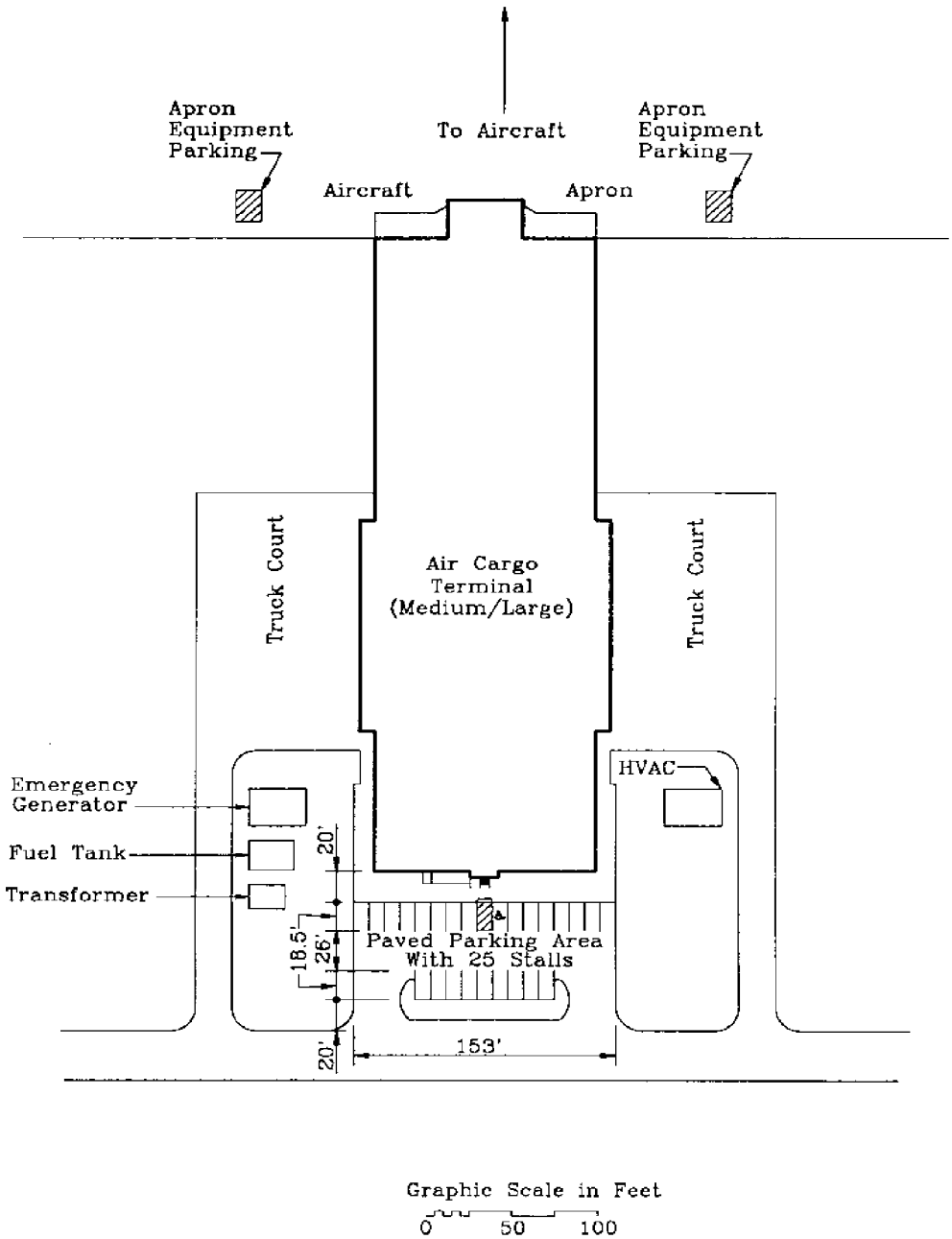
8.4.4 Mechanical Requirements



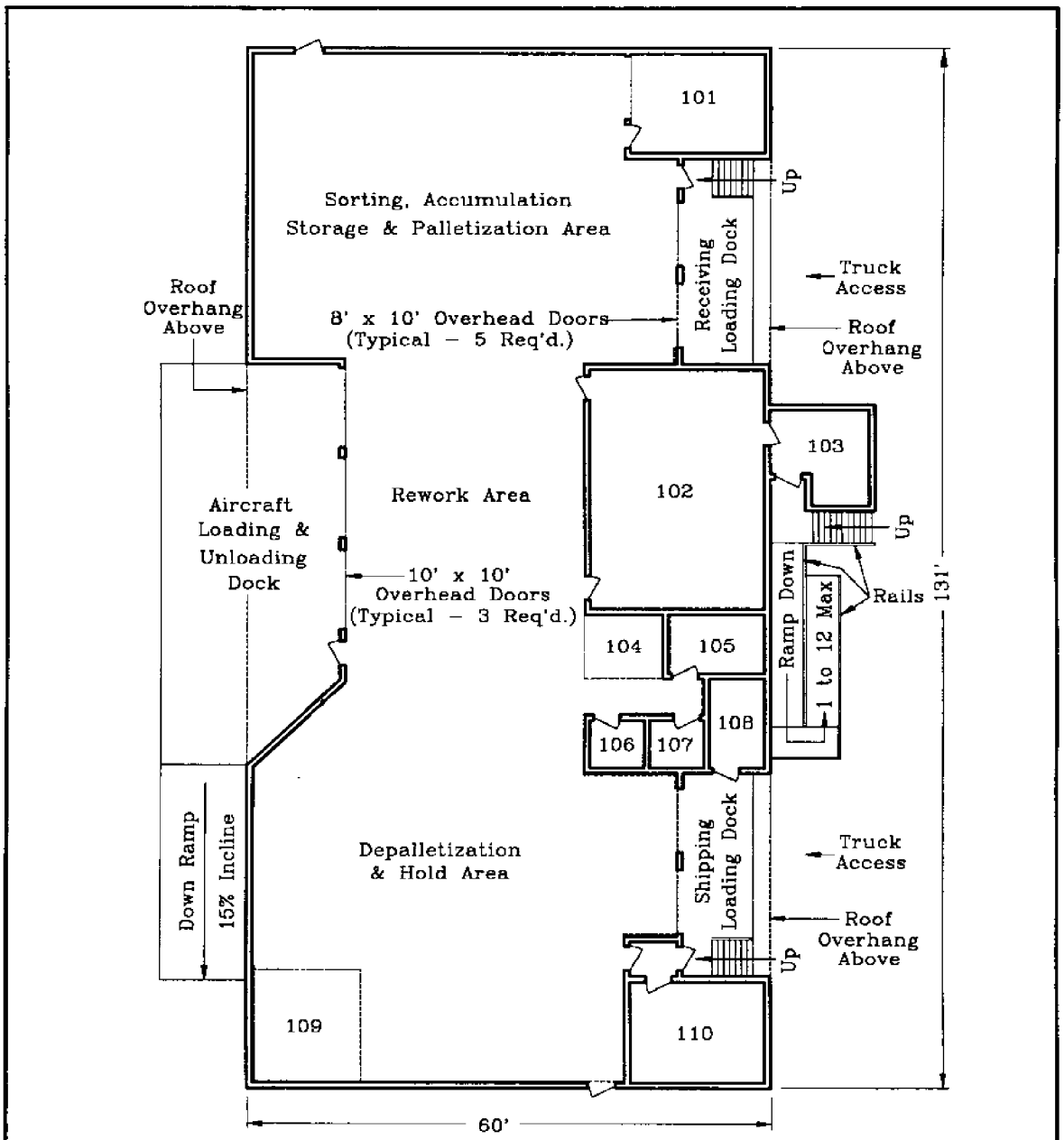
Graphic Scale in Feet

0 20 40

TITLE	DATE	FACILITY PLATE	SHEET
Air Cargo Terminal (Small) Facility Site Plan	11/92	141-12	1 OF 5



TITLE	DATE	FACILITY PLATE	SHEET
Air Cargo Terminal (Medium/Large) Facility Site Plan	11/92	141-12	2 OF 5



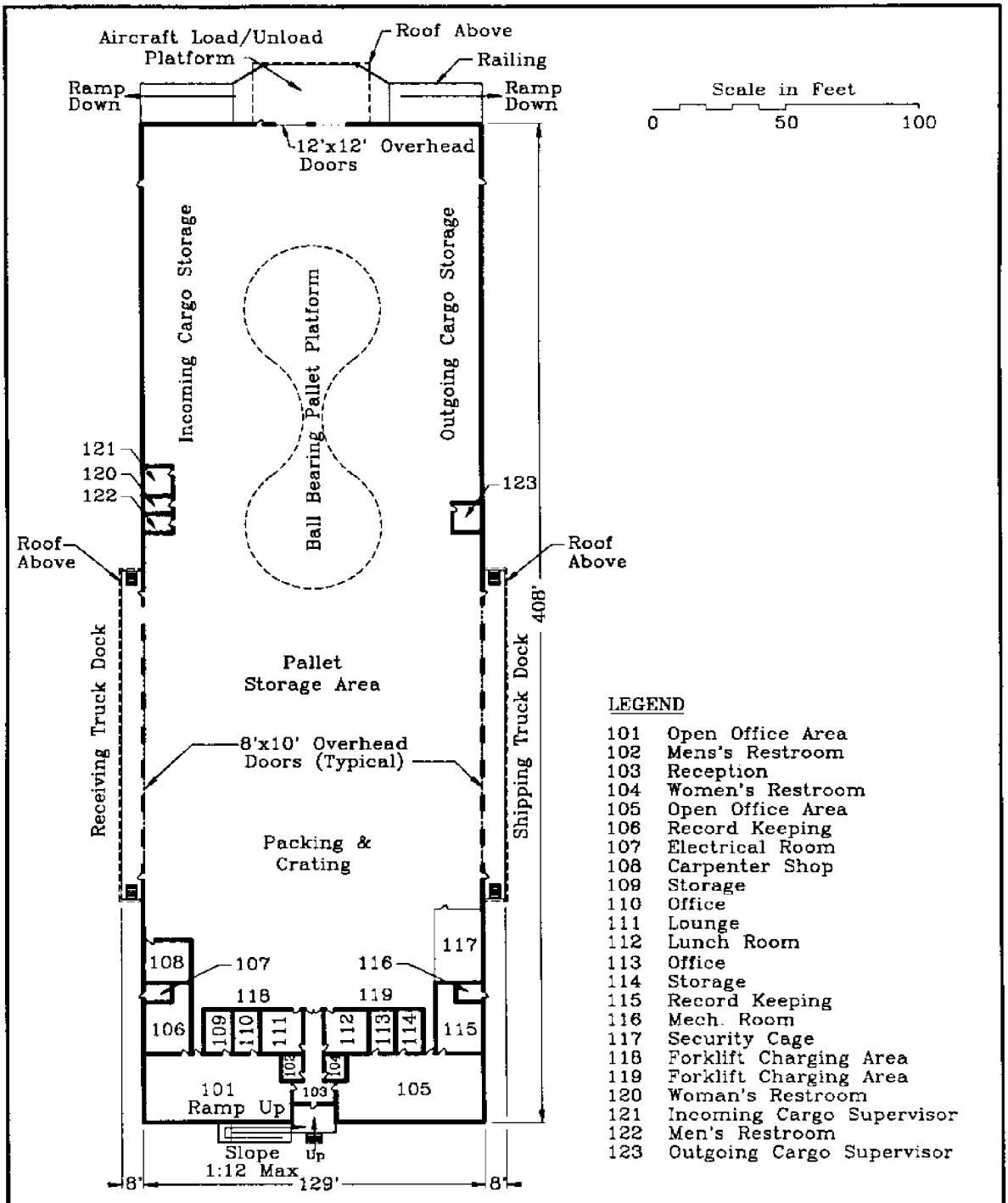
LEGEND

101 Shop
102 Office
103 Reception
104 Special Handling Cage
105 Classified Storage
106 Men's Restroom
107 Womens's Restroom
108 Mech. Room
109 Security Cage
110 Lunch Room

Scale in Feet

0 10 20 30 40

TITLE	DATE	FACILITY PLATE	SHEET
Air Cargo Terminal (Small) Building Layout	11/92	141–12	3 OF 5



TITLE	DATE	FACILITY PLATE	SHEET
Air Cargo Terminal (Medium/Large) Building Layout	11/92	141-12	4 OF 5

	Air Cargo Terminal Small	Air Cargo Terminal Medium/Large
Plumbing Requirements: G.P.M.		
Water;		
Cold	38	60
Hot		
Recovery Rate (100 Degs. Rise)	18	32
Storage (Gal)	60	100
Fire Protection Requirements		
Not Included		
Heating Requirements (MBH):		
(Inside Design Temperature = 70 Degs. F)		
Outside Design Temperature -5 Degs. F	290	1915
+5 Degs. F	240	1600
-15 Degs. F	195	1290
-25 Degs. F	150	970
Air Conditioning Requirements (MBH):		
Based on 91 ? D.B. 76 ? W.B. Outside Design Conditions;		
Cooling Load	36	175
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions;		
Heat rejected to conditioned spaces by energized test.		
Equipment & parts under repair not included.		
Electrical Requirements (KW):		
Lights;		
Connected Load	7.0	48.0
Estimated Demand	6.0	38.0
Power;		
Connected Load	5.0	26.0
Estimated Demand	3.0	21.0
Air Conditioning;		
Connected Load	11.0	66.0
Estimated Demand	9.0	53.0
Total;		
Connected Load	22.0	140.0
Estimated Demand	18.0	112.0
Emergency Generator	25.0	75.0
Areas (SF):		
Gross area including mechanical equipment room	7,860	52,632

General Notes:

Size of Facility Required is Determined By Throughput Per NAVFAC P-80.

TITLE	DATE	FACILITY PLATE	SHEET
Air Cargo Terminal Facility Design Notes	11/92	141-12	5 OF 5

8.4.4.1 Heating. Provide heating in accordance with par. 2.4. Design heating system for a minimum infiltration rate of two air changes per hour in cargo handling area. This rate depends on the installation of insulation seals on the overhead doors. Ensure the temperature of the cargo handling areas is thermostatically controlled for a minimum of 55 degrees F with the doors closed and 50 degrees F with the doors open.

8.4.4.2 Ventilation. Provide ventilation in accordance with par. 2.4. Provide roof-mounted ventilation fans for the cargo handling area.

8.4.4.3 Sawdust Collection and Control. Provide dust pickup, conveying, and collection system for carpenters shop. Refer to Title 29, CFR Part 1910.265, Sawmills and Industrial Ventilation: A Manual of Recommended Practice.

8.4.4.4 Fire Protection. Provide fire protection for the carpenter's shop in accordance with NFPA 664, Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.

8.4.5 Electrical Requirements

8.4.5.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads required by NFPA 101.

b) Exterior security lighting.

8.4.6 Lighting. Design lighting in accordance with par. 2.5.6. Provide high-pressure sodium vapor lighting in cargo/work areas.

8.4.7 Security. Air cargo terminals are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

8.4.8 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

8.5 Air Passenger Terminal

8.5.1 Function. The air passenger terminal houses equipment and personnel for processing authorized air passengers and their baggage and for handling incidental freight including unpalletized general cargo.

8.5.2 Location. Locate the air passenger terminal on the apron line as a stand-alone facility or combined with the air operations building or the air cargo building. When not combined with air operations building, locate in reasonable proximity to the air operations building. Refer to par. 2.2.6 and MIL-HDBK-1021/1.

8.5.3 Architectural and Structural Requirements. See Facility Plate 141-11 (Sheets 1 through 3 of 3). Provide the following:

a) Baggage conveyors for baggage check-in and claim areas.

b) Security vault accessed from reserved waiting lounge.

c) Kitchenette accessed from reserved waiting lounge.

d) Pay telephone stations and concession areas.

e) Passenger security screening and baggage x-ray equipment.

f) A separate holding area for security cleared passengers.

g) Built-in furnishings including information and check-in counters.

h) Space for infant changing area in men's and women's restrooms.

i) Interior layout and design to provide quiet and active waiting areas.

j) Storefront type windows and doors at terminal main entrances.

k) Public address and passenger paging system.

l) Facility and restroom areas readily accessible by the physically handicapped.

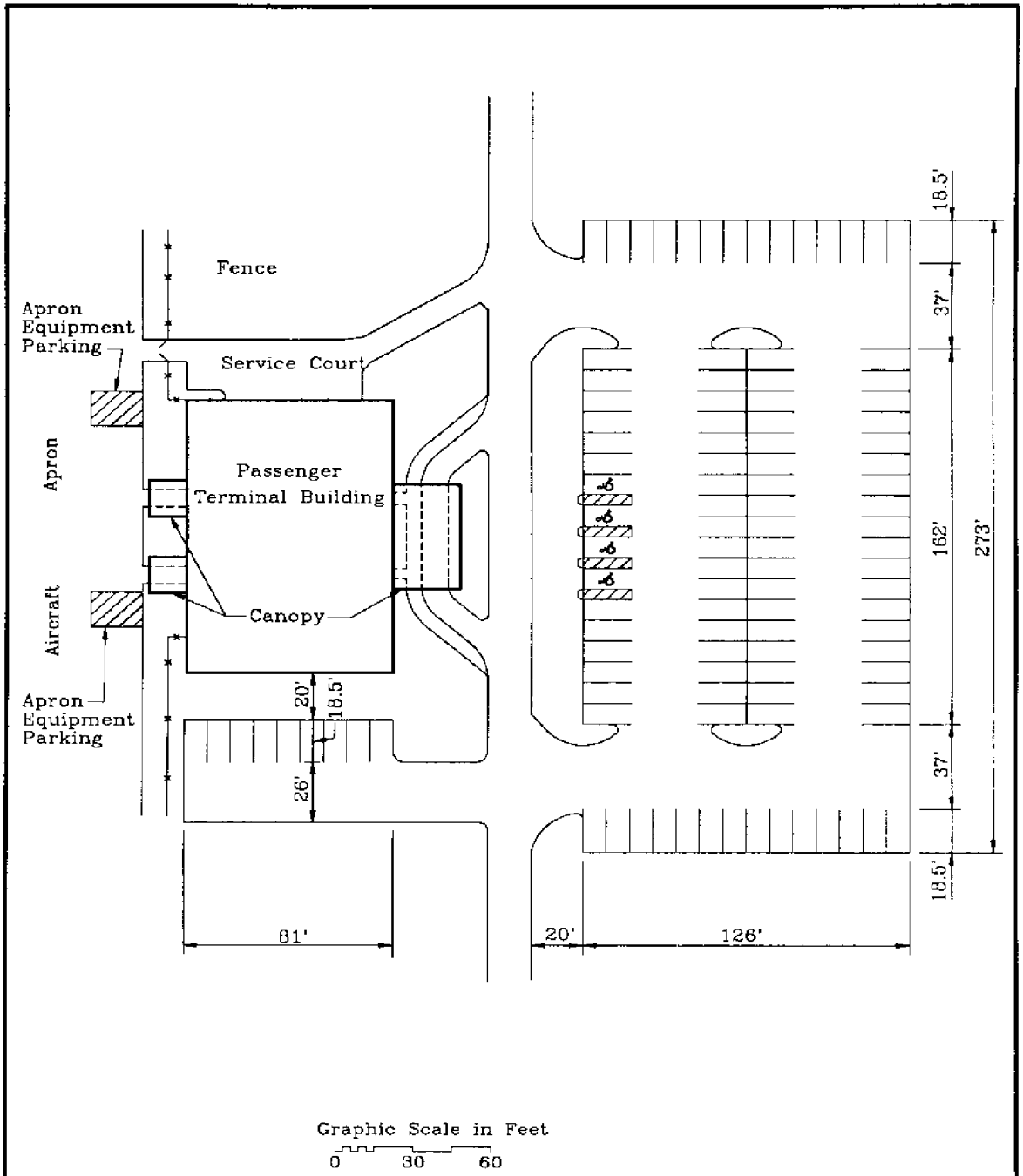
8.5.3.1 Wire Mesh Partitions. Construct wire mesh partition with door for detention area. Refer to NFGS-10605.

8.5.3.2 Ceilings. Consider an architecturally exposed structural ceiling.

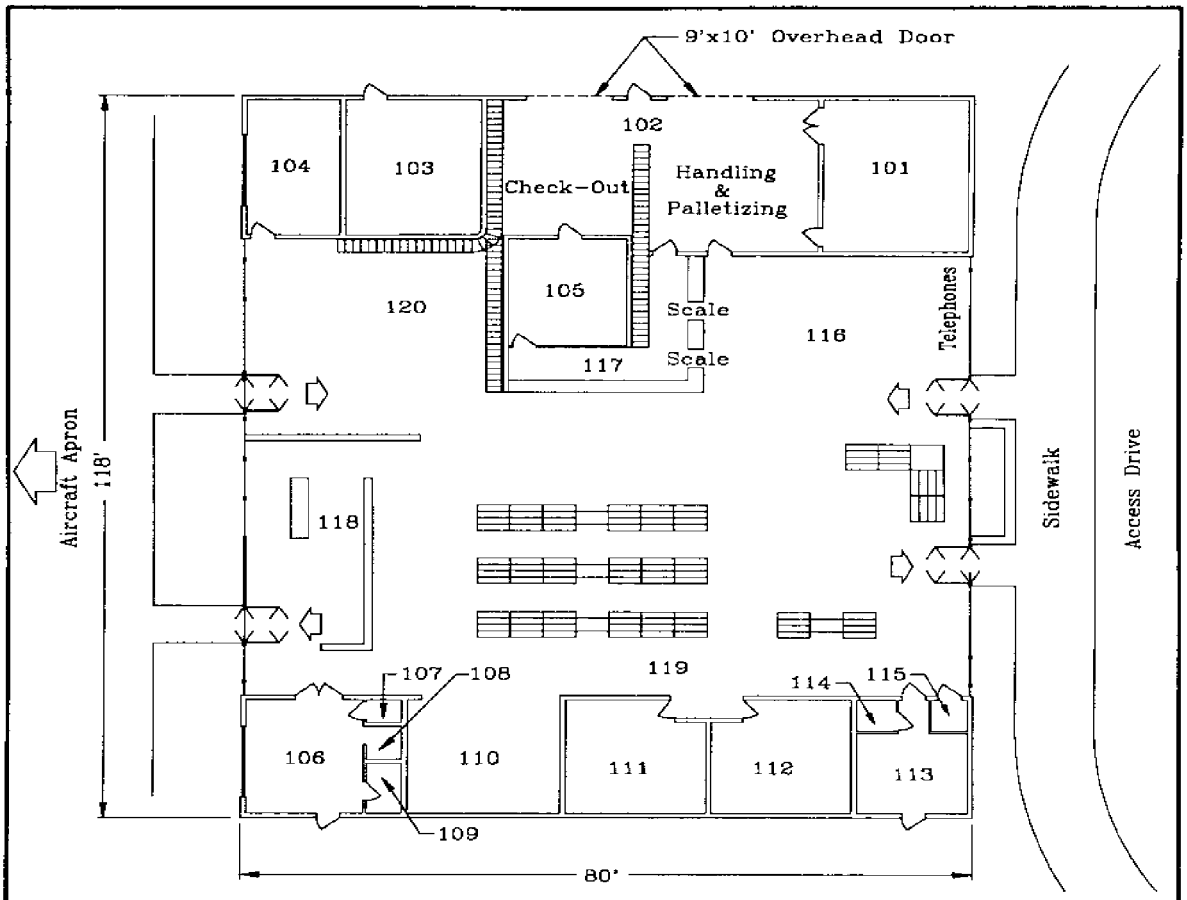
8.5.3.3 Overhead Doors. Provide electrically operated overhead doors.

8.5.3.4 Windows. Provide insulated glazing for noise reduction. Refer to par. 2.3.10.

8.5.3.5 Pre-engineered Buildings. Consider using a pre-engineered metal building. Refer to NFGS-13121.



TITLE	DATE	FACILITY PLATE	SHEET
Air Passenger Terminal Facility Site Plan	11/92	141-11	1 Of 3



LEGEND

101	Freight	112	Men's Restroom
102	Baggage	113	Detention
103	Mech. Room	114	Restroom
104	Aircrew	115	Janitor
105	Office	116	Check-In
106	Reserved Room	117	Information
107	Vault	118	Security Screening Device
108	Kitchenette	119	Waiting Lounge
109	Restroom	120	Baggage Claim
110	Vending	121	Concessions
111	Women's Restroom		

Scale in Feet

0 10 20 30 40 50

TITLE	DATE	FACILITY PLATE	SHEET
Air Passenger Terminal Building Layout	11/92	141-11	2 Of 3

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+)))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))),
*                                                                            *
*                                                  Air Passenger Terminal    *
*                                                                            *
*    Plumbing Requirements:  G.P.M.                                          *
*      Water;                                                                *
*                                                                            *
*        Cold                                                  80            *
*        Hot                                                                 *
*           Recovery Rate (100 Degs. Rise)                     42            *
*           Storage  (Gal)                                    100            *
*        Fire Protection Requirements                                        *
*        Not Included                                                        *
*                                                                            *
*    Heating Requirements  (BTU/HR x 1000):                                  *
*      (Inside Design Temperature  =  72 Degs. F)                            *
*      Outside Design Temperature     -5 Degs. F            400             *
*                                     +5 Degs. F            350             *
*                                    +15 Degs. F            300             *
*                                    +25 Degs. F            250             *
*                                                                            *
*    Air Conditioning Requirements (BTU/HR x 1000):                          *
*      Based on 91 Degs. D.B.   76 Degs. W.B. Outside Design                 *
*            Conditions; Cooling Load                        550             *
*                                                                            *
*      Heat rejected to conditioned spaces by energized test.                *
*      Equipment & parts under repair not included.                          *
*                                                                            *
*    Electrical Requirements  (KVA):                                         *
*      Lights;                                                               *
*         Connected Load                                       9.0           *
*         Estimated Demand                                     7.0           *
*                                                                            *
*      Power;                                                                *
*         Connected Load                                      16.0           *
*         Estimated Demand                                    13.0           *
*                                                                            *
*      Air Conditioning;                                                     *
*         Connected Load                                     202.0           *
*         Estimated Demand                                   162.0           *
*                                                                            *
*      Total;                                                                *
*         Connected Load                                     227.0           *
*         Estimated Demand                                   182.0           *
*                                                                            *
*    Areas  (SF):                                                            *
*      Gross area including mechanical                                       *
*      equipment room                                    10,400              *
*                                                                            *
*                                                                            *
*                                                                            *
/))))))))))))))))))))))))))))))))))))))))))))0)))))))0)))))))))))))))))))0))))))))1
* TITLE                                  * DATE  *  FACILITY PLATE  *  SHEET *
*       Air Passenger Terminal Facility  * 11/92 *      141-11      * 3 OF 3 *
*       Design Notes                     *       *                  *        *
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8.5.4 Electrical Requirements

8.5.4.1 Emergency Electrical Power. Emergency generator is not required.

8.5.5 Security. Air passenger terminals are normally located within restricted areas which meet the minimum security measures for external security. If the facility is located within a restricted area of a lower level of security or is located remote and outside of an established restricted area, provide additional measures to meet the minimum security requirements for the level of security assigned to the facility. The level of security and the designer's responsibility for particular security elements will be designated in the IDSEP. Refer to par. 2.6.

8.5.6 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

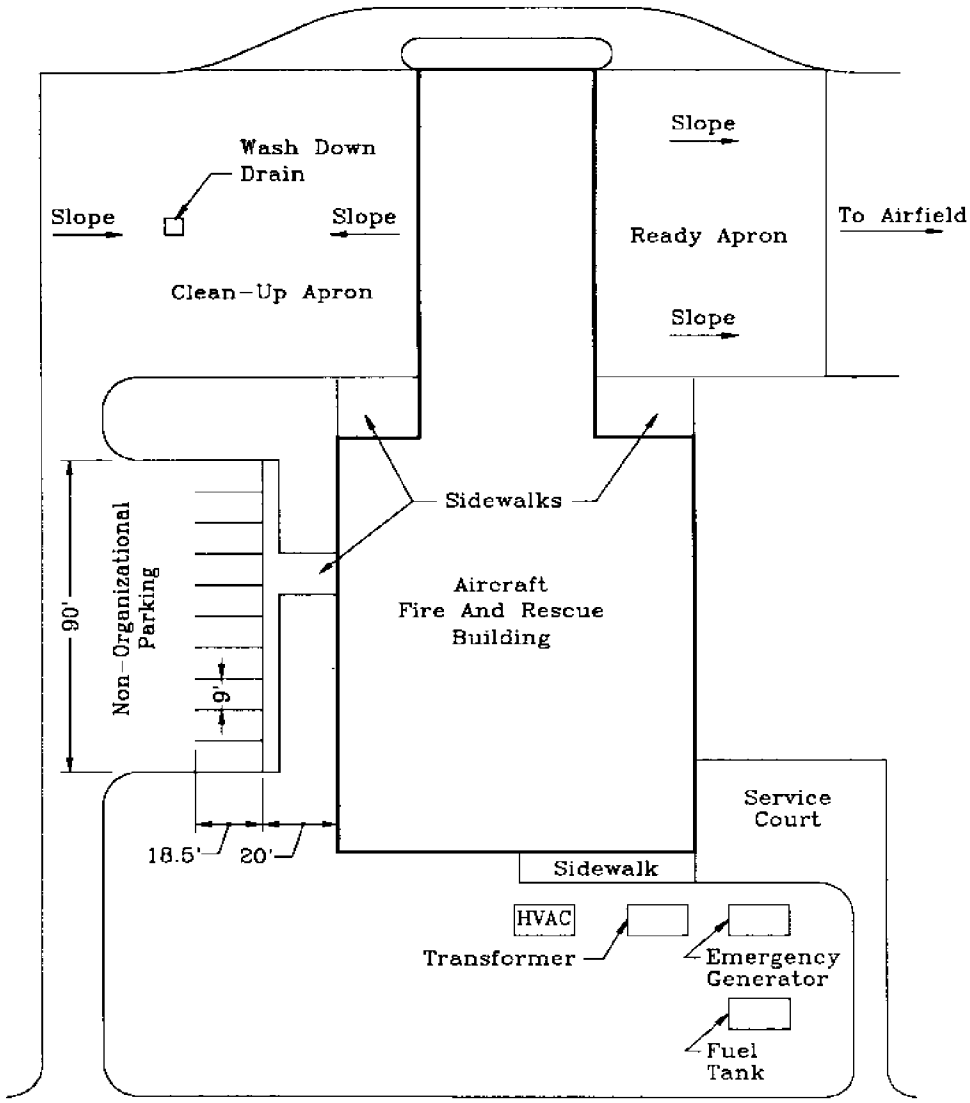
8.6 Aircraft Fire and Rescue Station and Combined Structural/Aircraft Fire and Rescue Station

8.6.1 Function. Fire and rescue stations provide housing for firefighting and rescue equipment and personnel.

8.6.2 Location. Locate as close as possible to the centroid of runway operations to minimize travel time to probable rescue sites and other areas such as aprons, hardstands, and hangars where aircraft fires may occur. Refer to par. 2.2.6 and MIL-HDBK-1021/1. Ready access from the aircraft fire and rescue station to all parts of the installation is necessary to permit assistance by fire/rescue vehicles when needed to control structural fires. Where the aircraft fire and rescue station is combined with the structural fire station, provide the latter with unobstructed access to all parts of the installation keeping intersections with other vehicular or pedestrian arteries to a minimum.

8.6.3 Architectural and Structural Requirements. Fire and rescue equipment housed in the station vary with the mission of the installation and depend on the gross weight of the aircraft supported. The facilities are divided into Class A and Class B for size distinction and are provided in a one-story structure. The number of fire apparatus stalls is determined locally and may include fire trucks and crash rescue equipment. Expansion of the apparatus area (crash rescue) for storage of aircraft lifting slings may be required. The amount of storage required is based on the size, type, and number of slings for the aircraft supported, and the local or regional rescue mission assignment. See Facility Plate 141-20 (Sheets 1 through 4 of 4) and Facility Plate 141-25 (Sheets 1 through 3 of 3). Provide the following:

a) Ceiling height in the apparatus area, unobstructed, with the doors open: the greater of 16 feet or 7 feet above the tallest vehicle.



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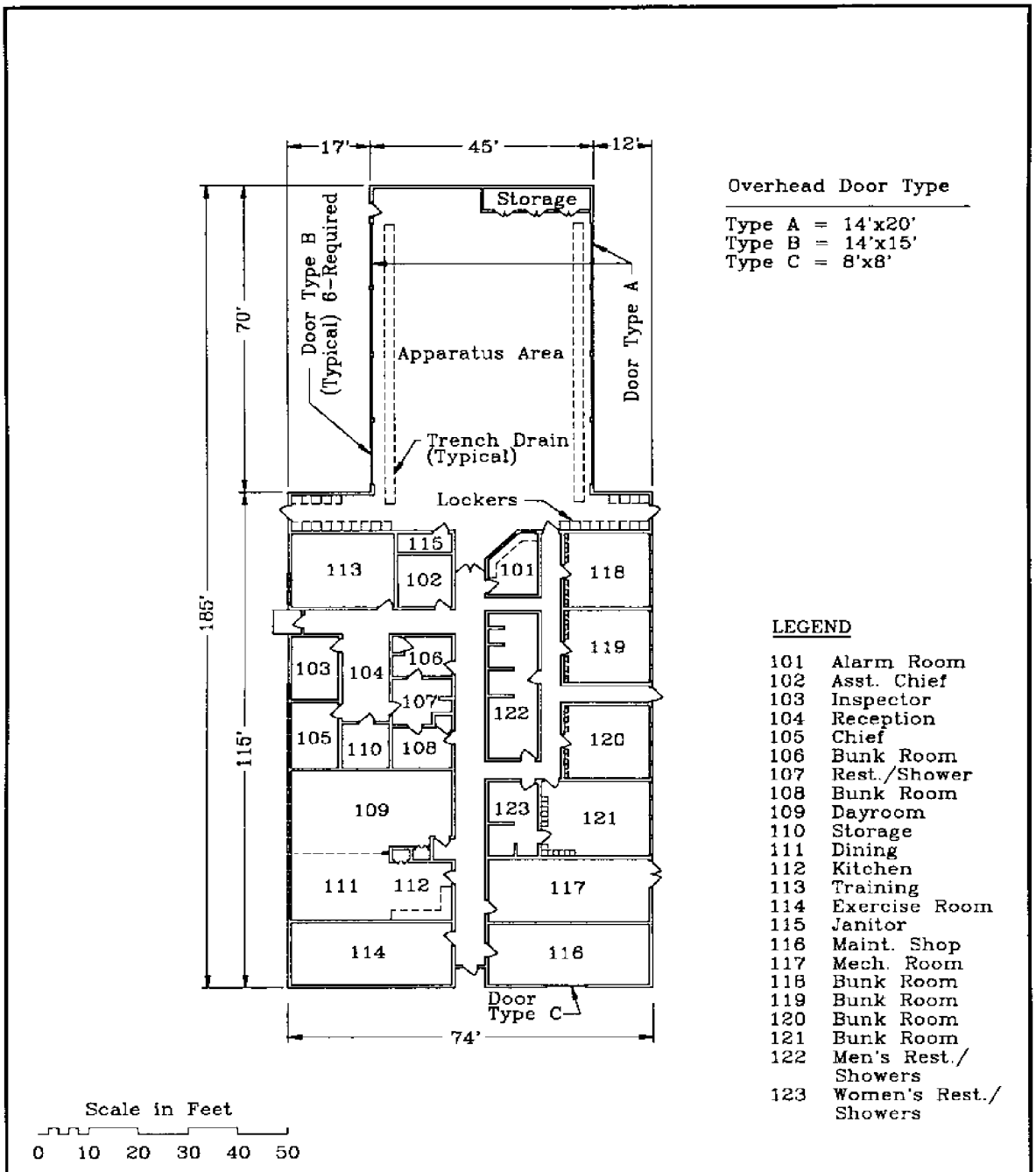
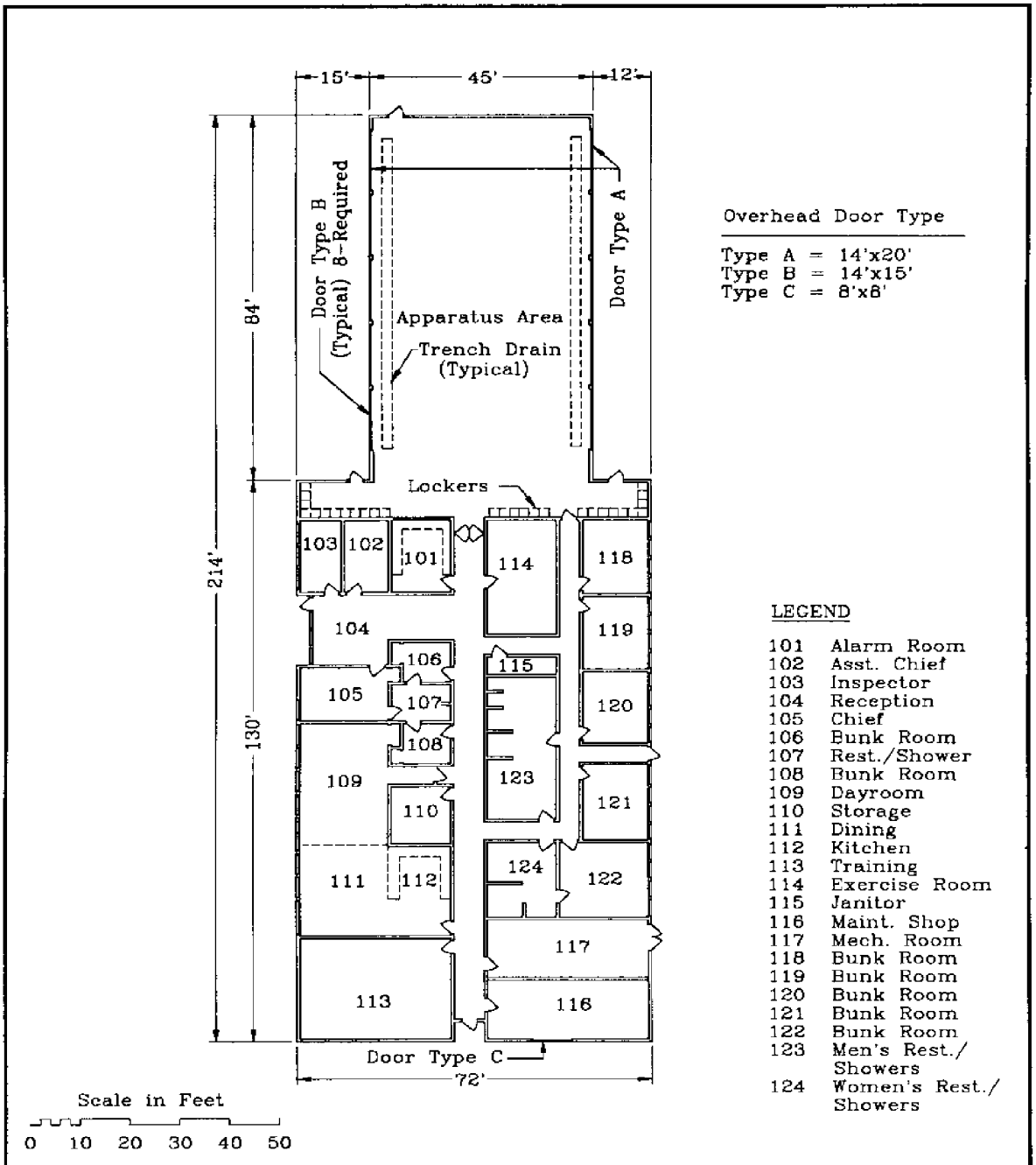
TITLE	DATE	FACILITY PLATE	SHEET
Aircraft Fire And Rescue Station (Class A & B) Site Plan	11/92	141-20	1 of 4



TITLE	DATE	FACILITY PLATE	SHEET
Aircraft Fire And Rescue Station Building Layout Class A	11/92	141-20	2 Of 4



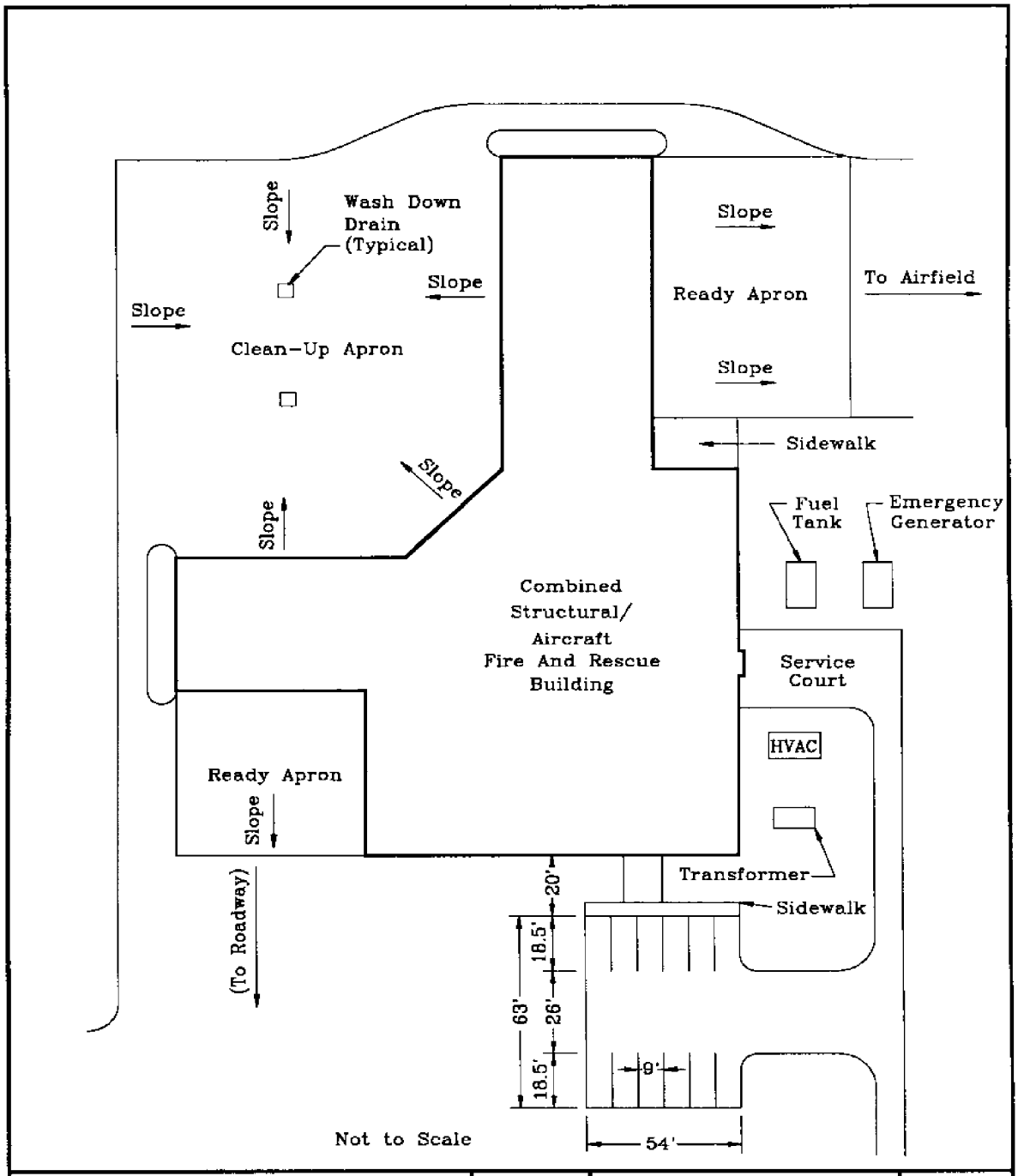
TITLE	DATE	FACILITY PLATE	SHEET
Aircraft Fire And Rescue Station Building Layout Class B	11/92	141-20	3 Of 4

	Aircraft Fire And Rescue Station Type	
Plumbing Requirements (GPM):	Class A	Class B
Water;		
Cold	67	67
Hot		
Recovery Rate (100 Degs. Rise)	37	37
Storage (Gal)	120	120
Fire Protection Requirements		
Not Included		
Heating Requirements (BTU/Hr x 1000):		
Inside Design Temperature:-Personnel Support Area=72 Degs. F		
-Aparatus Area(s)=55 Degs. F		
Outside Design Temperature -5 Degs. F	242	295
+5 Degs. F	204	249
+15 Degs. F	167	203
+25 Degs. F	129	158
Air Conditioning Requirements (BTU/Hr x 1000):		
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design Conditions;		
Cooling Load	175	195
Heat rejected to conditioned spaces by energized test.		
Equipment & parts under repair not included.		
Electrical Requirements (KVA):		
Lights;		
Connected Load	31.8	35.7
Estimated Demand	11.1	12.5
Power;		
Connected Load	15.7	17.6
Estimated Demand	5.5	6.2
Air Conditioning;		
Connected Load	83.8	94.1
Estimated Demand	29.3	32.9
Total;		
Connected Load	131.3	147.4
Estimated Demand	45.9	51.6
Emergency Generator (KW):	20.0	20.0
Areas (SF):		
Gross area including mechanical equipment room	11,660	13,140

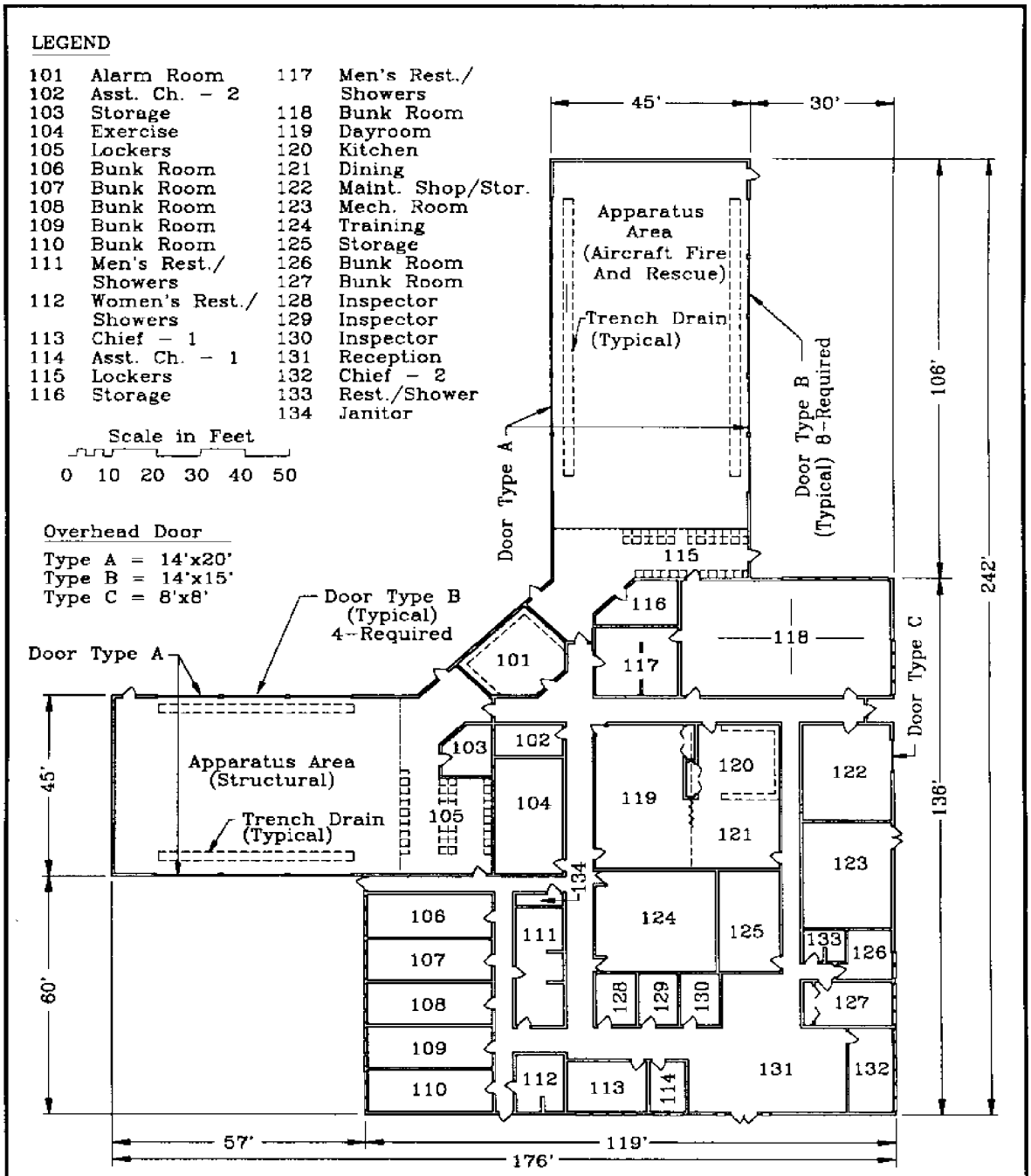
General Notes:

Apparatus stall depth is based on a vehicle length of 36 feet. Increase the stall depth for longer vehicles.

TITLE	DATE	FACILITY PLATE	SHEET
Aircraft Fire And Rescue Station (Class A & B) Facility Design Notes	11/92	141-20	4 OF 4



TITLE	DATE	FACILITY PLATE	SHEET
Combined Structural/Aircraft Fire And Rescue Station Site Plan	11/92	141-25	1 Of 3



TITLE	DATE	FACILITY PLATE	SHEET
Combined Structural/Aircraft Fire And Rescue Station Building Layout	11/92	141-25	2 Of 3

Combined Structural/Aircraft
Fire and Rescue Station

Plumbing Requirements (GPM):
Water;

Cold	80
Hot	
Recovery Rate (100 Degs. Rise)	46
Storage (Gal)	140

Fire Protection Requirements
Not Included

Heating Requirements (BTU/HR x 1000):
Inside Design Temperature:-Personnel Support Area=72 Degs. F
-Aparatus Area(s)=55 Degs. F

Outside Design Temperature -5 Degs. F	510
+5 Degs. F	430
+15 Degs. F	350
+25 Degs. F	270

Air Conditioning Requirements (BTU/HR x 1000):
Based on 91 Degs. D.B. 76 Degs. W.B. Outside Design
Conditions; Cooling Load 327

Heat rejected to conditioned spaces by energized test.
Equipment & parts under repair not included.

Electrical Requirements (KVA):

Lights;	
Connected Load	67.6
Estimated Demand	23.7
Power;	
Connected Load	36.6
Estimated Demand	12.8
Air Conditioning;	
Connected Load	195.4
Estimated Demand	68.4
Total;	
Connected Load	299.6
Estimated Demand	104.9

Emergency Generator (KW): 30.0

Areas (SF):
Gross area including mechanical
equipment room 22,585

General Notes:
Apparatus stall depth is based on a vehicle length of 36 feet.
Increase the stall depth for longer vehicles.

TITLE	DATE	FACILITY PLATE	SHEET
Combined Structural/Aircraft Fire And Rescue Station Facility Design Notes	11/92	141-25	3 OF 3

b) Corridors a minimum of 5 feet wide and clear of obstructions.

c) Storage for firefighting gear equal to 4 square feet per fire fighter.

d) A one-ton capacity, electrically controlled hoist. Provide hoist rails to permit one hoist to service vehicle bays.

e) Door guards to protect door jambs from vehicle damage.

f) An overhead storage tank for aqueous film forming foam (AFFF). Provide storage capacity equal to twice assigned AFFF capacity of vehicles.

g) Space for hose drying (when required).

h) Space for refilling breathing air apparatus.

i) Administrative and bunk areas with one-hour fire separation from the apparatus area.

j) The alarm and mechanical rooms with 2-hour fire separation from other areas.

k) Facility areas serving non-firefighting personnel readily accessible by the physically handicapped.

8.6.3.1 Interior Walls. Provide the following:

a) Impervious and sufficiently smooth walls in apparatus area for easy cleaning.

b) Demountable partitions for space separation in bunk rooms.

c) A folding partition between dining area and dayroom.

8.6.3.2 Floors. Design apparatus area floor in accordance with NAVFAC DM-5.04 for the critical wheel load of the apparatus to be housed. Slope floor toward trench drains and overhead doors. Seal concrete floor in apparatus area.

8.6.3.3 Interior Doors. Provide insulated doors between personnel spaces and apparatus areas.

8.6.3.4 Overhead Doors. Provide electrically operated doors in apparatus area. Provide manually operated doors in maintenance shop and storage rooms.

8.6.4 Mechanical Requirements

8.6.4.1 Heating. Provide heating in accordance with par. 2.4.

a) Design heating system for an infiltration rate of two air changes per hour in apparatus area. This rate depends on the installation of insulation seals on the overhead doors. Ensure the temperature of the apparatus areas is thermostatically controlled for a minimum of 55 degrees F.

b) Provide a switch activated by opening the overhead doors to override the space thermostat to stop the heating equipment in the apparatus area. Provide a minimum temperature thermostat field set at 34 degrees F to override the heating deactivation switch during door-open periods of subfreezing ambient temperatures. After the doors are closed, the space thermostat should resume control. Design for heating systems recovery time of 30 minutes after the doors are closed.

8.6.4.2 Ventilation. Provide roof-mounted ventilation fans for the apparatus areas. Provide direct connections for outdoor discharge of exhaust in areas where vehicle idling is anticipated.

8.6.4.3 Plumbing. Provide hose connections in the apparatus areas for refilling vehicle water tanks. Provide trench drains with sufficient laterals for aeration and easy clean out of oil and other residue.

8.6.5 Electrical Requirements

8.6.5.1 Emergency Electrical Power. Provide an emergency generator with automatic starting and switching capability as described in par. 2.5.7. Provide emergency power to the following:

a) Loads required by NFPA-101.

b) Exterior security lighting.

c) Station fire alarm.

8.6.6 Pavement. Design access pavement, ready apron, and cleanup apron in accordance with NAVFAC DM-5.04 and MIL-HDBK-1021/2, General Concepts for Airfield Pavement Design, for the critical wheel load of the apparatus to be housed at the station. Provide reinforced concrete ready apron and cleanup apron. Provide continuous access pavement to the roadway/taxiway system. Slope cleanup apron to drain into wash-down runoff collection system.

8.6.7 Drainage. Provide site drainage in accordance with par. 2.2.4. Separate the collection system for trench drains and cleanup apron from the site drainage system. Treat runoff collected from cleanup apron and trench drains in accordance with MIL-HDBK-1005/9, Industrial and Oily Wastewater Control.

8.6.8 Security. Aircraft fire and rescue stations are normally located within the airfield security area. Provide the minimum security measures for points of ingress and egress compatible with the level of security in which the facility is located. Refer to par. 2.6.

8.6.9 Additional Design Criteria. Refer to Section 2 for facility design requirements not addressed above.

REFERENCES

NOTE: THE FOLLOWING REFERENCED DOCUMENTS FORM A PART OF THIS HANDBOOK TO THE EXTENT SPECIFIED HEREIN. USERS OF THIS HANDBOOK SHOULD REFER TO THE LATEST REVISIONS OF CITED DOCUMENTS UNLESS OTHERWISE DIRECTED.

FEDERAL/MILITARY SPECIFICATIONS, STANDARDS, BULLETINS, HANDBOOKS, AND NAVFAC GUIDE SPECIFICATIONS:

Unless otherwise indicated, copies are available from the Defense Printing Service, Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Army Technical Manuals are available from the Commander, U.S. Army Publications Distribution Center, 1655 Woodson Road, St. Louis, MO 63114.

MILITARY SPECIFICATIONS

MIL-F-29046	General Specifications for Raised Flooring
MIL-P-43607	Padlock, Key Operated, High Security, Shrouded Shackle

FEDERAL SPECIFICATIONS

RR-F-191	Wire Fencing (Chain-Link Fabric)

MILITARY STANDARDS

MIL-STD-461	Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
MIL-STD-882	System Safety Program Requirements
MIL-STD-1472	Human Engineering Design Criteria for Military Systems, Equipment, and Facilities

BULLETINS

MIL-BUL-34	Engineering and Design Criteria for Navy Facilities

HANDBOOKS

MIL-HDBK-419	Grounding, Bonding, and Shielding for Electronic Equipment and Facilities Applications
MIL-HDBK-1001/2	Materials and Building Components

MIL-HDBK-1001/5	Roofing and Waterproofing
MIL-HDBK-1002 Series	Structural Engineering
MIL-HDBK-1002/2	Structural Engineering - General
MIL-HDBK-1004 Series	Electrical Engineering
MIL-HDBK-1004/1	Electrical Engineering - Preliminary Design Considerations
MIL-HDBK-1004/5	400-Hz Medium-Voltage Conversion/Distribution and Low-Voltage Utilization Systems
MIL-HDBK-1004/6	Lightning Protection
MIL-HDBK-1004/7	Wire Communications and Signal Systems
MIL-HDBK-1005/3	Drainage Systems
MIL-HDBK-1005/9	Industrial and Oily Wastewater Control
MIL-HDBK-1008	Fire Protection for Facilities, Engineering, Design, and Construction
MIL-HDBK-1012/1	Electronic Facilities Engineering
MIL-HDBK-1013/1	Design Guidelines for Physical Security of Fixed Land-Based Facilities
MIL-HDBK-1013/10	Design Guidelines for Security Fencing, Gates, Barriers, and Guard Facilities
MIL-HDBK-1021/1	Airfield Geometric Design
MIL-HDBK-1021/2	General Concepts for Airfield Pavement Design
MIL-HDBK-1190	Facility Planning and Design Guide
MIL-HDBK-1195	Radio Frequency Shielded Enclosures

NAVFAC GUIDE SPECIFICATIONS

NFGS-03300	Cast-in-Place Concrete
NFGS-04200	Unit Masonry
NFGS-08331	Rolling Service and Fire Doors

NFGS-08360	Sectional Overhead Doors
NFGS-08367	Vertical Lift Metal Doors
NFGS-08510	Steel Windows
NFGS-08520	Aluminum Windows
NFGS-08529	Aluminum Storm Windows
NFGS-08710	Finish Hardware
NFGS-08800	Glazing
NFGS-09100	Metal Support Systems
NFGS-09200	Lathing
NFGS-09212	Plastering and Stuccoing
NFGS-09215	Veneer Plaster
NFGS-09250	Gypsum Board
NFGS-09310	Ceramic Tile, Quarry Tile, and Paver Tile
NFGS-09500	Acoustical Treatment
NFGS-09660	Resilient Tile Flooring
NFGS-09665	Sheet Vinyl Flooring
NFGS-09680	Carpet
NFGS-09900	Painting
NFGS-10270	Access Flooring
NFGS-10605	Wire Mesh Partitions
NFGS-13121	Pre-engineered Metal Buildings (Rigid Frame)
NFGS-16306	400-Hertz (Hz) Solid State Frequency Converter

NAVY MANUALS, P-PUBLICATIONS, DRAWINGS, AND MAINTENANCE OPERATING MANUALS:

DESIGN MANUALS

DM-1.03	Architectural Acoustics

DM-2.08	Blast Resistant Structures
DM-3.01	Plumbing Systems
DM-3.03	Heating, Ventilating, Air Conditioning, and Dehumidifying Systems
DM-3.09	Elevators, Escalators, Dumbwaiters, Access Lifts, and Pneumatic Tube Systems
DM-3.10	Noise and Vibration Control for Mechanical Equipment
DM-5.04	Pavements
DM-12.02	High Altitude Electromagnetic Pulse Protection for Ground-Based Facilities
DM-13.02	Commercial Intrusion Detection Systems (IDS)
DM-22	Petroleum Fuel Facilities
DM-28.04	General Maintenance Facilities

P-PUBLICATIONS

P-80	Facility Planning Criteria for Navy and Marine Corps Shore Installations
P-80.3	Facility Planning Factor Criteria for Navy and Marine Corps Shore Installations, Appendix E: Airfield Safety Clearances
P-89	Engineering Weather Data
P-355	Seismic Design for Buildings
P-397	Structures to Resist the Effects of Accidental Explosions
P-442	Economic Analysis Handbook

NAVELEX PUBLICATIONS

NAVELEX 0101,107	Naval Shore Electronics Criteria

NAVFAC DEFINITIVE DRAWINGS

1404837	Parking Area Criteria for Vehicles

(Unless otherwise indicated, copies are available from the Defense Printing Service, Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

NAVY DEPARTMENTAL INSTRUCTIONS:

NAVFAC 11010.44	Shore Facilities Planning Manual

SPAWARS INSTRUCTIONS

SPAWARS 2804.1	Policy and Procedures Concerning Base Electronic Systems Engineering Plan

(Unless otherwise indicated, copies are available from Commanding Officer, Naval Publications and Forms Directorate, ASO Code 10, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

OTHER GOVERNMENT DOCUMENTS AND PUBLICATIONS:

TM 5-802-1	Life Cycle Cost Analysis Handbook
TM 5-822-2	General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas

(Unless otherwise indicated, copies are available from the Commander, U.S. Army Publications Distribution Center, 1655 Woodson Road, St. Louis, MO 63114.)

DIAM 50-3	Physical Security Standards for Construction of Sensitive Compartmented Information Facilities

(Unless otherwise indicated, copies are available from Director, Defense Intelligence Agency (DIA), ATTN: RTS-2D, Washington, DC 20340-3081.)

Title 14 CFR Part 77	Objects Affecting Navigable Airspace
Title 29 CFR Part 1910	Occupational Safety and Health Standards
Title 29 CFR Part 1910.265	Sawmills
Title 40 CFR Part 112	Oil Pollution Prevention
Title 40 CFR Part 113	Liability Limits for Small Onshore Storage Facilities

Title 40 CFR Part 114	Civil Penalties for Violation of Oil Pollution Prevention Regulations
Title 40 CFR Part 280	Underground Storage Tanks Technical Requirements

(Unless otherwise indicated, copies are available from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, D.C. 20402.)

FAA AC 70/7460	Obstruction Marking and Lighting
FAA AC 150/5300-13	Airport Design
FAA Order 6310.6	Primary/Secondary Terminal Radar Siting Handbook
FAA Order 6340.15	Primary/Secondary En Route Radar Siting Handbook
FAA Order 6480.4	Airport Traffic Control Tower Siting Criteria
FAA Order 6480.7	Airport Traffic Control Tower and Terminal Radar Approach Control Facility Design
FAA Order 6580.2	Remote Communications Facility Siting Criteria Handbook
FAA Order 6750.16	Siting Criteria for Instrument Landing Systems
FAA Order 6820.10	VOR, VOR/DME, and VORTAC Siting Criteria
FAA ER 530-81-04	Structural/Mechanical Design Requirements for Low Impact Resistance for Microwave Landing System Structures (MLS/LIRS)
FAA E-2470	Transparent Plastic Window Shades

(Unless otherwise indicated, copies are available from the U.S. Department of Transportation, Utilization and Storage Section, M-443.2, Washington, DC 20590.)

NON-GOVERNMENT PUBLICATIONS:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 523	Standard Test Method for Specular Gloss

(Unless otherwise indicated, copies are available from the American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1187.)

AMERICAN SOCIETY OF HEATING, REFRIGERATING, AND AIR CONDITIONING ENGINEERS (ASHRAE)

ASHRAE STD 62	Ventilation for Acceptable Indoor Air Quality
ASHRAE	Handbook of Fundamentals

(Unless otherwise indicated, copies are available from the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), 1791 Tullie Circle, N.E., Atlanta, GA 30329.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 13	Installation of Sprinkler Systems
NFPA 70	National Electrical Code
NFPA 75	Protection of Electronic Computer/Data Processing Equipment
NFPA 78	Lightning Protection Code
NFPA 80	Fire Doors and Windows
NFPA 101	Life Safety Code
NFPA 232	Protection of Records
NFPA 664	Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
NFPA 1141	Fire Protection in Planned Building Groups

(Unless otherwise indicated, copies are available from the National Fire Protection Association (NFPA), Batterymarch Park, Quincy, MA 02269.)

Time Saver Standards for Architectural Design Data, 6th Edition, McGraw-Hill Book Company

National Plumbing Code Handbook, McGraw-Hill Book Company

(Unless otherwise indicated, copies are available from the McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020.)

Uniform Federal Accessibility Standards (UFAS)

(Unless otherwise indicated, copies are available from ATBCB, 5th Floor, Room 1711, 18th Street, N.W., Washington, D.C. 20036-3894.)

Industrial Ventilation: A Manual of Recommended Practice, Committee on Industrial Ventilation, P.O. Box 453, Lansing, MI 48902

(Unless otherwise indicated, copies are available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, OH 45211-4438.)

GLOSSARY

AC. Advisory circular.

ACDS. Advanced combat direction system.

ADP. Automated data processing.

A-E. Architectural-engineer.

AFFF. Aqueous film forming foam.

ARSR. Air route surveillance radar.

ASCOMM. ASWOC support communications.

ASHRAE. American Society of Heating, Refrigerating, and Air Conditioning Engineers.

ASR. Airport surveillance radar.

ASTM. American Society for Testing and Materials.

ASUW. Anti-surface warfare.

ASW. Anti-submarine warfare.

ASWOC. Anti-submarine warfare operations center.

ATC. Air traffic control.

ATCRBS. Air traffic control radar beacon system.

BEAP. Base Exterior Architecture Plan.

BESEP. Base Electronic Systems Engineering Plan.

CCTV. Closed circuit television.

CFR. Code of Federal Regulations.

CNO. Chief of Naval Operations.

COMNISCOM. Commander, Naval Investigative Service Command.

DCS. Defense Communications System.

DIA. Defense Intelligence Agency.

DISA. Defense Informational Systems Agency.

DME. Distance measuring equipment.

DOD. Department of Defense.

EMR. Electromagnetic radiation.

ER. Engineering report.

ESS. Electronic sensor system.

FAA. Federal Aviation Administration.

FASFAC. Fleet area control and surveillance facilities.

GCA. Ground controlled approach.

HEMP. High altitude electromagnetic pulse.

IDS. Intrusion detection systems.

IDSEP. Intrusion detection systems engineering plan.

IFR. Instrument flight rules.

ILS. Instrument landing system.

JCF. Joint control facility.

MILCON. Military construction.

MLS. Microwave landing system.

MTRACON. Military terminal radar.

NAALS. Air navigation aids and landing systems.

NAVAIDS. Navigation aids.

NAVAIRSYSCOM. Naval Air Systems Command.

NAVFACENGCOM. Naval Facilities Engineering Command.

NAVOCEANCOM. Naval Oceanography Command.

NAVOCEANO. Naval Oceanographic Office I.C.

NCCS. Navy command and control systems.

NESSEC. Naval Electronics Systems Security Engineering Center.

NFPA. National Fire Protection Association.

NISE-EAST. Naval-in-Service Engineering, East Coast Division, Charleston, SC.

NISE WEST. Naval Command, Control, and Ocean Surveillance Center In-Service Engineering, West Detachment, Vallejo, CA.

NTDS. Navy tactical data system.

OCIP. Operational capability improvement request.

OPNAV. Operations Navy.

OTHT. Over the horizon targeting.

PALS. Precision approach landing system.

PAR. Precision approach radar.

POV. Privately owned vehicle.

RASS. Range airspace surveillance sites.

RATCF. Radar air traffic control facility.

RF. Radio frequency.

ROC. Range operations center.

SPAWARSYSCOM. Space and Naval Warfare Systems Command.

SPINTCOM. Special Information Command.

TACAN. Tactical air navigation.

UHF. Ultra high frequency.

UL. Underwriters Laboratories, Inc.

UPS. Uninterrupted power supply.

VFR. Visual flight rules.

VHF. Very high frequency.

VOR. Very high frequency omni-directional range.

VORTAC. Very high frequency omni-directional range/tactical air navigation.

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