



AIR MOBILITY COMMAND

AEROSPACE GROUND EQUIPMENT MAINTENANCE AND STORAGE FACILITIES DESIGN GUIDE





*Aerospace Ground Equipment (AGE) maintenance facilities are a vital key to AMC's mission, **"The Air Mobility Team...Responsive Global Reach for America...Every Day"**. They keep our aircraft ready to respond on short notice to any contingency.*

AMC's goal is to sharpen our focus on standards of quality and excellence in our working environments. Investments in excellent facilities are investments in the people who do such a great job of aircraft maintenance. AMC developed this guide to set the standard for AGE Maintenance facilities. Use it to attain levels of excellence which reflect professionalism and pride in the Air Force and the Air Mobility Command.

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Chapter 1

Introduction

A. Purpose

This design guide provides the basic criteria to organize, evaluate, plan, program, and design Air Mobility Command (AMC) **Aerospace Ground Equipment (AGE)** maintenance and storage facilities. It applies to the design of all new construction and renovation projects. The information presented is intended to make commanders and their staff aware of important design considerations and to aid them in project development. Quality facilities will improve the maintenance specialists efficiency and ability to service and repair equipment, and encourage pride of ownership in their workplace.

Aerospace Ground Equipment facilities are an essential component of aircraft operations. Facilities are required to support AGE activities for the following AMC aircraft: C-5, C-17, C-130, KC-10, and KC-135.

The types of equipment requiring repair, servicing, maintenance, and storage include **powered** and **non-powered** units. The quantity and type of equipment plays a major part in determining the space requirements for the facility. Fully functional and properly configured facilities will ensure that a higher percentage of the equipment is kept in operation.

This guide is for use by commanders, logistics personnel, base civil engineers, headquarters staffs, design architects and engineers, and others involved in Aerospace Ground Equipment maintenance and storage facilities. It is intended to help all participants better understand AGE facility requirements and design criteria so they can effectively participate in the project development process. Use this guide to supplement other Air Force and Department of Defense policies, instructions, and standards.

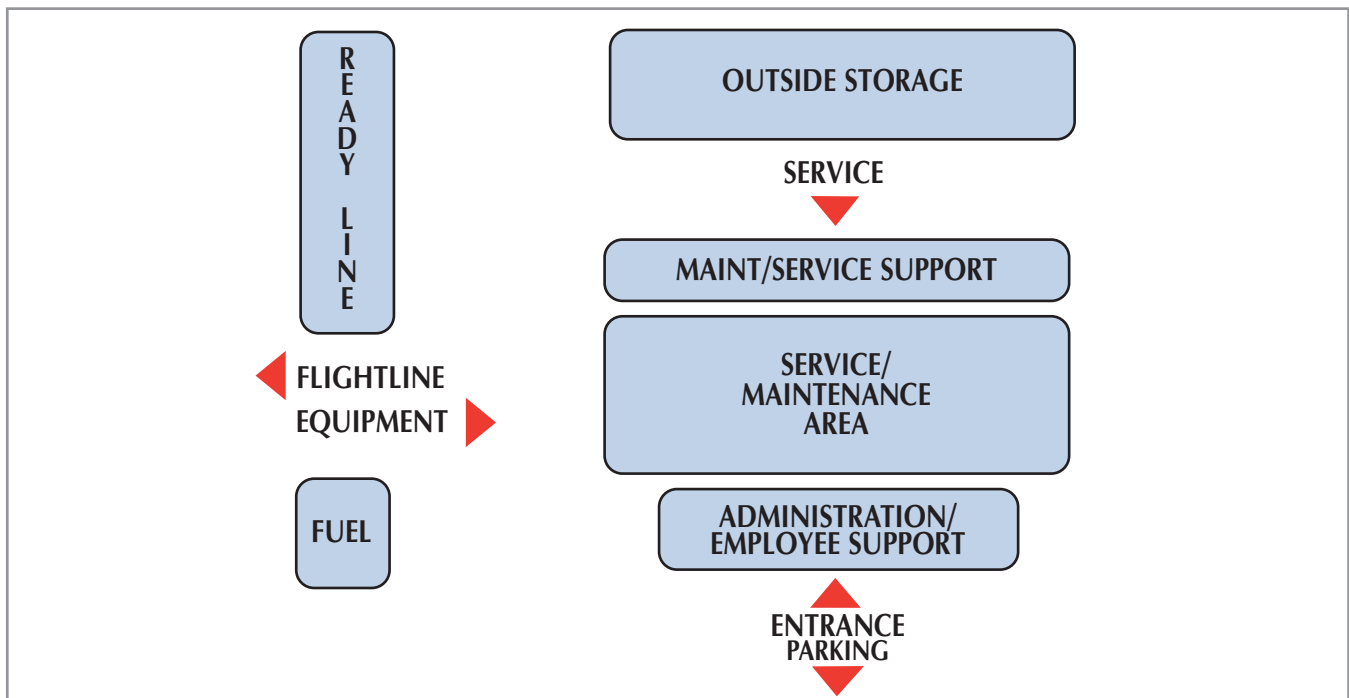


Figure 1-A: Conceptual Area Relationships.

B. Project Development

The key elements to successful facility delivery are planning, programming, design, and construction. Planning and programming for AGE facilities should consider all aspects of the operation, as well as maintenance, service, repair, and storage of the various equipment types.

1. Planning

Effective planning will establish and support the overall objectives for AGE facilities. It should also lead to a timetable for project completion. Planning must be long-term.

The siting of AGE facilities is important. Ideally, centrally locate the facility no further than the second-tier from the flightline to minimize access time to aircraft. In addition, a site must be of sufficient area to accommodate all of the functions and storage requirements for the overall complex. If possible, allocate space for facility expansion, modification for mission reassignments or additional aircraft capacity. Local weather conditions, soil analysis, and utility availability are other variables to consider in site evaluation.

When planning a new facility, initial site selection must be accomplished prior to completing a DD Form 1391, Military Construction Project Data. Additional requirements identified during the DD Form 1391 phase may require an alternate site selection.

2. Programming

Programming includes determining user requirements, developing solutions, identifying funding sources, and forwarding programming documents to the appropriate review and approval authorities. Each programmed project should be consistent with the base comprehensive plan for new and existing facilities. Work is classified as maintenance, repair, or construction.

Information required during preparation of the DD Form 1391, which initiates project development, is found throughout this guide. Included are space criteria, overall facility size, and special factors for consideration in estimating costs.

3. Design

Design includes concept development, design reviews, and construction documents. It is important for civil engineering and the user to actively communicate throughout the design process to bring about a successful project. A high quality design will maximize effective use of available space and provide an efficient AGE facility. Throughout the entire design process give preference to the use of environmentally friendly materials as described in Air Force Environmentally Responsible Facilities Guide.

Compliance with all applicable building codes is mandatory. Life safety code requirements take priority over other facility improvement requirements. All areas should be barrier free and accessible to the disabled in accordance with the Americans with Disabilities Act (ADA) and Uniform Federal Accessibility Standards (UFAS).

Prepare a comprehensive interior design (CID) package for the AGE facility in conjunction with any major design project. The CID package addresses interior finishes, artwork, signs, and furnishings. It ensures that even minor upgrade projects meet the design objectives for the entire facility. Refer to the AMC Interior Design Guide for an expanded discussion of interior design.

Integration of infrastructure (parking, utility, communication systems, etc.), engineering, architectural, and interior design issues throughout the design process will result in a well coordinated design. Analyze an existing facility's structural, mechanical, electrical, and communications systems prior to planning renovation projects. Refer to DoD, Air Force, industrial standards, and AGE manufacturers' recommendations for maintenance requirements. Include infrastructure improvements concurrently with interior finish work.

4. Construction

Quality reviews of the contractor's submittals by project engineers and daily on-site inspections by civil engineering construction management personnel and the user will help ensure that design goals are achieved. ■

Chapter 2

Exterior Elements

A. General

The exterior elements of the project significantly contribute to the overall appearance of the facility. This chapter addresses the concept site plan, parking areas, entrances, building materials/design, outside storage areas, refueling areas, landscaping, signs, utilities, and lighting. The Architectural Compatibility Guide for each base will assist in the design of these elements. The overall complex should present a cohesive architectural image.

B. Site Design/Improvements

1. Access

Provide access to the AGE facility from the flight-line, ready line, outside storage, and personnel parking lots. Access is also required for delivery of bench and shop stock to the various maintenance shops, and for hazardous material pick-up.

2. Parking

Provide all AGE facilities with parking areas for visitors, personnel, and official vehicles. Locate visitor, handicapped, and personnel parking close to the main entrance. Allow a minimum of 35 square yards per vehicle for planning of parking areas. This allowance includes maneuvering and circulation space in addition to parking space. Provide 90 degree parking whenever practicable.

3. Entrances

The facility entries and entry paths should be easily identifiable to the first-time visitor. Design the main entrance to provide protection from the weather whenever practicable.

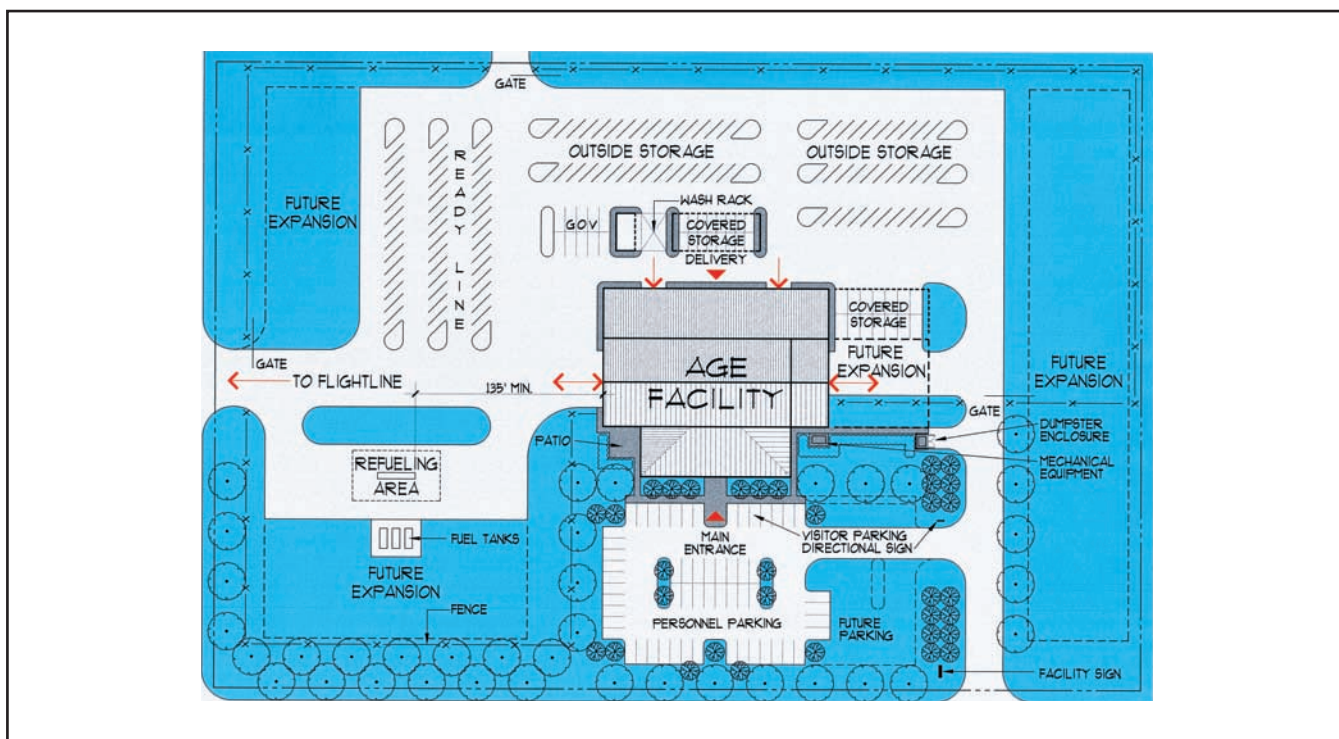


Figure 2-A: Concept Site Plan.

EXTERIOR ELEMENTS

4. *Building Materials/Design*

Construct new facilities with building materials in context with the base's architectural theme. Select materials that are durable and require minimal maintenance. Comply with the airfield clearance requirements for building height and setbacks in accordance with AFJM 32-1013, Airfield and Heliport Planning and Design.

5. *Equipment Storage Areas*

Provide concrete pavement for all areas in which equipment is parked due to potential fluid leaks. Outside storage should be sufficient in size to accommodate the quantity of authorized equipment. Include covered storage to protect designated AGE equipment from local weather conditions, which improves operational readiness. Designate a ready-line area for serviced equipment available for immediate deployment. During cold weather, inside storage of powered ready-line AGE will be required to ensure the reliability of equipment operation. Design covered and/or enclosed storage areas to be integral with the building design.

6. *Refueling/Defueling Facility*

Remotely locate this facility due to the potential fire hazard. Maintain minimum clearance requirements between the fuel dispensing facility and adjacent buildings and any pole-mounted power or telephone lines. Provide an electric defueling pump which filters and meters fuel being returned to the storage tanks. A canopy covered island protects the area and fueling operations during inclement weather. Design the canopy to provide adequate clearance and coverage of AGE equipment. Pave all immediate areas with concrete. Slope concrete to drains and provide an oil/water separator for collection of



A covered refueling island provides shelter from the elements.

accidental fuel spills. Allow adequate room for refueling truck maneuvering. Install tanks above ground and in accordance with Environmental Protection Agency (EPA), state, and local criteria where applicable. Provide visual screening where applicable.

7. *Landscape*

Landscape elements help create an attractive facility. These elements define the site, add visual interest, enhance the main entrance, and visually screen utilitarian areas (mechanical/electrical equipment, dumpsters, above ground tanks, etc.). Landscape elements include earth berms, trees and shrubs, pavement materials, site amenities, screen walls, fences, signs, and lighting. Provide low maintenance landscape and select only base-approved, native plant materials. Refer to the AMC Landscape Design Guide for specific information.



Architectural screening of utilitarian items enhances overall appearance.

8. *Signs*

Exterior signs include the facility, directional, parking, and flammable code signs. They must comply with AMC sign standards. See AFM 91-201 Explosives Safety Standards, to determine if fire symbol signs are required on the outside of the building.

9. *Utilities and Lighting*

Whenever possible, locate utility lines underground to avoid visual "clutter," and overhead obstructions to the movement of tall AGE equipment. Provide photo-cell controlled lighting for safety and security at all parking areas, walkways and entrances. Install additional lighting as required for night operations. Use high-intensity discharge light sources for all exterior illumination. Provide exterior engine warming receptacles as needed in severe cold weather climates for AGE as well as government owned vehicles (GOV) and private owned vehicles (POV).

Chapter 3

Functional Areas

A. General

The AGE flight inspects, maintains, repairs, services, and stores powered and non-powered equipment. The facility operates 24 hours per day, seven days a week depending on mission requirements. Space requirements for AGE facilities are determined by the number of authorized pieces of AGE. Refer to the space requirements tables on page 10 for allowable areas. Consider the number of authorized personnel when planning administrative and support areas.

B. Administration Areas

1. General

Administrative areas provide control and support to operations. Locate the administrative portion of the facility to serve as a control point between the entrance and the shop areas. In addition, acoustically separate the administrative area from the shop area.

2. Entrance/Lobby

The public entrance to the facility should be readily discernible from the parking lots. Provide an air-lock type vestibule with an independent heating and cooling system. In the lobby area, provide a public telephone, drinking fountain, and a visitor waiting area.

3. Staff Offices

Provide a private office for the AGE Flight Chief and general open office space for administrative support personnel. Include modular systems furniture for work stations to ensure efficient use of floor space while reducing the number of walls and small offices.

4. Air Reserve Technician (A.R.T.) Office

At certain installations, Air Reserve Technician personnel require an office. Provide a lockable office area with a secured storage closet.

5. Conference/Training Areas

Provide a multi-purpose space for conducting staff briefings, meetings, and technical training. Design the space to provide overhead, slide, and video projection. Also, include ample wall space for chalk/marker/tack boards and projection screens. Provide multiple switching and dimming controls to obtain appropriate, quality lighting levels. Locate an outlet in the floor for convenient electrical connection of equipment. Divide rooms with an acoustical rated operable partition to allow simultaneous conferences and training sessions. Furnish the conference/training room with durable, easily maintained tables and chairs. Furnish the conference/training room with individual study carrels when specific project conditions permit.

6. Technical Order (T.O.) Library

Include a library area for technical manuals located with easy access to all shop areas. Provide computer stations as required to access technical data.

7. Storage Room

Provide a small lockable room near the training room for storage of educational materials and teaching aids (books, papers, VCRs, video monitors/televisions, tapes, computers and peripherals, audio equipment, etc.), as well as office supplies and files.



Use systems furniture in staff offices for effective space utilization.

C. Service/Maintenance Areas

1. General

When planning a facility, consider the size, weight and maneuverability of all equipment to be serviced. Safety is a mandatory requirement for all functional areas within an AGE shop. Carefully address all safety issues in the design of the facility.

A center drive-through concept with service and maintenance bays on both sides provides an efficient layout. Provide coiling doors at each end, as well as other locations as needed for work flow. The minimum door width is 22 feet. Equip all overhead doors with push-button operated automatic door openers. Position support functions around the perimeter of the bays for convenient accessibility. In severe winter climates, use air curtains at overhead doors and compartmentalize areas to minimize heat loss. Unique mission requirements may require additional functions to support the overall equipment operations/maintenance effort.

2. Service/Maintenance Bays

Design a large, open space as the central work area. Provide ample width to include a two-way drive-through traffic lane with bays on either side. Allow space for personnel circulation and area for work benches. Incorporate overhead bridge cranes to cover the service/maintenance bays. The cranes should have a five (5) ton minimum lifting capacity. Provide a minimum clear height to accommodate the majority of equipment to be serviced. Size at least one isolated high bay, with exterior access, to comfortably handle the largest piece of AGE. Slope floors to a trench drain located down the center of the drive-through aisle. Connect all floor/trench drains to an oil/water separator. Mark floors with striping to visually separate work bays and circulation areas. Include an equipment exhaust venting system for the removal of fumes. Provide an exhaust vent connection for each maintenance stall in which powered equipment will be serviced.

3. Flightline Dispatch Office

The dispatch office serves as a control point which monitors equipment to and from the flightline. Provide an enclosed office space with views to the exterior and into service/maintenance areas to oversee the flow of traffic. A direct line of sight to the ready-line and fueling areas is important. Where operational activities are remotely located, use closed-circuit video cameras. Equip the room with a base radio, computers, fax machine, and an equipment dispatch/status board. Locate fuel pump controls and gauges within the room.



High bay access is required for oversized equipment.



An overhead crane is essential for equipment and material handling.

4. Shop Offices

Supervisory staff includes NCOIC(s), shift supervisor, supply officer, scheduling personnel, and others who are responsible for manpower assignment. Arrange enclosed office spaces near the functional areas they serve or control. Include windows to aid in the visual observation of daily shop operations. Acoustically treat the offices to reduce noise levels produced by shop activities.

5. Bench Stock/Special Tools

A centralized, enclosed, secure area is required for parts and special tools. Provide a service counter with a roll-up shutter. Allow space adjacent to the service counter for parts display. Equip the room with metal storage shelving, bins, racks and/or mezzanine to maximize storage space. Provide direct access to the exterior for deliveries.



A two level service counter is beneficial when issuing heavy items.

6. Machine Shop

Allocate sufficient work space for machine shop equipment (drill press, milling machine, grinder, etc.), lockable tool storage cabinets on casters, and work benches. The type and quantity of equipment will vary depending on mission requirements. Locate the space with immediate access to the exterior as well as the service/maintenance bays. Provide acoustical separation from other interior areas.

7. Floor Tools/Jack Storage

Assign floor space for the storage of jack stands, floor jacks, and miscellaneous tools. Locate the area directly adjacent to service bays for easy access by mechanics.

8. Flammable Storage

Store flammable materials within a fire-rated enclosure with access to the exterior.

9. Welding

Include a welding area in the design of the facility. Provide space for an acetylene welder, arc welder, and welding bench. Include an OSHA compliant screen/blind system and proper ventilation/hood to protect personnel from the hazards of welding operations.



Utilize pre-engineered paint spray booths to comply with environmental regulations.

10. Corrosion Control

Corrosion control is essential for prolonging the life of AGE. Provide a paint preparation, mixing and storage areas including storage cabinets and dust control screens. The paint booth must comply with all federal and state environmental regulations. Size the corrosion control area to handle a substantial portion of the AGE. Typically, the preparation and painting of oversized equipment will be accomplished elsewhere on the base, usually in the aircraft maintenance shop or corrosion control hangar.



An exterior, semi-enclosed wash rack.

11. Wash Rack

Depending on local climate, a semi-enclosed or fully-enclosed wash rack area is preferred for the washing of equipment. Allocate an exterior open area adjacent to the wash area to accommodate the cleaning of over-sized equipment. Slip-resistant flooring surfaces, water-resistant materials, and exterior electrical fixtures are mandatory requirements to ensure safety and durability. Provide an oil-water separator for drainage and comply with EPA, state, and local criteria where applicable. An independent hot water supply source, separate from the building's domestic hot water system, is highly recommended. Include a storage room nearby for soap and supplies.

12. Parts Cleaning

Components removed from AGE are cleaned in this area. Provide space for parts cleaning equipment and a work bench.

13. Liquid Oxygen (LOX)

Provide a separate oil-free area for LOX handling equipment. The floor must be concrete. This area must be covered, preferably inside the facility and located on an outside wall.

14. Battery Storage

Provide space for storage and periodic charging of batteries. Ensure that the area is appropriately ventilated.

15. Special Equipment

Each base will have special criteria and circumstances regarding equipment. The designer should verify all equipment specifications with the manufacturer. Include structurally designed foundations, substantial floor space and overhead clearances for jack testers. Use surface mounted, adjustable arm, equipment lifts to simplify repair and maintenance. Concrete pits offer limited benefits and should be avoided. Automotive style fluid dispensing units and racks are useful in maintaining a clean and uncluttered working environment. Tire repair operations include: removal equipment, a leak detector tank, a tire inflation safety enclosure, a balancing machine, and storage racks. Provide space for a load bank test area. Testing operations produce extreme noise levels. Preferably, locate the space in a covered outside location.

16. Hazardous Waste Accumulation Point

Designate an area to store hazardous waste generated by ongoing maintenance operations. Comply with current federal, state, and base regulations and procedures.

17. Support Equipment Storage

Provide a covered or enclosed area for the storage of AGE which requires protection from the weather.

18. Utilities

Provide ample pneumatic connections and electrical outlets for power tool hookups. A compressed air source (0-120 psi), hot/cold water valves, and electrical power (120 VAC, 240 VAC, 480VAC) should be conveniently located throughout the facility. Provide air service and electrical outlets adjacent to all overhead doors. Locate emergency shower/eye wash stations throughout the facility and connect to an alarm system to alert personnel in the event of an emergency.

D. Support Areas

1. General

Support areas include the roll call/break room, rest rooms, locker rooms, shower areas, janitor's closet, mechanical room, and electrical/communications room. When operations occur 24 hours per day, consider incorporating a game table or exercise room to help promote personnel health, welfare, and morale. Provide drinking fountains in convenient locations.

2. Roll Call/Break Room

The roll call/break room, contains a space large enough to assemble personnel for staff meetings. It also functions as the work-break/lunch room for personnel. Equip this room with a refrigerator, ice maker, microwave, coffee maker and sink with hot/cold water and a garbage disposer. Provide wall and base cabinets with countertop to assist in food preparation and storage. Allow space for vending machines with water hook-ups if necessary. Optional accessories include a television, radio, and bulletin board. Locate this room near conference and training rooms to support group activities.

3. Rest Rooms/Locker Rooms/Showers

Locate rest rooms within the facility to serve both administrative and technical staff. Provide separate men's and women's facilities. Each should have direct access to appropriate lockers and showers. Use electronic sensor faucet and wash stations to control on and off water flow.

Locker rooms should include two-tier high metal lockers with concrete bases and sloping metal tops to help maintain cleanliness. Provide hardwood benches for seating.

4. Janitor's Closet

Include a mop sink, a small counter, storage shelves, and hooks for cleaning supplies and maintenance equipment.



Break Rooms offer personnel an area for professional and social interaction.

5. Mechanical Room

The mechanical room should include adequate space for the HVAC and fire detection/prevention/alarm equipment. Locate this room away from administrative areas and provide sound insulation to prevent noise from disrupting activities. Include a double service door to the exterior and a concrete ramp for the convenient moving of large equipment and parts into the room.

6. Electrical/Communications Room

Provide an area for electrical service, to include distribution equipment, wiring, receptacles, grounding, interior, and exterior lighting, controls, emergency lighting, security and fire alarms, commercial telephone service, and local area network (LAN). Wall mount power and telephone distribution equipment and floor mount the LAN computer file server. Install a system of conduits (or raceways) for telephone and computer wiring with a central feed to this room. Locate conduits and raceways for accessibility. Size the conduit and provide nylon pulling lines to facilitate future additions or modifications to wiring systems. ■

FUNCTIONAL AREAS

Example - Functional Space Requirements Administration Area ⁽⁴⁾		
Function	Net SF	Net SM
Entrance/Lobby	150	14
Flight Chief's Office	200	19
Staff Offices ⁽⁴⁾	480	44
A.R.T. Office ⁽³⁾⁽⁵⁾	240	22
Conference Room ⁽⁶⁾	200	19
Training Room ⁽⁶⁾	200	19
T.O. Library	200	19
Storage Room	80	7
SUBTOTAL	1,750	163
Walls & Circulation (20%)	350	32
GROSS TOTAL AREA	2,100	195

Table 3-A: Space Requirements for Administration Areas.

Authorized Space Requirements for the AGE Service/Maintenance Area				
Number of Authorized Pieces of AGE	Gross Area ⁽¹⁾			
	Shop		Total Storage ⁽²⁾	
	SF	SM	SF	SM
Up to 100	5,400	502	5,687	528
101 to 150	6,900	641	8,537	793
151 to 200	8,050	748	11,385	1,053
201 to 250	9,200	855	14,234	1,322
251 to 301	10,350	962	17,081	1,587
301 to 350	11,500	1,068	19,922	1,850
351 to 400	12,650	1,175	22,700	2,115
401 to 450	13,800	1,282	25,619	2,380
451 to 500	14,605	1,357	28,468	2,644
501 to 550	15,180	1,410	31,307	2,908
551 to 600	15,755	1,464	34,155	3,174
601 to 650	16,330	1,517	37,004	3,438
651 to 700	16,905	1,570	39,853	3,702
701 to 750	17,480	1,624	42,691	3,966
751 to 800	18,055	1,677	45,540	4,231
801 to 850	18,630	1,731	48,389	4,496
851 to 900	19,250	1,784	51,238	4,760
901 to 950	19,780	1,838	54,076	5,024
951 to 1,000	20,355	1,891	56,925	5,288
Additional Area ⁽³⁾	4,020	373	-	-
Example-Total Area	19,200	1,783	31,307	2,908

Table 3-B: Authorized Space Requirements.

Example - Functional Space Requirements Service/Maintenance Area		
Function	Net SF	Net SM
Service/Maintenance Bays ⁽⁹⁾	8,800	818
Flightline Dispatch Office	240	22
Shop Offices ⁽⁵⁾	960	89
Bench Stock/Special Tools	900	84
Machine Shop	700	65
Floor Tools/Jack Storage	150	14
Flammable Storage	100	9
Welding ⁽³⁾	400	37
Corr. Contr. (Prep, Mix, Paint) ⁽³⁾	1,800	167
Wash Rack	800	74
Parts Cleaning	150	14
Liquid Oxygen (LOX)	150	14
Battery Storage	150	14
Jack Test Equipment ⁽³⁾	400	37
Hazardous Waste Accum. Point	100	9
Oversized Equipment Bay ⁽³⁾	900	84
SUBTOTALS		
Authorized Area	13,200	1,226
Additional Area ⁽³⁾	3,500	325
Walls & Circulation (15%)		
Authorized Area	1,980	184
Additional Area ⁽³⁾	520	48
GROSS AREAS		
Authorized Area	15,180	1,410
Additional Area ⁽³⁾	4,020	373
GROSS TOTAL AREA	19,200	1,783

Table 3-C: Space Requirements for Service/Maintenance Areas.

Example - Functional Space Requirements Support Area ⁽⁴⁾		
Function	Net SF	Net SM
Break Room ⁽⁷⁾	600	56
Rest Rooms	500	46
Locker Rooms/Shower	400	37
Janitor's Closet	75	7
Mechanical Room ⁽⁸⁾	600	56
Electrical Room ⁽⁸⁾	75	7
Communications Room ⁽⁸⁾	50	5
SUBTOTAL	2,300	214
Walls & Circulation (20%)	460	43
GROSS TOTAL AREA	2,760	257

Table 3-D: Space Requirements for Support Areas.

Chapter 4

Interior Standards

A. General

Quality interiors create an environment which improves job performance, conveys professionalism, and maintains security and safety in the workplace. Use qualified professional interior design services to establish and coordinate finish materials and furnishings. Select finishes for anticipated use, durability, life cycle maintenance, cost effectiveness, fire and life safety requirements, and appearance.

B. Finishes

1. Administrative Areas

Design administrative areas to resemble a typical office environment. Include carpeted floors, gypsum drywall partitions, vinyl wall coverings, wood doors, and suspended acoustical panel ceilings.

2. Maintenance Areas

Finishes within the maintenance areas are subject to constant traffic, cleaning, and abrasion. Install a slip/chemical resistant floor coating system. Use concrete block walls for impact resistance and massing to reduce sound transmission. Use hollow metal doors for durability. Provide exposed roof structure to maximize overhead clearance above the maintenance bays and paint it a light color to increase light reflectance.

3. Support Areas

In support areas, select materials which promote cleanliness and ease of maintenance.

C. Color Concepts

Designers should give special attention to color selection and provide a timeless color scheme. Use accent colors sparingly to complement a neutral color scheme.

Select neutral colors for industrial flooring, carpets, wallcoverings, and systems furniture wall panels. Incorporate accent colors in upholstery, graphics, borders, accessories, and artwork for design scheme consistency.

D. Specialties/Accessories

Administrative areas should include modular systems furniture to allow for reconfiguration. Systems furniture includes interchangeable wall panels, prehung desks, and storage modules which are combined to form office work stations. Use systems furniture that easily integrates computer hardware. Panels should incorporate integrated conduits and raceways to hide unsightly wires and cables. Sound absorbent fabric panels will reduce background noise and provide a quiet work area. Finish work surfaces in plastic laminate or wood.

Develop an interior sign plan and use only professionally made signs, appropriately sized for the viewing distance. Select professionally framed artwork, pictures, paintings, and awards that contribute to the facility's decor. Locate a quality display area in the lobby for the prominent recognition of awards, trophies, and other forms of notable achievements. Use vertical blinds or miniblinds in administration areas to control daylight levels and views. Use lined draperies to block daylight in the conference and operations/training rooms for visual presentation. These rooms can be divided into multiple rooms with fabric covered, acoustical rated, operable partitions.

E. Building Systems

1. Structural

Select a cost effective framing system based on size, project requirements, availability of materials, and local labor. Factors to consider when designing a structural building system include:

- ◆ Facility size and type
- ◆ Soil conditions
- ◆ Imposed conditions such as wind, snow, and seismic loads
- ◆ Clear span distance and clear height requirements
- ◆ Special equipment loading

2. Mechanical

Design all heating, ventilation, and air conditioning (HVAC) to comply with the ASHRAE, Handbooks and ACGIH Industrial Ventilation, A Manual of Recommended Practice.

Perform a life-cycle cost analysis of available energy sources, including consideration of passive solar design applications. Design the facility to meet federal energy conservation standards defined in 10 CFR (Code of Federal Regulations) Energy Conservation Voluntary Performance Standards for New Buildings.

Provide mechanical air circulation at all areas. Introduce outside fresh air at rates specified by code. Where authorized, provide air conditioning in the administrative areas. Provide zone controls to maintain different environmental conditions in all functional areas. Include hook-ups for the base energy monitoring and control system (EMCS).

3. Fire Protection

Provide a fire protection system in accordance with MIL-HDBK 1008B. Install an automatic sprinkler system through-out the facility, except in the mechanical room. In addition, a fire detection and alarm system is also required. Furnish fire extinguishers per NFPA 10. Construct facilities out of noncombustible construction materials. A minimum one hour fire rated wall is required between the administrative and service/maintenance areas.

4. Lighting

Natural and artificial lighting are important factors in creating a quality and productive environment. Lighting affects the perception of space, as well as the color of interior finishes. Design lighting to enhance the design scheme. Provide lighting intensities in accordance with the Illuminating Engineering Society (IES) Lighting Handbooks.

Use energy efficient light fixtures throughout the facility. Avoid the use of incandescent lighting due to its inefficiency and frequency of maintenance. Provide fluorescent lighting for general illumination of administrative and support areas. Use metal-halide lighting in interior service and maintenance areas. Include control systems to provide flexibility of lighting levels.

Consider natural lighting as a supplement to artificial lighting whenever possible. Windows and clerestories are preferred types of natural lighting elements. Due to maintenance and weather tightness factors, avoid the use of skylights. Some areas that benefit from natural lighting include the entrance, lobby, office areas, and service bays.

F. Communications

Provide telephone and computer wiring to support voice, data, security, and fire detection/ alarm systems. Equip the facility with the capability for on- and off- base phone lines, facsimile lines, intercom, public address system, and local area network (LAN).

The designer should contact the base civil engineer and the base communications unit for specific and/or additional requirements before undertaking major building upgrades or modifications. Provide for expansion and incorporate these internal and external requirements in building design and modification specifications. ■

INTERIOR STANDARDS

	FLOORS				BASE				WALLS				CEILING				
	Carpet	Vinyl Composition Tile	Ceramic Tile	Ceramic Paver Tile	Sealed Concrete	Slip/Chemical Resistant Coating	Vinyl	Ceramic Tile	Ceramic Paver Tile	Coved Coating	Painted Gypsum Board	Vinyl Wallcovering	Painted Concrete Block	Ceramic Tile	Acoustical Ceiling Tile	Painted Gypsum Board	Painted Exposed Structure
Administration Area:																	
Entrance/Lobby			◆					◆			◆			◆			
Flight Chief's Office	◆					◆					◆			◆			
Staff Offices	◆					◆					◆			◆			
A.R.T. Office	◆					◆					◆			◆			
Conference/Training Room	◆					◆					◆			◆			
T.O. Library		◆				◆				◆				◆			
Storage Room		◆				◆				◆				◆			
Equipment Maintenance Areas:																	
Service/Maintenance Bays					◆				◆		◆						◆
Flightline Dispatch Office	◆					◆					◆			◆			
Shop Offices	◆					◆					◆			◆			
Bench Stock/Special Tools				◆							◆						◆
Machine Shop					◆				◆		◆						◆
Floor Tools/Jack Storage					◆				◆		◆						◆
Flammable Storage					◆				◆		◆						◆
Welding Area				◆							◆						◆
Corrosion Control Area				◆							◆						◆
Wash Rack					◆				◆		◆						◆
Parts Cleaning					◆				◆		◆						◆
Liquid Oxygen (LOX)				◆							◆						◆
Battery Storage					◆				◆		◆						◆
Support Equipment Storage				◆							◆						◆
Support Areas:																	
Break Room	◆					◆				◆				◆			
Rest Rooms		◆					◆					◆			◆		
Locker Rooms/Showers		◆					◆					◆			◆		
Janitor's Closet				◆							◆				◆		
Mechanical Room				◆							◆						◆
Electrical/Communications Room				◆							◆						◆

Table 4-A: Finish Schedule.

References

ACGIH	American Conference of Governmental Industrial Hygienist, Industrial Ventilation, A Manual of Recommended Practice.
AFH 32-1084	Standard Facility Requirements Handbook
AFI 32-1021	Planning and Programming Facility Construction Projects
AFI 32-1023	Design and Construction Standards and Execution of Facility Construction
AFI 32-1024	Standard Facility Requirements
AFI 32-1032	Planning and Programming Real Property Maintenance Projects Using Appropriated Funds
AFI 32-7042	Solid and Hazardous Waste Compliance
AFI 88-3	Structural Design Criteria Loads
AFM 91-201	Explosives Safety Standards
AFJM 32-1013	Airfield and Heliport Planning and Design
AFP 88-40	Sign Standards
ADA	Americans with Disabilities Act
DoD 4270.1-M	Construction Criteria Manual
DoD 6055.9	Ammunition and Explosives Safety Standards
FED STD. 795	Uniform Federal Accessibility Standards (UFAS)
IES	Illuminating Engineering Society, Lighting Handbooks
MIL-HDBK 1008B	Fire Protection for Facilities Engineering, Design, and Construction
MIL-HDBK 1190	Military Building Code
NFPA 10	Portable Fire Extinguishers
NFPA 70	National Electric Code
NFPA 101	Life Safety Code
NFPA 220	Types of Construction
UBC	Uniform Building Code
10 CFR Chapter 11	Energy Conservation Voluntary Performance Standards for New Buildings
AMC	Commander's Guide to Facility Excellence
AMC	Architectural Compatibility Plans
AMC	Interior Design Guide
AMC	Landscape Design Guide
AMC	Sign Standards, "Engineering Technical Letter" (ETL 93-02)
	Air Force Center for Environmental Excellence, Air Force Environmentally Responsible Facilities Guide
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers, Handbooks
SMACNA	Sheet Metal & Air Conditioning Contractors National Association, Standards