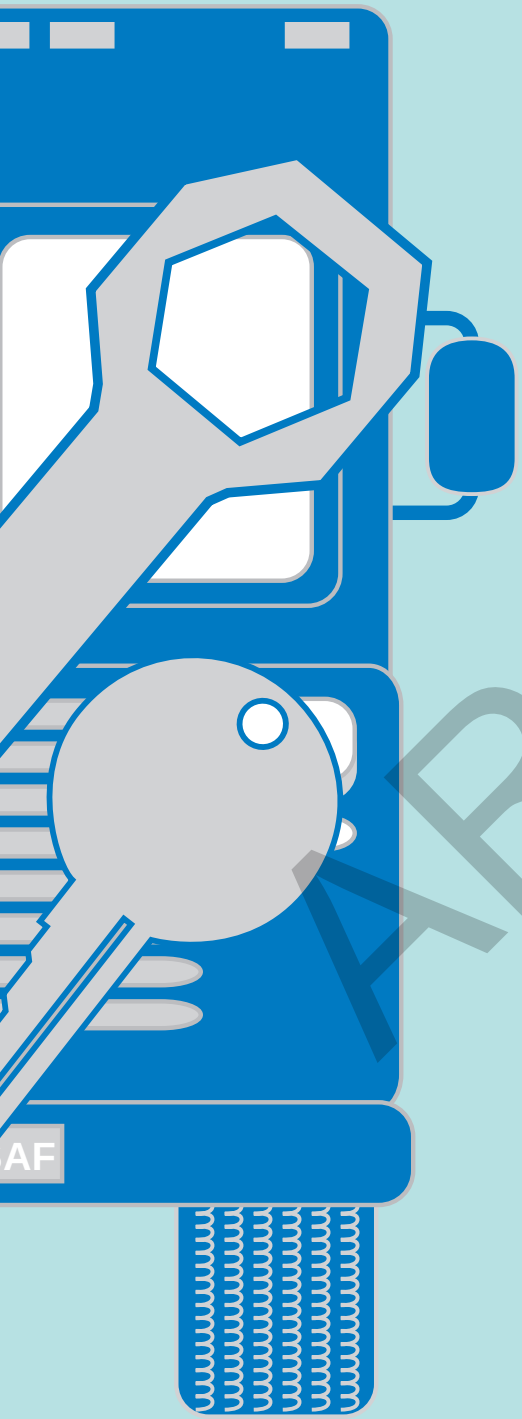

AIR MOBILITY COMMAND

VEHICLE OPERATIONS AND VEHICLE MAINTENANCE FACILITIES DESIGN GUIDE

Air Mobility Command provides a world class capability for our nation…the ability to project force, provide humanitarian service, or come to the assistance of our friends is unmatched by any other nation in the world. The Logistics personnel who support our worldwide operations deserve adequate facilities.

AMC has developed this Guide to set the standard for vehicle operations and vehicle maintenance facilities. Everyone's cooperation and support is needed to get on with the planning, programming, design, and construction. AMC's commitment is to our people — to upgrade their facilities — to give them the space they need, an environment in which they can be as productive as possible, and a workplace in which they can proudly serve.

"The Air Mobility Team … Responsive Global Reach for America … Every Day!"

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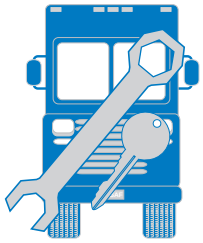
Chapter 1
Introduction



A. Purpose

This guide provides the basic criteria to evaluate, plan, program, and design Air Mobility Command (AMC) vehicle operations and vehicle maintenance facilities. It is intended to make commanders and their staffs aware of important design considerations and to aid in project development.

Planning and programming for vehicle operations and vehicle maintenance facilities should consider all aspects of the operation, as well as maintenance and repair of various vehicle types. Additionally, a quality design will maximize effective use of available space and provide efficient vehicle operations and vehicle maintenance facilities.

B. Design Guide Scope and Use

This guide applies to the design of all new construction and renovation projects for vehicle operations and vehicle maintenance facilities. It provides the overall criteria for determining requirements, site evaluation and planning, and design of exterior and interior areas.

Use this guide to supplement other Air Force and Department of Defense (DoD) policies and instructions to identify individual construction project requirements. The Requirements and Management Plan (RAMP) defines the program for design of an individual Military Construction (MILCON) project. It includes functional requirements, design criteria, and cost information. The material in this guide provides the basis for preparing the RAMP.

1. Project Initiation

Information required for preparation of the DD Form 1391, which initiates project development, is found in Chapter 2. This includes considerations of the space criteria to determine overall building size and site evaluation, and special factors to be used in the cost estimates.

2. Site Selection

This is generally part of the master planning process. It is completed prior to preparing a DD Form 1391 for an individual project. However, project programming requirements developed in the DD Form 1391 phase may require a re-evaluation of site selection decisions. For guidance in evaluating sites for a project, see Chapter 2, Section E, Site Evaluation.

3. Design

a. The design of a project is typically developed in progressive phases, i.e., planning and programming, concept and preliminary drawings, and final working drawings. Design guidance for all of these design phases is covered in Chapters 2 through 4.

b. Chapter 2 provides basic planning and programming criteria, along with tables for determining square footage requirements.

c. Chapter 3 presents concept and preliminary design considerations, such as the location of a facility on a site, the design of the facility and supporting utilities, as well as specific technical guidance.

d. Chapter 4 addresses specific design issues concerning individual functional areas, which are important for preliminary and working drawings. In this chapter, illustrative designs and photographs help clarify the design guidance of the preceding chapters.

4. Interior Finishes and Furnishings

Chapter 5 provides recommendations for the selection of interior materials, finishes, and colors. Carefully selected interior finishes and furnishings are essential for a quality design.

C. Vehicle Operations and Vehicle Maintenance Facilities

Vehicle operations and vehicle maintenance facilities are an essential element of aircraft support. Appropriate facilities are needed to support operations management, preventive maintenance, and unscheduled repair work on all vehicles on base (including vehicles belonging to tenant organizations). The types of vehicles requiring maintenance support will range from general fleet to special purpose, such as cargo loaders, construction equipment, aircraft tugs, snow removal equipment, along with refueling and emergency vehicles (e.g., fire trucks).

Fully functional and properly configured facilities will ensure that a higher percentage of the fleet is kept in operation. Quality facilities will improve the maintenance specialists' efficiency and ability to make repairs, and encourage pride of ownership in their workplace.

This guide evaluates the distinct requirements of a vehicle operations facility and a vehicle maintenance facility separately. However, the facilities can be organized in a complex as illustrated in Figure 1-A. The following provides an overview of necessary requirements for each facility.

1. Vehicle Operations Facilities

a. Provide an area to accommodate the following: administrative offices, vehicle washing/cleaning, heated parking (required in severe cold climate areas), fleet vehicle parking, dispatch, drivers' lounge, and fleet management. Unique mission requirements may require additional functions to support the overall vehicle operations/maintenance effort.

2. Vehicle Maintenance Facilities

a. Provide shops to maintain all vehicles assigned to the base. These shops should provide space and facilities for scheduled and unscheduled maintenance. This includes, but is not limited to, inspection, general repair and replacement of major assemblies, lubrication, fluid changes, tune-ups, tire rotation, painting, welding, upholstery repair, testing, cleaning, storage and retrieval of parts, and fabrication of minor parts.

b. Provide support functions for maintenance control and analysis, tool room, parts room, locker rooms, and offices. Shop operations are usually supported by a contractor-operated parts store (COPARS).

c. Other elements of the vehicle complex include a hazardous waste accumulation point, a dynamometer facility (certifies vehicle emissions), and various vehicle parking lots.

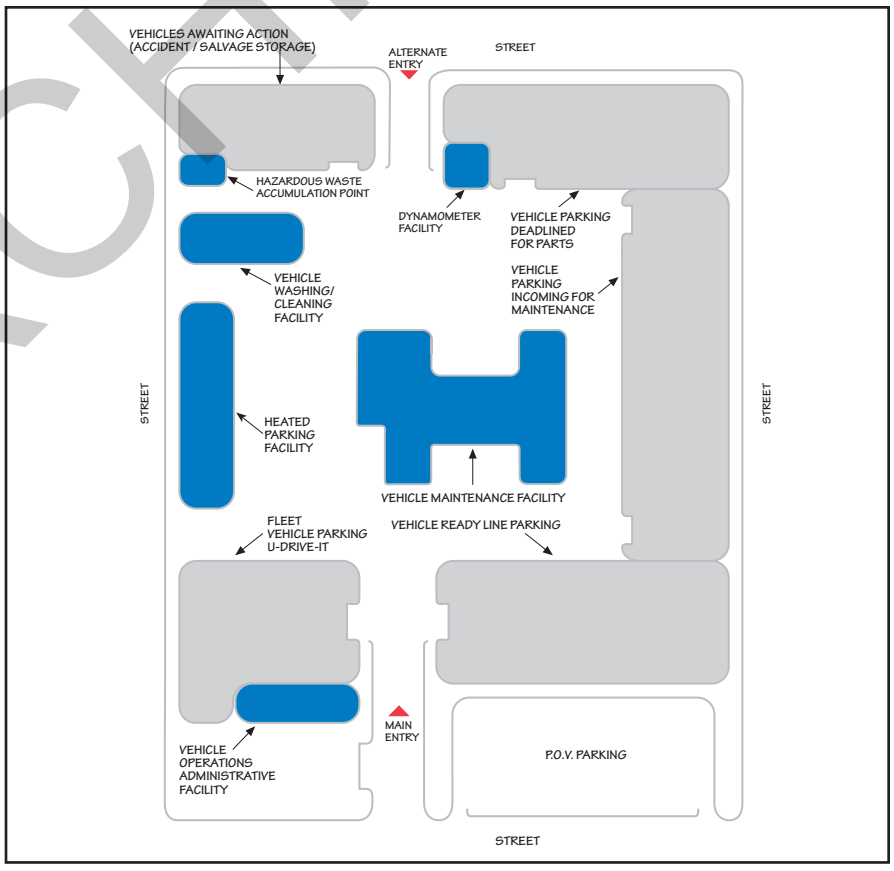
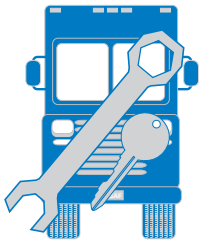


Figure 1-A: Site Organization for the Vehicle Operations and Vehicle Maintenance Complex.

Chapter 2
Program



A. General

The transportation organization encompasses command and control, combat readiness and resources, vehicle operations, vehicle maintenance and, at some locations, the traffic management office (TMO).

The squadron commander and first sergeant, with associated administrative support, provide command and control to the organization. Combat readiness and resources provide expertise for the commander to prepare and execute the unit's wartime mission. Vehicle operations manages the assigned vehicle fleet and ensures compliance with public laws related to the administration and management of military vehicles. Vehicle maintenance maintains the vehicles in a safe and serviceable condition.

At locations without an aerial port squadron, the TMO is a function of base transportation and manages personal property, passenger, and cargo shipments. At locations with an aerial port squadron, TMO is a function of that aerial port squadron.

It is highly desirable to house as many administrative functions as possible within one facility. For example, command and control and combat readiness and resources could share an area within the vehicle operations administrative facility, as this guide illustrates (see Figure 2-A). However, local mission needs should be the primary consideration for determining shared facilities.

1. Planning and Programming Considerations

a. Planning, programming, and designing a vehicle operations or vehicle maintenance facility normally require extensive coordination. This coordination is important because of the different organizations involved in developing facility requirements.

b. Personnel likely to have facility plan- ning and design inputs are as follows:

- Wing commander
- Wing safety officer
- Operations group commander
- Logistics group commander
- Support group commander
- Transportation squadron commander
- Vehicle operations officer
- Vehicle maintenance manager
- Supply squadron commander
- Communications squadron commander
- Civil engineer squadron commander
- Security police squadron commander

New facilities must meet AMC's facility standards.

2. *Vehicle Operations and Vehicle Maintenance Complex*

Programming functional requirements for vehicle operations and vehicle maintenance facilities (Figures 1-A, page 2) can be broken into the following categories:

a. Vehicle Operations Facilities

- Administrative
- Heated parking
- Vehicle washing/cleaning

b. Vehicle Maintenance Facilities

- Multipurpose vehicle maintenance
- Special purpose vehicle maintenance
- Allied trades
- Dynamometer (Facility for verifying and certifying vehicle emissions.)
- Refueling maintenance (Because of the potential fire hazard, locate this facility remotely. The ideal location for this facility would be adjacent to the POL and fuels operations facility.)
- Hazardous waste accumulation point

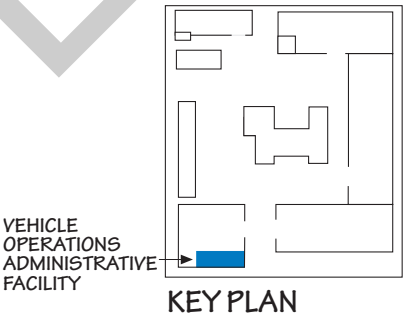
B. Vehicle Operations Administrative Facility Functions

See Figure 2-A for functional area relationships for the vehicle operations administrative facility.

1. *Administrative*

a. This building is the nerve center of vehicle operations. The center controls both operational and preventative maintenance functions for the vehicle fleet. Provide space for the following functions: administrative offices, drivers' ready room (lounge), vehicle dispatch, conference/training room for drivers' training and testing, lockers, and rest rooms.

b. Lobby/Entrance - Provide an air-lock vestibule at the main entrance with a customer waiting area.



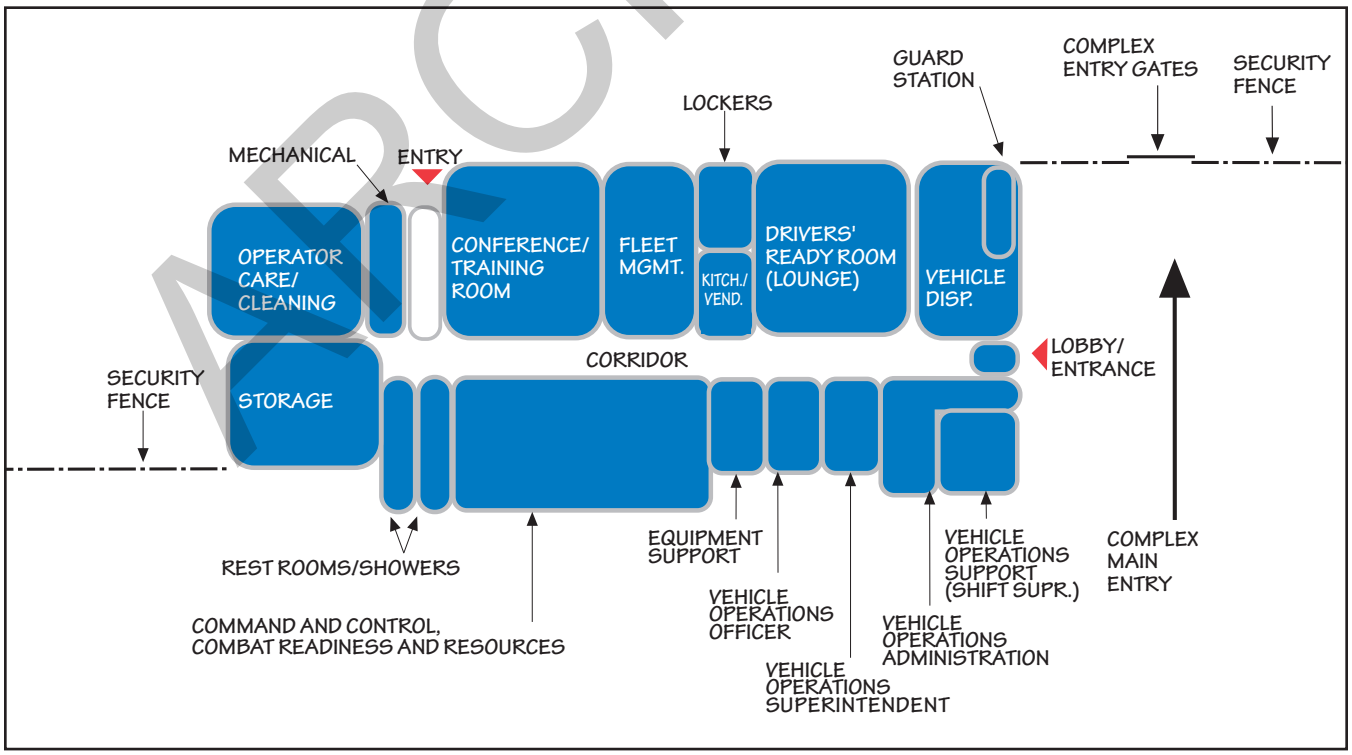


Figure 2-A: Functional Area Relationships for the Vehicle Operations Administrative Facility.

c. Vehicle Dispatch - Locate vehicle fleet dispatchers near the front entry of the building to serve customers efficiently. This function should maintain visual and physical contact with the drivers' ready room (lounge) and fleet parking area.

- Guard Station - Provide a station to control vehicle access to the complex. Locate the guard at the gate to control access to the complex.

d. Drivers' Ready Room (Lounge) - Locate the area adjacent to vehicle dispatch, with a pass-through window to dispatch. Also, provide easy access to the rest rooms, kitchen/vending, and lockers.

e. Lockers - Locate locker rooms adjacent to the drivers' ready room (lounge).

f. Kitchen/Vending - Locate adjacent to drivers' ready room (lounge).

g. Fleet Management - Locate administrative area with easy access to vehicle dispatch. Some of the fleet management functions include analysis, vehicle control, operators' records and licensing, and registered equipment management.

h. Conference/Training Room - Multipurpose space that is accessible to both drivers and administrative personnel.

i. Operator Care/Cleaning - Enclosed service bay for minor maintenance and general vehicle cleaning. The driveway access should be accessible from the U- drive-it fleet vehicle parking lot.

j. Mechanical - Spaces for heating, ventilating, and air conditioning (HVAC) equipment electrical service, telephone switching equipment, and fire detection and alarm equipment.

k. Storage - General interior storage area located adjacent to operator care/cleaning.

l. Vehicle Operations Support (Shift Supervisor) - Provide area for control of operational (short-notice, minor maintenance) and preventive maintenance of the vehicle fleet.

m. Vehicle Operations Administration - Locate in an open office area with easy access to the vehicle operations superintendent's office.

n. Vehicle Operations Superintendent - Locate adjacent to the vehicle operations officer's office. This office should provide easy access to the operations administrative staff.

o. Vehicle Operations Officer - This is a private office for the Officer-In-Charge (OIC) to oversee the operations of the facility. It should provide easy access to the operations administrative staff.

p. Equipment Support - This administrative space is for personnel who issue and maintain chains, road kits, and other essential equipment. Furnish office with modular systems furniture.

q. Command and Control - Additional administrative functions, such as combat readiness and resources, can share space within the vehicle operations administrative facility, even though the organization is not part of vehicle operations. The primary consideration for determining shared facilities is local mission requirements.

r. Rest Rooms/Showers - Centrally locate male and female facilities.

s. Janitor's Space - Area for mop sinks and storage of cleaning and maintenance supplies.

2. Heated Parking Facility

At locations where severe cold conditions exist, provide heated facilities for crew busses, commanders' cars, and other mission-essential vehicles.

3. Vehicle Washing/Cleaning Facility

a. Enclosed Bays - Bays for vehicle washing/cleaning should include a wash bay and an area for vehicle vacuuming and waxing.

b. Canopy - Provide covered area for washed/cleaned vehicles that are awaiting pickup.

c. Storage - Area for supplies to support vehicle washing/cleaning, such as wax, rags, and touch-up paint.

C. Vehicle Maintenance Facility Functions

See Figure 2-B, page 6, for functional area relationships for the vehicle maintenance facility.

1. Functional Considerations

a. If designing a stand-alone facility, refer to Chapter 4, paragraph E,

"Vehicle Maintenance Support Core," to select appropriate functions that support mission requirements. In addition, other requirements may need to be incorporated into:

- Multipurpose vehicle maintenance
- Special purpose vehicle maintenance
- Allied trades

b. Collocate two or more different types of maintenance shops whenever possible so that support core functions of the shops, such as tools, parts, machine shop, mechanical spaces, rest rooms, and other common areas can be shared. This improves overall flexibility of the mechanics performing the maintenance and reduces the requirements for parts and tools. Collocated functions will also reduce square footage requirements for the facility.

2. *Vehicle Maintenance Support Core*

See Figure 2-C, page 7, for functional area relationships of the support core for the vehicle maintenance facility.

a. Vehicle Maintenance Administration - Locate in an open office area within the vehicle maintenance facility. Provide easy access to customer entrances. Locate the vehicle maintenance manager's office adjacent to the vehicle maintenance administration area.

b. Vehicle Maintenance Manager's Office - Locate adjacent to the vehicle maintenance areas and administration center.

c. Customer Service Center - Locate at the facility's main entrance, with a service counter and customer service lounge.

d. Maintenance Control and Analysis - Locate within easy access of the vehicle maintenance manager.

e. Material Control - Provides administrative oversight of contracted operations. Locate within easy access of maintenance control and analysis, and the vehicle maintenance manager.

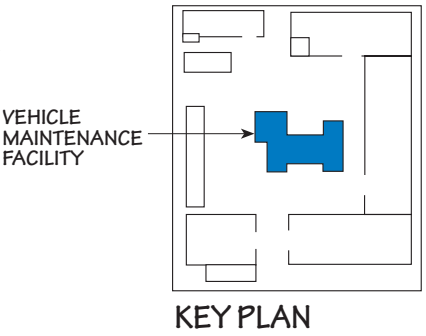
f. COPARS - Parts service area with counter and parts bins. Provide interior and exterior access.

g. Technical Order (TO) Library - Library for mechanics to refer to the latest publications and updates.

h. Rest Rooms/Showers/Lockers - Provide separate men's and women's facilities. Each should have direct access to appropriate lockers and showers for personnel assigned to the facility.

i. Break Room/Training Room - The multipurpose room can be divided by an acoustical-rated partition when necessary.

j. Mechanical - Space for HVAC, electrical service, telephone switching equipment, and fire detection and alarm equipment.



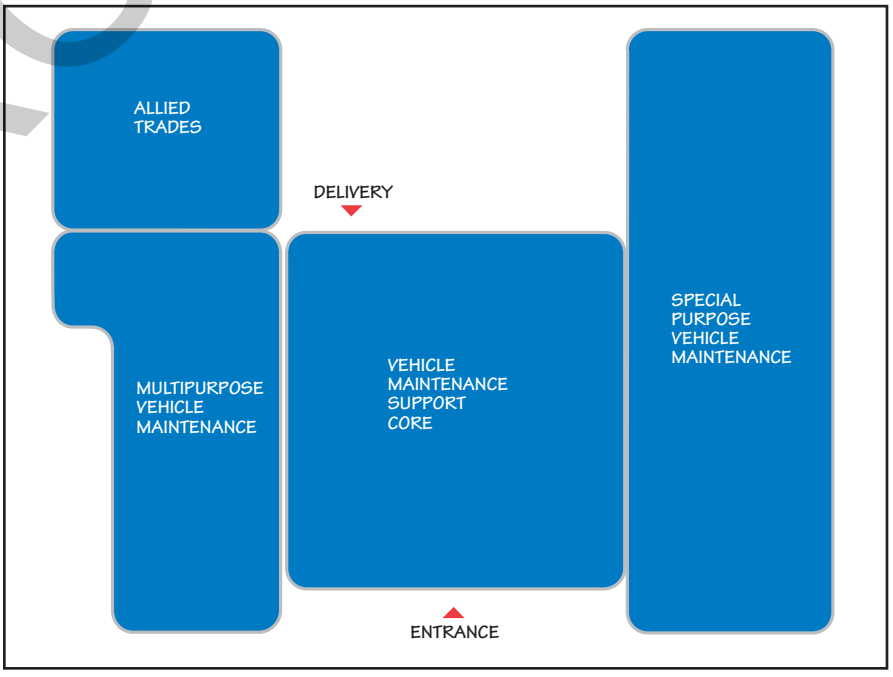


Figure 2-B: Functional Area Relationships for the Vehicle Maintenance Facility.

k. Machine Shop - Should have both an interior and exterior access.

l. Decentralized Supply Support - Area provided for parts storage and a supply computer terminal.

- Bench Stock - Provide an area for the storage of commonly used items.
- Parts Storage - Provide an area for the storage of vehicle parts.

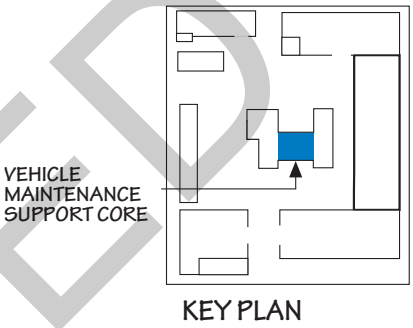
m. Tools - Provide an area for storage of tool boxes and shared tools.

3. Multipurpose Vehicle Maintenance

a. Service Bays - Provide bays for a drive-through maintenance area with servicing equipment to support a variety of vehicle types.

b. Minor Maintenance - Locate area adjacent to the customer service area. Bays for user organizations to perform tune-ups, lubrication, and quick turn around repairs (repair work taking less than two hours at a cost of under $100).

c. Jacks/Floor Tools - Locate adjacent to service bays with space for jack stands, lifts, hoists, etc.



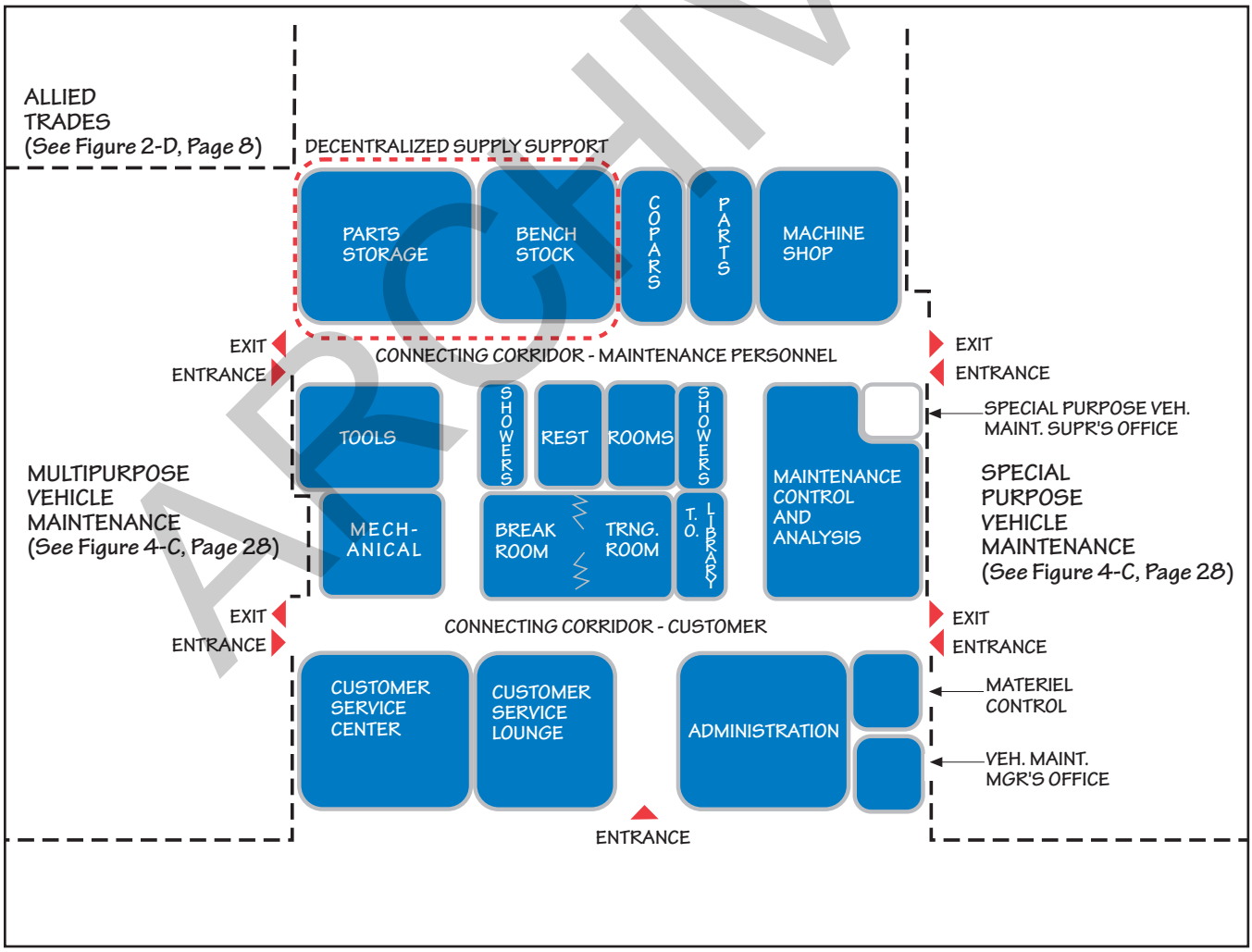


Figure 2-C: Functional Area Relationships for the Vehicle Maintenance Support Core.

d. Multipurpose Vehicle Supervisor's Office - Locate with easy access to service bays.

e. Tire Repair - Indoor area for tire storage, tire replacement, balancing, and repair.

4. Allied Trades

If combined as an integral part of a vehicle maintenance facility, allied trades can share support core functions. See Figure 2-D for the functional area relationships of the allied trades area.

a. Allied Trades Supervisor's Office - Provide the shop supervisor with visibility and access to the shop.

b. Welding - Specific area for arc and acetylene welding is required.

c. Upholstery - Area for repair of upholstery and storage of materials.

d. Paint Preparation - For sanding, taping, and clean-up prior to placing the vehicle in a paint booth.

e. Paint Booth - Area within the facility should be large enough to house the paint booth.

f. Repair Bays - For vehicle body repairs.

g. Jacks/Floor Tools - Locate adjacent to service bays with space for jack stands, lifts, hoists, etc.

5. Special Purpose Vehicle Maintenance

a. Service Bays - Provide bays for the repair and maintenance of specialized vehicles such as forklifts, aircraft cargo loaders, front-end loaders, aircraft tugs, heavy construction equipment, and snow removal equipment. Also provide maintenance bays for fire fighting vehicles when maintenance cannot be performed elsewhere on base.

b. Special Purpose Vehicle Maintenance Supervisor's Office - Locate within easy access of the service bays.

c. Jacks/Floor Tools - Locate adjacent to service bays with space for jack stands, lifts, hoists, etc.

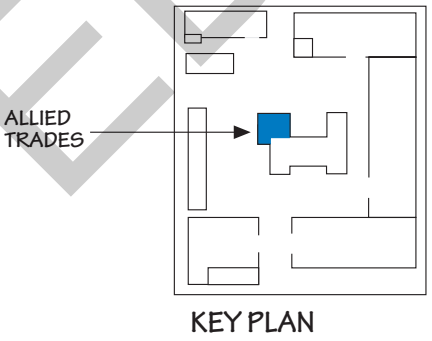
6. Refueling Maintenance Facility

This facility should be remotely located because of the potential fire hazard.

a. Entry/Waiting - Room with customer seating.

b. Supervisor's Office - For the shop supervisor, with easy access to the maintenance area.

c. Rest Rooms - Provide separate men's and women's facilities. Each should have direct access to appropriate lockers and showers for personnel



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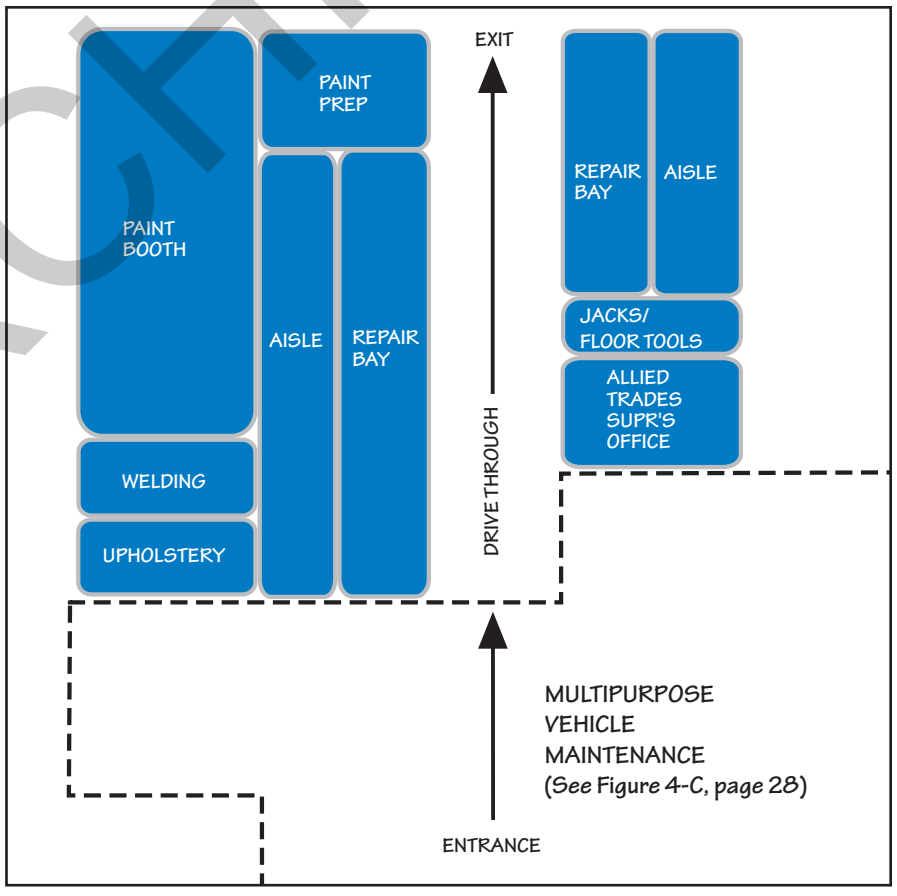


Figure 2-D: Functional Area Relationships for Allied Trades.

assigned to the facility. Provide separate unisex public rest room that is accessible from entry/waiting area.

d. Maintenance Bays - Provide sufficient room to accommodate the largest refueling vehicles.

e. Tools - Provide an area for storage of tool boxes and shared tools.

f. Jacks/Floor Tools - Locate adjacent to service bays with space for jack stands, lifts, hoists, etc.

g. Mechanical - Provide space for HVAC, electrical, plumbing, fire protection, and communications.

D. Space Criteria for Vehicle Operations Facilities and Vehicle Maintenance Facilities

1. Planning Considerations

a. Define the size, type, number, and functional area relationships required to support a vehicle operations or maintenance facility.

b. Development of space requirements should take into consideration the existing facilities relative to current and future needs.

2. Standard Facility Requirements

a. The AMC standard for a vehicle operations facility is 5,672 square feet. Table 2-A is an example of how the space should be apportioned.

b. Tables 2-B through 2-H provide space requirements for the vehicle maintenance facilities, which are based on the number and types of vehicles assigned to the base. The functional areas are graphically illustrated in Figures 2-B through 2-D.

- Table 2-A: Space Requirements for a Typical Vehicle Operations Administrative Facility - This is an example of the areas required to support the overall administrative functions of a vehicle operations facility.

Example – Space Requirements for Vehicle Operations Administrative Facility

Component	Net SF	Net SM*
Lobby/Entrance	122	11
Vehicle Dispatch	400	37
Guard Station	90	8
Drivers' Ready Room (Lounge)	550	51
Kitchen/Vending	100	9
Lockers	200	19
Men's Rest Room/Lockers/Shower	130	12
Women's Rest Room/Lockers/Shower	130	12
Fleet Management	450	42
Conference/Training Room	225	21
Veh. Operations Officer	150	14
Veh. Operations Superintendent	90	8
Veh. Operations Admin.	180	17
Veh. Operations Support (Shift Supr.)	90	8
Equipment Support	180	17
Operator Care/Cleaning	670	62
Storage	670	62
Mechanical/Electrical Room	300	28
Subtotal	4,727	438
Walls and Circulation (20%)(1)	945	88
Gross Total	5,672	526
Command and Control	1,500	139

Legend SF - Square Footage
*SM - Square Meters = .0929 x SF *(All measurements are rounded)*
(1) 20% factor is typical for administrative facilities

Table 2-A: Space Requirements for a Typical Vehicle Operations Administrative Facility.

- Table 2-B: Vehicle Maintenance Support Core - The areas which should be included in the administrative support for vehicle maintenance facility are as follows:
  - Vehicle maintenance manager
  - Vehicle maintenance administration
  - Maintenance control and analysis
  - Materiel control
  - COPARS
  - Technical order library
  - Break room/training room
  - Rest rooms/lockers/showers
  - Machine shop
  - Tools
  - Decentralized supply support (Validate square footage requirements for parts storage and bench stock with the local chief of supply. Table 2-B does not reflect square footage requirements for these areas.)
- Table 2-C: Customer Service Center - Area for customer service.
- Table 2-D: Multipurpose Vehicle Maintenance - This area includes space for multipurpose and general purpose vehicles, minor and major repairs, tire repair, and the superintendent's office.

Vehicle Maintenance Support Core

Total Assigned Vehicles	Gross SF	Gross SM*
0 to 250	5,000	465
251 to 500	6,000	557
501 to 700	7,000	650
701 to 900	8,000	743
901 to 1,100	8,500	790
1,101 to 1,200	9,000	836
1,201 to 1,300	9,500	883

Table 2-B: Space Requirements for Vehicle Maintenance Support Core.

Multipurpose Vehicle Maintenance

Total Assigned Vehicles	Gross SF	Gross SM*
0 to 100	5,000	465
101 to 200	7,500	697
201 to 300	10,000	929
301 to 400	12,500	1,161
401 to 500	15,000	1,394

Table 2-D: Space Requirements for Multipurpose Vehicle Maintenance.

Customer Service Center

Total Assigned Vehicles	Gross SF	Gross SM*
0 to 250	1,200	111
251 to 500	1,600	149
501 to 700	2,000	186
701 to 900	2,400	223
901 to 1,100	2,800	260
1,101 to 1,200	3,200	297
1,201 to 1,300	3,600	334

Table 2-C: Space Requirements for Customer Service Center.

Allied Trades

Total Assigned Vehicles	Gross SF	Gross SM*
0 to 250	2,000	186
251 to 500	2,500	232
501 to 700	3,000	279
701 to 900	3,500	325
901 to 1,100	4,000	372
1,101 to 1,200	4,500	418
1,201 to 1,300	5,000	465

Table 2-E: Space Requirements for Allied Trades.

Legend for Tables 2-B, 2-C, 2-D, and 2-E. SF - Square Footage *SM - Square Meters *(All measurements are rounded)*

Some of the types of vehicles repaired in this maintenance area are busses, ambulances, tractor trailers, sedans, and pickups.

- Table 2-E: Allied Trades - This area includes space requirements for the following functions: glass cutting, sheet metal bending, body repair, paint preparation area and paint booth, welding, and upholstery.
- Table 2-F: Special Purpose Vehicle Maintenance - Includes special purpose vehicles and material handling equipment in this area. Some of the types of vehicles repaired in this maintenance area are road graders, dump trucks, fire trucks (if applicable), forklifts, K-loaders, snow plows, and aircraft tow tractors.
- Table 2-G: Refueling Vehicle Maintenance - Area for refueling maintenance.
- Table 2-H: Space Requirements for the Typical Vehicle Maintenance Facilities - Example of the requirements for a hypothetical vehicle fleet.

Special Purpose Vehicle Maintenance

Special Purpose Vehicles		
Total Assigned Vehicles	Gross SF	Gross SM*
0 to 75	4,200	390
76 to 150	6,300	585
151 to 225	8,400	780
226 to 300	10,500	975
301 to 375	12,600	1,171
376 to 450	14,700	1,366
Material Handling Equipment		
0 to 20	2,500	232
21 to 40	4,100	381
41 to 60	5,700	529
61 to 80	6,500	604
81 to 100	7,300	678

Table 2-F: Space Requirements for Special Purpose Vehicles and Material Handling Equipment Maintenance.

Refueling Vehicle Maintenance

Total Assigned Vehicles	Gross SF	Gross SM*
0 to 10 (2 Bays)	3,500	325
11 to 20 (3 Bays)	4,250	395
21 to 30 (4 Bays)	5,000	465
31 to 40 (5 Bays)	5,750	535

Table 2-G: Space Requirements for Refueling Vehicle Maintenance.

Example – Space Requirements Typical Vehicle Maintenance Facilities

Based on a Total of 750 Vehicles: 29 Refuelers, 45 Material Handlers, 486 Multipurpose, and 190 Special Purpose

Component	Gross SF	Gross SM*
Administrative Support Core (Table 2-B, 750 Vehicles)	8,000	743
Customer Service Center (Table 2-C, 750 Vehicles)	2,400	223
Multipurpose Vehicle Maint. (Table 2-D, 486 Vehicles)	15,000	1,394
Allied Trades (Table 2-E, 750 Vehicles)	3,500	325
Special Purpose Vehicle Maint. (Table 2-F, 190 Vehicles)	8,400	780
Material Handling Equip. (Table 2-F, 45 Vehicles)	5,900	548
Refueling Vehicles Maint. (Table 2-G, 29 Vehicles)	4,250	395
Gross Total(1)	47,450	4,408

Table 2-H: Space Requirements for the Typical Vehicle Maintenance Facilities.

Legend for Tables 2-F, 2-G, and 2-H.
SF - Square Footage
*SM - Square Meters (All measurements are Rounded)
(1) Gross square footage includes a 15% factor for walls, circulation, and mechanical space. This is typical for large open types of buildings.

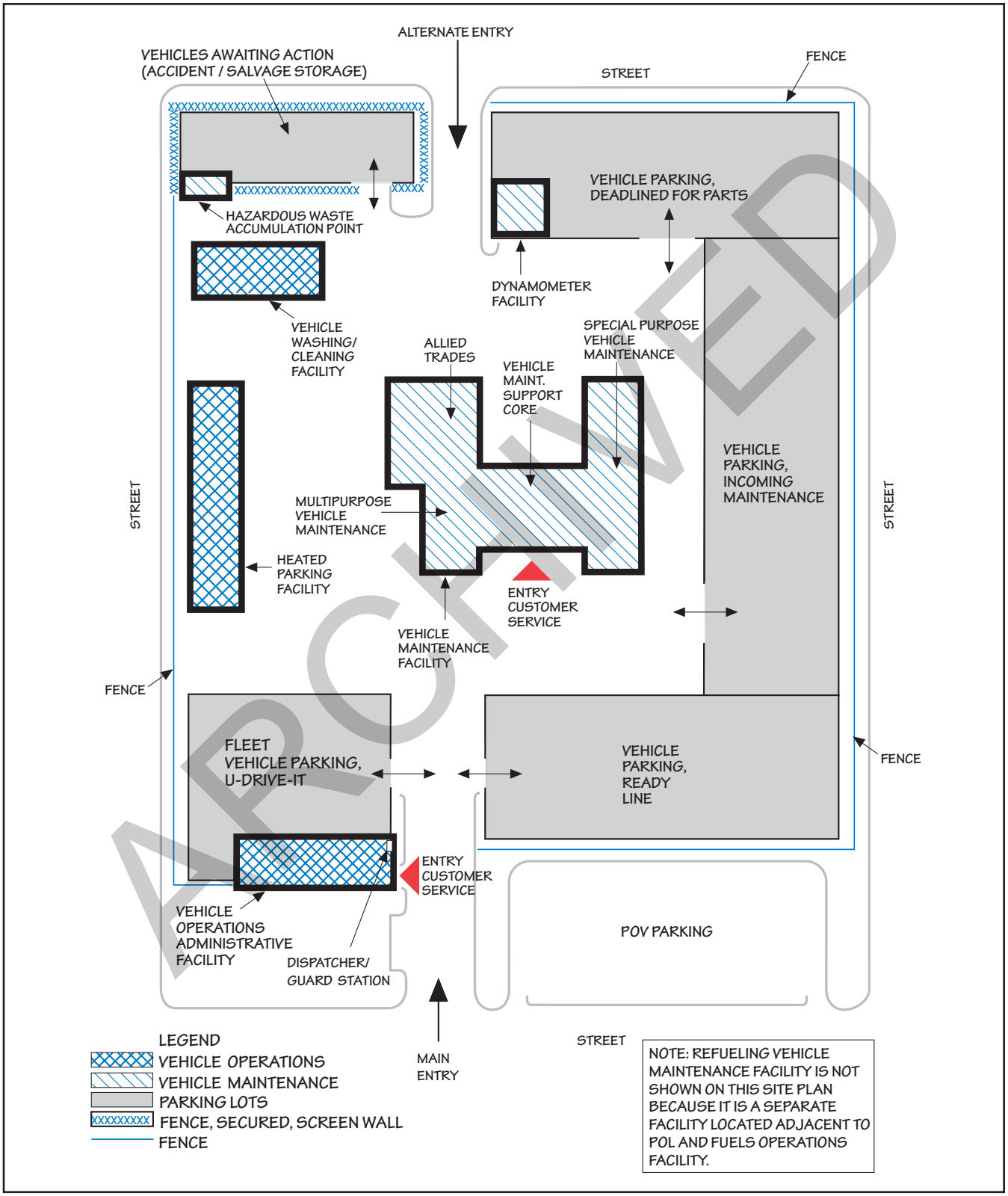


Figure 2-E: Site Organization for the Vehicle Operations and Vehicle Maintenance Complex.

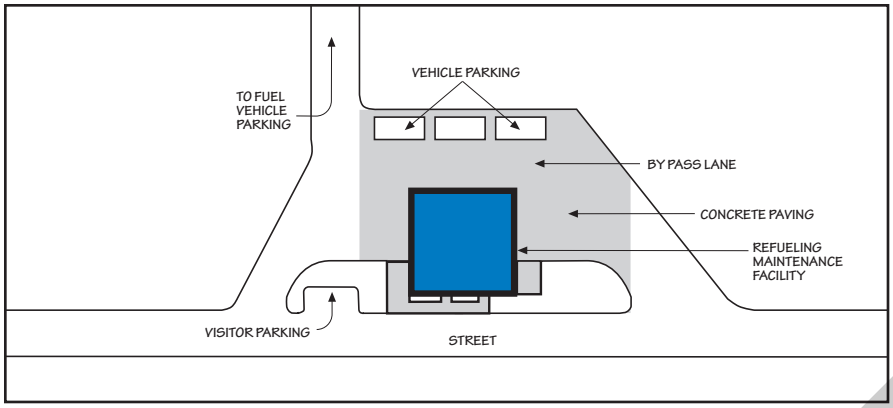


Figure 2-F: Refueling Vehicle Maintenance Facility Site Plan (Locate adjacent to POL and Fuels Operations Facility).

E. Site Evaluation

1. Location

Although it is not crucial for the complex to be centrally located, the quantity and types of vehicles a base maintains should be considered when selecting a location (vehicle types are defined in AFR 77-310, Vol. 1). Some areas to consider are as follows:

a. Vehicle Operations and Vehicle Maintenance Facilities - Locate facilities so they are readily accessible from all points on base. As stated earlier, co-locate two or more different types of maintenance shops whenever possible so that functions can be shared. Co-location of multipurpose vehicle maintenance, special purpose vehicle maintenance, and allied trades will allow sharing of functions within the vehicle maintenance support core.

b. Heated Parking Facility - Locate near the U-drive-it vehicle parking area.

c. Vehicle Washing/Cleaning Facility - Locate near the rear of the vehicle maintenance complex and away from public view.

d. Multipurpose Vehicle Maintenance Facility - Centrally locate this facility within the complex.

e. Allied Trades - Orient this function so that the exhaust system supporting the painting operations vents away from the center of the complex.

f. Special Purpose Vehicle Maintenance Facility - If the base mission includes functions such as heavy cargo shipping, consider siting this facility conveniently near the cargo handling function. In some cases, consider having two locations for special purpose vehicle maintenance – one in the main complex and one near a remote customer's location.

g. Refueling Vehicle Maintenance - Because of the potential fire hazard, locate this facility remotely. The ideal location would be near the refueling parking area (see Figure 2-F).

h. Hazardous Waste Accumulation Point - Provide a site to store hazardous wastes. It should be located near the rear of the complex.

i. Dynamometer Facility - The function of this facility is to certify that vehicles meet emission standards. Locate this function within the multi-purpose maintenance area, if possible. If not, locate adjacent to this area.

2. Size

a. Site Size - Depends on the gross building square footage, space requirements for access of government- owned vehicles (GOVs), vehicle turning radius requirements, and privately owned vehicle (POV) parking requirements.

b. Site Design - Complete to ensure basic building and site requirements can be accommodated.

c. Parking Lots - Several different types of parking lots are required within the fenced area of the vehicle maintenance complex. They include:

- Fleet Vehicle Parking (U-Drive-It) - Lot should be visible from the vehicle operations administrative building.
- Vehicles, Ready Line - Parking lot for repaired vehicles awaiting pickup.
- Vehicles, Incoming - Parking lot for vehicles awaiting repair.
- Vehicles, Deadlined - Parking lot for vehicles awaiting parts.
- Vehicles, Awaiting Action - Parking lot for vehicle accident/ salvage storage. Requires a perimeter screen wall to secure and visually screen the area.

d. Paved Lots - Lot sizes are determined by the size of the fleet, the mission of the base, and the types of vehicles being serviced. In addition to providing paved lots, provide adequate circulation and parking space around the buildings. Provide a POV lot outside the complex. Use 38 percent of assigned personnel or the size of the largest shift to determine number of spaces required for the POV lot.

e. Paved Curb Surfaces - Design all paved surfaces to direct water run-off into drains. They should be equipped with oil/water separators.

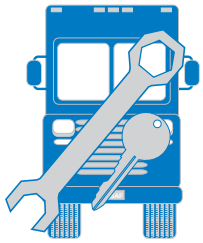
F. Special Project Costs

Consider the following special factors when establishing initial estimates of project costs (see relevant sections of Chapters 3 and 4). Special considerations are:

- Weather Conditions - Evaluate local wind, snow, and seismic conditions for their impact on project costs.
- Preliminary Soil Analysis - Determine whether specialized site and foundations work will be required.
- Structural Loads - Assess loads to determine any specific design costs, especially for high-bay clear spans, traveling overhead crane, and special vehicle lifts.
- Zone Controls - Functional areas may require different environmental conditions, based on function or hours of operation. Zone controls can be used to satisfy these individual environmental requirements.
- Exhaust - Provide a vehicle exhaust evacuation system, in addition to the typical building exhaust ventilation fans.
- Special Equipment - Specific requirements may be imposed on the building structure, such as:
  - Traveling overhead crane
  - Special vehicle lifts
- Specific Needs - Facilities will have specific needs for a paint booth, oil/water separators, and grease pits.

Chapter 3

Overall Project Design



A. General

This chapter provides broad criteria for locating vehicle operations and vehicle maintenance facilities on a site, design of the facilities and supporting utilities, and technical requirements that affect the overall complex.

B. Site Design

1. Selection

A site organization plan is illustrated in Figure 3-A, page 18.

a. The vehicle operations and vehicle maintenance buildings should be located within a central complex.

Provide a convenient, main, secured entrance, as well as a secondary entrance.

b. Building orientation should take into account the following factors:

- Protection from winds and glare

Buildings in a vehicle maintenance complex, such as this vehicle maintenance facility, should reflect the AMC standards of architectural compatibility.

The maintenance complex should have a single entry point.

- Shade from excessive sun in warm climates
- Orient operable windows to take advantage of summer breezes
- Maximum sun exposure in cold climates

c. Use landscape elements to define the site and main entry, and to help present an attractive image for the facility.

2. Access

a. Locate disabled-access parking spaces near the main entrance to facilities, and integrate accessible ramps into the building entrances.

b. Provide a clearly identifiable access to the main entry gate and customer service area.

c. Service traffic should always be segregated from other traffic and pedestrian access. Keep traffic control signs to a minimum and use them only for safe integration of car and truck traffic into off-site street traffic.

3. Facility Relationships

a. Vehicle Operations Administrative Facility - This facility should be adjacent to vehicle maintenance but have its own identity. The architectural design of this building should be that of an office building.

b. Heated Parking Facility - Bases in severe cold climates may require that certain vehicles, including emergency vehicles, be parked in a heated area. The facility should not be equipped for vehicle repairs.

c. Vehicle Washing/Cleaning Facility - Locate near the rear area of the vehicle maintenance complex.

d. Vehicle Maintenance Facility - This facility is made up of the following areas:

- Vehicle Maintenance Support Core - This area is the nerve center of the vehicle maintenance facility.

It contains common functions that can be shared by:

- Multipurpose vehicle maintenance
- Allied trades
- Special purpose vehicle maintenance

◆ Multipurpose Vehicle Maintenance - Provide large paved areas adjacent to the building entrances for vehicle maneuverability, traffic flow, and parking requirements.

◆ Allied Trades - Locate near multipurpose vehicle maintenance. The allied trades function can be part of a larger facility, but it also needs vehicle circulation and storage around the perimeter.

◆ Special Purpose Vehicle Maintenance - Depending on mission requirements, consider locating the facility on one end of the multipurpose vehicle maintenance building.

e. Refueling Maintenance Facility - Because of the potential fire hazard locate this facility separately. The facility is shown as a separate structure in Figure 2-F, page 13.

f. Hazardous Waste Accumulation Point - Provide a small accumulation point near the rear of the maintenance complex to register and temporarily store hazardous waste generated by ongoing vehicle maintenance actions.

g. Dynamometer Facility - When applicable, this function should be part of the multipurpose vehicle maintenance within the vehicle maintenance facility. (Shown as a separate structure in Figure 3-A, page 18.) This function will certify that a vehicle's emissions comply with state and local requirements.

4. Utilities

a. In accordance with local service procedures, provide:

◆ Water, sanitary sewer, and stormwater systems, plus natural gas, steam service, or fuel/oil systems

◆ Electric, telephone, sprinkler, fire alarm, and communications systems

5. Landscaping

a. Use landscape elements to help define the site and the main entrance. Landscaping should present an attractive image for the facility as well as natural screening for separation between parking areas.

b. Provide screen walls, in combination with earth berms and landscaping, at the perimeter of the complex to screen visual clutter.

c. Provide low maintenance landscaping and select only approved plant materials identified in the base Architectural Compatibility Guide.

C. Building Design

1. Organization and Circulation

a. The vehicle complex should comprise space for several facilities to support vehicle administrative and maintenance functions.

◆ Vehicle Operations Administrative Facility - Organize the functional areas around a central corridor to provide convenient access. This will allow each area to function independently, while controlling access to ensure safety and security.

◆ Vehicle Maintenance Facility - Could ideally house multipurpose vehicle maintenance, special purpose vehicle maintenance, and allied trades.

- The main entrance to this facility should provide direct access to the customer service center.

b. The open floor plan and internal circulation corridors should provide access to all administrative areas. Internal corridors should have a minimum width of five feet to facilitate reconfiguration, and they should match the adjoining office space in ceiling height, ceiling material, and floor material.

c. Restrict public access between the administrative offices and the maintenance functions for safety purposes, and access to provide security.

d. The lounges and rest rooms should have centralized, prominent locations with easy access from the circulation corridors.

e. The repair bays consist of large open areas with drive-through lanes and a mechanics' aisle at the front of the service bays.

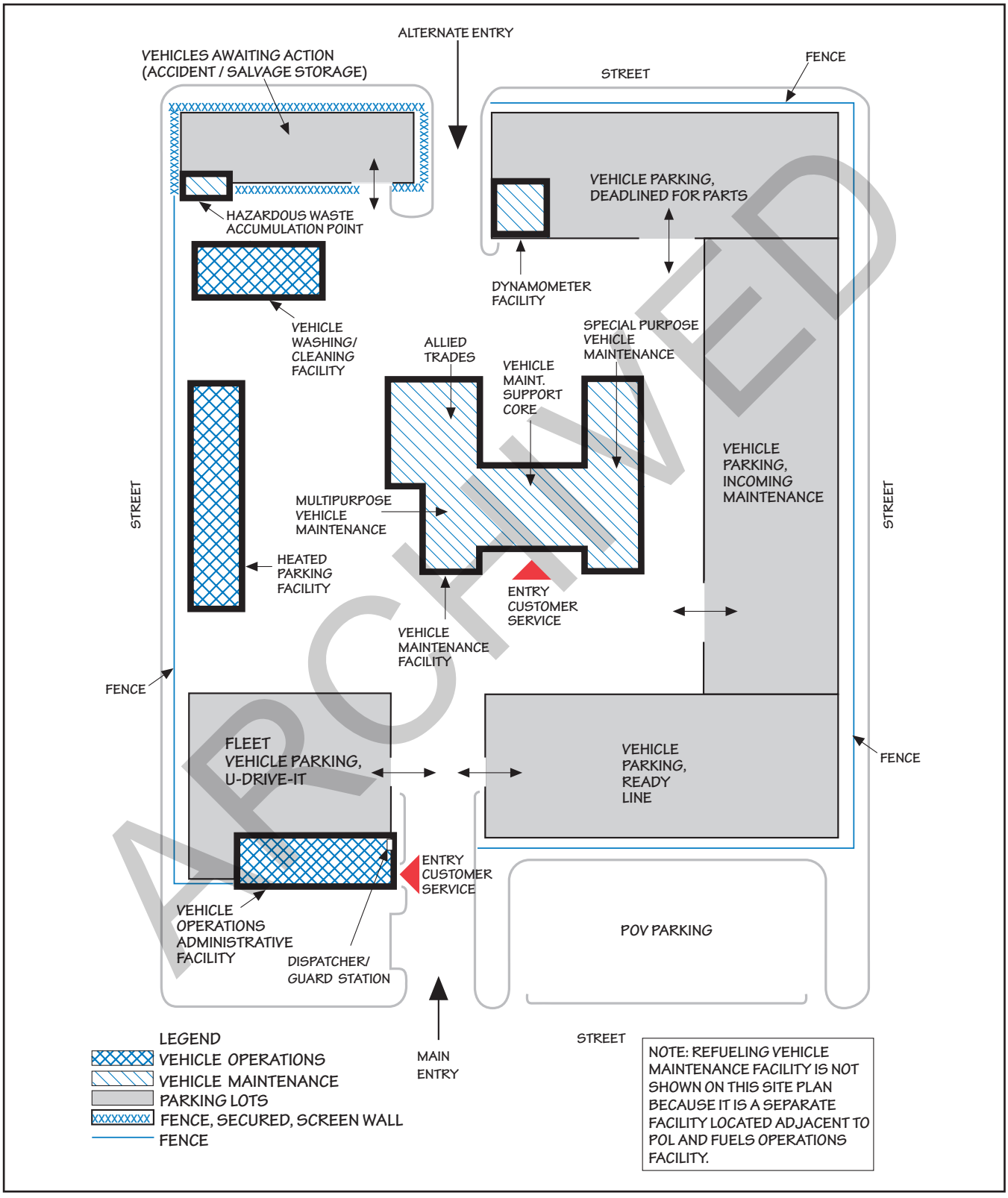


Figure 3-A: Site Organization for the Vehicle Operations and Vehicle Maintenance Complex.

2. Architectural Character, Materials, and Finishes

The architectural and interior design of the vehicle operations and vehicle maintenance facilities should be integrated. Both involve functional analysis and consideration of the appropriate environmental character, building organization and circulation, and future expansion requirements, as well as finishes and furnishings.

a. The design should reflect the regional and local base architectural style or character. Review the base Architectural Compatibility Guide to assure the design complements existing architecture.

b. The overall complex should present a cohesive architectural image.

c. Provide a variety of spaces and sub-spaces to accommodate different size groups and activities. Use modular systems furniture to economize on space, to provide flexibility, and to promote a sense of organization and visual order.

d. Consider the use of natural light whenever possible. Some areas that would benefit from natural light include the entrance corridor, the drivers' lounge, the central circulation paths, and the service bays.

3. Supervision and Security

a. Locate the vehicle operations administrative facility at the main entrance to the complex.

b. Provide a security guard station and dispatch area for the entire complex. This location should provide an optimum point for supervision of vehicle movement and processing.

c. Locate the vehicle maintenance facilities within a secured complex, fenced, and visible from the vehicle operations facility.

4. Flexibility and Expansion Potential

a. Whenever possible, provide for future expansion of the vehicle operations and vehicle maintenance complex. Vehicle inventory requirements may lead to increased parking areas and expansion of the fenced, secure area.

b. Vehicle maintenance buildings should be designed so that additional service bays can be added as needed.

5. Disabled Access

a. All areas should be barrier-free and accessible to the physically disabled in accordance with Americans with Disabilities Act (ADA) and Uniform Federal Accessibility Standards criteria.

b. The site and building design should enable physically disabled persons to act independently and access all areas of the facility. Accommodate level changes with ramps suitable for wheelchair access, indoors and outdoors.

6. Special Considerations for Renovations

a. When adding to existing facilities, provide an open flexible floor plan.

b. Survey, audit, and analyze existing buildings for energy efficiency upgrade.

D. Building Systems

1. Structural

a. Select a cost effective framing system based on size, projected load requirements, and availability of materials and local labor. Listed below are factors to be considered when designing a structural building system:

- Facility size and type
- Soil conditions
- Imposed conditions such as wind, snow, and seismic loads
- Projected load requirements for vehicle maintenance and refueling facilities include the following:
  - Floor slab
  - High-bay clear spans loading
  - Overhead crane loading
  - Vehicle lift loading

b. Select and design the structural system based on analysis of projected future needs to accommodate expansion requirements easily and economically; however, do not "over-design" the initial construction.

c. Design building structural components to reflect space requirements, economy, and subsystem dimensions (e.g., ceiling grid, masonry units, framing members, etc.).

2. Heating, Ventilating, and Air Conditioning

a. Perform a life-cycle cost analysis of available energy sources, including consideration of passive solar design applications.

b. Mechanical air circulation should be provided at public areas with limited or no air conditioning.

c. The mechanical system should introduce outside fresh-air at a rate of 20 cubic feet per minute (cfm) with a minimum ventilation rate of 20 cfm per square foot.

d. Design this facility to meet federal energy conservation standards defined in 10 CFR (Code of Federal Regulations), "Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings."

e. Provide zone controls (temperature sensors with remote adjustment instead of thermostats) to maintain different environmental conditions in all functional areas. Some areas of the facility may require operation of environmental systems when other areas are closed.

f. Mechanical exhausts should be provided for the rest rooms.

g. Hook-ups should be provided for the base energy monitoring and control system (EMCS), if applicable. If not applicable, provide night setback controls for the HVAC system.

3. Plumbing

a. Provide domestic hot and cold water, sanitary and storm drainage, plus oil/water separators and propane or natural gas systems, if required.

b. For general use, provide hot and cold water to all rest rooms, sinks, janitor's closets, and showers.

c. Provide shut-off valves at all plumbing fixtures.

d. Connect all inside floor drains that receive water runoff from vehicles to an oil/water separator.

e. Frost-free hose bibs should be provided on all exterior walls if local climate conditions justify them.

f. Provide exterior pneumatic (compressed air) connections adjacent to all overhead door entrances for multipurpose, special purpose, refueling vehicle maintenance, and allied trades.

g. Provide separate air compressors for multipurpose, special purpose, refueling vehicle maintenance, and allied trades. Also provide air compressors for vehicle operations facilities at vehicle operator care/cleaning, heated parking facility, and vehicle washing/cleaning facility. The intake for compressed air should be located away from the following:

- Any contaminated air source
- Vehicle exhaust fumes
- Mechanical equipment exhausts

4. Electrical

a. Provide electric service and distribution equipment, wiring, receptacles and grounding, interior and exterior lighting and controls, emergency lighting, telephones, and fire alarms.

b. Evaluate and include the following power needs to determine the electric service capacity: HVAC system, plumbing equipment, special equipment, and considerations for expansion.

c. All service equipment should be Underwriters Laboratories listed.

- As an alternative, provide published proof from a bona fide independent testing laboratory.

d. Grounding systems and all wiring methods should meet National Electric Code requirements.

e. General convenience receptacles and special power outlets should be commercial grade. Convenience receptacles should be a maximum of 12 feet apart. Provide special power outlets and circuits for all computer equipment, as required.

f. General lighting in office areas should be fluorescent with low temperature energy efficient ballasts and lamps. Indirect lighting systems of the high-intensity discharge or fluorescent types may be used where practical.

g. Use of incandescent lighting should be kept to a minimum because of energy efficiency and frequency of maintenance. When used, incandescent lighting should have an extended life of at least 2,500 hours.

h. Use metal halide lighting in all maintenance areas.

i. Lighting control systems should include light dimmers to automatically reduce intensity levels of artificial lighting when natural light is available.

j. Exterior lighting of parking areas, walkways, and building entrances should be provided. Use high-intensity discharge light sources.

k. Provide exterior 120V outlets adjacent to all overhead door entrances for multipurpose, special purpose, refueling vehicle maintenance, and allied trades.

l. Provide exterior engine warming receptacles when needed in severe cold climates.

5. Fire Protection

a. Facilities should be of noncombustible construction.

b. Areas containing hazardous quantities of combustible supplies should be contained within a fire-rated enclosure.

c. Any refueling vehicle maintenance facilities used for parking, storage, maintenance and/or repair of aircraft refueling vehicles or similar vehicles should be:

- Protected by an automatic sprinkler system or aqueous film forming foam (AFFF) sprinkler system
- Classified as Class 1, Division 2 electrical equipment

6. Communications

a. The base communications squadron, in coordination with the system telecommunications engineering manager, can provide details on communications requirements and design for the buildings' internal and external phone and data connectivity, as well as alarm system wiring.

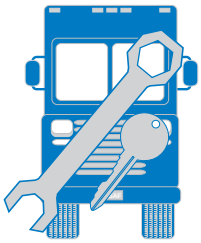
b. These requirements should be incorporated in building design specifications, including connectivity to base phone and data infrastructure systems sufficient to support the maximum planned number of building occupants. The requirements are as follows:

- Phone Connections - Provide sufficient pre-installed connections to support the maximum planned number of people in each room. Future growth, modem connections, and special requirements (pay phones, etc.) should also be taken into consideration.

- Administrative Data Connections (Local Area Networks - LANs) - Provide administrative computer and LAN printer connectivity. Specialized computer connectivity should also be provided to support the base mission, when required.
- Fiber Optic Connectivity - May be a requirement (internally to several locations and/or externally to system nodes) to support AMC command, control, communications, and computer systems.
- Hands-Free, Two-Way Intercom (Public Address System) - Should be provided throughout the facility, with wall-mounted speaker units. Locate the central intercom console at the scheduling desk in the vehicle operations administration facility, vehicle dispatch area.

Chapter 4

Functional Area and Space Criteria



A. General

This chapter presents criteria for designing each area of vehicle operations and vehicle maintenance facilities.

Design considerations are presented, indicating the use and performance, space organization and character, and relationships between component spaces of a given facility.

For each area, specific criteria are provided for each space. These recommendations may be modified to reflect mission requirements.

B. Vehicle Operations Administrative Facility

1. Design Considerations

See Figure 4-A for an illustrative floor plan.

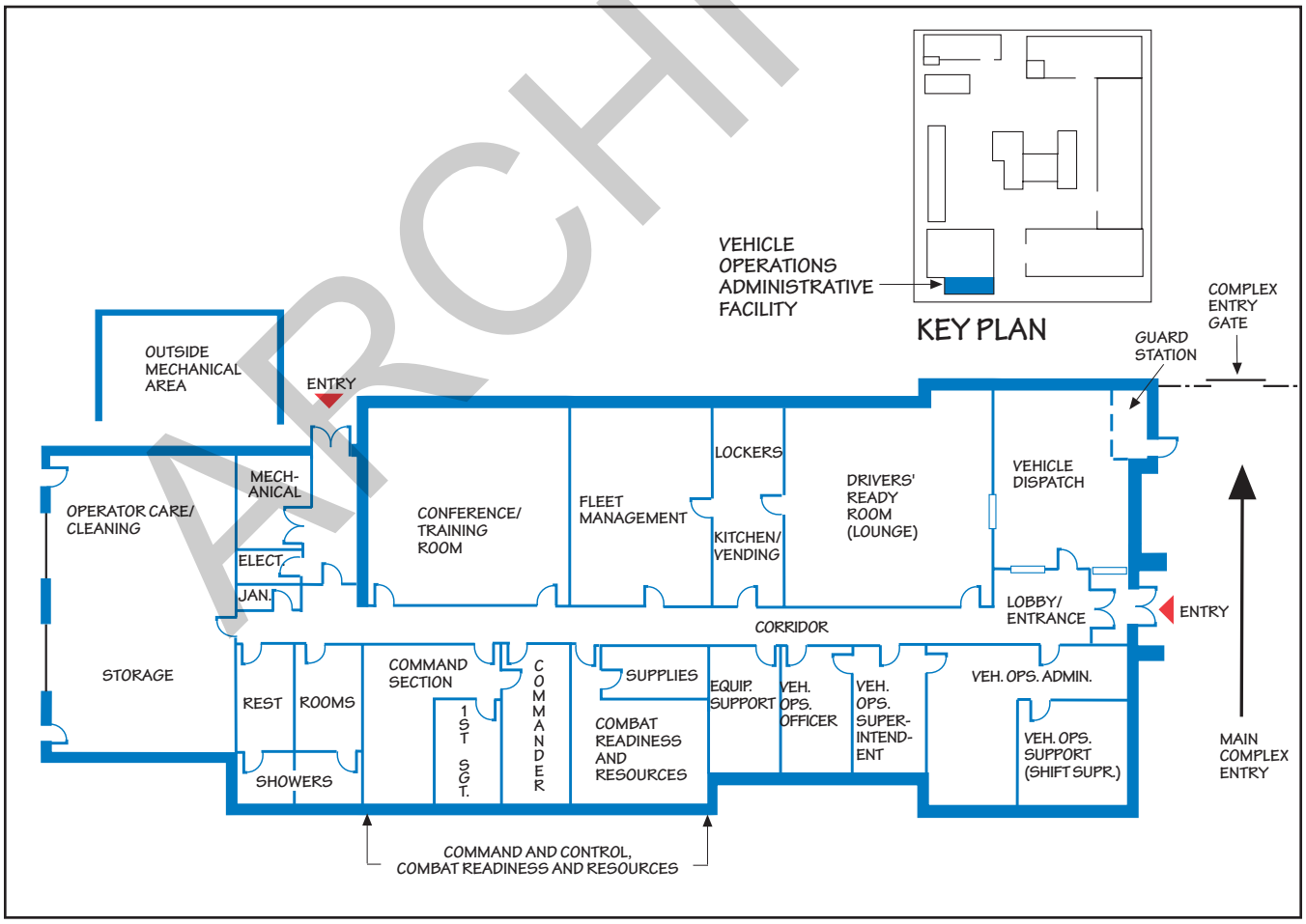


Figure 4-A: Illustrative Floor Plan of the Vehicle Operations Administrative Facility.

a. Use and Performance

- Administrative areas should provide services, control, and support to operations.
- Administrative areas should provide an organized atmosphere conducive to efficient management and access to services.

b. Space Organization and Character

- Locate administrative areas near the functional areas they serve or control.
- Use modular systems furniture in open office areas to ensure efficient use of floor space while reducing the number of walls and small offices.
- General Office Space - Additional administrative functions, such as command and control, can share space within the vehicle operations administrative facility, even though the organization is not part of vehicle operations. The primary consideration for determining shared facilities is local mission requirements.

2. Lobby/Entrance

a. Furnishings and Equipment

- Drinking fountain
- Seating for two to six people
- Signs for direction to vehicle dispatchers
- Public telephone

New facilities must meet base architectural standards of compatibility and functional requirements. The lobby/entrance serves as the focal point of this administration building.

Vehicle dispatch is the control point for fleet vehicles and should be well organized to support its operations 24 hours a day.

b. Technical Requirements

- Air lock/vestibule with independent heating system.
- Easily cleaned, water- and mud-resistant floor materials at all entrances

3. Vehicle Dispatch

a. Furnishings and Equipment

- Vehicle dispatch counter with pass-through window to drivers' lounge and customer waiting area
- Closed-circuit video camera system for security surveillance of the entry to the complex.
- Vehicle dispatch board

b. Technical Requirements

- Public address system to drivers' lounge
- Telecommunications data/ computer outlets
- Electric gate controls at guard station
- Guard station should provide visibility to complex entry gate and U-drive it parking lot.
- Wiring for LAN computers

4. Drivers' Ready Room (Lounge)

a. Furnishings and Equipment

- Comfortable seating
- TV and radio
- Game table
- Speakers for intercom system
- Bulletin board

b. Technical Requirements

- Wiring for LAN computers

5. Fleet Management

a. Furnishings and Equipment

- Open office with modular systems furniture

b. Technical Requirements

- Telecommunications data/ computer outlets
- Wiring for LAN computers

6. Conference/Training Room

a. Furnishings and Equipment

- Conference table
- Chairs
- Marker board
- Library shelving

b. Technical Requirements

- Electrical outlet in floor for projector
- Light fixtures on dimmers
- Telecommunications data/ computer outlets
- Wiring for LAN computers

7. Vehicle Operations Superintendent

a. Furnishings and Equipment

- Desk, chair, and guest chairs

b. Technical Requirements

- Direct access to vehicle operations administrative staff area
- Telecommunications data/ computer outlets
- Wiring for LAN computers

8. Command and Control

a. Furnishings and Equipment

- Open office with modular systems furniture with computer work stations

b. Technical Requirements

- Telecommunications data/ computer outlets
- Wiring for LAN computers

9. Vehicle Operations Administration

a. Furnishings and Equipment

- Open office with modular systems furniture
- Copy and fax machines

b. Technical Requirements

- Telecommunications data/ computer outlets
- Wiring for LAN computers

10. Vehicle Operations Support (Shift Supervisor)

a. Furnishings and Equipment

- Open office with modular systems furniture with computer work stations

b. Technical Requirements

- Locate adjacent to vehicle operations administration
- Telecommunications data/ computer outlets
- Wiring for LAN computers

11. Vehicle Operations Officer

a. Furnishings and Equipment

- Desk, chair, and guest chairs

b. Technical Requirements

- Locate adjacent to the vehicle operations support office
- Wiring for LAN computers

12. Equipment Support

a. Furnishings and Equipment

- Open office with modular systems furniture with computer work stations

b. Technical Requirements

- Locate adjacent to vehicle operations administration
- Telecommunications data/ computer outlets
- Wiring for LAN computers

13. Rest Rooms/Showers

a. Furnishings and Equipment

- Men: water closets, lavatories, showers, urinals, soap dispensers, paper towel dispenser and disposal units, paper holders, grab bars, mirrors, coat hooks, and partitions
- Women: same as men, minus urinals, plus sanitary napkin dispenser and disposal units.

b. Technical Requirements

- Separate facilities for men and women
- Electronic sensors at faucets to control water flow on and off

14. Lockers

a. Furnishings and Equipment

- Two-tier high metal lockers

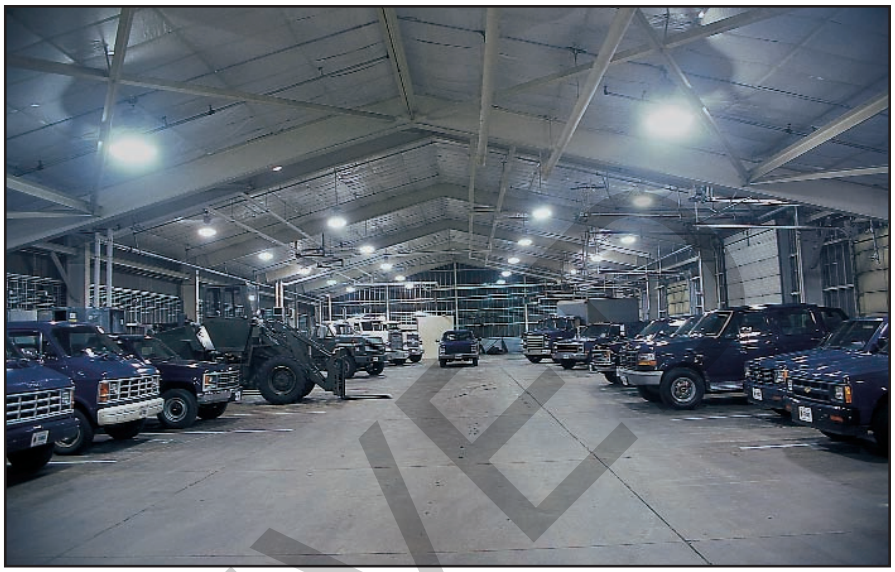
b. Technical Requirements

- Locate adjacent to drivers' lounge

15. Kitchen/Vending

a. Furnishings and Equipment

- Sink with disposal
- Appliances: microwave, refrigerator, and range



Heated parking facilities must be provided at certain bases because of severe cold climates.

b. Technical Requirements

- Locate adjacent to drivers' lounge
- Provide outlets for three vending machines and water, if required

16. Storage

a. Furnishings and Equipment

- Overhead door and man door
- Metal shelving units

b. Technical Requirements

- Locate off main corridor and adjacent to vehicle operator care/cleaning.

17. Mechanical Room

a. Furnishings and Equipment

- Electric panels
- Fire-suppression system controls

b. Technical Requirements

- Sound transmission class rating: 47-52
- Lockable door
- Slope floor toward floor drain

18. Operator Care/Cleaning

a. Furnishings and Equipment

- Overhead door and man door

b. Technical Requirements

- Floors should be sloped to drain, and connected to a water/oil separator
- Exhaust fan to remove vehicle exhaust fumes

19. Janitor's Space

a. Furnishings and Equipment

- Mop sink and storage shelves

b. Technical Requirements

- Lockable Room

C. Vehicle Operations Heated Parking Facility

This facility provides heated spaces for specific assigned vehicles at severe cold weather bases. Severe weather criteria: 30 or more days per year of minus 10 degrees F or lower, or with an average January temperature of 20 degrees F or lower as determined from two or more 10-year weather databases.

- Specific vehicles may be identified as mission essential and maintained in a "ready-to-operate" status.
  - Aircraft servicing, emergency vehicles, aircrew transport, command and control, and support vehicles for daily operational and housekeeping activities
  - Commercial and private vehicles that supplement the base vehicle inventory

D. Vehicle Operations Washing/ Cleaning Facility

This facility serves all vehicles on the base. It provides cleaning and washing areas, and an area for vehicles awaiting pick-up. See Figure 4-B for illustrative floor plan.

a. Space Organization and Character

- Locate the facility within easy access to the U-drive-it parking lot.
- Set facility back from the main entrance and screen it from public view.
- Enclosure should be provided for interior vacuuming, fluid level checks, waxing, and final vehicle clean-up.
- Cabinets for storage of supplies
- Covered area to park cleaned vehicles awaiting pickup

b. Technical Requirements

- Provide sufficient wash bays to adequately handle the vehicles on base.
- Slope floor to trench drain, connected to an oil/water separator

E. Vehicle Maintenance Support Core

1. Design Considerations

See Figure 4-C, Page 28, for illustrative floor plan of the vehicle maintenance facility.

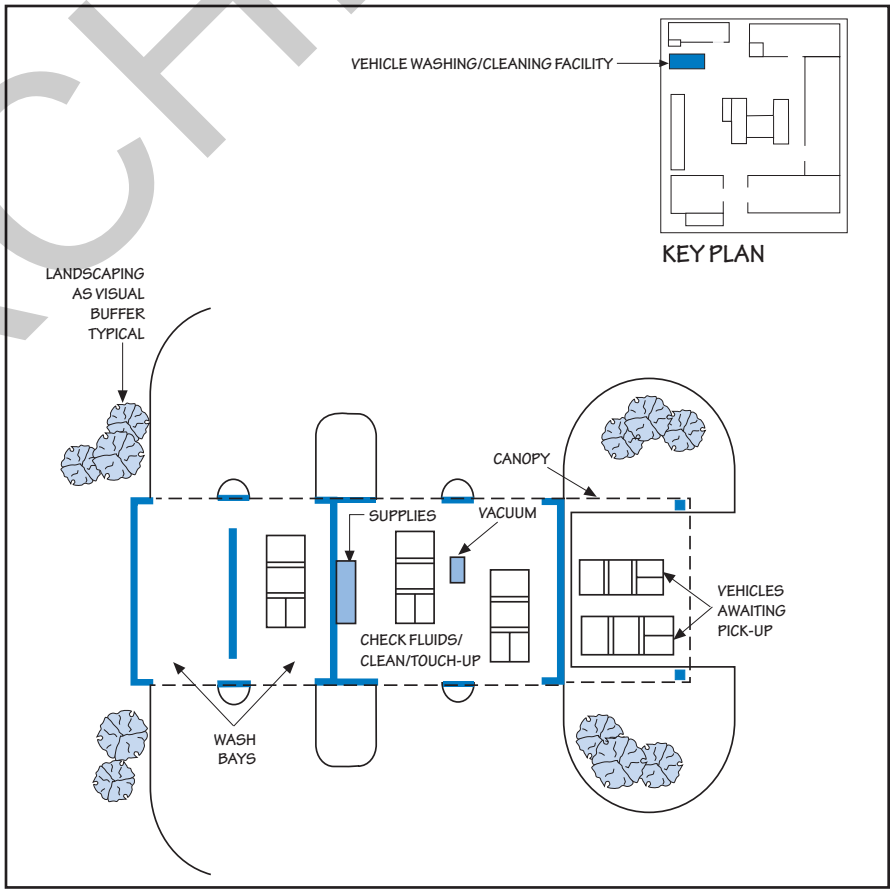


Figure 4-B: Illustrative Floor Plan for the Vehicle Washing/Cleaning Facility.

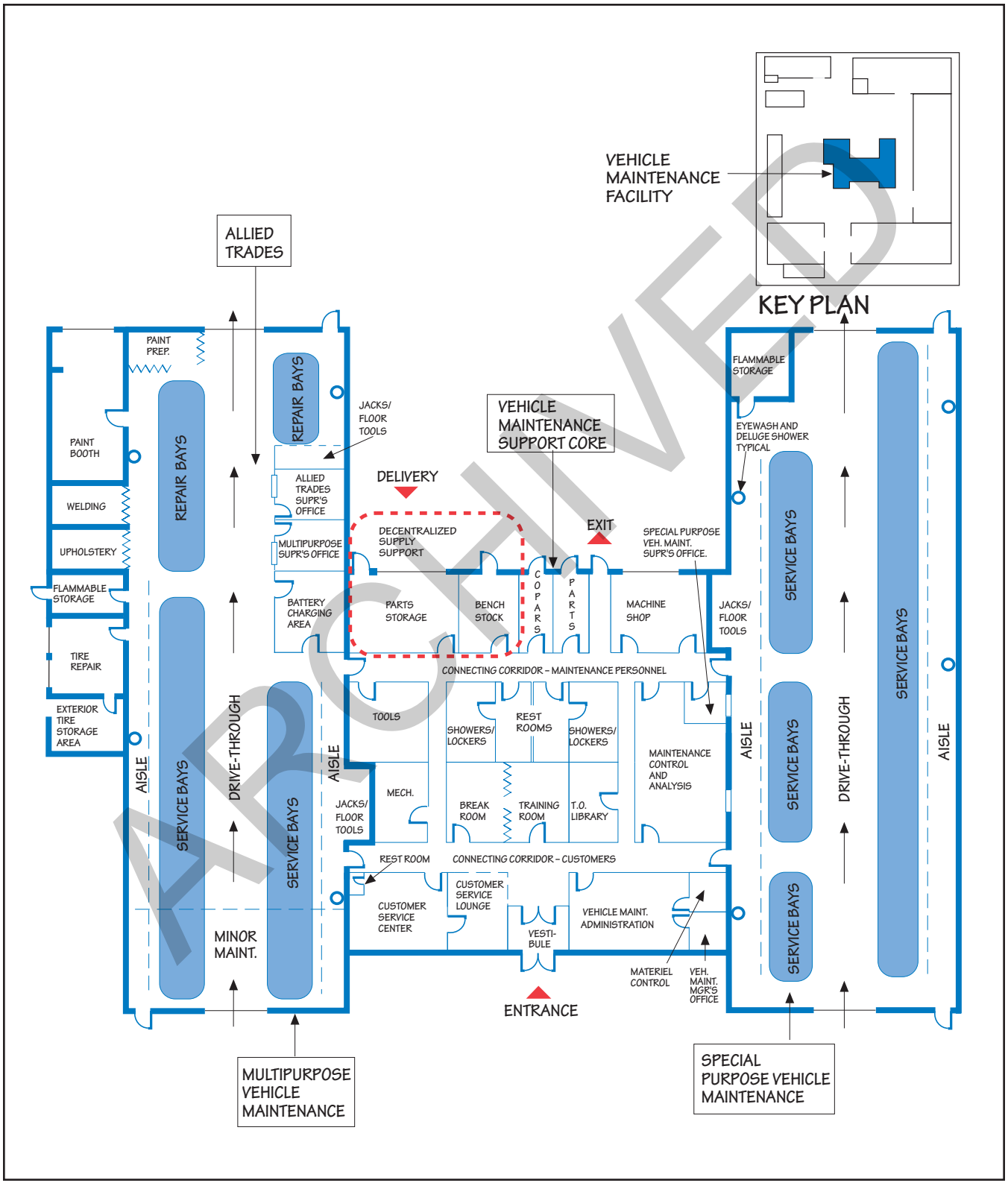


Figure 4-C: Illustrative Floor Plan for the Vehicle Maintenance Facility.

a. Space Organization and Character

- Administrative support core is the nerve center for:
  - Office space with customer-oriented functions
  - Support activities for vehicle maintenance

2. Vestibule

a. Technical Requirements

- Independent preheating unit
- Vestibule design should emphasize the building's entrance.
- Easily cleaned, water- and mud-resistant floor materials at entrances.

3. Customer Service Center

a. Furnishings and Equipment

- Service counter
- Open office with modular systems furniture

b. Technical Requirements

- Telecommunications and data/ computer outlets
- Wiring for LAN computers

4. Customer Service Lounge

a. Furnishings and Equipment

- Drinking fountain, vending machine, and public telephone
- Television, magazine racks, informational pamphlets, and bulletin board
- Lounge seating

b. Technical Requirements

- Locate adjacent to minor maintenance area

5. Maintenance Control and Analysis

a. Furnishings and Equipment

- Modular systems furniture in an open office environment

b. Technical Requirements

- Locate adjacent to maintenance administration area.
- Telecommunications and data/ computer outlets
- Wiring for LAN computers

6. Materiel Control

a. Furnishings and Equipment

- Desks and chairs, file cabinets, and bookcase

b. Technical Requirements

- Locate adjacent to maintenance administration.
- Telecommunications and data/ computer outlets
- Wiring for LAN computers

7. COPARS

a. Furnishings and Equipment

- Parts ordering counter
- Parts catalog bookshelves
- Parts storage racks

b. Technical Requirements

- Telecommunications and data/ computer outlets
- Lighting for parts bins
- Wiring for LAN computers
- Exterior access for deliveries

8. Rest Rooms/Showers/Lockers

a. Furnishings and Equipment

- Men: water closets, lavatories, showers, urinals, soap dispensers, paper towel dispensers and disposal units, paper holders, grab bars, mirrors, coat hooks, and partitions
- Women: same as men, minus urinals, plus sanitary napkin dispenser and disposal units
- Lockers

b. Technical Requirements

- Separate facilities for men and women
- Electronic sensors at faucets

9. Break Room/Training Room

a. Furnishings and Equipment

- Tables and chairs
- Acoustical-rated movable partition to allow for the separation of space
- Marker board/projection screen
- Book shelves

b. Technical Requirements

- Floor outlet for projection screen
- Light fixtures on dimmers
- Wiring for LAN computers

10. Technical Order Library

a. Furnishings and Equipment

- Tables and chairs
- Book shelves to hold technical manuals

A well-equipped and organized machine shop is an essential component of a vehicle maintenance facility.

b. Technical Requirements

- Locate area so that it is accessible from all shop areas
- Telecommunications and data/ computer outlets
- Wiring for LAN computers

11. Mechanical Room

a. Furnishings and Equipment

- Electric panels
- Fire-suppression system controls

b. Technical Requirements

- Sound transmission class rating: 47-52
- Slope floor toward floor drain

12. Tools

a. Furnishings and Equipment

- Tool storage cabinets
- Lockable tool boxes on casters

b. Technical Requirements

- Enclosed secure space
- Easily accessible for all maintenance personnel

13. Decentralized Supply Support - Bench Stock

a. Furnishings and Equipment

- Parts storage bins/racks

b. Technical Requirements

- Secured space

14. Decentralized Supply Support - Parts Storage

a. Furnishings and Equipment

- Metal storage shelving

b. Technical Requirements

- Overhead delivery door with direct access to the exterior

15. Machine Shop

a. Furnishings and Equipment

- Machine shop equipment will vary depending on base needs, availability of a qualified machinist, and mission requirements. Examples of such equipment are as follows:
  - Parts cleaning tank
  - Drill press
  - Milling machine
  - Lathe
  - Valve grinding equipment
  - Air compressor
  - Cylinder boring equipment
  - Engine hoist
  - Engine stand
- Emergency eye wash, and hand-washing sink

b. Technical Requirements

- Accessible from the exterior with overhead doors
- Interior access from the maintenance shop
- Natural lighting
- Connect floor drain to an oil/water separator
- Adequate electrical service to support machine shop equipment
- Acoustical separation from adjacent areas
- Pneumatic connections and electrical outlets for power tool hookups

16. Vehicle Maintenance Manager's Office

a. Furnishings and Equipment

- Desk and chairs, file cabinets, and bookcases

b. Technical Requirements

- Private office adjacent to the administrative area
- Access to multipurpose and special purpose vehicle maintenance areas
- Telecommunications data/ computer outlets
- Wiring for LAN computers

17. Vehicle Maintenance Administration

a. Furnishings and Equipment

- Open office with modular systems furniture

b. Technical Requirements

- Computer work stations with telecommunications and data/ computer outlets
- Wiring for LAN computers

18. Connecting Corridors

- Allow internal circulation and access to all areas of the support core by maintenance personnel and customers. To determine corridor width, consult the Uniform Building Code manual and applicable local codes.

Lifts that do not require floor penetrations are desirable for easy cleaning.

Use reflective surfaces such as painted floors to reflect light.

F. Multipurpose Vehicle Maintenance

If designing a stand-alone facility, refer to Chapter 4, paragraph E, "Vehicle Maintenance Support Core," to select appropriate functions that support the local base and mission requirements. In addition, other requirements may need to be incorporated into this facility specific to multipurpose vehicle maintenance.

1. Design Considerations

The following considerations should be addressed whether this facility is combined with allied trades and special purpose vehicle maintenance or is a stand-alone facility.

a. Use and Performance

- This facility provides maintenance to all multipurpose vehicles on the base.

b. Space Organization and Character

- Locate directly adjacent to the administrative support core

2. Service Bays

a. Furnishings and Equipment

- Hydraulic lift (Equipment depends on the types of vehicles that will be serviced in this facility.)
- Lubrication equipment
- Jacks, lifts, and pneumatic equipment
- Air compressors for pneumatic equipment
- Traveling overhead crane, with maximum 7-ton capacity, to access most of the maintenance bays (This provides flexibility for engine removal, and servicing boom trucks and other similar larger equipment.)
- Front end and wheel alignment equipment
- Provide centrally located eye wash fountain with water deluge shower.
- Ventilation hood for battery charging alcove

b. Technical Requirements

- Flammable materials should be contained within a fire-rated enclosure, with access to the exterior
- Battery charging alcove with wood shelves
- Special bays sized to allow the largest vehicles on base to be maintained
- Aisle space in front of bays for circulation to other bays and adjacent areas
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups
- Vehicle exhaust system
- Slope service bay floors to a trench drain located down the center of the drive through aisle, and equip with an oil/water separator.
- Epoxy paint the floor for easy maintenance and high light reflectivity.
- Wiring for LAN computers

3. Aisle Circulation Space

a. Furnishings and Equipment

- Pedestrian-mats at entrances to corridors for removal of metal shavings and grease.

b. Technical Requirements

- Circulation space should be provided for the parts room, tool room, technical order library, machine shop, and other common spaces within the vehicle maintenance support core.

4. Drive Through

a. Furnishings and Equipment

- Overhead garage doors (Provide at both ends of oversized service bay to accommodate the largest vehicles on base with sufficient headroom.)

b. Technical Requirements

- Minimum of two service bays should be drive-through so that large equipment will not have to back out of the facility

5. Minor Maintenance

a. Furnishings and Equipment

- Minor maintenance tools, tune-up, and lubrication equipment

b. Technical Requirements

- Adjacent to customer service center
- Easy access from exterior
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups
- Wiring for LAN computers

6. Multipurpose Supervisor's Office

a. Furnishings and Equipment

- Desk, chair, guest chairs, and file cabinet

b. Technical Requirements

- Visual connection to service area

- Telecommunications and data/ computer outlets
- Wiring for LAN computers

7. Tire Repair

a. Furnishings and Equipment

- Pneumatic wrenches
- Tire removal equipment
- Leak detector tank
- Tire inflation safety enclosure
- Tire balancing machine
- Tire storage racks

b. Technical Requirements

- Equipped to mount and balance tires on all base vehicles
- Inside storage space for commonly used tires
- An exterior, screened area for temporary storage of used tires awaiting disposal.
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups
- Wiring for LAN computers

G. Allied Trades

If designing a stand-alone facility, refer to Chapter 4, paragraph E, "Vehicle Maintenance Support Core," to select appropriate functions that would apply to support local base and mission requirements.

1. Design Considerations

The following considerations should be addressed whether this facility is combined with special purpose and multipurpose vehicle maintenance or designed as a stand-alone facility.

Bay dimension is critical to allow servicing of larger vehicles.

Service bays should be large enough to accommodate a variety of equipment.

a. Use and Performance

- Allied trades is responsible for vehicle body, glass, and upholstery repair work. All body work is done within this area except for major frame straightening.

b. Space Organization and Character

- At least one bay should be large enough to accommodate the largest vehicle on base.

2. Allied Trades Supervisor's Office

a. Furnishings and Equipment

- Desk, chair, guest chairs, and file cabinet

b. Technical Requirements

- Visual connection to service area
- Telecommunications and data/ computer outlets
- Wiring for LAN computers

3. Welding

a. Furnishings and Equipment

- Gas welder, arc welder, welding bench with vise
- Fire protective screen/hood and extinguishers

b. Technical Requirements

- Adequate electrical service
- Pneumatic connections and electrical outlets for power tool hookups

4. Upholstery

a. Furnishings and Equipment

- Upholstery table
- Material racks

b. Technical Requirements

- Separation from adjacent service bays
- Pneumatic connections and electrical outlets for power tool hookups

5. Paint Preparation

a. Furnishings and Equipment

- Storage cabinet for supplies
- Dust control screens

b. Technical Requirements

- Interior and exterior pneumatic connections and electrical outlets for power tool hookups

6. Paint Booth

a. Furnishings and Equipment

b. Technical Requirements

- Paint booth must comply with all federal and state environmental requirements.
- Separately controlled environment, preferably isolated from other allied trades areas
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups

7. Repair Bays

a. Furnishings and Equipment

- Tool cabinet
- Centrally located eye-wash fountain with water deluge shower

b. Technical Requirements

- Interior and exterior pneumatic connections and electrical outlets for power tool hookups
- Flammable materials should be contained within a fire-rated enclosure with access to the exterior
- Slope floor to trench drain, connected to an oil/water separator
- Open repair areas for all general body repair
- Telecommunications and data/ computer outlets
- Wiring for LAN computers

8. Jacks/Floor Tools

a. Technical Requirements

- Storage area adjacent to repair bay
- Directly adjacent to service bays and easily accessible by mechanics for tools

H. Special Purpose Vehicle Maintenance

If designing a stand-alone facility refer to Chapter 4, paragraph E, "Vehicle Maintenance Support Core," and select appropriate functions that would apply to support local base and mission requirements.

1. Design Considerations

The following functions should be addressed whether this facility is combined with allied trades and multipurpose vehicle maintenance or is a stand-alone facility.

a. Use and Performance

- Vehicles that are specific to the mission of the base are maintained in this facility.

b. Space Organization and Character

- This facility requires special considerations when allocating space to

support the various sizes of equipment. Determine final space allocation and adjacency requirements at the local installation.

2. Special Purpose Vehicle Maintenance Supervisor's Office

a. Furnishings and Equipment

- Desk, chair, guest chairs, and file cabinet

b. Technical Requirements

- Visual contact to service bay area
- Telecommunications and data/computer outlets
- Wiring for LAN computers

3. Service Bays

a. Furnishings and Equipment

- Specialized jacks, jack stands, and lifts that are specific to the base's vehicle types
- Lubrication equipment
- Traveling overhead crane, with maximum 7-ton capacity, to access most of the maintenance bays (This allows flexibility for engine removal and servicing boom trucks and other similar larger equipment.)
- Centrally located eye-wash fountain with water deluge shower

b. Technical Requirements

- Roof clearance should allow a boom truck to enter and allow the boom to partially extend for servicing.
- Width of the bays and drive-through aisles should allow for snow plows, cargo loaders, and other oversized equipment to be serviced.
- Extra-wide, overhead doors are needed to enable the largest piece of equipment on base to enter the facility.
- Slope floor to trench drain, connected to an oil/water separator
- Floor to be coated with epoxy finish to allow easy cleanup and provide good light reflection
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups
- Flammable materials should be contained within a fire-rated enclosure with access to the exterior
- Telecommunications and data/computer outlets
- Wiring for LAN computers

4. Jacks/Floor Tools

a. Furnishings and Equipment

- Jack stands, floor jacks, miscellaneous floor tools

b. Technical Requirements

- Directly adjacent to service bays and easily accessible by mechanics for tools

5. Aisle Circulation/Drive Through

a. Refer to paragraphs 4F3 and 4F4 for additional considerations.

I. Vehicle Maintenance Refueling Facility

1. Design Considerations

See Figure 4-D, page 36, for illustrative floor plan.

a. Use and Performance

- This facility is for maintaining aircraft refueling trucks. For safety reasons, specific requirements should be considered when designing this facility.
- Static resistant floor materials in all areas should be used to prevent static electricity buildup
- Grounding bars at all entrances to maintenance bays

b. Space Organization and Character

- Allow proper circulation space around the facility, as well as space for parking of refueling trucks either awaiting repair or pickup.
- Pave all surfaces in the immediate area with concrete.
- Interior and exterior pneumatic connections and electrical outlets for power tool hookups

2. Entry/Waiting

a. Furnishings and Equipment

- Customer seating for base individuals picking-up and delivering GOVs.

b. Technical Requirements

- Small waiting area and window to adjacent office
- Controlled-access entry to maintenance bays
- Dirt-resistant floor material for easy cleanup

3. Supervisor's Office

a. Furnishings and Equipment

- Desk, chair, guest chairs, file cabinet, and book shelves

b. Technical Requirements

- Visual contact to service bays
- Wiring for LAN computers

4. *Maintenance Bays*

a. Furnishings and Equipment

- Overhead traveling crane
- Lubrication equipment
- Eye wash fountain with water deluge showers (centrally located)
- Tank purging equipment

b. Technical Requirements

- Flammable materials should be contained within a fire-rated enclosure with access to the exterior
- Slope floor to trench drain, connected to oil/water separator
- Floor to be coated with epoxy finish for easy cleanup and light reflectivity finish

5. *Jacks/Floor Tools*

a. Furnishings and Equipment

- Jack stands, floor jacks, and miscellaneous floor tools

b. Technical Requirements

- Directly adjacent to maintenance bays and easily accessible by mechanics for tools

6. *Tools*

a. Furnishings and Equipment

- Storage shelving for parts
- Storage cabinets for tools

b. Technical Requirements

- Secured space for storage of commonly used parts and tools

7. *Rest Rooms*

a. Furnishings and Equipment

- Men: water closets, lavatories, showers, lockers, urinals, soap dispensers, paper towel dispensers and disposal units, paper holders, grab bars, mirrors, coat hooks, and partitions
- Women: same as men, minus urinals, plus sanitary napkin dispenser and disposal units

b. Technical Requirements

- Separate rest rooms for men and women in the maintenance bay area
- Showers
- Unisex rest room for visitors in the entry/waiting area
- Electronic sensors at faucets ■

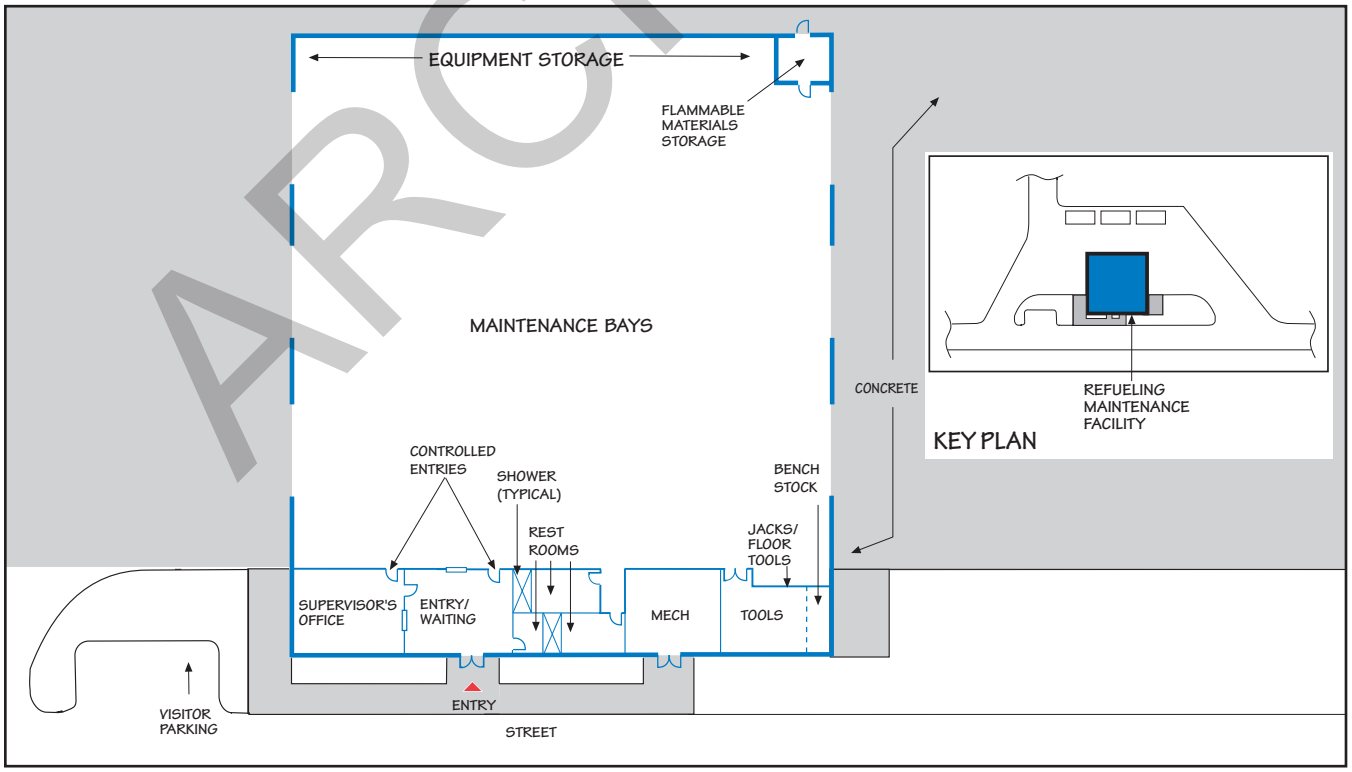


Figure 4-D: Illustrative Floor Plan for the Refueling Vehicle Maintenance Facility.

Chapter 5
Interior Finishes

A. General

Finish materials and furnishings should be selected using professional interior design services. Selections should be based on anticipated use, maintenance requirements, life-cycle cost, fire and other life safety requirements, as well as aesthetic qualities.

Coordinate materials, finishes, colors, and texture selections to complement the overall building design and image. Select colors and finishes to express professionalism, warmth, and a strong, positive image.

B. Finish Schedule

Use colors and finishes to highlight and differentiate spaces designed to accommodate different types and levels of activity. For example, the maintenance areas require extremely durable and easy to maintain finishes.

Color schemes should be predominantly neutral. The designer should consider the seasonal temperature range of the base when selecting a color scheme, such as cool colors (blue, green) in hot climates and warm colors (beige, tan) in cold climates.

Floor finishes in the maintenance areas should be durable, highly reflective, non-slip urethane surface of a natural color. Exposed ceiling structures within the maintenance areas should be painted with a color that is highly reflective.

Permanent and semi-permanent surface materials, such as tile, carpet, and the majority of the wallcoverings should be in neutral colors such as beige, taupe, or gray tones.

Furniture is an integral part of the building design and image.

Patterned carpet (bold tweeds) can be the basis for the overall color scheme, as well as mask traffic wear.

Paint mechanical and electrical devices to match the background surface. Room finish schedules are listed in Tables 5-A through 5-D.

C. Furniture

Furniture is an integral part of the overall building design and image. Coordinate furniture selection for consistency with finish materials, textures, and colors of built-in elements. Choose furniture that is durable, comfortable, modular, and flexible. Systems furniture, which may be funded as part of a military construction project, is recommended for administrative areas.

List of Abbreviations

ACT	Acoustical Ceiling Tile
CB	Concrete Block
CONC-P	Concrete, Painted with High-Reflective Nonslip Epoxy Paint
CONC-S	Concrete, Sealed
CPT	Carpet
CT	Ceramic Tile
EXP	Exposed Structure
GWB	Gypsum Wallboard
NA	Not Applicable
P	Paint
PL	Plastic Laminate
QT	Quarry Tile
VB	Vinyl Base
VCT	Vinyl Composition Tile
VWC	Vinyl Wallcovering

Finish Schedule—Vehicle Operations Administrative Facility

Area Name	Floors	Base	Walls	Ceiling
Lobby/Entrance	QT	QT	VWC	ACT
Vehicle Dispatch	CPT	VB	P	ACT
Drivers' Ready Room Lounge	CPT	VB	VWC	ACT
Fleet Management	CPT	VB	VWC	ACT
Conference/Training Room	CPT	VB	VWC	ACT
Veh. Operations Superintendent Office	CPT	VB	VWC	ACT
Command and Control	CPT	VB	VWC	ACT
Veh. Operations – Admin.	CPT	VB	VWC	ACT
Veh. Operations Support	CPT	VB	VWC	ACT
Veh. Operations Officer	CPT	VB	VWC	ACT
Equipment Support	CPT	VB	VWC	ACT
Women's Rest Rooms/Showers	CT	CT	CT/VWC	GWB-P
Men's Rest Rooms/Showers	CT	CT	CT/VWC	GWB-P
Lockers	VCT	VB	P	ACT
Kitchen/Vending	VCT	VB	P	ACT
Storage	CONC-S	NA	CB-P	EXP-P
Mechanical	CONC-S	NA	CB-P	EXP-P
Operator Care/Cleaning	CONC-P	NA	CB-P	EXP-P
Janitor's Space	CONC-S	VB	P	P
Guard Station	CPT	VB	P	ACT

Table 5-A: Finish Schedule for the Vehicle Operations Administrative Facility.

Legend for all applicable tables.
CONC-P for floors is a polyurethane coating for better house-cleaning, energy conservation, light reflection, and aesthetics. Color should be a light gray. Other colors may be used to highlight specific areas such as hazardous storage.

Finish Schedule—Vehicle Maintenance Facilities

Vehicle Maintenance – Multipurpose Vehicle Maintenance, Vehicle Maintenance Administrative, Allied Trades, Special Purpose Vehicle Maintenance, and Support Core

Area Name	Floors	Base	Walls	Ceiling
Vestibule	QT	QT	VWC	ACT
Customer Service Center	CPT	VB	VWC	ACT
Customer Service Lounge	CPT	VB	VWC	ACT
Maintenance Control & Analysis	VCT	VB	VWC	ACT
Materiel Control	VCT	VB	VWC	ACT
COPARS	VCT	VB	CB-P	EXP-P
Rest Rooms/Showers/Lockers	CT	CT	CT/VWC	P
Break Room/Training Room	VCT	VB	VWC	ACT
Technical Order Library	VCT	VB	VWC	ACT
Tools	VCT	VB	CB/P	ACT
Decentralized Supply Support – Bench Stock	VCT	VB	CB-P	EXP-P
Decentralized Supply Support – Parts Storage	VCT	VB	CB-P	EXP-P
Machine Shop	CONC-P	NA	CB-P	EXP-P
Vehicle Maint. Mgr's Office	VCT	VB	VWC	ACT
Vehicle Maint. Administration	VCT	VB	VWC	ACT
Connecting Corridor – Maintenance	VCT	VB	CB-P	ACT
Connecting Corridor – Customer	VCT	VB	VWC	ACT
Service Bays	CONC-P	NA	CB-P	EXP-P
Aisle Circulation Space	CONC-P	NA	CB-P	EXP-P
Drive Through	CONC-P	NA	CB-P	EXP-P
Minor Maintenance	CONC-P	NA	CB-P	EXP-P
Multipurpose Supervisor's Office	VCT	VB	P	ACT
Tire Repair	CONC-P	NA	CB-P	EXP-P
Allied Trades Supervisor's Office	VCT	VB	P	ACT
Welding	CONC-P	NA	CB-P	EXP-P
Upholstery	CONC-P	NA	CB-P	EXP-P
Paint Preparation	CONC-S	NA	CB-P	EXP-P
Paint Booth	CONC-S	NA	NA	NA
Repair Bays				
Jacks/Floor Tools	CONC-P	NA	CB-P	EXP-P
Special Purpose				
Veh. Maint. Supr's Office	VCT	VB	P	ACT
Service Bays	CONC-P	NA	CB-P	EXP-P
Mechanical	CONC-S	NA	CB-P	EXP-P
Flammable Storage	CONC-S	NA	CB-P	EXP-P

Table 5-B: Finish Schedule for the Vehicle Maintenance Facility.

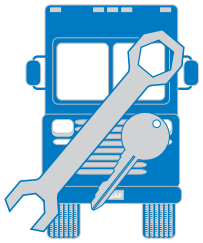
Finish Schedule—Vehicle Washing/Cleaning Facility				
Area Name	**Floors**	**Base**	**Walls**	**Ceiling**
Wash Bays	CONC-S	NA	CB/P	EXP-P
Check Fluids/Clean/ Touch-up Bays	CONC-S	NA	CB/P	EXP-P

Table 5-C: Finish Schedule for the Vehicle Washing/Cleaning Facility.

Finish Schedule—Refueling Maintenance Facility				
Area Name	**Floors**	**Base**	**Walls**	**Ceiling**
Entry/Waiting	VCT*	VB	P	ACT
Supervisor's Office	VCT*	VB	VWC	ACT
Maintenance Bays	CONC-P	NA	CB/P	EXP-P
Jacks/Floor Tools	CONC-S	NA	CB/P	EXP-P
Tools	CONC-S	VB	P	ACT
Rest Rooms	CT	CT	CT/VWC	GWB-P
Mechanical	CONC-S	NA	CB/P	EXP-P
** static resistant materials*				

Table 5-D: Finish Schedule for the Refueling Maintenance Facility.

References



AFI 24-302	Vehicle Maintenance Management
AFI 32-1024	Standard Facility Requirements
AFM 88-3	Structural Design Criteria Loads
AFOSH STD 127-20	Occupational Safety, Vehicle Maintenance Shops
AFI 24-301	Vehicle Operations
AFI 32-1023	Design and Construction Standards and Execution of Facility Construction Projects
ADA	Americans with Disabilities Act
DD 4270.1-M	Construction Criteria Manual
FED-STD 795	Uniform Federal Accessibility Standards
MIL-HDBK 1008B	Fire Protection For Facilities Engineering, Design, and Construction
MIL-HDBK 1190	Military Building Code
NFPA 88B	Standard for Repair Garages
NFPA 10	Life Safety Code
10 CFR Chapter 11	Energy Conservation Voluntary Performance Standards for New; Mandatory for Federal Buildings
AMC	Architectural Compatibility Plans
AMC	Commander's Guide to Facility Excellence
AMC	Interior Design Guide (April 1999)

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