
PART TWO – SUPPLY OPERATIONS

CHAPTER 5 CONTROLLING STORAGE SPACE

Section I Determining Space

This chapter is for the storage supervisor.

RESPONSIBILITIES

Storage space is the most critical and basic resource of any DSU storage facility. The amount of storage space that is available is often limited. Most DSUs usually cannot obtain additional space. Therefore, you must make the best use of all available space in many types of storage facilities. How effectively your storage section operates depends upon how fully you use the MHE assigned to your section. You will need to plan your storage areas so that this equipment can be used as much as possible. As storage supervisor, you are responsible for storing and protecting many kinds of supplies. Some of the items such as end items, repair parts, ammunition, petroleum products, subsistence, and classified and sensitive items may need special handling or may require special storage facilities. DOD 4145. 19-R-1 and this FM explain the storage requirements for these special kinds of items. You will need to keep these requirements in mind when you setup your storage areas.

STORAGE SPACE

Be sure an area has proper drainage before you use it for storage. Adequate drainage protects the supplies from water damage and lets you

maneuver MHE more easily. Even if you have proper drainage in a storage area, you still need to use some type of dunnage when you place supplies on the ground. As storage supervisor, you will be working with covered and open storage space.

Covered

Covered storage space is space within any facility that has a roof. This includes buildings, sheds, or any other covered areas that are used for storing supplies or that are assigned for storage operations. It can also include hangars, Quonset huts, and other stationary units.

Open

Open storage space is any improved or unimproved open area that is used for storing supplies. An improved area is one that is graded or topped with concrete, tar, or gravel. Open storage areas should be used for supplies that are not affected by adverse weather conditions and changes in temperatures. This type of storage area is generally used for items that are too large or too heavy to be placed in covered storage areas or on shelves.

Section II

Making a Storage Layout

STORAGE LAYOUT

A storage layout is a floor plan of the storage area or building that shows where the columns, stairs, elevators, latrines, and doors are located. Use the layout to help you plan where to place storage and working areas, shelves, and offices. The amount of time you need to spend in setting up the floor plan depends on the kinds of supplies your DSU stores and the types of facilities you have to use as storage areas. Before you begin to plan the storage layout, use your microfiche reader to check the physical security; arms, ammunition, and explosives security; and the risk or pilferage code of all of the items you will be storing. This code is listed on the AMDF. Check the NSN of all items to see if they fall into any of the SEC categories. Sensitive and pilferable items require special controls when they are stored and moved. Figure 5-1 describes some of the types of

items that come under these categories. You can find a complete listing in CDA Pamphlet 18-1. AR 740-1, Chapter 6, also gives instructions on how to store these kinds of items. Because your DSU receives irregular demands and large numbers of different supplies, the stock positions are always changing. To help you move the supplies through the receipt, storage, and issue sections quickly and efficiently, you will need to spend time and effort planning day-to-day operation procedures and storage layouts.

STORAGE LAYOUT PLAN

To aid you in planning the layout, the SCS can furnish you with the types and number of items on its ASL and NSL. Consider the following when you plan your layout.

SEC	PILFERABLE ITEMS
I . . . . .	.Aircraft engine equipment and parts.
M . . . . .	.Hand tools and shop equipment.
N . . . . .	.Firearms.
P . . . . .	.Ammunition and explosives.
Q . . . . .	.Controlled drugs (requiring secure storage).
R . . . . .	.Alcohol, alcoholic beverages, precious metals, drugs, or other substances requiring vault storage.
V . . . . .	.Individual clothing and equipment.
W . . . . .	.Office machines.
X . . . . .	.Photographic equipment and supplies.
Y . . . . .	.Communications/electronic equipment and parts.
Z . . . . .	.Vehicular equipment and parts.
J . . . . .	.Pilferable items, due to the size, shape, and utility, which do not fall under one of the above categories. Pilferage controls may be designated by the coding activity to items coded U (Unclassified) by recoding the item to J.

Figure 5-1. Extract from CDA Pamphlet 18-1

Maximum Use of Space

Space is vertical as well as horizontal. Stack material to use this space. Oddly shaped, heavy, or hard-to-move items should be stored in low-ceiling areas. Leave the high-ceiling areas for items that can be stacked higher.

Time and Labor Savings

The less distance an item is moved, the more time your personnel can spend on another operation.

Accessibility of Supplies

Store supplies in specific, marked locations so that they can be easily located. Consider the locations of doors and aisles and the use of your MHE when you are deciding whereto store items.

Maximum Protection of Supplies

Store supplies where they can be protected from theft, fire, weather damage, rodents, and insects.

STORAGE FACTORS

You must consider certain storage factors before you can begin drawing your layout. These factors will help you plan where various groups of items should be located. They are described below.

Similar Items

To speed storage and issue operations, group items according to their type. For example, all items in Class 7105 (office supplies) should be stored in one general area, if possible.

Rate of Turnover

Place fast moving items close to the issue point. This cuts down on the amount of time you spend pulling the item and bringing it to the issue and breakdown point.

Item Size or Weight

Place very heavy or large items close to the issue point. This shortens the distance items must be moved. It also reduces the need for MHE and helps to hold down labor costs. Heavy or large items may not be issued often, but you still should place

them close to the issue section and not within their class groupings. You should make sure that MHE can get to the items.

Quantity

Know the quantity of the items you need to store. This helps you determine the amount and type of space you will need. You can get this information from the SCS. Estimate the amount of space you will need so that you can keep the entire supply of an item in one place. By using one location for each item, you make it easier to restock supplies and set up the stock locator system.

Special Storage Requirements

Some items such as lumber, ammunition and explosives, vehicles, hazardous supplies, subsistence, petroleum, and metal products have special properties. You need to be aware of these properties if you are to provide the proper type of storage for these items. DOD 4145.19-R-1, Chapter 5, describes these items and explains the special type of storage and handling each item requires.

Hazardous Material

Some materials are dangerous if they are stored with other stock or if storage personnel do not handle them correctly. For example, explosives, poisons, and magnetic and corrosive materials require special storage and MHE.

Sensitive and Pilferable Items

Some items are medically regulated. Others may be subject to theft. Store these items where they can be protected. Sensitive and pilferable items usually have a high resale value on the illegal market and need to be strictly controlled and stored in an area that can be locked. Place restrictions on personnel moving in and out of these areas. You should assign one of your soldiers to be responsible for secured areas. Give the keys to the locked portions only to the key custodian and the officer in charge of the storage section. You will need to inventory most of these items quarterly. Some sensitive items require a monthly inventory. Check AR 190-11 for other information you will need to know in controlling these items.

Classified Items

Classified items include documents and supply items that need protection because of their importance to the national security. Store these items in specific types of secured areas. They also require special handling. Any storage personnel who work with classified items must have a security clearance and be under constant supervisory control.

Perishable Items

Perishable items such as food, film, and batteries can stay in storage for a limited time only because they will spoil or become outdated. Sometimes these items also require special handling. Many perishable items must be kept in areas that are refrigerated or temperature-controlled. If you must store perishable items in a single storage area, be sure to keep items that give off odors away from those that can absorb odors. For example, do not store onions and fish near butter or milk. Check AR 30-18 for information on the storage of perishables.

Oddly Shaped or Fragile Items

These items require special handling because of their shape or composition. They may also require special storage because of their bulk. Be sure the type of storage aid you use to stack these items can support the items easily. Items included in this category are reels, glass items, and construction materials. DOD 4145.19-R-1 gives instructions on storing unusual items.

STORAGE LAYOUT DRAWING

The storage layout drawing is a floor plan showing the way the open or covered storage area is divided into different sections. These sections can include storing and shipping areas, aisles, latrines, and offices. The floor plan shows the location of all columns, posts, exits, and stairs. It should also show the gross and net square footage of the areas. Use the floor plan to help you decide the best places for storage areas, working areas, and storage aids. Table 5-1 is a checklist for preparing a storage layout. Use it to help you make the best use of your storage space. Once you have a copy of the basic layout, fill in the required

sections. These sections include the bins, bulk, pallet rack, other storage areas, work areas, and aisles. Figure 5-2 shows samples of a basic floor plan and a prepared storage layout. Estimate the amount of space you need for different areas by using past storage reports that show item quantities, sizes, and demand rates. Estimate the amount of work space you will need by the amount of activity that will be in each area. The locator file area, for example, may take less space than the receiving or packing area. Plan for the best placement of areas so that work flow and personnel movement are simplified and in a straight line. Try to put stacks of large items next to an aisle so that you can issue them without having to move other supplies to get to them with MHE. Remember, if you think you will need to make any changes, try to make them before you set up the storage aids. The following guidelines will help you plan a better storage layout:

- Make as few aisles as possible and try to keep them as straight as possible.
- Make the aisles as narrow as possible, but allow enough space to use MHE. Table 5-2 gives the recommended aisle width for MHE.
- Make sure that areas where MHE will be used are near the front or rear of the storage warehouse so that it is easier to use the MHE.
- Locate offices and locker and break rooms against sidewalls so that your soldiers will not have to walk through work or traffic areas.
- Try to combine all scattered storage areas into one area.
- Put offices and support areas in low-ceiling sections. Save high-ceiling areas for storage.

After you have filled in where you think storage areas and operation areas should go, you need to decide where you will store specific supplies. Try to make the best use of vertical space when you plan supply storage. Remember that you must also consider the windows, light fixtures, and sprinkler systems when you plan to use MHE for stacked materials. Table 5-3 gives some guidelines for required space above stacks and below lights and sprinkler systems. Once you have made a general sketch of the way you want the supplies stored, have your soldiers move in the storage aids. You may have to make some minor adjustments once you see the way the bins and shelves fit into the actual building. Be sure to enter these changes in your layout sketch. Because you will store

Table 5-1. Checklist for preparing storage layout

FOR TOTAL LAYOUT AREA:

- Determine length of building.
- Determine width of building.
- Determine total square feet available for storage facility.
- Subtract structural losses (for example, latrines, posts, pillars, stairwells) from total square feet.
- Determine distance from floor to ceiling or to overhead obstructions.
- Find maximum allowable floor load limitations.
- Determine maximum stacking heights allowed for supplies.
- Determine required fire clearances and the condition of fire walls in the building. Use DOD 4145.19-R-1 to find clearances needed around fire doors and fire aisles.
- Determine required clearances for fire-fighting equipment and fire alarms.

NOTE: If the building does not have a sprinkler system, subtract 18 inches from the maximum stacking height. If it has a sprinkler system, subtract 36 inches.

- Determine types of supplies to be stored.
- Use DOD 4145.19-R-1 to find the required clearances for exterior walls. The clearances depend on the types of supplies to be stored.
- Set aside and mark storage areas for hazardous and flammable supplies.

FOR BIN AND BULK AREAS:

- Analyze commodity characteristics (size, weight, and shape) of supplies.
- Determine number of line items to be stored.
- Determine volume of items to be stored.
- Find out what types of storage aids are available.
- Find out what types of MHE are available.
- Determine the amount of space needed for each bin or bulk area.

FOR STORAGE SUPPORT FUNCTION AREAS:

- Determine space required for preservation, packaging, and packing area.
- Determine the space required for receiving area.
- Determine space required for assembly, shipping, and issue area.
- Allocate office space.
- Assign space for smoking area within storage facility.
- Compute total space required for storage support functions.

FOR SIZES AND TYPES OF AISLES:

- Determine need for fire aisles.
- Determine need for main aisles.
- Determine need for cross aisles.
- Determine need for bin aisles.
- Determine locations and sizes of warehouse doors and columns.
- Determine quantities, types, and turnover rates of supplies to be stored.
- Determine types and sizes of MHE to be used.
- Sketch storage layout plan.

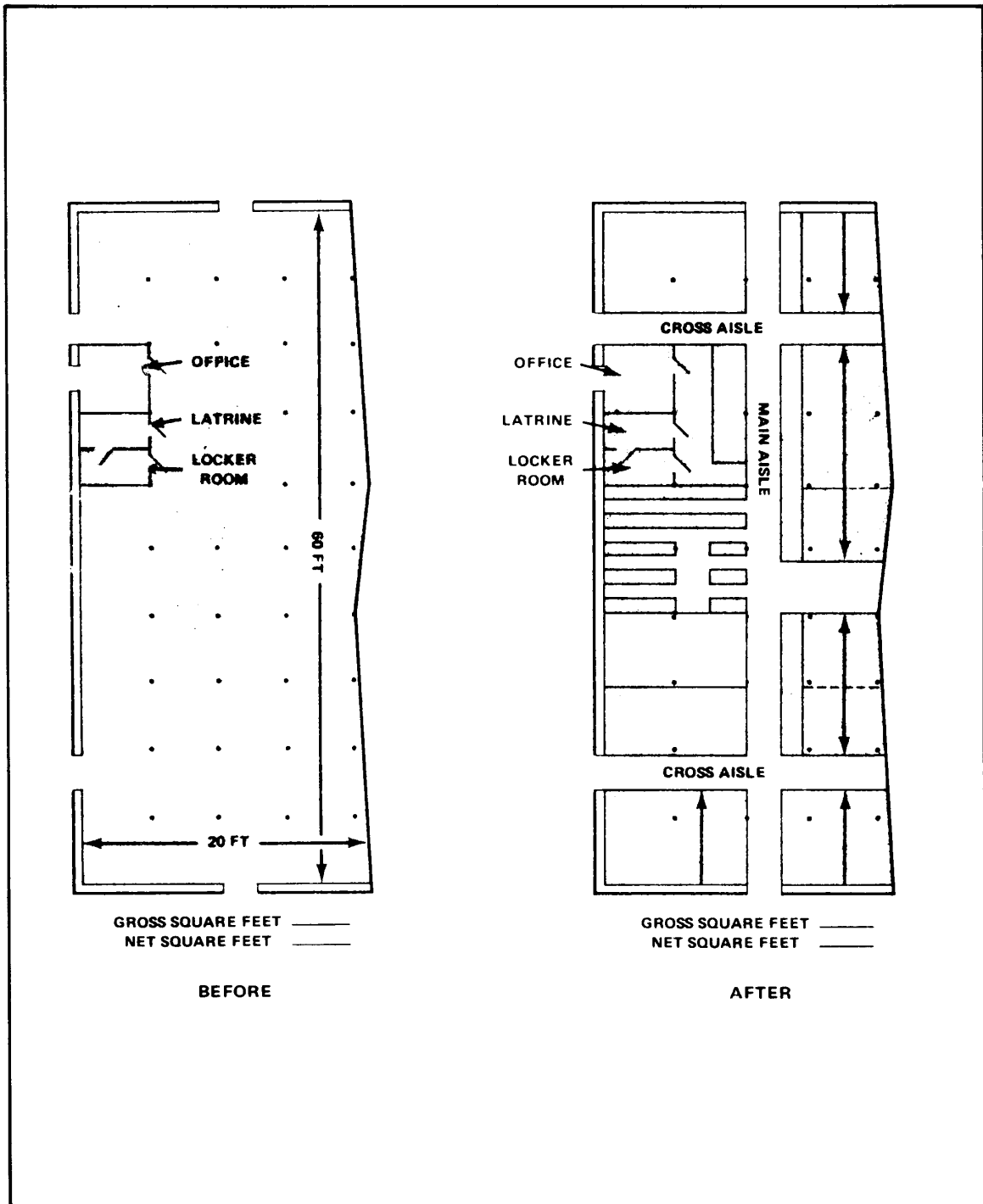


Figure 5-2. Samples of a basic floor plan and a prepared storage layout

Table 5-2. Recommended aisle width for MHE

TYPE OF MHE	RECOMMENDED AISLE WIDTH
2,000-pound-capacity forklift truck	9 feet 6 inches
3,000-pound-capacity forklift truck (extensive reach)	7 feet 0 inches
4,000-pound-capacity forklift truck	10 feet 0 inches
6,000-pound-capacity forklift truck	11 feet 6 inches
8,000-pound-capacity forklift truck (narrow aisle)	6 feet 0 inches
Stock selector truck	30 to 36 inches
<p>Table shows width for standard 40-inch load. For every 8 inches added to load width, add approximately 6 inches to aisle width. (Aisle width is determined by turning radius required for MHE.)</p> <p>NOTE: Common types of MHE are described and illustrated in Chapter 11 of this FM.</p>	

Table 5-3. Recommended vertical and horizontal clearances for storage areas

<p>Vertical and horizontal clearances are normally required in all storage areas because of floor load capacities and fire or safety regulations. The following list contains the most common clearances required in storage areas. Additional safety clearances are listed in DOD 4145.19-R-1, Chapter 6.</p> <p>VERTICAL CLEARANCES</p> <ul style="list-style-type: none"> • An 18-inch vertical clearance is required between all lighting and heating fixtures and the top of all stacks of nonhazardous supplies. • In storage areas with sprinkler systems: <ul style="list-style-type: none"> • An 18-inch vertical clearance is required between the sprinkler system and all stacks of nonhazardous supplies that are less than 15 feet tall. • A 36-inch vertical clearance is required between the sprinkler system and all stacks of nonhazardous supplies that are more than 15 feet tall. • A 36-inch vertical clearance is required between all rafters, beams, and roof trusses and all stacks of supplies, regardless of stack height. <p>HORIZONTAL CLEARANCES</p> <ul style="list-style-type: none"> • A 24-inch horizontal clearance is required between all stored material and substandard firewalls. • A 36-inch horizontal clearance is required between stored supplies and fire doors located next to aisles. • A 24-inch horizontal clearance is required between hazardous supplies stored in a general-purpose warehouse and any walls or nearby supplies. • A 12-inch maximum horizontal clearance between top of stacks and sprinkler system or rafters and beams is required if stored supplies are subject to excessive swelling.
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different types of items and the quantity of items you store will change, you will have to move some of the storage aids periodically. Make the adjustments on the layout sketch before you make the changes in the storage area. It will save you time and effort when you start moving storage aids to different positions if you know exactly where they should be placed to make the best use of the space.

OPEN STORAGE LAYOUT

Determine the layout of open storage areas by the location of the access roads. Because of the layout of roads and changes in terrain, each storage area presents different problems in layout planning. However, the same general storage principles used in storing supplies in covered areas also apply to open areas. Figure 5-3 is a sample of a typical open storage layout. Remember that your storage layouts must be

flexible so they can be adapted to the constant changes in quantities and sizes of stocked items. Use the guidelines below when planning open storage layouts.

- Allow 20 to 30 feet for aisles so that soldiers can operate rough-terrain forklift trucks and cranes for handling heavy supplies.
- Ensure that easy access and transportation can be provided for each type of item stored.
- Stack supplies according to their packaging, weight, shape, and turnover rate for stability.
- Limit stack heights to the lift capacity of your MHE and to the stability of the stacks.
- Cover supplies that require protection from the elements with tarpaulins.
- Provide adequate drainage to keep supplies from being water damaged.
- Use dunnage on all ground-level storage if supplies can be harmed by standing water or ground moisture.

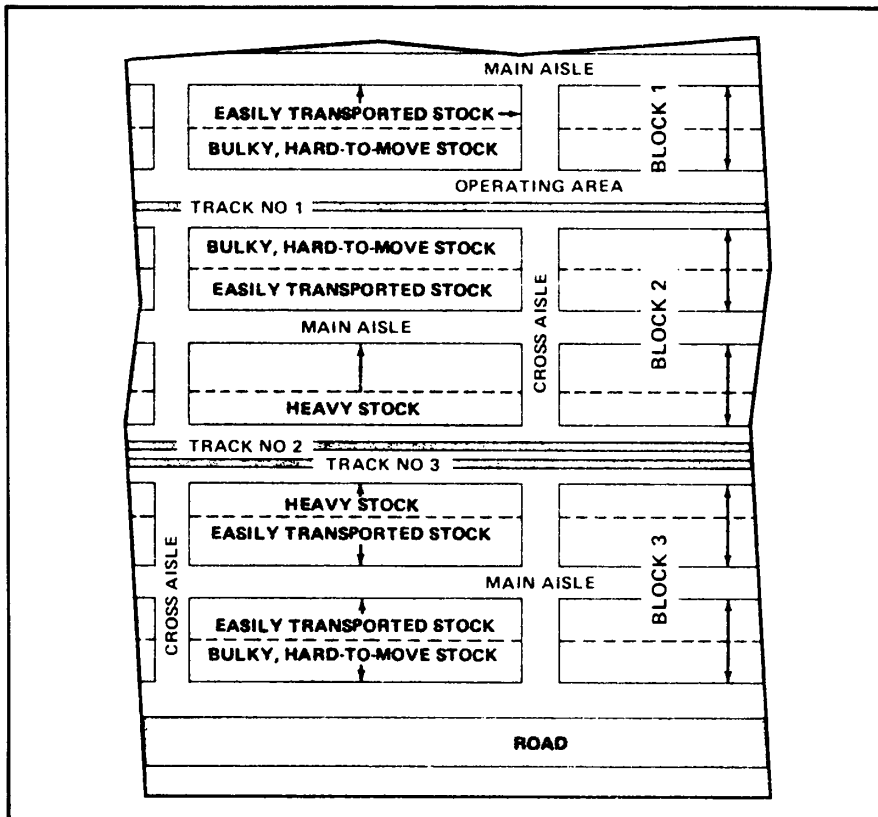


Figure 5-3. Typical open storage layout

- Keep the aisles as straight as possible from the unloading point to storage.
- Reserve storage space next to railroad tracks for very heavy stock so that cranes can be used.

TENT STORAGE LAYOUT

You may be involved in field exercises where there are no permanent warehouses or sheds. You must also be able to plan a layout for tent storage areas. A typical tent layout, as shown in Figure 5-4, includes a work area, pallet support set storage area, bin storage area, customer pickup bins, and a fire point where fire-fighting equipment is kept. The number and types of storage aids, the quantity of supplies that can be stored, and the amount of work area space needed in the tent will depend upon the type of unit you are supporting. This type of space is not reportable under the guidance related to storage space management reporting described elsewhere in this chapter. (In the sample layout about 300 to 350 stock-numbered items could be stored.) Try to follow the guidelines below when setting up your tent layout.

- Block one of the exits so that soldiers and supplies can be better controlled. Be sure the blocked exit will not be needed in case of a fire.
 - Allow room for a long table to use as a desk, work counter, or packing space.
 - Store fast-moving supplies close to the work areas. Store slow-moving supplies and pilferable supplies to the rear of the tent.
 - Store heavy items near the issue point.
 - Dig a trench around the outside of the tent to keep water from damaging the supplies. Be sure that the drainage trench is sloped away from the tent so that water does not backup but flows freely to an outlet.

BIN STORAGE LAYOUT

In a DSU, most of the items you stock and issue will be bin-type items. Therefore, you must plan the layout so that the maximum available space can be used for storing bin items. The amount of space you give an item will depend on the size of the package and the quantity of the item to be stored. Use the bin area to store supplies that have a high turnover rate or that are issued daily.

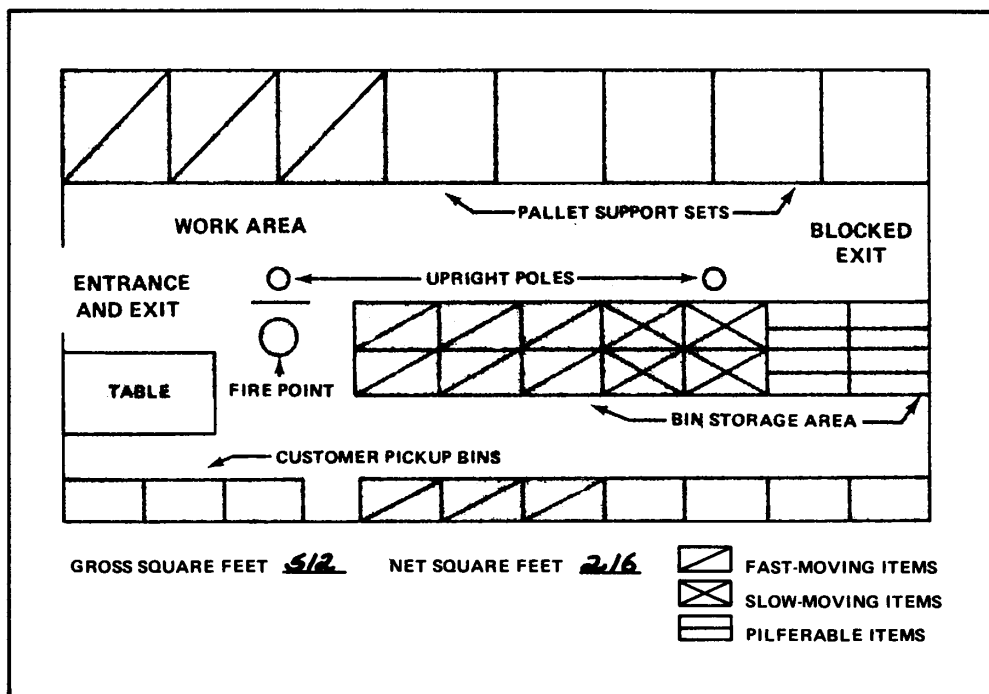


Figure 5-4. Typical tent storage layout

Locate the shopkeeper's office and the receiving area close to the bin area. This keeps your issue trips short and saves you time and labor. Figure 5-5 shows how a bin storage area in your warehouse should look. When bins run the same direction as the ends of your warehouse, you should receive bin items at one end of the warehouse and issue them at the other end. This arrangement will help you avoid bottlenecks and confusion. Figure 5-6 shows how to setup bin rows in your warehouse. You should build your bin storage area with standard shelves, pallet racks, and special or nonstandard shelves. Arrange them according to the physical limitations of the storage area and the characteristics of the items you are storing. Generally, sectional shelves are used in bin areas. These shelves are 87 to 99 inches high, 36 inches wide, and 18 inches deep. Because they are sectional, you can relocate them with

MHE whether they are empty or filled. Use the guidelines below when you arrange shelf space or when you arrange bin and shelf boxes within shelves.

- Place small lots in the center so that most items are in chest-high position for easy picking.
- Place heavy or large items toward the bottom with the slowest-moving items on the lowest shelf.
- Place light, large items toward the top with the slowest-moving items on the highest shelf.
- Place single rows of shelves side to side along the walls, if possible. You should also use the space along walls for storing irregular items, such as those with odd shapes or long handles.
- Use posts and columns as bin boundaries so that no space is lost.
- Place small bins in areas where powered MHE cannot fit but where manual MHE can move.

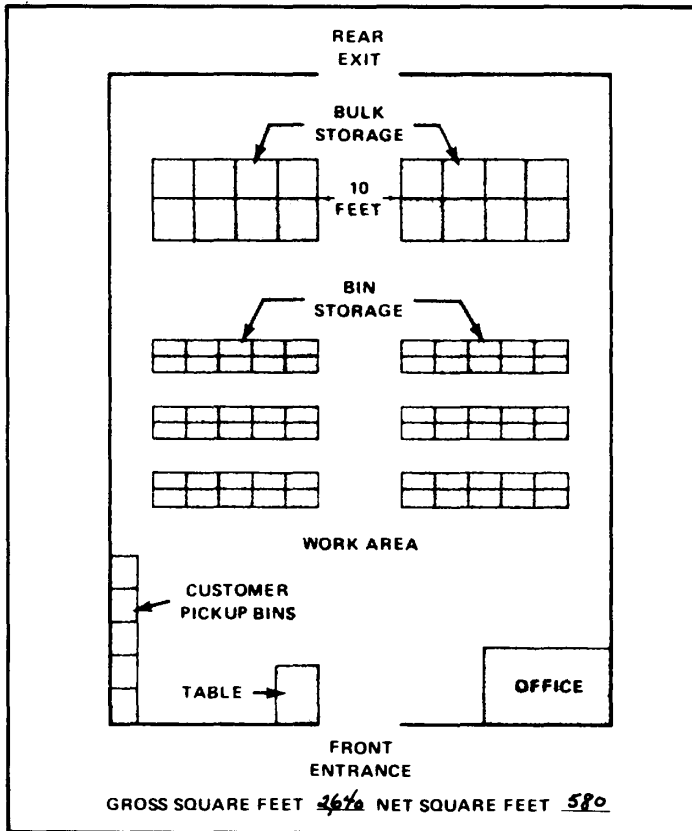


Figure 5-5. Typical layout of bin and bulk storage areas in a storage warehouse

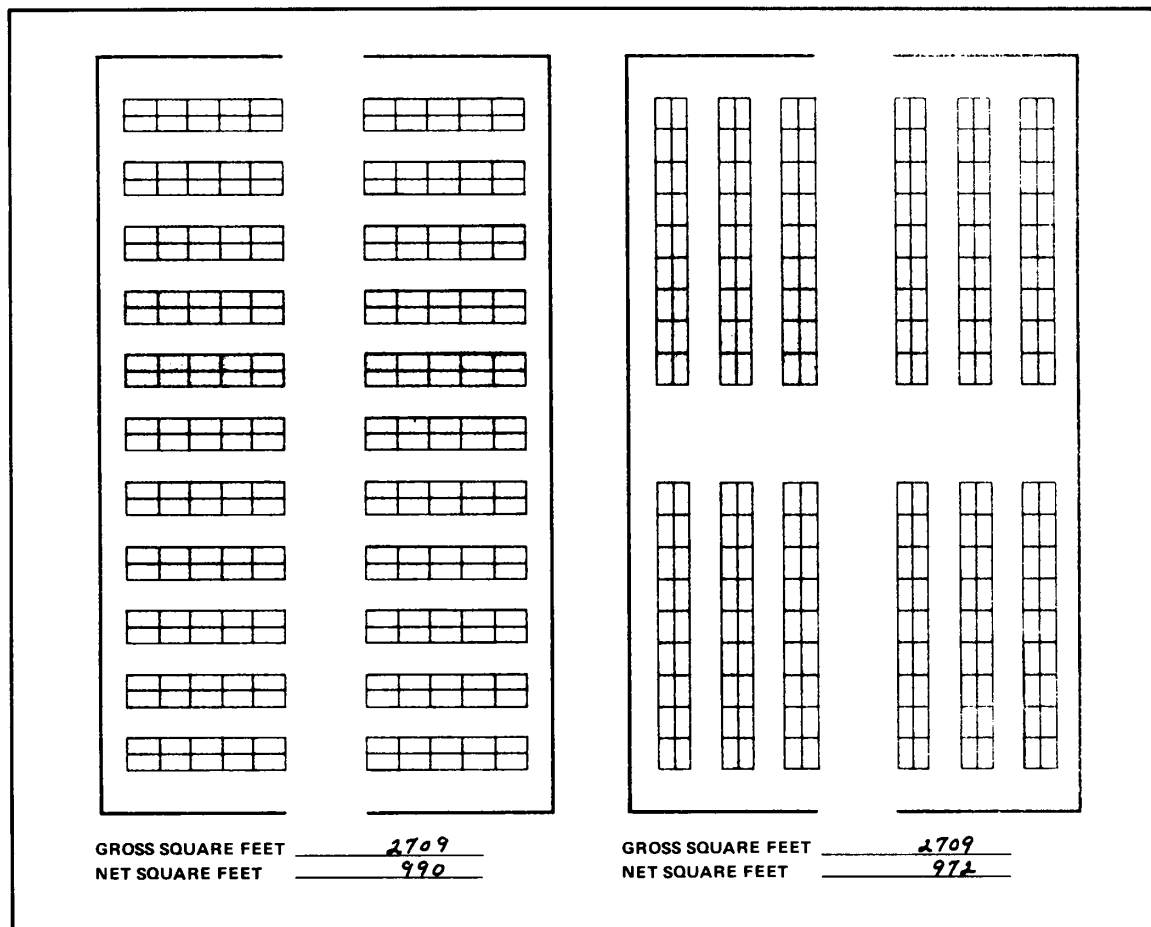


Figure 5-6. Typical layout of bin rows in a warehouse

- Do not mix items in bins. Store small, loose items in boxes instead of directly on the shelves. You can stack items in them since their walls support the items. You can double-stack boxes on a bin shelf. You can also relocate an item with the contents still inside the box. Figure 5-7 shows how the various sizes of shelf boxes can be used to store bin items. If no containers are available, put retaining strips across the front of the shelves to hold items in place. You should estimate the number and kinds of storage aids you need before you sketch the final bin layout. When you use bins, you reduce the problems with security and inventory that arise when broken cases of bin-type supplies are found in bulk storage locations.

BULK STORAGE LAYOUT

When you prepare the layout for heavy bulk items, you should increase the width of the main aisles or any aisles that are next to the bulk area to 11 1/2 feet. You will need to use MHE to move most of the bulk items. If your bulk items are in the same warehouse as the bin items, you should move all the bin items near the front entrance. Your heavy bulk items should be loaded and unloaded through the rear exits. This will save time, use of MHE, and labor because you can issue bulk items directly from their storage location without having to move them through the issue point. Refer to Figure 5-5 which shows a typical layout with bin and bulk storage areas. For more on planning bulk storage, check DOD 4145.19-R-1, Chapter 2.

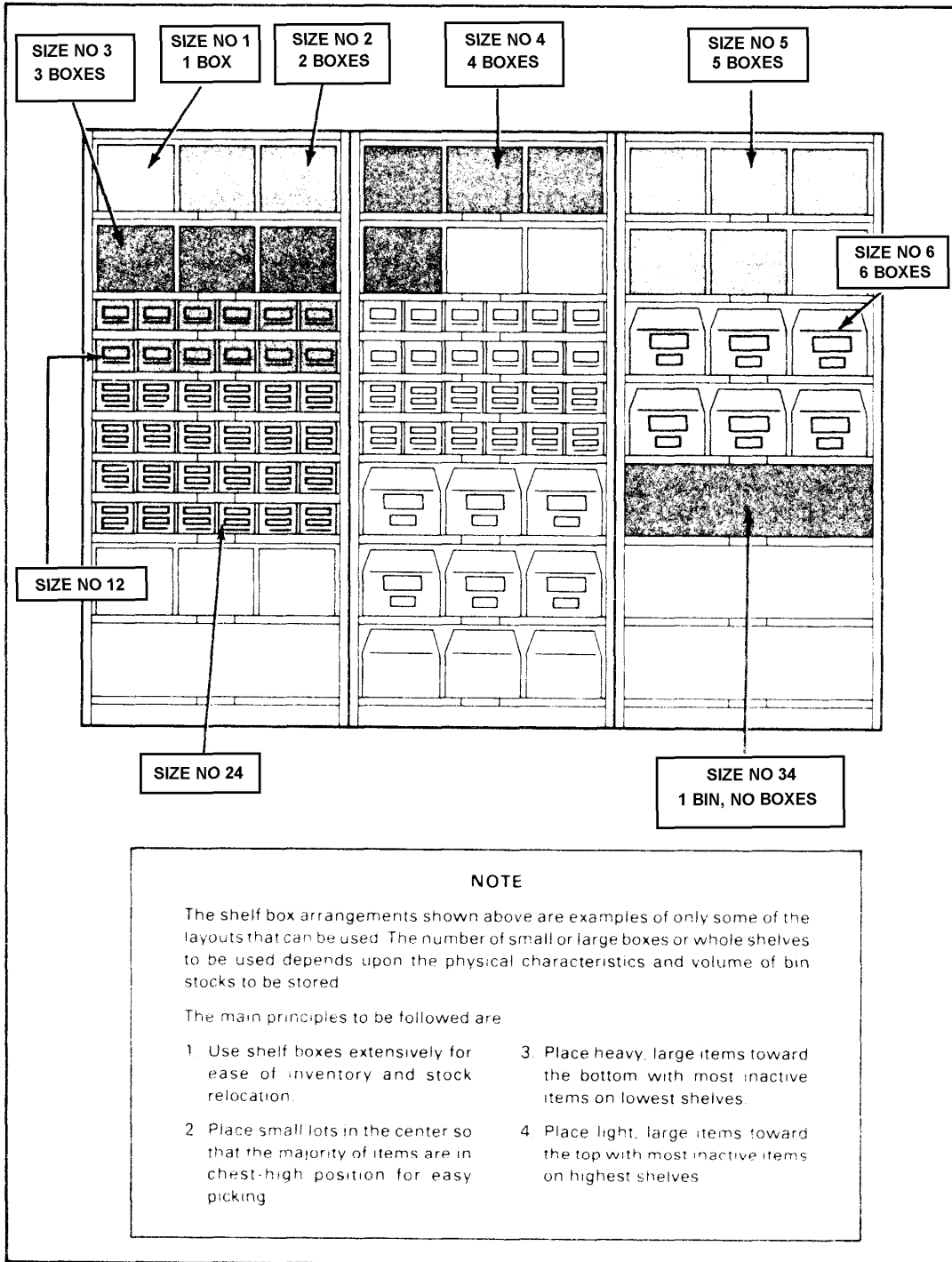


Figure 5-7. Shelf box arrangement

VAN STORAGE LAYOUT

Use the mobile van only for those items that are critical to the unit mission. Plan your layout so that you use all possible storage space. Store fast-moving items near the entrance. Store slow-moving and pilferable items in the rear of the van. Figure 5-8 shows a van storage layout. Note that the van has preassembled bins and extended sides. This type of space is not reportable under the guidance related to storage space management reporting described elsewhere in this manual.

FIELD STORAGE LAYOUT

When your DSU operates in a field environment, you must work with the accountable officer or supply platoon leader to set up the supply point. You will help choose the best places to store each class of supply. You must have room at the supply point for all supply sections and activities. For example, you will have to stock hundreds or even

thousands of items to meet the needs of the units you support. Your DSU will be handling clothing, canteens, lumber, barbed wire, generators, vehicles, and hundreds of other kinds of supplies and equipment. As storage supervisor, you have to provide storage areas for them. Before the supply soldiers set up the new supply point, you and the supply platoon leader should make a layout plan. To do this, make a sketch of the area and then draw your layout onto the sketch. You should be able to pick out general locations for each section by looking at the drawing. Remember to show the direction of the traffic flow and the locations of parking areas for customer units. Figure 5-9 shows how a field supply and storage point layout looks for Classes II, IV, and VII. After the supply platoon leader approves your layout, make sure your soldiers set up the sections correctly. Put soldiers at the entrance and exit areas to control the flow of traffic. If you can, setup a parking area

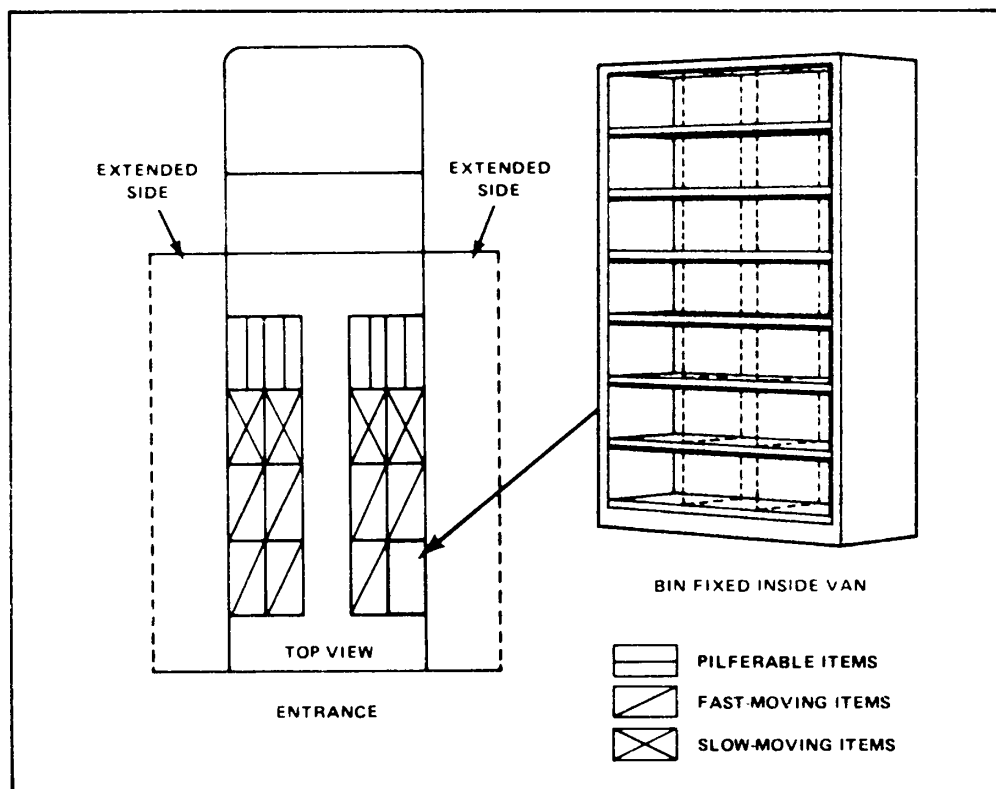


Figure 5-8. Van storage layout

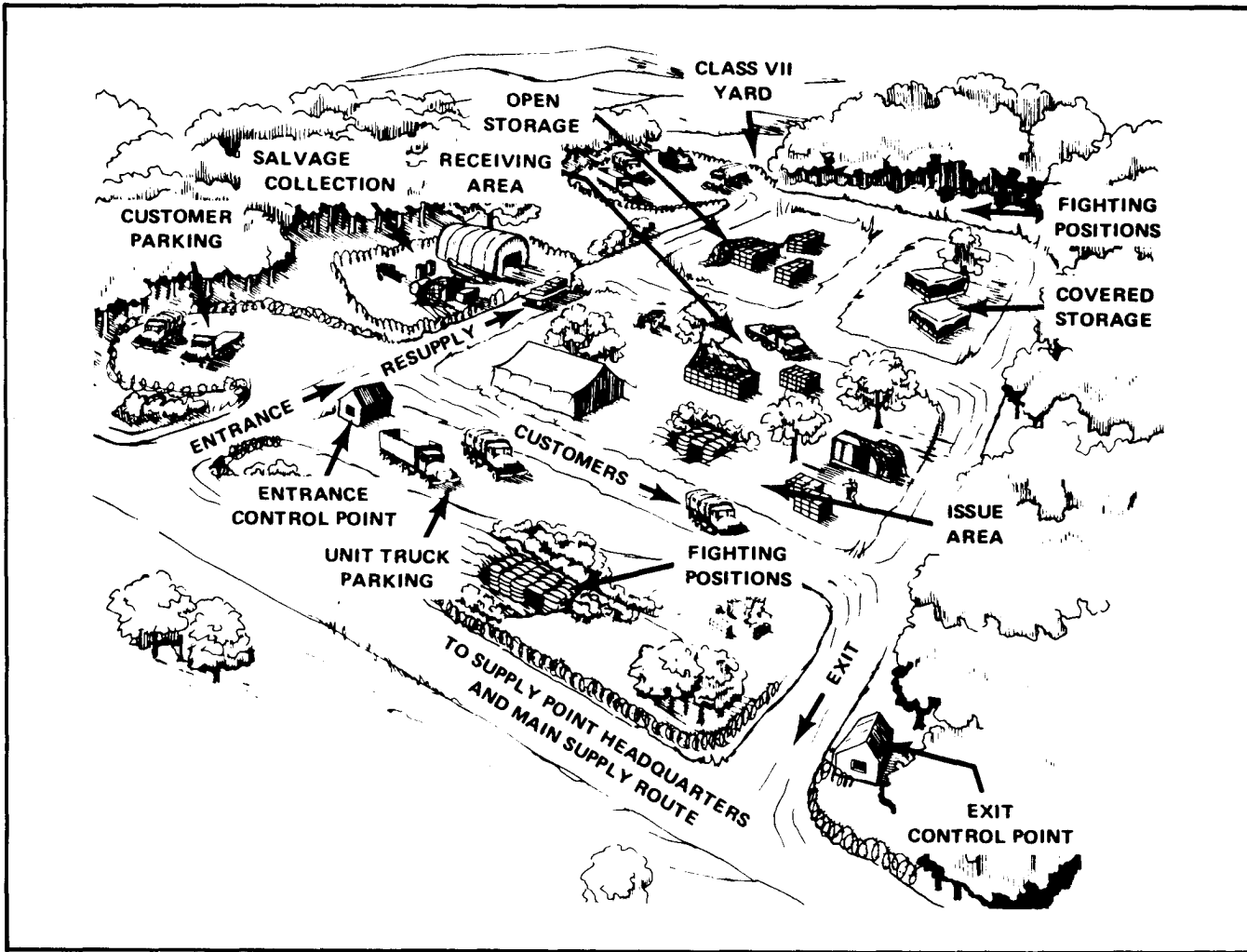


Figure 5-9. Field supply and storage point

near the entrance and the loading and unloading areas to keep the roads from becoming jammed. Your soldiers at the exit point need to check trucks and vehicles as they leave to make sure all supplies for the units are authorized and signed for. Do not forget to include a Class VII storage area for large equipment, such as generators and vehicles when you make the layout. As you plan and draw the supply and storage field layouts, follow the guidelines below.

- Make sure you have enough roads to allow supplies and equipment to be loaded, unloaded, and moved quickly.

- Try to provide cover and concealment for your tents and equipment. Use natural terrain to provide camouflage, or use camouflage nets if you cannot use natural terrain. FM 5-20 explains camouflage techniques.

- Make sure your area has adequate drainage. This will protect supplies from damage and will allow you to use MHE in all kinds of weather.

- Do not place tents, equipment, and supplies close to streams. Sudden rains can cause streams to flood.

- Protect items stored near unpaved roads from the dust and road spray from passing vehicles.

STORAGE AIDS

Storage aids help you use all available space. They make moving supplies easier. Storage aids also help prevent supplies from being damaged when stored on the ground. There are many kinds of storage aids. The most commonly used ones are described below and are shown in Figure 5-10.

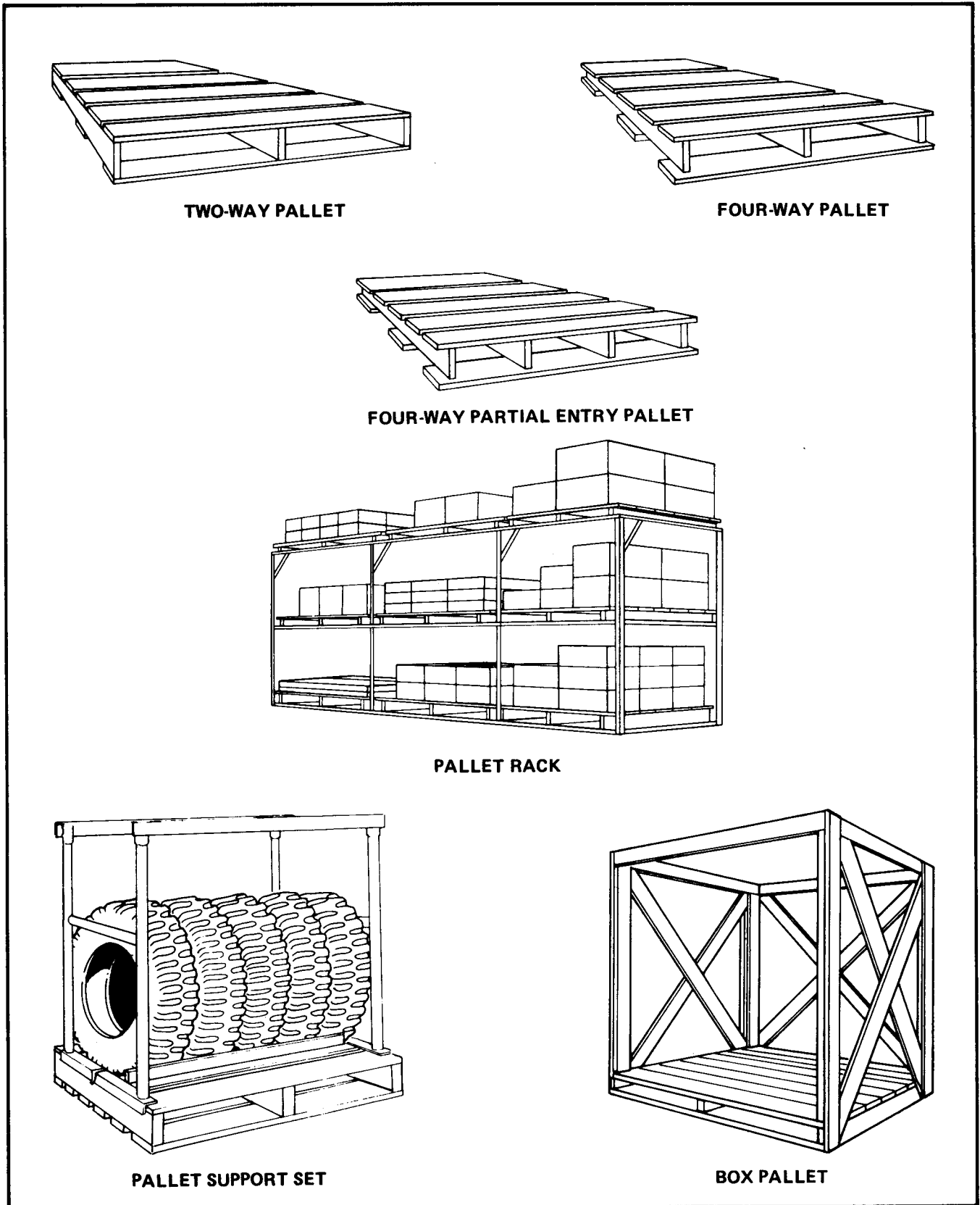


Figure 5-10. Storage aids

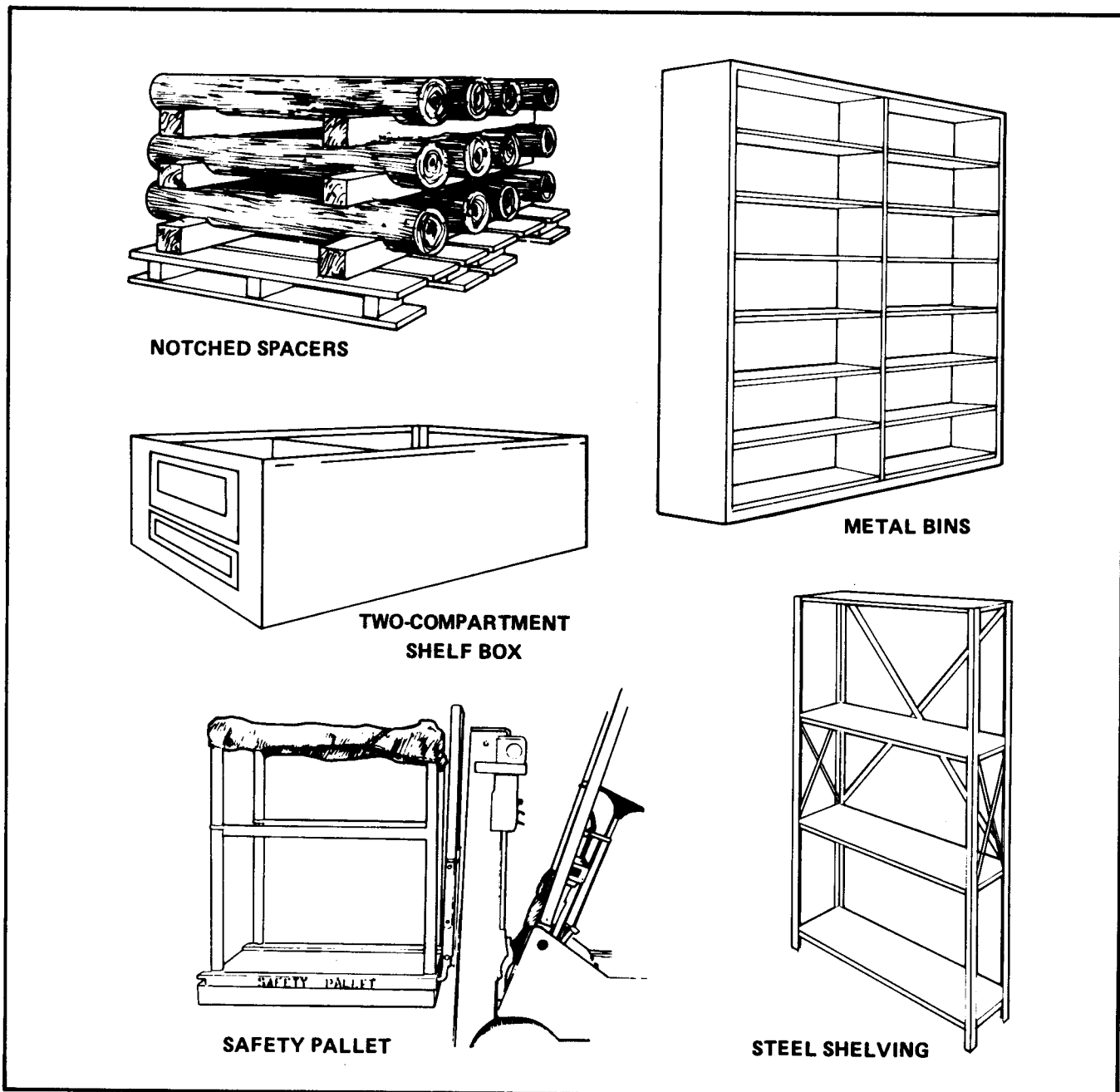


Figure 5-10. Storage aids (continued)

Pallets

A pallet is a portable platform upon which small quantities of material are placed so that they may be handled and stored. You can handle pallet loads with forklift trucks, transporters, and cranes. Soldiers manually place material on the pallet when it is received. It remains on the pallet for mechanical handling throughout the complete cycle of storage and issue operations. The types of pallets used are as follows:

Two-way pallet. The two-way pallet is not the standard DOD pallet, but it is in fairly common use in storage areas. It can be entered into on two opposite sides by forklift and pallet-type, hand-lift trucks. This pallet usually measures 40 by 48 by 6 inches.

Four-way pallet. The wing-end, four-stringer, four-way-entry-type pallet is the general-purpose

pallet. It is the standard one for procurement and use within DOD. The standard dimensions of this pallet are 40 by 48 by 5 1/2 inches.

Box pallet. This is the standard pallet with a frame mounted on it. There are several types of box pallets in use. The box pallet is used to hold supplies that are difficult to stack, such as mops, brooms, and bagged items. It is also used to hold partial pallet loads and loads which require additional support.

Safety pallet. The safety pallet is used for placing materials into or removing them from storage. It has special safety features—raised edges to keep small items from falling off, a metal back guard, mitered corners, a handrail, and safety chains around the pallet area. The safety pallet is generally painted yellow for easy visibility.

Pallet rack. The pallet rack is used when the quantity or physical characteristics of supplies do not permit full pallet stacks, when small lot items are stored back-to-back in retail areas, and when small lot items are stored in the end zone in bulk storage areas.

Pallet support set. The pallet support set is used for the same purpose as the pallet rack. An

advantage of this set is that it can be disassembled and broken down for storage when it is not needed.

Steel Shelving

Steel shelving is used for storing small quantities of items for retail issue. The material can be stored either loosely on the shelves or in shelf boxes.

Shelf Box

The shelf box is used to store small items which cannot be stored efficiently on open shelving.

Notched Spacers

Notched spacers are made of lengths of hardwood that have been cut a special way so cylinders can rest in the depressions. Cylinders or pipes can be stacked neatly. They also allow some items to be removed without destroying the balance of the stack.

Bin

A bin is used for storing small items, such as repair parts and electronic parts. Have open lots in divided storage bins so that you can select and issue these items easily.

Section III

Computing Storage Space

RESPONSIBILITIES

As storage supervisor, you must fill out many different storage space reports. You will also be asked to provide storage data for briefs and other reports that require you to make various mathematical computations. To get the necessary information, you must be able to compute storage space.

GROSS STORAGE SPACE

The gross storage space for an area is the total number of square feet in an area, including aisles, minus the space unusable for storage operations. The space not used for storage is referred to as

standby, out-granted, or unusable space. For example, if your storage area is 35 by 60 feet with an area of unusable space that measures 12 by 8 feet, what is the *gross storage space*? The steps below show you how to compute the gross storage space.

- *Step 1.* (Find total area.) 35×60 feet = 2,100 square feet total space
- *Step 2.* (Find area of unusable space.) 12×8 feet = 96 square feet unusable space
- *Step 3.* (Subtract unusable area from total area.) $2,100$ square feet - 96 square feet = $2,004$ square feet of gross storage space

NET STORAGE SPACE

The net storage space of an area is the gross storage space minus the space taken up by aisles, structural losses, and support space. It is expressed in square feet. For example, if your storage area has 2,004 square feet of gross storage space, two aisles that are each 10 feet wide by 40 feet long, 10 posts that measure 1 foot in diameter by 2 feet high each, and a latrine that measures 5 feet wide by 10 feet long. What is your *net storage space*? The steps below show you how to complete net storage space.

- *Step 1.* (Aisle area) two each x 10 feet x 40 feet = 800 square feet
- *Step 2.* (Post area) 10 each x 1 foot x 2 feet = 20 square feet
- *Step 3.* (Latrine area) one each x 5 feet x 10 feet = 50 square feet
- *Step 4.* (Subtract support space, structural loss, and aisle areas from gross storage space.) $2,004 - (800 + 20 + 50) = 1,134$ square feet of net storage space

COVERED STORAGE SPACE

Find the capacity of covered storage in cubic feet by multiplying the amount of net storage space of an area by the highest stacking height permitted by safety regulations. For example, your storage area has 1,134 square feet of net storage space. Under perfect conditions, you could stack items to a height of 12 feet. What is your capacity in cubic feet?

Attainable Cubic Capacity

The attainable capacity in cubic feet is affected by the MHE capability, floor load limitations, and safety regulations. For example, your storage area has 1,134 square feet of net storage space. Due to an overhead sprinkler system and floor load limitations for this section, the maximum height you can stack items safely is 9 feet. To find your *attainable capacity in cubic feet*, multiply the net storage area by the maximum stacking height: $1,134 \text{ square feet} \times 9 \text{ feet} = 10,206$ capacity in cubic feet.

Bin Cubic Capacity

To find the cubic capacity of a storage bin, multiply the outside dimensions of the bin length x width x height together.

NOTE: Do not include the unused space above the bin in figuring the dimensions.

Rack Cubic Capacity

To find the cubic capacity of a rack section, multiply the outside dimensions of the rack (length x width x height) and add this result to the cubic space of the area above the racks that can be safely used for storage.

DOLLAR VALUE PER CUBIC FOOT

To find the dollar value per cubic foot of storage space, divide the total dollar value of a specific stored item by the cubic feet it occupies. For example, you are storing cases of paper plates in 576 cubic feet of space. The total cost for the paper plates is \$7,874. To find how much it is costing you to store 1 cubic foot of paper plates, divide the dollar value by cubic feet of storage space: $\$7,874 \div 576 \text{ cubic feet} = \13.67 per cubic foot. Once you know the dollar value per cubic foot, you can figure approximately how much room you need to store an incoming shipment of the same item. To determine the cubic feet needed to store a certain dollar amount of an item, divide the total cost of the incoming items by the dollar value per cubic foot of the same item you have on hand. For example, you have an incoming shipment of paper plates which costs \$3,922. The dollar value of the paper plates you have in storage is \$13.67 per cubic foot. To find approximately how much room you will need to store the incoming shipment, divide the cost of the shipment by the dollar value per cubic foot: $3,922 \div \$13.67 = 286.9$ cubic feet.

VERTICAL SPACE IN USE

To find the percent of vertical space you are using, divide the actual storage height by the potential storage height. Your answer will be expressed as a percentage. For example, a survey shows that cases of batteries can be stacked safely to an average height of 14 feet under most conditions. However, you can stack them only 12 feet high in your warehouse due to overhead beams. To find what percentage of the available vertical space are you using, divide actual storage height by the potential storage height: $12 \text{ feet} \div 14 \text{ feet} = 86$ percent.

Section IV Reporting Storage Space

RESPONSIBILITIES

Storage of US government-owned supplies and equipment is a huge business. Millions of cubic feet of storage space are used in depots and storage facilities all over the world. The cost of constructing and maintaining these storage areas amounts to several billion dollars each year. To be sure that the best use is made of all storage space available, storage managers at all levels need to know how to use storage space under their control. To control the use of space, different aids and reports have been developed. As a storage supervisor, you need to know how to use these aids to help make the most efficient use of space and how to report your space use to higher HQ.

SPACE ALLOCATION MAP

The space allocation map is a map of your area showing the current status of areas that are designated for storage operations and the location of other related activities. Your input will be combined with that of other units until a map of the whole installation is completed. This map will

show the type of space, the use of the space (receiving, shipping, bulk storage, loose issue storage, office space, or other), and the type of material stored (repair parts, construction materials, end items, or other). For easier identification, each of these areas may be color-coded. Overlays may be used to keep the map current.

PLANOGRAPH

The planograph is the approved floor plan of the storage area drawn to scale. It shows the direction of bin and rack areas and the locations of the aisles, structural space, support areas, offices, and latrines. The planograph also shows the gross square feet and the net square feet of all available storage space. See Figure 5-11. Each major storage area within the total area should also show the gross and net square feet available. As chief of the storage activity, you are responsible for the preparation and use of the planographs. You do not have to show occupied or vacant spaces on each planograph within the storage areas. You

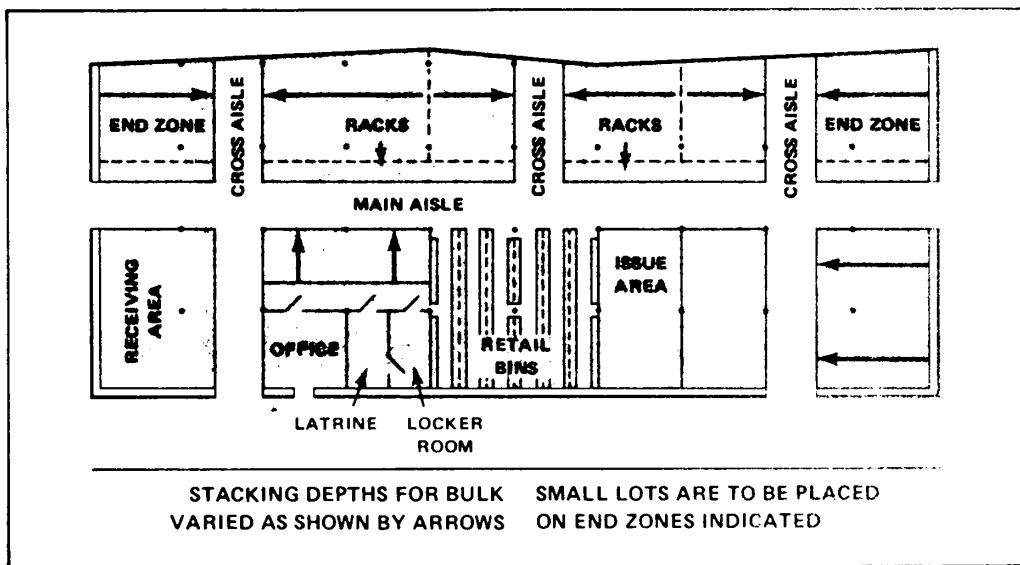


Figure 5-11. Planograph

must place a completed planograph of each warehouse, shed, or other storage area where it is highly visible. Mount it on wood and cover it with clear acetate so that you can use a grease pencil to make changes on it as needed. Maintain ammunition storage space data planographs also.

STORAGE SPACE SURVEY WORK SHEET

The storage space survey work sheet or space audit is a scaled drawing which shows the aisles and the amount of storage space available in a storage section. You must draw a work sheet for each supply warehouse section, shed, or open storage area. Figure 5-12 is an example of how a storage space survey work sheet is prepared. (The sample space worksheet in the figure does not apply to ammunition storer.) You should use the

information on the work sheet to update your space control and space assignment data and to compile reports for higher HQ. It is important that the information on the work sheet is an accurate measurement of the amount of space you have available and how much you are using. Therefore, before you can complete the work sheet, you will need to conduct a storage space survey. Every time the storage layout changes, you will need to change the storage space survey work sheet. When this happens, you should reproduce the storage space survey work sheets locally and change them as needed. The number of times per year that you compile this report is determined by your installation or depot HQ. However, you must complete at least one report each quarter. Additional information on storage space survey work sheets can be found in DOD 4145.19-R-1.

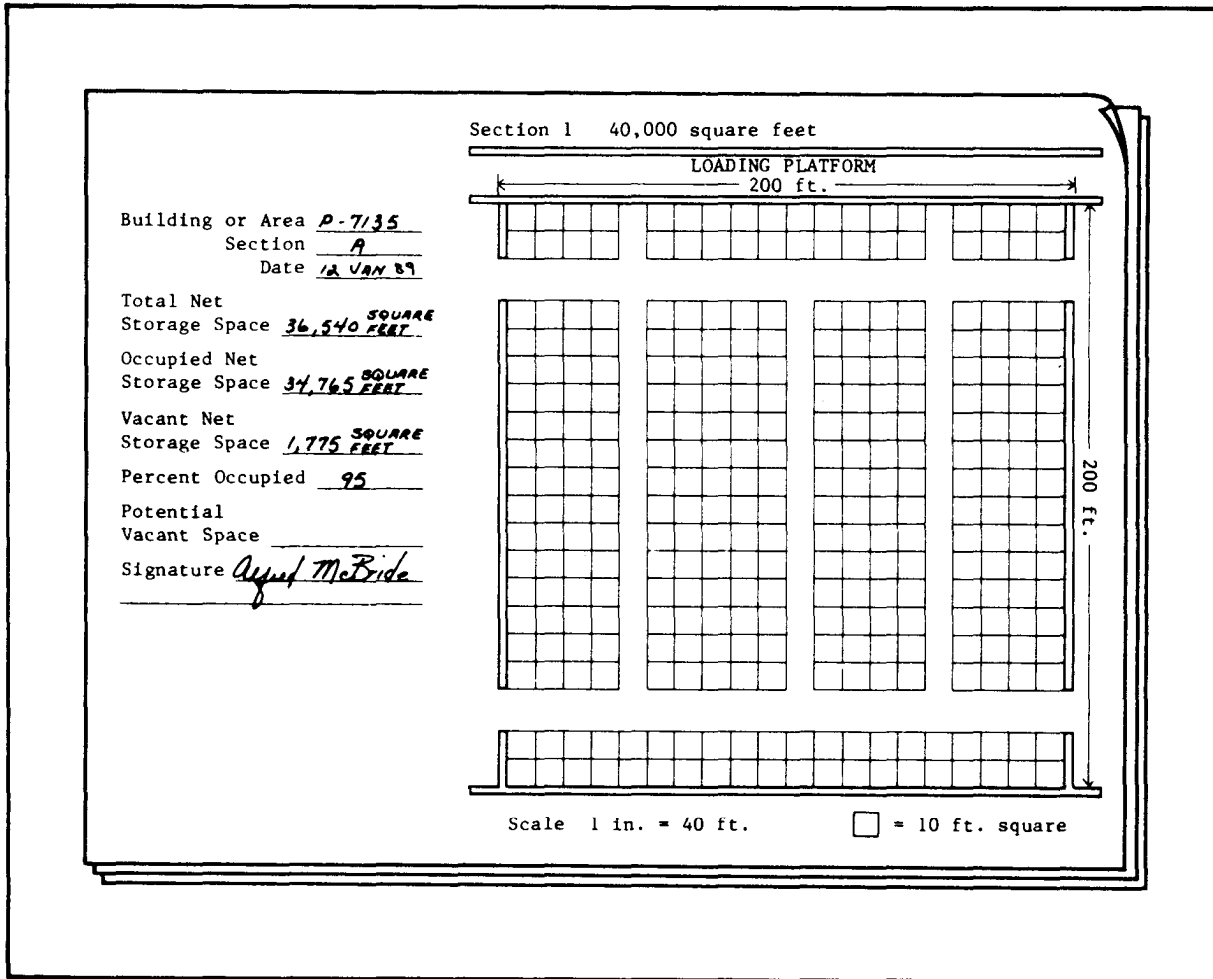


Figure 5-12. Storage space survey work sheet

STORAGE SPACE STATUS REPORT

You may be required to prepare storage space status reports quarterly, monthly, or as often as your HQ directs. There is no standard format for these reports. You will need to contact the activity requiring the report to find out what information is needed. This report is basically the current record of how much space your unit is assigned and how much space it uses. To prepare one of these reports, you need to know the types of material your unit stores, the types of storage used (bin area, tank space, or ammunition space), and the amount of space you are assigned. You also may be required to report how many gross and net square feet of storage space you control. Most of the data you need to prepare the storage space status report can be taken from storage layouts. To save time and effort when you prepare these reports, keep the layout and work sheets updated with changes as they occur.

SPACE RECAPITULATION RECORD

The space recapitulation record is a locally designed form which you use to report your unit's storage space data. It lists all storage information, including building number, section number, gross and net square feet, type of space, type of storage, and type of facility. You should use this record with the storage space status report to complete DD Form 805 (Storage Space Management Report). Figure 5-13 shows a sample of a space recapitulation record.

STORAGE SPACE MANAGEMENT REPORT

DD Form 805 is used to determine how much space is available for storage operations and how much space is currently being used Armywide. From this information, the DA procures, assigns, and controls its storage space. You will complete

SPACE RECAPITULATION RECORD				USING AGENCY <u>814 TH SSA</u> <u>ARO NY 32157</u>				REPORTING DATE <u>10 SEP 89</u>				(FEDER REPORT FOR CIGLD-1) (R4)				
TYPE OF BUILDING (Warehouse, shed)				NUMBER OF BUILDINGS <u>93</u>				TOTAL GROSS SQUARE FEET IN BUILDING <u>180,000</u>				OPEN AREA NUMBER				
<u>WAREHOUSE</u>				<input type="checkbox"/> HEATED <input checked="" type="checkbox"/> UNHEATED								<input type="checkbox"/> IMPROVED <input type="checkbox"/> UNIMPROVED				
				<input type="checkbox"/> INFLAMMABLE <input type="checkbox"/> OTHER (Type)												
SQUARE FEET																
TOTAL SQUARE FEET OCCUPIED																
SECTION NO.	GROSS SPACE FOR STORAGE OPERATIONS ITEM 1	NET STORAGE SPACE ITEM 2	BY COM.				TOTAL ITEM 7	ACTUAL VACANT SPACE ITEM 8	STRATEGIC AND CRITICAL MATERIALS ITEM 9	HOUSEHOLD GOODS ITEM 10	ALL OTHER NON-ODD OWNED MATERIALS ITEM 11	EXCESS SURPLUS, SALVAGE, OR SCRAP ITEM 12	UNSERVICABLE BUT REPAIRABLE ITEM 13	UNCLASSIFIED OR UNIDENTIFIABLE ITEM 14	OTHER NON-RELIABLE GOODS ITEM 15	TOTAL OF COLUMNS 16 THRU 18
			BY COM. 162	COM. 3	COM. 4	COM. 5										
<u>1</u>	<u>44,000</u>	<u>29,000</u>		<u>27,000</u>		<u>27,000</u>	<u>1,500</u>									
<u>2</u>	<u>40,000</u>	<u>28,000</u>		<u>26,400</u>		<u>26,400</u>	<u>1,400</u>									
<u>3</u>	<u>36,000</u>	<u>26,000</u>		<u>24,600</u>		<u>24,600</u>	<u>1,200</u>									
PREPARED BY (Signature and Title)																
CHECKED BY (Signature and Title)																

Figure 5-13. Sample space recapitulation record

this report once or twice a year, depending on the installation to which your unit is assigned. AR 740-1, Table 6-1, lists all Army installations and their reporting times. To make filling out the report easier, you should examine all recent storage space status reports. These reports will provide most of the information you need. DD Form 805 covers the total amount of your assigned storage space—even if this space is temporarily being used for other purposes. However, you DO NOT report storage space used for—

- Bulk petroleum, oils, and lubricants.

- Post exchange and supporting storage space.
- Installation civil or post engineer and supporting storage space.
- Clothing sales stores and supporting storage space.
- Commissary and supporting storage space.
- Bench and backup stocks in shops.
- Transit sheds and open areas at terminals or depots used only for cargo throughput operations.

Figure 5-14 shows a completed DD Form 805. Check AR 740-1, Chapter 6, for instructions on how to fill out the form for your type of unit.

STORAGE SPACE MANAGEMENT REPORT		DATE (CY Mo-Day) 90630	FREQ. A	INSTALL CODE HGQH	DOD COMPONENT A	NAME OF INSTALLATION Fort Lee	CITY NAME Petersburg	STATE/COUNTRY CODE VA	
ITEM (In thousands)	COVERED SPACE							OPEN SPACE	
	TOTAL COVERED (b)	GFCH FLM HAZ (c)	FREEZE CHILL (d)	SHED (e)	ICLDO AND MAGAZINE (f)	OTHER (g)	IMPROVED (h)	UNIMPROVED (i)	
SECTION A - GROSS STORAGE SPACE (Sq. Ft.)									
1. PRIOR 30 JUNE REPORT	4770	2393	11	114	1519	733	3490	2570	
2. THIS REPORT	4770	2393	11	30	1519	817	3490	2667	
3. UNUSABLE								NA	
4. STANDBY	14					19		NA	
5. OUTGRANTED TO NON-DOD USERS								NA	
6. OUTGRANTED TO DOD USERS									
7. USED FOR STORAGE OPERATION (Line 2 Minus Lines 3, 4, 5 and 6)	4756	2393	11	30	1500	817	3490	2667	
8. AISLES, STRUCTURAL LOSS, SUPPORT SPACE	1463	1060	3	1	300	99	1786		
SECTION B - NET STORAGE									
9. TOTAL SQUARE FEET (Line 7 Minus Line 8)	3288	1333	8	29	1200	718	1704	2667	
10. TOTAL CUBIC FEET	40834	20195	99	287	12600	7653	17040	26670	
11. ATTAINABLE CUBIC FEET	36823	18709	99	287	10440	7348	17040	26670	
12. OCCUPIED SQUARE FEET	3002	1207	0	23	1089	676	1489	2667	
13. OCCUPIED CUBIC FEET (Line 12 x 13b)	29449	14522	54	201	8704	5968	14890	26670	
a. REPORTING COMPONENT'S MATERIEL	25376	14359	54		6656	4114	10110	18220	
b. COMMON/CROSS SERVICED	4073	1663			2048	1854	4780	8450	
(1) DOD MATERIEL	3963	53			2048	1854	4780	50	
(2) NON-DOD MATERIEL	110	110						8400	
14. VACANT SQUARE FEET (Line 9 Minus 12)	286	126		6	112	42	215	NA	
15. VACANT CUBIC FEET (Line 11 Minus 13)	7534	4187		86	1736	1380	2150	NA	
16. UNOBLIGATED SQUARE FEET								NA	
17. UNOBLIGATED CUBIC FEET								NA	
18. RECOUPABLE CUBIC FEET THROUGH REWAREHOUSING (From Line 13)	128	123	1	2		2	NA	NA	
SECTION C - STORAGE SPACE ANALYSIS (Net Cubic Feet)									
19. REQUIREMENTS (Next Fiscal Year)									
20. RECOUPABLE WITH ADDITIONAL RESOURCES									
21. REQUIRES MAJOR REPAIR/MODIFICATION									
22. REQUIRES REPLACEMENT									
SECTION D - FIVE YEAR STORAGE SPACE REQUIREMENTS (Net Cubic Feet) FOR YEARS 2 THRU 5									
	FY COVERED		FY OPEN		FY COVERED		FY OPEN		
23. ATTAINABLE									
24. REQUIREMENTS									
25. EXCESS (+ Plus) / DEFICIT (- Minus)									
26. RECOUPABLE WITH ADDITIONAL RESOURCES									
Line 02, Column e: Decrease of 84M SF result of transitory shelters being erroneously reported as sheds on prior report.									

Figure 5-14. Completed DD Form 805