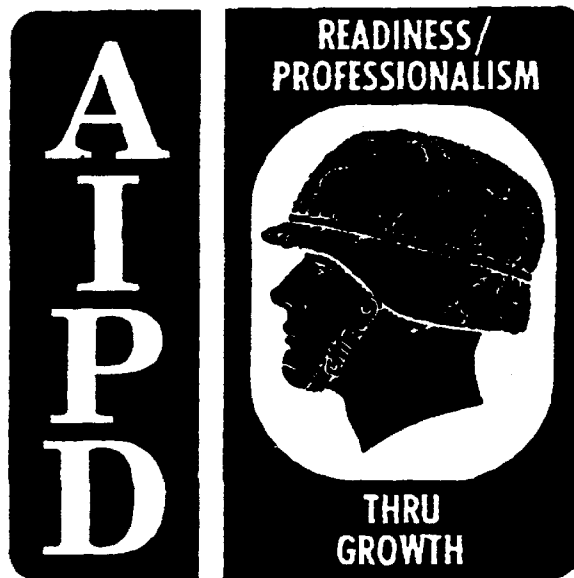


## MAGAZINE STORAGE AREAS



US ARMY ORDNANCE  
MISSILE AND MUNITIONS CENTER AND SCHOOL

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THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT  
**ARMY CORRESPONDENCE COURSE PROGRAM**

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## MAGAZINE STORAGE AREAS

Subcourse Number MM0148

EDITION A

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Missile and Munitions  
United States Army Combined Arms Support Command  
Fort Lee, Virginia 23801-1809

**2 Credit Hours**

**Edition Date: September 1992**

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## SUBCOURSE OVERVIEW

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This subcourse is designed to teach you the fundamental standards for ammunition and explosive storage, including types of ammunition storage magazines, operational regulations for magazine storage, and quantity-distance terms.

There are no prerequisites for this subcourse.

This subcourse reflects the current doctrine at the time the subcourse was prepared. In your own work situation, always refer to the latest publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to men and women.

### TERMINAL LEARNING OBJECTIVE

Action: You will identify the types of ammunition storage magazines, the operational regulations for magazine storage, and quantity-distance terms.

Condition: You will require only the information contained in this subcourse.

Standard: To demonstrate competency of this task, you must achieve a minimum of 70 percent on subcourse examination.

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## LESSON

### MAGAZINE STORAGE AREAS

Critical Task: 03.4010.01-0001

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## OVERVIEW

### Lesson Description

In this lesson you will identify basic standards for the safe storage of ammunition and explosives, including types of facilities, operational regulations for magazine storage, and quantity-distance terms.

### Terminal Learning Objective

Action: Learn the requirements that must be met to store various explosives and ammunition safely and properly.

Condition: You will have this subcourse booklet and will work without supervision.

Standard: You will be required to answer questions on the storage requirements and standards for military ammunition and explosive according to TM 9-1300-206 and AR 385-64.

References: The material contained in this lesson was derived from TM 9-1300-206 and AR 385-64.

## INTRODUCTION

As an ammunition officer, you must have a thorough understanding of how a typical magazine storage area (MSA) is laid out, to include the various types of Class V storage magazines and related operational regulations for magazine storage. One of the basic elements of the ammunition logistics system is the life cycle management of ammunition. The storage of Class V materials at the retail level is a part of this life cycle.

All ammunition stored by the active Army, the Army reserves, or the National Guard in the continental United States (CONUS) and outside the continental United States (OCONUS) is stored within the MSA complex.

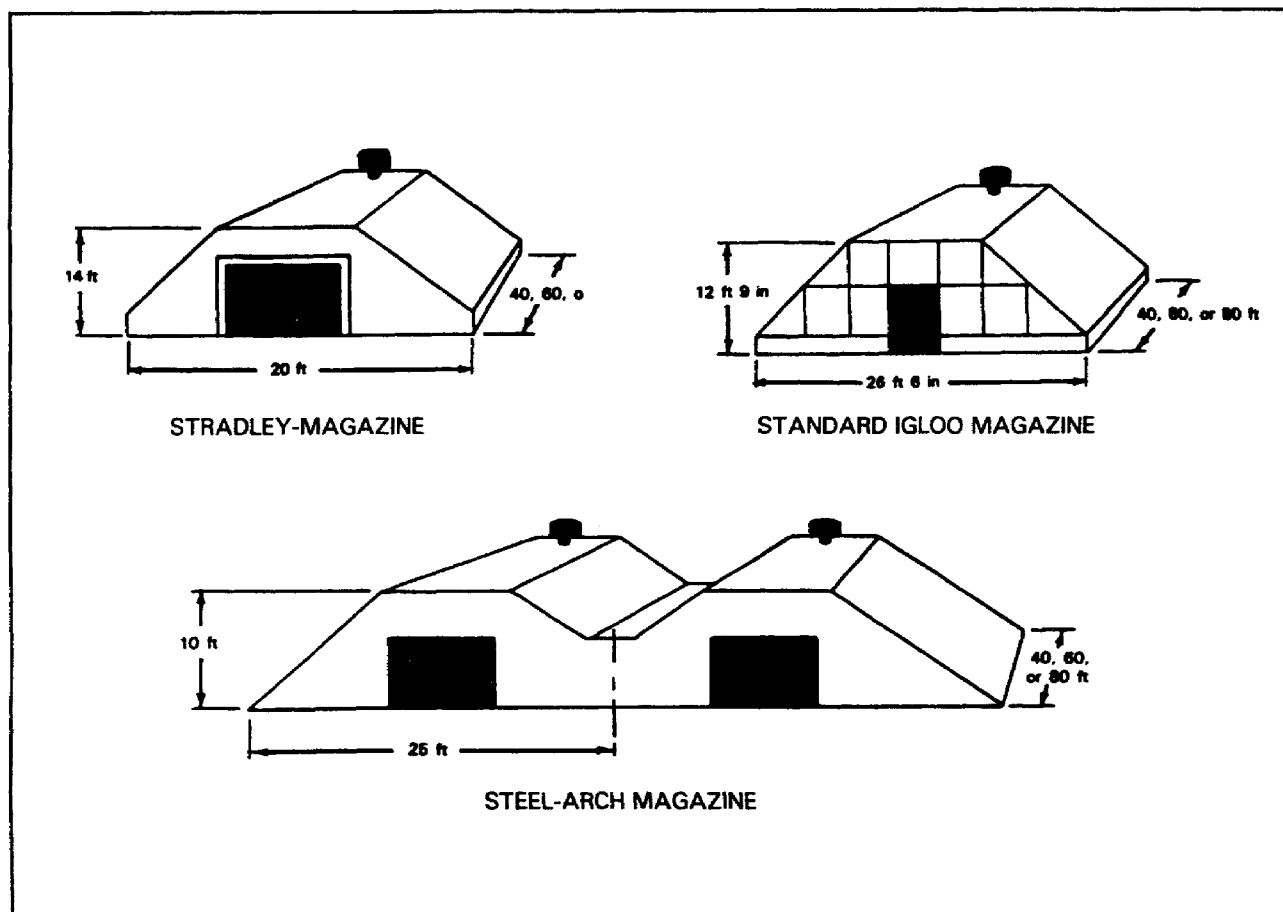
## MAGAZINE STORAGE OF EXPLOSIVES AND AMMUNITION

Magazine storage facilities include earth-covered magazines, above-ground magazines, and service magazines and service buildings.

### Earth-Covered Magazines

Earth-covered magazines provide the best and safest type of ammunition storage. They allow better temperature control than other types of storage facilities, and are particularly desirable for the storage of propellants and pyrotechnics. They should be used for storing separate loading projectiles and high

explosives if enough space is available. Earth-covered magazines include, but are not limited to, the standard igloo, the steel-arch, and the Stradley (Figure 1).



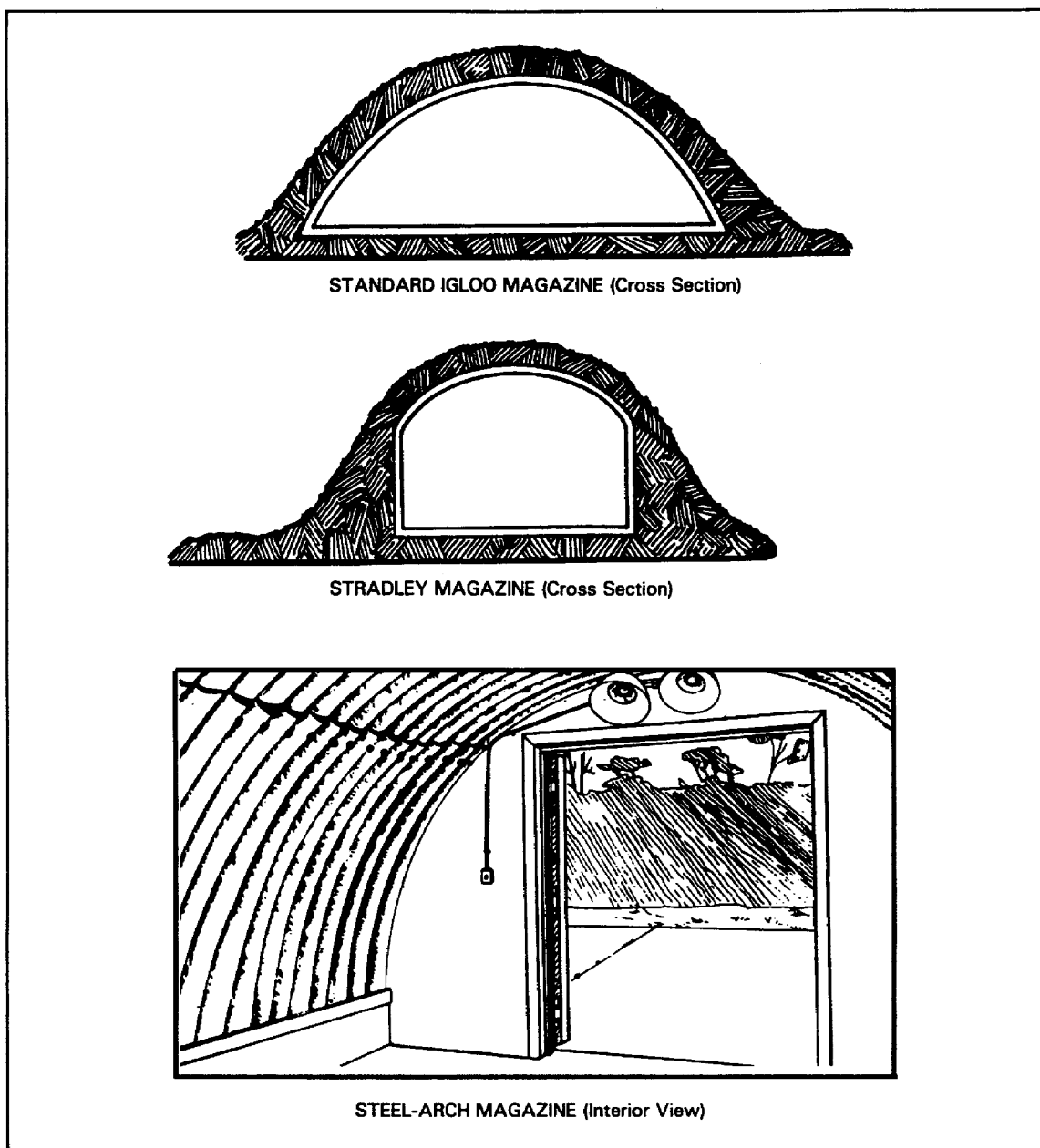
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Figure 1. Earth-covered magazines with some common specifications.

The standard igloo magazine is an older, obsolete design that is not practical for storing large missiles and rockets in the age of palletization and containerization. The doors are too small to admit a standard pallet by forklift. The standard igloo magazine has been, or is being replaced by newer type magazines.

The steel-arch magazine has the same curved metal inside walls and ceiling as the standard igloo magazine (Figure 2). It has a concrete floor and a door wide enough to handle pallets and missile containers. Forklifts can go in and out easily with pallets and missile containers.

The Stradley magazine (see Figure 2) is built of reinforced concrete and has a wide door or double doors to accommodate the present day ammunition packaging. Because of its straight-side design, nearly 25 percent more ammunition can be stored in it than in the standard igloo or the steel-arch magazine of comparable size.

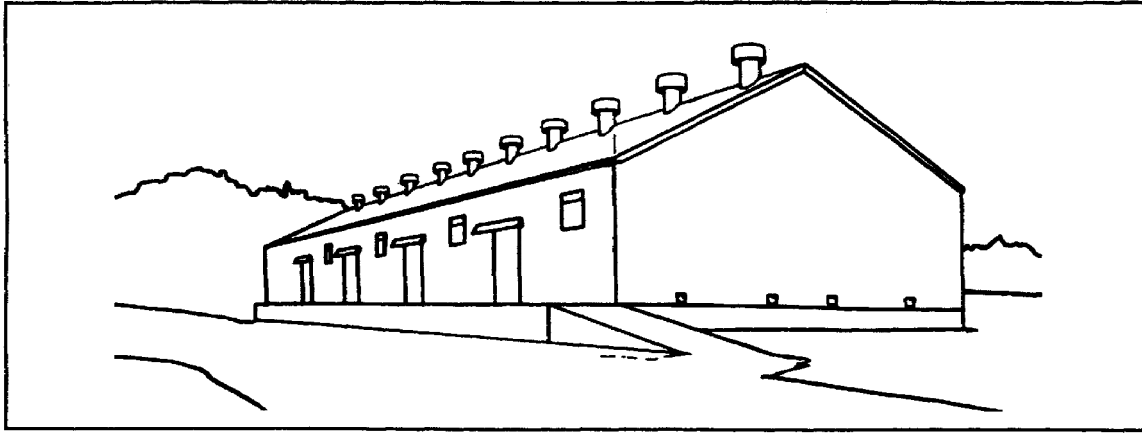


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Figure 2. Comparison of the standard igloo, Stradley, and steel-arch magazines.

### Above-Ground Magazines

Standard above-ground magazines (Figure 3) are made with steel and concrete frames and have hollow tile walls filled with sand. Their concrete floors are sometimes covered with a sparkproof surface. Designed to store 155mm and 8-inch separate loading projectiles, they usually have small-arms ammunition, firing devices, and other less explosive or less hazardous items stored in them. The largest above-ground magazines are about 51 feet wide by 218 feet long.

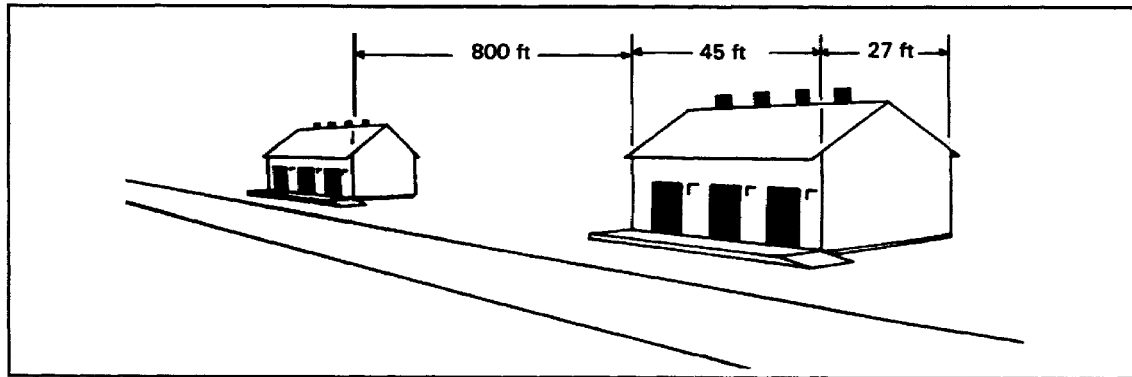


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Figure 3. Standard above-ground magazine.

There are two main types of above-ground magazines—high explosive or black powder magazines and primer or fuze magazines.

High explosive or black powder magazines (Figure 4) are used to store bulk explosives, such as TNT and black powder. They are spaced 800 feet apart so that if one blows up, the next magazine will not be affected.



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Figure 4. High explosive or black powder magazines.

Primer or fuze magazines (Figure 5) are built exactly the same as high explosive magazines. What makes them different is the spacing between each magazine, 300-400 feet versus 800 feet. Less space is required for primer or fuze magazines because primers and fuzes contain much less explosives than the bulk explosives stored in high explosive or black powder magazines.

### Service Magazines and Service Buildings

Service magazines and service buildings are used for intermediate storage of the minimum amount of explosives necessary for safe and efficient processing operations. Construction details of such magazines vary, depending upon local circumstances. However, consideration should be given to the use of fire-resistant materials or fire-resistant construction methods.

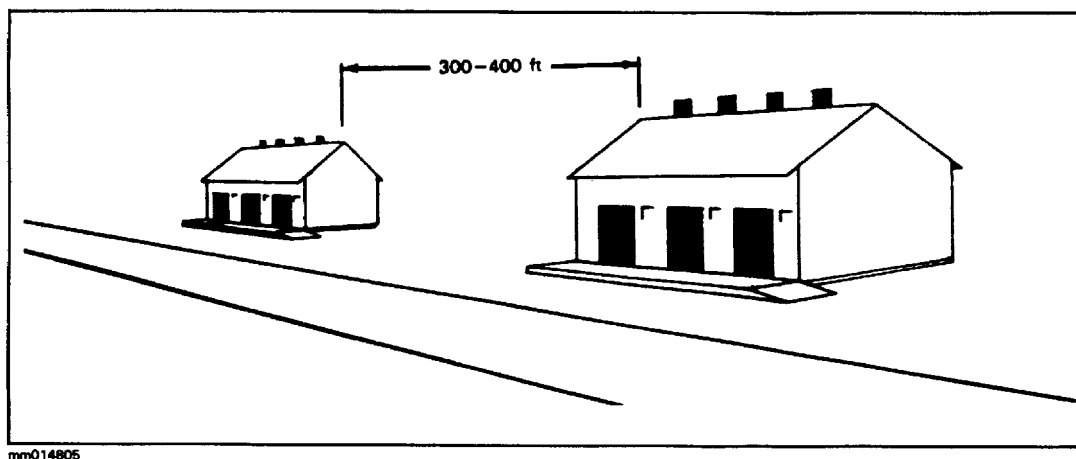


Figure 5. Primer or fuze magazines.

### Temperature control

Sudden changes in temperature may damage airtight containers, or may result in excessive condensation of moisture. If the temperature in a magazine exceeds 100°F for a period of more than 24 hours, the magazine should be cooled by wetting the exterior of the building with water and by opening the doors and ventilators after sunset and closing them in the morning. If these methods do not prove effective in lowering the temperature, the commander must decide whether the materials should be moved to another storage magazine.

Storage magazines in general, should not be provided with heat. An exception is made when it may be necessary to prevent condensation of moisture, to maintain constant temperature, or for other reasons. Where an approved heating apparatus is used to heat a magazine, it must be arranged where the explosives are at least 18 inches from the heating apparatus.

### OPERATIONAL REGULATIONS FOR MAGAZINE STORAGE

The following applies where any ammunition and explosives are stored:

- All magazines must have a DA Label 85 (Storage and Care of Explosives) (Figure 6) posted near or on each door inside of the magazine. The form must be bilingual in overseas locations where host nation support or local nationals are use.
- Vegetation around ammunition storage sites must be controlled. Usually a 50-foot firebreak is required around above-ground magazines.
- Components or loose rounds (those not boxed or palletized) should not be stored in the same magazine with properly packaged items.
- Conveyors, pallet jacks, equipment, tools, empty boxes, etc., are not stored in the same magazine as ammunition or explosives.
- Doors and locks on magazines must be kept in good working condition.
- The door or doors of a magazine must be kept open when a crew is working inside. The number of crews must not exceed the number of doors. Magazines must be kept locked at all times when no one is working in them.
- Ammunition must be placed or stacked in a magazine according to the applicable ammunition storage drawings.



## **STORAGE AND CARE OF EXPLOSIVES**

### **(MAGAZINE PLACARD)**

#### **GENERAL INSTRUCTIONS**

1. Always handle explosives and ammunition carefully.
2. Remove dirt, grit, and foreign materials from containers and ammunition before placing in storage.
3. Do not store explosives and ammunition in damaged containers.
4. Keep all containers in magazine effectively closed so that the contents cannot be handled, examined, or removed.
5. Store each lot separately. Make the stacks stable. Provide for a free circulation of air to all parts of the stack. Raise containers and ammunition off the floor by dunnage.
6. Do not open, repair, pack or repack containers in or within 75 feet of magazine except as permitted by TM 9-1300-206.
7. Do not keep empty containers, tools, or other materials in magazine.
8. Absolute cleanliness and order must be maintained.
9. Use only approved electric lights, lanterns or flashlights in magazines.
10. Do not smoke, or bring matches into magazine.
11. Do not allow unauthorized persons in or near magazine.
12. Keep magazine spark tight, with ventilators well screened, and no openings around doors or foundations.
13. Keep doors locked when magazine is unattended. Close doors when vehicle is approaching platform unless vehicle is equipped with spark arrestor on exhaust.
14. Keep the 50 foot cleared space around above ground magazines free from combustible material.
15. Two or more doors, when available, must be open when personnel are working in a magazine containing explosives or ammunition.
16. Post conspicuously one or more copies of these rules in magazine.
17. See TM 9-1300-206 for detailed instructions.

Figure 6. Storage and care of explosives (magazine placard).

- Ammunition lot numbers and markings must be placed so that they can be read without moving boxes or climbing on stacks.
- At least two inches of dunnage are required for magazine storage.

## **Ammunition Stacks**

All items in storage should be packed in approved boxes and stacked on dunnage if not palletized. Palletized ammunition has its own dunnage supplied by the pallet the ammunition is on. There should be sufficient aisle space to accommodate forklift trucks or emergency equipment. At least two inches of dunnage is required for magazine storage.

Ammunition lot numbers and markings must be placed so that they can be read without moving boxes or climbing on stacks. Ammunition is stacked by lot number with the nomenclature facing up and outward. Ammunition is always stacked from the back to the front, large lots first.

## **Loose Rounds and Damaged Containers**

Loose rounds of ammunition or single fiber containers with rounds therein will not be stored in magazines containing ammunition items that are packed according to approved ammunition storage drawings. They are to be stored in magazines set aside for their exclusive storage. Incomplete boxes of ammunition and explosives may be stored in magazines containing items that are packed according to approved ammunition storage drawings provided the ammunition and explosives are in standard packages. Ammunition and explosives in damaged containers are not stored in a magazine with ammunition in serviceable containers. Such containers are repaired or the contents transferred to new or serviceable containers.

Open containers and containers with covers not securely fastened are not allowed in magazines.

## **QUANTITY-DISTANCE TERMS**

Quantity-distance requirements were developed to provide certain levels of protection for nearby communities, public railroads, highways, and plant facilities from the effects of explosions that might occur within an ammunition storage area.

When using the term quantity-distance, we are talking about the net explosive weight (NEW) of ammunition or explosives that may be stored at one location based on the characteristics and hazards which they present. It also includes how near the storage location may be to buildings and other areas used by the local people as well as other ammunition or explosive storage sites.

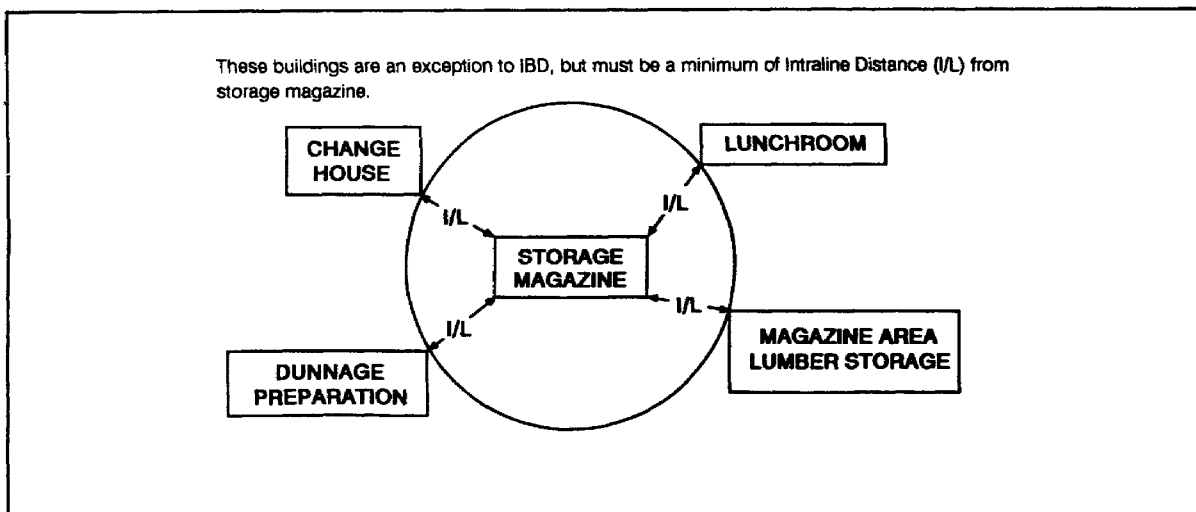
Listed below are some terms and definitions used to describe the different quantity-distance levels of protection required for each type of operation.

### **Intraline Distance**

Intraline distance is the minimum distance permitted between any two buildings within one operating line. See Figures 7 and 8.

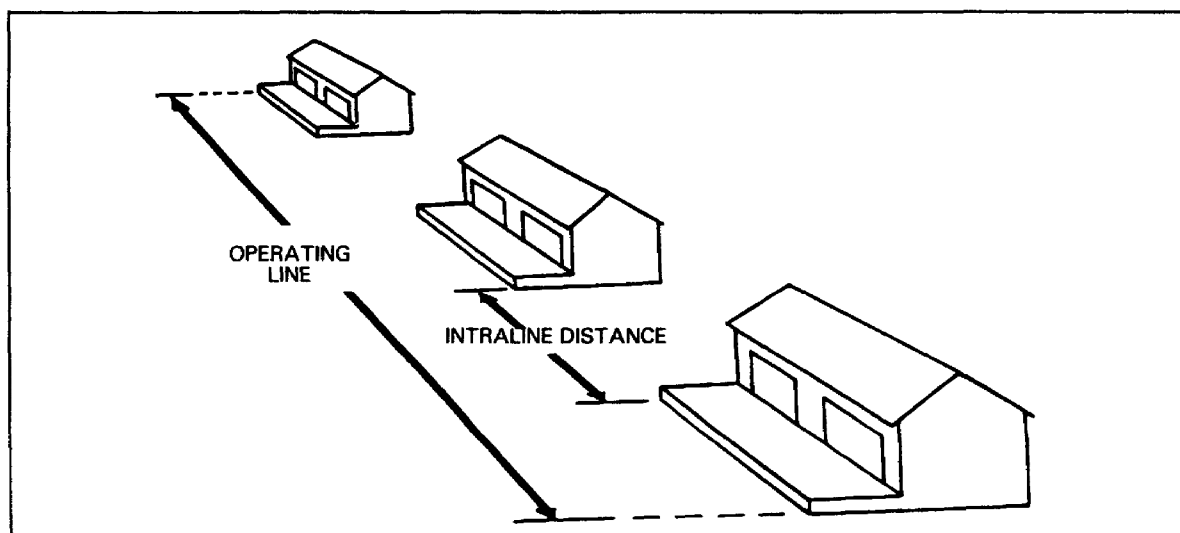
### **Inhabited Building Distance**

Inhabited building distance is the minimum distance from the MSA and buildings used by people. This includes schools, residences, stores, PX (Army exchange), hospitals, to name a few. See Figures 9 and 10.



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Figure 7. Intra-line distance in storage areas.



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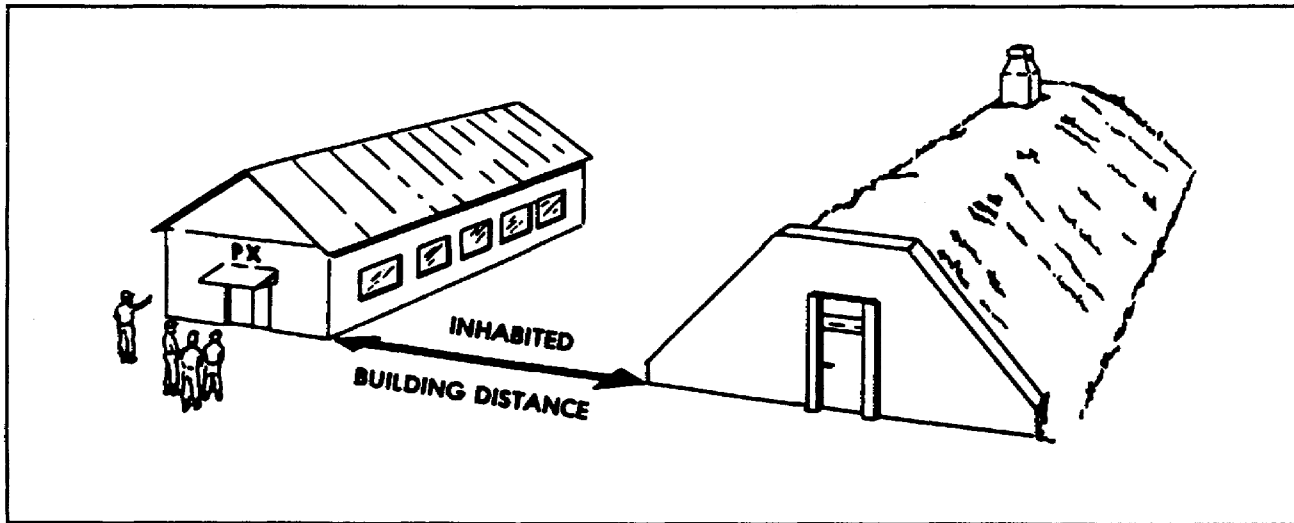
Figure 8. Operating line

**Magazine Distance**

Magazine distance is the minimum distance permitted between any two storage magazines. The distance required is determined by the types of magazine and also the type and the quantity of ammunition or explosives stored therein. See Figure 11.

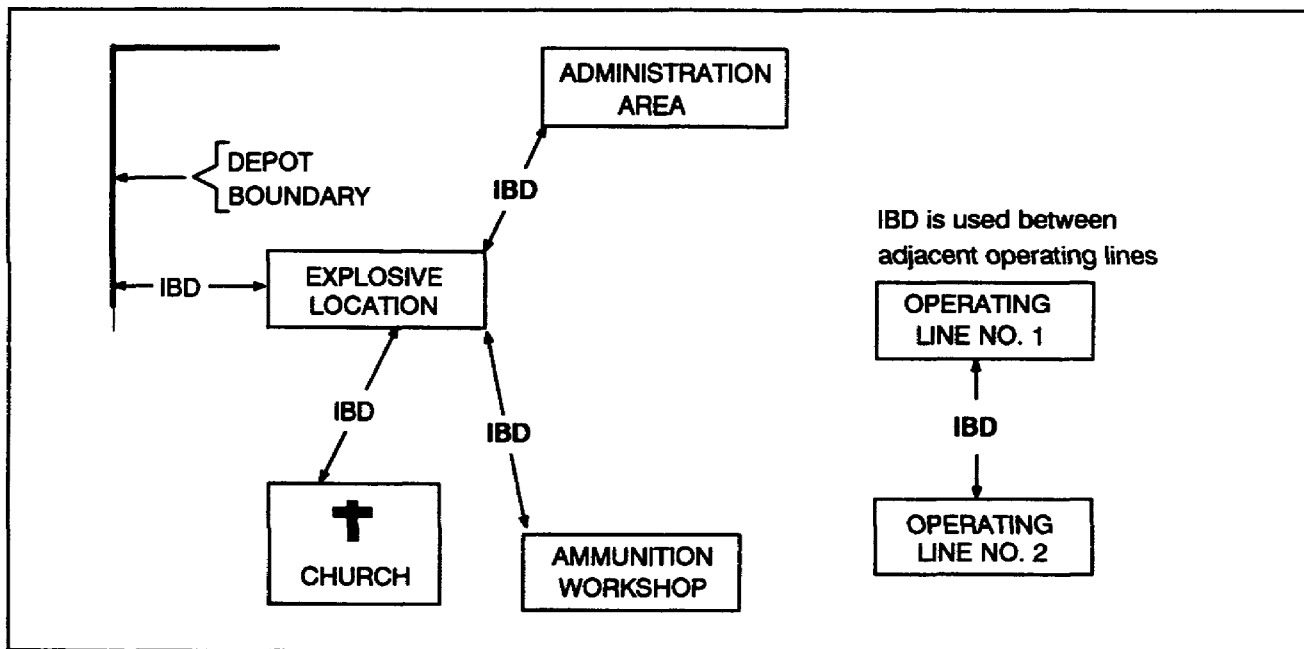
**Public Traffic Route Distance**

Public traffic route distance is the minimum distance permitted between the MSA and public roads, streams, and railways. See Figures 12, 13, and 14.



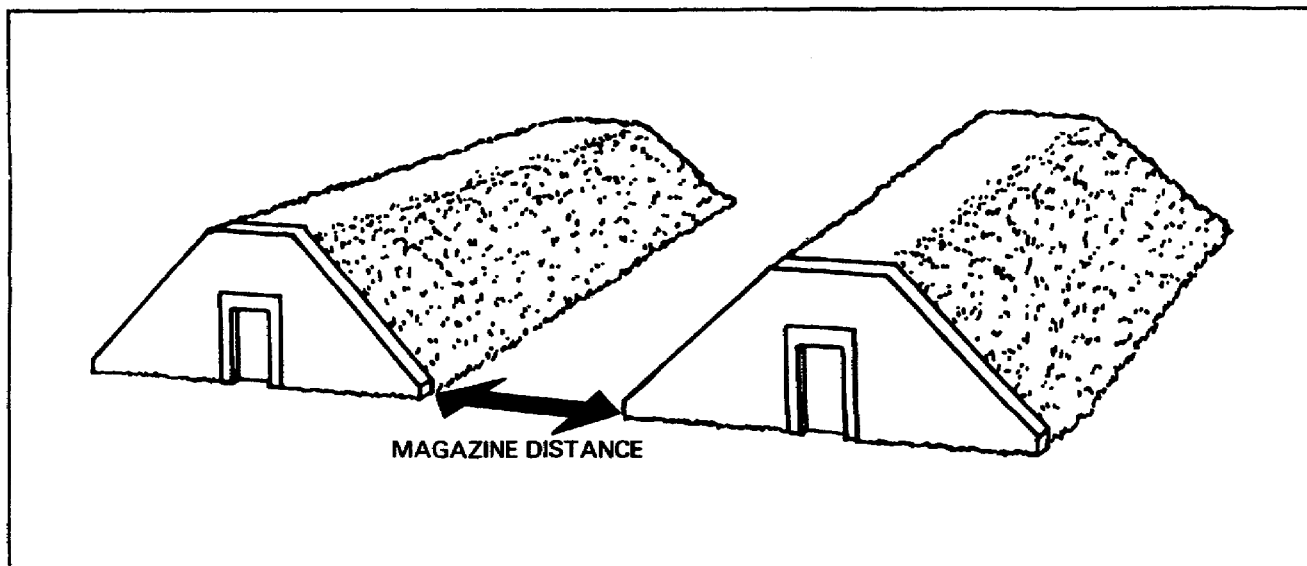
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Figure 9. Inhabited building.



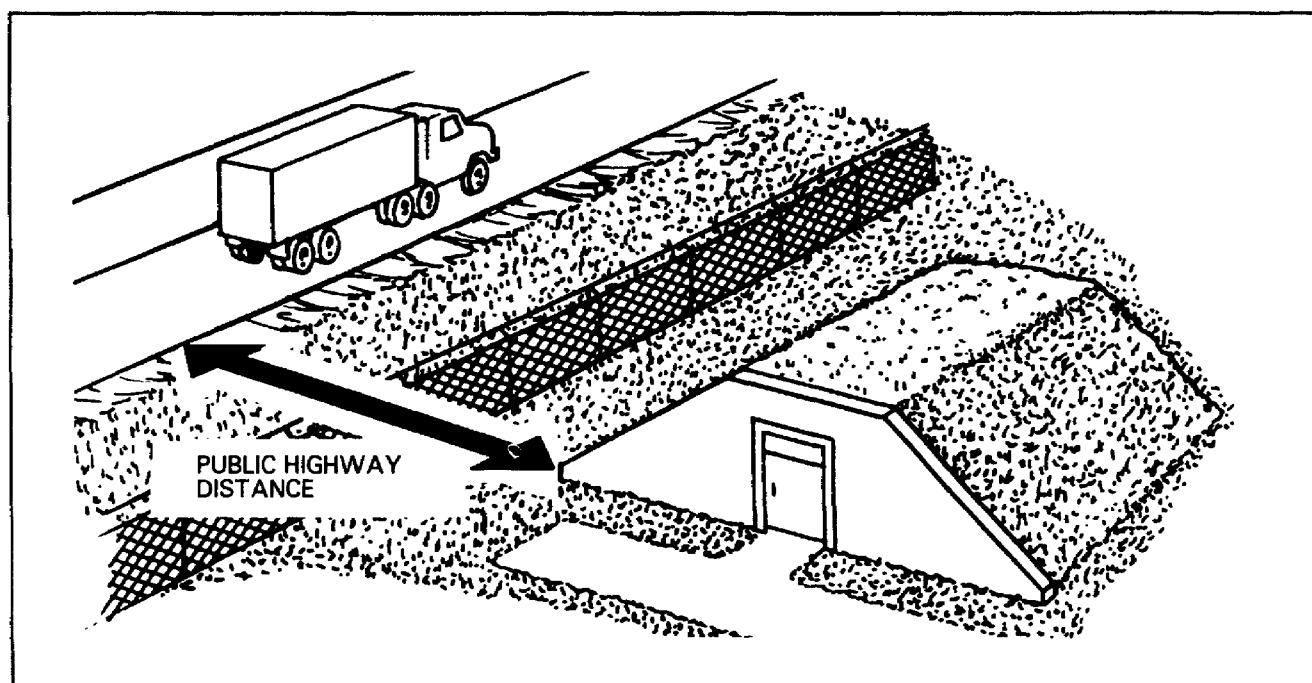
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Figure 10. Inhabited building distance (IBD).



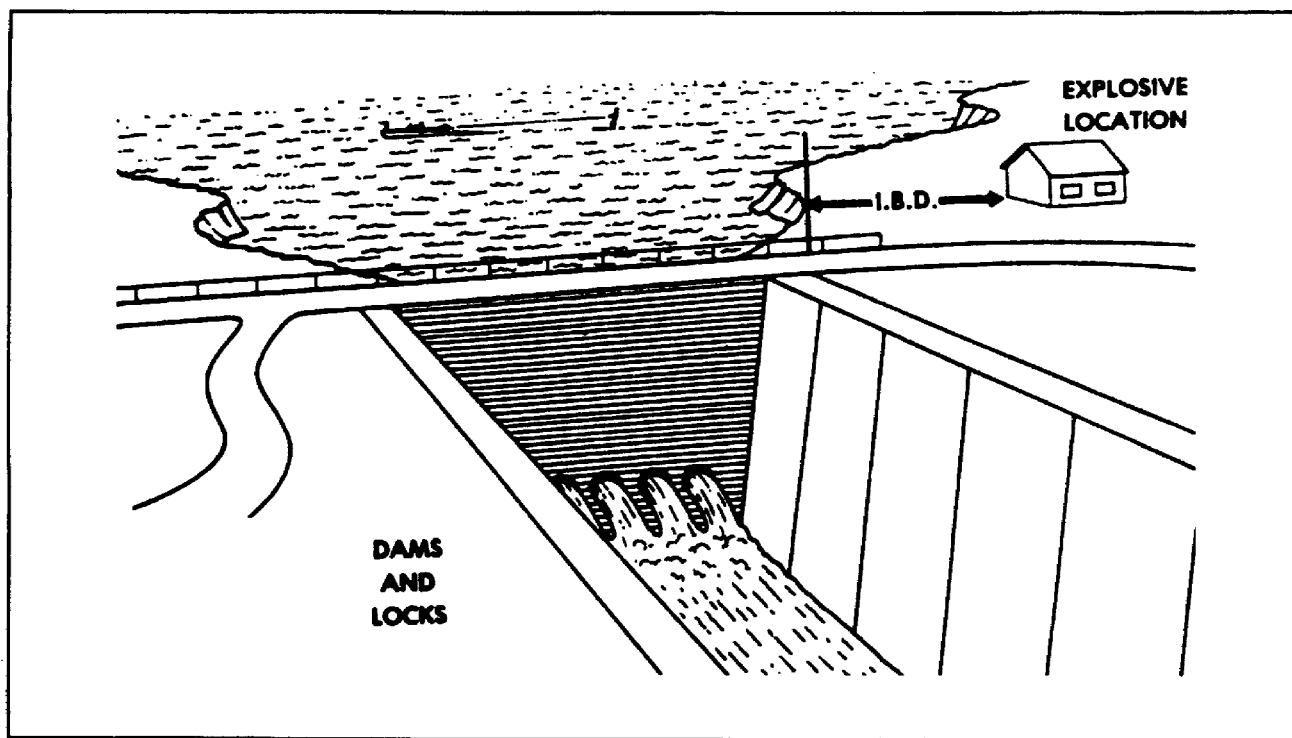
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Figure 11. Magazine distance.



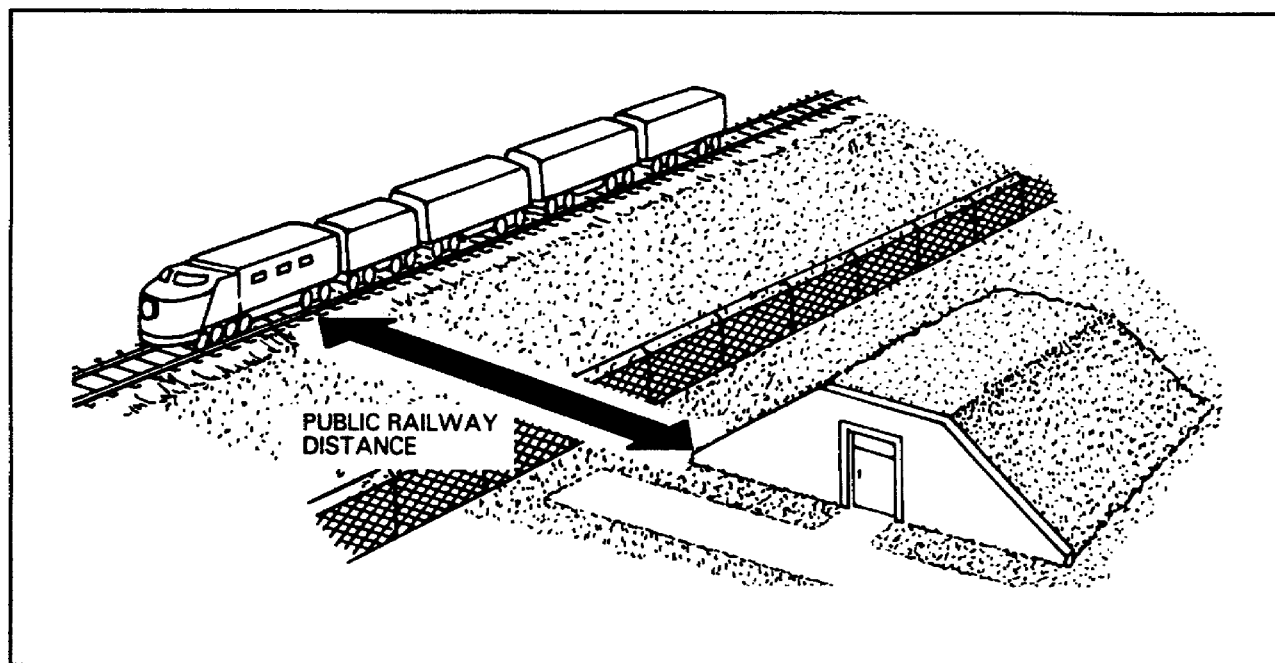
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Figure 12. Public traffic route distance.



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Figure 13. Public traffic route distance.



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Figure 14. Public traffic route distance.

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## PRACTICE EXERCISE

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The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What is intraline distance?
  - A. The minimum distance permitted between two buildings within an operating line.
  - B. The minimum distance between the mess hall and the magazine.
  - C. The minimum distance permitted between two storage magazines.
  - D. The minimum distance from the MSA and buildings used by people.
  
2. Which label is posted near or on the door of each magazine?
  - A. DA Label 50.
  - B. DA Label 85.
  - C. DA Label 100.
  - D. DA Label 120.
  
3. What type magazines are spaced 800 feet apart?
  - A. Service magazines.
  - B. Stradley magazines.
  - C. Prime or fuze magazines.
  - D. High explosive or black powder magazines.
  
4. How many main types of above-ground magazines are there?
  - A. One.
  - B. Two.
  - C. Three.
  - D. Four.
  
5. A firebreak around a magazine containing ammunition must be a minimum of how many feet?
  - A. 25 feet.
  - B. 50 feet.
  - C. 75 feet.
  - D. 100 feet.



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**LESSON  
ANSWER KEY AND FEEDBACK**

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*Item Correct Answer and Feedback*

1. A. The distance between two buildings within an operating line (Page 7).
2. B. DA Label 85 (Page 5).
3. D. High explosive or black powder magazines (Page 4).
4. B. Two (Page 4).
5. B. A 50-foot firebreak is required. (Page 5).