

CHAPTER III

MISCELLANEOUS CONSIDERATIONS

3-1. Earth Cover. Material for earth cover over magazines should be reasonably cohesive (solid or wet clay, or similar types of soil may not be used as they are too cohesive), free from deleterious organic matter, trash, debris, and stones heavier than 10 pounds or larger than 6 inches in diameter. The larger stones should be limited to the lower center of fills and will not be used for earth cover over magazines. Compaction and surface preparation should be provided, as necessary, to maintain structural integrity and avoid erosion. When it is impossible to use a cohesive material, for example, in sandy soil, the earth cover over magazines should be finished with a suitable material to ensure structural integrity. The minimum earth cover over the top of the magazine should be 2 feet, with a slope of 2 horizontal and 1 vertical. periodic maintenance must be performed to ensure restoration of erosion of cover below the 2-foot depth requirement. The earth-cover over and around the magazine is a critical element of the standard design. It provides some confinement and tends to directionalize the explosive force both upward and outward from the door end of the donor magazine. The cover over receiver magazines resists fragment penetrations and provides mass to the arch to resist the blast pressure. Where practical, earth cover should be seeded to prevent soil erosion. Where rainfall is insufficient to maintain grass cover, soil stabilization methods should be used.

3-2. Waterproofing. provisions are made in the standard magazine designs to ensure watertightness of the magazine. The type of magazine (steel or concrete) generally dictates the type of waterproofing used. An elastomeric membrane is most suitable on concrete arches, and a bituminous waterproofing is suitable on steel magazines. Moisture proofing difficulty is increased with steel-arch magazines because of the many lineal feet of joints.

3-3. Drainage Systems. Drainage systems are provided around the magazines to channel the water away from the structure. For concrete magazines, the drainage composite system is recommended. The older sand-gravel filter system is more costly and should be avoided, except for the steel arch where it is recommended due to the corrugated configuration.

3-4. Doors. Magazine doors are either of the swinging or the sliding type. Sliding doors are generally specified on large magazines, and swinging doors on smaller magazines. Doors are

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designed to withstand the dynamic forces from an explosion in an adjacent magazine and, therefore, are a critical element of the magazine design. These doors do not provide resistance to the effects of an explosion within the magazine.

3-5. Utilities and Power. The only utility usually required at a magazine site is electricity. This power is needed for lights at individual magazines, for perimeter lighting, and possibly for operation of electronic security equipment.

3-6. Road Network. The road network is not part of the standard design. The user must provide service to each magazine as part of the site adaptation process. vehicle size and wheel loads should be stated in the project development documentation. Forklift loads are usually the most critical. Two-lane roads are seldom required, except at the site entrance.

3-7. Aprons. Each magazine has an apron in front of its door to allow for loading and unloading. The aprons slope away from the door for drainage. Changes to the apron configuration to suit user needs will not compromise the pre-approved status of the standard design.

3-8. Retaining Walls (Wing walls). Retaining walls are for the sole purpose of retaining the earth fill away from the magazine doors. Construction type may vary from reinforced concrete, precast concrete to reinforced-earth systems. The slope of these walls should be 2 horizontal to 1 vertical.

3-9. Ventilation. Standard magazine designs usually include provisions for ventilation. Ventilation is provided by louvered openings in the headwall and ventilator stacks at the rear walls. Magazines intended for weapons storage containing certain active materials must be ventilated. Otherwise, louvers and ventilators are optional. Their necessity and size should be determined during the site adaptation based on material to be stored and geographical location.

3-10. Security. The security at a magazine complex is an integration of physical measures, equipment, and operational procedures. procedures are left to the using agency, since they are beyond the control of the designer. Limited security features included in the standard designs are high security hasp requirements at magazine doors (MIL-H-29181), steel bars at openings, shrouded ventilators, and basic provisions, i.e., steel conduit for electronic security equipment.

3-11. Cathodic protection. Cathodic protection may be required for steel-arch magazines and should be considered in areas where

galvanic action in some types of soils is likely to occur.

3-12. Lightning protection. Standard magazine designs include an integral system of lightning protection. The system consists of air terminals, roof conductors, down conductors, ground connections, and ground, electrically interconnected to form the shortest distance to ground. Lightning protection requirements are clearly described in each magazine specifications.

3-13. Mixing of Standard and Non-Standard Magazines. Mixing of standard and non-standard magazines is not cost effective and, therefore, is discouraged. The element that greatly influence the magazine classification (standard or non-standard) is the headwall and its door. Since the headwall and door cost is a small portion of the overall cost of the magazine, a greater benefit is realized from the increased storage capacity in standard magazines.