

CHAPTER 10
PROTECTIVE DESIGN CRITERIA

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CHAPTER 10
PROTECTIVE DESIGN CRITERIA

1. GENERAL. Protective design is defined as those passive measures that can be effected by construction related activities to reduce or nullify the effects of an attack or accidental explosion at an Army installation, or enhance the ability of the installation to recoup after an incident, or both. The term includes camouflage; protection of facilities against biological and chemical agents; physical security and anti-terrorist protection; explosives safety; conventional and nuclear weapons effects protection; and electronic emanations. It does not include all elements of passive defense such as immunization programs, or protective clothing.

2. POLICY.

a. Scope. All construction projects will be evaluated to determine the feasibility of providing protective measures against enemy action.

b. Alternatives. Protective design is one alternative among several that are available to reduce the vulnerability of forces, equipment, facilities, and missions. Other alternatives are dispersion of activities, duplication of facilities, and mobility of forces. When preparing projections of future force requirements and postures, the need for protective measures and the benefits to be derived therefrom must be considered. Protective design costs vary from near zero for such items as proper site selection or facility orientation and the proper application of "tone-down" painting, to extremely expensive for such items as the hardening of command posts to withstand direct hits from conventional weapons or near miss nuclear detonations. Therefore, in any planning of facilities, a complete range of actions must be studied with increasing detail and effort applied to the more costly alternatives. When making such studies, the importance of the facility to be protected must first be determined. Then a realistic attack or threat must be assumed that is consistent with intelligence information when extrapolated to the time period which the facility is to function. Such studies must consider that a "realistic" attack scenario changes with the protective measures employed, and is related to the total enemy capability as well as other targets that could be attacked.

c. Cost Increase. Protective measures that do not increase the cost of a project by more than 10 percent are acceptable and may be added without specific approval. When the cost increase exceeds 10 percent, guidance will be obtained from HQUSACE (CEMP-E).

3. SUPPORT.

a. Protective Design. Upon request, the U.S. Army Engineer District, Omaha, Protective Design Center of Expertise, will provide technical guidance in the areas of nuclear weapons effects protection, conventional weapons effects protection, biological and chemical agent protection, physical security and antiterrorist/force protection (AT/FP) and explosives safety.

b. Electronic Security Systems. (See Chapter 12.)

4. CONVENTIONAL AND NUCLEAR WEAPONS EFFECTS PROTECTION. Almost any design which includes strengthening of a facility to protect against the effects of nuclear or conventional weapons will require structural strength of a degree far beyond normal design. The lack of realistic environments in which to test designs has resulted in a much higher degree of dependence on analytic techniques and mathematical modeling than is customary in normal design. The tendency is to be very conservative in the approach to design, which is incompatible with the achievement of maximum economy. Nearly every problem is unique and requires the highest degree of mechanical competence and mathematical facility in both design and review. TM 5-1300 (reference 10-1), TM 5-858-1 through TM 5-858-8 series of manuals (references 10-2 through 10-9) and TM 5-855-1 and TM 5-855-4 (references 10-10 and 10-11) will be used during the design of Army facilities.

5. PHYSICAL SECURITY AND ANTITERRORISM/FORCE PROTECTION (AT/FP).

a. Security Engineering Manuals. TM 5-853-1 (reference 10-12) presents a systematic protective design process that considers economic, policy, intelligence, operations, architectural and engineering requirements related to physical security and AT/FP. The process guides engineers and planners in development of threats in terms of weapons, tools and explosives, and in development of mitigating measures for those threats. TM 5-853-2 and TM 5-853-3 (references 10-13 and 10-14) present more detailed design information on the mitigating measures for concept and final design. AT/FP design involves protection against high explosives and other weapons.

b. Electromagnetic Protective Measures. (See Chapter 12.)

c. Ammunition, Nuclear and Chemical Weapons Storage Facilities. TM 5-853-1 (reference 10-12) provides guidance for security of fixed installations, and AR 190-11 (reference 10-15), AR 50-5-1 (reference 10-16), and AR 190-59 (reference 10-17) provide security requirements for arms and ammunition storage facilities and nuclear and chemical weapons storage facilities, respectively. AR 190-13 (reference 10-18) provides policy guidance for the physical security of all Army facilities.

d. Chain-Link Security Fencing. Appropriate definitive and standard design drawings (references 10-19 through 10-28) are to be used in conjunction with CEGS 02831 (reference 10-29) for chain-link security fencing.

6. DECOMMISSIONING OF NUCLEAR FACILITIES. All facilities which handle, maintain, produce, store, or use radioactive materials will be designed to facilitate decommissioning at the end of their useful lives. The facilities and sites must be secured to protect public health and safety or decontaminated to acceptable residual contamination levels.

7. AMMUNITION AND EXPLOSIVES FACILITIES. AR 385-64 (reference 10-30) is the Army's basic document on ammunition and explosive safety. Facilities that handle or store ammunition and explosives are unique in that plans must be reviewed and approved by the DoD Explosives Safety Board (DDESB) before construction can begin. The procedure for obtaining approval is described in AR 385-60 (reference 10-31). Standard pre-approved designs exist for various magazines and for an ammunition surveillance facility. The Index of Design Drawings for Military Construction on TECHINFO (reference 10-32) and EP 1110-345-102 (reference 10-33) should be consulted for the current versions of these designs. Use of standard designs eliminates the need for DDESB to review structural drawings. Siting plans require DDESB approval at the concept stage whether standard designs are used or not.

8. REFERENCES.

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- 10-2 TM 5-858-1, Designing Facilities to Resist Nuclear Weapons Effects, Facilities System Engineering, 31 October 1983
- 10-3 TM 5-858-2, Designing Facilities to Resist Nuclear Weapons Effects, Weapons Effects, 6 July 1984
- 10-4 TM 5-858-3, Designing Facilities to Resist Nuclear Weapons Effects, Structures, 6 July 1984
- 10-5 TM 5-858-4, Designing Facilities to Resist Nuclear Weapons Effects, Shock Isolation Systems, 11 June 1984
- 10-6 TM 5-858-5, Designing Facilities to Resist Nuclear Weapons Effects, Air Entrainment, Fasteners, Penetration Protection, Hydraulic-Surge Protective Devices, EMP Protective Devices, 15 December 1983
- 10-7 TM 5-858-6, Designing Facilities to Resist Nuclear Weapons Effects, Hardness Verification, 31 August 1984

- 10-8 TM 5-858-7, Designing Facilities to Resist Nuclear Weapons Effects, Facility Support Systems, 15 October 1983, Change 1, 17 April 1985
- 10-9 TM 5-858-8, Designing Facilities to Resist Nuclear Weapons Effects, Illustrative Examples, 14 August 1985
- 10-10 TM 5-855-1, Fundamentals of Protective Design for Conventional Weapons, 3 November 1986
- 10-11 TM 5-855-4, Heating, Ventilation, and Air Conditioning of Hardened Installations, 28 November 1986
- 10-12 TM 5-853-1, Security Engineering - Project Development, May 1994 (FOUO)
- 10-13 TM 5-853-2, Security Engineering - Concept Design, May 1994 (FOUO)
- 10-14 TM 5-853-3, Security Engineering - Final Design, May 1994 (FOUO)
- 10-15 AR 190-11, Physical Security of Arms, Ammunition, and Explosives, 31 March 1986
- 10-16 AR 50-5-1, Nuclear Surety, 3 October 1986 (Regulation is classified confidential)
- 10-17 AR 190-59, Chemical Agent Security Program, 27 June 1994
- 10-18 AR 190-13, The Army Physical Security Program, 30 September 1993
- 10-19 DEF 872-10-01, Weapons Storage Area, Fence Details and Vehicle Barrier, June 1992
- 10-20 DEF 872-90-01, Weapons Storage Area, Perimeter Warning Sign, revision B, June 1992
- 10-21 STD 872-90-02, FE5 Chain-Link Security Fence Details, May 1992
- 10-22 STD 872-90-03, FE6 Chain-Link Security Fence Details, May 1992
- 10-23 STD 872-90-04, FE7 Chain-Link Security Fence Details for Non-Sensored Fence, May 1992
- 10-24 STD 872-90-05, FE8 Chain-Link Security Fence Details for Sensored Fence, May 1992
- 10-25 STD 872-90-06, FE5 Chain-Link Security Fence Details for Sensored Fence, May 1992
- 10-26 STD 872-90-07, FE5 Chain-Link Fence Gate Details, May 1992
- 10-27 STD 872-90-08, FE6 Chain-Link Fence Gate Details, May 1992
- 10-28 STD 872-90-09, FE7 Chain-Link Fence Gate Details, May 1992
- 10-29 US Army Corps of Engineers Guide Specification (CEGS) 02831, Chain-Link Fence, July 1992 or latest edition
- 10-30 AR 385-64, Ammunition and Explosives Safety Standards, 22 May 1987
- 10-31 AR 385-60, Coordination with Department of Defense Explosives Safety Board, 1 January 1982
- 10-32 Index of Design Drawings for Military Construction 14 July 1989

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20 July 1998

10-33 EP 1110-345-102, Explosives Storage Magazines, 31 August 1995