DEPARTMENT OF THE AIR FORCE
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Engineering Technical Letter (ETL) 86-10: Antiterrorism Planning and Design Guidance

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AFIT/DET/DEM			

1. Purpose. The facility designer's dilemma with regard to terrorism is to provide facilities that ensure mission continuity, personnel safety, architectural acceptibility and accpetable costs. The intent of this document is not to encourage the design and construction of hardened facilities but to raise the level of awareness among planners and designers of those measures that can be taken within functional, aesthetic and cost limitations.

a. This ETL contains information on installation planning, engineering design and construction techniques that can be used to minimize the effects of terrorist attacks upon existing and future facilities. It addresses comprehensive planning concepts, site planning and building system design concepts. It is not intended to identify or define a terrorist threat. The provisions of this document are presented as "guidelines" and are to be applied when/if MAJOMS/Installations determine the need.

b. This document is developed in three basic sections: Installation Planning, Facility Design and Building Systems. The Installation Planning section addresses facility siting and long range development concepts as developed by the Base Comprehensive Plan (BCP). The Facility Design section addresses concerns outside of the building perimeter, exterior utility systems, and functional design concepts. The Building Systems section addresses the concerns within and including the facility facade.

c. The guidance contained in this document is aimed at limiting access, preventing major structural damage and minimizing loss and damage to facility contents due to terrorist activities. However, there are no universal solutions to terrorism since the threat is largely undefined and certainly will change over time. Every design must be a balance of competing

demands
and considerations. The planner and designer must therefore be innovative and
look for additional opportunities and techniques for integrating physical
security measures. Make antiterrorism a conscious consideration.

2. Effective Date - Immediately.

3. Referenced Publications.

a. AFR 86-4, Base Comprehensive Planning.

b. Draft AFR 88-15, Air Force Design Manual - Criteria and Standards for Air Force Construction.

c. Terrorist Vehicle Bomb Survivability Manual (Vehicle Barriers), March 1986. Naval Civil Engineering Laboratory, Port Hueneme, California 93043. (Copy provided under separate cover).

d. Access Points for U.S. Army Installations, Definitive Drawings, June 7, 1985. U.S. Army Engineer Division - Huntsville, Corps of Engineers, Huntsville, Alabama, 35807.

e. AFM 88-22, Structures to Resist the Effects of Accidental Explosions.

4. Installation Planning.

a. Introduction

(1) Design option should be identified at the earliest stages of the planning and facility programming process. Much can be done in the arrangement of land uses, siting, orientation and design of facilities to decrease vulnerability to terrorist attack.

(2) The comprehensive plan is the primary guide for future installation development. These plans provide information on the resources, requirements and development options of an installation, and establish priorities for construction programs. Physical security requirements and considerations should be prepared with input from representatives of a cross section of base organizations, including Security Police and AFOSI. This will help ensure that security considerations are coordinated among all base using agencies.

(3) Planning Assistance Team (PAT) visits should include a Security Police representative for an analysis of physical security requirements. The PAT should addess potential planning and design solutions for terrorism.

b. Land Use Planning

(1) Proposed land use plans should be based on an evaluation of surrounding on and off base constraints and opportunities. These include terrain, vegetation (including agriculture) and structures which could conceal or facilitate access be adversaries or could permit outside observation of Air Force activities.

(2) Plan land use to provide clear zones around sensitive facilities/areas, (see Atch 1).

c. Siting.

(1) The location of the facility, as well as the natural features of
the site, can be used to limit the opportunity for and effects of terrorism.
Projects should be individually evaluated based upon the criteria:

(a) Siting facilities a minimum of 150 feet inside of the base perimeter reduces vulnerability to attacks from outside the base perimeter, (see Atch 1).

(b) Facilities can be sited so that topographic features, vegetation and adjacent structures will permit building occupants and security personnel to clearly monitor the adjacent area, (see Atch 2).

(c) Facilities sited at locations adjacent to higher surrounding terrain, other buildings, vegetation or topographic features such as drainage channels, ditches, ridges or culverts have increased vulnerability, (see Atch 3).

(d) Sites can be landscaped with vegetation in a manner that permits building occupants to look out but does not allow people outside of the facility to monitor the functions or people within the facility.

(e) Locating facilities containing function critical contents away from densely populated structures can reduce personnel unjury/loss.

d. Transportation Planning

(1) Base gates, possible "soft" entry points in the base perimeter, and approach areas (including overland routes) should not permit direct or straight line vehicle access leading to high risk resources, (see Atch 4).

(2) Provide alternate access/egress routes for fuel and munitions delivery vehicles.

e. Other Considerations

(1) Review adequacy of explosive ordinance disposal facilities, plans and procedures.

(2) Ensures that physical security aspects of beddown and other basing support activities are considered in theater of operations deployment planning. For example, plan for and provide adequate physical security in Base Base layouts, Prime BEEF/RIBS and RED HORSE encampments, and prepositioning equipment storage sites.

(3) Ensure that adequate physical security is addressed in overall planning of basing systems to support new weapons systems (such as the Small

Missile, GLCM and the Advance Tactical Fighter/Advanced Tactical Bomber).

5. Facility Design.

a. Installation/Facility access.

(1) Consider minimizing the number of access road/entrances into the installation/facility.

(2) Eliminate driveways within or under facilities.

(3) Avoid parking beneath facilities and avoid parking areas within 150 feet of facilities.

(4) When perimeter crash protection is required, provide a barrier consisting of a low wall (4 feet)/earth berm topped with fencing as a vehicle crash resistant system.

(5) Consider using vehicle barriers at installation entries and on drives that come within 150 feet of a facility perimeter (i.e. service drives and/or entrance drives). Barriers should be incorporated into a total perimeter system capable of stopping large, high speed vehicle carrying explosives.

(a) It is important to design and construct installation and facility entry points so that the velocity of any vehicle that might attempt crash it is impeded. Straight line vehicle approaches to a barrier should, therefore, be avoided when possible.

(b) Vehicle barriers can take many forms and be constructed of several materials and/or combinations of materials. They are categorized as static (passive) or active barriers. The static barriers are fixed in place and are used to channel traffic flow thru an access point, they rely on their bulk mass for effectiveness and have no moving parts. The active barriers are operable devices used to control access thru a gate or entrance, they require action by personnel or equipment to permit entry.

(c) For a reference on static and active barriers see Corps of Engineers Definitive Drawings on "Access Points for U.S. Army Installations" sheets 8 thru 10 of 12, drawing code DEF 872-50-01 and/or the Naval Civil Engineering Laboratory "Terrorist Vehicle Bomb Survivability Manual (Vehicle Barriers)".

(d) Chain link fences provide minimal protection as vehicle barriers. A car or light truch can easily penetrate most chain link fences.

b. Building Design Concepts. During initial development of the building design consider the following:

(1) Earth sheltered designs to reduce overall building

elevation.

(2) One story windowless buildings with skylighting, for technical and psychological effect.

(3) Placing the ground floor elevation at 4 feet above grade to prevent a vehicle from being driven up to and into the facility.

(4) Designing administrative buildings around an atrium/inner courtyard to provide an inward verses an outward focused facility.

(5) Placing personnel in the core of administrative buildings and expendable resources, such as files, restrooms and mechanical rooms, along the perimeter walls.

(6) Orienting the building horizontally as opposed to vertically to reduce the building profile and exposure.

(7) Designing safe havens/secure areas within the facility.

(8) Trash receptacles should not be placed with 150 feet of the facility, (see Atch 4).

(9) Not allowing structural elements such as columns to be exposed on the outside of the facility.

(10) Using earth tone colored materials and finishes on exterior surfaces diminishes prominence.

(11) Using smooth faced materials and architectural features on exterior walls to reduce the potential to scale the walls.

(12) Sloping exterior walls outward or providing architectural obstructins to make scaling difficult.

(13) Keeping exterior wall penetrations, doors, windows, etc. to an absolute minimum.

(14) Limiting the total glazed area on the facade to 15 percent of less of the total facade area.

(15) Turning glazed areas perpendicular to the facade to reduce exposure to blast and projectiles.

(16) Not allowing vehicle parking facilities within 15 feet of the facility facade, (see Atch 4).

(17) Eliminating signage on critical facilities and/or using verbiage to down play its critical nature.

(18) Screening play and outdoor recreation areas from public view.

(19) Eliminating the possibility for direct drive up to the facility entrances and/or under the facility, (see Atch 4).

(20) Not allowing parking beneath the facility.

(21) Creating humanly scaled, warm personalized areas in facilities that have been designed with a minimum of openings.

(22) Minimizing vehicular and pedestrian access points to the facility.

(23) Incorporating grills, screens, etc. on windows and other penetrations that occur within the first 16 feet of facility elevation.

c. Exterior utility systems

(1) Utility systems should follow the same protection guidelines as the supported facility. Limit visibility and access and provide physical protection as the level of threat dictates.

(2) Utility systems should be provided with redundant or loop service. Where more than one source or service is not currently available, provisions for future connections should be provided. In the interim, consider "quick connects" at the facility for portable backup systems.

(3) When possible, install utility system underground. Maximize the use of landscaping to conceal aboveground systems.

(4) Access to central heat and power plants, gas mains, fuel network equipment (pumps and valves), electrical substations and main water supplies should be secured at all items. Prevent covert acess to utilidors, concrete trenches, storm drains, duct systems, etc. Storm, sanitary and electric manhole covers should have locking devices. Use electronic monitoring on critical manhole covers.

(5) Minimize signs identifying key utility systems. Avoid signs such as "Main Base Electrical Substations."

(6) Locate petroleum, oil and lubricants (POL) storage tanks and operations facilities down slope and at least 100 feet from allother facilities. Site fuel tanks at an elevation lower than operations buildings or utility plants.

(7) Consider providing back up potable and nonpotable water supplies to critical facilities.

6. Building Systems.

a. Architectural

(1) To resist fires, window areas and other wall penetrations should be designed to limit the entry of incendiary devices. Protection can take the form of venetian blinds, curtains, grills, screens, etc.

(2) Glazing, under suddenly applied loads due to explosions and the associated large pressure changes, can produce lethal flying glass fragments. In order to contain these glass fragments together. Such films can be surface applied or be an integral part of the glazing system.

(3) Masonry interior partitions generally provide better blast protection than gypsum wall partitions and/or other free standing wall systems.

(4) Interior materials should be of the highest fire rating possible.

(5) Roof access hatches should be lockable from the interior.

(6) Roof access ladders should be removable/retractable or lockable.

b. Structural

(1) The structural frame must be designed to withstand localized blast effects that would result in a major structural collapse of the facility. Structural damage without collapse of the facility is an acceptable and practical design parameter. Hazards to the personnel who occupy the structure should be minimal.

(2) Consider the following general points to improve facility blast resistance.

(a) Eaves and overhangs should be avoided since these are points of high local pressure and suction. When used, they must be designed to withstand the blast effects.

(b) Windows that have measures taken to ensure integrity of the glass will increase loads on supporting walls.

(c) Antiscabbing (spalling) measures may be incorporated: i.e. profiled sheeting as permanent slab framework when large rotations or perforations are anticipated.

(d) Wire mesh in plaster, expanded metal or reinforcing in masonry bed joints reduce the incidence of flying fragments.

(e) Ductile materials are capable of safely withstanding very large deformations without complete failure.

(f) Reinforced concrete construction - stocky construction, internal damping by massive cracking means little rebound under large deflections. This is suitable for extremely close in explosions.

(g) Structural steel construction - slender structural sections, local instability and bucking give unpredictable ultimate capacities. Stress concentrations at welds, joints, notches are suited to structures subjected to low pressure loading.

c. Electrical

(1) Electrical distribution systems should be configureed to provide both a technical (critical) and a nontechnical bus. The technical bus should automatically transfer to the stand-by power source, if so equipped. The nontechnical load should be provided with a quick connect point for hook up to a mobile power generator.

(2) Consider using electronic security and surveillance systems where mission and threat dictate. Work requirements and approaches with Security Police and AFOSI antiterrorism specialists.

d. Mechanical

(1) Heating, ventilation and air conditioning (HVAC) systems should be protected from attack using bars and grates. In addition, the use of protected areas (safe havens) within a facility may dictate the need for isolated HVAC control systems and air supplies.

(2) Consider use of tapered seat blast valves in HVAC system ducting.

7. Reference Chart.

To Protect From	Consider
1. Flying Glass	1a. Mylar film to reduce glass fragments. b. Design glazing and frame to resist blast/projectile loads. c. Reduce number and size of apertures.
2. Bomb blast (nonvehicular) within 150 foot radius of facility.	2a. Minimize pedestrian access points. b. Eliminate exposed structural members.
3. Vehicle bomb at installation perimeter.	3a. Vehicle barriers fixed and/or operable thru channelized drive. b. Perimeter barrier consisting of combination low wall (4 feet) topped with fencing.
4. Vehicle bombs at facility.	4a. Access control (vehicle barriers) on all drives up to facility. Locate at 150 foot radius. b. Elimination of driveway access within 150 foot radius, c. Low wall (4 foot) barrier at 150 foot radius.

8. Office of Primary Responsibility.

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FOR THE CHIEF OF STAFF

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