

ANTI-TERRORISM SITE DESIGN GUIDELINES FOR U.S. MILITARY INSTALLATIONS:
AN EVALUATION OF THE IMPLEMENTATION PROCESS AT U.S. ARMY FORTS
IN TEXAS AND LOUISIANA

by

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ABSTRACT

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It is of vital importance to accommodate the need for security in site plans and designs on all military installations. Terrorism prevention, referred to as *force protection* by the United States Department of Defense, is accomplished through a combination of landscape and facility design standards. To minimize the likelihood of mass casualties from terrorist attacks against military personnel in the facilities in which they work and live, the Department of Defense has established design standards that shape the site design process. (Unified Facilities Criteria 4-010-01)

This research examines each stage of the implementation process of anti-terrorism site design guidelines for possible weaknesses and inconsistencies, then makes recommendations for improvements to the process. The research uses qualitative methods to evaluate the standard anti-terrorism site design guidelines and how they are implemented on selected U.S. military installations. The study is focused on Fort Hood, Fort Sam Houston, Fort Bliss, and Fort Polk.

Initially, primary military documents that contain anti-terrorism/force protection guidelines were studied for content, and compared to non-military literature on crime prevention through site design. Analysis of the literature resulted in a list of site design concepts for planning secure military installations. This list of design concepts were compared to the installation design guides of the selected military installations. Then interviews were conducted with three groups of key informants: U.S. Army Corps of Engineers Military Planning Staff, U.S. Army Installation Anti-terrorism Specialists, and U.S. Army Installation Planning Staff. Using the *data triangulation* method, the three groups' responses were compared, to search for themes or inconsistencies. (Taylor 1998, p. 80) The comments from the interviews revealed how well site-related anti-terrorism/force protection (AT/FP) site design standards are carried from one document to the next and ultimately to built military projects. The results indicate that there are some consistencies and inconsistencies in the perceptions of military personnel on the implementation of anti-terrorism site design standards.

Landscape Architects, engineers, and planners working for the U.S. Department of Defense are required to follow anti-terrorism/force protection guidelines, which affect the overall development of United States military installations. This study is valuable in ensuring that the U.S. Army Corps of Engineers is designing secure environments in which American soldiers work and live. Additionally, this research contributes to the profession of landscape architecture by educating practitioners on the role that site design plays in preventing terrorism.

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CHAPTER 1
INTRODUCTION
1.1 Overview

Facilities, personnel, and equipment of the United States Department of Defense present themselves as high-value potential targets of attack for terrorists. Although we cannot totally eliminate the possibility of an attack, the possibility can be greatly reduced by proper installation design. For this reason, the Department of Defense has developed written guidance on security issues for the planning, design, and construction of military installations to reduce the vulnerability to terrorist attacks. (UFC 4-010-01, 2007) In addition to this guidance, many other sources exist that offer information about crime prevention through environmental design. This thesis examines the U.S. Department of Defense site design standards for anti-terrorism/force protection, how they compare to non-military design guidelines for crime prevention, and how these standards are implemented on U.S. military installations.

The goal of the Department of Defense is to preclude or minimize the effects of terrorist attacks upon existing and future facilities. Military personnel use the term *force protection* when referring to measures designed to protect personnel, facilities, and equipment from terrorist attacks. Design Standards are in place for both the comprehensive planning process and facility site design with regard to force protection. These standards cover a wide range of topics that greatly affect the planning process and site design of military installations. Anti-terrorism/force protection (AT/FP) standards are documented in the Unified Facilities Criteria (UFC) 4-010-01. In addition to the UFC, each installation has its own specific guide called the *Installation Design Guide*, which describes how to best integrate the force protection design standards into the development of that installation. Content from the IDG is then used in the Request For Proposal

(RFP) for specific development projects impacting the outcome of the built environment at the chosen Army installations.

1.2 Purpose Statement

This research examines each stage of the implementation process of anti-terrorism site design guidelines for possible weaknesses and inconsistencies, and then makes recommendations for improvements to the process. This research evaluates the series of documents used to communicate and implement security site design guidelines created by the United States Department of Defense for minimizing the effect of terrorist attacks on U.S. military installations. The types of documents evaluated include the Unified Facilities Criteria (UFC 4-010-01, 2007), the Installation Design Guide (IDG), and Requests for Proposal of specific projects.

The following research questions form the theoretical foundation for this study:

1. How do the Army's site design guidelines for security compare to those found in non-military literature?
2. Are the anti-terrorism site design guidelines from the document which they originated covered in subsequent documents?
3. Are the anti-terrorism site design guidelines implemented into the construction of specific projects?

1.3 Methodology

This study focuses on the implementation process of anti-terrorism site design guidelines on four U.S. military installations Fort Hood, Fort Sam Houston, Fort Bliss, and Fort Polk. Preliminary methodology followed for data collection and analysis in this research include: content analysis of military and non-military documents, interview with key stakeholders in the Implementation process, and some preliminary observations of the application of the guidelines on some of the military bases under review.

Initially, the information related to security and site design, as found in the various military sources, such as the Unified Facilities Criteria (UFC 4-010-01, 2007), the Installation Design Guide, the Request for Proposal of specific projects, and non-military sources, such as *Crime Prevention Through Environmental Design*, *SafeScape*, and *Handbook of Loss Prevention and Crime Prevention*, was used to create a comparison matrix. This matrix highlights issues relevant to site design for security related concerns. Security concepts repeated in military and non-military documents demonstrate universal ideas that can be applied to all situations where enhanced security is desirable. The matrix also serves as an index that makes it easy to locate information on a specific topic in the covered literature.

Then, interviews were conducted with key informants who are actively involved in development processes on military installations and who regularly deal with anti-terrorism/force protection issues. The focus of the interview is to find what elements of force protection have been implemented on selected military development projects and to determine qualitatively what does or does not work. Results from the interviews are compared to the matrix created from the literature.

Finally, preliminary observations are made about selected installations from secondary sources. Additionally, site visits provide examples of implementation outcomes of these guidelines.

This research examines each stage of the implementation process of anti-terrorism site design guidelines for possible weaknesses and inconsistencies. The end product of the research is an overview of the implementation process of anti-terrorism/force protection site design guidelines on U.S. military installations, and recommendations are made for possible improvements to the process.

1.4 Significance and Limitations

This research provides an overview of the role that site design plays in protecting U.S. forces and facility assets from acts of terrorism on U.S. military installations. This overview of

security design concepts is important to Landscape Architects, Urban/Community Planners, Engineers, and other practitioners involved in planning and site design as it relates to anti-terrorism/force protection.

The research is valuable to designers, first by stressing the importance of planning security early in the design process, and second by providing security concepts that can be incorporated into future plans as needed. The research also outlines for designers the practical application of the security concepts and gives examples used by the U.S. Department of Defense.

This research is valuable to the Department of Defense, as it examines the process of force protection and compares the concepts currently in use to those found to be successful in the design practice outside the military. In addition, this research seeks to identify security objectives and how they have been accomplished through landscape architecture.

This research has several limitations. First is the sensitive nature of the information obtained throughout this study. Care was taken to prevent the exposure of any confidential information that could jeopardize the security of United States military installations. As such, only published documents and criteria were used in this analysis. Additionally, specific sites and their identifying information were masked to prevent any information that could be used against the U.S. Department of Defense from being revealed. Authorization for the use of military literature and pictures was obtained from appropriate military personnel at several stages of the research process (see Appendix A for the authorization letter).

One significant limitation in the study was the controlled access to facilities and information. The process of obtaining access to certain areas of military installations for research purposes was time consuming. Military officials had to be informed of the reason for the study, the nature of the study, and exactly what pictures would be taken at each installation.

An additional limitation is the restriction of time available with a graduate level thesis. Therefore, the study was restricted to Army forts that are under the responsibility of the Fort

Worth District of the U.S. Army Corps of Engineers. These forts include Fort Bliss, Fort Hood, Fort Sam Houston, and Fort Polk. Department of Defense personnel chosen for interviews were located at the Corps of Engineers District office in Fort Worth, Texas, and on base at the chosen installations.

1.5 Definition of Terms

The following terms apply in the discussion of anti-terrorism/force protection at U.S. military bases.

Access control – Any combination of barriers, gates, electronic security equipment, and/or guards that can deny entry to unauthorized personnel or vehicles. (UFC 4-010-01, 2007)

Access control point (ACP) – Entry point to the installation that accommodates the functions of observation, detection, inspection, access control, and disablement of hostile personnel and vehicles, while containing the vehicles and pedestrians until access is granted. (Fort Hood IDG, sec. 12.3.8)

Billeting – Any building or portion of a building, regardless of population density, in which 11 or more unaccompanied Department of Defense personnel are routinely housed, including temporary lodging facilities and military family housing permanently converted to unaccompanied housing. Billeting also applies to expeditionary and temporary structures with similar populations and functions. (UFC 4-010-01, 2007)

Controlled perimeter – For the purposes of these standards, a physical boundary at which vehicle access is controlled at the perimeter of an installation, an area within an installation, or another area with restricted access. A physical boundary will be considered as a sufficient means to channel vehicles to the access control points. At a minimum, access control at a controlled perimeter requires the demonstrated capability to search for and detect explosives. Where the controlled perimeter includes a shoreline and there is no defined perimeter beyond the shoreline, the boundary will be at the mean high water mark. (UFC 4-010-01, 2007)

Conventional construction – Construction methods designed only to resist common loadings and environmental effects, such as wind, seismic, and snow loads. (UFC 4-010-01, 2007)

DoD building – Any building or portion of a building (permanent, temporary, or expeditionary) owned, leased, privatized, or otherwise occupied, managed, or controlled by or for the U.S. Department of Defense. DoD buildings are categorized within these standards as low occupancy, inhabited, primary gathering, high occupancy family housing, and billeting. (UFC 4-010-01, 2007)

DoD personnel – Any U.S. military, DoD civilian, or family member thereof, host-nation employees working for DoD, or contractors occupying DoD buildings. (UFC 4-010-01, 2007)

Force protection condition (FPCOM) – A DoD-approved system that standardizes the Departments' identification and recommended preventive actions and responses to terrorist threats against U.S. personnel and facilities. This system is the principle means for a commander to apply an operational decision on how to protect against terrorism and facilitates inter-Service coordination and support for antiterrorism activities. (UFC 4-010-01, 2007)

Installation design guide (IDG) – Guidance for standardizing and implementing sustainable design and development throughout the installation in support of mission readiness. (Fort Hood IDG, 2006)

Inhabited building - Buildings or portions of buildings routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 40 gross square meters (430 gross square feet). This density generally excludes industrial, maintenance, and storage facilities, except for more densely populated portions of those buildings. such as administrative areas. The inhabited building designation also applies to expeditionary and temporary structures with similar population densities. In a building that meets the criterion of having 11 or more personnel, with portions that do not have sufficient population densities to qualify as inhabited buildings, those portions that have sufficient population densities will be

considered inhabited buildings, while the remainder of the building may be considered low occupancy, subject to provisions of these standards. An example would be a hangar with an administrative area within it. The administrative area would be treated as an inhabited building, while the remainder of the hangar could be treated as low occupancy. (UFC 4-010-01, 2007)

Level of protection - The degree to which an asset (person, equipment, object, etc.) is protected against injury or damage from an attack. (UFC 4-010-01, 2007)

Parking - Designated areas where vehicles may be left unattended. (UFC 4-010-01, 2007)

Primary gathering building - Inhabited buildings routinely occupied by 50 or more DoD personnel. This designation applies to the entire portion of a building that meets the population density requirements for an inhabited building. For example, if a portion of an inhabited building has 50 or more people in it, the entire inhabited portion of the building will be considered a primary gathering building. Inhabited buildings whose populations are increased through inhabited building additions such that the combined building meets the definition of a primary gathering building will be considered to be primary gathering buildings for their entire inhabited portions. The primary gathering building designation also applies to expeditionary and temporary structures with similar populations and population. (UFC4-010-01, 2007)

Roadways - Any surface intended for motorized vehicle traffic. (UFC 4-010-01, 2007)

Specific threat - Known or postulated aggressor activity focused on targeting a particular asset. (UFC 4-010-01, 2007)

Standoff distance - A distance maintained between a building or portion thereof and the potential location for an explosive detonation. (UFC 4-010-01, 2007)

Unified Facilities Criteria (UFC) – A document that establishes the minimum building antiterrorism standards for all Department of Defense components. (Fort Polk IDG 2006, sec. 12.2.1)

Unobstructed space - Space within 10 meters (33 feet) of an inhabited building that does not allow for concealment from observation of explosive devices 150 mm (six inches) or greater in height. (UFC 4-010-01, 2007)

1.6 Summary

In an effort to minimize the effects of potential terrorist attacks, the U.S. Department of Defense developed site design guidelines that are required to be implemented on new military construction projects. These guidelines greatly impact the way military installations are planned and developed. This research examines the documents used to implement anti-terrorism/force protection guidelines, as well as perceptions of the process by Army personnel involved in the site development of four Army forts in Texas and Louisiana.

The remainder of this document develops the subject thesis as follows:

- Chapter Two provides insight into military and non-military literature. The various sources are compared and a list evolves of the key concepts related to site design and security. See “Literature Review” on page 9.
- Chapter Three outlines the research methods used in this study and gives an illustration of the process. See “Research Methods” on page 32.
- Chapter Four reports the responses from the interviews and categorizes them for analysis. See “Results and Discussions” on page 39.
- Chapter Five presents conclusions based on the study and makes recommendations for improvements to the AT/FP process. In addition, chapter five includes suggestions for future research. See “Conclusions” on page 52.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter two focuses on security- and design-related literature to document and examine what information is covered in both military and non-military literature about designing a secure site. Information specific to designing a site to prevent terrorism is, in most cases, limited to published military literature. However, there are several non-military sources on designing sites for urban crime prevention. In this chapter, the military and non-military sources are documented and then compared in a matrix that lists the major security design concepts found in the literature. The matrix demonstrates which site design elements are found to be most important in military design, by showing repetition of the same concept in many sources. Also, the literature review expands on what the literature says about the concepts that were found to be important.

2.2 Military Literature Overview

Military anti-terrorism design standards are found in the Unified Facilities Criteria (UFC) "... which provides planning, design, construction, sustainment, restoration, and modernization construction criteria. Unified Facilities Criteria applies to the military departments, the defense agencies, and the DOD field activities in accordance with USD (AT&L) Memorandum, dated 29 May 2002." (Unified Facilities Criteria 2007, Foreword) The Unified Facilities Criteria is considered a living document periodically reviewed, updated, and made available to users involved in military construction. (Unified Facilities Criteria, 2007) The UFC is the authority on anti-terrorism/force protection guidelines—all other documents refer to it for validation. Due to regular updates to the UFC, military design guides often reference the UFC instead of listing the actual anti-terrorism design standards in the Installation Design Guide. The U.S. Army Corps of Engineers, Naval Facilities Engineering Command, and Air Force Civil Engineer Support Agency

are responsible for administration and implementation of the UFC system. (Unified Facilities Criteria, 2007)

The content of the Unified Facilities Criteria covers a wide range of subjects. Subjects related to protection from terrorism include philosophy, building design standards, and mass notification systems. The primary focus of this study is the portions of the UFC that relate to master planning and site design. The UFC standard that has the most significant impact on installation master planning is *Standoff Distance*. This term refers to required setbacks, primarily for buildings from parking areas and roads. However, other site area affordances are also affected by setbacks, such as trash container location and plant height. The primary design strategy of standoff distance is to keep threat vehicles as far away from inhabited DoD buildings as possible. (Unified Facilities Criteria, 2007) Many other standards in the UFC affect site design, including controlled perimeters, unobstructed space, and access control. The intent of these standards is to minimize the possibility of mass casualties in buildings or portions of buildings that are owned, leased, privatized, or otherwise occupied, managed, or controlled by or for the U.S. Department of Defense. (Unified Facilities Criteria, 2007)

Another significant military site design document is the *Installation Design Guide* (IDG), which derives anti-terrorism/force protection criteria from the UFC, but is written to provide overall guidance in standardizing design and development throughout a specific installation in support of its mission. "The Army goal for all IDGs is to provide a clear, comprehensive approach to establishing and maintaining a positive visual image throughout the installation and to implementing appropriate design standards." (Fort Hood IDG, 2006) Installation Design Guides offer guidance on integrating force protection into the overall image of the installation. Unlike the UFC, the Installation Design Guide is viewed as less enforceable criteria and more as a document that contains the general preferences of a specific installation. The IDG of each installation follows a standard template, but allows for flexibility of the content within the chapters to express the architectural and operational preferences of each installation. Force protection

guidelines are typically found in Chapter 12 of the IDG. However, anti-terrorism/force protection standards are also found throughout the IDG. The Installation Design Guides evaluated in this research all covered the same basic topics with regard to site design for preventing terrorism.

Major topics covered in the evaluated IDGs are the following:

- Standoff distance
- Building siting and orientation
- Landscape considerations
- Lighting
- Perimeter control
- Gates and entrances
- Parking

Evaluation of several installation design guides reveals that important force protection considerations are listed, but the UFC is usually referenced for the actual standards that apply.

2.3 Design Literature Overview

Non-military literature regarding safety, security, and design used in this study include sources on crime prevention through environmental design (CPTED), as well as other sources on designing safe environments. Crowe in his book *Crime Prevention Through Environmental Design* indicates that “Early interest in the CPTED concept began with Jane Jacobs. Her book, *The Death and Life of Great American Cities*, published in 1961, described many observations of the relationship between the urban design and crime.” (Crowe 2000, p. 6) Interest in the idea of preventing crime through design continued, resulting in the emergence of Oscar Newman’s 1972 book titled *Defensible Space*. In his book, “Newman demonstrated the importance of natural surveillance, access control, and territorial concern.” (Crowe 2000, p. 6) According to Timothy Crowe, in his 2000 book titled *Crime Prevention Through Environmental Design Applications of Architectural Design and Space Management Concepts*, “Dr. C. Ray Jeffery coined the phrase, “Crime Prevention Through Environmental Design,” in his 1971 book by that title in which he

described the relationship between urban design and crime. (Crowe 2000, p. 6) The concept expands upon the assumption that the proper design and effective use of the built environment can lead to a reduction in the fear of crime and the incidence of crime, and to an improvement in the quality of life. (Crowe 2000, p. 1)

According to Crowe, “State and local governments eventually began incorporating CPTED principles into local building codes. Design review ordinances have been modified to require the use of CPTED in building design. In 1985, the University of Louisville created the first CPTED training program at its National Crime Prevention Institute. This training program has been attended by several thousand participants who have spread the use of CPTED concepts in their communities throughout the world.” (Crowe 2000, p. 7) Crime Prevention Through Environmental Design has now become a popular area of study in law enforcement and other professions. The most widely accepted book on the practical application of CPTED principles is *Crime Prevention Through Environmental Design Applications of Architectural Design and Space Management Concepts* by Timothy Crowe.

In their 2001 book titled *SafeScape*, Al Zelinka and Dean Brennan outline principles for taking a holistic approach to community design to create safe places that stand the test of time. With regard to peoples’ perception, *SafeScape* states, “We are content when a place is aesthetically pleasing and well maintained. We feel livelier when a place facilitates walking, interaction, and learning. We feel safe when a place is designed so we can see our surroundings, control our direction, and move in the presence of others.” (Zelinka and Brennan 2001, p. 6) *SafeScape* outlines specific considerations for planning safe environments and provides case studies of planning and design solutions used to address unsafe situations. The case studies include the following categories: Civic-oriented, Downtown, Multi-family, Public Housing, Strip Commercial, Suburban Neighborhood, Transit-oriented, and Urban Neighborhood. “SafeScape challenges citizens, decision makers, and society to create communities that are vibrant, integrated, self policing, and sustaining.” (Zelinka and Brennan 2001, p. 9)

Similar to the other design literature, *SafeScape* focuses on creating safe environments by changing the attitude of the inhabitants. “The SafeScape principles respond to concerns about crime and fear of crime by addressing physical environmental issues and focusing on the importance of creating community.” (Zelinka and Brennan 2001, p. 173) An overarching concept throughout the book is designing places that focus peoples’ attention to the common areas where activities take place, referred to as *informal observation*. “SafeScape recognizes what our ancestors knew long ago: safer, more livable communities include neighborhoods closely knitted to human-scale centers (i.e., downtowns) that offer opportunities for work, school, shopping, and recreation.” (Zelinka and Brennan 2001, p. 105) With regard to design guidelines, Zelinka and Brennan state, “design guidelines present a natural opportunity to express the SafeScape principles because they deal with less quantifiable issues, such as distinguishing between public and private space.”

In the *Handbook of Loss Prevention and Crime Prevention* by Lawrence J. Fennelly, crime prevention is sorted into three categories; primary, secondary, and tertiary. “Primary prevention techniques are directed at modification and criminogenic conditions in the physical and social environment at large, such as citizen education programs, household and business security precautions, and modifications of the physical environment to reduce criminal opportunity.” (Fennelly 1989, p. 4) Secondary prevention techniques refer to “Early identification and intervention in the lives of individuals or groups in criminogenic circumstances.” (Fennelly 1989, p. 4) Tertiary prevention refers to “The prevention of recidivism through post adjudication diversion, reform, rehabilitation, incapacitation, hiring ex-offenders, aftercare services and other techniques.” (Fennelly 1989, p. 4)

This research focuses on the primary method of crime prevention, which is modification of the physical environment. The *Handbook of Loss Prevention and Crime Prevention* defines environmental security as “an urban planning and design process that integrates crime prevention with neighborhood design and urban development.” (Fennelly 1989, p. 23) According to the

handbook, “the basic premise of environmental security then, is that deterioration in the quality of urban life can be prevented or at least minimized through designing and redesigning urban environments so that opportunities for crime are reduced while correspondingly reducing the fear of crime.” (Fennelly 1989, p. 23)

The design literature on site design for security outlines many of the same concepts as the military literature. The difference noted is that the military design guidelines are created to prevent terrorism, and the non-military literature covers concepts to prevent crimes generally referred to as “street crimes,” such as assault, robbery, rape, murder, and theft. Table 2.1 Literature Matrix demonstrates which design concepts are consistent throughout military and non-military literature regardless of what type of crime is being prevented. The matrix also demonstrates which security design concepts are used only in military applications, as well as those concepts used only in non-military applications.

Table 2.1 Literature Matrix

Site Design Security Concepts	Military Literature – Concept Section Location					Non-Military Literature – Concept Page Location		
	UFC (2007)	IDG Fort Sam Houston (2006)	IDG Fort Bliss (2000)	IDG Fort Hood (2006)	IDG Fort Polk (2006)	Tim Crowe (2000)	Zelinka and Brennan (2001)	Fennelly (1989)
Standoff Distances	B-1.1	12.2.1.2	12.2.1.2	12.1.1	12.2.1.2			p. 502
Controlled Perimeter	B-1.1.1	12.3.1	12.3.1	12.3.1	12.3.1	p. 38	p. 93	p. 220
Access Control Points	B-1.5.1	12.7	12.7	12.3.7	12.7.1	p. 36		p. 34
Parking and Roadways	B-1.1.2	9.9.3, 9.4	9.9	9.9	12.8, 9.9	p. 138	p. 66	
Trash Container Location	B-1.1.7	12.4.8	12.4.9	12.3.6	12.4.9		p. 94	
Drive-up / Drop-off Areas	B-1.3	9.11	9.11	9.11	9.11			
Building Orientation	C-1.3	12.2.3	12.2.3	12.1.2	12.2.3		p. 26	
Railroad Location	C-1.6							
Clear Lines of Sight	B-1.2	12.2.3.1		12.2.1	12.4.10	p. 38	p. 141	p. 34
Avoid Plantings and Objects That Provide Concealment		12.4.5	12.4.5	12.2.1	12.4.5			p. 28
Use of Berms		12.6	12.4.4	12.2.2	12.6.1			
Use of Vegetation to Block Surveillance from Off-site		12.2.3.2	12.4.7	12.2.1	12.2.3.1			
Lighting		12.5	12.5	11.5.2.5	12.5	p. 49	p. 97	p. 31
Traffic Calming Techniques						p. 109	p. 147	
Land Use Compatibility						p. 126	p. 122	
Observation Cameras							p. 165	p. 320
Levels of Physical Security	Table 2-1							p. 197

2.4 Design Guidelines

After the review of military literature, it is apparent that Standoff Distance is the most influential security concept with regard to site design. Standoff distance is “a distance maintained between a building or portion thereof and the potential location for an explosive detonation.” (UFC 4-010-01, 2007) In the Unified Facilities Criteria, the United States Department of Defense has set design guidelines related to standoff distance. These guidelines affect military planning and the work of many design disciplines including: land planners, landscape architects, architects, intelligence personnel, security personnel, the force protection officer, and design engineers. Designers are now challenged to balance force protection requirements with all other requirements that impact site design, such as the Americans with Disabilities Act Accessibility Guidelines and the Uniform Federal Accessibility Standards. (Fort Hood IDG 2006, sec. 11.7)

As stated in the Unified Facilities Criteria, “the primary design strategy is to keep terrorists as far away from inhabited Department of Defense buildings as possible. The easiest and least costly opportunity for achieving the appropriate levels of protection against terrorist threats is to incorporate sufficient standoff distance into project designs.” (UFC 4-010-01 2007, sec. 2-3.1) This assumption about the cost-effectiveness of standoff distance is made without considering the cost of the land the project is built on. It is possible that standoff distance is not the most cost-effective option in some situations, if the value of the land was considered in cost analysis.

Building hardening is the alternative to standoff distance. Building hardening refers to architectural design and construction of buildings that are able to resist blast effects. “For existing buildings, the standoff distance will be provided except where doing so is not possible. In those cases, lesser standoff distance may be allowed where the required level of protection can be shown to be achieved through analysis or can be achieved through building hardening or other mitigating construction or retrofit.” (UFC 04-010-01 2007, sec. 2-4.5.2)

Each project has a threat assessment done by the installation's anti-terrorism/force protection personnel. The building is classified as one that requires minimum standards or more stringent design standards, such as building hardening. Distance criteria is based on the occupancy and function of the buildings. The standards affect the distance of buildings from any roadway or parking and the distance of trash containers from buildings. According to the UFC, any new buildings built with conventional construction methods must be a minimum of 82 feet from any roadway or parking area. In addition, all trash containers must be a minimum of 33 feet from inhabited buildings.

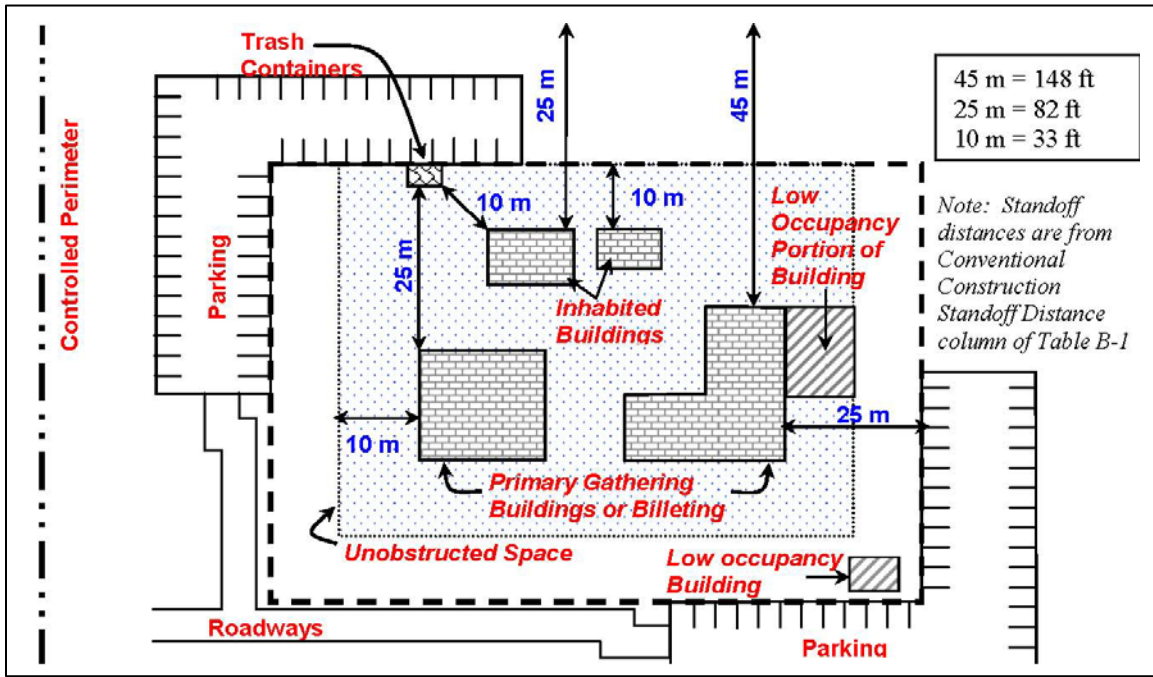


Figure 2.1 Standoff Distances for New and Existing Buildings

Table 2.2 Standoff Distances for New and Existing Buildings (UFC 4-010-01, 2007)

Location	Building Category	Applicable Level of Protection	Conventional Construction Standoff Distance	Minimum Standoff Distance	Applicable Explosive Weight
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Billeting and High Occupancy Family Housing	Low	45 m (148 ft.)	25 m (82 ft.)	I
	Primary Gathering Building	Low	45 m (148 ft.)	25 m (82 ft.)	I
	Inhabited Building	Very Low	25 m (82 ft.)	10 m (33 ft.)	I
Parking and Roadways within a Controlled Perimeter	Billeting and High Occupancy Family Housing	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Primary Gathering Building	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Inhabited Building	Very Low	10 m (33 ft.)	10 m (33 ft.)	II
Trash Containers	Billeting and High Occupancy Family Housing	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Primary Gathering Building	Low	25 m (82 ft.)	10 m (33 ft.)	II
	Inhabited Building	Very Low	10 m (33 ft.)	10 m (33 ft.)	II

Unobstructed space is a site design concept critical to anti-terrorism/force protection. “It is assumed that aggressors will not attempt to place explosive devices in areas near buildings where these explosive devices could be visually detected by building occupants observing the area around the building. Therefore, ensure that obstructions within 10 meters (33 feet) of inhabited buildings or portions thereof do not allow for concealment from observation of explosive devices 150 mm (6 inches) or greater in height.” (UFC 4-010-01 2007, sec. B-1.2) Therefore, plant material within 33 feet of buildings must be less than six inches tall. This greatly affects the planting design on military installations, and results in grass being used around most buildings due to the low cost and effectiveness in meeting this requirement. Figure 2.2 provides an example of unobstructed space.



Figure 2.2 Unobstructed Space

A *Controlled Perimeter* establishes the definition of the area to be protected, as well as provides the first line of defense against aggressors. Perimeter control is often accomplished with fencing. “Fences are used as protective measures against project-specific threats. They are most appropriately used to define boundaries and deter penetration of a secure area. Fences also serve as a platform for the intrusion detection system, as a screen against explosive projectiles, and to stop moving vehicles if they are reinforced to do so.” (Fort Sam Houston IDG 2006, sec. 12.3.1) Additionally, controlled perimeters encourage territoriality, meaning “physical design can create or extend a sphere of influence so that users develop a sense of proprietorship—a sense of territorial influence—and potential offenders perceive that territorial influence.” (Crowe 2000, p. 37) In contrast, when referring to gated communities, the book *SafeScape* states, “security gates deflect some potential threats from non-residents, but they also divert attention from more civil methods of establishing community safety—methods that may ultimately deliver greater satisfaction.” (Zelinka and Brennan 2001, p. 39) Figures 2.3 and 2.4 illustrate controlled perimeter options.



Figure 2.3 Controlled Perimeter – Post and Cable Fence



Figure 2.4 Controlled Perimeter – Guarded, High-security Fence

Parking and Roadway design and location are critical in planning military installations to meet anti-terrorism/force protection requirements. The standoff distance requirements largely refer to the distance of buildings from parking areas and roads. “Parking lots within a controlled perimeter shall be located a minimum of ten meters (33 feet) from inhabited structures, and 25 meters (82 feet) from troop billeting and primary gathering structures. Parking lots without a controlled perimeter shall be located a minimum of 25 meters (82 feet) from inhabited structures, and 45 meters (148 feet) from troop billeting and primary gathering areas.” (UFC 4-010-01 2007, Table B-1) “Designated parking for family housing located within secured perimeters with access control is excluded from the 25-meter (82-foot) setback requirement” (Fort Polk IDG 2006, sec. 9.9.4)

The requirements for roadways are similar to those of parking areas. “Anti-terrorism standards state that all inhabited buildings within a controlled perimeter will be set back a minimum of ten meters (33 feet) from roadways, and that troop billeting and primary gathering

spaces shall be set back a minimum of 25 meters (82 feet) from roadways. For inhabited buildings not within a controlled perimeter, the minimum setback distance is 25 meters (82 feet), and for primary gathering places and troop facilities, the minimum distance is 45 meters (148 feet).” (UFC 4-010-01, 2007) These setbacks greatly impact the scale of space at street level.

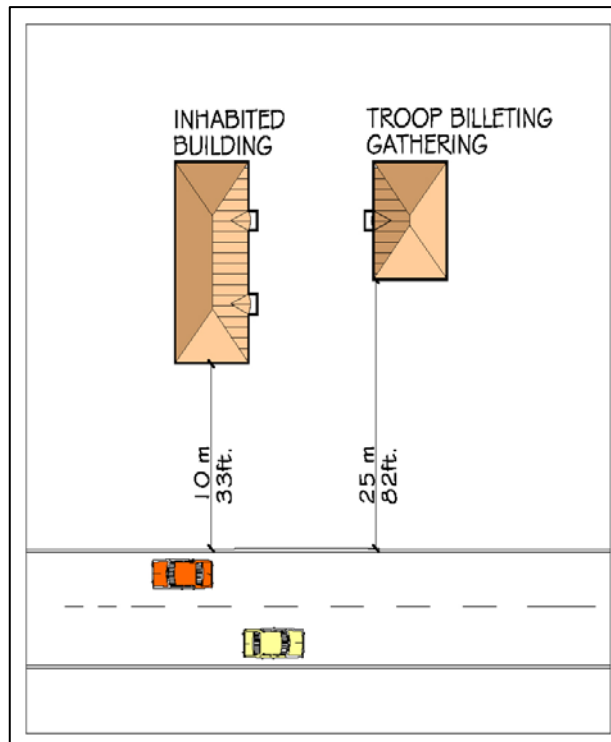


Figure 2.5 Anti-terrorism Roadway Setbacks Within a Controlled Perimeter
(Fort Hood IDG 2006, sec. 9.4)

A 2010 report from the Committee on Armed Services, House of Representatives, expresses concern about the impact of setbacks. “The Committee is concerned about the planning decisions at military installations and the intent to advocate for low-density developments that promulgate sprawl. The committee understands that the Department of Defense’s propensity for low-density development is driven primarily by a facility centric approach to anti-terrorism/force protection issues and requirements to insert standoff distances from roads and parking structures. Consequently, in the use of the current anti-terrorism/force protection criteria, the value of land as a commodity has been lost.” (National Defense

Authorization Act for Fiscal Year 2010) To counter this problem, form-based coding is becoming a new tenet in Army planning. “Form-based coding guides the development of appropriate building densities and building forms needed to support sustainable development. It also promotes mixed-use, compact, and walkable development patterns, not traditional auto-oriented, segregated land uses. Form-based codes focus on shaping the form of the public realm first and secondarily on controlling land uses.” (Army Regulation 210-20, ch. 2-2)

All of the installation design guides referenced in the study expressed the goal of promoting development sustainability. In the section on circulation, the Fort Bliss IDG states, “roads should be designed to minimize impacts, relieve driver monotony, and provide a positive visual experience for the user, without compromising safety.” (Fort Bliss IDG 2000, sec. 9.5.1) In the introduction of the Fort Bliss and Fort Sam Houston IDGs, one of the objectives is “to provide guidance for accomplishing sustainable development.” (Fort Bliss IDG 2000, sec. 1.3)

The Fort Hood IDG spelled out a very clear purpose in the first chapter. “The Purpose of the Fort Hood Installation Design Guide (IDG) is to provide guidance for standardizing and implementing sustainable design and development throughout the installation in support of mission readiness. The sustainable design and development standards include not only the visual impact of features on the installation, but also the impact of projects on both the built and the natural environments.” (Fort Hood IDG 2006, sec. 1.1)

The Fort Polk IDG defines sustainable design as “an integrated approach to planning, designing, building, operating, and maintaining facilities in a collaborative and holistic manner among all stakeholders.” (Fort Polk IDG 2006, app. D.1) The basic objectives of sustainability according to the Fort Polk IDG are as follows: (Fort Polk IDG 2006, app. D.1.1.1)

- Reduce the consumption of energy, land, materials, water, and other non-renewable resources.
- Minimize the waste of energy, land, materials, water, and other limited resources.
- Protect the natural environment that is the source of all natural resources.

- Create livable, healthy, and fiscally productive manmade environments for existing and future generations.



Figure 2.6 Sustainable Site Design Example (Fort Hood IDG 2006, sec. 1.9)

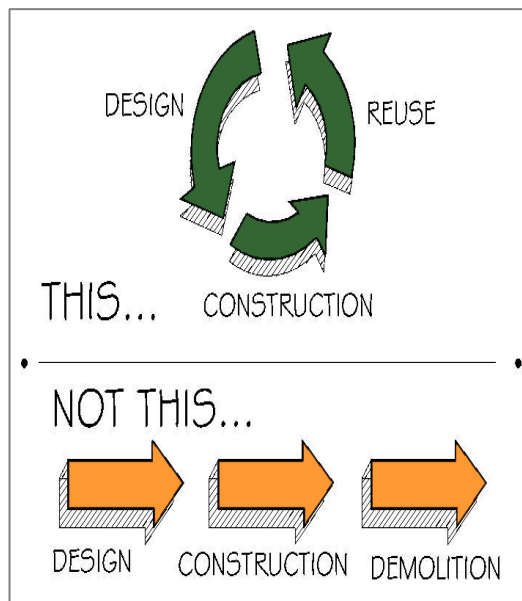


Figure 2.7 Sustainable Site Design Approach (Fort Hood IDG 2006, sec. 1.9)

Anti-terrorism/force protection is an extremely important consideration in planning. However, the requirement of standoff distance forces the Department of Defense to implement development practices that are not consistent with the goal of sustainable design and development listed in all installation design guides. The Committee on Armed Services, House of Representatives, believes “a layered approach to anti-terrorism/force-protection design is critical to defeating threats against an installation, and that effective perimeter security serves as the primary defense. Furthermore, the Committee believes that stand-alone facilities should have sufficient standoff distances. However, a military installation, which is formed by the concentration of multiple facilities, should be approached from a holistic view and the development of anti-terrorism/force criteria should be modified to reflect an installation approach.” (National Defense Authorization Act for Fiscal Year 2010) The committee also states, “Buttressing this installation approach to anti-terrorism/force-protection is the current public-sector approach to sustainable design. The committee believes that it is important to recognize that many communities are embracing a planning approach that promotes efficient use of public spaces and de-emphasizes vehicular travel.” (National Defense Authorization Act for Fiscal Year 2010)

Trash container location is another important consideration. The directions of the UFC are to “Measure the standoff distance from the nearest point of the trash container or trash container enclosure to the closest point on the building exterior or inhabited portion of the building. Where the standoff distance is not available, harden trash enclosures to mitigate the direct blast effects and secondary fragment effects of the explosive on the building if the applicable level of protection can be proven by analysis or testing.” (UFC 4-010-01 2007, sec. B-1.1.7) The guideline in the Fort Polk IDG is to “place trash containers as far away from the facility as possible. Anti-terrorism/force protection requirements restrict the location of dumpsters to a minimum of 10 meters (33 feet) from inhabited buildings and 25 meters (82 feet) from billeting and primary gathering areas.” (Fort Polk IDG 2006, sec. 12.4.9) In the book

SafeScape, the author points out, “because of their function, dumpsters are frequently located in areas that are not easily observed, making them vulnerable to neglect and inappropriate activities.” (Zelinka and Brennan 2001, p. 94)



Figure 2.8 Trash Container 82 Feet from Building

Building orientation is often planned based on accessibility, solar orientation, and desirable views. However, site security is also affected by building orientation for several reasons. The Fort Hood IDG listed the following items to be considered with regard to building orientation and security (Fort Hood IDG 2006, sec. 12.1.2):

- Deny aggressors a clear line of site to the facility from on or off the installation, where possible. Protect the facility against surveillance by locating the protected facility outside of the range or out of the view of vantage points.

- Protect against attack by selecting perimeter barriers to block sightlines, such as obstruction screens, trees, or shrubs. Non-critical structures or other natural or manmade features can be used to block sightlines.
- Create defensible space by positioning facilities to permit building occupants and police to clearly monitor adjacent areas.
- Avoid siting the facility adjacent to high surrounding terrain, which provides easy viewing of the facility from nearby non-military facilities.

In the book *SafeScape*, Zelinka and Brennan comment that “neighborhoods with front yard-oriented homes and pedestrian-scale street environments contribute to eyes on the street.” (Zelinka and Brennan 2001, p. 26) “Eyes on the street” is a concept identified by Jane Jacobs based on her philosophy that dense, urban centers foster relationships between people because of the variety of commercial and residential uses that encourage people to be out on the streets at all times of the day and night. Public safety results because the chances of crime being observed are increased through the presence of people (and eyes) on the street (and sidewalk). (Zelinka and Brennan 2001, p. 31)

Avoiding Plantings and objects that provide concealment is a fundamental goal in designing a secure site. The Fort Polk IDG states, “plant material that can provide concealment will not be used adjacent to high security structures or fence lines.” (Fort Polk IDG 2006, sec. 12.4.5) The Fort Hood IDG states, “plant material selection and placement shall minimize potential hiding places for bombs and aggressors.” (Fort Hood IDG 2006, sec. 12.2.1) “It is assumed that aggressors will not attempt to place explosive devices in areas near buildings where these explosive devices could be visually detected by building occupants observing the area around the building.” (UFC 4-010-01 2007, B-1.2) Therefore, the standard stated in the Unified Facilities Criteria is to “ensure that obstructions within ten meters or 33 feet of inhabited buildings do not allow for concealment from observation of explosive devices six inches or greater in height.” (UFC 4-010-01 2007, B-1.2) Turf grass is perceived as the most effective

plant choice to meet this requirement, which results in few variations in plant material around buildings on the installations.

In his book *Handbook of Loss Prevention and Crime Prevention*, Fennelly makes some suggestions about plant selection for security. "Large bushy plants or shrubs should be avoided as much as possible, particularly near entryways. Although attractive, removing them will eliminate ideal hiding places for potential intruders, rapists, or voyeurs. Large trees or plants that obstruct viewing of the structure from the street should also be avoided if feasible." (Fennelly 1989, p. 28) Timothy D. Crowe in his book, listed surveillance through physical design as an objective for residential environments. He suggests that the design should "improve opportunities for surveillance by physical design mechanisms that serve to increase the risk of detection for offenders." (Crowe 2000, p. 167) Plant selection and planting design are important considerations with regard to natural surveillance, because the size of the plants when planted is often very different from the size of the plants at maturity.

Vegetation combined with the *Use of Berms* for force protection is an aesthetically pleasing way to fulfill many functions. They can be used to "Define boundaries of property or boundary limits, Provide a barrier to moving vehicles, Hinder pedestrian movement, Intercept projectiles, and Obstruct lines of sight." (Fort Bliss IDG 2000, sec. 12.6.1) Used in conjunction with tall trees, berms are an effective way to block surveillance from off site. The Fort Hood IDG states, "berms or barriers used to block lines of sight or projectiles must be high enough to achieve those objectives or may be combined with landscaping or other construction elements." (Fort Hood IDG 2006, sec. 12.3.3) "Berm and barrier design should, however, be integrated into the landscape and built environment, complementing architectural style, colors, and materials." (Fort Hood IDG 2006, sec. 12.3.3) The following figures illustrate various types of vehicle barriers.



Figure 2.9 Berm and Wall as Vehicle Barrier



Figure 2.10 Concrete Blocks as Vehicle Barrier at Commissary



Figure 2.11 Berm Perimeter Barrier

Lighting is an important element discussed in both military and non-military sources. “Lighting systems for security operations provide illumination for visual and closed circuit television surveillance of boundaries, sensitive inner areas, and entry points.” (Fort Sam Houston IDG 2006, sec. 12.5) “Lighting also plays a significant role in maintaining a safe environment in a neighborhood. Without sufficient lighting a block can become a haven for criminal activity and unsafe for resident activities.” (Zelinka and Brennan 2001, p. 97) “Illumination is most important in discouraging criminal activity and enhancing public safety. Lighting is one of the most effective deterrents to certain types of crime, such as vandalism, burglary, and muggings. A person intending to commit a crime naturally desires to minimize the probability of being observed by either law enforcement officers or private citizens. This aversion to being seen includes the approach to and departure from the crime scene as well as the time required to commit the crime.” (Fennelly 1989, p. 31)

2.5 Results of Literature Review

Review of the literature revealed the following major site design concepts used for security on military installations.

Topics of Site-related Anti-terrorism Guidelines from military literature:

- Controlled Perimeter
- Standoff Distance
- Unobstructed Space (Avoid Plantings and Objects That Provide Concealment)
- Access Control Points
- Railroad Location
- Clear Lines of Sight
- Building Orientation to Prevent Vantage Points from Off Site
- Use of Vegetation to Block Surveillance from Off Site
- Lighting

Topics of Security considerations found in design literature but not in military literature:

- Traffic Calming Techniques
- Land Use Compatibility
- Observation Cameras

CHAPTER 3

RESEARCH METHODS

3.1 Introduction

The goal of the research is to evaluate the use of site design guidelines on United States Military Installations for minimizing the effect of terrorist attacks. Chapter three primarily focuses on the methods used in this research. The study examines the guidelines themselves, and the way they are communicated and implemented. In addition to the information about anti-terrorism/force protection collected through the literature review, the research involves focused interviews with professionals involved in the site design process of U.S. military installations. This qualitative research method makes it possible to evaluate the variations in professional perspectives about the implementation process of anti-terrorism/force protection site design guidelines.

3.2 Research Design

The study begins by examining security design concepts used in non-military applications. These design concepts are then compared to military anti-terrorism site design guidelines found in three major documents that influence the site design of military installations. These documents include the Unified Facilities Criteria 4-010-01, the Installation Design Guide, and the Request for Proposal. Concepts from the military documents were compared in a matrix format to those found in the non-military literature on security and site design (see Table 2.1 on page 15). The comparison reveals which concepts are found in all sources, which ones are only found in military sources, and which are found only in non-military sources.

Interviews are conducted with key informants who are involved with development on military installations and regularly deal with anti-terrorism/force protection issues. The focus of

the interviews is to gain insight from the respondents into the three research questions listed in chapter one.

1. Does the Unified Facilities Criteria contain the most effective guidelines for security through site design, when compared to non-military literature on designing secure sites?

2. Is information lost in the implementation process of the anti-terrorism site design guidelines from the Unified Facilities Criteria to the Installation Design Guide?

3. Do Requests for Proposals address all the site design security issues found in the UFC and IDG?

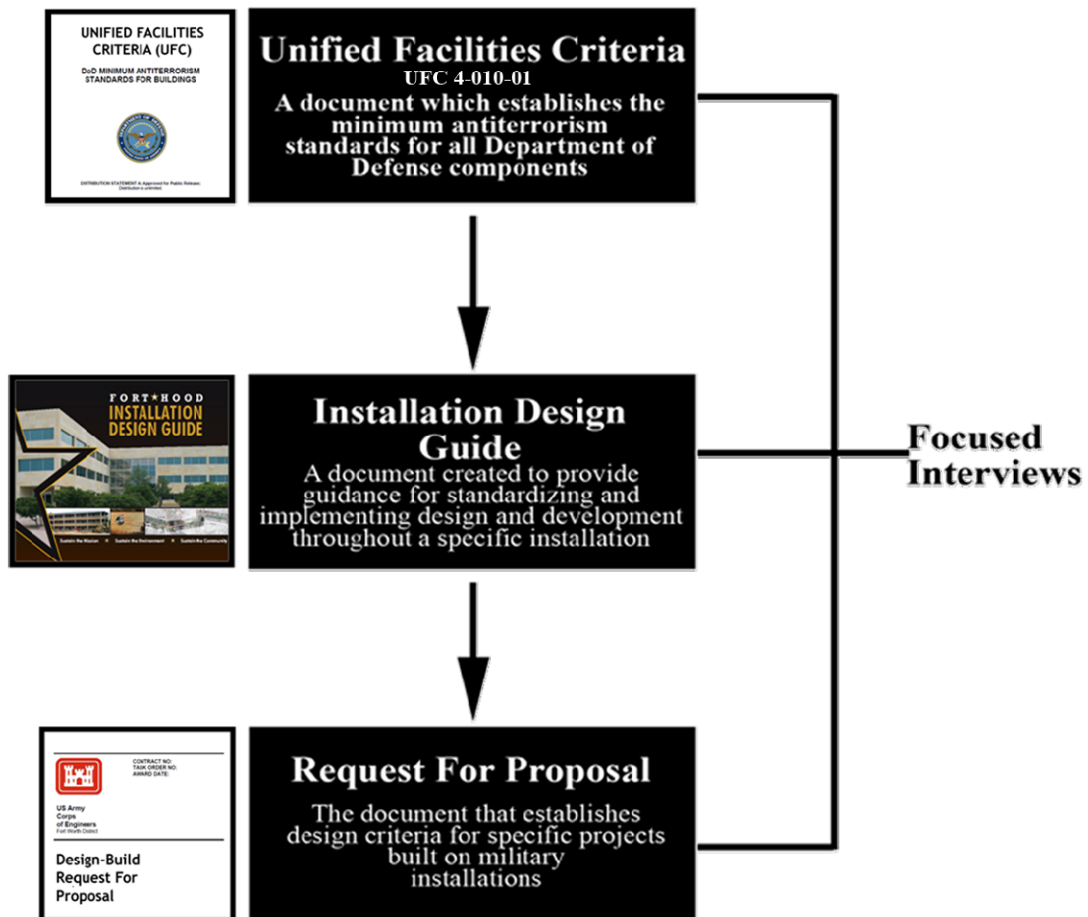


Figure 3.1 Research Components

3.2.1 *Military Installations*

Four military installations were included in this study:

- Fort Polk, near New Llano, Louisiana
- Fort Sam Houston, San Antonio, Texas
- Fort Bliss, El Paso, Texas
- Fort Hood, Killeen, Texas

3.2.2 *Informants*

The initial informants consisted of the following groups:

- U.S. Army Corps of Engineers Military Planning Staff: This group consists of employees of the U.S. Army Corps of Engineers, Fort Worth District Office. Their responsibility is to lead project delivery teams to carry out master planning of communities and training areas on military installations. In addition, they ensure that projects are carried out in compliance with the applicable legislation, policy, and guidance.

- U.S. Army Installation Anti-terrorism Specialists: Responsible for ensuring that the Unified Facilities Criteria 4-010-01 anti-terrorism standards are implemented for every new building or major building renovation and to certify by signed endorsement that force protection considerations have been incorporated into the project programming/design/construction process (using DoD Form 1391, design approval, etc.). In addition, as a member of the Construction Security Planning team, they determine the minimum level of protection required for each project.

- U.S. Army Installation Planning Staff: The installation planning staff monitors architecture and engineering design contracts to assure compliance to the government contract scope of work, regulations, codes, project criteria, and proper representation of the local Installation Design Guide.

The three groups of informants are all familiar with anti-terrorism/force protection guidelines, but are affected by them in different ways. Thus, the responses from the three

categories of informants are analyzed using data *triangulation*. “Triangulation refers to the combination of methods or sources in a single study. Triangulation is often thought of as a way of checking out insights gleaned from different informants or different sources of data.” (Taylor and Bogdan 1998, p. 80) In this study, comparing the three groups leads to a deeper understanding of why each group has the perspective they do about anti-terrorism/force protection.

The informants are chosen by first selecting an initial group that is diversified. Secondly, informants are chosen using a method referred to as *snowballing*, by Taylor and Bogdan in their book *Introduction to Qualitative Research Methods*. “Snowballing is getting to know some informants, then getting them to introduce you to others. A potential drawback of the snowballing technique is that it can limit the diversity of informants.” (Taylor and Bogdan 1998, p. 93) In this case, however, the diversity was established in the initial group. Therefore, snowballing was an effective way to increase the number of respondents.

3.2.3 Interview Techniques

After selecting the candidates, interviews were scheduled with a short phone call, keeping contact to a minimum to avoid influencing the responses in the interviews. An email was sent out to the candidates a few days prior to the actual interview. “The purpose of the pre-notice is to provide a positive and timely notice that the recipient will be receiving a request to help with an important study.” (Dillman 2007, p. 156) This email will remind the candidate of the coming interview and keep the idea fresh on their mind. The email explains the topic of the study, expresses appreciation, and provides contact information should the candidates have any questions.

Some of the interviews had to be conducted over the phone, and others could be done in person. In-person interviews with the respondents are beneficial for two reasons. The first is “to translate specific objectives into a form in which they can be communicated to the respondent with maximum effectiveness.” (Kahn 1957, p. 107) The second reason has to do

with the atmosphere created. In-person interviews motivate the respondent to participate fully, and create a psychological atmosphere, which enhances the relationship between interviewer and respondent as a basis for free communication between the two. (Kahn 1957, p. 107)

3.2.4 Interview Questions

The questions were designed to gain insight into professional perspectives on how anti-terrorism/force protection design guidelines are implemented on U.S. military installations. The first questions are employment identifiers of each respondent. These are necessary to discover trends among different groups, as well as to demonstrate the diversity of respondents. The employment identifiers are followed by questions about the guidelines related to findings from the literature review. The respondents were then asked about sources used to reference anti-terrorism/force protection guidelines. Finally, the respondents were asked about the implementation of the guidelines into Requests for Proposals and built projects. All questions are open-ended, allowing the respondent to express their point of view without limiting the possible responses. (Kahn 1957, p. 132) Consideration was also given to the fact that the chosen respondents are all very experienced in dealing with the anti-terrorism design guidelines. "Some minimal level of information is necessary for them to answer any questions, of course, and it is purposeless to raise questions which the respondent cannot comprehend, or which refer to things beyond their experience." (Kahn 1957, p. 135)

Following is the script used in each interview:

Thank you in advance for making time for this interview. This interview will focus on design guidelines related to anti-terrorism/force protection on United States military installations. Please give your most candid responses to the questions. Your information will be blinded and not associated with your name or position.

This interview is divided into two sections:

1. Employment identifiers
2. Anti-terrorism/force protection site design guidelines

Employment

1. Who is your employer?

U.S. Army

U.S. Army Corps of Engineers

Other _____

2. What is your position?

Planning Staff (U.S. Army Corps of Engineers)

Army Installation Master Planner

AT/FP Risk Management Specialist for Army Installation

Other

3. How many years have you worked for the United States Military?

4. How many years have you worked in this position?

5. What is your highest level of education?

6. What specialized area are you educated in?

Anti-terrorism/force Protection Guidelines

1. What reference material do you utilize for anti-terrorism/force protection site design guidelines and why?

2. Does the Unified Facilities Criteria cover all security topics related to site design?

3. How is the Unified Facilities Criteria used in the development of the Installation Design Guide with regard to site design?

4. How is the Installation Design Guide used in the development of the Request for Proposal with regard to site design?

5. Can you describe how AT/FP requirements have positively or negatively impacted the development of a specific project with which you've been involved?

6. Do on-site changes occur during the construction of projects that affect the fulfillment of the intended anti-terrorism site design elements?

Follow-up Questions (if time allows)

- Would the Department of Defense benefit from incorporating traffic calming techniques, land use compatibility, and observation cameras into the anti-terrorism/force protection guidelines? Why or why not?
- Should railroad location be mentioned in the Installation Design Guide as an anti-terrorism site design consideration? Why or why not?

3.3 Summary

Interviewing multiple informants provides a rich collection of data to be analyzed. The interviews provide insight into the perceptions of Army personnel about the AT/FP implementation process. In addition, the interviews reveal unique situations and challenges with the implementation of AT/FP requirements on specific projects.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

Chapter four focuses on findings from the literature review and the interviews. Discoveries found through comparing literature sources are exposed, as well as inconsistencies that may need attention. The results revealed in this chapter demonstrate differences in perspectives between military planning personnel, and many examples are given of anti-terrorism/force protection issues related to specific projects. In addition, the interview responses are categorized according to the three groups of respondents and analyzed through data triangulation to better understand the perspective of each group.

The process of AT/FP site design guideline implementation was evaluated by first looking at security site design concepts used in non-military applications and how they compare to concepts found in the UFC 4-010-01. Four Installation Design Guides were then analyzed to determine how much of the information from the UFC with regard to designing secure sites is included in them. Finally, interviews were conducted with military personnel to gain insight into variations in professional perceptions of the implementation process of AT/FP.

Transcripts of the interviews were analyzed. The results revealed variations between perceptions of the AT/FP implementation process. All respondents claim they would refer to the UFC 4-010-01 for information on AT/FP guidelines and not to the IDG. Some respondents were confident in the UFC covering all security concepts for site design; others offered suggestions for improvement. Variations were found in the purpose and importance of the IDG in the process. In addition respondents gave examples of AT/FP requirements impacting the development of specific projects.

4.2 Analysis of the Literature

Analysis of literature reveals that the Installation design guides of all four installations covered the required standards related to security site design as outlined in the Unified Facilities Criteria for Minimum Antiterrorism Standards. Standoff distance stands out as the most influential security concept with regard to site design. A large portion of chapter twelve in all the installation design guides is devoted to elaborating on the requirements of standoff distance, while short statements suffice on other topics. An additional observation is that the UFC (4-010-01) on minimum anti-terrorism standards mentions railroad location as a security consideration. None of the other sources, including military and non-military sources, mention railroad location at all.

Differences were found between the military literature and non-military literature studied. Military literature discussed many of the same concepts as non-military literature, but for different reasons. Military sources focused on preventing the effects of terrorist attacks, while non-military literature on security and site design focused on preventing crimes such as robbery or rape. Non-military sources discussed traffic calming techniques, land use compatibility, and observation cameras as site design considerations, which were not mentioned in the military sources.

Topics of Site-related Anti-terrorism Guidelines from Military Literature:

- Controlled Perimeter
- Standoff Distance
- Unobstructed Space (Avoid Plantings and Objects That Provide Concealment)
- Access Control Points
- Railroad Location
- Clear Lines of Sight
- Building Orientation to Prevent Vantage Points from Off Site
- Use of Vegetation to Block Surveillance from Off Site

- Lighting

Topics of Security considerations found in design literature but not in military literature:

- Traffic Calming Techniques
- Land Use Compatibility
- Observation Cameras

A major discovery from the literature is that the only enforceable standards from the UFC are those related to standoff distance and unobstructed space. The other guidelines are written in the form of recommendations. Some of the respondents referred to this and stated that they would prefer to see more of the recommendations become standards. "I prefer it to be black and white. Let's get it on paper so everyone follows the same rule." (Respondent 4)

Another discovery from the literature review is that railroad location is mentioned as a design consideration in the Unified Facilities Criteria but not in any other documents. This is interesting because all of the four installations studied have railroads going through them. Railroads introduce the same risk as roads in terms of providing a way to bring in a concealed explosive. If standoff distance is such a critical issue for building proximity to roads, it stands to reason that railroads provide the same vulnerability.

4.3 Analysis of the Interviews

Interviews with selected respondents were conducted in person and over the phone depending on their location and availability. Interviews were recorded using a digital recorder. The digital files were sent by email to an individual to be transcribed. The transcribed files were then returned to the researcher as text (.txt) files by email. The researcher reviewed the interviews and grouped the responses according to recurring themes in the responses, as described in this section.

4.3.1 Informants Profile

All respondents worked for the U.S. Army in some capacity. The shortest service time was two years and the longest was 30 years. More than half of the respondents have worked

for the U.S. Army for more than 20 years. Only one respondent did not have a college degree. The specialized areas of education represented are: Civil Engineering, Mechanical Engineering, Architecture, Landscape Architecture, Criminal Justice, Urban Planning, and Business Management.

Table 4.1 Informant Profiles

	Employer	Position	Years with U.S. Military	Years in Current Position	Highest Level of Education	Specialized Area of Education
1	U.S. Army Corps of Engineers	Lead Landscape Architect	18	18	Masters Degree	Landscape Architecture
2	U.S. Army Corps of Engineers	1391 Program Coordinator	21	4	Bachelors Degree	Civil Engineering
3	U.S. Army Corps of Engineers	Planning Staff	7	7	Masters Degree	Landscape Architecture
4	U.S. Army	Installation Master Planner	2	2	Bachelors Degree	Architecture
5	U.S. Army	Installation Master Planner	23	1	Bachelors Degree	Mechanical Engineering
6	U.S. Army	Installation Risk Management Specialist	28	7	Associates Degree	Criminal Justice
7	U.S. Army	Installation Master Planner	5	5	Bachelors Degree	Urban and Regional Planning
8	U.S. Army	Installation Master Planner	30	7	High School	General
9	U.S. Army	Installation Master Planner	25	?	Bachelors Degree	General Engineering
10	U.S. Army	Anti-terrorism Specialist	27	4	Bachelors Degree	Business Management

4.3.2 Reference material used for AT/FP site design guidelines

In response to the first question of what reference material they refer to, all respondents said they refer to the Unified Facilities Criteria 4-010-01. One respondent stated, “Typically you are not going to find what you’re looking for in the IDG because it’s so generalized. It does just provide links to guide you in the right direction. In this case for anti-terrorism stuff, it would refer

to the UFC because it's a much larger document." (Respondent 4) In contrast, another respondent found using the IDG with the UFC important. "We mainly reference the UFC 4-10-01 and that's the minimum anti-terrorism standoff distances for buildings. Also along with that, the Army Installation Design Guides, we utilize those, and those are more installation specific and they may provide a standard that goes above and beyond what the minimum standard of the UFC is." (Respondent 3) Other respondents simply stated that they reference UFC 4-010-01.

4.3.3 Effectiveness of the UFC in covering site design security concepts

Most respondents feel the UFC covers site design security-related topics. However, a couple of responses were not favorable. Respondent 4 said the UFC was too vague. For example, "It seems I always have to go to the physical security guy to get him to answer the question more clearly referring to high security fences. Building setbacks, parking lot setbacks, the 82-foot rule, and the 33-foot rule are all pretty clear. But when it comes to high security areas like motor pools or ammunition holding areas, fences are required to have setbacks. In my short period of time, there's been a lot of confusion of what that is. Some say it's 20 foot inside and 30 foot outside. Others say it's 30 foot inside and 20 foot outside. It just depends on the situation. I prefer it to be black and white. Let's get it on paper so everyone follows the same rule." (Respondent 4)

Respondent 3 stated, "The UFC, although detailed, doesn't cover every single design topic that may arise, but it does imply that there is an intent to meet force protection standards." Two respondents explained that when a special situation is not covered in the UFC in detail, it is fielded to the Army Corps of Engineers Protective Design Center in Omaha, Nebraska. This team makes determinations and provides AT/FP solutions for unique situations. Another respondent said the UFC does not include enough input from different groups who are specialized in things it refers to. He thinks security by site design is accomplished through a collaborative effort with input from many professionals who have experience in different fields working together. This respondent said, "Groups such as anti-terrorism, physical security,

planning, and others need to come together as a team early on before even deciding on a site.”
(Respondent 10)

4.3.4 Use of the UFC in developing the IDG

One respondent considers the Installation Design Guide a generic document. When asked how it was influenced by the Unified Facilities Criteria, he stated, “The anti-terrorism/force protection guidelines have to be adhered to no matter what you’re doing regardless of the Installation Design Guide. The IDG can be more stringent, but usually they’re not. They’re pretty generic documents.” (Respondent 2) In contrast, another respondent said, “The UFC contains the minimum standards an installation must comply with. Installations use these and then tailor their IDG to provide more specific detail about a particular design or topic, or better define the installation’s design preferences.” (Respondent 3)

4.3.5 Use of the IDG in development of a Request for Proposal

Several respondents view the Installation Design Guide as guidance for the contractors informing them of minimum standards and installation preferences so they can create a more accurate request for proposal (RFP). “The RFP will reference the IDG. Rarely does it get into specifics. The IDG is mainly a reference document.” (Respondent 2) One respondent told of a time when RFPs going out would just copy and insert sections of the IDG. “They’ve cut back on that because the RFPs got too big and hard to manage. In addition, there was a lot of push-back because a lot of the IDG got very prescriptive on what they were asking them to do, which was changing the design intent of the RFP.” (Respondent 1) “Unless the installation’s IDG is signed by the Garrison Commander and IMCOM, then it cannot be used as an enforcement tool. Many IDGs out there have not been approved, so they can’t be used for enforcement like people think they can.” (Respondent 1) According to him, information from an IDG that has not been approved cannot be copied into an RFP because that IDG has no authority.

4.3.6 AT/FP impact on the development of specific projects

According to one respondent, “On occasion, the UFC requirements may not specifically note a site element, but during the review, it may become apparent that there is a design issue.” (Respondent 3) He gave the example of a reflecting pool in the entrance courtyard of one of the installations studied. The reflecting pool was 18 inches deep with a dark surface, as needed to create reflection. “Although there is no specific reflecting pool force protection guideline that exists in the UFC, there was still a concern that the proposed 18-inch depth and dark color of the bottom surface could more easily conceal an explosive device within the pool and it not be noticed.” (Respondent 3) Those involved in the project decided the pool posed the same security problems addressed with the unobstructed space standard in the UFC of not allowing objects over six inches for a 33-foot setback from buildings. “So in effort to meet the intent of AT/FP standards with regard to the reflecting pool, the project team requested a ruling from the Protective Design Center. They reviewed the design and did find modifications should be made for it to be in compliance.

“The Protective Design Center gave three potential solutions to the design team for consideration. The team then took one of those and made modifications to the reflecting pool, so it would better meet force protection intent for safety. The alternatives were to limit the depth to six inches, so if something was placed in the pool it would be more easily identified. Another was to change the color of the bottom so things could be easily seen. The last was to leave the pool the way it is and add a grid at a six inch depth. The team ultimately decided to reduce the depth of the pool to six inches.” (Respondent 3)

Another example was given of a child development center (CDC) sited next to a rail line against the recommendation the installation anti-terrorism specialist. “We located a CDC right next to the installation perimeter. We sited the edge so that the main entrance was facing the interior of the installation, but it was right along a rail line. Recommended they didn’t do that, but they went ahead and sited it there anyway.” (Respondent 10) The issue of building proximity to

rail lines is listed as a recommendation in the Unified Facilities Criteria 4-010-01, but not as a standard that must be followed. In addition, none of the installation design guides reference railroad location at all. Respondent 10 is the only one to mention railroad location as a design consideration. "That's an example where it probably shouldn't be a recommendation, it should be more of a requirement." (Respondent 10)

An additional example was given at Fort Sam Houston. According to the respondent, "I was working on an area development guide for a building that sits atop an elevated area. The architect hired to do the development plan was trying to orient the facility so that it would best enhance the sustainability and energy conservation measures with regard to sun exposure. The AT/FP people determined there was a line of sight to the front door from Interstate 35, so we had to turn the orientation of the facility." (Respondent 7) This respondent did not agree with this action, because it not only compromised the energy efficiency but also interfered with the monumental effect gained from the building's placement. According to this respondent, "There could be some other measures rather than flipping the entire building." (Respondent 7)

Respondent 1 expressed, "The setbacks really negatively impact the space you have left. It creates these giant voids and actually eats up a lot of real estate that installations don't have an excess of. Although they are intended to be for safety, they really don't do a good job of creating an environment for people, so what you see is site planning that is spread out and expansive." (Respondent 1)

4.3.7 On-site changes during construction that affected AT/FP

Overall, the respondents said that AT/FP is not something that changes during the construction process. However, a couple of respondents said that it happens, but could not give examples. According to most, many other things may change but not the fulfillment of anti-terrorism/force protection requirements. "In design build you are going to have different things running at different times, different phases of design and construction happening at the same time. But when you're referring to anti-terrorism setbacks and those types of requirements, it's

the first thing to complete one hundred percent design. That is the first one that is signed off on and approved by our force protection office before it's ever constructed." (Respondent 4)

Another respondent stated, "Designs of higher dollar value may be downgraded during construction, but anti-terrorism/force protection must always be met." (Respondent 3) "Many installations use stone wall planters that have plant material and irrigation around the buildings. Hidden within the long, linear sections of planters are standard bollards so you can't see them, and it lends itself to a much more high-end look around the facility. Those may be specified as what they want, but many times they may decide to downgrade from that type of work and install your typical bollards in the ground. It still meets AT/FP requirements, it just meets it in a very minimum aesthetic capacity." (Respondent 3)

4.4. Analysis of Informant Group Responses

This section compares the informants and summarizes perspectives of the three groups of informants.

- U.S. Army Corps of Engineers Military Planning Staff
- U.S. Army Installation Anti-Terrorism Specialist
- U.S. Army Installation Planning Staff

The Corps of Engineers Planning Staff sees things from a larger perspective than the other two groups. They are able to view the entire process and its implementation at many installations, as well as the effect it has on the planned communities. Most of the respondents from the other two groups can only respond to the way AT/FP is implemented at the installation they work for. The Army Installation Anti-Terrorism Specialist group views AT/FP as more important than the other groups, because it is their primary role at the installations. They are quick to give examples of the implementation of anti-terrorism/force protection guidelines on specific projects. The Installation Planning Staff is similar to the Corps of Engineers, in that they understand the entire process and all documents involved, but they can only respond to the way it affects the installation they work for.

4.4.1 Effectiveness of UFC Site Design Guidelines for Security

The U.S. Army Corps of Engineers Military Planning Staff overall has a very neutral position in their responses about the Unified Facilities Criteria. One respondent stated, "The UFC sets a minimum standard, and although detailed, it does not cover every design topic that may arise. It does imply that there is an intent to meet force protection standards." (Respondent 3) The responses overall from the Corps of Engineers Planners were essentially that the guidelines exist, therefore we work with them.

The Army Installation Anti-terrorism Specialists as a group say that the Unified Facilities Criteria have a lot of room for improvement. One respondent from this group mentioned the lack of setback standards for existing structures. Another respondent felt the UFC replaced the collaborative effort between different specializations working as a team to decide on security issues at each project.

The Army Installation Planning Staff overall believe that the Unified Facilities Criteria include the appropriate design guidelines. Respondents from this group did have negative comments; one felt the guidelines were vague and claimed that he often needed clarification. Another stated, "In some situations it ties our hands to where a perfectly good buildable site requiring an 82-foot setback cannot be used. If it's borderline or just short of making the 82-foot, that site becomes useless." (Respondent 4) All respondents from this group claim the AT/FP specialist on the installation will clarify whatever the UFC does not cover.

4.4.2 Effectiveness of Implementation from UFC to IDG

Corps of Engineers Planners provided responses from the perspective of understanding the entire process and the role of each document in that process. They do not consider the Installation Design Guide an enforcement document for the guidelines. To them, the role of the IDG is to describe how each installation would like the guidelines to be implemented. "The IDG basically is an expansion of what is set up in the UFC for force protection criteria." (Respondent 1)

The anti-terrorism specialists all stated they were not familiar with the Installation Design Guide. "I'm not too familiar with the Installation Design Guide. But again, I use the UFC when it comes to any new construction or the designing of charrettes from the beginning of the designs to the completion of the structures." (Respondent 6) "That's something I don't really get involved with. It's mostly in the Planning Section." (Respondent 8) They did comment on specifics they feel should be covered in the IDG. "There should be something in the IDG saying, you know, you cluster those critical facilities together and don't put the site facilities where they can be observed from off installation. (Respondent10)

Overall, the installation planners informant group expressed that standoff distance from the UFC should be included above all else, then the IDG will address aesthetics. "After you use the UFC to determine the proper standoffs, then you begin to look at your other factors - aesthetics as far as parking lots, functional layouts of the parking lots, and aesthetics as far as your thoroughfares. But ideally, you need to start with the UFC." (Respondent 4)

4.4.3 Effectiveness of Implementation on Built Projects

The Corps of Engineers Planning Staff stated that the minimum requirements do get implemented and in unique situations, are given special consideration when there is no guideline to address an issue. Overall, they commented on the amount of space consumed by standoff requirements. "It creates these giant voids, and it actually eats up a lot of real estate." (Respondent 1) "It pushed more space between buildings." (Respondent 2)

The anti-terrorism specialists overall claimed they were not familiar with the Request for Proposal. They did, however, give examples of how the guidelines are implemented into built projects. One stated, "The biggest negative on just about all the projects is it drives the cost up. I don't know if there is anything positive about AT/FP other than it's supposed to provide more protection for those persons in the building. It reduces the amount of space you have to work with dramatically. You start taking 82 feet around every building that you're trying to build and you lose a lot of real estate." (Respondent 8)

Installation Planning Staff claim that, either excerpts are taken from the IDG and put into the Request for Proposal for a project or there is a line item in the RFP stating, "The contractor is responsible for maintaining all criteria put forth by the Installation Design Guide." (Respondent 4) One respondent from this group recognizes this as a reality but feels it is a deficiency in the implementation of AT/FP requirements. "There should be analysis of alternative courses of action. This is a guideline; it seems they stop at the minimum. They don't think of other ways to implement anti-terrorism/force protection." (Respondent 7).

4.5 Summary of Findings

Analysis of the literature, interviews, and a case study reveals answers to the research questions stated in the beginning. This section provides the answers in summary.

How do the Army's site design guidelines for security compare to those found in non-military literature? With the exception of standoff distance, the guidelines are very similar. The difference noted is the types of crimes they address. Military design guidelines are created to prevent the effects of terrorism, and the non-military literature covers concepts to prevent crimes generally referred to as street crimes. The non-military literature does contain explanations of traffic calming techniques, a concept that could be beneficial to the military, but is not found in the military literature.

Are the anti-terrorism site design guidelines from the document in which they originated covered in subsequent documents? The study reveals that the guidelines are covered in subsequent documents by repeating exactly what is said in the Unified Facilities Criteria. The installation design guide should not just repeat the guidelines but should explain how they will be accomplished on that installation. Requests for Proposals contain information copied from the installation design guides, when they should explain how the guidelines will be accomplished on specific projects.

Are the anti-terrorism site design guidelines implemented into the construction of specific projects? The research reveals that standoff distance and unobstructed space are

always implemented into the designs early in the process and ultimately into the built projects. Other guidelines, although recommended in the documents and by the anti-terrorism specialist on the installations, are not always implemented into built projects.

CHAPTER 5
CONCLUSIONS
5.1 Introduction

This research has revealed areas for improvement to the anti-terrorism/force protection process. In this chapter, an overview is given of perceptions from U.S. Army personnel to be considered in future decision making. Additionally, recommendations are made for improvement to the implementation of AT/FP guidelines based on findings from the research. The relevance of the study to the profession of Landscape Architecture is described. Finally, future research opportunities are outlined, which are valuable to the Army in fully understanding the impact of AT/FP guidelines on U.S. military installations.

5.2 Summary of Findings

Analysis of the literature, interviews, and basic observations reveals strengths and weaknesses of the implementation process of anti-terrorism site design guidelines on U.S. military installations. The process does have structure to it, however, people have different understandings of what the structure is. For instance, some view the IDG as a guide for aesthetics only and never refer to it for anti-terrorism guidelines. Others see it as a means of communicating the expectations of each installation with regard to these guidelines. Another finding is that the UFC covers most design concepts that are effective for designing secure sites, although most Army personnel only concern themselves with the two required guidelines, stand-off distance and unobstructed space. It is important to do analysis on each site and assess which guidelines are most appropriate rather than use a blanket application of the same two guidelines for every situation. Finally, in both the interviews and the literature, there is an expression of dislike for the sprawled environments created by standoff distance. Written documents address the amount of real estate consumed by the implementation of the standoff

distance guideline. Army personnel expressed preference for a more compact development model that would create connectivity, walkability, and human scale spaces.

5.3 Perceptions of U.S. Army Personnel

The general perception of the respondents is that the IDG is vague in the area of anti-terrorism/force protection. Most of them said they primarily refer to the Unified Facilities Criteria and rarely look at the installation design guide for information on anti-terrorism design guidelines. Overall, the primary focus of Army personnel is standoff distance and unobstructed space. As stated in previous chapters, many other design concepts are important to consider. However, these two are mandated for every project with a primary gathering facility, therefore, they become the focus of attention while other guidelines are neglected.

Overall, the respondents claim that information about AT/FP requirements in the Request for Proposals is taken directly from the installation design guide. "It's one of the ways of informing a contractor of standards that must be met, which in turn, provides for a more accurate RFP." (Respondent 3) According to the interview responses, Army personnel believe the IDG is useful for informing contractors of design preferences related to anti-terrorism/force protection even though they seldom refer to it.

More than one respondent expressed a negative perception of the guidelines. "I don't know if there is anything positive about AT/FP other than it's supposed to provide more protection for the persons in the building. ... Negatively, it reduces the amount of space you have to work with dramatically. I mean, you start taking 82 feet around every building that you are trying to build, and you're losing a lot of real estate." (Respondent 8) According to another respondent, "The setbacks for force protection from a facility to a road or parking area are so great that it really negatively impacts the space you have left. It creates these giant voids and eats up a lot of real estate on an installation. So although they're intended for safety, they really don't do a very good job of creating an environment for people." (Respondent 1) Army personnel work within the limitations they are given. However, some have given thought to what

could be if AT/FP requirements did not exist and wonder if these requirements actually reduce the likelihood of future incidents.

5.4 Recommendations for Improvement

A recurring theme in the interviews was that the Installation Design Guide was generalized. For this reason, many respondents said they don't even look at the IDG, they just go directly to the UFC. To not even look at the installation design guide circumvents the system that has been established. This should bring into question how many people look at the IDG for the many other topics it contains, or if the Army is wasting money creating it for each installation. The IDG, therefore, should have detailed explanations of the preferred methods each installation will use to accomplish the guidelines set forth by the UFC with regard to anti-terrorism/force protection.

An additional issue to consider with regard to AT/FP guidelines is restructuring the 82-foot rule to be situational, rather than a blanket guideline applied to all primary gathering facilities. In some situations, there may be perfectly good sites that become useless because they are a few feet short of accommodating standoff distance requirements. Although very appropriate in some situations, this rule becomes a hurdle for achieving the best solutions in others.

The rule causes planners to avoid innovative development visions for Army installations that could transform the communities where American soldiers and their families work and live. Standoff distance is a valid concept that should be mandatory in high-threat areas. In other places, Army personnel might prefer quality of life for themselves and their families rather than sprawled environments created to address a presumed threat. Standoff distance requirements should be evaluated on a case-by-case basis by a collaboration of professionals experienced in design, development, and security.

The only enforceable concepts found in the IDG are standoff distance and unobstructed space; other concepts are written as recommendations. Often those other concepts do not even

get consideration except by the installation AT/FP specialist. They can make recommendations but have trouble enforcing them without a document that carries authority on these issues. The issues include building orientation, blocking views from off-site with vegetation, railroad location, and perimeter control, to name a few. These concepts might be more critical to providing security than standoff distance in some cases and are all in the UFC as recommendations. This type of site design concept might be taken more seriously if they are rewritten as standards eligible for exemption in unique situations.

5.5 Relevance to the Profession of Landscape Architecture

This study is valuable in ensuring that the Army Corps of Engineers is designing secure environments for American soldiers to work and live. Additionally, this research contributes to the profession of landscape architecture by educating practitioners on the role that site design plays in preventing crime and the effects of terrorism. Furthermore, this research provides policy makers in the Department of Defense with insight to perspectives from military personnel on the current guidelines and their implementation. This research could in turn play a part in getting AT/FP guidelines changed, which impacts landscape architecture throughout the Army.

5.6 Suggestions for Future Research

This study revealed the following areas that warrant further research.

- *What are the impacts of AT/FP on the overall landscape of the installation?*

Anti-terrorism site design requirements drastically impact the overall landscape of military installations. The requirements for standoff distance cause each project developed to consume land that could have otherwise been used for other buildings, roads, or parking. Some appreciate these large expanses of turf as greenspace, while others dislike the requirements for the sprawled environment they create. This sprawled environment destroys the natural environments, such as woodlands, grasslands, and wildlife habitat that surround the installation cantonment areas, replacing them with buildings and turf. In addition, the sprawled environment makes it undesirable to walk from one destination to the next because the distance is too great.

There is also an aesthetic factor to consider, which is drastically affected by the scale of the space created. These factors all impact the quality of life for soldiers and their families. Therefore, a study of their perspectives on these issues is important in creating an environment for them to work and live that is commensurate with their service.

Recently, a week-long visioning charrette was held for an Area Development Plan to create a walkable town center at the core of one of the installations. The preferred alternative plan from the visioning example (see appendix B) represents the best possible scenario under AT/FP requirements, after hours of analysis by highly experienced urban planners. It is far superior to the typical military development that gives little consideration to walkability, human scale, and sustainable practices. However, this plan could be much more pedestrian-oriented without the constraints of standoff distance requirements. Spouses are often left at home with children and no vehicle. Therefore, walkable environments are important to military installations. The ability to walk to parks, stores, schools, and other uses would greatly increase the quality of life on the installation.

- *Are anti-terrorism/force protection guidelines consistent with the Department of Defense stated goals of Sustainable Planning?*

The requirement of standoff distance forces the Department of Defense to implement development practices that do not appear to be consistent with the goal of sustainable design and development listed in all the referenced Installation Design Guides. To counter this problem, form-based coding is becoming a new tenet in Army planning. "Form-based coding guides the development of appropriate building densities and building forms needed to support sustainable development. It also promotes mixed-use, compact, and walkable development patterns, not traditional auto-oriented, segregated land uses. Form-based codes focus on shaping the form of the public realm first, and secondarily on controlling land uses." (Army Regulation 210-20, ch2-2) How is form-based coding controlling the sprawl created from anti-terrorism site design guidelines?

- *Do anti-terrorism/force protection site design guidelines address current threats to military installations?*

Some do not believe that the type of rare event addressed by standoff distance requirements is worth consuming land and limiting the possibility for compact walkable development on Army installations. Even with the implemented standards, a terrorist who was determined could get an explosive near a building at least for long enough to escape the area and detonate. In many cases the terrorist will commit suicide, so they might just carry the explosive into the building with them or sit in a vehicle at a strategic location. As was witnessed recently at Fort Hood, terrorist attacks can also come from inside officials, which is very hard to prevent. An assessment of areas that need attention, other than standoff distance, could be very beneficial. What current vulnerabilities to terrorist attacks exist on U.S. Army Installations?

APPENDIX A

LETTER OF SUPPORT FROM THE U.S. ARMY CORPS OF ENGINEERS



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

January 22, 2010

Planning Branch

Dr. Taner Ozdil
601 W. Nedderman Dr.
Arlington, Texas 76019

Dr. Ozdil,

As you may know, Mr. Joey Ball is currently employed by the U.S. Army Corps of Engineers as a Landscape Architect, and is currently working to complete his Thesis under your direction, entitled "An Evaluation of Anti-Terrorism Site Design Guidelines for U.S. Military Installations".

I am aware of and support Mr. Ball's research efforts insofar as it advances the state of knowledge about best practices for facility design on U.S. military bases in terms of increasing security against threats from terrorism. To the end that Joey may encounter information of a sensitive nature and its release to the public not advised, I will work with him and our security office to ensure that his research presents information already within the public domain or that is unlikely to reduce our security posture.

We are very happy to have Mr. Ball on our staff. In the short time since his arrival here, he has proved himself a valuable addition to our planning staff.

If you have questions or wish to discuss this further, please call me at 817.886.1856.

A handwritten signature in black ink, appearing to read "M. Sams", written over a white background.

MEAD M. SAMS
Chief, Planning Branch
Planning, Environmental & Regulatory Division

Copy Furnished: Mr. Joey Ball

APPENDIX B
VISIONING PROJECT EXAMPLE

A week-long charrette was held for an Area Development Plan to create a walkable town center at the core of one of the installations. “During the week, stakeholders throughout the installation came together to identify challenges and opportunities facing the installation and to begin to craft a vision, goals, and design principles, to address key planning issues.” (The Urban Collaborative, LLC) Early in the process, the following goals were established by this group of stakeholders:

Goal 1: Appealing Town Center - Create an aesthetically pleasing town center that honors the culture and history of the place.

Goal 2: Walkable Town Center - Provide safe, convenient and comfortable walks within the heart of the community of that installation.

Goal 3: Connecting Places - Create connections between facilities and functions within the town center.

Goal 4: Places to live, work, shop, and play - Provide housing, offices, retail, and recreation in the downtown core.

On the next page, Figure B-1 shows the study area.

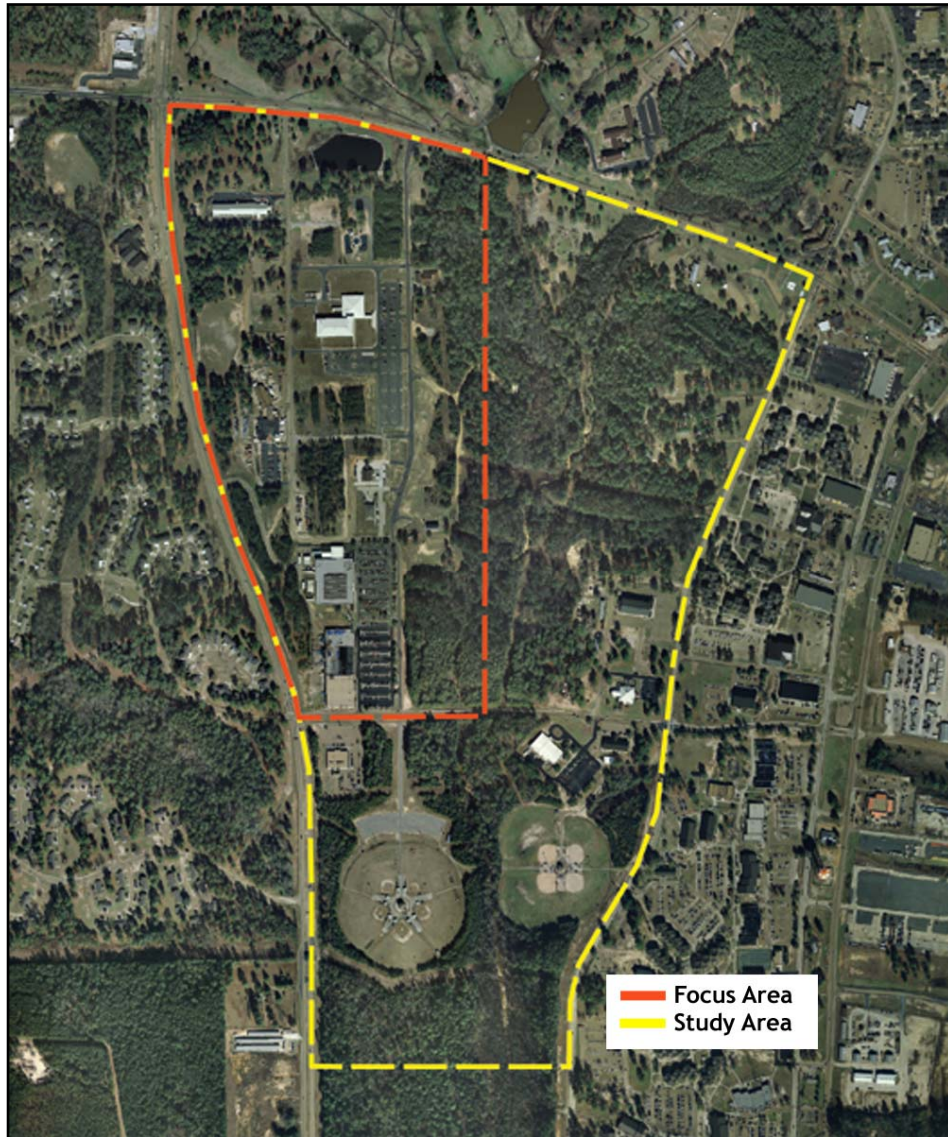


Figure B.1 Installation Study Area

After a visual preference survey was conducted, it was clear that the majority of participants desired a downtown area similar to that found in urban settings. The primary limitation to accomplishing this, however, is anti-terrorism/force protection standards. “Current AT/FP standards require much wider distance in front of the buildings than typical urban settings need. The proposed solution to achieve an urban design character, while still complying with AT/FP requirements, is to use small store fronts at the street level. They have lower

occupancy levels, and thus need less setback distance.” (The Urban Collaborative, LLC)
Buildings with occupancy less than 50 people are not required to have the 82-foot setback from roads and parking areas.

“The figure-ground map reveals the development patterns that have occurred over time, and the spaces between each building. This diagram shows how large buildings are dispersed over a broad area. Because of the considerable space that separates each building, their placement appears random, with no cohesive patterns that tie them together. Although these are community facilities with a public function, this plan does not have the appearance of a community. Rather, each facility appears as an individual bearing little relation to the other buildings that surround it.” (The Urban Collaborative, LLC)



Figure B.2 Existing Buildings Figure-Ground Map

To achieve a design that accommodated the expressed desires of the stakeholders and met the AT/FP requirements, the design team explored five alternatives, shown in Figures B.3 – B.7. In alternative A, “The central feature is a linear green space that transects the entire site from north to south, and provides a pedestrian corridor linking all the areas. Alternative B organizes a broad mix of facilities around several green spaces that are loosely linked by linear pedestrian corridors. Alternative C creates four distinctive areas comprised of green space or quadrangles surrounded by buildings. Each area has a distinctive focus and grouping of activities and facilities. Alternative D is simply a refinement of Alternative A. Finally, in Alternative E, the main Boulevard is redesigned as a divided road with a wide, planted median which terminates in a traffic circle.” (The Urban Collaborative, LLC)

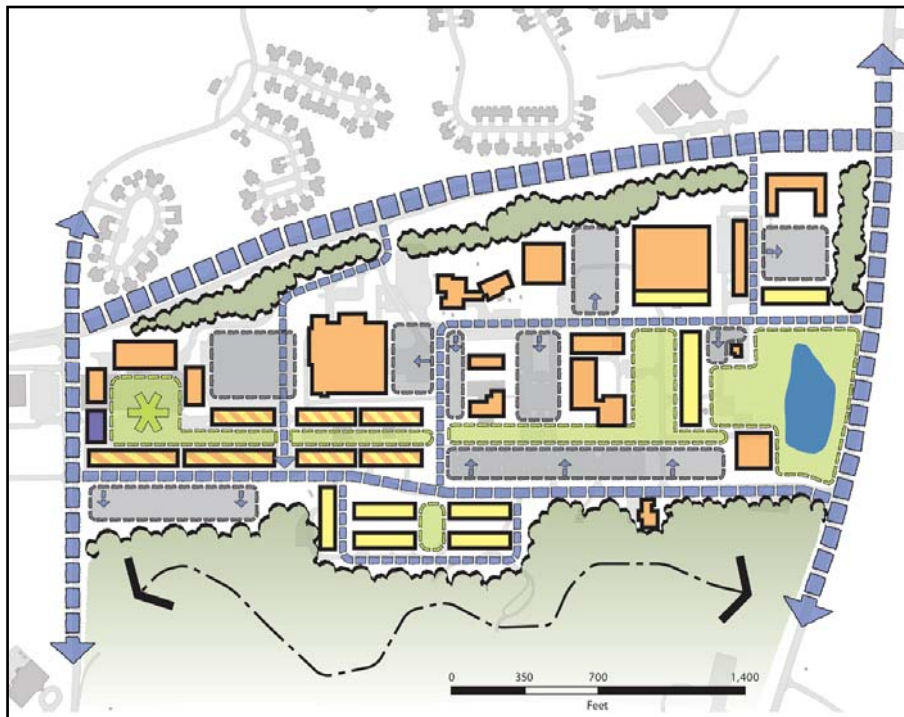


Figure B.3 Alternative A

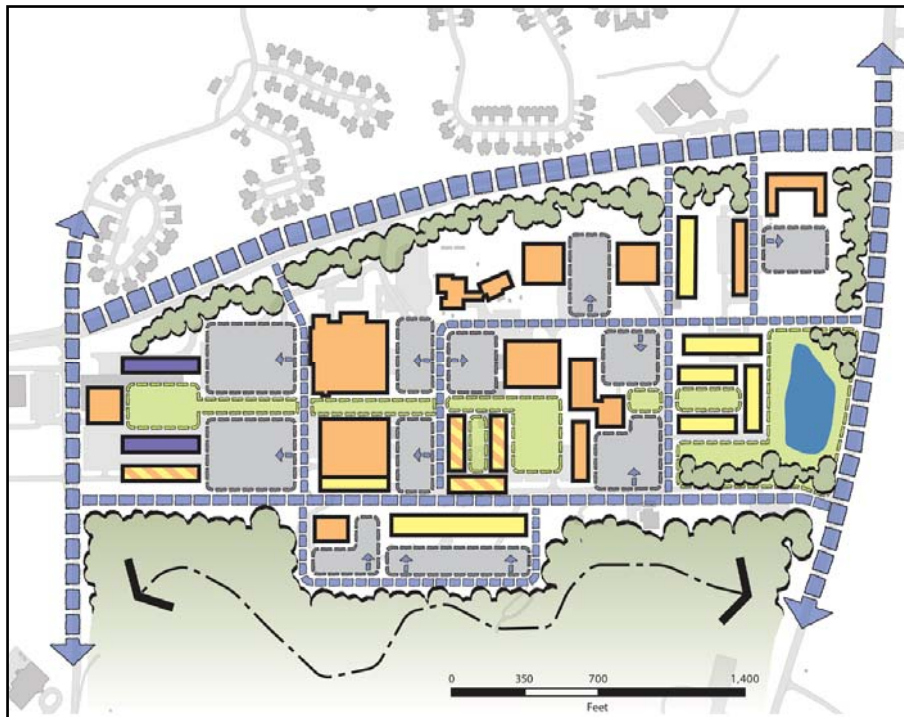


Figure B.4 Alternative B

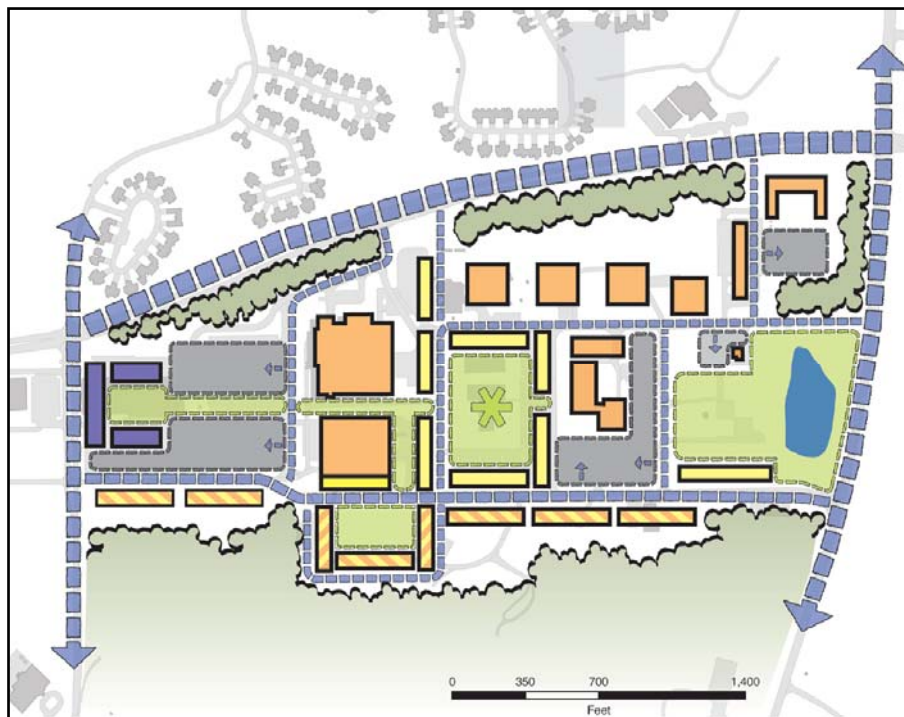


Figure B.5 Alternative C

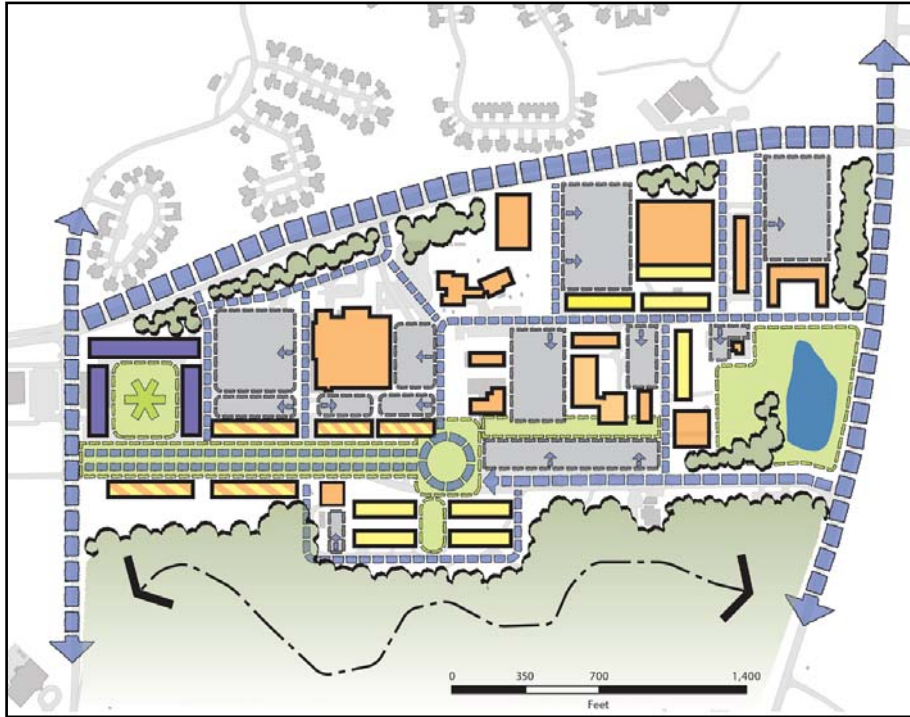


Figure B.6 Alternative D

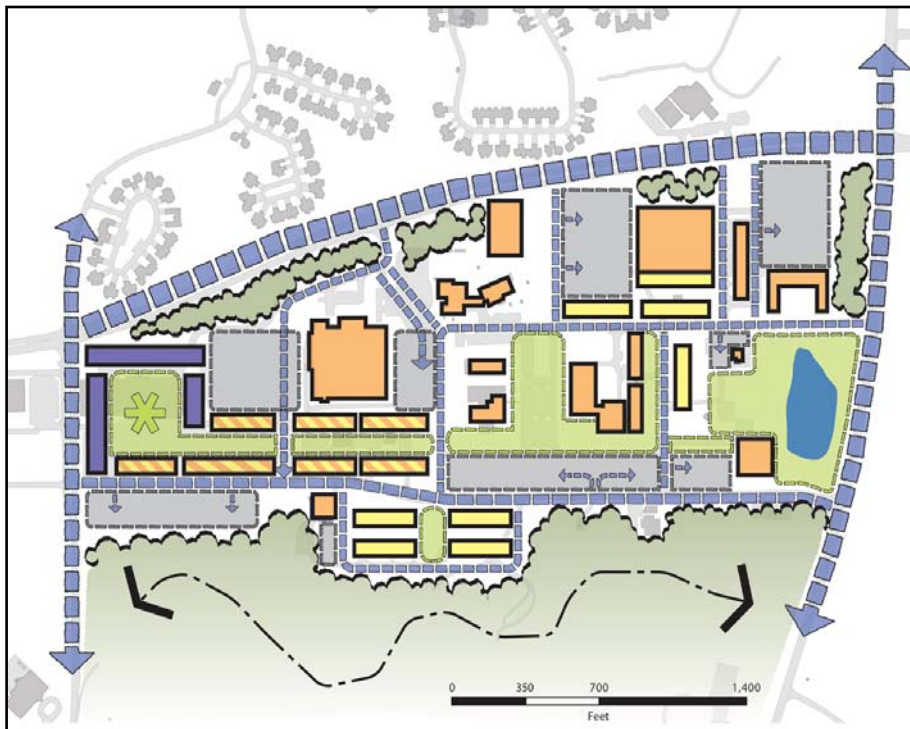


Figure B.7 Alternative E

In the preferred alternative, “the linear green space that transects the entire site from north to south and provides a pedestrian corridor linking all the areas was incorporated, as well as the redesign of major streets. The new streets include attributes such as on-street parallel parking for new housing and retail area, and planting strips separating pedestrian sidewalks from roadways.” (The Urban Collaborative, LLC)

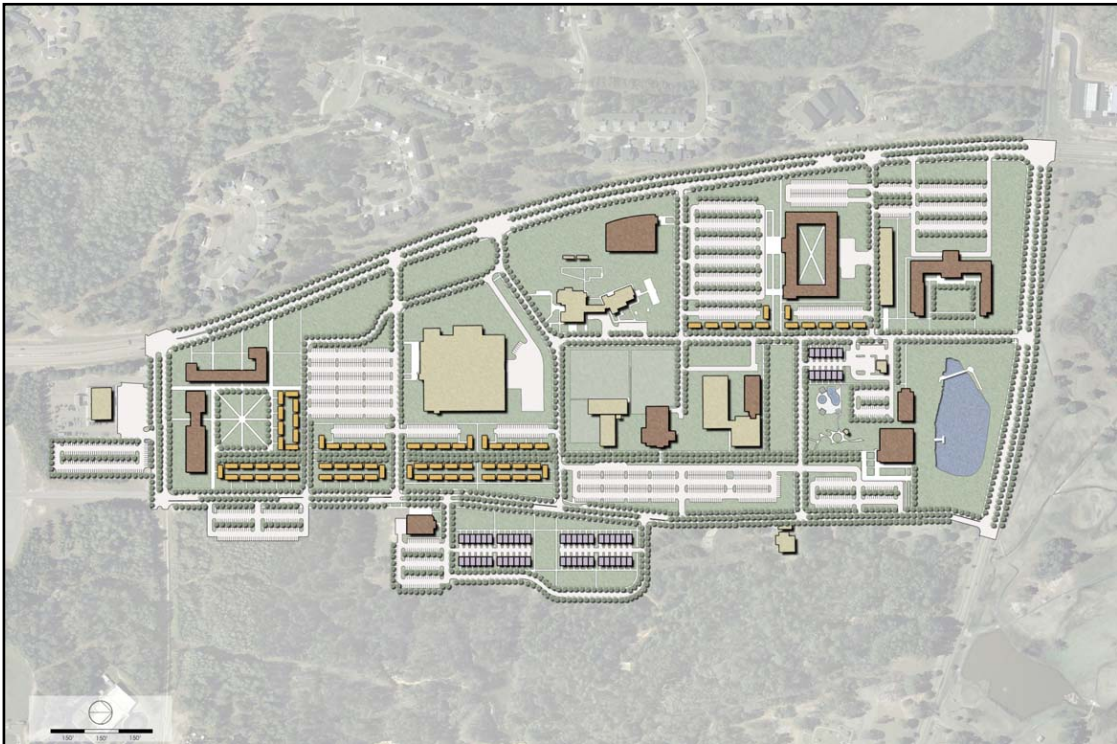


Figure B.8 Preferred Alternative

The preferred alternative plan represents the best possible scenario under AT/FP requirements, after hours of analysis by highly experienced urban planners. It is far superior to the typical military development that gives little consideration to walkability, human scale, and sustainable practices. However, this plan could be much more pedestrian-oriented without the constraints of standoff distance requirements. Spouses are often left at home with children and no vehicle. Therefore, walkable environments are important to military installations. The ability

to walk to parks, stores, schools, and other uses would greatly increase the quality of life on the installation.

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BIOGRAPHICAL INFORMATION

Joey Ball was born and raised in Texas. He always desired to be outdoors. This led him to work on a development around Joe Pool Lake, where he established an interest in large-scale landscapes. He continued working in landscape and construction over the years, as well as with industrial water purification. He now works on master planning of military installations, a rewarding field that allows him to put to use things learned not only from years in school, but also from past work experiences.

Joey graduated with a Bachelor of Business Administration degree from Northwood University in May 2005. After several years in the water purification industry, he felt drawn back to his interest in landscapes and discovered the Masters program in Landscape Architecture at the University of Texas at Arlington. During his four years in the program, he was privileged to be part of a design team that won the 2009 American Society of Landscape Architecture Student Design Award of Excellence for Analysis and Planning, for their work on the Talley Ranch Vision Plan.

His education from UTA has given him an exciting new career in landscape architecture. Joey plans to graduate in May 2010 and reside in the Dallas area with his wife Leticia and two children, Addison and Camden, while continuing to work for the U.S. Army Corps of Engineers.