3.1   INTRODUCTION

No project or property exists in isolation. Community context is a way of referring to the many community networks of which the site is a component. Reference to the community context occurs through the planning, development, and operation of every project. For example, the utilities and roadway infrastructure is part of a larger network; the customers, vendors, and employees are part of a larger business and social network; the ecosystems extend beyond the site boundaries. The community or larger context influences every project in many ways, including the choice of points of access, placement of buildings, style of architecture, and choice of materials.

When it comes to security, the risk assessment considers threats and vulnerabilities on site and off. Off-site issues include physical characteristics such as access to the property, views of the site, even wind patterns and topography that may disperse or concentrate CBR matter. The mission or operation of nearby facilities may increase the attraction of terrorists to the vicinity; the physical construction and proximity of adjacent structures could be the source of blast impacts on the projects. Likewise, security solutions may be developed off-site or in concert with neighboring properties. Off-site issues include a district-wide approach to controlling access, providing screening, and sharing surveillance operations and information. Changes in roadways can slow speeds and limit traffic movements, thus modifying a design basis threat and the resulting design criteria for effective barrier, size, strength, and placement.

Thoughtful planning can solve security needs while maintaining or enhancing existing community networks. Choice of design details and materials should reflect existing character and patterns. Four case studies in this chapter provide examples of how the design characteristics of a palette of security elements are used with differing materials and design details, based on the precincts of the cities where they are placed.

Prior to considering security opportunities and developing security requirements for the risk management strategy, it is important to conduct the threat, asset value (consequences), vulnerability, and risk assessments. Procedures for conducting these assessments are summarized in Chapter 2, and detailed methodologies for conducting them are provided in FEMA 452, *Risk Assessment, a How-To Guide to Mitigate Potential Terrorist Attacks against Buildings.*

This chapter opens with a description of the "layers of defense" approach to site security design. The three layers establish clear demarcation lines at the interfaces of the neighborhood or community and the defended site, and between the site and the face of the building. The first layer of defense is within the community. At the barrier between the first and second layers, the community looks towards and into the site, and the site looks outward into the surrounding neighborhood. At this interface, the defended perimeter shows a welcoming face to its neighbor or can be a bleak intruder on the urban scene (Figure 3-1).

Figure 3-1:
The community/site interface and the layers of defense.
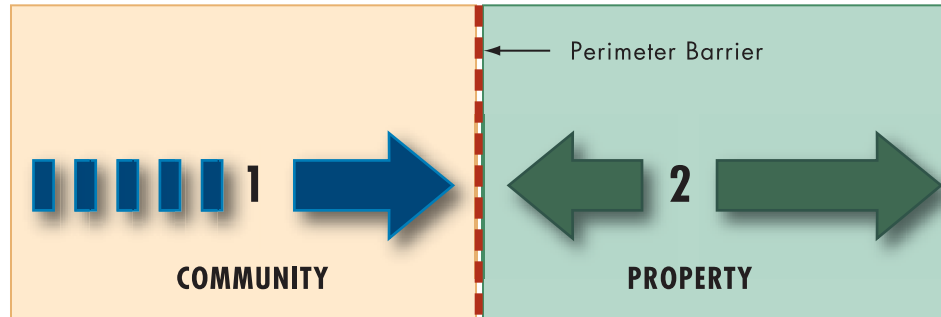
Hence, the next section discusses security design in relation to the context of the community, both in design solutions and by working with community representatives to ensure that community values are preserved or enhanced. This involves working with the stakeholders of the project and negotiating a myriad of local, state, and federal regulations.

3.2   THE THREE LAYERS OF DEFENSE

The FEMA/DHS Risk Management Series of publications uses the concept of **layers of defense** as a means to protect lives, properties and operations from terrorist attacks. The provision of layers of defense is a traditional approach in security engineering that has been used since ancient times to protect the occupants of a fortress or castle (see Chapter 1). The medieval castle employed a sequence of moats, walls, and towers to protect the heart of the castle, or asset; this strategy is still employed today.

The intent of the layered concept is to create a defense in depth by creating cumulative successive obstacles that must be penetrated, thus providing additional warning and response time for security personnel and to allow building occupants to move to defensive locations or designated "safe havens." Penetration of the perimeter leads only to further defense systems that must be overcome to reach the assets. Each layer has its specific security strategies but, as will be seen, methods of defense are also sometimes shared between adjoining layers.

This section deals with the basic concept of the layers of defense (Figure 3-2). Chapter 5 covers the layers of defense for typical open sites, and Chapter 6 discusses the defense measures for urban sites in which full development of the three layers is restricted due to lack of space.
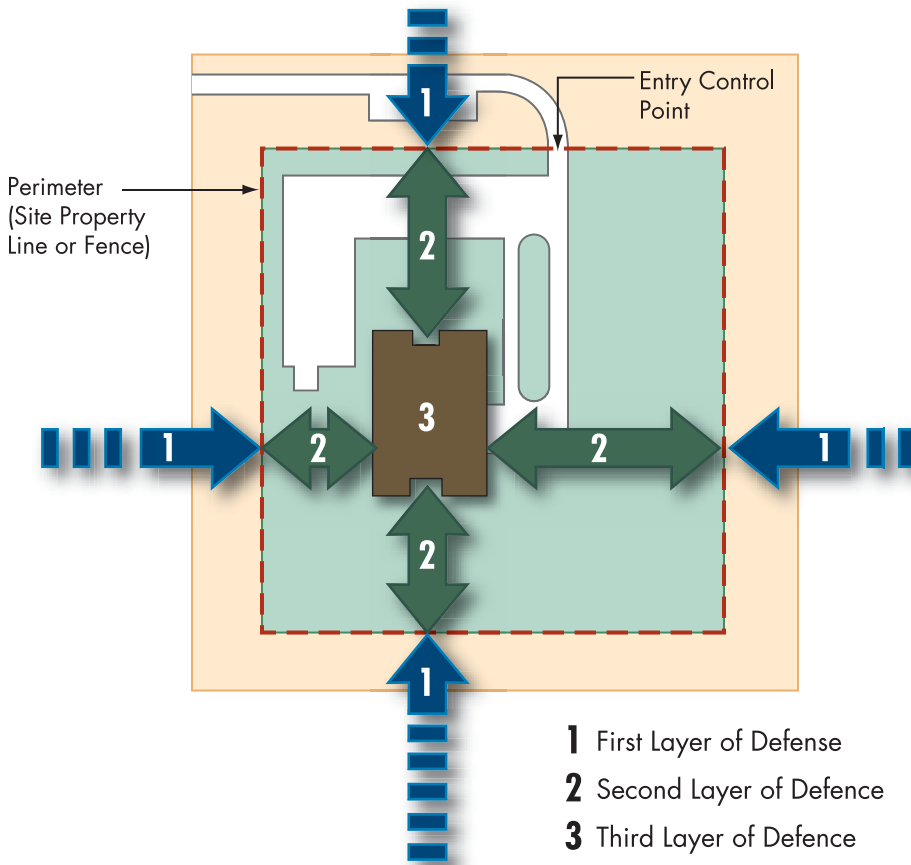

Perimeter (Site Property Line or Fence)

Entry Control Point

Figure 3-2: The three "layers of defense."

1 First Layer of Defense
2 Second Layer of Defence
3 Third Layer of Defence

The general **layers of defense concept** presupposes a spacious site with a vehicular approach to the defended building and on-site parking. The defended perimeter may or may not be the site property line. Egress and entry through the defended perimeter is controlled.

3.2.1   FIRST LAYER OF DEFENSE

The first layer of defense refers to the neighborhood and community surrounding the site, including building construction types, occupancies, and the nature and intensity of adjacent activities. The community context is everything that exists outside of and up to the first layer of defense. The context can modify the design basis requirements of the first layer and also its appearance. The line of demarcation between the first and second layers is the defended perimeter. This impacts the experience of the adjacent public space. Visible barriers and controlled entry points provide visitors with their first impression of the nature of the security measures and the quality of the welcome that the site offers.

It is important that the designers study the surroundings of the site to identify potential threats. GIS information, which may be available from local and state planning departments, and the FEMA HAZUS programs are vital tools that can be used to identify the characteristics of the site surroundings, since they can provide data on such topics as the building stock, essential facilities, hazardous materials, transportation systems, and demographics. Full understanding of the surroundings requires the involvement of many professional disciplines, including HAZUS and GIS experts. Many local and state agencies are also sources of information. A number of security and intelligence organizations are also a good source of information and data about the surroundings, including the local police department, the state police, and the FBI (Figure 3-3).

Figure 3.3:
GIS examples from HAZUS for the first layer of defense, depicting different critical infrastructure, the site perimeter, and surrounding buildings.

SOURCE: FEMA HAZUS AND E155 APPENDIX A

Investigation of the surroundings should not be limited to a HAZUS-type site plan view, but should include overhead features such as overlooking buildings and tall structures, together with underground utilities and tunnels and installation of risk mitigation measures.

3.2.2 SECOND LAYER OF DEFENSE

The second layer of defense refers to the space that exists between the defended perimeter and the assets that require protection, usually one or more buildings or other facilities. Perimeter security can be augmented within the site by the placement of buildings; site circulation to prevent high-speed vehicular approach; landscape measures, such as earth berms to deflect blast; and the provision of stand-off distance. In addition, parking, pedestrian walkways, security lighting, signage, and site utilities are subject to security design. Many of these features are shared between the first and second layers of defense.

For the second layer of defense, the designers should also consider a 360-degree view in all planes and directions that includes features that are overhead and underneath the site surface, from overlooking vantage points to underground utilities. This investigation may involve many different professional disciplines, such as security experts, land use planners, architects, landscape architects, civil and structural engineers, and other specialists that may be necessary to analyze a specific site and its interaction with the community.

The primary strategy in planning the second layer of defense is to keep terrorists away from inhabited buildings, since blast loads decrease rapidly with distance (see Chapter 2, Section 2.4). It is a well-known fact that it is less costly to achieve security through a good site design than to harden buildings for blast protection. The cost trade-off is between the cost of land to provide stand-off, together with barriers, and the cost of hardening the building envelope and structure. The trade-offs will also vary depending on whether a new or existing building is under consideration. A number of site elements may be used to create physical barriers, some natural and some man-made. Natural barrier elements include rivers, lakes, waterways, steep terrain, mountains, barren areas, plants, and other terrain features that are difficult to traverse. Man-made elements include fencing, walls, buildings, bollards, planters, fountains, concrete barriers, other heavy objects, and operable devices.

The most important initial step in planning a site to resist terrorism is to prepare a comprehensive assessment of the man-made threats and natural hazards, as was outlined in Chapter 2, so that protective measures can be designed that are appropriate and effective in the reduction of vulnerability and risk.

As discussed in Chapter 2, for a given blast level, the stand-off distance is the single most important factor in determining the extent of damage. There is no ideal stand-off distance: it is determined by the type of threat, the type of construction, and desired level of protection, and will vary with each project. However, provision of sufficient stand-off distance is often not possible; some guidelines endorse a minimum of 82 feet for stand-off distance to protect against smaller threats, but in urban areas this is often impossible, since buildings may be less than 10 feet from the curb (Figure 3-4). The ISC recommends 50 feet as a minimum. Compromise in the level of protection may be necessary if extensive building hardening is prohibitive; an alternative is judicious hardening combined with increased surveillance and security personnel. Chapter 6 discusses in more detail methods of achieving reasonable site security for the central business district.

In urban areas, standoff distance is generally impossible to achieve; sidewalks provide less than 10 feet
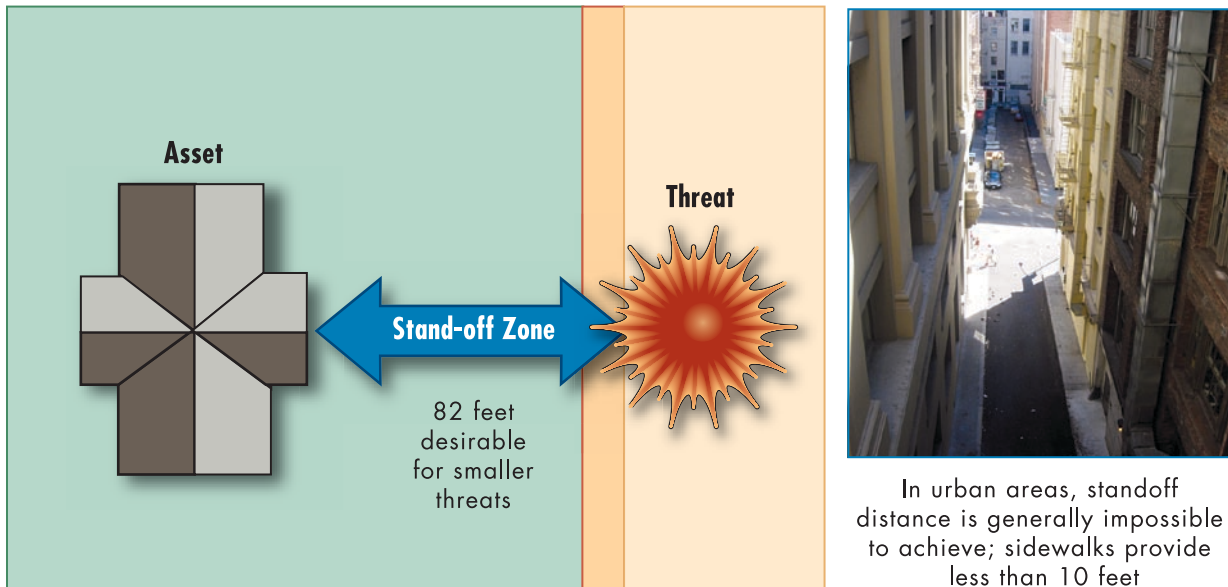
Figure 3-4: Recommended stand-off compared with sidewalks in urban areas.

SOURCE: LEFT, FEMA 426

3.2.3 THIRD LAYER OF DEFENSE

Detailed discussion of the third layer of defense is beyond the scope of this publication. This layer refers to the protection of the asset itself; it includes the security-influenced design of typical building attributes – its overall configuration; the nature of the building envelope; structure; interior space planning; nonstructural elements; mechanical, electrical, and plumbing services; and surveillance equipment (Figure 3-5).

ELEMENTS OF THE THIRD LAYER OF DEFENSE

- ❍ Architectural
- ❍ Structural System
- ❍ Building Envelope
- ❍ Mechanical Systems
- ❍ Plumbing and Gas
- ❍ Electrical Systems
- ❍ Fire Alarm Systems
- ❍ Communications and IT

Figure 3.5: Key elements of the third layer of defense.

A key third level of defense concept is building "hardening", or strengthening. In cases where sufficient stand-off distance is not available to protect a building, hardening of the building's exterior envelope and structural systems to resist blast may be required, including design to prevent progressive collapse. Hardening a building can be very costly, especially for existing buildings. Reinforced concrete is the most effective material, and precast concrete techniques may be able to reduce the cost of installation and business interruption. Less stand-off requires more mass and more steel for hardening, thicker and stronger glass, and better window frame connections to the building's structural frame or walls.

The first step when considering building hardening is to estimate the blast loads on the structure. A structural engineer must determine the building design features needed to achieve the desired level of protection to ensure that no collapse occurs, and other life-threatening damage is reduced to an acceptable level. The engineer must also work with the architect in the design of the building envelope. Envelope designers should aim to minimize hazardous flying debris during an explosive event, because most injuries result from glass fragments and debris from walls, ceilings, and other non-structural features. Window and glazing design vary widely in conventional construction and are normally the most fragile building envelope components.

The overall hardening of the building envelope must be balanced by the concerted efforts of the architect and structural engineer to ensure that the columns, walls, and windows have approximately equal response to the design basis threat weapon at the available stand-off distance for the desired level of protection.

In the consideration of mitigation measures against CBR attacks, the building HVAC systems are of particular concern, because they can become an entry point and distribution system for airborne hazardous contaminants. Even without special protective measures, buildings can provide protection in varying degrees against airborne hazards that originate outdoors. Conversely, the hazards produced by a release inside a building can be much more severe than a similar release outdoors. Because buildings allow only a limited exchange of air between indoors and outdoors, not only can higher concentrations occur when there is a release inside, but hazards may also persist longer indoors.

To avoid this, protection against outdoor releases can be provided by interrupting or filtering the flow of outside air into the building. If installed, HVAC air filtration and air-cleaning systems or segregation of HVAC systems between high-threat and low-threat areas can reduce the effects of an internal CBR agent release, by removing or containing the contaminants within a building.

Building risk mitigation measures are discussed in *FEMA 426*, Chapter 3, while CBR threats and protective design and other occupant protection methods are discussed in *FEMA 426*, Chapter 5. They can be as simple as defining a protective action plan or as complex as exacting design measures practical only for new construction.

3.3 DESIGN IN TUNE WITH THE COMMUNITY CONTEXT

Before September 11, 2001, communities were not forced to live with security beyond normal neighborhood police protection. Now, the community must learn to participate in the layers of defense strategy for the protection of a defended asset. The community must learn to live with security, and designers must be educated to understand security needs and to reconcile them with traditional urban design principles. The development of understanding of community-based security design – a design approach oriented to balancing amenity and public safety in major urban and suburban security projects – has become a necessity both for the community and the designers. The approach has the purpose of avoiding conflicts, such as compromised functionality and poor appearance, that can impact neighborhoods when security projects are not fully coordinated and comprehensively planned.

Security solutions need to be very carefully planned to maintain the public amenities and aesthetic qualities in neighborhoods in which residents and visitors feel welcomed, comfortable, and safe. This publication recommends the adoption of security design that is in tune with the com-

munity context and objectives, rather than solutions that focus solely on individual project objectives. Community-based solutions encourage community participation and analysis to provide understanding that can influence the project design and ensure that it respects or even enhances the project neighborhood. It should be noted, however, that not all the elements of the security planning can be shared with the public, and tact and discretion must be used in dispensing information.

Experience has proven that strategies are more easily accepted and effective when worked out at the community level. The use of unobtrusive surveillance cameras throughout wide areas and across neighborhoods in London and Washington, D.C., exemplifies a community-level strategy. Traffic control on a district-wide basis and the sharing of security officers and equipment are other examples of community-wide operations. As more community-based solutions are developed and common strategies are applied to multiple projects within the same neighborhood, the ability to resolve conflicts and challenges will increase.

Every design project, whether it is new construction or additional work for an existing project, begins with an assessment of existing conditions (see Chapter 2). Typically, the risk assessment is completed before the site and building designers are hired. Using the risk assessment as background information, security projects begin with studies that cover security issues, the community context, and neighborhood objectives. Sufficient time must be provided for adequate review and assessment of existing conditions to ensure that community expectations are understood and design strategies are developed that are in balance with project security and community needs.

The scope of the studies includes issues such as:

❍ Identification and evaluation of existing physical features (topography, planting areas, site walls, planters, and lighting) that might be incorporated into the perimeter security design.

❍ Detailed early documentation of underground utilities and structures to enable the design team to avoid utility and foundation conflicts. This information may have major influence on the location of barrier systems.

❍ Investigation of the existing conditions in the community (land use development patterns, site conditions, physical characteristics, transportation, etc.) provides important information for vulnerability assessment, design strategy, regulatory approval, and community acceptance of the project.

❍ Preliminary identification of potential opportunities and conflicts between security and amenity can reduce later possible problems and delays.

Table 3-1 is a tool to help analyze the relationship between the community context and the first layer of defense. It includes some questions and guidance that can assist in the collection and review of information on key existing conditions topics. Every site and community is different, so additional topics may also be relevant. An analysis of these questions will help to determine the opportunities and constraints for project and security design.

Table 3-1: Existing Conditions and Design Implications

Topic	Guidance
Context	
What is the general nature of project setting -- urban, suburban, or campus? **Urban:** first layer of defense. NYPD **Suburban**: first layer of defense. **Campus**: first, second, and third layers of defense. GOOGLE EARTH	❍ The specific nature of the project context provides guidance for the design approach. ❍ The density of urban sites provides many influences to evaluate – nearby buildings and land use, traffic patterns, streetscape plans, architectural character, limited area for loading and parking, conflicts with sightlines from other buildings and structures. The numerous utilities compete for the limited area below grade. Urban areas have regulations and guidelines that tightly control development. Requirements for pedestrian mobility and access to street level shops and services are critical and are often overlooked. ❍ In suburban locations, more land area may be available for stand-off and queuing for inspection; sight lines are much more open. Vehicle circulation patterns are important. Landscape solutions incorporating natural features may be more viable. Community networks for mass transit, trails, and parks should be preserved or enhanced. ❍ A campus setting resembles a community within a community. In many cases, the campus may have shared its amenities and program with the outer community. Changes in security may change that relationship; for example, casual walking through the campus or walk-in attendance at programs may no longer be possible. Community networks may be interrupted. Visual impacts should also be assessed. A campus setting can provide advantages, allowing efficiencies in operations by placement of facilities and clustering low-risk and high-risk operations appropriately within the campus.

Table 3-1: Existing Conditions and Design Implications (continued)

Topic	Guidance
Land Use	
What are the existing land uses in the neighborhood of the site? Is the site proximate to public or private institutions, or centers for entertainment or attractions that draw significant traffic or visitors? Do planned land uses differ from the existing ones? **Transportation Centers** 	❍ The dominant development pattern may suggest an approach for treatment of the perimeter that is compatible with or enhances the existing relationships. ❍ The functions of sites and buildings with large numbers of visitors may need special consideration in the design approach. ❍ When future or planned land uses are significantly different from the existing development pattern, the design treatment should consider a design approach compatible with the future land use. ❍ The design should avoid limiting access, egress, or circulation around transportation centers and make sure to consider each mode's movements. Opportunities to relieve existing problems or limitations should be investigated.
Development Patterns	
Does the surrounding development have common patterns, such as consistent setbacks and the building's relation to the street? Is the site part of an historic district or adjacent to historic buildings or landscapes? What is the nature of the public realm including streets, sidewalks, etc? Determine if the design of the existing areas is successful, e.g. should it be a model for future conditions or are some improvements called for? What is the level of activity in this neighborhood?	❍ The existing development pattern or architectural style can suggest a treatment for the perimeter in keeping with its neighborhood. ❍ Historic districts, buildings, and landscapes can inspire and guide the design approach. For example the Washington Twin Globe Light pole design by Henry Bacon (1923) with a polycarbonate globe and internal louvers can be installed on a heavy-duty base as part of a security barrier. NCPC ❍ Every effort should be made to preserve the vitality of "on the street" activities that make busy urban districts successful. CPTED techniques to enhance security may be appropriate (see Appendix A).

Table 3-1: Existing Conditions and Design Implications (continued)

Topic	Guidance
Scenic Vistas and Views	
Does treatment of the perimeter or development of the site impact any existing views and vistas? NCPC	❍ Lines of sight should be evaluated for views to and through the site. Placement of barriers in relation to buildings should be located to respect scenic vistas and views. NCPC
Parks, Recreation, Open Space, Trails, and Bike Paths	
Does the site include access to or circulation through existing parks and open space? Can the site provide an opportunity to link existing parks?	❍ Minimize interruption or closure of community access and mobility to parks and open space. ❍ Locate the perimeter barriers in ways that allow pedestrian access to use or expand local pedestrian networks (sidewalks, trails).
Signage	
Does the community or district have a signage ordinance? 	❍ Proposed signage and wayfinding should be carefully designed to be compatible with design standards and signage regulations. This notice board is carefully designed to be compatible with its location and to function as part of the security barrier. NCPC

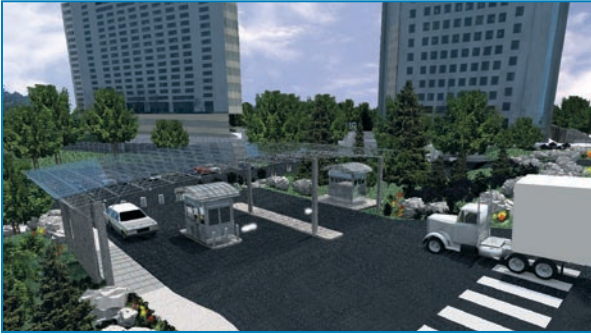Table 3-1: Existing Conditions and Design Implications (continued)

Topic	Guidance
CPTED	
What opportunities exist for CPTED? (See Appendix A.)	❍ Consider the potential of areas adjoining the site boundaries to support natural access controls, natural surveillance, or territorial reinforcement.
Community Facilities	
Are there any community facilities that will be interrupted, closed, or impacted by the security design?	❍ Look for opportunities to maintain, complete, or enhance access to public facilities. ❍ Maintain a sense of openness within the community.
Roads and Access	
Are there any existing conditions that could be improved through the security design? **Are there any areas where the security design may create new negative impacts?** NCPC	❍ Proposed configurations for access, queuing, inspection, and stand-off can be planned to address improvements of existing traffic problems and reduce approach speed and divert from a direct path. ❍ Proposed configurations for access, queuing, inspection, and stand-off should maintain or enhance existing traffic flows. This inspection station allows traffic to pull off the main road for queuing, and multiple lanes offer greater capacity. NCPC
Transit	
Are there any transit stops, stations, or approaches to stations near the site? 	❍ Perimeter design should aim to maintain or improve routes, stops, and access to transit for vehicles or pedestrians.

Table 3-1: Existing Conditions and Design Implications (continued)

Topic	Guidance
Access for Emergency Response	
How will emergency responders access the site and adjacent areas?	❍ Perimeter design should not impair access to the site, building, and adjacent areas by emergency responders. Make sure that fire lanes are well marked and access to stand pipes and hydrants is open and clearly visible.
Maintenance	
Does the design support ongoing maintenance of streetscape, utilities, streets, and sidewalks?	❍ Design should allow for regular and routine maintenance to be performed.
Underground Infrastructures	
What exists below grade beneath roadways and sidewalks?	❍ Design should accommodate underground utilities, vaults, etc. This may constrain the placement of bollards and other barriers that require deep foundations.
Mature Streetscape and Trees	
How will the design impact the existing streetscape?	❍ Proposed solution should minimize impacts and interruptions to existing streetscapes and plantings. Mature trees may be incorporated in a barrier system, although there are limitations on their use, as discussed in Chapter 4, Section 4.4.4.

Table 3-2 shows bad and good examples of response to community context. It illustrates some instances of how key opportunities to develop designs for security in support of community vitality can be realized through the active collaboration of owners, developers, planners, and designers, compared to characteristic instances where opportunities have been missed.

Table 3-2: Community Design Issues and Design Opportunities

Inappropriately Implemented Security	Opportunities to Enhance the Community Through Good Design
Design of each project without consideration for overall community impact can result in an unattractive and incoherent district.	Adherence to community guidelines and cooperation in the review process can help to create an attractive district and streetscape.
Poor design or the wrong design details can inadvertently draw too much attention to the security design and make tenants and neighbors feel more vulnerable and threatened. NYPD	The appropriate design can blend security into the existing streetscape or community without drawing attention to it and serve as amenities for tenants and neighbors. NCPC
Installation of poorly located perimeter barriers can interfere with or eliminate existing pedestrian patterns and trails and create a negative community response. NCPC	Perimeter barriers can define pedestrian zones and may increase the safety of pedestrians by separating them from vehicular traffic.

Inappropriately Implemented Security	Opportunities to Enhance the Community Through Good Design
Improperly designed perimeter barriers are unattractive and detract from surrounding architecture, streetscape, and community character. This can have a negative impact on leasing, sales, and project acceptance. NCPC	Well-designed perimeter barriers can be in tune with and enhance local programs for streetscape improvements, such as street tree planting, while improving the overall security of the project. NCPC
Queuing for security checkpoints can back up into adjacent curb lanes and roadways, slowing everyone's travel. NCPC	Properly designed, queuing does not interfere with traffic patterns when an adequate holding area is provided. Separate enclosed queuing area for pedestrian screening and inspection.
Implementing stand-off distance as the preferred security strategy, without consideration of the full range of potential costs and solutions, can accelerate sprawl and costs to local communities by reinforcing a pattern of isolated developments that requires the extension of services.	The lack of land in urban areas or high land cost in central business districts may mean that a hardened building or enhanced security and surveillance are better solutions than stand-off distance.

SECURITY DESIGN AND THE COMMUNITY CONTEXT

Inappropriately Implemented Security	Opportunities to Enhance the Community Through Good Design
Typically, projects have to comply with many different regulations and review processes from multiple agencies. Waiting too long to consider how regulations or policies interact with security design may hinder the achievement of an effective, creative solution without schedule and budget overruns.	Understanding all the project parameters and criteria early on allows the project team plenty of latitude to find the best solution for security in balance with other requirements. NCPC

Case Study 1, from the NCPC Urban Design Plan, shows the different neighborhoods into which Washington has been divided, based on their urban design and functional character, and shows how the same palette of hardened street furniture can be modified to respect the neighborhood context. Different design and different materials provide the same level of security.

CASE STUDY 1: THE NATIONAL CAPITAL URBAN DESIGN AND SECURITY PLAN

1.0 INTRODUCTION

The National Capital Planning Commission (NCPC) Urban Design Guidelines for Washington, D.C., subdivided the District into contextual areas, each with a unique character and design style. Security design for each of these precincts is developed to be compatible with the overall urban design setting. This case study is an example of site security design within the community context.
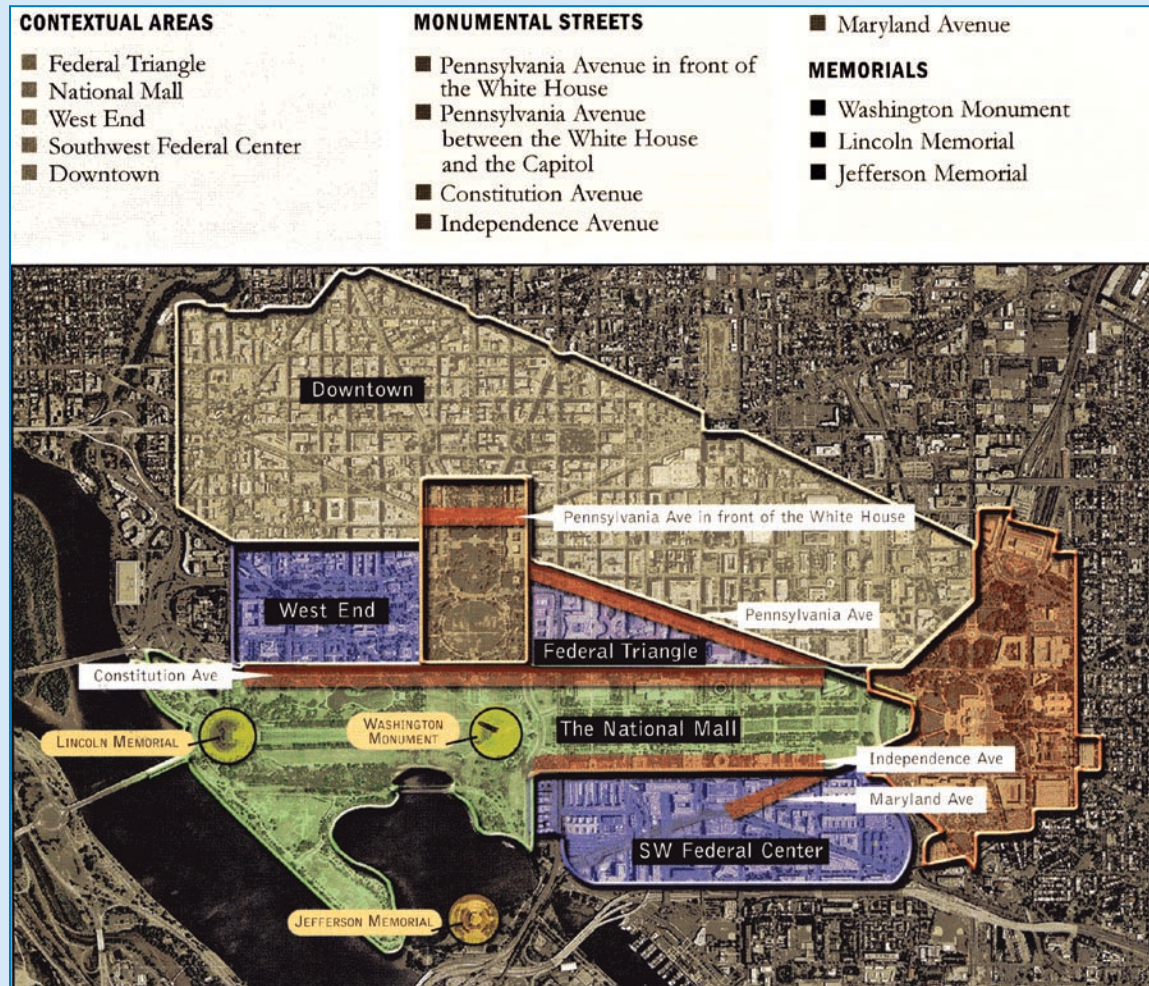
Washington, D.C., is known for the National Mall and many other open parks and attractive public spaces. However, after September 11th, 2001, temporary barriers and fortifications became a common sight in the Nation's Capital.

In 2002, a group of nationally recognized landscape architects, urban designers, and security experts assisted the NCPC in preparing a design framework and implementation strategy titled, the *National Capital Urban Design and Security Plan*. The plan focuses on preserving parks, streetscapes, and public spaces in Washington's monumental core and downtown neighborhoods, while protecting public buildings and neighborhoods from vehicle-borne explosives.

CASE STUDY 1: THE NATIONAL CAPITAL URBAN DESIGN AND SECURITY PLAN (continued)

CONTEXTUAL AREAS, MONUMENTAL STREETS, AND MEMORIALS

CONTEXTUAL AREAS
- Federal Triangle
- National Mall
- West End
- Southwest Federal Center
- Downtown

MONUMENTAL STREETS
- Pennsylvania Avenue in front of the White House
- Pennsylvania Avenue between the White House and the Capitol
- Constitution Avenue
- Independence Avenue
- Maryland Avenue

MEMORIALS
- Washington Monument
- Lincoln Memorial
- Jefferson Memorial

1.1   Project Scope

The goal of the *National Capital Urban Design and Security Plan* is to coordinate design and installation of streetscape projects, integrating building perimeter security and restoring the beauty, openness, and accessibility that have traditionally defined the city. The study was completed 2002.

2.0   DESIGN APPROACH

**The design approach is motivated by six goals:**

1. Appropriate balance between the need for security and the need to maintain the vitality of the public realm

2. The provision of security within a larger context of streetscape enhancement and beautification of the public realm

CASE STUDY 1: THE NATIONAL CAPITAL URBAN DESIGN AND SECURITY PLAN (continued)

3. The creation of an expansive palette of elements that gracefully provide security while avoiding monotony and clutter

4. A coherent strategy for applying "families" of streetscape and security elements that achieve aesthetic continuity within neighborhoods, rather than focusing on the needs of a particular building
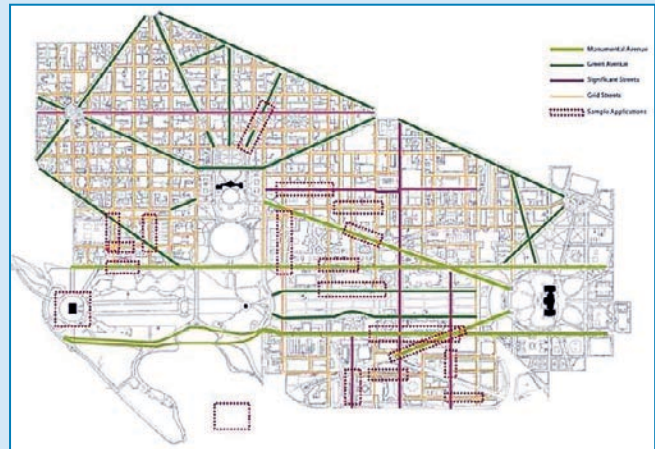
5. Provision of perimeter security in a manner that does not impede pedestrian and vehicular mobility, impact the health of existing landscape elements of historic character, or disrupt the commerce and vitality of the city

6. Efficient and cost-effective coordination of implementation

STREETSCAPE SECURITY ELEMENTS
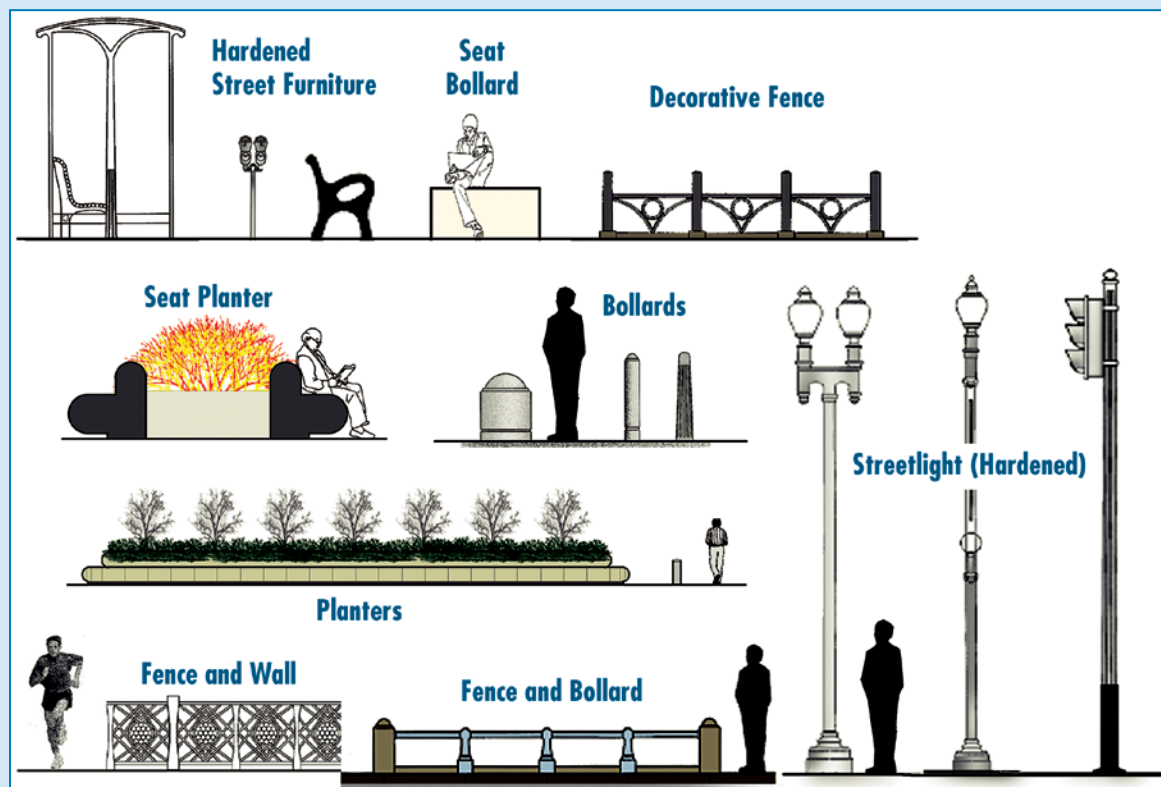
FEMA 426

CASE STUDY 1: THE NATIONAL CAPITAL URBAN DESIGN AND SECURITY PLAN
(continued)

### 3.0 ELEMENTS INCORPORATED

First Layer of Defense

- ❍ Creating "families" of coordinating streetscape components that can be hardened to incorporate security and that are designed to relate to different contextual areas of the NCPC plan.

Second Layer of Defense

- ❍ A design approach that creates a sense of community and protects, without diminishing image and quality of life for residents and visitors.

Third Layer of Defense

- ❍ This case study does not address building hardening, operational procedures, or surveillance.
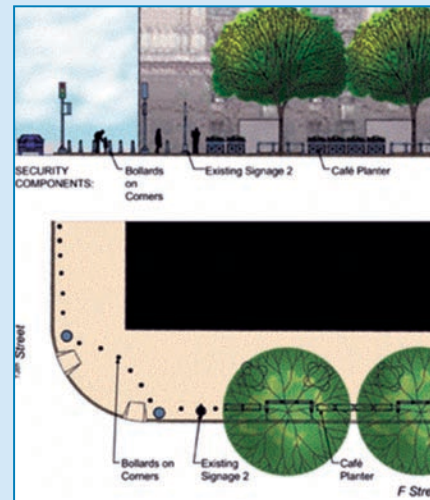

4.0 BLENDING WITH THE NEIGHBORHOOD CONTEXT

The image of the District and the quality of life experienced by its inhabitants and visitors have suffered in recent years, without a unified, coordinated approach to security design. Temporary or repetitive security elements detract from the existing character of the city, disrupting pedestrian movement throughout the city as well as potentially blocking evacuation routes and emergency access. This guide offers ideas and a process toward a unified, well-coordinated approach to urban design and security.
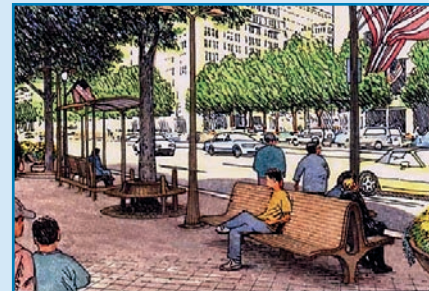
5.0 INNOVATIONS AND BEST PRACTICES

The *National Capital Urban Design and Security Plan* discusses the diversity and character of its urban setting, and the importance of working within the existing context, for a more successful, holistic approach to urban and security design. By breaking the city into distinct neighborhoods, and illustrating how "families" of design elements could be used to create a cohesive community experience and still accomplish the required goals, the plan offers a framework for design that promotes an open dialogue between security and urban design strategies.
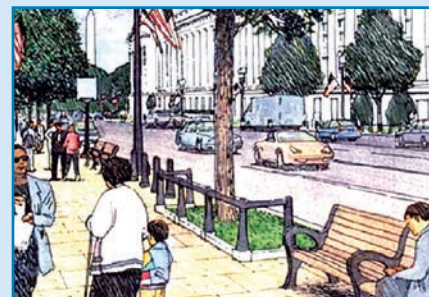
The published plan demonstrates a planning framework and also provides other examples in response to these issues. It continues to be a key reference for how to approach neighborhood contextual design for security.

Case Study 2 shows an analysis of existing conditions and how the security design responds. The building is located on the National Mall in Washington, D.C., and the security design respects the framework of the NCPC *National Capital Urban Design and Security Plan.*

A design treatment is developed that reflects the open spaces to the north, the streetscape of each side of the project, the character of the historic buildings in the neighborhood, and the design of security features from nearby buildings. The technical conditions include the dimension of the available stand-off distance, which varies on each side of the building, the adjacent surface and on-street parking, underground utilities and vaults, the types of uses within the building that need protection, and the location of loading zones and parking entrances.

CASE STUDY 2: ANALYSIS OF EXISTING CONDITIONS AND THE SECURITY DESIGN RESPONSE

1.0 INTRODUCTION

An analysis and concept plan for four buildings for the United States Department of Agriculture (USDA) on the National Mall was conducted, beginning in December 2003. Studies were made of the existing conditions for the Whitten Building, South Building, Yates Building, and the Cotton Annex, along each of the buildings' four perimeters. Analyses were then used to create a conceptual plan for permanent security perimeter upgrades.

This case study will focus on one of the four sites: The Whitten Building.

The Whitten Building was constructed between 1904 and 1930 and is the only Presidential Cabinet level office building on the Mall. Bordered by 14th Street, one of Washington, D.C.'s major emergency evacuation routes; Independence Avenue, which flanks the National Mall; the 12th Street Tunnel; and Jefferson Drive; the site boasts several parking lots and a vehicle ramp that provides below-grade access to the building, when heightened security is required.

2.0 PROJECT SCOPE

Pedestrian and vehicular circulation plans, including key entrances and exits, were identified, along with analysis of vending areas, guard booths, and visitor centers. In addition, the study located the closest Metro entrances, bus stops, and all street parking options adjacent to the site, as well as memorials, retaining walls, specimen trees, and notable topography, analyzing their condition and use.

All of this carefully collected and cataloged information was then used to highlight the significant challenges and opportunities offered by the site. The goal is to attain the most setback possible in this tight urban environment, while integrating new perimeter security elements seamlessly into the existing neighborhood vocabulary. The study completed in 2004.

CASE STUDY 2: ANALYSIS OF EXISTING CONDITIONS AND THE SECURITY DESIGN RESPONSE (continued)
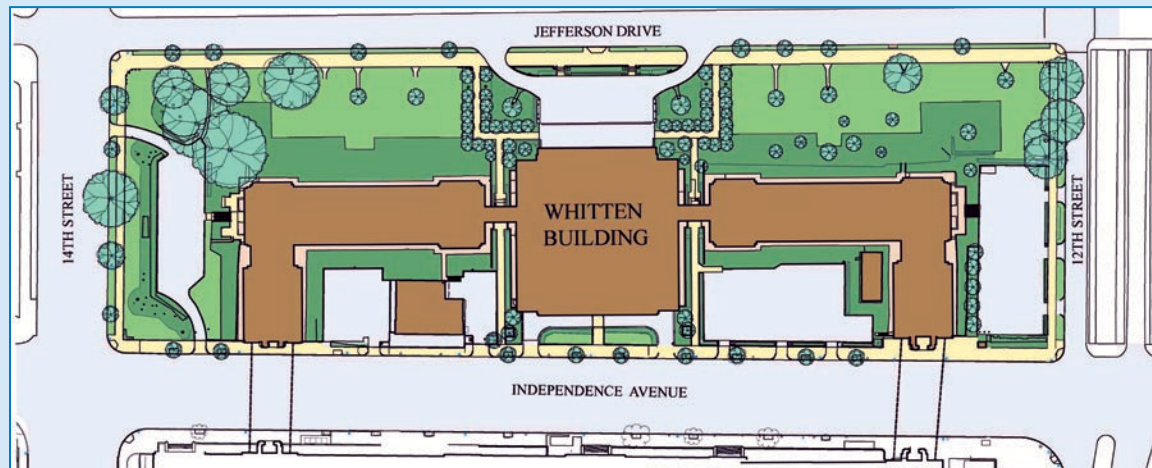

JEFFERSON DRIVE
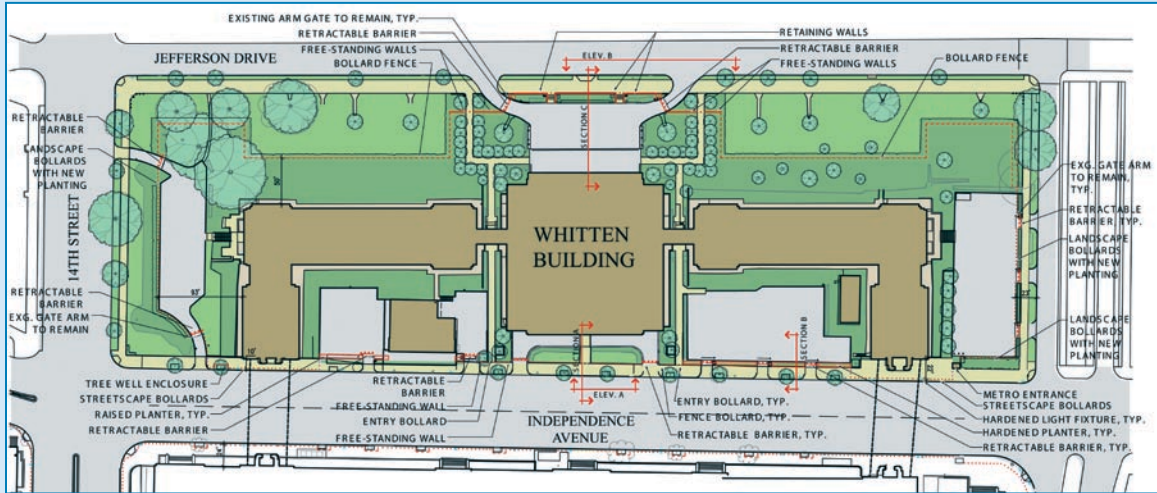
INDEPENDENCE AVENUE

12TH STREET

14TH STREET

EXISTING SITE PLAN

SECURITY DESIGN AND THE COMMUNITY CONTEXT

CASE STUDY 2: ANALYSIS OF EXISTING CONDITIONS AND THE SECURITY DESIGN RESPONSE (continued)

PROPOSED PLAN


3.0 DESIGN APPROACH

3.1 Issues Addressed

❍ High-profile, high-traffic area, adjacent to the National Mall

❍ 14 access drives (six existing parking lots and a vehicle ramp to below-grade access) requiring protection

❍ Perimeter needed to accommodate emergency egress

3.2 Security Strategy

First Layer of Defense

❍ Increase stand-off and maintain a perimeter that allows access to emergency exits, with hardened, retractable bollards for controlled entry

BUILDING SECTIONS

SECTION A - INDEPENDENCE AVE. @ "MOAT"
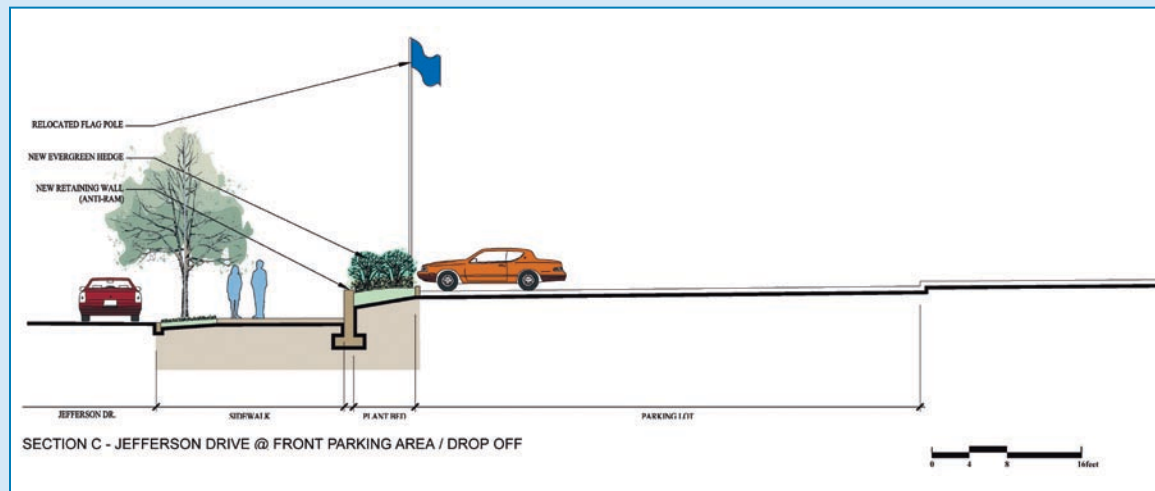
SECTION B - INDEPENDENCE AVE. @ NEW PLANTER
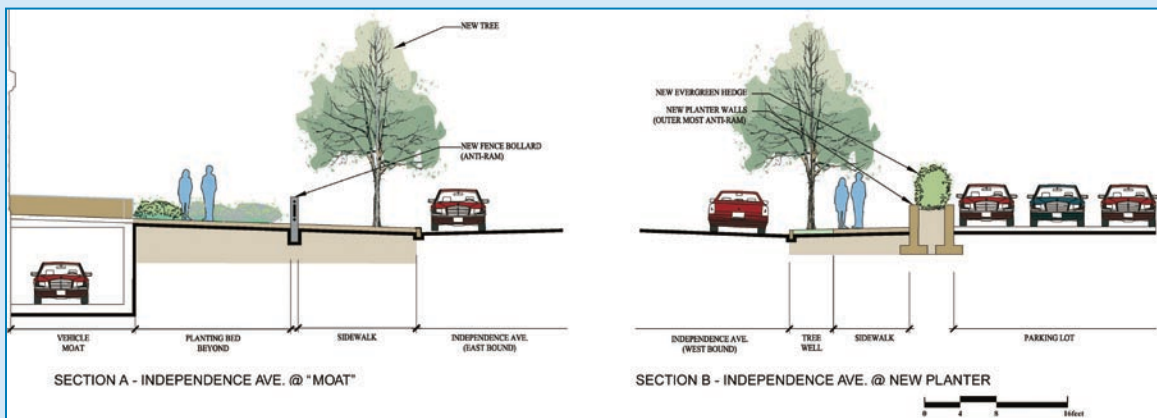
CASE STUDY 2: ANALYSIS OF EXISTING CONDITIONS AND THE SECURITY DESIGN RESPONSE (continued)
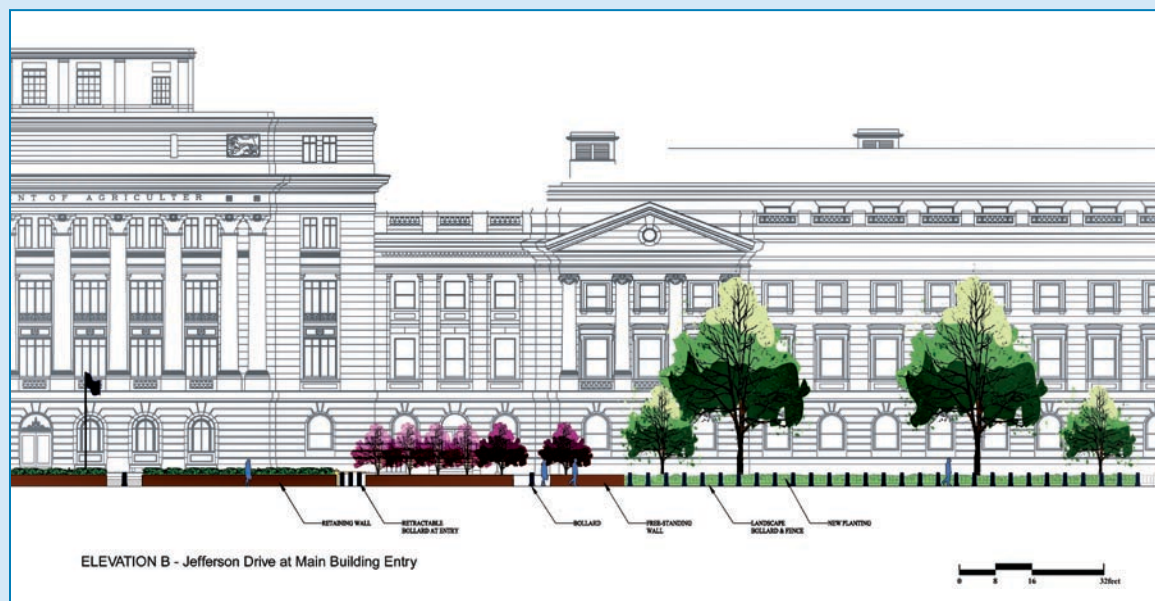
Second Layer of Defense

❍ Maintain open feel and unimpeded pedestrian access to generous lawn and memorial trees on site, with bollard fences

❍ Combine retaining and free-standing walls with low shrub beds to provide both deterrent and screen
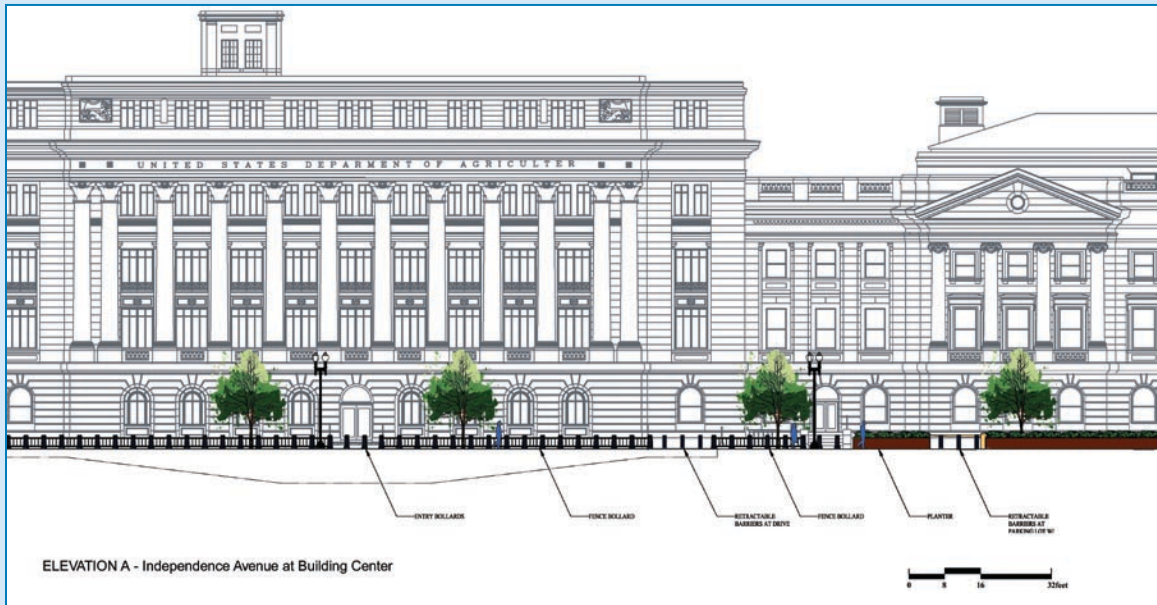
BUILDING SECTIONS

SECTION C - JEFFERSON DRIVE @ FRONT PARKING AREA / DROP OFF

BUILDING ELEVATION

ELEVATION B - Jefferson Drive at Main Building Entry

CASE STUDY 2: ANALYSIS OF EXISTING CONDITIONS AND THE SECURITY DESIGN RESPONSE (continued)

BUILDING ELEVATION

ELEVATION A - Independence Avenue at Building Center

Third Layer of Defense

❍ Appropriate modifications to the building

4.0 BLENDING WITH THE NEIGHBORHOOD CONTEXT

❍ Maintaining a generous area of lawn, respecting the significant, historic, and open character of the National Mall

❍ Creating a consistent unified streetscape vocabulary that works within the larger framework of the *National Capital Urban Design and Security Plan*

3.4 WORKING WITH STAKEHOLDERS

Most jurisdictions have plans and policies that describe the future development of the community that must be considered during any major project design review and approval process.

In addition to official public plans and policies, private sector trends and activities need to be identified through discussion with local "movers and shakers," who may provide useful input into design strategy and direction. The stakeholders are all those individuals or groups who hold an interest in the project outcome. There are both internal and external stakeholders. Internal stakeholders include all those with a financial interest in the project, such as the owner/developer and potential tenants and users. External stakeholders are those living and working outside the project boundaries that have some relationship with the project as observers, suppliers, and visitors. They may include individuals and neighbors; businesses, local, regional, state, and federal government agencies and departments; community groups and organizations such as historic preservation societies; "friends of" groups for parks or the environment; neighborhood associations; churches; colleges; and schools. Some of the considerations involved in working with the stakeholders are:

❍ Local government agency personnel can often help to identify local stakeholders and their areas of concern.

❍ The best solution will clearly respond to stakeholders' priorities so that they will feel that their concerns have been heard and fairly assessed, even if they cannot be fully satisfied.

❍ Face-to-face dialogue is the best way to identify stakeholders, develop relationships, and understand concerns. Many groups

also have websites, publications, staff, or other ways of providing background information.

❍ Establishment of familiarity with the community is the key to finding the project stakeholders. Those individuals and groups with geographic knowledge, subject matter, and regulatory interest should be sought out.

❍ Distinguish early on between those who share the same interests as the project, and become possible local "project champions," and those who can harm the project's design, approval process, and success.

❍ Some stakeholders may have unique knowledge and insights that may benefit the project's strategy, so early and frequent dialogue with them can be helpful in shaping a good design solution.

❍ Stakeholders can often provide a more subtle, accurate, and practical level of information about existing and future conditions than the information provided through published documents and official policy statements.

❍ Stakeholders may have concerns about the threat assessment, regarding it as too high or too low.

❍ Recognize that security concerns are only one aspect of the stakeholders' total range of interests.

❍ Security requirements may be seen to conflict with other community development strategies, such as smart growth, creation of a "walkable" environment, and urban design objectives.

❍ Security measures may be seen as affecting accessibility and environmental quality.

❍ A few stakeholders may hold definite positions for or against the project while many just want to know what it is and how it will affect the future.

❍ The stakeholders can influence regulatory approval of a project or delay it, so their acceptance and support are highly desirable.

Case Study 3 describes the process used to provide protection for an iconic site: the Mies van der Rohe Chicago Federal Center. Many governmental and public stakeholders were involved in the process, including the original project architect for the complex, with the result that security provisions are in complete harmony with the original design and the openness of the site is preserved.

CASE STUDY 3: THE MIES van der ROHE CHICAGO FEDERAL CENTER

1.0 INTRODUCTION

The Federal Complex in Chicago, Illinois, consists of three iconic Mies van de Rohe buildings located within the Loop in Central Chicago. The Everett Dirksen Courthouse is 383 feet high and stretches almost the entire length of the block. The John Kluczynski Administrative Building is 545 feet high. The open plaza contains the one story, 197-foot-square Post Office Building. A parking garage is located underneath the plaza. The complex was designed and constructed between 1959 and 1974.

The plaza was designed to serve city needs for public communal space, such as farmers' markets and public gatherings, and includes a large Alexander Calder sculpture.

The plaza and its sculpture are Chicago landmarks and significant tourist attractions.
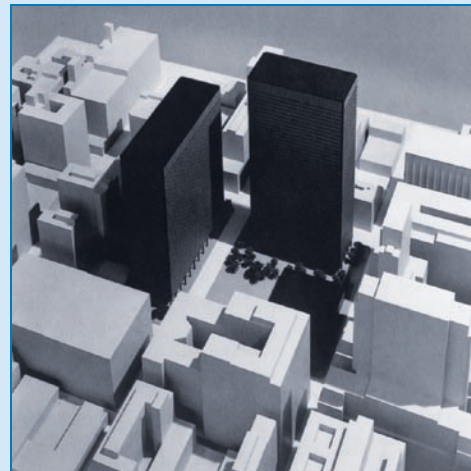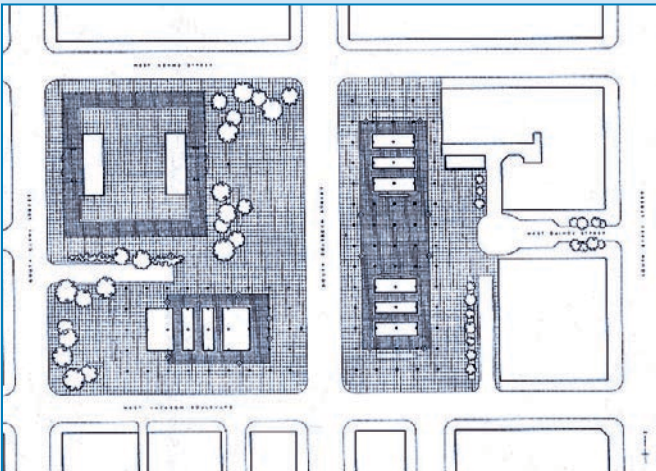
1.1 Project Scope

The project involved the design of effective security measures that would preserve the unique architectural character of the complex and contribute to the greater context of the City Beautification Program.

2.0 DESIGN APPROACH

2.1 Issues Addressed

❍ High-profile public space, frequent site of large assemblies

❍ Bounded on all sides by narrow streets and large buildings with little setback

❍ Design of buildings with open ground floors to provide easy access and to open up one street to another was unfavorable to security design

❍ Need to arrive at a design consensus among many stakeholders

CASE STUDY 3: THE MIES van der ROHE CHICAGO FEDERAL CENTER
**(continued)**

2.2 Design Process

○ Conduct a security-conscious site analysis: establish perimeter protection zone, identify types of tenants, identify existing security performance, identify limitations in achieving layers of defense and identify vehicular/pedestrian flexibility to accommodate changes

○ Planning and design process involved local government, the client agencies, and the public. Peer review group instituted, consisting of client representatives, security experts, educators and leading practitioners.

○ Meetings and workshops held with client agencies, city officials, and other public and private entities with a vested interest in the project.

○ Identification of clear goals, the scope of desired preservation, and the framework for minimum compliance (acceptable risk)

○ Utilization of CPTED principles in design process

○ Initial development of large number of design alternatives.

BARRIER WALL ALTERNATIVE
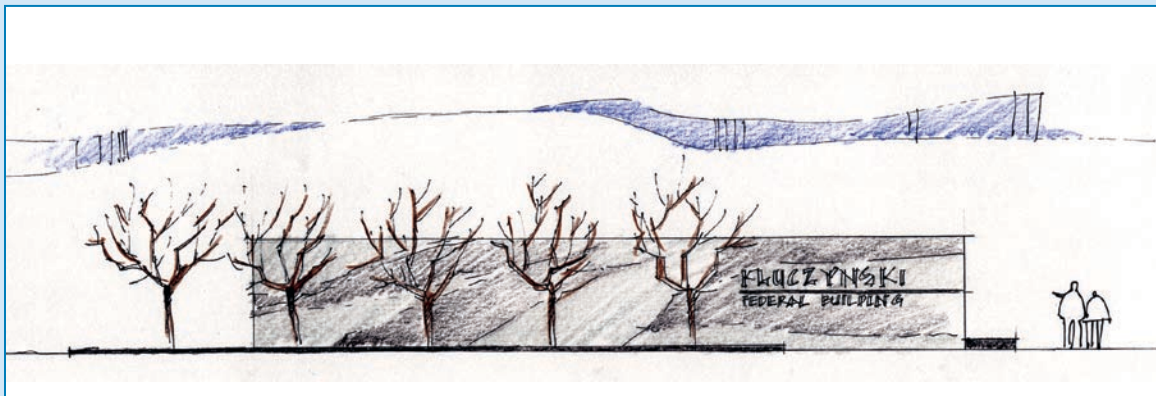
**CASE STUDY 3: THE MIES van der ROHE CHICAGO FEDERAL CENTER**
(continued)

BARRIER WALL AND BENCH ALTERNATIVE
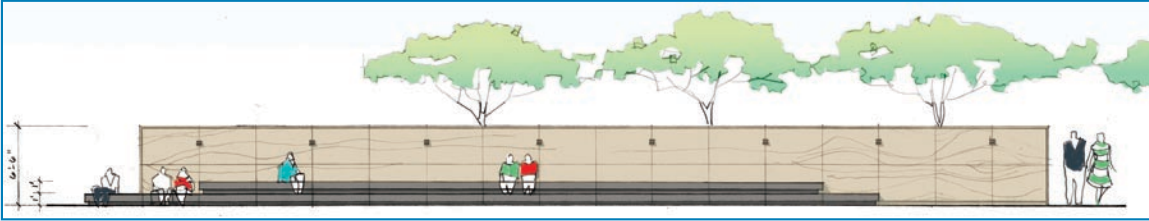
2.3 Security Strategy

First Layer of Defense

- Stand-off provided with bollards, granite blocks, and benches designed to harmonize with the building architecture and materials

- Multiple layers of bollards placed at each of the protected sidewalk corners to respond to direct vehicular impact from the street intersections
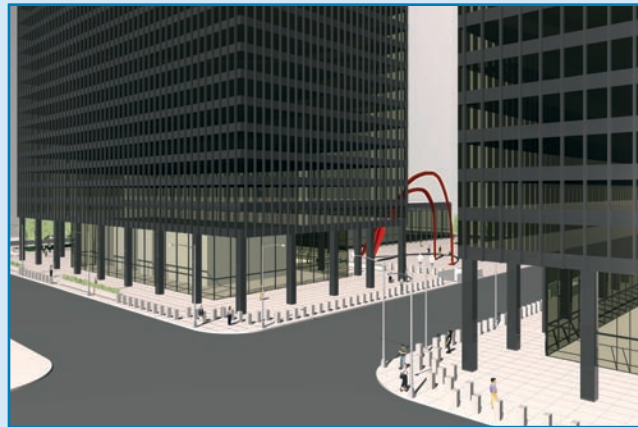
Second layer of defense

- Barriers and planting within the plaza to provide unobtrusive barriers while allowing public openness.

Third layer of defense

- Appropriate defense measures depending on the nature and location of assets.

3.0 BLENDING WITH THE NEIGHBORHOOD CONTEXT

- Consistent vocabulary that harmonizes with existing materials and forms
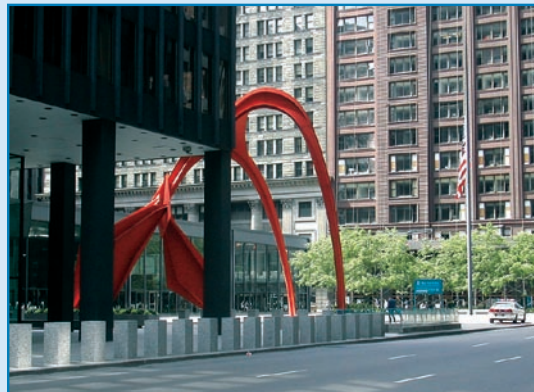
CASE STUDY 3: THE MIES van der ROHE CHICAGO FEDERAL CENTER (continued)

❍ Preservation of sense of openness

❍ Planting that enhances the environment throughout all seasons of the year

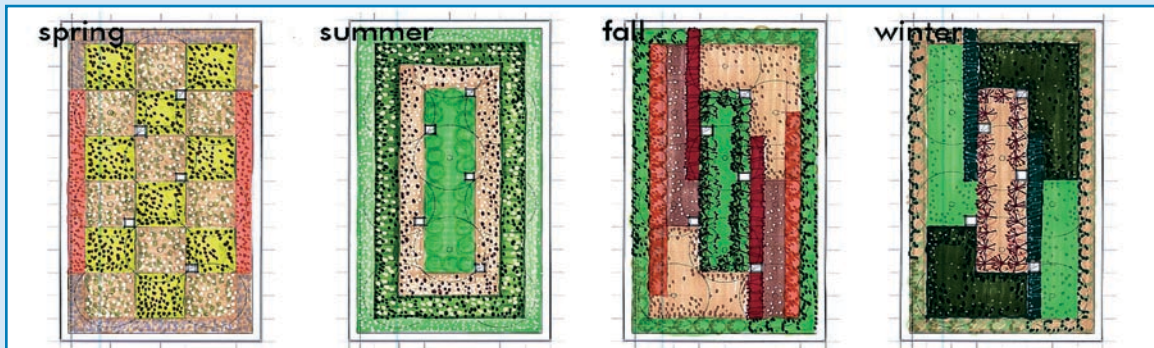# 3.5   THE IMPACT OF REGULATORY REQUIREMENTS

Regulations at the local state and federal level may impact and control some aspects of the site security design and implementation. It is also expected that continuing building security needs result in new regulations and codes that may affect projects. Some considerations are:

❍ Identification of these requirements early in the design phase is essential to smooth the design and approval process.

The Freedom Tower at the World Trade Center site in New York had to be substantially redesigned and relocated, because it did not meet the stand-off distance and other requirements of the New York Police Department.

❍ Regulations typically originate from many different sources, often to deal with unrelated defects and concerns, so there may be inherent inconsistencies and conflicts to navigate. Conflicts between policies and regulations from different agencies are not uncommon. When this occurs, the designers should identify and discuss potential conflicts early in the design process, and then meet with relevant regulatory agencies to resolve conflicts between project requirements and codes, guidelines, standards, and policies.

❍ In order to identify the relevant agencies and their roles, precise knowledge of the geographic location and historic and existing conditions of the site are necessary.

❍ Sometimes jurisdiction is established by simple presence within a city, town, county, or state (e.g., the city zoning code or the state tree regulations). In other cases, characteristics of the property itself may establish whether regulations apply, such as presence of wetlands, step slopes, or endangered species. The project team should check federal, state, regional, and local jurisdictions for applicable land use, zoning, historic preservation, and other planning considerations.

❍ Complete familiarity should be established as to the relevant process and timelines for local review and approval processes by early consultation with staff of the regulatory agencies.

❍ Pre-meetings to discuss the project, the risk management strategy, and potential issues and opportunities can be very beneficial. Meeting with planning department officials to explain the project needs before filing for approval provides the reviewers with a better understanding of the project for their review process.

Table 3-3 identifies various local regulatory topics, issues, and impacts that are expressions of community goals and requirements that may influence the development of the security solution.

Table 3-3: Regulatory Topics, Issues, and Impacts

Topic	Development and Design Issues	Security Design Impact
Environmental Features	Certain types of environmental areas may prohibit or restrict development. These include wetlands, flood plains, coastal zones, certain types of habitat, steep slopes, etc. Federal controls include those administered by EPA and DOE. State and local agencies also regulate environmental protection and conservation.	Presence of these environmental features can impact placement and design of perimeter barriers, access, and buildings.
Historic Preservation	The National Historic Preservation Act (NHPA) restricts demolition, modification, and renovation of registered historic structures. State historic preservation officers and local historic preservation districts and departments should be consulted.	Historic districts often have design standards and regulations that control design and materials of adjacent new construction. Historic preservation constituencies may be well-organized and vocal stakeholders that should be recognized in community assessment process.
Land Use	Land use policies address land use types, density, availability and capacity of utilities, and transportation planning, as well as identifying locations of districts with district design standards. Land use is usually regulated at a local and/or state level.	Land use planning documents describe the future directions for development or development control. It may provide guidance on the project design strategy and suggest opportunities to align with the community strategy. Strategies for smart growth and transit friendly and walkable communities may conflict with security strategies for stand-off and secured perimeters.

Table 3-3: Regulatory Topics, Issues, and Impacts

Topic	Development and Design Issues	Security Design Impact
Zoning	Zoning describes permitted uses, development controls (height, density, coverage or floor area ratios), sign regulations, and fencing. Zoning is usually a matter for local governments.	Zoning may prescribe quantities of parking, open space, and landscaping. Zoning may prescribe minimum setbacks and types of landscaping and fencing that can be used to control the site perimeter, as well as the placement and development envelope for buildings.
Economic Development	Economic development programs address community policy and planning issues.	Economic development programs at the local, state, or federal level may provide funding or expertise to support security or other aspects of the project. Federal, state, or local funds may be available for redevelopment of public rights of way and streetscapes that could support the perimeter security design.
Design Guidelines	Many office parks and planned communities also have design guidelines, a detailed set of non-governmental "regulations" that prescribe colors, building materials, architectural styles, and detailed design approaches.	These guidelines provide specific input about the acceptable design solution, specifying materials, colors, and installation of fences, lighting, and signage.
Transportation	Capital improvement programs are multi-year implementation programs that describe recommended and funded transportation projects at local, state, and federal levels. These may include all modes: roadways, parking, sidewalks, trails, bikeways, transit, rail, etc.	Implementation and timing of these programs can have significant impacts on the circulation to and access into projects. Security concerns may impact the design of roadways, including radius of curves, directions of traffic, and street closures.
DOTs and DPWs	Public Works or Transportation Departments manage street and sidewalk standards, on-street parking and meters, vendors and newspaper boxes, and other roadway and roadside elements.	Standards and codes for these elements and operation of these programs can have significant impacts on the circulation to and access into projects. Use of hardened streetscape items may conflict with existing standards for underground utilities, streetlights, parking meters, or sign posts.
Fire Marshal	There are very specific access requirements and identification of clear zones for fire trucks to be addressed in site and building design. The fire marshal is a key local official.	Emergency access to the site must be assured.
Pedestrian Mobility	Local public works departments often have standards for trails, sidewalks, and bikeways.	Standards for walkways, trails, and bikeway systems that may be included on the site should be consistent with adjacent networks. The Americans with Disabilities Act (ADA – a federal law) requirements must be satisfied for all sidewalks and pedestrian-accessible areas.

Case Study 4 shows a security solution that is built to service an existing district rather than an individual project, by using a variety of well-designed elements to harden a site without creating monotonous lines of barriers. Vehicular movement is controlled by subtle modifications of roadway design.

CASE STUDY 4: BATTERY PARK CITY STREETSCAPES PROJECT

1.0 INTRODUCTION

Since the attacks of September 11, 2001, government buildings and other high-profile institutions and organizations are more aware of their vulnerability. Response to the perceived threats has been quick and not always well planned or executed, often usurping space that was once open and accessible to the public.

Battery Park City, a 90-acre planned community that is built on land fill, created in 1976 from the excavation of the World Trade Center and other properties in the neighborhood, occupies the southwestern tip of Manhattan. The site of the World Financial Center and numerous commercial, retail, and residential buildings, Battery Park City is bounded to the east by West Street and to the west, north, and south by a tidal estuary of the Hudson River.

Rogers Marvel Architects was hired to evaluate the existing conditions of the streetscape in Battery Park City and to make urban design recommendations to increase the security of the area. In the process, they explored ways to reclaim public space by evaluating security issues as part of the overall fabric of the existing neighborhood. The result is an overarching plan for protection that uses innovative techniques to create subtle deterrent features within the streetscape plan without compromising the experience of the neighborhood's public spaces and controls access by redesigning approach routes and traffic flow rather than throwing up barricades.

The project won the AIA Institute Honor Award for Regional and Urban Design and the ASLA Honor Award in Analysis and Planning in 2005.

1.1 Project Scope

Responses to vehicular threats are considered in relation to the particular context of the Battery Park City neighborhood, requiring study of the specific approach and movement of vehicles within neighborhood streetscapes. With the help of a Creative Research and Development Agreement (CRADA) with the U.S. Army Corps of Engineers Mobility Division in Vicksburg, Mississippi, the design team is able to gain insights from military defensive techniques and barriers, which are tested and then re-scaled to fit into the urban streetscape context.

The neighborhood is analyzed and redesigned to balance the desire for security with the importance of quality of life and public space for the residents and visitors of Battery Park City. Security measures are integrated into the public urban space, with the hope that they will add benefit to the community and provide protection if ever it is needed. This project was completed in 2006.

BATTERY PARK CITY NEIGHBORHOOD

LEGEND

- high-speed approach
- slow-speed approach
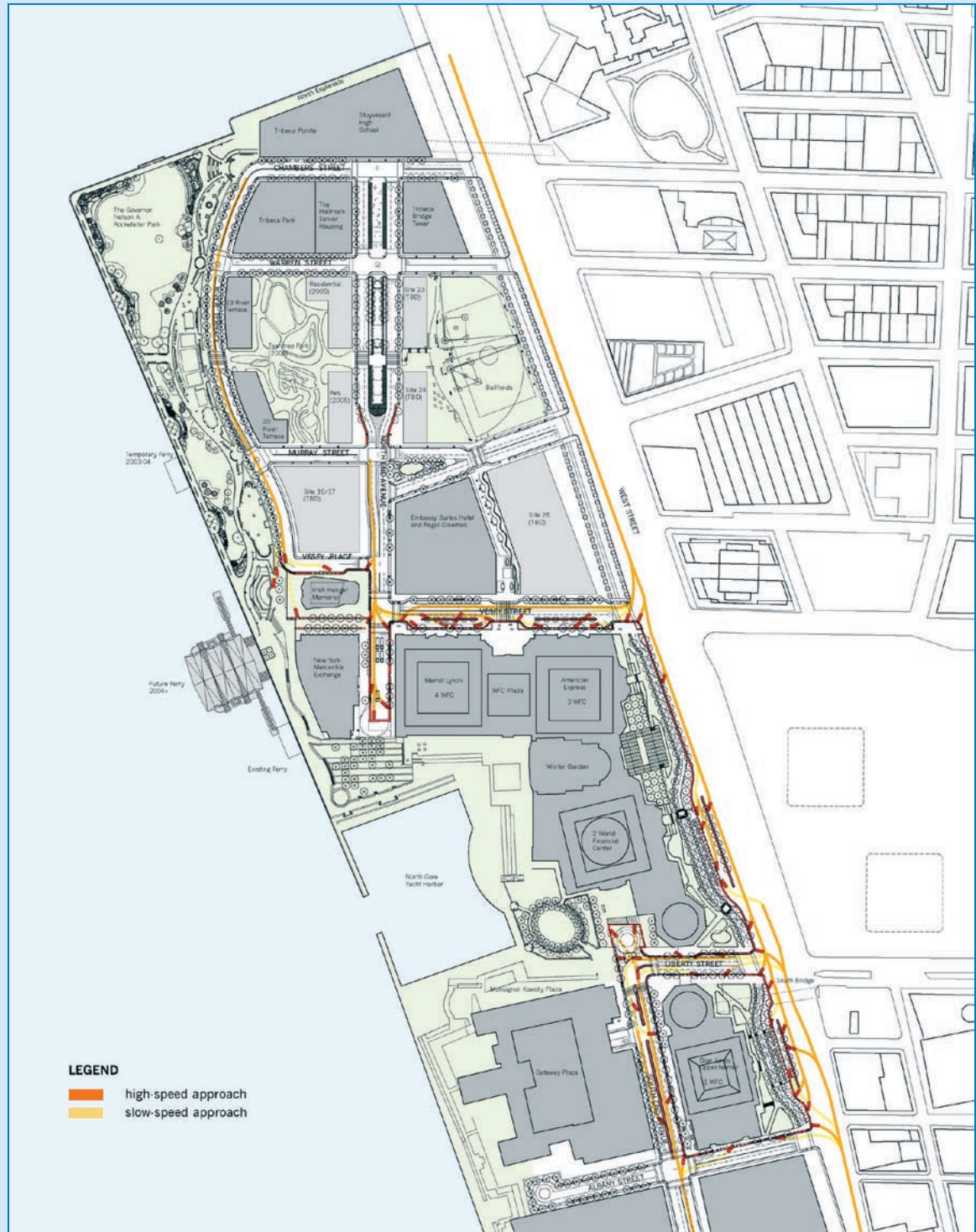
CASE STUDY 4: BATTERY PARK CITY STREETSCAPES PROJECT
(continued)

2.0 DESIGN APPROACH

2.1 Issues Addressed

❍ High-traffic area – with the crossing of pedestrians, bicyclists, and ferry passengers

❍ Bus and taxi queuing

❍ Concentration of commercial vehicles

❍ Highest level of security required for World Financial Center

❍ Long uninterrupted vehicular approaches

❍ On-street security check in high traffic area

❍ Parks, benches, and ball fields immediately adjacent to traffic

2.2 Security Strategy

First Layer of Defense

❍ Various risk mitigation measures to reduce vehicle speeds, improve pedestrian safety, and reduce the threat of vehicle approach velocities.
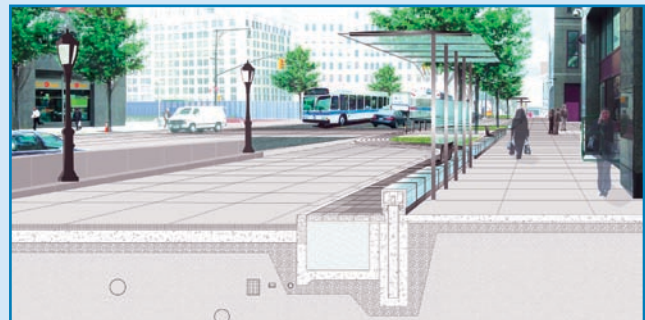
Second Layer of Defense

❍ Fence-enclosed dog run with reinforced shade structures – protective setback with an added benefit to the public

❍ Use of Tiger Trap to create collapsible fill vehicle traps

Third Layer of Defense

❍ Appropriate modifications to the buildings will increase the overall security of the site and its inhabitants

CASE STUDY 4: BATTERY PARK CITY STREETSCAPES PROJECT
(continued)

3.0 BLENDING WITH THE NEIGHBORHOOD CONTEXT

❍ Existing streetscape element – cobble band – incorporated as breakaway cover for pit trap system

❍ Adjusted curb lines to increase stand-off, ease pedestrian movement, and organize vehicular traffic patterns

4.0 INNOVATIONS AND BEST PRACTICES

❍ Urban issues are reviewed in conjunction with security needs in order to synthesize a solution that satisfies both, while accentuating the neighborhood's character and its residents' quality of life.

❍ Military defensive techniques and barriers are studied and tested, and then re-scaled and adapted to fit into the urban streetscape context.

❍ Investment in security serves a dual purpose, protecting and providing public benefit.

❍ Looking beyond setback distance, which can be scarce in an urban setting, to the larger experience of the site – controlling access and speed of approach to the site, hardening existing site features to add to layers of on-site security, and incorporating clear and consistent signage.

3.6   CONCLUSION

The project design strategy should seek the maximum benefit for the greater community. Consideration must be devoted as to how the project design and security measures will impact local transportation, accessibility, views, historic districts and recreation. A project that is compatible with its community and adds value to local resources develops support for its approval and is more attractive to future tenants and buyers.