



Security Site Design

HISTORY

Designers throughout history have included protection and security as part of their work. This included protection against the elements as well as security against those that would do them harm. Early on, site selection considered geographic features like rivers, mountains, canyons, and other natural barriers to enhance security. Security design thinking evolved into building man-made barriers like walls, fences, and moats for protection against unwanted outsiders. Such security measures were directed toward keeping intruders out, keeping them at a safe distance where they could inflict little damage, or slowing their advancement to give defenders time to respond. The physical elements of protection, nat-

ural and man-made, gave defenders a tactical edge over those seeking to do them harm.

Security design is not very different today. The primary objectives remain the same. Even the simplest of fences defines property and, however easy to circumvent, clearly shows that the trespasser is in violation of the owner's basic rights. The design of these perimeter barriers can escalate along with any associated threat. However, just about any perimeter defense can be circumvented. There will always remain some degree of risk because of physical, budget, or personnel limitations. The objective is to match an appropriate barrier with a reasonably anticipated threat.

Vigilance that is responsive to accurate assessments of actual and likely threats results in a proper level of physical and psychological precautions being taken. When threats are exaggerated or unlikely scenarios are magnified—as when, for example, broad media attention focuses on one target and overstates its importance to the general public—there can be serious repercussions. The quality of our daily lives suffers and our actions are guided by unrealistic fears. The balance between openness and the restriction of our freedom of movement, access to public buildings, and connection with our government is upset. The limited personnel and financial resources that we have to direct toward security design may be spent in ways that are less than effective and take away resources from more necessary security needs. We must exercise a rational approach to finding a balance between those that put security concerns above all others and those that argue that openness in our society must be a priority.

Finding this balance is a fundamental task in the process of security design development. The basis for a creative security design solution must be an accurate risk assessment. Security setbacks must be carefully considered for their impacts on the architectural character of the surrounding community. The elements used between the building and perimeter become critically important components in order to incorporate the security design response with the architectural context of the area. The design will provide a strong connection to the street and architectural character of the adjacent properties, as well as establish a secure perimeter. It creates a situation where those seeking to overcome the barrier look overtly obvious by the means they must carry out to break through the perimeter. Moreover, the extended time needed to defeat the perimeter security will delay

would-be attackers, such that other responses can be focused on stopping them.

The range of potential threat has been broadened by scientific and technological advancement. The availability of this knowledge and accessibility of materials to carry out violent acts have added to the sophistication of the terrorist arsenal. Today, biological, radiological, and cyber terrorism have been added to the list of potential threats. These same advancements have provided enhanced security measures in our built environment to counter these new threats. The defender and terrorist are constantly engaged in the effort to be one step ahead and gain a tactical advantage.

The response to terrorist threat must be multifaceted, comprehensive, and coordinated in order to address a problem of this magnitude. Therefore, it is extremely important that the landscape architect know the anticipated threats based on thorough analysis of the threat, the site, and its context. A good security design will be based on an accurate collection of data that is responsive to the unique situations of each site rather than a prescriptive, one-size-fits-all approach that attempts to impose a predetermined design solution. Furthermore, landscape architects must actively collaborate with other professionals involved in a security design response to employ the strategies and materials available to create designs that meet the client's security and programmatic needs.

CONTEXT IN TODAY'S SECURITY-CONSCIOUS ENVIRONMENT

"Life as we know it will never be the same after 9/11." We have heard that expression so many times, yet the impact of that day continues to affect the social, psychological, economic and physical fabric of this country and the world. As design professionals, we need to recognize and respect this change in the environment in which we live and respond to these changes in the work that we do.

The attacks on 9/11 were not without precedent, though never of the magnitude and coordination witnessed that tragic day. The attacks on U.S. embassies and facilities abroad since the 1980s were, in retrospect, preludes to 9/11 in the sense that American assets were no longer safe from foreign terrorist

groups. The first bombing of the World Trade Center in New York and the bombing of the Alfred P. Murrah federal building in Oklahoma City showed that both foreign- and U.S.-born terrorists were at work in ways most Americans had not imagined.

As a coordinated effort to hijack commercial airliners unfolded, there was a lack of clear communications between those who first realized something was terribly wrong and those who would need to respond. Our air defense system, once notified, scrambled jet fighters that would not be in a position to intercept the hijacked planes but could only arrive after they had already completed their missions of destruction and death. In the hours that followed the attack, we found our emergency response systems lacked necessary coordination and redundancy to respond to an event of this magnitude. Although we paid an extraordinarily high price that day, our nation learned a great deal about threats that confront us. We recognized that mistakes were made and began instituting changes as we moved ahead into what is a very different world. As a nation, we discovered that we are not immune from the devastating terrorist strikes that we were accustomed to reading about in other parts of the world. Just as the physical design of U.S. compounds overseas responded to the need for heightened security, we now need to focus that same level of effort to safeguard our citizens and national symbols on U.S. soil.

It is now imperative that security be a critical overlay in every major public or private design project currently being considered, and existing facilities and sites must be retrofitted to enhance security. As design professionals, we are uniquely positioned to contribute to America's safety and well being, responding to the war on terror by redesigning our domestic battlegrounds, to give us the tactical edge while taking advantage away from those seeking to do us harm.

ISSUES

Architecture is inescapably a political art, and it reports faithfully for ages to come what the political values of a particular age were. Surely ours must be openness and fearlessness in the face of those who hide in the darkness. Precaution. Yes. Sequester. No.

SENATOR DANIEL PATRICK MOYNIHAN

The immediate physical response to the attacks of 9/11 was to use just about anything heavy or strong enough to stop vehicles dead in their tracks or keep them from violating standoff zones. The most common temporary element used was probably precast jersey barriers (used for traffic control on roadways), followed closely by large precast planters known as *bunker pots* (actual potted plants seemed optional). This spectrum broadened to include precast drainage structures and dry-well rings (materials intended to be buried in the ground) installed along the perimeter and major paths in highly visible areas around our government institutions in Washington, D.C. See Figures 1-1, 1-2, and 1-3, for example.

Street closings utilizing temporary jersey barriers were employed to restrict vehicular traffic accessibility to potential high-profile targets. Often, large security vehicles with drivers were used to function as sliding gates to allow the passing of emergency or other authorized vehicles through openings between the barricades. The lack of a coordinated approach to these closings resulted in an increase in traffic congestion, a compromising of emergency services access, and disruption of pedestrian movement. One of the most notable streets affected

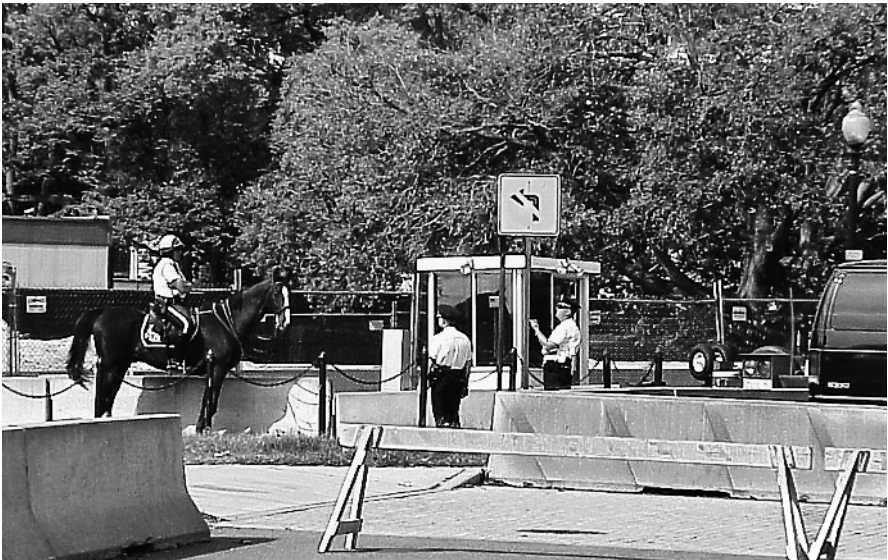


Figure 1-1

Jersey barriers and police barricades installed to provide temporary perimeter security. Courtesy of the National Capital Planning Commission.

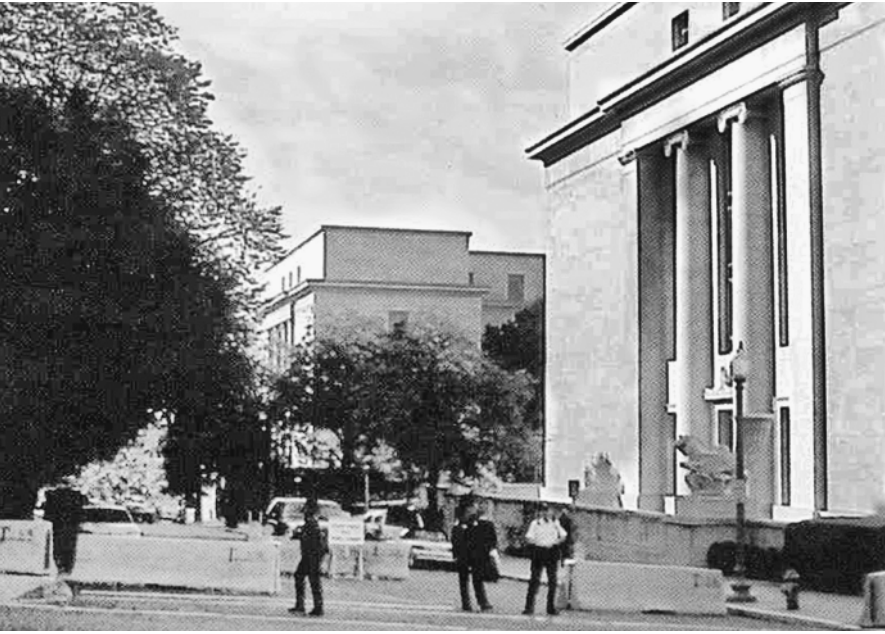


Figure I-2

Temporary barriers require additional security personnel to help make them effective. Security personnel have to be taken from their routine patrols and responsibilities. Courtesy of the National Capital Planning Commission.



Figure I-3

Access to the Capitol is controlled by vehicular barriers, along with portions of a highway barrier in front of the guard booth, "bunker pots," and precast concrete drainage structures on the sidewalks. Courtesy of the National Capital Planning Commission.



Figure 1-4

Layers of redundant security barriers in front of the White House. Courtesy of American Society of Landscape Architects.

was Pennsylvania Avenue, which was closed in front of the White House. There now is general agreement that Pennsylvania Avenue should remain closed and the area transformed into a pedestrian promenade fitting of its symbolic and historical significance. In most respects, this will be an improvement over the proliferation of temporary barriers that have sprung up in this area.

Many observers reacted negatively to the aesthetic and psychological impact of widespread deployment of precast concrete *anything* sprinkled throughout our most valued landscapes. This got the attention of not just designers but government officials, who realized security measures taken to protect our people and institutions must not inflict damage to our physical, historical, and cultural heritage. Security cannot be achieved by sacrificing the very values and qualities that we seek to protect. Figure 1-4 illustrates the extensive barrier system erected around the White House.

Deploying the quickest and cheapest means of protection when heightened security first arises is understandable, but the



Figure 1-5

The Washington Monument became the “poster child” of temporary barriers that became long-term fixtures, remaining in place for over a decade. Courtesy of American Society of Landscape Architects.

likelihood of these temporary measures becoming permanent should concern us all. Knee-jerk responses can actually increase the perception of threat and instill fear, rather than promote a secure feeling. A measure of terrorist success is if we all become terrified. In addition, erected barriers greatly affect the way people interact with their institutions, government, and each other. Figure 1-5 highlights the barriers surrounding the Washington Monument that, while offering protection, also diminish the view of the obelisk rising from the ground to the sky.

The tendency to default to an extreme fortress-like design response must be avoided. A parallel can be drawn to the American criticism of the Soviet public architecture during the Cold War years. During this time, our nation was critical of the lack of openness of Soviet government buildings and embassies, and the perception that secretive discussions and decisions that were hidden from other nations, as well as the Soviet people, were architecturally manifested in these fortress-like structures. We need to be sensitive that if we move too far toward this architecture of high walls, imposing building facades, restriction

of public access, and intimidating security checkpoints, we will be gravitating towards an architectural symbolism that we found so inherently objectionable just a few years ago.

The immediate responses to heightened security come at a high price: the price of temporary physical improvements, increased personnel and overtime costs, and the psychological impact on our citizens. It is imperative that we integrate security measures in our designs for new construction (or the retrofitting of existing facilities) in a way both effective and flexible to varying levels of threat. This can be achieved using familiar site elements while providing effective security in a seamless, transparent manner.

It is possible to have good urban design principles employed—creating beautifully rich streetscapes and public urban plazas—in an approach that also addresses the need for enhanced security. These objectives need not be mutually exclusive. The direct and indirect costs of employing temporary barriers and security measures and maintaining them over time can be reinvested in a coordinated and comprehensive approach utilizing good, permanent security design. Over the long term, this will prove to be a cost-effective approach in dollars as well as to protect and express the democratic ideals that serve as the very foundation of this country's existence. The premise that our government is "for the people, and by the people" cannot be underestimated or sacrificed in the name of security. Instead, it must challenge us to come up with creative design responses that meet the needs for enhanced security as well as reinforce our nation's fundamental civic values.

DAWN OF A NEW SITE DESIGN ERA

A number of reports were issued during the 1990s and early twenty-first century in response to attacks on United States interests at home and abroad. Many of the reports generated were initiated at the federal level, but the criteria and guidelines developed are certainly applicable at the state/local and public/private levels. The reports acknowledge that terrorist attacks can take many forms, but the overwhelming threat—accounting for more than half of incidences—is from bomb-laden vehicles. This type of attack (for which stand-off zones

were created) is thought of as the easiest way to cause extensive damage, loss of life, and possible progressive collapse of the structure being attacked. The emphasis on creating secure setbacks is one of the primary responses required in order to enhance security of a potential target.

The most referenced and useful reports issued through 2004 are as follows:

- *Urban Design Guidelines for Physical Perimeter Entrance Security: An Overlay to the Master Plan for the Federal Triangle*, issued by the General Services Administration (GSA), published by Sorg and Associates in Washington, D.C. May not be available to the general public; for more information, contact Sorg and Associates at (202) 393-6445.
- *Designing for Security in the Nation's Capital*, issued by the National Capital Planning Commission's (NCPC) Interagency Security Task Force, November 1, 2001.
- *The National Capital Urban Design and Security Plan*, October 2002, issued by the National Capital Planning Commission's (NCPC) Interagency Security Task Force, October 2002.
- *Security Planning and Design: A Guide to Architects and Building Design Professionals*, copyright 2004 by the American Institute of Architects. Published by John Wiley & Sons, Inc., Hoboken, NJ.

In addition to the resources noted above, the Federal Emergency Management Agency (FEMA) is creating a series of reference manuals called the Risk Management Series. The publications are directed at man-made disasters. The objective of the series is to reduce physical damage to structural and nonstructural components of buildings and their related infrastructure, and to reduce resultant casualties during conventional bomb attacks, as well as during attacks using chemical, biological, and radiological agents. Publication 430, *Primer for Incorporating Building Security Components in Architectural Design*, due out in 2005, will provide guidelines for providing security against physical attack through perimeter, site, and building design. It will be a companion volume to FEMA 426, *Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings*, which provides basic guidance for site and building security design. FEMA 430, however, will focus on site and building design in more detail and with particular reference to achieving acceptable security with minimum

impact on community, site, and building amenity, attractiveness, and day-to-day functionality. For more details, visit the following website: www.fema.gov/fima/rmsp.shtm.

For landscape architecture practitioners, the *NCPC's National Capital Urban Design and Security Plan* is a comprehensive reference of security design proposals for downtown Washington, D.C., prepared by several of the most prominent landscape architecture and architecture firms practicing in the United States, including Chan Krieger and Associates, Devroux & Purnell, EDAW, Michael Van Valkenburgh Associates, Olin Partnership, Peter Walker & Partners, and Wolff Clements and Associates, Ltd. Excerpts from this publication appear in Chapter 4.

What makes these documents so significant is their recognition of varying levels of security for buildings based on their likelihood of being a terrorist target. Not every building or facility needs the same level of protection. The varying levels of threat classified in this document, and the strategies for response presented, are the basis for the consideration of a broader spectrum of design elements to be used to establish perimeter security. Figures 1-6, 1-7, and 1-8 show recommendations for security zones.

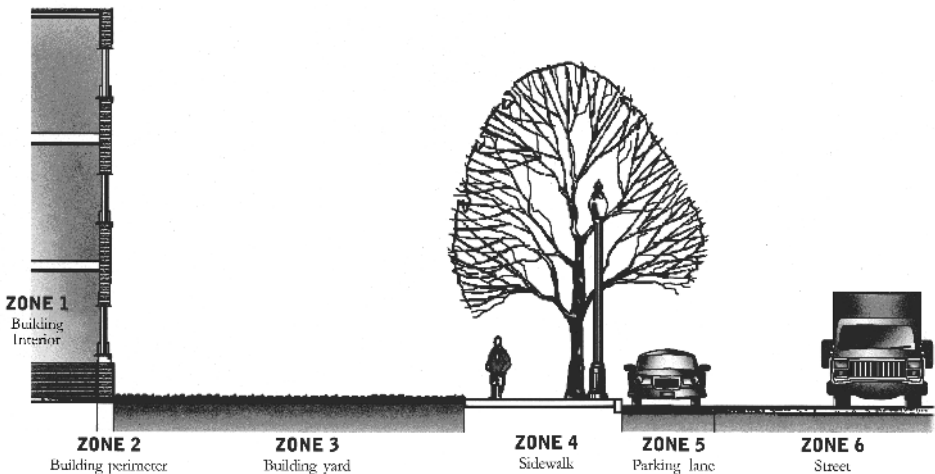


Figure 1-6

GSA Security Zones. Courtesy of the National Capital Planning Commission.

General Security Design Solutions

Building Security Zones

The "Urban Design Guidelines for Physical Perimeter Entrance Security: An Overlay to the Master Plan for the Federal Triangle," prepared by GSA, presented the concept of security zones. Each of these zones, ranging from the building's interior to the public streets around the building, have different security risks and responses. These can be translated into different architectural, landscape, and streetscape responses to meet these security needs.

GSA's security zones include:

- Zone 1: Building Interior
- Zone 2: Building Perimeter
- Zone 3: Building Yard
- Zone 4: Sidewalk
- Zone 5: Curb or Parking Lane
- Zone 6: Street

Zones 1 and 2 are related exclusively to the architecture of the building, and are not the subject of these guidelines for physical perimeter security. Zone 6 is not subject to these guidelines, except insofar as a decision in the case of Pennsylvania Avenue near the White House must be made – whether to open the street or to keep it closed.

Zones 3, 4, and 5 are related to both the public right-of-way and the surrounding design context of the building. Design guidelines are recommended for these zones.

Zone Prototypes

Extending GSA's concept of security zones, the Task Force developed prototypes for the exterior zones of buildings.

Building Yard (Zone 3)

The building yard is that portion of the site located between the building wall or façade and the sidewalk or public right-of-way. The following are recommended guidelines for security measures to be implemented in the building yard security zone:

- Design security measures, such as gatehouses and other entry facilities, to relate primarily to the design of the building
- Design other security measures to relate to the character of the surrounding area.
- Do not impede pedestrian access to building entries or pedestrian circulation on adjacent sidewalks.
- Use raised planter or building terrace as vehicular barrier, and integrate landscaping and seating.
- Use bollards, light standards, planters, or other furnishings to secure gaps and limit vehicular access through pedestrian access points.
- Plant trees in the yard adjacent to the sidewalk to create a double row of trees flanking the sidewalk.
- Incorporate furnishings and amenities into the building yard.

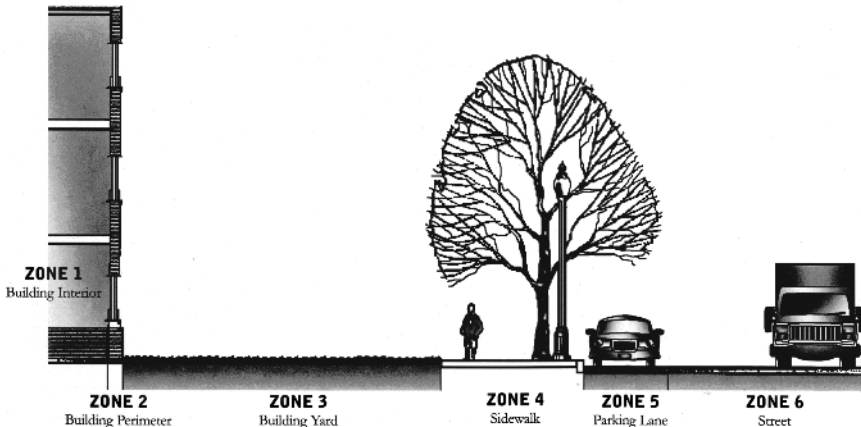
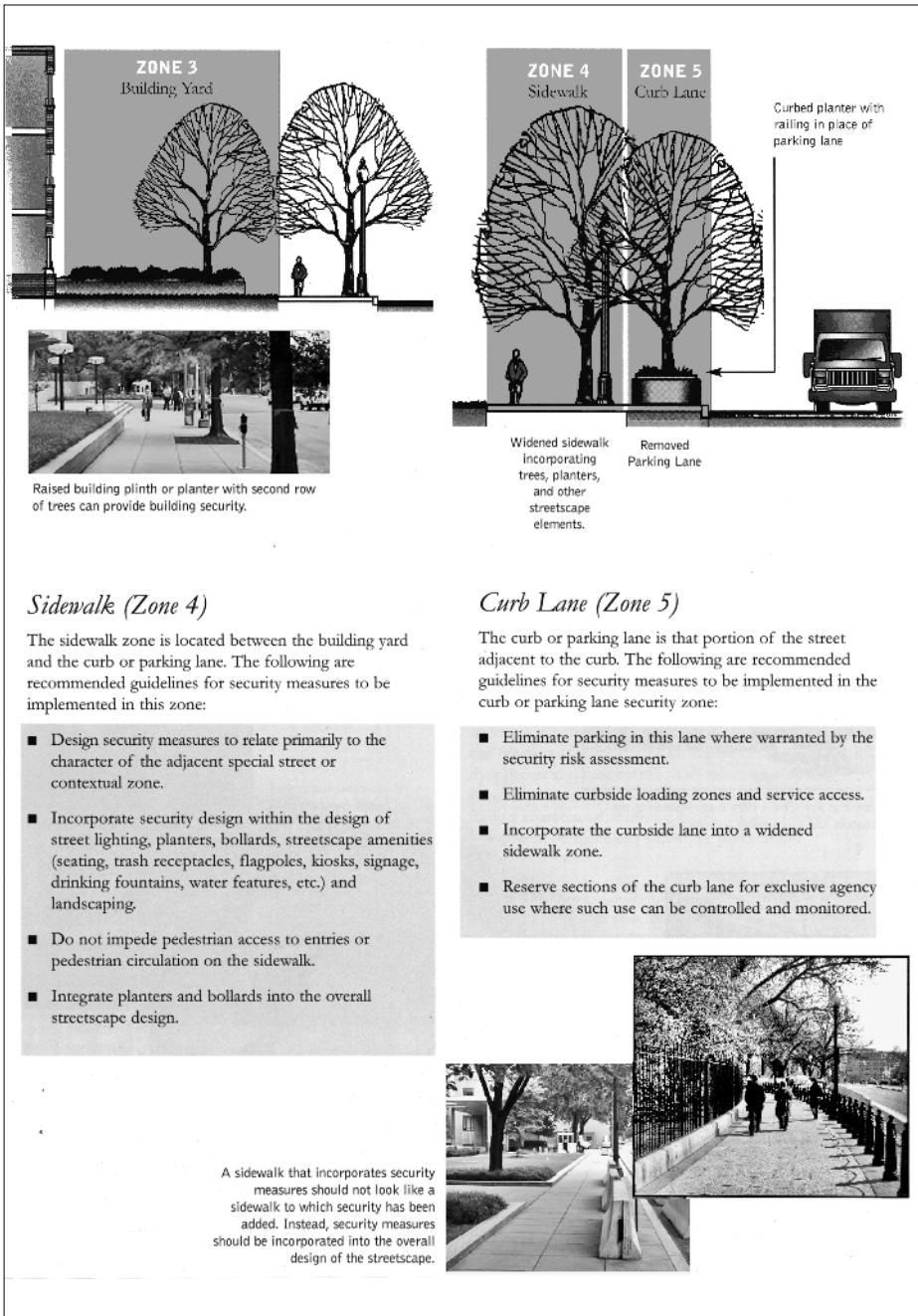


Figure I-7

Recommendations for Building Yard (Zone 3) security design enhancements. Courtesy of the National Capital Planning Commission.



Sidewalk (Zone 4)

The sidewalk zone is located between the building yard and the curb or parking lane. The following are recommended guidelines for security measures to be implemented in this zone:

- Design security measures to relate primarily to the character of the adjacent special street or contextual zone.
- Incorporate security design within the design of street lighting, planters, bollards, streetscape amenities (seating, trash receptacles, flagpoles, kiosks, signage, drinking fountains, water features, etc.) and landscaping.
- Do not impede pedestrian access to entries or pedestrian circulation on the sidewalk.
- Integrate planters and bollards into the overall streetscape design.

Curb Lane (Zone 5)

The curb or parking lane is that portion of the street adjacent to the curb. The following are recommended guidelines for security measures to be implemented in the curb or parking lane security zone:

- Eliminate parking in this lane where warranted by the security risk assessment.
- Eliminate curbside loading zones and service access.
- Incorporate the curbside lane into a widened sidewalk zone.
- Reserve sections of the curb lane for exclusive agency use where such use can be controlled and monitored.

Figure 1-8 Recommendations for Sidewalk (Zone 4) and Curb Lane (Zone 5) security design enhancements. Courtesy of the National Capital Planning Commission.

General Services Administration Zone Classifications

Because of the high threat levels attached to many of its properties, the General Services Administration (GSA) has taken the federal government's lead on setting standards for domestic site and building security guidelines. (For U.S. government-owned properties abroad, the lead agencies are the U.S. Department of State's Bureau of Overseas Building Operations in coordination with the Bureau of Diplomatic Security). GSA's approach provides state and local governments and the private sector with guidelines for approaching a comprehensive site security design strategy.

The *Urban Design Guidelines for Physical Perimeter Entrance Security: An Overlay to the Master Plan for the Federal Triangle* report classifies threats with letter designations (A through E), and divides a building and its site into six numbered zones. A-level buildings are considered least likely to be threatened, while E-level facilities require a very high level of protection. The security zones are Zone 1, Building Interior; Zone 2, the Building Perimeter; Zone 3, the Building Yard; Zone 4, the Sidewalk; Zone 5, the Curb Lane; and Zone 6, the Street (refer back to Figure 1-6).

In order to establish an appropriate security level, the various agencies of the federal government were asked to evaluate their facilities in accordance with a number of criteria that would help determine the level of potential threat. The criteria considered a building's symbolic importance, critical nature of operations, consequence of an attack, and a look at the surrounding site conditions.

Site factors that influence a building's level of potential threat need to be considered, as well. In looking at stopping a vehicle, the angle of approach and ability for the vehicle to accelerate to a high rate of speed need to be evaluated. A building's existing setback from the site perimeter is a consideration. The Interagency Security Task Force established a desired setback of 50 feet and a minimum setback of 20 feet. Many existing buildings may not have this desired minimum setback, and security alternatives need to take the existing setbacks into account. Existing buildings must be evaluated for their structural ability to resist the effects of a bomb blast. As each building is unique architecturally and structurally, a determination must be made

related to the ability to harden the building's structure, if that option is even possible, and balance that against the cost of those modifications.

When this threat classification system was applied to the many public and federal buildings in Washington, D.C., most buildings fell into either a C or D threat level. To put this threat level into perspective, a perimeter barrier for a D-level building must be able to stop a 6-ton vehicle traveling 50 mph impacting perpendicular to the barrier.

The GSA's establishment of security zones includes a wide range of alternatives that can be used in each of the zones to address the established level of threat. The suggested site elements allow for combinations and placement resulting in creative designs that can complement the surrounding architectural character of the area.

In looking at the security zones exterior to the building, Zone 3, the Building Yard, is defined as the area between the building's facade and the sidewalk. Security elements for this area should complement the building's architecture. Where the building yard provides the necessary setback from the street, perimeter barrier elements can be placed along this zone's outer edges or adjacent to the sidewalk. No additional perimeter security would need to be provided beyond that point (see Figure 1-7).

Zone 4, the Sidewalk, is defined as the area between the edge of the building yard and the curb or parking lane. This zone should be kept as free as possible so as not to impede pedestrian movement. It is in this area that many of the street amenities that we all feel familiar and comfortable with can be located in a hardened form to provide perimeter security. In cases where there is a need to extend the setback distance even further, the sidewalk can be widened, possibly eliminating the parking lane. Where parking remains, barriers must allow for the opening of car doors and safe access for the passengers from their car to the sidewalk. A minimum distance of 18 inches is recommended between the edge of the curb and adjacent sidewalk site elements.

Zone 5, the Curb Lane, is the lane of the street used for curb-side parking, passenger drop-off, and service vehicles loading and unloading. In special situations, this lane can be removed for the meaningful widening of the sidewalk thus increasing the setback distance to the building. However, parking and other needs

of nearby buildings, along with street traffic flow, must be taken into account before removing this curb lane (see Figure 1-8).

In new construction, a site can be enhanced with security features integrated in the architecture. Structural modifications and building hardening can be applied to existing facilities, and the measures employed can be unique for every structural and architectural design. This approach, if at all possible, is usually very costly. As such, most efforts to enhance the security of existing facilities and structures focus on the exterior zones (3 to 6), making them extremely important. Although a wide range of recommended approaches to site security are presented, particularly for Zones 3 and 4, a few general principles are imbedded in these recommendations. One, that security measures taken should relate in character and context to the adjacent buildings and surrounding area, and should not impede pedestrian access. Another is the recommendation that enhanced security should be provided through the integration of design elements, rather than be dependent on one single element.

THE GOAL OF GOOD SECURITY DESIGN

Good security design should integrate site and building security elements and associated technologies into a design that makes high-quality and enjoyable spaces, especially in the public realm.

A good security design integrates the building's purpose and operation with protection against real and likely threats through design, technology, and operational activities and procedures.

A comprehensive and coordinated security design is most easily developed and implemented when a new building is being constructed on a site. New construction allows for a security-thoughtful site selection and location for the building on that site. One of the most obvious benefits is that the proposed building can incorporate structural features to meet desired security objectives in the initial design phase. Another closely related benefit of a new building is the ability to have the floor plan design reflect the location of personnel and various critical functions in a way that minimizes the potential impact of a terrorist event. The location and number of entrances can be designed for good security visibility and to minimize the need for monitoring by security personnel. The location and design of vehicular entry

points, a critical point of vulnerability, can be carefully considered to screen vehicles and their occupants without disrupting pedestrian travel on the sidewalk. Electronic detection and surveillance equipment can be incorporated into the new design to maximize their effectiveness. And finally, the coordination of site security design concepts and elements can be incorporated, at the earliest stages of design development, to complement the building's physical security design features. Security concerns have made the integration of building architecture and site design increasingly critical. The key to taking full advantage of the security design opportunities that new building construction offers is the collaboration of all the related professionals at the beginning of the design process and each step along the way.

The development of a comprehensive physical security design response in an existing building, even as an afterthought in new construction, is generally a more difficult task. The structural modifications and building hardening that can be applied to existing buildings can be unique for every structural and architectural design. The retrofitting with structural modifications to resist terrorist attacks can interfere with the existing building's basic functions, place constraints on the usable space within the building, compromise the original design intent, and have a negative impact on the building's architectural character and aesthetics. This approach, even when possible, is usually very costly and must be balanced with the results of the threat analysis for the building. As such, most efforts to enhance the security of existing facilities and structures focus on the area between the building facade and the street.

Whether coordinated with new construction or modified to enhance the security of existing buildings and facilities, site elements used to restrict vehicular access and define pedestrian circulation are extensive and varied. Some of these amenities include bollards, major trees (with and/or without tree guards), benches, planters, bike racks, information kiosks, bus shelters, overhead structures, signage, and flagpoles. These are among the more common elements used to provide vehicular barriers along the street and effective perimeter security.

Building plazas and public gathering places can use these site amenities as well, along with raised planters, changes in elevation (i.e., steps, ramps, and railings), walls, fences, colonnades, statues, and fountains. All of these site amenities can enhance

and complement the character of an area and architecture of adjacent buildings. These features provide a meaningful reason for widening pedestrian sidewalks while providing an important increase in the setback distance between the building and vehicles along the street.

Moreover, people are comfortable with these familiar design elements as components in our landscape, and they are thus important tools to be used strategically to enhance site security. These security enhancements will safely allow people to gather in our public and civic spaces, taking part in a wide variety of positive activities. Each of these elements can be beautifully designed and carefully sited, with their commonplace, everyday character disguising their protective role. However, the most successful implementations consist of a combination of many elements rather than any one element. One should think of the vocabulary of site amenities as separate threads woven to create a durable fabric, resulting in a rich streetscape as well as enhanced security.