



Beyond the Bunker

Achieving high design in high security buildings

Federal buildings serve two critical functions in the representation of the government. They should be designed to express the stability and strength of the government, while also portraying a feeling of openness and transparency that is important to a democratic society. These meaningful goals are often at odds with the fact that some federal buildings can also be targets for offenders. How does one express openness and stability while simultaneously providing a higher level of safety and security for visitors and employees in these buildings?

Wight & Company has been designing buildings for federal clients with strict security requirements for over 25 years. We have seen an evolution in these requirements, particularly after the bombing of the Alfred P. Murrah federal building in Oklahoma City in 1995 and the events of 9/11. Today, security requirements for all buildings continue to grow, especially for our federal clients.



GSA Federal Office Building, Chicago, Illinois

Security Strategies

Designing buildings for security and safety requires a proactive approach that anticipates and protects from potential hazards the building occupants, resources, structure, and continuity of operations. Consequently, site and building security measures are often necessary even though they are unlikely to be called upon to mitigate an attack. Though rarely if ever deployed, these measures have an impact on the quality and attractiveness of the building and the everyday experiences of its occupants. The Architect's challenge today, more than ever, is to integrate security measures as seamlessly as possible with site design and architecture.

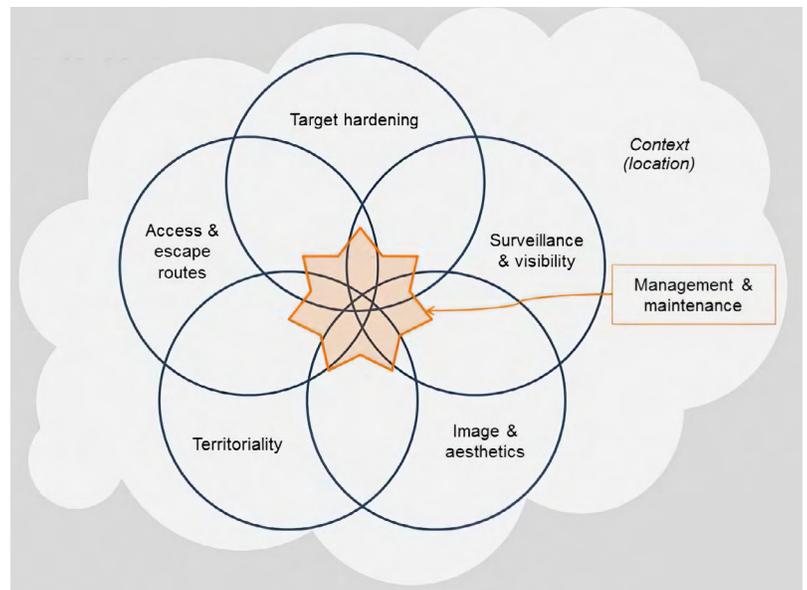
One commonly employed strategy to address security is Crime Prevention Through Environmental Design (CPTED). CPTED is a multi-disciplinary approach of crime prevention for cities and neighborhoods that reduces threats and deters offender decisions that could lead to criminal acts. It is a proactive tool that aims to discourage potential offenders before they decide to commit a crime.

For a government building, thoughtful integration of CPTED principles can support safety, as they encourage strategies in landscape and architectural design. For example, a well-lit site discourages potential intruders from approaching. A clearly defined pathway from the site entry to the building entrance allows unobstructed surveillance. Providing one main public entry to a building versus multiple entries helps simplify and centralize a building's perimeter security.

Additionally, several of our federal clients follow security standards developed by the Interagency Security Committee (ISC). ISC standards define

required analysis and performance benchmarks for federal buildings. As part of this analysis, we perform site risk assessments, bomb blast and progressive collapse analyses, and other studies to identify threats and engineer the building's response to them. ISC criteria focus on mitigating threats, including approaching vehicles, explosive packages, preventing and expelling attacks initiated from chemicals or biological agents, and improving surveillance in and around the property.

When CPTED and ISC principles are put into practice, the resulting environment, including the building and its surroundings, will reduce or impede criminal behavior. Therefore, we draw from both in the design of our high-security facilities. At the same time, we constantly challenge the theory that overt physical deterrents must extend past the perimeter, onto the site, and into the building. If necessary, overt deterrents must be seamless and unobtrusive.



CPTED Design Principles

Example of an unwelcoming street view – Can't we do better?



The Site

The goal of site security design is a strategic reduction of risk. An assessment of this risk begins with the site itself. We evaluate sites to confirm the surrounding buildings do not offer unimpeded views into the building; a site adjacent to a high-rise residential building, for instance, is not optimum. We also assess the surrounding topography to ensure adjacent sitework is not significantly higher than our site such that it could aid the efforts of an intruder. Additionally, we examine surrounding thoroughfares to confirm they do not provide a direct approach to the site entry that would allow a vehicle to gain speed and breach any security equipment which may be put in place.

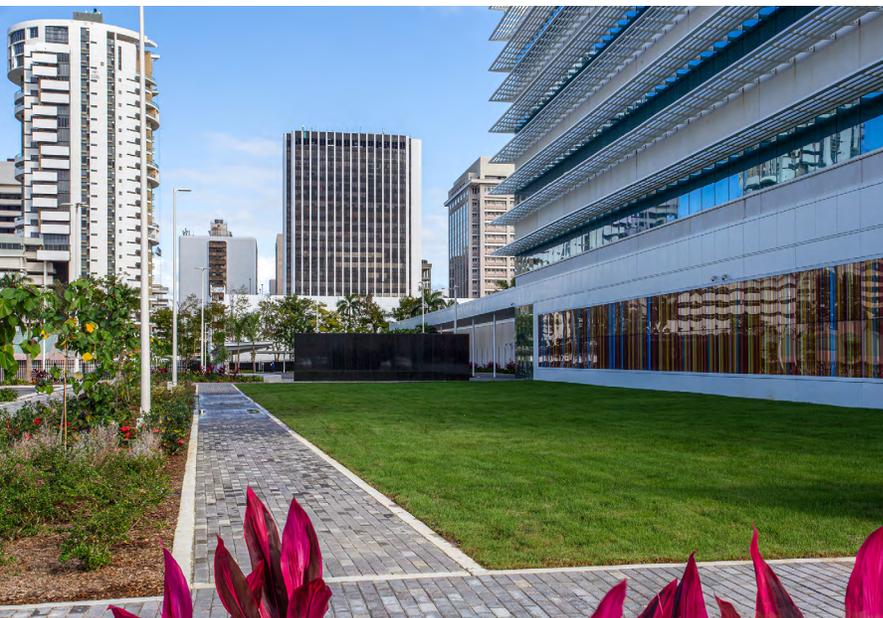
At the site perimeter, some measure of physical deterrence may be necessary. Many of the secured facilities we design contain high-performance security fencing to define the perimeter of the site and provide a physical and psychological barrier to discourage potential intruders. Drive lanes entering and leaving facilities are often equipped with hydraulic vehicle barriers to stop intruding vehicles, and secured buildings are frequently within campuses that are fronted with small security buildings to screen visitors before they are allowed entry to the secured site.

Once inside the site, we maximize opportunities to create attractive and useful spaces. This begins

with pedestrian wayfinding into the building. We strive to eliminate fences or other obvious wayfinding by designing a short, clear, and well-lit route from the site entry to the building lobby. In addition to providing a welcoming approach to the building, it allows for proper surveillance of visitors. When necessary, we utilize low plantings and landscaping rather than overt elements like fencing to provide a directional approach to the building entry.



**GSA Federal Office Building
San Juan, Puerto Rico – Visitor's approach**



**GSA Federal Office Building
San Juan, Puerto Rico – front lawn**

Safety

Good site design can also enhance overall safety through thoughtful approaches to landscape design that minimize hiding places for an intruder while still providing pleasing views for those inside and outside of the building. We study sight lines to allow for effective surveillance. Trees are planted away from the building to provide open views for both security personnel and building occupants.

Additionally, we often prescribe setbacks that can approach 50 feet or more from the street. We take advantage of this setback to provide open, landscaped spaces, enhancing the functionality and aesthetics of the site for employees and visitors while satisfying standoff needs.

Lighting

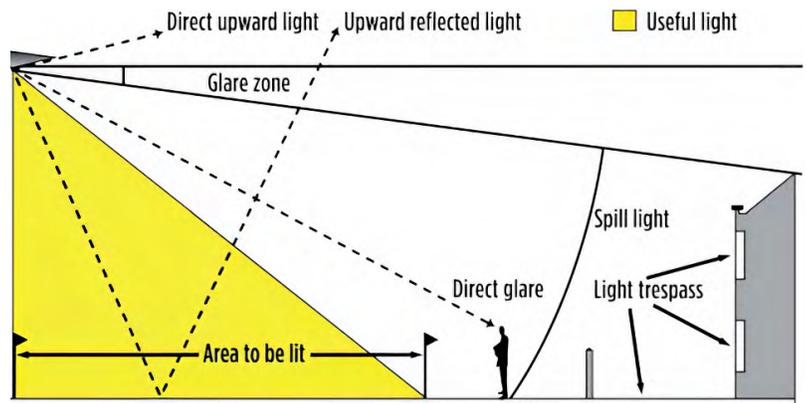
As noted, a well-lit site can discourage potential offenders from attempting to gain entry. Additionally, an evenly lit site is often desirable for optimum performance of surveillance equipment like closed-circuit television cameras. Consequently, providing evenly distributed, glare-free lighting is the objective of an optimized perimeter security lighting system. Unfortunately, this goal can lead to harsh, overly lit sites that can compromise security by creating excessive glare and contrast, making it difficult to see into shadows. Light pollution in the form of glare and light spillage can reduce visibility for pedestrians and vehicles and have a negative impact on the health of humans, birds and the natural environment.

Properly designed site lighting is efficient and effective, providing light exactly where it needs to be for safety and security. Using photometric studies, we carefully evaluate light levels to ensure an acceptable uniformity across the site for the operation of security cameras. At the same time, we provide enhanced lighting at building entries to serve as beacons for visitors to aid in wayfinding.

Light spillage occurs when illumination reaches beyond areas that require lighting for safety and

security reasons. The migration to LED lighting has greatly aided the effort to reduce light spillage, reducing the need for shields or diffusers to direct the light where it needs to be while increasing energy efficiency.

Ultimately, the building and site should be complemented by using light wisely for both security and place-making, to design a more welcoming pedestrian environment, and to do so as efficiently as possible. Therefore, use of the appropriate color temperature is also important, preferably equal to or less than 3000K. Motion sensor activated lighting, if acceptable to the client, can also be implemented to further reduce light pollution and conserve energy.



Site Lighting Strategies



GSA Federal Office Building
Sacramento, California – employee outdoor seating

Rethinking Spaces

As with our private clients, we feel that governmental employees should benefit from certain building amenities. Areas where people can relax and decompress before returning to their work tasks is important. Nearly every facility we design contains some sort of outdoor seating space. This can present a challenge, as some federal agencies wish to preserve the anonymity of their employees. Through thoughtful use of landscape, canopies, and trellises, we provide pleasant outdoor spaces that shield employees from the view of those off-site.

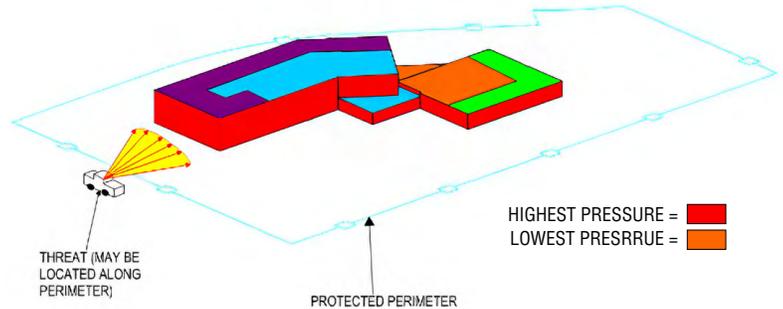
Even within secured sites, vehicle ram protection is occasionally desired. We see requests for additional protection most often at employee entry points. Rather than defaulting to protective bollards, we utilize planters, benches, or other site elements to serve as countermeasures. These elements are engineered to resist ram forces while adding color and interest, softening hard lines and further blending security into the overall site design.

The Building

In the wake of the Murrah bombing, several agencies introduced bomb blast resistance requirements into their program requirements. Initial building solutions were crude and often brutalist looking; defensive architecture designed to function like a fortress, with heavy facades and a minimum of glass area. Then technology began to catch up. Today, high-performance curtain walls can be engineered as a primary protection system to prevent integrity failure of the glazing and framing support from bomb blasts, allowing Architects to design buildings with blast-resistant facades that can still emphasize an open, inviting expression to visitors and the surrounding community.

The most successful security measures are those that are integrated into building design to provide safety for employees while still providing an engaging space to the public. This begins at the building lobby, which sets the stage for a positive interaction with the public. An open, welcoming lobby – as opposed to a “fortress” aesthetic – encourages

visitors to engage with personnel. We strive to maximize the expanse of glass while minimizing the visual impact of the blast resistant frame sections. Steel loading curtainwall mullions can increase their strength without significantly increasing their width and depth. Structural glazing detailing solutions further enable the Architect to move away from the wide profiles previously associated with blast resistant systems. Even seemingly atypical curtain wall solutions like planar cable-net walls can be considered due to their flexibility and deflection capabilities.



Typical Blast Analysis



GSA Federal Office Building
Chicago, IL – Ceremonial Lobby



GSA Federal Building
San Juan, Puerto Rico – typical open work area

Daylight in Offices

Views to the outside are especially important, as they maximize daylight for employees while also providing open views that enhance the sense of security for building occupants. Daylight in offices, like building amenities, are important to employee’s well-being and productivity. However, this can be challenging in a building that has an enclosure designed to limit security breaches. We evaluate pressure and impulse distribution from the site’s secure barrier. Larger standoff distances lessen blast impacts and can permit lighter wall construction with larger expanses available for windows.

We most often enhance these views by detailing window wall systems that allow for continuous glazing that extends at a minimum from desk height to the ceiling, rather than a more constricting punched window approach. The results are improved views for employees with increased opportunity to employ daylighting strategies.

The Future

One thing that is certain is that security requirements for buildings will continue to evolve, and Architects will be challenged to design flexible, adaptable public spaces that meet these changing requirements. At the same time, clients will continue to challenge architects to develop integrated design solutions that enhance the experiences of their occupants and the surrounding community. As technology continually changes, Architects will need to stay ahead of the curve and anticipate future needs when developing the infrastructure systems of their buildings. Above all, Architects will need to remember the importance of the human experience in designing for security, so that our secured facilities can not only protect but also enrich the lives of those who occupy them.



Proposed Federal Building, South Carolina

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