
EXECUTIVE SUMMARY

The New York City Police Department (NYPD) developed *Engineering Security: Protective Design for High Risk Buildings* to aid the New York City building community by providing information on how to prevent and mitigate the effects of a terrorist attack on a building. Since September 11, 2001, government agencies and the private sector have struggled to find an appropriate and sensible balance between security, on the one hand, and economic vitality, creativity, and openness, on the other. This struggle has played out in many different arenas, from domestic intelligence to airport security to cyber security. This document focuses on buildings: how to identify the very limited number of structures that present especially great terrorist risks and how to build or retrofit them in ways that mitigate those risks.

A number of executive branch agencies, including the Department of Homeland Security and the Department of Justice, have produced reports presenting risk-tiering systems or offering recommendations for improving building security. To date, no such report has been tailored to meet the specific needs presented by New York City's unique risk environment. The NYPD authored *Engineering Security* to fill that void.

Engineering Security contains two main parts: the NYPD's risk-tiering system, which organizes buildings into Low, Medium, and High Tiers based on assessed threat, vulnerability, and impact levels; and a set of recommendations tailored to buildings in the City that fall into the High Tier and, to a lesser extent, the Medium Tier.

In the NYPD's risk-tiering system, threat scores are determined by threat profile and target attractiveness; vulnerability scores are determined by adjacency, accessibility, and structural performance; and impact scores are determined by maximum

occupancy or height, economic criticality, transportation criticality and proximity, and critical infrastructure proximity.

The vast majority of buildings in the City achieve overall risk scores that place them in the Low Tier. Only a relative few buildings fall into the Medium or High Tier. Generally, High Tier buildings present exceptional threat, vulnerability, and impact characteristics because they exhibit *many* of the following features: they are the targets of one or more credible specific threats; their architectural design is nationally recognizable; they are located adjacent to other High Tier buildings; the movement of people within them is not controlled nor are vehicles obstructed or screened before approaching or entering; their primary structural elements and individual columns do not satisfy load-bearing standards designed to enable buildings and structural elements to withstand specific blast pressures at certain distances; they have maximum occupancy levels of more than 10,000 people or they are taller than 800 feet; a successful attack on them would severely impact the local or regional economy, or affect the national economy for an appreciable period of time; they sit atop five or more sets of rail lines or a vehicular tunnel, or they are located adjacent to the footprint of a significant transportation hub servicing five or more sets of rail lines or the entrance to a bridge; and they are located so close to critical infrastructure that a successful attack would severely disrupt service.

The recommendations presented in *Engineering Security* are organized thematically. Most of the recommendations address traditional threats from explosive devices, including guidelines on enhancing perimeter security; achieving robust building design; designing effective access control, screening, and monitoring systems; and developing fire-resistance, emergency egress, and communication system solutions. The recommendations also address emerging threats from chemical, biological, and radiological weapons, including guidelines on deploying and using heating, ventilation, and air conditioning (HVAC) systems and associated detection devices.

As a first step toward enhancing perimeter security, the NYPD recommends that owners of High Tier buildings conduct vehicle threat vector analyses and incorporate hard perimeters into their design plans.

With respect to achieving robust building design, the NYPD recommends that owners of High Tier buildings incorporate designs in which crowd surges in excess of 500 people are directed away from potential projectile sources, particularly glass atriums, windows, and curtain walls; disperse critical facilities in order to reduce the potential for disruption of multiple critical systems during an attack; orient glass facades away from nearby High Tier buildings; take into account failure modes when selecting facade materials; ensure that walls surrounding critical and sensitive areas are made of strong material, such as concrete, as opposed to weaker material, such as sheetrock; develop robust primary structural elements capable of withstanding large blast pressures; and incorporate both threat-independent and threat-dependent design methods.

High Tier buildings also require systems to control, screen, and monitor people inside the building. The NYPD recommends that owners of High Tier buildings implement access control systems that incorporate identity authentication and turnstiles to enforce entry authorization; limit access to critical facilities, including building security, building engineering, and fire systems rooms; ensure that security personnel conduct background checks on all individuals with access to sensitive security information or critical facilities, both during and after construction, with recurring screenings of individuals involved with critical building functions; establish requirements for storage, disclosure, reproduction, transmission, shipment, disposition, and labeling of documents containing sensitive security information; set screening thresholds at levels no higher than the design basis threat level for a contact charge on a structural column; create protocols for screening of delivered packages with stationary x-ray equipment and explosives detection canines or equipment, and for screening of vehicles at direct entry points as well as at the entrances to underground parking areas and loading docks; provide for off-site screening of vehicles; install comprehensive closed-circuit television (CCTV) systems that incorporate comprehensive coverage of critical facilities and sensitive areas within and around buildings; and interface CCTV systems with current alarm points and access control systems to allow for remote assessment of alarm conditions.

Fire resistance, emergency egress, and communication systems are also important aspects of building security. The NYPD recommends that owners of High Tier buildings ensure that structures meet fire-resistance rating standards that provide for

the time required either for burnout without partial collapse or for full evacuation of building occupants; provide for a stairwell width of at least 66 inches, or a stairwell width informed by a time motion egress study that provides an equivalent building exit time; incorporate two or more remotely located stairwells on each floor; and connect critical emergency responder radio system components in commercial buildings to emergency power systems.

There is increasing evidence of terrorist interest in using unconventional weapons, including chemical, biological, and radiological (CBR) agents. Building owners can use HVAC systems to mitigate the potential effects of unconventional attacks and detection technologies to provide early warning of such attacks. Accordingly, the NYPD recommends that owners of High Tier buildings locate HVAC system controls away from public areas, such as lobbies, loading docks, or mailrooms; invest in advanced filtration systems that can afford a measure of protection against CBR threats and consider equipping them with ultraviolet radiation technology; prepare operational response protocols to manage CBR release events through a process of detection, assessment, and fan and damper operations; monitor chemical, biological, and radiological detection technologies and carefully study the benefits of implementing such systems; and inform local law enforcement and first responders of the building's CBR countermeasures and associated emergency protocols.

Engineering Security's recommendations for High Tier and, to a lesser extent, Medium Tier buildings significantly exceed the requirements set out in municipal codes, including the New York City Building Code and Fire Code, and may conflict with prevailing zoning resolutions and guidelines. The long-standing governmental systems for regulating how buildings are built and renovated have not yet fully incorporated a method for differentiating the terrorist risks presented by specific structures or for mitigating the extreme risks at those structures. Additionally, the advent of computer-assisted design has allowed architects and engineers to develop highly optimized buildings that, while beautiful and efficient, are more vulnerable to catastrophic failure than older, less optimized structures. The NYPD offers these recommendations, which are not legally compulsory, as a step toward the more systematic inclusion of security considerations in the building design process.

The NYPD Counterterrorism Bureau's Threat Reduction Infrastructure Protection Section consults on many of the major development projects in the City. Although each building presents a unique set of security concerns, the NYPD has found many of its recommendations to be generally applicable to buildings that present elevated risk levels. *Engineering Security* represents the NYPD's attempt to organize and circulate these recommendations.

Engineering Security is a living document: as new threats and associated protective security design measures evolve, the NYPD will refine and supplement its recommendations.

