SECURITY AND BUILDING DESIGN

Building security design barely made the radar screen of most architects a decade ago. But, as architect Barbara A Nadel explains, the last decade has brought the issue front and centre.

As we head into 2010, within the design and construction industry the two hot concerns when it comes to building design are security and environmental sustainability. What a difference a decade makes, according to author and architect Barbara A Nadel, FAIA, who specialises in building security, planning and design.

Nadel, who runs an architectural practice in New York City, remembers when security and green design were mainly an afterthought. But that has all changed in a post-9/11 world and building architecture has evolved tremendously in the last decade. Security is now a paramount concern before ground is even broken. Nadel explains why in this Q&A session.

How did you first become interested in security with regard to building design and architecture?
I formed my architectural firm in 1992. Before that, I had been working mainly in healthcare and institutional design. During the 1990s, there was a need for healthcare planning in the prison system and, through that, I got into correctional facility planning and design. I've been very active with the American Institute of Architects (AIA) for many years. I was 2001 AIA National vice president, during the events of 9/11. After 9/11, I realised there was no single security resource for the design and construction industry, especially for architects, engineers, facility managers, consultants, and building owners seeking guidance on security design in the post-9/11 world. Terrorism and crime had been around for a long time but, after 9/11, things changed.

What was your response?
With all of that in mind, I put together a group of national experts in various fields and wrote 'Building Security: Handbook for Architectural Planning and Design'.

Had people in the security and design industries been seeking this kind of security and design knowledge for a while? Or was it really the concerns of a post-9/11 world that prompted the popularity of the book?
There were several benchmark events before 9/11, impacting US facilities at home and abroad. Most of them occurred at government-owned buildings. The 1983 bombing of the US Marine barracks in Beirut was the first incident of a truck bomb used to destroy a building. In 1996, the destruction of the Khobar Towers in Dhahran involved the truck bombing of a US military installation. The 1998 bombings of the US embassies in Tanzania and Kenya underscored the need to provide secure facilities for Foreign Service personnel serving overseas. And, within the US, the first World Trade Center bombing occurred in 1993, in an underground parking garage. The Oklahoma City bombing of the Alfred P. Murrah Federal Building happened in 1995. Both incidents involved vehicle bombings of iconic buildings and, after these events, those responsible for security within government facilities where people live and work became more acutely aware of increased security needs.

Was there a real mindset change then in the business community?
Earlier, commercial building owners weren't necessarily as concerned - it wasn't quite on their radar screen. The events of 9/11 changed this

approach, as many private building owners started to realise their people, buildings, and assets could be at risk. The threat of terrorism put a different spin on what could happen to public and private facilities. Terrorism around the world, as we have seen in different places, from London, the Middle East, to Mumbai, has made many governments sensitive to protecting their populations, infrastructure, and communities. Security is not an isolated issue - every free, democratic country in the world is concerned about terrorism, and how to protect their assets. This can typically include critical infrastructure, such as roads and energy sources, and high-rise buildings, especially if there are global companies as tenants or owners. Governments and private companies must protect their people and property. It's a global issue.

So the time is right…

Back to the initial question - people want this kind of information now because many are struggling to figure things out. "What do we do? We can call upon law enforcement, gather intelligence and deploy operational and military personnel, but how do we protect our buildings?" The challenge is that we don't want to build fortress cities. We don't want to build bunkers. We want beautiful buildings and vibrant cities that will attract tourism and send the message that it is safe to visit, live and work in these urban centres and suburban places. But we also now must have a level of protection that signals, "We aren't going to make it easy for terrorism and crime to disrupt our way of life."

You're in the beginning stages of developing a second edition of the book. What's changed with security and the design industry since the book was first published in 2004?

I have heard from a number of the book's contributors that many security approaches have been refined and improved in various areas. The second edition of the book will include some new topics as well. From engineering, technology, and code perspectives, there have been more innovations and ongoing research. Design-wise, many high performance and sustainable materials, such as blast-resistant-glazing and curtain walls, have come on the market.

And the impact on the construction industry?

There have been many lessons learned after 9/11. In New York City. The building code was amended because of the events at the World Trade Center. Before 9/11, getting people out of a burning high-rise building was a major concern reflected in the codes. After 9/11, avoiding what is known as progressive collapse, whether from a bomb, explosion, or other cause, became a critical structural engineering issue. Thus, rapid and safe evacuation of high-rise building occupants to the outdoors during an emergency is now a concern for owners and tenants. In new high-rises, stairwells need to be designed wide enough and photoluminescent exit signs and strips might now be in stairways so people can see in the event of loss of power.

What are the issues that need to be considered in the design and build process?

Building security planning and design often means considering worst case scenarios and how the design can anticipate and respond to specific threats. For example, if the power is out, or a water supply on one side of the building is not available, providing redundancy on another side of the building can ideally allow continuity of service. These approaches relate not just to terrorism, but to natural disasters as well. A comprehensive security plan addresses design, technology, and operations. While each element can stand alone, building owners derive greater benefits, both financially and in the long run, by considering all three together, at the earliest stages of any design and construction project. Balancing these concerns during conceptual planning provides opportunities to review capital and operational long-term costs and potential savings through life cycle cost analysis. For example, installing new technology may reduce the need for outsourced security guard services, while new design or renovations to harden building exteriors and provide greater visibility inside and outside might produce operational efficiencies among security personnel.

What about more public spaces?

Another area being studied is security at public venues, such as sports facilities. There has been a lot of work on how to protect stadiums, arenas, and other open spaces that might attract thousands of people for an event, like the Olympics, but which might also be terrorism targets. These are just a few examples of how the thinking around security and architecture has evolved. I have no doubt we will see more innovative design solutions, security-related materials and exciting new technology in the next decade.

Barbara A Nagel heads up the firm Barbara Nadel Architect, in New York City and has also served as editor-in-chief of 'Building Security: Handbook for Architectural Planning and Design'.

THE SECURE TOWER

"Everything is vertical in the extreme - it's pushing a lot of the technologies out on the market to their ends," said Joseph de Jong in an interview with the American Society for Industrial Security. De Jong is executive engineer in security for Sinclair Knight Merz (SKM), the Australian consulting firm hired by Emaar to protect the Burj Khalifa.

As an example of the challenges faced, just consider the normally straightforward installation of surveillance camera systems in the building's elevators. Nobody before had installed a microns-thin fibre optics glass line to connect the cameras in a building of 140 storeys. Just one break through vibration would ruin the whole system.

However, the Burj Khalifa had one clear advantage in the security game – it was a fresh build where security could be in-built from the start rather than having to be retrofitted like older tall buildings. Emaar's instructions to designers and engineers were clear, apparently: see how security could be built in from the start to counter both manmade and natural threats, from theft to earthquakes.

Brought onboard to help the project team were building experts who HAD worked on the studies into the collapse of the World Trade Center. Lessons learned were folded into the planning of the Burj Khalifa, though nobody is talking specifics.

Access was a key area of concern so, for instance, the underground garage is only accessible via special cards, as are the elevators from the garage. The cards will also only grant access to the floors the users are entitled to visit. This concept of a security audit and secured zones is critical in new builds. Visitors using temporary access cards can be tracked throughout the tower and hotel lobbies, corporate suites, apartments and observation deck visitors. If they want to move between sections, they will need security clearance.

According to de Jong, the security function has been made easier because the concept of discrete routing of different user groups throughout the building was implemented at the design stage. Ubiquitous surveillance is also a main feature analogue cameras are throughout the tower with images converted for digital storage. They're also linked to motion sensors – part of what de Jong describes as "system response".

Security experts have also taken into account the specific local nature of potential problem areas. Neither sand storms nor summer temperatures are good for external cameras, which have been fitted with pressurised and self-cleaning housings, as well as sunshields.