Antiterrorism – The First Step in the Sustainability Formula

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We all have a responsibility to ensure the places where people work and live will provide them relative safety from a variety of threats, both natural and man-made. Protecting people in occupied space is paramount to building design and it is actually the first step in sustainability. More often than not we think sustainability is about protecting infrastructure. Normally, this is done through a series of government regulations concerning building construction codes. But the reality is, we can rebuild later our goal is to ensure people are protected from the elements and threats, and that the building itself doesn't become the hazard.

So, as part of the design process, everyone on the design team, has an inherit responsibility in applying strategies, whether regulatory or industry "best practice" that manages or mitigates threats to people in the buildings they occupy. Toward this goal, a concept that has been around since the late 90's is Crime Prevention through Environmental Design. It is commonly known by its acronym CPTED. CPTED incorporates four principles of design. CPTED is founded on the idea that crime can be designed out of the environment. CPTED implements the following four approaches:

- natural surveillance – the placement of physical features, activities and people in a way to maximize visibility
- natural access control – physically guiding people through a space by strategic design
- territorial reinforcement – using physical attributes to express ownership or separating public from private space
- maintenance – allows for the continued use of the space for its intended purpose

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In short, the idea is to get "eyes on" in as many places as possible on the property so that the users/occupants will "police" the area due to a sense of ownership. Many municipal governments have formally adopted CPTED principles and police departments have been partnering to enforce the codes and have been effectively reducing crime in their cities.

While CPTED works to control the environment where people are, the five design principles discussed in the following paragraphs focus on lowering the risk to people and reducing the effects of a catastrophic event through building design. In essence, preventing or reducing the possibility of mass casualties. Both formulas can work together to provide a full spectrum of protection, especially from man-made threats.

THE PROCESS

The normal process for designing buildings goes something like this; a requirement is formed, then an architect is contacted, some designs are drawn up based on the functionality or proposed use for the building, the owner approves the visual, and then the engineers go to work putting together all of the detailed drawing that ultimately will incorporate the owners desires and the architect's concept and…*voila'* a building is born.

Sure there are varying steps where the stakeholders (functional area experts) may have some input, but for the most part, they are limited to the parameters outlined by the design team. Consequently, their input is limited to, "Let's put an electrical outlet there or a door here". They really have very limited input as to the structural design of the building.

And finally in the process, the security team gets called in almost as an afterthought. This causes the engineers to scramble to redesign the electrical grid and other facets of the building to accommodate "newly" added security equipment; such as, intrusion detection systems or access control technology. Sometimes, but rarely can the security team have enough influence to affect the changing of a wall or the removal of a recessed doorway.

With this scenario in mind, the first order of business is to ensure the design team includes everyone from the very beginning; i.e., architects, engineers, owners, stakeholders, security and building management – everyone.

With everyone included from the on-set, the second issue of beginning the process with everyone "on the same page" becomes redundant, due to everyone's "buy in" from the start. This keeps modifications to the project to a minimum; thereby, reducing additional costs and delays.

DESIGN PHILOSOPHIES

The overarching philosophy should be that in the case of a catastrophic event occurring at our building, the building will not be what kills or injures people. This must be unequivocal in our planning. We can do this by first accepting the fact that we cannot provide protection from all threat scenarios, whether natural and man-made. There is considerable guidance and mandatory regulations concerning designing buildings to seismic code or to resist hurricane or tornado force winds and for fire safety. Little guidance provides for protection against most man-made threats. Although, recently considerable effort is being put toward thwarting "active shooter/barricaded hostage" situations by designing schools differently. Unfortunately, this focus doesn't include other places where people congregate, like administrative office buildings or factories or high-rise apartments or nightclubs or shopping malls or theaters.

I probably shouldn't even say the next design philosophy, because it really is a "no brainer". Implement protection into buildings were people usually are. Many of you are saying, "Like, duh!" But there are some people out there that will say, buildings are designed to house people so just by their nature people will be inside of them. That's somewhat true of all buildings, but many are simply structures to prevent the elements from having an impact of the equipment or materials located inside and are rarely inhabited consistently. Forget about uninhabited buildings (uninhabited defined as buildings with ten or less people in them on a regular basis) – the cost benefit is too low. Instead concentrate of buildings with a population density above 50.

We must also accept that in order to get the protection we need, the philosophies outlined here must have already been designed into the building prior to an event occurring.

ASSUMPTIONS

With that in mind, there are several basic assumptions that must be made:

- **All buildings will "come into compliance" over time, as major modification or renovations are made that follow these concepts**
- **Specific protection from some threats will provide protection from other threats or hazards**
- **Reduced vehicle stand-off distances (how close a vehicle can legally park next to a building) equates to increased construction costs due to construction hardening**
- **If the building is located within a compound, vehicle threats will be stopped at the property line due to the presence of qualified guard personnel or sufficient security measures are already in place to prevent a vehicle borne device from breaching the perimeter**

STRATEGIES

Strategy 1 – Maintain Staff-off Distances

Maximize the distance a vehicle can legally park near a building. By keeping parking away from the building, then any illegally parking closer to the building than is allowed will be noticed as unusual and warrant a call to the security folks to investigate.

The same rule applies to trash containers, dumpsters and such.

Reduce the opportunities for people to hide objects. Landscape so that if an object were placed near the building it would be seen as people approach the entrance. Create an area of unobstructed space near the buildings by using low-laying ground cover or grass or cobbles. Limit access to spaces immediately surrounding the building

by the placement of sidewalks, so that if a person were to tread off of the pedestrian walkway, it would draw attention and guards would be summoned.

If the parking must be close to the building, underneath or on the roof, then control the parking with some type of physical barrier (think parking garage) and authentication method.

Strategy 2 – Prevent Progressive Collapse

Most of the people who were killed in the Oklahoma City bombing didn't die from the truck explosion; instead, they died because the building fell on top of them. Buildings that have three or more stories should be considered for non-progressive collapse design. Get an engineering firm that specializes in blast analysis to do this work.

Note: The designers of the World Trade used this strategy, so that on 9/11 the buildings stayed standing long enough for the majority of people to get to safety. This same philosophy was used at the Pentagon prior to 9/11 and we all saw the effects. The building stayed standing for almost 35 minutes – enough time for people to get out safely.

When considering progressive collapse our thought should be, "it's okay if the building falls down, so long as it stays standing for a while to give the people inside a chance to get out". Think about it this way. The designers of formula one cars design them so that the chassis and body of the car absorbs all of the energy of an impact when the car strikes a wall or guardrail. They do this so the driver is kept safe. The car is destroyed but the driver is saved. They will rebuild the car later. We should do the same when designing buildings. Design it so the occupants are saved – we'll rebuild later.

Strategy 3 – Minimize Flying Debris Hazards

Even without progressive collapse a high number of injuries and death can occur because of flying glass fragments and debris from walls, ceilings, fixtures and non-

structural features. Flying debris can be minimized through building design and the avoidance of certain building materials and construction techniques. Limit windows to the upper third of the elevation. If possible, replace annealed glass with laminated glass. Consult a blast mitigation specialist to determine thickness. Avoid fragmentation retention film (FRF) as a solution to the flying debris issue because it is rarely installed properly. To install it properly the window and frame needs to be taken out, the film stretched over it and then the window and frame reinstalled. Since the costs for a laminated glass system is about the same as the process described here for installing FRF, why not just replace the window system with laminated glass? Besides laminated glass systems last longer.

Additionally, don't forget about secondary debris hazards – furniture or equipment flying around. With this idea in mind, avoid placing people close to windows.

I just cringe when I see buildings with all glass facades. They are extremely pretty and provide great light internally for the building occupants, but unless the first strategy of maximizing standoff distance has been met, they provide little protection from bomb blast and may become the problem or at least, contribute to the flying debris issue.

Strategy 4 – Limit Airborne Contamination

Effective design of heating, ventilation and air conditioning (HVAC) systems can significantly reduce the potential for chemical, biological and radiological agents from being dispersed throughout the building, whether they originate internally or externally.

A common practice these days is to locate the HVAC or air intakes on the roof. While this is a good practice, all too often we forget about limiting access to the ladder that leads to the roof. A better solution is to place roof access within an internal room, such as a mechanical room, of the building that is normally kept locked.

By installing emergency cut-off switches in prominent locations throughout the building; such as, in a break-room or close to emergency exits we can further limit airborne contamination. Periodic drills and the training of fire alarm procedures will go

along way in teaching people what to do if there is contaminate detected. Make sure you train new hires during newcomer's orientation.

During the anthrax scare right after 9/11 many mailrooms and admin offices received letters or packages with suspicious white powder. You probably are thinking that this threat no longer exists. Well guess again, white powder substances arriving in the mail are almost a daily occurrence somewhere in the world. Although, anthrax is rarely found, it cannot be ruled out as a potential threat; therefore, isolate mailroom ventilation systems from that of the rest of the building.

Strategy 5 – Provide Mass Notification

Providing notification to building occupants about potential threats and how they should respond to those threats in a timely fashion can reduce the risk of mass casualties. Effective design will include both local and remote origination of information.

Real time visual and audible notification is essential. Whatever type of notification you choose make sure it is programmable, in other words, it can have pre-recorded messages or tones and has the ability to provide on-the-spot announcement. Ensure all areas of the facility grounds are covered; including parking lots, playgrounds, etc. The last thing you want is for someone from outside to go inside and vice versa and get contaminated.

SUMMARY

By implementing these simple and effective design strategies we can reduce the effects of hazardous events at our buildings. At the end of the day, preventing or reducing mass casualties is our goal – after all, isn't that what it's all about?