

BREADTH STUDY: BUILDING SECURITY

Building Security Overview

Building security has always been important in designing a building, but since 9/11/01, one of the greatest building disasters in history the topic has received more attention in the last three years than ever.

Has the 9/11 disaster revolutionized the way engineers approach a building design? Are buildings constructed and renovated today more secure than buildings of just three years ago? Whether the answer is yes, or no, how is the level of security determined? What makes a building secure?

The answer to all of these questions depends on the definition of security, which varies tremendously depending on the source and application. The definition of security on which the original building design was intended will be used: *Building security is the simultaneous minimizing of inconvenience to occupants and daily functions and maximizing of the level of comfort.*

Furthermore, despite the definition of security, there is no procedure or method of calculating safety risk factors that can be applied to every building. Just as a variable air volume system can be identified as such and depending on floor plans and required flow rates still have the uniqueness of a fingerprint, so must a security system be fitted per building. However, general technology and several usage cases will be necessary in customizing systems and security techniques for Penn Place.

Specifying Security

Security strategies vary greatly depending on size of the building, number of occupants, location, use, etc. Security strategies will be specified for buildings sized to fit AE thesis building criteria: 50,000-100,000 sq.ft, less than four stories. In addition, moderate-risk government courthouse and court office buildings, local government buildings, were of primary consideration, although security strategies for smaller and larger and lower and higher level security risk buildings were studied in order to pinpoint what technologies to study in the case of buildings like Penn Place.

Courthouse and Local Government Office Facilities

Since early colonial days, courthouses represented the enduring presence of government in cities and towns across the U.S. As icons of American government, courthouses are targets for terrorism and crime, especially during high-profile trials, requiring high levels of security at building perimeters, exteriors, and entry points. Internal threats, stemming from family court disputes and civil cases also pose significant security risks.

Balancing the need for openness and security is the major challenge for courthouse administrators, judges, planners, and designers. Courthouses provide a public forum for dispute resolution, and are environments where people express outrage at legal proceedings and outcomes. When parties in a lawsuit or case do not accept the decision of the judge or jury, they may react violently, requiring preventative security measures to minimize potential threats.

Courthouse violence is not limited to urban areas and big cities. Violence and terrorism can occur in any location, especially where prominent symbols of government are accessible to the public. Violent incidents have occurred within small jurisdictions and courthouses in California, Michigan, and Kentucky. As concern for homeland security increases, law enforcement and public safety agencies, especially in small communities and counties should consider training for and addressing courthouse violence, in

Un-natural Disasters that Prompt a Security Re-Evaluation

The difficulty in designing a security system is that there is a lack of historical and performance data. In designing a structural system, an engineer can use experimental wind pressure or seismic data to predict and prepare the system for the most likely worst conditions that it will have to sustain. With security, events are much more sporadic and non-standard. It is difficult to model the intent and capability of a threat to a security system. Historical data is limited.

The following are examples of disasters that have prompted security renovations in court and local government office facilities:

Wilkes Barre, PA. Luzerne County Courthouse, March 2004.

A fugitive entered the courthouse with the intent to shoot a judge and then himself. He was apprehended (without gun), but after using a bystander to shield himself from deputies, and was being escorted through the building by the deputy sheriffs, to the sheriff's office, when he ran into the district attorney's office, damaged a door, and soiled himself while screaming inside the office.

Cause-Effect. 1. Fugitive was not immediately handcuffed (as a result of a previous incident where it took 6 officers to apprehend him? Why wouldn't that want to make you throw on the cuffs faster?) 2. Three main doors to the DA's office were not locked, 3. No smart card system.

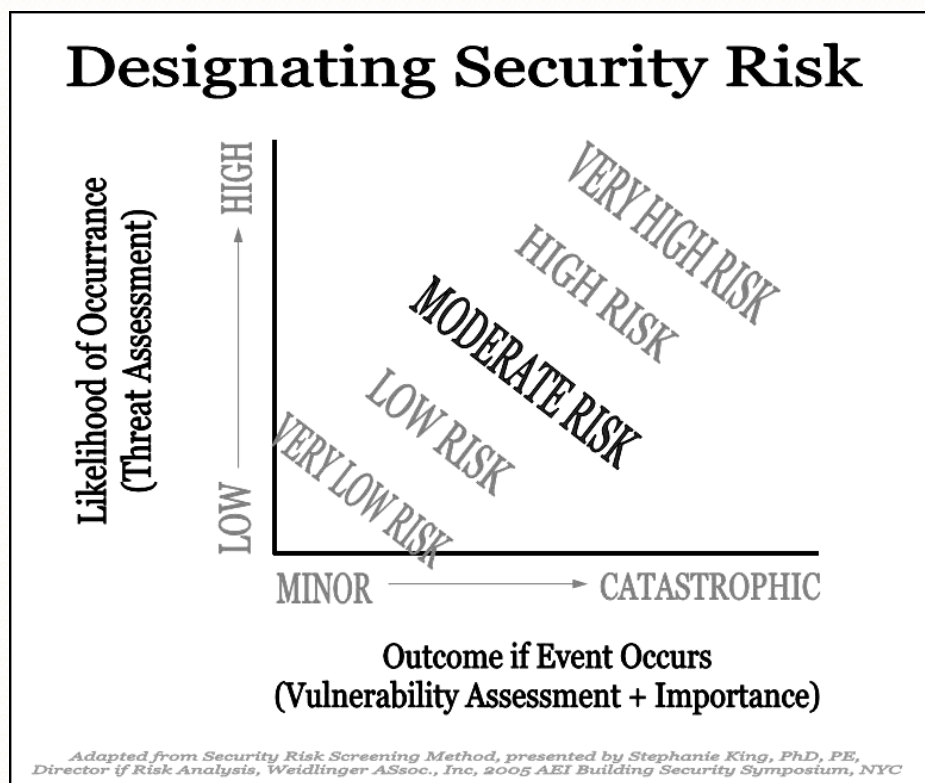
Obstacles. 1. Employees enter and exit too frequently for doors to be locked, 2. Security officers cannot arrest individuals that pose a threat

Atlanta, GA. March 2005. A judge, court reporter and deputy were killed and another deputy was wounded Friday in a shooting at the Fulton County Courthouse in downtown

Atlanta. Authorities were hunting for the gunman, who fled in a carjacked auto.

The judge, later identified as Superior Court Judge Rowland Barnes, was shot on the eighth floor of the courthouse, while one of the deputies was shot on a street corner just outside the building. It was not immediately known how the suspect got a gun, but county employee Ali Lamei said he was told by officers that a sheriff's sergeant was escorting a prisoner into Barnes' courtroom when the prisoner grabbed the sergeant's gun and shot the judge and sergeant. (Associated Press, March 11, 2005)

Risk Assessment



Components of Risk:

1. *Occurrence*: uncertain initiating event, whether it be natural, accidental, or deliberate
2. *Vulnerability*: uncertain outcome given an event occurs (conditional probability of failure, or conditional expected damage and loss)
 - Includes the adverse outcome we are trying to quantify, and engineering analysis (modeling loads and responses)
3. *Importance*: relative severity of the outcome as defined by the decision maker (risk tolerance)
 - social and economic considerations (often subjective)
 - independent of hazard (cause of the adverse outcome)

Security Considerations by System

Site	Architectural	Structural	Utilities (Elec., Stored Water, Fuel Storage)	Mechanical
adjacent risks	building entrances	blast resistance	electricity	air intakes
perimeter	building access control	stand off	domestic water	air filtration
site access control	critical assets	progressive collapse	sewer systems	AHUs
parking	lobby area	parking garages	fuel	building automation
exterior lighting	loading docks	critical elements	heating and cooling capabilities	building zoning
vehicle circulation	emergency egress	discontinuities	communications systems	
anti-ram devices	structural frame	detailing		
landscaping/vegetation	internal organization of elements	exterior walls/envelope		
topography	space and function	fenestration		
line of site/visibility	aesthetic, multifunction of elements	atria		
segregate inspection and entry functions				
utility entries				
obstructions/hiding places				
lighting				

Plumbing/Gas	Electrical	Communications/IT	O & M	Security
Redundency	redundency	entry points	documentation	perimeter
accessibility	accessibility	UPS	monitoring	building
storage and reserves	critical systems	redundency	emergency procedures	system standardizaton
	emergency power	accessibility	repair and service agreements	system integration
	building lighting	protection		alarm systems
	alarm monitoring	backup		lock systems
	facility requirements			security control center
	primary service (location, reliability, vulnerability, redundancy, service capabilities)			secure areas
	standby power (location, capacity, vulnerability, cost/benefit, fuel storage, opportunities)			security master plan

Involvement: Who should be involved in security planning?

- owner
- users
- architect
- blast engineer
- security specialist
- CBR specialist
- structural engineer
- traffic engineer
- civil engineer
- fire protetion/life safety
- estimator
- M,E,P engineers

Goals for a Secure Building

1. Save lives, reduce injuries
2. Protect assets
3. Facilitate safe evacuation, reduce & anticipate recovery
4. Anticipate and not preclude changing security requirements
5. Develop Comprehensive strategy for a balanced approach considering cost effectiveness while accepting some risk
6. Maintain balance between security and clients needs, zoning/codes, culture, community, location, etc.

Pennsylvania Courthouse Security Case Studies

BERKS COUNTY

The security system of the Berks County Courthouse consists of walk-through metal detectors, x-ray machines, and an access card/turnstile system. A county-employed subconsultant, Security Guards, Inc, manages security. Security personnel are present 24 hours/day.

There are a total of 21 employees staffing 2 county courthouse buildings and a parkade, including roving ground patrol. The average salary of an employee is \$9/hr. Most employees are retired cops whose security training is specific to each station.

Mr. Morris Demsko of Security Guards, Inc. verified that, initially, Berks County was able to cut security costs by approximately \$100,000. Costs have increased since that time because employee duties and benefits have increased. Mr. Demsko noted that the cost of running security through the subconsultant firm would be much less expensive than the cost of having Luzerne County sheriff's employees run the system (assuming Sheriff's employees receive a \$19,750/yr starting salary). Also, because Security Guards, Inc. is operated locally, the county has more direct contact and control over security issues than if security were managed by a national company.

For additional information, please contact the following:

Morris Demsko (Security Guards, Inc.) 1-800-543-8063

John Mitchell (Security Guards, Inc.) 610-375-4747

Dale Derr (Berks Co. Courthouse Admin.) 610-478-6208

LANCASTER COUNTY

The security system of the Lancaster County Courthouse consists of walk-through metal detectors and x-ray machines. The sheriff's department manages security. Hours of operation for Lancaster County Courthouse Security are 7am to 6pm. During that shift, there are 2 employees at each detector, 4 or 5 total employees at two entrances. Low-level security (one or two patrolling employees) is present during other hours and at night.

Note that the Lancaster County Engineering Dept. is currently looking into hiring a subconsultant, Wackinhut, Inc., to take over courthouse security, and will also be conducting a survey on local county courthouse security systems.

For additional information, please contact the following:

Jenelle Walker (Lancaster Co. Engineering Dept.) 717-299-8323

CENTRE COUNTY

The security system of the Centre County Courthouse consists of a main entrance with a walk-through metal detector and x-ray machine, and a secondary entrance with a guard with a hand-held metal-detecting device. All doors have Mag locks, and all security personnel are armed. The sheriff's department manages security. Hours of operation are 8:30am-5pm. There is one employee at each entrance, and a patrolling supervisor. Security personnel are uniformed sheriff's employees who work in rotating 5 hour shifts throughout the hours of operation. The average salary of each employee is \$9/hr.

Sheriff Denny Nau commented that the County originally dealt with a subconsultant (Burns Security, a national company), but had little or no control over any slacking employees who, by contract, only were required to report to the company headquarters in Pittsburgh, Pa. The county had to switch to the current system to acquire more direct, county-controlled security operation.

For additional information, please contact the following:
Centre Co. Sheriff, Denny Nau 814-355-6803

MONROE COUNTY

The security system of the Monroe County Courthouse consists of walk-through metal detectors at a main/public entrance, and a proximity card system at a separate employee entrance. All doors are alarmed, and there are storage lockers at the main entrance for safekeeping of restricted items. The sheriff's department manages security. Courthouse hours are 8:30am to 4:30pm. Security hours are 7:30am to 5pm. Employees work 8:30-4:30 day shifts, rotating employees for the extra morning/opening and afternoon/closing hours. During operating hours, there are two bailiffs at each entrance, and a patrolling supervisor. The supervisor holds all keys to the building and carries a radio.

The average starting salary of each employee is \$19,800. Bailiff qualifications include a H.S. diploma and, for some, but not all, ACT 120. The sheriff hires all employees.

For additional information, please contact the following:
Deputy Benzoni (Monroe Co. Sheriff's Dept.) 570-420-3400

COLUMBIA COUNTY

The security system of the Columbia County Courthouse consists of a 2-finger alarm system, which is 95% wireless. The sheriff's department is on call to respond at the push of a button located in each courtroom and office. Sheriff's department employees

are the security personnel for the courthouse. Security hours and number of employees on security duty are varied, depending on the need for increased/decreased security for particular court cases.

The sheriff provided information on other security systems, in courthouses/prisons the sheriff had worked with across the state and country, and recommended referring to the security operation of the Schuylkill Co. Courthouse because of the similarity of that security system to the system proposed by Luzerne County.

For additional information, please contact the following:
Columbia Co. Sheriff 570-389-5604

DAUPHIN COUNTY

The security system of the Dauphin County Courthouse consists of metal detectors, x-ray machines, and cameras at each entrance. There are separate public and county employee entrances. The security department, run by the county, is separate from the sheriff's department. Hours of operation are 24 hours/day. During the day, there are 3 men/station. During the night shift (11pm-7am), there is 1 man/building for lower-level security. An on-duty supervisor and deputy chief of security head security. About half of the security staff consists of retired police officers, while others are specially trained security personnel.

Full time employees receive full benefits, including 2 weeks vacation time and one sick week, and an average salary of \$9/ hour. On average, part time employees are paid \$7.60/hr. Employees with Act 235 training receive \$10/hr, and full time benefits.

For additional information, please contact the following:
Dauphin Co. Security Dept. 717-255-2816
Security Head, Mike Pries 717-255-2700

SCHUYLKILL COUNTY

The security system of the Schuylkill County Courthouse consists of a single entrance with a walk-through metal detector, x-ray machine, a personnel access card system with varying access depending on each county employee's needs. A camera/monitor system is run from a security station in the basement, and computer in the sheriff's office monitors camera views and the access card system. The sheriff's department manages security. Hours of operation are 7am to 5pm. The security staff is mostly "unsworn deputies" who are retired cops mostly.

For additional information, please contact the following:
Sgt. Barbara Szczyglak (Schuylkill Co. Sheriff's Dept.) 570-628-1446

Sampling Technology Across Systems

Technology	Description	Implementation Requirements	Cost Range
Surveillance Closed Circuit TV	Typical Video surveillance system; intrusion detection and tracking, not protective device;	half of operation depends on personnel	
Digital Video Recording	multiple camera recording, can be at different speeds, facial recognition; intrusion detection and tracking, not protective device;	half of operation depends on personnel	
Access Control x-ray	contraband detection;	half of operation depends on personnel	
metal detector	contraband detection;	half of operation depends on personnel; installation requires one electrician	
proximity card reader	ID swipe card regulates entrances	must supply ID cards to all employees; installation requires one electrician	\$350-\$1175/ea.
electromagnetic door holder and closer	and security controlled electric lockdown or exit strategy system	installation requires one electrician	~\$625/ea.
Electrical 12V ultrasonic motion detector	intrusion detection	installation requires one electrician	~\$425/ea.
Infrared photoelectric detector	intrusion detection	installation requires one electrician	~\$385/ea.
Mechanical Filter	Bio filters, high efficiency biological contaminant removal		
Damper	Class Air Movement and Control Association (AMCA) licensed low-leakage Class I or better for use in contaminant isolation		
Lighting Uplighting	lights installed in ground to minimize shadows		
Structural high consequence facility glass	shatters in a way that won't create projectiles in case of blast		up to \$180/SF
wall back-up, catcher system	reinforcement of wall studs to "catch" blast; can be sheet steel if thermal bridging prevention precautions are taken; welded wire fabric	must design against thermal bridging	sheet steel can add \$4/SF to stud wall assembly

Application of Security Plan to Penn Place

There should be a staffed gate at the entrance to the under-floor parking. Entrances should be staffed with one guard and an x-ray machine. Closed circuit television in the lobbies and main corridor of each floor is the main form of surveillance. Proximity cards readers are installed on office doors of court officials.

To protect against the specific threat of someone pulling a fire alarm and escaping from the rear stairwells, currently unmonitored, surveillance should be considered at the rear of the building, and automatic locks with a safety override should be installed.

Optional measures would be wall backup/catcher system in holding rooms.

Beyond technology, the most important security tactic for this building, because of its location and level of public use is making occupants aware of who should be in the building and who should not.



Conclusions

Penn Place Mechanical System

A case of over-ventilation and fluctuation in occupancy and operations makes the Penn Place building an excellent candidate for demand- controlled ventilation based on CO2 levels.

Renovating the system with sensors and controls can save as much as 10% of energy per year, and about 12% of the current building overall operating cost. Payback would be about 2.2 years, making the solution one worth investigating.

Security

A basic security master plan for Penn Place includes guarded parking lot gated entrance, and smart card readers throughout the building. The most important security tactic for this building, because of its location and level of public use is making occupants aware of who should be in the building and who should not.