

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I

Building Design for Homeland Security for Continuity of Operations (COOP) Train-the-Trainer



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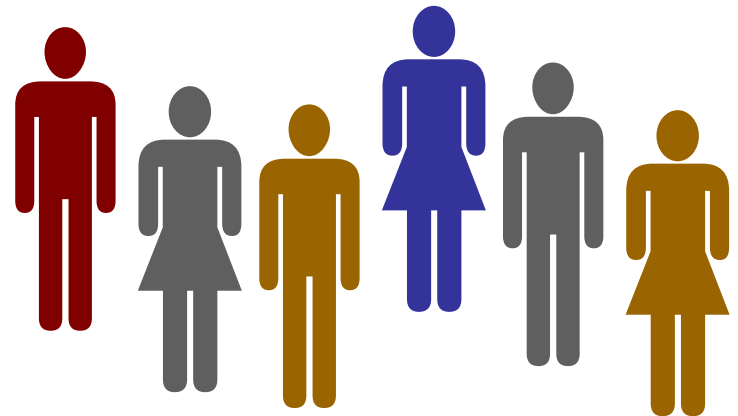
Student Introductions

Name

Affiliation

Area of Concentration

Course Expectations



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Purpose of Course and FEMA 426 Manual

- Provide guidance to COOP Planners/Managers to perform an assessment of their COOP sites
- Enable and encourage COOP Planners/Managers to apply measures and technology available to reduce risk from terrorist attack

Mitigation Information

- Not mandatory
- Not applicable to all buildings
- Not applicable when it interferes with other hazards

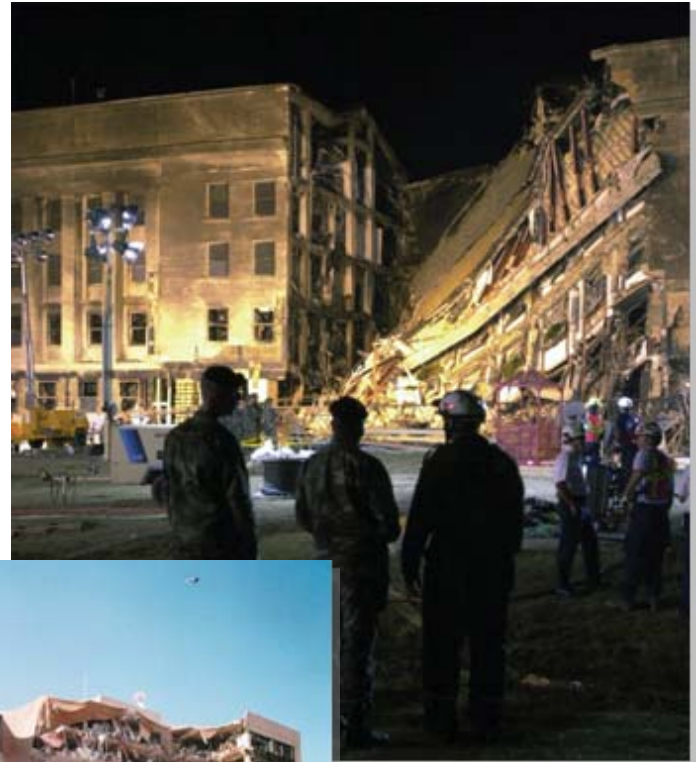


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Course Goals

To enhance student understanding of the measures and technology available to reduce risk from terrorist attack.

To enhance student ability to assess a site for COOP requirements and natural and man-made hazards



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U.S. AIR FORCE



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Course Objectives

Students will be able to:

- 1. Explain** the basic components of the assessment methodology.
- 2. Appreciate** the different assessment methodology approaches that can be used.
- 3. Perform** an assessment for a building by identifying and prioritizing assets, threats, and vulnerabilities and calculating relative risk.



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Course Objectives

- 4. Identify** available mitigation measures applicable to the site and building envelope.
- 5. Understand** the technology limitations and application details of mitigation measures for terrorist tactics and technological accidents.
- 6. Perform** an assessment for a given building by identifying vulnerabilities using the Building Vulnerability Assessment Checklist in FEMA 426.



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Course Objectives

- 7. Select** applicable mitigation measures and prioritize them based upon the final assessment risk values.
- 8. Appreciate** that designing a building to mitigate terrorist attacks can create conflicts with other design requirements.
- 9. Understand** interfaces between assessing a facility for man-made and natural threats / hazards and for use as a COOP facility.



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Course Overview – Day 1

Unit I – Introduction and Course Overview

Unit II – Asset Value Assessment

Unit III – Threat / Hazard Assessment

Unit IV – Vulnerability Assessment

Unit V – Risk Assessment / Risk Management



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Course Overview – Day 2

Unit VI – FEMA 452 Risk Assessment Database

Unit VII – Explosive Blast

Unit VIII – Chemical, Biological, and Radiological
(CBR) Measures

Unit IX – Site and Layout Design Guidance



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Course Overview – Day 3

Unit X – Building Design Guidance

Unit XI – Electronic Security Systems

Unit XII – Finalization of Case Study Results

Unit XIII – Train-the-Trainer

Unit XIV – Course Wrap-up



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Course Materials

Federal Preparedness Circular – 65

FEDERAL EXECUTIVE BRANCH CONTINUITY OF OPERATIONS (COOP)

The June 15, 2004 version of FPC-65 has been integrated into this course from the building assessment standpoint

All Federal agencies, regardless of location, shall have in place a viable COOP capability to ensure continued performance of essential functions from alternate operating sites during any emergency or situation that may disrupt normal operations.



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Course Materials

Federal Preparedness Circular – 65

Alternate Facility Objective:

- Ensuring that agencies have alternate facilities from which to continue to perform their essential functions during a COOP event



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Course Materials

Federal Preparedness Circular – 65

Alternate Facility Requirements:

- Must be capable of implementation both with and without warning
- Must be operational within a minimal acceptable period of disruption for essential functions, but in all cases within 12 hours of COOP activation
- Must be capable of maintaining sustained operations until normal business activities can be reconstituted, which may be up to 30 days



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Course Materials

Federal Preparedness Circular – 65

Alternate Facility Requirements (continued):

- Must provide for a regular risk analysis of current alternate operating facility(ies)
- Must locate alternate operating facilities in areas where the ability to initiate, maintain, and terminate continuity operations is maximized
- Should consider locating alternate operating facilities in areas where power, telecommunications, and internet grids would be distinct from those of the primary



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Course Materials

Federal Preparedness Circular – 65

Alternate Facility Requirements (continued):

- Should take maximum advantage of existing agency field infrastructures and give consideration to other options, such as telecommuting locations, work-at-home, virtual offices, and joint or shared facilities
- Must consider the distance of alternate operating facilities from the primary facility and from the threat of any other facilities/locations (e.g., nuclear power plants or areas subject to frequent natural disasters)

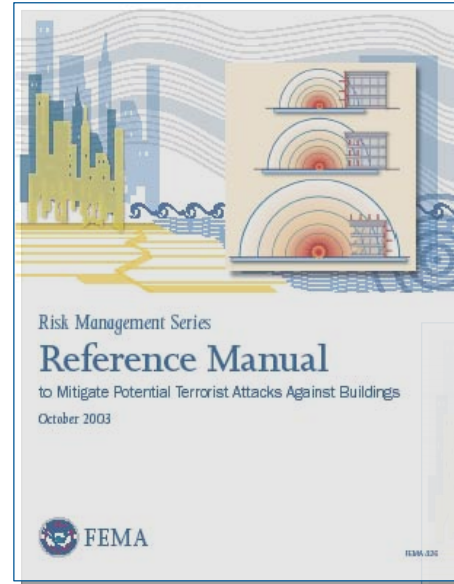


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Course Materials

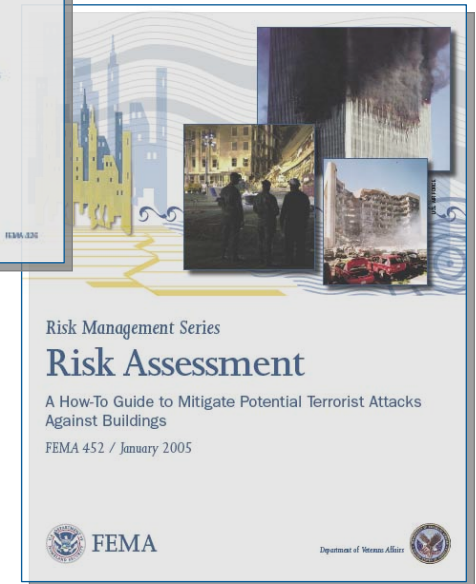
FEMA Publication 426

Reference Manual
to Mitigate Potential Terrorist
Attacks Against Buildings



FEMA Publication 452

**Risk Assessment: A How-To
Guide to Mitigate Potential
Terrorist Threats Against
Buildings**



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FEMA 426 Reference Manual

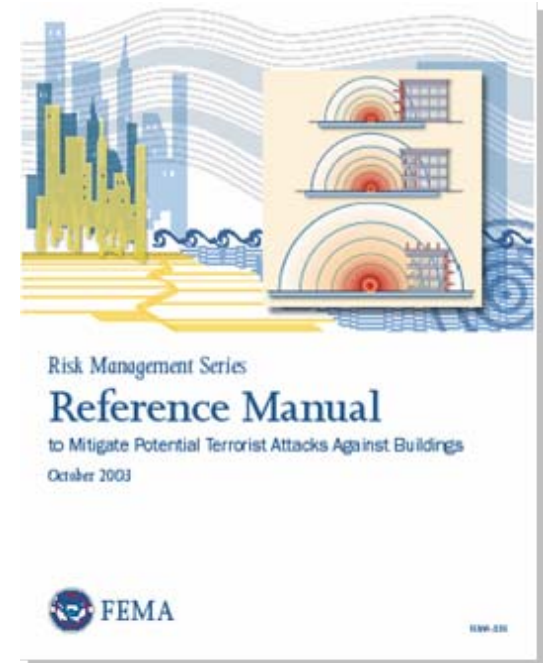
Chapter 1 – Asset Value, Threat/Hazard, Vulnerability, and Risk

Chapter 2 – Site and Layout Design Guidance

Chapter 3 – Building Design Guidance

Chapter 4 – Explosive Blast

Chapter 5 – CBR Measures



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FEMA 426 Reference Manual

Appendix A – Acronyms

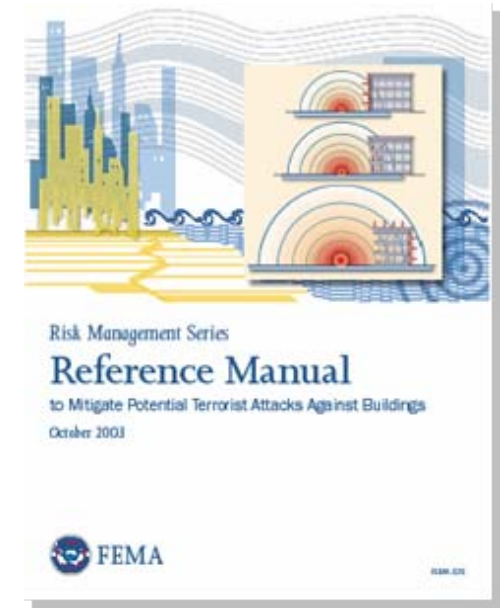
Appendix B – General Glossary

Appendix C – CBR Glossary

Appendix D – Electronic Security Systems

Appendix E – Bibliography

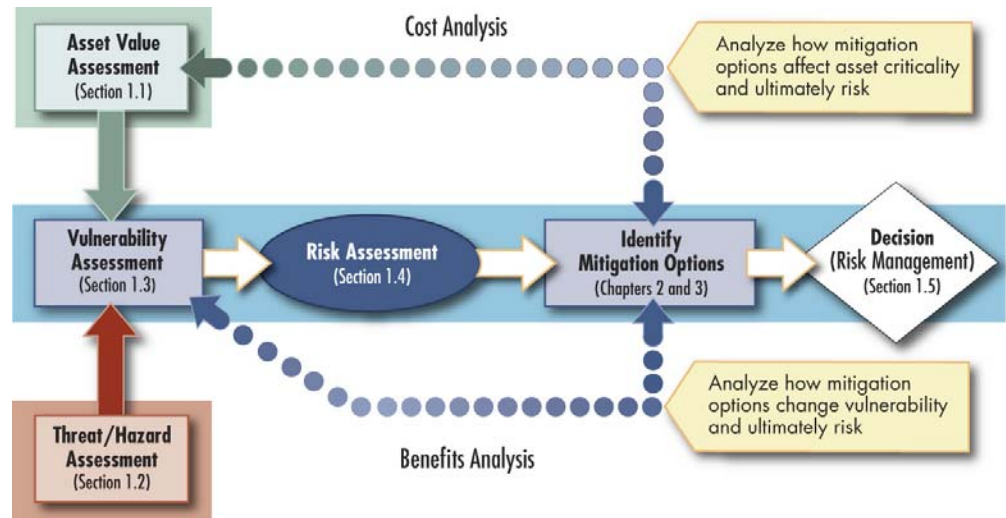
Appendix F – Associations and Organizations



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FEMA 426 – Chapter 1

- Asset Value Assessment
- Threat/Hazard Assessment
- Vulnerability Assessment
- Risk Assessment
- Risk Management
- Building Vulnerability Assessment Checklist



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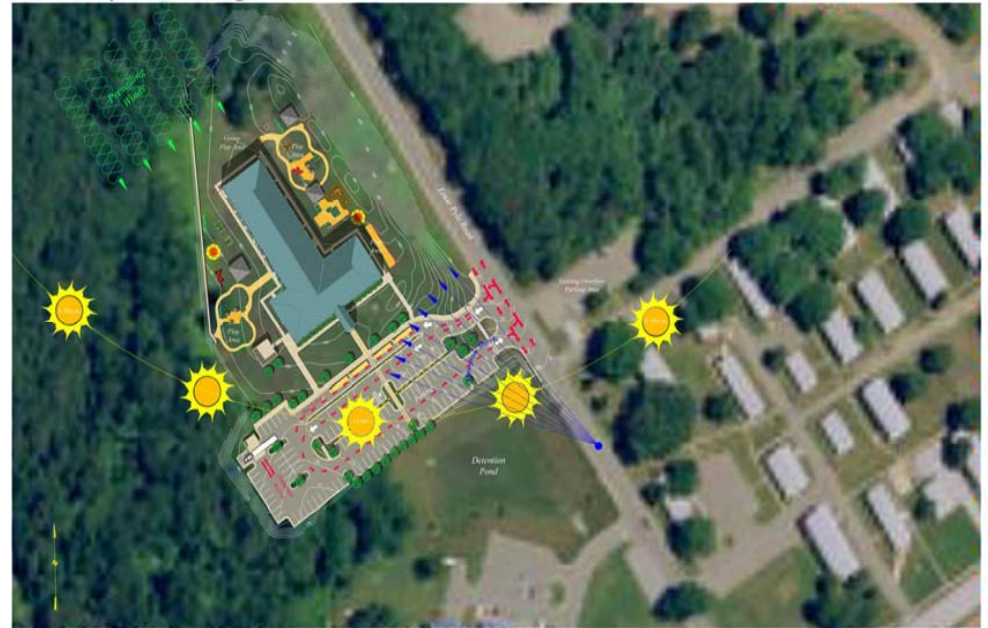
FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

FEMA 426 – Chapter 2

Site and Layout Design

- Layout Design
- Siting
- Entry Control/Vehicle Access
- Signage
- Parking
- Loading Docks
- Physical Security Lighting
- Site Utilities

Site Analysis Drawing



Samaha
Associates

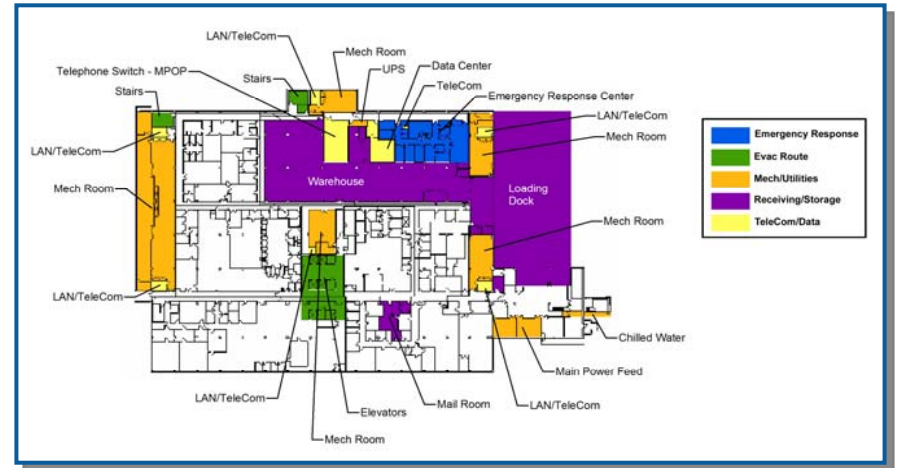


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FEMA 426 – Chapter 3

Building Design Guidance

- Architectural
- Building Structural and Nonstructural Considerations
- Building Envelope considerations
- Other Building Design Issues
- Building Mitigation Measures



FEMA 426, Figure 1-10: Non-Redundant Critical Functions Collocated Near Loading Dock, p. 1-41

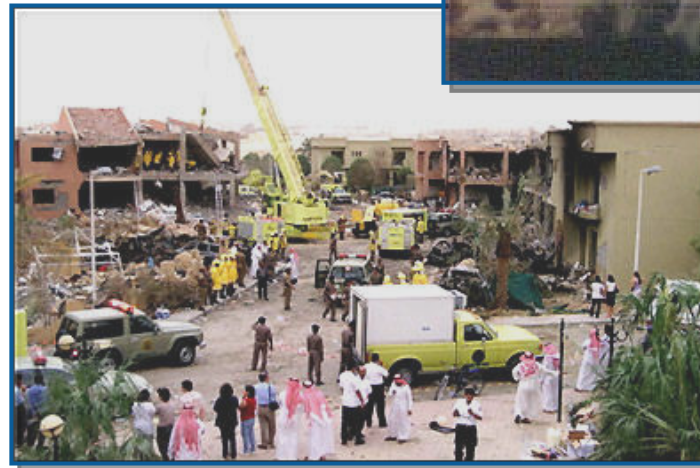


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FEMA 426 – Chapter 4

Explosive Blast

- Building Damage
- Blast Effects and Predictions
- Stand-off Distance
- Progressive Collapse



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FEMA 426 – Chapter 5

CBR Measures

- Evacuation
- Sheltering in Place
- Personal Protective Equipment
- Filtering and Pressurization
- Exhausting and Purging



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FEMA 452 Risk Assessment How-To

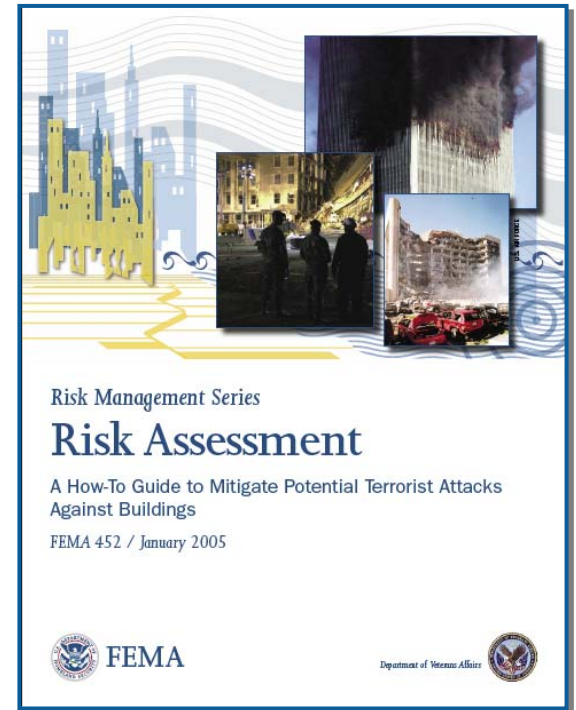
Step 1 – Threat Identification and Rating

Step 2 – Asset Value Assessment

Step 3 – Vulnerability Assessment

Step 4 – Risk Assessment

Step 5 – Consider Mitigation Options



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FEMA 452 Risk Assessment How-To

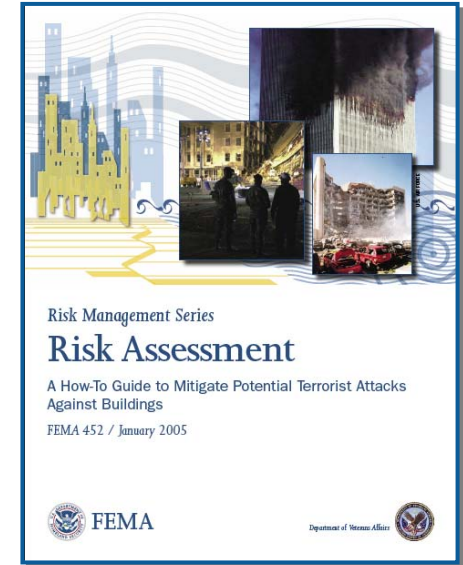
Appendix A – Building Vulnerability Assessment Checklist

Appendix B1 – Risk Management Database v1.0: Assessor's User Guide

Appendix B2 – Risk Management Database v1.0: Database Administrator's User Guide

Appendix B3 – Risk Management Database v1.0: Manager's User Guide

Appendix C – Acronyms and Abbreviations



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Summary

FEMA 426 and 452 are intended for building sciences professionals.

Manmade hazards risk assessments use a “Design Basis Threat.”

Site and building systems and infrastructure protection are provided by layers of defense.

Multiple mitigation options and techniques.

Use cost-effective multihazard analysis and design.

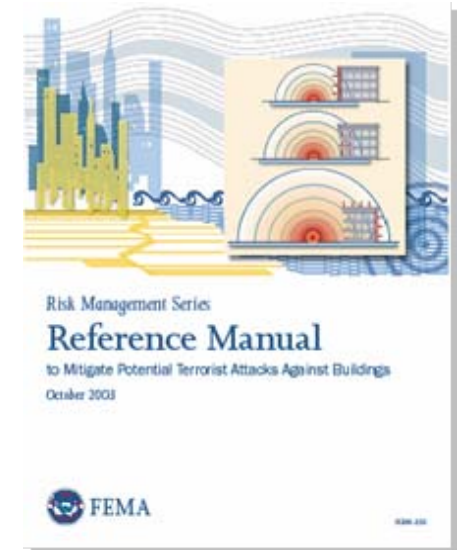


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Case Study Activities

In small group settings, apply concepts introduced in the course.

Become conversant with contents and organization of FEMA 426.



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COOPERVILLE INFORMATION / BUSINESS CENTER (CI/BC)

Case Study

Small information technology company which also operates a Business Center at same location

- Occupies portion of building rented in Suburban Office Park
- Data center and communications for off-site clients
- Computer and office support for Business Center clients



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Cooperville Information / Business Center



Cooperville Information / Business Center (CI/BC)



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I-C-29

Mission

Regional Computer / Business Center

- Real-time IT support
- Backup services
- 24 x 7 operations
- Temp office / computer space

Customers

- Government and commercial
- Some classified work

Layout

- Downstairs: Business Center, Computers, Communications, Loading dock, Storage
- Upstairs: Executive offices, Staff



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Threat Analysis

Terrorist Threat

Intelligence Threat

Criminal Threat



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FEMA 426, Figure 2-1: An Example of Using GIS to Identify Adjacent Hazards, p. 2-5

Hazard Analysis

HazMat

- Facilities
- Highway
- Rail

Liquid Fuels



Air Traffic

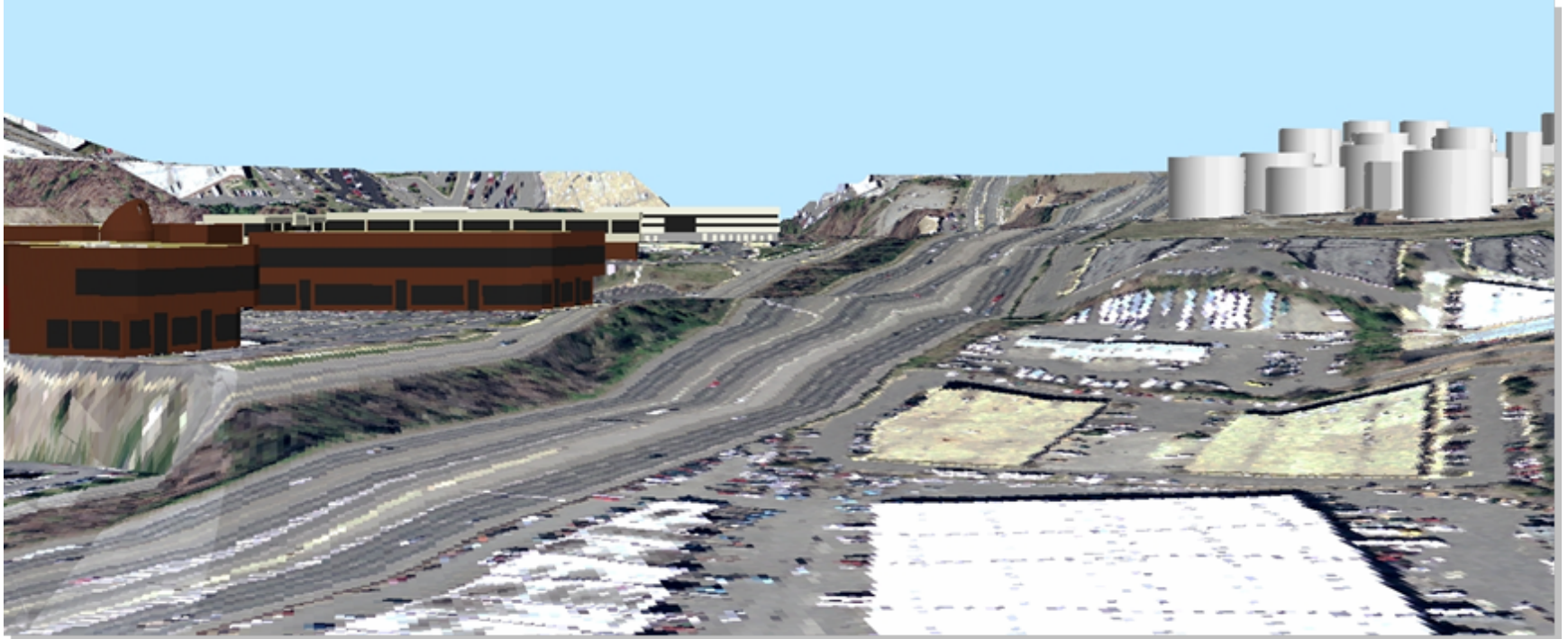


Natural Hazards



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Computerized Elevation Looking Northwest

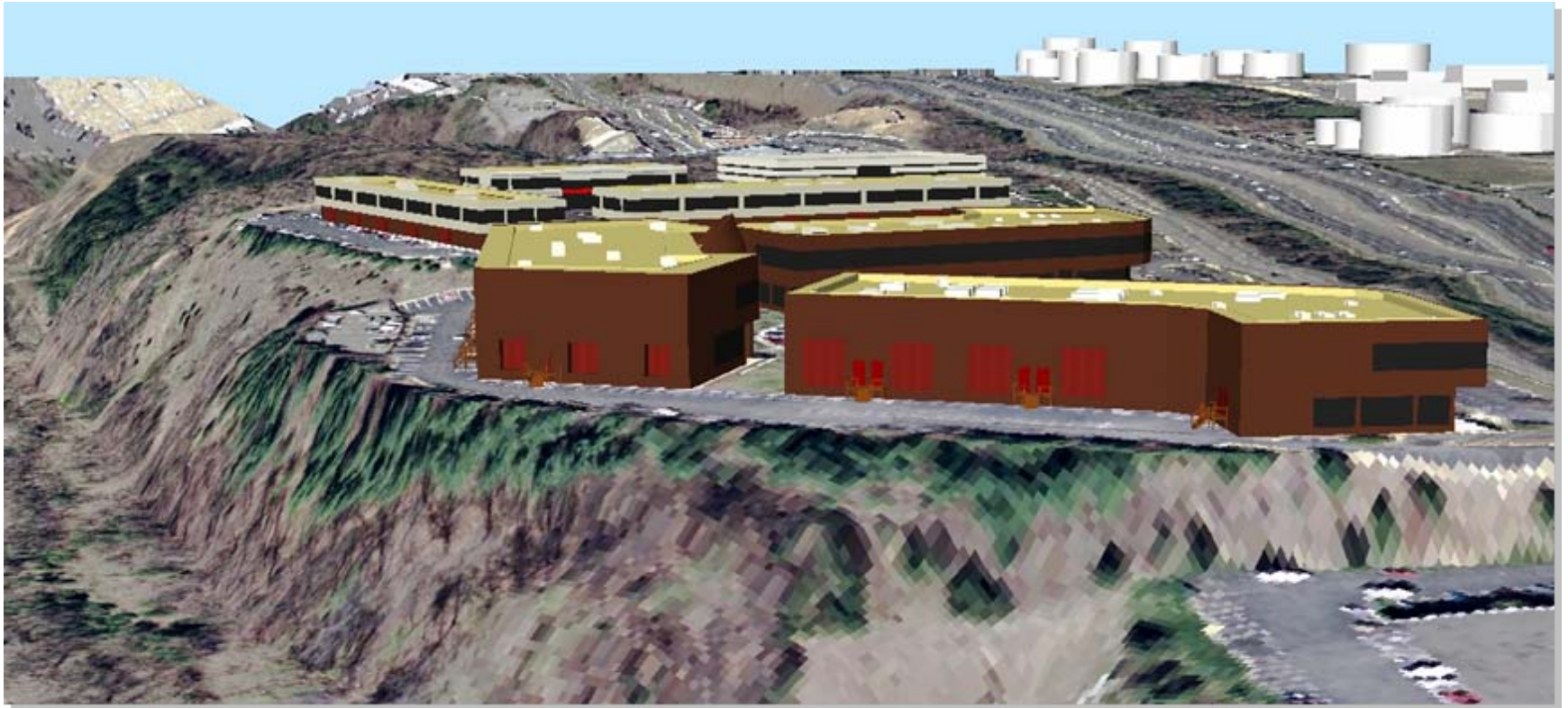


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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I-C-33

Computerized Elevation Looking Northeast



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I-C-34

Building Data

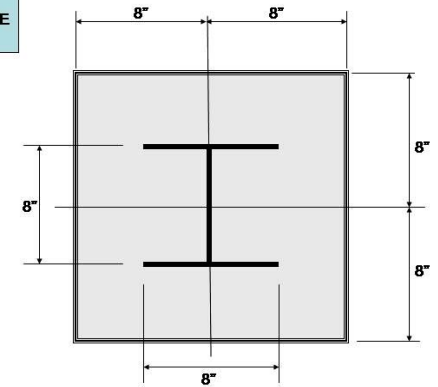


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Building Structure



COLUMN ENCLOSURE DETAIL



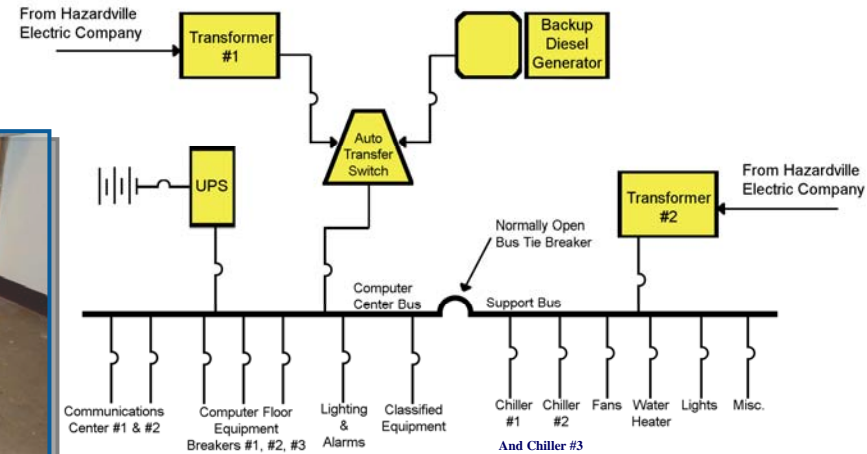
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Mechanical Systems



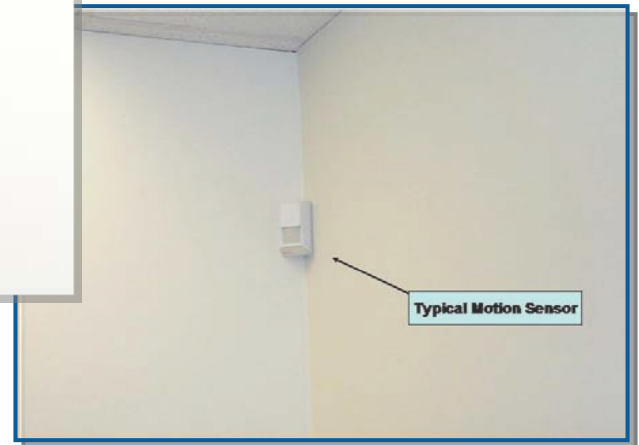
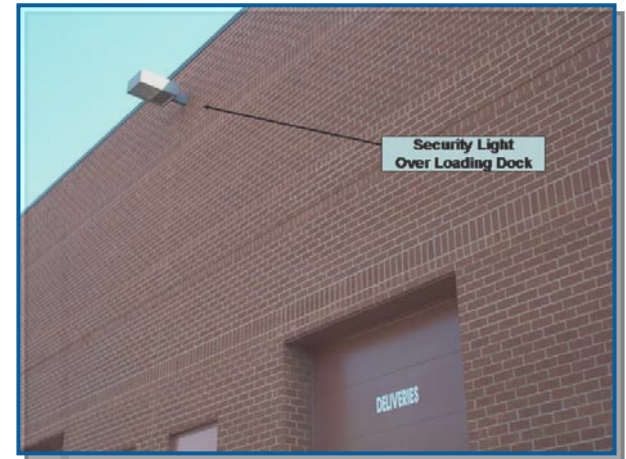
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Electrical Systems



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Physical Security



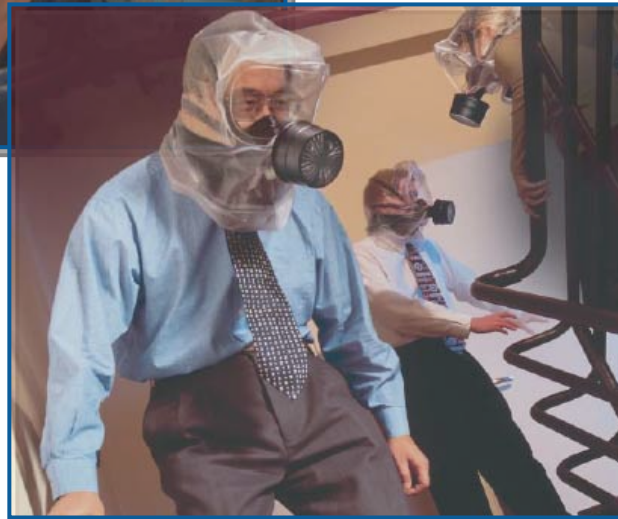
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IT Systems



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Emergency Response



Source: Mine Safety Appliances Company



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Design Basis Threat

Explosive Blast: Car Bomb 250 lb TNT equivalent. Truck Bomb 5,000 lb TNT equivalent (Murrah Federal Building class weapon)

Chemical: Large quantity gasoline spill and toxic plume from the adjacent tank farm, small quantity (tanker truck and rail car size) spills of HazMat materials (chlorine)

Biological: Anthrax delivered by mail or in packages, smallpox distributed by spray mechanism mounted on truck or aircraft in metropolitan area

Radiological: Small “dirty” bomb detonation within the 10-mile radius of the CI/BC building



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Design Basis Threat

Criminal Activity/Armed Attack: High powered rifle or handgun exterior shooting (sniper attack or direct assault on key staff, damage to infrastructure [e.g., transformers, chillers, etc.]

Cyber Attack: Focus on IT and building systems infrastructure (SCADA, alarms, etc.) accessible via Internet access



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Levels of Protection and Layers of Defense

Levels of Protection for Buildings

- Interagency Security Committee (ISC) Level II Building
- DoD Low – Primary Gathering Building

Elements of the Layers of Defense Strategy

- Deter
- Detect
- Deny
- Devalue



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Risk Matrix

Infrastructure	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Structural Systems	48	128	192	144
Asset Value	8	8	8	8
Threat Rating	3	4	3	2
Vulnerability Rating	2	4	8	9

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176

Risk = Asset Value x Threat Rating x Vulnerability Rating

Asset: You x Threat: Intruder x Vulnerability: Open Door

FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems Pre-Assessment Screening Matrix, p. 1-39

FEMA 426, Table 1-19: Total Risk Color Code, p. 1-38

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I-C-45

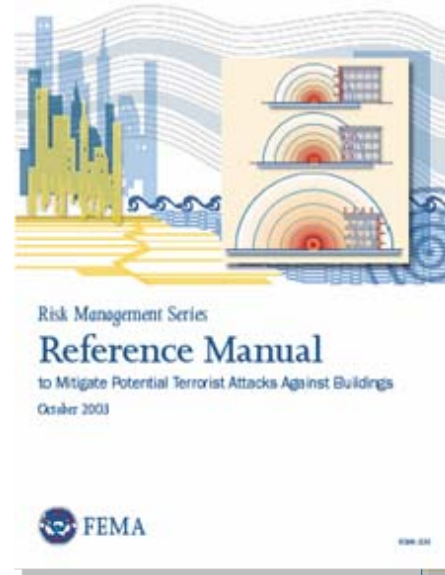


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Summary

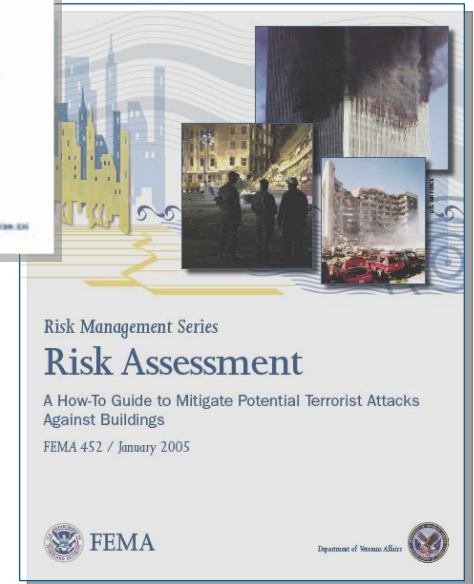
FEMA Publication 426

Reference Manual
to Mitigate Potential Terrorist
Attacks Against Buildings



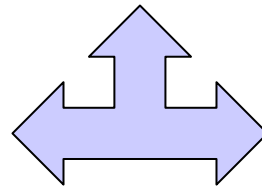
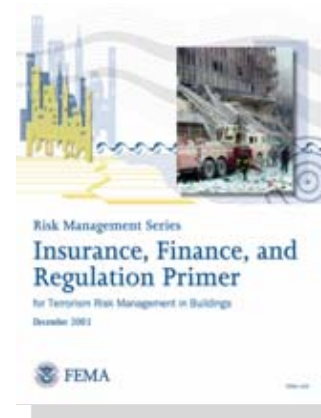
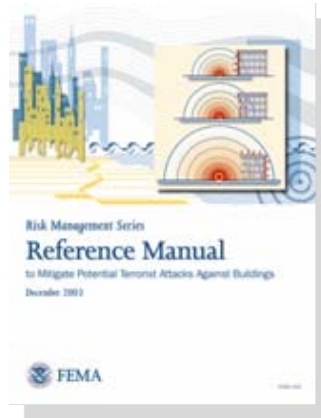
FEMA Publication 452

**Risk Assessment: A How-To
Guide to Mitigate Potential
Terrorist Threats Against
Buildings**

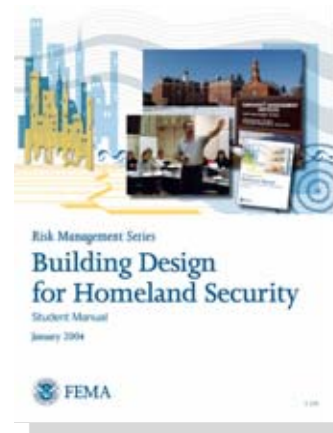


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RMS Publications – 2003 - Present

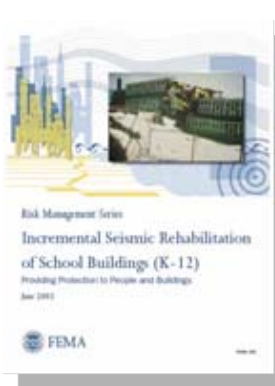
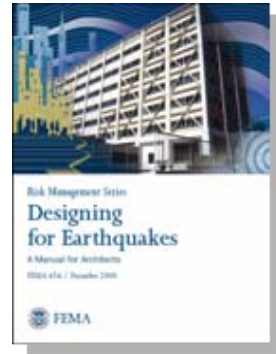


CHEMICAL,
BIOLOGICAL,
RADIOLOGICAL AND
EXPLOSIVES
&
RISK ASSESSMENTS



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RMS Publications – 2003 - Present



FEMA

Earthquakes

Multihazard

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit I-C-16

RMS Publications – In Development

FEMA 452 (enhanced) – A How-To Guide to Prepare
Multihazard Risk Assessments

FEMA 430 – Site and Urban Design for Security

FEMA 455 – Rapid Visual Screening for Building Security

FEMA 549 – Incremental Rehabilitation to Improve
Building Security

FEMA 582 – Design Guide to improve Commercial
Building Safety for Earthquake, Flood, and
Wind



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Unit I Case Study Activity

Introduction and Overview

Background

- Answers to FEMA 452 database COOP questions applicable to Case Study found in student activity
- Note additional COOP information at end of activity

Requirements

As a team, determine if sufficient square footage is available for DAI essential functions

- Needed information contained in student activity
- Ask instructors any clarifying questions based upon your experience



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit II

Asset Value Assessment



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Unit Objectives

Identify the assets of a building or site that can be affected by a threat or hazard.

Explain the components used to determine the value of an asset.

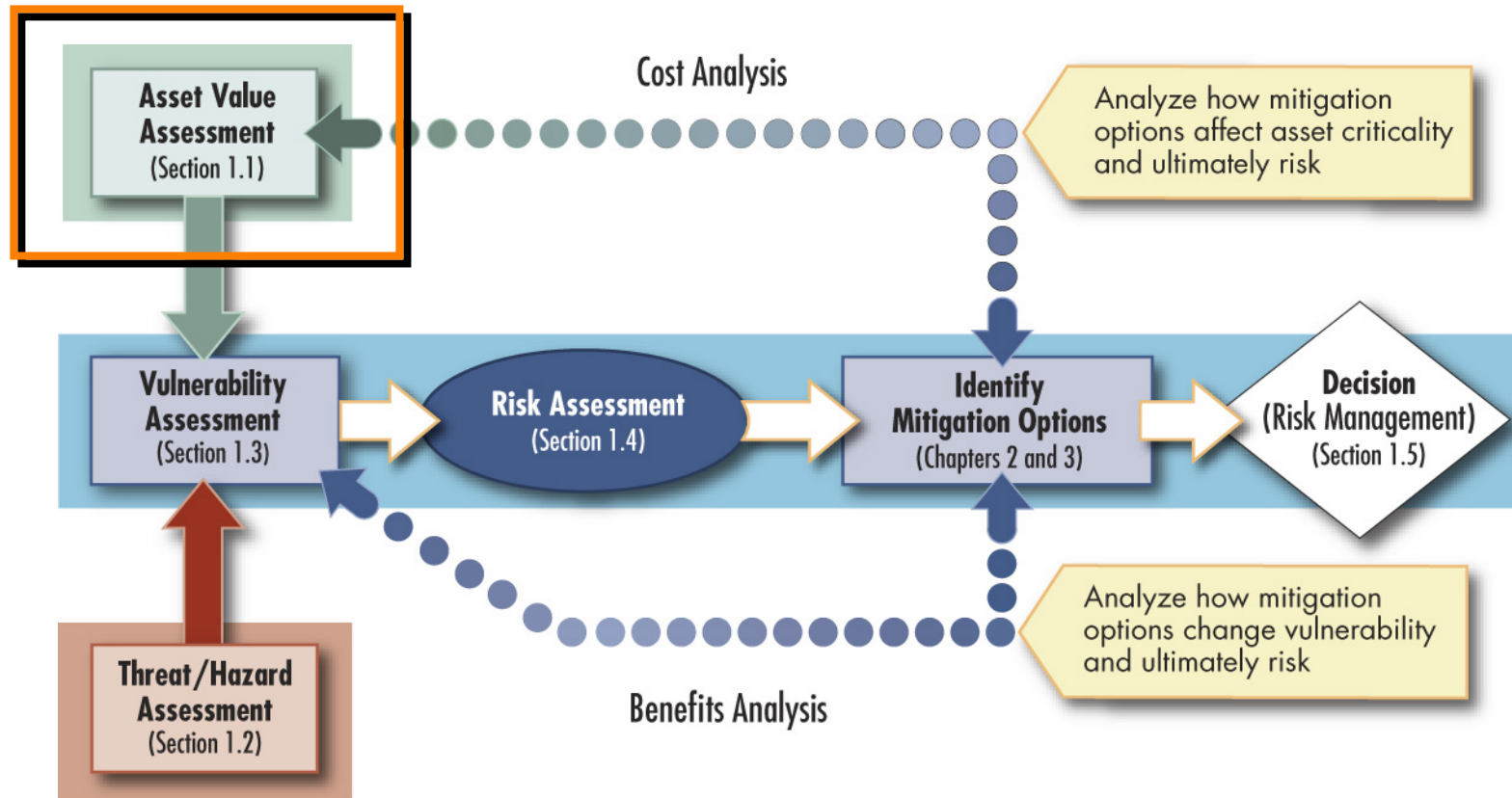
Determine the critical assets of a building or site.

Provide a numerical rating for the asset and justify the basis for the rating.



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Assessment Flow Chart



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FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

Definition of Risk

Risk is a combination of:

- The probability that an event will occur, and
- The consequences of its occurrence

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176

Risk = Asset Value x Threat Rating x Vulnerability Rating

Infrastructure	Function
Replacement/Repair	People
Loss of Use	

Asset - A resource of value requiring protection. An asset can be tangible, such as buildings, facilities, equipment, activities, operations, and information; or intangible, such as processes or a company's information and reputation.

FEMA 426, Table 1-19: Total Risk Color Code, p. 1-38



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People and Asset Value

Asset Value - The degree of debilitating impact that would be caused by the incapacity or destruction of an asset.



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Identification of a Building's Assets

Two Step Process

Step 1: Define and understand a building's core functions and processes

Step 2: Identify site and building infrastructure and systems



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Asset Value

Core Functions

- Primary services or outputs
- Critical activities
- Identify customers
- Inputs from external organizations
- Number of people affected

Critical Infrastructure

- Injuries or deaths related to lifelines
- Effect on core functions
- Availability of replacements / Cost to replace
- Critical support lifelines
- Critical or sensitive information



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Asset Value Rating

Asset Value		
Very High	10	Very High – Loss or damage of the building’s assets would have exceptionally grave consequences, such as extensive loss of life, widespread severe injuries, or total loss of primary services core processes, and functions.
High	8-9	High – Loss or damage of the building’s assets would have grave consequences, such as loss of life, severe injuries, loss primary services or major loss of core processes and functions for an extended period of time.
Medium High	7	Medium High – Loss or damage of the building’s assets would have serious consequences, such as serious injuries or impairment of core processes and functions for an extended period of time.

Key elements

- Loss of assets and/or people would have grave, serious, moderate, or negligible consequences or impact



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FEMA 426, Adaptation of Table 1-1: Asset Value Scale, p. 1-13

Asset Value Rating (continued)

Asset Value		
Medium	5-6	Medium – Loss or damage of the building’s assets would have moderate to serious consequences, such as injuries or impairment of core functions and processes.
Medium Low	4	Medium Low – Loss or damage of the building’s assets would have moderate consequences, such as minor injuries or minor impairment of core functions and processes
Low	2-3	Low – Loss or damage of the building’s assets would have minor consequences or impact, such as a slight impact on core functions and processes for a short period of time.
Very Low	1	Very Low – Loss or damage of the building’s assets would have negligible consequences or impact.

Key elements

- Loss of assets and/or people would have grave, serious, moderate, or negligible consequences or impact



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FEMA 426, Adaptation of Table 1-1: Asset Value Scale, p. 1-13

Asset Value Notional Example

Asset	Value	Numeric Value
Site	Medium Low	4
Architectural	Medium	5
Structural Systems	High	8
Envelope Systems	Medium High	7
Utility Systems	Medium High	7
Mechanical Systems	Medium High	7
Plumbing and Gas Systems	Medium	5
Electrical Systems	Medium High	7
Fire Alarm Systems	High	9
IT/Communications Systems	High	8



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FEMA 426, Table 1-2: Nominal Building Asset Value Assessment, p. 1-14

Critical Functions

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Administration				
Asset Value	5	5	5	5
Threat Rating				
Vulnerability Rating				
Engineering				
Asset Value	8	8	8	8
Threat Rating				
Vulnerability Rating				



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FEMA 426, Adaptation of Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

Critical Infrastructure

Infrastructure	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Site				
Asset Value	4	4	4	4
Threat Rating				
Vulnerability Rating				
Structural Systems				
Asset Value	8	8	8	8
Threat Rating				
Vulnerability Rating				



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FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems
Pre-Assessment Screening Matrix, p. 1-39

Summary

Identify a building's Critical Functions and Critical Infrastructure

Assign a value to a building's assets or resources

Input values into Critical Functions and Critical Infrastructure areas of Threat Matrix



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Asset Value Rating Considerations

Go to Page SM II-C-2 in your Student Manual

1. Criticality to overall organization
2. Criticality to unit at location
3. Ease of replacement
4. Relative value (\$, # personnel, # critical personnel)
5. Consequences of destruction, failure, or loss of function in terms of casualties, property loss, and economic impacts
6. Likelihood of cascading or subsequent consequences



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Unit II Case Study Activity

Asset Value Ratings

Background

Asset value: degree of debilitating impact that would be caused by the incapacity or destruction of a building's assets

FEMA 426: Tables 1-1 and 1-2

Requirements

Refer to Case Study and answer worksheet questions:

- Identify Core Functions
- Identify Building Assets
- Quantify Asset Values



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit III

Threat / Hazard Assessment



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Unit Objectives

Identify the threats and hazards that may impact a building or site.

Define each threat and hazard using the FEMA 426 methodology.

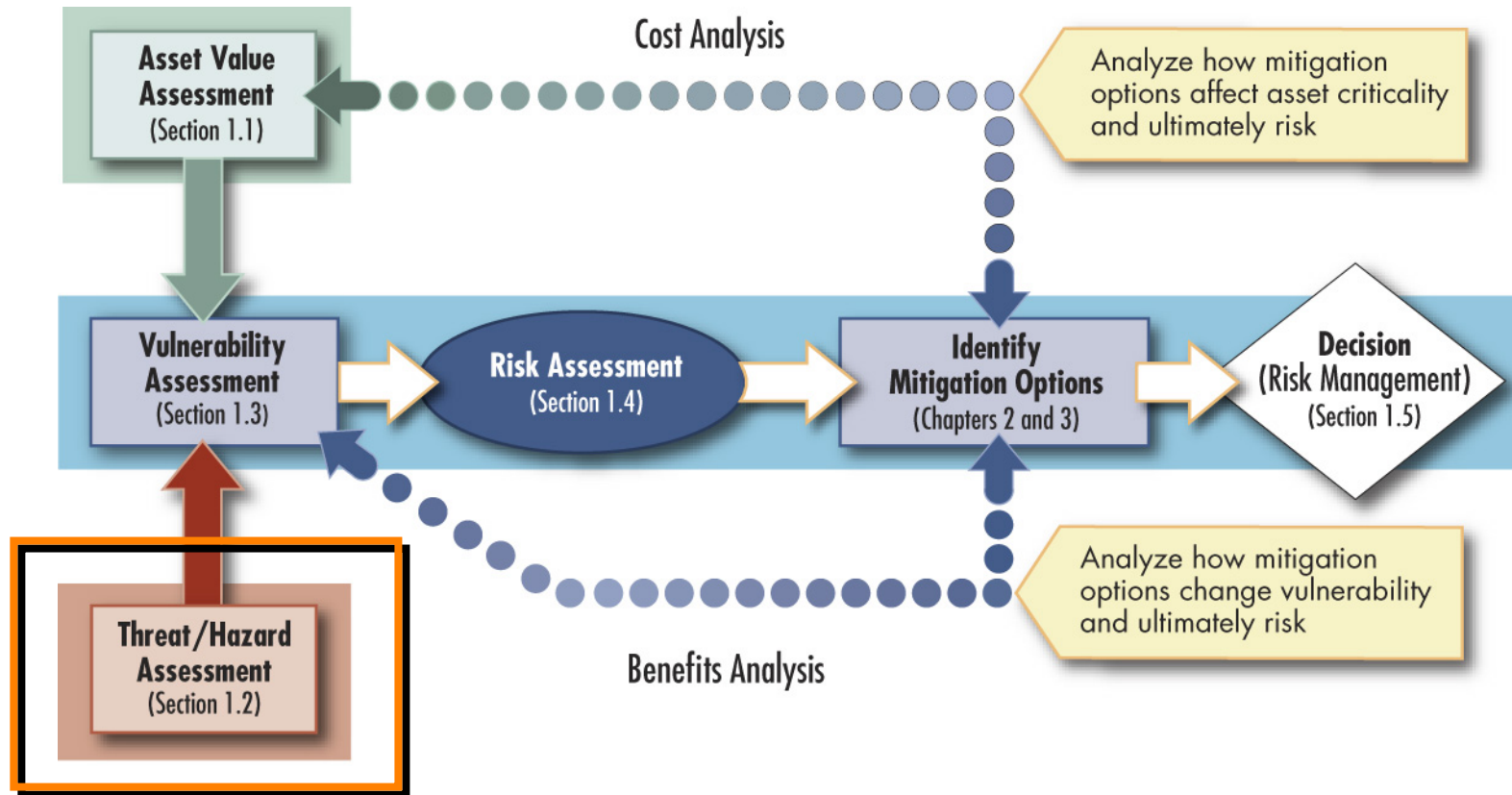
Provide a numerical rating for the threat or hazard and justify the basis for the rating.

Define the Design Basis Threat, Levels of Protection, and Layers of Defense.



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Assessment Flow Chart

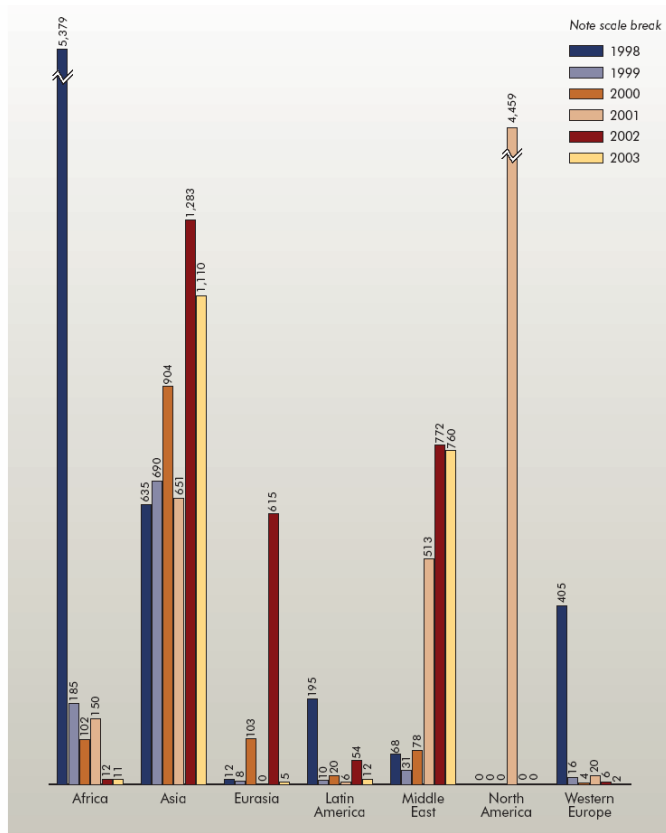


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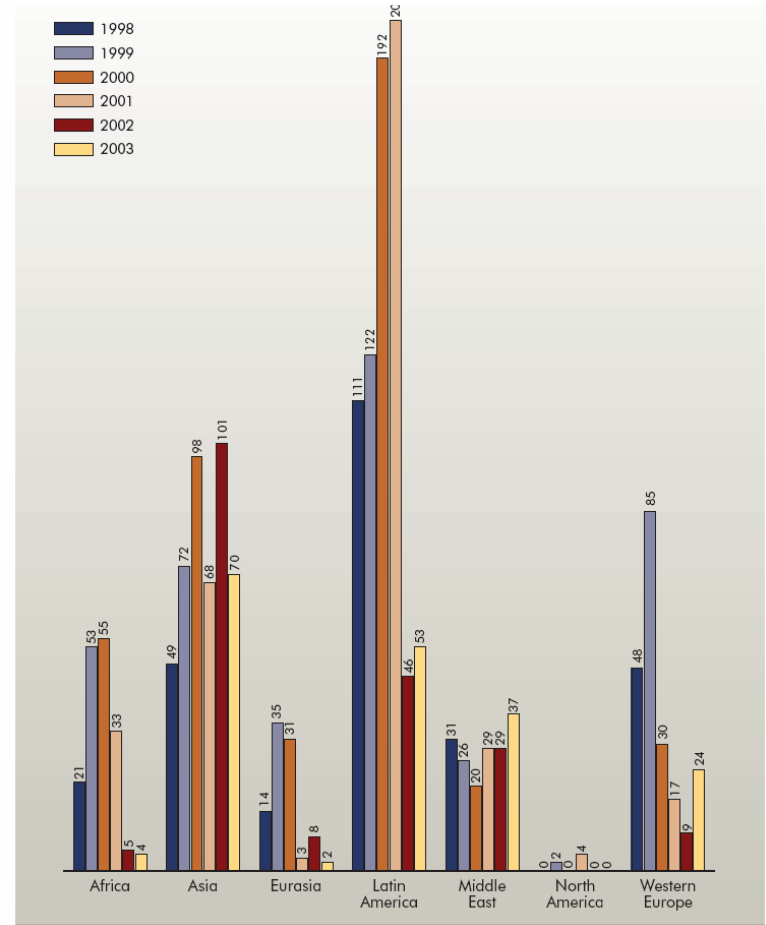
FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

Nature of the Threat

International Casualties by Region 1998-2003



International Attacks by Region 1998-2003

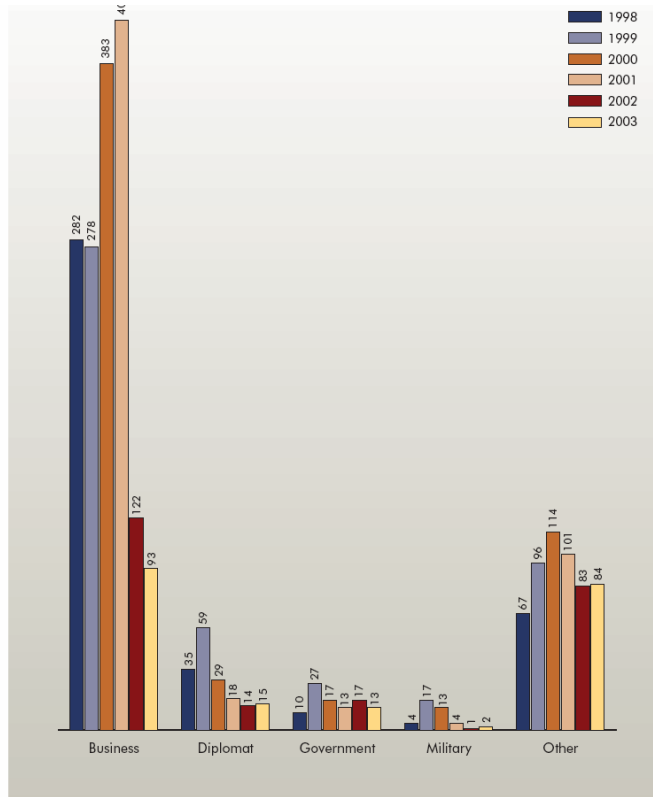


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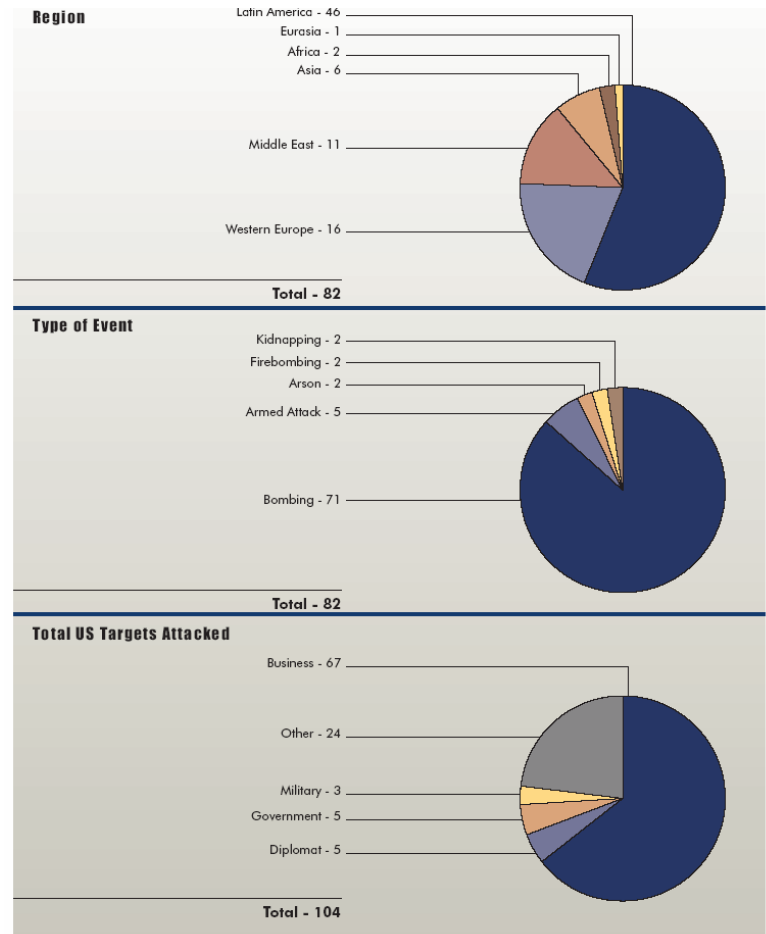
From *Patterns of Global Terrorism 2003* Department of State April 2004

Nature of the Threat

Facilities Struck by International Attacks 1998-2003



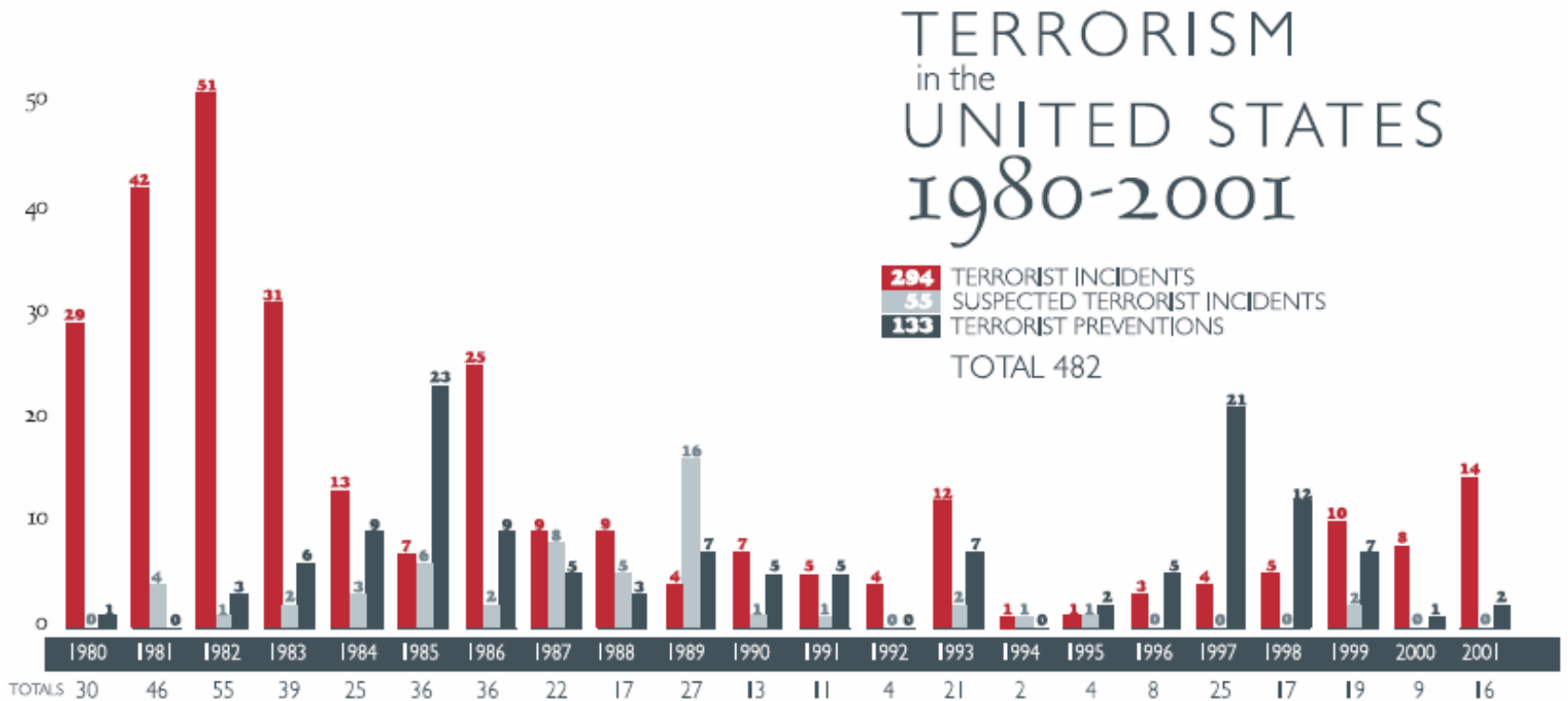
Total Anti-US Attacks 2003



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From *Patterns of Global Terrorism 2003* Department of State April 2004

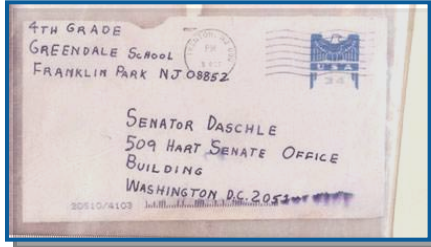
Nature of the Threat



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From *Terrorism 2000/2001 FBI Publication #0308*

CBR Terrorist Incidents Since 1970



1972 Typhoid

70 75 80 85 90 95 00



1984 Salmonella
200 Injured

1984 Botulinum

1985 Cyanide

June 1994 Sarin
7 Dead, 200 Injured

1992 Cyanide
March 1995 Ricin

April 1995 Sarin

April-June 1995 Cyanide, Phosgene, Pepper Spray

March 1995 Sarin
12 Dead, 5,500 Affected

May 1995 Plague

February 1997 Chlorine
14 Injured, 500 Evacuated

April 1997 U235

June 1996 Uranium

December 1995 Ricin

November 1995 Radioactive Cesium

March 1998 Cesium-137

2001 Anthrax



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Hazard

Hazard - A source of potential danger or adverse condition.

- Natural Hazards are naturally-occurring events such as floods, earthquakes, tornadoes, tsunamis, coastal storms, landslides, hurricanes, and wildfires.



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Manmade Threats

Threats – Any indication, circumstance, or event with the potential to cause loss of, or damage to an asset. They can be technological accidents and terrorist attacks.



Technological accident



Terrorism act



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Threat Overview

Any indication, circumstance, or event with the potential to cause loss of, or damage to an asset

Involves two steps:

- **Selection of primary threats:**
tools and tactics as well as people with intent to cause harm
- **Determine the threat rating:**
a parameter used to quantify your losses



Weapons, tools, and tactics can change faster than a building can be modified.



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Threat Overview

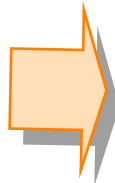
- Improvised Explosive Device (Bomb)
- Armed Attack
- Chemical Agent
- Biological Agent
- Radiological Agent
- Cyberterrorism



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Step 1: Selection of Primary Threats

Criteria



Selected Threats

- Cyber Attack
- Armed Attack
- Vehicle Bomb
- CBR Attack

Criteria							
Scenario	Access to Agent	Knowledge/Expertise	History of Threats (Building Functions/Tenants)	Asset Visibility/Symbolic	Asset Accessibility	Site Population/Capacity	Level of Defense
9-10	Readily available	Basic knowledge/open source	Local incident, occurred recently, caused great damage; building functions and tenants were primary targets	Existence widely known/ iconic	Open access, unrestricted parking	> 5,000	Little to no defense against threats. No security design was taken into consideration and no mitigation measures adopted.
6-8	Easy to produce	Bachelor's degree or technical school/open scientific or technical literature	Regional/State incident, occurred a few years ago, caused substantial damage; building functions and tenants were one of the primary targets	Existence locally known/ landmark	Open access, restricted parking	1,001-5,000	Minimal defense against threats. Minimal security design was taken into consideration and minimal mitigation measures adopted.
3-5	Difficult to produce or acquire	Advanced training/rare scientific or declassified literature	National incident, occurred some time in the past, caused important damage; building functions and tenants were one of the primary targets	Existence published/ well-known	Controlled access, protected entry	251-1,000	Significant defense against threats. Significant security design was taken into consideration and substantial mitigation measures adopted.
1-2	Very difficult to produce or acquire	Advanced degree or training/classified information	International incident, occurred many years ago, caused localized damage; building functions and tenants were not the primary targets	Existence not well-known/ no symbolic importance	Remote location, secure perimeter, armed guards, tightly controlled access	1-250	Extensive defense against threats. Extensive security design was taken into consideration and extensive mitigation measures adopted.

FEMA 452, Table 1-4: Criteria to Select Primary Threats, p. 1-20



FEMA

Step 1: Selection of Primary Threats

Scenario	Criteria							Score
	Access to Agent	Knowledge/Expertise	History of Threats (Building Functions/Tenants)	Asset Visibility/Symbolic	Asset Accessibility	Site Population/Capacity	Level of Defense	
Improvised Explosive Device (Bomb)								
1-lb. Mail Bomb	9	9	3	8	3	10	3	45
5-lb. Pipe Bomb	9	9	3	8	3	10	3	45
50-lb. Satchel Bomb/Suicide Bomber	8	8	6	8	3	10	5	48
500-lb. Car Bomb	6	8	7	8	3	10		
5,000-lb. Truck Bomb	4	8	5	8	3	10		
20,000-lb. Truck Bomb	2	6	1	8	3	10		
Natural Gas	2	8	1	8	3	10		



Scenario	Criteria							Score	
	Access to Agent	Knowledge/Expertise	History of Threats (Building Functions/Tenants)	Asset Visibility/Symbolic	Asset Accessibility	Site Population/Capacity	Level of Defense		
Chemical Agent									
Choking	Chlorine	5	7	2	8	3	10	5	40
	Phosgene	3	10	2	8	3	10	5	41
Blood	Hydrogen Cyanide	3	8	2	8	3	10	5	39
Blister	Lewisite	3	6	2	8	3	10	5	37
Nerve	Sarin	3	4	9	8	3	10	5	42



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FEMA 452, Adaptation of Table 1-5: Nominal Example to Select Primary Threats for a Specific Urban Multi-story Building, p. 1-21

Step 2: Determine the Threat Rating

Threat Rating		
Very High	10	Very High – The likelihood of a threat, weapon, and tactic being used against the site or building is imminent. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is credible.
High	8-9	High – The likelihood of a threat, weapon, and tactic being used against the site or building is expected. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is credible.
Medium High	7	Medium High – The likelihood of a threat, weapon, and tactic being used against the site or building is probable. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is credible.



Key elements

- Likelihood of a threat (credible, verified, exists, unlikely, unknown)
- If the use of the weapon is considered imminent, expected, or probable



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FEMA 452 Table 1-6: Threat Rating, p. 1-24

Step 2: Determine the Threat Rating

(continued)

Threat Rating		
Medium	5-6	Medium – The likelihood of a threat, weapon, and tactic being used against the site or building is possible. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is known, but is not verified.
Medium Low	4	Medium Low – The likelihood of a threat, weapon, and tactic being used in the region is probable. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is known, but is not likely.
Low	2-3	Low – The likelihood of a threat, weapon, and tactic being used in the region is possible. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat exists, but is not likely.
Very Low	1	Very Low – The likelihood of a threat, weapon, and tactic being used in the region or against the site or building is very negligible. Internal decision-makers and/or external law enforcement and intelligence agencies determine the threat is non-existent or extremely unlikely.



Key elements

- Likelihood of a threat (credible, verified, exists, unlikely, unknown)
- If the use of the weapon is considered imminent, expected, or probable



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FEMA 452 Table 1-6: Threat Rating, p. 1-24

Critical Functions

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Administration				
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating				
Engineering				
Asset Value	8	8	8	8
Threat Rating	8	5	6	2
Vulnerability Rating				



FEMA

FEMA 426, Adaptation of Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

Critical Infrastructure

Infrastructure	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Site				
Asset Value	4	4	4	4
Threat Rating	4	4	3	2
Vulnerability Rating				
Structural Systems				
Asset Value	8	8	8	8
Threat Rating	3	4	3	2
Vulnerability Rating				



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FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems
Pre-Assessment Screening Matrix, p. 1-39

Threat Sources

Identify Threat Statements

Identify Area Threats

Identify Facility-Specific Threats

Identify Potential Threat
Element Attributes

Seek information from local law enforcement, FBI, U.S. Department of Homeland Security, and Homeland Security Offices at the state level.

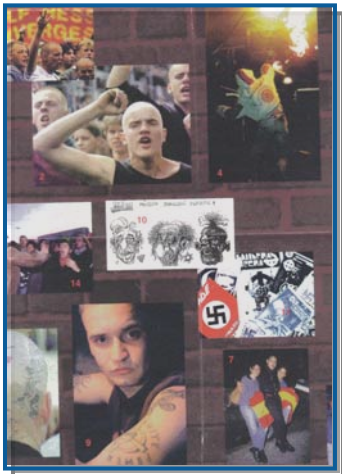


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FEMA 426, p. 1-14 to 1-15

Design Basis Threat

The threat against which assets within a building must be protected and upon which the security engineering design of the building is based.



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Levels of Protection

Layers of Defense Elements

- Deter
- Detect
- Deny
- Devalue

The strategy of Layers of Defense uses the elements and Levels of Protection to develop mitigation options to counter or defeat the tactics, weapons, and effects of an attack defined by the Design Basis Threat.



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FEMA 426, p. 1-9

Levels of Protection

Deter: The process of making the target inaccessible or difficult to defeat with the weapon or tactic selected. It is usually accomplished at the site perimeter using highly visible electronic security systems, fencing, barriers, lighting and security personnel; and in the building by security access with locks and electronic monitoring devices.

Detect: The process of using intelligence sharing and security services response to monitor and identify the threat before it penetrates the site perimeter or building access points.



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FEMA 426, p. 1-9

Levels of Protection

Deny: The process of minimizing or delaying the degree of site or building infrastructure damage or loss of life or protecting assets by designing or using infrastructure and equipment designed to withstand blast and chemical, biological, or radiological effects.

Devalue: The process of making the site or building of little to no value or consequence, from the terrorists' perspective, such that an attack on the facility would not yield their desired result.



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FEMA 426, p. 1-9

Levels of Protection

Level**	Typical Location	Examples of Tenant Agencies***	Security Measures (based on evaluation)
I	10 Employees (Federal) 2,500 Square Feet Low Volume Public Contact Small "Store Front" Type Operation	Local Office District Office Visitor Center USDA Office Ranger Station Commercial Facilities Industrial/Manufacturing Health Care	High Security Locks Intercom Peep Hole (Wide View) Lighting w/Emergency Backup Power Controlled Utility Access Annual Employee Security Training
II	11 - 150 Employees (Federal) 2,500 - 80,000 Square Feet Moderate Volume Public Contact Routine Operations Similar to Private Sector and/or Facility Shared with Private Sector	Public Officials Park Headquarters Regional/State Offices Commercial Facilities Industrial Manufacturing Health Care	Entry Control Package w/Closed Circuit Television (CCTV) Visitor Control/Screening Shipping/Receiving Procedures Guard/Patrol Assessment Intrusion Detection w/Central Monitoring CCTV Surveillance (Pan-Tilt, Zoom System) Duress Alarm w/Central Monitoring



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FEMA 426, Table 1-6: Classification Table Extracts, p. 1-26

Levels of Protection (continued)

Level**	Typical Location	Examples of Tenant Agencies***	Security Measures (based on evaluation)
III	151 - 450 Employees (Federal) Multi-Story Facility 80,000 - 150,000 Square Feet Moderate/High Volume Public Contact Agency Mix: Law Enforcement Operations Court Functions Government Records	Inspectors General Criminal Investigations Regional/State Offices GSA Field Office Local Schools Commercial Facilities Industrial Manufacturing Health Care	Guard Patrol on Site Visitor Control/Screening Shipping/Receiving Procedures Intrusion Detection w/Central Monitoring CCTV Surveillance (Pan-Tilt/Zoom System) Duress Alarm w/Central Monitoring
IV	>450 Employees (Federal) Multi-Story Facility >150,000 Square Feet High Volume Public Contact High-Risk Law Enforcement/Intelligence Agencies District Court	Significant Buildings and Some Headquarters Federal Law Enforcement Agencies Local Schools, Universities Commercial Facilities Health Care	Extend Perimeter (Concrete/Steel Barriers) 24-Hour Guard Patrol Adjacent Parking Control Backup Power System Hardened Parking Barriers
V	Level IV Profile and Agency/Mission Critical to National Security	Principal Department Headquarters	Agency-Specific



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FEMA 426, Table 1-6: Classification Table Extracts, p. 1-26

Levels of Protection

DoD Minimum Antiterrorism (AT) Standards for New Buildings

Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Below AT standards	Severely damaged. Frame collapse/massive destruction. Little left standing.	Doors and windows fail and result in lethal hazards	Majority of personnel suffer fatalities.
Very Low	Heavily damaged - onset of structural collapse. Major deformation of primary and secondary structural members, but progressive collapse is unlikely. Collapse of non-structural elements.	Glazing will break and is likely to be propelled into the building, resulting in serious glazing fragment injuries, but fragments will be reduced. Doors may be propelled into rooms, presenting serious hazards.	Majority of personnel suffer serious injuries. There are likely to be a limited number (10 percent to 25 percent) of fatalities.



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FEMA 426, Table 4-1, p. 4-9

Levels of Protection (continued)

DoD
Minimum
Standards

Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Low	Damaged – unreparable. Major deformation of non-structural elements and secondary structural members, and minor deformation of primary structural members, but progressive collapse is unlikely.	Glazing will break, but fall within 1 meter of the wall or otherwise not present a significant fragment hazard. Doors may fail, but they will rebound out of their frames, presenting minimal hazards.	Majority of personnel suffer significant injuries. There may be a few (<10 percent) fatalities.
Medium	Damaged – repairable. Minor deformations of non-structural elements and secondary structural members and no permanent deformation in primary structural members.	Glazing will break, but will remain in the window frame. Doors will stay in frames, but will not be reusable.	Some minor injuries, but fatalities are unlikely.
High	Superficially damaged. No permanent deformation of primary and secondary structural members or non-structural elements.	Glazing will not break. Doors will be reusable.	Only superficial injuries are likely.



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FEMA 426, Table 4-1, p. 4-9

Levels of Protection

UFC 4-010-01 APPENDIX B

DoD MINIMUM ANTITERRORISM STANDARDS FOR NEW AND EXISTING BUILDINGS

Standard 1	Standoff Distances
Standard 2	Unobstructed Space
Standard 3	Drive-Up/Drop-Off Areas
Standard 4	Access Roads
Standard 5	Parking Beneath Buildings or on Rooftops
Standard 6	Progressive Collapse Avoidance
Standard 7	Structural Isolation
Standard 8	Building Overhangs
Standard 9	Exterior Masonry Walls
Standard 10	Windows and Skylights
Standard 11	Building Entrance Layout
Standard 12	Exterior Doors



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Levels of Protection

UFC 4-010-01 APPENDIX B

DoD MINIMUM ANTITERRORISM STANDARDS FOR NEW AND EXISTING BUILDINGS

Standard 13	Mail Rooms
Standard 14	Roof Access
Standard 15	Overhead Mounted Architectural Features
Standard 16	Air Intakes
Standard 17	Mail Room Ventilation
Standard 18	Emergency Air Distribution Shutoff
Standard 19	Utility Distribution and Installation
Standard 20	Equipment Bracing
Standard 21	Under Building Access
Standard 22	Mass Notification



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Summary

Process

- Identify each threat/hazard
- Define each threat/hazard
- Determine threat rating for each threat/hazard

Threat Assessment Specialists

Critical Infrastructure and Critical Function Matrix

Determine the “Design Basis Threat”

Select the “Level of Protection”



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Threat/Hazard Rating Considerations

Go to Page SM III-C-2 in your Student Manual

1. Asset visibility, proximity, or locality
2. Asset usefulness (\$, goals, publicity)
3. Asset availability
4. Local incidents in past
5. Geographic area incidents in past
6. Potential for future incidents (# terrorist groups, # HAZMAT sites, natural hazard history)
7. Accessibility to asset
8. Effectiveness of law enforcement
9. Cyber



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Unit III Case Study Activity

Threat Ratings

Background

Hazards categories: natural and manmade

Case Study Threats: Cyber Attack, Armed Attack, Vehicle Bomb, and CBR Attack (latter two are main focus of course)

Result of assessment: “Threat Rating,” a subjective judgment of threat

Requirements

Refer to Case Study data

Complete worksheet tables:

- Critical Function Threat Rating
- Critical Infrastructure Threat Rating



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IV

Vulnerability Assessment



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Vulnerability

Any weakness that can be exploited by an aggressor or, in a non-terrorist threat environment, make an asset susceptible to hazard damage



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Unit Objectives

Explain what constitutes a vulnerability.

Identify vulnerabilities using the Building Vulnerability Assessment Checklist.

Understand that an identified vulnerability may indicate that an asset:

- is vulnerable to more than one threat or hazard;
- and that mitigation measures may reduce vulnerability to one or more threats or hazards.

Provide a numerical rating for the vulnerability and justify the basis for the rating.



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Vulnerability Assessment

Identify site and building systems design issues

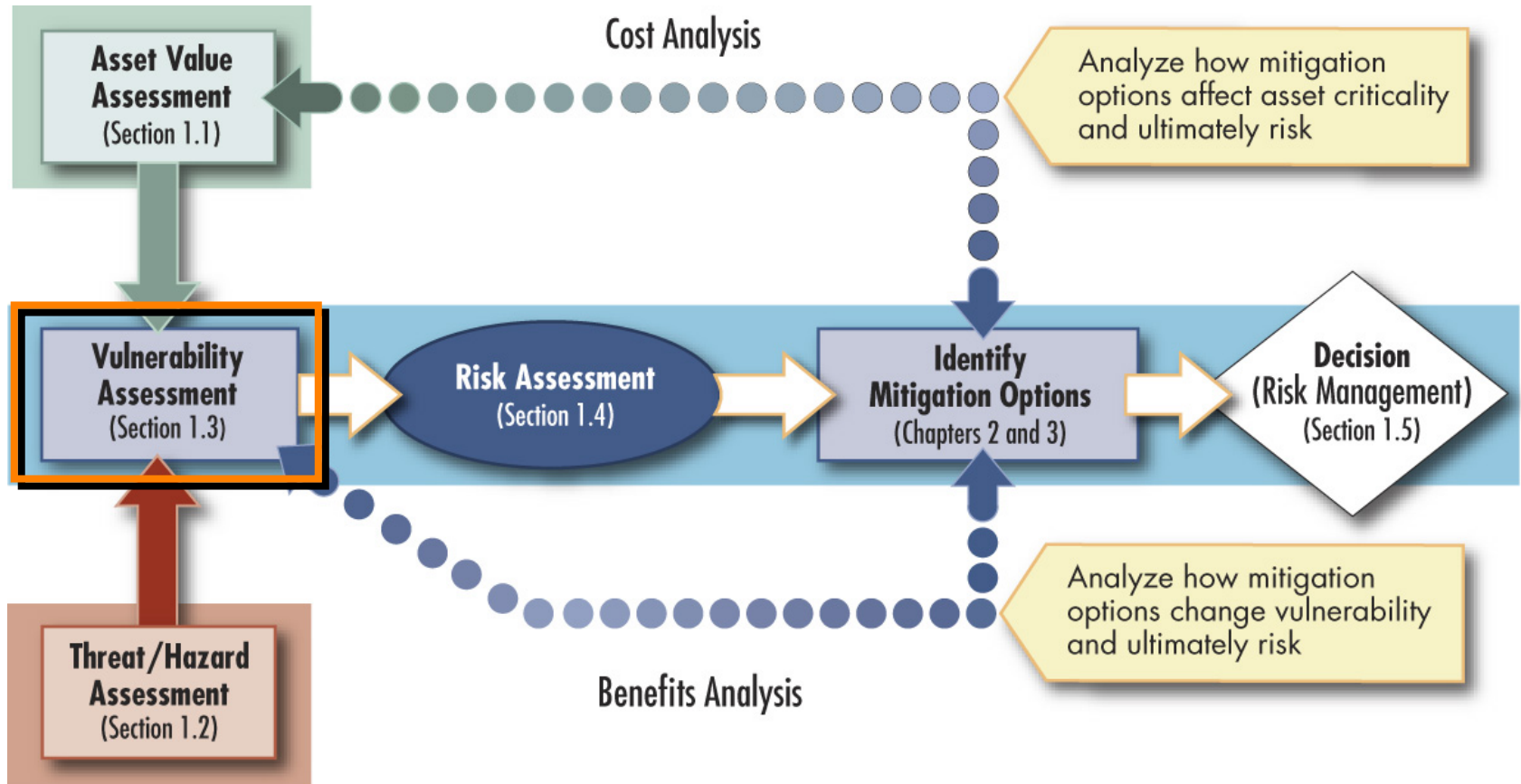
Evaluate design issues against type and level of threat

Determine level of protection sought for each mitigation measure against each threat



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Assessment Flow Chart



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FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

Identifying Vulnerabilities

Multidisciplinary Team

- Engineers
- Architects
- Security specialists
- Subject matter experts
- Outside experts if necessary



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Vulnerability Assessment Preparation

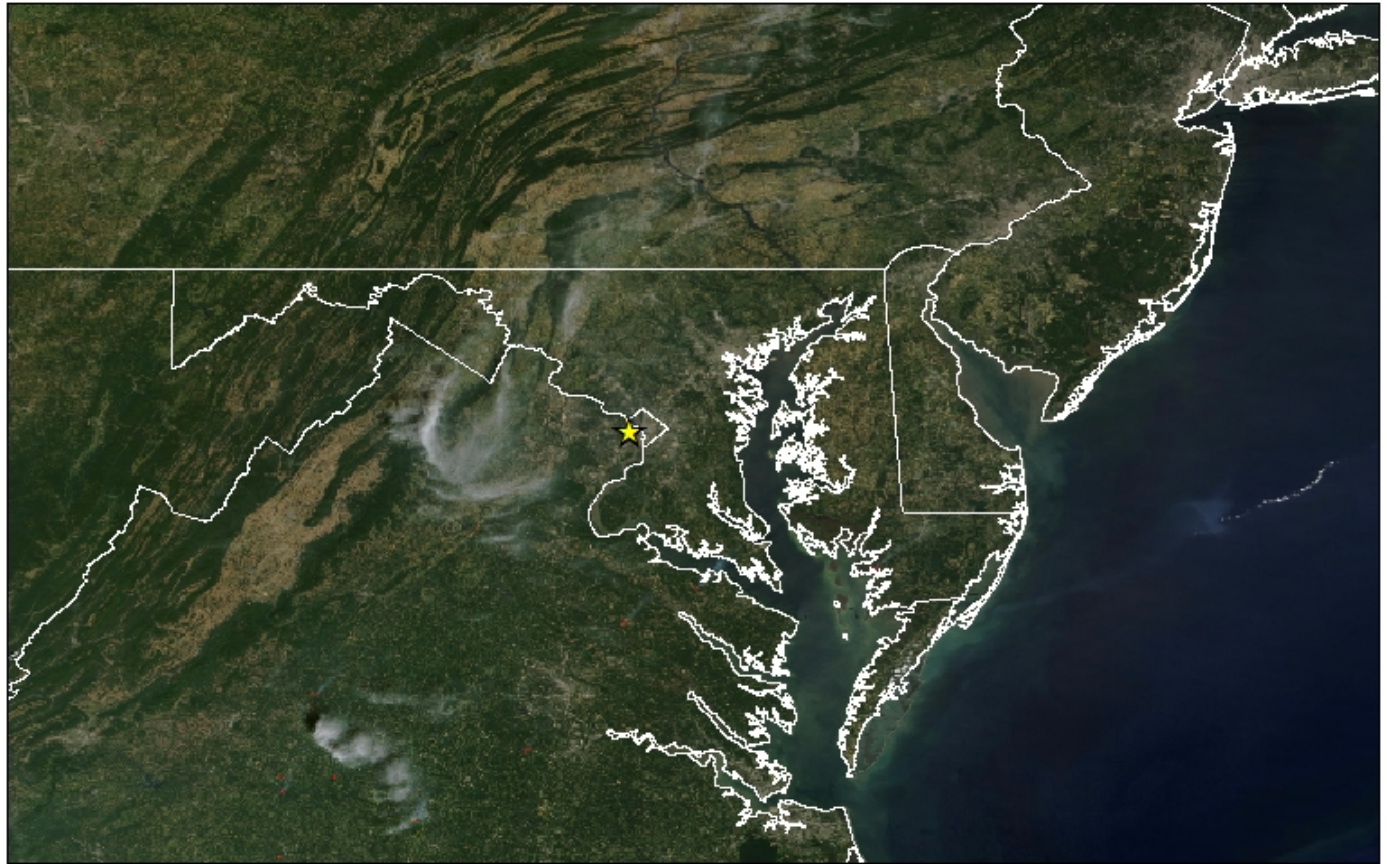
Coordinate with the building stakeholders:

- Site and Building Plans
- Utilities
- Emergency Plans (shelter, evacuation)
- Interview schedules
- Escorts for building access



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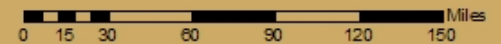
Assessment GIS Portfolio



Arlington County Assessments
Arlington County - Virginia

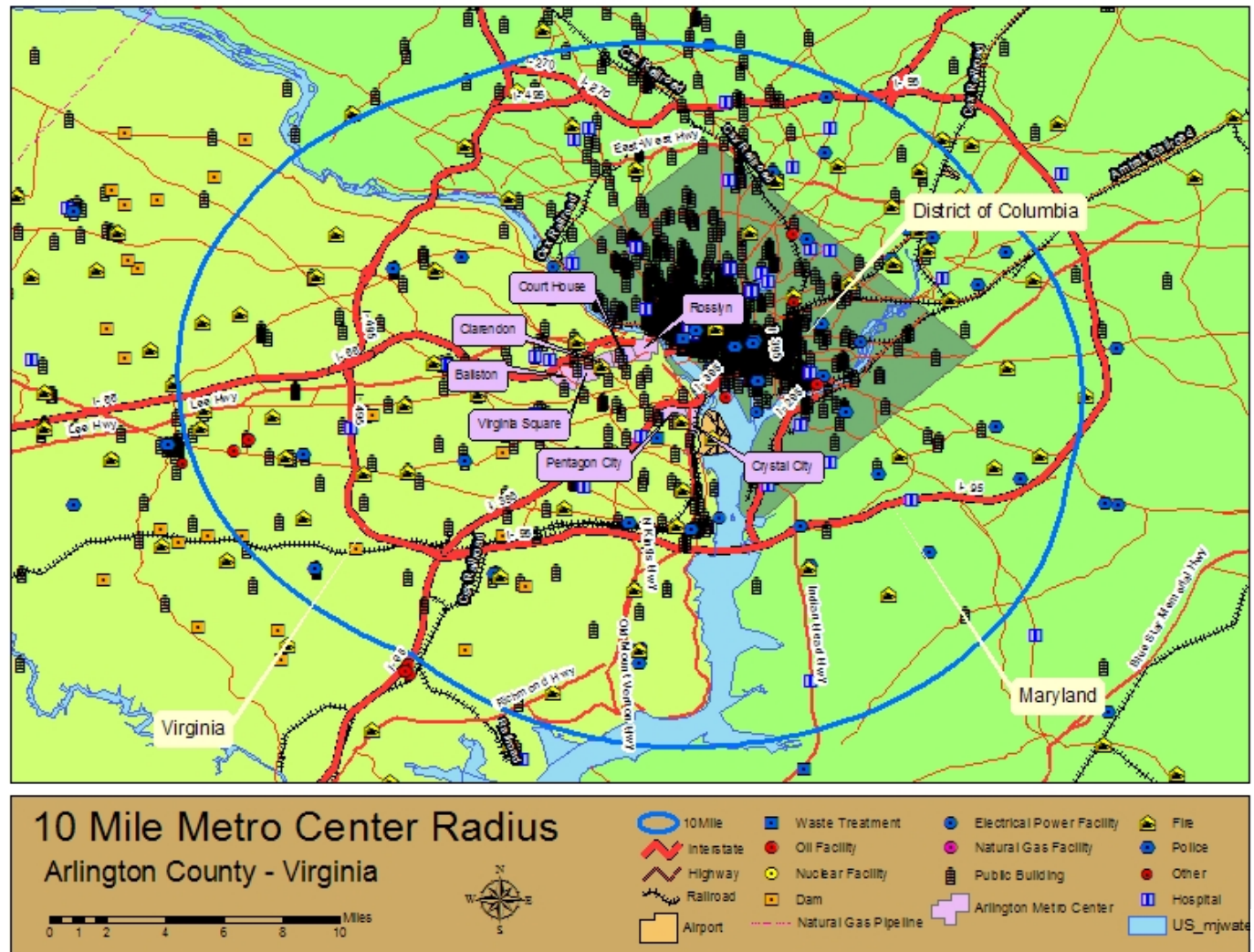


★ Arlington County



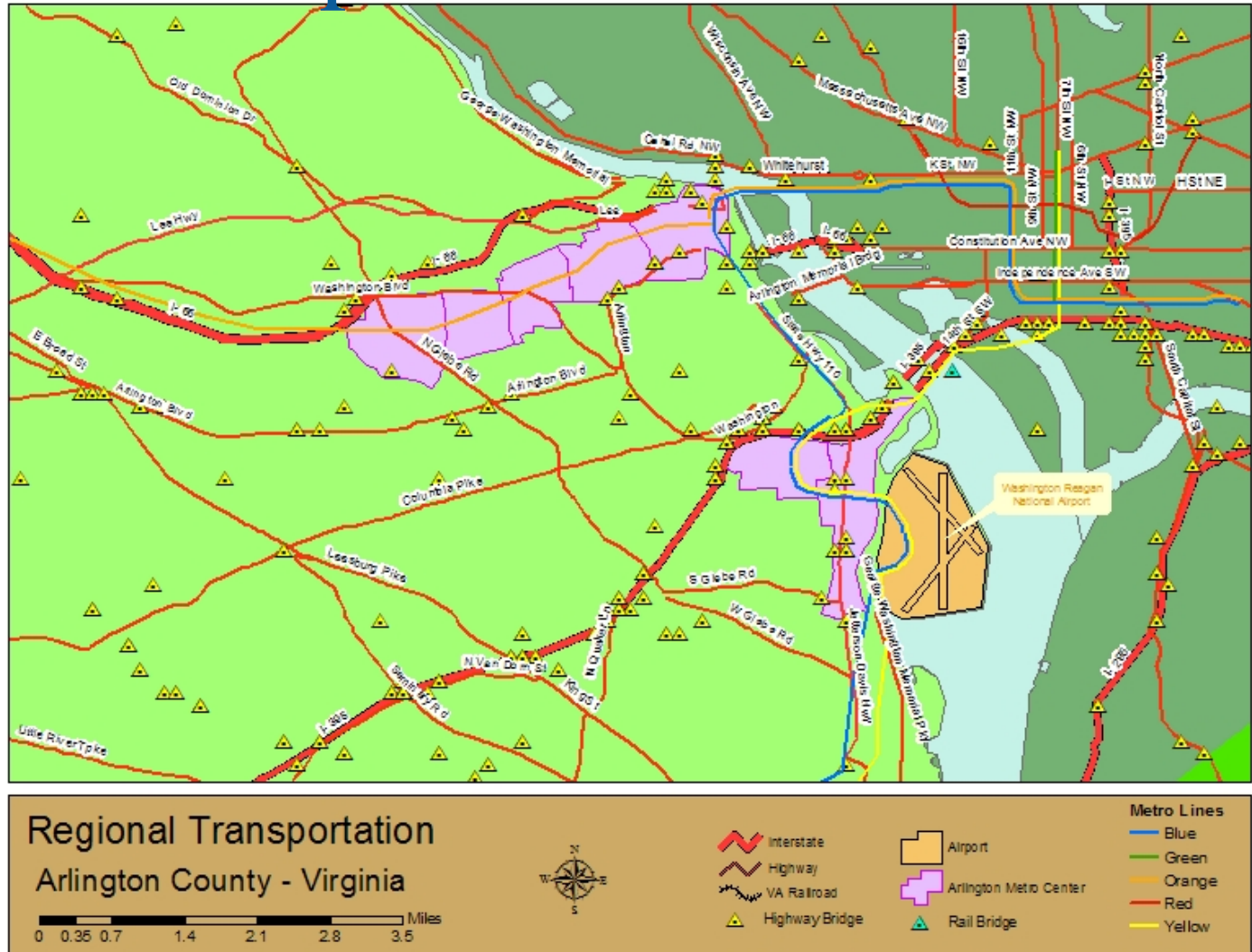
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10-Mile Radius



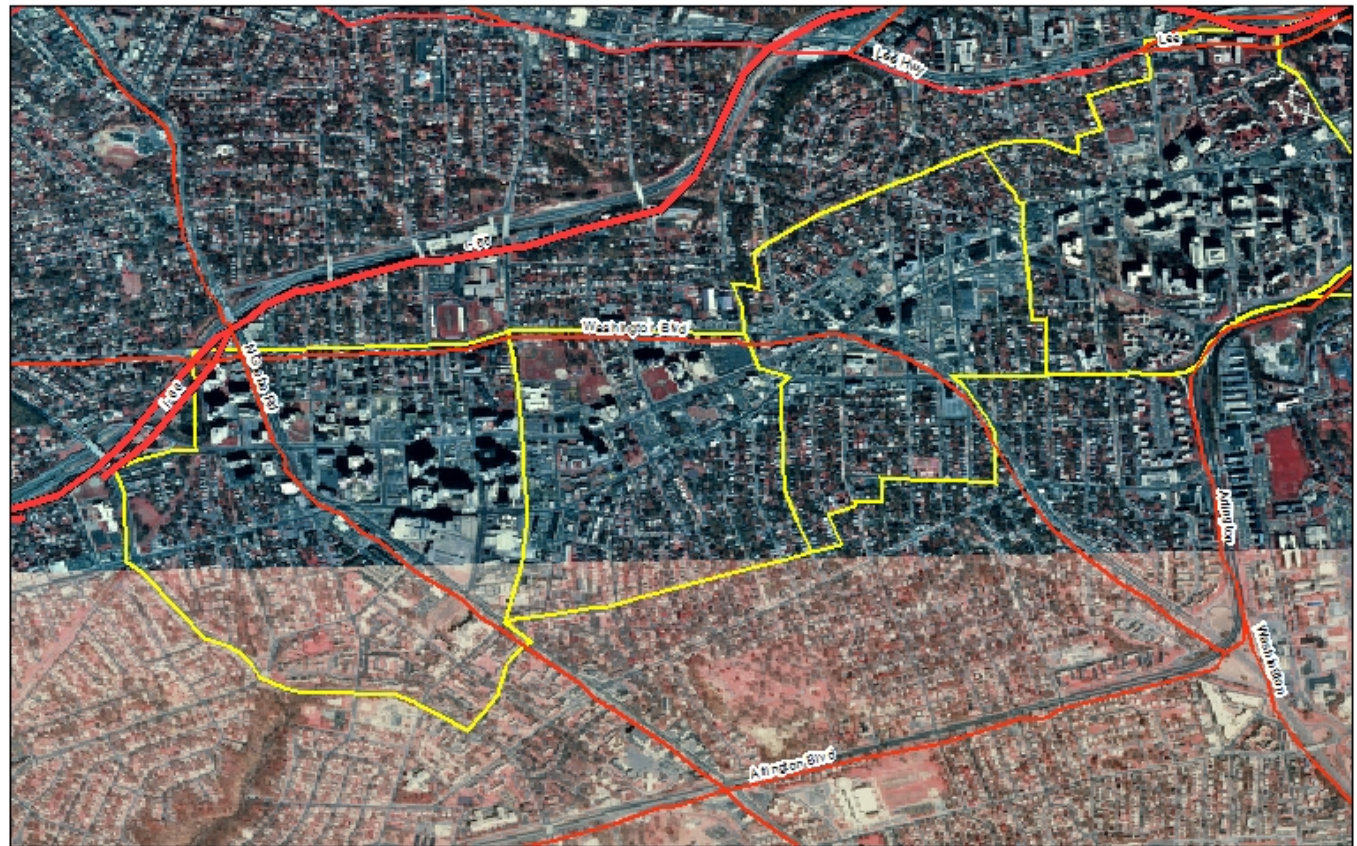
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Regional Transportation



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Metro Center Imagery



Metro Center Imagery

Arlington County - Virginia

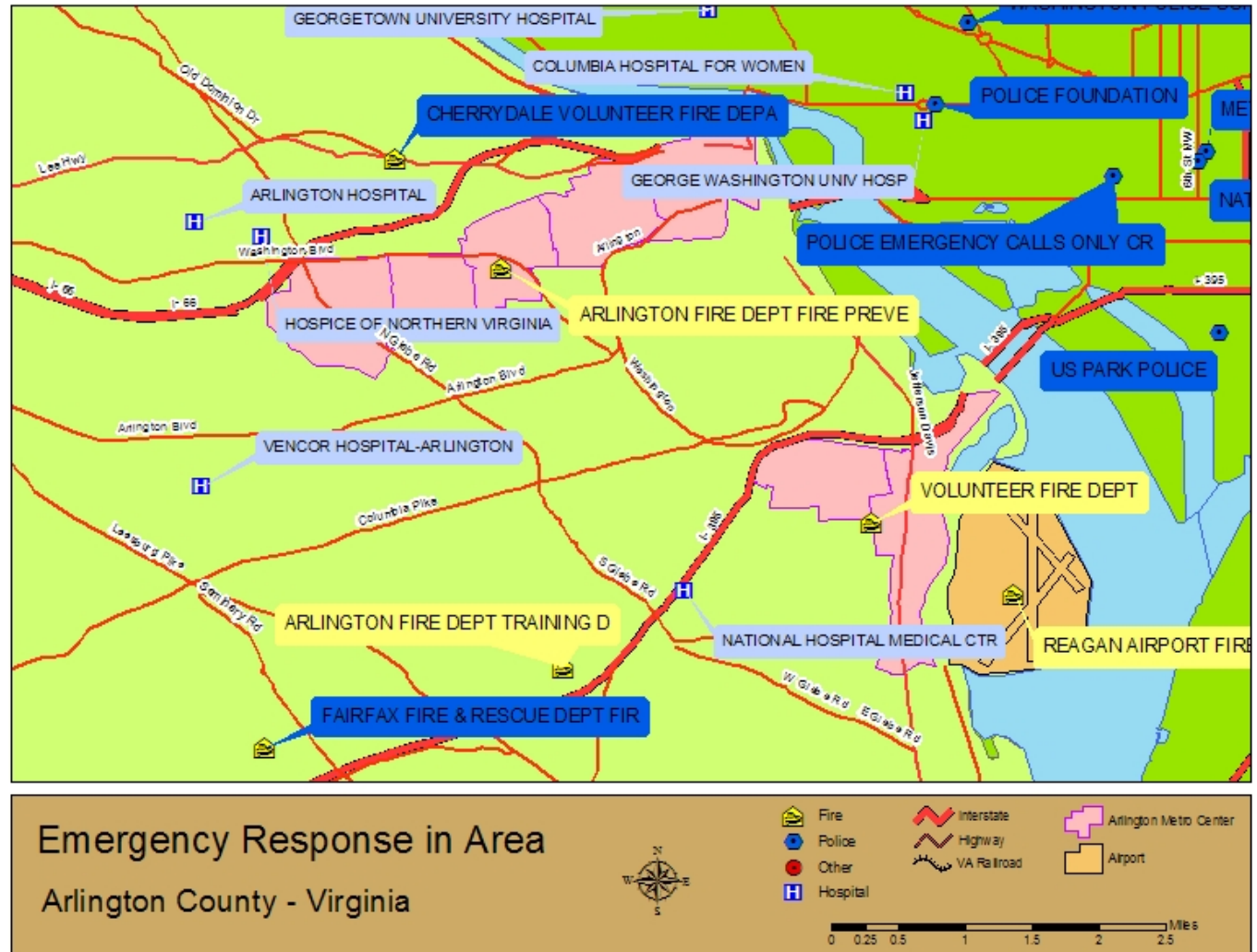


-  Interstate
-  Highway
-  VA Railroad
-  Arlington Metro Center



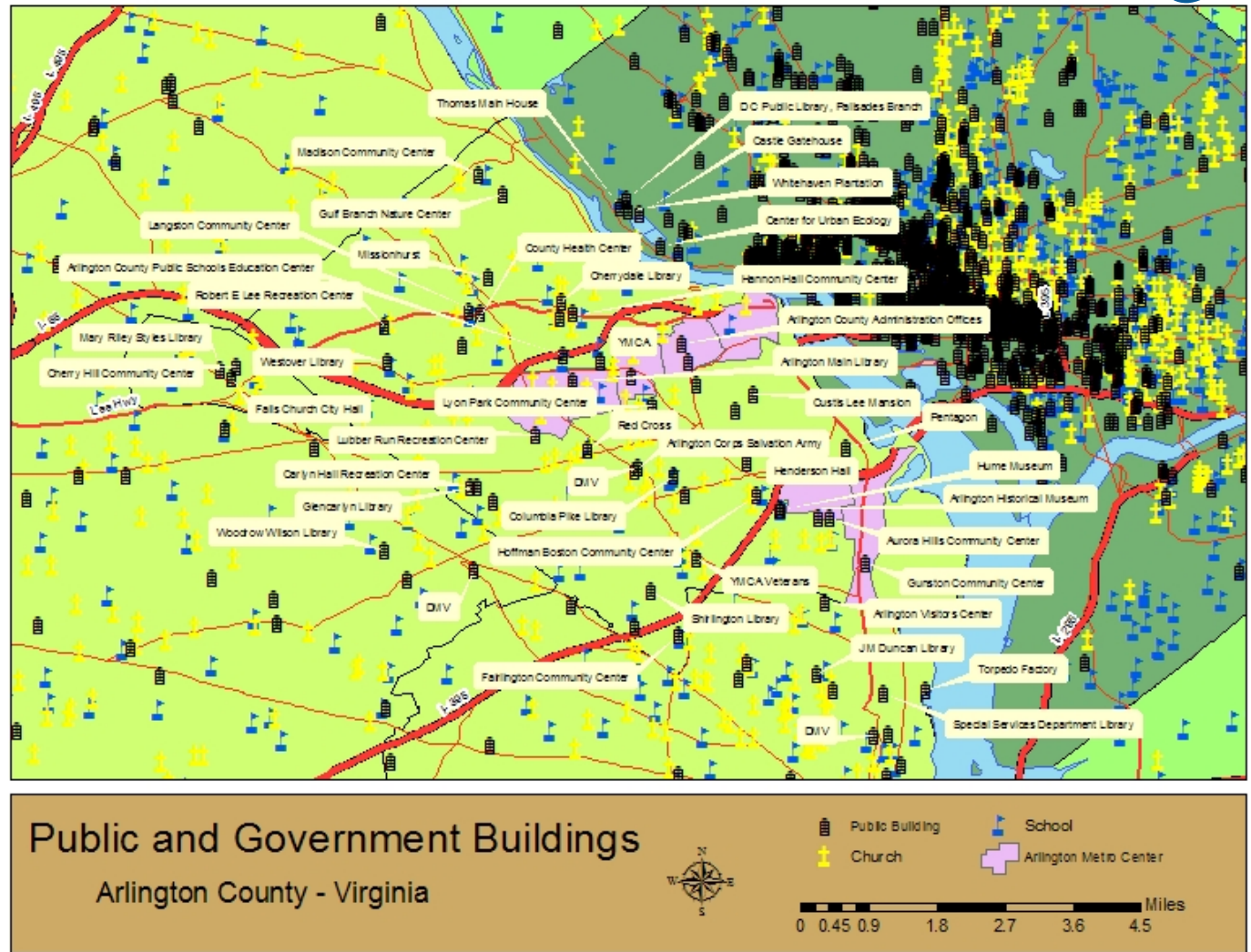
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Site Emergency Response



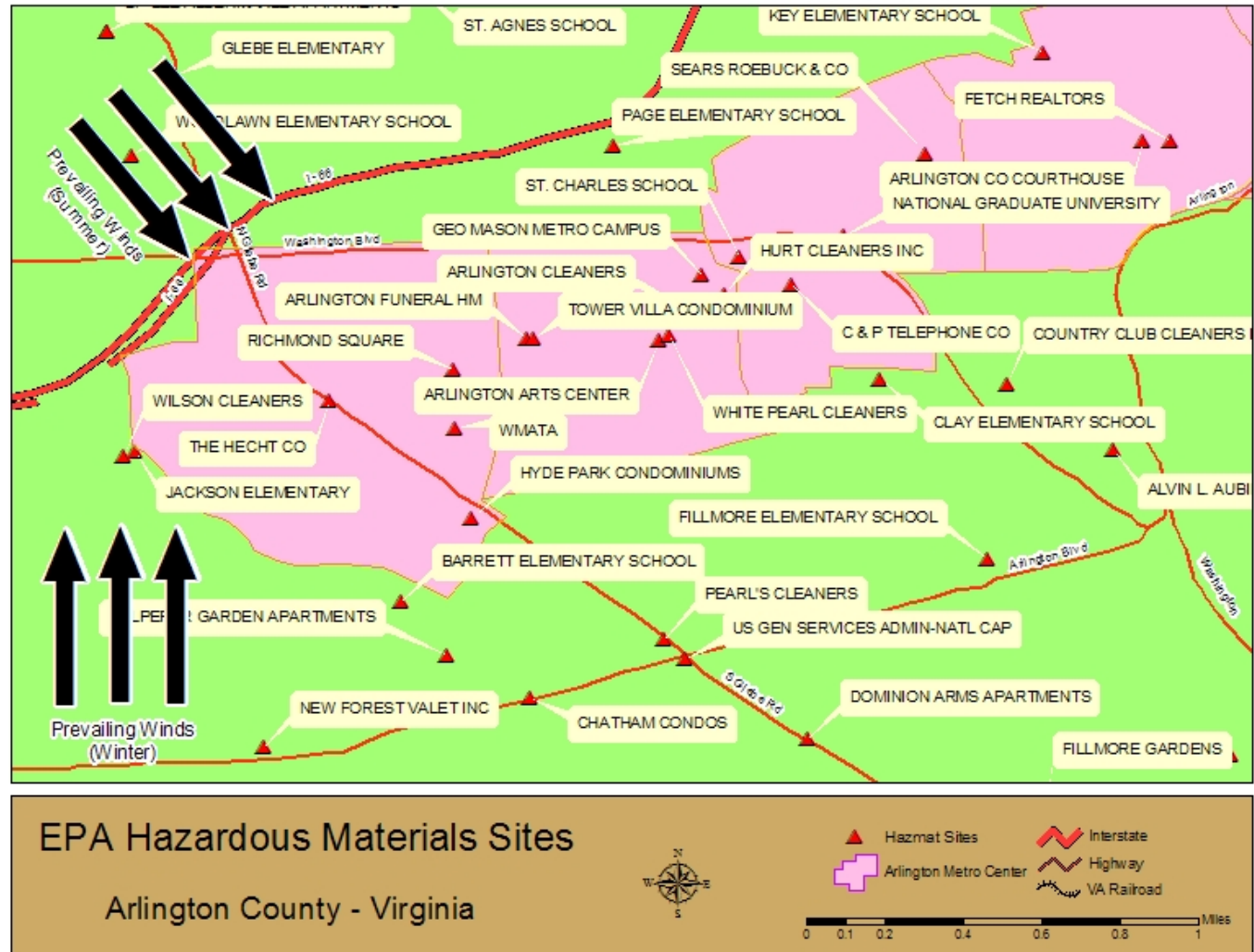
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Site Public and Government Buildings



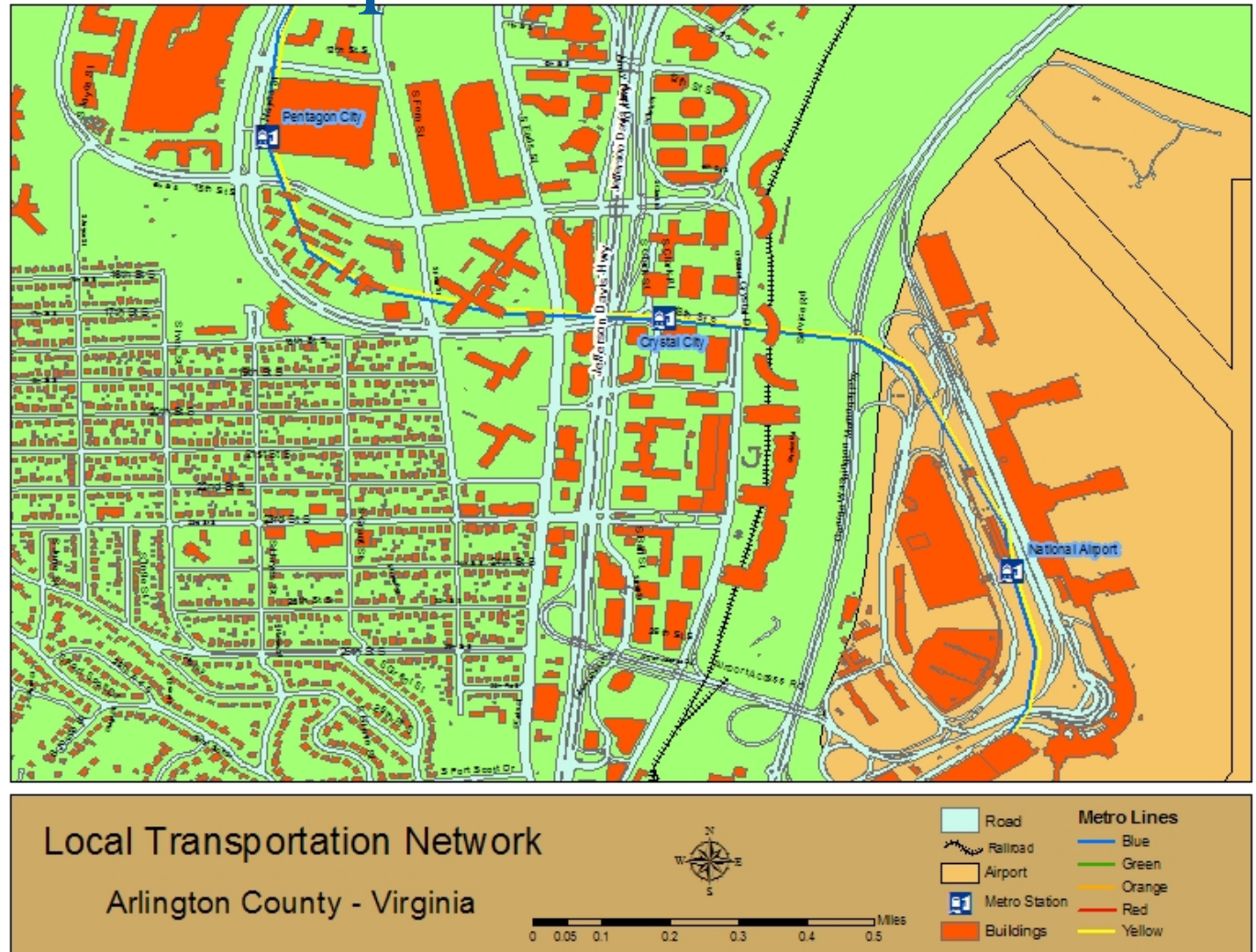
FEMA

Site HazMat



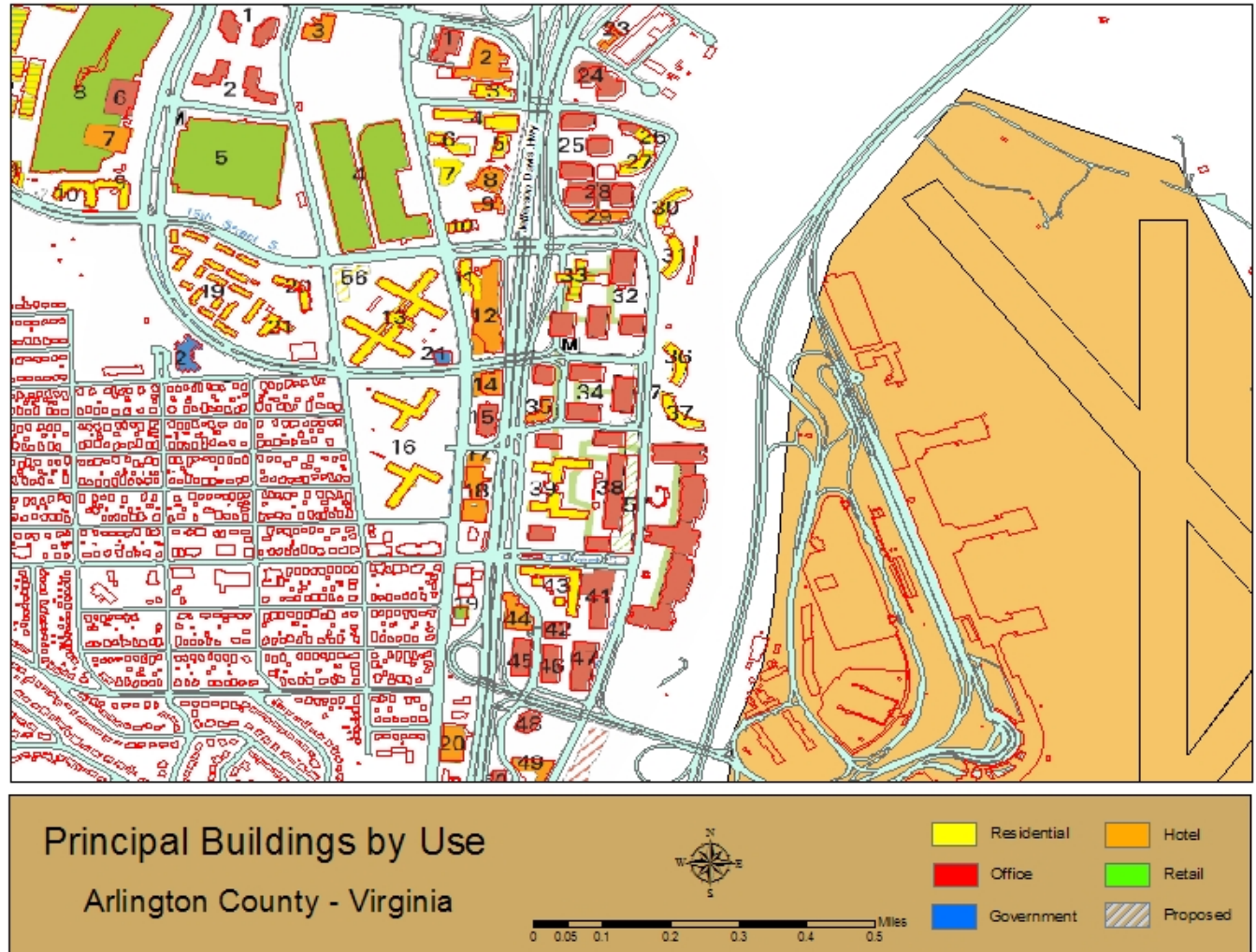
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Site Local Transportation Network



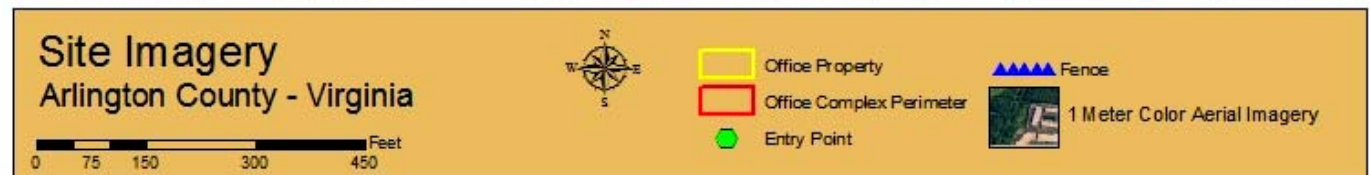
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Site Principal Buildings by Use



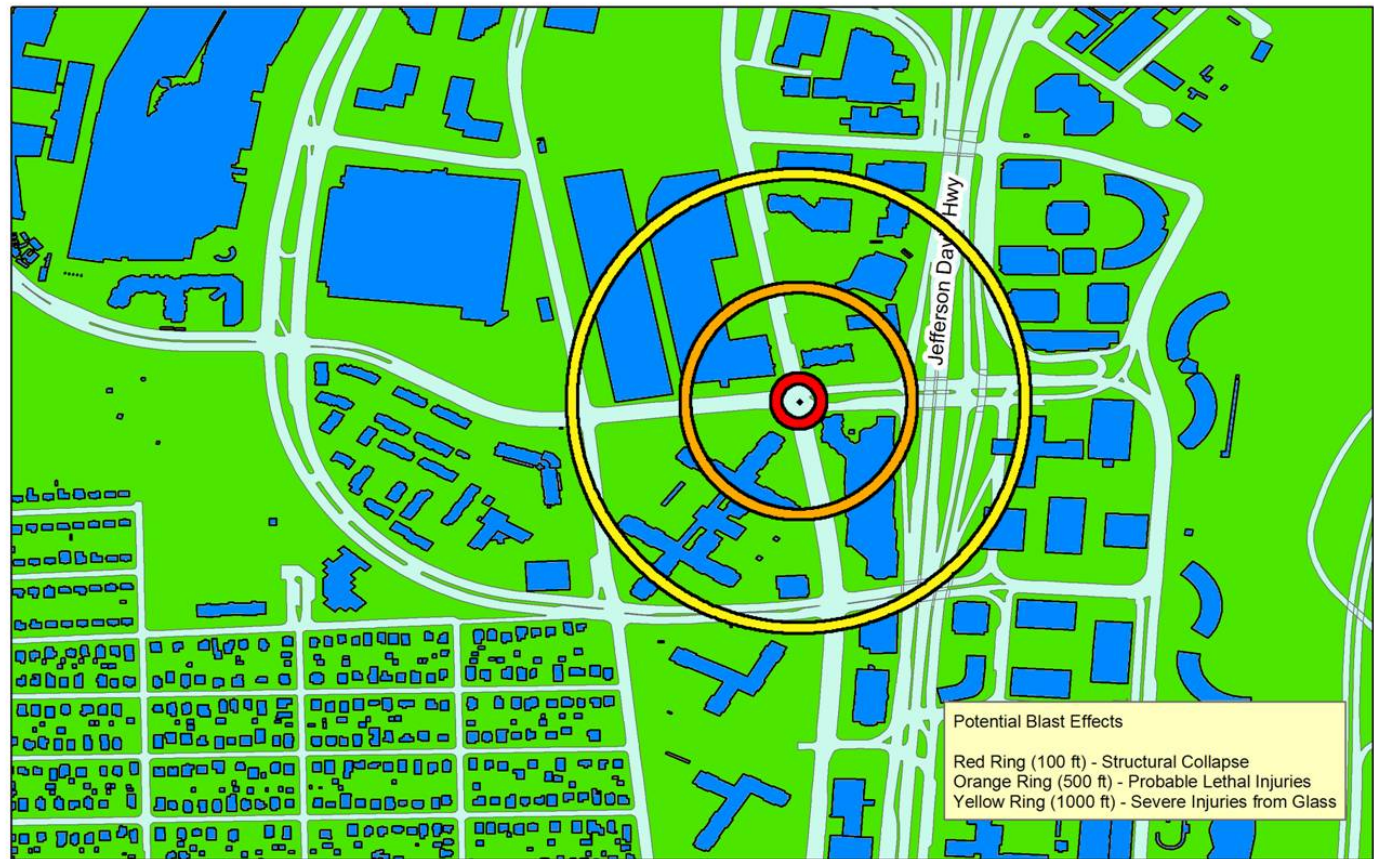
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Site Perimeter Imagery



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Site Truck Bomb



Potential Blast Effects - Nominal Large Truck Bomb

Arlington County - Virginia



Building

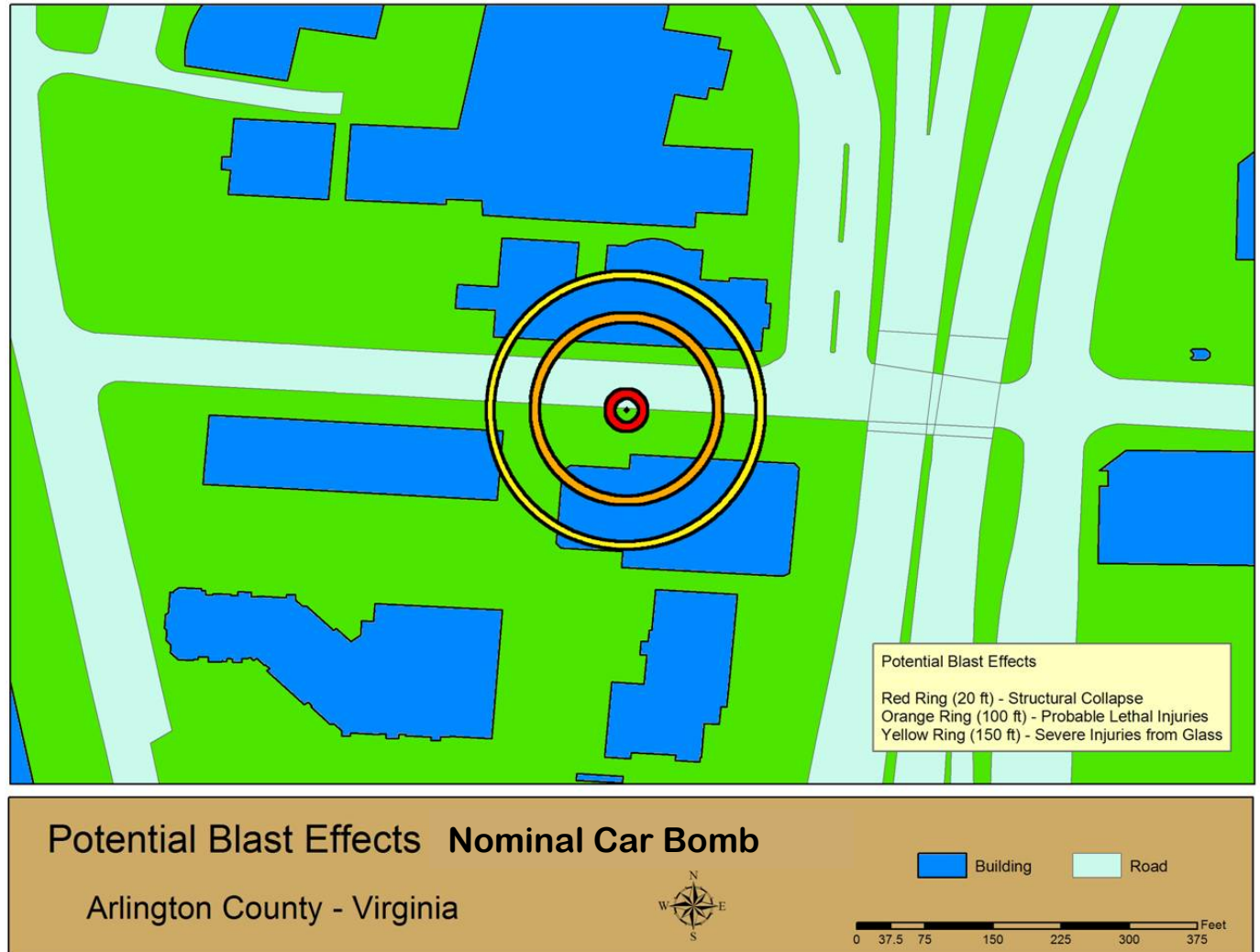
Road

0 162.5 325 650 975 1,300 1,625 Feet



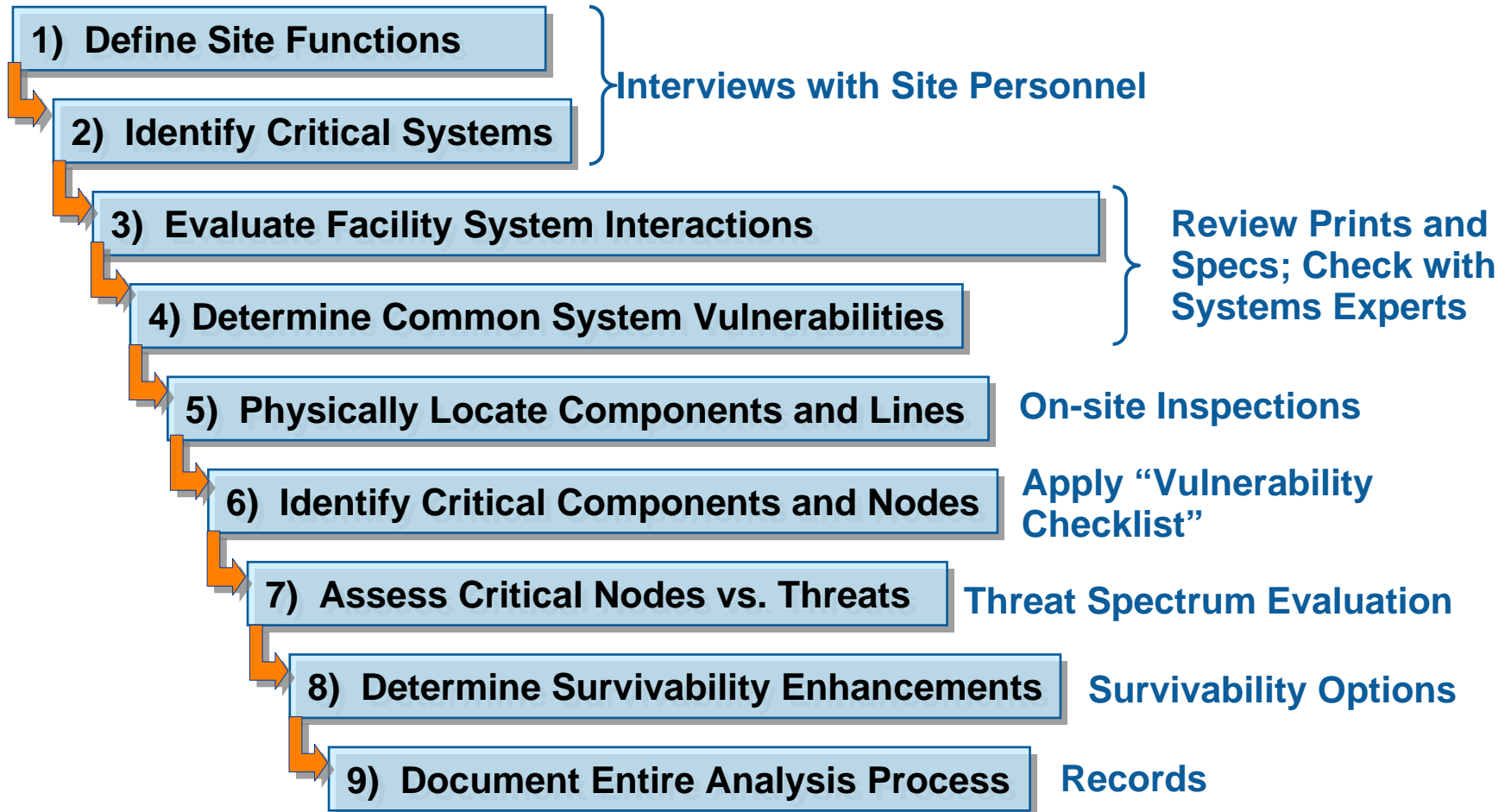
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Site Car Bomb



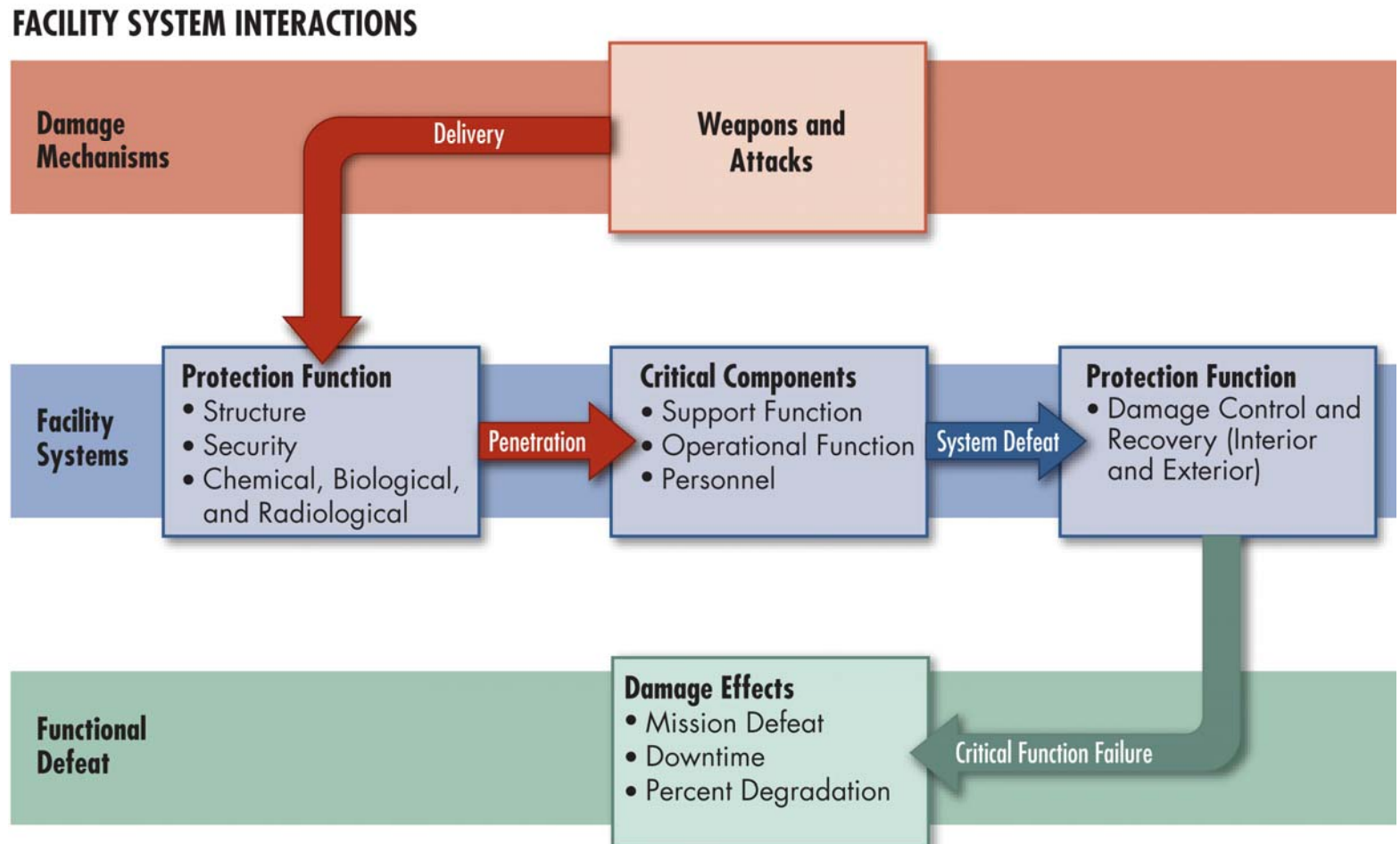
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Options to Reduce Vulnerability



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Facility System Interactions

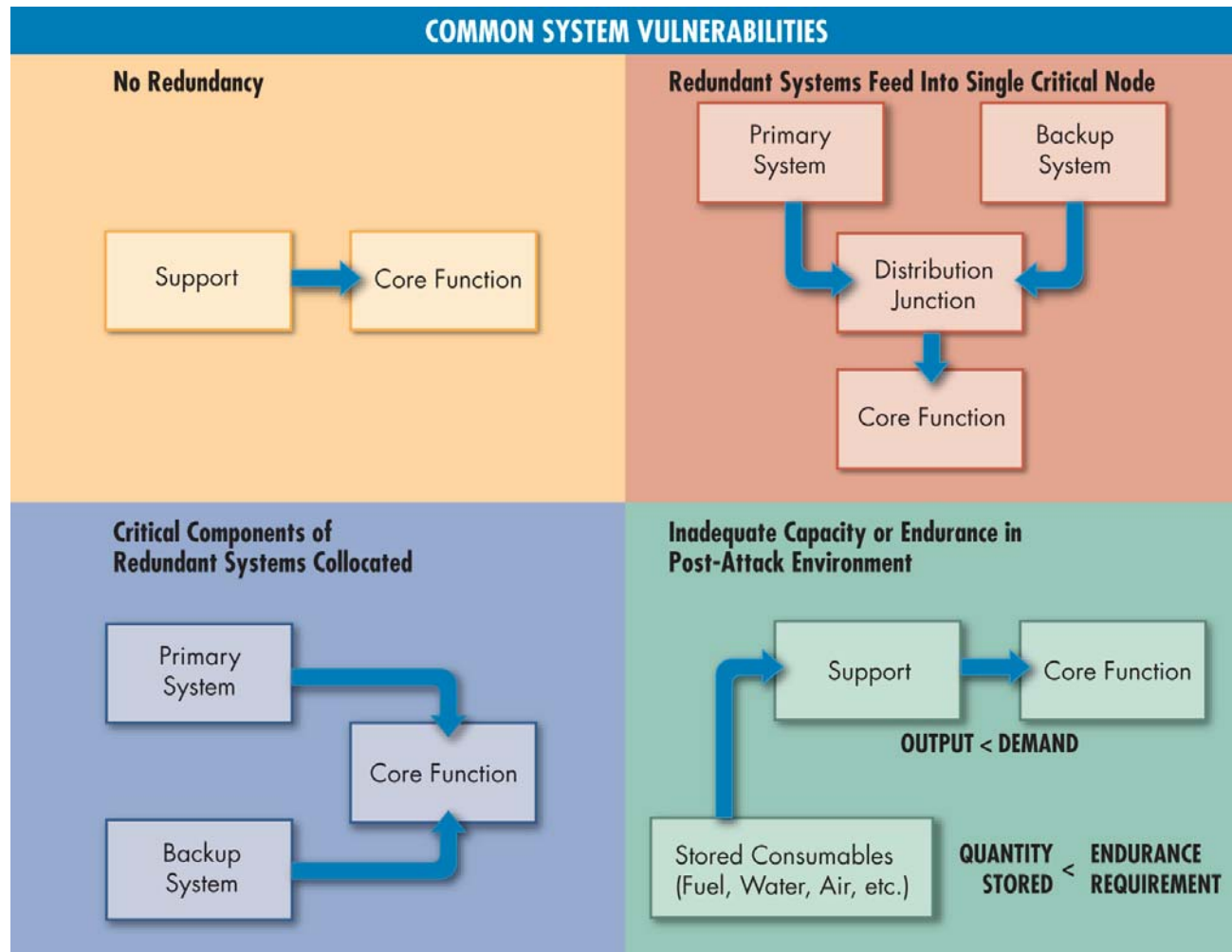


FEMA 426, Figure 1-8: Facility System Interactions, p. 1-23



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Single-Point Vulnerabilities



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FEMA 426, Figure 1-9: Common System Vulnerabilities, p. 1-35

Functional Analysis SPVs



Standard 11	The loading dock and warehouse provide single point of entry to the interior
Standard 13 and 17	The mailroom is located within the interior and not on exterior wall or separate HVAC system
Standard 1	The telecom switch and computer data center are adjacent to the warehouse
Standard 1	The trash dumpster and emergency generator are located adjacent to the loading dock



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FEMA 426, Figure 1-10: Non-Redundant Critical Functions Collocated Near Loading Dock, p. 1-41

Infrastructure SPVs



Air Intakes



Drive Through



Electrical Service



Telecom Service

FEMA 426, Figure 1-11: Vulnerability Examples, p. 1-42



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Building Vulnerability Assessment Checklist

Compiles best practices from many sources

Includes questions that determine if critical systems will continue to function during an emergency or threat event

Organized into 13 sections

- Each section should be assigned to a knowledgeable individual
- Results of all sections should be integrated into a master vulnerability assessment
- Compatible with CSI Master Format standard to facilitate cost estimates



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Building Vulnerability Assessment Checklist

Site

Architectural

Structural Systems

Building Envelope

Utility Systems

Mechanical Systems
(HVAC and CBR)

Plumbing and Gas
Systems

Electrical Systems

Fire Alarm Systems

Communications and IT
Systems

Equipment Operations
and Maintenance

Security Systems

Security Master Plan



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Building Vulnerability Assessment Checklist

Vulnerability Question	Guidance	Observations	
6	Mechanical Systems (HVAC and CBR)		
6.1	<p>Where are the air intakes and exhaust louvers for the building? (low, high, or midpoint of the building structure)</p> <p>Are the intakes and exhausts accessible to the public?</p>	<p><i>Air intakes should be located on the roof or as high as possible. Otherwise secure within CPTED-compliant fencing or enclosure. The fencing or enclosure should have a sloped roof to prevent throwing anything into the enclosure near the intakes.</i></p> <p><i>Ref: CDC/NIOSH Pub 2002-139</i></p>	
6.2	<p>Is roof access limited to authorized personnel by means of locking mechanisms?</p> <p>Is access to mechanical areas similarly controlled?</p>	<p><i>Roofs are like entrances to the building and are like mechanical rooms when HVAC is installed. Adjacent structures or landscaping should not allow access to the roof.</i></p> <p><i>Ref: GSA PBS -P100, CDC/NIOSH Pub 2002-139, and LBNL Pub 51959</i></p>	



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FEMA 426, Adapted from Table 1-22: Building Vulnerability Assessment Checklist, p. 1-46 to 1-92

Building Vulnerability Assessment Checklist



1.15	Is there minimum setback distance between the building and parked cars?
4.1	What is the designed or estimated protection level of the exterior walls against the postulated explosive threat?
4.2	Is the window system design on the exterior façade balanced to mitigate the hazardous effects of flying glazing following an explosive event? (glazing, frames, anchorage to supporting walls, etc.)?



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FEMA 426, Adapted from Table 1-22: Building Vulnerability Assessment Checklist, p. 1-46 to 1-92

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IV-C-28

Building Vulnerability Assessment Checklist



2.19

Are loading docks and receiving and shipping areas separated in any direction from utility rooms, utility mains, and service entrances, including electrical, telephone/data, fire detection/alarm systems, fire suppression water mains, cooling and heating mains, etc.?

1.16

Does adjacent surface parking on site maintain a minimum stand-off distance? *For initial screening consider using 25 meters (82 feet) as a minimum with more distance needed for unreinforced masonry or wooden walls. Reference: GSA PBS-P100*



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FEMA 426, Adapted from Table 1-22: Building Vulnerability Assessment Checklist, p. 1-46 to 1-92

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IV-C-29

Building Vulnerability Assessment Checklist



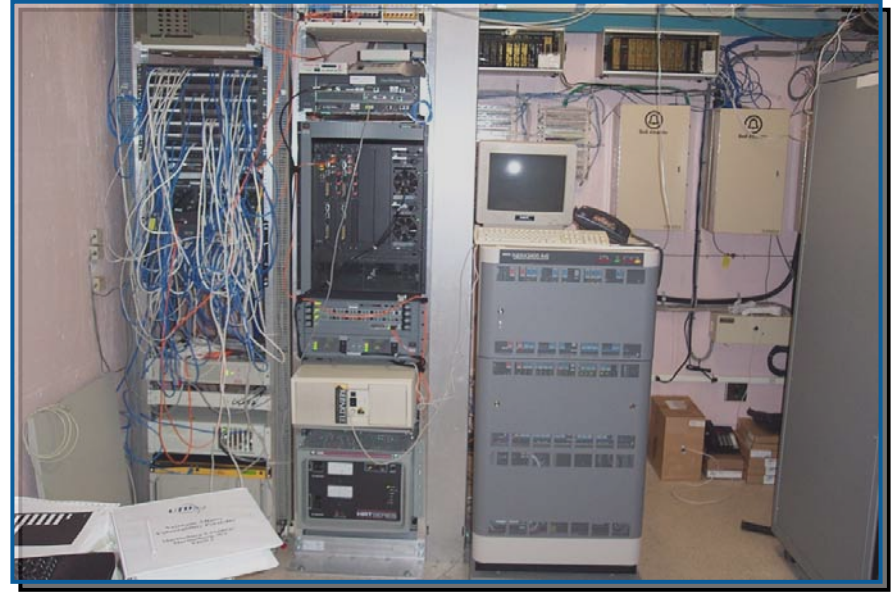
<p>6.1</p>	<p>Where are the air intakes and exhaust louvers for the building? (low, high, or midpoint of the building structure)</p> <p>Are the intakes and exhausts accessible to the public?</p>
<p>1.9</p>	<p>Is there any potential access to the site or building through utility paths or water runoff? <i>(Eliminate potential site access through utility tunnels, corridors, manholes, storm water runoff culverts, etc. Ensure covers to these access points are secured.)</i></p>
<p>3.1</p>	<p>What type of construction?</p> <p>What type of concrete and reinforcing steel?</p> <p>What type of steel?</p> <p>What type of foundation?</p>



FEMA

FEMA 426, Adapted from Table 1-22: Building Vulnerability Assessment Checklist, p. 1-46 to 1-92

Building Vulnerability Assessment Checklist



5.19	By what means does the main telephone and data communications interface the site or building?
5.20	Are there multiple or redundant locations for the telephone and communication service?
5.21	Does the fire alarm system require communication with external sources? By what method is the alarm signal sent to the responding agency: telephone, radio, etc.? Is there an intermediary alarm monitoring center?



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FEMA 426, Adapted from Table 1-22: Building Vulnerability Assessment Checklist, p. 1-46 to 1-92

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IV-C-31

Vulnerability Rating

Criteria		
Very High	10	Very High – One or more major weaknesses have been identified that make the asset extremely susceptible to an aggressor or hazard. The building lacks redundancies/physical protection and the entire building would be only functional again after a very long period of time after the attack.
High	8-9	High – One or more major weaknesses have been identified that make the asset highly susceptible to an aggressor or hazard. The building has poor redundancies/physical protection and most parts of the building would be only functional again after a long period of time after the attack.
Medium High	7	Medium High – An important weakness has been identified that makes the asset very susceptible to an aggressor or hazard. The building has inadequate redundancies/physical protection and most critical functions would be only operational again after a long period of time after the attack.



Key elements

- Number of weaknesses
- Aggressor potential accessibility
- Level of redundancies /physical protection
- Time frame for building to become operational again



FEMA

FEMA 452, Table 3-4: Vulnerability Rating, p. 3-16

Vulnerability Rating (continued)

Criteria		
Medium	5-6	Medium – A weakness has been identified that makes the asset fairly susceptible to an aggressor or hazard. The building has insufficient redundancies/physical protection and most part of the building would be only functional again after a considerable period of time after the attack.
Medium Low	4	Medium Low – A weakness has been identified that makes the asset somewhat susceptible to an aggressor or hazard. The building has incorporated a fair level of redundancies/physical protection and most critical functions would be only operational again after a considerable period of time after the attack.
Low	2-3	Low – A minor weakness has been identified that slightly increases the susceptibility of the asset to an aggressor or hazard. The building has incorporated a good level of redundancies/physical protection and the building would be operational within a short period of time after an attack.
Very Low	1	Very Low – No weaknesses exist. The building has incorporated excellent redundancies/physical protection and the building would be operational immediately after an attack.



Key elements

- Number of weaknesses
- Aggressor potential accessibility
- Level of redundancies /physical protection
- Time frame for building to become operational again



FEMA

FEMA 452, Table 3-4: Vulnerability Rating, p. 3-16

Critical Functions

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Administration				
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating	7	7	9	9
Engineering				
Asset Value	8	8	8	8
Threat Rating	8	5	6	2
Vulnerability Rating	2	4	8	9



FEMA

FEMA 426, Adaptation of Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

Critical Infrastructure

Infrastructure	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Site				
Asset Value	4	4	4	4
Threat Rating	4	4	3	2
Vulnerability Rating	1	7	9	9
Structural Systems				
Asset Value	8	8	8	8
Threat Rating	3	4	3	2
Vulnerability Rating	1	1	8	1



FEMA

FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems Pre-Assessment Screening Matrix, p. 1-39

Summary

Step-by-Step Analysis Process:

- Expertly performed by experienced personnel
- Determines critical systems
- Identifies vulnerabilities
- Focuses survivability mitigation measures on critical areas
- Essential component of Critical Functions and Critical Infrastructure Matrices



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Vulnerability Rating Considerations

Go to Page SM IV-C-2 in your Student Manual

1. Effectiveness of threat tactic / hazard against asset
2. Redundancy
3. Layers of Defense and depth of layers
4. Cyber



FEMA

Unit IV Case Study Activity

Vulnerability Rating

Background

Vulnerability: any weakness that can be exploited by an aggressor or, in a non-terrorist threat environment, make an asset susceptible to hazard damage

Requirements: Vulnerability Rating Approach

Use rating scale of 1 (very low or no weakness) to 10 (one or major weaknesses)

Refer to Case Study and rate the vulnerability of asset-threat/hazard pairs:

- Critical Functions
- Critical Infrastructure



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit V

Risk Assessment / Risk Management



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Unit Objectives

Explain what constitutes risk.

Provide a numerical rating for risk and justify the basis for the rating.

Evaluate risk using the Risk (Threat-Vulnerability) Matrix to capture assessment information.

Identify top risks for asset-threat/hazard pairs that should receive measures to mitigate vulnerabilities and reduce risk.



FEMA

Risk Management

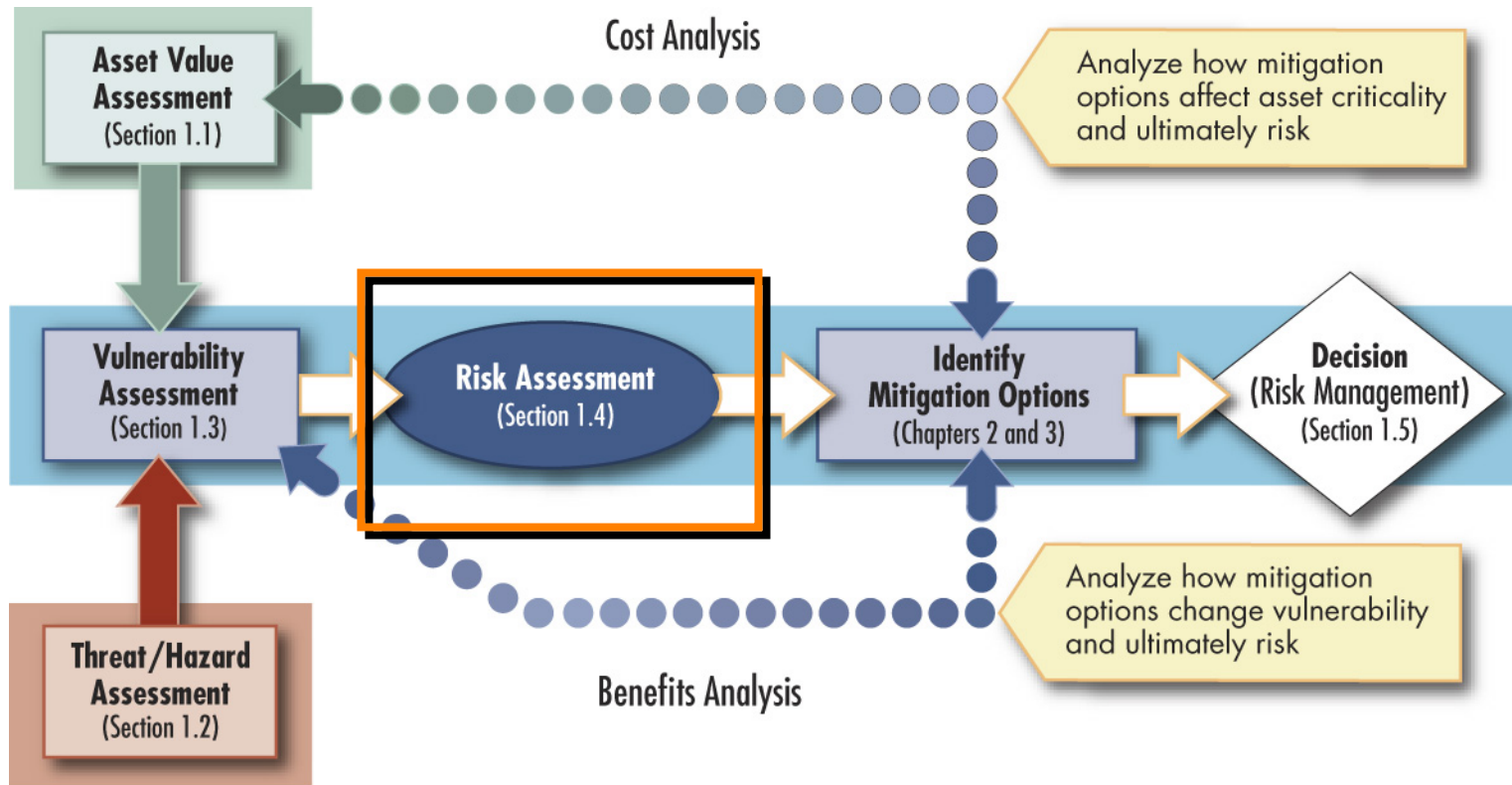
Risk management is the deliberate process of understanding “risk” – the likelihood that a threat will harm an asset with some severity of consequences – and deciding on and implementing actions to reduce it.

GAO/NSIAD-98-74: Combating Terrorism – Threat and Risk Assessments Can Help Prioritize and Target Program Investments, April 1998



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Assessment Flow Chart



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FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5

Definition of Risk

Risk is a combination of:

- The probability that an event will occur, and
- The consequences of its occurrence

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176

$\text{Risk} = \text{Asset Value} \times \text{Threat Rating} \times \text{Vulnerability Rating}$



FEMA

FEMA 426, Table 1-19: Total Risk Color Code, p. 1-38

Quantifying Risk

Risk Assessment

Determine Asset Value

Determine Threat Rating Value

Determine Vulnerability Rating Value

Determine relative risk for each threat against each asset

Select mitigation measures that have the greatest benefit/cost for reducing risk



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An Approach to Quantifying Risk

Table 1-18: Risk Factors Definitions

**Risk = Asset Value x
Threat Rating x
Vulnerability Rating**

Very High	10
High	8-9
Medium High	7
Medium	5-6
Medium Low	4
Low	2-3
Very Low	1

Table 1-19: Total Risk Color Code

	Low Risk	Medium Risk	High Risk
Risk Factors Total	1-60	61-175	≥ 176



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FEMA 426, p. 1-38

Critical Functions

Function	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Administration	280	140	135	90
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating	7	7	9	9
Engineering	128	160	384	144
Asset Value	8	8	8	8
Threat Rating	8	5	6	2
Vulnerability Rating	2	4	8	9



FEMA

FEMA 426, Adaptation of Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

Critical Infrastructure

Infrastructure	Cyber attack	Armed attack (single gunman)	Vehicle bomb	CBR attack
Site	48	80	108	72
Asset Value	4	4	4	4
Threat Rating	4	4	3	2
Vulnerability Rating	3	5	9	9
Structural Systems	48	128	192	144
Asset Value	8	8	8	8
Threat Rating	3	4	3	2
Vulnerability Rating	2	4	8	9



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FEMA 426, Adaptation of Table 1-21: Site Infrastructure Systems Pre-Assessment Screening Matrix, p. 1-39

Risk Assessment Results

Function	Cyber Attack	Armed Attack (single gunman)	Vehicle Bomb	CBR Attack
Administration	280	140	135	90
Asset Value	5	5	5	5
Threat Rating	8	4	3	2
Vulnerability Rating	7	7	9	9
Engineering	128	128	192	144
Asset Value	8	8	8	8
Threat Rating	8	4	3	2
Vulnerability Rating	2	4	8	9
Warehousing	96	36	81	54
Asset Value	3	3	3	3
Threat Rating	8	4	3	2
Vulnerability Rating	4	3	9	9
Data Center	360	128	216	144
Asset Value	8	8	8	8
Threat Rating	9	4	3	2
Vulnerability Rating	5	4	9	9
Food Service	2	32	48	36
Asset Value	2	2	2	2
Threat Rating	1	4	3	2
Vulnerability Rating	1	4	8	9
Security	280	140	168	126
Asset Value	7	7	7	7
Threat Rating	8	4	3	2
Vulnerability Rating	5	5	8	9
Housekeeping	16	64	48	36
Asset Value	2	2	2	2
Threat Rating	8	4	3	2
Vulnerability Rating	1	8	8	9
Day Care	54	324	243	162
Asset Value	9	9	9	9
Threat Rating	3	4	3	2
Vulnerability Rating	2	9	9	9

* NOTIONAL DATA INSERTED FOR DEMONSTRATION PURPOSES.



FEMA

FEMA 426, Table 1-20: Site Functional Pre-Assessment Screening Matrix, p. 1-38

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit V-C-10

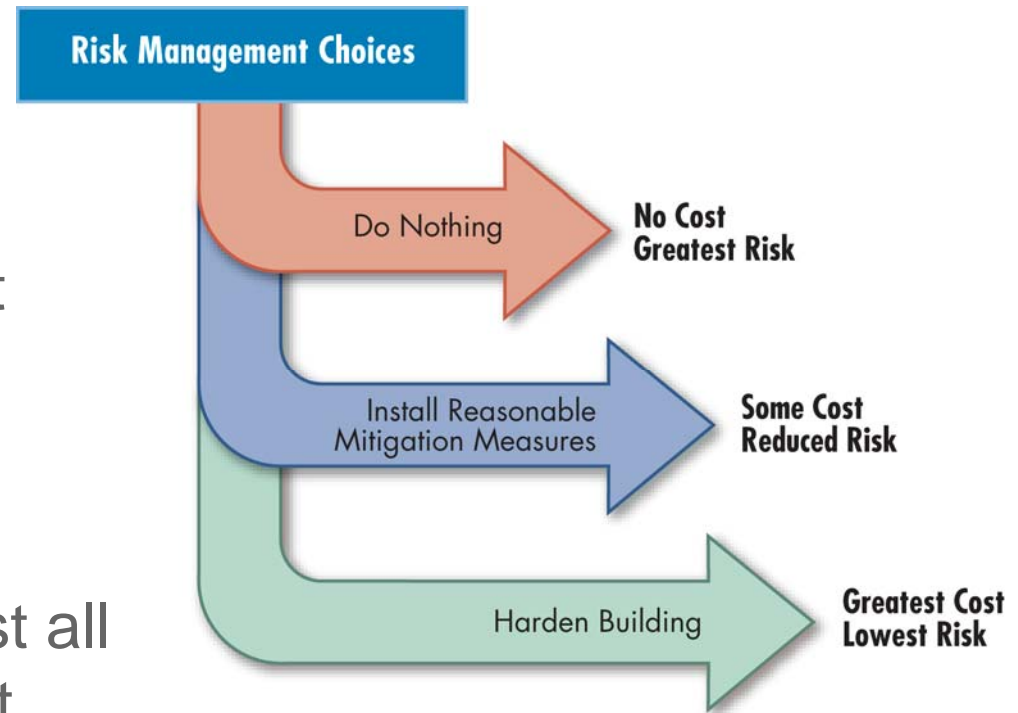
Selecting Mitigation Measures

Three Options:

Do nothing and accept the risk.

Perform a risk assessment and manage the risk by installing reasonable mitigation measures.

Harden the building against all threats to achieve the least amount of risk.



FEMA

FEMA 426, Figure 1-13: Risk Management Choices, p. 1-44

Mitigation Measures

A mitigation measure is an action, device, or system used to reduce risk by affecting an asset, threat, or vulnerability.

- **Regulatory measures**
- **Rehabilitation of existing structures**
- **Protective and control structures**



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Mitigation Measures

- **Mitigation measures can be evaluated against the following parameters**

- **Political Support**
- **Community Acceptance**
- **Cost and Benefit**
- **Financial Resources**
- **Legal Authority**
- **Adversely Affected Population**
- **Adverse Effects on Built Environment**
- **Environmental Impact**
- **Technical Capacity**
- **Maintenance and Operations**
- **Ease and Speed of Implementation**
- **Timeframe and Urgency**
- **Short-term and Long-Term Solutions**
- **Estimated Cost**



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Achieving Building Security: Planning Factors

Building security integrates multiple concepts and practices.

Objective is to achieve a balanced approach that combines aesthetics, enhanced security, and use of non-structural measures.



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Process Review

Calculate the relative risk for each threat against each asset

Identify the high risk areas

Identify Mitigation Options to reduce risk



FEMA

Summary

Risk Definition

Critical Functions and Critical Infrastructure
Matrices

Numerical and color-coded risk scale

Identify Mitigation Options



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Unit V Case Study Activity

Risk Rating

Background

Formula for determining a numeric value risk for each asset-threat/hazard pair:

$$\text{Risk} = \text{Asset Value} \times \text{Threat Rating} \times \text{Vulnerability Rating}$$

Requirements: Vulnerability Rating Approach

Use worksheet tables / Risk Matrix poster to summarize Case Study asset, threat, and vulnerability ratings determined in previous activities

Use the risk formula to determine the risk rating for each asset-threat/hazard pair for:

- Critical Functions
- Critical Infrastructure



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit VI

FEMA 452

Risk Assessment Database



FEMA

FEMA 452: Risk Assessment



Risk Management Series

Risk Assessment

A How-To Guide to Mitigate Potential Terrorist Attacks
Against Buildings

FEMA 452 / January 2005

Available at: <http://www.fema.gov/plan/prevent/rms/rmsp452.shtm>



FEMA

Unit Objectives

Explain database install process, if not already installed

Identify where to save photos, maps, drawings, plans, etc. to interface with database

Explain information required for database to function within each screen, how to move between screens, and switch between assessment tool operating mode and master database operating mode

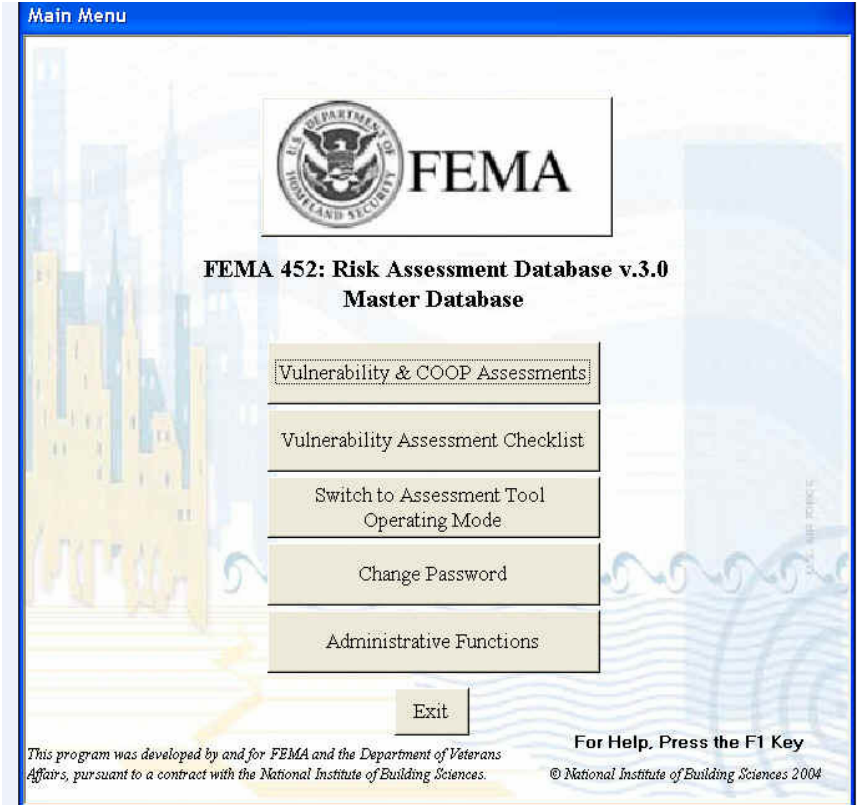
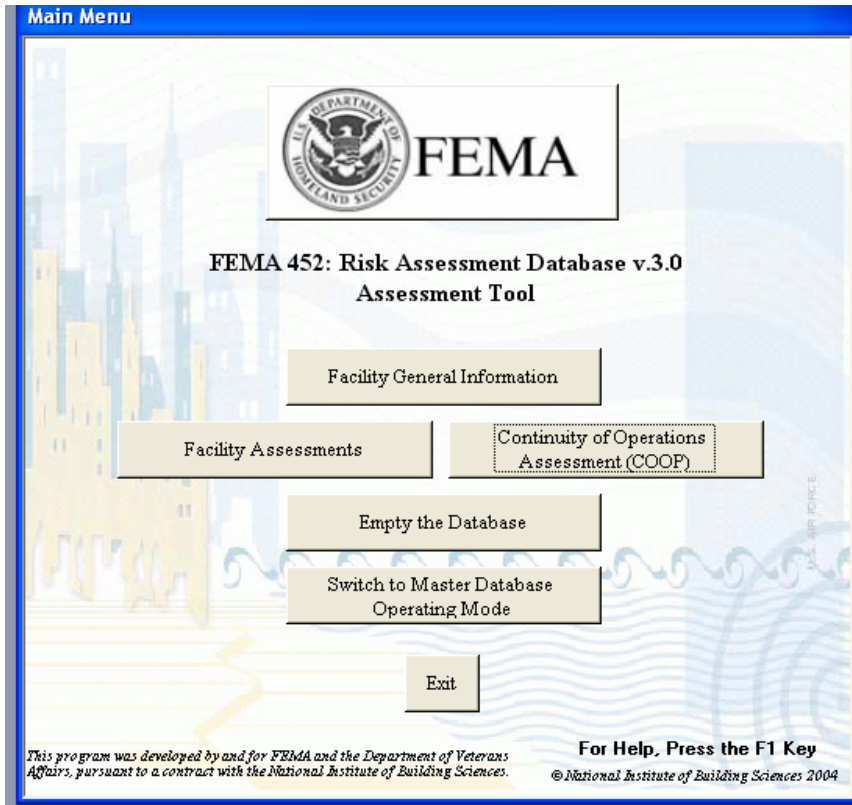
Explain benefit and approaches to setting priorities on identified vulnerabilities

Explain how to use database to produce standard reports and search database for specific information



FEMA

FEMA 452: Risk Assessment



Assessment Tool Mode

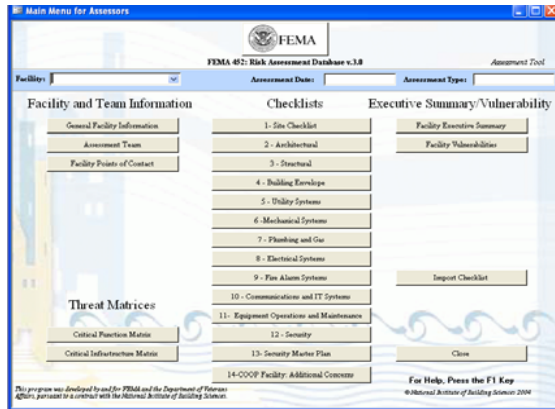
Master Database Mode



FEMA

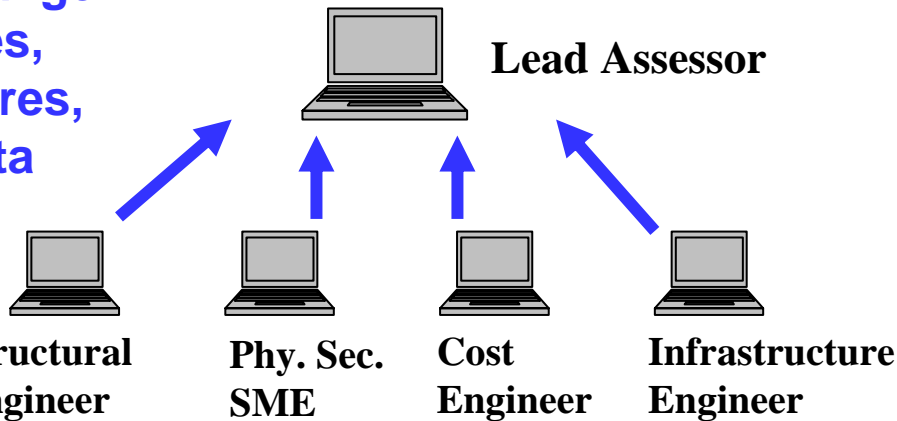
Database Structure

Conduct Assessment



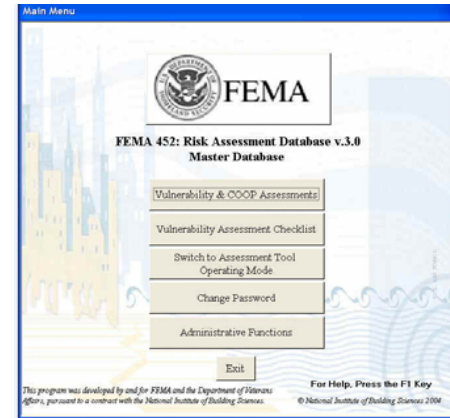
Assessment Tool Mode

Exchange
Files,
Pictures,
Data

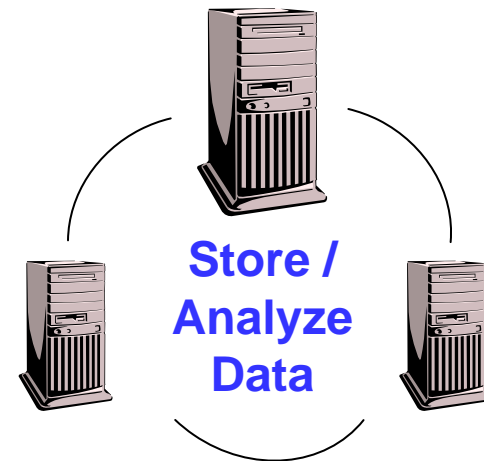


FEMA

Manage Program



Master Database Mode



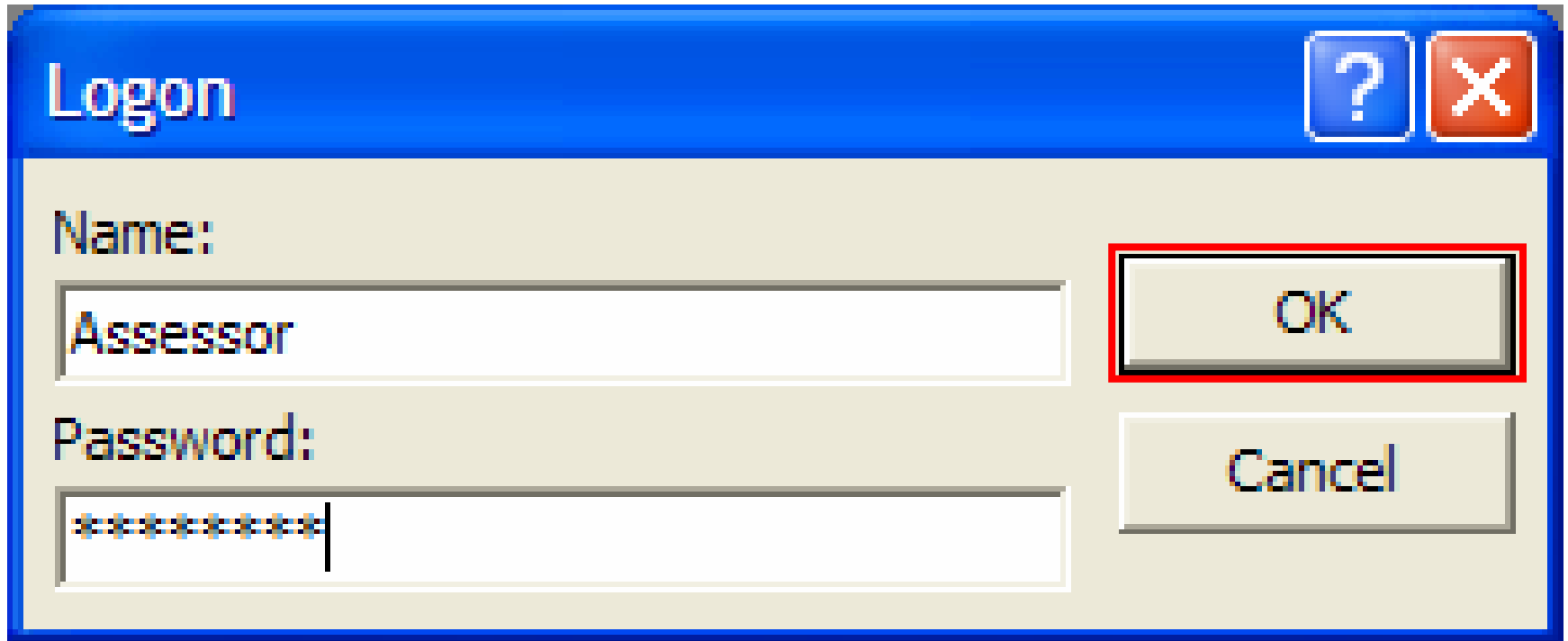
Import
Assessments

Open Database



FEMA

Login to Database

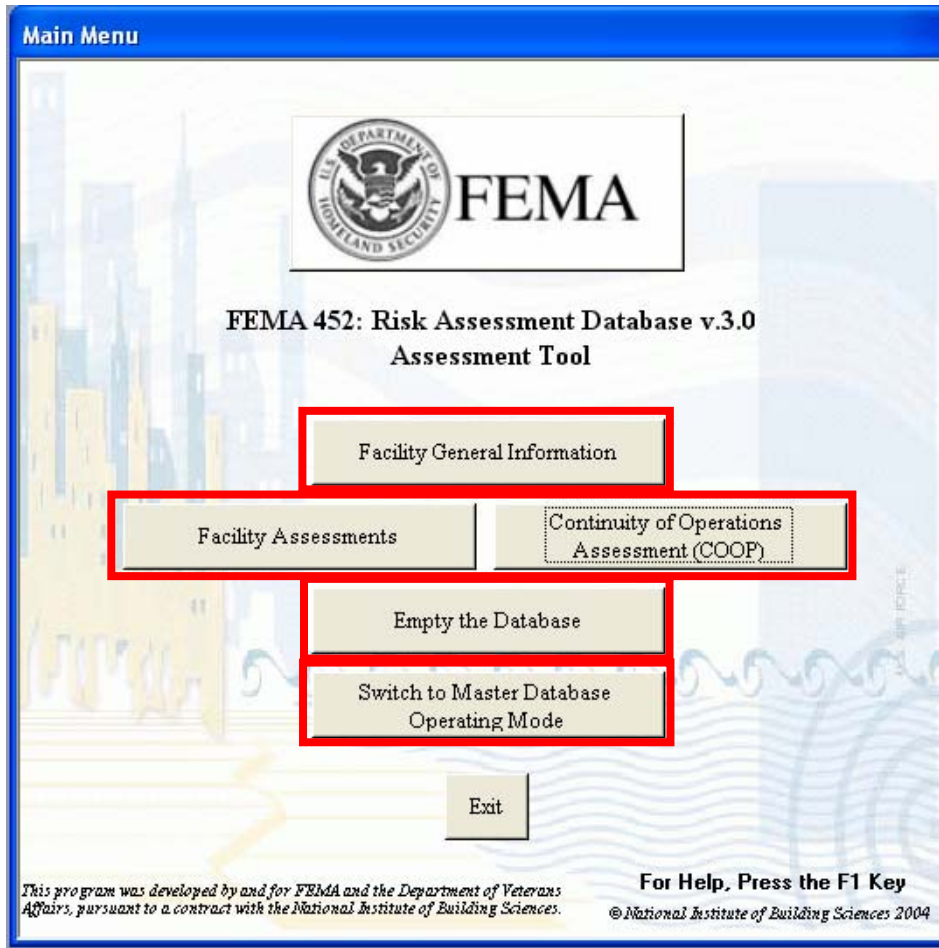


The image shows a classic Windows-style dialog box titled "Logon". The title bar is blue and contains a question mark icon and a close (X) icon. The main area has a light beige background. On the left, there are two labels: "Name:" and "Password:". Below "Name:" is a text input field containing the word "Assessor". Below "Password:" is a password input field containing eight asterisks. To the right of these fields are two buttons: "OK" and "Cancel". The "OK" button is highlighted with a red rectangular border.



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Assessment Operating Mode



- Create and name assessment
- Enter the Facility or COOP assessment forms
- Empty database
- Switch to Master Database Mode




FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: CI-BC
Org. Name:
Address1:
Address2:
City: St
Zip:

Default Facility Image: 

Facility Descriptive Text:

Assessments Buildings

Assessment Location*: CI-BC
Assessment Date*: 2/2/2007
Assessment Type*:
Assessment Folder Name: X

Entered By:
Enter Date: Date Created
Modified By:
Modify Date:

New Facility <-Previous Facility Next Facility-> * Required Field(s) For Help, Press the F1 Key Close

Record: 1 of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: **Default Facility Image:**

Org. Name: **Facility Descriptive Text:**

Address1:

Address2:

City: **St:**

Zip:

Assessments | Buildings

Assessment Location*: **Entered By:**

Assessment Date*: **Enter Date:**

Assessment Type*:

Assessment Folder Name: **Modify Date:**

Facility Tier 1
Facility Tier 2
Facility Tier 3
COOP Facility

* Required Field(s)

Record: of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: CI-BC
Org. Name:
Address1:
Address2:
City: St:
Zip:

Default Facility Image: No Image Available

Facility Descriptive Text:

Assessments | Buildings | Essential Functions | Deployment Planning | COOP Facility

Assessment Location*: CI-BC
Assessment Date*:
Assessment Type*: COOP
Assessment Folder Name:

Microsoft Access

This Facility Assessment will be stored in folder:
C:\Program Files\FEMA Master Assessment Database V3\CI-BC\Assessment_2007-02-02\
Photos will need to be placed in the \Photos subfolder
GIS Portfolio images will need to be placed in the \GIS_Portfolio subfolder
Miscellaneous files will need to be placed in the \Miscellaneous subfolder

OK

New Facility | <-Previous Facility | Next Facility-> | * Required Field(s) | For Help, Press the F1 Key | Close

Record: 1 of 1



FEMA

Facility Information

Main Menu



**FEMA 452: Risk Assessment Database v.3.0
Assessment Tool**

Facility General Information

Facility Assessments Continuity of Operations
Assessment (COOP)

Empty the Database

Switch to Master Database
Operating Mode

Exit

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For Help, Press the F1 Key
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Facility Information

Create Assessment Facility Record

Facility Name*: CI-BC
Org. Name:
Address1:
Address2:
City: St:
Zip:

Default Facility Image: No Image Available

Facility Descriptive Text:

Assessments | Buildings | **Essential Functions** | Deployment Planning | COOP Facility

Assessment Location*: CI-BC
Assessment Date*: 2/2/2007
Assessment Type*: COOP Facility
Assessment Folder Name: Assessment_2007-02-02\

Entered By: Assessor
Enter Date: Date Created
Modified By: Assessor
Modify Date: Date Created

New Facility | <-Previous Facility | Next Facility-> | * Required Field(s) | For Help, Press the F1 Key | Close

Record: 1 of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: Default Facility Image:

Org. Name:

Address1:

Address2:

City: St

Zip:

Facility Descriptive Text:

Assessments | Buildings | Essential Functions | **Deployment Planning** | COOP Facility

Priority	Essential Function	Req No. Of Personnel	Req No. Of Computer Terminals	Req No. Of Telephones	Cell Phone Coverage Required	Additional Requirement
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Record: of 1

New Facility | <-Previous Facility | Next Facility-> | * Required Field(s) | For Help, Press the F1 Key | Close

Record: of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: Default Facility Image:

Org. Name:

Address1:

Address2:

City: St

Zip:

Facility Descriptive Text:

No Image Available

Assessments | Buildings | Essential Functions | Deployment Planning | **COOP Facility**

Minimum Distance to COOP Facility (miles):

Requires Access To Private Vehicle:

Requires Access To Agency Transportation:

Requires Access To Mass Transit:

New Facility | <-Previous Facility | Next Facility-> | * Required Field(s) | For Help, Press the F1 Key | Close

Record: of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: Default Facility Image:

Org. Name:

Address1:

Address2:

City: St:

Zip:

Facility Descriptive Text:

No Image Available

Assessments | Buildings | Essential Functions | Deployment Planning | **COOP Facility**

How soon after decision to deploy must facility be available (hours)?

Number of Persons to be supported overall (all shifts)

When activated, how many HOURS per DAY will it operate (1-24)?

When activated, how many DAYS per WEEK will it operate (1-7)?

If people must stay overnight at the facility, indicate the total billet requirement.

If necessary, the number of meals served on facility per day.

Facility requirements for auxilliary power sources (generators).

New Facility <-Previous Facility Next Facility-> * Required Field(s) For Help, Press the F1 Key Close

Record: of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: Default Facility Image:

Org. Name:

Address1:

Address2:

City: St:

Zip:

Facility Descriptive Text:

No Image Available

Assessments | Buildings | Essential Functions | Deployment Planning | **COOP Facility**

When activated, how many DAYS per WEEK will it operate (1-7)?

If people must stay overnight at the facility, indicate the total billet requirement.

If necessary, the number of meals served on facility per day.

Facility requirements for auxilliary power sources (generators).

Auxiliary power fuel requirement in gallons per hour.

Parking requirement (Unsecured).

Parking requirement (Secured).

Vehicle Fuel requirement (gallons per day)

New Facility <-Previous Facility Next Facility-> * Required Field(s) For Help, Press the F1 Key Close

Record: of 1



FEMA

Facility Information

Create Assessment Facility Record

Facility Name*: Default Facility Image:

Org. Name: Facility Descriptive Text:

Address1:

Address2:

City: St

Zip:

Assessments | Buildings | Essential Functions | Deployment Planning | **COOP Facility**

Parking requirement (Secured).

Vehicle fuel requirement (gallons per day).

Water requirement (gallons per day).

Radio requirement (description).

Satellite Communications requirement (description).

Required size of space, according to the scope of the staffing plan (description).

Additional information, as required (description).

No Image Available

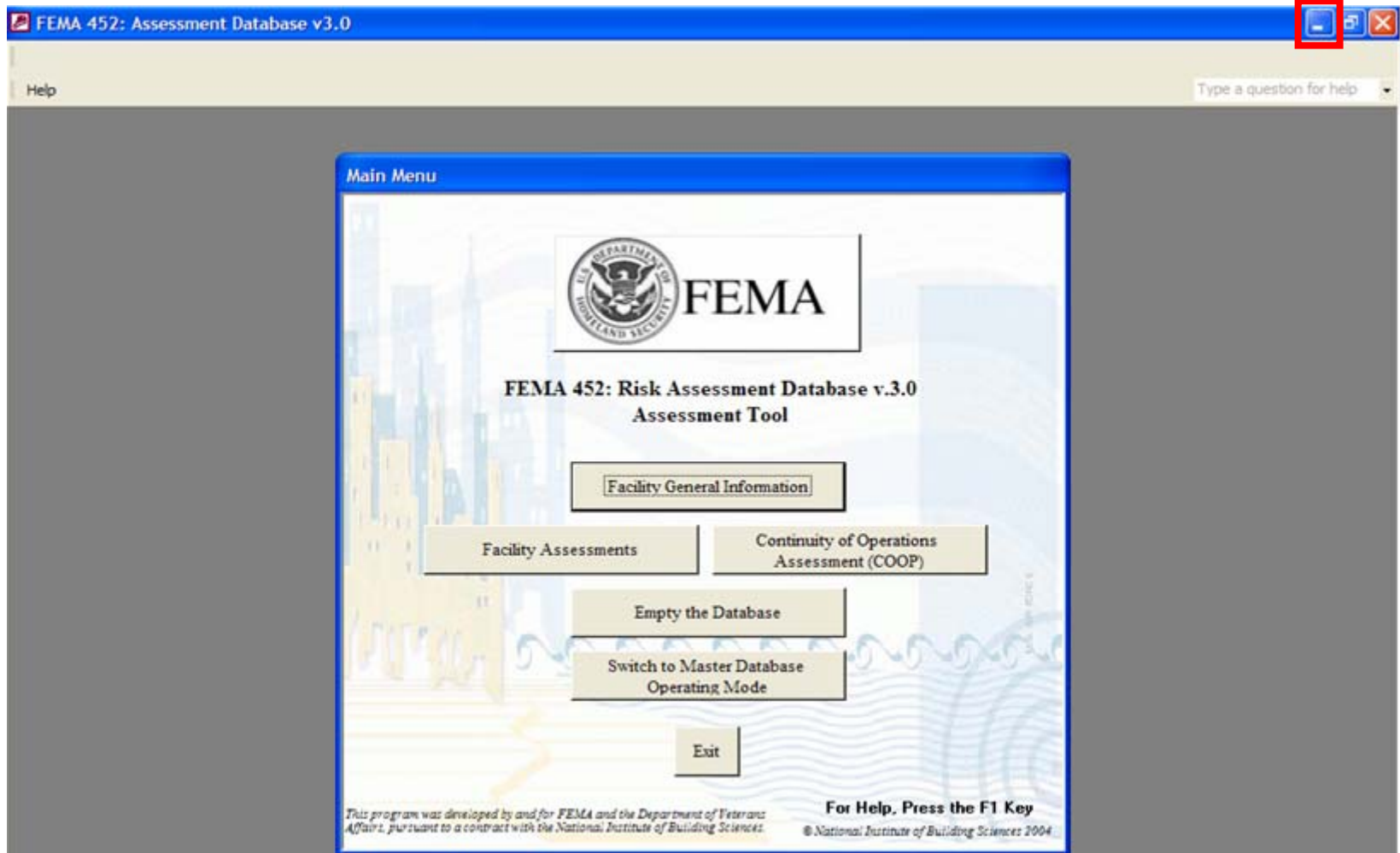
New Facility <-Previous Facility Next Facility-> * Required Field(s) For Help, Press the F1 Key **Close**

Record: of 1



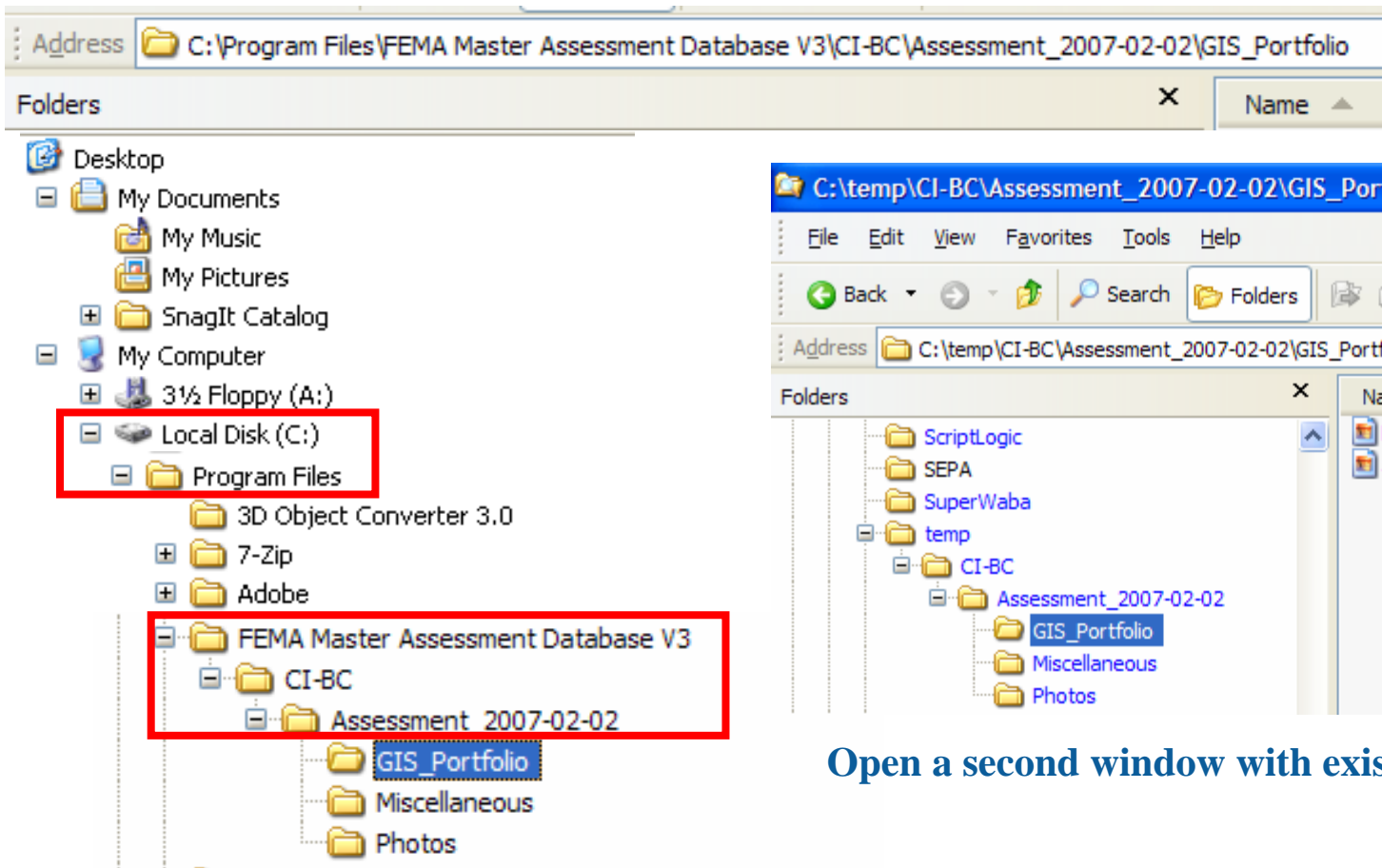
FEMA

Facility Information



FEMA

Load Information

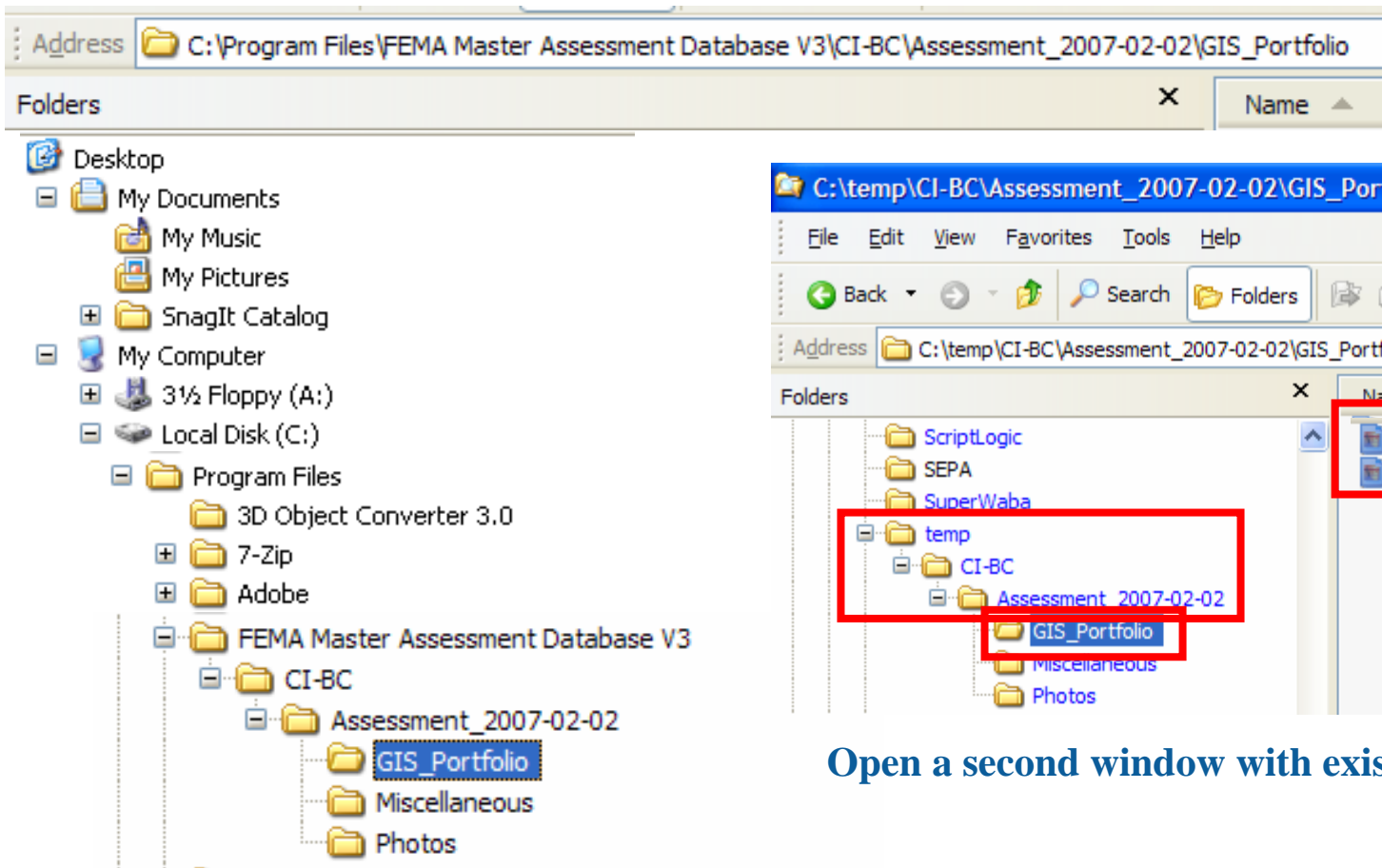


Open a second window with existing data



FEMA

Load Information



Open a second window with existing data



FEMA

Load Information

The screenshot shows a Windows Explorer window with the address bar set to `C:\Program Files\FEMA Master Assessment Database V3\CI-BC\Assessment_2007-02-02\GIS_Portfolio`. The left pane shows the folder tree, with the path `Program Files > FEMA Master Assessment Database V3 > CI-BC > Assessment_2007-02-02 > Miscellaneous` highlighted. The right pane shows the contents of the `Miscellaneous` folder, which includes `Emergency Plan.doc` and `SiteAlpha.xls`.



FEMA

Load Information

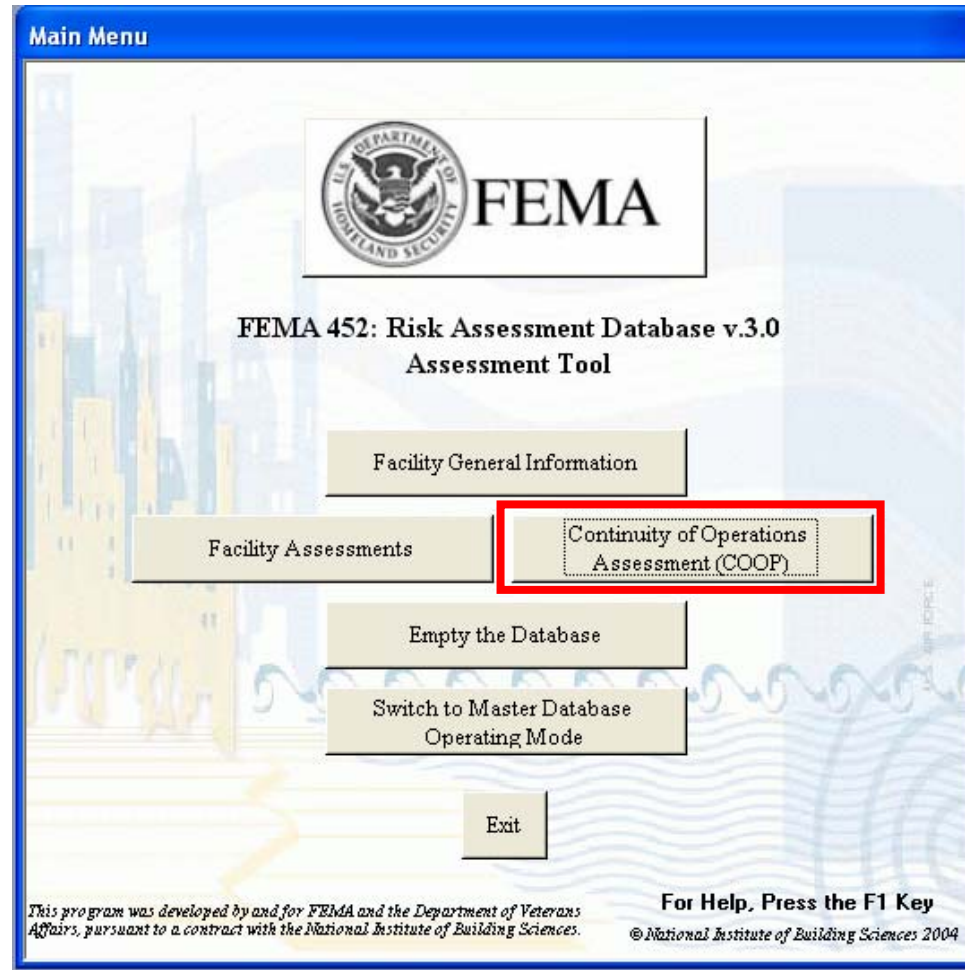
The image shows two overlapping Windows Explorer windows. The background window displays the 'Folders' pane for 'Local Disk (C:)', with the path 'Program Files\FEMA Master Assessment Database V3\CI-BC\Assessment_2007-02-02\GIS_Portfolio' highlighted in the address bar. The foreground window shows the 'Folders' pane for 'C:\temp\CI-BC\Assessment_2007-02-02\Photos', with the address bar showing 'C:\temp\CI-BC\Assessment_2007-02-02\Photos'. The foreground window's file list contains: airintake 1.jpg, cctv.jpg, NatGasFeed.JPG, and transformer 1.jpg.



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Assessment Tool

Restore from tray at bottom of screen



FEMA

Assessment Tool

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 *Assessment Tool*

Facility: Assessment Date: Assessment Type:

Facility and Team Information	Checklists	Executive Summary/Vulnerability
General Facility Information	1- Site Checklist	Facility Executive Summary
Assessment Team	2 - Architectural	Facility Vulnerabilities
Facility Points of Contact	3 - Structural	
	4 - Building Envelope	
	5 - Utility Systems	
	6 - Mechanical Systems	
	7 - Plumbing and Gas	
	8 - Electrical Systems	
	9 - Fire Alarm Systems	Import Checklist
	10 - Communications and IT Systems	
	11- Equipment Operations and Maintenance	
	12 - Security	
	13- Security Master Plan	Close
	14-COOP Facility: Additional Concerns	

Threat Matrices

Critical Function Matrix

Critical Infrastructure Matrix

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Assessment Tool

Main Menu for Assessors

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FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: Assessment Date: Assessment Type:

Facility and Team Information	Checklists	Executive Summary/Vulnerability
<input type="button" value="General Facility Information"/>	<input type="button" value="1- Site Checklist"/>	<input type="button" value="Facility Executive Summary"/>
<input type="button" value="Assessment Team"/>	<input type="button" value="2 - Architectural"/>	<input type="button" value="Facility Vulnerabilities"/>
<input type="button" value="Facility Points of Contact"/>	<input type="button" value="3 - Structural"/>	
	<input type="button" value="4 - Building Envelope"/>	
	<input type="button" value="5 - Utility Systems"/>	
	<input type="button" value="6 -Mechanical Systems"/>	
	<input type="button" value="7 - Plumbing and Gas"/>	
	<input type="button" value="8 - Electrical Systems"/>	
	<input type="button" value="9 - Fire Alarm Systems"/>	<input type="button" value="Import Checklist"/>
	<input type="button" value="10 - Communications and IT Systems"/>	
Threat Matrices	<input type="button" value="11- Equipment Operations and Maintenance"/>	
<input type="button" value="Critical Function Matrix"/>	<input type="button" value="12 - Security"/>	
<input type="button" value="Critical Infrastructure Matrix"/>	<input type="button" value="13- Security Master Plan"/>	<input type="button" value="Close"/>
	<input type="button" value="14-COOP Facility: Additional Concerns"/>	

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Assessment Tool

Main Menu for Assessors

FEMA
FEMA 452: Risk Assessment Database v.3.0
Assessment Tool

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information	Checklists	Executive Summary/Vulnerability
General Facility Information	1- Site Checklist	Facility Executive Summary
Assessment Team	2 - Architectural	Facility Vulnerabilities
Facility Points of Contact	3 - Structural	
	4 - Building Envelope	
	5 - Utility Systems	
	6 - Mechanical Systems	
	7 - Plumbing and Gas	
	8 - Electrical Systems	
	9 - Fire Alarm Systems	Import Checklist
	10 - Communications and IT Systems	
	11- Equipment Operations and Maintenance	
	12 - Security	
	13- Security Master Plan	Close
	14-COOP Facility: Additional Concerns	

Threat Matrices

Critical Function Matrix

Critical Infrastructure Matrix

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Add Team Members

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

Executive Summary | Vulnerabilities | Points of Contact | **Assessment Team** | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Team Member	Title	Organization	Work Phone	Mobile Phone	Email
-------------	-------	--------------	------------	--------------	-------

Select Team Member from List | **Add New Team Member**

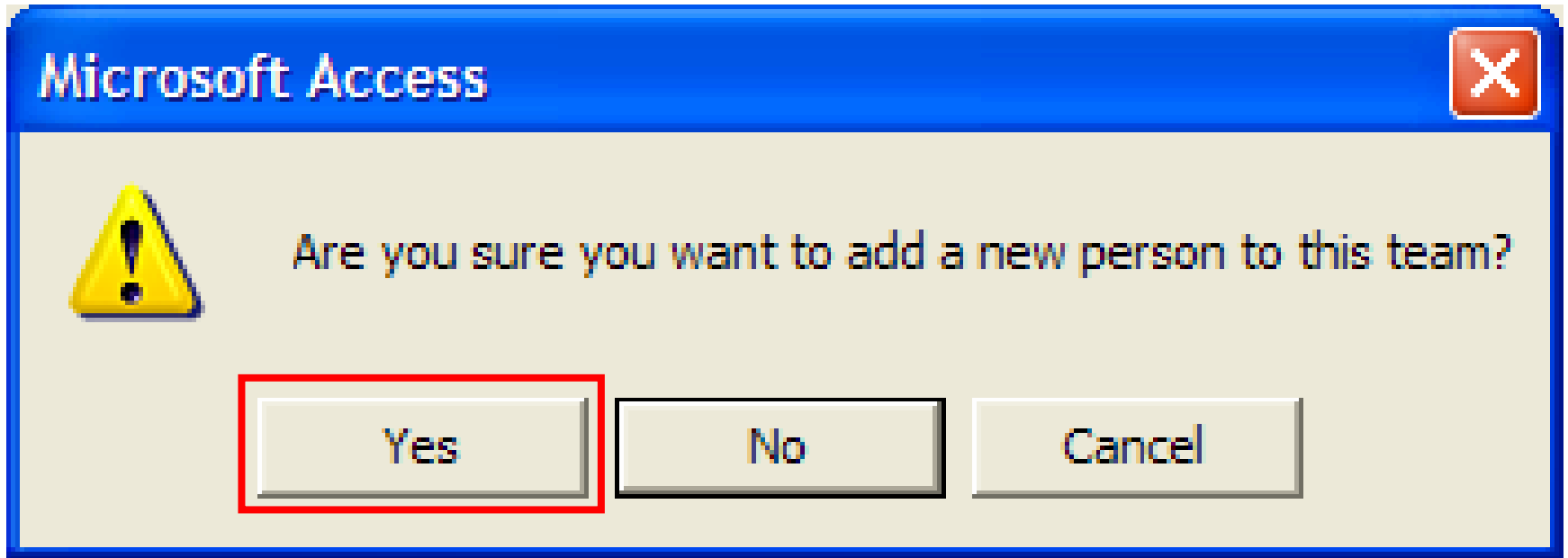
Record:

For Help, Press the F1 Key



FEMA

Add Team Members



FEMA

Add Team Members

Add a new person to this Team

Add New Person

First Name:

Last Name:

Title:

Company:

Address:

City:

State:

Zip:

Email:

Work Phone:

Mobile Phone:

Entered By:

Enter Date:

Modified By:

Modify Date:

For Help, Press the F1 Key



FEMA

Team Members

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | **Assessment Team** | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Team Member	Title	Organization	Work Phone	Mobile Phone	Email
▶ <input type="text" value="Smith, John"/>	<input type="text" value="Senior Assessor"/>	<input type="text" value="ABC Inc."/>	<input type="text" value="(123) 456-7890"/>	<input type="text" value=""/>	<input type="text" value="jsmith@abc.com"/>

Select Team Member from List

Record: of 1

For Help, Press the F1 Key



FEMA

Team Members

Assessment Main Page

Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary Vulnerabilities **Points of Contact** Assessment Team Add Photos Photos Add GIS Portfolio Images GIS Portfolio Miscellaneous Files

	Organization	Work Phone	Mobile Phone	Email
▶ Assessor	ABC Inc.	(123) 456-7890		jsmith@abc.com

▶ New Team Member

Record: 1 of 1

For Help, Press the F1 Key Close



FEMA

Add Point of Contact

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | **Points of Contact** | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

First Name	Last Name	Title	Organization	Address	City	State	Zip
------------	-----------	-------	--------------	---------	------	-------	-----

Record:

For Help. Press the F1 Key



FEMA

Add Point of Contact

Assessment Main Page

Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | **Add Photos** | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

First Name	Last Name	Title	Organization	Address	City	State	Zip
Joe	Smith	Director	Cooperville Information-Busir	1234 USA Drive	Cooperville	VA	12345

Add New POC Delete POC: Joe Smith **Add New POC and Duplicate**

Record: 1 of 1

For Help, Press the F1 Key Close



FEMA

Add Photos

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | **Add Photos** | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

File Name	Description	Comments
-----------	-------------	----------

Microsoft Access

Added 4 photos to the Photos table (tblPhotos)

OK

Add Photos ?

Record:

For Help, Press the F1 Key



FEMA

Add Photos

Assessment Main Page

Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | **Add Photos** | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

File Name	Description	Comments
airintake1.jpg		
cctv.jpg		
NatGasFeed.JPG		
transformer1.jpg		

Microsoft Access

Attached 4 photos to this ASSESSMENT!

OK

Add Photos ?

Record: 1 of 4

For Help, Press the F1 Key Close



FEMA

Add Photos

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | **Photos** | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

File Name	Description	Comments
<input type="checkbox"/> airtakel.jpg		
<input type="checkbox"/> cctv.jpg		
<input type="checkbox"/> NatGasFeed.JPG		
<input type="checkbox"/> transformer1.jpg		

Record: of 4

For Help, Press the F1 Key



FEMA

Add Photos

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | **Add Photos** | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>

Load Photos (4 images total)

For Help, Press the F1 Key



FEMA

Add Photos

Assessment Main Page






Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | **Add Photos** | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

				
Image #: 1 airintakel.jpg	Image #: 2 cctv.jpg	Image #: 3 NatGasFeed.JPG	Image #: 4 transformer1.jpg	Image #:

Load Photos ← → (4 images total)

For Help, Press the F1 Key Close





FEMA

Add Photos

Photo Zoom

Description: n/a Photo Comments: n/a



Zoom (Stretch Proportionally) Clip (Actual size without scroll bars) View with IE (Actual size with scroll bars)  Close



FEMA

Add GIS Images






Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | **Add GIS Portfolio Images** | GIS Portfolio | Miscellaneous Files

				
Image #: 1 airintakel.jpg	Image #: 2 cctv.jpg	Image #: 3 NatGasFeed.JPG	Image #: 4 transformer1.jpg	Image #:

Load Photos (4 images total)

For Help, Press the F1 Key



FEMA

Add GIS Images

Assessment Main Page


Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

File Name	Description	Comments
<div data-bbox="656 588 1245 839"><p>Microsoft Access</p><p>Added 2 Portfolio Images to the GIS Portfolio)</p><p>OK</p></div>		

Add GIS Portfolio Images

Record:

For Help, Press the F1 Key Close



FEMA

Add GIS Images

Assessment Main Page

Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

File Name	Description	Comments
Local_Imagery.mxd.jpg		
Sitel_lr.jpg		

Microsoft Access

Attached 2 GIS Portfolio Images to this ASSESSMENT!

OK

Add GIS Portfolio Images

Record: 1 of 2

For Help, Press the F1 Key Close



FEMA

Add GIS Images

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | **GIS Portfolio** | Miscellaneous Files

File Name	Description	Comments
Local_Imagery.mxd.jpg		
Sitel_lr.jpg		

Add GIS Portfolio Images ?

Record: of 2

For Help, Press the F1 Key



FEMA

Add GIS Images

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>	Image #: <input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Load GIS (2 images total)

For Help, Press the F1 Key



FEMA

Add GIS Images

Assessment Main Page






Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | **Miscellaneous Files**

				
Image #: 1	Image #: 2	Image #:	Image #:	Image #:
<input type="text" value="Local_Imagery.mxd.jpg"/>	<input type="text" value="Site1_lr.jpg"/>			

(2 images total)

For Help, Press the F1 Key



FEMA

Add Miscellaneous Files

Assessment Main Page

Facility Name: CI-BC Default Image: [Dropdown]
Assessment Location: CI-BC
Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | **Miscellaneous Files**

Folder Type	File Name	File Description	File Size	File Date	Enter Date

Microsoft Access [Close]

Original files: 0
Files Loaded Now: 1
Total files for this Assessment: 1

OK

Add Miscellaneous Files [?] *** Double click "File Name" of desired file to open. ***

Record: [Navigation] 1 of 1

For Help, Press the F1 Key Close




FEMA

* Same as photos and GIS images

Add Miscellaneous Files

Assessment Main Page

Help for Adding Miscellaneous files

 Clicking the [Add Miscellaneous Files] button will make the program look on your hard drive in the following folder:


C:\Program Files\FEMA Master Assessment Database V3\CI-BC\Assessment_2007-02-02\GIS_Portfolio\

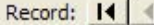

for files of the following types:

*.doc, *.dwf, *.dwg, *.dxf, *.pdf, *.txt, *.ppt

for this assessment and will add them to the database, if they have not already been added.

OK

Add Miscellaneous Files  *** Double click "File Name" of desired file to open. ***

Record:  1  of 1

For Help, Press the F1 Key **Close**



FEMA

Threat Matrices

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information	Checklists	Executive Summary/Vulnerability
General Facility Information	1- Site Checklist	Facility Executive Summary
Assessment Team	2 - Architectural	Facility Vulnerabilities
Facility Points of Contact	3 - Structural	
	4 - Building Envelope	
	5 - Utility Systems	
	6 - Mechanical Systems	
	7 - Plumbing and Gas	
	8 - Electrical Systems	
	9 - Fire Alarm Systems	Import Checklist
	10 - Communications and IT Systems	
	11- Equipment Operations and Maintenance	
	12 - Security	
	13- Security Master Plan	Close
	14-COOP Facility: Additional Concerns	

Threat Matrices

- Critical Function Matrix
- Critical Infrastructure Matrix

This program was developed by and for FEMA and the Department of Veterans Affairs, pursuant to a contract with the National Institute of Building Sciences.

For Help, Press the F1 Key
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FEMA

Critical Functions Matrix

Threats 

Critical Functions Matrix -- Page 1

Facility Name: CI-BC Assessment Date: 02/02/2007 Assessment Type: COOP Facility

TR: Threat Rating
AV: Asset Value
VR: Vulnerability Rating

Legend:
■ Low Risk (1-60)
■ Medium Risk (61-175)
■ High Risk (>175)

No.	Critical Function	Improvised Explosive Device (Bomb)				Chemical Agent				Arson / Incendiary Attack				Armed Attack				Biological Agent				Cyberterrorism				Agriterrorism				No.	Critical Function
		TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk		
1	Administration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Administration	
2	Engineering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	Engineering	
3	Warehousing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	Warehousing	
4	Data Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	Data Center	
5	Food Service	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	Food Service	
6	Security	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	Security	
7	Housekeeping	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	Housekeeping	
8	Day Care	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	Day Care	
9	Other CF-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	Other CF-1	
10	Other CF-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	Other CF-2	
11	Other CF-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	Other CF-3	
12	Other CF-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	Other CF-4	
13	Other CF-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	Other CF-5	
14	Other CF-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	Other CF-6	
15	Other CF-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	Other CF-7	
16	Other CF-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	Other CF-8	
17	Other CF-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	Other CF-9	
18	Other CF-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	Other CF-10	

Page 1 Page 2 Page 3 Rollup For Help, Press the F1 Key Close

Record: 1 of 18

Functions 

Threat Rating

1- 10

Asset Value

1- 10

Vulnerability Rating

1- 10



Low risk (1-60)



Medium risk (61-175)



High risk (> 175)



FEMA

Critical Functions Matrix

Threats 

critical Functions Matrix -- Page 1

Facility Name: CI-BC Assessment Date: 02/02/2007 Assessment Type: COOP Facility


TR: Threat Rating
AV: Asset Value
VR: Vulnerability Rating




Low Risk (1-60)
Medium Risk (61-175)
High Risk (>175)

No.	Critical Function	Improvised Explosive Device (Bomb)				Chemical Agent				Arson / Incendiary Attack				Armed Attack				Biological Agent				Cyberterrorism				Agriterrorism				No.	Critical Func
		TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk		
1	Administration	3	6	8	144	4	6	9	216	5	6	3	90	5	6	8	240	2	6	7	84	9	6	4	216	0	0	0	0	1	Administration
2	Engineering	3	6	8	144	4	6	2	48	5	6	5	150	2	6	7	84	2	6	7	84	5	6	4	120	0	0	0	0	2	Engineering
3	Warehousing	3	2	8	48	4	2	9	72	8	2	3	48	2	2	7	28	2	2	7	28	2	2	4	16	0	0	0	0	3	Warehousing
4	Data Center	3	6	8	144	4	6	5	120	2	6	2	24	2	6	3	36	2	6	7	84	9	6	4	216	0	0	0	0	4	Data Center
5	Food Service	3	3	8	72	4	3	9	108	5	3	5	75	6	3	7	126	2	3	7	42	2	3	4	24	0	0	0	0	5	Food Service
6	Security	3	5	8	120	4	5	9	180	2	5	2	20	2	5	4	40	2	5	7	70	2	5	4	40	0	0	0	0	6	Security
7	Housekeeping	3	2	8	48	4	2	9	72	6	2	2	24	2	2	4	16	2	2	7	28	2	2	4	16	0	0	0	0	7	Housekeeping
8	Day Care	3	3	8	72	4	3	9	108	5	3	2	30	2	3	7	42	2	3	7	42	2	3	4	24	0	0	0	0	8	Day Care
9	Other CF-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	9	Other CF-1
10	Other CF-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	Other CF-2
11	Other CF-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	Other CF-3
12	Other CF-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	Other CF-4
13	Other CF-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	Other CF-5
14	Other CF-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	Other CF-6
15	Other CF-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	Other CF-7
16	Other CF-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	Other CF-8
17	Other CF-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	Other CF-9
18	Other CF-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	Other CF-10

Page 1 Page 2 Page 3 Rollup For Help, Press the F1 Key Close

Record: 9 of 18

Functions 

Threat Rating 1- 10  Low risk (1-60)
 Asset Value 1- 10  Medium risk (61-175)
 Vulnerability Rating 1- 10  High risk (> 175)



FEMA

Threat Matrices

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information	Checklists	Executive Summary/Vulnerability
General Facility Information	1- Site Checklist	Facility Executive Summary
Assessment Team	2 - Architectural	Facility Vulnerabilities
Facility Points of Contact	3 - Structural	
	4 - Building Envelope	
	5 - Utility Systems	
	6 -Mechanical Systems	
	7 - Plumbing and Gas	
	8 - Electrical Systems	
	9 - Fire Alarm Systems	Import Checklist
	10 - Communications and IT Systems	
	11- Equipment Operations and Maintenance	
	12 - Security	
	13- Security Master Plan	Close
	14-COOP Facility: Additional Concerns	

Threat Matrices

- Critical Function Matrix
- Critical Infrastructure Matrix**

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FEMA

Critical Infrastructure Matrix

Threats 

Critical Infrastructure Matrix -- Page 1

Facility Name: CI-BC Assessment Date: 02/02/2007 Assessment Type: COOP Facility


TR: Threat Rating AV: Asset Value VR: Vulnerability Rating

■ Low Risk (1-60)
■ Medium Risk (61-175)
■ High Risk (>175)

No.	Critical Infrastructure	Improvised Explosive Device (Bomb)				Chemical Agent				Arson / Incendiary Attack				Armed Attack				Biological Agent				Cyberterrorism				Agriterrorism				No.	Critical Infrastructure
		TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk		
1	Site	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	Site	
2	Architectural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	Architectural	
3	Structural Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	Structural Systems	
4	Envelope Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	Envelope Systems	
5	Utility Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	Utility Systems	
6	Mechanical Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	Mechanical Systems	
7	Plumbing and Gas Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	Plumbing and Gas Systems	
8	Electrical Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	Electrical Systems	
9	Fire Alarm Systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	Fire Alarm Systems	
10	IT/Communications Syste	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	IT/Communications System		
11	Other CI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	Other CI-1	
12	Other CI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	Other CI-2	
13	Other CI-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	Other CI-3	
14	Other CI-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	Other CI-4	
15	Other CI-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	Other CI-5	
16	Other CI-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	Other CI-6	
17	Other CI-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	Other CI-7	
18	Other CI-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	Other CI-8	
19	Other CI-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	Other CI-9	

Page 1 Page 2 Page 3 Rollup For Help, Press the F1 Key Close

Record: 1 of 20

Infrastructure 

Threat Rating

1- 10



Low risk (1-60)

Asset Value

1- 10



Medium risk (61-175)

Vulnerability Rating

1- 10



High risk (> 175)



FEMA

Critical Infrastructure Matrix

Threats →

Critical Infrastructure Matrix -- Page 1

Facility Name: CI-BC Assessment Date: 02/02/2007 Assessment Type: COOP Facility

TR: Threat Rating
AV: Asset Value
VR: Vulnerability Rating

Legend:
■ Low Risk (1-60)
■ Medium Risk (61-175)
■ High Risk (>175)

No.	Critical Infrastructure	Improvised Explosive Device (Bomb)				Chemical Agent				Arson / Incendiary Attack				Armed Attack				Biological Agent				Cyberterrorism				Agriterrorism				No.	Critical Infrastructure	
		TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk	TR	AV	VR	Risk			
1	Site	3	2	9	54	4	2	3	24	3	2	8	48	5	2	2	20	2	2	2	8	1	2	2	4	0	0	0	0	1	Site	
2	Architectural	3	2	7	42	4	2	3	24	3	2	4	24	5	2	2	20	2	2	2	8	1	2	2	4	0	0	0	0	2	Architectural	
3	Structural Systems	3	5	7	105	4	5	3	60	3	5	3	45	5	5	2	50	2	5	2	20	1	5	2	10	0	0	0	0	3	Structural Systems	
4	Envelope Systems	3	5	9	135	4	5	3	60	3	5	3	45	5	5	2	50	2	5	2	20	1	5	2	10	0	0	0	0	4	Envelope Systems	
5	Utility Systems	3	5	9	135	4	5	7	140	3	5	7	105	5	5	7	175	2	5	7	70	5	5	5	125	0	0	0	0	5	Utility Systems	
6	Mechanical Systems	3	5	9	135	4	5	3	60	3	5	7	105	5	5	7	175	2	5	7	70	3	5	5	75	0	0	0	0	6	Mechanical Systems	
7	Plumbing and Gas Systems	3	5	9	135	4	5	7	140	3	5	7	105	5	5	7	175	2	5	7	70	1	5	5	25	0	0	0	0	7	Plumbing and Gas Systems	
8	Electrical Systems	3	5	7	105	4	5	2	40	3	5	7	105	5	5	7	175	2	5	2	20	1	5	5	25	0	0	0	0	8	Electrical Systems	
9	Fire Alarm Systems	3	2	5	30	4	2	2	16	3	2	2	12	5	2	2	20	2	2	2	8	1	2	2	4	0	0	0	0	9	Fire Alarm Systems	
10	IT/Communications Syste	3	7	5	105	4	7	2	56	3	7	7	147	5	7	6	210	2	7	2	28	9	7	6	378	0	0	0	0	10	IT/Communications Syste	
11	Other CI-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	Other CI-1
12	Other CI-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	Other CI-2
13	Other CI-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	Other CI-3
14	Other CI-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	Other CI-4
15	Other CI-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	Other CI-5
16	Other CI-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	Other CI-6
17	Other CI-7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	Other CI-7
18	Other CI-8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	Other CI-8
19	Other CI-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	Other CI-9

Page 1 Page 2 Page 3 Rollup For Help, Press the F1 Key Close

Record: 11 of 20

Infrastructure ↓

Threat Rating

1- 10



Low risk (1-60)

Asset Value

1- 10



Medium risk (61-175)

Vulnerability Rating

1- 10



High risk (> 175)



FEMA

Checklists

Main Menu for Assessors

FEMA
FEMA 452: Risk Assessment Database v.3.0
Assessment Tool

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information	Checklists	Executive Summary/Vulnerability
General Facility Information	1 - Site Checklist	Facility Executive Summary
Assessment Team	2 - Architectural	Facility Vulnerabilities
Facility Points of Contact	3 - Structural	
	4 - Building Envelope	
	5 - Utility Systems	
	6 - Mechanical Systems	
	7 - Plumbing and Gas	
	8 - Electrical Systems	
	9 - Fire Alarm Systems	Import Checklist
	10 - Communications and IT Systems	
	11 - Equipment Operations and Maintenance	
	12 - Security	
	13 - Security Master Plan	Close
	14 - COOP Facility: Additional Concerns	

Threat Matrices

Critical Function Matrix

Critical Infrastructure Matrix

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FEMA

Site Checklist

Observations and Recommendations/Remediations for Section Heading: Site

ility Name: CI-BC Type: COOP Facility

#	Observation	Recommendation/Remediation	Vuln?	Vulnerability Assessment Question	Guidance	Additional R
			<input type="checkbox"/>	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and	FPC 65: Annex Alternate Operating Facilities, Plan Considerations
			<input type="checkbox"/>	Does the terrain place the building in a depression or low area?	Depressions or low areas can trap heavy vapors, inhibit natural decontamination by prevailing winds, and reduce the effectiveness of in-place sheltering. - Reference: USAF Installation Force Protection Guide	FPC 65: Annex Alternate Operating Facilities, Plan Considerations
			<input type="checkbox"/>	In dense, urban areas, does curb lane parking place uncontrolled parked vehicles unacceptably close to a building in public rights-of-way?	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology for the distance between a building and	FPC 65: Annex Alternate Operating Facilities, Plan Considerations

View Facility Information For Help, Press the F1 Key Close

Record: 1 of 25 (Filtered)



FEMA

Site Checklist

Observations and Recommendations/Remediations for Section Heading: Site

Site Name: CI-BC Type: COOP

Q#	Observation	Recommendation/Remediation	Vuln?	Vulnerability Assessment Question	Guidance
1-1	Two Critical Hazard Facilities within 2 mile and a dozen Tier II HAZMAT Facilities within 3 miles. Major interstate highway within 1/4 mile. Two railroads have tracks within 1/2 mile with no restrictions on materials carried. Four nearby buried long-distance	Collateral effects of attacks or accidents impact CI-BC similar to CBR attacks. See recommendations for HVAC systems.	<input type="checkbox"/>	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and
1-2	The site is above the tank farm and the rear parking area slopes away from the building to a stream, which allows winds to pass over the structure unhindered.	None.	<input type="checkbox"/>	Does the terrain place the building in a depression or low area?	Depressions or low areas can trap heavy vapors, inhibit natural decontamination by prevailing winds, and reduce the effectiveness of in-place sheltering. - Reference: USAF Installation Force Protection Guide
▶ 1-3	With a loading dock on the west side, it is possible for vehicles to park right next to the building. Normal parking for employees is in front; the closest row is 44 feet from the front door.	Increased stand-off or increased access control is needed to reduce risk of vehicle-borne improvised explosive device. Any action will require coordination with Business Park Management and other tenants due to impacts on the overall business park.	<input checked="" type="checkbox"/>	In dense, urban areas, does curb lane parking place uncontrolled parked vehicles unacceptably close to a building in public rights-of-way?	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology for the distance between a building and

Record: 3 of 23 (Filtered) Close



FEMA

Site Checklist

Observations and Recommendations/Remediations for Section Heading: Site

Site Name: CI-BC Type: COOP

Q#	Observation	Recommendation/Remediation	Vuln?	Vulnerability Assessment Question	Guidance
1-1	Two Critical Hazard Facilities within 2 mile and a dozen Tier II HAZMAT Facilities within 3 miles. Major interstate highway within 1/4 mile. Two railroads have tracks within 1/2 mile with no restrictions on materials carried. Four nearby buried long-distance	Collateral effects of attacks or accidents impact CI-BC similar to CBR attacks. See recommendations for HVAC systems.	<input type="checkbox"/>	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and
1-2	The site is above the tank farm and the rear parking area slopes away from the building to a stream, which allows winds to pass over the structure unhindered.	None.	<input type="checkbox"/>	Does the terrain place the building in a depression or low area?	Depressions or low areas can trap heavy vapors, inhibit natural decontamination by prevailing winds, and reduce the effectiveness of in-place sheltering. - Reference: USAF Installation Force Protection Guide
1-3	With a loading dock on the west side, it is possible for vehicles to park right next to the building. Normal parking for employees is in front; the closest row is 44 feet from the front door.	Increase vehicle development coefficient Management and maintenance impacts on the overall business park.	<input type="checkbox"/>	You WILL still have to supply a Building Number and a Priority in the Vulnerabilities section.	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology for the distance between a building and

Record: 3 of 23 (Filtered)

Close

Microsoft Access

Copying this Observation to the Vulnerabilities section...

You WILL still have to supply a Building Number and a Priority in the Vulnerabilities section.

OK



FEMA

Site Checklist

Observations and Recommendations/Remediations for Section Heading: Site

Site Name: CI-BC Type: COOP

Q#	Observation	Recommendation/Remediation	Vuln?	Vulnerability Assessment Question	Guidance
1-1	Two Critical Hazard Facilities within 2 mile and a dozen Tier II HAZMAT Facilities within 3 miles. Major interstate highway within 1/4 mile. Two railroads have tracks within 1/2 mile with no restrictions on materials carried. Four nearby buried long-distance	Collateral effects of attacks or accidents impact CI-BC similar to CBR attacks. See recommendations for HVAC systems.	<input type="checkbox"/>	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and
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▶ 1-3	With a loading dock on the west side, it is possible for vehicles to park right next to the building. Normal parking for employees is in front; the closest row is 44 feet from the front door.	Increased stand-off or increased access control is needed to reduce risk of vehicle-borne improvised explosive device. Any action will require coordination with Business Park Management and other tenants due to impacts on the overall business park.	<input checked="" type="checkbox"/>	In dense, urban areas, does curb lane parking place uncontrolled parked vehicles unacceptably close to a building in public rights-of-way?	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology for the distance between a building and

Record: 3 of 23 (Filtered)

Close



FEMA

Checklists

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0

Assessment Tool

Facility: CI-BC

Assessment Date: 2/2/2007

Assessment Type: COOP Facility

Facility and Team Information

General Facility Information

Assessment Team

Facility Points of Contact

Checklists

1 - Site Checklist

2 - Architectural

3 - Structural

4 - Building Envelope

5 - Utility Systems

6 - Mechanical Systems

7 - Plumbing and Gas

8 - Electrical Systems

9 - Fire Alarm Systems

10 - Communications and IT Systems

11 - Equipment Operations and Maintenance

12 - Security

13 - Security Master Plan

14 - COOP Facility: Additional Concerns

Executive Summary/Vulnerability

Facility Executive Summary

Import Checklist

Close

Threat Matrices

Critical Function Matrix

Critical Infrastructure Matrix

All launch similar checklists with places to enter observations and recommendations / remediations

For Help, Press the F1 Key

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FEMA

Executive Summary

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 *Assessment Tool*

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information

- General Facility Information
- Assessment Team
- Facility Points of Contact

Checklists

- 1- Site Checklist
- 2 - Architectural
- 3 - Structural
- 4 - Building Envelope
- 5 - Utility Systems
- 6 -Mechanical Systems
- 7 - Plumbing and Gas
- 8 - Electrical Systems
- 9 - Fire Alarm Systems
- 10 - Communications and IT Systems
- 11- Equipment Operations and Maintenance
- 12 - Security
- 13- Security Master Plan
- 14-COOP Facility: Additional Concerns

Executive Summary/Vulnerability

- Facility Executive Summary
- Facility Vulnerabilities
- Import Checklist
- Close

Threat Matrices

- Critical Function Matrix
- Critical Infrastructure Matrix

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Executive Summary Tab

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Introduction	Observations	Recommendations/Remediations
<div style="border: 1px solid black; height: 200px;"></div>	<div style="border: 1px solid black; height: 200px;"></div>	<div style="border: 1px solid black; height: 200px;"></div>

Record: of 1

For Help, Press the F1 Key Close



FEMA

Vulnerabilities



FEMA

Vulnerabilities and Recommendations

Assessment Main Page

Facility Name: CI-BC Default Image:

Assessment Location: CI-BC

Assessment Date: 2/2/2007 Type: COOP Facility

No Image Available

Executive Summary Vulnerabilities Points of Contact Assessment Team Add Photos Photos Add GIS Portfolio Images GIS Portfolio Miscellaneous Files

Building Name or Number	Vulnerability	Priority	Recommendation/Remediation	Vulnerability Status / Cost	Extracted Check Observa
<input type="text"/>		<input type="text"/>			

Update Remediation Details

Record: 1 of 1

For Help, Press the F1 Key Close



FEMA

Vulnerabilities and Recommendations

Remediations

Building No	Vulnerability	Priority	Recommendation/Remediation
CI-BC		1	

Action	Date	Cost	Comments
Initial		\$0	
Planned		\$0	
Underway		\$0	
Completed		\$0	

For Help, Press the F1 Key Close



FEMA

Vulnerabilities and Recommendations

Assessment Main Page

Facility Name: Default Image:

Assessment Location:

Assessment Date: Type:

No Image Available

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Add Photos | Photos | Add GIS Portfolio Images | GIS Portfolio | Miscellaneous Files

Building Name or Number	Vulnerability	Priority	Recommendation/Remediation	Vulnerability Status / Cost	Extracted Check Observa
<input type="text"/>		<input type="text"/>			<input type="text" value="Update Remediation Details"/>

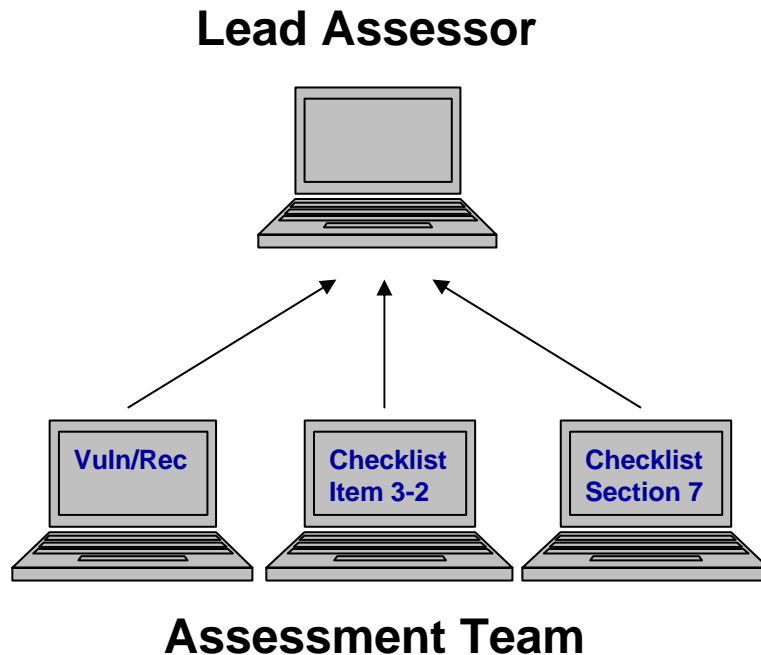
Record: of 1

For Help, Press the F1 Key



FEMA

Assessment Team Import Function



- Establish a link to a team member's database
- Open the remote database
- Import Observation, Recommendation/Remediation, or Vulnerability entries

The assessment team members to combine their data into one database file on one computer at the end of the assessment.



FEMA

Import Assessments

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: Assessment Date: Assessment Type:

Facility and Team Information	Checklists	Executive Summary/Vulnerability
<input type="button" value="General Facility Information"/>	<input type="button" value="1- Site Checklist"/>	<input type="button" value="Facility Executive Summary"/>
<input type="button" value="Assessment Team"/>	<input type="button" value="2 - Architectural"/>	<input type="button" value="Facility Vulnerabilities"/>
<input type="button" value="Facility Points of Contact"/>	<input type="button" value="3 - Structural"/>	
	<input type="button" value="4 - Building Envelope"/>	
	<input type="button" value="5 - Utility Systems"/>	
	<input type="button" value="6 -Mechanical Systems"/>	
	<input type="button" value="7 - Plumbing and Gas"/>	
	<input type="button" value="8 - Electrical Systems"/>	
	<input type="button" value="9 - Fire Alarm Systems"/>	<input type="button" value="Import Checklist"/>
	<input type="button" value="10 - Communications and IT Systems"/>	
	<input type="button" value="11- Equipment Operations and Maintenance"/>	
	<input type="button" value="12 - Security"/>	
	<input type="button" value="13- Security Master Plan"/>	<input type="button" value="Close"/>
	<input type="button" value="14-COOP Facility: Additional Concerns"/>	

Threat Matrices

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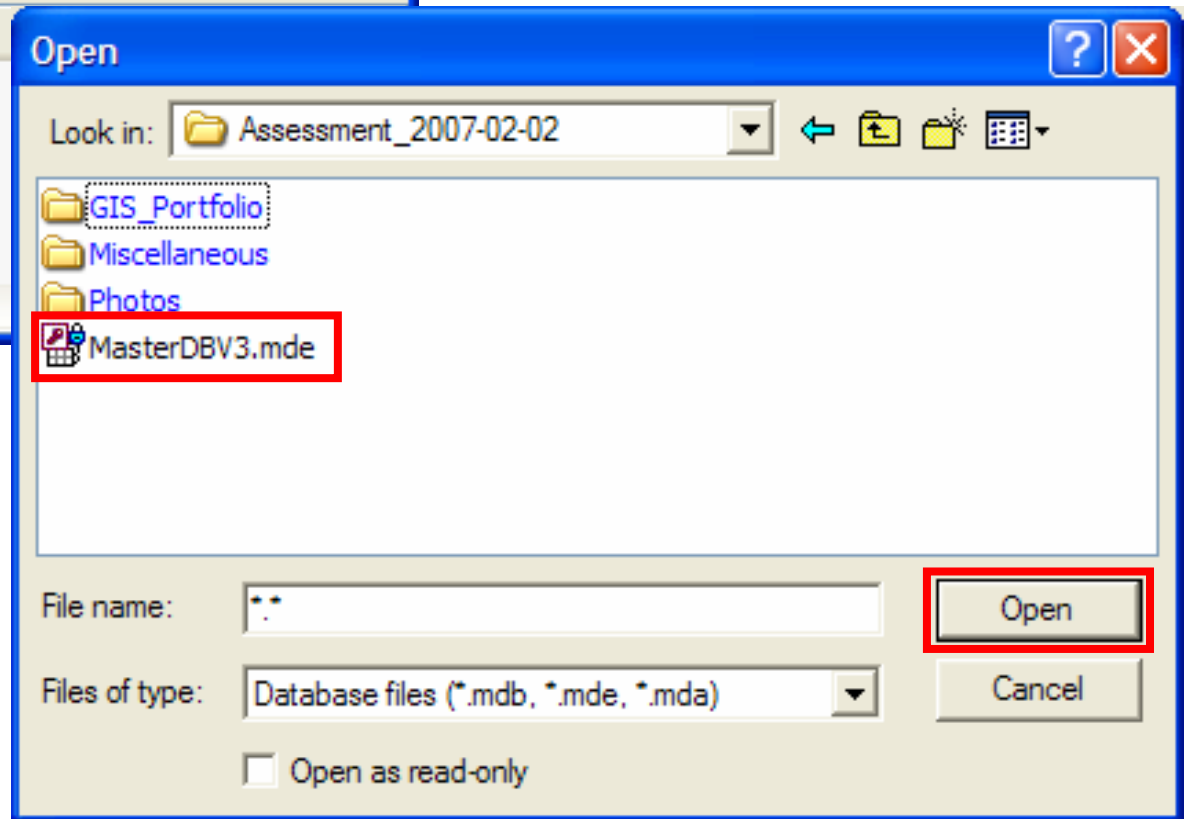
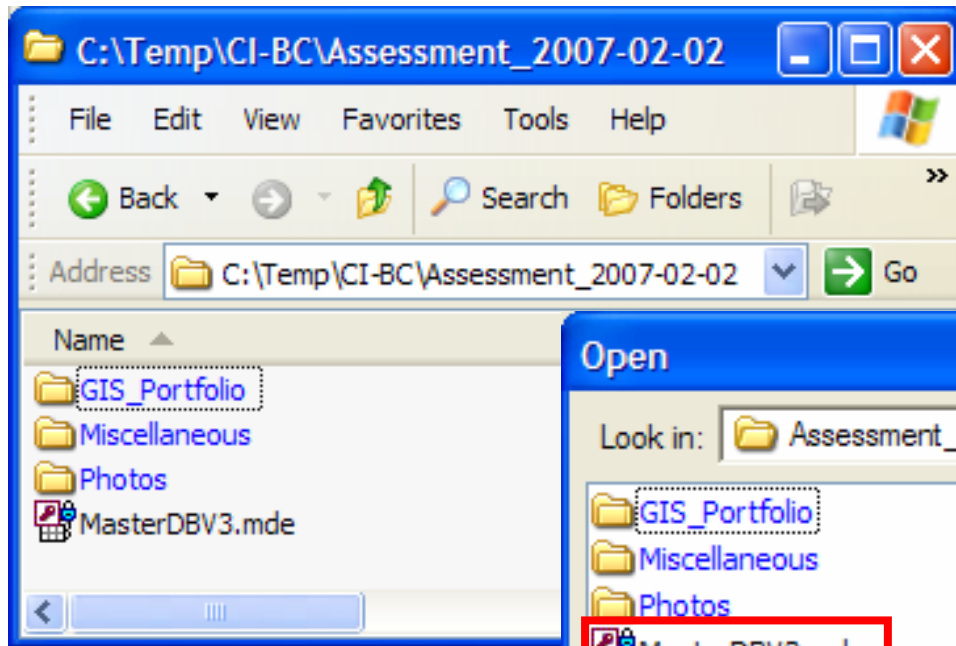
Import Assessments

The screenshot displays the 'Main Menu for Assessors' window for FEMA's Risk Assessment Database v.3.0. The interface includes a header with the FEMA logo and the text 'FEMA 452: Risk Assessment Database v.3.0' and 'Assessment Tool'. Below the header, there are input fields for 'Facility: CI-BC', 'Assessment Date: 2/2/2007', and 'Assessment Type: COOP Facility'. The main area is divided into several sections: 'Facility and Team Information', 'Checklists', and 'Executive Summary/Vulnerability'. A 'Select File' dialog box is open, showing the path 'C:\Import_Obsssss\Import_ME.mdb' and a 'Browse' button highlighted with a red box. Below the dialog box, there are buttons for 'Import' and 'Close'. The background shows a list of systems: 6 - Mechanical Systems, 7 - Plumbing and Gas, 8 - Electrical Systems, 9 - Fire Alarm Systems, 10 - Communications and IT Systems, 11 - Equipment Operations and Maintenance, 12 - Security, 13 - Security Master Plan, and 14 - COOP Facility: Additional Concerns. There are also buttons for 'Import Checklist' and 'Close'. At the bottom, there is a 'Threat Matrices' section with buttons for 'Critical Function Matrix' and 'Critical Infrastructure Matrix'. A footer contains the text: 'This program was developed by and for FEMA and the Department of Veterans Affairs, pursuant to a contract with the National Institute of Building Sciences.' and 'For Help, Press the F1 Key' and '© National Institute of Building Sciences 2004'.



FEMA

Import Assessments



FEMA

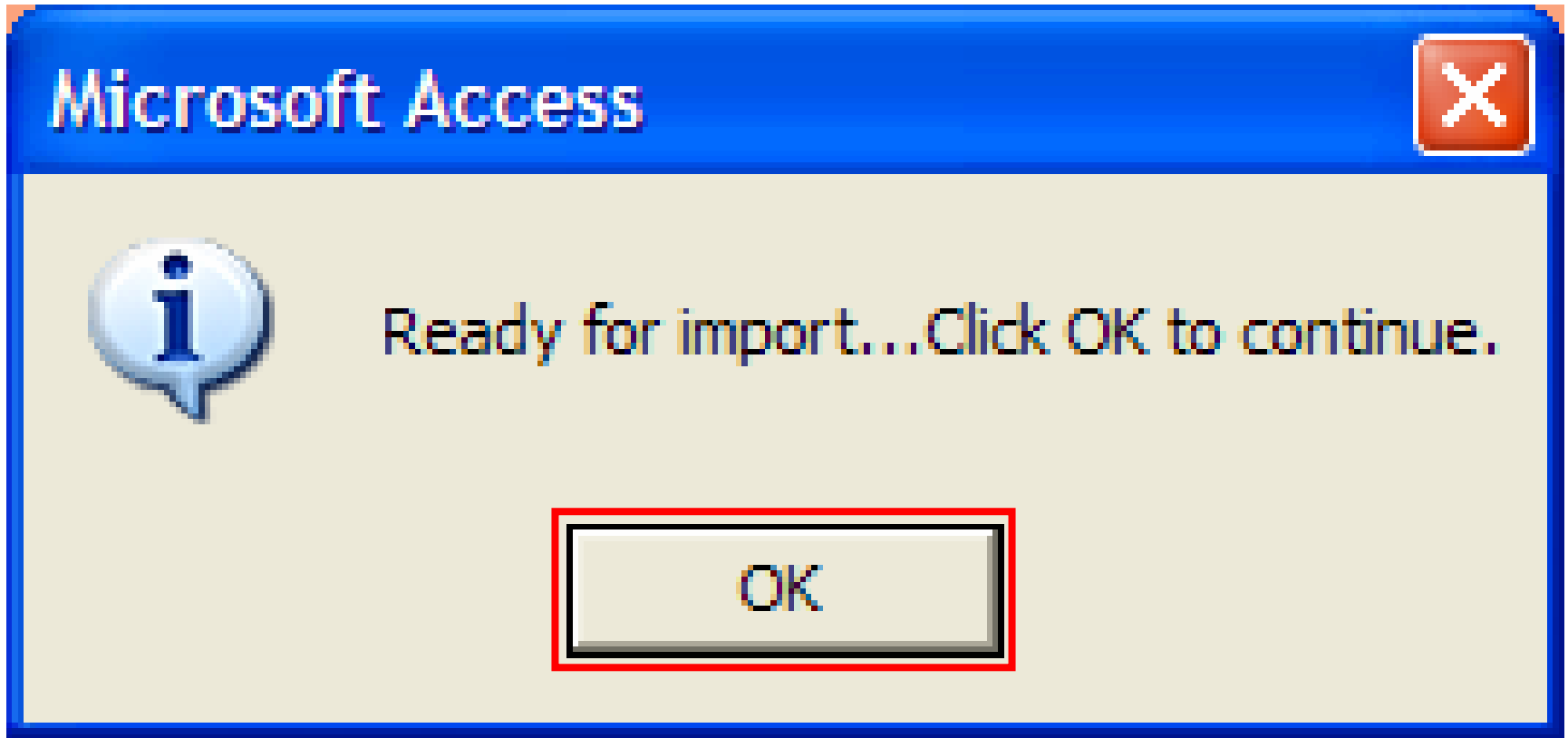
Import Assessments

The screenshot displays the 'Main Menu for Assessors' window for FEMA 452: Risk Assessment Database v.3.0. The interface includes a header with the FEMA logo and the text 'FEMA 452: Risk Assessment Database v.3.0' and 'Assessment Tool'. Below the header, there are input fields for 'Facility: CI-BC', 'Assessment Date: 2/2/2007', and 'Assessment Type: COOP Facility'. The main menu has tabs for 'Facility and Team Information', 'Checklists', and 'Executive Summary/Vulnerability'. A 'Select File' dialog box is open, showing the file path 'C:\Temp\CI-BC\Assessment_2007-02-02\MasterDBV3.mde' selected. The 'Import' button in the dialog box is highlighted with a red rectangle. Below the dialog box, there is a list of system categories: 6 - Mechanical Systems, 7 - Plumbing and Gas, 8 - Electrical Systems, 9 - Fire Alarm Systems, 10 - Communications and IT Systems, 11 - Equipment Operations and Maintenance, 12 - Security, 13 - Security Master Plan, and 14 - COOP Facility: Additional Concerns. There are buttons for 'Import Checklist' and 'Close'. On the left, there are buttons for 'Threat Matrices', 'Critical Function Matrix', and 'Critical Infrastructure Matrix'. At the bottom, there is a footer with the text 'This program was developed by and for FEMA and the Department of Veterans Affairs, pursuant to a contract with the National Institute of Building Sciences.' and '© National Institute of Building Sciences: 2004'. A note says 'For Help, Press the F1 Key'.



FEMA

Import Assessments



FEMA

Import Assessments

frmSiteAssessments_Remote

Assessments Available for Import From: C:\Temp\CI-BC\Assessment_2007-02-02

Site Name	Address 1	City	Assessment Location	Assessment Date	Type
▶ CI-BC			CI-BC	2/2/2007	COOP Facility
Example site 2			Site 2	2/2/2006	Tier 2
Example site 3			Site 3	6/6/2006	Tier 3

Select Assessment

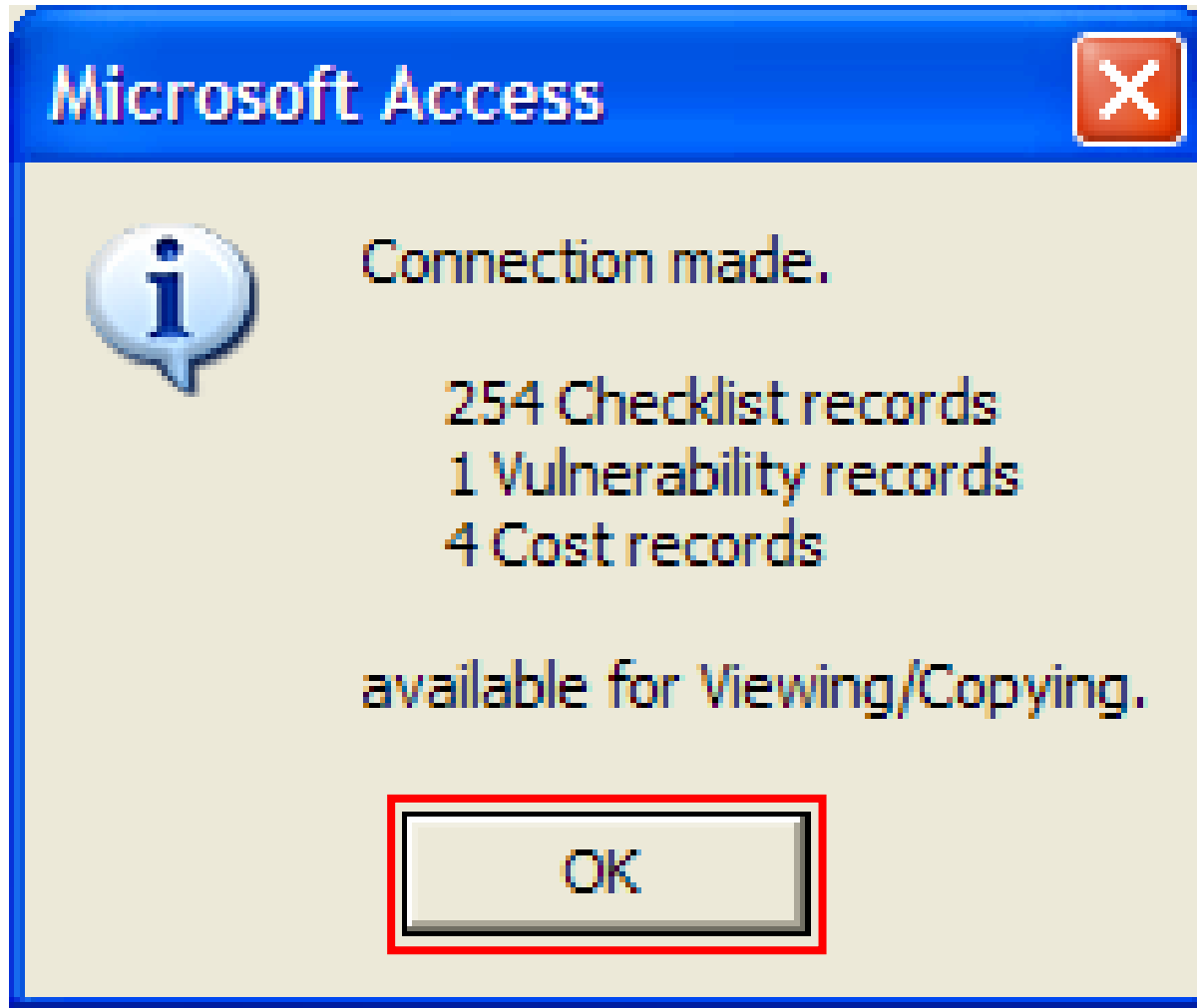
Cancel

Record: 1 of 3



FEMA

Import Assessments



FEMA

Assessment Team Import Function

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: CI-BC Assessment Date: 2/2/2007 Assessment Type: COOP Facility

Facility and Team Information	Checklists	Executive Summary/Vulnerability
<input type="button" value="General Facility Information"/>	<input type="button" value="1- Site Checklist"/>	<input type="button" value="Facility Executive Summary"/>
<input type="button" value="Assessment Team"/>	<input type="button" value="2 - Architectural"/>	<input type="button" value="Facility Vulnerabilities"/>
<input type="button" value="Facility Points of Contact"/>	<input type="button" value="3 - Structural"/>	
	<input type="button" value="4 - Building Envelope"/>	
	<input type="button" value="5 - Utility Systems"/>	
	<input type="button" value="6 -Mechanical Systems"/>	
	<input type="button" value="7 - Plumbing and Gas"/>	
	<input type="button" value="8 - Electrical Systems"/>	
	<input type="button" value="9 - Fire Alarm Systems"/>	<input type="button" value="Import Checklist"/>
	<input type="button" value="10 - Communications and IT Systems"/>	
Threat Matrices	<input type="button" value="11- Equipment Operations and Maintenance"/>	
<input type="button" value="Critical Function Matrix"/>	<input type="button" value="12 - Security"/>	
<input type="button" value="Critical Infrastructure Matrix"/>	<input type="button" value="13- Security Master Plan"/>	<input type="button" value="Close"/>
	<input type="button" value="14-COOP Facility: Additional Concerns"/>	

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FEMA

Assessment Team Import Function

Observations and Recommendations/Remediations for Section Heading: Site

Facility Name: CI-BC Type: COOP Facility

Open Remote Data C:\Temp\CI-BC\Assessment_2007-02-02\MasterDBV3.mde

Q#	Observation	Recommendation/Remediation	Vuln?	Vulnerability Assessment Question	Guidance
1-1			<input type="checkbox"/>	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and
1-2			<input type="checkbox"/>	Does the terrain place the building in a depression or low area?	Depressions or low areas can trap heavy vapors, inhibit natural decontamination by prevailing winds, and reduce the effectiveness of in-place sheltering. - Reference: USAF Installation Force Protection Guide
1-3			<input type="checkbox"/>	In dense, urban areas, does curb lane parking place uncontrolled parked vehicles unacceptably close to a building in public rights-of-way?	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology for the distance between a building and

View Facility Information For Help, Press the F1 Key Close

Record: 1 of 25 (Filtered)



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Assessment Team Import Function

Observations Details from the REMOTE DATABASE

Site Name: CI-BC

Copy Record	Q#	Observation	Recommendation/Remediation	Vuln?
<input type="checkbox"/>	1-1	Two Critical Hazard Facilities within 2 mile and a dozen Tier II HAZMAT Facilities within 3 miles. Major interstate highway within 1/4 mile. Two railroads have tracks within 1/2 mile with no restrictions on materials carried. Four nearby buried long-distance	Collateral effects of attacks or accidents impact CI-BC similar to CBR attacks. See recommendations for HVAC systems.	<input type="checkbox"/>
<input type="checkbox"/>	1-2	The site is above the tank farm and the rear parking area slopes away from the building to a stream, which allows winds to pass over the structure unhindered.	None.	<input type="checkbox"/>
<input type="checkbox"/>	1-3	With a loading dock on the west side, it is possible for vehicles to park right next to the building. Normal parking for employees is in front; the closest row is 44 feet from the front door.	Increased stand-off or increased access control is needed to reduce risk of vehicle-borne improvised explosive device. Any action will require coordination with Business Park Management and other tenants due to impacts on the overall business park.	<input checked="" type="checkbox"/>

Select All Update Local Copy Copy and OVERWRITE Copy and APPEND Close

Record: 1 of 23 (Filtered)



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Close Assessment Tool

Main Menu for Assessors

FEMA

FEMA 452: Risk Assessment Database v.3.0 Assessment Tool

Facility: Assessment Date: Assessment Type:

Facility and Team Information	Checklists	Executive Summary/Vulnerability
<input type="button" value="General Facility Information"/>	<input type="button" value="1- Site Checklist"/>	<input type="button" value="Facility Executive Summary"/>
<input type="button" value="Assessment Team"/>	<input type="button" value="2 - Architectural"/>	<input type="button" value="Facility Vulnerabilities"/>
<input type="button" value="Facility Points of Contact"/>	<input type="button" value="3 - Structural"/>	
	<input type="button" value="4 - Building Envelope"/>	
	<input type="button" value="5 - Utility Systems"/>	
	<input type="button" value="6 -Mechanical Systems"/>	
	<input type="button" value="7 - Plumbing and Gas"/>	
	<input type="button" value="8 - Electrical Systems"/>	
	<input type="button" value="9 - Fire Alarm Systems"/>	<input type="button" value="Import Checklist"/>
	<input type="button" value="10 - Communications and IT Systems"/>	
	<input type="button" value="11- Equipment Operations and Maintenance"/>	
	<input type="button" value="12 - Security"/>	
	<input type="button" value="13- Security Master Plan"/>	<input type="button" value="Close"/>
	<input type="button" value="14-COOP Facility: Additional Concerns"/>	

Threat Matrices

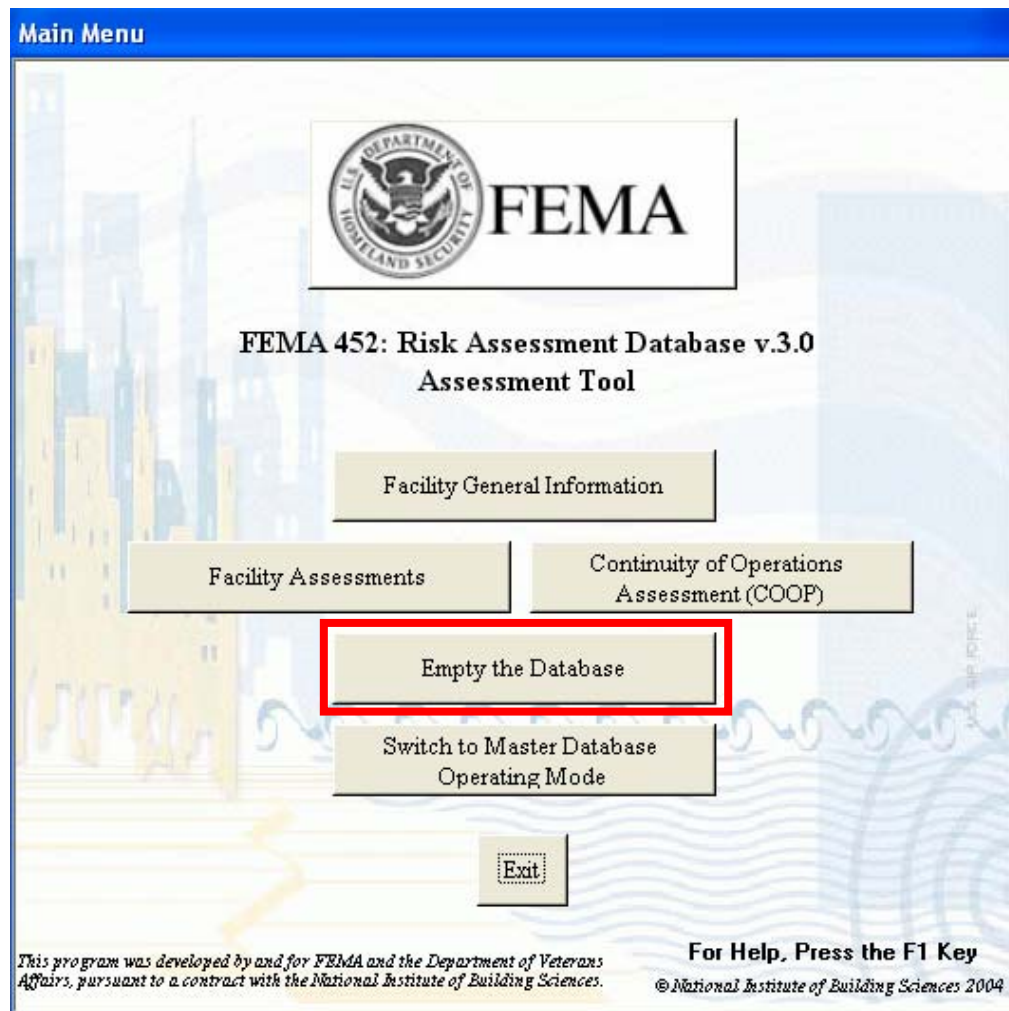
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For Help, Press the F1 Key
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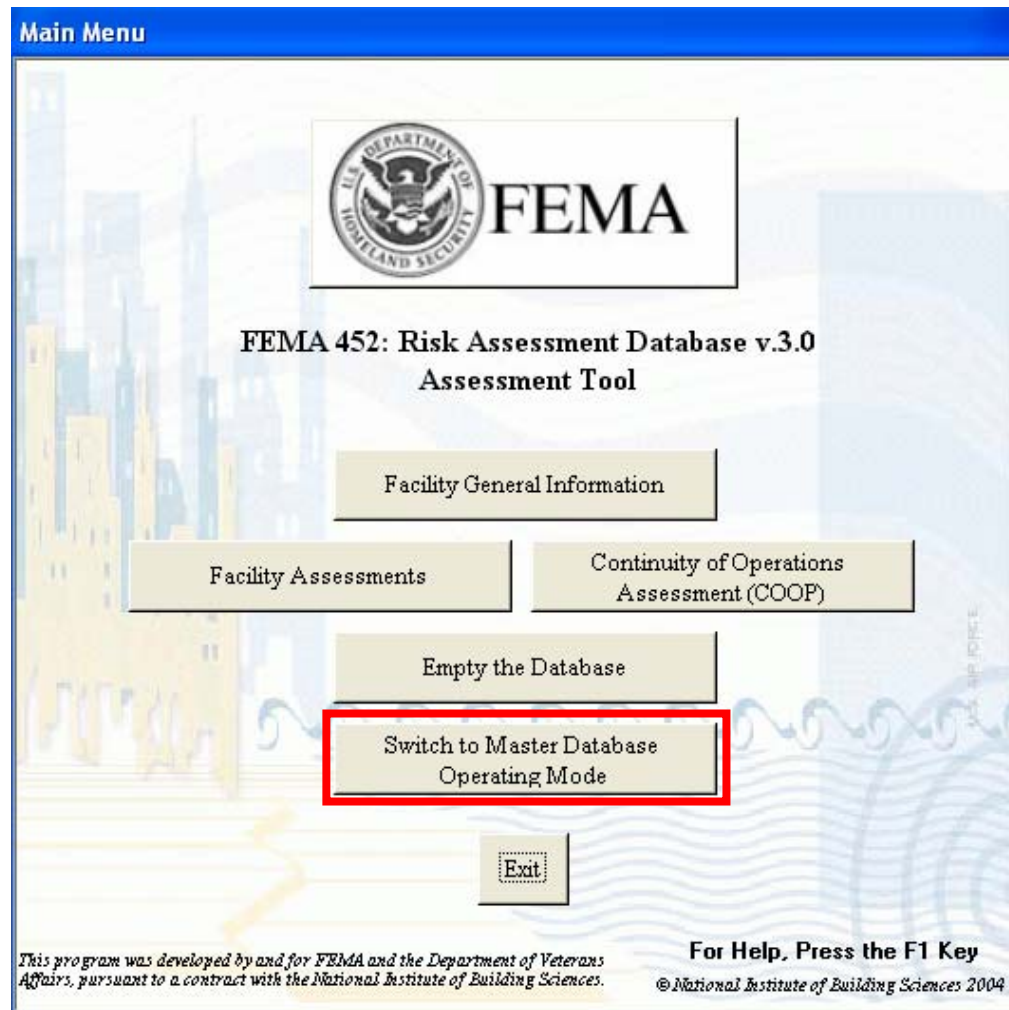
FEMA

Empty Database



FEMA

Switch to Master Database



FEMA

Switch to Master Database

Microsoft Access



The system is currently operating in ASSESSOR TOOL mode.

Would you like to switch Modes to the MASTER DATABASE mode?

Yes

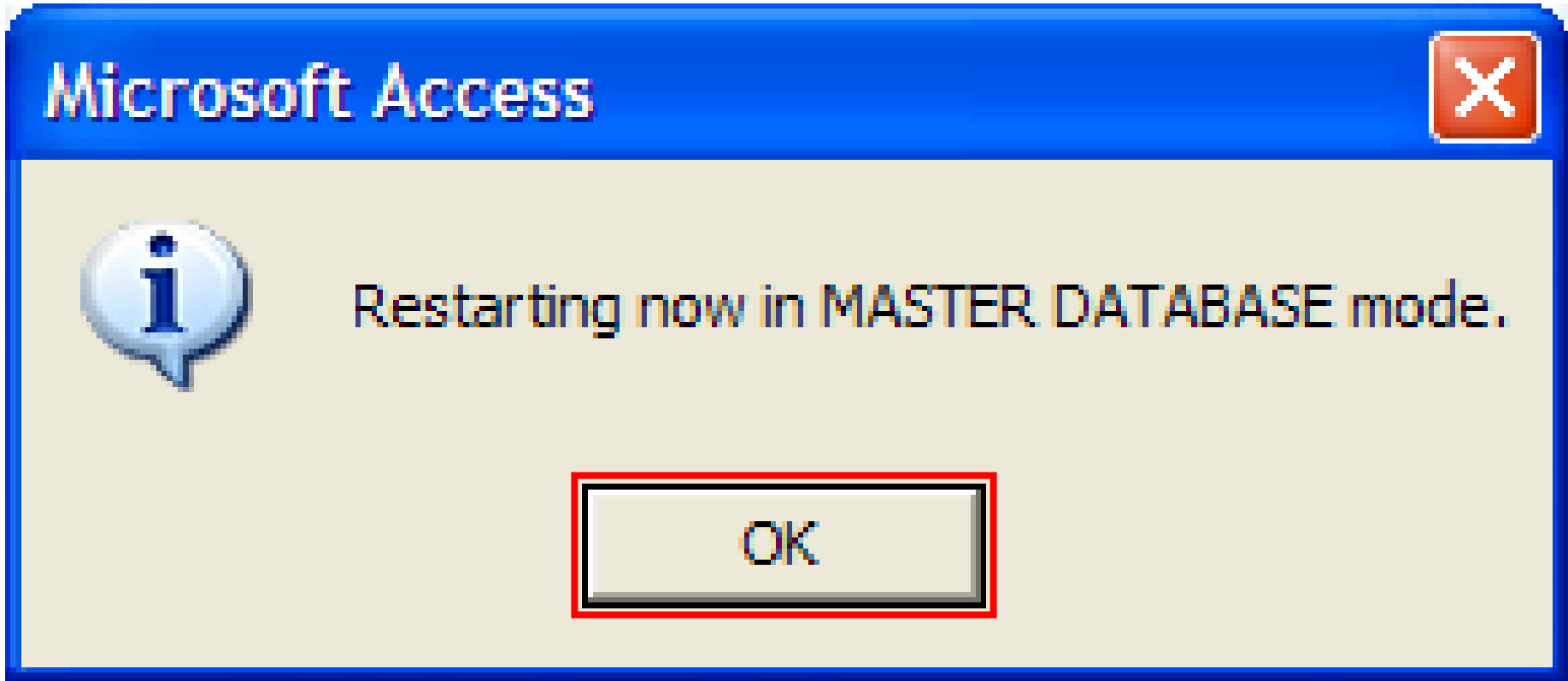
No

Cancel



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Switch to Master Database



FEMA

Master Database Mode



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View Checklists

List of Assessments

Assessment ID	Assessment Location	Organization Name	Assessment Date	Assessment Type	Assessment Folder Name
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27	CI-BC	CI-BC	2/2/2007	COOP Facility	Assessment_2007-02-02\

Record: 1 of 2



FEMA

View Checklists

Assessment Checklists

Facility Name: CI-BC
Assessment Location: CI-BC
Assessment Date: 2/2/2007 Type: COOP Facility

Site | Architectural | Structural | Building | Utility | Mechanical | Plumbing/Gas | Electrical | Fire Alarm | Comm/IT | Equipment O&M | Security | Security Master Plan | COOP

Q#	Observation	Recommendation / Remediation	Vulnerability?	Vulnerability Assessment Checklist Question
▶ 1-1				What major structures surround the facility (site or building)?
1-2				Does the terrain place the building in a depression or low area?
1-3				In dense, urban areas, does curb lane parking place uncontrolled access to the building?
1-4				Is a perimeter fence or other types of barrier controls in place?
1-5				What are the site access points to the site or building?
1-6				Is vehicle traffic separated from pedestrian traffic on the site?
1-7				Is there vehicle and pedestrian access control at the perimeter?
1-8				Is there space for inspection at the curb line or outside the building?
1-9				Is there any potential access to the site or building through the perimeter?
1-10				What are the existing types of vehicle anti-ram devices in place?
1-11				What is the anti-ram buffer zone stand-off distance from the building?
1-12				Are perimeter barriers capable of stopping vehicles? -- W

Record: 1 of 25

View All [Site] Observations | View All [Site] Vulnerability Assessment Questions | For Help, Press F1 | Close



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Reports

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27	CI-BC	CI-BC	2/2/2007	COOP Facility	Assessment_2007-02-02\

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Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Photos | GIS Portfolio | Miscellaneous Files

Assessment Checklist | Critical Function | Critical Infrastructure | Facility Information | **Assessment Reports** | Other Reports | Help | Close



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6	CI-BC2				Assessment_2007-02-02\

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Facility: CI-BC

Summary Sheet

Vulnerabilities

Executive Summary

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Facility Assessment Team

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Facility Information

Observations and Comments

For Help, Press the F1 Key

Close

Executive Summary

Vulnerabilities

Portfolio

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Critical Function

Critical Infrastructure

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Close

Record: 1 of 2



FEMA

Reports

FEMA 452: Risk Assessment Database v2.0 - [Vulnerability Report without Costs]

Help

File Close Report

Vulnerabilities and Recommendations

Priority	Building Number	Vulnerability	Recommendation/Remediation
1	CI-BC	All windows are in the office space area of the building (all the front and half of one side). In that area the penetration is probably more than 40%. The window system is standard commercial installation and thus, the glass, framing and anchorage are expected to be insufficient for the design basis threat.	For balanced performance, the anchorage of the windows should be improved for the blast capability of the frame and silicone sealant and fragmentation retention film should be added to the glass.
2	CI-BC	With a loading dock on the west side, it is possible for vehicles to park right next to the building. Normal parking for employees is in front; the closest row is 44 feet from the front door.	Increased stand-off or increased access control is needed to reduce risk of vehicle-borne improvised explosive device. Any action will require coordination with Business Park Management and other tenants due to impacts on the overall business park. For example, increase distance to first parking space to 50 feet by closing off nearby parking, control access to rear of building, or use reserved parking spaces in front of building anywhere within 80 feet of building.
3	CI-BC	The loading dock connects directly into the interior space, critical functions, and infrastructure.	There is little that can be done for the loading dock directly. Access control already required for other vulnerabilities will be beneficial in keeping threats away from the loading dock and reducing risk.

Page 1

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Reports

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Facility: CI-BC

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- Executive Summary**
- Vulnerabilities
- Threat Matrix
- Facility Assessment Team
- Facility Points of Contact
- Facility Information
- Observations and Comments

For Help, Press the F1 Key

Close

Record: 1 of 2

Executive Summary | Vulnerabilities | Portfolio | Miscellaneous Files

Assessment Checklist | Critical Function | Critical Infrastructure | Facility Information | **Assessment Reports** | Other Reports | Help | Close



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Reports

FEMA 452: Assessment Database v3.0 - [Executive Summary Report]

File: **Close Report**

Close this Report

Executive Summary

Introduction

Coopersville Information Co. (CI-BC) is a state-of-the-art information technology (IT) services company located in a major metropolitan city in a typical suburban business office park. The company's mission is to provide information technology and services support to include hosting servers, databases, applications, and other hardware and software, develop, install, and maintain software applications; provide field support IT technicians; and provide 24-hour help desk support.

CI-BC has over 20 clients and supports approximately 1,000 users and 100 applications as a primary data center and as a disaster recovery site. CI-BC clients include local and regional government offices and commercial entities along with large prime defense contractors and Federal government agencies. CI-BC handles unclassified and classified information.

Observations

Due to standard business office park construction, CI-BC is vulnerable to terrorist attacks and technological accidents both as the targeted facility and as collateral damage. There are limited procedural changes available to provide protection. Each attack possibility has a set of measures that can be prioritized and applied to mitigate that attack and reduce the risk from other attacks as well.

Recommendations / Remediations

The owner has agreed to work with a recommended set of design-basis threat (DBT) and consider GSA and DoD facility levels of protection criteria. Access control of vehicles would be the primary deterrent for vehicle-borne improvised explosive devices. While Chemical, Biological, Radiological (CBR) attacks are at a risk level to consider, proximity to transportation, storage, and other HAZMAT sites indicates that CBR considerations would also provide protection against technological accidents. There are also measures to take from a COOP (Continuity of Operations Plans) perspective as this is a backup facility for other data centers.

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Ready



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- Facility Assessment Team
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Close

Executive Summary | Vulnerabilities | Portfolio | Miscellaneous Files

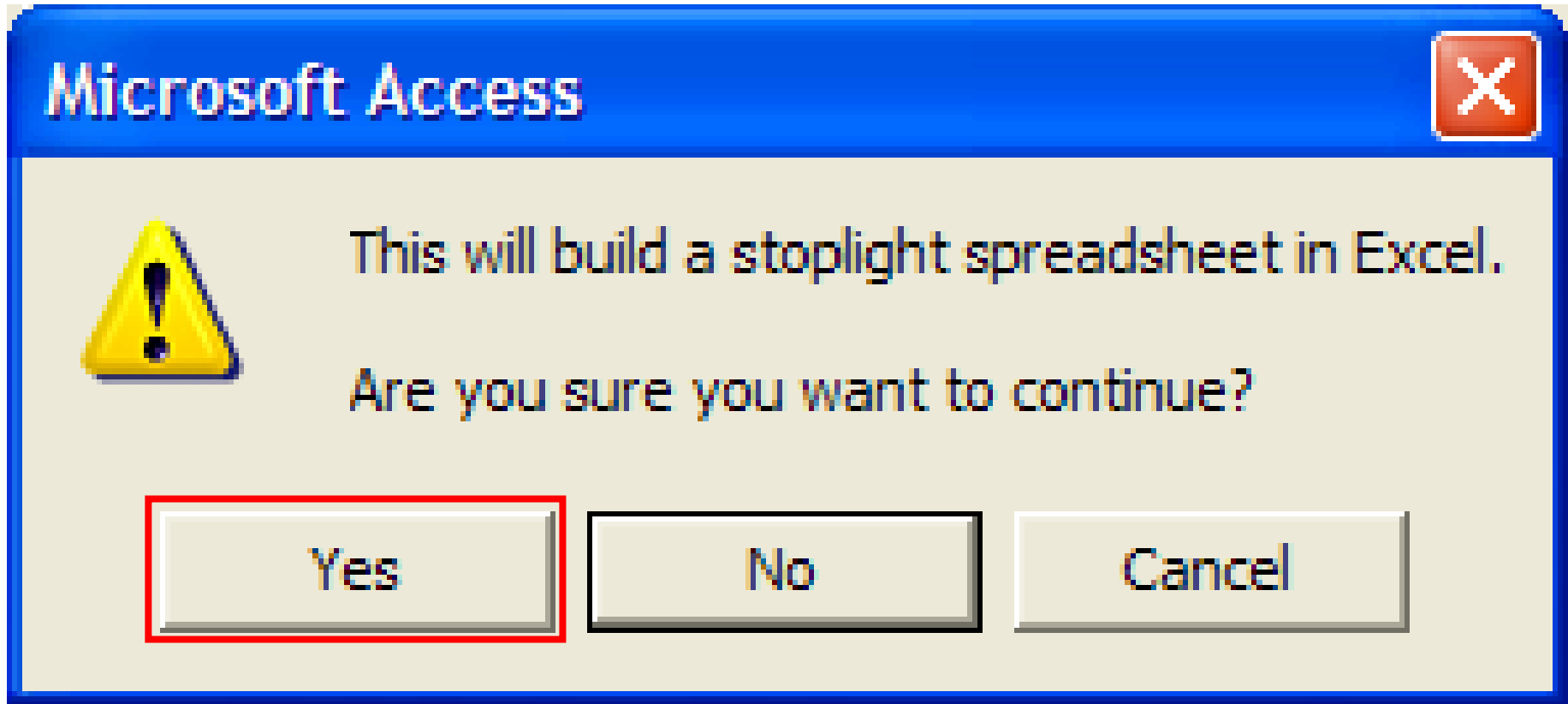
Assessment Checklist | Critical Function | Critical Infrastructure | Facility Information | Assessment Reports | Other Reports | Help | Close

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Reports



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Threat Matrix

K7		fx										
	A	B	C	D	E	F	G	H	I	J	K	
11	Facility											
12				Improvised	Chemical	Arson / Incendiary	Armed	Biological	Cyberterrorism	Agriterrorism	Radiological	N
13	Critical Infrastructure			Explosive Device	Agent	Attack	Attack	Agent			Agent	C
14												
15	Site			240	160	0	120	160	15	0	160	
16		Threat Rating		6	4	0	3	4	1	0	4	
17		Asset Value		5	5	0	5	5	5	0	5	
18		Vulnerability Rating		8	8	0	8	8	3	0	8	
19	Architectural			240	80	0	120	80	15	0	80	
20		Threat Rating		6	4	0	3	4	1	0	4	
21		Asset Value		5	5	0	5	5	5	0	5	
22		Vulnerability Rating		8	4	0	8	4	3	0	4	
23	Structural Systems			240	60	0	120	60	15	0	60	
24		Threat Rating		6	4	0	3	4	1	0	4	
25		Asset Value		5	5	0	5	5	5	0	5	
26		Vulnerability Rating		8	3	0	8	3	3	0	3	
27	Envelope Systems			240	60	0	120	60	15	0	60	
28		Threat Rating		6	4	0	3	4	1	0	4	
29		Asset Value		5	5	0	5	5	5	0	5	
30		Vulnerability Rating		8	3	0	8	3	3	0	3	
31	Utility Systems			180	60	0	175	60	75	0	60	
32		Threat Rating		6	4	0	5	4	3	0	4	
33		Asset Value		5	5	0	5	5	5	0	5	
34		Vulnerability Rating		6	3	0	7	3	5	0	3	
35	Mechanical Systems			224	196	0	245	196	105	0	196	
36		Threat Rating		4	4	0	5	4	3	0	4	
37		Asset Value		7	7	0	7	7	7	0	7	
38		Vulnerability Rating		8	7	0	7	7	5	0	7	
39	Plumbing and Gas Systems			160	100	0	120	100	30	0	100	
40		Threat Rating		4	4	0	3	4	2	0	4	
41		Asset Value		5	5	0	5	5	5	0	5	
42		Vulnerability Rating		8	5	0	8	5	3	0	5	
43	Electrical Systems			224	140	0	147	140	105	0	140	
44		Threat Rating		4	4	0	3	4	3	0	4	
45		Asset Value		7	7	0	7	7	7	0	7	
46		Vulnerability Rating		8	5	0	7	5	5	0	5	
47	Fire Alarm Systems			160	60	0	45	60	30	0	60	
48		Threat Rating		4	4	0	3	4	2	0	4	
49		Asset Value		5	5	0	5	5	5	0	5	
50		Vulnerability Rating		8	3	0	3	3	3	0	3	
51	IT and Communication Systems			320	240	0	240	240	1000	0	240	
52		Threat Rating		4	4	0	3	4	10	0	4	
53		Asset Value		10	10	0	10	10	10	0	10	
54		Vulnerability Rating		8	6	0	8	6	10	0	6	
55	Other1			0	0	0	0	0	0	0	0	



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Other Reports

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27	CI-BC	CI-BC	2/2/2007	COOP Facility	Assessment_2007-02-02\

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Search Reports Menu

Note: These reports search the entire database and are not limited to the Assessment you are currently viewing.

Search Observations and
Recommendations/Remediations

Search Vulnerabilities and
Recommendations/Remediations

Close



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Other Reports

Observations and Recommendations/Remediations for Assessment Checklist

Facility Name	Vulnerability Assessment Checklist #	Section Heading	Observation	Recommendation / Remediation
<input type="text"/>	1	Site	<input type="text"/>	<input type="text"/>
CI-BC	1-1	Site		
CI-BC	1-2	Site		
CI-BC	1-3	Site		
CI-BC	1-4	Site		
CI-BC	1-5	Site		

Print Observations, Sorted by Site Print Observations, Sorted by Checklist # Close

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Other Reports

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Search Reports Menu

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Search Observations and
Recommendations/Remediations

Search Vulnerabilities and
Recommendations/Remediations

Close



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27	CI-BC	CI-BC	2/2/2007	COOP Facility	Assessment_2007-02-02\

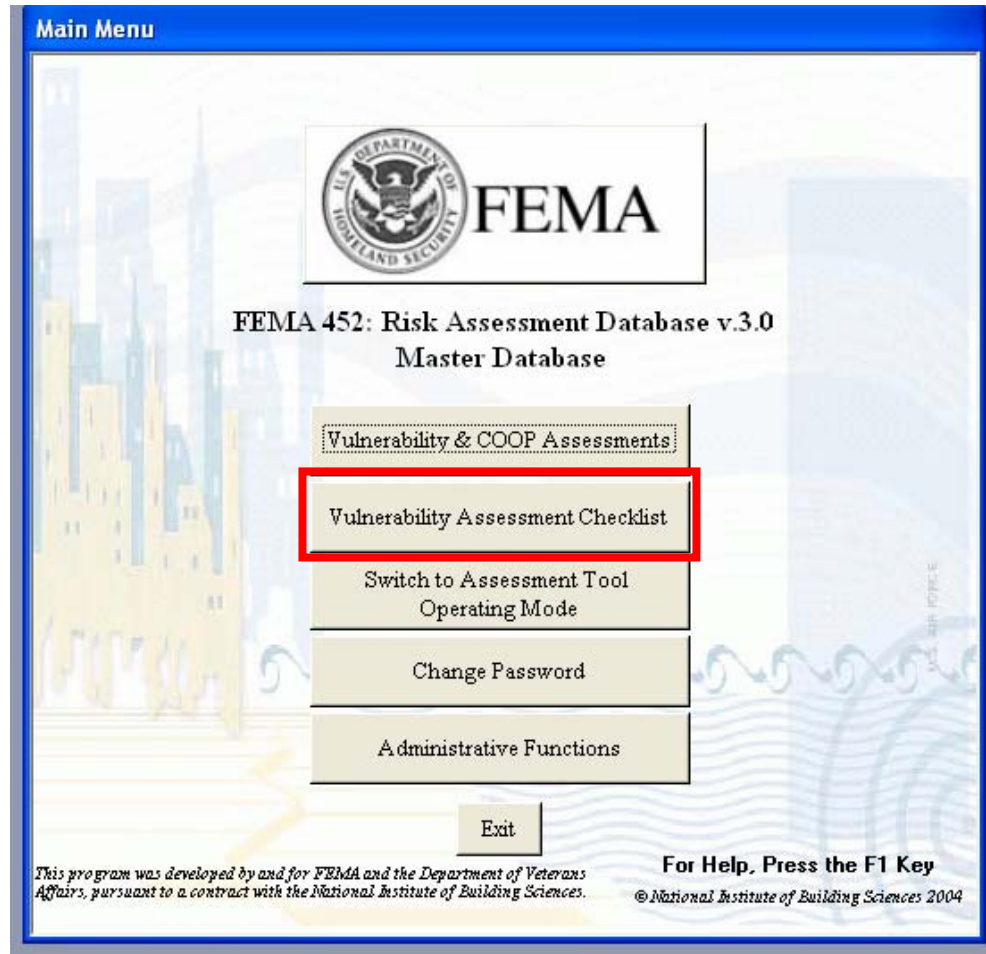
Record: 1 of 2

Executive Summary | Vulnerabilities | Points of Contact | Assessment Team | Photos | GIS Portfolio | Miscellaneous Files | Assessment Checklist | Critical Function | Critical Infrastructure | Facility Information | Assessment Reports | Other Reports | Help | **Close**



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Master Database



FEMA

Vulnerability Assessment Checklist Search

Assessment Checklist Question Details

Vulnerability Assessment Checklist #	Section Header	Question	Guidance	Additional Reference
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>	<input type="button" value="Search"/> <input type="button" value="Clear"/>
1-1	Site	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base	FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 1
1-2	Site	Does the terrain place the building in a depression or low area?	Depressions or low areas can trap heavy vapors, inhibit natural decontamination by prevailing winds, and reduce the effectiveness of in-place sheltering. - Reference: USAF Installation Force Protection Guide	FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 1
1-3	Site	In dense, urban areas, does curb lane parking place uncontrolled parked vehicles unacceptably close to a building in public rights-of-way?	Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane. Setback is common terminology	FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 8

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FEMA

Vulnerability Assessment Checklist Search

All Observations and Recommendations/Remediations for this Question

Vulnerability Assessment Section Header:

Question What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting the other major structures or attack on the major structures impacting this facility)? -- What are the adjacent land uses immediately outside the perimeter of this facility (site or building(s))? -- Do future development plans change these land uses outside the facility (site or building (s)) perimeter? -- Although this question bridges threat and vulnerability, the threat is the man-made hazard that can occur (likelihood and impact) and the vulnerability is the proximity of the hazard to the building(s) being assessed. Thus, a chemical plant

Guidance Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base stations; telephone trunking and switching stations, including critical cable routes and major rights of way - Electric power systems - Power plants, especially nuclear facilities; transmission and distribution system components; fuel distribution, delivery, and storage - Gas and oil facilities - Hazardous material facilities, oil/gas pipelines and storage facilities - Banking and finance institutions - Financial institutions (banks, credit unions) and the business district: note schedule business/financial district may follow: armored car services - Transportation networks - Airports:

Additional Reference FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 1

Site Name	Assessment		Observation	Recommendation /Remediation	Vulnerability?
	Date	Type			
CI-BC	2/2/2007	COOP Fac			<input type="checkbox"/>
Hazardville Information Company	2/2/2007	Facility Tier 1			<input type="checkbox"/>

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For Help, Press the F1 Key

Record: of 1 (Filtered)



FEMA

Vulnerability Assessment Checklist Search

All Observations and Recommendations/Remediations for this Question

Vulnerability Assessment Section Header:

Question What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral damage (attack at this facility impacting the other major structures or attack on the major structures impacting this facility)? -- What are the adjacent land uses immediately outside the perimeter of this facility (site or building(s))? -- Do future development plans change these land uses outside the facility (site or building (s)) perimeter? -- Although this question bridges threat and vulnerability, the threat is the man-made hazard that can occur (likelihood and impact) and the vulnerability is the proximity of the hazard to the building(s) being assessed. Thus, a chemical plant

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Additional Reference FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 1

Site Name	Assessment		Observation	Recommendation /Remediation	Vulnerability?
	Date	Type			
CI-BC	2/2/2007	COOP Fac			<input type="checkbox"/>
Hazardville Information Company	2/2/2007	Facility Tier 1			<input type="checkbox"/>

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For Help, Press the F1 Key

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Vulnerability Assessment Checklist Search

Assessment Checklist Question Details

Vulnerability Assessment Checklist #	Section Header	Question	Guidance	Additional Reference
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Search"/> <input type="button" value="Clear"/>
1-1	Site	What major structures surround the facility (site or building(s))? -- What critical infrastructure, government, military, or recreation facilities are in the local area that impact transportation, utilities, and collateral	Critical infrastructure to consider includes: - Telecommunications infrastructure - Facilities for broadcast TV, cable TV; cellular networks; newspaper offices, production, and distribution; radio stations; satellite base	FPC 65: Annex E, Alternate Operating Facilities, Planning Considerations, para 1
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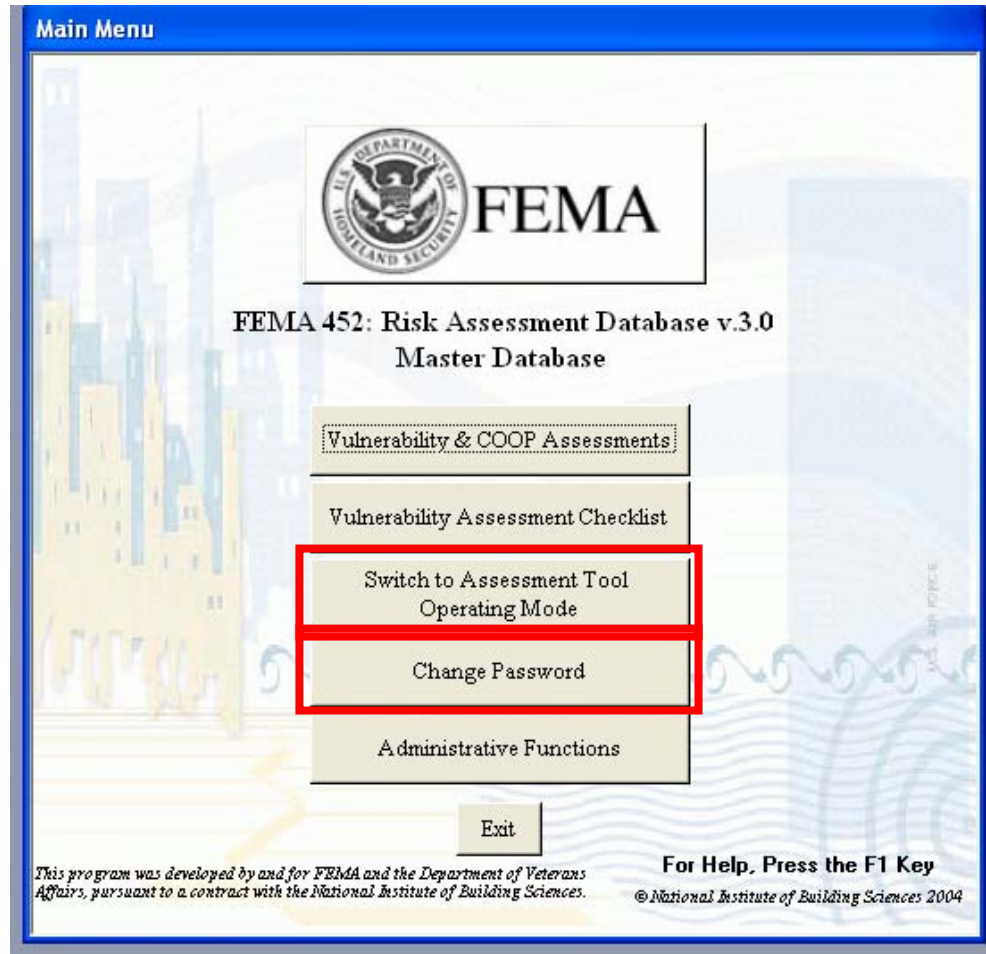
View Questions/Observations For Help, Press the F1 Key

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Master Database



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Master Database

Change Password for a User Account

Change Password

User Name:

Old Password:

New Password:

Verify:

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3. Numbers (0-9)
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Master Database

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- Vulnerability Assessment Checklist
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Operating Mode
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- Administrative Functions**
- Exit

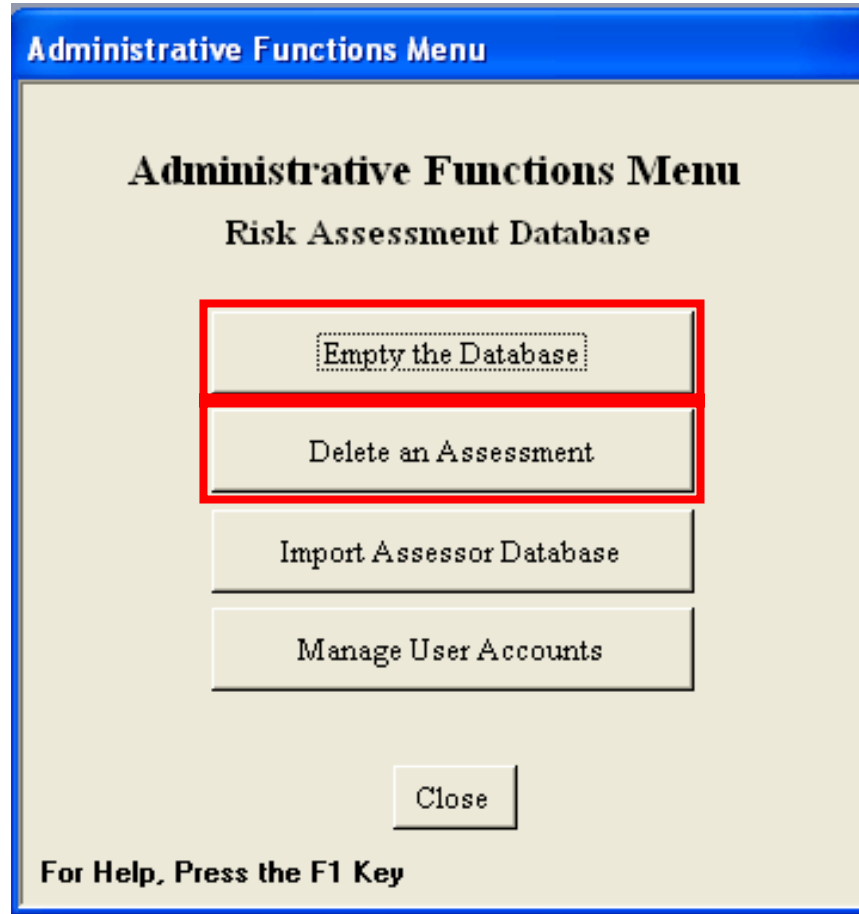
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Master Database: Erasing One or All Assessments



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Master Database: Erasing One or All Assessments

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5	CI-BC		2/2/2007	COOP Facility	Assessment_2007-02-02\
6	CI-BC2		2/2/2007	COOP Facility	Assessment_2007-02-02\

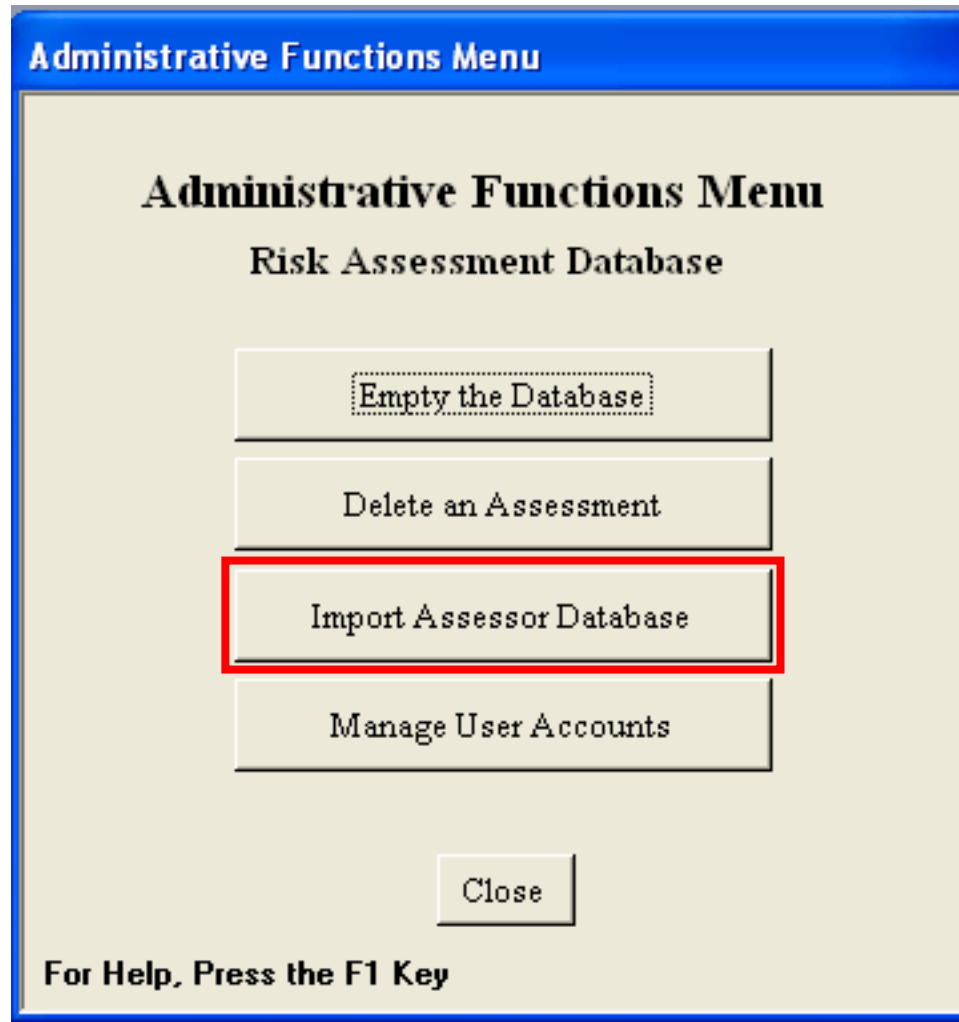
Record: 2 of 2

For Help, Press the F1 Key



FEMA

Master Database: Import Function



FEMA

Master Database: Import Function

Import Assessments

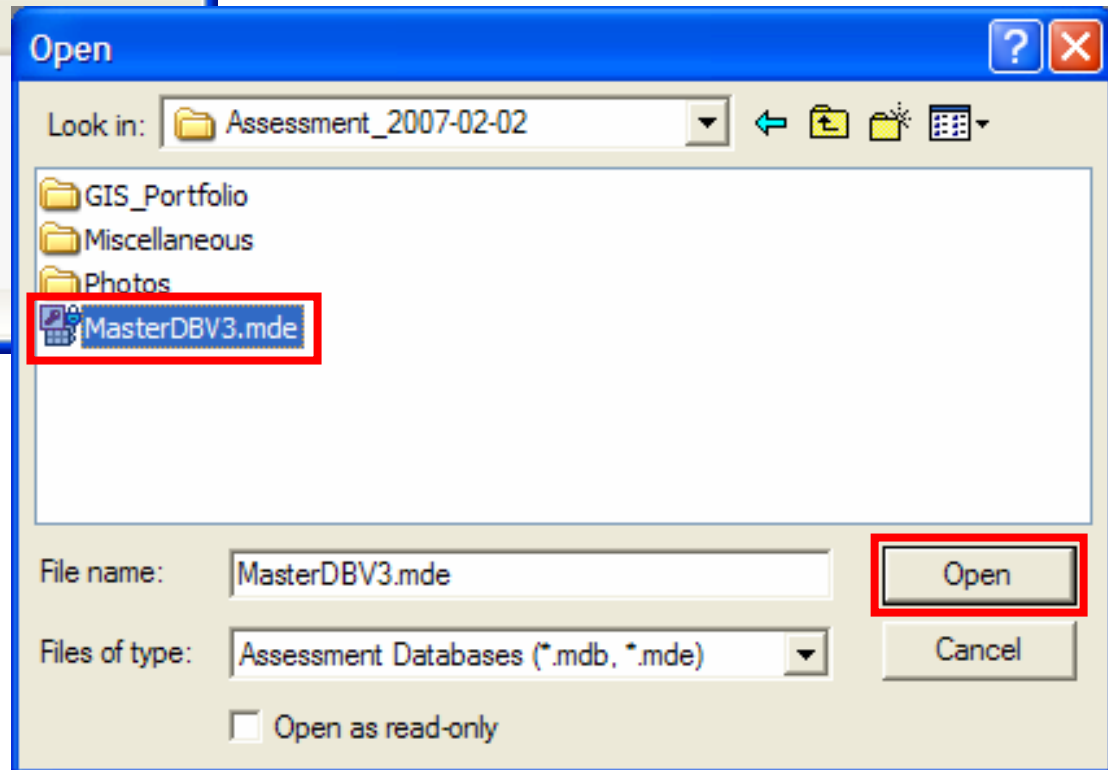
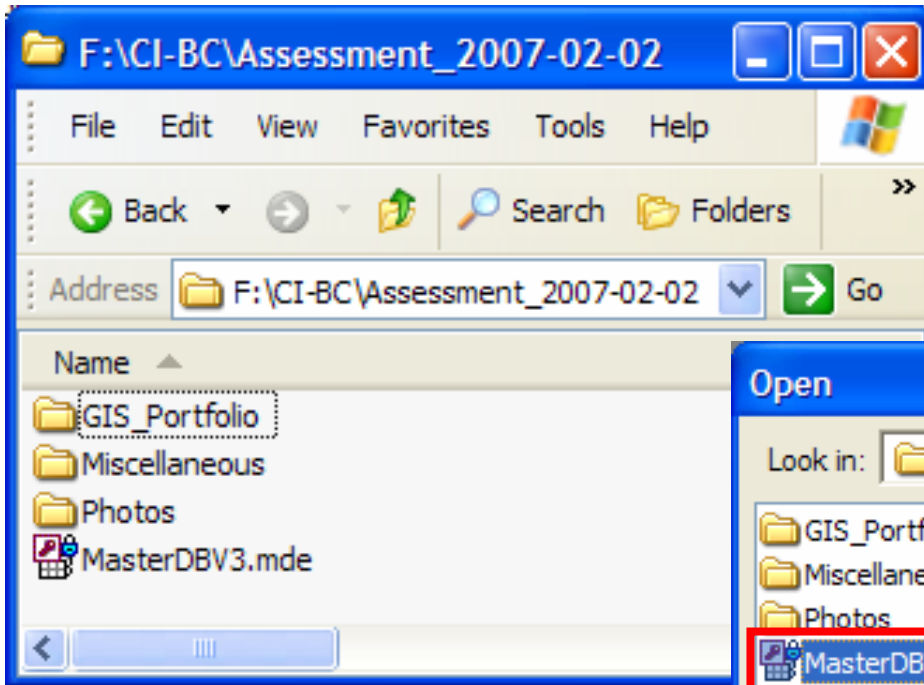
Select a database from which to import an Assessment. Then click [Import].

Currently Linked to:



FEMA

Master Database: Import Function



FEMA

Master Database: Import Function

Import Assessments

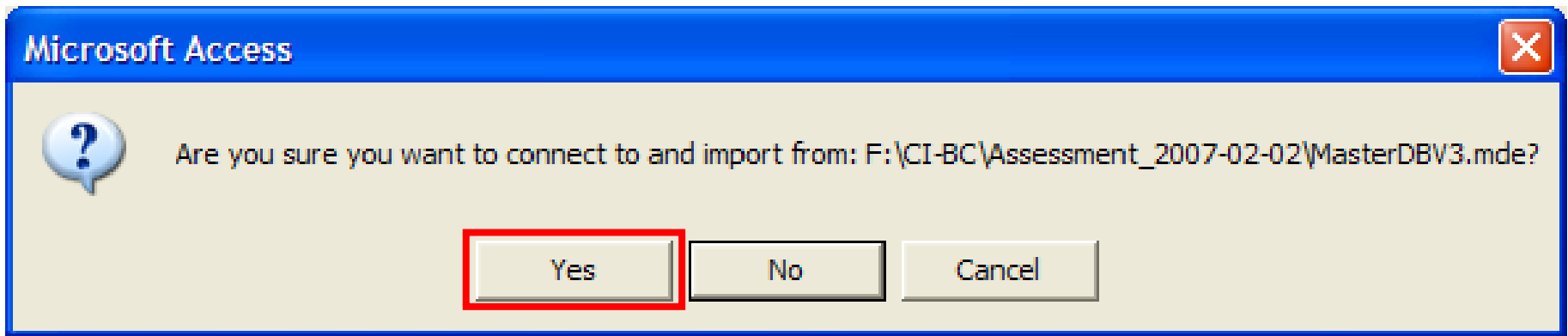
Select a database from which to import an Assessment. Then click [Import].

Link and Import from:



FEMA

Master Database: Import Function



FEMA

Master Database: Import Function

Microsoft Access



All 18 tables that were linked to: E:\UTD\IR_and_D\2007-01-14\MasterDB_IRandD.mdb
have been relinked to: F:\CI-BC\Assessment_2007-02-02\MasterDBV3.mde

OK



FEMA

Master Database: Import Function

frmSiteAssessments_Remote

Assessments Available for Import From: F:\CI-BC\Assessment_2007-02-02\MasterDBV3.mde

Site Name	Site Folder Name	Address 1	City	Assessment Location	Assessment Date	Type	Assessment
CI-BC	CI-BC\			CI-BC	2/2/2007	COOP Facility	Assessment_2007-0:
CI-BC2	CI-BC2\			CI-BC2	2/2/2007	COOP Facility	Assessment_2007-0:

Select Assessment

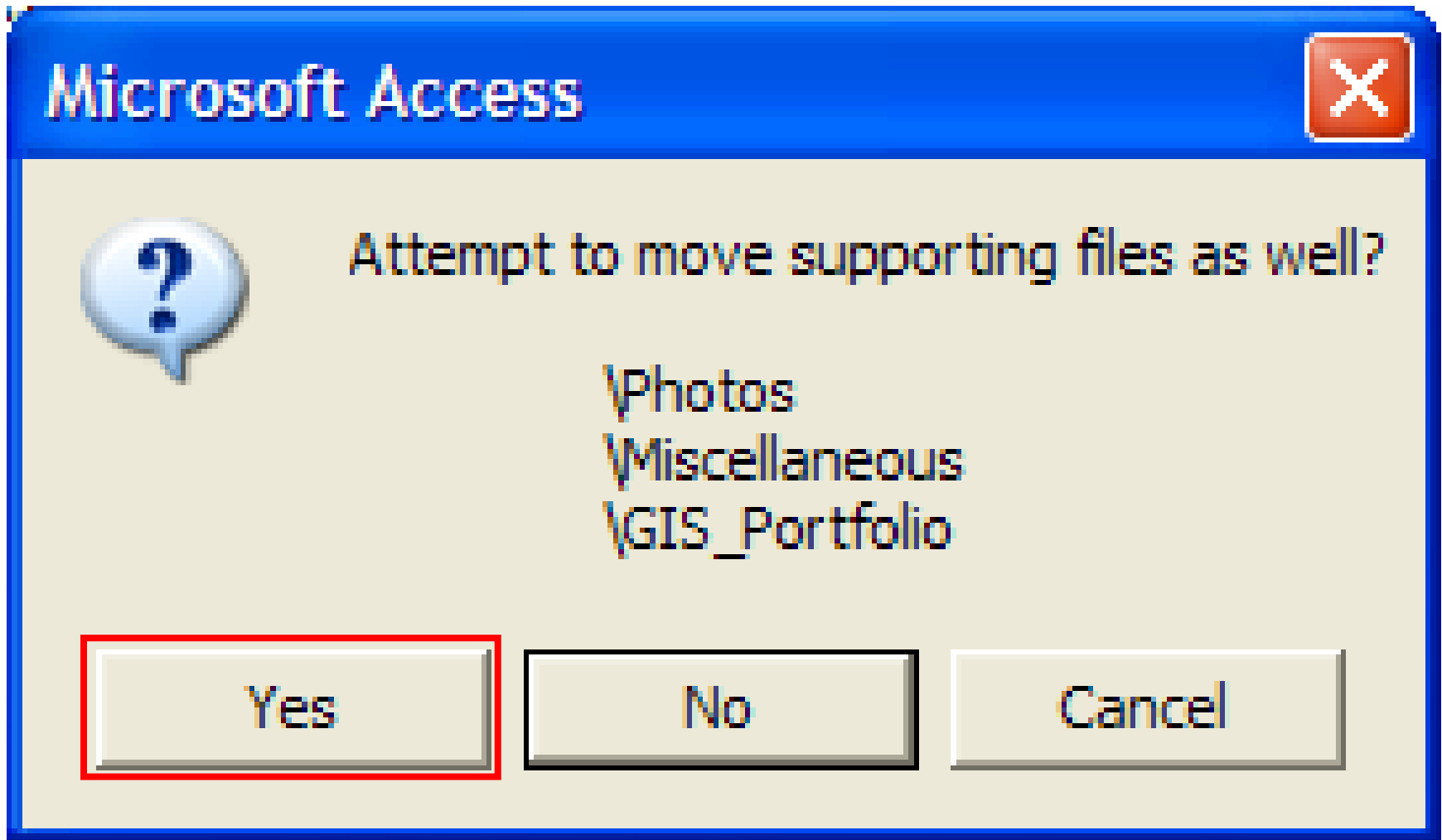
Cancel

Record: 1 of 2



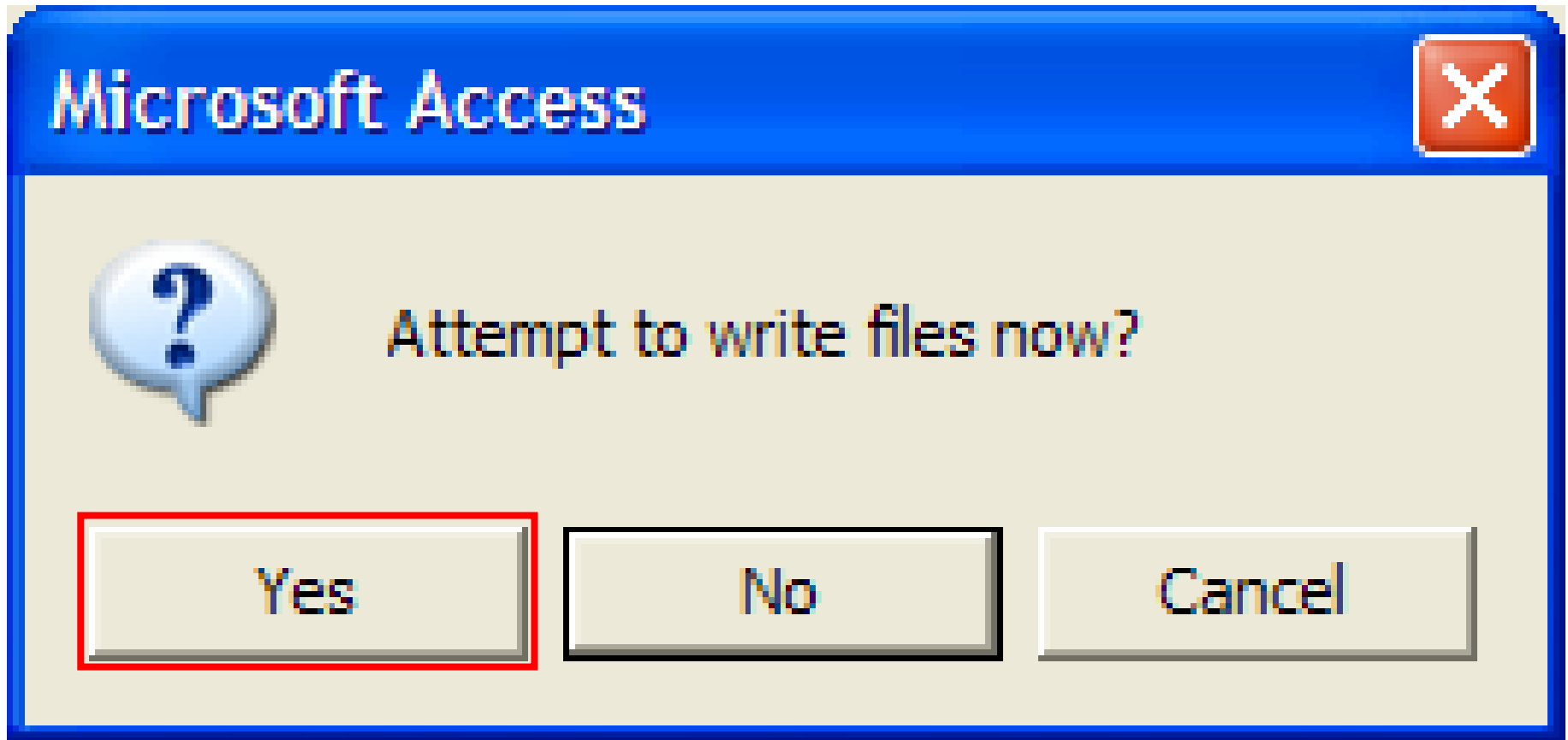
FEMA

Master Database: Import Function



FEMA

Master Database: Import Function



FEMA

Master Database: Import Function

Import Assessments

Select a database from which to import an Assessment. Then click [Import].

Link and Import from:



FEMA

Master Database: Import Function

Import Detailed Diagnostics						
Import Order	Importing	NumberOf RecordsBefore	NumberOf RecordsAttempted	NumberOf RecordsAfter	Successful	
1	Sites	2	1	3	<input checked="" type="checkbox"/>	
2	Buildings (*handled differently)	1	30	30	<input checked="" type="checkbox"/>	
3	People	0	0	0	<input checked="" type="checkbox"/>	
4	Assessments	2	1	3	<input checked="" type="checkbox"/>	
5	Observations	508	254	762	<input checked="" type="checkbox"/>	
6	Vulnerabilities	1	1	2	<input checked="" type="checkbox"/>	
7	Executive Summary	2	1	3	<input checked="" type="checkbox"/>	
8	Critical Infrastructure	40	20	60	<input checked="" type="checkbox"/>	
9	Critical Functions	36	18	54	<input checked="" type="checkbox"/>	
10	Assessment Personnel	0	0	0	<input checked="" type="checkbox"/>	
11	GIS images this assessment	2	2	4	<input checked="" type="checkbox"/>	
12	Photos	0	0	0	<input checked="" type="checkbox"/>	
13	Assessment Photos	0	0	0	<input checked="" type="checkbox"/>	
14	Miscellaneous files	1	1	2	<input checked="" type="checkbox"/>	
15	COOP Essential Functions	0	0	0	<input checked="" type="checkbox"/>	
16	COOP Deployment Planning	2	1	3	<input checked="" type="checkbox"/>	
17	COOP Alternate Facility	2	1	3	<input checked="" type="checkbox"/>	
18	Remediation Costs	4	44	8	<input type="checkbox"/>	

Record: 1 of 18



FEMA

Master Database: Import Function

Import Assessments

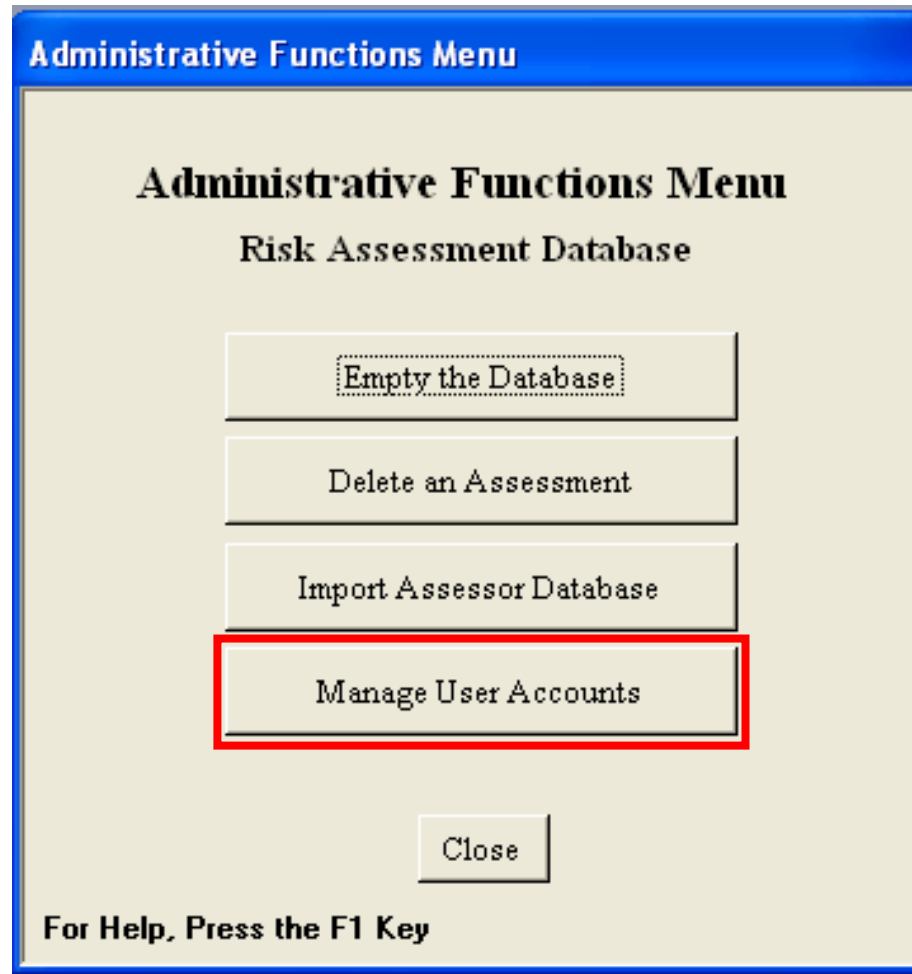
Select a database from which to import an Assessment. Then click [Import].

Link and Import from:



FEMA

Master Database: Manage User Accounts



FEMA

Master Database: Manage User Accounts

List of Users and the Group to which they belong

User ID	User Name	Group
1	Administrator	Admins
2	Assessor	Admins
3	Editor	Full Data Users
4	Reader	Read-Only Users

Administrator, Assessor, Editor, and Reader passwords can be changed.

Add New User Delete User Change Group for: Reader Close

Record: 4 of 4



FEMA

Master Database: Manage User Accounts

Add a New User Account

Add a new USER Account

User Name	Group
<input type="text"/>	<input type="text"/>



FEMA

Master Database: Manage User Accounts

Add a New User Account

Add a new USER Account

User Name	Group
<input type="text" value="New User"/>	<input type="text" value="Read-Only Users"/>
<input type="button" value="Add User"/>	<input type="text" value="Full Data Users"/>
	<input type="text" value="Admins"/>



FEMA

Master Database: Manage User Accounts

List of Users and the Group to which they belong

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1	Administrator	Admins
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3	Editor	Full Data Users
4	New User	Full Data Users
5	Reader	Read-Only Users

Administrator, Assessor, Editor, and Reader passwords can be changed.

Add New User Delete User Change Group for: New User Close

Record: 4 of 5



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Summary

Installation, as appropriate, and opening of database

Filing of GIS Portfolio, Miscellaneous, and Photos to link with the database and importing the database in the two operating modes

Moving about the database software and between the Assessment Tool and the Master Database operating modes

Setting priorities on identified vulnerabilities and how the software records this process

Production of standard reports and searching the database for specific information

How to use administrative functions



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit VII

Explosive Blast



FEMA

Unit Objectives

Explain the basic physics involved during an explosive blast event, whether by terrorism or technological accident.

Explain building damage and personnel injury resulting from the blast effects upon a building.

Perform an initial prediction of blast loading and effects based upon incident pressure.



FEMA

Unit VII: Explosive Blast

Units I-VI covered the Risk Assessment Process

Units VII and VIII explain Explosive Blast, CBR Agents, and their effects

Units IX and X demonstrate techniques for site layout and building design to counter or mitigate manmade threats and similar technological hazards

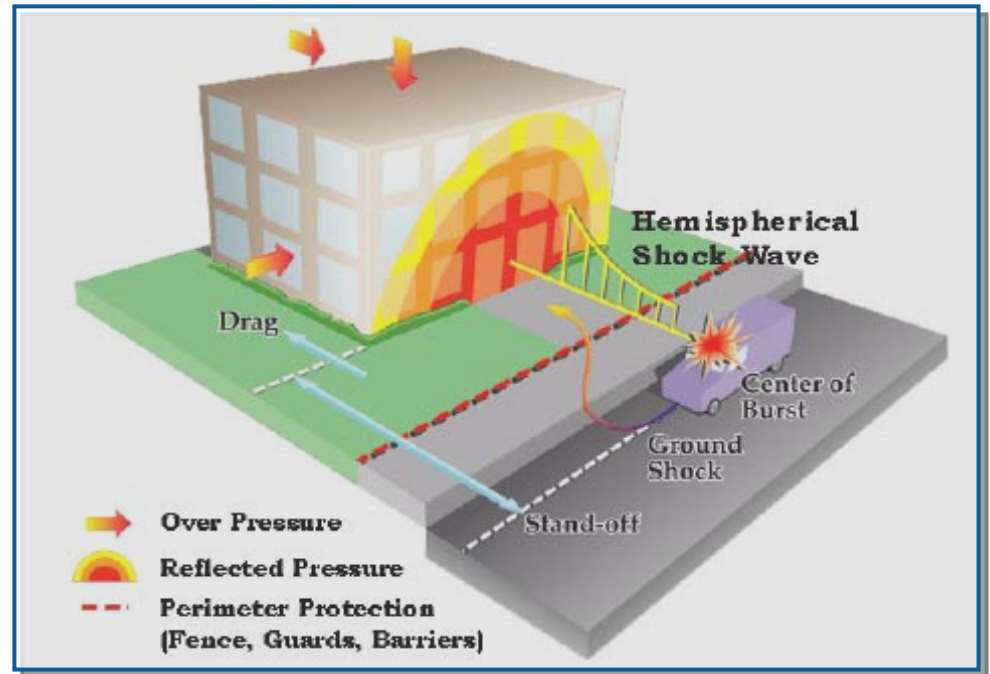


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Blast Loading Factors

Explosive properties

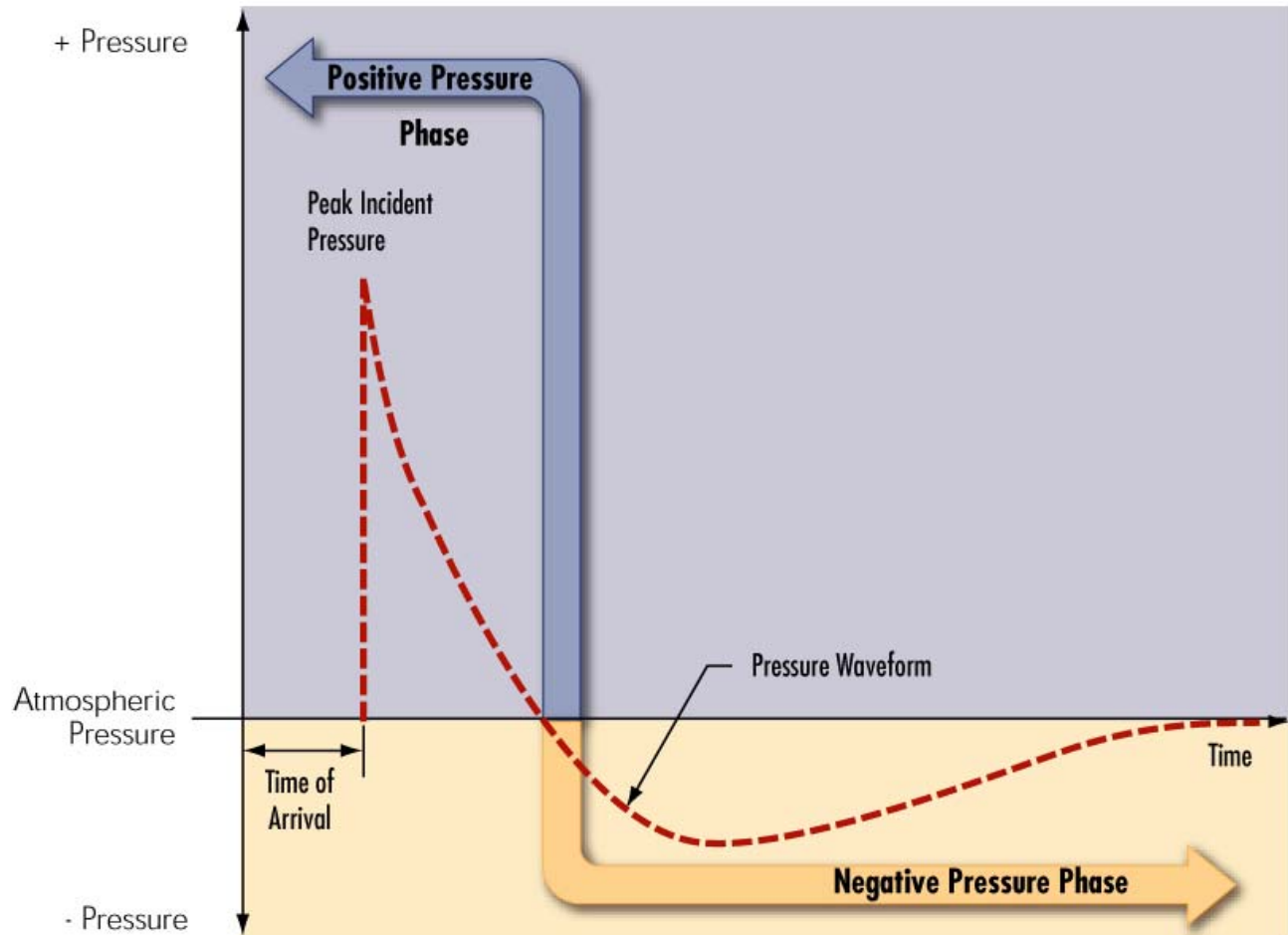
- Type
- Energy output (TNT equivalency)
- Quantity



FEMA

FEMA 427, Figure 2-1: Schematic of Vehicle Weapon Threat Parameters and Definitions, p. 2-2

Typical Incident Pressure Waveform



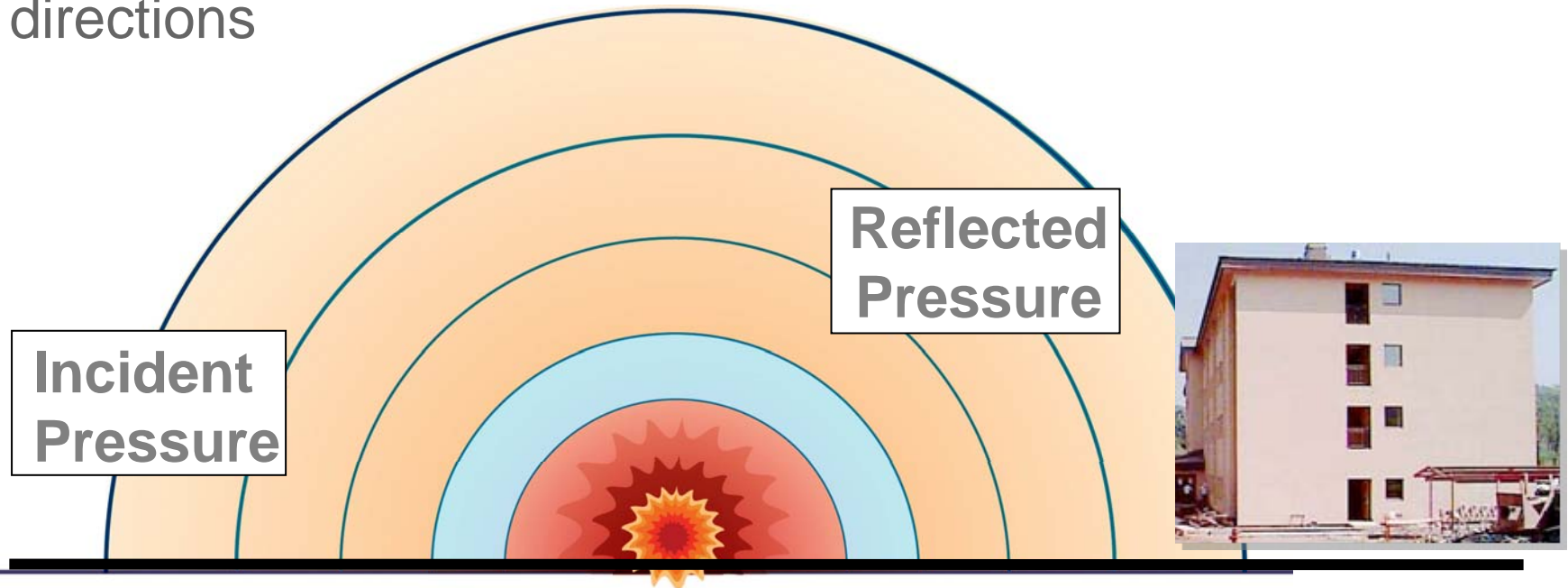
FEMA 426, Figure 4-1: Typical Pressure-Time History, p. 4-2



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Incident and Reflected Pressure

Blast energy lost at rate of volume increase in X, Y, and Z directions

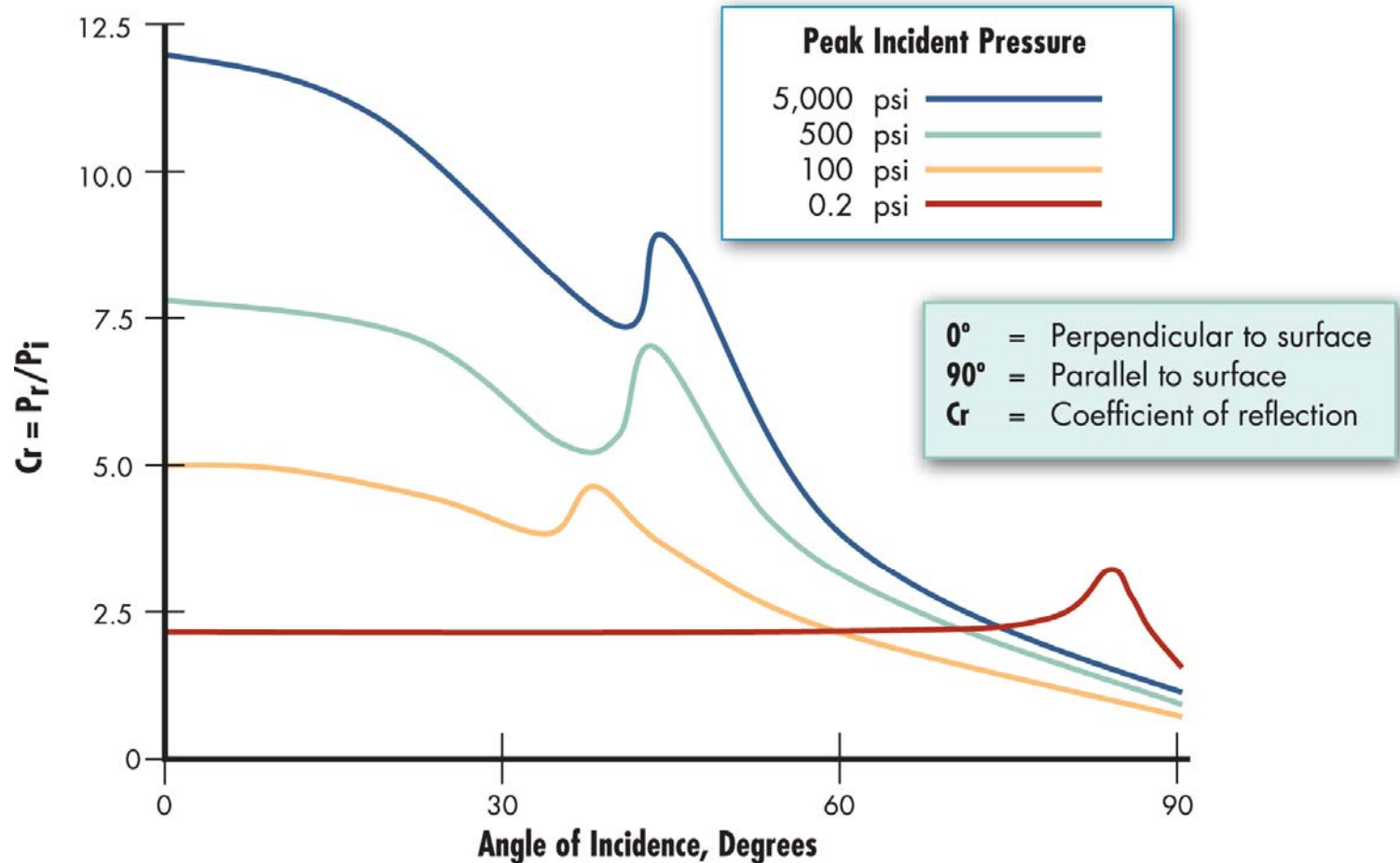


Equivalent pressure occurs at Scaled Distance =
Distance / (Net Explosive Weight, TNT equivalent)^{1/3}



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Reflected Pressure/Angle of Incidence

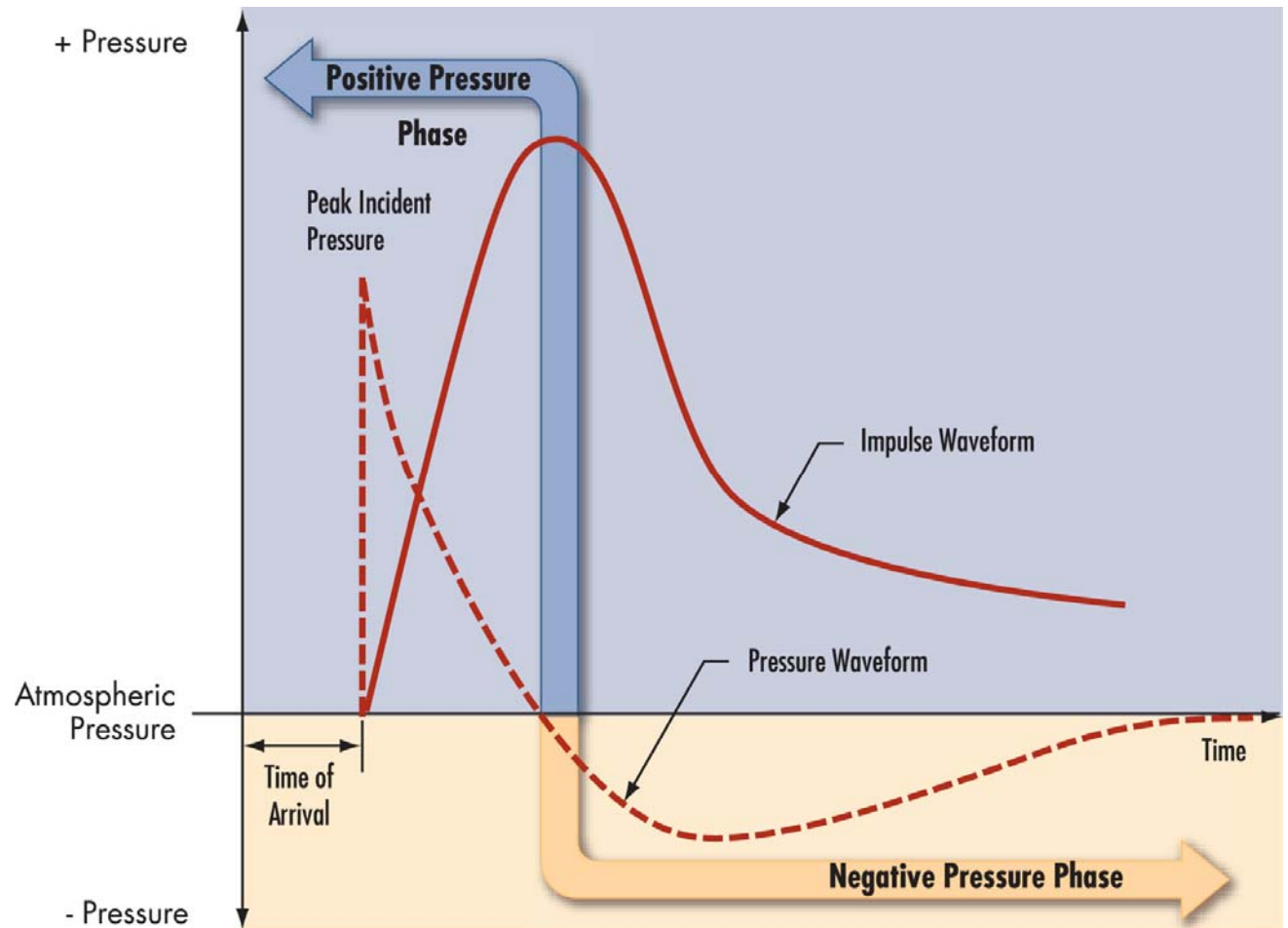


FEMA 426, Figure 4-2: Reflected Pressure Coefficient vs. Angle of Incidence, p. 4-3



FEMA

Typical Blast Impulse Waveform



FEMA 426, Figure 4-3: Typical Impulse Waveform, p. 4-4



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Blast Loading Factors

Location of explosive relative to structure

- Stand-off distance
- Reflections and reflection angle
 - Ground
 - Buildings
- Identify worst case

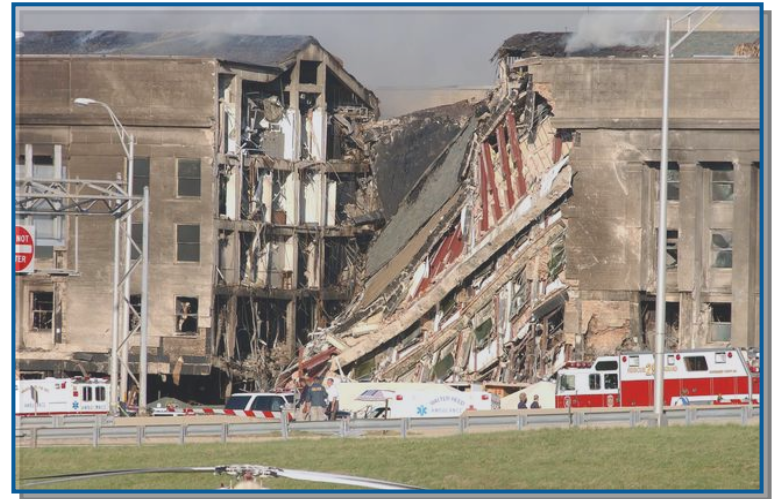


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Blast Compared to Natural Hazards

Higher incident pressures and relatively low impulse

- High explosive (C-4)
- Low-order explosive (ANFO)
- Aircraft or vehicle crash combines kinetic energy (velocity, mass), explosive loads, and fuel/fire
- 200 mph hurricane generates only 0.8 psi, but with very large impulse



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Blast Compared to Natural Hazards

Direct airblast causes more localized damage

- Component breakage
- Penetration and shear
- Building's other side farther away
- Reflections can increase damage on any side

Greater mass historically used for blast protection

- Greater mass usually detrimental during earthquake due to resonance



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Types of Building Damage

Direct Air Blast

- Component failure
- Additional damage after breaching

Collapse

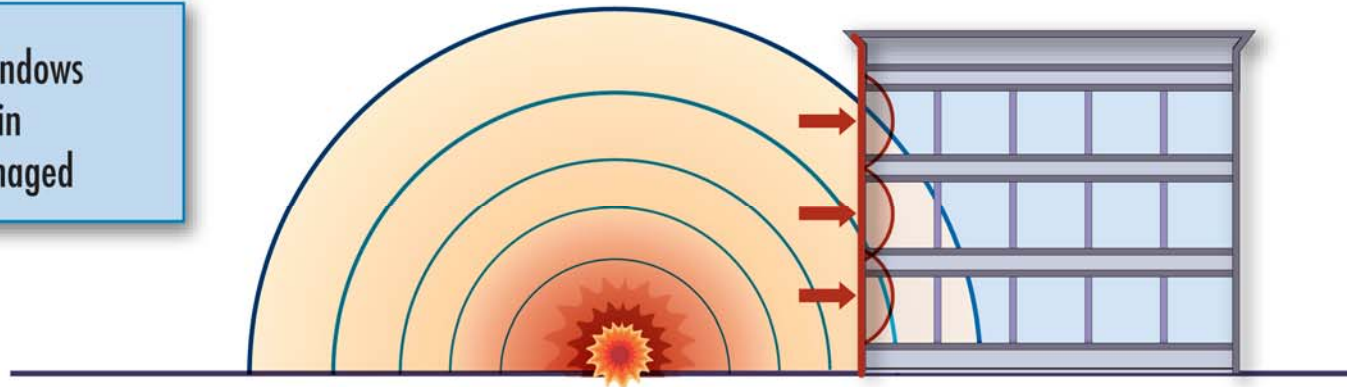
- Localized
- Progressive



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Blast Pressure Effects

1. Blast wave breaks windows
Exterior walls blown in
Columns may be damaged

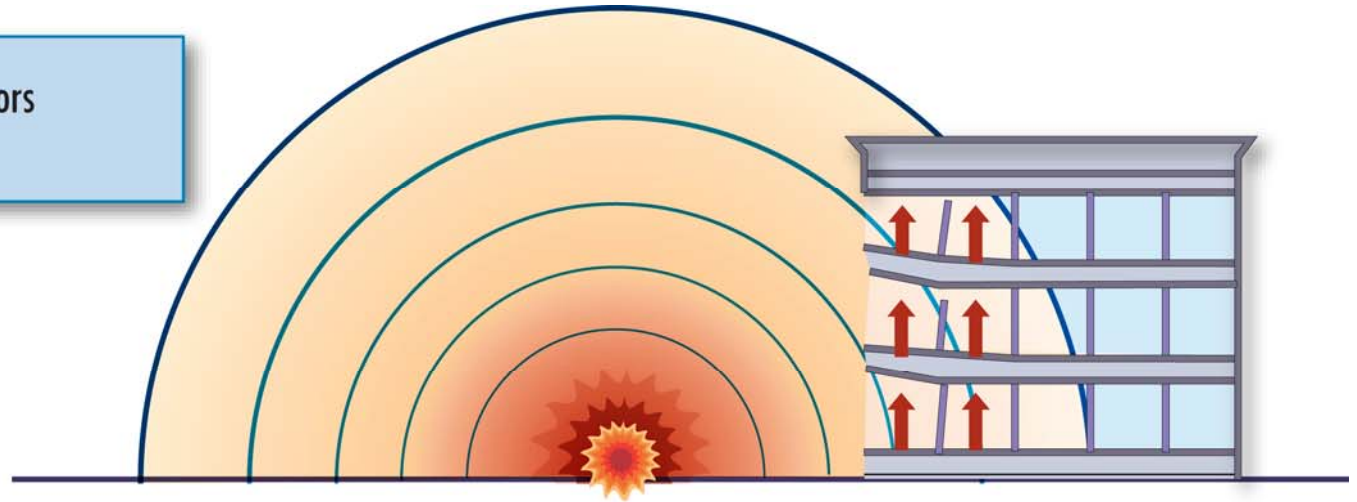


FEMA

FEMA 426, Figure 4-4: Blast Pressure Effects on a Structure, p. 4-7

Blast Pressure Effects

2. Blast wave forces floors upward

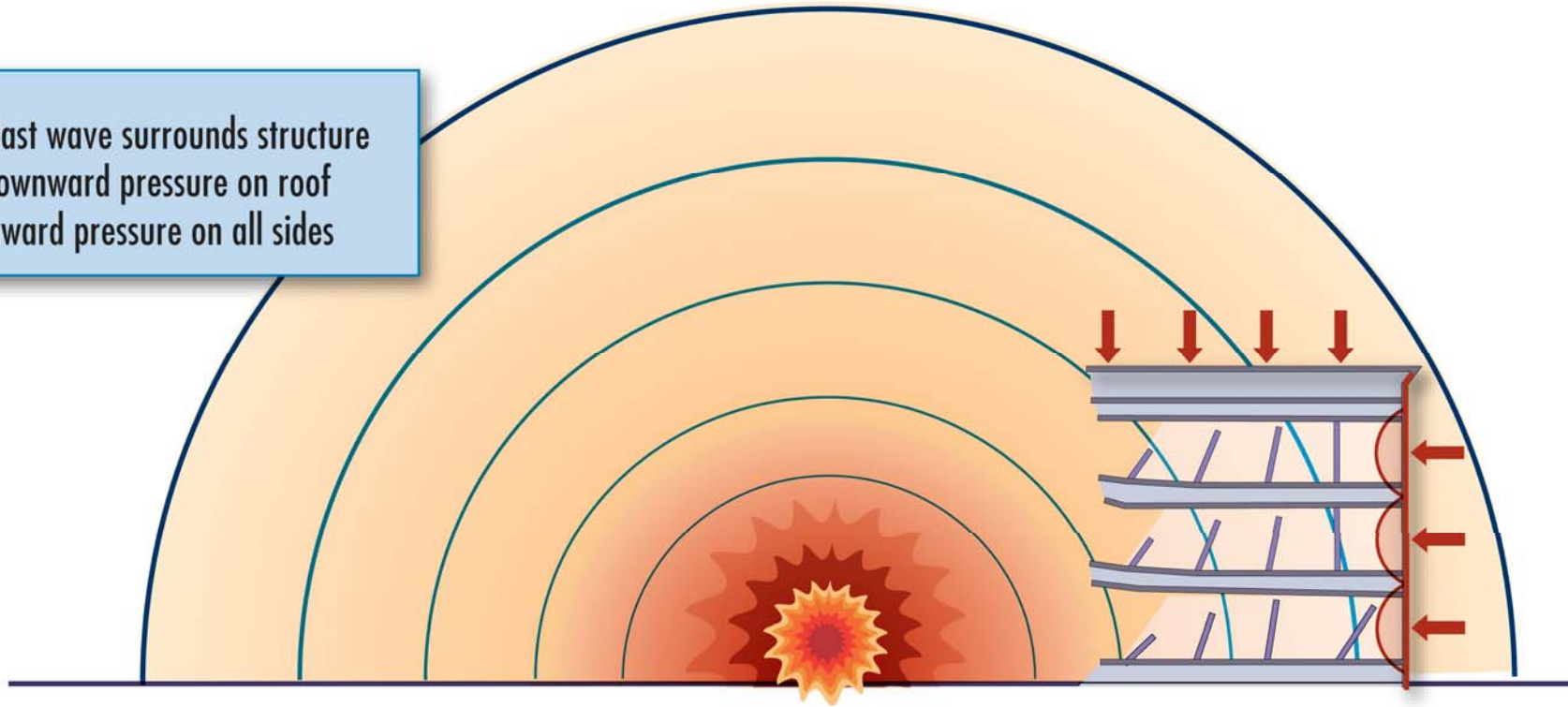


FEMA

FEMA 426, Figure 4-4: Blast Pressure Effects on a Structure, p. 4-7

Blast Pressure Effects

3. Blast wave surrounds structure
Downward pressure on roof
Inward pressure on all sides



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FEMA 426, Figure 4-4: Blast Pressure Effects on a Structure, p. 4-7

Causes of Blast Injuries

Overpressure

- Eardrum rupture
- Lung collapse/failure

Blast Wave

- Blunt trauma, lacerations, and impalement



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Causes of Blast Injuries

Fragmentation

Bomb or vehicle

Street furniture or jersey barriers

Building component failure

- Glass – predominant
- Walls
- Floors



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Murrah Federal Building, Oklahoma City



FEMA

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit VII-C-18

Murrah Federal Building, Oklahoma City

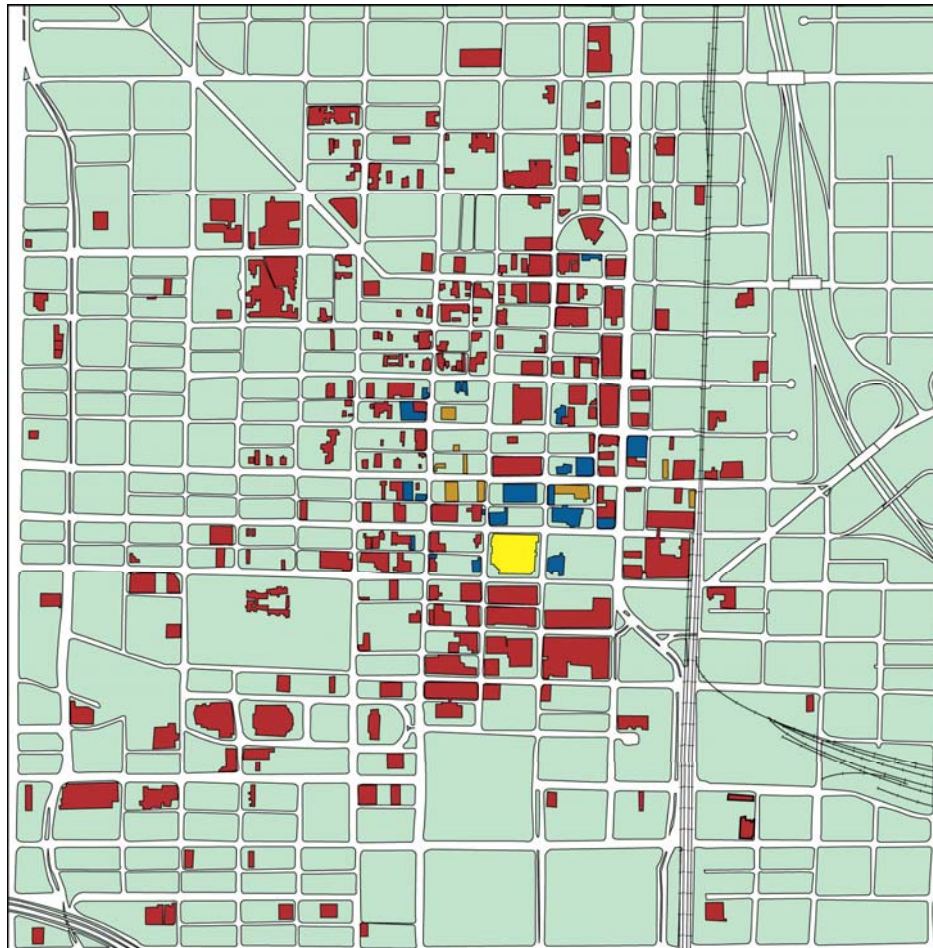
The majority of deaths were due to the collapsing structure



FEMA





From *Journal of American Medical Association*, August 7, 1996

Murrah Federal Building, Oklahoma City



Building Inspection Area

Legend

-  A. P. Murrah Federal Building
-  Collapsed Structure
-  Structural Damage
-  Broken Glass/Doors



1.8 square miles

Approximate Scale: 1" = 1,300'

Note: Undamaged structures are not shown on this map.



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From *FEMA Oklahoma City Bombing Report 9-0300 / FEMA 277*,
August 1996

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit VII-C-20

Levels of Protection

CONVENTIONAL CONSTRUCTION

INCIDENT OVERPRESSURE

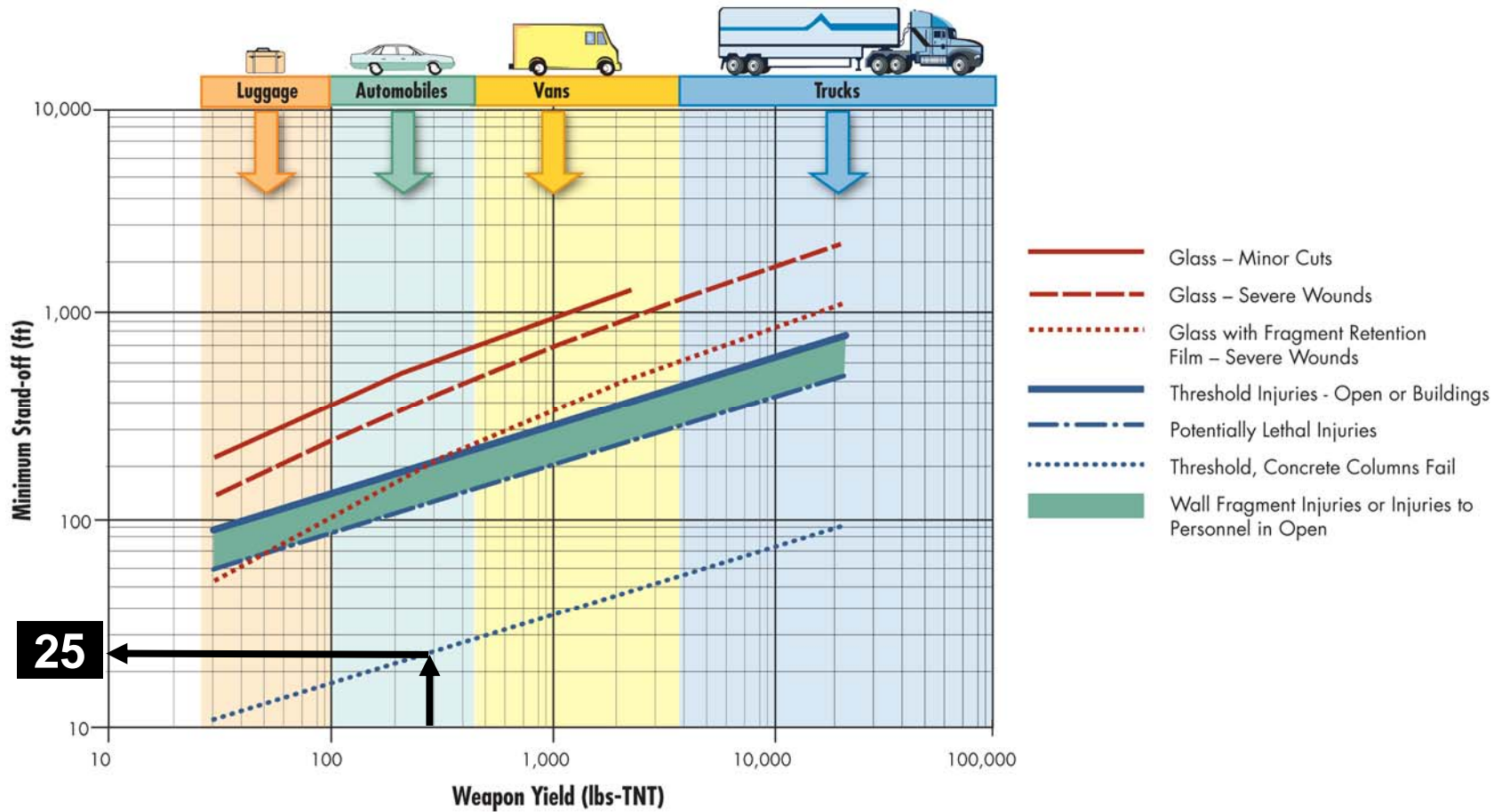
Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Below AT standards	Severe damage. Progressive collapse likely. Space in and around damaged area will be unusable.	Doors and windows will fail catastrophically and result in lethal hazards. (High hazard rating) GSA 5	Majority of personnel in collapse region suffer fatalities. Potential fatalities outside collapsed area likely.
Very Low psi = 3.5	Heavily damaged - onset of structural collapse. Major deformation of primary and secondary structural members, but progressive collapse is unlikely. Collapse of non-structural elements.	Glazing will break and likely propelled into building, resulting in serious glazing fragment injuries, but fragments will be reduced. Doors may be propelled into rooms, presenting serious hazards. GSA 4	Majority of personnel in damaged area suffer serious injuries with potential for fatalities. Personnel outside damaged area will experience minor to moderate injuries.
Low psi = 2.3	Moderate damage – Building damage will not be economically repairable. Progressive collapse will not occur. Space in and around damaged area will be unusable.	Glazing will fracture, potentially come out of frame, but at reduced velocity, does not present significant injury hazard. (Very low hazard rating) Doors may fail, but will rebound out of frames, presenting minimal hazards. GSA 3a	Majority of personnel in damaged area suffer minor to moderate injuries with potential for a few serious injuries, but fatalities unlikely. Personnel outside damaged areas will potentially experience minor to moderate injuries.



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FEMA 426, Adapted from Table 4-1: DoD Minimum Antiterrorism Standards for New Buildings, p. 4-9, updated with UFC 4-010-01, 22 Jan 2007

Nominal Range-to-Effect Chart



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FEMA 426, Figure 4-5: Explosive Environments – Blast Range to Effects, p. 4-11

Comparison of Stand-off



Murrah Federal Building

YIELD (≈TNT Equiv.) 4,000 lb.
Reflected PRESSURE 9,600 psi.
Stand-off 15 feet

166 killed



Khobar Towers

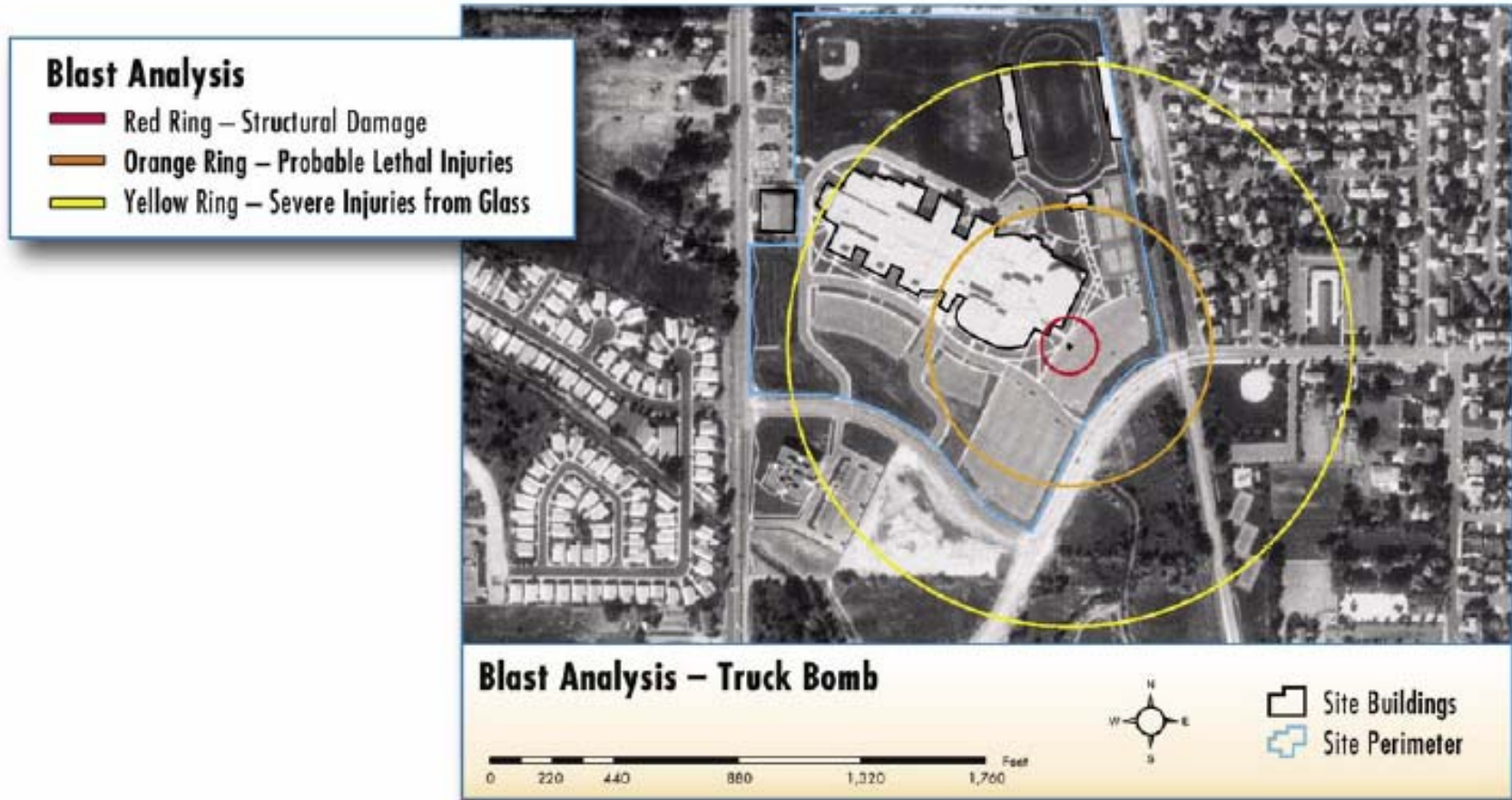
YIELD (≈TNT Equiv.) 20,000 lb.
Reflected PRESSURE 800 psi.
Stand-off 80 feet

19 killed



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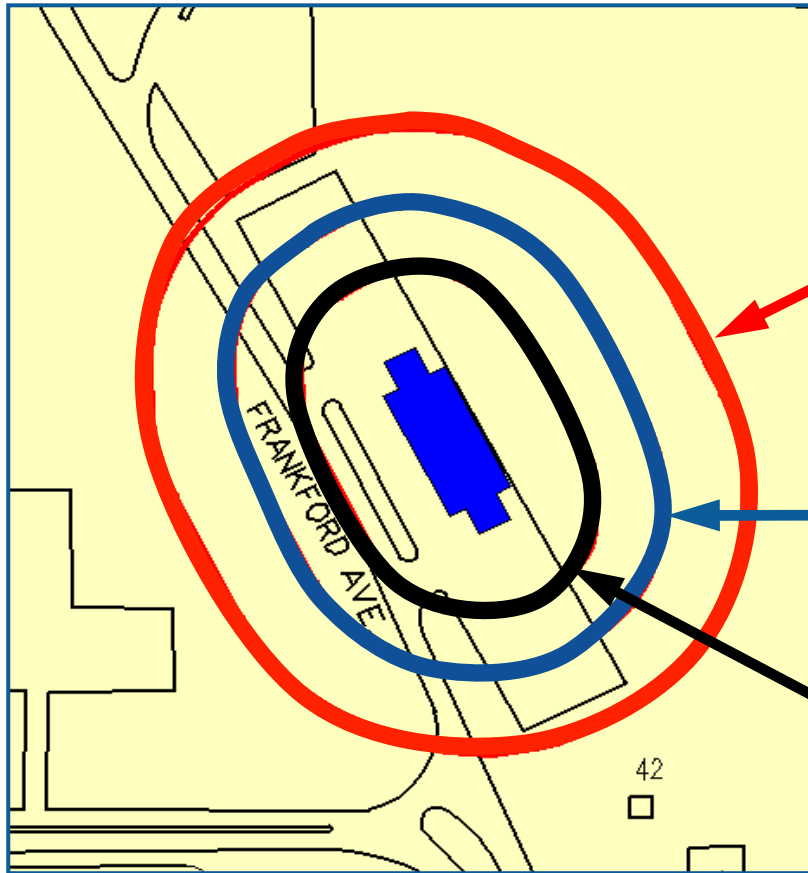
Vulnerability Radii



FEMA

FEMA 426, Figure 4-7: Blast Analysis of Building for Typical Large Truck Bomb Detonated in Building's Parking Lot, p. 4-12

Iso-Damage Contours



Stand-off required to prevent lethal glass injury

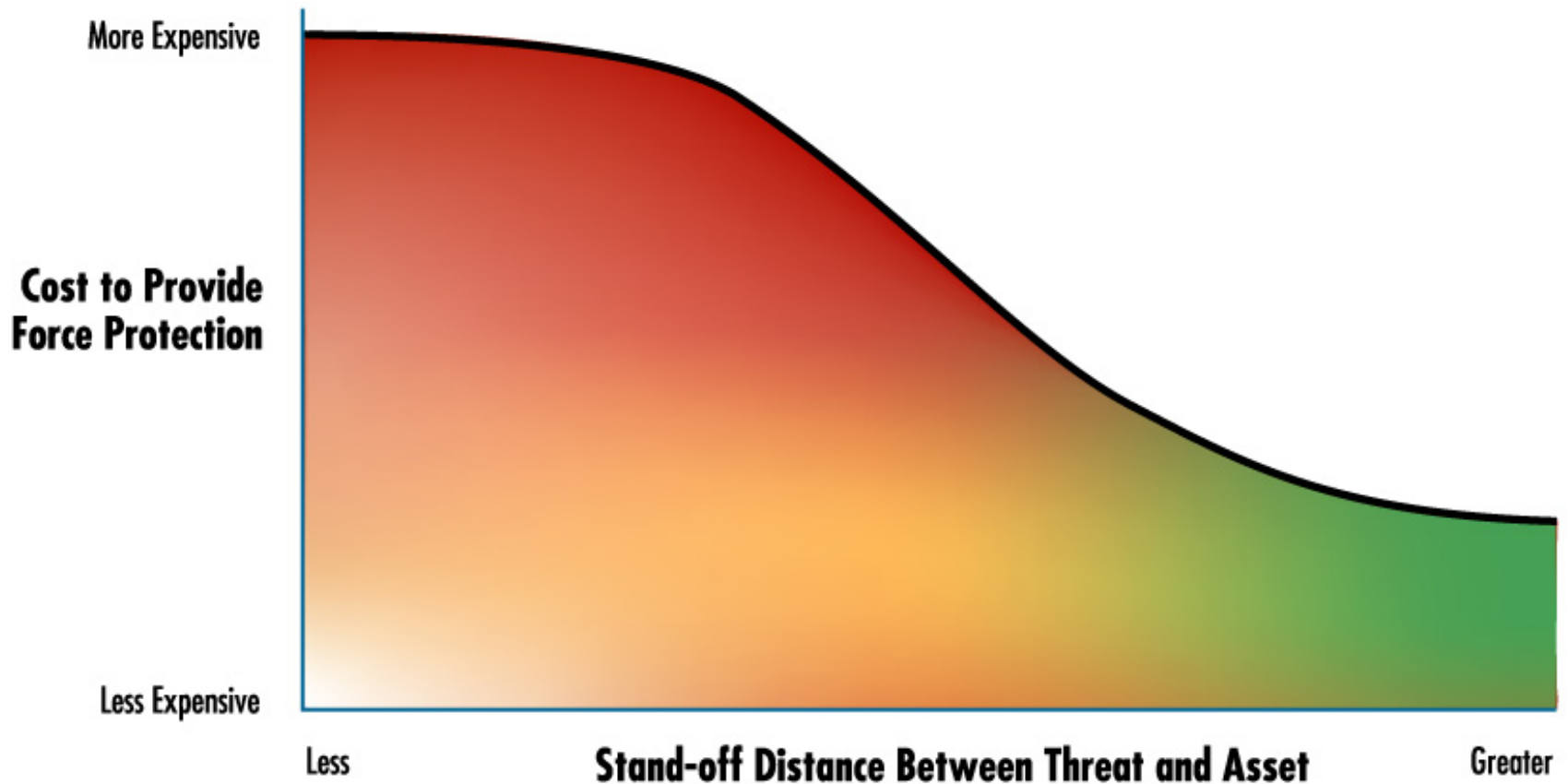
Stand-off required to prevent lethal wall damage

Stand-off required to prevent collapse



FEMA

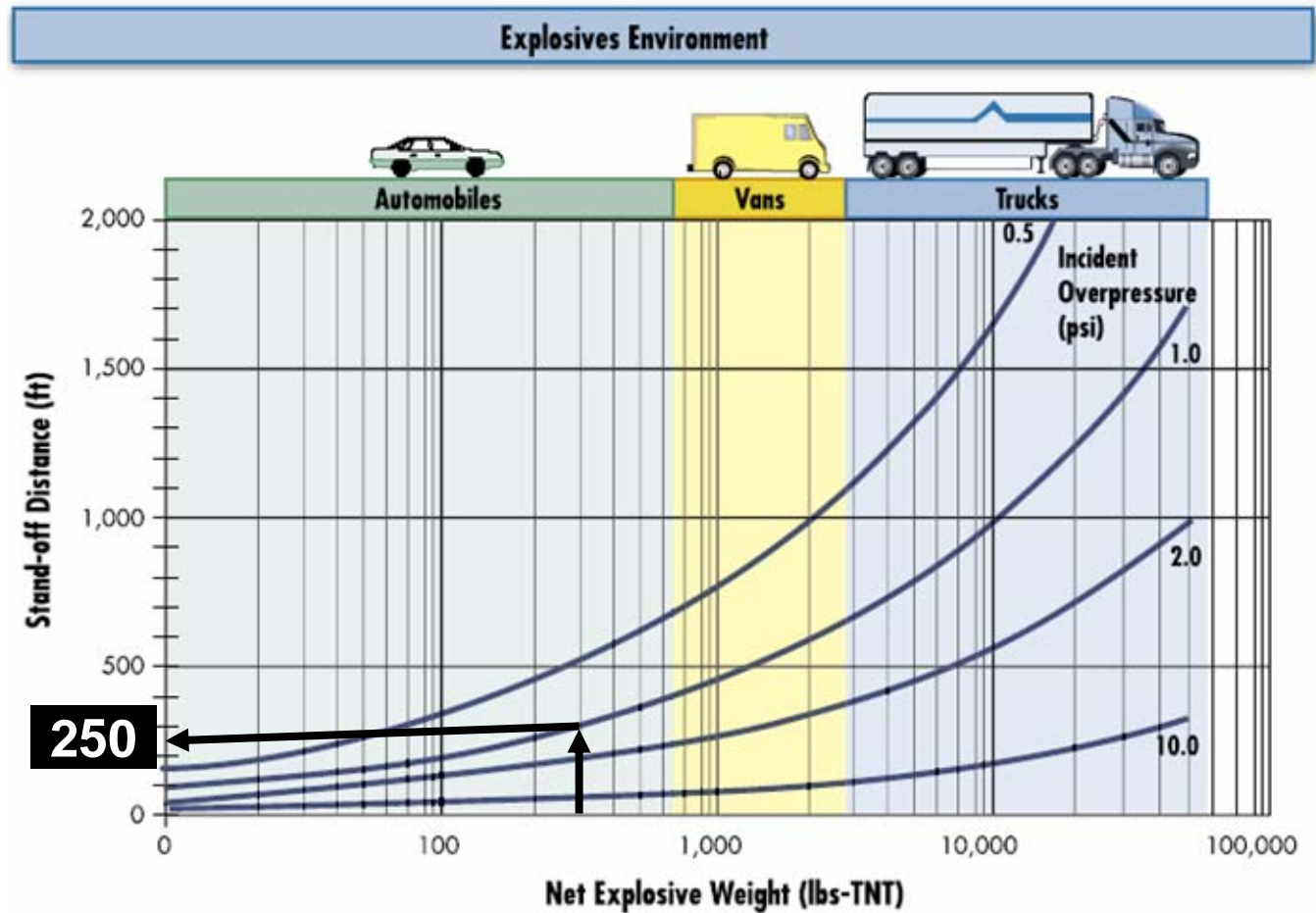
Cost Versus Stand-off



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FEMA 426, Figure 4-8: Relationship of Cost to Stand-off Distance, p. 4-13

Pressure versus Distance



FEMA 426, Figure 4-10: Incident Overpressure Measured in Pounds Per Sq. Inch, as a Function of Stand-Off Distance and Net Explosive Weight, p. 4-17



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Blast Damage Estimates

Damage	Incident Pressure (psi)
Typical window glass breakage (1)	0.15 – 0.22
Minor damage to some buildings (1)	0.5 – 1.1
Panels of sheet metal buckled (1)	1.1 – 1.8
Failure of unreinforced concrete blocks walls (1)	1.8 – 2.9
Collapse of wood frame buildings (2)	Over 5.0
Serious damage to steel framed buildings (1)	4 – 7
Severe damage to reinforced concrete structures (1)	6 – 9
Probable total destruction of most buildings (1)	10 – 12

FEMA 426, Table 4-3: Damage Approximations,
p. 4-19

Level of Protection	Incident Pressure (psi)
High	1.2
Medium	1.9
Low	2.3
Very Low	3.5
Below AT Standards	> 3.5



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Manchester Bombing



FEMA

Summary

Explosive blast physics

Blast damage to buildings

Injury to personnel

Prediction of loading, damage, and injury

- Range-to-effect chart
- Incident pressure chart



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Unit VII Case Study Activity

Explosives Environment, Stand-off Distance, and the Effects of Blast

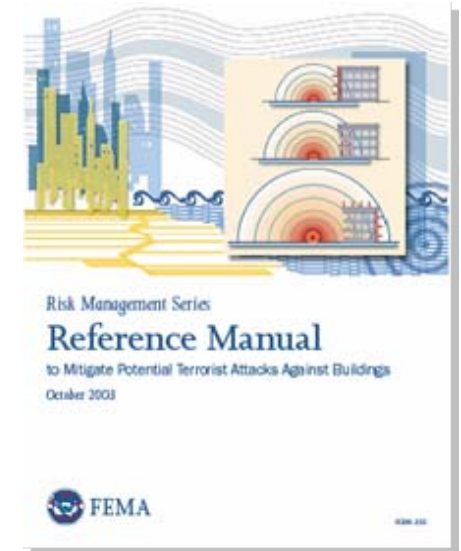
Background

Purpose of activity: check on learning about explosive blast

Requirements

Refer to Case Study and FEMA 426

Answer worksheet questions



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit VIII

Chemical, Biological, and Radiological (CBR) Measures



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Unit Objectives

Explain the five possible protective actions for a building and its occupants.

Compare filtration system efficacy relative to the particles present in CBR agents.

Explain the key issues with CBR detection.

Identify the indications of CBR contamination.



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Unit VIII: CBR Measures

Units I-VI covered the Risk Assessment Process

Units VII and VIII explain Explosive Blast, CBR Agents, and their effects

Units IX and X demonstrate techniques for site layout and building design to counter or mitigate manmade threats and similar technological hazards



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CBR Measures: An Overview

FEMA 426, Chapter 5 is based on best practices for safeguarding building occupants from CBR threats. This module is organized into four sections :

- Protective Actions for Buildings and Occupants
- Air Filtration and Cleaning Principles and Technology
- CBR Detection and Current Technology
- Non-Technology CBR Contamination Indications

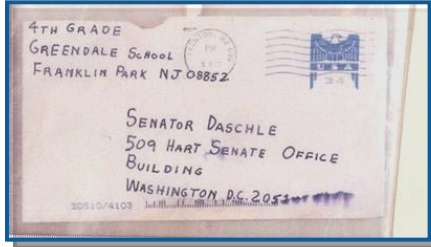


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SOURCE: SENSIR TECHNOLOGIES

CBR Terrorist Incidents Since 1970



1972 Typhoid

70 75 80



1984 Salmonella
200 Injured

1984 Botulinum

1985 Cyanide

June 1994 Sarin
7 Dead, 200 Injured

1992 Cyanide
March 1995 Ricin

April 1995 Sarin

April-June 1995 Cyanide, Phosgene, Pepper Spray

March 1995 Sarin

May 1995 Plague

April 1997 U235

February 1997 Chlorine
14 Injured, 500 Evacuated

March 1998 Cesium-137

June 1996 Uranium

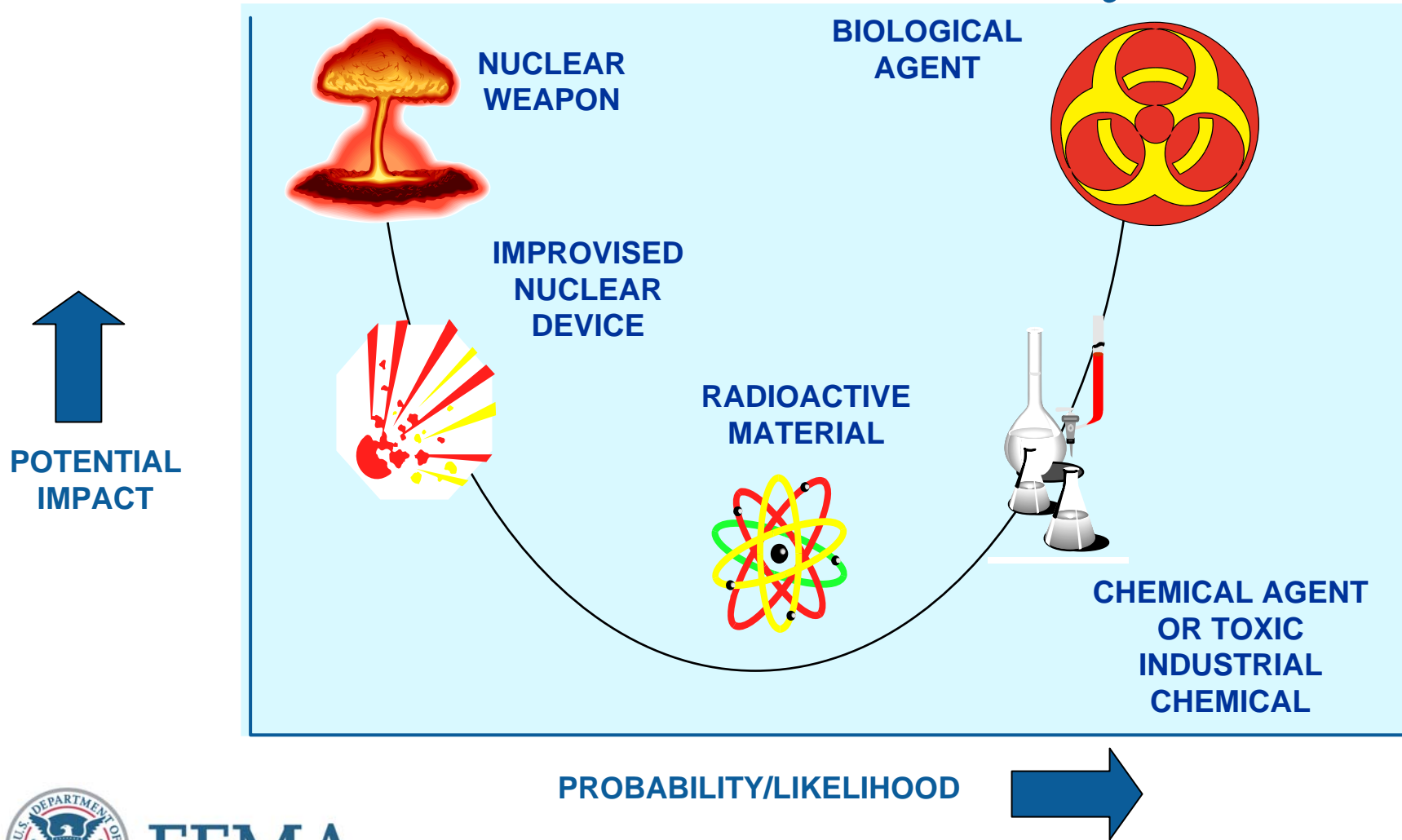
2001 Anthrax

December 1995 Ricin

November 1995 Radioactive Cesium



What is the CBR Threat Today?



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Why Would Terrorists Use CBR?

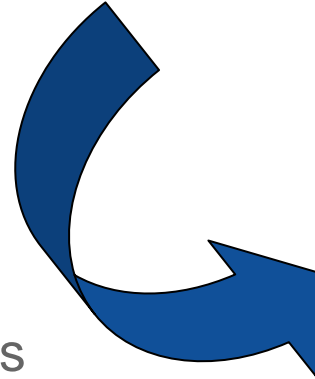
- Available and relatively easy to manufacture
- Large amounts not needed in an enclosed space
- Easily spread over large areas
- Potential for mass casualties
 - Strong psychological impact
 - Overwhelms resources
 - Difficult to recognize (contagious or spread by victims)



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CBR Sources

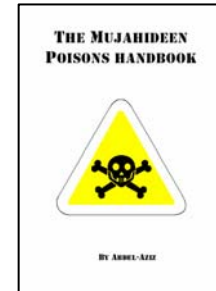
- Laboratory/commercial
- Industrial facilities
- Foreign military sources
 - At least 26 countries possess chemical agents or weapons
 - 10 countries are suspected to possess biological agents or weapons
- Medical/university research facilities
- Nuclear facilities
- Home production



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Limitations of CBR Materials

- Targeted dissemination is difficult
- Delayed effects can detract from impact
- Counterproductive to terrorists' support
- Potentially hazardous to the terrorist
- Development and use require time and expertise



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Chemical Agents: Characteristics and Behavior

- Generally liquid (when containerized)
- Normally disseminated as aerosol or gas
- Present both a respiratory and skin contact hazard
- May be detectable by the senses (especially smell)
- Influenced by weather conditions

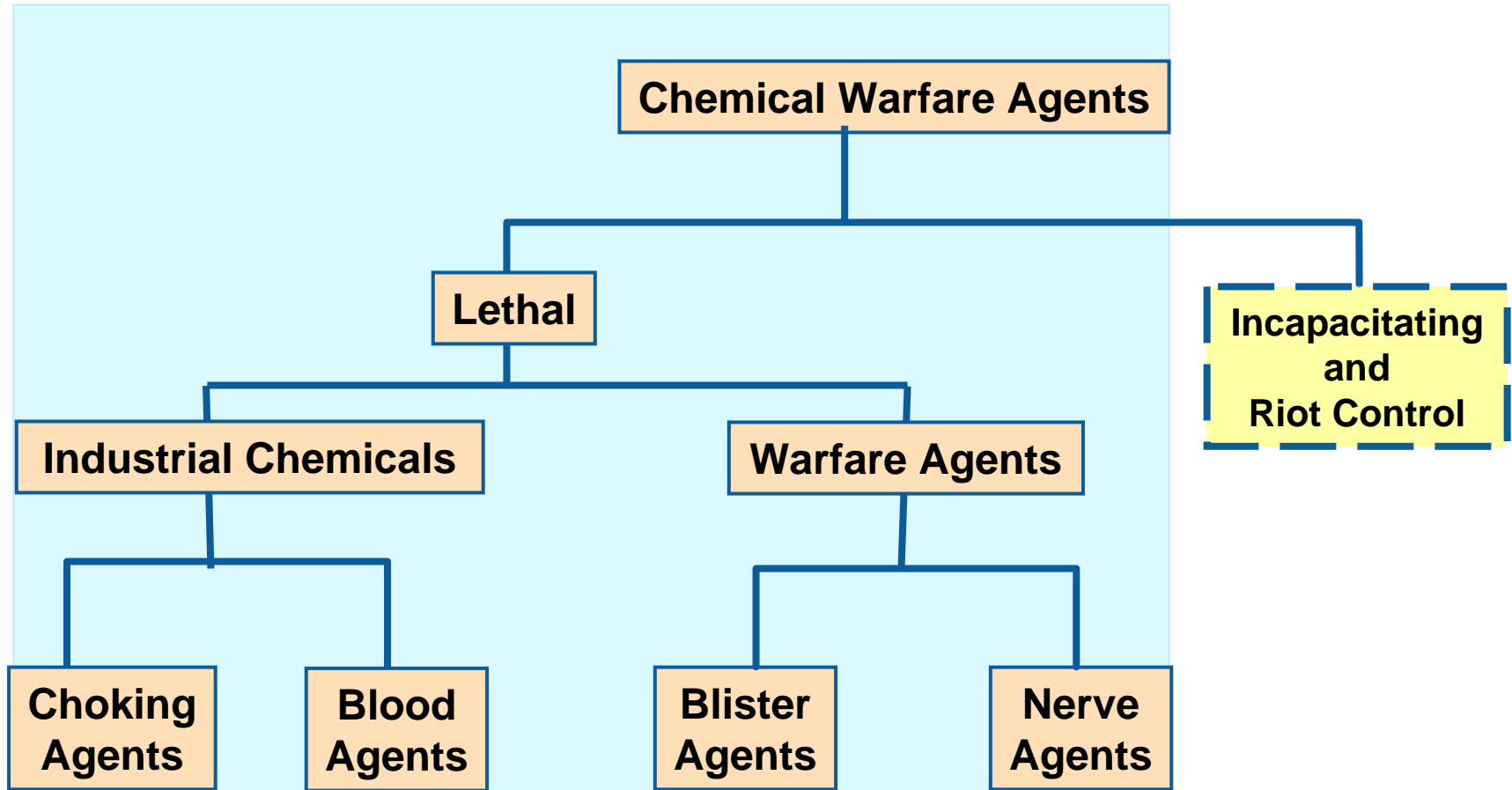


Subway riders injured in Aum Shinrikyo sarin gas attack, Tokyo, March 20, 1995.
(AP Photo/Chikumo Chiaki)



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Classes of Chemical Agents



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Industrial Chemicals

Industrial chemicals previously used as chemical warfare agents

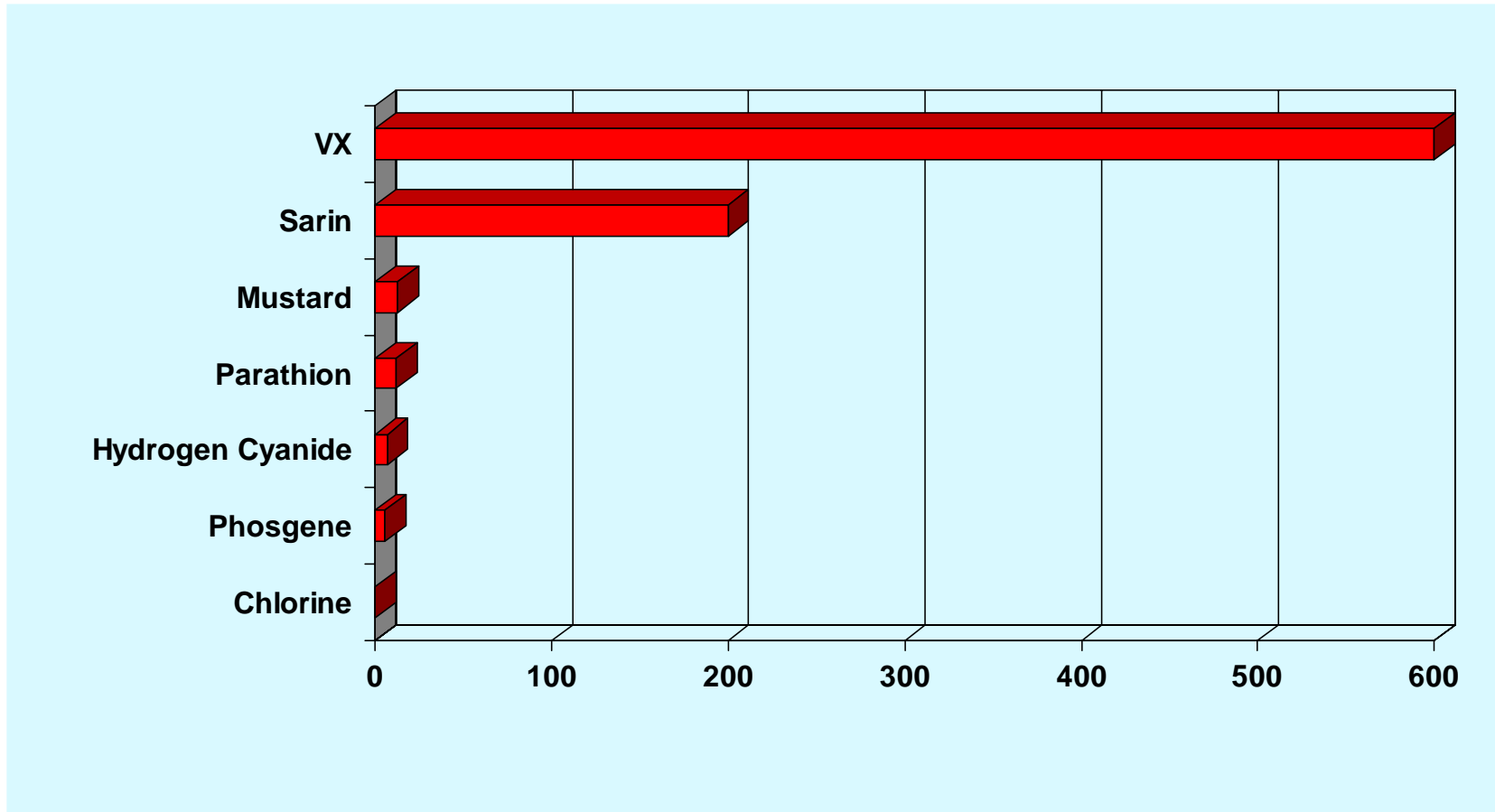
	Choking Agents Chlorine/Phosgene	Blood Agents Hydrogen Cyanide/ Cyanogen Chloride
Physical Appearance	Greenish-yellow vapor/ colorless vapor	Colorless vapor
Odor	Bleach/mown hay	Bitter almonds
Signs and Symptoms	Coughing, choking, tightness in chest	Gasping for air Red eyes, lips, skin
Protection	Respiratory	Respiratory
Treatment	Aeration	Aeration, cyanide kit

Four industrial chemicals previously used as chemical warfare agents



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Comparative Toxicity



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How Much Sarin Does it Take?

Structure	Lethal Amount
Domed Stadium	107 kg (26 gals)
Movie Theater	1.2 kg (5 cups)
Auditorium	52 g (1/4 cup)
Conference Room (50-100 seating)	33 g (1 shot glass)

LD₅₀ amounts for 1 minute exposure to Sarin aerosol



FEMA

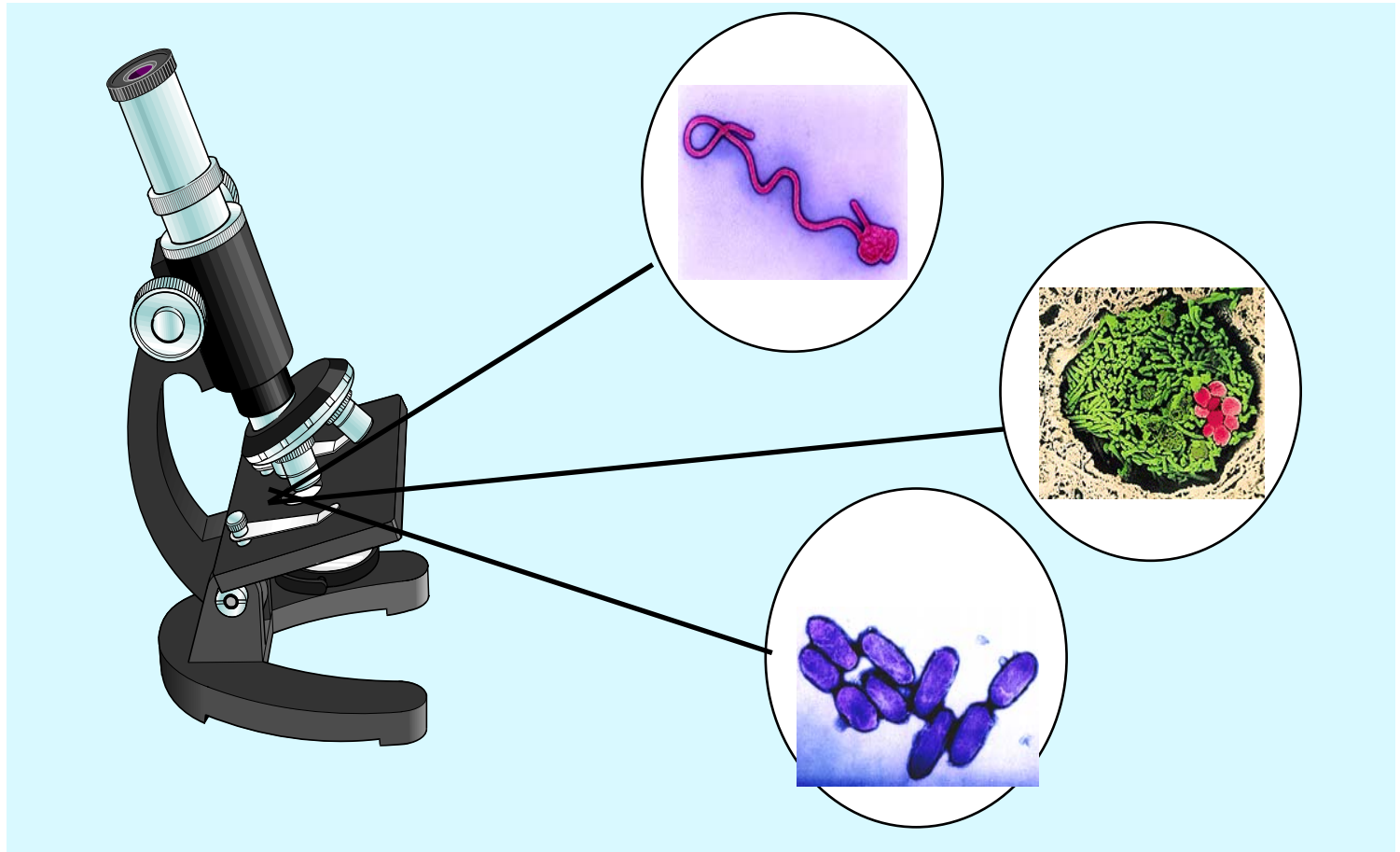
Chemical Agents Key Points

- Chemical agents are super toxic
- Relative toxicity: industrial chemicals < mustard < nerve
- Normal states are as a liquid or a vapor
- Inhalation hazard is of greatest concern



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Biological Warfare Agents



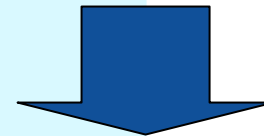
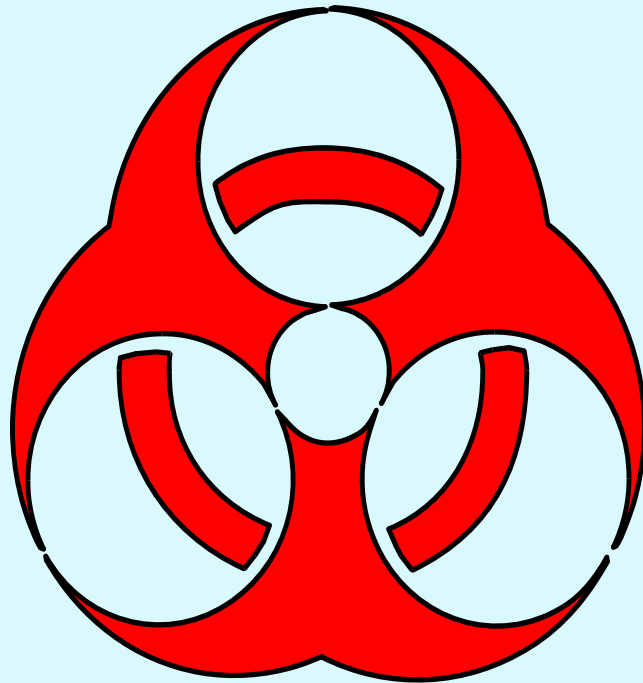
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Classes of Biological Agents

Bacteria

Viruses

Toxins



FEMA 426 - Appendix C contains a CBR glossary and characteristics of biological agents



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Bacteria

	Anthrax	Plague
Incubation Period	1 to 6 days	2 to 3 days for pneumonic 2 to 10 days for bubonic
Contagious	NO	YES (pneumonic) NO (bubonic)
Signs and Symptoms	Chills, fever, nausea, swollen lymph nodes	Chills, high fever, headache, spitting up blood, shortness of breath
Protection	Standard Precautions	Standard Precautions and Droplet Precautions
Treatment	Antibiotics and vaccines	Antibiotics and vaccines



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Viruses

	Smallpox	Viral Hemorrhagic Fevers
Contagious	YES	YES
Signs and Symptoms	Fever, rigors, vomiting, headache, pustules	Fever, vomiting, diarrhea, mottled/blotchy skin
Protection	Standard Precautions + Droplet + Airborne + Contact Precautions	Standard Precautions + Droplet + Airborne + Contact Precautions
Treatment	Vaccine, supportive therapy	Vaccines available for some



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Toxins

	Neurotoxin (Botulinum)	Cytotoxin (Ricin)
Onset of Symptoms	1 to 3 days	4-8 hours after ingestion 12-24 hours after inhalation
Contagious	NO	NO
Signs and Symptoms	Weakness, dizziness, dry mouth and throat, blurred vision, paralysis	Chills, high fever, headache, spitting up blood, shortness of breath
Protection	Standard Precautions	Standard Precautions
Treatment	Supportive care, antitoxins, and vaccines	Supportive oxygenation and hydration

Note: There are numerous naturally-occurring toxins. For our purposes, we will group them into two categories.



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Biological Agents Key Points

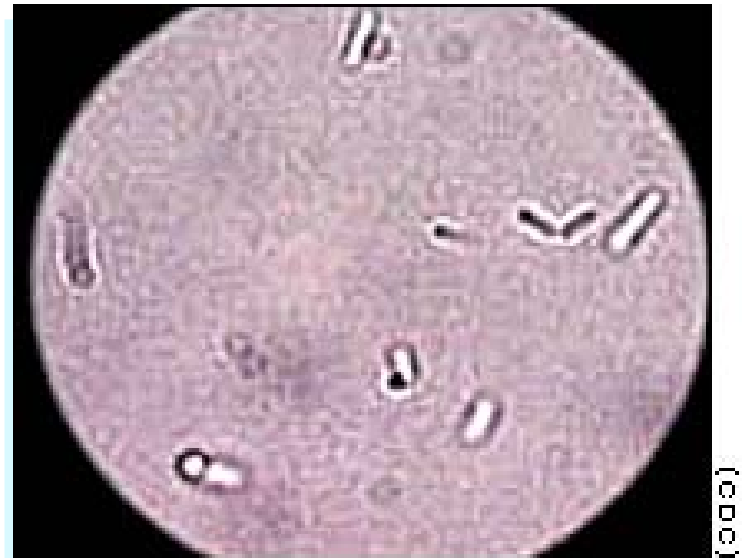
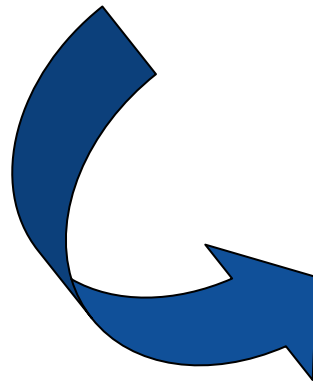
Onset of symptoms

Potentially contagious

Signs and symptoms

Protection

Treatment



(CDC)



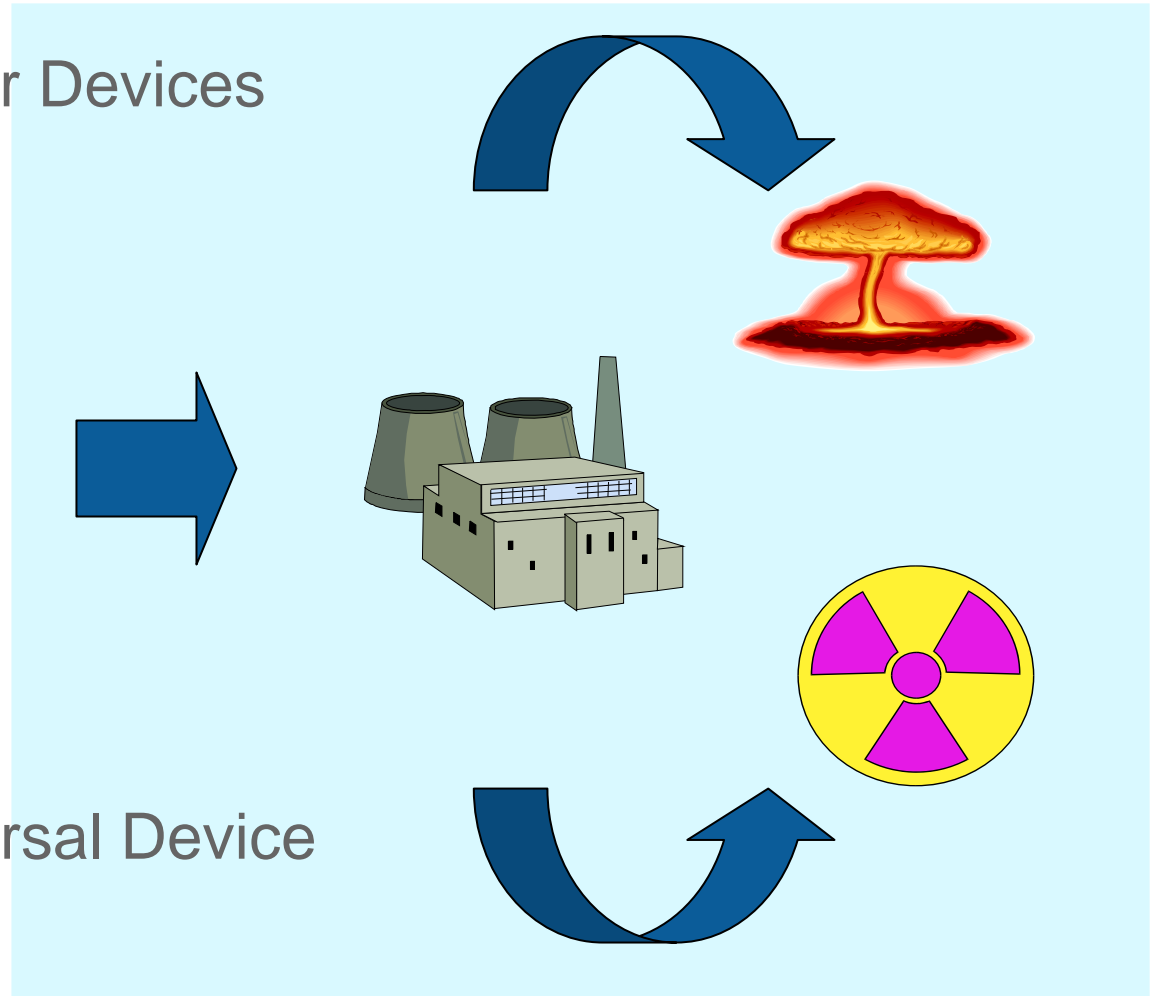
FEMA

Nuclear/Radiological Materials

Improvised Nuclear Devices

Nuclear Plants

Radiological Dispersal Device



FEMA

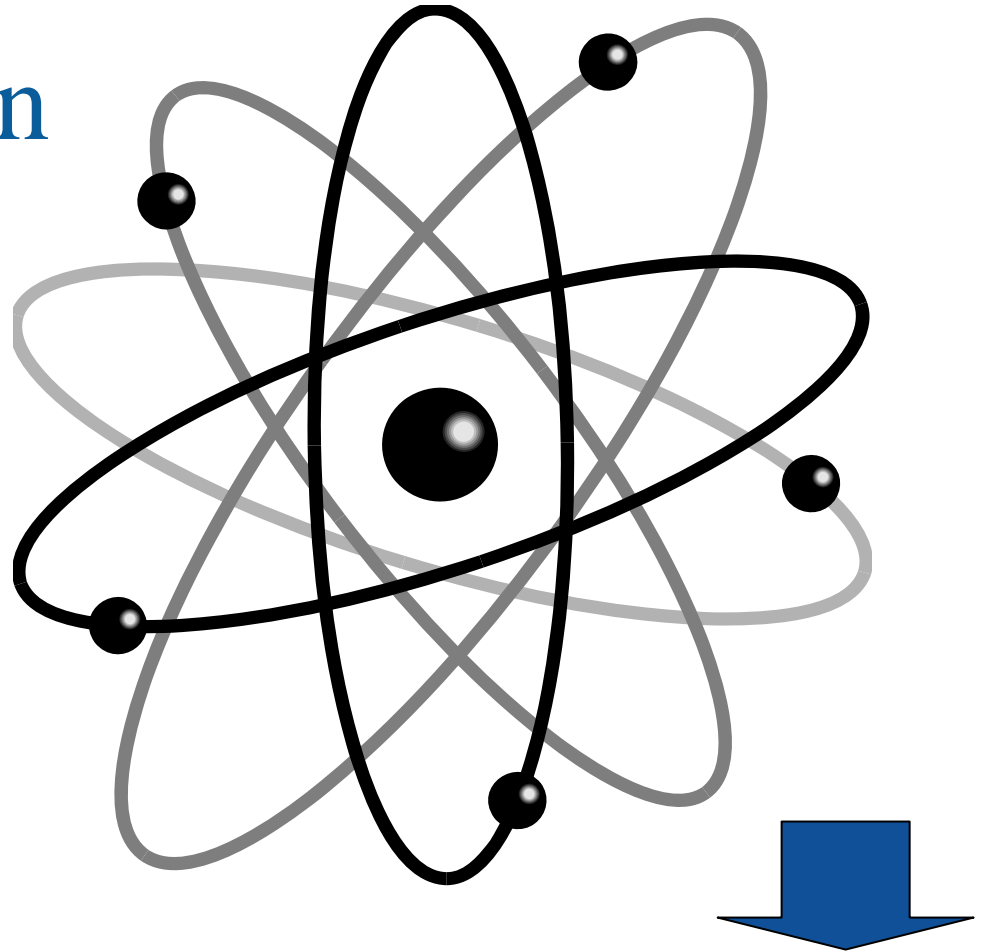
Ionizing Radiation

Alpha particles

Beta particles

Gamma rays

Neutrons





There are also non-ionizing types of radiation – fluorescent lights, lasers, and microwaves. In these examples, the radiation can cause burns, but it does not cause molecular change or ionization



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Common Radiation Exposures

Average annual exposure	360 mrem per year	Chronic 
Chest x-ray	10 to 30 mrem	
Flight	0.5 mrem every hour	
Smoking 1.5 packs per day	16,000 mrem per year	
<hr/>		
Mild radiation sickness*	200,000 mrem	Acute 
Lethal dose*	450,000 mrem	

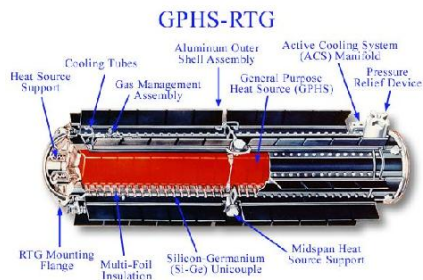
* single acute exposure



FEMA

Health Hazards in an Incident

- Exposure to radiation source (external)
- Contamination (possible internal and/or external)



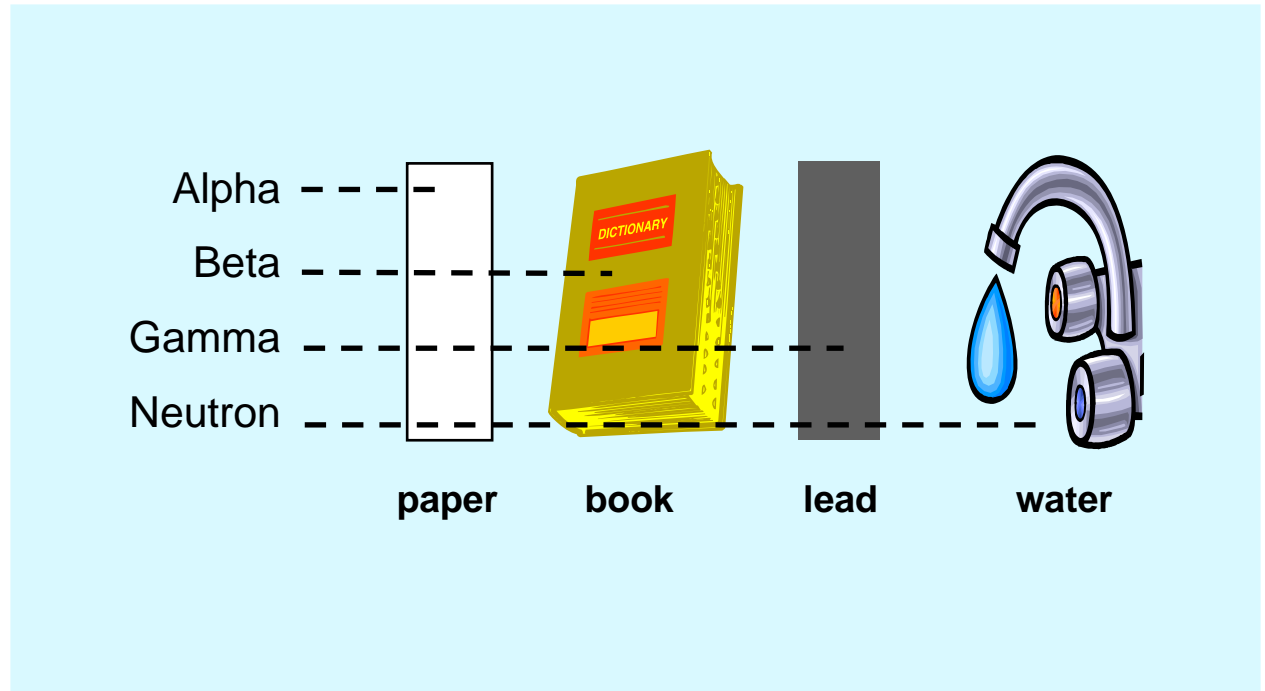
FEMA

Protection from Radiation Exposure

Time

Distance

Shielding



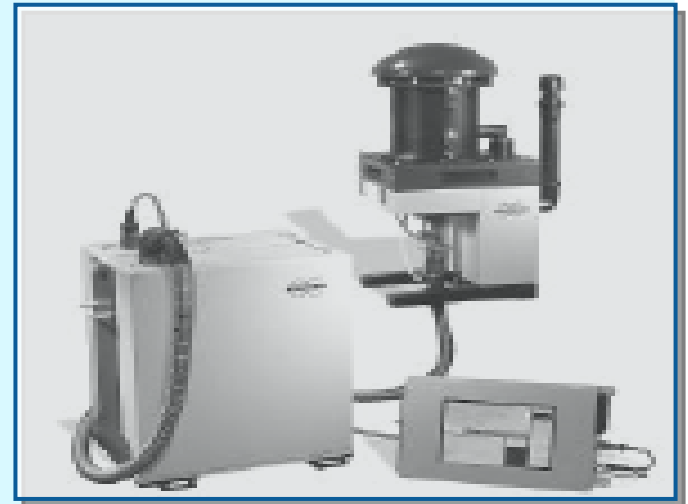
FEMA

CBR Detection

Radiological	✓
Chemical	✓
Biological	?



SOURCE: BAE SYSTEMS



SOURCE: BRUKER DALTRONICS



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CBR Incident Indicators

Indicator	Chemical	Biological	Radiological
Dead Animals	✓		✓
Lack of Insect life	✓		
Physical Symptoms	✓	✓	✓
Mass Casualties	✓		✓
Unusual Liquids	✓		
Unexplained Odors	✓		
Unusual Metal Debris/Canisters	✓	✓	✓
Heat Emitting or Glowing			✓
Spray Mechanisms	✓	✓	



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CBR Protection Strategies

Protective Actions:

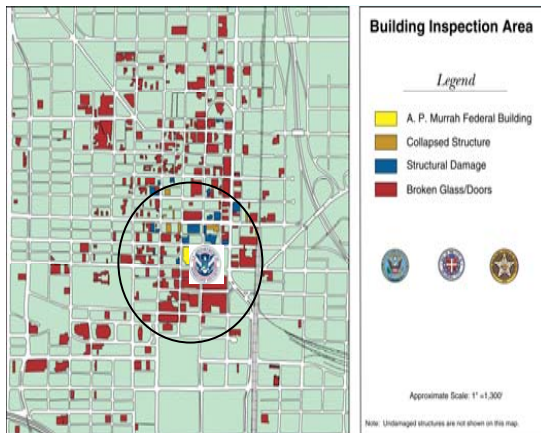
- Evacuation
- Sheltering in Place
- Personal Protective Equipment
- Air Filtration, Pressurization, and Ultraviolet Light
- Exhausting and Purging



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Evacuation

- Determine airborne hazard source -- internal or external
- Determine if evacuation will make things better or worse
- Assembly should be upwind, at least 1,000 feet away, and three different locations (A, B, C plan)
- In most cases, existing plans for fire evacuation apply – follow through - exercise



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Sheltering in Place

A building can provide substantial protection against agents released outside if uptake of contaminated air can be halted or reduced and/or if uptake of fresh/filtered air can be increased.

The amount of protection varies with:

- How tight the building is
- Level of exposure (dose x time)
- Purging or period of occupancy
- Natural filtering



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Personal Protective Equipment



SOURCE: BARDAS CHILD PROTECTIVE WRAP (ISRAEL)



SOURCE: MINE SAFETY APPLIANCES COMPANY (USA)



SOURCE: BROOKDALE INTERNATIONAL SYSTEMS INC (CANADA)



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Aftermath of Tragic Events



NMRT decontamination corridor.



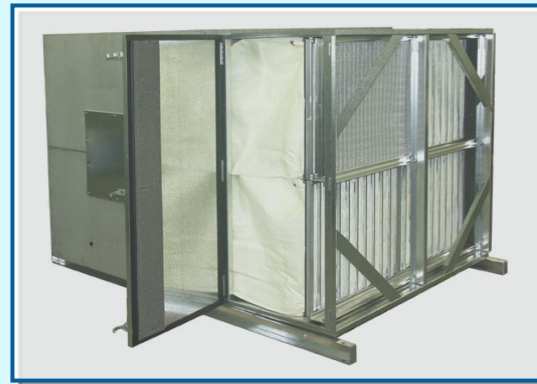
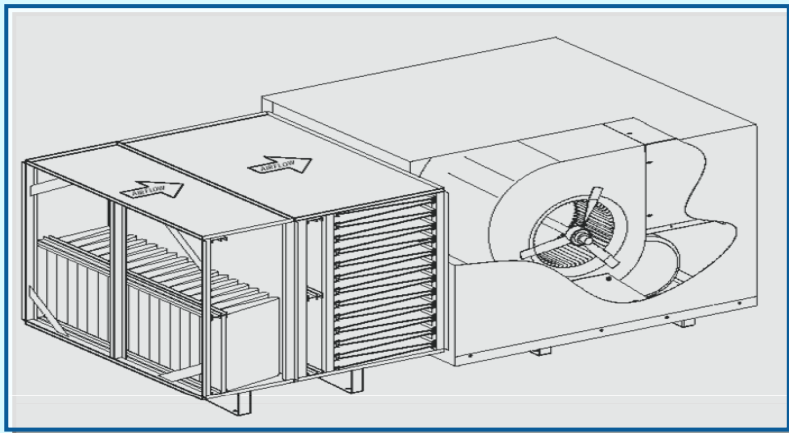
Assembly should be to the upwind side of the building at least 1,000 feet away since any airborne hazard escaping the building during an internal release will be carried downwind.



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Air Filtration and Pressurization

- Requires modifications to HVAC and electrical systems – significant initial and life-cycle costs
- Introduces filtered air at a rate sufficient to produce an overpressure and create an outward flow through leaks and cracks



SOURCE: TRION INCORPORATED



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FEMA 426, Figures 5-5 and 5-12: Bag Filter and HEPA Filter; Commercial Air Filtration Unit, p. 5-12 and 5-22

Air Filtration and Cleaning

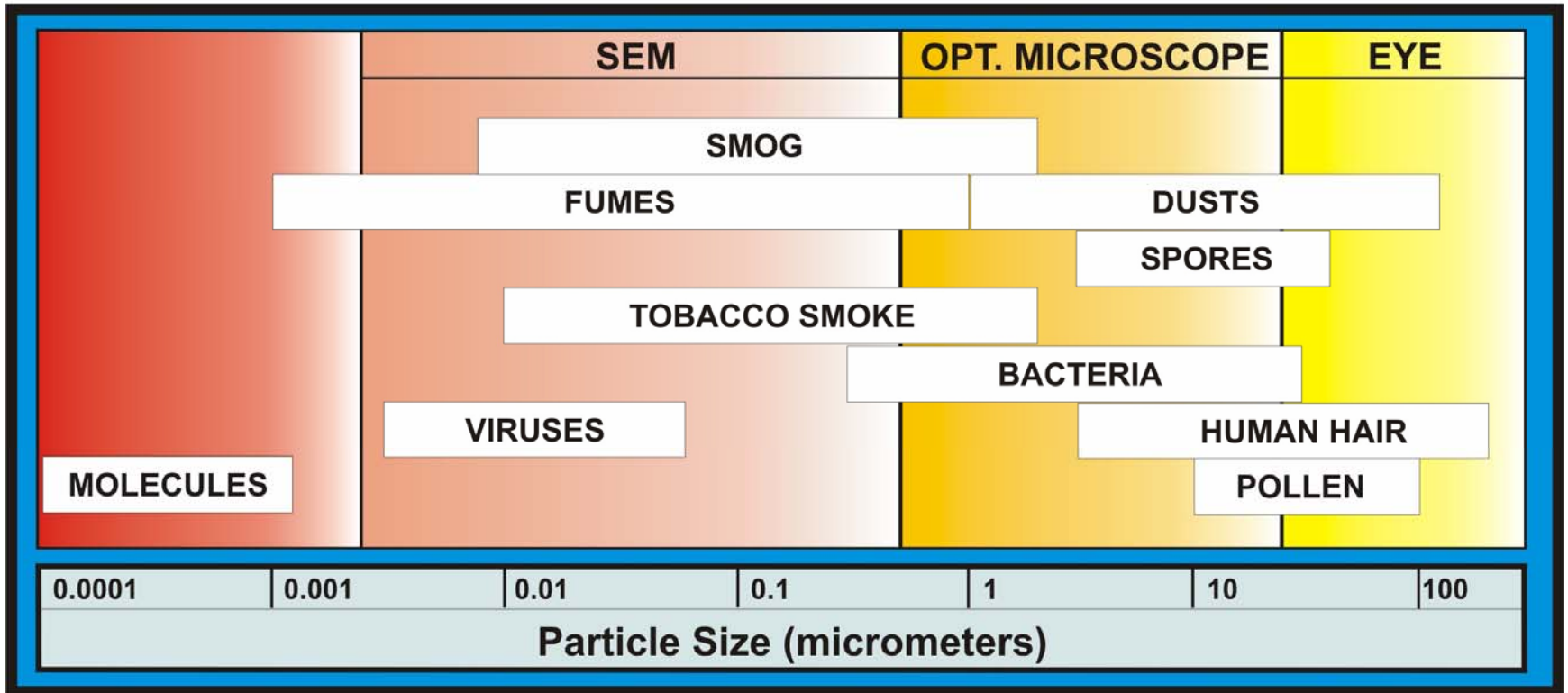
Two Types of Collection Systems:

- Particulate air filtration
 - Principles of collection
 - Types of particulate filters
 - Filter testing and efficiency ratings
- Gas-phase air filtration
 - Principles of collection
 - Types of gas-phase filters



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Air Contaminant Sizes



FEMA

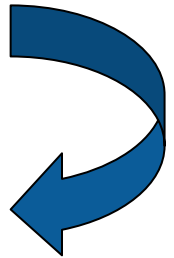
Various Filter Types

HEPA Filters



SOURCE: FLANDERS CORPORATION

Pleated Panel Filters



SOURCE: AMERICAN FILTER

Carbon Filters



SOURCE: FLANDERS CORPORATION

FEMA 426, Figure 5-9: Charcoal Filter Beds (center), p. 5-17

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit VIII-C-37



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ASHRAE Standards

ASHRAE 52.2				ASHRAE 52.1		Particle Size Range, μm	Applications
MERV	Particle Size Range			Test			
	3 to 10 μm	1 to 3 μm	.3 to 1 μm	Arrestance	Dust Spot		
1	< 20%	-	-	< 65%	< 20%	> 10	Residential, light, pollen, dust mites
2	< 20%	-	-	65 - 70%	< 20%		
3	< 20%	-	-	70 - 75%	< 20%		
4	< 20%	-	-	> 75%	< 20%		
5	20 - 35%	-	-	80 - 85%	< 20%	3.0 - 10	Industrial, Dust, Molds, Spores
6	35 - 50%	-	-	> 90%	< 20%		
7	50 - 70%	-	-	> 90%	20 - 25%		
8	> 70%	-	-	> 95%	25 - 30%		



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FEMA 426, Table 5-1: Comparison of ASHRAE Standards 52.1 and 52.2, p. 5-12

ASHRAE Standards

9	> 85%	< 50%	-	> 95%	40 - 45%	1.0 – 3.0	Industrial, Legionella, dust
10	> 85%	50 - 65%	-	> 95%	50 - 55%		
11	> 85%	65 - 80%	-	> 98%	60 - 65%		
12	> 90%	> 80%	-	> 98%	70 - 75%		
13	> 90%	> 90%	< 75%	> 98%	80 - 90%	0.3 – 1.0	Hospitals, Smoke removal, Bacteria
14	> 90%	> 90%	75 - 85%	> 98%	90 - 95%		
15	> 90%	> 90%	85 - 95%	> 98%	~95%		
16	> 95%	> 95%	> 95%	> 98%	> 95%		
17	-	-	≥ 99.97%	-	-	< 0.3	Clean rooms, Surgery, Chembio, Viruses
18	-	-	≥ 99.99%	-	-		
19	-	-	≥ 99.999%	-	-		
20	-	-	≥ 99.9999%	-	-		



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FEMA 426, Table 5-1: Comparison of ASHRAE Standards 52.1 and 52.2,
p. 5-12

Inside Versus Outside Releases

Outside Release

- Keep people inside building
- Reduce indoor/outdoor air exchange – close dampers
- Shut off air handling systems and equipment that moves air – HVAC, exhausts, combustion, computers, elevators
- Close all windows and doors
- Once the outdoor hazard has dissipated
 - Open all doors and windows
 - Turn on all fans, including purging systems



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Inside Versus Outside Releases

Inside Release

- Turn off all air handling equipment if no special stand-alone systems installed
- If special systems installed, i.e. mailroom
 - Place air handling system on full (or 100% outside air) to pressurize the space around release room
 - Turn off all air handling supplying release room
- Consider activating fire sprinklers in release room if toxic chemicals involved
- Evaluate evacuation routes for contamination
- Evacuate building in accordance with emergency plan



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Exhausting and Purging

Basic Principles:

- Use ventilation and smoke/purge fans to remove airborne hazards
 - Use primarily after an external release plume has passed
 - Selectively use for internal release – may spread contamination further
- Purging should be carefully applied
 - Primarily when agent has spread throughout building



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HVAC System Upgrade Issues

- What is the threat? Toxic Industrial Chemicals, particulate, gaseous, chemical, biological?
- How clean does the air need to be and what is the associated cost?
- What is the current system capacity?
- Is there filter bypass and how significant is air infiltration into the building envelope?
- Will improved indoor air quality offset upgrade costs?
- Is system maintenance addressed?



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Economic Issues to Consider

Initial Costs

- Filters, housing, blowers
- Factors including flow rate, contaminant concentration

Operating Costs

- Maintenance, replacement filters, utilities, waste disposal

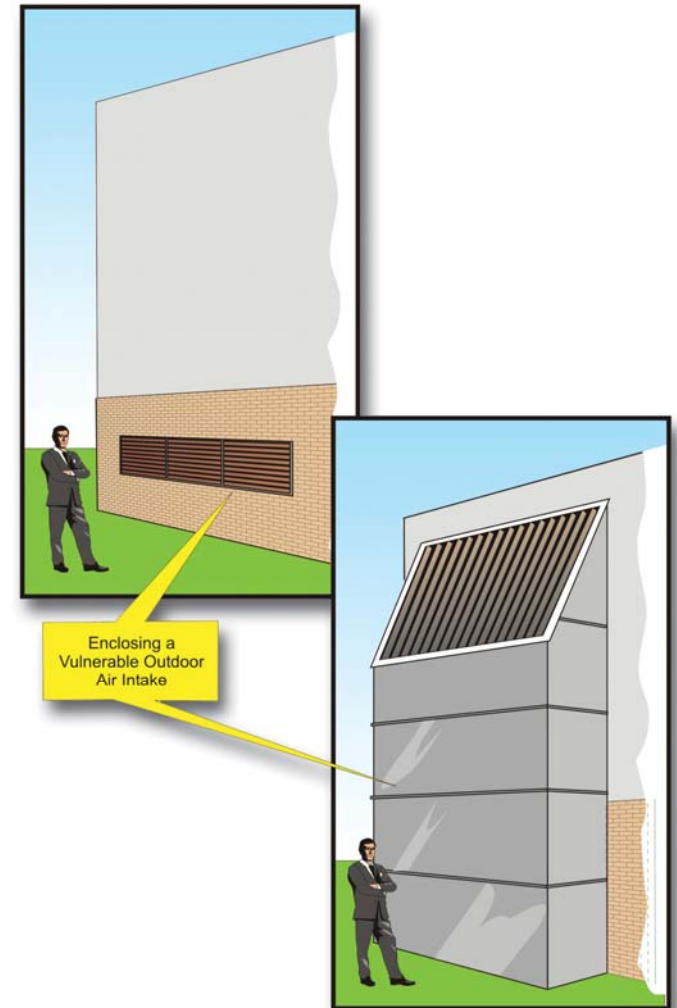
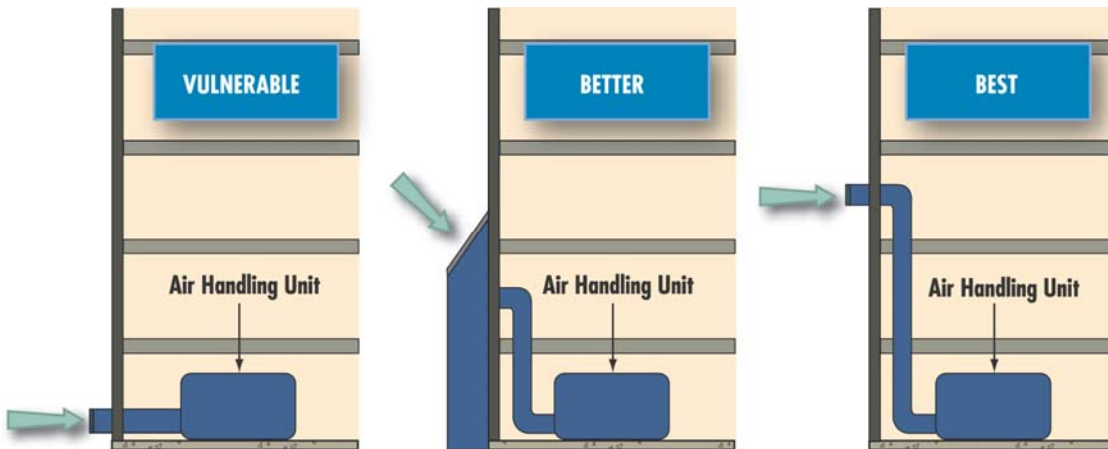
Replacement Costs

- Filter life (factors include continued concentration and particle size distribution, flow rates, etc.)



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Access to Outdoor Intakes

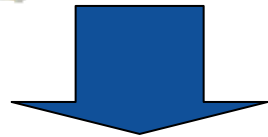
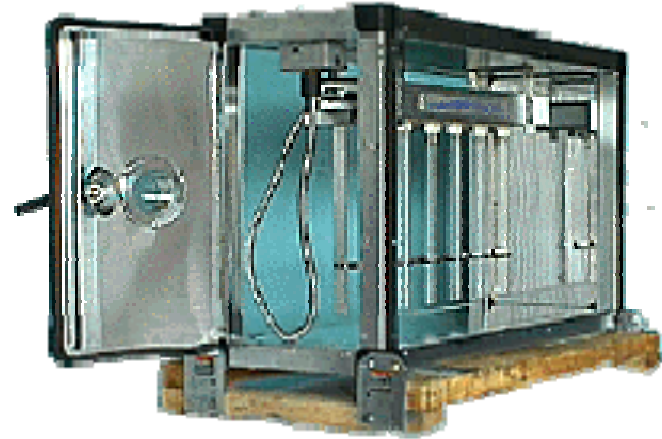


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FEMA 426, Figure 3-8, Example of Protecting Outdoor Air Intakes, p. 3-36 and Figure 3-11, Example of Enclosing Existing Vulnerable Air Intake, p.3-38

Ultraviolet Germicidal Irradiation

All viruses and almost all bacteria (excluding spores) are vulnerable to moderate levels of UVGI exposure



UV lamps resemble ordinary fluorescent lamps, but are designed to emit germicidal UV



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FEMA 426, Figure 5-10: UVGI Array with Reflective Surfaces, p. 5-19

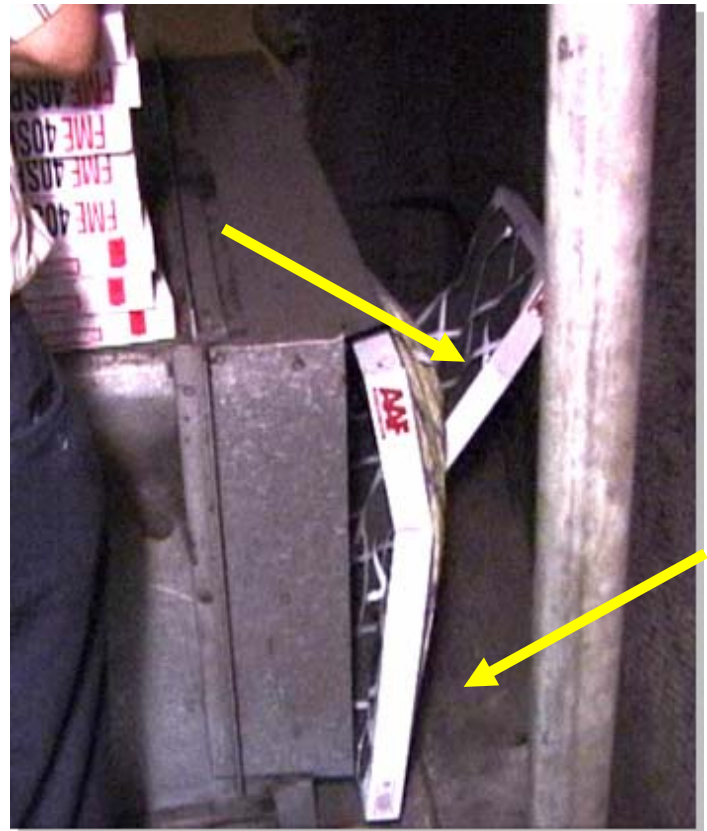
Infiltration and Bypass

Infiltration

- Building envelope tightness and ventilation control are critical

Bypass

- Filters should be airtight
- Check gaskets and seals
- Periodically check



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Things Not to Do

- Outdoor air intakes should not be permanently sealed.
- HVAC systems (includes filter upgrades) should not be modified without understanding effects on building systems or occupants.
- Fire protection and life safety systems should only be modified after careful analysis and review.



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Things to Do

- Have a current emergency plan that addresses CBR concerns
 - Exercise plan
 - Revise plan based upon lessons learned
- Understand your HVAC building vulnerabilities
- Conduct periodic walk-through of system for evidence of irregularities or tampering
- Recognize that there are fundamental differences among various CBR events



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Summary

- CBR threats are real and growing.
- Industrial chemicals are readily available.
- Military chemicals require specialty expertise.
- Most buildings provide a reasonable level of protection.
- Inside versus outside building release determines evacuation and other reaction decisions.
- Develop an emergency plan and ensure it works.



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Unit VIII Case Study Activity

Chemical, Biological, and Radiological (CBR) Measures

Background

Purpose of activity: check on learning about the nature of chemical, biological, and radiological agents

Requirements

- Refer to Case Study and FEMA 426
- Answer worksheet questions



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IX

Site and Layout Design Guidance



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Unit Objectives

Identify site planning concerns that can create, reduce, or eliminate vulnerabilities and understand the concept of “Layers of Defense.”

Recognize protective issues for suburban site planning.

Compare the pros and cons of barrier mitigation measures that increase stand-off or promote the need for hardening of buildings at risks.



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Unit Objectives

Understand the following critical issues:

- Need for keeping up with the growing demand for security design
- Benefits that can be derived from appropriate security design

References

FEMA Building Vulnerability Assessment Checklist, Chapter 1, page 1-46, FEMA 426

Site and Layout Design Guidance, Chapter 2, FEMA 426

FEMA 430, Site and Urban Design for Security, Guidance Against Potential Terrorist Attack



FEMA

Unit Objectives

Understand the following critical issues (continued):

- Benefits of adopting a creative process to face current design challenges
- Benefits of including aesthetic elements compatible with security and architectural characteristics of building and surrounding environment

References

FEMA Building Vulnerability Assessment Checklist, Chapter 1, page 1-46, FEMA 426

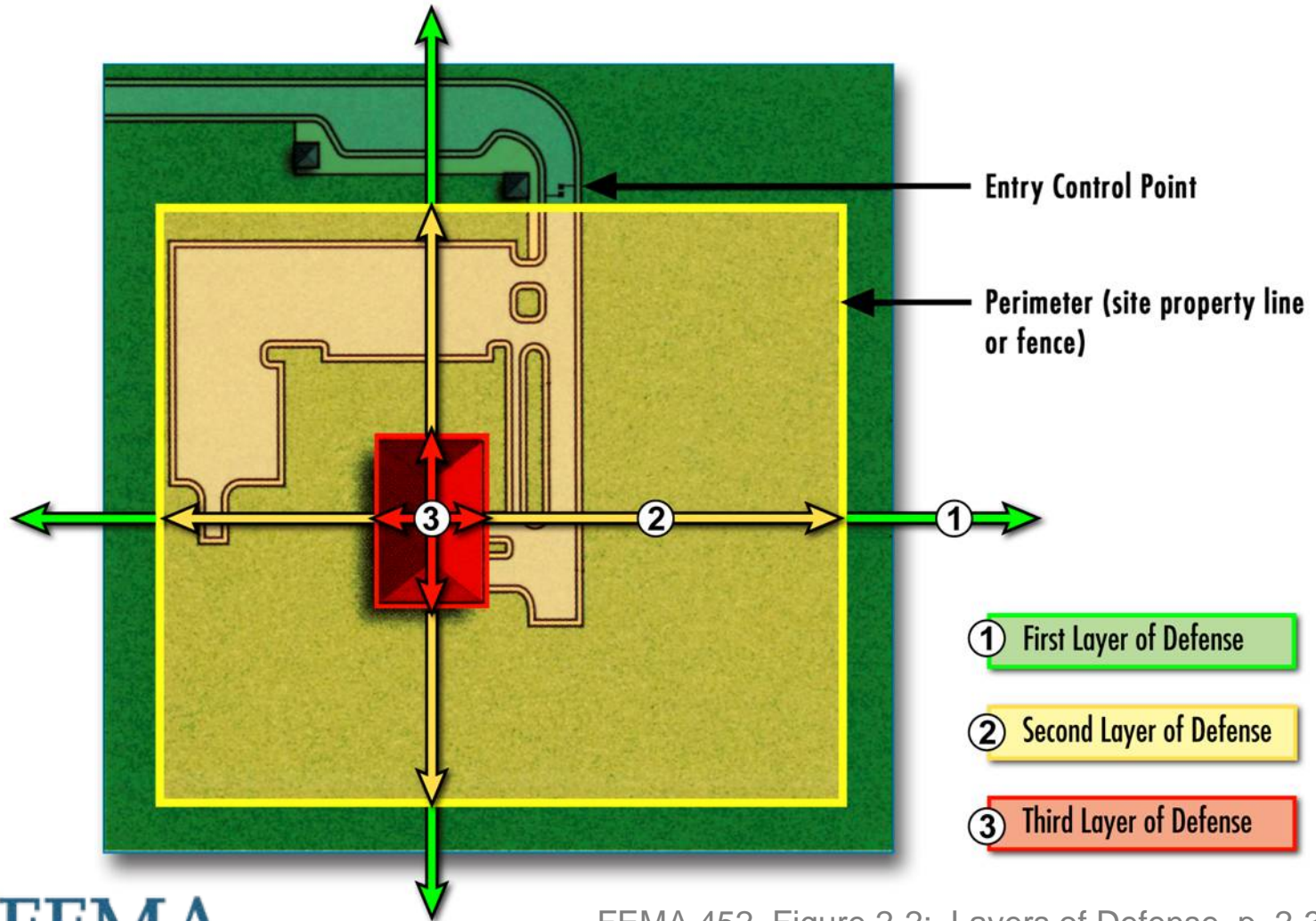
Site and Layout Design Guidance, Chapter 2, FEMA 426

FEMA 430, Site and Urban Design for Security, Guidance Against Potential Terrorist Attack



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Layers of Defense



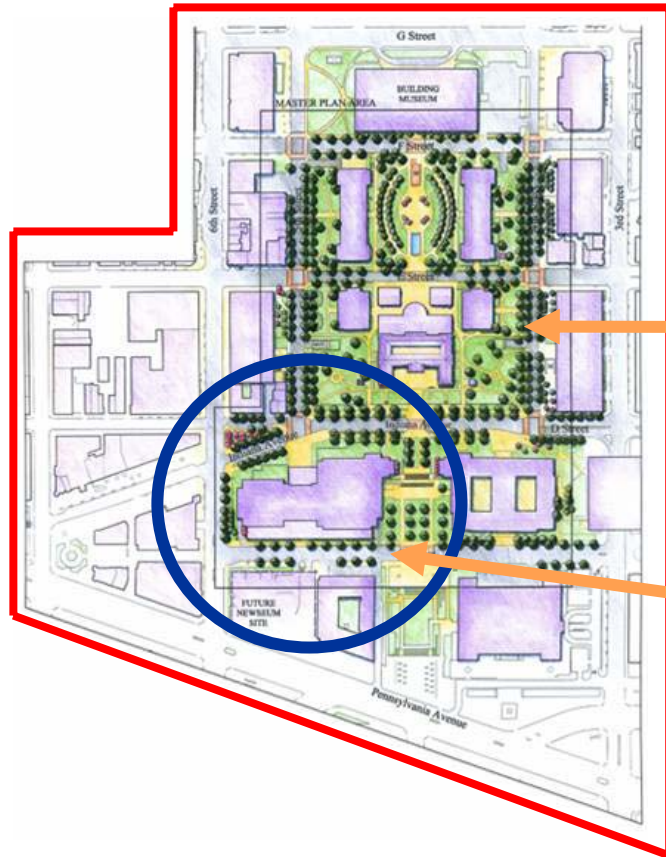
FEMA

FEMA 452, Figure 2-2: Layers of Defense, p. 2-3

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IX-C-5

Layers of Defense



First Layer of Defense (Uncontrolled)

- Personnel Access Control
- Vehicle Access Control & Inspection
- Vehicle Stand-off

Second Layer of Defense (Controlled)

- Personnel Access Control
- Vehicle Access Control
- Vehicle Stand-off

High Security Building Third, Second, and First Layers of Defense (Controlled)

- Personnel Access Control
- Vehicle Access Control
- Hardening



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Layers of Defense

Layers of Defense	Survey Surroundings	Access Points	Layout / Site Considerations	Barriers / Bollards / Fencing	Gatehouses / Screening	Sidewalks and Curbs	Street Furniture	Yards and Plazas	Roadways	Parking	Signage	Security Lighting	Sensors / CCTV	Site Utilities
First Layer														
Second Layer														
Third Layer														

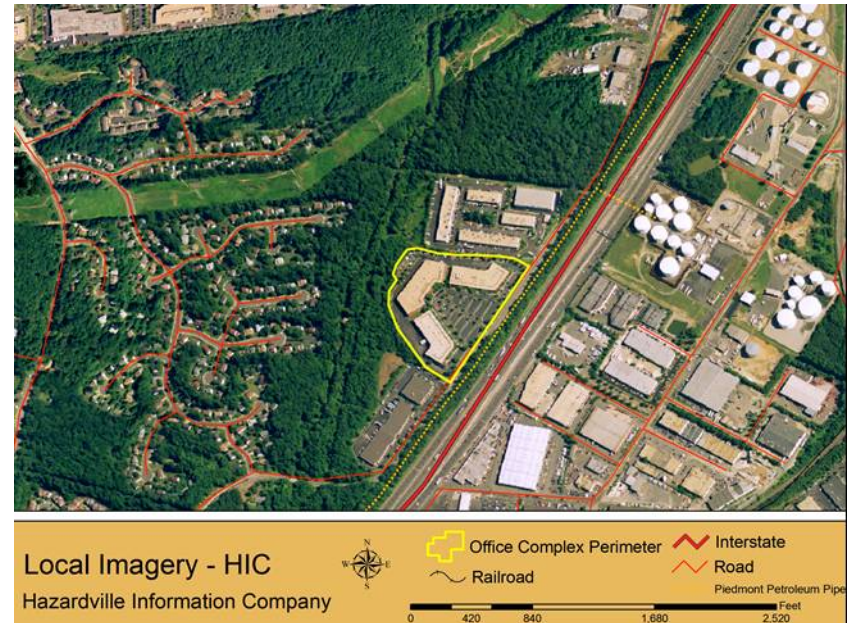


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First Layer of Defense

Survey Surroundings / Data Collection

- 360 degrees - all directions
- Overhead and underground utilities and structures
- Use GIS and local authorities to understand surroundings
 - Buildings
 - Infrastructure
 - Geographic/topographic elements



FEMA 426, Figure 2-1: Example of Using GIS to Identify Adjacent Hazards, p. 2-5



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First Layer of Defense

Access Points

- Have commercial vehicle gates if possible
- Provide traffic calming
- Avoid high speed approaches
- Control angles of approach
- Prevent unauthorized access
- Avoid traffic queuing
- Have equal security capacity for exit

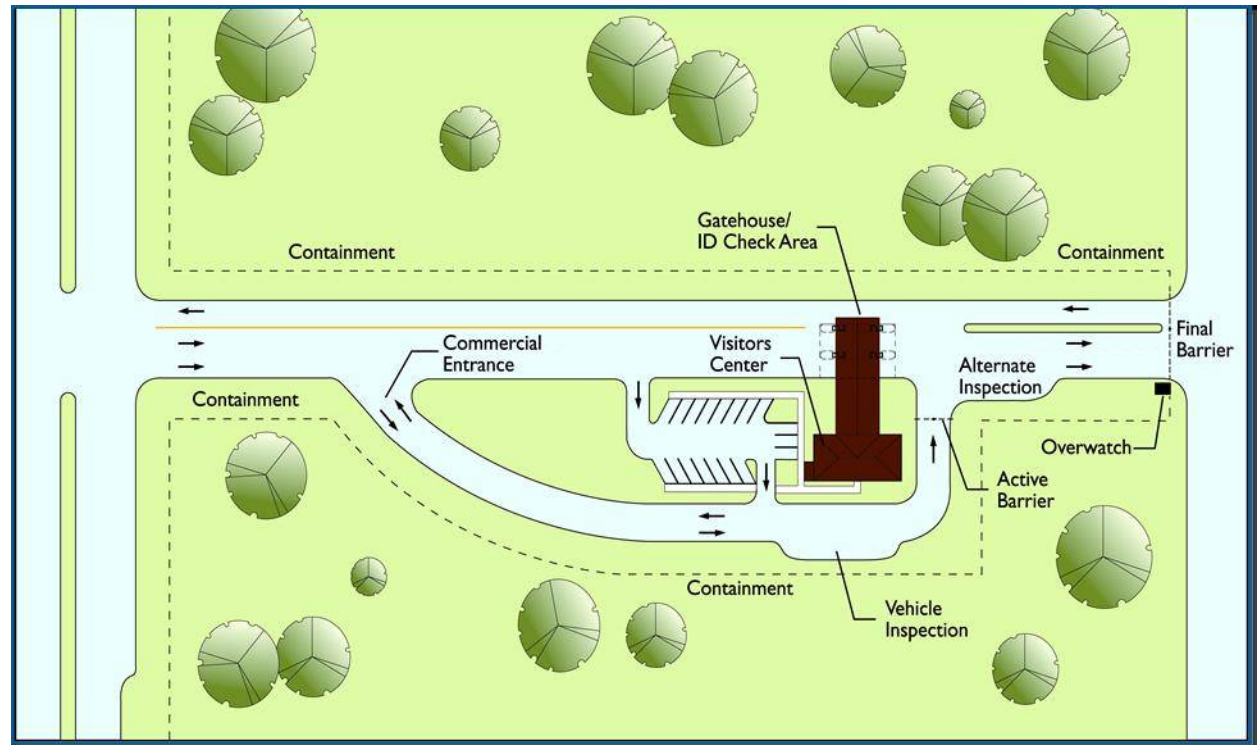


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First Layer of Defense

Access Points

- Reject vehicles before final barrier
- Inspection area blast effects
 - Pressure
 - Fragments
- Reaction time to activate barriers



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FEMA 426, Figure 2-15: Combined Multi-User Gate, p. 2-37

Second Layer of Defense

The following considerations can have an impact in the layout site design:

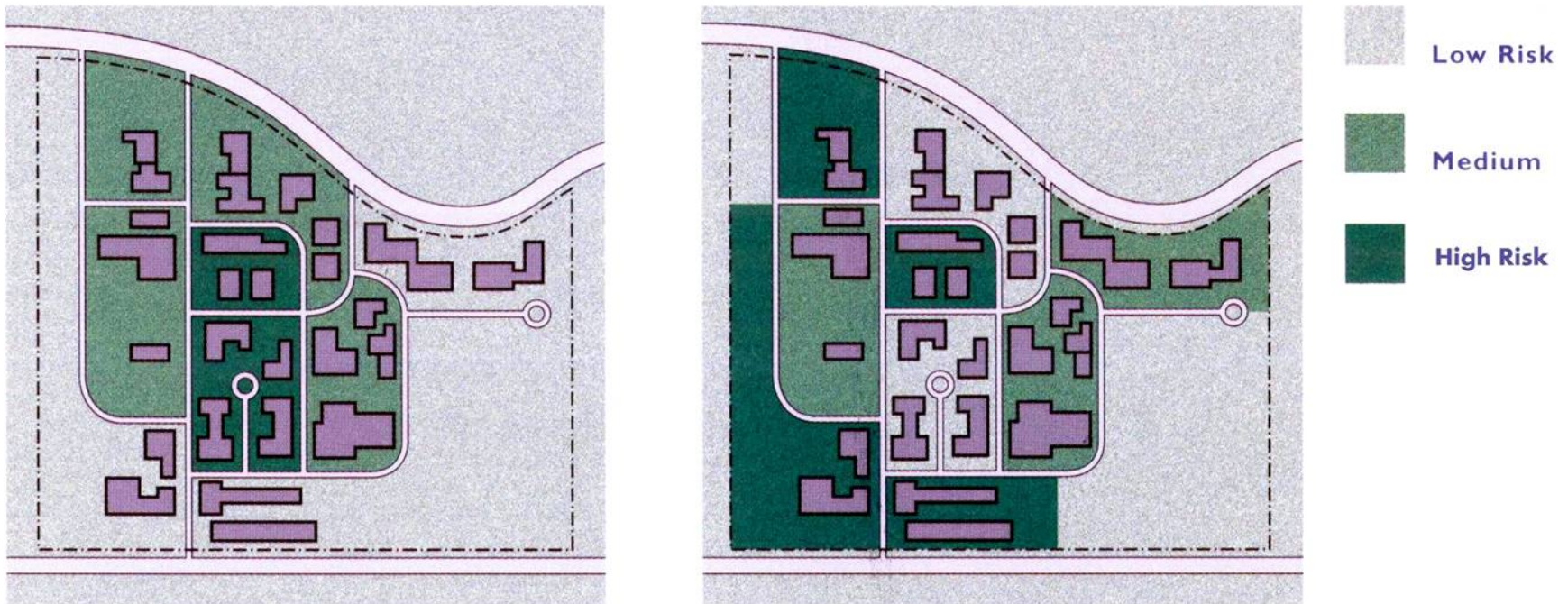
- Clustered versus dispersed facilities / functions
- Orientation
- Siting and view relationships



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Second Layer of Defense

Layout/Site Considerations



Clustered facilities

Dispersed facilities



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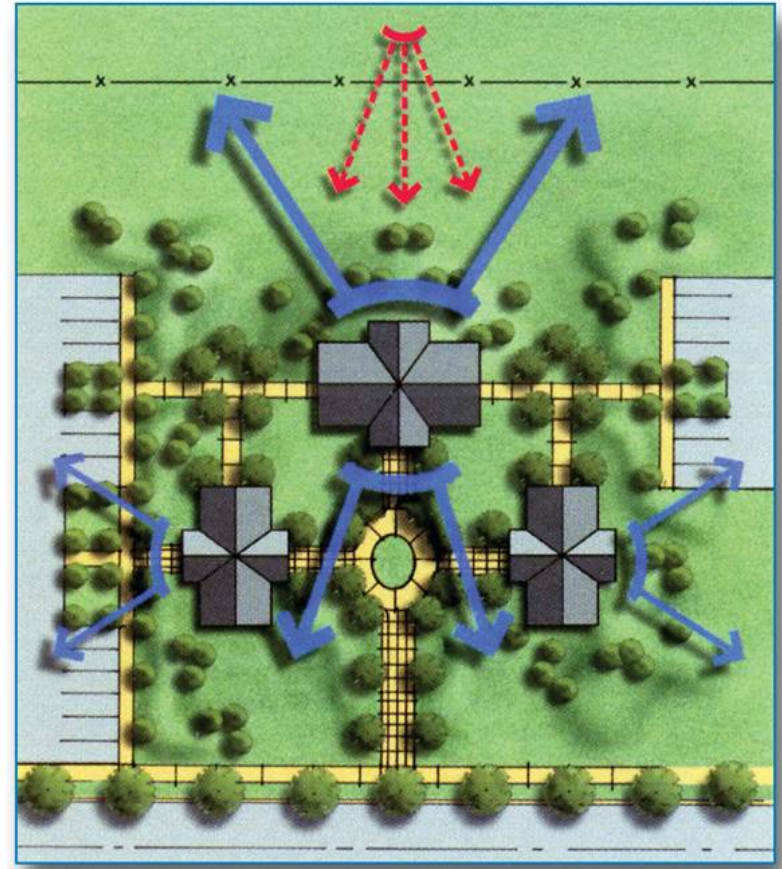
FEMA 426, Figure 2-2: Clustered versus Dispersed Site Layouts, p. 2-8

Second Layer of Defense

Layout/Site Considerations

Orientation

- Significant impact on making building visible or hidden to aggressors
- Enhance surveillance opportunities of approaches and parking
- Minimize views into building
- Reduce blast effects



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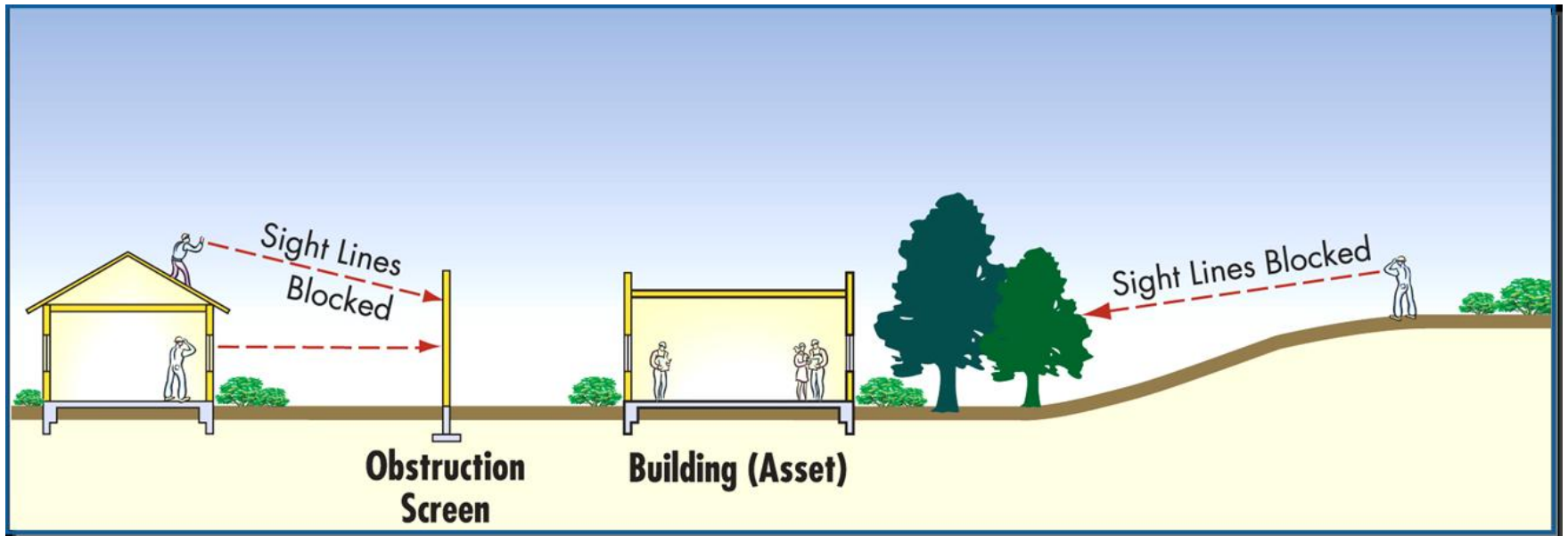
FEMA 426, Figure 2-3: Clustering to Enhance Surveillance Opportunities While Minimizing Views into Buildings, p. 2-8

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IX-C-13

Second Layer of Defense

Layout/Site Considerations



Siting and View Relationships



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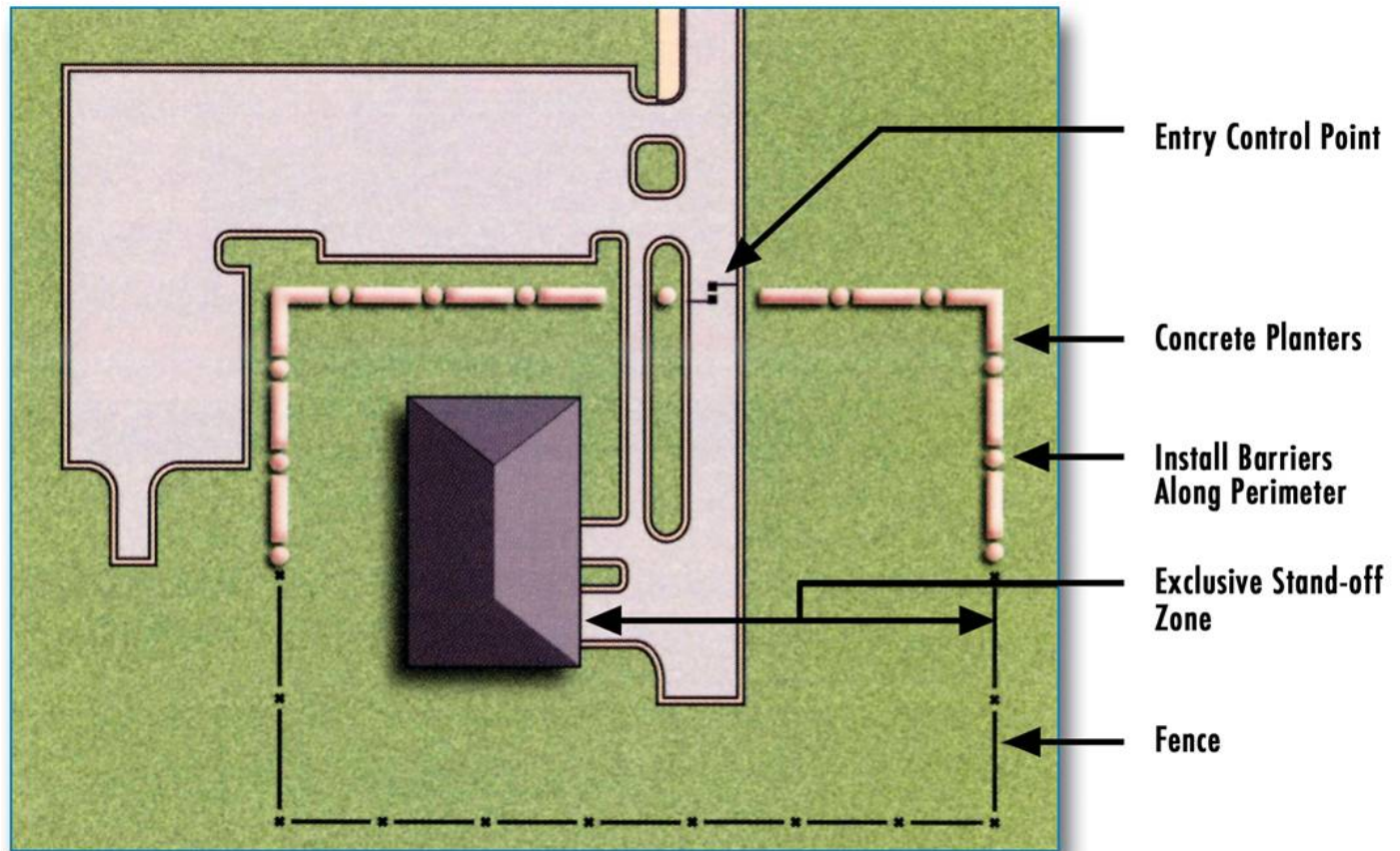
FEMA 426, Figure 2-5: Blocking of Site Lines, p. 2-20

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IX-C-14

Second Layer of Defense

Barriers/Bollards/Fencing



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FEMA 426, Figure 2-11: Application of Perimeter Barrier Elements, p. 2-28

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit IX-C-15

First/Second Layer of Defense

Barriers/Bollards/Fencing - Passive



Source: Yodock Wall Company



Source: Yodock Wall Company



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First/Second Layer of Defense

Barriers/Bollards/Fencing - Active



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First/Second Layer of Defense



Rotating Drum, Drop Arm, and Rotating Plate Vehicle Barriers
FEMA

First/Second Layer of Defense

Barriers, Bollards, and Fencing

Department of State periodically issues list of manufacturers and model numbers certified in meeting prescribed testing criteria (March 2003)

Rating	Vehicle Weight (lbs.)	Vehicle Speed (mph)	Distance Past Barrier (ft)
K4	15,000	30	≤ 3.3
K8	15,000	40	≤ 3.3
K12	15,000	50	≤ 3.3

Check site utilities, water runoff, and other subterranean conditions when installing bollards and barriers



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First/Second Layer of Defense

Barriers, Bollards, and Fencing

- Fixed bollards
- Retractable bollards
- Planters



Fixed bollards

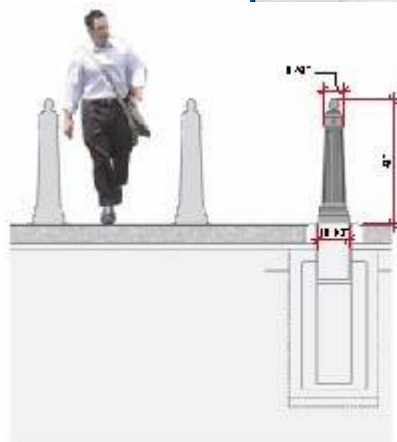
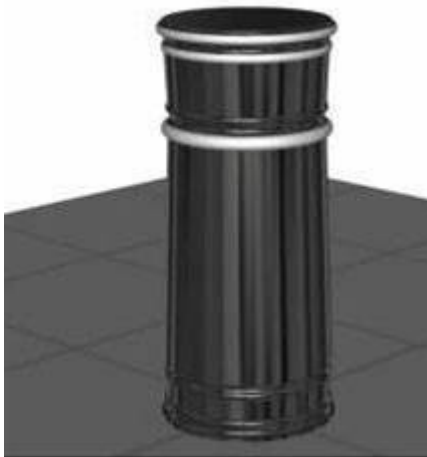


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First/Second Layer of Defense

Barriers, Bollards, and Fencing

Retractable



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First/Second Layer of Defense

Barriers, Bollards, and Fencing



Planters

- If well designed, planters can be an element of beautification
- Ensure barriers are properly anchored to stop vehicles and configured to reduce fragmentation



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First/Second Layer of Defense

Barriers, Bollards, and Fencing

Avoid designing barriers that impair access by first responders:

- Intersection with driveways and gates
- Crossing of pedestrian paths and handicapped ramps
- Fire hydrants



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First/Second Layer of Defense

Barriers, Bollards, and Fencing

Long expanses of bollards should be carefully designed and sited to avoid monotony



Bollard spacing should ensure no vehicles can get through



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First/Second Layer of Defense

Barriers, Bollards, and Fencing

Fencing

- Delineates layer of defense
- Demarcates stand-off required
- Provides access control
- Augments existing security
- Channels vehicle/pedestrian traffic
- Enhances electronic security



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First/Second Layer of Defense

Gatehouses/Screening

Access control with human intervention

- Hardened as determined by threat
- Protection from elements
- Located to minimize queuing

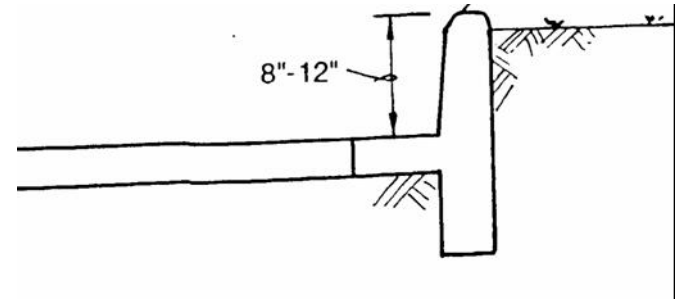


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First/Second Layer of Defense

Sidewalks and Curbs

- Creating stand-off in lieu of hardening is usually less expensive
- High curbs can keep vehicles from departing roadway
- Do not remove curbside parking unless additional stand-off absolutely required

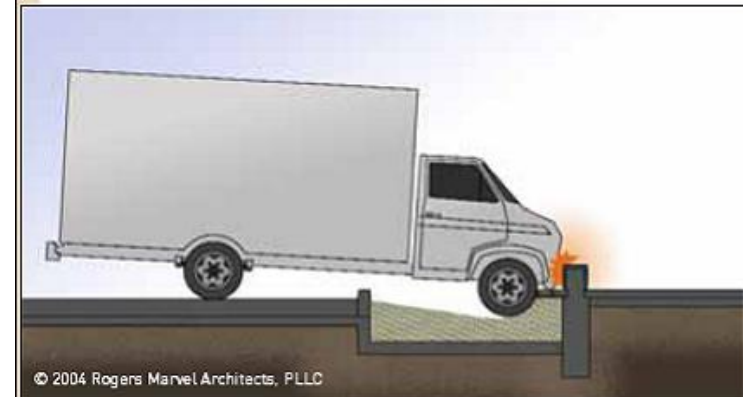
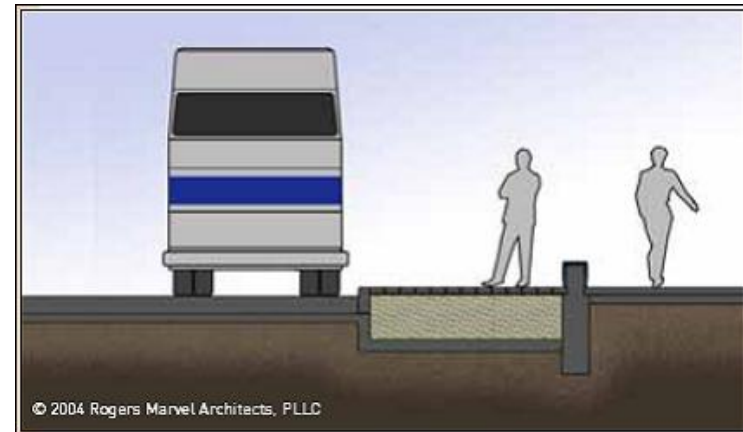


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First/Second Layer of Defense

Sidewalks and Curbs

An alternate to visible barriers/bollards/fencing is collapsible sidewalks using low-strength concrete



A vehicle can be immobilized by the collapsible material of the Tiger Trap™ system.



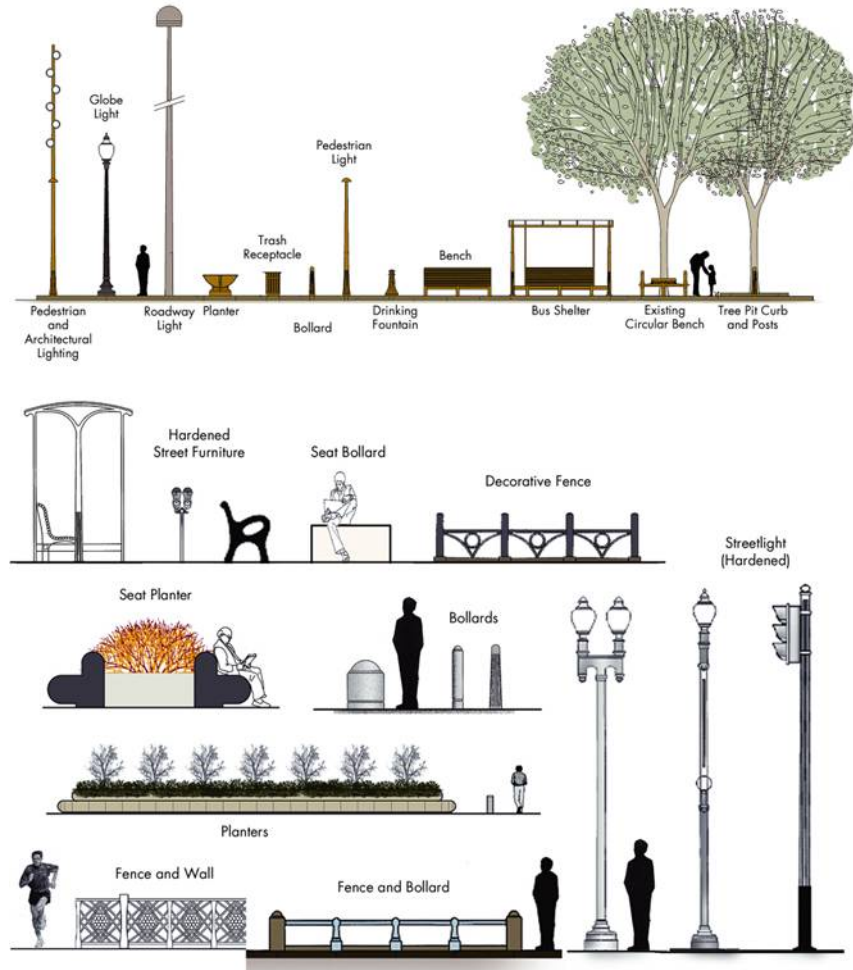
FEMA

First/Second Layer of Defense

Street Furniture

Streetscape can be used to increase security. Hardened elements that become security elements

- Parking meters
- Streetlights
- Benches
- Planters
- Trash receptacles



NCPD Streetscape Catalogue

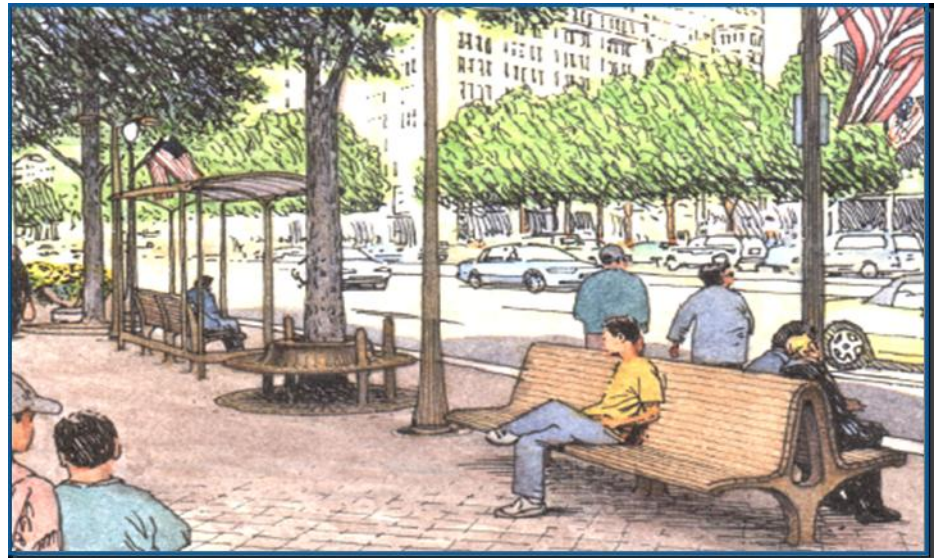


First/Second Layer of Defense

Street Furniture

Place streetscape security components at least 24 inches from edge of curb

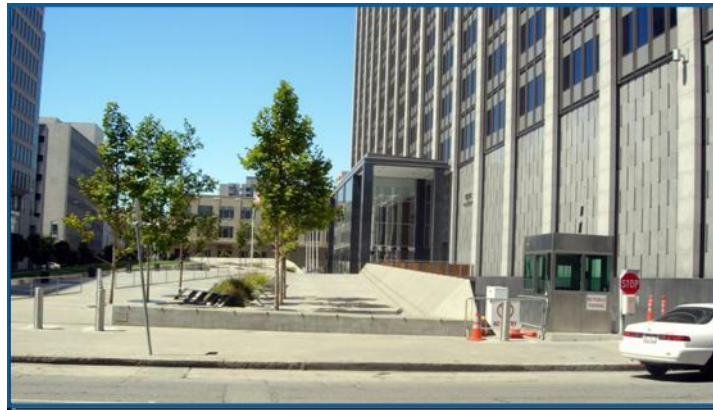
- Allow for opening car doors
- Allow for pedestrian movement from car to sidewalk



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Second Layer of Defense

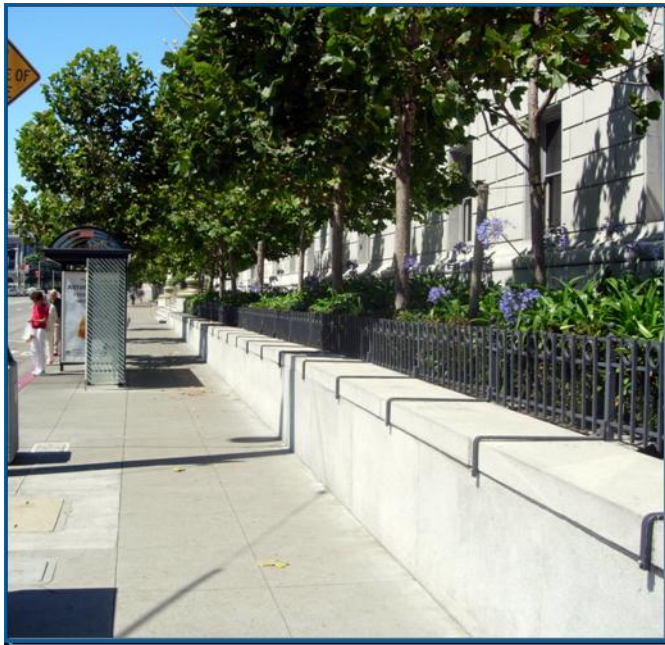
- Buildings with front yards
- Buildings with plazas



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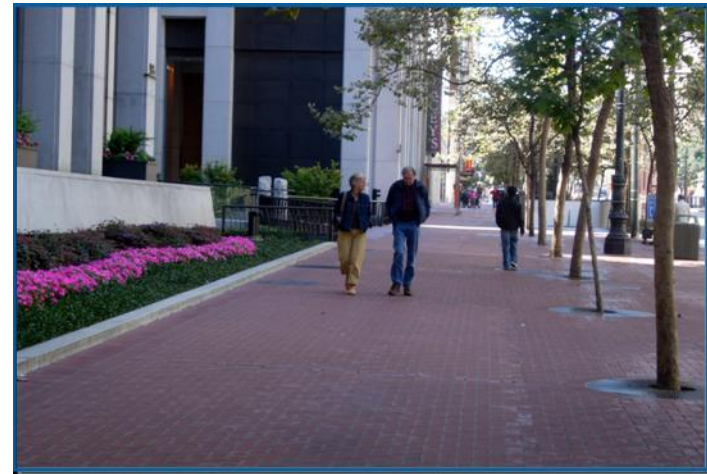
Second Layer of Defense

Building Yard



Narrow yard incorporating low stone wall and metal fence

- **Generally small**
- **Usually provided for governmental & institutional buildings**



Small yard with wide pavement that provide some useful stand-off



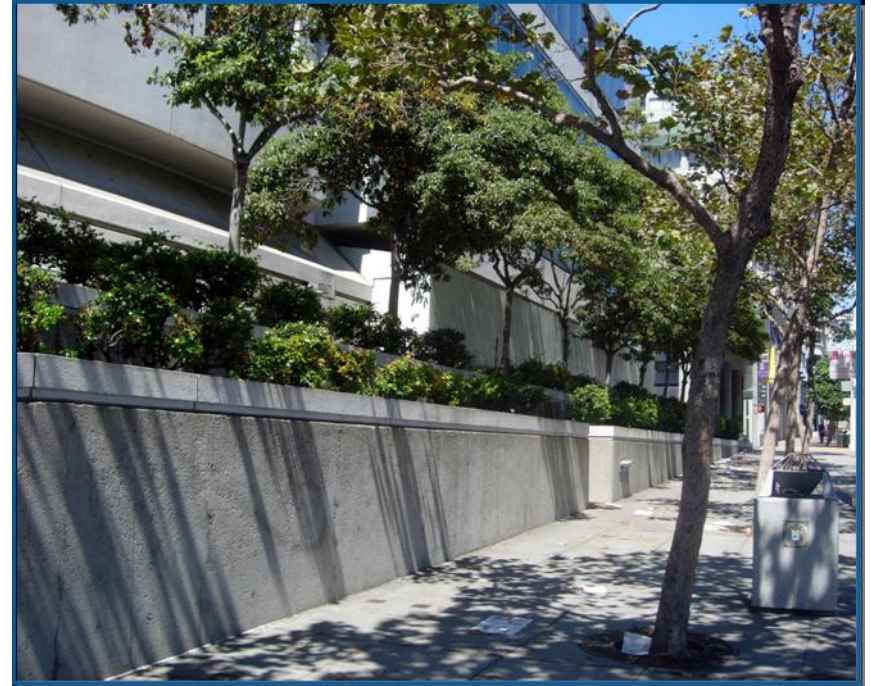
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Second Layer of Defense

Building Yard



Low planting makes a moderate barrier



High stepped yard on sloping site make a strong barrier



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Second Layer of Defense

Building Yard



Monumental yards make excellent barriers and elements of beautification



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Second Layer of Defense

Plaza

- An expanded building yard
- Moved out from the controlled building access
- A developer provided public space
- A well designed plaza can provide visual interest at same time providing good stand-off



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Second Layer of Defense

Roadways

- Minimize interruption or closure of street
- Ensure minimal conflict between pedestrian and traffic flow



FEMA

Second Layer of Defense

Parking

- Restrict parking from the interior of a group of buildings and away from restricted area
- Locate parking within view of occupied buildings
- If possible, design the parking lot with one-way circulation



FEMA

Adapted from FEMA 452, Figure 2-4: Layers of Defense, p. 2-5
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T **Unit IX-C-37**

Second Layer of Defense

Parking



FEMA

Second Layer of Defense

Parking

- Restrict parking and access between buildings
- Consider one-way circulation in parking lots
- Locate parking within view of occupied buildings
- Restrict parking underneath buildings
- Well-lit, with security presence, emergency communications, and/or CCTV
- Apply progressive collapse hardening to columns when parking garage is in the building



FEMA

Second Layer of Defense

Parking - Loading Docks

- Avoid trucks parking into or underneath of the buildings
- Keep dumpsters away from buildings
- Separate loading docks from building critical functions
- Design to prevent progressive collapse



FEMA

Second Layer of Defense

Parking - Loading Docks

- Ensure separation from critical systems, functions, and utility service entrances
- Provide sufficient area for screening vehicles and packages



FEMA

Second Layer of Defense

Signage

- Unless required, do not identify sensitive areas
- Minimize signs identifying critical utilities
- Warnings signs limiting access to control areas should be posted at all entrances
- Signpost may be hardened and included as part of the perimeter barrier
- The lighting of signage should enhance nighttime safety
- Warning signs should be posted in languages commonly spoken



FEMA

First/Second Layer of Defense

Security Lighting

High-mast lighting at entry control points

Continuous lighting

- Glare projection
- Controlled lighting (avoid glare)
- Closed circuit television (CCTV)

Standby lighting

Movable lighting

Emergency lighting



FEMA

First Layer of Defense

Sensors / CCTV

- When stand-off and hardening are not possible, security must rely upon sensors and CCTV
- Look for suspicious vehicles and people, especially those that seem to be profiling your building
- Monitor access to utilities serving the building
- Currently high tech monitoring systems need to be selected and placed by experts



FEMA

Second Layer of Defense

Site Utilities



FEMA

Second Layer of Defense

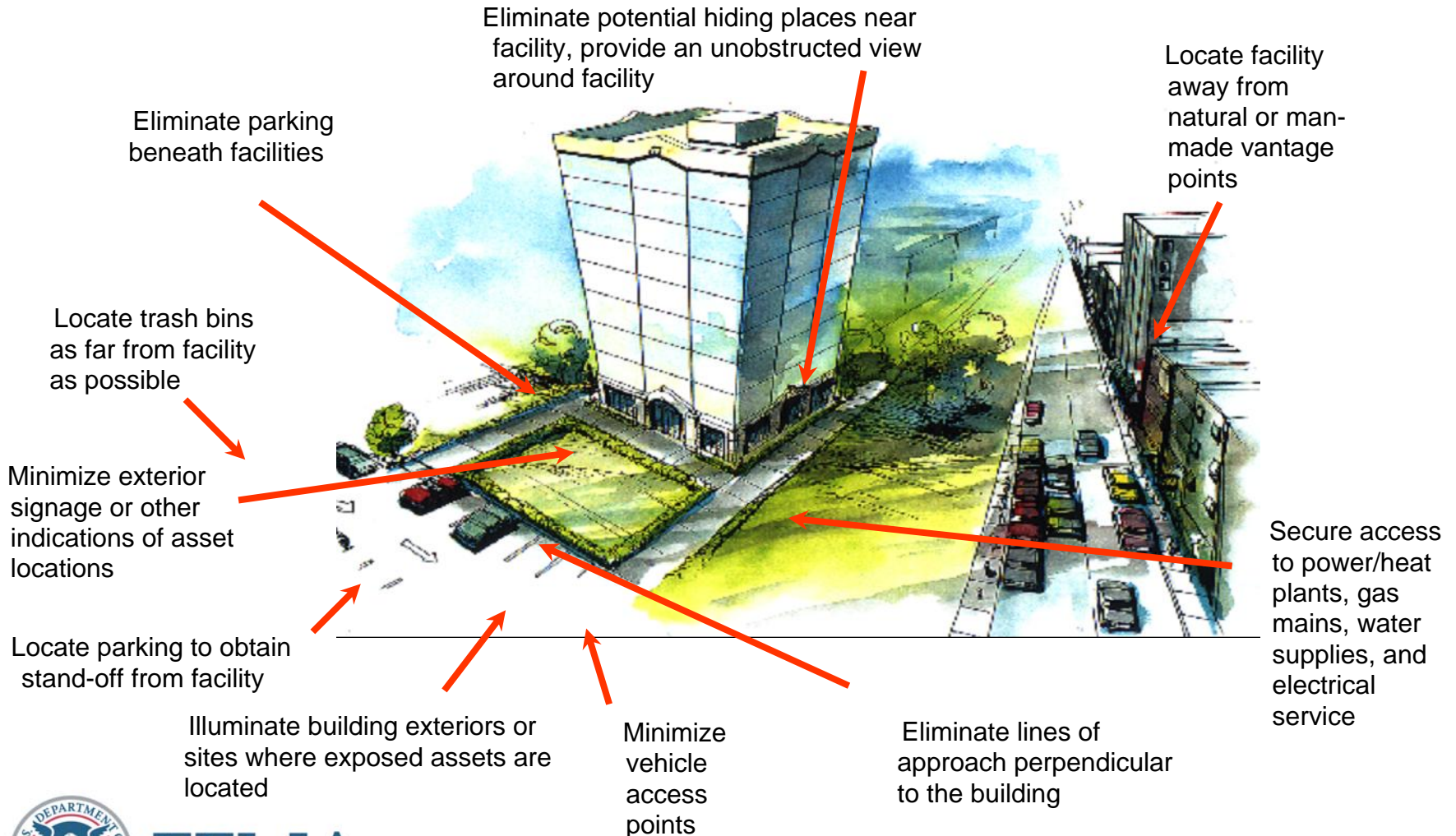
Site Utilities

- Concealed versus exposed
- Underground versus overhead
- Protect/secure versus accessible
- Surveillance if possible



FEMA

Best Practices



FEMA

Figure 2-16, Summary of Site Mitigation Measures, p. 2-53

Unit IX Case Study Activity

Site and Layout Design Guidance

Background

FEMA 426, Building Vulnerability Assessment Checklist: screening tool for preliminary design vulnerability assessment

Requirements: Vulnerability Rating Approach

Assign sections of the checklist to qualified group members

Refer to Case Study and answer worksheet questions

Review results to identify site and layout vulnerabilities and possible mitigation measures



FEMA

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit X

Building Design Guidance



FEMA

Unit Objectives

Explain architectural considerations to mitigate impacts from blast effects and transmission of chemical, biological, and radiological agents from exterior and interior incidents.

Identify key elements of building structural and non-structural systems for mitigation of blast effects.



FEMA

References

FEMA Building Vulnerability Assessment Checklist, Chapter 1, page 1-46, FEMA 426

Building Design Guidance, Chapter 3, FEMA 426

FEMA 430, Site and Urban Design for Security, Guidance Against Potential Terrorist Attack

Unit Objectives (cont.)

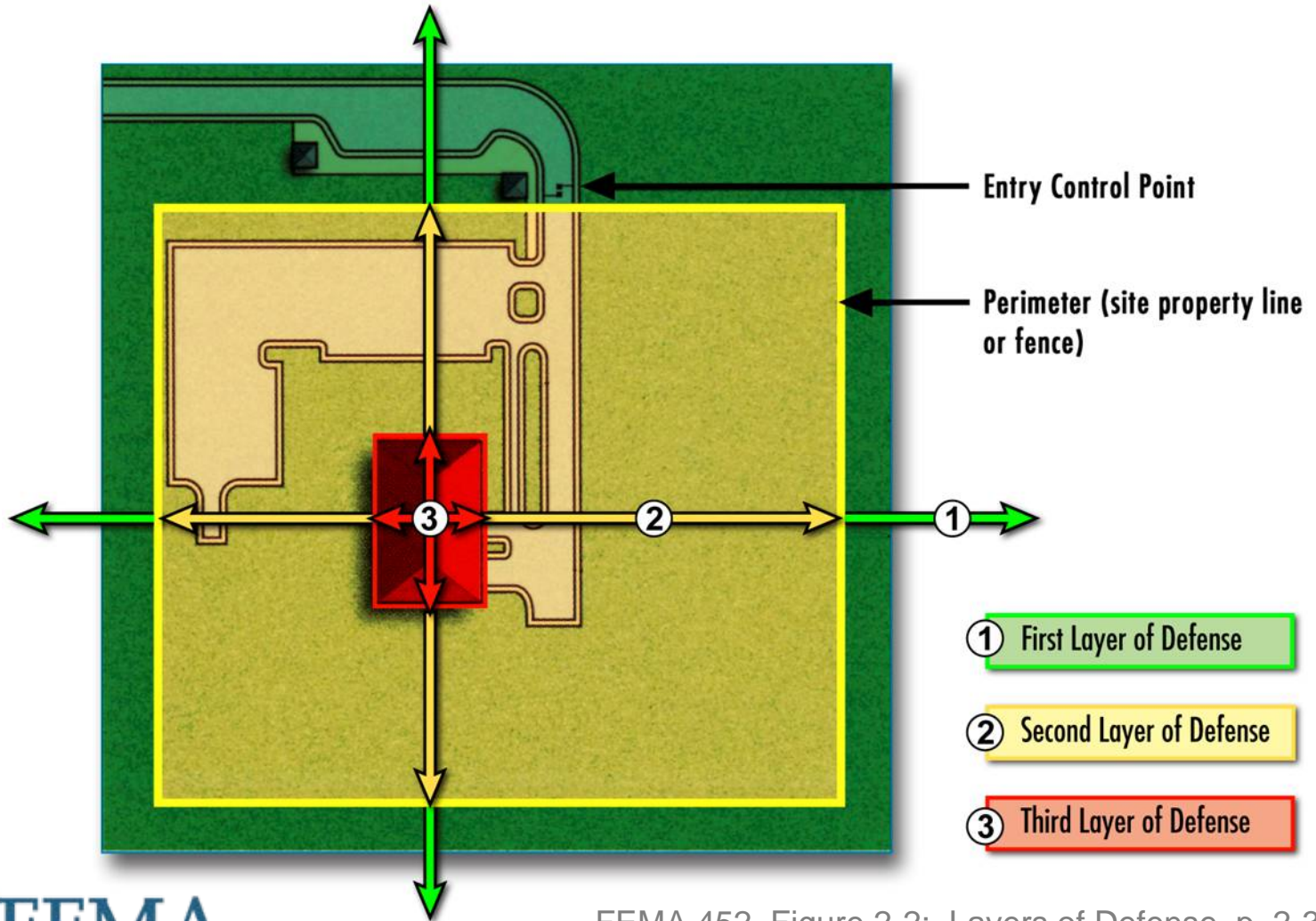
Compare and contrast the benefit of building envelope, mechanical system, electrical system, fire protection system, and communication system mitigation measures, including synergies and conflicts.

Apply these concepts to an existing building or building conceptual design and identify mitigation measures needed to reduce vulnerabilities.



FEMA

Layers of Defense



FEMA

FEMA 452, Figure 2-2: Layers of Defense, p. 2-3

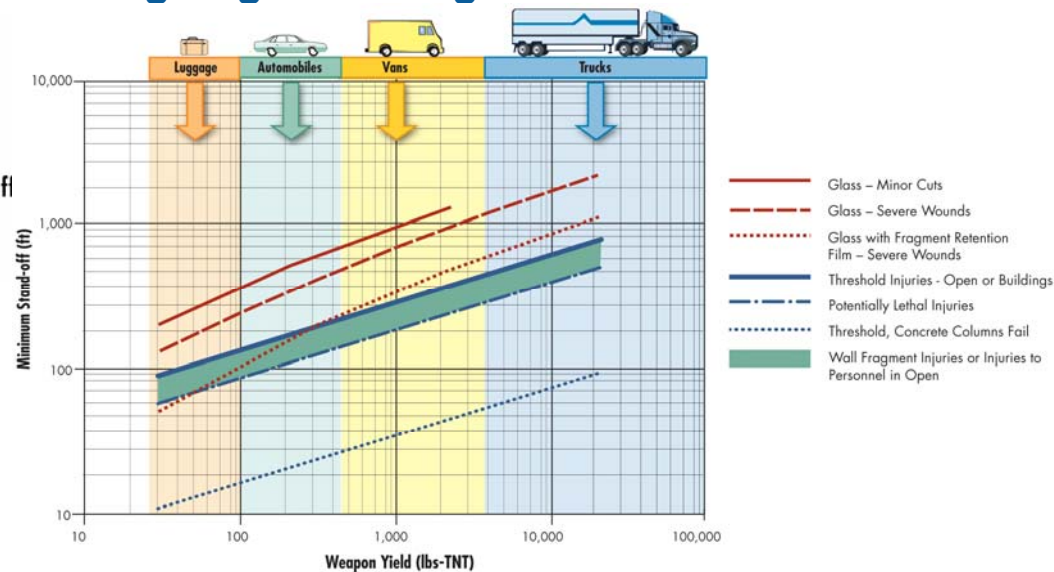
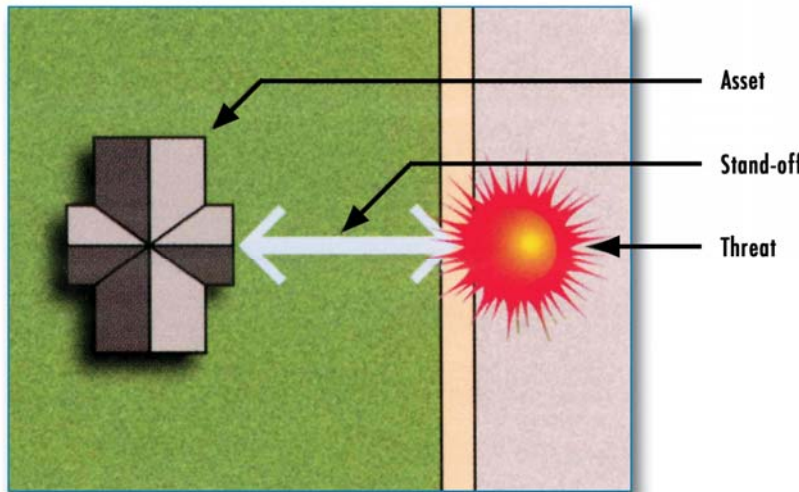
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit X-C-4

Third Layer of Defense

Stand-off Distance – primary impact on design and construction of building envelope and structure against design basis threat (explosives)

To protect against unauthorized vehicles approaching target buildings



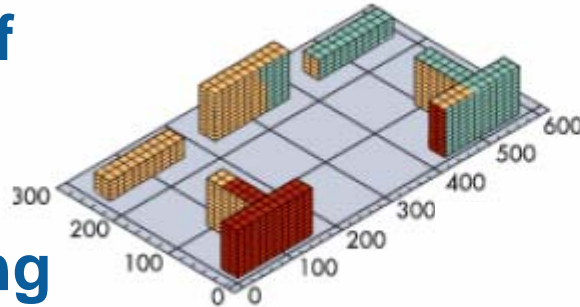
FEMA

FEMA 426, Figure 2-8: Concept of stand-off distance, p. 2-22 (left)
FEMA 426, Figure 4-5: Explosive blast range to effects, p. 4-11 (right)
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T **Unit X-C-5**

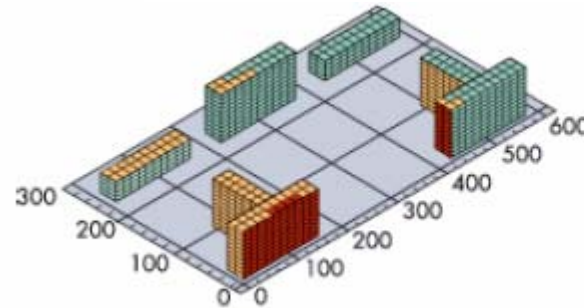
Third Layer of Defense

Stand-off versus Given Hardening

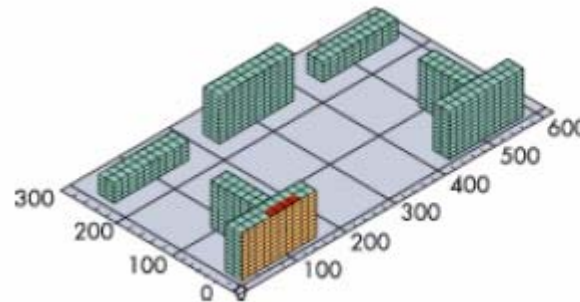
- Red – Very severe damage, possible collapse
- Yellow – Very unreparable structural damage
- Green – Moderate repairable structural damage



Detonation at 80 feet



**Detonation at
171 feet**



**Detonation at
400 feet**



FEMA

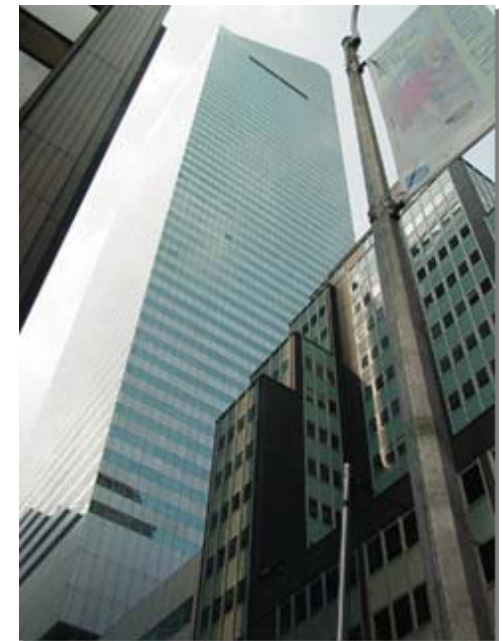
FEMA 426, Figure 4-9: Stand-off distance versus blast impact
– Khobar Towers, p. 4-15
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit X-C-6

Third Layer of Defense

Hardening

Less stand-off requires

- More mass
- More steel
- Thicker and stronger glass
- Better door and window frame connection to building/wall



FEMA

Third Layer of Defense

Layers of Defense	Architecture	Structural Systems	Building Envelope	Utility Systems	Mechanical & Electrical Sys	Plumbing & Gas Systems	Fire Alarm Systems	Comm - Info Technology Sys	Equipment Ops & Maint	Security Systems
First Layer										
Second Layer										
Third Layer										



FEMA

Third Layer of Defense

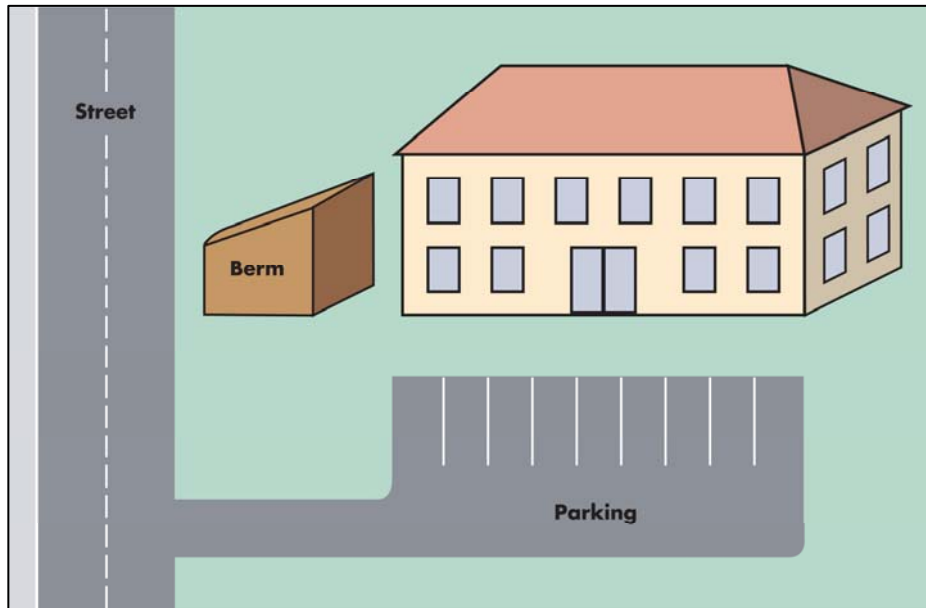
When hardening a building, the following should be considered:

- Progressive collapse
- Appropriate security systems
- Hardening the building envelope
- Appropriate HVAC systems to mitigate CBR
- Hardening the remaining structure
- Hardening and location of utilities



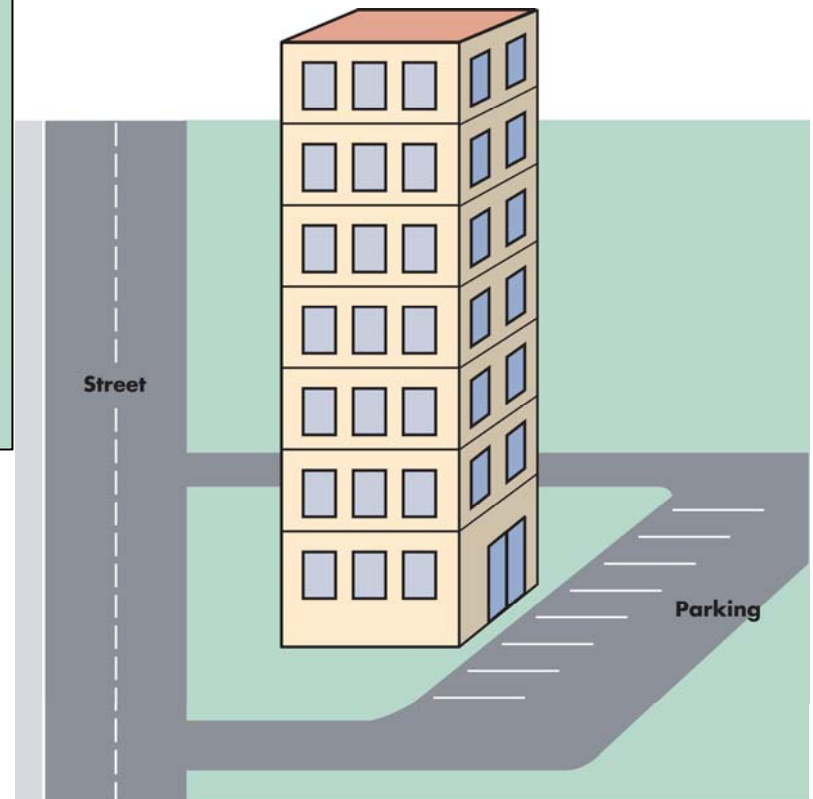
FEMA

Architecture – Building Configuration



Low, Large Footprint

Tall, Small Footprint



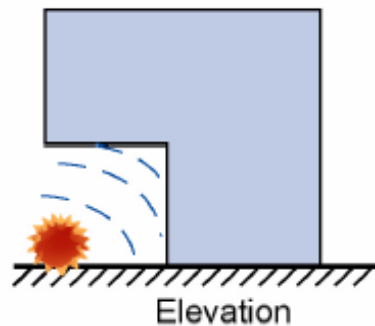
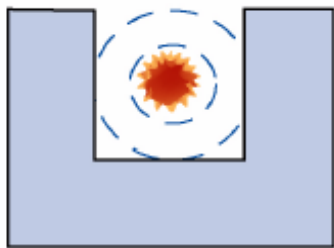
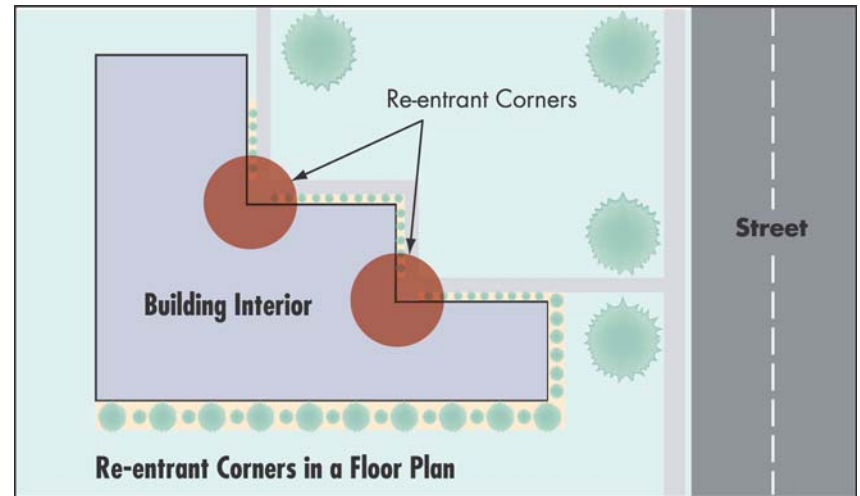
FEMA

Architecture – Building Configuration

Rectangular versus
“U”, “L” or “E”

Avoid re-entrant corners

Flush face versus eaves
and overhangs



**Shapes That
Accentuate Blast**

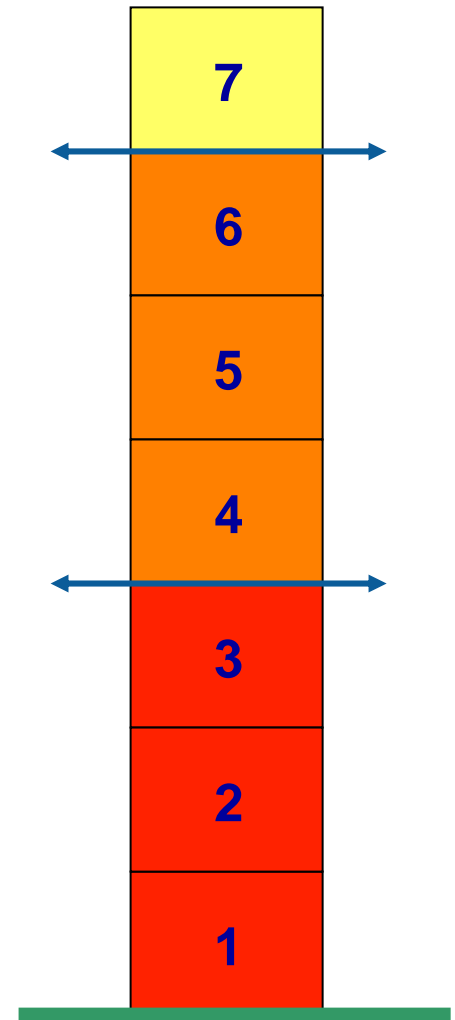


FEMA 426, Figure 3-2: Re-entrant corners in a floor plan, p. 3-6
FEMA 427, Figure 6-3: Effects of building shape vs. air blast, p. 6-9

Architecture – Building Configuration

Hardening – Story height vs Stand-off

- Hardening of first three floors is critical as these take brunt of blast
- At third through sixth floor, hardening can be reduced due to reflection angle
- Above the sixth floor, conventional construction may be sufficient depending upon design threat and reflections off adjacent buildings



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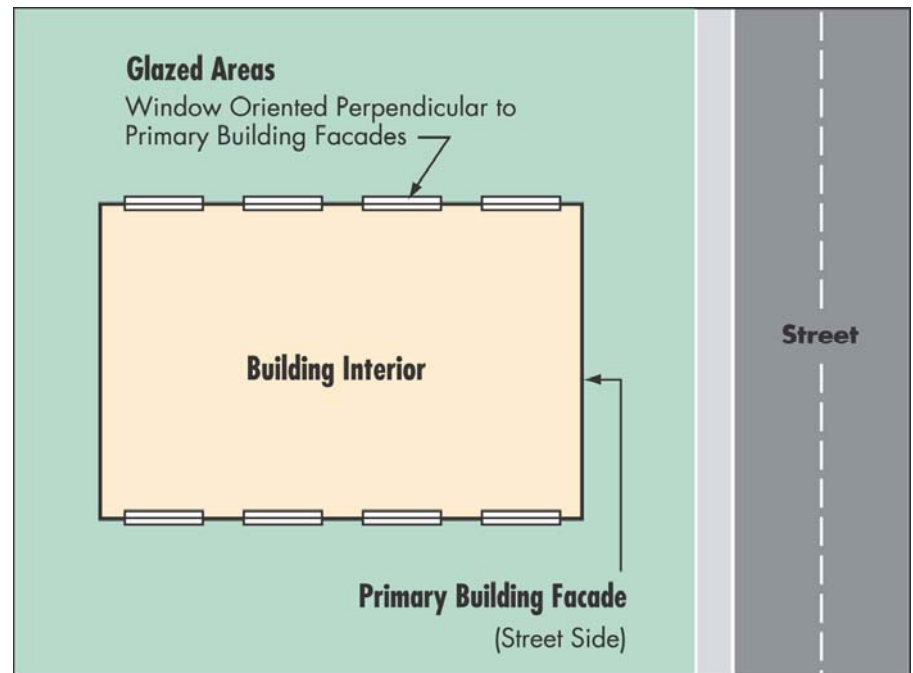
Architecture – Building Configuration

Ground floor elevation 4 feet above grade

Orient glazing perpendicular to principal threat direction

Avoid exposed structural elements

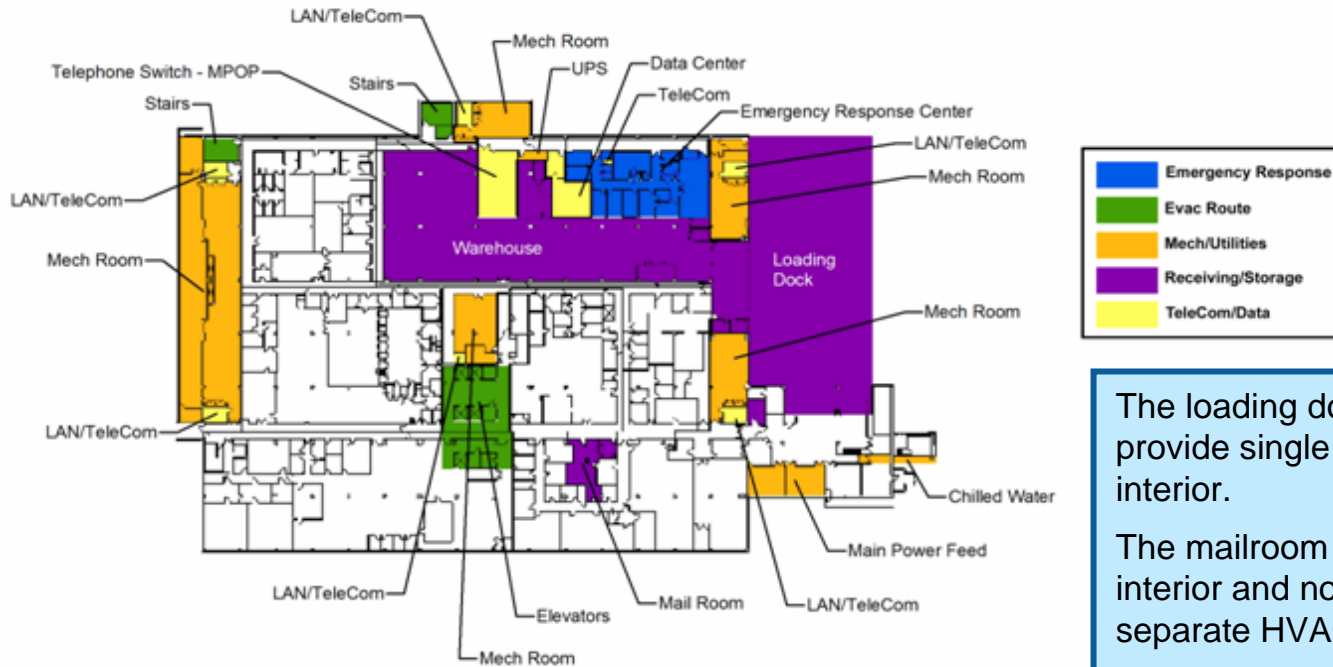
Pitched roofs and pitched window sills



FEMA 426, Figure 3-1: Glazed areas perpendicularly oriented away from streets, p. 3-5



Architecture – Space Design



The loading dock and warehouse provide single point of entry to the interior.

The mailroom is located within the interior and not on exterior wall or separate HVAC system.

The telecom switch and computer data center are adjacent to the warehouse.

The trash dumpster and emergency generator are located adjacent to the loading dock.



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FEMA 426, Figure 1-10: Non-redundant critical functions collocated near loading dock, p. 1-41

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit X-C-14

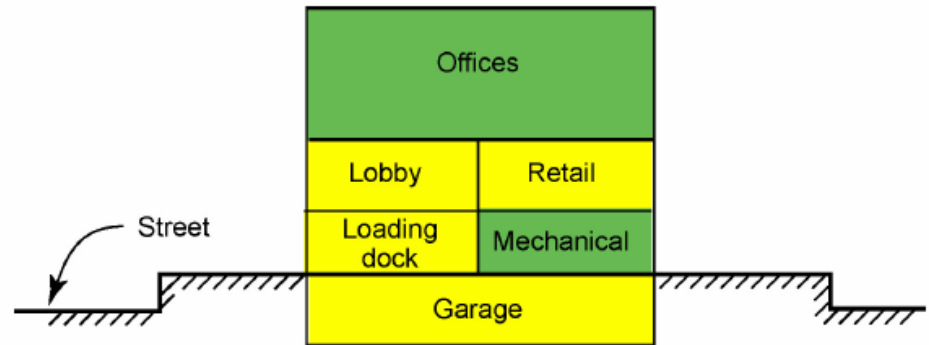
Architecture – Space Design

Place unsecured or high risk areas outside building footprint

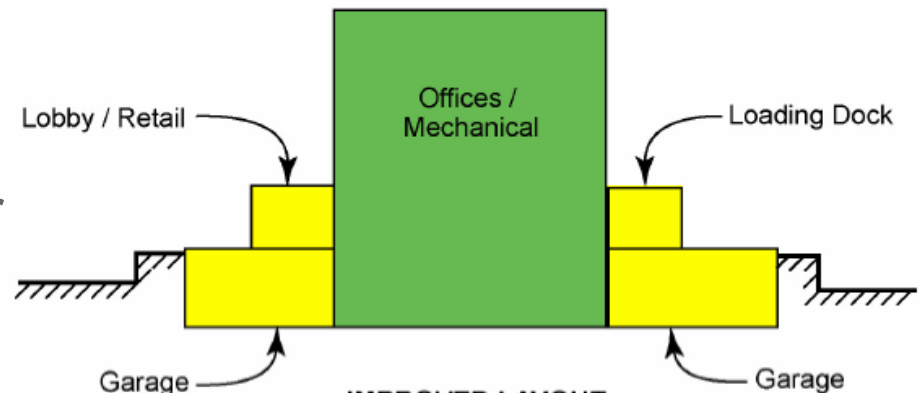
Do not mix high risk and low risk tenants in same building

Locate critical assets into interior of building

Separate areas of high visitor activity (unsecured) from critical assets



ORIGINAL LAYOUT



IMPROVED LAYOUT

FEMA 427, Figure 6-4: Improving layout of adjacent unsecured and secured areas, p. 6-10



FEMA

Structural Systems

Progressive Collapse Design

GSA Progressive Collapse Analysis and Design Guidance for New Federal Office Buildings and Major Modernization Projects

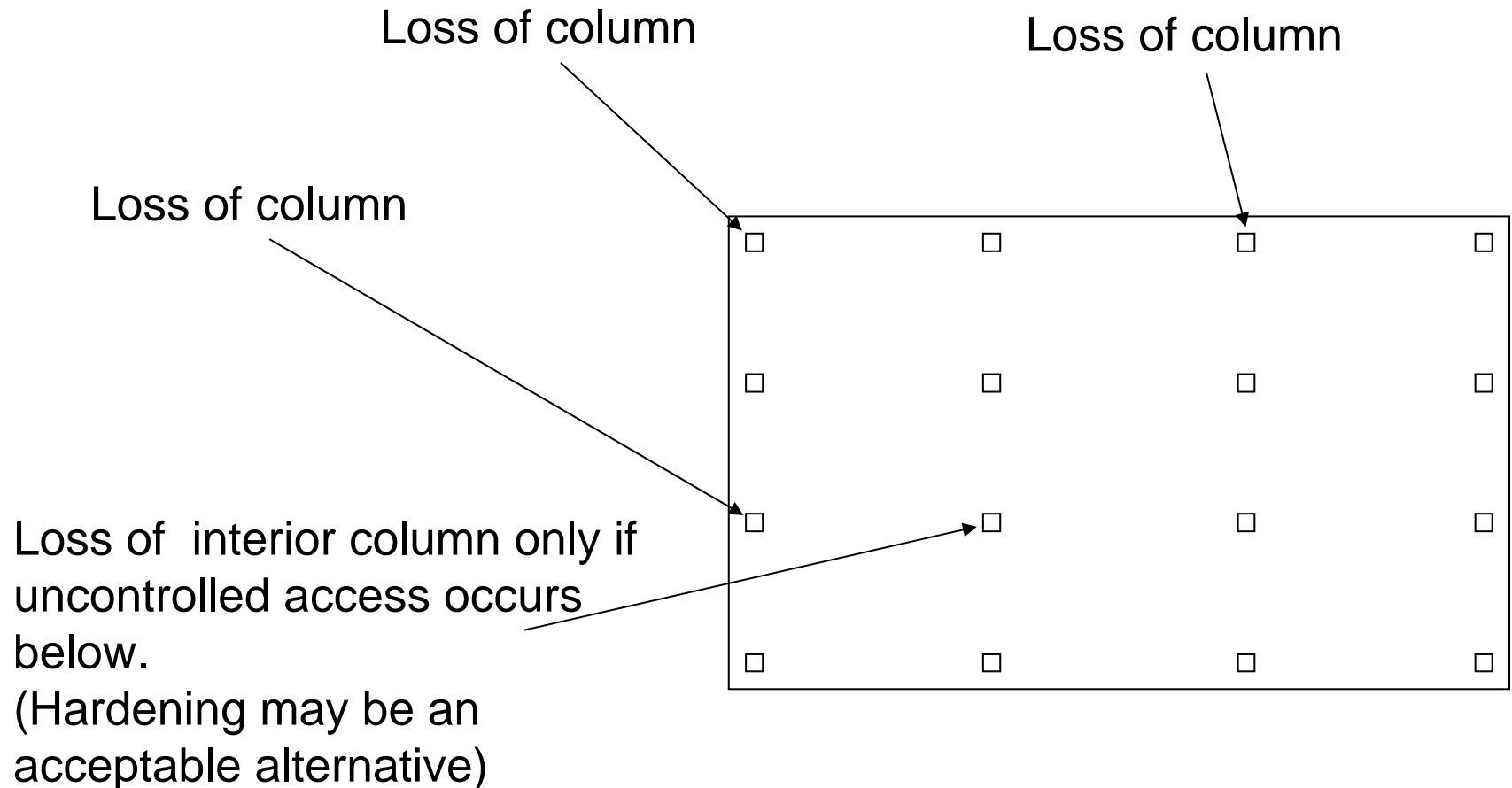
DoD Unified Facilities Criteria - Minimum Antiterrorism Standards for Buildings



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Structural Systems

Progressive Collapse Concept



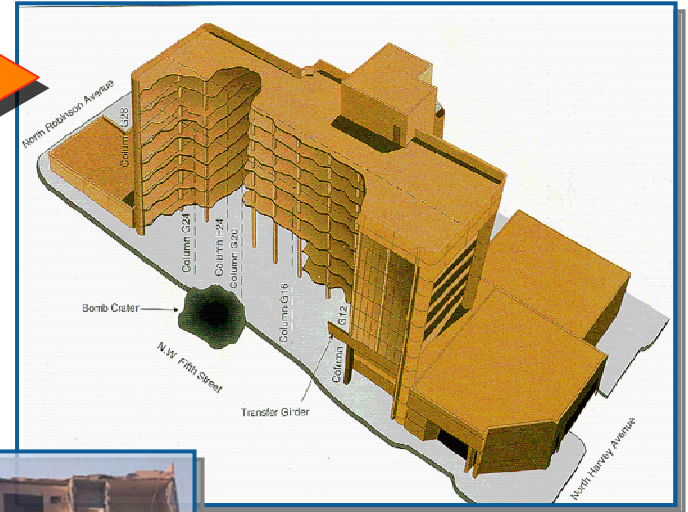
FEMA

BUILDING PLAN

Structural Systems -- Loads and Stresses



Murrah Federal Building,
Oklahoma City



Ronan Point,
London



Khobar Towers,
Dhahran



FEMA

Structural Systems – Best Practices

Consider incorporating active or passive internal damping into structural system (sway reduction in high-rise)

Use symmetric reinforcement, recognizing components might act in directions opposite to original or standard design – flooring especially

Column spacing should be minimized (≤ 30 feet)



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Structural Systems – Best Practices (cont.)

Stagger lap splices and other discontinuities and ensure full development of reinforcement capacity or replace with more flexible connections – floors to columns especially

Protect primary load carrying members with architectural features that provide 6 inches minimum of stand-off

Use ductile detailing requirements for seismic design when possible



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Building Envelope

During actual blast or CBR event, building envelope provides some level of protection for people inside:

- Walls
- Windows
- Doors
- Roofs

Soil can be highly effective in reducing damage during an explosive event

Minimize “ornamentation” that may become flying debris in an explosion.



FEMA

Building Envelope – Best Wall Practices

Use symmetric reinforcement, recognizing that components might act in directions opposite to original or standard design

- Lobbies and mailrooms

Use wire mesh in plaster – reduces spalling / fragmentation

Floor to floor heights should be minimized (≤ 16 feet)



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Building Envelope – Best Wall Practices (cont.)

Connect façade from floor slab to floor slab to avoid attachments to columns (one-way wall elements)

- Limits forces transferred to vertical structural elements

No unreinforced CMU – use fully grouted and reinforced construction



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Building Envelope – Windows

Balanced Window Design

Glass strength

Glass connection to window frame (bite)

Frame strength

Frame anchoring to building

Frame and building interaction

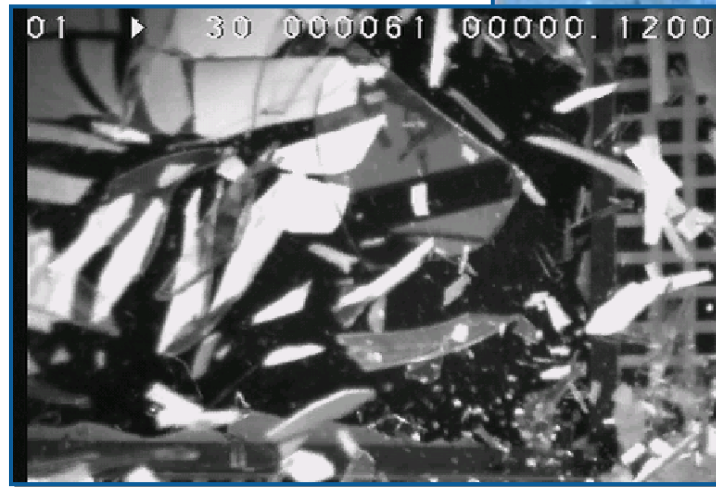


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Building Envelope – Windows

Glass (weakest to strongest)

- Annealed (shards)
- Heat Strengthened (shards)
- Fully Thermally Tempered (pellets)
- Laminated (large pieces)
- Polycarbonate (bullet-resistant)



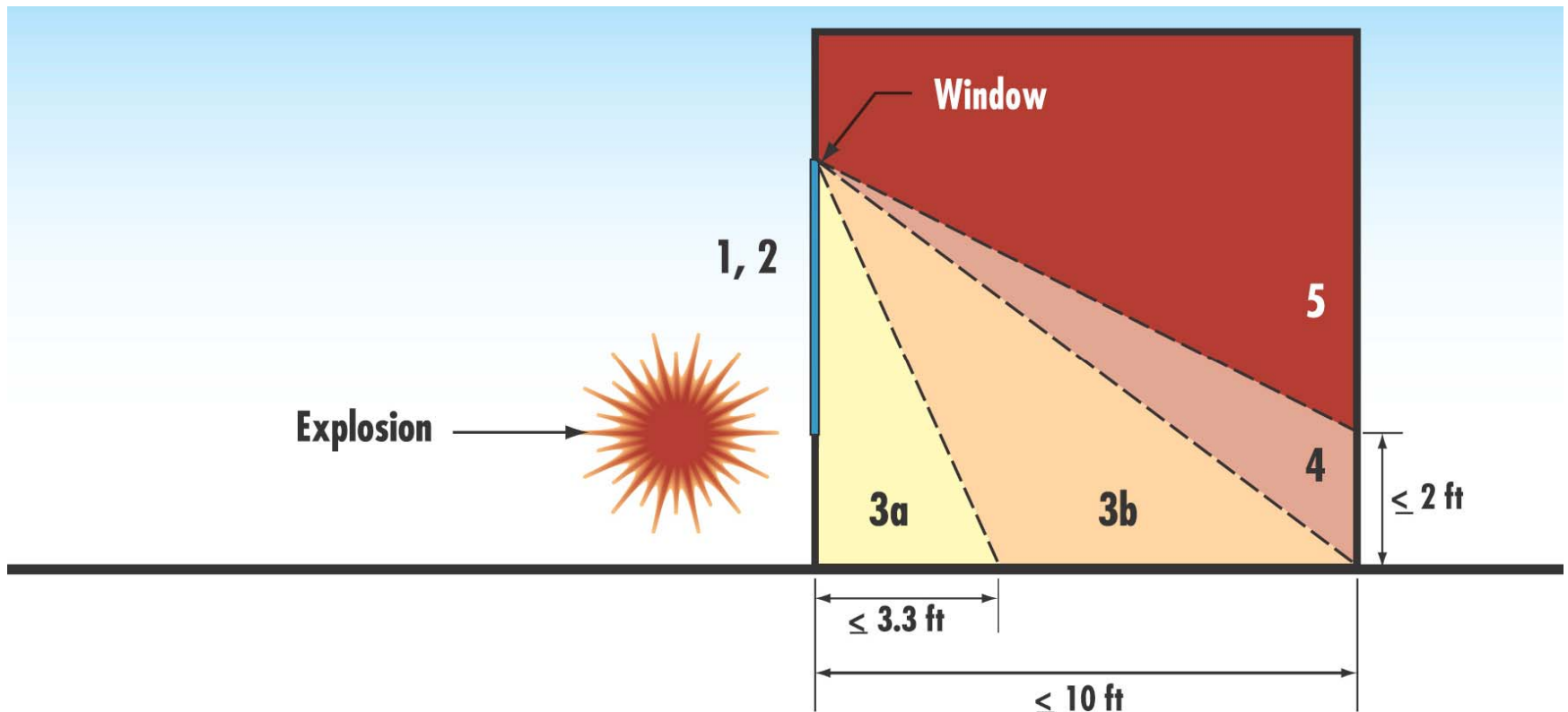
“Balanced Design”



FEMA

Building Envelope – Windows

GSA Glazing Performance Conditions



FEMA 426, Figure 3-4: Side view of a test structure illustrating performance conditions of Table 3-2, p. 3-22



FEMA

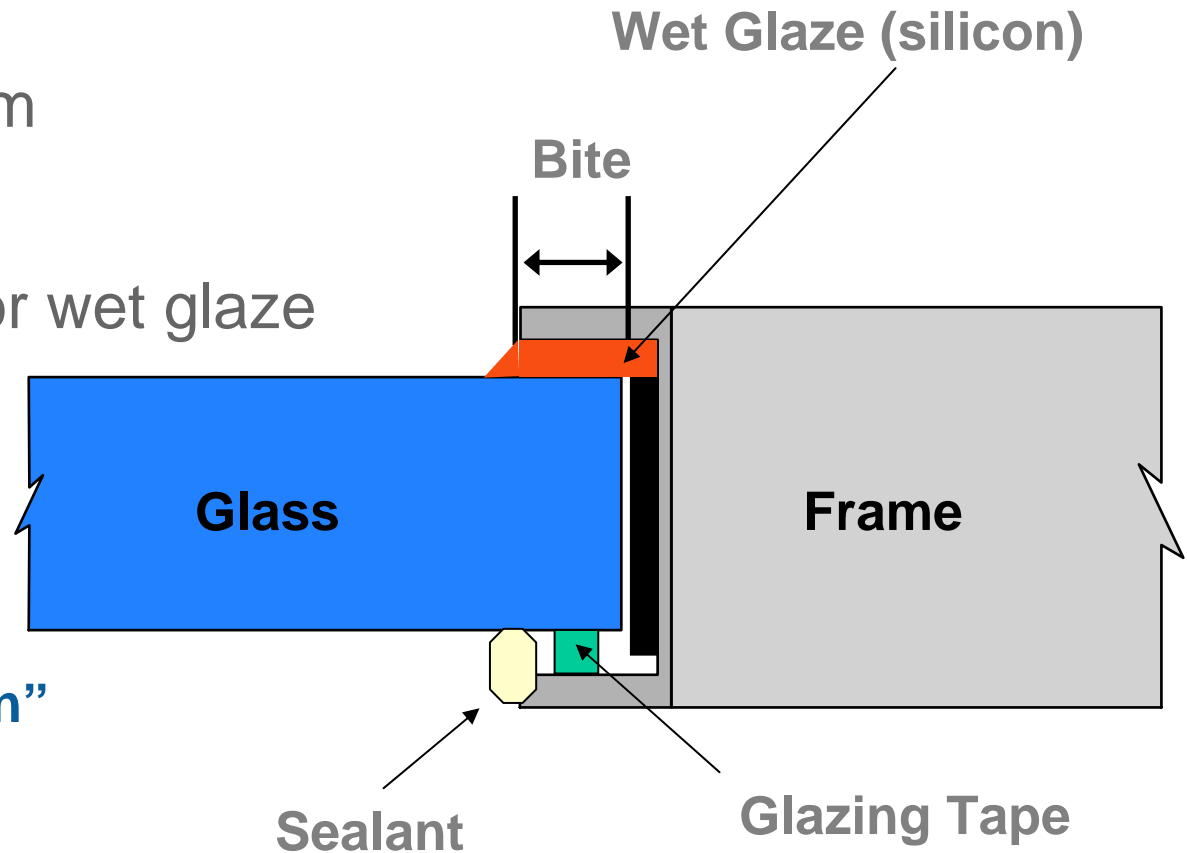
Building Envelope - Window Frames

Goal: transfer load from glass to frame and retain glass in frame

Bite: 1/2 inch minimum

Structural sealant:
1/4 inch bead or wet glaze

“Balanced Design”



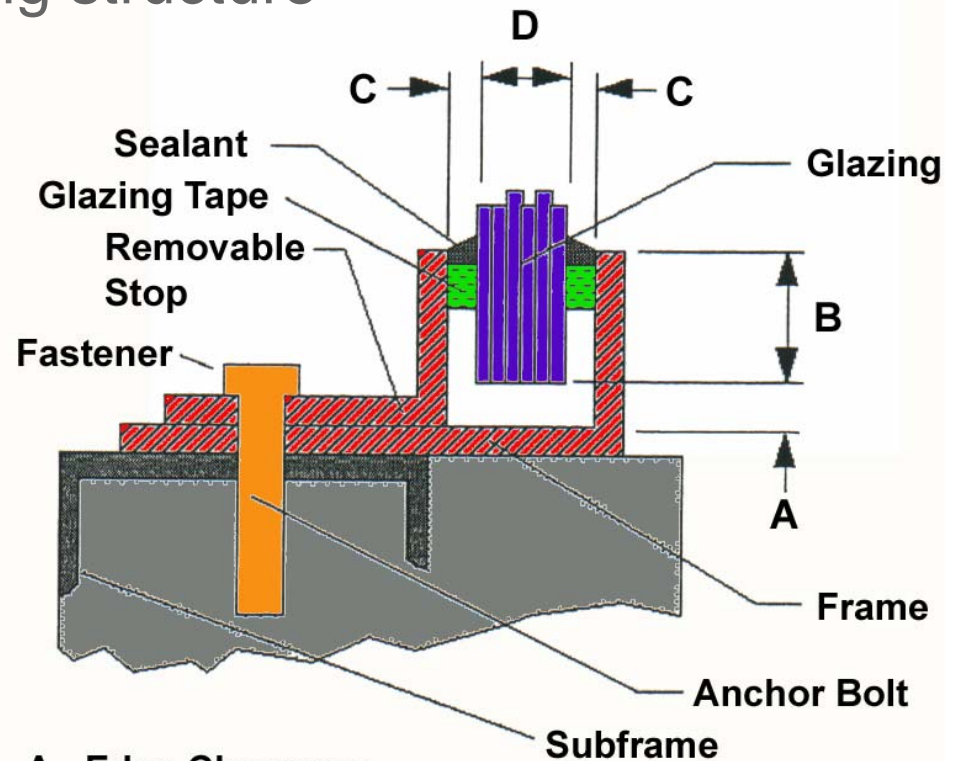
FEMA

Building Envelope - Window Frames

Goal: transfer load to building structure

Balanced strength:
glass, frame,
and connection
of frame to wall

“Balanced Design”

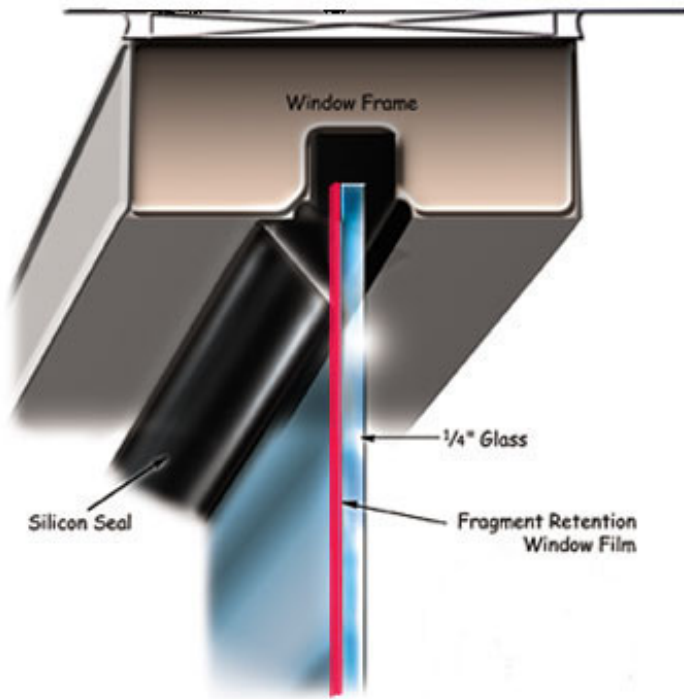


- A - Edge Clearance
- B - Bite-edge Engagement
- C - Face Clearance
- D - Glazing Thickness

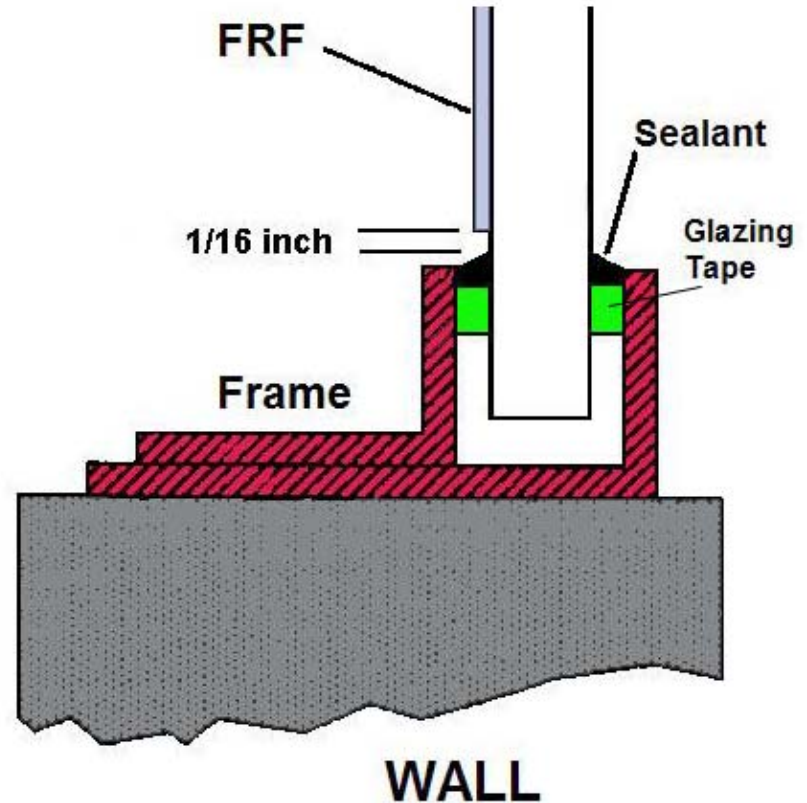


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Building Envelope - Fragment Retention Film



“Wet Glazing” (edge to edge)



“Daylight Application”



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Building Envelope – Best Window Practices

No windows adjacent to doors

Minimize number and size of windows - watch building code requirements

Laminated glass for high-occupancy buildings

Stationary, non-operating windows, but operable window may be needed by building code

Steel versus aluminum window framing



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Building Envelope – Doors

Balanced strength

- Door
- Frame
- Anchorage to building

Hollow steel doors or steel-clad doors

Steel door frames

Blast-resistant doors available

- Generally heavy
- Generally expensive



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Building Envelope – Roofs

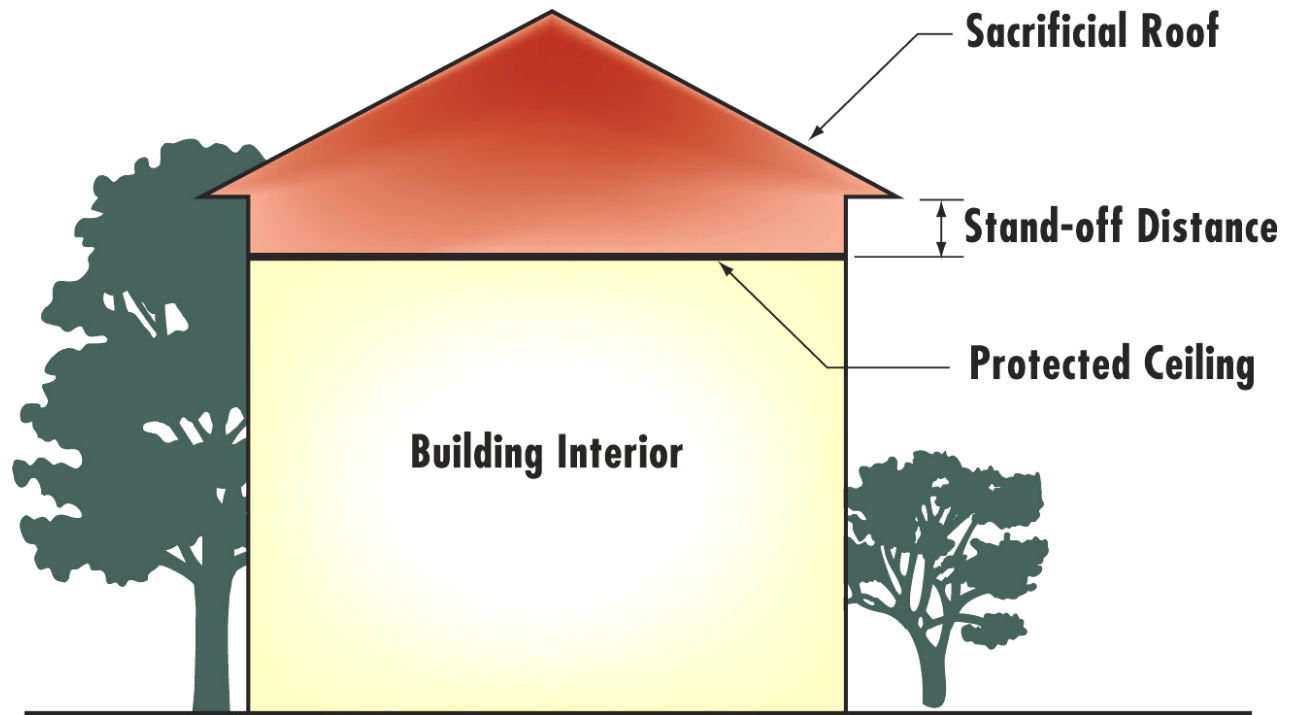
Preferred – poured in place reinforced concrete

Lower protection – steel framing with concrete and metal deck slab

Sloped sacrificial roof over protected roof/ceiling

Sandbags or dirt layer

Restrict access to roof



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FEMA 426, Figure 3-7: Sacrificial roof, p. 3-33

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit X-C-32

Utility Systems

Building Service

- Electric – commercial and backup
- Domestic water
- Fire protection water
- Fuel – coal, oil, natural gas, or other
- Steam heat with or without condensate return
- Hot water heat



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Utility Systems

Building Service (cont)

- Sewer – piping and sewage lift stations
- Storm drainage
- Information
- Communications
- Fire alarm
- Security systems and alarms



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Utility Systems

Entrances

- Proximity to each other
- Aboveground or underground
- Accessible or secure

Delivery capacity

- Separate
- Aggregate

Storage capacity

- Outage duration
- Planned or historical



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Mechanical & Electrical Systems

Functional layout – physical separation or hardening

Structural layout – systems installation

Do not mount utility equipment or fixtures on exterior walls or mailrooms

Avoid hanging utility equipment and fixtures from roof slab or ceiling



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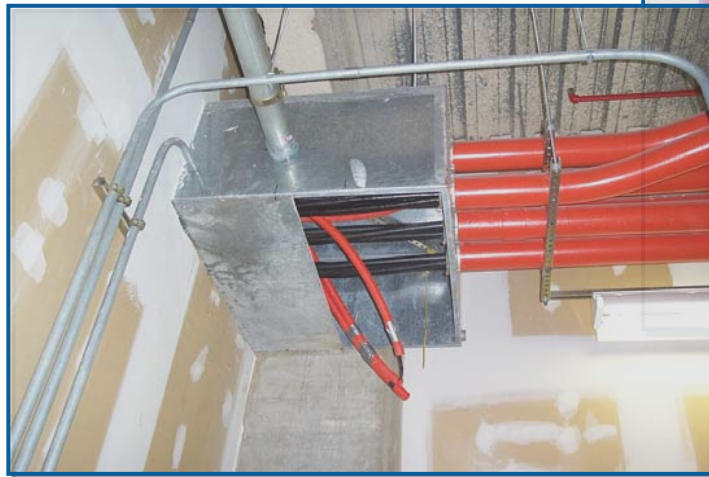
Mechanical & Electrical Systems

Distribution within building

- Looped or multiple radial versus single radial
- Pipe chases – horizontal and vertical – cross impacts

Normal and emergency equipment locations

- Generators versus commercial switchboard or transfer switch
- Electric fire pumps versus diesel fire pumps



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Mechanical & Electrical Systems

Restrict access - locks / alarms / surveillance

- Utility floors / levels
- Rooms
- Closets
- Roofs
- Security locks/interlocks comply with building code
- Building information
- Also consider for other systems



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Mechanical & Electrical Systems

Building lighting and CCTV compatibility

- Intensity
- Resolution
- Angle
- Color

Exit lighting – consider floor level, like airplanes

Emergency lighting – battery packs have their place



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Mechanical & Electrical Systems

Ventilation and Filtration – HVAC Control Options

- Building specific
- System shutdown – configuration and access
 - HVAC fans and dampers
 - Include 24/7 exhausts, i.e. restrooms
- Zone pressurization
 - Doors and elevator use
 - Shelter-in-place



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Mechanical & Electrical Systems

Ventilation and Filtration – HVAC Control Options

- Specialized exhaust for some areas – i.e., lobbies and mailrooms
 - Air purge (e.g., 100 percent outside air if internal release)
 - CBR filters to trap and prevent spread elsewhere
- Pressurized egress routes (may already exist)
 - Filtered air supply or shutdown if release external



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Plumbing and Gas Systems

Same considerations as electrical and mechanical systems

Added concern is fuel distribution

- Heating sources / open flames / fuel load

Interaction with other systems during an incident

- Fuel versus alarms / electric / fire protection water / structure
- Water versus electronic / electric



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Fire Alarm Systems

Considerations similar to information and communications systems, but tighter building codes

- Centralized or localized
- Fire alarm panel access for responding fire fighters or fire control center
- Interaction with other building systems
 - Telephone / IT
 - Energy management
 - HVAC controls
- Off-premises reporting and when



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Communications - Information Technology Systems

Looped versus radial distribution

Redundancy

- Landline, security, fire watch
 - Copper
 - Fiber optics
- Cell phones (voice, walkie-talkie, text)
- Handheld radios / repeaters
- Radio telemetry / microwave links
- Satellite



Mass notification

- Loud speakers
- Telephone hands-off speaker
- Computer pop-up
- Pager



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Communications - Information Technology Systems (cont.)

Empty conduits

- Future growth
- Speed repair

Battery and backup power for IT

- Hubs, switches, servers, switchboards, MW links, etc.
- VOIP, building ops, alarms, etc.

Fire stopping in conduits between floors



Secure dedicated lines between critical security functions

Backup control center with same capability as primary



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Equipment Operations and Maintenance

Preventive Maintenance and Procedures

- Drawings indicating locations and capacities are current?
- Maintenance critical to keep systems operational
 - Critical systems air balanced and pressurization monitored regularly?
 - Periodic recommissioning of major systems?
- Regularly test strategic equipment
 - Sensors, backup equipment and lighting, alarms, and procedures tested regularly to ensure operation when needed?
 - Backup systems periodically tested under worst case loadings?



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Equipment Operations and Maintenance

Maintenance Staff Training

- System upgrades will require new training
- Specific instructions for CBR event (internal vs external release)
- Systems accessible for adjustment, maintenance, and testing



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Security Systems

Electronic Security Systems

Purpose is to improve the reliability and effectiveness of life safety systems, security systems, and building functions.

- Detection
- Access control
- Duress alarms
- Primary and backup control centers – same procedures



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Security Systems

Emergency Plans

All buildings should have current plans

- Building evacuation with signage & emergency lighting
- Accountability – rally points, call-in
- Incorporate CBR scenarios into plans
 - General occupant actions
 - Response staff actions – HVAC and control centers

Exercise the plans to ensure they work

- Coordinate with local emergency response personnel
- Test all aspects



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Practical Applications

What can be done with a reasonable level of effort?

End of Chapter 3, FEMA 426 listing of mitigation measures

- Less protection, less cost, with less effort
- Greater protection, greater cost, at greater effort



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Desired Building Protection Level

Component design based on:

Design Basis Threat

Threat Independent approach

Level of Protection sought

Leverage natural hazards design/retrofit

Incorporate security design as part of normal capital or O&M program

Use existing tools/techniques, but augment with new standards/guidelines/codes



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Summary

Building Design Guidance and Mitigation Options

Using the FEMA 426 Checklist will help identify vulnerabilities and provide recommended mitigation options.

There are many methods to mitigate each vulnerability.

Relatively low cost mitigations significantly reduce risk.



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Unit X Case Study Activity

Building Design Guidance and Mitigation Measures Background

Emphasis:

- Providing a balanced building envelope that is a defensive layer against the terrorist tactic of interest
- Avoiding situations where one incident affects more than one building system

FEMA 426, Building Vulnerability Assessment Checklist

Requirements

Assign sections of the checklist to qualified group members

Refer to Case Study, and answer worksheet questions

Review results to identify vulnerabilities and possible mitigation measures



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XI

Electronic Security Systems



FEMA

Unit Objectives

Explain the basis concepts of electronic security system components, their capabilities, and their interaction with other systems.

Describe the electronic security system concepts and practices that warrant special attention to enhance public safety.

Use the Building Vulnerability Assessment Checklist to identify electronic security system requirements that can mitigate vulnerabilities.

Justify selection of electronic security systems to mitigate vulnerabilities.



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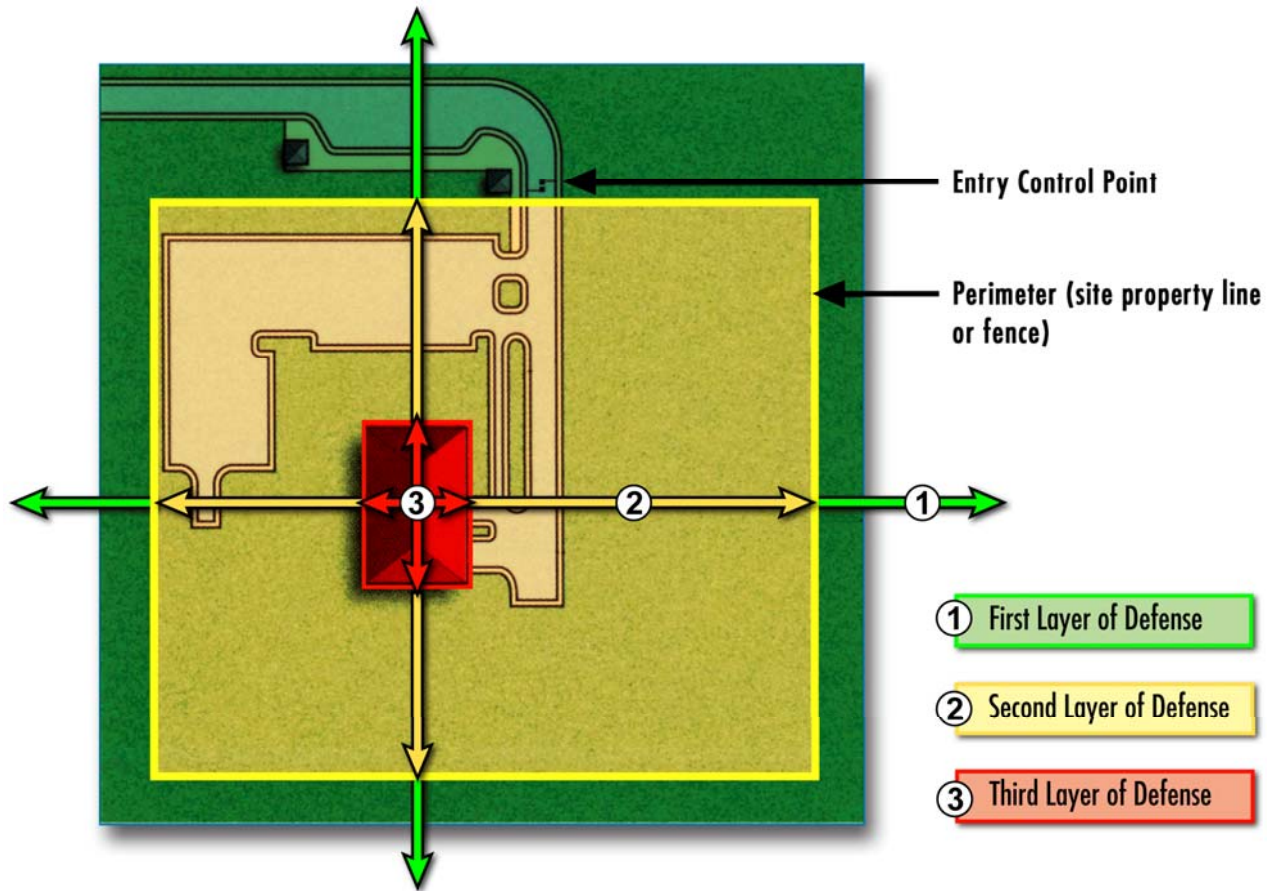
Electronic Security System (ESS) Concepts

- Basic concepts of site security systems
- Use of ESS
- General ESS Description
- ESS Design Considerations



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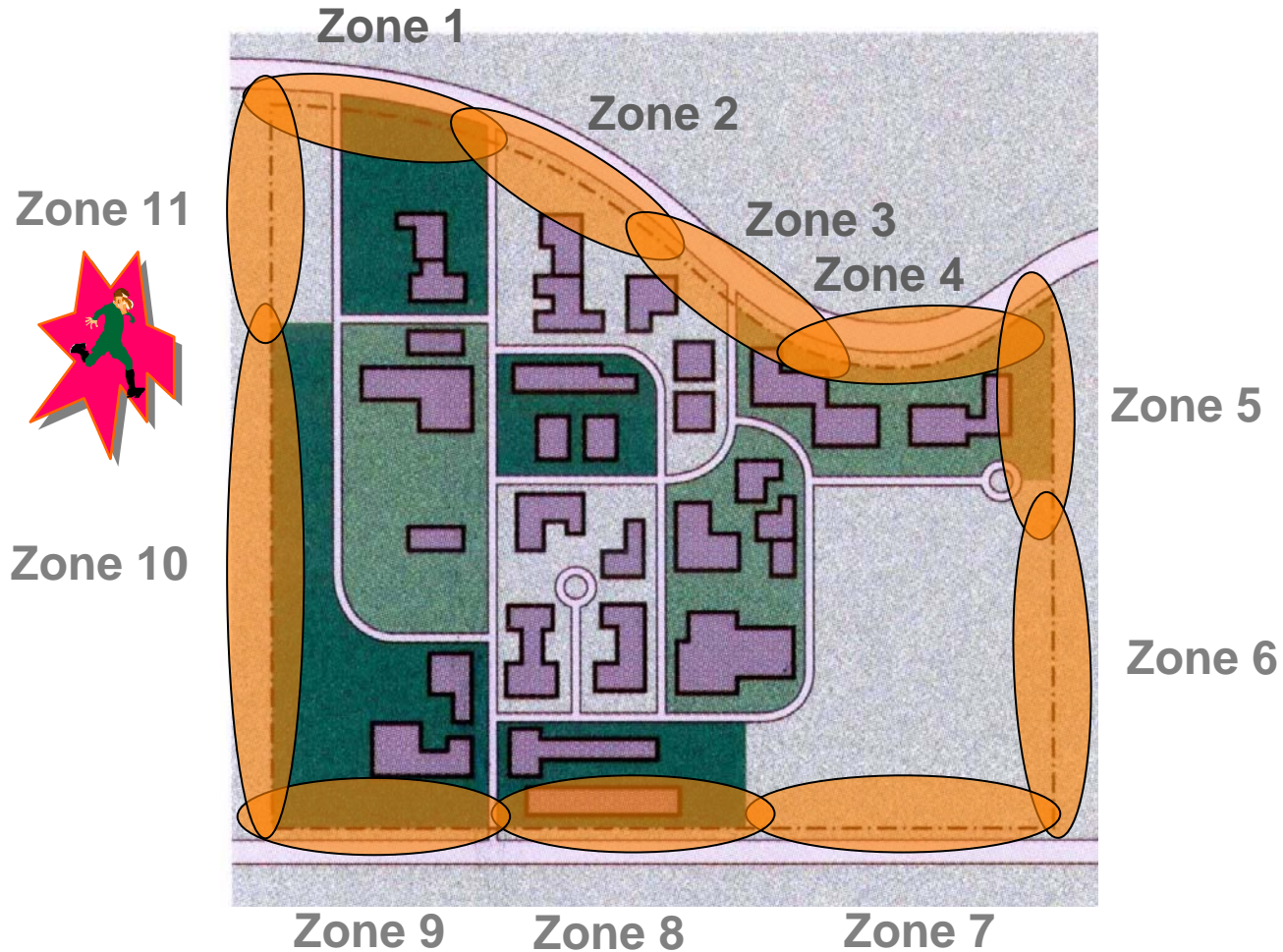
Perimeter Zone



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FEMA 452, Figure 2-2: Layers of Defense, p. 2-3

Perimeter Zone



FEMA

Adapted from FEMA 426, Figure 2-2: Dispersed Facilities, p. 2-8

Intrusion Detection Systems

Old Generation

CCTV

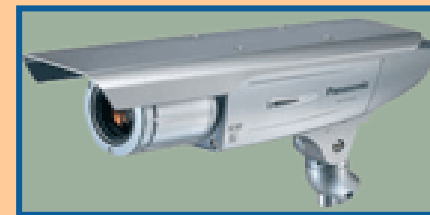


Motion Sensors



New Generation

CCTV



Motion Sensors



Source: Protech

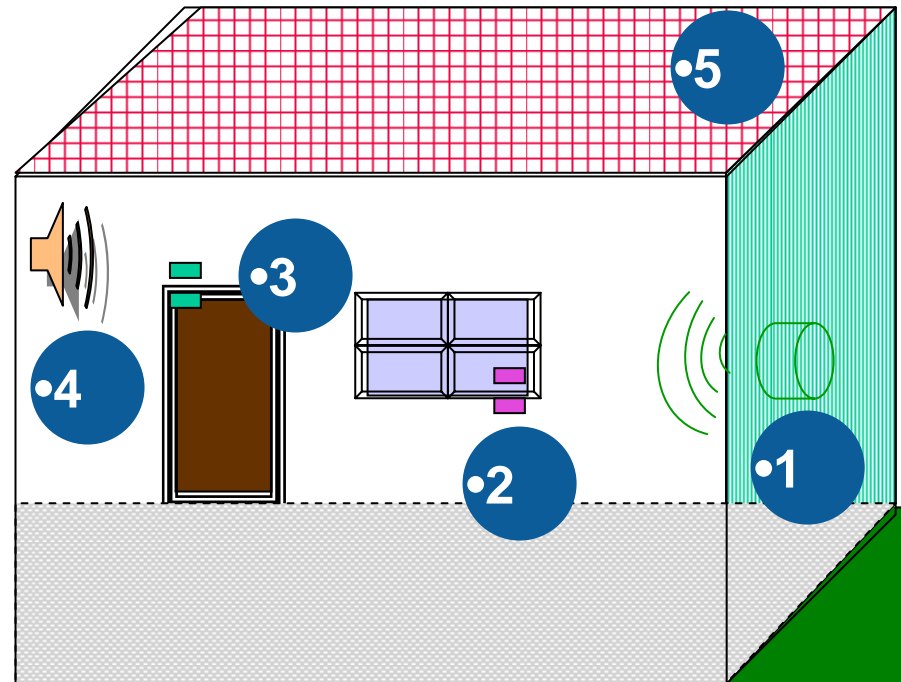
Source: Protech



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Boundary Penetration Sensors

1. Structural Vibration Sensors
2. Glass Break (GB) - both acoustical and contact mount
3. Balanced Magnetic Switches (BMS) - doors, windows, and hatches
4. Passive Ultrasonic Sensors
5. Grid Wire Sensors



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Adapted from DARPA Perimeter Security Sensor Technologies Handbook,
July 1998, p. 1-13

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XI-C-7

Volumetric Motion Sensors

Designed to detect intruder motion within the interior of the protected volume

- Microwave Motion Sensors
- Passive Infrared (PIR) Motion Sensors
- Dual Technology Sensors
- Video Motion Sensors
- Point Sensors
- Capacitance Sensors
- Pressure Mats
- Pressure Switches



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Exterior Intrusion Detection

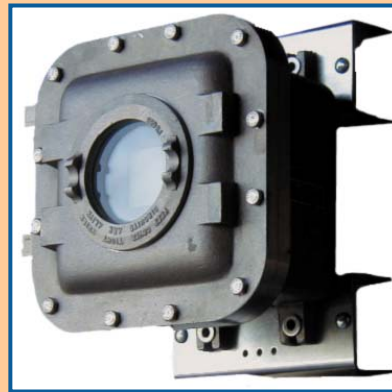
Strain Sensitive Cable

Fiber Optic Cable, Bistatic/Monostatic Microwave, Active Infrared, and Ported Coax

Dual Technology
(PIR/MW)

Video Motion

Explosion Proof



Source: Protech



First Layer of Defense



FEMA

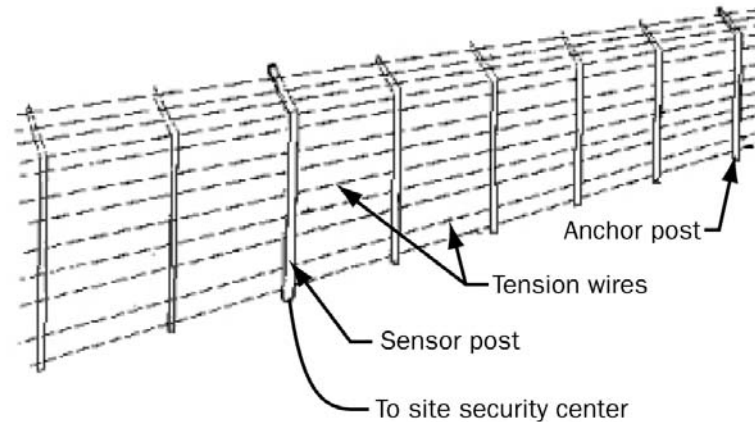
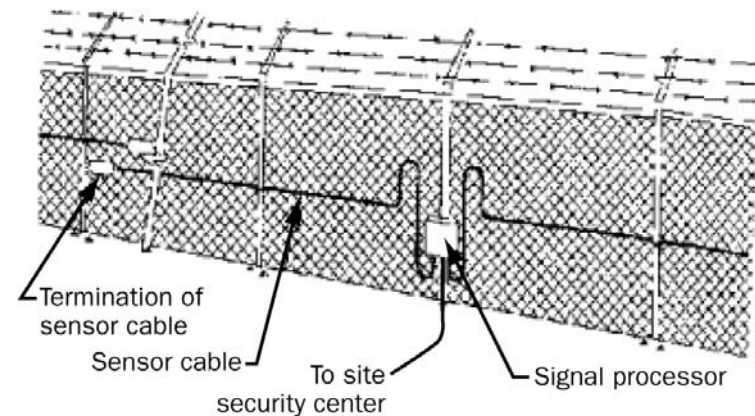
Fence Sensors

Strain sensitive cables

Taut wire sensors

Fiber optic sensors

Capacitance proximity sensors



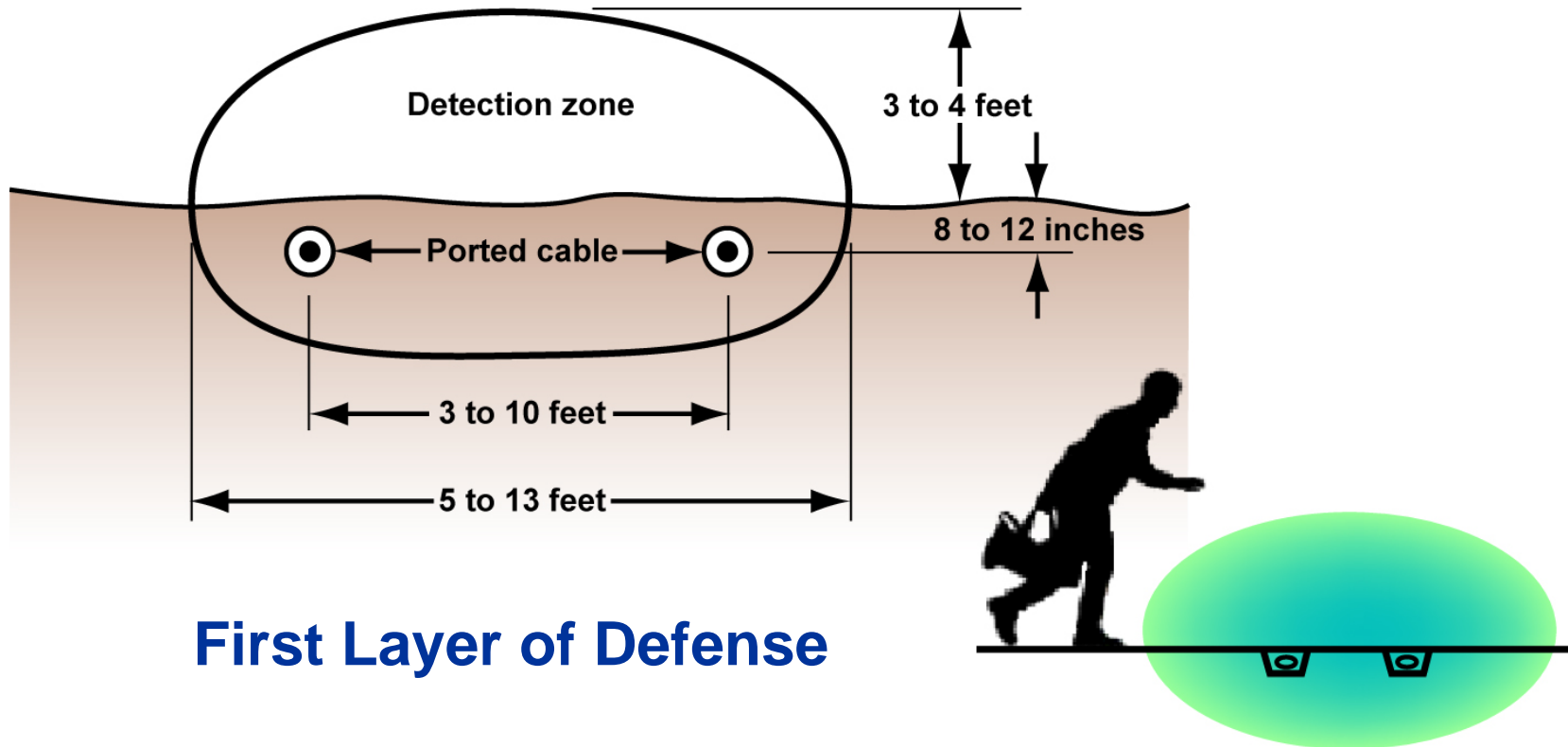
First Layer of Defense



FEMA

Army TM 5-853-4, Electronic Security Systems, pgs. 5-3 and 5-4

Buried Line Sensors



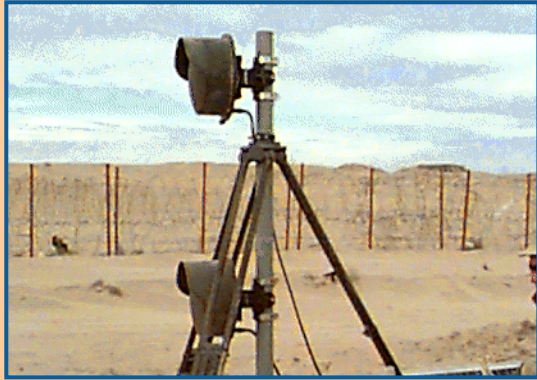
FEMA

Army TM 5-853-4, Electronic Security Systems, p. 5-6

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XI-C-11

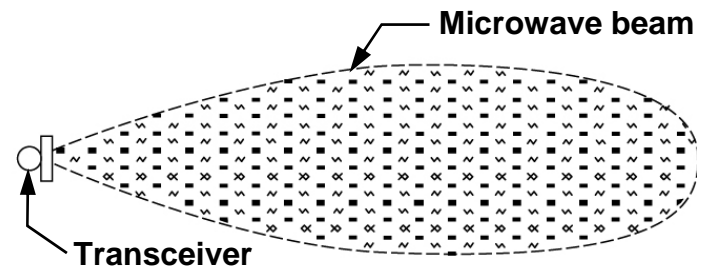
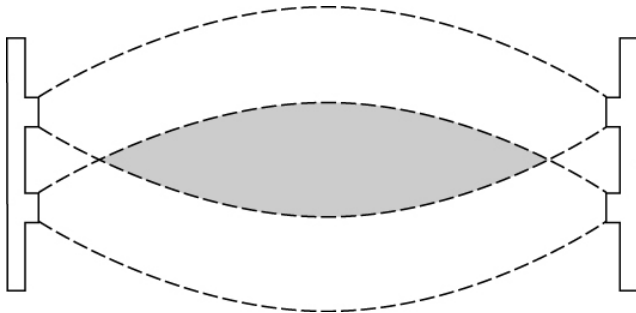
Microwave Sensors



Bistatic System



Monostatic System



First Layer of Defense



FEMA

Army TM 5-853-4, Electronic Security Systems, pgs. 5-15 and 5-7

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XI-C-12

Infrared Sensors

Active

Passive



First or Second Layer of Defense



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Video Motion Sensors

Old Generation



New Generation



Source: Protech



First or Second Layer of Defense



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Electronic Entry Control

Coded Devices

Credential Devices

Biometric Devices

Inspection Devices



**First or Second
Layer of Defense**



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Coded Devices

Electronic Keypad Devices

Computer Controlled Keypad
Devices



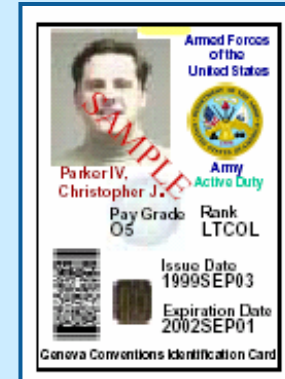
**First, Second, or Third
Layer of Defense**



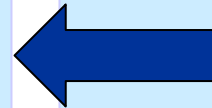
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Credential Devices

- Magnetic Stripe Card
- Wiegand-effect Card
- Proximity Card
- Smart Card
- Bar Code
- “i” Button
- Radio Frequency ID (RFID)



First, Second, or Third Layer of Defense



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Biometric Devices

Fingerprints

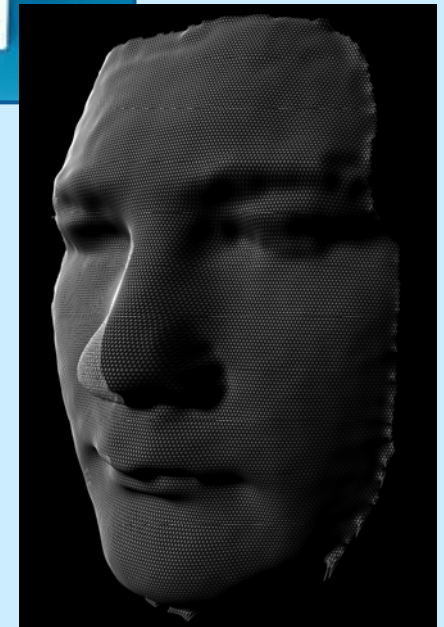
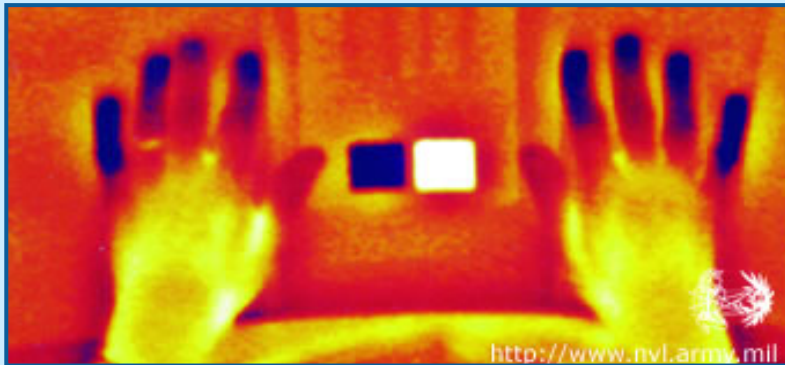
Hand Geometry

Retinal Patterns

Facial Patterns



Source: Veridit



Source: A4Vision



FEMA

First, Second, or Third Layer of Defense

Closed Circuit Television

Source: Protech Protection Technologies, Inc.

Interior CCTV

Alarm assessment, card reader door assessment, emergency exit door assessment, and surveillance of lobbies, corridors, and open areas

Exterior CCTV

Alarm assessment, individual zones and portal assessment, specific paths and areas, exclusion areas, and surveillance of waterside activities



First, Second, or Third Layer of Defense



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Security Operations Center

Enhancements to Overcome Operator/System Limitations

- Workspace / Hardening
- Alarm Recognition / Alerts
- CCTV Image Alarm - Motion Detection
- Smart CCTV Auto Pan/Tilt/Zoom on Tripped Sensor Location
- Forwarding Alarms to Pagers, PDAs, Radios
- Data Recording - DVR
- Line Supervision / Backup Feeds
- Emergency Power to System



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Summary

Use the Building Vulnerability Assessment Checklist to identify electronic security system requirements.

Public safety is enhanced by electronic security systems (deter, detect, deny, devalue).

Electronic security systems components and capabilities interact with other systems (LAN, doors, windows, lighting, etc.).

Electronic security systems can be used to mitigate vulnerabilities.



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Unit XI Case Study Activity

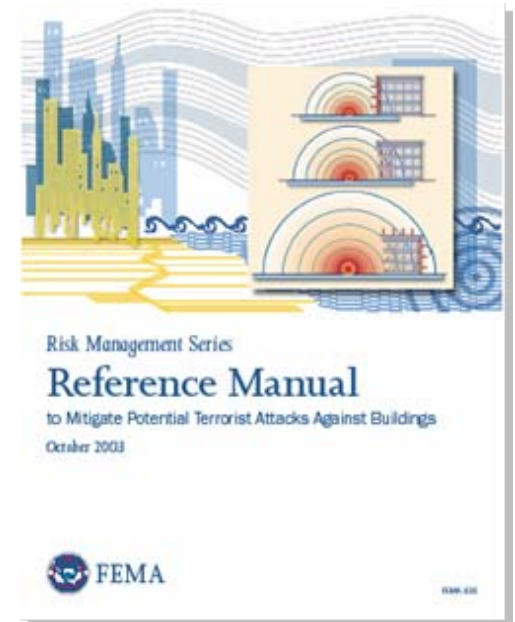
Electronic Security Systems

Background

Emphasis: Various components and technology available for use in electronic security systems

FEMA 426, Building Vulnerability Assessment Checklist

Assess Electronic Security Systems in Case Study for vulnerabilities and recommended mitigation measures



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BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XII

Case Study



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Unit Objectives

Explain building security design issues to a building owner for consideration prior to a renovation or new construction.

Explain the identification process to arrive at the high risk asset-threat/hazard pairs of interest.

Justify the recommended mitigation measures, explaining the benefits in reducing the risk for the high risk situations of interest.



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Cooperville Information / Business Center

Company

- Functions
- Infrastructure

Threats/Hazards

- Design Basis Threat
- Levels of Protection

Vulnerabilities

- Impact
- Mitigation

Report



Cooperville Information / Business Center (CI/BC)



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Coopersville Information / Business Center

IT services and support and temporary office facilities

- 75+ employees

Two-story building in small corporate office park

Located in suburban area of major metropolitan city

“Neighbors” include:

- Offices
- Industry
- Road, Rail, Air traffic



FEMA 426, Figure 2-1: Example of Using GIS to Identify Adjacent Hazards, p. 2-5

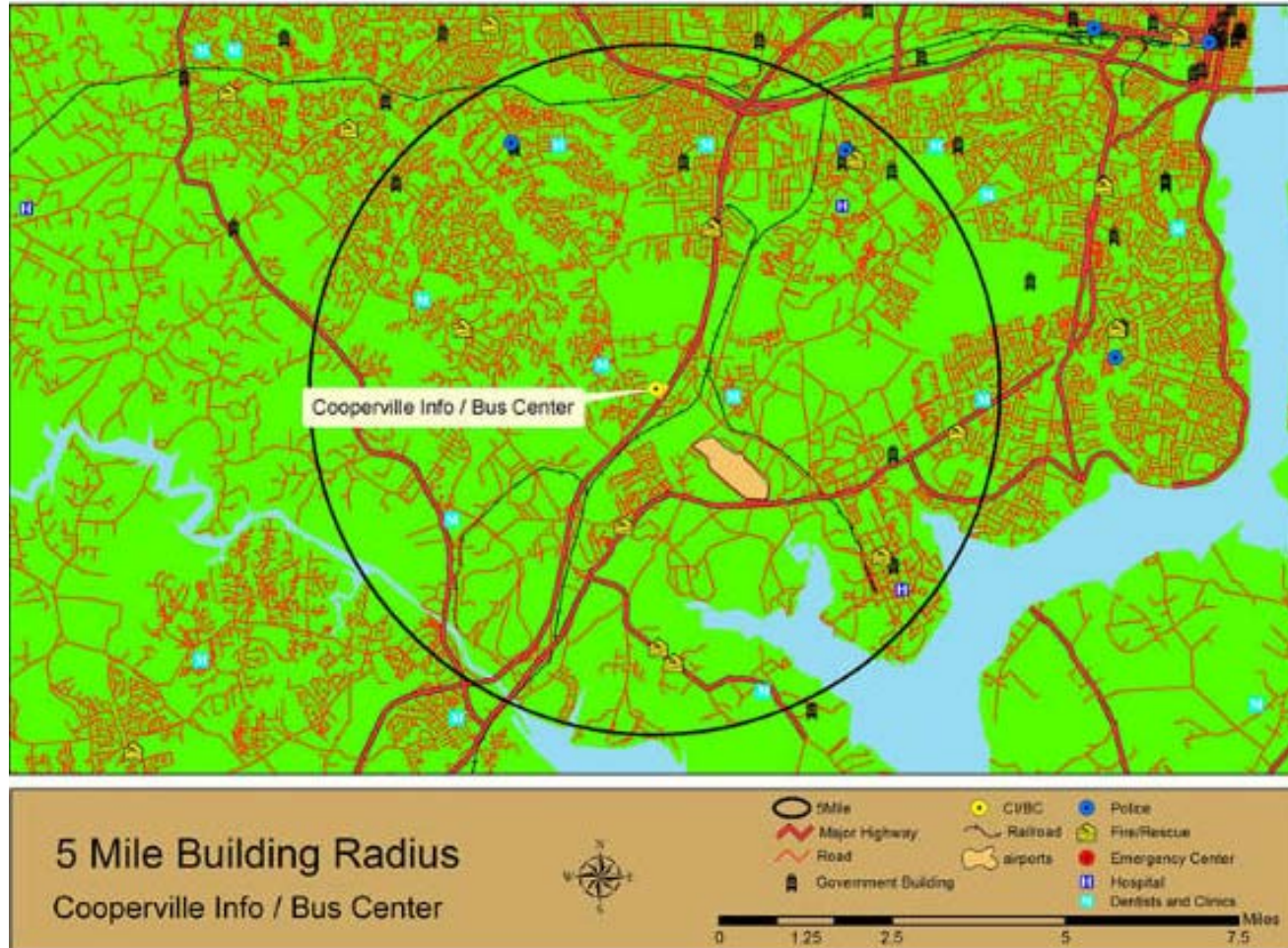
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T

Unit XII-C-4



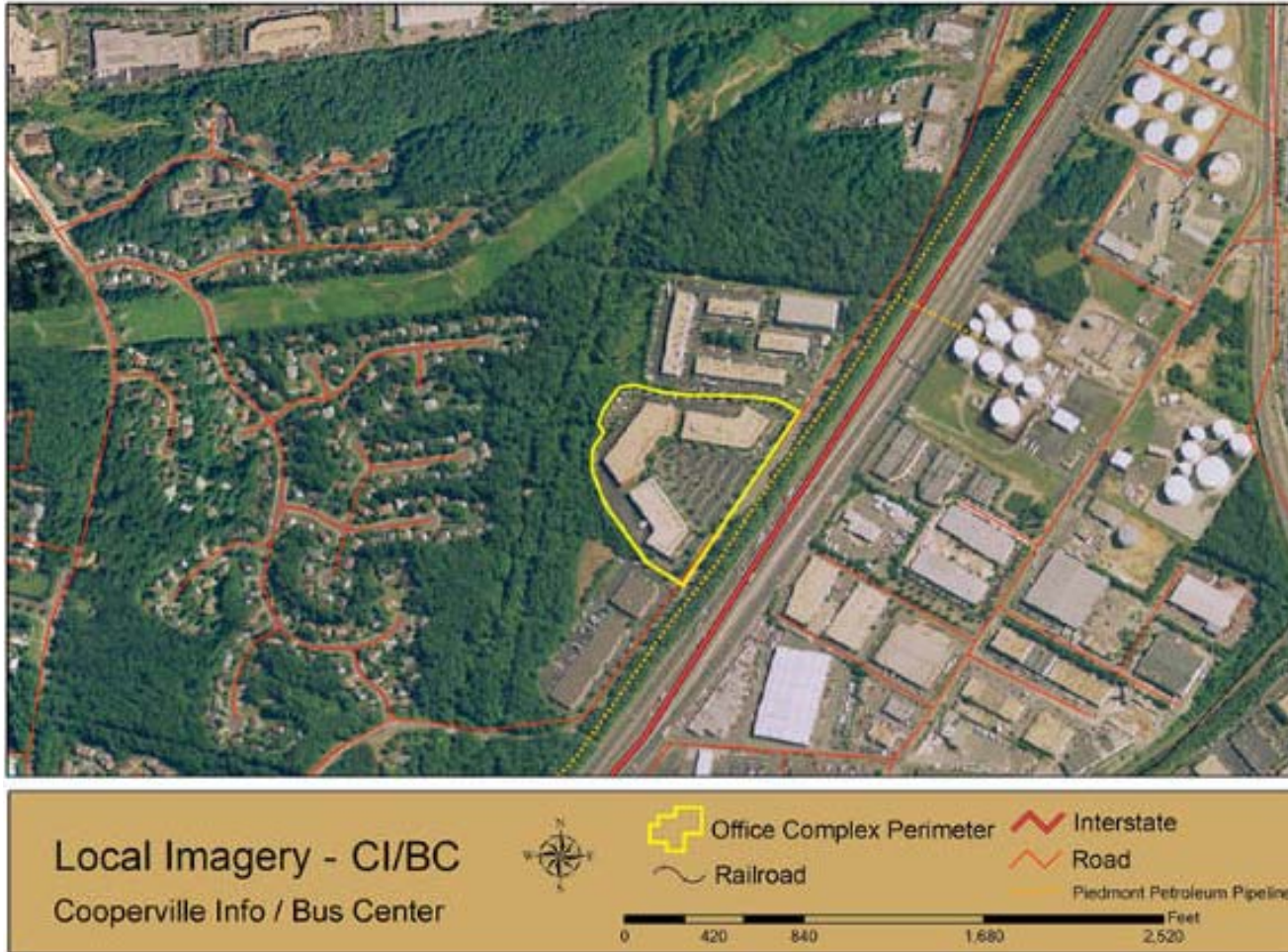
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5-Mile Building Radius



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Local Imagery



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FEMA 426, Figure 2-1: Example of Using GIS to Identify Adjacent Hazards, p. 2-5
BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit XII-C-6

Site Imagery



Site Imagery - CI/BC
Cooperville Info / Bus Center

0 125 250 500 750 Feet

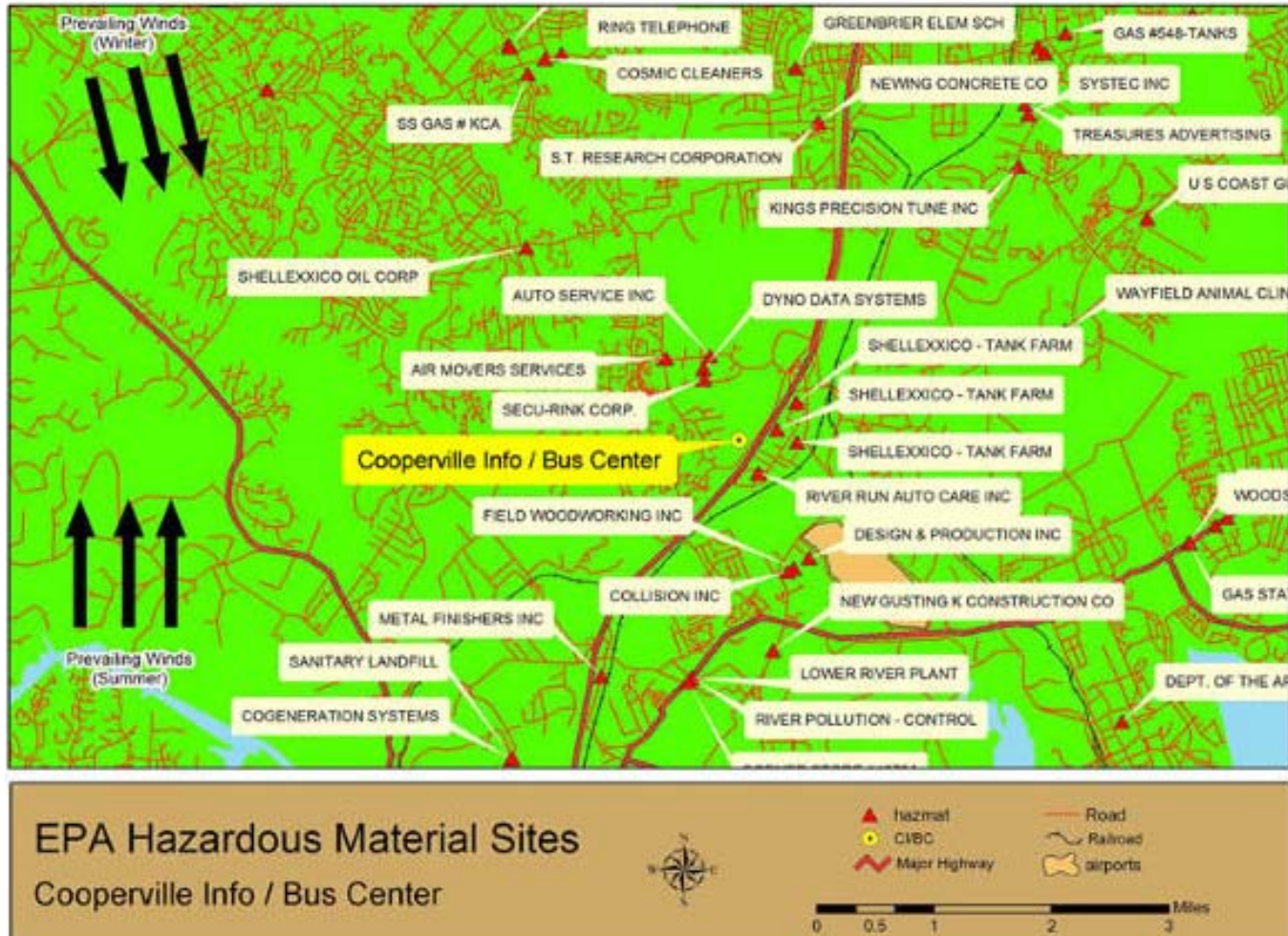
CI/BC Property
Office Complex Perimeter
Entry Point

Fence
1 Meter Color Aerial Imagery



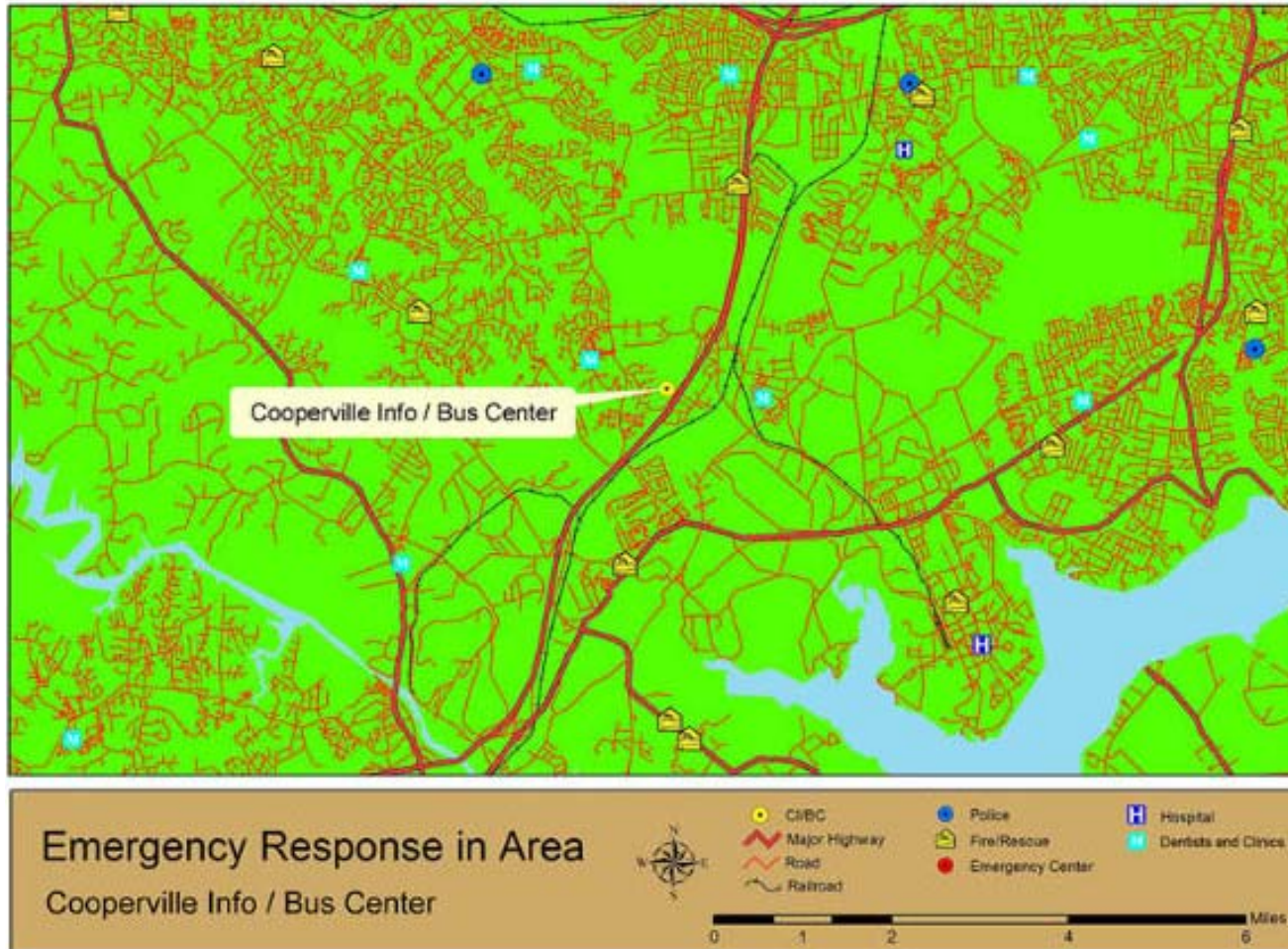
FEMA

HazMat Sites



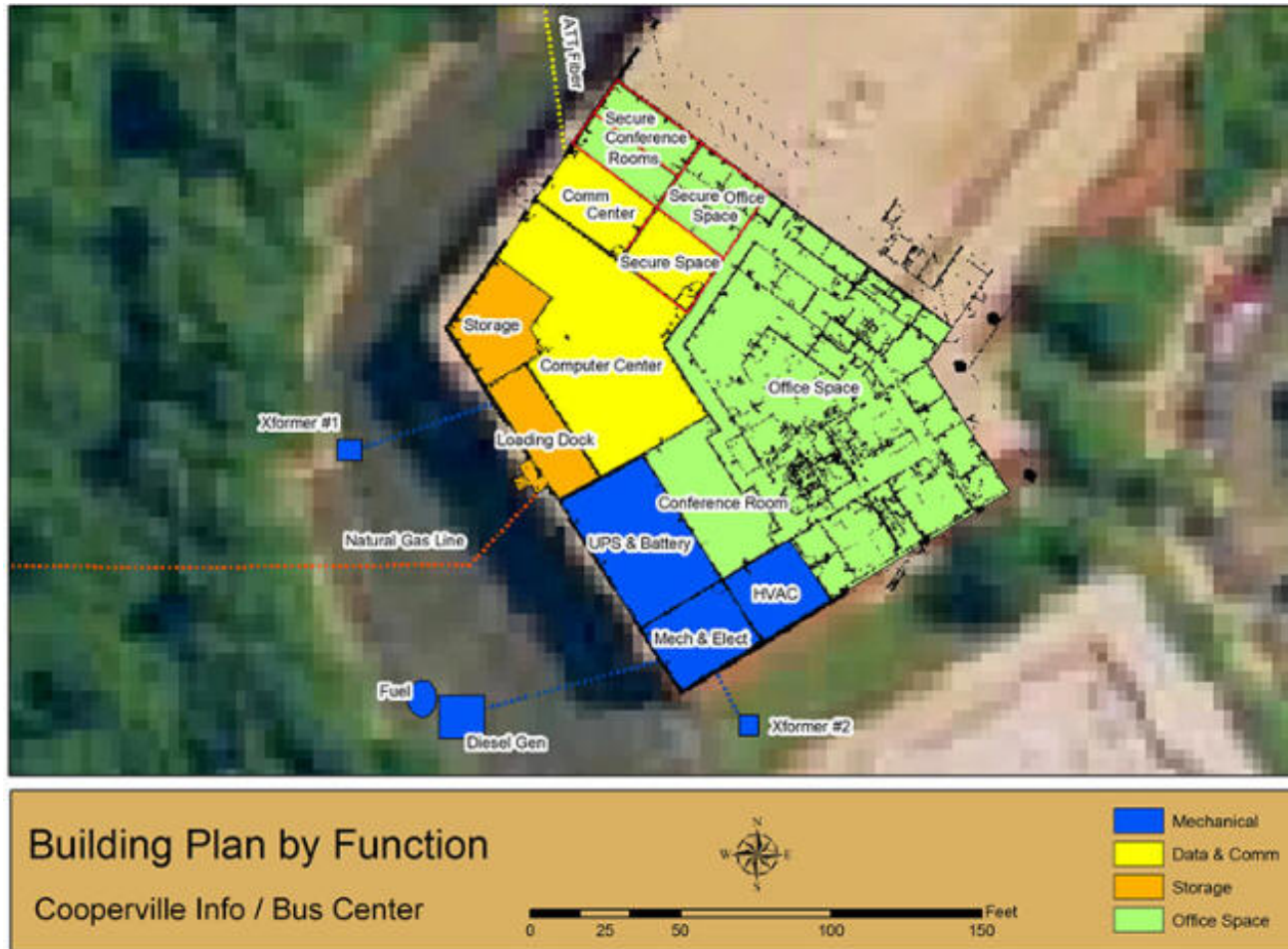
FEMA

Emergency Response



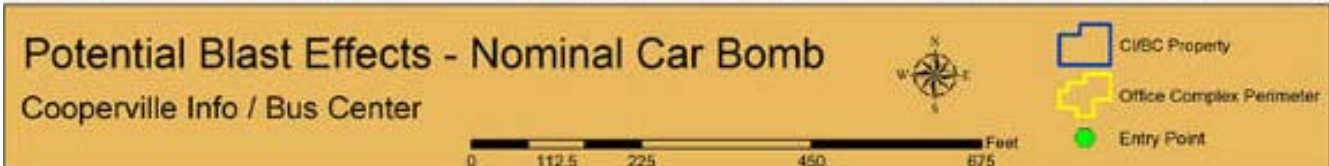
FEMA

Functional Layout



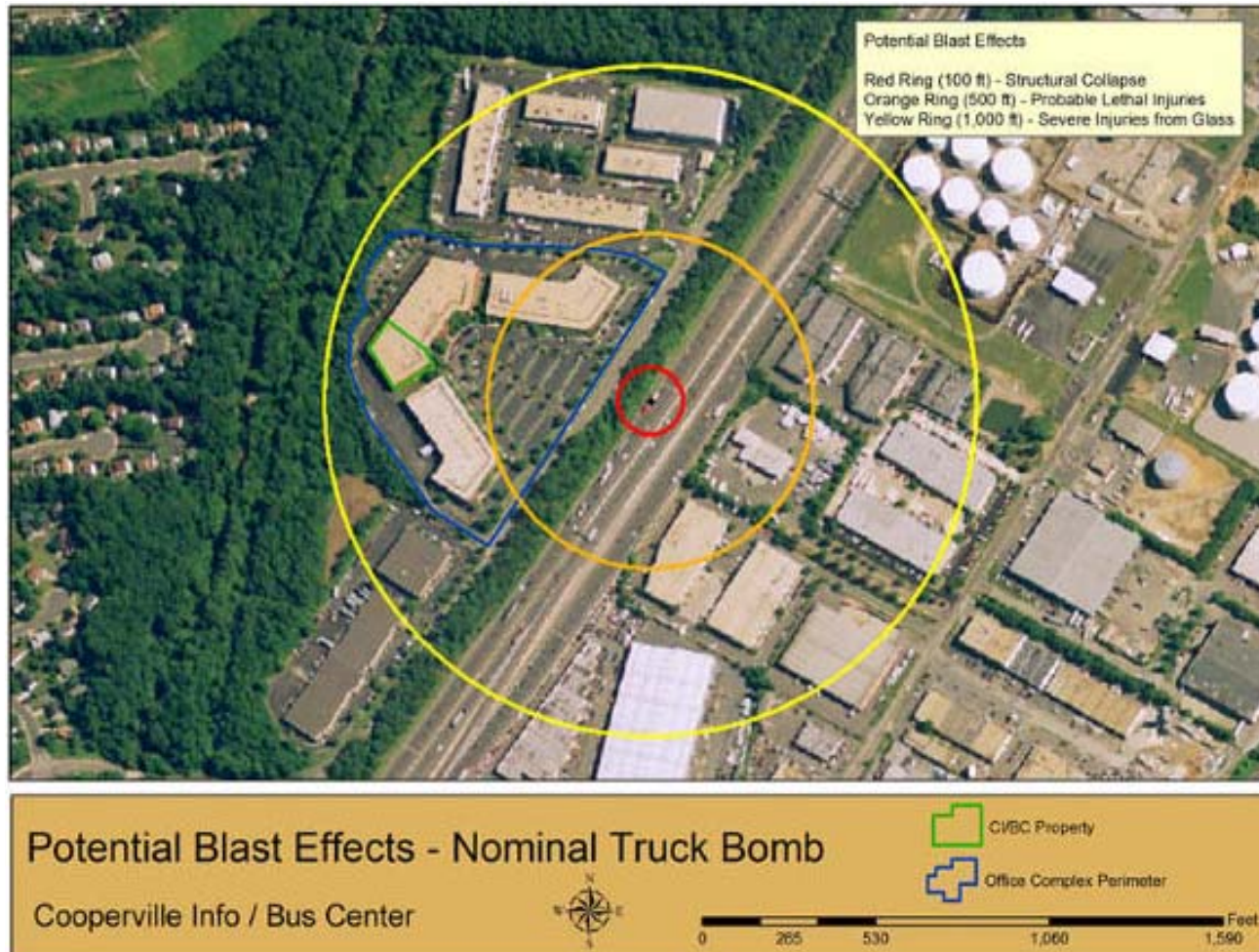
FEMA

Car Bomb Blast Effects



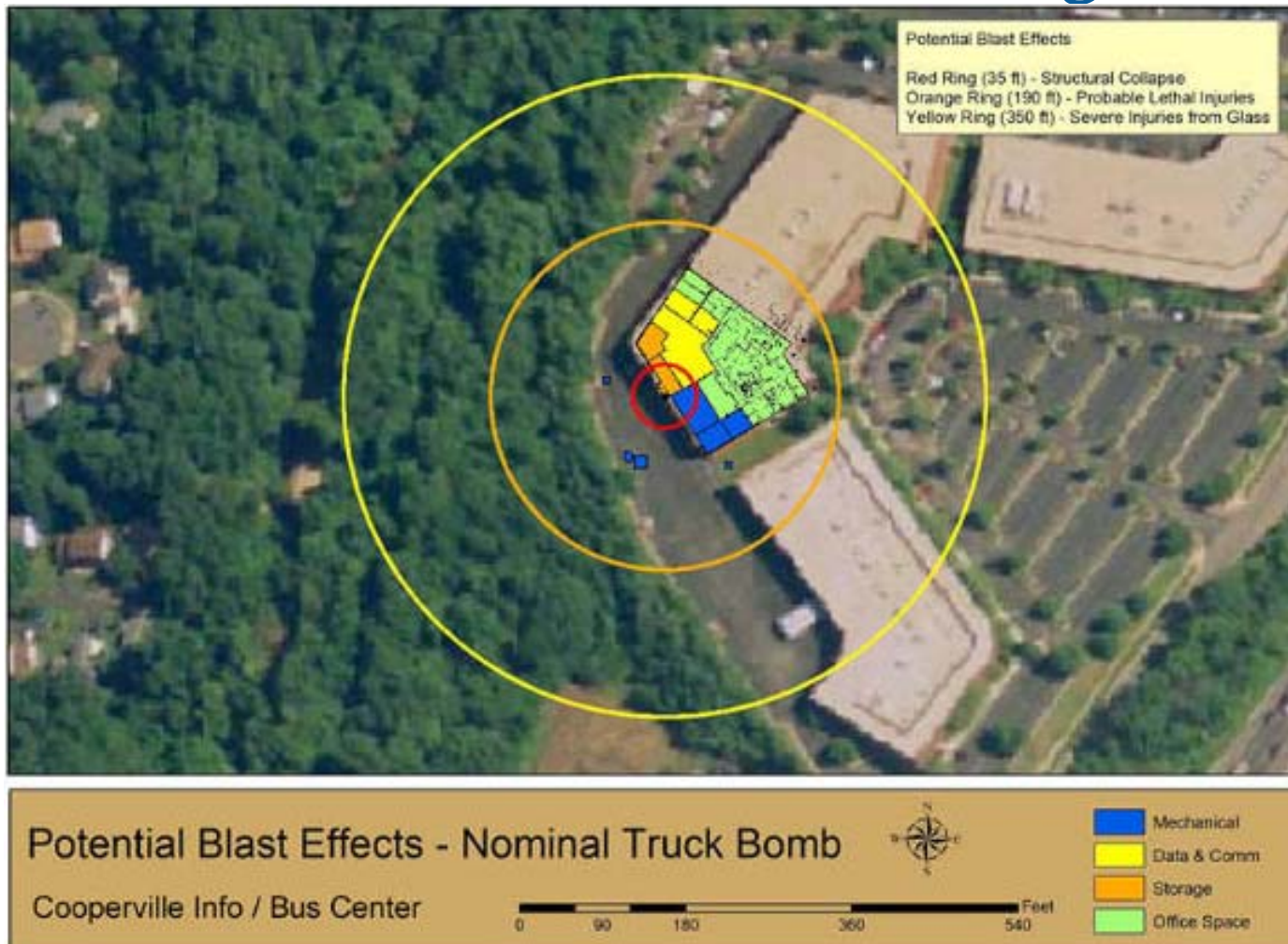
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Truck Bomb Blast Effects - Highway



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Truck Bomb Blast Effects – Loading Dock



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Building Data

Infrastructure

Structural

- 2 Story Steel Frame with brick façade
- Annealed glass

Mechanical

- HVAC
- Gas
- Fire Suppression

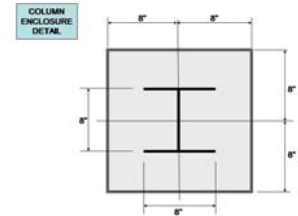
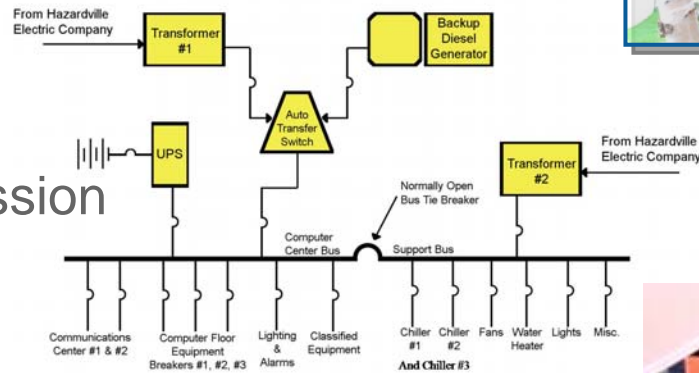
Electrical

- Primary
- Back-up

IT

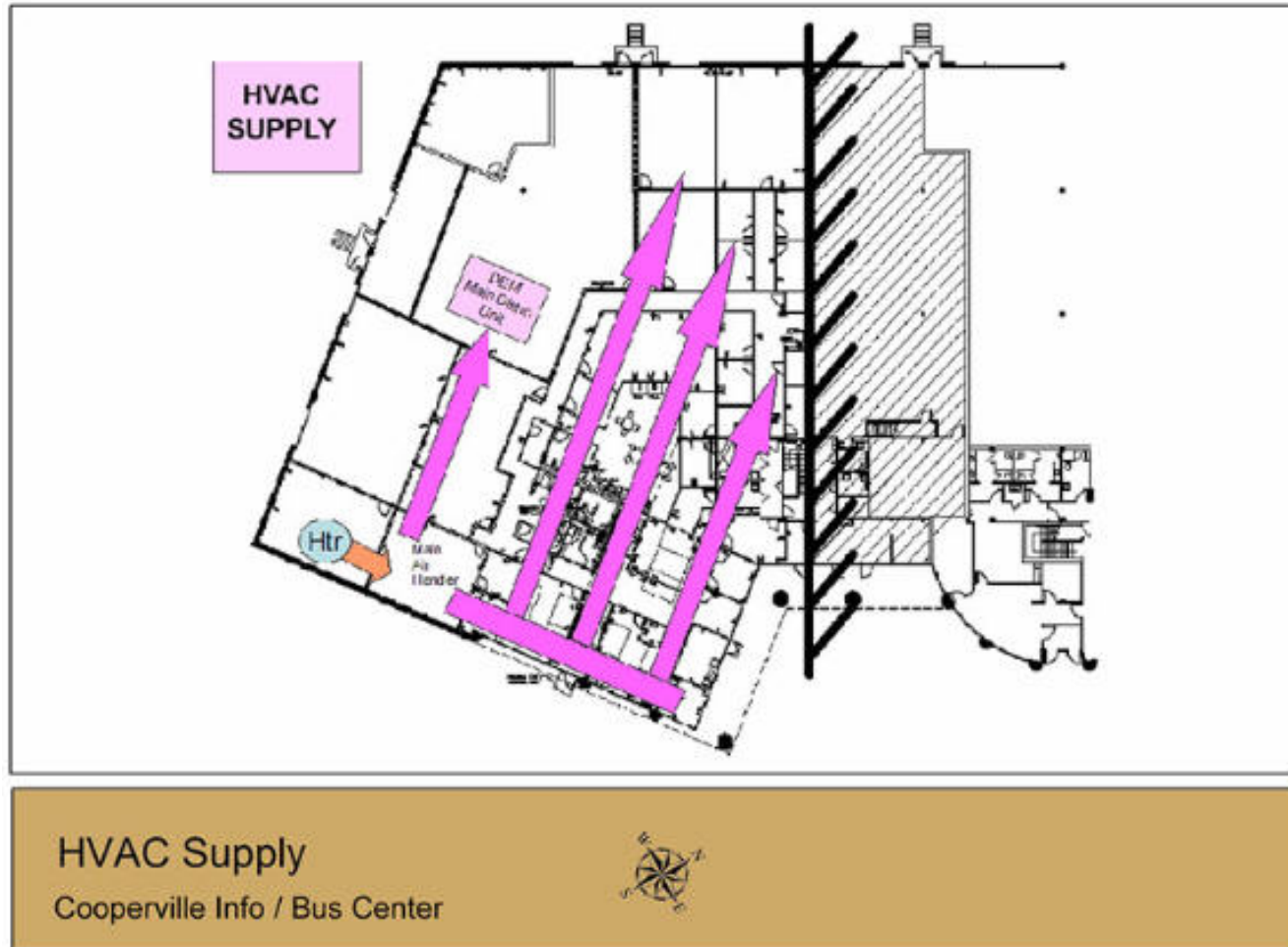
- Data Center
- Telecom

Physical Security



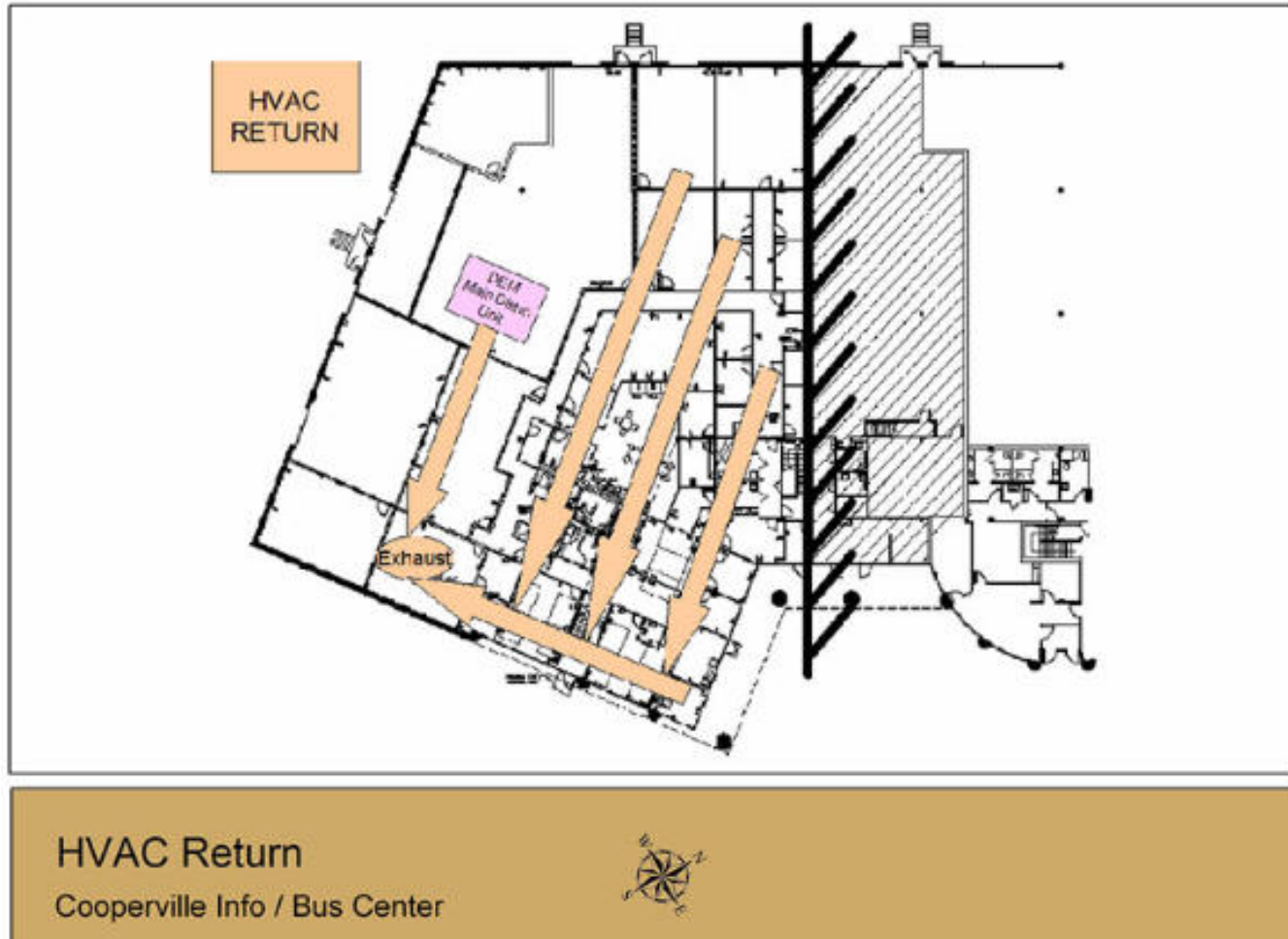
FEMA

Mechanical Systems



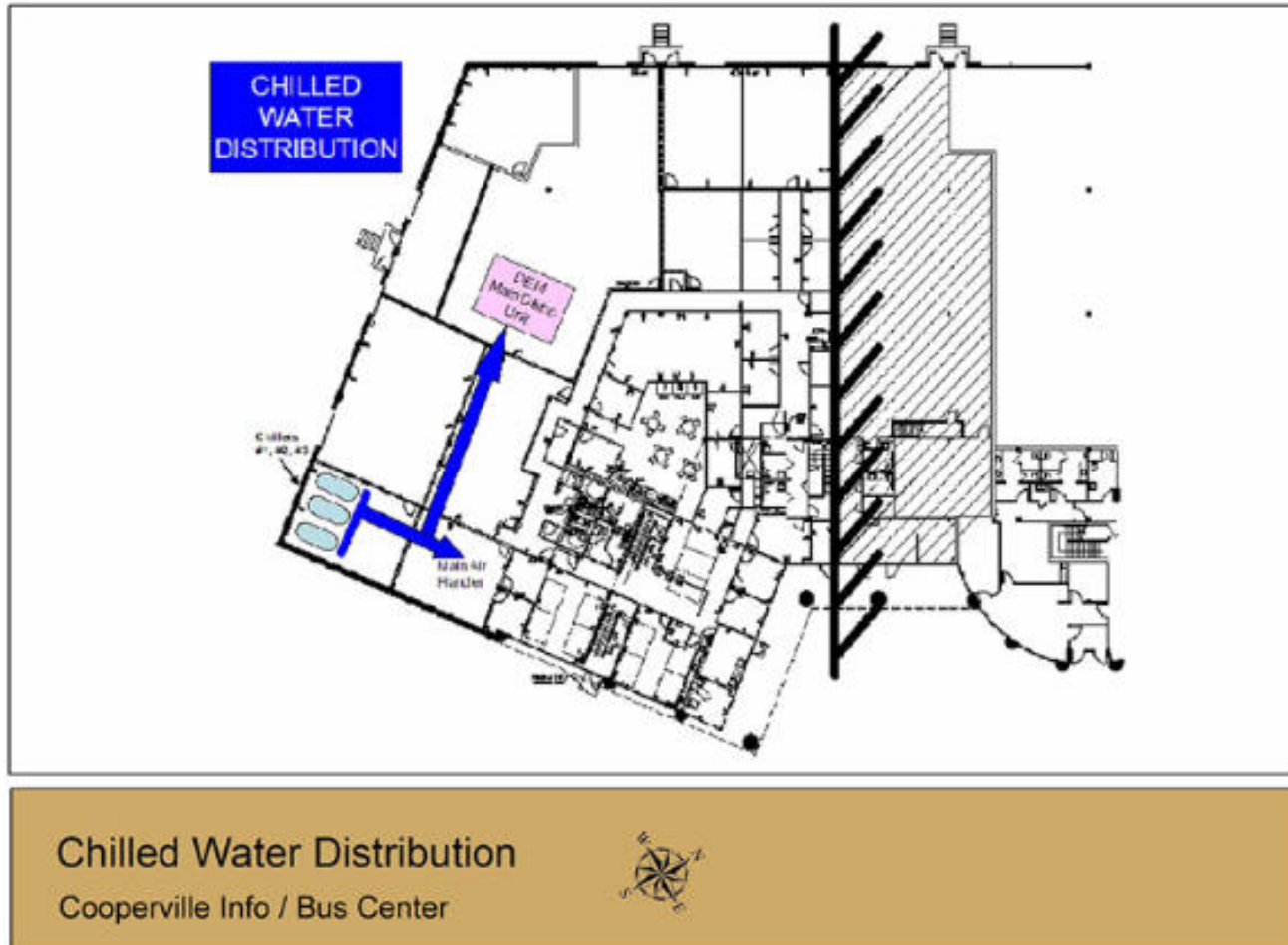
FEMA

Mechanical Systems



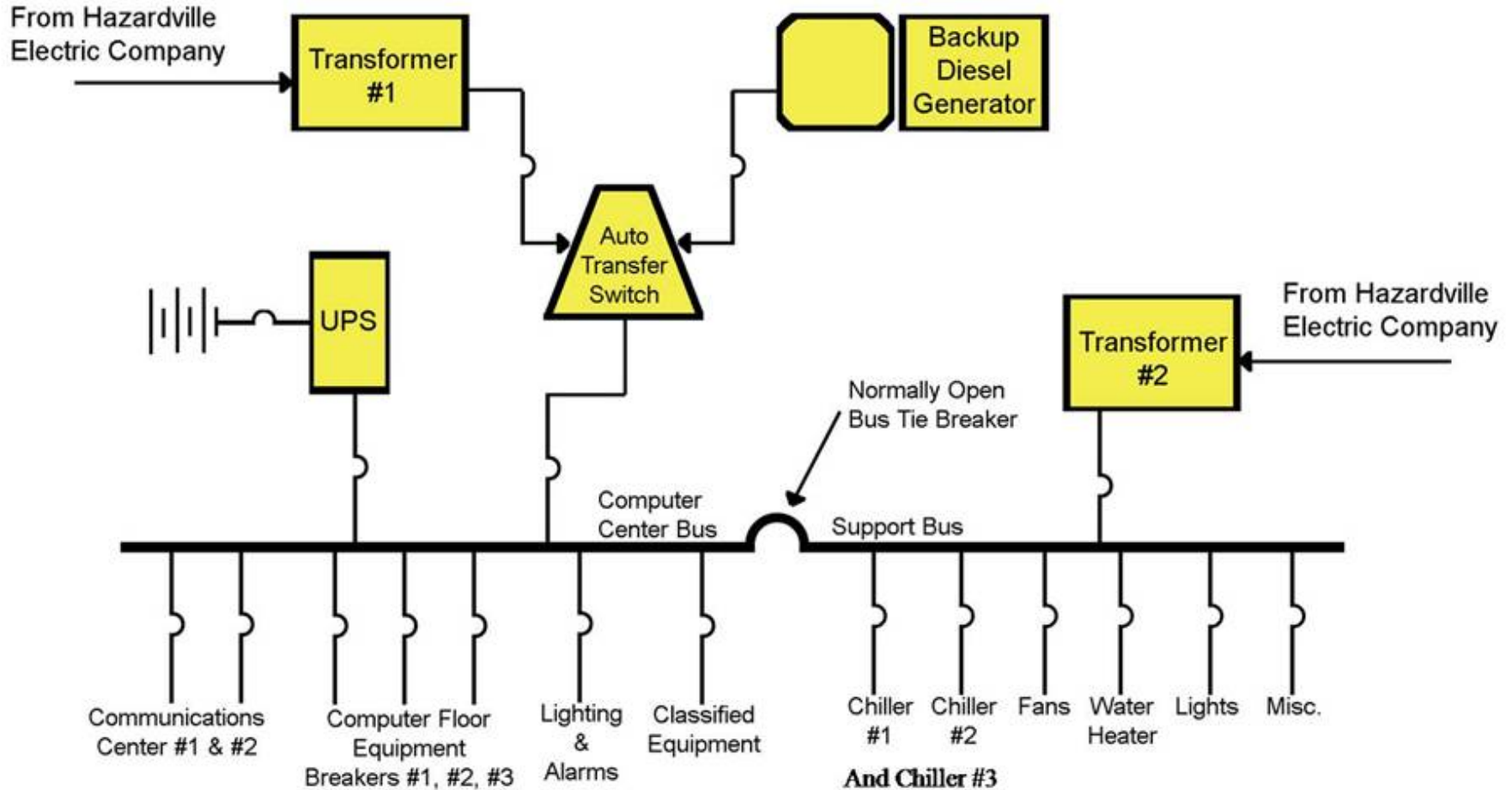
FEMA

Mechanical Systems



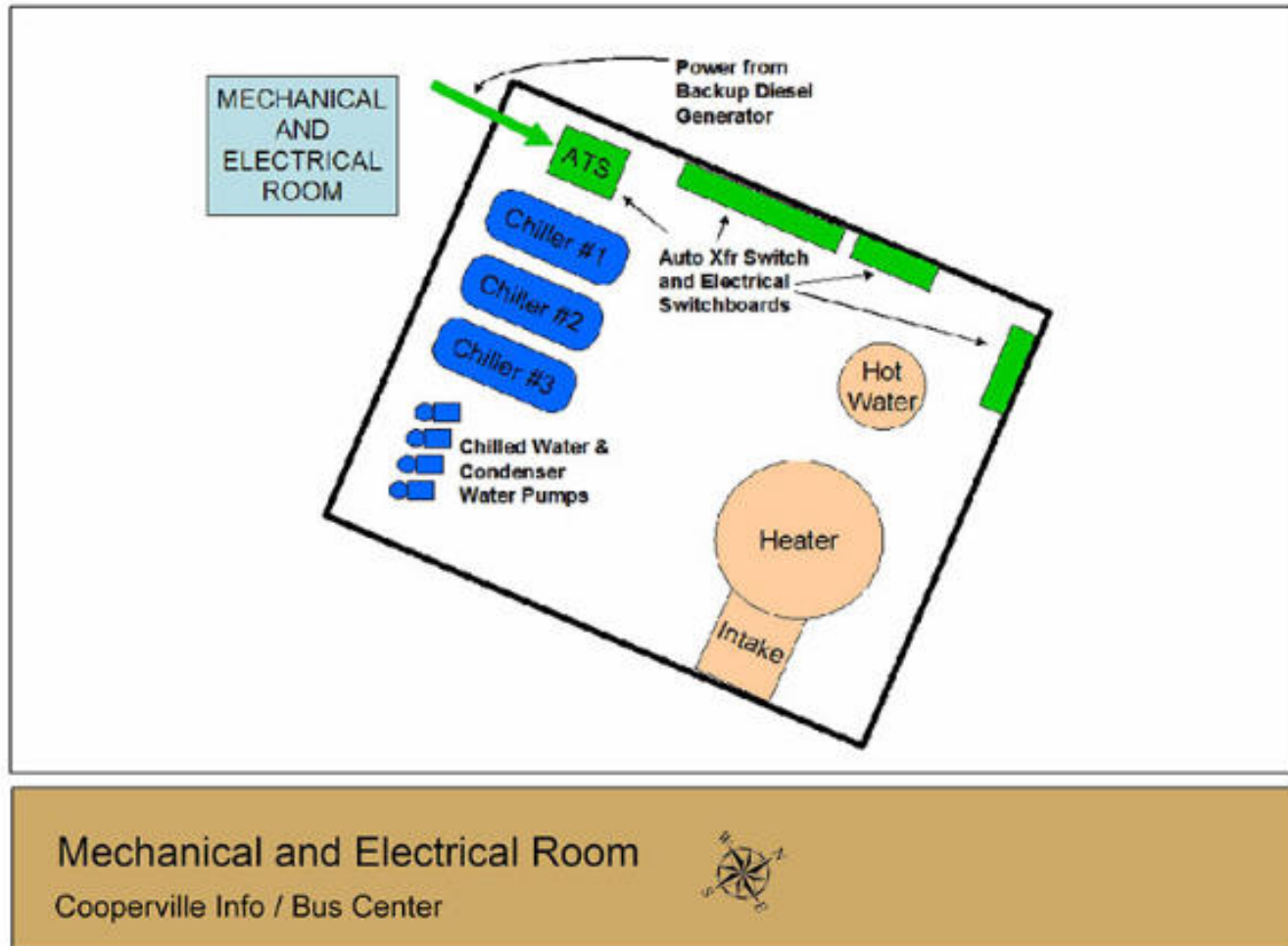
FEMA

Electrical Systems



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Mechanical and Electrical Room



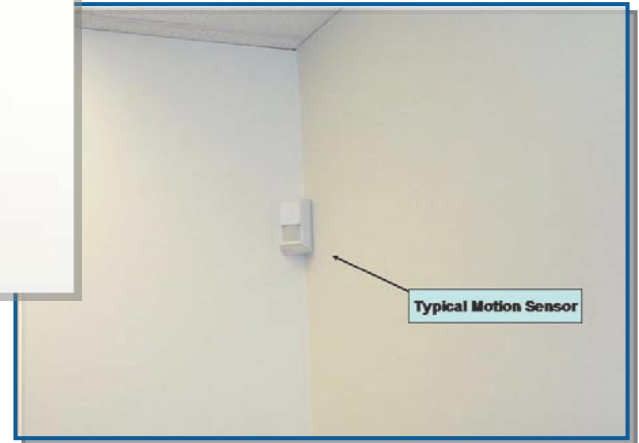
FEMA

Information Technology



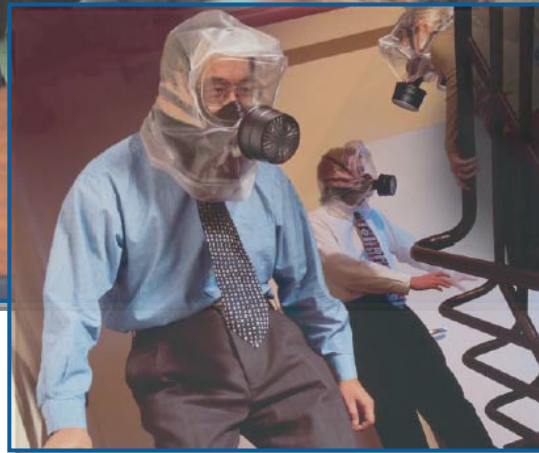
FEMA

Physical Security



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Emergency Response



Source: Mine Safety Appliances Company



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Threats/Hazards

Threats include:

Terrorism

- No direct threat to CI/BC
- Government, military, industry in the area

Intelligence Collection

Crime

- High threat in metro area, lower in suburbs



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Threats/Hazards

Threats (continued):

HazMat -- nearby facilities

- Fuel farm and pipeline
- Interstate highway
- Rail line

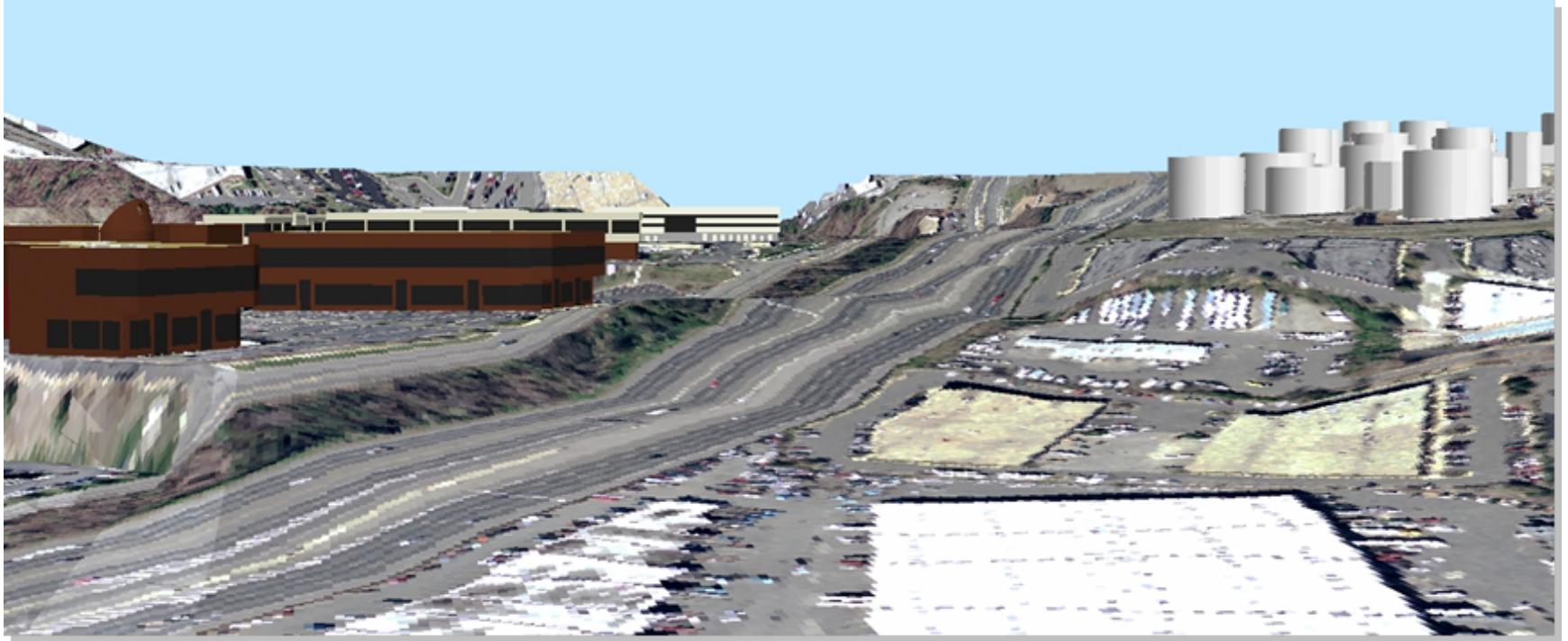
Natural Hazards

- Hurricanes – Infrequent
- Tornadoes – Almost every Spring
- Earthquakes – Low intensity and low probability
- Flooding – Not in 100 Yr Flood Plain
- Lightning - Frequent



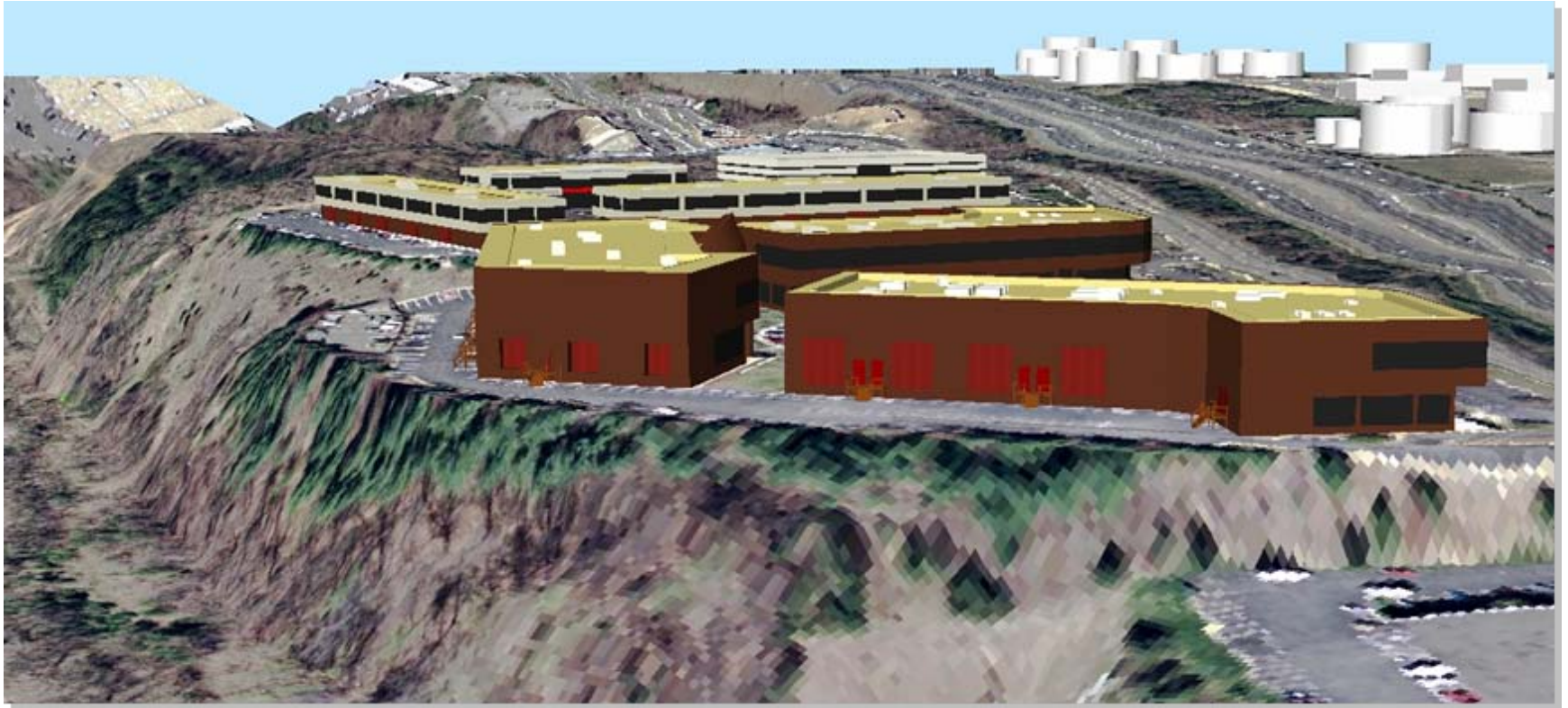
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Computerized Elevation Looking Northwest



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Computerized Elevation Looking Northeast



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Design Basis Threat

Explosive Blast: Car Bomb 250 lb TNT equivalent. Truck Bomb 5,000 lb TNT equivalent (Murrah Federal Building class weapon)

Chemical: Large quantity gasoline spill and toxic plume from the adjacent tank farm, small quantity (tanker truck and rail car size) spills of HazMat materials (chlorine)

Biological: Anthrax delivered by mail or in packages, smallpox distributed by spray mechanism mounted on truck or aircraft in metropolitan area

Radiological: Small “dirty” bomb detonation within the 10-mile radius of the CI/BC building



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Levels of Protection

DHS Interagency Security Committee Criteria

Level II Building – between 11-150 employees; 2,500 to 80,000 sq ft

- Perimeter Security
- Entry Security
- Interior Security
- Administrative Procedures
- Blast/Setback Standards



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Levels of Protection

DoD Antiterrorism Standards

Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Low	<p>Moderate damage – Building damage will not be economically repairable.</p> <p>Progressive collapse will not occur.</p> <p>Space in and around damaged area will be unusable.</p>	<p>Glazing will fracture, potentially come out of the frame, but at a reduced velocity, does not present a significant injury hazard. (Very low hazard rating)</p> <p>Doors may fail, but they will rebound out of their frames, presenting minimal hazards.</p>	<p>Majority of personnel in damaged area suffer minor to moderate injuries with the potential for a few serious injuries, but fatalities are unlikely.</p> <p>Personnel in areas outside damaged areas will potentially experience minor to moderate injuries.</p>



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FEMA 426, Adapted from Table 4-1: DoD Minimum Antiterrorism Standards for New Buildings, p. 4-9, updated for *UFC 4-010-01*, 22 Jan 2007

Levels of Protection

DoD Antiterrorism Standards

Location	Building Category	Stand-off Distance or Separation Requirements			
		Applicable Level of Protection	Conventional Construction Stand-off Distance	Minimum Stand-off Distance	Applicable Explosives Weight
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Primary Gathering Building	Low	45 m 148 ft	25 m 82 ft	Car Bomb



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Adapted from DoD Unified Facilities Criteria (UFC), “DoD Minimum Antiterrorism Standards for New Buildings”, UFC 4-010-01, 22 Jan 2007

Levels of Protection

UFC 4-010-01 APPENDIX B

DoD MINIMUM ANTITERRORISM STANDARDS FOR NEW AND EXISTING BUILDINGS

Standard 1	Stand-off Distances
Standard 2	Unobstructed Space
Standard 3	Drive-Up/Drop-Off Areas
Standard 4	Access Roads
Standard 5	Parking Beneath Buildings or on Rooftops
Standard 6	Progressive Collapse Avoidance
Standard 7	Structural Isolation
Standard 8	Building Overhangs
Standard 9	Exterior Masonry Walls
Standard 10	Windows and Skylights
Standard 11	Building Entrance Layout
Standard 12	Exterior Doors



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Levels of Protection (continued)

UFC 4-010-01 APPENDIX B DoD MINIMUM ANTITERRORISM STANDARDS FOR NEW AND EXISTING BUILDINGS	
Standard 13	Mail Rooms
Standard 14	Roof Access
Standard 15	Overhead Mounted Architectural Features
Standard 16	Air Intakes
Standard 17	Mail Room Ventilation
Standard 18	Emergency Air Distribution Shutoff
Standard 19	Utility Distribution and Installation
Standard 20	Equipment Bracing
Standard 21	Under Building Access
Standard 22	Mass Notification



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Unit XII Case Study Activity

Finalization and Presentation of Group Results

Purpose

- Groups finalize their assessments
- Decide on high priority risk concerns
- Determine appropriate mitigation measures
- Present findings to class

Requirements

Based on findings from previous activities, complete the worksheet table, including COOP requirements not yet met

Prepare to present conclusions and justify decisions to class in a 5- to 7-minute presentation



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Vulnerability/Mitigation

Basis of Mitigation Measures

Recommendations ultimately require an understanding of benefit (capability) versus cost to implement

Blast Modeling

- Various scenarios run at Tier III level for comparison using Design Basis Threats
 - Truck bomb is worst case
 - Car bomb also analyzed for comparison
 - Some interesting and unexpected results
- More analysis required for final design



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Vulnerability/Mitigation

Basis of Mitigation Measures

Plume Modeling (CBR or HazMat)

- Tier II / Tier III performed for selected Design Basis Threats external to building
- Additional Tier III analysis required inside building
 - Understand internal pressure changes during building operation
 - Understand how HVAC and other changes implemented in response plans affect building
 - Supports design of CBR measures



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Vulnerability/Mitigation

Basis of Mitigation Measures

Cost Estimates are ROM (Rough Order of Magnitude)

- Assumes 10% Overhead and 10% Profit
- Assumes Area Cost Factor of 1.0 (DoD) or 100 (RS Means)
 - DoD Range: **0.84** (Huntsville AL) to **1.67** (Anchorage AK)
 - RS Means Range: **82.5** (Baton Rouge LA) to **131.9** (New York NY)
 - Adjusted for July 2006
- Anti-Terrorism / Force Protection equipment and construction costing information is still immature



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Vulnerability/Mitigation

Site / Vehicle Bomb

Maximize available stand-off

- Front side along sidewalk to prevent direct approach into building and ensure stand-off – 100 LF
- Due to straightaways on front and back of building, need K12 stopping power
 - Planters - \$22.3K
 - Plinth wall - \$50.7K
 - Landscaping (boulders) - \$19.5K



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Vulnerability/Mitigation

Building Envelope / Vehicle Bomb

Harden windows (balanced envelope)

- Fragment Retention Film
 - Not costed -- could not meet performance required for upgraded stand-off
- Laminated glass -- 56 windows
 - 1/2" laminated interior pane with 0.060 PVB interlayer, air gap to 0.25 inches, and retention of exterior pane - \$170.8K



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Window Hardening

Original Glazing

■ Large DBT – 1,136 ft

■ Small DBT – 338 ft

Hardened Glazing

■ Large DBT – 422 / 579 ft

■ Small DBT – 29 / 150 ft

Between the two hardened glazing distances glass blows OUT of building



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Vulnerability/Mitigation

Building Envelope / Vehicle Bomb

Harden exterior -- Close in overhang

- Brick bonded to 4" Reinforced Concrete Wall, #3 rebar @12 inches each way - \$64.2K
- Brick backed with truck bed liner - \$34.6K
- Deduct window hardening if overhang enclosed – (\$85.4K)



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Infill Hardening

Overhang Infill – Brick Only

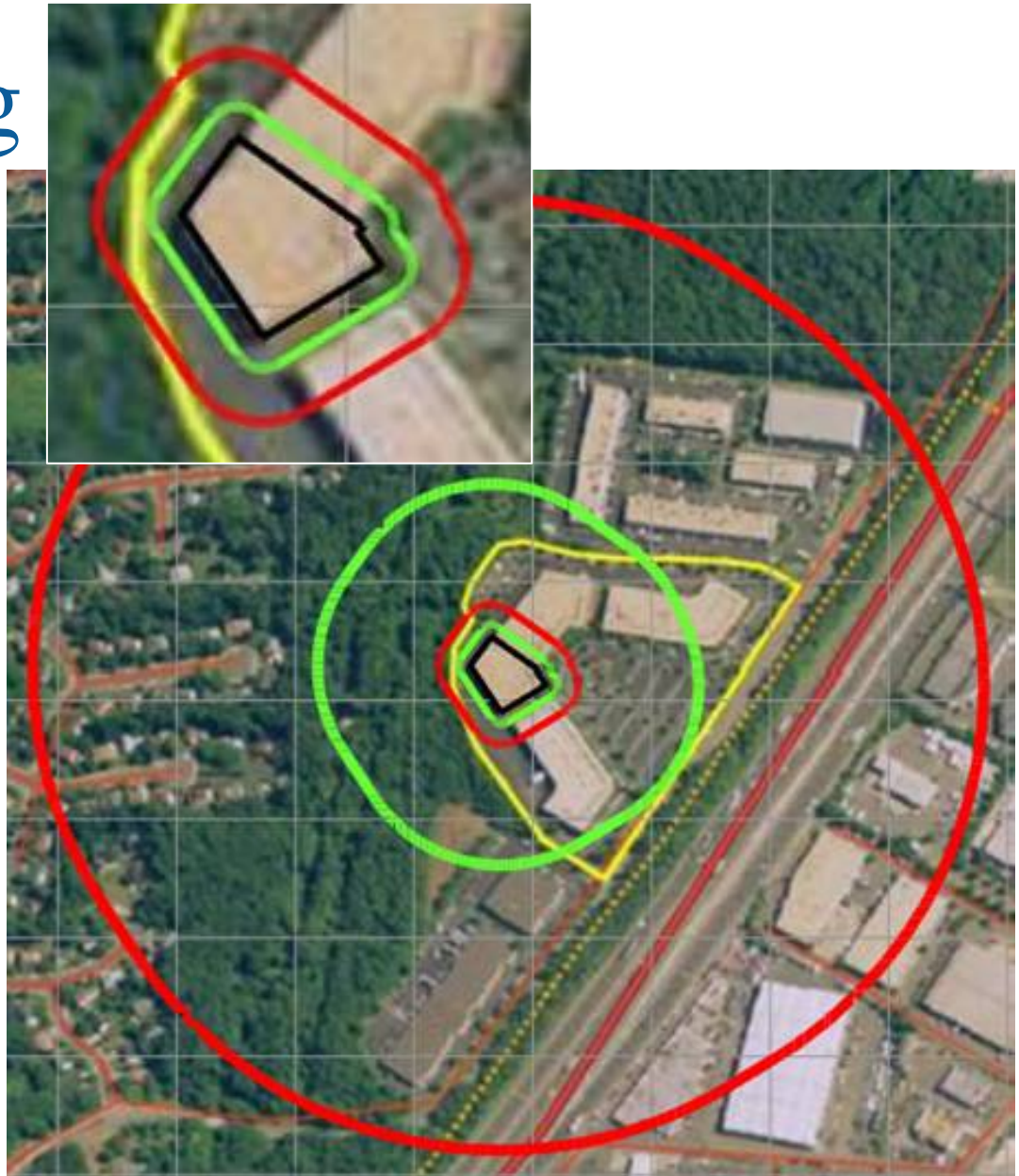
 Large DBT – 1,210 ft

 Small DBT – 88 ft

Hardened Overhang Infill
w/ R/C Backup Wall

 Large DBT – 422 ft

 Small DBT – 32 ft



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Infill Hardening

Overhang Infill – Brick Only

 Large DBT – 1,210 ft

 Small DBT – 88 ft

Hardened Overhang Infill
w/ Spray-On Liner

 Large DBT – 213 ft

 Small DBT – 17 ft



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Vulnerability/Mitigation

Building Envelope / Vehicle Bomb

Harden walls (balanced envelope)

- Vermiculite in wall cavity - \$23.5K
- Spray on truck bed liner - \$43.4K



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Wall Hardening

Cavity Wall – CMU Only

■ Large DBT – 1,022 ft

■ Small DBT – 230 ft

Hardened Cavity Walls w/ Vermiculite in gap

■ Large DBT – 371 ft

■ Small DBT – 31 ft



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Wall Hardening

Cavity Wall – CMU Only

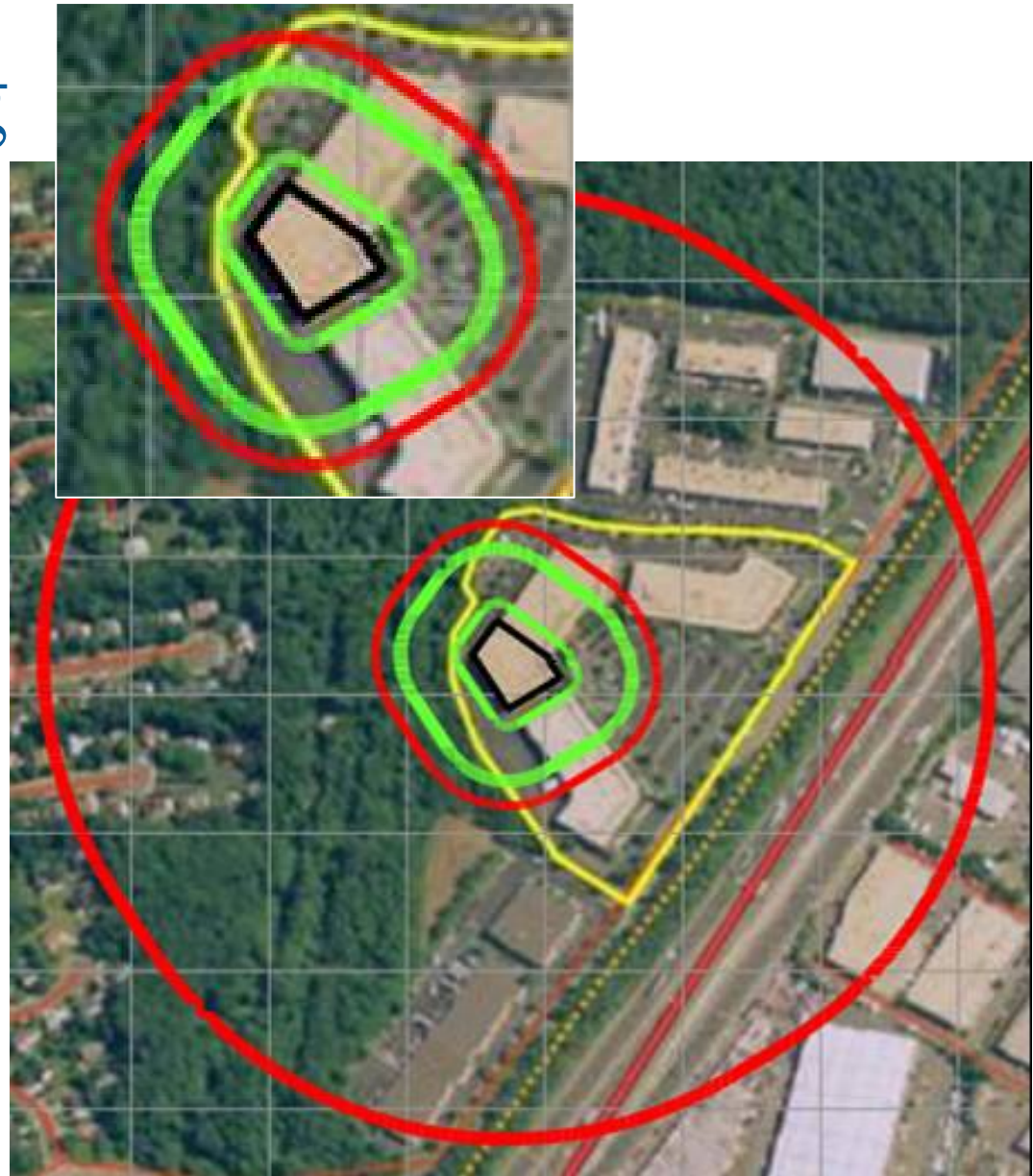
 Large DBT – 1,022 ft

 Small DBT – 230 ft

Hardened Cavity Walls
w/ Spray-On Liner

 Large DBT – 171 ft

 Small DBT – 42 ft



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Vulnerability/Mitigation

Site / Vehicle Bomb

Protect site from truck bomb by establishing controlled perimeter

- Chain link fencing along main road – K8 with two aircraft cables - \$50,500
- Vehicle pop-up barriers – K8, 3 entrances - \$181.7K
- Pre-screening away from building
 - Facility (Pre-Engineering Building) - \$35,000
 - Manpower/year - \$187.2K



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Vulnerability/Mitigation

Architectural / Vehicle Bomb

Strengthen overhead anchorage elements

- Heaters - \$2.1K



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Vulnerability/Mitigation

Site / Armed Attack (Physical Security)

Controlled Perimeter

- Fencing on three sides of site not on main road - \$66.0K
- Upgrade Security Ops Center (security managers office) – digital CCTV, digital video recording (DVR), and cameras for complete building coverage - \$55.0K



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Vulnerability/Mitigation

Architectural / Mailroom

Separate front lobby from interior office space

- Harden wall between lobby and office space - \$22.9K
- Harden door between lobby and office space - \$4.4K
- Separate HVAC system - \$4.4K
- Total \$31.7K

Separate Mailroom, hardened with separate HVAC - \$40.0K



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Vulnerability/Mitigation

Utilities / Mechanical Systems / Vehicle Bomb

Natural gas meters / pressure regulators

- Bollards, K12, 3 total - \$2.3K
- Fencing (access control) - \$0.20K

Utilities / Electrical Systems / Vehicle Bomb

Electrical transformers

- Bollards, K12, 6 total – \$4.6K



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Vulnerability/Mitigation

Mechanical Systems / Fire Alarm Systems / General Vulnerability – Redundancy

Fire Alarm / Suppression

- Install annunciator panel - \$3.5K
- Fire detection zones for CI/BC corporate space with dual detection in Data Center - \$81.0K
- Convert Data Center to clean agent to supplement water (check local code) - \$137.5K

Chilled Water

- Install backup piping to primary air handling units - \$26.0K



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Vulnerability/Mitigation

Electrical Systems / General Vulnerability – Redundancy

Increase size of generator fuel tank

- 2,000 to 3,000 gallons (30 hours at full output) - \$17.0K
- 3,000 gallons of diesel fuel - \$8.7K
- Total \$25.7K
- Arrange multiple suppliers for daily deliveries under worst case conditions

Conduct full and extended load test of emergency generator and UPS system to confirm performance



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Vulnerability/Mitigation

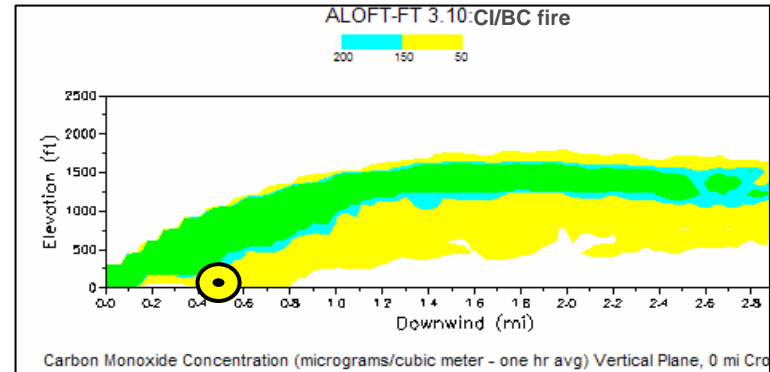
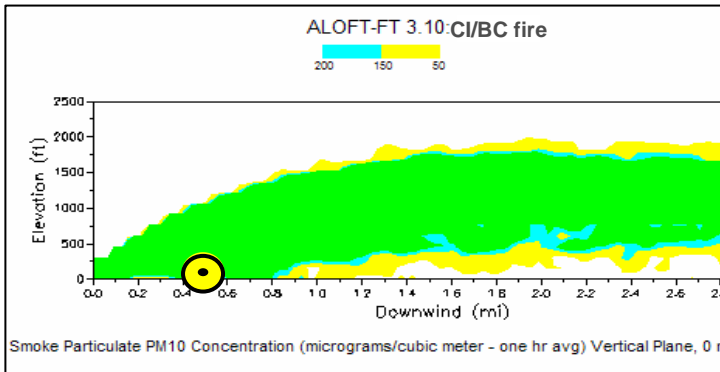
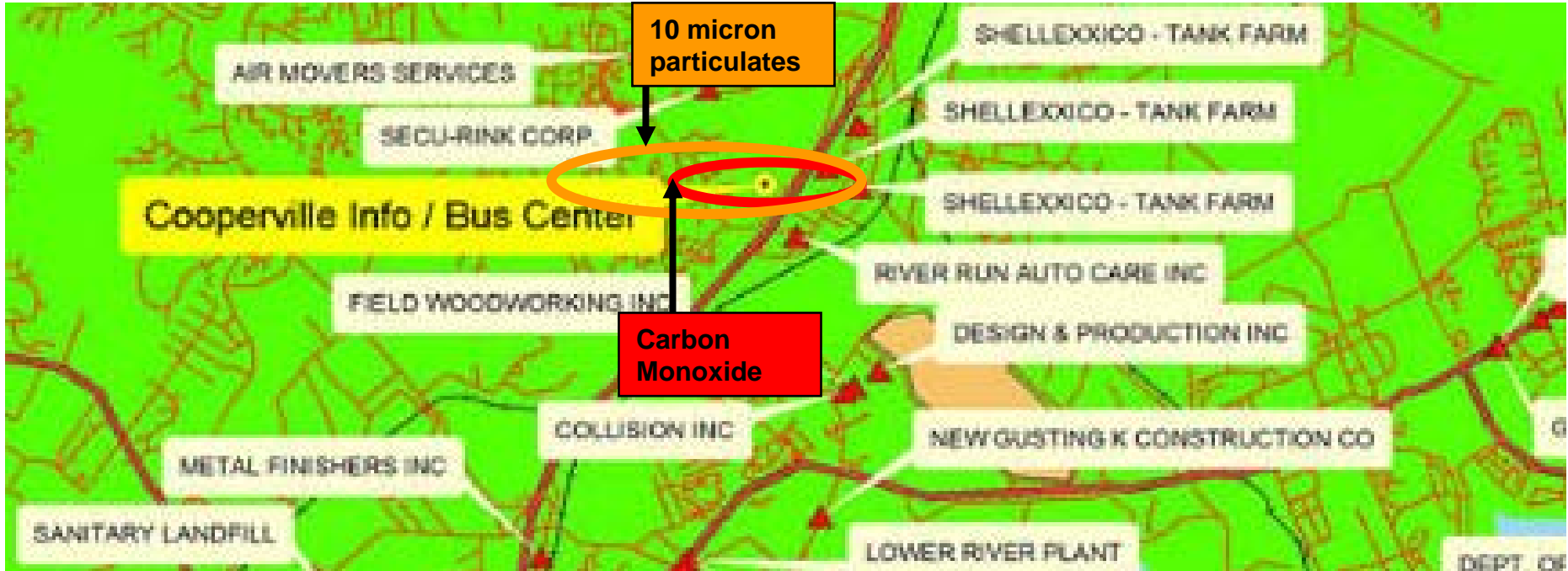
Mechanical Systems-HVAC / CBR Attack

- Protect outside air intake - \$21.0K
(architecturally compatible)
- Emergency shut down switch - \$10.0K
- Upgrade filters to MERV 11/13 (gasoline plume and radioactive particulates)
 - \$25.0K (filter assembly only) to
 - \$500.0K (upgraded air handling)



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Fire Plumes – Smoke & CO



Smoke Particles
FEMA

Carbon Monoxide

Vulnerability/Mitigation

Mechanical Systems-HVAC / CBR Attack

- Evaluate carbon filters for chlorine type spills
- \$130.0K
- Evaluate UVGI - \$8.0K



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CI/BC Chlorine Release Parameters

SITE DATA INFORMATION:

Location: FAIRFAX, VIRGINIA
Building Air Exchanges Per Hour: 0.34 (sheltered double storied)
Time: November 29, 2005 1111 hours EST (using computer's clock)

CHEMICAL INFORMATION:

Chemical Name: CHLORINE
Molecular Weight: 70.91 g/mol
ERPG-3: 20 ppm ERPG-2: 3 ppm ERPG-1: 1 ppm
IDLH: 10 ppm
Carcinogenic risk - see CAMEO
Normal Boiling Point: -29.3° F Ambient Boiling Point: -29.7° F
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 7 mph from 180° true at 3 meters
No Inversion Height
Stability Class: D Air Temperature: 70° F
Relative Humidity: 50% Ground Roughness: urban or forest
Cloud Cover: 5 tenths

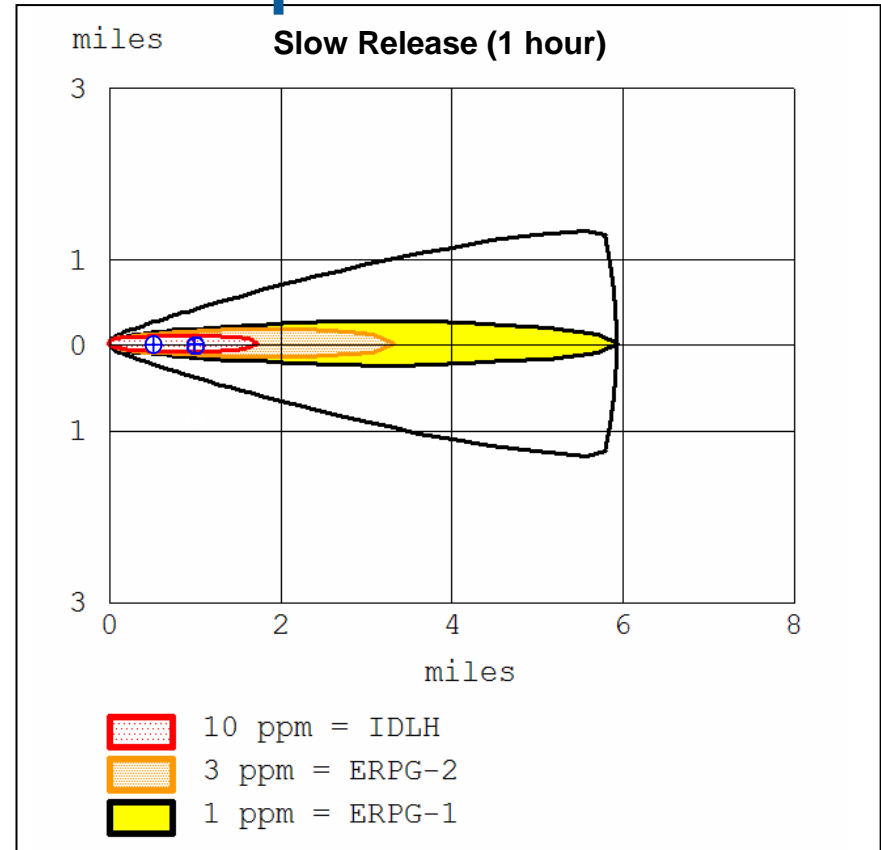
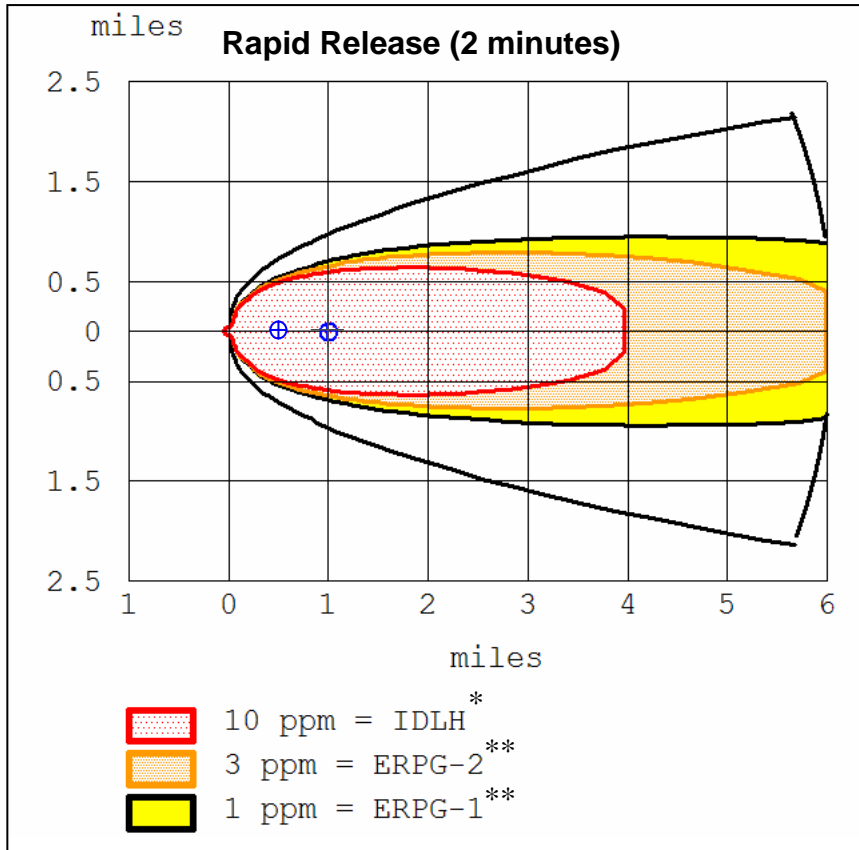
SOURCE STRENGTH INFORMATION:

Leak from hole in horizontal cylindrical tank
Tank Diameter: 6 feet Tank Length: 24.1 feet
Tank Volume: 5100 gallons Tank contains liquid
Internal Temperature: 70° F
Chemical Mass in Tank: 30 tons Tank is 100% full
Circular Opening Diameter: 6 inches
Opening is 6 inches from tank bottom
Release Duration: 2 minutes
Max Average Sustained Release Rate: 57,700 pounds/min
(averaged over a minute or more)
Total Amount Released: 59,200 pounds
Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).



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Chlorine Release Footprints



- Rapid release yields a large plume
- IDLH four miles long and over 1 mile wide

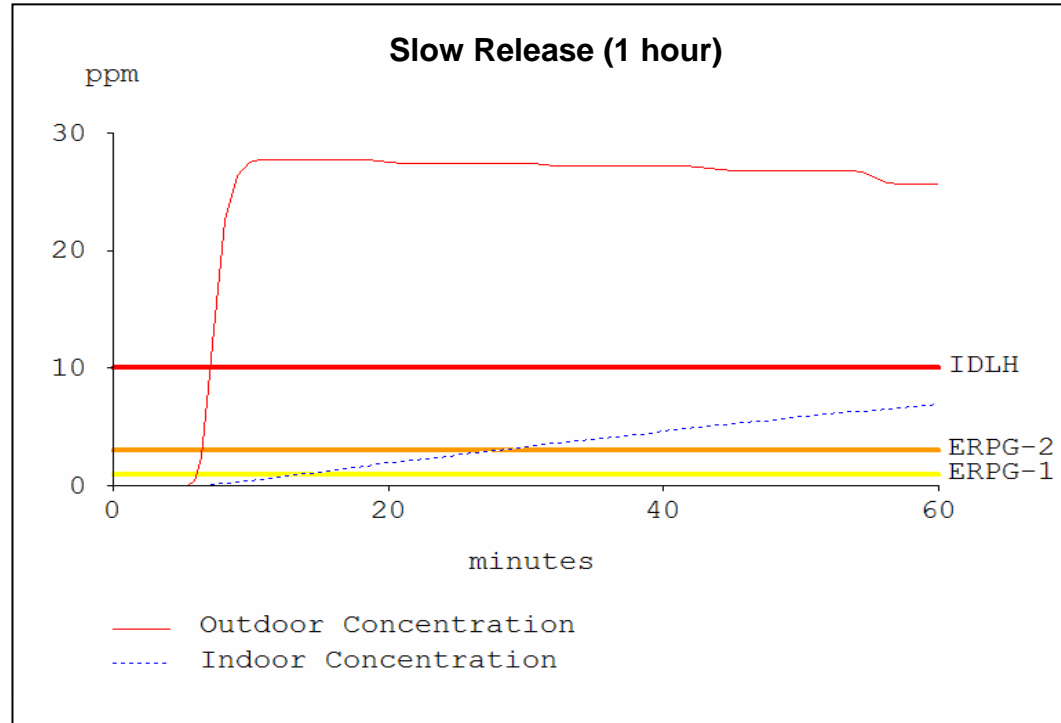
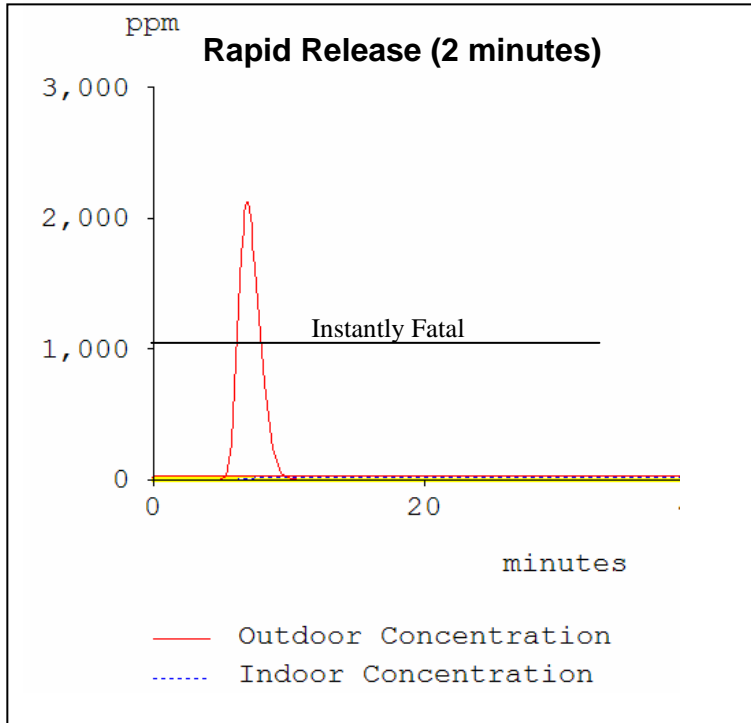
- Slow release reduces plume size
- IDLH less than 2 miles long and 0.5 miles wide

* Immediately Dangerous to Life or Health – maximum concentration that allows 30 minutes exposure without serious or irreversible health risk
 ** Emergency Response Planning Guide (1 hour exposure guidelines) 1 = mild symptoms, 2 = moderate symptoms, but without irreversible damage and not incapacitating



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Chlorine Concentrations at CI/BC



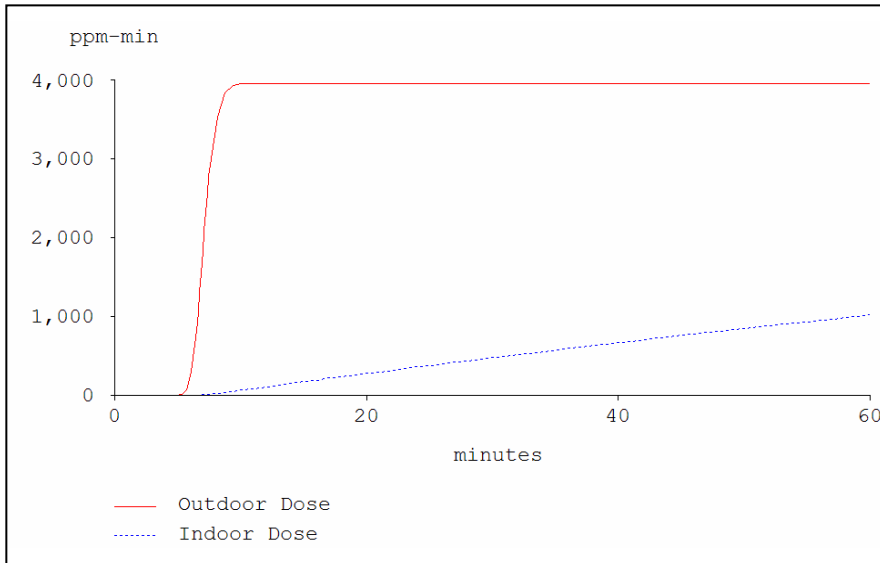
- Rapid spike outdoors at CI/BC from 6 –12 minutes later
- Instantly fatal concentration levels for this short period
- Indoor concentrations remain low during plume passage
- Evacuees likely to become fatalities from 0.5 to 4 miles downwind during typical evacuation times (5-30 minutes) particularly absent clear/proper evacuation instructions

- Rapid spike outdoors at CI/BC begins at 6 minutes and continues for over an hour but at 100x lower levels
- Short exposures at 20-30 ppm (2xIDLH) for any lengthy period could cause serious or irreversible health problems
- Indoor concentrations remain below IDLH for > 1 hour and below ERPG 2 for > 0.5 hours



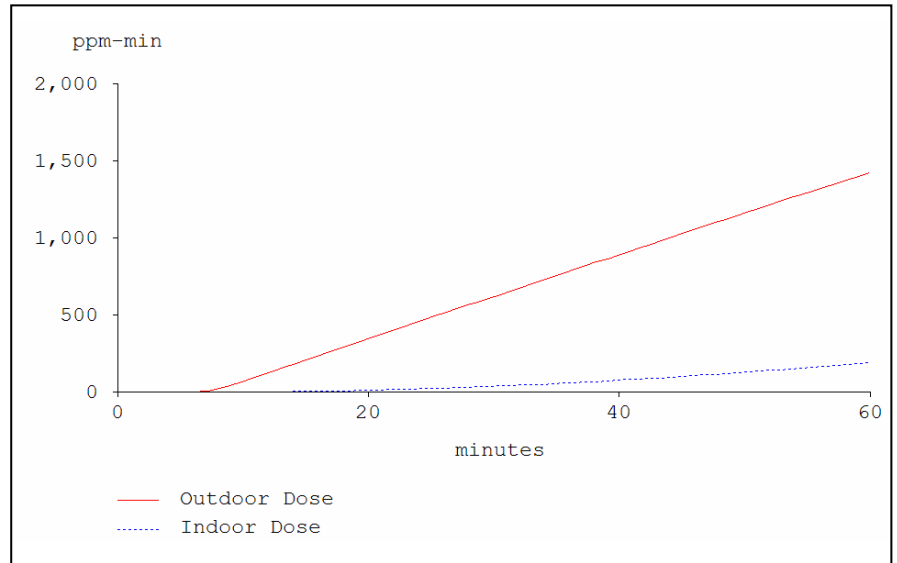
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Chlorine Dose at CI/BC



Rapid Release (2 minutes)

- Dose spikes rapidly outdoors at CI/BC at 6 minutes
- Lethal dose at 6 minutes but no increase in dose after the plume passes (~12 minutes post release)
- Indoor concentrations increase at about 16 ppm 1000ppm-min/60 min. Health problems are likely in less than 30 minutes (IDLH - 10 ppm).



Slow Release (1 hour)

- Dose increases gradually outdoors at CI/BC beginning at 6 minutes and continues for over an hour but at a rate not much greater than the indoor rates for a rapid release (1 hour dose = 1500 ppm vs 1000 ppm (rapid release))
- Indoor dose remains very low throughout the full hour



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Vulnerability/Mitigation

IT Communications Systems / Utility Systems / Cyber Attack - Redundancy

Identify alternate telecom carrier circuits and availability



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Vulnerability/Mitigation

Emergency Operations & Response

Post shelter and evacuation procedures - \$900

Identify rally points (A, B, C) at sites away from building - \$900

Conference Room for shelter-in-place (130 people)
[Sealing and Overpressurization] –\$177.4K

Personal protective evacuation hoods - \$180 / person - \$23.4K



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Unit XIII

Building Design for Homeland Security for Continuity of Operations (COOP) Train-the-Trainer



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Best of Both Worlds



Subject Matter
Expert AND
Trainer



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Unit XIII Objectives

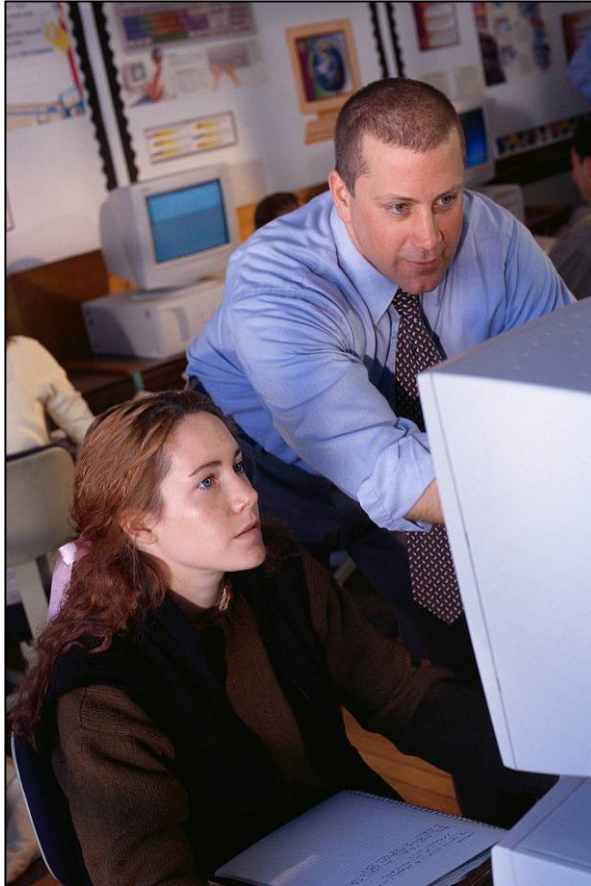


- Discuss basic adult learning principles
- Explain the key functions of instructional delivery
- Describe key steps of instructional preparation



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Adult Learning Styles



- Auditory
- Visual
- Kinesthetic



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Auditory Learners



- Listen to every word
- Remember what they hear
- Prefer face-to-face



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Visual Learners



- Take a lot of notes
- Think in pictures and images
- Can see connections and patterns easily



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Kinesthetic Learners

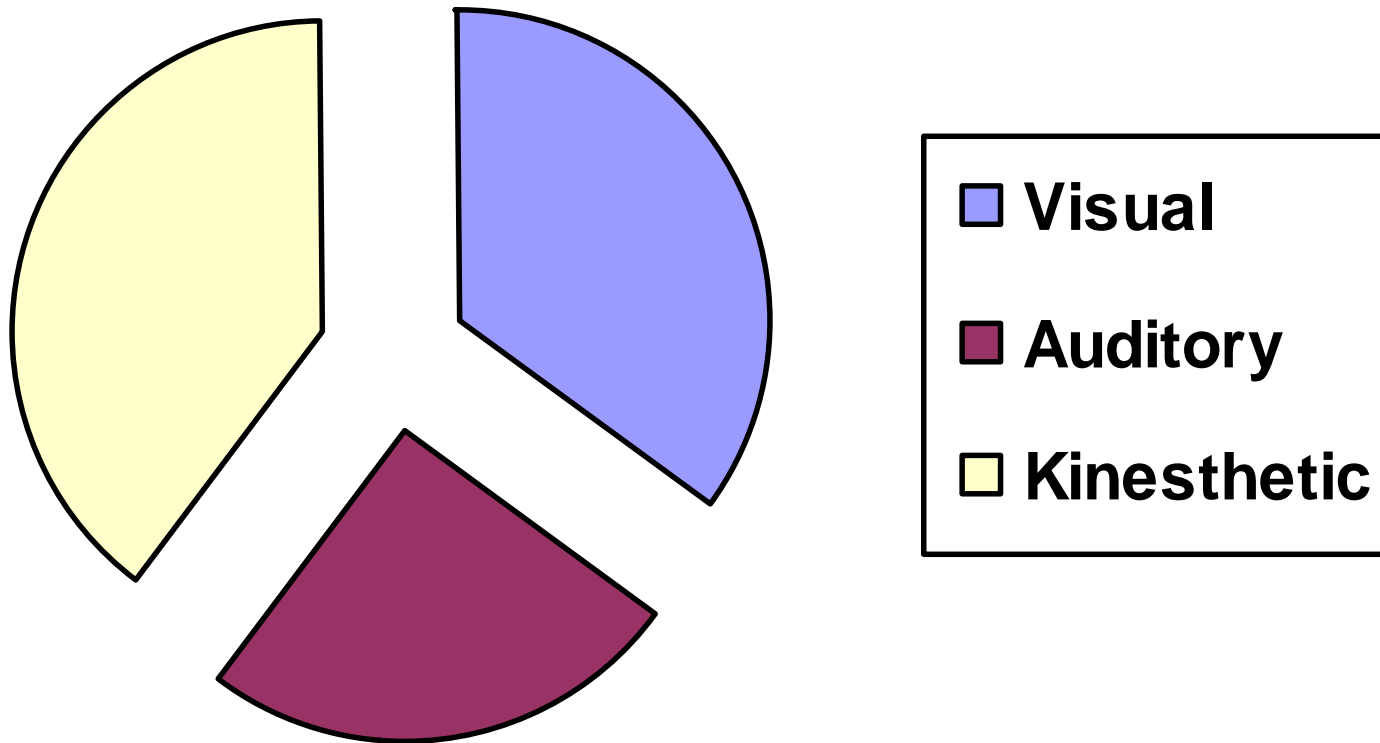


- Learn best by touching and doing
- Can work in busy, noisy surroundings without getting distracted
- Like games, role-plays, and exercises



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Typical Learners in a Class



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To Work with the Mix...

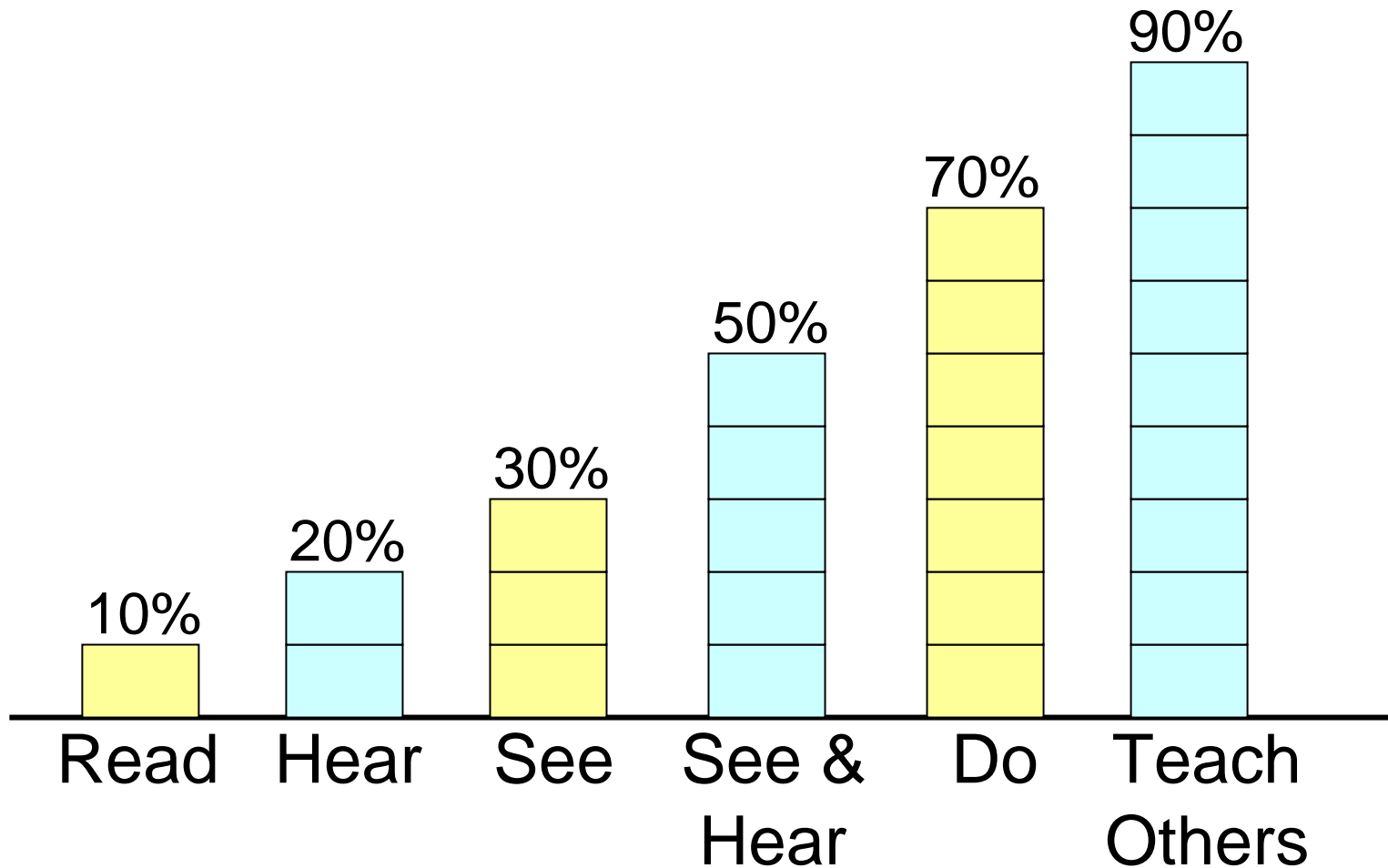


- Use all styles
- Switch styles
- Use easel charts
- Have highlighters
- Ensure light for notes



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How Adults Remember



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Physiological Characteristics



- Loss of vision
- Loss of hearing
- Fatigue
- Loss of motion
- Special needs



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Audience Analysis



- Analyze your audience
- Adjust delivery to meet learners' needs



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Now What?

Audience analysis information

+

Key assumptions about adult learning



Determine **BEST METHODOLOGY** to
use



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Training Methods

Lecture

Demonstration

Role-Play

Group Discussion / Brainstorming

Case Study / Small Group Activity

Simulation / Exercise

Games



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Presenting Information

Watch body language
Maintain eye contact
Monitor tone, inflection, pace
Speak clearly
Pay attention to vocabulary
Maintain comfortable stance
Maintain appearance



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Preparing for Training: Course Materials

- Obtain Course CD from Eric Letvin (Visuals, Instructor Guide, Student Manuals)
- Print Instructor Guide(s) and Student Manuals in color
- Make copies of Student References CD and FEMA 452 Risk Management Database CD
- Obtain copies of FEMA 426 and FEMA 452 from Mila Kennett



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Preparing for Training: Preparation

Instructor Preparation

- Study Instructor Guide
- Send pre-course information to participants
- Form participant teams

Participant Preparation

- Download, print, and read case study from:
<http://www.fema.gov/plan/prevent/rms/rmsp155.shtm>
- Bring laptop to download FEMA 452 Risk Assessment Database



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Preparing for Training



- Coordinate with other instructors
- Prepare agenda
- Ensure adequate publications
- Collect course supplies



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Preparing for Training: Training Site



- Have course materials and supplies present
- Check classroom set-up
- Check equipment and visuals
- Check temperature and lighting



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Preparing Yourself



What would you do to prepare yourself to teach Building Design for Homeland Security?



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Preparing Yourself



Practice

Practice

Practice



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Expecting the Unexpected



- Proactive readiness
- Program flexibility
- Grace under pressure



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