

Unit I-B

UNIT TITLE

Introduction and Course Overview

REQUIREMENTS

1. FEMA 426, *Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings* (one per student)
2. Instructor Guide, Unit I-B
3. Student Manual, Urban Case Study (one per student)
4. Overhead projector or computer display unit
5. Unit I-B visuals
6. Risk Matrix poster and one box of dry-erase markers (one per team)
7. Chart paper, easel, and markers

UNIT I-B OUTLINE	<u>Time</u>	<u>Page</u>
I-B. Introduction and Course Overview	105 minutes	IG I-B-1
1. Welcome and Opening Remarks, Instructor Introductions, Administrative Information	10 minutes	IG I-B-5
2. Student Introductions	30 minutes	IG I-B-5
3. Course Overview	8 minutes	IG I-B-6
4. Course Materials	12 minutes	IG I-B-12
5. Summary and Transition	2 minutes	IG I-B-22
6. Introduction to the Urban Case Study	13 minutes	IG I-B-24
7. Student Activity: Introduction and Overview (Version B Urban) [20 minutes for students, 10 minutes for instructor review]	30 minutes	IG I-B-37

PREPARING TO TEACH THIS UNIT

- **Tailoring Content to the Local Area:** This instruction unit has no linkages to the Local Area. The unit is a course overview and familiarization with the contents of the Urban Case Study.
- **Optional Activity:** There are no optional activities in this unit, except Student Activity questions that are applicable to the selected Case Study (Suburban or Urban) – Urban in this case.
- **Activity:** The students will begin familiarizing themselves with the Case Study materials. The Case Study is a risk assessment and analysis of mitigation options and strategies for a high-rise commercial office building located in an urban environment. The assessment will use the DoD Antiterrorism Standards and the GSA Interagency Security Criteria to determine Levels of Protection and identify specific vulnerabilities. Mitigation options and strategies will use the concepts provided in **FEMA 426** and other reference materials.
- Refer students to their Student Manuals for worksheets and activities.
- Direct students to the appropriate page in the Student Manual.

- Instruct the students to read the activity instructions found in the Student Manual. Note that this Student Activity provides page numbers for each question to assist the students in their familiarization and answering of the questions.
- Tell students how long they have to work on the requirements.
- While students are working, all instructors should closely observe the groups' process and progress. If any groups are struggling, immediately assist them by clarifying the assignment and providing as much help as is necessary for the groups to complete the requirement in the allotted time. Also, monitor each group for full participation of all members. For example, ask any student who is not fully engaged a question that requires his/her viewpoint to be presented to the group. This latter point may not be evident in this first student activity.
- At the end of the working period, reconvene the class.
- After the students have completed the assignment, “walk through” the activity with the students during the plenary session. Call on different teams to provide the answer(s) for each question. Then simply ask if anyone disagrees. If the answer is correct and no one disagrees, state that the answer is correct and move on to the next requirement. If there is disagreement, allow some discussion of rationale, provide the “school solution” and move on.
- If time is short, simply provide the “school solution” and ask for questions. Do not end the activity without ensuring that students know if their answers are correct or at least on the right track.
- Ask for and answer questions.

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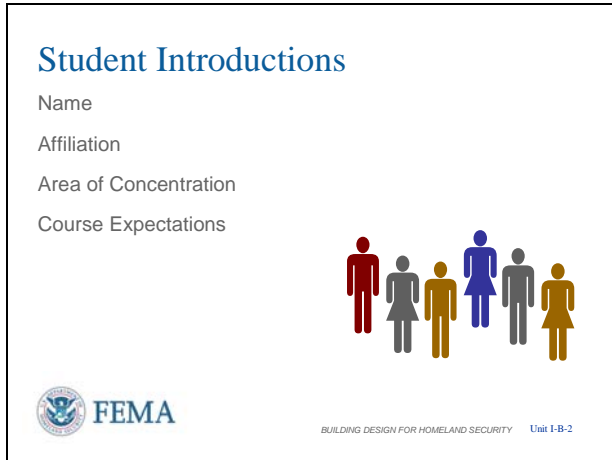
INSTRUCTOR NOTES

CONTENT/ACTIVITY

VISUAL I-B-1



VISUAL I-B-2



Recommend an instructor not presenting Unit I-B to collect Student Expectations on an easel tablet for reference throughout the course and review in Unit XIII.

Welcome and Opening Remarks

Welcome the students to the Building Design for Homeland Security Course.

Introduce yourself, using:

- Your name
- A brief statement of background and experience

Make the necessary administrative announcements, including:

- Housing, parking, and meals
- Attendance, start/stop times, breaks
- Restroom locations
- Messages and emergencies
- Fire exits

Student Introductions

Ask the students to introduce themselves, including:

- Name
- Affiliation, brief background and experience statement, including work in the course topic area if applicable
- Reasons they are attending course / course expectations. [These will be reviewed during Unit XIII, Course Wrap-Up.]

VISUAL I-B-3

Purpose of Course and FEMA 426 Manual

Provide guidance to building sciences community

Decision-makers determine which threats and mitigation measures

Information

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



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-3

Purpose

The purpose of **FEMA 426** and this course is to provide guidance to the building sciences community working for private institutions. It presents tools to help decision-makers assess the performance of their buildings against terrorist threats and to rank recommendations. It is up to the decision-makers to decide which types of threats they wish to protect against and to determine their level of risk against each threat. Those decision-makers who consider their buildings to be at high risk can use this guidance as necessary. The information in **FEMA 426** and this course is:

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

VISUAL I-B-4

Course Goal

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



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-4

Course Goal

The goal of this course is to enhance student understanding of the measures and technology available to reduce risk from terrorist attack.

Included in this understanding is the process for assessing risk to focus upon which mitigation measures have the greatest applicability and benefit. The students will understand the design approaches to mitigate manmade hazards and comprehend the trade-offs needed to optimize various design requirements.

VISUAL I-B-5

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.



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-5

Course Objectives

The primary target audience for this course will be engineers, architects, and state and local government and building officials with engineering and architectural backgrounds involved in mitigation planning and design to protect people and property against manmade hazards.


After attending the Building Design for Homeland Security course, the students should be able to:

1. Explain the basic components of the assessment methodology – threat/hazard, asset value, vulnerability, and risk, as applied to site, layout, and building.
2. Understand the different assessment methodology approaches being used by Federal agencies and comprehend which approach to use for a given organizational structure.
3. Perform an assessment for a given building by identifying the assessment components and prioritizing the asset- threat/hazard pairs by their relative risk to focus resources upon mitigation measures that reduce risk.

VISUAL I-B-6

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.



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-6


Course Objectives

4. Identify available mitigation measures either in-place or for new design and comprehend their applicability to a given situation.
5. Understand the technology limitations and application details of mitigation measures for terrorist tactics and technological accidents involving explosive blast and agent release (chemical, biological, and radiological) to achieve a desired level of protection.
6. Use the **Building Vulnerability Assessment Checklist in FEMA 426 (Table 1-22, pages 1-46 to 1-93)** and adjust the assessment relative risk based upon the identified vulnerabilities.

VISUAL I-B-7

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.



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-7


Course Objectives

7. Select applicable mitigation measures and prioritize them based upon the final assessment relative risk values and associated estimated risk reduction provided so as to focus limited resources, all for a given situation.
8. Appreciate that designing to mitigate building vulnerabilities against terrorist attacks has conflicts with other design requirements, resulting in trade-offs to achieve acceptable compliance and levels of performance among the differing regulations, codes, programs, operational requirements, and owner desires within the resources available.

VISUAL I-B-8

Course Overview – Day 1

Unit I-B – Introduction and Course Overview
Unit II – Asset Value Assessment
Unit III – Threat / Hazard Assessment
Unit IV – Vulnerability Assessment
Unit V – Risk Assessment / Risk Management

 BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-8

Course Overview – Day 1

This course is a full 3 days in length and includes 12 units of instruction. Most instruction blocks have an associated student activity using a Case Study to emphasize the concepts taught and apply what was just learned.

A detailed schedule is located in your Student Manuals. This is Unit I-B – Introduction and Course Overview using the Urban Case Study in the Student Activities. This unit reviews the other blocks of instruction and the course materials.

For the rest of the first day, the course will introduce the components of risk and how to determine risk. Unit II – Asset Value Assessment will discuss how to identify assets – or things to be protected, and how to assign a relative value to them.

Unit III will examine the Threat / Hazard Assessment process and identify the threats and hazards that could impact a building or site, review a Department of Defense methodology for defining threats, describe how threats and hazards may interact to increase damage, and provide a numerical rating for the threat or hazard.


Unit IV will cover a Vulnerability Assessment, including what constitutes vulnerability and how to identify vulnerabilities using the **Building Vulnerability Assessment Checklist in FEMA 426 (Table 1-22, pages 1-46 to 1-93)**.

Finally, the last Topic that will be covered on Day 1 is Unit V – Risk Assessment / Risk Management. Students will be taught what constitutes risk and how to determine a

VISUAL I-B-9

Course Overview – Day 2

Unit VI – FEMA 452 Risk Assessment Database
Unit VII – Explosive Blast
Unit VIII – Chemical, Biological, and Radiological (CBR) Measures
Exam and Exam Review
Unit IX-B – Site and Layout Design Guidance

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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-9

numerical value for risk and be introduced to the concept of the Design Basis Threat.

Course Overview – Day 2

Day 2 will start with Unit VI which presents a software database in a demonstration / performance approach. If you brought a laptop, you can use a FEMA 452 Database CD to be provided later to follow along the presentation, by installing and navigating the database. The database is an electronic way of managing the information you collected manually yesterday to assess risk, make observations, and identify vulnerabilities and mitigation measures, track actions, and generate reports.

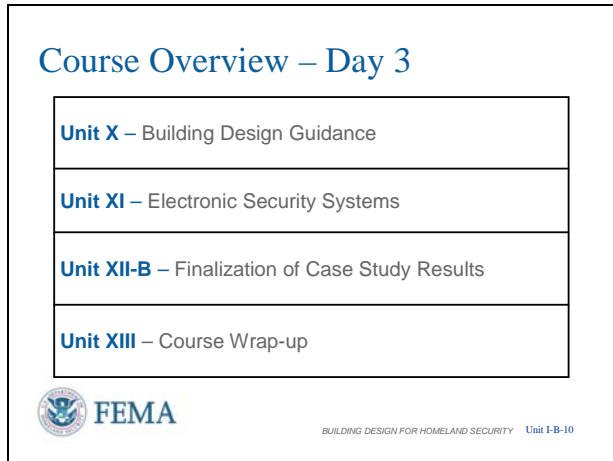
After completing Units V and VI, students should have a firm grasp of risk and its components. They should know how to calculate a numeric value of risk based on its three components – asset value, threat rating, and vulnerability rating. The database will present an efficient way to manage the diverse information collected during a risk and vulnerability assessment.

Units VII and VIII will provide students with an understanding of some of the weapons commonly used by terrorists. Unit VII will cover explosive blast and Unit VIII will cover chemical, biological, and radiological or CBR weapons.

No course would be complete without an exam – so there will be an open book short answer exam on Day 2. And we do not make it any easier having it right after lunch!

After the exam, the course will begin to explore mitigation options for reducing the risk and impact of terrorist attacks against buildings.

VISUAL I-B-10



Unit IX-B – Site and Layout Design Guidance will cover things you can do to mitigate terrorist attacks for the site – meaning from the property line up to the building.

Course Overview – Day 3

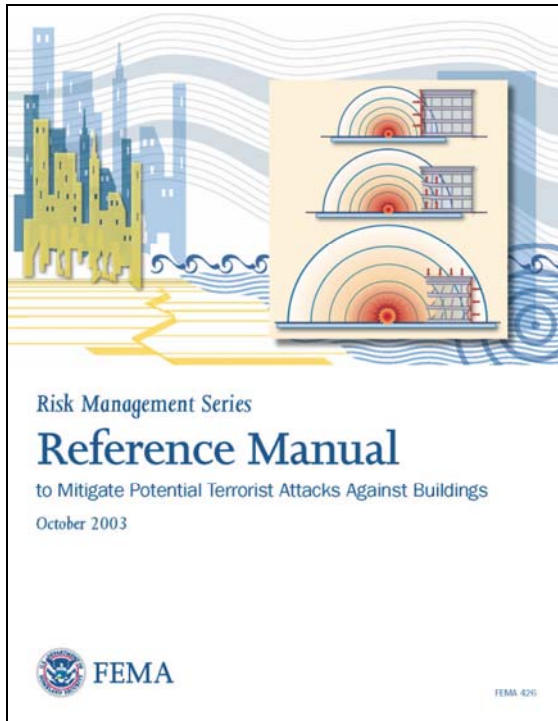
Unit X will explore mitigation options for the building envelope and systems within the building.

Unit XI will introduce the basic concepts of electronic security systems.

As mentioned earlier – each block of instruction has an associated student activity using a Case Study to emphasize the concepts taught and apply what was just learned. In Unit XII-B, students will present the results of their work using the Urban Case Study – highlighting their top three risks identified by the group, the vulnerabilities identified for these risks, and the top three mitigation measures to reduce vulnerability and risk.

Finally, Unit XIII will summarize the key points from the course and answer any final questions.

FEMA 426 (Hardcopy)



Display a copy of **FEMA 426**.

Confirm that each student has a copy.

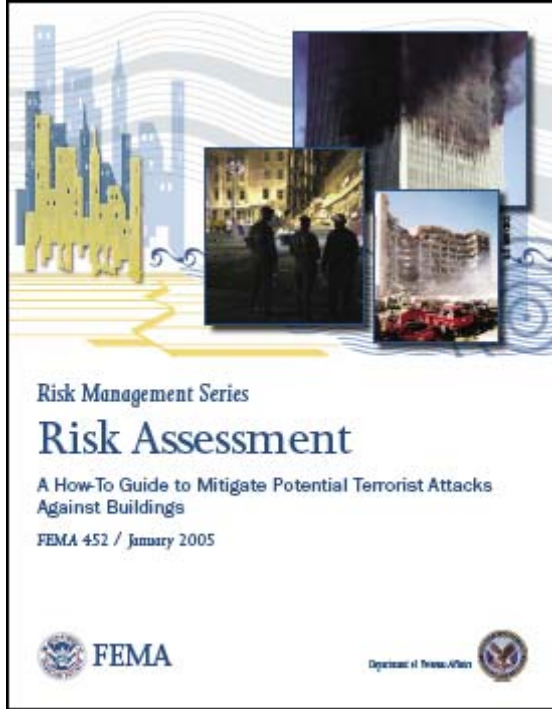
FEMA 426 (Hardcopy)

- This is the primary reference for this course.
- Throughout the course, the slides will contain references to figure numbers and page number in this document.
- There will be a comprehensive introduction to the document in this unit.

INSTRUCTOR NOTES

CONTENT/ACTIVITY

FEMA 452 (Hardcopy)



Display a copy of **FEMA 452**.

Confirm that each student has a copy.

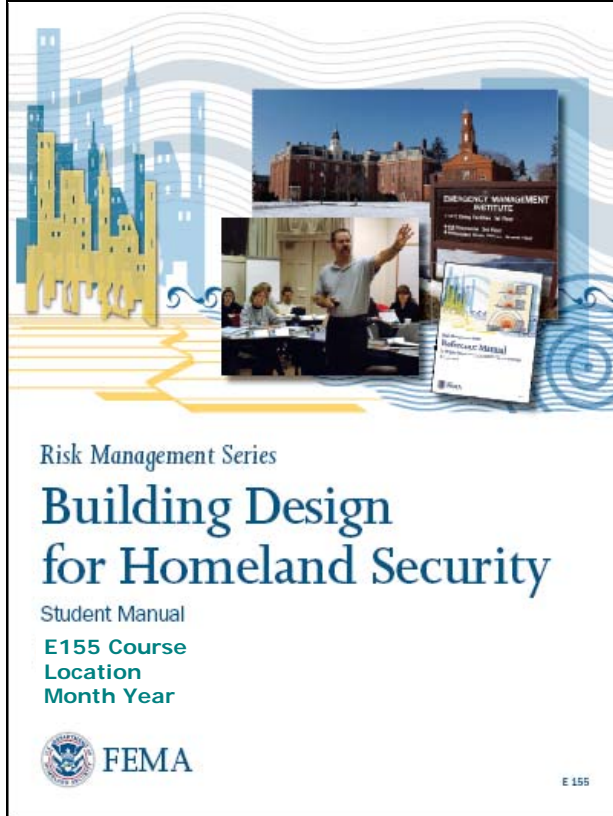
FEMA 452 (Hardcopy)

- This is the “How-To” document that supplements FEMA 426 and expands the content of instruction units 2, 3, 4, and 5.
- It introduces the FEMA 452 Databases as the Risk Management tools to support the assessment and mitigation processes
- Similar to FEMA 426, the slides will contain references to figure numbers and page number taken from this document ,as well as other publications

INSTRUCTOR NOTES

CONTENT/ACTIVITY

Student Manual (Hardcopy)



Display a copy of the Student Manual.

Confirm that each student has a copy.

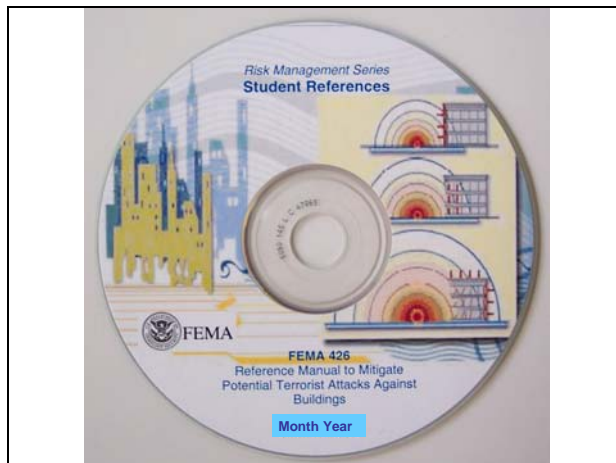
Student Manual (Hardcopy)

- The Student Manual will be primarily used as a workbook for activities designed to apply major teaching points.
- Each unit contains worksheets that will be completed in the small group activity sections of each unit.
- **Appendix B** of the Student Manual is the Urban Case Study: HazardCorp Building (HZC) that you were asked to read prior to beginning this course.

INSTRUCTOR NOTES

CONTENT/ACTIVITY

Student References CD (Hardcopy)



Display a Student Reference CD.

Show the media storage package containing the **Student References CD** and the **FEMA 452 Databases CD**.

FEMA 452 Database CD (Hardcopy)



Display a FEMA 452 Database CD.

Show the reverse side of the media storage package to show the **FEMA 452 Database CD**.

Student References CD (Hardcopy)

- The Student References CD contains electronic copies of various documents that were used in developing FEMA 426, will be referenced during this course, and are contained in the Bibliography of FEMA 426.
- You will receive a Student References CD tomorrow morning at the start of Day 2.

FEMA 452 Database CD (Hardcopy)

- The FEMA 452 Databases CD contains the installation programs, User Guides, and files that will be used to demonstrate the features, capabilities, and operation of the database during Unit VI tomorrow.
- You will also receive this CD tomorrow morning during Unit VI.
- If they have a laptop, bring it at the start of Day 2.
- Eventually the databases for the Case Studies associated with this course will be included on this CD to be used as reference **AFTER** the course.

INSTRUCTOR NOTES

CONTENT/ACTIVITY

Risk Matrix Poster


Walk to a table and indicate the Risk Matrix poster.


VISUAL I-B-11

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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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-11

Risk Matrix Poster

- The small group activities are focused on the Urban Case Study: HazardCorp Building (HZC).
- In small groups, you will conduct a phased assessment of the HZC building after each step of the assessment process is introduced by the instructors.
- The final activity involves the development of possible mitigation actions to address identified risks.
- The Risk Matrix poster is provided for groups to keep a comprehensive record of their findings and for use in presenting these findings to the class.

Course Materials

Now that we have confirmed the Course Materials you should have in your possession now or will have tomorrow, we will look further into these publications.

VISUAL I-B-12

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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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-12

As you begin the following walk-through of **FEMA 426**:

Point out that the students will be following **FEMA 426** throughout the course and will use some sections heavily during exercises. The course visuals include **FEMA 426** page references for easy reference.

Encourage them to flag key pages and passages with Post-It[®] notes and highlighting.

Ask them to open **FEMA 426** and follow along as you preview the contents.

FEMA 426 Reference Manual

There are five chapters in the manual as listed here. This manual contains many how-to aspects based upon current information contained in FEMA, Department of Commerce, Department of Defense (including Army, Navy, and Air Force), Department of Justice, General Services Administration, Department of Veterans Affairs, Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health, and other publications. It is intended to provide an understanding of the current methodologies for assessing asset value threat/hazard, vulnerability, and risk, and the design considerations needed to improve protection of new and existing buildings and the people occupying them. As needed, this manual should be supplemented with more extensive technical resources, as well as the use of experts when necessary.


Key concepts:


- Design Basis Threat
- Levels of Protection
- Layers of Defense

VISUAL I-B-13

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



 **FEMA**

BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-13

FEMA 426 Appendices

The manual also has six appendices to facilitate its use as a reference:


- Appendix A – Acronyms
- Appendix B – General Glossary
- Appendix C – CBR Glossary
- Appendix D – Electronic Security Systems
- Appendix E – Bibliography
- Appendix F – Associations and Organizations

VISUAL-I-B-14

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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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-14



FEMA 452 Risk Assessment How-To

This publication expands Chapter 1 of FEMA 426 going into greater detail in each step of the risk assessment process as indicated by Steps 1 through 4. Step 5 takes an overarching view of mitigation options, looking at cost, benefit, special considerations, and the like rather than going into specific mitigation options as done in Chapters 2 through 5 of FEMA 426.

VISUAL-I-B-15

FEMA 452 Risk Assessment How-To

- Appendix A** – Building Vulnerability Assessment Checklist
- Appendix B1** – Risk Management Database: Assessor's User Guide
- Appendix B2** – Risk Management Database: Database Administrator's User Guide
- Appendix B3** – Risk Management Database: Manager's User Guide
- Appendix C** – Acronyms and Abbreviations

BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-15

FEMA 452 Risk Assessment How-To Appendices

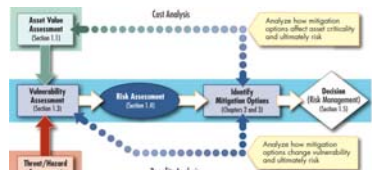

The manual also has five appendices to facilitate its use as a reference:

- Appendix A – Building Vulnerability Assessment Checklist [This is the same checklist as found at the end of Chapter 1 in FEMA 426]
- Appendices B1, B2, and B3 – Different User Guides to use the **Version 1.0** of the FEMA 452 Risk Assessment Database that comes with FEMA 452 on the inside back cover. [This is the large organization version of the database for use on servers to facilitate access by tens and hundreds of people.]
- Appendix C – Acronyms and Abbreviations

VISUAL I-B-16

FEMA 426 – Chapter 1

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

FEMA 426, Figure 1-3: The Assessment Process Model, p. 1-5
BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-16

FEMA 426 - Chapter 1: Asset Value, Threat / Hazard, Vulnerability, and Risk

Chapter 1 presents selected methodologies to integrate threat / hazard, asset criticality, and vulnerability assessment information using applications such as the FEMA HAZUS-MH Geographic Information System (GIS) application to overlay imagery and maps to show access points, blast stand-off, and other site and building information.

The chapter also presents a risk matrix for the preparation of risk assessments. The topic areas of Chapter 1 are:

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


For each of the following chapters, have the students flip through each chapter and highlight some of the key concepts, graphics, etc.

VISUAL I-B-17


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



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-17

Finally, Chapter 1 provides an assessment checklist that compiles many best practices (based upon current technologies and scientific research) to consider during the design of a new building or renovation of an existing building.

Assessment Flow Chart

The assessment flow chart illustrates the process you will follow in conducting the assessment.

FEMA 426 - Chapter 2: Site Layout and Design Guidance

Chapter 2 discusses architectural and engineering design considerations (mitigation measures), starting at the perimeter of the property line, and includes the orientation of the building on the site. Therefore, this chapter covers issues outside the building envelope.

Chapter 2 also discusses the following site layout and design topics:


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

VISUAL I-B-18


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
BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-18



FEMA 426 - Chapter 3: Building Design Guidance

Chapter 3 provides the same considerations for the building – its envelope, systems, and interior layout.

The topic areas in Chapter 3 include:



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

VISUAL I-B-19


FEMA 426 – Chapter 4

Explosive Blast

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



FEMA 426, Figure 1-11: Explosive Blast, p. 1-42
BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-19



FEMA 426 - Chapter 4: Explosive Blast

Chapter 4 provides a discussion of blast theory to understand the dynamics of the blast pressure wave, the response of building components, and a consistent approach to define levels of protection.

Some of the details you will address include:


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


VISUAL I-B-20

FEMA 426 – Chapter 5

CBR Measures

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



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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-20

FEMA 426 - Chapter 5: CBR Measures

Chapter 5 presents chemical, biological, and radiological measures that can be taken to mitigate vulnerabilities and reduce associated risks for these terrorist tactics.

The concepts you should be familiar with at the end of the instruction include:

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

VISUAL I-B-21

Summary


FEMA 426 is 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.

 FEMA

BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-21

Summary

- **FEMA 426** is intended for building sciences professionals.
- Manmade hazards risk assessments use a “Design Basis Threat” and “Levels of Protection” for manmade disaster loading upon buildings versus building codes which prescribe loadings for natural disasters.
- Site and building systems and infrastructure protection are provided by layers of defense.
- There are multiple mitigation options and techniques to deter, detect, deny, and devalue.
- Use cost-effective multihazard analysis and design.

INSTRUCTOR NOTES

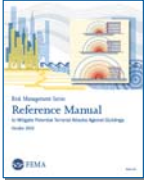
CONTENT/ACTIVITY


VISUAL I-B-22

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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BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-22

Case Study Activities

Through case studies in small group settings, students will become conversant with the contents and organization of **FEMA 426**.

- In small group settings, apply concepts introduced in the course
- Become conversant with contents and organization of FEMA 426

VISUAL I-B-23

Unit I-B Case Study Activity


HazardCorp Building Urban Case Study Overview

Requirements

Briefly review Case Study materials.

As a group, complete the worksheet.

Use only the Case Study data to answer worksheet questions.

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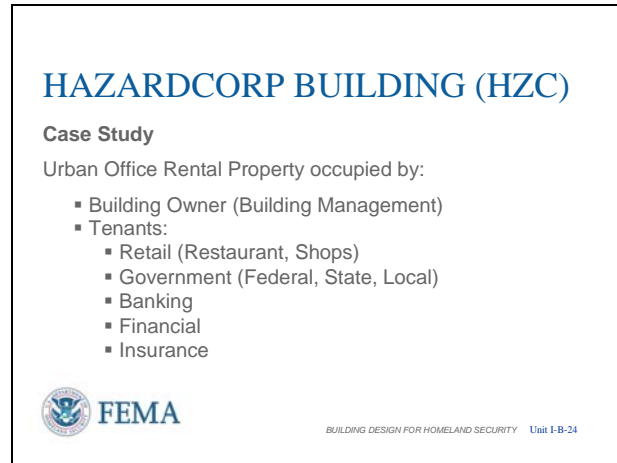
BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-23

Unit I-B Case Study Activity

Requirements

- Briefly review HZC Case Study materials (Appendix B of the Student Manual)
- As a group, complete the worksheet
- Use only the Case Study data to answer worksheet questions

VISUAL I-B-24



Divide students into small groups of five to eight, with seven being the optimal. Greater than 8 leaves people out of the activity and tables are not usually large enough.

Students should work in these groups for the remainder of the small group sessions.

Refer students to the Unit I-B Case Study activity in the Student Manual.

Members of the instructor staff should be available to answer questions and assist groups as needed.

At the end of 20 minutes, reconvene the class and facilitate group reporting.

Introduction to the Urban Case Study

The Case Study activities throughout this course provide opportunities, in a small group setting, to apply concepts introduced in each unit.

These activities will enable students to become conversant with **FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings.**

Students will be able to use the document readily during the process of mitigating potential damage from terrorist attacks against buildings.

The activities are designed to “walk” students through the same assessment and design steps using a Case Study involving a hypothetical building and associated data about the threat environment.

HazardCorp Building (HVC)

The HazardCorp Building (HVC) is a fictional entity created for this course (see Appendix B of the Student Manual).

- It is a composite of actual sites and buildings with actual systems typical of a number of commercial buildings.
- **NOTE:** You are assessing Building Management (the Building Owner’s) as to the set-up and operation of the building for the benefit and support of the tenants. You will not assess any tenant(s) specifically.

The Case Study mainly addresses threat information related to manmade hazards:

- Cyber attack
- Armed attack
- Explosive blast

INSTRUCTOR NOTES

CONTENT/ACTIVITY

- Chemical, biological, and radiological agents

These are as listed on the Risk Matrix posters given to each team.

Each section of the Case Study activity includes:

- Examination of specific aspects of the Case Study data.
- Assessment of data and application to the Case Study of concepts and processes addressed in the unit.
- Completion of worksheets that demonstrate participant mastery of unit learning objectives.

General Requirements

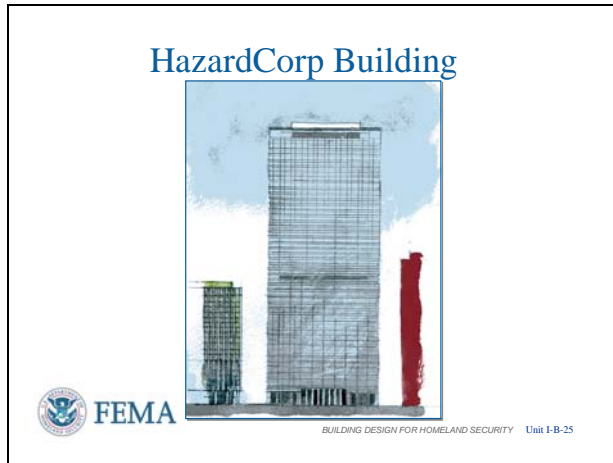
Each student is responsible for completion of his or her own worksheets.

In addition, the small groups will produce a completed worksheet for each unit's activity and post it in a designated location.

Group members are encouraged to discuss activity requirements and collaborate on completion of the worksheets.

To facilitate this process, select a leader and a recorder.

VISUAL I-B-25



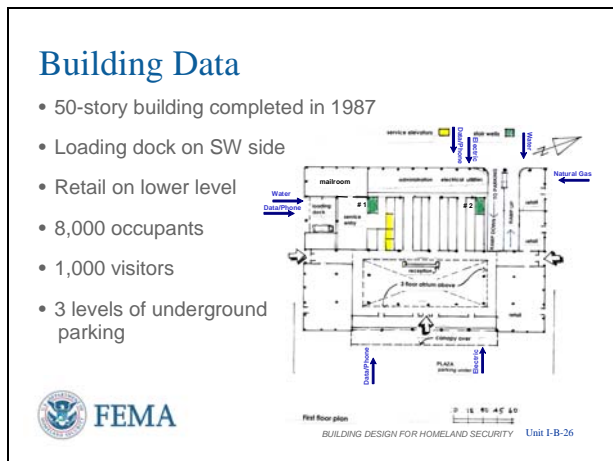
HazardCorp Building

Activity Requirements

- Turn to Appendix B, the Urban Case Study materials in the Student Manual and briefly peruse the document.
- Read the “familiarization” questions on the following worksheet and, as a group, complete the worksheet.
- Use only the Case Study data to answer worksheet questions.

Take 20 minutes to complete this activity. Solutions will be reviewed in the plenary group.

VISUAL I-B-26



Building Data

The HazardCorp Building and Building Management provide office space to a wide range of tenants in their 50 story high-rise structure.

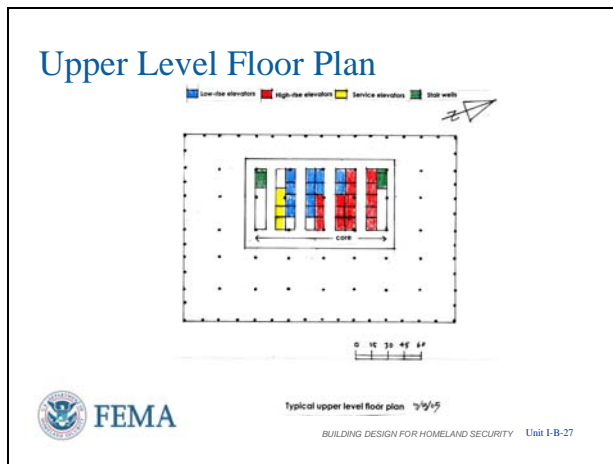
The first floor contains retail space open to the general public, although certain floors of the building also get general public traffic, including the meeting rooms on the second and third floors around the atrium.

There are about 8,000 tenants on-site at any given time and about 1,000 visitors to the first floor retail space and the tenants above.

Building Management has offices in the Administration area of the first floor where the building systems are controlled from. Building Management has corporate offices on the third floor.

Note that the Lobby area has a three story

VISUAL I-B-27



atrium with structural columns only on the perimeter of the atrium.

Also note the loading dock, multiple utility service entrances, and three levels of underground parking.

An interesting feature of this building is the mailroom next to the loading dock which has just been renovated to DoD standards. Mail and packages are inspected here for not only HazardCorp Building tenants, but also other government offices in the local area.

Upper Level Floor Plan

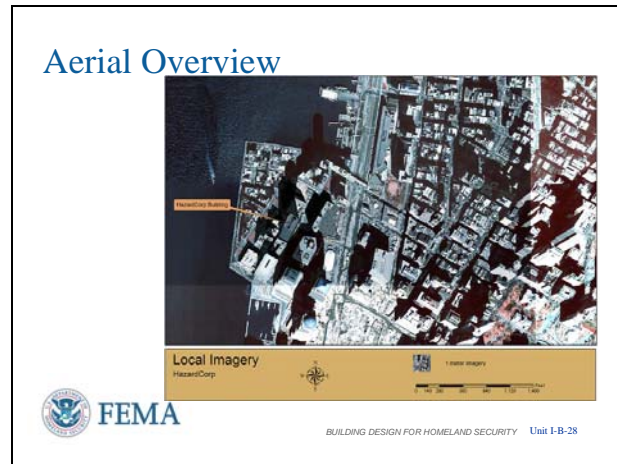
This slide shows the core of the building and the vertical transportation systems:

- Emergency stairwells
- Service elevators
- Low-Rise elevators
- High-Rise elevators

Note the structural column pattern becomes very regular in pattern on floors 4 to 50.

This core area includes the utility risers for all utilities between the floors. Many utilities have more than one riser to provide redundancy because utilities are the life-blood of a high-rise office building, especially electricity, communications, and water/sewage.

VISUAL I-B-28

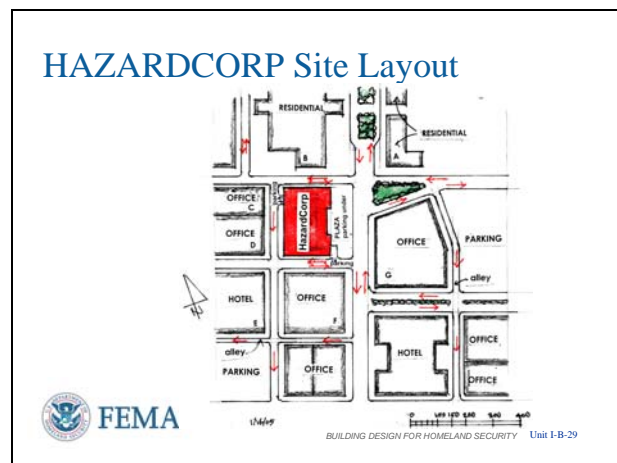


Aerial Overview

While a normal approach to an assessment is to work outside in, we began with the HazardCorp Building in this case, so let us now take a look at the surroundings where this building is located.

GIS (Geographic Information System) aerial imagery is very beneficial indicating the building of interest is located in a dense urban area among a cluster of other tall buildings. It is not on a main thoroughfare but one is nearby and it is relatively close to water (river) which exists in many urban areas.

VISUAL I-B-29



Site Layout

Moving in closer we can see the streets and adjacent buildings in the plan view of the site.

Note the different structures and their functions adjacent to the HazardCorp Building.

Note the primarily two lane traffic, with the one way road (alley) on the west side of the building. Also note the lettering on the adjacent buildings for reference.

The plaza on the east side of the building is a unique feature in the area.

Note the two entrances / exits to the underground parking.

The Loading Dock is on the southwest corner of the building (lower left corner as seen in this slide).

What immediately jumps out here is the lack of stand-off between vehicles and buildings in this location.


INSTRUCTOR NOTES

CONTENT/ACTIVITY

VISUAL I-B-30

HAZARDCORP Neighbors

- A and B: 14 - 26-story residential condominiums, constructed 2001-2005.
- C: 10-story office, constructed 1925
- D: 10-story office, constructed 1934
- E: 14-story hotel, constructed 1935
- F: 20-story office, constructed 1970
- G: 20-story office, constructed 1994



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-30

Neighboring Buildings

This gives some idea of the structures adjacent to the HazardCorp building. The letters correlate with the letters on the buildings shown in the previous slide, with Building A on the Northeast side (1 o'clock position) and the lettering proceeding in a counterclockwise direction.

VISUAL I-B-31

HAZARDCORP Occupancy

FLOOR	TENANT OCCUPANCY
49-50	Mechanical Floors
31-48	National financial services company
29-30	Bank offices
27-28	Federal government offices (IRS, DOD, CIA)
26	Mechanical room
25	Office of Emergency Management
23-24	Financial service company
20-22	Insurance company
19	State Employment Commission
15-18	Vacant
14	Financial management company
8-13	Federal government offices (SEC, Secret Service)
6-7	Bank offices
4-5	Storage, switch gear, generators, transformers
3	Open to first floor lobby, rentable meeting space, building management
2	Open to first floor lobby, rentable meeting space
1	Lobby, retail, fuel storage, switchgear, building administration, loading dock
UG1	Parking
UG2	Parking
UG3	Parking

BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-31

Building Occupancy

This building occupancy by floor is to further understand how the functions of the building are configured and where tenants are located.

The former is provided to understand how various hazards can impact this building.

- Note that other than service entrances, most utilities and associated equipment are located on the first floor and above, with most of it above.

The latter is provided to provide a threat perspective

- Note the Federal government offices located on floors 8-13 and floors 27-28. They will drive additional protection requirements that other tenants may not be concerned with.

VISUAL I-B-32



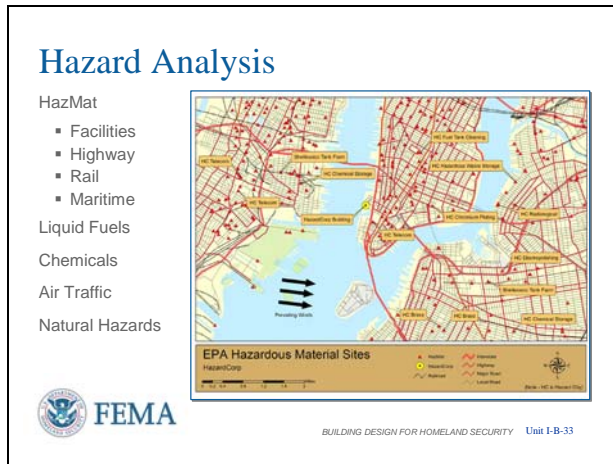
Threat Analysis

- Terrorism
 - No known specific targeting of HazardCorp Building
 - Certain tenants could be assessed by domestic or international terrorists as valuable targets.
 - *Orange Threat Definition*: Credible intelligence indicates that there is a high risk of a local terrorist attack, but a specific target has not been identified.
- Intelligence
 - Tenants with security clearances are potential targets for foreign intelligence services.
 - Threat includes commercial processes, financial information, and technology development that are the focus of commercial tenants of HazardCorp Building
- Crime
 - Almost all statistics for the Hazard City Business District are well above national averages

These are covered in the Case Study in more detail than presented here.

Note the site location, terrain, parking, and other commercial buildings around HZC. These can have an affect upon collateral damage.

VISUAL I-B-33



Hazard Analysis

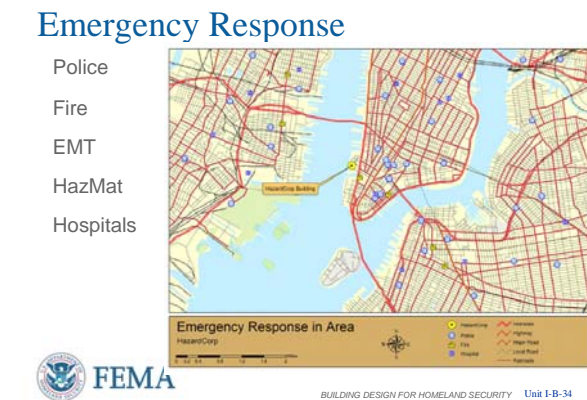
Due to transportation, shipping, and storage in the area there are many hazardous materials that are technological hazards if an accident would occur.

- Average 100 hazardous materials spills and releases each year in Hazard City

Natural hazards are especially diverse.

- 100 tornadoes/hurricanes/severe weather conditions per year
- Flooding from weather conditions has occurred, but also from water main breaks.
- HazardCorp Building is in evacuation zone for storm surges caused by severe weather, winds, and tides.
- Moderate seismic activity

VISUAL I-B-34



HZC Emergency Response

Determine the location, availability, and readiness condition of emergency response assets in the local community.

- Multiple police jurisdictions
- Nearby fire departments with firefighters that are also trained EMTs (Emergency Medical Technicians) and HazMat (Hazardous Materials) responders
- Nearby Hospitals

The Building Security Office in the Administration area of the first floor acts as the EOC (Emergency Operations Center) for HazardCorp Building. Note that Hazard City has an EOC located within the Office of Emergency Management on the 25th floor.

INSTRUCTOR NOTES

CONTENT/ACTIVITY

VISUAL I-B-35


Design Basis Threat

Explosive Blast: Car Bomb approximately 500 lb TNT equivalent. Truck Bomb approximately 5,000 lb TNT equivalent (Murrah Federal Building class weapon)

Chemical: Large quantity gasoline spill and toxic plume from the upwind petroleum tank farm or large quantity chlorine release from the upwind chemical storage 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 HazardCorp building



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-35

Design Basis Threat

- Explosive Blast
- Chemical
- Biological
- Radiological (“dirty” bomb)

VISUAL I-B-36

Design Basis Threat

Criminal Activity/Armed Attack: High powered rifle (sniper attack) or handgun shooting (direct assault on individuals).

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



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-36

Design Basis Threat

- Criminal Activity / Armed Attack
- Cyber Attack

INSTRUCTOR NOTES

CONTENT/ACTIVITY

VISUAL I-B-37


Levels of Protection and Layers of Defense

Levels of Protection for Buildings

- GSA Interagency Security Criteria Level IV Building
- DoD Primary Gathering Building

Elements of the Layers of Defense Strategy

- Deter
- Detect
- Deny
- Devalue



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-37

Levels of Protection and Layers of Defense

The Case Study will use both the GSA and DoD Levels of Protection to evaluate vulnerabilities against and to develop mitigation options.

- Part of any assessment is to determine if the criteria is mandatory or desirable and how compliance is to be applied.
- The applicable GSA and DoD criteria as may be applied to this building is found in the last 7 pages of Appendix B.

A key design strategy and concept is “Layers of Defense.” The elements of a layered system are:

- Deter
- Detect
- Deny
- Devalue

VISUAL I-B-38

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



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-38

Summary

The objective of this course is to provide a comprehensive approach to reducing the physical damage to structural and non-structural components of buildings and related infrastructure, focusing on six specific types of facilities:

- Commercial office facilities
- Retail commercial facilities
- Light industrial and manufacturing
- Health care
- Local schools
- Higher education

Exam Questions #A18 and B17

Most importantly, the course provide participants with a solid foundation on the key concepts needed for designing mitigation measures:

- Design Basis Threat
- Levels of Protection
- Layers of Defense

INSTRUCTOR NOTES

CONTENT/ACTIVITY

VISUAL I-B-39

Unit I-B Case Study Activity

Introduction and Overview

Background

Emphasis:

- Refamiliarize yourself with Appendix B Case Study and answer general questions
- Get acquainted with FEMA 426

Requirements

Refer to Case Study, and independently answer worksheet questions
Confer with team members on answers to normalize team information



BUILDING DESIGN FOR HOMELAND SECURITY Unit I-B-39

Student Activity

Emphasize to students that the assessment of the HazardCorp Building is the assessment of the Building Management (building owner's agents in charge), the physical facilities themselves, and their interfaces with all tenants in general. It would take longer than 3 days to assess each tenant and these would, in essence, require their own assessment. Then that assessment would become an input to the support required from Building Management.

Have the students turn to Tab I-B in their Student Manuals. Note that hints are provided as to what pages the answers are located to speed your familiarization with the Case Study.

INSTRUCTOR NOTES

CONTENT/ACTIVITY

Transition

In this course, you will learn how to perform a risk assessment of a building and become familiar with the key concepts to protect buildings from manmade threats and hazards:

- Asset Value
- Threat Assessment
- Design Basis Threat
- Levels of Protection
- Layers of Defense
- Vulnerability Assessment
- Risk Assessment
- Mitigation

Using the approach and guidance provided in **FEMA 426**, the majority of building owners should be able to complete a risk assessment of their building in a few days and identify the primary vulnerabilities, mitigation options, and make informed decisions on the ability of their building to survive, recover, and operate should an attack or event occur.

For the rest of the first day, the course will introduce the components of risk and how to determine risk.

- Unit II – Asset Value Assessment
- Unit III – Threat / Hazard Assessment
- Unit IV – Vulnerability Assessment
- Unit V – Risk Assessment / Risk Management

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**UNIT I-B CASE STUDY ACTIVITY:
CASE STUDY OVERVIEW
HAZARDCORP BUILDING
(Urban Version)**

Requirements

Turn to Appendix B, Case Study, and briefly peruse the document. Read the “familiarization” questions on the following worksheet and, as a group, complete the worksheet. Use only the Case Study data to answer worksheet questions. Information has been limited in an effort to focus the activity.

Students should read the case study before attending a course offering, but if not, we recommend reading it as soon as possible on the first day of class. During the first day of class students realize that the general reading is a good start, but assessment requires a more in depth analysis of content and functional and spatial inter-relationships to perform the student activities.

The answer to the first question is filled-in as an example.

Question	Answer	Page # in Case Study
<p>1. What are the major transportation modes in the surrounding area?</p>	<p><i>There is significant water access within 5-miles of the building and because of the water; ground access is constrained by bridges, tunnels, and ferries.</i></p> <p><i>While two major airports are over 5 miles from the building, what is not shown are 8 heliports and two skyports inside 5-miles of the building.</i></p> <p><i>A metropolitan subway also serves the business district and the nearest station is two blocks from the building.</i></p> <p><i>There is significant shipping serving the various ports carrying all types of materials for use in Hazard City and transshipment to other locations. In conjunction with the ports and the transshipment of goods, there is extensive railroad trackage, some as close as within 1-1/2 miles of the building. The area around Hazard City is the No. 4 intermodal port in the Western Hemisphere. Intermodal means the ability to move freight from ship to train to truck and back again.</i></p> <p><i>While the HazardCorp Building is not located on a main thoroughfare, a random estimate of truck traffic within 1,000 feet of the building indicates 30 delivery trucks (18-foot-long enclosed bodies) transit the area per hour and a</i></p>	<p>B-2, B-3, B-14, B-26</p>

Question	Answer	Page # in Case Study
	<p><i>similar number of smaller delivery vans between 0600 and 1800. These numbers reduce to about 10 delivery trucks and 10 delivery vans on average per hour between 1800 and 0600.</i></p> <p><i>More than 2,000 trucks loads of hazardous materials are transported each day within city limits.</i></p> <p><i>HazardCorp receives mail, packages, and equipment at the Loading Dock where a recently renovated (per DoD criteria) mailroom/shipping office inspects the items using x-ray and other equipment before distributing to tenants within the building. By agreement, HazardCorp Building accepts deliveries for specific tenants in other buildings in the immediate vicinity (within 2 city blocks) due to this mailroom capability.</i></p>	
<p>2. What life safety/emergency response assets are available, and what are their response times?</p>	<ul style="list-style-type: none"> • Primary police facilities within 2 miles from multiple police jurisdictions that may not all respond • Fire facilities are more limited, with 2 fire stations within 1 mile, and seven others within 5 miles • Firefighters are trained as Emergency Medical Technicians (EMTs) and Hazardous Material Technicians. Many are also skilled in technical rescue (high places, confined spaces, etc.). Ambulances are also dispatched from these stations. Emergency response time estimated to be 5 minutes • Two hospitals with emergency rooms within 1 mile and seven other hospitals within 2.75 miles • Public Address speakers for voice evacuation announcements located throughout building and activated at Fire Control Center • Emergency generators for life safety systems • Battery-powered and backup-powered exit lighting in stairwells • Limited number of hand-held fire extinguishers located in building, usually in mechanical spaces, where cooking is done, and in a designated Fire Watch area on each floor • Radio repeaters for first responders and Fire Watch phones • Wet pipe sprinkler system 	<p>B-9, B-18 - B-20, B-22 - B-24, B-26</p>

Question	Answer	Page # in Case Study
	<ul style="list-style-type: none"> • Other fire stations, while 2-3 miles from building, must travel along transportation chokepoints to get over water, resulting in longer response times • Multiple means of ingress and egress to building site, mostly on secondary roads for the last 0.2 miles 	
<p>3. What threats / hazards may affect HazardCorp Building?</p>	<ul style="list-style-type: none"> • Hazardous materials sites and transshipment nearby • Natural hazards – tornadoes, hurricanes, floods, earthquake, lightning • Technological hazards – water main breaks, two large Hazardous Material (HazMat) storage facilities west of building (large petroleum tank farm and chemical storage tank farm with chlorine, compressed natural gas, and hydrofluoric acid. These tank farms receive and distribute product by truck, rail, and ship. • Air traffic -- Two major airports approximately 8 miles away • Shipping along river to west of building carries petroleum products, fertilizer, and compressed natural gas among other items. • Terrorism -- Not currently primary target, but certain tenants could be assessed by domestic or international terrorists as valuable targets; recipient of potential collateral damage due to higher value targets in area • Criminal threat – generally higher incidents of major crimes compared to US as a whole – robbery, larceny, and vehicle threat 	<p>B-8, B-26 - B-28</p>
<p>4. What are the prevalent weather/wind conditions at HazardCorp Building?</p>	<p>The prevailing weather pattern comes out of the west on the average and can carry toxic releases from storage facilities over the building. Seasonally, the weather patterns and winds shift, coming out of the northwest during the winter and out of the southwest during the summer. The area is known for periodic flooding due to storm surges during hurricane season with up to 100 tornadoes of various F-scale per year.</p>	<p>B-8 – B-9, B-26</p>

Question	Answer	Page # in Case Study
<p>5. What are the components of HazardCorp Building's critical utility infrastructure?</p>	<p>Principal focus is on Building Management for HazardCorp Building Secondary focus is on tenant requirements which may match Building Management, but will be specifically for tenant, such as dedicated backup generators and fuel storage.</p> <ul style="list-style-type: none"> • Electric systems (primary and backup power, emergency lighting, pumps for water systems) • Water systems (fire protection, general sanitation – restrooms) • Mechanical systems (air conditioning) • Data/phone (communications) systems (business connectivity) • Electronic Security Systems (due to high criminal threat, ESS is vital utility benefiting building as a whole) • Emergency response systems (life safety, mass notification, radio support) • Not Natural Gas (since primarily only used for cooking) 	<p>B-10, B18 - B-25</p>
<p>6. What are the components of HazardCorp Building's critical building infrastructure?</p>	<ul style="list-style-type: none"> • Parking (street and underground) • Entryways (access to building and to parking) • Exits (emergency egress) • Elevators and stairwells (entrance and egress) • Loading docks (materials, equipment, supplies) 	<p>B-3, B-4, B-11, B-18</p>
<p>7. What personnel are key to the operation of HazardCorp Building?</p>	<p>As the assessment is primarily for Building Management, the key personnel are those that keep the overall building functional on a day-to-day operational basis.</p> <ul style="list-style-type: none"> • Security personnel for building access control and crime detection, alarm and CCTV monitoring, security plans, emergency egress, etc. • Building maintenance personnel to keep critical utilities operational, SCADA, EMCS, etc. • Loading Dock personnel – security, off-loading, and on-loading 	<p>No specific page – think globally of who in Building Management does what for all tenants in general.</p>