Unit II (C)

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

TIME 75 minutes

UNIT TITLE Asset Value Assessment

OBJECTIVES

1. Identify the assets of a building or site that can be affected by a threat or hazard
2. Explain the components used to determine the value of an asset
3. Determine the critical assets of a building or site
4. Provide a numerical rating for the asset and justify the basis for the rating

SCOPE

The following topics will be covered in this unit:

1. The core functions and critical infrastructure listed on the threat-vulnerability matrix.
2. Various approaches to determine asset value – FEMA, Department of Defense, Department of Justice, and Veterans Affairs.
3. A rating scale and how to use it to determine an asset value.
4. Activity: For the assets identified in the Risk Matrix, use the information in the Case Study, review the asset value for each asset of interest, and provide rationale for the asset value rating given.

REFERENCES

1. FEMA 426, *Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings,* pages 1-10 to 1-14
2. FEMA 452, *Risk Assessment: A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings*, pages 2-1 to 2-26
3. Case Study – Appendix C: COOP, Cooperville Information / Business Center
4. Student Manual, Unit II (C) (info only – not in SM)
5. Unit II (C) visuals (info only – not in SM)

REQUIREMENTS

1. FEMA 426, *Reference Manual to Mitigate Potential Terrorist Attacks Against Building*s (one per student)
2. FEMA 452, *Risk Assessment: A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings* (one per student)

3. Instructor Guide, Unit II (C)
4. Student Manual COOP Case Study (C) (one per student)
5. Overhead projector or computer display unit
6. Unit II (C) visuals
7. Risk Matrix poster and box of dry-erase markers (one per team)
8. Chart paper, easel, and markers (one per team)

UNIT II (C) OUTLINE

PREPARING TO TEACH THIS UNIT

- **Tailoring Content to the Local Area:** This is a generic instruction unit that does not have any specific capability for linking to the Local Area. However, Local Area discussion may be generated as students have specific situations for which they would like to determine asset value. Also, the determination of asset value rating is subjective because this course was designed for small organizations with few decision makers or levels of decision making. Large organizations would need a more objective approach to asset value rating so that the ratings of different people would be comparable, which does not occur in small organizations.

- **Optional Activity:** There are no optional activities in this unit.

- **Activity:** The students will apply the techniques of asset identification and asset value rating to the Case Study in order to identify and rate the assets found in the Case Study. The students will have to quickly scan the Case Study information with the specific intent of determining assets and their value to the organization. Reading the Case Study prior to the class greatly helps in performing this activity.

- Refer students to their Student Manuals for worksheets and activities.

- Direct students to the appropriate page (Unit #) in the Student Manual.

- Instruct the students to read the activity instructions found in the Student Manual. Note that this Student Activity provides asset value ratings that the students must determine agreement with and rationale for the given asset value rating.

- Explain that the asset value ratings determined by the team must be transferred to the Risk Matrix poster.

- 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.

- 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.

Editor Note: Two methods have been used in Instructor Guides to ensure the slide designation and slide thumbnail in the left column aligns with the Content/Activity in the right column.

(1) Highlight row by placing cursor in left column until arrow shifts to right, Tab <Insert>, <Break>, <select Page Break>, <OK>

(2) Highlight row as in (1), right click on highlighted row for menu, <Table Properties>, Tab <Row>, remove check in box <Allow row to break across pages>

(3) Alternate for (2), highlight row, click on <Table> at top of screen, <Table Properties> and continue like (2)

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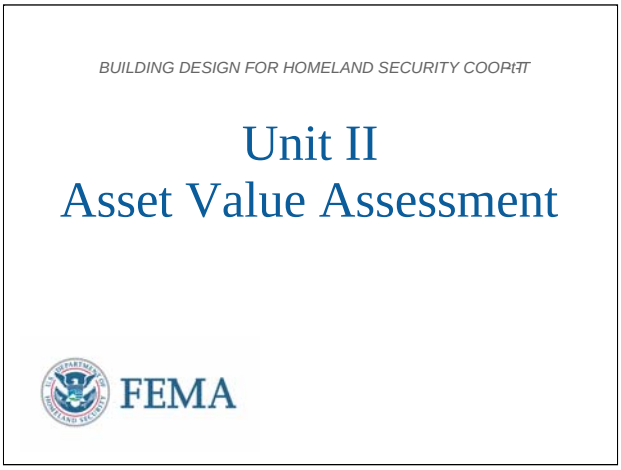
INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-1



Introduction and Unit Overview

This is Unit II, Asset Value Assessment. This section will describe how to perform an asset value assessment (the first step in the assessment process), to identify people and asset values categorized as core functions and core infrastructure. Key to this process is interviewing stakeholders including owners, facility staff, and tenants.

VISUAL II-C-2

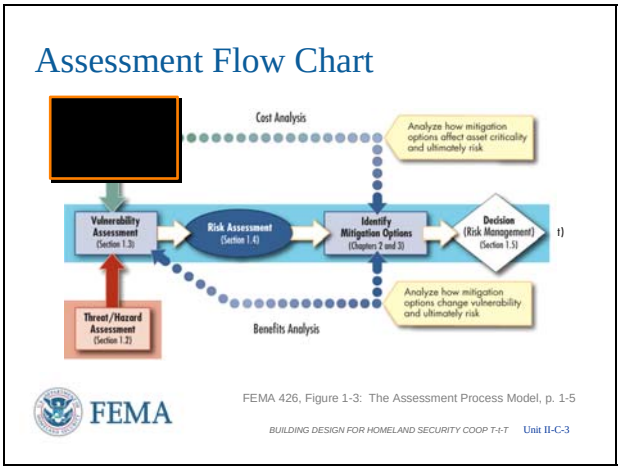
Unit Objectives

At the end of this unit, the students should be able to:

1. Identify the assets of a building or site that can be affected by a threat or hazard.
2. Explain the components used to determine the value of an asset.
3. Determine the critical assets of a building or site.
4. Provide a numerical rating for the asset and justify the basis for the rating.

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-3

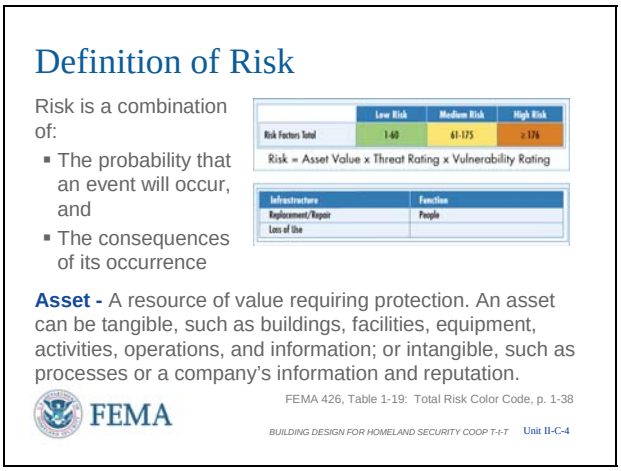


Assessment Flow Chart

Reviewing the Assessment Flow Chart, the first step in the risk assessment process is to determine asset value.

An asset is anything you want to protect because of its value, its need to maintain business continuity, and/or its difficulty in replacing within a required timeline.

VISUAL II-C-4



Risk

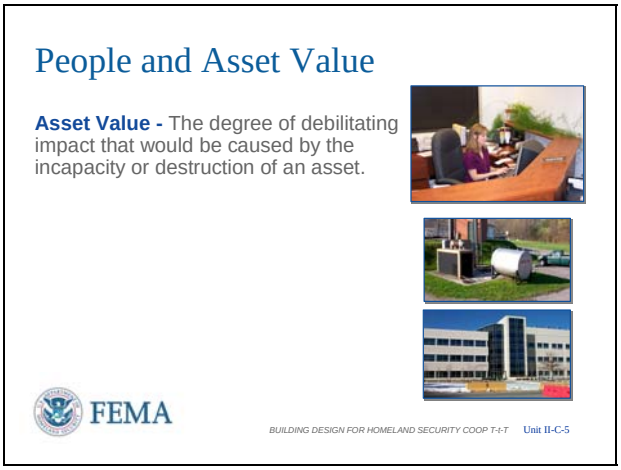
Risk can be defined as the potential for loss of or damage to an asset. It takes into account the **value of an asset**, the **threats or hazards** that potentially impact the asset, and the **vulnerability** of the asset to the threat or hazard.

Values can be assigned to these three components of risk to provide a risk rating.

In general terms, asset value can be considered the replacement cost for infrastructure and equipment. It can include lost profit to a business or lost capability to a mission that result in greater damage and loss to that asset and other assets.

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-5



People and Asset Value

Understanding asset criticality is comparable to strategic planning in that the building owner should understand the mission of the organization, the resources that are used to perform that mission, how those resources interface with one another to achieve goals, and how the organization would cope or maintain business continuity if the asset(s) were lost.

People are a building's most critical asset.

VISUAL II-C-6

Identification of a Building's Assets

Identifying a building's critical assets is accomplished in a two-step process.

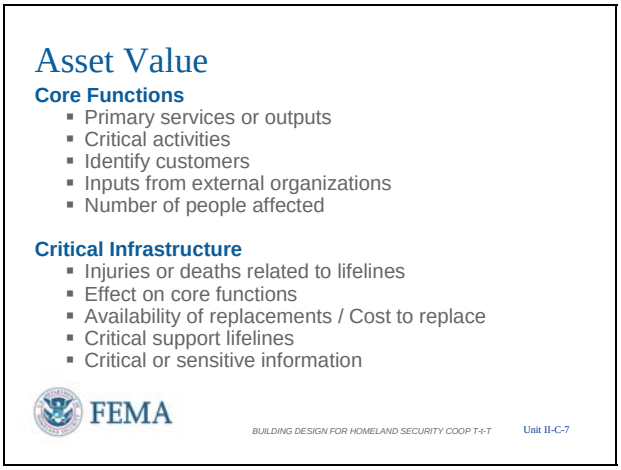
Step 1: Define and understand a building's core functions and processes.

Step 2: Identify site and building infrastructure and systems:

- Critical components/assets
- Critical information systems and data
- Life safety systems and safe haven areas
- Security areas

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-7



Asset Value

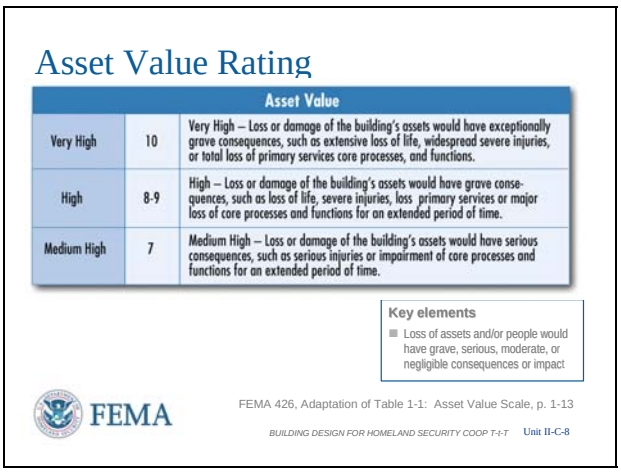
The objective in the initial step is to determine the core functions for the building that will enable it to continue to operate or provide services after an attack. This focuses the assessment team on the key areas of the building. Factors include:

- What are the primary services?
- What critical activities take place at the building?
- Who are the building's occupants and visitors?
- How many people are affected by the loss of this asset

To help evaluate and rank critical infrastructure, consider the following factors:

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

VISUAL II-C-8



Quantifying Asset Value

After a building's assets requiring protection have been identified, they are assigned a value. The asset value is the degree of debilitating impact that would be caused by the incapacity or destruction of the building's assets.

FEMA 426 uses a combination of a seven-level linguistic scale and a ten-point numeric scale.

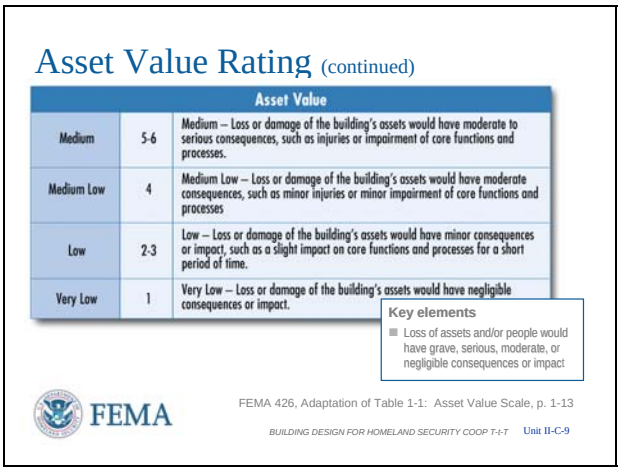
- **Very High** – Loss or damage of the asset would have exceptionally grave consequences, such as extensive loss of life, widespread severe injuries, or total

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

loss of primary services, core processes, and functions.

- **High** – Loss or damage of the asset would have grave consequences, such as loss of life, severe injuries, and loss of primary services.
- **Medium High** – Loss or damage of the asset would have serious consequences, such as serious injuries, or impairment of core processes and functions for an extended period of time.

VISUAL II-C-9



Quantifying Asset Value (continued)

At the other end of the scale we have:

- **Medium** – Loss or damage of the asset would have moderate to serious consequences.
- **Medium Low** – Loss or damage of the asset would have moderate consequences, such as minor injuries, or minor impairment of core functions and processes.
- **Low** – Loss or damage of the asset would have minor consequences or impact.
- **Very Low** – Loss or damage of the asset would have negligible consequences or impact.

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-10

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

FEMA

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

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit II-C-10

Asset Value Notional Example

The key assets for this notional example by system are listed and an asset value rating is entered into the site critical infrastructures matrix.

HVAC mechanical systems in most buildings will likely be medium high (7).

VISUAL II-C-11

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				

FEMA

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

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit II-C-11

Note: The Asset Value under the Administration and Engineering functions is highlighted. A medium value rating (6) is assigned to the Administration function asset value because they are a small part of the total organization, but important to the organization for continuity of business and profit. A high Asset Value rating (8) was assigned for the Engineering Function as they account for over half of the organization and are considered the core of the business for the company.

Critical Functions Matrix

List functions down the left side and threats across the top.

In general, the asset value for a given function is the same for all threats and the matrix helps to identify the primary functions in a quantitative form. The functions matrix is people oriented and is subjective, but the completed matrix should provide a guide to vulnerabilities and risks. An organization with few administrative staff, but with a large engineering group, is used in this example.

Note the value is the same for all threat pairs. It does not matter how the asset is lost. The asset value reflects the impact to the people and organization should the asset be lost, damaged, or degraded.

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-12

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				

FEMA

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

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit II-C-12

Note: The Asset Value rating under the Site and Structural Systems is highlighted. A medium low Asset Value rating (4) could be an initial value for a site infrastructure that has a well-defined and protected perimeter and economic replacement costs that are acceptable. A high Asset Value rating (8) could be an initial value for a Structural System in a multi-story that is subject to progressive collapse and cannot be replaced.

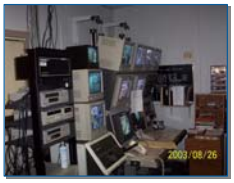
VISUAL II-C-13

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



FEMA

BUILDING DESIGN FOR HOMELAND SECURITY COOP T-t-T Unit II-C-13

Critical Infrastructure Matrix

List infrastructure down the left side and threats across the top.

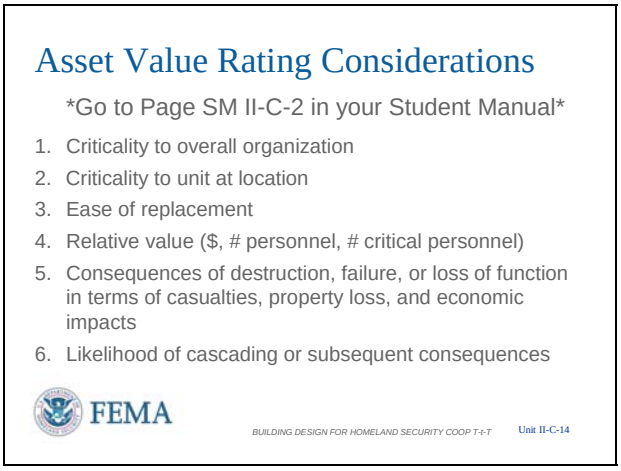
Note that the value is the same for all threat pairs to reflect the economic and organization impact losses that could occur over time should the critical infrastructure be lost, degraded, or damaged due to any threat tactic.

Summary

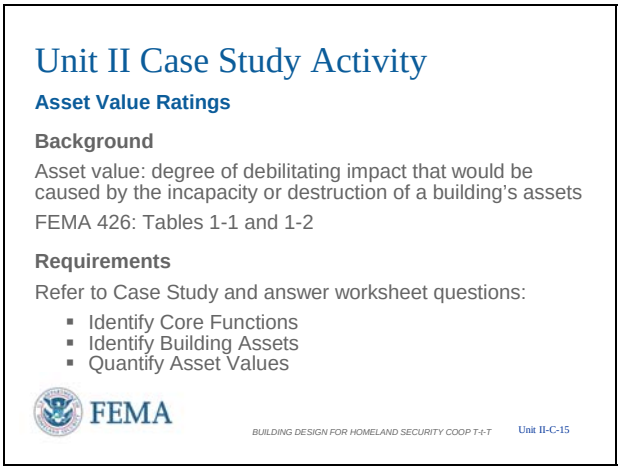
- Identify a building's Critical Functions and Critical Infrastructure
- Assign a value to a building's assets or resources
- Insert values into the Critical Functions and the Critical Infrastructure areas of the Threat Matrix
  [Risk Matrix poster, manual spreadsheets, electronic spreadsheets, or risk assessment database]

INSTRUCTOR NOTES | **CONTENT/ACTIVITY**

VISUAL II-C-14



VISUAL II-C-15



Refer participants to **FEMA 426** and the Unit II Student Activity for the Selected Case Study (C) in the Student Manual.

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

At the end of 35 minutes, reconvene the class and facilitate group reporting.

NOTE to instructor: Work tables and room to draw out student answers, especially when they

Asset Value Rating Considerations

As a further emphasis to ensure understanding of definitions, a review of Asset Value and how it can be looked at is provided here. The list on the slide is expanded with examples on the designated page of the Student Manual.
[It is also the first page of the Case Study Activity later in this document (about 2 pages).]

Walk the students through each point on the slide using the expanded information in the Case Study Activity.

Student Activity

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

- **Table 1-1 on Page 1-13 of FEMA 426** provides an **Asset Value Scale** to quantify asset value, as well as definitions of the ratings.
- **Table 1-2 on page 1-14 of FEMA 426** provides a format to summarize the value of the major categories of a building's assets.

Activity Requirements

NOTE to instructor: Walk the students through the completed examples so that they have a feel for the ultimate goal of this activity.

- Working in previously assigned small groups, refer to the Case Study Student Activity (Version C for COOP) and answer the worksheet questions.

INSTRUCTOR NOTES	CONTENT/ACTIVITY
are different from the "school solution." Point out that team consistency of rationale as applied to all assets is more important than the specific number provided in the rating. Allow 10 minutes for the plenary session. Keep in mind that there are no incorrect answers. It is more important to be able to clearly explain and support the underlying rationale for the values that have been assigned. Also it has been proven that 7 people working effectively as a group can achieve genius level in their consensus response.	Take 35 minutes to complete this activity. Solutions will be reviewed in plenary group. **Transition** Unit III will cover Threat / Hazard Assessment and Unit IV will cover Vulnerability Assessment to continue the risk assessment process.

UNIT II (C) CASE STUDY ACTIVITY: ASSET VALUE RATING (COOP Version)

Asset Value Rating Considerations (Impact or Consequences if asset is lost or damaged)

1. Criticality to the overall organization, agency, company, or government entity goals
   - Higher criticality means higher value
     - Number of users affected
     - Direct economic loss and cost to rebuild
     - Potential number of deaths from an attack

2. Criticality to the goals of the specific unit, location, branch, or office being assessed
   - Higher criticality means higher value
     - Number of users affected
     - Direct economic loss and cost to rebuild
     - Potential number of deaths from an attack
   - Example, the loss of the kitchen at a Veterans Affairs Hospital is important to that hospital, but the loss of that kitchen is not critical to the overall goals of the Department of Veterans Affairs.

3. Ease of replacement
   - Harder to replace (measured in months to years) means higher value
   - Easier to replace (measures in days) means lower value

4. Relative value of assets
   - Just like in fire protection assessment, the higher the cost of the items individually and in aggregate, the higher the value
   - For people performing functions, the number of critical personnel and the number of total personnel in the facility determine the relative rating; the higher the number of people the higher the value
   - Critical personnel may be harder to replace due to the time needed for education, training, and experience to meet functional needs; similar to ease of replacement but with much longer timelines

5. What are the consequences of destruction, failure, or loss of function of the asset in terms of fatalities and/ or injuries, property losses, and economic impacts? (Similar to criticality above)
   - Number of users affected
   - Direct economic loss and cost to rebuild
   - Potential number of deaths from an attack

6. What is the likelihood of cascading or subsequent consequences should the asset be destroyed or its function lost?
   - Interdependency – will loss of the asset have an effect upon other assets in the same or different Critical Infrastructure Sectors

UNIT II (C) CASE STUDY ACTIVITY: ASSET VALUE RATING (COOP Version)

Asset value is the degree of debilitating impact that would be caused by the incapacity or destruction of a building's assets. **Page 1-13 of FEMA 426** provides an Asset Value Scale **(Table 1-1)** to quantify asset value, as well as definitions of the ratings. **Table 1-2 on page 1-14 of FEMA 426** provides a format to summarize the value of the major categories of a building's assets. **FEMA 452, pages 2-17 to 2-19** provide additional information.

Requirements

Referring to the Appendix C Case Study to determine answers to the following questions:

The first question below has the answer provided as an **example**. The other questions have the pages identified where the answers may be found.

Activity #1: Identifying Building Core Functions

1. What are Cooperville Information / Business Center's (CI/BC) primary services or outputs? [Page C-5 to Page C-6]

   Information Division -- IT services support for over 20 private and government organizations/clients. CI/BC supports over 1,000 users and over 100 applications as a primary data center and as a disaster recovery backup site to include field technicians and help desk. Many clients depend on CI/BC's ability to provide real time IT support, on a 24 x 7 basis. Others rely on the company's IT backup services.

   Business Center – Provides day-to-day office space and office, telephone, and computer support to short-term clients, including Information Division requirements.

2. What critical functions/activities take place at CI/BC? [Page C-31 to Page C-35]

   Computer-based data processing, storage, and disaster recovery. Wired/wireless networking, information technology and communications. Secure office space, conference space, and computer support.

3. Who are the building's occupants and visitors? [Page C-5 to Page C-6]

   CI/BC employees and clients; business park neighbors are a mix of government and commercial organizations. CI/BC has over 75 employees and approximately 25 employees in the building at any given time. Visitors to the Information Division are vendors and clients. Clients include Fortune 500 companies, national and regional banks and credit unions, a major airline,

large prime defense contractors, and government agencies, including one classified client.

The company's business center mission is to provide temporary office support on a short term basis to business travelers or companies who need additional space, including some space at higher security levels. Thus the Business Center can support anyone, but secure space and computer access requires proper verification of security clearance prior to entering any of these spaces.

4. What inputs from external organizations are required for CI/BC's success? [Page C-5 to Page C-6 and Page C-17 to Page C-35]

Utilities and communications supplies/vendors; hardware and software applications vendors; client data and support. The Business Center relies upon business travelers and existing clients that need temporary office space.

Activity #2: Identifying Building Assets and Quantifying Asset Value Ratings

Use the following process to complete the following tables – CI/BC Critical Functions Asset Value Ratings and CI/BC Critical Infrastructure Asset Value Ratings.

Adjust your asset value ratings of CI/BC's critical functions and critical infrastructure based upon the COOP needs of DAI.

1. Refer to **Table 1-1 in FEMA 426** and the associated value descriptions for the ratings listed below
   - Very High (10)
   - High (8-9)
   - Medium High (7)
   - Medium (5-6)
   - Medium Low (4)
   - Low (2-3)
   - Very Low (1)

2. Consider the questions on **page 1-11 in FEMA 426** as you rate CI/BC's assets.

3. Refer to **Table 1-2 in FEMA 426, Nominal Building Asset Value Assessment** and use the descriptions of these asset categories as found in the Appendix C Case Study to focus the rating. Another approach is to use an asset value rating of 5 (mid-range) and do a pair-wise comparison to each asset category as the process continues, raising or lowering the rating from 5 as the team compares asset value inputs collected from the Appendix C Case Study.

NOTE 1: The first two rows in both tables are completed as **examples**. Nominal ratings are provided in all other asset categories.

1. Confirm the team's Asset Value Rating for each category [agree, raise, or lower the indicated rating]
2. Provide Rationale for each rating [whether changed or unchanged]
3. Enter asset value rating on the Risk Matrix

NOTE 2: Consult **Table 1-22, pages 1-46 to 1-92, in FEMA 426.** Look at the content of the questions to understand the various infrastructure asset categories.
For example, Utility Systems apply to all utilities outside the 3-foot drip line of the building (from the source to the building, but primarily on the site), while Mechanical, Plumbing, Gas, Electrical, Fire Alarm, Communications, and Information Technology Systems are inside the 3-foot drip line of the building.

CI/BC Critical Functions Asset Value Ratings

Asset	Value	Numeric Value	Rationale
1. Administration	Medium-Low	4	Redundancy and staff skills that can be replaced. Senior managers and financial systems in the same area increase value. Low to medium economic cost to replace. Can impair in the short term the core functions and processes. DAI COOP value is minimal as ERG is self-contained, at least for the first 30 days.
2. Engineering / IT Technicians	High	8	Staff skills require specialized expertise, but can be replaced. Key equipment and resources needed for 24/7 ops. High economic cost to replace. Can impact core functions and processes for extended period of time. DAI COOP value is high as this function ensures connectivity and communications.
3. Loading Dock / Warehouse	Medium-Low	4	***Single point of entry into the interior for major shipping and receiving. Low to medium economic cost to replace. Can use other entryways in interim for most items. Minor impairment of core functions and processes. DAI COOP value is no different from CI/BC.***
4. Data Center	Very High	10	***Primary function and organization critical. Many key staff and critical equipment. Very high economic cost to replace. Vital for 24/7 operation. Total loss of primary services, core***

Asset	Value	Numeric Value	Rationale
			processes, and functions possible. DAI COOP value is equivalent to CI/BC.
5. Communications	High	9	***Primary function and organization critical. A few key staff and critical equipment. High economic cost to replace. Needed for 24/7 operation. Major affect on primary services and core functions and processes for extended period of time. DAI COOP value is equivalent to CI/BC.***
6. Security	Medium High	7	***Access and monitoring systems, security records, and location make the function critical to the organization. Needed due to client requirements. Medium economic cost to replace. Serious impairment of primary services, core processes and functions for extended period of time. Security is also necessary for the Business Center, especially the controlling of access to secure space and the identification of Business Center users. The latter need may increase the asset value rating. DAI COOP value may be higher than CI/BC due to ERG personnel and essential functions on site.***
7. Housekeeping	Very Low	1	***Easily replaced, no critical skills or equipment. Minimal cost to replace. Many workarounds, thus negligible consequences or impact. DAI COOP value is equivalent to CI/BC.***

CI/BC Critical Infrastructure Asset Value Ratings

Asset	Value	Numeric Value	Rationale
1. Site	Medium-Low	4	CI/BC does not own building or site, but location is critical to access and support to clients. Cost is $10 - $20 per square

Asset	Value	Numeric Value	Rationale
			foot which indicates other office complexes in area are competitive. Moderate consequences or minor impairment of core processes and functions if must move from site. DAI COOP value can be higher than CI/BC, due to CI/BC backup of DAI data.
2. Architectural	Medium	5	Signage and business office information couple the building to other park tenants (geographically clustered, centralized). Nothing overly descriptive that requires the use of this building, but moderate to severe consequences or impairment if lost. Limited architectural flexibility either exterior or interior. DAI COOP value no different than CI/BC, as long as signage remains non-descript. Building layout will be as is.
3. Structural Systems	Medium-Low	8	***Relatively strong and flexible two-story building using standard construction will not experience progressive collapse, but has a great potential for localized collapse. Loss of structural systems in whole or in part would have grave consequences, such as loss of life, severe injuries, loss of primary services, or major loss of core functions and processes for an extended period of time. DAI COOP value equivalent to CI/BC.***
4. Envelope Systems	Medium	5	***Fairly tight envelope, newer construction, CBR agents not likely to penetrate into interior through wall cracks or roof gaps without longer contact time. Over 50 percent of exterior surface is glazing on front and one-third of the side where glazing exists. Loss of any envelope system will have moderate to serious consequences or impairment of core functions and processes mainly due to environmental effects—weather entering building. A higher rating may***

Asset	Value	Numeric Value	Rationale
			be in order based upon security requirements. DAI COOP value may justify higher value also based upon security needs.
5. Utility Systems	Medium	5	***Necessary for efficient and economic operation. Commercial utilities have high reliability in area. Loss of one or more utility systems would have moderate to serious consequences and impairment of core functions and processes. Backups in-place indicate the recognized value of these systems. DAI COOP value equivalent to CI/BC.***
6. Mechanical Systems	High	8	***Single HVAC system supports multiple HVAC Air Handling Units and interior spaces. High economic cost to replace. Loss of business revenue. Limited workarounds due to location of HVAC load within building. Loss of HVAC and chilled water seriously hampers core functions and processes. DAI COOP value equivalent to CI/BC.***
7. Plumbing and Gas Systems	Medium	6	***Wet pipe sprinkler system and hand-held extinguishers are means of fire protection in this 24/7 operation. Natural gas provides some humidity control for core processes but workarounds (portable dehumidifiers) possible. Water for cooling tower makeup is critical to support core processes, but workaround (water tanker) possible. Moderate to serious consequences or impairment of core functions and processes if lost. DAI COOP value equivalent to CI/BC.***
8. Electrical Systems	High	8	***Grave consequences to loss of this primary service. High economic cost to replace, but more so loss of business revenue if systems cannot operate. Commercial utility with backup***

Asset	Value	Numeric Value	Rationale
			generator required to meet 24/7 requirements. DAI COOP value equivalent to CI/BC.
9. Fire Alarm Systems	Medium	5	***Wet pipe sprinkler system and hand-held extinguishers are only means of fire protection. Fire alarm system provides additional coverage – heat and smoke detectors. Nearby fire department has connection to alarm. Moderate to serious consequences or impairment of core functions or processes if lost. Workarounds (roving fire watchmen) possible. DAI COOP value equivalent to CI/BC.***
10. IT / Communications Systems	High	9	***Single-point vulnerability and organization critical. High economic cost to replace, but replaceable. Loss of business revenue. Loss of primary services or major loss of core processes and functions for an extended period. DAI COOP value may be higher than CI/BC due to greater communications needed.***

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