

Building Security Rating System

Checklists to Assess Risks, Consequences,
and Security Countermeasures

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Building Security Rating System

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Building Security Rating System

Checklists to Assess Risks, Consequences, and Security Countermeasures

Prepared by the
Building Rating Security Committee (BRSC) of the
Architectural Engineering Institute (AEI) of the
American Society of Civil Engineers (ASCE)

Edited by
Mohammed M. Ettouney, Ph.D., P.E.



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PREFACE

This document presents a building security rating system (BSRS), which addresses security-related disciplines—from conceptual to design and development to operations and maintenance—and enables improved survivability of buildings and occupants subjected to terrorist attack. The BSRS rates buildings for their relative security using a rigorous system that (1) identifies physical and operational criteria that enhance building security and (2) compares building conformity with those criteria. The system includes the development and maintenance of a security-enhancing physical and operations rating protocol. Personnel training is the key to this end. This training includes, but is not limited to, continued adequate certification and education programs.

Conceptually, the BSRS is similar to the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) system; both systems rate buildings according to an accepted set of rules for ensuring particular categories of performance in their respective fields. Technically, the building security rating system is based on the physical and operational features defined in FEMA 426 (2003a). FEMA 426 provides guidance for building stakeholders to reduce physical damage to buildings, related infrastructure, and people caused by terrorist assaults. This approach allows for the effective transfer of decades of federal and Department of Defense (DoD) research and experience to the broader building science community. The guidance of FEMA 426 is presented in the form of a comprehensive qualitative checklist that covers the essential 13 building security disciplines. In addition, FEMA 426 provides a complete commentary to all security items in the checklist to guide the user and ensure accurate implementation. The conceptual and technical basis of the system is described in Section 1.2 of Chapter 1.

The BSRS system is based on three pillars: building classification, security countermeasures, and the building security rating as shown in Fig. P-1. The three are interdependent, and their interdependency is accommodated in the rating system methodology. Note that Version 2.0, presented in this manual, covers only buildings; no other types of infrastructures are covered.

The building is classified, from a security viewpoint, into four classes. The classes (A, B, C, and D, from higher to lower security sensitivity) depend on both security exposure (hazard or threat) and consequence of loss (effects of loss). The classification system covers all important aspects of the hazards and the effects of terrorist attacks on buildings in a qualitative-to-quantitative method. The method is simple, based on a checklist and multiple-choice approach as detailed in Chapter 1. The multiple choices help in assigning quantitative values to the qualitative checklist. A simple method is then applied to quantify the final building security classification (A, B, C, or D). The multiple choice checklists for building classifications are given in Appendix A.

The second pillar of the rating system comprises the five rating categories. From the least secure to the most secure, the ratings are rated bronze, silver, gold, and platinum. Awarding a particular security rating category to a building depends on the building class (the first pillar) and existing security countermeasures (the third pillar). A description of the security rating categories is provided in Chapter 4.

The third pillar of the rating system is the security countermeasure (mitigation) evaluation. The basis of this step is that for each of the five security rating categories and the four building classes, a minimum level of security countermeasures must be implemented. The security countermeasure evaluation identifies 20 levels of countermeasures for the rating category–building class combinations. The different security countermeasures are subdivided by discipline (similar to FEMA 426). Given a desired security rating category, the building must achieve certain combinations of countermeasure levels. The procedures for achieving particular levels of countermeasures are detailed in Chapter 3. The actual checklists of all countermeasures are given in Appendix B.

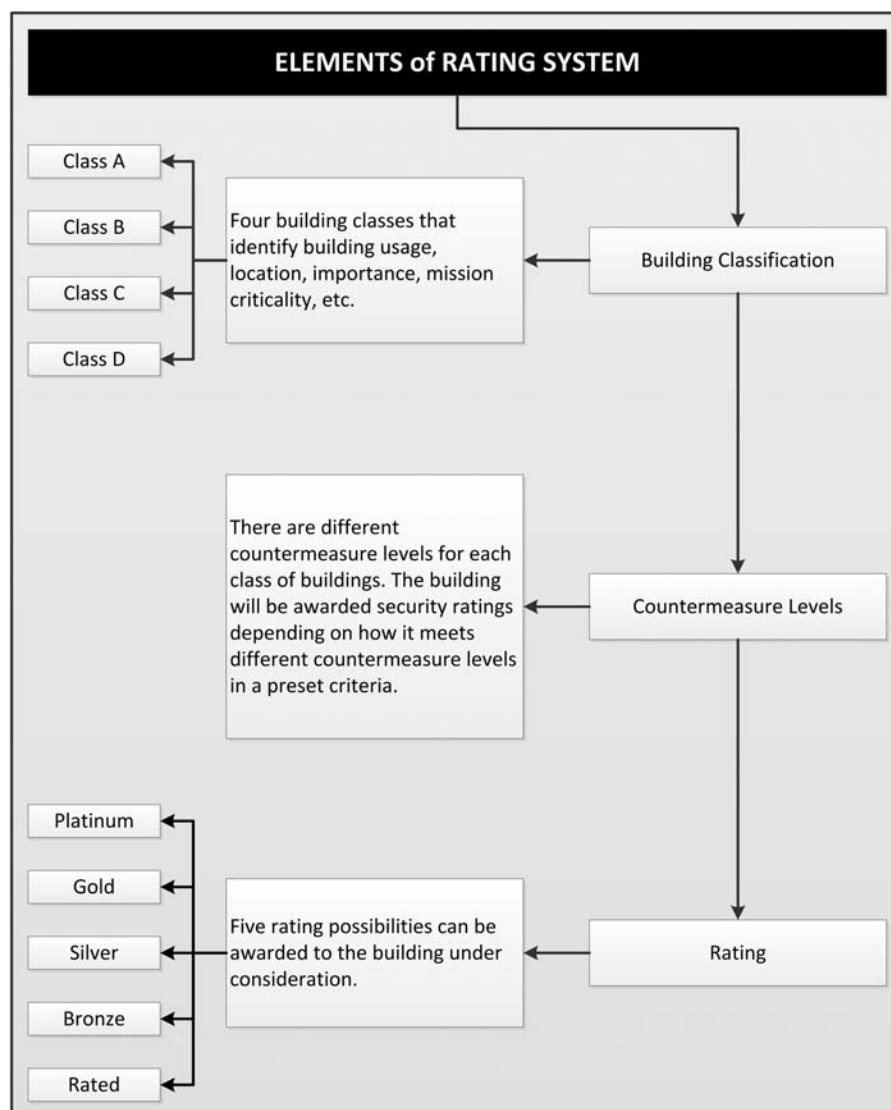


Fig. P-1. Elements of the Security Rating System.

To promote innovations in building security, the rating system includes extra points. Details are provided in Appendix C.

A security evaluation is a complex undertaking, because it covers several disciplines and relies heavily on the qualitative judgment of professionals. To help in standardizing and simplifying the rating system, comprehensive commentary is given in Appendixes D, E, F, G, and H. Finally, a comprehensive bibliography is supplied in the references.

In summary, this document describes a comprehensive method for rating building security. The method is straightforward and comprehensive and is based on the state of the art of building security. It is multidisciplinary, with appropriate representation of all disciplines factoring into building security. The methodology accounts for threat, effect, and mitigation as related to building security and, in doing so, provides a quantifiable measure of building security status: the building security rating. Knowledge of the building security rating can help building stakeholders assess the status of their building security in an objective manner. This rating will allow cost-effective building and public security improvements.

HISTORY OF THE BUILDING SECURITY RATING SYSTEM (BSRS)

Version 1.0 of the building security rating system was developed by Applied Research Associates, Inc., under the direction of the American Society of Civil Engineers (ASCE) Building Security Council (BSC) Rating System Development Committee.

Version 1.1 included several additions, changes, and rearrangements. The modifications were done as a result of the volunteer efforts of the BSC Rating System Development Committee. Version 1.1 was a draft document for review and testing. Versions 1.1 and 1.2 were used in a pilot-testing program.

Version 2.0 is the first version released to the public. Future versions will be issued by the AEI Building Rating System Committee (BRSC) as modifications dictate.

Both Versions 1.0 and 1.1 were named the PLUS system. In Version 2.0, the name of the system has been modified to *building security rating system (BSRS)*.

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CHAPTER 1

Introduction

AEI, the Architectural Engineering Institute of ASCE, will develop and maintain a building security rating system (BSRS) that enables building owners to evaluate and improve the security of their facilities.

1.1 PURPOSE

The building security rating system was created to develop construction and operations criteria and a matching rating system to describe the relative security and safety of buildings and building systems, the objective being to enhance the security and safety of building mission and life safety services and thus the safety of building occupants. The rating system addresses the design, engineering, and construction disciplines (planning, architectural, structural, mechanical, electrical, heating, ventilation and air-conditioning, etc.) governing building design, development, and operations, while offering improved survivability of buildings and occupants when subjected to terrorist or criminal attacks involving nuclear, chemical, and biological agents or conventional explosives. The construction and operation criteria are part of a qualitative assessment engine used to govern building design and development, construction, and operations. The rating system is applicable to existing buildings and new building designs and guides owners and facility decision makers in improving survivability (or enhanced continued operations) after an attack. It also provides an indication of security value for facility owners and occupants that is analogous to the U.S. Green Building Council's LEED building rating system. Buildings are rated according to likely survivability, security, and safety given various degrees and types of terrorist or criminal assaults.

Note that in this rating system the term "security" is defined as *the capability to prevent terrorist or criminal attacks, reduce vulnerability to such events, and provide enhanced recovery from an event if one occurs. Consideration of life safety is at the forefront of prevention, mitigation, response, and recovery.*

1.2 BASIS

The rating system builds upon concepts present in other efforts and references.

1.2.1 LEED System

The former Building Security Council (BSC) was modeled after the U.S. Green Building Council (USGBC); however, it addressed security rather than sustainability. While the building security rating system maintains some elements of the LEED system, such as providing an indication of value for facility owners and occupants and categories named after precious metals, it diverges substantially by introducing risk and cost-benefit analysis into the rating methodology. The building security rating system recognizes that facilities have varying levels of risk and that all potential risk mitigation measures do not provide the same benefit. Therefore, the building security rating system introduces a sliding scale for rating a facility's security posture. Higher-risk buildings require more countermeasures in conjunction with the performance requirements of those countermeasures, based on the combined value of the countermeasures in mitigating the risk to the facility and the expense and/or effort required in implementing the countermeasures. This cost-benefit analysis provides a ranked countermeasure checklist with somewhat simple countermeasures at one end of the sliding scale and more complex countermeasures at the other, where the increased risk mitigation justifies the expense.

1.2.2 FEMA 426

The Federal Emergency Management Agency (FEMA) developed the *Reference Manual to Mitigate Potential Terrorist Attacks against Buildings* (FEMA 426, 2003a) to provide information on how to mitigate the effects of potential terrorist attacks. The intended audience includes architects and engineers in private institutions and state and local

government officials working in the building sciences community. The objective of this manual is to reduce physical damage to structural and nonstructural components of buildings and related infrastructure and to reduce casualties during conventional bomb attacks and those using chemical, biological, and radiological (CBR) agents. Because of the similarity of goals, FEMA 426 was the primary reference for the building security rating system.

A fundamental difference, however, is that FEMA 426 asks a series of questions designed to determine a building's vulnerability, while the building security rating system provides countermeasures intended to measure a facility's security posture based on potential threats. The building security rating countermeasures are essentially answers to FEMA questions that are appropriate to a specific facility.

1.2.3 Other References

In addition to LEED and FEMA 426, many other references were used in developing the building security rating system. The countermeasures were developed based on references used across the security industry, the application of crime prevention through environmental design (CPTED) principles, and professional experience. These references supplemented and, in some cases, refined the countermeasures developed from FEMA 426 (2003a). Specific references used to determine countermeasures include

- FEMA risk management publications:
 - FEMA 426 (2003a),
 - FEMA 427 (2003b),
 - FEMA 452 (2005), and
 - FEMA 455 (2009);
- U.S. Department of Homeland Security (DHS) integrated rapid visual screening / risk assessment methodologies including
 - DHS (2009),
 - DHS (2011a)
 - DHS (2011b), and
 - DHS (2011c);
- Various risk assessment methodologies including
 - Federal security risk management (FSRM), and
 - Sandia National Laboratory's risk assessment methodology (RAM);

- Interagency Security Committee (ISC) security design criteria for new federal office buildings and major modernization projects; and
- Department of Defense (DoD) unified facilities criteria.

Most countermeasures used in the building security rating system appear in one or more of the reference documents and are common to the security and risk mitigation industry. However, the countermeasures do not always appear in these references with the same specificity and detail. For example, FEMA publications, various risk methodologies, and CPTED guidelines are intended for a general audience and, in most cases, do not provide specific performance requirements for recommended countermeasures. Federal design criteria provide specific performance requirements (based on risk) that are appropriate for federal or DoD facilities. In many cases, those countermeasures require substantial engineering design and analysis to implement.

The building security rating system seeks to strike a balance between the various reference documents and provides a simple-to-use checklist, appropriate for a wide variety of facilities, with a reasonable means of measuring adequacy. In some cases, where appropriate, the checklist includes the requirement for a more detailed risk or engineering level analysis to determine appropriate countermeasure development and performance.

While the building security rating system utilizes countermeasures from various federal and DoD references and criteria, the system is not a replacement for and does not constitute full compliance with any specific criteria.

1.3 THIS DOCUMENT

This document contains the complete description of the BSRS system. It includes a section on the methodology for classifying buildings according to potential threats and the consequences of an event, the list of specific countermeasures required for each level of relative security, the technique for determining the appropriate countermeasures for a specific building, and full commentary on the application of the countermeasures.

CHAPTER 2

Building Classification

The first step in the rating system is to classify buildings from a security viewpoint. All buildings are placed into one of four classes: A, B, C, or D. Four classes were chosen to provide a reasonable level of distinction between the threat to and impact of an event on different buildings without overly complicating the classification and, consequently, the rating process.

2.1 OVERVIEW

Class A facilities are typically large-occupancy, high-profile buildings that are attractive targets for a wide variety of attacks. They may also be one-of-a-kind facilities that would be difficult and/or impossible to replace in a reasonable timeframe. Additionally, these facilities are likely to be located in large metropolitan areas, near other high-profile targets or critical infrastructure, and face a high risk of collateral damage from one of these potential targets. Other attributes of Class A buildings might include being a public facility with many visitors or located in a high-crime area. Examples of Class A facilities include the New York Stock Exchange, the U.S. Capitol, or a facility that is a key piece of the U.S. power grid.

Class B facilities are usually slightly smaller and less populated than Class A buildings, or are less attractive targets. They may still exist in metropolitan areas and be located close to high-profile facilities, critical infrastructure, or industrial facilities. Examples of Class B facilities include a large federal building, a state capitol, a large hospital, or a nuclear power plant located in a rural area.

Class C facilities are generally moderate in size with limited occupancy (fewer than 450 occupants); are likely to be located in cities with fewer than 500,000 people; or do not present an attractive target for a large-scale attack. Examples of Class C facilities include commercial office buildings, apartment complexes, large shopping centers,

most large hotels and schools (unless they are close to other potential targets), local government buildings, and industrial plants in rural locations.

Class D facilities are typically small offices or buildings that are more likely to be targets of criminal activity such as burglary or vandalism. Examples of Class D facilities are an office with fewer than 100 people located in a city with fewer than 100,000 people, a small school located in a rural community, and a small shopping center.

The four building classes are used to determine the quantity and extent of the countermeasures required to protect the building and its occupants.

The following sections introduce how buildings are classified. The overall classification strategy is described first. Then classification system components are introduced. Finally, the mathematical description of the classification system is presented.

Currently, the rating system is limited to those structures specifically cited in the foreword to FEMA 426 (2003a), namely, commercial office facilities, retail commercial facilities, light and industrial manufacturing facilities, health care facilities, local schools (K–12), and higher educational (university) facilities. Other infrastructure types, such as bridges, utilities, power generation plants, residential buildings, and places of public assembly such as stadia or amusement parks, are not covered by this rating system.

2.2 METHODOLOGY: GENERAL

Classifying buildings is a challenging task that must be performed as a part of an overall building evaluation scheme. In so doing, the following two questions must be asked:

1. What is the ultimate purpose of the building evaluation activity?
2. Are any other factors involved in the building evaluation, beyond the desired building classification?

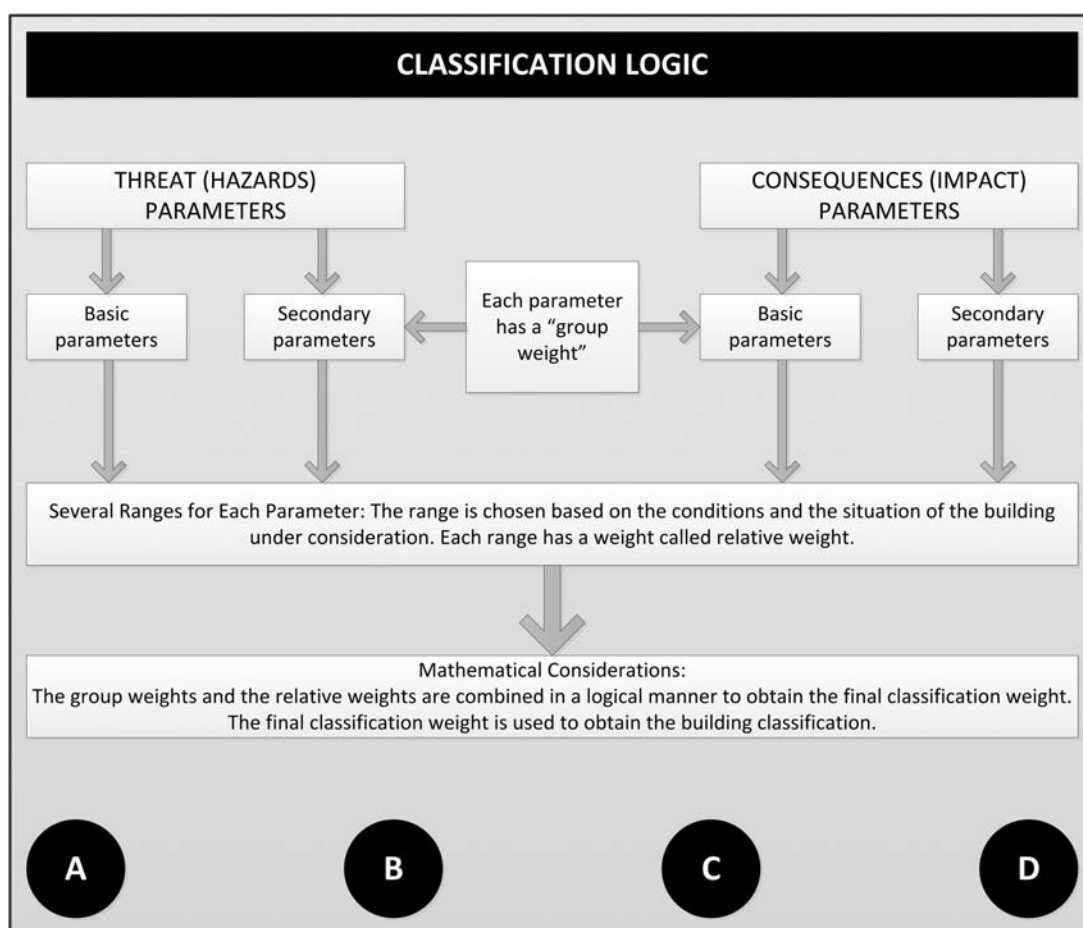


Fig. 2-1. Classification logic.

Based on the answers to these two questions, the building classification can be reasonably designated. For example, the evaluation of buildings for vertical loads in structural engineering is performed according to function (libraries, office buildings, residential buildings, etc.) and location (e.g., snow and wind loads) only. As soon as the building function is determined, the hazard (actual live load) and mitigation (acceptance limits) are determined. If the building function is a measure of the importance or impact of the building, it becomes clear that the process is an informal risk assessment. Within that process, the building classification represents only one part. In this structural engineering example, all three aspects (hazard, mitigation, and impact) are interconnected; that is, they are not independent.

In the field of building security, the interdependencies among these three parameters (hazard, mitigation, and impact) are not as tightly related as in the structural engineering example just provided. The current rating system subdivides the rating process into two parts: building classification and countermeasures. The countermeasures, obviously, provide mitigation parameters. The building

classification covers both the threat (hazard) and the consequence (impact) parameters. Although the parameters are generally discussed individually, they are interrelated, as will be discussed later. Fig. 2-1 shows the overall composition of the classification system.

2.3 GENERAL CLASSIFICATION APPROACH

The classification system is based on two parameters: the consequence (impact) parameter and the threat (hazard) parameter. The final classification considers the combined effect of both parameters. To determine both the level of impact and hazard for a particular building, a series of factors are evaluated. For each parameter, the factors are divided into primary (basic) and secondary groups. The primary group considers issues with a significant (or governing) effect on the level of impact or hazard. The secondary factors address issues of lesser significance to the impact or hazard. Each factor is evaluated with questions that have a range of answers. The possible answers vary by question from a simple binary choice (yes or no) to a long list of

building types. In addition, some questions require a numeric answer, while others are qualitative in nature and require considerable judgment on the part of the user.

An essential step in the classification system is converting the answers to numeric values. To do so, a relative weight that increases as the relative threat or consequence increases within the range is assigned to each possible choice for a given question. In addition, a group weight is assigned to factors under consideration. The total weight of the factor is the product of the relative weight times the group weight. Thus, for any given factor

$$\text{Factor weight} = \text{Relative weight} * \text{Group weight} \quad (2-1)$$

Note that the relative weight is chosen during the building's security assessment depending on the specifics of the property. The group weight is a preassigned weight that controls the overall relevancy of the factor under consideration. The preassigned group weights also reflect the difference between primary and secondary factors. Due to the essential nature of the primary factors, the group weights of the primary factors are considerably higher than the group weights of the secondary factors. Fig. 2-1 shows the logical relationships and hierarchy of the parameters, factors, and classification system.

2.4 PRIMARY HAZARD CLASSIFICATION FACTORS

Three factors are considered primary and thus have a significant effect on the hazard parameter:

1. **Building Functions (or Usage) and Threat Weights.**

Table 2-1 shows four building function categories based on the Building Occupancy Categories from ASCE 7-05 (2006). For each building function category, a hazard relative weight is assigned. Note that the weights range from 1 to 4, with a weight of 1 representing a low hazard level and a weight of 4 representing a maximum hazard level. The group weight is 18.75. Thus, the minimum weight of this factor is 18.75, while the maximum weight is 75. For buildings with multiple uses, select the building type corresponding to the most critical (highest relative weight) occupancy.

Note that Table 2-1 provides a general guideline only, and the relative weight values provided describe commonly held notions and assumptions for the given building type and function. For instance, typical assumptions for libraries, educational facilities, recreation centers, and such may distinguish these facilities as "vacant" during times of emergency and, correspondingly, might be assigned a somewhat low threat weight value. However, if the building is designated as a community emergency shelter, a higher threat weight must be assigned.

Recognizing that it would be impractical to describe every possible scenario, the Building Rating Security Committee (BRSC) determined that the rating would be optimized by the sound engineering judgment of the users. Therefore, it is the responsibility of the users to consider all operational and environmental factors and correspondingly validate and determine appropriate threat weight values.

When a need exists to deviate from the threat weights given in Table 2-1, the users need to keep a record of the following minimum information:

- a. Project identifiers;
- b. Users' identifiers and contact information;
- c. Affected table and item;
- d. Brief justification narrative; and
- e. Proposed value.

2. **Critical Infrastructure Association.** The second basic hazard factor is the building's association with critical U.S. infrastructures. Five qualitative choices are possible. They range from "very low" association to critical infrastructures to "very high" association to critical infrastructures, as shown in Table 2-2. Each association level is assigned a relative weight from 0 to 4 with the more critical infrastructure association assigned a higher weight. The group weight for this parameter is also 18.75. Thus, the maximum possible weight from this factor is 75 while the minimum weight is 0.

3. **Threat History.** This factor reflects the history of threats received the previous year and uses the number of those threats as an indication of the building's future threat exposure. Five weights are assigned, as shown in Table 2-3. Each range of threat values is assigned a relative weight from 0 to 4. If no threats occurred in the previous year, the relative weight is 0. If the number of threats in the previous year is 100 or more, the relative weight is 4. Because of the direct correlation between the actual threat and the threats received in the previous year, the group weight for this factor is also 18.75. Thus, the maximum possible weight for this factor is 75 while the minimum weight is 0.

2.5 SECONDARY HAZARD CLASSIFICATION FACTORS

Seven secondary hazard factors can have an effect on the final building classification. These secondary hazard factors are

1. **The VIP Factor.** The threat to a building increases as VIPs or celebrities reside, work in, or visit the building. Table 2-4 shows the binary (yes or no) possibilities and their relative weights (1 or 0). The group weight for this factor is 2.0. Thus, the minimum factor weight is 0, and the maximum weight is 2.

Table 2-1 Building Functions and Threat Weights

Building Type or Function	Categories / Relative Weight	Group Weight
All buildings except those listed in other categories.	1	
Buildings that represent a substantial hazard to human life in the event of failure, including, but not limited to • Buildings where more than 300 people congregate in one area; • Buildings with daycare facilities with a capacity greater than 150; • Buildings with elementary school or secondary school facilities with a capacity greater than 250; • Buildings with a capacity greater than 500 for colleges or adult education facilities; • Health care facilities with a capacity of 50 or more resident patients, but not having surgery or emergency treatment facilities; and • Jails and detention facilities. Buildings, not included in Category 3 or 4 (for simplicity, the value of relative weight is the same as the value of the building category), with potential to cause a substantial economic impact and/or mass disruption of day-to-day civilian life in the event of failure, including, but not limited to, telecommunication centers.	2	
Buildings not included in Category 3 or 4 containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released, including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, hazardous waste, or explosives.		18.75
Buildings and other structures designated as essential facilities, including, but not limited to • Hospitals and other health care facilities with surgery or emergency treatment facilities; • Fire, rescue, ambulance, and police stations and emergency vehicle garages; • Designated emergency shelters; • Designated emergency preparedness, communication, and operation centers and other facilities required for emergency response; • Public utility facilities required in an emergency; and • Buildings having critical national defense functions. Buildings containing highly toxic substances where the quantity of the material exceeds a threshold quantity established by the authority having jurisdiction, including, but not limited to, facilities that manufacture, process, handle, store, use, or dispose of such substances as hazardous fuels, hazardous chemicals, or hazardous waste.	3	
Buildings containing highly toxic substances shall be eligible for classification as Category 2 structures if it can be demonstrated by a hazard assessment that a release of the highly toxic substances does not pose a threat to the public. This reduced classification shall not be permitted if the buildings also function as essential facilities.		
Buildings with an essential national or local emergency response function.	4	

Table 2-2 Critical Infrastructure Association Factor

Infrastructure Association	Relative Weight	Group Weight
Very low	0	
Low	1	
Medium	2	18.75
High	3	
Very high	4	

Table 2-3 Threat History Factor

Number of Threats	Relative Weight	Group Weight
None	0	
1–5	1	
6–10	2	18.75
11–100	3	
>100	4	

Table 2-4 VIP Factor

VIP Factor	Relative Weight	Group Weight
Yes	1	2.0
No	0	

Table 2-5 Public Visitors Factor

Number of Public Visitors	Relative Weight	Group Weight
<20	0	1.5
20–49	1	
50–99	2	
100–300	3	
>300	4	

Table 2-6 City Population Factor

Population	Relative Weight.	Group Weight
<100,000	0	1.0
100,000–500,000	1	
500,001–1 million	2	
>1 million	3	

- Public Visitors Factor.** The threat to a building increases with an increased number of public visitors. Table 2-5 shows five ranges of weights corresponding to the number of public visitors to the facility, ranging from fewer than 20 to more than 300 per day. The relative weight ranges from 0 to 4. The group weight for this factor is 1.5. Thus, the minimum weight of this factor is 0, while the maximum weight is 6.
- City Population Factor.** The threat to a building increase as the city population increases. Table 2-6 shows four city population ranges, from a population of fewer than 100,000 to a population of more than 1 million. The relative weight is assigned in increasing order from 0 to 3. The group factor weight is 1.0. Thus, the minimum factor weight is 0, while the maximum weight is 3.
- Distance to Hazardous Materials/Transportation Routes.** The threat to a building increases if the building is located near a hazardous material storage site. Additionally, if the building or facility is located near a hazardous material transportation route, the threat to the facility increases. This is due to the possibility of hazardous material being released or bomb explosions from cars or trucks traveling along the transportation route. Table 2-7 shows five ranges of distances from

Table 2-7 Distance to Hazardous Materials/Transportation Routes Factor

Distance to Hazardous Materials or Trans. Rte. (ft)	Relative Weight	Group Weight
>1,000	0	1.0
501–1,000	1	
101–500	2	
6–100	3	
0–5	4	

Note: 1 ft = 0.3048 m.

Table 2-8 Distance to High-Profile Buildings Factor

Distance to High-Profile Buildings (ft)	Relative Weight	Group Weight
>1,000	0	1.0
501–1,000	1	
101–500	2	
10–100	3	
0–10	4	

Note: 1 ft = 0.3048 m.

- Distance to High-Profile Buildings.** The threat to a building increases if the building is located near one or more high-profile buildings. This is due to the possibility of collateral damage if the adjacent high-profile buildings are attacked. Table 2-8 shows five ranges of distances from the building site to a high-profile building. The distance ranges from 0 m to 305 m (0 ft to more than 1,000 ft). The relative weight ranges from 0 to 4. The group weight for this factor is 1.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 4.
- Gang Activities.** The threat (hazard) to the building increases if there is known gang activity in the area or if the building is located in a high crime area. For this factor (Table 2-9) the choices are binary (yes or no). The relative weights are 1 or 0, respectively. The group weight for this factor is 2.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 2.

Table 2-9 Gangs or Criminal Activities Factor

Gangs or Criminal Activities Parameter	Relative Weight	Group Weight
Yes	1	2.0
No	0	

Table 2-10 Proximity to Law Enforcement Factor

Law Enforcement Proximity	Relative Weight	Group Weight
Yes	1	4.0
No	0	

Table 2-11 National Symbolism or Prominence Factor

National Prominence	Relative Weight	Group Weight
Very low	0	18.75
Low	1	
Medium	2	
High	3	
Very high	4	

7. **Proximity to Law Enforcement Agencies.** If a building is located near a law enforcement agency such as a police station, the threat to the building increases. Also, if a law enforcement agency is a tenant in the building, the threat to the building increases. For this factor (Table 2-10) the choices are binary (yes or no). The relative weights are 0 or 1, respectively. The group weight for this factor is 4.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 4.

2.6 PRIMARY IMPACT/CONSEQUENCE CLASSIFICATION FACTORS

Four primary classification factors relate to the impact (or consequences) of losing building functions.

1. **National Symbolism or Prominence.** The first of these factors is the national symbolic function or the national prominence of the building. For example, the Statue of Liberty or the New York Stock Exchange would rank very high for this factor. As shown in Table 2-11, this factor has five relative weights. The values range from very low with a relative weight of 0 to very high with a relative weight of 4. The group

Table 2-12 National Political Significance Factor

National Political Significance	Relative Weight	Group Weight
Very low	0	18.75
Low	1	
Medium	2	
High	3	
Very high	4	

Table 2-13 Local Economic Significance Factor

Local Economic Significance	Relative Weight	Group Weight
Very low	0	18.75
Low	1	
Medium	2	
High	3	
Very high	4	

weight for this factor is 18.75. Thus, the maximum weight of this factor is 75, while the minimum weight is 0.

2. **National Political Significance.** The next primary factor is the national political significance of the building. For example, the White House in Washington, D.C., or an abortion clinic would rank very high. As shown in Table 2-12, this factor has five relative ranges. The values range from very low with a relative weight of 0 to very high with a relative weight of 4. The group weight of this factor is 18.75. Thus, the maximum weight of this factor is 75, while the minimum weight is 0.
3. **Local Economic Significance.** The next primary factor is the local economic significance of the building with respect to its primary function. For example, a large employer, financial institution, or tax revenue generator would rank very high. As shown in Table 2-13, this factor has five values. The values range from very low with a relative weight of 0 to very high with a relative weight of 4. The group weight of this factor is 18.75. Thus, the maximum weight of this factor is 75, while the minimum weight is 0.
4. **Infrastructure or Transportation Utility.** The final primary factor is the infrastructure or transportation utility of the building. For example, transportation hubs or control facilities of major bridges or tunnels would rank very high. As shown in Table 2-14, this parameter has five values. The values range from very

Table 2-14 Infrastructure or Transportation Utility Factor

Infrastructure or Transportation Utility	Relative Weight	Group Weight
Very low	0	18.75
Low	1	
Medium	2	
High	3	
Very high	4	

Table 2-15 Child Care Factor

Child Care Facility is Present	Relative Weight	Group Weight
Yes	1	1.0
No	0	

low with a relative weight of 0 to very high with a relative weight of 4. The group weight for this factor is 18.75. Thus, the maximum weight of this factor is 75, while the minimum weight is 0.

2.7 SECONDARY IMPACT/CONSEQUENCE CLASSIFICATION FACTORS

Six secondary impact or consequence factors can have an effect on the final building classification. These secondary factors are

1. **Child Care Factor.** The impact or consequence of the loss of the function of the building increases if the building is or includes a child care facility. For this factor, shown in Table 2-15, the choices are binary (yes or no). The relative weights are 0 or 1, respectively. The group weight for this factor is 1.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 1.
2. **Occupancy Factor.** The impact or consequence of the loss of a facility with high occupancy is much higher than that if the building or facility has a low occupancy. Table 2-16 shows four ranges of building occupancy, from fewer than 10 people (on average) to more than 450 people (on average). The relative weight ranges from 0 to 3. The group weight for this factor is 1.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 3.
3. **Building Size Factor.** The impact or consequence of the loss of a large facility (as measured by total floor area) is much higher than if the facility is small. Table 2-17 shows four ranges of building floor area,

Table 2-16 Occupancy Factor

Building Occupancy	Relative Weight	Group Weight
<10	0	1.0
10–150	1	
151–450	2	
>450	3	

Table 2-17 Building Size Factor

Building Area (sq ft)	Relative Weight	Group Weight
<2,500	0	1.0
2,501–80,000	1	
80,001–150,000	2	
>150,000	3	

Note: 1 sq ft = 0.0929 sq m.

Table 2-18 Public Visitors Factor

Number of Daily Public Visitors	Relative Weight	Group Weight
<20	0	1.5
20–49	1	
50–99	2	
100–300	3	
>300	4	

from an area less than 232 sq m (2,500 sq ft) to areas of more than 150,000 sq ft (13,935 sq m). The relative weight ranges from 0 to 3. The group weight for this factor is 1.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 3.

4. **Public Visitors Factor.** The impact or consequence of the loss of a facility increases when the number of public visitors increases. Table 2-18 shows five ranges of the number of public visitors to the facility, from fewer than 20 to more than 300 per day. The relative weight ranges from 0 to 4. The group weight for this factor is 1.5. Thus, the minimum weight of this factor is 0, while the maximum weight is 6. Note that this factor is also included as a secondary factor for the threat effects on building classification. This is in recognition that the presence of public visitors can be both a threat and a consequence.
5. **Historic Status Factor.** The impact or consequence of the loss of a historically designated building should be included in any building classification, because it would be difficult (in some cases impossible) to

Table 2-19 Historic Status Factor

Does the Building Have a Historic Designation?	Relative Weight	Group Weight
Yes	1	2.0
No	0	

Table 2-20 Overall Impact Factor

Overall Impact Parameter	Relative Weight	Group Weight
Low	0	2.0
Medium	1	
High	2	

replace such a building. For this factor, shown in Table 2-19, the choices are binary (yes or no). The relative weights are 1.0 or 0.0, respectively. The group weight for this factor is 2.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 2.

6. **Overall Impact Factor.** The purpose of this factor is to represent the overall impact on the major tenant organizations if the facility is destroyed or damaged beyond use for an extended period of time. A significant loss of business would carry a high weight. Table 2-20 shows three qualitative ranges (low, medium, and high) that describe the overall impact. The relative weight ranges from 0 to 2. The group weight for this factor is 2.0. Thus, the minimum weight of this factor is 0, while the maximum weight is 4.

2.8 MATHEMATICAL EVALUATION OF BUILDING CLASSIFICATION

The factors defined in the previous sections are evaluated and assigned numerical values. These values must be combined in a meaningful way to determine the building classification. This section explains the mathematical process by which the classification is obtained. For a given factor, i , and its range, j , the relative weight is defined as RW_{ij} . Similarly, the group weight is identified for the factor i as GW_i . Thus the total weight for each factor is computed as

$$TW_i = RW_{ij}GW_i \quad (2-2)$$

Note that Eq. (2-2) is the formal representation of Eq. (2-1).

Using Table 2-1 through Table 2-20, the total weight for each of the 20 factors, TW_i , can be calculated. Note that the subscript $i = 1 \dots 20$ is distributed as shown in Table 2-21.

The next step is to compute the aggregate weights of the primary hazard (threat) factors, secondary hazard (threat)

Table 2-21 Counters i and Their Uses

Counter	Comment
$i = 1 \dots 3$	Primary hazard (threat) factors (total of 3 factors)
$i = 4 \dots 10$	Secondary hazard (threat) factors (total of 7 factors)
$i = 11 \dots 14$	Primary impact (consequence) factors (total of 4 factors)
$i = 15 \dots 20$	Secondary impact (consequence) factors (total of 6 factors)

Table 2-22 Values of Scaling Factors

i	TWM_i
4	2
5	6
6	3
7	4
8	4
9	2
10	4
15	1
16	3
17	3
18	6
19	2
20	4

factors, primary impact (consequence) factors, and secondary impact (consequence) factors, PT , ST , PC , and SC , respectively, as follows:

$$PT = MAX(TW_1, TW_2, TW_3) \quad (2-3)$$

$$ST = 100 \frac{\sum_{i=4}^{i=10} TW_i}{\sum_{i=4}^{i=10} TWM_i} \quad (2-4)$$

$$PC = MAX(TW_{11}, TW_{12}, TW_{13}, TW_{14}) \quad (2-5)$$

$$SC = 100 \frac{\sum_{i=15}^{i=20} TW_i}{\sum_{i=15}^{i=20} TWM_i} \quad (2-6)$$

where TWM_i = the maximum possible total weight for a given i , as shown in Table 2-22.

Note that the use of the *MAX* function for the primary factors results in an equal effect for each factor. In such a case, the higher weight of the factor governs the value of the total weight. If a summation had been used instead, the lower factor weights would result in a lowering of the final weight, clearly an undesirable result.

The denominators in Eqs. (2-4) and (2-6) are scaling factors that contain the maximum possible value for each factor i as shown in Table 2-22. This results in a percentage score for the aggregate secondary threat and consequence factors. From Table 2-22, the value of the dominators in Eqs. (2-4) and (2-6) are 25 and 19, respectively.

Eqs. (2-4) and (2-6) can now be expressed as

$$ST = 100 \frac{\sum_{i=4}^{i=10} TW_i}{25} \quad (2-7)$$

$$SC = 100 \frac{\sum_{i=15}^{i=20} TW_i}{19} \quad (2-8)$$

The primary threat and consequence factors are combined using a square root of the sum of the squares (SRSS) approach, resulting in a primary parameter weight:

$$W_{PRIMARY} = MIN\left(100, \sqrt{PT^2 + PC^2}\right) \quad (2-9)$$

Table 2-23 Final Building Classification

Final Classification Weight, W_{FINAL}	Building Classification
$W_{FINAL} \geq 75$	A
$50 \geq W_{FINAL} < 75$	B
$25 \geq W_{FINAL} < 50$	C
$W_{FINAL} < 25$	D

The use of the *MIN* function in Eq. (2-9) limits the value of $W_{PRIMARY}$ to 100.

Given the uncertain nature of the variables and their occurrences, the SRSS method for combining the effects of *PT* and *PC* provides a reasonable empirical approach.

The secondary factors are combined in a similar fashion to obtain the secondary parameter weight:

$$W_{SECONDARY} = MIN\left(100, \sqrt{ST^2 + SC^2}\right) \quad (2-10)$$

The use of the *MIN* function in Eq. (2-10) limits the value of $W_{SECONDARY}$ to 100.

The final classification weight can then be expressed as

$$W_{FINAL} = 0.75W_{PRIMARY} + 0.25W_{SECONDARY} \quad (2-11)$$

The final classification of the building can then be obtained from the final classification weight, W_{FINAL} , using Table 2-23.

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CHAPTER 3

Countermeasure Evaluation

As discussed in Chapter 2, the building classification system is based on three pillars. The first two are threat and impact or consequence. The third pillar of building security, mitigation measures or countermeasures, is the subject of this section.

3.1 OVERVIEW

Generally speaking, each building class has a corresponding security rating level of potential countermeasures used to evaluate the security posture of a facility. Because the building security rating system must represent a wide variety of buildings, the countermeasures represent some level of risk acceptance and are thus considered to be practically achievable within their respective classes. It is assumed that the facility owner has the ability to accomplish or implement all the countermeasures. Such measures as moving a facility, closing streets, protecting against aircraft attacks, and so on, are not included because they cannot be realistically implemented by all facility owners. Although these measures are not considered part of the official rating system, these measures and others like them are innovative examples that can be used to reward building owners and give them credit in meeting their security goals. Ultimately, the rating system and countermeasures listed here are performance based and are intended to achieve a desired security goal.

Fig. 3-1 shows the countermeasure checklist system. The overall level system is discussed first, followed by the levels of countermeasures. As noted in the Fig. 3-1, countermeasure level determined in this section is combined with building class discussed in Chapter 2 to determine building system rating (Rated, Bronze, Silver, Gold, or Platinum) described in Chapter 4.

3.2 COUNTERMEASURE LEVELS

Many security countermeasures can be applied to a building to enhance its security. Some of the countermeasures are

basic and suitable to building Class D. Some countermeasures are demanding and are needed only for more sensitive building classes, such as Class A. In recognition of this, the security countermeasures were divided into five levels, according to the degree of protection they provide. The most basic level is the rated level (level 1). A rated level provides a basic security protection for the building. The four additional levels of protection are levels 2 through 5; level 2 provides the lowest protection level (even though level 2 still provides higher protection than a rated level 1). Levels 3, 4, and 5 provide increasing levels of protection, with level 5 providing the maximum protection.

Countermeasure levels interact closely with building classifications in the building rating process. This interaction is described in the next section, which presents the layout of the countermeasure levels.

3.3 LAYOUT OF LEVELS

All five levels of countermeasures have a similar layout. Each level is subdivided by security discipline into 13 groups, as shown in Table 3-1.

The 13 checklist disciplines are the same as those of FEMA 426 (2003a) and are based on common physical security principles. Each discipline has a certain number of countermeasures that relate to the discipline. The countermeasures increase in their demands as the security level increases. For example, the rated level (level 1) covers the least demanding countermeasures; next, level 2 covers more demanding countermeasures, and so on. The most demanding level is level 5. Rating class, countermeasure requirements for each rating level, and corresponding countermeasure checklists are given in Appendix B.

The step-by-step procedure for each level is executed as follows:

1. For a given level and a given discipline, i , the professional evaluates each countermeasure, j . The result of the evaluation takes the form of a drop-down list with

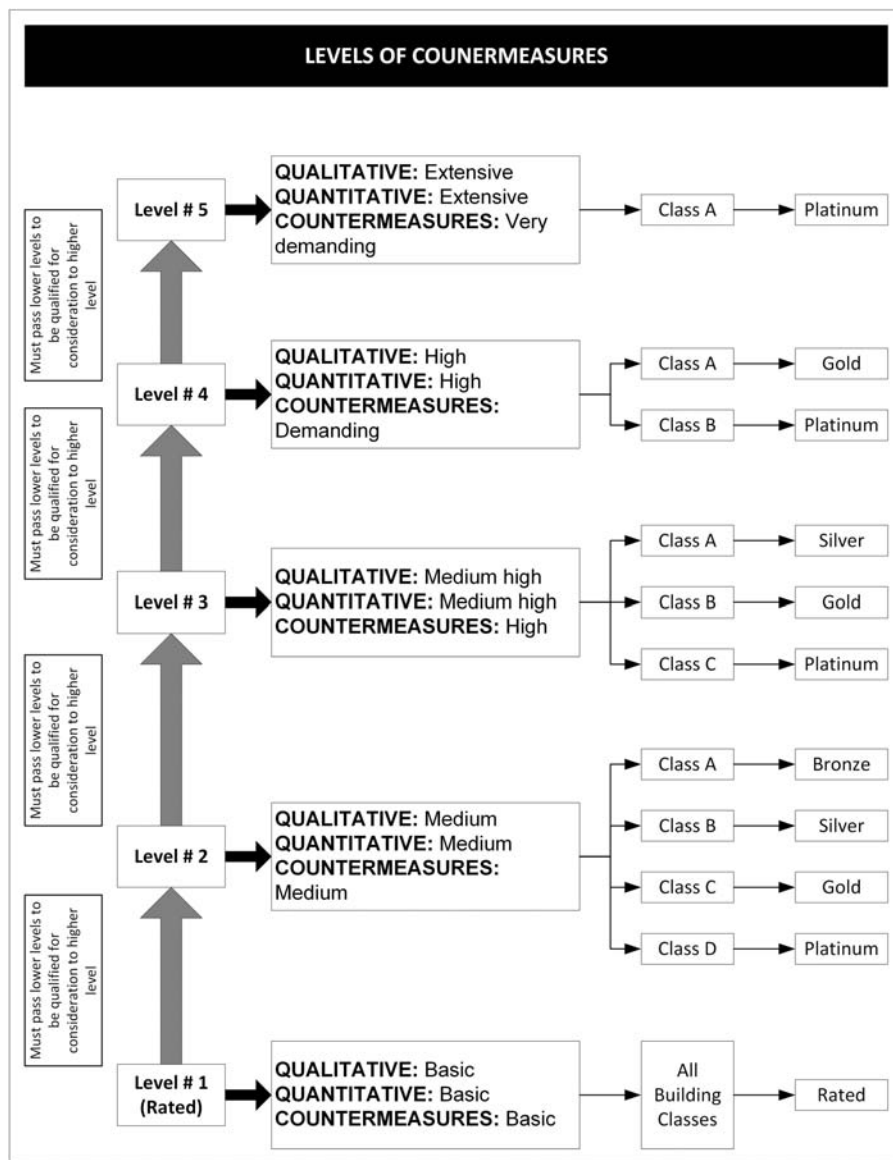


Fig. 3-1. Layout of the levels system.

preset choices; each choice has a preset weight, w_{ij} . Note that $0 \leq w_{ij} \leq 1.0$. In certain situations, no numerical value is given for the choice. One of these situations is when the countermeasure is *required*. The other situation is when the countermeasure is *not applicable* (N.A.) to the condition being investigated. Both situations will be discussed in more detail later in this section. Different preset drop-down lists and their preset weights, w_{ij} , are shown in Tables 3-2, 3-3, 3-4, and 3-5.

- Each countermeasure j has a constant, preassigned weight, W_{ij} , that reflects the relative importance of that countermeasure relative to other countermeasures in discipline i . The values for W_{ij} are shown in Tables

(3-6)–(3-10) for the five levels. Note that an R in a table indicates that the countermeasure is required for this level; as such the weight is considered infinite. The required countermeasures are discussed later in this section.

- The product $w_{ij}W_{ij}$ represents the relative weight of the j^{th} countermeasure in discipline i for the building being considered. The value W_{ij} represents the maximum possible relative weight that countermeasure j can attain (this implies $w_{ij} = 1.0$).
- For each discipline, i , there are two representative weights, the actual summation of the discipline weight, A_i , and the maximum possible summation of the discipline weight, T_i . They are computed as

Table 3-1 Disciplines of Each Countermeasure Level

Numbering System (Consistent with FEMA 426)	Discipline
1	Site
2	Architectural
3	Structural
4	Building envelope
5	Utilities
6	Mechanical
7	Plumbing and gas
8	Electrical
9	Fire
10	Communications and IT
11	Equipment operations and maintenance
12	Security systems
13	Security master plan

Table 3-2 Required Drop-Down List

Choice	w_{ij}
1 None	Fail
2 Full	Pass
3 N.A.	N.A.

Table 3-3 Binary Drop-Down List

Choice	w_{ij}
1 None	0
2 Full	1
3 N.A.	N.A.

Table 3-4 Three-Level Drop-Down List

Choice	w_{ij}
1 None	0
2 Medium	0.5
3 Full	1
4 N.A.	N.A.

Table 3-5 Five-Level Drop-Down List

Choice	w_{ij}
1 None	0
2 Low	0.25
3 Medium	0.5
4 High	0.75
5 Full	1
6 N.A.	N.A.

Table 3-6 Values of w_{ij} for Level 1 (Rated)

Discipline		Countermeasure Counter						
		1	2	3	4	5	6	7
1	Site	R	R	R	R	1	1	1
2	Architectural	1	1	1	1	1	1	
3	Structural	R	R	R				
4	Building envelope	2	2	4				
5	Utilities	R	R					
6	Mechanical	1	1	1				
7	Plumbing and gas	0						
8	Electrical	0						
9	Fire	0						
10	Communications and IT	0						
11	Equipment operations and maintenance	2						
12	Security systems	3	1	R	1	1		
13	Security master plan	R						

Table 3-7 Values of W_{ij} for Level 2

Discipline	Countermeasure Counter													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Site	R	1	1	1	1	1	1	1	1	1	1			
2 Architectural	1	3	1	2	1	1	1	2	1	R	1	1	1	1
3 Structural	3	1	R	R	4	1								
4 Building envelope	3	3	3	1	4									
5 Utilities	1	4												
6 Mechanical	4	3	1	1										
7 Plumbing and gas	0													
8 Electrical	1													
9 Fire	0													
10 Communications and IT	1													
11 Equipment operations and maintenance	2	1												
12 Security systems	3	1	R	R	1	1	1	1	1	2				
13 Security master plan	2	1												

Table 3-8 Values of W_{ij} for Level 3

Discipline	Countermeasure Counter																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Site	1	R																
2 Architectural	R	1	R	R	1	1	1	1										
3 Structural	1	3	1	R	R	2	2											
4 Building envelope	3	2	4	4														
5 Utilities	2	1	1	2	1	1												
6 Mechanical	1	3	1															
7 Plumbing and gas	1	1																
8 Electrical	2	1	4	1														
9 Fire	1	1	1	1	2	1												
10 Communications and IT	2																	
11 Equipment operations and maintenance	3																	
12 Security systems	3	3	1	1	2	2	R	1	2	1	1	2	2	3	2	1	1	R
13 Security master plan	R	1	1	1	R	R												

Table 3-9 Values of W_{ij} for Level 4

Discipline	Countermeasure Counter																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 Site	R	2	1	2	1	3	3	1	1										
2 Architectural	3	1	1	2	1	1	1	1	1	1	1	1	2						
3 Structural	1	3	2	3	R	2	2	2	3	3	3	3	3	3	3	3	3	3	3
4 Building envelope	R	1	2	R	3	3	3	3											
5 Utilities	1	1	1	1	3	2	1	1	2	1	1								
6 Mechanical	1	2	3	2	3	2	2												
7 Plumbing and gas	2	1	2																
8 Electrical																			
9 Fire	2	1	2	1	R														
10 Communications and IT	1	1	1	1															
11 Equipment operations and maintenance	2	1	2																
12 Security systems	2	3	1	2	2	1	1	1	1	1									
13 Security master plan	1	1	1	1	1														

Table 3-10 Values of W_{ij} for Level 5

Discipline	Countermeasure Counter													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Site	2	3	1											
2 Architectural	3													
3 Structural	2	1	R	1	R	R	R	3	3					
4 Building envelope	R	3	3											
5 Utilities	2	1	1	3										
6 Mechanical	3	3	3	1	2	3	3	3	1	2	2	2	1	1
7 Plumbing and gas	1	1												
8 Electrical														
9 Fire	3													
10 Communications and IT	1													
11 Equipment operations and maintenance	1	1												
12 Security systems	3	2	2											
13 Security master plan	1	1												

Table 3-11 Values of N_i for Different Disciplines and Levels

Discipline	Level 5	Level 4	Level 3	Level 2	Level 1 (Rated)	Total # of Countermeasures per Discipline
1 Site	3	9	2	11	7	32
2 Architectural	1	13	8	14	6	42
3 Structural	9	19	6	6	3	43
4 Building envelope	3	8	2	5	3	21
5 Utilities	4	11	6	2	2	25
6 Mechanical	14	7	3	4	3	31
7 Plumbing and gas	2	3	2	0	0	7
8 Electrical	0	0	4	1	0	5
9 Fire	1	5	6	0	0	12
10 Communications and IT	1	4	1	1	0	7
11 Equipment operations and maintenance	2	3	1	2	1	9
12 Security systems	4	10	18	10	5	47
13 Security master plan	2	5	6	2	1	16
Total number of countermeasures per level	46	97	65	58	31	297

$$A_i = \sum_{j=1}^{j=N_i} w_{ij} W_{ij} \quad (3-1)$$

$$T_i = \sum_{j=1}^{j=N_i} W_{ij} \quad (3-2)$$

The total number of countermeasures for the i^{th} discipline is N_i . The values of N_i are shown in Table 3-11.

- Each discipline, i , within a security level has a preassigned relative weight. The purpose of the discipline relative weight, WDT_i , is to balance relative security countermeasures among different disciplines within the level. The relative actual weight and maximum possible weight for each discipline, i , are represented by the products $WDT_i A_i$ and $WDT_i T_i$, respectively. Table 3-12 shows the preassigned discipline weights for all levels.
- The actual total building security score for the level under consideration, S_{ACTUAL} , and the maximum possible building security score for the same level, $S_{MAXIMUM}$, can be computed as

$$S_{ACTUAL} = \sum_{i=1}^{i=13} WDT_i A_i \quad (3-3)$$

$$S_{MAXIMUM} = \sum_{i=1}^{i=13} WDT_i T_i \quad (3-4)$$

The actual-to-maximum score ratio for the level

$$\alpha = \frac{S_{ACTUAL}}{S_{MAXIMUM}} \quad (3-5)$$

is of particular importance in the rating system. It is used in evaluating the adequacy of the security of the building within a particular security level. Note that $0 \leq \alpha \leq 1.0$. A higher security status is approached when $\alpha \rightarrow 1.0$. Conversely, when $\alpha \rightarrow 0.0$, a lower security status is approached.

It is important to discuss in more detail the *required* and the *not applicable* (N.A.) situations for a countermeasure.

3.4 REQUIRED COUNTERMEASURES

Several countermeasures in each level are required. A required countermeasure is an essential countermeasure that must be implemented to pass that level. Required countermeasures do not have assigned weights; thus, they do not contribute to the computations in Eqs. (3-1)–(3-5). However, if the building fails to satisfy any required countermeasure, the building will not pass that level; this makes any computation of a security score irrelevant. Table 3-13 shows the number of required countermeasures for different levels.

3.5 NOT APPLICABLE COUNTERMEASURES

The building rating system was developed to be as general as possible. In some situations, this generality results in countermeasures that do not apply to a particular building. The rating system accommodates these situations by introducing a not applicable (N.A.) choice for that particular countermeasure. An N.A. selection does not contribute

Table 3-12 Discipline Relative Weights, WDT_i

Numbering System (Consistent with FEMA 426)	Discipline	Level 5	Level 4	Level 3	Level 2	Level 1 (Rated)
1	Site	6	14	1	10	3
2	Architectural	3	17	5	17	7
3	Structural	11	43	12	9	0
4	Building envelope	6	15	13	14	8
5	Utilities	16	48	26	10	0
6	Mechanical	68	15	5	9	3
7	Plumbing and gas	2	5	2	0	0
8	Electrical	0	0	12	5	0
9	Fire	5	16	27	0	0
10	Communications and IT	5	20	2	5	0
11	Equipment operations and maintenance	2	5	3	3	2
12	Security systems	9	15	28	11	6
13	Security master plan	2	5	3	3	0

Table 3-13 Number of Required Countermeasures

Level 5	Level 4	Level 3	Level 2	Level 1 (Rated)
5	5	11	6	11

numerically to Eqs. (3-1)–(3-5). It is recommended that the N.A. selection be used carefully, because it can bias the final security rating. When selecting N.A. from the menu, a detailed written explanation should be provided.

3.6 INTERRELATIONSHIPS AMONG COUNTERMEASURES

Where a countermeasure requires a set parameter, such as setback distance, the user of the rating system may consider using that countermeasure if some direct action or design has been included that substitutes for the given parameter, such as structural hardening instead of setback distance. Future versions of the rating system will address this equivalence by linking appropriate countermeasures in an automatic and logical manner.

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CHAPTER 4

Building Security Rating

The final step of the security rating system is combining the building classification and the security countermeasures. Such a combination ensures that the security rating accommodates all three important issues: threat, consequence (the components of the classification system), and countermeasures (the components of the countermeasure level system).

4.1 OVERVIEW

This chapter combines the building classification described in Chapter 2 and the security countermeasure levels described in Chapter 3 in a systematic fashion.

4.2 DESCRIPTION OF RATING CATEGORIES

The combined security rating system is subdivided into five categories: Platinum, Gold, Silver, Bronze, and Rated. Fig. 4-1 shows schematically the interaction among building security ratings, building classes, and countermeasure levels.

Note that for a given building class, say Class C, the countermeasure level increases as the building security rating increases. Similarly, for a given building rating category, say a Silver rating, the countermeasure level increases as the building classification increases.

4.2.1 Rated

This category is best described as a minimum baseline that is appropriate for all facilities regardless of the specific risk to that facility. Although only one countermeasure in the Rated category references a building code, the countermeasures in this category can be viewed in the same spirit as code requirements and should be considered the minimum standards that all building owners should strive to achieve.

Many countermeasures in this category are good safety and emergency planning practices that will improve pre-

paredness for a wide variety of scenarios (such as fire, natural hazards, and accidents) as well as security. Other countermeasures are considered to be relatively inexpensive crime prevention through environmental design (CPTED) measures. Overall, a minimum level of protection against forced entry (robbery and burglary), vandalism, and assault are achieved.

4.2.2 Bronze

In addition to increasing protection against the threats and tactics initially addressed in the Rated category, this category begins addressing some of the more severe terrorist tactics such as bombings and chemical, biological, and radiological (CBR) attacks. This category includes some of the more expensive CPTED measures, substantial site planning to control pedestrian and vehicular movement, and architectural planning to strategically locate building functions and systems. Additionally, more comprehensive emergency management planning measures are included in this category. Overall, a low level of protection against forced entry (robbery and burglary), vandalism, and assault are achieved and a minimum level of protection against threats such as hand-delivered bombs, mail bombs, vehicle bombs, hand-delivered weapons of mass destruction (WMDs), and airborne WMDs.

4.2.3 Silver

This category continues to incrementally increase the level of protection against the threats and tactics addressed by the previous categories. Specifically, intrusion detection systems become increasingly more detailed and comprehensive and facility hardening (against blast events) is first addressed. In this category, emergency management planning is optimized with the development of occupant emergency plans, command centers, and other preparedness and response planning. This category also substantially increases the

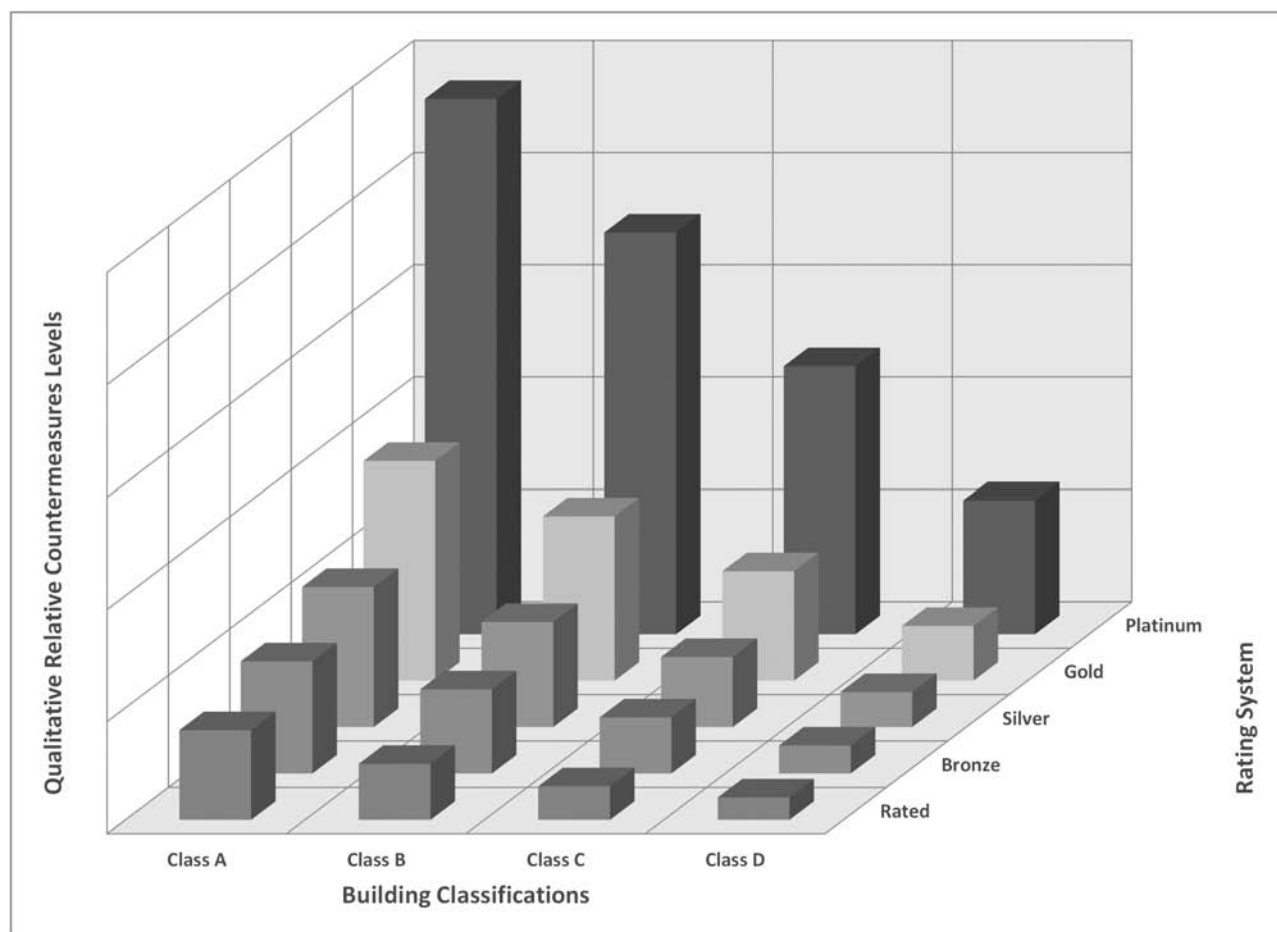


Fig. 4-1. Relationship among rating system categories, building classifications, and countermeasure levels; note: countermeasure axis is only schematic, not to scale.

security operational policies and procedures to support the increased physical countermeasures. Finally, this category requires a facility risk assessment, blast analysis, and fire analysis to quantify the consequences of potentially successful attacks and overall facility vulnerability. A medium level of protection against forced entry (robbery and burglary), vandalism, and assault and a low level of protection against threats such as hand-delivered bombs, mail bombs, vehicle bombs, hand-delivered WMDs, and airborne WMDs are achieved.

4.2.4 Gold

In this category, intrusion detection, access control, and closed-circuit television (CCTV) systems have been maximized for detection, surveillance, and assessment. The facility hardening has increased, and the available standoff has been protected. Security systems, operational procedures, and architectural features have been implemented to screen and control access of staff and visitors throughout the facility. Finally, the facility now employs some initial

countermeasures intended to mitigate the effects of waterborne contaminants. Overall, a high level of protection against forced entry (robbery and burglary), vandalism, and assault and a medium level of protection against hand-delivered bombs, mail bombs, vehicle bombs, hand-delivered WMDs, airborne WMDs, and waterborne WMDs are achieved.

4.2.5 Platinum

The Platinum rating should be considered an exemplary standard that is achieved by few facility owners other than the federal government in the higher building classifications. This is considered the highest level of security (based on risk) that building owners should be expected to achieve to protect the facility, the staff, and the visitors within. In this category the facility has been hardened to actual loads (based on the risk assessment) with the structural system specifically designed to protect against progressive collapse. Additionally, ballistic resistance is required for high-risk areas. A CBR analysis has been performed to optimize the

facility's protection against such attacks through additional countermeasures and operational procedures. Further, additional countermeasures to mitigate waterborne attacks have been implemented. Finally, all pedestrians and vehicles are controlled on the site and in the facility through additional physical countermeasures and operational procedures. Overall, a high level of protection has been achieved by the facility against credible threats and tactics.

4.3 RATING SYSTEM PHILOSOPHY

The rating categories are based on layers of security and are similar to the level of protection (LOP) designation required for the implementation of federal security design criteria such as the ISC Security Design Criteria and the Department of Defense (DoD) Unified Facilities Criteria. These criteria require the LOP to determine which countermeasures (or performance requirements of those countermeasures) are appropriate for a facility based on the specific risk to the facility. The building security rating system is similar in that as the building class and rating category increase, the number of required countermeasures increases in conjunction with the performance requirements of countermeasures.

The increase of ranking of the countermeasure rating system (Rated to Bronze, Bronze to Silver, Silver to Gold, and Gold to Platinum) is based on the combination of two factors:

- The benefit of the countermeasures in mitigating the risk to the facility, and
- The expense and/or effort required to implement the countermeasures.

Generally, this cost-versus-benefit analysis provides a ranked countermeasure checklist with somewhat inexpensive countermeasures at the Rated end of the spectrum and more expensive countermeasures at the Platinum end, where the increased risk mitigation justifies the expense.

The Rated category is a minimum baseline of security that all minimally secured buildings require. Beyond this, additional layers of security are provided in the higher categories to address increased risks. Class A facilities have inherently higher risks that create the need for additional layers of security, while the other classes require fewer layers of security. A Class D facility has adequate protection with two layers of security. In each class, determining an acceptable level of security for a building should be evaluated in the context of Rated, which is considered the minimum baseline appropriate for all facilities regardless of the specific risk to that facility. As noted earlier, the countermeasures in the Rated category should be considered the minimum standards that all building owners should strive to achieve while the Platinum rating should be considered an exemplary standard that would be achieved by few facility owners other than the federal government in the higher building classifications.

A Class A building with a Platinum rating has a very extensive list of countermeasures. The intermediate rating levels of Bronze, Silver, and Gold provide logical intervals within the spectrum to allow building owners to assess the risk and choose their desired security goals given a level of acceptable risk. Each interval contains a manageable number of countermeasures that will produce an appropriate level of protection for a reasonable expense. Moving down in building classification and building rating, the number of intervals decreases with the number of required countermeasures. Additionally, each category represents a general "level of protection" achieved against certain threats and tactics. However, it should be noted that certain threats and tactics can be mitigated at various degrees and that some level of protection against most threats and tactics exists in each category.

4.4 PROCESS OF RATING BUILDING SECURITY

This section will now discuss the actual process of rating a building with a given classification. Fig. 4-1 shows how the security rating relates to the building classification and the countermeasure levels. There are four building classifications, five countermeasure levels, and five possible security rating outcomes. All of these issues need to be related together in a logical manner.

The rating process starts with classifying the building (A through D). In addition the desired security rating (Rated through Platinum) is specified. Thus, two items are needed to start the process, CL_i and RT_j , the building classification ($i = 1, \dots, 4$) and the desired building security rating ($j = 1, \dots, 5$), respectively. For completeness, CL_i and RT_j are shown in Table 4-1 and Table 4-2.

For a building of class CL_i to attain a security rating of RT_j , it must achieve countermeasure level LV_{ij} . To achieve a specific countermeasure level (LV_{ij}), the first step is to recall that each countermeasure level has two specific components (see Chapter 3). Note that subscripts i and j were added for generality.

- Does the building for this LV_{ij} level pass all required countermeasures? (Yes or no)
- What is the value of the actual-to-maximum score ratio, α_{ij} ? (See Eqs. 3-3, 3-4, and 3-5)

Table 4-1 Building Classification, CL_i

Counter, i	CL_i
1	A
2	B
3	C
4	D

Two limiting values for α_{ij} are introduced as follows:

$$\text{Achieved actual-to-maximum score ratio} = \alpha_{ij}|_{\text{ACHIEVEMENT}} \quad (4-1)$$

$$\text{Advance actual-to-maximum score ratio} = \alpha_{ij}|_{\text{ADVANCE}} \quad (4-2)$$

The $\alpha_{ij}|_{\text{ACHIEVEMENT}}$ is the ratio that is needed so that the score satisfies (achieves) the required countermeasure for rating level under consideration. The $\alpha_{ij}|_{\text{ADVANCE}}$ is the ratio that is needed before the building is considered for the next rating level. Generally speaking,

$$\alpha_{ij}|_{\text{ACHIEVEMENT}} \leq \alpha_{ij}|_{\text{ADVANCE}} \quad (4-3)$$

The actual-to-maximum score ratio α_{ij} for the level LV_{ij} needs to satisfy

$$\alpha_{ij} \geq \alpha_{ij}|_{\text{ACHIEVEMENT}} \quad (4-4)$$

for a building of classification CL_i to achieve the desired building security rating RT_j .

Table 4-2 Desired Building Security Rating, RT_j

Counter, j	RT_j
1	Rated
2	Bronze
3	Silver
4	Gold
5	Platinum

Moreover, the actual-to-maximum score ratio α_{ij} for the level LV_{ij} needs to satisfy

$$\alpha_{ij} \geq \alpha_{ij}|_{\text{ADVANCE}} \quad (4-5)$$

for a building of classification CL_i to be eligible for consideration of an RT_{j+1} rating.

Thus, the rating process for a given classification CL_i starts at the least demanding rating level LV_{1j} (the Rated level). Three outcomes may result:

1. The building passes all *required* countermeasures of that level;
2. The equation $\alpha_{i1} \geq \alpha_{i1}|_{\text{ACHIEVEMENT}}$ is satisfied; and
3. The equation $\alpha_{i1} \geq \alpha_{i1}|_{\text{ADVANCE}}$ is satisfied.

If conditions 1 and 2 are not satisfied, then the building does not achieve the Rated rating. Obviously, it cannot advance to the next level. Also, if condition 3 is not met, then the building cannot advance to the next level. However, if the building satisfies all three conditions, then it is eligible for consideration for the next higher rating level LV_{2j} (i.e., the Bronze level). Again, three outcomes may result:

1. The building passes all required countermeasures of that level;
2. The equation $\alpha_{i2} \geq \alpha_{i2}|_{\text{ACHIEVEMENT}}$ is satisfied; and
3. The equation $\alpha_{i2} \geq \alpha_{i2}|_{\text{ADVANCE}}$ is satisfied.

The process continues as above until the building achieves the desired rating or gets to a point where the building cannot advance to the next level. Fig. 4-2 shows the flow-chart of the rating process. Table 4-3 shows the different

Table 4-3 Security Ratings as a Function of Class and Countermeasure Levels

Class	Rating	Countermeasure Level	$\alpha_{ij} _{\text{ACHIEVEMENT}}$ Needed to Achieve Rating (%)	$\alpha_{ij} _{\text{ADVANCE}}$ Needed to Advance (%)	Required Countermeasures
A	Platinum	Level 5	60.00	N.A.	5
	Gold	Level 4	60.00	90.00	5
	Silver	Level 3	60.00	90.00	11
	Bronze	Level 2	60.00	90.00	6
B	Platinum	Level 5	40.00	N.A.	2
	Gold	Level 4	40.00	50.00	2
	Silver	Level 3	50.00	60.00	9
	Bronze	Level 2	50.00	60.00	5
C	Platinum	Level 5	20.00	N.A.	0
	Gold	Level 4	30.00	50.00	0
	Silver	Level 3	40.00	40.00	6
	Bronze	Level 2	40.00	40.00	4
D	Platinum	Level 5	10.00	N.A.	0
	Gold	Level 4	20.00	20.00	0
	Silver	Level 3	30.00	30.00	3
	Bronze	Level 2	30.00	30.00	3



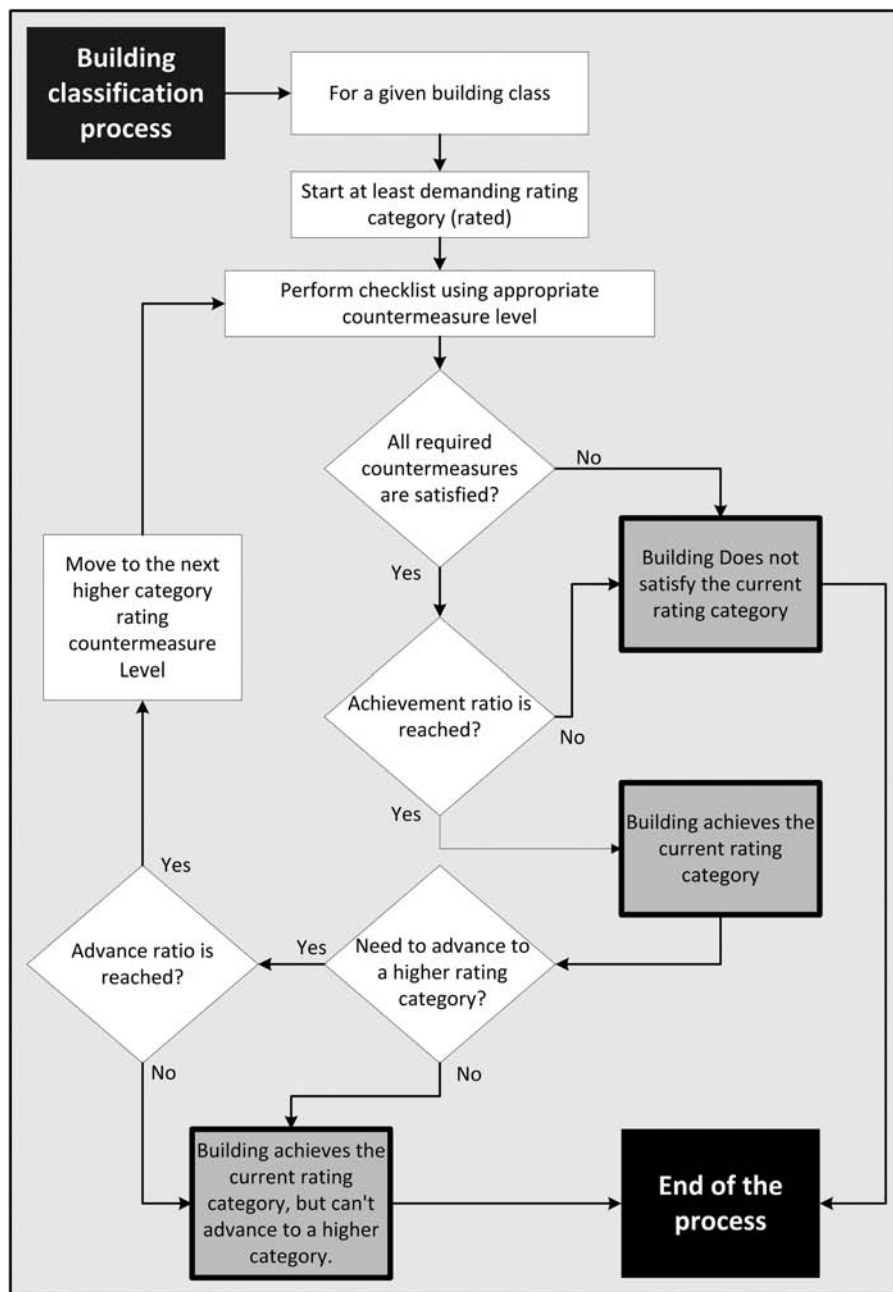


Fig. 4-2. Building security rating process.

values of $\alpha_{ij|ACHIEVEMENT}$ (expressed in %); $\alpha_{ij|ADVANCE}$ (expressed in %); and the number of required countermeasures for the four countermeasure levels, the different building classifications, and the different building security ratings.

One of the advantages of this process is that it systematically ensures that basic countermeasures in the lower security rating categories are not bypassed when attempting to achieve a higher security rating category.

4.5 BONUS POINTS

At the end of each rating category, there is a provision for awarding bonus points. These bonus points are awarded for innovative countermeasures not included in the checklist (see Appendix B) that provide a substantial benefit to building security. Some examples of innovation are given in Appendix C, Innovations in Building Security, but building owners are not restricted to just those listed.

Bonus points can be applied to obtain the rating in the category where awarded. In other words, bonus points may be used to help in satisfying Eq. (4-4) above. However, there are limits to the use of bonus points. For example, to move on to the next rating category, the required countermeasures and the required percentage of the applicable

listed countermeasure points to advance must still be met for the previous categories. Further, to move to the next category, the bonus points cannot be substituted for failure to meet countermeasure points in a previous category. In summary, the bonus points can't be used to satisfy Eq. (4-5) above.

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APPENDIX A

Classification and Impact Questions

This appendix presents BSRS building classification questions and their corresponding group weights. Table A-1 contains threat questions and their possible multiple answers. Table A-2 contains impact questions and their possible mul-

iple answers. Details of the multiple possible choices for each question and the relative weights for these choices are shown in Table A-3 through Table A-22.

Table A-1 Threat Questions for Building Classification

Parameter Type	Threat Classification Question	Group Weight
Primary	What type of facility is being assessed? Please choose the option that best applies. These facility types provide a baseline risk level for the classification point system.	18.75
Primary	To what extent is the building associated with U.S. critical infrastructure, such as transportation, utilities, fuel, telecommunications, etc.? An essential operation to the infrastructure system would be considered high.	18.75
Primary	How many threats have been received at the facility in the last five years?	18.75
Secondary	Are there VIPs or other occupants that are attractive targets for criminals or terrorists?	2
Secondary	How many public visitors are in the building on average in a single day?	1.5
Secondary	What is the population of the city?	1
Secondary	What is the distance from the building to the hazardous material facility or transportation route?	1
Secondary	What is the distance from the building to the high-profile target?	1
Secondary	Are there regular instances of criminal or gang-related activity in the surrounding area?	2
Secondary	Are law enforcement agencies (i.e., police, FBI, ATF, U.S. Marshals Service, etc.) located in this facility?	4

Table A-2 Impact Questions for Building Classification

Parameter Type	Impact Classification Question	Group Weight
Primary	What is the national symbolic significance of the facility and its primary function? For example, the Statue of Liberty, Washington Monument, or New York Stock Exchange would be considered high.	18.75
Primary	What is the national political significance of the facility and its primary function? For example, the White House, the U.S. Capitol, or an abortion clinic would be considered high.	18.75
Primary	What is the local economic significance of the facility and its primary function? For example, major employer, financial institution, or large tax revenue creator would be considered high.	18.75
Primary	To what extent is the building associated with U.S. critical infrastructure such as transportation, utilities, fuel, telecommunications, etc.? An essential operation to the infrastructure system would be considered high.	18.75
Secondary	Does the facility contain a child care center?	1
Secondary	What is the facility occupancy?	1
Secondary	What is the square footage of the facility?	1
Secondary	How many public visitors are in the building on average in a single day?	1.5
Secondary	Is the facility a listed historic building?	2
Secondary	What is the overall impact to the major tenant organizations if this facility is destroyed or damaged beyond use for an extended period of time? A significant loss of business would be considered high.	3

Table A-3 Choices for Threat Question Number 1—To Be Used for Building Classification

Question	
What type of facility is being assessed? Please choose the option that best applies. These facility types provide a baseline risk level for the classification point system.	
Choice	Weight
Airport Terminals, Hangars, and Aviation-Related Structures	3
Ammunition and Explosive Storage Magazines	4
Apartments and Condominiums	2
Armories	4
Chemical Plants	4
Commercial Facilities	3
Community Services	1
Educational Facilities	2
Federal Courthouses	4
Federal Government	4
Financial Institutions	4
Gymnasiums, Recreation Centers, and Athletic Practice Facilities	1
Health Care Facilities	2
High-Rise Office Buildings	3
Hotels, Motels, and Resorts	2
Industrial Facilities	3
Land Ports of Entry	3
Libraries	1
Local Government	2
Maintenance Facilities and Equipment Buildings	1
Military	4
Monuments	2
Multistory Office Buildings	2
Museums	2
One-Story Office Buildings	1
Other Critical Infrastructure Facilities	4
Parking Facilities	1
Petroleum Plants	4
Power Plants	4
Religious Facilities	2
Research Facilities	3
Sea Ports of Entry	3
Shopping Centers and Retail	2
Single Family Dwellings	1
Stadiums, Arenas, Ballparks, and Entertainment Venues	3
State Government	3
Warehouses	2

Table A-4 Choices for Threat Question Number 2—To Be Used for Building Classification

Question	
Are there VIPs or other occupants that are attractive targets for criminals or terrorists?	
Choice	Weight
Yes	1
No	0

Table A-5 Choices for Threat Question Number 3—To Be Used for Building Classification

Question	
How many threats have been received at the facility in the last 5 years?	
Choice	Weight
None	0
1–5	1
6–10	2
11–100	3
>100	4

Table A-6 Choices for Threat Question Number 4—To Be Used for Building Classification

Question	
How many public visitors are in the building on average in a single day?	
Choice	Weight
<20	0
20–49	1
50–99	2
100–300	3
>300	4

Table A-7 Choices for Threat Question Number 5—To Be Used for Building Classification

Question	
What is the population of the city?	
Choice	Weight
<100,000	0
100,000–500,000	1
500,001–1 million	2
>1 million	3

Table A-8 Choices for Threat Question Number 6—To Be Used for Building Classification

Question	
What is the distance from the building to the hazardous material facility or transportation route?	
Choice	Weight
>1,000 ft (304.80 m)	0
1,000 ft (304.80 m)	1
500 ft (152.40 m)	2
100 ft (30.48 m)	3
0 ft (0.0 m)	4

Table A-9 Choices for Threat Question Number 7—To Be Used for Building Classification

Question	
To what extent is the building associated with the United States critical infrastructure such as transportation, utilities, fuel, telecommunications, etc.? An essential operation to the infrastructure system would be considered High.	
Choice	Weight
Very Low	0
Low	1
Medium	2
High	3
Very High	4

Table A-10 Choices for Threat Question Number 8—To Be Used for Building Classification

Question	
What is the distance from the building to the high profile target?	
Choice	Weight
>1,000 ft (304.80 m)	0
1,000 ft (304.80 m)	1
500 ft (152.40 m)	2
100 ft (30.48 m)	3
0 ft (0.0 m)	4

Table A-11 Choices for Threat Question Number 9—To Be Used for Building Classification

Question	
Are there regular instances of criminal or gang-related activity in the surrounding area?	
Choice	Weight
Yes	1
No	0

Table A-12 Choices for Threat Question Number 10—To Be Used for Building Classification

Question	
Are law enforcement agencies (i.e. police, FBI, ATF, U.S. Marshals Service, etc.) located in this facility?	
Choice	Weight
Yes	1
No	0

Table A-13 Choices for Impact Question Number 1—To Be Used for Building Classification

Question	
What is the national symbolic significance of the facility and its primary function? For example, the Statue of Liberty, Washington Monument, or New York Stock Exchange would be considered High.	
Choice	Weight
Very Low	0
Low	1
Medium	2
High	3
Very High	4

Table A-14 Choices for Impact Question Number 2—To Be Used for Building Classification

Question	
What is the national political significance of the facility and its primary function? For example, the White House, U.S. Capitol, or an abortion clinic would be considered High.	
Choice	Weight
Very Low	0
Low	1
Medium	2
High	3
Very High	4

Table A-15 Choices for Impact Question Number 3—To Be Used for Building Classification

Question	
What is the local economic significance of the facility and its primary function? For example, major employer, financial institution, or large tax revenue creator would be considered High.	
Choice	Weight
Very Low	0
Low	1
Medium	2
High	3
Very High	4

**Table A-16 Choices for Impact Question
Number 4—To Be Used for Building Classification**

Question	
To what extent is the building associated with the United States critical infrastructure such as transportation, utilities, fuel, telecommunications, etc.? An essential operation to the infrastructure system would be considered High.	
Choice	Weight
Very Low	0
Low	1
Medium	2
High	3
Very High	4

**Table A-17 Choices for Impact Question
Number 5—To Be Used for Building Classification**

Question	
Does the facility contain a child care center?	
Choice	Weight
Yes	1
No	0

**Table A-18 Choices for Impact Question
Number 6—To Be Used for Building Classification**

Question	
What is the facility occupancy?	
Choice	Weight
<10	0
10–150	1
151–450	2
>450	3

**Table A-19 Choices for Impact Question
Number 7—To Be Used for Building Classification**

Question	
What is the square footage of the facility?	
Choice	Weight
<2,500	0
2,500–80,000	1
80,001–150,000	2
>150,000	3

**Table A-20 Choices for Impact Question
Number 8—To Be Used for Building Classification**

Question	
How many public visitors are in the building on average in a single day?	
Choice	Weight
<20	0
20–49	1
50–99	2
100–300	3
>300	4

**Table A-21 Choices for Impact Question
Number 9—To Be Used for Building Classification**

Question	
Is the facility a listed historic building?	
Choice	Weight
Yes	1
No	0

**Table A-22 Choices for Impact Question
Number 10—To Be Used for Building
Classification**

Question	
What is the overall impact to the major tenant organizations if this facility is destroyed or damaged beyond use for an extended period of time? A significant loss of business would be considered High.	
Choice	Weight
Low	0
Medium	1
High	2

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APPENDIX B

Rating Class and Countermeasure Requirements for Each Rating Level

This appendix shows different countermeasures for different security rating levels. Countermeasures for each level are categorized according to 13 building disciplines.

LEVEL 1 (RATED) COUNTERMEASURE CHECKLIST

Discipline	Count	Countermeasure
1—Site		
1	1	Vehicle and pedestrian entrances are lit for safety.
1	2	Perimeter vehicle and pedestrian circulation areas (including parking) are lit for safety.
1	3	Landscaping does not conceal and obstruct views near the perimeter of the facility.
1	4	Sufficient access to all fire hydrants is available.
1	5	Signage off site and at entrances is available to direct traffic.
1	6	Signage on site is available to direct vehicles and pedestrians.
1	7	Signage is clear to avoid confusion and direct users to their destinations efficiently.
2—Architectural		
2	1	Vehicle entry/exit points are kept to a minimum.
2	2	Employees and the public use the same building entrances if visitor screening is not present. (If present, separate entrances can be used.)
2	3	Openings for mail or express boxes and trash receptacles are small enough to prohibit insertion of packages.
2	4	Areas of refuge are identified, with special consideration given to egress.
2	5	High-value functions, critical assets, and officials are protected from public view and access.
2	6	Elevator lobbies are well lit and visible to both patrons in the parking areas and the public on the street.
3—Structural		
3	1	Vehicular or personnel proximity to transfer girders is not possible.
3	2	Simple supported load-carrying systems are not utilized.
3	3	Construction material is NOT light metal, wood, or nonreinforced bearing wall systems, or structural system is NOT accessible to pedestrian or vehicular traffic.
4—Building envelope		
4	1	Exterior walls and doors are designed to resist forced entry.
4	2	All door hinges and locking hardware are on the secure side of the door or window.
4	3	Building envelope (walls and roof) is anchored to the structural system.

Discipline	Count	Countermeasure
		5—Utilities
5	1	Emergency power for exit lights is provided.
5	2	Commercial central station is employed for after-hours monitoring or to supplement on-site monitoring.
		6—Mechanical
6	1	Exterior points of access to the building roof (ladders, adjacent structures, platforms, or buildings) cannot be used by unauthorized personnel to gain access.
6	2	Interior points of access to the building roof (hatches, doors, elevator, etc.) are kept locked to prevent access by unauthorized personnel.
6	3	Doors to utility or mechanical rooms are kept locked.
		11—Equipment operations and maintenance
11	1	Access to building information is restricted.
		12—Security systems
12	1	Facility has basic intrusion-detection devices (contacts for doors and operable first-floor windows) for entrances into the facility.
12	2	Ground-level pedestrian exits that open into nonsecure areas are used as emergency exits and are fitted with (only) panic bar hardware for exiting.
12	3	All security locking arrangements on doors used for egress comply with the requirements of NFPA 101, Life Safety Code (2012).
12	4	Self-contained battery lighting is provided in stairwells and for exit signs as backup in case of emergency generator lag time or failure.
12	5	Vaults or safes are located in secure rooms with no windows and a minimal number of doors.
		13—Security master plan
13	1	The facility has emergency evacuation plans updated annually, and evacuation drills are performed semi-annually.

LEVEL 2—BRONZE COUNTERMEASURE CHECKLIST

Discipline	Count	Countermeasure
		1—Site
1	1	Lighting supports visual or closed-circuit television (CCTV) surveillance.
1	2	Redundant routes are provided for emergency vehicle access and egress.
1	3	Attended booths or parking offices are located so that activity at pedestrian and vehicle entry points to the facility can be monitored.
1	4	Culverts, sewers, storm drains, concrete trenches, duct systems, and pipelines (that enter or go under the facility) have openings with no dimension greater than 6 in (15 cm).
1	5	Vegetation (bushes, trees, etc.) and other nonhardened landscape elements are used to control vehicle access.
1	6	Adjacent street curb lane parking is restricted to key employee parking.
1	7	Site is designed to clearly identify property lines.
1	8	Under-building access to crawl spaces and utility tunnels is restricted.
1	9	Security station or reception area is located where it is visible to the public and where the attendant can directly monitor entry/exit activity.
1	10	Design of stair towers and elevator lobbies ensures that people using these areas can be easily seen and can see out to reduce likelihood of assault.
1	11	Inside parking is restricted to selected employees only.

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Discipline	Count	Countermeasure
2—Architectural		
2	1	Pedestrian walkways concentrate activity.
2	2	Parking facility has vehicular access control.
2	3	Security screening or fencing has been provided at openings to discourage anyone from entering the parking facility on foot.
2	4	Streets, sidewalks, and building entrances clearly indicate public routes and direct people away from private or restricted areas.
2	5	Access to private areas is discouraged with structural elements and limited access (no cut-through streets).
2	6	Shrubby is less than 2 ft (60 cm) in height.
2	7	Lower branches of existing trees are kept at least 10 ft (3 m) off the ground.
2	8	Visitors (and their baggage) to facility are screened for weapons and explosives.
2	9	Circulation routes have unobstructed views of people approaching controlled access points.
2	10	Signage identifying high-risk areas is minimized.
2	11	Shelter-in-place locations are provided.
2	12	Sensitive areas are controlled by locks and physical barriers.
2	13	Staff areas are separated from the public by locked doors and barriers.
2	14	For lobby retail, control access to main building with separate entryways, access control, hardened partitions (against intrusion), and security operational measures is provided.
3—Structural		
3	1	Structural system is reinforced concrete (neither prestressed nor precast) or steel frame.
3	2	Structural system is braced frame, shear wall, or bearing wall.
3	3	Structural system is prestressed or precast reinforced concrete system (slabs, beams, and/or columns) and blast and/or progressive collapse analysis were performed.
3	4	Structural system is either wood or light metal, and blast and/or progressive collapse analysis were performed.
3	5	There are NO transfer girders within the structural system.
3	6	Loading zones are separate from public parking.
4—Building envelope		
4	1	The glazing has sufficient “bite.”
4	2	Exterior walls are framed curtain walls (metal).
4	3	Exterior walls are reinforced precast concrete panels or reinforced masonry.
4	4	Exterior walls are non-reinforced masonry or nonreinforced concrete panels.
4	5	Exterior walls are designed for high wind.
5—Utilities		
5	1	Restrooms are provided with emergency lighting.
5	2	Facility has an emergency power system or generator for life safety and security systems.
6—Mechanical		
6	1	Air intakes have been located on the roof or as high on the building as practical, or ground-level outdoor air intakes have a security zone established by fencing or grilling or other means of physical protection.
6	2	Ventilation equipment is located away from high-risk areas such as loading docks, garages, mailrooms, and lobbies.
6	3	Return air vent grilles are secured from general access.
6	4	Prerecorded message over the elevator cab speakers notifies passengers of an emergency and explains how to proceed.

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