ISC SECURITY DESIGN CRITERIA

for
New Federal Office Buildings
and Major Modernization Projects

The Interagency Security Committee

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FOR OFFICIAL USE ONLY

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The *ISC Security Design Criteria* contains physical security design and construction criteria and standards for Federal buildings and facilities. Disclosure of this data to other than Federal officials or contractors with a specific need to know may compromise the security of the facility and its occupants. The document and the standards and criteria contained therein will be made available ONLY to those Federal officials and/or contractors, contract employees and identified consultants who have a direct need for the information to design/specify/estimate/review a specified project. Precautions should be taken to safeguard and control distribution of the *ISC Security Design Criteria*, and any individuals provided copies will assume responsibility for assuring that the information is secure.

INTRODUCTION

Purpose

The Interagency Security Committee (ISC) developed this document to ensure that security becomes an integral part of the planning, design, and construction of new Federal office buildings and major modernization projects. The criteria consider security in all building systems and elements.

The ISC was established by Executive Order 12977 of October 19, 1995 to develop long-term construction standards for locations requiring blast resistance or other specialized security measures. In a series of working group discussions, the ISC revised and updated GSA's 1997 Draft Security Criteria, taking into consideration technology developments, new cost considerations, the experience of practitioners applying the criteria, and the need to balance security requirements with public building environments that remain lively, open, and accessible.

Both the ISC Security Design Criteria and the GSA Draft Security Design Criteria that preceded it grew out of the Department of Justice's (DOJ) Vulnerability Assessment, written at President Clinton's direction after the 1995 Oklahoma City bombing. The three documents speak to a common purpose, but this ISC Security Design Criteria is aimed at major projects and uses a different system than the DOJ Vulnerability Assessment to rate risk and assign protection levels.

Initially, this document will be reviewed by the ISC Long-term Construction Standards Working Group at least once per year to assure it remains up to date.

Applicability

These criteria apply to new construction of general purpose office buildings and new or lease-construction of courthouses occupied by Federal employees in the United States and not under the jurisdiction and/or control of the Department of Defense. The criteria also apply to lease-constructed projects being submitted to Congress for appropriations or authorization. They do not apply to airports, prisons, hospitals, clinics, border patrol stations, and ports of entry; or to unique facilities, such as those classified by the DOJ Vulnerability Assessment as Level V (the Pentagon, CIA headquarters, etc).

Where prudent and appropriate, the criteria apply to major modernization projects. The principles contained here may be considered for projects not meeting the foregoing definitions.

The criteria are intended for design and security professionals in the development of detailed project requirements. Because the criteria emphasize flexibility and are therefore subject to interpretation, users should consider preparing project-specific requirements for contractors.

While the criteria cover many aspects of facility security, they do not directly address certain threats, such as workplace violence; tactics, such as chemical or biological attacks and sabotage of cyber-based information systems; and operations procedures, such as developing occupant emergency plans.

Risk Basis

The application of the Security Design Criteria is based on a project-specific risk assessment that looks at threat, vulnerability, and consequences, three important components of risk. Threat is the actual or perceived source of jeopardy. The primary threat addressed by this document is a person or persons using various tactics (weapons, tools, methods) to cause harm. Other threats to buildings, such as earthquakes or hazardous materials stored inside the facility, are beyond the criteria's scope. Vulnerability is the degree to which a facility is susceptible to a threat. Consequences are the negative effects of an event. An additional component of risk – probability or likelihood – is determined using historical and intelligence information, when available.

The government will give the designer a list of project-specific tactics to design to (a multidisciplinary team will select security criteria to meet the facility's needs).

Security Design Philosophy

These criteria take a flexible and realistic approach to the reliability, safety and security of Federal office buildings. The document considers urban design principles, cost effectiveness, and geographic location; acknowledges acceptance of some risk; and recognizes that Federal buildings must connect with the community in an open, accessible way.

The criteria address the need to save lives and prevent injury as well as protect Federal buildings, functions, and assets. To this end, the document addresses protection zones, moving from the outer elements in – from the perimeter, including streetscape, parking, and sidewalks, to the building envelope, structural design, and interior components. For all protection zones, the criteria offer a broad range of techniques and systems to detect, deter, and delay terrorist and criminal attacks.

How to Use This Document

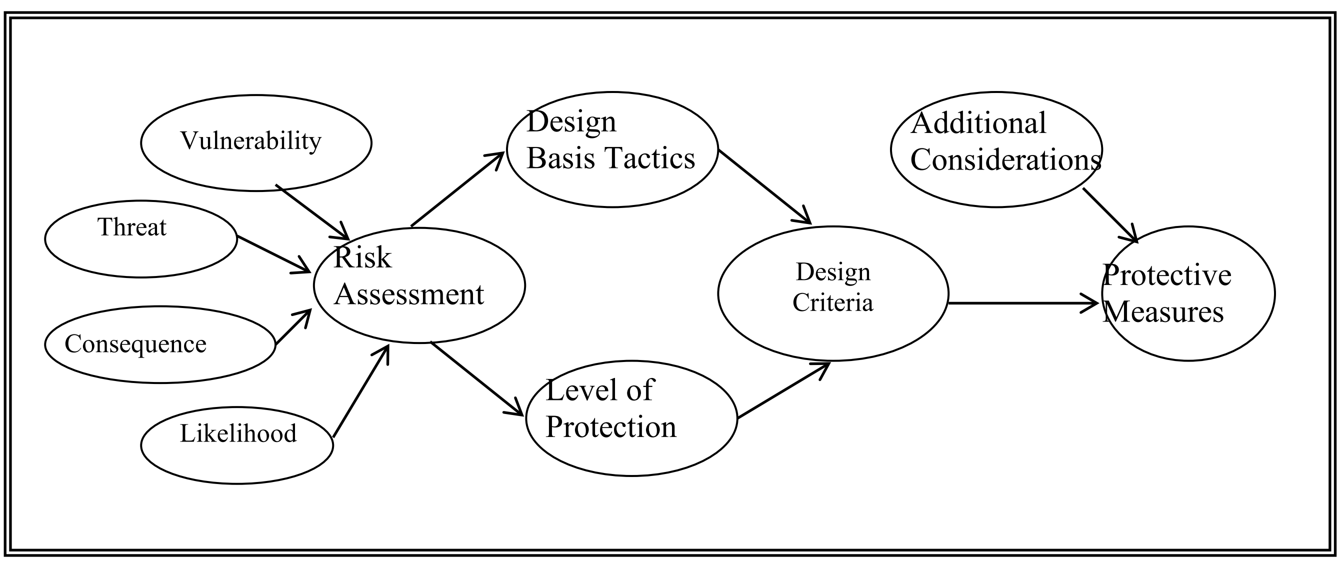
It is the intent of this document to apply the security design criteria on a building-by-building basis. Once a facility-specific risk assessment is completed, a multidisciplinary project team can use the document to plan security measures for a project's building and site. The team may include security, intelligence, and operations professionals; architects and engineers; and owners and tenants. Specialists in fire protection, cost estimating, communications, and other disciplines should be included as necessary.

The team will use two project-specific products of the risk assessment to make security and design decisions. The first product is a list of design basis tactics. These are the particular criminal or terrorist weapons or acts, such as vehicle bombs or forced entry, that the facility must be designed to. The second product of the risk assessment is a level of protection designation. This will specify the appropriate protection level (Low, Medium/Low, Medium, or Higher) for each building element and sub-element, based on an analysis of threat, vulnerability, consequences, and – if feasible – likelihood.

The team will use the design basis tactics and assigned protection levels to select appropriate criteria from Part II of this document, Design Criteria. Part III of the document, Risk Guidelines, provides additional information on the security implications of some of the criteria to help team members choose measures that best meet the facility's needs.

Throughout the planning and design stages, special considerations or constraints (e.g., cost estimates, site characteristics, or physical security surveys) may lead the team to modify its choice of criteria. In addition, design decisions will be affected by emergency occupant plans and operations procedures. For example, the number and locations of entrances will be determined, in part, by where the team wants people to flow during an emergency, and how many screening stations are preferred. Ultimately, the team will arrive at a final set of protective measures to be implemented. Figure 1 offers a graphic representation of the decision-making process.

FIGURE 1 – DECISION-MAKING PROCESS



In Part III of this document, the team will find worksheets to help with criteria selection. Project information in these tables should be protected from potential adversaries. At a minimum, information should not be subject to disclosure under the Freedom of Information Act. Users may classify the tables following Classified National Security Information: E. O. 12958 and its Implementing Directives.

It is extremely important that the team-based security decision-making process be implemented as early in the project as possible to ensure that the most effective and efficient solutions are reached. Security planning should start as soon as a project concept is developed, including during site evaluations and selection.

DESIGN CRITERIA

Planning and Cost

1.A Planning
- 1.A.1 Zones of Protection
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- 1.A.3 Capability to Increase or Decrease Security
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- 1.A.7 Access Control and Electronic Security

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- 1.B.1 Initial Costs
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1.0 Planning and Cost

1.A Planning

Security must be an integral part of building and site planning, starting at the earliest phase and continuing throughout the process. A multidisciplinary team will determine the appropriate design criteria for each project, based on a facility-specific risk assessment and an analysis of all available information on security considerations, constraints, and tenant needs.

1.A.1 Zones of Protection

A zoned protection system is used, with intensifying areas of security beginning at the site perimeter and moving to the interior of the building. The Security Design Criteria chapters are generally arranged according to the following zones of protection. Because some design elements overlap zones, some items appear in more than one chapter or are grouped together for ease of reference.

- Perimeter:
  - Chapter 2 - Site and Landscape Design
  - Chapter 9 - Parking Security
- The Building Envelope:
  - Chapter 4 - Structural Engineering
- The Building Interior:
  - Chapter 3 - Architecture and Interior Design
  - Chapter 5 - Mechanical Engineering
  - Chapter 6 - Electrical Engineering
  - Chapter 7 - Fire Protection Engineering
  - Chapter 8 - Electronic Security
  - Chapter 9 - Parking Security

1.A.2 Crime Prevention Through Environmental Design (CPTED)

CPTED techniques should be used to help prevent and mitigate crime. Good strategic thinking on CPTED issues such as site planning, perimeter definition, sight lines, lighting, etc., can reduce the need for some engineering solutions[1].

1.A.3 Capability to Increase or Decrease Security

Designs should include the ability to increase security in response to a heightened threat, as well as to reduce security if changes in risk warrant it.

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[1] For further information on CPTED, see publications by the National Institute of Law Enforcement and Criminal Justice (NILECJ). See also Crowe, Timothy D. Crime Prevention Through Environmental Design. National Crime Prevention Institute (1991).

1.A.4 Multidisciplinary Approach

Improving security is the business of everyone involved with Federal facilities including designers, builders, operations and protection personnel, employees, clients, and visitors. Professionals who can contribute to implementing the criteria in this document include architects and structural, mechanical, fire protection, security, cost, and electrical engineers. Blast engineers and glazing specialists may also be required as well as building operations personnel and security professionals experienced in physical security design, operations, and risk assessment.

Each building system and element should support risk mitigation and reduce casualties, property damage, and the loss of critical functions. Security should be considered in all decisions, from selecting architectural materials to placing trash receptacles to designing redundant electrical systems.

Multidisciplinary risk management is built into this document. The criteria work in concert to allow a building to function more effectively in the event of an incident. For example, in the presence of toxic gas, Chapters 3, 5 and 6 criteria increase the likelihood that emergency systems will operate; Chapter 4 considers outside venting of gasses; Chapter 5 calls for mechanical venting and pressurization; and Chapter 6 encourages electrical system reliability.

1.A.5 Site Security Requirements

Site security requirements, including perimeter buffer zones, should be developed before a site is acquired and the construction funding request is finalized. This requirement may be used to prevent the purchase of a site that lacks necessary features, especially sufficient setback, and to help reduce the need for more costly countermeasures such as blast hardening.

1.A.6 Adjacent Sites

When warranted by a risk assessment, consideration should be given to acquiring adjacent sites or negotiating for control of rights-of-way. Adjacent sites can affect the security of Federal facilities.

1.A.7 Access Control and Electronic Security

Electronic security, including surveillance, intrusion detection, and screening, is a key element of facility protection; many aspects of electronic security and the posting of security personnel are adequately dealt with in other criteria and guideline documents. These ISC criteria primarily address access control planning

- including aspects of stair and lobby design - because access control must be considered when design concepts for a building are first conceived. While fewer options are available for modernization projects, some designs can be altered to consider future access control objectives.

1.B Cost

1.B.1 Initial Costs

When cost is not considered, one risk can consume a disproportionate amount of the budget while other risks may go unmitigated or not addressed at all. Budgets should match the requirements of the risk assessment. It is important that decision-makers know funding needs early so that they can request funding to fully implement the requirements of the risk assessment. Should projects be over budget, security, along with other building elements, may be reevaluated. However, if security is decreased, there should be compensating operational procedures and/or periodic reevaluation to see if technology or procedures can mitigate the risk.

The security budget should be an output of a project-specific risk assessment. After the initial risk assessment has been conducted, a plan should outline security requirements for specific building systems. To facilitate funding, cost control, and risk management, agencies should consider a work breakdown structure which summarizes security expenditures in a specific account that can be clearly identified and monitored throughout design phases. This can facilitate the allocation of those funds to countermeasures for project-specific risks. For example, funding crime prevention may be more important than funding terrorist prevention countermeasures for some projects.

1.B.2 Cost-Risk Analysis

Actual costs may be more or less than budgeted. This cost risk results from the need to predict bidding market costs years in advance, evolving technology, changing risks, different countermeasures, and varying project conditions. The "Standard Practice for Measuring Cost Risk of Buildings and Building Systems," ASTM E 1946-98, may be used to manage cost risk.

1.B.3 Economic Analysis

A guide for selecting economic methods to evaluate investments in buildings and building systems can be found in ASTM E 1185-93. Two such economic practices are ASTM E 917-93 to measure life-cycle costs, and ASTM E 1074-93 to measure net economic benefits. ASTM E 1765-95 provides a way to evaluate both qualitative and quantitative aspects of security in a single model.

Security's life-cycle cost objective should be to minimize the total cost of building ownership while simultaneously improving a building's efficiency. Total costs include all costs incurred by the owner and users of a building. While great emphasis is often placed on meeting initial budget, scope, and schedule, these are only a small fraction of a building's total life-cycle costs. Operations is a critical area where improved effectiveness and productivity can have the greatest impact upon cost, performance, and mission accomplishments. Serious consideration of life-cycle costs during the initial project stages can greatly reduce total life-cycle costs.

One use of life-cycle costing is to measure the impact of security countermeasures on other costs. Increasing security, for example, may lower operations costs because employees who fell more secure may be more productive. In addition, the cost of training replacements for employees who leave because of safety concerns is high.

Decision-makers can also use life-cycle costing to compare items performing similar functions. For example, automating some safety functions could reduce the number of guards needed, resulting in significant on-going reductions in annual operating costs. Life-cycle costing should not be used to compare alternatives that do not perform the same function. For example, a guard force at the building's perimeter does not perform the same function as strengthening the building's exterior wall or structure.

The "Standard Practice for Applying Analytical Hierarchy Process (AHP) to Multi-attribute Decision Analysis of Investments Related to Buildings and Building Systems," ASTM E 1765-95, can help overcome the limitations of both life-cycle costing and net benefit analysis. It is a standard to consider qualitative values, such as security and aesthetics, and to evaluate them with cost.

Site Planning and Landscape Design

2.A Vehicular Control
- 2.A.1 Distance
- 2.A.2 Perimeter Protection Zone
- 2.A.3 Perimeter Vehicle Inspection

2.B Site Lighting

2.C Site Signage

2.D Landscaping

2.0 Site Planning and Landscape Design

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

Effective site planning and landscape design can enhance the security of a facility and eliminate the need for some engineering solutions. Security considerations should be an integral part of all site planning, perimeter definition, lighting, and landscape decisions.

2.A Vehicular Control

2.A.1 Distance

The preferred distance from a building to unscreened vehicles or parking is _____(project-specific information to be provided). Ways to achieve this distance include creating a buffer zone using design features such as street furniture and bollards that can function as barriers; restricting vehicle access (see 2.A.2 and Ch. 9); and landscaping (see 2.D).

2.A.2 Perimeter Protection Zone

Site perimeter barriers are one element of the perimeter protection zone. Perimeter barriers capable of stopping vehicles of _______ lbs., up to a speed of______, shall be installed (project-specific information to be provided). A vehicle velocity shall be used considering the angle of incidence in conjunction with the distance between the perimeter and the point at which a vehicle would likely be able to start a run at the perimeter. A barrier shall be selected that will stop the threat vehicle. Army TM 5-853-1 and TM 5-853-2/AFMAN 32-1071, Volume 2 contain design procedures. In designing the barrier system, consider the following options:

- Using various types and designs of buffers and barriers such as walls, fences, trenches, ponds and water basins, plantings, trees, static barriers, sculpture, and street furniture;
- Designing site circulation to prevent high speed approaches by vehicles; and
- Offsetting vehicle entrances as necessary from the direction of a vehicle's approach to force a reduction in speed.

2.A.3 Perimeter Vehicle Inspection

2.A.3.1 Provide space for inspection at a location to be specified.

2.A.3.2 Provide design features for the vehicular inspection point that stop vehicles, prevent them from leaving the vehicular inspection area, and prevent tailgating.

2.B <u>Site Lighting</u>

The following are examples of effective site lighting levels: at vehicular and pedestrian entrances, 15 horizontal maintained foot candles; and for perimeter and vehicular and pedestrian circulation areas, 5 horizontal maintained foot candles. In most circumstances, perimeter lighting should be continuous and on both sides of the perimeter barriers, with minimal hot and cold spots and sufficient to support CCTV and other surveillance. However, for safety reasons and/or for issues related to camera technology, lower levels may be desirable. Other codes or standards may restrict site lighting levels.

2.C <u>Site Signage</u>

Confusion over site circulation, parking, and entrance locations can contribute to a loss of site security. Signs should be provided off site and at entrances; there should be on-site directional, parking, and cautionary signs for visitors, employees, service vehicles, and pedestrians. Unless required by other standards, signs should generally not be provided that identify sensitive areas.

2.D <u>Landscaping</u>

Landscaping design elements that are attractive and welcoming can enhance security. For example, plants can deter unwanted entry; ponds and fountains can block vehicle access; and site grading can also limit access. Avoid landscaping that permits concealment of criminals or obstructs the view of security personnel and CCTV, in accordance with accepted CPTED principles.

Architecture and Interior Design

3.A Planning
- 3.A.1 Office Locations
- 3.A.2 Mixed Occupancies
- 3.A.3 Public Toilets and Service Areas
- 3.A.4 Refuge
- 3.A.5 Loading Docks and Shipping and Receiving Areas
- 3.A.6 Retail in the Lobby
- 3.A.7 Stairwells
- 3.A.8 Mailroom

3.B Interior Construction
- 3.B.1 Lobby Doors and Partitions
- 3.B.2 Critical Building Components

3.C Exterior Entrances
- 3.C.1 Forced Entry
- 3.C.2 Equipment Space
- 3.C.3 Entrance Co-location
- 3.C.4 Garage and Vehicle Service Entrances

3.D Additional Features
- 3.D.1 Areas of Potential Concealment
- 3.D.2 Roof Access

3.0 Architecture and Interior Design

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

3.A Planning

3.A.1 Office Locations

Offices of vulnerable officials should be placed or glazed so that the occupant cannot be seen from an uncontrolled public area such as a street. Whenever possible, these offices should face courtyards, internal sites, or controlled areas. If this is not possible, suitable obscuring glazing or window treatment shall be provided, including ballistic resistant glass (see 4.B.4.4.1), blast curtains, or other interior protection systems.

3.A.2 Mixed Occupancies

When possible, high-risk tenants should not be housed with low-risk tenants. If they are housed together, publicly accessible areas should be separated from high-risk tenants.

3.A.3 Public Toilets and Service Areas

Public toilets, service spaces, or access to vertical circulation systems should not be located in any non-secure areas, including the queuing area before screening at the public entrance.

3.A.4 Refuge

In high rise buildings, areas of refuge should be identified during the programming and design phases. Special consideration may be given to egress. Refer to life-safety codes for design guidance.

3.A.5 Loading Docks and Shipping and Receiving Areas

Loading docks and receiving and shipping areas should be separated by at least 50 feet in any direction from utility rooms, utility mains, and service entrances including electrical, telephone/data, fire detection/alarm systems, fire suppression water mains, cooling and heating mains, etc. Loading docks should be located so that vehicles will not be driven into or parked under the building. If this is not possible, the service shall be hardened for blast (see Chapter 4).

3.A.6 Retail in the Lobby

Retail and other mixed uses, which are encouraged by the Public Buildings Cooperative Use Act of 1976, create public buildings that are open and inviting. While important to the public nature of the buildings, the presence of retail and other mixed uses may present a risk to the building and its occupants and should be carefully considered on a project specific basis during the risk assessment process. Retail and mixed uses may be accommodated through such means as separating entryways, controlling access, and hardening shared partitions, as well as through special security operational countermeasures.

3.A.7 Stairwells

Stairwells required for emergency egress should be located as remotely as possible from areas where blast events might occur. Wherever possible, stairs should not discharge into lobbies, parking, or loading areas.

3.A.8 Mailroom

The mailroom should be located away from facility main entrances, areas containing critical services, utilities, distribution systems, and important assets. In addition, the mailroom should be located at the perimeter of the building with an outside wall or window designed for pressure relief. It should have adequate space for explosive disposal containers. An area near the loading dock may be a preferred mailroom location.

3.B Interior Construction

3.B.1 Lobby Doors and Partitions

Doors and walls along the line of security screening should meet requirements of UL752 Level___(project-specific information to be provided).

3.B.2 Critical Building Components

The following critical building components should be located no closer than ____ feet in any direction to any main entrance, vehicle circulation, parking, or maintenance area (project-specific information to be provided). If this is not possible, harden as appropriate (see Chapter 4):

- Emergency generator including fuel systems, day tank, fire sprinkler, and water supply;
- Normal fuel storage;
- Main switchgear;
- Telephone distribution and main switchgear;
- Fire pumps;

- Building control centers;
- UPS systems controlling critical functions;
- Main refrigeration systems if critical to building operation;
- Elevator machinery and controls;
- Shafts for stairs, elevators, and utilities;
- Critical distribution feeders for emergency power.

3.C Exterior Entrances

The entrance design must balance aesthetic, security, risk, and operational considerations. One strategy is to consider co-locating public and employee entrances. Entrances should be designed to avoid significant queuing. If queuing will occur within the building footprint, the area should be enclosed in blast-resistant construction. If queuing is expected outside the building, a rain cover should be provided.

3.C.1 Forced Entry

See 4.B.3 for swinging door, horizontal sliding door, and wall criteria. See 4.B.4 for window criteria.

3.C.2 Equipment Space

Public and employee entrances should include space for possible future installation of access control and screening equipment.

3.C.3 Entrance Co-location

Combine public and employee entrances.

3.C.4 Garage and Vehicle Service Entrances

All garage or service area entrances for government controlled or employee permitted vehicles that are not otherwise protected by site perimeter barriers shall be protected by devices capable of arresting a vehicle of the designated threat size at the designated speed. This criterion may be lowered if the access circumstances prohibit a vehicle from reaching this speed (see 2.A.2).

3.D Additional Features

3.D.1 Areas of Potential Concealment

To reduce the potential for concealment of devices before screening points, avoid installing features such as trash receptacles and mail boxes that can be used to hide devices. If mail or express boxes are used, the size of the openings should be restricted to prohibit insertion of packages.

3.D.2 Roof Access

Design locking systems to limit roof access to authorized personnel.

Structural Engineering

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4.C Existing Construction Modernization
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4.D Historic Buildings

4.E Good Engineering Practice Guidelines

4.0 Structural Engineering

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The intent of these criteria is to reduce the potential for widespread catastrophic structural damage and the resulting injury to people. The designer should exercise good judgment when applying these criteria to ensure the integrity of the structure, and to obtain the greatest level of protection practical given the project constraints. There is no guarantee that specific structures designed in accordance with this document will achieve the desired performance. However, the application of the criteria will enhance structural performance if the design events occur.

There are three basic approaches to blast resistant design: blast loads can be reduced, primarily by increasing standoff; a facility can be strengthened; or higher levels of risk can be accepted. The best answer is often a blend of the three.

The field of protective design is the subject of intense research and testing. These criteria will be updated and revised as new information about material and structural response is made available.

4.A General Requirements

4.A.1 Designer Qualifications

For buildings designed to meet Medium or Higher Protection Levels, a blast engineer must be included as a member of the design team. He/she should have formal training in structural dynamics, and demonstrated experience with accepted design practices for blast resistant design and with referenced technical manuals.

4.A.2 Design Narratives

A design narrative and copies of design calculations shall be submitted at each phase identifying the building-specific implementation of the criteria. Security requirements should be integrated into the overall building design starting with the planning phase.

4.A.3 Compliance

Full compliance with the risk assessment and this chapter is expected. Specific requirements should be in accordance with the findings of the facility risk assessment.

4.A.4 New Techniques

Alternative analysis and mitigation methods are permitted, provided that the performance level is attained. A peer group should evaluate new and untested methods.

4.A.5 Methods and References

All building components requiring blast resistance shall be designed using established methods and approaches for determining dynamic loads, structural detailing, and dynamic structural response. Design and analysis approaches should be consistent with those in the technical manuals (TMs) below.

The following are primary TMs (see 4.E, Item 18 for additional references):

- Air Force Engineering and Services Center. Protective Construction Design Manual, ESL-TR-87-57. Prepared for Engineering and Services Laboratory, Tyndall Air Force Base, FL. (1989)

- U.S. Department of the Army. Fundamentals of Protective Design for Conventional Weapons, TM 5- 855-1. Washington, DC, Headquarters, U.S. Department of the Army. (1986)

- U.S. Department of the Army. Security Engineering, TM 5-853 and Air Force AFMAN 32-1071, Volumes 1, 2, 3, and 4. Washington, DC, Departments of the Army and Air Force. (1994)

- U.S. Department of the Army. Structures to Resist the Effects of Accidental Explosions, Army TM 5-1300, Navy NAVFAC P-397, AFR 88-2. Washington, DC, Departments of the Army, Navy and Air Force. (1990)

- U.S. Department of Energy. A Manual for the Prediction of Blast and Fragment Loading on Structures, DOE/TIC 11268. Washington, DC, Headquarters, U.S. Department of Energy. (1992)

4.A.6 Structural and Non-Structural Elements

To address blast, the priority for upgrades should be based on the relative importance of a structural or non-structural element, in the order defined below:

- Primary Structural Elements - the essential parts of the building's resistance to catastrophic blast loads and progressive collapse, including columns, girders, roof beams, and the main lateral resistance system;

- Secondary Structural Elements - all other load bearing members, such as floor beams, slabs, etc.;

- Primary Non-Structural Elements - elements (including their attachments) which are essential for life safety systems or elements which can cause substantial injury if failure occurs, including ceilings or heavy suspended mechanical units; and

- Secondary Non-Structural Elements - all elements not covered in primary non-structural elements, such as partitions, furniture, and light fixtures.

Priority should be given to the critical elements that are essential to mitigating the extent of collapse. Designs for secondary structural elements should minimize injury and damage. Consideration should also be given to reducing damage and injury from primary as well as secondary non-structural elements.

4.A.7 Loads and Stresses

Where required, structures shall be designed to resist blast loads. The demands on the structure will be equal to the combined effects of dead, live , and blast loads. Blast loads or dynamic rebound may occur in directions opposed to typical gravity loads.

For purposes of designing against progressive collapse, loads shall be defined as dead load plus a realistic estimate of actual live load. The value of the live load may be as low as 25% of the code-prescribed live load.

The design should use ultimate strengths with dynamic enhancements based on strain rates. Allowable responses are generally post elastic.

4.A.8 Protection Levels

The entire building structure or portions of the structure will be assigned a protection level according to the facility-specific risk assessment. Protection levels for ballistics and forced entry are described in 4.B. The following are definitions of damage to the structure and exterior wall systems from the bomb threat for each protection level:

4.A.8.1 Low and Medium/Low Level Protection - Major damage. The facility or protected space will sustain a high level of damage without progressive collapse. Casualties will occur and assets will be damaged. Building components, including structural members, will require replacement, or the building may be completely unrepairable, requiring demolition and replacement.

4.A.8.2 Medium Level Protection - Moderate damage, repairable. The facility or protected space will sustain a significant degree of damage, but the structure should be reusable. Some casualties may occur and assets may be damaged. Building elements other than major structural members may require replacement.

4.A.8.3 Higher Level Protection - Minor damage, repairable. The facility or protected space may globally sustain minor damage with some local significant damage possible. Occupants may incur some injury, and assets may receive minor damage.

4.B New Construction

4.B.1 Progressive Collapse[2]

Designs that facilitate or are vulnerable to progressive collapse must be avoided. At a minimum, all new facilities shall be designed for the loss of a column for one floor above grade at the building perimeter without progressive collapse. This design and analysis requirement for progressive collapse is not part of a blast analysis. It is intended to ensure adequate redundant load paths in the structure should damage occur for whatever reason. Designers may apply static and/or dynamic methods of analysis to meet this requirement. Ultimate load capacities may be assumed in the analyses.

In recognition that a larger than design explosive (or other) event may cause a partial collapse of the structure, new facilities with a defined threat shall be designed with a reasonable probability that, if local damage occurs, the structure will not collapse or be damaged to an extent disproportionate to the original cause of the damage.

In the event of an internal explosion in an uncontrolled public ground floor area, the design shall prevent progressive collapse due to the loss of one primary column, or the designer shall show that the proposed design precludes such a loss. That is, if columns are sized, reinforced, or protected so that the threat charge will not cause the column to be critically damaged, then progressive collapse calculations are not required for the internal event. For design purposes, assume there is no additional standoff from the column beyond what is permitted by the design.

Discussion: As an example, if an explosive event causes the local failure of one column and major collapse within one structural bay, a design mitigating progressive collapse would preclude the additional loss of primary structural members beyond this localized damage zone (i.e., the loss of additional columns, main girders, etc.). This does not preclude the additional loss of secondary structural or non-structural elements outside the initial zone of localized damage,

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[2] Design to mitigate progressive collapse is an independent analysis to determine a system's ability to resist structural collapse upon the loss of a major structural element. It is not a part of traditional blast analysis. It is possible, however, that a blast may be the cause of the removal of structural members. ASCE 7-95 describes progressive collapse and offers additional guidelines.

provided the loss of such members is acceptable for that performance level and the loss does not precipitate the onset of progressive collapse.

4.B.2 Building Materials

All building materials and types acceptable under model building codes are allowed. However, special consideration should be given to materials which have inherent ductility and which are better able to respond to load reversals (i.e., cast in place reinforced concrete and steel construction). Careful detailing is required for material such as pre-stressed concrete, pre-cast concrete, and masonry to adequately respond to the design loads. The construction type selected must meet all performance criteria of the specified Level of Protection.

4.B.3 Exterior Walls

4.B.3.1 Design for limited load

Design exterior walls for the actual pressures and impulses up to a maximum of ___ psi and ___ psi-msec (project-specific information to be provided).

The designer should also ensure that the walls are capable of withstanding the dynamic reactions from the windows.

Shear walls that are essential to the lateral and vertical load bearing system, and that also function as exterior walls, shall be considered primary structures. Design exterior shear walls to resist the actual blast loads predicted from the threats specified.

Where exterior walls are not designed for the full design loads, special consideration shall be given to construction types that reduce the potential for injury (see 4.B.2).

4.B.3.2 Design for full load

Design the exterior walls to resist the actual pressures and impulses acting on the exterior wall surfaces from the threats defined for the facility (see also discussions in 4.B.3.1).

4.B.3.3 Forced Entry

4.B.3.3.1 Security of Swinging Door Assemblies
ASTM F 476 Grade ____ (project-specific information to be provided).

4.B.3.3.2 Measurement of Forced Entry Resistance of Horizontal Sliding Door Assemblies ASTM F 842 Grade ___ (project-specific information to be provided).

4.B.3.3.3 A medium protection level (per TM 5-853) for walls would be the equivalent of 4” concrete with #5 reinforcing steel at 6” interval each way or 8” CMU with #4 reinforcing steel at 8” interval. TM 5-853 provides other alternatives for low, medium, and high protection.

4.B.4 Exterior Windows

4.B.4.1 No restriction.

No restrictions on the type of glazing

4.B.4.2 Limited protection

These windows do not require design for specific blast pressure loads. Rather, the designer is encouraged to use glazing materials and designs that minimize the potential risks.

1. Preferred systems include: thermally tempered heat strengthened or annealed glass with a security film installed on the interior surface and attached to the frame; laminated thermally tempered, laminated heat strengthened, or laminated annealed glass; and blast curtains.
2. Acceptable systems include thermally tempered glass; and thermally tempered, heat strengthened or annealed glass with film installed on the interior surface (edge to edge, wet glazed, or daylight installations are acceptable).
3. Unacceptable systems include untreated monolithic annealed or heat strengthened glass; and wire glass.

The minimum thickness of film that should be considered is 4 mil. In a blast environment, glazing can induce loads three or more times that of conventional loads onto the frames. This must be considered with the application of anti-shatter security film.

The designer should design the window frames so that they do not fail prior to the glazing under lateral load. Likewise, the anchorage should be stronger than the window frame, and the supporting wall should be stronger than the anchorage.

The design strength of a window frame and associated anchorage is related to the breaking strength of the glazing. Thermally tempered glass is roughly four times as strong as annealed, and heat strengthened glass is roughly twice as strong as annealed.

4.B.4.3 Design up to specified load

Window systems design (glazing, frames, anchorage to supporting walls, etc.) on the exterior facade should be balanced to mitigate the hazardous effects of flying glazing following an explosive event. The walls, anchorage, and window framing should fully develop the capacity of the glazing material selected.

The designer may use a combination of methods such as government produced and sponsored computer programs (e.g., WINLAC, GLASTOP, SAFEVU, and BLASTOP) coupled with test data and recognized dynamic structural analysis techniques to show that the glazing either survives the specified threats or the post damage performance of the glazing protects the occupants in accordance with the conditions specified here (Table 4-1). When using such methods, the designer may consider a breakage probability no higher than 750 breaks per 1000 when calculating loads to frames and anchorage.

While most test data use glazing framed with a deep bite, this may not be amenable to effective glazing performance or installation. It has been demonstrated that new glazing systems with a ½-inch bite can be engineered to meet the performance standards of Table 4-1 with the application of structural silicone. However, not much information is available on the long-term performance of glazing attached by structural silicone or with anchored security films.

All glazing hazard reduction products for these protection levels require product-specific test results and engineering analyses performed by qualified independent agents demonstrating the performance of the product under the specified blast loads, and stating that it meets or exceeds the minimum performance required. Performance levels are based on the protection conditions presented in Table 4-1. A government-provided database indicating the performance of a wide variety of products will be made available to the designer.

Window Fenestration: The total fenestration openings are not limited; however, a maximum of 40 % per structural bay is a preferred design goal.

Window Frames: The frame system should develop the full capacity of the chosen glazing up to 750 breaks per 1000, and provide the required level of protection without failure. This can be shown through design calculations or approved testing methods.

Anchorage: The anchorage should remain attached to the walls of the facility during an explosive event without failure. Capacity of the anchorage system can be shown through design calculations or approved tests that demonstrate that failure of the proposed anchorage will not occur and that the required performance level is provided

Glazing alternatives are as follows:

1. Preferred systems include: thermally tempered glass with a security film installed on the interior surface and attached to the frame; laminated thermally tempered, laminated heat strengthened, or laminated annealed glass; and blast curtains.
2. Acceptable systems include monolithic thermally tempered glass with or without film if the pane is designed to withstand the full design threat (see Condition 1 on Table 4-1).
3. Unacceptable systems include untreated monolithic annealed or heat-strengthened glass; and wire glass.

In general, thicker anti-shatter security films provide higher levels of hazard mitigation than thinner films. Testing has shown that a minimum of a 7 mil thick film, or specially manufactured 4 mil thick film, is the minimum to provide hazard mitigation from blast. The minimum film thickness that should be considered is 4 mil.

Not all windows in a public facility can reasonably be designed to resist the full forces expected from the design blast threats. As a minimum, design window systems (glazing, frames, and anchorage) to achieve the specified performance conditions (Table 4-1) for the actual blast pressure and impulse acting on the windows up to a maximum of ___ psi and ___ psi-msec. As a minimum goal, the window systems should be designed so that at least __ % of the total glazed areas of the facility meet the specified performance conditions when subjected to the defined threats (project-specific information to be provided).

In some cases, it may be beneficial and economically feasible to select a glazing system that demonstrates a higher, safer performance condition. Where tests indicate that one design will perform better at significantly higher loads, that design could be given greater preference.

Where peak pressures from the design explosive threats can be shown to be below 1 psi acting on the face of the building, the designer may use the reduced requirements of 4.B.4.2.

4.B.4.4 Additional Glazing Requirements

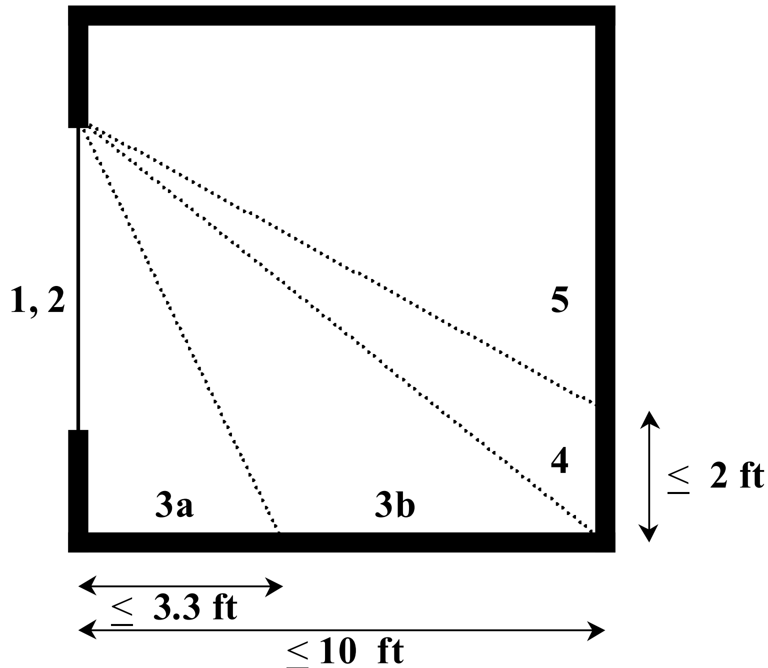
4.B.4.4.1 Ballistic windows, if required, shall meet the requirements of UL 752 Bullet-Resistant Glazing Level ___ (project-specific information to be provided). Glass-clad polycarbonate or laminated polycarbonate are two types of acceptable glazing material.

4.B.4.4.2 Security glazing, if required, shall meet the requirements of ASTM F1233 or UL 972, Burglary Resistant Glazing Material.

This glazing should meet the minimum performance specified in Table 4-1. However, special consideration should be given to frames and anchorages for ballistic-resistant windows and security glazing since their inherent resistance to blast may impart large reaction loads to the supporting walls.

4.B.4.4.3 Resistance of Window Assemblies to Forced Entry (excluding glazing) ASTM F 588 Grade___ (project-specific information to be provided; see 4.B.4.4.2 for glazing).

4.B.4.4.4 Design for eavesdropping and electronic emanations is beyond the scope of the criteria.



Test window should be in the design position or centered on the wall.

Figure 4-1 Side view of test structure illustrating performance conditions of Table 4-1

Table 4-1. Glazing Protection Levels Based on Fragment Impact Locations

Performance Condition	Protection Level	Hazard Level	Description of Window Glazing Response
1	Safe	None	Glazing does not break. No visible damage to glazing or frame.
2	Very High	None	Glazing cracks but is retained by the frame. Dusting or very small fragments near sill or on floor acceptable.
3a	High	Very Low	Glazing cracks. Fragments enter space and land on floor no further than 3.3 ft. from the window.
3b	High	Low	Glazing cracks. Fragments enter space and land on floor no further than 10 ft. from the window.
4	Medium	Medium	Glazing cracks. Fragments enter space and land on floor and impact a vertical witness panel at a distance of no more than 10 ft. from the window at a height no greater than 2 ft. above the floor.
5	Low	High	Glazing cracks and window system fails catastrophically. Fragments enter space impacting a vertical witness panel at a distance of no more than 10 ft. from the window at a height greater than 2 ft. above the floor.

* In conditions 2, 3a, 3b, 4 and 5, glazing fragments may be thrown to the outside of the protected space toward the detonation location.

4.B.5 Non-Window Openings

Non-window openings such as mechanical vents and exposed plenums should be designed to the level of protection required for the exterior wall. Designs should account for potential in-filling of blast over-pressures through such openings. The design of structural members and all mechanical system mountings and attachments should resist these interior fill pressures.

4.B.6 Interior Windows

Interior glazing should be minimized where a threat exists. The designer should avoid locating critical functions next to high risk areas with glazing, such as lobbies, loading docks, etc.

4.B.7 Parking

The following criteria apply to parking inside a facility where the building superstructure is supported by the parking structure:

4.B.7.1 The designer shall protect primary vertical load carrying members by implementing architectural or structural features that provide a minimum 6-inch standoff.

4.B.7.2 All columns in the garage area shall be designed for an unbraced length equal to two floors, or three floors where there are two levels of parking.

4.B.8 Selected Design Areas

For lobbies and other areas with specified threats:

4.B.8.1 The designer shall implement architectural or structural features that deny contact with exposed primary vertical load members in these areas. A minimum standoff of at least 6 inches from these members is required.

4.B.8.2 Primary vertical load carrying members shall be designed to resist the effects of the specified threat (see 4.B.1).

4.B.9 Loading Docks

The loading dock design should limit damage to adjacent areas and vent explosive force to the exterior of the building. Significant structural damage to the walls and ceiling of the loading dock is acceptable. However, the areas adjacent to the loading dock should not experience severe structural damage or collapse. The floor of the loading dock does not need to be designed for blast resistance if the area below is not occupied and contains no critical utilities.

4.B.10 Mailrooms and Unscreened Retail Spaces

Mailrooms where packages are received and opened for inspection, and unscreened retail spaces (see 3.A.6 and 3.A.8) shall be designed to mitigate the effects of a blast on primary vertical or lateral bracing members. Where these rooms are located in occupied areas or adjacent to critical utilities, walls, ceilings, and floors, they should be blast and fragment resistant. Significant structural damage to the walls, ceilings, and floors of the mailroom is acceptable. However, the areas adjacent to the mailroom should not experience severe damage or collapse.

4.B.11 Venting

The designer should consider methods to facilitate the venting of explosive forces and gases from the interior spaces to the outside of the structure. Examples of such methods include the use of blow-out panels and window system designs that provide protection from blast pressure applied to the outside but that readily fail and vent if exposed to blast pressure on the inside.

4.C Existing Construction Modernization

Existing structures undergoing a modernization should be upgraded to new construction requirements when required by the risk assessment except where noted in 4.C.2. The requirements of new construction apply to all major additions and structural modifications.

4.C.1 Protection Levels

Risk assessments based on the new construction criteria shall be performed on existing structures to examine the feasibility of upgrading the facility. The results, including at a minimum recommendations and cost, shall be documented in a written report before submission for project funding.

4.C.2 Progressive Collapse

Existing buildings will not be retrofitted to prevent progressive collapse unless they are undergoing a structural renovation, such as a seismic upgrade.

Prior to the submission for funding, all structures shall be analyzed according to requirements for new construction, and a written report shall clearly state the potential vulnerability of the building to progressive collapse. This report will be used as a planning tool to reduce risk. Findings of the design-analysis shall be incorporated into the project’s risk assessment and include the methodology, the details of the progressive collapse analysis, retrofit recommendations, cost estimates, and supporting calculations.

4.D Historic Buildings

Historic buildings are covered by these criteria in the same manner as other existing buildings (see 4.C).

4.E Good Engineering Practice Guidelines

The following are rules of thumb commonly used to mitigate the effects of blast on structures. Details and more complete guidance are available in the Technical Manuals listed in 4.A.5 and in the references below. The following guidelines are not meant to be complete, but are provided to assist the designer in the initial evaluation and selection of design approaches.

For higher levels of protection from blast, cast-in-place reinforced concrete is normally the construction type of choice. Other types of construction such as properly designed and detailed steel structures are also allowed. Several material and construction types, while not disallowed by these criteria, may be undesirable and uneconomical for protection from blast.

1. To economically provide protection from blast, inelastic or post elastic design is standard. This allows the structure to absorb the energy of the explosion through plastic deformation while achieving the objective of saving lives. To design and analyze structures for blast loads, which are highly nonlinear both spatially and temporally, it is essential that proper dynamic analysis methods be used. Static analysis methods will generally result in unachievable or uneconomical designs.

2. The designer should recognize that components might act in directions for which they are not designed. This is due to the engulfment of structural members by blast, the negative phase, the upward loading of elements, and dynamic rebound of members. Making steel reinforcement (positive and negative faces) symmetric in all floor slabs, roof slabs, walls, beams and girders will address this issue. Symmetric reinforcement also increases the ultimate load capacity of the members.

3. Lap splices should fully develop the capacity of the reinforcement.

4. Lap splices and other discontinuities should be staggered.

5. Ductile detailing should be used for connections, especially primary structural member connections.

6. There should be control of deflections around certain members, such as windows, to prevent premature failure. Additional reinforcement is generally required.

7. Balanced design of all building structural components is desired. For example, for window systems, the frame and anchorage shall be designed to resist the full capacity of the weakest element of the system.

8. Special shear reinforcement including ties and stirrups is generally required to allow large post-elastic behavior. The designer should carefully balance the selection of small but heavily reinforced (i.e., congested) sections with larger sections with lower levels of reinforcement.

9. Connections for steel construction should be ductile and develop as much moment connection as practical. Connections for cladding and exterior walls to steel frames shall develop the capacity of the wall system under blast loads.

10. In general, single point failures that can cascade, producing wide spread catastrophic collapse, are to be avoided. A prime example is the use of transfer beams and girders that, if lost, may cause progressive collapse and are therefore highly discouraged.

11. Redundancy and alternative load paths are generally good in mitigating blast loads. One method of accomplishing this is to use two-way reinforcement schemes where possible.

12. In general, column spacing should be minimized so that reasonably sized members can be designed to resist the design loads and increase the redundancy of the system. A practical upper level for column spacing is generally 30 ft. for the levels of blast loads described herein.

13. In general, floor to floor heights should be minimized. Unless there is an overriding architectural requirement, a practical limit is generally less than or equal to 16 ft.

14. It is recommended that the designer use fully grouted and reinforced CMU construction in cases where CMU is selected.

15. It is essential that the designer actively coordinate structural requirements for blast with other disciplines including architectural and mechanical.

16. The use of one-way wall elements spanning from floor-to-floor is generally a preferred method to minimize blast loads imparted to columns.

17. In many cases, the ductile detailing requirements for seismic design and the alternate load paths provided by progressive collapse design assist in the protection from blast. The designer must bear in mind, however, that the design approaches are at times in conflict. These conflicts must be worked out on a case by case basis.

18. The following additional references are recommended:

- Biggs, John M. Introduction to Structural Dynamics. McGraw-Hill. (1964).
- The Institute of Structural Engineers. The Structural Engineer's Response to Explosive Damage. SETO, Ltd., 11 Upper Belgrave Street, London SW1X8BH. (1995).
- Mays, G.S. and Smith, P.D. Blast Effects on Buildings: Design of Buildings to Optimize Resistance to Blast Loading. Thomas Telford Publications, 1 Heron Quay, London E14 4JD. (1995).
- National Research Council. Protecting Buildings from Bomb Damage. National Academy Press. (1995).

Mechanical Engineering

5.A Air System
- 5.A.1 Air Intakes

5.B Utility Protection
- 5.B.1 Utilities and Feeders
- 5.B.2 Incoming Utilities

5.C Ventilation Systems
- 5.C.1 Smoke Evacuation
- 5.C.2 Pressurized Stairways

5.0 Mechanical Engineering

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The mechanical system should continue the operation of key life safety components following an incident. The criteria focus on locating components in less vulnerable areas, limiting access to mechanical systems, and providing a reasonable amount of redundancy.

5.A Air System

5.A.1 Air Intakes

On buildings of more than 4 stories, locate intakes on the 4th floor or higher. On buildings of 3 stories or less, locate intakes on the roof or as high as practical. Locating intakes high on a wall is preferred over a roof location.

5.B Utility Protection

5.B.1 Utilities and Feeders

Utility systems should be located at least 50 feet from loading docks, front entrances, and parking areas.

5.B.2 Incoming Utilities

Within building and property lines, incoming utility systems should be concealed and given blast protection, including burial or proper encasement wherever possible (see 6.A.6).

5.C Ventilation Systems

5.C.1 Smoke Evacuation

In the event of a blast, the ventilation system may be essential to smoke removal, particularly in large, open spaces. Ventilation equipment should be located away from high risk areas such as loading docks and garages. The system controls and power wiring to the equipment should be protected. The ventilation system should be connected to emergency power to provide smoke evacuation.

The designer should consider having separate HVAC systems in lobbies, loading docks, and other locations where the significant risk of internal event exists.

Ventilation and smoke evacuation equipment should be provided with stand-alone local control panels that can continue to individually function in the event the control wiring is severed from the main control system.

During an interior bombing event, smoke evacuation and control is of paramount importance. The designer should consider the fact that if window glazing is hardened, a blast may not blow out windows, and smoke may be trapped in the building.

5.C.2 Pressurized Stairways

A stairway pressurization system should maintain positive pressure in stairways for occupant refuge, safe evacuation, and access by fire fighters. The entry of smoke and hazardous gases into stairways must be minimized.

Electrical Engineering

6.A Service and Distribution
- 6.A.1 Distributed Emergency Power
- 6.A.2 Normal Fuel Storage
- 6.A.3 Emergency Fuel Storage
- 6.A.4 Tertiary Power
- 6.A.5 Emergency Generator
- 6.A.6 Utilities and Feeders

6.B Power and Lighting
- 6.B.1 Site Lighting
- 6.B.2 Restrooms
- 6.B.3 Stairways and Exit Signs

6.C Communications and Security Systems
- 6.C.1 Redundant Communications
- 6.C.2 Radio Telemetry
- 6.C.3 Alarm and Information Systems
- 6.C.4 Empty Conduits

6.0 Electrical Engineering

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The major security functions of the electrical system are to maintain power to essential building services, especially those required for life safety and evacuation; provide lighting and surveillance to deter criminal activities; and provide emergency communication (see Part II 3.B.2 for location of critical building components).

6.A Service and Distribution

6.A.1 Distributed Emergency Power

Emergency and normal electric panels, conduits, and switchgear should be installed separately, at different locations, and as far apart as possible. Electric distribution should also run at separate locations.

6.A.2 Normal Fuel Storage

The main fuel storage should be located away from loading docks, entrances, and parking. Access should be restricted and protected (e.g., locks on caps and seals).

6.A.3 Emergency Fuel Storage

The day tank should be mounted near the generator, given the same protection as the generator (see 6.A.5), and sized to store approximately _____ hours of fuel (project-specific information to be provided). A battery and/or UPS could serve a smaller building or leased facility.

6.A.4 Tertiary Power

Conduit and line can be installed outside to allow a trailer-mounted generator to connect to the building's electrical system. If tertiary power is required, other methods include generators and feeders from alternative substations.

6.A.5 Emergency Generator

The emergency generator should be located away from loading docks, entrances, and parking. More secure locations include the roof, protected grade level, and protected interior areas. The generator should not be located in any areas that are prone to flooding.

6.A.6 Utilities and Feeders

Utility systems should be located away from loading docks, entrances, and parking. Underground service is preferred. Alternatively, they can be hardened.

6.B Power and Lighting

6.B.1 Site Lighting

Site lighting should be coordinated with the closed-circuit television (CCTV) system.

6.B.2 Restrooms

Emergency power should be provided for exit lighting in restrooms.

6.B.3 Stairways and Exit Signs

Self-contained battery lighting should be provided in stairwells and for exit signs as back up in case of emergency generator lag time or failure. As an alternative to battery powered lighting, handrails, stair treads, signs, and doors can be painted with phosphorescent paint. Floor-level evacuation lighting systems should also be considered since a bombing event may fill corridors with dense smoke.

6.C Communications and Security Systems

6.C.1 Redundant Communications

6.C.1.1 The facility could have a second telephone service to maintain communications in case of an incident.

6.C.1.2 A base radio communication system with antenna should be installed in the stairwell, and portable sets distributed on floors. This is the preferred alternative.

6.C.2 Radio Telemetry

Distributed antennas could be located throughout the facility if required for emergency communication through wireless transmission of data.

6.C.3 Alarm and Information Systems

Alarm and information systems should not be collected and mounted in a single conduit, or even co-located. Circuits to various parts of the building shall be installed in at least two directions and/or risers. Low voltage signal and control copper conductors should not share conduit with high voltage power conductors. Fiber-optic conductors are generally preferred over copper.

6.C.4 Empty Conduits

Empty conduits and power outlets can be provided for possible future installation of security control equipment.

Fire Protection Engineering

7.A Active System

- 7.A.1 Water Supply
- 7.A.2 Dual Fire Pumps: Electric and Diesel
- 7.A.3 Standpipe Connection
- 7.A.4 Fire Alarm System
- 7.A.5 Egress Door Locks

7.0 Fire Protection Engineering

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The fire protection system inside the building should maintain life safety protection after an incident and allow for safe evacuation of the building when appropriate.

While fire protection systems are designed to perform well during fires, they are not traditionally designed to survive bomb blast. The three components of the fire protection system are: (1) active features, including sprinklers, fire alarms, smoke control, etc.; (2) passive features, including fire resistant barriers; and (3) operational features, including system maintenance and employee training. (This chapter focuses on active features. Some passive features are discussed in 3.0. Operations are not covered in these criteria. See Part II 3.B.2 for location of critical building components.)

7.A Active System

7.A.1 Water Supply

The fire protection water system should be protected from single point failure in case of a blast event. The incoming line should be encased, buried, or located 50' away from high threat areas. The interior mains should be looped and sectionalized.

7.A.2 Dual Fire Pumps: Electric and Diesel

To increase the reliability of the fire protection system, a dual pump arrangement should be used, with one electric pump and one diesel pump. The pumps should be located apart from each other.

7.A.3 Standpipe Connection

Locked covers should be provided on standpipe and Siamese connections to ensure reliability and prevent damage to threads.

7.A.4 Fire Alarm System

An intelligent, microprocessor-based, addressable fire alarm system with voice capability should be provided. The system should be configured so that any single impairment shall not disable the system on more than one-half of a floor. The configuration should include individual data gathering panels arranged on a network with stand-alone capability in case the main control panel is incapacitated. The system main control panel should be located in the fire control room near the building's main entrance to facilitate fire department access.

7.A.5 Egress Door Locks

All security locking arrangements on doors used for egress must comply with requirements of NFPA 101, Life Safety Code.

Electronic Security

8.A Control Centers and Building Management Systems
- 8.A.1 Operational Control Center (OCC), Fire Command Center (FCC), and Security Control Center (SCC)
- 8.A.2 Backup Control Center (BCC)

8.B Security for Utility Closets, Mechanical Rooms, and Telephone Closets
- 8.B.1 Key System
- 8.B.2 Monitored Access

8.C Devices and Alarms
- 8.C.1 Elevator Recall
- 8.C.2 Elevator Emergency Message

8.D Intrusion Protection System
- 8.D.1 Door Locks
- 8.D.2 Intrusion Detection
- 8.D.3 Monitoring
- 8.D.4 Closed Circuit TV (CCTV)
- 8.D.5 Duress Alarms or Assistance Stations

8.0 Electronic Security

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

The purpose of electronic security is to improve the reliability and effectiveness of life safety systems, security systems, and building functions. When possible, accommodations should be made for future developments in security systems.

This chapter is not a design guide for electronic security systems. The following criteria are only intended to stress those concepts and practices that warrant special attention to enhance public safety. Please consult design guides pertinent to your specific project for detailed information about electronic security (see Part II 3.B.2 for location of critical building components).

8.A Control Centers and Building Management Systems

8.A.1 Operational Control Center (OCC), Fire Command Center (FCC), and Security Control Center (SCC).

8.A.1.1 The SCC and OCC may be co-located. If co-located, the chain of command should be carefully pre-planned to ensure the most qualified leadership is in control for specific types of events.

8.A.1.2 Provide secure information links between the SCC, OCC, and FCC.

8.A.2 Backup Control Center (BCC)

8.A.2.1 A backup control workstation should be provided in a different location, such as a manager's or engineer's office. If feasible, an off-site location should be considered.

8.A.2.2 A fully redundant BCC should be installed (this is an alternative to 8.A.2.1).

8.B. Security for Utility Closets, Mechanical Rooms, and Telephone Closets

Security system wiring/conduit should not be accessible in utility/telephone closets. Controlled access must be provided.

8.B.1 Key System

Anticipate use of a key system.

8.B.2 Monitored Access

Access will be monitored remotely.

8.C Devices and Alarms

8.C.1 Elevator Recall

A button can be provided on the FCC to recall elevators to an alternate floor in the event that the normal evacuation route would involve traveling through a high risk area or that elevators could be safely used to evacuate disabled persons.

8.C.2 Elevator Emergency Message

In conjunction with the recall system, a pre-recorded message should be installed in elevator cab speakers, notifying passengers of an emergency and explaining how to proceed.

8.D Intrusion Protection System

8.D.1 Door Locks

8.D.1.1 No special keying system
8.D.1.2 Security keying system
8.D.1.3 High security keying system
8.D.1.4 Electronic locks

8.D.2 Intrusion Detection

Some or all of the following basic intrusion detection devices should be provided:

8.D.2.1 Magnetic reed switches for interior doors and openings.
8.D.2.2 Glass break sensors for windows up to scalable heights.
8.D.2.3 Balanced magnetic contact switch sets for all exterior doors, including overhead/roll-up doors; review roof intrusion detection.

8.D.3 Monitoring

8.D.3.1 Monitoring should be done at an off-site facility.
8.D.3.2 Use an on-site monitoring center during normal business hours.
8.D.3.3 Have a 24-hour on-site monitoring center.

8.D.4 Closed Circuit TV (CCTV)

A color CCTV surveillance system with recording capability shall be provided to view and record activity at the perimeter of the building, particularly at primary entrances and exits. A mix of monochrome cameras should be considered for areas that lack adequate illumination for color cameras.

8.D.5 Duress Alarms or Assistance Stations

Call buttons should be provided at key public contact areas and as needed in the offices of managers and directors, in garages, and other areas that are identified as high risk locations by the project-specific risk assessment.

Parking Security

9.A Parking
- 9.A.1 Parking on Adjacent Streets
- 9.A.2 Parking on Adjacent Properties
- 9.A.3 Parking Inside the Building
- 9.A.4 On-site Surface or Structured Parking

9.B Parking Facilities
- 9.B.1 Natural Surveillance
- 9.B.2 Stair Towers and Elevators
- 9.B.3 Perimeter Access Control
- 9.B.4 Surface Finishes and Signage
- 9.B.5 Lighting
- 9.B.6 Emergency Communications
- 9.B.7 CCTV

9.0 Parking Security

IMPORTANT NOTE: The following criteria do NOT apply to all projects. Follow each criterion only if instructed to by your project-specific risk assessment.

Parking restrictions help keep threats away from a building. In urban settings, however, curbside or underground parking is often necessary and/or difficult to control. Mitigating the risks associated with parking requires creative design and planning measures, including parking restrictions, perimeter buffer zones, barriers, structural hardening, and other architectural and engineering solutions.

9.A Parking

9.A.1 Parking on Adjacent Streets

Parking is often permitted in curb lanes, with a sidewalk between the curb lane and the building. Where distance from the building to the nearest curb provides insufficient setback, and compensating design measures do not sufficiently protect the building from the assessed threat, parking in the curb lane shall be restricted as follows:

9.A.1.1 Allow unrestricted parking.

9.A.1.2 Allow government-owned and key employee parking only.

9.A.1.3 Use the lane for stand-off. Use structural features to prevent parking.

9.A.2 Parking on Adjacent Properties

The recommended minimum setback distance between the building and parked vehicles for this project is _____ (project-specific information to be provided). Adjacent public parking should be directed to more distant or better protected areas, segregated from employee parking and away from the facility.

9.A.3 Parking Inside the Building

9.A.3.1 Public parking with ID check.

9.A.3.2 Government vehicles and employees of the building only.

9.A.3.3 Selected government employees only.

9.A.3.4 Selected government employees with a need for security.

9.A.4 On-site Surface or Structured Parking

Adjacent surface parking shall maintain a minimum stand-off of _____ feet. Parking within _____feet of the building shall be restricted to authorized vehicles (project-specific information to be provided).

9.B Parking Facilities

9.B.1 Natural Surveillance

For all stand-alone, above ground parking facilities, maximizing visibility across as well as into and out of the parking facility shall be a key design principle.

The preferred parking facility design employs express or non-parking ramps, speeding the user to parking on flat surfaces.

Pedestrian paths should be planned to concentrate activity to the extent possible. For example, bringing all pedestrians through one portal rather than allowing them to disperse to numerous access points improves the ability to see and be seen by other users. Likewise, limiting vehicular entry/exits to a minimum number of locations is beneficial. Long span construction and high ceilings create an effect of openness and aid in lighting the facility. Shear walls should be avoided, especially near turning bays and pedestrian travel paths. Where shear walls are required, large holes in shear walls can help to improve visibility. Openness to the exterior should be maximized.

It is also important to eliminate dead-end parking areas, as well as nooks and crannies.

Landscaping should be done judiciously so as not to provide hiding places. It is desirable to hold planting away from the facility to permit observation of intruders.

9.B.2 Stair Towers and Elevators

9.B.2.1 Stair tower and elevator lobby design shall be as open as code permits. The ideal solution is a stair and/or elevator waiting area totally open to the exterior and/or the parking areas. Designs that ensure that people using these areas can be easily seen - and can see out - should be encouraged. If a stair must be enclosed for code or weather protection purposes, glass walls will deter both personal injury attacks and various types of vandalism. Potential hiding places below stairs should be closed off; nooks and crannies should be avoided.

9.B.2.2 Elevator cabs should have glass backs whenever possible. Elevator lobbies should be well-lighted and visible to both patrons in the parking areas and the public out on the street. When enclosure is required, such as in underground parking garages, an automatic fire door, or for a larger opening, a rolling fire shutter with an access door, can be employed so that the area is wide open during normal use. Either the door or shutter will be closed by a smoke detector when needed instead of a fire rated door that remains closed all the time.

9.B.3 Perimeter Access Control

9.B.3.1 Security screening or fencing may be provided at points of low activity to discourage anyone from entering the facility on foot, while still maintaining openness and natural surveillance.

9.B.3.2 A system of fencing, grilles, doors, etc. should be designed to completely close down access to the entire facility in unattended hours, or in some cases, all hours. Any ground level pedestrian exits that open into non-secure areas should be emergency exits only and fitted with panic bar hardware for exiting movement only.

9.B.3.3 Details of the parking access control system will be provided for the designer.

9.B.4 Surface Finishes and Signage

Interior walls should be painted a light color (i.e., white or light blue) to improve illumination. Signage should be clear to avoid confusion and direct users to their destination efficiently. If an escort service is available, signs should inform users.

9.B.5 Lighting

Lighting levels should comply with the following table[3]:

Maintained Illumination Levels (Footcandles)

	Low	Low/Med.	Medium	Higher
Horizontal illumination at pavement, minimum				
Covered parking areas	1.25	1.50	1.75	2.00
Roof and surface parking areas	0.25	0.50	0.75	1.00
Stairwells, elevator lobbies	2.5	3.5	4.5	5.5
Uniformity ratio (average: minimum)	4:1	4:1	4:1	4:1
Uniformity ratio (maximum: minimum)	20:1	20:1	20:1	20:1
Vertical illumination 5 feet above pavement, minimum				
Covered parking areas	0.625	0.75	0.875	1
Roof and surface parking areas	0.125	0.25	0.375	0.5
Stairwells, elevator lobbies	1.25	1.75	2.25	2.75

The lighting level standards[4] recommended by the Illuminations Engineering Society of North America (IESNA) Subcommittee on Off-Roadway Facilities are the lowest acceptable lighting levels for any parking facility. The above table

[3] From Chrest, Anthony P., Smith, Mary S., and Bhuyan, Sam. Parking Structures: Planning, Design, Construction, Maintenance and Repair, 2nd edition. Chapman and Hall. (1996).
[4] IESNA is expected to publish a revised standard on “Lighting for Parking Facilities” at the end of 1998.

adjusts the lighting levels according to the protection level. A point by point analysis should be done in accordance with the IESNA standards.

9.B.6 Emergency Communications

Emergency intercom/duress buttons or assistance stations should be placed on structure columns, fences, other posts, and/or freestanding pedestals and brightly marked with stripping or paint visible in low light. If CCTV coverage is available, automatic activation of corresponding cameras should be provided, as well as dedicated communications with security or law enforcement stations. It is helpful to include flashing lights that can rapidly pinpoint the location of the calling station for the response force, especially in very large parking structures. It should only be possible to re-set a station that has been activated at the station with a security key. It should not be possible to re-set the station from any monitoring site.

A station should be within 50 feet of reach.

9.B.7 CCTV

9.B.7.1 Color CCTV cameras with recording capability and pan-zoom-tilt drivers, if warranted, should be placed at entrance and exit vehicle ramps. Auto-scanning units are not recommended.

9.B.7.2 Fixed-mount, fixed-lens color or monochrome cameras should be placed on at least one side of regular use and emergency exit doors connecting to the building or leading outside. In order for these cameras to capture scenes of violations, time-delayed electronic locking should be provided at doors, if permitted by governing code authorities. Without features such as time-delayed unlocking or video motion detection, these cameras may be ineffective.

RISK GUIDELINES (FOR OFFICIAL USE ONLY)

General Requirements

1.A Purpose

Part III of the ISC Criteria provides guidance on developing requirements to protect buildings against a variety of criminal and terrorist tactics, including bomb blasts. This document is a basic tool for security, design, and engineering professionals to use for decision-making purposes when planning projects covered by the criteria. The document sets forth minimum performance standards which agencies may exceed based on project-specific considerations.

1.B Applicability

See Part I Section A.

1.C Risk Basis

1.C.1 Project-Specific Requirements

The criteria in this document should be applied using a decision-based approach tailored to each building. The building's specific security requirements should be based on a risk assessment – done at the earliest stages of programming – that considers, at a minimum, the risk factors described in 1.C.3, the tactics identified in 1.E, and the severity level of the risk to the building. Risk evaluations should also use information from a variety of other sources, including physical security surveys and law enforcement/intelligence agencies.

Once the risk has been defined and quantified, funding, costs, site requirements, and other considerations or restrictions should be factored in to develop building-specific design requirements. Building Security Committee and tenant recommendations must be considered. If the desired mitigation of identified risks is not attainable, some portion of the risk may have to be accepted. One of the objectives of a risk assessment system is to achieve a responsible and prudent balance between risk and mitigation measures, recognizing that no agency will have sufficient resources or justification to implement every countermeasure.

1.C.2 Assessment Designations

The criteria in this document use designations ranging from Low to Higher for two purposes. The first is to indicate the severity of the risk to a facility; the second is to designate the appropriate protection level, which means the degree to which the building should offer protection against specific tactics.

1.C.3 Risk Factors

For the purposes of the criteria, risk levels are rated Low, Medium/Low, Medium, or Higher. A Very High risk level could be assigned, but is beyond the scope of these criteria. The risk levels are communicated by tactic severity. For example, the vehicle bomb tactic is categorized according to the varying charge weights of the explosives. The lowest weight dealt with in this document is considered a Low risk; the heaviest weight is a Higher risk.

A building-specific risk assessment should consider the following factors, at a minimum:

- Symbolic Importance: Some facilities are highly visible symbols of this country, either nationally, regionally, or locally. The Alfred P. Murrah Federal Building, for instance, was the primary symbol of the U.S. Government in Oklahoma City.

- Criticality: This measures the degree to which a building houses operations and functions critical to national or regional interests of the United States.

- Consequence: This measures a successful attack's impact on a building's occupants, assets, and functions, as well as on the larger community.

- Threats: These are classified as either criminal or terrorist threats. Tactics may include bombs, forced entry, chemical and biological attacks, criminal acts, etc.

1.C.4 Protection Levels

As used in this document, protection levels Low, Medium/Low, Medium, and Higher refer to how the building is to perform during an emergency, and the degree to which the building and its constituent elements should offer protection against specific tactics. Although it is beyond the scope of these criteria, a Very High Protection Level could be assigned. (Structural protection levels are discussed in Part II 4.A.8.)

The designation of protection levels, as well as the actual planning, design, and construction of a project, should be closely guided by emergency operations objectives to ensure that the resulting occupant emergency plans (OEPs) are reliable, efficient, and cost effective. For example, if an OEP calls for evacuation down a stairwell, the plan for the building should consider where the stairs will discharge, the need for pressurization, and the need for a source of electrical power that will function in that area if a design-basis event occurs. If a project-specific OEP does not exist, use either a generic OEP or an OEP from a similar project.

An entire building should not simply be assigned a single protection level. A facility with a low protection requirement for bomb blast may require a higher protection level for crime; a building's structure may require a higher protection level than its mechanical system; a building requiring low structural protection may need a higher protection level CCTV system.

1.C.5 Risk Assessment Methodology

A security risk assessment for each new or major alteration is essential, first because it channels limited budgets to best minimize risk, and second because it optimizes the performance of a building during a criminal or terrorist event.

The risk assessment is a major element in determining which security criteria apply to a facility. Since many building features, including structure and mechanical and electrical systems, are difficult and costly to change, risk must be carefully and thoughtfully evaluated in all its complexity. Risk assessors should have intelligence on past, current, and future threats. Projections must be made over the life of the facility – as difficult as that may be to do – because of the inflexibility of most building systems, some of which may be designed to last 30-100 years.

Risk assessors also need to consider the separate characteristics as well as the inter-relatedness of building systems. Each element and system – architectural, mechanical, electrical, structural, etc. – should receive its own protection level rating. Throughout the security design process, professionals from many disciplines need to consider how threats and mitigating measures applied to one element affect the rest of the facility.

Currently, there is no government-wide risk assessment system, and this document does not provide such a system.

1.C.6 Project-specific Criteria Tables

Once a project-specific risk assessment is completed, a building's multidisciplinary project security team should use the tables at the end of Part III to determine appropriate criteria for the building. Table 1 provides design basis tactics and their severity levels.

Tables 2 - 9 are designed to communicate criteria and protection levels. They list levels of protection: Low, Medium/Low, Medium, and Higher, and provide countermeasures appropriate to each level. Team members can use columns 1-5 of the tables to select criteria that would provide the desired protection levels, and columns 6-8 to note constraints or other factors and final security solutions.

The tables are intended to be removed from the criteria, copied, and attached to additional sheets of project-specific details and information, as needed. The following is an explanation of the column headings:

- Building Element - The particular component or system being assigned a protection level.
- Tactic – The weapon, action, or method of attack that is the basis of design.
- Criteria – A reference to each criterion number in Part II.

- Countermeasure – The method of protecting the building element against the designated tactic; this column contains one-sentence summaries of the design criteria found in Part II.
- Protection Level/Performance Standards – More specific information on the countermeasure needed to achieve the desired protection level. A dash (-) in this column means a criterion does not apply. Design criteria are detailed in Part II, and application information is in Part III.
- Requirements/Remarks – The space for project-specific figures, such as explosive charge weights, distances, and locations. This area may also include information on operational procedures related to design.
- Considerations/Constraints – The place to fill in physical characteristics relating to the facility or site and non-technical constraints, such as those relating to cost or tenant needs. Requirements unrelated to security often constrain protective system design.
- Protective Measures to be Implemented – The final choice of design criteria and methods to enhance facility security.

1.D Co-location

Agencies that are functionally similar or that require similar levels of protection should be housed in the same location. High-risk tenants, such as law enforcement agencies, should not be co-located with lower risk tenants. If co-location can not be avoided, high-risk tenants should be segregated from publicly accessible areas.

1.E Tactics

It is important to try to identify an aggressor's likely strategy and to identify the severity of the risk to a building. The section below categorizes these strategies into various tactics. For each tactic, the severity of the risk is described from Low to Higher, depending on the events the risk assessment concludes are most likely to occur.

1.E.1 Bombs

1.E.1.1 Moving vehicle bomb:

- For Low and Medium/Low risks, no special construction;
- For Medium risks, the size is a 4,000 lb. vehicle at the maximum practical approach speed up to 30 mph; and
- For Higher risks, the size is a 15,000 lb. vehicle at the maximum practical approach speed up to 50 mph.

1.E.1.2 Stationary exterior vehicle bomb (an aggressor covertly parks an explosives-laden car or truck near a facility, at least 20 feet from the exterior wall):

- For Low and Medium/Low risks, no special construction;
- For Medium risks, the size is a minimum of 100 lbs. of TNT equivalent; and

- For Higher risks, the size is a minimum of 500 lbs. of TNT equivalent.

1.E.1.3 Mail bombs (the aggressor delivers bombs or incendiary devices to the target in letters or packages. The bomb sizes involved are relatively small) (see Part II 4.B.8):

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, the size is 5 lbs.

1.E.1.4 Medium and large size package or supply bombs (at supply and material handling points such as loading docks):

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, the size is 50 lbs.

1.E.1.5 Small package bombs in uncontrolled public areas, prior to screening (see Part II 4.B.8):

- For Low and Medium/Low risks, no special construction;
- For Medium risks, the size is 10 lbs.; and
- For Higher risks, the size is 50 lbs. for progressive collapse and 10 lbs. for non-progressive collapse.

1.E.1.6 The introduction of explosives within controlled areas (see Part II 4.B.8):

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, the size is 2 lbs.

Specify critical building systems or areas of the building to which this applies (e.g., floors, HVAC, structure).

1.E.1.7 Stationary vehicle bomb inside the building:

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, the size is 50 lbs.

1.E.2 <u>Forced Entry and Firearms</u>

1.E.2.1 Small arms - glazing only:

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, use concealment and ballistic-resistant glazing.

Concealment may include blinds, drapes, reflective film, and other visual barriers.

1.E.2.2 Attacks and forced entry at the building envelope:

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, use CCTV and electronic sensors; consider necessary response time.

1.E.2.3 Unauthorized entry (the aggressor attempts to enter a facility by using false credentials or stealth. The aggressor may carry weapons or explosives into the facility):

- For Low and Medium/Low risks use locks and alarms;
- For Medium risks, use locks and alarms plus electronic access control, intrusion detection, and CCTV; and
- For Higher risks, use locks and alarms plus electronic access control, screening and intrusion detection, and CCTV.

There is some very limited discussion of countermeasures for the following tactics. Comprehensive countermeasures for these tactics are not within the scope of the criteria.

1.E.3 Surveillance

1.E.3.1 Visual surveillance (the aggressor employs ocular and photographic devices such as binoculars and cameras with telephoto lenses to monitor facility operations or to see assets):

- Courthouses and Higher risks (requirements to be developed on a project-specific basis by tenants).

1.E.3.2 Acoustic eavesdropping (the aggressor employs listening devices to monitor voice communication or other audibly transmitted information):

- Courthouses and Higher risks (requirements to be developed on a project-specific basis by tenants).

1.E.3.3 Electronic eavesdropping or electronic emanations:

- Courthouses and Higher risks (requirements to be developed on a project-specific basis by tenants).

1.E.4 Airborne Contaminants

1.E.4.1 Airborne contamination (an aggressor contaminates the air supply of a facility by introducing chemical or biological agents into it):

- For Low and Medium/Low risks, no special construction; and
- For Medium and Higher risks, consider special construction.

1.F <u>Classification</u>

1.F.1 Parts I and II are public information.

1.F.2 Part III is "For Official Use Only." It is submitted in draft form and therefore exempt from disclosure under FOIA. It is expected to remain in draft form until the risk assessment system is developed.

1.F.3 Tables 1 to 9 may be classified when completed with project-specific information following.

Site and Landscape Design

From the earliest programming stages, security considerations should be an integral part of site planning, perimeter definition, lighting, signage, and landscaping decisions. Site and landscape design can help protect a building - particularly by keeping threats away and by incorporating CPTED principles - and decrease the need for costly building engineering solutions to safety concerns. (See Part II 1.A.2 for CPTED references.)

Use the information here as well as in Part II Chapter 2 and Table 2 to specify site and landscaping requirements.

2.A Vehicular Control

Blast pressures from an exploding vehicle bomb decrease rapidly with distance from the explosion. Each foot of setback can be of critical importance. When a vehicle bomb is identified as a threat, consideration must be given to how the site design can offer maximum protection to the building, or whether site constraints require design modifications to the structure of the building itself.

There is a need to balance costs, risks, and the technical issues of distance and hardening. Achieving this balance requires the participation of those acquiring sites, security professionals, urban planners, designers, and others.

2.A.1 Distance

One design strategy to mitigate blast effects is to maintain as much distance as possible between a vehicle bomb and the facility. The following distances are recommended to achieve the designated protection levels.

Protection Level	Distance
Low	0 feet
Medium/Low	5 feet
Medium	**50 feet**
Higher	100 feet

On any given site, the recommended distance may not be available. In that case, the identified threat can be addressed by countermeasures such as perimeter barriers (Ch. 2), structural hardening (Ch. 4) and parking restrictions (Ch. 9); relocation of vulnerable functions within or away from the building; operational procedures, such as increased surveillance; or acceptance of some higher degree of risk.

2.A.2 Perimeter Protection Zone

Specify the need for this protection and the size and speed of the vehicle.

2.A.3 Perimeter Vehicle Inspection

Consider providing space for inspection at the curb line or outside the protected perimeter for gross amounts of explosives. Ideally, the location should be separated from the building as much as practical. If screening space cannot be provided, other design features such as hardening, or other operational procedures, such as finding alternative space for inspection, may be required.

2.A.3.1 Specify the location and requirements for inspection.

2.A.3.2 Specify design features or functions.

2.B Site Lighting

Specify lighting that is required to perform the security functions.

2.C Signage

Specify signage requirements including sensitive areas that should not have signs.

2.D Landscaping

Provide special landscaping requirements considering good CPTED practices.

Architecture and Interior Design

This chapter focuses on using interior planning to safeguard occupants and critical building systems. The location of functions away from high risk areas can reduce vulnerability and the consequences of various tactics. The careful selection of materials can improve building performance and enhance the OEP.

Use the information here, along with Part II Chapter 3 and Table 3, to specify architecture and interior design requirements.

3.A Planning

3.A.1 Office Locations

Specify offices requiring special location. Consider numbering offices on drawings and lists rather than referring to them by name.

3.A.2 Mixed Occupancies

Provide tenant information, such as the fact that high- and low-risk tenants are not separated, that may necessitate specific design solutions.

3.A.3 Public Toilets and Service Areas

Specify whether or not this criterion is applicable.

3.A.4 Refuge

Refuge provides a safe area for occupants to go if they cannot safely exit the building. Specify the tactics against which refuge is provided, and the location principles. These should support the OEP.

3.A.5 Loading Docks and Shipping and Receiving Areas

Protecting utility systems and/or locating them away from vulnerable areas helps assure that services will provide life safety and operations support after an attack.

3.A.6 Retail

Specify security measure for retail spaces.

3.A.7 Stairwells

Stairwells required for emergency egress should be designed to support the OEP. Specify related requirements.

3.A.8 Mailroom

The basic strategy is to detect delivered bombs before they explode. Space may need to be provided for equipment to examine incoming packages and for special containers. In some areas, an off-site location may be cost effective, or several buildings may share one mailroom.

3.B Interior Construction

3.B.1 Lobby Doors and Partitions

Where screening and access control are performed to preclude introduction of weapons into a building, an adversary may bring a weapon into the pre-screening area. Make doors and walls along the line of security screening ballistic resistant per UL document 752, "Standard for Safety: Bullet-Resisting Equipment."

Specify whether or not screening is required, the level of protection, and the location.

Protection Level	UL Rating Level
Low and Medium/Low	NA
Medium	**UL Rating Level 3**
Higher	UL Rating Level 8

Security procedures and OEPs will have a major impact on lobby design. Concepts such as self-enclosed screening systems at the lobby result in a different lobby design than screening stations within the building and impact other building systems, including egress, queuing, HVAC, and fire protection.

3.B.2 Critical Building Components

Assuming that the building has structurally survived a bomb blast, evacuation and rescue are the most important concerns. The goal of this criterion is to increase the likelihood that emergency systems will remain operational during a disaster. This criterion also responds to the presence of toxic gasses in the facility, since ventilation systems that continue to work during an emergency may mitigate this hazard to some extent.

One obvious strategy to avoid the cost of hardening is to locate these systems away from attack locations.

Specify the vulnerable areas and the distance utilities should be separated from these areas.

3.C Exterior Entrances

3.C.1 Forced Entry Protection

This criterion protects against limited hand tool attacks on the building. See 4.B.3 for swinging door, horizontal sliding door, and wall criteria. See 4.B.4 for window criteria.

3.C.2 Equipment Space

This criterion deals with space for the immediate or future installation of equipment such as walk-through metal detectors and x-ray devices, as well as ID check, electronic access card, and turnstiles. Actual equipment requirements are dealt with separately as part of each building's project-specific risk assessment.

For Medium and Higher Levels, protection would call for space for equipment at public entrances. Space to add equipment in times of heightened alert would also be provided for Medium/Low Level. For employee entrances, Medium and Higher Level protection would call for equipment space.

Consider providing space for vapor and other detection systems in the event they are needed in the future.

Indicate whether, where, and how much space is to be provided for security operations. Provide space, location, and operational requirements for security command centers (see 8.A).

3.C.3 Entrance Co-location

Co-locating public and employee entrances for buildings may, depending upon the security procedures, result in operational cost savings if the same staff can supervise both entrances. Reconstructing entrances to accommodate security functions can be much more expensive than incorporating them originally. Combining entrances may, depending on the situation, make access control more difficult.

Specify whether entrances will be co-located and provide other security-related access criteria.

3.C.4 Garage and Vehicle Service Entrances

Provide design information for security functions.

3.D Additional Features

3.D.1 Areas of Potential Concealment

Specify security measures.

3.D.2 Roof Access

Specify security measures, such as locking method and countermeasures for other means of gaining access to the roof.

Structural Engineering

The structural criteria address bombing, forced entry, and small arms tactics. Various bomb locations are provided in Part III 1.E.1. Forced entry and small arms tactics are listed in 1.E.2. The exterior wall and structure can provide protection against surveillance tactics listed in 1.E.3 and exterior airborne contaminants in 1.E.4, but those countermeasures are beyond the scope of this document.

Use information here along with Part II Chapter 4, Table 4, and design basis tactics from Table 1 to specify protection levels and structural requirements.

For all tactics, security personnel should select the risk level and protection level required with the assistance of other professionals. For expensive structural mitigations, security professionals should evaluate other countermeasures. For example, the intelligence and law enforcement communities may be applying resources to reduce the chance of buildings being bombed, and because of that action, less protection may be required.

4.A.1- 4.A.5, 4.A.7 General Requirements

These requirements deal with procedures applicable to all levels of protection. Use the remarks section in Table 4 to provide additional comments, such as on new techniques that should be used or considered.

4.A.6 Structural and Non-Structural Elements

This is a place in the table to specify protection measures for secondary, non-structural elements.

4.A.8 Protection Levels

This section defines levels of protection for blast. Indicate areas or building elevations where higher or lower protection levels are required. For example, elevations facing streets where vehicles have been vetted may warrant lower protection levels. A storage area may not have the same protection level as occupied areas.

4.B and 4.C New and Existing Construction

For new construction, the criteria require protection against progressive collapse as well as resistance to blast loads. For existing construction, however, progressive collapse measures are called for only if the structure is undergoing a structural renovation, such as a seismic upgrade. The same blast features that apply to new buildings apply to existing buildings, if technically and economically feasible.

Complete the 4.B and 4.C sections of Table 4 for both new and existing construction.

4.B New Construction

4.B.1 Progressive Collapse

Insert special progressive collapse requirements. The consequences of progressive collapse for small buildings are much less than for tall buildings, for example.

4.B.2 Building Material

The choice of building materials is usually left to designers.

4.B.3 Exterior Walls

Three levels of protection are provided by Part II. The specific design pressure alternatives are noted below:

No requirements for Low and Medium/Low Protection Levels

4.B.3.1 Design to limited load - applies to Medium Protection Level. The most commonly used pressures are 4 psi (design pressure) and 28 psi-msec.

4.B.3.2 Design to full load - applies to Higher Protection Level. The suggested design pressures are 10psi (incident pressure) and 89 psi-msec.

4.B.3.3 Forced Entry

For doors, criteria are based on ASTM standards. Provide the designer with the Grade (30 or 40) for each:

4.B.3.3.1 Security of Swinging Door Assemblies

4.B.3.3.2 Horizontal Sliding Door Assemblies

4.B.3.3.3 Walls

This is applicable if some or all of the walls need forced entry protection in addition to what is provided by traditional construction. The criterion specifies a Medium Level design equivalent. TM 5-853 is a source of alternatives for Medium and Higher protection levels. Specify the location for which this feature is required, such as for 16 feet above grade level.

4.B.4 Exterior Windows

There are four protection levels for windows in Part II with specific design pressure alternatives noted below:

4.B.4.1 No restriction – applies to Low Protection Level

4.B.4.2 Limited protection – applies to Medium/Low Protection Level

4.B.4.3 Design up to specified load:

- Design up to 4 psi and 28 psi-msec – applies to Medium Level Performance conditions 1 through 4 (see Table 4-1 in Part II).

- Design up to 10 psi and 89 psi-msec – applies to Higher Level Performance conditions 1 through 3 (see Table 4-1 in Part II).

A common goal is that 90% of the glazing should meet the performance standard specified. This means that up to 10% of the windows will fail catastrophically under the 4 and 10 psi design criteria (see Part II 4.B.4. 1). The results from actual pressure and impulse will be much higher than the design requirements – they may be 10s of psi or 100s of psi.

The 90 % requirement assumes a rectangular building with glass on four sides. A blast at the center of one side of the building may cause the failure of 40% of the glass on that side, resulting in an unsatisfactory performance condition as defined by Table 4-1 in Part II. Two factors to consider are buildings that do not have four exposed sides and glass response at higher pressure levels.

To achieve the same protection level on a building with glass on only two sides, the requirement would be 80%. Table 4 is the place to specify alternative percentages.

In some cases, it may be beneficial and economically feasible to select a glazing system that demonstrates a higher, safer, performance condition. Where tests indicate that one design solution will perform better at significantly higher loads, that design could be given greater preference.

4.B.4.4 Additional Window Requirements

Additional window requirements include resisting ballistics and forced entry. For forced entry, three protection levels are as follows:

4.B.4.4.1 Choose one of the following protection levels for ballistic windows:

Low and Medium/Low: NA

Medium: UL Rating Level 3
Higher: UL Rating Level 8

Provide locations, such as at the lower levels of the building.

4.B.4.4.2 Indicate if security glazing is required and provide locations, such as for the first 16 feet above street level.

4.B.4.4.3 Indicate whether resistance of window assemblies against forced entry applies and the grade (30 or 40); provide locations, such as at the lower levels of the building.

4.B.4.4.4 Glazing and exterior walls can also be designed to reduce the flow of electronic emanations into or out of a building. While this subject is beyond the scope of these criteria, some types of glass, window film, and laminated glass can reduce emanation risks. Similarly, the types of materials regularly used in exterior wall construction may provide low levels of protection. Indicate whether or not this protection is required.

4.B.5 Non-Window Openings

These should be designed to the same protection level as the exterior wall.

4.B.6 Interior Windows

Indicate the extent of interior glass permitted at locations such as the lobby.
Specify treatment, if required, using information from Part II 4.B.4.

4.B.7 Parking

Indicate whether the features are required.

4.B.8 Selected Design Areas

For lobbies and other areas with specified threats, indicate whether the feature is required.

4.B.9 Loading Docks

Specify if there is a need for this type of design.

4.B.10 Mail Rooms and Unscreened Retail Spaces

Indicate whether venting is required. Also consider how mail is to be processed. For example, security needs may warrant off-site processing, eliminating the mailroom from the facility.

4.B.11 Venting

Indicate any special interior venting requirements such as for parking garages. Consider the likelihood of interior events and the extent to which the building exterior is hardened.

4.C Existing Construction Modernization

4.C.1 Protection Levels

Indicate that a report is required for existing facilities to be upgraded. Consider the vulnerability noted in the report when developing OEPs and other security requirements.

4.C.2 Progressive Collapse

If the facility is to undergo a structural renovation, such as a seismic upgrade or an addition, progressive collapse design is recommended.

4.D Historical Buildings

Because of their symbolic importance and limited design alternatives, historic buildings usually require special consideration.

4.E Good Engineering Practice

These practices are most practical for new construction, such as an addition to a building. The extent to which the practices have been implemented for existing buildings may be helpful in determining how those buildings will perform under blast loading.

Mechanical Engineering

The continued operation of the mechanical system components facilitates evacuation, life safety, refuge, and/or operations following an incident. The criteria focus on locating system components in safe areas, limiting access to mechanical systems, and providing a reasonable amount of redundancy. Since the goal is to have the building perform better during emergencies, the mechanical system should be coordinated with the building's Occupant Emergency Plan requirements.

Use the information here, as well as Part II Chapter 5 and Table 5, to specify ventilation system and utility protection requirements. In addition, the following references are helpful: NFPA 92A, "Recommended Practice for Smoke-Control Systems, 1996 edition" and NFPA 92B, "Guide for Smoke Management Systems in Malls, Atria, and Large Areas, 1995 edition."

5.A Air System

5.A.1 Air Intakes

Raising air intakes makes the building ventilation system less accessible.

Filtration of air, which may have other health and energy-saving benefits in addition to the security ones, is beyond the scope of these criteria, as is the detection of chemical and biological agents.

Indicate actions to be taken on air intakes.

5.B Utility Protection

Protecting utility systems, locating them away from vulnerable areas, and restricting access helps assure that services will provide life safety and operations support after an event.

Incoming utilities are major services coming into the building, such as water lines; utilities and feeders are an important distribution network within the building, and include pipes and pumps.

Indicate whether utilities are to be protected.

5.C Ventilation Systems

Smoke evacuation and stair pressurization are elements of the fire protection system that sustain air quality during the evacuation of occupants. The risk of a significant interior event provides additional justification for installing these systems, particularly for larger buildings. If exterior glass has been strengthened (see Ch. 4), windows may not break during an interior event; as a result, toxic gases cannot be diluted or exhausted through window openings.

Pressurizing some or all stairs reduces the chances of smoke and hazardous gases migrating into these spaces. Pressurization is not necessary in buildings lower than 75’ or six stories above or below grade, unless required by other criteria.

For ventilation systems to function, electrical power must be available (see Ch. 6).

Electrical Engineering

The criteria are aimed at protecting the electrical system and ensuring that it functions in the event of a blast. During an emergency, the electrical system maintains power to essential building services, facilitates evacuation, and allows for continuing communication. Since the goal is to have the building perform better during emergencies, the electrical system should be coordinated with the building's Occupant Emergency Plan requirements.

Use information here along with Part II Chapter 6 and Table 6 to specify electrical system requirements.

6.A Service and Distribution

These criteria increase the reliability of the building's power distribution, fuel storage, generator, utilities, and feeders during an emergency. The focus is on separating power sources and locating electrical systems away from vulnerable areas.

6.A.1 Distributed Emergency Power

Emergency power may not be available in small buildings except for power conditioner or UPS system.

6.A.3 Emergency Fuel Storage

An emergency fuel day tank should be sized to store 8 hours of fuel (more if needed).

6.A.4 Tertiary Power

A tertiary power source is intended for buildings where operational continuity is critical. If the trailer-mounted generator option might be used, an operations plan should be in place.

6.A.5 Emergency Generator

If the emergency generator is installed outdoors at grade, it should be protected by perimeter walls and locked entrances.

6.B Power and Lighting

6.B.1 Site Lighting

Although CCTV cameras are available for low-light applications, operations are enhanced with higher uniform lighting levels. Coordinate site lighting with camera requirements.

6.B.2 Restrooms

Emergency lighting in restrooms may facilitate evacuation or permit limited use during power outages not requiring immediate evacuation. Where daylight is available, emergency lighting may not be required.

6.C Communications and Security Systems

6.C.1 Redundant Communications

If primary phone service is disrupted, a base radio system is the preferred alternative for back up.

6.C.2 Radio Telemetry

This refers to wireless data transmission, which minimizes the risk of communications breakdowns due to wiring damage. Radio telemetry can be used for non-secure data that support the life safety system and other critical operations.

6.C.3 Alarm and Information Systems

Having circuits follow different paths reduces the risk of total system failure during some events.

6.C.4 Empty Conduits

This criterion avoids major retrofits and facilitates installing security equipment, including metal detectors, explosives detectors, and X-ray machines, as the need arises and technology advances. This criterion is not intended to require installation of the equipment at any particular time.

Fire Protection Engineering

Many of the fire protection criteria focus on a building's performance during a fire. But during some of the design events, different responses may be required. For example, during a blast, the electronic fire protection system, communications, and sprinkler system may be disabled by the blast. The goal of this chapter is to increase the reliability of the fire protection systems; registered fire protection engineers can assist. Ventilation issues are covered in 4.B.11 and 5.C.

Use information here as well as Part II Chapter 7 and Table 7 to specify special protection and reliability features.

7.A Active System

Protecting the water supply, dual fire pumps, and standpipe connection and/or locating them away from vulnerable areas helps assure that services will provide life safety and operations support after an event.

NOTES: Operational System

- Guard and Employee Training – The following elements of emergency training should be implemented:

  - An Occupant Emergency Plan (OEP) manual should be created for every facility location.
  - Security guards and employees should receive emergency training in the proper reporting and response to fires and other emergencies, and in the use of portable and built-in protection systems, including training in system maintenance.

- Building Documents - An area should be designated, preferably in the Operation Control Center, where the following building documents will be readily available:

  - Emergency instructions
  - OEP manuals
  - Building plans (for Medium and Higher Protection Levels)

The extent to which building plans are made available to others is a subject beyond the scope of these criteria.

Electronic Security

Electronic security should be considered early in project planning to help ensure that it is a cost effective, integral part of the facility design. The criteria in this chapter focus on safety, security systems, and building functions. These criteria are not intended to be comprehensive, since other sets of criteria and design guides specify electronic security systems more thoroughly. Countermeasures for electronic and acoustic surveillance are not covered by this document.

Use information here, along with Part II Chapter 8 and Table 8 to provide information on electronic security systems.

8.A Control Centers and Building Management Systems

Centralization of control center information can improve the reliability and effectiveness of life safety systems, security systems, and building functions. Therefore, the OCC, FCC, and SCC may be co-located. (NOTE: This does not require the addition of an OCC, FCC, or SCC if one does not exist. Operational requirements, especially a pre-designed chain of command for various types of incidents, should be carefully considered before implementing this criterion.)

A backup control center provides redundancy in case the primary center is disabled. Identify the space required for security functions and its location early in the design and planning process.

8.B Security for Utility Closets, Mechanical Rooms, and Telephone Closets

NOTE: Conduit for security system, emergency communication and associated systems should be routed through separate and secure closets.

8.B.1 Key System

Maintain a key system with some method of noting times of entry and departure, such as a watchman's clock system. (For this alternative, the designer needs to use conventional keyed doors only.)

8.B.2 Monitored Access

For Medium and Higher Levels, access to mechanical, electrical, and telecommunication rooms should be authorized, programmed, and monitored by the SCC through pre-identification of maintenance personnel. This alternative anticipates a more sophisticated security system for doors. The designer may need to know details of the system to properly design the doors.

8.C Devices and Alarms

8.C.1 Elevator Recall

An OEP may prefer that elevators not discharge personnel on the first floor (lobby) during some events.

8.C.2 Elevator Emergency Message

In conjunction with the recall system, a pre-recorded elevator message informs passengers of an emergency and explains how to proceed.

8.D Intrusion Protection System

8.D.1 Door Locks

8.D.1.1 All facilities should be key-locked during evenings, weekends, and at other times the facility is unoccupied.

8.D.1.2 In addition, for Medium/Low Level, a security keying system or card reader system should be used.

8.D.1.3 For Medium and Higher Levels, a very high security keying system or card reader system with provisions for a pin number should be used. Duplicating keys on a conventional machine should be made difficult. A formal key control program should be maintained at Medium and Higher Levels.

8.D.1.4 Also at Higher Level, critical entrances should have electronic locking such as electromagnetic locks for fire exits, consistent with NFPA 101 requirements.

8.D.2 Intrusion Detection

For Low and Medium/Low Levels, basic intrusion detection should be provided for entrances into the facility, generally by means of magnetic reed switches. For Medium/Low Level, glass break sensors are optional if local crime conditions justify additional detection measures.

For Medium Level, basic intrusion detection should be provided for entrances into the facility. Interior door protection should be by means of magnetic reed switches. Exterior door protection, especially at loading docks, should be provided by balanced magnetic contact switch sets, to include all overhead/roll-up doors. Glass-break sensors should be provided.

For the Higher Level, basic intrusion detection should be provided for entrances into the facility. Interior door protection should be by means of magnetic reed switches or balanced magnetic contact switch sets for locations at which "magnet substitution" is a vulnerability. Exterior door protection, especially at loading docks, should only be provided by balanced magnetic contact switch sets, to include all overhead/roll-up doors. Glass-break sensors should be provided. Requirements for roof intrusion detection should be reviewed.

8.D.3 Monitoring

8.D.3.1 For Low and Medium/Low Levels, monitoring should be provided by a commercial central station. For Medium/Low Level, in special circumstances, an on-site security central control center may be provided during normal business hours.

8.D.3.2 For Medium Level, security systems should be monitored by an on-site, proprietary security control center. To mitigate staffing requirements and annual operating costs, commercial central stations may be used for after-hours or to supplement on-site monitoring.

8.D.3.3 For Higher Level, security systems should be monitored by an on-site, proprietary security control center.

8.D.4 Closed Circuit TV (CCTV)

When Low and Medium/Low Levels of Protection are provided for other building systems, CCTV monitoring may still be required, depending on the overall result of the risk assessment. In special circumstances, CCTV may be used if the purpose is to record security events on videotape for subsequent review, investigation, and prosecution.

For Medium and Higher Levels, CCTV should be provided. The monitoring for both Levels should be mainly at entrances, monitored exits, vehicular entrances into parking garages, and loading docks. The CCTV systems should be primarily for alarm assessment and access control automation purposes. The use of the CCTV system for general surveillance should be discouraged, with the occasional exception of automated video guard tours.

All CCTV cameras should be on real-time and time-lapsed video recorders. For deterrence as well as to aid post-incident investigations, key exterior areas (for Medium Level) or most exterior areas (for Higher Level), especially vehicle routes close to the facility, should be video recorded. The use of digital video systems should be considered by the designer.

Provide instructions on other operational capabilities such as pan, tilt, and zoom.

8.D.5 Duress Alarms or Assistance Stations

Alarms for Low and Medium/Low Levels should report to the central station during normal business hours; Medium and Higher Level duress alarms should report to the security command center. There shall be duress alarms for all guard posts and command centers.

Parking Security

Parking criteria address two important issues: protecting a building from a vehicle bomb (detailed in Part III 1.E.1-2, and 1.E.7), and making parking facilities safe from crime for employees and visitors. Both issues are complicated by the often conflicting requirements for easy accessibility, public openness, and prudent security measures. Planners can try to balance these needs through a combination of restricted vehicle access and architectural and engineering solutions.

Use the information here, along with Part II Ch. 9 and Table 9, to select parking locations and restrictions and to specify safety measures for parking facilities.

9.A Parking

9.A.1 Parking on Adjacent Streets

In dense, urban areas, curb lane parking may place uncontrolled parked vehicles unacceptably close to a facility in public rights-of-way. Where distance from the building to the nearest curb provides insufficient setback, restrict parking in the curb lane. For typical city streets this may require negotiating to close the curb lane for the Higher Level.

See Part II Ch. 9 to choose parking restrictions for adjacent streets.

9.A.2 Parking on Adjacent Properties

Select the desired distance from the building to vehicles parked on adjacent properties.

Protection Level	Distance from Building to Curb
Low	0 feet
Medium/Low	*5 feet*
Medium	50 feet
Higher	*100 feet*

Note: See Part III 2.A.1 for a discussion of alternatives if distances cannot be met.

9.A.3 Internal Parking

See Part II Ch. 9 to choose parking restrictions for internal parking.

9.A.4 On-site Surface or Structured Parking

Select the appropriate parking restrictions and distances from the building to on-site parking.

Protection Level	Parking Restrictions/Distance from Building
Low	No restrictions.
Medium/Low	Within 25 feet of the building, employee parking only.
Medium	Within 50 feet of the building, employee parking only; preferably no public parking within 100 feet.
Higher	30 foot standoff to employee parking; minimum 100 foot standoff to all public parking.

Note: See Part III 2.A.1 for a discussion of alternatives if distances cannot be met.

9.B Parking Facilities

Parking security systems have two features: passive and active. Passive security features, such as lighting, are a physical part of the design of the facility. Active security measures, including security patrols and monitored closed circuit television (CCTV) systems, invoke a response by the management and/or employees of the facility. Active systems are often needed to solve problems created by constraints on the passive security features.

9.B.1 Natural Surveillance

Attended booths or parking offices should be located so that activity at pedestrian and vehicle entry points to the facility can be monitored. Likewise, a security station, if provided, should be located where it is visible to the public and where the attendant can directly monitor entry/exit activity.

9.B.2 Stair Towers and Elevators

9.B.2.1-2 Decide if an open design is necessary.

9.B.3 Perimeter Access Control

9.B.3.1 Consider security operations procedures and compensating measures, including lighting and monitoring, before deciding to put fences around parking lots, particularly when control over who enters the lot is limited.

9.B.3.2 Indicate if there is a need for fencing, grills, and doors.

9.B.3.3 While details of the parking access control system are beyond the scope of these criteria, the following are examples of what could be specified on Table 9 for Medium and Higher Levels:

- An intercom/car reader/keypad station at vehicle and pedestrian entrances (with optional installation at exit-only openings);
- Control over the use of pedestrian emergency exit-only routes for unauthorized entry or escape;

- Devices to allow for an audit trail of cards, electronic vehicle tags, or keypad codes that have been used to release electromechanical locks, activate roll-up service door motors, or otherwise permit entrance to a controlled parking area;
- Features to prevent entrance piggy-backing.

Alternatively, a simple picture ID badge could be shown to a guard.

9.B.4 Surface Finishes and Signage

Indicate "yes" or "no" for these features.

9.B.5 Lighting

Choose an appropriate lighting level, using the information in Part II, Ch. 9.

9.B.6 Emergency Communications

For Medium and Higher Levels, these stations are not an alternative to on-site monitoring, but are to be used in conjunction with monitoring. Decide if stations are needed and where they should be located.

9.B.7 CCTV

The intent of these criteria is to assist or deny access, assess alarms, look for potential danger, and gather information for investigations at Medium and Higher Levels. Choose "yes" or "no" for the two CCTV criteria.

9.B.7.1 The cameras should be oriented to record license plates of entering and departing vehicles, and to record pedestrians exiting or entering via vehicle ramps.

Table 1 –Design Basis Tactics

Tactic Category	**Criteria**	**Specific Tactic**	**Applicable?**		**Specific Requirements**	**Remarks**
			Yes	**No**		
BOMBS	1.E.1.1	Moving Vehicle			________ lb. vehicle ____max mph	
	1.E.1.2	Stationary Vehicle			________ lb. Location:	
	1.E.1.3	Mail			________ lb. Location:	
	1.E.1.4	Package or Supply			________ lb. Location:	
	1.E.1.5	Package Prior to Screening			________ lb. Location:	
	1.E.1.6	Explosives in Controlled Areas			________ lb. Location:	
	1.E.1.7	Vehicle within Facility			________ lb. Location:	
FORCED ENTRY & FIREARMS	1.E.2.1	Small Arms				
	1.E.2.2	Forced Entry & Attacks				
	1.E.2.3	Unauthorized Entry				
SURVEILLANCE	1.E.3.1	Visual Surveillance				
	1.E.3.2	Acoustic Eavesdropping				
	1.E.3.3	Electronic Eavesdropping				
AIRBORNE CONTAMINANTS	1.E.4.1	Airborne Contamination				

Table 2 –Site and Landscape Design

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Building Element	**Tactics**	**Criteria**	**Counter-measures**	**Protection Levels/ Performance Standards**				**Requirements / Remarks**	**Additional Considerations /Constraints**	**Protective Measures to be Implemented**
				Low	**Med./Low**	**Med.**	**Higher**			
Perimeter	A,B	2.A.1	Increase distance between vehicles and facility.	0 ft.	5 ft.	50 ft.	100 ft.	Distance=__ft.		
Perimeter	A,B	2.A.2	Keep moving vehicles away from building.	_	_	Use barriers to stop __lb. vehicle at __mph.	Use barriers to stop __lb. vehicle at __mph.	See Part III, 1.E.1.1		
Perimeter	A,D	2.A.3.1	Provide space for vehicle inspection.	_	_	Consider providing space.	Provide space.	Location:		
Perimeter	A,D	2.A.3.2	Provide features for vehicle inspection.	_	_	Consider features to stop vehicles, keep them from leaving inspection, and prevent tailgating.	Install features to stop vehicles, keep them from leaving inspection, and prevent tailgating.			
Parking			(see Chs. 4 and 9)							
Site Lighting	A,E-H	2.B	Provide necessary lighting for security and cameras.	_	Yes	Yes	Yes			
Signage	A-H	2.C	Include appropriate signage to reduce confusion.	_	Yes	Yes	Yes			
Landscaping	A,E-H	2.D	Use design elements to enhance security.	_	Yes	Yes	Yes			

Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards Low	Med./Low	Med.	Higher	Requirements / Remarks	Additional Considerations /Constraints	Protective Measures to be Implemented
Offices	A-H	3.A.1	Locate vulnerable offices out of public view (see 4.B.4.4.1 for windows).	_	_	Locate offices in safe sites in the building or treat windows.	Same as for Med.			
Offices	A-H	3.A.2	Separate high- and low-risk tenants.	_	Yes	Yes	Yes			
Public Service Areas	B, C	3.A.3	Do not place public toilets and service areas in unsecured locations.	_	_	Yes	Yes			
Interior Space	A-E,G	3.A.4	Provide areas of refuge.	_	_	_	Yes			
Service Docks	A-D, G,H	3.A.5	Separate loading docks and shipping and receiving from utilities.	_	Yes	Yes	Yes			
Retail Space	B,C,E, G,H	3.A.6	Design for retail and mixed uses, where appropriate.	Yes	Yes	Yes	Yes			
Stairwells	A-E,G	3.A.7	Locate emergency stairwells away from high-risk areas.	_	Yes	Yes	Yes			
Mailroom	B	3.A.8	Locate mailroom away from critical components; provide space for disposal container and/or other equipment.	Yes; disposal container	Same as for Low	Yes; disposal container and other equipment	Same as for Med.			
Interior Construction	A-E	3.B.1	Strengthen doors and walls at security screening.	_	_	Design to UL rating level 3.	Design to UL rating level 8.			

Interior Construction	A-E	3.B.2	Separate critical building components from high-risk areas (see also 4.B).	–	–	Harden critical components within 25 ft. of high-risk areas.	Harden critical components within 50 ft. of high-risk areas.			
Entrances	E	3.C.1	Protect against forced entry (criteria located in Ch. 4).					See 4.B.		
Entrances	A-H	3.C.2	Provide space for security functions.	–	Yes	Yes	Yes			
Entrances	B-F	3.C.3	Co-locate public and employee entrances.	–	Yes	Yes	Yes			
Entrances	A-H	3.C.4	Stop unauthorized vehicles at garage and service entrances.	–	Yes	Yes	Yes			
Interior Features	B,C	3.D.1	Do not install features that could conceal devices in unsecured areas.	–	Yes	Yes	Yes			
Roof	B,C,E-H	3.D.2	Specify roof access design requirements.	Yes	Yes	Yes	Yes			

Table 4 – Structural Engineering

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Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards Low	 Med./Low	 Med.	 Higher	Requirements / Remarks	Additional Considerations /Constraints	Protective Measures to be Implemented
Procedures	A-E	4.A.1-4.A.5, 4.A.7	Use specified definitions and procedures.	Yes	Yes	Yes	Yes			
Structural Elements	A-D	4.A.6	Protect non-structural elements.	_	_	Yes	Yes			
Definitions	A-E	4.A.8	Select protection level.							
Structural Integrity	A-D	4.B.1	Design to prevent progressive collapse.	Yes	Yes	Yes	Yes			
Exterior Walls	A,C,D	4.B.3	Design walls for blast load.	_	_	Design walls for limited load. 4.B.3.1	Design walls for full load. 4.B.3.2	____ psi ____ psi-msec		
Exterior Doors	E	4.B.3.3.1	Design swinging doors against forced entry.	_	Consider Grade 30.	Grade 30	Grade 40			
Exterior Doors	E	4.B.3.3.2	Design horizontal sliding door against forced entry.	_	Consider Grade 30.	Grade 30	Grade 40			
Exterior Walls	E	4.B.3.3.3	Design wall against forced entry.					Height _____		
Exterior windows	A,C, D,F	4.B.4	Design window for blast load.	Use any type of glazing. 4.B.4.1	Use window system that minimizes potential threats. 4.B.4.2	Design up to 4 psi & 28 psi-msec. Performance conditions 1-4. 4.B.4.3	Design up to 10 psi & 89 psi-msec. Performance conditions 1-3. 4.B.4.3	____ psi ____ psi-msec ____ % fenestration ____ % meeting performance standard		
Exterior Windows	E,H	4.B.4.4.1	Provide ballistic glazing.	_	_	UL Rating Level 3	UL Rating Level 8	Level ___ Locations:		
Exterior Windows	E	4.B.4.4.2	Provide security glazing.					Locations:		

Exterior Windows	E	4.B.4.4.3	Design window assemblies against forced entry.	_	Consider Grade 30.	Grade 30	Grade 40	Locations:		
Exterior Windows	F	4.B.4.4.4	Design for electronic emanations, if required.							
Non-Window Openings	A,C,D, G	4.B.5	Provide protection level.	_	_	Yes	Yes			
Interior Windows	A-D	4.B.6	Specify interior window requirements.							
Interior Parking	B-D	4.B.7.1	Protect primary vertical load carrying members.	_	_	Yes	Yes			
Interior Parking	B-D	4.B.7.2	Design columns for multi-floor unbraced length.	_	_	Yes	Yes			
Lobbies	B,C	4.B.8.1	Protect primary vertical load carrying members.	_	_	Yes	Yes			
Lobbies	B,C	4.B.8.2	Design primary vertical load carrying members for specified threat.	_	_	Yes	Yes			
Loading Docks	A-D	4.B.9	Design to limit damage done to adjacent areas.	_	_	Yes	Yes			
Mailrooms, Unscreened Retail	B	4.B.10	Design to limit damage to adjacent areas.	_	_	Yes	Yes	Location:		
Venting	B-D	4.B.11	Facilitate venting of blast forces and gases.	_	Yes	Yes	Yes			
Modern-ization of Existing Construction	A-F	4.C	Requirements are the same as for new construction with the exception of 4.C.1,2 below.	Yes	Yes	Yes	Yes			

Modern-ization of Existing Construction	A-F	4.C.1	Submit documentation.	Yes	Yes	Yes	Yes			
Modern-ization of Existing Construction	A-D	4.C.2	Retrofit for progressive collapse if the facility will undergo a structural renovation.	Yes	Yes	Yes	Yes			
Historic Buildings	A-F	4.D	Protect historic buildings.	Yes	Yes	Yes	Yes			
Good Practices	A-F	4.E	Follow appropriate guidelines.	Yes	Yes	Yes	Yes			

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Table 5 – Mechanical Engineering

Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards Low	Med./Low	Med.	Higher	Requirements / Remarks	Additional Considerations /Constraints	Protective Measures to be Implemented
Air Intakes	G	5.A.1	Place air intakes at high level.	Yes	Yes	Yes	Yes			
Utilities	A-D	5.B.1	Locate utilities away from vulnerable areas.	–	–	Yes	Yes			
Utilities	A-D	5.B.2	Protect incoming utilities.	–	–	Yes	Yes			
Ventilation System	A-D	5.C.1	Protect ventilation equipment and locate away from high risk areas.	–	–	Yes	Yes			
Ventilation System	A-D	5.C.2	Maintain positive pressure in stairways.	–	–	Yes	Yes			

Table 6 – Electrical Engineering

Las

Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards				Requirements / Remarks	Additional Considerations /Constraints	Protective Measures to be Implemented
				Low	Med./Low	Med.	Higher			
Service and Distribution	A-D	6.A.1	Separate normal and emergency electrical power.	_	Yes	Yes	Yes			
Service and Distribution	A-D	6.A.2	Locate normal fuel storage away from high risk areas.	_	Yes	Yes	Yes			
Service and Distribution	A-D	6.A.3	Protect emergency fuel storage.	_	Yes	Yes	Yes	___ hr. storage		
Service and Distribution	A-D	6.A.4	Provide tertiary power.	_	_	_	Yes			
Service and Distribution	A-D	6.A.5	Locate emergency generator away from high risk areas.	_	Yes	Yes	Yes			
Service and Distribution	A-D	6.A.6	Locate utilities and feeders away from high risk areas.	_	Yes	Yes	Yes			
Lighting	A-H	6.B.1	Coordinate site lighting with CCTV system.	Yes	Yes	Yes	Yes			
Lighting	A-D	6.B.2	Provide emergency power for restroom lighting.	_	_	Yes	Yes			
Lighting	A-D	6.B.3	Provide battery lighting for stairwells and exit signs.	_	_	Yes	Yes			
Communica -tion Systems	A-D	6.C.1.1	Provide redundant telephone service.	_	_	_	Yes			
Communica -tion Systems	A-D	6.C.1.2	Install portable radio communication system.	_	_	Yes	Yes			

Communica-tion Systems	A-D	6.C.2	Provide wireless data communication.	_	_	_	Yes			
Communica-tion & Security Systems	A-D	6.C.3	Use multiple paths to distribute alarm and information wiring.	_	_	Yes	Yes			
Lighting and Power	B-F	6.C.4	Provide empty conduits and power outlets.	_	_	Yes	Yes			

Table 7 – Fire Protection Engineering

Las

Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards Low	Med./Low	Med.	Higher	Requirements / Remarks	Additional Considerations Constraints	Protective Measures to be Implemented
Water Supply	A-D	7.A.1	Protect water main.	Yes	Yes	Yes	Yes			
Water Supply	A-D	7.A.2	Use one electric and one diesel pump, located separately.	–	–	–	Yes			
Standpipe and Hose System	H	7.A.3	Have locked covers for standpipe connections.	Yes	Yes	Yes	Yes			
Fire Alarm System	A-D	7.A.4	Provide microprocessor-based fire alarm system.	Yes	Yes	Yes	Yes			
Egress Door Locks	E	7.A.5	Comply with NFPA 101 on egress door locks.	Yes	Yes	Yes	Yes			
Operational Procedures	A-H		See notes in Part III on training, OEP, and documents	Yes	Yes	Yes	Yes			

Table 8 – Electronic Security

Las

Building Element	**Tactics**	**Criteria**	**Counter-measures**	**Protection Levels/ Performance Standards**				**Requirements / Remarks**	**Additional Considerations /Constraints**	**Protective Measures to be Implemented**
				Low	**Med./Low**	**Med.**	**Higher**			
Control Centers	A-H	8.A.1	Coordinate OCC, FCC, and SCC.	Provide inform-ation links. 8.A.1.2	Provide inform-ation links. 8.A.1.2	Co-locate OCC and SCC. 8.A.1.1	Co-locate OCC and SCC. 8.A.1.1			
Control Centers	A-H	8.A.2	Provide a backup control center.	–	–	Locate backup station in existing office. 8.A.2.1	Install a redundant BCC. 8.A.2.2			
Utility Rooms	B,C,E, H	8.B.1	Provide for key system security.	Yes	Yes	Yes	Yes			
Utility Rooms	B,C,E, H	8.B.2	Design for remote monitoring of access.	–	–	Yes	Yes			
Devices and Alarms	A-D,G	8.C.1	Provide elevator recall button at FCC.	Yes	Yes	Yes	Yes			
Devices and Alarms	A-D,G	8.C.2	Install prerecorded emergency message on elevators.	Yes	Yes	Yes	Yes			
Door Locks	B-H	8.D.1	Provide security key system.	No special key system. 8.D.1.1	Use security key system. 8.D.1.2	Use high security key system. 8.D.1.3	Provide electronic locks. 8.D.1.4			
Intrusion Detection	B-H	8.D.2.1	Use magnetic reed switches.	Yes	Yes	Yes – interior doors.	Yes – interior doors.	Locations:		
Intrusion Detection	B-H	8.D.2.2	Have glass break sensors.	–	Yes	Yes	Yes			
Intrusion Detection	B-H	8.D.2.3	Provide balanced magnetic contact switch sets.	–	–	Yes	Yes	Locations:		

Monitoring	A-H	8.D.3	Provide CCTV monitoring station.	Monitor at off-site facility. 8.D.3.1	Monitor at off-site facility. 8.D.3.1	Have business hours monitoring by on-site center. 8.D.3.2	Have 24 hour monitoring by on-site center. 8.D.3.3	Location:		
Monitoring	A-H	8.D.4	Provide color/ monochrome CCTV system. (See 6.B.1)	–	–	Yes	Yes	Locations:		
Monitoring	H	8.D.5	Provide duress alarms.	Yes	Yes	Yes	Yes	Locations:		

Table 9 – Parking Security

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Building Element	Tactics	Criteria	Counter-measures	Protection Levels/ Performance Standards Low	Med./Low	Med.	Higher	Requirements / Remarks	Additional Considerations /Constraints	Protective Measures to be Implemented
Adjacent Street Parking	A	9.A.1	Restrict adjacent street parking.	Allow unrestrict-ed parking. 9.A.1.1	Allow only govern-ment-owned and key employee parking. 9.A.1.2	Allow only government-owned and key employee parking. 9.A.1.2	Use parking lane for stand-off. 9.A.1.3			
Adjacent Property Parking	A	9.A.2	Maintain prescribed distance between parked cars and facility.	0 ft.	5 ft.	50 ft.	100 ft.			
Internal Parking	D	9.A.3	Restrict internal parking.	Allow public parking with ID check. 9.A.3.1	Allow only govern-ment vehicles and employees of the building. 9.A.3.2	Allow only selected government employees. 9.A.3.3	Allow only selected government employees with need for security. 9.A.3.4			
On–site Surface or Structured Parking	A	9.A.4	Maintain prescribed distance between parked cars and facility.	0 ft.	Only employee vehicles within 25 ft.	Only employee vehicles within 50 ft.	100 ft. standoff for public parking; 30 ft. standoff for employee parking.			
Parking Facilities	A,D,H	9.B.1	Design to enhance natural surveillance.	Yes	Yes	Yes	Yes			
Parking Stairs and Elevator Lobby	H	9.B.2.1	Have open stair tower and elevator lobby.	_	_	Yes	Yes			

Parking Elevator	H	9.B.2.2	Provide glass-back elevator cabs, security lighting.	_	_	Yes	Yes			
Parking Access Control	A,E,H	9.B.3.1	Consider alternatives to fencing.	Yes	Yes	Yes	Yes			
Parking Access Control	A,E,H	9.B.3.2	Use fencing, grills, or doors to close access when necessary.	_	_	Yes	Yes			
Parking Access Control	A,D	9.B.3.3	Provide details of parking access control system.							
Parking Signage	H	9.B.4	Provide clear signage and light surface finishes.	_	Yes	Yes	Yes			
Parking Lighting	H	9.B.5	Maintain adequate lighting levels.	Yes	Yes	Yes	Yes	Level ____		
Parking Duress Stations	B,C,D,H	9.B.6	Provide emergency duress stations.	_	_	Yes	Yes	Locations:		
Parking CCTV	D,H	9.B.7.1	Provide CCTV cameras at entry and exit ramps.	_	_	Yes	Yes			