

1.1 WHAT IS INTEGRATED INCREMENTAL BUILDING PROTECTION

Integrated incremental building protection is a process for improving safety in existing buildings with minimum cost and disruption of building function. Integrated, incremental protection of existing commercial buildings from terrorist attacks applies the basic principles of security evaluation and design to the physical and operational demands of existing buildings. Rehabilitation of existing buildings poses special challenges not faced in the case of design and construction of new buildings. Site conditions are pre-defined. Configuration and structural system are given, and current building occupants must be accommodated during the rehabilitation process. Investments in rehabilitation of existing buildings may also not be justified in light of the expected remaining useful life of the building.

The term “building protection” or “protection,” as used in this chapter, refers to a specific category of building “rehabilitation” that addresses terrorism risk reduction. When the term “rehabilitation” is used it refers to general activities that may or may not include terrorism risk reduction.

1.1.1 INTEGRATION OF TERRORISM RISK REDUCTION IN THE FACILITY MANAGEMENT PROCESS

The integrated, incremental protection process is based on the identification of increments of security enhancement that may be integrated into the normal schedule of maintenance and capital improvement. For example, when window replacement is considered for energy conservation or modernization, blast resistance can be enhanced at the same time with relatively little added expense. The advantage of this approach to rehabilitation is that it reduces the cost of implementing security enhancements and it reduces the cost due to added business interruption related to a single purpose intervention in the building. The integration of terrorism risk reduction measures with normal maintenance and capital improvement takes advantage of regularly scheduled design, contracting, and staging to implement security enhancements at marginal added cost. The identification of specific increments of security enhancement allows these improvements

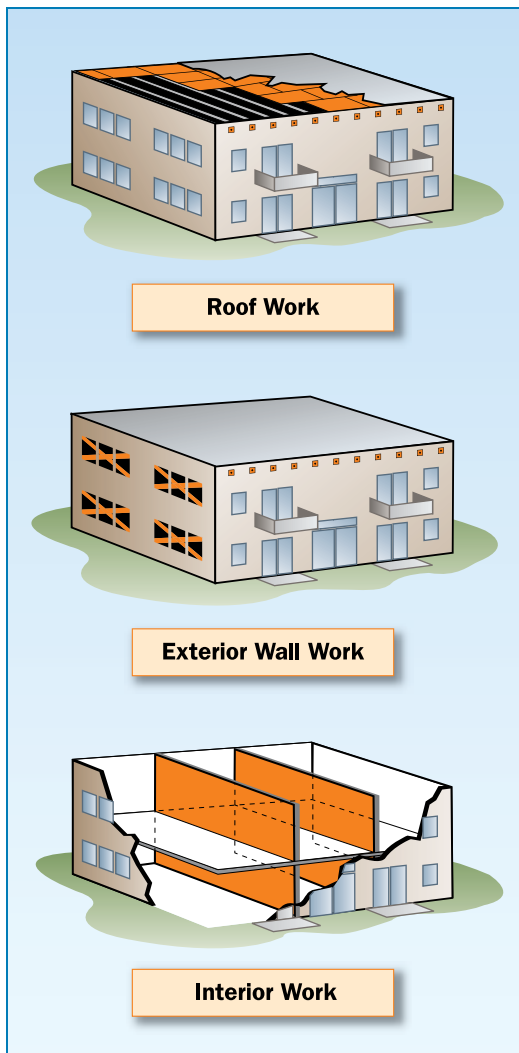


Figure 1-1: Schematic integration opportunities.

to be made opportunistically as normal work is carried out on various components of the building.

Integration of specific increments of terrorism risk reduction is illustrated in the three buildings of Figure 1-1. These examples show the opportunistic character of the incremental approach. By pre-identifying the increments of risk reduction, implementation can effectively “piggy-back” on work that arises in the normal course of building maintenance and capital improvement. For example, roofs are usually replaced on a schedule of 15 to 20 years. Strengthening the roof/wall connections and improving the blast resistance of the structure is relatively easy and inexpensive to do during a scheduled roof replacement. Provisions for opening up the roof and erecting scaffolding can serve both the purposes of roof renewal and terrorism risk reduction.

In a similar way, exterior wall maintenance and window replacement provide the opportunity for reducing outdoor air penetration into the building and improving the blast resistance of the windows. Work on interior walls provides the opportunity for strengthening of blast resistance and the creation of safe areas.

1.1.2 INCREMENTAL APPROACH DISTRIBUTES COST OVER TIME AND AVOIDS ADDED DISRUPTION

Over time, the accumulated effect of the incremental measures will be the same as a comprehensive one-stage building rehabilitation that would require closing the building and a major one-time investment. The incremental approach spreads the cost of security enhancement costs over a period of years, reducing the impact of rehabilitation costs.

Because the integrated incremental rehabilitation approach is designed to accommodate business continuity and a continued revenue stream from the commercial building, it is closely tied to the schedules and requirements of specific occupancies.

Investment in the rehabilitation of existing commercial buildings requires a strong business case. Sustainable costs must be justified and supported by future revenue generated by the building. Factors to consider in the justification of rehabilitation investment include: estimation of the remaining lifetime of the building, desirability for potential occupants, and the market value of security enhancements.

1.1.3 RISK REDUCTION DECISIONS

This manual is designed primarily for application in existing office, retail, multi-family residential, and hotel buildings. Owners of existing commercial buildings face a sequenced set of cost decisions diagrammed in Figure 1-2. On the basis of risk assessment methodologies, building owners can evaluate the terrorism risk for specific buildings. Based on the informed risk perception, the building owner may decide that building protection is not necessary. Alternatively, the building owner may decide to invest in terrorism risk reduction measures. If the decision is made to invest in terrorism risk reduction, the next decision is whether to replace the building, i.e., demolish or sell it and build a new one, or to rehabilitate the building to reduce terrorism risk.

Owners who decide to rehabilitate the building may initiate a single-stage intervention. Such an approach typically requires the evacuation of the building for a significant period of time and a major one-time

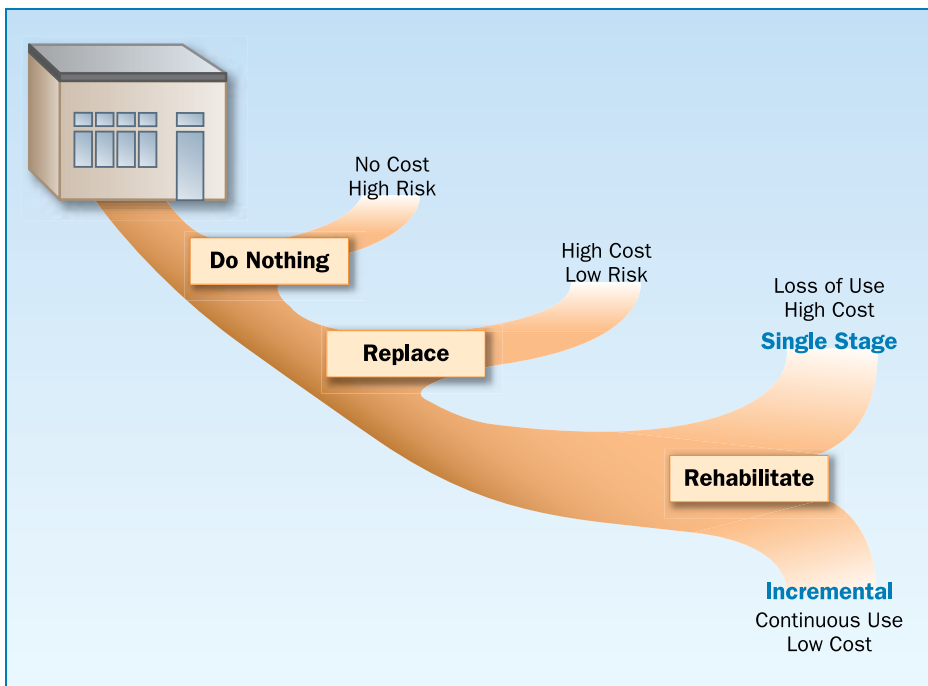


Figure 1-2: Cost decision scheme.

rehabilitation investment. Both these factors may be difficult to accept in the case of an existing commercial building with limited remaining asset life. An alternative approach is the incremental rehabilitation of the building.

The integrated incremental building protection approach has the advantage of reduced and distributed costs. While extending the time of implementation, an integrated incremental building protection program will eventually provide the same level of protection that can be supported by the revenue of an existing commercial building.

Careful planning and efficient use of opportunities for low cost risk reduction can make terrorism risk reduction feasible even for marginal existing commercial buildings.

1.2 POTENTIAL THREATS

Commercial building owners who want to implement measures that may save lives and property must understand the nature of the hazards that can affect their buildings and the impacts of those hazards on the buildings. The term “threat” is typically used to characterize manmade disasters (technological accidents) or terrorism hazards. Because there have been few terrorist attacks in the United States and data for manmade threats is scarce, predictions of the magnitude and recurrence of terrorist attacks are largely subjective.

Aggressor tactics may include: moving vehicle bombs, stationary vehicle bombs, bombs delivered by persons (suicide bombers), exterior attacks (thrown objects like rocks, Molotov cocktails, hand grenades, or hand-placed bombs), stand-off weapons attacks (rocket-propelled grenades, light antitank weapons, etc.), ballistic attacks (small arms and high-power rifles), covert entries (gaining entry by false credentials or circumventing security with or without weapons), mail bombs (delivered to individuals), supply bombs (larger bombs processed through shipping departments), airborne contamination (chemical, biological, and radiological [CBR] agents used to contaminate the air supply of a building), and waterborne contamination (CBR agents injected into the water supply). This section focuses on explosive threats, chemical agents, biological warfare agents, and radiological attacks.

1.2.1 EXPLOSIVE THREATS











The explosive threat is particularly significant, because all of the ingredients required to assemble an improvised explosive device are readily available at a variety of farm and hardware stores. The intensity of the explosive detonation is a function of the weight of the explosive. For explosive threats, the weight of the explosive depends on the means of transportation and delivery. Explosives weigh approximately 100 pounds per cubic foot and, as a result, the maximum credible threat corresponds to the weight of explosives that can be packaged in a variety of containers or vehicles. The U.S. Department of Defense (DoD) developed a chart indicating the weight of explosives and deflagrating materials that may reasonably fit within a variety of containers and vehicles (see Table 1-1). The table indicates the safe evacuation distances for occupants of conventional buildings, based on the ability of the buildings to withstand severe damage or resist collapse.

Operational security measures (see Chapter 5) define the areas within or around a building at which a device may be located, undetected by the building facility staff. These security procedures include screening of vehicles, inspection of delivered parcels, and vetting hand carried bags. The extent to which this inspection is carried out will determine the size of an explosive device that may evade detection. Despite the most vigilant attempts, however, it is unrealistic to expect complete success in preventing a small explosive threat from evading detection. While it is unlikely that a large explosive threat may be brought into a building, a parcel sized device may be introduced into publicly accessible lobbies, garages, loading docks, cafeterias, or retail spaces and a smaller explosive device may be brought anywhere into a building.

Only two domestic terrorist bombings involved the use of large quantities of High Energy explosive materials in the United States. (For more information on High Energy explosives, see FEMA 426, *Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings*, Chapter 4.) Although these events represent the largest explosions that have occurred to date, they may not represent the current domestic explosive threat. The 1995 explosion that collapsed portions of the Murrah Federal Office Building in Oklahoma City contained 4,800 pounds of ammonium nitrate and fuel oil (ANFO) and the 1993 explosion within the parking garage beneath the World Trade Center complex contained 1,200 pounds of urea nitrate.

Every year, approximately 1,000 intentional explosive detonations are reported by the Federal Bureau of Investigation (FBI) Bomb Data Center. The FBI statistics indicate that the majority of the domestic events contain significantly smaller weights of Low Energy explosives. (For more information on Low Energy explosives, see FEMA 426, Chapter 4.)

Table 1-1: Safe Evacuation Distances from Explosive Threats

Threat Description		Explosives Mass* (TNT equivalent)	Building Evacuation Distance**	Outdoor Evacuation Distance***	
High Explosives (TNT Equivalent)		Pipe Bomb	5 lbs 2.3 kg	70 ft 21 m	850 ft 259 m
		Suicide Belt	10 lbs 4.5 kg	90 ft 27 m	1,080 ft 330 m
		Suicide Vest	20 lbs 9 kg	110 ft 34 m	1,360 ft 415 m
		Briefcase/ Suitcase Bomb	50 lbs 23 kg	150 ft 46 m	1,850 ft 564 m
		Compact Sedan	500 lbs 227 kg	320 ft 98 m	1,500 ft 457 m
		Sedan	1,000 lbs 454 kg	400 ft 122 m	1,750 ft 534 m
		Passenger/ Cargo Van	4,000 lbs 1,814 kg	640 ft 195 m	2,750 ft 838 m
		Small Moving Van/Delivery Truck	10,000 lbs 4,536 kg	860 ft 263 m	3,750 ft 1,143 m
		Moving Van/ Water Truck	30,000 lbs 13,608 kg	1,240 ft 375 m	6,500 ft 1,982 m
		Semi-Trailer	60,000 lbs 27,216 kg	1,570 ft 475 m	7,000 ft 2,134 m

* Based on the maximum amount of material that could reasonably fit into a container or vehicle. Variations are possible.

** Governed by the ability of an unreinforced building to withstand severe damage or collapse.

*** Governed by the greater of fragment throw distance or glass breakage/falling glass hazard distance. These distances can be reduced for personnel wearing ballistic protection. Note that the pipe bombs, suicide belts/vests, and briefcase/suitcase bombs are assumed to have a fragmentation characteristic that requires greater stand-off distances than an equal amount of explosives in a vehicle.

Although the majority of the explosions reported by the FBI targeted residential properties and vehicles, 63 took place in educational facilities, causing a total of \$68,500 in property damage. Other than the attack against the Murrah Federal Office Building, no explosive devices were detonated at a Federal government-owned facility, and only nine were detonated at local/state government facilities. Nearly 80 percent of the people known to be involved in bombing incidents were young offenders, and less than 0.5 percent of the perpetrators were identified as members of terrorist groups. Vandalism was the motivation in 53 percent of the known intentional and accidental bombing incidents, and the timing of the attacks was fairly uniformly distributed throughout the day.

1.2.2 CBR THREATS

Like explosive threats, CBR threats may be delivered externally or internally to a building. While there may not be official warning of a CBR event, the best defense may be to be alert to signs of a release.

There are three potential methods of CBR attack:

- A large exterior release originating some distance away from the building (includes delivery by aircraft)
- A small localized exterior release at an air intake or other opening in the exterior envelope of the building
- A small interior release in a publicly accessible area, a major egress route, or other vulnerable area (e.g., elevator lobby, mail room, delivery, receiving and shipping)

The following paragraphs provide summary information about each of the components of CBR attacks—chemical agents, biological agents, and radiological threats.

1.2.2.1 Chemical Agents

Toxic chemical agents can present airborne hazards when dispersed as gases, vapors, or solid or liquid aerosols. Unlike biological or radiological agents, chemical agents generally produce immediate effects. In most cases, toxic chemical agents can be detected by the senses, although a few are odorless. Their effects occur mainly through inhalation, although they can also cause injury to the eyes and skin.

1.2.2.2 Biological Agents

Biological agents are organisms or toxins that can kill or incapacitate people and livestock, and destroy crops. The three basic groups of biological agents that would likely be used as weapons are bacteria, viruses, and toxins.

- **Bacteria.** Bacteria are small free-living organisms that reproduce by simple division and are easy to grow. The diseases they produce often respond to treatment with antibiotics.
- **Viruses.** Viruses are organisms that require living cells in which to reproduce and are intimately dependent upon the body they infect. The diseases they produce generally do not respond to antibiotics; however, antiviral drugs are sometimes effective.
- **Toxins.** Toxins are poisonous substances found in, and extracted from, living plants, animals, or microorganisms; some toxins can be produced or altered by chemical means. Some toxins can be treated with specific antitoxins and selected drugs.

Most biological agents are difficult to grow and maintain. Many break down quickly when exposed to sunlight and other environmental factors, while others such as anthrax spores are very long lived. There are three methods for delivery of biological agents:

- **Aerosols.** Biological agents are dispersed into the air, forming a fine mist that may drift for miles. Inhaling the agent may cause disease in people or animals.
- **Animals.** Some diseases are spread by insects and animals, such as fleas, flies, mosquitoes, and mice. Deliberately spreading diseases through livestock is also referred to as agroterrorism. Person-to-person spread of a few infectious agents is also possible. Humans have been the source of infection for smallpox, plague, and the Lassa viruses.
- **Food and water contamination.** Some pathogenic organisms and toxins may persist in food and water supplies. Most microbes can be killed, and toxins deactivated, by cooking food and boiling water.

1.2.2.3 Radiological Threats

This manual does not address the severe and various effects generated by nuclear events, including blinding light, intense heat (thermal radiation),

initial nuclear radiation, blasts, fires started by the heat pulse, and secondary fires caused by the destruction.

Terrorist use of a radiological dispersion device (RDD), often called “dirty bomb,” is considered more likely than use of a nuclear device. These radiological weapons are a combination of conventional explosives and radioactive material designed to scatter dangerous and sublethal amounts of radioactive material over a general area. Very little technical knowledge is required to build and deploy such radiological weapons as compared to that of a nuclear device. Also, radioactive materials, used widely in medicine, agriculture, industry, and research, are more readily available and easy to obtain compared to the weapons-grade uranium or plutonium required for a nuclear device.

1.3 TERRORISM RISK REDUCTION

1.3.1 CATEGORIES OF RISK REDUCTION INCREMENTS

The adoption of risk reduction increments as part of enhancing, retrofitting, or rehabilitating a building can be an effective approach in reducing vulnerability to terrorist attacks. There is a range of risk reduction increments that can be used to enhance security in case of blasts and chemical, biological, and radiological hazards. For this manual, two categories are identified:

- **Physical Protection and Strengthening of Existing Buildings.** Physical protection and strengthening deals with structural and non-structural modifications of existing buildings. While new buildings may include protective measures to reduce the potential impact of terrorist attacks, existing buildings may be at larger risk because they were constructed without the appropriate safety measures to withstand potential attacks. Thus, improving the safety and structural integrity of existing buildings is often the best way to reduce the impact of terrorist attacks on such structures. When a terrorism threat occurs, it can directly damage a target building or indirectly cause secondary effects in adjacent buildings (collateral damage). Poorly engineered and constructed buildings cannot usually resist the forces generated by a blast event or serve as safe havens in case of CBR attacks.
- **Operational Measures.** Unlike other risk reduction increments that improve the resistance of buildings to disasters, protective and control measures focus on protecting structures by deflecting the destructive forces from vulnerable structures and people. Ideally, a potential terrorist attack is prevented or pre-empted through intelligence

measures. If the attack does occur, physical security measures combine with operational forces (e.g., surveillance, guards, and sensors) to provide layers of defense that can delay or thwart the attack. Deception may be used to make a facility appear to be more protected or lower risk than it actually is, making it a less attractive target. Deception can also be used to misdirect an attacker to a portion of the facility that is non-critical. Because of the interrelationship between physical and operational security measures, it is imperative for building owners and security professionals to define what extent of operational security is planned for various threat levels.

1.3.2 IMPLEMENTATION CONSIDERATIONS

The implementation of some risk reduction increments may create public inconvenience. For example, the placement of bollards, closure of public streets, and rehabilitation of buildings may affect people's access to public places or have a negative effect on community aesthetic. The implementation of mitigation enhancements involves the following considerations.

- **Costs and Benefits.** When implementing a risk reduction increment, the benefits (reduction of potential future losses) of implementing the option should outweigh the costs (capital cost of protection measure, operating cost of protection measure, and adverse effects on business).
- **Legal Authority.** A risk reduction increment should not be undertaken without the appropriate legal authority. Building owners should determine whether they have the legal authority to implement selected mitigation options. For example, creating standoff distances in urban areas can violate zoning ordinances and building set-back requirements.
- **Adverse Effects on the Built Environment.** Some risk reduction increments may have a negative effect on the built environment. When selecting mitigation measures, building owners should scrutinize the potential effects on:
 - Traffic/vehicular mobility
 - Pedestrian mobility
 - Ingress and egress to the building
 - Other building operations
 - Aesthetics

- Interference with first responders
- **Impact on the Natural Environment.** Considering whether the recommended risk reduction increments will have a negative effect on environmental assets, such as air quality, water quality, threatened and endangered species, and other protected natural resources is also important.

1.4 SPECIAL ISSUES RELATED TO EXISTING COMMERCIAL BUILDINGS

Certain features of existing buildings clearly distinguish them from newly designed and constructed buildings and may limit the range of security mitigation options available for consideration:

- The physical fabric of the existing building may be concealed or unknown. New buildings are designed and specified in terms of materials and systems whose characteristics are fully defined and that conform to known standards. By contrast, the design basis, materials, and standards that governed the design and construction of currently existing buildings are more ambiguous. Determining the inherent response of the building and its systems to blast forces, for example, may not be possible.
- Existing buildings are likely to have been designed to conform to older, and possibly archaic, building codes. Their performance under current physical conditions may be difficult to determine or control.
- The relationship of existing buildings to the surrounding site, roads, access, standoff, utilities, and adjacent buildings is fixed and not subject to significant alteration.
- The physical fabric of an existing building may constrain or prohibit the implementation of specific risk reduction measures that are considered in new building design as a matter of course.
- Existing buildings are usually occupied and perform a variety of business, cultural, and life support functions for their occupants. This may constrain or prohibit the implementation of specific risk reduction measures unless business or service interruption is acceptable.
- Compared to new buildings, existing buildings often have a limited useful remaining lifetime, which dictates a much shorter payback period for investments in security enhancement.

- Conditions of financing capital improvements in existing buildings may differ from those applicable to new buildings.

The commercial buildings addressed in this manual are office buildings, retail buildings, multifamily apartment buildings, and hotel buildings. All four categories have features that may limit the range of security mitigation options available for consideration:

- Commercial buildings are income-generating systems for their owners. Interruption of building operations interrupts the flow of income and is equivalent to an added cost when considering any capital improvement. This feature makes commercial buildings ideal candidates for integrated incremental enhancements, which better manage costs and disruption.
- Access control is a significant aspect of security enhancement for buildings. Commercial office, retail, hotel, and multifamily apartment buildings require public access. The extent to which that access can be controlled may be limited.

1.5 COMMERCIAL BUILDING CLASSIFICATIONS

Commercial buildings are often classified for real estate purposes into three classifications—Classes A, B, and C. The Urban Land Institute, a noted authority on commercial land uses, says the following about these classifications in its Office Development Handbook. Class A space can be characterized as buildings that have excellent location and access, attract high quality tenants, and are managed professionally. Building materials are high quality and rents are competitive with new buildings. Class B buildings have good locations, management, and construction, and tenant standards are high. Buildings should have very little functional obsolescence and deterioration. Class C buildings are typically 15 to 25 years old but are maintaining steady occupancy. Tenants filter from Class B to Class A and from Class C to Class B. In a normal market, Class A rents are higher than Class B, which are above Class C.

Facility management practices in commercial buildings vary as a function of this classification (Class A, B, or C) as well as the type and scale of ownership. The effectiveness of physical and operational security enhancements depends on the quality of the facility management.

1.6 FACILITY MANAGEMENT PROCESS FOR EXISTING COMMERCIAL BUILDINGS

Facility management processes for existing commercial buildings vary in detail by type of occupancy (office, retail, multifamily, hotels, etc.). The complexity and completeness of facility management practices may also vary by type of ownership (real estate investment trust [REIT], pension fund, insurance company, partnership, individual, etc.) and by scale of operation (dispersed portfolio, concentrated portfolio, individual building). Despite these variations, a generic facility management process consists of seven phases of activities:

1. Acquisition
2. Redevelopment
3. Current Building Use
4. Planning
5. Maintenance and Rehabilitation Budgeting
6. Maintenance and Rehabilitation Funding
7. Maintenance and Rehabilitation Implementation

Figure 1-3 depicts these seven distinctive phases in the overall facility management process and the activities associated with each phase, which are discussed in detail in the following sections. The facility

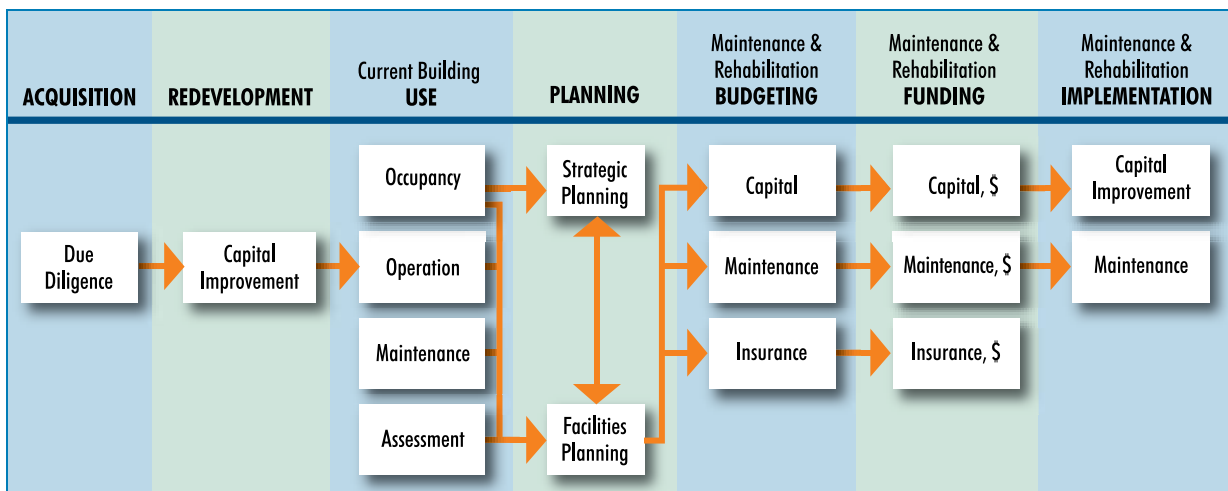


Figure 1-3: Typical facility management process.

management process is sequential, progressing from **acquisition** through **implementation** of rehabilitation in any given building. It begins with acquisition because commercial buildings normally change ownership every seven to 15 years, and this usually entails new financing and insurance, providing a unique opportunity for facility assessment and initial redevelopment. A current owner of an existing commercial building, as opposed to a prospective owner, begins the facility management process with the third phase, the **use** phase. An owner who has a large inventory of buildings is likely to have ongoing activities in all of these phases in different buildings.

This process is generic, and while there may be variations, commercial building owners generally follow it, either explicitly or implicitly.

The following sections briefly describe each phase, the activities therein, and some factors that influence those activities (indicated graphically by downward arrows for factors outside the owner organization and upward arrows for factors internal to the organization).

1.6.1 THE ACQUISITION PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The acquisition phase of the typical commercial building facility management process consists of **due diligence** activities and is influenced by significant internal and external pressures, as depicted in Figure 1-4.

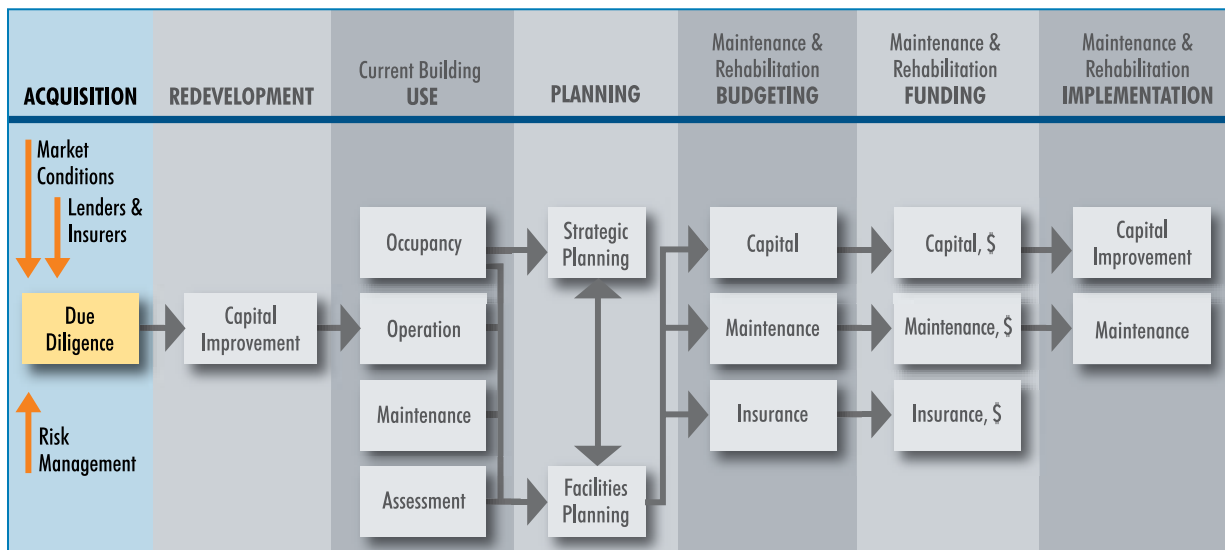


Figure 1-4: Acquisition phase.

Commercial building acquisitions initiate the facility management process for all owners who are not also developers or merchant builders. The **due diligence** process that precedes an acquisition is intended to identify, and quantify if possible, all the liabilities and risks or potential liabilities and risks related to the asset being acquired.

Acquisition phase decisions are influenced by three factors:

- **Market Conditions.** External local conditions of the commercial rental market are the principal factors governing commercial building acquisition, regardless of the short-term or long-term strategic objectives of the purchaser. This is true for all types of owners, be they REITs, pension funds or other fiduciary institutions, partnerships, or individuals.
- **Lenders and Insurers.** Lenders and insurers are important external participants in many commercial building acquisitions, and each carry out due diligence functions to determine the risks and potential liabilities in any given deal. By their nature, lenders and insurers spread their risks over a wider range of investments than that presented to an owner in a specific acquisition. The insurability of the acquired property is of great concern to commercial building owners, but the cost of insurance is of lesser concern because the cost may be passed on to tenants in many commercial properties.
- **Risk Management.** Many commercial building owners have formally established internal risk management functions within their organizations. These risk managers participate in the due diligence analyses carried out prior to acquisition. The rigor of internal due diligence varies from owner to owner.

1.6.2 THE REDEVELOPMENT PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The redevelopment phase of the typical commercial building facility management process consists of various types of **capital improvements**, and is influenced by significant internal and external pressures, as depicted in Figure 1-5.

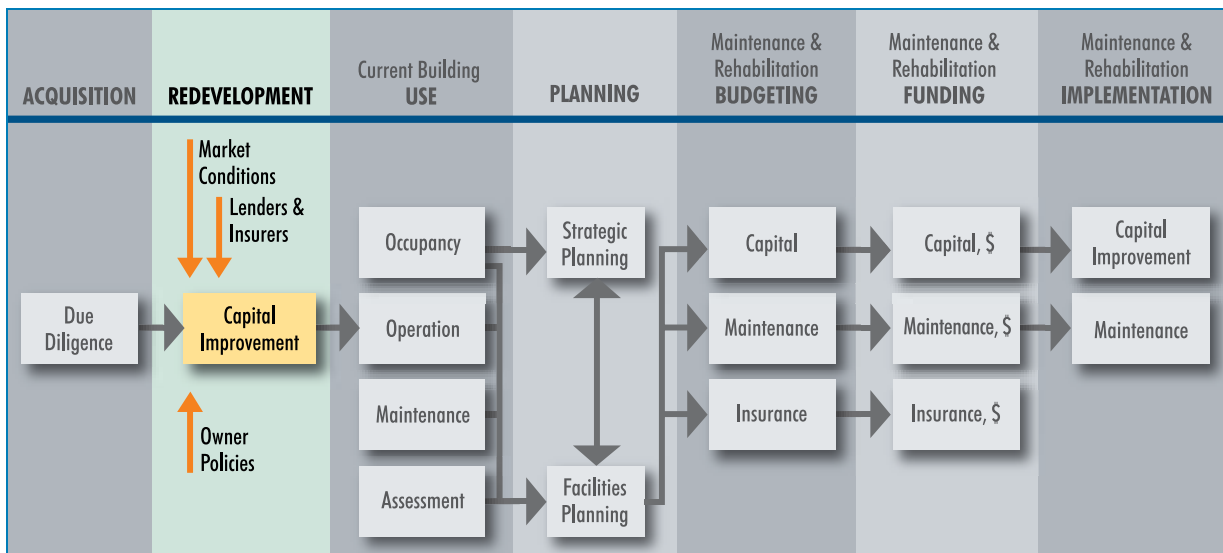


Figure 1-5: Redevelopment phase.

The types of redevelopment phase capital improvement projects vary as a function of the building's classification (A, B, or C). They generally consist of:

- Architectural upgrading of entrances, lobbies, and public areas
- Architectural upgrading of facades
- Upgrading of the heating, ventilation, and air-conditioning (HVAC) systems
- Environmental and other risk remediation work identified in the due diligence process
- Upgrading of life safety systems

Redevelopment phase decisions are influenced by three factors:

- **Market Conditions.** Commercial properties in a given classification must compete with neighboring, similarly classified properties. Local architectural traditions and fashions and historic preservation are significant factors determining the specific nature of various capital improvement projects.
- **Lenders and Insurers.** External lenders and insurers may require specific capital improvements as a condition of the deal. For example, they may require the replacement of a questionable roof or HVAC system. These are generally the direct result of the due diligence analyses.

- **Owner Policies.** Owners’ marketing and architectural policies are the principal internal factors governing capital improvement decisions in the redevelopment phase.

1.6.3 THE CURRENT BUILDING USE PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The current building use phase of the typical commercial facility management process consists of four categories of activities and is influenced by significant internal and external pressures, as depicted in Figure 1-6.

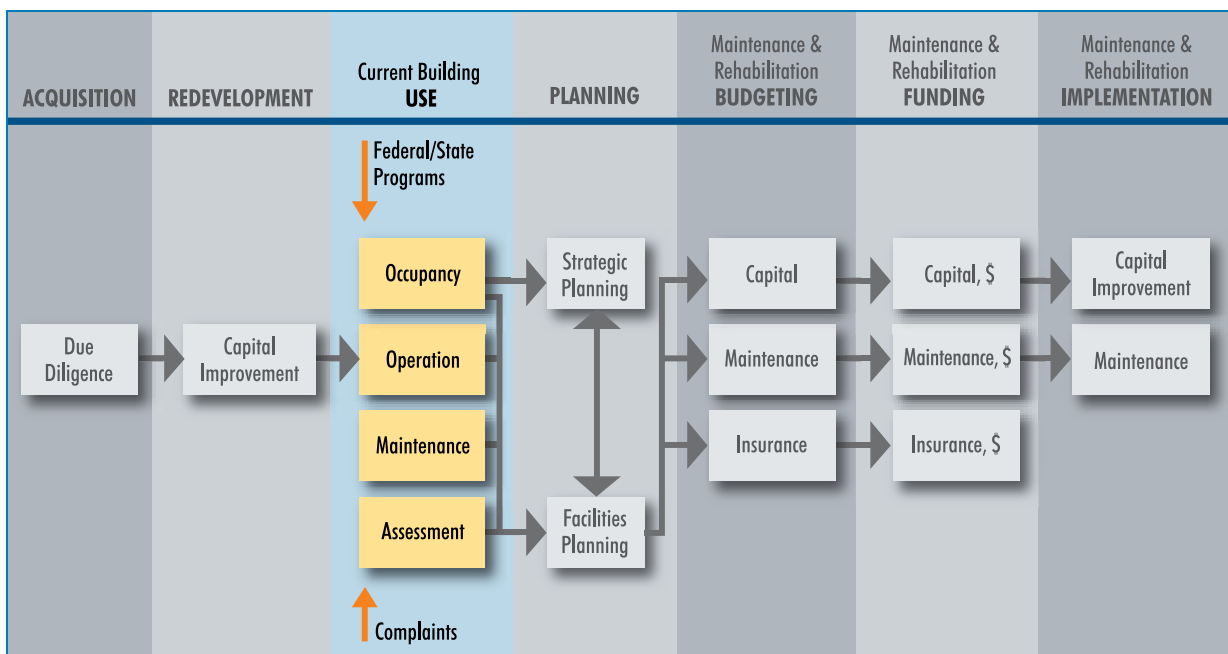


Figure 1-6: Use phase.

- **Occupancy.** The primary function of this category is occupancy of commercial space by tenants. Support functions are administrative, such as collecting rents and addressing tenants’ concerns. Ancillary functions may be recreational, such as operating a health club, pool, or spa, and social, such as operating a lecture room, restaurant, or similar facility. The specific functions may vary depending on the building classification (A, B, or C).

Occupancy functions are carried out in each building by the tenants and facility managers. Each of these functions is subject to security risk and can be disrupted by terrorist attacks.

- **Operation.** Facility operation consists of all the activities and functions that are required to support the occupancy. Examples of facility operation include mechanical functions (heating, cooling, and ventilation), electrical functions (lighting, communications, and alarm), and plumbing functions.

Operation functions may be carried out by custodial staff of the owner and/or by contractors. Each of these functions is subject to security risk and can be disrupted by terrorist attacks.

- **Maintenance.** Maintenance includes all the activities required to enable the occupancy and operation of the building continuously over time. They can be broken down into custodial maintenance, routine maintenance, and repair.

Maintenance functions may be carried out by custodial staff of the owner and/or by contractors. In some cases, tenants or their contractors may carry out some maintenance functions.

- **Scheduled Facility Assessment.** Facility assessment, which less sophisticated commercial building owners may not carry out systematically, consists of the survey or inspection of the buildings on a scheduled basis. It may also include a review of documents, such as archival building plans, for retrieving specific information. The purpose(s) of the surveys or inspections is to determine facility conditions in relation to one or more of the following categories:

- Specific environmental hazards
 - Asbestos
 - Lead paint
 - Lead
 - Radon
- Preventive maintenance needs
 - Structural hazards
 - Fire/life safety
 - Environmental quality
 - Energy use/conservation
- User complaints
- Accessibility
- Maintenance needs
- Other

These surveys may or may not be coordinated by schedule, content, personnel, etc. Facility managers may or may not use prepared inspection forms or checklists. Finally, the extent and specific nature of recordkeeping and reporting by facility managers may vary.

Current use phase decisions are influenced by two factors:

- **Federal and State Programs.** Various external programs may establish requirements affecting the use of commercial buildings that have facilities implications (e.g., Americans with Disabilities Act [ADA])

and Occupational Safety and Health Administration [OSHA] requirements).

Specific surveys or inspections may be mandated by State or local laws/programs. These surveys/inspections may be carried out by a variety of entities:

- Federal personnel (e.g., from OSHA or the Environmental Protection Agency)
 - State/city/county personnel (e.g., fire marshal, code enforcement, environmental, health)
 - Commercial building personnel (e.g., custodial or facility managers)
 - Commercial building contracted personnel (e.g., asbestos inspectors)
 - Consultants
- **Complaints by Occupants.** Complaints by tenants are a potentially significant internal pressure on the facility management process.

1.6.4 THE PLANNING PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The planning phase consists of projecting and forecasting future needs. It can be carried out periodically or continuously, and the time period covered by the projections and forecasts may vary. The owner, with or without the assistance of consultants, may carry out planning functions. Planning consists of two separate but related activities—strategic planning and facility planning—and is affected by significant internal and external pressures, as depicted in Figure 1-7.

Strategic Planning. Strategic planning attempts to formulate future business strategy by analyzing and forecasting financial trends as well as national, regional, and local commercial space markets. Many owners acquire properties for a limited period of time, and many have an exit strategy in place at the time of acquisition. Strategic planning addresses such issues as:

- Should the property classification (A, B, or C) be upgraded or downgraded?
- Should the exit strategy be accelerated or prolonged?

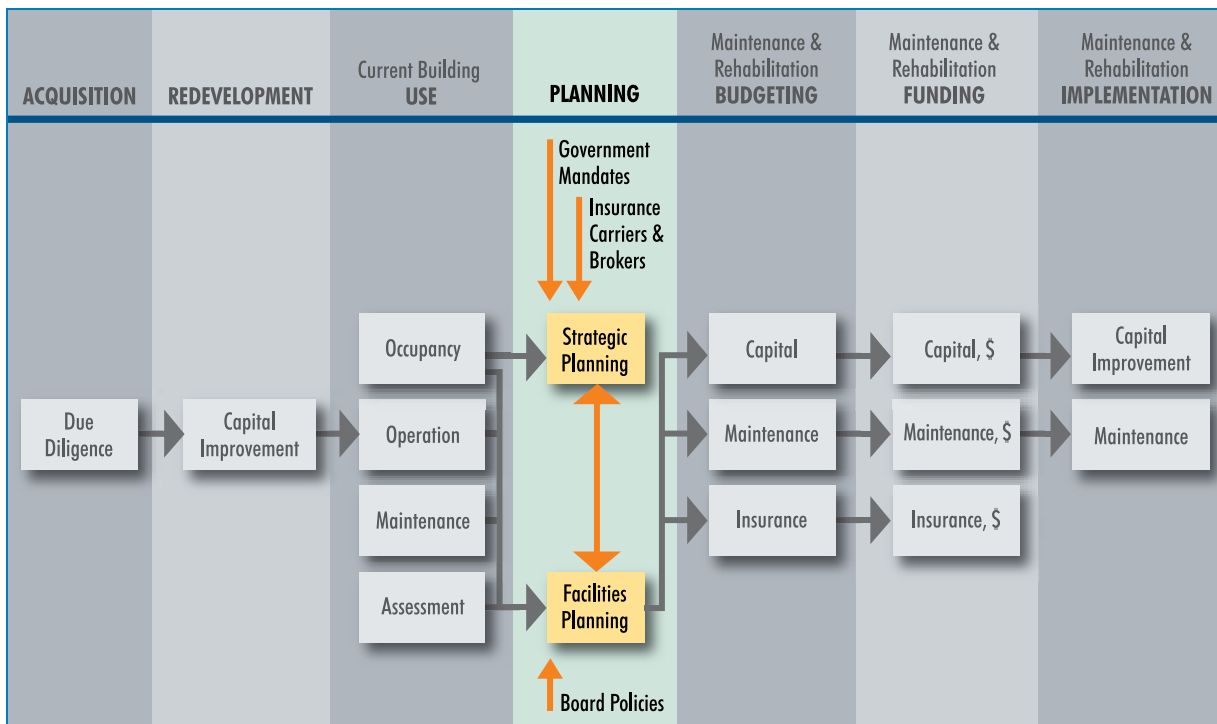


Figure 1-7: Planning phase.

- Should trends in the insurance market revise current investment programs?
- Should specific major capital investments be considered?

Strategic planning is usually carried out at the owner’s headquarters and addresses the owner’s entire commercial building portfolio or large segments of it.

Facility Planning. Facility planning consists of preparing short- and long-range facility plans. It combines the products of two distinct activities—the strategic plan and the facility assessment (see Figure 1-6)—into a detailed projection of facility requirements. The projection may cover a defined time frame, such as 5 years.

Different owners may use different classifications of projects in their facility plans, reflecting a variety of legal, administrative, jurisdictional, and other factors. However they may be classified, a comprehensive facility plan should include the following elements:

- New construction
- Additions to existing buildings
- Renovations of existing buildings

- Building systems replacements
- Building systems repairs
- Scheduled maintenance
- Preventive maintenance
- Building disposition (change of use, sale, demolition)

The plan identifies the time frames for accomplishing each project, and it may include cost estimates.

If effective, the facility plan is used as a budgeting tool and provides direct inputs into the budget process. It should be revised and updated on a routine basis to reflect:

- Changes in the strategic plan (including market conditions)
- Revised facility assessments
- Budgeting and funding realities

Facility planning usually begins at the individual building or project level and entails the flow of information up the management hierarchy for final capital decision-making and budgeting at the owner's headquarters in the case of large portfolios.

Planning phase decisions are influenced by three factors:

- **Government Mandates.** Federal, State, and local government agencies may establish external requirements affecting facility planning in the planning phase. These requirements may have facility rehabilitation implications.
- **Insurance Carriers and Brokers.** External private property and casualty insurance companies often require surveys or inspections of commercial buildings on an annual or other scheduled basis. Insurance carriers are more than willing, when asked, to provide building owners with Loss Control and Prevention Reports that include recommendations for loss prevention. Insurance brokers also employ loss/risk specialists.
- **Board Policies.** In terms of internal influences, boards of directors may occasionally adopt written policies on issues of business and social significance that can affect both strategic and facility planning. These policies guide the actions of the owner organization.

1.6.5 THE MAINTENANCE AND REHABILITATION BUDGETING PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The budgeting phase consists of the projection of future financial resources required to meet future needs. It is carried out annually (covering a period of 1 or more years). Each local or regional facility manager initiates it with input from his or her staff. In the case of large portfolio owners, the facility budget process is initiated locally or regionally, and is overseen centrally. The facility budgeting is a process that can be thought of as percolating up through the organization. It is affected by external government fiscal regulations and lender requirements, and internal risk management policies and budget constraints, as depicted in Figure 1-8.

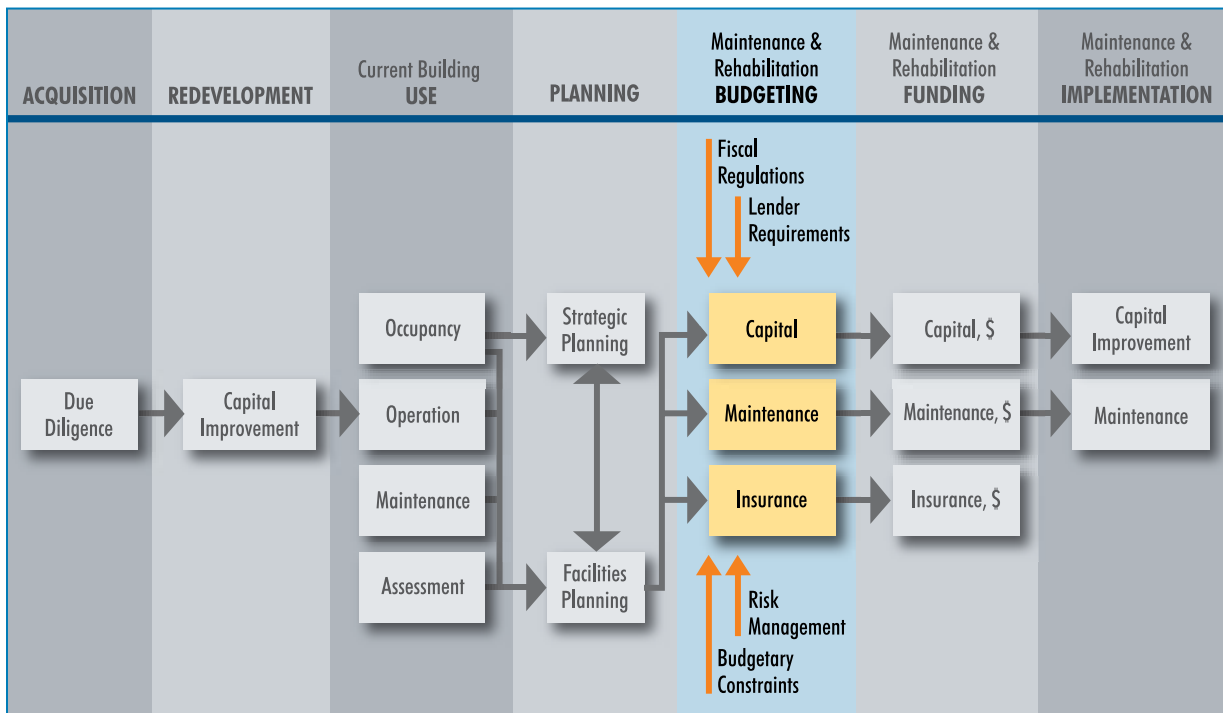


Figure 1-8: Budgeting phase.

Three elements of the budget are relevant to the discussion of facility management:

- Capital
- Maintenance
- Insurance

- **Capital Budgets.** Capital generally relates to the acquisition of buildings and major systems, which is not annual or repetitive, and which can therefore be amortized. The distinction between capital and maintenance budgets may vary among different commercial building owners. At one extreme is a total separation, mandated by law, labor jurisdiction, or other factor. At the other extreme is a rather unclear separation between the two funding mechanisms.
- **Maintenance Budgets.** Maintenance budgets generally relate to recurring annual expenditures and address existing inventories of buildings and systems without adding to the inventories.
- **Insurance Budgets.** Financial resources earmarked for insurance may be used in different ways, including the purchase of third-party insurance and/or the funding of a self-insurance reserve. Property and general liability insurance are relevant to facility management considerations.

Budgeting phase decisions are influenced by four factors:

- **Government Fiscal Regulations.** Federal, State, and local government agencies have historically established external requirements dealing with fiscal responsibility of commercial property owners. A variety of Security and Exchange Commission regulations apply to REITs. Pension funds are subject to a variety of fiduciary requirements. Partnerships are subject to a variety of State and Federal regulations. One important objective of these regulations is to ensure the responsible stewardship of third party resources. These requirements may have facility rehabilitation implications, if resources are expended in an irresponsible manner. Additionally, these regulations may determine, directly or indirectly, the length of time an acquired real estate asset must be held and, therefore, what the owner's planning horizon should be.
- **Lender Requirements.** Commercial lenders impose requirements on building owners who use mortgage financing for capital improvements. Often, the lender requires the purchase of a particular type of insurance coverage.
- **Budgetary Constraints.** Internally, political and economic conditions may place limits on commercial building capital and maintenance budgets. The problem is often exacerbated by unfunded mandates imposed on commercial buildings by Federal and State agencies.

- **Risk and Insurance Management.** Internally, the owner organization’s risk and insurance management may directly or indirectly affect insurance decisions in the budgeting phase of the process.

1.6.6 THE MAINTENANCE AND REHABILITATION FUNDING PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The funding phase consists of those activities required to obtain the financial resources to meet the budgets. It is influenced externally by regional and local economic conditions and bond financing regulations, as depicted in Figure 1-9.

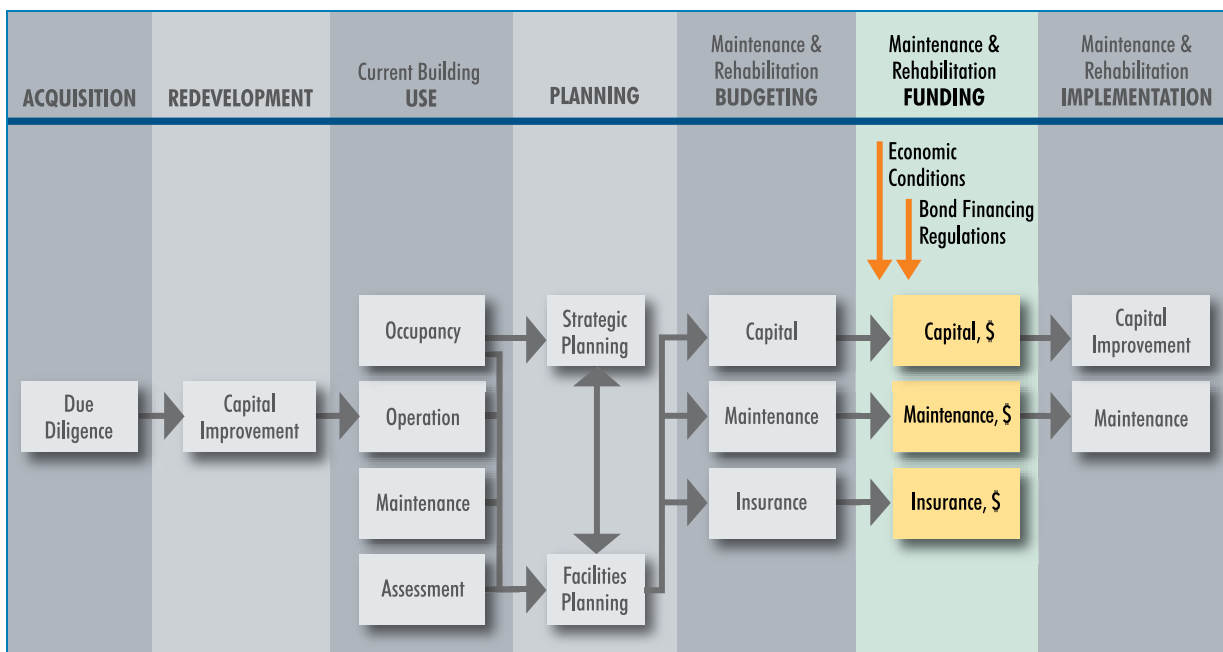


Figure 1-9: Funding phase.

The funding of commercial building budgets in general, and of the three budget elements of capital improvement, maintenance, and insurance, varies among owner organizations. Commercial building owners can fund their budgets by various combinations of equity and debt.

Funding phase decisions are influenced by two factors:

- **Regional and Local Economic Conditions.** Externally, the funding of commercial building construction is subject to local and national socioeconomic conditions well beyond the control of the building owner. Construction funding depends on interest rates, the owner’s bond rating, and similar parameters.

- **Bond Financing Regulations.** The local administrative procedures and structure in place to obtain bond financing will have a significant impact on the ability of commercial building owners to achieve their objectives, regardless of whether they include terrorism risk reduction or not. Certain types of expenditures out of the proceeds of a bond issue, such as operations or maintenance, may be prohibited by the conditions of the bond.

1.6.7 THE MAINTENANCE AND REHABILITATION IMPLEMENTATION PHASE OF COMMERCIAL BUILDING FACILITY MANAGEMENT

The implementation phase includes design and construction and can be broken into three categories of projects, all of which are relevant to existing buildings:

- Building acquisition projects
- Capital improvement projects
- Maintenance projects

The implementation phase is primarily affected by external Federal and State programs and building code requirements, as depicted in Figure 1-10.

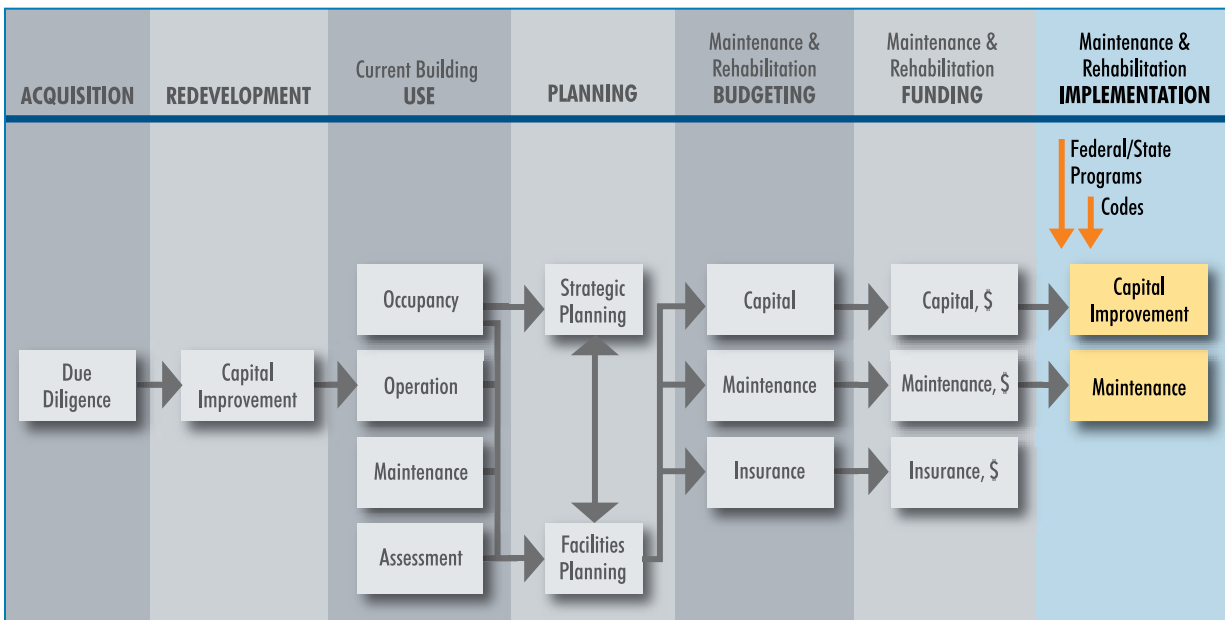


Figure 1-10: Implementation phase.

Acquisition includes new building construction and the acquisition of existing buildings. Acquisition of existing buildings is discussed above as the first phase of the facility management process.

Capital improvement and maintenance projects are managed by the commercial building owner's staff and carried out by the staff and contractors. The management of these two categories may be separated or combined, depending on issues of labor jurisdiction and legal authority.

Implementation phase decisions are influenced by two factors:

- **Federal and State Mandates and Programs.** Externally, Federal and State programs may establish requirements affecting the implementation phase (e.g., ADA and OSHA requirements).
- **Codes and Code Enforcement.** Also externally, building codes impose requirements on the implementation phase in cases of repair, alteration, or addition to existing buildings. These requirements may be enforced by a State or local agency. Such requirements can add costs to a project and jeopardize feasibility, unless done incrementally.

1.7 PLANNING AND MANAGING INCREMENTAL TERRORISM RISK REDUCTION

The implementation of an integrated incremental building protection program is supported by decisions and actions in each phase of the facility management process described in the preceding section.

There are nine steps of an incremental terrorism risk reduction program:

1. Conduct a Due Diligence Terrorism Risk Assessment
2. Identify and Implement Initial Increment Integration Opportunities
3. Assess Terrorism Risk
4. Develop a Security Master Plan
5. Plan Incremental Rehabilitation for Specific Buildings
6. Stage Rehabilitation Increments
7. Coordinate with Tenant Work
8. Define Budget Packaging
9. Implement Integrated Incremental Rehabilitation Project Management

Each of these steps relates to one (or more) of the facility management phases, as illustrated in the following table.

Table 1-2: Steps of an Incremental Terrorism Risk Reduction Program

Facility Management Process Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

1.7.1 STEP 1 – CONDUCT A DUE DILIGENCE TERRORISM RISK ASSESSMENT

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented in the acquisition phase of the facility management process. It may be performed by the owner (buyer), lender, and insurer. Each may include a Tier 1 FEMA 452 assessment (discussed in more detail in Chapter 2) or equivalent terrorism risk assessment in their implementation of due diligence.

1.7.2 STEP 2—IDENTIFY AND IMPLEMENT INITIAL INCREMENT INTEGRATION OPPORTUNITIES

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented in the initial redevelopment phase of the facility management process. As stated above, the types of redevelopment phase capital improvement projects vary, but generally consist of:

- Architectural upgrading of entrances, lobbies, and public areas
- Architectural upgrading of facades
- Upgrading of the HVAC systems
- Environmental and other risk remediation work identified in the due diligence process
- Upgrading of life safety systems

The owner should consider using the guidance provided in Chapter 2 of this manual to identify and implement specific terrorism risk reduction increments that can be integrated with these redevelopment capital improvements. Detailed information on specific risk reduction increments is presented in Chapters 3, 4, and 5.

1.7.3 STEP 3—ASSESS TERRORISM RISK

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the scheduled and recurring assessment activities carried out in the use phase of the facility management process. As stated above, some of these assessment activities may address the following issues:

- Specific environmental hazards
 - Asbestos
 - Lead paint
 - Lead
 - Radon
- Preventive maintenance needs
 - Structural hazards
 - Fire/life safety
 - Environmental quality
 - Energy use/conservation
- User complaints
- Maintenance needs
- Accessibility
- Other

The owner should consider performing a Tier 1 FEMA 452 terrorism risk assessment (discussed in more detail in Chapter 2 of this manual) or equivalent as appropriate. Particular attention should be paid to the following factors:

- Government tenants, such as the U.S. General Services Administration or DoD, or government leased facilities that may have specific security requirements
- Tenant complaints about perceived security vulnerabilities

1.7.4 STEP 4—DEVELOP A SECURITY MASTER PLAN

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the planning phase of the facility management process. A security master plan relates to both strategic plans and facility plans. A security master plan should be a 3- to 5-year plan, based on the goals of the overall organization. It should state the vision, goals, and objectives of the security program. The plan should also outline the operational security measures, the path for the security program to keep pace with the changing threat environment, and future initiatives. Further, it should be benchmarked against the security programs of similar facilities.

The security master plan provides the basis for all subsequent steps of the incremental terrorism risk reduction program.

A comprehensive Security Master Plan should:

- Be communicated and disseminated to all levels of management and building occupants as appropriate
- Be integrated into the facility construction or renovation planning
- Be benchmarked or compared to related facilities
- Be tested and evaluated
- Identify threats/hazards, assets, vulnerabilities, and risks

- Establish a security improvement implementation schedule
- Establish a security operating and capital budget
- Follow regulatory or industry guidelines/standards

The owner should consider requiring the development of a Security Master Plan in accordance with guidance provided in Chapter 5.

1.7.5 STEP 5—PLAN INCREMENTAL REHABILITATION FOR SPECIFIC BUILDINGS

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the planning phase of the facility management process.

The owner should consider using the guidance provided in Chapter 2 of this manual to identify and implement specific terrorism risk reduction measures that can be integrated with planned maintenance and capital improvement projects.

The incremental rehabilitation plan combines information from the Security Master Plan (Step 4) and the strategic and facility plans discussed in Section 1.5.4, and provides a coherent sequencing of increments.

1.7.6 STEP 6—STAGE REHABILITATION INCREMENTS

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the planning phase of the facility management process, and is closely related to Step 5.

Consider the staging of increments of terrorism risk reduction on the basis of a life-cycle benefit analysis. Figure 1-11 illustrates such a life-cycle benefit analysis. The three wide arrows represent the benefits of single-stage rehabilitation occurring at three points in time: now, in 10 years, and in 20 years. Clearly, the largest benefit derives from a single-stage rehabilitation done now, and is designated as 100 percent. The benefits of single-stage rehabilitation done in the future must be discounted and expressed as some percentage lower than 100 percent, as represented by the smaller arrows. The stepped portion of the diagram represents incremental rehabilitation starting soon and completed in four increments over 10 years. The benefits of the future increments must also be discounted, and the benefit of the completed incremental rehabilitation is therefore expressed as a percentage lower than 100 percent, but higher than the single-stage rehabilitation in year 10 or 20. Reducing the overall duration of the incremental rehabilitation will increase its benefit, and extending the duration will decrease it.

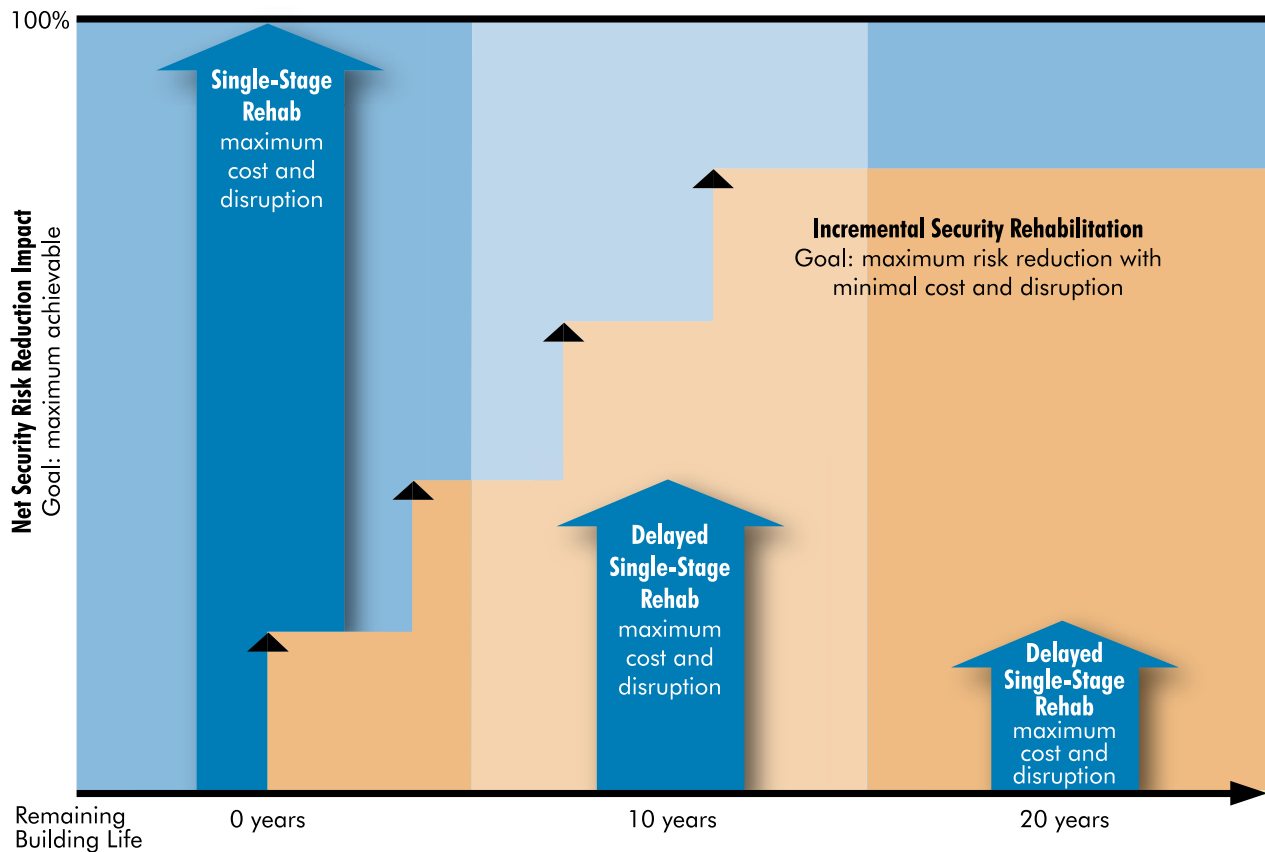


Figure 1-11: Life-cycle benefit analysis.

1.7.7 STEP 7—COORDINATE WITH TENANT WORK

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the planning phase of the facility management process, and is closely related to Step 5.

In addition to the integration opportunities with maintenance and capital improvement work done in Step 5, the owner should consider integrating additional increments of terrorism risk reduction with tenant work in coordination with the tenants.

1.7.8 STEP 8—DEFINE BUDGET PACKAGING

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

This step is implemented as part of the budgeting phase of the facility management process.

The owner’s facility, risk, and financial managers should determine:

- Potential losses due to terrorist attack (life, property, business interruption)
- The owner’s potential liability related to terrorist attacks
- The extent of security considerations attendant to government fiscal regulations applicable to the owner’s organization
- The extent of lender-imposed terrorism risk insurance requirements

The owner’s facility, risk, and financial managers should carefully plan the presentation of incremental security enhancement budgets to maximize the probability of their being approved, given the financial realities of the owner organization. A benefit-cost analysis as initiated in Step 6 can help. Concentrating on terrorism risk reduction measures that also reduce the risk of damage from natural disasters, and other causes may also be useful.

1.7.9 STEP 9—IMPLEMENT INTEGRATED INCREMENTAL REHABILITATION PROJECT MANAGEMENT

Phase	Steps of an Incremental Terrorism Risk Reduction Program
Acquisition	1. Conduct Due Diligence Terrorism Risk Assessment
Redevelopment	2. Identify and Implement Initial Increment Integration Opportunities
Use	3. Assess Terrorism Risk
Planning	4. Develop a Security Master Plan
	5. Plan Incremental Rehabilitation for Specific Buildings
	6. Stage Rehabilitation Increments
	7. Coordinate with Tenant Work
Budgeting	8. Define Budget Packaging
Funding	
Implementation	9. Implement Integrated Incremental Rehabilitation Project Management

The implementation of the plans developed in Step 5, consisting of selected incremental security rehabilitation measures in combination with other building work, may require added attention to project design and bid packaging.

- Fully brief or train in-house architects/engineers or outside consultants preparing the bid documents on the rationale behind the integration of physical protection and strengthening increments with the maintenance and capital improvement activities, as presented in Chapter 2 of this manual, to ensure that the terrorism risk reduction objectives are achieved.
- Ensure the continuity of building documentation from the analysis and design stages through construction and as-built drawings.
- Conduct a pre-bid conference to explain to all prospective bidders the terrorism risk reduction objectives and the rationale for their selection.
- In cases where security rehabilitation increments are to be implemented within tenant spaces, whether or not they are integrated with other items of tenant work, the tenant work and owner work should be well coordinated.

1.8 TERRORISM RISK ASSESSMENT TO TERRORISM RISK REDUCTION

These two activities, briefly discussed in this chapter as they relate to the phases of commercial building facility management, are discussed in detail in the Chapter 2.