For Facility Managers, Risk Managers, & Financial Managers

Part

Planning and Managing the Process for Earthquake Risk Reduction in Existing Hospital Buildings

Introduction

Part B of this manual is written specifically for healthcare organization and hospital facility managers, risk managers, and financial managers concerned with the seismic safety of their buildings. The organization's senior management may have requested you, the manager, to make a recommendation to address seismic safety in hospitals or may have made the decision to address it, or there may already be a seismic safety program in place. Part B describes when and how specific activities that will accomplish the goal of seismic risk reduction can be introduced into an ongoing hospital facility management process. Part B also provides the framework and outline that can be used by the facility managers, risk managers, and financial managers in developing and communicating their recommendations to senior management.

An incremental seismic rehabilitation program is one of several seismic risk reduction strategies that can be implemented in hospital buildings. It can be implemented separately or in combination with other seismic risk reduction actions. If you determine that such a program is appropriate for your organization, the planning and implementation of incremental seismic rehabilita-

In Brief

- **Planning for earthquake risk reduction in hospitals requires a coordinated and integrated effort by facility managers, risk managers, and financial managers.**
- **Ten specific activities can be added to the current facility management process to implement an incremental seismic rehabilitation program.**
- ***Nine additional activities can be added to the facility management process to further reduce seismic risk.***
- ***There are three ways to start reducing seismic risk.***

tion should be integrated into the facility management processes and integrated with other seismic risk reduction actions that will complement it or support it.

B.1 Integrating the Efforts of Facility Management, Risk Management, and Financial Management

Preparing an analysis of a healthcare organization's earthquake risk reduction needs, and planning and managing such a process, benefits from an integrated effort by the organization's facility managers, risk managers, and financial managers, or by the administrators charged with those respective responsibilities. Such an integrated effort may be a departure from current practices, but such collaboration is the key to improving safety cost-effectively and with a minimum of disruption.

Facility managers currently carry out their planning activities by considering the parameters of healthcare delivery programs, medical technology, area demographics, and the physical condition and projected useful life of the existing healthcare facilities. Often they consider pressing social issues such as physical security and equity. Some of these issues become federal or local government mandates, such as asbestos and lead abatement or energy conservation. Sometimes facility managers consider the risks to hospital buildings from natural disasters such as earthquakes or windstorms.

Risk managers, relatively recent additions to many healthcare organizations, carry out their planning activities by considering three aspects: risk identification, risk reduction, and risk transfer. The latter generally involves the purchase of insurance or the contribution to a risk pool. Currently, risks in healthcare organizations are classified into three broad areas: medical risk, employee risk, and facility and environmental risk. While risk managers are keenly aware of the extreme healthcare demands that natural disasters may place on their hospital facilities, rarely do they consider the risks to the facilities and their occupants themselves from these disasters. Rather, they tend to assume that risks from natural disasters are addressed by building codes and similar regulations.

Financial managers currently deal with facilities by controlling and managing maintenance budgets, capital improvement budgets, and insurance budgets. The facility managers and risk managers present the demands on these budgets to the financial managers, but rarely are the potential tradeoffs among these budgets considered. The costs and benefits of various options of facility risk management are rarely explicitly addressed.

Addressing the problem of earthquake risk reduction requires establishing active communication among the three management functions and coordinating activities into an integrated planning and management effort. Facility and risk managers will have to consider facility risk, and financial managers will have to consider the costs and benefits of various options for managing facility risk. Specific recommendations on implementing such an effort are provided in the following sections.

B.2 Integrating Incremental Seismic Rehabilitation into the Facility Management Process

B.2.1 A Model of the Facility Management Process for Existing Hospital Buildings

The typical facility management process for existing hospital buildings consists of seven phases of activities: Acquisition, Current Building Use, Accreditation, Planning, Maintenance & Rehabilitation Budgeting, Maintenance & Rehabilitation Funding, and Maintenance & Rehabilitation Implementation. Each phase consists of a distinct set of activities as follows:

Acquisition: due diligence

Current Use: facility occupancy, facility operation, facility maintenance, and facility assessment

Accreditation: Joint Commission on Accreditation of Healthcare Organizations (JCAHO) or alternate accreditation emergency management planning

Planning: strategic planning and facility planning

Budgeting: capital budgeting, maintenance budgeting, and insurance budgeting

Funding: financing of capital, maintenance, and insurance budgets

Implementation: capital improvement and maintenance

This process is sequential, progressing from acquisition through implementation of rehabilitation in any given building. A healthcare organization that has a large inventory of buildings is likely to have ongoing activities in all of these phases in different buildings. The process is illustrated in the following diagram. The Appendix to this manual, Additional Information on Hospital Facility Management, contains a discussion of the specific phases and the activities therein for hospital administrators seeking further detail on the facility management process. This is a generalized model subject to local variation.

B.2.2 Elements of an Incremental Seismic Rehabilitation Program

The following activities are considered essential elements of an incremental seismic rehabilitation program for hospitals:

1. Due Diligence Analysis
2. Seismic Screening
3. Seismic Evaluation
4. Emergency Management Planning for Accreditation
5. Developing a Risk Reduction Policy
6. Seismic Rehabilitation Planning for Specific Buildings
7. Staging Seismic Rehabilitation Increments

8. Budget Packaging
9. Bond Packaging
10. Seismic Rehabilitation Project Management

Incremental Seismic Rehabilitation

Element 1
Due Diligence Analysis

B.2.2.1 Due Diligence Analysis

In regions of high and moderate seismicity, due diligence should include a probabilistic analysis of potential earthquake risks. Such an analysis considers damage from earthquakes of all levels of intensity, and will provide information on seismic vulnerabilities in the building. If the building is acquired, the due diligence analysis will provide information for the initiation of a full seismic assessment. Probabilistic analysis, because of its detail and scope, will be more expensive than more simplistic Probable Maximum Loss (PML) analysis.

Incremental Seismic Rehabilitation

Element 2
Seismic Screening

B.2.2.2 Seismic Screening

Following building acquisition, seismic screening of the healthcare organization's building inventory is the first step of the incremental seismic rehabilitation process. Seismic screening procedures can be incorporated into other facility assessment activities. Begin with a determination of the status of the archival records. If building plans are available, a document review for the determination of building structure types is the first step in seismic screening. The following chart can be used to obtain an overall view of seismic concerns based on the seismic hazard map in Part A.

Initial Hospital Facility Manager/ Risk Manager Screening of Seismic Concerns

Level of Seismic Concern by Typical Building Type	Level of Seismic Concern by Building Location*		
	Green	Yellow	Red
Wood Frame		Low	High
Steel Frame		Low	High
Concrete Frame	Very Low	Medium	Very High
Unreinforced Masonry	Low	High	Very High

Patterned after recommendations developed by Dr. Charles Scawthorn for the California Seismic Safety Commission's *Earthquake Risk Management: A Toolkit for Decision Makers.*

* Locations refer to the seismic hazard map in Part A, Section A.1.

The Federal Emergency Management Agency (FEMA) has developed FEMA 154, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook, Second Edition*[1] as guidance for seismic screening of an inventory of buildings. It describes a technique for identifying the relatively more vulnerable buildings in a large inventory so that they can be addressed in more detail.

The FEMA 154 publication is nationally applicable and addresses all building types. In some cases, the screening will suggest specific seismic rehabilitation opportunities that do not require additional engineering and risk analyses.

[1] To order this and other FEMA publications, you may write to FEMA, PO Box 2012, Jessup, MD 20794-2012; or you may call 1-800-480-2520, Monday - Friday, 8:00 a.m. - 5:00 p.m., eastern time; or you may fax your request to 301-362-5335.

The incorporation of seismic screening into ongoing facility assessment activities requires assigning the screening to the appropriate inspectors. If inspections are periodically carried out in the healthcare organization's buildings for other purposes such as life safety, insurance, occupational health and safety, or hazardous materials identification, it may be possible to assign the seismic screening to the same inspectors with some additional training. Alternatively, the seismic screening can be assigned to a consulting architect or engineer.

B.2.2.3 Seismic Evaluation

Incremental Seismic Rehabilitation

Element 3
Seismic Evaluation

Seismic evaluation is an engineering analysis of individual healthcare buildings. It usually follows the seismic screening, when the buildings identified as relatively more vulnerable are subjected to a more detailed analysis. However, in some cases, such as when the organization's building inventory is small, seismic evaluation of individual buildings may be the first step of the incremental seismic rehabilitation process.

Guidance for seismic evaluation of buildings is contained in standard ASCE 31, *Seismic Evaluation of Existing Buildings*,[2] which is based on FEMA 310, *Handbook for the Seismic Evaluation of Existing Buildings—A Prestandard*. The standard provides engineering guidance on how to evaluate categories of buildings in order to identify deficiencies and determine effective rehabilitation measures.

Seismic evaluation can be done by the healthcare organization's professional staff or by a consulting engineer.

B.2.2.4 Emergency Management Planning for Accreditation

Incremental Seismic Rehabilitation

Element 4
Emergency Management Planning for Accreditation

During the Accreditation Phase, seismic screening (B.2.2.2) and seismic evaluation (B.2.2.3) can support and enhance the demonstration of compliance with JCAHO's Environment of Care (EC) standards EC.1.4 and EC.2.4 (amended and expanded in January 2001). The EC standards require hospital, ambulatory care, behavioral health, home care, and long term care organizations to develop and implement a management plan that ensures effective response to emergencies affecting the delivery of healthcare.

The American Society for Healthcare Engineering (ASHE) has developed a tool, entitled *Hazard Vulnerability Analysis,*[3] to help healthcare organizations develop an emergency management plan. It is a simple matrix that lists a variety of hazards, including earthquake, and requires the rating of each in terms of its probability (on a 4-point scale from "none" to "high"), risk (on a 5-point scale from "low disruption" to "life threat"), and preparedness (on a 3-point scale from "poor" to "good"). The values on each scale are multiplied to arrive at a total value for each hazard. The tool instructs: "Determine a value below which no action is necessary. Acceptance of risk is at the discretion of the organization."

Seismic screening and seismic evaluation can add more sophisticated earthquake vulnerability analysis to the emergency management plan required for JCAHO accreditation.

[2] ASCE 31 can be obtained from the American Society of Civil Engineers at 1-800-548-2723.

[3] Healthcare Facilities Management Series, Management Monograph #055920, Susan B. McLaughlin, February 2001, ASHE of the American Hospital Association.

Emergency management plans are required to address the four phases of emergency management activities:

- Mitigation
- Preparedness
- Response
- Recovery

The official JCAHO newsletter, *Perspectives*, dated December 2001, includes the following definition of an emergency:

> "It is a natural or manmade event that suddenly or significantly
>
> - disrupts the environment of care (for example, damage to the organization's buildings, and grounds due to severe windstorms, tornadoes, hurricanes, or earthquakes);
> - disrupts care and treatment (for example, loss of utilities—power, water, telephones—due to floods, civil disturbances, accidents, or emergencies within the organization or in its community); or
> - changes or increases demands for the organization's services (for example, bioterrorist attack, building collapse, or airplane crash in the organization's community)."

The newsletter continues with the following discussion of mitigation, which is one part of the emergency management plan:

> "Mitigation activities lessen the severity and impact of a potential emergency. Mitigation begins by identifying potential emergencies (hazards) that may affect the organization's operations or the demand for its services, followed by implementing a strategy that supports the perceived areas of vulnerability within the organization."

Incremental Seismic Rehabilitation

Element 5
Developing a Risk Reduction Policy

B.2.2.5 Developing a Risk Reduction Policy

Convince the board of directors to adopt a clear policy statement supporting seismic risk reduction. Such a policy should, at a minimum, establish seismic performance objectives for the healthcare organization's buildings. Seismic performance objectives define the target performance of a building following an earthquake of a specified intensity. The policy and objectives should be developed and documented as part of the seismic rehabilitation planning process.

Incremental Seismic Rehabilitation

Element 6
Seismic Rehabilitation Planning for Specific Buildings

B.2.2.6 Seismic Rehabilitation Planning for Specific Buildings

FEMA has developed engineering guidance to plan seismic rehabilitation for specific buildings, including FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*, which includes specific techniques for analyzing and designing effective seismic rehabilitation. The planning task entails four specific facility planning **subtasks**:

1. **Establish seismic target performance levels.** With cooperation between hospital staff and central administration, establish the performance level desired in each of the healthcare organization's buildings following an earthquake. Performance levels used in FEMA 356 are, in declining level of protection:
   - Operational
   - Immediate Occupancy
   - Life Safety
   - Collapse Prevention

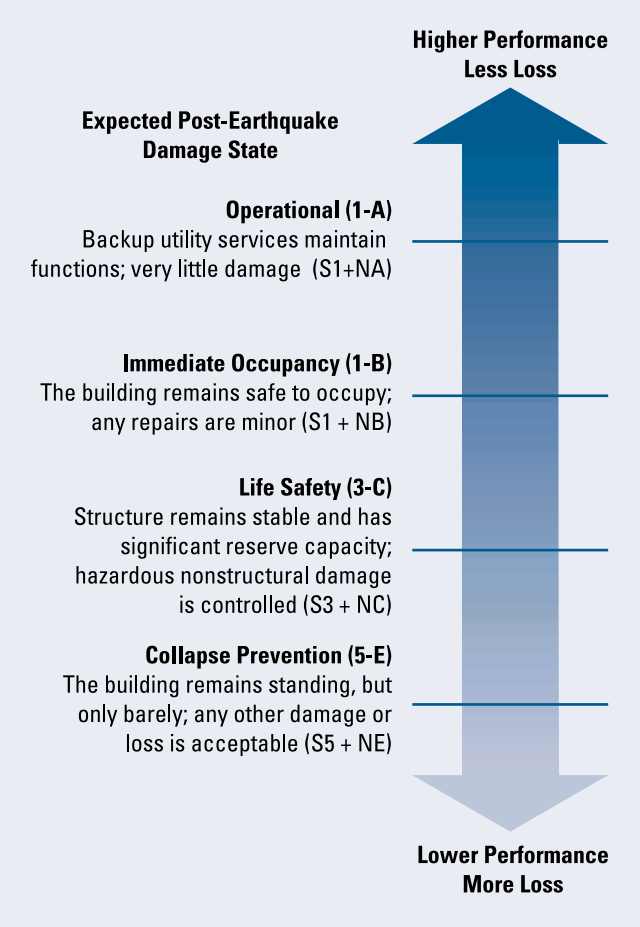
   This is an expansion of the two performance levels, Immediate Occupancy and Life Safety, included in ASCE 31, *Seismic Evaluation of Existing Buildings*.

The figures adapted from FEMA 356 on this and the following page demonstrate the use of these performance levels. Reasonable objectives and expectations should be considered for moderate, severe, and rare great earthquakes.

2. **Prioritize rehabilitation opportunities:** Carry out additional engineering and risk analysis in order to prioritize the seismic rehabilitation opportunities identified in the seismic evaluation in terms of risk reduction. ASCE 31 and FEMA 356 include lists of seismic rehabilitation measures as a function of common building types. Priorities for these measures are established in terms of respective contribution to the overall earthquake resistance of the structure.

   Apply a "worst first" approach. Attend to heavily used sections of the most vulnerable buildings housing the greatest number of occupants, as well as to areas housing critical functions and equipment. For example, higher priorities may be given to rehabilitation of hospital areas where patients and staff spend most of their time, and to corridors, stairs and exits, which will facilitate the evacuation of the building in an earthquake.

Target Building Performance Levels and Ranges



Adapted from FEMA 356, Figure C1-2

3. **Define increments:** Break down the specific seismic rehabilitation opportunities into discrete incremental rehabilitation measures that make sense in engineering and construction terms. When establishing increments, consider scheduling to minimize the disruption to normal hospital operations.

4. **Integrate with other rehabilitation work:** Link each incremental rehabilitation measure with other related facility maintenance or capital improvement work. The related work classifications may differ from one healthcare organization to another, but will fall into the following generic categories:

   - Building envelope improvements
   - Interior space reconfiguration
   - Life safety and accessibility improvements
   - Refinishing and hazardous materials removal
   - Building systems additions, replacements, and repairs
   - Additions to existing buildings
   - Medical technology improvements
   - Patient care improvements

Damage Control and Building Performance Levels

	Target Building Performance Levels Lower Performance More Loss → Higher Performance Less Loss			
	Collapse Pervention Level (5-E)	Life Safety Level (3-C)	Immediate Occupancy Level (1-B)	Operational Level (1-A)
Overall Damage	**Severe**	**Moderate**	**Light**	**Very Light**
General	Little residual stiffness and strength, but load-bearing columns and walls function. Large permanent drifts. Some exits blocked. Infills and unbraced parapets failed or at incipient failure. Building is near collapse.	Some residual strength and stiffness left in all stories. Gravity-load-bearing elements function. No out-of-plane failure of walls or tipping of parapets. Some permanent drift. Damage to partitions. Building may be beyond economical repair	No permanent drift. Structure substantially retains original strength and stiffness. Minor cracking of facades, partitions, and ceilings as well as structural elements. Elevators can be restarted. Fire protection operable.	No permanent drift. Structure substantially retains original strength and stiffness. Minor cracking of facades, partitions, and ceilings as well as structural elements. All systems important to normal operations are functional.
Nonstructural Components	Extensive damage.	Falling hazards mitigated but many architectural, mechanical, and electrical systems are damaged	Equipment and contents are generally secure, but may not be operable due to mechanical failure or lack of utilities.	Negligble damage occurs. Power and other utilities are available, possibly from standby sources.
Comparison with performance intended for buildings designed under the *NEHRP Provisions* for the Design Earthquake	Significantly more damage and greater risk.	Somewhat more damage and slightly higher risk.	Less damage and lower risk.	Much less damage and lower risk.

Adapted from FEMA 356, Table C1-2

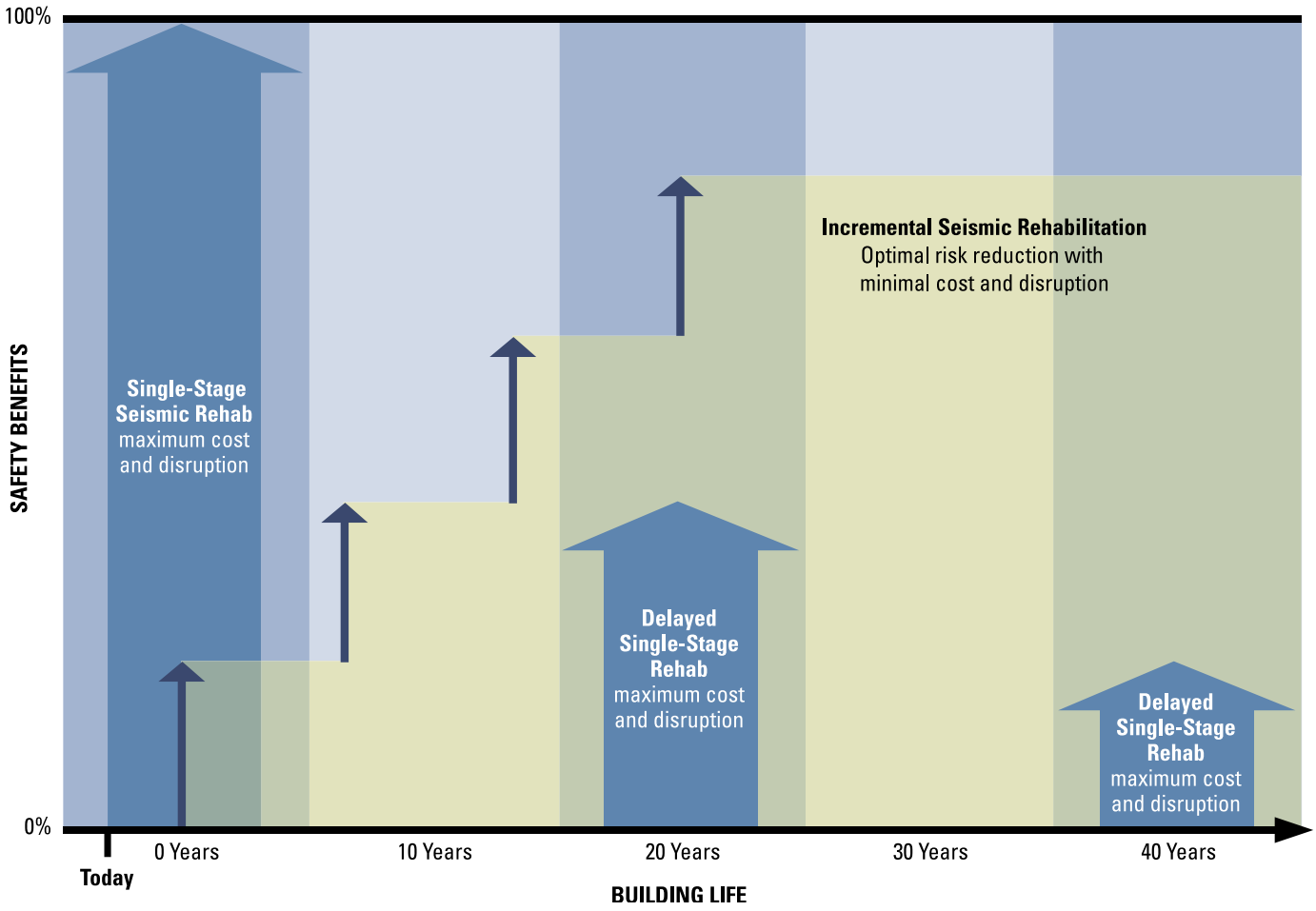
Opportunities for project integration are listed in Part C, Section 2 of this manual. Some examples of the opportunities you can use to link projects are: when accessing concealed areas, when removing finishes and exposing structural elements, when performing work in a common location, when sharing scaffolding and construction equipment, and when sharing contractors and work force.

The four subtasks described above form an iterative process. The definition and related cost estimation of increments, as well as the integration with other maintenance and capital improvement projects (subtasks 3 and 4), may lead to a revision of target performance levels (subtask 1) or to specific analysis carried out as part of subtask 2.

B.2.2.7 Staging Seismic Rehabilitation Increments

Determine the number and scope of incremental stages that will be undertaken and the length of time over which the entire rehabilitation strategy will be implemented.

Estimates of seismic damage can be quantified in terms of percentage of building value damaged. Annual seismic damage is calculated as the probable damage that can result in any year from all possible earthquakes. The benefits of seismic rehabilitation are quantified as the reduction in annual seismic damage resulting from specific rehabilitation actions (also quantified in terms of percentage of building value). A generalized life-cycle benefit analysis shows that incremental approaches can return a substantial portion of the expected benefits of single-stage seismic rehabilitation carried out now.



The schematic diagram above 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 20 years, and in 40 years. Clearly, the largest benefit derives from a single-stage rehabilitation done now, and it is designated as 100%. The benefits of single-stage rehabilitation done in the future must be discounted and expressed as some percentage lower than 100%, as represented by the decreased arrows. The stepped portion of the diagram represents incremental rehabilitation starting soon and completed in four increments over 20 years. The benefits of the future incre-

ments must also be discounted, and the benefit of the completed incremental rehabilitation is therefore expressed as a percentage lower than 100%, but higher than the single-stage rehabilitation in year 20. Reducing the overall duration of the incremental rehabilitation will increase its benefit, and extending the duration will decrease it.

Incremental seismic rehabilitation affords great flexibility in the sequence and timing of actions when the following precautions are kept in mind:

- It is important to get started as soon as possible. Any early reduction of risk will provide benefit over the remaining life of the building. Delaying action extends risk exposure. The incremental approach can be more effective than a delayed, single-stage rehabilitation, as long as one gets started soon.
- Even if the completion of the incremental program takes 10 or 20 years, most of the risk reduction benefit is realized.
- There is a wide margin of error. For example, you may unintentionally increase the probability of damage in the first few years due to an initial rehabilitation increment that inadvertently makes the building more vulnerable to damage, and still realize the benefit of risk reduction if you complete the incremental rehabilitation over a reasonable period.

Incremental Seismic Rehabilitation Element 8 ***Budget Packaging***

B.2.2.8 Budget Packaging

The hospital directors and facility managers should carefully plan how to present the incremental seismic rehabilitation budgets, given the political and financial realities of the healthcare organization, and Medicare's depreciation schedules.

The facility capital improvements and maintenance budget proposals, generated both locally at the facility and centrally at organization headquarters, are results of the facility planning process. The budget, however, is also a vehicle for establishing funding priorities, through a board decision, a bond issue, or other process. It is unlikely for healthcare organizations in most parts of the United States to be able to raise funds for a comprehensive seismic rehabilitation program of all their hospitals. While the incremental rehabilitation approach appears to be a viable alternative, in some organizations it may be necessary to "package" incremental seismic rehabilitation with other work in order to get it funded.

In regions of moderate seismicity and low seismic awareness (parts of New York and New England, for example), it may be useful to concentrate on rehabilitation measures that also reduce the risk of loss due to other natural or man-made forces, such as high winds or terrorist attack. Such a multi-hazard approach will help justify mitigation investments.

For those parts of the country where the understanding of earthquake risk is limited, it may be necessary and appropriate to combine seismic rehabilitation costs with normal maintenance budgets.

Incremental Seismic Rehabilitation Element 9 ***Bond Packaging***

B.2.2.9 Bond Packaging

Since a bond issue is one of the three financing mechanisms for seismic rehabilitation (in addition to revenue and interest income), one must ensure that bond-financed incremental seismic rehabilitation does not include categories of work precluded by law or regulation.

Experience with bond-financed incremental seismic rehabilitation has been limited to school districts, and the most extensive is that of the Seattle Public Schools program. Seattle's experience may be of interest to some office building owners. Seattle Public Schools used two types of bonds to fund its program. Capital Levy Bonds were used to fund projects with smaller seismic rehabilitation increments categorized as repair and major maintenance. Capital Improvement Bonds were used to fund major projects categorized as modernization of hazardous buildings. This distinction was necessary because of Washington state law. Similar distinctions may be required in other parts of the country.

B.2.2.10 Seismic Rehabilitation Project Management

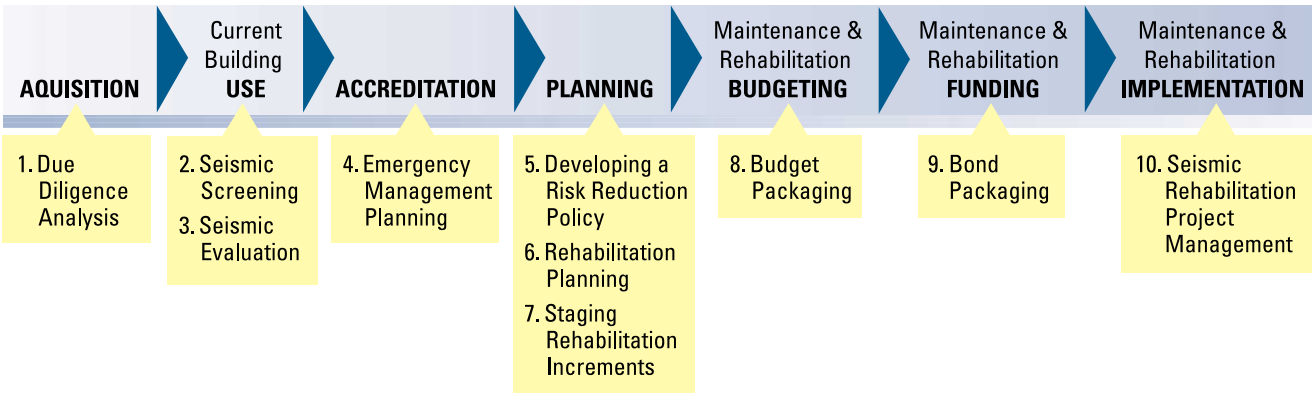
The implementation of the selected incremental seismic rehabilitation measures in combination with other building work may require added attention to project design and bid packaging.

- Fully brief or train in-house architects/engineers or outside consultants preparing the bid documents on the rationale behind the rehabilitation measures, in order to assure that the seismic 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 fully explain to all prospective bidders the seismic risk reduction objectives and the rationale for their selection.

Federal and state mandates and programs represent opportunities for seismic rehabilitation. Externally, federal and state programs may establish requirements affecting the implementation phase that have implications for healthcare facilities (e.g., Americans with Disabilities Act [ADA] and Occupational Safety and Health Administration [OSHA] requirements). Additionally, governmental funding programs may mandate facility requirements, such as energy conservation, in participating healthcare organizations. However, there are currently no seismic rehabilitation mandates or implications in any federal or state programs related to non-federal hospitals outside of California.

B.2.3 Integration into the Hospitals Facility Management Process

The following diagram illustrates the integration of the 10 elements discussed in the preceding sections (B.2.2.1 through B.2.2.10) into the healthcare facility management process. The elements are shown in the phase of the management process in which they are most likely to be implemented.



B.3 Opportunities for Seismic Risk Reduction in Support of Integrating Incremental Seismic Rehabilitation into the Facility Management Process

The following nine opportunities for seismic risk reduction will support the integration of an incremental seismic rehabilitation program:

1. Responding to Occupant Concerns
2. Emergency Management/Response Planning
3. Emergency Management/Mitigation Planning
4. Developing a Risk Reduction Policy
5. Incorporating Federal and State Mandates and Programs
6. Coordinating with Risk and Insurance Managers
7. Becoming Familiar with Applicable Codes
8. Establishing and Maintaining a Roster of Design Professionals
9. Negotiating Code Enforcement

These opportunities are created by internal and external factors that typically influence the healthcare facility management process. Internal factors are generated within the healthcare organization and its administration. External factors are imposed on organizations by outside pressures, such as the government, insurance regulations and practices, or the financial climate. The following factors may influence each respective phase:

Acquisition: internally generated purchase forms that guide purchase decisions

Current Use: external state licensure, health insurance, property and liability insurance, federal and state programs, and emergency management and internal occupant concerns

Accreditation: external accreditation procedures

Planning: internal board policies, and external government mandates and health insurance requirements

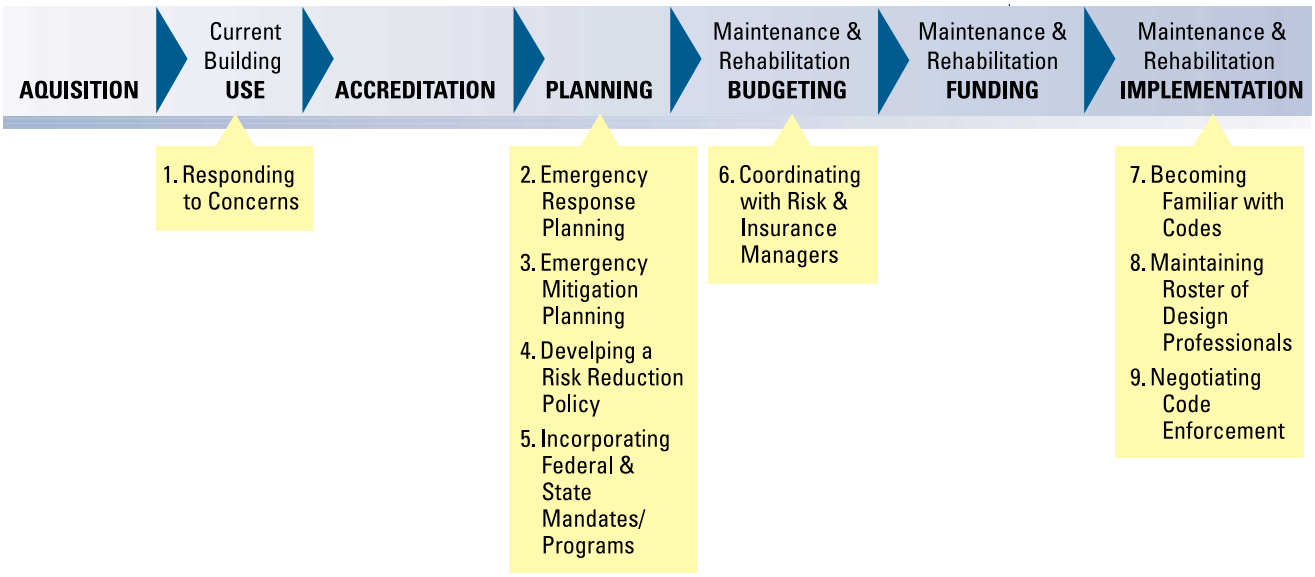
Budgeting: internal budgetary constraints and risk management

Funding: external economic conditions, federal and state programs, and bond financing regulations

Implementation: external federal and state mandates and programs, codes and code enforcement

The Appendix to this manual, Additional Information on Hospital Facility Management, contains a discussion of the specific phases and the related internal and external influences for those seeking more information on the facility management process.

The following diagram illustrates the integration of these opportunities into the hospital facility management process. The opportunities are shown in the phase of the management process in which they are most likely to be implemented. Each opportunity is discussed in detail in the following sections (B.3.1 through B.3.9).



B.3.1 Responding to Occupant Concerns

Track all staff and patient concerns that relate to earthquake vulnerability, and make sure they are understood and considered in the **planning** phase.

Be alert to occupant concerns, especially the safety concerns of the staff. They can be a source of considerable influence on risk managers as well as a potentially significant pressure on the facility management process. Occupant concerns may become the vehicle for channeling internal pressures of all kinds, including policies adopted by the Board, into capital improvements and maintenance actions.

B.3.2 Emergency Management/Response Planning

Establish a liaison with emergency management agencies and volunteer agencies, such as the Red Cross.

State or local emergency management agencies usually assign specific roles that specific hospital buildings must perform in case of natural and manmade disasters, including earthquakes. This may affect the occupancy activities by requiring periodic exercises involving building occupants. Emergency management plans related to the role of hospital facilities in a disaster may be general and broad, or detailed and specific.

Become familiar with the role of regional hospital buildings in the local emergency response plans, and if it is a significant role, become active in the emergency planning process. Define the role in specific detail, assigning exact functions to particular facilities. The role of specific hospital buildings in the local emergency response plans should affect seismic performance objectives and the priority of specific seismic rehabilitation measures. Therefore, there should be full coordination between a healthcare organization's emergency planning and facility planning functions.

B.3.3 Emergency Management/Mitigation Planning

Establish a liaison with emergency management mitigation planners at the state and local levels.

Endeavor to incorporate the hospital building earthquake mitigation into the state's mitigation plan, and to recognize the healthcare organization's incremental seismic rehabilitation measures as elements of the mitigation plan.

Federal resources and funds are available to states for the support of disaster mitigation planning activities. Federal matching funds may be available for the implementation of mitigation following a presidentially declared disaster. These resources are available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100-707). Healthcare organizations should make every effort to obtain these resources.

B.3.4 Developing a Risk Reduction Policy

Convince the board of directors to adopt a clear policy statement supporting seismic risk reduction. Such a policy should, at a minimum, establish seismic performance objectives for the healthcare organization's buildings. Seismic performance objectives define the target performance of a building following an earthquake of a specified intensity. The policy and objectives should be developed and documented as part of the seismic rehabilitation planning process.

B.3.5 Incorporating Federal and State Mandates and Programs

Currently there are no seismic rehabilitation mandates or implications in any federal or state programs related to existing hospitals outside of California. In California, healthcare systems are subject to Senate Bill 1953 (SB1953) that has established three interim milestone dates (January 1, 2002; January 1, 2008; and January 1, 2030) for progressively bringing all hospital buildings into full seismic compliance with California Building Codes by January 1, 2030.

Become familiar with the seismic rehabilitation requirements imposed on the healthcare organization's hospitals by federal and state programs, currently or under discussion for the future, and take them into account in planning activities.

B.3.6 Coordinating with Risk and Insurance Managers

Establish coordination between the facility management and risk management functions in the healthcare organization.

The healthcare organization's risk and insurance management may have a direct or indirect role in the budgeting phase of the facility management process with regard to decisions related to insurance as well as other budget categories.

In areas of seismic risk, the risk of building loss or damage, the risk of occupant death or injury, and the risk of healthcare organization liability must all be assessed. The decision of whether to seek earthquake property and casualty insurance coverage and general liability coverage must be made. Insurance companies that offer such coverage do not usually offer incentives to customers to undertake loss reduction measures in the form of seismic rehabilitation. However, this situation might change, and the question may be subject to negotiation with some companies. Insurance carriers are more than willing, when asked, to provide building owners with Loss Control and Prevention Reports that include recommendations for loss prevention.

The organization's risk manager should be fully informed on individual hospitals' approaches to seismic risk reduction, and should be a participant in the planning process. This may entail the establishment of new communication lines between central organization staff and local hospital staff.

If seismic risk is covered by the organization's insurance carrier or by an insurance pool, it may be possible to negotiate a rate reduction, deductible reduction, or increased maximum benefit. On the other hand, the insurer may require some seismic rehabilitation as a condition of coverage. Additionally, a regional or statewide risk and insurance pool in which an organization may participate could become an active participant in its facilities assessment and planning processes.

B.3.7 Becoming Familiar with Applicable Codes

Become familiar with the seismic rehabilitation requirements imposed in your building inventory's jurisdictions by building codes or other codes and ordinances, currently or under discussion for the future such as rehabilitation codes, and take them into account in planning activities.

B.3.8 Establishing and Maintaining a Roster of Design Professionals

Develop and maintain a roster of architects, engineers, and other consultants with expertise in the fields of seismic assessment of buildings, seismic design, and risk analysis to quickly make use of their specialized expertise when needed. Such qualified professionals can be identified with the assistance of professional societies such as the American Society of Civil Engineers, the American Institute of Architects, or the Earthquake Engineering Research Institute.

B.3.9 Negotiating Code Enforcement

Discuss the organization's planned incremental seismic rehabilitation actions with the applicable code enforcement authorities.

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 if not taken into account.

Although additions must comply with building code seismic requirements, few codes mandate seismic rehabilitation in repair and alteration projects. Incremental seismic rehabilitation is consistent with most building code requirements applicable to existing buildings.

If applicable, negotiate with code enforcement authorities an optimization of life safety and risk reduction when undertaking seismic rehabilitation. Some code enforcement agencies negotiate required life safety and other improvements with owners of existing buildings who undertake voluntary building rehabilitation. Such negotiations attempt to strike a compromise between safety, feasibility, and affordability.

B.4 Preparing a Plan for the CEO and the Board

This section provides guidance to healthcare facility managers, risk managers, and financial managers when preparing a proposal for a seismic safety program in response to top management's request.

B.4.1 Getting Started

The facility, risk, and financial managers of the healthcare organization should prepare a proposal for a seismic risk reduction program. This proposal should be based on an analysis of each of the elements of an incremental seismic rehabilitation program (B.2.2) and opportunities for seismic risk reduction (B.3) as discussed above, and additional components (B.5) discussed below. The proposal should include the following elements:

- A discussion of each recommendation in Part B from the perspective of the organization's current facility management, risk management, and financial management practices. This may take the form of a comprehensive rewriting of Part B.
- A specific plan and recommendation for initiating the first two steps following building acquisition, **Seismic Screening** and **Seismic Evaluation.** The plan should include a budget and schedule of activities.
- A request for the budget for these first steps.

B.4.2 Getting Started Plus

If the necessary resources are available to the facility manager, perform a rapid visual screening, as outlined in B.2.2.2, prior to preparing the program proposal. Then, expand the proposal based on the known inventory of potentially vulnerable buildings as determined in the screening process.

B.4.3 Getting Started with a Jump Start

If the organization has a current 5-year capital improvement plan or its equivalent, add the following details to the proposal discussed above:

- Identify existing buildings currently included for rehabilitation in the current 5-year plan.
- Perform a preliminary review of their seismic vulnerabilities, as outlined in B.2.2.2.
- Using Part C of this manual, identify potential seismic rehabilitation increments that could be integrated with the rehabilitation program.
- Add a FEMA 356, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings*, seismic rehabilitation design task to the rehabilitation projects.

B.5 Additional Components of a Comprehensive Earthquake Safety Program

In addition to integrating an incremental seismic rehabilitation program into the hospital facility management process and integrating opportunities to support and implement such a program, there are additional activities that can become part of a comprehensive earthquake safety program for hospitals. These activities can be implemented at any time.

B.5.1 Building Contents Mitigation

Initiate housekeeping or maintenance measures to reduce or eliminate risks from earthquake damage to equipment, furnishings, and unsecured objects in buildings. Work may include such tasks as:

- Fastening laboratory equipment
- Anchoring file cabinets, storage shelves, and other large furnishings
- Restraining objects on shelves
- Securing the storage of hazardous materials such as chemicals

FEMA has developed materials that contain information on contents mitigation. These include FEMA 74, *Reducing the Risk of Nonstructural Earthquake Damage: A Practical Guide*, and FEMA 241, *Identification and Reduction of Nonstructural Earthquake Hazards in Schools*. (While the latter is addressed primarily to schools, it is equally applicable to other facility types.)

B.5.2 Earthquake Drills

Introduce earthquake drills and appropriate earthquake preparedness materials into the regular hospital emergency preparedness program. These drills should address the influx of patients and casualties as well as hospital building failure. Knowing what to do and where to go in an emergency can be critical to life safety in earthquakes.