

CHAPTER 6 SUMMARY OF STATE AND LOCAL FINDINGS

State Summaries

GENERAL

Six States were visited between May and August of 1989 and revisited in early 1990 after the Loma Prieta earthquake: Massachusetts, Missouri, South Carolina, Tennessee, Utah, and Washington. They were selected on the basis of regional variety (two on the east coast, two in the central U.S., two in the west), the presence of some degree of seismicity and earthquake planning activity, and interest in the project. Discussions were conducted with State government officials in each of the State capitals.

General findings and observations about the six States are hereby reported, and brief summaries of the highlights of the findings by State follow. See Volume 2, State and Local Case Studies and Recommendations, for write-ups of the State case studies in more detail.

Level of Earthquake Awareness

Awareness of earthquakes and their risk among the general population and among State government officials seems to follow a regional pattern. It is highest in Utah and Washington, moderate in Missouri and Tennessee, and virtually non-existent in Massachusetts and South Carolina (with the exception of Charleston, where one finds modest awareness). Loma Prieta has led to an overall rise in the levels of earthquake awareness, except in Massachusetts and South Carolina, in the latter State, people being concerned with the aftermath of Hurricane Hugo.

It should be noted that these observations are subjective, based on conversations and review of written materials, and were not in any way based on scientific sampling.

Budgets

All the States, with the possible exception of South Carolina, reported severe budget limitations, which would limit or prohibit the introduction of new State programs at this time. This appeared to be most severe in Massachusetts where drastic budget cuts coincided with our case study.

Financial Incentives

State financial incentives for seismic strengthening of private sector existing buildings do not exist in any of the six States. In none of the States did we find anyone who thought such incentives were likely to be created in the foreseeable future.

Earthquake legislation was submitted in Missouri, Utah, and Washington in the wake of Loma Prieta. All the proposals in Utah and Washington were defeated. In Missouri a bill was passed which requires certain earthquake preparedness measures in areas along the New Madrid Fault Zone, including requiring seismic design in major structural renovations. The penalty for non-compliance is loss of State aid.

Emergency Management

An attempt was made to assess the extent to which the State emergency management offices are active in earthquake planning and could become factors in the promotion of programs for seismic strengthening of existing buildings. Here, the regionalism appears to be a function of north and south. Missouri, Tennessee, and South Carolina have extensive earthquake planning activities by emergency management, with the Missouri and Tennessee agencies enjoying a moderate to strong degree of political support in their respective legislatures and executive branches. As far as Missouri and Tennessee are concerned, this situation may well be an indication of results of the efforts of the FEMA-sponsored Central United States Earthquake Consortium (CUSEC). Utah appears to be neutral in this regard, with a program that was perhaps stronger in the past and is now being progressively reduced. Massachusetts and Washington seem to have little or no earthquake planning activities by emergency management at the State level.

It should be noted that even in Missouri and Tennessee seismic hazard mitigation in buildings is not a significant part of the emergency management planning and activities. The tendency seems to be that building issues are the domain of other State and/or local agencies.

State Building Regulatory Agencies and Activities

The State can become a factor in bringing about mandatory or voluntary seismic strengthening programs for existing buildings if the State has a statewide mandatory building code, or statutes mandating specific local code adoption, and if local building officials are trained to enforce its existing building provisions.

None of the States included in this report has mandated the retroactive seismic strengthening of any class of buildings, nor is this being contemplated.

Massachusetts, Tennessee, Utah, and Washington have a mandatory State building code. In Utah and Washington the code triggers some degree of seismic strengthening in buildings undergoing a change of use, and possibly ones undergoing rehabilitation. In Massachusetts an attempt to develop a statewide seismic requirement for buildings undergoing change of use or rehabilitation is currently underway. Tennessee has just adopted a building code which includes seismic provisions for new construction.

In South Carolina a statewide building code is not mandated, but legislation to do so has been proposed. If adopted, it is unclear at this time how a statewide code will be enforced in the case of change of use or rehabilitation.

In Missouri, there is no statewide building regulation, but recent legislation mandates the use of the seismic requirements of a model code in new buildings and rehabilitation.

Risk Management

As discussed in the preceding chapter, government risk managers have been identified as being in a unique position to bring about loss reduction measures in government-owned buildings.

None of the risk management practices in any of the States has so far brought about seismic strengthening as a loss reduction measure in State-owned buildings. However, based on subjective judgment, the potential is strongest in South Carolina and Utah. In South Carolina the State's Insurance Reserve Fund covers earthquake losses in its property coverage, offered to all levels of State and local government. Loss reduction is encouraged in South Carolina by the State risk managers, but does not lead to reduced

premiums. In Utah the State's risk management fund insures against various risks in State facilities and operations, including local schools. The Office of Risk Management recommends loss reduction measures which lead to reduced premium contributions. However, property protection currently excludes earthquake damage.

In the rest of the States, risk management was not seen as an imminent potential factor in the seismic strengthening of buildings, although the risk management profession has taken a much greater interest in earthquakes since Loma Prieta.

Seismic Strengthening of State Buildings

Seismic strengthening of their own buildings by the State governments seems to correlate with the level of earthquake awareness. In Washington, the legislature has been funding gradual seismic strengthening since 1973. In Utah, reportedly one building, the State Office Building, has been recently seismically strengthened, and 25 to 30 projects are currently in some stage of design or construction of seismic upgrade.

No State buildings in any of the other four States have been strengthened against seismic forces, but senior State officials in Massachusetts have indicated an interest in the subject.

State Influence on School Construction

State influence in school construction is highlighted because of the potential urgency to target schools for seismic strengthening. Five of the States—Massachusetts, South Carolina, Tennessee, Utah, and Washington—play an important role in local school construction and/or its financing. While none of them has used this influence to press seismic strengthening, the potential exists.

In Massachusetts, 90% of public school funding is provided by the State. In Washington, the State provides an average of 50% of the school capital improvement funds. In South Carolina, Tennessee, and Utah, school construction is regulated by the State, which provides minimal or no funding.

Missouri has no apparent role in local school construction, but legislation recently passed in Missouri establishes mandatory seismic design in new and rehabilitated school buildings.

The preceding discussion can be summarized graphically in the matrix shown in Figure 1. A "+" indicates a positive or potential factor in initiating seismic strengthening of existing buildings (i.e., existing strengths or pressure points), a "0" indicates a moderate potential factor (or no information), and a "-" indicates no potential in the foreseeable future.

FIGURE 1

	MA	MO	SC	TN	UT	WA
Earthquake Awareness	-	0	-	0	+	+
Budgets	-	-	0	-	-	-
Financial Incentives	-	0	-	-	-	-
Emergency Management	-	+	+	+	0	-
State Building Reg. Agencies	+	0	0	-	+	+
Risk Management	-	-	0	-	0	-
Seismic Strengthening of State Buildings	0	-	-	-	+	+
State Influence on School Construction	+	0	+	+	+	+

MASSACHUSETTS

Of the six States, Massachusetts is perhaps the least likely State to effect seismic strengthening of existing buildings within its borders. A low level of general seismic awareness, a minimal earthquake program within the State emergency management function, and a budget crisis all combine to support this conclusion.

An earthquake loss study for the Boston metropolitan area has been recently completed. The dissemination of this study, and some glimmers of interest expressed in the wake of Loma Prieta, may initiate some change in attitudes in Massachusetts.

In addition, Massachusetts has had since 1972 a mandatory State building code which, perhaps surprisingly, in 1975 incorporated requirements for design of new buildings to resist seismic forces. The code is rather ambiguous as to the applicability of seismic requirements to existing buildings.

As a result, the Seismic Advisory Committee to the State Board of Building Regulations and Standards is presently developing amendments to the present provisions governing existing buildings and also an entirely new set of provisions which is intended to supersede sometime in the future all other seismic design provisions for existing buildings.

It is unclear whether the existing building provisions currently under development will be adopted, and in what form, but most public and private persons we spoke to agreed that if adopted, such provisions would be complied with and the result would be that many rehabilitated buildings would be seismically strengthened. There was disagreement, however, on whether the adoption of seismic rehabilitation code requirements would lead to State and/or local governments allocating public funds to strengthen existing buildings or to encourage private owners to do so.

Finally, it should be noted that by virtue of financing 90% of local school budgets, the State could bring about seismic strengthening of schools, if and when this became politically and economically feasible.

MISSOURI

Missouri is in a slightly stronger position than Massachusetts. While State funding of seismic strengthening of existing buildings of any kind is unlikely in the foreseeable future, Missouri has a strong emergency management function with significant earthquake planning. General awareness of earthquake hazards appears to be moderate, at least in eastern Missouri, and has grown in the wake of Loma Prieta.

As a result, the State Emergency Management Agency could become a key player in assisting cities like St. Louis and Kansas City to generate seismic mitigation programs which may eventually include seismic strengthening of existing buildings.

Legislation passed in the wake of Loma Prieta could lead to mandated seismic strengthening of schools and other buildings. Senate Bill No. 539 requires that all jurisdictions located along the New Madrid Fault Zone "require new construction and major structural renovation to comply with provisions for seismic design and construction within" one of two model building codes (National or Uniform), beginning January 1, 1991 (emphasis added). Jurisdictions which do not comply are not eligible for State aid. The bill also requires that all school districts located along the New Madrid Fault Zone establish an earthquake emergency procedure system for every school building. In addition, the bill requires all school districts in the State to distribute earthquake information to all students. Finally, the bill requires the State Department of Natural Resources to provide each county in the State, and the City of St. Louis, with a geological hazard assessment, and to assist the jurisdiction in its use, including, if requested by the local government, to assist in the establishment of construction standards.

SOUTH CAROLINA

South Carolina is in a similar position to Missouri, insofar as the potential role of the State. Earthquake mitigation advocates located in Charleston are actively promoting the mandatory statewide adoption of the latest edition of the Standard Building Code. If successful, this will mandate seismic design in new construction statewide, and will likely lead the South Carolina Building Codes Council to develop guidance on how to apply the code to existing buildings undergoing change of use or rehabilitation.

The same earthquake advocates are developing informational materials and a possible demonstration on seismic strengthening of existing schools. School construction in South Carolina is regulated at the State level. These factors could eventually lead to widespread seismic strengthening of schools.

Strong emergency management planning at the State level, together with sophisticated State risk management could be combined to effect additional State support for the emerging seismic mitigation program.

Finally, the Hurricane Hugo disaster created an opportunity for South Carolina to benefit from federal Hazard Mitigation Grants under the Stafford Act.

TENNESSEE

In Tennessee, strong emergency management at the State level, combined with growing public awareness of the earthquake hazard, may combine to support local efforts at developing seismic mitigation programs which could lead to seismic strengthening, especially in Memphis and Shelby County. In the latter two jurisdictions seismic awareness is growing rapidly, and various programs are in a state of development (see Volume 2).

UTAH

Utah has the advantage of a widespread awareness of the earthquake potential, contrasted, however, with an unwillingness of the State government to do much about earthquake hazard mitigation. The latter is apparently due to a combination of political, economic, cultural, and religious factors.

Utah has recently adopted the Uniform Building Code as mandatory throughout the State. Local jurisdictions have been struggling with the issue of enforcement of the seismic requirements of the code in existing buildings undergoing change of use or substantial rehabilitation. There is some evidence, amplified in Volume 2, State and Local Case Studies and Recommendations, that enforcing the seismic requirements in these cases has been a constraint to the rehabilitation of some buildings, and has contributed to their continued deterioration or abandonment. Ogden and Provo have both attempted to enforce somewhat reduced seismic criteria in rehabilitation, including use of the Uniform Code for Building Conservation (UCBC), which was developed specifically for this purpose. The reduction of seismic criteria for existing buildings, while maintaining the basic protection of life safety, appears to be a useful statewide objective for Utah. For example, Utah could adopt the UCBC statewide.

At least one State building has been seismically strengthened, and several more are in the process of doing so. Several city-owned buildings in Salt Lake City (fire stations), the City and County Building, as well as a scattering of private buildings have been strengthened as well. The State Division of Comprehensive Emergency Management could develop and disseminate information on these projects in order to encourage more seismic strengthening.

Finally, there is beginning to develop a popular pressure in Salt Lake City for the seismic strengthening of the public schools. Since the State regulates school construction in Utah, it could take an active role in resolving this problem in Salt Lake City and in other jurisdictions. There is, however, no indication that this will happen without some encouragement from FEMA or other branch of the federal government.

All earthquake legislation proposed in Utah in the wake of Loma Prieta, including efforts to address schools, was defeated. However, there is a growing constituency which will keep reintroducing legislation.

WASHINGTON

Washington is similar to Utah, with three differences which may lead to earlier implementation of more widespread seismic strengthening:

- o Washington does not have the cultural and religious factors which tend to constrain seismic mitigation.
- o Many more State-owned buildings, schools, and possibly buildings in general, have been seismically strengthened in Washington.
- o Washington plays an active role in funding local school capital budgets, and the State is undertaking a statewide survey of seismic hazards in schools.

Washington could, therefore, benefit from the same suggestions made for Utah:

- o Disseminate information on seismic strengthening projects that have been completed.

- o Analyze the enforcement of the building code's seismic requirements in existing buildings undergoing change of use or rehabilitation, and modify if necessary. Consider use of the UCBC.
- o Encourage seismic strengthening of schools.

Local Summary

Fourteen cities in the six States were visited between May and August of 1989, and many of them were revisited in February–March of 1990. These were:

- o Boston, Worcester, and Lowell in Massachusetts
- o St. Louis and Kansas City in Missouri
- o Charleston and Columbia in South Carolina
- o Memphis in Tennessee
- o Salt Lake City, Ogden, and Provo in Utah
- o Seattle, Tacoma, and Olympia in Washington.

They were selected so as to provide diversity of city size, economic conditions, and historic character. Discussions were conducted with local government officials in a senior executive or legislative capacity, budget officers, planners in community or economic development, emergency managers, building regulators, risk managers, operators or managers of city-owned buildings, and school district officials. In the private sector, discussions were conducted with hospital administrators, local associations representing building owners and managers, chambers of commerce, bankers, selected building owners, private risk managers, and engineers. In some cities discussions were also held with public or private individuals active in historic preservation.

General findings and observations about the 14 cities are reported here. See Volume 2, State and Local Case Studies and Recommendations, for write-up of the city case studies in more detail.

Level of Earthquake Awareness

The level of earthquake awareness among the public officials and private sector people with whom we met generally corresponds to the categories of awareness described for the States, with several notable exceptions.

The six cities in Utah and Washington lead the field, with a generally high degree of awareness of their seismicity. St. Louis, Memphis, and Charleston follow with a mixed degree of awareness, with rapidly increasing awareness in the wake of Loma Prieta. People's awareness of the seismicity in Charleston is undoubtedly due to the relatively recent (1886) serious earthquake it experienced and the documentation of its effects. We found virtually no awareness of the earthquake hazard (except among earthquake professionals) in the three Massachusetts cities, in Columbia, and surprisingly in Kansas City.

Economic Conditions

Subjective descriptions of the economic conditions of each city were elicited from various sources. These have not been verified through a review of economic data. They are categorized into "rapid growth to growth", "holding its own or turning around, (or no information)", "decline", as follows:

- Rapid growth to growth: Charleston, Columbia, Provo, Seattle
- Holding its own or turning around: Boston, Lowell, St. Louis, Kansas City, Memphis, Tacoma, Olympia
- Decline: Worcester, Salt Lake City, Ogden

Constitutional or Legal Limits on Spending/Taxing

Given the reported decline in federal and State budgets, a city's ability to fund new programs may be determined or limited by constitutional or legal restrictions on spending, taxing, or borrowing capacity. While this was not studied or analyzed in detail, some extremes were identified.

Massachusetts, Missouri, Tennessee, and Washington all appear to have such restraints in place. South Carolina and Utah do not.

Financial Incentives

None of the cities has any financial or other incentives in place to encourage seismic strengthening of existing buildings. Furthermore, none of the cities expressed a current readiness to divert existing incentives into seismic strengthening.

Charleston and Columbia have an opportunity to benefit from federal Hazard Mitigation Grants and other federal contributions under the Stafford Act, in the wake of Hurricane Hugo and the resultant Presidential Disaster Declaration. Some of these resources could be used for seismic strengthening.

Emergency Management

An attempt was made to assess the extent to which local emergency management offices are active in earthquake planning and could become factors in the promotion of programs for seismic strengthening of existing buildings. In some of the visited jurisdictions, the emergency management function is a county function, which would add an inter-government coordination factor to any such program, if it were to be developed.

Emergency management as a positive factor was found in St. Louis, Memphis (very positive), and Tacoma. It has received a further boost by Loma Prieta.

A weaker, but potential factor (or no information) was found in Charleston, Columbia, Salt Lake City, Seattle, and Olympia.

Ineffective emergency management, from the perspective of seismic mitigation, was found in the Massachusetts cities and in Kansas City, Ogden, and Provo.

Seismic Code Enforcement in Rehabilitation

Voluntary seismic strengthening of existing buildings can be achieved through the building regulatory system by enforcing seismic requirements in existing buildings undergoing a change of use or rehabilitation. The model codes all leave the degree of enforcement in these cases up to the judgment of the enforcement authority.

Active enforcement of seismic requirements in existing buildings was found in the Utah and Washington cities and was reported, but not verified, in Charleston.

Requirements in change of use and rehabilitation are not enforced in St. Louis (which has adopted seismic requirements for new construction), although the Building Commissioner has a long term strategy for introducing their enforcement. They are not enforced in Kansas City and Memphis (both of which are in the process of adopting seismic requirements for new construction).

Massachusetts is somewhere in between in that it is in the process of developing a seismic code for existing buildings. Columbia has only recently adopted seismic requirements for new construction, and has not yet been faced with the problem of enforcement in existing buildings.

Seismic Strengthening of Buildings

Information was elicited on the extent to which buildings (city-owned, institutional, private) in each city have actually been strengthened to resist seismic forces.

Most strengthening has occurred in Salt Lake City and Seattle. In the former, some city-owned buildings were strengthened, and institutional and private strengthening was triggered by the building code. The same is true in Seattle, except that no information on institutional buildings was obtained.

Some seismic strengthening of schools has taken place in Seattle and Tacoma, and is being studied in Salt Lake City.

Some commercial buildings were strengthened in Provo and in Tacoma, triggered by the building code.

We have no information on seismic strengthening in Olympia. No strengthening has been undertaken in the cities in Massachusetts, Missouri, and South Carolina, and in Memphis.

Earthquake Insurance of City-Owned Buildings

Those cities with earthquake insurance coverage of their buildings present an opportunity to effect seismic strengthening through loss reduction activities encouraged by their carriers or their own risk managers. While no such loss reduction activities, let alone seismic strengthening resulting therefrom, were found, it is useful to note the cities with earthquake insurance:

Covered by earthquake insurance: Kansas City, Charleston, Memphis, and Tacoma

Not covered by earthquake insurance: St. Louis, Ogden, and the Massachusetts cities

No information: Columbia, Salt Lake City, Provo, Seattle, and Olympia

Special Findings/Historic Districts

While all 14 cities have historic districts, two stand out in that their historic district is one of several important factors in their economy, and, therefore, historic preservation is a major political factor--Charleston and Lowell. In exploring the relationship of seismic strengthening to historic preservation in these two cities, two diametrically opposed conditions were found.

In Charleston, the 1886 earthquake is part of the city's history. Many of the historic buildings which survived the earthquake carry the marks of attempted reinforcement. There appears to be an agreement among Charleston preservationists that seismic strengthening of historic buildings is a desirable goal in that it would lead to the survival of the historic heritage. Clearly, the physical strengthening must be accomplished in a manner consistent with the historic character of the buildings. In Charleston, the preservation community may be one of seismic strengthening's strongest supporters.

In Lowell there is no awareness of earthquake risk. Seismic strengthening there is viewed by historic preservationists, and planners in general, as an unnecessary expense. If undertaken, it would result in depleting resources that could be used to repair and preserve additional historic buildings. In Lowell, the preservation community is now an opponent of seismic strengthening.

The preceding discussion can be summarized graphically in the matrix shown in Figure 2. A "+" indicates a positive or potential factor in initiating or promoting seismic strengthening of existing buildings (i.e., existing strengths or pressure points), a "0" indicates a moderate potential factor, or no information, and a "-" indicates no potential, or a constraint, in the foreseeable future.

FIGURE 2

	Boston	Worc.	Lowell	St. Louis	St. Kansas City	Charleston	Columbia	Memphis	Salt Lake City	Ogden	Provo	Seattle	Tacoma	Olympia
Earthquake Awareness	-	-	-	0	-	0	-	0	+	+	+	+	+	+
Financial Condition	0	-	0	0	0	+	+	0	-	+	+	0	0	0
Public Spending Limits	-	-	-	-	+	+	+	0	0	0	0	-	-	-
Financial Incentives	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Emergency Management	-	-	-	+	-	0	0	+	0	-	-	0	+	0
Building Rehab Code Enforcement	0	0	0	0	-	+	0	-	+	+	+	+	+	+
Seismic Strengthening /City	-	-	-	-	-	0	-	-	+	-	-	+	+	0
/Inst.	-	-	-	-	-	-	-	-	+	0	-	0	-	0
/Commercial	-	-	-	-	-	-	-	-	+	+	+	+	+	0
Earthquake Insurance	-	-	-	-	+	+	0	+	0	-	0	0	+	0