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PRE-DISASTER PLANNING FOR RECOVERY A MULTI-STATE CHALLENGE - AND OPPORTUNITY

This Special Issue is devoted to Disaster Recovery, and draws on recent experience and research, including **Emergency Response and Recovery** (Monograph 4, Tom Durham and Eileen Baumgartner, co-chairs), prepared for the 1993 National Earthquake Conference, Memphis.

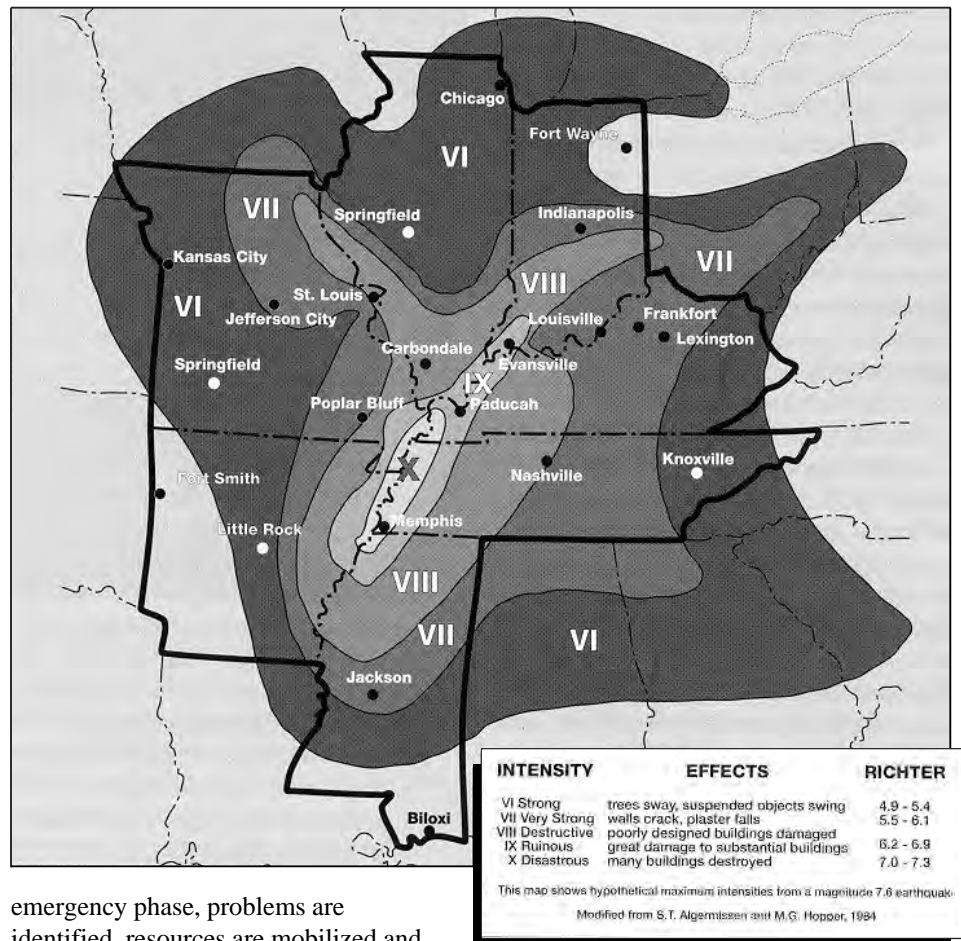
Responsibility for managing post-disaster recovery rests with local government. This responsibility can be overwhelming and place a tremendous burden on local officials. In the aftermath of a major disaster, local officials are confronted with changing conditions, competing priorities, and unexpected demands. For communities that do not anticipate the problems and issues associated with recovery, the consequences are predictable. Confusion is magnified, lack of interagency coordination slows the pace of recovery, and most importantly, opportunities to rebuild more safely may be lost.

Much can be done prior to a disaster to minimize problems and accelerate the recovery process. For these reasons, CUSEC is placing more emphasis on pre-disaster planning for recovery. This edition examines recovery, defined as the process of restoring a community back to normal following an earthquake or other major disaster.

DISASTER RECOVERY IN PERSPECTIVE

When an earthquake strikes, attention is immediately focused on saving lives and minimizing suffering. During the

EARTHQUAKE EFFECTS Hypothetical maximum intensities from a 7.6 earthquake



emergency phase, problems are identified, resources are mobilized and deployed, priority is given to meeting the immediate needs of disaster victims. Actions are basically functional in nature - e.g. fire suppression, search and rescue, and emergency medical services.

As the immediate, lifesaving emergency functions are carried out, a second "intermediate or transitional" phase begins, one that addresses the multitude of tasks associated with public safety and the initial restoration of

services. This phase may be referred to as the "sustained emergency/restoration phase," and includes such functions as building inspections, demolition of unsafe buildings, restoration of utilities, emergency shelter, and temporary housing.

Recovery and reconstruction, which can begin within days of a disaster, is driven by a complex interaction of social,

(Continued on page 2)

economic, cultural, and political factors. This phase, which may last for years, is dominated by fundamental, long-term, problems and issues, including: business recovery, land use/re-use, temporary and permanent housing, restoration of public facilities and services, and debris disposal.

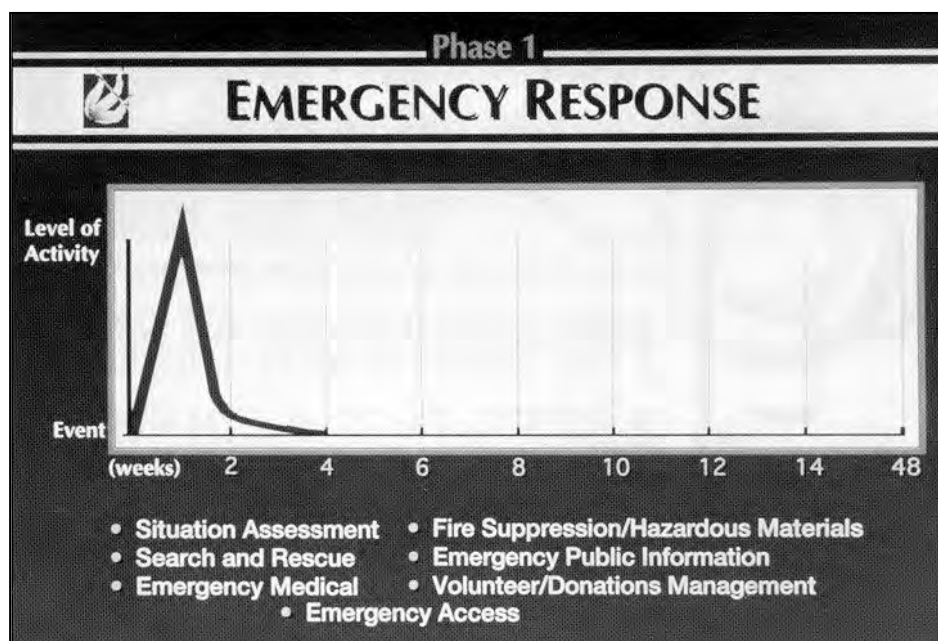
In practice, response and recovery activities take place simultaneously, a factor that has important implications for pre-disaster planning and post-disaster recovery operations. The following sections examine the organizational aspects of recovery planning, and the key issues associated with the “sustained emergency/restoration” phase.

ESTABLISHING A RECOVERY ORGANIZATION

A useful starting point for local government is to establish an organization to guide the policy and planning decisions that will be made after a disaster. In many instances, an existing organization may be used, consisting of department heads (e.g. planning, building control, public works, housing, legal staff, and other key decision-makers).

It is important that the organization have clear support from the jurisdiction’s elected body, and have well defined authorities and responsibilities for coordinating recovery operations. Provisions should be made to allow the organization to operate under streamlined procedures to ensure that decisions can be made quickly, and policies implemented in an expeditious manner. Finally, the organization should provide for public participation. Competing interests will surely surface in the aftermath of a disaster; debates usually center on the need for change versus a return to status quo.

Managing and financing the recovery process following a New Madrid earthquake will be long-term, costly, controversial, and involve unprecedented levels of coordination in the identification and utilization of public and private sector resources to support recovery. At the local level, there are several pre-disaster measures that a Recovery organization can take to minimize confusion in the days and weeks following a major disaster.



* **Develop a plan and strategy for communicating to the public following a disaster.** Chances are, electric power will not be available, and in a crisis period, everyone wants information. Outreach efforts need to be coordinated. Local newspapers, radio stations, and the public access cable channel are important resources following a disaster.

* **Determine how to effectively use volunteers.** Disasters trigger a convergence of volunteer resources - well intentioned people with an array of skills and expertise. Through pre-disaster planning, volunteers can become a tremendous resource, as opposed to a tremendous burden. Plans should be developed to screen, manage, and assign volunteers. Staging areas need to be established; written checklists of duties will facilitate the organization and deployment of volunteers. Finally, plans should include provisions for caring, feeding, and sheltering volunteers.

* **Determine how to effectively use donations.** An increasingly familiar scene following a disaster is large piles of donated goods - food, clothing, pharmaceuticals, medical and relief supplies - most of which are unsolicited and of dubious value to the community. Donations plans should address the following: how to

assess donations needs; mechanisms for receiving cash donations; coordination and management of donations, including inter-agency agreements for prioritizing donations; identification of warehouses and other space to receive, sort, and distribute donated goods; and perhaps most importantly, a broad-based information campaign that sensitizes the public to the “do’s and don’ts” of sending donated goods and services.

* **Identify measures for taking care of local personnel in the aftermath of a major disaster.** During the response and recovery phases, local employees will be subjected to extreme stress, fatigue, unfamiliar conditions, extended periods of time away from families, and the possibility that several employees will suffer disaster related losses. Pre-disaster planning for employees should include provisions for counseling, family care (including child care arrangements), special transportation and housing arrangements for disaster workers, and leave and employment policies for workers who have sustained personal losses.

SUSTAINED EMERGENCY/ RESTORATION PHASE

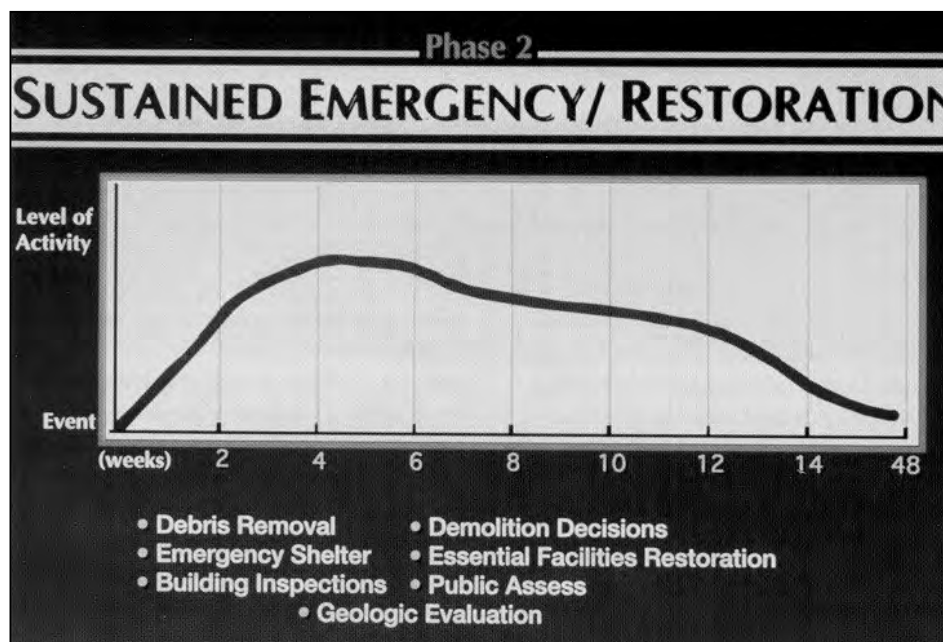
This critical phase may be thought of as the “link between response and long-

term recovery.” Clear cut objectives and priorities in the emergency phase give way to broader, policy oriented issues in the sustained emergency/restoration phase. Different organizations become involved. Government is faced with making difficult decisions - in often stressful conditions - on issues such as public access to disaster sites, condemnation and demolition of unsafe buildings, and establishing priorities for restoration of basic services. An ad hoc approach is often taken, at least initially.

“Again, pre-disaster planning and training can greatly improve coordination, minimize conflict, and expedite the recovery process.”

need to be found for those persons who are displaced.

Rapid building assessment in the Central U.S. will be influenced by at least



Intense media coverage may also compound the difficulties in adjusting to unprecedented demands on government.

Again, pre-disaster planning and training can greatly improve coordination, minimize conflict, and expedite the recovery process. The following sections examine the key functions and activities that fall under the Sustained Emergency/Restoration Phase.

BUILDING DAMAGE ASSESSMENT

After a major earthquake, hundreds or thousands of buildings can instantly be damaged, many reduced to rubble. Building damage assessment is a critical function immediately following an earthquake or other major disaster. People need to be kept from entering or using unsafe buildings, and safe shelters

three interrelated factors; 1) the preponderance of unreinforced, brick masonry buildings; 2) the potential for widespread damages - over a multi-state area; and 3) the shortage of trained engineers to carry out the building safety assessment.

Prior to a disaster, there are several steps that local government can take to increase the efficiency and quality of building damage assessments, as discussed below.

* In order to deploy inspectors to the most damaged areas as quickly as possible, local jurisdictions should undertake pre-disaster vulnerability surveys of neighborhoods, and perform survivability studies of critical facilities and other large public and private buildings. The

Applied Technology Council has developed a pre-disaster survey methodology (ATC-21) that has been adopted by several communities in the Central U.S.

- * Local governments should officially adopt standard procedures and criteria to guide the inspection of damaged buildings following a disaster. Most high risk jurisdictions have adopted the ATC-20 guidelines for building assessment.
- * Local engineers and other technicians need to be trained in the ATC-20 methodology. A recurring problem after many earthquakes is the lack of trained inspectors; the Central U.S. needs to develop a cadre of specialists for deployment across state boundaries.

Post-disaster building damage assessment will be one of the most challenging functions that will confront local officials following an earthquake. The ATC-20 guidelines represent a technical approach to building damage assessment. In the final analysis, the effectiveness of this (or other) assessment tools will be shaped by a number of factors: cultural, legal, social, economic, environmental, and political. Several problems can be anticipated: 1) a lack of trained inspectors; 2) aftershocks, which may pose a major risk to damage assessment teams; 3) the presence of hazardous materials (including asbestos); 4) the presence of emotional, distraught, and combative disaster victims; and 5) the length of time that it may take to complete the damage assessment function - up to several months.

PUBLIC ACCESS

Managing public access to damaged buildings and unsafe areas after an earthquake or other major disaster is a difficult and sensitive issue for local officials. A variety of groups have legitimate needs for entering damaged areas and buildings: homeowners, tenants, public safety officials, contractors, and others. These needs must be weighed against safety measures.

One of the lessons that has emerged from recent California earthquakes is: clear access policies, developed prior to the event, can minimize confusion and

conflict. However, these policies must be applied uniformly, consistently, and should not vary according to personalities involved. Furthermore, these policies must be communicated effectively to all interested parties. Finally, there will be an on-going requirement for adequate security to ensure that the policies that are adopted are enforced. Public safety personnel will be called upon for numerous emergency related functions; alternative security personnel should be identified in advance.

“Managing public access to damaged buildings and unsafe areas after an earthquake or other major disaster is a difficult and sensitive issue for local officials.”

DEMOLITION DECISIONS

Demolition of damaged structures is expected to present many public policy and private sector problems. During the initial days following an earthquake, local officials will be confronted with a number of decisions, including: 1) which buildings are suitable for demolition? 2) how should local officials treat historic and architecturally significant buildings? and 3) should the demolition process be carried out by local government or under contract with private companies?

Two additional factors will influence decisionmaking on the demolition of unsafe structures in the Central U.S. First, the occurrence of aftershocks over a period of several months may change the condition of buildings over time. Secondly, the potential for widespread regional damage means that demolition equipment and expertise may be scarce. Furthermore, the prospect of damage in a dozen or more counties in any given State places additional pressure on State and local officials to develop uniform and consistent standards and criteria for demolition of unsafe structures.

Building demolitions policies and criteria should be developed prior to a disaster. Local governments can develop checklists of demolition issues to be

SEVEN LESSONS FROM RECENT DISASTERS

1. Disasters tend to expose and exacerbate existing economic and societal problems; yet, many of these problems can be anticipated prior to the disaster and strategies developed to facilitate the recovery process.
2. Small businesses often hold the key to economic recovery. Government-business coordination is critical.
3. Following disasters, tensions often surface between two camps: those who want to return the community to pre-disaster conditions, and those who want to use the recovery and reconstruction period as an opportunity to pursue long-term community planning goals.
4. Organizations that have the expertise and mandate to direct and manage recovery and reconstruction efforts are typically not brought into the fold until after the event occurs; one result is that mitigation opportunities are not factored into recovery planning.
5. The emergency response period and recovery process are marked by different dynamics. During the response, priorities tend to be clear and resource allocation is based on observable needs. By contrast, the recovery period is often characterized by conflicting priorities, and by issues of inequity.
6. Earthquakes aggravate existing housing problems. Temporary housing sites often become permanent.
7. Planning for rebuilding is an accelerated version of normal planning. Carefully conceived land-use plans can guide decisionmaking in a high pressured, crisis environment.

considered and resolved before ordering any structure demolished. In recent years, the principal factor governing demolition decisions has been public safety - in general, buildings have been demolished where dangerous conditions prevailed and where no reasonable alternatives to demolition existed.

DEBRIS REMOVAL AND DISPOSAL

Within minutes, an earthquake can generate tremendous volumes of debris. The unreinforced masonry structures that dominate the downtown business districts of cities and towns throughout the Central U.S. could contribute significantly to the debris encountered by first responders and others in emergency response.

There are two phases of debris removal; each has attendant problems and challenges. The emergency phase involves the removal of debris - bricks, glass, damaged automobiles, etc. from neighborhoods and streets to allow access for fire, medical, search and rescue, and security personnel. Debris disposal, the second phase, is a long-term recovery issue, and will have to be undertaken in a regional context in the Central U.S. following a major earthquake. Pre-

disaster planning should involve at least three steps: 1) to determine debris removal and disposal requirements; 2) to identify potential sites to temporarily hold earthquake generated debris; and 3) to identify agencies with responsibilities for sorting and disposing of hazardous materials. Again, policies and actions should be coordinated on a regional basis.

The Loma Prieta earthquake and other recent disasters have highlighted at least two problems that can be anticipated in debris removal operations in the Central U.S. First, debris removal must be closely coordinated with search and rescue operations; priority should be given to ensuring that debris removal will not endanger lives or jeopardize rescue operations. Secondly, all debris has the potential to contain hazardous or toxic materials. Transformers may contain PCB's. Asbestos will be found. Dangerous chemicals will be present. Local fire authorities can assist in the identification of these and other materials and should be an integral part of the debris removal operation.

EMERGENCY SHELTER

A major earthquake in the New Madrid Seismic Zone will temporarily

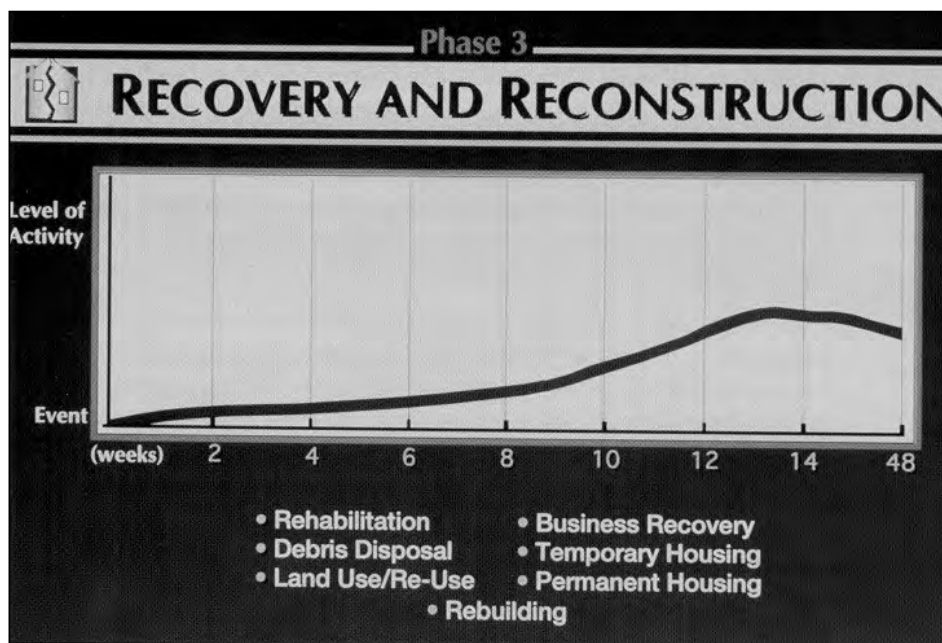
displace tens of thousands of families and individuals in the Central U.S.

Emergency shelter - which includes emergency provision of housing, food, emergency relief items, and medical care to displaced victims - is expected to be a critical function.

Hurricane Andrew focused attention on the range of problems and challenges associated with providing emergency shelter for nearly 250,000 displaced disaster victims. Sheltering problems are expected to be magnified considerably in a major earthquake in the Central U.S. Aftershocks must be planned for. Heating requirements must be considered. Basic infrastructure - water, sewer, power, transportation routes, and communications - may not be readily

“Vulnerability analyses can provide local officials with information on potential damages to housing stock and resulting shortfalls in post-earthquake shelters.”

potential damages to housing stock and resulting shortfalls in post-earthquake shelters. One study (FEMA's "Six City Study," 1985) estimated that a magnitude 7.6 earthquake in the southern end of the New Madrid Seismic Zone could immediately displace up to 250,000 people in Memphis alone.



available in a multi-county and multi-state area.

Emergency shelter can no longer be viewed as simply care facilities to shelter people for relatively short periods of time. The shelter issue is much more complex, mirroring the very complexity of our society. In practice, pre-event emergency planning must address a number of factors, as outlined below.

Vulnerability Analysis and Damage Assessments

Vulnerability analyses can provide local officials with information on

Pre-disaster shelter planning should involve local community support groups at the outset. Human service agencies, community service groups, local planning and housing authorities are among the community based organizations (CBO's) that have direct day-to-day contact with local citizens (and often their trust).

Special Populations

It has become axiomatic that disasters generally have the greatest impact on the poor and the elderly. The ethnic and cultural diversity of our cities pose additional challenges for shelter planners. Unaccompanied minors must also be provided for. In essence, provisions must be made for the unique needs of each of these groups. Special preferences must be weighed against special needs.

The rise of the chronically homeless population in our nation places additional stress on the shelter service system in the aftermath of a disaster. In recent disasters, the homeless have had access to shelter and feeding programs during the emergency phase. A critical, and as yet unresolved issue, is how to meet the sheltering requirements of the "double homeless," those persons who did not have a permanent residence prior to the disaster and thus do not meet the requirements of temporary housing or individual assistance.

Public Information

Many problems in the emergency shelter of a disaster can be traced back to unrealistic public expectations. Pre-disaster public information campaigns are important. A major earthquake in the New Madrid Seismic Zone could cause substantial damages to housing stock throughout the region; therefore, the standards of "acceptable" emergency shelter may have to be redefined.

Public information following a disaster is also critical, as evidenced in Hurricane Andrew (where, for example, local officials relied upon the Goodyear blimp for messages to the public). In the confusion that is likely to follow a major earthquake, it is essential that local officials be positioned to disseminate clear, accurate public information to a diverse population in a timely manner.

Rapid building damage assessments of potential shelters are critical. In the Central U.S., schools are typically used for shelters, yet these structures are known to be vulnerable to the level of ground shaking expected in such a major earthquake.

Shelter Operations

Shelter planners must assume that "emergency shelter services" - housing, food, clothing, medical services, information, transportation, water, and power - will have to be provided for months following a major earthquake.

Evacuation of Damaged Structures

Local officials will have to confront a fundamental problem: the reluctance of some and possibly many citizens to vacate damaged residential buildings for fear of looters, or other reasons. Security will be an issue. The problem is compounded by the possibility of aftershocks. Shelter planning must factor in these realities.

CRITICAL FACILITIES RESTORATION

Getting the communication, transportation, and utility systems into operation after an earthquake is a high priority. Facilities needed for emergency response - hospitals, fire stations, and emergency operations centers - should receive immediate attention following an earthquake.

Three categories of critical facilities warrant special attention in pre-disaster planning and post-disaster recovery efforts: 1) electric power; 2) transportation; and 3) communication.

Electric Power

The pace of disaster recovery will be greatly influenced by the availability of electric power. In Memphis, for example, water pumps are driven by electricity; loss of power means loss of water supply. Emergency services, air and ground traffic control, commercial transactions, and countless other daily functions are dependent on electrical power. In the Central U.S., restoration problems are further compounded by the potential nature and magnitude of damage (several states), and the attendant problems in locating and transporting equipment and supplies to multiple sites.

The good news is that electric utility companies in the Central U.S. are now taking action. Memphis Light, Gas, and Water, for example, has embarked on a major, long-term retrofit program to secure and protect sensitive equipment. Priority plans and procedures for restoration are in place. Much of the recent progress can be traced to the lessons from the Loma Prieta earthquake.

Transportation

The vulnerability of roads, bridges, airports (particularly navigation

DISASTER RECOVERY VERSUS FEDERAL DISASTER ASSISTANCE

It is important to distinguish between Federal disaster assistance - and the disaster recovery process (which is long termed and locally managed). The former is a subset of the latter. When State and local governments are overwhelmed and incapable of effective and timely response, Federal disaster assistance is made available through the Stafford Disaster Relief Act (P.L. 100-707), on a 75-25 Federal/State-local match, or in the case of a catastrophic disaster, the Federal government may elect to pick up 100 percent of the eligible costs.

In practice, there are at least two trends that should be noted: First, the Federal role in response to and recovery from a major or catastrophic disaster continues to expand; and secondly, political factors continue to shape, if not drive the Federal response and recovery efforts.

Finally, recent major disasters - including hurricanes Hugo, Andrew, and Iniki and the Loma Prieta earthquake - have illustrated some of the shortfalls in traditional disaster assistance programs.

- * *Federal disaster relief programs tend to focus on the immediate, short-term needs of impacted communities. Disaster recovery is a complex, long-term process having multiple dimensions: political, social, cultural, financial, physical, and environmental.*
- * *Federal disaster programs do not meet the needs of many small business owners - the "mom and pop" operations that thrive on low overhead, and low rent on a month-to-month basis. An earthquake can shatter this fragile underpinning. The loss of these businesses will have a direct impact on the local economy; Federal policy and programs need to address the needs of these small business entrepreneurs.*
- * *Federal disaster assistance programs can perpetuate hazard vulnerability, as opposed to reducing it because it is easier politically to expand Federal disaster recovery and reconstruction programs than to implement the more divisive mitigation programs that are needed in the long-term to reduce community vulnerability.*

“The pace of disaster recovery will be greatly influenced by the availability of electric power.”

equipment), and rail lines in the Central U.S. is well documented. Access to and from disaster areas is expected to be impeded by damage to the transportation network.

The restoration of transportation routes is critical for two fundamental reasons: 1) the efficiency of disaster relief operations - the movement of supplies, equipment, and personnel across the region - will be dependent on the restoration of transportation routes; and

2) the pace of the economic recovery will depend on the ability to move goods and services across the region.

States in the Central U.S. have acknowledged the vulnerability of transportation systems to earthquakes. Programs are being implemented to upgrade key links of the network, particularly State highways and bridges. What is needed is a comprehensive, regional program that addresses all modes of transportation, their interdependency, and vulnerability. This initiative should become a part of a federally supported program to upgrade the nation's infrastructure.

Communication

It is a well understood axiom - buttressed by lessons from recent

disasters - that the ability of any jurisdiction to respond effectively to a disaster and manage recovery operations depends to a large extent on the ability to communicate, both internally and with the public.

The restoration of the communication system in the Central U.S. following a major earthquake is critical. Problems can be anticipated; communication plans and procedures should be developed prior to the disaster to minimize disruption and facilitate emergency response.

Critical facilities and systems -

transportation, communication, utilities, medical, emergency services, and others - are highly interdependent. That is, the failure of one will necessarily impact the others. The implications for State and local officials in the Central U.S. are clear: pre-disaster planning and post-disaster recovery must be guided by a "systems" approach that takes into account the impact of failure of any one part on the performance of the entire system. This is essential to the prioritization of the restoration of critical facilities and services.

The phase between response and recovery, referred to here as the "sustained emergency/restoration phase," is a critical period in the recovery process. In the Central U.S., State and local officials will be confronted with many diverse demands and the need for decisions on a range of problems and issues, many of them policy oriented and potentially controversial.

The following section examines the problems, issues, and challenges associated with recovery. The underlying theme of this article is this: **the recovery process begins with the event itself; decisions that are made (or not made) in the immediate aftermath of a disaster will shape the course of recovery.**

ISSUING BUILDING PERMITS FOLLOWING AN EARTHQUAKE

Early in the rebuilding process, local officials will be faced with a significant challenge: how to expedite the issuance of building permits without compromising the need to check building plans. Several options are available, from issuing building permits in the field for shoring buildings to establishing special plan checking departments to deal with repair. A forthcoming publication from the California Office of Emergency Services, **Earthquake Recovery for Local Governments: A Resource Manual**, outlines several issues and policy actions that local building departments should address prior to the next event to expedite the post-disaster permitting process.

- * *Will plan check and/or permit fees be waived? If these fees are waived, the fees will be eligible for reimbursement from FEMA if the disaster receives a Presidential declaration.*
- * *Establish a process so that permits for shoring can be issued by inspectors in the field. This will allow shoring work to be accomplished soon after the earthquake, ensuring that damaged buildings are stabilized, and minimizing additional damage.*
- * *Evaluate your staff capability. Should your department establish a section which will deal only with permitting repair projects? Should you hire an outside consultant to process disaster-related claims?*
- * *Can you develop a simplified review and plan check process for reviewing engineering evaluations and proposed repair plans and issuing building permits?*
- * *Establish procedures for changing building placards based on engineering evaluations performed by professionals retained by the building owners.*
- * *Will building owners be allowed to place temporary trailers on site? Will permits be required for their use? What kinds of environmental health issues need to be addressed with the temporary trailers, sewer hook-ups, etc.*
- * *Will an expedited process be used if owners want to put back what was there before? How will requests for new buildings or different designs be handled?*
- * *Will you have a one-stop permitting center, where all city and utility departments are located together, or will building owners need to go individually to the various departments for permits?*

DISASTER RECOVERY

It is useful to start with a definition of three terms that are often used interchangeably - recovery, reconstruction, and rehabilitation.

Reconstruction stresses the physical aspects of post-disaster rebuilding, generally incorporating the guidance and input of varied groups - planners, community based organizations, developers, historic preservation officials, and others. Implicit is the desire to achieve a better quality of life and to improve aesthetics and community design.

Rehabilitation is defined as the repair of damaged structures to restore them to pre-earthquake conditions.

Recovery, on the other hand, takes a much broader view and encompasses the physical, social, economic, and environmental "healing" of a community, a process that may take a decade or longer.

REALITIES OF RECOVERY

Judging from experience, the recovery and reconstruction process in the Central U.S. following an earthquake will likely be very political, controversial, and divisive. An examination of recent post-disaster rebuilding efforts in California and Florida reveal a pattern of problems and issues that will probably surface in the Central U.S.: 1) the rebuilding effort can polarize a community (those who favor change versus those who want to return to the status quo); attention often

will focus on long-standing problems and issues that existed before the disaster, and which may be difficult to resolve; 2) the desire and will to implement a rehabilitation and rebuilding program may be thwarted by a lack of information (e.g. geologic data), a lack of necessary financial resources to initiate the rebuilding, and/or inadequate legislative authorities; and 3) the political process itself can become a stumbling block. New coalitions take time to evolve and public participation needs to be ensured; this time consuming process may be overwhelmed by the urgency to start the rehabilitation process.

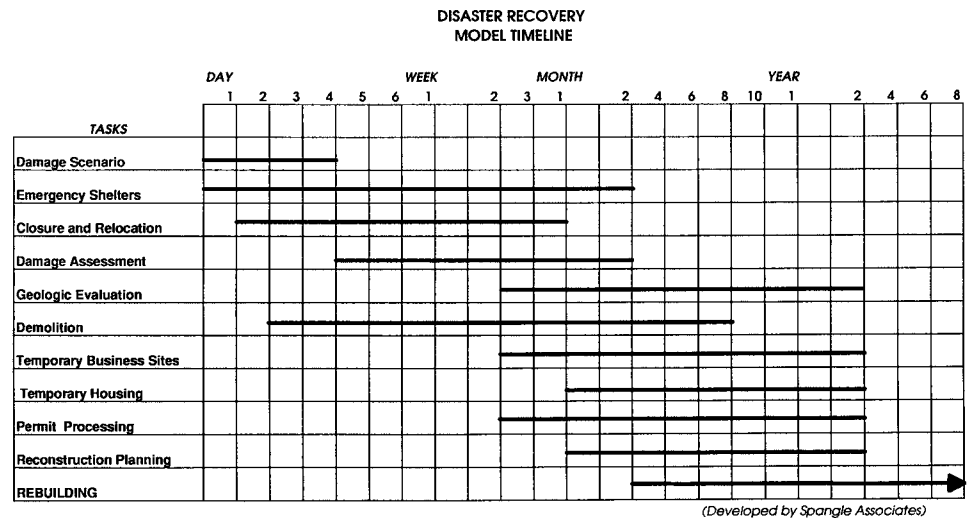
Against this backdrop, four key, interrelated aspects of disaster recovery are briefly examined: 1) Establishing repair standards; 2) Business recovery; 3) Housing the displaced; and 4) Rebuilding public facilities and services.

REPAIR STANDARDS

A central question that community officials will face in the rehabilitation and rebuilding phase is: "What standards should be used to repair damaged buildings? Building standards vary from state to state, as do the permitting processes. There will be pressures from some groups to rebuild to higher standards to minimize future damages; others will push for accelerated rebuilding to spur recovery efforts.

Decisions on rebuilding standards are likely to be undertaken in an environment that is fraught with tension. The damage assessment, inspection, and repair process will take time. A shortage of building officials and contractors will exacerbate the problem. Post-disaster rebuilding will be a balancing act: how to meet the needs of disaster victims, yet to not overlook the window of opportunity to rebuild safer structures.

CUSEC and the States should work with high risk communities in the Central U.S. to review local codes and procedures; to identify appropriate repair standards for each classification of buildings - including historic structures; to identify procedures for expediting the permit process for damaged structures; and to identify expanded powers that may be necessary to carry out an accelerated rehabilitation and rebuilding program.



BUSINESS RECOVERY

The pace of community recovery following a major earthquake will be directly tied to how quickly and effectively the business community is able to recover. In the Central U.S. and elsewhere, the central business district is the "heart and soul" of the community; therefore, the challenge of rebuilding it has enormous financial as well as psychological implications.

At least two categories of businesses will be impacted by an earthquake: first, the large retail chains that tend to be located in local or regional shopping centers; and second, the locally owned businesses that often operate with limited capital, typically in a building that is rented or leased. For the first category, a damaging earthquake may mean the temporary closing of a few outlets; for the second category - the independent merchant - an earthquake can spell disaster: loss of building, loss of inventory, and loss of utility services.

In smaller communities, the entire central business district can sustain heavy damage (e.g. Coalinga in 1983 and Santa Cruz in 1989), resulting in a significant loss of tax revenue from business interruption.

A Business Recovery Strategy

A business recovery strategy for the Central U.S. needs to be tailored to the unique needs of business owners. It should actively involve local chambers of commerce and other organizations in pre-disaster and post-disaster planning. A

“Decisions on rebuilding standards are likely to be undertaken in an environment that is fraught with tension.”

business recovery strategy should be an integral part of a regional strategy for economic recovery in the Central U.S. While conditions will vary from state to state and from community to community, a business recovery strategy be guided by a common goal: to re-establish commercial activity to facilitate the community's recovery. Following is a discussion of some of the key elements or a business recovery strategy.

1. The foundation of a business recovery strategy is a pre-disaster inventory of all commercial buildings in the community that is designed to assist public officials in determining the earthquake's economic impact. The inventory should include: ownership, value, type of structure, occupancy, and the nature of the business. This information, which in many instances is available through the local planning agency or community development department, can be used to determine priorities for inspection, repair, restoration of services, and other recovery actions.

2. Business associations (or chambers of commerce in smaller communities) can serve as the focal point for the

development of post-disaster business recovery strategy.

3. Funding is critical to business recovery. Federal financial aid typically requires a demonstrated ability to repay; many small business owners often find themselves on their own in finding the financial means to resume their livelihood. This element should identify the range of funding resources that are available to assist local businesses or property owners to repair or upgrade their damaged structures, and thus stay in business.

4. A business recovery strategy should provide displaced business with inexpensive, alternate business locations immediately following the earthquake. Planning for temporary facilities should address the location and space requirements for the different categories of businesses. For example, restaurant/food vendors have special hook-ups, and often are subject to local codes.

5. The business recovery planning process should bring together the business associations and/or chamber of commerce and public officials to review the policies, plans, and procedures that will govern the rehabilitation and rebuilding process. They include: building inspection criteria and procedures, public access rules and procedures, local government priorities in rebuilding, and plans and procedures for rehabilitation of historic structures.

Pre-disaster planning for business mitigation, preparedness, and recovery in the Central U.S. can pay immediate dividends following an earthquake. Confusion and dissension can be minimized, rebuilding priorities can be established, and economic revitalization can be accelerated. Many of the requisite organizations for a public-private partnership are in place; the challenge is to bring these groups together prior to the earthquake to develop recovery strategies that maximize scarce resources, and expedite the rebuilding process.

HOUSING THE DISPLACED

One of the greatest challenges that is expected following a major earthquake in the New Madrid Seismic Zone will be - how to meet the short-term and long-term

housing needs of tens of thousands of potentially displaced persons and families. Judging from the lessons of past earthquakes, notably Loma Prieta, a number of factors are present that will contribute to a significant post-disaster housing problem in the Central U.S.:

1) **vulnerability of housing stock** - Memphis, St. Louis, and other population centers are already packed with tenant occupied unreinforced masonry structures; 2) **significant levels of poverty and homelessness** - these chronic pre-disaster problems will be exacerbated by a major earthquake; and 3) **organizational fragmentation** - there are numerous agencies that are involved in providing housing; past disasters highlight the urgent need for agency coordination in the recovery and reconstruction phases.

The repair and reconstruction of housing after a disaster follows a well understood process. Phase one - emergency shelter - was addressed in a previous section. Phase two - temporary housing - is a transitional phase that may last for several months. Homeowners are preoccupied with repairs to damaged residences, often with the help of Federal funding. Mobile homes and other temporary housing are often used until permanent housing can be secured. Phase three - permanent housing - is the long-term reconstruction of housing, a process that is highly political and which involves the fundamental issue: "to what level of seismic safety should the next generation of housing be constructed?" Following is a discussion of important housing recovery issues and lessons that have emerged from recent disasters, with an emphasis on the implications for the Central U.S.

Housing Recovery: Lessons for the Central United States

1. The nature and scope of expected housing problems can be determined through pre-disaster planning, and an examination of the problems and issues that have surfaced in recent earthquakes. Vulnerability studies should focus on the jurisdiction's housing stock (including multi-family buildings, low-income residency hotels, and other residences) and

demographic data (including income distribution, ownership patterns, cultural diversity, etc.). The product of these studies should be a series of overlays, readily adaptable to geographic information systems, which profile the community's housing patterns and potential housing problems following an earthquake.

2. Numerous organizations and agencies have a role in the provision of post-disaster shelter and housing; pre-disaster coordination can minimize confusion and conflict. Coordination should include: identification of programmatic and funding responsibilities and authorities of local jurisdictions, community organizations, the Red Cross, State agencies, and Federal agencies, including the U.S. Department of Housing and Urban Development.
3. When possible, local jurisdictions (and other organizations that provide housing assistance) should attempt to move as many people as possible from emergency shelters into permanent housing to avoid the costs associated with temporary housing. Alternatively, housing specialists in the Central U.S. should investigate the feasibility of developing temporary housing that could be converted into permanent housing (e.g. prefabricated units or "core" housing).
4. Protracted emergency periods, involving extended stays by victims in mass shelters, appear to increase the potential for social conflict to emerge over issues of short-term relief as well as restoration and recovery. Such conflicts are more likely to appear in situations where the class and ethnic divisions of a community are relatively pronounced before the disaster. The potential for such conflict exists in the Central U.S. owing to anticipated shortages of shelters and temporary housing, combined with current patterns of ethnic polarization and tension that are prevalent in our cities. These factors reinforce the need to involve community based organizations - those groups that normally provide social services to low-income and homeless - in the pre-disaster planning for housing.

5. Damage assessment and structural safety inspections play an important role in the provision of shelter and temporary housing. In all likelihood, there will be a shortage of trained structural engineers in Central U.S. communities; therefore, priorities for inspection should be determined before the disaster and publicized in order to minimize confusion and conflict.
6. Replacement of low-income housing is expected to be a major problem in the urban centers of the Central U.S. following a major earthquake. Among the most vulnerable groups are families and individuals who occupy single room occupancy (SRO) units, victims who share housing (and can't document the fact that they have lived in a location for 30 days - a requirement for FEMA's temporary housing assistance), and low-income families who rent. Housing issues are expected to dominate the headlines of local newspapers in the Central U.S. following an earthquake. Why this pronouncement? The reason is that affordable housing is already a major problem in our urban centers - disasters will only serve to expose, magnify, and compound these problems. Many would argue that current Federal programs are inadequate to address the post-disaster housing problems that will overwhelm local officials in the aftermath of a major earthquake. Nevertheless, housing recovery needs to be addressed in the context of a comprehensive, national recovery policy for the United States.

PUBLIC FACILITIES AND SERVICES

Loss estimation and damage studies in the Central U.S. drive home a central fact: essential facilities and services are vulnerable to damaging earthquakes. The infrastructure that supports local government - transportation, communication, and utility systems - will be disrupted, perhaps for long periods of time. The public buildings (many of which are historical structures) that dot the "county squares" in the Central U.S.

“Housing issues are expected to dominate the headlines of local newspapers in the Central U.S. following an earthquake.”

are typically constructed of unreinforced masonry materials. In short, emergency response and recovery efforts in the Central U.S. will be greatly hampered by damage to public facilities and services. Local government may be forced to operate from widely scattered locations with little or no notice, with no communications and a shortage of essential supplies and equipment.

Planning for Rebuilding of Public Facilities and Services

Two factors will have a significant impact on pre-disaster planning and post-disaster restoration of public facilities and services in the Central U.S.: 1) The regional impact of an earthquake in the New Madrid Seismic Zone; and 2) The preponderance of small communities in this part of the nation (at least relative to California and other high risk areas).

Regional Impact of an Earthquake

The dispersed and widespread damage distribution is expected to have direct implications for restoration of public facilities and services. First, the delivery of State aid, and Federal disaster assistance (through Disaster Application Centers) may be delayed due to the sheer number of affected communities and attendant logistical problems of administering aid. Secondly, the regional impact of a quake will cause delays due to resource shortfalls. Transportation, communication and utility systems are just that - "systems" - which are made up of critical vulnerable components, many of which may be in short supply after a major earthquake. Finally, the New Madrid Seismic Zone bisects a national transportation and energy network that constitutes a critical national distribution center. This fact has significant implications for the prioritization of the restoration of public facilities and services.

Metropolitan versus small communities

In the Central U.S., over half the population resides in communities of 25,000 or fewer. The demographics of the region, combined with the nature of the earthquake hazard, is expected to have direct implications for recovery and reconstruction. While smaller communities will experience fewer casualties (on a per capita basis), that their urban counterparts, the impact of an earthquake on public facilities and services can be just as severe. Smaller communities tend to have more elderly residents. Isolation is also a factor. Rural communities may have to compete for scarce resources in rebuilding public facilities and services, at least initially. In essence, recovery strategists must take into account the unique needs and resource levels of urban versus rural populations in establishing priorities for rebuilding public facilities and services following an earthquake.

The message can be summed up as follows: 1) regional damage (e.g. more than one county) will warrant a regional approach to establishing priorities for rebuilding public facilities and services; that is, critical facilities may be designed to serve more than one county; 2) policymakers will face difficult decisions in establishing priorities and targeting communities for restoration of facilities and services; and 3) communities (large and small) that have land-use policies and implementation plans (zoning, capital improvements programming, etc.) will be better positioned following a quake to establish rebuilding priorities; and 4) local government should have contingency plans and programs in place to facilitate self-sufficiency in the provision of basic services following a major earthquake.

FINANCING RECOVERY

Earthquake recovery costs money - lots of money. The Loma Prieta earthquake, for example, is believed to have caused at least \$8.0 billion in damage to buildings, building contents, infrastructure, and other direct costs. Indirect economic costs from the earthquake are uncertain, but appear to be in the range of \$2.0 billion (estimate of

the California Seismic Safety Commission). These costs include lost productivity, wages, and sales; transportation disruption; decreased tourism; and other economic losses.

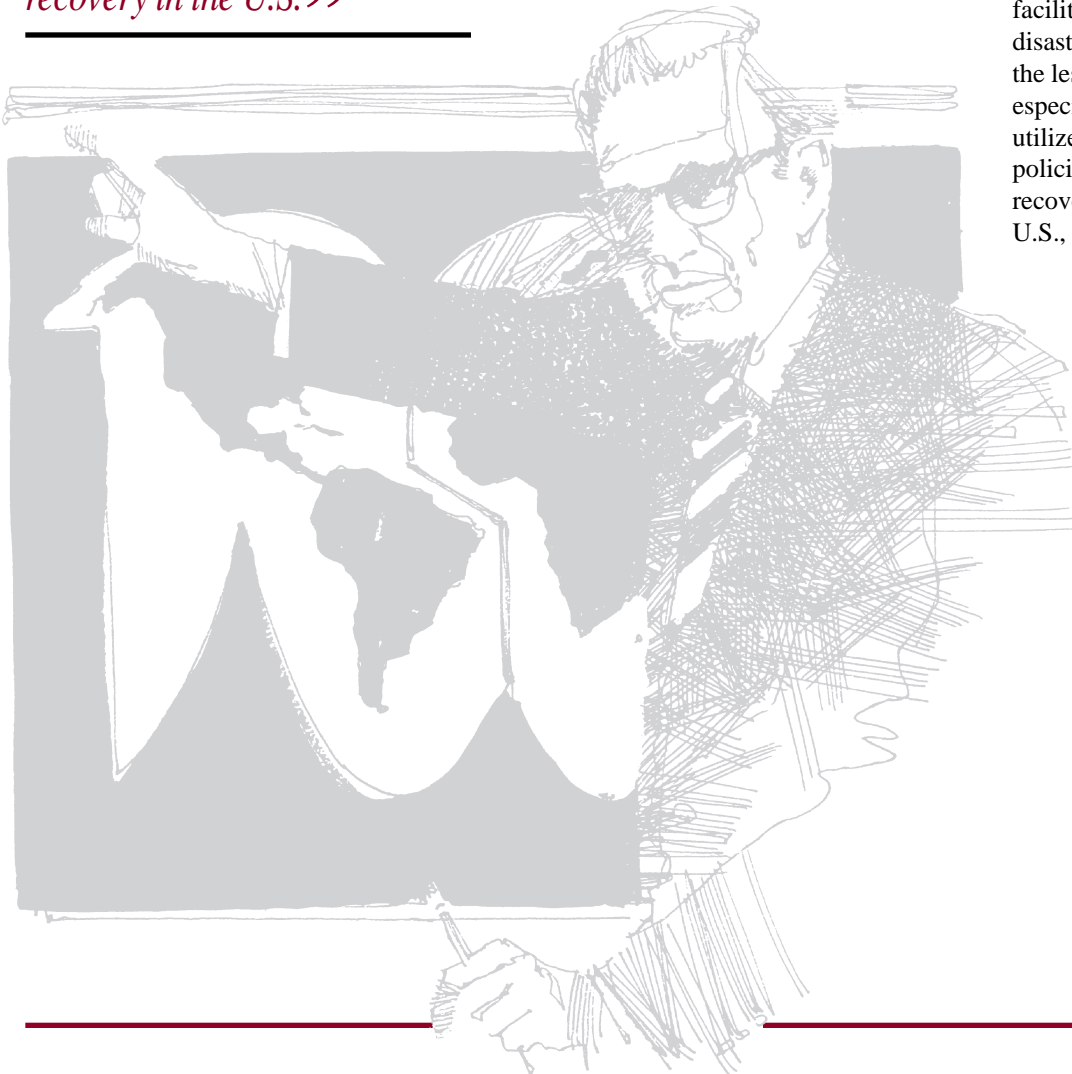
By contrast, estimates of the direct and indirect losses from a major earthquake in the New Madrid Seismic Zone range from \$25 to \$50 billion (the latter figure is an estimate by the insurance industry of insured losses). While the total direct and indirect costs associated with a major earthquake in the New Madrid Seismic Zone are subject to interpretation, no one disputes the potential for very adverse economic consequences in the affected areas.

“In the final analysis, financing recovery is arguably the most critical—yet least understood—aspect of disaster recovery in the U.S.”

From the perspective of a local government, the crucial question becomes, **“Who is going to pay for the costs of recovery?”** In practice, funding for recovery comes from a variety of sources, including Federal, State, and local governments, voluntary organizations, and the individuals and businesses affected by the earthquake. The cost sharing will vary from event to event, but to provide some perspective, it is estimated that following the Loma Prieta earthquake, the total Federal, State, and charitable disaster recovery funding was approximately \$4.0 billion, leaving a balance of \$6 to \$7 billion to be absorbed by local areas (CSSC). In reality, virtually every group suffers financially; most programs are not designed to fully compensate the victims. Furthermore, it is common for individuals and businesses to choose not to recover - for a variety of reasons.

In the final analysis, financing recovery is arguably the most critical - yet least understood - aspect of disaster recovery in the U.S. “Disaster economics” is a subdiscipline that is still in its formative stages; the quantification of earthquake losses, for example, has yet to be undertaken in a rigorous, categorized fashion.

In summary, the disaster recovery process is highly complex, often controversial, and involves a broad spectrum of individuals and organizations, many of whom have competing agendas. Yet, the recovery process is understandable, problems and issues are predictable, and opportunities for change are unprecedented. In summarizing, there are at least three fundamental points that need to be emphasized: 1) a major earthquake in the New Madrid Seismic Zone has the potential to cause damage and casualties of a scope and magnitude that are unprecedented in our nation’s history; 2) recovery and reconstruction can be facilitated and accelerated through pre-disaster planning and coordination; and 3) the lessons from previous disasters - especially Hurricane Andrew - should be utilized in developing new, imaginative policies and strategies for post-disaster recovery and reconstruction in the Central U.S., and elsewhere.



HISTORIC STRUCTURES AND DISASTERS

A recurring, and predictable issue following an earthquake or other major disaster is, "What to do with damaged historic or architecturally significant structures?" Decisions are often complex, and controversial. Balancing public safety and economic issues with preservationist interests is difficult enough under normal conditions. The following a disaster, competing interests surface, the situation can become polarized. Yet, much can be learned from an examination of the experiences of communities that have recently been through disasters. The following article, by **Andrew Hellenthal**, examines the challenges associated with historic structures and disasters, with emphasis on the implications for the communities in the Central U.S.

INTRODUCTION

The built environment is man's tribute to his own development and the development of his civilization. Through time structures have reflected the changes in attitudes and man's perspectives on the environment. From the beginning, the first structures were built to resist the elements of nature. However, it has only been in relatively recent times, historically speaking, that man has attempted to build structures which are resistant to the most violent of nature's forces: earthquakes, hurricanes, tornadoes, and floods.

Our historic structures, unique yet fragile, are among the most vulnerable to the effects of natural disasters. The reason is that these structures were built prior to the engineering and architectural advances of our current building practices, which are currently being reviewed and improved upon every two to three years depending on the building code organization. For examples of the vulnerability and fragility of these relics of our past, one only has to look at the

damage and destruction to historic Charleston, South Carolina from Hurricane Hugo in 1989 and to the many historic sites in the San Francisco Bay area impacted by the Loma Prieta earthquake, also in 1989. More recently, in 1992, there was significant damage and loss to cultural property in Chicago by flooding due to the failure of the physical infrastructure. All these disasters have in common damage and destruction to irreplaceable historic and cultural properties.

IMPACTS OF DISASTERS ON HISTORIC STRUCTURES AND COMMUNITY ACTIONS

Damage from Hurricanes - (Hurricane Hugo, 1989)

On September 21, 1989 Hurricane Hugo made landfall in Charleston, South Carolina with wind speeds ranging from 120 to 135 miles per hour and wind gusts much higher. This in conjunction with an exceptionally high tide created a storm surge of nearly 17 feet above the mean low tide. Loss of roofs due to the winds and flooding to ground floors of buildings are what caused the most damage. The forces of the hurricane damaged over 5,000 historic structures in South and North Carolina, creating repair and restoration costs of nearly \$ 250,000, 000 in these two states alone (Nelson, 1991). Damage from the hurricane included: roofs blown off, subjecting structural parts and interiors to direct contact with the elements; wind blown rain and the storm surge flooding structures in coastal areas; flooded structures from wind blown rain and the storm surge; and uprooted trees and defoliated gardens and natural landscape areas. There were more subtle damages: building appendages and architectural and ornamental elements were torn away from structures; historic cemeteries were disturbed with headstones and memorials toppled; moisture penetrated plaster walls, electrical and mechanical systems; libraries, archives and museum facilities had structural damage or were damaged

by water.

It has been estimated that between 80 and 90 percent of structures in the Charleston area were damaged. Keep in mind that there are some 4,500 historic structures and numerous natural landscape areas which were impacted by the storm. (Nelson, 1991)

Community Actions

Charleston, SC

The community of Charleston holds historical preservation as an integral part of its culture. This was evident in the response and recovery actions which took place following Hurricane Hugo. The mayor of the city called upon the city's preservation officer and the local city planning staff to lead Charleston's recovery and restoration efforts. By working together in a coordinated effort the city's leaders and the historic preservationists were able to save most of the damaged historic structures. Only six damaged structures had to be demolished, out of the 672 historic buildings with structural damage. (Olshansky, 1993) This was accomplished through close coordination and a planning policy that emphasized the importance of historic



Historic site 12 Vanderhorst St. received damage during Hurricane Hugo. The site has since been restored.

preservation to the city. The pre-disaster planning laid the foundation for immediate actions, including: the establishment of an emergency stabilization and preservation task force, at the request of the mayor; a 24 hour preservation assistance program and database was set up to keep track of contractors; and the RESTORE program (Regional Emergency Support to Owner Rehabilitation Efforts) to promote proper restoration techniques. In addition, Charleston's architectural review board greatly speeded up its review process, while keeping existing standards. The National Trust set up funding assistance programs, which were managed by the city's revitalization office, for commercial buildings. Finally, several funding assistance programs were established and managed by various historic preservation organizations and agencies throughout the Charleston area. (Nelson, 1991)

Charleston was able to preserve its historic landmarks by having a close relationship between the historic preservation and local government leaders that proved invaluable to the recovery effort. Today, a visitor to Historic Charleston would have a difficult time finding evidence of the damage and destruction created by Hurricane Hugo. However, Charleston and communities like it must continue to plan for such events, as disasters will continue to impact our cities. Only through coordinated planning and response efforts, along with educating the public on the importance of historic resources will we be able to preserve these relics of our past for future generations.

Damage from Earthquakes - (Loma Prieta, 1989)

Barely one month after the devastating blow Hurricane Hugo gave to the southeast coast of the United States, the San Francisco Bay area and a large portion of northern California was shaken by a magnitude 7.1 earthquake located on the Loma Prieta fault just south of the city of San Francisco. The quake is estimated to have created the most structural damage to the area since the 1906 earthquake. The most severely impacted areas were the cities of Santa Cruz, Los

Gatos and Watsonville, located close to the quake's epicenter. Several of the buildings damaged in these areas were of historical significance. Based on assessments by the National Trust for Historic Preservation, out of the 38,000 historic buildings in the Bay area, some 472 had structural damage and 70 historic structures were demolished. The total estimated repair and restoration costs from damage by the earthquake to historic structures was 350 million dollars. (Architectural Resources Group, 1990)

The most common types of damage to historic structures were: failure of the cripple wall, causing wood frame structures to slide or "walk off" their foundations; cracked and collapsed unreinforced masonry walls; collapse of inadequately anchored exterior masonry walls; failure of walls and parapets; collapse or severely damaged multi-story structures having a "soft" first story; collapse of masonry chimneys at the roof line; and cracking or collapse of interior plaster walls and/or ceilings. Based on assessments by the California Office of Historic Preservation and the National Park Service Earthquake Inspection Team, the buildings performed as would be expected in an earthquake of this magnitude (Kariotis, Krakower and Roselund, 1991). However, much of the damage could have been prevented. California law requires that local jurisdiction identify potentially hazardous unreinforced masonry structures and adopt plans for mitigating these hazards. The law does not, however, require owners to strengthen their buildings, but to merely have them identified and proposed mitigation plans submitted to the State Seismic Safety Commission.

The greatest controversy came in the "red tagging" of buildings by local inspectors and damage assessment teams, marking them unsafe for occupancy. This in turn led to the decision to demolish several historic structures, simply because they had been "red tagged". The number of experienced engineers and architects in the repair and reconstruction of historic was limited, meaning that the decision to "red tag" and inevitably to demolish some of the historic structures was based on

inaccurate information (Kariotis, Krakower and Roselund, 1991). The response and recovery efforts were coordinated with the historic preservation groups, and in fact these groups were seen as a special interest group trying to interject their interest into the picture. Had there been better coordination with historic preservation groups in pre-disaster planning and in the initial response, most likely many of the historic structures which were demolished may have been able to have been restored.

Community Actions

Santa Cruz, CA

The city of Santa Cruz has 134 properties eligible or listed on the National Historic Register. The Pacific Garden Mall sustained the most damage. Nearly a third of the buildings in this area suffered structural damage. Teams of volunteer engineers, who were brought in from other cities by the California Office of Emergency Services, did the initial damage assessment.

The damage assessment teams concentrated on the Pacific Garden Mall location since it was the most severely effected and appeared to have the most damage. The Pacific Garden Mall, which was placed on the National Register as a Historic district, also has the largest concentration of historic structures in Santa Cruz. Out of the 90 buildings in the Mall, 31 are listed on the National Historic Register. Some fifty-nine percent or 16 structures were demolished following the Loma Prieta earthquake (Architectural Resources Group, 1990). Much of this was done with little or no coordination between the historic preservation organizations and local government officials. In a document published by the California Preservation Foundation entitled, **The Engineer's View -Loma Prieta: Historic Buildings, Earthquake Damage and Seismic Strengthening**, several historic structures were demolished due to the inaccuracy of building assessment forms that were provided to the engineering teams by the city of Santa Cruz. Furthermore, the Mall's National Historic designation was not disclosed to the engineers in initial briefing sessions. Partly as a result of this

lack of coordination, only 15 of the original 31 historic structures in Santa Cruz's primary historic district remain today.

The impact of the Loma Prieta earthquake on the city of Santa Cruz's historic properties was tremendous. Out of the 134 historic properties, 18 percent were demolished, including more than half of one of the West Coast's most notable historic districts. Shortly after the Loma Prieta earthquake, the State legislature in California passed into law Public Resources Code 5028, protecting national and local landmarks from demolition which have been damaged by natural disasters. This again is evidence of event driven action. Hopefully the circumstances in Santa Cruz will not be duplicated in other parts of the country. Communication is the key in planning for and effectively recovering from any natural disaster.

CALIFORNIA PUBLIC RESOURCES CODE 5028

Section 5028 as added to the Public Resources Code:

5028 (a) No structure that is listed on the National Register of Historic Places, on the California Register of Historic Places, or any local public register of historic places, and that has been damaged due to natural disaster, including, but not limited to, an earthquake, fire, or flood may be demolished, destroyed, or significantly altered, except for restoration to preserve or enhance its historical values, unless the State Office of Historic Preservation determines, pursuant to subdivision (b), that the structure may be demolished, destroyed, or significantly altered.

(b) Any local government may apply to the State Office of Historic Preservation for its determination as to whether a structure meeting the description set forth in subdivision (a) shall be demolished, destroyed, or significantly altered. That determination shall be based upon the extent of damage to the structure, the cost of rehabilitating or reconstructing the structure, the structure's historical significance, and any other factor deemed by the State Office of Historic preservation to be relevant. In making that determination, the State Office of Historic Preservation shall consider the recommendation of a team selected by the State Office of Historic Preservation composed of three residents with historic preservation expertise who reside in the affected county. The determination of the State Office of Historic Preservation shall be issued no later than 30 days after the structure was damaged, or 30 days after the receipt of the application, whichever occurred later.

Historic Structures in the New Madrid Seismic Zone

The region encompassed by the New Madrid Seismic Zone (NMSZ) is rich in historic structures. The National Register of Historic Places has over 9,200 listings in the New Madrid region. These include both historic buildings and historic districts, which may include anywhere from 3 to 3,000 separate structural units (Olshansky, 1993). Currently, there has been very little if any effort to address the problem of the impact to these historic sites from an earthquake in this region. Many of the historic structures are built of unreinforced masonry and would be vulnerable if even a moderate magnitude earthquake were to occur along the New Madrid Seismic Zone. All states have a State Historic Preservation Office, which is responsible for developing statewide plans for preservation, identifying and surveying historic sites, nominating properties to the National Register, providing technical assistance to the public (as well as local and state agencies), and participating in the review process of any Federal actions that may affect historic properties. The final requirement has a thirty day waiver for the Federal Emergency Management Agency in disaster recovery actions. This is probably the best reason for the State Historic Preservation Office to interact with and contribute to the initial emergency management and disaster response planning processes being undertaken in each state. Those local jurisdictions who have established Historic Preservation organizations and have passed ordinances with special areas of conservation should also work with their local emergency management and planning agencies to ensure that proper handling of historic properties in an emergency response and recovery will take place. The example of Charleston, South Carolina following Hurricane Hugo, is one that can be duplicated, and indeed should.

ACTION CHECK LIST

Before the Disaster

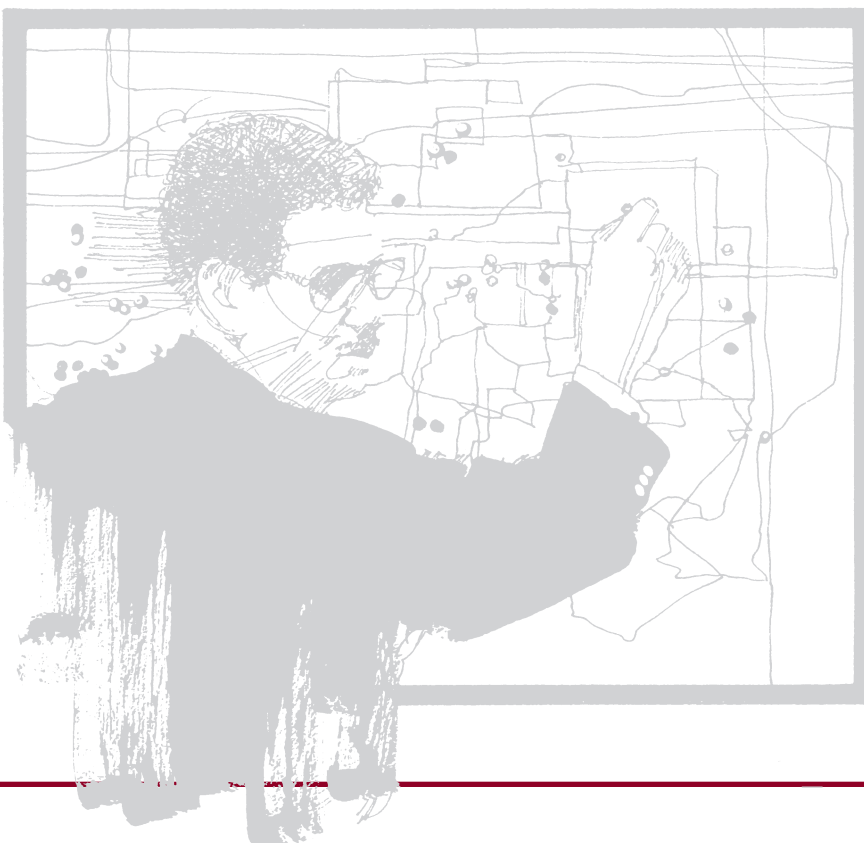
- Assess vulnerability and risks to potential disasters
- Survey inventory of historical properties and collections. Best preserved on computer database.
- Prepare an emergency/disaster plan coordinated with local and state officials.
- Update and exercise the plan on a regular basis.
- Provide training to staff on the plan.
- Identify local or regional resources (personnel or materials) which may be utilized in response to and recovery from a disaster.
- Regularly inspect and maintain historic properties. Proper maintenance goes a long way in mitigating the effects of disasters.
- Identify potential hazards of structural and nonstructural components on and around historic properties and collections.
- Develop and implement an effective mitigation plan addressing identified hazards.

After the Disaster

- Utilize resources identified in the emergency plan. Use qualified and experienced personnel for damage assessment and stabilization work.
- Preach "patience and preservation" as opposed to the quick fix.
- Ensure that the design review and landmark preservation procedures are maintained at the same level as prior to the event.
- Utilize historically appropriate materials and skilled labor for reconstruction. Even if this means waiting until they arrive.
- Identify and provide information on funding sources for reconstruction and design assistance.
- Keep the public informed.
- Review and evaluate response to the event.
- Update and revise the plan, learning from the experience!

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DISASTER RECOVERY RESEARCH

There is a gap between what is known about earthquakes and their effects, and what is being applied. One of CUSEC's goals is to improve the application of earthquake hazards research and information in the Central United States, and in the process begin to narrow this gap. This section of the CUSEC Journal is devoted to Research and Information Transfer. The first part provides a synopsis of current research projects. The second part is a review of useful publications that address issues associated with disaster recovery.

CURRENT RESEARCH

Linkages between Disaster Response and Recovery: The Lessons for Policy-makers: The Cases of the Recent U.S.

and the reconstruction and recovery period. By developing a set of recommendations, the results of this investigation will assist the natural hazard decision-makers both in the pre-disaster planning phase, as well as in the decision-making process after the disaster. Major outcomes of this research effort will be a research report, and workshop proceedings containing recommendations, and needed "next steps."

USEFUL PUBLICATIONS

Earthquake Recovery and Reconstruction Planning Guidelines for Local Government. *Southern California Earthquake Preparedness Project. May, 1991. 161 pp. Limited copies available from the Earthquake Program, Southern Region, Governor's Office of Emergency Services, 1110 East Green St., Suite 300, Pasadena, CA, 91106.*

This Guide outlines pre-disaster steps that local officials and their staffs can take to prepare for the problems of recovery from earthquakes. Sections address the organizational aspects of recovery planning; housing the displaced; public facilities and services; financing recovery; business recovery; and other aspects of recovery and reconstruction planning. While written primarily for a California audience, the planning process that is described in the Guide is applicable to high risk jurisdictions outside of California.

The Loma Prieta Quake: What One City Learned. *Richard C. Wilson, International City Management Association. 1991. 98 pp. Available from the International City Management Association, 777 North Capitol St., N.E., Washington, D.C., 20002.*

This report was written by the city manager of Santa Cruz, describing his city's experience after the Loma Prieta earthquake. Practical lessons are



provided that address a range of problems and issues, including: demolition decisions; controlling public access to disaster sites; dealing with historic structures; the permitting process following a major disaster; emergency shelter and temporary housing; and how to form partnerships with the business community to expedite private sector recovery. This account is grounded in experience, and serves as a useful guide for local officials in preparing for the predictable problems that will be faced in the aftermath of a major disaster.

Earthquake Recovery for Local Governments: A Resource Manual.

Governor's Office of Emergency Services. 1993. 91 pp. (not including appendices). Limited copies available from the Governor's Office of Emergency Services, Sacramento, CA.

This document is intended for use as a reference - a source of information for local government officials trying to deal with the aftermath of an earthquake. The manual is organized into five major categories: Recovery Management and Financing; Rebuilding and Reconstruction; Housing Recovery;

Recovery of Public Facilities and Services; and Business Recovery. Each of the twenty eight subsections examines specific issues that must be addressed by local officials after an earthquake. Policy actions are outlined; questions are posed on predictable issues. Finally, the manual draws on the considerable experience of California communities in recovery, and provides an extensive array of attachments (sample forms, ordinances, etc.). This a very useful publication.

Rebuilding After Earthquakes:

Lessons from Planners. *Spangle Associates. Portola Valley, CA. 1991. 80 pp. Copies available from Spangle Associates, 3240 Alpine Road, Portola Valley, CA 94028.*

This report summarizes the content and recommendations of a symposium that brought together planners from throughout the world who have experienced the problems and challenges of rebuilding after an earthquake. Intended primarily for planners, this publication examines the key issues in recovery associated with housing, clearance, infrastructure, business resumption, public facilities, and planning. The authors examine the rebuilding experiences of communities

from throughout the world to develop a timeline for recovery and reconstruction, which can serve as a gauge for policy-makers and practitioners in the Central U.S. and elsewhere.

Planning for Disaster Recovery.

Management Information Service Report, International City Management Association, Washington, D.C. July, 1993. 24 pp.

This MIS report (published monthly by ICMA) focuses on disaster recovery, and is intended for city and county managers. City officials who have undergone the experience of recovery from a major disaster have contributed to this report. Practical lessons are provided on a range of issues, from dealing with FEMA to the use of cellular telephones in the immediate recovery phase. A Community Recovery Matrix is provided that outlines a broad range of recovery needs/possible actions under such headings as: economic and job assessment; public and private finance; housing and business concerns; public services and facilities; environmental and ecological issues; and health, welfare, and other needs. The appendix includes a useful list of information sources.

Coping with Catastrophe - Building an Emergency Management System to Meet People's Needs in Natural and Manmade Disasters.

National Academy of Public Administration for the U.S. Congress and Federal Emergency Management Agency. 1993. 133 pp. Available from NAPA, 1120 G Street, NW, Suite 850, Washington, D.C. 20005.

Following hurricanes Andrew and Iniki, Congress mandated that the National Academy of Sciences conduct a comprehensive and objective study of governmental capacity to respond effectively to major natural disasters. This publication is the result of an intensive four month study that looks at the whole system for emergency management. The study concluded that the nation needs a well-organized, effective emergency management system, but does not have one. To address this fundamental problem, the panel outlines a series of major recommendations to



strengthen the Federal, State and local capacities to effectively respond to and recover from major disasters. This study will become a milestone in the evolution of emergency management in this Nation, and in this context is relevant to researchers and practitioners alike.

Procedures for Post-Earthquake Safety Evaluations of Buildings (ATC-20).

Applied Technology Council. 1991. 173 pp. Copies available from the Central U.S. Earthquake Consortium.

The ATC-20 guidelines provide a state-of-the-art post-earthquake safety assessment procedure. The purpose of the guidelines is to promote uniformity in the rating of building damage. Technical guidelines include detailed criteria for building evaluation of different structural types, the assessment of geotechnical hazards, nonstructural hazards, and secondary hazards such as fires, gas explosions, spills, and releases of toxic materials. These guidelines are being widely adopted in the Central U.S.; the ATC-20 manual can be used as the basis for training and orientation programs.

“There is a gap between what is known about earthquakes and their effects, and what is being applied.”

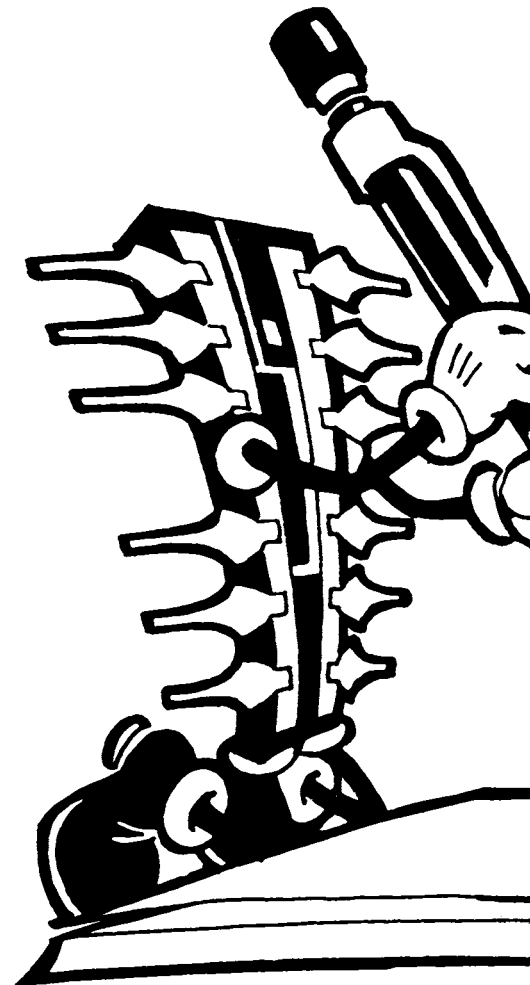
Findings and Recommendations: Policy Issues in the Provision of Post-Earthquake Shelter and Housing. *Bay Area Regional Earthquake Preparedness Project (BAREPP) and the National Center for Earthquake Engineering Research (NCEER). 1992. Limited copies available from the Central U.S. Earthquake Consortium.*

This report contains the findings and recommendations of a joint BAREPP-NCEER symposium on problems, issues, challenges, and opportunities associated with the provision of housing in the aftermath of an earthquake or other major disaster. The findings, which are grounded in the experience of the Bay Area following the Loma Prieta earthquake, are very useful for states and communities in the Central U.S. that are attempting to develop pre-disaster strategies that address the varied

dimensions - social, cultural, physical, economic - of housing the displaced following a disaster.

Proceedings: Joint Symposium on Earthquake Hazard Management in Urban Areas. *Bay Area Regional Earthquake Preparedness Project. 1992. Limited copies available from the Central U.S. Earthquake Consortium.*

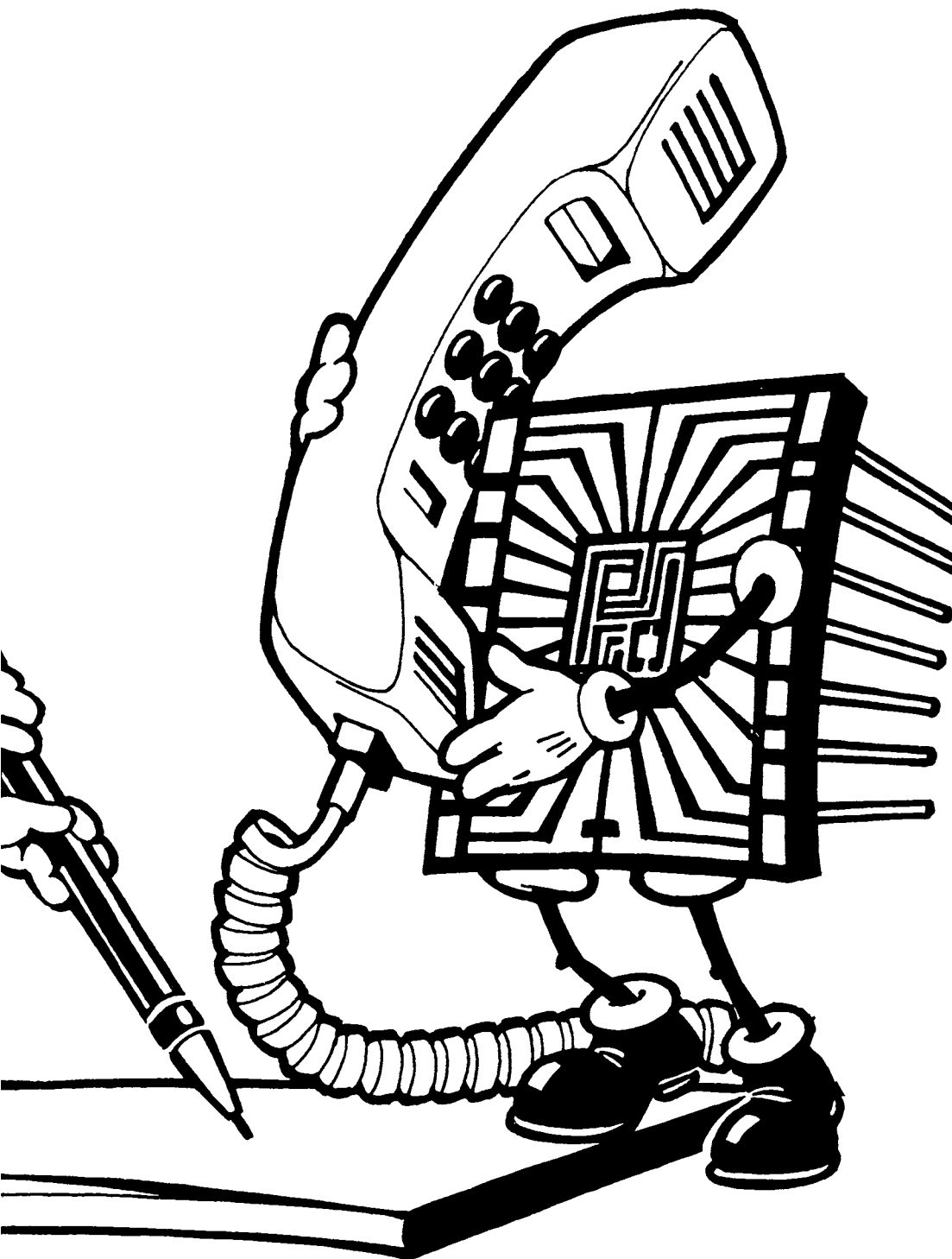
The unique problems associated with managing urban earthquakes was the subject of a symposium held in California following the Loma Prieta earthquake. City department heads from San Francisco, Los Angeles, and Oakland discussed their problems, and outlined strategies for improving the management of urban earthquakes. The findings and recommendations are applicable to urban centers in the Central U.S.



CUSEC IN TRANSITION

CUSEC would like to welcome its newest Board member - Judge Joe Dillard, the newly appointed State Director of the Arkansas Office of Emergency Services. Governor Jim Guyotaker appointed Judge Dillard, effective July 12, 1993. Judge Dillard served as the Baxter County Judge, a position he has held since 1981. He currently chairs the Northwest Arkansas Economic Development District, and is a member of the Mountain Home School Board.

During his tenure as Baxter County Judge Joe Dillard coordinated and created a communications system between local fire districts and the Baxter County Sheriff's office. He also took the lead in establishing a local emergency planning committee in his county. With this hands-on experience, Judge Dillard will continue the excellent record of service the Arkansas Office of Emergency Services has been able to maintain over the years.



CONFERENCES AND TRAINING

CUSEC Sponsored

EVENT	DATE	LOCATION
* Seismic Design Workshop	Aug. 12-13	Memphis, TN
* Recovery and Reconstruction Exercise	Aug. 18-19	Cape Girardeau, MO
* Research Information Transfer	Aug. 20	Cape Girardeau, MO
* CUSEC Board of Directors/ EQ Program Managers Meeting	Aug. 26-27	Memphis, TN
* Colloquium Series- (Univ. of Miss.)	Sept. 14	Oxford, MS
* Urban Search & Rescue 101	Sept. 29	Cape Girardeau, MO
* Urban Search & Rescue 101	Sept. 30	Jackson, MS
* Disaster Medicine (NIUS&R)	Oct. 7-9	Albuquerque, NM
* EERI Technical Conference	Oct. 28-29	Little Rock, AR
* CUSEC Board of Directors/ EQ Program Managers Meeting	Nov. 9-10	Memphis, TN

International Conferences and Training

EVENT	DATE	LOCATION
* Practical Approach to Hazardous Substance Accidents	Sept. 7-10	Saint John, New Brunswick, Canada
* Disaster Management in Metropolitan Areas	Nov. 1-4	Nagoya, Japan

**For more information on training please contact CUSEC Headquarters or the Earthquake Program Manager with your State Emergency Management Agency.*

The **Central United States Earthquake Consortium** is a not-for-profit corporation established as a partnership with the Federal government and the seven member states: Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee; and eight associate member states: Alabama, Georgia, Louisiana, South Carolina, North Carolina, Ohio, Oklahoma and Nebraska. The Federal Emergency Management Agency provides the basic funding for the organization.

CUSEC's purpose is to help reduce deaths, injuries, damage to property and economic losses resulting from earthquakes occurring in the central United States. Basic program goals include: improving public awareness and education, mitigating the effects of earthquakes, coordinating multi-state planning for preparedness, response and recovery; and encouraging research in all aspects of earthquake hazard reduction. CUSEC supports the International Decade for Natural Disaster Reduction.

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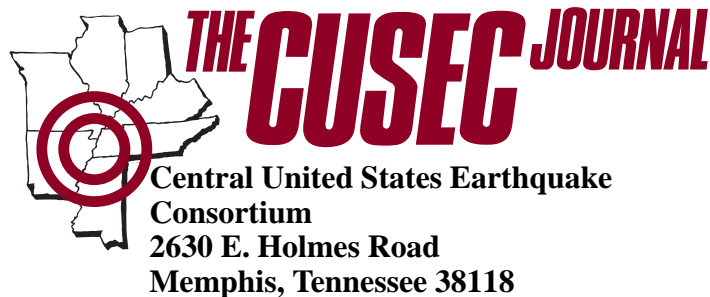
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