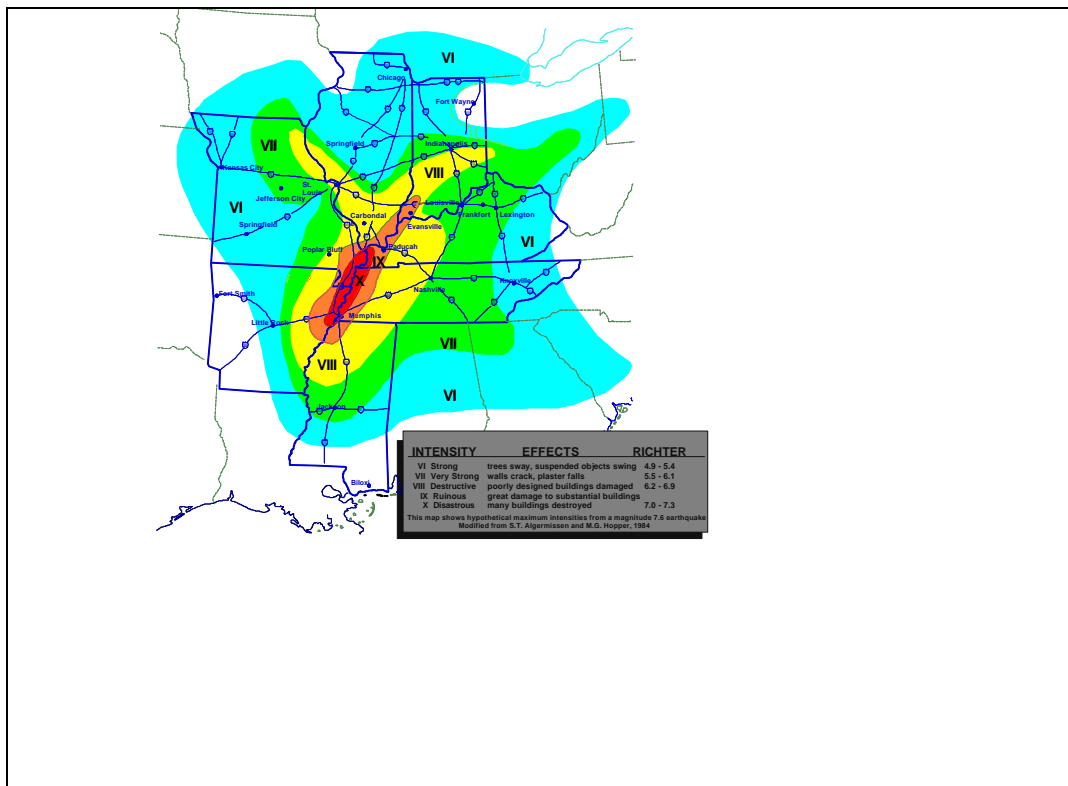


A HOUSING RECOVERY STRATEGY

FOR A NEW MADRID EARTHQUAKE



**Draft Report of the Housing Recovery Working Group
A FEMA / Federal - CUSEC Initiative**

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Preliminary Draft

HOUSING RECOVERY STRATEGY FOR A NEW MADRID EARTHQUAKE

Introduction

Recent earthquakes in Northridge, California (1994) and Kobe, Japan (1995) have focused attention on the significant and complex problems associated with providing shelter to tens of thousands of displaced disaster victims in these urban areas. The problems of post-disaster housing recovery in the Central U.S. will be compounded by several factors: 1) the concentration of unreinforced buildings in urban neighborhoods of St. Louis, Memphis, and other Central U.S. communities, which suggests it may be necessary to shelter 30 to 40 percent of a community's population; 2) the relatively high percentage of urban dwellers living at or below the poverty level line, typically in hazardous structures (e.g., approximately 30,000 Memphis residents live in public housing); 3) the tremendous difficulties in gaining access to damaged areas and displaced populations; 4) the multi-state impact of a New Madrid earthquake resulting in considerable competition for limited resources; and 5) the lack of experience in the Central U.S. in dealing with the consequences of a major earthquake.

It is clear that an effective approach to addressing the basic housing needs of potentially thousands of displaced disaster victims will require a comprehensive, long-term strategy that involves the input and active support from a range of agencies and organizations - Federal, State, local, nonprofit community based, and others.

A Housing Recovery Strategy

Acknowledging the nature, scope, and magnitude of the post-disaster shelter and housing problem in the Central U.S. following a catastrophic earthquake, the Central U.S. Earthquake Consortium, member States, FEMA, the American Red Cross, and other organizations are collaborating to develop - and implement - a *Housing Recovery Strategy for A New Madrid Earthquake*. A Housing Recovery Working Group (see appendix) has been established to coordinate this multi-year initiative.

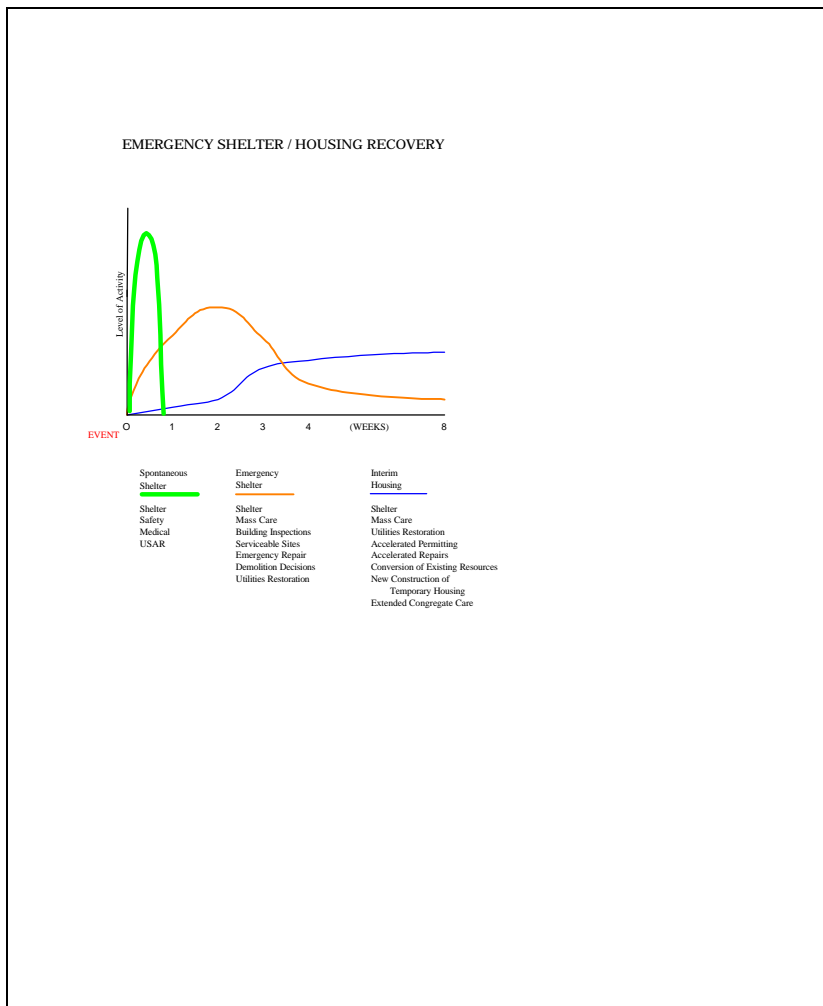
The *Strategy* will complement and support the Federal Response Plan, and set forth a range of pre-disaster, scenario driven *policy options* to guide decision making in four, overlapping phases:

1. Spontaneous Shelter (first 72 hours) - to provide an interim, safe haven while the situation stabilizes
2. Emergency Shelter (first 60 days) - to provide emergency shelter and feeding to displaced population requiring shelter.
3. Interim Housing (first year and beyond) - to provide temporary housing - safe and secure shelter, water, power, and heating - to displaced disaster victims while efforts are underway to make permanent repairs to dwellings, or to find other suitable permanent housing.
4. Permanent Housing - to provide long-term, permanent housing solutions for disaster victims.

Structure and Format of the Housing Recovery Strategy

The chart on the following page depicts the phases of housing recovery, and is intended to reinforce a central point: pre-disaster planning for housing recovery must recognize that decisions and actions that are undertaken in the immediate aftermath (emergency shelter phase) of an earthquake will have major implications for interim housing options and strategies; furthermore, decisions on interim housing (e.g., utilities restoration priorities, building inspection priorities) will be made within days of the disaster. Most importantly, local government agencies - public housing authorities, planning departments, building departments, emergency management agencies as well as utility companies-need to be an integral part of the decision making and planning process.

The good news, loss estimation tools such as *HAZUS* are available that can estimate or forecast losses from future earthquakes. Decisions on emergency shelter and interim housing can be anticipated. Strategies can be developed - *before the disaster* - that describe the likely disaster scenarios; identify many of the key shelter and housing recovery issues that need to be examined; and identify the range of resources that will be needed to expedite housing recovery.



The *Housing Recovery Strategy* is organized into two parts.

- Part 1 Assessing the Nature and Scope of the Housing Shortfall - this section examines the potential losses from a New Madrid earthquake, with an emphasis on housing; the application of HAZUS - FEMA's earthquake loss estimation software program, to support pre-disaster planning and post-disaster rapid impact assessment; and the role of key agencies and organizations in developing the *Strategy*.
- Part 2 Housing Recovery Alternatives that include three, overlapping phases - Spontaneous Shelter, Emergency Shelter; and Interim Housing. For each phase, the Alternatives address the following:
- 1) Assumptions - *what are the operating considerations for each of the shelter/housing phases?*
 - 2) Implementation Constraints - *what factors (social, demographic, political, economic) need to be explicitly considered in developing a housing recovery strategy?*
 - 3) Alternatives - *what policy and program options are available that-when implemented following an earthquake - will most effectively address and provide for the short-term shelter and long-term housing needs of disaster victims? (Note: Some or all alternatives may be appropriate depending upon circumstances.)*
 - 3) Pre-Disaster Actions - *what steps need to be taken, and under whose auspices, to advance the strategy, ensure interagency and intergovernmental coordination, and contribute to a CAPABILITY to carry out the programs and initiatives that will accelerate the provision of safe and secure shelter following an earthquake?*

How to Use the Strategy

The primary objective of the Housing Recovery Working Group is to develop a *coordinated strategy* to meet the short-term shelter and long-term housing requirements of displaced disaster victims, and ultimately to develop a *capability* at the local level to carry out the necessary actions and decisions to optimize available resources in the response and recovery phases following an earthquake.

The *Strategy* is a *unifying* document that can be used by Federal, State, local, nonprofit and non-government organizations, and the business community to assess the nature and scope of the problem; to identify assumptions, constraints, and critical issues to be addressed; to identify a range of policy and program options that - when implemented - will lead to a coordinated strategy for housing recovery; and to prioritize actions and monitor progress in implementing program elements.

Housing Recovery Strategy and Project Impact

Finally, the *Housing Recovery Strategy* can become an integral feature of Project Impact - the FEMA-led initiative to develop *Disaster Resistant Communities*. Disaster "resistance" is an objective. Expressed in terms of performance objectives and performance standards, a community can be said to be disaster resistant when - after a major earthquake, flood, hurricane, or other disaster - the following conditions are present:

- Instead of heavy casualties, there is a *minimal loss of life and limited interruption of public services* - including emergency shelter, emergency medical and health services, electric and water utilities, transportation, and communications.
- The community is able to *manage the response operations* - including the provision of emergency shelter and medical care following a major disaster - supplemented by pre-planned resources and State and Federal government resources.
- The private sector is able to *resume business operations* in a timely manner, contributing to the recovery of the community.
- The community is able to *recover* to at least pre-disaster conditions in an accelerated, ordered, pre-planned manner. This includes the capability to implement a housing recovery strategy that is the product of collaboration between local government leaders, State and Federal government, nonprofit and non-government organizations, and the business community.

In essence, *housing recovery* should be an integral feature of a long-term strategy to reduce the vulnerability of a community to natural hazards, so that when a major or catastrophic disaster *does occur* - policy and program options are in place to expedite housing recovery, and in the process guide decision-making in the critical days and weeks following the disaster.

Part One

ASSESSING THE NATURE AND SCOPE OF THE HOUSING SHORTFALL

One of the first steps in the development of a *Housing Recovery Strategy* for a New Madrid earthquake is to determine the nature and scope of the housing shortfall, and the damages and loss of function of electric power, water supply and other community services.

The American Red Cross conducted a study (1994) of the impacts of a magnitude 7.6 New Madrid earthquake, and the estimated shelter shortfall and shelter requirements in the New Madrid Seismic Zone.

SHELTER AND FEEDING REQUIREMENT NEW MADRID EARTHQUAKE					
	Seven States	FEMA Region IV (KY, TN, MS)	FEMA Region V (IL, IN)	FEMA Region VI (AR)	FEMA Region VII (MO)
Shelter Requirement	576,800	266,800	107,400	47,600	155,000
Shelter Capacity	131,000	43,000	53,000	32,000	21,600
Shelter Shortfall	445,800	223,800	54,400	15,600	133,400
Feeding Requirement	1,516,700	659,100	351,600	119,000	387,000
Feeding Capability	614,150	461,650	76,000	71,000	5,500
Feeding Shortfall (times 2 meals per day)	902,550	197,450	275,600	48,000	381,500
<i>CAPABILITY IS A REFLECTION OF AVAILABLE SUPPLIES, EQUIPMENT, AND PERSONNEL</i>					
<small><i>This graphic, prepared by the American Red Cross, reflects the expected shelter and feeding requirements and shortfalls as a result of a magnitude 7.6 earthquake in the New Madrid Seismic Zone.</i></small>					

Application of HAZUS - FEMA's Loss Estimation Methodology

In developing a *Housing Recovery Strategy*, it is important to have reliable data on the effects of various scenario earthquakes on buildings - including single and multi-family dwelling units - and lifelines (transportation, water supply, and electric power). By being able to estimate or *forecast* the loss of housing habitability and critical services - including water supply and electric power- it is possible to estimate the numbers of *displaced households*.

FEMA's Loss Estimation Methodology can be used to generate "loss estimates" for scenario earthquakes (e.g., magnitude 6.2) and provide the following information for a city or region:

- *Quantitative estimates of losses* in terms of direct costs for repair and replacement of damaged buildings and lifeline system components; direct costs associated with loss of function; casualties; people displaced from residences.
- *Functionality losses* in terms of loss-of-function and restoration times for critical facilities such as hospitals, components of transportation, and utility lifeline systems.
- *Extent of induced hazards* in terms of fire ignitions and fire spread, exposed population and building value due to potential flooding, and location of hazardous materials.

Loss Estimation Outputs

<p>Maps of seismic hazards</p> <ul style="list-style-type: none"> ➤ Contour maps of intensities of ground shaking ➤ Contour maps of permanent ground displacement ➤ Liquefaction probability ➤ Landslide probability <p>Characterization of damage to general building stock</p> <ul style="list-style-type: none"> ➤ Structural and nonstructural damage probabilities by census tract, building type, and occupancy class <p>Transportation and utility lifelines</p> <ul style="list-style-type: none"> ➤ For all components of all lifelines: damage state probabilities, cost of repair or replacement and expected functionality for various times following earthquake ➤ For potable water system: percent service reduction to serviced areas ➤ For electric power systems: probabilistic estimate of service outages <p>Essential facilities</p> <ul style="list-style-type: none"> ➤ Cost of repair or replacement ➤ Loss of beds in hospitals and medical facilities <p>High potential loss facilities</p> <ul style="list-style-type: none"> ➤ Location of dams ➤ Location of nuclear plants ➤ Location of military installations ➤ Others 	<p>Fire following earthquake</p> <ul style="list-style-type: none"> ➤ Number of ignitions by census tract ➤ Percentage of burned area by census tract <p>Inundated areas</p> <ul style="list-style-type: none"> ➤ Exposed population and exposed dollar value of facilities <p>Hazardous material sites</p> <ul style="list-style-type: none"> ➤ Location of facilities with hazardous materials <p>Debris</p> <ul style="list-style-type: none"> ➤ By weight and type of material <p>Social losses</p> <ul style="list-style-type: none"> ➤ Displaced households ➤ Number of people requiring temporary shelter ➤ Casualties in four categories of severity <p>Dollar losses associated with general building stock</p> <ul style="list-style-type: none"> ➤ Cost of repair or replacement ➤ Loss of contents ➤ Business inventory damage or loss ➤ Relocation costs ➤ Business income loss ➤ Loss of rental income
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Thus, HAZUS can serve as a valuable tool in forecasting the short-term shelter and longer-term housing requirements of displaced households - by census tract - for communities and states in the Central U.S. More specifically, HAZUS can be used to estimate the following:

1. Total number of displaced households (due to loss of habitability) - Loss of habitability is calculated directly from damage to the residential occupancy inventory, and from loss of water and power. The methodology for calculating short-term shelter requirements recognizes that a percentage of those displaced from their homes will seek public shelter, and that shelter demand will fluctuate depending on factors such as the presence of pre-disaster homeless and other social and economic factors. Households may also be displaced as a result of fire following earthquake, inundation, (or threat of inundation) due to dam failure, and by significant hazardous waste releases.
2. Demographic profiles of affected population - In developing housing recovery alternatives, it is important to have information on the characteristics of the population that may be displaced following an earthquake. It is known, for example, that based on experience from past disasters, those seeking shelter typically have very low incomes, and that pre-disaster homeless overwhelmingly will seek shelter following a major disaster. In essence, demographic profiles - by census tract - can provide useful information on the relative "coping capabilities" of the potentially impacted population, and assumptions can be made and factored into short-term and long-term housing recovery alternatives.

HAZUS provides the following information:

- Number of people.
- Income breakdown of households.
- Ethnicity of households.
- Percentage of homeowners and renters in the census tract.
- Age breakdown of households.

3.Number of people requiring short-term shelter - The methodology estimates the number of displaced persons who will seek shelter, based on certain assumptions and experiences from recent earthquakes. All households living in uninhabitable dwellings will seek alternative shelter. Many will stay with friends and relatives or in the family car. Others will stay in hotels (depending on the magnitude of the earthquake). Some will stay in public shelters provided by the Red Cross, including pre-disaster homeless. Finally, data from Northridge indicate that approximately one-third of those in public shelters came from residences with no or insignificant structural damage. Some likely were anticipating that aftershocks could cause further damage. Depending on the degree to which infrastructure damage is incorporated into the number of displaced households, that number could be increased by up to 50 percent to account for "perceived" structural damage as well as lack of water and power.

4.Probability of residential units being without water and/or power immediately after the earthquake - In many instances, a dwelling may remain structurally intact and habitable, but be without water or electric power, and thus be considered "unhabitable". HAZUS uses analysis of lifeline utility damages and functionality and factors this into estimates of estimates of residential units without water or power.

5.Percentage of households affected by utility outages likely to seek alternative shelter - Depending on weather conditions, families living in these units may require only feeding and sources of potable water or may be forced to seek alternative shelter. A cold-weather event will also trigger a higher percentage of those affected by loss of power (heat) leaving their otherwise undamaged homes. Because no data exist on the impact of power losses on "perceived habitability," this assessment is left to the user.

6.Fraction of dwelling units likely to be vacated if damaged -The number of uninhabitable dwelling units is not only a function of the amount of structural damage but it is also a function of the number of damaged units that are *perceived* to be uninhabitable by their occupants. All dwelling units located in buildings that are in the complete damage state are considered uninhabitable. In addition, dwelling units that are in moderately or extensively damaged multi-family structures can also be uninhabitable due to the fact that renters perceive some moderately damaged and most extensively damaged rental property as uninhabitable. On the other hand, those living in single-family homes are much more likely to tolerate damage and continue to live in their homes. For these reasons, weighting factors have been developed that describe the fraction of dwellings likely to be vacated if they are damaged.

In summary, HAZUS can be used as a database and planning tool for State and local governments. More specifically, HAZUS can be used to forecast short-term shelter and long-term housing requirements for future earthquakes; determine the geographic profile - by census tract - of impacted populations; estimate fire following earthquake and other seismically induced hazards; and estimate damages and functionality of lifelines.

APPLICATION OF HAZUS TO SUPPORT THE HOUSING RECOVERY STRATEGY

STRATEGY: Among the first steps in developing a *Housing Recovery Strategy* for the Central U.S. is to estimate or *forecast* the nature and scope of the problem. HAZUS will allow CUSEC, member states, FEMA, and other agencies to:

1. Establish a pre-disaster planning information baseline that will provide states and Federal agencies with estimates of damages to buildings and lifelines, economic losses, earthquake induced losses (fire, hazmat releases, debris), casualties, and numbers of displaced victims for scenario earthquakes; and
- 2) Conduct a post-disaster rapid impact assessment of damages, casualties, economic losses, and numbers and distribution of displaced victims.

PRE-DISASTER ACTIONS	RESPONSIBILITY		
	Federal	State	Local/Other
1. Form a HAZUS/Housing Recovery Working Group (and eventually for other functional areas), comprised of the U.S. Army Corps of Engineers, FEMA Mitigation, FEMA Response and Recovery, CUSEC, and perhaps others. The Working Group will refine the action steps, timetables, and coordinate the implementation of HAZUS.	FEMA USACE HUD	Designate lead State	CUSEC
2. Conduct HAZUS training for the U.S. Army Corps of Engineers (April, 1998) and other agencies that will take a lead role in conducting the building inventories and doing the analyses.	FEMA USACE		
3. Develop a HAZUS pilot project for Memphis/Shelby County that will allow the Working Group to concentrate data collection, analyses, and HAZUS application on one community; and develop a "HAZUS methodology" that can be used in other states.	USACE FEMA	Tennessee	
4. Initiate collection of inventory data for Memphis/Shelby County, including: a) Soil maps and liquefaction maps b) Building inventory data	USACE USGS	Tennessee	Local gov't CUSEC CERI
5. Develop a "How to" manual that outlines sources of data, where found, organizations involved, recommendations for other states.	FEMA		CUSEC
6. Initiate building inventory in St. Louis, and other communities/states	USACE		

SPONTANEOUS SHELTER

(First 72 Hours)

GOAL: To provide an interim, safe haven for displaced victims while the situation stabilizes.

ASSUMPTIONS:

1. For the first 24 hours following a catastrophic earthquake, response will be dominated by spontaneous actions - e.g., search and rescue, medical aid, fire suppression - at the local level.
2. People will seek whatever shelter they can, whether that shelter is safe or not.
3. It may be 48 to 72 hours before all pockets of damages are detected and reported.
4. Given the potential for damages over a seven - to ten - state region, and the inability to access the disaster sites, some communities may not receive any substantial outside help for 72 hours.
5. Managed shelters may not open until after 72 hours.
6. People should be prepared to be self-sufficient for the first 72 hours following an earthquake.

IMPLEMENTATION CONSTRAINTS:

1. Urban populations (e.g., Memphis, St. Louis, E. St. Louis) are in a special category by virtue of the high concentrations of hazardous buildings; the lack of financial resources (personal and community) to handle emergencies; the lack of mobility; and the relatively high dependence on government services for day-to-day routines further complicated by the likelihood that the government will be a victim of a major earthquake.

SPONTANEOUS SHELTER

ALTERNATIVE: 1.1 Pre-designated facilities

Pre-designated congregate care facilities; camping in open areas (parks, vacant lots, parking lots, closed streets, backyards, rest areas, truck stops, school play fields); vacant and structurally sound buildings.

PRE-DISASTER ACTIONS	RESPONSIBILITY		
	Federal	State	Local/Other
1. Develop pre-scripted messages for immediate broadcast/dissemination that provide emergency public information on safety procedures, where to go for assistance, where shelters are, etc. The messages - and methods for communicating the messages - should be carefully coordinated for consistency and accuracy.	FEMA	State EMA	Local EMA ARC
2. Develop and test several alternatives for communicating emergency public information to ensure that messages get out even in the most critical conditions.		State EMA	Local EMA
3. Target high risk communities and neighborhoods with pre-disaster training and awareness programs - such as Community Emergency Response Training (CERT) - to promote survival basics in first 72 hours after the earthquake, emergency first aid, safety tips, and initial coping actions (e.g., turn off gas and electricity, extinguish fires).	FEMA	State EMA	Local EMA ARC
4. Pre-designate structurally sound congregate care facilities that can be used in the first 72 hours following an earthquake, and publicize/communicate the availability of these facilities.	USACE	State EMA	Local EMA ARC
5. Enter into agreement with owners/operators of engineered, structurally sound, accessible buildings that can be used in the immediate aftermath of an earthquake to shelter disaster victims.	USACE	State EMA	Local EMA ARC
6. Identify open areas that can be used for congregate; develop procedures for providing basic care during this phase.		State EMA	Local EMA ARC

EMERGENCY SHELTER

(First 60 Days)

GOAL: To provide emergency shelter and sustained emergency care for displaced victims - including food, water, medical attention and information - in an effort to meet basic needs in the aftermath of a major disaster.

ASSUMPTIONS:

1. Some percentage of the population will voluntarily leave the area (at least temporarily); others will remain in the area but secure shelter on their own (staying with relatives or friends).
2. People will prefer being housed near their affected property or in proximity to the disaster site.
3. Approximately 25 percent of the displaced population will seek emergency shelter. There will likely be many more displaced victims than shelters.
4. An emergency shelter strategy must be flexible and responsive to basic needs of a diverse population with a wide range of "coping capabilities" in a major disaster.
5. Sheltering urban populations poses formidable challenges. Sheltering strategies should be needs driven, not program driven.
6. A central element of an emergency shelter strategy is a clear definition of the minimum criteria for shelter selection. These criteria should include consideration of size and configuration of interior space, ability to withstand hazards, facilities for long-term emergency use, restrooms, supplies, emergency power, and capacity to accommodate the medically dependent or those with special needs.
7. Relocation of families to housing facilities outside the disaster region may be necessary until housing resources become available in their respective area or community.
8. There will be an influx of disaster workers, insurance adjusters, building inspectors, and the media - all competing for scarce sheltering resources. Decisions will need to be made concerning how to allocate available shelter among victims and disaster workers.

IMPLEMENTATION CONSTRAINTS:

1. By quickly inspecting buildings after a disaster to assess their safety, the inventory of habitable buildings will increase significantly in the days and weeks after an earthquake. However, an efficient, intergovernmental inspection system does not exist, nor has it been tested in the central U.S.
2. The potential for social conflict will be present, particularly if extended stays in shelters are required. This can be minimized with involvement of community leaders and advocacy groups in the planning process..
3. The occurrence of aftershocks and secondary events such as fires, floods, hazardous material spills will further restrict the availability of shelter sites.
4. Extensive reliance on tents can result in the proliferation of "tent cities."

EMERGENCY SHELTER

~~ALTERNATIVE: 2.1 Traditional congregate shelters~~

The traditional approach pre-designates congregate shelters - schools, churches, community centers, armories, convention centers. These facilities are vulnerable to earthquakes. A 1996 survey conducted by the U.S. Army Corps of Engineers, Memphis District, determined that only 5 percent of designated shelters in Memphis would be available following a magnitude 7.5 earthquake in the New Madrid Seismic Zone.

ALTERNATIVE: 2.2 Conversion of structurally sound commercial and publicly owned facilities

This alternative focuses on the conversion of existing, structurally sound, accessible buildings for use as *emergency* shelter that meet basic human needs in the first 90days. Structures in this category include: commercially owned warehouses, manufacturing plants, unused military bases, hotels, and other transient lodging.

ALTERNATIVE: 2.3 Utilization of tents/other portable structures

This alternative calls for the deployment and installation of tents and other portable structures to serve as *emergency, short-term shelters*. The advantages of this alternative are the availability and transportability of these structures. Disadvantages include the lack of protection against cold weather and societal considerations (e.g., lack of privacy, confined spaces, hygienic issues).

ALTERNATIVE: 2.4 Accelerated repair of damaged dwellings

This alternative aims at increasing the supply of safe housing through targeted/coordinated building inspection program that can be carried out in 60 to 90 days post event. It should be coordinated with the FEMA Housing Inspection process, SBA, State and local agencies, etc.

PRE-DISASTER ACTIONS:	LEAD RESPONSIBILITY		
	Federal	State	Local/Other
1. Develop a consensus on a clear definition of the minimum criteria for shelter selection. Criteria should include consideration of size and configuration of interior space, restrooms, emergency power, and capacity to accommodate medically dependent or those with special needs. Consideration should be given to categories of shelters that are designed for extended stays (up to 6 months).	USACE		Red Cross Local gov't
2. Complete structural surveys (ATC-21) of designated shelters to determine the likely availability of these shelters in the immediate aftermath of a damaging earthquake.	USACE	State EMA	Red Cross Local gov't
3. Identify privately owned structures that could serve as emergency shelters; develop memorandums of understanding with private owners/operators of these facilities; include provisions to encourage/reward employers to provide emergency, short-term shelter for employees.	USACE	State EMA	Local gov't

PRE-DISASTER ACTIONS	RESPONSIBILITY		
	Federal	State	Local/other
4. Prioritize building inspections, assign responsibilities to ensure that designated shelters are inspected in a timely and expeditious manner.		EMAC	Local gov't
5. Identify requirements for building inspectors, shelter managers, and other key personnel, and assess availability from surrounding states for utilization in the sustained emergency phase.	DoD	State EMA	Local gov't
6. Establish linkages with local community services agencies, housing authorities and other local agencies that are the day-to-day "lifeline" of urban populations.	FEMA	State Housing Authorities State EMA	Local gov't
6. Develop/refine emergency public information program to target potentially tens of thousands of displaced disaster victims.		State	ARC
7. Inventory stocks of tents; determine capacity of tents to meet shelter demand; identify space and location requirements to establish tent communities as one element of an emergency shelter strategy.	FEMA	State EMA	Local gov't ARC
8. Consider the unique requirements of the elderly, handicapped, homeless, and other special needs populations.		State EMA	Local gov't ARC
9. Develop policies and criteria for addressing the housing needs of disaster workers, so that competition with victims for scarce housing space can be adjudicated in a systematic way.			Local gov't ARC

INTERIM HOUSING

(First Year and Beyond)

GOAL: To provide safe and secure interim housing and utility services (water, power) to displaced disaster victims while efforts are underway to make permanent repairs to damaged homes, or to find permanent housing.

ASSUMPTIONS:

1. The intent in this phase is not to make all disaster victims “whole” but rather to provide interim housing that is safe and secure.
2. Normal housing resources (e.g., resources FEMA and other agencies normally use to handle interim housing, (such as vacant rental resources) will be unavailable or insufficient to meet demands.
3. Repairing damaged housing will be a primary means of meeting housing needs.
4. Construction resources in the impacted area will be overwhelmed, and the construction industry, including materials, labor and equipment, will also be victims of the disaster. An acceptable rate of reconstruction will not be achieved without augmentation of indigenous construction capabilities from outside the Midwest.
5. The recovery housing problem will vary greatly geographically. Some areas will be so severely impacted that alternative interim housing may need to be constructed. Other areas will be affected in more traditional ways, and repairs may be able to be accomplished with existing community resources in relatively short periods of time. Housing plans must be flexible enough to adapt to this range of conditions.
6. Innovative and non-traditional housing solutions will be needed.
7. Weather, location, and time of year will have a significant impact on the type of housing that will be necessary. Planning should consider the full seasonal cycle, since interim housing requirements may last for one to two years, or more.
8. Displaced residents will resist leaving the general vicinity of their damaged dwellings.
9. If large-scale relocation of victims is to be considered as a response strategy for interim housing, planning for it should be a public process and the resulting plans should be widely disseminated.
10. The predominant form of assistance provided by most housing recovery programs is financial (money to rent or repair home); this may not be appropriate or effective in the most damaged areas in a catastrophic earthquake.

IMPLEMENTATION CONSTRAINTS:

1. The lack of available labor, equipment, and supplies to accomplish repairs will prolong requirements for emergency shelter.
2. The need for expedited construction and repairs in the interest of public safety should be balanced with the equal but more time-consuming objective to incorporate mitigation into new, upgraded building standards.
3. Amending local procedures and bringing in outside manpower to expedite the issuance of building permits to streamline and accelerate rebuilding can initially result in administrative delays.
4. Meeting various regulatory/administrative requirements, ranging from environmental and historic preservation considerations to Davis-Bacon minimum wage provisions to licensing and building codes, can significantly slow down repairing damaged dwellings and constructing interim housing.
5. Measures must be taken to direct local input into housing recovery decisions when local governments may be victims.
6. State and local responsibility for management/ownership of housing resources will be diminished if housing authorities and

community resources are overwhelmed.

7. Matching housing recovery assistance with needs and desires of victims must be taken into account.
8. Disaster victims may expect that the government will make them “whole” in the absence of clear, direct public statements on the nature and extent of disaster recovery assistance to be provided.
9. The lack of appropriate construction sites for temporary housing in the disaster area may require expropriation of privately owned land.
10. The provision of interim housing also will entail the provision of accompanying public health, medical, welfare and other services.
11. There will be a tendency for interim housing to become permanent housing without a long-term housing recovery plan, proactive leadership, and adequate financing.

INTERIM HOUSING

ALTERNATIVE: 3.1 Accelerated repair of damaged dwelling.

Returning displaced victims to their own repairable dwellings in a short period of time is much cheaper and more efficient than obtaining or building interim housing, needs no additional land, and is least disruptive to the life of neighborhoods.

This alternative seeks to increase the supply of habitable dwellings through an accelerated program that targets minimally damaged buildings for emergency repairs. The success of a *rapid repair* strategy will depend on a number of factors including: rapid building inspections; repair standards in place that are agreed upon by pertinent building officials; availability of technical support for getting design and engineering work completed and permitted in a short period of time; availability of public and private financing for repairs; and availability of "residential construction workers" who can make use of volunteer labor and accessible materials.

PRE-DISASTER ACTIONS:	RESPONSIBILITY		
	National	State	Local/Other
1. Develop and maintain lists of large contracting firms specializing in home construction and repair (source: Association of General Contractors).	FEMA	EMAC	
2. Develop stand-by contracts with large national or international construction companies that can quickly mobilize the resources that will be necessary to expedite repairs.	FEMA		
3. Establish procedures and management plan for State oversight of contracts.		State EMA	
4. Develop criteria and standards for repair of damaged buildings.			Local gov't
5. Refine the definition of "habitability" to allow residents to move back into homes that have little or no structural damage.	USACE		
6. Amend the Post-Disaster Building Safety Assessment (ATC-20) forms to include designation of buildings "for quick repair" following an earthquake.	USACE	State EMA	Local gov't
7. Develop memorandums of understanding between Corps of Engineers, State and local governments that will assign responsibility for categories of structures to be inspected following a damaging earthquake.	FEMA HUD	State EMA	Local gov't
8. Prepare instructional materials that can be disseminated to residents to encourage "do-it-yourself" quick fixes to make structures habitable until permanent repairs can be made.	FEMA		Private companies

3.1 continued

PRE-DISASTER ACTIONS:	RESPONSIBILITY		
	National	State	Local/Other
9. Offer formal training now to local building and design professionals so they can help with damage inspection after the earthquake.		Professional Assoc.'s State EMA	Local gov't
10. Develop procedures to facilitate and support the construction of interim housing (e.g., basic, hand-made shelter) on or near premises while repairs are being undertaken.			Local gov't
11. Work with financial institutions to accelerate the processing of loan approval for housing repairs and rebuilding.	HUD FEMA		Local gov't

INTERIM HOUSING

ALTERNATIVE: 3.2 Conversion of existing resources

This alternative calls for remodeling or adaptation of available, structurally sound buildings - or other resources - as temporary housing on an intermediate term. This includes privately owned buildings that can be appropriated by local authorities for conversion to housing. Examples of structures/resources that can be converted to temporary housing are listed below.

<u>Conversion Options</u>	<u>Sources</u>
Vacant public housing stock	HUD, VA, USDA
Travel trailers, campers, recreational vehicles (RV's)	Car rental companies
Rail cars	DOT/FRA, AMTRAK, private companies
Aircraft carriers, other ships	DoD, cruise companies
Campgrounds	DOI/NPS, USDA, state parks
Military bases, holding areas	DoD, state National Guard
Warehouses, storage facilities	Private companies

PRE-DISASTER ACTIONS:	RESPONSIBILITY		
	Federal	State	Local/Other
<ol style="list-style-type: none"> 1. Conduct a structural survey (e.g., ATC-21) of designated shelters and other publicly owned facilities that can serve as interim housing following a major earthquake. 2. Inventory privately owned buildings and other resources that may serve as interim housing. This would include RV's and travel trailers. 3. Develop memorandums of understanding with private sector owners and operators of assets that could be converted into shelters. 4. Anticipate and document requirements associated with overseeing the procurement, siting, and placement of mobile homes and other forms of interim housing. Develop memorandums of understanding between appropriate parties. 	FEMA	State EMA State EMA State EMA	Local EMA Local gov't Local gov't

INTERIM HOUSING

ALTERNATIVE: 3.3 Construction of new interim housing

There is a wide range of modular building systems available in the United States which can be used to house large numbers of disaster victims. This option would require potentially large, serviceable tracts of land. In a catastrophic disaster, "interim" housing can become permanent.

PRE-DISASTER ACTIONS:	RESPONSIBILITY		
	Federal	State	Local/Other
1. Develop and/or refine space and location criteria for selection of sites that can support new interim housing.	USACE FEMA		Local gov't
2. Identify a range of serviceable tracts of land in and around high risk communities that can serve as interim housing sites.	USACE		Local gov't
3. Develop and maintain a list of manufacturers and suppliers of modular/prefabricated manufactured housing.	FEMA	EMAC	
4. Seek waivers of local building codes, permitting requirements, and fees to accelerate construction of interim housing (NOTE: existing or more stringent codes should be strictly enforced in construction of permanent housing).	FEMA		Local gov't
5. Develop a process and criteria that can be put in place to expedite decision making on demolition of unsafe structures.	HUD		Local gov't
7. Consider designing interim housing to become permanent housing, involving community planners and housing officials in the pre-disaster planning process.	HUD		Local gov't
7. Work with developers to identify what government can do to assist them in expediting construction of interim housing.	HUD		Local gov't Trade groups
8. Identify incentives for private investment in interim housing construction.	HUD		Lenders

INTERIM HOUSING

ALTERNATIVE: 3.4 Extended congregate care

In a catastrophic earthquake, it is likely that a significant portion of the emergency shelter population will be in congregate shelters up to 60days. This is due to a number of factors, from lack of water, power, and other services, to the sheer complexity of matching victims' housing desires with viable options. Reliance on extended congregate shelter is not desirable, but should be anticipated and planned for.

PRE-DISASTER ACTIONS:	RESPONSIBILITY		
	Federal	State	Local/Other
<ol style="list-style-type: none"> Develop standards so future buildings that will be used as shelters are constructed and equipped with sufficient interior space and facilities for long term emergency shelter use. Minimum features should include restrooms, supplies, and emergency power. 	FEMA USACE		ARC

INTERIM HOUSING

ALTERNATIVE: 3.5 Establishing Interim Housing in Street Rights-of-Way

In urban areas, in particular, street rights-of-way can be used as interim sites for housing following an earthquake. The advantages are: displaced victims can be in or near their neighborhoods, which will allow victims to remain in familiar social and neighborhood surroundings, and facilitate rebuilding; and services can be brought to the interim housing sites (e.g., "service pods" consisting of rest room facilities, utilities, common cooking areas, child care, communication can be incorporated into design layouts).

PRE-DISASTER ACTIONS	RESPONSIBILITY		
	Federal	State	Local/Other
1. Determine feasibility of using street rights-of-way and other vacant spaces (e.g., backyards, parking lots, neighborhood parks) in high-risk communities for interim housing; assess post-disaster accessibility; determine space and location requirements for "service pods."	FEMA HUD		Local gov't (Planning & Building & Depts)
2. Develop various prototypes and siting concepts based on available land configurations in "typical" high risk communities. Identify access points for sewer, water, power, and other utilities for residents of interim housing.	FEMA HUD		American Institute of Architects
3. Identify a range of pre-fabricated, modular, and/or core construction building types that can be built on-site, or transported to vacant parcels.	FEMA		

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