Chapter 5

A Planner's Tool Kit

Most communities never need to avail themselves of the full arsenal of planning tools that exists to address hazard mitigation and post-disaster reconstruction issues. It is worthwhile, however, to establish a full inventory of those tools and to understand how they might be used effectively to tackle specific challenges. Most planners dealing with natural hazards issues have learned on the job and not in planning school. This chapter is designed as a primer for those new to the task and as a quick reference source for veterans.

Whole books have been written about many of the specific techniques outlined here. This chapter, therefore, will not seek to discuss any of them in depth but will provide an overview of the range of tools planners can use and references to other sources that can provide whatever depth is needed. For that reason, the text of this chapter will consist simply of brief commentaries on the most valuable features of each tool, supplemented by a pull-out chart (Figure 5-1 on page 117) comparing the circumstances under which the tools might be used.

The planning tools described in this chapter have been divided into emergency measures and the larger roster of tools appropriate to long-term hazard planning. Emergency measures may be under the direct authority of other departments. If so, the planner's role is discussed. The long-term measures have been divided into several categories. The descriptions note whether the tool is especially adaptable, or unsuitable, for particular types of post-disaster scenarios.

This chapter concludes with a model recovery and reconstruction ordinance prepared by Kenneth C. Topping specifically for inclusion in this report. The model ordinance integrates the use of many of the most essential planning and emergency management tools to facilitate post-disaster recovery and reconstruction and should be read closely in connection with the details of the tool kit itself.

EMERGENCY MEASURES

Damage Assessments

Damage assessments are a focal point of the post-disaster environment. The building department is usually in charge of this process, but planners should participate on the assessment team in order to obtain data specific to planning issues. The sidebar on the following page lists the data types that are most useful in a planning context. The challenge for planners is to help design the assessment process to glean as much useful information for local planning purposes as possible while also meeting the needs of state and federal disaster agencies considering a disaster declaration or seeking to identify specific causes of damage. Combining damage assessments with modern data management tools, such as a Global Positioning System (GPS)

or a Geographic Information System (GIS), described below under "Long-Term Measures," is increasingly the sign of a department sophisticated in disaster planning operations. (For more information on this topic, see FEMA 1994, Unit 3.)

The building department is responsible for administering any moratorium on development after a disaster, but planners should coordinate with building officials so that they are aware of the time planners may need to revisit the pre-disaster plan. A moratorium can buy valuable time for planners to reassess the wisdom of rebuilding in a stricken area before the permits are issued.

Development Moratorium

The building department is responsible for administering any moratorium on development after a disaster, but planners should coordinate with building officials so that they are aware of the time planners may need to revisit the pre-disaster plan. A moratorium can buy valuable time for planners to reassess the wisdom of rebuilding in a stricken area before the permits are issued. Planning departments must use the tool selectively, however, by applying it to areas where a strong justification emerges from damage assessments. (For more details on this topic, see the model ordinance at the end of this chapter.)

Temporary Repair Permits

Because the building department is responsible for issuing repair permits, planners will not be making decisions about allowing permits for repairs. They can, however, help set policy that allows city officials to distinguish between those temporary repairs that get part of the community back on its feet and those that may compromise important opportunities for hazard mitigation. (See the model ordinance below.)

Demolition Regulations

The building department is in charge of issuing demolition permits, but planners should provide input where they feel existing regulations or practices may impede long-term planning goals, particularly in the area of historic preservation. Chapter 4 discussed the opportunities here for using emergency demolition to remove the most damaged buildings quickly, to allow neighborhoods to remove dangers and eyesores that may threaten or stymie redevelopment, and to involve special interests, such as the historic preservation community, in decisions on landmarks in order to avoid unnecessary controversy over disaster policies. (See the model ordinance below.)

Temporary housing sites can become permanent unless recovery and reconstruction are managed effectively. . . . Preparing effectively for this problem in a plan for post-disaster recovery can minimize problems by ensuring that temporary housing is provided in areas conducive to residential uses.

Zoning for Temporary Housing

Temporary housing sites can become permanent unless recovery and reconstruction are managed effectively. The administration and development of temporary housing for disaster victims is largely the domain of social services and emergency services departments. Preparing effectively for this problem in a plan for post-disaster recovery can minimize problems by ensuring that temporary housing is provided in areas conducive to residential uses. It can also allow planners to collaborate with other city officials, such as those involved in housing and human services, in identifying locations that will facilitate the effective delivery of emergency services to displaced residents following a disaster and to avoid potential social conflicts that can arise in already tense surroundings. Periodic updating will be required as land-use patterns change within the community, especially if areas suitable for temporary housing become built out. (For more information, see the model ordinance below and Governor's Office of Emergency Services (1993, Ch. 22).)

Setting Priorities for Infrastructure Repairs

Setting priorities for repairs to infrastructure is predominantly the responsibility of the public works or engineering department. Ideally, a community will

Gathering Planning Data Through Damage Assessments

The table below is an attempt to categorize for planners the types of damage assessment data most valuable for purposes of planning post-disaster recovery and reconstruction. It illustrates some of the reasons planners should involve themselves in the damage assessment process, at least to the extent of shaping the agenda for the types of information collected.

DATA NEEDED FOR POST-DISASTER RECOVERY AND RECONSTRUCTION	FLOODS	EARTHQUAKES	HURRICANES	TORNADOES	WILDFIRES
Areal extent of damage	l	l	l	l	l
Number and location of destroyed structures[a]	l	l	l	l	l
Number and location of red, yellow, green tagged buildings or unsafe buildings if tagging is not used[b]	l	l	l	l	l
Use and occupancy of each damaged structure, number of residential units by tag[c]	l	l	l	l	l
Historic status or approximate age[d]	l	l	l	**O**	l
Type of construction[e]	l	l	l	**O**	l
Condition of infrastructure—bridges, streets, sewers, water lines, etc.[f]	l	l	l	**O**	l
Dollar value of damage[g]	**O**	**O**	**O**	**O**	**O**

Key:

l = very important

O = less important

Notes:

a. Locational information is critical and unlikely to come in the form that planners would like for combining with other planning data. Usually, damage data are collected by address; planning data are often assembled by parcel number. Planners may need to devise a system for incorporating damage data into existing databases, such as a Geographic Information System (GIS) or a Geographic Positioning System (GPS).

b. Most areas subject to earthquakes are prepared to use the ATC-20 system for damage assessment with red, yellow, and green tags. With earthquakes, it is important to remember that aftershocks mean that damage assessment is done over and over again.

c. Planners need to know the uses of damaged structures. If they have a database system into which they can enter the tagging data, they will not have to rely on field inspection for this information. This is an area for preplanning. Quickly identifying the number of housing units that cannot be occupied is essential for planning shelters, temporary housing, and permanent replacement housing. Similarly, quickly identifying damaged commercial and industrial buildings can help you anticipate needs for temporary business sites and facilities.

d. Historic status is important because FEMA procedures for demolition and repairs are different for these buildings.

e. Type of construction is important because it may indicate the need for a mitigation program based on construction type (URMs or tilt-ups in earthquakes, unelevated buildings in floods, houses with certain kinds of roofs in hurricanes and wildfires, etc.). However, this can be much more problematic in the case of tornadoes.

f. Decisions about rebuilding depend on knowing the status of infrastructure.

g. Value of damage is a part of the assessment because the state and FEMA need it to determine the need for a disaster declaration and the level of aid needed.

have used its post-disaster plan to identify the most essential infrastructure and set priorities for repairs, replacement, or movement out of hazardous areas. It can then move quickly to implement a pre-existing priority list after the disaster, based on its inventory of damaged structures and roadways. Such a list must remain somewhat flexible, be updated regularly, and be revised based on emergency circumstances. This tool has some implications for planning priorities and must be coordinated with current budgetary realities, ongoing pre-disaster mitigation efforts for public facilities, and effective plans for accessing federal disaster assistance. (For more information, see BSSC (1987a); Hanley (n.d.); and David Plummer & Associates (1995).)

LONG-TERM MEASURES

In addition to rebuilding the community and restoring normal economic and social activity, all the tools below should be used to reduce vulnerability to natural hazards and enhance public safety. Many of these tools will be used outside the disaster recovery context and should be part of an ongoing program of hazard mitigation. However, to the extent possible, we attempt to discuss in precise terms the triggers that activate the use of these tools specifically in the post-disaster period. It is important also to keep in mind that the tools can be used to address hazards other than those that are mentioned specifically. Figure 5-1 may serve as a more comprehensive guide in this respect.

The most effective but probably most costly way of moving development out of harm's way is to acquire the land and retain it in public ownership for open space. The most common use of this approach is in floodplains, perhaps secondarily in coastal zones. But it has also been used in mountainous areas including such Southern California communities as Claremont, where wildfire and landslide hazards are prevalent.

While the tools described below are listed in six categories related to the authority that enables planners to use them, some tools may be used in other contexts. The division of categories is not clear-cut because, in real life, communities employ a variety of methods to organize their local development codes. Many design tools separated here into the section on design controls, for instance, appear in local zoning ordinances, as do some subdivision tools. While building codes might not always be seen in that context, they do affect design and provide a form of quality control in the context of mitigating natural hazards. To avoid redundancy, however, we have listed each tool just once in the category where it best belongs.

General Planning Tools

Fee simple acquisition. The most effective but probably most costly way of moving development out of harm's way is to acquire the land and retain it in public ownership for open space. The most common use of this approach is in floodplains, perhaps secondarily in coastal zones. But it has also been used in mountainous areas including such Southern California communities as Claremont, where wildfire and landslide hazards are prevalent. Occasionally, the two objectives combine, as in Bellevue, Washington, which developed an open space program for managing riparian open space in an area with steep riparian slopes (Sherrard 1996). Boulder's plan for Boulder Creek, also a hilly riverine environment, merits attention as well (Havlick 1995). Arnold, Missouri, the subject of the case study in Chapter 8, provides a highly successful example of a community combining an ongoing greenway acquisition program with post-disaster dollars to accelerate the achievement of its objectives (Brower, Beatley, and Blatt 1987, Ch. 5; Wetmore 1996a and 1996b).

Property acquisition has a special context in the flood program because of specific National Flood Insurance Program (NFIP) provisions and funds for this purpose. The best approach remains one of targeted priorities established through a long-range plan that includes multiple objectives and funding sources to help underwrite the cost of acquisition.

The merits of property acquisition are not limited to floodplains, however. Salt Lake City, faced with resident concern about the construction of a

Figure 5-1. Planning Tools and Their Post-Disaster Applications

TOOLS BY CATEGORY	FLOOD	HURRICANE	EARTHQUAKE	WILDFIRE	TORNADO	LANDSLIDE
EMERGENCY						
Damage assessment	x	x	x	x	x	x
Development. moratorium	x	x	x	x	x	x
Temporary repair permits	x	x	x	x	x	x
Zoning for temporary housing	x	x	x	x	–	–
Prioritize infrastructure repairs	x	x	x	x	x	–
PLANNING TOOLS						
Acquisition	x	x	x	x	x	x
Easements	x	x	–	x	–	x
Infrastructure policy	x	x	x	x	–	x
Floodplain management plan	x	x	–	–	–	–
Environmental review	x	x	x	x	x	x
Annexation plans	x	x	x	x	–	x
Stormwater management plan	x	–	–	–	–	–
ZONING TOOLS						
Nonconforming uses	x	x	x	x	x	x
Performance standards	x	x	x	x	x	x
Special use permits	x	x	x	x	–	x
Historic preservation	x	x	x	x	x	–
Density controls	x	x	x	x	–	x
Floating zones	x	x	–	x	–	x
Overlay zones	x	x	x	x	x	x
Coastal Zone Management regulations	x	x	–	–	–	–
Floodplain zoning	x	x	–	–	–	–
Setbacks	x	x	x	x	–	x
Site plan reviews	x	x	x	x	–	x
Height and bulk regulations	x	x	–	x	–	x
Wetlands development regulations	x	x	–	–	–	–
SUBDIVISION CONTROLS						
Subdivision regulations	x	x	x	x	–	x
Road width/access	x	x	x	x	–	x
Water supply	–	–	x	–	–	–
Hillside development regulations	–	–	–	x	–	x
Open space requirements	x	x	x	x	–	x
DESIGN CONTROLS						
Trees and vegetation	x	x	–	x	–	x
Design review	x	x	x	x	x	–
Building codes	x	x	x	x	x	x
FINANCIAL TOOLS						
Targeting grant funds	x	x	x	x	x	x
Relocation aid	x	x	x	x	–	x
Special districts	x	x	x	x	x	x
Redevelopment projects	x	x	x	x	x	x
Lending policies	x	x	x	x	x	x
Transfer of Development Rights	x	x	–	x	–	x
MANAGEMENT TOOLS						
Interjurisdictional coordination	x	x	x	x	x	x
Geographic Information System	x	x	x	x	x	x
Geologic investigation	–	–	x	–	–	x
Soil stability ratings	x	x	x	–	–	x
Public education	x	x	x	x	x	x

residential apartment building astride a known fault line on the Wasatch Front, acquired the parcel immediately to the north, including some old apartments it then refurbished, and established Faultline Park as permanent urban open space that serves in part as a public education tool on seismic hazards (Tyler 1995). However a community chooses to proceed, it is clear that additional money for land acquisition is often available after a disaster for those communities ready to take advantage of it. Collaboration with local officials in this area can yield significant dividends.

Easements. Easements can be a very cost-effective means of controlling development without having to accept the responsibilities of being a public landlord. One means of securing easements is to work closely with nonprofit land trusts who generally share the community's mitigation goals and are willing to move quickly to acquire conservation easements or to accept donated easements. The Nature Conservancy is a national organization that has teamed up often with local and state governments to preserve land through donations, easements, and other means. The Land Trust Alliance has produced some excellent guidebooks on this subject. (For more information, see Lind (1991); Land Trust Alliance (1993); and Trust for Public Land (1995).)

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Infrastructure development policies. The placement of infrastructure in hazard-prone areas is a significant step in facilitating the development of those areas. The post-disaster period offers a time for reassessing the desirability of replacing damaged infrastructure in such locations, and of considering mitigation options (e.g., elevating roadways, widening culverts) making use of Federal Emergency Management Agency (FEMA) Public Assistance or Hazard Mitigation Grant Program (HMGP) funds to accomplish such objectives (Design Center for American Urban Landscape 1994, pp. 31-36).

Infrastructure considerations are often particularly critical when they involve facility extensions beyond the city limits. Philipsborn (1997), in the example of Boone, North Carolina, discussed in Chapter 3, notes that the city planned to "waive current policy by agreeing to extend sewer and water services to the proposed new site" of a nursing home in order to facilitate its relocation out of the city's floodplain to a new location outside the city limits. What might normally have been seen as a sprawl generator instead served a purpose for flood mitigation.

Infrastructure in the urban/wildland interface is uniquely vulnerable because of the high temperatures wildfires can generate and the speed with which they often move through an area. Where a city chooses to extend sewer and water lines and other utility services is a powerful influence on development patterns and can help orient construction away from the most hazardous areas. Where a city does choose to extend these facilities, however, it can also take precautionary measures to protect that investment. One common measure applied to both publicly and privately owned utilities is to require that power, telephone, cable, and other lines be placed underground (Slaughter 1996, Ch. 5).

While engineering measures can address many of the serious seismic safety concerns that attend the development of infrastructure and utility lifelines, it is also reasonable for planners to argue that these measures will be even more effective if siting avoids the areas where the hazards are greatest. Moreover, many public facilities influence the siting of other development that follows. The siting of these facilities and the extension of infrastructure not only can set a worthwhile public example, but also can facilitate or discourage other types of private investment. Maximizing the safety of public and utility infrastructure also increases the community's ability to recover and to restore essential services following an earthquake.

FEMA has produced a series of useful manuals addressing seismic hazard abatement for lifeline utility services. (See also BSSC (1987a) and BSSC (1987b).)

In the end, there is no substitute for incorporating natural hazard mitigation considerations into infrastructure policy as a matter of routine in all project reviews. Sometimes, this is as much a matter of influencing the timing of development as of actually preventing it, depending on the other public policy objectives involved. Adequate public facilities ordinances (APFOs) have become a means of staging growth by clarifying where and when a community intends to provide the infrastructure to support it (White 1996).

Designed primarily to steer development away from areas where local governments want to slow growth, these ordinances force developers to pay for the necessary expansion of infrastructure if they wish to build in areas where the infrastructure does not already exist. This can include impact fees for schools, the costs of adding new water and sewer lines, and a host of other particulars that facilitate the presence of new housing or commercial development. While these measures do not prevent development in hazardous areas, they can be used to raise its costs and thus provide a market mechanism for redirecting development to areas where infrastructure already exists. Much of the original objective of APFOs was to conserve public infrastructure expenditures, but communities can recraft their ordinance language to use this tool to limit development in hazard-prone areas. Obviously, APFOs are a companion measure to infrastructure development policies and help to make them more effective in their intent. They have been widely used in Florida and Maryland. (For more information, see Morris and Schwab (1991); Maryland Office of Planning (1996); and White (1996).)

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Floodplain management plan (and flood insurance regulations). The regulations associated with NFIP can be viewed in either of two ways: as a set of restrictions that dictate how a community may build in a floodplain, or as a starting point for creative local efforts to mitigate flood hazards. Many communities are ambivalent when choosing between these perspectives because of development pressures, but repetitive losses and the emotional shock of a major flood have induced in others a change of heart, even to the point of relocating entire communities (Becker 1994a and 1994b). While NFIP requires only the adoption and enforcement of a floodplain management ordinance, the desire to provide a first-rate rationale for the ordinance can be the motive force behind a floodplain management plan that can examine the full range of issues facing the community. (See also Wetmore (1996a and 1996b); Schwab (1996a); Tulsa (1994); and FIFMTF (1995).)

FEMA's Community Rating System (CRS) is an attempt to provide communities with incentives through rate reductions to take those extra steps in developing and implementing an effective floodplain management plan. It uses a scoring system for a variety of activities, including public information, mapping and regulatory activities, flood damage reduction, and flood preparedness. (See sidebar). The higher the score, the more rate reductions a community earns, in 5 percent increments from the standard insurance rates. FEMA (1995e through 1995f) has produced various publications connected with CRS to delineate the point system, provide examples of quality plans, and encourage local initiative in responding to flood problems. Communities developing floodplain management plans should also take note of the Flood Mitigation Assistance (FMA) program created by Congress under the National Flood Insurance Reform Act of 1994 (P.L. 103-325) to provide grants through FEMA to communities for cost-effective mitigation projects. FMA requires a community to develop a flood mitigation plan as a prerequisite for obtaining funds for projects.

CRS Credited Activities

PUBLIC INFORMATION ACTIVITIES

Elevation Certificates

Map Determinations

Outreach Projects

Hazard Disclosure

Flood Protection Library

Flood Protection Assistance

MAPPING AND REGULATORY ACTIVITIES

Additional Flood Data

Open Space Preservation

Higher Regulatory Standards

Flood Data Maintenance

Stormwater Management

FLOOD DAMAGE REDUCTION ACTIVITIES

Repetitive Loss Projects

Floodplain Management Planning

Acquisition and Relocation

Retrofitting

Drainage System Maintenance

FLOOD PREPAREDNESS ACTIVITIES

Flood Warning Program

Levee Safety

Dam Safety

Environmental reviews. Although they are hardly synonymous, it should not be surprising that many of the most hazardous areas are also among the most environmentally sensitive. Floodways, coastal zones, hillsides, and forested areas all provide essential habitat for countless varieties of flora and fauna, yet their scenic and other amenities are likewise immensely attractive for human development. The purpose of environmental reviews is to construct a clear picture of what resources are affected, and in what ways, by proposed development. Although the National Environmental Policy Act (NEPA) brought this mechanism to prominence on the national scene, many state laws establish environmental review mechanisms beyond those of federally mandated environmental impact assessments.

Mandelker (1997), among others, has noted that state environmental policy acts (SEPAs) responded in most cases to the failure of local planning to address environmental concerns, yet differ from local comprehensive planning in largely adopting a case-by-case approach to environmental problems by focusing on reviewing the environmental impacts of individual proposed development projects. This can lead to some duplication of SEPA reviews in local planning and development approval processes. APA's *Growing Smart℠ Legislative Guidebook* has sought to integrate environmental reviews with planning and development regulations in its model state planning legislation. It also uses natural hazards as a trigger for environmentally sensitive areas ordinance reviews. The state of Washington includes geologically hazardous areas and 100-year floodplains in its sensitive areas legislation.

Annexation plans. The problem of controlling development just beyond the city limits is a classic one in American urban planning. State laws governing extraterritorial zoning controls by municipalities vary widely, so there is no good way here to discuss the issue briefly. Likewise, planners must consult state laws to determine what annexation policies will be legitimate for their own community. The essential principle for natural disasters, however, is that mitigation should be included as a routine consideration in proposed annexations, particularly in the aftermath of a natural disaster, where there may be some reason to annex a devastated area to facilitate redevelopment and where it may be in the municipality's best interests to gain greater control over the quality of that redevelopment. Healdsburg, California, for instance, requires a specific plan prior to annexation that includes an evaluation of geologic hazards. Specific plans and development agreements are potent tools for incorporating such concerns into the annexation process (Tyler 1995).

Stormwater management plans. As it is evident that storms can produce floods, it stands to reason that poorly managed stormwater flows can accelerate and exacerbate them, almost invariably adding a load of nonpoint pollutants in the bargain. In recent years, as Miller (1994) notes, stormwater management has become more holistic in many communities as they have begun to grapple with the larger impacts of past watershed management practices. Although the U.S. Environmental Protection Agency (EPA) has pushed municipalities to develop adequate stormwater management plans for environmental reasons, using the regulatory device of requiring applications for municipal stormwater permits, these have the impact of also pushing the same local governments to control flooding by better managing stormwater runoff. Local planners should seize this process as an opportunity for better water quality and nonstructural flood control rather than allowing their communities to regard these as just another set of onerous federal mandates (Schwab 1992).

The purpose of stormwater management plans, often developed by special watershed management districts, is to develop water policy for an entire

Floodplain Management Plan Elements

In formulating community development goals and in adopting floodplain management regulations, each community shall consider at least the following factors—

(1) *Human safety;*

(2) *Diversion of development* to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible floodplain use;

(3) *Full disclosure* to all prospective and interested parties (including but not limited to purchasers and renters) that (i) certain structures are located within flood-prone areas, (ii) variances have been granted for certain structures located within flood-prone areas, and (iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;

(4) *Adverse effects of floodplain development* on existing development;

(5) *Encouragement of floodproofing* to reduce flood damage;

(6) *Flood warning and emergency preparedness plans;*

(7) *Provision for alternative vehicular access and escape routes* when normal routes are blocked or destroyed by flooding;

(8) *Establishment of minimum floodproofing and access requirements* for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communications centers, water and sewage pumping stations, and other public or quasi-public facilities already located in the flood-prone area, to enable them to withstand flood damage, and to facilitate emergency operations;

(9) *Improvement of local drainage* to control increased runoff that might increase the danger of flooding to other properties;

(10) *Coordination of plans* with neighboring communities' floodplain management programs;

(11) The requirement that *all new construction* and substantial improvements in areas subject to subsidence be *elevated above the base flood level* equal to expected subsidence for at least a 10-year period;

(12) For riverine areas, requiring *subdividers to furnish delineations for floodways* before approving a subdivision;

(13) *Prohibition of any alteration or relocation of a watercourse,* except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood-carrying capacity within the altered or relocated portion of the watercourse is maintained;

(14) Requirement of *setbacks for new construction* within Zones V1-30, VE, and V on a community's FIRM;

(15) Requirement of an *additional elevation above the base flood level for all new construction* and substantial improvements within Zones A1-30, AE, V1-30, and VE on the community's FIRM to protect against such occurrences as wave wash and floating debris, to provide an added margin of safety against floods having a magnitude greater than the base flood, or to compensate for future urban development;

(16) Requirement of *consistency between state, regional, and local comprehensive plans* and floodplain management programs;

(17) *Requirement of pilings or columns* rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the floodplain and to minimize the potential for negative impacts to sensitive ecological areas;

(18) *Prohibition,* within any floodway or coastal high hazard area, of plants or facilities in which *hazardous substances* are manufactured;

(19) Requirement that a *plan for evacuating residents* of all manufactured home parks or subdivisions located within flood-prone areas be developed and filed with and approved by appropriate community emergency management authorities.

Source: 44 CFR 60.22(c) (part of the National Flood Insurance Program (NFIP) Regulations for Floodplain Management). Emphasis has been added.

The Community Rating System

THE FLOODPLAIN MANAGEMENT PLANNING PROCESS

Communities in the National Flood Insurance Program (NFIP) that use the Community Rating System (CRS) receive a reduction of floodplain insurance premiums for actions they have taken to reduce flood losses. As of October 1, 1998, 894 communities, representing 66 percent of the NFIP policy base, are now participating in CRS. CRS communities are given credit points for 18 activities in four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. The greater the number of creditable actions taken, a larger the reduction in floodplain insurance premiums for residents. Credit points are based upon how well an activity implements the goals of the CRS. Communities may receive credit points for floodplain management planning, open space dedication, and acquisition and relocation of floodprone properties.

CRS guidance materials stress that the floodplain management planning process is far more valuable than the plan document that results from it. Planning is viewed as a crucial means for overcoming the problem of conflicting goals and actions by various local government departments and by the public that may hinder flood loss reduction. There are seven recommended steps in the CRS planning process.

Problem Identification. The local government should obtain data describing water sources, depth of flooding, repetitive loss areas, special hazards, and other information from FEMA regional offices and other federal and state agencies.

Flood Hazard Area Inventory. CRS credits are given for an inventory that addresses floodprone buildings, damage projections, development trends, development constraints (including zoning and subdivision regulations), critical community facilities (i.e., hospitals, water treatment plants), and floodprone areas that provide natural and beneficial floodplain functions (e.g., flood storage areas and wildlife habitats).

Review of Possible Activities. The local government needs to review all existing and proposed activities that can prevent or reduce flood losses. It must also review activities that can protect the natural functions of the floodplain, including stormwater quality management, wetlands protection, and open space conservation.

Coordination with Other Agencies. There needs to be a review of government agencies whose activities may affect floodplain management efforts or that could support such efforts. The state NFIP coordinator, FEMA regional hazard mitigation officer, and regional planning agencies staff will be helpful in this regard.

Action Plan. This plan must include a schedule and budget for all activities that will be taken to reduce flood losses. CRS materials recommend that each community develop its own criteria for selecting which activities are appropriate to its needs and that are fiscally reasonable.

Public Input. The participating local government must document how residents, affected businesses and organizations, and local officials will be involved in the floodplain management planning process. CRS recommends a task force of community representatives.

Adoption and Implementation. The plan must be officially adopted by the local legislative body to receive CRS credit. A planning department staff person should be assigned responsibility for coordinating the implementation of actions listed in the plan.

Source: Morris (1997). CRS figures were updated in 1998.

watershed, including the full range of issues like aquatic habitat preservation, water supply, water quality (through pollution prevention and runoff controls, among other devices), scenic preservation, and the development of greenways. These plans generally rely on a good deal of interjurisdictional cooperation for their success because most of the truly effective controls on the nonpoint-source runoff that affects stormwater quantity and quality rely on local zoning and subdivision regulations (Herson-Jones 1995; Jeer et al. 1998).

Some of these local controls may be outside the planning department, perhaps in the building department, such as regulations concerning

construction practices. One possibly underestimated factor in helping to minimize flooding risks due to excess runoff and water channel clogging is the application of best management practices to soil erosion and runoff from construction sites. Construction regulations adopted in the form of erosion control ordinances can require builders to undertake measures to stem erosion during the periods when bare soil is subject to the forces of wind and precipitation. These efforts can include straw bales, detention ponds, and other devices to arrest the movement of soil downhill and into waterways, where sediment can clog the flow of flood waters in an emergency. (For more information, see Kennedy (1992); NIPC (1991); Wisconsin DNR (1989).)

A related but more difficult challenge is that of controlling nonpoint runoff from agricultural operations, usually a subject tackled through state or federal environmental regulations and through programs of the U.S. Department of Agriculture's Natural Resources Conservation Service. The swampbuster provisions of the federal Food Security Act of 1986 have also gone some distance in reining in this problem. Among other notable efforts in this area are those of the states in the Chesapeake Bay region.

Capital improvements plans. Capital improvements programming is the multiyear scheduling of public physical improvements. Local governments, to be run soundly and efficiently, must have a means of projecting both their needs for physical improvements and their means over time of paying for them. The capital improvements plan (CIP) is the way to accomplish this. These improvements can include everything from street widening to sidewalk and curb repair to lighting renovations, among dozens, if not hundreds, of other possibilities. The plan deals with the means of financing these activities, such as general obligation bonds, special assessments, the use of state and federal grants, and various taxing devices. Many of these are discussed below under financial tools, but their inclusion in a CIP is critical for ensuring the priority of such projects on the local public agenda.

The relevance for disaster planning is clear. CIPs can call for public expenditures to reduce hazards through a variety of locally appropriate hazard mitigation and disaster protection measures, including raising bridge heights in flood-prone areas, widening culverts, seismic strengthening of buildings, and the development of emergency public shelters. (For more information, see Bowyer (1993) and So and Getzels (1988).)

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Zoning Tools

Zoning is a versatile tool in dealing with almost all natural hazards. It can be used:

- to prevent new development in hazardous areas;
- to allow new development in hazardous areas while minimizing densities;
- to influence the level of site plan review that a proposed development project must undergo;
- as an incentive to retrofit an existing building to resist forces associated with natural hazards (as when density bonuses are offered in exchange for retrofitting buildings);
- to control changes in existing building occupancy in hazardous areas; and
- to facilitate the post-disaster rebuilding process in severely damaged areas (Schwab 1998).

Floodplain management is the most frequent hazard-related objective of zoning because not only is flooding the most common hazard, but also because mapping of flood hazards most easily lends itself to such purposes. Most communities rely on the use of Flood Insurance Rate Maps (FIRMs) to determine the boundaries of floodplain zones in local ordinances. The mapping process itself is described in greater detail in Chapter 7. In concert with floodplain management regulations based on NFIP minimum requirements, zoning remains one of local government's most powerful tools for controlling development in special flood hazard areas, especially if it is tied to a well-prepared floodplain management plan. Nonconforming use regulations are reinforced by provisions in NFIP regarding the reconstruction of substantially damaged buildings. Setbacks can be used to provide waterfront buffers and minimize flood exposure of buildings. Density restrictions can orient development away from the most hazardous areas. All of these devices are described elsewhere in this section, but a floodplain district in the zoning ordinance is the land-use umbrella under which flood mitigation objectives can be pursued.

Focusing strictly on hazard mitigation, however, is a major mistake. Floodplain zoning is an ideal regulatory tool for achieving multiple community planning objectives, including resource conservation, open space, water-quality protection, and recreation goals. (See also Wetmore (1996a and 1996b); Schwab (1996a and 1997); FIFMTF (1995); and Maryland Office of Planning (1993).)

In a post-disaster period, a community is likely to see more requests to rebuild nonconforming uses than it would under any other circumstances. For that reason, the model ordinance presented later in this chapter offers some practical alternatives in the post-disaster setting to the strict application of normal rules concerning nonconforming uses.

Nonconforming use regulations. In zoning law, nonconforming uses are those that predate the passage or amendment of a zoning ordinance that disallows them in the district where they are found. Because they existed prior to passage of the ordinance, they are allowed to continue but are restricted by judicial and statutory rules from expanding, changing, or being rebuilt. In a post-disaster period, a community is likely to see more requests to rebuild nonconforming uses than it would under any other circumstances. For that reason, the model ordinance presented later in this chapter offers some practical alternatives in the post-disaster setting to the strict application of normal rules concerning nonconforming uses. One obvious means of preparing for such possibilities, however, is to use the pre-disaster plan to identify zoning districts with high incidences of nonconforming uses.

The ability to rebuild is the privilege most directly affected by planning for the post-disaster period and hazards legislation, most particularly NFIP. As discussed above, local ordinances adopted in conformance with NFIP allow rebuilding but require elevation to the base flood elevation if the building is substantially damaged. Local ordinances may be stricter than the federal requirements. Furthermore, the CRS offers credit in the form of reduced insurance rates for property owners in a community that requires a building to be raised to the base flood level when the cumulative cost of construction actions needed to improve or repair damage to it equals 50 percent of its market value. In such a case, the community is responsible for tracking the cumulative cost of substantial improvements or the amount of substantial damage. CRS also gives points if the community sets its substantial damage standard at less than 50 percent of market value. Normally, these requirements apply only when any single flood causes that extent of damage. Finally, note that the Increased Cost of Compliance (ICC) provision in NFIP policies issued or renewed after June 1, 1997, provides for up to $15,000 to property owners to bring substantially damaged or repetitively flooded properties into compliance with local floodplain management requirements (FEMA 1997d).

Beyond those provisions, local governments can use zoning to effect a good deal of hazard mitigation in the area of nonconforming uses. Having

established restrictions pertaining to wildfire hazards, floodplain areas, earthquake liquefaction zones, landslide hazard zones, or other problem areas, local zoning can then allow planners to enforce limitations on the ability to rebuild in place once a structure has been substantially damaged from any source or for any reason. Those limitations may require options other than relocation, such as elevation, seismic retrofitting, or fire-resistant construction. Obviously, the boundaries for the defined districts must be justified through sound hazard identification techniques in order to withstand legal challenges. This is primarily a gradual remedy when planners recognize the existence of an undesirable situation and wish to use the post-disaster reconstruction process in part to force any rebuilding to comply with new standards or to eliminate uses that no longer are deemed acceptable in their current location. (See also Williams (1986, Vol. 4A, Ch. 114) and the model ordinance below.)

Environmental or hazard-related performance standards. Increasingly, detention ponds and swales are common mitigating features of new developments complying with standards for stormwater management. Even outside delineated hazard zones, development activity and planning for wider areas like watersheds can significantly affect disaster vulnerability. The case study of Arnold, Missouri, in Chapter 8 provides an illustration of how upstream development in a metropolitan area can have serious detrimental impacts on downstream communities. Such problems have been cited for years in a number of Chicago suburbs and often involve serious issues of interjurisdictional cooperation, addressed in the sections on general planning tools (above) and management tools below.

Landscaping, site plan reviews, and other tools described in this chapter all intersect at a variety of points, but may also be used individually by communities that do not adopt all of the other related devices. The post-disaster period may be an ideal time to press the political agenda for establishing new performance standards, particularly with regard to the design or rebuilding of planned unit developments.

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A good example of the effective use of hazard-related performance standards in the context of floodplains is the zoning Wake County, North Carolina, employs for flood hazard areas that include not only FIRM-specified floodplains, but a list of soil types specified in the county soil survey and referred to in the ordinance as flood hazard soils, mostly consisting of silt and sand. The burden is on the property owner in those locations to prove that such soils are not part of the floodplain. The regulations vary according to the size of the drainage area, with the strictest applying in areas of 100 acres or more, where the applicant must show that any rise in water level resulting from building on the property can be contained on the property. The only alternative is to secure easements from neighboring property owners to allow for that rise. (See also Maryland Office of Planning (1995c) and Schwab (1997).)

Special use permits. Zoning ordinances often designate zones within which specified uses are permitted only if they meet certain conditions or established criteria. It is then up to local officials to grant or deny a permit application based on the compliance of the proposed use with those conditions or criteria, which must be clearly stated in the ordinance. In the post-disaster context, these criteria presumably would relate to the reduction of adverse environmental impacts or the minimization of vulnerability to natural hazards. For example, in hurricane- or tsunami-prone coastal zones or in mountainous terrain with landslide or wildfire potential, the feasibility of evacuation might be the basis for some criteria governing special use permits.

Floodplains are prime candidates for the application of this tool. For instance, in a model ordinance that Livingston County, Michigan, prepared

for one of its townships, the only permitted principal uses in floodplain, wetland, and steep land areas are public and private nature reserves and wildlife areas, and public forest preserves, game preserves, hunting areas, fishing sites, and boat-launching sites. All other principal uses allowed in the coexisting zoning district require a special use permit. (See also Schwab (1997).)

Regulations dealing with damaged historic properties. The issue of regulation of damaged historical property was addressed in Chapter 4 under "Elements of the Post-Disaster Plan." It bears repeating that having some regulations already in place as part of a post-disaster plan makes matters easier when the problem arises. Even more important is identifying as precisely as possible all historic properties in hazard-prone areas, as well as the proposed mitigation techniques most appropriate in each case. Planners undertaking such an inventory should include not just listed properties, but any structures more than 50 years old that potentially could be listed properties, and be aware that state historic preservation officers (SHPOs) use this broader definition of their area of concern. The National Trust for Historic Preservation and SHPOs have a number of good information booklets available concerning restoration techniques for various types of historic buildings and categories of disaster damage. (See also Nelson (1991); NTHP (1993); Utah Division of State History (n.d.); and FEMA Region I (n.d.).)

Downzoning is potentially one of the most politically controversial approaches to many natural hazards problems precisely because it involves at least a perceived, and often a real, diminution in the value of land for development purposes. Whether a proposal for downzoning a severely damaged area in the aftermath of a disaster will be politically palatable may depend on the degree to which planning and consensus building in the pre-disaster period have prepared people to understand its logic.

Downzoning/density controls. At a minimum, planners should be able to articulate concerns about the limitations of building codes in mitigating hazards in areas where reduced density or outright prohibition of building would be a more effective solution. Better structural engineering solves many problems but not all, and it often is not the most cost-effective solution to a problem. Engineering solutions face practical limits in terms of both technology and economics. Planners should move aggressively to examine the land-use planning lessons from each disaster to identify areas where downzoning might be an effective approach in minimizing future hazard vulnerability. The key benefit of downzoning is simply that it minimizes the risk to future development.

That said, downzoning is potentially one of the most politically controversial approaches to many natural hazards problems precisely because it involves at least a perceived, and often a real, diminution in the value of land for development purposes. Whether a proposal for downzoning a severely damaged area in the aftermath of a disaster will be politically palatable may depend on the degree to which planning and consensus building in the pre-disaster period have prepared people to understand its logic.

As a more general proposition, density controls established prior to an area's development are somewhat easier to sell if clearly tied to serious hazard-related concerns. In the urban / wildland interface, for example, minimum-lot-size regulations, provisions for clustered development, and other density restrictions are all zoning tools that may serve to reduce hazard vulnerability by allowing homes to be sited safe distances away from fuel sources. Performance controls can relate levels of density to slope factors and other objective hazard measures as local policy makers deem appropriate. Slope / density ratios work off the simple concept that density should decrease as slopes increase on the assumption that steeper slopes require more grading and other slope-disturbance activities. Portola Valley and Rancho Cucamonga, California, both have used slope / density regulations in order to minimize steep slope hazard problems (Olshansky 1996).

Because some seismic mitigation measures can be quite expensive, it is worth remembering that there is a converse truth: pre-existing high density may make it easier in some situations to finance the cost of stringent

mitigation measures. This became apparent, for instance, in the redevelopment of San Francisco's Mission Bay area, which is largely built on relatively unstable infill. The area plan's life-safety section requires detailed soil-engineering and geologic investigations for each new building site, with especially stringent construction standards for critical facilities. Larger projects may be able to bear these costs more easily, making it logical to put higher-intensity uses on poorer soils. (See also Tyler (1995).)

Floating zones. In the zoning ordinance, a floating zone is one that has no specific geographic designation but carries instead a descriptive designation that attaches to an appropriate parcel of land when ordinance conditions are met. In the recovery period following a disaster, this tool can be used effectively to control redevelopment in a severely damaged area, as the special conditions attaching to the zone can then be put into effect. An important caveat is that not all states permit the use of this device.

The South Florida Regional Planning Council's model plans suggest the use of floating zones as one element of a post-disaster plan in which the community could decide in advance to activate predetermined density reductions according to the extent of overall property damage occurring in particular locations.

The Nags Head, North Carolina, plan offers a particularly apt example in connection with incipient inlets, areas where coastal erosion is carving out a water pathway through a barrier island. A severe coastal storm or hurricane can often sever an island in two by vastly accelerating that intrusion. North Carolina's Coastal Area Management Act addresses the problem of inlet hazard zones by allowing structures of no more than 5,000 square feet at a density of no more than one unit per 15,000 square feet of developable land. (For more information, see Williams (1986, Vol. 1, Ch. 28); South Florida RPC (1990); and Beatley, Brower, and Schwab (1994).)

Overlay districts. Overlay districts are used to solve problems in zoning codes that are not adequately addressed in conventional use districts. Generally, they aim to address specific needs that cut across other district designations and whose inclusion would result in a level of delineation in normal districts that would serve to confound zoning enforcement efforts. They also allow a degree of flexibility that is often needed in dealing with environmental constraints, with floodplains being a common example. They are called overlays because they add a separate layer of regulations to the area to which they apply that are distinct from the underlying traditional zoning. Overlay districts can be used in almost any hazard context to establish special conditions for various uses, including many of the disaster-specific tools below. Examples would include an urban / wildland interface district, a hillside protection district, a riverfront or shoreline district, or an earthquake high-hazard zone (as in areas with high soil liquefaction or along fault lines).

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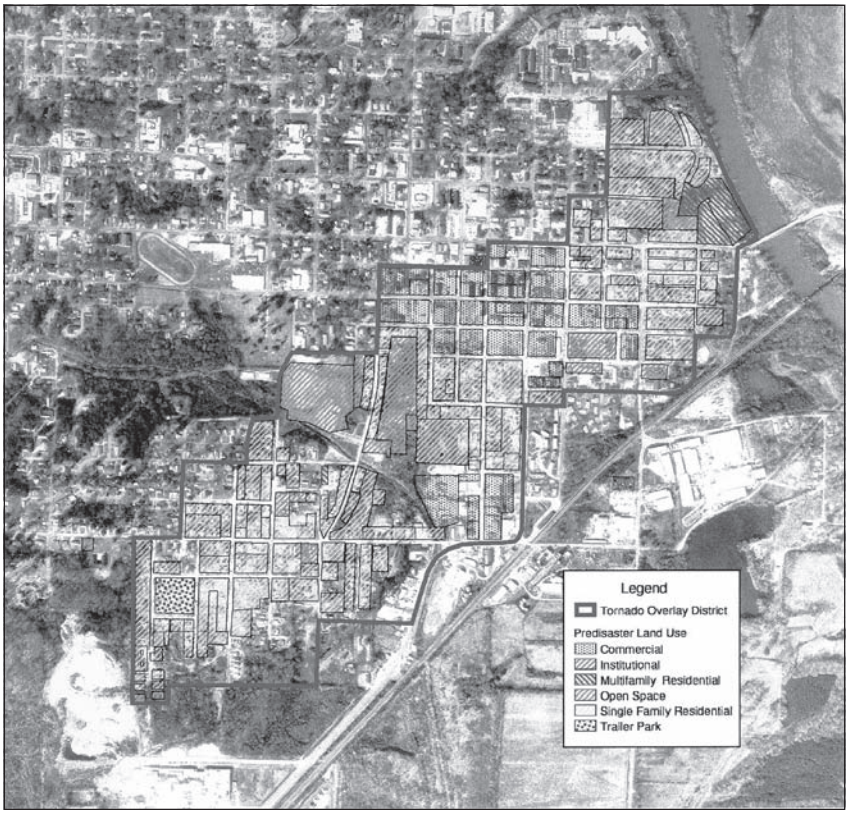
Arkadelphia, Arkansas, following the March 1, 1997, tornado that struck that community, established as part of its rebuilding process a design overlay district for the tornado-damaged parts of town. This enabled planners to introduce a number of measures that facilitated the development of quality affordable housing, including clustered development and parking, zero lot line zoning, and shared facilities. Pieter de Jong, project manager for the Arkadelphia Recovery Plan, pointed out that the value of the disaster overlay district for Arkadelphia is that it encourages innovative redevelopment strategies as compared to what would be allowable under the existing commercial and residential zoning district requirements (Woodward-Clyde 1997a). This approach is especially relevant for the smaller rural communities, which may be burdened with outdated (often Euclidean) zoning regulations, and are then confronted with a major disaster



URS Greiner Woodward-Clyde

This aerial photo of Arkadelphia, Arkansas, shows the tornado overlay district the city created to facilitate reconstruction after disaster struck in March 1997, and the underlying zoning districts that pre-existed the tornado. Woodward-Clyde Consultants, FEMA's prime contractor for such planning, helped the city prepare its redevelopment plan.

recovery effort. It serves as an example of how this device can be used to take advantage of opportunities to reshape development in heavily damaged neighborhoods in the aftermath of a disaster. (See also Kennedy (1991); Maryland Office of Planning (1995b); and Schwab (1998).)

Coastal zone management regulations. Barrier islands, dune systems, tidal wetlands, estuaries, and coral reefs all pose special planning problems and opportunities not encountered elsewhere. Various federal and coastal state statutes impose specific mandates and constraints on local communities and provide particular federal mechanisms for addressing many of these challenges. In some cases, the community may be able to identify a need or opportunity to work with the state or federal government to preserve parts or all of the local coastal zone in wildlife reserves, marine sanctuaries, or even national parks. While many of these initiatives may be undertaken as much for environmental protection as for hazard mitigation, they often serve both purposes simultaneously, as is the case with the Coastal Barrier Resources Act.

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State laws and policies can deal directly with the problem of restricting development in designated storm damage zones. For instance, Rhode Island Coastal Resource Management Council regulations prohibit reconstruction on dunes after 50 percent property destruction.

Clearly, the primary body of legislation addressing this issue is the federal Coastal Zone Management Act and its related state statutes and regulations. In addition, however, many communities enact their own special protective measures for coastal areas. The specific techniques employed in local coastal management include many of the zoning and subdivision tools detailed in this chapter, often for reasons other than hazard mitigation, such as preserving the historic or architectural character of the community. It may be noted here, though, that the replanning of badly damaged coastal planned unit developments and the use of coastal construction control lines (discussed in

more detail in the Florida context in Chapter 10), which amount to setbacks based on coastal erosion, represent opportunities in the post-disaster period for planners to reduce future vulnerability. (See also Beatley, Brower, and Schwab (1994); R.I. Division of Planning (1989); and FAU / FIU (1995).)

Setbacks. Removing housing and other buildings from wildland interface hazards can be partly accomplished through required setbacks that establish minimum distances from trees, cliffs, highly flammable vegetation (e.g., shrubs and chaparral), and other landscape features that may enhance the volatility, speed, and temperature of a wildland fire. Fire officials generally recommend a 30-foot buffer between homes and wildland vegetation to reduce vulnerability. As with much else in this area, adequate hazard identification efforts can help to clarify specific local needs and thus justify effective adaptations to local circumstances.

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As noted in the subsection above on coastal zone management regulations, states like Florida and Rhode Island have been using statutorily mandated setbacks to control construction near the seacoast. North Carolina's Coastal Area Management Act requires a setback of at least 30 times the average annual rate of erosion in the local area, measured from the first line of vegetation. Myrtle Beach, South Carolina, has prescribed a 50-year erosion line that allows only such uses as sundecks and gazebos seaward of that line.

Riparian corridors also deserve attention with regard to setbacks because they serve an extra function of conveying stormwater, and proper maintenance can help to reduce flooding. Experience in Bellevue, Washington, demonstrates, however, that the issue along riparian corridors, especially those with steep banks, may not always be as simple as just establishing setbacks. Retaining and replanting native vegetation may also be needed to preserve a river's viability as an effective natural channel for flood waters, reducing damage to property. These issues play a role in landscaping requirements, discussed below in the section on design review (Sherrard 1996).

California law strongly encourages the use of setbacks relative to earthquake faults in the Alquist-Priolo Act, which requires geologic investigations within one-eighth of a mile of a fault line. The regulations established by the California Mining and Geology Board require a minimum setback of 50 feet from any active fault for habitable buildings. Determining accurately the location of all such faults may require geologic investigations, a tool discussed below. (For more information, see Beatley, Brower, and Schwab (1994); Olshansky (1996); Tyler (1995).)

Site plan reviews. Site plan review almost invariably applies to new projects and only rarely to the reconstruction of existing sites. Such reviews, however, provide an opportunity for planners to assess patterns of damage in hazard-prone areas and to apply those lessons to new development. For instance, planners can consider the design and location of structures, parking lots, and other improvements with an eye to drainage, soil integrity, vegetative landscaping, and other issues that may affect the disaster-resistant qualities of a proposed development. Schwab (1993) has also suggested using site plans with proposed industrial and commercial developments to evaluate conformance with performance standards where hazardous materials are involved. This could easily be adapted to ensure the disaster-resistant storage of such materials. (See also Thurow, Toner, and Erley (1975) and Maryland Office of Planning (1995c).)

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Height and bulk regulations. Height and bulk have special significance in a coastal zone, particularly in the coastal high-hazard area. A major issue that has driven some legislation and lawsuits in this area is visibility and the public's right to an ocean view. That issue clearly originated with concerns

about public access and aesthetics, but, in some areas, there are valid safety considerations relating to the distortion of wind patterns and flying debris that may also favor the establishment of height and bulk restrictions. Strong building code enforcement is an essential accompaniment to such regulations in any event. Nags Head, North Carolina, has combined a number of concerns with its desire to maintain a family beach atmosphere in enacting zoning changes that include strict setback, height, and open space requirements for oceanfront motels and condominiums (Bortz 1990).

Wetlands development regulations. Floodplains and wetlands are far from synonymous, particularly after two or more centuries of human activity in draining wetland areas for agriculture and development. Nonetheless, protection of remaining wetlands areas plays an important secondary role in reducing flood hazards, and while these regulations clearly serve their own environmental purposes, they also form part of an overall strategy for flood hazard mitigation. The environmental elements of a comprehensive plan should account for these benefits as a selling point for winning public acceptance and understanding of community objectives in this area. (See also Burke et al. (1988).)

The rules that govern the subdivision of land clearly provide some of the best opportunities planners have to create sites that are both buildable and safe. Lots can be configured to keep structures out of the floodplain, to reduce fire and landslide hazards in forested and mountainous wildlands, or to reduce the exposure of buildings to fault slippage, among other possibilities.

Subdivision Controls

Subdivision regulations. The rules that govern the subdivision of land clearly provide some of the best opportunities planners have to create sites that are both buildable and safe. Once a lot is created, it is enormously difficult to prevent building. The roots of effective subdivision regulations in this regard stem inexorably from thorough and accurate hazard identification at the beginning of the planning process. This may include requirements for hazard assessments to accompany subdivision applications in known hazard zones. Lots can be configured to keep structures out of the floodplain, to reduce fire and landslide hazards in forested and mountainous wildlands, or to reduce the exposure of buildings to fault slippage, among other possibilities. Clustering is increasingly popular as a means of preserving open space in new subdivisions, and Arendt (1996) has addressed the merits and methods of this technique at considerable length. Various Planning Advisory Service (PAS) Reports have addressed issues concerning subdivision design for earthquake, landslide, and floodplain hazards respectively. (See also Maryland Office of Planning (1994).)

In hillside areas, the need is to pursue such subdivision design features as clustering with an eye to resource conservation and the use of those areas requiring a minimum of grading and soil-disturbing activities during construction. Special attention should also be paid to road access and minimizing the amount of linear roadway needed for access to the number of homes that will be built in comparison to conventional subdivision design.

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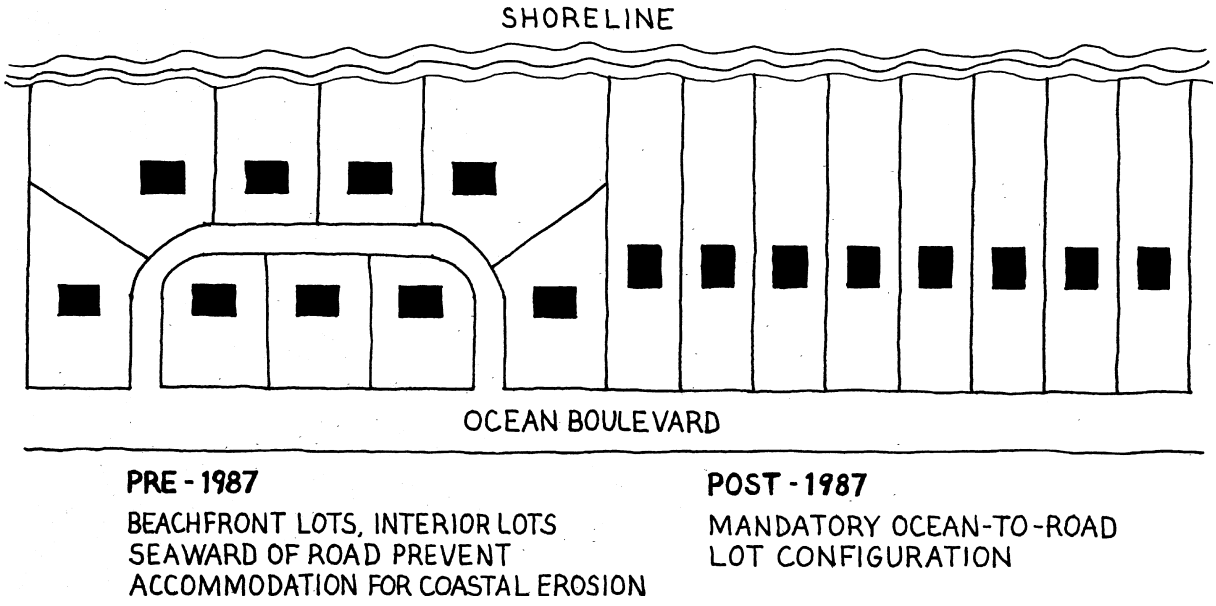
The mapping of special flood hazard areas offers excellent opportunities for planners to apply this practical information as they review the design and lot layout of subdivisions, consider street access and layout, the positioning of utilities and detention basins, open space dedications, tree preservation, landscaping requirements, and a host of other floodplain management issues that come into play with each new subdivision proposal. Planners can also draft subdivision ordinances that prescribe standards for these items with respect to the documented hazards. This is obviously a proactive rather than post-disaster measure, as are many of the tools discussed here, but the implications are enormous.

The Nags Head, North Carolina, subdivision ordinance requires lots on the ocean side of the major north-south road parallel to the coast to be

configured perpendicular to the ocean and road. (See Figure 5-2). If coastal erosion subsequently threatens the structures built on those lots, this configuration allows the houses to be moved landward, and the ordinance then provides for a reduction of required setbacks from 30 to 15 feet to accommodate those circumstances (Morris 1997).

Nags Head has provided for some post-disaster planning intervention to mitigate flood hazards in existing subdivisions by allowing the possibility, prior to rebuilding, of requiring that adjoining lots in common ownership be combined into one large lot (Bortz 1990).

Figure 5-2. Nags Head, North Carolina, Oceanfront Lot Requirements



As noted above concerning setbacks, California's Alquist-Priolo Act already restricts development near earthquake faults. The concept of avoiding visible or known fault lines is merely a starting point, however, for the seismic considerations that ought to enter into lot configurations and subdivision design because direct fault rupture accounts for only a tiny fraction of overall earthquake damage. Extensive local mapping of earthquake fault traces, liquefaction zones, and other natural seismic hazards is an essential prelude to effective review of lot shape, building placement and design, and overall subdivision layout in order to minimize problems. In most cases, where the hazards are known to be moderate or severe, requiring geologic investigations of the site (see the section below on management tools) will give planners better data with which to review subdivision plans and minimize exposure to seismic hazards. The use of clustering and the preservation of more geologically hazardous areas of a site for open space or parkland represent the adaptation of well-known conservation planning devices to a seismically hazardous setting. Portola Valley, California, has used this device in allowing a developer in an area crossed by the San Andreas Fault and flanked by unstable hillsides to create smaller, clustered lots and keep vulnerable areas in permanent open space. (See also Jaffe, Butler, and Thurow (1981); William Spangle and Associates (1988); Tyler (1995).)

Extensive local mapping of earthquake fault traces, liquefaction zones, and other natural seismic hazards is an essential prelude to effective review of lot shape, building placement and design, and overall subdivision layout in order to minimize problems.

Road width and access regulations. Another byproduct that planners can derive from thorough seismic hazard identification is the ability to identify

potential limitations on access to damaged areas following an earthquake. Where are the major arteries that may fail for which there are no satisfactory alternative routes? Particularly vulnerable areas may include those where access requires traversing a mountain pass or crossing a bridge over a major waterway. This is largely a transportation and capital improvements problem, but one with major consequences for recovery and reconstruction policy in the event of failure. It is also a significant consideration in identifying land-use lessons in the aftermath of a disaster and influencing post-disaster road and bridge rebuilding priorities to remedy known deficiencies (BSSC 1987a).

The same concerns can be brought to bear on post-flood transportation repairs, to say nothing of pre-flood design of subdivisions in flood hazard areas. If some roads needed for access and evacuation are washed out, are there residents who will be stranded for lack of a secondary evacuation route? The solution almost always is to locate driveways and streets in those areas of the subdivision least likely to be flooded and approaching buildings from the direction opposite the floodplain, preferably not disrupting natural drainage patterns so as to minimize erosion and runoff problems. While remedying a subdivision road design that is deficient in this regard may be more difficult, in the aftermath of a major flood it may be possible to reorient some access routes if the local government is able to acquire the appropriate properties for this purpose (Morris 1997).

In planning new development in an area potentially subject to wildfire hazards, planners can work to ensure that local traffic will not exceed the carrying capacity of the roads for evacuation and fire access purposes. Many roads in wildfire hazard areas, particularly those with steep slopes, are notoriously narrow relative to the need for fire equipment to reach threatened areas in an emergency.

In planning new development in an area potentially subject to wildfire hazards, planners can work to ensure that local traffic will not exceed the carrying capacity of the roads for evacuation and fire access purposes. Many roads in wildfire hazard areas, particularly those with steep slopes, are notoriously narrow relative to the need for fire equipment to reach threatened areas in an emergency. Planners considering road width should also consider their value as fire-breaks. In the aftermath of a disaster, as discussed elsewhere in this report, planners also have the opportunity to reassess the adequacy of local roads in terms of experience and to advocate for rebuilding them in a safer fashion (Slaughter 1996, Ch. 5).

Water supply. More detail is provided on the subject of water supply in Chapter 7. What bears noting here is that, where a city or county has no plans to extend water lines to meet development, it can insist that homes not near a natural source of accessible water for fire protection, such as a pond or stream, must include some other water supply mechanism that can assist firefighters, such as a cistern, swimming pool, or dry hydrant (NFPA n.d.).

Hillside development regulations. Wildfires have some known behavioral patterns as they sweep through canyons, down hills, and across other natural features. Many of these patterns depend on updrafts and downdrafts to feed the fire with bursts of oxygen, and flammable structures or vegetation lying in the path are extremely vulnerable. High winds are accelerated by natural wind tunnels and serve to exacerbate these patterns. Hillside development ordinances can take advantage of this knowledge to regulate the placement of structures relative to vegetation, cliffs, and other natural or landscaped features.

Regulations should serve double duty in simultaneously addressing landslide hazards. One sure way to accelerate erosion is to reduce or strip the vegetative cover that holds soil in place, so construction practices, grading, landscaping, lot orientation, and architectural design should all be reviewed with regard to the primary objective of protecting the site against such deterioration. Vegetation issues, which extend beyond considerations in subdivision review alone, are discussed separately below in a section on design controls. In addition, engineering reports on slope stability provide essential information to help planners ensure that building sites are chosen

to maximize public safety. (For more information, see Olshansky (1996) and Erley and Kockelman (1981).)

Open space requirements. Hillside development virtually demands some open space concessions in order to preserve the integrity of the sensitive area involved. A community simply cannot afford to pepper the hillside environment with homes in the same way that urban flatland is developed, where grid designs and high density are often appropriate. All the risk factors already discussed—slope instability, soil erosion, loss of vegetative cover, and wildfire fuel factors—plus other community values, such as aesthetics and habitat and view protection, require a second look at the way in which steep slopes are carved into lots. Requiring the dedication of open space and parkland in such areas is a valid regulatory measure to protect all these values and to ensure public safety. In many cases, however, a community may wish to look at the use of easements or actual acquisition (perhaps through a land trust or some public / private partnership) of hillside land to get this job done (Olshansky 1996).

Flood mitigation poses another opportunity for the use of open space requirements. Preserving a linear park along riparian corridors can be part of the strategy in a planned unit development, preserving wetlands, woodlands, and other natural features that minimize flooding by controlling streambank erosion while enhancing the visual and recreational qualities of a site. The trees filter and absorb runoff, and the community gains a combination of other open space and parkland benefits. (See also Brooks and Deines (1995 and 1996.)

Landscaping acquires special significance in relation to wildfire hazards because vegetation becomes a fuel that feeds the hazard that is threatening people and property.

Design Controls

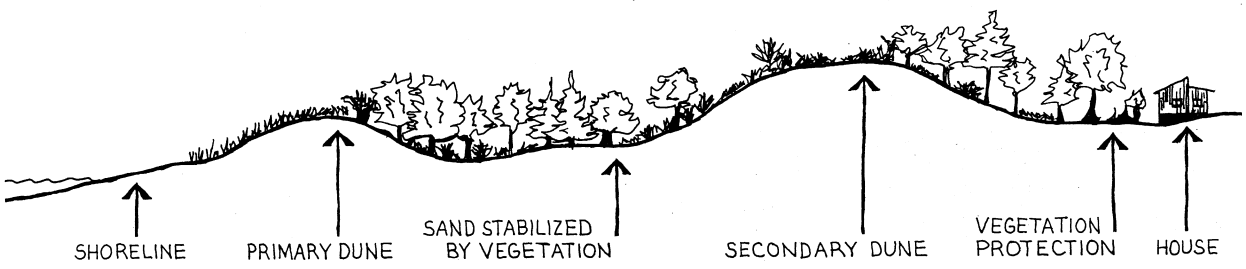
Good design of the built environment is an essential element of effective mitigation. What makes one building less susceptible to wind or fire damage than its neighbors? Why do flood waters swirl past one building, inflicting minimal damage, while another suffers the brunt of nature's blow? The answer to these questions often lies in a combination of considerations involving both the design and choice of materials in the structure itself and the design and contours of the immediate surroundings, such as the slope of the land, the vegetation, and building placement within the lot. The two previous sections dealt with the larger contexts of zoning and overall subdivision design. This section addresses issues specific to individual buildings and the parcels of land on which they sit.

Tree conservation and vegetation requirements. Landscaping and vegetation make a difference in mitigating the impacts of natural hazards. Trees break the force of the wind and stabilize the soil. Wetlands absorb much of the overflow from stream channels. Fire-resistant vegetation can retard the spread of wildfires toward vulnerable buildings. Planners can use landscaping requirements to preserve or enhance the protection such natural features afford. These requirements may be part of site plan reviews or a separate set of zoning regulations and environmental performance standards.

Landscaping requirements for shoreline properties can be tailored to meet the special needs of dune system preservation and barrier island stability. (See Figure 5-3.) While this is typically handled through required setbacks measured in relation to an established reference point in a coastal setting, it is also important in connection with not permitting other disturbances of the natural dune system. Also, requiring the use of only native vegetation in coastal areas minimizes the possibility that high winds or flooding will uproot trees, causing damage from debris (Pilkey et al. 1980; Morris 1997).

Landscaping acquires special significance in relation to wildfire hazards because vegetation becomes a fuel that feeds the hazard that is threatening people and property. The Oakland case study in Chapter 11

Figure 5-3. Typical Dune Cross Section



helps to highlight some of the practical issues of vegetation and landscaping connected with wildfire hazards, which are also addressed in Chapter 7. They are among the most essential elements of any plan to address wildfire hazard mitigation. In this case, the most salient point concerns not so much the preservation of natural vegetation, although that is often important for other reasons, but maintaining some distance between buildings and the most flammable types of local vegetation, as well as trying to use more fire-resistant vegetation wherever possible (Olshansky 1996; Slaughter 1996, Ch. 16).

Nothing holds soil in place better than living plants, so it is little surprise that tree conservation, landscaping, and vegetation all play a major role in mitigating landslide hazards on steep slopes. Clearing and grading activities disturb this natural stability and accelerate erosion, leading to potentially catastrophic landslides under extreme circumstances, such as heavy rainfalls, seismic vibrations, or rapid snowmelt. In addition to the obvious landslide and mudslide problems, there is the potential for this runoff to cause or exacerbate flooding problems, particularly where steep bluffs rise above stream corridors.

Nothing holds soil in place better than living plants, so it is little surprise that tree conservation, landscaping, and vegetation all play a major role in mitigating landslide hazards on steep slopes. Clearing and grading activities disturb this natural stability and accelerate erosion, leading to potentially catastrophic landslides under extreme circumstances, such as heavy rainfalls, seismic vibrations, or rapid snowmelt.

Sherrard (1996) offers an overview of an approach to the management of riparian open space in Bellevue, Washington, which combines stream corridors, forested riparian hillsides, and residential subdivisions. The approach combines tree preservation and open space dedication requirements with municipal oversight of management plans for areas of common ownership through homeowners associations. The city adopted its sensitive areas ordinance in 1987 and updated it in 1996.

Tree conservation ordinances can address development problems in forested hillsides but may be less useful in other situations, where requirements for natural landscaping and protection of grassy vegetation may apply. As with so much else in this area, specific ordinance requirements must be built on a solid base of hazard identification and environmental research (Maryland Office of Planning 1993; Duerksen 1993).

Design review. The Oakland case study in Chapter 11 offers a prime example of the importance of design review with regard to wildfire hazards, particularly in a post-disaster context. The process of design review can be used to establish conformity with important criteria both for safety and aesthetic purposes. These commonly include building size, height and bulk, view protection, avoidance of fire-enhancing features such as overhangs and the use of wood shake or shingle roofs, attached downhill-side decks, and parking and loading facilities, among others. Boulder, Colorado, for instance, has outlawed the use of wood shake shingles. Local fire safety officials often can serve as good on-staff consultants concerning design details that enhance or detract from fire safety (Olshansky 1996).

For mitigation purposes, the focus of design review obviously varies with the nature of the hazard. Overhangs are undesirable, for instance, in coastal areas, though not for the same reasons as in wildfire zones. Rather, high

winds in hurricanes (and tornadoes, sometimes spawned by tropical cyclones) gain extra potency in tearing roofs off buildings because of the powerful leverage that overhangs afford. In fact, any insecurely fastened appendages, including porches, chimneys, exterior signs, lights, or doors, railings, and other adornments, may break loose and become airborne projectiles. In addition, buildings should be oriented to minimize the impact of the likely prevailing wind pattern and water flow in such storms, which for the most part is a known quantity. Although many of the best mitigation measures are related to building codes, design review plays a part in minimizing damage and danger, and there is, fortunately, a fair amount of research both already performed and underway to improve our understanding of wind-related impacts on the built environment (National Research Council 1993; FIA 1992; FIA / Hawaii 1993).

As always, the process of post-disaster reconstruction offers an opportunity to reshape or to rationalize design compatibility in neighborhoods and commercial districts, and design review can be used to achieve aesthetic improvements that might take much longer under other circumstances.

As a general matter, planners undoubtedly will be aware that, while important, hazard mitigation may not be the only, or even the primary, focus of design review following a disaster. As always, the process of post-disaster reconstruction offers an opportunity to reshape or to rationalize design compatibility in neighborhoods and commercial districts, and design review can be used to achieve aesthetic improvements that might take much longer under other circumstances. Arkadelphia, Arkansas, is a recent example of the use of design review within the context of a tornado overlay district, with the goal of developing a unified historical period appeal in the reconstruction of the central business district (Woodward-Clyde Associates 1997a).

Building codes. Planners generally have little direct influence over building codes, which for the most part are adopted at the state level and enforced by local building departments. Burby, May, and Paterson (1998) surveyed code enforcement practices and found inadequate compliance to be a major obstacle to the effective implementation of planning and development programs. They also found what they called a facilitative model of compliance, which concentrates on working cooperatively with regulated firms and individuals, to be more effective in producing results than a systematic model that concentrates on the deterrent effect of strict enforcement. Of course, the two approaches are not totally incompatible, but largely depend on emphasis, and a facilitative strategy can be just aggressive as one of throwing the book at violators. The authors attribute their findings in part to the fact that compliance is often a matter of interpretation rather than one of obeying clear-cut rules. At the same time, Burby and French (1998) examined property losses in suburban jurisdictions from the Northridge Earthquake and found lower losses where communities had expended more effort on enforcing the seismic provisions of the Uniform Building Code.

In any event, it is important to see planning controls and building codes as complementary and compatible mitigation and reconstruction tools and not as tools that are in any way competing with each other as priorities in the disaster planning context. A comprehensive approach to hazard mitigation and sound post-disaster planning will emphasize each set of controls in its own place and seek to achieve useful synergies wherever each can strengthen the gains that the other produces.

Planners are not directly responsible for building codes, but they do have varying degrees of influence over the quality of enforcement, with more likelihood of successful interaction with building officials in jurisdictions where planning and building functions are consolidated in a single department. That consolidation means that a single agency administrator is overseeing both functions and can help to coordinate policy. In smaller jurisdictions, even without such consolidation, the more informal collegiality of a small municipal staff may also facilitate communication and coordination about areas of concern to planners.

In any event, it is important to see planning controls and building codes as complementary and compatible mitigation and reconstruction tools and not as tools that are in any way competing with each other as priorities in the disaster planning context. A comprehensive approach to hazard mitigation and sound post-disaster planning will emphasize each set of controls in its

own place and seek to achieve useful synergies wherever each can strengthen the gains that the other produces. For example, making a building both structurally wind-resistant and siting it so as to minimize exterior wind impacts (for example, by putting it behind dunes and tree cover that will brake wind speeds) enhances the efficacy of both structural and locational approaches to mitigation. Using stricter building codes in more hazardous areas is another way of integrating planning and building code concerns. Planners can be effective advocates for the enactment of building codes that exceed model codes and NFIP.

Although questions were raised about enforcement following the devastation of Hurricane Andrew, where one-fourth of the $16 billion in insured losses were attributed to code violations (Burby, May, and Paterson 1998), the South Florida building code is especially geared to building wind resistance into the design of buildings in order to sustain hurricane wind damage. Ongoing wind research is expanding our knowledge of wind-resistant building qualities and is worth investigation. Planners at least would benefit from an understanding of the role and effectiveness of those codes in an overall strategy for wind hazard mitigation. (For more information, see National Research Council (1993) and Structural Engineers Association of Hawaii (1992).)

Building with fire-resistant materials, especially avoiding wood-shake roofs and broad overhangs, is the essential change needed for adaptation to the wildland / urban interface. One approach is to specify the performance criteria for such buildings while leaving the choice of building materials to builders to demonstrate their own creativity and the viability of alternative materials if they wish to work in the interface environment.

Construction techniques also can minimize obstructions to the flow of high-velocity waves in coastal high-hazard areas through construction on pilings and limiting the use of below-deck areas for carports and patios (FIA 1993c). This is congruent with NFIP regulations.

Building with fire-resistant materials, especially avoiding wood-shake roofs and broad overhangs, is the essential change needed for adaptation to the wildland / urban interface. One approach is to specify the performance criteria for such buildings while leaving the choice of building materials to builders to demonstrate their own creativity and the viability of alternative materials if they wish to work in the interface environment. One factor making this approach advisable is the variation in local climatic and topographical factors that may require fine-tuning such performance standards from one part of the country to another (Slaughter 1996, Part II).

Seismic safety is an important premise for building code requirements in seismically active locations. While building codes, based on models developed by the three national model code organizations, are generally adopted at the state level and consigned to local enforcement, states do not always require local adoption of seismic safety provisions. One major issue in such codes is the feasibility of retroactively requiring retrofitting in existing buildings because of the potential cost implications. The balance between cost and safety considerations is one that must be decided locally based on the age and quality of the existing building stock and the public's willingness to adopt measures to ameliorate undesirable impacts on housing affordability. However, the National Earthquake Hazards Reduction Program (NEHRP) has developed useful documentation on this point. Based on studies performed on behalf of FEMA, the cost to rehabilitate existing buildings to meet the NEHRP recommended provisions is approximately $20 per square foot. The cost to incorporate seismic strengthening in constructing new buildings to meet NEHRP-recommended provisions is approximately 5 percent of the structural cost of the building, equating to 1 to 2 percent of the total cost (FEMA 1993b, 1995g).

The whole issue of building codes takes on special significance because, to date, they have played a much larger role in earthquake hazard mitigation than have land-use regulations. The job of the building code with regard to seismic hazards is to reduce the likelihood of foundation failure and to heighten structural stability against lateral acceleration forces (BSSC 1990).

Special floodproofing techniques and materials can more easily be mandated for new construction in flood hazard areas, and FEMA has already published a series of technical bulletins as guides for compliance with such construction requirements (FIA 1993a-c).The requirements in the technical guides are those of NFIP; more stringent local codes would take precedence. FEMA has also sought the inclusion of flood-resistant construction standards into the three model building codes as well as the standards of the American Society of Civil Engineers (ASCE), which has incorporated provisions for the determination of flood loads and flood load combinations into ASCE 7-95, "Minimum Design Loads for Buildings and Other Structures," and a newer "Flood Resistant Design and Construction Standard," which can be incorporated into the building codes directly or by reference. FEMA partially funded this effort by ASCE to ensure the standard would meet or exceed NFIP minimum requirements.

Financial Tools

The growing costs of natural disasters was highlighted in Chapter 1 in explaining taxpayers' concerns that governmental responses to disasters become smarter and not simply more generous. Fixing what becomes broken in a disaster often requires substantial and, sometimes, huge financial resources. A host of federal programs now exist in whole or in part to respond to those needs, and identifying priorities for targeting those resources is a major task not only for federal grant makers but also for local and state governments, which both apply for and expend the funds available. This section is designed to identify specific uses for disaster funds and the issues planners must address in order to use them as wisely and efficiently as possible.

Where should the grant money go for rebuilding the community? Planners can help advance the effectiveness of local hazard mitigation policy by redirecting portions of their community's CDBG funds as the nonfederal match for federal HMGP money and doing so in a way that enhances strategic objectives in the local post-disaster plan.

Florida, through its Resource Identification Strategy (RIS), is helping local governments obtain vital planning and technical assistance to strengthen their communities against the impacts of natural disasters. The Florida Department of Community Affairs has partnered with the Florida Public Affairs Center at Florida State University to develop RIS, which includes an online database (www.state.fl.us / comaff / hcd / fccr / ris) with information on historical and potential funding sources for disaster mitigation, disaster recovery, and long-term redevelopment projects. For readers of this document, Appendix C provides a directory of federal disaster assistance sources.

Targeting of Community Development Block Grant (CDBG) and other grant funds. Where should the grant money go for rebuilding the community? Planners can help advance the effectiveness of local hazard mitigation policy by redirecting portions of their community's CDBG funds as the nonfederal match for federal HMGP money and doing so in a way that enhances strategic objectives in the local post-disaster plan. This strategy has continued to be pursued very effectively in facilitating many of the buyouts in Midwest communities in the aftermath of the 1993 floods. Among them were Rhineland and Arnold, Missouri.

CDBG, Small Business Administration (SBA), and Economic Development Administration (EDA) programs and funds may be applied toward rebuilding communities' economies after disasters. All three agencies incorporate and promote mitigation strategies into resources being applied to disaster-stricken areas. It is important to note, however, that these agencies do not have specific post-disaster funds available as FEMA and other agencies do under Stafford Act authorization. Communities must therefore either tap into their pre-existing block grant funds or seek agency program funds appropriated by Congress annually.

In limited cases, however, Congress may grant supplemental funding to the U.S. Department of Housing and Urban Development (HUD) or EDA

after a major disaster for specific recovery needs. Such funding to HUD augments the CDBG and Home Investment Partnerships (HOME) programs, and comes from Disaster Recovery Initiative (DRI) grants. HUD's formula "considers disaster recovery needs not met by other Federal disaster programs." Communities, in addition to having significant unmet recovery needs, must also be able to carry out a disaster recovery program. Most such communities, according to HUD, are already receiving allocations of CDBG or HOME funds. The communities receiving DRI funds also must award at least half the money for "activities that benefit low- and moderate-income persons." They may use the funds for recovery efforts involving housing, economic development, infrastructure, and prevention of further damage, so long as this does not duplicate funding already available from FEMA, SBA, and the U.S. Army Corps of Engineers. Before they can receive DRI funds, however, eligible local governments must develop and submit an Action Plan for Disaster Recovery describing the intended uses of the funds. (See the HUD web site at www.hud.gov/progdesc/disaster.html.)

One major fear of homeowners considering relocation from a floodplain or other hazard zone is that they may not find adequate or equivalent housing elsewhere. Particularly for low-income families, including those living in manufactured housing, these concerns are legitimate.

Relocation assistance. One major fear of homeowners considering relocation from a floodplain or other hazard zone is that they may not find adequate or equivalent housing elsewhere. Particularly for low-income families, including those living in manufactured housing, these concerns are legitimate. Special issues affecting minorities may also be a factor in some communities (see Perry, Greene, and Mushcatel 1983). These issues often include the treatment of rental housing and the relocation of tenants, and may introduce serious questions of environmental justice into the post-disaster recovery agenda. Effective acquisition and carefully targeted use of relocation assistance can persuade many of these people that the move is in their own long-term best interest and may be less painful than they thought. A planning department that gains a reputation for easing this aspect of a wrenching decision can garner valuable public acceptance of long-term hazard mitigation goals.

Special taxing or assessment districts. One way to send a market signal to developers and home buyers alike is to establish the principle that special services, such as those most likely to be used in an emergency by people living in hazard-prone areas, must be supported through special fees, taxes, or assessments in the area affected. The concept is akin to that commonly applied in other districts receiving special services or benefits and allows the community to establish the differential costs for those choosing to live or buy property in such areas. One example is the Lee County, Florida, All Hazards Protection District and its associated fund (Brower, Beatley, and Blatt 1987, Ch. 5).

California, in Division 17 of its Public Resources Code, enacted enabling legislation for a similar device called Geologic Hazard Abatement Districts (GHADs). Local governments may establish special assessment districts in the area of known geologic hazards and collect fees from property owners to finance repairs from landslides and implement geologic hazard mitigation measures. The local legislative body creating a GHAD may serve as its board of directors. While their use has not yet become widespread, these districts exist in some jurisdictions, such as Contra Costa County. The first two Contra Costa County GHADs were formed by the county and a subdivider prior to lot sale and development (Tyler 1995).

Tax increment financing (TIF). The underlying concept of a TIF district is somewhat opposite of a benefit assessment district, where additional taxes are levied to support additional services. A TIF district establishes a current base level of taxation determined by existing property values and assigns additional increments resulting from increases in future valuations to a

special fund used to pay for infrastructure improvements within the district. In other words, the planned improvements are expected to increase property values, and those increased values, when they materialize, produce additional property tax revenues that underwrite the cost of the improvements. In a neighborhood or business district badly devastated by a natural disaster, a TIF district can be an effective mechanism for financing the reconstruction of essential infrastructure ranging from new street lights to aesthetic changes in street and sidewalk design intended to draw new business to an area undergoing substantial redevelopment. TIFs invariably have some time limit applied to their existence, so that eventually the improvements return greater tax revenues to the larger community once the mission of redevelopment has been accomplished.

Many states have statutes authorizing the use of this differential taxing device. One interesting wrinkle regarding the use of TIF districts for post-disaster redevelopment, however, is that Alaska's TIF legislation specifically limits its use to earthquake recovery purposes.

Impact fees. Impact fees are a broader application of the concept behind benefit assessment districts. The idea is to make new development pay the costs of infrastructure expansion within the local jurisdiction. Typically, these fees have been used to underwrite the expansion of or addition to schools, libraries, fire and police stations, sewer and water services, and any number of other necessary public facilities. Their legality varies widely depending on state enabling legislation and the degree of freedom local governments have to craft their own revenue enhancement schemes. Consequently, planning departments considering impact fees as a growth control measure must check the applicable state legislation, if there is any. One difference from benefit assessments is that impact fees are not tied to the value enhancement of individual properties but, instead, are tied to the impact that those properties have on the overall level of need for particular facilities or services.

In a neighborhood or business district badly devastated by a natural disaster, a TIF district can be an effective mechanism for financing the reconstruction of essential infrastructure ranging from new street lights to aesthetic changes in street and sidewalk design intended to draw new business to an area undergoing substantial redevelopment.

In a post-disaster context, one interesting example of the use of impact fees again comes from Lee County, Florida, where, in 1993, the county's department of public services proposed the creation of an emergency public shelter impact fee. The idea was to use the impact fee on new development to fund the development of adequate shelters to house those likely to be fleeing from highly hazardous areas during a hurricane. The study documenting the proposal details evacuation lead times, the numbers of people likely to need shelter services, and other relevant details in calculating the size of the fee needed to support the necessary services. Although the proposal was never enacted in Lee County, this innovative idea could well have applicability in highly flood-prone riverine areas as well as in coastal zones.

Differential taxation. Differential taxation does not enhance the local government's revenue stream directly or for clear post-disaster purposes. It is a long-term measure aimed at discouraging development in areas that the local government would prefer to see remain as some type of open space. It has been used extensively by states as a technique for lowering the effective cost of retaining forest or farmland by taxing such lands at their current use value, rather than the value at which the market might appraise them for other purposes, such as residential development. Where a local government seeks to retain undeveloped land in that state in a hazardous area, this may be an appropriate tool, although its use is likely to be heavily dependent on state legislation. One problem that is sometimes identified in literature on this type of taxing is that owners often are induced to retain the land only while there is a marginal benefit that outweighs the profits of selling or developing. For that reason, local governments may wish to enhance the effectiveness of such taxing with the use of a device called "existing use zoning" by Humbach

(1992). This device avoids the problem of takings in relation to a landowner's development expectations simply by creating a category of existing use that is applied to land that is still currently used for forestry or agricultural purposes, thus allowing the owner to retain the value that he or she currently enjoys from the use to which the property is already put. Coupling this zoning device with differential taxation would remove most of the incentives for entertaining development proposals by making clear that a developer would have to seek to rezone the property before the land could acquire any anticipated additional value. If most surrounding land were in the same category, rezoning would become particularly difficult.

Urban renewal or redevelopment funds. Planning redevelopment projects can be every bit as complex and idiosyncratic as the individual communities that undertake them, each of which has its own special distribution of manufacturing and service businesses, employment base, business district infrastructure and character, and business retention prospects. Moreover, redevelopment projects are generally not under the direct control of planning departments but are administered by separately established redevelopment agencies upon which state legislation has bestowed powers of eminent domain for purposes of land assembly and redevelopment. It is essential that such entities understand and participate in mitigation plans and plans for post-disaster recovery and reconstruction, so that redevelopment goals and projects will not conflict with local government mitigation and recovery objectives, especially if the redevelopment districts are pre-identified as being in hazard-prone areas.

Planners need to take the initiative before a disaster strikes to collaborate with local redevelopment officials to determine what authority they may have to use the redevelopment agency as a funding source for post-disaster reconstruction purposes.

Because redevelopment funds represent an excellent potential source of money for rebuilding damaged areas, particularly in central business districts or pre-existing blighted areas, planners need to take the initiative before a disaster strikes to collaborate with local redevelopment officials to determine what authority they may have to use the redevelopment agency as a funding source for post-disaster reconstruction purposes.

Florida and California have both produced and commissioned guides and model plans to address the special problems involved in post-disaster redevelopment efforts (TBRPC 1994; Governor's Office of Emergency Services 1993, Chs. 29-30). While it is impossible here to detail the variations among 50 states in their redevelopment enabling legislation, it is interesting to consider California law because of the special attention that state has paid to post-earthquake recovery as an aspect of local redevelopment authority. As California's Seismic Safety Commission (1994a) notes, "Redevelopment agencies throughout the state have used their authority extensively to subsidize seismic retrofitting of unsafe structures and to assist with post-earthquake recovery." One interesting early example is that of Santa Rosa, which suffered a mild earthquake in 1969, in which no buildings collapsed, but many in the downtown were damaged. Santa Rosa expanded its existing redevelopment district to include the central business district and used its federal contribution of $5 million to acquire and clear some properties for a major regional shopping center. More importantly, the city over the next two years developed and adopted a resolution requiring a preliminary inspection (at city expense) of all buildings built before 1958 and setting up a program for upgrading such buildings to meet newer seismic retrofit standards (William Spangle and Associates 1980).

The passage in 1994 of California Assembly Bill 1290, which changed the definition of blighted areas, facilitated the inclusion of disaster-stricken properties so that redevelopment authorities could use their funds for mitigation. At the time, 375 redevelopment agencies in the state were overseeing 665 redevelopment project areas, many involving older down-

Following an earthquake in 1969, Santa Rosa, California, undertook redevelopment of downtown buildings. The inset photo shows retrofit buildings and the cleared site for a new mall in 1979; the photo below shows the completed mall in 1986.

towns whose buildings are more vulnerable because they were built prior to the adoption of modern seismic building code standards. The seismic commission's Compendium of Background Reports for the Northridge Earthquake cites several examples of both:

- the use of tax-increment financing to subsidize seismic hazard mitigation, largely to retrofit unreinforced masonry buildings (Culver City; Fullerton; City of Orange); and
- assistance in post-earthquake recovery, such as subsidizing repair of damaged structures, alleviating hazardous conditions (including through demolition), and providing relocation and temporary housing assistance to property owners and residents (Coalinga, Whittier, and Santa Cruz, the last being detailed in the case study in Chapter 12).

One interesting feature of California redevelopment legislation, adopted in 1964 to address tsunami damage in Crescent City after the Alaska earthquake, is the Community Redevelopment Financial Assistance and Disaster Project Law (California Health and Safety Code, Section 34000 et seq.), known popularly as the "disaster law." Its importance lies in its provisions for expedited plan adoption if the proposed redevelopment area is certified by the governor as in need of assistance and the president has declared it a disaster area. The three cities cited above have all used this measure to speed the process of adopting plans and implementing post-disaster redevelopment projects (William Spangle and Associates 1991).

An interesting local plan for redevelopment emerged out of the devastated town of Homestead, Florida, after Hurricane Andrew. The local redevelopment agency, Homestead Economic and Rebuilding Organization (HERO), was created in the aftermath of the disaster to help rebuild a community that lost 8,000 jobs when the Homestead Air Force Base was virtually destroyed. The business community devastation was nearly as massive. Nevertheless, despite losing the presence of major league baseball for spring training, Homestead built a Grand Prix auto racing track, new housing, and a park.

Because Homestead is a smaller city (population 26,000) with a spotty planning history prior to Andrew, this attempt constitutes a potentially interesting example for other communities of similar size (Enterprise / Homestead Planning / Action Team and City of Homestead 1993; City of Homestead-Enterprise / Homestead and HERO 1993). Local or regional planners may also wish to consider the desirability of at least having in place contingency plans for the efficient post-disaster formation of such a redevelopment authority where none already exists.

Public mortgage lending subsidies and policies. Many cities and states have programs to subsidize interest rates or provide other breaks for low-income and first-time home buyers or to encourage redevelopment in blighted areas. Examples of the latter group include sweat equity and homesteading programs that allow willing buyers to acquire and rehabilitate blighted properties at little or no cost in order to put them back on the tax rolls and revitalize the community. Reexamining the policies that guide these programs with an eye to achieving hazard mitigation in the bargain is a way to leverage these public subsidies to prevent future disaster damage.

Transfer of development rights. One way of reducing density in hazardous areas is to allow property owners to sell or transfer their development rights to developers of property in other, nonhazardous areas of the community. This technique is applicable across all hazard categories if properly framed to define the boundaries of the transferring and receiving areas and the circumstances under which rights may be transferred. The technique has been used in several locations around the U.S., including Montgomery County, Maryland, where it is part of a program for protecting farmland. Using it in a natural hazards context is simply a change of purpose, but a valid one. This technique might be especially useful in the aftermath of a natural disaster as a means of persuading some landowners to redevelop outside the most heavily stricken areas. Fortunately, planners considering such options have several good resources in the planning literature to guide their thinking and steer them past any legal pitfalls (Maryland Office of Planning 1995a; Roddewig and Inghram 1987; Bredin 1998).

Scottsdale, Arizona, uses density transfers tied specifically to hazardous conditions as well as the protection of natural resources in its Environmentally Sensitive Lands Ordinance, adopted in 1991. The provisions allow transfers from areas with slopes that are unstable or exceed 25 percent, or areas appearing on the city's special features map (Olshansky 1996, Appendix C).

TDR programs require some land-use sophistication on the part of the jurisdiction managing the program. The administration of the program can take several forms. One extreme is simply to designate the sending and receiving areas and the allowable density rights in each and otherwise let the market operate within those parameters. The other end of the spectrum occurs when the jurisdiction itself serves as the broker, buying and selling land development rights. This allows greater control over prices and procedures but requires more direct oversight and staff expense. Variations on these themes involve more limited interventions based on particular policy considerations of the local government and its comprehensive plan. In any case, the local planning

department must develop a substantial knowledge base concerning local market conditions and trends in order to operate an effective program that achieves comprehensive plan objectives. (See also Brower, Beatley, and Blatt (1987, pp. 133-36) and Roddewig and Inghram (1987).)

Management Tools

Coordination with neighboring jurisdictions. Beyond mutual aid agreements, discussed in Chapter 3, lie a host of potential devices for cooperation on natural hazards problems, many of which get far less attention than they deserve. Floodplain management is one area that is overly ripe for regional cooperation between neighboring municipalities, and one that can yield substantial dividends even in smaller watersheds. Despite the frequent competition between neighboring communities in large metropolitan areas, Glassford (1993) offers an intriguing contrary example of a successful cooperative agreement among seven southern Chicago suburbs in the case of Butterfield Creek. Formed in 1983, the Butterfield Creek Steering Committee (BCSC) first engaged the U.S. Soil Conservation Service (now the Natural Resources Conservation Service) and the Illinois Department of Transportation's Division of Water Resources to study flooding problems and learned that 100-year flood levels in some locations were as much as 2.5 feet higher than existing FIRMs indicated, and that the problem could get worse with further development upstream in natural storage areas.

Beyond mutual aid agreements lie a host of potential devices for cooperation on natural hazards problems, many of which get far less attention than they deserve. Floodplain management is one area that is overly ripe for regional cooperation between neighboring municipalities, and one that can yield substantial dividends even in smaller watersheds.

By November 1990, BCSC had reviewed local ordinances and published its own Butterfield Creek Model Floodplain and Stormwater Management Code. The model code strengthens detention requirements, requires effective soil erosion and sediment control, encourages natural drainage practices like swales and vegetative filters, and limits many uses in the floodway. One example of implementing the last point is a sunken baseball diamond in Flossmoor, which doubles as a catch basin to retain and dissipate flood waters without damaging nearby properties. What the BCSC model demonstrates above all is the value of local leadership in establishing the basis for cooperation on natural hazards that cross municipal boundaries in a metropolitan area.

Training programs. Because the whole arena of emergency management and planning for post-disaster recovery and reconstruction involves so much technical and procedural knowledge, FEMA and state emergency management agencies have made available a number of training tools for use by local government officials. These include technical assistance available from FEMA regional offices (see Appendix D), FEMA manuals and guides for mitigation and disaster planning, and the programs of FEMA's Emergency Management Institute (EMI) in Emmitsburg, Maryland. Specifically relevant to training for post-disaster recovery are three tabletop mitigation and recovery exercises, which provide earthquake, flood, and hurricane recovery scenarios. The facilitator's guide for these exercises is available on the Internet at www.fema.gov/priv/g398.htm. This allows local officials to decide whether to stage the exercise themselves or engage their state hazard mitigation officer to do so.

Few planning concerns lend themselves better to the use of modern computer technology than natural hazards. GIS combines mapping and database features to perform data storage and computation functions that were measurably more complex prior to the advent of this technology, which continues to improve constantly, like virtually all software innovations.

Geographic Information Systems (GISs) and the Global Positioning System (GPS). Few planning concerns lend themselves better to the use of modern computer technology than natural hazards. GIS combines mapping and database features to perform data storage and computation functions that were measurably more complex prior to the advent of this technology, which continues to improve constantly, like virtually all software innovations. Properly maintained, GIS can enable planners to access more information more quickly and make better informed, more sophisticated land-use decisions than would have seemed possible just a generation ago.

GIS has come increasingly into its own as an essential post-disaster tool with some of the more recent disasters, including the Northridge earthquake (Topping 1994). Topping has developed a useful list of data layers relevant to disaster needs. (See sidebar.) However, for cost reasons among others, GIS will seldom if ever be used only for disaster planning purposes, and generally has served more than planning purposes when purchased, installed, and maintained by local governments. GIS systems are complex multipurpose tools that can help local officials coordinate and integrate data concerning a wide variety of land-use concerns, including infrastructure, housing, natural resources and hazards, zoning, and commercial and industrial activities. In short, the versatility of GIS mirrors the complexity of the issues planners will face in managing post-disaster recovery and reconstruction. In making the leap into the use of GIS, however, a local government should understand the commitment it must make in terms of time and personnel to maintain the database that will allow planners and other decision makers to realize the system's potential utility (Monmonier 1997).

GPS technology is increasingly being used to complement GIS in post-disaster damage assessments. In rural areas, for example, it is particularly valuable in establishing the location of damaged properties for disaster assistance and mitigation planning purposes.

Soil stability ratings. Accessing good soil data is a necessary prelude to the development of the regulatory tools in a hillside development ordinance. Local government planners can turn to the U.S. Geological Survey (USGS) for information, much of which is increasingly available through the USGS World Wide Web site on the Internet (www.usgs.gov), and to the Natural Resources Conservation Service. Preparatory to a site plan or subdivision review, however, it would be wise to require a geologic site investigation (see below) to develop adequate data for decision making (Olshansky 1996).

GPS technology is increasingly being used to complement GIS in post-disaster damage assessments. In rural areas, for example, it is particularly valuable in establishing the location of damaged properties for disaster assistance and mitigation planning purposes.

Soil and water conservation districts also provide soil reports on rezonings and subdivision proposals. Communities should take these sources of information seriously, although many currently do not.

Geologic studies. The standard method for ensuring the geologic suitability of a site for development is to require the completion of a geologic, or geotechnical, site investigation prior to review. In most cases, the applicant is required to hire the engineering geologist who prepares the study. The study may then be reviewed, depending on the circumstances and the requirements of local ordinances, by the local planning agency, an outside geologist hired by the jurisdiction, and/or by a staff geologist working either in the planning department or in some other division of local government (for example, public works). The local regulations should specify the level of detail and the specific types of supporting information desired in the study, including maps. Figure 5-4 illustrates the differentiation spelled out in the regulations for Santa Clara County, California (Tyler 1995).

This tool can be linked to zoning inasmuch as those areas required to have this review would have to lie within certain zoning categories where the hazard identification process outlined in Chapters 3 and 4 has shown that there are special problems.

Salt Lake County, Utah, which faces serious seismic safety problems along the Wasatch Front as well as slope stability problems in the nearby mountains, enacted its Natural Hazards Ordinance (Salt Lake County Zoning Ordinance Chapter 19.75) in 1989. Any applicant "requesting development on a parcel of land within a natural hazards study area" must submit a natural hazards report by an engineering geologist, or in the case of snow avalanche hazard, by a experienced avalanche expert. The report

Initial GIS Data Layers Useful to Response and Recovery

PREDEVELOPED DATA LAYERS

- congressional district boundaries
- state assembly and senate district boundaries
- metropolitan planning area boundaries
- county boundaries
- city boundaries
- local community and council district boundaries and areas
- special district boundaries
- school district boundaries
- ZIP code and postal place name boundaries and areas
- redevelopment area boundaries
- Census block group characteristics, including household size, owner-renter occupancy, income, age, ethnicity, and language data
- type of unit: single-family detached, multifamily attached, *number of floors**
- type of structure: wood-frame, URM, reinforced concrete, etc.
- manufactured housing parks
- freeways, interchanges, and ramps
- arterial and local streets with address ranges and street names
- dirt roads and four-wheel drive trails
- railroads, surface rail transit lines, and stations
- international, regional, and general aviation airports
- flood hazard areas and stream beds
- areas subject to liquefaction, strong ground motion, and seismically induced landslides
- Alquist-Priolo Study Zones areas (California)
- potential dam and tsunami inundation areas
- fire hazard areas
- areas subject to slumping, ground failure, and debris flows
- existing land-use polygons and areas
- unreinforced masonry (URM) buildings
- historical buildings
- public and private schools and areas
- hospitals, including type, number of beds
- emergency medical centers
- parks, including buildings and areas
- community centers
- police and fire stations
- nuclear and conventional power plant locations
- major oil and gas pipeline and storage tank locations
- powerline, waterline, and dam locations
- digital elevation models (DEMs), topography, slope, aspect
- hazardous materials, chemical, and ordinance storage sites

INCIDENT-SPECIFIC DATABASE ITEMS

- road closures and rerouting
- building damage by address and assessor's parcel number
- infrastructure damage location and extent by facility type
- shaking intensities
- ground motion, including horizontal and vertical displacement
- areas of ground rupture, liquefaction, landsliding
- areas flooded at crest
- tsunami high water line and areas
- burned areas
- *location of shelters**
- *location of temporary housing**
- Disaster Assistance Center and service center locations
- individual assistance applicants
- public assistance applicants
- hazard mitigation analytic maps

* Items in italics were added to the original source list for purposes of this PAS Report.

Source: Kenneth C. Topping, *OES GIS Strategic Plan*, Circulation Draft, prepared for Office of Emergency Services, State of California.

Figure 5-4. Hazard Zones and Investigation Requirements
Summarized from Santa Clara County, California, Relative Seismic Stability Map

	HAZARDS	INVESTIGATION REQUIREMENTS
RED	Areas of high potential for liquefaction, lateral spreading, differential settlement, fault rupture, earthquake-induced landslides, tsunamis, and flooding.	Site investigations mandatory unless detailed information permits waiver.
YELLOW	Area of moderate potential for liquefaction, lateral spreading, and earthquake-induced landslides.	Site investigations required unless waived by county.
GREEN	Area with low potential for liquefaction, lateral spreading, and earthquake-induced landslides.	Site investigation not automatically required; may be required by county on the basis of detailed information.

Source: Tyler (1995)

must include a detailed site map (i.e., one inch equal to 200 feet), with delineation of recommended setback distances and locations for structures. (See Figure 5-5.) While many jurisdictions contract with an independent geotechnical expert for review of the adequacy of such studies, Salt Lake County is the only county in Utah to retain its own staff geologist within the planning department. One significant advantage of this arrangement, where the work load is sufficient to make it cost-effective, is that a staff geologist can over time develop a much stronger working knowledge of the local environment than can an outside expert.

Public education. Planners and planning departments are perennially faced with the need to improve public understanding of the goals of the planning process and the means of achieving them. Natural hazards are among the more complex issues requiring elucidation in this regard, but the stakes are high, and as has been discussed with regard to multiobjective management, other actors on the local political scene are likely both to be informed about some of the issues and to have a stake in advancing the cause of hazard mitigation and sustainable post-disaster recovery and reconstruction. However, the best time to initiate the public education is unquestionably during the pre-disaster period. Even though it may be easier and vitally necessary to get people's attention after a disaster, the message will be more effective if the groundwork for disseminating it has been laid beforehand.

Planners and planning departments are perennially faced with the need to improve public understanding of the goals of the planning process and the means of achieving them. Natural hazards are among the more complex issues requiring elucidation in this regard, but the stakes are high, and as has been discussed with regard to multiobjective management, other actors on the local political scene are likely both to be informed about some of the issues and to have a stake in advancing the cause of hazard mitigation and sustainable post-disaster recovery and reconstruction.

Examples of good pre-disaster public education campaigns by local government, especially those involving planning departments, abound in each hazard category. While these may be developed locally and independently, sometimes they are coordinated with other entities, including the American Red Cross, which produces its own public education resources. One of the most common subjects is floodproofing, often including the use of technical open houses and other hands-on means of conveying information to homeowners (U.S. Army Corps of Engineers 1994; FEMA 1986). Glassford (1993) notes that this technique was particularly effective in reaching homeowners after flooding incidents along Butterfield Creek in the south Chicago suburbs. In addition, Florida's Department of Community Affairs (n.d.) has supported education efforts about hurricanes and other coastal hazards. USGS (n.d.) has produced public education materials concerning

earthquakes customized to individual regions of the country, such as the Bay Area and southern Alaska. FEMA (1993a) has also produced some general purpose booklets for public consumption that local officials can use, as well as providing a good deal of public education material on its World Wide Web site (www.fema.gov).

The value of public education in helping to build informed consensus behind an effective plan for post-disaster recovery and reconstruction, or an effective long-term plan for hazard mitigation, should be obvious from the foregoing discussion in Chapter 4. An informed public is a potential ally planners can ill afford to forego if they wish to address disaster issues in a serious manner.

A MODEL RECOVERY AND RECONSTRUCTION ORDINANCE

The model recovery and reconstruction ordinance that follows these introductory paragraphs is based on the principles established elsewhere in this PAS Report. It provides basic elements of a comprehensive ordinance establishing a recovery organization and authorizing a variety of pre- and post-event planning and regulatory powers and procedures related to disaster recovery and reconstruction. Designed to be adopted in advance of a major disaster, it can also be quickly adapted to post-disaster conditions if it has not been adopted before the disaster.

Figure 5-5. Special Study Area Report Requirements, Salt Lake County, Utah

	IS A SITE-SPECIFIC NATURAL HAZARDS REPORT REQUIRED PRIOR TO APPROVAL?			
Land Use (Type of Facility)	**Liquefaction Potential High and Moderate**	**Very Low and Low**	**Surface Fault Rupture Special Study Area**	**Avalanche Path Special Study Area**
Critical facilities (essential and hazardous facilities, and special occupancy structures)	Yes	Yes	Yes	Yes
Industrial and commercial buildings (more than 2 stories or less than 5,000 square feet)	Yes	No	Yes	Yes
Multifamily residential structures (4 or more units per acre, and all other industrial and commercial)	Yes	No	Yes	Yes
Residential subdivisions	Yes	No	Yes	Yes
Residential single lots and multifamily dwellings (less than 4 units per acre)	No	No	Yes	Yes

Source: Salt Lake County, Utah, Zoning Ordinance, Chapter 19.75

Unlike ordinary planning ordinances, this ordinance requires involvement by many other departments within the city or county government organization under the guidance and leadership of the city manager, county administrative officer, or equivalent position. Some of the actions called for

by this ordinance require direct involvement of the planning department, although frequently it will be acting in concert with other departments. Having an inherently interdepartmental focus, this ordinance structures a model process that has generic value. Due to widely ranging circumstances, however, the content may vary considerably.

The essential concepts of this ordinance include: the establishment of a recovery organization before a major disaster to prepare a pre-event plan; the adoption of that plan and this ordinance by the governing body before a major disaster occurs; and the use of the recovery plan and organization to efficiently and wisely guide post-disaster recovery and reconstruction activity. The recovery organization may be constructed differently from place to place, but the idea is to create an ongoing organization integrated with, but extending beyond, any existing emergency operations organization.

Although an existing emergency operations organization may serve as a useful base from which to fashion a recovery organization, there are certain fundamental differences in function that make it preferable to establish a recovery organization that operates parallel to the emergency response organization. Continuity of the recovery organization and expediting the rebuilding processes for which it is responsible become very important.

Although an existing emergency operations organization may serve as a useful base from which to fashion a recovery organization, there are certain fundamental differences in function that make it preferable to establish a recovery organization that operates parallel to the emergency response organization. Continuity of the recovery organization and expediting the rebuilding processes for which it is responsible become very important.

1. Local government emergency response organizations tend to focus on emergency preparedness and response operations. Strongly oriented toward police and fire functions, during "peace-time" they characteristically handle routine local emergencies and undertake training and preparedness for disaster response operations. Typically, recovery and reconstruction functions do not fall within their purview, although this is beginning to change in some jurisdictions.

2. Some powers reflected by this ordinance are activated by the declaration of a local emergency. However, these powers are characteristically broader than emergency response powers because the latter do not include property, building, land-use, and development regulations, or the public hearing process.

3. Certain regulatory powers authorized by this ordinance are identified for initial implementation during the time in which a declaration of local emergency is in effect. However, such powers tend to be extended for much longer periods of time. Although a declared emergency may not be terminated for months after the end of emergency response operations, complete implementation of rebuilding processes often takes years.

In short, this is an emerging area of disaster management practice that crosses over into city planning, redevelopment, and building. Much of the thinking and implementation for the processes identified in this ordinance have only emerged within professional literature or practice within the past decade. Although some form of ad hoc recovery organization is created with every major disaster, such arrangements tend to exist for the peak rebuilding period and then are disbanded. As yet, very few local jurisdictions have formally created recovery organizations in advance of a disaster or maintained them continuously afterwards.

This ordinance structures many processes that tend to take place anyway after a major disaster without forethought or knowledge of available options. It provides organizational and procedural dimensions that can accelerate thinking and planning needed in advance of a disaster to recover and rebuild more wisely and efficiently than would happen were such preparation not to occur. It captures the broadest possible range of pre-event and post-disaster activities that interact with urban planning and development,

recognizing that not all provisions may be germane to circumstances within individual communities.

There is little established practice of record to use as a point of departure. Few ordinances in use by local jurisdictions deal with such a broad scope of recovery functions. Those which have been adopted tend to cover a more limited range of elements, such as rebuilding, permitting, and nonconforming use procedures. With the upswing in major disasters in the last several years, however, substantial experimentation is taking place, and more communication is occurring regarding outcomes of various recovery strategies.

These processes will inevitably lead to revisions of the ideas reflected here. Therefore, this ordinance should be considered a framework for flexible application of pre-event and post-event procedures that can be modified to fit emerging ideas as well as local conditions. Although a separate ordinance is not essential to the performance of many functions, the value of adopting a recovery ordinance is in providing clear policy guidance in advance for dealing with contingencies as well as an overall rationale in case of legal challenge.

The following ordinance language is interspersed with italicized commentaries that provide alternatives or amplification. Commentaries sometimes identify areas for possible modification or explain reasons why certain provisions are included. Commentary has been omitted for sections that are self-explanatory or unlikely to require change.

Certain conventions have been included throughout the model that will require change by some local governments. Specifically, terms that are bracketed are generic and need to be replaced with specific local titles. These terms include name of jurisdiction, the name of the appropriate local legislative body (e.g., the city council), and equivalents for state emergency management agency, recovery task force, and other committees, agencies, legislation, and plans. The numbering system is designed to reflect the structure of the ordinance content and may require adaptation to the numbering of local ordinances.

A MODEL RECOVERY AND RECONSTRUCTION ORDINANCE
by Kenneth C. Topping, AICP

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Section 2. Purposes

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- 3.15 Major Disaster
- 3.16 Interagency Hazard Mitigation Team

About the Author

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Section 11. Recovery and Reconstruction Strategy
11.1 Functions
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Section 12. Severability

WHEREAS, [jurisdiction name] is vulnerable to various natural hazards such as earthquakes, flooding, wildfires, and wind, resulting in major disasters causing substantial loss of life and property;

WHEREAS, [jurisdiction name] is authorized under state law to declare a state of local emergency and take actions necessary to ensure the public safety and well-being of its residents, visitors, business community, and property during and after such major disasters;

WHEREAS, it is essential to the well being of [jurisdiction name] to expedite recovery and reconstruction, mitigate hazardous conditions, and improve the community after such major disasters;

WHEREAS, disaster recovery and reconstruction can be facilitated by establishment of a recovery organization within [jurisdiction name] to plan, coordinate, and expedite recovery and long-term reconstruction activities;

WHEREAS, preparation of a pre-event plan for disaster recovery and reconstruction can help [jurisdiction name] organize to expedite recovery in advance of a major disaster and to identify and mitigate hazardous conditions, both before and after such a disaster;

WHEREAS, recovery can be expedited by pre-event adoption of an ordinance authorizing certain extraordinary governmental actions to be taken during the declared local emergency to expedite implementation of recovery and reconstruction measures identified in a pre-event plan;

WHEREAS, it is mutually beneficial to cooperatively plan relationships needed between [jurisdiction name] and other state and federal governmental authorities;

WHEREAS, it is informative and productive to consult with representatives of business, industry and citizens' organizations regarding the most suitable and helpful approaches to disaster recovery and reconstruction;

The [name of legislative body] does hereby ordain:

SECTION 1. AUTHORITY

This ordinance is adopted by the [name of legislative body] acting under authority of the [authorizing legislation], [state emergency management act *or* equivalent], and all applicable federal laws and regulations.

SECTION 2. PURPOSES

It is the intent of the [name of legislative body] under this chapter to:

- authorize creation of an organization to plan and prepare in advance of a major disaster for orderly and expeditious post-disaster recovery and to direct and coordinate recovery and reconstruction activities;
- direct the preparation of a pre-event plan for post-disaster recovery and reconstruction to be updated on a continuing basis;
- authorize in advance of a major disaster the exercise of certain planning and regulatory powers related to disaster recovery and reconstruction to be implemented upon declaration of a local emergency;
- identify means by which [jurisdiction name] will take cooperative action with other governmental entities in expediting recovery; and implement means by which [jurisdiction name] will consult with and assist citizens, businesses, and community organizations during the planning and implementation of recovery and reconstruction procedures.

SECTION 3. DEFINITIONS

As used in this ordinance, the following definitions shall apply:

3.1 **damage assessment survey.** A field survey to determine levels of damage for structures and identify the condition of structures.

3.2 **development moratorium.** A temporary hold, for a defined period of time, on the issuance of building permits, approval of land-use applications or other permits and entitlements related to the use, development, redevelopment, repair, and occupancy of private property in the interests of protection of life and property.

3.3 **Director.** The director of the [recovery organization] or an authorized representative.

3.4 **Disaster Field Office (DFO).** A center established by FEMA for coordinating disaster response and recovery operations, staffed by representatives of federal, state, and local agencies as identified in the Federal Response Plan (FRP) and determined by disaster circumstances.

3.5 **Disaster Recovery Centers (DRCs).** A multi-agency center organized by FEMA for coordinating assistance to disaster victims.

3.6 **Damage Survey Report (DSR).** A claim by a local jurisdiction for financial reimbursement for repair or replacement of a public facility damaged in a major disaster, as authorized under the Stafford Act and related federal regulations, plans, and policies.

3.7 **emergency.** A local emergency, as defined by the Municipal Code, which has been declared by the [legislative authority] for a specific disaster and has not been terminated.

3.8 **event.** Any natural occurrence that results in the declaration of a state of emergency and shall include earthquakes, fires, floods, wind storms, hurricanes, etc.

3.9 **Federal Response Plan (FRP).** A plan to coordinate efforts of the government in providing response to natural disasters, technological emergencies, and other incidents requiring federal assistance under the Stafford Act in an expeditious manner.

3.10 **Flood Insurance Rate Map (FIRM).** An official map of the community, on which the Federal Insurance Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

3.11 **Hazard Mitigation Grant Program.** A federal program that assists states and local communities in implementing long-term hazard mitigation measures following a major disaster declaration.

3.12 **historic building or structure.** Any building or structure listed or eligible for listing on the National Register of Historic Places, as specified by federal regulation, the state register of historic places or points of interest, or a local register of historic places, and any buildings and structures having historic significance within a recognized historic district.

3.13 **in-kind.** The same as the prior building or structure in size, height and shape, type of construction, number of units, general location, and appearance.

3.14 **Interagency Hazard Mitigation Team.** A team of representatives from FEMA, other federal agencies, state emergency management agencies, and related state and federal agencies, formed to identify, evaluate, and report on post-disaster mitigation needs. [Note: Not all states employ the use of this team.]

3.15 **major disaster.** Any natural catastrophe (including any [hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought]), or, regardless of cause, any fire, flood, or explosion, which in the determination of the President of the United States causes damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of states, jurisdictions, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

3.16 **reconstruction.** The rebuilding of permanent replacement housing, construction of large-scale public or private facilities badly damaged or destroyed in a major disaster, addition of major community improvements, and full restoration of a healthy economy.

3.17 **recovery.** The process by which most of private and public buildings and structures not severely damaged or destroyed in a major disaster are repaired and most public and commercial services are restored to normal.

3.18 **recovery organization.** An interdepartmental organization that coordinates [jurisdiction name] staff actions in planning and implementing disaster recovery and reconstruction functions. [Note: "Recovery organization" is a generic term. Other locally chosen names (e.g., The Municipal Disaster Recovery Commission) can, of course, be substituted.]

3.19 **recovery plan.** A pre-event plan for post-disaster recovery and reconstruction, composed of policies, plans, implementation actions, and designated responsibilities related to expeditious and orderly post-disaster recovery and rebuilding, with an emphasis on mitigation.

3.20 recovery strategy. A post-disaster strategic program identifying and prioritizing major actions contemplated or under way regarding such essential recovery functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.

3.21 safety element. An element of the comprehensive, long-term general plan for the physical development of a community that addresses protection of the community from unreasonable risks associated with the effects of earthquakes, landslides, flooding, wildland and urban fires, wind, coastal erosion, and other natural and technological disasters.

3.22 Stafford Act. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended).

SECTION 4. [RECOVERY ORGANIZATION]

There is hereby created the [recovery organization] for the purpose of coordinating [jurisdiction name] actions in planning and implementing disaster recovery and reconstruction activities.

4.1 Powers and duties. The [recovery organization] shall have such powers as enable it to carry out the purposes, provisions, and procedures of this chapter, as identified in this chapter.

4.2 [Recovery Task Force]. The [recovery organization] shall include a [recovery task force *or* locally chosen term] comprised of the following officers and members:

a. The [title of the chief executive officer (e.g., the mayor)] who shall be Chair;

b. The [title of deputy chief executive officer (e.g., city manager or county or town equivalent)] who shall be Director and Vice-Chair;

c. The [title of the next ranking executive officer (e.g., assistant city manager)] who shall be Deputy Director, and who shall act as Vice-Chair in the absence of the Vice-Chair;

d. The [title of the jurisdiction's legal adviser] who shall be Legal Adviser;

e. Other members, including the [list the titles of other interested jurisdiction officials, which might include the chief building official, chief engineer, the director of community development or planning, the fire chief, the emergency management coordinator, the general services director, the historic preservation commission director, the police chief, the director of public works, and the director of utilities], together with representatives from such other departments and offices as may be deemed necessary by the Chair or Director for effective operation.

Commentary. *The formal structure of a recovery organization will vary from community to community. The important thing is to include representatives from agencies and organizations so that the broadest array of functions that may have a direct or indirect role in recovery and reconstruction can be addressed. Also, formal leadership may vary by size and structure of local governmental organization. In a big-city environment, presence and availability of the mayor or a deputy mayor may be important from a leadership standpoint, even though recovery in many instances is largely a staff-driven process. On the other hand, in a typical council-manager form of government, inclusion of the mayor may not be very useful. The intent here is to provide a communications connection with the appropriate legislative body as well as a ceremonial function.*

4.3 Operations and Meetings. The Director shall have responsibility for [recovery organization] operations. When an emergency declaration is not in force, the [recovery task force] shall meet monthly or more frequently, upon call of the Chair or Director. After a declaration of an emergency, and for the duration of that declared emergency period, the [recovery task force] shall meet daily or as frequently as determined by the Director.

Commentary. *The overall concept here is for the city manager to run the recovery task force operations on behalf of the city council, reserving the presence of the mayor for those times when policy matters are being discussed or at critical junctures following a major disaster. In actuality, the city manager inevitably becomes the pivotal party for informing and advising the city council on recovery matters, interpreting council policy and coordinating staff functions.*

4.4 Succession. In the absence of the Director, the Assistant Director shall serve as Acting Director and shall be empowered to carry out the duties and responsibilities of the Director. The Director shall name a succession of department managers to carry on the duties of the Director and Assistant Director, and to serve as Acting Director in the event of the unavailability of the Director and Assistant Director.

4.5 Organization. The Recovery Task Force may create such standing or ad hoc committees as determined necessary by the Director.

4.6 Relation to [emergency management organization]. The [recovery organization] shall work in concert with the [emergency management organization] that has interrelated functions and similar membership.

Commentary. *As noted in the introductory paragraphs, there are certain fundamental differences in function that make it preferable to establish a recovery organization that can operate parallel to the emergency response organization. However, because of the inherent linkage of emergency preparedness and response with recovery, reconstruction, and hazard mitigation functions, a close relationship must be continuously maintained. For many purposes, these overlapping organizations can meet and work jointly. The value of having a separate recovery organization is best recognized when hard-core building, planning, redevelopment, and economic recovery issues require extended attention during the pre-event planning phase or during the long months and years it is likely to take to fully rebuild.*

SECTION 5. RECOVERY PLAN

Before a major disaster, the [recovery task force] shall prepare a pre-event plan for post-disaster recovery and reconstruction, referred to as the recovery plan, which shall be comprised of pre-event and post-disaster policies, plans, implementation actions, and designated responsibilities related to expeditious and orderly post-disaster recovery and rebuilding, and will incorporate hazard mitigation in all elements of the plan.

5.1 Recovery Plan Content. The recovery plan shall address policies, implementation actions and designated responsibilities for such subjects as business resumption, damage assessment, demolitions, debris removal and storage, expedited repair permitting, fiscal reserves, hazards evaluation, hazard mitigation, historical buildings, illegal buildings and uses, moratorium procedures, nonconforming buildings and uses, rebuilding plans, redevelopment procedures, relation to emergency response plan and comprehensive general plan, restoration of infrastructure, restoration of standard operating procedures, temporary and replacement housing, and such other subjects as may be appropriate to expeditious and wise recovery.

5.2 Coordination of Recovery Plan with County and Regional Plans, FEMA, and Other Agencies. The recovery plan shall identify relationships of planned recovery actions with those of adjacent communities and state, federal, or mutual aid agencies involved in disaster recovery and reconstruction, including but not limited to the Federal Emergency Management Agency (FEMA), the American Red Cross, the Department of Housing and Urban Development (HUD), the Small Business Administration (SBA), the Environmental Protection Administration (EPA), the Department of Transportation (DOT), the [state emergency management agency *or* equivalent], and other entities that may provide assistance in the event of a major disaster. The Director shall distribute a draft copy of the plan to the [state emergency management agency *or* equivalent] for review in sufficient time for comment prior to action on the recovery plan by the [local legislative body].

Commentary. *In contrast to most local emergency management organizations, FEMA and the state emergency management agency have substantial recovery and reconstruction responsibilities. FEMA is a significant source of funds made available by Congress under the Stafford Act for rebuilding public facilities. Because the state emergency management agency is an important point of coordination between localities and FEMA, it is important to solicit from that agency as much advance information as can be obtained regarding post-disaster procedures essential to recovery and reconstruction. For example, cities and counties should become fully informed through communication with their state emergency management agency about Damage Survey Report (DSR) and Hazard Mitigation Grant Program (HMGP) procedures before*

disaster strikes. Because recovery issues often affect jurisdictions outside the immediate disaster area, the recovery plan should be coordinated with recovery planning activities of adjacent communities and regional entities.

5.3 Recovery Plan Adoption. Following formulation, the recovery plan shall be transmitted to the [local legislative body] for review and approval. The [local legislative body] shall hold one or more public hearings to receive comments from the public on the recovery plan. Following one or more public hearings, the [local legislative body] may adopt the recovery plan by resolution, including any modifications deemed appropriate, or transmit the plan back to the [recovery task force] for further modification prior to final action.

Commentary. *Governing board adoption of this ordinance together with the pre-event plan is extremely important to its successful post-disaster implementation. The city council needs to become comfortable with the concept of pre-event plan and ordinance adoption in order to be supportive of greater than normal delegation of decisions to staff, which may be necessary during post-disaster recovery operations. If council adoption is not possible immediately because of the press of other business, look for opportunities to bring the plan and ordinance forward, such as when a catastrophic disaster has struck in another jurisdiction.*

5.4 Recovery Plan Implementation. The Director and [recovery task force] shall be responsible for implementation of the plan both before and after a major disaster, as applicable. Before a declaration of emergency, the Director shall prepare and submit reports annually, or more frequently as necessary, to fully advise the [local legislative body] on the progress of preparation or implementation of the recovery plan. After a declaration of emergency in a major disaster, the Director shall report to the [local legislative body] as often as necessary on implementation actions taken in the post-disaster setting, identify policy and procedural issues, and receive direction and authorization to proceed with plan modifications necessitated by specific circumstances.

5.5 Recovery Plan Training and Exercises. The [recovery task force] shall organize and conduct periodic training and exercises annually, or more often as necessary, in order to develop, convey, and update the contents of the recovery plan. Such training and exercises will be conducted in coordination with similar training and exercises related to the emergency operations plan.

Commentary. *Clearly, training and exercises are functions which should happen on a joint, ongoing basis with the city's emergency management organization. For greatest value, training and exercises should include careful attention to critical relationships between early post-disaster emergency response and recovery actions that affect long-term reconstruction, such as street closings and reopenings, demolitions, debris removal, damage assessment, and hazards evaluation. FEMA has developed tabletop exercises for use by communities about early recovery for earthquakes, flood, and hurricane scenarios. See Appendix C for point of contact.*

5.6 Recovery Plan Consultation with Citizens. The [recovery task force] shall schedule and conduct community meetings, periodically convene advisory committees comprised of representatives of homeowner, business, and community organizations, or implement such other means as to provide information and receive input from members of the public regarding preparation, adoption, or amendment of the recovery plan.

5.7 Recovery Plan Amendments. During implementation of the recovery plan, the Director and the [recovery task force] shall address key issues, strategies and information bearing on the orderly maintenance and periodic revision of the plan. In preparing modifications to the plan, the [recovery task force] shall consult with City departments, business, and community organizations and other government entities to obtain information pertinent to possible recovery plan amendments.

5.8 Recovery Plan Coordination with Related Plans. The recovery plan shall be prepared in coordination with related elements of the [comprehensive general plan] and [emergency operations plan], or such other plans as may be pertinent. Such related plan elements shall be periodically amended by the [local legislative body] to be consistent with key provisions of the recovery plan, and vice versa.

SECTION 6. GENERAL PROVISIONS

The following general provisions shall be applicable to implementation of this chapter following a major disaster:

6.1 Powers and Procedures. Following a declaration of local emergency in a major disaster and while such declaration is in force, the Director and the [recovery task force] shall have authority to exercise powers and procedures authorized by this chapter, subject to extension, modification, or replacement of all or portions of these provisions by separate ordinances adopted by the [local legislative body].

6.2 Post-Disaster Operations. The Director shall direct and control post-disaster recovery and reconstruction operations, including but not limited to the following:

a. Activate and deploy damage assessment teams to identify damaged structures and to determine further actions that should be taken regarding such structures;

b. Activate and deploy hazards evaluation teams to locate and determine the severity of natural or technological hazards that may influence the location, timing, and procedures for repair and rebuilding processes;

c. Maintain liaison with the [jursidiction name] [emergency operations organization] and other public and private entities, such as FEMA, the American Red Cross, and the [state emergency management agency *or* equivalent] in providing necessary information on damaged and destroyed buildings or infrastructure, natural and technological hazards, street and utility restoration priorities, temporary housing needs and similar recovery concerns;

d. Establish "one-stop" field offices located in or near impacted areas where appropriate, staffed by trained personnel from appropriate departments, to provide information about repair and rebuilding procedures, issue repair and reconstruction permits, and provide information and support services on such matters as business resumption, industrial recovery, and temporary and permanent housing;

e. Activate streamlined procedures to expedite repair and rebuilding of properties damaged or destroyed in the disaster;

f. Establish a moratorium subject to [local legislative body] ratification, as provided under Section 7.3;

g. Recommend to the [local legislative body] and other appropriate entities necessary actions for reconstruction of damaged infrastructure;

h. Prepare plans and proposals for action by the [local legislative body] for redevelopment projects, redesign of previously established projects or other appropriate special measures addressing reconstruction of heavily damaged areas;

i. Formulate proposals for action by the [local legislative body] to amend the [comprehensive general plan *or* equivalent], [emergency operations plan], and other relevant plans, programs, and regulations in response to new needs generated by the disaster;

j. Such other recovery and reconstruction activities identified in the recovery plan or by this chapter, or as deemed by the Director as necessary to public health, safety, and well-being.

6.3 Coordination with FEMA and Other Agencies. The Director and the [recovery task force] shall coordinate recovery and reconstruction actions with those of state, federal, or mutual aid agencies involved in disaster response and recovery, including but not limited to the Federal Emergency Management Agency (FEMA), the American Red Cross, the Department of Housing and Urban Development (HUD), the Small Business Administration (SBA), the [state emergency management agency *or* equivalent] and other entities that provide assistance in the event of a major disaster. Intergovernmental coordination tasks including but not limited to the following:

a. Assign trained personnel to provide information and logistical support to the FEMA Disaster Field Office;

b. Supply personnel to provide information support for FEMA Disaster Recovery Centers (DRCs);

c. Participate in damage assessment surveys conducted in cooperation with FEMA and other entities;

d. Participate in the development of hazard mitigation strategies with the Interagency Hazard Mitigation Team (when activated) with FEMA and other entities;

e. Cooperate in the joint establishment with other agencies of one-stop service centers for issuance of repair and reconstruction options and permits, business resumption support, counseling regarding temporary and permanent housing, and other information regarding support services available from various governmental and private entities;

f. Coordinate within city government the preparation and submission of supporting documentation for Damage Survey Reports (DSRs) to FEMA;

g. Determine whether damaged structures and units are within floodplains identified on Flood Insurance Rate Maps (FIRMs) and whether substantial damage has occurred;

h. Implement such other coordination tasks as may be required under the specific circumstances of the disaster.

Commentary. *To provide direction for handling of emergency response and recovery in relation to major disasters, Congress has enacted the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended). A substantial portion of the Stafford Act is devoted to the means by which federal funds are distributed to persons, businesses, local governments, and state governments for disaster response and recovery. For most communities, this is an important means by which disaster losses can be compensated, at least in part. Although insurance can be instrumental in personal or business loss recovery for major hurricane, flood, and fire disaster damage, it has little value for compensation from losses incurred from disasters for which insurance is too costly or difficult to obtain, such as for earthquake damage, and no value for circumstances for which there is no insurance. Some of the federal assistance is in the form of grants and loans, involving not only FEMA but also other agencies, such as HUD and SBA. The federal government has become increasingly interested in promoting more effective means of coordinating post-disaster victim services as well as mitigating hazards having to do with land use and building construction. Consequently, federal assistance to localities in many instances is contingent upon coordination of local, state, and federal recovery and hazard mitigation policies and practices. In other words, as with many other forms of more traditional assistance, the community may find it necessary to adjust its policies in order to receive federal post-disaster assistance.*

6.4 Consultation with Citizens. The Director and the [recovery task force] shall schedule and conduct community meetings, convene ad hoc advisory committees comprised of representatives of business and community organizations, or implement such other means as to provide information and receive input from members of the public regarding measures undertaken under the authority of this chapter.

Commentary. *One of the critical components in establishing a relatively successful relationship between local government and disaster victim organizations after the Oakland, California, firestorm was the series of weekly meetings held in the affected area by the assistant city manager. Direct outreach to the community should be established in advance of a major disaster through neighborhood safety or similar programs conducted by fire and law enforcement officials, ideally in conjunction with preparation of a pre-event plan. Following a major disaster, proactive outreach is critical to establishing a two-way flow of information, without which controversy inherent in post-disaster settings can become severe.*

SECTION 7. TEMPORARY REGULATIONS

The Director shall have the authority to administer the provisions of this section temporarily modifying provisions of the [municipal code *or* equivalent] dealing with building and occupancy permits, demolition permits, and restrictions on the use, development or occupancy of private property, provided that such action, in the opinion of the Director, is reasonably justifiable for protection of life and property, mitigation of hazardous conditions, avoidance of undue displacement of households or businesses, or prompt restoration of public infrastructure.

Commentary. *The following temporary regulations are at the heart of the recovery process. Although existing state law or city ordinances may already authorize some of these functions, it is preferable to have a single source for locally adopted ordinances that, among other things, identifies regulatory functions related to post-disaster recovery, clearly places responsibility for implementation, and provides a coordinated rationale for city intervention in case of challenge. Among the components of these temporary regulations are provisions dealing with duration, damage assessment, development moratoria, debris clearance, permit expediting, temporary uses and repairs, deferral of fees, nonconforming buildings and uses, condemnation and demolition, and temporary and permanent housing. Each of these components needs careful examination and, as appropriate, adjustment based on local policies and conditions. Pre-event adoption of this ordinance (adjusted to take into account local circumstances) provides a solid basis for initial post-disaster action and legitimizes the policies established as part of the planning process. It is not possible to anticipate the exact character, magnitude, and distribution of damage from a major disaster. Pre-adopted regulations, however, provide a basis for more efficient action that is substantially less subject to policy reversals and other uncertainties typically found in cities that have not prepared in this manner.*

7.1 Duration. The provisions of this section shall be in effect for a period of six months from the date of a local emergency declaration following a major disaster or until termination of a state of local emergency, whichever occurs later, or until these provisions are extended, modified, replaced by new provisions, or terminated, in whole or in part, by action of the [local legislative body] through separate ordinances.

Commentary. *This provision allows for flexibility in the duration of application of the temporary regulations, so that any portion can be terminated, modified, or extended depending upon local circumstances. It also reflects a recognition that temporary regulations may be in effect for an extended period of time beyond either termination of the local emergency or passage of the six-month period. Depending on the nature and scale of the disaster, such as an earthquake, temporary provisions may be in effect for several years after the disaster.*

7.2 Damage Assessment. The Director of the [recovery team] or an authorized representative shall direct damage assessment teams having authority to conduct field surveys of damaged structures and post placards designating the condition of such structures as follows:

a. A placard indicating "Inspected—Lawful Occupancy Permitted" is to be posted on any building in which no apparent structural hazard has been found. This does not mean there are not other forms of damage that may temporarily affect occupancy.

Commentary. *This is commonly known as the "green tag" placard.*

b. A placard indicating "Restricted Use" is to be posted on any building in which damage has resulted in some form of restriction to continued occupancy. The individual posting this placard shall note in general terms the type of damage encountered and shall clearly and concisely note the restrictions on continued occupancy.

Commentary. *This is commonly known as the "yellow tag" placard.*

c. A placard indicating "Unsafe - Do Not Enter or Occupy" is to be posted on any building that has been damaged to the extent that continued occupancy poses a threat to life safety. Buildings posted with this placard shall not be entered under any circumstances except as authorized in writing by the department that posted the building or by authorized members of damage assessment teams. The individual posting this placard shall note in general terms the type of damage encountered. This placard is not to be considered a demolition order.

Commentary. *This is commonly known as the "red tag" placard.*

d. This chapter and section number, the name of the department, its address, and phone number shall be permanently affixed to each placard.

e. Once a placard has been attached to a building, it shall not be removed, altered or covered until done so by an authorized representative of [jurisdiction name] or upon written notification from [jurisdiction name]. Failure to comply with this prohibition will be considered a misdemeanor punishable by a $300 fine.

Commentary. *Damage assessment and the placement of placards identifying whether buildings are safe or unsafe to occupy are two functions having perhaps the most profound effects on life, property, and community recovery than any other within the post-disaster decision and action sequence towards which the provisions of these temporary regulations are directed. Damage assessment is undertaken by various entities following a major disaster, usually the city, state, and FEMA.*

There is at least a twofold purpose for these inspections. One is to determine the degree of structural damage of each building and notify the public about the relative safety of entry and occupancy. This has been a longstanding duty under local government public health and safety responsibilities with which building departments are usually very familiar. The other is to quickly estimate the approximate replacement costs of damaged buildings and other property in order to inform the state and federal governments of whether a federal declaration is warranted. Another concurrent purpose of placarding is to identify potential substantially damaged buildings. This is essential in floodplains to ensure that the home is built according to NFIP requirements (elevated); nonresidential buildings can be floodproofed or elevated if substantially damaged.

The most important element of all these concerns is the establishment of standard identification of structural damage both in gross general terms reflected in the red-, yellow-, and green-tag placard systems, as well as in the details recorded on the placards for each building. This ordinance reflects only the standard placard system, leaving to the building professionals the means by which such determinations are made and recorded in detail. The source of the language for the placard system in this model ordinance is a publication by the California Governor's Office of Emergency Services, Model Ordinances for Post-Disaster Recovery and Reconstruction. *The procedures used to make these basic safety distinctions in the California model ordinance are based on detailed post-disaster inspection methods described by the Applied Technology Council in* ATC-20, Procedures for Postearthquake Safety Evaluation of Buildings, *and in the State of California's publication,* Post-Disaster Safety Assessment Plan. *While somewhat oriented toward structural damage from earthquakes due to California's known seismicity, the placard system is adaptable to other disasters. For additional references regarding damage assessment safety notifications, the reader is referred to the International Conference of Building Officials, Southern Building Code Congress International, and Building Officials and Code Administrators International.*

7.3 Development Moratorium. The Director shall have the authority to establish a moratorium on the issuance of building permits, approval of land-use applications or other permits and entitlements related to the use, development, and occupancy of private property authorized under other chapters and sections of the [pertinent legislation] and related ordinances, provided that, in the opinion of the Director, such action is reasonably justifiable for protection of life and property and subject to the following:

a. *Posting.* Notice of the moratorium shall be posted in a public place and shall clearly identify the boundaries of the area in which a moratorium is in effect as well as the exact nature of the development permits or entitlements that are temporarily held in abeyance.

a. *Duration.* The moratorium shall be in effect subject to review by the [local legislative body] at the earliest possible time, but no later than 90 days, at which time the [local legislative body] shall take action to extend, modify, or terminate such moratorium by separate ordinance.

Commentary. *After disasters around the world, the prevailing sentiment often is to act quickly to replicate pre-disaster building patterns. In many instances, this sentiment prevails as policy despite the presence of a severe natural hazard condition, thus reinforcing the chances of repeating the disaster. The most notable example has been the rebuilding of homes in the Turnagain Heights area on land severely deformed by a landslide in the 9+ Magnitude 1964 Anchorage earthquake.*

To prevent or lessen the chances of repetition of the disaster, it may be necessary for a city to interrupt and forestall repair and rebuilding long enough to assess rebuilding options and/or to determine effective means of mitigation. The city may wish to establish an emergency moratorium on issuance of repair and rebuilding permits or on land-use approvals in areas where severely hazardous conditions are identified. The hazard may be newly detected, as in a post-earthquake circumstance where the pattern of damage or ground deformation may indicate the need for geologic studies to clearly identify such hazards as landslides, liquefaction, or fault rupture. On the other hand, the hazardous condition may be a well-known cause of prior damaging disasters, as in the Oakland Hills firestorm area, which had a long history of previous fires, or communities affected by the 1993 Midwestern floods where prior flood control and floodproofing efforts were proven ineffective.

A moratorium on development may be important for a city to undertake from the standpoint of enlightened public policy. However, since such action may be extremely controversial and unpopular, it is important to lay the groundwork with the community in advance, if possible. This subsection provides prior authorization through adoption of this ordinance before a major disaster, whereby city staff can act expeditiously in a post-disaster setting to forestall premature issuance of permits in areas shown to be hazardous. Such action is necessarily subject to local legislative review, ratification, modification, or termination.

7.4 Debris Clearance. The Director shall have the authority to remove from public rights-of-way debris and rubble, trees, damaged or destroyed cars, trailers, equipment, and other private property, without notice to owners, provided that in the opinion of the Director such action is reasonably justifiable for protection of life and property, provision of emergency evacuation, assurance of firefighting or ambulance access, mitigation of otherwise hazardous conditions, or restoration of public infrastructure. The Director shall also have the authority to secure emergency waivers of environmental regulations from state and federal authorities and to call upon outside support from such agencies for debris clearance, hazardous materials spills, and restoration of ground access.

Commentary. *Although clearance of privately owned debris is routinely considered a function of local government, it can become very controversial where owners take the position that such property is salvageable and has value (e.g., used brick after an earthquake). Pre-event adoption of such a provision reinforces the expectation that debris clearance functions will be carried out decisively, thus minimizing a problem otherwise compounded by city hesitation or ambiguity of intention. The U.S. Army Corps of Engineers has the lead under the Federal Response Plan for ensuring resources for local emergency and long-term debris clearance. FEMA and the state emergency management agency determine priorities for the entire disaster area.*

7.5 One-Stop Center for Permit Expediting. The Director shall establish a one-stop center, staffed by representatives of pertinent departments, for the purpose of establishing and implementing streamlined permit processing to expedite repair and reconstruction of buildings, and to provide information support for provision of temporary housing and encouragement of business resumption and industrial recovery. The Director shall establish such center and procedures in coordination with other governmental entities that may provide services and support, such as FEMA, SBA, HUD, or the [state emergency management agency *or* equivalent].

Commentary. *One-stop permit centers have become more common with recent major disasters, often combining the presence of multiple agencies to provide better coordination of information that disaster victims may need in order to rebuild. A prime example was the Community Restoration and Development Center established by Oakland, California, shortly after the 1991 firestorm and operated until mid-1994 with financial support from FEMA. Benefits to be gained for establishing a special one-stop center include not only accelerated review but also integration of information and permitting functions. Setting up a team of specialists working exclusively on repair and rebuilding permit issues has the added advantage of insulating normal development review from disruption by the recovery process and vice versa.*

7.6 Temporary Use Permits. The Director shall have the authority to issue permits in any residential, commercial, industrial, or other zone for the temporary use of property that will aid in the immediate restoration of an area adversely impacted by a major disaster, subject to the following provisions:

a. *Critical response facilities.* Any police, fire, emergency medical, or emergency communications facility that will aid in the immediate restoration of the area may be permitted in any zone for the duration of the declared emergency;

b. *Other temporary uses.* Temporary use permits may be issued in any zone, with conditions, as necessary, provided written findings are made establishing a factual basis that the proposed temporary use:

   1. will not be detrimental to the immediate neighborhood;

   2. will not adversely affect the [comprehensive general plan or any applicable specific plan]; and

   3. will contribute in a positive fashion to the reconstruction and recovery of areas adversely impacted by the disaster.

Temporary use permits may be issued for a period of one year following the declaration of local emergency and may be extended for an additional year, to a maximum of two years from the declaration of emergency, provided such findings are determined to be still applicable by the end of the first year. If, during the first or the second year, substantial evidence contradicting one or more of the required findings comes to the attention of the Director, the temporary use permit shall be revoked.

Commentary. *Most zoning ordinances have no provisions for temporary use of property following a disaster. A few allow temporary placement of mobile units or manufactured housing on residentially zoned sites pending reconstruction of a residence. Time limits vary, but are usually for a two-year period. After a major disaster, special latitude may be needed, however, to support various recovery needs. Care must be taken not to set precedents that will erode or destroy a pre-existing pattern of zoning that the city may wish to protect.*

The language within this section is modeled after provisions of the Los Angeles recovery ordinance adopted after the Northridge earthquake, Temporary Regulations Relating to Land Use Approvals for Properties Damaged in a Local Emergency. *That ordinance is geared toward the needs of a large and diverse city. Smaller communities may wish to restrict temporary uses to those already allowed by the zone in which they are located, limiting the provision to temporary structures, such as tents, domes, or mobile units.*

7.7 Temporary Repair Permits. Following a disaster, temporary emergency repairs to secure structures and property damaged in the disaster against further damage or to protect adjoining structures or property may be made without fee or permit where such repairs are not already exempt under other chapters of the [pertinent legislation]. The building official must be notified of such repairs within 10 working days, and regular permits with fees may then be required.

Commentary. *This provision is specifically written for repairs that may not be exempt under standard building code permit exemptions but which are justifiable from a public health and safety standpoint to avoid further damage to property after a disaster. It is modeled after a provision of a post-disaster rebuilding ordinance adopted in 1992 by the County of San Bernardino shortly after the Landers-Big Bear earthquake. Written before the earthquake, the ordinance was based on a pre-event study, Post-Disaster Rebuilding Ordinance and Procedures, which included a survey of top managers and elected officials regarding various post-disaster rebuilding provisions, such as for nonconforming buildings and uses. Because of the pre-event involvement of top managers and elected officials, it was adopted after the earthquake with no controversy.*

7.8 Deferral of Fees for Reconstruction Permits. Except for temporary repairs issued under provisions of this chapter, all other repairs, restoration, and reconstruction of buildings damaged or destroyed in the disaster shall be approved through permit under the provisions of other chapters of this code. Fees for such repair and reconstruction permits may be deferred until issuance of certificates of occupancy.

Commentary. *Pressure to waive or defer processing fees frequently arises after a disaster when victims are unsure of their sources of financing for rebuilding. It is inadvisable to succumb to pressures to waive fees entirely due to the need for cost recovery for disaster-related services at a time when there may be substantial uncertainties in revenue flows. Also, it is helpful to buy time to determine the degree to which sources other than the victims may help offset fee costs. For example, sometimes insurance will cover the cost of processing fees. Also, such costs have been covered by FEMA. Deferral of fees until occupancy permit issuance provides time in which such alternate sources can be worked out, without sacrificing the basic revenue flow to the city treasury. This provision is modeled after similar language in the Los Angeles temporary regulations.*

7.9 Nonconforming Buildings and Uses. Buildings damaged or destroyed in the disaster that are legally nonconforming as to use, yards, height, number of stories, lot area, floor area, residential density, parking, or other provisions of the [pertinent local legislation] may be repaired and reconstructed in-kind, provided that:

a. the building is damaged in such a manner that the structural strength or stability of the building is appreciably lessened by the disaster and is less than the minimum requirements of the [pertinent local legislation] for a new building;

b. the cost of repair is greater than 50 percent of the replacement cost of the building;

c. all structural, plumbing, electrical, and related requirements of the [pertinent local legislation] are met at current standards;

d. all natural hazard mitigation requirements of the [pertinent local legislation] are met;

e. reestablishment of the use or building is in conformance with the National Flood Insurance Program requirements and procedures;

f. the building is reconstructed to the same configuration, floor area, height, and occupancy as the original building or structure, except where this conflicts with National Flood Insurance Program (NFIP) provisions;

g. no portion of the building or structure encroaches into an area planned for widening or extension of existing or future streets as determined by the comprehensive general plan or applicable specific plan; and

h. repair or reconstruction shall commence within two years of the date of the declaration of local emergency in a major disaster and shall be completed within two years of the date on which permits are issued.

Nothing herein shall be interpreted as authorizing the continuation of a nonconforming use beyond the time limits set forth under other sections of the [pertinent local legislation] that were applicable to the site prior to the disaster.

Commentary. *No issue can be more vexing to planners than whether to encourage reestablishment of nonconforming uses and buildings after a major disaster. Planners have sought for decades to write strict provisions in zoning ordinances designed to gradually eliminate nonconforming uses or buildings as they were abandoned, changed owners, or were damaged by fire, wind, or water. The latter provisions normally prohibit reestablishment of nonconforming uses and buildings where damage exceeds a certain percentage of replacement cost, most often 50 percent. This approach is logical, orderly, and normally equitable when weighing community interests balanced with those of the property owner. However, the thinking behind such provisions has been geared to incremental adjustments or termination of such uses over time, not to sudden catastrophic circumstances forcing attention to disposition of such uses as a class at a single point in time.*

In theory, disasters represent an opportunity to upgrade conditions, such as parking deficiencies attributable to the nonconforming status of a building or use. More fundamentally, disasters are seen as an opportunity to eliminate uses that conflict with the prevailing pattern in a neighborhood but which remain because of legal nonconforming status (e.g., scattered industrial uses in a residentially zoned neighborhood). In reality, however, after a major disaster, local governments are normally beset by severe pressures from property owners and other community interests to reestablish the previous development pattern exactly as it previously existed, including nonconforming buildings and uses. Moreover, such pressures extend beyond the demand to reestablish nonconforming buildings or uses to include waiver of current building, plumbing, and electrical code provisions to the standards in place at the time of construction. From a risk management, liability exposure, or public safety standpoint, acquiescence to the reduction of standards in the face of a known hazard can be seen as clearly unacceptable by the local legislative body. However, zoning provisions hindering reestablishment of nonconforming buildings and uses tend to be more arguable and are more likely to be modified by the local legislative body under extreme pressures of the moment to restore the prior status quo.

In recognition of such pressures, this model ordinance language offers a straightforward trade-off that allows reestablishment of a nonconforming use or building in turn for strict adherence to structural, plumbing, electrical code, and related hazard mitigation requirements. The language assumes the existence of a commonly found provision in the pertinent local legislation (e.g., the municipal code) authorizing repair or reestablishment of a nonconforming use or building where damage is less than 50 percent of the replacement cost. It also assumes that the building was substantially weakened by the disaster and is below present code requirements.

This compromise approach recognizes that its application may require the unwelcome decision to accept continuation of disorderly land-use patterns, unless a solution can be found through redevelopment or rezoning. Instead, it places a high value on life safety.

It is important to note that the language of these provisions includes important limitations that tend to limit the economic incentive to reestablish the nonconforming use or building.

1) It does not extend any previously stipulated life of the nonconforming use—an important disincentive if the costs of replacement cannot be offset by insurance, FEMA assistance, SBA loans, or other sources of financial support.

2) It does not allow the extent of nonconformance to be increased over what existed prior to the disaster, thwarting another common pressure.

3) It requires strict adherence to existing structural, plumbing, electrical, and other requirements of the local code as well as any street setbacks stipulated within the comprehensive plan circulation element and related ordinances. This may be especially costly from a structural standpoint, for example, when replacing previously unreinforced masonry buildings after a devastating earthquake.

4) It recognizes that compliance with existing local hazard mitigation requirements may be needed, especially in cases involving increased on-site hazards because of fault rupture, landsliding, coastal erosion, or severe flooding where upgrading to current structural, plumbing, and electrical code requirements isn't enough. Compliance with the latter provision may also be sufficiently costly to discourage reestablishment of the use or other nonconforming feature.

The relative importance of post-disaster reestablishment of nonconforming uses and buildings may vary greatly from jurisdiction to jurisdiction. Therefore, the most useful time to assess this aspect of post-disaster recovery is before a major disaster, in the course of pre-event planning. Education of the local legislative body in advance can help lessen post-disaster tendencies to compromise critical hazard mitigation and public safety requirements, notwithstanding the outcome on nonconforming use and building requirements.

SECTION 8. DEMOLITION OF DAMAGED HISTORIC BUILDINGS

The Director shall have authority to order the condemnation and demolition of buildings and structures damaged in the disaster under the standard provisions of the [pertinent local legislation], except as otherwise indicated below:

8.1 Condemnation and Demolition. Within [a number determined by the local government] days after the disaster, the building official shall notify the State Historic Preservation Officer that one of the following actions will be taken with respect to any building or structure determined by the building official to represent an imminent hazard to public health and safety or to pose an imminent threat to the public right of way:

a. Where possible, within reasonable limits as determined by the building official, the building or structure shall be braced or shored in such a manner as to mitigate the hazard to public health and safety or the hazard to the public right of way;

b. Whenever bracing or shoring is determined not to be reasonable, the building official shall cause the building or structure to be condemned and immediately demolished. Such condemnation and demolition shall be performed in the interest of public health and safety without a condemnation hearing as otherwise required by the [pertinent local legislation]. Prior to commencing demolition, the building official shall photographically record the entire building or structure.

8.2 Notice of Condemnation. If, after the specified time frame noted in Subsection 8.1 of this chapter and less than 30 days after the disaster, a historic building or structure is determined by the building official to represent a hazard to the health and safety of the public or to pose a threat to the public right-of-way, the building official shall duly notify the building owner of the intent to proceed with a condemnation hearing within [a number determined by the local government] business days of the notice in accordance with [pertinent provisions of the local legislation]; the building official shall also notify FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, of the intent to hold a condemnation hearing.

8.3 Request to FEMA for Approval to Demolish. Within 30 days after the disaster, for any historic building or structure which the building official and the owner have agreed to demolish, the building official shall submit to FEMA, in accordance with the National Historic Preservation Act of 1966, as amended, a request for approval to demolish. Such request shall include all substantiating data.

8.4 Historic Building Demolition Review. If, after 30 days from the event, the building official and the owner of a historic building or structure agree that the building or structure should be demolished, such action will be subject to the review process established by the National Historic Preservation Act of 1966, as amended.

Commentary. *One of the more difficult aspects of post-disaster response and recovery in older communities is the existence of damaged historically significant structures. Since these can be very old, measures needed to make them structurally sound may be more difficult and costly and complicated than normal. Because of the emotion frequently attached to this issue and the often widely conflicting views, community controversy can erupt when a badly damaged historical structure is subject to demolition. Therefore, it is wise to have language already in place to guide the planning and building officials involved.*

Because of problems with seemingly premature or unjustifiable demolition of historic structures in previous disasters, the National Historic Preservation Act of 1966, as amended, identifies steps that must be taken by a jurisdiction or owner to mitigate public health and safety hazards resulting from disaster-caused damage when using federal funding. The intent is to establish predictable rules by which proposed demolitions, except in extreme cases of danger to the public, can be reviewed by state and federal officials in order to provide time to identify options for preservation of a damaged historic building or structure. The review process is also intended to discourage hasty demolition action by local officials when such action may not be justified.

The preceding language is adapted from California's Model Ordinances for Post-Disaster Recovery and Reconstruction. *This language supplements provisions of the* Uniform Code for the Abatement of Dangerous Buildings *by providing specific time frames and actions for abatement of hazards created by damage to historic buildings. The important element of local judgment here is the establishment of a specific time frame for declaring a structure an imminent hazard to public health and safety justifying immediate demolition without a condemnation hearing. Such time frames are generally from three to five days, though sometimes stretched to ten days. After the established time frame, the threat may no longer be justified as imminent and, therefore, the remaining procedures kick in.*

SECTION 9. TEMPORARY AND PERMANENT HOUSING

The Director shall assign staff to work with FEMA, SBA, HUD, the [state emergency management agency *or* equivalent], and other appropriate governmental and private entities to identify special programs by which provisions can be made for temporary or permanent replacement housing that will help avoid undue displacement of people and businesses. Such programs may include deployment of manufactured housing and manufactured housing developments under the temporary use permit procedures provided in Section 7 of this chapter, use of SBA loans, and available Section 8 and Community Development Block Grant funds to offset repair and replacement housing costs, and other initiatives appropriate to the conditions found after a major disaster.

Commentary. *The issue of post-disaster temporary and permanent replacement housing has grown to one of critical dimensions in the San Francisco area since the Loma Prieta earthquake. After that earthquake, many displaced low-income occupants of damaged or destroyed housing simply disappeared—a common pattern following many disasters. Relatively little real progress has been made since then in finding effective ways by which to handle this issue on a broad scale. For example, after the Northridge earthquake, HUD became active immediately in attempting to assist localities in dealing with housing issues. Available resources were insufficient to cover the cost of much of the replacement housing needed. Housing issues were extremely complex. Low- and moderate-income rental housing replacement problems were somewhat alleviated by the existence of a high rate of apartment vacancies. However, recession-generated housing devaluation combined with substantial damage costs altered loan-to-value ratios to uneconomical levels. Repairs of single-family and multifamily buildings dragged out for many months due to lending, engineering, and permitting problems. As a consequence, some middle-income households simply walked away from mortgages. The most visible evidence of earthquake-induced housing impacts were the large condominium and apartment complexes that remained in a fenced-off, unrepaired state until financing and repairs began to catch up two years later.*

For these reasons, this section is essentially a placeholder for language that should be made more specific on the basis of a pre-event plan for post-disaster recovery and reconstruction that takes into account the level of local housing vulnerability. For example, a community with a long history of flooding may have developed temporary shelter arrangements, such as in school gymnasiums, sufficient for short-term displacement. If there are no other

hazards present, that community may not need to consider replacement housing. Whereas a community in an earthquake hazard area with a large portion of its housing inventory in unreinforced masonry (URM) construction should consider both temporary shelters and interim housing, such as some form of manufactured housing, with the expectation that several years will be needed for replacement housing to be built.

A great deal more research is needed to find satisfactory solutions for prompt, efficient provision of both interim and replacement housing. Clearly, the magnitude of the Northridge housing problems caught public- and private-sector institutions off-guard. Little is yet understood regarding issues like the most effective means for dealing with damaged condominiums or the effect of the secondary mortgage market on housing repair and replacement. With downsizing of federal budgets in future years, this issue will become more critical since levels of support could be diminished.

SECTION 10. HAZARD MITIGATION PROGRAM

Prior to a major disaster, the Director shall establish a comprehensive hazard mitigation program that includes both long-term and short-term components.

10.1 Safety Element. The long-term component shall be prepared and adopted by resolution of the [local legislative body] as the safety or natural hazards element of the [comprehensive general plan] for the purpose of enhancing long-term safety against future disasters. The safety element shall identify and map the presence, location, extent, and severity of natural hazards, such as:

a. severe flooding;

b. wildland and urban fires;

c. seismic hazards such as ground shaking and deformation, fault rupture, liquefaction, tsunamis, and dam failure;

d. slope instability, mudslides, landslides, and subsidence;

e. coastal erosion;

f. hurricanes and other high winds;

g. technological hazards, such as oil spills, natural gas leakage and fires, hazardous and toxic materials contamination, and nuclear power plant and radiological accidents.

The safety element shall determine and assess the community's vulnerability to such known hazards and shall propose measures to be taken both before and after a major disaster to mitigate such hazards. It shall contain linkages between its own provisions and those of other [comprehensive plan elements *or* equivalent] including, but not limited to, [land use, transportation, housing, economic development, and historic preservation, and any other pertinent element] so that development and infrastructure decisions will incorporate considerations of natural hazards.

Commentary. *Although California may be viewed by some citizens in other parts of the country as perhaps atypical when considering lifestyles, ideas, the arts, or politics, it nevertheless has been the source of much forward-looking planning legislation and has recently become the site of a series of major natural disasters from which important post-disaster response and recovery lessons are being learned. One of the far-seeing components of planning legislation in California is the mandatory general plan safety element, which became a requirement after the 1971 Sylmar earthquake. Now, more than 20 years after the passage of that legislation, virtually all California cities have adopted safety elements as part of their comprehensive general plans, and many have implemented them in one specific way or another, which has helped mitigate recognized hazards.*

The safety element concept can be adapted for use in many other states to help localities deal more directly with significant local hazards. Its great value is the establishment of safety considerations at the policy level and the development of hazard mapping that can serve as an undergirding for specific regulations. The discussion in Chapter 3 of natural hazards element requirements in state planning enabling legislation provides background data on the application of this concept across the country, including its use for coastal hazards in Florida, North Carolina, and Georgia. These elements can be helpful in providing greater legal defensibility of regulations establishing substantial restrictions on the use of portions of properties subject to a natural hazard, such as landslides, flooding, or beach erosion. Such considerations are important in taking into account issues related to the taking of private property in light of recent Supreme Court decisions.

There is a growing body of knowledge about the nature of many of the hazards identified in this language, yet there remains a need for further research on how to integrate this knowledge in planning practice. A need exists for more definitive guidelines on how to mitigate many of these hazards through community design and site layout. For instance, with respect to wind, it was found on the Island of Kauai following Hurricane Iniki that homes placed along the windward edge of bluffs suffered greater damage than homes that were set back. It was also found that directional placement of roof overhangs in relation to prevailing direction of storm winds was important to the degree of damage. Such practical community design knowledge on wind effects should be extended and integrated with research on other hazards. Much needed is research material providing guidance on mitigation through community design for all natural hazards.

10.2 Short-Term Action Program. A short-term hazard mitigation program shall be included in the [recovery plan]. It shall be comprised of hazard mitigation program elements of highest priority for action, including preparation and adoption of separate ordinances dealing with specific hazard mitigation and abatement measures, as necessary. Such ordinances may require special site planning, land-use, and development restrictions or structural measures in areas affected by flooding, urban/wildland fire, wind, seismic, or other natural hazards, or remediation of known technological hazards, such as toxic contamination.

Commentary. *This provision extends the safety element concept into the pre-event planning for post-disaster recovery and reconstruction process, identifying key measures that would have the most value for short-term implementation. Some of these measures, such as special ordinances related to floodplain management, may already be in place. The concept here is to look beyond measures that are in place to determine which others are critically needed and to move forward toward their implementation.*

10.3 Post-Disaster Actions. Following a major disaster, the Director shall participate in developing a mitigation strategy as part of the [Interagency Hazard Mitigation Team *or* equivalent] with FEMA and other entities, as called for in Section 409 of the Stafford Act and related federal regulations. As appropriate, the Director may recommend to the [local legislative body] that the [jurisdiction] participate in the state's Hazard Mitigation Grant Program, authorized in Section 404 of the Stafford Act, in order to partially offset costs of recommended hazard mitigation measures.

Commentary. *This provision acknowledges FEMA mitigation programs presently operating under the Stafford Act and corresponding federal regulations. FEMA has published guidelines relative to state implementation of these regulations.*

10.4 New Information. As new information is obtained regarding the presence, location, extent, and severity of natural or technological hazards, or regarding new mitigation techniques, such information shall be made available to the public, and shall be incorporated as soon as practicably possible within the [comprehensive general plan safety element *or* equivalent] and the [recovery plan] through amendment.

SECTION 11. RECOVERY AND RECONSTRUCTION STRATEGY

At the earliest practicable time following the declaration of local emergency in a major disaster, the Director and the [recovery task force] shall prepare a strategic program for recovery and reconstruction based on the pre-disaster plan and its policies.

11.1 Functions. To be known as the recovery strategy, the proposed strategic program shall identify and prioritize major actions contemplated or under way regarding such essential functions as business resumption, economic reinvestment, industrial recovery, housing replacement, infrastructure restoration, and potential sources of financing to support these functions.

11.2 Review. The recovery strategy shall be forwarded to the [local legislative body] for review and approval following consultation with other governmental agencies and business and citizen representatives. The recovery strategy shall provide detailed information regarding proposed and ongoing implementation of initiatives necessary to the expeditious fulfillment of critical priorities and will identify amendment of any other plans, codes, or ordinances that might otherwise contradict or block strategic action. The Director shall periodically report to the [local legislative body] regarding progress toward implementation of the recovery strategy, together with any adjustments that may be called for by changing circumstances and conditions.

Commentary. *The concept behind this provision is to structure the flow of local post-disaster recovery and reconstruction actions around a short-term strategy that extends the pre-event plan into greater detail at the earliest possible time after a major disaster. This may prove absolutely essential to the extent that damage conditions differ substantially from those anticipated as part of the pre-event plan. In any case, development of such a strategy in the early days of recovery has the special benefit of adding a proactive emphasis to the recovery process to counter the overwhelmingly reactive context. It can be updated as often as necessary as experience is gained and new issues emerge. It also has the added benefit of providing a source from which the pre-event recovery plan and related plans can later be readily updated.*

SECTION 12. SEVERABILITY

If any provision of this chapter is found to be unconstitutional or otherwise invalid by any court of competent jurisdiction, such invalidity shall not affect the remaining provisions that can be implemented without the invalid provision, and, to this end, the provisions of this ordinance are declared to be severable.