



FEDERAL EMERGENCY MANAGEMENT AGENCY

PROTECTING YOUR HOME FROM EARTHQUAKE DAMAGE

INTRODUCTION: While making repairs to your flood damaged home, there are certain practical, low cost steps you can take at the same time to reduce the potential for earthquake damage.

NOTE: Information contained in this package presents concepts for seismic strengthening of non-structural building elements and does not represent specific engineering and cost guidance for individual buildings.

Techniques shown herein are consistent with minimum *National Earthquake Hazard Reduction Program* (N.E.H.R.P.) recommended provisions. Communities may enforce more restrictive requirements, which shall take precedence.

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PROTECTING YOUR HOME FROM EARTHQUAKE DAMAGE

The Great Flood of 1993 inflicted devastating amounts of damage throughout the midwest, possibly including your home. While floods have been and will continue to be a problem in this area, they are not the only natural hazard with which we have to deal. The midwest is also home to high winds from tornadoes that can accompany summer thunderstorms. Equally important, the midwest is also home to the earthquake fault that produced the largest earthquake ever felt in the United States--the New Madrid fault located in southern Illinois and southeastern Missouri.

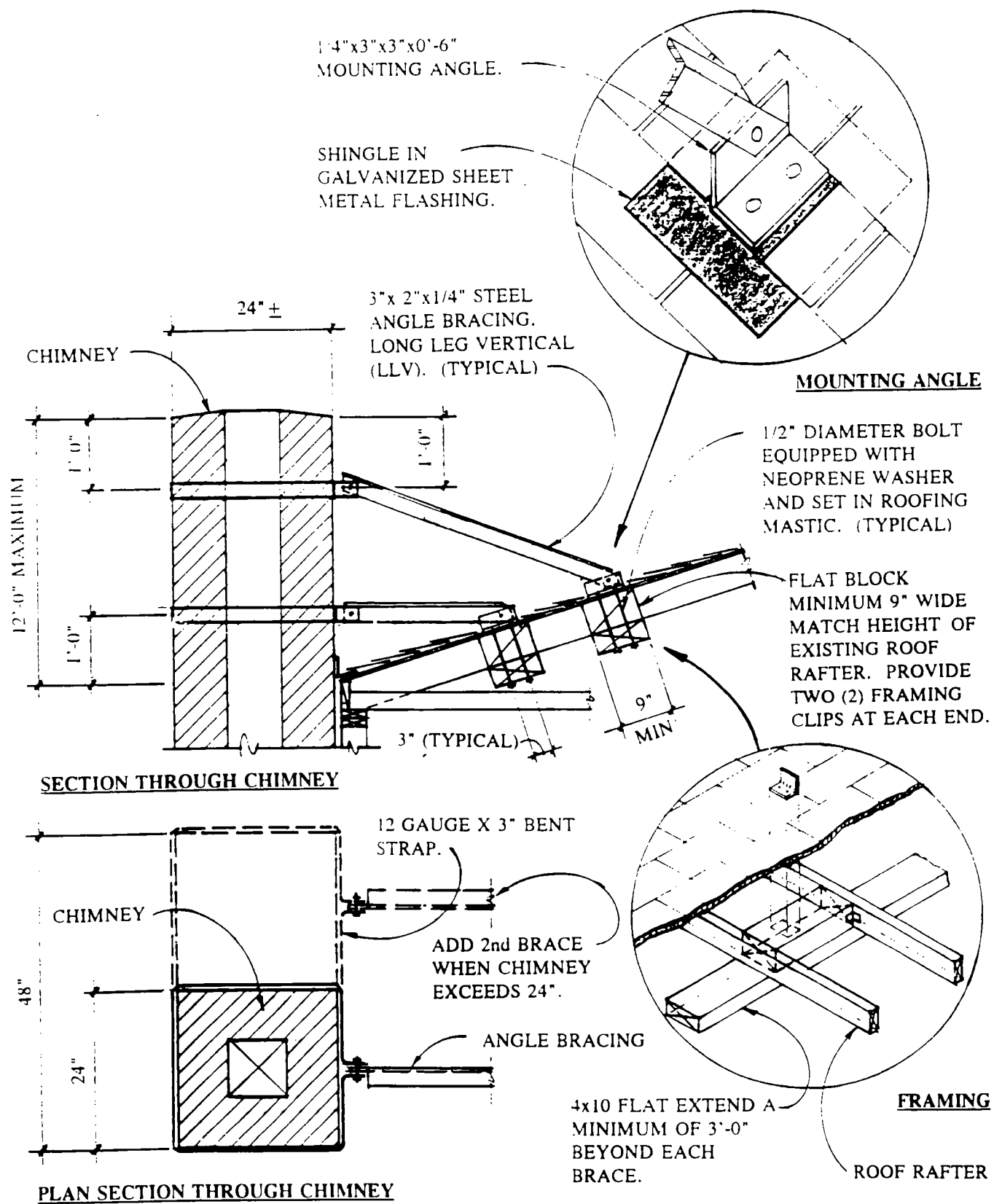
While you are making repairs to your flood damaged home, there are certain practical steps you can take at the same time to reduce the chance of damage from these other hazards. Fortunately, strengthening a home to resist earthquake damage also increases its ability to withstand wind damage, since both impact your home in a horizontal manner. These steps are generally low cost and easily done at the same time you are making floor repairs.

These earthquake protection steps can be divided into two categories: steps that deal with the building structure itself; and steps that can be taken with other parts of the building and its contents.

For steps that can be taken on the building structure, the most important step is making sure your home is properly bolted down onto its foundation so it will not slide off in an earthquake. Another important step, especially if you are raising your foundation to place your house above flood levels, is to make sure your foundation can withstand an earthquake. For masonry block foundations, this usually means strengthening key portions of the wall by installing reinforcing bars in the blocks and then filling them with concrete grout. FEMA has developed a sample plan for strengthening a masonry block foundation wall. This plan and this type of work can be complicated and normally requires the expertise of a professional engineer, architect, or contractor.

For steps involving other building parts and building contents, earthquake protection usually involves simple activities that homeowners can undertake themselves. FEMA has prepared some simple one-page descriptions of these steps that are available.

As you repair your home, take the time to do those extra steps that will help prevent floodwaters from again destroying your home. But don't stop there. Remember that Mother Nature can do more than just flood your home. Please take those extra steps to prevent the next earthquake from being another disaster for your home and your family.



CHIMNEY BRACING

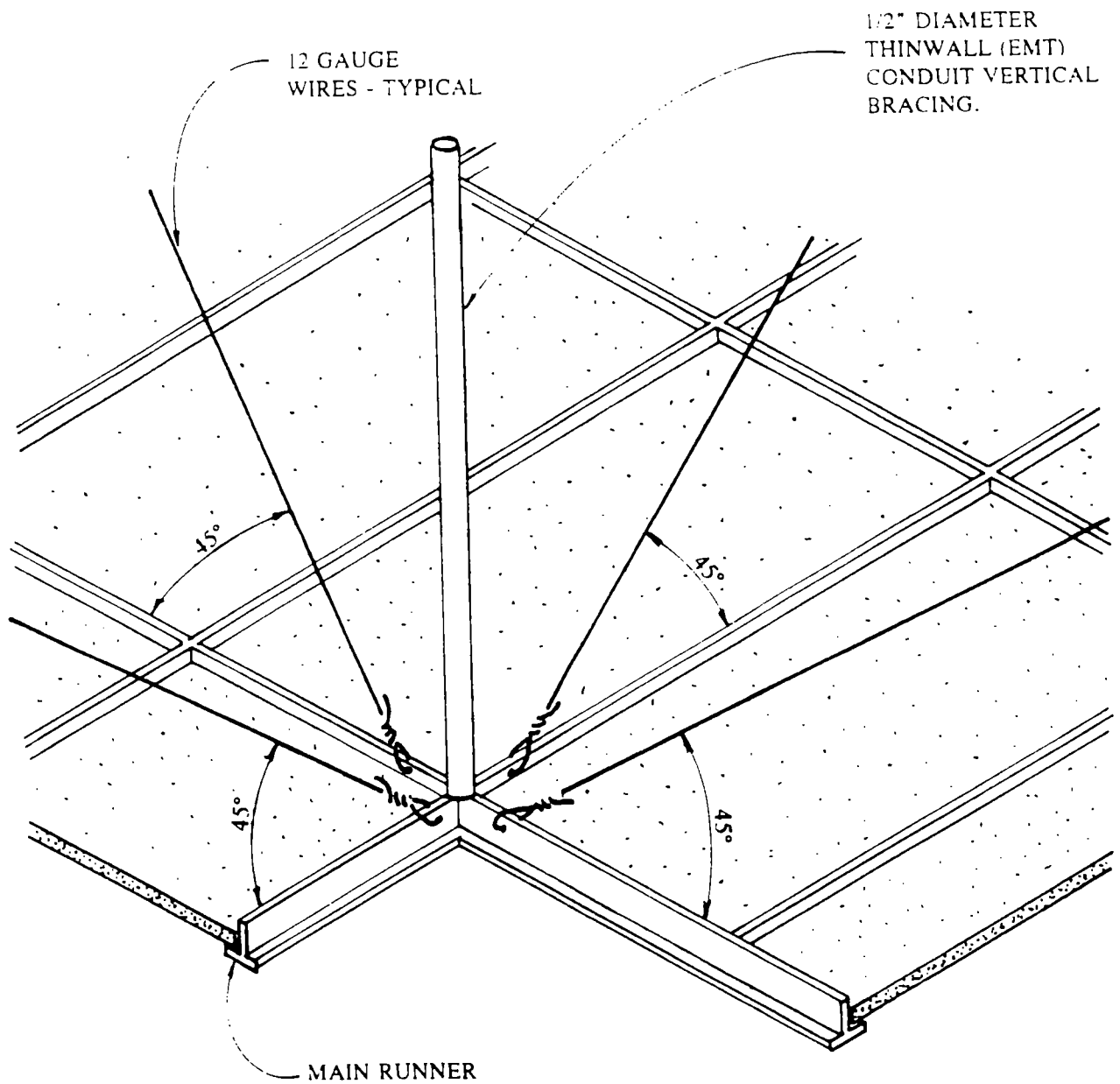


CHIMNEY BRACING

During an earthquake unreinforced chimneys present a potential risk of chimney damage, smoke and fire damage, building damage due to falling debris, and personal injury. Chimneys may rock or collapse, and bricks/stone may dislodge and fall when exposed to seismic forces.

The following recommendations can be used to reduce the earthquake damage associated with chimneys:

- 1) Consult with local building officials to determine if chimney satisfies local codes and if seismic bracing is recommended or required.
- 2) Install flat blocks between roof rafters. Flat blocks should be at least 9 inches wide and the same height as the rafters. Secure with four (4) framing clips, two (2) at each end. Install a single 4x10 flat block below new blocking, as shown. Extend 3'-0" beyond each brace. Nail to each rafter with two (2) 16d toe nails.
- 3) Shingle in 24 gauge galvanized sheet metal flashing above blocking. Fasten 1/4"x3"x3"x0'-6" steel mounting angles through sheet metal flashing and roofing system using two (2) 1/2" diameter machine bolts per angle. Equip machine bolts with neoprene washers and set in elastomeric sealant to prevent water leakage.
- 4) Install two (2) 12 gauge x 3" bent steel straps around chimney. One strap should be 1'-0" above roof line and the other should be 1'-0" below the chimney top.
- 5) Connect bent straps to mounting angles using two (2) 3"x2"x1/4" long leg vertical (LLV) steel bracing angles. If chimney width exceeds 24" install additional bracing angles. Bracing angles may be required on more than one side, consult local building official.



SUSPENDED CEILING BRACING

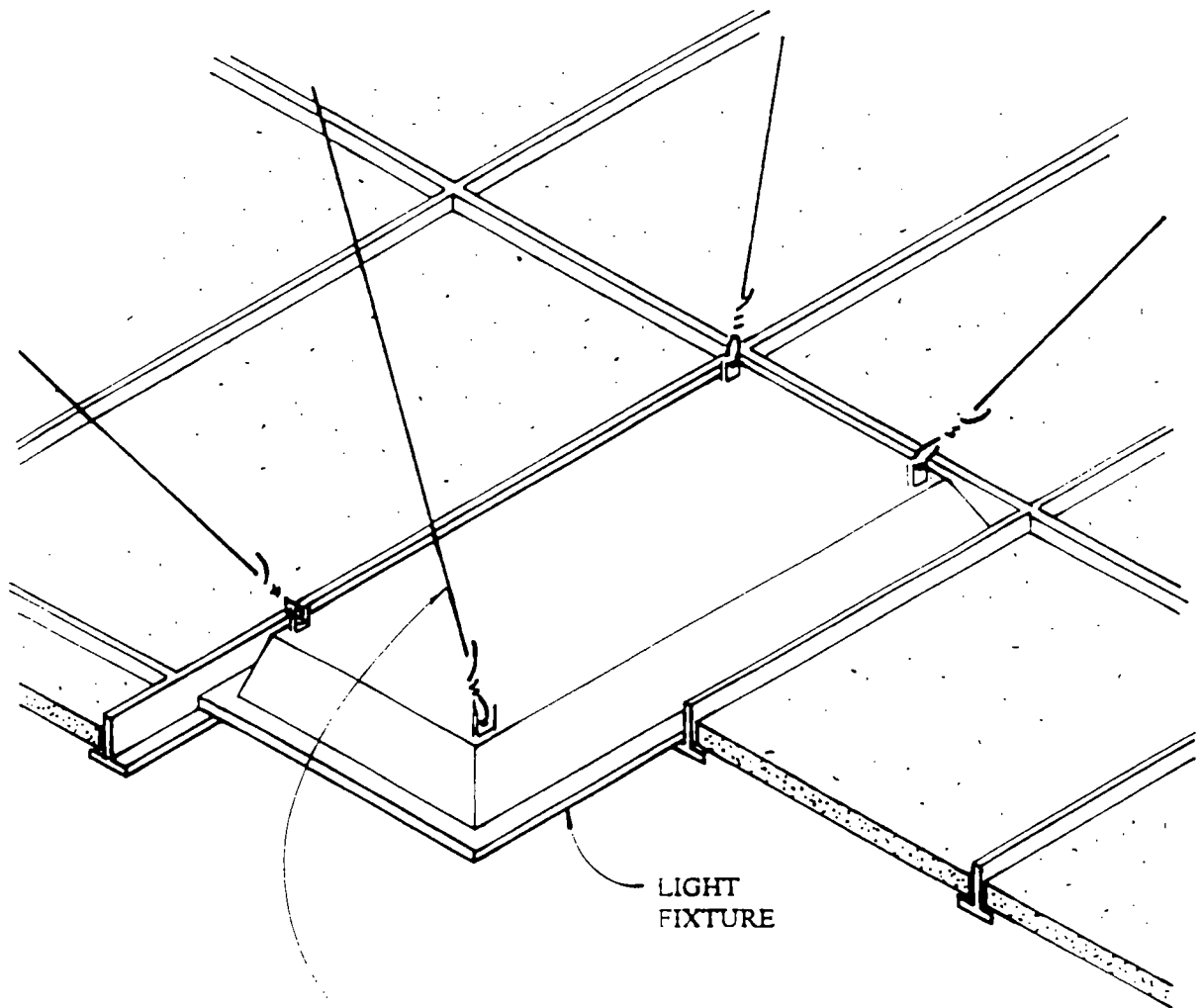


SUSPENDED CEILING BRACING

Unless properly braced, suspended ceiling systems present a risk of damage and personal injury during an earthquake. Seismic forces may cause the ceiling to rack and "bounce", cause tiles to dislodge, or cause the ceiling tiles and associated framework to fall.

The following procedures are recommended to reduce the hazards associated with suspended ceilings during an earthquake:

- 1) Provide 4-way diagonal bracing every 12 feet on main runners and within 4 feet of walls. Bracing shall consist of no. 12 gauge wires connecting main and cross runners to structural members at a 45 degree angle.
- 2) Provide 1/2" diameter thinwall (EMT) conduit vertical bracing at diagonal bracing locations to prevent vertical movement.



LIGHT
FIXTURE

12 GAUGE WIRES
@ EACH CORNER OR
AT LEAST DIAGONALLY
@ OPPOSITE CORNERS



LIGHT FIXTURE BRACING

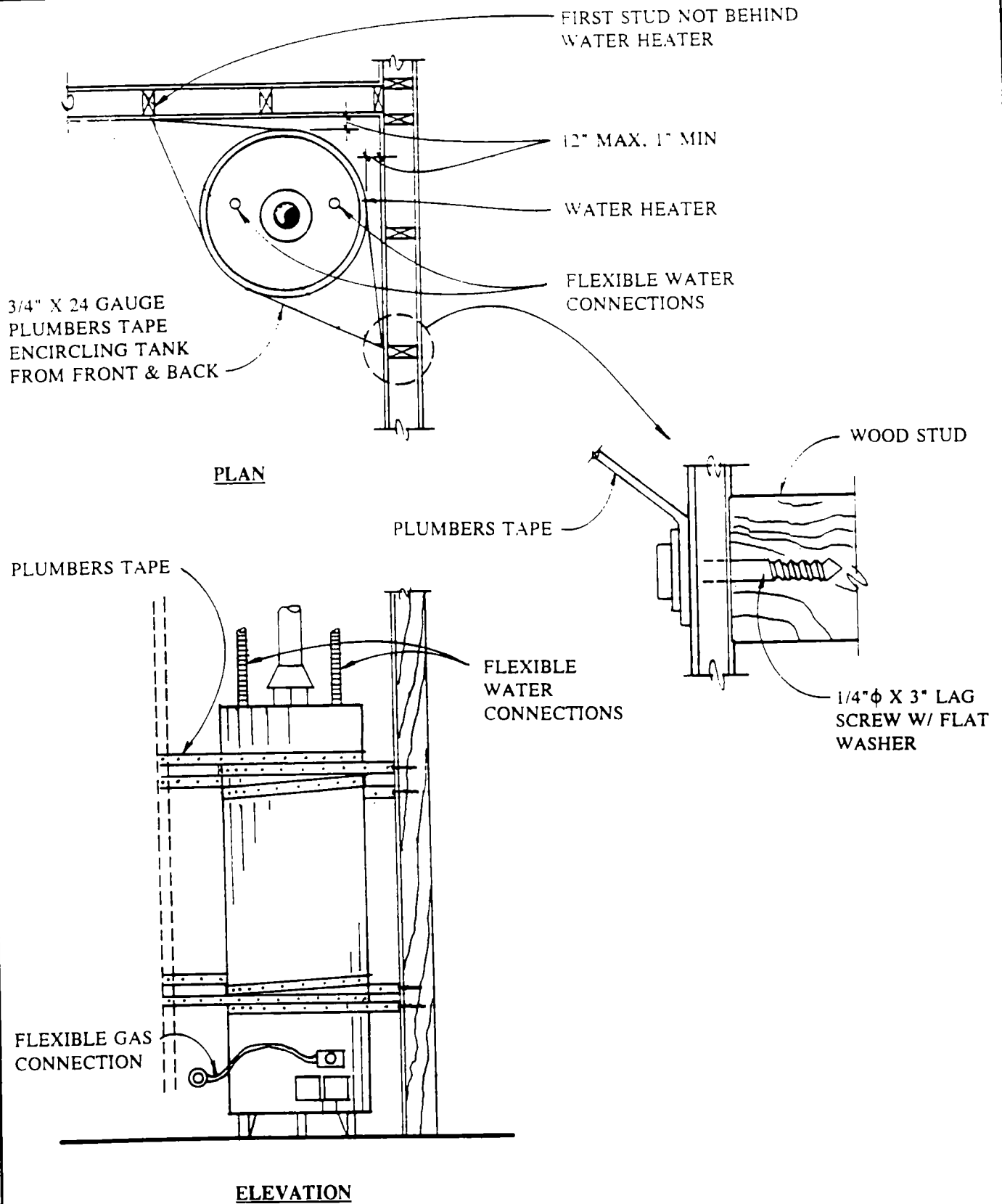


LIGHT FIXTURE BRACING

Unless properly braced, suspended ceiling light fixtures present a risk of damage and personal injury during an earthquake. Seismic forces may cause light fixtures and associated framework to fall.

The following procedures are recommended to reduce the hazards associated with light fixtures during an earthquake:

- 1) Provide bracing at each corner or a minimum of diagonally opposite corners. Bracing shall consist of no. 12 gauge wires connecting the fixture to structural members.
- 2) For exposed fluorescent light bulbs or fixture lenses subject to falling, secure in place with 2 wires that wrap beneath the lens or bulb and attach securely to the fixture.



WATER HEATER BRACING **(CORNER INSTALLATION)**

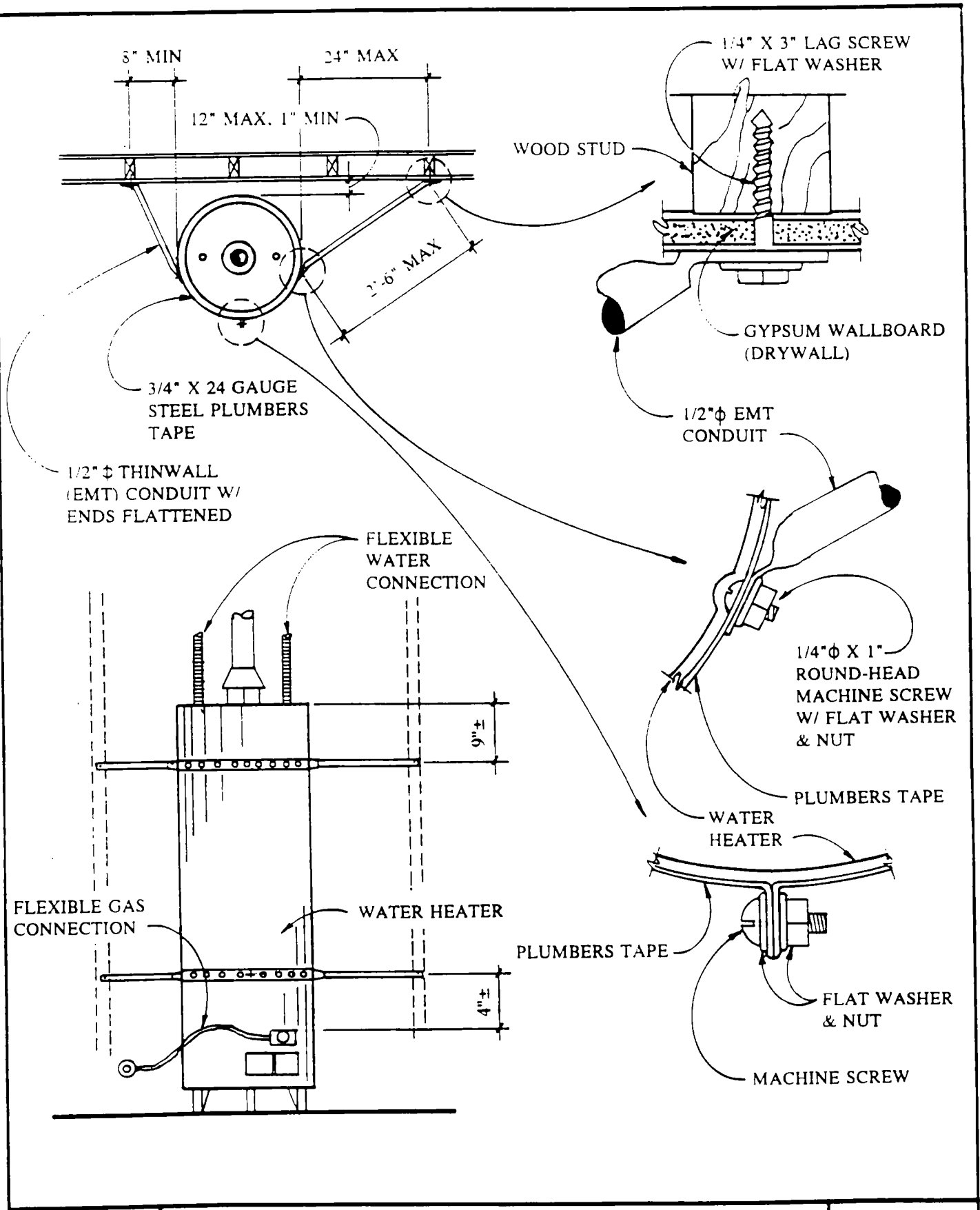


WATER HEATER BRACING **(CORNER INSTALLATION)**

Improperly secured water heaters and their associated piping present a potential risk of fire damage, water damage, heater damage and personal injury during an earthquake. Water heaters can slide, rock, or overturn when exposed to seismic forces, possibly rupturing the heater or breaking the supply lines. Gas leaks are frequently the cause of earthquake related fires.

The following recommendations can be used to reduce the earthquake damage associated with water heaters:

- 1) Place water heater no less than 1 inch and no more than 12 inches from adjoining walls.
- 2) At the top of the unit, install two (2) straps of 3/4" x 24 gauge plumbers tape. One strap encircling the unit from the front and the other from the back. Each strap should wrap a minimum of one full turn. Fasten each end of the strap to the first stud not directly behind the water heater using a 1/4" diameter x 3" lag screw equipped with a flat washer. Repeat procedure at bottom of unit.
- 3) Provide a flexible pipe connection between the water heater and the rigid gas and water lines. The connection should have sufficient length to allow the tank to move without breaking the line.



WATER HEATER BRACING
(WALL INSTALLATION)



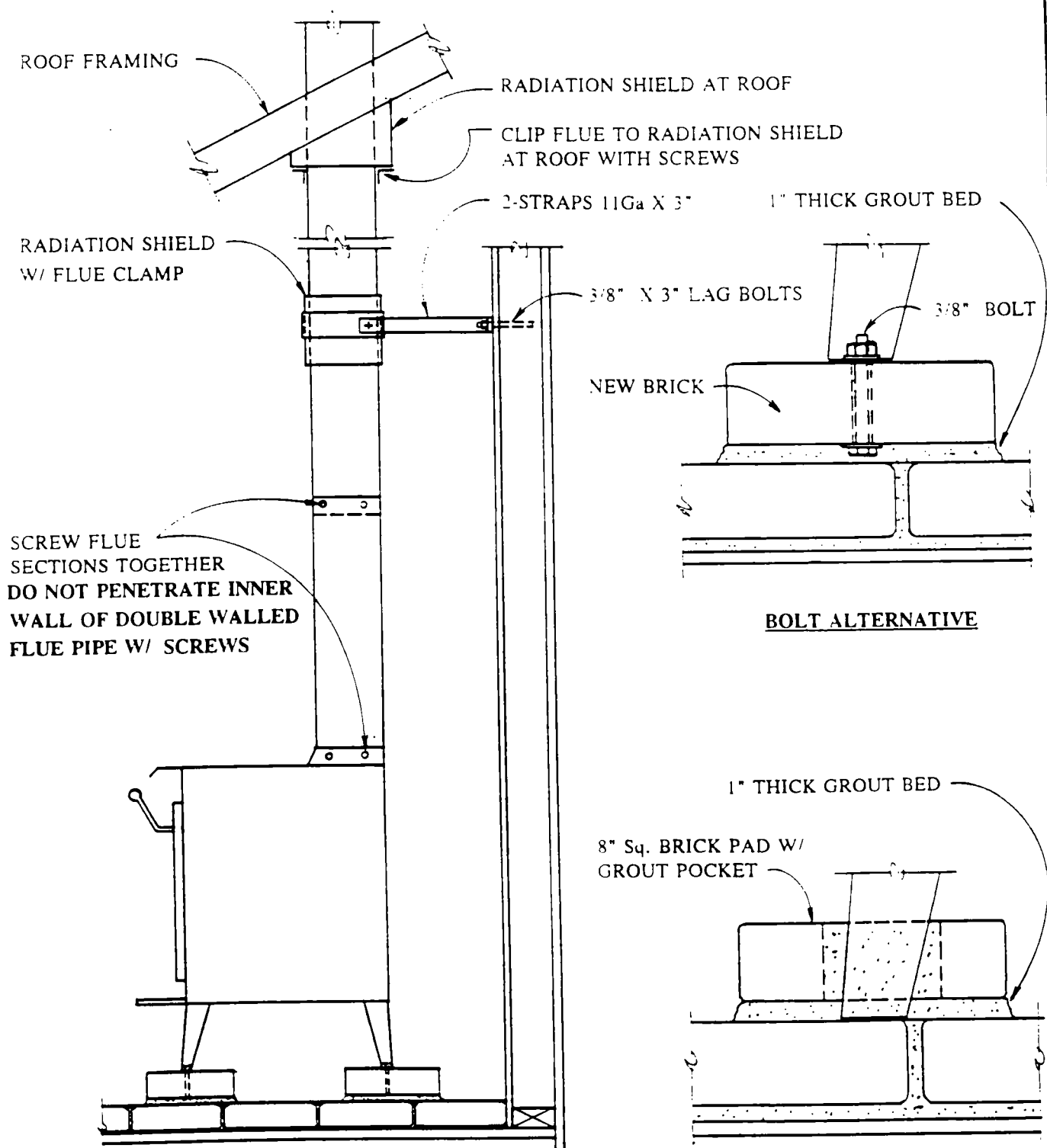
WATER HEATER BRACING

(WALL INSTALLATION)

Improperly secured water heaters and their associated piping present a potential risk of fire damage, water damage, heater damage and personal injury during an earthquake. Water heaters can slide, rock, or overturn when exposed to seismic forces, possibly rupturing the heater or breaking the supply lines. Gas leaks are frequently the cause of earthquake related fires.

The following recommendations can be used to reduce the earthquake damage associated with water heaters:

- 1) Place water heater no less than 1 inch and no more than 12 inches from wall.
- 2) Cut 1/2 inch diameter thinwall (EMT) conduit bracing to lengths sufficient to span between water heater and wood stud as shown (2'-6" maximum). Flatten and pre-drill ends.
- 3) Wrap 3/4" x 24 gauge plumbers tape one full turn around both the top and bottom of the unit.
- 4) Fasten conduit braces to plumbers tape using 1/4" diameter x 1" round head machine screws with washer and nut. Round head should face the water heater.
- 5) Fasten ends of plumbers tape together using a 1/4" diameter x 1" machine screw equipped with flat washer and nut.
- 6) Fasten the ends of the conduit bracing to studs a minimum of 8 inches and a maximum of 24 inches away from the water heater using a 1/4" diameter x 3" lag screw equipped with a flat washer.
- 7) Provide a flexible pipe connection between the water heater and the rigid gas and water lines. The connection should have sufficient length to allow the tank to move without breaking the line.



STOVE ANCHORAGE

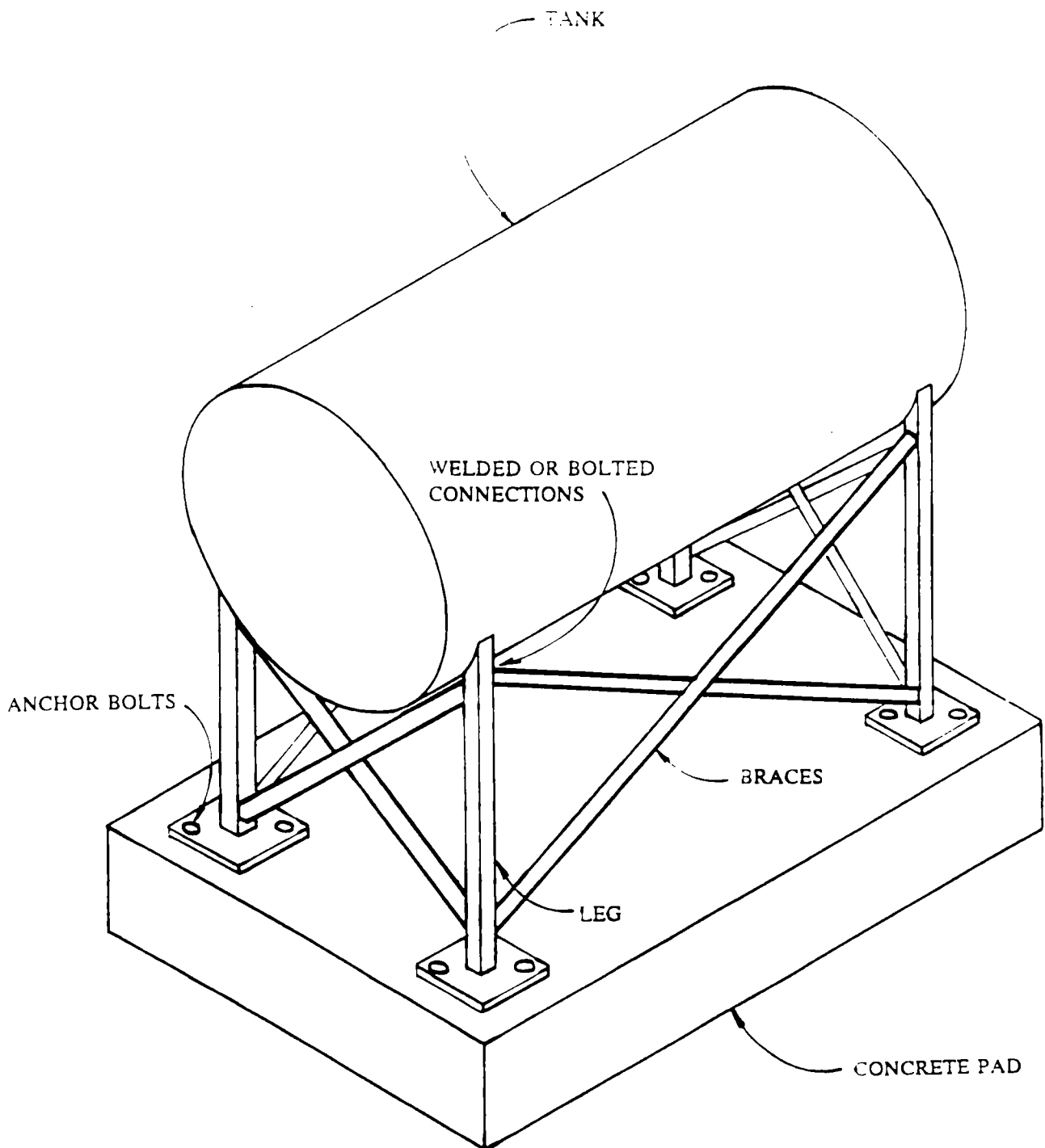


STOVE ANCHORAGE

Improperly anchored wood burning stoves and their associated flue piping present a potential risk of stove damage, fire and smoke damage and personal injury during an earthquake. Stoves can slide, rock, or overturn when exposed to seismic forces, possibly dislodging flue pipes and setting fires.

The following recommendations can be used to reduce the seismic hazard associated with wood burning stoves:

- 1a) For a stove set on a brick hearth, anchor stove with 3/8" diameter bolts through 1/2" hole to a new support brick. Fasten new support brick to existing hearth with a 1" thick bed of grout.
- 1b) If a bolt hole is not present on existing stove, build an 8" square brick pad with grout pocket at each leg. Provide at least 1 inch of grout all around the leg. Fasten brick pad to hearth with a 1" thick bed of grout.
- 2) Provide sheet metal screws at flue exit and between stove pipe sections.
NOTE: Do *not* penetrate inner wall of double walled flue pipe with screws.
- 3) Where flue is unsupported for more than 8 feet, provide a radiation shield with pipe clamp braced to wall using two (2) 11 gauge x 3" straps attached to a wall stud with 3/8" x 3" lag screws.



ELEVATED TANK BRACING

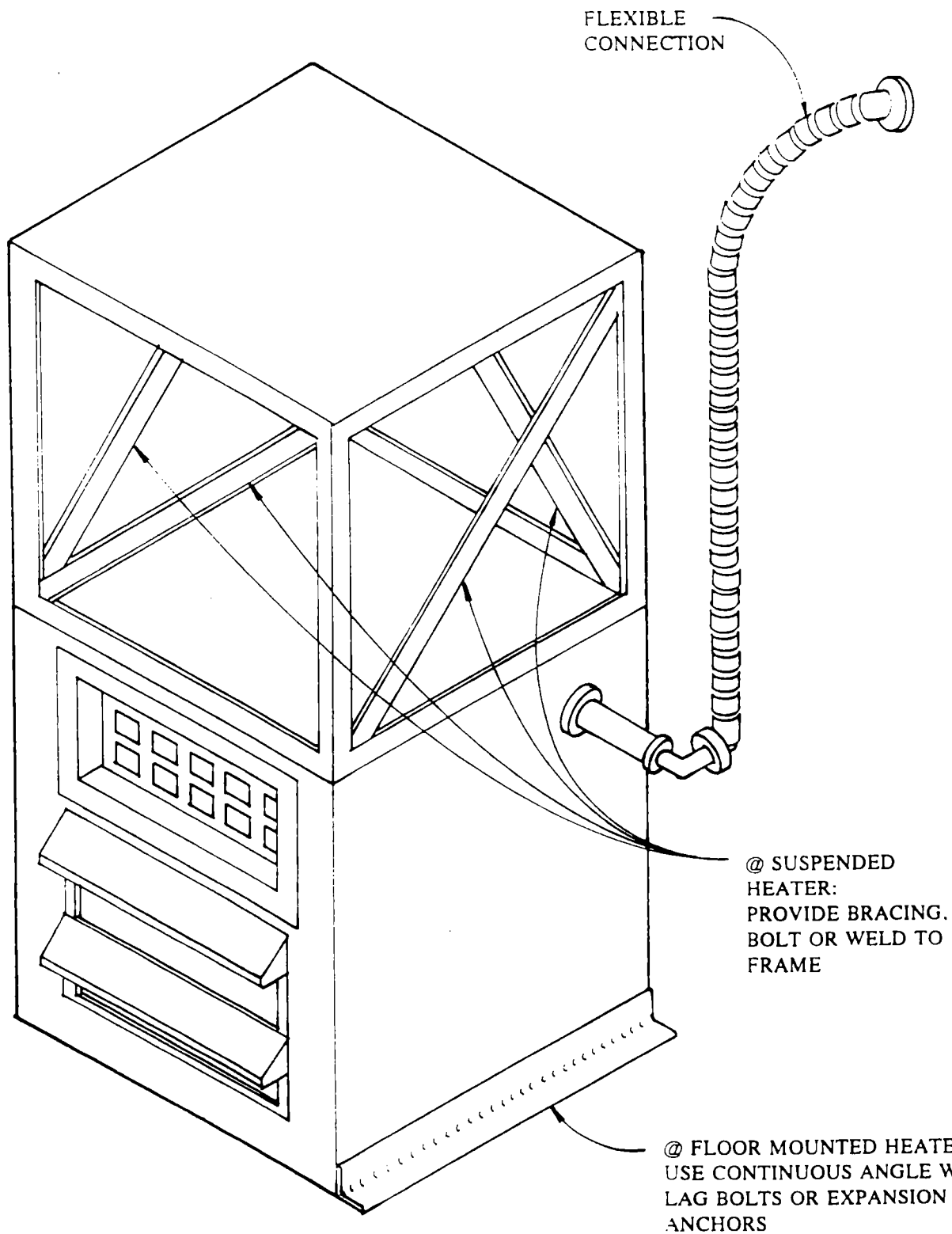


ELEVATED TANK BRACING

Elevated tanks are potentially vulnerable to earthquake damage unless the tank support structure is properly secured and braced. Elevated tanks can slide, rock, overturn, leak, or break out of their saddles during an earthquake.

The following recommendations can be used to reduce the risk of fire, flooding, chemical leaks, damage and personal injury associated with elevated tanks during an earthquake:

- 1) Inspect the tank to ensure that it is attached to its saddles and supports. If not, consult manufacturer and/or qualified engineer for proper attachment procedure.
- 2) Mount the tank support legs on a continuous concrete pad by bolting the legs to the concrete. To provide adequate stability, the concrete pad should be a minimum of 12 inches wider than the tank on either side and have a minimum thickness of 12 inches.
- 3) Bolt or weld additional cross bracing to the tank support legs, as shown.
- 4) At rigid pipeline connections, provide flexible hose connections to prevent possible brittle failures. Connections should have sufficient length to allow the tank to move without breaking the line.
- 5) Clear the area around the tank to ensure that there are not any tall or heavy objects which could fall and rupture the tank or the connecting lines.



SPACE HEATER BRACING

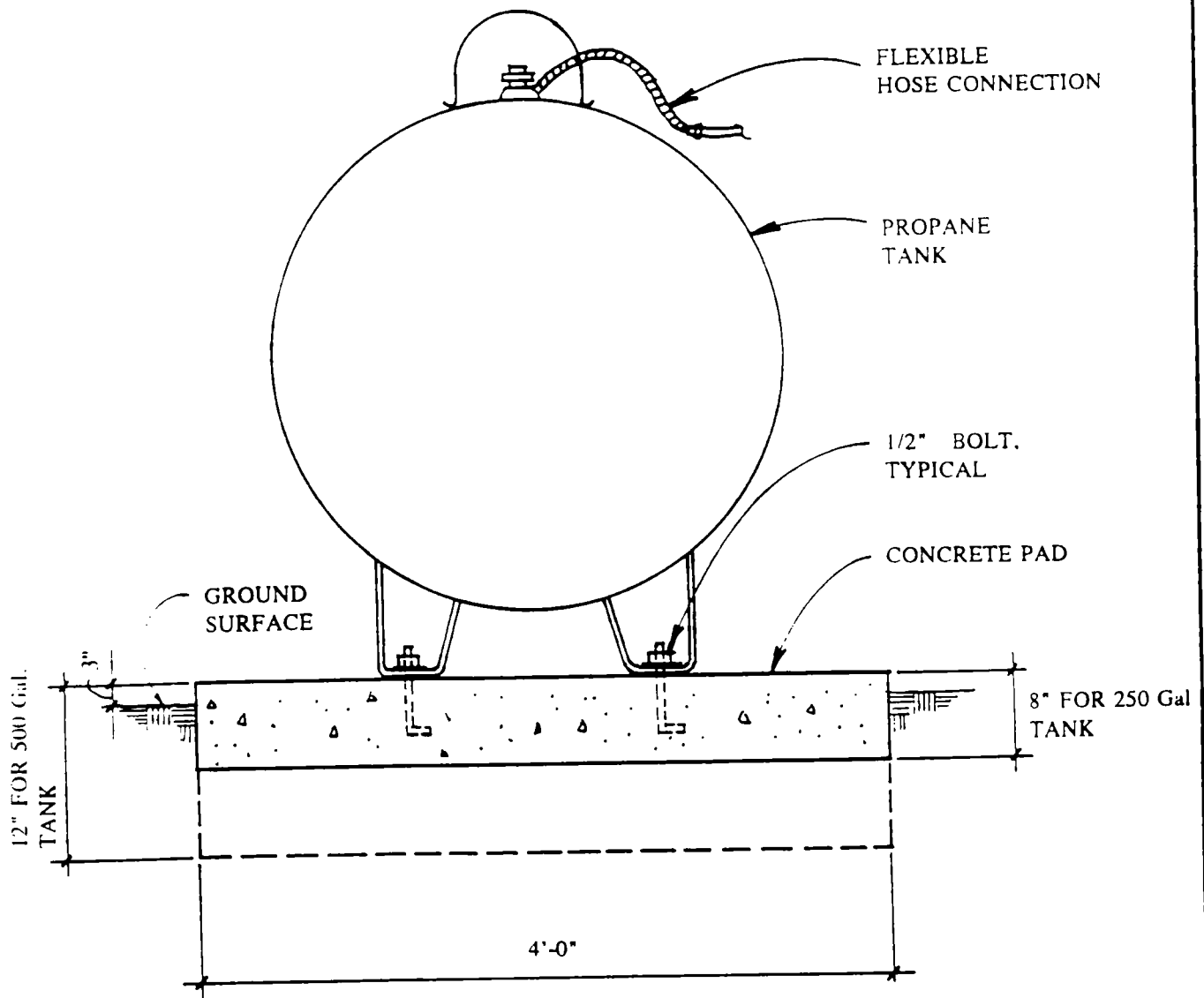


SPACE HEATER ANCHORAGE AND BRACING

Space heaters are potentially vulnerable to earthquake damage unless both the unit and the attached piping are properly supported. These units can slide, sway or overturn during an earthquake, possibly breaking the supply line or setting nearby combustible materials aflame. Gas leaks are frequently the cause of earthquake related fires.

The following recommendations can be used to reduce the risk of heater damage, fire damage, and personal injury associated with heaters during an earthquake:

- 1a) For suspended heaters, bolt or weld bracing to vertical hanging members.
- 1b) For floor mounted units, install continuous angle. Fasten angle to floor using lag screws or expansion anchors.
- 2) Provide a flexible gas line connection between the heater and the rigid supply line. The connection should have sufficient length to allow the heater to move without breaking the line.



PROPANE TANK ANCHORAGE

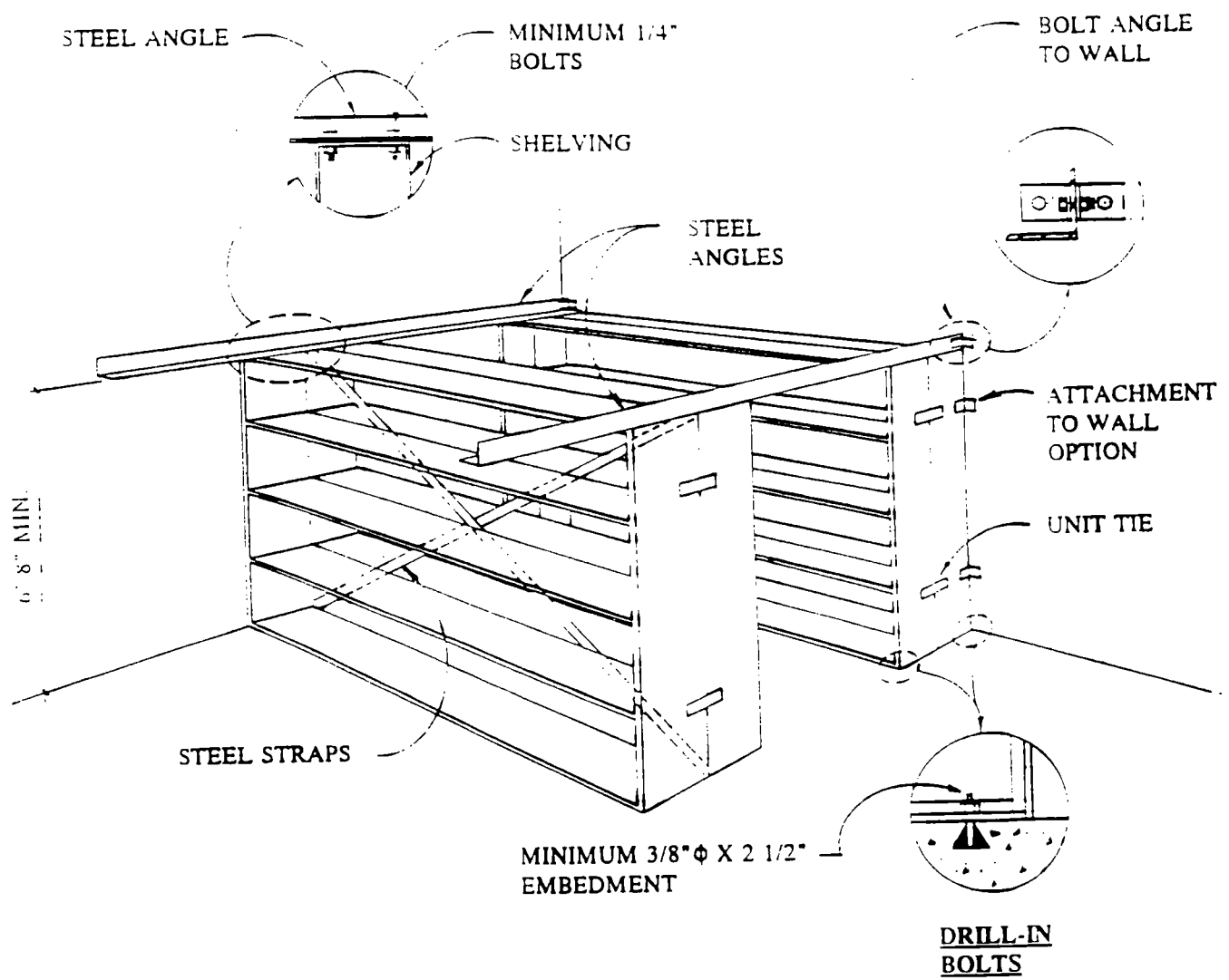


PROPANE TANK ANCHORAGE

Propane tanks are potentially vulnerable to earthquake damage unless both the tank and the attached piping are properly supported. These tanks can slide, rock, or overturn during an earthquake, possibly rupturing the tank or breaking the supply line. Gas leaks are frequently the cause of earthquake related fires. Propane tanks located below the base flood elevation should be mounted to concrete pads of sufficient size to prevent the tank from floating during a flood.

The following recommendations can be used to reduce the risk of tank damage, fire damage, and personal injury associated with propane tanks during an earthquake:

- 1) Mount the tank on a continuous concrete pad and bolt the four (4) legs using 1/2" bolts with a 5" minimum embedment into the concrete. The concrete pad should be a minimum of 12" wider than the tank on either side to provide adequate stability. To prevent floating during flood conditions, the tank should be elevated above base flood elevation. If not possible, the pad should be a minimum of 8 inches thick for a 250 gallon tank and a minimum of 12 inches thick for a 500 gallon tank.
- 2) Provide a flexible pipeline connection between the tank and the rigid supply line as well as where the supply line enters the house. The connection should have sufficient length to allow the tank to move without breaking the line.
- 3) Clear the area around the tank to ensure that there are not any tall or heavy objects which could fall and rupture the tank or the supply line.



TALL SHELVING ANCHORAGE & BRACING



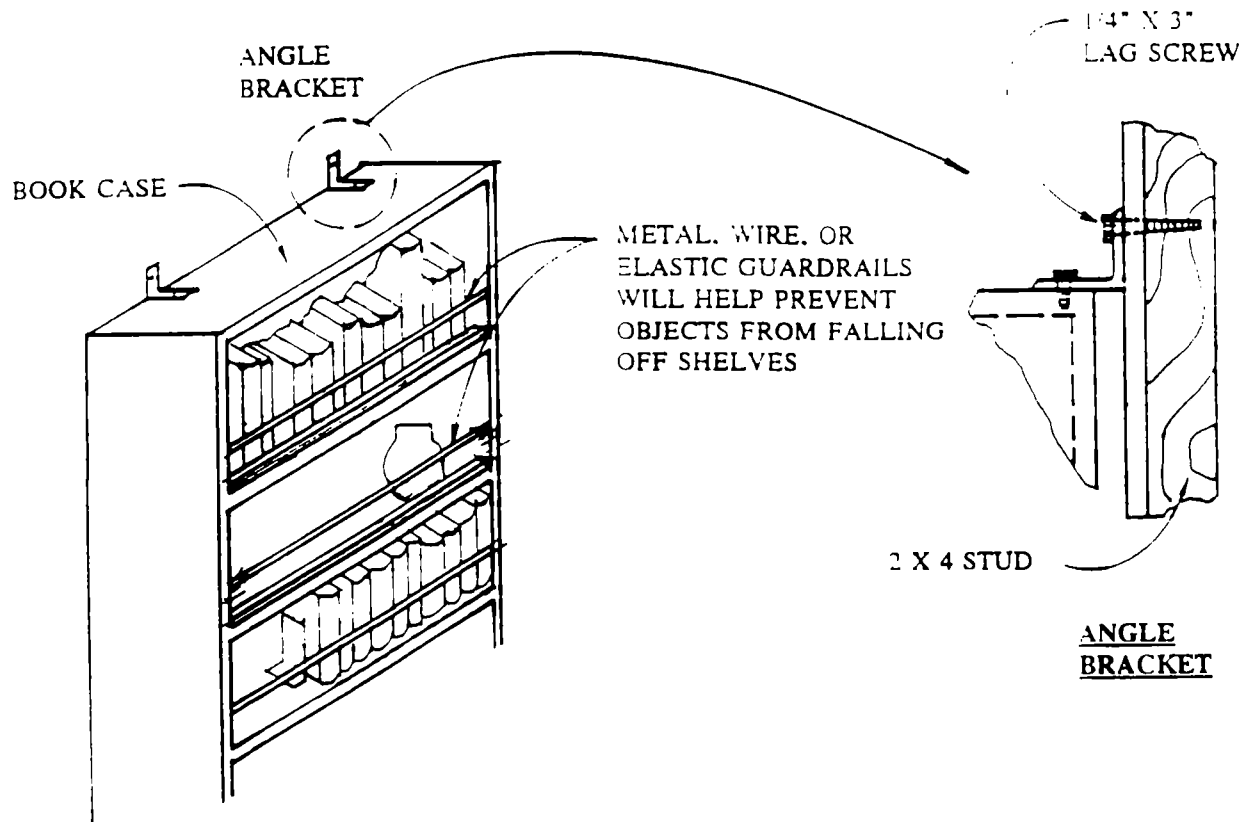
TALL SHELVING ANCHORAGE AND BRACING

Unless properly braced and secured, tall shelving units present a potential seismic hazard. Tall shelving units may rock, slide, overturn, collapse, or empty their contents when subjected to seismic forces.

The following procedures are recommended to reduce the risk of damage or personal injury associated with tall shelving units during an earthquake:

- 1) Mount continuous steel angle braces to top of shelving units at each end using a minimum of two (2) 1/4" bolts per connection.
- 2) Bolt continuous steel angle braces to stud or structural member using a double angle connection and a minimum of two (2) 1/4" diameter x 3" lag bolts.
- 3) Fasten the base of shelving units to the floor using minimum 3/8" diameter x 2 1/2" embedment lag bolts or expansion anchors.
- 4) Tie adjacent units together using minimum 3/16" diameter bolts. Tying the units together creates a more seismically stable shape.
- 5) Install steel strap cross bracing.
- 6) (Optional) Fasten unit to wall using two (2) 1/4" diameter bolts or #14 wood screws per connection. Embed fastener a minimum of 2" into stud or structural member.
- 7) (Optional) Provide metal, wire, or elastic ("bungee") cord guardrails or restraints to help prevent objects from sliding off of shelves. Large Velcro patches (4 or 5 sq. in.) glued to the bottom of objects and the top of shelves will also prevent objects from sliding.

NOTE: In order to install continuous bracing angle, shelving units should be a minimum of 6'-8" tall.



BOOK CASE ANCHORAGE



BOOKCASE ANCHORAGE

Unless properly secured, bookcases and similar heavy shelving units present a risk of damage or personal injury during an earthquake. Bookcases may rock, slide, overturn, or empty their contents when subjected to seismic forces.

The following recommendations can be used to reduce the earthquake damage associated with bookcases:

- 1) Secure top and/or sides of the bookcase to a wall using a minimum of two (2) metal angle brackets per unit. Secure the angle bracket to a wood stud using a 1/4" x 3" lag screw.
- 2) Provide metal, wire, or elastic ("bungee") cord guardrails to help prevent objects from sliding off of shelves. Large Velcro patches (4 or 5 sq. in.) glued to the bottom of objects and the top of shelves will also prevent objects from sliding.

2- 1/4" ϕ BOLTS OR
#14 WOOD SCREWS PER
UNIT
2" MINIMUM
PENETRATION
INTO STUD

TOP CONNECTIONS TO TIE
UNITS TOGETHER TO FORM
MORE STABLE SHAPE

3/16" BOLT,
MINIMUM

CONTINUOUS ANGLE
W/ LAG BOLTS OR
EXPANSION ANCHORS
TO FLOOR (DO NOT
USE TOGGLE BOLTS)

LATCHING DRAWERS



CABINET ANCHORAGE



CABINET ANCHORAGE

Unless properly secured, cabinets and similar heavy furniture present a risk of damage or personal injury during an earthquake. When subjected to seismic forces, cabinets may rock, slide, or overturn. Drawers may open and empty their contents.

The following recommendations can be used to reduce the earthquake damage associated with cabinets:

- 1) Secure top and/or sides of the cabinet to a wall using angle brackets. Secure the angle bracket to a wood stud or structural member using a 1/4" x 3" lag screw. **NOTE:** Do *not* use toggle bolts.
- 2) Prevent free-standing cabinets from sliding by installing a continuous angle floor support. Fasten the angle to the floor using lag bolts or expansion anchors. Fasten the angle to cabinets using a minimum of two (2) 1/4" bolts per cabinet. **NOTE:** Do *not* use toggle bolts.
- 3) Tie adjacent units together using minimum 3/16" diameter bolts. Tying the units together creates a more stable shape.
- 4) Purchase cabinets with locking drawers or install latches to drawers to prevent them from opening during an earthquake.

BUDGET ESTIMATE

Item Description	Material Cost	Labor Cost	Budget Estimate
Chimney Bracing	\$ 50.00	\$ 550.00	\$ 600.00
Suspended Ceiling Bracing (per brace)	\$ 5.00	\$ 45.00	\$ 50.00
Light Fixture Bracing (per light)	\$ 5.00	\$ 45.00	\$ 50.00
Water Heater Bracing (corner)	\$ 10.00	\$ 70.00	\$ 80.00
Water Heater Bracing (straight wall)	\$ 30.00	\$ 170.00	\$ 200.00
Stove Anchorage	\$ 45.00	\$ 280.00	\$ 325.00
Elevated Tank Bracing	\$ 150.00	\$ 840.00	\$ 990.00
Space Heater Anchorage and Bracing	\$ 35.00	\$ 50.00	\$ 85.00
Propane Tank Anchorage	\$ 120.00	\$ 740.00	\$ 860.00
Tall Shelving Anchorage and Bracing	\$ 85.00	\$ 115.00	\$ 200.00
Bookcase Anchorage	\$ 5.00	\$ 35.00	\$ 40.00
Cabinet Anchorage	\$ 15.00	\$ 35.00	\$ 50.00

DAMAGE ASSESSMENT WORKSHEET RESIDENTIAL CONSTRUCTION

8/93

1. Address: _____

2. Owner: _____
Tel. No: _____
3. Occupant: _____
Tel. No: _____
4. Residential Building: Yes _____ No _____
5. (Optional) Insurance coverage: Building: \$ _____
Company Name: _____
Contents: \$ _____ Policy #: _____
6. Special Flood Hazard Area: Community I.D.# _____
FIRM Panel: _____ Flood Zone: _____
FIRM DATE: _____ BFE/NGVD: _____
Existing Lowest Floor Elevation: _____

If the building is a manufactured/mobile home, go to question 12
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7. DESCRIPTION OF STRUCTURE: RESIDENTIAL
 - (a) Wood Frame
1) Plywood/Hardboard _____
2) Stucco _____
3) Siding or Shingles _____
4) Masonry/Veneer _____
 - (b) Masonry
1) Brick _____
2) Concrete Block _____
3) Other: _____
Describe _____
- (c) 1 story _____ 1-1/2 Story _____ Tri-level _____
2 story _____ Bi-level _____ 3 or more _____
- (d) Garage: attached _____ detached _____ Carport: attached _____ detached _____
- (e) Foundation: slab-on-grade _____
basement _____
crawl space _____
- (f) Basement: finished _____
unfinished _____

8. Condition of Structure: a. Collapsed _____
b. Structure Moved off Foundation _____
c. Totally Destroyed _____

9. Description of Damage:

a. Plumbing:

1) Is it;

Exposed _____
Damaged _____

2) Needs to be;

Repaired _____
Replaced _____

b. HVAC/Electrical:

1) Submerged _____
(a) water Depth _____ ft.

2) Damaged _____

3) Repairable _____ 4) Replace _____

c. Foundation

d. Exterior walls

e. Interior Walls

f. Roof

(Use corresponding number[s])

1. settlement/cracked
2. partially missing
3. sagging
4. dislodged/destroyed
5. submerged
6. include all above
7. other: Explain

10. Duration of Flooding:

a) _____ hours b) _____ days

11. High Water Mark: Specify depth of water:

a) Exterior Walls _____ ft.

b) Interior Walls _____ ft.

12. DESCRIPTION OF STRUCTURE: Manufactured/Modular Home(s)

Dimensions: a) single wide _____ size _____ X _____ Elevated to BFE Y/N _____
b) double wide _____ size _____ X _____ Elevated to BFE Y/N _____

Roof: a) metal/corrugated or ribbed _____
b) composition shingles _____

Plumbing: a) number of bathrooms _____

Fireplace: a) Y/N _____

Foundation: a) post/pier/piles
b) continuous concrete
c) treated wood system
d) conventional installation/dry-stack block
e) metal or vinyl
f) horizontal lap

Heating/Cooling:
a) forced air
b) warm & Cooled
c) wall furnace
d) heat pump

Skirting: a) metal or vinyl
b) horizontal lap
c) simulated stone/brick
d) veneer
e) lattice

Appliances: built in only: a) list _____

Carport: a) attached b) detached

Garage: a) attached b) detached

ESTIMATED COST OF REPAIR/RECONSTRUCTION

Worksheet Application # _____
 OWNER(s) NAME: _____
 Contractor's Signature _____
 Address: _____ Telephone # _____

ITEMS AND COSTS TO BE INCLUDED FOR CALCULATING SUBSTANTIAL DAMAGE

ITEMS	LABOR	MATERIALS	FOR OFFICIAL USE	
			LABOR	MATERIALS
Foundation				
Walls				
Roof				
Flooring				
Plumbing				
Electrical				
Furnace/HVAC Equipment				
Insulation				
Exterior Wall Finish (i.e. Vinyl Siding/Wood Siding)				
Interior Wall Finish (i.e. drywall)				
Bathroom Fixtures				
Cabinets (Built-in Only)				
Windows				
Doors				
Flooring (i.e. carpeting over sub-flooring, linoleum, or hardwood floors)				
Appliances (Built-in Only)				
Interior Finish Carpentry				
Paneling & other decorative finishes				
Paint				
Light Fixtures & Ceiling Fans				
Attached Items Subtotal				
TOTAL				

TOTAL (LABOR & MATERIALS): _____ (For Official Use)

ITEMS THAT CAN BE EXCLUDED FROM THE COST OF REPAIR

- Plans, specifications, survey and building permits.
- Demolition costs associated with clean-up, debris removal, and preparation of the site.
- Structural fill for elevating the building.
- Carpeting and re-carpeting installed over finished flooring such as finished wood or tiling.
- Plug-in type appliances such as washers, dryers, stoves, refrigerators, window air-conditioning units, or de-humidifiers.
- Detached Structures such as garages, sheds, gazebos.
- Fences, sidewalks, and yard lights.
- Swimming pools.

Determination of Building Value

Market Value May be determined using various methods. Only the value of the building itself must be determined. The value of other site improvements such as landscaping, pavement, pools, and detached buildings do not need to be included.

In lieu of market value, actual cash value or replacement cost may be used at the community's discretion compliant with applicable state requirements.

Acceptable methods of estimating market value include:

- Independent appraisals by a professional appraiser

- Detailed estimates of the structure's Actual Cash Value

- Property appraisals used for tax purposes (adjusted Assessment Value: used as a screening tool.

- The value of the building based on insurance claims

- Qualified estimates based on sound professional judgement made by staff of the local building department or local or state tax assessor's office.

Determination of Substantial Damage

Percent Damage = $\frac{\text{Cost of Repair}}{\text{Value of Building}}$ = $\frac{\$}{\$}$

In the event that the "Percent Damage" is equal to or greater than 50%, the building is substantially damaged.

_____ This building is substantially damaged and therefore must be elevated so that the lowest floor is at or above the elevation of the base flood.

_____ This building is not substantially damaged. This building can be repaired without having to be elevated.

_____ This is a properly elevated structure and may be reconstructed at its existing elevation.

Reviewed by: _____ Date _____

Approved by: _____ Date _____



INTERIM REPORT

for

FEMA-DR-995-MO declared July 9, 1993

and

FEMA-DR-989-MO declared May 11, 1993



8/14/93

Prepared from information contained within the following State documents:

409 Hazard Mitigation Plan
DR-995 Response Reports
DR-989 IHMT Report (Draft)

Acknowledgements

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Executive Summary

During 1993, the State of Missouri has been responding to an ongoing flood event that has produced record breaking flood levels. The Mississippi River gage at St. Louis measured over nineteen feet above flood stage on August 8, 1993. While the State has estimated damages at over four billion dollars; the full scope of damages will not be known until flood waters recede.

On May 11, 1993, the President of the United States declared that a major disaster existed in the State of Missouri as a result of severe storms and flooding. The FEMA-DR-989-MO disaster declaration included seven counties that were eligible for Individual Assistance programs under the authorities of Public Law 93-288, as amended (the Stafford Act). The incident period was April 15 - May 29, 1993.

An Interagency Hazard Mitigation Team (IHMT) met on June 24, 1993, to identify mitigation opportunities. The DR-989 IHMT report resulting from the meeting remains in draft form, due primarily to team members involvement in continued flooding that subsequently resulted in the declaration of FEMA-DR-995-MO.

The second Missouri disaster declaration in the State of Missouri, on July 9, 1993, was due to continued severe storms and flooding. The initial declaration for FEMA-DR-995-MO, listed five counties eligible for Individual Assistance. Subsequent amendments have brought the total number of eligible counties for Individual Assistance to seventy-seven plus the City of St. Louis. To date, sixty-four counties and the City of St. Louis have been listed for Public Assistance. The incident period for this disaster started June 10, 1993, and has not been closed as of this date.

The purpose of the interim report is to identify hazard mitigation opportunities arising from FEMA-DR-989-MO and FEMA-DR-995-MO.

A nine-state, basin-wide symposium is tentatively scheduled for September 1993. The purpose of the symposium will be to address mitigation opportunities that may stretch across state boundaries, as well as developing state specific goals. The interim report will serve as the outline for the State's issues for discussion at the symposium or future IHMT meeting. This interim report should stimulate discussion regarding:

- A. Levees
- B. Recovery - Rebuilding
- C. Hazardous Materials

Following the symposium, a final IHMT Report will be written as required by the Stafford Act. All reports are distributed to Federal State and local agencies review, comment, and implementation.

Introduction

The following issues for FEMA-DR-995-MO were developed by combining existing plans and reports with field surveys and internal meetings. This report is intended to be used as a discussion tool at the upcoming September, 1993, symposium. The IHMT normally convenes after a disaster declaration and strives to complete its report within 15 days of the declaration. Due to the enormity of the flooding (nine states involved) the need for coordinated hazard mitigation between FEMA, state and local governments is evident.

Interagency Hazard Mitigation Team

The Interagency Hazard Mitigation Team process is essential in the identification of effective mitigation opportunities. The team members are representatives from appropriate Federal, state and local agencies. The team may be augmented by representatives from the private sector (e.g. insurance or historic preservation fields). Team members are chosen for their knowledge of disaster response and recovery, and their expertise in their own agency's programs.

Federal agencies provide disaster assistance and technical assistance that can be used by state and local government in implementing hazard mitigation efforts. State agencies provide expertise in state policies, issues, and resources. Local government and private sector involvement add additional information on community activity. The lack of participation by an agency may lead to a lack of understanding about mitigation efforts and an inability to participate effectively.

The primary purpose of the IHMT Report is to provide an overall framework for the hazard mitigation and disaster recovery activities of the affected Federal agencies. The IHMT Report is a tool in which issues are addressed and recommendations developed to assist disaster recovery efforts and post-disaster planning. Participation by state, local, and private sector representatives is critical in identifying mitigation opportunities which are integral to community activities and goals.

Mitigation Action Components

Mitigation actions proposed within the IHMT Report and State 409 Hazard Mitigation Plan should include a statement of the problem; a discussion of the alternatives and recommended strategy; and the identification of a lead agency, time frame for completion, and potential source of funding.

Interagency Hazard Mitigation Team Issues

The Flood of '93 has affected nine states including Illinois, Iowa, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, Wisconsin, Missouri. Five floods have merited Presidential declarations of disaster in Missouri during the past nine years. Many communities have experienced repetitive flooding.

Three areas have been identified for discussion and, hopefully, change. (A) An examination of Missouri levees, and the issues surrounding rebuilding those levees is needed. The extent of levee failure in Missouri was notable. (B) Floodplain development and the relating National Flood Insurance Program elements represent the second area to be examined. (C) And the third category of issues for discussion are those surrounding hazardous materials.

A. LEVEES

Background: There are approximately 784 levees in the State of Missouri. Approximately 42 have been built by the Army Corps of Engineers (USACE) and turned over to a levee district (public sponsor) for maintenance. Approximately 142 non-federally funded levees participate in the USACE program; they have been built to USACE requirements and are being maintained. The remaining 600 levees do not meet required standards, nor do they participate in a federal program. Subsequently, the question arises as to who will pay to rebuild these levees and to what requirement they will be rebuilt.

Recently, USACE held a two day conference in Kansas City to address rebuilding levees in the aftermath of this disaster. The Soil Conservation Service (SCS) also held a similar meeting to address the same issue. On August 6, 1993, both the USACE and SCS met with FEMA representatives to develop a unified approach to levee rebuilding.

Currently, the disaster field office in Earth City, MO, is compiling a data base documenting Missouri levees and their ownership, and noting if they meet federal requirements. Typically, the Federal government will not pay for the rebuilding of a levee if there is a lack of public sponsorship or maintenance, or if it does not meet federal requirements.

There are two types of federally recognized levee systems: agricultural levees and urban levees. Federally recognized levee systems, whether they are agricultural or urban, are built to a level of protection that maximizes net benefits gained. Net benefits are defined as average annual benefits less the average annual costs to maintain the levee. In cases where a higher levee can be justified, (e.g. sites of dense population), a higher levee can be approved, as long as the cost does not exceed the benefit.

Issue A1 - Levee Rebuilding: If the levees that have been breached, or have failed in this flood, are not rebuilt in time for spring rain and planting season; farmers are likely to suffer additional real property damage and economic loss.

Issue A2 - Floodplain Management: The State should establish a data base with all levee districts that identifies ownership, level of protection and standard of design of all levees. This data base can be used as a management tool to track levee systems.

B. RECOVERY - REBUILDING (GUIDELINES FOR DEVELOPMENT IN THE FLOODPLAIN/NFIP)

Background: The National Flood Insurance Program (NFIP) is recognized as a hazard mitigation measure for participating communities, residents and businesses in a floodplain.

There are approximately 169,000 structures in the State of Missouri that are in the floodplain. However, only 14,950 NFIP flood insurance policies are in force, which represents approximately 8.8 percent of the structures located in the floodplain.

In Missouri, there are 544 communities: 108 are either sanctioned, suspended, or non participants in the NFIP. Since these 108 communities have not enforced the NFIP requirements, or elected not to participate in the NFIP; FEMA-coordinated federal disaster assistance will be limited. Individuals residing in sanctioned, suspended, or non-participating communities will be eligible only for the rental assistance portion of the FEMA Disaster Housing Assistance Program. Emergency needs for food, clothing, or shelter are met by voluntary organizations such as the American Red Cross or the Salvation Army.

As a result of the flooding, many homeowners have expressed interest in relocating out of the floodplain. For homeowners with current NFIP policies in force at the time of the disaster, some relief may be found under the NFIP Section 1362 Acquisition Program. The Section 1362 program is a fund to purchase repetitively flood damaged structures. For the uninsured, creative solutions will be needed for acquisition/relocation projects as a result of this disaster.

Issue B1 - Community participation in the NFIP: The State Flood Management Unit along with FEMA Natural and Technological Hazards (NTH) Division need to develop an outreach program outlining the benefits of NFIP participation.

Background: The State of Missouri has been responding to an ongoing flood event that has produced record breaking flood levels. Many homeowners located in the floodplain have fought tirelessly to hold back floodwater, only to experience overtopping or failure of the levees. As a result, many homes have been flooded. In some instances, homes have been inundated with water for several weeks. It can be assumed that many homes will have substantial damage, requiring the homeowners to adhere to NFIP requirements if rebuilding.

Issue B2 - NFIP Compliance: The state will need to enforce compliance of the NFIP requirements within the floodplain, possibly by adopting a statewide building standard.

Background: A community that participates in the National Flood Insurance Program means that flood insurance is available to all structures in the community. As described in the Robert T. Stafford Act, under FEMA's Public Assistance Program, "where an insurable building damaged by flooding is located in a special flood hazard area..., assistance shall be reduced. The amount of the reduction shall be the maximum amount of the insurance proceeds which would have been received had the building and its contents been fully covered by a standard flood insurance policy". This means that the full cost of repairs will not be received under FEMA program.

Issue B3 - Public Awareness: Public awareness of the FEMA Public Assistance policy is needed, so that the owners of public facilities will be encouraged to purchase and maintain the proper flood insurance coverage.

Background: In Missouri, there are 114 counties, many are under a commission-precinct form of government. There are 544 cities, villages or municipalities, of which, most have a mayor/council form of government. Many of these communities have experienced repetitive flooding.

As noted in the 1984 State Hazard Mitigation Report, the State "typically has refused to get involved in regulating the floodplain". Possibly some of the situations surrounding hazardous materials and the damage to infrastructure and individual structures could have been avoided if more strict floodplain regulations were enacted. In order to mitigate against widespread flooding, comprehensive floodplain management regulations need to be developed and enforced.

Issue B4 - Floodplain Management: The State needs to track development in the floodplain and enforce comprehensive floodplain regulations.

C. HAZARDOUS MATERIALS

Background: In a flood of the size and duration sustained by Missouri in 1993, issues regarding hazardous materials are magnified. The quantity of hazardous materials reclaimed thus far (8/12/93) exceeds:

430 Drums (30-55 gallons)
604 Miscellaneous container
46 Propane/Freon tanks
10 Fuel storage tanks

Seventy-five drinking water systems are currently being monitored as a result of the flood; 6 systems are considered threatened, 2 have complete outages, 7 have partial outages, and 8 systems have boil orders in effect. Of Missouri wastewater treatment systems; 22 are threatened but operational, 57 systems are experiencing significant disruption and/or discontinued service (38 of these are flooded).

Issue C1 - Burning of Debris: Floodwater debris is an amalgam of innocuous and hazardous materials. A common method of debris disposal is burning.

- Is debris segregated into hazardous and non-hazardous materials before it is burned?
- Should air monitoring be conducted when burning debris?
- Some Missouri towns have 'no burning' zones. Should these regulations be overridden during disaster recovery?

Issue C2 - Household Hazardous Waste: When basements and homes are flooded, it can be assumed that household hazardous waste floats freely. Examples include batteries, cleaning agents, paints and thinners, and other materials commonly stored in the home. Some people may have a collection point for hazardous waste in the basement or an outdoor storage building.

- How can household hazardous waste be segregated from normal debris?
- Should every town establish Amnesty Days when private citizens could dispose of their hazardous waste and prevent household stockpiles from developing?

Issue C3 - Sorting and Disposal of Debris: A single aerosol can of oven cleaner is not an issue. But the accumulation and variety of debris from a flood of this size is staggering.

- Debris disposal from a flood of this magnitude must have clear guidelines.

- Where do landfills and their existing regulations fit into this picture?

Issue C4 - Cleaning Process: Individuals pumping basements where household hazardous waste spillage has occurred are re-polluting surrounding soil and water.

- Filtration and or disposal requirements of clean-up operations should be examined.

Issue C5 - Small Flood Industrial Waste: Unlike large businesses, the small business owner or farmer may not be faced with disposal of hazardous waste in normal times. Flooding can create hazardous waste (such as flooded farm pesticide containers) for owners unprepared to dispose of it, or unable to pay for disposal.

- Consider methods to educate the public about hazardous waste disposal.

- Develop funding sources to pay for disposal/clean-up costs.

Issue C6 - SARA Title 3 Facilities: SARA Title 3 legislation ensures a community's "right-to-know" what is stored in their area. It requires hazardous materials of particular quantities, and their release, to be catalogued. Local Emergency Planning Commissions (LEPC) keep inventory of qualifying sites.

- These LEPCs should be promoted as an informational resource during the response phase of a disaster.

- LEPCs can also be used to identify sites storing materials that become flammable or explosive when mixed with water (e.g. magnesium and calcium carbides). These sites, if identified within the floodplain, could be examined for improved floodproofing or relocation.

Issue C7 - Underground Storage Tanks: Underground storage tanks can pop up from water-saturated soil, or be crushed by the weight of water-saturated soil.

- Zoning issues within the floodplain should be examined (e.g. gas stations located in the floodplain).

Issue C8 - Communication Regarding Hazardous Material Threats: An example of "missed timing" occurred in a Des Moines, Iowa incident. A member of ESF #10 phoned a report of fire to Emergency Operations Control. Subsequently, the same field person phoned to say that the fire was under control. Public information had already gone out that there was a threatening situation which might require evacuation. Yet, the situation was known to be under control while the media was promoting concern.

- A clear channel of communication should be established between the field operatives, Emergency Operations Control, and Public Information. Timing is critical both in the warning phase and in the announcement that danger has passed.

Issue C9 - Monitoring: Air, soil, and water are monitored. As the disaster aftermath goes on, contaminants may change form. For example, soil may dry and become airborne. Or flood-contaminated debris may be burned releasing particles into the air. Winds may blow farm pesticides into nearby water sources.

- Do we have enough monitoring in place?
- What benchmarks are in place to compare the quality of air, soil and water before and after the disaster?

Issue C10 - Regulations for Storage Tanks: While some owners have begun to reclaim propane and fuel storage tanks, most remain unidentified and unclaimed.

- Review regulations requiring anchor straps and tie-downs.
- Review regulations requiring identification marks on tanks.

appendix a

Missouri Disaster Declarations Since 1984

July 1993 Flood

DR-995 for IA - 77 Counties & 1 City: Adair, Andrew, Audrain, Atchison, Barry, Bates, Benton, Boone, Buchanan, Caldwell, Callaway, Camden, Cape Girardeau, Carroll, Cass, Chariton, Clark, Clay, Clinton, Cole, Cooper, Daviess, Dekalb, Franklin, Gasconade, Gentry, Grundy, Harrison, Henry, Hickory, Holt, Howard, Jackson, Jasper, Jefferson, Johnson, Knox, Lafayette, Lewis, Lincoln, Linn, Livingston, Macon, Maries, Marion, McDonald, Mercer, Miller, Moniteau, Montgomery, Morgan, New Madrid, Newton, Nodaway, Osage, Pemiscot, Perry, Pettis, Pike, Platte, Pulaski, Putnam, Ralls, Randolph, Ray, Saline, Schuyler, Scotland, Scott, Shelby, St. Charles, St. Louis, Ste. Genevieve, Stone, Sullivan, Warren, Worth, and the City of St. Louis.

DR-995 for PA - 64 Counties & 1 City: Adair, Andrew, Atchinson, Barry, Bates, Benton, Boone, Buchanan, Callaway, Camden, Cape Girardeau, Carroll, Chariton, Clark, Clay, Clinton, Cole, Daviess, Franklin, Gentry, Gasconade, Grundy, Harrison, Henry, Holt, Howard, Jackson, Jefferson, Johnson, Knox, Lafayette, Lewis, Lincoln, Linn, Livingston, Macon, Maries, Marion, McDonald, Mercer, Miller, Montgomery, Moniteau, New Madrid, Newton, Nodaway, Osage, Perry, Pettis, Pike, Platte, Putnam, Ralls, Ray, Saline, Schuyler, Scotland, Shelby, St. Charles, St. Louis, Ste. Genevieve, Sullivan, Warren, Worth and the City of St. Louis.

May 1993 Flood

DR-989 for IA - 7 Counties : Jefferson, Lincoln, Marion, Pike, St. Charles, Ste. Genevieve, St. Louis

May 1990 Flood

DR-867 for PA - 1 County : Jackson County

October 1986 Flood

DR-779 for IA - 15 Counties : Boone, Callaway, Cole, Cooper, Franklin, Gasconade, Howard, Montineau, Montgomery, Osage, Saline, St. Charles, St. Louis, Vernon, Warren.

DR-779 for PA - 17 Counties and 6 Cities/Townships : Bates, Benton, Cass, Clark, Henry, Johnson, Lewis McDonald, Miller, Morgan, Pettis, Ralls, St. Clair, Scotland, Shelby, Vernon, Warren/Cedar City and Town of Mokane (Calloway), City of Hermann and Roark Township (Gasconade), Loutre Township (Montgomery), Sweet Springs (Saline).

June 1984 Flood

DR-713 for IA - 3 Counties : Buchanan, Holt, Platte

DR-713 for PA - 11 Counties : Andrew, Atchison, Buchanan, Caldwell, Clinton, DeKalb, Gentry, Holt, Knox, Worth

appendix b

Interim Report Acronyms

BFE	Base Flood Elevation
CRS	Community Rating System
DAC	Disaster Assistance Center
DFR	Density Floodway Regulations
DR	Disaster Response
EMA	Emergency Management Agency
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
HMGP	Hazard Mitigation Grant Program
IA	Individual Assistance Program
IFG	Individual & Family Grant Program
IHMT	Interagency Hazard Mitigation Team
LEPC	Local Emergency Planning Commissions
MO/DNR	Missouri Department of Natural Resources
NFIP	National Flood Insurance Program
NTH	Natural & Technological Hazards Division
PA	Public Assistance Program
SARA	Superfund Amendments & Reauthorizations Act
SBA	Small Business Administration
SCS	(USDA) Soil Conservation Service
SEMA	State Emergency Management Agency (Missouri)
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture

appendix c

DR-989-MO (Draft) IHMT Report

Acknowledgements

The following individuals provided invaluable assistance in the preparation and production of this report:

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The Flood Event

The event that triggered the flooding in Missouri, was the heavy rain and flooding to the north, in and above Iowa and Illinois. The Mississippi river began rising above flood stage beginning on April 3, 1993 in the vicinity of Lincoln and St. Charles Counties, Missouri. This was compounded by the Missouri and Illinois River rising above flood stage where they join the Mississippi. The higher river levels lessened the capability of the Mississippi River to handle additional rainfall runoff. In the order of magnitude, this flood ranks in the top ten of recorded historical Mississippi River crests in the disaster area.

The continued heavy rains locally and to the north of the affected area caused the Mississippi to crest many times in the impacted area. Disaster related damages to private and public facilities began with the first crest on April 15, 1993, and continued for several weeks. At the crest during the period of April 26 - 29, 1993, the Mississippi River was eight feet above flood stage at Winfield Dam in the center of the area requested by the Governor. The Mississippi River remained many feet above flood stage for several weeks and receded at an extremely slow rate (1/10th ft./day with no additional rains.) The river remained above flood stage longer than was first predicted by the U.S. Army Corps of Engineers, who had anticipated that waters would fall below flood stage by May 21.

Summary of Damages

Three deaths and thirty five injuries were directly attributable to the flooding. In addition, there were over seven hundred persons in immediate need of temporary housing. Many homes were accessible only by boat and some were not even accessible by boat as conditions were too dangerous. A significant number of automobiles were observed submerged throughout the inaccessible areas, with many of these vehicles being primary vehicles. Based on the type and age of vehicles seen it was estimated that most would not have comprehensive insurance coverage. Most of the homes affected by this flood have wells and septic tank system. Well contamination present a major problem. Many propane tanks have floated away from homes.

DR-989-MO (Draft) Recommendations

This appendix has been prepared from the information contained in the draft copy of the IHMT Report written in response to the Federal Disaster Declaration on May 11, 1993, for Missouri. The counties of Jefferson, Lincoln, Marion, Pike, St. Charles, Ste. Genevieve, and St. Louis had been declared eligible to receive Individual Assistance. Many of the issues developed in the draft report are similar to the issues apparent in DR-995-MO. Since the (draft) report has not been circulated to team members, the issues and background have been edited and grouped under the following 11 headings:

- A. Floodplain Mapping
- B. Dikes & Levees
- C. Floodway Restrictive Covenants
- D. Hazardous Materials
- E. Household Hazardous Wastes
- F. Rebuilding - Permitting by Local Officials
- G. Rebuilding - Public Awareness
- H. Rebuilding - Minimization Measures
- I. Rebuilding - Flood Audit Findings
- J. Floodplain Management/NFIP
- K. State Hazard Mitigation Programs

A. FLOODPLAIN MAPPING

Local officials must have accurate maps of the Special Flood Hazard areas along with updated Base Flood Elevations (BFE) in order to properly manage their floodplain management programs. In view of major flooding along the Missouri and Mississippi Rivers, it is important that hydrology and river profiles be re-evaluated. FEMA and USACE typically are involved in updating flood maps.

Recommendation 1: FEMA and USACE should advise the state on their schedule for reviewing and updating the Missouri and Mississippi River studies with respect flood mapping.

B. DIKES & LEVEES

The State Association of Soil and Water Conservation Districts and others (e.g. MO Levee and Drainage Districts Organization) could work together to petition the State legislature to enact administrative codes with respect to levees and dikes. The current

policies have not created an effective structural system.

Recommendation 2: The State should enact an administrative code to govern the design, construction, and maintenance of rehabilitated levees/dikes.
(continued from 1986)

C. FLOODWAY RESTRICTIVE COVENANTS

The USACE Real Estate Division regularly contracts with property owners in the floodplain to buy Flow Easements. These are areas along the riverway that the owner deeds over to the USACE (for a fee) to allow periodic flooding. The USACE real estate Division also regularly leases land it owns on the river side of its structural protection projects to local tenants for certain prescribed uses. The hazard mitigation survey team or IHMT should review/evaluate this information for possible expansion/restriction of these programs with regard for future mitigation efforts.

Recommendation 3: FEMA should investigate and evaluate the USACE leased lands and flow easement policies for future hazard mitigation opportunities.

D. HAZARDOUS MATERIALS

According to existing St. Charles County code, new propane tank leases require that the tanks to be tied down. However, preexisting tanks are grandfathered, and are not required to be secured. Floating tanks are potential floating bombs - the large quantities of debris that exist in floodwater heightens the possibility of puncture and explosion. This hazard is an unnecessary and repetitive risk to life and the environment.

Recommendation 4: Require all water, fuel, propane/oil/chemical storage tanks to be adequately tied down and marked through a state-wide ordinance or code revision. (continued from 1986 report)

E. HOUSEHOLD HAZARDOUS WASTES

In Times Beach, MO, there were findings of asbestos, oil and other household hazardous wastes within individual homes. In cleaning up from a disaster, typically, all household debris is binned together. The county is required to separate hazardous and non-hazardous materials before using the landfill dumps. This is a costly procedure. Homeowners need to be advised to separate their hazardous materials from the rest of their household debris.

Recommendation 5: The County should investigate if there are any household/solid waste disaster recovery programs available, and prepare public awareness information with regard to local conditions on the proper disposal of household hazardous waste following flooding.

F. REBUILDING - DETERMINING LOCAL PROPERTY VALUES

Federal agencies should use the same baselines when determining fair market values for an area. Local county assessors data for the area affected would be a reasonable place to start this process. Everyone should be using the same base-line data to generate damage assessment, determining extent of damage (i.e. > 50%) and disaster assistance needs (i.e. IFG, Temp. Housing, SBA...)

SBA should consider requiring all applicants to obtain all necessary federal, state, and local permits, before any federal or state agency assistance funds are disbursed (grant and loans). This would help to accomplish two missions. The first is further enforcement of NFIP regulations by ensuring proper permitting. Second, is the mission of FEMA to assist disaster victims with their immediate needs while focusing on the necessity to administer flood plain management and working in conjunction with local enforcement authorities to the same end: i.e., helping the disaster victim return to a normal life as soon as possible.

G. REBUILDING - PUBLIC AWARENESS

General information on rebuilding and hiring contractors is given to applicants at the FEMA Disaster Assistance Centers (DAC), but local laws and restrictions are only known by local officials. Making sure all applicants and affected persons are informed about rebuilding guidelines is important. People who register by telephone, and those who do not apply in person, do not have access to the FEMA and local materials on rebuilding that should be available at the DAC.

Recommendation 7: Local permit officials should distribute permit information and reconstruction guidelines at FEMA Disaster Information Centers (DAC) and take the lead in developing news releases on permit issues and rebuilding guidelines (how to obtain information, when and if, who to call).

H. REBUILDING - MINIMIZATION MEASURES

The FEMA Individual & Family Grant (IFG) Minimization Program enables eligible applicants to elevate or relocate damaged utilities out of the flooded area, rather than returning them to their pre-disaster position. This program has proved effective in cases where there is repetitive low level flooding. These measures can be used by anyone, at their own expense, or through a community wide HMGP project, to ensure against loss before the next disaster occurs. Public awareness of these measures can increase the protection of the homeowner's awareness of the need to protect utilities. Often, the utility companies will participate in this effort.

Recommendation 8: The State should ensure that information on utility protection measures is made available to the public.

I. REBUILDING - FLOOD AUDIT FINDINGS

The USACE conducted a Flood Audit for individual structures in the West Wood and Alton Lakes Estates subdivisions. They recorded flood heights and damage for

individual structures. This information is valuable when programs such as the Minimization program is implemented.

Recommendation 9: As information becomes available from USACE Flood Audits, it should be publicized for use by individual homeowners, the minimization program, and to identify potential HMGP projects.

J. FLOODPLAIN MANAGEMENT/NFIP

St. Charles County elected to adopt FEMA Density Floodway Regulations (DFR) as part of their disaster recovery program. The County had to develop a set of administrative procedure to record, monitor and maintain parcel ownership records, floodplain development permits, and elevation/floodproofing certificates for future development determinations, compliance actions or buy-out programs. The County system tracks development as of December 15, 1992. These are all compliance matters under the DFR program, and a Community Assistance Visit is scheduled for May 1994, to assess the County's progress in all aspects of floodplain management.

The FEMA/NFIP Section 1362 Acquisition Program is a limited pool of funds available nationwide on a first come first serve basis. The FEMA Community Rating System (CRS) program rewards communities with lower premium costs for actions that are above minimum NFIP regulations. The County expressed interest in participation in both programs and was referred by the IHMT to FEMA/FIA for further information. If there is sufficient interest by the county in pursuing these options, the program criteria would have to be added to the County's administrative procedures.

Recommendation 10: St. Charles County to evaluate participation in FEMA's 1362 and CRS programs, and determine if SBA loans can be restricted to follow currently issued building permits.

K. STATE HAZARD MITIGATION PROGRAMS

The State lacks effective floodplain management legislation. The state seeks to update the Governor's Executive Order 81-12 and all regulations for state floodplain management and has identified funding to be available under CAP-SSSE in FY94. This item is continued from 1986. Along with legislation, the State has identified that they need to update their 409 Hazard Mitigation Plan to identify and priorities statewide mitigation efforts for all types of disasters that affect this state. They have also identified the need for further training of state and local officials in hazard mitigation and for local officials to form their own hazard mitigation teams and write their own hazard mitigation plans. SEMA wants to require the attendance at FEMA and State floodplain management seminars by county EMAs. FEMA can provide technical assistance to the state for these tasks. The State can provide technical assistance to the local levels.

Recommendation 11: The State and FEMA's resources should be utilized to strengthen its hazard mitigation programs.

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NATIONAL FLOOD INSURANCE PROGRAM (NFIP) REQUIREMENTS FOR
SUBSTANTIALLY DAMAGED BUILDINGS IN FLOODWAYS

A floodway is designated within the floodplain of a river or stream to maintain the flood-carrying capacity of the floodplain. The floodway is defined as the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height (usually one foot). Floodways are delineated on the Flood Insurance Rate Map (FIRM) or on a separate Flood Boundary and Floodway Map (FBFM). Because of the need to protect upstream properties from damages due to increased flood heights, special requirements apply in floodways. NFIP criteria at 44 CFR 60.3(d)(3) require the community to prohibit all development within the floodway that would cause any increase in flood heights.

The substantial damage requirements of the NFIP are particularly important when considering mitigation measures in a floodway. At a minimum, in riverine A Zones, a structure which has been substantially damaged (whereby the cost of restoring the structure equals or exceeds 50% of its pre-damaged value or "replacement cost") must be elevated so that the top of the lowest floor (including basement) is at or above the Base Flood Elevation (BFE).

The allowable mitigation measures under the NFIP for substantially damaged residential structures are elevation in place to or above the BFE or relocation or demolition of the structure. Relocation out of the floodway or demolition are preferred mitigation alternatives for structures in floodways since they remove buildings from what are generally hazardous areas and reduce obstructions to flood flows. The elevation may be accomplished through use of fill, elevated foundation walls, piers, piles or columns. Elevating an existing building within its foundation footprint will not increase flood heights. However, elevating that same building on fill, changing its orientation or location, or adding an addition can and usually will increase flood heights and must be evaluated through hydrologic and hydraulic analyses to ensure that the requirements of 44 CFR 60.3(d)(3) are met.

Similar to residential structures, this provision applies to manufactured homes which have been substantially damaged as a result of a flood. This provision apply⁽¹⁶⁵⁾ equally to a manufactured home on a lot outside of a manufactured park or subdivision or in an existing manufactured home park or subdivision. *expansion to pk or subdiv*

Residential structures elevated on extended foundations walls with enclosed areas below the lowest floor must have openings to allow for free flow of water to prevent flood damages. The enclosures must be solely used for parking of vehicles, building access or storage. All structural and non-structural building materials below the lowest floor must be unfinished and resistant to flood damage. Mechanical, electrical, or plumbing equipment

must be either elevated to or above the base flood elevation or floodproofed to that elevation. While floodproofing is not an allowable mitigation alternative for residential structures which have been substantially damaged, nonresidential structures may be floodproofed (made watertight) to the BFE in lieu of elevation.

There are also rivers and other watercourses for which FEMA has provided the community with floodplain delineations and base flood elevation data, but has not provided sufficient information to designate a floodway. For these floodplains the community must prohibit encroachments unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community [44 CFR 60.3(c)(10)]. Again, elevating an existing structure within its current exact footprint will not increase flood heights. Other mitigation measures that could obstruct flood flows will require a hydrologic and hydraulic analysis.

Local floodplain management ordinances, building codes, and other State and local land use regulations may affect the selection of the particular mitigation measure. In some instances, community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards, such as freeboard, limitations on the types of foundations permitted, or requiring full compliance with floodplain management regulations when repairs are less than 50% of a building's value. Consequently, any floodplain management regulations adopted by a State or community which are more restrictive than the criteria set forth in the NFIP Regulations are encouraged and shall take precedence.

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INTERAGENCY HAZARD MITIGATION TEAM REPORT WISCONSIN



Abutment Failure - Rock Dam, Clark County

FEMA 994 DR -WI
JULY 23, 1993

Storms and Flood Events during June and early July 1993
Affecting the counties of

Adams, Buffalo, Calumet, Chippewa, Clark, Columbia, Crawford,
Dane, Dodge, Dunn, Eau Claire, Fond du Lac, Grant, Green, Green
Lake, Iowa, Jackson, Jefferson, Juneau, Kenosha, La Crosse,
Lafayette, Lincoln, Marathon, Marquette, Milwaukee, Outagamie,
Pepin, Pierce, Portage, Price, Racine, Rock, Rusk, Sauk, St.
Croix, Trempealeau, Vernon, Waupaca, Waushara, Winnebago, and
Wood

8/6/93

Guide for Building Officials
for Post-Disaster Repair and Reconstruction

**Federal Emergency Management Agency
Natural and Technological Hazards Division
175 West Jackson Boulevard, 4th Floor
Chicago, Illinois 60604-2698
(312) 408-5532**

Introduction

This guide is for use by building officials to assist in the process of rebuilding after a disaster. Ideas and information are based on the experiences of building officials that have recently been involved in recovery and rebuilding after major disasters.

This guide provides suggestions so that building officials may establish and carry out a plan of action for the following four repair and rebuilding processes:

1. Assessment of Damaged Buildings
2. Permit Issuing Procedures
3. Need for Additional Building Department Staff and Resources
4. On-Going Building Inspections and Code Enforcement

Additional suggestions are also provided on page 8 under Other Suggestions.

This guide makes reference to additional guidance materials for building officials on National Flood Insurance Program (NFIP) and disaster-related issues. These additional guidance materials are available from the FEMA Regional Office contacts listed on the cover of this guide.

1. Assessment of Damaged Buildings

This assessment is needed to identify the extent of building damage within the community in order to plan for obtaining additional resources and to determine the scope of the rebuilding effort. Following is a list of elements to be considered in the assessment.

- Establishing a temporary community-approved moratorium on the issuance of permits will allow the Building Official to complete the damage assessment; get the additional building department staff and other resources that will be needed for permit review and on-going inspections of repairs and rebuilding; and bring in engineering expertise to deal with structural engineering problems.
- Determine the number of damaged buildings and the approximate amount of damage for each damaged building.
- The attached sample *Damage Assessment Field Work Sheet* and its instructions give specific structural damage categories to look for in the field. Guidance for identifying which of 3 general damage categories each building falls into (minor; major; destroyed). This information will be needed when doing research before issuing permits; to determine the need for additional building officials; and for other purposes during the rebuilding process.
- Information on the field work sheet regarding utilities may be needed in working with utility companies so that they do not restore power to buildings where it is unsafe to do so. Residents will want their power restored as soon as possible and may underestimate the amount of their damage because they are anxious to clean up and repair.
- For buildings that have major damage, building officials will need structural engineering assistance to determine if the building is structurally sound. If the building is not structurally sound it should be clearly marked as being unsafe.
- The damage categories identified during this damage assessment are general. In order to determine if the substantial damage rule (explained in additional guidance materials available from the FEMA Regional Office) applies to a damaged building, a detailed listing of labor and materials costs for all necessary repairs must be provided by the contractor (or homeowner) and verified by the Building Official. In most instances, cost estimates should include structural engineering input.

- The flood hazard zone and flood elevation information on the field work sheets will help in issuing permits for those buildings that must meet the substantial damage requirements.

2. Permit Issuing Procedures

In order to prepare for the submission of permit applications during the rebuilding effort, a number of issues need to be considered.

- The moratorium on issuing permits should be only temporary-- a 30 to 60 day moratorium may be necessary as an emergency measure.
- Repairs done with temporary materials (such as tarps or plastic sheeting) generally do not require a permit.
- Expedite permits for minor (non-structural) repairs, such as windows, as soon as possible for those buildings with minor damage.
- Emergency and critical facilities (hospitals, water and power plants, fire stations) must be exempt from the moratorium.
- Establish conditions for declaring hazardous damaged buildings as a public nuisance--this may require an emergency ordinance. Structural engineering assistance may be needed to determinate if damaged buildings unrepairable and may need to be demolished.
- Building Official should require detailed labor and materials cost breakdown for all repair and rebuilding costs from contractors (or homeowners) so that the Building Official will be able to determine if the substantial damage rule applies.
- To be consistent and equitable in determining if the substantial damage rule applies to damaged buildings, use published methods of costing such as Marshall and Swift, Inc. *Real Estate Repair and Remodel Cost Guide*, Dodge *Repair and Remodel Cost Book*, and Means *Residential Cost Data*.
- Labor and materials costs for permit applications must be carefully and thoroughly verified by the Building Official before each permit is issued. In most cases this will require a site visit to determine if all appropriate costs have been included in the submitted cost figures.
- Require the contractor applying for a permit to show a contract signed by the building's owner and the contractor, and covering all work specified in the permit application. This will reduce fraud.

- For a building was covered by flood insurance, the flood insurance claims information may be extremely valuable to the Building Official, but this claims information may not be available in a timely manner and therefore building officials cannot rely on flood claims information.
- If permit fees are reduced or waived, this will be lost revenue to the community. Income from permits can be used to partially offset community's flood-related and rebuilding-related expenses. On the other hand, some communities may wish to reduce or waive permit fees as a goodwill gesture during the rebuilding process.

3. Need for Additional Building Department Staff and Resources

The assessment of damaged buildings will help to determine the extent of additional staffing and office-related resources that may be need during the rebuilding effort.

- Additional building officials will be needed in most communities to ensure that all damaged buildings will be rebuilt in a safe manner and in compliance with applicable ordinances and codes. The building department will also be needed to determine if damaged buildings are safe to occupy.
- The need for additional building officials can be determined by reviewing the damage assessment field work sheets, and will be based on the number and extent of damaged buildings. Use the guideline that a Building Official can reasonable inspect 15 to 20 buildings each day.
- FEMA, under the Public Assistance program generally approves the salary expenses associated with a community's demonstrated need for additional building officials in a Presidentially declared disaster area. A Damage Survey Report (DSR-FEMA Form 90-91, Feb. 91) must be completed and submitted.
- Contact state building code office, your model code office, the Illinois Department of Professional Regulation and other unaffected communities in your area for names and addresses of building officials and other appropriate building department staff who are available to assist your community.
- The substantial damage rule cannot be waived because a community is overwhelmed by the volume of repair and rebuilding to be done after the flood.
- It is essential that all building officials and building department staff understand the substantial damage requirements.
- Communities may need to hire structural engineering expertise to determine the structural safety of buildings. Homeowners or contractors may need an engineer or architect to determine how rebuilding can best be done for buildings with major damage.
- Depending on the number and severity of damaged buildings and the number of buildings that may need to meet the substantial damage rule, additional office space and phone lines may be needed to accommodate permit applicants and additional building department staff.

4. On-Going Building Inspections and Code Enforcement

The rebuilding process will involve continued inspections to review that work is being carried out as stated on the permit. Following are issues to consider in this process.

- The damaged areas will need to be regularly patrolled by the building department to limit the amount of repair and reconstruction work that is proceeding without appropriate permits.
- The contractor (or homeowner) is responsible for informing the Building Official of changes in the cost of repairs or the amount of work being done to the building. The Building Official must make this clear by periodically inspecting all damaged building sites.
- Buildings that are habitable; not habitable but repairable; and not habitable and need to be demolished should be clearly marked so the markings can be seen from the street during the on-going inspection process.

5. Other Suggestions

- Create a Reconstruction Task Force, with public and private sector membership, to advise local elected officials and legal counsel on safety, reconstruction, repair, and public health issues.
- Work with public health officials to disseminate important health and safety and clean-up information to residents for any areas that were touched by floodwaters.
- Establish restricted access to damaged areas. Allowing contractors into damaged areas only if they have the approval of the building department will reduce fraud.
- Accurate maps of the community will be needed by building officials and engineers or architects who do not know their way around.
- Establish curfews.

POST FLOOD RECOVERY

MISSISSIPPI BASIN

AUG. 30-31, 1993

**PHOTOCOPY
PRESERVATION**

Membership Categories

STATE—Representatives of state or territorial government within the United States who are responsible for or interested in state floodplain management programs and/or coordinating National Flood Insurance Program activities in their states.

ASSOCIATE—Those persons who do not meet the above requirements but have an interest in floodplain management.

AGENCY—Local, state, regional or federal government agencies or nonprofit organizations responsible for floodplain management programs and/or coordination of National Flood Insurance Program activities or interested in floodplain management or flood damage reduction programs.

STUDENT—Any full-time student with an interest in floodplain management, hazard mitigation, or flood damage reduction programs.

SUBSCRIPTION—This is a nonmember/nonvoting category for any person or institution interested in information about floodplain management.

CORPORATE—Any private firm or corporation with an interest in floodplain management, hazard mitigation, or the National Flood Insurance Program.

CHAPTER—Any official state group that has been recognized as a chapter by the ASFPM Board of Directors.

See insert for fee structure and application.

For more information, contact:

Larry A. Larson

Executive Director

Association of State Floodplain Managers

P.O. Box 2051

Madison, Wisconsin 53701-2051

(608) 266-1926

Association of State Floodplain Managers
P.O. Box 2051
Madison, Wisconsin 53701-2051



**Association
of
State
Floodplain
Managers**

About the ASFPM

The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning and recovery. The group has become a respected voice in floodplain management practice and policy in the United States because it represents the flood hazard specialists of local, state and federal government, the research community, the insurance industry, and the fields of engineering, hydrologic forecasting, emergency response, water resources, and others.

Goals

The ASFPM supports comprehensive nonstructural and structural management of the nation's floodplains and related water resources. The ASFPM believes that, through coordinated, well-informed efforts, the public and private sectors can:

- *reduce loss of human life and property damage resulting from flooding,*
- *preserve the natural and cultural values of floodplains, and*
- *avoid actions that exacerbate flooding.*

To help reach these goals, the ASFPM fosters communication among those responsible for flood hazard activities, provides technical advice to governments and other entities about proposed actions or policies that will affect flood hazards, and encourages flood hazard research, education and training.



Conferences and Workshops

The annual meeting of the ASFPM has become the principal vehicle by which flood hazard management professionals throughout the nation meet to share information and ideas. Each year the program focuses on a particular issue or issues critical to improving floodplain management. The papers presented at the meeting are published in an annual proceedings volume.

The ASFPM also sponsors regional and/or specialized workshops on such topics as high-risk flooding, flood problems in arid regions, hazard mitigation planning, coastal floods, and multi-objective greenways.

Publications

The ASFPM publishes a monthly newsletter, the proceedings of its annual meeting, a series of technical papers, and other specialized reports.

Technical Expertise

The ASFPM provides national representation for state and local governments on matters of floodplain management practice. This perspective, coupled with the group's diverse technical expertise, enables the ASFPM to provide valuable input on the broad range of public and private activities that affect the nation's floodplains.

The ASFPM comments on proposed federal policies and regulations and presents testimony on federal legislation that will affect flood loss reduction programs.

ASFPM representatives sit on the technical advisory panels of flood-related research projects and of numerous governmental programs dealing with flood hazards.

The ASFPM maintains a network of communication and cooperation with agencies at every level of government and with the numerous other public and private organizations whose activities affect some aspect of flood hazard management.

Training and Education

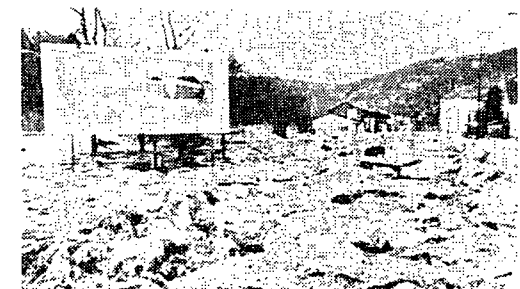
The ASFPM helps develop training programs for state and local personnel, provides technical assistance to local governments, and provides flood hazard mitigation information for meetings and workshops on request. The ASFPM both conducts and sponsors applied research on the technical and management questions that must be answered before the nation's floodplains can be managed with complete effectiveness. To encourage in-depth interest in flood problems, the ASFPM awards annual grants from its Flood Hazard Fellowship Fund.

Membership Benefits

Members are placed on the ASFPM mailing list to receive the *News & Views* and *Insider* newsletters, membership directory, announcements of special events, and additional information. Members are eligible for reduced registration fees at conferences and workshops and discounts on publications. Committees of the ASFPM are open to all members. Regional and chapter subdivisions provide opportunities for closer member interaction and representation in ASFPM decision making.

Additional Information

A sample issue of *News & Views*, a list of publications, the ASFPM floodplain management policy statement, and other additional information are available on request from the Executive Director's office.





ASSOCIATION OF STATE FLOODPLAIN MANAGERS

P.O. Box 2051
Madison, WI 53701-2051

APPLICATION FOR MEMBERSHIP

NAME _____

EMPLOYER _____

ADDRESS _____

CITY/STATE _____ ZIP _____

DAY PHONE (_____) _____ Ext. _____ FAX # (_____) _____

AFFILIATION: Local Gov't _____ State Gov't _____ Fed Gov't _____ Private _____
Academia _____ Other _____

NATURE OF DUTIES: Engineering _____ Planning _____ Administration _____
Environmental _____ Insurance _____ Other _____

Membership Class Applied For:

- ___ Individual Membership \$35
- ___ Subscription Only \$35
- ___ Student (Full Time) \$10
- ___ AGENCY SPONSORSHIP \$100
- ___ CORPORATE SPONSORSHIP
- ___ 10 or under employees \$100
- ___ 11-99 employees \$200
- ___ 100 + employees \$400

I am interested in these committees:

- S = Serve R = Get Reports
(please do not mark more than three)
- S ___ R ___ Flood Mitigation Issues
 - S ___ R ___ Coastal Issues
 - S ___ R ___ Flood Insurance
 - S ___ R ___ Arid Regions
 - S ___ R ___ Floodproofing/Retrofitting
 - S ___ R ___ Mapping & Engineering Standards
 - S ___ R ___ Floodplain Regulations
 - S ___ R ___ Urban Stormwater Management
 - S ___ R ___ Research
 - S ___ R ___ Professional Development
 - S ___ R ___ Public Education

I am also interested in the following areas of concern:

- ___ Litigation/Legal Issues
- ___ Flood Warning & Response
- ___ International Interchange
- ___ Multi-Objective River Corridor Management
- ___ Flood Data
- ___ Wetland Issues
- ___ Dam Safety
- ___ Structural Flood Control
- ___ OTHER _____

Circle one: NEW RENEWAL Auth. Signature _____

YES!! ___ Please send me my
ASFP lapel pin now!
Actual size.
Add'l \$5.00 enclosed.



FLOOD HAZARD FELLOWSHIP FUND

- ___ Send me information on the Fund
- ___ Donation to the Fund enclosed \$ _____
- ___ Please send me a receipt for tax purposes

QUESTIONS? Please call Diane Watson at (608) 249-0649

ENCLOSE YOUR CHECK MADE PAYABLE TO ASFP AND SEND TO ADDRESS ABOVE.

Department of the Army
U.S. Army Corps of Engineers--Civil Works
Tabulation of Levees

8/12/93

Category	LMS		LMM		NCS		NCR		MRK		MRO		Total	
	Damaged	Total	Damaged	Total	Damaged	Total	Damaged	Total	Damaged	Total	Damaged	Total	Damaged	Total
Fed Constructed/Fed Maintained	0	0	0	3	0	0	3	8	0	3	0	1	3	15
Fed Constructed/Local Maintain	12	42	0	0	1	32	9	65	6	45	8	30	36	214
Total Federal	12	42	0	3	1	32	12	73	6	48	8	31	39	229
Non-Fed/Local Maintain & Eligible	20	27	0	0	2	83	6	22	110	110	26	26	164	268
Non-Fed not Eligible (See Note 3)	19	20	0	2	0	10	13	163	700	700	147	184	879	1079
Total non-Federal	39	47	0	2	2	93	19	185	810	810	173	210	1043	1347
Total	51	89	0	5	3	125	31	258	816	858	181	241	1082	1576

Notes:

1. "Damaged" levees include those that have breached or were overtopped. There may be additional levees that were not breached or overtopped that were damaged. These will require damage surveys to identify.

2. "Non-Fed/Local Maintain & Eligible" levees in the impacted area (within counties declared a disaster area) that were included in the districts' lists of levees that met the requirements for assistance under PL 84-99.

3. "Non-Fed not Eligible" levees include: a). those levees that were determined to be ineligible for assistance under PL 84-99, and b). those levees for which no application was submitted. The numbers are almost certainly incomplete (the actual total may be over 2000). Most are privately owned agricultural levees. Some of these levees may be eligible for assistance from the Department of Agriculture, Soil Conservation Service.

4. Current rough estimate of the total length of non-federal eligible levees is 1800 miles and the length of non-federal ineligible levees is 4000 miles.



POST FLOOD RECOVERY MEETING

* Aug. 30-31, 1993 *

PRE-REGISTERED ATTENDEES

EXECUTIVE OFFICE of the PRESIDENT
White House Brian Burke
Domestic Policy
OMB - Water Bruce Long
Resources Branch
Office of Sci- Dr. Mark Schaefer
ence & Technology Policy

CONGRESSIONAL STAFF
House Public Works & Trans.Comm.
 Ben Grumbles
 Scott Slesinger
 Jack Wells
 Charlie Ziegler

Library of Congress
Congr.Research Steve Hughes
Service

ECONOMIC DEVELOPMENT ADM.

Reg. 8 Steve Brennan
 Reg. 5 Ed Jeep

OTHERS

Nat.Haz.Ctr. Mary Fran Myers

Researcher Elliott Mittler

IAFSM French Wetmore
 Bradley Brink

Mitigation Clancy Philipsborn (*)
 Assistance Corp.

Wash.Univ.,MO Daniel Mandelkar

ASFPM Doug Plasencia, Chair
 Karen Kabbes, '94 Conf
 Program Chair

Amer.Rivers Scott Faber

Midwest Rivers Christopher Brescia
 Coalition

Coal.to Restore G. Paul Kemp
 Coastal Louis.

NAPA DeWitt John

City of Tulsa Jack Page
 Ann Patton
 Carol Williams

City St.Louis _____

McKnight Found. Dan Ray

Council of State Michael McCabe
 Gov'ts

Univ.MO.,St.Louis _____

Nat'l Wildlife David Conrad
 Federation

Friends of Earth Brent Blackwelder

Envlr.Consultant David Gaffney

QuadCity Conser- Mark Beorkrem
 vation Alliance

Plan.Consultant Ron Flanagan



POST FLOOD RECOVERY MEETING
*** Aug. 30-31, 1993 ***

PRE-REGISTERED ATTENDEES

STATES

FLOODPLAIN MANAGERS

Illinois Dennis Kennedy
David Boyce

Iowa Jack Riessen

Kansas Kerry Wedel
Don Kostecki

Minnesota Joe Gibson

Missouri Dick Gaffney

Nebraska Brian Dunnigan

South Dakota Darrell Dvorak

Wisconsin Larry Larson

EMERGENCY MANAGERS

Iowa Jerry Ostendorf
John Cavanagh
Chris Finch

Kansas James Alexander
Missouri Dale Schmutzler
Susan Case

South Dakota Darrell Dvorak

Wisconsin Margie Weigle

DAM SAFETY

Iowa Jack Riessen

Wisconsin Sue Josheff

WETLANDS

Jon Kusler, Ex.Dir.

Iowa Jack Riessen

Missouri Reggie Bennett

Wisconsin Scott Hausman

FEDS

CORPS

HQ

Maj.Gen. Genega
Ed Hecker
Dr. Robert Stearns
Dan Spellman
Dean Caldwell

Missouri

FEMA

DAP

DAP

Emer.Mgt.Spec.

FIA

FIA

Congr.Relations

Reg. 5

"

Reg. 7

"

"

"

Reg. 8

Larry Zensinger
Karen Helbrecht
Diana Paschke
Cecelia Rosenberg
John Gambel
Maria Vorel
Norb Schwartz
Eric Berman
Jodi Broida
Marlee Carroll
Ron McCabe
John LaTourelle
Virginia Motoyama

DEPT. OF INTERIOR

Fish & Wildlife

" " D.C.

" " IL

" " MO

" " MO

" " MN

Russ Earnest
Michelle Altemus
Rick Nelson
Jerry Brabander
Jim Milligan
Ed Crozier

Nat'l Park Serv.

" NE

Dan Meyer
Angeles Tornes

U.S. DEPT. OF AGRICULTURE

Tom Wehri

N.O.A.A.

Policy Analyst

Dave Jansen

EPA

Susan Hamilton
Cory Giacobbe
Claire Rubin

Congress

State - local - Fed'l partnership in comprehensive floodpl. management.

Particularly, data collection and distribution; and coordination. Help to identify those communities which are most suitable for alternatives.

1:30-3:00 Fed'l Agency Overview

FEMA - Major Flood in St. Louis in 1973.

① - what objective

② - what outreach

③ - what techniques

④ - what resources

① FEMA's goal is to let people know about the alternative and to then get the options to them. ② W/R/T substantial improvement issue (65% damage or more have to be elevated), FEMA will hold the line. (Nothing has come from the WH). ③ Funds available under this program will be available for elevation. This is for states' priority.

② Outreach. getting the word out to communities. Nobody has been talking about available resources, what vehicles

③ Technical expertise - FEMA will make their people available and suggests that others be made available.

④ 45 million available in a state region. HUD has 200 million. (It is questionable how that \$ is used). Larry's goal is to

present so many requirements, that we do not have enough money to do it all. More interest in relocation and other money will be made available.

430

- This disaster involved more countries than any other disaster.
- It will probably cost just a bit less than Andrew.
- 94,000 housing applications from the 9 states (close to 100,000 people).
- 900 million in FEMA funds already, alone.
- This is going to be very expensive. What can we do about relocation and repair of public facilities.
- ⊗ - Problem will not be solved immediately. The mitigation will come gradually.

ARMY CORP

P.L. 84-99, authorizing law

- Largest program ever funded by the Corp.
- Coordinated fed'l agency response. This is a true commitment. The next step in making this work is better integrating the local and state equivalents to assure ① outreach, ② technical expertise, ③ and satisfying the objectives.

SCS / USDA

Short term vs. Long term

- Sec. Esby has the long-term objective/charge.
- FEMA has the ~~long-term~~ short-term.

c3) basin-wide approach? yes, that is part of the long-term, and it should be local/state led.

c4) before FEMA established floodways, levees were built on the riverbank, (no storage) levees overtopped w/ considerable damage. This was a man-made catastrophe.

⊗ Fed'l task forces will not listen to the state, if they take the lead. (But, we are here so that that is not the case)

- We don't have the luxury to stop the process and hold him.

⊗ - 1st time the DFO offices have attempted interagency coordination in this way

- FEMA insurance coverage assessment. Teams w/ GPS collectors. They go through and Georeview. They do this one structure at a time. Potential substantially damaged is 2,000.

State Updates

Illinois

- All states claim they need increased warning systems.

⊗ - wide range of Fed'l agencies, ~~states~~ states etc. The Time is now, the stars are aligned

- ⑧ - outstanding collection of professionals with ^{essential} technical knowledge necessary to achieve our objectives.
Present programs and incentives. ⑨
 - extension service
 - emergency conservation program
 - emergency watershed program
 - FEMA program
 - Rural Dev has 2 programs
 - water assistance
 - insurance assistance
 - Commodity credit disaster program
- ⑩ - We need to quickly set up an outreach effort with the local and state folks, to assure that the ^{affected community knows what's available,} criteria for an alternative are met.

Comments ("C")

- C1) Grant \$ from FEMA should not be used only for repairs and relocation. This would help grant dollars to go further. HUD ~~does not have~~ has \$ which may be used otherwise / for rehab and repair. FEMA response. The \$ needs to be targeted for those people in the flood plane are taking taken care of.
- C2) What market value will be used in the calculation? pre-flood or post-~~flood~~ flood. SCS thinks it should be pre-flood.

Clancy -

- ① enthusiasm, he's correct, the stars are aligned.
- ② his example of outreach and local presence is essential, and largely available to local and state folks. "bottom-up" is the way to go.
- ③ Admin problem is a problem.
- ④ data collection is another problem.

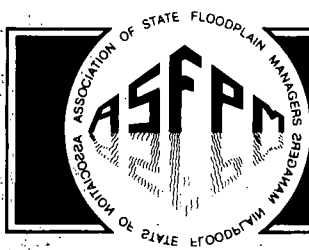
- how can we coordinate the initial response so that individuals are made aware of the options from day one. We need mechanisms for the associations, states, the administration and Congress to institutionalize the alternatives from here on in.

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NEWS & VIEWS

ASSOCIATION of STATE FLOODPLAIN MANAGERS, Inc.

August 1993

Vol. 6, No. 4

MIDWEST FLOODING RAISES HARD QUESTIONS

At press time, the Midwest floods of 1993 had chalked up \$10-12 billion in damages and 39 lost lives. It was still raining, but there was reason to think that the worst might be over. We offer here some observations about this dreadful but not unexpected event.

A Change in Attitude?

In the usual frenzy of media attention, an altered mood was noted. There seemed to be less outrage at the rains and the river and the government, and more honest probing for reasons for the severity of the event and what might be done about it. Among the hopeful signs:

- There has been a steady stream of inquiries to the Association's Executive Office from the media, requesting information on the "bigger picture" and about alternative ways of managing floods and floodprone areas;
- Federal, state, and county officials and agricultural specialists—especially in Iowa—are seriously debating the extent to which the intensive farming practices of the last 50 years contributed to the severity of the flooding; there is talk about ensuring the sustainability of the river system and agriculture;
- In a question-and-answer session (not a prepared speech), President Clinton was heard to use the term "100-year floodplain"—correctly.
- The mainstream news media have been a highly visible forum for prolonged discussions about the wisdom of levees and channelization of the Mississippi River, the effectiveness of flood insurance, the impact of lost wetlands on flood levels, and the need to reexamine policies intent on forcing the natural systems to human will.

Seize the Moment

Now is the time—when we have the attention of the public, elected officials, and those responsible for relevant private and government programs—to take action to further the acceptance, planning, and implementation of alternative approaches to flood problems. The Association has been participating in the debate in the media, taking the stance that it is time to consider ways to start giving land back to the river (see "From the Chair," next page). Enclosed in this issue you will find a copy of a letter from the Association to President Clinton, urging him, among other things, to appoint a Presidential task force to reexamine national policy for dealing with flood hazards.

At the same time, floodplain managers across the country should consider this a golden opportunity to maximize the effectiveness of their own programs and activities, and in some cases perhaps to regain strength that may have been lost in years of relative disinterest. Bids for increased staffing and funding are more likely to be successful now, as are public awareness efforts. While we lend our sympathies, expertise, and assistance to those directly involved in the aftermath of the Midwest floods, we can also move decisively on our home fronts to be sure that the "next time" is a better time.

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POST FLOOD RECOVERY IN THE MISSISSIPPI BASIN

**Sponsors: Association of State Floodplain Managers
Association of State Wetland Managers**

AGENDA

Day 1 - August 30

STATUS OF FEDERAL AND STATE MITIGATION EFFORTS

12:00 pm - 1:00 pm

Registration

1:00 pm - 1:15 pm

Welcome, Goals

Larry Larson, ASFPM Executive Director

Doug Plasencia, ASFPM Chair

Jon Kusler, ASWM Executive Director

1:15 pm - 1:30 pm

Introduction

All participants will have 20-30 seconds to identify themselves and outline what they most want from the workshop

1:30 pm - 3:00 pm

Overview and Status of Principal Federal Agency Post Disaster Mitigation Efforts

* What activities are underway?

* What programs and incentives are available to landowners and governmental units?

* What activities are under consideration?

Panel members from FEMA, Corps of Engineers and Soil Conservation Service each have 20 minutes + 10 minutes of discussion

Moderator: Doug Plasencia

3:00 pm - 3:30 pm

Break

3:30 pm - 6:00 pm

Reports from the State Post Disaster Mitigation Teams

* What is the status of efforts in each state?

* What mitigation recommendations have been made?

* Are there innovative opportunities?

* What strategies are being considered beyond FEMA's Section 404 Hazard Mitigation Grant Program?

Each state gets 20 minutes to report

Moderator: Larry Larson

6:00 pm - 8:00 pm

Dinner (on your own)

8:00 pm - 10:00 pm

White House and Congressional Update with Regard to Post Disaster Mitigation

Discussion will focus on priority opportunities for litigation.

Moderator: Jon Kusler



POST FLOOD RECOVERY IN THE MISSISSIPPI BASIN

AGENDA

Day 2 - August 31

EXAMINATION OF POST DISASTER MITIGATION OPPORTUNITIES: FUTURE DIRECTIONS

The following questions will be addressed for each of the strategies listed below:

- * What policies are in place?
- * What are the financial incentives?
- * What are the barriers to effective mitigation?
- * What opportunities exist? How might they be implemented?

8:30 am - 10:00 am

Rebuilding Private and Public Levees and Dams

Moderator: Doug Plasencia

10:00 am - 10:20 am

Break

10:20 am - 12:00 pm

"Substantial Damage" Issue, i.e. 50% damage rule

- * Floodproofing
- * Elevation on Fill

Moderator: John Gambel

12:00 pm - 1:00 pm

Lunch (on your own)

1:00 pm - 2:00 pm

Relocation of Structures Subject to Damage

Moderator: Larry Larson

2:00 pm - 3:00 pm

Restoration of Floodplains and Wetlands

Moderator: Jon Kusler

3:00 pm - 3:15 pm

Break

3:15 pm - 4:15 pm

Future Directions, Priority Opportunities

Each federal agency and state will make a brief presentation (3-4 minutes each) on what they see as priority future directions for interstate cooperation, Congressional action, White House action, etc.

Moderator: Larry Larson

4:15 pm - 4:30 pm

Concluding Remarks; Follow-up Actions
Larry Larson, ASFPM; Jon Kusler, ASWM



THE VICE PRESIDENT
WASHINGTON

August 19, 1993

Mr. Doug Plasencia
Chair
Association of State Floodplain Managers
P. O. Box 2051
Madison, Wisconsin 53701-2051

Dear Mr. Plasencia:

Thank you for your letter, cosigned by Jon Kusler of the Association of State Wetland Managers, and for your suggestions for the interagency task force to address issues associated with the devastating flooding in the Midwest. I very much appreciate your sharing this information with me.

I noted that you sent a copy of the letter to Katie McGinty at White House; as you may know, she is heading the task force effort. To ensure that your ideas are fully considered and utilized, I have taken the liberty of forwarding a copy to the head of the White House Office of Science and Technology Policy. I found your correspondence to have great merit, and I am sure we will benefit from your expertise in this area.

Once again, thank you for your assistance. I am looking forward to working with you to meet the challenges associated with this flood.

Sincerely,

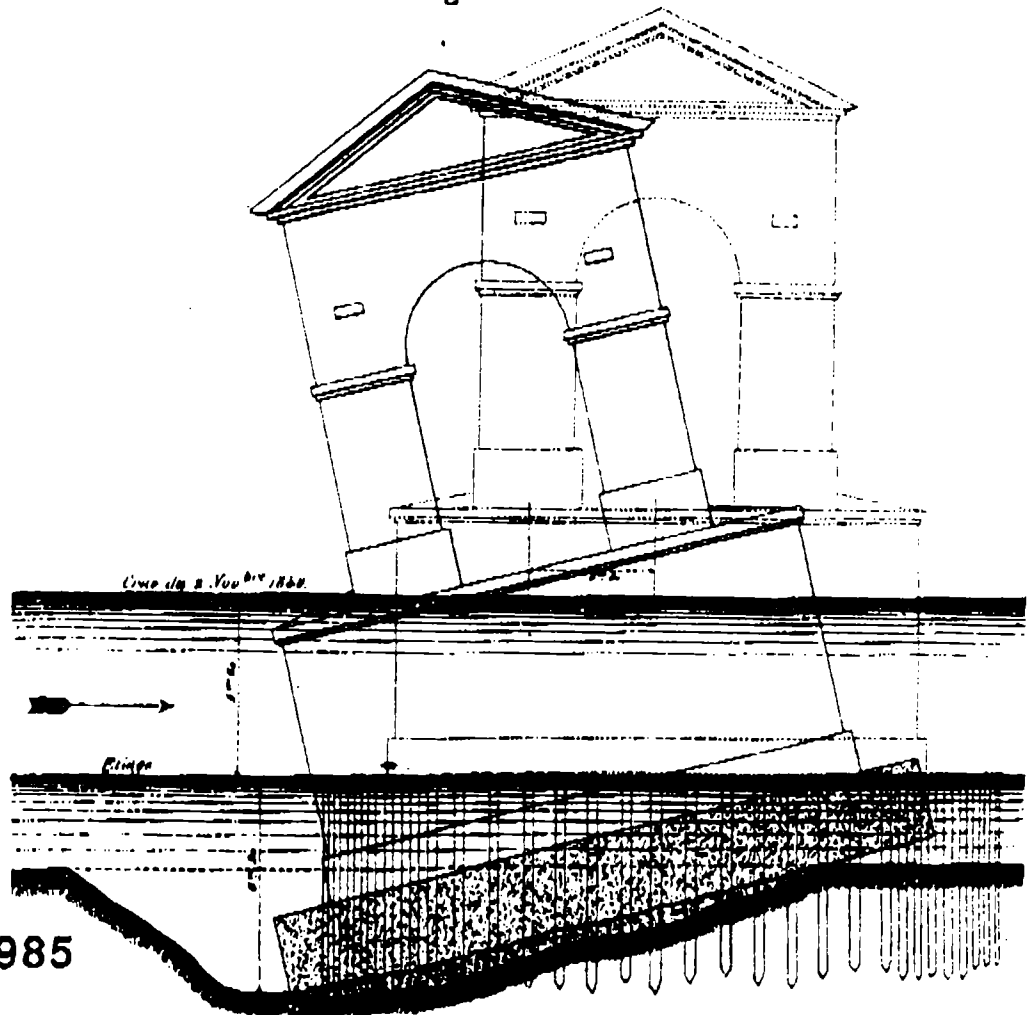
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NATURAL DISASTERS**

***POST DISASTER RESPONSE
AND
MITIGATION OF FUTURE LOSSES***

Pont de Bourg-S^tAndéol sur le Rhône.



**October 23-26, 1985
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Jon. A. Kusler (Ed.)

**American Bar Association
Special Committee on Housing and Urban Development Law**

Proceedings of an International Symposium

**Housing and Urban Development
After
Natural Disasters**

Post Disaster Response and Mitigation of Future Losses

*Miami, Florida
October 23-26, 1985*

Edited by Jon A. Kusler, Esq.

**Conducted by
The American Bar Association
Special Committee on Housing and Urban Development Law**

Sponsored by the

National Science Foundation
U.S. Agency for International Development
U.S. Federal Emergency Management Agency

In Cooperation with the

American Red Cross
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CHAPTER ONE

IMPEDIMENTS TO MITIGATION

Impediments to Mitigation

Jon Kusler, Esq.
Consultant to the American Bar Association

INTRODUCTION *

Natural disasters (including drought) kill an estimated 115,000 individuals annually and affect over 40 million (Wijkman and Timberlake, 1984). Impacts often spread geographically far beyond the disaster area and may endure for many years. Economic and political instability as well as pain and suffering may result. For example, governments in Nicaragua and Guatemala were undermined and toppled due, in part, to dissatisfaction with government responses to major earthquakes.

Traditionally national or federal government response to disasters in the United States and elsewhere has been "relief" oriented. Emphasis has been upon rescue, emergency food and water, medical care, and temporary housing.

When the disaster is large, typically all levels of government share in the response whether or not they have adopted, prior to the disaster, specific disaster legislation, plans or policies. The issue is not whether governments will respond to disasters -- they inevitably do -- but whether this response will meet disaster victims' short-term and long-term needs, whether this response will support or undermine efforts to implement broader economic and social goals, and whether this response will lead to a continuing cycle of building, disaster losses, rebuilding and repair in the same location, and more losses.

Disaster victims and governments have several choices for rebuilding and repair after a disaster:

1. Repair damaged infrastructure and structures in situ without hazard protection in which case further damage will occur with the next hazard event;
2. Repair or rebuild damaged structures incorporating hazard-resistant designs, providing partial or total protection;
3. Implement warning systems and evaluation plans to reduce loss of life and injury and movable goods;

*This introduction is based upon a literature review. See bibliography of the Chapter and articles cited in selected bibliography by Mary Ellen Voilbrecht in the Appendix of this proceedings.

4. Relocate the structures, infrastructure and hazard prone activities to less hazard prone areas; or
5. Construct hazard reduction measures such as sea walls, dams, and levees (effective only for floods, mudslides, erosion).

Despite a growing international awareness that a particular disaster event will eventually reoccur or be exceeded at a particular site, the first alternative -- repair and rebuilding without incorporation of improved building design is by far most common.

Repair without mitigation is not, in itself, a sign of poor decision-making. The costs of mitigation need to be compared with the benefits. This is not easy since costs and benefits are hard to quantify, particularly where loss of life may be involved, and long-term benefits and costs are hard to project. Decision-making is also often driven by other factors which may (arguably) be equally valid as economics -- humanitarian concern, disaster victim desires, and short-term profit or political needs.

Despite practical reasons for repair without mitigation in some contexts, incorporation of simple, cost effective damage reduction measures such as the use of materials with low damage potential are often possible but ignored.

POST-DISASTER MITIGATION IN THE U.S.

Incorporation of mitigation measures in post-disaster recovery and repair in the U.S. has taken place primarily after flood disasters. Disillusioned with escalating flood damage, despite the expenditure of over \$7 billion in federal funds alone, the U.S. Congress in 1968 adopted the National Flood Insurance Act to help "spread" flood losses and to encourage new construction and rebuilding consistent with development guidelines. In 1973 the Act was amended, in effect, to mandate flood insurance by requiring that communities enroll in the Program if they wished to qualify for disaster assistance, loans, or other types of federal assistance in the floodplain. As a result of the 1968 and 1973 Acts, 17,000 communities have adopted minimal floodplain regulations and have enrolled in the National Flood Insurance Program. Program guidelines for community programs require that communities adopt regulations for repair and expansion of existing structures when

"substantial" improvements occur. Substantial improvements are defined to include repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure either (a) before the improvement or repair started, or (b) if the structure has been damaged and is being restored, before damage occurred.

No repairs or upgrading of damaged structures are required by the regulations unless the 50% figure is exceeded. Flood insurance rates do not usually increase no matter how many times a structure is damaged.

Federal disaster insurance has not been made widely available for other disasters. However, in an attempt to mitigate future losses once a disaster occurs, Congress incorporated section 406 in the Disaster Relief Act of 1974 which makes disaster loans and grants to states and local governments for all types of disasters on the condition that recipients evaluate hazards and adopt mitigation measures.

In 1979 Congress appropriated funds to the Federal Emergency Management Agency to begin acquisition of repetitively damaged and high risk flood areas subject to the National Flood Insurance Program. Although very modestly funded, this program embodied still another to mitigate future flood losses -- acquisition and relocation.

Finally, in 1981 the Office of Management and Budget issued a memorandum to ten federal agencies to create federal flood disaster teams after federally declared disasters to survey disaster areas and make recommendations for mitigation within 15 days.

At local and state levels, some efforts have been made to incorporate mitigation measures in post-disaster response (Kusler, 1982); see also Table 1. These have principally related to flooding -- and have typically taken the form of flood and erosion control measures. However, some broader efforts have been made to mitigate future losses from earthquakes, mudflows, subsidence, and other disasters, often pursuant to broader community planning programs. Most of these have occurred only after severe disasters. The mitigation measures have also usually been applied only to destroyed or seriously damaged structures. Other structures have simply been repaired.

INTERNATIONAL EXPERIENCE

As with the U.S., there are many examples in both developed and developing nations of the construction of structural mitigation measures such as dams, levees, and sea walls constructed after major floods. For example, the Dutch and English undertook massive efforts to strengthen sea walls and levees after the floods of 1955 including the construction of a \$2 billion flood gate on the Thames. The Japanese have constructed an estimated 20,000 engineering works to reduce landslides and mudslides. The Swiss have constructed many avalanche control measures.

Efforts have also been made to implement flood warning systems in most nations.

Control of land uses in hazard areas through regulatory approaches are far less common on the international scene although flood regulations have been adopted by some communities in England and Australia. Regulations establishing minimum standards for earthquake resistant design have been adopted in Italy, Turkey, Mexico, Chile, Venezuela, and other countries although most codes apply only to large cities or major structures. Much of the rebuilding and new construction in high risk areas throughout the world makes no adjustment for hazards.

IMPEDIMENTS TO DISASTER MITIGATION

Opportunities for mitigation are created by disasters. Disasters raise public awareness. Both governments and private individuals share a common interest in reducing future loss of life, injury, and property damage. Relatively large sums of money may be available for rebuilding due to domestic appropriations and international relief. Where structures have been totally destroyed, there is opportunity to start over and "do it right" to accomplish not only hazard reduction goals but broader land planning and economic development objectives.

Why, then, is incorporation of hazard mitigation measures in reconstruction so rare in both developed and developing nations?

-- Media attention and mitigation efforts focus almost exclusively on destroyed or seriously damaged structures. Total destruction or serious damage to more than 10-20% of affected structures is uncommon in even the most severe floods, hurricanes, or earthquakes. Media and disaster attention and mitigation efforts typically focus on this small percentage -- often located near the epicenter of an earthquake; the wave zone of a hurricane; or the velocity and deep inundation zone of a river floodplain. But most of the damaged dwellings, infrastructure, and economic activities (such as agriculture) are located in other affected areas. Repair and reoccupation usually occurs without mitigation.

-- Lack of clear long-term mitigation goals or procedures. In the U.S. and internationally, only limited legislation has been adopted promoting long-term mitigation. Most legislation is relief-oriented and makes no mention of long-term reduction of future hazard losses. Clear articulation of mitigation goals in national legislation and policies is needed if the tendency to return to old ways of financing and construction are to be countered. Lack of legislation may actually limit mitigation where disaster assistance is available only for reconstruction to preexisting standards and funds cannot be used for hazard resistant design which is more expensive.

-- Inadequate standards and simple "how to do it" guidelines for building reconstruction and repair. With little exception, building codes

focus upon new construction, not the repair of existing buildings to reduce potential future losses. It is often impossible or impractical to incorporate these design alternatives or specifications desirable for new development into repair. Standards and guidelines specifically drafted for repair and reconstruction are needed.

-- Inadequate incentives to encourage incorporation of damage reduction measures in reconstruction and repair. There are few immediate financial incentives for long-term mitigation. For example, the National Flood Insurance in the U.S. offers little incentive for loss reduction in repair since insurance is usually at the same rate no matter how many times a structure is damaged. Disaster assistance in the U.S. and elsewhere also offers little incentive for long-term mitigation.

-- Inadequate dissemination of information. Disaster victims, banks, local governments, insurance companies, and others making repair and reconstruction decisions often have little knowledge of mitigation options.

-- Lack of leadership. The post disaster scene is often dominated by relief-oriented individuals and organizations such as civil defense agencies, national guards, church groups, and private organizations with little expertise or interest in long term mitigation. Natural resource and water resource agencies with some expertise in mitigation may play a role but until recently, most engineers and other experts had training only in structural hazard reduction techniques such as dams, not selective non-structural mitigation techniques such as retrofitting buildings and warning systems.

-- Inadequate engineering, architectural, hydrologic expertise after a disaster to assess hazards and formulate rebuilding mitigation options. Lack of expertise is a particularly serious problem for rural areas and developing nations.

-- Inadequate land use control mechanisms. In some states and communities in the U.S. existing buildings cannot be regulated pursuant to existing statutes and regulations which exempt or "grandfather" such structures. In developing nations, much of the development in urbanizing areas is also not subject to regulations or cannot practically be regulated due to lack of land ownership information, low literacy rates, and broadscale squatter settlements.

-- Emphasis upon relief. Both developed and developing nations and private relief organizations emphasize disaster relief. Long term repair and mitigation rarely receives much attention.

-- Critical data-gathering, planning, and decisions fail to occur in the immediate post-disaster context. Time is of the essence after a disaster if mitigation measures are to be incorporated in repair and rebuilding. Rapid and informed data-gathering planning and decision-making (within three to six weeks) are needed but rare. Prior to the establishment of post-

disaster mitigation teams in the U.S., rapid definition of mitigation options was uncommon. Even now definition of mitigation options and regulations or incentives to help implement those options are somewhat limited. As a result, too often victims return to their homes and start repair. Businesses reopen. Repair and reconstruction occurs without consideration of future losses.

-- No constituency for "mitigation" during building repair and long term recovery. Often national leaders and local groups including some disaster victims are enthusiastic about mitigation immediately after the disaster. This enthusiasm may continue for 6 months to a year. But after that, the disaster is often discounted as "not likely to happen again" and rebuilding without mitigation occurs.

-- Hazard and other information maps are lacking, inaccurate, or at too small a scale. After a disaster, detailed maps and other data of the sort needed for repair and rebuilding are often lacking. Maps are needed not only identifying the boundaries of hazard areas but the magnitude of the specific hazards (depth, velocities, erosion potential, etc.) within such areas.

-- Problems with coordination. Coordination problems in relief and recovery efforts are common in both developing and developed nations with little definition of common long term mitigation goals by participating organizations. Once the emergency is over, separate agencies, levels of government, private relief groups, and disaster victims follow different courses.

-- The possibility of a state, national, or local long term "bailout" discourages local mitigation. A study several years ago concerning innovative local floodplain management programs in the U.S. concluded that few if any communities were willing to tightly regulate new development, renovate existing development or otherwise mitigate future potential losses as long as there was a prospect of federally financed (usually 100% financing) flood control works for the area. The possibility of free long term aid and "bailout" appears to discourage local action wherever it occurs.

-- Financing without consideration of future losses. Long term rebuilding and new development in hazard areas is largely financed by development agencies, institutions, and banks with little supervision or input from disaster mitigation agencies and little expertise in mitigation. Massive losses may later incur and the debtor, individual, group, or nation may be unable to finance or find great difficulty in financing repairs.

-- Plans prepared for rebuilding after a disaster are often untimely, impractical, or politically unacceptable. Public plans prepared for rebuilding after major disasters are often only partially implemented or not implemented at all due to deficiencies:

- They are prepared six months, a year, or

more after the disaster and after much of the repair has been completed.

- They are either too grandiose and impractical or, on the other hand, lack sufficient vision.
- They are prepared without adequate local and private sector input, undermining their political acceptability.
- They are prepared without recognition of the limitations on implementation such as budgetary restrictions.
- They are not tied in with longer term growth and economic development plans and trends.

THE PAPERS WHICH FOLLOW

Speakers in this symposium were asked to make recommendations for overcoming these problems and implementing post disaster mitigation strategies. The papers have been grouped into sixteen chapters addressing various issues and approaches.

SELECTED BIBLIOGRAPHY

Selected works dealing with post-disaster response and mitigation of future losses. See Appendix for more references.

Cuny, F.C. 1983. Disasters and Development. Oxford University Press, New York.

Federal Emergency Management Agency. 1981. Flood Hazard Mitigation, Handbook of Common Procedures. Interagency Regional Hazard Mitigation Teams. Washington, DC.

Friesema, H.P., J. Caporaso, G. Goldstein, R. Lineberry, and R. McCleary. 1979. Aftermath: Communities After Natural Disasters. Sage Publications, Beverly Hills, California.

Haas, J.E., R.W. Kates, and M.J. Bowden. 1977. Reconstruction Following Disaster. MIT Press, Cambridge, Massachusetts.

Kusler, J.A. and R.H. Platt. 1982. The Law of Floodplains and Wetlands, Cases and Materials. American Bar Association, Special Committee on Housing and Urban Development, Washington, DC.

Kusler, J.A. 1982. Regulation of Flood Hazard Areas to Reduce Flood Losses (Vol 3). Special Publication 2, Institute of Behavioral Science, University of Colorado, Boulder.

Kusler, J.A. 1982. Innovation in Local Floodplain Management: Summary of Community Experiences. Special Publication 4, Institute of Behavioral Science, University of Colorado, Boulder.

Kusler, J.A. 1979. Floodplain Acquisition: Issues and Options in Strengthening Federal Policies. Prepared for the U.S. Water Resources Council. National Technical Information Service, Springfield, Virginia.

Miller, C.H. 1979. Enforcement of "Substantial Improvement" Regulations: Scituate, Massachusetts. Report prepared for Federal Insurance Administration, Washington, DC.

Minnesota Department of Natural Resources, Division of Waters. 1982. Reducing Flood Damages by Acquisition and Relocation: The Experiences of Four Minnesota Communities. Minnesota Department of Natural Resources, St. Paul.

National Science Foundation. 1980. A Report on Flood Hazard Mitigation. Washington, DC.

Petak, W.J. and A.A. Atkinson. 1981. Natural Hazard Risk Assessment and Public Policy. Springer-Verlag, New York.

Platt, R. and G.M. McMullen. 1980. Post-Flood Recovery and Hazard Mitigation: Lessons from the Massachusetts Coast. Water Resources Research Center, University of Massachusetts, Amherst.

Platt, R. 1979. Options to Improve Federal Nonstructural Response to Floods. U.S. Water Resources Council, Washington, DC.

Quantarelli, E.L. (Ed.). 1978. Disasters - Theory and Research. Sage Press.

Rabin, R.L. 1978. Dealing with disasters: some thoughts on the adequacy of the legal system. Stanford Law Review 30(2):281-298.

Rossi, P.H., J.D. Wright, E. Weber-Burdin. 1982. Natural Hazards and Public Choice: The State and Local Politics of Hazard Mitigation. Academic Press, New York.

Rubin, C.B. 1979. Natural Disaster Recovery Planning for Local Officials. Academy for Contemporary Problems, Columbus, Ohio.

Rubin, C.B. 1981. The Long Term Recovery from Natural Disasters: A Comparative Analysis of Six Local Experiences. The Academy for Contemporary Problems, The Resource Referral Service. Washington, DC.

Water Resources Council. 1981. Handbook on State and Local Acquisition of Land in Floodplains and Wetlands. U.S. Water Resources Council, Washington, DC.

White, G.F. (Ed.). 1974. Natural Hazards: Local, National, Global. Oxford University Press, New York.

Wijkman, A. and L. Timberlake. 1984. Natural Disasters: Acts of God or Acts of Man? Eastscan, International Institute for Environment and Development, London and Washington, DC.

TABLE 1

Examples of Post-Disaster Mitigation in the U.S.
- prepared by Mary Ellen Vollbrecht

Klamath, California

In 1964, severe flooding washed away all but two buildings in this northern California town. Emergency regulations prohibited all rebuilding in the floodway. Compliance with the regulation was a condition of the agreement for obtaining federal help to build a new town site.

Hilo, Hawaii

In a 20 year period, tsunamis twice caused estimated damages of over \$25 million. Following the second event, a seven month building moratorium was adopted. A relocation project was planned. 388 parcels were acquired creating a 310 acre open space zone along the shore.

Baltimore County, Maryland

The county's periodic severe flooding culminated with events causing \$85 million in damages between 1972 and 1976. In response, the county adopted zoning, subdivision regulations, and building codes stronger than those required by the federal government and began a staged acquisition program for clearing the floodplain and creating greenways for flood prone areas.

Lycoming County, Pennsylvania

This county has suffered repeated severe flooding which was particularly costly in Tropical Storm Agnes in 1972 along the more than 2200 miles of streams, including 38 miles of the Susquehanna River. The county has adopted a strong subdivision ordinance which is administered by the county for municipalities without their own ordinances. A relocation program, floodproofing education, and an extensive volunteer flood warning system make up the county's comprehensive program.

Gulf Shores, Alabama

Hurricane Frederic in 1979 damaged or destroyed 500 structures by wave action and 10-12 foot storm surges. New regulations require protection from wave heights in addition to elevation to the 100-year surge height. Some properties have also been acquired.

Avalon, New Jersey

A 1962 "nor'easter" destroyed much of this barrier island town's dune system. In addition to aggressively enforced regulations, snow fences and beach grass plantings have been used to reestablish the dunes. The entire beach front has been acquired.

Soldier's Grove, Wisconsin

A severe flood in 1978 inundated the whole town, causing \$52 million in damages. Public education began and federal funds were aggressively sought. The entire downtown has been relocated to a floodfree site. The new town was dedicated in 1982 with the floodplain converted to parkland.

Scottsdale, Arizona

In this arid region, periodic flash flooding

has caused severe flood damage. As a result, land in the 100-year floodplain was acquired for a greenbelt. Floodplain regulations require developers to prove that new construction will not increase 100-year flood heights.

Austin, Minnesota

Flash flooding in 1978 resulted in a Presidential disaster declaration. A citizens' task force was formed and federal funds were obtained for acquisition and relocation. New, strengthened regulations were adopted. Long range plans call for a river park corridor.

Dallas, Texas

This rapidly growing large city suffered repeated severe flooding in the mid 1960's. Stringent floodplain regulations were adopted, based upon large scale accurate maps. Subdivision regulations require dedication of floodplain lands. Many properties have been acquired and relocated and much of the floodplain placed in public ownership.

Galveston, Texas

By the time Hurricane Alicia hit the Texas coast with 10 foot storm surges, the Baytown Subdivision had already subsided to less than two feet above mean high tide (a result of groundwater withdrawal). Alicia destroyed most of the homes in Baytown. Using Section 1362 relocation funds, most Baytown properties have been acquired and the residents moved to upland sites.

Lake Elsinore, California

Long term lake level fluctuations caused severe recurrent damages. In 1980, over 255 properties were inundated. Interim regulations with a built in "buffer zone" and a Governor's interagency task force were the first steps in mitigation. A more restrictive permanent ordinance has been adopted. An acquisition program has acquired and relocated many flooded structures.

Scituate, Massachusetts

The blizzard and flood of 1978 devastated the seashore. Private damages alone were over \$172 million. A building moratorium was adopted, followed by more restrictive coastal construction regulations. Some structures have been acquired.

Anchorage, Alaska - Earthquake

In 1964, perhaps the strongest earthquake to strike North America in recent time destroyed 30 blocks, including nearly 1,000 dwelling units in Anchorage. Mitigation experiences were mixed. Interim building regulations and federal funds enabled relocation and structural protection from landslides in areas already slated for urban renewal.

Conclusions, Recommendations, and Research Needs

What conclusions and recommendations for strengthening future post-disaster mitigation can be gleaned from these many excellent papers and discussion? What are the research needs? To what extent do the mitigation needs of developing and developed nations differ?

OPPORTUNITIES FOR POST-DISASTER MITIGATION

Not all future hazard losses can, of course, be predicted or prevented. The costs of preparedness and mitigation must be compared with the benefits. As emphasized by speakers throughout the symposium (e.g., Speck), strong political and social pressures to return to the status quo as quickly as possible will undoubtedly continue. Mitigation must compete, in both pre- and post-disaster contexts, for scarce funds and will often lose to higher priority needs. Lack of expertise and limited dissemination of hazard information to decision-makers will be a problem for the foreseeable future. The tendency of both private and public decision-makers to quickly forget or minimize hazards and to focus upon the immediate, rather than the possible or inevitable return of a statistically low probability event, will no doubt remain.

Despite these problems, the opportunities for cost-effective and "do-able" mitigation in both developed and developing nations are increasing as the result of several factors:

- improved hazard data base and hazard evaluation techniques (e.g., Hay, Whetmore)
- increased "how to do it" information on a broad range of mitigation techniques including design of new buildings, retrofitting of existing buildings (Lash), warning systems (Wright), marking of areas, relocation (Seyffert), use of insurance as an incentive (Thomas), and conditioning of grants (Cole),
- increased awareness of the problems which have hindered or prevented mitigation in the past and approaches for overcoming those problems,
- increased motivation of governments and financial institutions (public and private) to encourage and require mitigation in both pre- and post-disaster

contexts (e.g., Speck, Platt, Gelman, Cole),

-- improved exchange of information between government agencies, researchers, educators, consultants, architects engineers, legislators and others concerning workable (and unworkable) mitigation approaches (e.g., Geis, Schram.)

KEYS TO SUCCESSFUL MITIGATION

Successful mitigation has two major requirements:

- timely knowledge on the part of those who make rebuilding and repair decisions (hazard area occupants, banks, relief organizations, builders, government agencies) about what to do, and
- sufficient short-term and long-term motivation and funding to carry out mitigation activities.

More specific suggestions for strengthening post-disaster mitigation offered by speakers and panelists include the following:

1. Establish clear goals and commitments to long-term mitigation. Long-term commitments to mitigation are needed since the tendency is to quickly rebuild and return to the status quo. (Davis, Thomas, Gelman, Hirsch, Seyffert, Popkin) Such goals should be established by legislatures, agencies and relief organizations and incorporated into legislation, regulations, executive orders, plans, deeds, plats and other legal instruments pertaining to disaster assistance grants, loans, public reconstruction activities, building permits, and long-term economic development and redevelopment programs.

Equally important, those providing leadership in a post-disaster context must be familiar with and have an incentive to follow such goals since most of the political pressures favor return to the status quo. Appointment of post disaster mitigation teams with members having sufficient power and responsibility to formulate mitigation options and to act on behalf of relief and response agencies can help counter the tendency of public and

private agencies to stress short-term relief (Eisel, Bond, Zensinger).

2. Initiate mitigation "early on". It is necessary to act quickly after a disaster to assess damages, formulate mitigation options, educate decision-makers with regard to those actions, and carry out certain implementation activities (Zensinger, Thayer). However, not all actions must be undertaken with equal speed. For example, less urgency exists for permanent relocation of structures than for repair of partially damaged structures.

3. Adopt temporary moratoria on rebuilding and repair for certain areas or structures. Often repair and reconstruction must be temporarily halted until mitigation plans are complete and necessary resources are located for implementation. Government regulations prohibiting repair, rebuilding, and reoccupation are often politically unpopular (Thayer) but necessary. Relatively detailed analyses of hazards and damaged buildings and infrastructure can permit the imposition of highly selective moratoria for specific areas or buildings which should not be rebuilt or repaired rather than a large area (Brower).

4. Map hazard zones at scales and degrees of accuracy consistent with implementation needs. Broadscale analysis of hazard zones may be sufficient in a predisaster context to guide evacuation and disaster assistance activities, especially where such broadscale delineations are used only as a presumption of future hazards. More detailed delineation of hazards is necessary for formulating mitigation options and applying particular design standards to specific structures and infrastructure. (Hay, Whetmore, Seffert, Thayer, Lash). For example, flood velocities, duration, and erosion as well as flood heights must be known if structures are to be adequately retrofitted or rebuilt with hazard protection.

Hazard information must usually be developed quickly if it is to guide repair decisions. It is particularly important to quickly collect perishable data (Mitchell).

Various approaches are available for defining hazard zones and risks within those zones including onsite surveys of damage by postdisaster teams (Zensinger, Wright, Bond), engineering studies by consultants or agencies (Hay, Kochleman), and the use of damage questionnaires (Alexander).

5. Survey damage to structures, facilities, activities. Assessment of the nature and degree of damage to structures and infrastructure is needed to guide the adoption of building moratoria and form the basis for reoccupation and repair decisions including more detailed mitigation planning for redevelopment, relocation, etc. (Brower).

In some instances such assessments must be carried out within days of the disaster since

it is often unrealistic or impossible to keep occupants of hazards areas from returning to their homes and beginning repairs within a few days of a minor hazard event and a week or two of a major disaster except for severely damaged areas.

A "triage" classification of damaged structures to guide decision-making may be helpful (Brower).

Evaluation of damage and mitigation potential often requires engineering and architectural expertise not available at the local level. In the U.S., the federal post flood disaster teams have proven particularly useful in providing such expertise and formulating mitigation options (15 days). (Zensinger, Bond, Eisel).

6. Propose and evaluate specific mitigation options. Successful mitigation requires the formulation of timely, practical and attractive mitigation options. What can be done with a specific structure to reduce vulnerability? Who will pay? how much? with what time frame? Post flood disaster mitigation teams in the U.S. have proven highly useful in suggesting options. Engineering consultants and agency staff trained in retrofitting and other mitigation approaches have played similar roles in other contexts.

Detailed analysis of not only damaged buildings but those suffering little or no damage can help guide mitigation planning for future disasters including the identification of buildings which may be used for shelter in future disasters (Lash, Pace, Ruche, et. al.)

7. Support local government initiatives in mitigation. Federal agencies, states, and private relief organizations play major roles in relief and the immediate post disaster context. But local governments are often principally responsible for long-term land use decision-making and rebuilding. State, national, and international relief efforts are often poorly coordinated with local government mitigation initiatives (Rubin, Hirsch, Popkin) and may, in fact, undermine their efforts. For example, relief efforts which facilitate immediate repair of buildings in high risk areas may undermine long-term relocation goals for a redevelopment area. The promise of long-term flood control or other subsidies by a federal government agency may undermine local government efforts to encourage or require retrofitting or relocation.

Support for local short and long-term mitigation efforts may take many forms: involvement of locals in post-disaster teams (Bond); putting locals in charge of relief and recovery (Alexander); working closely with locals to discover "what they want" (Hirsch, Seyffert); training and education (Schramm, Torrellva); financial assistance for acquisition (Strong, Thayer); demonstration projects (Godshalk); mapping hazard zones (Hay, Thayer); subsidized insurance and disaster assistance conditioned upon mitigation (Thomas, Simeon, Cook); and technical assistance (e.g., Lash, Pace, Wright).

Encourage and support for local government initiatives will do little good, however, unless the local governments themselves have some interest in mitigation and are willing to "help themselves" (Rubin). Local government initiatives to "help themselves" may include the formation of local post-disaster assessment teams (Bond), adoption of moratoria (Thayer), future planning for disasters (Berke, Seyffert, Whetmore), formation of one or more recovery teams (Brower), marking of hazard areas (Thayer), acquisition (Hirsch, Seyffert, Strong), evacuation planning (Griffiths), and building surveys (Whetmore).

8. Encourage private retrofitting of partially damaged structures. Most structures in a disaster area are partially damaged, not destroyed (Whetmore, Lash, Alexander). These are often quickly repaired with little thought of future damage.

Building surveys should be conducted quickly after a disaster to classify structures according to degree of damage and mitigation possibilities. (Whetmore, Brower, Pace, Lash). Guidebooks and training should be provided to hazard area occupants, engineers, architects, and other builders and contractors to encourage retrofitting (Lash). Financial incentives are also needed such as preferential insurance rating and disaster assistance specifically earmarked for mitigation.

9. Define disaster victim and local area needs and preferences. Earthquakes, floods, tornados, etc. cause physical damage but the extent of the "disaster" depends upon the impact of the event on people (Dyne) and their responses. The true nature of this impact and disaster victim needs and preferences in responding to various sorts of damage are unfortunately poorly understood in many disaster relief and recovery contexts. Plans are fitted to people and not vice versa. This undermines long-term mitigation efforts since long-term mitigation depends (to a considerable extent) upon the motivation of victims, not simply the desires of agencies.

More attention needs to be placed upon the "politics" of mitigation (Thayer). To insure their support for long-term mitigation, victims must be treated equitably. Government programs need to be carefully explained and reexplained (Strong). Victims should not be given false expectations with regard to disaster assistance or long-term mitigation (e.g., a dam) (Lydstadt).

They must be carefully educated and worked with in formulating mitigation strategies and options (Seyffert, Hirsch).

10. More fully involve the private sector in formulating and helping to implement long-term options. The help of private relief organizations, bankers, developers, hazard area occupants and other "private" sector groups and individuals is needed in promoting and implementing longterm mitigation. In

general, private relief organizations such as the churches and the Red Cross now focus almost exclusively upon immediate relief (Popkin). Training and education of these groups with the aim of having them shift some of their emphasis and resources to long-term mitigation could help bring the message to local governments and disaster victims as well as encourage better coordination of relief and long-term recovery.

Bankers, contractors, developers and hazard area occupants are also inadequately involved in post-disaster mitigation planning (Popkin, Godschalk) although they make most of the long-term land use decisions. Options for strengthening their roles in mitigation include their involvement on post-disaster assessment teams, the formation of redevelopment committees (Brower, Godschalk), training and education (Popkin), incorporation of mitigation conditions in grants and loans, and negotiated development (Godschalk).

11. Strengthen training and education for those making rebuilding and repair decisions. Training and education of hazard area decision-makers such as bankers, contractors, local governmental officials and hazard area occupants with regard to the nature of risks and what can be done about them are key to long-term mitigation (Schramm, Popkin, Godschalk, Geis). But such training and education is not easy since decision-makers are located throughout a region, not simply in hazard areas; turnover is large (particularly among local government officials); and decision-makers may have a low level of interest except immediately after the disaster.

Suggestions for training and education include the development and widespread dissemination of "how to do it" manuals and guidebooks on retrofitting and other mitigation technique (Lash), the use of demonstration projects (Godschalk), and marking hazard areas (Thayer).

Workshops, short courses, and special seminars also have considerable potential, particularly for members of professional organizations such as architects and engineers and bankers who deal, over a period of years, with individual projects in hazard areas (Geis), post disaster team members (Eisel), and state agency personnel who deal on a continuing basis with many local governments and hazard area occupants (Bond).

12. Formulate "visionary" mitigation plans. Visionary, multi-objective mitigation plans based upon a "future image" for a community sometimes succeed where small plans do not (Zinsinger, Hirsch, Rubin). Some of the major success stories in mitigation such as Soldier's Grove, Wisconsin; Baltimore County, Maryland; and Denver, Colorado have involved considerable "vision" and imagination. A well-conceived development and redevelopment plan for a community as a whole may tap a wide variety of funding sources (Hirsch, Seyffert), and may draw support from groups within the community.

This is not to suggest that large scale plans are always necessary or successful or that plans drafted without careful attention to specifics, funding potential, and client groups will succeed.

13. Formulate "factually sensitive" mitigation plans. Successful mitigation efforts have, with little exception, been "opportunistic" with regard to the specific factual situations. They have rarely been imposed solutions, but rather ones which arose when practical and do-able alternatives were identified for specific structures or activities (Seyffert, Hirsch, Rubin). In other words, the design and deployment of successful mitigation requires a high degree of sensitivity to specifics and often must be built upon the desire of hazard occupants to improve their own situations.

14. Attachment mitigation conditions to insurance payments, grants, loans and other forms of disaster assistance. The attachment of mitigation conditions to various forms of assistance (Gelman, Davis, Bender) is politically difficult but may be essential for long-term implementation of mitigation strategies. The conditioning of flood insurance upon adoption of local floodplain regulations in the United States has been very successful in encouraging communities to adopt floodplain regulations (Thomas, Platt). Progress had also been made in the U.S. in conditioning both flood and nonflood disaster assistance upon the preparation of disaster mitigation plans (Zensinger) and in conditioning federal activities and financial assistance for activities in the floodplain with compliance with the Floodplain Management Executive Order (Thomas). On the international scene, some grants and loans have been conditioned upon mitigation (Cook, Cole).

However, the use of conditions has not always worked, particularly where the agency attaching the conditions is not in a position to compel long-term compliance (Cook). To be successful, conditions must be carefully tailored to the mitigation objectives, the actual financial situation, the time frame, and the sponsorship. (Cook)

15. Provide financial incentives for long-term mitigation or remove disincentives. The success of the National Flood Insurance program in the U.S. promoting in 17,000 communities to adopt regulations for future development is quite phenomenal (Platt, Thomas). However, this program has been largely unsuccessful in encouraging retrofitting for partially damaged structures and has been largely unsuccessful in reducing the number of existing structures at risk (Thomas, Lash) due (at least in part) to lack of incentives in the insurance rate structure. Some landowners have apparently come to look forward to "flood insurance income" from repetitively damaged structures (Strong).

Additional financial incentives or disincentives are needed in this and other insur-

ance programs (Simeon) to encourage mitigation such as a surcharge on repetitively damaged properties. This surcharge might be waived or reduced if mitigation measures were installed.

Other financial incentives for mitigation could include allocation of a portion of disaster relief funds to mitigation (e.g. 20%), additional long-term loans and grants specifically earmarked for mitigation, favorable cost-sharing for projects involving mitigation, and favorable mortgage financing for retrofitted structures.

On the other side of the coin, financial disincentives to mitigation should also be removed or modified such as flood insurance policies which continue to pay whether or not mitigation occurs, federal "bail out" programs for flood control, and subsidies for redevelopment of floodways as well as barrier islands (Godschalk, Whilden).

16. Implement comprehensive pre-disaster preparedness and prevention measures. "An ounce of prevention is..." (Alexander, Luther, Speck, Whetmore, Seyffert, etc.). Advance mapping of hazard areas, adoption of design guidelines for structures in hazard areas, deployment of warning systems and other measures to reduce loss of life and property are most effective when implemented as part of the original construction.

It is, of course, moot to argue after a disaster that a prevention program should have been in place. But the awareness and political support generated by one disaster may permit establishment of a broader mitigation program to control new development, retrofit and reduce vulnerability to buildings and infrastructures over time as well as repair and rebuild consistent with mitigation guidelines. A disaster prevention program also can establish many of the policies, data base and organizational responsibilities which facilitate mitigation after a disaster.

17. Prepare a post-disaster redevelopment plan prior to a disaster, ready for implementation when and if a disaster occurs. "Ad hoc" attempts to mitigate future losses after a disaster have been much less successful than situations in which redevelopment plans were already in place (Rubin). The experiences of Rapid City and Soldiers Grove and other areas with prior redevelopment plans indicate their value (Hirsch, Whetmore, Seyffert). Having a plan and policies for redevelopment, deployment of warning systems, acquisition or other mitigation matters prior to a disaster can guide immediate repairs, the adoption of moratoria, and long-term rebuilding. Preparation of such a plan in the pre-disaster period is complicated by lack of staff and resources, chaos, and the inability of local officials to make complicated decisions during the stress period.

As desirable as a "pre-post disaster" development plan may be, it is difficult to gain the political support to prepare a

detailed redevelopment plan based solely upon the contingency of a future disaster. But long range, multi-objective land and water resource planning with hazard mitigation as a major component and scheduled for long-term implementation whether or not a disaster occurs can be politically acceptable (e.g., Soldiers Grove, Wisconsin).

18. Implement measures to provide long-term landowner and institutional awareness of hazards. Landowners and other decision-makers often quickly forget or ignore hazards (Thayer) unless reminded on a continuing basis. Possibilities for improving long-term awareness include putting signs in hazard areas; construction of monuments; indicating high water marks (for flooding) on trees, public buildings and telephone poles; including descriptions of hazards in deed restrictions and notations, and plat restrictions and notations; incorporation of hazard maps into zoning maps; and the conditioning of mortgages and other forms of long-term financial assistance upon the purchase of hazard insurance or other mitigation measures.

19. Incorporate hazard mitigation into long-term comprehensive and multisectoral planning. Hazard mitigation should be incorporated in long-term economic development, housing, infrastructure and other types of planning. (Luther, Berke, Brower, Bender, Gelman, Davis). In developing nations much of the development is planned and financed through such programs. Considerable engineering, architectural and other forms of expertise of the sort not typically available on an individual small project basis can be brought to bear in such planning efforts. Large scale development programs for infrastructure, economic development and housing often offer opportunities for mitigation also not available on a building by building basis.

FEMA ASSISTANCE IN A PRESIDENTIAL DISASTER DECLARATION

On November 23, 1988, the Disaster Relief and Emergency Assistance Amendments of 1988 were signed into law (Public Law 100-707.) This law amended The Disaster Relief Act of 1974 and retitled it the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Under the Stafford Act, the Governor of a State can request Federal disaster assistance through FEMA after the occurrence of a disaster. If the Governor requests Federal disaster assistance, FEMA and the State conduct a joint Preliminary Damage Assessment to determine the extent of damages and whether Federal assistance is necessary. Federal disaster assistance is intended to supplement State and local assistance, and is recommended by FEMA only if it is determined that the damages are beyond the response and recovery capabilities of the State and local governments. The attached chart outlines the process of requesting Federal disaster assistance.

The Stafford Act vests FEMA with the responsibility of coordinating the delivery of Federal disaster assistance. A Federal Coordinating Officer is appointed by the President for this purpose. The Stafford Act also authorizes a variety of FEMA disaster assistance programs, which are outlined below and are covered in the remainder of this paper. Other Federal and volunteer agencies, such as the Small Business Administration, the Farmers Home Administration, the Soil Conservation Service, the Salvation Army, and the Red Cross also provide disaster assistance.

FEMA's disaster assistance programs fall into three categories.

1. **Individual Assistance** provides assistance to individuals and families in the form of grants for immediate and necessary needs, and through minimal repair of damaged housing or other forms of temporary housing assistance.
2. **Public Assistance** provides assistance to State and local governments, Indian tribes, Alaskan native villages, and to certain private-non-profit organizations for emergency work, debris removal, and repair or reconstruction of damaged facilities.
3. **Hazard Mitigation Assistance** provides fifty percent funding for mitigation measures designed to reduce future losses to public or private property in the disaster area. Eligible applicants are State and local governments, Indian tribes, Alaskan native villages, and certain private-non-profit organizations.

HAZARD MITIGATION ASSISTANCE

Once a Presidential disaster declaration occurs, a variety of hazard mitigation programs and activities are implemented. The overriding goal of all of these programs and activities is to reduce the potential for future loss of life and property within the disaster area. The three principal mitigation programs are outlined below.

Interagency Flood Hazard Mitigation Teams: Pursuant to a 1980 Directive from the Office of Management and Budget, twelve Federal agencies signed an interagency agreement that establishes teams which convene after every flood disaster for the purpose of identifying mitigation opportunities that can be undertaken by Federal, State or local governments. Each of the ten FEMA regions maintains a roster of team members and activates the teams after flood disasters. These teams are interagency, intergovernmental, and interdisciplinary in nature, and represent a wide range of talent and experience in the field of hazard mitigation. Each team produces a mitigation report, generally within 15 days of the date of the disaster declaration. These reports outline key mitigation opportunities for the disaster.

Hazard Mitigation Planning: Section 409 of the Stafford Act requires that State and local governments evaluate the hazards within the disaster area, and take appropriate steps to mitigate those hazards. This is done through preparation of a hazard mitigation plan, which by regulation is due 180 days after the disaster declaration. The plan is intended to set forth a broad and long range mitigation strategy which State and local governments can implement to reduce future losses from natural hazards. The ultimate goal of this planning requirement is to establish active mitigation programs at the State and local level which can become an integral part of normal planning, development, and emergency response activities.

Hazard Mitigation Grant Program: Section 404 of the Stafford Act established a program specifically designed to fund mitigation measures after a disaster. Under this program, FEMA can contribute up to 50 percent of the cost of eligible mitigation measures. Total Federal funding is limited to ten percent of the estimated grants made for permanent restorative work under the Public Assistance Program. By law, mitigation measures must be cost-effective, must benefit the disaster area, and must be consistent with the mitigation plans required under Section 409. Measures can be proposed to protect both public and private property. The State is the Grantee for this program and has responsibility for soliciting projects from eligible applicants and establishing priorities for projects to be funded. Once State review of proposed projects is complete, the State submits these projects to FEMA for review and approval.

HAZARD MITIGATION GRANT PROGRAM

Purpose of the Program: The Hazard Mitigation Grant Program (HMGP) is designed to fund immediate and long term mitigation projects after a major disaster declaration. Under this program, FEMA can contribute up to 50 percent of the cost of eligible mitigation measures. Total federal funding for the HMGP is limited to ten percent of the estimated grants for permanent repairs or replacement made under the Public Assistance Program. The overall goal of the Program is to reduce a State or community's vulnerability to natural hazards.

Eligibility Criteria: Eligible applicants are the same as for the Public Assistance Program, although the HMGP does not duplicate mitigation measures eligible under that program. The HMGP provides funding for mitigation measures that substantially reduce the risk of future damages. The funded projects must be cost effective and environmentally compatible, and should be consistent with the evaluation of hazards and mitigation objectives in the State Hazard Mitigation Plan. Types of projects eligible for funding under the HMGP include:

Purchase of floodprone property along a river and development of a linear park. This type of project would permanently reduce the potential flood damages in a community.

Floodproof specific structures in a community. Projects may include construction of a levee to protect a sewage lift station to eliminate the effects of sewage backup due to flooding of the stations.

Modification of structures to eliminate or reduce potential damages. Types of projects may include elevation of a building, or improving the design to withstand flooding or earthquakes.

Other Mitigation Requirements: In the FEMA-State Agreement, the State accepts the responsibility to evaluate natural hazards in the disaster area and to prepare or update a Statewide hazard mitigation plan within 180 days of the declaration. This plan is commonly referred to as the State 409 Hazard Mitigation Plan. In addition, an Interagency Hazard Mitigation Team (IHMT) is made up of representatives of 12 Federal agencies who evaluate mitigation opportunities and recovery options after flood disasters. The Team prepares a report within 15 days of the disaster declaration, which provides a framework for the State Hazard Mitigation Plan and often identifies potential projects for funding under the HMGP.



Federal Emergency Management Agency

Washington, D.C. 20472

AUG 20 1993

MEMORANDUM FOR: Midwest DFO's

ATTENTION: Federal Coordinating Officers
Hazard Mitigation Officers

FROM: *[Signature]*
Dennis M. Kwiatkowski
Assistant Associate Director
Disaster Assistance Programs

SUBJECT: Federal Assistance to Midwest Communities for
Relocation and Elevation Projects

We held a meeting on August 16 with several Federal agencies to discuss programs and potential funding for relocation and elevation of structures in the floodplain. We have developed a fact sheet briefly describing the Federal programs and how those programs might be used to assist individuals and local governments in the recovery process (attached). We will continue to coordinate with the agencies, and ensure that we have appropriate Regional or State contacts to assist us in answering program issues.

We encourage you to provide technical assistance to the affected States and to local communities to help them develop comprehensive solutions to their housing problems. Communities may need planning guidance, engineering support, and assistance in packaging funds to meet their needs. Additional guidance on how to best coordinate this interagency process will be provided as soon as we can get it to you.

In addition, due to the interest in mitigation, especially relocation and elevation projects, we need for the Hazard Mitigation Officers to provide Headquarters (HM Branch) with a weekly status report on all hazard mitigation projects whether they are proposed, in review, or funded.

If you have any questions, comments, or suggestions, please contact me at (202) 646-3615 or Karen Helbrecht at (202) 646-3358.

Attachment

FEDERAL ASSISTANCE TO MIDWEST COMMUNITIES FOR RELOCATION AND ELEVATION OF FLOOD DAMAGED PROPERTY

I. Introduction:

The widespread flooding in the Midwest is prompting communities to seek assistance from the Federal Government to solve serious and repetitive flood damage problems. Relocation and elevation of homes are highly effective measures that are increasingly being employed for long-term damage reduction. However, because many residents are already beginning to rebuild, it is difficult to encourage voluntary mitigation. Indeed, damage prevention measures are sometimes mandated by law. For instance, communities participating in the National Flood Insurance Program (NFIP) must require that homes needing repair equalling 50% or more of the pre-flood value of the home be elevated to NFIP standards. Still, without assistance, some homeowners may not be able to afford to elevate their home or relocate.

Several Federal programs are available to assist communities and residents in relocating out of a floodplain or in elevating structures to comply with the NFIP requirements. The programs can, and often are, combined in areas with repetitive flooding problems to provide comprehensive assistance. These programs are described in part III of this paper.

II. Comprehensive Delivery of Available Programs:

In order to maximize the use of Federal money to facilitate the post-disaster reconstruction process and ensure that opportunities to prevent future damage are not overlooked, individual community needs for mitigation must be identified quickly. Communities will also need assistance in determining which programs can be used to address their situation. FEMA has developed a strategy to identify these needs and assist affected communities in evaluating available alternatives. This strategy will require coordination between the various Federal agencies and the affected States to:

1. Contact community leadership to discuss needs and mitigation approaches;
2. Develop site-specific technical guidance for mitigation opportunities;
3. Package the different types of Federal and State financial assistance to meet individual community needs;
4. Advise communities of their alternatives, funding options, timing, and needs for temporary housing; and
5. Implement the mitigation measures, monitor progress, and ensure completion of projects.

The five components of this strategy should be addressed through an interdisciplinary team approach.

Current Efforts to Implement Strategy:

FEMA is working closely with the States to identify funding resources and clarify the various eligibility and application requirements. Each State plays an integral role in setting immediate reconstruction and mitigation priorities as well as long-range planning objectives. Providing this information and the necessary technical assistance to communities is an ongoing FEMA-State effort.

- **NFIP Site Visits:** FEMA's regional Natural and Technological Hazards staff are currently conducting site visits to communities participating in the NFIP. The FEMA staff provides technical assistance regarding the requirement to elevate substantially damaged structures as well as other insurance issues.
- **Interagency Hazard Mitigation Teams:** These joint Federal-State teams are activated following all presidentially declared disasters. The teams are conducting site visits in the nine affected States and making recommendations for potential mitigation measures in the form of issue papers and team reports. The teams also discuss possible funding for recommendations and provide information to the communities they visit.
- **Community Assistance Outreach:** FEMA currently has a contract with Iowa State University Institute for Design Research and Outreach which will work with at least 10 communities over the next year. The contract provides for technical assistance teams to work one on one with interested communities to identify mitigation options, match needs with available programs, and develop proposals for funding requests. FEMA can provide the same assistance to all affected states.
- **Reconstruction Information Centers:** Information centers were established during the recovery from Hurricane Andrew and were an effective means of providing technical and financial guidance to individuals concerned about rebuilding. The same technique can be used in the midwest, providing detailed information to interested communities, then hosting reconstruction workshops for individuals.
- **Grant Awards:** FEMA has already approved a Hazard Mitigation Grant Program project to provide funding to individuals rebuilding to the NFIP standards. The Neighborhood Housing Services of Des Moines, Iowa is the applicant, and individuals will provide the 50% match. An example of Federal relocation assistance is a project in English, Indiana where FEMA's HMGP and NFIP are working together with HUD and other Federal agencies to relocate the entire town out of the floodplain.

Implementing a comprehensive strategy will require considerable resources in the field to work hand-and-hand with communities. The development, implementation, and monitoring of this type of effort will take several months, requiring a long term commitment of resources by FEMA and all Federal and State agencies involved.

III. Federal Programs For Relocation And Elevation:

FEMA has several programs which can be used to provide this assistance.

FEMA Programs:

- The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act 93-288, as amended. HMGP can provide 50% of the cost of elevating structures in compliance with NFIP standards, and/or for acquiring properties in a floodplain, providing relocation assistance as necessary. Communities can apply through the State for the HMGP following a Presidential disaster declaration. The State, as HMGP grantee, is responsible for identifying and prioritizing projects. Although State and local units of governments are the eligible applicants, funds can be provided to individuals for these projects.

- Through Section 1362 of the National Flood Insurance Program, FEMA can purchase flood-damaged property and provide property owners the opportunity to relocate in areas not prone to flooding. To be eligible the property owner must have a flood insurance policy in force when the damage occurs and meet one of three other program criteria. In addition, the community must agree to accept title to the purchased property and manage it for open space purposes. Due to the small number of flood insurance policies in effect in the Midwest, this program will have limited application for the current flooding.

- Several Individual Assistance programs can also be used to facilitate elevation or relocation out of a floodplain. The Individual and Family Grant (IFG) program can be used in conjunction with other programs to elevate or relocate individual structures, although funding is limited. The maximum grant is \$11,900. In addition, Disaster Housing assistance can be provided to individuals for up to 18 months while relocation and elevation programs are being developed and implemented. Program regulations for use of the special Cora Brown Fund specifically refer to relocation out of hazardous areas, and to hazard mitigation and floodplain management purposes.

- FEMA's Public Assistance program can provide some limited assistance in the areas of elevation and relocation. For example, if entire portions of a community were to be relocated outside of the floodplain, PA can assist in rebuilding the necessary infrastructure in the new location. If a community determines that a badly damaged facility is not to be repaired, the estimated damage amount may be used to fund hazard mitigation measures.

Some other Federal programs which can assist with property elevation, acquisition, and relocation are:

HUD Programs:

- The Community Development Block Grant (CDBG) program can provide funds for a variety of projects, including floodplain property acquisition and relocation, or elevation. The Supplemental Appropriation Bill provided an additional \$200 million for the CDBG

Program, however funds are restricted to "repairing, replacing, or restoring the function of facilities damaged by or continuing services interrupted by the flood". These funds can be used for elevation of structures, or in combination acquisition/relocation projects. Allocations to entitlement jurisdictions are expected to be made the week of August 23.

- The HOME Program provides grants to States and larger cities and urban counties for permanent housing for low-income persons. Allocations to communities will be based on the CDBG formula. Individuals may apply for these funds if they are low income (80% of median income). There is no minimum or maximum loan amount and interest rates are determined by the recipient community. The community may decide to grant funds to individuals rather than provide loans. Funds can be used for acquisition, new construction, or elevation. \$50 million was added to this program in the Supplemental Appropriations Bill. Application requirements and housing quality standards requirements have been waived and other processes streamlined.

SBA Programs:

- SBA provides disaster loans to homeowners and businesses to repair or replace property damaged in a declared disaster. Loans may be used to meet required building codes, such as the NFIP requirements. SBA may also provide loans for involuntary relocations out of special flood hazard areas, when required by local officials. While SBA's legislation prohibits the agency from making disaster loans for voluntary relocations, there are exceptions that can be made including relocations of homeowners, renters and business-owners out of special flood hazard areas. These loans would be limited to the amount necessary to repair or replace the damage at the disaster site. Loans are available for up to \$120,000 for homeowners; \$20,000 for renters; and, \$500,000 for businesses. SBA loans may also be used to refinance existing mortgages.

Farmers Home Administration Programs:

- FmHA is authorized to make rural housing loans and grants to eligible applicants to buy, build, or repair housing located in a rural areas. Homes constructed or repaired through FmHA are required to meet the NFIP elevation requirements. The Section 502 Home Ownership Loan Program, available to low and very low income applicants (50% and 80% respectively of the area's median income, can be used to elevate or relocate individual structures; \$1.2 billion was provided in the supplemental. The maximum loan amount is \$105,000, and interest rates, based on income, may be as low as 1%.

- FmHA's Section 504 Home Improvement Loans and Repair Loans and Grants Program can provide funds to elevate homes or farm structures; \$12.5 million was added to the loan program and \$12.5 million was added to the grant program in the supplemental appropriation. The grant portion of this program (up to \$5,000) is made only to very low income senior citizens. The loan program may provide loans up to \$15,000, with the lowest interest rate, based on income, at 1%.

- FmHA Emergency Loans are available to assist family sized farmers and ranchers in refinancing existing debt, as well as to cleanup and restore farms and repair farm structures.

Loans can be used to elevate living areas to meet NFIP requirements or to relocate homes out of the floodplain. Loans are provided at 4.5% interest over a 30-40 year period for physical losses. The supplemental appropriation added \$80 million to this program.

USACE Programs:

- The USACE is authorized to relocate homes out of the floodplain if it proves to be more cost effective than a structural flood control measure. However, this can be a lengthy process; the Section 205 Program, for projects under \$5 million, can take several years to complete, while projects over this amount would take much longer.

Economic Development Administration Programs:

- The EDA provides funding for projects resulting in economic growth for communities. The Administration has received additional funding through the supplemental appropriation for its programs in the affected communities in the Midwest.

SECTION II:

FEDERAL DISASTER POLICIES - AN HISTORICAL PERSPECTIVE

Federal disaster policies have evolved gradually over the past two centuries. Two trends are especially evident. First, direct federal involvement in disaster prevention and disaster relief has increased over time, escalating since the first world war. Originally a bystander providing minimal humanitarian aid, the federal government now is the architect and leader in disaster prevention and relief.

Second, policy making has been the result of a combination of an evolving Congressional definition of its legislative powers and the demands of a dynamic society. While this report will concentrate on Congressional debates that led to major shifts in federal disaster policy, societal influences and constituent demands have often been catalysts for change and should be recognized for their importance in the change process. Three factors seem preeminent. First, sustained population growth has led to a steady increase in damage potential and actual damage loss. As population densities increased, more people and property were placed in harm's way. Second, the dollar value of property exposed to disasters has risen beyond the financial ability of local and state government to satisfy local and regional disaster preparation and recovery needs. Third, major disasters often involved more than one state. As populations increased, property values rose, and devastating floods, hurricanes, and earthquakes affected areas of multiple jurisdictions, disasters were forced on the national agenda.

To fully comprehend current Congressional and administration views toward natural disaster relief programs, an historical analysis of federal disaster policies is presented to illustrate the evolutionary path these attitudes have taken.

COLONIAL PRECEDENTS

Disaster relief policies predate the founding of the United States. In colonial times, because early settlements were typically established along the coast or along river fronts, floods comprised the major disasters threatening their inhabitants. Initial attempts to prevent riverine flooding were to construct levees between rivers and populated or cultivated areas, thereby preventing rivers from overflowing their banks and destroying property. Because inhabited areas were small and isolated, these actions were strictly local affairs where property owners took the responsibility to protect themselves.

One of the first disaster prevention laws was established in the mid-eighteenth century in territorial Louisiana. Swamps along the Mississippi River were being reclaimed for farm land. Land grants from the King of France obligated Louisiana planters to build levees to protect these lands from flooding. To gain compliance, the territorial governor created an ordinance that required

planters to meet their obligations or forfeit their grants. (See Frank, 1930.) These legal developments established the principle that a central government has a responsibility to protect its property owners and their property from known natural threats, that local government has a responsibility to implement and enforce these decrees, and that private property owners are financially responsible for mitigations that directly benefit them. For property owners to comply, an underlying assumption is that the benefit to the individual property owner exceeds the cost of the mitigation.

THE FIRST LAND USE LAW

From the beginning of the republic to World War I, federal participation in disaster relief was typically limited to acts guided by humanitarian concerns. Most often, Congress would appropriate small sums of money to provide food, clothing, tents, or other provisions for distribution to sufferers of natural and other disasters. The actual recovery was left to those affected by the disaster. However, the devastating earthquakes which struck New Madrid, Missouri in 1812 caused Congress to enact its first major piece of disaster relief legislation to assist owners of private property. (See Table 1 for a list of precedent-setting federal disaster relief legislation.) On February 17, 1815, a law was enacted "for the relief of inhabitants of the late county of New Madrid, in the Missouri territory, who suffered from earthquakes." The earthquakes caused a permanent change in the flow of the Mississippi River, damaging much land in the New Madrid area. Congress authorized that the federal government could exchange plots of land up to 160 acres with owners of land which was damaged by the earthquakes. In return, the federal government took title to the damaged properties to prevent further use, thereby enacting the first land use law to prohibit development on property known to be subject to severe natural disasters.

FLOOD CONTROL - THE FIRST HAZARD MITIGATION POLICY

During the latter part of the nineteenth century and the early twentieth century, Congress wrestled with the question whether it had the constitutional power to legislate programs which would protect private property from disasters or, in the event of disasters, provide direct aid to those suffering damage. Debates centered around flood control, a topic which occupied Congress for almost one hundred years. It was a complex issue of many dimensions. On the surface, flood control was an attempt by some members of Congress to establish federal mitigation of a natural disaster; however, what it proposed challenged traditional federal-state relationships and aroused the ire of fiscal conservatives.

Strict constitutionalists objected to the policy because flood control was not specifically enumerated in Article 1, Section 8 of the Constitution as a congressional power, and, according to the tenth amendment, they argued that states should have jurisdiction over flood control. In addition, this policy ran counter to the tradition that local property owners bore the responsibility of protecting themselves from floods.

TABLE 1: PRECEDENT-SETTING FEDERAL LEGISLATION GRANTING RELIEF TO SUFFERERS FROM EARTHQUAKES, FLOODS, AND OTHER NATURAL DISASTERS

<u>YEAR</u>	<u>LAW AND TITLE</u>	<u>PRECEDENT</u>
1815	(Untitled), An Act for the relief of the inhabitants of the late county of New Madrid, in the Missouri territory, who suffered by earthquakes.	Established in principle that the federal government could employ land use laws to recompense those suffering from an earthquake. This law authorized that the federal government could grant lands to owners of lands injured by the 1812 New Madrid earthquake in exchange for injured lands of equal size.
1917	P.L. 64-367, FLOOD CONTROL ACT OF 1917	Established in principle that the federal government is responsible for the protection of its citizens from natural disasters through hazard mitigation.
1928	P.L. 70-391, FLOOD CONTROL ACT OF 1928	Established in principle that structural hazard mitigations by themselves provide inadequate protection from natural disasters. Established in Section 7 an indemnification plan for certain groups not directly covered in this act. Section 7 created an emergency fund to repair any flood-control work on any tributaries of the Mississippi River threatened or destroyed by flood.
1933	P.R. 73-2, (Untitled), A Joint Resolution to authorize the Reconstruction Finance Corporation to make loans for financing the repair or reconstruction of buildings damaged by earthquake in 1933.	Established in principle that the federal government could provide loans for the repair or reconstruction of private residences damaged by an earthquake. In response to the Long Beach, California earthquake, the focus of disaster recovery shifted to the individual victim and making him whole.
1934	P.L. 73-160, (Untitled), An Act authorizing the Reconstruction Finance Corporation to make loans to nonprofit corporations for the repair of damages caused by floods and other catastrophes, and for other purposes.	Institutionalized the practice of providing loans for the repair and reconstruction of public and private buildings damaged by natural disasters.
1936	P.L. 74-738, FLOOD CONTROL ACT OF 1936	Established in principle that the benefits of federal projects must exceed their costs.
1956	P.L. 84-1016, FEDERAL FLOOD INSURANCE ACT OF 1956	Established in principle the use of disaster insurance for private residences. Established that rates be risk based, fixed at actuarial levels, and established by the federal government. Established that certain rates could be subsidized if unreasonably high. Established that the government provide reinsurance for private insurance companies. Established that properties in violation of state or local flood zoning laws be denied coverage. Further established that local governments adopt and maintain mandatory mitigation laws for continuing insurance coverage.

Fiscal conservatives objected to flood control projects for two major reasons. First, flood control projects (the construction of levees to prevent rivers from overflowing their banks) were viewed as wasteful expenditures and would cause Congress to eventually raise taxes. The people of the United States, it was argued, would be unfairly asked to pay for expensive levees from which the majority received no benefit. Second, flood control projects were often very similar to projects enacted through the many rivers and harbors bills which ostensibly were proposed to improve navigation for the facilitation of interstate commerce. Fiscal conservatives objected because they could not distinguish between flood control and navigation projects, which had become popularly recognized as the traditional source of pork-barrel politics. Standing on principle, they opposed anything which potentially smacked of pork.

Proponents of federal flood control had a difficult time convincing a majority in Congress that their position was constitutionally sound and not fiscally irresponsible. What led to the eventual acceptance of their policy position was the scale of destruction caused by floods along the Mississippi River in 1912 and the Ohio River valley and Mississippi River in 1913 and the reasons for the widespread destruction. When the Federal Flood Act of 1917 (P.L. 64-367) became law, it was not an ideological victory, but occurred because private citizens and local levee boards in several states, most notably Mississippi and Louisiana, were no longer financially able to protect themselves from floods. Flood damages had grown to the point where the cost of constructing, repairing, and maintaining local flood control projects was approaching or exceeding the value of the land they were protecting. The outcry from devastated constituents and their supporters turned the tide.

As Congress was debating the flood control issue, the traditional principle that communities which benefitted from flood mitigation should bear the cost of such projects was being challenged by flooded communities and states. From the end of the Civil War to the start of World War I, the population along the large navigable rivers had mushroomed. Along with the population came increased uncoordinated construction of independent flood control systems, resulting in the situation where upstream communities were able to keep potential flood waters in the main river channels causing downstream communities to either raise their levees or suffer more damaging floods. A question of who should be responsible for the cost of levees in downstream states arose. What made this question impossible to answer and led many to seek a national solution was the fact that river systems are extremely large and complex. For example, the Mississippi and its tributaries are located in 31 states.

The Flood Control Act of 1917 did not provide a totally satisfactory solution for those damaged by the 1912 and 1913 floods, as it was the result of a compromise between proponents and opponents of flood control. On the one hand, it established the principle that the federal government had the power to mitigate natural disasters. It empowered the federal government to coordinate flood control projects along two rivers, the Mississippi and the Sacramento, and permitted the Mississippi River Commission to make surveys of what effects levees in an upstream state would have on flooding in the lower Mississippi River valley and then to determine what levees would be built and where. On the

other hand, no national program was established, and local interests were required to pay at least half of the costs to construct or repair any levee even though they had no say in determining which levees would be constructed. The dire financial conditions of several local levee boards were not alleviated, and several communities along the lower Mississippi River remained exposed to future floods because they were unable to come up with their share of the costs needed before levee construction could begin. Old principles don't die off easily.

WORLD WAR I AND FEDERAL INSURANCE PROGRAMS

World War I provided an entirely different platform for Congress to examine federal disaster policies. Before the United States was formally involved in the war, Congress felt that foreign commerce on the high seas was endangered, partially due to the fact that there was inadequate private marine insurance to protect against loss or damage of American ships and their cargoes from the risk of war. To fill in the breach, Congress enacted the War Risk Insurance Act of 1914 (P.L. 63-193) on September 2, 1914, which established a Bureau of War Insurance in the Treasury Department. (See Table 2 for a list of precedent-setting federal disaster insurance programs.) The Bureau was authorized to write war risk policies with "reasonable" premium rates based on the risks associated with class of cargo, ports visited, and the circumstances of the war whenever the Secretary of the Treasury determined that American vessels, shippers, or importers "are unable in any trade to secure adequate war risk insurance on reasonable terms."

Three important federal insurance precedents were set in this statute. First, the federal government determined that insurance was a legitimate disaster relief policy. Second, the federal government decided that it would provide insurance under one condition, when the private insurance industry was unable to provide insurance at reasonable rates. In terms used today, war risk insurance met the principle of *correcting a market failure*, defined here as the inability of the private insurance industry to provide insurance at reasonable rates. Third, premium rates should be risk based. Although it might be argued that reasonable rates could be interpreted as subsidized rates, during the four years (1914 - 1918) that the insurance was available, the government received \$46.7 million in premiums, paid out \$29.3 million in losses, and made \$17.4 million in gross profits (U.S. Congress, 1939, p. 33).

A fourth federal insurance precedent, reinsurance, was enacted on June 12, 1917 after the United States entered the first world war. As a means of sharing the increased risk of shipping with its allies, Congress amended the War Risk Insurance Act (P.L. 65-20) to authorize the Secretary of the Treasury to make reciprocal reinsurance arrangements with the governments of other nations to protect American and foreign friendly vessels and their cargoes.

The War Risk Insurance Act also served as the model for the first attempt at federal crop insurance by Congress. On June 17, 1917, Representative Edward J. King (R, Illinois) introduced H.R. 5148 to establish a bureau of farm risk insurance in the Treasury Department. With only slight

TABLE 2: PRECEDENT-SETTING FEDERAL LEGISLATION AUTHORIZING FEDERAL DISASTER INSURANCE PROGRAMS

<u>YEAR</u>	<u>LAW AND TITLE</u>	<u>PRECEDENT</u>
1914	P.L. 63-193, WAR RISK INSURANCE ACT OF 1914	Established in principle that insurance was a legitimate federal disaster relief policy. Established that the federal government could provide insurance when the private industry was unable to provide insurance at reasonable rates. Established that premium rates be risk based. Further established that private and government insurance could be offered simultaneously and that federal insurance should be maintained only until the private insurance industry determined that it could service the entire market.
1917	P.L. 65-20, An act amending the War Risk Insurance Act of 1914.	Established that the federal government could offer reinsurance when sufficient amounts were unavailable in the private markets.
1938	P.L. 75-430, FEDERAL CROP INSURANCE ACT OF 1938	Established that the federal government could offer disaster assistance due to losses suffered from natural disasters. Further established that insurance was fiscally responsible compared to other forms of relief.
1940	P.L. 76-677, An act amending the Merchant Marine Act of 1936 "to provide marine war-risk insurance and reinsurance and for marine risk reinsurance."	Established the first comprehensive federal primary insurance-reinsurance program. Established in principle that reinsurance was a legitimate federal disaster relief policy. Further established that the federal government could participate in an insurance program if the private insurance industry lacked the capacity to write sufficient primary insurance at reasonable rates or lacked the capacity to provide sufficient reinsurance.
1942	P.L. 77-506, An act amending the Reconstruction Finance Corporation Act authorizing the federal government to provide private property insurance and reinsurance against losses which may result from "enemy attack."	Established in principle that the federal government could provide property insurance for private residences. Established that the federal government could utilize the private insurance industry to provide the services necessary to sell policies, collect premiums, and adjust claims. Established the concept of risk sharing between the federal government and participating private insurance companies.
1956	P.L. 84-1016, FEDERAL FLOOD INSURANCE ACT OF 1956	See Table 1.
1968	P.L. 90-448, NATIONAL FLOOD INSURANCE ACT OF 1968	Was the first flood insurance program to be implemented.
1973	P.L. 93-234, FLOOD DISASTER PROTECTION ACT OF 1973	Established that the federal government could mandate disaster-prone communities to participate in a national disaster insurance program.

modifications to the War Risk Insurance Act, this bill sought to stimulate the production of nonperishable agricultural products by providing crop insurance when the private insurance industry was unable to offer it at reasonable rates. The bill died in committee. (Congress eventually returned to this issue during the great midwest drought in the late 1930's and enacted a crop insurance program as part of the Agricultural Adjustment Act of 1938, P.L. 75-430, which later became popularly known as the Federal Crop Insurance Act.)

AMENDING THE FLOOD CONTROL LAWS

By not completely resolving the flood control situation in 1917, the federal government left the Mississippi River valley susceptible to continued catastrophic floods. In 1927, the inevitable occurred. At this time, the 1927 flood was considered the worst natural disaster ever to take place in the United States. According to the Red Cross (U. S. Congress, 1927, Part 6, pp. 4757-4758), "levees broke in 145 places, and water covered land from Cairo, Ill., to the Gulf of Mexico, a distance of a thousand miles. The entire flood area embraced more than 20,000 square miles." One hundred seventy-four counties in the eight states of Kentucky, Tennessee, Missouri, Arkansas, Illinois, Mississippi, Louisiana, and Oklahoma were affected. Two hundred forty-five persons were killed, damages ran over \$650 million, and more than 600,000 people were displaced.

The scope of this disaster called the total flood control program into question. Emerging from the lengthy Congressional investigation recorded in 4,924 pages of hearings before the House Committee on Flood Control in 1927 and 1928, Congress and the administration concluded once and for all that structural mitigation (a levees-only policy) alone was inadequate to prevent flooding along major rivers. Many alternative solutions were proposed, including a bill prepared by Senator Elmer Thomas (D, Oklahoma) which would establish a federal emergency relief fund to furnish "relief to sufferers from floods, fires, earthquakes, storms, droughts, famines, plagues, pestilences, and other disasters in any part of the United States" (U.S. Congress, 1927, Part 1, p. 241). Although Senator Thomas never formally introduced this bill, he recognized that disasters were a national problem, that the amount of damage and suffering was beyond the ability of the Red Cross and local agencies to handle, and that the infusion of money would allow local responses to local problems instead of all the money being spent on levees on the Mississippi River which would not benefit his constituents in Oklahoma.

The debate in Congress over the scope of a new flood control act was centered on whether the act should be regional like the 1917 act or should be expanded to national proportions. President Coolidge and the Senate favored the limited approach which would aid only the Mississippi River valley below Cairo, Illinois. The total cost of this plan would be \$325 million. The House, led by Frank Reid (R, Illinois, and Chairman of the Flood Control Committee), preferred a national plan which would provide a comprehensive evaluation of the flood danger followed by a massive physical effort to prevent future flood catastrophes. The total cost of this plan was estimated at over \$1 billion, a

figure that troubled Reid because it was obviously cheaper for the federal government to pay for all the damages rather than authorize the construction of an extensive network of structural mitigation projects which scientists and engineers could not guarantee would offer 100% protection from future floods.

President Coolidge was able to gather enough support to limit the Flood Control Act of 1928 (P.L. 70-391) to flood control projects in the Mississippi River valley. In Section 7 of the bill, however, notice was taken of "backwater" areas which were flooded, and \$5 million was authorized to be appropriated as an emergency fund to be spent "in rescue work or in the repair or maintenance of any flood-control work on any tributaries of the Mississippi River threatened or destroyed by flood including the flood of 1927." In effect, Section 7 established what Senator Thomas had argued for, an indemnification program for privately funded flood control projects not located in the main flood area.

FEDERAL DISASTER POLICY SHIFTS TO THE INDIVIDUAL

Between the time Franklin Delano Roosevelt was elected and the time he took office as President in March, 1933, the largest earthquake in the United States since the 1906 event in San Francisco, struck Long Beach, California. As previous presidents had done, Roosevelt asked Congress to appropriate \$5 million for emergency relief purposes to those who suffered in the calamity. The bill to carry out the president's wishes was introduced as Senate Joint Resolution 14. After the Senate agreed to the President's request, the bill was referred to the House Appropriations Committee. Clearly in disregard of past traditions, the Appropriations Committee refused to appropriate the funds and instead offered a substitute bill which would provide direct assistance to private citizens suffering disaster damage by the issuance of federal loans through the Reconstruction Finance Corporation.

When the committee substitute was introduced on the floor of the House on March 17, 1933, it stirred a lengthy debate about whether Congress should establish the precedent of expanding federal disaster relief to include aiding individuals in the reconstruction of their homes and businesses (Congressional Record, 73rd Cong., 1st sess., 1933, Vol. 77, Part 1, pp. 586-595). Appropriations Committee Chairman James Paul Buchanan (D, Texas) made the point that the immediate relief needs for which the original appropriations request was made had been met by the Red Cross. If Congress appropriated the funds, Buchanan argued, then the money would be used as "a direct appropriation to rehabilitate both residences and business houses," a conclusion he derived from recent committee hearings on the issue (Congressional Record, 73rd Cong., 1st sess., 1933, Vol. 77, Part 1, pp. 587-588). He opposed the idea of direct federal grants, but suggested the loan policy because "these people, owing to the financial crisis, closed banks, and so forth, have nowhere to turn to get one penny of credit to rebuild" (Congressional Record, 73rd Cong., 1st sess., 1933, Vol. 77, Part 1, p. 588). In principle, the Appropriations Committee realized that in the event of a natural disaster, the federal government should provide the necessary services to rehabilitate devastated communities when private interests are unable to perform those services.

The committee substitute was agreed to in the House by voice vote and later concurred to by the Senate and signed by the President. Possibly the best explanation of why Congress so abruptly shifted its disaster relief policy to provide direct financial assistance for stricken individual home and business owners was summed up by freshman Representative John Dockweiler (D, California) during the debates when he stated one of the philosophies of "new deal" politicians just elected to Congress. Answering those who would deny earthquake sufferers federal loans because of precedent, Dockweiler said:

"When you talk of precedents in a time like this I have no sympathy with the subject, because I, as well as many of my colleagues, was elected on the basis of forgetting and disregarding some of the old, hackneyed, time-worn precedents that have been in vogue for years" (Congressional Record, 73 Cong., 1st sess., 1933, Vol. 77, Part 1, p. 592).

INSTITUTIONALIZING AND EXPANDING THE NEW DISASTER RELIEF POLICY

In the months following the Long Beach earthquake, other disasters befell communities in disparate parts of the country. To establish a national disaster relief policy equitable to all citizens who might become disaster victims, Congress enacted P.L. 73-60 (April, 13, 1934) expanding the authority of the Reconstruction Finance Corporation to provide disaster loans for the repair or reconstruction of private residences and various business buildings and structures for all disasters which occurred in 1933 and in the months of January and February, 1934.

For the first time since 1815, Congress also included a land use policy in a disaster relief act. P.L. 73-60 authorized loans "for the acquisition of land in replacement of land privately owned and declared by public authority to be unsafe by reason of flood, or earthquake" and declared that "such unsafe property shall be conveyed by the owner thereof, without cost, to the county, municipality, or district in which any property is situated."

The occurrence of major floods and other disasters in the mid-1930's placed tremendous pressure on Congress to enact annual legislation authorizing the Reconstruction Finance Corporation to provide loans for the growing numbers of disaster victims. The amount of appropriations and the number of requests for loans increased to the point where Congress was persuaded to establish the Disaster Loan Corporation within the Reconstruction Finance Corporation in 1937 (P.L. 75-5) to manage the loan program. In 1939, Congress abandoned its annual disaster loan appropriations ritual and authorized the Disaster Loan Corporation to provide loans indefinitely in the future.

CONGRESS RECONSIDERS DISASTER PREVENTION

When the Flood Control Act of 1928 was enacted, millions of dollars were expended to create a network of reservoirs, levees, and spillways to protect

the Mississippi River valley from subsequent catastrophic floods. Unfortunately, because President Coolidge was shortsighted and was unwilling to establish a national flood control program, not a single federal dollar was spent on flood control along other major river systems. Significant flooding in the northeast and the Ohio River valleys in 1936 finally convinced Congress and the administration that the prevention of catastrophic floods required a national flood control effort. Consequently, Congress enacted the Flood Control Act of 1936 (P.L. 74-738) establishing once and for all time that "flood control on navigable waters or their tributaries is a proper activity of the Federal Government."

The Flood Control Act of 1936 was an extremely important law for the precedents it set. However, it seems as if Congress was trying to kill two very different birds with one stone when it enacted this law. One of its foremost innovations was incompatible with the stated purpose of the legislation. Congress intended the Army Corps of Engineers to develop and implement entire river flood control systems made up of component projects, each contributing to the overall success of its system. At the same time, Congress authorized that each individual flood control project undergo a benefit-cost analysis, and only those whose aggregate benefits were greater than its costs could become eligible for federal consideration. While benefit-cost analysis seems like an appropriate means to screen out economically undesirable projects, its inclusion in flood control legislation was not to ensure that the most effective flood control projects would be selected, but rather to identify appropriate public works projects to reduce regional unemployment, a principal goal of the Roosevelt administration.

There have been several unintended negative consequences as a result of Congress mandating benefit-cost analysis for flood control purposes. The primary goal of federal disaster prevention policies, to reduce disaster damage potential, has been subverted. In an economic analysis, while construction costs are easy to measure, traditional disaster prevention benefits like the potential number of lives saved, the general welfare of the population, and the security of the nation are difficult to affix economic values. According to Schulze and Kneese (1981), the utilitarian philosophy undergirding benefit-cost analysis discriminates against projects promoting social values and favors projects which provide the greatest measurable good for the greatest number of citizens. In addition, benefit-cost analysis distorted the systems approach to mitigation by focusing attention on individual projects and away from flood control systems.

Roosevelt's emphasis on reducing unemployment through public works programs, such as those on inland waterways, set in motion a series of events that forever changed the relative importance of flood control to more utilitarian rivers and harbors goals such as recreation and navigation. From 1937 to 1960, flood control was relegated from a prominent position on Congress' annual agenda to an ingredient in the federal recipe for waterways management. Most important in flood control's loss of stature was the termination of the standing House Committee on Flood Control on January 2, 1947, which had served Congress since it was established on February 3, 1916. If any thoughts remained that disaster prevention was the primary goal of flood control, they were dashed with the passage of the Rivers and Harbors and Flood Control Act of 1960, which formally merged the two previously separate policies. According

to Hull and Hull (1967), flood control became one of many integral elements in an extensive federal waterways policy designed to promote:

"multiple purpose water resource development permitting fuller and more efficient utilization of available sites and reducing the burden of public costs for flood control, water supply, conservation, recreation, and other project features. With the rise of national responsibility for full employment and economic growth, established policy has served as a stimulus to industrial expansion and broadened employment opportunities, particularly effective in 'depressed area' rehabilitation " (p. 47).

As far as federal disaster policies are concerned, the Flood Control Act of 1936 was flawed. It set a lasting precedent that disaster prevention goals are subservient to economic considerations. This view was clearly articulated by Major General Samuel D. Sturgis, Jr., Chief of Engineers, United States Army, in response to a question from Senator Herbert Lehman (D, New York) in hearings on flood insurance approximately twenty years later in 1956. Senator Lehman (U.S. Congress, 1955, p. 43) asked, "is it not a fact, General, that you cannot guarantee any specific area or group of areas against loss through construction of flood-control works?" General Sturgis replied, "The limiting factor there is the fact that Congress has said they must be economically justified. So that is as far as we go." To the next question from Senator Prescott Bush (R, Connecticut) concerning the value of flood insurance, General Sturgis said, "I think that flood insurance should dovetail with flood-control structures. In other words, we should build to the maximum economic limit that we can, but what perhaps is not economical to build could and very likely should be covered by flood insurance" (U.S. Congress, 1955, p. 43).

A NATIONAL CROP INSURANCE PROGRAM IS ESTABLISHED

Starting in 1921, the federal government began to provide continuous assistance to farmers following disastrous crop failures. Among the relief activities were drought relief, flood relief, storm relief, seed and feed loans, forage loans, crop-production loans, rural rehabilitation, and grants to states for rural rehabilitation. During the 1920's and the early 1930's, annual expenditures averaged over \$60 million.

Because relief funds cared for those who were already destitute, members of Congress often introduced bills in the 1920's and 1930's to establish national crop insurance programs which would protect farmers against losses which might reduce them to the position of needing relief assistance. Nothing came of these initiatives until 1936 when President Roosevelt asked the Secretary of Agriculture to chair the President's Committee on Crop Insurance in order to determine whether crop insurance was a feasible method to lessen future "financial and human costs" arising from crop disasters (U.S. Congress, 1937, p. 16).

After consulting studies prepared by the Department of Agriculture to determine actuarially sound methods for calculating premiums using data on wheat production, and then consulting with farmers' representatives and the insurance industry, the President's Committee concluded that a federal crop insurance program (limited to wheat) was both feasible and also a fiscally responsible public policy. According to the committee, in a comparison between relief and insurance, "insurance would reduce the need for assistance from Federal agencies" (U.S. Congress, 1937, p. 12). Based on its analysis, the committee recommended to the President that crop insurance should become national policy.

In his letter transmitting this report to Congress, President Roosevelt recommended enactment of crop insurance legislation and echoed the committee's sentiment. He supported crop insurance because "the expense in the past to Federal, State, and local governments arising by reason of crop losses points to the desirability of employing the principle of insurance in order to lessen the cost - financial and human - of future crop disasters" (U.S. Congress, 1937, p. III).

Crop insurance became a reality in 1938 with the passage of the Federal Crop Insurance Act (P.L. 75-430). It marked the first time that disaster insurance had been demonstrated to be a more fiscally prudent public policy than relief.

WAR RISK INSURANCE RETURNS

In 1939, the United States found itself in a similar situation as it was prior to World War I. As war was breaking out in Europe and the Far East, the risk to foreign commerce on the high seas was increasing. President Roosevelt sent a message to the Congress asking for emergency legislation to provide the necessary marine insurance and reinsurance to keep American ships at sea in the event that private American insurance companies could not provide adequate amounts of insurance at reasonable rates.

The issues of this time were more complex than those of 25 years earlier. The American merchant fleet had grown as had the American marine insurance industry. However, as estimated by Senator John Overton (D, Louisiana), the marine insurance market in the United States was only "insuring up to about 35 percent of American vessel-borne commerce" (Congressional Record, 76th Cong., 3rd sess., 1940, Vol. 86, Part 8, p. 8980). In normal times, the remaining direct market and most of the reinsurance market was dominated by British and Japanese companies, neither of whom could be relied upon to continue their coverages. Without the participation of foreign firms, Representative Schuyler Bland (D, Virginia), Chairman of the Committee on Merchant Marine and Fisheries, who carried H.R. 6572 for the President, citing evidence in his committee's report, concluded that there was insufficient capacity in the American market "to protect the high values which may be exposed concurrently to war perils" (Congressional Record, 76th Cong., 3rd sess., 1940, Vol. 86, Part 8, p. 8890).

After a short debate in each house, Congress amended the Merchant Marine Act of 1936 "to provide for marine war-risk insurance and reinsurance and for marine risk reinsurance" (P.L. 76-677). Whereas the War Insurance Act of 1914 marked the first time the federal government got into the direct insurance market, and the 1917 amendment marked the first time the federal government entered the reinsurance market, the 1940 statute marked the first time the government created an inclusive, comprehensive insurance-reinsurance program. Both Representatives Bland and Martin J. Kennedy (D, New York) argued that the participation of the federal government would have the same positive effects that federal marine insurance had during the first world war. They argued that availability of federal insurance at federally established rates would stabilize market premium rates at a reasonable level, spread the risk, and would keep the private market open. When they and other members of Congress stated that the private insurance companies supported this legislation and that the earlier federal marine insurance program was profitable, opposition of those desiring to keep the government out of an insurance market where private insurance was offered vanished.

Two precedents were set in P.L. 76-677. First, the federal government determined that reinsurance was a legitimate disaster relief policy. Although the United States offered reinsurance in the first world war, the policy was enacted in consort with allied countries to spread the risk of war among the allies. Second, and most important, the federal government expanded its definition of a market failure to warrant its participation in an insurance program. In the event that the private insurance industry *did not have the capacity to write sufficient insurance at reasonable rates and/or lacked the capacity to provide sufficient reinsurance*, the federal government was willing to commit itself to meet unmet demands for both insurance and reinsurance. In doing so, the federal government recognized itself as the insurer of last resort for potential catastrophic disasters.

MORE WAR RISK INSURANCE, THIS TIME FOR HOMES

On December 13, 1941, by Executive order, President Roosevelt authorized the Reconstruction Finance Corporation to organize the War Risk Insurance Corporation to insure private property against damages caused by enemy attack. He allocated \$100 million to establish the capital structure of that corporation. Following the order, he asked Congress to provide for permanent war risk insurance and to grant the corporation the power to borrow up to \$1 billion.

After the Japanese attack on Pearl Harbor, American citizens feared further attacks and wished to protect themselves and their property. According to Representative Mike Monroney (D, Oklahoma), federal assistance in the form of property insurance was necessary as "the people on our two coasts in December were becoming hysterical because they had no place to turn for insurance" (Congressional Record, 77th Cong., 2nd sess., 1942, Vol. 88, Part 2, p. 1865).

In a brief three months, Congress responded to the President's request and amended the Reconstruction Finance Corporation Act (P.L. 77-506) authorizing the Reconstruction Finance Corporation to empower the newly-named War Damage Corporation (WDC) to provide private property insurance and reinsurance against losses which may result from "enemy attack." Because there was no private war damage insurance market for private residences or businesses, this was the first federal insurance program developed from scratch, and it contained several innovative features.

First, the federal government decided to rely on the private insurance companies to provide actuarial and underwriting services. After signing participation agreements with the WDC, private insurance companies implemented the program, issuing and selling insurance, collecting premiums and then remitting the funds to Washington. In exchange for their services, the private companies were paid a fixed fee per policy.

Second, risk sharing was used for the first time. In the participation agreement, each private company agreed to assume an obligation equal to 10% of the net deficit or share in 10% of the net profit at the end of the program. (Copies of the participation agreement forms are included in Appendix B of U.S. Congress, 1956a, pp. 299-304).

Third, the premium rate structure was designed to meet multiple goals. Congress believed that citizens in all areas of the country should share equally in any losses from enemy attack, so it decided not to impose totally risk based rates. Although adverse selection might occur, geographical risks were specifically ignored in the establishment of the rates, which were statutorily based on the average risk of loss on all property of similar type in the United States.

Fiscal conservatives like Representative Jesse Wolcott (R, Michigan, and ranking minority member on the Committee on Banking and Currency) applauded this insurance program and its rate structure. They supported the program because the insurance fund would grow at a rapid rate (due to the fact that business comes in a short period of time) and would keep down the size of the national debt in the event of enemy attack. Additionally, the existence of the fund reduced contingent liabilities and met the shared administration-congressional goal of eliminating non-war expenditures which could deplete the federal treasury. (See Congressional Record, 77th Cong., 2nd sess., 1942, Vol. 88, Part 2, pp. 2656-2661.)

The war damage insurance program was the first wholly federal insurance program, the first to utilize the underwriting and adjustment services of the private insurance industry for a fee, and the first to utilize risk sharing between the federal government and the private insurance industry. At the end of the war, the WDC had collected \$250 million in premiums, had spent \$39 million in operating expenses, leaving a net profit of \$210 million, of which \$21 million was distributed to participating private insurance companies (U.S. Congress, 1956a, p. 254).

A NATIONAL NATURAL DISASTER RELIEF PROGRAM

Under the Truman administration, the foundation of a national natural disaster relief program was established. Instead of enacting relief bills for victims of specific disasters, Congress passed the Disaster Relief Act of 1950 (P.L. 81-875) to provide "an orderly and continuous means of assistance by the Federal Government to the States and local governments in carrying out their responsibilities to alleviate suffering and damage resulting from major disasters." The President was authorized to determine what constituted a major disaster, and after making this declaration, to direct federal agencies to provide aid to the victims.

This law formally took notice of the fact that natural disaster relief was a local responsibility, but some disasters would be of such severity that relief and rehabilitation would be beyond the financial capabilities of state and local governments. State governors had to formally request the President to declare a major disaster. If granted, the federal government would then provide disaster assistance "to supplement the efforts and available resources of States and local governments in alleviating the disaster."

The philosophy of the administration in regard to federal disaster policy was stated in Executive Order 10221 issued March 2, 1951 to implement the Disaster Relief Act. In it, President Truman explained:

"Federal disaster relief provided under the act shall be deemed to be supplementary to relief afforded by State, local, or private agencies and not in substitution thereof; Federal financial contributions for disaster relief shall be conditioned upon reasonable State and local expenditures for such relief; the limited responsibilities of the Federal Government for disaster relief shall be made clear to State and local agencies concerned; and the States shall be encouraged to provide funds which will be available for disaster relief purposes."

In addition to providing conditional assistance to state and local governments in an orderly fashion, the Disaster Relief Act provided authority for the repair, reconstruction, or restoration of federal facilities damaged or destroyed in any major disaster.

FEDERAL FLOOD INSURANCE - THE FIRST TIME AROUND

The new federal disaster relief policy was put to the test almost immediately after its enactment. From May 15 to early July, 1951, heavy rains caused a great flood in Kansas, Missouri, Oklahoma, and parts of adjacent states. Structural flood control projects were unable to prevent America's first billion dollar disaster. According to the President in his report to Congress (U.S. Congress, 1951), under provisions of the Disaster Relief Act of 1950, federal agencies were directed to provide emergency aid, and \$25 million was

appropriated to assist communities in providing relief.

In his evaluation of the national disaster relief effort, Truman stated:

"in a disaster of this magnitude, the combined resources now available to the Federal Government, the States, and the local communities, and private organizations such as the American Red Cross, are far from enough to accomplish the tremendous task of restoring for the Nation the productivity and economic vitality of one of its major regions" (U.S. Congress, 1951, p. 3).

Truman further noted that the full federal response authorized by the Disaster Relief Act of 1950 fell short of relieving human suffering, restoring economic life, and protecting against future losses from similar disasters. Realizing shortcomings in flood control projects to prevent major floods from recurring and in disaster loans to provide rehabilitation "without a crushing burden of new debt for every individual," Truman recommended that Congress take measures "urgently required to meet the needs of the present and of the immediate future" (U.S. Congress, 1951, p. 4). Specifically, he asked Congress to appropriate \$400 million for the following purposes:

- "1. To indemnify the flood victims for a portion of their losses of real and personal property.
2. To make and guarantee loans on liberal terms for the building of homes and businesses to replace those destroyed.
3. To help farmers drain and rehabilitate their land, replace buildings, and restore the productive capacity of their farms, through on-farm assistance and disaster loans.
4. To permit loans where necessary to enable States and local government participation in the rehabilitation activities.
5. To provide funds to establish a national system of flood disaster insurance, similar to the war damage insurance system of World War II" (U.S. Congress, 1951, p. 4).

In explaining his desire for Congress to enact a national flood insurance program, Truman noted that the "lack of a national system of flood-disaster insurance is now a major gap in the means by which a man can make his home, his farm, or his business secure against events beyond his control" (U.S. Congress, 1951, p. 5). Like the war damage insurance program, he suggested a system of flood insurance incorporating risk based rates and utilizing the facilities of private insurance companies "based, if possible, upon private insurance with reinsurance by the Government" (U.S. Congress, 1951, p. 5). And to avoid future situations where the federal government provides only partial relief to victims, Truman concluded that "as a permanent national policy, insurance is far superior to direct Federal payments" (U.S. Congress, 1951, p. 5).

On May 5, 1952, President Truman sent a second message to Congress containing draft legislation to create a national flood insurance program. In it, he argued that federal involvement was necessary because private insurance companies were not providing flood insurance and it was likely that they would not be able to at *reasonable rates*. Truman recognized that flood control was a necessary element in a federal mitigation strategy; however, he concluded that "flood insurance will always be necessary to protect people against the financial losses which may be caused by unexpected and catastrophic floods which it is impossible to prevent" (U.S. Congress, 1952, p. 2).

Truman's draft legislation [later introduced in the House by Representative Richard Bolling (D, Missouri) as H.R. 7726 and Senator Burnet Maybank (D, South Carolina) as S. 3146] contained several innovative features. It encouraged homeowners to construct flood-resistant structures, proposing a maximum amount of insurance for any one person or business of \$250,000 but limiting the insurance payment to 90 percent of the loss sustained after a \$300 deductible to "preserve the incentive for the property owner to do what he can to protect his own property" (U.S. Congress, 1952, p. 2). The proposed legislation also authorized "Federal agencies that make or guarantee loans to require borrowers to purchase flood insurance where it is available" (U.S. Congress, 1952, p. 3). Finally, the draft legislation proposed that "properties whose use is in conflict with State or local flood zoning laws" not be issued insurance or reinsurance.

Senator Frank Carlson (R, Kansas) concurred with the President in the need for flood insurance, but also saw the need for insurance for other natural disasters including earthquakes and hurricanes which was not being provided by the private insurance industry. On September 20, 1951, he introduced S. 2148 to establish a National Disaster Insurance Corporation. The provisions of the bill were similar to those advocated by President Truman.

The response of the President and Congress to the 1951 floods marked a turning point in the underlying principles of federal disaster relief. The idea that structural mitigations could prevent disasters vanished as the dominant principle. In its place, the historic doctrine used in colonial Louisiana specifying the national government's assumption of the obligation to protect property owners from natural disasters, the state's and local government's role as implementer and enforcer of protective laws, and the property owners' assumption of financial responsibility for mitigations directly benefiting them was substituted.

Unfortunately, circumstances in 1951 were far different from those in colonial Louisiana. It was no longer true that the actions of a property owner or a group of them would not affect others. The systems concept, lost in flood control in 1936, remained absent in the new notion of federal disaster relief. As populations moved to the suburbs and great subdivisions were constructed, the federal government failed to take into account the potential flood damages to neighboring communities caused by the altered landscape. Because the focus of federal policy was on individuals, contractors and home owners alike were free to ignore the consequences of their actions on others, thereby creating a situation where populations in the path of new runoff patterns would be placed in

increasingly perilous positions, often subject to floods no matter what they did to protect themselves.

Although President Truman urged immediate Congressional action on his proposal, his term of office was nearing its end and there was too little time for Congress to act. The House Committee on Banking and Currency did hold hearings on H.R. 7726 on July 1, 1952, but no further actions were taken on the House side. The Senate Committee on Banking and Currency took no action on either the President's or Senator Carlson's bills.

FEDERAL FLOOD INSURANCE - THE SECOND TIME AROUND

Disaster insurance did not stay off the national agenda for long. Following a devastating tornado in Worcester, Massachusetts, in 1953, Representative Philip Philbin (D, Massachusetts) introduced the National Disaster Relief Corporation Charter Act (H.R. 6129) to establish a Government-owned corporation to provide insurance and reinsurance against losses from catastrophes eligible to be declared major disasters by the President in the Disaster Relief Act of 1950. The bill did not make it out of committee; however, insurance was fast becoming the preferred congressional option for a federal disaster recovery program in the aftermath of major disasters.

In August, 1955, floods caused by Hurricane Diane ravaged the northeastern United States. Immediately, President Eisenhower met with governors of the flood-stricken states and announced that he would look into the feasibility of a federal insurance program to prevent future disaster losses. Shortly thereafter, Senator J. William Fulbright (D, Arkansas), Chairman of the Committee on Banking and Currency, asked committee staff to prepare a study on federal disaster insurance and permitted Senator Lehman of New York to conduct hearings on behalf of the full committee so when Congress reconvened in January a comprehensive bill could be introduced and quickly enacted.

Many members of Congress drafted bills which were discussed in the Senate hearings (See U.S. Congress, 1955 and 1956a). From these, three bills [S. 2768 sponsored by Senators Kennedy (D, Massachusetts) and Saltonstall (R, Massachusetts), S. 2862 drafted by the administration and carried by Senator Bush (R, Connecticut), and S. 3137, the Senate committee bill sponsored by Senator Lehman (D, New York) and ten co-sponsors including Senator Kennedy] emerged as the basis of a final compromise. On the House side, companion bills for S. 2862 (H.R. 8278) and S. 3137 (H.R. 7960) were introduced.

The Senate Committee on Banking and Currency staff report provided the first full-scale evaluation of public policy issues dealing with federal disaster insurance. It provided the principles on which the Congress debated the flood insurance issue. Comprehensive lists of arguments in favor and in opposition to a federal flood insurance program were prepared so competing bills and principles could be evaluated. (These lists are reproduced in Tables 3 and 4.) As a general conclusion, the staff believed that a federal insurance program would allow individual victims to recover more "whole" than other relief

**TABLE 3: ARGUMENTS FOR A FEDERAL FLOOD INDEMNITY PROGRAM
DEVELOPED BY STAFF OF THE SENATE COMMITTEE ON CURRENCY
AND BANKING, 1956**

According to the staff, the main arguments for a federal indemnity plan would include the following:

1. Keeps disaster victim's credit sound.
2. Quickens his economic recovery.
3. Tax income recuperates faster.
4. Sales tax receipts increase quicker.
5. Reimbursed losses can't be deducted for Federal income tax purposes.
6. Would complement and save costly expense of superflood protection.
7. Would offset present demands for Government relief and would be supported by advance contributions.
8. Variable premium rates discourage use of floodable land.
9. Would help morale of potential victims.
10. Government need not seek a profit on the program.
11. Government can meet catastrophic impact of demands.
12. Federal reinsurance could limit net exposure of private insurer, enabling low actuarial rates for that portion of coverage. Adding a low nonactuarial rate for Government exposure could result in a low overall premium rate.
13. Government can do what private industry or people can't or won't do - provide a workable flood indemnity program.
14. Objections to some features of certain plans can be met without discarding the whole plan.
15. Statutory limits can control Government exposure to risk.

Reproduced from U.S. Congress, 1956a, p. 17.

**TABLE 4: ARGUMENTS AGAINST A FEDERAL FLOOD INDEMNITY PROGRAM
DEVELOPED BY STAFF OF THE SENATE COMMITTEE ON CURRENCY
AND BANKING, 1956**

According to the staff, the arguments against a federal indemnity plan would include the following:

1. Actuarial premiums are discouragingly high.
2. Without them, Federal subsidies are involved.
3. Those not participating will still demand Federal flood relief.
4. Some proposals conflict with insurance now available.
5. Charging for a peril not present violates insurance principles.
6. Insurance is a deceptive description of an indemnity program; its failure may impair confidence in true insurance operations; its success may lead to unjust comparison with private insurance rates.
7. Private insurers may hesitate to issue disaster policies even with Federal reinsurance.
8. Flood losses are catastrophic and frequent; hence insuring them is feared unprofitable.
9. Mortgagees will self-insure against flood risk by selectivity.
10. Insisting on mortgagor's carrying flood insurance would place a mortgagee at a competitive disadvantage.
11. So would adding flood risk to extended coverage.
12. Excluding high-risk areas denies benefits where needed; including them induces a high premium or an unfairly distributed premium.
13. Contractual Federal insurance policies may impede sound Federal fiscal management.
14. Providing relief on the basis of actual disaster facts is more practical.
15. The brother's keeper method of handling disaster relief has worked well.
16. Flood-protective works should be emphasized.
17. A short program will not give a true measure of failure or success.
18. Issuing high-risk policies to many compounds, rather than spreads, the risk.
19. Voluntary insurance would be plagued by adverse selection.
20. Uniform charges would unwisely encourage use of floodable lands.
21. Those building in known flood-risk areas have probably paid little for the land.
22. Statutory limits on Government exposure can be easily pierced on demand.
23. Such limits on eligible beneficiaries won't hold against demands from others wanting to be beneficiaries.
24. Experience shows tendency to drop flood coverage in nonflood years.
25. The same trend develops when premium rates increase.
26. While a small program can't spread the risk, a large program would be costly upon failure.

Reproduced from U.S. Congress, 1956a, pp. 17-18.

alternatives; would lessen the financial impact on the federal purse, both in terms of relief outlays and lost tax revenues; and could provide coverage at reasonable rates which the private insurance industry could not.

In order to decide the detailed composition of a federal program if one was desired, staff prepared a list of 14 critical issues to be resolved. (See Table 5 for a reproduction of the staff list.) After lengthy hearings and debate, the Senate Committee on Currency and Banking unanimously recommended a flood insurance program which they believed maximized the positive attributes and minimized the negative consequences of a federal insurance program. S. 3732, largely a reconciliation of the Lehman-Kennedy bill (S. 3137) and the Bush bill (S. 2862), authorized that a new agency, the Federal Flood Insurance Administration, be created and located in the Housing and Home Finance Agency, and further authorized it to issue direct flood insurance and reinsurance for policies issued by private insurance companies. Following the example set by war disaster insurance, private insurance companies would market policies and adjust claims. Recognizing the extreme variance in flood damages from one year to the next, premiums would be fixed at actuarial rates based on existing flood damage data "to produce sufficient proceeds over a reasonable period of years to pay all claims for losses" (U.S. Congress, 1956b, p. 9). To keep rates reasonable and to achieve marketability of the insurance, a ceiling was placed on the rates and a minimum rate equal to 60 percent of the actuarial rate was set to determine and limit acceptable subsidies. Any subsidies would be shared on a fifty-fifty basis between the federal government and the states. No insurance would be offered in any state where the state government refused to pay its share.

Voluntary flood insurance would be offered on all real and personal private property with a limit of \$10,000 per residence and \$250,000 per business. However, the government would limit its exposure to \$3 billion (\$5 billion with the President's approval) plus the amount collected in the insurance fund, even though the staff noted that this would not approximate the losses from a catastrophic event. To avoid "nuisance" claims, each policy had a \$100 deductible, and the government would pay at most 95 percent of the rest of the claim, the policy holder being responsible for the remaining 5 or more percent.

As all previous federal insurance programs had done, this program advocated the participation of private insurance companies who were encouraged to offer flood insurance in excess of the federal policy. To gain their acceptance, reinsurance was offered to limit potential losses. In addition, as an ongoing activity, the Commissioner of the new agency was directed to study the feasibility of turning over the flood insurance program to the private insurance industry.

Mandatory mitigation was included. Any property in violation of local flood zoning laws would be excluded from coverage. And after June 30, 1958, the Commissioner would be permitted to deny insurance and reinsurance to geographical areas where the local government had not adopted minimum local flood zoning laws thought necessary by the Commissioner to reduce potential flood damages.

**TABLE 5: SPECIFIC TOPICS NEEDED TO BE DECIDED FOR DEVELOPMENT OF A
FEDERAL FLOOD INDEMNITY PROGRAM, DEVELOPED BY STAFF OF THE
SENATE COMMITTEE ON CURRENCY AND BANKING, 1956**

According to the staff, the following specific topics for development should be noted:

1. Policy conditions?
2. Insurance or reinsurance?
3. Use private insurers as issuers?
4. Use private insurers to recommend claim adjustments?
5. Government administering agency?
6. Advisory committee makeup?
7. Total liability?
8. Government reimbursement of loss on private policies?
9. Types of policies?
10. Items insured?
11. Require Government-aided mortgagors to carry disaster insurance?
12. Reinsure excess loss on portfolio basis?
13. Group insurance for community residents?
14. Line of credit to potential victims on payment of commitment fee?

Reproduced from U.S. Congress, 1956a, pp. 18-19.

After subsequent Congressional debate, the Federal Flood Insurance Act of 1956 (P.L. 84-1016) was enacted. In addition to the features of S. 3732 described above, the law authorized the Administrator under this Act to establish a program of loans, and a program combining insurance and loans, to assist flood victims. For those without insurance, loans would exclude the first \$500 in damages. The short-term goal of this law was for the federal government to provide assistance to flood victims; the long-term goal was to have the private insurance industry take over the entire program.

As a program designed to help individual victims and devastated regions recover from natural disasters, the Federal Flood Insurance Act of 1956 had several admirable features. It concentrated its focus on the victim, providing sufficient insurance for most families and small businesses to recover without additional financial burdens. For those with more extensive damages, loans were available and guaranteed. No one was left out of the program; if voluntary insurance was not purchased, victims were still eligible for loans at subsidized rates. Coordination of insurance and loan procedures was assured as both were directed by the same agency.

The required mitigation, adoption of land use laws, allowed local and state governments to apply regional planning to the flood problem, a gap created when the Flood Control Act of 1936 caused the Army Corps of Engineers to turn away from a systems analysis of flood control. At the same time, individuals, who often had no control over potential flood damages to their properties and became victims because of the actions of others, were not made responsible for mitigation measures.

Three aspects of this bill proved to be troublesome. First, the statutory requirement that each state contribute 50 percent of the subsidized premiums of its citizens or forfeit the privilege of having federal flood insurance was opposed by most states as state constitutions typically prevented them from disbursing funds that would directly benefit specific private individuals or businesses. Congressional leaders also opposed this provision because states would in essence be given veto power over a national program, but reluctantly agreed to include it in the legislation at the behest of the administration, who originally proposed it. After the bill passed, there was little movement by states to prepare the required constitutional amendments.

Second, there was a great fear that actuarially determined premiums could not be determined and the federal government would be liable for billions of dollars worth of damage resulting from a catastrophic flood. The data needed to make such decisions had not been collected by insurance companies because most had decided that actuarially sound rates would be unreasonably high for all but the highest risk land owners. There was also no completed analysis of flood data for the nation. W. B. Langbein of the United States Geological Survey, in testimony before the House Committee on Banking and Currency, noted that the Geological Survey had completed only 11 statewide studies of the frequency of floods which could be used to help determine such rates (U.S. Congress, 1956c, pp. 115-121).

Third, the provision that administrative expenses would come from annual congressional appropriations instead of from the premiums allowed congressional opponents another opportunity to defeat the bill through the withholding of appropriations. When appropriations to implement the Federal Flood Insurance Act of 1956 were requested in 1957, the Senate enthusiastically supported authorization; however, opponents in the House defeated each of several attempts to pass the appropriations. Two predominant arguments in the floor debates seemed to have swayed a majority of House members to withhold funds. The fear that rates would be set too low prompted many to believe that the federal government's insurance exposure would lead to extensive borrowing from the Treasury and force taxpayers to cover the cost of floods. In addition, opponents argued that losses would approximate the full face amount of the insurance exposure of the program, an assumption that implies that everyone in the country with a flood insurance policy will file a claim for the full extent of their policies. Although that assertion was blatantly erroneous, it carried the day.

The flood insurance program never got off the ground when the House refused to appropriate the necessary funds. The law remained in the statute books but was not implemented.

DISASTER RELIEF TURNS TO GRANTS

During the mid-1960's, the Alaska earthquake and Hurricane Betsy again pointed out the inadequacies of the Disaster Relief Act of 1950 and forced the federal government to enact special laws to promote relief and recovery. For homeowners and small businesses, the government's main form of relief was a disaster loan provided by the Small Business Administration (SBA), which assumed this role in 1953 after the Reconstruction Finance Corporation was disbanded.

According to Kunreuther (1973) and FEMA (1983), more direct aid was required in Alaska because President Johnson's administration did not want this new state to "go under." The government's response ushered in the direct subsidy or grant as a federal disaster relief policy.

The 1964 Amendments to the Alaska Omnibus Act (P.L. 88-451) authorized federal agencies "to compromise or release such portions of a borrower's indebtedness under programs administered" by them and permitted refinancing of any outstanding indebtedness. Home mortgages could also be retired or adjusted up to \$30,000 by the state on a fifty-fifty match of the federal government provided the mortgagor absorbed the equity loss and agreed to pay \$1,000 on the loan balance. This retroactive mortgage indemnification program was the first to be applied on private residences and the first retroactive indemnification program since the 1928 Flood Control Act. Congress debated whether to authorize a retroactive earthquake insurance program, but "the administration objected to the precedent and believed that the question of prospective insurance required much more study" (FEMA, 1983, p. 38).

One year later, following Hurricane Betsy, Congress enacted the

Southeast Hurricane Disaster Relief Act of 1965 (P.L. 89-339). To provide assistance in the reconstruction of homes, small businesses, and farms, the law authorized that borrowers of either SBA or Farmers Home Administration loans, at their option, can "on that part of any loan in excess of \$500, (A) cancel up to \$1,800 of the loan, or (B) waive interest due on the loan in a total amount of not more than \$1,800 over a period not to exceed three years." This was the first time the federal government permitted the forgiveness of loans. As a public policy, it had obvious positive short-term reconstruction benefits; however, it also subsidized the continued development of flood plains and increased the probability that future flood losses would continue.

Since the passage of these two laws, some form of grant provision has been included in virtually every subsequent disaster relief act. Currently, in the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100-107), families can receive direct grants up to \$10,000 with respect to any single Presidentially declared major disaster [Sec. 411. (f)].

FLOOD INSURANCE, A THIRD TRY

The Southeast Hurricane Disaster Relief Act of 1965 mandated the Secretary of Housing and Urban Development (HUD) to undertake studies of flood and earthquake insurance and to report his findings and recommendations to Congress. The flood insurance study was completed in the required nine months following the enactment of the law. It wholeheartedly supported a federal flood insurance program. As a consequence, the National Flood Insurance Act of 1968 (P.L. 90-448) was created.

As part of the 1968 act, all but one section of the 1956 act was repealed. In its place, the 1968 act offered no new precedents, but it refined and enhanced the 1956 law. Changes reflected a greater understanding of the flood problem among technical experts and the removal of the barriers which prevented the 1956 act from being implemented. Flood maps for all 50 states were now considered sufficient for actuarial rates to be determined. The program remained voluntary and permitted subsidies which "would encourage prospective insureds to purchase flood insurance." Rates now included administrative expenses. State and local participation was conditioned upon a willingness to participate and giving assurance that permanent land use and control measures would be adopted by June 30, 1970.

The most significant difference between the 1956 and 1968 laws was the shift in emphasis placed on mandatory mitigation by state and local governments. At both times, the federal government considered loss prevention to be its paramount concern. In 1956, flood insurance was viewed as a supplementary program to flood control, providing relief for those areas which flood control was either not yet constructed or not economically justified. In 1968, it was obvious that the flood problem in the United States was worsening, even after billions had been expended on flood control projects. Flood insurance was now looked at as a potential primary vehicle to reduce future damages, and Congress shifted a greater part of the responsibility for loss prevention to the

state and local mitigation provisions of the insurance program.

In 1956, Congress had limited requiring states' mitigation efforts to land use or zoning measures. The prevailing attitude among legislators was expressed by Senator Lehman in response to a question by Governor Hodges of North Carolina concerning the possibility of the federal government imposing mandatory building codes. He stated, "Of course, the Federal Government could not possibly presume to adopt or compel stricter building codes" (U.S. Congress, 1955, p. 841).

The reluctance of Congress to mandate states and local governments to adopt loss prevention measures as a condition of participating in a national flood insurance program vanished by the time the 1968 law was written. Congress specifically authorized the investigation of potential mandatory state and local actions to "include, but not be limited to, laws, regulations, or ordinances relating to encroachments on stream channels and floodways, the orderly development and use of flood plains of rivers and streams, floodway encroachment lines, and flood plain zoning, building codes, building permits, and subdivision or other building restrictions" [Section 1361. (b)].

Not only did the 1968 law seek to use flood insurance as a means to promote loss prevention, it also transferred the systems analysis of flood control to the states. With the ball in their court, states slowly began coping with statewide flood problems including stormwater runoff. Starting with Pennsylvania in 1978, state governments began to enact stormwater management acts which compelled local governments to adopt appropriate regulations to control downstream flooding caused by new developments (Kaiser and Burby, 1987). Not all states have acquired a comprehensive understanding of the dynamics of water systems within their boundaries, and until they and their neighbors go further and construct regional models of shared or overlapping river systems, it is unlikely that future flood losses will be abated.

FLOOD INSURANCE PARTICIPATION GUIDELINES AMENDED

The National Flood Insurance Program (NFIP) got off to a poor start. As a voluntary program, few eligible localities joined, and few individuals purchased insurance. After a few years and for the first time, Congress decided that stringent penalties for nonparticipating localities and strict requirements for participating localities would be necessary to attain desired levels of loss prevention. According to the earlier HUD study (U.S. Congress, 1966), a mandatory loss prevention program would discourage flood plain development and offset the negative effects of the existing government disaster grant program. With annual flood losses continuing to increase at "an alarming rate" according to congressional findings, the Flood Disaster Protection Act of 1973 (P.L. 93-234) was enacted to require known flood-prone states and communities, "as a condition of future Federal financial assistance, to participate in the flood insurance program and to adopt adequate flood plain ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses." For those communities who would choose not to

participate, no federal financial assistance for acquisition or construction purposes nor flood insurance on existing homes would be available.

The NFIP has been in existence for over twenty years. The jury is still out on how successful it will be. A thorough investigation of the program was conducted by the Subcommittee on Policy Research and Insurance of the House Committee on Banking, Finance and Urban Affairs in 1989 and 1990. Among the issues raised at hearings in May, 1989, was whether premium rates had risen to a point of being unreasonable. In her testimony, Representative Lindy Boggs (D, Louisiana) noted that since 1981, when "an effort was initiated to make the program self-supporting," that rates had increased "120 percent in the 7 years from 1981 to 1988." According to her, rate increases were "so significant as to constitute a shift away from the legislative requirement that rates be kept affordable" (U.S. Congress, 1989, p.7).

At the same hearings, Representative Thomas Carper (D, Delaware) testified that less than 15% of the eligible households have purchased the insurance, bringing into question the enforcement procedures of federal instrumentalities which monitor compliance. Finally, according to Federal Insurance Administration (FIA) data, a large percentage of the flooding occurs in areas previously flooded and in areas not considered flood-prone. These problems bring back the issues of whether the lack of a systems approach has created a fundamental flaw in how flood-prone areas are identified and in whether potential flood losses are underevaluated, leading to a less than comprehensive mitigation program to prevent future losses.

SUMMARIZING FEDERAL DISASTER INSURANCE PROGRAMS

For the past 80 years, Congress has produced a rich history of floor debates, committee hearings, and staff reports focusing on the role of federal insurance in the disaster recovery process. In that time, it has established a set of principles delimiting when federal involvement should be required in a disaster insurance program and what it should contain.

The most important principle centers around what constitutes sufficient justification for federal participation in a primary insurance and reinsurance program. The concept of a *market failure* takes center stage. Using the war risk insurance programs developed in 1914 and 1940 as guidelines, Congress has determined that when the private insurance industry has been unable to offer primary coverage at reasonable rates and/or does not have the capacity to provide reinsurance, then a market failure exists and Congress may act. The federal government may not, however, create an insurance program whose aim is to supplant private sector involvement. Its role is both secondary and complementary to what the private insurance industry is capable of offering. Congress has visited and revisited this issue several times since 1914 and has always affirmed the position that the federal government should be a reluctant partner with the private insurance industry, serving to strengthen a weak market while preparing for the time when the private industry could take over the entire program.

During World War II, Congress extended its definition of a market failure to include situations where the private insurance industry refused to offer any insurance at all due to financial unsoundness. The first example of such a program was the establishment of federal war damage insurance to protect private property from enemy attack. This program served as the basis for the flood insurance program.

Since 1933, when Congress authorized federal loans to finance the repair or reconstruction of structures damaged by the Long Beach earthquake, all disaster relief and recovery programs, including insurance, have been guided by the principle of making victims whole. Their focus has been on the individual.

To allow for individual recovery, Congress has established that premium rates be reasonable, actuarially sound, and risk based. Mitigations have been linked with rate-setting since 1914, when characteristics of ships were factored into the rate-setting mechanism. The underlying principle for individual recovery is that people should be allowed to return to their predisaster conditions without personal gain and taxpayers should suffer no losses. In accordance with welfare principles, however, there is an exception; subsidies can be granted to low income sufferers.

Beginning with crop insurance, Congress enacted disaster insurance programs only after it was convinced that insurance represented fiscally responsible public policies when compared to alternative forms of government assistance. Contingent liabilities were minimized once actuarial rates were established.

Congress realized in 1815 that it had the obligation to protect citizens from unreasonable risk. Following the New Madrid earthquake, it enacted a land use law to prevent further human development of injured property. Since then, Congress has championed land use and zoning ordinances to reduce losses from disasters. Laws of this nature were introduced in flood control and later flood insurance programs.

Finally, risk sharing, originally established as a means to entice private insurance involvement in the war damage insurance program begun in 1942, has been promoted in federal insurance programs. If the long-term goal of federal programs is to eventually turn over their operations to the private sector, then risk sharing provides an opportunity for private companies to develop underwriting practices and to gain the experience needed to create a sound private market.

**A FISCAL RESPONSIBILITY ANALYSIS
OF A
NATIONAL EARTHQUAKE INSURANCE PROGRAM**

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SEPTEMBER 1992

JUNE 1993

VOLUME 35

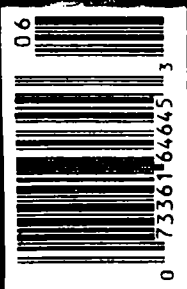
NUMBER 5

\$4.50

ENVIRONMENT



Beyond the Ark



Beyond the Ark

A New Approach to U.S. Floodplain Management

By Jon Kusler and Larry Larson

Floodplains occupy a significant portion of the United States. About 7 percent, or 178 million acres, of all U.S. land is floodplain, and, of course, the percentages are much higher along the coasts and major rivers, where most of the larger cities are located.¹ Floodplains are lands subject to periodic inundation by hurricanes, storm tides, heavy rains, and spring snow melt. They are the lowlands adjoining the channels of rivers, streams, and other watercourses and the shorelines of oceans, lakes, and other bodies of water.

Floodplains are shaped by water-related, dynamic physical and biological processes and include many of the nation's most beautiful landscapes, most productive wetlands,

and most fertile soils. They are home to many rare and endangered plants and animals, as well as to sites of archaeological and historical significance. In their natural state, floodplains have substantial value. These complex, dynamic systems contribute to the physical and biological support of water resources, living resources, and cultural resources. They provide natural flood and erosion control, help maintain high water quality, and contribute to sustaining groundwater supplies. Therefore, proper management of floodplains is important to preserve their value and to reduce losses caused by flooding.

The United States is now at a pivotal point in floodplain management. A national status report on floodplain management was released last year by the Federal Interagency Floodplain Management Task Force, and federal agencies responsible for reducing the losses caused by floods are about to begin deliberations on future directions in floodplain management.² At the same time, the Clinton administration and Congress wish

to reduce spending in light of the \$4-trillion national debt. Also, little money is available at state and local levels for flood-loss reduction measures and disaster relief.

The task force's status report, entitled *Floodplain Management in the United States: An Assessment Report*, is the first assessment of the status of the nation's floodplains in 25 years and the most comprehensive assessment and description of floodplain management policies ever undertaken (see the box on page 8). It is an excellent, useful, and even-handed report, but its documentation of all aspects of existing conditions is also its chief weakness because a discussion of existing conditions does not, in itself, adequately set the stage for consideration of possible future directions. Some issues and trends are much more important than others for suggesting informed future directions.

Substantial progress has been made in the last 25 years in U.S. floodplain management. This progress is especially evident in the increased public awareness of flood hazards and the

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ability of humans to predict potential flooding and to influence risk exposure. But floodplain management in the United States has gone about as far as it can go with its existing approaches. Prime dam sites have been exploited; major floodplains have been mapped; and minimal floodplain regulations have been adopted by more than 18,200 communities.³ Increased funding for existing approaches is not the answer to many of the remaining problems. Instead, a fundamental change is needed. The focus of floodplain management must change from consideration of property losses alone to the consideration of the many purposes of floodplains. Management should be extended to smaller rivers and streams and tailored to watershed conditions. Broad-brush approaches to mapping and regulation that reflect only flood elevations should be replaced, in many contexts, by approaches that also reflect water velocity, sediment regimes, and the changes in runoff that are caused by watershed development. Multiobjective mitigation plans and implementation strategies involving landowners, citizen groups, and local governments should not only improve guidance for future development of floodplain areas but also address the restoration of stream, wetland, and riparian zones. A recent report by the National Academy of Sciences calls for the restoration of 400,000 miles of rivers and streams.⁴ It notes that, of the nation's total mileage of rivers and streams, only 2 percent are high-quality, free-flowing segments.⁵

There are many examples of such multiobjective protection and restoration efforts.⁶ They have been variously called "greenway," "multiobjective river corridor management," and "environmental corridor management" programs.⁷ More than 500 communities have implemented such programs for some or all of their rivers and streams. These programs have been characterized by innovative, problem-solving approaches and broad public involvement (see the boxes on

pages 11 and 32).

A number of federal programs encourage such efforts, including the National Park Service's Rivers and Trails Program, the Army Corps of Engineers' floodplain management program, the Tennessee Valley Authority's floodplain management program, and the Federal Emergency Management Agency's community rating system. Some state floodplain, river, wetland, and open space programs also encourage such efforts. The California Urban Stream Restoration Program has been particularly successful in encouraging low-cost community stream restoration

efforts with broad public involvement through technical assistance and small grants-in-aid to communities. Other examples include the Missouri stream restoration program, the Massachusetts greenway program, and the Maryland greenway program. Despite the success of such projects, no coordinated national legislation, policy, or program exists to support such efforts.⁸

At one time, structural changes—such as dams, levees, channel alterations, and shoreline protection—were the primary approach for addressing flood losses. Although such structural approaches have reduced flood losses,

EVALUATING THE EFFECTIVENESS OF FLOODPLAIN MANAGEMENT

The Federal Interagency Floodplain Management Task Force's assessment report concluded that it was difficult to evaluate the effectiveness of floodplain management because of a lack of specified goals, baseline data, and monitoring. Nevertheless, the report reached a number of significant observations that were outlined in the summary and executive summary:

- Public recognition of flood hazards is now widespread.
- Judicial support for regulations is also widespread, which increases the liability of landowners who undertake activities that increase flood hazards on other lands.
- Some reduction has occurred in floodplain development.
- A reduction in losses to new development has occurred because of regulatory standards.
- A shift from federal domination toward a more equal federal, state, and local partnership has occurred.
- There is now greater awareness that no single floodplain management strategy is appropriate for every area.
- There has been success in reducing loss of life, but there has been no decline in overall flood losses.
- Floodplain regulations have not arrested deterioration of natural and cultural functions.
- A truly unified floodplain management program is not in place.

The report also outlined a number of opportunities for increasing the effectiveness of floodplain management.

These include

- setting flood-loss reduction goals to be achieved by a certain date;
- improving the database;
- conducting new research;
- integrating strategies for flood-loss reduction and for restoring and preserving natural resources;
- improving coordination and integration in floodplain management;
- increasing cooperation among all persons, programs, and agencies with an interest in reducing flood losses;
- developing methods for better management of high-risk flood hazard areas;
- adopting broader watershed-based and river corridor management approaches;
- improving the incorporation of local conditions in floodplain management approaches;
- helping rural and economically disadvantaged areas;
- improving incentives to encourage the best mix of management measures and better enforcement of floodplain regulations;
- improving awareness and education, including more training and education for government officials; and
- improving techniques for restoring and preserving the natural and cultural resources of floodplains.

SOURCE: Federal Interagency Floodplain Management Task Force, *Floodplain Management in the United States: An Assessment Report*, doc. FIA-17/May 1992 (Washington, D.C.: Federal Emergency Management Agency, 1992), Chapters 15 and 18.

they often do so at great cost and with great environmental impact. Since 1968, considerable progress has been made in implementing nonstructural loss-reduction measures, such as regulations, warning systems, and evacuation plans. Of the 22,000 flood-prone communities in the United States, more than 18,200, or 82 percent, have adopted floodplain management regulations and participate in the National Flood Insurance Program (NFIP). More than 2.6 million flood insurance policies are presently in force through this program. The Federal Emergency Management Agency (FEMA) has mapped 18,492 communities, and 2,463 restudies have been completed or are in progress.⁹

Despite these efforts, flood losses continue to increase. Per-capita damages have increased despite measures to reduce such losses, although the rate of increase has slowed. A 1987 study for FEMA estimated that 9.6 million households in 17,466 communities with a total of \$390 billion in property value were at risk from flooding. From 1916 to 1985, flood-related deaths averaged 104.4 per year. Per-capita flood-related deaths have decreased, but per-capita flood losses were 2.5 times as great from 1951 to 1985 as from 1916 through 1950, after adjustment for inflation.¹⁰

In fact, 1992 was the most expensive year in U.S. history for natural disasters, with total estimated losses from floods and hurricanes exceeding \$30 billion. In fiscal 1992, 46 presidentially declared disasters and 2 emergencies occurred—the largest number in recent history. Of these, 2 were related to contaminated water supplies and 38, or 83 percent, were flood-related.¹¹ The paid flood insurance claims for three of these events were huge: \$115 million for Hurricane Andrew's flooding in Florida; \$30 million for Andrew's flooding in Louisiana; and \$30 million for Hurricane Iniki's damage in Hawaii.¹² However, damage caused by wind was much more costly, as is typical of most hurricanes. Hurricane Andrew was the most damaging and powerful hurri-

cane to hit the U.S. mainland this century, and yet it could easily have been worse. However, deaths were exceptionally low: fewer than 70 in Florida and none in Louisiana. This low mortality can be attributed to the effectiveness of the evacuation and warning program, which evacuated an estimated 2.7 million people. Andrew's record-low barometric pressure, sustained winds of 115 to 140 miles per hour, and gusts of 145 to 170 miles per hour resulted in a storm surge of up to 17 feet on Key Biscayne Bay and up to 12 feet in other places.

Although these were unusual storms, they do raise issues such as the cost-effectiveness of various approaches to floodplain management; how cost-benefit ratios are to be calculated; and to what extent floodplain occupancy should continue to be subsidized by the federal government through NFIP. Soaring costs and deficits require, at a minimum, a careful re-evaluation of the effectiveness of various approaches, particularly those that blatantly subsidize continued occupation of high-risk areas at taxpayers' expense and achieve only single-purpose goals.

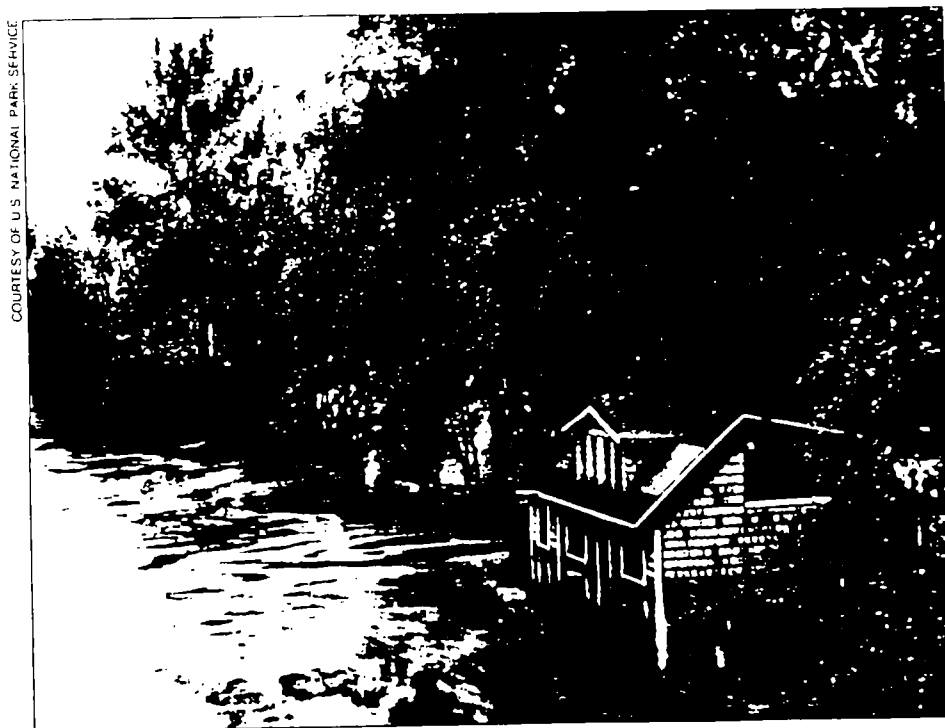
In light of high deficits, how can federal, state, and local governments best reduce future flood losses and respond to floods and other hazards?

Gaps in Current Programs

Structural and nonstructural efforts to reduce losses have been at least moderately effective in addressing certain situations, but they were not designed to address other situations and do not do so. Several major gaps in existing programs must be addressed.

First, despite the expenditure of \$873 million for federal mapping of floodplains, approximately 100 million acres, or one-half of the nation's floodplains, have been mapped.¹³ Unmapped floodplains generally are not subject to regulatory standards by communities or states. Much of the land not subject to management lies along smaller rivers and creeks or along smaller lakes.

In addition, more than 31 percent of flood insurance claims were paid for flood damage outside the mapped "100-year" floodplain.¹⁴ This means that development in these areas is cov-



The costs of rebuilding after a flood today are much higher than those of historical floods, such as this one, which closed the Chesapeake & Ohio Canal in 1924.

ered by federal insurance but is not subject to regulations to guide new development. To remedy this problem, watershed planning and multiobjective river corridor management for these smaller streams and rivers are needed. This is where development is currently unregulated for flood-hazard reduction purposes and where the greatest changes in hydrology are occurring because of urbanization. It is also where community and local organizations can do the most.

Even in mapped and regulated floodplain areas, however, serious deficiencies exist. Much of the mapped floodplain does not have calculated flood elevations but only a general outline of flood risks. As a result, communities do not have the tools they need to guide and protect new development. Even where flood studies are under way, it typically takes five years or more to complete a study and adopt regulations. Often, much of the floodplain is developed by then, putting buildings and people at risk.

Another gap in current programs

concerns high-risk and unusual hazard areas that have been mapped and regulated but whose maps and regulations inadequately address the special problems. Such areas include alluvial fans; floodplains adjacent to rivers or streams with moveable (erodible) channels; combined flooding/erosion areas, both inland and coastal; areas with long-term fluctuations in ground- and surface-water elevations, such as those adjacent to closed basin lakes; ice jam flooding situations; and subsidence areas. In some parts of the United States, such as the West, most of the flood-risk areas are of such a "special" nature.

Despite the massive NFIP and large expenditures for mapping, only limited efforts have been made to prepare special maps for or to apply regulatory standards to special high-flood hazard areas. When the mapping program was first developed more than 20 years ago, the high costs caused a uniform national approach to be developed to map and regulate all hazard areas, even high-risk ones. In ad-

dition, mapping efforts have generally assumed "existing" watershed conditions, despite broad recognition that urbanization causes dramatic increases in future flood peaks.

The time has come for a shift in mapping philosophy from one overall approach for the whole nation—based primarily upon historical flood events—to much more specific mapping of certain areas to reflect geomorphological factors and particular hazards and to anticipate future development. Such mapping is essential to provide local communities with the tools they need to convince citizens that there is a reasonable, credible, and accurate way of identifying and managing the flood hazards on their properties and to develop multiobjective local regulatory and management efforts. Such mapping will be expensive, but it need not be carried out on a nationwide basis and could be undertaken on a cost-share basis with states and communities.

Another gap in existing floodplain programs is mitigating the losses to existing structures, starting with structures that have experienced repetitive loss and substantial damage. The assessment report and FEMA data indicate that, in the 1980s, 30,000 structures (2 percent of NFIP-insured structures) filed 2 or more claims of \$1,000 or more and thus accounted for about 30 percent of the claims paid, or \$747 million. In that same period, about 18,000 buildings suffered damages of more than 50 percent of their value, accounting for more than \$438 million in claims paid.¹⁵ Despite hopes that present regulations would lead to a gradual upgrading or elimination of existing substandard structures, only limited progress has been made through the regulation approach alone. A multiobjective mitigation program designed to prevent or reduce future flood damage to these few structures through elevation or relocation has tremendous savings potential.

The lack of financial incentives and landowner assistance to relocate or upgrade substantially damaged struc-



Most flood insurance policies will pay for rebuilding flood-damaged houses like this one but will not pay to relocate them out of the flood zone.

tures is illustrated by the situation in Florida's Dade County, which includes Miami. In this area, more than 3,000 homes were substantially damaged by the winds of Hurricane Andrew.¹⁶ Insurance will provide funds to rebuild the homes to their "before-hurricane" conditions. The catch is that these homes are in a flood hazard area. Rebuilding at their former level will not reduce the risk of their being significantly damaged by up to four feet of water in the next flood.

It would cost an additional \$30,000 each to elevate the structures. Because the residents' entire savings were lost in the hurricane and their places of employment may also be out of business for an indeterminate time, their ability to pay for or to arrange mortgages for this work is almost nonexistent. Insurance policies, even flood insurance policies, do not provide monies to mitigate against future disasters. Similarly, disaster relief funds can only be used for rebuilding.¹⁷

It is now more than nine months since Hurricane Andrew, and many of the 3,000 homes remain unrepaired. Most federal mitigation grants or loans could help reduce the federal and private outlays when disasters do occur.

Floodplain programs also fail to protect the natural and cultural functions of floodplains. The task force's assessment report discusses the natural and cultural functions of floodplains in some depth and concludes that the existing federal, state, and local floodplain management programs do not adequately protect the pollution-control, habitat, flood storage, recreational, and other natural functions. The report does not, however, adequately examine the reasons why the programs neglect these functions. One reason is that such functions are not mentioned in federal standards for floodplain regulations, and only a relatively small number of communities have incorporated additional provisions into their regulations. In some instances, the availability of subsidized federal flood insurance may

SOLDIERS GROVE: A SUCCESS STORY

Soldiers Grove is a small town in Wisconsin beside the Kickapoo River. The river is subject to flash flooding, and, as the hillsides in the watershed have changed from forests to farmed fields, the flood levels have increased. Small towns such as Soldiers Grove were built around mill dams that provided the power to saw logs and grind flour. These small towns are now subject to repeated flooding.

In the 1950s and 1960s, the U.S. Army Corps of Engineers developed a plan to build a dam on the Kickapoo River. Because the dam was miles above Soldiers Grove, it would only provide partial protection to the community. The corps told the village it would still need a levee to keep the flood waters out of the town.

The people of Soldiers Grove were distraught. According to Tom Hirsch, a planner for Soldiers Grove, the townspeople felt that a levee would merely change the village from "a small, economically dying village subject to flooding" into "a small, economically dying village NOT subject to flooding."

Therefore, the village residents pleaded with the corps to look at other alternatives, such as relocating structures to clear out the high-risk flood hazard area, elevating some structures in lower-risk flood areas, and creating open space uses in the cleared high-risk areas. These nonstructural alternatives did not meet the corps' benefit-cost criteria, mainly because the value of the at-risk downtown property, although low because it was subject to flooding, was still greater than the value of the same property with no buildings on it.

Village residents developed their own plan, one that was designed to ad-

dress not only the village's flooding problem, but also other community needs, such as economic development, energy management, housing, recreation, and the quality of life in Soldiers Grove. Through a series of meetings with the townspeople, help with studies from the state, and some small economic grants, the plan evolved. The entire downtown business district would be relocated away from the river, clearing the way for a community recreation area. Homes on the fringe would be floodproofed through elevation. The new downtown buildings would have to have half of their heat supplied through solar energy. Residential housing would be incorporated with commercial structures. Housing for senior citizens would be close enough to the downtown area so that elderly people could walk to the pharmacy and grocery store.

No federal or state agency had a program that could help fund any part of the plan, and Soldiers Grove, while still seeking funding help, was devastated by another flood in 1978. Only then did the Secretary of Housing and Urban Development release some discretionary funds that provided some leverage to implement the village's plan. More than half the cost of the plan, however, was paid by the village and property owners.

Despite these setbacks, this is a success story. The floodplain management plan was carried out. The community has been relocated, and many new structures have been added. The old business district is now a park.

SOURCE: Wisconsin Department of Natural Resources. "Come Rain, Come Shine: A Case Study of a Floodplain Relocation Project at Soldiers Grove, WI."

have promoted development in highly sensitive or valuable areas, such as wetlands and riparian habitat in the West. Secondly, federal and state floodplain management agencies have generally not promoted the protection of natural and cultural functions because of their narrow flood-loss reduction objectives, a lack of expertise concerning such functions, and a lack of multiobjective approaches for both reducing flood losses and promoting natural and cul-

tural functions. A third reason is that floodplain management has for a long time been narrowly conceived of as managing "excess water" rather than as a part of a broader water resources management that encompasses point and nonpoint source pollution control, storm-water management, water supply, erosion and sediment control, recreation, aquatic habitat protection, and wetland protection and management.

(continued on page 31)

Floodplain Management

(continued from page 11)

Cost-Effective Management

To address all of these problems, floodplain management should be approached as part of multiobjective watershed (water resources) management with adequate protection for natural and cultural functions. Improving the monitoring and enforcement of existing approaches is necessary, but it will address only a portion of the gaps.

Community, citizen-based efforts are essential to closing these gaps, and yet communities are not being provided with adequate incentives and help. The U.S. floodplain management program needs to be more integrated with other programs that affect floodplains, more localized, more comprehensive, and more unified on a watershed and local government level.

At the federal level, less emphasis should be placed on new massive programs and new expenses and more should be placed on shifting the federal role from managing the nation's floodplains to being a facilitator for state and local programs that address the gaps in existing efforts. To address flood losses and better protect natural and cultural functions, the administration, Congress, states, and local governments need to provide a rational, multiobjective framework for watershed-level efforts that are facilitated by federal agencies and states. Federal agencies and states should have continued roles in providing technical assistance, grants in aid, and other assistance to facilitate the accomplishment of federal, state, and local goals, including flood-loss reduction, wetland protection, good water quality, and recreation, while avoiding single-purpose programs. FEMA's community rating system, which provides lower insurance rates for communities with floodplain management efforts that exceed federal standards, is a positive example of such a measure.

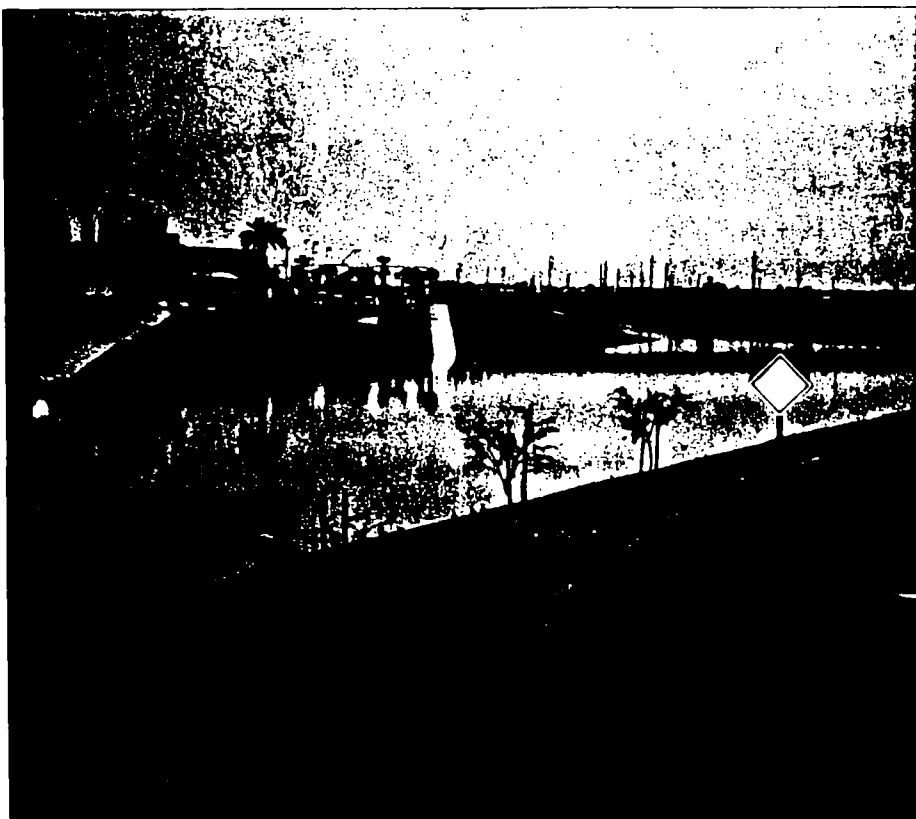
Federal subsidies should also be revised to better promote individual responsibility and multiobjective approaches. Nonstructural approaches adopted over the last 25 years—as well as NFIP—tend toward that goal. Nevertheless, this goal is undermined by continued disaster assistance and federal subsidies for beach nourishment, beach erosion control, flood control, and flood insurance for certain high-risk areas where the low insurance rates and regulations do not accurately reflect the risk. These subsidies continue to bias local and state decisionmaking toward structural solutions, even when such decisions are not consistent with individual responsibility, cost-effective use of the floodplain, or achievement of natural and cultural functions.

Federal cost-benefit ratios for flood control and other water resources projects also deserve a hard look, particularly in regard to the calculation of benefits for preventing future flood losses, protecting natural and cultural functions, and providing long-term

sustainable use of natural systems. Present procedures are applied in a manner that produces high benefit-cost ratios where intensive development has already occurred or is allowed in the floodplain.

In addition, Congress should provide incentives for multiobjective floodplain and watershed planning and management that anticipate future conditions. Preference should be given to state and local governments, watershed planning, open space, floodplain management, and post-disaster assistance programs that integrate floodplain management into future-oriented environmental programs, such as river management, greenways, trails, point and nonpoint source pollution controls, erosion controls, and wetland management. Such incentives and funding could include adopting a special multiobjective river corridor management act that gives small grants to communities and citizen groups that undertake multiobjective programs and implementing new wetland and watershed management ini-

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, ARIZ.



Using flood-prone land for recreational purposes—such as this park near the Arizona Canal Diversion Channel—is often better than rebuilding flood-damaged structures.

tatives for states and local communities as part of the Clean Water Act reauthorization. Support for multiobjective programs should be included in public works budgets and in the new "job corps" and economic stimulus package of the Clinton administration.

Coordination among federal, state, and local governments should also be improved. An interagency mechanism is needed to permit and encourage the federal agencies to play a more active and coordinated role in establishing and implementing multiobjective floodplain and water resources management policies. For all of its faults, the U.S. Water Resources Council served this role, and its reestablishment or the formation of a new coordinating and policy-setting body is needed.

Improved joint training and technical assistance are also needed. Two of the principle barriers to effecting change in national floodplain management policy are compartmentalism and lack of training. Federal multidisciplinary teams that include representatives of federal agencies, states, local governments, and non-profit interest groups would particularly benefit from joint training because it would increase cooperation. Priority topics should include mapping and regulation of high-risk and unique hazard areas, facilitation of local government multiobjective watershed efforts, evaluation and protection of natural and cultural functions, restoration of floodplain systems, and nonstructural ("soft") engineering alternatives.

Data gathering, monitoring, and oversight of federal flood-loss reduction programs should be improved in relation to one another and to other resource management programs. Federal flood-loss reduction programs should be evaluated in terms of the overall objective of reducing flood losses and protecting natural and cultural functions rather than achieving the programs' individual statutory mandates. For example, NFIP must be viewed in the context of larger

federal disaster and flood-loss reduction efforts—not as a separate program that balances its own books even though the taxpayers' costs for disaster assistance continue to rise. Post-disaster policies should also be re-evaluated to determine whether they are reducing, rather than simply perpetuating, future losses.

Shifting floodplain management to emphasize community-based multi-

objective and watershed-based efforts tailored to local conditions will not be easy. Existing institutions have enormous bureaucratic inertia, and many interest groups as well as agency staff tend to favor the status quo. Uniform, broad-brush national approaches for mapping, regulation, and management are less time-consuming for federal agency staff to administer, and measures that increase the federal

MULTIOBJECTIVE RIVER CORRIDOR MANAGEMENT

Many communities have rejected the traditional engineering approaches to reduce flood hazards and have adopted various multiobjective river corridor management programs not only to reduce flood loss but also to protect and restore the natural values of rivers and floodplains and meet recreation needs. A number of these are described in *A Casebook in Managing Rivers for Multiple Uses*, published by the National Park Service in 1991. Profiles of several promising management programs are provided in this publication:

- Charles River. The Army Corps of Engineers, the Commonwealth of Massachusetts, and local governments protected 8,500 acres of wetlands along the upper Charles River as part of a "Natural Valley Storage" project. Acquisition costs of wetlands totaled \$10 million, compared to potential costs of \$100 million for the construction of upstream dams and levees.

- South Platte River. The city of Littleton, Colorado, established a 625-acre floodplain park along 2.5 miles of the South Platte River. Old gravel pits were reclaimed to form natural areas and ponds for fish, wildlife, and recreation. Fish habitat in the river was restored. A nature center and recreation trail were built in the park.

- Wildcat and San Pablo Creeks. Local citizens of North Richmond, California, prepared a "consensus plan," with alternative designs for flood channels to resemble natural channels. The plan that is now being implemented more fully considers sediment management and involves riparian tree restoration and innovative design of bank and floodplain areas.

- Boulder Creek. Boulder, Colorado, has created a 5-mile recreational greenway and a bike path along Boulder Creek. Wetlands have been created or restored to double as storm-water retention and detention areas. Bioengineering has been used for bank stabilization; the trout fishery has been restored; and the greenway has become a central focus of the community.

- Mingo Creek. After a series of damaging floods, the city of Tulsa, Oklahoma, developed a greenway plan for Mingo Creek that involves the development of parks and trails linking multipurpose flood control structures along the creek. Restoration of riparian vegetation, a system of lakes, and recreational facilities are incorporated in the plan.

- Kickapoo River. After repeated severe flooding of the downtown area, Soldiers Grove, Wisconsin, relocated the entire business district from the Kickapoo floodplain to an upland site. The floodway was converted to a riverside park and recreation area. Assessed property values nearly doubled.

- Chattahoochee River. In 1973, the Georgia legislature adopted the Metropolitan River Protection Act, which created a 4,000-foot-wide river corridor (including the width of the river). A river corridor plan was adopted that incorporated standards for land vulnerability, buffer zones, and flood hazards. Local governments are responsible for implementing the plan.

SOURCE: National Park Service, Association of State Wetland Managers, and Association of State Floodplain Managers, *A Casebook in Managing Rivers for Multiple Uses* (Washington, D.C.: NPS, 1991).



Property losses from floods are not limited to buildings. The ground under this road in Hollywood Hill, Washington, was washed away by torrential rains.

workload without increasing federal staff will encounter strong opposition. Some federal agency staff also fear the loss of control. They are accustomed to initiating and implementing flood-loss reduction measures and are reluctant to share responsibility and power with states and local governments. In addition, various federal statutes authorize strong, direct federal roles rather than assistance to local governments.

Floodplain managers also often lack the multidisciplinary expertise needed for the protection and restoration of natural and cultural functions, such as wetland protection. In addition, there are concerns that local government and citizen-based programs will be dominated by local real-estate and other special interests and will not meet regional or national needs and that local, citizen-based efforts will lack the expertise to address highly technical flood, pollution control, and wetland restoration efforts. Community-based watershed approaches involving detailed data gathering, computerized geographic information systems, and other sophisticated analy-

sis techniques can also be very expensive. Various land-use planning efforts for watersheds and other areas have often proved to be of limited value if separated from implementation.

All of these arguments, however, do not justify continuing the status quo. Experience over the last 30 years has shown that, despite the expenditure of huge sums of money, the federal government alone cannot "solve" flood problems.

New, community-based efforts can be practical and implementation-oriented. They need not be prohibitively expensive, as indicated by many successful efforts already implemented across the nation (see the box on page 32). Community efforts can be financed by combining funds from a variety of programs meant to address such activities as nonpoint and point pollution control, storm-water management, outdoor recreation, community redevelopment, and wetland and habitat protection and restoration, as well as flood-loss reduction. Landowners, citizen groups, and local governments must be brought more fully into the process as part-

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ners to address not only flood control but also other community economic and environmental needs.

Community-based initiatives need not place huge new demands on federal staff or budgets if coordinated use can be made of the many experts throughout the federal agencies, including the Army Corps of Engineers, FEMA, the Soil Conservation Service, the National Park Service, the Environmental Protection Agency, and the U.S. Geological Survey. Strong, continued federal and state involvement in such community efforts is needed to provide technical assistance and training and to reflect regional perspectives.

It is true that floodplain management must be revised technically to continue to reduce flood losses and meet broader, multiobjective goals. But, more importantly, floodplain management must become a more complete and real local, state, and federal partnership.

NOTES

1. See U.S. Water Resources Council, "Estimated Flood Damages: Appendix B," *Nationwide Analysis Report* (Washington, D.C.: U.S. Government Printing Office, 1977); and Federal Interagency Floodplain Management Task Force, *Floodplain Management in the United States: An Assessment Report*, doc. FIA-17 May 1992 (Washington, D.C.: Federal Emergency Management Agency, 1992), Chapter 1.
2. See discussion and many references contained in Federal Interagency Floodplain Management Task Force, note 1 above, Chapter 3.
3. Information provided by the Federal Insurance Administration, Federal Emergency Management Agency, Washington, D.C.
4. National Research Council, *Restoration of Aquatic Ecosystems* (Washington, D.C.: National Academy Press, 1992).
5. *Ibid.*
6. See T. Kusler, "Innovation in Local Floodplain Management: A Summary of Community Experience," Special Publication 4 (Boulder, Colo.: Natural Hazards Research and Applications Information Center, 1982); J. Kusler and S. Daly, eds., "Wetlands and River Corridor Management" (Paper presented at the Association of State Wetland Managers, Charleston, S.C., 5-9 July 1990); National Park Service, *A Casebook in Managing Rivers for Multiple Uses* (Washington, D.C.: NPS, 1991); C. E. Little, *Greenways for America* (Baltimore, Md.: Johns Hopkins University Press, 1990); E. Grundfest, ed., "Multiobjective River Corridor Planning" (Proceedings of the Multiobjective Workshops in Knoxville, Tenn., and Colorado Springs, Colo., Association of State Floodplain Managers, 1989); and L. M. Labaree, *How Greenways*

Work: A Handbook on Ecology (Washington, D.C.: National Park Service, 1992).

7. *Ibid.*
8. Congressmen Joseph M. McDade (R-Pa.) and Morris K. Udall (D-Ariz.) introduced a State and Local Multiobjective River Corridor Assistance Act in 1989 (HR 4250). This bill would have provided technical assistance and grants-in-aid to local governments initiating multiobjective efforts. The bill was referred to committee and never adopted.
9. Federal Insurance Administration, note 3 above.
10. See Donnelly Marketing Information Service, *System Update Report* (Washington, D.C.: Federal Emergency Management Agency, 1987) as described in Federal Interagency Floodplain Management Task Force, note 1 above, Chapter 3.
11. Disaster Assistance Program, Federal Emergency Management Agency.
12. Federal Insurance Administration, note 3 above. According to hurricane damage estimates provided by various newspapers, Hurricane Iniki's damages totaled approximately \$1.6 billion; in Florida, Hurricane Andrew's total damages came to between \$15 billion and \$30 billion; and in Louisiana, Andrew's damages amounted to \$1 billion.
13. Federal Interagency Floodplain Management Task Force, note 1 above, Chapter 6.
14. Information provided by the Federal Insurance Administration, note 3 above.
15. Federal Interagency Floodplain Management Task Force, note 1 above, Chapter 13.
16. Information provided by FEMA and Dade County, Florida, staff at the Association of State Floodplain Managers conference in Atlanta, Georgia, March 1993.
17. *Ibid.*

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