

ASSOC OF MIDWEST FLOODPLAIN MANAGERS

PHOTOCOPY  
PRESERVATION

Field Office (DFO), so that interested agencies may contribute to the evaluation process. The Federal Emergency Management Agency shall provide space at its DFOs for representatives of relevant agencies.

- In evaluating applications for levee repair and restoration in the region of the Midwest floods of 1993, each agency shall consider, to the extent practical, nonstructural alternatives and design modifications that could provide greater local benefits of flood control, reduction of future potential flood damages to the applicant and adjacent upstream and downstream localities, lower long-term cost to the Federal government, and natural resource protection. Agencies are encouraged to include other interested agencies during their evaluation process, to the extent practicable.
- Prior to final action on each application, project proposals shall be made available for review and comment to other Federal and State agencies and local interests represented at the applicable DFO for a minimum period of 24 hours (excluding weekends and holidays). Comments are to be made available to the projects' applicants. Agencies shall take these comments into consideration when making final project decisions.
- On a monthly basis, each agency shall report to the Office of Management and Budget and the Office on Environmental Policy on the status of levee repair and restoration, including: applications received, comments received, and actions taken.

August 27, 1993

### Discussion Paper

(This background paper has been prepared to stimulate discussion in a workshop concerning post-disaster mitigation which will be held September 28 and 29 in St. Louis, Missouri by The Association of State Wetland Managers and The Association of State Floodplain Managers).

# POST DISASTER RESPONSE AND RECOVERY IN THE MISSISSIPPI BASIN AND THE RESTORATION OF FLOODPLAIN AND WETLAND AREAS

by Dr. Jon Kusler<sup>1</sup>

Recent severe flooding in the nine state regions of the upper Mississippi Basin with flood losses which may exceed \$12.5 billion dollars provides opportunities to "restore" selected wetland and floodplain areas. This background paper raises some of the key issues with such restoration based upon past experiences (see selected bibliography) and provides recommendations for encouraging such efforts in the short and long-term.

## CONCLUSIONS, RECOMMENDATIONS

Based upon post flood response experience and floodplain and wetland restoration experiences in the past two decades, recommendations may be made with regard to restoration of floodplain and wetland areas in a Mississippi Basin post-flood context (Kusler, 1982; 1985; 1989; 1990):

1. The key to various types of past river and floodplain "restoration" efforts has, with little exception, been landowner support and community sponsorship. Federal agencies and states should, therefore;

- ◆ First, **educate private landowners and local governments** with regard to federal financial assistance for relocation, restoration, etc. They need to know what flood, post-disaster and natural resource funding is available, whether they qualify, and how to proceed.
- ◆ Second, **make financial and technical relocation and restoration assistance rapidly available** to landowners and local governments before redevelopment decisions are made. Landowners also need technical help in filling out forms, making plans, etc.
- ◆ Third, **support existing local, state, and federal regulations which apply to rebuilding including regulations pertaining to maintenance of floodways and "substantial" improvements.** Support for such regulations should be combined with technical and financial assistance.
- ◆ Fourth, **adopt a "go slow" approach to the rebuilding of smaller private levees with public funds** to insure that such levees will not "back-up" water on other landowners or governmental entities and that such rebuilding efforts are in the broader public interest. Federal funding for such reconstruction should be conditioned upon studies determining the impact of levees on flood conveyance.
- ◆ Fifth, **identify and prioritize sites with restoration potential.** Such sites need to be proactively identified in cooperation with landowners, local governments, nonprofits, and others. See discussion of "restoration" below.
- ◆ Sixth, **help form local citizen/local river corridor restoration groups with landowner, nonprofit, and government members to help decide what they want for their river corridor and how to implement this "vision".**
- ◆ Seventh, **provide longer term training and technical assistance to landowners, local governments and nonprofits** (e.g., the National Park Service Rivers and Trails Program; the U.S. Army Corps of Engineers Floodplain Management Program; the Soil Conservation Service Wetland Reserve; and restoration efforts) to help them develop and implement more detailed river corridor plans.
- ◆ Eighth, **provide longer term coordinated federal financial assistance on a cost-share basis** to help implement river corridor management plans.

2. From economic and political perspectives, restoration efforts can often best be approached from a multiobjective, river corridor perspective--future flood loss reduction, pollution control, protection and restoration of wildlife and fisheries habitat, recreation, and urban renewal (in some instances).

3. A broad concept of floodplain "restoration" should be applied to river corridor areas linked to specific floodplain and wetland functions and values, the potential for reducing future flood losses, and landowner needs. Restoration of floodplain and wetland areas should be approached broadly for evaluation, planning and implementation purposes in terms of a number of types and degrees of restoration including: (a) restoration of flood conveyance and storage while maintaining many existing uses, (b) creation of multiobjective recreational greenways, and (c) restoration of the ecological integrity of some areas to near settlement conditions.

## WHY "RESTORE" FLOODPLAIN AND WETLAND AREAS

Partial or complete restoration of main stem and tributary floodplain and wetland areas may be desirable in specific contexts to both help meet landowner needs and achieve a variety of other goals:

(1) Lower future flood heights by removing artificial impediments (constrictions) to flood flows such as levees which back-up floodwaters on upstream and adjacent lands and increase downstream flood velocities and erosion. This can help floodplain landowners as well as reduce future public losses.

(2) Restore natural flood storage, thereby also lowering future flood heights and damages. This will also help floodplain landowners as well as reduce future public flood losses.

(3) Relocate from the floodplain, elevate or floodproof private houses, industrial and commercial facilities, sewage treatment plants, water supply plants, roads and other structures and facilities. This can help private and public landowners and reduce future flood insurance and disaster assistance payments and the economic and social disruption caused by flooding.

(4) Restore fish and wildlife habitat including endangered species habitat by restoring stream and river bank vegetation, wetlands, spawning grounds, etc. This can help private landowners.

(5) Restore water quality from point and nonpoint sources of pollution by restoring wetlands and vegetated filter strips.

(6) Reduce erosion and stream meander by revegetating stream banks and creating revegetated filter strips; and

(7) Restore natural recreational opportunities for hiking, birding, and canoeing or create new ones (e.g., bike paths) by restoring natural vegetation, wetlands, riparian habitat, free-flowing waters, etc.

The restoration of selected floodplain and wetland areas is consistent with the "net gain" goal recommended by the National Wetland Policy Forum and the recommendation by the National Academy of Sciences. (National Research Council, 1991).

## EXPERIENCE IN OTHER CONTEXTS: MITIGATION OF FUTURE LOSSES

Recent flooding along the Mississippi has been particularly severe in terms of depth and duration of flooding. The Mississippi floodplain is also relatively unique because of its unparalleled length and width, because of the number of cities and villages located on the floodplain, and because of the size and number of levees. Yet, the issues and opportunities for mitigation of future flood losses and restoration of floodplain/wetland areas are similar to those of many smaller rivers and streams faced by the more than 20,000 communities in the United States with flood problems.

A relatively clear and consistent picture emerges from U.S. and international flood recovery efforts over the last 30 years and attempts to implement "mitigation" to reduce future losses. (See Kusler 1982; 1989; 1992). Many at least partially successful efforts have been undertaken by communities (likely more than 500) to partially "restore" floodplain areas after repeated flooding through the creation of "greenways", relocation of structures, bioengineering, and other approaches. However, these efforts have usually been undertaken to achieve multiple goals and not restoration of floodplains and wetlands to their natural conditions.

Several lessons from these efforts include the following:

(1) In general a very narrow window of opportunity has existed in efforts for relocation, floodproofing, and other individualized adjustments to reduce future flood losses. Often severely flooded and damaged landowners wish to move, relocate, or otherwise take measures to reduce future potential flood losses during the immediate period following a flood event while the consequences of the flooding is clear in their minds and they have not repaired and moved back into their structures. However, once they have received flood insurance, disaster assistance, and have begun or finished repair and moving back onto the lands, they are much less receptive to individual mitigation options. Instead, they are likely to push strongly for dams or levees or other measures at public expense to "remedy" the flood problem.

(2) In general, restoration efforts have been locally initiated and have involved broadscale community involvement. Land acquisition has usually been on a willing-seller basis. Many of the efforts have been at least partially funded at the local level. However, federal financial and technical assistance have played key roles.

(3) Virtually none of these restoration efforts have involved attempts to restore entire floodplain areas to natural conditions although many have involved at least partial restoration of wetlands or other natural areas within a broader management area. However, in the last 15 years a great deal has been learned scientifically about the restoration of wetlands, riparian zones, and other natural habitat. In addition, new sources of funds and technical assistance are available. For this reason, past efforts should not totally be viewed as a model for future efforts.

## THE MISSISSIPPI FACTUAL CONTEXT

Any effort to "restore" Mississippi floodplains and wetlands must take place in the context of a highly complex and varied floodplain:

- ◆ A river and floodplain system with highly varied physical characteristics ranging from relatively high velocity streams, streams with narrow floodplains and almost no wetlands (mountainous headwater areas) to low gradient, slow moving streams with large floodplains and many wetlands (both headwater areas and the lower Mississippi).
- ◆ A floodplain utilized for a wide variety of activities (agricultural, residential, commercial) and degrees of development. Large, middle-size, and smaller urban areas are common. Much of the remaining floodplain is in agricultural and forestry use.
- ◆ A floodplain with a variety of types and degrees of flood control and flood loss reduction measures including a wide variety of combinations of levees, channel modifications, dams, and fills. Most urban areas are protected by federal or cooperative federal levees.
- ◆ A river and tributaries with highly modified hydrologic and sedimentation regimes and water quality due to flood control measures, clearing in the watershed, and discharges of point and nonpoint pollutants. Virtually all of the upper Mississippi is now subject to dams and locks which control the water levels (at least during nonflood river stages).

## CONCEPTS AND REQUIREMENTS OF "RESTORATION"

It will not be possible to fully restore any Mississippi floodplain or wetlands to pre-1700 conditions due to the extensive hydrologic modifications in the Mississippi watershed and changes in flood levels, "normal" flows, low flows, hydroperiod, sediment regimes, water quality, and both vegetation and wildlife. But, various degrees and types of restoration are possible if certain floodplain and wetland functions are possible. Three major options for "restoration" of at least certain functions include:

(1) **Primary goal: future flood loss reduction.** One option for "restoration" while also reducing flood damages to landowners would be to not repair levees or raze existing levees at selected sites and to floodproof, elevate, or relocate structures in affected areas. The future flood loss reduction effects in lowering upstream and adjacent water levels for a particular discharge of flood by removing levees and other impediments could be determined through water surface profiles (e.g., HEC 2) with a fair amount of specificity and accuracy. Flood storage (in contrast with flood conveyance) could also be restored by not repairing certain levees or by breaching levees. However, it is more difficult to determine the effects of increasing flood storage on a large river such as the Mississippi.

Note, restoration of flood storage and conveyance does not necessarily require the restoration of areas behind breached or restored levees to a natural condition. Nor does it require public ownership. Back lying areas could continue to be used for agriculture, forestry, or other activities which do not affect conveyance or storage.

(2) **Goals: multiobjective use of river corridors; promote recreational and tourism values.** A second option is not only to restore flood storage and/or conveyance but a variety of other additional functions and values and to enhance recreational values. "Greenways" created by many communities are examples of such multiobjective efforts. Greenways usually involve public acquisition of areas, the relocation of structures (often on a willing-seller basis) and the creation of trails and public access points. Selected wetland and other natural areas may be partially restored to a natural (or semi-natural) condition within the broader greenway corridor.

(3) **Goals: restore wetlands, riparian zones, endangered species habitat, fishery habitat, etc.** A third option (and not necessarily inconsistent with options one and two) is total or nearly total restoration of some floodplain areas to natural or nearly natural conditions. As noted above, total restoration to pre-settlement conditions is virtually impossible due to highly modified hydrologic regimes. But, considerable restoration may be achieved in some contexts.

Restoration to pre-settlement conditions will not be a scientific or economic alternative for many filled areas and many urban areas due to continued water quality and other influences (runoff, sediment) and the highly modified hydrology. Restoration efforts may best take place (in most instances) in rural areas with modest land values, large parcels of land in single ownership, and limited alterations to existing hydrology such as levees or partial agricultural drainage of wetlands.

Restoration efforts should create not simply isolated pieces of restored lands, but linked parcels and corridors to permit movement of wildlife and fish and a broader range of habitats. Restoration efforts may best take place where a nonprofit (e.g., the Nature Conservancy) or a public agency (e.g., the U.S. Fish and Wildlife Service) can manage the land over time including control of nuisance species, controlled burns, etc. These areas are often adjacent to existing public or nonprofit lands.

## RESTORATION OPPORTUNITIES

A variety of options are available to partially or wholly restore particular floodplain and wetland natural functions and values.

- ◆ Do not repair or provide public funding for damaged levees; raze existing levees. This could help restore flood conveyance and storage. From economic and political perspectives, this may be primarily an option with the smaller, private levees. However, partially damaged levees may continue to block flood flows (conveyance) and failure to rebuild levees will not, in itself, achieve most other restoration objectives.

- ◆ Construct "setback" levees rather than rebuild levees in place. This would, in some instances, help restore wetlands and riparian zones and provide river-front recreation areas.
- ◆ Rebuild levees with environmentally sensitive design and revegetation. This could reduce the environmental impact of levees and increase recreational use.
- ◆ Use bioengineering rather than riprap to stabilize stream and river banks. This could reduce environmental impact and increase natural wildlife, fisheries, scenic, and other functions.
- ◆ Relocate houses and other buildings from the floodplain, but maintain the floodplain in agriculture or other private open space uses. This could simultaneously reduce future flood losses while increasing flood storage and conveyance and a broad range of other functions.
- ◆ Elevate and/or flood-proof structures. This can reduce future flood losses and reduce the pressures/need for repair of levees or new flood control works.
- ◆ Create "greenways" with bike paths, etc. This can simultaneously reduce flood losses and increase recreational, tourism, and other functions.
- ◆ Passively restore wetlands and riparian zones by allowing areas behind levees, etc. to naturally revert to wetland. This can help restore a broad range of functions and values.
- ◆ Actively restore wetlands and riparian zones by filling drainage ditches, removing fills, etc. This can also help restore a broad range of functions and values.

## IDENTIFYING (MAPPING) AREAS WITH RESTORATION POTENTIAL

One of the impediments to restoration is lack of detailed information and maps identifying areas with restoration potential. What information is needed to identify potential restoration areas and how might these be mapped or otherwise identified?

A pragmatic, multi-step approach should be taken for the identification of potential restoration areas:

(1) It may be useful to first identify (exclude) areas with low restoration potential due to high costs, the highly altered conditions of natural conditions, or political unacceptability. These will include intensively developed urban areas and some intensively developed rural areas with major levees, fills and other alterations. These areas may also include some urbanizing or rural areas with extensive infrastructure.

(2) It may then be useful to identify several types of areas with different sorts of restoration potential:

- (a) Areas behind breached levees (primarily rural areas behind smaller, agricultural levees) where the levees have significantly restricted flood conveyance or destroyed large areas of flood storage. Repair of the levees may not be desirable to provide flood storage or flood conveyance but relocation, elevation, or flood-proofing of structures in affected areas combined with continued private agricultural use of the floodplain may be appropriate. This will help restore flood storage and conveyance.
- (b) Urbanizing and rural areas with relatively low intensity development, limited infrastructure, limited critical facilities, smaller or no levees, serious flood damages from this flood event, and repetitive flood damages, and strong recreational needs where relocation, public acquisition, and creation of "greenways" may be appropriate.
- (c) Rural areas with limited or no development, agricultural or forestry uses, major existing wetlands, other significant wildlife or fisheries values, significant "lost" wetlands and restoration potential, and relatively modest land values. A combination of post-disaster funds and resource protection and management funds could be applied to facilitate relocation, acquisition, and restoration to expand existing National Wildlife Refuges or state or local parks, forests, or other wildlife areas. Some of this land could remain in private ownership; other lands might be placed in public ownership.

The following types of maps (or other inventories) would be helpful in identifying these areas:

- ◆ Maps showing breached levees, particularly smaller levees and the areas inundated by recent flooding behind these levees.
- ◆ Maps or other identification of levees in floodway areas which have caused and will cause increased flood heights on upstream or adjacent lands due to blockage of flood flows. Apparently these will need to be developed.
- ◆ Maps identifying levees and back lying areas which may provide significant flood storage. These maps will need to be developed.
- ◆ Flood maps (more generally) showing areas subject to frequent, damaging flooding including leveed areas. The Federal Emergency Management Agency (FEMA), the U.S. Geological Survey, the U.S. Army Corps of Engineers, or U.S.D.A. Soil Conservation Service flood maps are available for most main stem and major tributary areas but are not available for many smaller streams through the basin.
- ◆ Maps showing the numbers and types of structures in the floodplain, including their vulnerability to flooding, flood damages suffered in the recent flood, and flood damages suffered over the last 20 years (e.g., repetitive claim structures pursuant to the Flood Insurance Program.) FEMA flood maps show existing structures but not much of the rest of the information.

- ◆ Existing land use maps (agriculture, forestry, residential, etc.) and zoning maps. Local zoning maps are available for virtually all urban areas along the Mississippi and many rural areas.
- ◆ Maps showing the location of infrastructure and critical facilities in the floodplain and whether they have been subject to flooding. Zoning maps show some but not all of these areas.
- ◆ Maps of existing wetlands and "lost" wetlands. National Wetland Inventory maps will show existing wetlands; U.S.D.A. Soil maps will (in general) indicate "lost" wetlands.
- ◆ Maps showing sites of endangered species habitat. These are apparently available for some areas.
- ◆ Maps showing areas subject to water pollution and, conversely, areas with particularly great potential for reducing or preventing such pollution if restored.
- ◆ Land ownership (whether public or private) and the size of parcels.

## **FEDERAL FINANCIAL AND TECHNICAL ASSISTANCE**

A variety of financial and technical assistance programs outlined in Table 4 exist to help private landowners and governments with restoration efforts. However, they are quite different in their intent and are implemented by different agencies. They include (1) disaster assistance, flood insurance, and other flood-related efforts, and (2) natural resource, river, and wetland-related efforts. These efforts need to be carefully coordinated.

## **PUTTING IT ALL TOGETHER**

Experience with past flood events reveals that often a great deal of federal, state, local and private (e.g., Red Cross) technical and financial assistance is available to help flood victims but such assistance is often poorly coordinated, does not arrive when needed, and is not "bundled" in useful ways. Ironically, the greatest incentive for coordination of all forms of assistance is at the lowest level--the landowner and local governments. Yet landowners and local governments affected by disasters are at least able to provide such coordination due to lack of knowledge and the need to cope with a broad range of issues and problems (jobs, clean up, families, etc.). Landowners and local governments need planning and technical assistance help. They need to be brought together to think collectively about their future. They need help in applying for various types of assistance.

This sort of help can and should be provided by federal and state agencies. However, the "specialist" orientation of most agency staff reduce their ability to provide this sort of assistance. It can also be provided by land trusts, universities, and nonprofits. However, their ability is also limited by lack of knowledge of programs and techniques.

Rapid training programs combined with simple hand-outs, videos, and other materials could help federal and state agencies, universities, land trusts, and others.

## **SELECTED BIBLIOGRAPHY**

- Kusler, J. 1990. Wetland Restoration and Creation: Status of the Science, Island Press.
- Kusler, J. 1985. Post Disaster Response and Mitigation of Future Losses, American Bar Association.
- National Research Council. 1991. Restoration of Aquatic Ecosystems, National Academy Press.
- Kusler, J. and L. Larson. 1993. "Beyond the Ark" June Issue, Environment Magazine.
- Kusler, J. 1982. Innovation in Local Floodplain Management A Summary of Community Experience. Natural Hazards Research and Applications Information Center, Special Publication 4.
- Kusler, J. et al (ed.). 1989. Wetlands and River Corridor Management. Association of State Wetland Managers.

**Table 1**  
**Restoration Opportunities**

- ◆ Raze or do not repair existing levees (particularly smaller, private levees which block flood flows).
- ◆ Construct "setback" levees.
- ◆ Rebuild levees with environmentally sensitive design such as revegetation.
- ◆ Use bioengineering rather than riprap to stabilize banks.
- ◆ Relocate houses and other buildings from the floodplain.
- ◆ Create "greenways" with bike paths, etc.
- ◆ Elevate and/or flood-proof structures.
- ◆ Passively or actively restore wetlands and riparian zones by blocking drainages, etc.

*Table 2*

**Common Impediments to Restoration**

Common impediments to restoration include:

- ◆ lack of restoration funds (in general) or lack of funds early enough to affect private and public decision-making;
- ◆ decisions to rebuild are made without knowledge of funding options;
- ◆ areas with high restoration potential are not identified to guide restoration efforts;
- ◆ inadequate information is available concerning structures and activities which block floodways and preempt significant flood storage areas;
- ◆ restoration "goals" are not adequately identified or disagreements arise with regard to such goals;
- ◆ inadequate involvement of landowners and local interest groups to work out a solution suitable for their needs; and
- ◆ lack of coordination of federal, state, local, nonprofit, and other programs.

*Table 3*

**Keys to Successful Restoration  
(Wetland Restoration, Riparian Zone Restoration)**

- ◆ Landowner support.
- ◆ Community support.
- ◆ Identification of sites with high restoration potential.
- ◆ Expertise in design and project supervision.
- ◆ Restoration of the hydrology. If hydrology is restored, replanting is often not needed.
- ◆ Mid-course correction capability.
- ◆ Long-term monitoring, maintenance, and management capability.

*Table 4*

**Federal Programs Offering Potential Assistance to Landowners  
for Restoration, Relocation**

**Flood, Post Disaster Programs**

Section 1362 Program, Federal Emergency Management Agency  
Section 404 Program, Federal Emergency Management Agency  
Disaster Assistance, Federal Emergency Management Agency  
Flood Insurance Program, Federal Emergency Management Agency  
Public Law 99 Assistance in Rebuilding Levees, U.S. Army Corps of Engineers  
Public Law 566, U.S.D.A. Soil Conservation Service

**Nature Resource, River, Wetland**

Rivers and Trails Program, National Park Service  
Partners for Wildlife, North American Waterfowl Management Plan, Waterbank Program, U.S. Fish and Wildlife Service  
Wetland Reserve Program, U.S.D.A. Soil Conservation Service  
Section 319 Watershed Planning Program, U.S. Environmental Protection Agency  
Land and Water Conservation Fund, U.S. Department of the Interior



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

## PRE-REGISTERED ATTENDEES

### STATES

#### FLOODPLAIN MANAGERS

|              |                               |
|--------------|-------------------------------|
| Illinois     | Dennis Kennedy<br>David Boyce |
| Iowa         | Jack Riessen                  |
| Kansas       | Kerry Wedel<br>Don Kostecki   |
| Minnesota    | Joe Gibson                    |
| Missouri     | Dick Gaffney                  |
| Nebraska     | Brian Dunnigan                |
| South Dakota | Darrell Dvorak                |
| Wisconsin    | Larry Larson                  |

#### EMERGENCY MANAGERS

|              |                                                 |
|--------------|-------------------------------------------------|
| Iowa         | Jerry Ostendorf<br>John Cavanagh<br>Chris Finch |
| Kansas       | James Alexander                                 |
| Missouri     | Dale Schmutzler<br>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<br>Ed Hecker                       |
| Missouri | Dr. Robert Stearns<br>Dan Spellman<br>Dean Caldwell |

#### FEMA

|                  |                   |
|------------------|-------------------|
| DAP              | Larry Zensinger   |
| DAP              | Karen Helbrecht   |
| Emer. Mgt. Spec. | Diana Paschke     |
| FIA              | Cecelia Rosenberg |
| FIA              | John Gambel       |
| Congr. Relations | Maria Vorel       |
| Reg. 5           | Norb Schwartz     |
| "                | Eric Berman       |
| Reg. 7           | Jodi Broida       |
| "                | Marlee Carroll    |
| "                | Ron McCabe        |
| "                | John LaTourelle   |
| Reg. 8           | Virginia Motoyama |

#### DEPT. OF INTERIOR

|                  |                  |
|------------------|------------------|
| Fish & Wildlife  | Russ Earnest     |
| " " D.C.         | Michelle Altemus |
| " " IL           | Rick Nelson      |
| " " MO           | Jerry Brabander  |
| " " MO           | Jim Milligan     |
| " " MN           | Ed Crozier       |
| Nat'l Park Serv. | Dan Meyer        |
| " NE             | Angeles Tornes   |

#### U.S. DEPT. OF AGRICULTURE

|  |           |
|--|-----------|
|  | Tom Wehri |
|--|-----------|

#### N.O.A.A.

|                |             |
|----------------|-------------|
| Policy Analyst | Dave Jansen |
|----------------|-------------|

#### EPA

|  |                |
|--|----------------|
|  | Susan Hamilton |
|  | Cory Giacobbe  |
|  | Claire Rubin   |



# 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 Science & Technology Policy Dr. Mark Schaefer

### CONGRESSIONAL STAFF

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

### Library of Congress

Congr. Research Service Steve Hughes

### 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 Assistance Corp. Clancy Philipsborn

Wash. Univ., MO Daniel Mandelkar

### ASFPM

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

### Amer. Rivers

Scott Faber

### Midwest Rivers Coalition

Christopher Brescia

### Coal. to Restore Coastal Louis.

G. Paul Kemp

### NAPA

DeWitt John

### City of Tulsa

Jack Page  
Ann Patton  
Carol Williams

### City St. Louis

McKnight Found. Dan Ray

Council of State Gov'ts Michael McCabe

### Univ. MO, St. Louis

Nat'l Wildlife Federation David Conrad

Friends of Earth Brent Blackwelder

Envir. Consultant David Gaffney

QuadCity Conser- vation Alliance Mark Beorkrem

Plan. Consultant Ron Flanagan



## **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 mitigation.

*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*

August 25, 1993

## Announcement and Invitation

River/Floodplain Restoration, Wetland Restoration, Greenways

### Workshop 2

# POST FLOOD RECOVERY AND THE RESTORATION OF MISSISSIPPI BASIN FLOODPLAINS INCLUDING RIPARIAN HABITAT AND WETLANDS

## Increasing Alternatives and Incentives for Private Landowners and Governments

The Association of State Wetland Managers and the Association of State Floodplain Managers are the national co-hosts. Local co-hosts are to be confirmed.

**September 28-29, 1993**

Henry VIII Hotel and Conference Center; St. Louis, Missouri.

**Sponsor:** The McKnight Foundation

**Goals:** The principal goal of the workshop is to explore potential opportunities and incentives for private landowners and governmental units who wish to relocate and/or restore floodplain areas. A second goal will be to help form partnerships for restoring (or managing) the Mississippi Basin floodplains as part of post flood recovery. More specific goals include:

- ◆ To identify and help promote the exchange of information between local interest groups along the Mississippi and national organizations concerning post-disaster mitigation opportunities and how restoration might or might not fit into such opportunities;
- ◆ To help identify areas where federal/state/and local legislative strategies for restoring Mississippi River and tributary wetlands and floodplains could be best applied;
- ◆ To assist in a reevaluation of national flood control and floodplain management policy to reflect restoration opportunities;
- ◆ To identify training and technical assistance needs; and
- ◆ Help plan follow up restoration workshops and training sessions to be held at a later point in time.

**Need for Workshop:** Recent flooding along the Mississippi and its tributaries has inundated millions of acres of floodplain and caused an estimated \$12.5 billion dollars in damage. It has intensified local, state and the national debate on the use of floodplain and wetland areas and how floodplain and wetland policies might be better coordinated. The destruction of many levees and widespread property losses also raises the possibility that some wetland and/or floodplain areas (particularly in undeveloped areas) may best be partially or wholly restored. What sorts of land use may be possible or desirable? How might these areas be identified? What alternatives and forms of financial assistance are available to private landowners who may wish to relocate or restore their lands? How can these opportunities be increased?

**Cooperating Organizations:** (organizations designated by \* are to be confirmed.)

- ◆ Association of State Wetland Managers
- ◆ Association of State Floodplain Managers
- ◆ Coalition for the Restoration of Aquatic Ecosystems
- ◆ U.S. Army Corps of Engineers\*

- ◆ Federal Emergency Management Agency
- ◆ U.S.D.A. Soil Conservation Service\*
- ◆ National Wildlife Federation
- ◆ U.S. Environmental Protection Agency
- ◆ U.S. Fish and Wildlife Service
- ◆ Interstate Council on Water Policy
- ◆ National Governor's Association
- ◆ World Wildlife Fund
- ◆ Environmental Defense Fund
- ◆ American Rivers
- ◆ National Fish and Wildlife Foundation
- ◆ The Environmental Law Institute
- ◆ Sierra Club
- ◆ Isaak Walton League
- ◆ Coalition for the Restoration of Coastal Louisiana
- ◆ Coalition to Restore Urban Waters

**Workshop Directors:** Project director, Jon Kusler, Executive Director, Association of State Wetland Managers; Co-director, Larry Larson, Executive Director, Association of State Floodplain Managers

**Qualifications of Co-host Organizations:**

The Association of State Wetland Managers and the Association of State Floodplain Managers are two technical organizations with extensive experience with floodplain and wetland management at state, federal, and local levels including post disaster response. These organizations have conducted a broad range of workshops, training sessions, and seminars over a period of years dealing with post disaster response, restoration of aquatic ecosystems, etc.

The Association of State Wetland Managers has also recently completed 6 workshops concerning wetlands and watershed management involving 1300 not-for-profit, local, state, and federal participants across the nation (West Palm Beach, Florida; Atlanta, Georgia; Niagara Falls, New York; Reno, Nevada; West Eugene, Oregon). Two more are planned for next year.

**The Hotel:** The workshop will be held at the Henry VIII Hotel and Conference Center, 4690 N. Lindbergh, St. Louis, Missouri 63044. The hotel is located on the western border of the Airport. The hotel offers courtesy car transportation service. Room rates are \$74.00 for single/double (this price includes tax). Call 1-800-325-1588 or 1-800-392-1660 (within Missouri) to make reservations by **September 13, 1993**. Let the hotel know that you are with the "Flood Restoration Group". Rooms will be available after that date on an "as available" basis.

**Registration Fee:** A registration fee of \$65.00 will be charged all participants except speakers and those receiving scholarships. The fee will include background materials, one lunch, coffee breaks, and attendance at all sessions. All participants are responsible for their lodging, travel, and incidentals.

Registration fee scholarships will be available upon request.

## REGISTRATION FORM

Please detach and return to the address below by **September 13, 1993**.

Name: \_\_\_\_\_

Affiliation: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Registration Fee: \$65.00 \_\_\_\_\_

Amount Enclosed: \_\_\_\_\_

Please mail with check to:  
**The Association of State Wetland Managers, Inc.**  
 PO Box 2463  
 Berne, NY 12023-9746  
 518-872-1804  
 Tax I.D. # 03-0303870

# AGENDA

(8/25/93)

## WITH SUGGESTED SPEAKERS

(NOTE, SOME BUT NOT ALL SPEAKERS HAVE BEEN CONFIRMED)

### *Day 1. September 28. Issues and Options*

**8:30a.m.-8:45a.m.** Welcome, Goals of Workshop. Jon Kusler, Association of Wetland Managers; Larry Larson, Executive Director, Association of State Floodplain Managers

**8:45a.m.-9:05a.m.** Introductions. Each participant at the workshop will introduce themselves.

**9:05a.m.-9:25a.m.** Overview of Issues and Options in Post Disaster Response and the Restoration of Wetland and Floodplain Systems: What Have We Learned? Jon Kusler, Executive Director, Association of State Wetland Managers. (20 minutes)

**9:25a.m.-9:45a.m.** Overview of Post Disaster Response and Recovery Efforts and Mitigation of Future Losses in the Mississippi Basin: Report From Workshop 1. Doug Plasencia, Chairman, Association of State Floodplain Managers

**9:45a.m.-10:45a.m.** Why Restore Floodplains Including Riparian Habitat and Riparian Areas? What Do We Mean By "Restoration" and What Types and Degree of "Restoration" Are Needed to Protect Particular Functions and Values?

- ◆ Need for Restoration, Overview. Don Hey, Wetland Research, Inc. (20 minutes)
- ◆ Overview of River and Floodplain Restoration Requirements and Techniques. Richard Sparks, Illinois Natural History Survey (20 minutes)

*Panel Discussion:* What sorts of restoration are needed to restore particular types of functions and values?

**10:45a.m.-11:05a.m.** Coffee

**11:05a.m.-12:15p.m.** What Are the Restoration Opportunities; How Do We Identify Areas With High Restoration Potential?

- ◆ Overview of Floodplain and River Restoration Opportunities--Levee Rebuilding, Bioengineering, Etc. Ann Riley, Golden State Wildlife Federation and Former Director of the California Urban Streams Program (20 minutes)
- ◆ How Do We Identify and Map Potential "Restoration" Sites? Dan Willard, Indiana University (20 minutes)

*Panel:* Efforts Underway to Map Floodplain/Wetland Areas Relevant to Identification of Potential Restoration Sites

- ◆ Bill Wilen, U.S. Fish and Wildlife Service (10 minutes)
- ◆ ? FEMA (10 minutes)

**12:15p.m.-1:30p.m.** Lunch (On your own)

**1:30p.m.-2:15p.m.** What Are Landowner Needs?

*Panel:* (10 minutes each)

- ◆ The Agricultural Community  
Ed Thompson, American Farmland Trust
- ◆ The Forestry Community
- ◆ The Development Community

**2:15p.m.-3:15p.m.** What Federal Flood and Disaster Programs Are Available to Private Landowners and Local Governments To Assist and Help Finance Post Disaster Restoration? How are they being applied?

*Panel:* (15 minutes each)

- ◆ Disaster Assistance. Larry Zensinger, FEMA (15 minutes)
- ◆ Section 1362 and Flood Insurance. Frank Thomas, FEMA (15 minutes)
- ◆ Corps of Engineers Programs. Speaker to be designated. (15 minutes)
- ◆ U.S.D.A. Programs Including Soil Conservation Service Programs. Speaker to be designated. (15 minutes)

**3:15p.m.-3:35p.m.** Coffee.

**3:35p.m.-5:15p.m.** What Federal Resource Management, Wetland, River and Other Programs Are Available to Assist Private Landowner and Government Restoration Efforts? How are they being applied?

- ◆ Wetland Reserve and Other U.S.D.A. Programs. Billy Teels, U.S. Soil Conservation Service (20 minutes)
- ◆ Partners for Wildlife, Water Bank, North American Waterfowl Plan and Other Department of Interior Programs. Speaker to be designated. (20 minutes)

- ♦ Wetland, Section 319 and Other U.S. Environmental Protection Agency Programs. Bob Wayland, U.S. Environmental Protection Agency (20 minutes)

**5:15p.m.-6:15p.m.** Mixer, Cash Bar

**6:15p.m.-8:00p.m.** Dinner (On your own)

**8:00p.m.-10:00p.m.** Perspectives from the Mississippi River Basin. What are the highest priority restoration opportunities? What can or should be done by the federal government/states/local governments or others to help?

*State Panel:* (8-10 minutes each)

- ♦ Larry Larson, Association of State Floodplain Managers
- ♦ Holly Stoerker, Upper Mississippi River Basin Association
- ♦ ? National Governor's Association

*Environmental Organizations Panel:* (8-10 minutes each)

- ♦ Brett Hulsey, Sierra Club
- ♦ Paul Hanson, Issak Walton League
- ♦ Jon Duyvejonck, Upper Mississippi River Conservation Committee
- ♦ Paul Kemp, Coalition to Restore Coastal Louisiana

***Day 2. September 29. Opportunities and Priorities for Post Disaster Mitigation and Restoration of Wetland and Floodplain Systems***

**8:30a.m.-10:30a.m.** What Are the Scientific, Management and Political Requirements of Successful Floodplains Including Wetland Restoration? What Have We Learned?

- ♦ Wetland Restoration and Watershed Management. Kevin Erwin, Kevin Erwin Consulting Ecologist, Inc. (20 minutes)
- ♦ Community Involvement and Multiple Funding Sources: The Tulsa Experience. Ron Flanagan, R.D. Flanagan and Associates (20 minutes)
- ♦ Involving the Public. Ann Riley, Golden State Wildlife Federation (20 minutes)

**10:30a.m.-10:50a.m.** Coffee

**10:50a.m.-12:15p.m.** National Perspective. What Is Being Done or Should be Done at the National Level (White House, Agencies, Congress) To Increase the Opportunities for Post Disaster Mitigation and Restoration and To Reduce Future Losses?

*Panel:* (10 minutes each)

- ♦ Connie Hunt, World Wildlife Fund and Coalition to Restore Aquatic Ecosystems
- ♦ Tim Searchinger, Environmental Defense Fund
- ♦ Scott Faber, American Rivers
- ♦ David Conrad, National Wildlife Federation

**12:15p.m.-1:30p.m.** Lunch. White House and Congressional Initiatives. Speakers to be designated.

**1:30p.m.-3:00p.m.** Workshops. Implementing Post Disaster Mitigation and Restoration.

1. Working With the Agricultural Community. Moderator: Ed Thompson, American Farmland Trust
2. Levees: To Build or not to Rebuild. Moderator: Ann Riley, Golden State Wildlife Federation
3. Making Restoration Work From a Scientific Perspective. Moderators: Don Hey, Wetland Research, Inc.; Kevin Erwin, Kevin Erwin Consulting Ecologist, Inc.
4. Mapping and Otherwise Identifying Restoration Sites. Moderator: Dan Willard, Indiana University

**3:00p.m.-3:20p.m.** Coffee

**3:20p.m.-4:45p.m.** Workshops. Enhancing Post Disaster Mitigation and Restoration Opportunities.

1. Restoration in the Context of Greenways and Multiobjective River Corridor Management. Moderators: Jon Kusler, Association of State Wetland Managers; Larry Larson, Association of State Floodplain Managers
2. Federal Agency Technical Assistance and Training for Landowners, Local Groups. Moderators: Chris Brown, National Park Service; Billy Teels, Soil Conservation Service
3. Mitigation Opportunities Provided by Federal Disaster Assistance, The Flood Insurance Program and Other Federal Flood and Disaster Assistance Programs. Moderators: To be determined.
4. Present and Potential Post Flood Restoration Activities of Conservation Organizations Along the Mississippi. Moderators: To be determined.

**4:45p.m.-5:45p.m.** Wrap-up, Workshop Report, Next Steps. Larry Larson, Association of State Floodplain Managers; Jon Kusler, Association of State Wetland Managers

***Day 3. (Optional)***

**8:30a.m.-12:00p.m.** Small group discussion concerning follow-up for conservation organizations along the Mississippi, states, and others. This will be a follow on workshop to provide time for more discussion and help design follow on workshops and activities for the nine floodprone states. The agenda for this session is not yet firm but will include, at a minimum, discussion of:

- ◆ Joint activities by various organizations concerning their activities along the Mississippi and ideas for possible follow-up activities.
- ◆ A proposal by Connie Hunt of the World Wildlife Fund to conduct a series of followon, state by state workshops.
- ◆ A proposal by the Association of State Wetland and Floodplain Managers to conduct follow-up river/wetland restoration training workshops for local environmental organizations.

***Association of Wetland Managers***

**P.O. Box 2463**

**Berne, New York 12023-9746**

# INNOVATION IN LOCAL FLOODPLAIN MANAGEMENT

## A Summary of Community Experience

Jon A. Kusler  
Attorney at Law

### CHAPTER I

#### RECOMMENDATIONS

Two types of recommendations can be offered for establishing and implementing innovative community programs: those addressed to communities themselves and those addressed to federal or state agencies that wish to encourage community innovation.

#### Recommendations for Community Leaders

##### Positive and Creative Attitude

Communities with innovative floodplain management programs have looked beyond the short term--coping with flood problems and recovering after a disaster. They have promoted long-range, comprehensive solutions to their flood problems and introduced multi-objective planning for the best use of floodplain lands. They view floods as opportunities for correcting past mistakes in land use, for reallocating floodplains to their most appropriate uses, and for reducing future flood losses. A positive, creative attitude can capture the interest of community leaders, citizens, and federal, state, and local officials.

##### Leadership by Community Officials and Interest Groups

Elected officials, planners, and floodplain landowners should take the lead in educating the public about flood problems and possible solutions; in developing carefully conceived management strategies for their lands; in seeking state and federal assistance; and in carrying plans and programs to completion. With few exceptions, one or more motivated individuals have played key roles in developing and implementing innovative programs. These individuals not only have provided leadership, but also have encouraged a sense of community responsibility



Natural Hazards Research and  
Applications Information Center  
Special Publication 4

Program on Environment and Behavior  
Institute of Behavioral Science  
The University of Colorado  
1982

and motivated the community to deal with its problems. Even though federal or state assistance has played an important role in floodplain programs, surprisingly few innovative solutions have been imposed from the outside.

#### A Comprehensive Approach to Resource Management

Floodplain management is often most effective when integrated with comprehensive resource management and planning programs that address multiple needs and goals. Frequently floodplain managers stress the negative aspects of flooding. This is less effective than emphasizing resource management to protect recreation areas, prime agricultural lands, flood storage areas, groundwater recharge, sand and gravel deposits, water quality, and beach access. Broader comprehensive planning that also provides for low income housing, economic development, and public services not only underpins floodplain management but also helps to obviate the objection that regulations prevent growth.

Floodplain management frequently produces financial benefits. Besides federally subsidized flood insurance and disaster assistance, the benefits include reduced drainage costs, tax and job benefits, mortgage security, reduced costs for public services, and cost-effective provision of open space, including open space grants from state and federal agencies.

Although comprehensive community planning is desirable, especially in urban settings, a narrow focus on flood problems may also succeed. Attempts to become too comprehensive have sometimes lost sight of key problems and have failed due to impracticality.

#### Community Involvement

Strong involvement of community leaders, landowners, and interest groups can provide the expertise and personnel needed to implement innovative floodplain management. It also provides the political base

required for regulation, acquisition, and other implementation activities. Innovation has often been motivated or guided by formal and informal community work groups that have been formed to deal with flooding threats and the broader aspects of floodplain management. These groups can gather data, educate landowners, formulate policies, and help with implementation.

#### Detailed Flood Maps and Sources of Expertise

Flood maps at scales of 1"=200' to 600' on a topographic or orthophoto base are essential for comprehensive floodplain management. With few exceptions, successful programs have developed more detailed and accurate flood maps than those provided by FEMA and supplementary data, including information on structures, fill, parks and parkways, soils and detailed topographic information.

Expertise in floodproofing, relocation, flood control works, flood hazard analysis, and similar topics is also needed to develop and administer innovative programs. Such expertise has sometimes been developed in-house but, more commonly, has come from federal or state agencies, or private consultants. Many programs have established or relied on conservation commissions or on water or flood control districts.

#### Cooperation with Other Communities

Some innovations, particularly in riverine areas, have involved two or more communities dealing with extraterritorial aspects of flooding such as drainage and floodway delineation. In most instances, these have involved not only informal communication but also formal contracts and agreements and joint efforts to develop plans and guidelines.

#### Floodplains as Ecological Systems

The capability and limitations of each portion of a community's floodplain can be evaluated, planned, and used according to its special qualities--resources, existing uses, potential, and other factors.

Innovative programs have developed varied use policies and have applied different implementation techniques. For example, acquisition and relocation may be appropriate for a developed area while regulations may be applied to an undeveloped area.

#### Packaging State and Federal Assistance

Programs can combine or package state and federal assistance such as floodplain mapping, technical and disaster assistance, or grants-in-aid for acquisition with local regulations, floodproofing, education, and flood warning systems to achieve multiple purposes in floodplain management.

#### Persistence

Program implementation requires persistence. All programs take time to implement, ranging from a few months to ten years. Persistence is essential to arrange necessary federal assistance, to educate landowners, and to implement the program.

#### Preflood Planning

Unless preflood planning lays the groundwork for intelligent decisions following a serious flood, rapid rebuilding may occur with no thought of the consequences. Although a single major flood may precipitate planning and discussion, a second is often required to stimulate funding and actual implementation. This two-flood phenomenon may be explained in part by the added impetus given by a second flood and in part by the planning and preparation that was done between the two disasters.

#### Community Awareness After a Disaster

After a disaster, a community is in the best position to develop and implement an innovative floodplain management program, beginning with moratoria on redevelopment until coherent proposals for response are developed. However, more permanent regulations should be combined

with a mitigation plan, relocation, floodproofing, flood warning system, and other measures.

#### Combining Regulations with Nonregulatory Approaches

In some situations, regulations are best combined with nonregulatory techniques to deal with existing uses and to allocate other floodplain areas to more appropriate uses. Communities with innovative programs and extensive development consistently apply some combination of regulatory and nonregulatory approaches. Acquisition, flood warning systems and floodproofing are most commonly used.

#### Recommendations for Federal Incentives

Because of their fragmentary, uncoordinated approaches and inflexibility in standards, some federal programs have tended to discourage local innovation in floodplain regulation. However, others have helped. Recent NFIP initiatives encouraging innovation include: technical assistance; training; education; support for local acquisition through constructive total loss payments; Section 1362 payments; and emphasis on preflood planning. The U.S. Water Resources Council initiatives to strengthen state and local reliance on nonstructural floodplain management measures have also helped. Federal actions such as these should be continued and expanded and other federal programs should be evaluated and revised to remove impediments to local innovation.

Additional recommendations are:

#### Nonstructural Measures

Federal agencies, Congress, and the White House should treat nonstructural floodplain management measures and flood control works equally. Regulation, acquisition, flood insurance, and flood warning systems should have the same priority as structural measures in benefiting from cost-sharing, grants-in-aid, and other federal support.

This would encourage communities to choose innovative combinations rather than stress flood control simply because 80-100% of the cost of flood control works is federally subsidized. Similarly, if flood insurance rates were revised to reflect actual risks, the tendency to rely on insurance alone would also be reduced.

#### Minimum Nature of Federal Standards

Federal agencies should emphasize the minimum nature of federal mapping and standards such as the floodway standards and the 100-year protection elevation established by the NFIP. Agencies could encourage more creative local approaches by providing maps tailored to local needs and by modifying flood insurance rates to reflect actual risk. They could also further support local programs by providing technical assistance, education and training.

#### Distribution of Materials

FEMA, WRC, the National Oceanic and Atmospheric Administration (NOAA), the U.S. Army Corps of Engineers, the Soil Conservation Service (SCS), and other agencies should act as clearinghouses to document innovative floodplain management programs and provide such documentation to communities that are looking for leadership examples and "how to" information. This documentation should stress the "nuts and bolts" aspects of innovation, including financial costs and benefits.

#### Technical Assistance

FEMA, the Environmental Protection Agency (EPA), SCS, the U.S. Geological Survey (USGS), the Tennessee Valley Authority (TVA), the Corps, and NOAA should provide additional assistance to communities or enhance state capabilities to provide assistance with innovations. This assistance could include: detailed mapping for land capability and flooding analysis; map interpretation; dissemination of information on

the packaging of federal grants and programs; and distribution of materials on floodproofing, acquisition, and flood warning systems.

#### Training and Education

In cooperation with states, regional planning agencies, and universities, federal agencies should train local government officials, lenders, municipal attorneys, and planners in innovative and integrated floodplain management strategies and techniques. This may best be accomplished directly by FEMA after a major flood disaster or at the point a community converts to the regular flood insurance program. However, universities or private groups familiar with local conditions should also provide ongoing assistance. Training materials may include case studies of innovative community experiences, slide shows, and booklets.

Federal agency staffs should also be trained in innovative approaches and in implementation of the Floodplain Management and Protection of Wetlands Executive Orders (E.O. 11988 and 11990). The WRC, FEMA, the Corps, USGS, or other agencies should hold workshops to familiarize federal staff with the components of innovative community programs; what motivates the innovations; and how federal agencies could encourage their development. Local government officials and planners from innovative communities could speak about their communities' experiences at these workshops.

#### Tailoring Federal Programs to Local Conditions

Federal flood insurance, disaster assistance, mapping, and other programs should be tailored to the needs of communities with common sets of problems, such as those located on barrier islands, those prone to flash floods, or those with long-term fluctuation in water levels (e.g., lakeshores). Until recently, federal programs generally followed the "norm" in technical assistance and mapping. To some extent, this was

necessary during early program phases: more sophistication is needed now.

Specific tailoring could begin by having FEMA, the National Science Foundation (NSF), WRC, the Corps, or SCS survey major categories of flood problems in communities.\* Standards for particular situations then could be developed. For example, FEMA could provide more specific standards for erosion problems, areas behind levees, lakeshore flooding, and "supercritical flow" areas.

#### Implementation of Executive Orders

To minimize federal investment and reinvestment in hazard areas, federal agencies should aggressively implement the Floodplain Management and Protection of Wetlands Executive Orders for federal and federally licensed, permitted or funded projects. Implementation in both preflood and postflood contexts would support and encourage local innovation by establishing examples of sound federal floodplain management for locals to follow; better informing the public; encouraging nonstructural approaches; and providing a community infrastructure (e.g., roads, sewers) consistent with regulations.

#### Encouragement for State Programs

Strong federal support for innovative state programs will, in turn, encourage innovative local programs, particularly in rural areas. State programs often play a role in local innovation by providing a regulatory framework, technical assistance and training, and assistance in packaging federal and state programs. Continuation of FEMA grants provided by its State Assistance Program is important to encourage such state roles. Additional federal encouragement may take the form of technical assis-

tance, training and education, mapping, and stronger involvement of the states in postdisaster response.

#### Mapping

Specialized and accurate federal and state floodplain maps are needed to encourage and support community innovations. States, federal agencies, and local communities should agree on specifications for such maps which then would be selectively produced. Often such a map can be developed as a "restudy" of an area.

Coastal areas need data on wave heights and erosion; inland areas also need data on erosion and more specialized data on "supercritical flow," lake flooding, and erosion. Soil and wetland maps are also needed in some areas.

After a disaster, mapping is particularly critical to help guide redevelopment. Flood maps should be large-scale (e.g., 1"=200') and should be on a photographic or topographic base showing existing uses. Floodways shown on maps should reflect community decisions for acceptable backwater increases or alternative floodway boundaries. Urban areas need watershed mapping with projections of urbanization in calculation of flood flows. The specific mapping could be carried out on a cost-sharing basis among federal, state, and local units.

#### Ancillary Data Gathering

Mapping can often provide only a portion of the data needed for innovative floodplain management. Additional site-specific data gathering is needed for acquisition and relocation, flood control works, flood warning systems, floodproofing, and other management techniques. Flood velocities, soil erosion potential, flora and fauna, and land ownership are types of information commonly needed. Such site-specific data gathering may be carried out by federal agencies such as the Corps, SCS.

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\* See Chapter 8, Volume 3, Regulation of Flood Hazard Areas to Reduce Flood Hazard Areas to Reduce Flood Losses, for a description of such a classification system.

USGS, and NOAA as individual plans and programs are developed after a flood disaster or as projects are proposed for the flood hazard area.

#### Preflood and Postflood Planning

Federal agencies should work closely with local communities and the states in developing hazard mitigation plans for use before and after a disaster. The plans should address land capability, floodproofing or relocation of existing structures, regulation, acquisition, flood warning systems, drainage, and evacuation. These plans should be sensitive to relationships among uses upstream and downstream, across the waterway, and elsewhere within the drainage basin.

#### Coordination and Packaging of Federal Programs

WRC, the Council on Environmental Quality (CEQ), FEMA, the Office of Management and Budget (OMB), and other agencies should coordinate and package federal policies addressing preflood and postflood situations. They should also encourage local innovation through a combination of flood insurance, grants-in-aid for open space, floodplain mapping and other programs. In the past, communities usually had to shop for grants and apply for assistance on a piecemeal basis. Implementation of the floodplain and wetland Executive Orders and the July 10, 1980 OMB directive that requires ten federal agencies to enter into interagency agreements to mitigate flood damages after disasters will improve such coordination. A coherent federal policy on flood hazard mitigation has been lacking. Moreover, the sheer complexity of procedures and forms for disaster relief, open space grants, and flood control measures has discouraged communities (particularly smaller ones) from applying for assistance.

# **WETLAND PUBLICATIONS AVAILABLE FROM**

**The Association of Wetland Managers  
P.O. Box 2463  
Berne, New York 12023-9746**

**International Symposium: Wetlands of the Great Lakes -- Niagara Falls, New York, May 16-18, 1990. 335 pages. Nonmember \$22.50, Member \$19.50.**

Chapters: Binational, National and Regional Wetland Policy; Great Lakes Coastal Wetland Databases; Wetland Protection in Michigan: The Permitting Process; Water Level Efforts on Great Lakes Coastal Wetlands; Nutrient Effects on Great Lakes Coastal Wetlands; Habitat Stress on Great Lakes Coastal Wetlands; Wetland Education and Aesthetics; Wetland Valuation; Wetland Mitigation and Creation; Artificial Wetlands and Water Quality; Wetlands Research; Appendix.

**Selected Bibliography: Wetland Creation and Restoration written by Kevin L. Erwin. 58 pages. Approximately 600 references. Nonmember/Member \$7.00.**

This bibliography deals with created and restored wetlands. The objective is to provide researchers, practitioners, and government agencies with an index for identifying and locating publications useful in designing, evaluating, and managing wetland creation and restoration projects. We believe this is a very useful compilation of references.

**Wetlands Creation and Restoration: The Status of the Science. 1990. 600 pages. Prepared, in part, for the US EPA by the Association of State Wetland Managers. Edited by Jon A. Kusler and Mary E. Kentula. Nonmember \$35, Member \$33.**

Part 1 -- Regional Review; Part 2 -- Perspectives. 28 papers from leading scientists and technicians working in the field, the book represents a state-of-the-art report on wetlands restoration in the U.S. Provides the first major regional assessment of the capacity to implement a goal of no-net-loss of wetlands. Designed to help managers and researchers improve methods, provide guidance for effective project design, and help in developing methods for evaluating the potential and actual success of projects. Published by Island Press.

**International Symposiums: Ecotourism and Resource Conservation -- A Collection of Papers from Two International Conferences: Merida, Mexico, April 17-19, 1989; Miami Beach, Florida, Nov. 27-Dec. 2, 1990. 885 pages in two volumes. Members and Nonmembers \$14 each volume (each volume counts as one book for shipping charges).**

Chapters Volume 1: Introduction; The Ecotourist; Ecotourism and Native Cultures; Local Community and Landowner Involvement/Benefits and Ecotourism; Perspectives from Various Nations.

Chapters Volume 2: Protected Areas; Ecotourism and Coastal Zone Management; Ecotourism and Development; Tour Operators Perspectives; Journalism, Publicity, and Ecotourism; Training and Education; Appendix.

**International Symposium: Wetlands and River Corridor Management -- Charleston, South Carolina, July 5-9, 1989. 520 pages. Nonmember \$28, Member \$24.**

Chapters: Policies and Techniques; U.S. Case Studies of River Corridor Impacts and Protection Strategies; International Case Studies of River Corridor Impacts and Protection Strategies; Fishery, Habitat, Forestry Values; Aesthetic/Recreational Values; Water Quality; Flood Loss Reduction with Dams and Other Techniques; Hydrologic Modifications and Instream Flow Needs; Institutions for Landscape and Watershed Management; Evaluation, Modelling, Monitoring Information Systems; Mitigation/Restoration/Creation; Regulations; State Programs; Legal Issues; Bibliography.

**National Wetland Symposium: Urban Wetlands -- Oakland, California, June 26-29, 1988. 402 pages. Nonmember \$23, Member \$19.**

Chapters: Introduction, Urban Wildlife and Habitat Values, Flood Control and Stormwater, Aesthetic and Scenic Values, Pollution and Urban Wetlands, Data Bases and Boundary Delineation, Advanced Identification and Special Area Management, Planning and Case Studies, Section 404, Local Regulations, Restoration and Creation, Vernal Pools, The Future.

**National Wetland Symposium: Wetland Hydrology -- Chicago, Illinois, September 16-18, 1987 -- 339 pages. Nonmember \$20, Member \$17.**

Chapters: Hydrology and Wetland Functions, Hydrology and Wetland Classification, Wetlands and Flood Storage, Hydrology and Water Quality, Wetlands and Stormwater, Case Studies of Assessment, Wetlands and Groundwater, Hydrology and Restoration/Creation, Hydrology and Legal Issues, Multiobjective Management of Wetlands, Research Needs.

**National Wetland Symposium: Mitigation of Impacts and Losses -- New Orleans, Louisiana, October 8-10, 1986 -- 460 pages. Nonmember \$27, Member \$23.**

Chapters: Perspectives on Mitigation, Federal and State Policies, Reducing Impacts, Mitigating Cumulative Impacts, Special Area Management, Wetland Restoration/Creation, Large Scale Projects and Mitigation Banking, Research Needs, Draft Guidelines for Wetland Restoration/Creation.

**National Wetlands Assessment Symposium -- Portland, Maine, June 17-20, 1985 -- 331 pages. Nonmember \$20, Member \$16.**

Chapters: Issues in Wetland Assessment, Federal Perspectives, Assessing Specific Wetland Functions, Comprehensive Assessment Methods, the Regulator's Perspective, Data Sources for Wetland Assessment, Boundary Definition, Assessing Impacts of Specific Activities, Assessing Cumulative Impacts, Rating and Ranking, Mitigation and Restoration, Assessment and the Courts, Regional Perspectives.

**National Wetland Protection Symposium: Strengthening the Role of the States -- Gainesville, Florida, September 19-21, 1984 -- 711 pages. Nonmember \$18, Member \$12.**

Chapters: Overview, Definitions and Jurisdiction, Evaluation, Cooperative State/Local Regional Programs, Mitigation, Special Management Areas, Special Uses, Wetlands and Floodplain Regulations, Section 404 Program Assumption, Recent Legislative Initiatives, Legal Issues and Enforcement, Nonregulatory Approaches, Training and Education, Research Needs, Conclusions.

---

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**DRAFT**

**MINIMIZATION PLAN FOR THE  
INDIVIDUAL AND FAMILY GRANT PROGRAM**

**DR-996-14**

**6 AUGUST 1993**

FEMA  
IOWA IFG  
DR-996-LA  
APPENDIX E  
8-6-93

**I. SEQUENCE OF INDIVIDUAL ASSISTANCE MINIMIZATION**

- A. The contract inspector identifies the items potentially eligible for minimization.

Inspectors will:

- note type of heating fuel
- note type of basement
- note basement ceiling height
- note point of entry of flood water
- note type of foundation
- make recommendations for types of minimization measures feasible
- photograph exterior of the damaged dwelling

- B. Quality Control staff completes their review processing, making any additional field inspections deemed necessary, and reviewing for more cost effective alternatives. The application package is then forwarded to IMS. for transmittal to IFG per their normal routing.
- C. IMS tracks the minimization applicants by adding the additional marking 'M' in the user field of the inspection field.
- D. Document control pulls all of the contract inspection photographs for minimization applicants and forwards them, with their respective files, in the normal routing to IFG.
- E. The IFG routes their initial payment processing as normal, but marking minimization applicant files for future follow-up. Upon completion of the initial review the IFG review panel prepares the cover letter explaining the minimization program and the customized "Letter of Intent" for each applicant. These are then mailed to each applicant along with the initial IFG award letter. Applicants are instructed to return the "Letter of Intent", signed, to IFG if they want to participate in the program. Copies of each "Letter of Intent" are routed to the Hazard Mitigation Packaging Team for their program tracking records.

**EXCEPTION:**

Applications marked for "899" assistance, "Elevation or Relocation" are not sent "Letters of Intent". A copy of the application, inspection forms and photographs are forwarded to the Hazard Mitigation Packaging Team for

alternative funding possibilities. The applicant is not notified at this time of any funding possibilities. Funding options are researched and the applicant is notified at the appropriate time regarding any possible FEMA funding available to them.

- F. If the "Letter of Intent" is not returned within 10 days the IFG reviewer will investigate for "extenuating circumstances" as to why the applicant has not responded. (i.e. elderly, no mail delivery, etc.) The reviewer may then contact the applicant to determine if the applicant needs additional information about the program.
- G. "Letters of Intent" that are returned to the IFG program will be forwarded to the Hazard Mitigation Packaging Team for funding recommendations and data entry to the program tracking records. The Packaging Team will also provide technical support to the IFG minimization program (field inspection) and technical telephone support to the applicants.
- H. The HM Packaging Team will route the application to one of three options:
  - 1. Direct Pay - applications requiring only desktop review for recommendation of approval for minimization funding
  - 2. Technical Review - applications requiring additional technical field inspection to determine the most cost effective minimization recommendation
  - 3. Alternative Funding - applications with elevation or relocation issues which cannot be adequately covered through the basic minimization programs nos. 801-817. Applicants for Alternative Funding will be notified of funding options by the HMPT at the appropriate processing point.

The HM packaging team will not be limited to the IFG minimization program for funding. Where appropriate the Cora Brown Program, 1362, code compliance, "substantial damage", ARC, etc. will be investigated for funding or work-in-kind assistance.

All application routings will be recorded in the program tracking records.

- I. After review by the HM packaging team all applications appropriate for IFG minimization funding will be promptly returned to IFG for Processing of supplemental minimization award. IFG will return the applications to IMS for supplemental payment and recording of "800" participation items.
- J. Final inspections of completed minimization program projects will be made by the packaging team as time allows. Follow-up telephone calls will also be

made to as many applicants as feasible by the HM packaging team. All results will be recorded in the program tracking records.

INDIVIDUAL AND FAMILY GRANT PROGRAM  
STATE OF IOWA  
DEPARTMENT OF HUMAN SERVICES  
OFFICE OF EMPLOYEE SERVICES  
HOOVER STATE OFFICE BUILDING  
DES MOINES, IOWA 50319  
1-800-858-6918

Dear Applicant:

The Federal Emergency Management Agency (FEMA) recently inspected your flood damaged home. The inspector has indicated that certain types of flood damages may be avoided in the future if you choose to make some changes now.

The cost of some flood-loss reduction measures can be provided to you through the Minimization Program from the Iowa State Individual and Family Grant (IFG) Program. "Minimization" means the construction steps that can be taken to lessen or prevent future losses to your house structure. This is a voluntary program offered to you upon agreement that the funds will be used only on the specific minimization projects authorized.

Enclosed is a "Statement of Intent" form, indicating to you the items IFG is offering to fund. If you intend to participate, please review the form and sign next to each minimization item you agree to complete. Return the "Statement of Intent" form within 10 days from the date of this letter. Upon receipt of this letter, the IFG program will issue a check specifically for the minimization items.

A final inspection of completed minimization projects may be performed by this office. You must keep all documentation, i.e; bills, receipts, and canceled checks for three years.

If you have any questions or need assistance, please feel free to call.

Sincerely,

Grant Coordinating Officer

STATE OF IOWA  
INDIVIDUAL AND FAMILY GRANT PROGRAM  
STATEMENT OF INTENT  
DR-996-IA

(name)  
(address)

Activation Date: x  
FEMA Control # : x

PLEASE READ ATTACHED COVER LETTER BEFORE COMPLETING THIS FORM.

The minimization measures listed below were identified during your FEMA inspection. These measures will reduce your likelihood of experiencing similar damages to your home in a future flood event of equal flood height.

Your signature next to each Minimization Measure indicates your interest to use the IFG Grant Award for that purpose. You must sign next to each line item you agree to implement in order to receive the additional funding. Line item measures not signed-off by you will not be funded. You are eligible for all measures listed and you must comply with all local building codes and ordinances in your community.

APPLICANT'S

|                |                             |                    |                  |
|----------------|-----------------------------|--------------------|------------------|
| <u>"800" #</u> | <u>MINIMIZATION MEASURE</u> | <u>IFG FUNDING</u> | <u>SIGNATURE</u> |
|----------------|-----------------------------|--------------------|------------------|

This form must be returned to the IFG address indicated above within 10 days of the activation date listed to be eligible for the minimization funding. For information please call the Iowa IFG Program at 1-800-858-6918. Your call will be referred to the appropriate minimization program personnel.

A final inspection of completed minimization applicants may be performed by this office. If you decide not to complete some or all of the items that you have received IFG funds to perform you must return those funds to the IFG program.

Sincerely,

IFG Grant Coordinator Officer

DOCUMENTATION

8-6-93

DR-996-IA

INDIVIDUAL ASSISTANCE

STATE OF IOWA INDIVIDUAL AND FAMILY GRANT PROGRAM

ISSUE: MINIMIZATION PROGRAM

The State of Iowa Individual and Family Grant Program, in conjunction with a 75% funding match from FEMA, has agreed to include the following minimization items in their IFG disaster funding program:

- |        |                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------|
| 801    | Construction of Interior Flood Walls around utilities                                                        |
| 802    | Elevation of the Main Electrical Panel to a height above the 100 year base flood elevation (per local codes) |
| 803    | Relocate the Main Electrical Panel to the main floor of the building                                         |
| 804    | Elevate the Heating Plant to a height above the 100 year base flood elevation (per local codes)              |
| 805    | Suspend the Heating Plant at a height above the 100 year base flood elevation (per local codes)              |
| 806    | Relocate the Heating Plant to the main floor of the building                                                 |
| 807    | Anchor the Fuel Storage Tank to prevent flotation or overturning                                             |
| 808    | Elevate the Hot Water Heater to a height above the 100 year base flood elevation (per local codes)           |
| 809    | Relocate the Hot Water Heater to the main floor of the building                                              |
| 811    | Install interior backwater valve                                                                             |
| 899    | Participate in funding, as deemed appropriate, of elevation or relocation of the structure                   |
| 814(m) | Relocate washing machine to the main floor                                                                   |
| 815(n) | Elevate the washing machine to a height above the 100 year base flood elevation (per local codes)            |
| 816(o) | Relocate the dryer to the main floor                                                                         |
| 817(p) | Elevate the dryer to a height above the 100 year base flood elevation (per local codes)                      |

The State of Iowa Individual and Family Grant Program does not agree to fund the following minimization items:

- |     |                                                                                              |
|-----|----------------------------------------------------------------------------------------------|
| 812 | Install Exterior Backwater Valves                                                            |
|     | Reason: Many local jurisdictions do not permit the installation of exterior backflow valves. |

COST-EFFECTIVENESS OF "800" SERIES - 996  
Based on Average Costs

|                                          | Standard<br>Price | Minim<br>Cost1      | Total     | Percent |
|------------------------------------------|-------------------|---------------------|-----------|---------|
| 801 INTERIOR FLOOD WALLS                 |                   | \$12.00 psf         |           |         |
| 802 ELEVATE MAIN PANEL                   | \$650.00          | \$250.00            | \$900.00  | 46%     |
| 803 RELOCATE MAIN PANEL                  | \$650.00          | \$550.00            | \$1200.00 | 84%     |
| 804 REPLACE AND ELEVATE<br>HEATING PLANT |                   |                     |           |         |
| Forced hot air                           | \$1600.00         | \$1100.00           | \$2700.00 | 68%     |
| Forced hot water                         | \$2700.00         | \$1100.00           | \$3600.00 | 40%     |
| Steam                                    | \$2700.00         | (N/A OR ALT system) |           |         |
| 805 SUSPEND HEATING PLANT                | \$1600.00         | \$ 800.00           | \$2400.00 | 50%     |
| 806 RELOCATE HEATING PLANT               |                   |                     |           |         |
| Forced hot air                           | \$1600.00         | \$1500.00           | \$3100.00 | 93%     |
| forced hot water                         | \$2700.00         | \$2000.00           | \$4700.00 | 74%     |
| 807 ANCHOR FUEL TANK - new               |                   |                     |           |         |
| Propane                                  | \$ 110.00         | \$ 100.00           | \$ 210.00 | 90%     |
| Oil & Kerosene                           | \$ 600.00         | \$ 225.00           | \$ 825.00 | 37%     |
| Reinstall existing tank                  | \$ 295.00         | \$ 225.00           | \$ 520.00 | 76%     |
| 808 ELEVATE WATER HEATER                 | \$ 348.00         | \$ 200.00           | \$ 548.00 | 57%     |
| 809 RELOCATE WATER HEATER                | \$ 348.00         | \$ 300.00           | \$ 648.00 | 86%     |
| M ELEVATE WASHER                         | \$                | \$ 121.00           |           |         |
| N ELEVATE DRYER                          | \$                | \$ 121.00           |           |         |
| O RELOCATE WASHER                        | \$                | \$ 165.00           |           |         |
| P RELOCATE DRYER                         | \$                | \$ 110.00           |           |         |
| 811 INSTALL INTERIOR BACKWATER VALVE     |                   |                     |           |         |

Note: The cost of a standard line item is divided into the cost of the minimization. Minimization measures are cost effective when they fall within the 85% threshold.



# Federal Emergency Management Agency

Disaster Field Office  
2333 Rockingham Road  
Davenport, Iowa 52802

A copy of your application for disaster aid has been forwarded to the Hazard Mitigation office of the Federal Emergency Management Agency. "Hazard Mitigation" means to repair your home in such a way as to reduce damages in the event of a future flood.

Your application indicates your home has sustained some flood damage. Included in this packet is some information we hope will be helpful for clean up and repair, as well as choosing mitigation techniques to protect your home in the future.

If you would like some technical assistance, or have any questions about this information, please call the HAZARD MITIGATION ASSISTANCE number at (319) 322-4081.



**FEMA**  
Region X

# HAZARD MITIGATION

## Flood Damage Control

### #321 Wet Floodproofing

**Prepare  
Clean  
Prevent** ✓

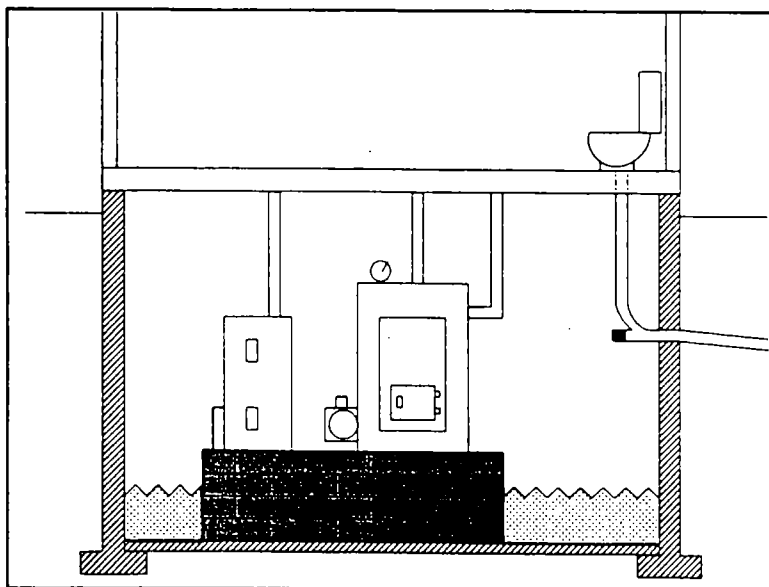


**Figure 1:** Elevate appliances above the flood level

Wet floodproof when there is no way to keep floodwaters from entering part of the building. To wet floodproof, you modify the building and contents so that floodwater will cause the least possible damage. Use water-resistant materials to replace building materials below the flood level, because floodwaters are allowed into the building to equalize pressure and prevent structural damage.

In rooms likely to be flooded, use lightweight, portable furnishings. Relocate heavy or attached items such as bookcases and water tanks upstairs or onto platforms at least 12 inches above the flood level. Furnaces can be suspended from the ceiling or installed in the attic or on a flat roof. Move electrical outlets above the flood level. If foundation repairs are needed, you may be able to elevate or relocate using the same equipment to hold the house up during foundation repairs. Be sure to obtain all necessary permits before beginning any of this, and adhere to all local and state building codes.

One advantage of wet floodproofing is that it takes very little work or money to make a big difference in losses from the next flood. Rebuilding with water-resistant materials adds very little to construction costs.

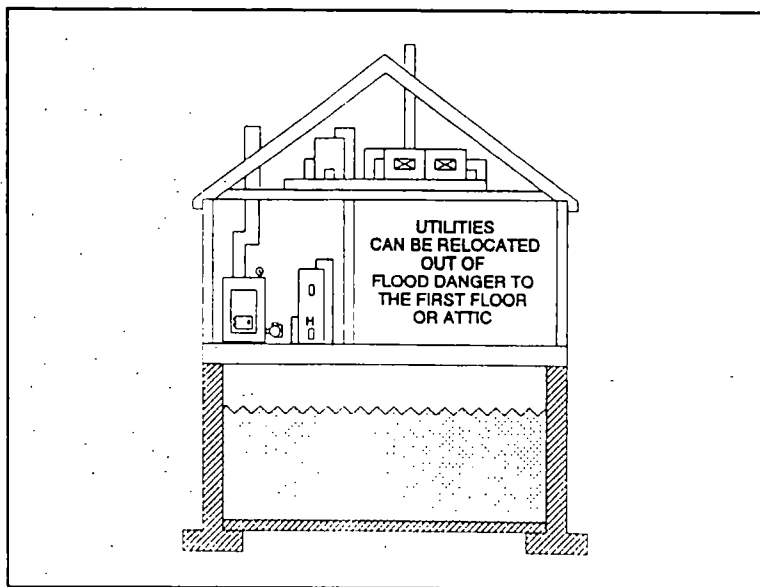


**Figure 2:** Relocate appliances & utilities



**FEMA**  
Region X

# HAZARD MITIGATION

## Flood Damage Control

### #322 Elevating a House

**Prepare  
Clean  
Prevent** ✓

Most types of homes can be elevated above floodwaters, including wood frame, brick, slab-on-grade, crawlspace, or homes with basements. This is an extremely reliable floodproofing method and requires little human intervention to prepare for a flood event. The floor elevation height should be set at least a foot above the 100-year-flood level, but buildings may be elevated as much as 9 feet above their existing floor levels. In such an extreme case, the new lower level would probably be used as a garage. In all cases, a new entry stair and front porch is built to meet the new height. Elevating a home requires use of professional plumbers, electricians, house movers and contractors, and a structural engineer to help you design your new foundation and obtain a permit from your building department. Because the new foundation will be in the floodwaters, it is extremely important that it be structurally designed to withstand lateral (sideways) forces such as fast-flowing currents and the impact of water-borne debris.

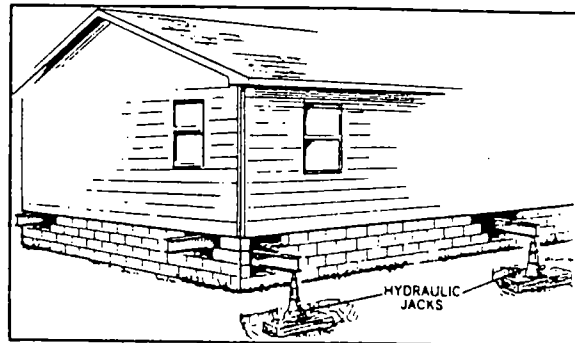


**Figure 1:** I-beams are placed under lifting points perpendicular to floor joists with a second set beneath for uniform lifting.

#### **Basic Steps in Elevating a Building:**

- ◆ Have appropriate professionals disconnect all utilities.
- ◆ Hire a professional house mover to disconnect your house from the existing foundation, jack it up to the new height, and provide a temporary foundation.
- ◆ Have the utilities temporarily reconnected so the house is liveable while foundation work is done.
- ◆ Build a temporary access stair to meet the new height.
- ◆ Build a new, permanent foundation.
- ◆ Have the house mover lower the house onto the new foundation and connect the anchor bolts.
- ◆ Have the utilities permanently reconnected.
- ◆ Build a new, permanent access stair and landing.

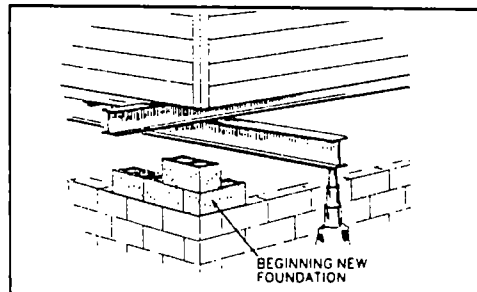


**Figure 2:** The house is detached from the foundation, lifted by jacks, and a new foundation built beneath it.

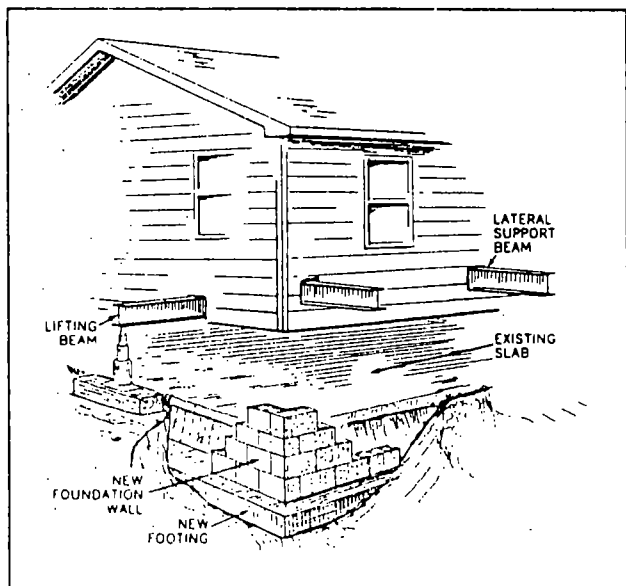


**Figure 3:** Lifting beams are placed under bearing walls and posts for a slab-on-grade house. The house is uniformly lifted using jacks. A new foundation and floor is built under the house.

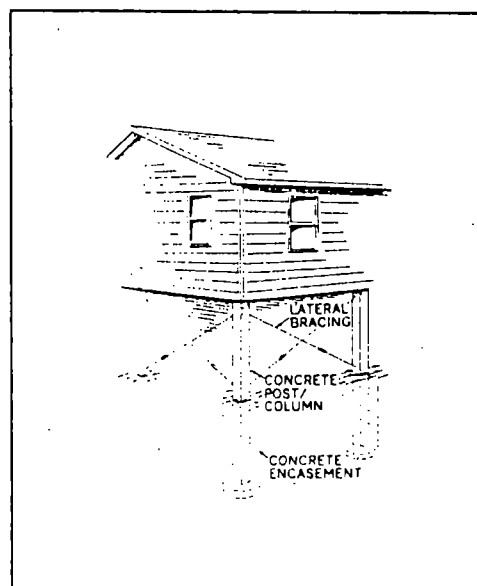


**Figure 4:** Posts can also be anchored in concrete encasements.



**FEMA**  
Region X

# HAZARD MITIGATION

## Flood Damage Control

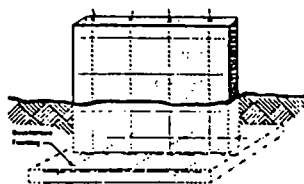
### #323 Installing a Manufactured Home

**Prepare  
Clean  
Prevent** ✓

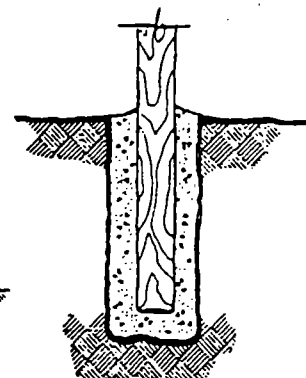
The three basics of proper elevation and anchoring of a manufactured home are: Foundations, cross bracing, and tie-downs. All three are essential in creating a safe and secure mobile home installation.



Manufactured Home Showing  
Cross Bracing and Foundation



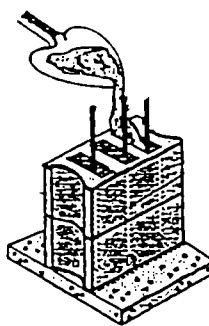
Large Pier Design



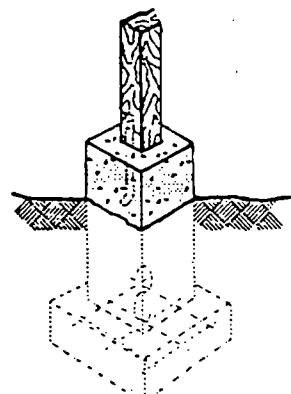
Post Backfilled  
With Concrete

#### Foundations:

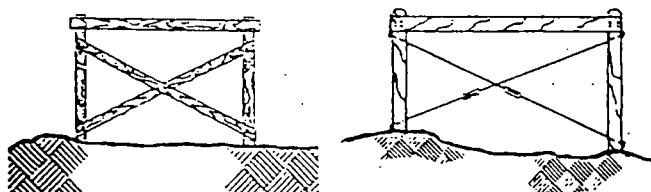
A poured concrete footing, reinforced with rebar, gives maximum stability. The rebar must turn out of the footing and up into the pier. Maake piers can of poured concrete or concrete blocks reinforced with rebar; the blocks must be filled solid with concrete. Cast threaded anchor bolts into the top of each pier so the mobile home frame can be anchored to the foundation. In areas with soft ground, post foundations may be able to achieve the required foundation strength. Drive posts into the ground down to a rock foundation, or to a depth specified by an engineer. Backfill a post with concrete for maximum strength.



Filling of Piers



Post Anchoring



Diagonal Bracing with Wood      Diagonal Bracing  
with Steel Rods

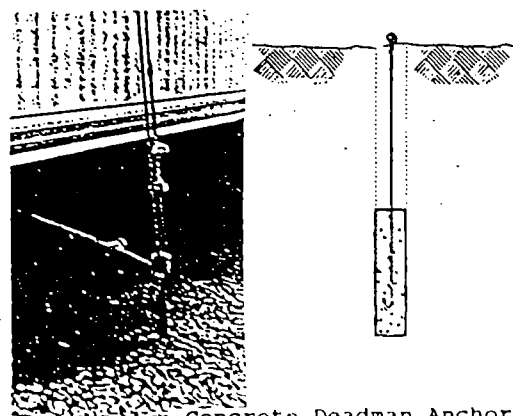
#### Tie-down straps:

Tie-down straps are used at the base of the manufactured home and can be tied over the top. The most common failure is pullout of the ground anchor. For maximum pullout resistance, cast the anchor into a concrete deadman.

In frame ties, the strap is secured to the ground anchor and manufactured home I-beam as shown in Figure 3.31.

#### Cross-bracing:

Diagonal bracing will keep the foundation from twisting and collapsing in a flood or high wind situation. Bracing can be achieved with 2-inch nominal lumber bolted to the piers, or with steel rods fitted through drilled holes and fastened with nuts.



Concrete Deadman Anchor



Tie Down Straps



Tie Components

---

## **Clinton Presidential Records Digital Records Marker**

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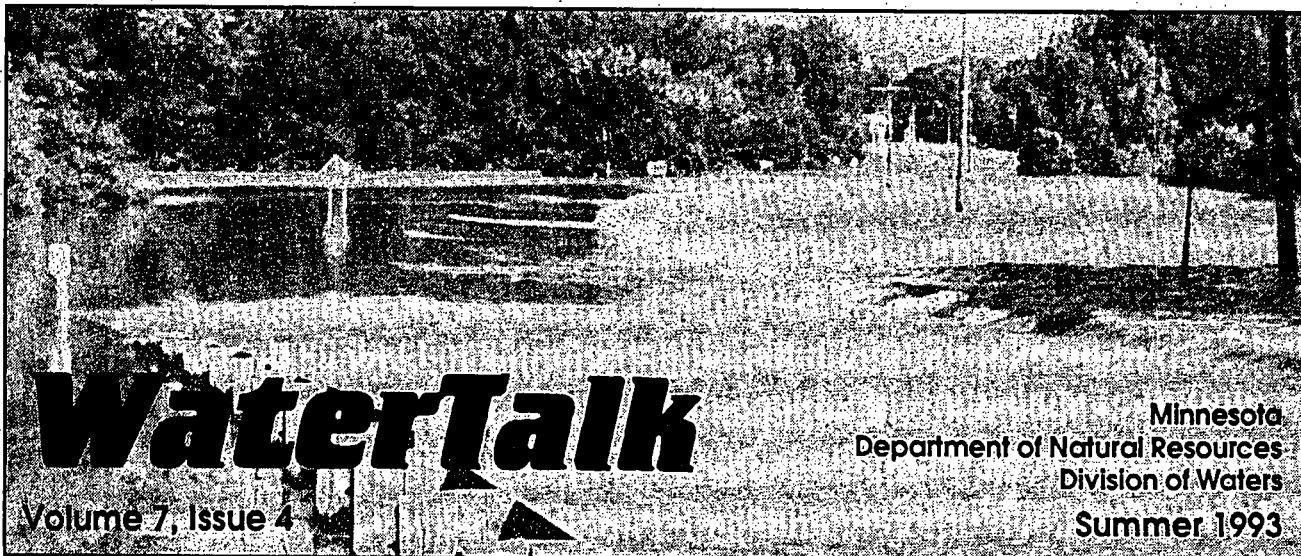
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Publications have not been scanned in their entirety for the purpose of digitization. To see the full publication please search online or visit the Clinton Presidential Library's Research Room.

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# WaterTalk

Volume 7, Issue 4

Minnesota  
Department of Natural Resources  
Division of Waters  
Summer 1993

TH 22, south end of St. Peter, looking west. 6/22/93. Photo credit: L Kramka.

## FLOOD!

Headlines and photographs of major flooding from Minnesota to Missouri have dominated the front pages of the nation's newspapers since May. The heavy rains started in early May and haven't stopped. Some of the questions often asked in the aftermath of a severe flood are in regard to the severity of the flood. Was this a 100-year flood? How does the 1993 flood compare to earlier floods?

First, a refresher course on the term "100-year flood". The 100-year flood is more appropriately called the "1%-chance" flood, since it has a 1% chance of occurring or being exceeded during any given year. This terminology avoids the misconception that a 100-year flood can only happen once in 100 years. It is possible for a 100-year flood to occur three years in a row, and then not to occur at all for the next 300 years. Similarly, a 10-year flood has a 10% chance of occurring or being exceeded during any given year. A 50-year flood has a 2% chance of occurrence.

The City of Marshall bore the brunt of the heaviest rainfall and flooding this summer. No doubt many residents in Marshall must have thought that every time it rained, they suffered through the 100-year flood. In fact, during the

May 6 - 8 flooding, the Redwood River was within a few inches of reaching the 100-year flood profile shown in the Marshall Flood Insurance Study. The June 16 - 17 storm resulted in approximately the 30-year flood.

**The 100-year flood can be measured by elevation or by discharge.**

The highest flood levels along the Redwood River in Marshall occurred in June, 1957. Higher flows were recorded in Marshall in April, 1969; however, the Corps of Engineers had constructed a diversion channel prior to the 1969 flood, significantly reducing flood levels. The peak flow of May 8, 1993 will be close to 1969 flood flows. The U.S. Geological Survey is still compiling and verifying the data they have collected.

...please turn to page 2

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## PROPOSED PILOT 404 PROJECT GRANT TO NEIGHBORHOOD HOUSING SERVICES

### THE ISSUE:

There are at least 100 homes in the project area, 50 of which will not be offered permanent protection against future flood damage, and will be required to meet the flood proofing requirements of the National Flood Insurance Program.

### THE PROJECT:

FEMA will enter an agreement with the State of Iowa to contract with Neighborhood Housing Services of Des Moines to process the 404 grants to program applicants. FEMA will provide an initial \$300,000 local grants and pay administration costs approximating 3% of the grant amount. Neighborhood Housing Services will assure that the local jurisdiction is participating in the National Flood Insurance Program (NFIP).

Applicants will be required to provide:

- 0 Proof of ownership, title, purchase contract, certificate of title insurance. Disclosure of any liens or loans secured by the house.
- 0 Evidence that the damage was caused by the declared event.
- 0 Proof that they are required to elevate the house to code standards such as an elevation certificate, building permit, or conditional occupancy permit. The proof must state the present elevation of the building and the required elevation of the building.
- 0 Proof of National Flood Insurance or commitment to purchase before final payment.
- 0 A bid, or contract with a licensed, bonded, contractor, or other evidence that the work can be completed within the anticipated grant amount.
- 0 The applicant will submit all receipts for work and materials in the construction project. The receipts will be held by the sub-grantee for 3 years after closeout.
- 0 Proof the owner has secured matching share financing, including in-kind services and materials.
- 0 The sub-grantee will provide all supervision, inspection, accounting, and other service necessary to conduct the program from inception to close-out.

- 0 The sub-grantee will provide the Small Business Administration Loan Officer with current list of applicants and their, address, phone, and FEMA control number.
- 0 Make periodic disbursement, retaining a significant withholding until final inspection and project approval.
- 0 Evidence that the non-federal matching share is not federal funds except from Community Development Block Grant awards. Federal loan funds are exempt from this requirement.
- 0 Provide procedures for uncompleted projects.
- 0 Inquire into the standing of the proposed contractor with the State Licensing agency of other appropriate agencies.
- 0 Retain project records for 3 years after closeout or audit.



# Federal Emergency Management Agency

FEMA-DR-996-Iowa  
Disaster Field Office I  
2333 Rockingham Road  
Davenport, Iowa 52802

August 11, 1993

MEMORANDUM TO: James Lee Witt  
Director

ATTENTION: Dennis H. Kwiatkowski  
Assistant Associate Director  
Disaster Assistance Programs  
*R. a. Buck*

FROM: Richard Buck  
Federal Coordinating Officer

SUBJECT: Comprehensive approach to Mississippi River levee repair

Before FEMA commits to individual levee repairs, it is imperative that all involved agencies understand the cumulative affects of multiple levee systems. We must recognize that a single levee has a sphere of impact far beyond the property it protects. While there is agreement on how to repair a given levee, we have not agreed on a larger approach that will examine the entire river system and the consequences of levee repairs throughout the Mississippi River system. I fear that we are not addressing levee repair in a comprehensive manner, and we are neglecting opportunities to affect long term solutions.

At a meeting on August 6, 1993, FEMA, the Corps of Engineers, and the Soil Conservation Service, agreed on how to approach the repair of a given levee. I concur with the results of this meeting in that we:

- Need to create an Interagency Team with members from FEMA, USACE, and the SCS to review immediate repairs of priority levees.

However, I strongly feel we must undertake efforts that were not agreed to. We must:

- Evaluate a particular levee repair within the context of protecting the larger area, and
- Assign an agency to develop a comprehensive restorative strategy for each watershed segment.

**I. NEED TO CREATE AN INTERAGENCY TEAM TO WORK ON THE IMMEDIATE REPAIR OF PRIORITY LEVEES.**

As a result of the August 6th meeting, it was agreed that:

- An Interagency Team would be available at each DFO.
- The Team will determine which agency will work on a particular levee repair.
- 75/25 match will be expected regardless of sponsoring agency.
- Agency programs will be similarly implemented. This includes such FEMA programs as:

Alternative Funding  
Cost Effective Mitigation

Use of Codes and Standards  
The 50% rule

**II. CONSIDER A PARTICULAR LEVEE REPAIR WITHIN THE CONTEXT OF THE LARGER AREA BEING PROTECTED.**

Executive Order 11988 requires that all federal actions that could impact a floodplain go through a planning process. If, after going through this process, an alternative to the flood plain action cannot be found, then and only then can the action commence. The Order also requires that mitigation measures be incorporated into the solution. Accordingly, USACE's P.L 84-99 and SCS's Emergency Management Work (EMW) programs should be considered "actions" as defined by E.O. 11988.

Both the Corps and SCS believe that all emergency work is exempt from E.O. 11988; we disagree. We believe that only one category of emergency work, work necessary to save lives, is exempt. "Life saving emergency work" means emergency repairs or flood fighting -- *not permanent work*.

Both P.L. 84-99 and EMW fund permanent repairs. More importantly, both programs improve levees and often effectively increase their elevations. These "improvements" include:

1. Providing additional protection: This can be done by placing a hard cap over the levee, but it is often done by placing one to three feet of additional material on the levee. This freeboard is typically not taken into account in the hydraulic modeling.
2. Even out the levee profile: Field crews often make a uniform gradient along the levee, frequently starting from the highest point.

3. Improving the maintenance by building a road along the top of the levee. This road can easily add 18 additional inches to a levee.
4. Increase the ease of flood fighting. A flood fight effort can easily increase the effective elevation by three feet. Levees can be designed in such a way as to ease flood fighting, or can provide for weir flow, thereby discouraging a flood fight effort.

Executive Order 11988 would not be important if a levee only impacted the development it was intended to protect. The problem is that *a levee has a sphere of impact that reaches well beyond the particular levee under question.*

E.O. 11988 allows us to address these issues and unfortunately, with the demise of the Water Resources Council, no agency is left to advise other agencies. FEMA must assume this role.

Following 11988 will not delay the repair process. All levees cannot be repaired simultaneously because there are not enough crews available to perform the work. Also, levees need to be de-watered before repairs can proceed. That priorities need to be established and certain levees need repair or even improvement is not in doubt.

### **III. ASSIGN A DESIGNATED AGENCY TO DEVELOP A COMPREHENSIVE RESTORATIVE STRATEGY FOR EACH WATERSHED SEGMENT.**

If the Interagency Teams are required to follow the planning process defined by E.O. 11988, they will have to view the entire levee system and its environs from a bird's eye view. The process will encourage a global focus on the river system, rather than an isolated, local one.

However, there are problems and solutions that would not surface even at this scale of analysis. The agricultural and forest practices undertaken in Northern tier States and Canada have a direct effect on Iowa riverside residents. A regional and international oversight is needed.

Fortunately such a regional analysis is possible. There is time to do the research, sufficient damage to make the research practical, new thinking has arisen from the activities of such organizations as the National Flood Insurance Program, and there are agencies to do the planning.

1. Time: As said previously all levees cannot be repaired simultaneously. Priorities need to be established. This gives us time. One benefit of concentrating on specific priority projects is congressional acceptance. Congressional representatives and staff would be assured that everything that can be done is being done.

2. Damage sufficient to allow us to re-examine the system: Many individual levees will need major restorative work. Repair will not just consist of repairing individual breaches. Re-coring, adding levels of protection, re-armoring, and adding maintenance roads may represent more than 50 % of a given levee system.
3. New thinking has arisen through the efforts of our own National Flood Insurance Program. Historically, when the Mississippi provided the sole commercial transportation link to the nation's heartland we thought that we could make permanent structural *improvements* to our nation's rivers.

Our view of our capabilities has changed. Hopefully we are humbled by this event. The NFIP has taught us to view rivers and their flood plains as elements of the same system; to view levees as necessary structures that have extensive short term and long term costs. We know that a levee protects one community at the expense of others, and that levees represent a liability to the descendants of all "protected" communities. Levees represent a regional debt no less real, considering the size of this disaster, than our national fiscal debt.

FEMA's NFIP and others are advocating the much softer, longer range, and less maintenance intensive flood plain management solutions. Where there are no alternative levees, smaller ring levees, setback levees and systems that do not reduce storage during extreme events are being suggested. Also, extensive applied research has uncovered numerous tools that can control the discharge ultimately responsible for the flooding. In many areas, agricultural practices have greatly reduced flooding, as have off-channel measures such as contour farming, terracing and retention levees.

4. Capable Research Agencies: The Planning Branches of USACE, our own Risk Management Division, the USGS, and SCS are capable of assembling the talent needed to develop such a plan of attack.

To address the problem, we could create a national team, similar to the Interagency levee review teams proposed for the Disaster Field Offices. A headquarters based interagency team could determine which agency should address a given watershed segment. For instance, the Rock Island District Planning Branch of USACE could perform the analysis needed for the Iowa River Watershed, while the Lincoln, Nebraska SCS office could be responsible for the Nishnabotna River. The assigned agency could work under the overall direction of an interagency steering committee. The results of this group would be communicated to the teams working in the DFOs.

# Flood Safety

***Although floodwater may be down, many dangers still exist. Here are things to remember in the days ahead:***

**Take good care of yourself.** Recovering from a flood is a big job. It is tough on both the body and the spirit. The effects a disaster has on you and your family may last a long time. Learn to recognize and care for anxiety, stress, and fatigue.

**Clean everything that got wet.** Floodwater has picked up sewage and chemicals from roads, farms, factories, and storage buildings. Spoiled food and flooded cosmetics and medicines are health hazards. **When in doubt, throw them out.**

**Stay away from power lines and electrical wires.** Electrical current can travel through water. Report downed power lines to your utility company or local emergency manager.

**Turn off your electricity when you return home.** Some appliances, such as TV sets, can shock you even after they have been unplugged. Don't use appliances or motors that have gotten wet unless they have been taken apart, cleaned, and dried.

**Turn off the gas.** If you suspect a leak, or smell gas, leave your home immediately and call your gas company to check your service.

**Watch for animals, especially snakes.** Animals that have been flooded out of their homes may seek shelter in yours. Use a stick to poke and turn items over and scare away small animals.

**Look before you step.** After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery. Wear protective foot gear if you must wade through water.

# Getting Help

- Contact the FEMA Disaster Information Hotline, 1-800-853-3362 to find out more about protective measures you can take to prevent future flood damage.
- The American Red Cross can provide you with a cleanup kit: mop, broom, bucket, and cleaning supplies.
- Contact your insurance agent to discuss claims.
- If you hire cleanup or repair contractors, be sure they are qualified to do the job. Be wary of people who drive through neighborhoods offering help in cleaning up or repairing your home. Check references.

Or, write for these **free** books:

## *Repairing Your Flooded Home*

Publication - FEMA 234

- clean up techniques
- first aid
- financial assistance
- rebuilding
- damage prevention

## *Design Manual for Retrofitting Flood Prone Residential Structures*

Publication - FEMA 114

- elevation
- relocation
- floodwalls
- closures
- sealants

## *Manufactured Home Installation in Flood Hazard Areas*

Publication - FEMA 85

- technical information

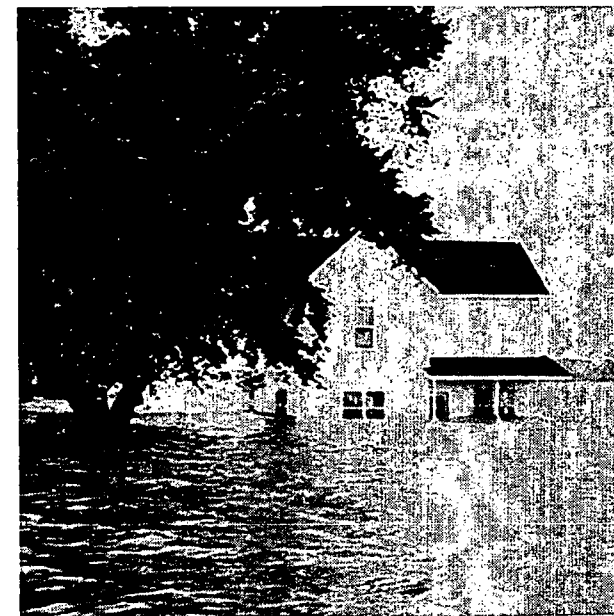
Write to:  
FEMA Publications  
P.O. Box 70274  
Washington, DC 20024

# Returning to your home...

## *After the Flood*



**FEMA  
Hazard Mitigation**



# Dealing with Damage Debris, and Dampness

*Floodwater affects homes in three ways:*

- **Water damages** building materials. Wallboard will disintegrate if it stays wet too long. Wood can swell, warp, or rot. Electrical parts can short out, malfunction, and cause fires or shock.
- **Debris**, such as mud, silt, and unknown contaminants in the water not only get everything dirty, they are also unhealthy.
- **Dampness** promotes the growth of mildew, a mold or fungus that can grow on everything.

## Discard or Save?

**Always throw out:**

Food  
Cosmetics  
Medicines and supplies  
Stuffed animals  
Baby toys

**If wet or damp, throw out:**

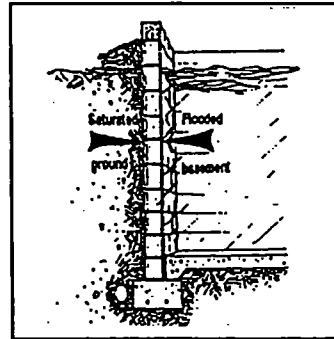
Mattresses, pillows  
Foam rubber  
Large carpets, padding  
Upholstered furniture  
Books  
Paper products

Remember, do not burn or bury discarded items. There will usually be more frequent garbage pickups after a flood. Check your local newspapers, TV and radio for trash pick-up schedules and drop-off sites.

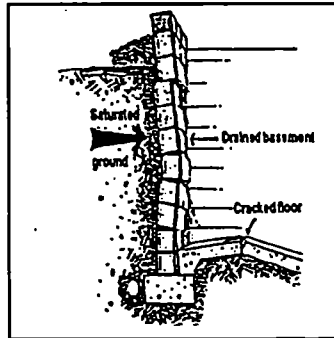
# Pumping Out Your Flooded Basement

*If your basement is flooded, don't be in too big a hurry to pump it out.*

Water in the ground outside your house will still be pushing hard against the outside of your basement walls, and the water inside your basement is pushing right back. If you drain your basement faster than the water outside drains, the outside pressure will be greater than the inside pressure. This may cause walls and floor to crack and possibly collapse.



1. Water in the basement equalizes pressure from water outside.



2. Without water in the basement, pressure from ground water can cause walls and floor to collapse.

early to drain your basement. Wait 24 hours, then pump the water down 2 or 3 feet again. Mark the level and check it the next day. When the water stops going back up, pump down another 2 or 3 feet and wait overnight. Repeat until all the water is out.

# Before You Rebuild...

Local codes generally require a building permit before you make repairs or flood proofing upgrades to your structure. You will usually need to get a permit for electrical work, plumbing and repairs for structural damage (such as foundations and exterior walls). Because your property may be located in a designated "floodplain" you will also want to check with your building department before building any flood walls or berms in your landscaping.

The National Flood Insurance Program (NFIP), and most local and state building codes require that a building that is substantially damaged or substantially improved be treated as a new construction. A new residential building must be built so that its lowest floor is at or above the base flood (100-year flood protection) elevation.

"Substantial damage" means that the cost to restore your house to its pre-damaged condition would equal or exceed 50% of the market value of your house before the damage occurred.

If your home is substantially damaged, you may have no choice but to elevate or relocate your house to meet NFIP standards. If your home has been damaged an average of 25% or more at least three times within the past 5 years, you also may be required to elevate it.

---

## Flood Insurance

Flood Insurance is available in all communities that are participating in the National Flood Insurance Program (NFIP). Call your local property and casualty insurance agent or the NFIP at 1 (800) 638-6620 for details.

## Working with the contractor

### *How do I find a contractor?*

Talk with relatives, friends, neighbors and co-workers. Also, check trade journals, newspaper advertisements and your local telephone directory.

### *What should I do next?*

Contact at least three contractors. Refer to protection measures in this brochure and briefly explain what you need to get the job done. Explain that you want a bid for a **complete project** that includes any work that they may, in turn, sub-contract to other professionals. Schedule a meeting for each prospective contractor to come to your house, survey the work and submit a bid proposal.

### *What should written bid proposals include?*

Actual specifications and code compliance designs are the contractor's responsibility. They must be included in the written bid proposal. It is recommended that the contractor obtain all required permits from local officials.

A complete bid proposal states the tasks to be performed and all associated costs. To avoid delays, be sure the contractor agrees to:

- ✓ Give you a detailed written description of work
- ✓ Provide material and equipment specifications
- ✓ Payments made in installments (see next page)
- ✓ List all prices including sub-contracts, materials, labor, permits, etc.
- ✓ Show licensing or registration documentation
- ✓ Furnish certificate of Liability & Worker's Compensation insurance
- ✓ Give written guarantee that states that all work complies with applicable building codes
- ✓ A written guarantee that states who is responsible for supplies and equipment

Beware of any bid that is substantially lower than the others -- it may indicate that the contractor has made a mistake or has not included all the work quoted by the other contractors.

### *Do I need to sign bid proposals?*

Do not sign any bid proposals until you have decided which contractor to hire. The signed bid proposal becomes your official contract. **Never sign a blank contract or one with blank spaces.**

### *How do I know the contractor is reputable?*

Ask for references. Experienced contractors can provide you a list of former clients; call them to make sure they were satisfied with the job.

Most states have laws that require contractors to be licensed or registered with the state. Licensed contractors typically have worker's compensation insurance and liability insurance.

### *Ask to see credentials.*

Check with the Better Business Bureau or local business trades council to ensure that there have been no complaints filed against the contractor.

### *When and how do I pay the contractor?*

The most common practice is to pay the contractor in three installments: An initial deposit of 1/3 after start date has been agreed upon; an additional 1/3 when the job is half done, and the remaining 1/3 upon satisfactory completion of the work. **If possible, pay the contractor by check or money order, not cash.**

### *Am I liable in the event of an accident?*

All licensed contractors typically are required to carry general liability insurance and Worker's Compensation insurance. **You must receive proof of coverage before you sign an agreement.** If the contractor is not insured, you may be liable for accidents that occur on your property or to your residence.

### *Is the work guaranteed?*

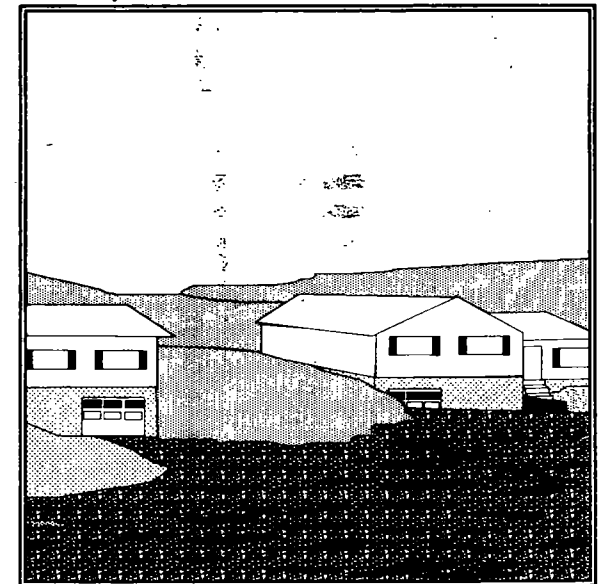
Work performed by a contractor is usually guaranteed for one year from the date of completion. Equipment is normally covered under the manufacturer's warranty. All warranty information must appear on the written proposal.

## After the flood...

# Protecting Your Utilities from Floods



**FEMA  
Hazard Mitigation**



## Relocate or Rebuild?

Returning to a flood damaged home can be overwhelming, and it is natural to want to repair and rebuild to make things "just like they were before." But before you rebuild, consider that each year, there are more flood disasters in the United States than any other kind of natural disaster. Chances are, you'll experience flood damage again, especially if you live in a flood plain.

The first thing to do following a flood is to decide if you and your family would be safer living in a different location, away from areas that flood. Relocation is the surest way to protect your family from being flooded again. Ask local officials about government programs that may purchase property for open space in areas that flood repeatedly.

## Don't Just Build It Back, Build It Better

If you decide to rebuild, consider floodproofing measures, which means using materials and methods that prevent or lessen damage from future floods.

There are many benefits to floodproofing your house:

- It saves money and aggravation during the next flood.
- Many floodproofing measures are inexpensive.
- Protecting your house from the next flood increases your property's resale value.
- It can easily be included into the repair and rebuilding process, thus reducing your costs.

## Check the Building Codes

Local codes generally require you to get a building permit for repairs or floodproofing upgrades. A permit is typically needed for electrical, plumbing, and structural damage repairs (i.e. foundations and exterior walls).

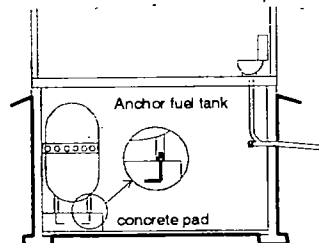
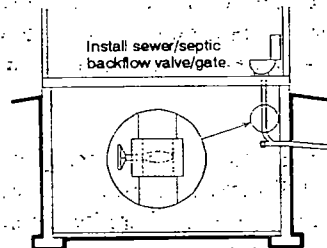
The National Flood Insurance Program (NFIP), and most local and state building codes require that a building that is substantially damaged or has been substantially improved be subject to the same building codes as a new construction. "Substantial damage" means that the cost to restore a home to its pre-damaged condition equals or exceeds 50% of its market value before the damage occurred.

If your home is substantially damaged, you may have no choice but to elevate or relocate your house to meet NFIP standards. If your home has been damaged an average of 25% or more at least three times within the past 5 years, you also may be required to elevate it.

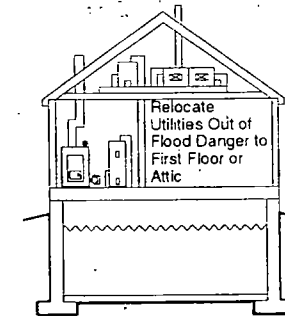
## Utility Protection

Protect your utilities by installing them above flood levels whenever possible. Look at attics, pantries, closets, porches, and unused rooms for space to house utilities above the flood level.

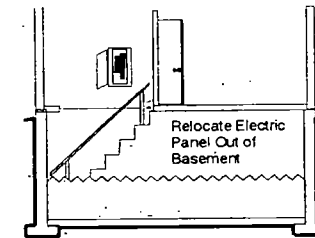
Protect your home from potential sewer back-ups. Install a backflow valve that conforms to state and local building codes. If your home is on a slab, an exterior valve may be necessary.



Anchor your fuel tank to prevent floatation and overturning. Metal strapping and fasteners should be non-corrosive; wood bracing should be pressure-treated wood.

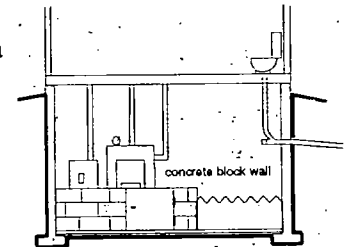


In medium to high level flooding, relocate hot water heater and heating systems out of flooded areas to at least 12" above base flood elevation. Relevant permits must be obtained before work begins.

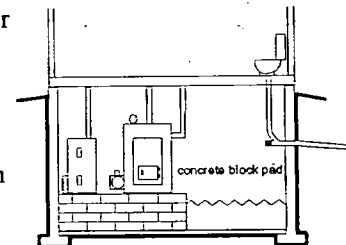


Elevate the electric panel. Maximum height of the panel is typically regulated by code. Relevant permits must be obtained. Ideally, your utility company will raise the meter as well.

In low level flooding, construct a watertight masonry flood wall to enclose utilities. The wall should not exceed 3'0" in height and must be constructed to prevent failure under flood conditions.



Or, elevate the water heater, furnace or other heavy appliances on a platform inside the basement. Put them on concrete blocks or wooden platforms.



**U.S. ARMY CORPS OF ENGINEERS**  
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# COMMENTARY

## Rebuild In Harmony With Environment

8/1/93

By R. Roger Pryor

**E**ven though it may seem hard to believe for the moment, the flood waters will go down and the rivers will return to their regular channels. The suffering will not end there, however. Massive clean up efforts and repair programs will begin as soon as the waters start to recede.

Public infrastructure damaged by the rivers — roads, sewers, water treatment plants, etc. — will still have to be assessed. People displaced by the flooding will struggle to rebuild their lives; they will face the tough choice of rebuilding or relocating their homes, businesses and farms.

And public policies dealing with flood control, disaster insurance and relief, flood plain management and wetlands, preservation and restoration will cause renewed debate throughout the upper Midwest and around the country.

Common sense and personal observation tell us that rivers flood from time to time. Every once in a while, they flood big time. We talk of this flooding as a disaster because it has destroyed so much of *our* property and disrupted so many of *our* lives. The real disaster is that we showed too little respect for rivers and how they function and too much faith in the technocrats and how they don't function.

The present disaster will only be compounded if we fail to re-evaluate our relationship with rivers and their flood plains. But if we take this terrible experience, learn from it and change our behavior, then much of the heartache and many of the dollars lost can be prevented in the future.

What about wetlands and the flood plain? Originally, most of the flood plains of the Missouri and Mississippi and other great rivers were covered with bottomland hardwoods or forested wetlands and marshes. These wetlands served many important purposes: (1) as habitat for many species of wildlife, including migratory fowl; (2) as natural filtration to prevent impurities from entering the rivers; (3) as flood storage areas; and (4) as recharge areas for ground water.

Most of these forested wetlands and marshes have been destroyed. Along the rivers, the levees and wing dikes of the Army Corps of Engineers have pinched the rivers into narrow, deep channels. The sloughs, backwaters and islands have disappeared as silt has filled in behind the dikes. The resulting "dry" land was then cleared and put into agriculture. In places like the Bootheel, vast bottomland forests were drained and cleared and planted in corn and soybeans. In southeast Missouri, some 2.5 million acres of wetlands have been reduced to a mere 50,000.

Preserving the few remaining pristine wetlands is a laudable goal. But so few are left — and many that do remain are cut off from their associated river by levees — that they fail to function as part of a complete ecosystem. Our few remaining fragmentary wetlands are like shrines. In addition to saving the pristine remnants, we must undertake a massive program of wetlands restoration — on a scale at least approaching the one that led to their demise. Throughout the Midwest, millions of acres of wetlands need to be restored. Some progress and planning are under way.

In addition, we need to allow the rivers access to areas of their flood plains when necessary. If we do not, the rivers will take them back anyway, on their own terms. Agricultural areas in the flood plains, along with park lands and other open space areas, should be covered by floodway easements whereby the government underwrites the losses for legitimate flood plain developments in exchange for using these areas in times of extreme flooding.

Instead of resisting a major flood, agricultural levees could be gated to allow deliberate entry of flood water during a declared emergency. This would reduce the pressure on urban levees where they are needed to protect long-standing river communities and save considerable dollars over the long run. Major damage to agricultural levees could also be avoided, preserving them for more typical flood events.

We can also regain many of the benefits and diversity that a more natural river system can provide. Cities and towns are not going to be moved; major levees are not going to be torn down; the 80 to 90 percent of our wetlands destroyed are not going to magically reappear. Eden is lost — but we can still live in a garden.

How can we do this? First, we need a mission around which we can build a consensus of public support. This consensus must include river townspeople, flood plain farmers, wildlife biologists, waterways shippers, and everyone else with an interest and an opinion.

Our mission should be to redefine our national strategy about managing rivers and their watersheds, especially their flood plains. Right away, I can hear the Farm Bureau yelling: "Sounds like national land use planning!" But not having a plan is in itself a plan. The real question is: Do we want a good plan or a bad plan?

If the consensus is that we want a bad plan, then we can just go ahead and rebuild all the structures in the flood plain that were damaged, raise the heights of private levees trying to keep ahead of our neighbors downstream, encourage more industrial developments on the flood plain (like Earth City and Riverport in St. Louis County), drain and fill the few remaining wetlands, and pay out billions of dollars every few years for flooding disasters.

If the consensus is that we want a good plan, then we have to take into account what the rivers need as well as what we want. People of good will can disagree, of course, but here are some of the ingredients from the environmentalist perspective:

- No construction of any new buildings or unnecessary structures in the flood plains.
- Buy out and relocation of any homes damaged in this year's flooding in lieu of rebuilding them in the flood plain. Convert land to open space uses.
- No additional wetland losses in the flood plain, period. None of this "no net loss" mush. With less than 15 percent of the riparian wetlands left, we must save every acre.
- Acquisition of the highest flood-risk lands and launching of a major forested wetlands restoration effort.
- Encouraging farmers to move their homes, grain storage bins and other easily damaged structures to higher ground or, in some cases, to elevate them above major flood levels.
- Rethinking the bank stabilization and navigation projects on the Missouri River and the Mississippi River from St. Louis to Cairo, Ill.

■ No new urban-style (500-year protection) levees for commercial development on the flood plains.

Every crisis is an opportunity. The Great Flood of 1993 has given us the opportunity to reflect and rethink before we rebuild. We only need to approach this task with the same selflessness and caring demonstrated by the thousands of volunteers — all sacrificing for the public good.

*R. Roger Pryor is executive director of the Missouri Coalition for the Environment.*

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## United States Army Corps of Engineers

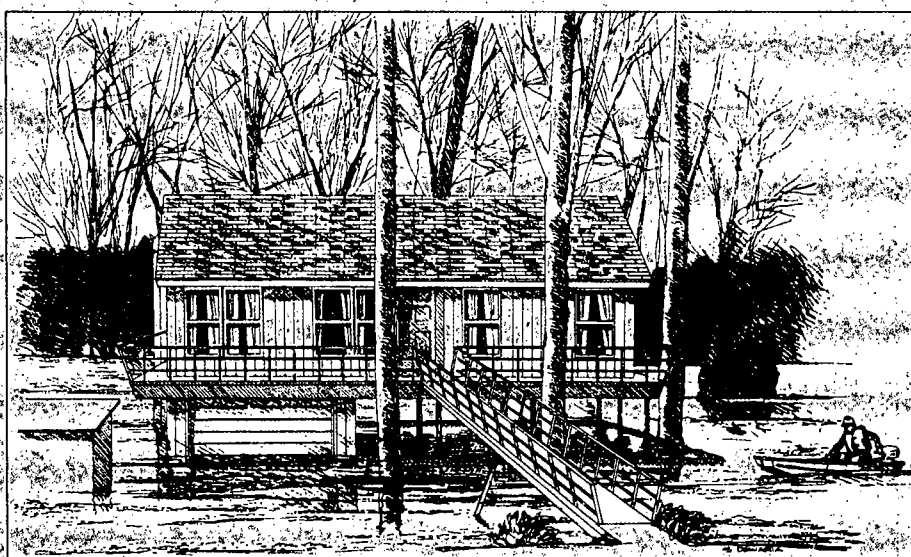
*National Flood Proofing Committee*

Attn: CECW-PF

20 Massachusetts Avenue NW

Washington, D.C. 20314-1000

United States Army Corps of Engineers  
*National Flood Proofing Committee*  
Attention: CECW-PF  
20 Massachusetts Avenue, NW  
Washington, D.C. 20314-1000



**Need to  
know more  
about flood  
proofing?**

**E**ach year, floods and storm tides cause millions of dollars worth of damage to homes and businesses nationwide. When the flood waters recede and the damage is assessed, many property owners ask themselves, "What could I have done to prevent this?"

While nothing can prevent floods from occurring, in most cases, the extent of the damage can be reduced by using proper flood proofing measures to protect property.

Simply put, flood proofing means making changes or modifications to buildings and properties that will reduce flood damages. Before implementing a flood proofing strategy, it is important that property owners understand the variety of techniques available. For example:

- What is the difference between "wet" and "dry" flood proofing?
- What agencies have flood proofing assistance programs?
- Where can documents on various aspects of flood proofing be obtained?

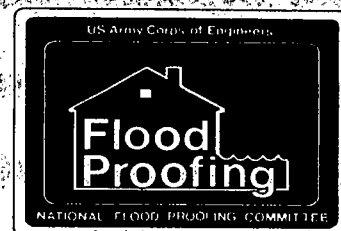
**T**he United States Army Corps of Engineers National Flood Proofing Committee has published a new guidebook, ***Flood Proofing Techniques, Programs, and References***, which is designed to help individuals and organizations involved in flood proofing activities. The guidebook explains the most widely used flood proofing techniques, including:

- elevating or moving structures
- construction of barriers
- "dry" and "wet" flood proofing

The guidebook also provides a listing of information sources for technical and financial assistance, such as federal, state, and local government agencies; professional organizations; and books and publications.

***Flood Proofing Techniques, Programs, and References*** is available free of charge while supplies last. Just fill out the attached coupon and return it to the Corps of Engineers or contact your nearest Corps of Engineers field office.

**D**on't wait until a flood alert to take action toward increased flood proofing protection. ***Flood Proofing Techniques, Programs, and References*** can answer many of your questions about flood proofing. Send for your copy today.



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**DETACH AND MAIL TODAY!**

**Y**es! I would like to know more about flood proofing. Please send me a copy of the United States Army Corps of Engineers National Flood Proofing Committee's guidebook ***Flood Proofing Techniques, Programs, and References***.

Name: \_\_\_\_\_

Address: \_\_\_\_\_ Apt. #: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

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AUGUST 24, 1993

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# TECHNICAL INFORMATION ON ELEVATING SUBSTANTIALLY DAMAGED RESIDENTIAL BUILDINGS IN THE MIDWEST



*Prepared by the*

OFFICE OF LOSS REDUCTION  
FEDERAL INSURANCE ADMINISTRATION  
FEDERAL EMERGENCY MANAGEMENT AGENCY

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FEDERAL EMERGENCY MANAGEMENT AGENCY  
INFORMATION/GUIDANCE CONCERNING ELEVATING FLOODPRONE  
RESIDENTIAL STRUCTURES IN CONFORMANCE WITH THE  
NATIONAL FLOOD INSURANCE PROGRAM

# **Raising A Wood-Frame-Over- Crawl-Space Structure**

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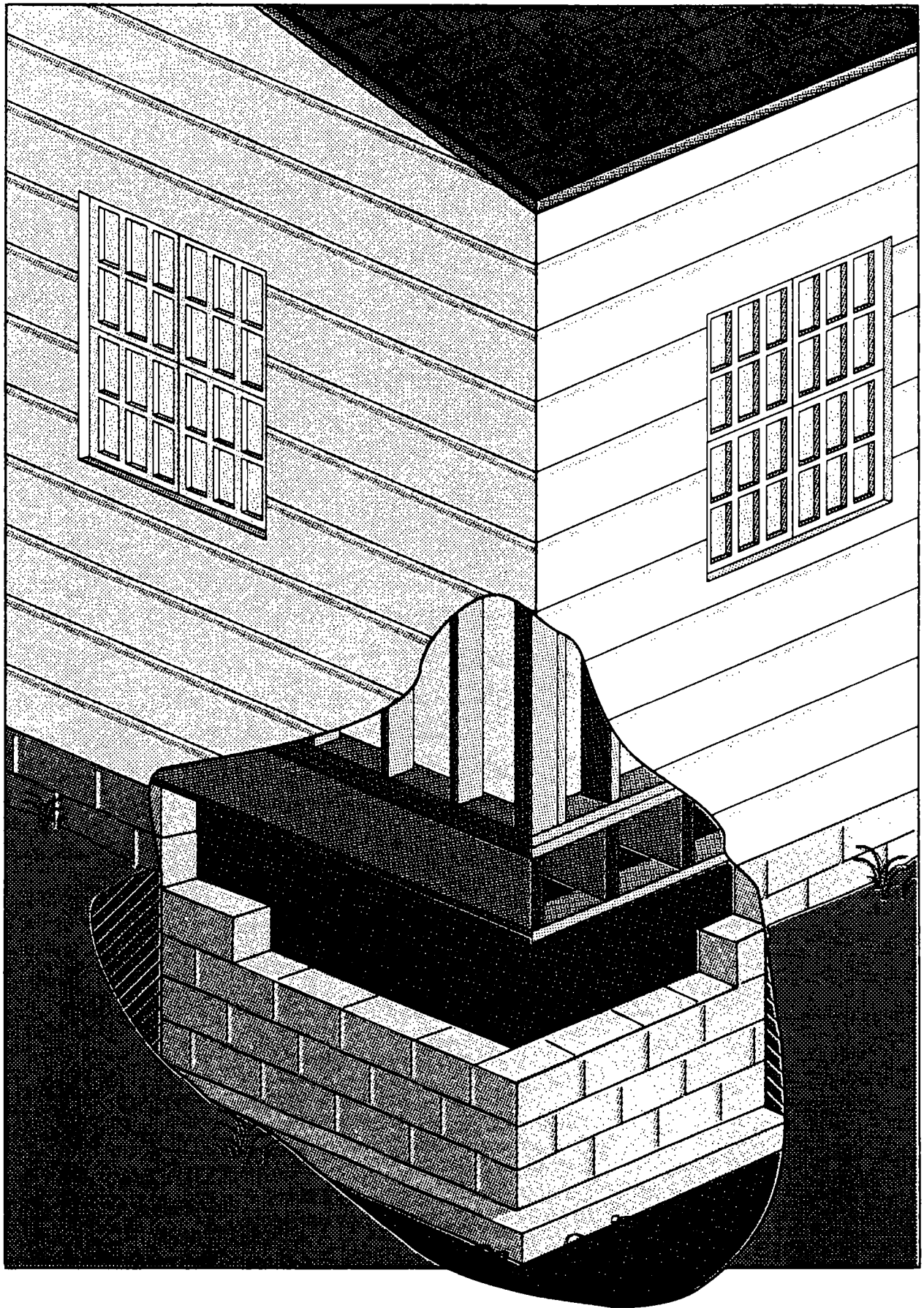
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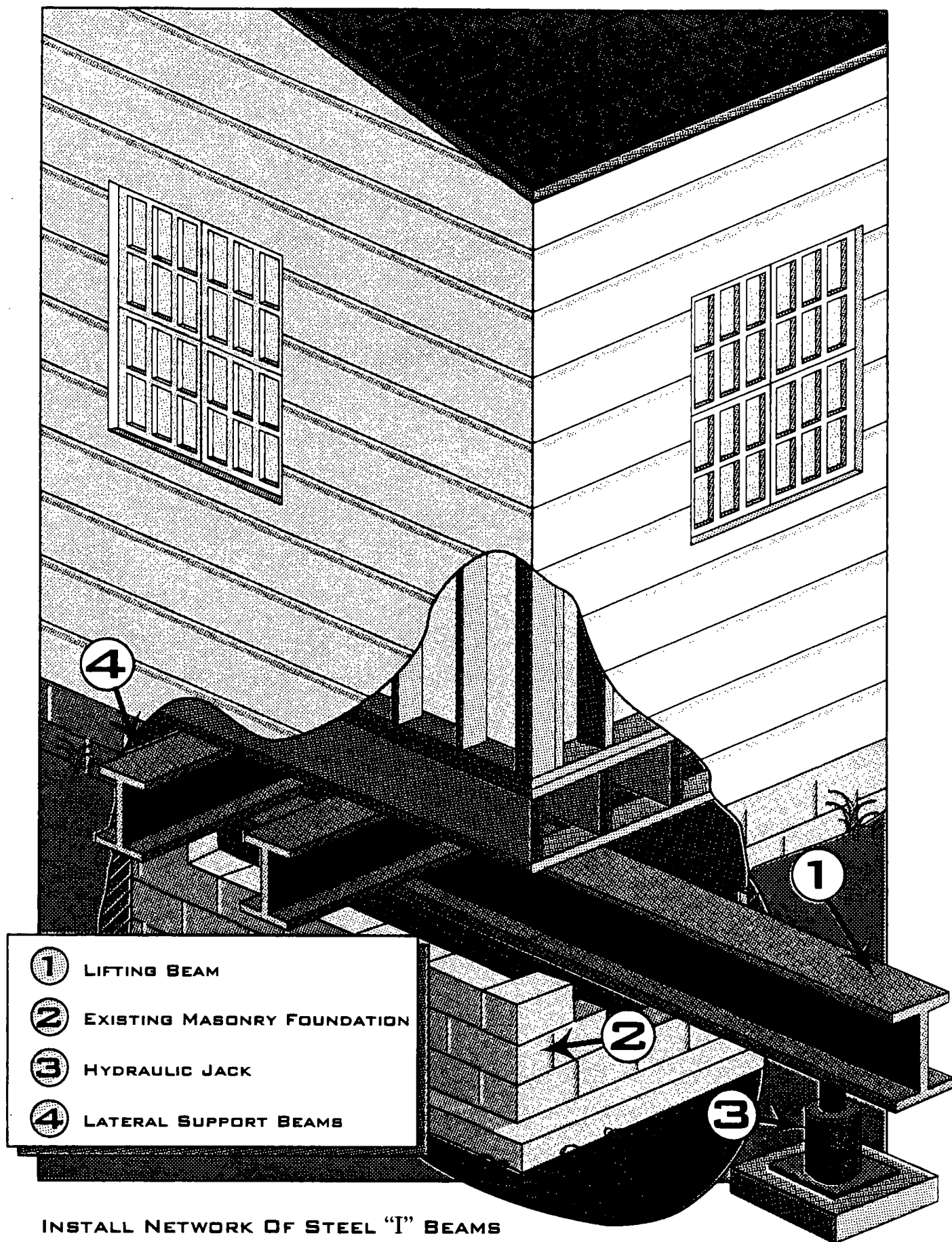
TECHNIQUES SHOWN HEREIN REFLECT MINIMUM NATIONAL FLOOD INSURANCE PROGRAM (NFIP) REQUIREMENTS. COMMUNITIES MAY ENFORCE MORE RESTRICTIVE REQUIREMENTS, WHICH SHALL TAKE PRECEDENCE.

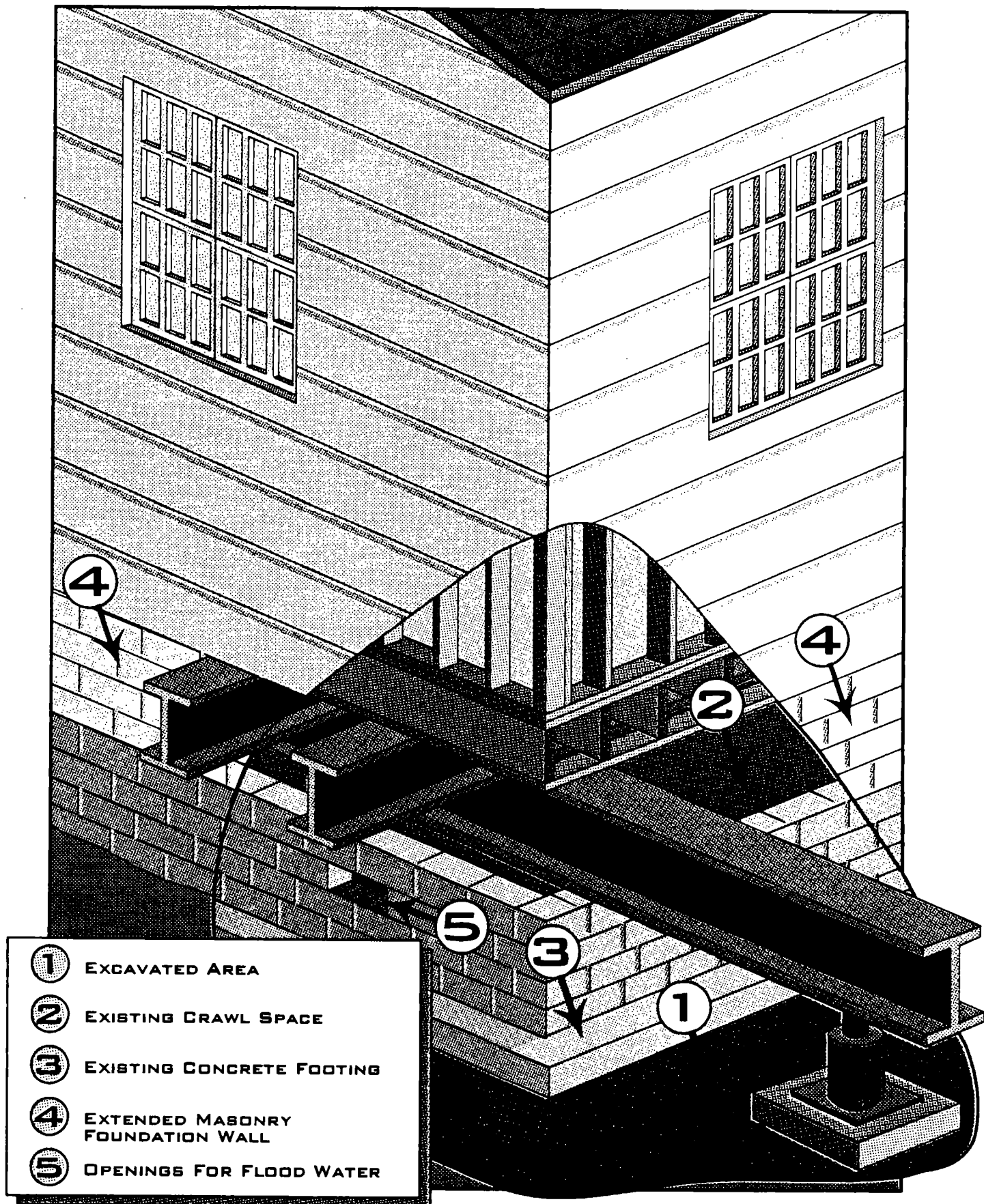
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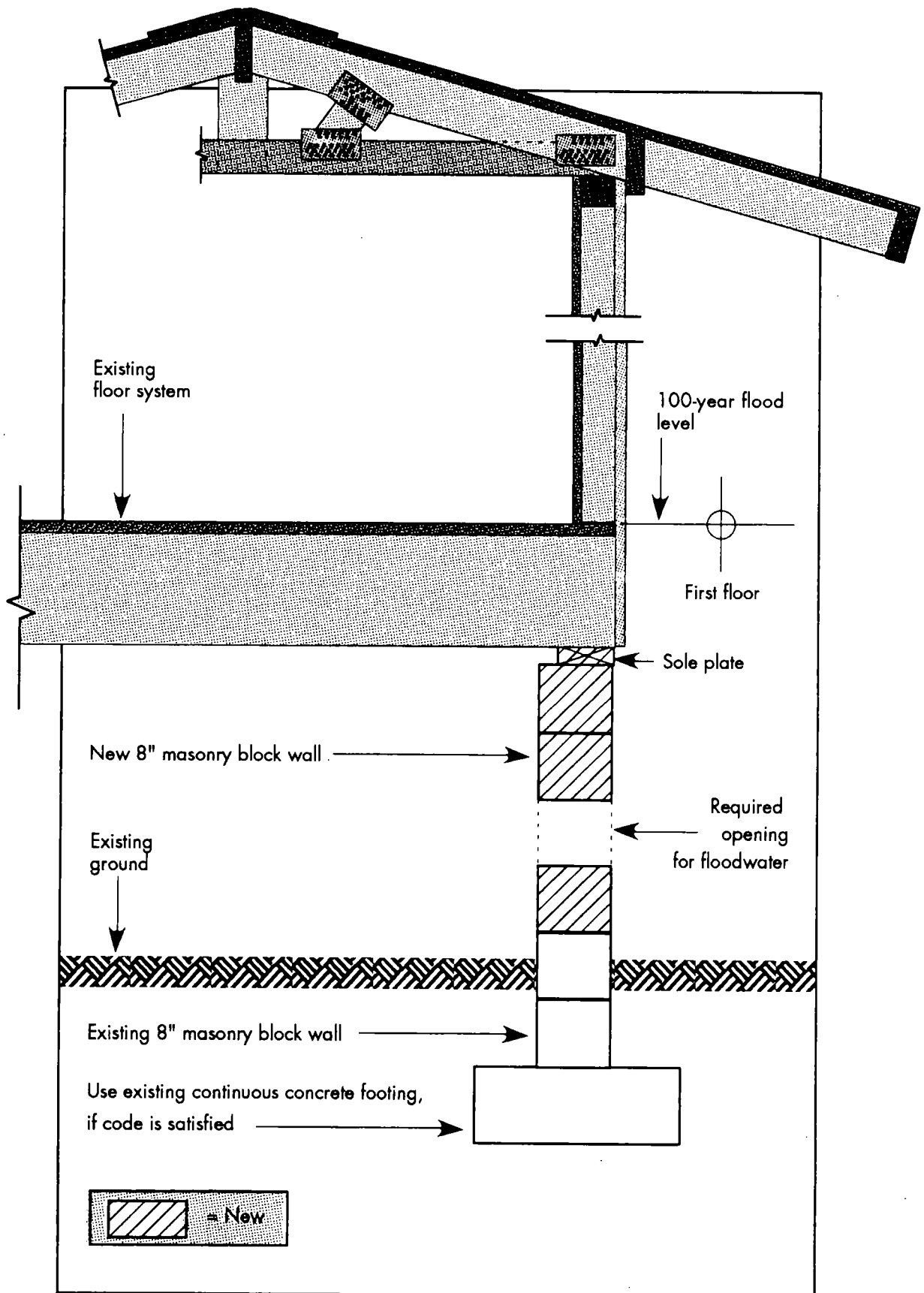


EXISTING WOOD-FRAME RESIDENCE WITH CRAWL SPACE





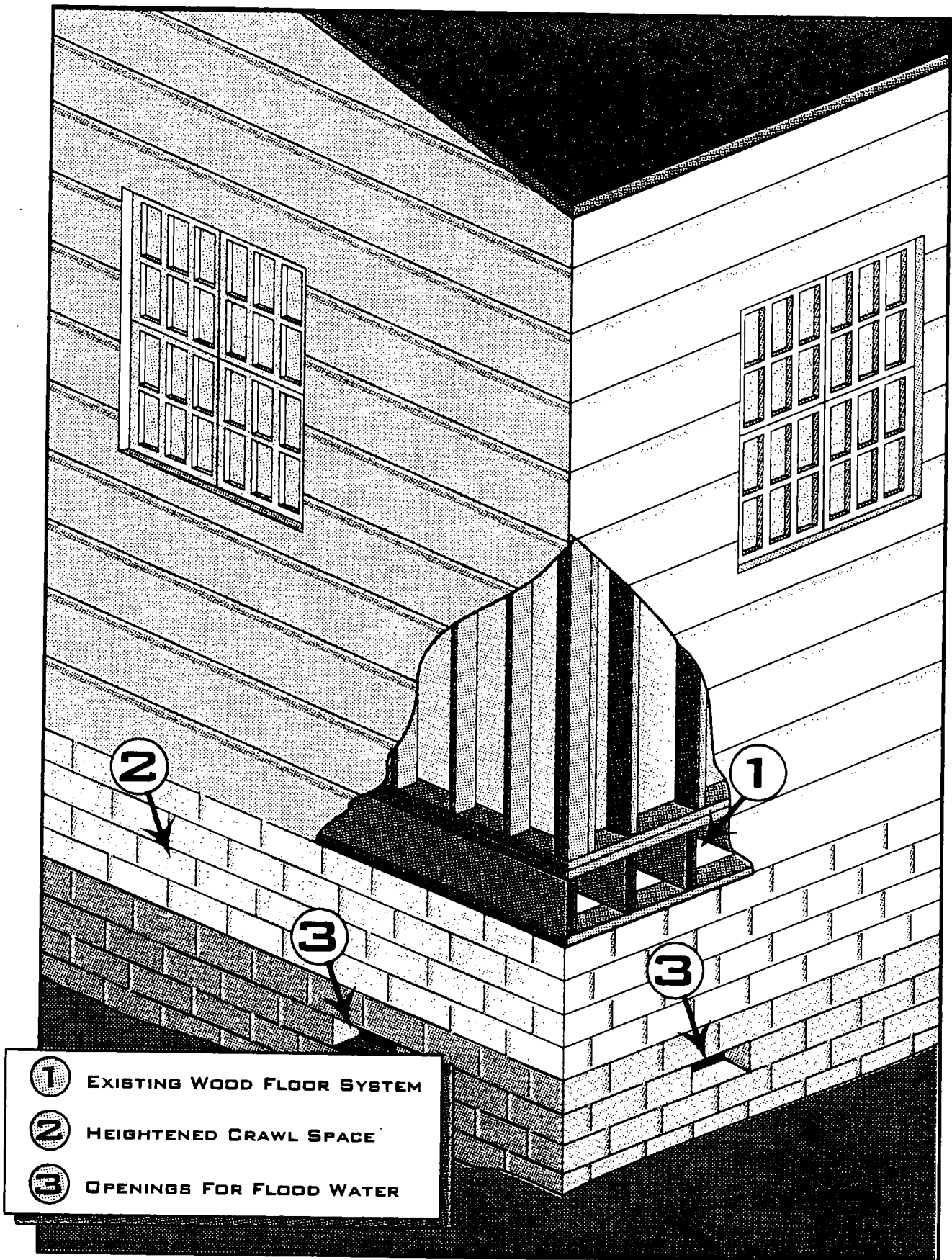
**LIFT RESIDENCE AND EXTEND FOUNDATION WALLS  
RELOCATE UTILITY AND MECHANICAL EQUIPMENT ABOVE FLOOD LEVEL**



## RAISING A WOOD FRAME-OVER-CRAWL-SPACE STRUCTURE

RAISE WOOD FRAME AND EXTERNAL FOUNDATION STEM WALLS

SEISMIC STRENGTHENING NOT SHOWN



SET RESIDENCE ON EXTENDED FOUNDATION AND REMOVE "I" BEAMS



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# **Creation Of A New Masonry Enclosed Area On Top Of An Abandoned Basement**

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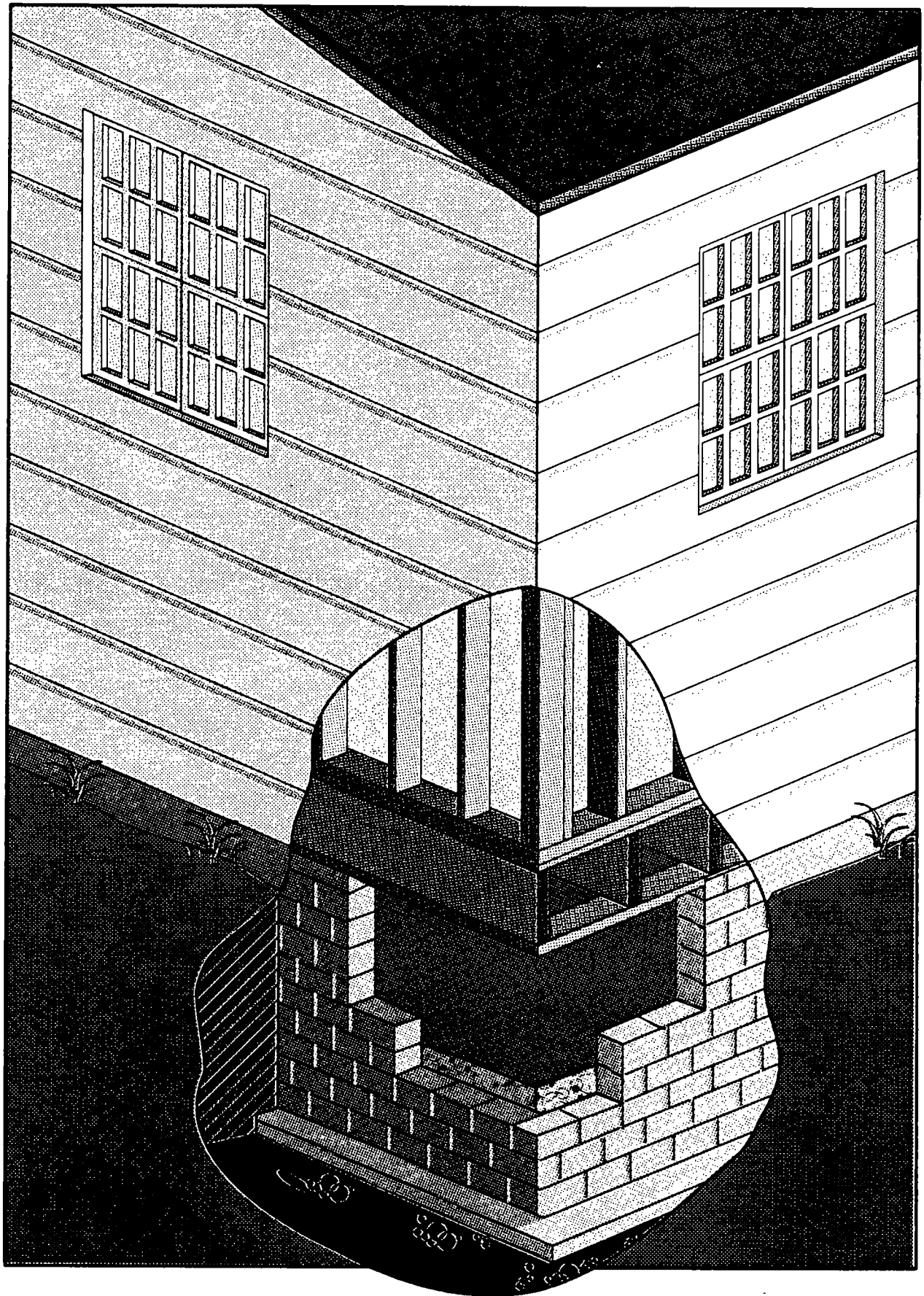
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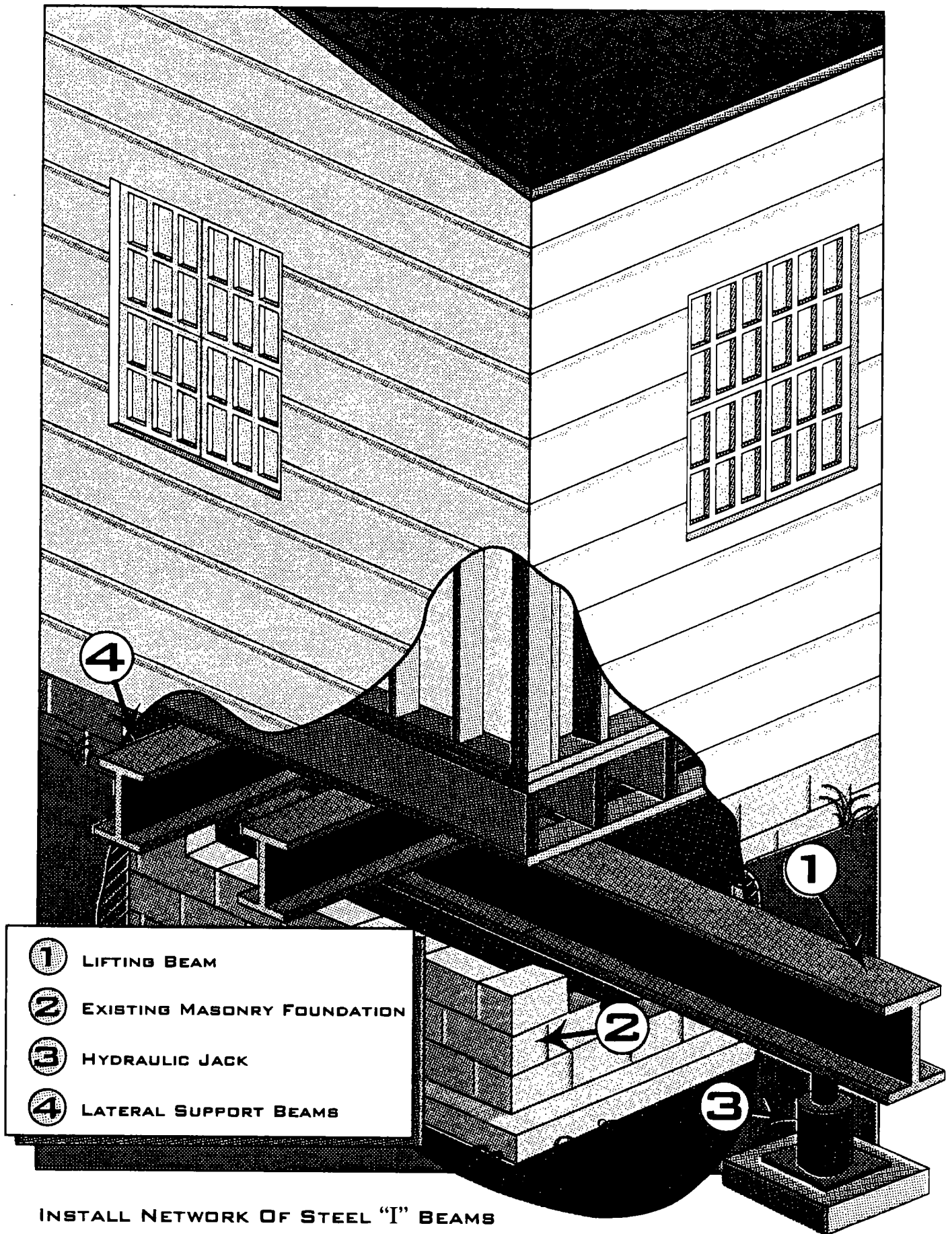
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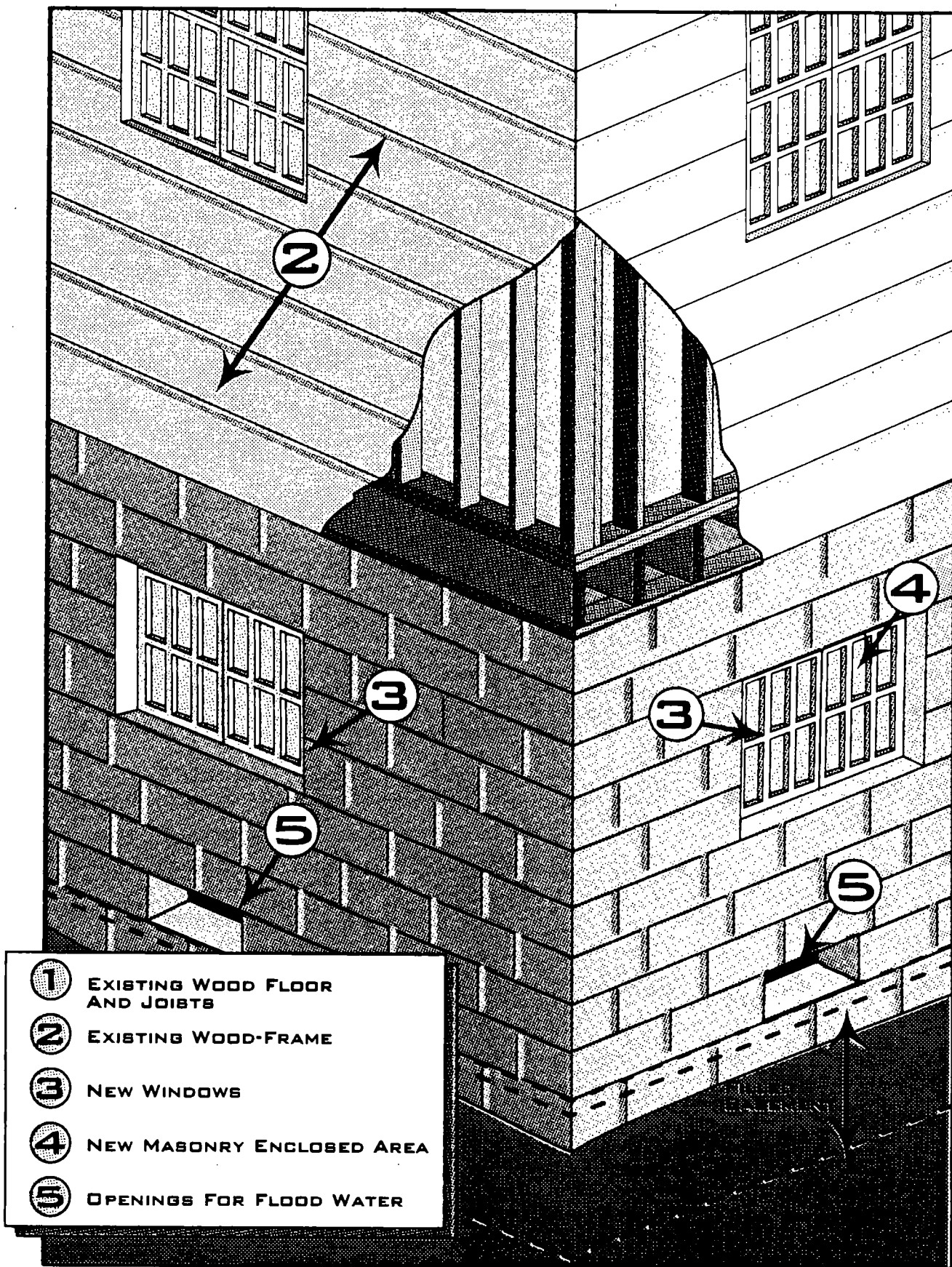
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AUGUST 24, 1993

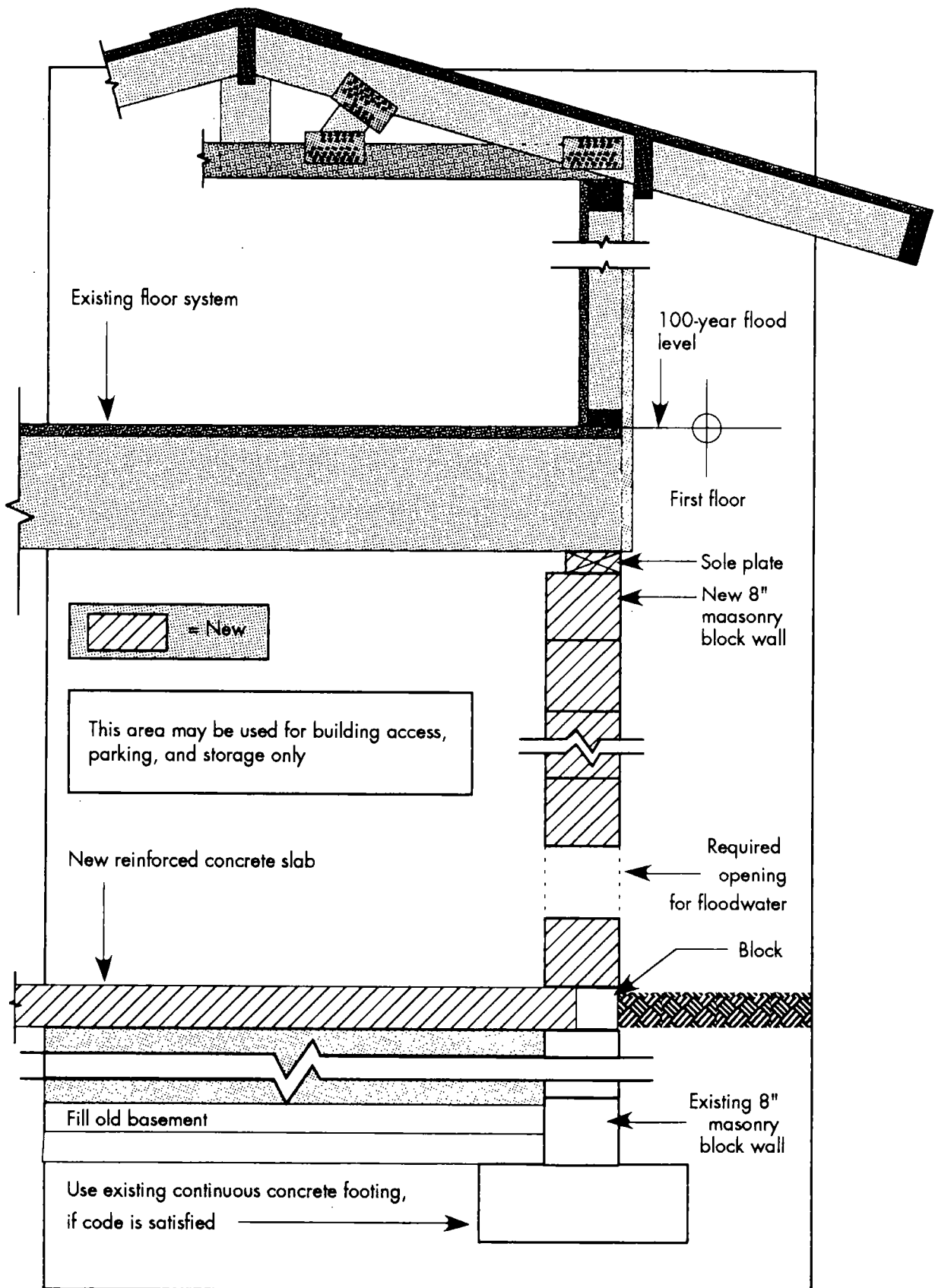


WOOD-FRAME HOUSE WITH BASEMENT





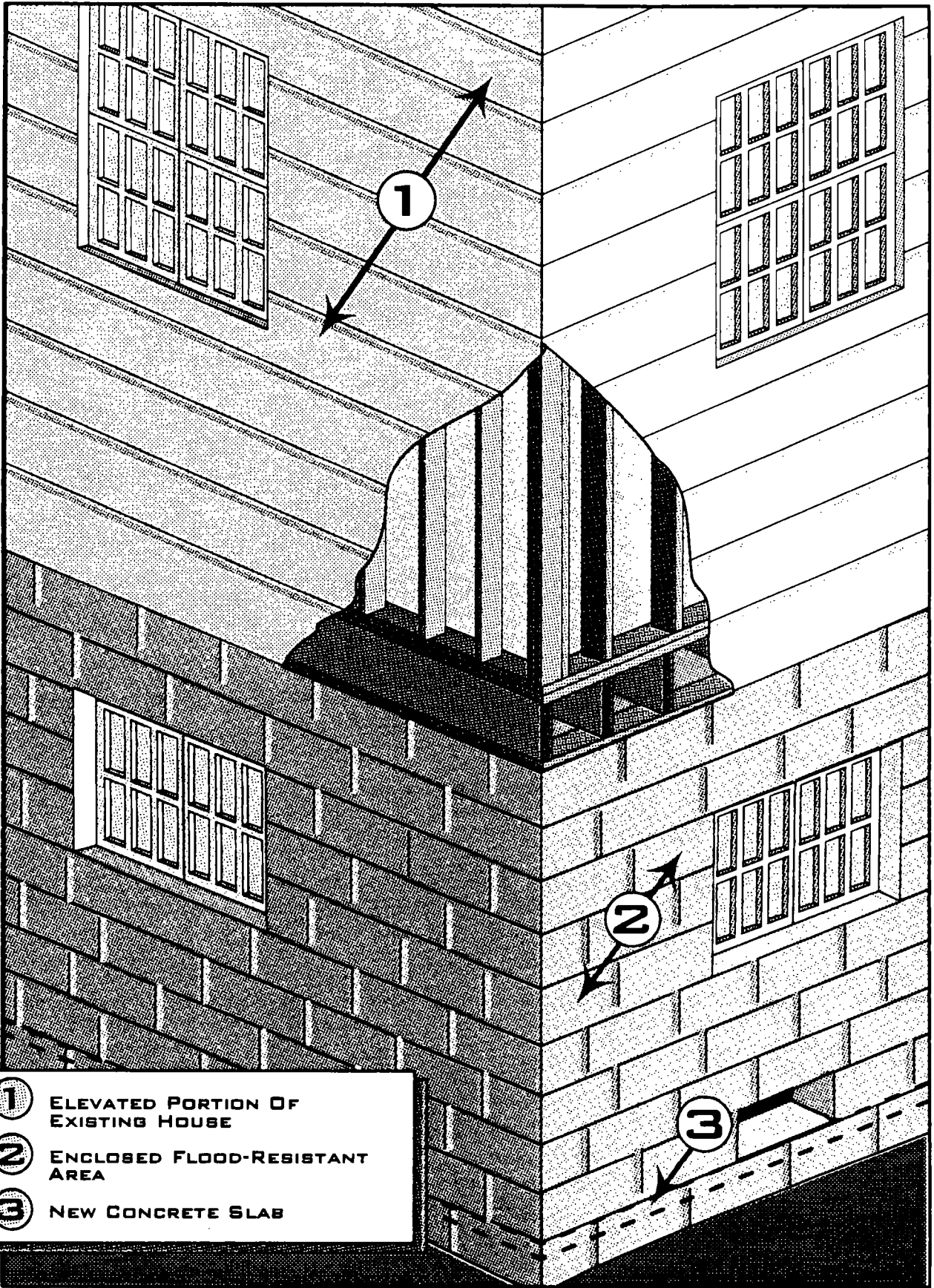
RELOCATE UTILITY AND MECHANICAL EQUIPMENT ABOVE FLOOD LEVEL



## CREATION OF A NEW MASONRY ENCLOSED AREA ON TOP OF AN ABANDONED BASEMENT

FILL BASEMENT, REVISE WOOD FRAME, AND ADD NEW FIRST FLOOR MASONRY

SEISMIC STRENGTHENING NOT SHOWN



- ① ELEVATED PORTION OF EXISTING HOUSE
- ② ENCLOSED FLOOD-RESISTANT AREA
- ③ NEW CONCRETE SLAB

LOWER AREA FOR PARKING, STORAGE, AND BUILDING ACCESS ONLY



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# **Raising A Slab-On-Grade Wood-Frame Structure Without The Slab (Proposed First Floor-Wood Truss)**

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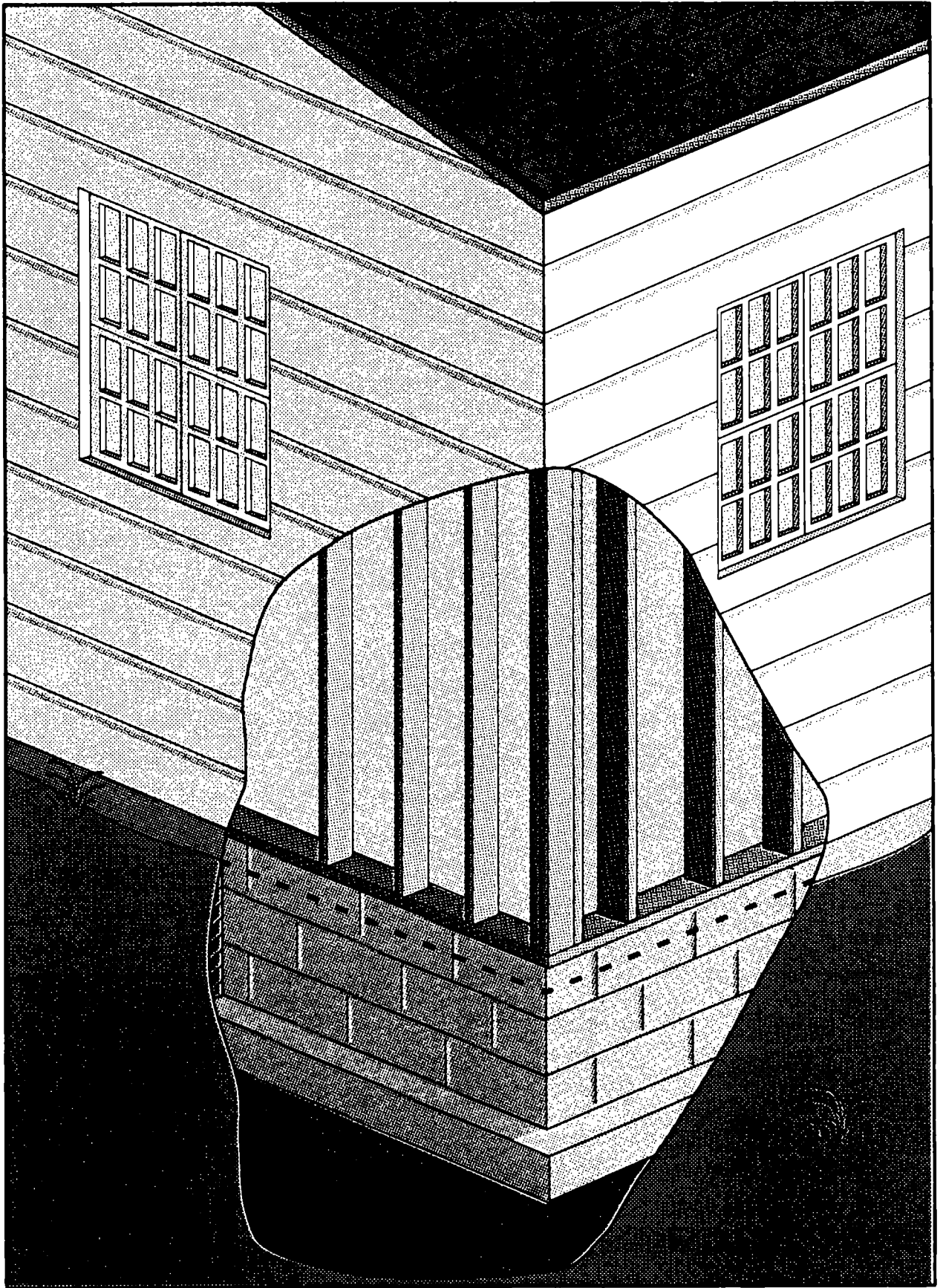
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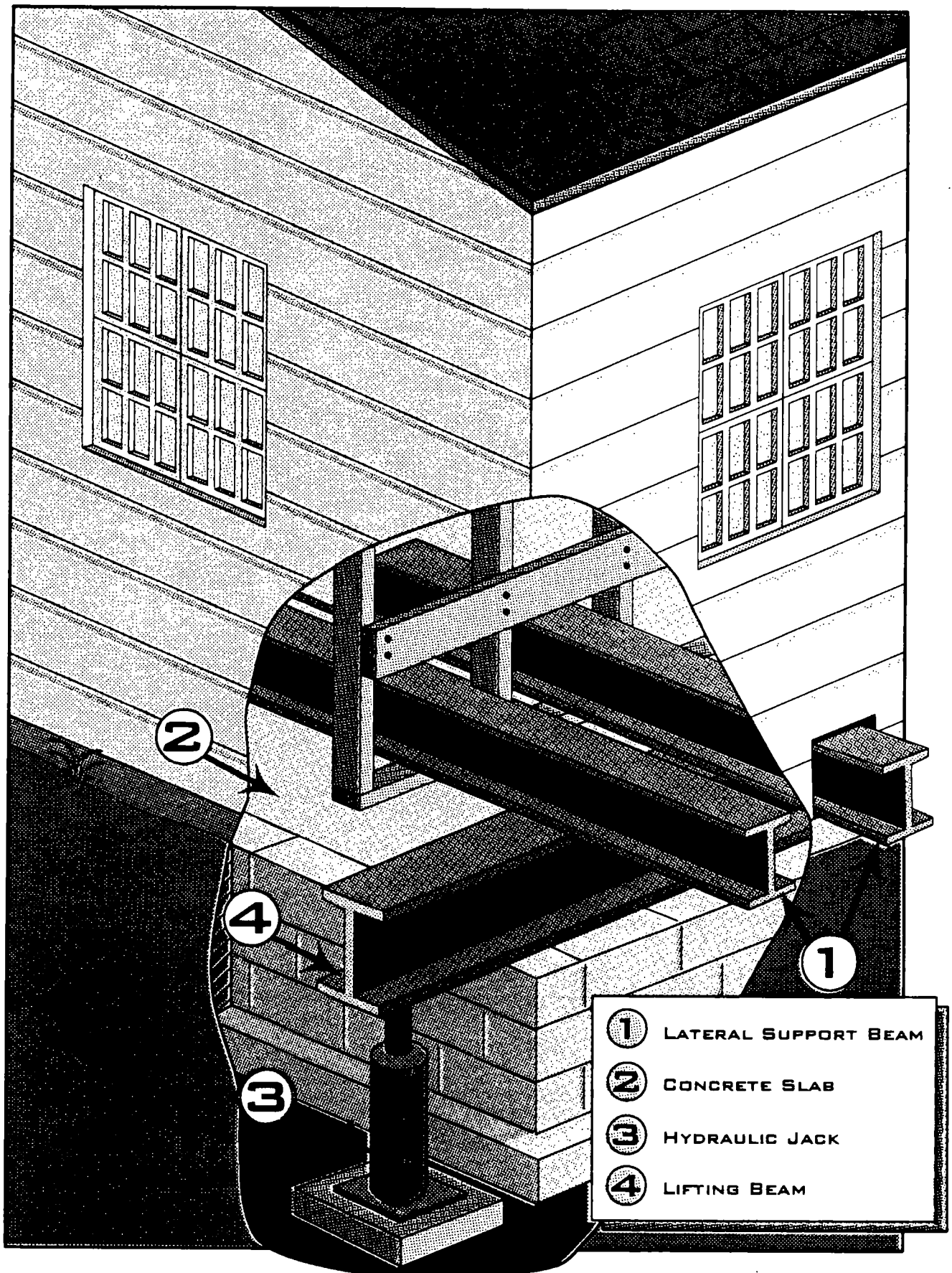
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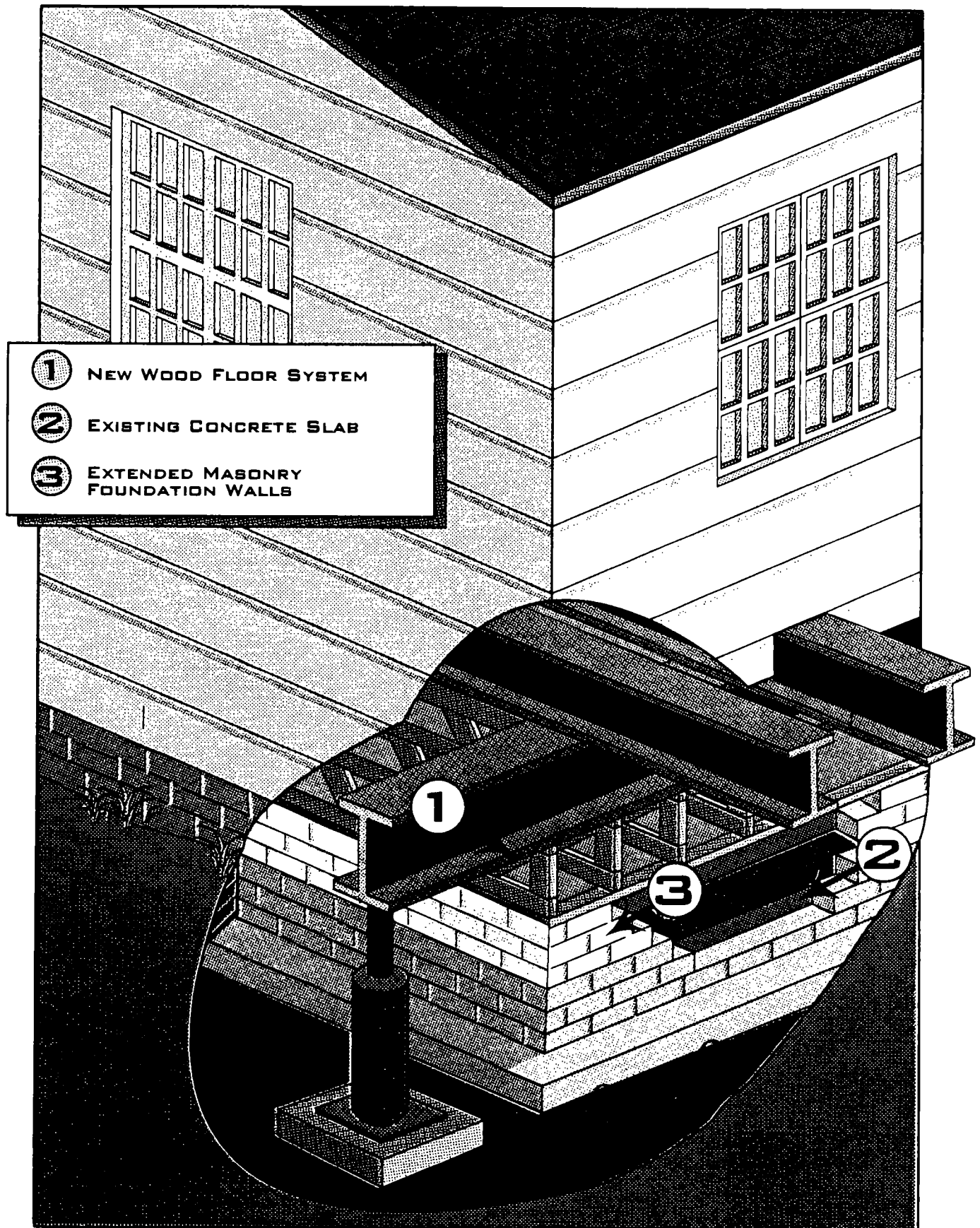
AUGUST 24, 1993



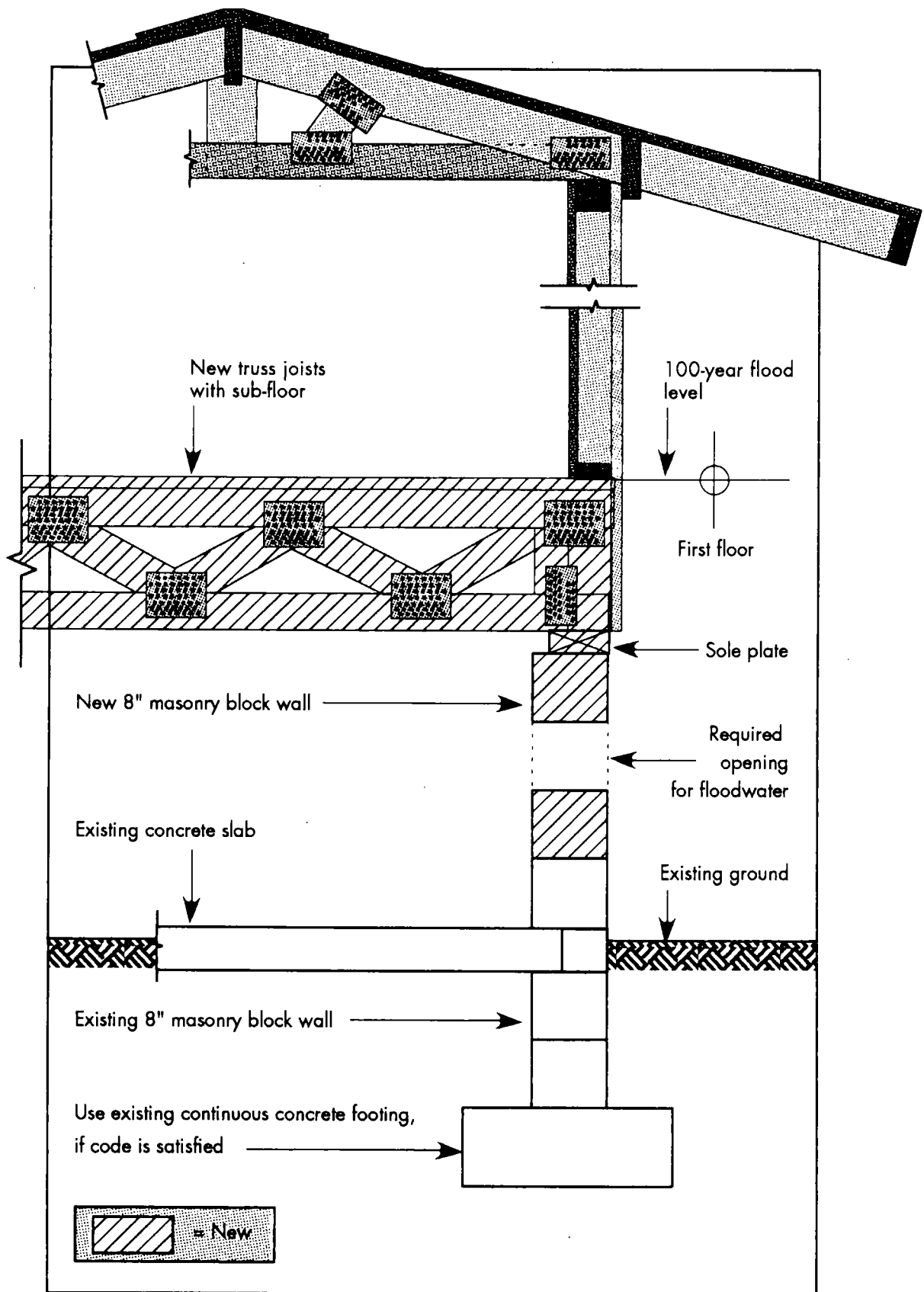
EXISTING SLAB-ON-GRADE WOOD-FRAME RESIDENCE



INSTALL STEEL "I" BEAM NETWORK AND PREPARE TO LIFT WALLS



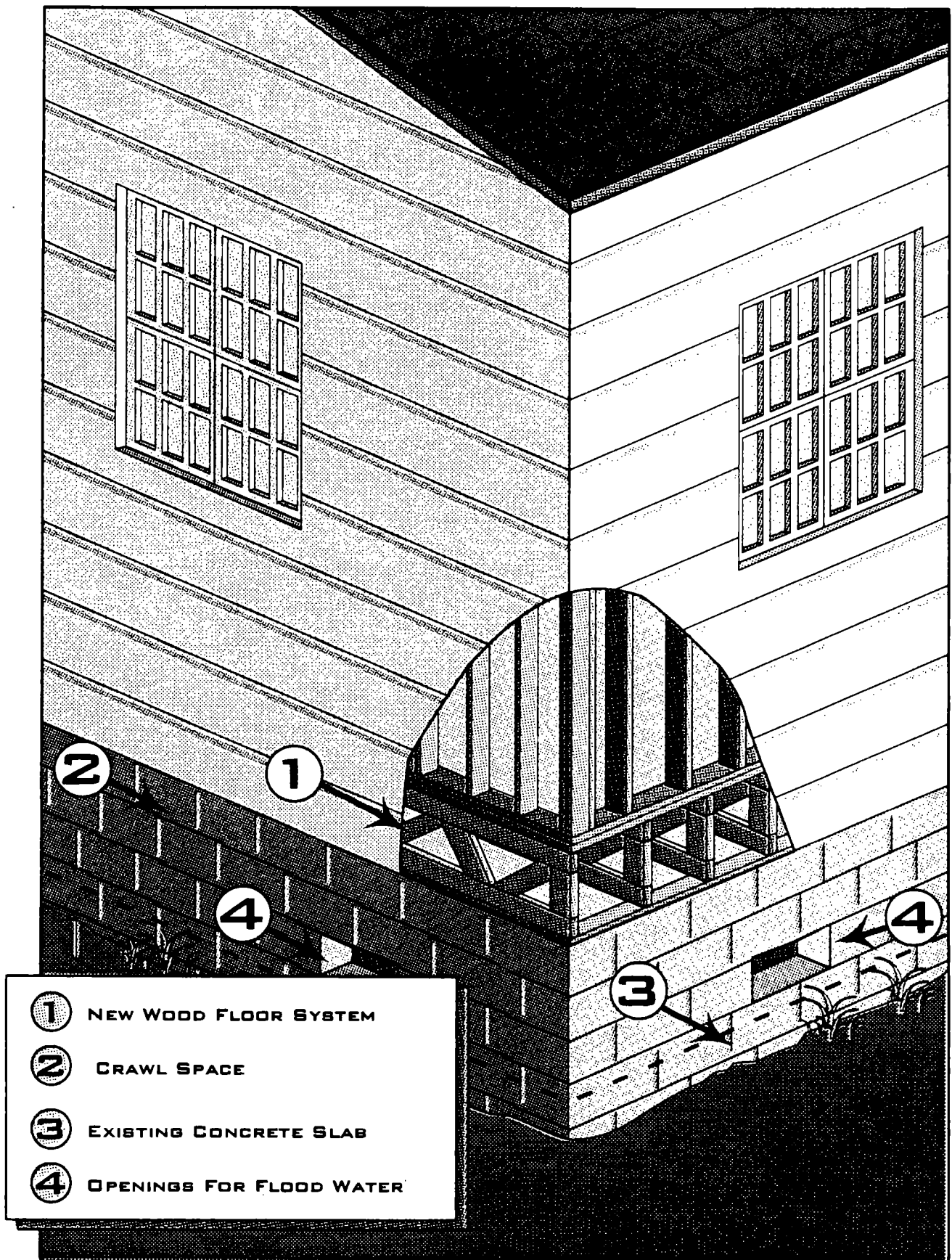
LIFT RESIDENCE AND EXTEND MASONRY FOUNDATION WALL  
RELOCATE UTILITY AND MECHANICAL EQUIPMENT ABOVE FLOOD LEVEL



## RAISING A SLAB-ON-GRADE WOOD-FRAME STRUCTURE

WITHOUT SLAB (PROPOSED FIRST FLOOR-WOOD TRUSS OR SOLID JOIST)

SEISMIC STRENGTHENING NOT SHOWN



SET RESIDENCE ON NEW FOUNDATION AND REMOVE "I" BEAMS



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# **Raising A Slab-On-Grade Wood- Frame Structure Without The Slab (Proposed First Floor-Concrete Slab)**

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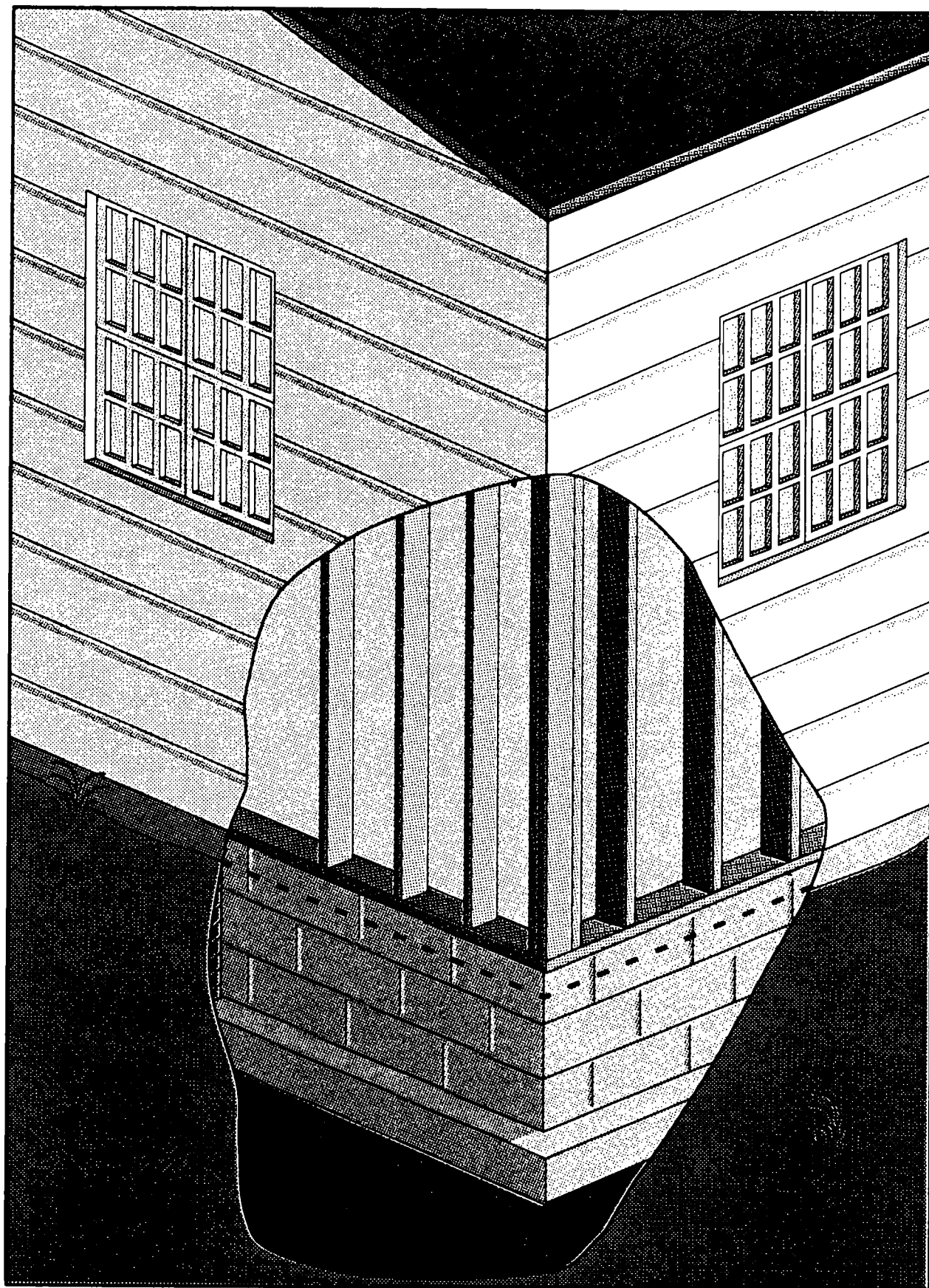
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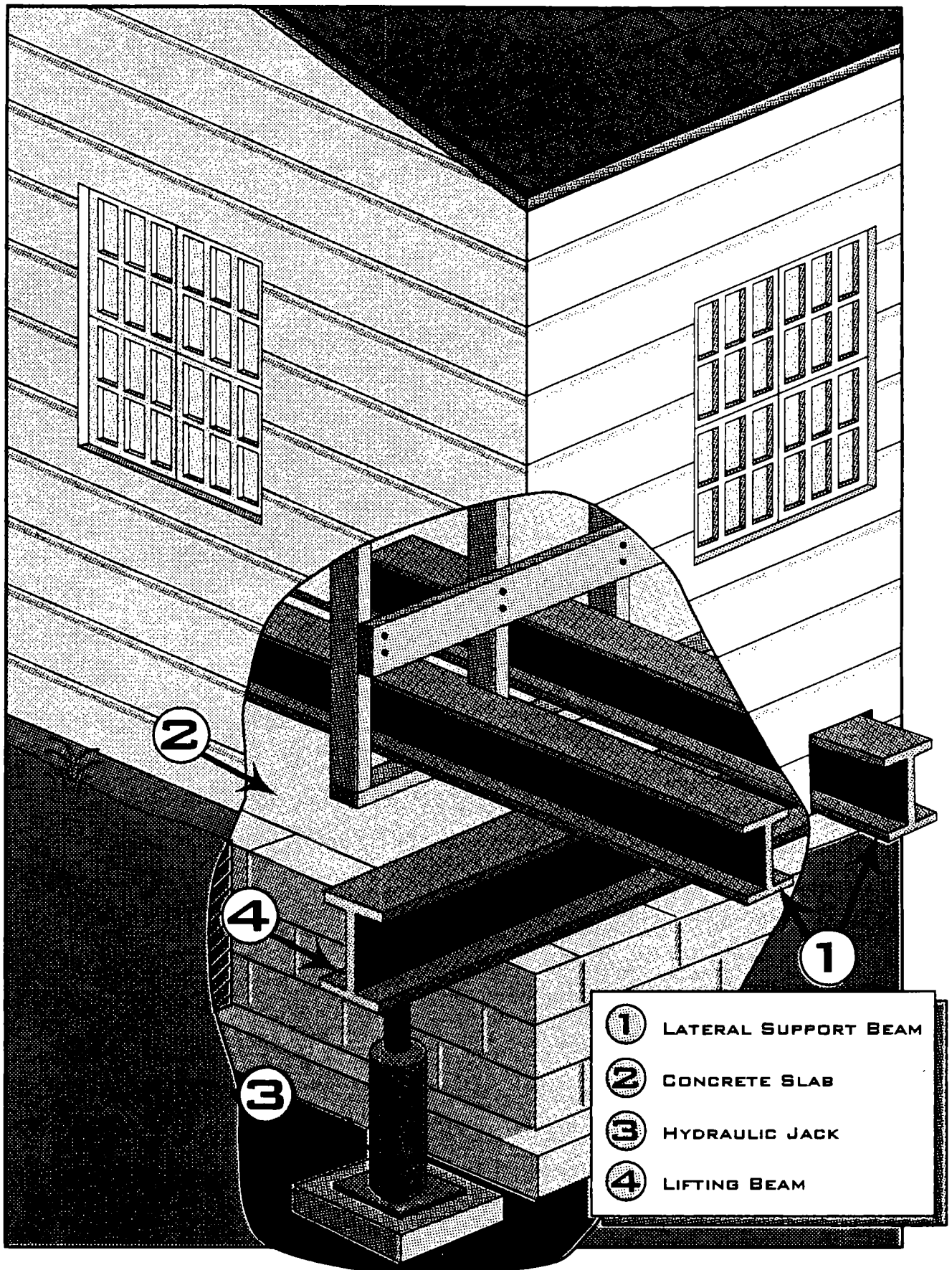
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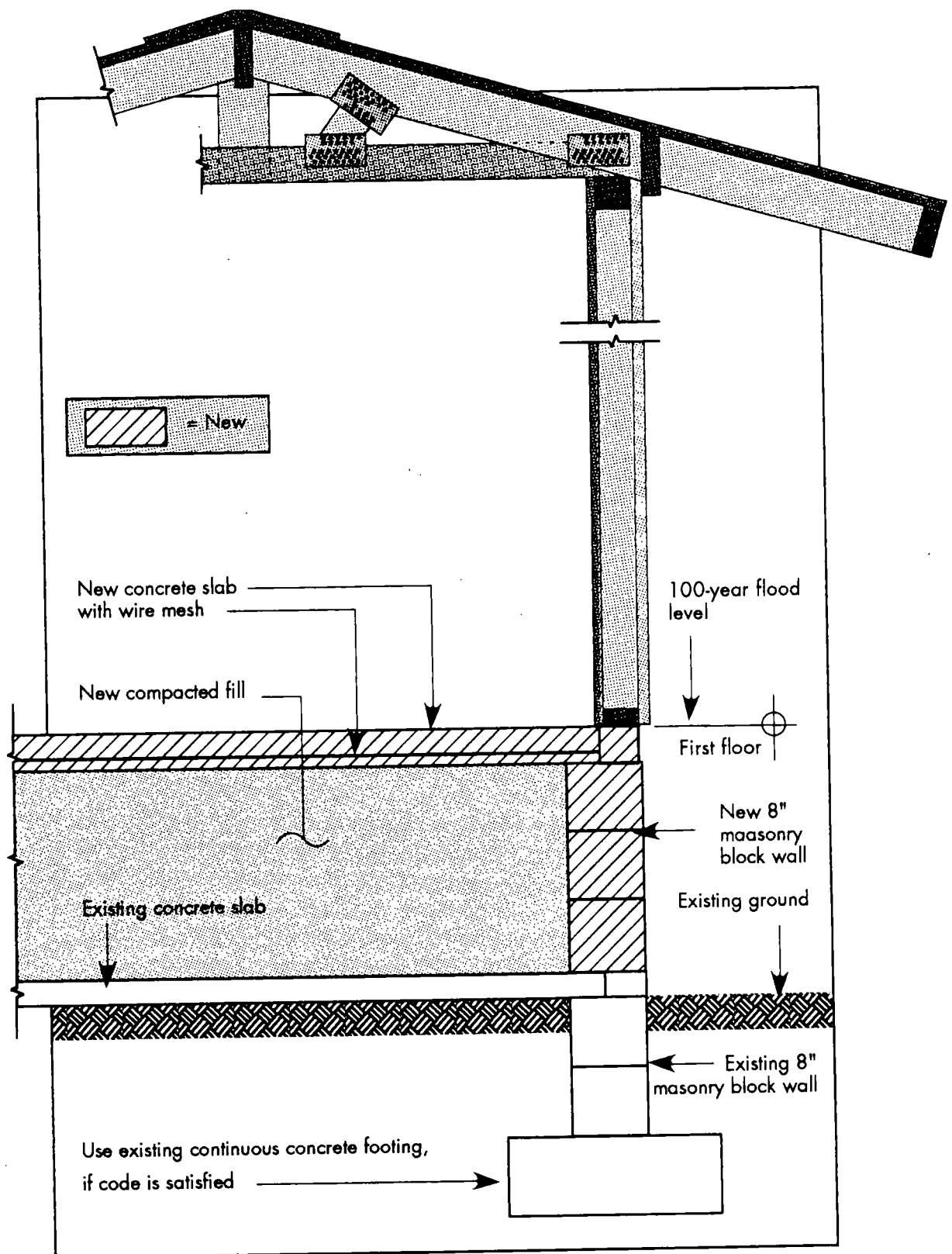


EXISTING SLAB-ON-GRADE WOOD-FRAME RESIDENCE



INSTALL STEEL "I" BEAM NETWORK AND PREPARE TO LIFT WALLS

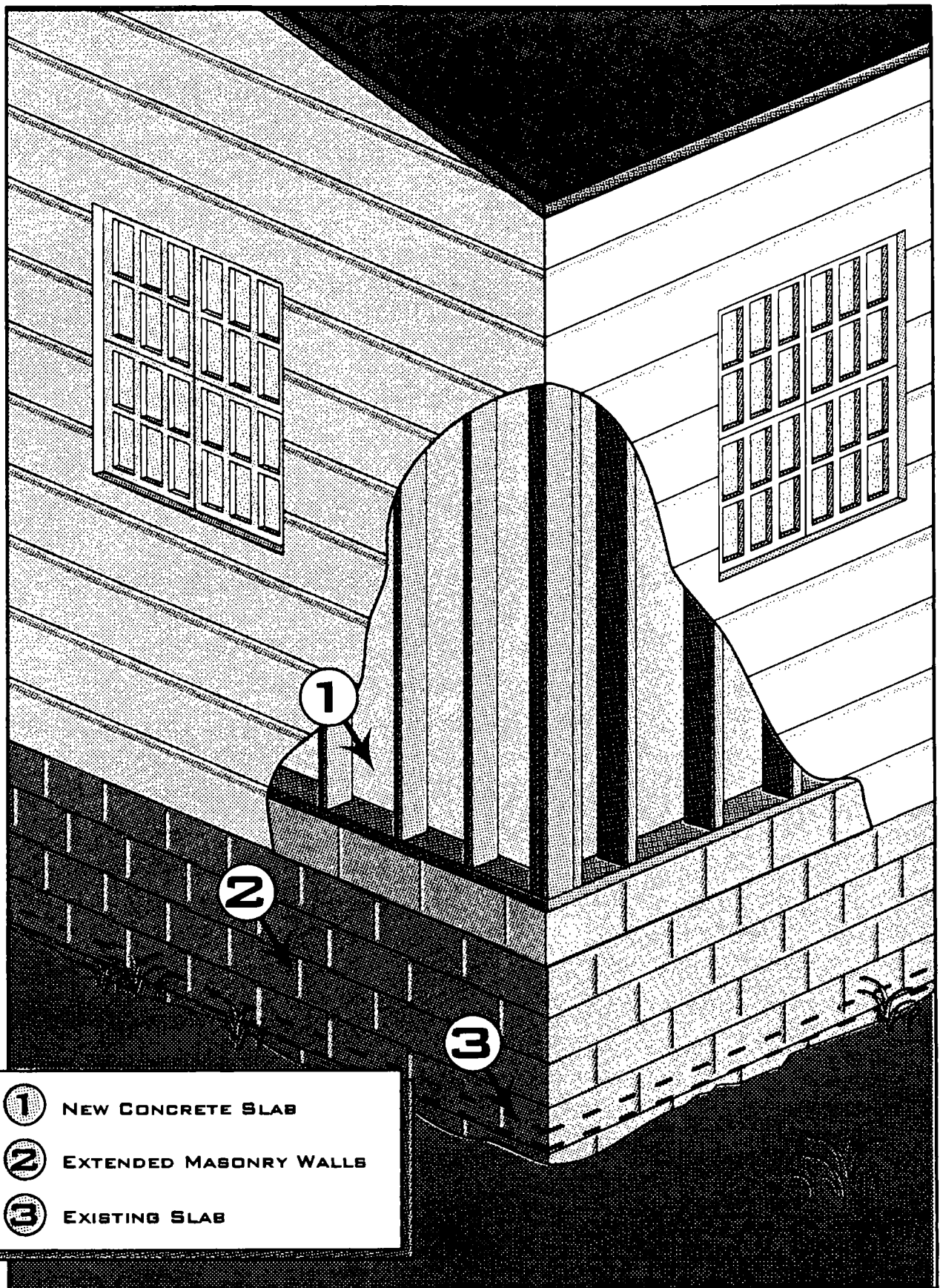




## RAISING A SLAB-ON-GRADE WOOD-FRAME STRUCTURE WITHOUT THE SLAB INTACT

(PROPOSED FIRST FLOOR-CONCRETE SLAB)

SEISMIC STRENGTHENING NOT SHOWN



SET RESIDENCE ON NEW FOUNDATION AND REMOVE "I" BEAMS



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# **Raising A Slab-On-Grade Wood- Frame Structure With The Slab Intact**

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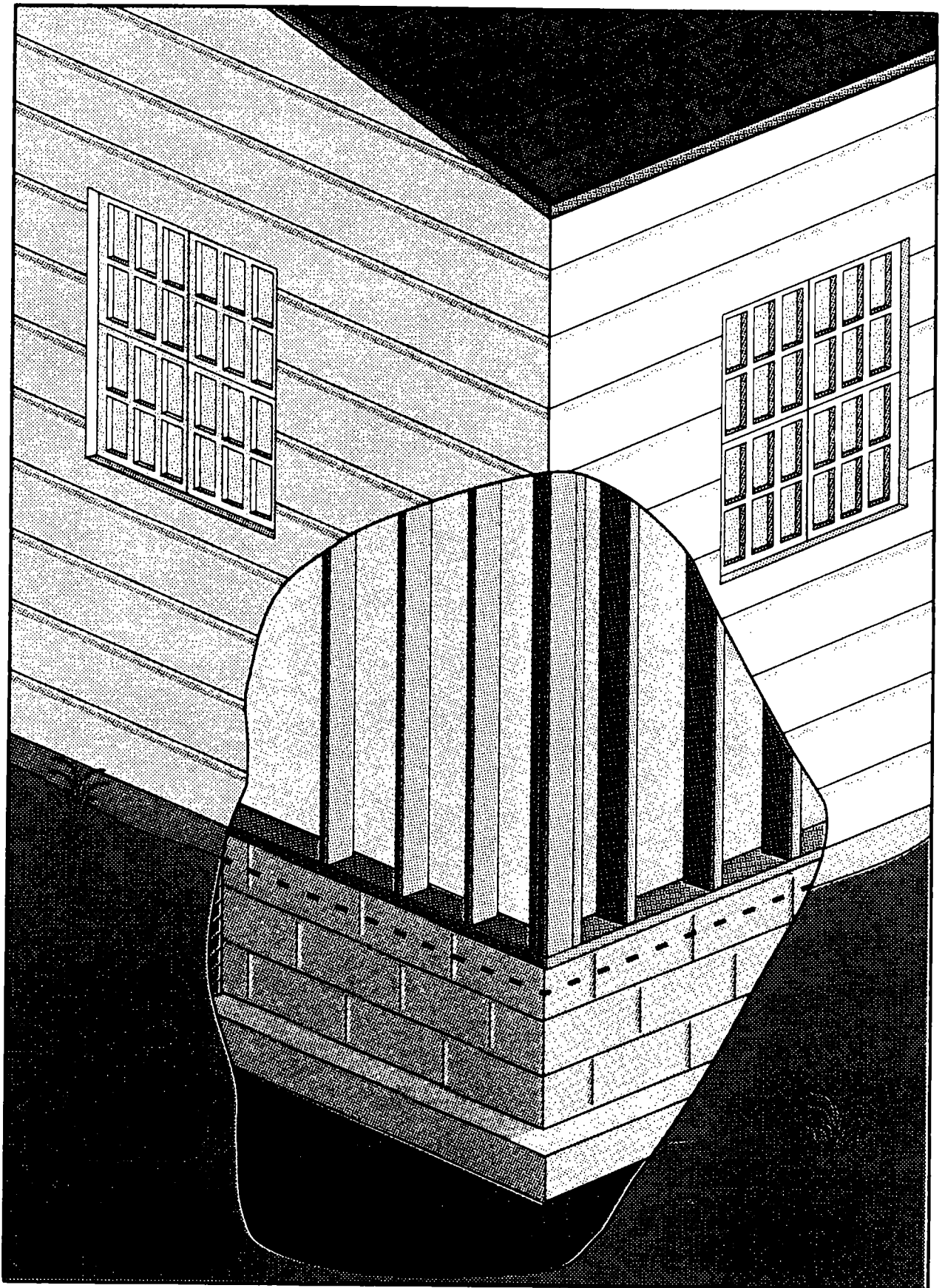
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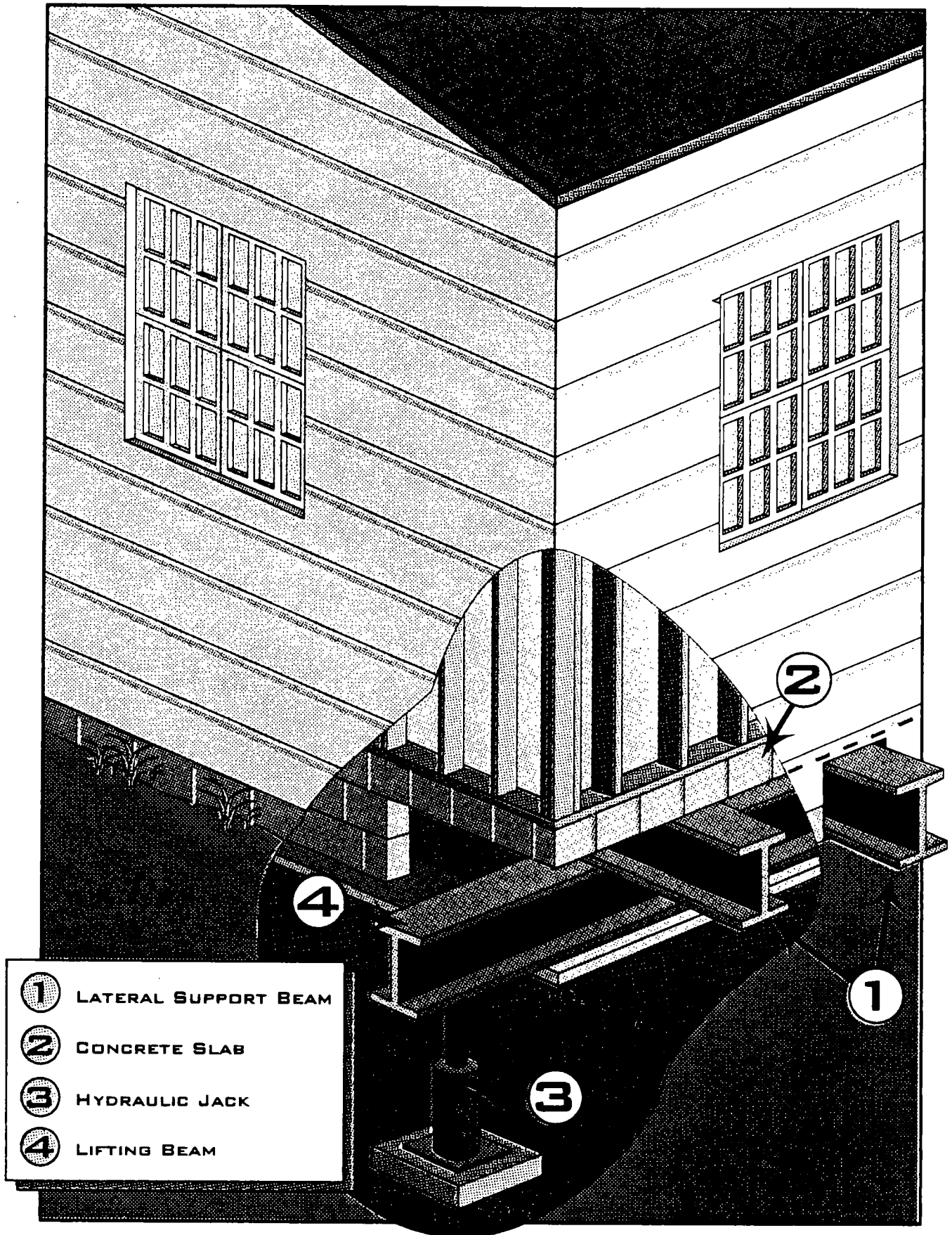
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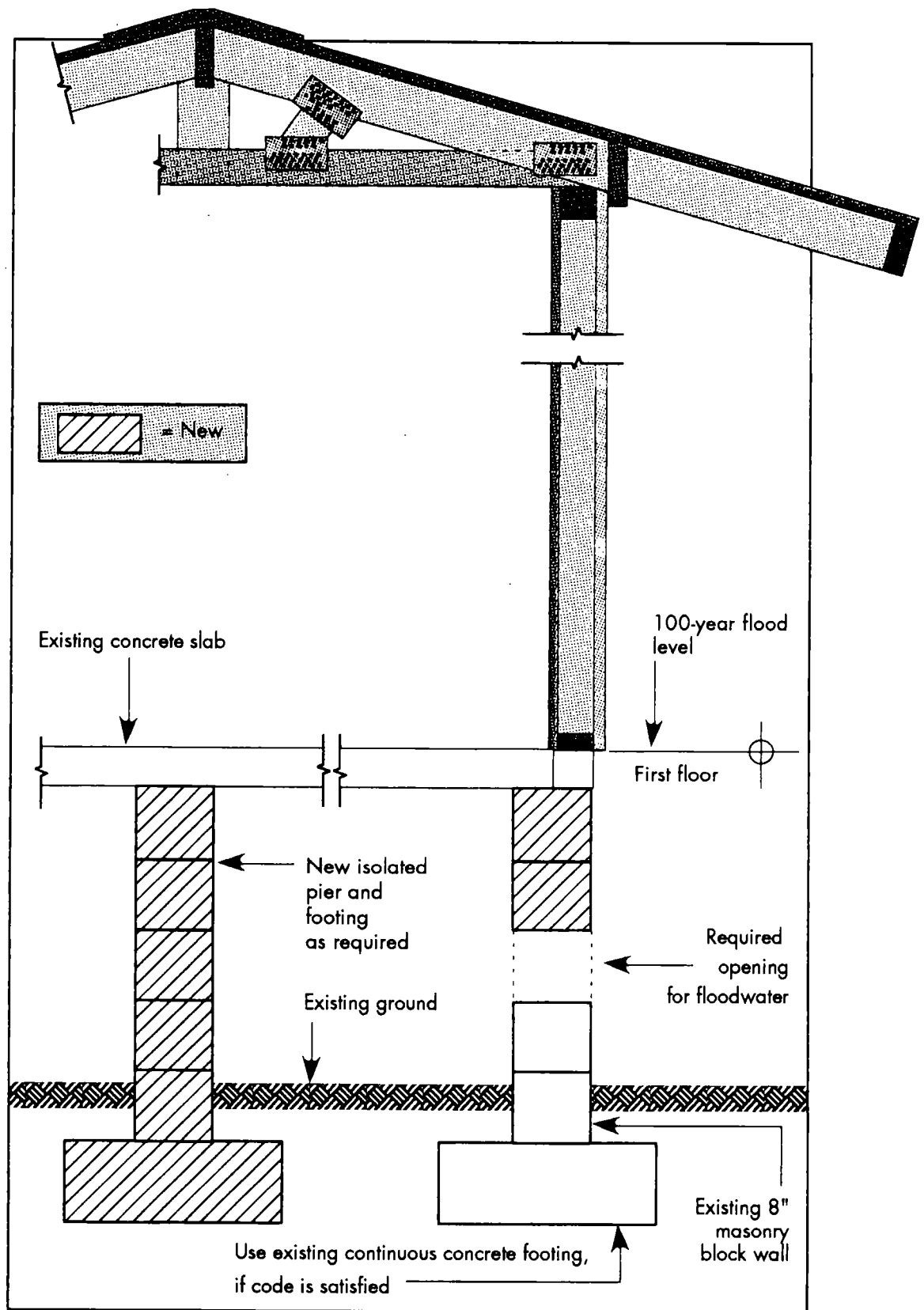
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EXISTING SLAB-ON-GRADE WOOD-FRAME RESIDENCE



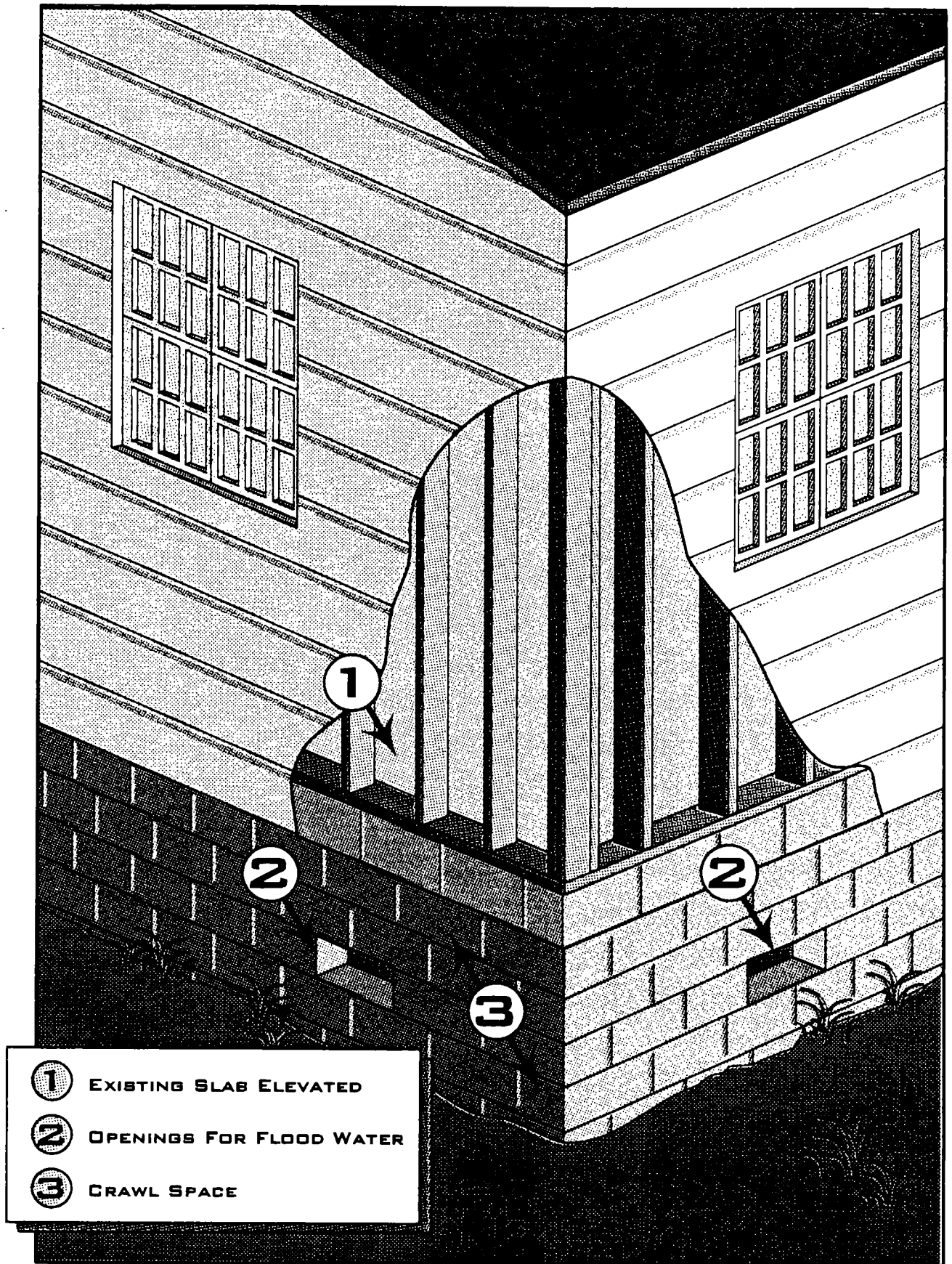
EXCAVATE UNDER EXISTING SLAB AND INSTALL NETWORK OF STEEL "I" BEAMS.



## **RAISING A SLAB-ON-GRADE WOOD-FRAME STRUCTURE WITH THE SLAB**

**E**

SEISMIC STRENGTHENING NOT SHOWN



SET RESIDENCE ON NEW FOUNDATION AND REMOVE "I" BEAMS



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# **Raising A Wood-Frame- Over-Crawl-Space Structure On Masonry Piers**

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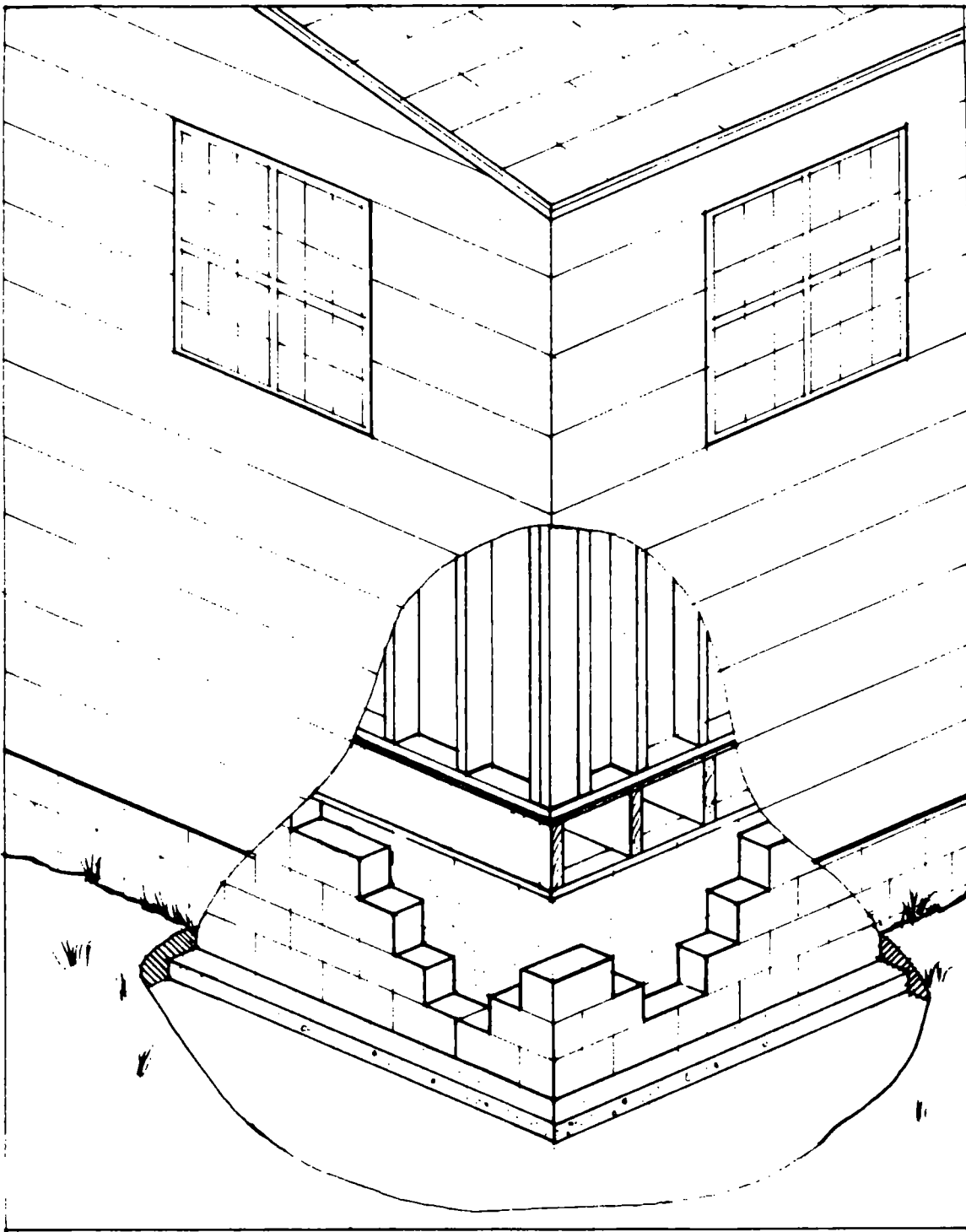
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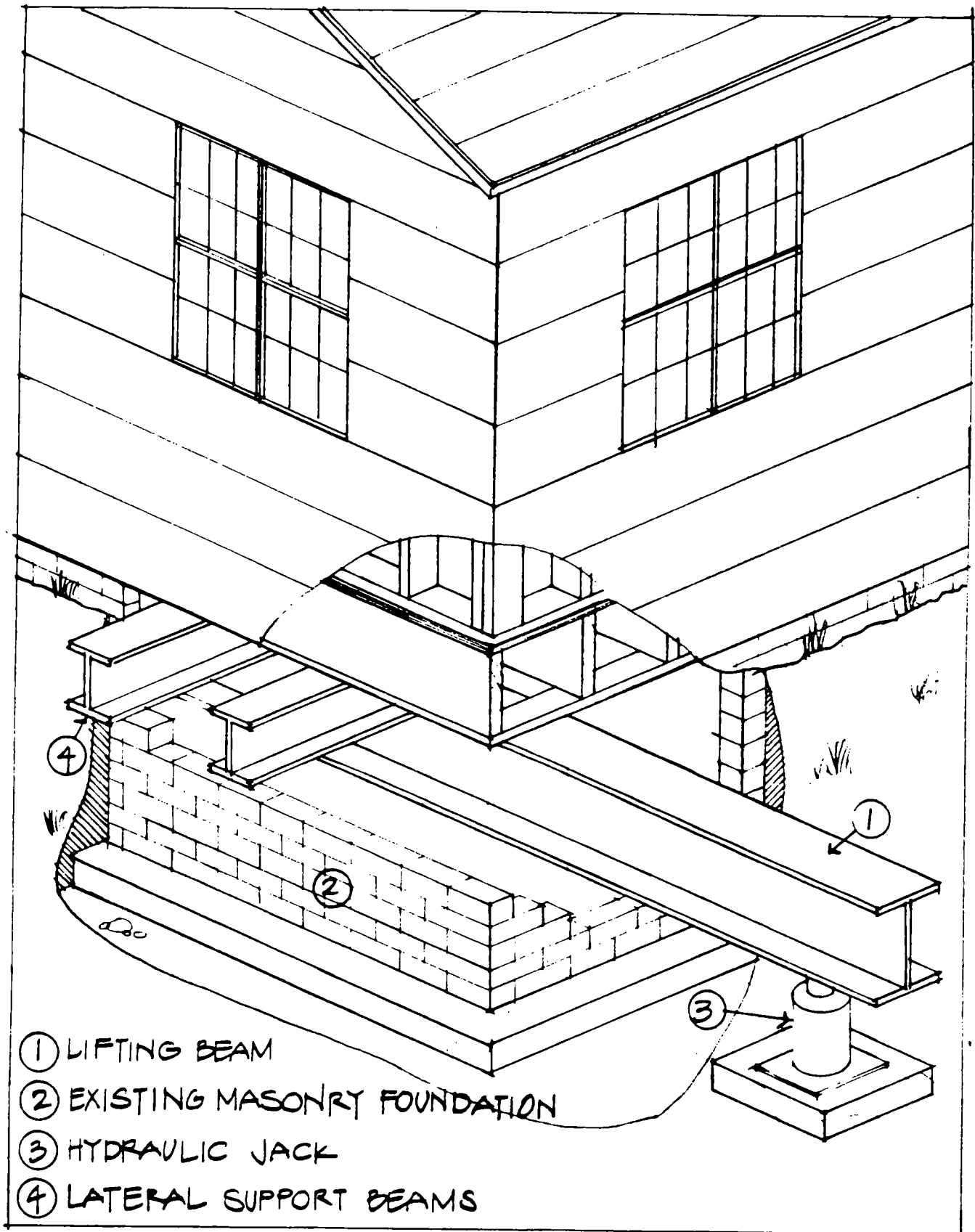
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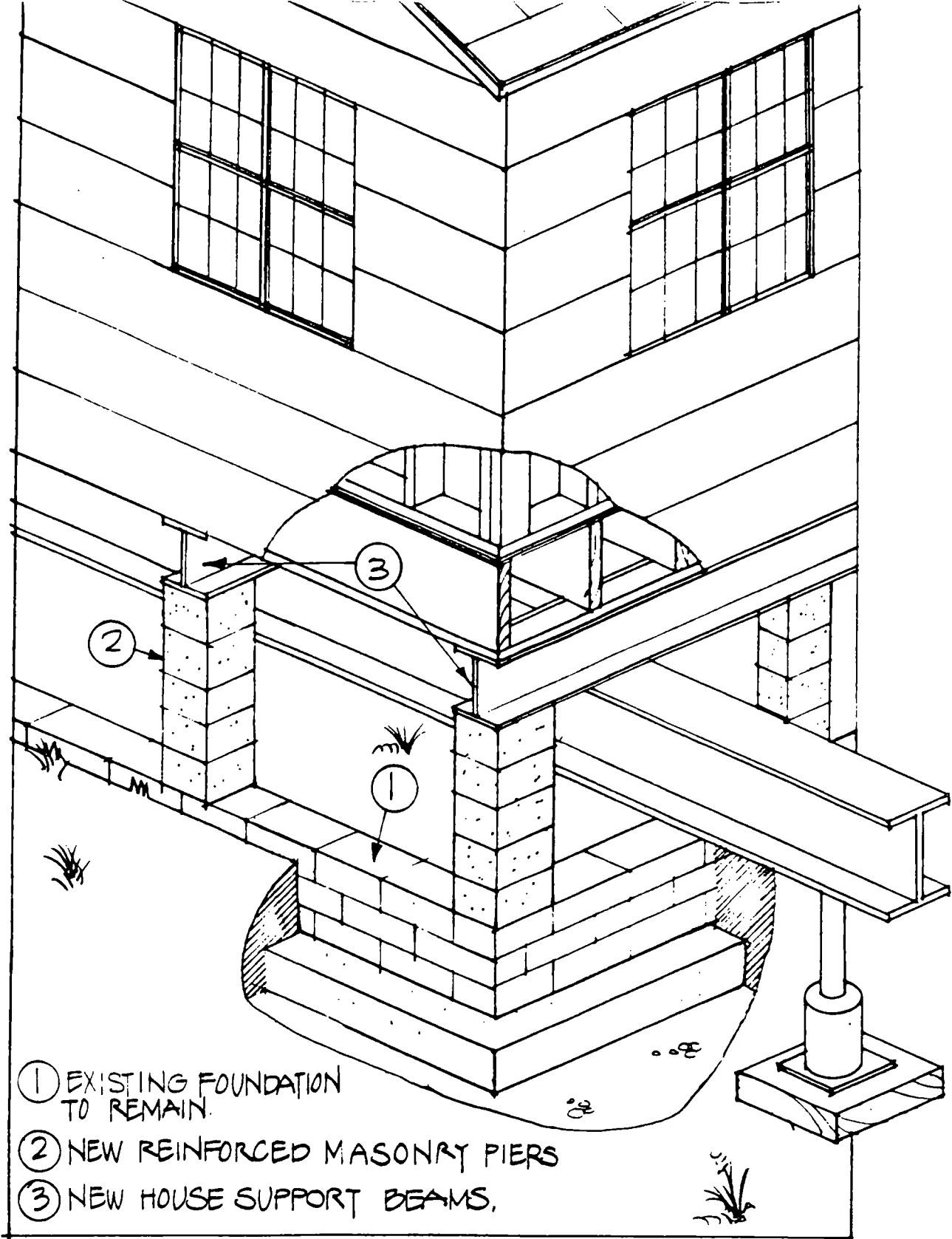
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EXISTING WOOD-FRAME RESIDENCE WITH CRAWL SPACE



• INSTALL NETWORK OF STEEL "I" BEAMS.



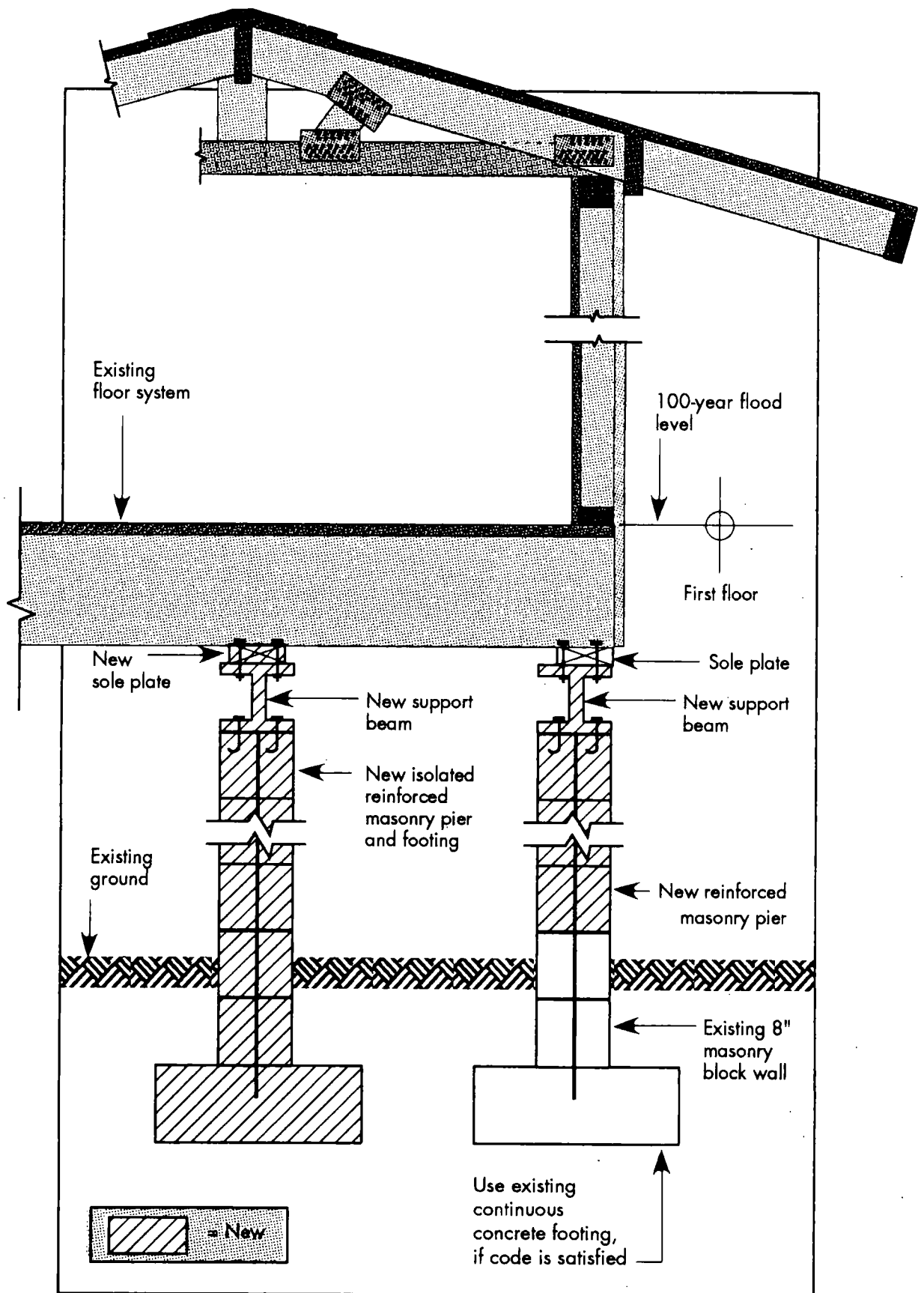
① EXISTING FOUNDATION  
TO REMAIN.

② NEW REINFORCED MASONRY PIERS

③ NEW HOUSE SUPPORT BEAMS.

• INSTALL NETWORK OF STEEL "I" BEAMS.

NOTE: PIERS SHOULD MEET LOCAL BUILDING CODE  
AND/OR BE DESIGNED BY A PROFESSIONAL  
ENGINEER OR ARCHITECT.

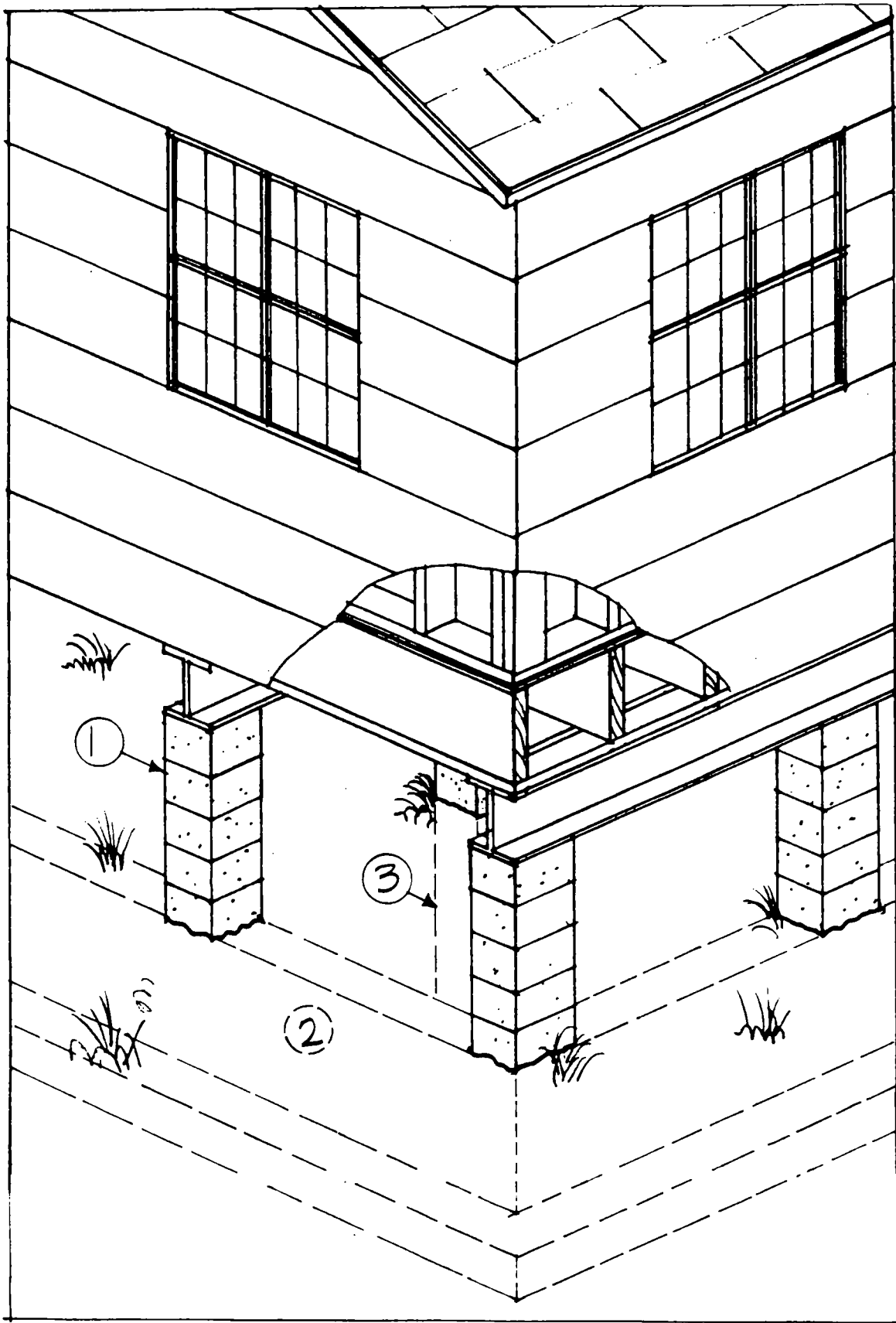


**F**

## RAISING A WOOD-FRAME-OVER-CRAWL-SPACE STRUCTURE

RAISE WOOD FRAME ON MASONRY PIERS

SEISMIC STRENGTHENING NOT SHOWN



- ① NEW REINFORCED MASONRY PIERS.
- ② EXISTING FOUNDATION.
- ③ NEW ISOLATED REINFORCED MASONRY PIER AND FOOTING.



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# **Raising A Wood-Frame- Over-Basement Structure On Masonry Piers**

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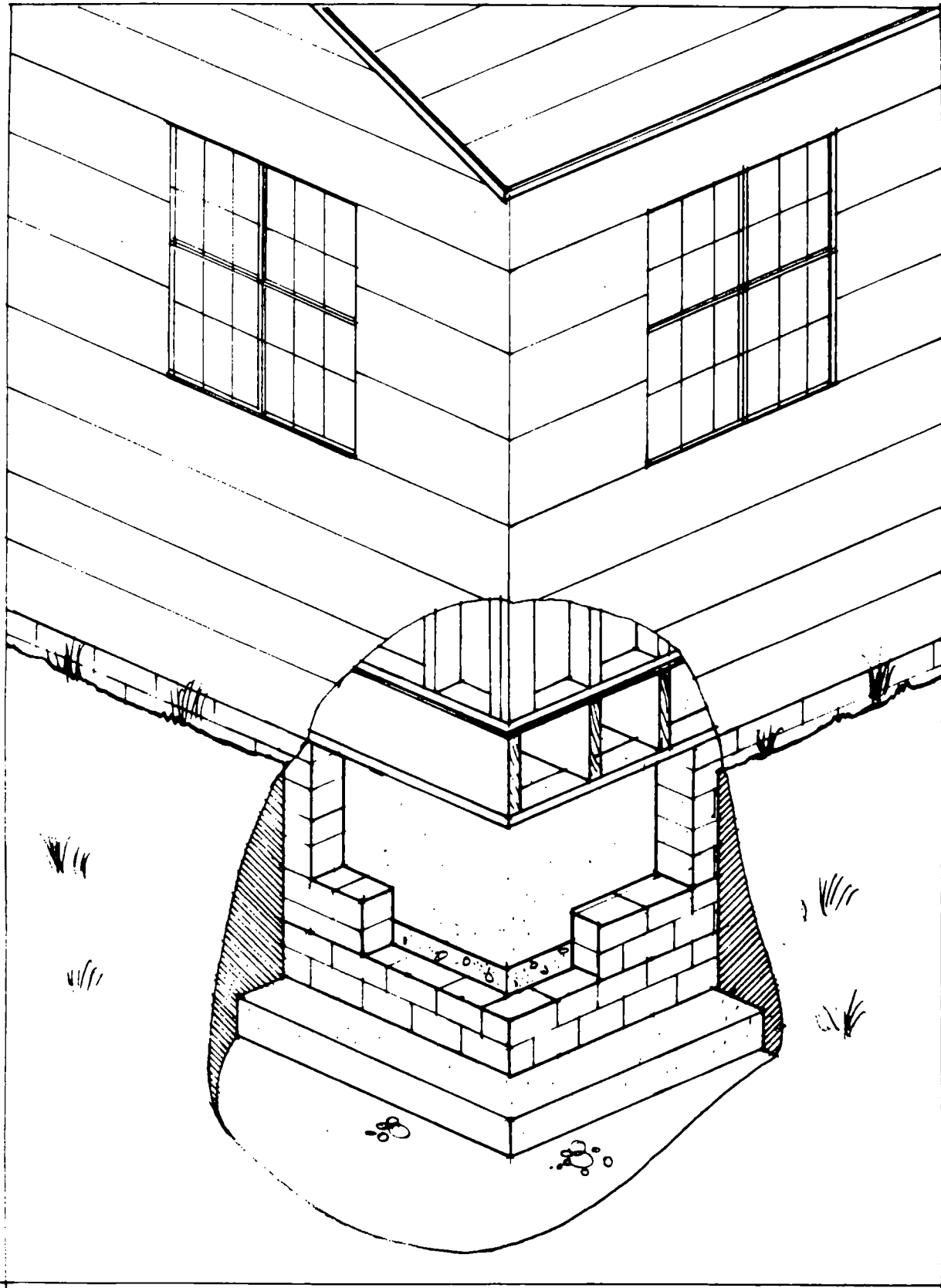
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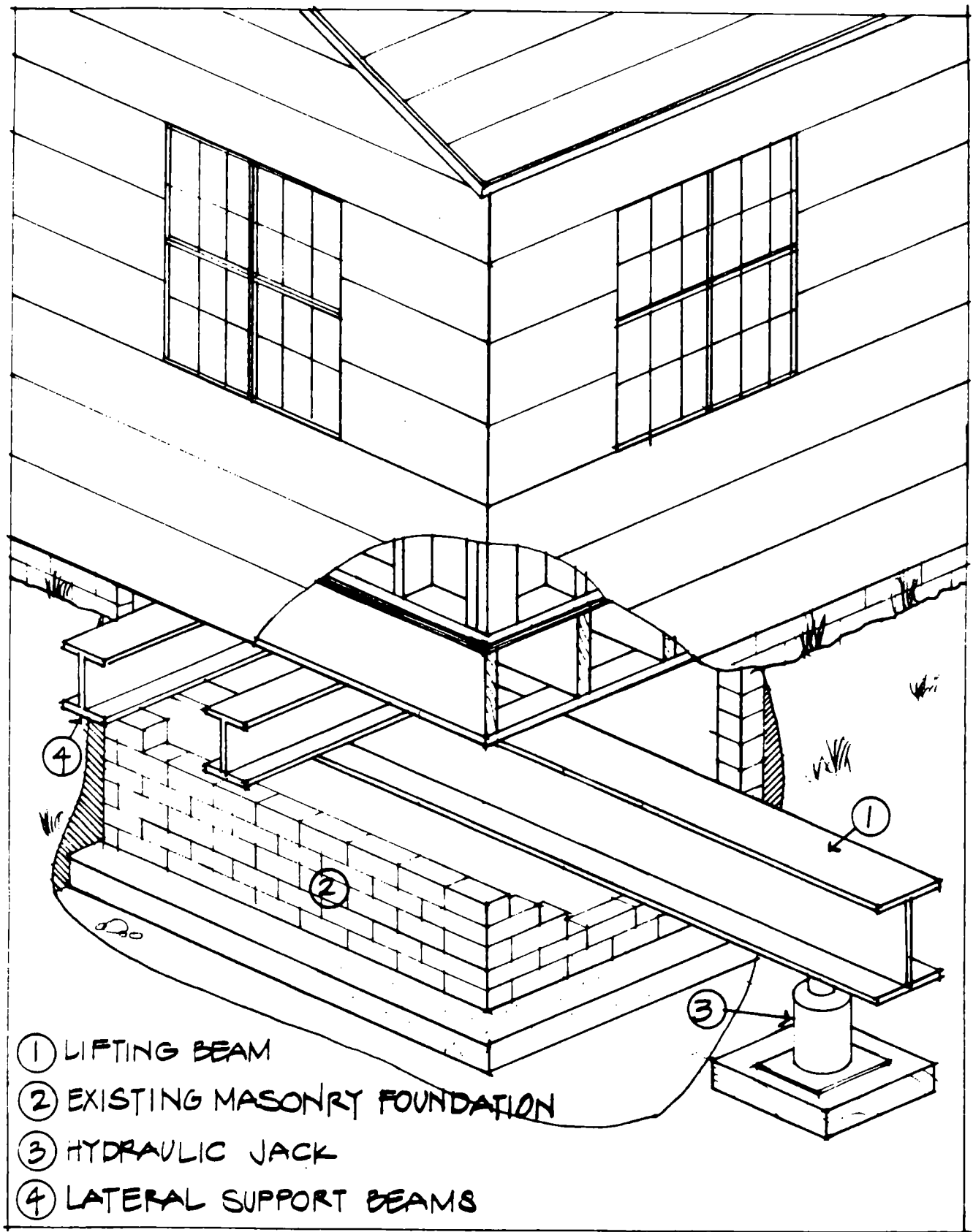
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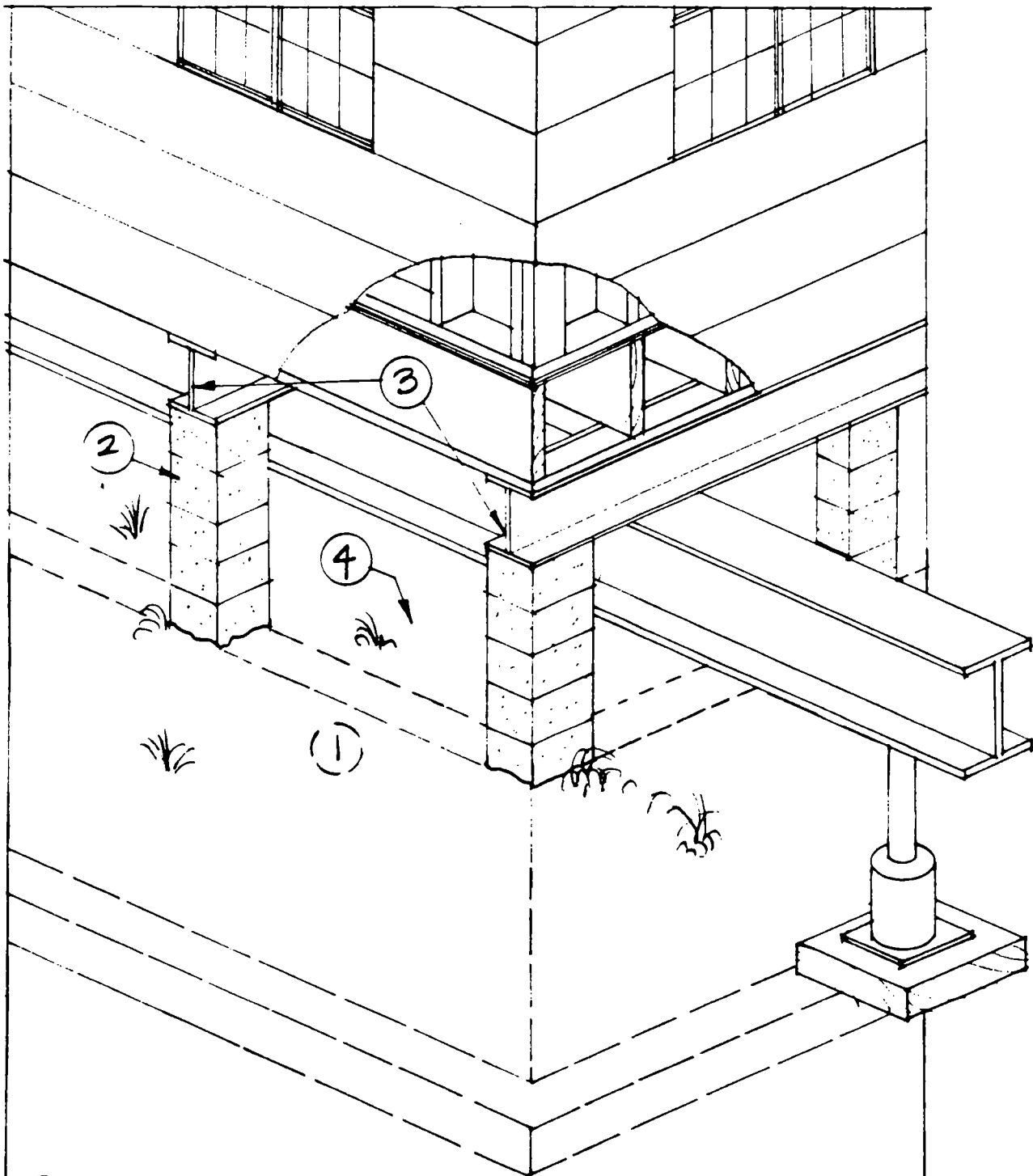
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WOOD FRAME HOUSE WITH BASEMENT



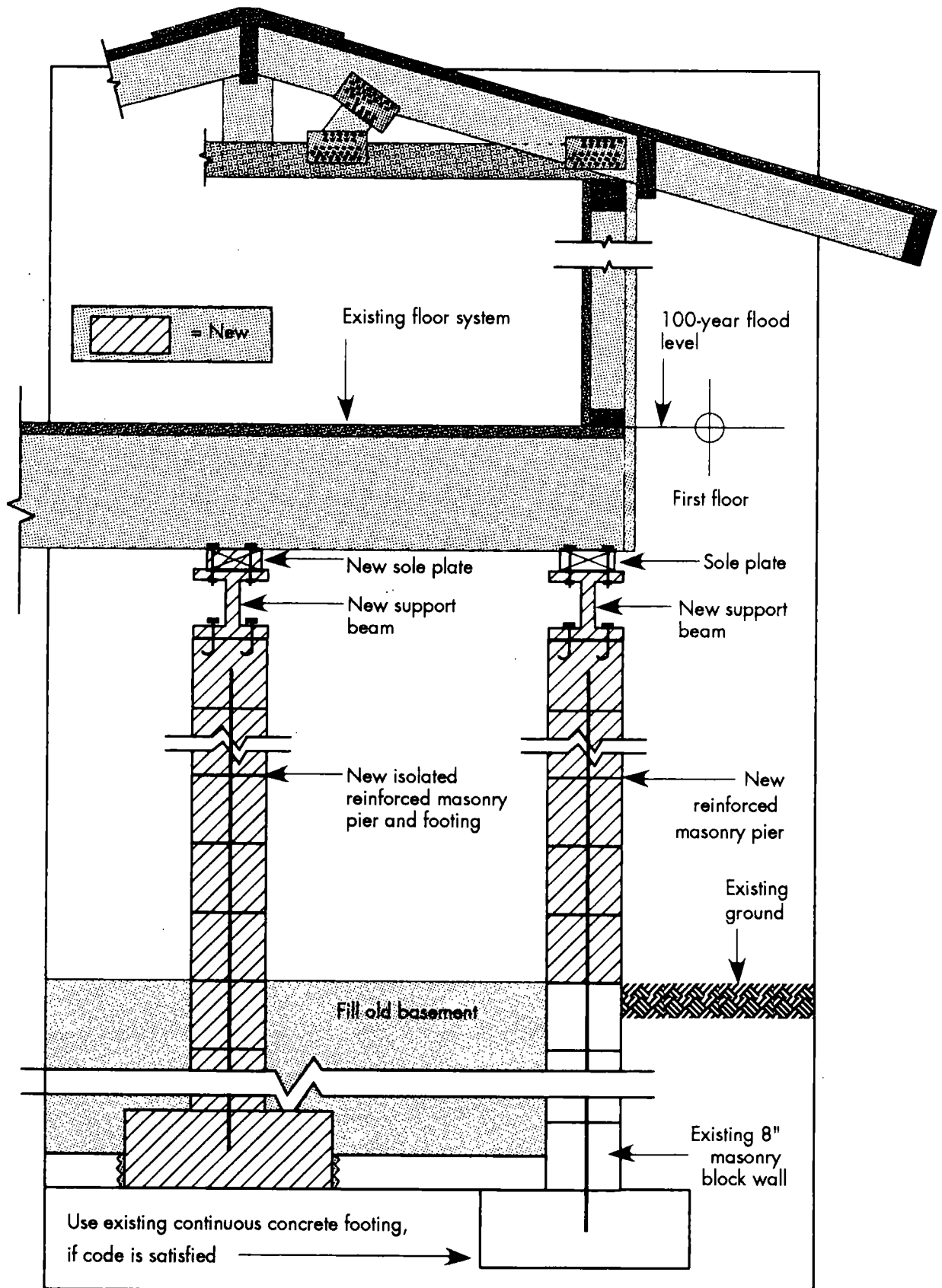
• INSTALL NETWORK OF STEEL 'I' BEAMS.



- ① EXISTING FOUNDATION TO REMAIN.
- ② NEW REINFORCED MASONRY PIERS.
- ③ NEW HOUSE SUPPORT BEAMS.
- ④ FILL BASEMENT.

• INSTALL NETWORK OF STEEL 'I' BEAMS.

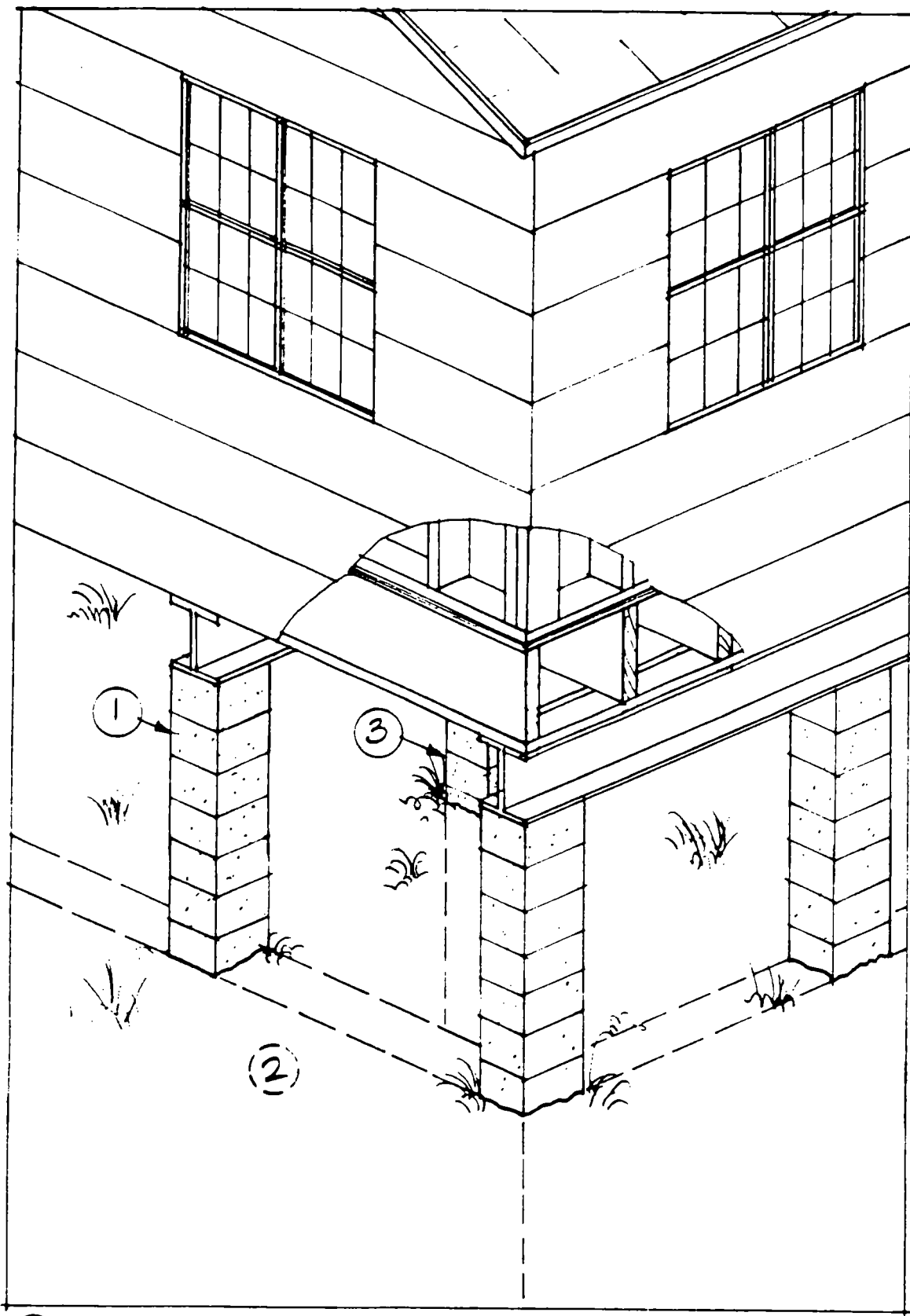
NOTE: PIERS SHOULD MEET LOCAL BUILDING CODE AND/OR BE DESIGNED BY A PROFESSIONAL ENGINEER OR ARCHITECT



## CREATION OF A NEW MASONRY ENCLOSED AREA ON TOP OF AN ABANDONED BASEMENT

FILL BASEMENT, REVISE WOOD FRAME, AND ADD NEW FIRST FLOOR MASONRY

SEISMIC STRENGTHENING NOT SHOWN



- ① NEW REINFORCED MASONRY PIERS
- ② EXISTING FOUNDATION.
- ③ NEW ISOLATED REINFORCED MASONRY PIER AND FOOTING.

# COST COMPARISONS<sup>1</sup> FOR ELEVATING SUBSTANTIALLY DAMAGED RESIDENTIAL BUILDINGS IN THE MIDWEST (1,000-SQUARE-FOOT WOOD-FRAME STRUCTURE)

| HEIGHT ABOVE<br>GRADE HOME IS<br>BEING ELEVATED | ALTERNATIVES   |                |                |          |                |          |          |                                                                                         |
|-------------------------------------------------|----------------|----------------|----------------|----------|----------------|----------|----------|-----------------------------------------------------------------------------------------|
|                                                 | A <sup>2</sup> | B <sup>2</sup> | C <sup>2</sup> | D        | E <sup>2</sup> | F        | G        | H <sup>3</sup><br>(DEMOLITION)                                                          |
| 1 TO 3 FEET                                     | \$20,000       | \$26,500       | \$23,500       | \$24,600 | \$32,100       | \$23,900 | \$28,500 | <div style="text-align: center;">\$5,500</div> <div style="text-align: center;">↓</div> |
| 4 FEET                                          | \$21,400       | \$27,900       | \$24,900       | \$27,100 | \$33,100       | \$24,300 | \$28,900 |                                                                                         |
| 5 FEET                                          | \$22,800       | \$29,300       | \$26,300       | \$29,400 | \$34,100       | \$24,700 | \$29,000 |                                                                                         |
| 6 FEET                                          | \$24,200       | \$30,700       | \$27,700       | \$31,700 | \$35,100       | \$25,100 | \$29,400 |                                                                                         |
| 7 FEET                                          | \$25,600       | \$32,100       | \$29,100       | \$35,500 | \$36,100       | \$25,500 | \$29,900 |                                                                                         |
| 8 FEET                                          | \$27,100       | \$33,600       | \$30,600       | \$36,400 | \$37,100       | \$26,000 | \$31,300 |                                                                                         |
| 10 FEET                                         |                |                |                |          |                | \$28,200 | \$33,500 |                                                                                         |
| 12 FEET                                         |                |                |                |          |                | \$29,500 | \$33,800 |                                                                                         |
| 14 FEET                                         |                |                |                |          |                | \$34,200 | \$35,500 |                                                                                         |
| 16 FEET                                         |                |                |                |          |                | \$35,500 | \$38,800 |                                                                                         |

## NOTES:

- 1 ESTIMATED COSTS ARE PROVIDED FOR GENERAL STRUCTURAL COST GUIDANCE ONLY AND DO NOT INCLUDE POTENTIAL ADDITIONAL COSTS FOR COMPLIANCE WITH WIND LOAD REQUIREMENTS, FOR NEW ROOFING SYSTEM, FOR SEISMIC STRENGTHENING, OR FOR GENERAL CONTRACTOR CHARGES, OR ANCILLARY COSTS SUCH AS ELECTRICAL, PLUMBING, FINISHING, AND OTHER NON-STRUCTURAL COSTS.
- 2 NO FINISH IN NEW MASONRY ENCLOSED AREA.
- 3 DEMOLITION DOES NOT INCLUDE ENVIRONMENTAL ASSESSMENT AND/OR CLEANUP COST.