

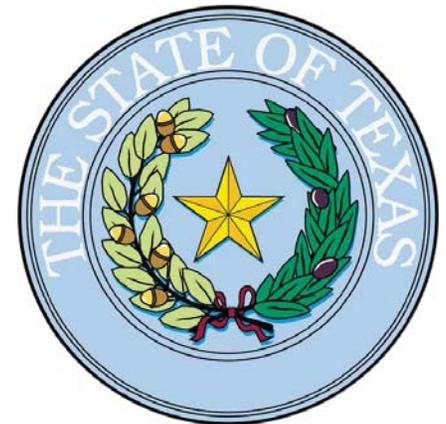
2015

Quick Guide

Floodplain Management in Texas



Texas Floodplain Management
Association www.tfma.org



Contents

About This Guide	1	Understanding the Floodway.....	22
Introduction	2	Approximate Flood Zones and Unnumbered A Zones.....	23
Texas Flood Events and Flood Facts	3	Areas of Shallow Flooding.....	24
Why Communities Regulate Floodplains.....	4	Understanding the Coastal Floodplain.....	25
What is the National Flood Insurance Program?	5	The Coastal A Zone (LiMWAs).....	26
Flood Insurance: Property Owner's Best Protection	6	Flood Insurance Rate Map (Coastal).....	27
Want to Learn More About Floodplain Management?.....	7	Use the Transect Map to Determine Coastal BFEs.....	28
Want to Learn More About Flood Insurance?	8	Use the Transect Map to Determine Coastal BFEs (Cont.).....	29
The NFIP's Community Rating System (CRS).....	9	Coastal Barriers Resource System (CBRS) Areas.....	30
The NFIP and Community Responsibilities.....	10	Changes to FEMA Flood Maps.....	31
Looking for Floodplain Information?	11	Flood Map Revisions: LOMA and LOMR-F.....	32
Flood Maps and Flood Zones	12	Flood Map Revisions: CLOMR and LOMR.....	33
Nature Doesn't Read Maps	13	Is Your Building Site Higher than the BFE?.....	34
FEMA's Risk Mapping Assessment Planning (Risk MAP) Program.....	14	Activities Requiring Permits.....	35
FEMA Flood Maps Online and FIRMettes.....	15	Some Key Permit Review Steps.....	36
Old Format Flood Insurance Rate Map (Riverine).....	16	Carefully Complete the Permit Application.....	37
New Flood Insurance Rate Map (Riverine).....	17	Freeboard: Build Above the BFE.....	38
The Countywide Flood Insurance Rate Map.....	18	What is Meant by Pre-FIRM and Post-FIRM Structures?.....	39
Understanding the Riverine Floodplain	19	Paperwork is Important - For You and Your Community.....	40
Use the Riverine Flood Profile to Determine BFEs	20	What is the Elevation Certificate and How is it Used?.....	41
The Flood Boundary and Floodway Map (Riverine).....	21	Completing the Elevation Certificate.....	42

Contents, continued

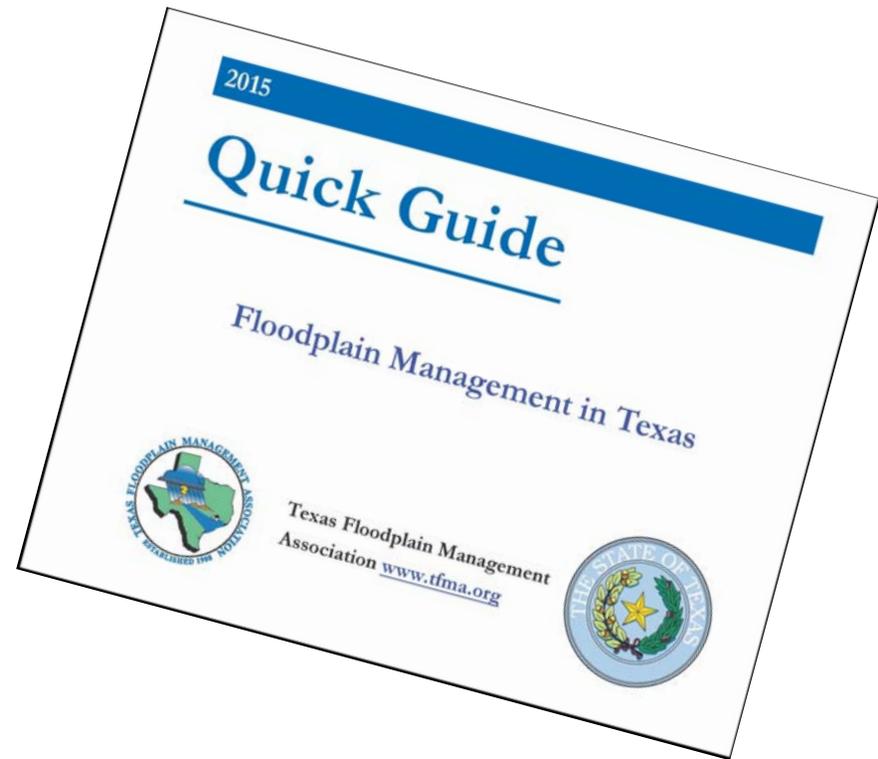
Floodplain Fill Can Make Things Worse.....	43	Non-Substantial Improvements.....	64
Required Floodway "No Impact" Certification.....	44	Elevating a Pre-FIRM Building.....	65
Think Carefully Before You Seek a Variance.....	45	Some Flood Protection for Older Homes is Easy and Low Cost.....	66
How to Elevate Your Floodplain Building (Riverine).....	46	Small Levees and Floodwalls Can Protect Older Homes.....	67
Compaction of Floodplain Fill (A Zone).....	47	What About After Damages?.....	68
Enclosures Below the BFE (Riverine Only).....	48	Substantial Damage Estimator.....	69
Crawlspace Details (A Zones).....	49	Paying for Post-Flood Compliance - ICC.....	70
Typical Elevation Methods for Coastal Buildings.....	50	Repetitive Loss Eligibility Under ICC.....	71
The V Zone Certificate Sample.....	51	Repetitive Loss Eligibility Under ICC (Cont.).....	72
Coastal Houses Must Resist Wind and Water Forces.....	52	Some Flood Mitigation Projects Are More Costly.....	73
Enclosures Below V Zone Buildings.....	53	Safe Uses of the Floodplain.....	74
Utility Service Inside Enclosures.....	54	Be Flood Safe - Don't Drive Through Flooded Roads.....	75
Utility Service Outside Buildings.....	55	Useful Web Sites and Common Acronyms.....	76
Basements Are Unsafe.....	56	Resources.....	77-82
Manufactured Homes Deserve Special Attention.....	57	Code of Federal Regulations: CFR.....	83-88
Accessory (Appurtenant) Structures.....	58		
Recreational Vehicles.....	59		
Planning to Improve Your Floodplain Building?.....	60		
Substantial Improvement: Renovation Only.....	61		
Substantial Improvement: Lateral Addition Only.....	62		
Substantial Improvement: Addition Plus Other Work.....	63		

About This Guide

This **Quick Guide** will help you understand more about why and how communities in the State of Texas manage floodplains to protect people and property.

Flood-prone communities adopt ordinances and court orders that detail the rules and requirements for floodplain development. In case of conflict, that ordinance or court order and not this publication, must be followed.

If you have questions, be sure to talk with your local planning, permit, engineering or floodplain management office.



Questions and comments on the Quick Guide can be directed to the Texas Floodplain Management Association (TFMA) at <http://www.tfma.org>.

Introduction

The Texas Floodplain Management Association (TFMA) and its partners are pleased to provide this **Quick Guide** to help citizens understand what floodplain management is and why floodplain development is regulated.

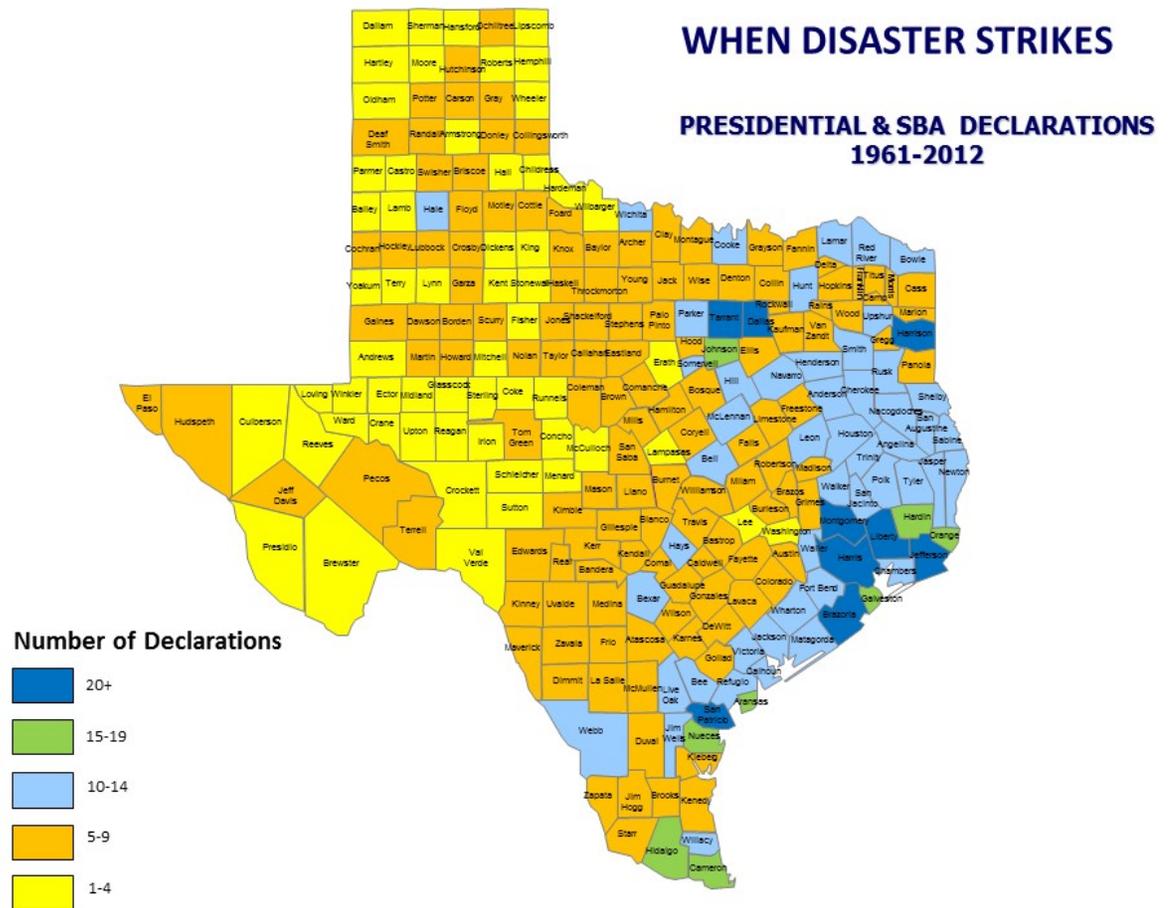
Communities regulate the floodplain to:

- **Protect** people and property
- **Ensure** Federal flood insurance and disaster assistance is available
- **Save** tax dollars
- **Reduce** future flood losses
- **Reduce** liability

Floods have been, and continue to be, the most destructive natural disaster in terms of economic loss to the citizens of Texas with a total coverage of about \$156 billion. More than 12% of the state's land area is subject to flooding. Since 1978, Texas flood insurance policy holders have filed over 251,569 flood loss claims totaling \$5.8 billion in claim payments. Even though that represents many insurance payments, most flood-prone Texans don't have flood insurance.

Texas Flood Events and Flood Facts

- Flood-prone areas have been identified in most counties, cities and towns in Texas.
- Millions of structures are located in mapped flood-prone areas.
- Since 1988, over 400 people have died in flood-related incidents and over \$4 billion in damage has occurred.
- About 12% of the state's land area is mapped floodplain. Many waterways have not been mapped.



Not all flood events are declared major disasters. Many floods are local, affecting only small areas or a few watersheds.

Why Communities Regulate Floodplains

- **To protect people and property.** Floodplain management is about smart development. It makes good sense. If we know part of our land will flood from time to time, we should make reasonable decisions to help protect our families, homes, and businesses.
- **To make sure that federal flood insurance and disaster assistance is available.** To make sure that federal flood insurance and disaster assistance is available. A community must participate in the NFIP for residents and businesses to be eligible to purchase flood insurance through the NFIP. If your community does not participate, flood insurance through the NFIP is not available and eligibility for federal disaster assistance is very limited. In addition, homeowners may find it hard to secure a mortgage.
- **To save tax dollars.** Every flood disaster affects your community's budget. If we build smarter, we'll have fewer problems the next time it floods. Remember, federal disaster assistance isn't available for all floods. And even when the President declares a disaster, you and your community still have to pay a portion of the costs of evacuation, temporary housing, repair, and clean-up.
- **To avoid liability and law suits.** If we know an area is mapped as a high-risk flood area, and likely to flood, if we know people could be in danger, and if we know that buildings could be damaged, it makes sense to take reasonable protective steps when we develop and build.
- **To reduce future flood losses in Texas.** Development that complies with the minimum floodplain management requirements is better protected against major flood-related damage. State legislation was amended in 1999 and again in 2001 with SB 936 to require all cities and counties to adopt ordinances or orders to become eligible to participate in the NFIP. Communities in Texas also have authority to regulate development with stricter local floodplain management requirements.

What is the National Flood Insurance Program?

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to protect lives and property and to reduce the financial burden of providing disaster assistance. The NFIP is administered by the Federal Emergency Management Agency (FEMA). Nationwide, over 22,000 communities participate in the NFIP-including many in Texas.

The NFIP is based on a mutual agreement between the Federal Government and communities. Communities that participate agree to regulate floodplain development according to certain criteria and standards. The partnership involves:

- **Flood hazard maps.** FEMA prepares maps that are used by communities, insurance agents and others.
- **Flood insurance.** Property owners in participating communities are eligible to purchase federal flood insurance for buildings and contents.
- **Regulations.** Communities must agree to adopt and enforce floodplain management regulations so that development, including buildings, is undertaken in ways that reduce exposure to flooding.



To learn more about the NFIP, including your potential flood risk and the approximate cost of a flood insurance policy, go to FEMA's FloodSmart Web site at <http://www.floodsmart.gov>.

Flood Insurance: Property Owner's Best Protection

Who needs flood insurance? **EVERYONE**. Every homeowner, business owner, and renter in Texas communities that participate in the National Flood Insurance Program may purchase a flood insurance policy — **regardless** of the location of the building. A typical homeowners insurance policy does not cover flood insurance.

Unfortunately, it's often after a flood that many people discover that their homeowner or business property insurance policies do not cover flood damages. Approximately 25% of all flood damages occur in low risk zones, commonly described as being “outside the mapped flood zone.”

The Texas Floodplain Management Association and the State of Texas urge YOU to protect your financial future by getting a flood insurance policy. To purchase a policy, call your insurance agent. To get the name of an agent in your community, call the NFIP's toll free number 1 (888) 356-6329 or go to www.floodsmart.gov.

Being prepared by having flood insurance will save you money. For a \$50,000 loan at 4% interest, you will pay around \$3,000 per year for 30 years. Compare that to a \$100,000 flood insurance premium, which is about \$700 per year. If your property is in a low risk zone, your premium may be low and could include coverage for your property's contents.



**NATIONAL
FLOOD
INSURANCE
PROGRAM**

Want to Learn More About Floodplain Management?

- For advice on flood information and permits, call your community's building permit office, engineering or planning department.
- Learn about FEMA's Risk Mapping, Assessment and Planning (RiskMap) at: www.riskmap6.com
- To order flood maps, call FEMA's Flood Map Service Center – (877) 336-2627 or enter the FEMA Map Store to order online at www.msc.fema.gov.
- FEMA's publications can be found at www.fema.gov/library. Search by key word, title or publication number. Call (800) 480-2520 to order free printed copies.
- Find Elevation Certificate training for surveyors by going to www.fema.gov and search "Elevation Certificate."
- Learn about the NFIP's Community Rating System at: www.fema.gov/national-flood-insurance-program-community-rating-system
- Find out about floodplain management conferences and training sessions at www.tfma.org

Want to Learn More About Flood Insurance?

- Consumer information about flood insurance, flood risks, and flood maps is online at www.floodsmart.gov to learn more about estimating the cost of a policy, finding an agent, purchasing a policy, coverage limits and exclusions, filing claims, and other topics.
- At www.floodsmart.gov, click on “About the National Flood Insurance Program” to learn more about the NFIP Partnership coverage and when insurance is required to make communities safer.
- Also at www.floodsmart.gov, click on “Preparation and Recovery” to learn more about what to do before, during, and after a flood.
- To obtain an NFIP flood insurance policy, call your insurance agent. Most insurance companies can write an NFIP policy for you. If you need more help, call the National Flood Insurance Program’s toll free number to get the name of an agent in your area who does write flood insurance, (888) 379-9531
- To find out how many NFIP flood insurance policies are in force in your community, or how many claims have been paid since 1978, go to www.fema.gov/national-flood-insurance-program and click on “Statistics.”

The NFIP's Community Rating System (CRS)

The NFIP's CRS gives “extra credit” to communities in the form of reduced flood insurance premiums. Communities must apply to the CRS and commit to implement and certify activities that contribute to reduced flood risk. Examples of actions your community can take to reduce the cost of your insurance premiums include:

- Preserve open space in the floodplain
- Enforce higher standards for safer development through zoning, stormwater, subdivision, and flood damage protection ordinances
- Develop hazard mitigation plans
- Undertake engineering studies and prepare flood maps
- Obtain grants to buy out or elevate houses or to floodproof businesses
- Maintain drainage systems
- Monitor flood conditions and issue warnings
- Inform people about flood hazards, flood insurance, and how to reduce flood damage

DID YOU KNOW?

Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resource Center ([see page 76](#)).

Did You Know? Property owners who live in communities that participate in the CRS program receive a discount on their flood insurance premium.

The NFIP and Community Responsibilities

To participate in the National Flood Insurance Program, your community agrees to:

- **Adopt and enforce** a flood damage prevention ordinance/court order.
- **Require** permits for all types of development in the floodplain (see page 35)
- **Ensure** that building sites are reasonably safe from flooding
- **Estimate** flood elevations that were not determined by FEMA
- **Require** new or substantially improved homes and manufactured homes to be elevated above the Base Flood Elevation (BFE)
- **Require** other buildings to be elevated or floodproofed
- **Conduct** field inspections and cite violations
- **Require** Elevation Certificates to document compliance (see pages 41 through 42)
- **Carefully consider** requests for variances
- **Resolve** non-compliance and violations
- **Advise** FEMA when updates to flood maps are needed

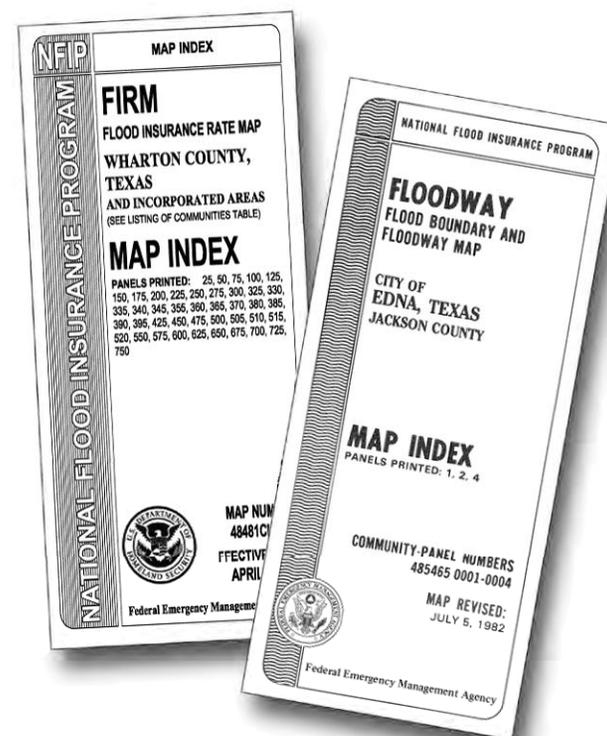


Agents.FloodSmart.gov
A FloodSmart site for NFIP agents

Looking for Floodplain Information?

Go to FEMA's Flood Map Service Center (MSC) at <http://msc.fema.gov/portal>. Downloads of the official flood maps and flood insurance studies (effective and historic) are available along with a range of other flood hazard products. The MSC can also be reached at (877) FEMA MAP (877-336-2627)

- FEMA prepares Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRMs) for communities in Texas.
- Most FIRMs show Special Flood Hazard Areas (also called “100-year floodplain” or 1% annual chance floodplain) and floodways. Some FIRMs show floodplains delineated using approximation analyses (see page 23).
- Not all waterways have designated floodplains – but all waterways will flood, even though a floodplain study may not have been prepared.
- In coastal communities, FIRMs show Special Flood Hazard Areas, including areas subject to wave action (see pages 26 and 27).

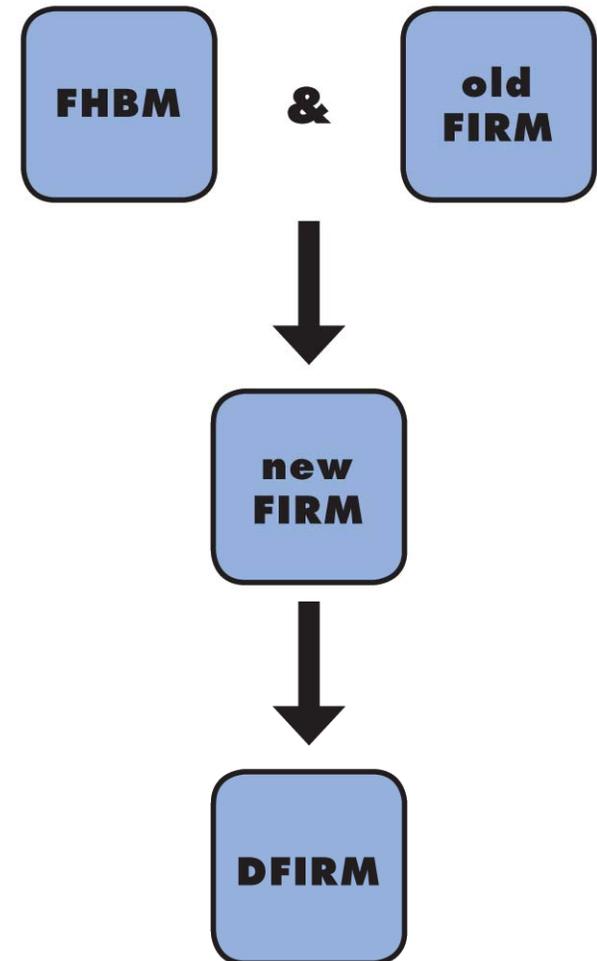


Need a fast answer? Visit your community's planning, engineering or permit office where flood maps are available for viewing by the public.

Flood Maps and Flood Zones

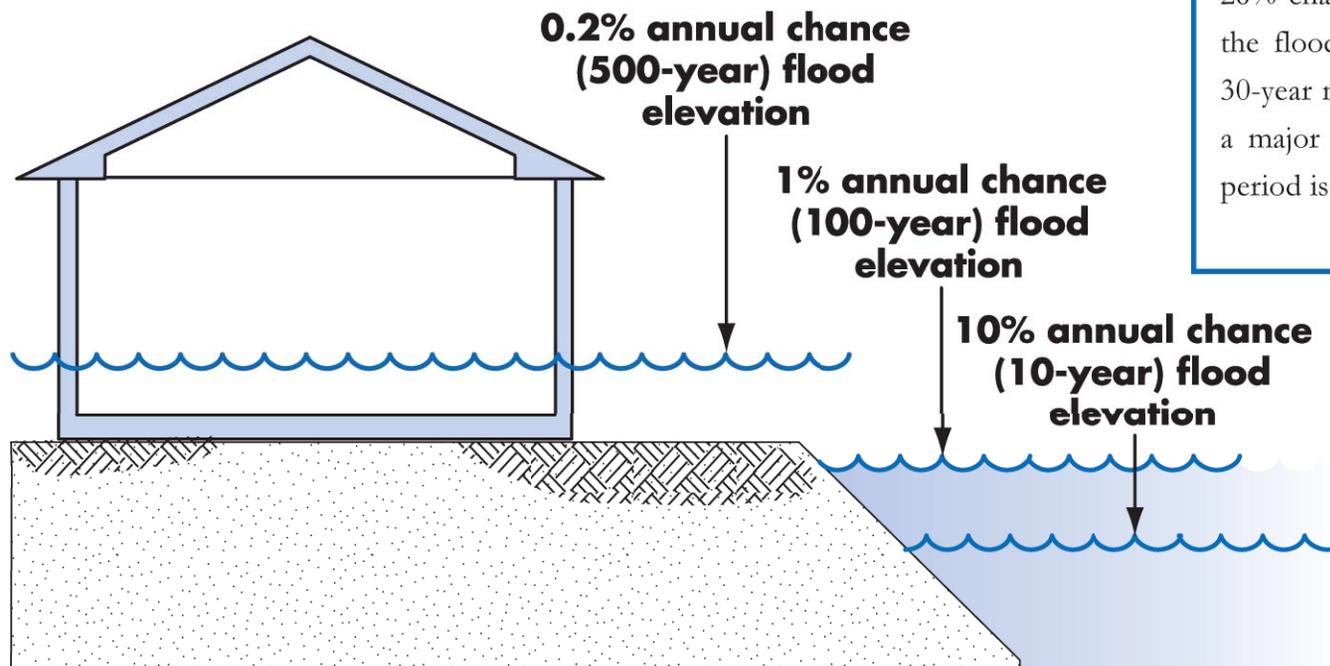
FEMA prepares Flood Insurance Rate Maps (FIRMs) to show areas that are at high risk of flooding. Since the 1970s, many versions and updates to maps have been produced.

- “Old format” maps may include flood zones (like B, C, A1-30) that are not being included in map updates. The maps were only available in hard copy and were often accompanied with Flood Hazard Boundary Maps.
- “New format” maps have been produced in order to simplify map zone designations and make map items easier to identify.
- Flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. These Zones are depicted on a community's Flood Hazard Boundary Map (FHBM) or FIRM and Digital FIRMs (DFIRMs) if the DFIRM is available. Each zone reflects the severity or type of flooding in the area.
- High Risk Areas: All A and V Zones - the area that is located within the 1% annual chance floodplain (100-year floodplain) identified as a Special Flood Hazard Areas on Flood Insurance Rate Maps. Flood insurance is available to all property owners and renters. Lenders require mandatory purchase of flood insurance.
- Moderate to Low Risk Areas - Zones B (moderate), C and X (low) - areas located outside the one-percent annual chance floodplain. Includes areas protected from flood by certified levees. Area is higher than base flood elevation. Lower-cost flood insurance is available to all property owners and renters. Mandatory Flood insurance purchase requirements do not apply.
- Undetermined Risk Areas - Zone D - Unstudied areas of undetermined but possible flood hazards. Base flood elevations not available. Flood insurance is available to all property owners and renters. Mandatory flood insurance purchase requirements do not apply.



NFIP Flood Insurance is not available to residents of communities that do not participate in the NIFP. It is also not available for structures built or substantially improved in CBRA (Coastal Barrier Resources Act) areas after their designation date, even though the structure may be in a participating community.

Nature Doesn't Read Maps



Important Information

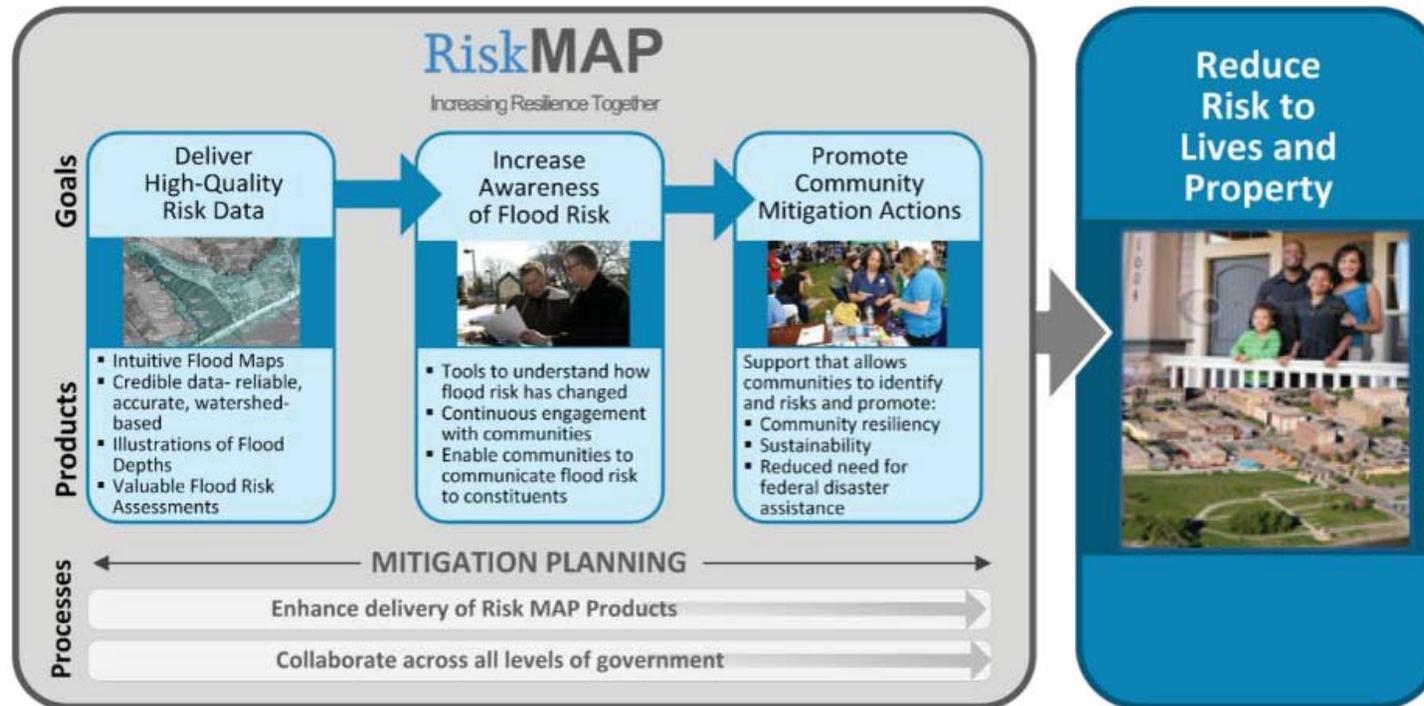
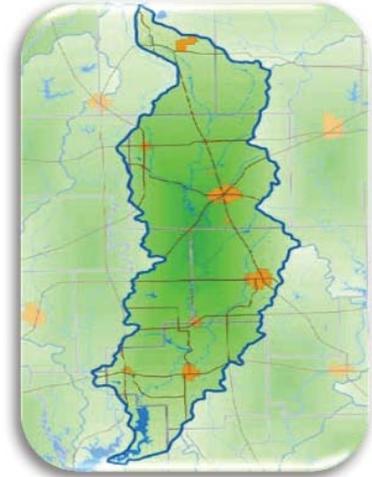
Many people don't understand just how risky the floodplain can be. There is a 26% chance that a non-elevated home in the floodplain will be damaged during a 30-year mortgage period. The chance that a major fire will occur during the same period is less than 5%.

CAUTION: Nature doesn't read the flood map. Major storms and flash floods can cause flooding that rises higher than the 1% annual chance floodplain (BFE). Consider safety - protect your home or business by building higher. See page 34 to see how this will save you money on insurance.

FEMA's Risk Mapping Assessment and Planning (Risk MAP) Program

Flood risks change over time, based on new building and development, weather pattern changes, and other factors. The FEMA Risk Mapping, Assessment and Planning (Risk MAP) program will assist communities nationwide, assess flood risks, and encourage mitigation planning to avoid or minimize damage in the face of future disasters. Through more precise flood maps, risk assessment tools and outreach support, Risk MAP strengthens local ability to make informed decisions about reducing risk. Identifying the hazards and risk in communities, anticipating disaster recovery issues, and prioritizing hazard mitigation actions before a disaster strikes will result in substantial long-term reduction of risk and future disaster damage. An effective hazard mitigation planning process is critical to make communities more disaster resistant.

During Risk MAP, FEMA will use the watershed boundaries to conduct future studies. This watershed approach will allow communities to come together to develop partnerships, combine resources, share flood risk information with FEMA, and identify broader opportunities for mitigation action. Groups such as local governments, county governments, Tribes, commerce, and non-profit organization will have opportunities to develop a vision for the watershed's future.

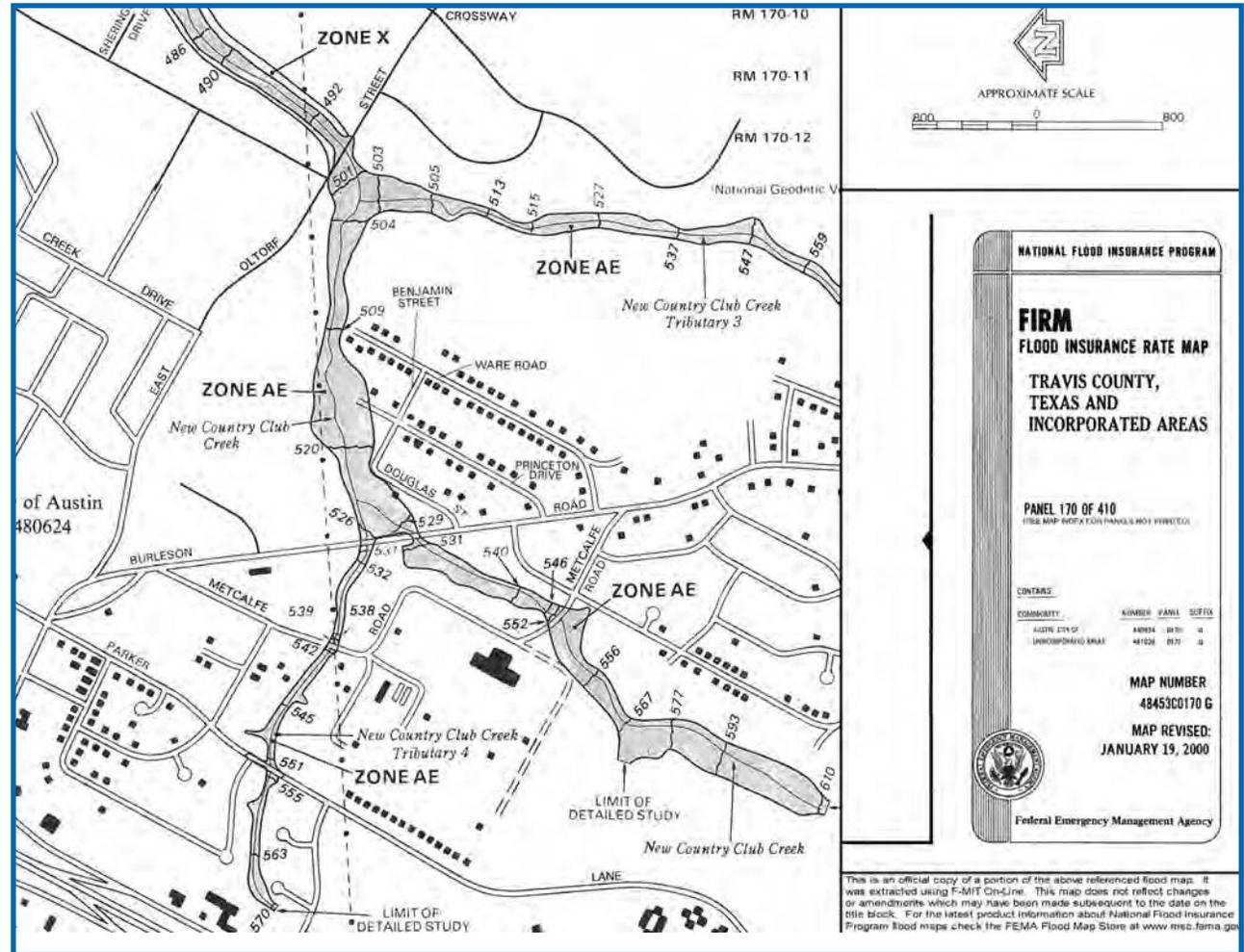


FEMA Flood Maps Online and FIRMettes

You can find and print a FIRM by using online tools at www.msc.fema.gov.

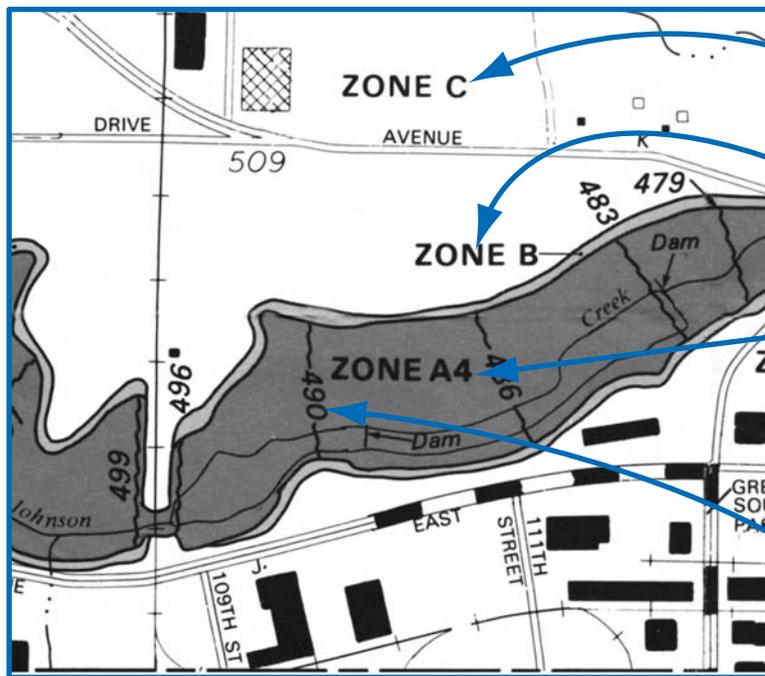
- Click the “View” button to display the map panel.
- Once you find your map, use the pan and zoom tools to find the specific area of interest – a miniature map on the left side of the screen shows a red box around the area you are viewing.
- Click the “Make a FIRMette” button and drag the pink translucent box over the area you wish to print.
- Select paper size and Adobe Acrobat (pdf) or Image File (tif).
- Your FIRMette will be displayed and you can print or save the file to your hard drive.

You can also order paper maps or digital maps on CD-ROM from FEMA’s Map Service Center at www.msc.fema.gov or (877) 336-2627.



Old Format Flood Insurance Rate Map (Riverine)

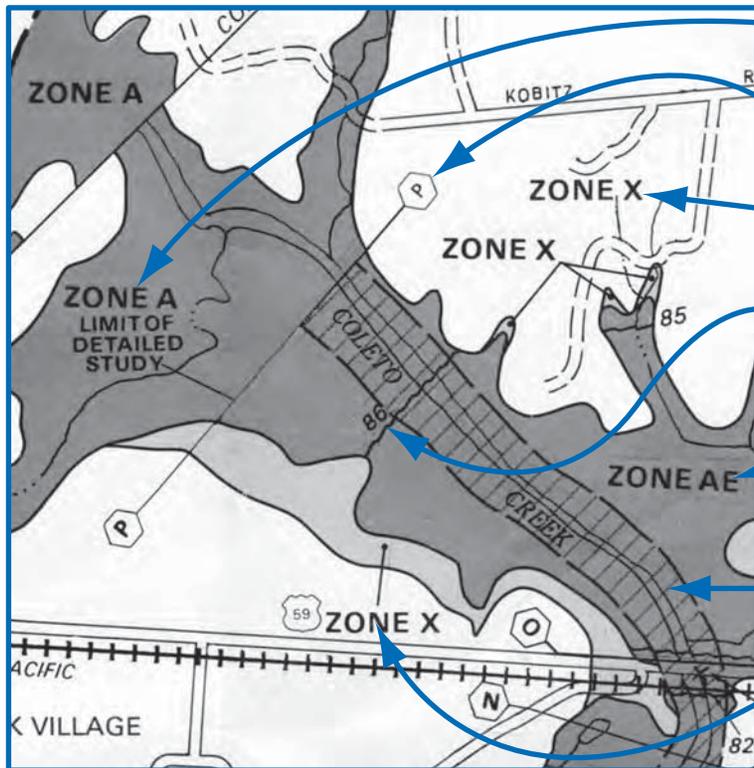
FEMA prepares Flood Insurance Rate Maps (FIRMs) to show areas that are at high risk of flooding.



FLOOD HAZARD ZONES

- 1 Zone C** (or Zone X) is all other areas, considered to be low-risk.
- 2 Zone B** (or shaded Zone X) is subject to flooding by the 500-year flood (0.2% annual chance), and is a moderate risk area.
- 3 Zone A, Zones A1-A30 and Zone AE** are subject to flooding by the base or 100-year flood (1% annual chance), and are considered high-risk areas.
- 4 Base Flood Elevation (BFE).** Water surface elevation of the base flood at specific locations.

New Flood Insurance Rate Map (Riverine)



- 1 Zone A** (unnumbered) is flood hazard areas without BFEs.
- 2 Cross Section** location (see page 14).
- 3 Zone X** (unshaded) is all other areas considered low risk (formerly Zone C).
- 4 Base Flood Elevation (BFE)** is the water surface elevation of the base flood at specific locations.
- 5 Zone AE** is the 100-year (1% annual chance) floodplain (also called Zone A1-A30).
- 6 The Floodway** is the "cross-hatched" area.
- 7 Zone X** (shaded) shows low risk areas affected by the 500-year flood (0.2% annual chance) floodplain (also called Zone B).

The Countywide Flood Insurance Rate Map

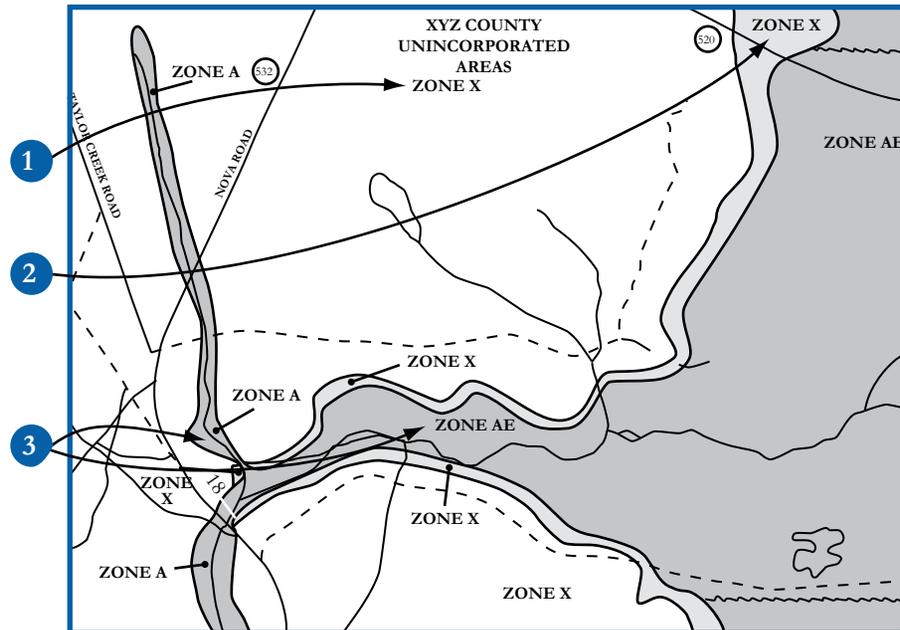
Many newer FIRMs combine counties and incorporated municipalities.

Zone X (unshaded) is all other areas considered low risk (formerly Zone C)

Zone X (shaded) shows low risk areas subject to the 0.2% annual chance flood (500-year flood) (formerly Zone B)

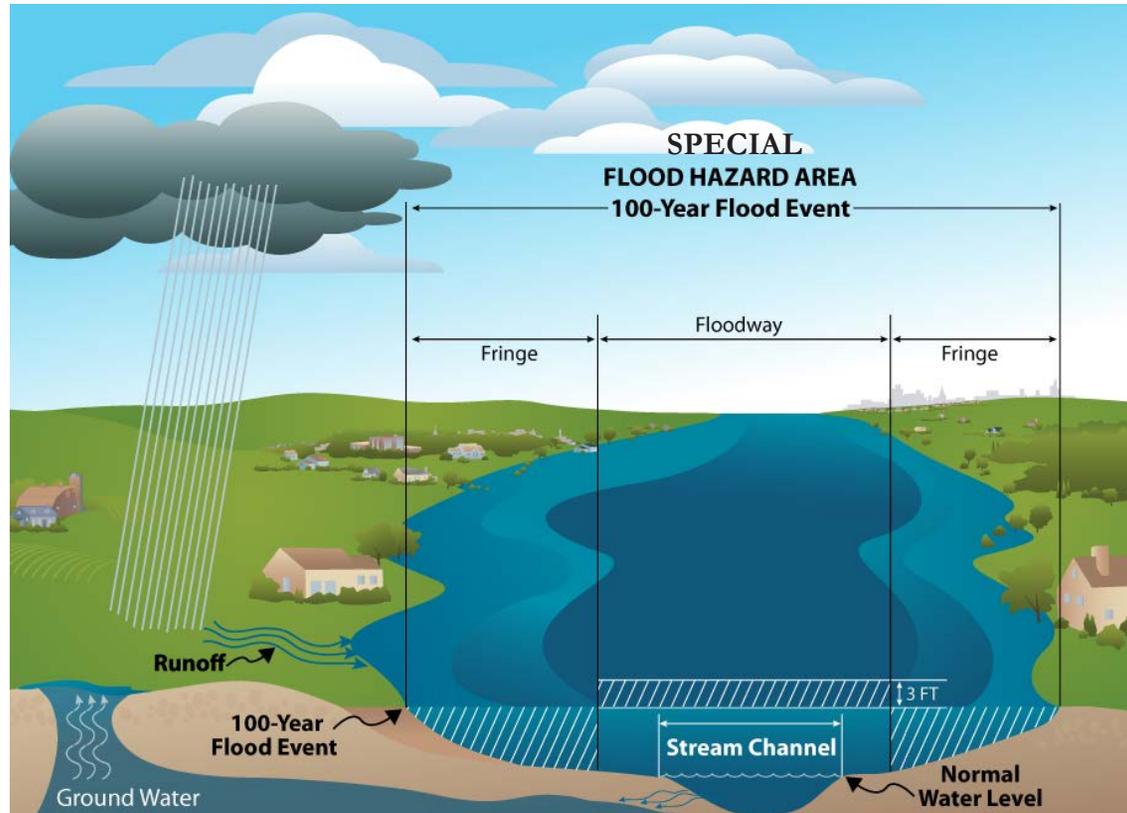
Zones A and AE are subject to flooding by the base or 1% annual chance flood (100-year flood) and are considered to be high-risk areas.

Some countywide maps show other flood zones.



Understanding the Riverine Floodplain

For floodplains with Base Flood Elevations, check the Flood Insurance Study to find the Flood Profile which shows water surface elevations for different frequency floods.



Terms and Definitions

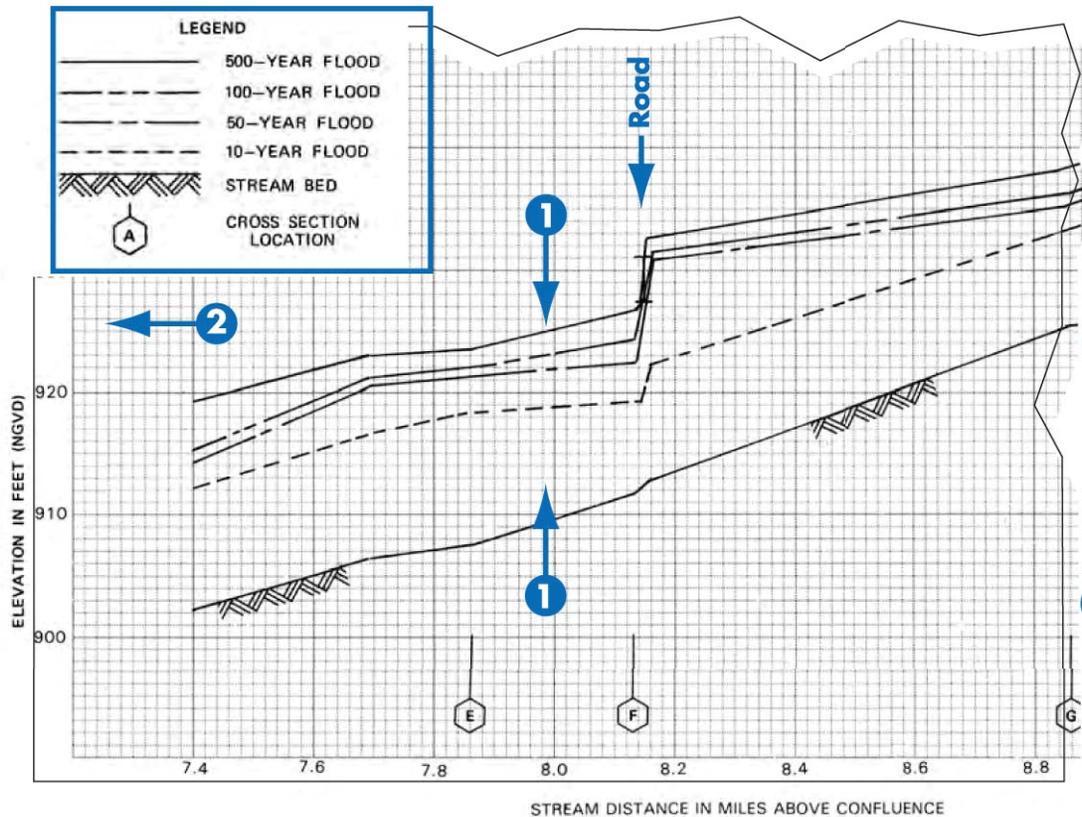
The Special Flood Hazard Area

(SFHA) is that portion of the floodplain subject to inundation by the base flood and/or flood-related erosion hazards. SFHAs are shown on FHBMs or FIRMs as Zones A, AE, A1-A30, AH, AO, AR, V, VE, and V1-V30.

See pages 21 and 22 to learn about the floodway, the area of the floodplain where floodwaters usually flow faster and deeper.

The base flood means the flood having a 1% chance of being equaled or exceeded in any given year (also called “100-year floodplain”).

Use the Riverine Flood Profile to Determine BFEs



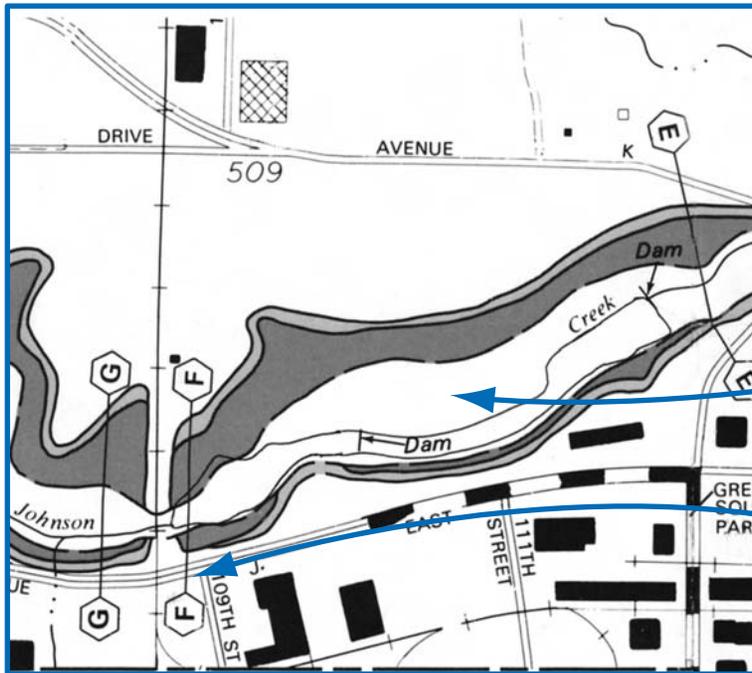
Flood profiles can be used to determine the BFE at a specific site. Profiles also show estimated water surface elevations for floods other than the 1% annual chance flood (100-year flood.)

1 On the effective flood map, locate your site by measuring the distance, along the center line of the stream channel, from a road or cross section, for example, **E** or **F**.

2 Scale that distance on the Flood Profile and read up to the profile of interest, then across to determine the elevation.

The Flood Boundary and Floodway Map (Riverine)

FEMA prepares Floodway maps as companions to many FIRMs. Check to see if your project will be in the Floodway because additional engineering may be required (see page 46).



- 1 **The Floodway** is the “white” area along the waterway.
- 2 **Cross Section** location, where ground surveys determined the shape of the land and how constrictions such as bridges and culverts affect the flow of floodwater.



Important

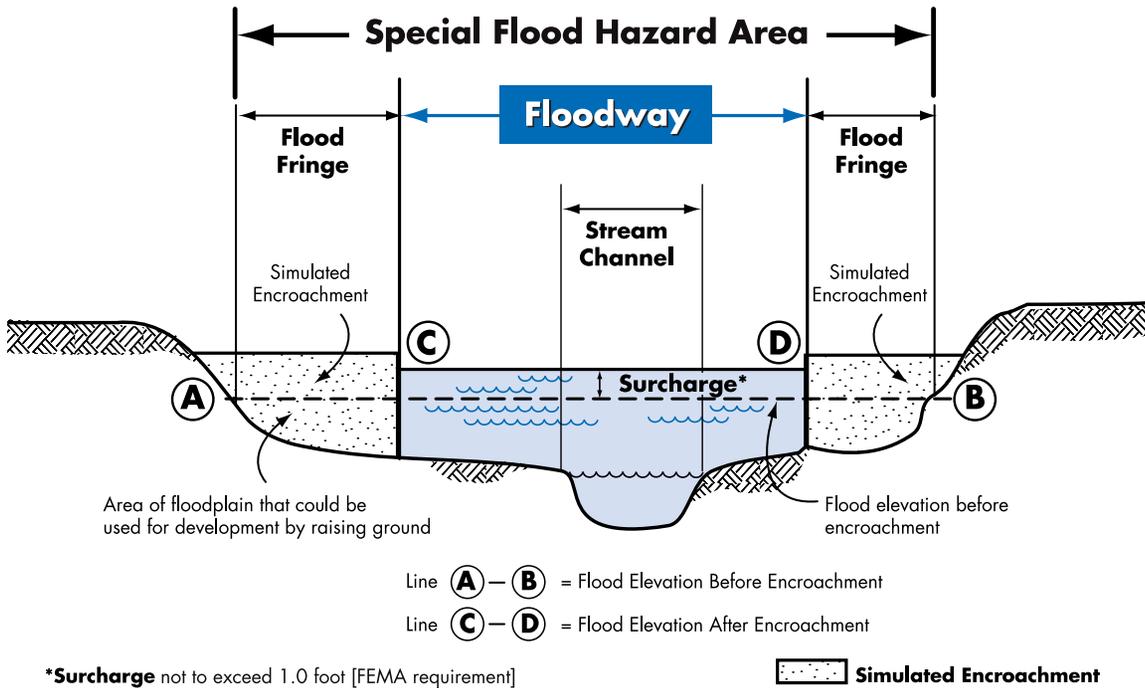
Information

Initial floodplain maps were flood hazard boundary maps accompanied with separate floodway maps.

Floodway maps do not show flood zones or BFEs. Check the companion FIRM and FIS for that information. Page 15 shows the FIRM that matches the map clip to the left.

Understanding the Floodway

For any proposed floodway development, before a local floodplain permit can be issued, the applicant must provide evidence that “no rise” will occur (see page 44). You will need a qualified registered engineer to make sure your proposed project won’t increase flooding on other properties.



de Terms and Definitions

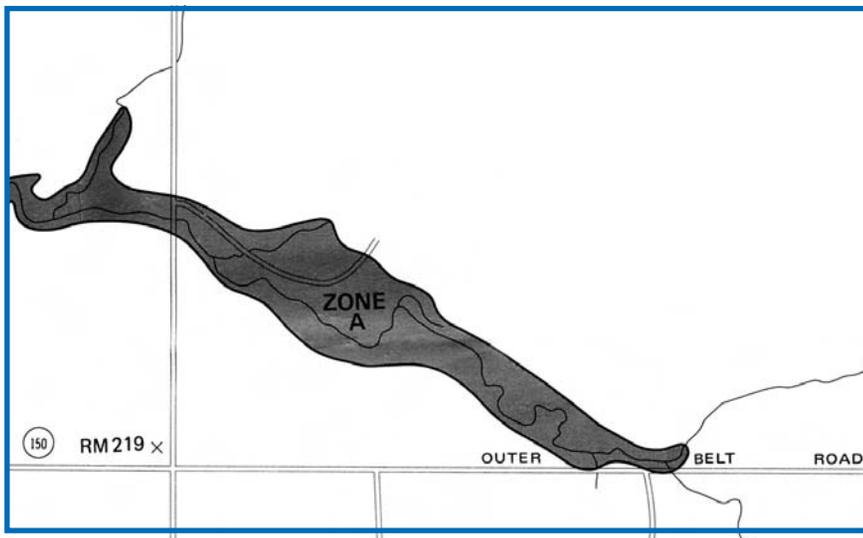
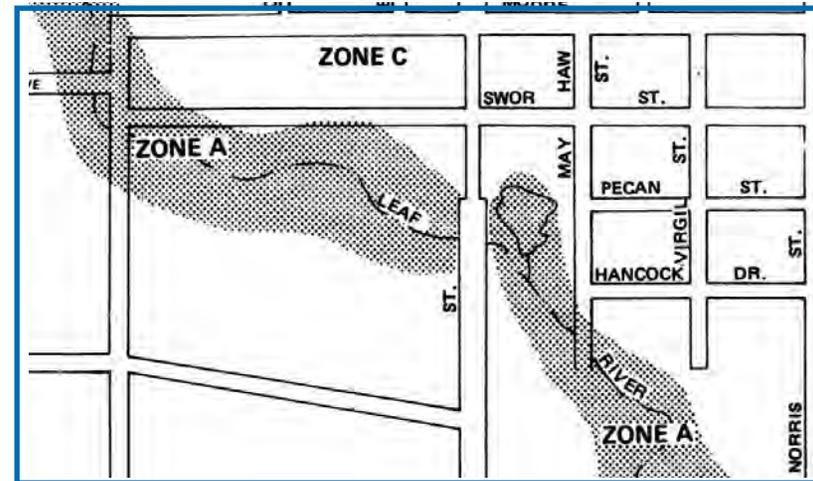
The Floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to pass the base flood discharge without increasing flood depths.

Computer models of the floodplain are used to simulate “encroachment” or fill in the flood fringe in order to predict where and how much the base flood elevation would increase if the floodplain is allowed to be filled.

Approximate Flood Zones and Unnumbered A Zones

Some floodplains are delineated using approximate methods and therefore do not have specified base flood elevations (BFE). If you need help determining the BFE, check with your community permit office and/or FEMA.

FEMA publication *Managing Floodplain Development in Approximate Zone A Areas* (FEMA 265) is useful for engineers and community officials.



de Terms and Definitions

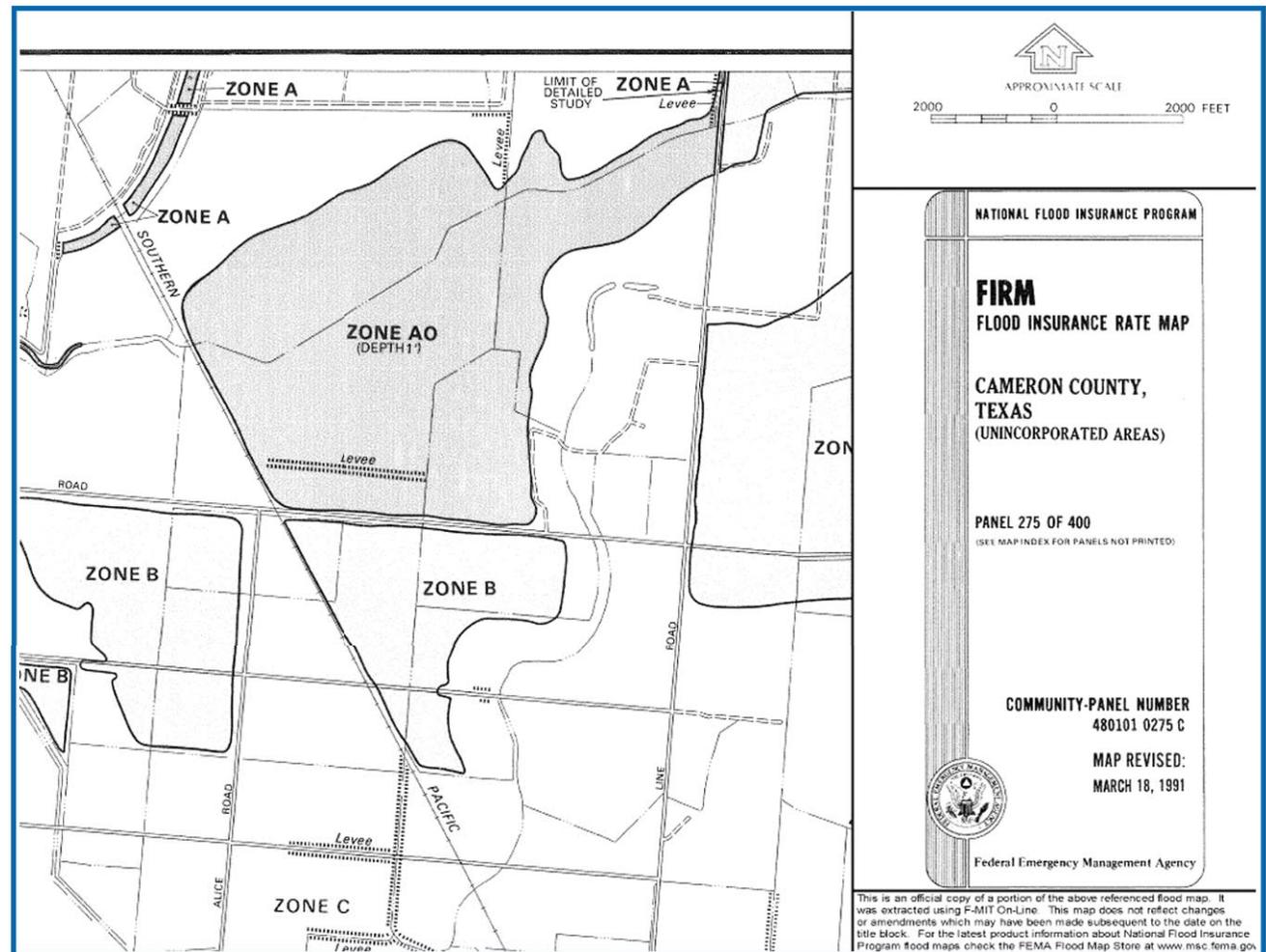
An Approximate or Unnumbered A Zone is a special flood hazard area where BFE information is not provided.

Topographic maps can be used to estimate the Base Flood Elevation if the FIRM shows approximate or unnumbered A Zones.

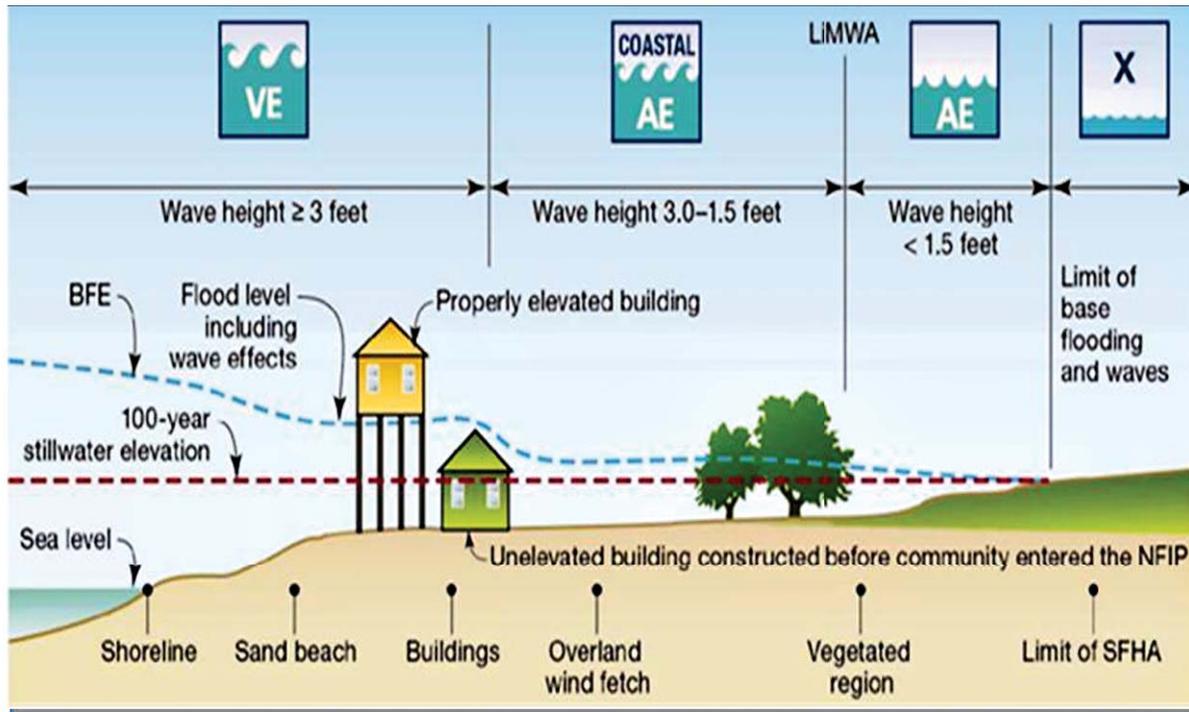
Areas of Shallow Flooding

These are areas with a 1% annual chance of a shallow flood (1-3 feet of flood depth) each year.

- **Zone AH** areas usually flood from ponding in which water is generally not moving across the land.
- **Zone AO** areas usually flood from sheet flow in which water moves across land where there is no defined channel.



Understanding the Coastal Floodplain

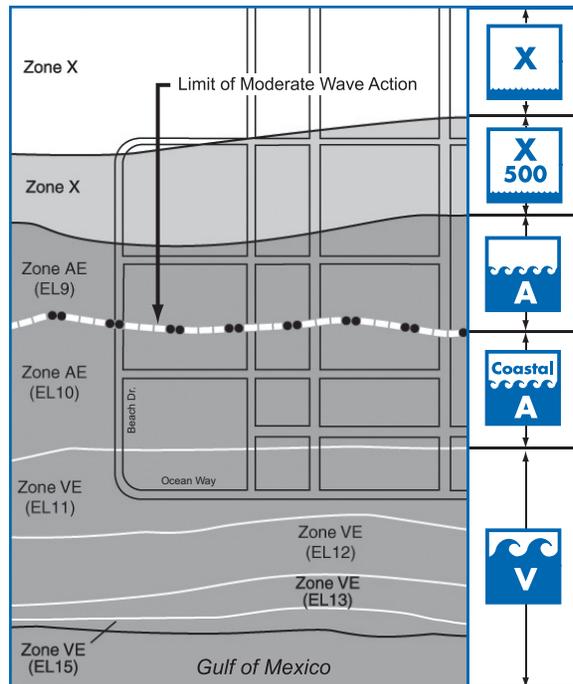


Terms and Definitions

The **Coastal High Hazard Area (V Zone)** is the Special Flood Hazard Area that extends from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action. The area is designated on the FIRM as Zone V1-V30, VE, or V.

The term **Coastal A Zone** means the portion of the SFHA landward of the V Zone or landward of a shoreline that does not have a mapped V Zone. The principal sources of flooding are associated with astronomical tides, storm surges, seiches or tsunamis. Coastal A Zones may be subject to wave effects, velocity flows, erosion, scour, or combinations of these forces and may be treated as V Zones.

The Coastal A Zone (LiMWAs)

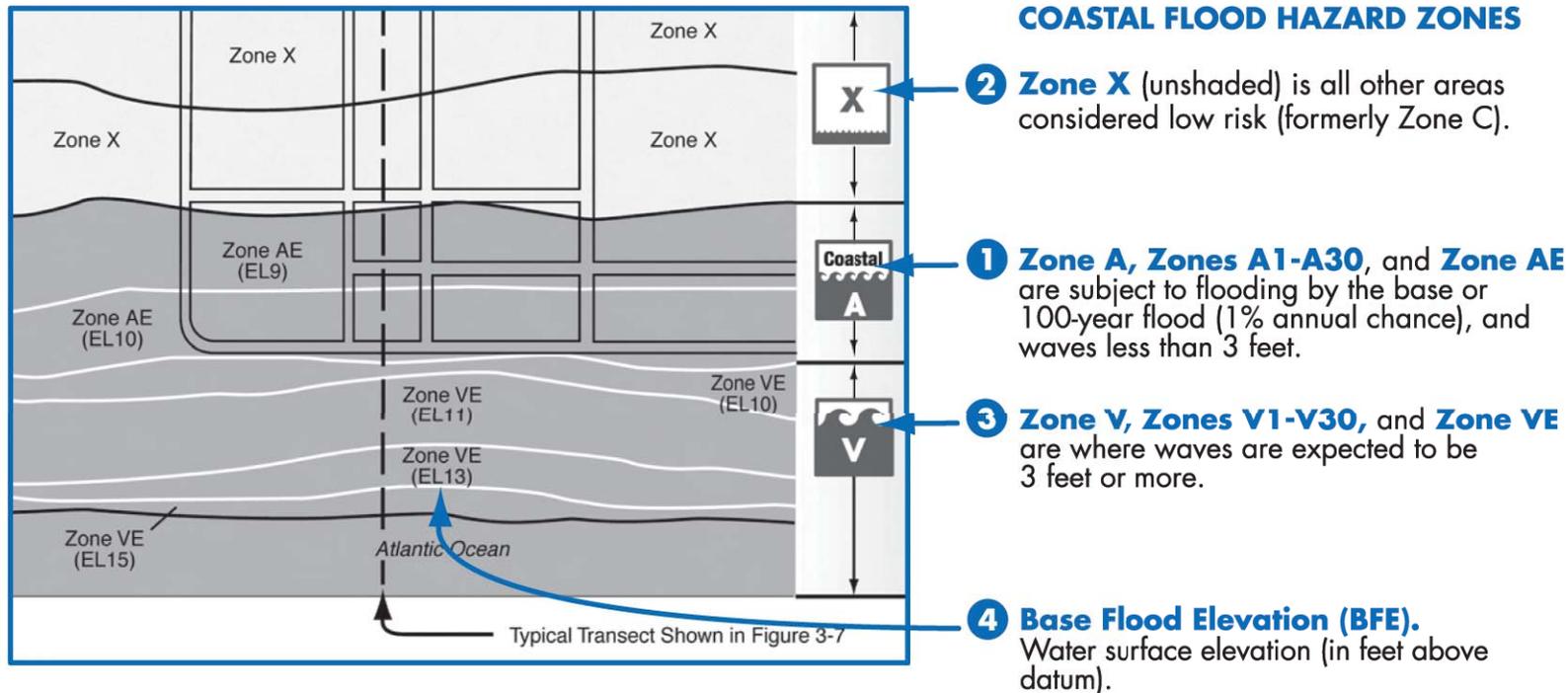


For illustration purposes only. Some FIRMs published after 2009 may show the Limit of Moderate Wave Action.

- Post-flood evaluations and laboratory tests confirm that breaking waves as small as 1.5 feet high cause damage to walls and scour around foundations.
- The Limit of Moderate Wave Action (LiMWA) may be shown on revised FIRMs.
- LiMWA conditions are found inland of Zone V and along shorelines without Zone V.
- LiMWA conditions occur where stillwater depths are between 2 and 4 feet, which can support 1.5 to 3-foot waves.
- Scour and erosion should be considered in LiMWA if soils are sandy and erodible.
- Federal flood insurance in LiMWAs is rated using Zone A rates (lower than Zone V rates).

Flood Insurance Rate Map (Coastal)

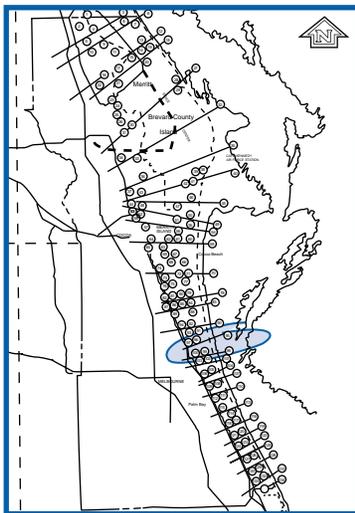
This portion of a FIRM shows a coastal Special Flood Hazard Area (SFHA) (dark gray), the 500-year flood hazard area (light gray), coastal Base Flood Elevations (BFEs) (numbers in parentheses), and flood insurance rate zones (AE and VE = SFHA, VE = Coastal High Hazard Area, X = areas outside the SFHA).



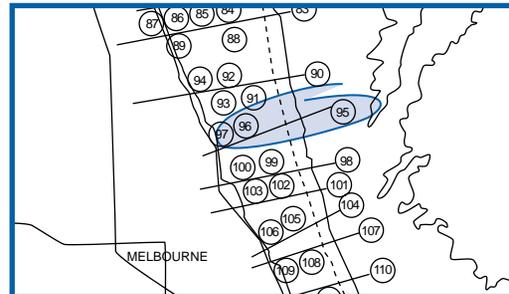
Use the Transect Map to Determine Coastal BFEs

The FEMA Flood Insurance Study (FIS) contains a Transect Map with the locations of transects included in the study.

EXAMPLE: Verify the BFE for a site approximately 500 feet south of Ocean Dunes Drive.



1 From the Transect Map, identify transects in the vicinity of interest.



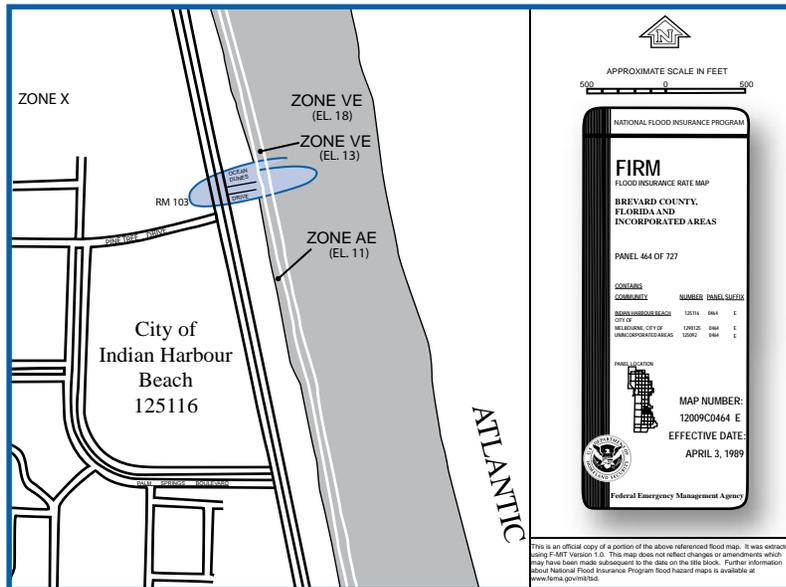
2 Refer to the Transect Table to confirm the location as applicable (in this case, Transect #95).

TABLE 4 - TRANSECT LOCATIONS STILLWATER STARTING ELEVATIONS AND INITIAL WAVE CREST ELEVATIONS

Elevation (Feet NGVD)			
Transect	Location	Stillwater	Wave Crest
95	From the Atlantic coastline, approximately 700 feet south of Ocean Dunes Drive, extending west.	10.0	15.0
96	From the Indian River east bank, across Merritt Island Point between Eleuthra Street and Bahama Drive, extending east.	3.0	4.0

Use the Transect Map to Determine Coastal BFEs (continued)

- 3 Refer to the applicable Flood Insurance Rate Map (FIRM) panel to verify the location.



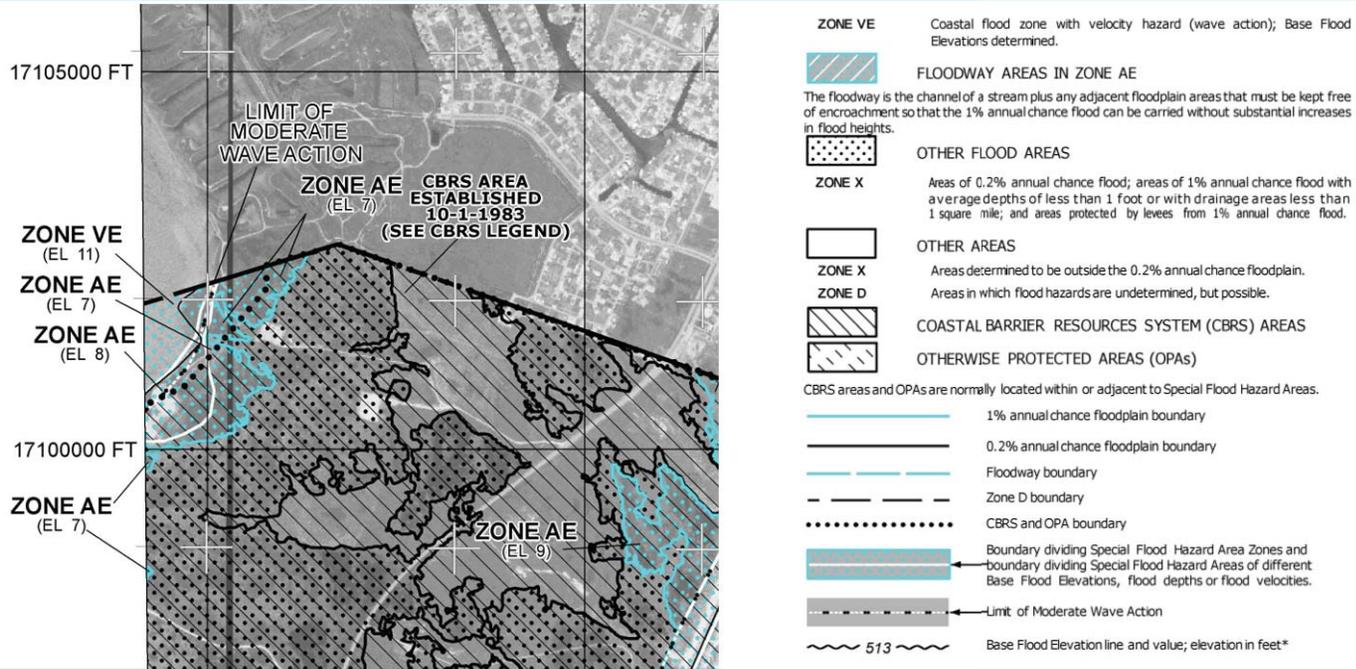
- 4 Find the Stillwater Elevation summary table in the FIS to determine the range of the BFE.

FLOODING SOURCE AND TRANSIT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION ^{1,2} (FEET NGVD)
		10-YR	50-YR	100-YR	500-YR		
INDIAN RIVER	93	1.6	2.7	3.3	4.5	AE	3 - 4
	94	1.7	2.9	3.5	4.6	AE	3 - 5
ATLANTIC OCEAN	95	4.6	6.8	10.0	10.3	VE AE	12 - 15 10 - 12
INDIAN RIVER	96	1.6	2.6	3.0	4.2	AE	3 - 4
	97	1.6	2.6	3.1	4.1	AE	3 - 4
ATLANTIC OCEAN	98	4.5	6.7	9.9 ³	10.1	VE AE	12 - 15 10 - 12
INDIAN RIVER	99	2.4	3.5	4.0	5.3	AE	4 - 5
	100	2.4	3.5	4.0	5.3	AE	4 - 5
ATLANTIC OCEAN	101	4.5	6.7	9.9 ³	10.1	VE AE	12 - 15 10 - 12

¹Rounded to the nearest foot and may include effects of wave action.
²Due to map scale limitations, base flood elevations shown on map may represent average elevations for the zones depicted.
³Includes the effects of wave setup.

NOTE: The Summary Table also lists 10, 50 and 500-year elevations used for regulatory purposes. Notice that the BFEs on the FIRM correspond to those in the Summary Table. However, in Special Flood Hazard Areas/floodplains where BFEs have been determined, always consult the FIS.

Coastal Barriers Resource System (CBRS) Areas



In areas designated as a Coastal Barrier Resource System (CBRS) or an Otherwise Protected Area (OPA), NFIP insurance is not available for new or Substantially Improved structures built on or after the designation date.

Changes to FEMA Flood Maps

Most changes to FIRMs are made by Letter of Map Change (LOMC) – a letter which reflects an official revision to an effective NFIP map.

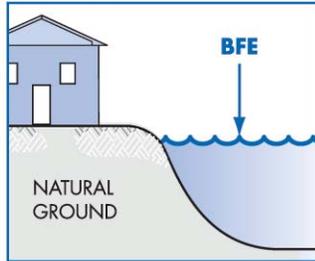
1. **Letter of Map Amendment (LOMA)** is an official amendment to an effective FIRM that may be issued when a property owner provides additional technical information from a licensed land surveyor or engineer, such as ground elevation relative to the BFE, SFHA, and the building. Lenders may waive the flood insurance requirement if the LOMA documents that a building is on ground above mapped floodplain.
2. **Electronic Letter of Map Amendment (eLOMA)** is web based application to submit simple LOMAs to FEMA.
3. **Letter of Map Revision (LOMR)** is an official revision to an effective FIRM that may be issued to change flood insurance risk zones, special flood hazard area and floodway boundary delineations, BFEs and/or other map features. Lenders may waive the insurance requirement if the approved map revision shows buildings to be outside of the SFHA.
4. **Letter of Map Revision Based on Fill (LOMR-F)** is an official revision to an effective FIRM that is issued to document FEMA's determination that a structure or parcel of land has been elevated by fill above the BFE, and therefore is no longer in the SFHA. Lenders may waive the insurance requirement if the LOMR-F shows that a building on fill is above the BFE.

Physical Map Revision (PMR) may be issued for major floodplain changes that require engineering analyses, such as bridges, culverts, channel changes, flood control measures, and large fills that change the BFE or Floodway. Physical map revisions are also issued when a new study updates or improves the FIRM.

Requests for map revisions must be coordinated through your community.

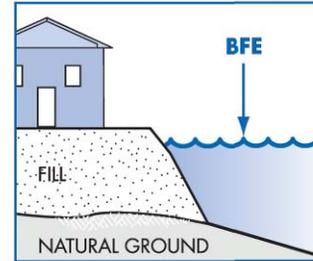
Flood Map Revisions: LOMA and LOMR-F

The most accurate information available is used to make flood maps, including topographic base maps and detailed engineering methods or methods of approximation. FEMA issues map revisions if technical data are submitted to support the changes.



Letter of Map Amendment (LOMA) is an official amendment to an effective FIRM that may be issued when a property owner provides additional technical information from a registered land surveyor or engineer, such as ground elevation relative to the BFE.

Lenders may waive the flood insurance requirement if the LOMA removes a building site from the SFHA because natural ground at the site is above the BFE.



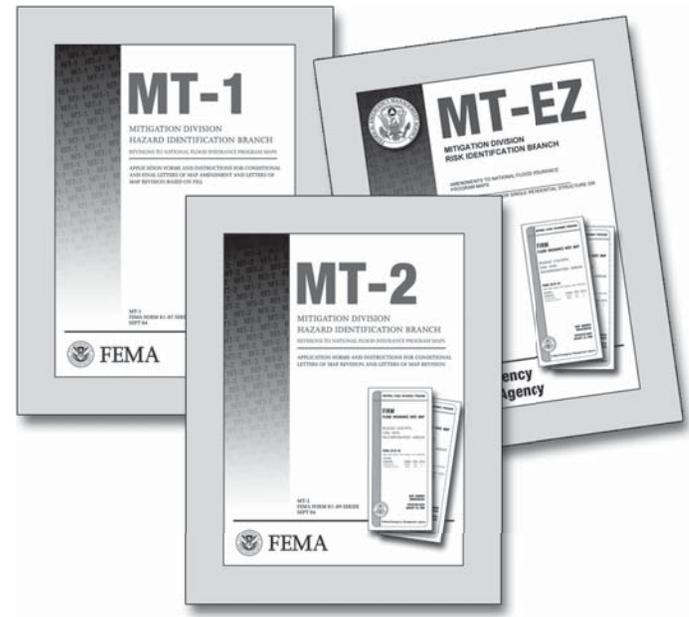
Letter of Map Revision Based on Fill (LOMR-F) is an official revision to an effective FIRM that is issued to document FEMA's determination that a structure or parcel

of land has been elevated by fill above the BFE, and therefore is no longer in the SFHA. Lenders may waive the insurance requirement if the LOMR-F removes a building site from the SFHA.

Check online at www.fema.gov/letter-map-amendment-letter-map-revision-based-fill-process for more about map revisions for different user groups (homeowners, floodplain managers, surveyors, engineers and insurance professionals). Also learn about eLOMA, a web-based application for surveyors and engineers to submit applications for simple LOMAs and FEMA.

Flood Map Revisions: CLOMR and LOMR

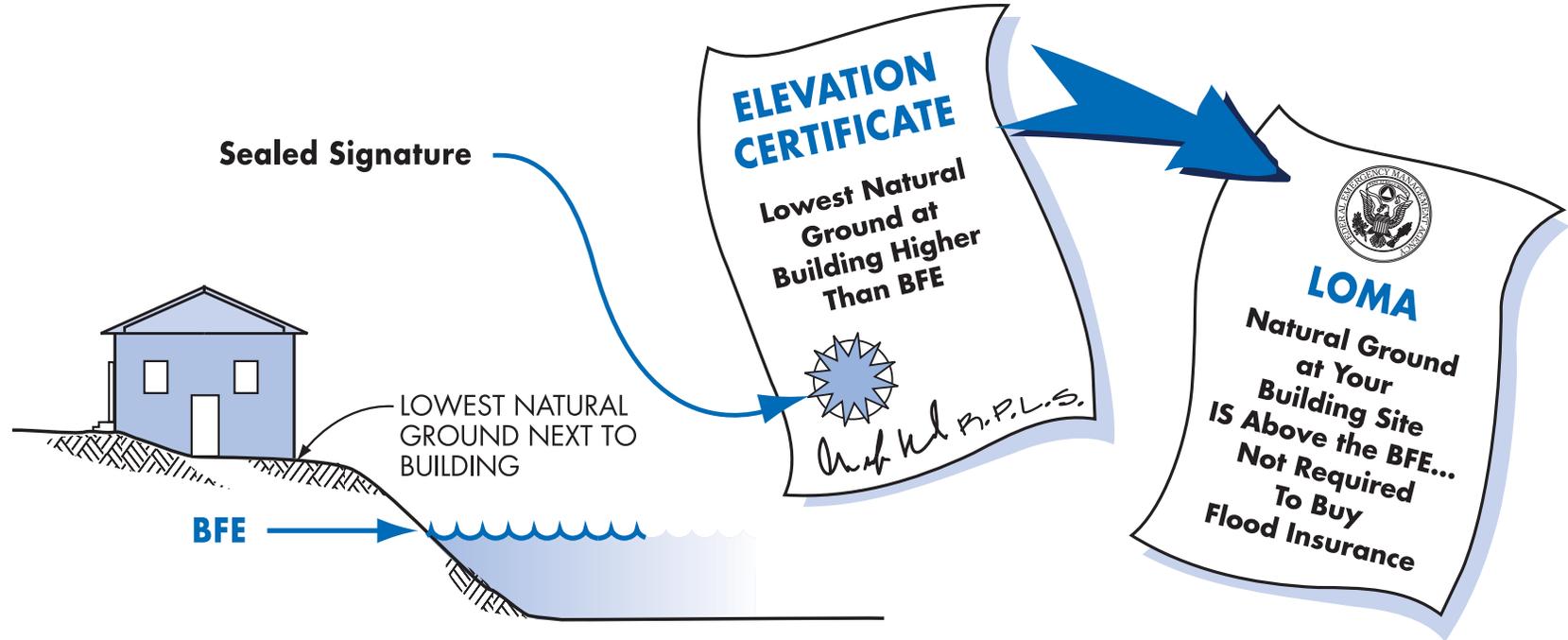
- **Conditional Letter of Map Revision (CLOMR)** is a letter commenting on whether a proposed project, if built as shown on the submitted documentation, would meet the standards for a map revision. Communities may require this evidence prior to issuing a permit, and the Certificate of Occupancy/Compliance should be withheld until receipt of the final LOMR based on “as-built” documentation and certification.
- **Letter of Map Revision (LOMR)** is an official revision to an effective FIRM that may be issued to change flood insurance risk zones, special flood hazard areas and floodway boundary delineations, BFEs and/or other map features. Lenders may waive the insurance requirement if the approved map revision shows buildings to be outside of the SFHA.



To download the forms used to submit map revisions, go to www.fema.gov/library, click on “Search by Resource Title,” and search on “MT-EZ”, “MT-1”, and “MT-2”.

Is Your Building Site Higher than the BFE?

If your land is shown on the map as in the regulatory floodplain, but your building site is higher than the Base Flood Elevation (BFE)... get a licensed land surveyor or engineer to complete a FEMA Elevation Certificate (EC). Submit the EC with an application for a Letter of Map Amendment to FEMA to verify that your property is above the BFE. If approved, it could remove the mandatory federal requirement to purchase flood insurance if you have a federally backed mortgage. Keep the certificate with your deed, it will help future buyers.



Keep in mind that Lender could still require insurance.

Activities Requiring Permits

Most man made changes to land in the floodplain requires a permit.

Examples include:

- Constructing new buildings (including temporary or agricultural)
- Additions to existing buildings
- Substantial improvements to existing buildings (including interior renovation)
- Repair of substantially damaged buildings
- Placement of manufactured (mobile) homes
- Subdivision of land
- Parking or storage of recreational vehicles
- Storing materials, including gas/liquid tanks
- Construction of roads, bridges and culverts
- Placement of fill, grading, excavation, mining and dredging
- Alteration of stream channels
- Oil and gas drilling



Code of Federal Regulations - 44 CFR 59.1: Development

Development means any man made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

Some Key Permit Review Steps

The Permit Reviewer has to check many things. Some of the key questions are:

- Is the site in the mapped floodplain?
- Is the site in the mapped floodway?
- Have other local, state and federal permits been obtained (septic, water quality, wetland)?
- Is the site reasonably safe from flooding?
- Does the site plan show the Base Flood Elevation, development location and the floodplain delineation?
- Is substantial improvement of an older building proposed?
- Is an addition proposed?
- Will new buildings and utilities be elevated properly?
- Will manufactured homes be properly elevated and anchored?
- Do the plans show an appropriate and safe foundation?
- Will an Elevation Certificate be required?



Carefully Complete the Permit Application

FLOODPLAIN DEVELOPMENT PERMIT *(partial)*

OWNER DAVID & SALLY JONES
 ADDRESS 781 REED STREET

PROJECT DESCRIPTION

<input checked="" type="checkbox"/> Single Family Residential	<input checked="" type="checkbox"/> New Construction	<input type="checkbox"/> Channelization
<input type="checkbox"/> Multi-Family Residential	<input type="checkbox"/> Substantial Improvement (>50%)	<input checked="" type="checkbox"/> Fill
<input type="checkbox"/> Manufactured (Mobile) Home	<input type="checkbox"/> Improvement (<50%)	<input type="checkbox"/> Bridge/Culvert
<input type="checkbox"/> Non-Residential	<input type="checkbox"/> Rehabilitation	<input type="checkbox"/> Levee
<input type="checkbox"/> Other/Explanation _____		

FLOOD HAZARD DATA
 Watercourse Name DRY RIVER
 The project is proposed in the _____ Floodway Floodway Fringe
 Base (100-year) flood elevation(s) at project site 59.2
 Elevation required for Lowest Floor 60.2 /Floodproofing _____

JOHN DOE, CFM 06/01/2015
 Floodplain Administrator's Signature Date

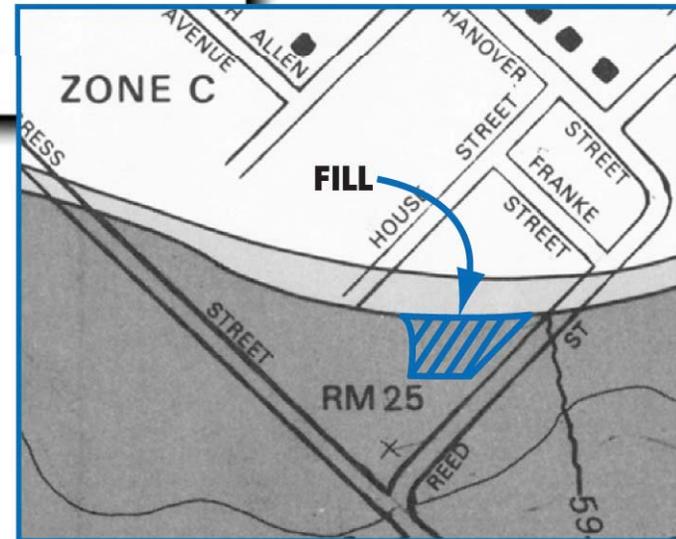


Important

Information

You **MUST** get a permit **before** you do work in a floodplain.

Good information will lead to better construction and less exposure to future flood damage. Freeboard is a common Higher Standard used to provide added protection to homes built in the SFHA. (see page 38)



Freeboard: Build Above the BFE

Want to save some money and have peace of mind at the same time? Then add Freeboard to build higher than the minimum elevation requirement. Freeboard is a factor of safety, usually one, two or even three feet above the BFE. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the BFE.

Annual Flood Insurance Cost	
If you have:	
<input checked="" type="checkbox"/>	a post-FIRM structure
<input checked="" type="checkbox"/>	in an AE Zone
<input checked="" type="checkbox"/>	with \$250,000 structural coverage (maximum)
<input checked="" type="checkbox"/>	with \$100,000 contents (maximum)
The approximate annual cost for flood insurance:	
+3 ft.	\$500
+2 ft.	\$550
+1 ft.	\$700
BFE	\$1,100
-1 ft.	\$5,000
-2 ft.	expensive (submit for rate)

NOTE: This is hypothetical and flood insurance premiums change yearly. For specific rate information contact a licensed insurance agent.



Important

Information

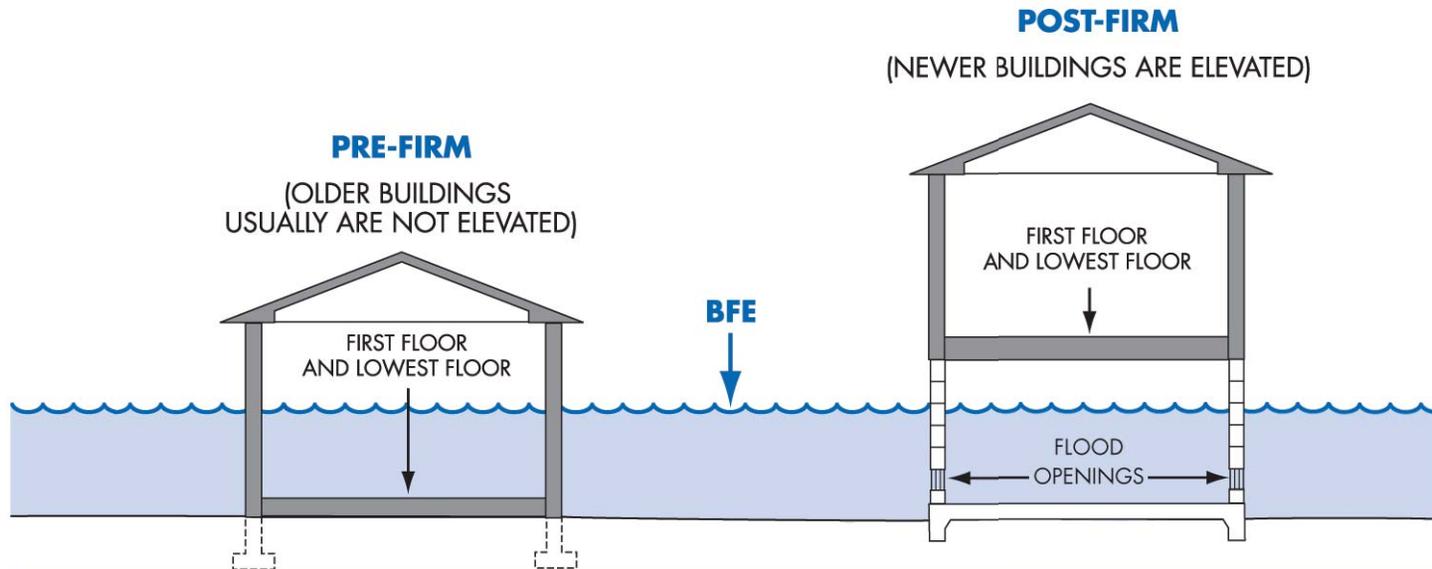
NOTE: Flood insurance rates and various fees change from time to time. Rather than specific costs for insurance, this figure gives a feel for how much difference just a foot or two can make.

Building owners will save insurance money if they elevate above the BFE. But more impressive is how the cost of insurance can more than double if the building is only one foot below the BFE.

Remember:

The community may be able to grant a variance, but the owner will probably still be required to buy insurance. Imagine trying to sell a house if the bank requires insurance that costs about \$10,000 a year.

What is Meant by Pre-FIRM and Post-FIRM Structures?



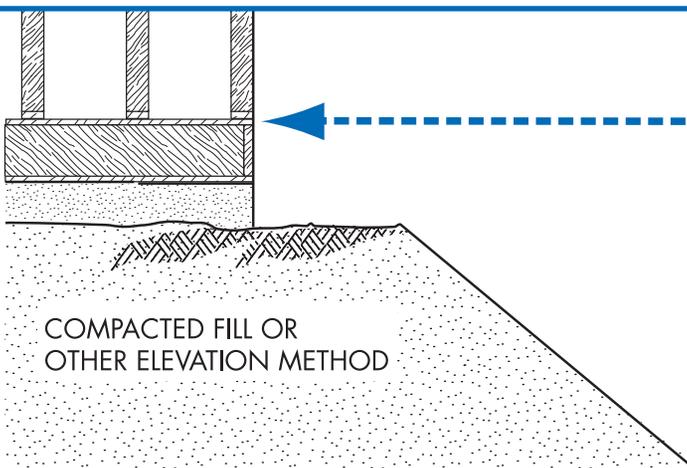
A building is **Pre-FIRM** if it was built **before** the date of your community's first FIRM. If built or substantially improved **after** that date, a building is **Post-FIRM**. Find the initial FIRM date for your community online at www.fema.gov/cis/TX.html or call your community's planning, engineering, or permit office.

Permits are required for improvements or repairs to Pre-FIRM buildings, which may have to be elevated to the current BFE and flood zone requirements. *See definition on Substantial Improvement on page 60.*

Terms and Definitions

44 CFR 59.1 Lowest Floor

Lowest Floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; Provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of §60.3



If you get a permit to build in the floodplain, it will be necessary for you to show that the building was built in compliance with the community's Flood Damage Prevention Ordinance. Use of the FEMA Elevation Certificate, which is certified by a licensed surveyor or engineer, will help document the compliance of the structure. It may prove that you built correctly, and it may help lower flood insurance costs.

What is the Elevation Certificate and How is it Used?

- The Elevation Certificate (EC) is a FEMA form used to record building elevation site conditions and FIRM information for a development site. Find FEMA's EC at: www.fema.gov/media-library/assets/documents/160.
- The EC must be completed and sealed by a licensed surveyor, architect or engineer.
- A community official or property owner may complete the EC for sites in approximate flood zones and AO Zones.
- It can be used to show that the ground at a development is above the Base Flood Elevation (see page 34).
- It is used to verify that buildings are elevated properly (see page 34).
- Insurance agents use the EC to write and rate flood insurance policies.

By itself, the EC cannot be used to waive the requirement to purchase flood insurance. See page 31 to learn about Letters of Map Amendment.

The image shows a FEMA Elevation Certificate form. The top part features the FEMA logo and the text 'NATIONAL FLOOD INSURANCE PROGRAM' and 'ELEVATION CERTIFICATE AND INSTRUCTIONS'. Below this is a detailed form with several sections:

- SECTION A - PROPERTY INFORMATION:** Includes fields for Building Owner's Name, Building Street Address, City, State, and ZIP, and Property Description.
- SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION:** Includes fields for Map Panel Number, Scale, FIRM Index Date, FIRM Panel Elevation, FIRM Flood Zone, and Flood Elevation.
- SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED):** Includes fields for Building Elevation, FIRM Flood Zone, and various elevation points (e.g., Top of Finish Floor, Top of First Floor, etc.).
- SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION:** Includes a signature line and a 'PLACE SEAL HERE' box.

Completing the Elevation Certificate

Elevation Certificate (partial)

SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: Construction Drawings* Building Under Construction* Finished Construction

*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO. Complete Items C2.a-g below according to the building diagram specified in Item A7.

Benchmark Utilized RM66

Vertical Datum NAVD 88

Conversion/Comments none

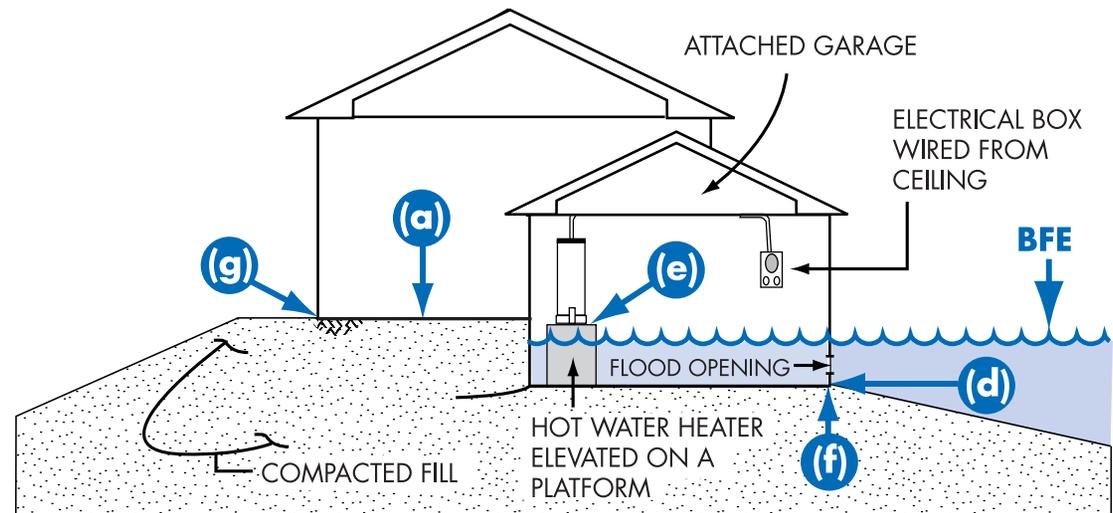
Check the measurement used.

- | | | | |
|--|---------------|--|--|
| a) Top of bottom floor (including basement, crawl space, or enclosure floor) | <u>286.00</u> | <input checked="" type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| b) Top of the next higher floor | <u>n/a</u> | <input type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| c) Bottom of the lowest horizontal structural member (V Zones only) | <u>n/a</u> | <input type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| d) Attached garage (top of slab) | <u>282.5</u> | <input checked="" type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| e) Lowest elevation of machinery or equipment servicing the building
(Describe type of equipment in Comments) | <u>286.0</u> | <input checked="" type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| f) Lowest adjacent (finished) grade (LAG) | <u>282.5</u> | <input checked="" type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |
| g) Highest adjacent (finished) grade (HAG) | <u>286.0</u> | <input checked="" type="checkbox"/> feet | <input type="checkbox"/> meters (Puerto Rico only) |

In this example, the BFE is 285.

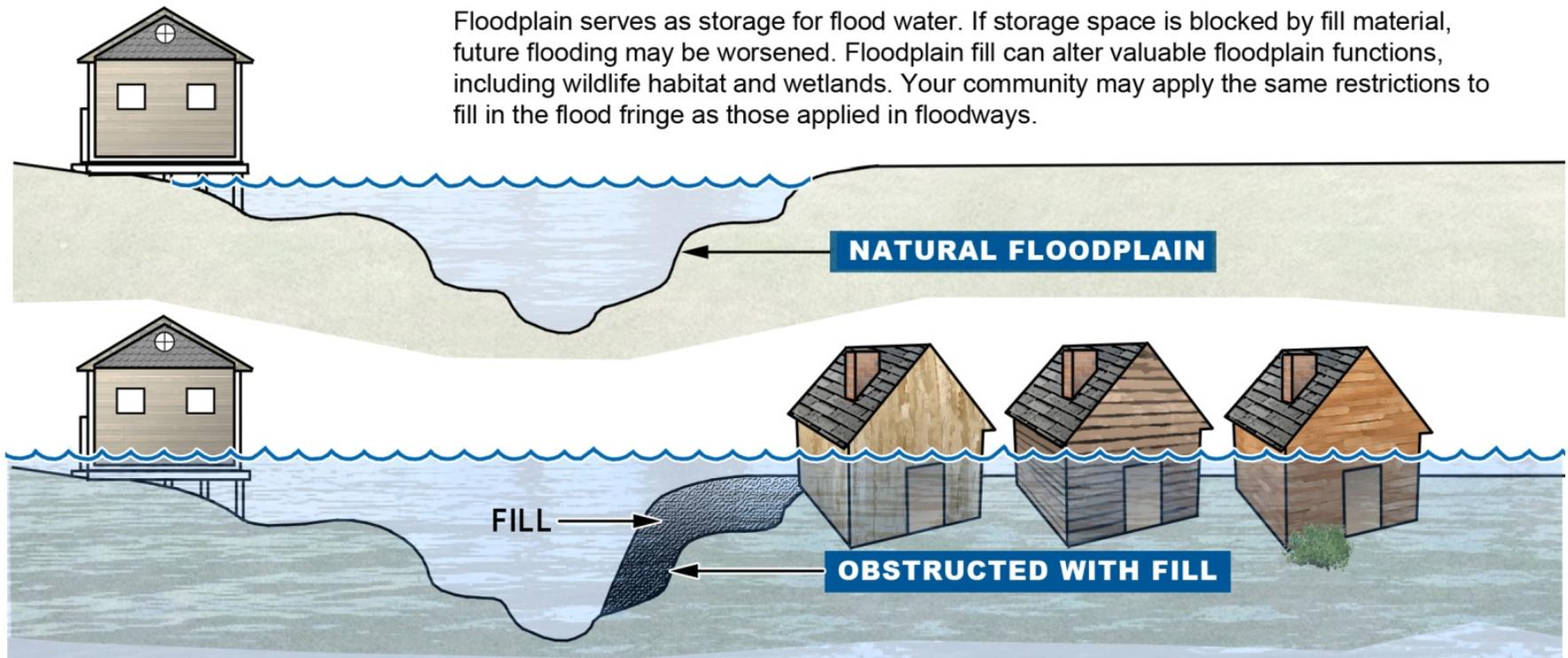
The slab-on-grade house was elevated on fill 1' above the BFE, and the vented garage is 2.5' below the BFE.

You will get a blank Elevation Certificate form when you get your permit. You must have a licensed surveyor or engineer fill it out and seal it. The Elevation Certificate includes diagrams for ten building types. Several points must be surveyed.



Floodplain Fill Can Make Things Worse

Floodplain serves as storage for flood water. If storage space is blocked by fill material, future flooding may be worsened. Floodplain fill can alter valuable floodplain functions, including wildlife habitat and wetlands. Your community may apply the same restrictions to fill in the flood fringe as those applied in floodways.



Make sure your floodplain fill project won't harm your neighbors. Floodway fill is allowed only if an engineering evaluation demonstrates that "no-rise" in flood level will occur.

Code of Federal Regulations - 44 CFR 60.3 D(3): Encroachment

Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

Required Floodway “No Impact” Certification

- Floodways can be dangerous because water may flow very fast
- Development is prohibited unless “no impact” in flood elevations, floodway elevations, and floodway widths is certified. *See page 43 for reference to 44 CFR 60.3 D(3).*
- An engineer must evaluate the hydraulic impact of proposed development

ENGINEERING “NO IMPACT” CERTIFICATION (*example*)

 <p>NATIONAL FLOOD INSURANCE PROGRAM</p>	This is to certify that I am a duly qualified engineer licensed to practice in the State of _____. It is to further certify that <u>the attached technical data</u> supports the fact that the proposed (Name of Development) will not impact the Base Flood Elevations (100-year flood), floodway elevations and the floodway widths on (Name of Stream) .
Signature _____	Seal _____

A “no impact” certification is required and must be signed, sealed, and dated by a registered professional engineer. Check with your community for guidance **before** you decide to work in a floodway.

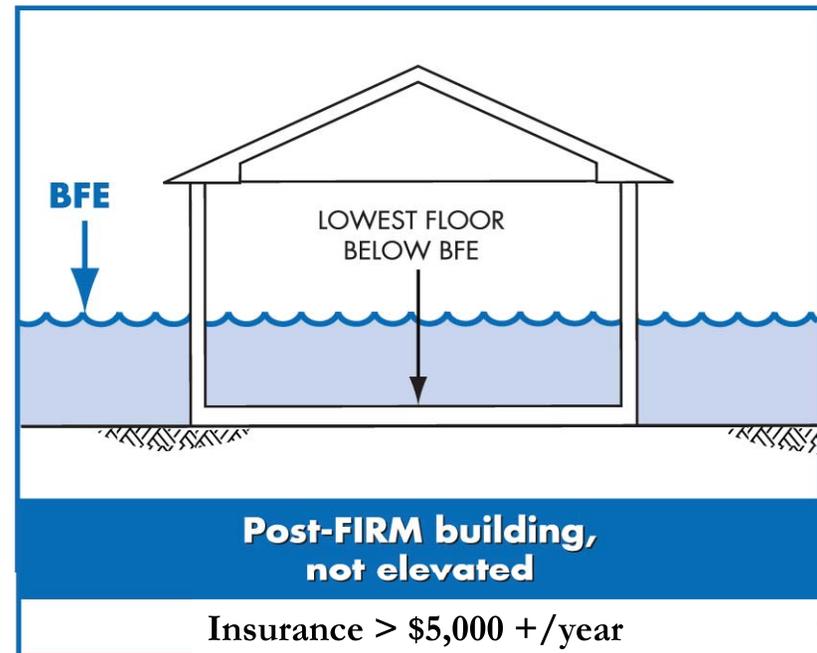
The engineering analysis must be based on regulatory data from FEMA.
Save time and money – **don’t build in the floodway!**

Think Carefully Before You Seek A Variance

Very specific conditions related to the property not the owner's actions or preferences, must be satisfied to justify a variance:

- Good and sufficient cause
- Unique site conditions
- Individual non-economic hardship
- If in the floodway, no increase in flood level
- See 44 CFR 60.6 for more

A variance that allows construction below the BFE does not waive your lender's flood insurance requirement. Flood insurance will be very expensive – perhaps more than \$5,000 per year as compared to less than \$500 (see page 38).

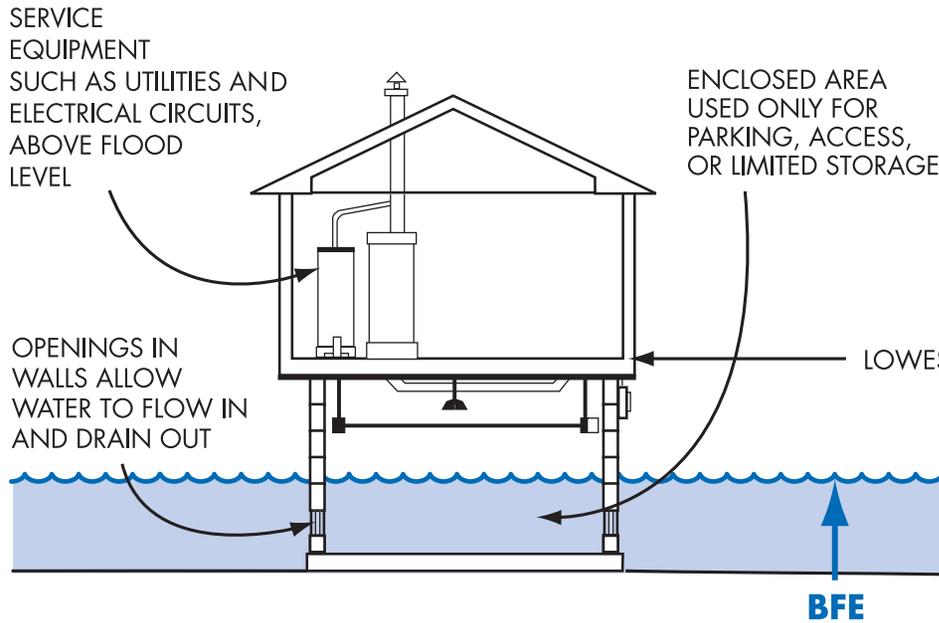


Think carefully about seeking a variance to build below the Base Flood Elevation. Not only will your property be more likely to get damaged, but insurance will be very costly.

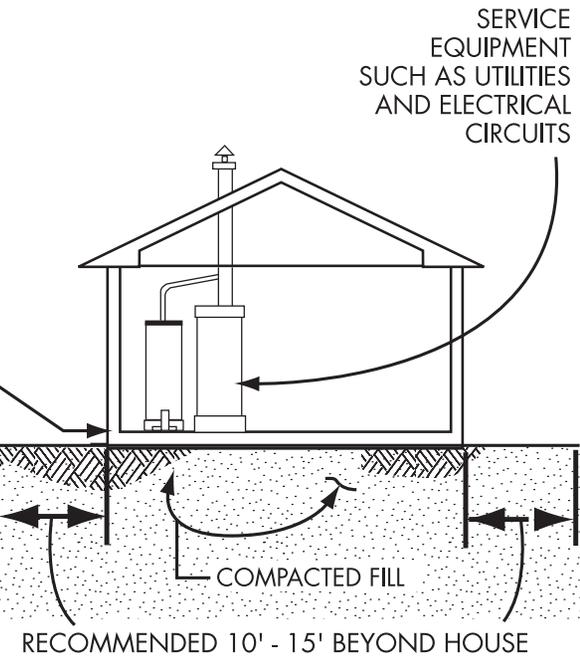
If your community has a pattern of inconsistent variances, sanctions can be imposed – costing you even more.

How to Elevate Your Floodplain Building (Riverine)

Elevate on Foundation Walls



Elevate on Fill



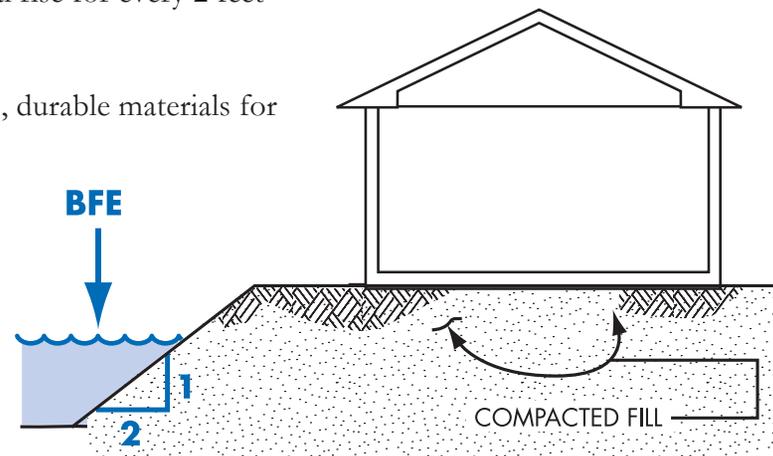
CAUTION: Enclosures (including crawlspaces and basements) have some special requirements, see page 48.

Note: When the walking surface of the lowest floor is at the BFE, under-floor utilities are not allowed. Fill used to elevate buildings must be placed properly. See 44 CFR 60.3 A(3)

Compaction of Floodplain Fill (A Zone)

Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet floodplain requirements, floodplain fill should:

- Be good clean soil, free of large rocks, construction debris, and woody material (stumps, roots)
- Be machine compacted to 95 percent of the maximum density (determined by design professional)
- Extend 10 to 15 feet beyond the footprint of the structure.
- Have graded side slopes that are not steeper than 2:1 (one foot vertical rise for every 2 feet horizontal extent); flatter slopes are recommended.
- Have slopes protected against erosion (vegetation for “low” velocities, durable materials for “high” velocities – determined by design professional)



Note: Fill **may not** be used to elevate a building in V Zones. Information on elevating in V Zones on pages 51 through 53.

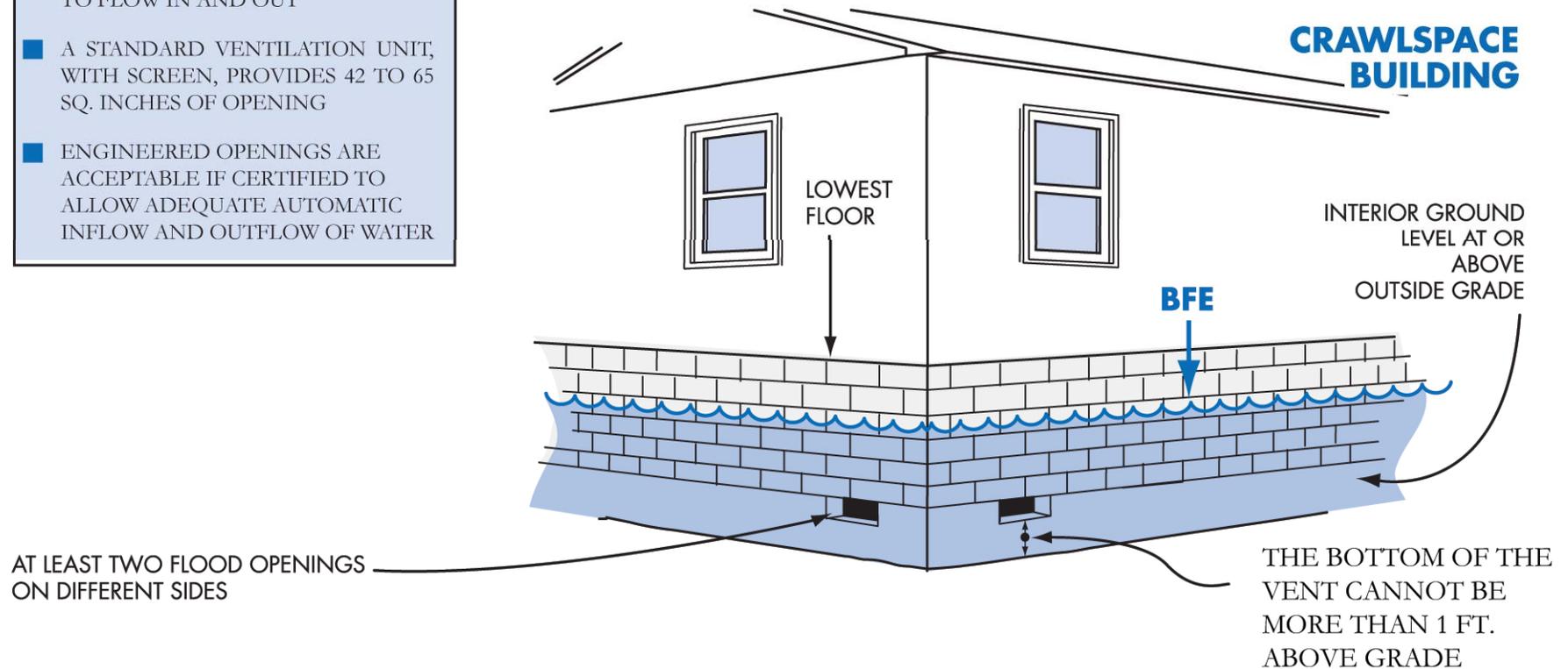
Your community may ask for certification of the elevation, compaction, slope, and slope protection materials. Your engineer or design professional can find more information in FEMA’s technical guidance (MT-1).

Enclosures Below the BFE (Riverine Only)

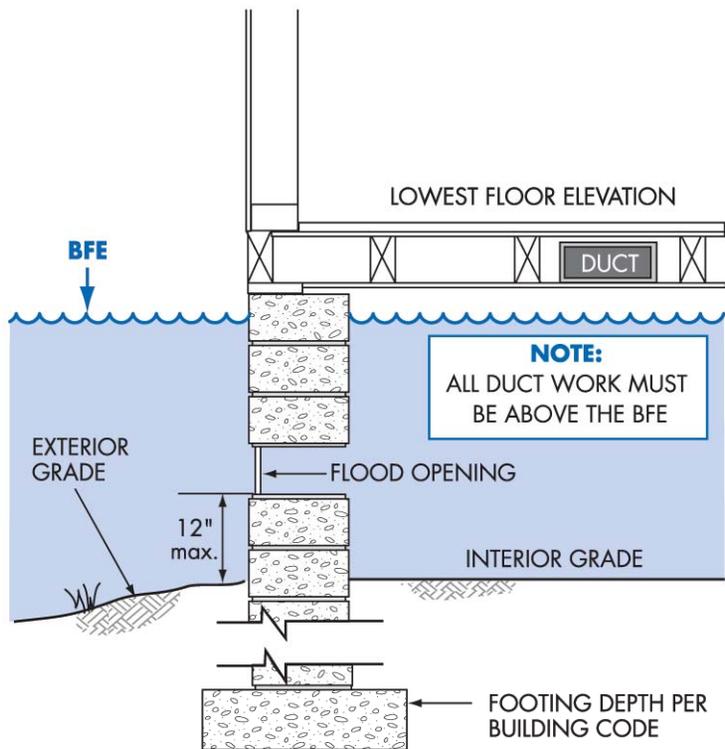
NOTE:

- TOTAL NET AREA OF ALL TOTAL OPENINGS IS 1 SQ. IN. PER SQ. FT. OF ENCLOSED AREA
- A 25' X 45' BUILDING NEEDS 1125 SQ. INCHES OF OPENINGS (25 X 45 = 1125)
- STANDARD VENTILATION UNITS USED IN BLOCK FOUNDATION WALLS MUST BE DISABLED IN THE OPEN POSITION TO ALLOW WATER TO FLOW IN AND OUT
- A STANDARD VENTILATION UNIT, WITH SCREEN, PROVIDES 42 TO 65 SQ. INCHES OF OPENING
- ENGINEERED OPENINGS ARE ACCEPTABLE IF CERTIFIED TO ALLOW ADEQUATE AUTOMATIC INFLOW AND OUTFLOW OF WATER

Solid perimeter wall foundations can enclose flood-prone space. A crawlspace is a good way to elevate just a couple of feet. In all cases, the following are required: openings/vents, elevated utilities, flood resistant materials, and limitations on use. *See 44 CFR 60.3 C(5)*



Crawlspace Details (A Zones)



- The Lowest Floor Elevation must be at or above the BFE.
- All materials below the BFE must be flood resistant.
- The bottom of flood openings must be no more than 12 inches above grade.
- Standard air ventilation units must be disabled in the “open” position to allow water to flow in and out.
- Interior grade must be equal to or higher than exterior grade on at least one side.

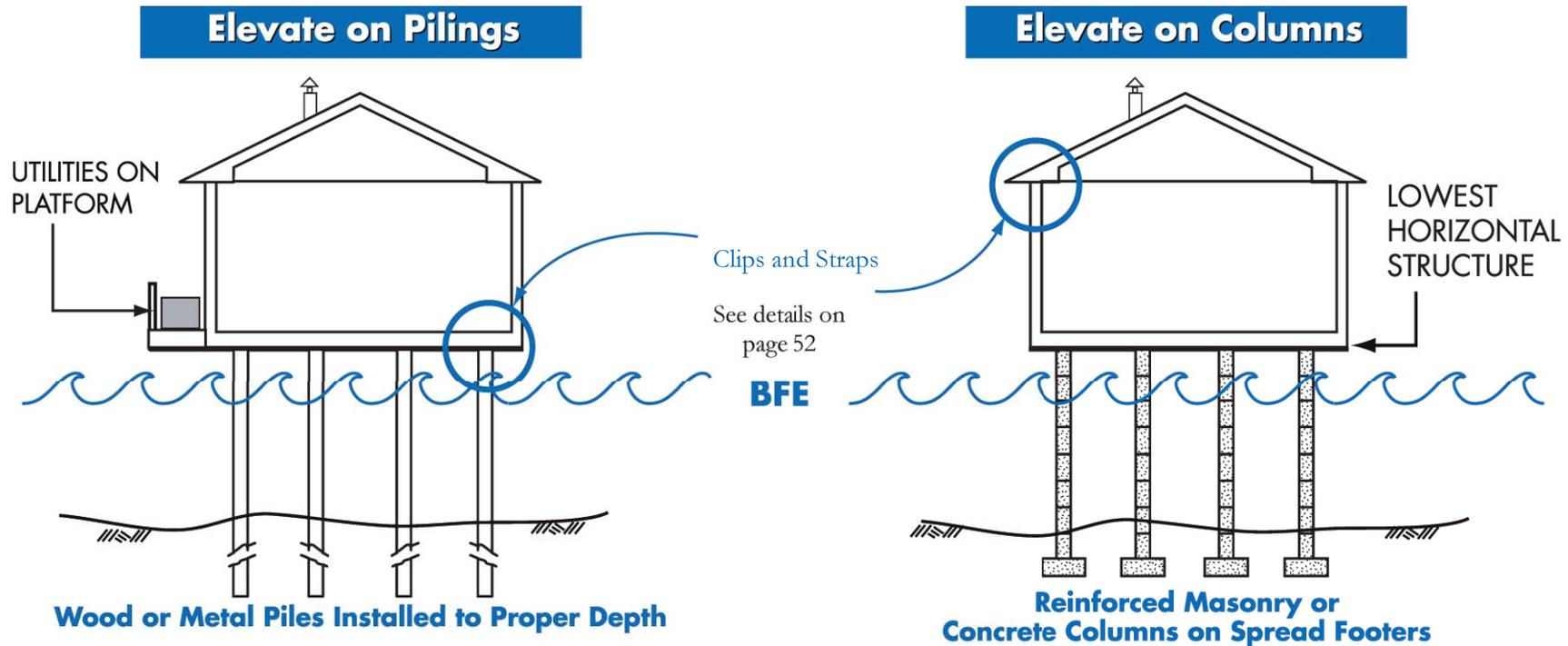
Calculate Net Flood Opening:

A building that measures 30' x 40' has 1,200 square feet of enclosed crawlspace. Flood openings must provide 1,200 sq. in. of net open area (or have certified engineered openings).

If a standard air vent unit provides 60 sq. in. of net open area, 20 vent units are required to satisfy the flood opening requirement (1,200 divided by 60). As an alternative, use certified engineered openings.

Typical Elevation Methods for Coastal Buildings

In V Zones the design specifics will be determined by your licensed architect or engineer based on your site, including how your building will be elevated and how deep in the ground the foundation elements will extend. Your community will require certified or sealed building designs and plans. Structures should be elevated on pilings and columns so that the bottom of the lowest horizontal structural member is elevated to or above the BFE. *See 44 CFR 60.3 E 4*

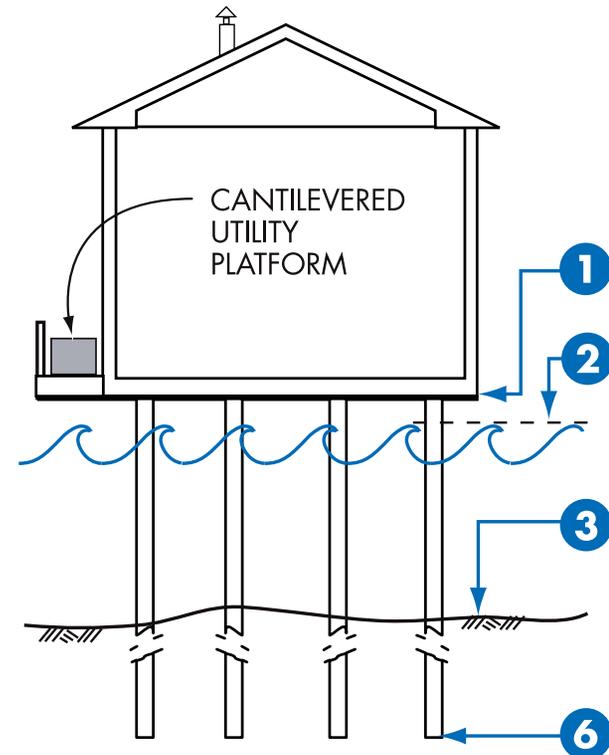


The V Zone Certificate (Sample)

V Zone Building Design and Performance Certificate (partial)

Section 2: Elevation Information

1. Elevation of the Bottom of the Lowest Horizontal Structural Member..... 17 feet
2. Base Flood Elevation (BFE)..... 16 feet
3. Elevation of Lowest Adjacent Grade (LAG)..... 6 feet
4. Foundation type: Piling Post ___/ Pier ___/ Column ___/ Fill ___/ Shear Wall ___/ Enclosed Wall ___/
Foundation Description: Driven Wood piles. No Obstructions except open stairs
5. Approximate depth of scour/erosion used for foundation design..... 3 feet
6. Embedment depth of pilings or foundation below LAG..... 16 feet

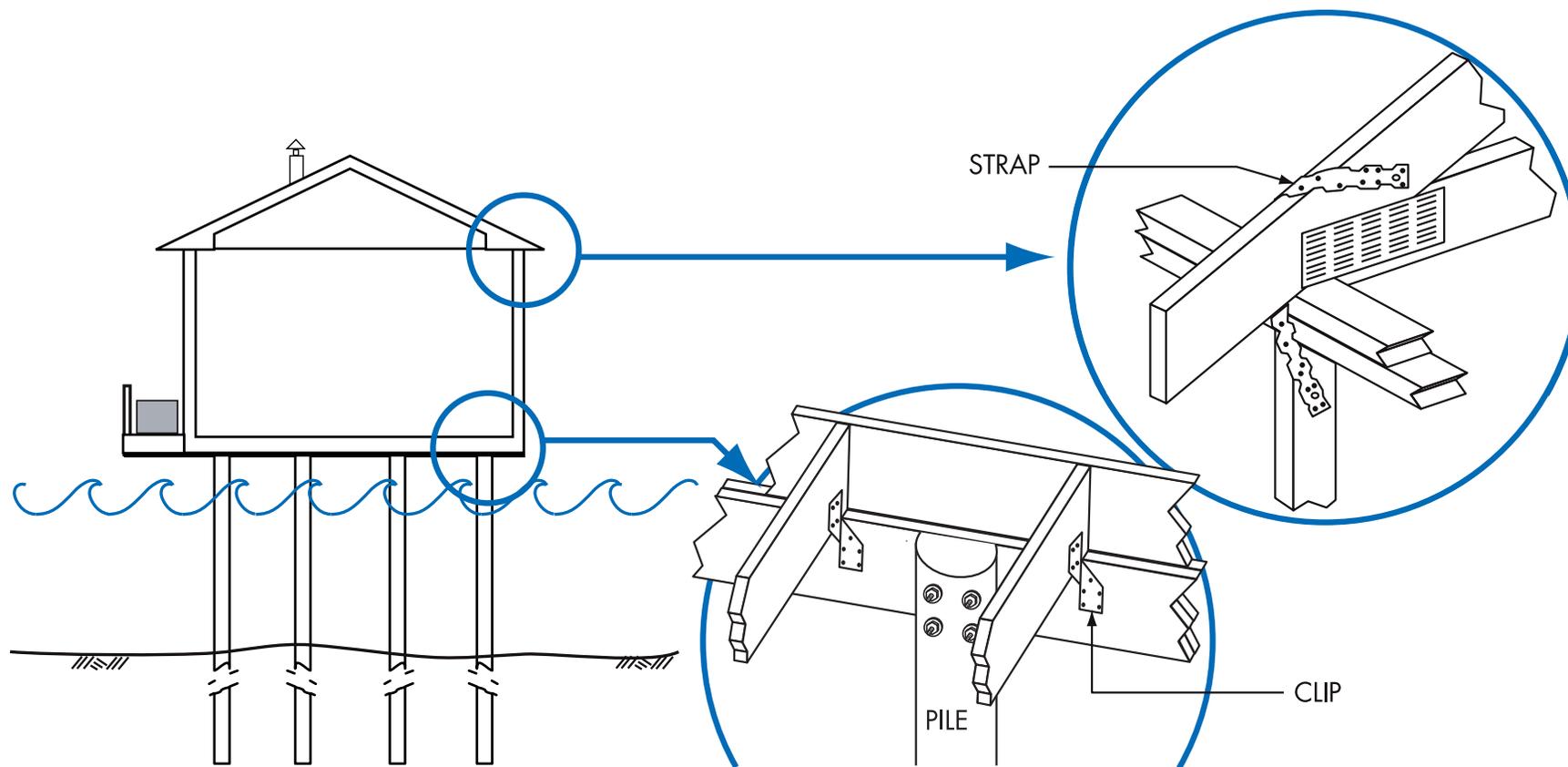


A Registered Professional Engineer or Architect must review or prepare your building design and provide a signed and sealed statement that the design meets minimum design and construction requirements. You will also need to submit an “as built” Elevation Certificate when construction is finished.

Resource: *Coastal Construction Manual* (FEMA 55CD). Revised in 2011, this interactive CD is a useful tool for engineers and architects who design buildings in V zones.

Coastal Houses Must Resist Wind and Water Forces

Coastal buildings may be exposed to both hurricane winds and floodwater, so they must be built to hold together during storms. These details are only examples. Your architect or engineer will decide the type of clips and straps to keep the roof and building connected to the foundation.



Enclosures Below V Zone Buildings

Avoid building an enclosure under your V Zone building. If you must enclose a small area, your community will require:

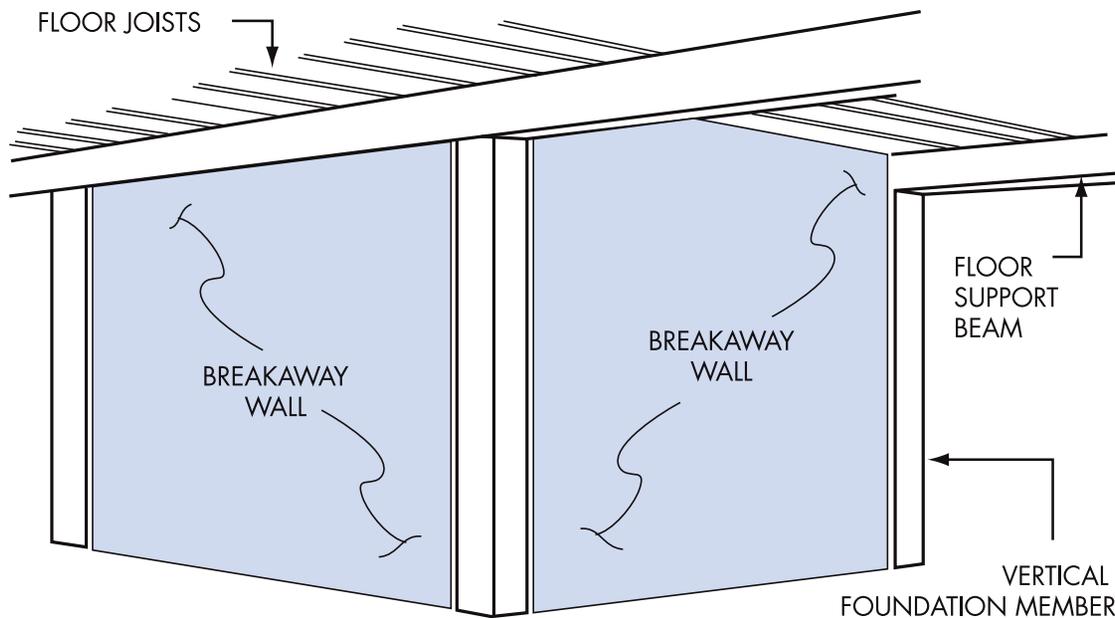
- Walls designed to collapse or “breakaway” under storm and flood conditions
- Flood resistant materials
- Utility wires and pipes should not go through or be attached to the breakaway walls
- Enclosed area is to be used only for parking, building access, or storage
- No bathrooms, utility rooms, or electric service below BFE
- Size limited to 300 square feet or less



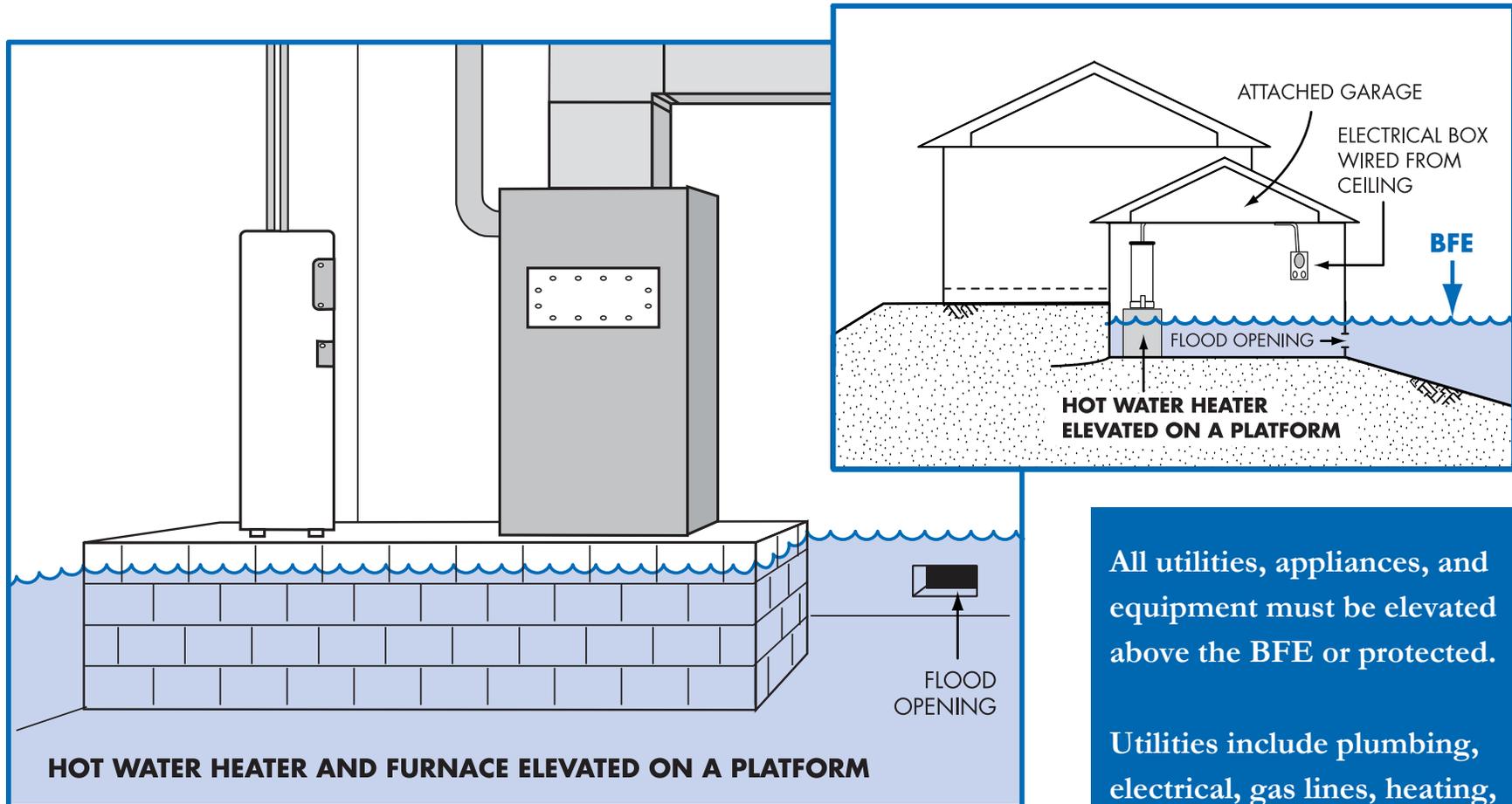
Do not modify an enclosure below an elevated V Zone building (or any zone for that matter). It is a violation of your community’s regulations, and you may have increased damage when it floods.

Plus, your flood insurance policy will cost a lot more.

See 44 CFR 60.3 E 5



Utility Service Inside Enclosures



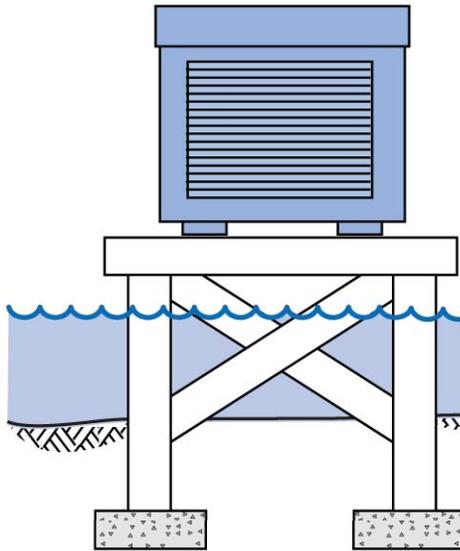
All utilities, appliances, and equipment must be elevated above the BFE or protected.

Utilities include plumbing, electrical, gas lines, heating, and air conditioning.

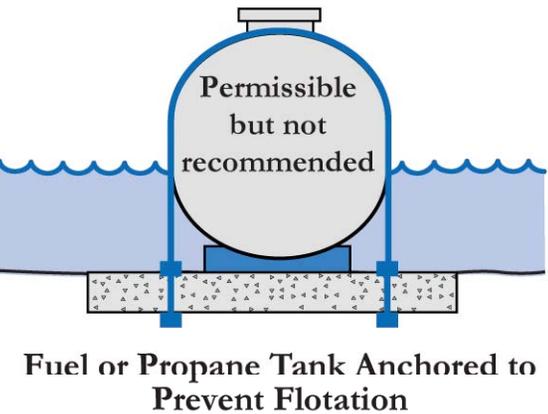
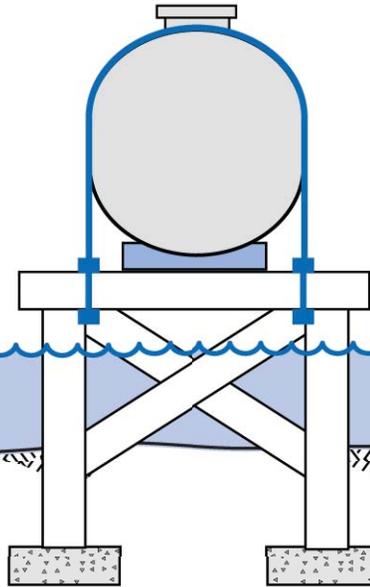
See 44 CFR 60.3 A 3 (iv)

Utility Service Outside Buildings

Heat Pump or A/C
on Platform



Fuel or Propane Tank
Anchored on Platform



Whether inside an attached garage or outside the building, all utilities, appliances and equipment must be elevated above the BFE or protected against flood damage.

Utilities include plumbing, electrical, gas lines, fuel tanks, and heating and air conditioning equipment.



Important

Information

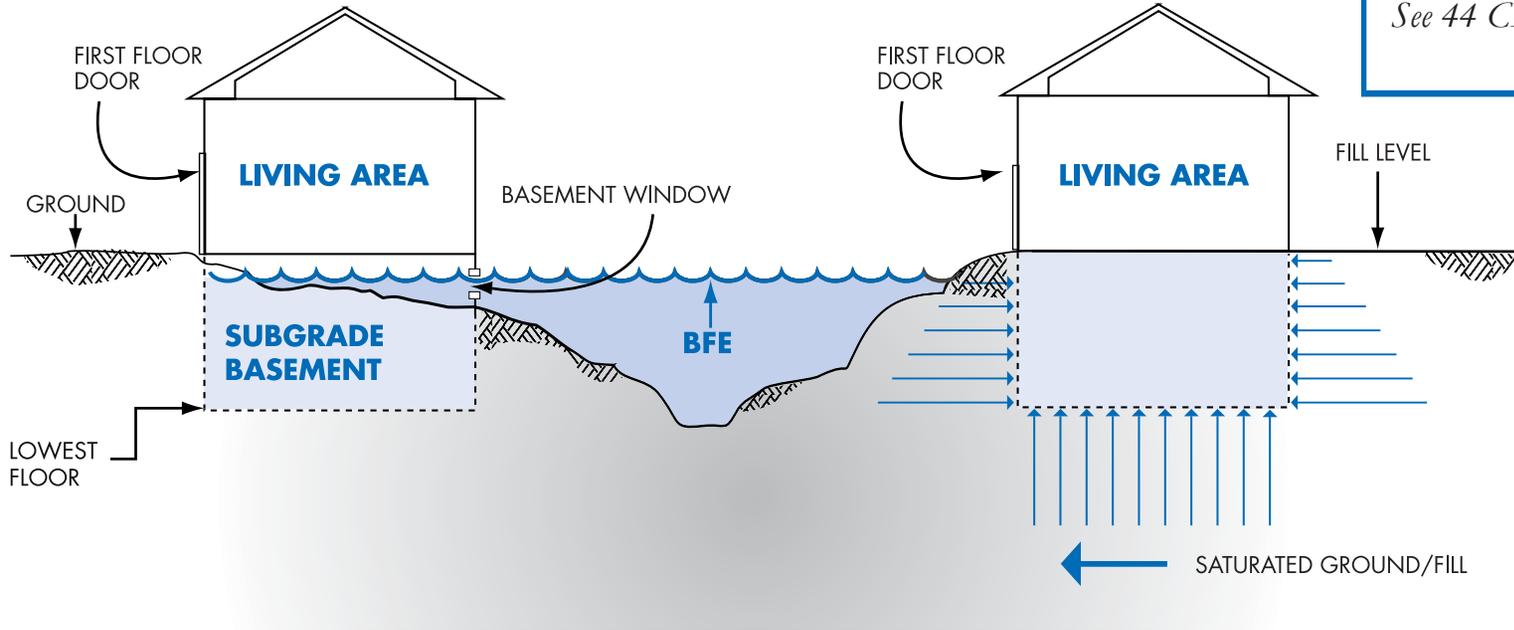
Fuel and propane tanks may cause explosion and pollution risks during flood conditions. Even shallow water can create large buoyant force on tanks, so extra care must be taken to ensure that all tanks are anchored.

Basements Are Unsafe

Basements below the BFE **are not** allowed in new development and flood insurance coverage is very limited in existing basements for a very good reason. It only takes an inch of water over the sill and the entire basement fills up. Excavating a basement into fill doesn't always make it safe because saturated groundwater can damage the walls.

Terms and Definitions

A **basement** is any portion of a building that has its floor sub-grade (below ground level) on all sides.
See 44 CFR 59.1



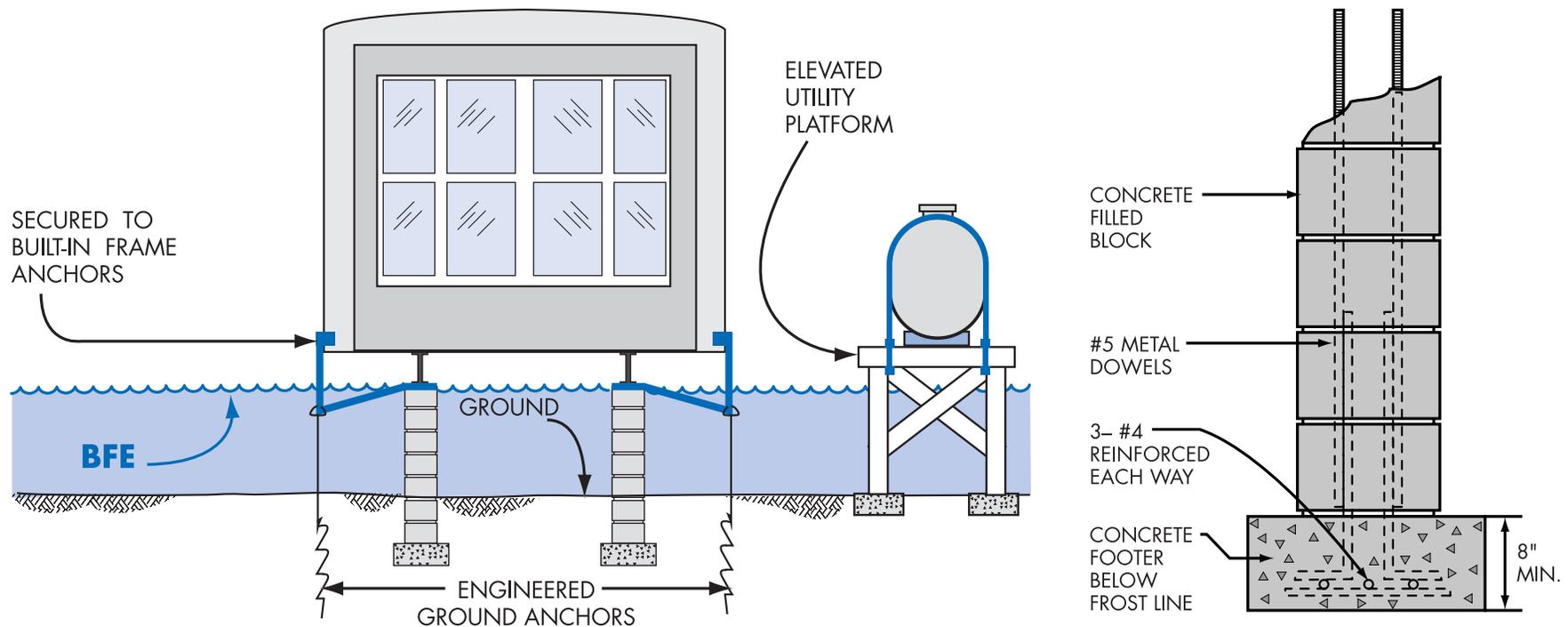
Manufactured Homes Deserve Special Attention

Experience shows that manufactured homes are easily damaged. As little as one inch of water can cause substantial damage.

Dry stacked blocks are **NOT** acceptable — they will **NOT** withstand a flood.

Manufactured homes must be anchored to resist flotation, collapse, or lateral movement by being tied down in accordance with your community's ordinance or the manufacturers' installation specifications. See FEMA's publication **FEMA P-85 Protecting Manufactured Homes from Floods and Other Hazards**.

The **Manufactured Housing Division (MHD)** of the Texas Department of Housing and Community Affairs administers the **Texas Manufactured Housing Standards Act**.



Accessory (Appurtenant) Structures

- Not habitable
- Anchored to resist floating
- Flood openings/vents
- Built of flood resistant materials
- Elevated utilities
- Used only for storage or parking
- Cannot be modified for different use in the future
- Documented floor elevation



Even small buildings are “development” and permits are required. They must be elevated or anchored and built to withstand flood damage. Caution: Remember, everything inside is likely to get wet when flooding occurs.

Terms and Definitions

Accessory (Appurtenant) Structure means a structure that is located on the same parcel of land as a principal structure and whose use is incidental to the use of the principal structure. Accessory structures should be no more than a minimal initial investment, may not be used for human habitation, and must be designed to minimize flood damage. Examples: detached garages, carports, storage sheds, pole barns, and hay sheds.

See 44 CFR 59.1

Recreational Vehicles

In a flood hazard area, an RV must:

- Be licensed and titled as an RV or park model (not as a permanent residence)
- Be built on a single chassis
- Have inflated tires and be self-propelled or towable by light truck
- Have no attached deck, porch, shed
- Be used for temporary recreational, camping, travel, or seasonal use (no more than 180 days)
- Be less than 400 sq. ft. in area (measured at largest horizontal projection)
- Have quick-disconnect sewage, water, and electrical connectors

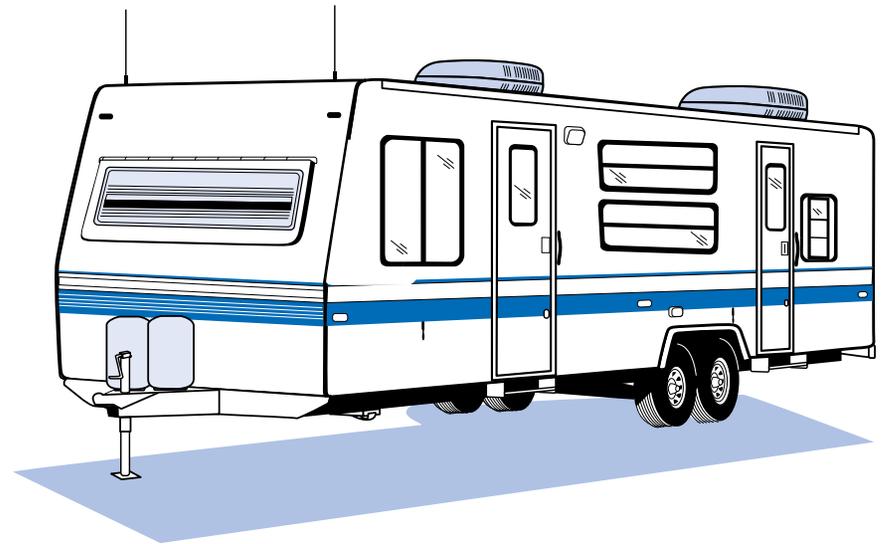
RVs that do not meet these conditions must be installed and elevated like Manufactured Homes, including permanent foundations and tie-downs (see page 57) and *see 44 CFR 60.3 C 14 (i-iii)*



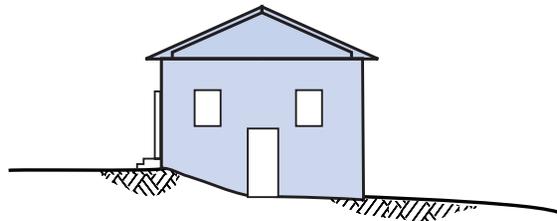
Important

Information

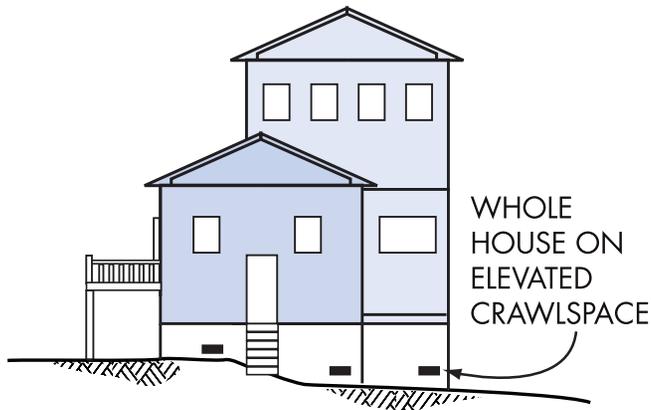
Camping near the water? Ask the campground or RV park operator about flood warnings and plans for safe evacuations.



Planning to Improve Your Floodplain Building?



Before Improvements
Building Market Value = \$110,000



After Improvements
Cost of Improvements = \$68,500



Important

Information

If the cost of the improvement equals or exceeds 50% of the market value of the building, you must comply with the Substantial Improvement requirements.

If the costs are less than 50% of its market value, only the addition is required to be built above the BFE, but you should still consider ways to reduce future damage.

The cost to correct previously cited violations of State or local health, sanitary, or safety code to provide safe living conditions can be excluded.

Alteration of a registered historic structure is allowed, as long as it will continue to meet the criteria for listing as a historic structure.

See FEMA p-758 Substantial Improvement/ Substantial Damage Desk Reference for more.

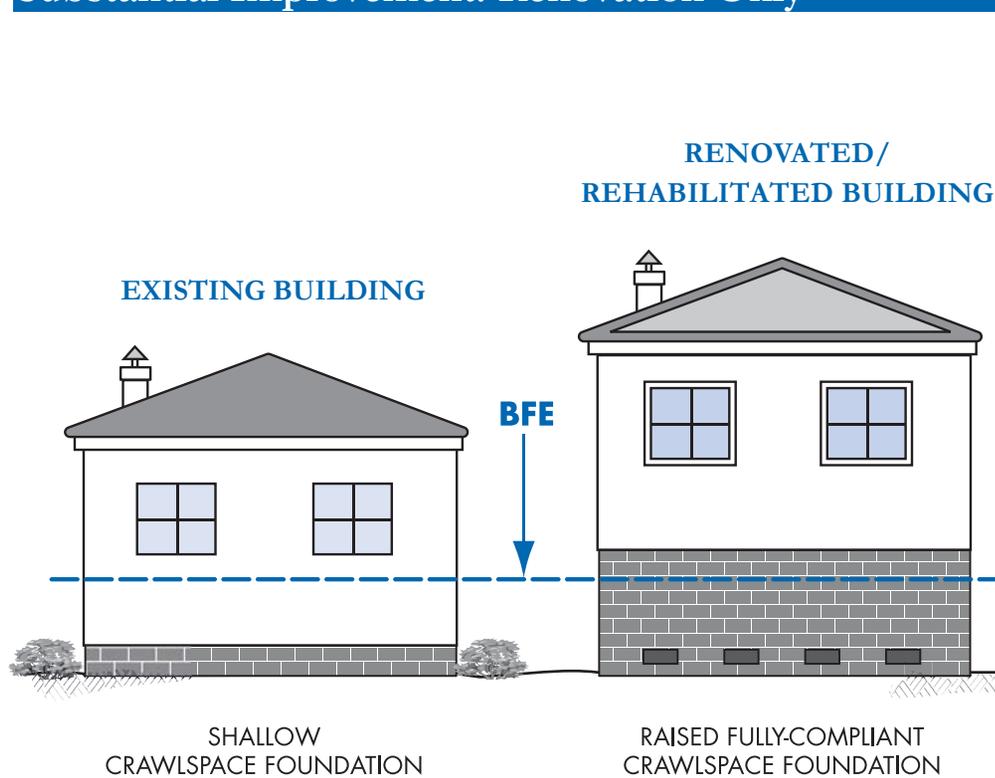


Terms and Definitions

Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement.

This term includes structures which have incurred substantial damage from any cause, regardless of the actual repair work performed (see page 68).

Substantial Improvement: Renovation Only



Important Information

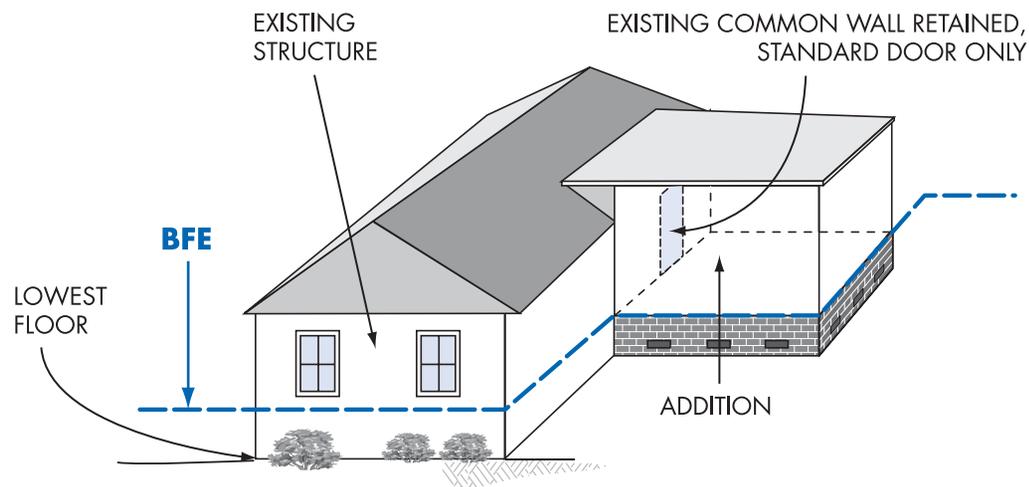
Floodplain buildings can be improved, renovated, rehabilitated or altered, but special rules apply.

Check with your local permit office before you begin. It will be easier to do it right the first time.

The cost to correct previously cited violations of State or local health, sanitary, or safety codes to provide safe living conditions can be excluded from the cost of renovations.

Alteration of a registered historic structure is allowed, by variance, as long as it will continue to meet the criteria for listing as a historic structure.

Substantial Improvement: Lateral Addition Only



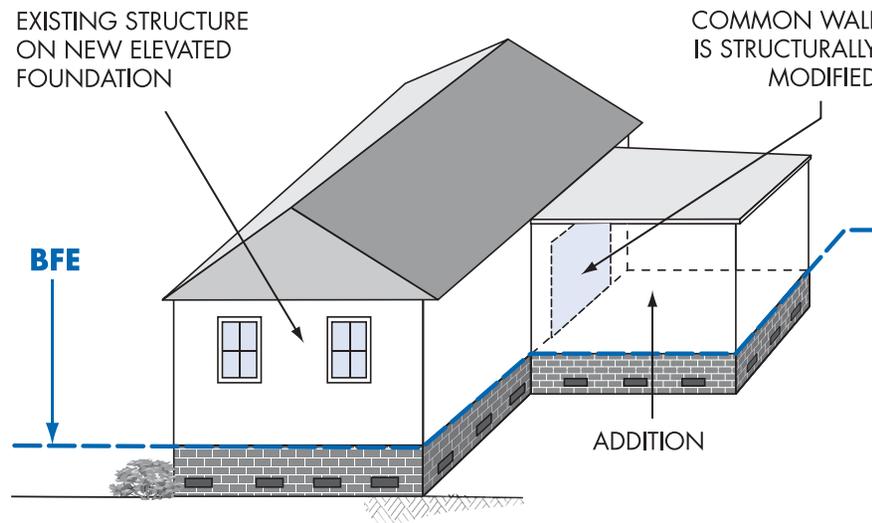
 **Important Information**

See page 63 if your project to add a lateral addition also includes modifying the interior of the existing building or making structural modifications to the existing common wall.

You must get a permit from your community to build an addition to your building located in a floodplain. Only the addition must be built with the lowest floor at or above the Base Flood Elevation provided:

- You make no interior modifications to the existing building; and
- You make no structural modifications to the existing common wall other than adding a standard 36 inch door.

Substantial Improvement: Addition Plus Other Work



Your community must prepare an evaluation to determine if all of your proposed work will trigger the Substantial Improvement requirement. Substantial Improvement is triggered if:

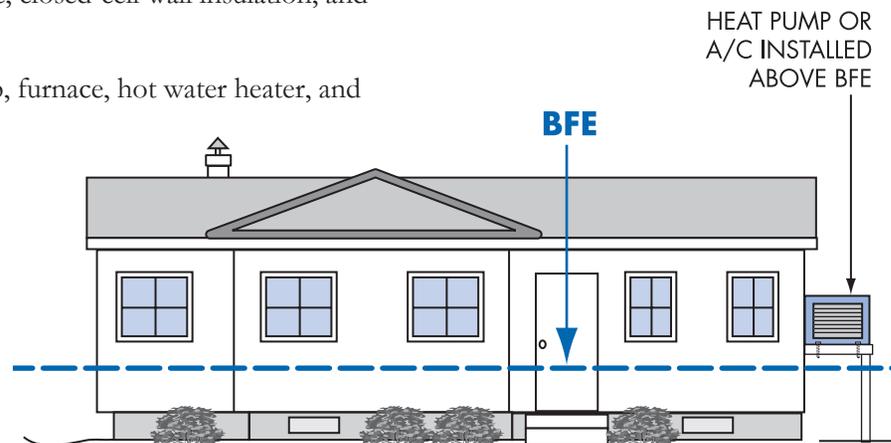
- The work involves adding a new top floor, modifying the interior of the existing building, or structural modifications to the existing common wall (for lateral addition).

Your community's permit office can help you determine which requirements apply. It is always a good idea to request a preliminary review before you get too far along with your plans.

Non-Substantial Improvements

Your proposed improvements are “non-substantial” if the costs of all improvements are less than 50% of the market value of the building. Although you are not required to bring the existing building into compliance, there are many things you can do to reduce future flood damage. Find out the BFE at your location and consider the following:

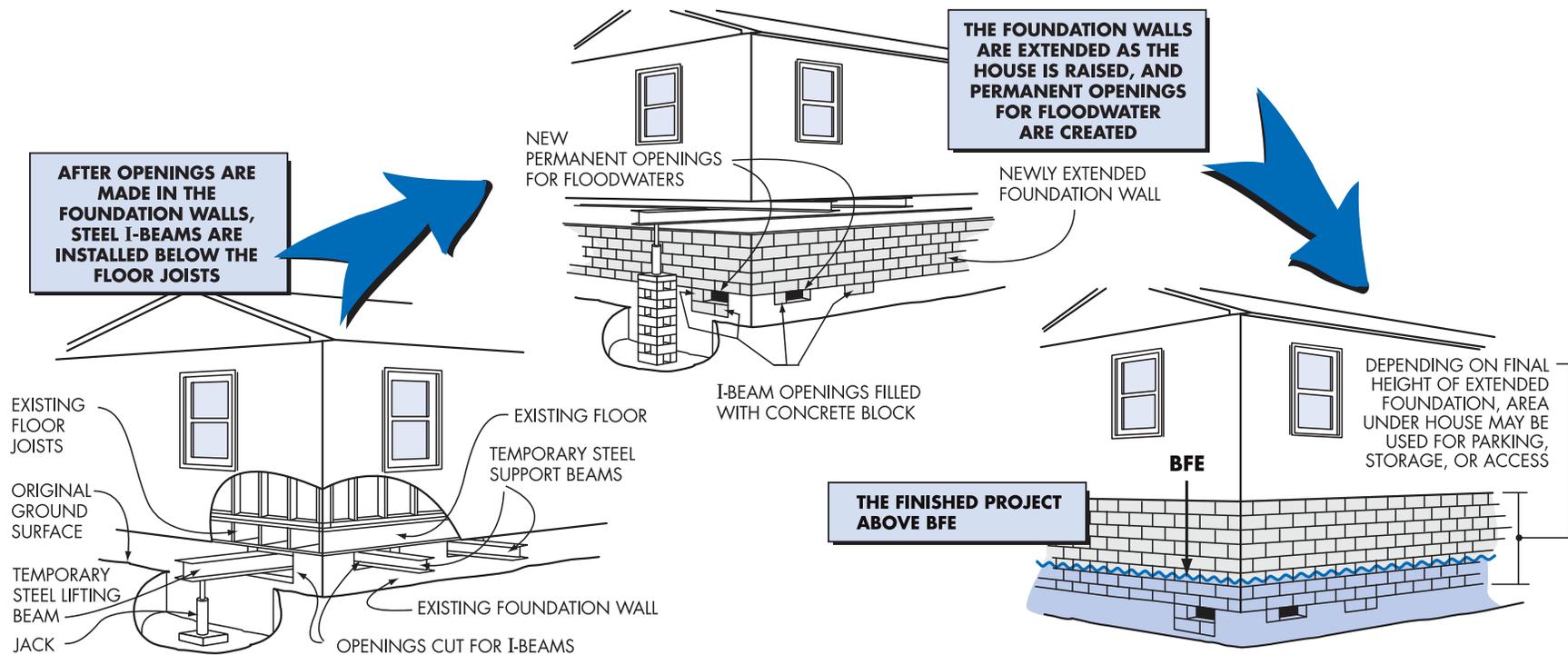
- Use flood resistant materials, for example tile, closed-cell wall insulation, and polyvinyl wall coverings.
- Raise air conditioning equipment, heat pump, furnace, hot water heater, and other appliances on platforms.
- Install electrical outlets above the BFE.
- Move ductwork out of crawlspaces.
- Retrofit crawlspaces with flood openings.
- Fill in below-grade crawlspaces/utility space.



Note! Be sure to include ALL proposed work in your initial permit application. If you add more work after the permit is issued, your community will make another evaluation for Substantial Improvement.

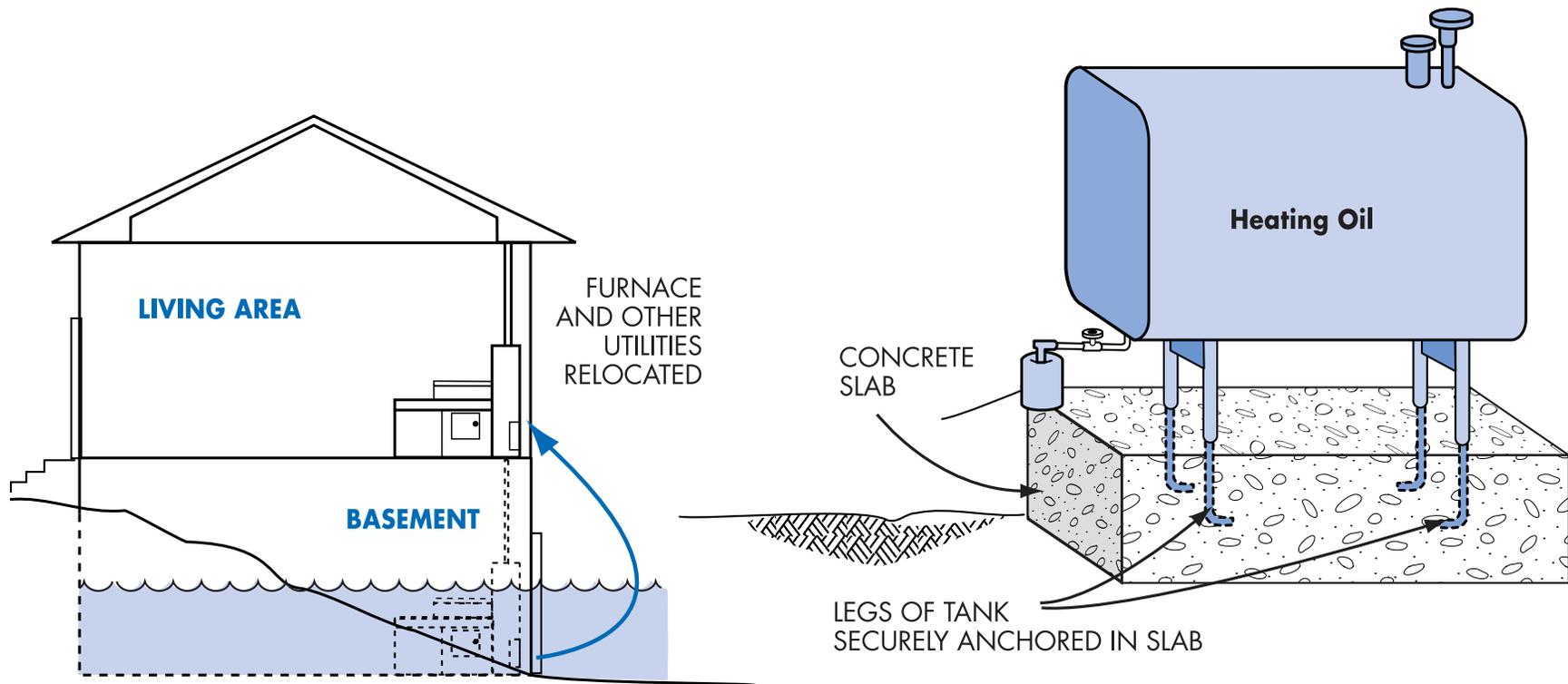
Elevating a Pre-FIRM Building

This is one way to elevate an existing building to comply with floodplain regulations. If your insured building is damaged by flood, you may be eligible for an Increased Cost of Compliance payment. The State and FEMA can help with more information and options.



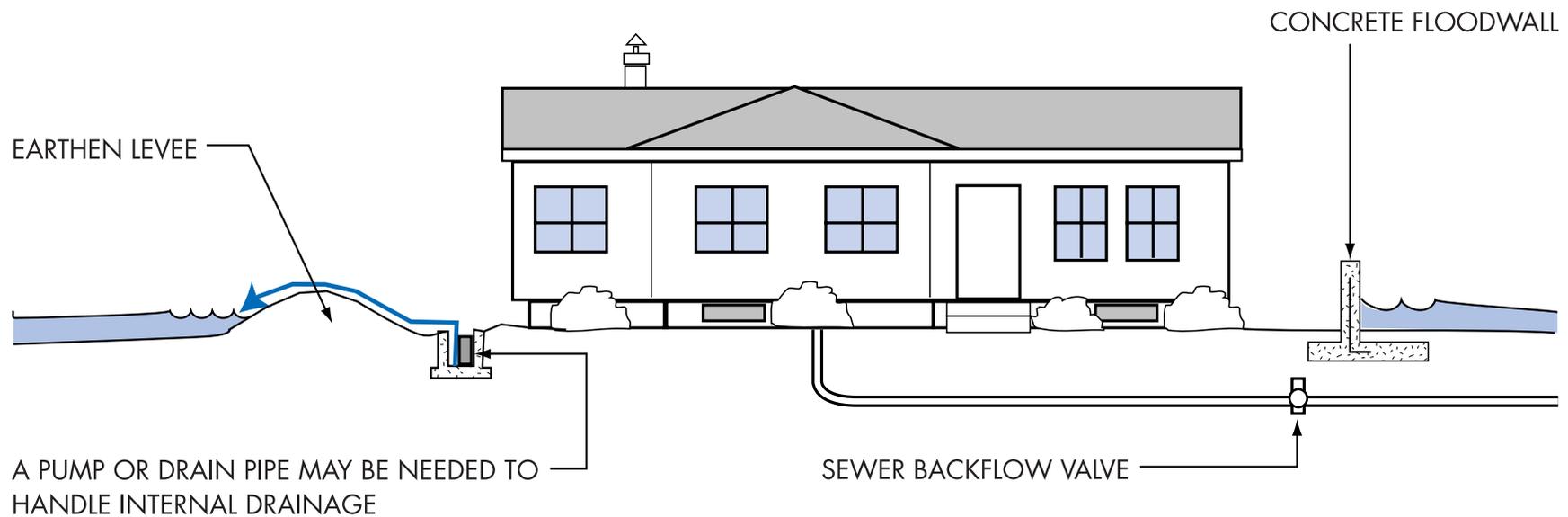
Some Flood Protection for Older Homes is Easy and Low Cost

Move your hot water heater, furnace and ductwork out of basements and crawlspaces or build small platforms above the BFE. Anchor heating oil and propane tanks to prevent flotation. Do not store valuables or hazardous material in a flood-prone basement or crawlspace. Use water-resistant materials when you repair.



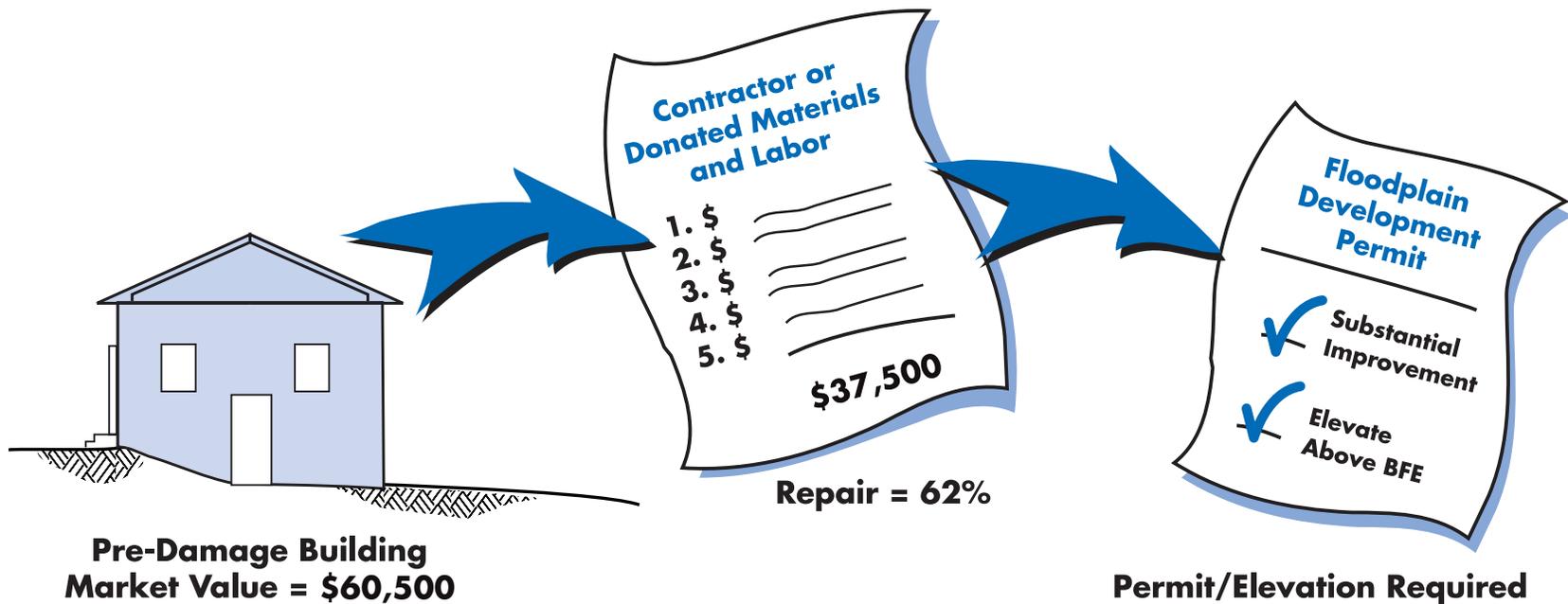
Small Levees and Floodwalls Can Protect Some Older Homes

In areas where floodwaters aren't expected to be deep, sometimes individual buildings can be protected by earthen levees or concrete floodwalls. You must get a permit for those protection measures, and extra care must be taken if the site is in a floodway. A levee or floodwall cannot be used to comply with floodplain regulations for a new or substantially improved building, or one that is repaired after substantial damage. **Important:** These protective measures will not reduce your flood insurance premium.

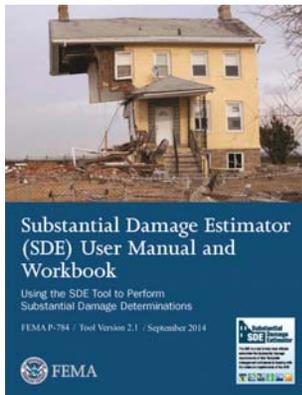


What About After Damages?

A permit is required to repair substantial damage from any cause — fire, flood, wind, or even a truck running into a building. Check with your community permit office to be sure. You will be asked to provide a detailed cost estimate for repairs. See page 61 for more information about elevating an existing building on a crawlspace.



Substantial Damage Estimator



The SDE 2.1 Tool was developed by FEMA to assist State & local officials in determining substantial damage for residential & non-residential structures in accordance with a local floodplain management ordinance meeting the requirements of the National Flood Insurance Program (NFIP).

The tool can be used to assess flood, wind, wildfire, seismic, & other forms of damage. It helps communities provide timely substantial damage determinations so that reconstruction can begin following a disaster.

www.fema.gov/media-library/assets/documents/18692

The Substantial Damage Estimator Best Practices was developed to provide suggested approaches for dealing with some of the challenging situations users may encounter while using the SDE Tool. To download this publication, visit <http://www.fema.gov/media-library/assets/documents/26753>

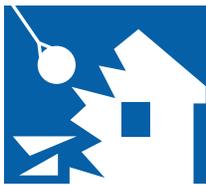
Paying for Post-Flood Compliance - ICC



Elevate



Relocate



Demolish

Increased Cost of Compliance, or ICC, coverage is part of most Standard Flood Insurance Policies. Claims for ICC benefits are filed separately from your claim for contents or building loss. If eligible, you can collect up to \$30,000 to help cover the cost of bringing your home or business into compliance with current flood damage prevention ordinances. You may file a claim for your Increased Cost of Compliance coverage in two instances:

* If your community determines that your home or business is damaged by flood to the point that repairs will cost 50 percent or more of the building's pre-damage market value. This is called substantial damage.



Floodproof

* If your community has a repetitive loss provision in its floodplain management ordinance and determines that your home or business was damaged by a flood two times in the past 10 years, where the cost of repairing the flood damage, on the average, equaled or exceeded 25 percent of its market value at the time of each flood. This is called repetitive damage. Additionally, there must have been flood insurance claim payments for each of the two flood losses.

ICC funding can be used to elevate or demolish homes, relocate them to higher ground, or floodproofing of non-residential structures. Also, when participating in a community sponsored FEMA funded mitigation project, ICC funds may be used as part of the local match requirement. For more information please contact your local community official.

Detailed information on ICC is available at <http://www.fema.gov/media-library/assets/documents/1973?id=1532> and in the FEMA publication *Guidance for State and Local Officials - Increased Cost of Compliance Coverage* (FEMA 301).

Repetitive Loss Eligibility Under ICC

Your Community's Floodplain Management (FPM) Ordinance must be amended to make Repetitive Loss (Rep Loss) insured structures eligible to receive ICC benefits up to \$30,000. If a community has a "Repetitive Loss" definition in the FPM ordinance, ICC benefits will be paid when a flood insured structure in the SFHA is paid flood damage claims two times within a 10-year period, where the cost of repairing the flood damage, on the average, equals or exceeds 25 percent of the structure's pre-damaged fair market value at the time of each flood. Rep Loss is not eligible under ICC unless Rep Loss is defined in the definitions section of the community's Flood Damage Prevention Ordinance.

To make Rep Loss structures eligible for ICC benefits:

1. Add a new definition to the FPM ordinance as underlined below:

Repetitive Loss means flood-related damages sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, equals or exceeds 25 percent of the market value of the structure before the damage occurred.

2. Modify this definition in the FPM ordinance by adding the following underlined text:

Substantial Damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. The term includes buildings that are determined to be Repetitive Loss (see definition).

The term does not apply to:

- a.) any project for improvement of a building required to comply with existing health, sanitary, or safety code specifications which have been identified by the Code Enforcement Official and which are the minimum necessary to assure safe living conditions, *or*
- b.) any alteration of a "historic structure" provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Repetitive Loss Eligibility Under ICC (continued)

3. Modify this definition in the Flood Damage Prevention Ordinance by adding the underlined text:

Substantial Improvement means any combination of reconstruction, alteration, or improvement to a building that equals or exceeds 50 percent of the fair market value of the building before the damage occurred. For the purposes of this definition, an improvement occurs when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the building. This term includes structures, which have incurred “repetitive loss” or “substantial damage”, regardless of the actual repair work done.

The term does not apply to:

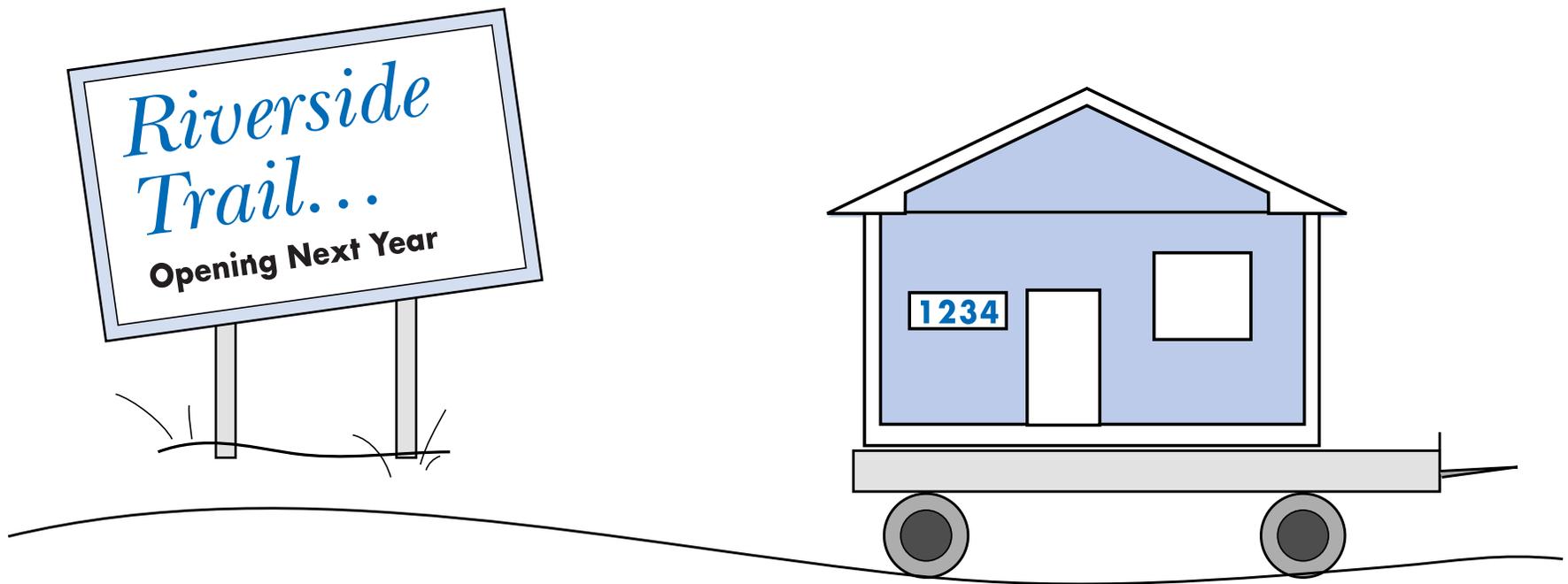
- a.) any project for improvement of a building required to comply with existing health, sanitary, or safety code specifications which have been identified by the Code Enforcement Official and which are solely necessary to assure safe living conditions, *or*
- b.) any alteration of a “historic structure” provided that the alteration will not preclude the structure’s continued designation as a “historic structure”.

Substantially improved existing manufactured home parks or subdivisions is where the repair, reconstruction, rehabilitation or improvement of the streets, utilities and pads equals or exceeds 50 percent of the value of the streets, utilities and pads before the repair, reconstruction or improvement commenced.

SPECIAL NOTE: It is recommended that communities develop and adopt written substantial improvement policies and procedures.

Some Flood Mitigation Projects are More Costly But Give You More Protection

After floods, some communities buy out and demolish homes that were severely damaged. The acquired land is dedicated to open space and can be used for recreation or to help restore wildlife habitat and wetlands. In other instances, homes have been raised up on higher foundations, and others have been moved to safer high ground.

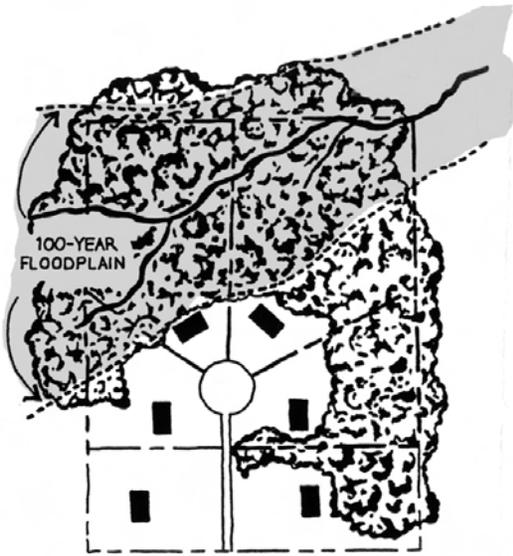


Safe Uses of the Floodplain

Let the floodplain do its job – if possible, keep it natural open space. Other low damage uses may include recreational areas, playgrounds, reforestation, parking, gardens, pasture, accessory structures, created wetlands, ecosystem restoration and wildlife management.

RECOMMENDED

All land subdivided into lots, some lots partially in the floodplain, setbacks modified to keep homesites on high ground.



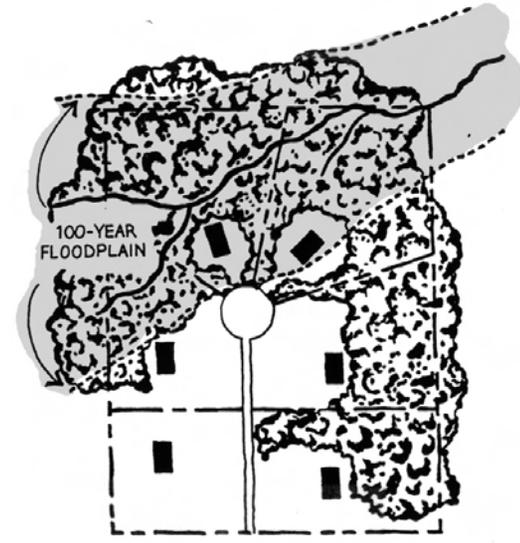
RECOMMENDED

Floodplain land put into public/common open space, net density remains, lot sizes reduced and setbacks modified to keep homesites on high ground.



NOT RECOMMENDED

All land subdivided into lots, some homesites and lots partially or entirely in the floodplain.



Be Flood Safe — Don't Drive Through Flooded Roads

- Never drive through flooded roads – they may be washed out.
- Passenger cars may float in only 18-24 inches of water.
- Floating cars easily get swept downstream, making rescues difficult and dangerous.
- Be especially cautious at night when it is harder to recognize dangers.
- Hundreds of people have died in floods in Texas – many were trapped in cars.
- It takes only six inches of fast moving water to sweep an adult off their feet.



Flash floods are dangerous. Do not try to walk or drive through fast-moving water.

Useful Web Sites and Common Acronyms

Useful Web Sites

- American Red Cross: www.redcross.org/what-we-do/disaster-relief
- FEMA Resource Library: www.fema.gov/resource-document-library
- FEMA NFIP Information: www.fema.gov
- FEMA Flood Map Service Center (MSC): www.msc.fema.gov
- Community Rating System (CRS) Resource Center:
www.fema.gov/national-flood-insurance-program-community-rating-system
- Association of State Floodplain Managers: www.floods.org
- Texas Floodplain Management Association: www.tfma.org
- Texas Water Development Board: www.twdb.texas.gov
- Texas Natural Resources Information System: www.tnris.org
- Texas Department of Insurance: www.tdi.texas.gov
- Texas General Land Office: www.glo.texas.gov
- Texas Division of Emergency Management: www.dps.texas.gov/dem
- Texas Hazard Mitigation Package: www.thmp.info

Common Acronyms

- **BFE** = Base Flood Elevation
- **EC** = Elevation Certificate
- **FEMA** = Federal Emergency Management Agency
- **FIRM** = Flood Insurance Rate Map
- **NFIP** = National Flood Insurance Program
- **SFHA** = Special Flood Hazard Area
- **TWDB** = Texas Water Development Board
- **TFMA** = Texas Floodplain Management Association

Resources

Federal Agency Resources

Federal Emergency Management Agency (FEMA)

FEMA is the agency that manages the NFIP & Risk MAP Program. Performs studies to update Flood Insurance Rate Maps. Prepares updated digitized FIRMs

www.fema.gov for general information

www.msc.fema.gov for the Map Service Center

U.S. Army Corps of Engineers

Conducts flood studies, reservoir operations and flood control. Oversees capital projects in waterways. Determines flood damage assessments for property buyouts. Issues 404 Wetlands Permits.

www.usace.army.mil

National Weather Service

Provides weather forecasts and severe weather alerts through the internet, television, and NOAA All Hazard Radio. Regional River Forecast Office provides flood forecasts. Promotes Severe Weather and Turn Around Don't Drown awareness.

www.weather.gov

U.S. Fish and Wildlife

May be required to involve in certain project to issue permits and ESA compliance for CLOMR applications.

www.fws.gov

National Park Service

May be required to involve in certain projects to issue a permit.

www.nps.gov

Association of State Floodplain Managers (ASFPM)

Provides technical information for Nation Wide floodplain management challenges, legislation, and support.

www.floods.org

Resources

Environmental Protection Agency (EPA)

Provides guidance on Clean Water Act and may need to be contacted for certain permits to be issued.

www.epa.gov

National Resource Conservation Service (NRCS)

May be required to involve in certain projects to issue a permit and may have technical information relevant to floodplain management.

www.nrcs.usda.gov

National Highway Traffic Safety Administration

May be required to involve in certain projects to issue a permit.

www.nhtsa.dot.gov

State Agency Resources

Texas Water Development Board (TWDB)

State National Flood Insurance Program (NFIP) Coordinating Agency. Partners with FEMA – Community Assistance Program. Provides technical assistance, training, ordinance/court order assistance, and public outreach. Part of the Agency entails the Texas Natural Resources Information System (TNRIS) which is the State mapping and geographic information data repository. Manages Flood Mitigation Assistance Grant Program, Flood Protection Planning Grant fund, and the Severe Repetitive Loss Grant fund. www.twdb.texas.gov/flood/index.asp

Michael Segner, NFIP State Coordinator: (512) 463-3509 - michael.segner@twdb.texas.gov

Shawn Snyder, NFIP Field Coordinator: (512) 463-7771 - shawn.snyder@twdb.texas.gov

Jesse Libra, NFIP Field Representative: (512) 463-9677 - jesse.libra@twdb.texas.gov

Or feel free to email the Flood Mitigation Planning group at: flood@twdb.texas.gov

or

Texas Water Development Board: (512)-463-7847 - www.twdb.texas.gov/index.asp

Resources

Governor's Division of Emergency Management

The Texas Department of Emergency Management manages the Hazard Mitigation Grant (HMGP) Program and Pre-Disaster Mitigation (PDM) Grant Program. The agency also has the State Hazard Mitigation Officer (SHMO). They are part of the Texas Department of Public Safety.

www.dps.texas.gov/dem

Texas Department of Insurance

Named as co-coordinator for the NFIP in Texas (TWDB is the other State agency). Provides aid, advises and cooperates with all participating political subdivisions. Administers Windstorm Inspection Program (first tier of Texas counties fronting Gulf of Mexico). Facilitates availability of wind insurance.

www.tdi.texas.gov

Texas Commission on Environmental Quality (TCEQ)

Oversees State Dam Safety Program, which monitors and regulated both private and public dams in Texas. In addition, the agency also deals with water rights.

www.tceq.texas.gov

Texas General Land Office (GLO)

Texas Coastal Management Program (CMP) is to improve the management of the State's coastal natural resources and to ensure the long-term ecological and economic productivity of the coast. Oversees Open Beaches Act, which provides that all beaches be public land and open for public access. Manages Dune Protection Program, which protects sand dunes for coastal stabilization, storm protection, ecosystem management, and economic development.

www.glo.texas.gov

Resources

Texas Department of Housing and Community Affairs (TDHCA)

Have anchoring regulations listed for manufactured homes and other important information regarding installation of manufactured homes.

www.tdhca.state.tx.us/mh/

Texas Department of Health

Handles individual grants for families after a disaster.

www.dshs.state.tx.us

Texas Parks and Wildlife

Handles permits for sand and gravel operations and addresses environmental concerns.

www.tpwd.texas.gov

National Legislation/Regulation

National Flood Insurance Act of 1968

Established the National Flood Insurance Program; a voluntary program based on mutual agreement between the Federal government and local community. In exchange for adopting and enforcing a Floodplain Management Ordinance or Court Order, federally backed flood insurance is made available to property owners throughout the participating community. Prior to the 1968 Act the sole relief available to flood victims was special disaster loans. See 44 Code of Federal Regulations (CFR) Chapter 60.3 (a-e) for detailed floodplain management regulations.

Flood Disaster Protection Act of 1973

Now required flood insurance as a condition for receiving federal financial assistance for acquisition or construction purposes in Special Flood Hazard areas. Publication of Flood Hazard Boundary Maps now officially designated a community as “flood prone” and subject to the act.

Resources

Executive Order 11988

Federal Agencies are required to “avoid long-and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid direct and indirect support of floodplain development wherever there is a practical alternative”. Federally funded “Critical Facilities” like Hospital and Fire Stations are to be protected to the 0.2% Annual Chance Event or 500 year flood.

Executive Order (EO) 13690

On January 30, 2015, the President signed EO 13690 revising Executive Order 11988 and establishing the Federal Flood Risk Management Standard (FFRMS), a flexible framework to increase resilience against flooding and help preserve the natural values of floodplains. The EO and new standard would apply to federal actions such as federal grants used to repair and redevelop after a natural disaster. The FFRMS gives agencies the flexibility to select one of three approaches to establishing the flood elevation and hazard area.

- Use data and methods informed by best-available, actionable climate science;
- Build two feet above the 1%-annual chance (100 year) flood elevation for standard projects, and three feet above for critical buildings like hospitals and evacuation centers; or
- Build to the 0.2%-annual chance (500 year) flood elevation.

For additional information regarding EO 13690 please reference <http://www.fema.gov/federal-flood-risk-management-standard-ffrms>

Section 404 Wetlands Permits

The U.S. Army Corps of Engineers administers Section 404 of the Clean Water Act (CWA). It establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.

Disaster Mitigation Act of 2000

Communities must adopt and have an approved all hazards mitigation plan prior to November 1, 2004 to be eligible to receive Hazard Mitigation Grant Program funding (44 CFR Part 201).

Resources

State Legislation/Regulation

House Bill 1018

The 77th Legislature of the State of Texas (2001) amended Subchapter 1, Chapter 16 in the Texas Water Code by adding Section 16.3145 to read as follows: “The governing body of each city and county shall adopt ordinances or orders, as appropriate, necessary for the city or county to be eligible to participate in the National Flood Insurance Program, not later than January 1, 2001.”

Senate Bill 936

In 2001, the 77th Legislative Session made possible the adoption of more comprehensive floodplain management regulations. The bill also allows for the collection of reasonable fees to cover administrative costs incurred by the administration of a local floodplain management program. It also provides for Criminal and Civil Penalties and injunctive relief for failure to comply with floodplain regulations.

House Bill 1445

77th Legislative Session; Provides regulation of subdivisions in Extraterritorial Jurisdictions (ETJ). It authorizes the municipality and the county to enter into an inter-local agreement to establish floodplain development regulations for plats and subdivisions within the ETJ.

House Bill 1481

79th Legislative Session; Barricade law that makes it a criminal offense to cross a barricade at a flooded area.

Senate Bill 1601

75th Legislative Session: Relating to utility hookup only being approved once all necessary permits have been completed with the jurisdiction.

44 CFR 60.3 A-E Floodplain Management Criteria for Flood-prone Areas

The Federal Insurance Administrator will provide the data upon which flood plain management regulations shall be based. If the Federal Insurance Administrator has not provided sufficient data to furnish a basis for these regulations in a particular community, the community shall obtain, review and reasonably utilize data available from other Federal, State or other sources pending receipt of data from the Federal Insurance Administrator. However, when special flood hazard area designations and water surface elevations have been furnished by the Federal Insurance Administrator, they shall apply. The symbols defining such special flood hazard designations are set forth in §64.3 of this subchapter. In all cases the minimum requirements governing the adequacy of the flood plain management regulations for flood-prone areas adopted by a particular community depend on the amount of technical data formally provided to the community by the Federal Insurance Administrator. Minimum standards for communities are as follows:

(a) When the Federal Insurance Administrator has not defined the special flood hazard areas within a community, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, but the community has indicated the presence of such hazards by submitting an application to participate in the Program, the community shall:

- (1) Require permits for all proposed construction or other development in the community, including the placement of manufactured homes, so that it may determine whether such construction or other development is proposed within flood-prone areas;
- (2) Review proposed development to assure that all necessary permits have been received from those governmental agencies from which approval is required by Federal or State law, including section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334;
- (3) Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy, (ii) be constructed with materials resistant to flood damage, (iii) be constructed by methods and practices that minimize flood damages, and (iv) be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.
- (4) Review subdivision proposals and other proposed new development, including manufactured home parks or subdivisions, to determine whether such proposals will be reasonably safe from flooding. If a subdivision proposal or other proposed new development is in a flood-prone area, any such proposals shall be reviewed to assure that (i) all such proposals are consistent with the need to minimize flood damage within the flood-prone area, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided to reduce exposure to flood hazards;
- (5) Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems; and
- (6) Require within flood-prone areas (i) new and replacement sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and (ii) onsite waste disposal systems to be located to avoid impairment to them or contamination from them during flooding.

44 CFR 60.3 A-E Floodplain Management Criteria for Flood-prone Areas

(b) When the Federal Insurance Administrator has designated areas of special flood hazards (A zones) by the publication of a community's FHBM or FIRM, but has neither produced water surface elevation data nor identified a floodway or coastal high hazard area, the community shall:

- (1) Require permits for all proposed construction and other developments including the placement of manufactured homes, within Zone A on the community's FHBM or FIRM;
- (2) Require the application of the standards in paragraphs (a) (2), (3), (4), (5) and (6) of this section to development within Zone A on the community's FHBM or FIRM;
- (3) Require that all new subdivision proposals and other proposed developments (including proposals for manufactured home parks and subdivisions) greater than 50 lots or 5 acres, whichever is the lesser, include within such proposals base flood elevation data;
- (4) Obtain, review and reasonably utilize any base flood elevation and floodway data available from a Federal, State, or other source, including data developed pursuant to paragraph (b)(3) of this section, as criteria for requiring that new construction, substantial improvements, or other development in Zone A on the community's FHBM or FIRM meet the standards in paragraphs (c)(2), (c)(3), (c)(5), (c)(6), (c)(12), (c)(14), (d)(2) and (d)(3) of this section;
- (5) Where base flood elevation data are utilized, within Zone A on the community's FHBM or FIRM:
 - (i) Obtain the elevation (in relation to mean sea level) of the lowest floor (including basement) of all new and substantially improved structures, and
 - (ii) Obtain, if the structure has been floodproofed in accordance with paragraph (c)(3)(ii) of this section, the elevation (in relation to mean sea level) to which the structure was floodproofed, and
 - (iii) Maintain a record of all such information with the official designated by the community under §59.22 (a)(9)(iii);
- (6) Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Federal Insurance Administrator;
- (7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;
- (8) Require that all manufactured homes to be placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

(c) When the Federal Insurance Administrator has provided a notice of final flood elevations for one or more special flood hazard areas on the community's FIRM and, if appropriate, has designated other special flood hazard areas without base flood elevations on the community's FIRM, but has not identified a regulatory floodway or coastal high hazard area, the community shall:

44 CFR 60.3 A-E Floodplain Management Criteria for Flood-prone Areas

- (1) Require the standards of paragraph (b) of this section within all A1-30 zones, AE zones, A zones, AH zones, and AO zones, on the community's FIRM;
- (2) Require that all new construction and substantial improvements of residential structures within Zones A1-30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level, unless the community is granted an exception by the Federal Insurance Administrator for the allowance of basements in accordance with §60.6 (b) or (c);
- (3) Require that all new construction and substantial improvements of non-residential structures within Zones A1-30, AE and AH zones on the community's firm
 - (i) have the lowest floor (including basement) elevated to or above the base flood level or,
 - (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
- (4) Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of paragraph (c)(3)(ii) or (c)(8)(ii) of this section, and (ii) a record of such certificates which includes the specific elevation (in relation to mean sea level) to which such structures are floodproofed shall be maintained with the official designated by the community under §59.22(a)(9)(iii);
- (5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
- (6) Require that manufactured homes that are placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM on sites
 - (i) Outside of a manufactured home park or subdivision,
 - (ii) In a new manufactured home park or subdivision,
 - (iii) In an expansion to an existing manufactured home park or subdivision, or
 - (iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred “substantial damage” as the result of a flood, be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement.

44 CFR 60.3 A-E Floodplain Management Criteria for Flood-prone Areas

- (7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified);
- (8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely floodproofed to that level to meet the floodproofing standard specified in §60.3(c)(3)(ii);
- (9) Require within any A99 zones on a community's FIRM the standards of paragraphs (a)(1) through (a)(4)(i) and (b)(5) through (b)(9) of this section;
- (10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.
- (11) Require within Zones AH and AO, adequate drainage paths around structures on slopes, to guide floodwaters around and away from proposed structures.
- (12) Require that manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A-1-30, AH, and AE on the community's FIRM that are not subject to the provisions of paragraph (c)(6) of this section be elevated so that either
- (i) The lowest floor of the manufactured home is at or above the base flood elevation, or
 - (ii) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.
- (13) Notwithstanding any other provisions of §60.3, a community may approve certain development in Zones A1-30, AE, and AH, on the community's FIRM which increase the water surface elevation of the base flood by more than one foot, provided that the community first applies for a conditional FIRM revision, fulfills the requirements for such a revision as established under the provisions of §65.12, and receives the approval of the Federal Insurance Administrator.
- (14) Require that recreational vehicles placed on sites within Zones A1-30, AH, and AE on the community's FIRM either
- (i) Be on the site for fewer than 180 consecutive days,
 - (ii) Be fully licensed and ready for highway use, or
 - (iii) Meet the permit requirements of paragraph (b)(1) of this section and the elevation and anchoring requirements for “manufactured homes” in paragraph (c)(6) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.

44 CFR 60.3 A-E Floodplain Management Criteria for Flood-prone Area

(d) When the Federal Insurance Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AO zones, AH zones, A99 zones, and A zones on the community's FIRM, and has provided data from which the community shall designate its regulatory floodway, the community shall:

- (1) Meet the requirements of paragraphs (c) (1) through (14) of this section;
- (2) Select and adopt a regulatory floodway based on the principle that the area chosen for the regulatory floodway must be designed to carry the waters of the base flood, without increasing the water surface elevation of that flood more than one foot at any point;
- (3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge;
- (4) Notwithstanding any other provisions of §60.3, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community first applies for a conditional FIRM and floodway revision, fulfills the requirements for such revisions as established under the provisions of §65.12, and receives the approval of the Federal Insurance Administrator.

(e) When the Federal Insurance Administrator has provided a notice of final base flood elevations within Zones A1-30 and/or AE on the community's FIRM and, if appropriate, has designated AH zones, AO zones, A99 zones, and A zones on the community's FIRM, and has identified on the community's FIRM coastal high hazard areas by designating Zones V1-30, VE, and/or V, the community shall:

- (1) Meet the requirements of paragraphs (c)(1) through (14) of this section;
- (2) Within Zones V1-30, VE, and V on a community's FIRM, (i) obtain the elevation (in relation to mean sea level) of the bottom of the lowest structural member of the lowest floor (excluding pilings and columns) of all new and substantially improved structures, and whether or not such structures contain a basement, and (ii) maintain a record of all such information with the official designated by the community under §59.22(a)(9)(iii);
- (3) Provide that all new construction within Zones V1-30, VE, and V on the community's FIRM is located landward of the reach of mean high tide;
- (4) Provide that all new construction and substantial improvements in Zones V1-30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of paragraphs (e)(4) (i) and (ii) of this section.

44 CFR 60.3 A-E Flood plain Management Criteria for Flood-prone Area

(5) Provide that all new construction and substantial improvements within Zones V1-30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system. For the purposes of this section, a breakaway wall shall have a design safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading resistance of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions:

(i) Breakaway wall collapse shall result from a water load less than that which would occur during the base flood; and,

(ii) The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and water loads acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards.

Such enclosed space shall be useable solely for parking of vehicles, building access, or storage.

(6) Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, and V on the community's FIRM;

(7) Prohibit man-made alteration of sand dunes and mangrove stands within Zones V1-30, VE, and V on the community's FIRM which would increase potential flood damage.

(8) Require that manufactured homes placed or substantially improved within Zones V1-30, V, and VE on the community's FIRM on sites

(i) Outside of a manufactured home park or subdivision,

(ii) In a new manufactured home park or subdivision,

(iii) In an expansion to an existing manufactured home park or subdivision, or

(iv) In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, meet the standards of paragraphs (e)(2) through (7) of this section and that manufactured homes placed or substantially improved on other sites in an existing manufactured home park or subdivision within Zones V1-30, V, and VE on the community's FIRM meet the requirements of paragraph (c)(12) of this section.

(9) Require that recreational vehicles placed on sites within Zones V1-30, V, and VE on the community's FIRM either

(i) Be on the site for fewer than 180 consecutive days,

(ii) Be fully licensed and ready for highway use, or

(iii) Meet the requirements in paragraphs (b)(1) and (e) (2) through (7) of this section.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions.