FLOODPLAIN MANAGEMENT IN COLORADO

2012

Quick Guide

Colorado Water Conservation Board
www.cwcb.state.co.us

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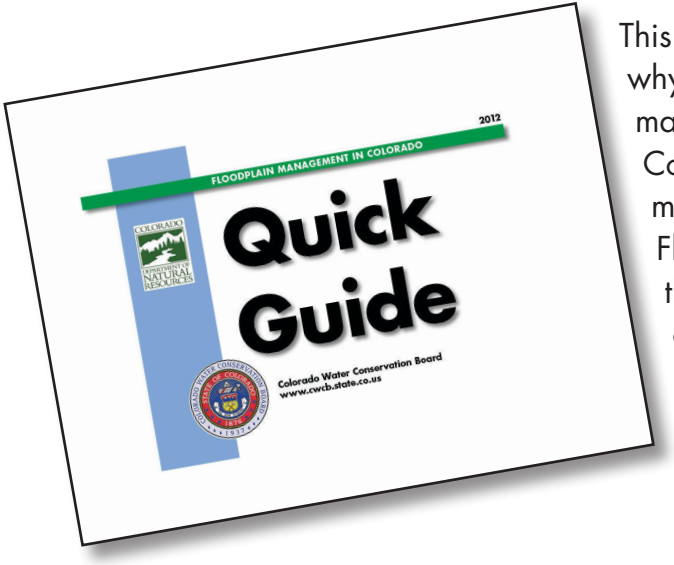
About This Guide



This **Quick Guide** will help you understand more about why and how communities in the State of Colorado manage floodplains to protect people and property. Colorado's floodplain management and flood hazard mitigation programs have been active since 1937. Floodprone communities adopt ordinances that detail the rules and requirements. In case of conflict, that ordinance and not this publication, must be followed. If you have questions, be sure to talk with your local planning or permit office.

The Colorado Water Conservation Board (CWCB) coordinates the National Flood Insurance Program in Colorado. Questions and comments on the **Quick Guide** can be directed to the CWCB at (303) 866-3441. More information about Colorado's Flood Protection Program is on the web at **http://www.cwcb.state.co.us.**

Introduction

The Colorado Water Conservation Board is pleased to provide this floodplain management **Quick Guide** informational tool to citizens and community officials.

Counties and local communities regulate the floodplain to:

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

Floods have been, and continue to be, a destructive natural hazard in terms of economic loss to the citizens of Colorado Since 1978, Federal flood insurance policy holders in Colorado have received over $10 million in claim payments. Floodprone areas have been identified in most of Colorado's counties, cities and towns.

Flood Insurance: Property Owner's Best Protection

Who needs flood insurance? ***EVERYONE!*** Every homeowner, business owner, and renter in one of Colorado's communities that participate in the National Flood Insurance Program may purchase a flood insurance policy - regardless of the location of the building.

Unfortunately, it's often after a flood that many people discover that their 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 Colorado Water Conservation Board and the Colorado Office of Emergency Management 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) 379-9531 or visit www.floodsmart.gov.

Be Flood Safe — Don't Drive Through Flooded Roads

- Flooded roads may be washed out.
- Passenger cars may float in only 18-24 inches of water.
- Floating cars easily get swept downstream, making it hard for rescuers.
- Most people who die in floods are trapped in cars.
- 144 people died in Colorado's deadliest flood, 1976's Big Thompson flood — many were trapped in cars.

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

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 20,000 communities participate in the NFIP — including most of Colorado's communities.

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 adopt and enforce minimum floodplain management regulations so that development, including buildings, is undertaken in ways that reduce exposure to flooding. (see page 8)

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 website www.floodsmart.gov

The NFIP's Community Rating System (CRS)

The NFIP's CRS is a voluntary program that provides communities the opportunity to reduce flood insurance premiums for its citizens. 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
- 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

Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resources Center (see page 52)

Property owners in 46 Colorado communities with a "Class 9" or better rating receive discounts ranging from 5% to 30% for properties in a Special Flood Hazard Area (SFHA) and 5% to 10% for properties not in a SFHA.

Why Do We Regulate the Floodplain?

- **To protect people and property.** Floodplain management is about building smart. It makes good sense. If we know part of our land will flood from time to time, we should make reasonable decisions lo help protect our families, homes, and businesses.

- **To make sure that federal flood insurance and disaster assistance are available.** If your home or business is in the floodplain, and federal flood insurance isn't available, then you can't get some types of federal financial assistance. Home mortgages will be hard lo find, and you won't be able lo get some types of state and federal loans and grants.

- **To save tax dollars.** Every flood disaster affects your community's budget. If we build smarter, we'll have fewer problems the next time the river rises. Remember, federal disaster assistance isn't available for all floods. And even when the President declares a disaster, your community still has to pay a lot to cover the costs of evacuation, temporary housing, repair, and clean-up.

- **To avoid liability and lawsuits.** If we know an area is mapped as floodplain 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 Colorado.** Floodplain development regulations are simply a "good neighbor" policy designed to protect our citizens from future flood losses. It is illegal to do any floodway activity that may increase or divert flood waters onto neighboring properties. This helps keep flooding conditions from getting worse as more and more development takes place.

Community Responsibilities

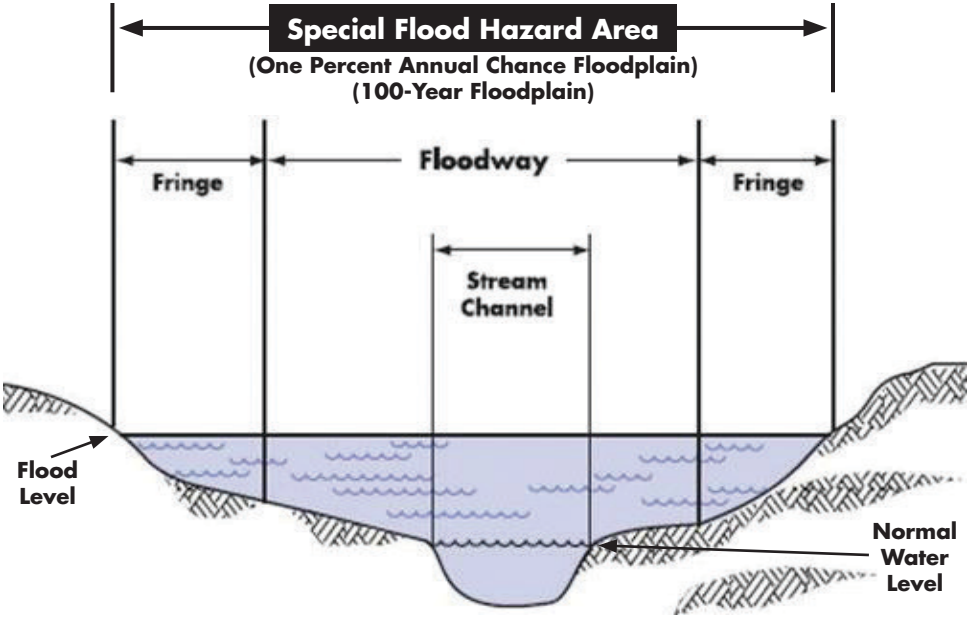
To participate in the National Flood Insurance Program and to be compliant with State floodplain management requirements, your community agrees to:

- **Adopt and enforce** a flood damage prevention ordinance
- **Require** permits for all types of development in the floodplain (see page 23)
- **Assure** that building sites are reasonably safe from flooding
- **Require** new or improved homes and manufactured homes to be elevated one foot above the Base Flood Elevation (BFE)
- **Require** non-residential buildings to be elevated or floodproofed
- **Conduct** field inspections and cite violations
- **Require** Elevation Certificates to document compliance (see pages 31 and 32)
- **Carefully consider** requests for variances
- **Advise** FEMA when updates to flood maps are needed

BE FLOOD ALERT

NATIONAL FLOOD INSURANCE PROGRAM

Understanding the Riverine Floodplain



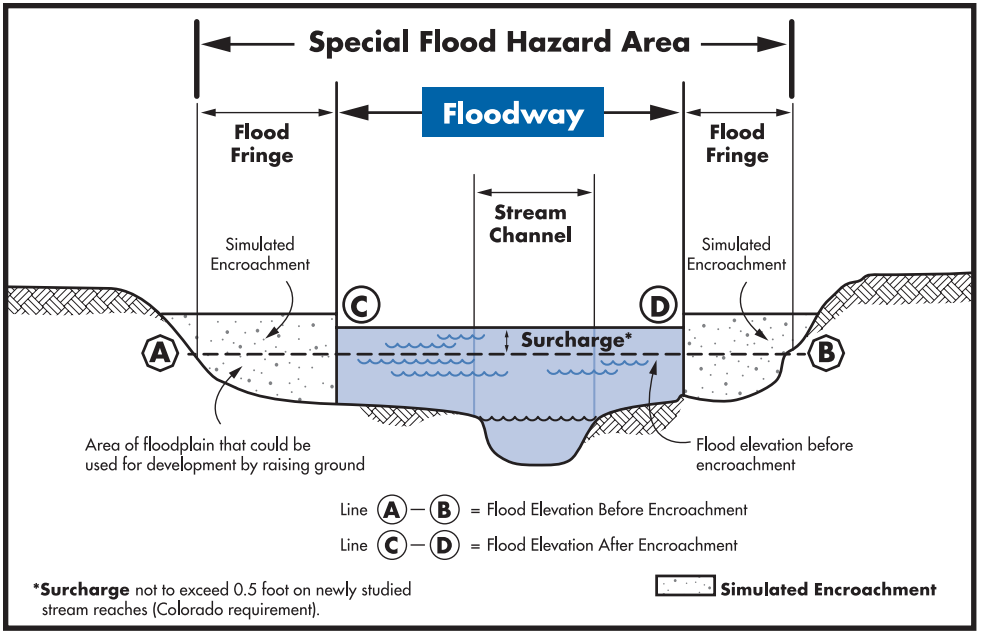
Terms and Definitions

The **Special Flood Hazard Area (SFHA)** is that portion of the floodplain subject to innundation 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 page 10 to learn about the floodway, the area of the floodplain where floodwaters usually flow faster and deeper.

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 (see page 17).

Understanding the Floodway



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.

For any proposed floodway development, before a local floodplain permit can be issued, the applicant must provide evidence that "no rise" will occur or obtain a Conditional Letter of Map Revision (CLOMR) (page 35). You will need a qualified engineer to make sure your proposed project won't increase flooding on other properties.

Natural and Beneficial Floodplain Function

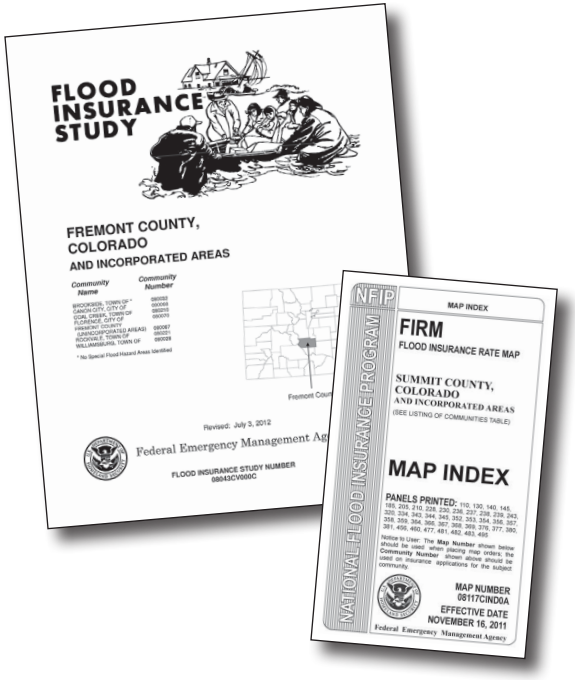
Undeveloped floodplains can serve natural and beneficial functions. They:

- Store flood water and stormwater.
- Enhance water quality by filtering runoff through wetlands.
- Offer habitats for plants and animals.
- Sustain biological productivity.
- Reduce erosion and sediment runoff.
- Offer recreation opportunities.

"No Adverse Impact" (NAI) floodplain management is essentially a "do-no-harm" policy based on the concept that the actions of any community or property owner should not adversely affect others. It calls for identifying the potential direct and indirect adverse impacts of any development action on people, property and the environment. Adverse impacts must be avoided or mitigated.

The Association of State Floodplain Managers, Inc. developed the the NAI concept in response to rising flood damages, even though communities administer floodplain management ordinances. At http://www.floods.org, click on the NAI tab to download publications, the NAI Tool Kit and PowerPoint as well as several documents about legal issues.

Looking for Floodplain Information?

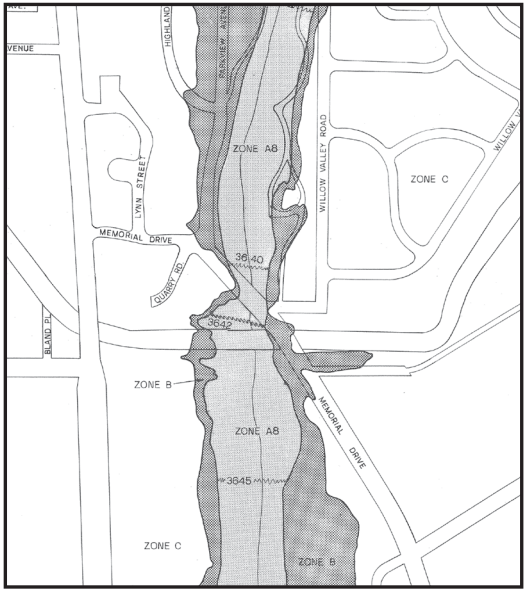


- View online flood maps or order paper copies of the flood maps at the FEMA Map Service Center at http://www.msc.fema.gov.
- FEMA prepares **Flood Insurance Studies** and **Flood Insurance Rate Maps** (FIRMs) for Colorado's communities.
- Most FIRMs show special flood hazard areas and floodways. Some FIRMs show floodplains delineated using approximate analyses (see page 19).
- Floodplain Information Reports may be produced by local governments, slate and federal agencies, special districts, or by engineering companies working for private property owners and developers. Reports must be approved by CWCB (see page 20).
- Not all waterways have designated floodplains - but all waterways will flood, even though a floodplain study may not have been prepared.

Flood Maps and Flood Insurance Studies should be available for viewing at your local planning or permit office.

Online Flood Map Tools

You can view FIRMs and print clips from FIRMs called FIRMettes by using FEMA's online tools at the FEMA Map Service Center at: http://www.msc.fema.gov/.

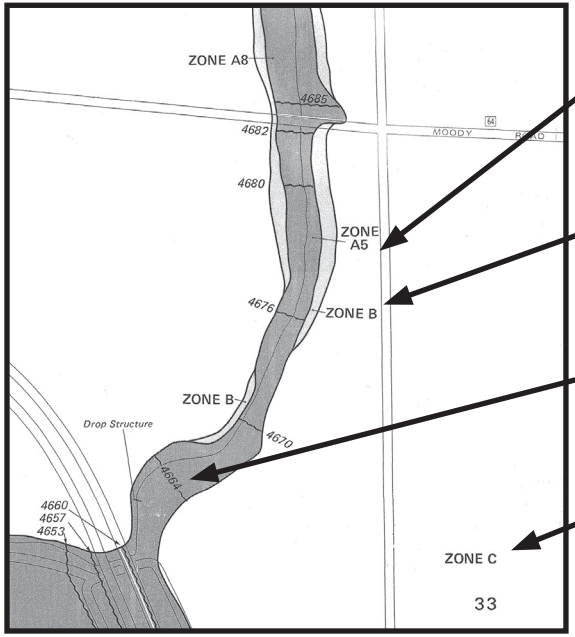


From the Map Service Center you can:

- Locate a FIRM by state, county and community and FIRM panel.
- Zoom in or out to view a specific area of a FIRM.
- Create a FIRMette showing a specific area of the FIRM, the FIRM Title Block, north arrow and FIRM approximate scale.
- Print the FIRMette.
- Save the FIRMette as an Adobe PDF or an image file.
- Click on "What is a FIRMette?" on the Map Service Center web page for detailed instructions on how to make a FIRMette.

From the Map Service Center you can also purchase a CD-ROM containing the FIRMs and related information for your community.

Old Format Flood Insurance Rate Map



FLOOD HAZARD ZONES

1. **Zone A, Zones A1-A30 and Zone AE** are subject to flooding by the base or 1% annual chance (100-year) flood, and are considered high risk areas.

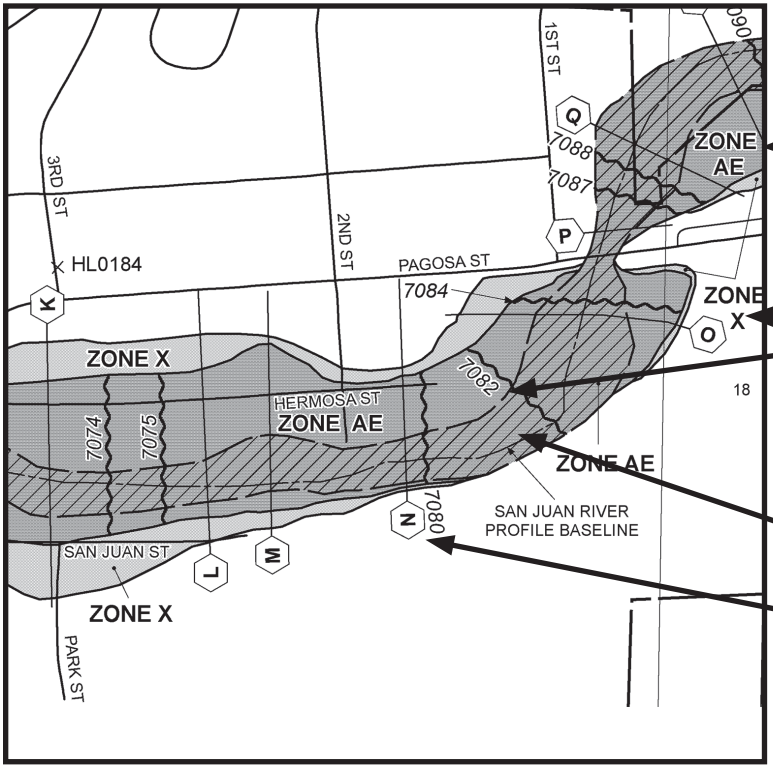
2. **Zone B** (or shaded Zone X) is subject to flooding by the 0.2% annual chance (500-year) flood, and is a moderate risk area.

3. **Base Flood Elevation (BFE)**.
Water surface elevation of the base flood at specific locations.

4. **Zone C** (or Zone X) is all other areas, considered to be low risk.

FEMA prepares Flood Insurance Rate Maps (FIRMs) to show areas that are at high risk of flooding after intense or major storms. Most FIRMs show the flood elevation (how high the water may rise), called the Base Flood Elevation.

Flood Insurance Rate Map



1. **Zone AE** is the 1%-annual chance (100-year) floodplain with BFEs (also called Zone A1- A30).
2. **Zone X** (shaded or unshaded) is all other areas considered low risk (formerly Zone B or C).
3. **Base Flood Elevation (BFE)** is the water surface elevation, rounded to the nearest foot, of the base flood at specific locations.
4. The **Floodway** is the cross-hatched area.
5. **Cross Section** location.

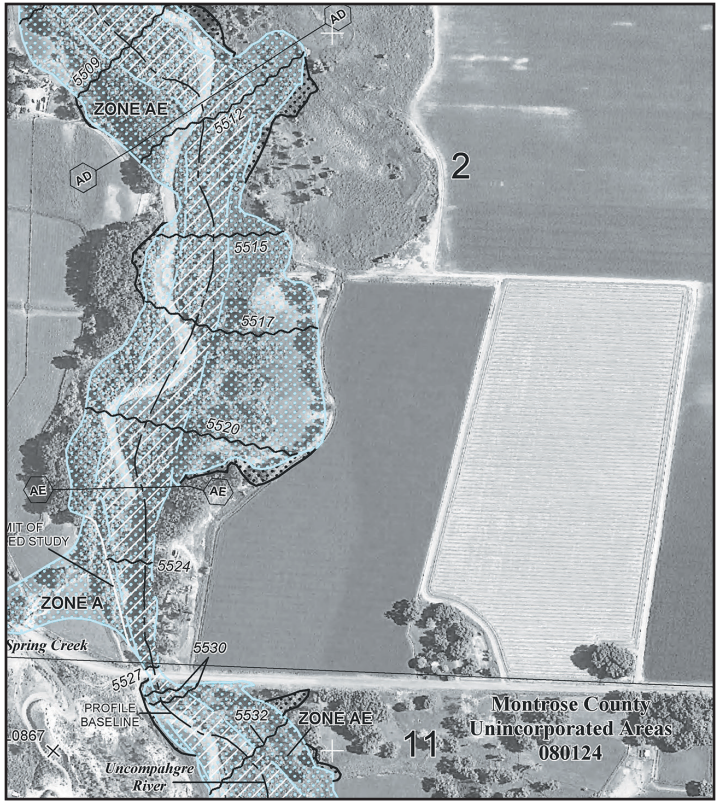
The Countywide Digital FIRM

FEMA, in cooperation with state, local and business partners is producing countywide Digital Flood Insurance Rate Maps (DFIRMs) through the Map Modernization program.

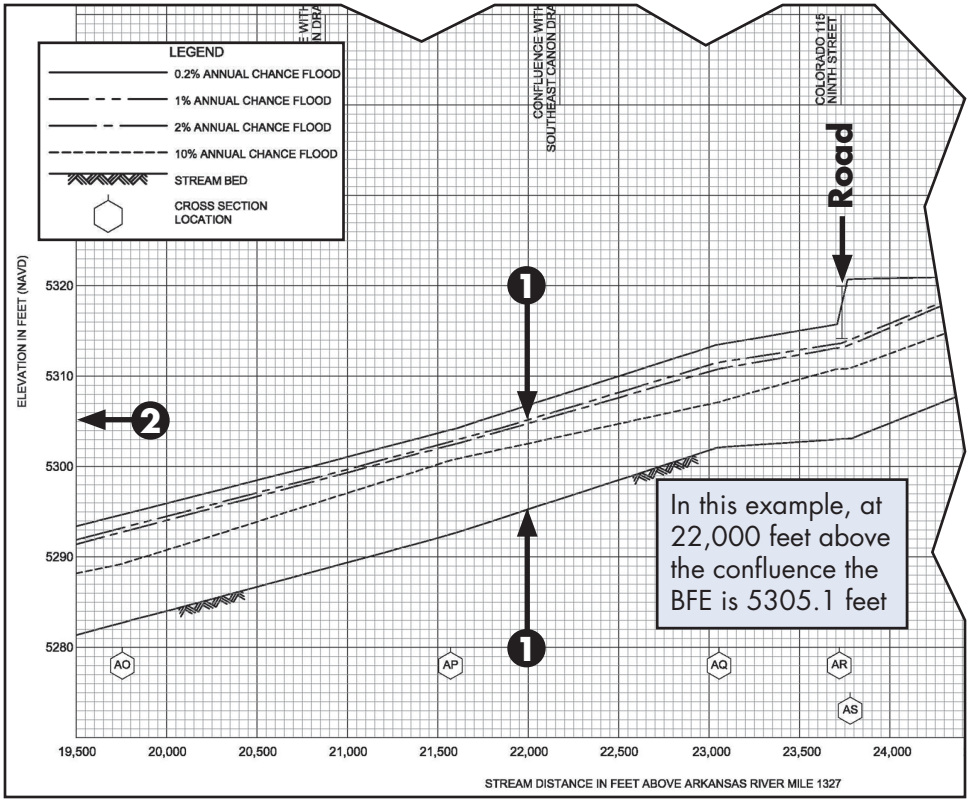
DFIRMs are in an industry-standard Geographic Information System format, that allows users to view information in a graphical format and add or remove layers of data according to their needs.

The flood risk zones, street names jurisdictional boundaries and other data can be overlaid on aerial photographs. The new map format enables more efficient and accurate flood risk determinations.

Visit http://www.coloradofloodrisk.state.co.us/ for more information on DFIRMs and Colorado's floodplain mapping program.



Use the Stream 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.

1. On the Flood Insurance Rate Map, locate your site by measuring the distance along the centerline of the stream channel from a cross section, for example, AP or AQ.

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

Floodway Data Tables

The Floodway delineates that portion of the SFHA that must be reserved to convey the Base Flood without increasing the water surface elevation more than the amount specified in the Floodway Table.

FLOODING SOURCE		FLOODWAY			1-PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
ARKANSAS RIVER A-AO[2]								
AP	21,578	350	2,011	10.9	5,302.8	5,302.8	5,303.4	0.6
AQ	23,058	370	1,922	11.4	5,311.6	5,311.6	5,311.6	0.0
AR	23,728	168	1,789	12.3	5,313.7	5,313.7	5,314.6	0.9
AS	23,788	200	2,197	10.0	5,314.0	5,314.0	5,314.9	0.9
AT	25,508	154	1,432	15.4	5,321.3	5,321.3	5,321.3	0.0
AU	25,538	186	1,1968	11.2	5,322.3	5,322.3	5,322.3	0.0
AV	26,618	120	1,215	18.1 ❶	5,327.3 ❷	5,327.3	5,327.3	0.0 ❸

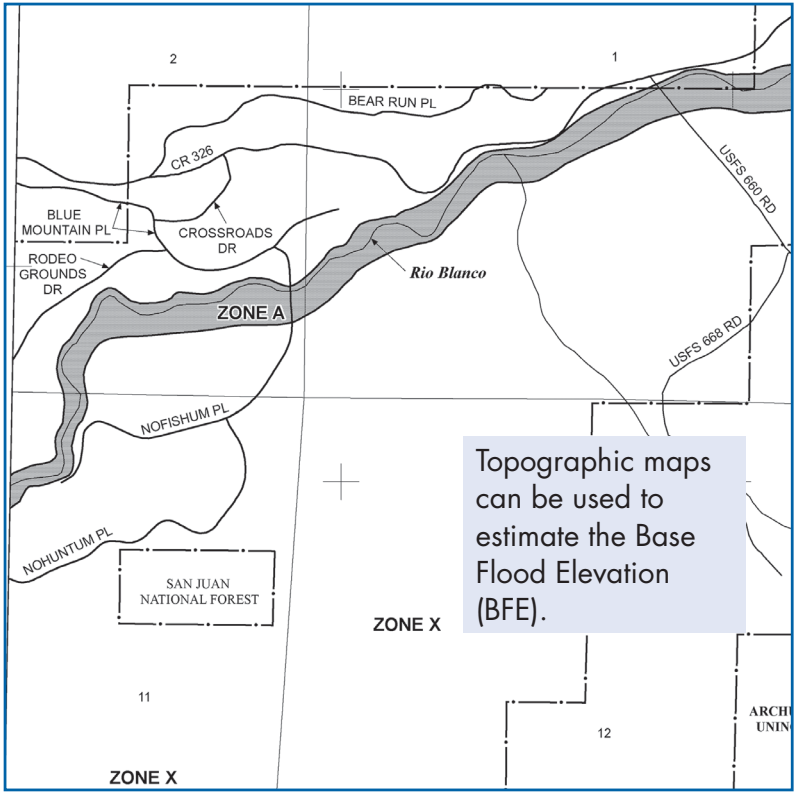
The Flood Insurance Study (FIS) has a Floodway Table for every waterway that was studied by detailed methods for which floodways were delineated.

❶ This is the only readily available velocity data to use in computations of hydrodynamic loads.

❷ Computed BFE (rounded values are shown on the FIRM).

❸ Amount of allowable increase - not more than 1 foot for older studies and 0.5 foot for new studies at any location.

Approximate Zone A

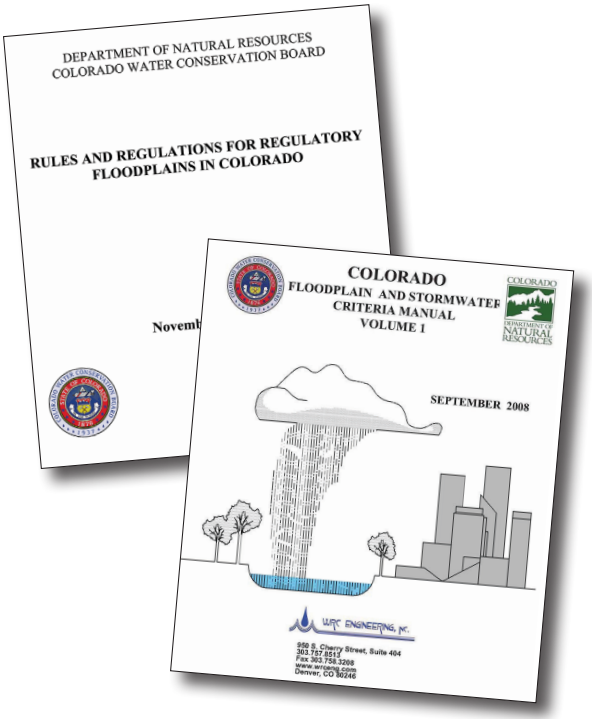


Topographic maps can be used to estimate the Base Flood Elevation (BFE).

Approximate A zones are drawn based on existing information, not engineering studies. FEMA checked with the U.S. Army Corps of Engineers, the U. S. Geological Survey, the State, local offices, and historic records. When existing information was lacking, an approximate delineation was performed.

If you need help in determining the BFE, check with the Colorado Water Conservation Board or your community's planning, engineering or permit office. FEMA publication *Managing Floodplain Development in Approximate Zone A Areas* (FEMA 265) is useful for engineers.

Designation and Approval of Floodplain Information



- The cornerstone of reliable floodplain management is good floodplain mapping.
- Your community may require you to provide new floodplain information, for example if the current map shows only approximate flood information. If development proposals involve more than 5 acres or 50 lots, then federal regulations require permit applicants to provide detailed information.
- New engineering studies typically are required for some projects that involve changing the floodplain, for example placing large quantities of fill or altering a waterway.
- CWCB must approve and designate new floodplain studies and information that are to be used for regulatory uses. To learn more about this process, download CWCB's Floodplain and Stormwater Criteria Manual and Rules and Regulations for Regulatory Floodplains in Colorado.
- You will have to hire an engineer if your community requires you to have a flood study done to support your project. To speed the review, engineers are encouraged to download CWCB's guidelines.

Download CWCB guidelines and brochures at www.cwcb.state.co.us

Letters of Map Change

1. **Letter of Map Amendment (LOMA)** is an official change to an effective FIRM that may be issued when a property owner provides additional technical information such as ground elevation relative to the BFE, SFHA and the building. Lenders may waive the flood insurance requirement if the LOMA documents a structure on ground is above the mapped floodplain.

2. **Letter of Map Revision (LOMR)** is an official change to an effective FIRM that may be issued to change flood insurance risk zones, floodplain and boundary delineations, BFEs, and/or other map features. Lenders may waive the flood insurance requirement if the approved map revision shows structures to be outside of the SFHA.

3. **Letter of Map Revision Based on Fill (LOMR-F)** is an official change 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 BFE, and therefore is no longer in the SFHA. Lenders may waive the flood insurance requirement if the LOMR-F shows a structure on fill is above the BFE and outside of the SFHA. Areas removed from the floodplain by a LOMR-F are subject to development regulations.

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

Important Information

Check FEMA's Flood Hazard Mapping website for more information about map revisions concerning homeowners, engineers, and surveyors.

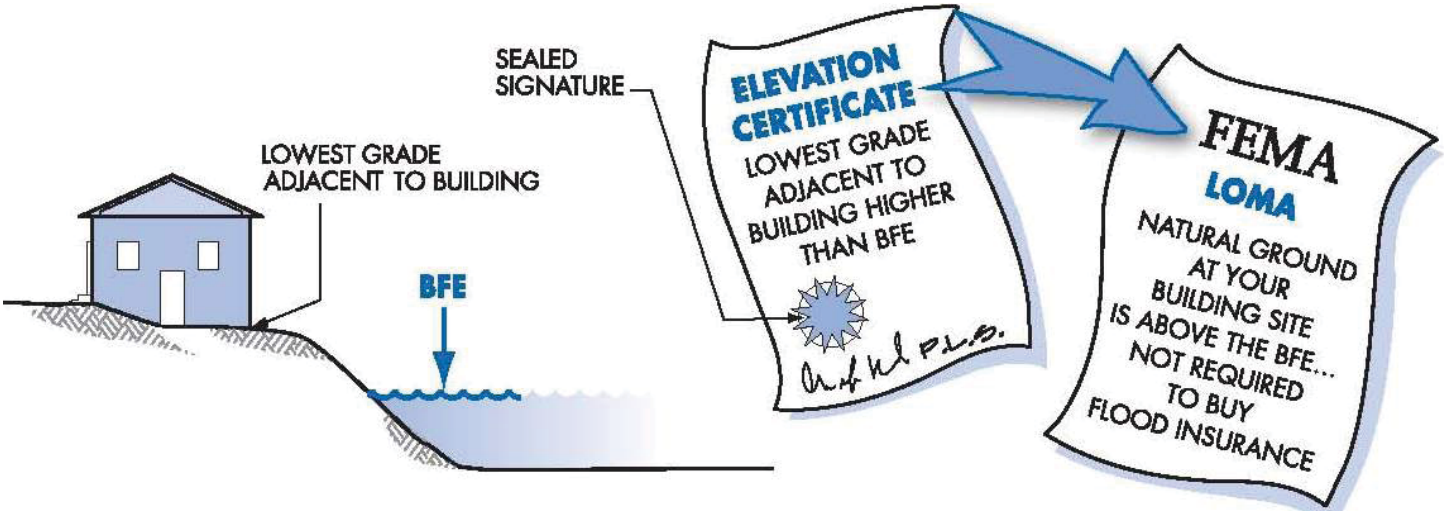
To·leam the Status of Map Change Requests, call FEMA's Map Service Center at 1-877-FEMA-MAP (1-877-336-2627).

Information:
http://www.fema.gov/status-map-change-requests

Forms:
http://www.fema.gov/forms

Requests for map revision must be endorsed by your community

Is Your Building Site Higher than the BFE?



If your land is shown on the mop as "in" the floodplain, but your building site is higher than the Base Flood Elevation (BFE)... get a surveyor or engineer to complete a FEMA Elevation Certificate (EC). Submit the EC with an application to FEMA and a Letter of Map Amendment may be issued (page 21). This is the **ONLY** way to remove the requirement to buy flood insurance. Keep the certificate with your deed, it will help future buyers.

Activities Requiring Permits Include

- Constructing new buildings
- Additions to existing buildings
- Substantially improving existing buildings
- Placing manufactured (mobile) homes
- Subdivision of land
- Temporary buildings and accessory structures .
- Agricultural buildings
- Parking or storage of recreational vehicles
- Storing materials, including gas/liquid tanks
- Roads, bridges, and culverts
- Fill, grading, excavation, mining, and dredging
- Altering stream channels

YOU NEED PERMITS FOR **ALL** OF THESE ACTIVITIES

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 state and federal permits been obtained?
- Does the site plan show the Base Flood Elevation?
- 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?
- Has the owner submitted an Elevation Certificate?

Carefully Complete the Permit Application

Owner's Name:
DAVID & SALLY JONES

Site Address, Tax #, Parcel #:
781 REED STREET, 400-35A-002

A. Description of Work

1. Proposed Development Description:

- [x] New Construction
- [ ] Dredging
- [x] Alteration or Repair
- [ ] Manufactured/Modular
- [x] Filling
- [ ] Logging
- [ ] Grading
- [ ] Other

2. Size and Location of Development

SINGLE FAMILY (2,000 CY FILL);
FLOOD FRINGE OF OAK CREEK

3. Type of Construction

- [x] New Residential
- [ ] Improvement
- [ ] New Non-Residential
- [x] Renovation
- [ ] Addition
- [x] Accessory structure
- [ ] Temporary

Applicant's Signature: David M. Jones

Part of a Sample Application

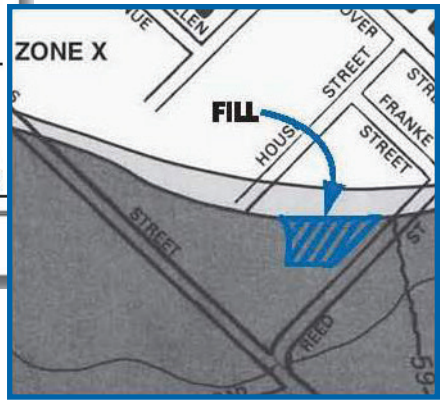
(may vary by community)

Community, Map, and Elevation Data:

1. Community No: 570171
2. Panel No: 5720512700J
3. Zone AE
4. Base Flood Elevation 59.2
5. Required Lowest Floor Elevation (including basement) 60.2
6. If floodproofed, required floodproofing elevation N/A
7. Elevation to which all attendant utilities, including all heating, duct work, and electrical equipment will be installed or floodproofed: 60.2

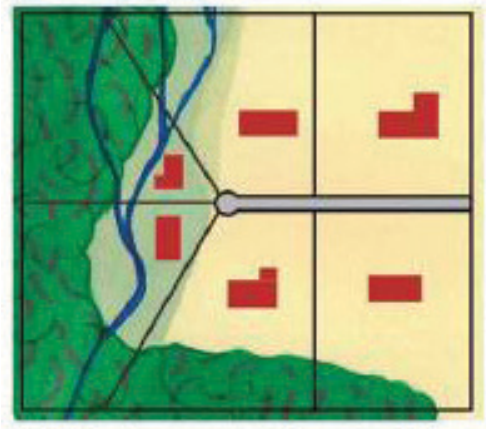
Important Information

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

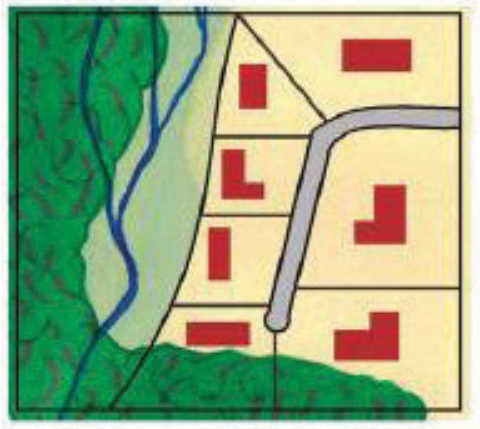


Good information will lead to better construction and less exposure to future flood damage.

Safe Uses of the Floodplain



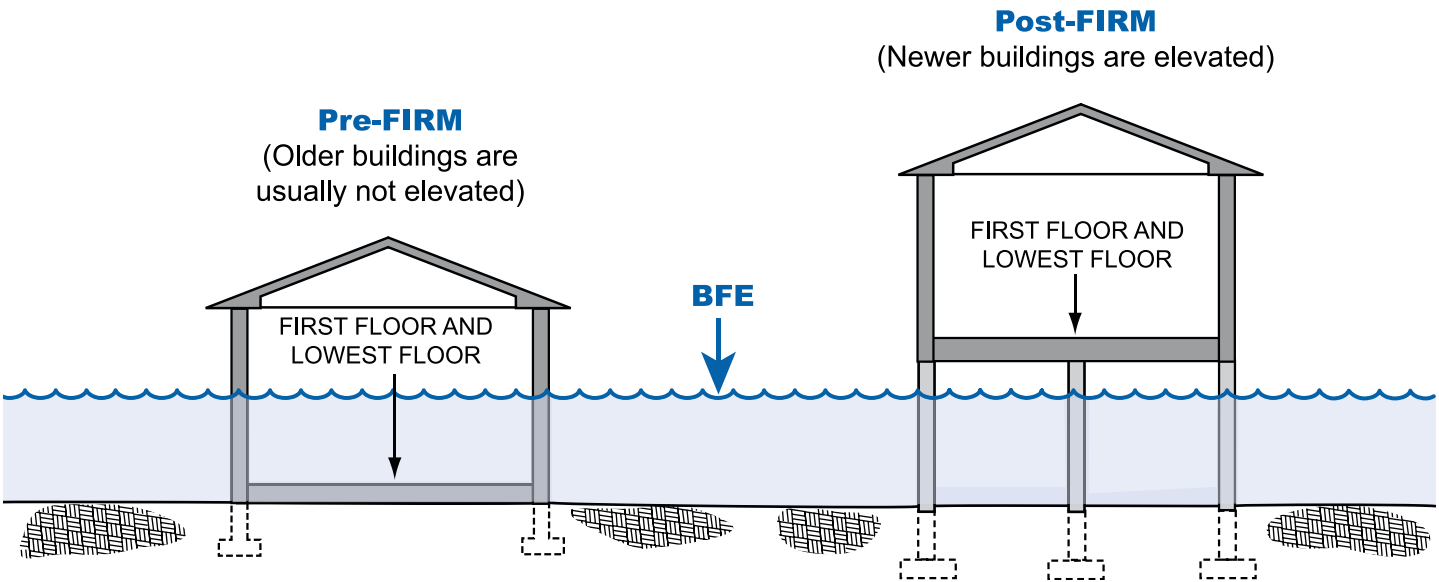
All land subdivided into lots, some homesites and lots partially or entirely in the floodplain.
NOT RECOMMENDED



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

Let the floodplain do its job — if possible, keep it natural open space. Other low damage uses: recreational areas, playgrounds, reforestation, parking, gardens, pasure, accessory structures, created wetlands.

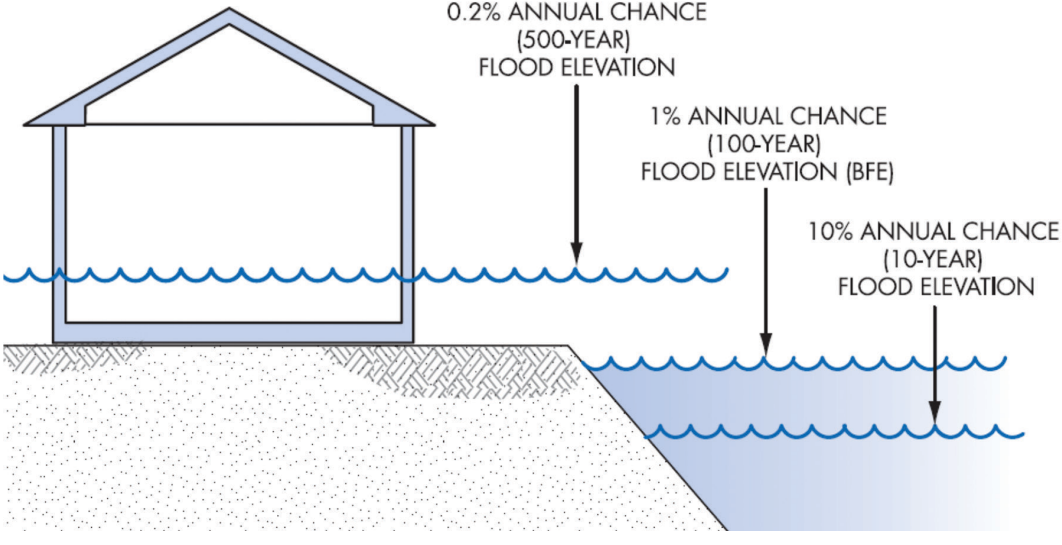
What is Meant by Pre-FIRM and Post-FIRM?



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

Improvements or repairs to Pre-FIRM buildings may require permits (see page 23).

Nature Doesn't Read Maps

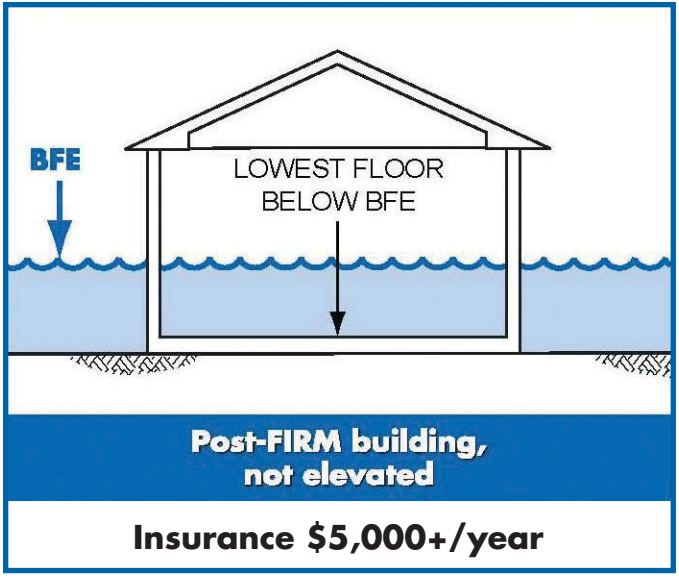


Important Information

Flash Floods
Flash floods are the #1 weather-related killer in the U.S. since they can roll boulders, tear out trees, and destroy buildings and bridges. A flash flood is a rapid flooding of low-lying areas in less than six hours, which is caused by intense rainfall from a thunderstorm or several thunderstorms. Flash floods can also occur from the collapse of a man-made structure or ice dam.

CAUTION! Nature doesn't read the flood map! Major storms and flash floods can cause flooding that rises higher than the 100-year elevation (BFE). Consider safety - protect your home or business by building higher. See page 30 to see how this will save you money on insurance.

Think Carefully Before You Seek a Variance



Very specific conditions must be satisfied to justify a variance:

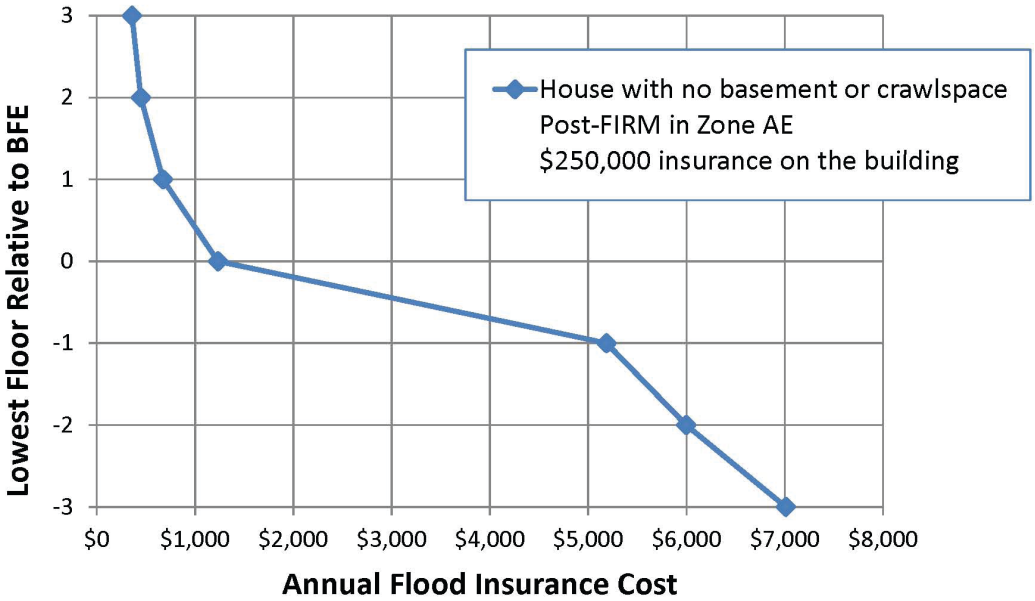
- Good and sufficient cause
- Unique site conditions
- Individual non-economic hardship
- If in the floodway, no increase in flood level

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 (see page 30)!

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!

Freeboard: Go the Extra Foot!

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 or two feet above the BFE. In Colorado, one foot of freeboard is required for residential and non-residential structures and critical facilities must have two feet of freeboard.



Important Information

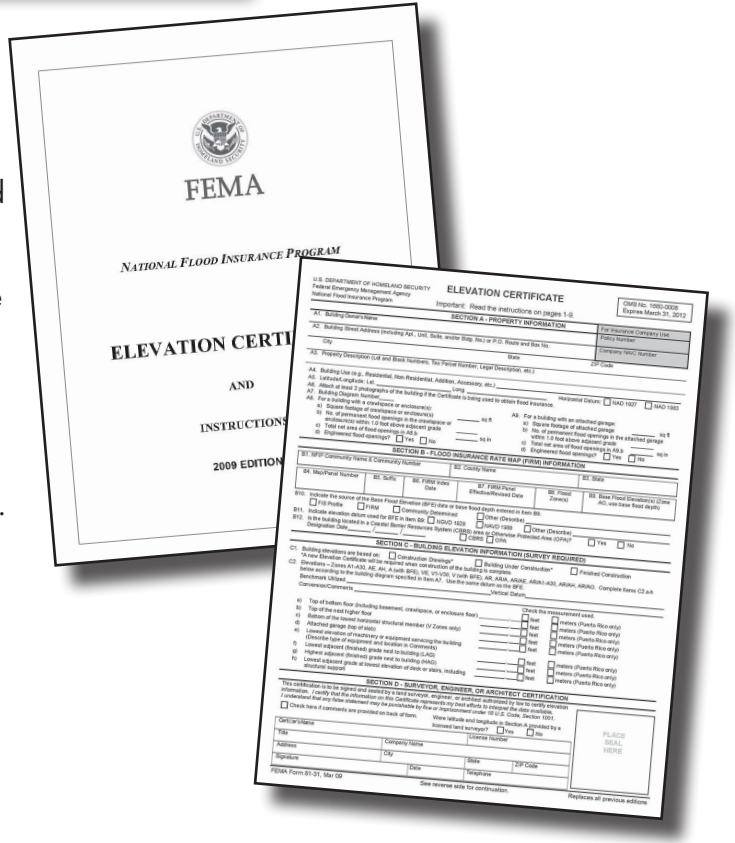
NOTE: Flood insurance rates and various fees change from time to time. Rather than specific costs for insurance, this figure gives a feel for how much difference just a foot or two can make.

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 over $5,000 a year!

What is the Elevation Certificate and How is it Used?

- The Elevation Certificate (EC) is a FEMA form, download a copy from the FEMA website **http://www.fema.gov/forms/**
- The EC must be completed and sealed by a registered surveyor or engineer when the floodplain has BFEs.
- A community official or property owner may complete the EC for sites in approximate flood zones.
- It can be used to show that sites are natural ground above the Base Flood Elevation (see page 22).
- It is used to verify that buildings are elevated properly.
- Insurance agents use the EC to write flood insurance policies.
- By itself, the EC cannot be used to waive the requirement to get flood insurance. See page 22 to learn about Letters of Map Amendment.



Completing the Elevation Certificate

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-h below according to the building diagram specified in Item A7. Use the same datum as the BFE.

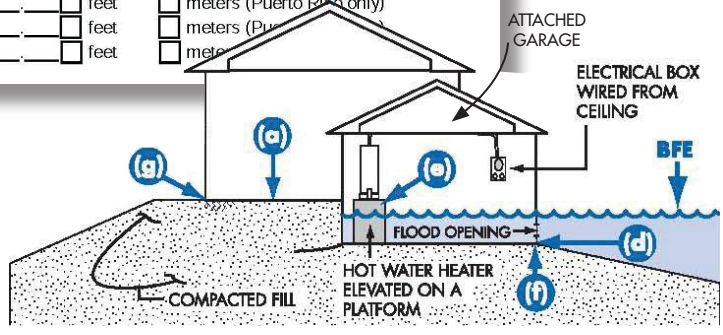
Benchmark Utilized BM66 Vertical Datum NAVD 1988

Conversion/Comments

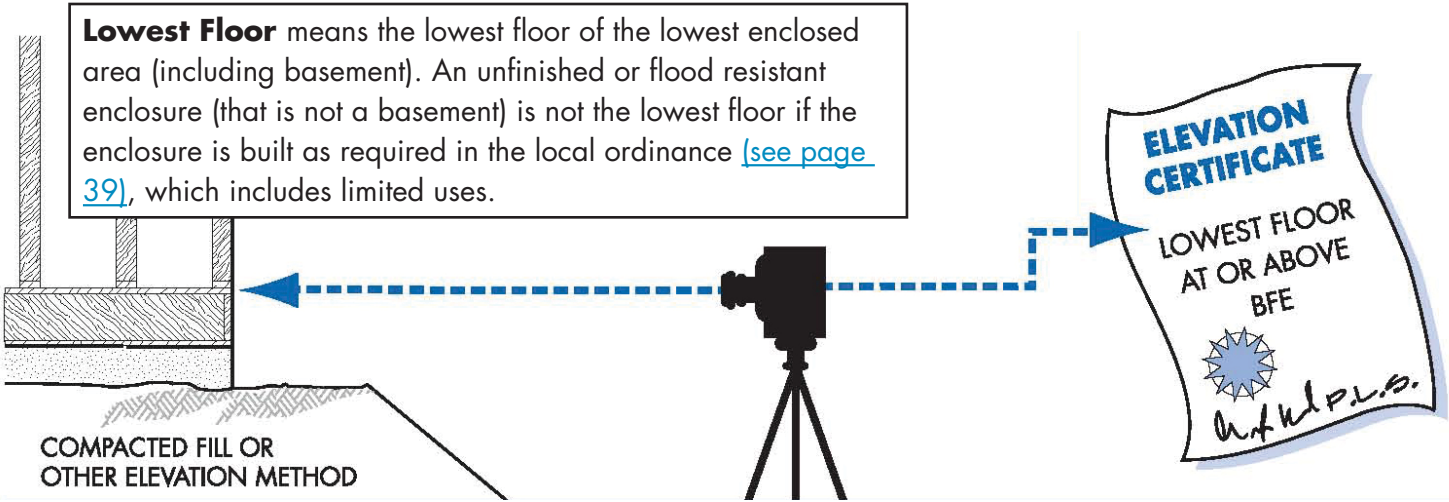
			Check the measurement used.	
a)	Top of bottom floor (including basement, crawlspace, or enclosure floor)	4,286	■ feet	☐ meters (Puerto Rico only)
b)	Top of the next higher floor	N/A	☐ feet	☐ meters (Puerto Rico only)
c)	Bottom of the lowest horizontal structural member (V Zones only)	N/A	☐ feet	☐ meters (Puerto Rico only)
d)	Attached garage (top of slab)	4,282	☐ feet	☐ meters (Puerto Rico only)
e)	Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	4,286	☐ feet	☐ meters (Puerto Rico only)
f)	Lowest adjacent (finished) grade next to building (LAG)	4,286	☐ feet	☐ meters (Puerto Rico only)
g)	Highest adjacent (finished) grade next to building (HAG)	4,286	☐ feet	☐ meters (Pu
h)	Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	4,286	☐ feet	☐ mete

In this example, the BFE is 4,285.

The slab-on-grade house was elevated on fill 1′ above the BFE, and the vented garage is 3′ below the BFE.



You will get a blank Elevation Certificate form when you get your permit. You must hove a surveyor or engineer fill it out and seal it. The Elevation Certificate indudes diagrams for eight buildings types. Several points must be surveyed.



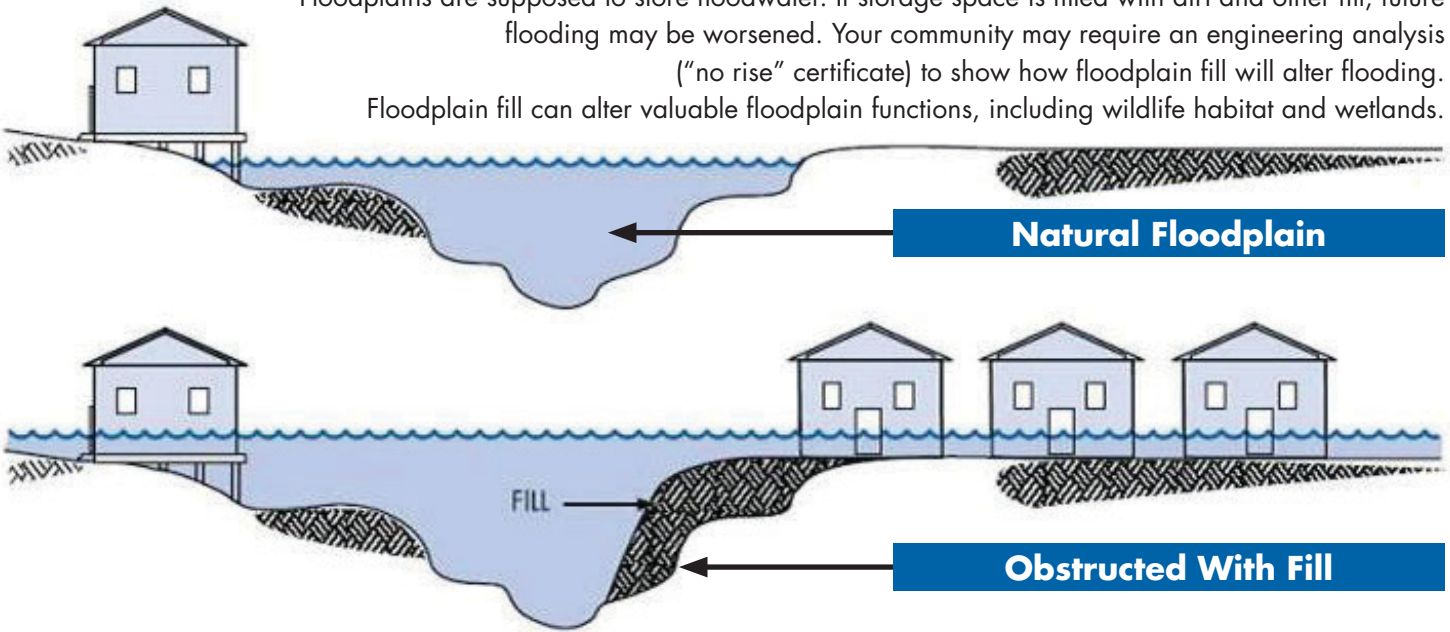
If you get a permit to build in the floodplain, you will be given an Elevation Certificate form. As soon as your lowest floor is set, get the form filled out and sealed by a surveyor or engineer. An "as-build" survey and Elevation Certificate will be required when construction is completed.

This form is important!

It proves that you built correctly, and it can be used to get the lowest cost flood insurance.

Floodplain Fill Can Make Things Worse

Floodplains are supposed to store floodwater. If storage space is filled with dirt and other fill, future flooding may be worsened. Your community may require an engineering analysis ("no rise" certificate) to show how floodplain fill will alter flooding. Floodplain fill can alter valuable floodplain functions, including wildlife habitat and wetlands.



Make sure your floodplain fill project won't harm your neighbors. Floodway fill is allowed **only** if on engineering evaluation demonstrates that "no-rise" in flood level will occur (see page 35).

The Floodway "No Rise" Certification

- Floodways can be dangerous because water may flow very fast
- Development is not allowed unless "no rise" in flood levels is certified. "No rise" means no increase in flood elevations greater than 0.00 feet.
- An engineer must evaluate the hydraulic impact of proposed development
- A "no rise" certification must be signed, sealed, and dated by a registered professional engineer
- Check with CWCB for guidance before you decide to work in a floodway

ENGINEERING "NO-RISE" CERTIFICATION *(example)*

BE FLOOD ALERT
NATIONAL FLOOD INSURANCE PROGRAM

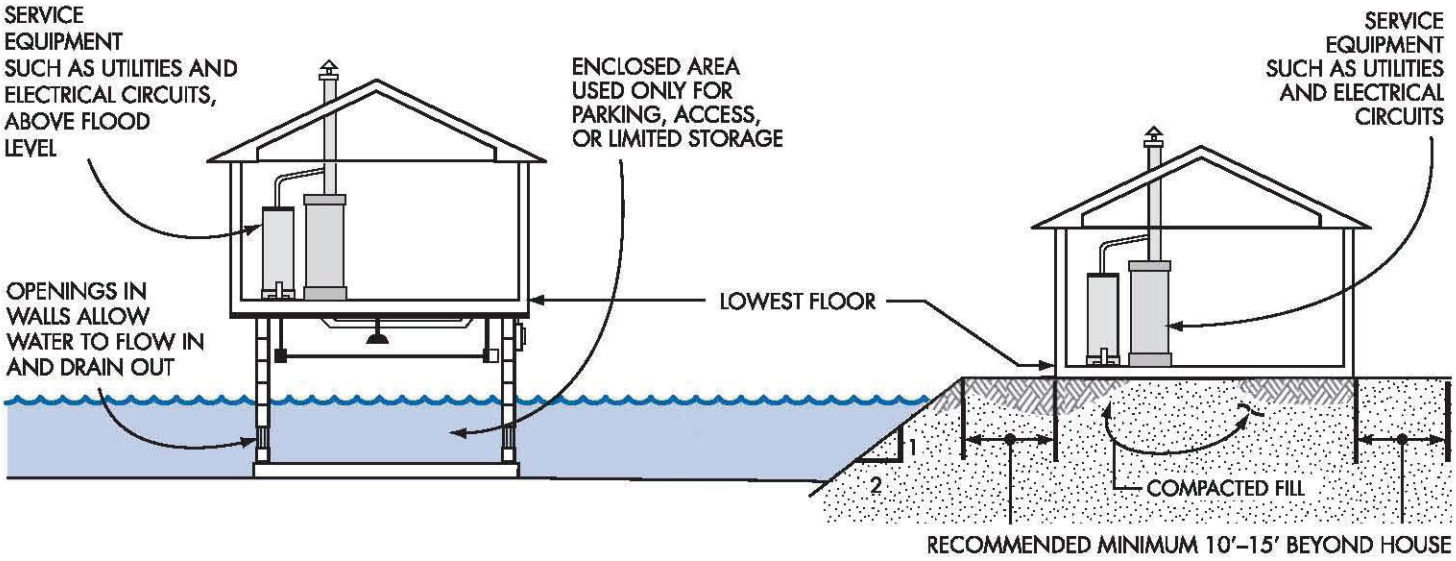
This is to certify that I am a duly qualified engineer licensed to practice in the State of Colorado. It is to further certify that the attached technical data supports the fact that proposed ***(Name of Development)*** will not impact the Base Flood Elevations (100-year flood), floodway elevations and the floodway widths on ***(Name of Stream)***.

Signature _____ *Seal* _____

The engineering analysis must be based on technical data obtained from FEMA.
Save time and money - don't build in the floodway!

Elevate on Foundation Walls

Elevate on Fill

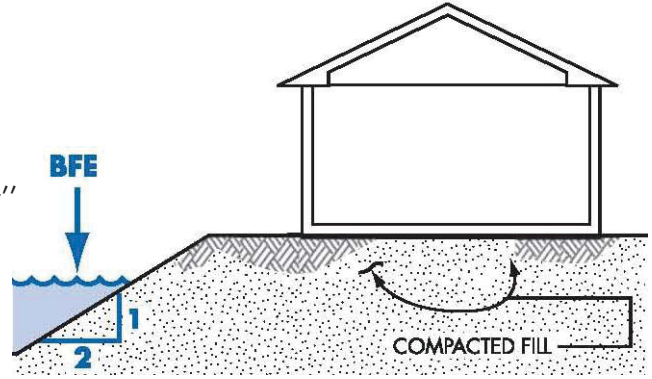


CAUTION! Enclosures (including crawlspaces) have some special requirements, see page 39.
Note: When the walking surface of the lowest floor is at the minimum elevation, under-floor utilities are not allowed.
Fill used to elevate buildings must be placed property (see page 37).

Certification of Floodplain Fill

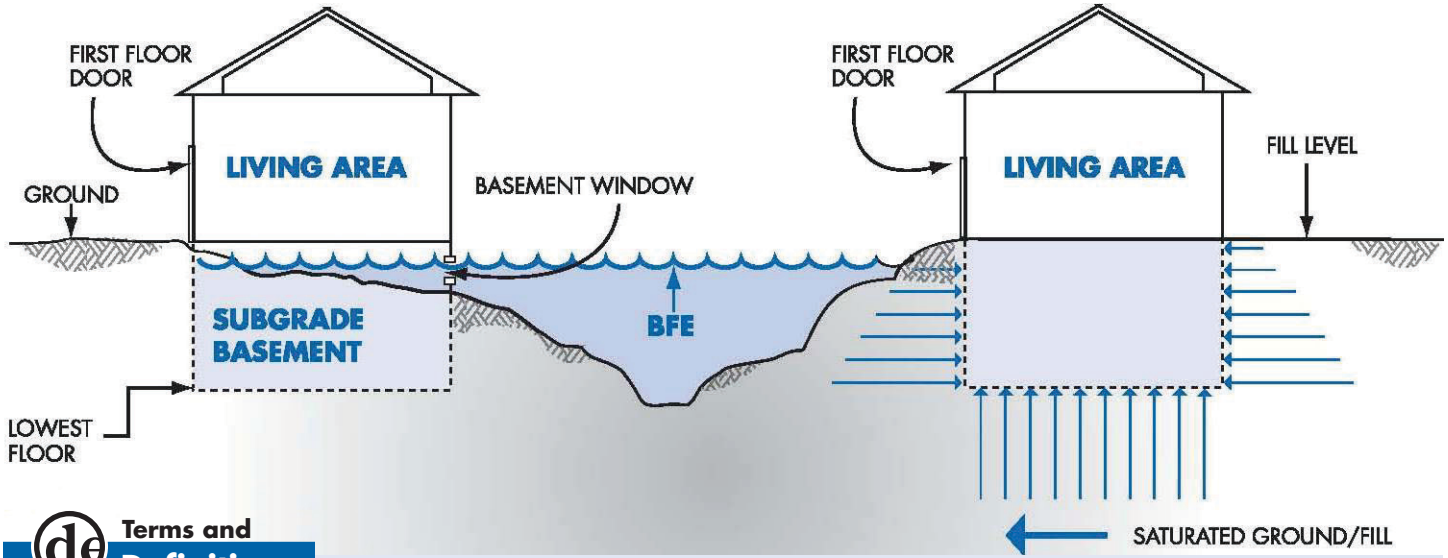
Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet floodplain requirements, floodplain fill must:

- 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)
- Have graded side slopes that are not steeper than 1:2 (one foot vertical rise for every 2 feet horizontal extent)
- Have slopes protected against erosion (vegetation for "low" velocities, durable materials for "high" velocities – determined by design professional)



Your community will require certification of the elevation, compaction, slope, and slope protection materials in order to determine that the proposed structure will be "reasonably safe from flooding."

Basements Are Especially Floodprone



Terms and Definitions

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

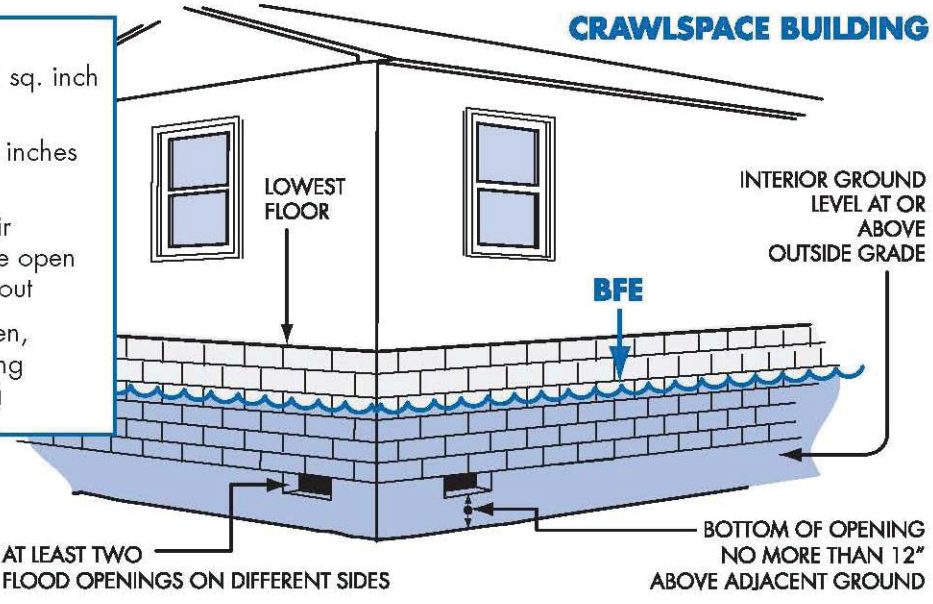
Basements below the BFE are not allowed in new development and flood insurance coverage is very limited in existing basements for a very good reason. It only takes an inch of water over the sill and the entire basement can fill up! Excavating a basement into fill doesn't always make it safe because saturated groundwater can damage the wells. Basements below the BFE are not allowed in areas removed from the floodplain by a LOMR-F.

Enclosures Below the Lowest Floor

NOTE:

- Total net area of all total openings is 1 sq. inch per sq. foot of enclosed area
- A 30′ x 40′ building needs 1,200 sq. inches of openings
- If inserted in flood openings, typical air ventilation units must be disabled in the open position to allow water to flow in and out
- A typical air ventilation unit, with screen, provides 42 to 65 sq. inches of opening (look for "net free area" stamp on unit)

ALTERNATIVE: Engineered openings are acceptable **if certified** to allow adequate automatic inflow and outflow of floodwaters.

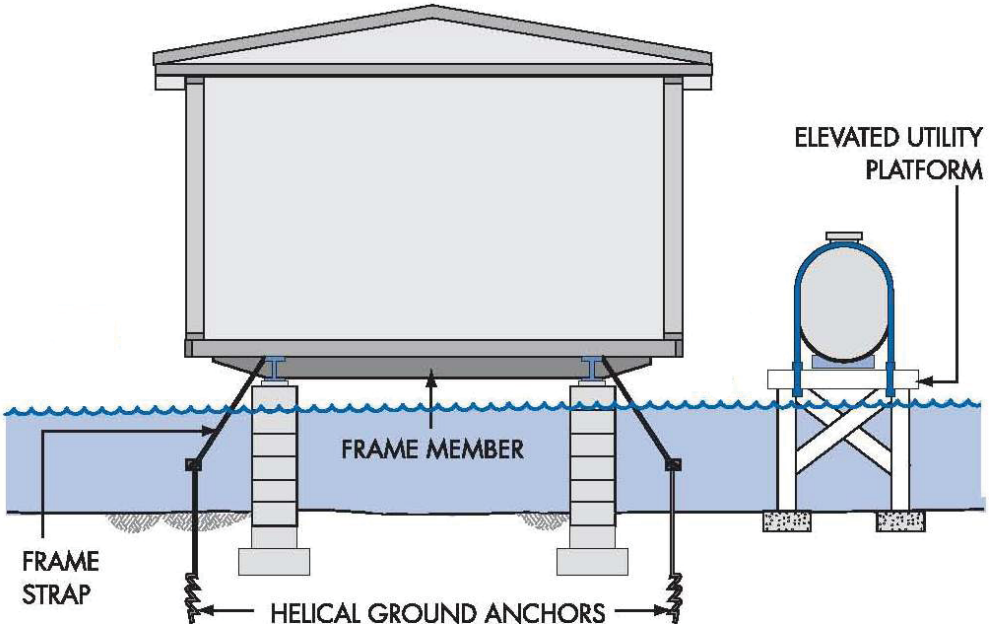


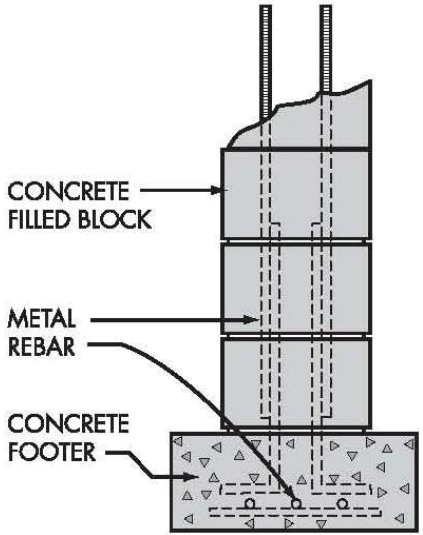
Solid perimeter wall foundations can enclose floodprone space. A crawlspace is a good way to elevate just a couple of feet. In all cases, the following are required: openings/vents, elevated utilities, flood resistant materials, and limitations on use.

Manufactured Homes Deserve Special Attention

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

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



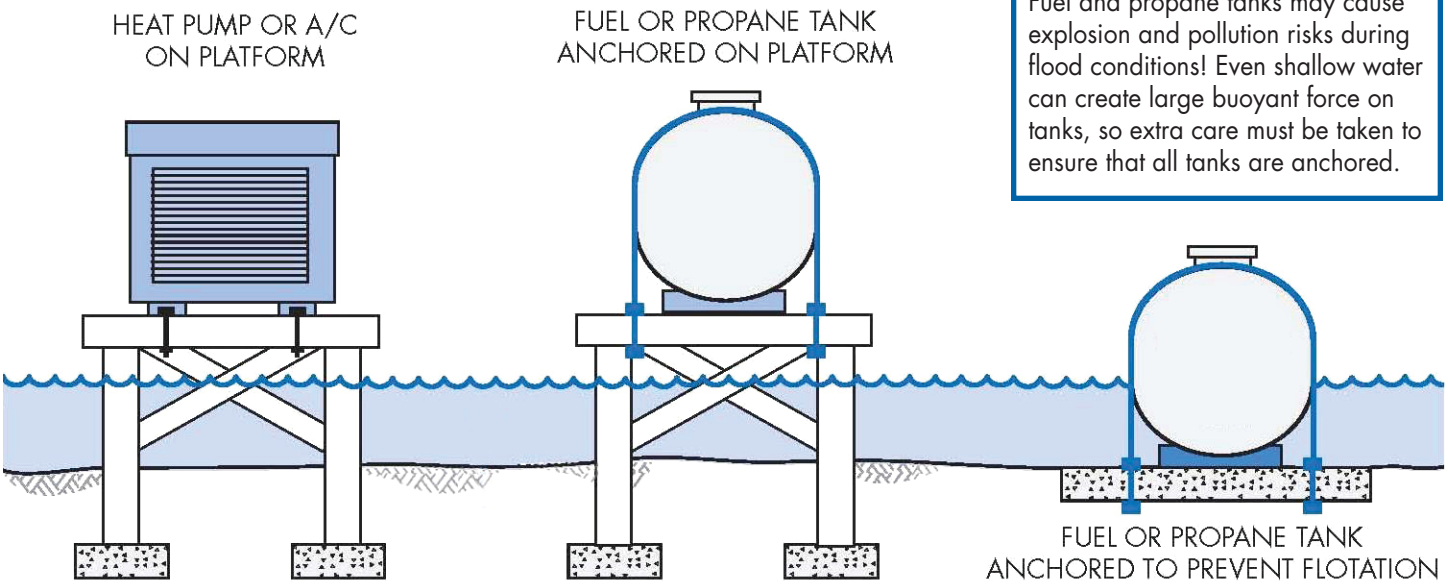


Manufactured homes must be anchored to resist flotation, collapse, or lateral movement by being tied down in accordance with your community's ordinance, or the manufacturers' installation specifications.

Utility Service Outside Buildings

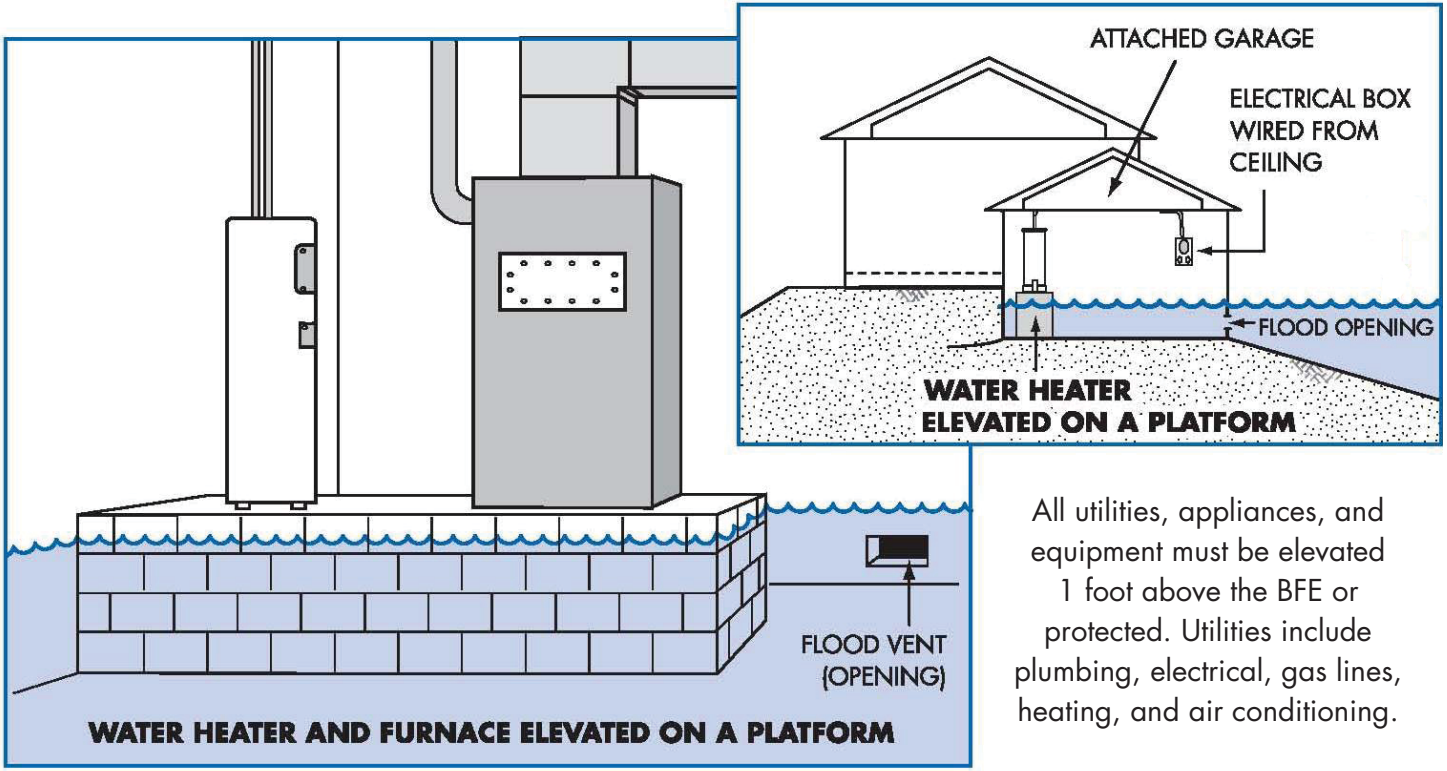
Important Information

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.



Whether inside on attached garage or outside the building, all utilities, appliances and equipment must be elevated 1 foot above the BFE or protected against flood damage. Utilities include plumbing, electrical, gas lines, fuel tanks, and heating and air conditioning equipment.

Utility Service Inside Enclosures

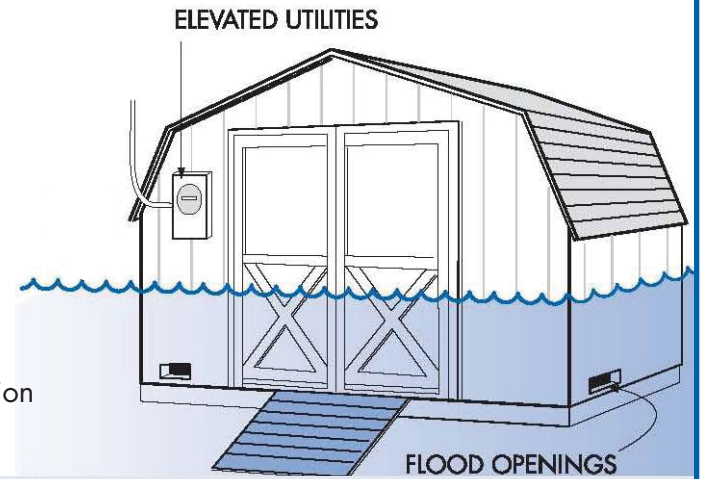


All utilities, appliances, and equipment must be elevated 1 foot above the BFE or protected. Utilities include plumbing, electrical, gas lines, heating, and air conditioning.

Accessory (Appurtenant) Structures

In Special Flood Hazard Areas, accessory structures must:

- Not be habitable
- Be anchored to resist floating
- Have flood openings/vents
- Be built of flood resistant materials
- Have elevated utilities
- Be used only for storage or parking
- Not be modified for different use in the future
- Have documented floor elevation



Even small buildings are "development" and permits or variances with noted conditions 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 principle 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, pale barns, and hay sheds.

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 wheels 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

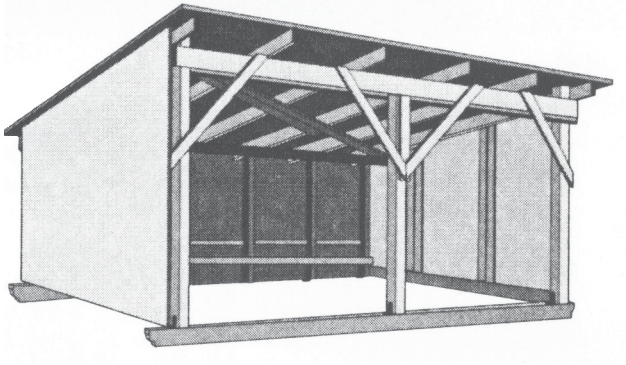
Important Information

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

RVs that do not meet these conditions must be installed and elevated like Manufactured Homes, including permanent foundations and tie-downs (see page 40)

Variances are allowed for:

- Pole frame buildings
- Steel grain bins
- Steel frame corn cribs
- General purpose feeding barns open on one side



Variances are not allowed for:

- Livestock confinement buildings
- Poultry houses
- Dairy operations
- Similar livestock operations

Important Information

Farm Houses are not agricultural structures.

Contact CWCB for additional guidance on variances for agricultural structures.

The best flood protection is to elevate agricultural buildings, but certain types can be approved by variance if they are "wet floodproofed."

Planning to Improve Your Floodplain Building?

To obtain a permit to improve an existing building:

- You must provide a copy of your construction contract or a cost estimate (including estimated market value of your own or donated labor and materials).
- You may submit an independent assessment of the market value of the building, if performed by a licensed appraiser.
- Your community will compare the cost of the proposed work to the market value of the building and check the value of improvements.
- If the cost of the improvement equals or exceeds 50% of the market value of the building, it is considered a Substantial Improvement and you must bring the building into full compliance.

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**, regardless of the actual repair work performed (see page 47).

Important Information

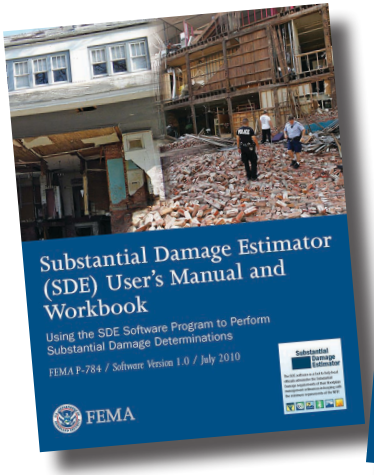
Floodplain buildings can be improved or altered, but special rules may apply!

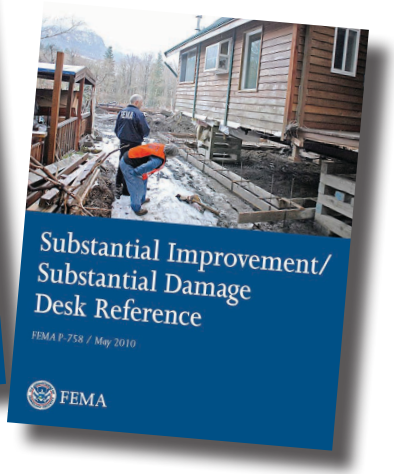
If the cost of an addition to a Pre-FIRM structure is less than 50% of its market value, only the addition is required to be built 1 foot above the BFE. Check with your local permit office.

The cost to correct previously cited violations of state or local health, sanitary, or safety codes 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.

Repairing Damaged Buildings





- The Substantial Damage Estimator (SDE) User's Manual and Workbook (FEMA P-784) was developed to assist community officials in estimating building value and repair costs.
- The Substantial Improvement/Substantial Damage Desk Reference provides practical guidance and suggested procedures to assist community officials in implementing substantial improvement and substantial damage requirements
- These guidance documents can be downloaded from the FEMA Library. www.fema.gov/library

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 before you begin repairs. You will be asked to provide a detailed cost estimate to repair the building to its pre-damaged condition. If the repair costs are 50% or more of the pre-damage market value of the building, then the building is Substantial Improved and you must bring the building into full compliance.

See page 49 for more information about elevating on existing building on a crawlspace.

Paying for Post-Flood Compliance

You may be eligible for up to $30,000 to help pay to protect your building in compliance with your community's requirements – if all of the following apply:

USE THE ICC CLAIM TO:

ELEVATE THE HOUSE ON YOUR LOT

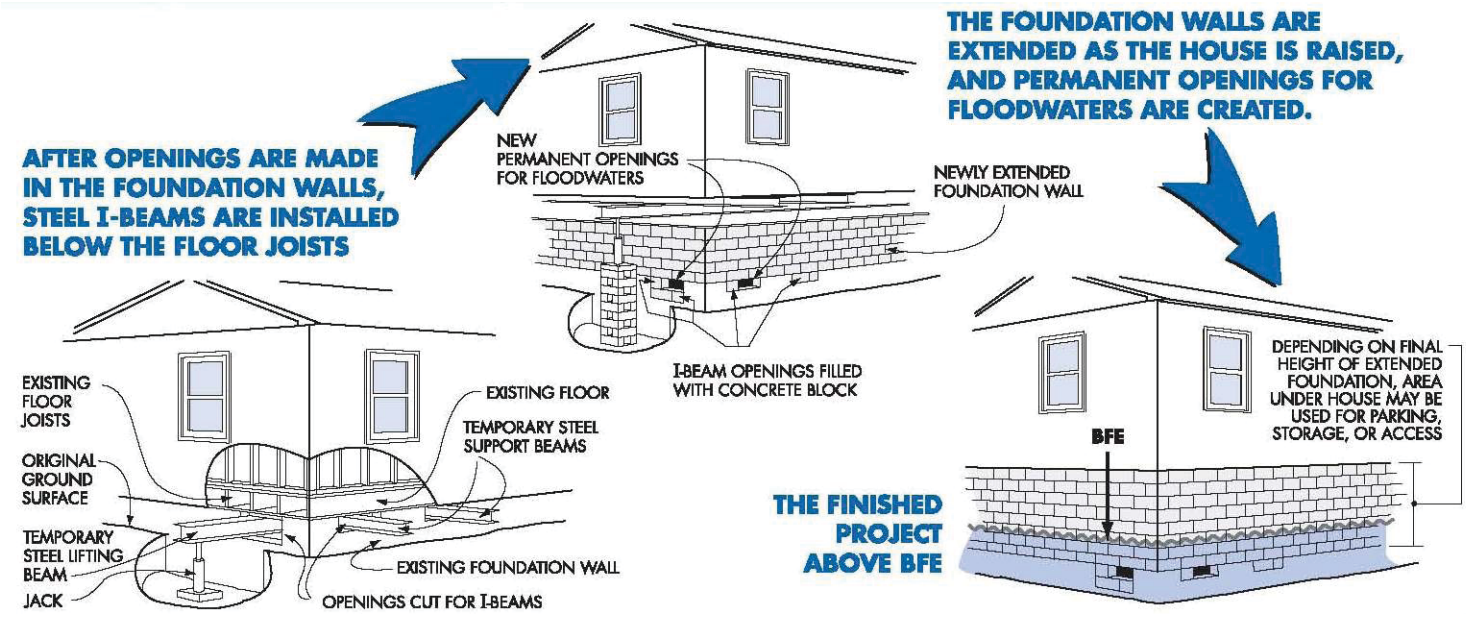
DEMOLISH AND REBUILD THE HOUSE

MOVE THE HOUSE TO HIGH GROUND

- You have NFIP flood insurance – it includes Increased Cost of Compliance (ICC) coverage.
- Your building is in the mapped Special Flood Hazard Area.
- Your building's lowest floor is below the elevation required by your community.
- Your community has made an official determination that the building was substantially damaged by flooding.
- You act quickly with your claims adjuster and community official to process all the required paperwork.

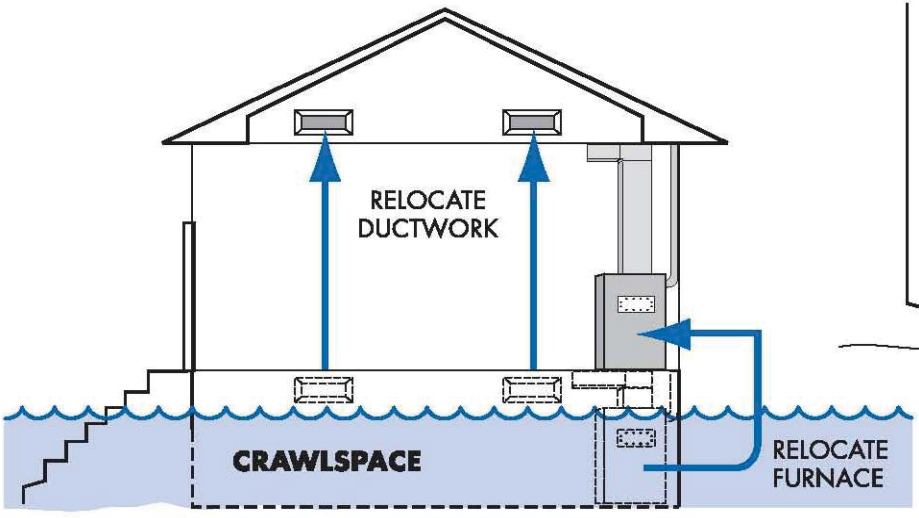
Owners whose buildings are substantially damaged are required to "bring the building into compliance" with floodplain requirements. Substantial damage is a special case of substantial improvement.

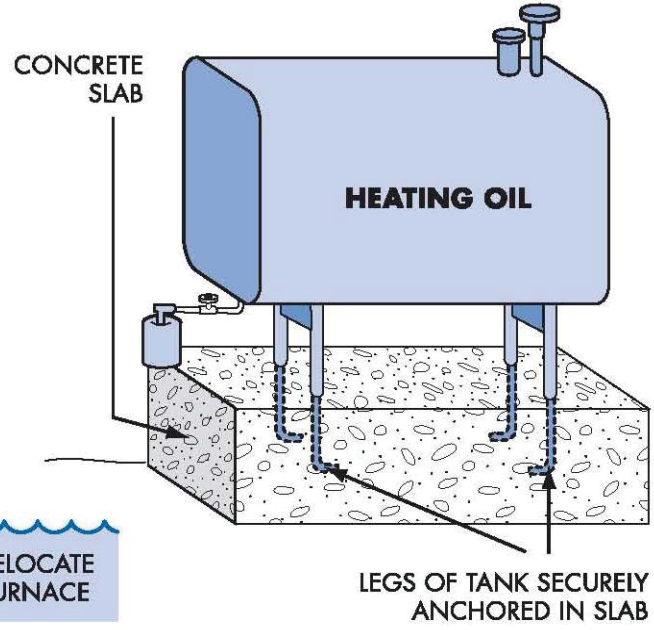
Elevating a Pre-FIRM Building



This is one way to elevate on existing building to comply with floodplain regulations.
The state and FEMA can help with more information and options.

Some Flood Protection for Older Homes is Easy and Low Cost

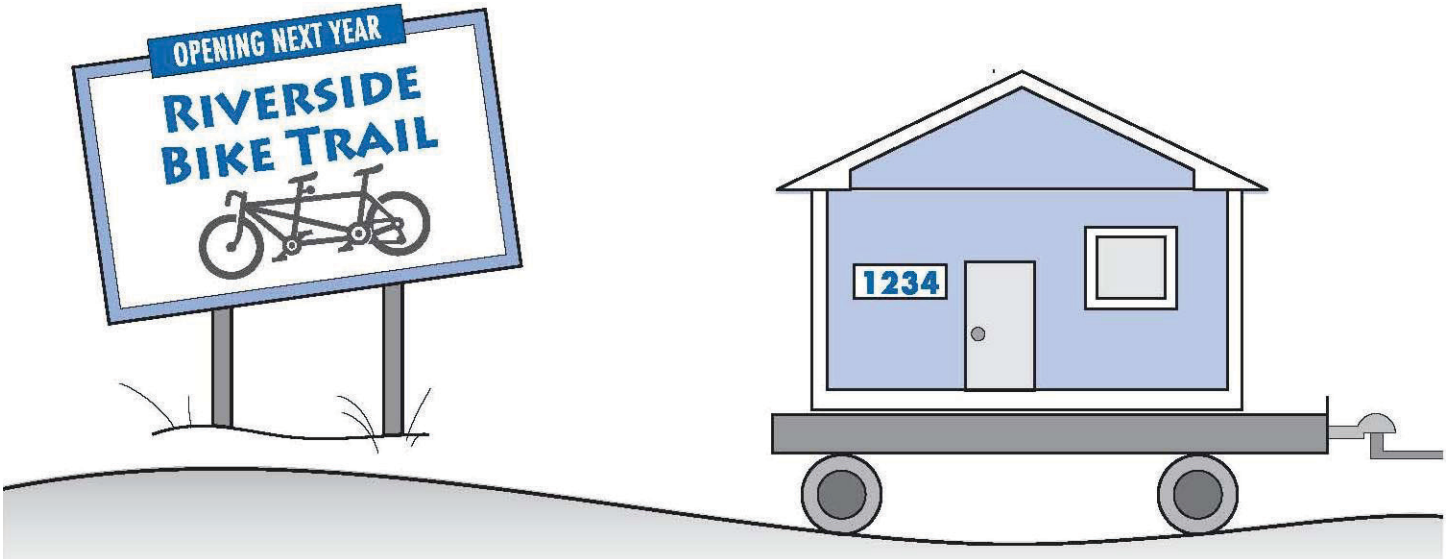




Move your hot water heater and furnace out of the basement; or build small platforms for them.
Anchor heating oil and propane gas tanks to prevent flotation.
Do not store valuables in a floodprone basement.
Use water-resistant materials when you repair.

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. Homes have been lifted up on higher foundations, and others hove been moved to safer high ground.

Useful Resources and Common Acronyms

Useful Resources

- **Family disaster planning:**
  http://www.redcross.org/prepare/location/home-family
- **Information for flood victims:**
  http://www.fema.gov/survivor-resources
- **Colorado Flood Protection:**
  http://www.cwcb.state.co.us/flood.htm
- **CRS Resource Center:**
  http://training.fema.gov/EMIWeb/CRS
- **Protecting Your Property or Business from Disaster:**:
  http://www.fema.gov/protect-your-property-or-business-disaster

Common Acronyms

- BFE = Base Flood Elevation
- CWCB = Colorado Water Conservation Board
- EC = Elevation Certificate
- FEMA = Federal Emergency Management Agency
- FIRM = Flood Insurance Rate Map
- MFH = Manufactured Housing unit
- NFIP = National Flood Insurance Program
- SFHA = Special Flood Hazard Area

Want to Learn More?

- For advice on flood information and permits, call your community's building permit office, or planning department.
- The Colorado Water Conservation Board coordinates the National Flood Insurance Program, on-line information is available at **http://www.cwcb.state.co.us/flood.htm**
- For information about flood reduction programs, call the Colorado Water Conservation Board - **(303) 866-3441**
- To order Flood maps, call FEMA's Map Service Center — **1 (877) FEMAMAP** or order on-line at **http://msc.fema.gov**
- Learn more about Flood maps and check the Status of Map Change Requests at **http://www.fema.gov/national-flood-insurance-program/flood-map-information**
- You can order printed copies of FEMA publications from the FEMA Distribution Center. To place an order, call **1(800) 480-2520**.
- FEMA's on-line publications can be found in the FEMA Virtual Library. Many are pasted in the Portable Document Format (PDF). Go to **http://www.fema.gov/library/publicat.htm** for more information.
- To learn about flood insurance, 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. The number is **1(888) 379-9531**.
- To get the best rates for flood insurance, call a local surveyor to complete an Elevation Certificate.
- For additional information about flood insurance, visit www.floodsmart.gov