2022

FLOODPLAIN MANAGEMENT IN MICHIGAN

Quick Guide

EGLE

MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

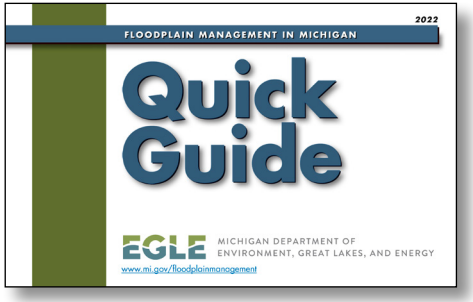
www.mi.gov/floodplainmanagement

Table of Contents

Table of Contents (continued)

About This Guide

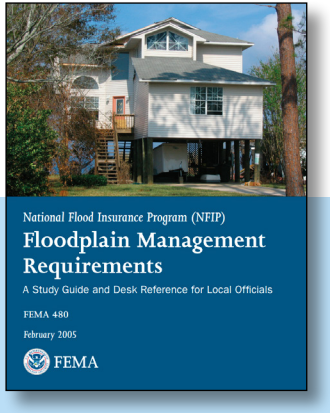
This **Quick Guide** helps local officials and citizens understand why and how Michigan communities must manage development in floodplains to protect people and property. Flood-prone communities adopt codes and ordinances that detail the rules and requirements. In cases of conflict, those codes and ordinances, not the guidance provided in this publication, must be followed.



This **Quick Guide** was developed and funded jointly by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and the Federal Emergency Management Agency (FEMA). Download the **Quick Guide** from www.michigan.gov/floodplainmanagement.

Questions, comments and requests for additional copies should be directed to the State NFIP Coordinator at occhipintim@michigan.gov.

For more detail on all aspects of floodplain management, please refer to FEMA 480, *National Flood Insurance Program, Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials.*



Prepared by:

RCQUINN CONSULTING, INC.

Why Do We Regulate the Floodplain?

To protect people and property. Implementing floodplain management regulations reduces vulnerability to future flood risk. If we know low lying land will flood from time to time, we should make reasonable decisions to help protect our families, homes, and businesses.

To make sure National Flood Insurance Program (NFIP) flood insurance is available. Communities must join the NFIP and administer floodplain management requirements before residents and businesses can purchase NFIP flood insurance and be eligible for some types of Federal assistance, including flood mitigation grants.

To save tax dollars. Every time communities experience flood disasters local budgets are impacted. If we build smart, we'll have fewer problems the next time the water rises. Remember, Federal disaster assistance is not available for all floods. Even when the President declares a disaster, communities still must pay a portion of repair and clean-up costs, temporary housing assistance, and evacuation expenses.

To avoid liability and lawsuits. If we know an area is mapped as a flood hazard area, and if we know people could be in danger and buildings could be damaged, doesn't it make sense to take reasonable protective steps as our communities develop and redevelop?

Since 1978, NFIP flood insurance policy holders in Michigan have received over $134 million in claim payments. Even though that represents many payments, most of the State's flood-prone property owners do not have flood insurance.

What is the National Flood Insurance Program (NFIP)?

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 22,300 communities participate in the NFIP. In Michigan, more than 1,000 counties, cities, townships and villages participate.

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

- **Flood hazard maps.** In partnership with communities and the State, FEMA produces flood maps in accordance with FEMA standards. The maps are used by communities, insurance agents, real estate professionals, and others.
- **Flood insurance.** Property owners and renters in participating communities are eligible to purchase NFIP 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.

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.

Community Responsibilities

To participate in the National Flood Insurance Program, Michigan communities agree to:

- **Recognize** flood hazards in community planning (see page 5)
- **Adopt and enforce** flood maps and a flood damage prevention ordinance
- **Require** permits for all types of development in the floodplain (see page 27)
- **Assure** that building sites are reasonably safe from flooding
- **Require** new and substantially improved homes, manufactured homes, and additions to be elevated to or above the Base Flood Elevation (BFE) plus 1 foot
- **Require** non-residential buildings to be elevated or dry floodproofed to or above the BFE plus 1 foot
- **Determine** if damaged buildings are substantially damaged
- **Conduct** field inspections; cite and remedy violations
- **Require and maintain** surveyed elevation information to document compliance (see pages 38, 39, and 40)
- **Carefully consider** requests for variances
- **Resolve** non-compliance and violations of floodplain management requirements
- **Advise and work** with FEMA and the EGLE when updates to flood maps are needed
- **Maintain** records for review and respond to periodic requests for reports from EGLE and FEMA

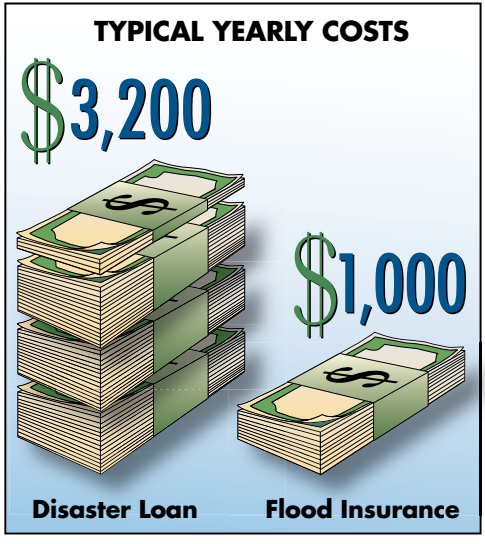
NFIP Recommended Planning Considerations

Michigan communities should consider incorporating planning considerations into comprehensive plans, land development codes, floodplain management regulations, and multi-hazard mitigation plans to reflect the long-term goal of increasing resiliency to future flooding. NFIP regulations (44 CFR Section 60.22(c)) outline 19 factors for consideration, including:

- **Divert** development to areas outside the SFHA to reduce flood damage
- **Full public disclosure** to potential buyers of properties in the SFHA
- **Acknowledge** that SFHA development may increase flood risk of existing development
- **Improve** local drainage to control increased runoff that increases the probability of flooding on other properties
- **Require** additional elevation above the minimum above the elevation required by the Michigan Construction Codes (MCC), which is the BFE plus 1 foot
- **Require** consistency between State, regional and local comprehensive plans and floodplain management programs
- **Require** evacuation plans for manufactured home parks and subdivisions

Flood Insurance: Property Owner's Financial Protection

Who needs flood insurance? Flood insurance is required for all buildings in mapped flood zones shown on FEMA's maps if they are financed by Federally-backed loans or mortgages. **All homeowners, business owners, and renters in communities that participate in the NFIP may purchase NFIP flood insurance on any building and its contents, even if outside of the mapped flood zone.** Homes in mapped flood zones are five times more likely to be damaged by flooding than by major fires.



Not in a mapped flood zone? Unfortunately, it's often after a flood that many people discover that their home or business property insurance does NOT cover flood damage. In Michigan, approximately 35% of all flood damage occurs in low risk zones, commonly described as being "outside the mapped floodplain."

Protected by a levee or dam? Even areas protected by levees or other flood control structures have some risk of flooding if the structures are overtopped or fail. Even when levees provide "100-year" flood protection, there is still a chance that a higher flood will occur.

What about disaster grants and loans? Federal disaster grants do not cover most losses and repayment of a disaster loan can cost many times more than the cost of a flood insurance policy.

Want to know more? Learn more at www.floodsmart.gov. To purchase a policy, call your insurance agent.

The NFIP's Community Rating System (CRS)

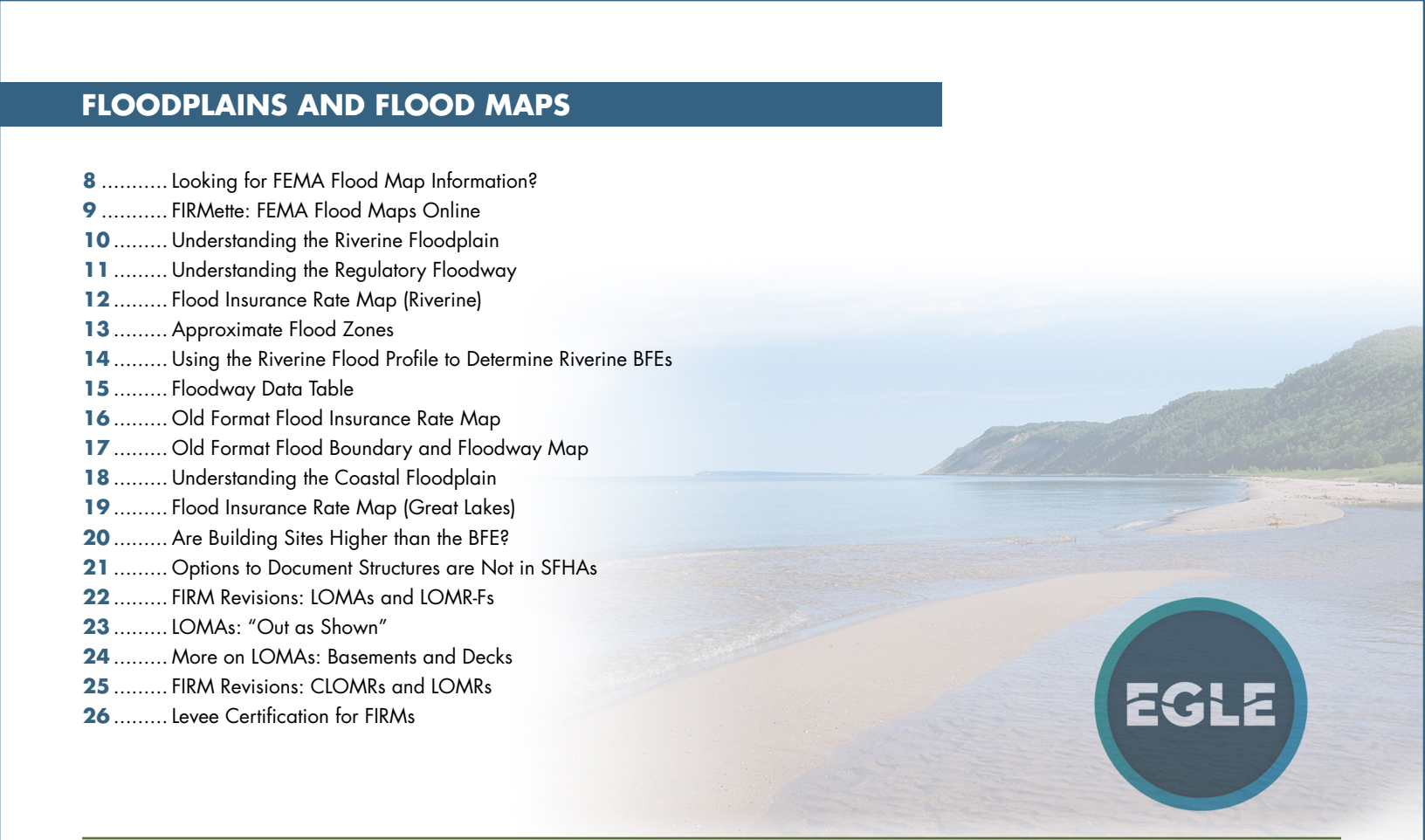
The NFIP recognizes communities that achieve better flood resiliency by providing policy holders with reduced flood insurance premiums. Communities must apply to participate in CRS and commit to implement and certify activities that contribute to reduced flood risk. Examples of actions communities can take to reduce the cost of flood insurance premiums include:

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

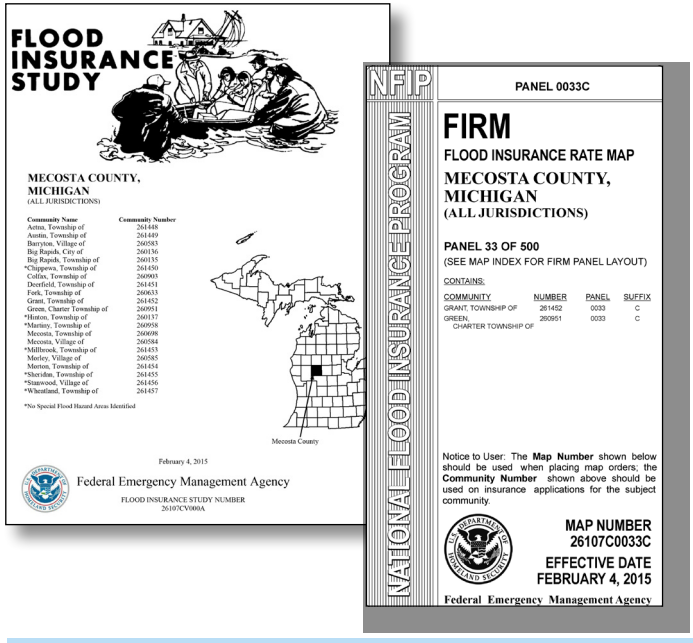
Community officials can request assistance from CRS specialists to help with the application process and prerequisites. Check the online CRS Resource Center (see page 69).

Property owners in 21 Michigan communities that participate in the CRS receive premium discounts ranging from 5% to 25% (as of January 2022).

FLOODPLAINS AND FLOOD MAPS



Looking for FEMA Flood Map Information?



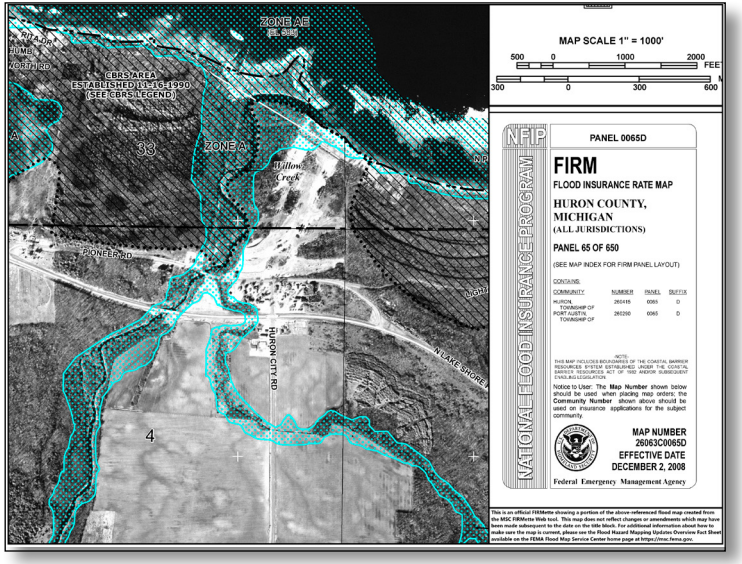
- Flood Insurance Studies (FISs) are compilations of flood risk information used for community planning and development.
- Flood Insurance Rate Maps (FIRMs) show flood zones subject to regulations and where flood insurance is required.
- Access FIRMs at the FEMA Flood Map Service Center at https://msc.fema.gov, where current and historical flood maps may be viewed and downloaded.
- Many cities and counties also make digital flood maps available online, sometimes with property parcel data.

Need a fast answer? Csommunity planning, zoning, engineering, or permit offices may also have paper flood maps available for viewing by the public.

FIRMette: FEMA Flood Maps Online

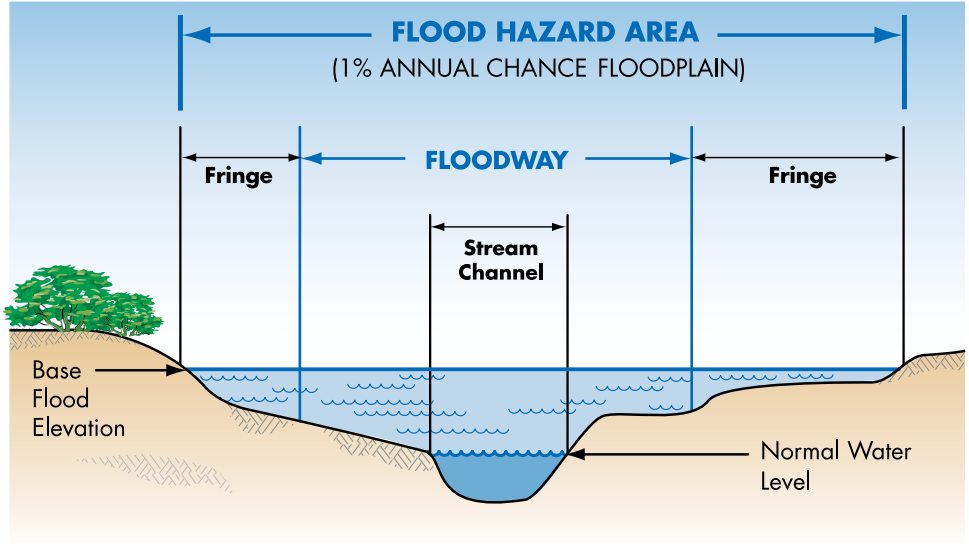
Portions of flood maps can be produced, saved, and printed by making a "FIRMette." FIRMettes are full-scale sections of FIRMs.

- For instructions, search online for "How to Print a FIRMette and Download a FIRM Panel."
- Making a FIRMette is easy after a property is located. Use the <Search by Address> link or <Search All Products> to find the community and map panel of interest.
- Earlier versions of FIRMs are available for many communities, so current flood hazard information can be compared to historic data.



Go to https://msc.fema.gov and check out the "MSC Frequently Asked Questions." For step-by-step instructions on how to read flood maps and view the How to Read a Flood Insurance Rate Map Tutorial.

Understanding the Riverine Floodplain



For riverine floodplains with Base Flood Elevations (BFEs) determined by detailed flood studies, the Flood Profile in the Flood Insurance Study shows water surface elevations for different frequency floods (see page 14).

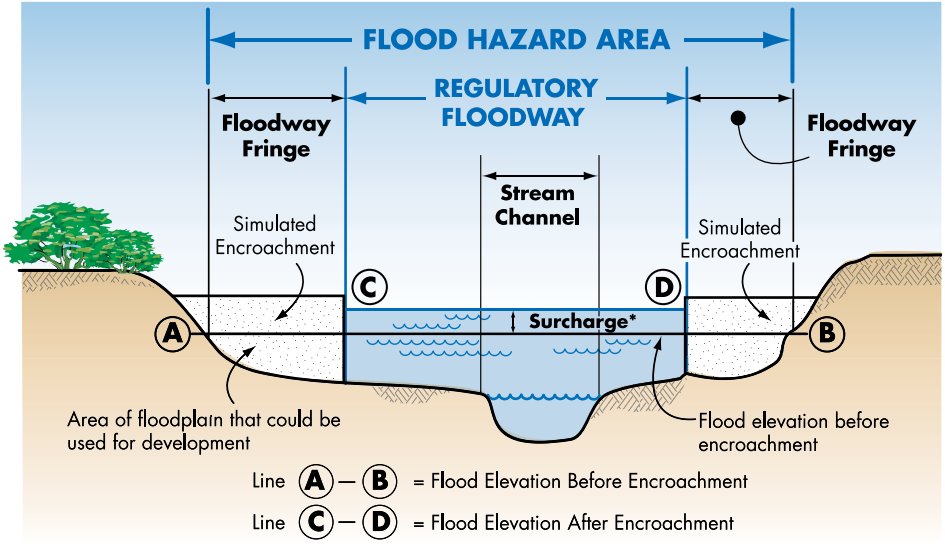
Terms and Definitions

The **Special Flood Hazard Area (SFHA)** is that portion of the floodplain subject to inundation by the base flood (1% annual chance). Riverine SFHAs are shown on FIRMs as Zones A, AE, AH, AO, AR, and A99. Older FIRMs may have Zones A1-A30.

See page 11 to learn about the floodway, the area of the SFHA where flood waters usually are deeper and flow faster.

See page 18 to learn about coastal floodplains in the Great Lakes counties.

Understanding the Regulatory Floodway



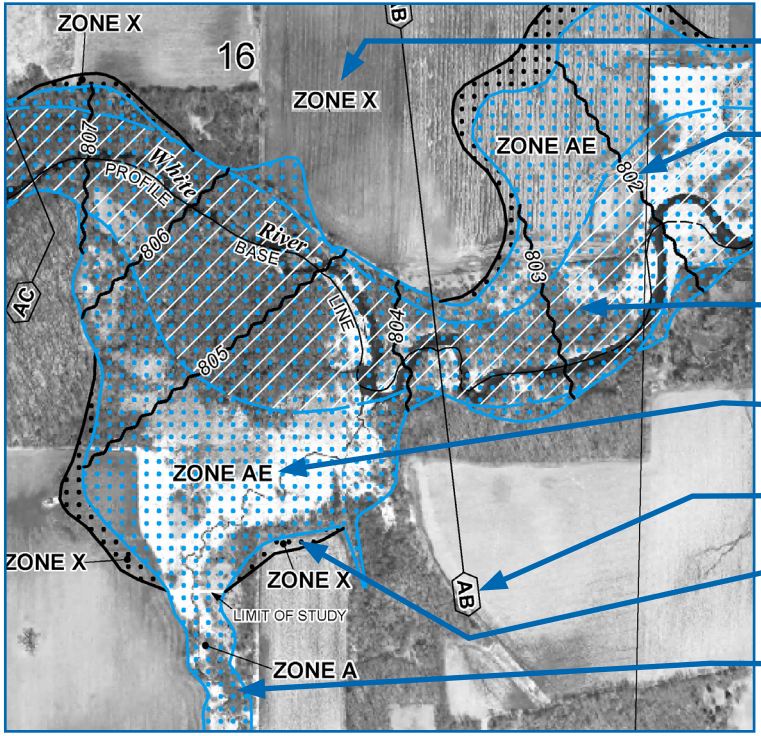
Terms and Definitions

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 cumulatively increasing flood elevations.

Computer models are used to simulate "encroachment" or development in the floodway fringe in order to predict where and how much the Base Flood Elevation would increase if the floodway fringe is allowed to be developed.

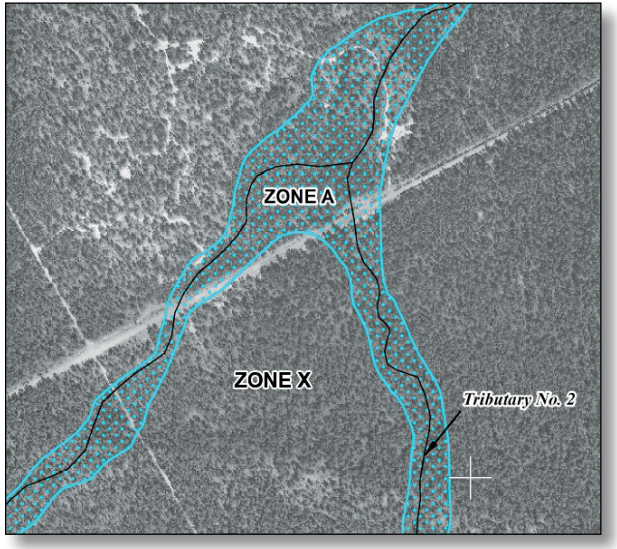
For any proposed floodway development, the applicant must provide evidence that "no rise" will occur or obtain a Conditional Letter of Map Revision (CLOMR) before a local floodplain permit can be issued (see page 25). Experienced registered professional engineers must make sure proposed projects either won't increase flooding or that any increases do not impact structures on other properties.

Flood Insurance Rate Map (Riverine)



1. **Unshaded Zone X** is all other areas considered low risk.
2. **Base Flood Elevation (BFE)** is the water surface elevation of the base flood rounded to the nearest whole foot (consult FIS profiles and tables for regulatory elevations).
3. The **Floodway** is the cross-hatched area (see page 11).
4. **Zone AE** is the 1% annual chance (100-year) floodplain with BFEs.
5. **Cross Section** location (see page 14).
6. **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain.
7. **Zone A** (approximate) is the 1% annual chance floodplain.

Approximate Flood Zones



Everyone lives in an area with some flood risk – it's just a question of whether it is a low, moderate, or high-risk flood hazard area.

Approximate Zone A designations are based on minimum criteria established FEMA, using very little field work and limited data. Newer FIRMs have better elevation data based on high resolution topography (LiDAR) which results in more accurate boundaries.

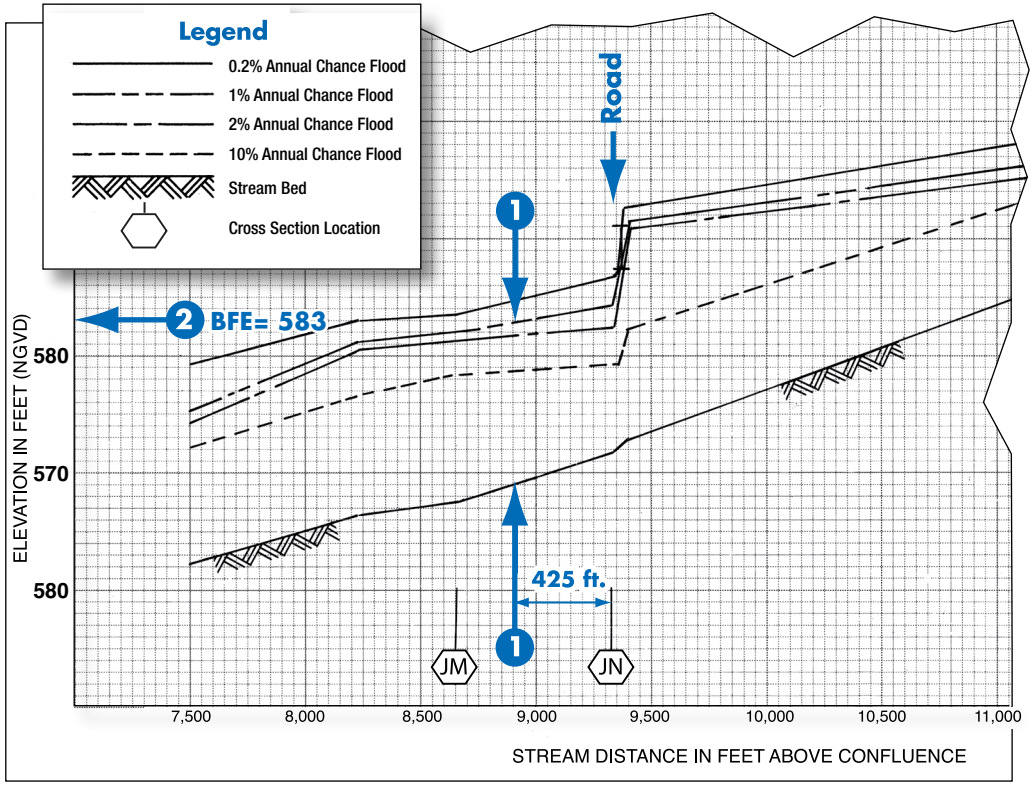
Terms and Definitions

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

When development is proposed in Approximate Zone A, BFEs must be determined before permit applications are reviewed. BFE estimates may be provided by EGLE.

For more information and to look up EGLE floodplain staff contacts by district, visit www.michigan.gov/floodplainmanagement.

Using the Riverine Flood Profile to Determine Riverine BFEs



Flood Profiles from Flood Insurance Study reports 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).

1. On the effective flood map, locate the site by measuring the distance, along the profile baseline of the stream channel, from a known point such as a road or cross section, for example, ⟨JM⟩ or ⟨JN⟩.

2. Scale that distance on the Flood Profile and read up to the profile of interest, then across to determine the BFE, to the nearest 1/10 of a foot. (Answer: 583.0 feet).

Floodway Data Table

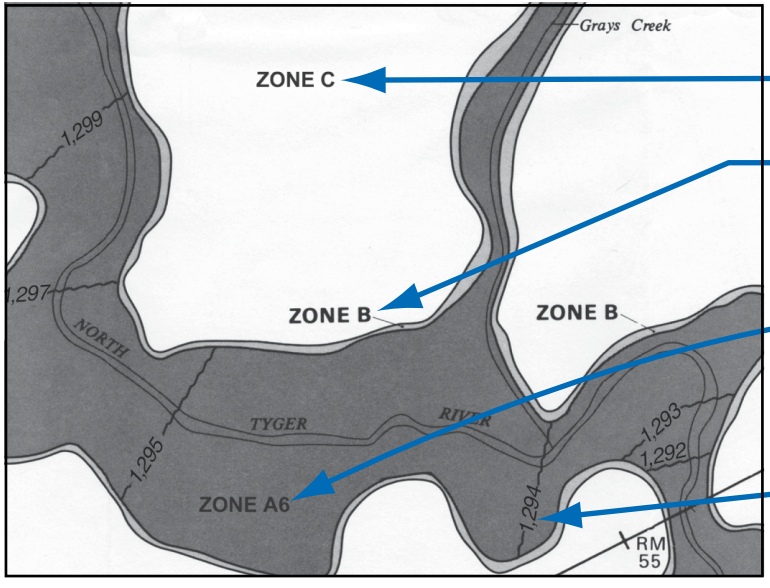
Flood Insurance Studies have Floodway Data Tables for every waterway that was studied by detailed methods for which floodways were delineated.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFEREN
Plaster Creek (continued)							
BA	26,454	352	1,876	1.43	660.7	660.6	0.1
BB	26,980	706	4,073	0.66	660.9	660.8	0.1
BC	28,124	292	1,444	1.86	661.1	661.1	0.0
BD	28,680	376	2,103	1.28	661.4	661.4	0.0
BE	29,459	296	752	3.58 (1)	662.2 (2)	662.1	0.1 (3)

[1]Feet above mouth

1. Velocity estimates based on the mean velocity for the cross sections.
2. Elevations may not consider backwater effect from downstream river.
3. Amount of increase between without and with floodway is not more than 0.1 ft at any location.

Old Format Flood Insurance Rate Map

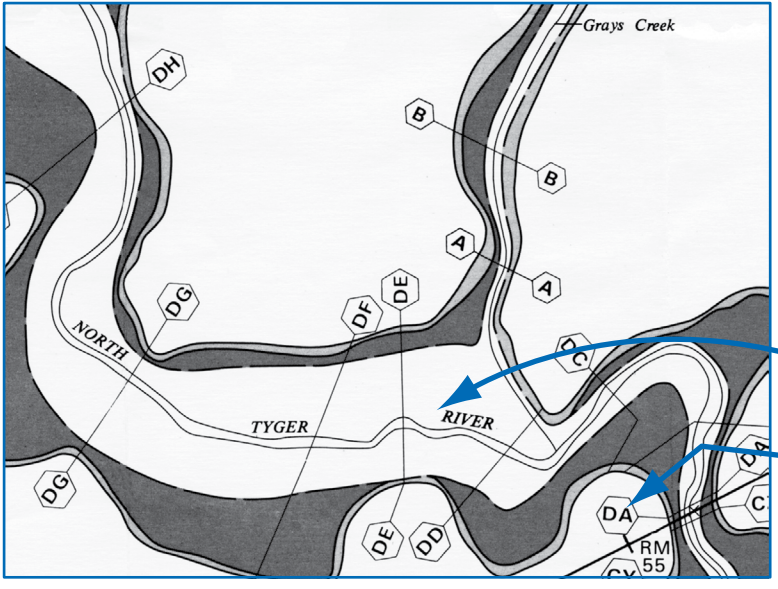


FLOOD HAZARD ZONES

1. **Zone C** (or Zone X) is all 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 other moderate risk areas.
3. **Zone A, Zones A1-A30** or **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.

FEMA prepares Flood Insurance Rate Maps (FIRMs) to show areas that are at high risk of flooding. These "old format" FIRMs, and companion Flood Boundary and Floodway Maps (see page 17), are being revised and digitized as part of FEMA's nationwide revision initiative.

Old Format Flood Boundary and Floodway Map



Important

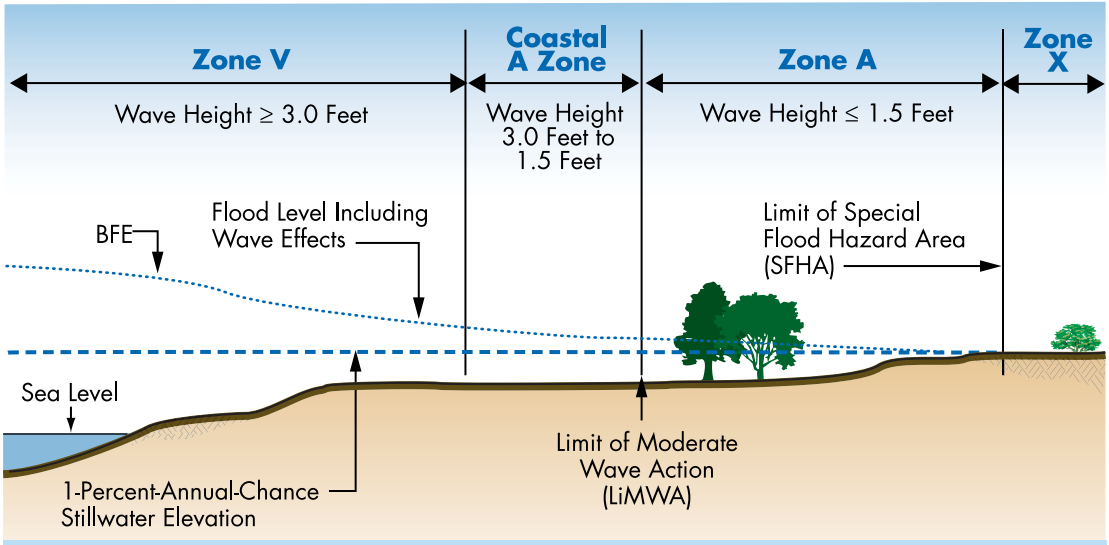
Information

Floodway maps do not show flood zones or BFEs. Check the companion FIRM for that information. Page 16 shows the FIRM that matches the map clip to the left.

1. **The Floodway** is the white area around the waterway centerline.
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.

FEMA prepared Floodway maps as companions to many "old format" FIRMs. You should check to see if your project will be in the Floodway because additional engineering may be required (see page 30)

Understanding the Coastal Floodplain



Areas subject to Coastal A Zone conditions (wave heights between 3 feet and 1.5 feet) may not be shown on FIRMs. The Michigan Construction Code treats the CAZ area as Zone V and requires development to comply with the Zone V requirements, except backfilled stem walls are allowed.

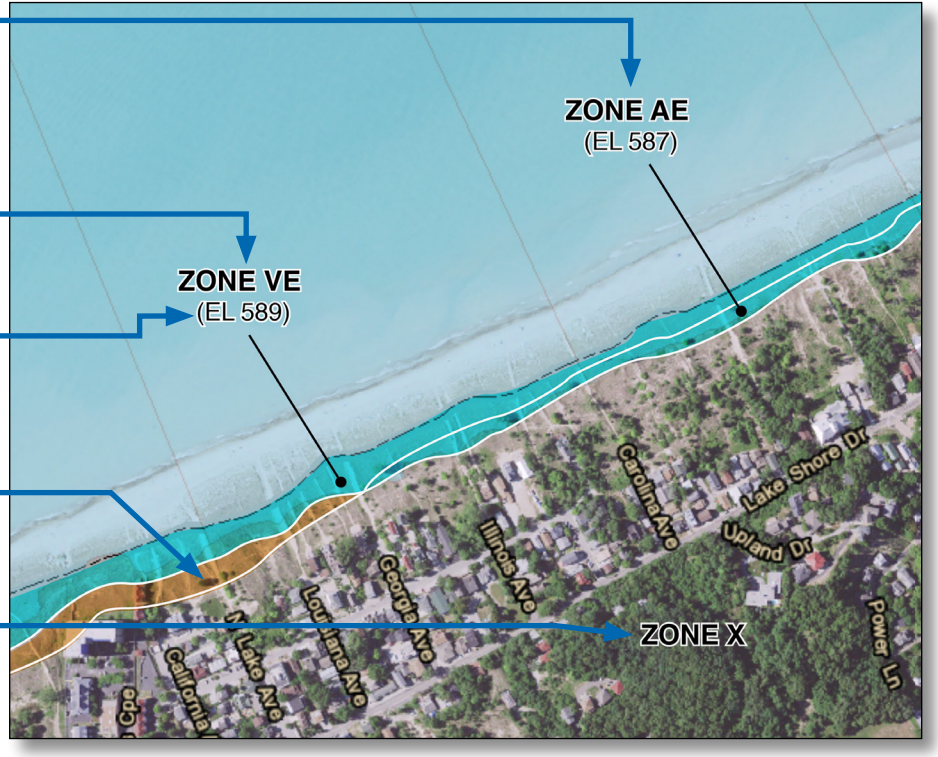
Terms and Definitions

The **Coastal High Hazard Area (Zone V)** 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 VE.

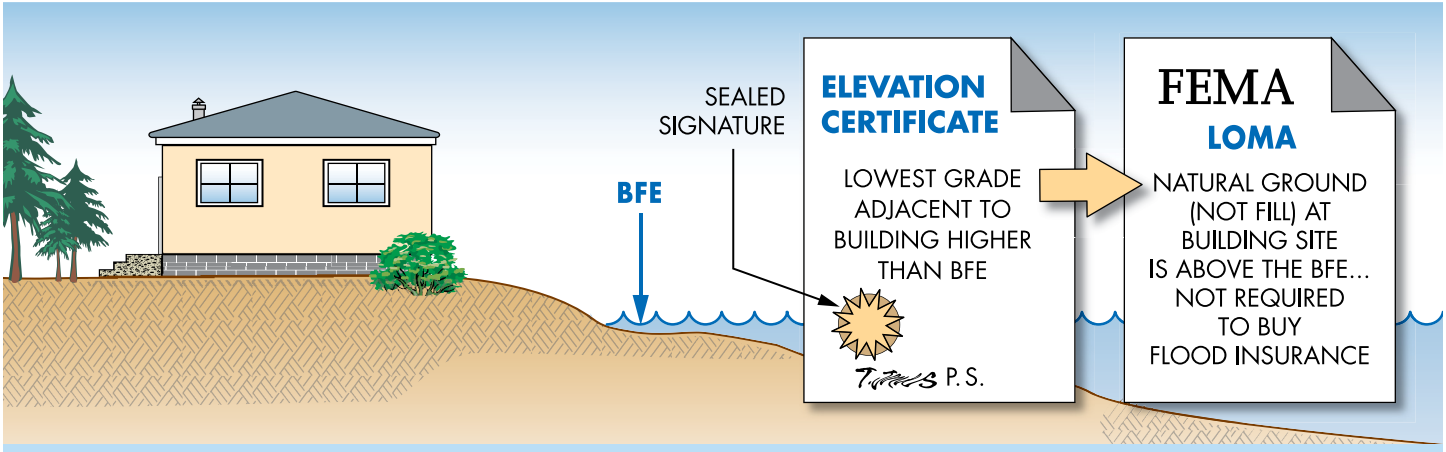
The term **Coastal A Zone (CAZ)** refers to a portion of the SFHA landward of a Zone V or landward of an open coast without Zone V. CAZs may be subject to breaking waves between 3 and 1.5 feet high.

Flood Insurance Rate Map (Great Lakes)

1. **Zone AE** is subject to flooding by the base or 1% annual chance (100-year) flood, and waves less than 3 feet high.
2. **Zone VE** is where wave heights are expected to be 3 feet or more.
3. **Base Flood Elevation (BFE)** is the water surface elevation (in feet above the vertical datum shown on the map).
4. **Shaded Zone X** is the 0.2% annual chance (500-year) floodplain.
5. **Unshaded Zone X** is the area of minimal flood risk outside the 0.2% annual chance (500-year) floodplain.



Are Building Sites Higher than the BFE?



If land is shown on the map as "in" the SFHA, but the building site is on natural ground that is higher than the BFE, owners should get a professional surveyor to complete a FEMA Elevation Certificate (EC). Submit a request for a Letter of Map Amendment (LOMA) to FEMA along with the EC to verify that the structure is above the BFE (see page 22). If FEMA approves the request, lenders are not required to have property owners get flood insurance policies, although some may still require policies.

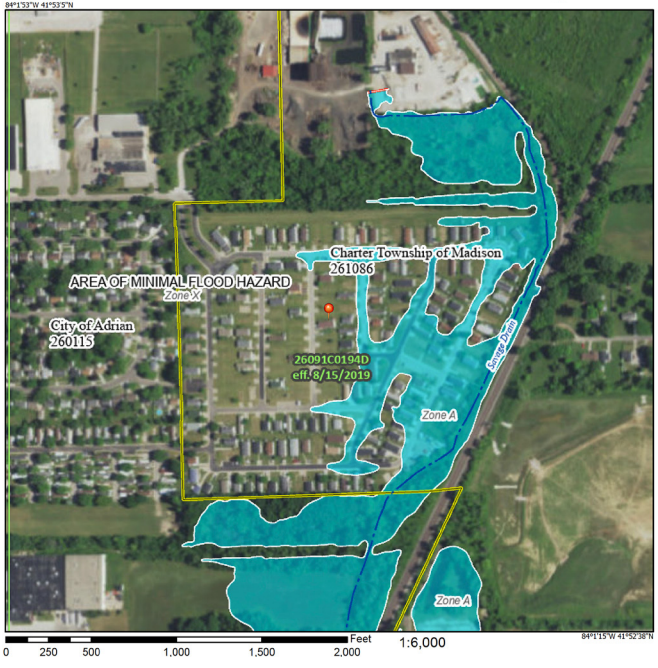
FEMA and EGLE encourage owners with LOMAs to get flood insurance at reduced rates. Owners should keep certificates and LOMAs with deeds— the documentation will help future buyers.

Options to Document Structures are Not in SFHAs

Sometimes property owners are asked to provide evidence their buildings and structures are not in SFHAs.

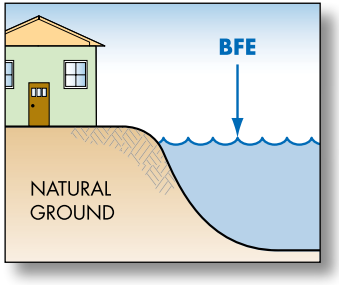
- Most mortgage lenders will accept FIRMettes (see page 9) as evidence that structures are not in SFHAs.
- Lenders may require maps provided by a community, surveyor, or engineer that clearly show structures are not in SFHAs.
- Owners can ask lenders to reconsider determinations. Documentation may be required to clearly show a structure is outside of the SFHA. Lenders may require FEMA LOMAs, especially if it is a close call.

National Flood Hazard Layer FIRMette

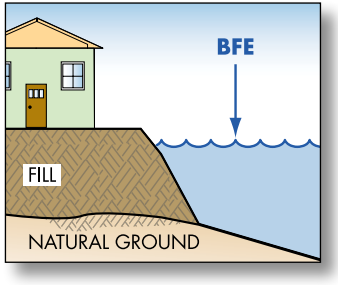


FIRM Revisions: LOMAs and LOMR-Fs

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 professional surveyor, 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 at or 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 www.fema.gov/letter-map-amendment-letter-map-revision-based-fill-process for guidance on map revisions. Professional surveyors can submit eLOMAs through FEMA's web-based application for professional surveyors.

LOMAs: "Out as Shown"

- Mortgage lenders that are regulated or insured by the Federal Government are mandated to require flood insurance when structures are in, or touch, the SFHA.
- Lenders sometimes perform automated determinations, where computers compare parcel locations to the SFHA map.
- Owners can ask lenders to reconsider determinations. Documentation may be required to clearly show a structure is outside of the SFHA. Lenders may require FEMA LOMAs, especially if it is a close call.
- Lenders have discretion to require flood insurance even when structures are not in the SFHA (usually occurs when a portion of the lot is in the SFHA).

See page 21 for documentation required for lenders or that is required to seek Letters of Map Amendment from FEMA to show structures are not in SFHAs, sometimes called "out as shown."

Red Circle: A corner of the structure is in the SFHA. Lenders must require flood insurance unless the owner obtains a Letter of Map Amendment from FEMA.

Yellow Circles: Structures clearly not in the SFHA, but parts of the lots may be in. (Flood insurance is not mandatory, but is encouraged.)

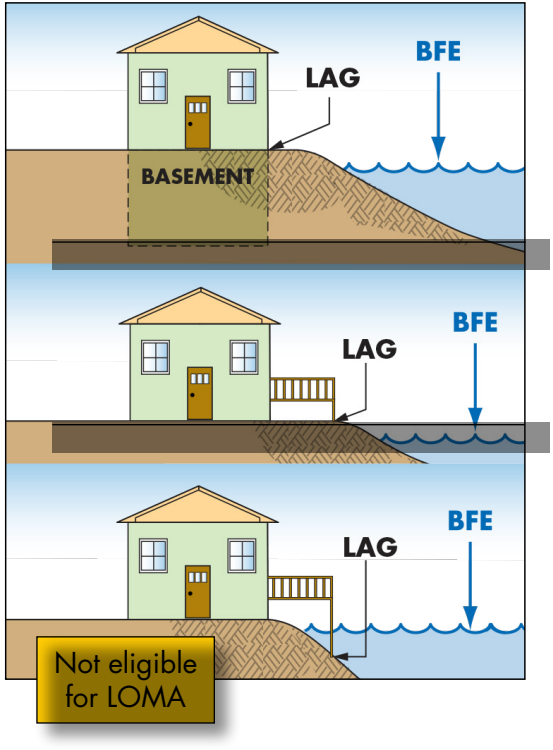
More on LOMAs: Basements and Decks

Owners can obtain LOMAs to show buildings are not in SFHAs even when buildings have basements, provided:

- Earthen fill has not been placed since date of the first FEMA map showing the site in the SFHA.
- The Lowest Adjacent Grade (LAG) is at or above the BFE.

Owners can obtain LOMAs to show buildings are not in SFHAs when buildings have decks or stairs, provided:

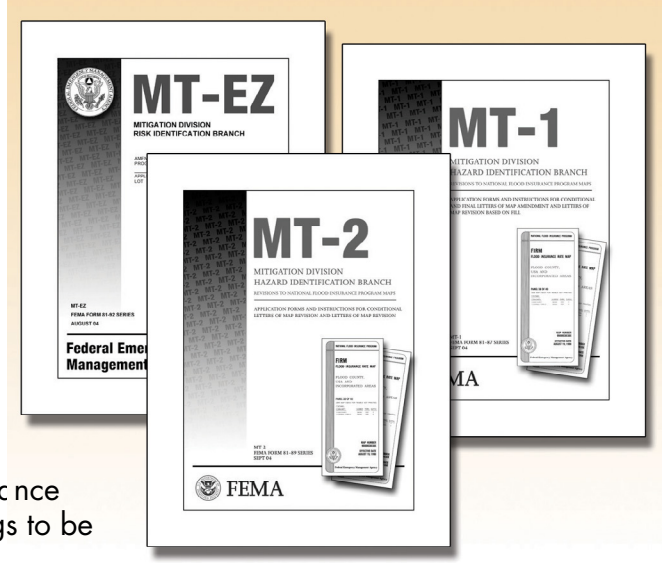
- The Lowest Adjacent Grade (LAG) at the lowest deck or stair support is at or above the BFE.
- Documentation that the deck or stairs are detached (not structurally connected), as long as the LAG next to the building is at or above the BFE.



FIRM Revisions: CLOMRs and LOMRs

- **Conditional Letter of Map Revision (CLOMR)** comments on whether a proposed project, if built as shown on the submitted documentation, would meet the standards for a map revision. Communities should require CLOMRs before issuing permits for projects that propose to increase BFEs or change SFHA or floodway boundaries. Certificates 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.



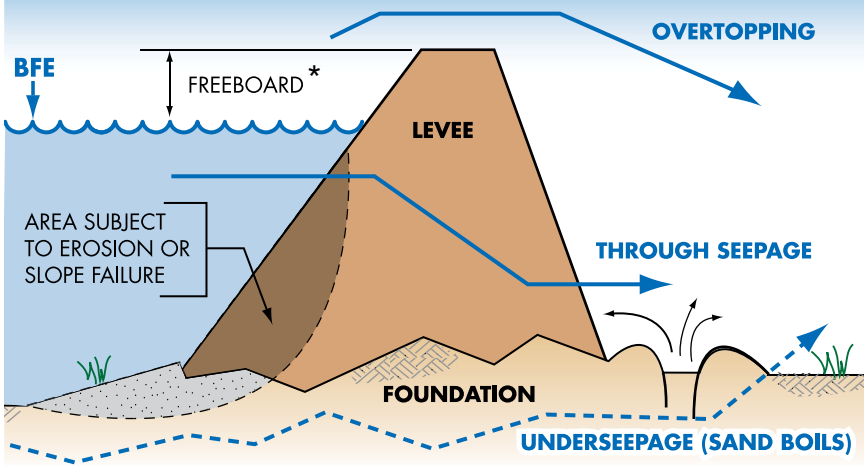
State law requires LOMRs when fill and grading alter BFEs or change SFHA or floodway boundaries. To learn more and download FEMA forms, find links by searching key words "MT-EZ," "MT-1," and "MT-2."

Levee Certification for FIRMs

Many levees are designed to protect land against flooding from the Base Flood. In order for FEMA to show those areas as outside of the Special Flood Hazard Area, communities and levee owners must certify that levees meet certain design criteria. Certification will present significant challenges during the map revision process.

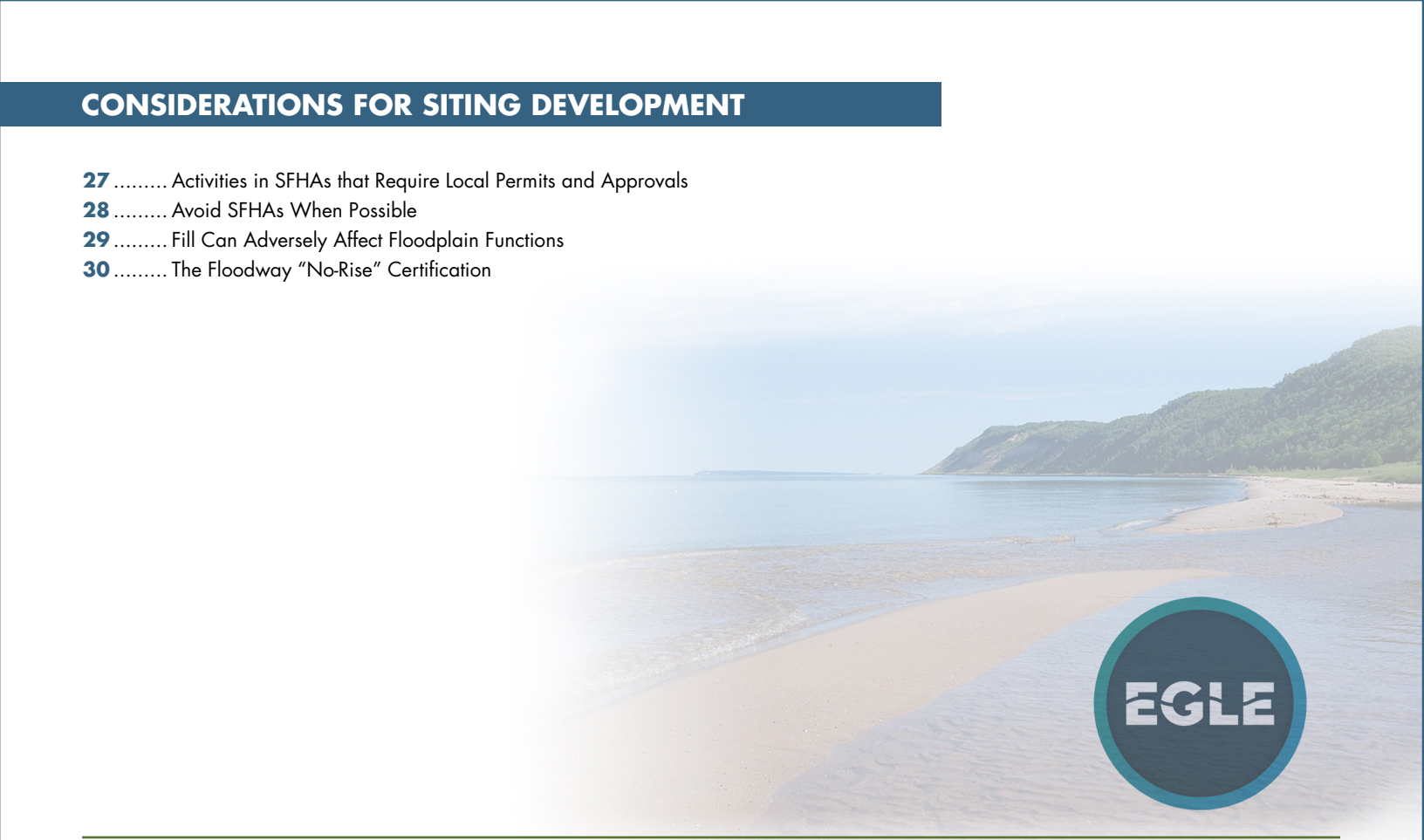
Communities that have levees should determine as soon as possible whether certification will be required. Pursuant to FEMA's Procedural Memoranda 34 and 43, and as outlined in Federal regulations at 44 CFR Section 65.10, the documentation requirements address:

- Freeboard
- Closures
- Embankment protection for erosion
- Embankment and foundation stability
- Settlement
- Interior drainage and seepage
- Operation and maintenance plans
- Other site-specific criteria and state requirements



* Freeboard is the distance between the BFE and the top of the levee; for FEMA accreditation freeboard is usually 3 feet

CONSIDERATIONS FOR SITING DEVELOPMENT



Activities in SFHAs that Require Local Permits and Approvals

Regulated activities include but are not limited to:

- Construction of new buildings
- Additions to buildings
- Improvements to buildings
- Renovation of building interiors
- Repair of damaged buildings
- Placement of manufactured homes
- Subdivision of land
- Construction or placement of temporary buildings and accessory structures
- Construction of agricultural buildings
- Construction of roads, bridges, and culverts
- Placement of fill, grading, excavation, mining, and dredging

Floodplain development or building permits must be obtained before these activities and **ANY** land-disturbing activities occur in flood zones.
Contact community permitting offices for specific requirements.

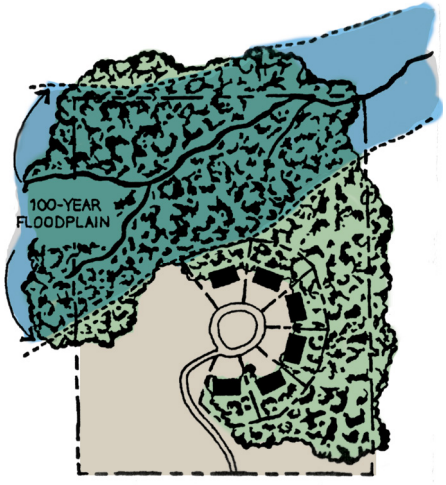
Avoid SFHAs When Possible

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

NOT RECOMMENDED

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

RECOMMENDED



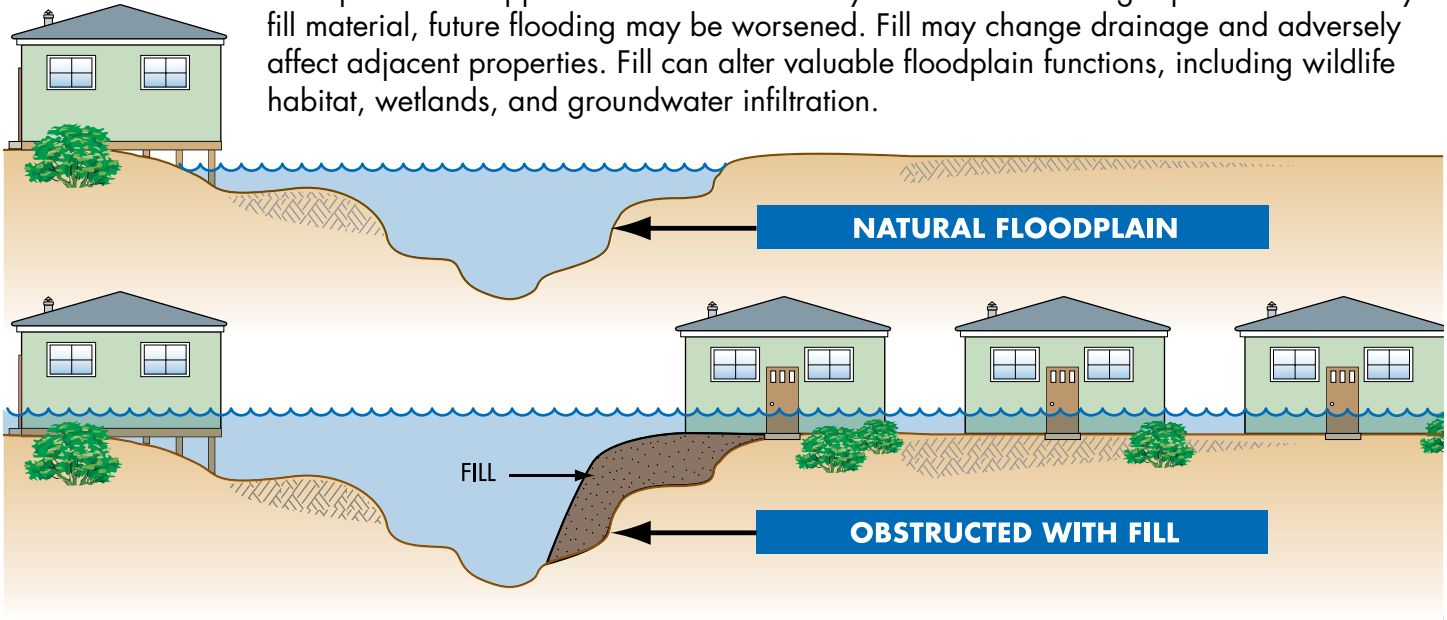
Floodplain land put into public/ common open space, net density remains, lot sizes reduced and setbacks modified to keep homesites on high ground.

RECOMMENDED

Let the floodplain perform its natural function – if possible, keep it as open space. Other compatible uses: Recreational areas, playgrounds, reforestation, unpaved parking, gardens, pasture, and created wetlands.

Fill Can Adversely Affect Floodplain Functions

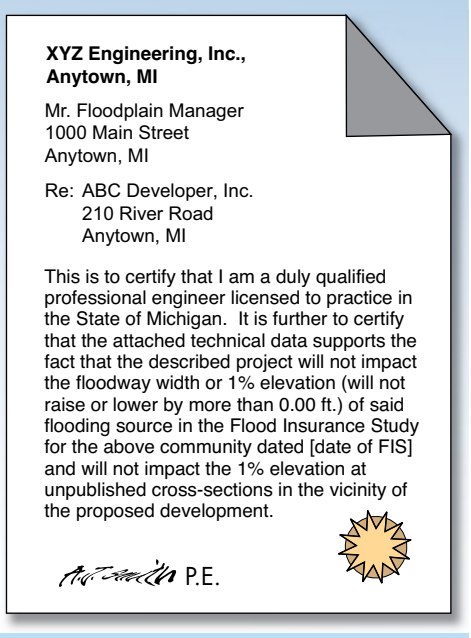
Floodplains are supposed to store and convey floodwater. If storage space is blocked by fill material, future flooding may be worsened. Fill may change drainage and adversely affect adjacent properties. Fill can alter valuable floodplain functions, including wildlife habitat, wetlands, and groundwater infiltration.



Some communities and the State floodplain statute require compensating excavation to offset the loss of flood storage associated with projects that propose placing fill in floodplains.

The Floodway "No-Rise" Certification

- Floodways convey the a large volume of water and may have high velocities.
- State law prohibits residential development in floodways.
- Engineers must prepare floodway encroachment analyses to evaluate the hydraulic impact of proposed development, including but not limited to grading/filling, new/replacement culverts and bridges, and bank stabilization.
- Development is allowed if certified to cause "no-rise" (0.00 ft. increase) in BFEs or if legal arrangements are made.
- Fencing in floodways should be "open" to allow floodwater to flow through; solid and chain link fencing are floodway encroachments.
- "No-rise" certifications must be signed by a Professional Engineer licensed in Michigan and qualified to conduct hydraulic analyses.
- Search online for "Michigan Hydraulic Report Guidelines" for more information about no-rise certifications and hydraulic modeling of floodway impacts.



XYZ Engineering, Inc.,
Anytown, MI

Mr. Floodplain Manager
1000 Main Street
Anytown, MI

Re: ABC Developer, Inc.
210 River Road
Anytown, MI

This is to certify that I am a duly qualified professional engineer licensed to practice in the State of Michigan. It is further to certify that the attached technical data supports the fact that the described project will not impact the floodway width or 1% elevation (will not raise or lower by more than 0.00 ft.) of said flooding source in the Flood Insurance Study for the above community dated [date of FIS] and will not impact the 1% elevation at unpublished cross-sections in the vicinity of the proposed development.

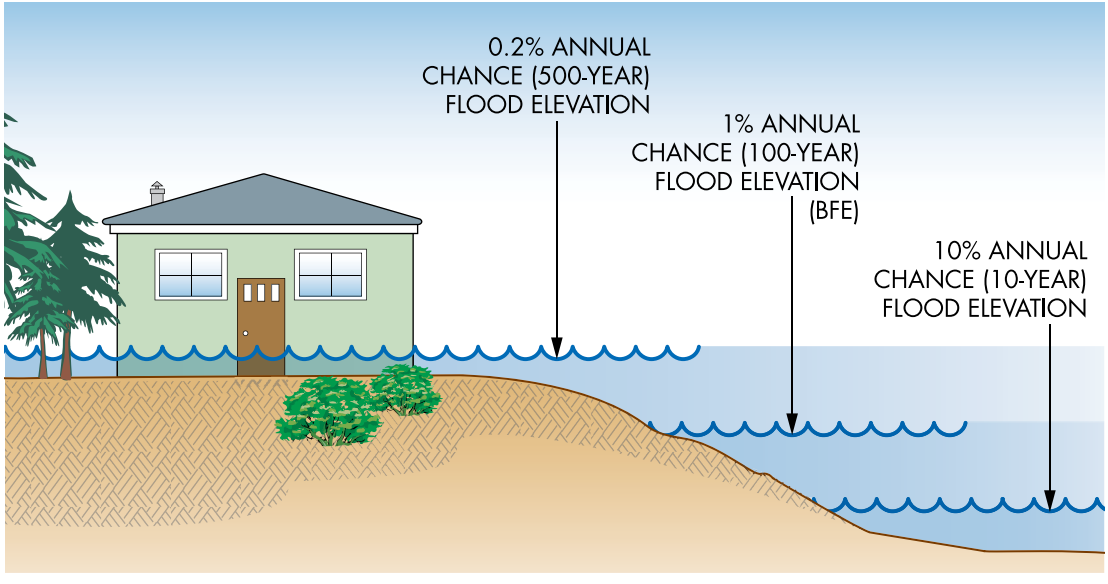
P.E.

The floodway encroachment analysis must be based on technical data obtained from FEMA.

Reduce flood risk – don't build in the Floodway!

PLANNING DEVELOPMENT AND BUILDINGS

Floods Don't Always Stop at the BFE



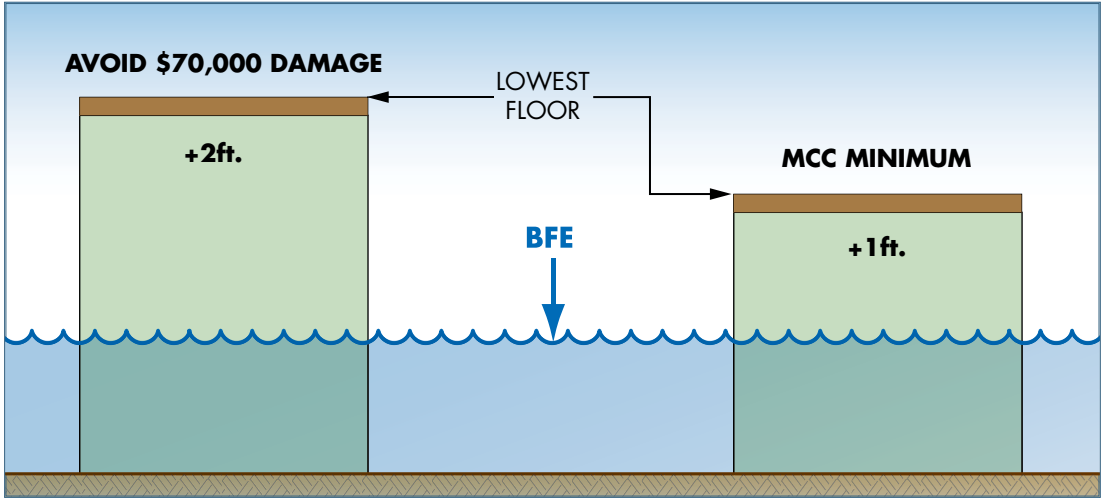
Important Information

Many people don't understand just how risky building in flood zones can be. There is a greater than a one in four chance that a non-elevated home in the SFHA will be flooded during a 30-year mortgage period. The chance that a major fire will occur during the same period is less than one in 20!

CAUTION! Major storms and flash floods can cause flooding that rises higher than the Base Flood Elevation (BFE). Be safer – protect your home or business by avoiding flood zones or building higher. See page 32 to see how this will avoid damage and may lower your NFIP flood insurance costs.

Freeboard: Build Higher, Reduce Damage, Save on Insurance

The Michigan Construction Codes require all buildings in SFHAs to have the lowest floor elevated to at least BFE plus 1 foot. Estimated savings – avoided building flood damage – shown below for elevating **one foot higher** do not include costs to replace personal belongings and temporary housing costs during clean-up and repairs. Owners of buildings elevated above the BFE also save on federal flood insurance.



Based on data from www.floodsmart.gov for 2,500 sq. ft. 1-story home

Terms and Definitions

Freeboard is additional height– a factor of safety– above the BFE. Buildings that are higher than the BFE experience less flood damage.

Important Information

Remember!
Builders must submit floor elevations as part of foundation inspections. An error of just 6 or 12 inches could be costly for all future owners.

Fundamentals of Flood Resistant Construction

Two objectives of the NFIP are to reduce flood damage and guide development to less hazard prone areas. When buildings are built in special flood hazard areas, increased resistance to flooding is achieved by the following fundamentals:

- **Foundations** capable of resisting flood loads
- **Lowest floors elevated** at least 1 foot above the BFE (100-year floodplain)
- **Equipment and utilities** elevated or designed to remain intact and be restored easily
- **Enclosures below elevated floors** limited to parking, limited storage, and building access and designed to minimize damage
- **Flood damage-resistant materials** used below elevated lowest floors

Critical and essential facilities such as hospitals, fire stations, police stations, and buildings where hazardous materials or critical records are stored should be located outside of the floodplain. But when they must be located in the floodplain, Michigan Building Code requires them to be elevated at least 2 feet above the BFE for more protection during extreme flooding. Facility owners should develop emergency plans for actions to take before the onset of flooding, during floods, and after floodwater recedes.

In short ... flood resistant buildings!

Michigan Construction Code Includes Flood Requirements

As of mid-2022, the 2015 MCC includes flood provisions that meet or exceed the NFIP requirements for buildings and structures in flood hazard areas. All counties, cities and towns are required to enforce the MCC. Some communities enforce "higher standards" than those required by the MCC.

- **Michigan Building Code (MBC):** Flood provisions are primarily in Section 1612 Flood Loads, which refers to the standard *Flood Resistant Design and Construction* (ASCE 24).
- **MBC Appendix G:** Floodplain management requirements in Appendix G include flood map duties, variances, and development other than buildings, including subdivisions, site improvements, floodway encroachments, watercourse alterations, manufactured homes, recreational vehicles, tanks, temporary storage and structures, and miscellaneous structures
- **Michigan Residential Code (MRC):** Flood provisions are primarily in Section R322 Flood-Resistant Construction, although there are requirements in several other sections.
- **Michigan Rehabilitation Code for Existing Buildings:** Flood provisions are found in sections on repairs, alterations, additions, and historic structures and in sections on prescriptive and performance compliance methods.
- **Michigan Plumbing, Mechanical, and Fuel Gas Codes:** Flood provisions are in a number of sections.

View the MCC, with State amendments, at https://up.codes/codes/michigan and view FEMA's "Highlights of ASCE 24" at www.fema.gov/emergency-managers/risk-management/building-science/building-codes/flood.

APPLICATIONS AND ELEVATION CERTIFICATES

Carefully Complete the Permit Application

Part of Floodplain Development Permit Application (only key parts shown)

Application No.: 2022-12 Date Filed: 3/23/2022

Applicant: David and Sally Jones

Type of Development: ❑ New construction ❑ Residence ❑ Commercial
❑ Multifamily ❑ Warehouse/Industrial ❑ Addition ❑ Repair
❑ Accessory Structure/Garage ☑ Fill/Grading ❑ Culvert/Bridge
❑ Other (describe): _____

Property located in Zone AE on FIRM dated: 12/9/2014

Location is: ❑ Floodway/Fringe not determined. ☑ Fringe. ❑ Floodway.

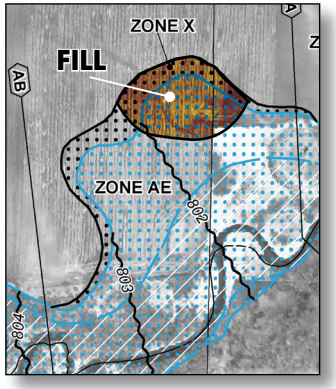
Base Flood Elevation (BFE) at site: 802.0 Datum: ❑ NAVD, 1929

Flood Protection Elevation (FPE) at site: 804.0 ☑ NAVD, 1988

Approved by: Robert Reviwer Title: Building Official Date: 5/18/2022

Important Information

You must get all permits **before** you work in a flood zone.

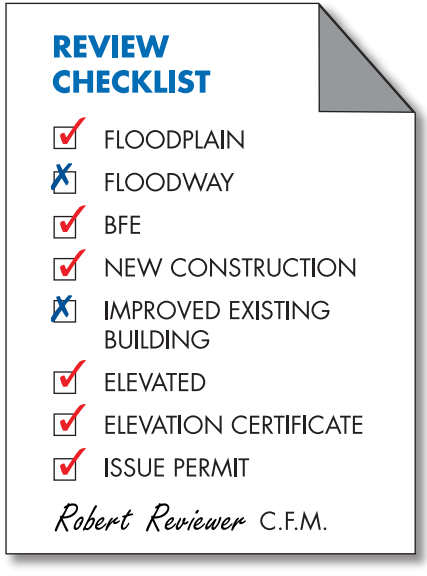


Good information will lead to better construction and less exposure to future flood damage. Contact the local floodplain administrator or building, planning, zoning, or engineering department for application forms and guidance.

Some Key Floodplain Development Permit Review Steps

The permit reviewer must check many things. Some of the key questions are:

- Is the site in the mapped flood zone or floodway?
- Is the natural ground elevation below the BFE?
- Does the site plan show the flood zone, Base Flood Elevation and building location?
- Is substantial improvement or repair of substantial damage proposed?
- Is an addition proposed?
- Will new buildings and utilities be elevated properly?
- Do the plans show an appropriate and safe foundation?
- Are all required design certifications submitted?
- Will the owner/builder have to submit an as-built Elevation Certificate?
- Have all required State and federal permits been issued before the local permit is issued?



Communities Must Retain Flood Records Permanently

Communities that participate in the NFIP agree to maintain certain documentation for all development in flood zones, including but not limited to:

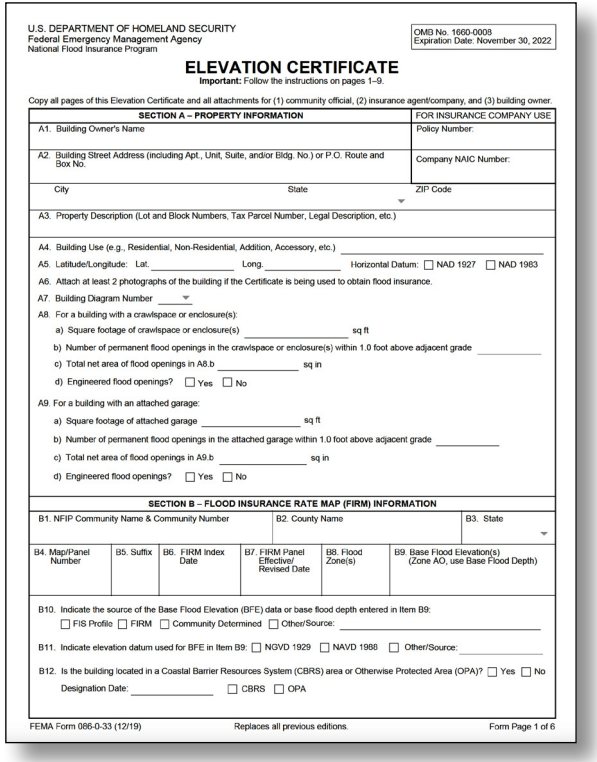
- Permits issued and variances granted
- Letters of Map Change revising FIRMS (see pages 22 and 25)
- Floodway encroachment and watercourse alteration
- Design certifications for dry floodproofed buildings
- Design certifications for engineered flood openings
- Determinations of whether alterations, improvements or additions to existing buildings are substantial improvements
- Determinations of whether damaged buildings are substantially damaged
- "As-built" building elevations (Elevation Certificates) completed by a licensed Professional Surveyor.

Important Information

Maintaining permanent records allows communities to respond to citizen inquiries and to provide documentation to FEMA and EGLE as part of Community Assistance Visits (CAV).

What is the Elevation Certificate and How is it Used?

- The Elevation Certificate (EC) is a FEMA form. Go to www.fema.gov and search for "Elevation Certificate."
- The EC must be completed and sealed by a licensed professional surveyor.
- It can be used to show lowest grades adjacent to planned or existing building sites are above the Base Flood Elevation (see page 20).
- It is used to verify building and equipment elevations.
- Insurance agents can use the EC to write and rate NFIP flood insurance policies.



U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2022

ELEVATION CERTIFICATE
Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION | FOR INSURANCE COMPANY USE

A1. Building Owner's Name | Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. | Company NAIC Number:

City | State | ZIP Code

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat._____ Long._____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):
a) Square footage of crawlspace or enclosure(s) _____ sq ft
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A8.b _____ sq in
d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:
a) Square footage of attached garage _____ sq ft
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A9.b _____ sq in
d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date: _____ ☐ CBRS ☐ OPA

FEMA Form 086-0-33 (12/19) Replaces all previous editions. Form Page 1 of 6

By itself, the EC **cannot** be used to waive the mortgage lender requirements to obtain flood insurance. See page 22 to learn about FEMA's Letter of Map Amendment process.

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.

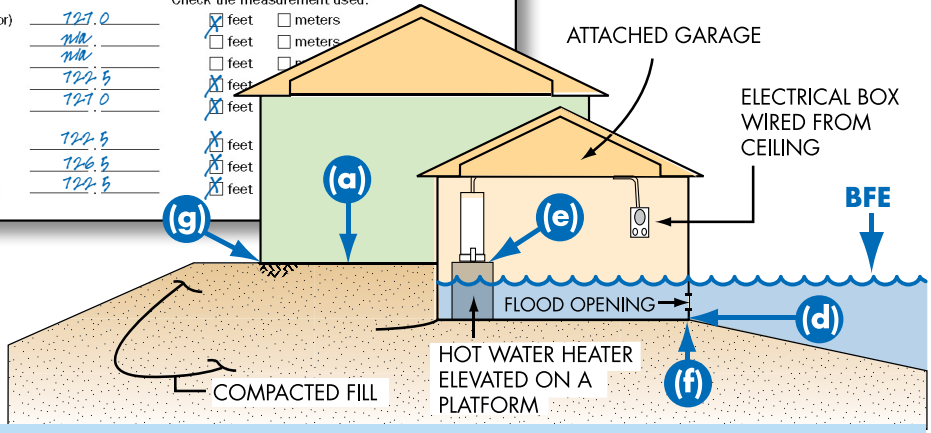
C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.

Benchmark Utilized: _____ Vertical Datum: _____

Indicate elevation datum used for the elevations in items a) through h) below. ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____
Datum used for building elevations must be the same as that used for the BFE.

		Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	727.0	☒ feet	☐ meters
b) Top of the next higher floor	NA	☐ feet	☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only)	NA	☐ feet	☐ meters
d) Attached garage (top of slab)	722.5	☒ feet	☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	727.0	☒ feet	☐ meters
f) Lowest adjacent (finished) grade next to building (LAG)	722.5	☒ feet	☐ meters
g) Highest adjacent (finished) grade next to building (HAG)	726.5	☒ feet	☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	722.5	☒ feet	☐ meters

ELEVATION CERTIFICATE
(partial)

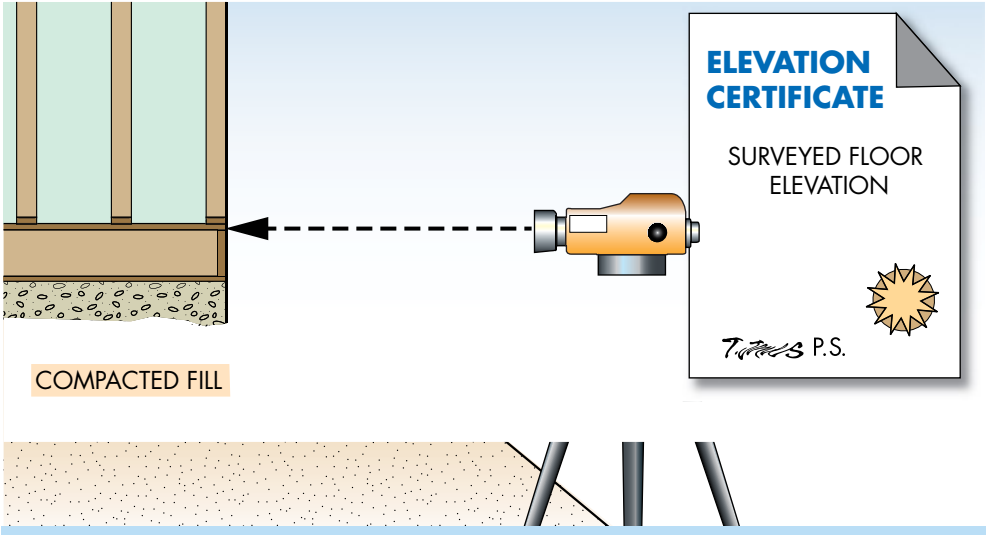


In this example, the BFE is 725.0 feet.

The slab-on-grade house was elevated on fill 2 feet above the BFE; the garage is 2.5 feet below the BFE (with flood openings).

The Michigan Construction Code requires submission of elevation documentation two times: when the lowest floor is set and prior to further vertical construction and again prior to the final inspection. A Michigan licensed professional surveyor must fill out and seal the surveyed elevations. The EC includes diagrams for different building types. Several points must be surveyed.

Paperwork is Important



Important Information

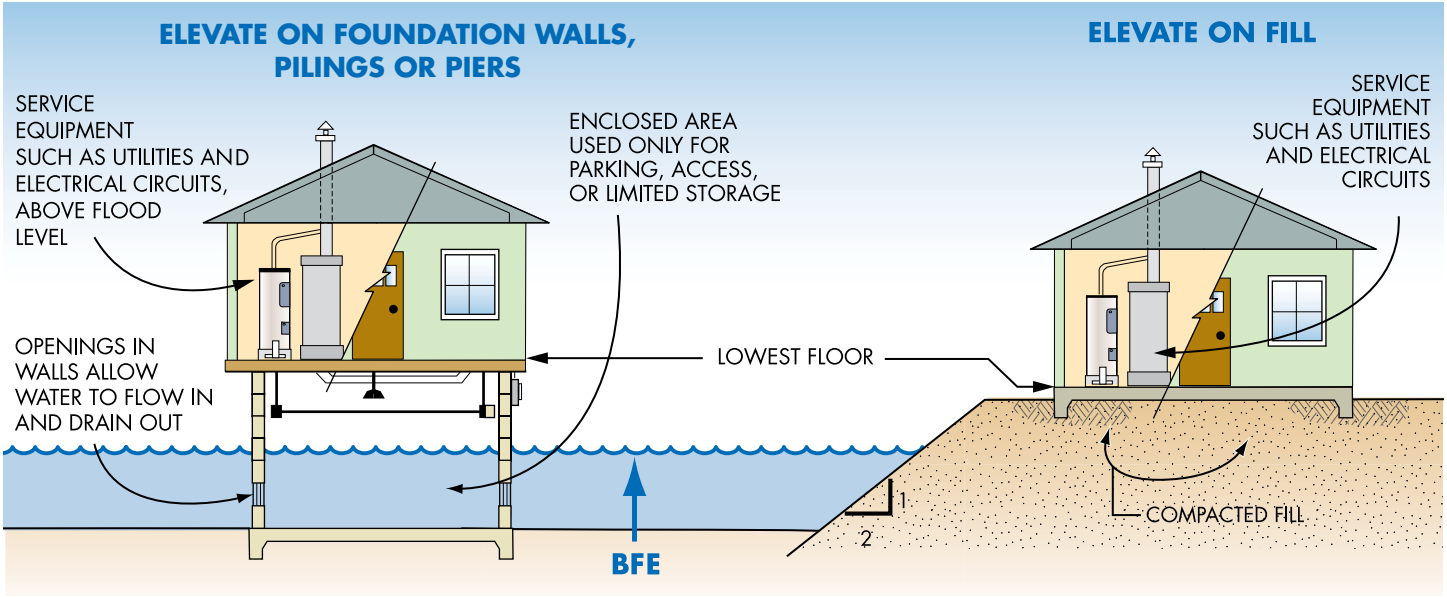
Lowest Floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure (that is not a basement) is not the lowest floor if the enclosure is limited to parking, limited storage, and building access and it is built as required by the MCC. Crawlspaces are enclosures.

"As-built" Elevation Certificates must be submitted before the final inspection. Surveyors collect information helpful to verify compliance, including flood openings and elevation of equipment.

Owners should keep Elevation Certificates in a safe place. They can be used to demonstrate that buildings were compliant at the time of construction. Also, Elevation Certificates may be used to obtain NFIP flood insurance policies.

FLOOD ZONE A/AE: BUILDING REQUIREMENTS

How to Elevate Buildings in Flood Zone A/AE

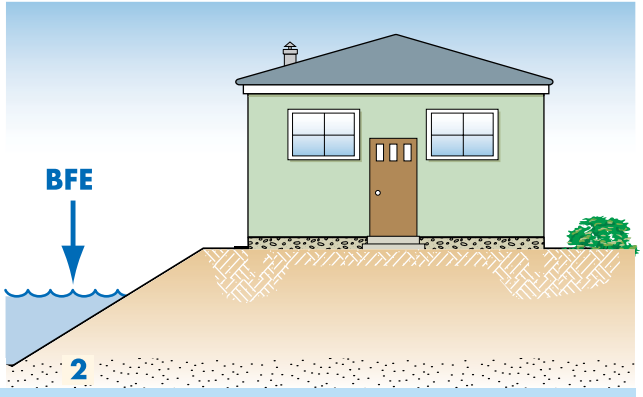


CAUTION! Enclosures (including crawlspaces) have some specific requirements.
Note: When the walking surface of the lowest floor is at the BFE + 1 ft., under-floor utilities are not allowed.
Fill used to elevate buildings must be placed properly (see page 42).

Placement and Compaction of Fill in Zone A/AE

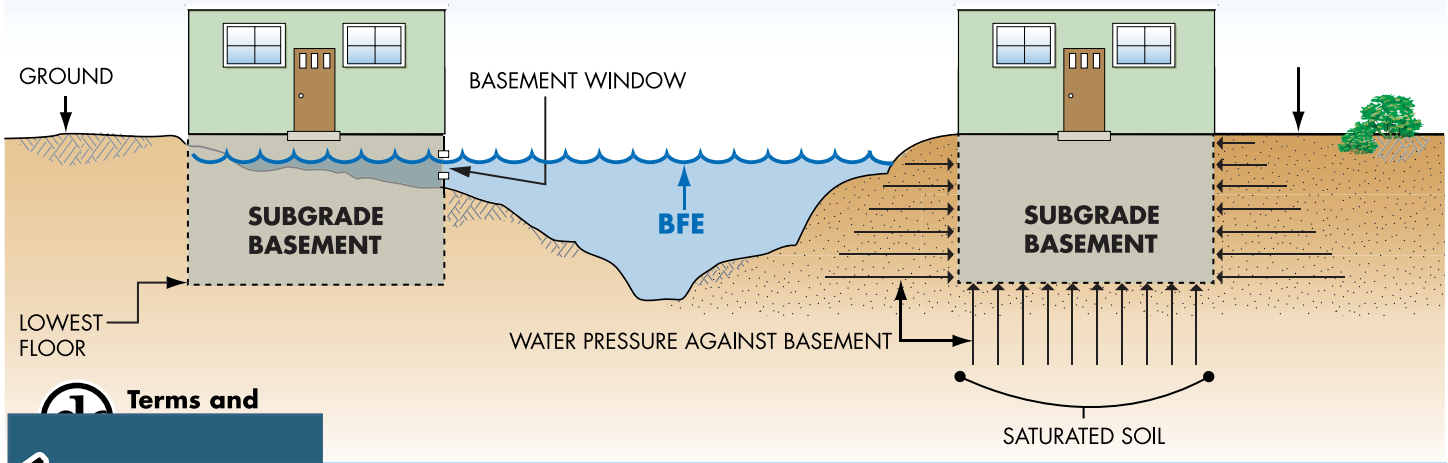
Earthen fill used to raise the ground above the flood elevation must be placed properly so that it does not erode or slump when water rises. For safety and to meet requirements, fill should:

- Not be placed in areas with poor drainage or where the fill may divert water onto adjacent properties
- 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 a design professional)
- Have graded side slopes that are not steeper than 2:1 (one foot vertical rise for every 2 feet horizontal extent); 3:1 flatter slopes are recommended
- Have slopes protected against erosion (vegetation for "low" velocities, durable materials for "high" velocities – determined by a design professional)
- Avoid the floodway (see pages 11 and 30)



Engineers can find more information in FEMA's instructions for Letters of Map Revision based on Fill (FEMA Form MT-1) and NFIP Technical Bulletin 10. In Zone V, buildings on fill are not permitted. In Coastal A Zones, the MCC limits use of fill to backfilled stem walls.

Basements in Flood Zones Are Unsafe

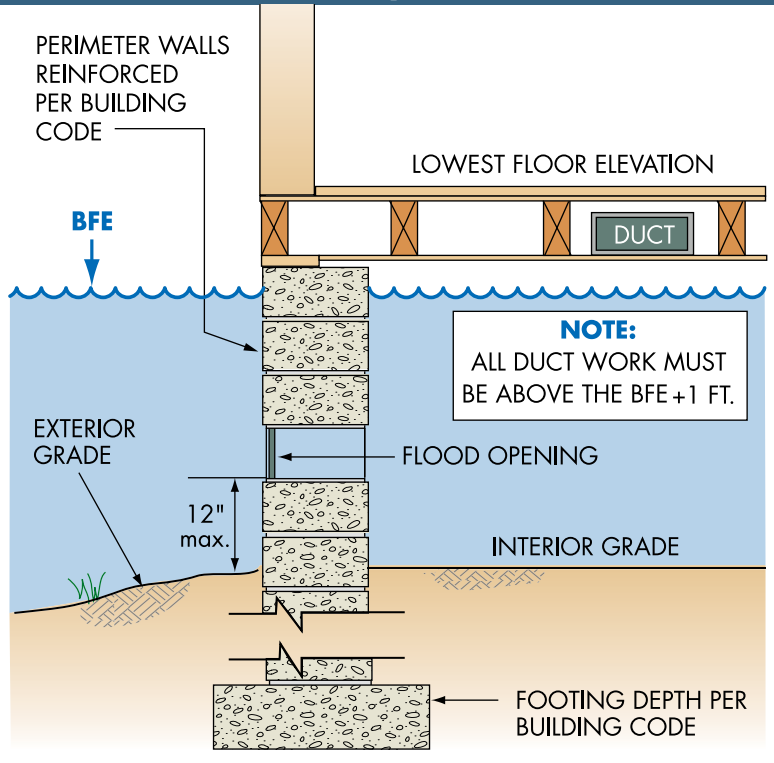


Terms and

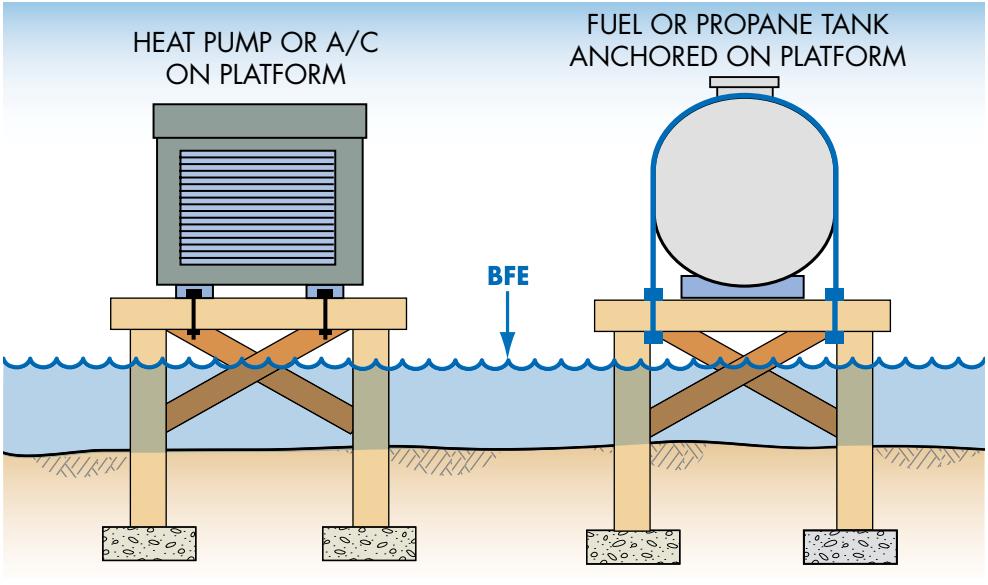
A **basement** is any portion of a building that has its floor subgrade (below ground level) on all sides.

New buildings are not allowed to have basement floors below the BFE and NFIP flood insurance coverage is very limited in existing basements. It only takes an inch of water over a door threshold or window 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.

Enclosures and Crawlspace Details (Zone A/AE)



- The MCC requires the Lowest Floor at or above BFE plus 1 foot.
- All materials below the lowest floor must be flood resistant.
- Interior grade or floor must be equal to or higher than exterior grade on at least one side.
- Flood openings must provide 1 sq. in. of net open area for every sq. ft. of area enclosed by the perimeter walls – or certified engineered openings may be used.
- The bottom of flood openings must be no more than 12 inches above the higher of the interior and exterior grades.
- Standard air ventilation units must be permanently disabled in the "open" position to allow water to flow in and out.
- See FEMA Technical Bulletin 1 *Requirements for Flood Openings in Foundation Walls and Walls of Enclosures*.



Important Information

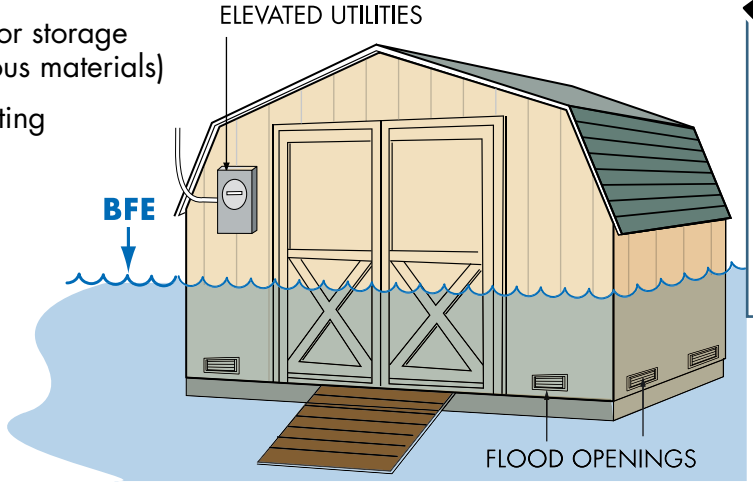
Fuel and propane tanks may explode or release contents during flooding. Even shallow water can create large buoyant forces on tanks. Tanks may be underground, elevated on platforms or columns, or at-grade and anchored to resist flood loads.

Fuel and propane tanks can pose serious threats to people, property and the environment during flood conditions. Search online for FEMA videos on "Fuel Tank Flood Hazards" and "How to Anchor Home Fuel Tanks".

Accessory Structures

If not elevated, accessory structures in flood zones must:

- Not be habitable
- Be used only for parking or storage (not pollutants or hazardous materials)
- Be anchored to resist floating
- Have flood openings
- Be built of flood damage-resistant materials
- Have elevated utilities
- Not be modified for different use in the future



Terms and Definitions

Accessory Structure, defined in the Michigan Residential Code is accessory to and incidental to a dwelling and is located on the same lot as a dwelling.

Sheds and detached garages in flood zones are "development" and permits are required. By policy, FEMA limits the size of non-elevated wet floodproofed accessory structures in Zone A/AE to 600 sq. ft. **Caution!** Remember, everything inside will get wet when flooding occurs.

Recreational Vehicles

In flood zones, RVs must:

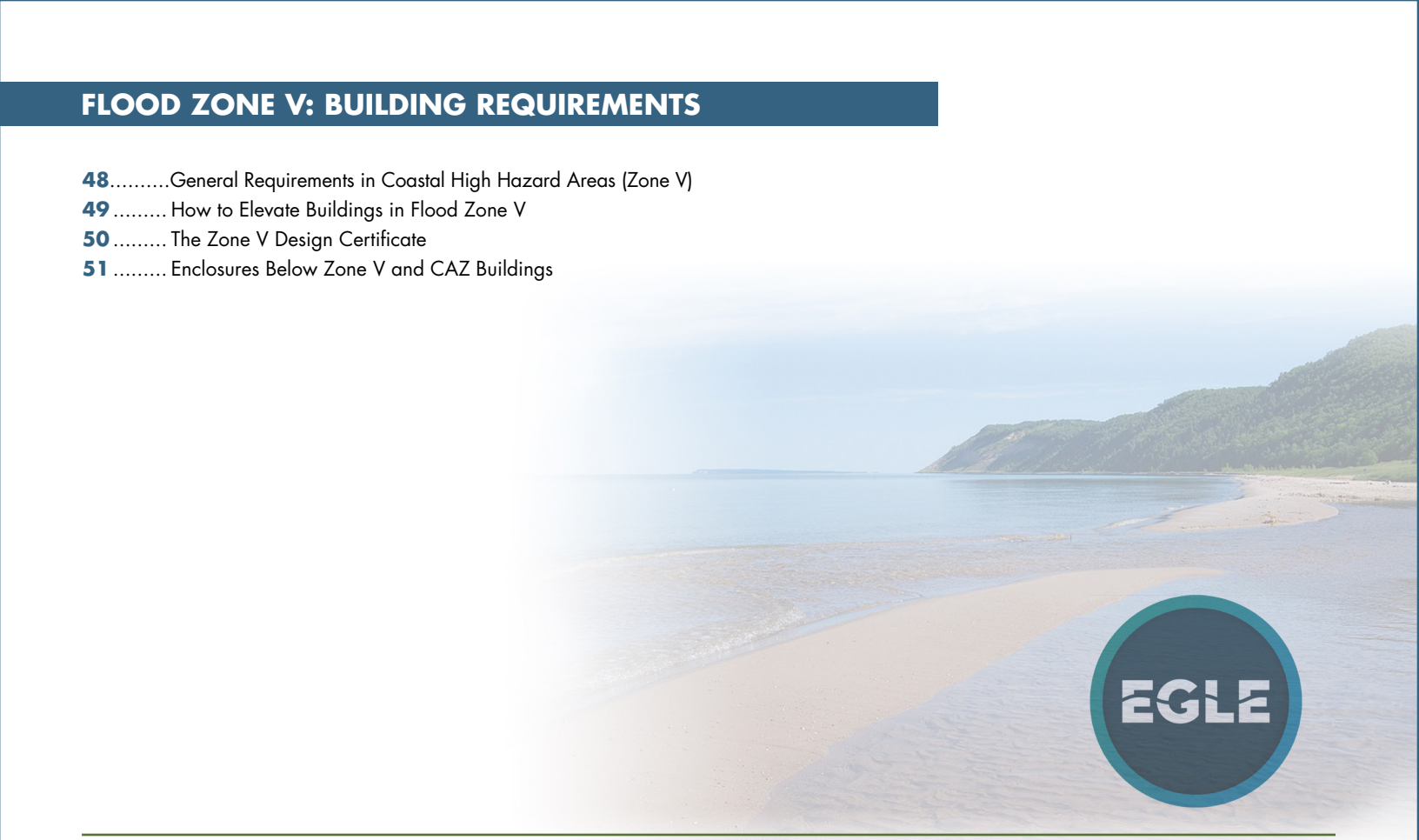
- Be licensed and titled as an RV (not as a permanent residence)
- Be built on a single chassis
- Must measure 400 sq.ft. or less (measured at largest horizontal projection)
- Be road-ready, with inflated tires and be self-propelled or towable by a light-duty truck
- Have no attached deck, porch, shed, or utilities
- Be used for temporary recreational, camping, travel or seasonal use (no more than 180 consecutive days)
- 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 the above conditions must be installed in compliance with the Michigan Construction Code requirements for dwellings, including permanent foundations. RVs are prohibited in floodways.

FLOOD ZONE V: BUILDING REQUIREMENTS



General Requirements in Coastal High Hazard Areas (Zone V)

Revisions to Flood Insurance Rate Maps for the Great Lakes shorelines may show coastal high hazard areas (Zone V) and Coastal A Zones.

The fundamental requirements for flood resistant construction apply in Zone V and:

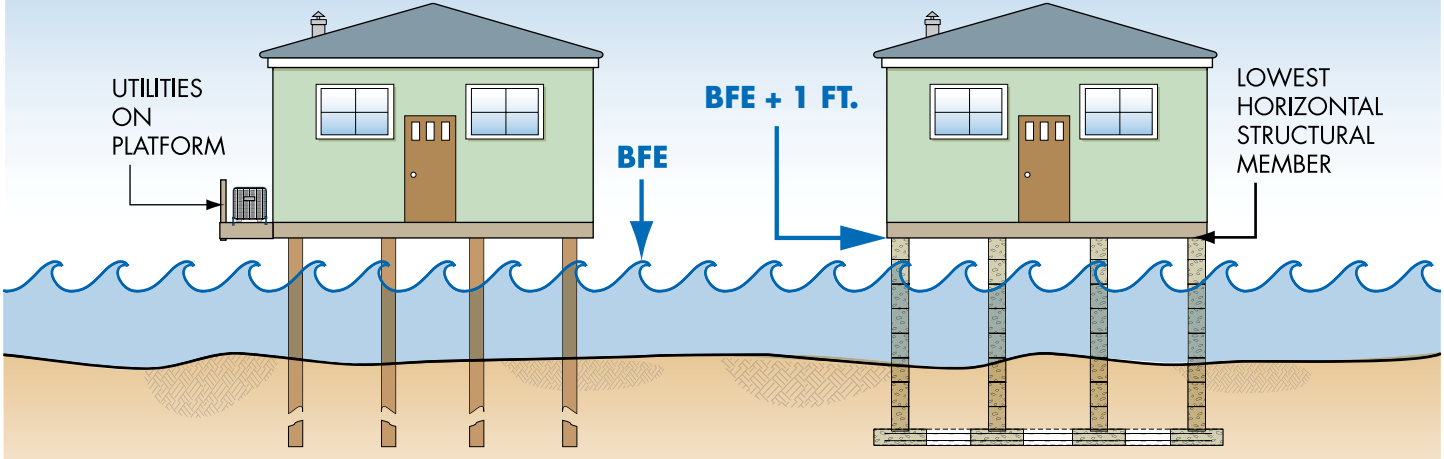
- Buildings must be elevated on "open" foundations (piers, pilings, columns) to allow waves and water to pass under without imposing significant wave forces (see page 49).
- The lowest horizontal structural member of the lowest floor must be elevated to or above the BFE + 1 foot.
- Foundation designs must be prepared and certified by registered design professionals (see page 50).
- Walls of enclosures below elevated buildings must be designed to break away (see page 51).

Terms and Definitions

Coastal High Hazard Areas (Zone V) are shown on FIRMs to identify areas subject to high velocity wave action during base flood conditions. In Zone V, waves may be 3 ft high or higher.

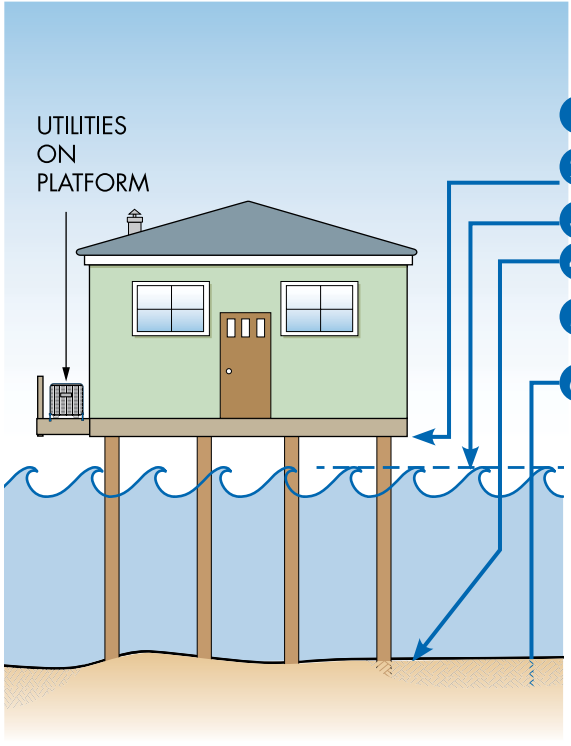
Where FIRMs show a Limit of Moderate Wave Action (LiMWA), the area between the LiMWA and Zone V boundary or shorelinev is the Coastal A Zone (CAZ). The building code treats CAZ similar to Zone V.

How to Elevate Buildings in Flood Zone V



In Zone V, the design specifics will be determined and certified by an architect or engineer based on the site, including how the building will be elevated and how deep the foundation elements will be in the ground (see page 50). For more information, see FEMA P-762, *Local Officials Guide to Coastal Construction* and FEMA P-55, *Coastal Construction Manual*.

The Zone V Design Certificate



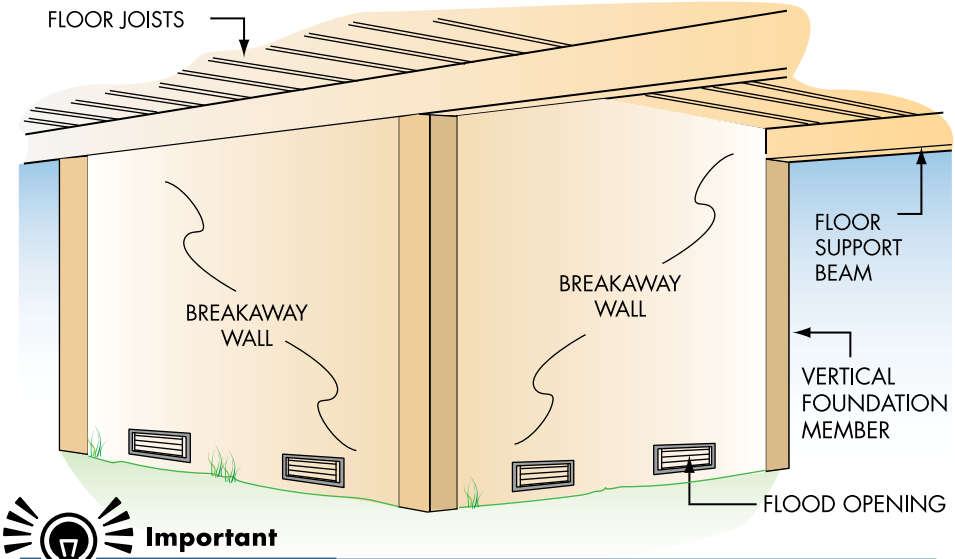
ZONE V DESIGN CERTIFICATE (Partial)

Elevation Information Used for Design

1. Datum..... ☐ NGVD ☒ NAVD ☐ Other
2. Elevation of the Bottom of Lowest Horizontal Structural Member ..... 597.0 feet above datum
3. Base Flood Elevation (BFE)..... 595.0 feet above datum
4. Elevation of Lowest Adjacent Grade ..... 590.0 feet above datum
5. Approximate Depth of Anticipated Scour/Erosion used for Foundation Design..... 1 feet
6. Embedment Depth of Pilings or Foundation Below Lowest Adjacent Grade..... 8' feet

Construction documents must include documentation prepared and sealed by a registered professional engineer or architect stating that the design and methods of construction meet the applicable requirements of the Michigan Construction Code and local floodplain regulations.

Enclosures Below Zone V and CAZ Buildings



Important

Information

It is a violation if enclosures below elevated buildings are modified or used for purposes other than parking, storage, and building access. Not only will damage be increased during floods, but NFIP flood insurance policies may be more expensive.

Enclosures under elevated buildings should be avoided. If areas are enclosed, the MCC requires:

- Walls designed to collapse or "break away" under flood conditions and have flood openings
- Enclosures must be unfinished and made of flood resistant materials
- Utility wires and pipes must not go through or be attached to breakaway walls
- Enclosures must be used only for parking, limited storage, and building access (no bathrooms, recreation, or utility rooms)
- Minimal electric service for safety (light switch)

EXISTING BUILDINGS

Improvements and Repairs of Buildings in Flood Zones

Permits to improve and repair buildings are required. Local officials must:

- Review costs estimated in construction contracts or other cost estimates (including estimate market value of owner labor and donated labor and materials).
- Estimate the market value using property assessment records or have an independent licensed appraiser determine the Actual Cash Value (in-kind replacement, depreciated).
- Compare the cost of improvements and repairs to the market value of the building.
- Require buildings to be brought into full compliance if the costs equal or exceed 50% of the market value, called Substantial Improvement.
- Encourage owners to consider other ways to reduce future damage if the comparison is less than 50% (see page 65).

Terms and Definitions

Substantial Improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% 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** (flood, fire, snow, tornadoes, etc.), regardless of the actual repair work performed.

Important Information

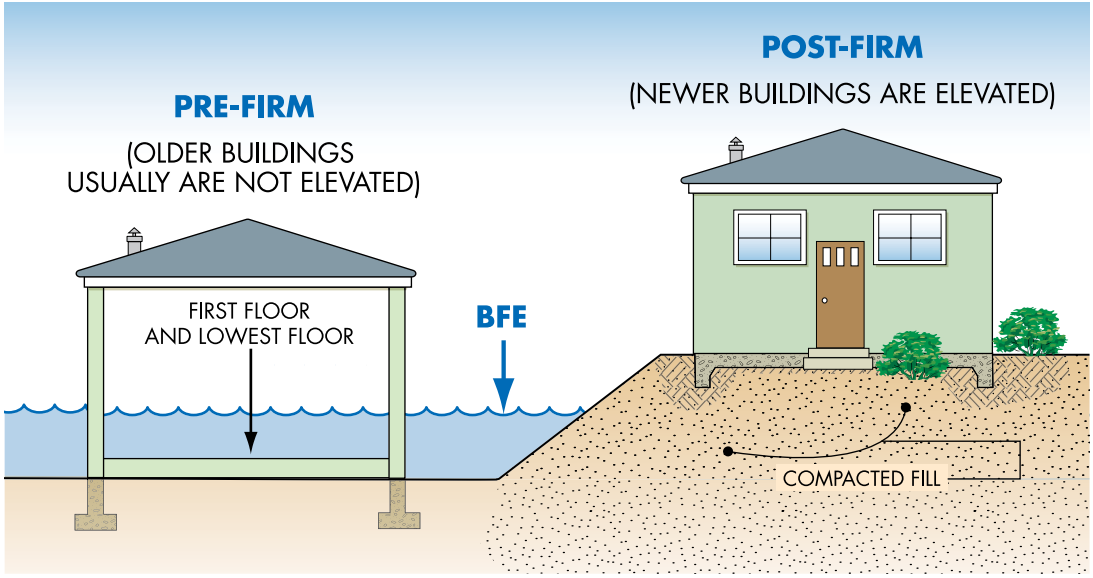
Improvements include:

- Renovation/ rehabilitation of the interior of the existing building (see page 59)
- Lateral addition, **without** renovation or structural alteration of the existing building (see page 60)
- Lateral addition, **with** renovation or structural alteration of the existing building (see page 61)
- Vertical addition (add new story)

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

Pre-FIRM and **Post-FIRM** are NFIP insurance terms tied to a community's initial FIRM. The terms are used to determine flood insurance rates. Although common, the terms should not be used to distinguish between buildings constructed before a community joined the NFIP and those built after, especially in communities where the FIRMs have been revised.

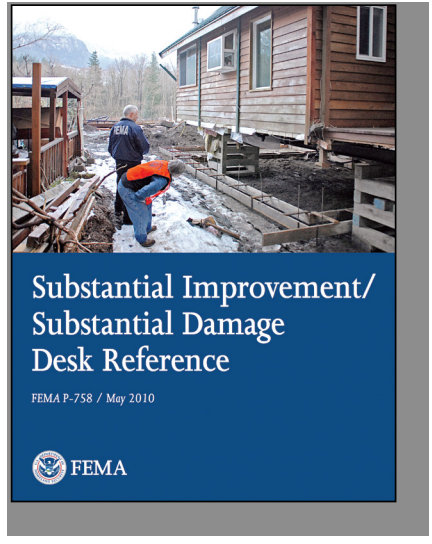
Buildings must be brought into compliance when work is determined to be substantial improvement or repair of substantial damage.



Substantial Improvement/Substantial Damage Desk Reference

FEMA's SI/SD Desk Reference (FEMA P-758) provides guidance and suggested procedures for:

- Estimating costs of improvements and costs of repairs (see page 56)
- Estimating market values
- Community and property owner responsibilities
- Administrative requirements
- Key aspects of bringing buildings into compliance
- Suggestions for preparing for disasters

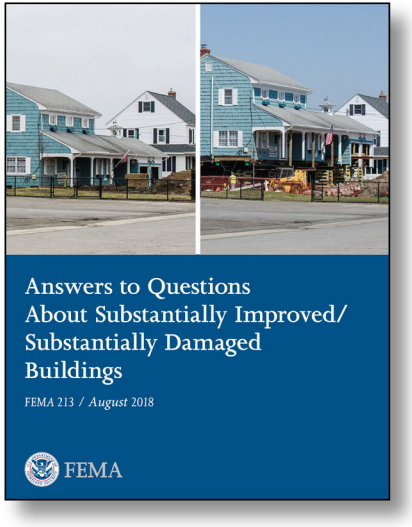


Terms and Definitions

Substantial Damage means damage of any origin sustained by a structure whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.

Answers to Questions about Substantial Improvement and Substantial Damage

FEMA's *Answers to Questions about Substantially Improved/Substantially Damaged Buildings* (FEMA 213) is a good resources for citizens, elected officials, members of appointed boards, contractors, and real estate and insurance professionals. Each question refers the reader to sections in the *SI/SD Desk Reference* (FEMA P-758) for more details.



FEMA 213 uses the FAQ format to:

- Explain the NFIP definitions and regulations for SI/SD
- Answer general questions about the SI/SD requirements
- Explain how local officials make SI/SD determinations
- Explain how to estimate costs and market values
- Answer common questions that arise in the post-disaster period

Estimating Costs of Improvements and Repairs

The costs of improvements (or the costs to repair damaged buildings to pre-damage condition) must be estimated before determining whether proposed work constitutes substantial improvement or repair of substantial damage.

- **Include** costs of all structural elements, all interior and exterior finishes, built-in appliances, all utility and service equipment
- **Include** site preparation related to the improvement or repair (e.g., foundation excavation or filling in basements)
- **Include** costs of demolition, construction management, contractor overhead and profit
- **Include** costs associated with elevating a structure when the proposed elevation is lower than the BFE + 1 foot
- **Exclude** costs of plans and specifications, land survey, permit and inspection fees, and debris removal
- **Exclude** costs of outside improvements (landscaping, irrigation, sidewalks, driveways, fences, yard lights, pools, detached accessory structures, etc.)

Important Information

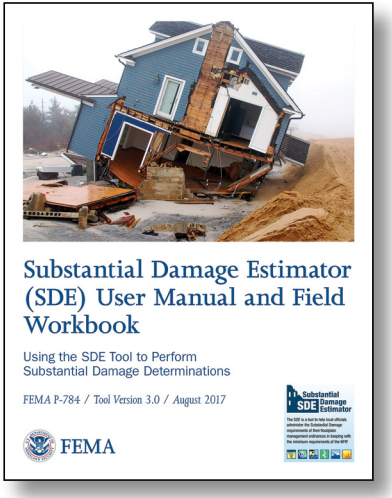
Written estimates prepared by contractors provide the best cost information.

Owners performing work must include estimates of the value of their own labor.

Equivalent costs must be estimated when materials are donated or volunteers help with construction.

For more details on cost items that must be included and those that are excluded, see the SI/SD Desk Reference (page 54).

Estimating Substantial Damage



FEMA's Substantail Damage Estimator (SDE) tool was developed to help state and local officials to collect uniform information needed to make substantial damage determinations for residential and non-residential structures.

The SDE tool:

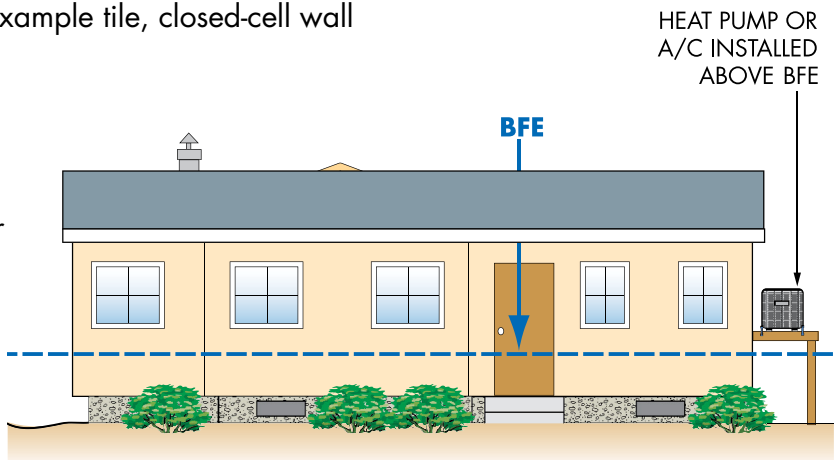
- Can be used to assess flood, wind, wildfire, seismic, and other forms of damage
- Helps provide timely substantial damage determinations so that reconstruction can begin following events that damage buildings
- Is used in conjunction with industry-accepted construction cost-estimating guides

Search online for FEMA P-784 to download the SDE software installation package, User Manual and Workbook, forms, worksheets and other materials.

Non-Substantial Improvements Other than Additions

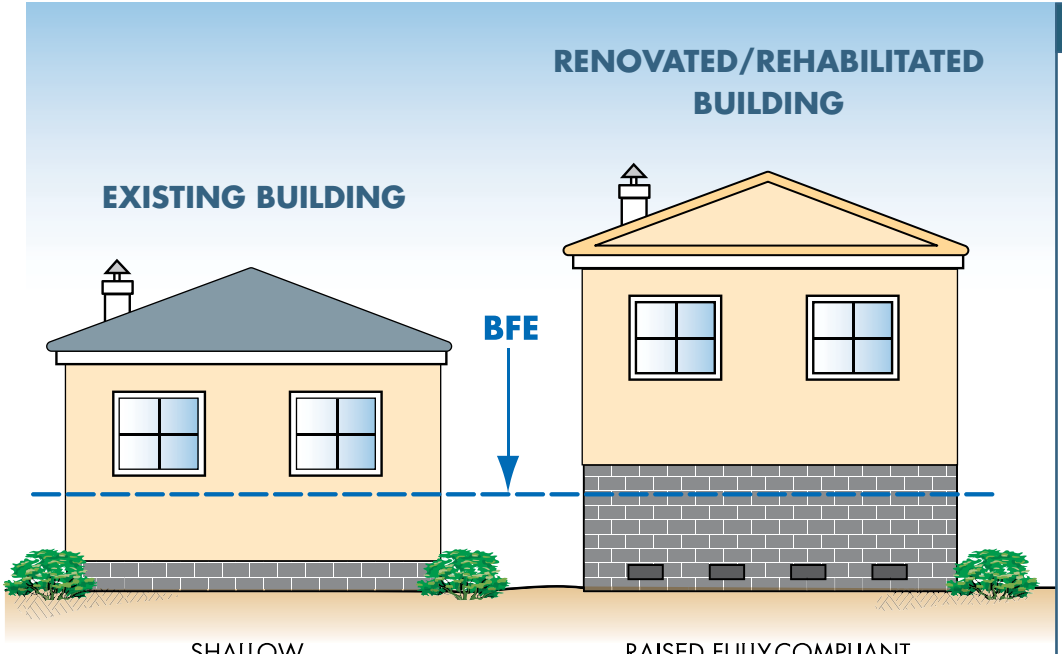
Proposed improvements are "non-substantial" if the costs are less than 50% of the market value of the building. In these cases, buildings are not required to be brought into compliance. However, there are many things owners can do to reduce exposure to future flooding. Owners should consider the following:

- Use flood damage-resistant materials, for example tile, closed-cell wall insulation, and polyvinyl wall coverings
- Raise air conditioning equipment, heat pumps, furnaces, water heaters, and other appliances on platforms
- Move electric outlets higher above the floor
- Add flood openings to crawlspace foundations
- Move ductwork out of crawlspaces
- Fill in below-grade crawlspace



Note! ALL proposed work must be included in permit applications. If more work is proposed or undertaken after a permit is issued, community officials must determine whether the additional work changes the substantial improvement determination.

Substantial Improvement: Renovation Only



(SEE PAGE 63)

Important Information

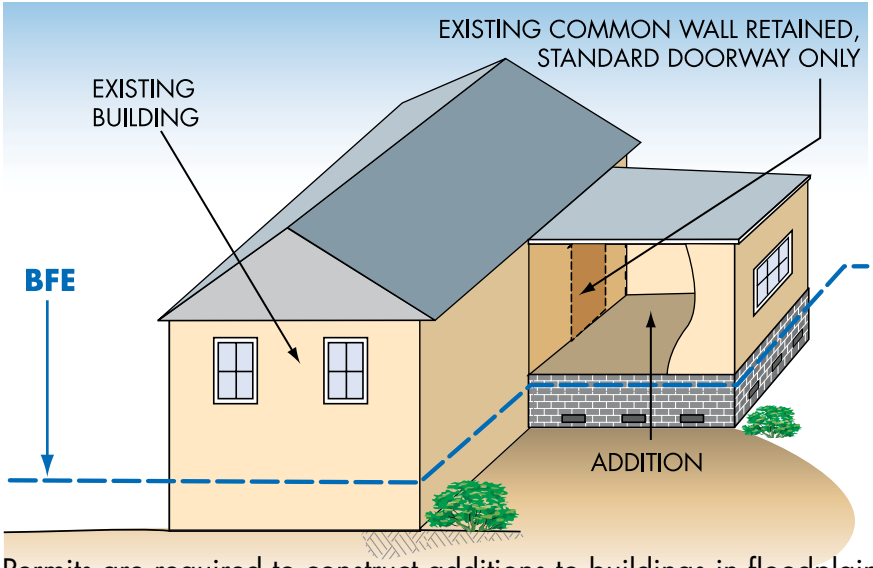
Floodplain buildings can be improved, renovated, rehabilitated or altered, but special rules apply.

Consult local permit offices before beginning work. Provide complete information about all proposed work.

If local code officials have cited violations of State or local health, sanitary, or safety codes, minimum costs to correct violations to provide safe living conditions can be excluded from the cost of renovations.

Alteration of registered historic structures are allowed, by variance, as long as the structures continue to meet the criteria for listing as historic structures.

Lateral Addition Only



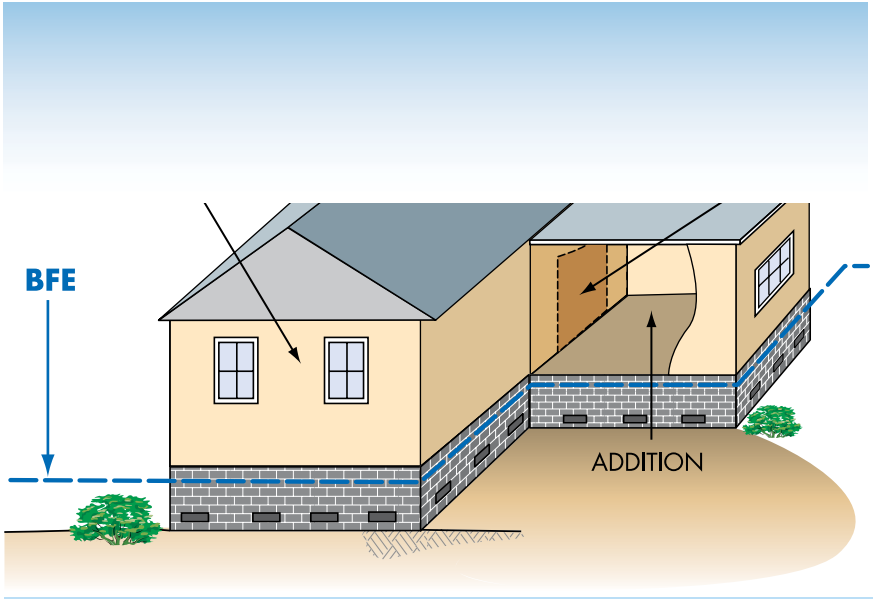
Important Information

See page 61 for projects to add lateral additions that also modify the interior of the existing building or make structural modifications to the existing common wall.

Permits are required to construct additions to buildings in floodplains. Lateral additions for residences in floodways are prohibited.

When a local official determines a lateral addition is not a substantial improvement (less than 50%), only the addition must be elevated to at least the BFE plus 1 foot. When determined to be substantial improvement, the existing building and the addition must be brought into compliance (see page 61).

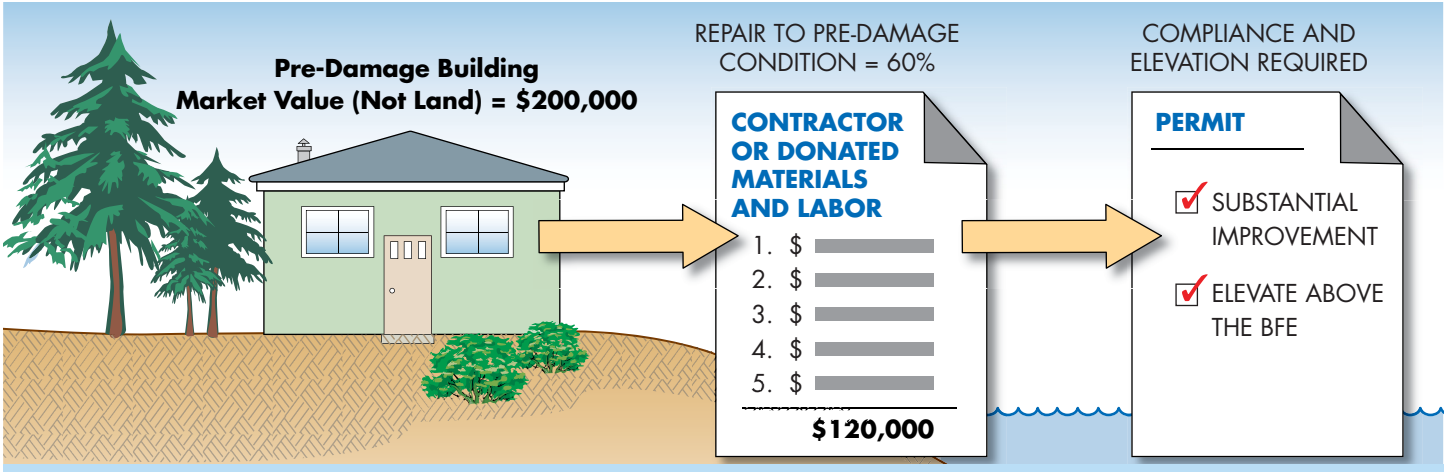
Substantial Improvement: Addition Plus Other Work



Communities must prepare evaluations to determine if all proposed work will trigger the substantial improvement requirement. For additions, substantial improvement when the **cost of the addition plus the cost of improvements** equals or exceeds 50% of the market value of the existing building.

Community permit offices can help determine which requirements apply when buildings must be brought into compliance. A preliminary review of proposed improvements is recommended before projects are designed and before permit applications are submitted.

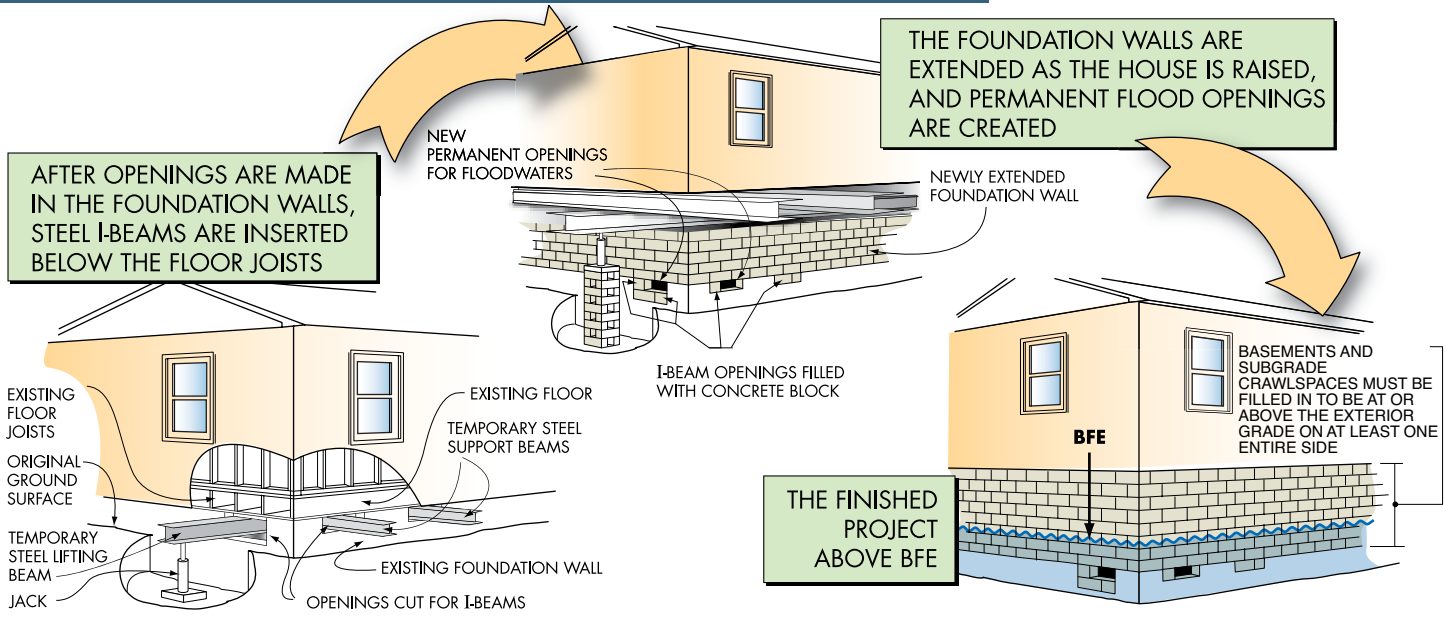
Repair of Damaged Buildings



Permits are required to repair damaged buildings, regardless of the cause – fire, flood, wind, or even vehicle impact. Detailed estimates of the cost to repair a building to pre-damage condition are required (see page 56). If the costs are 50% or more of the pre-damage market value of the building (**not land**), then it is "substantially damaged" and must be brought into compliance, which may involve raising the building and other measures. Consult with local permit offices before repairs are started.

See page 63 for an example of elevating an existing building above a crawlspace.

Elevating an Existing Building



This is one way to elevate an existing building to comply with building code and floodplain regulations (also see FEMA P-312, *Homeowner's Guide to Retrofitting*). If an NFIP-insured building is damaged by flood and the community determines it is substantially damaged, the owner may be eligible for an **Increased Cost of Compliance** payment (see page 64).

Paying for Post-Flood Compliance

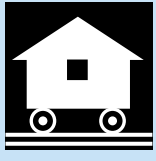
Owners may be eligible for up to $30,000 to help pay to bring buildings into compliance with building code and community requirements – if all of the following apply:

- Buildings are located in a mapped flood zone
- Buildings are covered by NFIP flood insurance, which includes Increased Cost of Compliance coverage
- Buildings have lowest floors below the BFE
- Buildings are substantially damaged by flooding
- Owners act quickly with their claims adjusters and community officials to process all required paperwork

Learn more at www.fema.gov/increased-cost-compliance-coverage.

USE THE ICC CLAIM TO:

ELEVATE-IN-PLACE



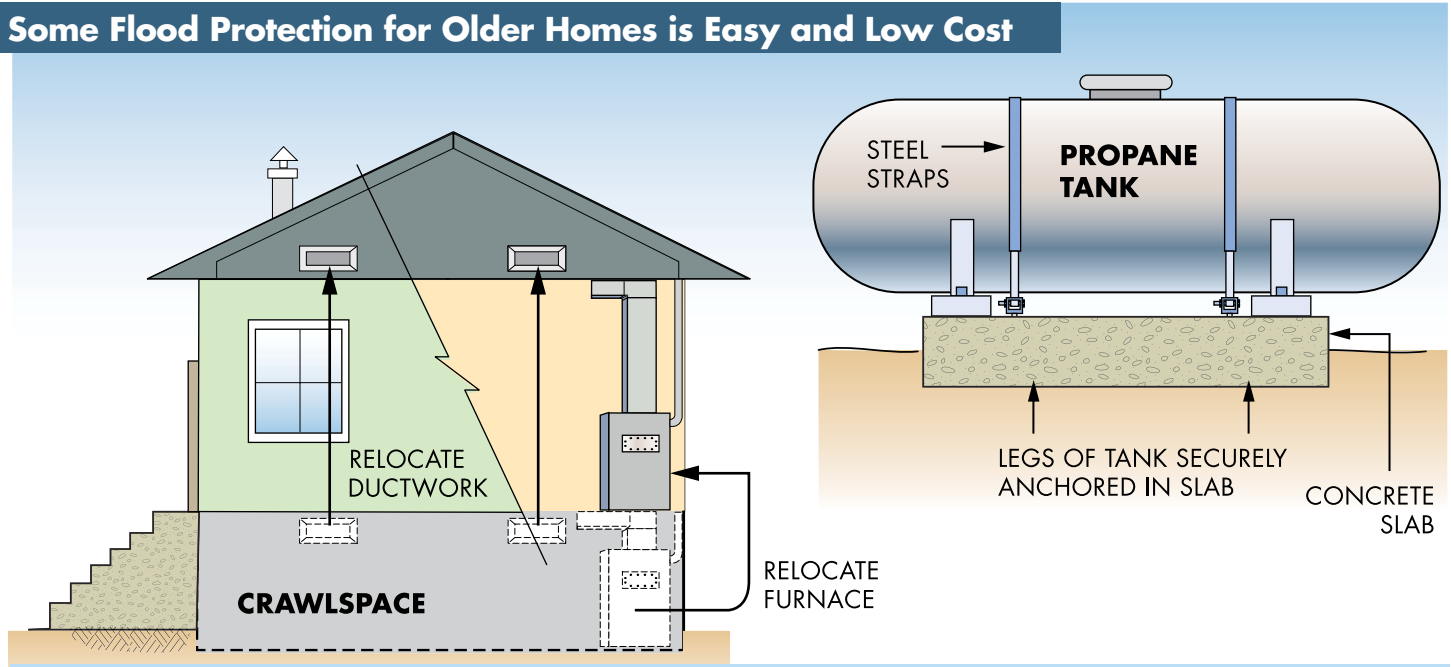
RELOCATE TO HIGH GROUND

DEMOLISH

Owners whose buildings are substantially damaged are required to "bring the buildings into compliance" with flood zone requirements.

FLOOD PROTECTION AND MITIGATION

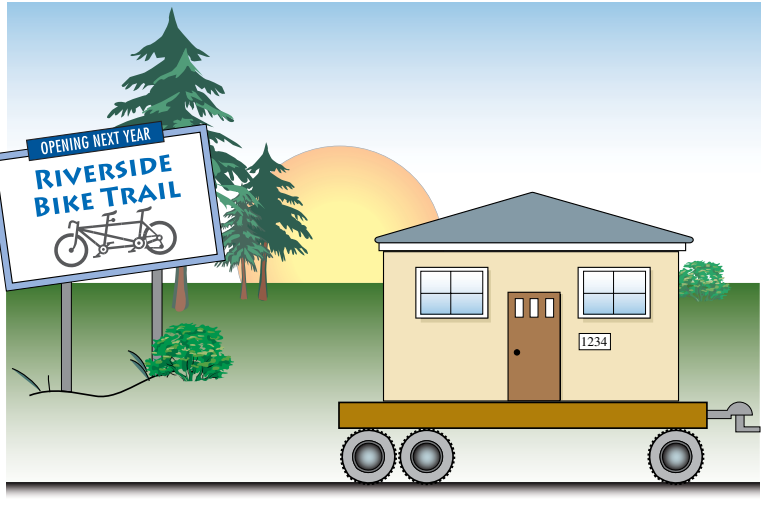
Some Flood Protection for Older Homes is Easy and Low Cost



Move fuse boxes, water heaters, furnaces, and ductwork out of crawlspaces and basements.
Anchor heating oil and propane gas tanks to prevent flotation and lateral movement.
Do not store valuables or hazardous materials in a flood-prone crawlspace or basement.
Use flood-resistant materials when repairs are made.

Some Flood Mitigation Projects are More Costly Up Front

But Give More Protection and a Positive Return on Investment



Following floods, some communities purchase and remove damaged homes. The acquired land is dedicated to public open space or stormwater storage and can be used for recreation or to help restore wildlife habitat and wetlands.

Some homes have been elevated on new, higher foundations, and others have been moved to safer high ground outside of high risk flood hazard areas. Studies indicate these types of projects have a 7:1 return on investment.

The Michigan State Police, Emergency Management and Homeland Security Division administers FEMA mitigation grant programs. Communities interested in grants to help reduce future flood damage can learn more online at https://www.michigan.gov/msp/divisions/emhsd/grant-programs/hma/hazard-mitigation-assistance.

SAFETY AND PREPAREDENSS

Be Prepared for Flood Emergencies

Everyone should be prepared for floods and other emergencies. Preparation begins at home, at work places, at schools, and in communities.

Sometimes floods and other disasters can strike quickly and without warning and evacuation may be required. Basic services (water, gas, electricity and telephones) may be interrupted, perhaps for several days. Local officials and emergency relief workers will be on the scene after disasters, but they cannot reach everyone right away. Communities, families, and businesses should prepare before disasters occur by:

- Learning about natural hazards (Michigan communities participate in developing Hazard Mitigation Plans)
- Making family and workplace emergency plans and knowing where to go if evacuations are required
- Putting together disaster kits with supplies to last a few days

Learn more about emergency preparedness at www.michigan.gov/miready and at the American Red Cross (www.redcross.org). Also check with local emergency management agencies.

Turn Around Don't Drown®

Learn about flood risks and follow these safety rules:

- When flooding is expected, stay away from creeks, streams, and rivers.
- NEVER drive through flooded roads – they may be washed out.
- Passenger cars may float in only 12-24 inches of water.
- Be especially cautious at night when it is harder to recognize dangers.
- Just 6 inches of fast-moving water can knock you off your feet.
- https://www.weather.gov/safety/flood-turn-around-dont-drown.

RESOURCES

Useful Resources and Common Acronyms

- The Department of Environment, Great Lakes, and Energy posts information about floodplain management, floodplain staff contacts, Flood Insurance Studies and floodplain mapping, State floodplain management laws and rules, FAQ, newsletters and guidebooks, guidance for submitting online requests for floodplain elevations, and more at: www.michigan.gov/floodplainmanagement
- NFIP regulations, Title 44 CFR: www.fema.gov/flood-insurance/rules-legislation
- NFIP Technical Bulletins: www.fema.gov/emergency-managers/risk-management/building-science/national-flood-insurance-technical-bulletins
- CRS Resources: www.fema.gov/floodplain-management/community-rating-system
- Michigan Stormwater-Floodplain Association (MSFA): www.mifloods.org

Common Acronyms

- BFE = Base Flood Elevation
- EC = Elevation Certificate
- FIRM = Flood Insurance Rate Map
- ICC = Increased Cost of Compliance
- MCC = Michigan Construction Codes
- NFIP = National Flood Insurance Program
- SFHA = Special Flood Hazard Area (100-year floodplain)

Want to Learn More?

- For information and advice on permits, contact local building or planning departments.
- To learn more about flood maps, go to www.fema.gov/national-flood-insurance-program-flood-hazard-mapping.
- FEMA's on-line publications can be found in the FEMA Library (www.fema.gov/library/) or by using an Internet search engine to search on the publication number or title.
- To learn about NFIP flood insurance, call an insurance agent. Most insurance companies write NFIP policies.
- To learn the importance of taking steps to financially protect homes and businesses from flood damage go to www.floodsmart.gov.
- To join the Michigan Stormwater-Floodplain Association, go to www.mifloods.org.

This **Quick Guide** may be downloaded from

Michigan Department of Environment, Great Lakes, and Energy

www.michigan.gov/floodplainmanagement

EGLE

Michigan Stormwater-Floodplain Association

www.mifloods.org

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