

RESIDENTIAL FLOODPLAIN CONSTRUCTION MANUAL



Department of Public Services

Planning Division

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Introduction –What is the National Flood Insurance Program (NFIP)?

The City of Rock Springs is providing this handout to help guide the citizens of the City of Rock Springs through the process of developing or improving residential properties that are located within the FEMA designated floodplain. This document utilizes information found in a variety of Technical Bulletins and Publications available through FEMA's Website www.fema.gov. A list of references is included at the end of this handout.

The National Flood Insurance Program (NFIP) was created in 1968 with the passing of the National Flood Insurance Act. The NFIP was created primarily to:

- ❖ Guide development away from the flood hazard areas.
- ❖ Require that new and substantially improved buildings be constructed in ways that minimize or prevent damage during or after a flood event.
- ❖ Transfer the costs of private property flood losses from the entire tax paying community to floodplain property owners through flood insurance premiums.
- ❖ Provide aid to floodplain property owners after floods, especially after smaller flooding events which do not warrant federal disaster aid.

The NFIP is a mutual agreement between the Federal Government and the local community whereby a community adopts and enforces a floodplain management ordinance to reduce future flood risks and the Federal Government ensures flood insurance is available within the community. There are three basic parts to the NFIP – mapping, insurance, and regulations.

Mapping:

The Federal Emergency Management Agency (FEMA) prepares and issues the floodplain map and the floodplain hazard data for the community. The Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) were first issued to the City of Rock Springs on July 16, 1979. The most recent FIRM and FIS were issued to the City of Rock Springs on July 20, 1998. These maps and data are used to:

- ❖ Provide a basis for regulating new flood prone construction to prevent future flood damages;
- ❖ Rate flood insurance policies; and,
- ❖ Determine when flood insurance must be purchased as a condition of a loan or other financial assistance.

Insurance:

Every building located in a NFIP participating community may be covered by a flood insurance policy – even buildings located outside of the mapped floodplain. For insurance purposes, a flood is defined as “a general and temporary condition of partial or complete inundation of normally dry land areas from: 1 – overflow of inland or tidal waters or 2 – the unusual and rapid accumulation or runoff of surface waters from any source.” Flood insurance premiums are based on the degree of flood protection that the structures are provided. Therefore, it is important that a community ensure new buildings are properly constructed.

The mandatory purchase of flood insurance requirement applies to all forms of federal or federally regulated financial assistance for buildings located in Special Flood Hazard Areas (including but not limited to loans and grants for purchase, construction, repair, and

improvements). Some of these programs include VA, FHA, HUD, and Small Business Administration Loans. If a community does not participate in the NFIP, these loan options may not be available to properties located in an identified Special Flood Hazard Area due to the inability to purchase flood insurance. The NFIP will write flood insurance policies ONLY in those communities participating in the NFIP.

Regulations:

The NFIP underwrites flood insurance coverage only in those communities that adopt and enforce floodplain regulations that meet or exceed the NFIP criteria. These regulations are designed to ensure that new buildings will be protected from the flood levels shown on the community's FIRM and that development within these areas will not make the flood hazards worse over time.

Oftentimes, floodplain regulations are controversial and are difficult for the community to enforce. However, if the community fails to enforce the minimum NFIP regulations, FEMA has recourse through the following actions:

- 1- Reclassification of the community's involvement through the Community Rating Systems (for participating communities, loss of the benefits provided the community through their participation in the Community Rating System) – NOTE: Rock Springs is not a participating Community Rating System Community.
- 2- Probation – The community has 90 days to correct deficiencies and remedy identified violations. FEMA also notifies all policyholders telling them that an additional \$50.00 premium will be charged on policies sold or renewed during the probation period. The probation period may be continued for up to one year.
- 3- Suspension – If, after probation, the community fails to remedy its deficiencies, it will be suspended from the NFIP and sanctions for non-participating communities will be imposed. These sanctions include:
 - a. Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
 - b. Existing flood insurance policies will not be renewed (even if required through the loans listed above).
 - c. No Federal grants or loans for development may be made in identified Special Flood Hazard Areas (HUD, SBA, EPA, VA, etc.).
 - d. No Federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by flooding.
 - e. No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
 - f. Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazards areas that there is a flood hazard and that the property is not eligible for Federal Disaster Relief.

Why Do We Regulate the Floodplain?

The main purpose of regulating the floodplain is to promote health, safety, and welfare by reducing losses due to flooding in known areas of special flood hazard. The City's regulations are intended to:

- ❖ Protect human life and health.
- ❖ Minimize expenditures of public money for costly flood control projects.
- ❖ Minimize the need for rescue and relief efforts associated with flooding that are generally undertaken at the expense of the general public.
- ❖ Minimize prolonged business interruptions.
- ❖ Minimize damage to public facilities and utilities, such as water and gas mains, electric, telephone and sewer lines, and streets and bridges, located in areas of special flood hazard.
- ❖ Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas.
- ❖ Ensure potential buyers are notified that property is in an area of special flood hazard.
- ❖ Ensure that those who occupy the areas of special flood hazards assume responsibility for their actions.

Community's Responsibilities:

By participating in the National Flood Insurance Program, the community (City of Rock Springs) agrees to:

- ❖ Adopt and enforce minimum floodplain management standards (Flood Damage Reduction Ordinance).
- ❖ Require permits for all development in the Special Flood Hazards Areas.
- ❖ Assure building sites are reasonably safe from flooding.
- ❖ Conduct field inspections and cite violations.
- ❖ Require Elevation Certificates and other documents to verify compliance.
- ❖ Keep permit files and records to substantiate how buildings were actually constructed.
- ❖ Resolve non-compliance and violations.
- ❖ Advise FEMA when updates to flood maps are needed.

Understanding the Floodplain:

- Ø Floodplain: Any land area that is susceptible to being inundated by water from any source.
- Ø Base Flood: The base flood is the one-percent annual chance flood. The one-percent annual chance flood is the flood that has a one (1%) percent (one out of 100) chance of occurring in any given year. The base flood is also informally referred to as the 100-year flood. (See *Figure 1*)
- Ø Special Flood Hazard Area: The land area covered by the floodwater of the “base flood” is the “base floodplain”, which is also referred to as the Special Flood Hazard Area (SFHA). The SFHA is the area where the NFIP’s floodplain management regulations must be enforced by the community as a condition of participation in the NFIP and it is the area where the mandatory flood insurance purchase requirements apply.
- Ø Base Flood Elevation: The computed elevation to which floodwater is anticipated to rise during the “Base Flood”.
- Ø Floodway: The channel of a river or other watercourse and the adjacent land area 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 to predict where and how much the base flood elevation would increase if the floodplain is allowed to be filled. (See *Figure 2*)

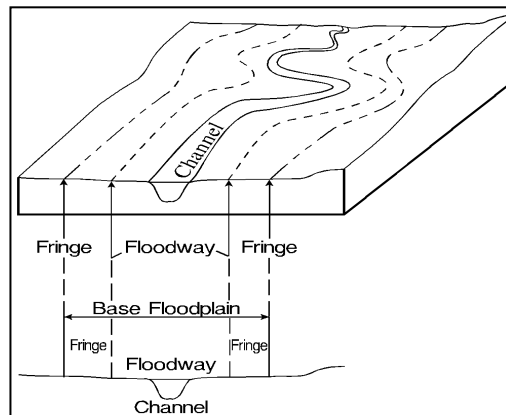


Figure 1: Floodplain Profile Provided by FEMA, “NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials”

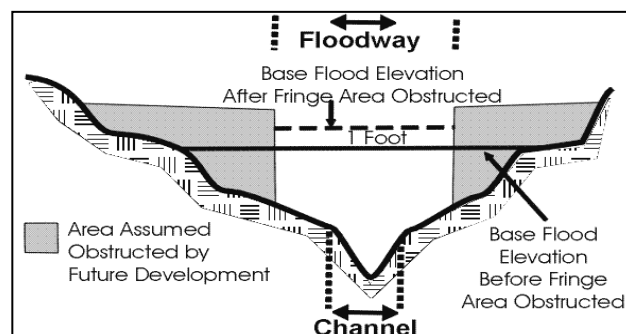
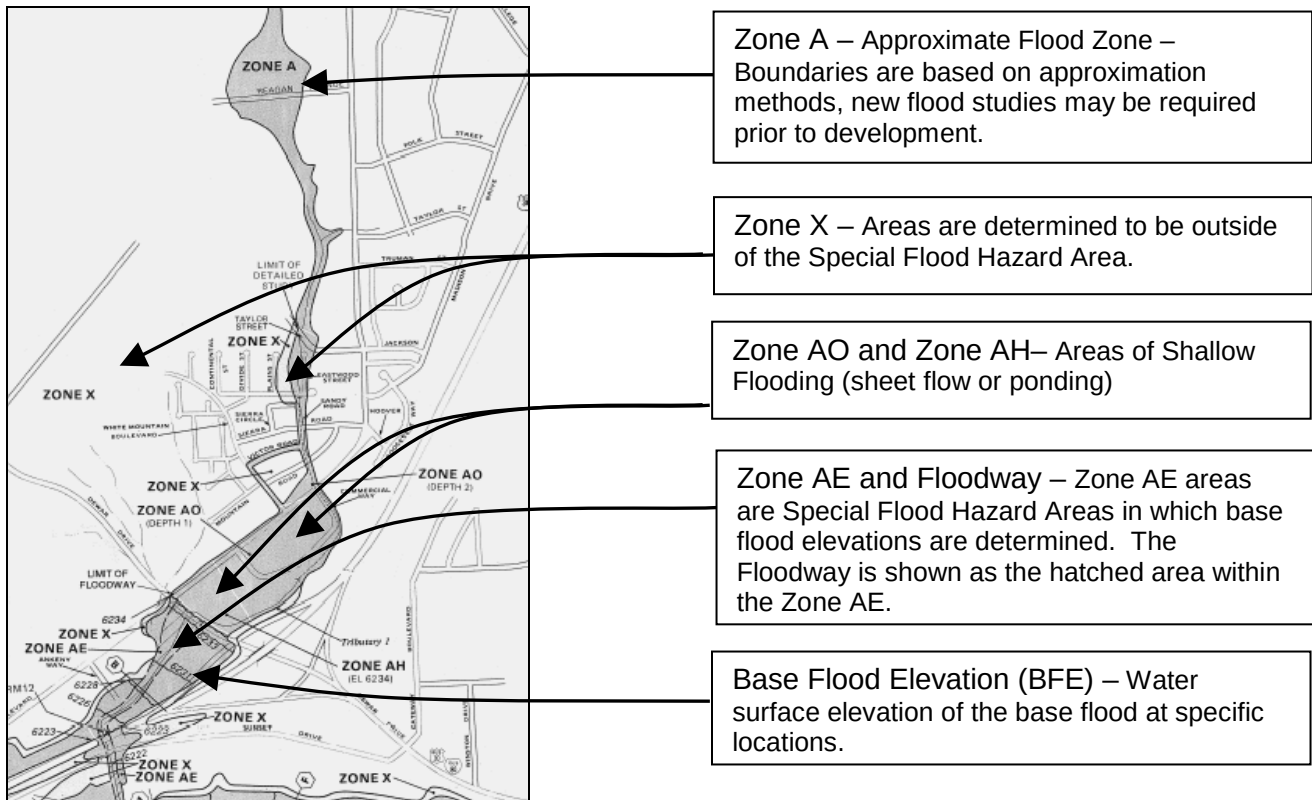


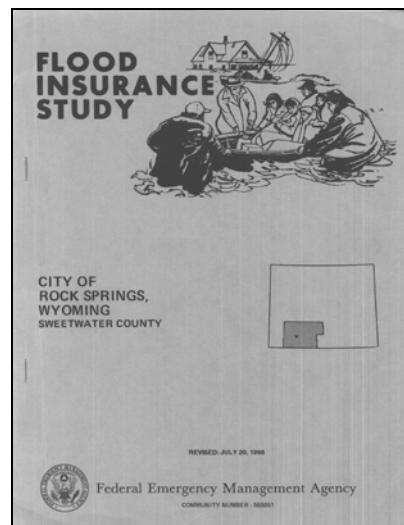
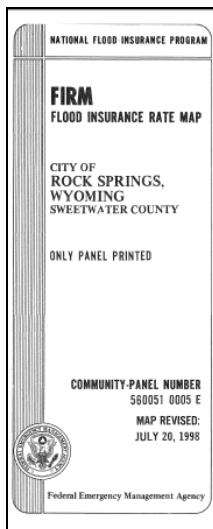
Figure 2: Floodway Profile Provided by FEMA, “NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials”

The Rock Springs Flood Insurance Rate Map (FIRM):

The current Rock Springs FIRM was issued to the City of Rock Springs on July 20, 1998. A portion of the Rock Springs FIRM (Community Panel Number 560051 0005 E) is included below:



Anyone can obtain a Rock Springs Flood Insurance Rate Map (FIRM) and Rock Springs Flood Insurance Study (FIS) by going to the FEMA Map Service Center website at www.msc.fema.gov or you may contact the City of Rock Springs to request a copy.



Residential Floodplain Construction Requirements:

Important definitions:

- Ø Highest Adjacent Grade: The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.
- Ø Lowest Floor: The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of the Ordinance.
- Ø New Construction: For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.
- Ø Substantial Improvement: 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. The term does not, however, include either:
 - 1. Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or
 - 2. Any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Residential Construction:

In the City's AE and AH Zones, all new construction and substantial improvements of residential structures must be elevated so that the lowest floor (including the basement) is elevated to or above the Base Flood Elevation.

In the City's AO Zones, all new construction and substantial improvements of residential structures shall have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM, or at least two feet if no depth number is specified (i.e. - in a ZONE AO (depth 2) the lowest floor must be elevated at least 2 feet above the highest adjacent grade).

Elevating a structure can be done in one of three ways:

1. Elevation on fill;
2. Elevation on piles, posts, piers or columns;
3. Elevation on walls or a crawlspace.

In A Zones, under the minimum NFIP requirement, the lowest floor is measured from the top of the floor (*Figure 3*).

However, it is recommended that buildings on elevated foundations, such as piles or a crawlspace, have supporting beams or floor joists above the BFE to protect them from flood damage.

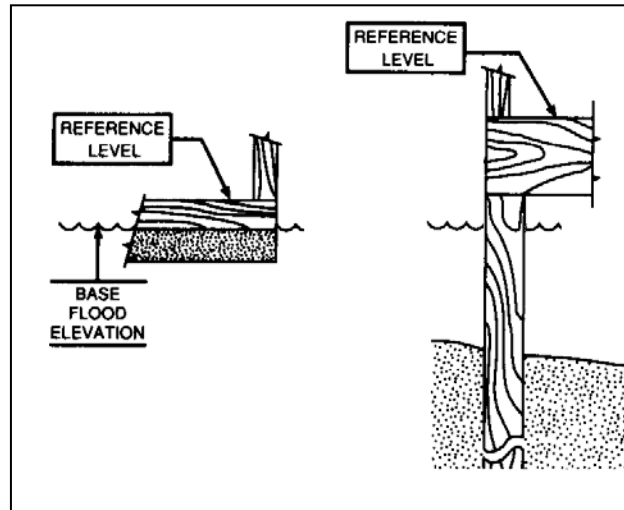


Figure 3: Floor Elevation Figure Provided by FEMA, "NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials"

In addition to the above elevation requirements, the following general construction requirements must be satisfied:

- { All construction shall be anchored to prevent floatation, collapse or lateral movement of the structure and shall be capable of resisting the hydrostatic and hydrodynamic loads.
- { All construction shall be constructed with materials and utility equipment resistant to flood damage.
- { All construction shall be constructed using methods and practices that minimize flood damage.
- { All construction shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located (elevated) so as to prevent water from entering or accumulating within the components during conditions of flooding.
- { All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.
- { All new and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into the flood waters.

Openings in Foundation Walls:

Elevating a residential structure may be accomplished by placing the structure on a crawlspace foundation. However, it should be noted that solid walls can collapse from hydrostatic pressure if floodwaters get too deep outside the building. To prevent this, FEMA requires that enclosures such as crawlspaces have openings to allow floodwaters to enter and leave, thereby automatically equalizing hydrostatic flood forces on both sides of the walls. The foundation design must meet or exceed the following three criteria:

- { The bottom of the openings must be no higher than one foot above grade (see *Figure 4*).
- { The openings shall be installed on at least two walls of the enclosure to ensure that at least one will work if others get blocked or plugged.
- { Provide a minimum of two openings having a net area of not less than one square inch for every square foot of enclosed area that is subject to flooding (i.e. if the enclosure is 1,000 square feet, the area of the openings combined must total at least 1,000 square inches).

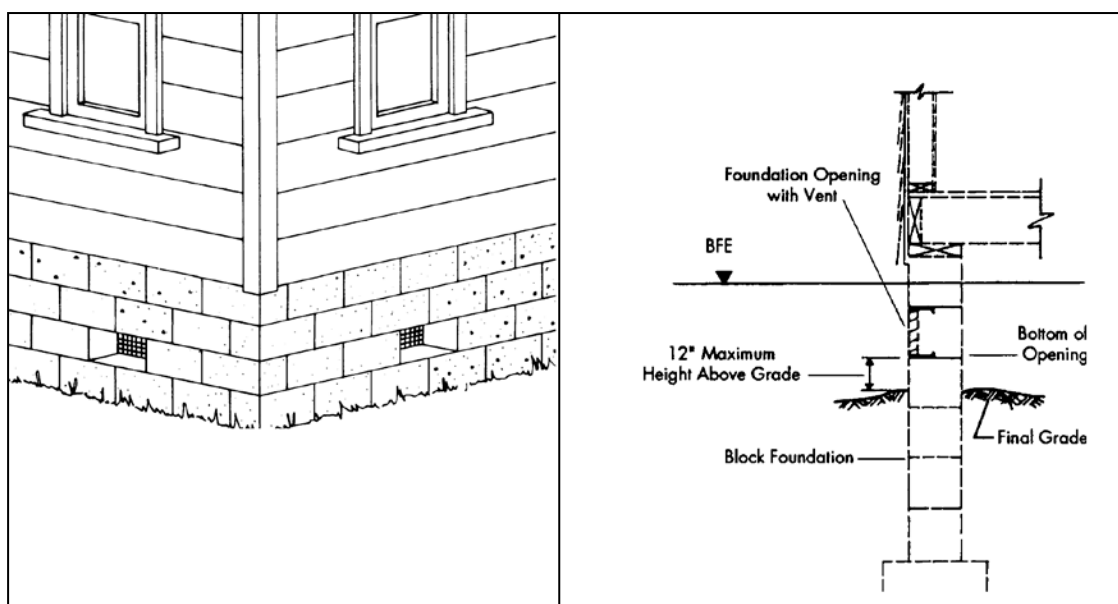


Figure 4: Openings in Foundation Walls - Provided by FEMA, "NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials"

If the above three criteria cannot be met, another method of meeting the foundation opening requirement is to have the design certified by a registered professional engineer or architect as meeting the requirement to automatically equalize hydrostatic forces on exterior walls by allowing for the entry and exit of floodwaters.

The openings may be equipped with screens, louvers, valves or other coverings or devices to keep animals out of the enclosures. However, the covering must allow for the automatic flow of floodwaters in both directions.

K Enclosed areas are to be used only for parking vehicles, storage or access to the elevated living area. It is a violation to convert enclosed areas below the lowest floor into living space.

Special Considerations for Residential Construction:

Crawlspaces:

If constructing a crawlspace to elevate your residential structure, the following must be considered (See *Figure 5* for Preferred Crawlspace Construction):

- { The Lowest Floor Elevation must be at or above the Base Flood Elevation.
- { Interior and exterior grades should be equal on at least two sides.
- { The bottom of flood openings must be no more than 1 foot above grade.
- { Total area of flood openings is 1 square inch for every square foot of enclosed area.
- { A standard ventilation unit, with screen, provides 42 square inches of opening.
- { Standard ventilation units must be disabled in the “open” position to allow water to flow in and out.

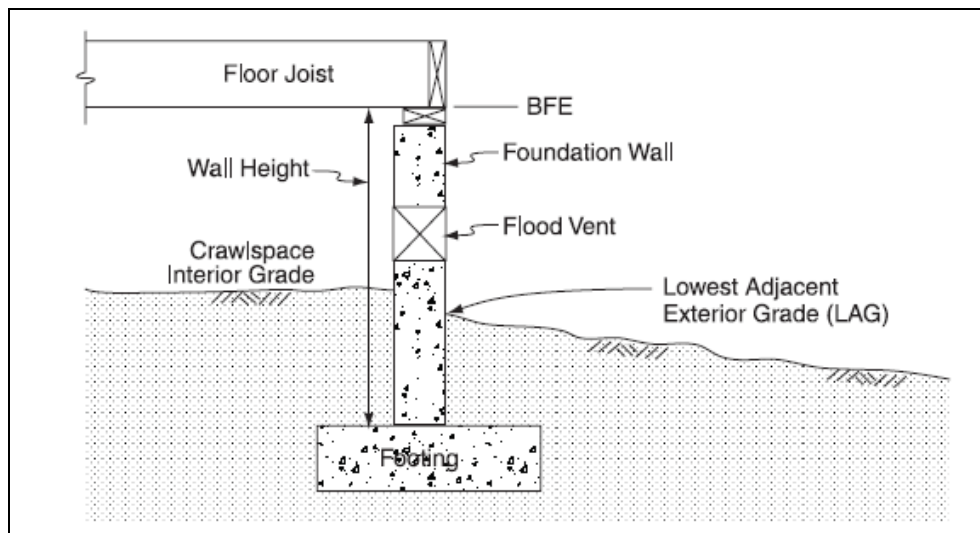


Figure 5: Preferred Crawlspace Construction - Provided by FEMA Technical Bulletin 11-01 "Crawlspace Construction for Buildings in Special Flood Hazard Areas"

- { Below grade crawlspaces will be permitted only if all of the following requirements are met (see *Figure 6*):
 - o Shallow flooding only – depth of water no more than 2 feet above the lowest adjacent grade and no more than 4 feet deep inside the crawlspace.
 - o Ductwork and utilities elevated above the Base Flood Elevation
 - o Flood Openings as outlined above.
 - o NOTE: Flood insurance will cost more if your building has a below grade crawlspace!!!

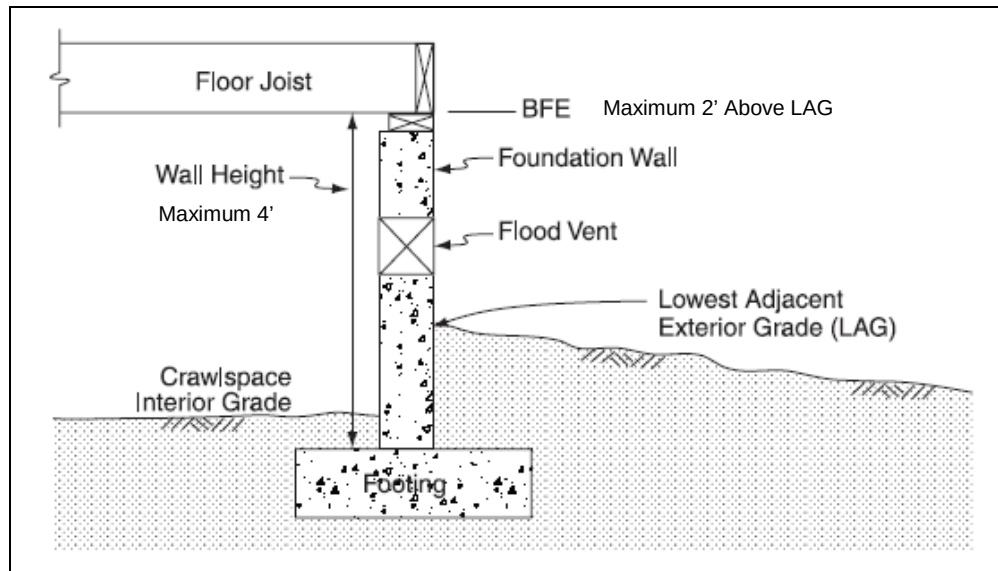


Figure 6: Below Grade Crawlspace Construction - Provided by FEMA Technical Bulletin 11-01 "Crawlspace Construction for Buildings in Special Flood Hazard Areas"

Freeboard:

Freeboard is an additional height above the Base Flood Elevation (BFE) that provides a margin of safety against unknown risks. Some communities require a certain level of Freeboard (i.e. requiring the lowest floor to be 1-2 feet above the BFE instead of at or above the BFE). The City of Rock Springs does not require freeboard, however it is highly recommended. When constructing a new elevated building, the additional cost of going up an additional amount is usually negligible. The benefits by far outweigh the costs.

Reasons to consider Freeboard are:

- { Accounts for future increases in flood levels if additional development occurs in the floodplain or upstream in the watershed.
- { Acts as a barrier against backwater flood conditions caused by ice jams and debris jams.
- { Reflects uncertainties inherent in flood hazard mapping limitations, modeling, topography, etc.
- { Provides an added measure of safety against flooding.
- { Results in significantly lower flood insurance rates due to lower flood risk.

The Elevation Certificate:

The Elevation Certificate is a FEMA form (FORM 81-31) that must be completed with all construction and/or substantial improvements within Special Flood Hazard Areas. The Elevation Certificate and Instructions can be downloaded from the FEMA website: www.fema.gov/pdf/nfip/elvcert.pdf or you may request a copy from the City of Rock Springs.

The Elevation Certificate must be completed and sealed by a registered surveyor or engineer for all areas with specified Base Flood Elevations. *Figure 7* shown below is a sample that shows a completed portion of an Elevation Certificate.

The Elevation Certificate must be submitted to the City of Rock Springs prior to issuance of any Occupancy Permit for the structure. The Elevation Certificate that is submitted to the City must be based on the finished construction, not based on construction drawings. It is highly recommended that the developer contact a registered surveyor or engineer prior to preparing any construction drawing to obtain the natural ground elevation to ensure that the structure will be elevated properly and will be in compliance with the elevation requirement. It is also recommended that the final Elevation Certificate be completed by a registered surveyor or engineer as soon as the lowest floor is set rather than waiting until the entire structure is completed.

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
B1. NFIP Community Name & Community Number <i>Rock Springs 560051</i>		B2. County Name <i>Sweetwater</i>		B3. State <i>Wyoming</i>	
B4. Map/Panel Number <i>560051.0005</i>	B5. Suffix <i>E</i>	B6. FIRM Index Date <i>7/16/1979</i>	B7. FIRM Panel Effective/Revised Date <i>7/20/1998</i>	B8. Flood Zone(s) <i>AE</i>	B9. Base Flood Elevation(s) (Zone AO, use base flood depth) <i>6231</i>
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 (Describe) _____					
B11. Indicate elevation datum used for BFE in Item B9: ☒ NGVD 1929 ☐ NAVD 1988 ☐ Other (Describe) _____					
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No Designation Date _____ ☐ CBRS ☐ OPA					
SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)					
C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☒ Finished Construction *A new Elevation Certificate will be required when construction of the building is complete.					
C2. Elevations – Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO. Complete Items C2.a-g below according to the building diagram specified in Item A7.					
Benchmark Utilized <i>RM 12</i>		Vertical Datum _____			
Conversion/Comments _____					
Check the measurement used.					
a) Top of bottom floor (including basement, crawl space, or enclosure floor)	<i>6231.9</i>	☐ feet	☐ meters (Puerto Rico only)		
b) Top of the next higher floor	_____	☐ feet	☐ meters (Puerto Rico only)		
c) Bottom of the lowest horizontal structural member (V Zones only)	_____	☐ feet	☐ meters (Puerto Rico only)		
d) Attached garage (top of slab)	_____	☐ feet	☐ meters (Puerto Rico only)		
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment in Comments)	_____	☐ feet	☐ meters (Puerto Rico only)		
f) Lowest adjacent (finished) grade (LAG)	<i>6228.9</i>	☐ feet	☐ meters (Puerto Rico only)		
g) Highest adjacent (finished) grade (HAG)	<i>6229.6</i>	☐ feet	☐ meters (Puerto Rico only)		

Figure 7: Example of a portion of a complete Elevation Certificate. Note that the answer to C2.a (Top of Lowest Floor Elevation) should always be equal to or higher than the answer provided in B9 (Base Flood Elevation).

The Floodway:

The “Floodway” is the channel of a river or other watercourse and the adjacent land area that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. It is the central portion of the floodplain that is needed to carry the deeper, faster moving water. The floodway is the highest hazard area of the floodplain. Buildings, structures and other development (including fill) placed in the floodway are more likely to obstruct flood flows, causing the water to slow down, not discharge properly, and back up, thereby cause higher flood elevations.

FEMA states: “In the regulatory floodway, communities must prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.” 44 CFR 60.3(d)(3)

Therefore, all projects in the regulatory floodway must undergo an “encroachment review” to determine their effect on flood flows and ensure that they do not cause problems. This review is called a “NO RISE CERTIFICATION” (*Figure 8*). The certification must be supported by technical data, which should be based on the same computer model used to develop the floodway shown on the community’s map.

“NO-RISE” CERTIFICATION

This is to certify that I am a duly qualified registered professional engineer licensed to practice in the State of _____

It is further to certify that the attached technical data supports the fact that proposed _____ (Name of Development) will not impact the 100-year flood elevations, floodway elevations, or floodway widths on _____ (Name of Stream) at published sections in the Flood Insurance Study for _____ (Name of Community) dated _____ (Study Date) and will not impact the 100-year flood elevations, floodway elevations, or floodway widths at unpublished cross-sections in the vicinity of the proposed development.

Attached are the following documents that support my findings:

Date: _____

Signature: _____

Title: _____

{SEAL}

Figure 8: Example No Rise Certification

Improving a Residential Floodplain Structure:

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

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If the cost of improvement or the cost to repair damages to a structure located in a Special Flood Hazard Area exceeds 50% of the market value of the building, the entire structure must be brought up to current floodplain management standards. (See *Figure 9*)

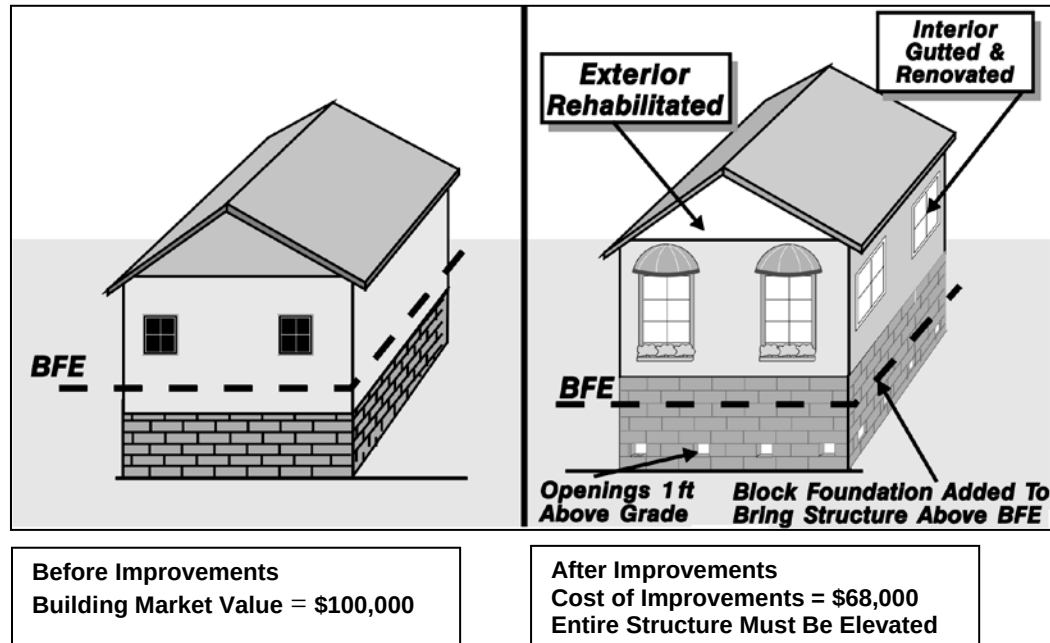


Figure 9: Substantial Improvement. Figures provided by FEMA, "NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials"

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If the cost of an addition or other improvements to a structure is less than 50% of its market value, only the addition (or other improvements) is required to be built above the Base Flood Elevation. (See *Figure 10*)

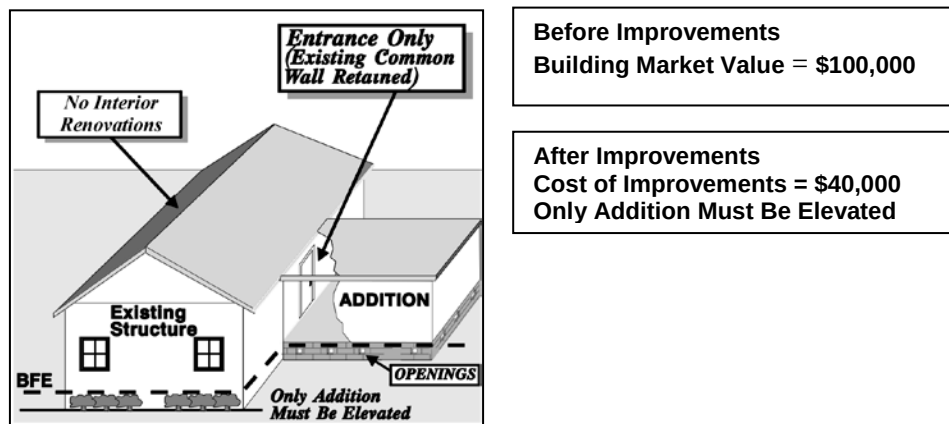


Figure 10: Not Substantial Improvement: Only Addition Must Be Elevated. Figures provided by FEMA, "NFIP Floodplain Management Requirements: A Study Guide and Desk Reference for Local Officials"

Useful Resources and Links:

Many useful documents and forms can be found on FEMA's website www.fema.gov. These include the following:

- V** "Above the Flood: Elevating your Floodprone House" (FEMA 347): <http://www.fema.gov/rebuild/recover/fema347.shtm>
- V** "Answers to Questions about the NFIP": <http://www.fema.gov/business/nfip/ganda.shtm>
- V** "Below-Grade Parking Requirements": <http://www.fema.gov/pdf/fima/job12.pdf>
- V** "Crawlspace Construction for Building Located In Special Flood Hazard Areas" (Technical Bulletin 11-01): <http://www.fema.gov/pdf/fima/tb1101.pdf>
- V** FEMA Elevation Certificate: <http://www.fema.gov/business/nfip/elvinst.shtm>
- V** "Elevated Residential Structures": <http://www.fema.gov/hazard/flood/pubs/lib54.shtm>
- V** "Ensuring that Structures Built on Fill In or Near Special Flood Hazard Areas are Reasonably Safe From Flooding" (Technical Bulletin 10-01): <http://www.fema.gov/pdf/fima/tb1001.pdf>
- V** "NFIP Requirements: A Study Guide and Desk Reference for Local Officials": http://www.fema.gov/plan/prevent/floodplain/fm_sg.shtm
- V** "Openings in Foundation Walls" (Technical Bulletin 1-93): <http://www.fema.gov/pdf/fima/job2.pdf>
- V** "Protecting Building Utilities from Flood Damage": <http://www.fema.gov/hazard/flood/pubs/pbuffd.shtm>
- V** Other publications of interest can be found at <http://www.fema.gov/plan/prevent/floodplain/publications.shtm>
- V** Other Technical Bulletins can be found at <http://www.fema.gov/fima/techbul.shtm>