



Emergency Management  
NC DEPARTMENT OF PUBLIC SAFETY

# Living on Barrier Islands A Workshop for Real Estate Professionals NFIP Overview and Updates February 18, 2025

Steve Garrett, CFM, State NFIP Coordinator





Emergency Management  
NC DEPARTMENT OF PUBLIC SAFETY



# NATIONAL FLOOD INSURANCE PROGRAM



NATIONAL  
FLOOD  
INSURANCE  
PROGRAM

- Identifies & maps flood hazard areas
- Provides a framework for floodplain management regulations
- Makes flood insurance available in Communities that participate in the NFIP



# NFIP Goals

- Reduce loss of life & property
- Reduce rising disaster relief costs
- Increase importance of hazard mitigation (flood resistant construction, guide future development, & prohibit development in floodplains that would increase flood levels)
- Decrease taxpayer-funded disaster costs
- Make Federally backed insurance coverage available to property owners
- Restore & protect natural resources & functions of floodplains





# Community Participation in the NFIP

A **VOLUNTARY** program based on a mutual agreement between the Federal government and the local community:

In exchange for **adopting, implementing** and **enforcing** a Floodplain Management Ordinance

- Federally-backed flood insurance is made available to property owners throughout the community.
- Federal disaster assistance and mitigation grant programs made available.



# Role of NFIP Participating Community

- Review floodplain development permit applications and issue/deny floodplain development permits
- **Inspect ALL development to ensure compliance with local ordinances**
- Maintain floodplain development records
- Assist in preparation & revision of floodplain maps
- Help citizens obtain information on flood hazards, floodplain map data, flood insurance, & proper construction measures





## What is Floodplain Development?

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



National Flood Insurance Program

# Elevation Certificate

and Instructions

2022 EDITION



**FEMA**

## Elevation Certificate Form

- Verify Regulatory Compliance
- Supporting documentation for map revision & amendment applications
- Provide better/recent data to insurance companies to see if a better rate is available
- **NOTE:** Data collected on this form is for the construction & utility service to a single STRUCTURE only – not the lot or other improvements.



# The Community's EC Review

- Community Officials MUST review Elevation Certificate's (ECs) before accepting them to ensure:
  - **Completeness**
  - **Reasonableness/Accuracy**
  - **Compliance**
- NFIP requires the Finished Construction EC for all:
  - **New Construction**
  - **Additions**
  - **Substantial Improvements**
- To structures located in the Special Flood Hazard Area.





# Question????????

A property owner needs a copy of the elevation certificate for their structure.





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# Answer...

- ✓ The local permitting jurisdiction
- ✓ Surveyor
- ✓ Previous/Current Owner
- ✓ Insurance Agent

State NFIP staff do NOT have a database of ECs.





## Important Updates...

### JUST RELEASED:

- ASCE 24 Flood Resistant Design and Construction Update
  - American Society of Civil Engineers (ASCE) 24-24 provides minimum requirements for flood resistant design and construction of structures that are subject to building code requirements and that are located, in whole or in part, in Flood Hazard Areas.
  - This standard applies to new construction and subsequent work to such structure and work classified as substantial improvement or an existing structure that is not a historic structure.
- NFIP Technical Bulletin 2, Flood Damage Resistant Materials Requirements (2025)
  - Provides guidance on the National Flood Insurance Program's (NFIP's) requirements on the use of construction materials that are resistant to flood damage in Special Flood Hazard Areas (SFHAs).
- New Federal Flood Risk Management Standard (FFRMS) - see next slides





## Housing and Urban Development's FFRMS

- Ensures federal agencies take actions to enhance the nation's resilience to current and future flooding and to ensure that projects funded with taxpayer dollars last as long as intended.
  - Established through EO 13690 which amends and builds upon EO 11988; Floodplain Management. HUD adopted the final rule to implement FFRMS on April 23, 2024.
- The FFRMS is a resilience standard that expands the floodplain for federally funded projects to a higher vertical elevation and corresponding horizontal floodplain area to address future flood conditions in a changing climate.





# Floodplain Expansion – Vertical and Horizontal

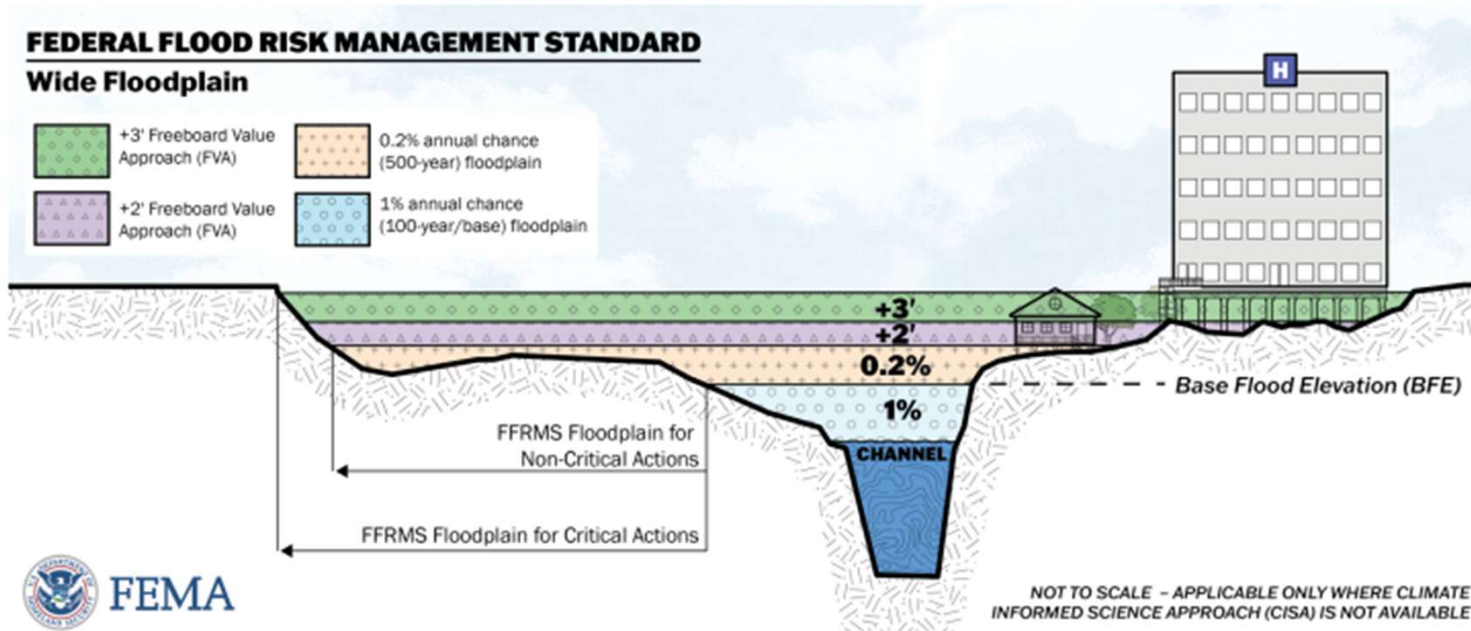


Figure 2. Image depicting nested floodplains with examples of critical (hospital) and non-critical (house) actions elevated to the applicable FFRMS flood elevation





## Federal Flood Risk Management Standard (FFRMS)

This Floodplain Management Standard Will Apply To:

- Federal Housing Administration (FHA)-Insured Projects
  - New Construction of 1- to 4-Unit Residential Properties.
  - Includes FHA Single Family Mortgage Insurance Programs.
  - DOES NOT apply to the purchase of manufactured homes insured under FHA Single Family Programs
- Federally-Funded Projects, involving:
  - New Construction;
  - Substantial Improvement; Or
  - Repairs to Address Substantial Damage.
- Hazard Mitigation Assistance Projects, involving:
  - Structure elevation;
  - Dry Floodproofing; and
  - Mitigation Reconstruction





## FHA-Insured Projects

FHA loans are mortgages intended for certain borrowers who might find it difficult to obtain loans otherwise. The federal government insures FHA loans, which are issued by private lenders, such as banks and credit unions. FHA loans or mortgages are those insured by FHA mortgage insurance programs.

- Applies to structures located in the Special Flood Hazard Areas (A, A99, AE, AH, AO, Coastal A, and VE zones);
- Applies to New Construction (1- to 4-unit Residential) Insured Under FHA Single Family Mortgage Insurance Programs and Low-Rent Public Housing Programs; and
- **Implements a 2-Foot Freeboard** – requires the lowest floor be at least 2-feet above the Base Flood Elevation (BFE).

**Why is this important to you?**





## WHY IS THIS IMPORTANT TO YOU??

- If a community does not have a similar 2-foot freeboard requirement in its floodplain regulations, it risks severely limiting homeownership opportunities, as homebuyers may no longer be able to access HUD-financed homes in these areas.
- Contractor's/Builder's/Developer's could have an issue selling new construction if loans are not available.







## Who Should Be Aware of this New Rule & 2-Foot Freeboard Requirement

- Community Leaders;
- Local Floodplain Administrators;
- Local Builders;
- Realtors;
- Housing Agencies;
- Home Buyers
- Anyone involved in new construction in the floodplain.





## Who Enforces?

- The local floodplain administrator/manager must enforce the locally adopted floodplain management regulations (which may include a freeboard or MAY NOT);
- HUD enforces the FHA minimum property standards for the purposes of evaluating whether to approve an FHA insured mortgage through FHA-approved appraisers.
- For new construction in SFHAs, the lenders (mortgagees) rely on the builder's self-certified assessment of site analysis information (HUD-92541) and FEMA NFIP Elevation Certificates (FF-206-FY-22-152) to reach their determination.



If you need flood zone/risk information for a property, where do you personally go to find that information?





# Flood Risk Information System

## Welcome to the North Carolina Flood Risk Information System (FRIS)

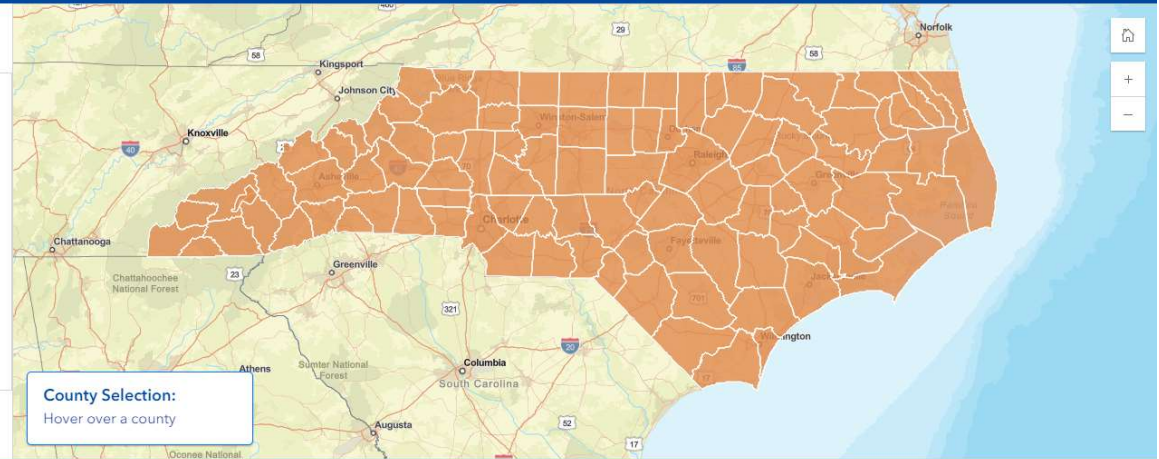
### Am I at Risk of Flooding?

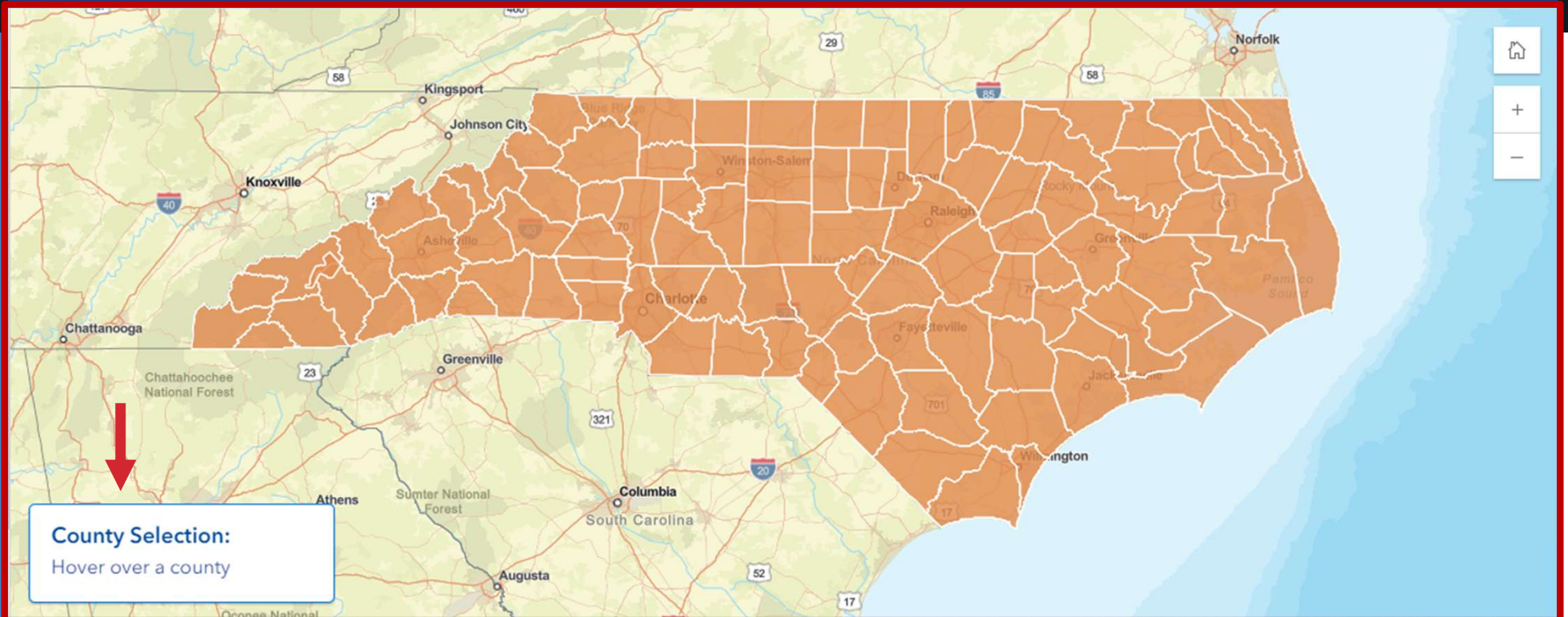
Our Flood Risk Information System (FRIS) can tell you!

Enter your address or county below, select a county on the map, or click "Go to my location" to get started.

GO

GO TO MY LOCATION





The State of North Carolina provides this website as a public service to the citizens of North Carolina. The Flood Risk Information System (FRIS) contains digitally accessible flood hazard data, models, maps, risk assessments, and reports that are database driven. This site also provides geospatial data, along with hydraulic and hydrologic models that are available for download and use. The North Carolina Floodplain Mapping Program has made every effort to ensure accuracy of this information. Contact information for the North Carolina Floodplain Mapping Program is available at [flood.nc.gov](http://flood.nc.gov) under the Contacts Menu, [frishelp@ncdps.gov](mailto:frishelp@ncdps.gov) or (919) 715-5711.

# TOOLS



Overview

Overview

Layers

Regulatory P

DFIRM Panel



Flood Zone



Zone V



Zones



Zones

Contai

Flood



Zone A

Hazard

Condit



Zone A

Annual

Comm



0.2% A

Chann



Zone X

Condit

1% Future Conditions Contained In Channel:  
Community Encroachment Area

Zone X: Protected By Levee

Zone D

Open Water

Zone X

Stream Centerlines

Limit of Study

Geodetic Monuments

Levee Seclusion Area



Letter of Map Revision (LOMR)



Riverine



Coastal



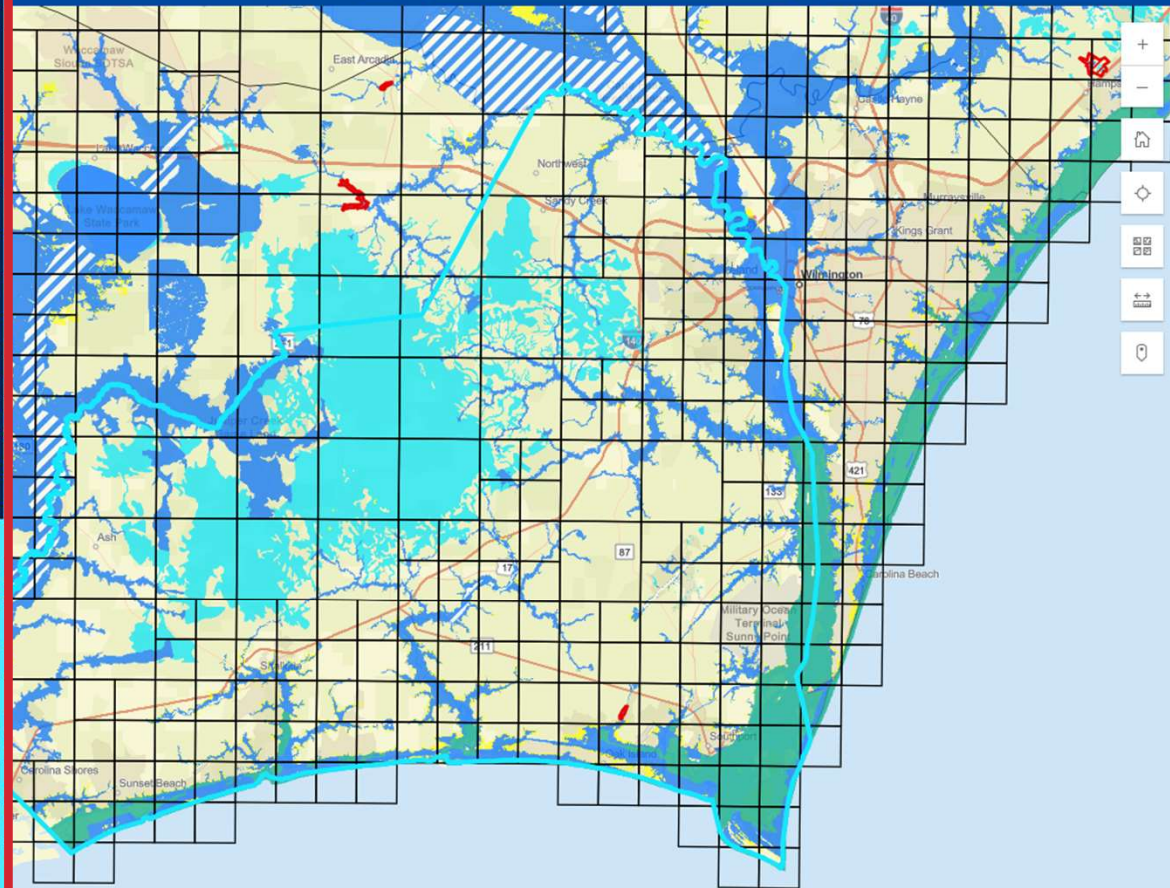
Home Map Download Help



Brunswick County, North Carolina

Create Map

Draw & Export



**FRIS** Flood Risk Information System

Tools    Map View: Effective Preliminary

**TOOLS** [Close]

Overview    **Layers**

- Regulatory Flood Map Layers [+]
- Flood Risk Datasets** [+] ←
- Base Map Layers [+]

[Reset Default Layers](#)

ACCREDITATION PROGRAM

**TOOLS** [Close]

Overview    **Layers**

**Flood Risk Datasets** [Close]

**Building Risk** [Expand]

- Building Footprints
- Building Footprints with Risk
- Building Footprints with Depth
- Damage Hotspots Riverine
- Damage Hotspots Coastal

**Coastal Enhanced Risk Products** [Expand]

- 1-percent Plus 1, 2 and 3-ft

**Water Surface Elevation Rasters** [Expand]

- 10 Percent Annual Chance
- 4 Percent Annual Chance
- 2 Percent Annual Chance
- 1 Percent Annual Chance
- 1 Percent Annual Chance Future Conditions
- 0.2 Percent Annual Chance

Home    **Map**    Download    Help

Search: Brunswick County, North Carolina    [Create Map](#)    [Draw & Export](#)

Map navigation controls: [Zoom In] [Zoom Out] [Home] [Full Screen] [Layers] [Print] [Share]

NORTH CAROLINA

**FRIS** Flood Risk Information System

Tools | Map View: Effective | Preliminary

**TOOLS** [Close]

Overview | **Layers**

- Regulatory Flood Map Layers [+]
- Flood Risk Datasets [+]
- Base Map Layers** [+] ←

Reset Default Layers

ACCREDITATION PROGRAM

**TOOLS** [Close]

Overview | **Layers**

**Regulatory Flood Map Layers** [+]

**Flood Risk Datasets** [+]

**Base Map Layers** [-]

- Political Areas
- County Boundaries

Reset Default Layers

Home | Map | Download | Help

Search: Brunswick County, North Carolina [X] | **Create Map** | **Draw & Export**

Map showing Brunswick County, North Carolina with various flood risk layers and political boundaries. The map includes labels for locations like Loris, Lenoir, and Wilmington. A red arrow points to the 'Base Map Layers' section in the left sidebar.

Reset Default Layers

NORTH CAROLINA



TOOLS

Overview

Layers

Stream Centerlines

Limit of Study

Geodetic Monuments

Levee Seclusion Area

Letter of Map Revision (LOMR)

Riverine

Coastal

Coastal Transects

Coastal Barrier Resources System (CBRS)

Limit of Moderate Wave Action (LIMWA)

LIMWA Polygon

Primary Frontal Dune

Reset Default Layers

AE Zone

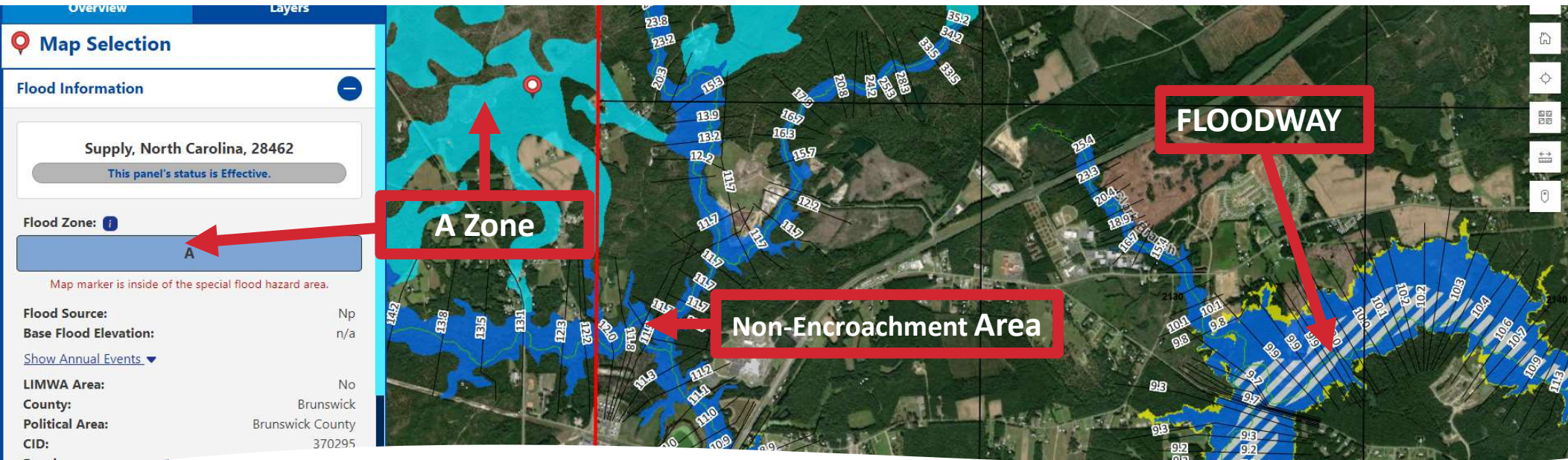
LIMWA &  
COASTAL AE Zone

V & VE ZONE

Shaded X Zone

Always contact your local jurisdictions to learn about their development requirements!!!





# FRIS symbology and what it means for development



- A = No Base Flood Elevations (BFE); usually 2-feet above highest adjacent grade
- AE = BFE; usually with a local adopted freeboard to top of finished floor
  - AE Non-encroachment Area (NEA) = No-Rise Analysis by Engineer \*
  - AE Floodway = No-Rise Analysis by Engineer \*
- Coastal AE = adhere to VE zone development standards \*\*
- VE = BFE; usually with local adopted freeboard to bottom of lowest horizontal structural member \*\*

- No-Rise Analyses - Required for ALL development including fill, grading, storage of materials, etc.
- Coastal effects from wave action (Coastal AE 1.5'-3' wave heights; VE 3' plus wave heights)



**FRIS** Flood Risk Information System

Tools Map View: Effective Preliminary

**TOOLS**

Overview Layers

Map Selection

Flood Information

Supply, North Carolina, 28462  
This panel's status is Effective.

Flood Zone: VE  
Map marker is inside of the special flood hazard area.

Flood Source: Atlantic Ocean  
Base Flood Elevation: 14 ft  
Show Annual Events

LIMWA Area: No  
County: Brunswick  
Political Area: Brunswick County  
CID: 370295  
Panel: 2036  
Map Number: 3720203600K  
Panel Effective Date: 8/28/2018  
Latitude: 33.929209  
Longitude: -78.215374

Flood Risk Information  
Download Options Deselect

**TOOLS**

Overview Layers

Base Flood Elevation: 14 ft  
Show Annual Events

LIMWA Area: No  
County: Brunswick  
Political Area: Brunswick County  
CID: 370295  
Panel: 2036  
Map Number: 3720203600K  
Panel Effective Date: 8/28/2018  
Latitude: 33.929209  
Longitude: -78.215374

Flood Risk Information  
FIS Tables & Reports  
Engineering Models & Reports  
LOMR  
Cross Section  
Geodetic Monuments  
CBRS Area  
Hydraulic Structures  
Download Options Deselect

Home Map Download Help

Brunswick County, North Carolina  
Create Map Draw & Export

Always contact your local development requirements!!!

Always contact your local

development requirements!!!



Tools

Map View:

Effective

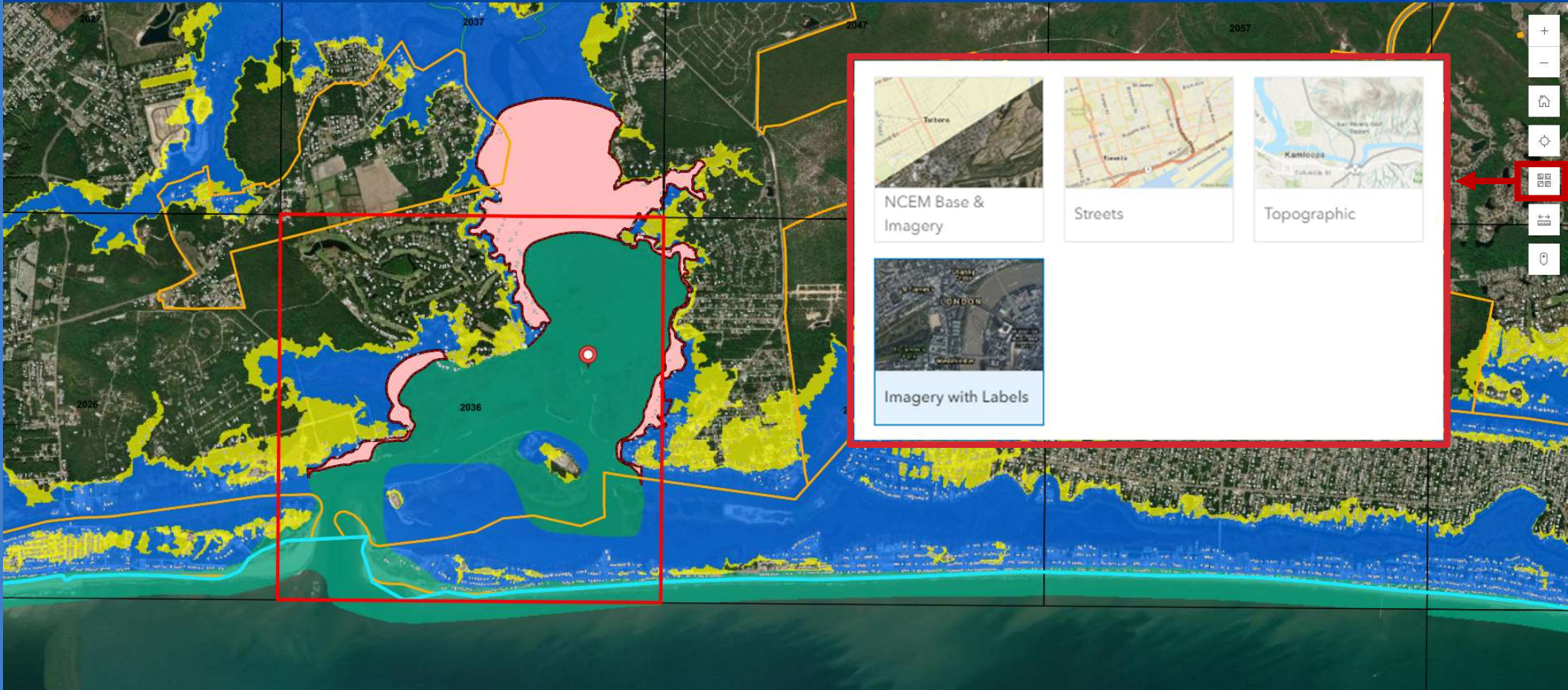
Preliminary



Brunswick County, North Carolina

Create Map

Draw & Export





Tools Map View: Effective Preliminary



Brunswick County, North Carolina

Create Map

Draw & Export

TOOLS

Overview

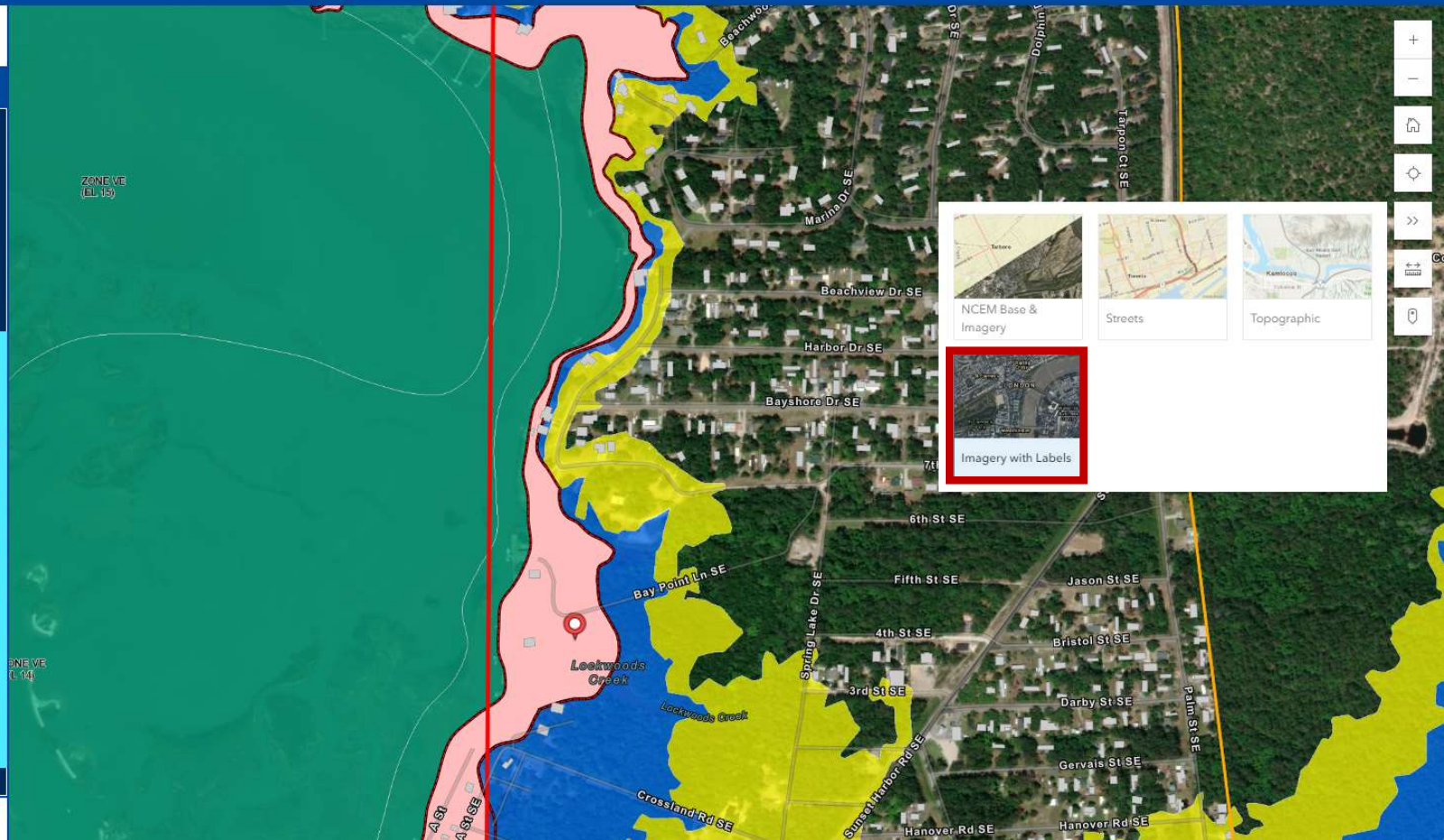
Layers

Flood Source: Atlantic Ocean  
 Base Flood Elevation: 13 ft  
 Show Annual Events  
 LIMWA Area: Yes  
 County: Brunswick  
 Political Area: Brunswick County  
 CID: 370295  
 Panel: 2046  
 Map Number: 3720204600K  
 Panel Effective Date: 8/28/2018  
 Latitude: 33.929587  
 Longitude: -78.207615

- Flood Risk Information
- FIS Tables & Reports
- Engineering Models & Reports
- LOMR
- Cross Section
- Geodetic Monuments
- CBRS Area

Download Options

Deselect



Map style selection menu:

- NCEM Base & Imagery
- Streets
- Topographic
- Imagery with Labels (highlighted with a red border)



# Online Resources

Flood.NC.gov – <http://flood.nc.gov>

FRIS – <http://fris.nc.gov>

FIMAN – <http://fiman.nc.gov>

ReadyNC – <http://readync.gov>

FloodSmart - <http://floodsmart.gov>

FEMA – <http://fema.gov>





flood.NC.gov

Go to FRIS site

Go to FIMAN site

Go to Flood Advisory site

Go to NC CNMS site

Home Property Risk Mapping Program Find a Document Events Floodplain Management LOMC Mitigation Flood Warning Industries

Do You Know Your Flood Risk?

Search an address

Use my current location

Property Risk

Learn about flood risk at a specific address, to include flood hazard, structural and content impacts, potential insurance rates, mitigation opportunities and the location of flood warning sites near you.

Learn More

Web applications



Real Estate Agent



Insurance Agent



Professional Engineer/Surveyor



Community Official





# Flood.NC.gov

flood.NC.gov

[Go to FRIS site](#)

[Go to FIMAN site](#)

[Go to Flood Advisory site](#)

[Go to NC CNMS site](#)

[Home](#) [Mapping Program](#) [Find a Document](#) [Events](#) [Floodplain Management](#) [LOMC](#) [Mitigation](#) [Flood Warning](#) [Industries](#)

[PRELIMINARY FLOOD STUDY INFORMATION](#) - more info-

[DR-4827-HELENE FLOODPLAIN MANAGEMENT RESOURCES](#) - more info-

Property Risk  
ESTIMATOR



Calculate Risk Level



Events & Training

[See More >](#)

## Real Estate Agents

[More Answers from the Quick Guide](#)

[See All >](#)

### For Real Estate Agents Working with Buyers and Sellers in North Carolina

#### Important Links:

[Flood Risk Information System \(FRIS\)](#)

[Residential Property and Owners' Association Disclosure \(Form REC 4.22\)](#)



#### Frequently Asked Questions

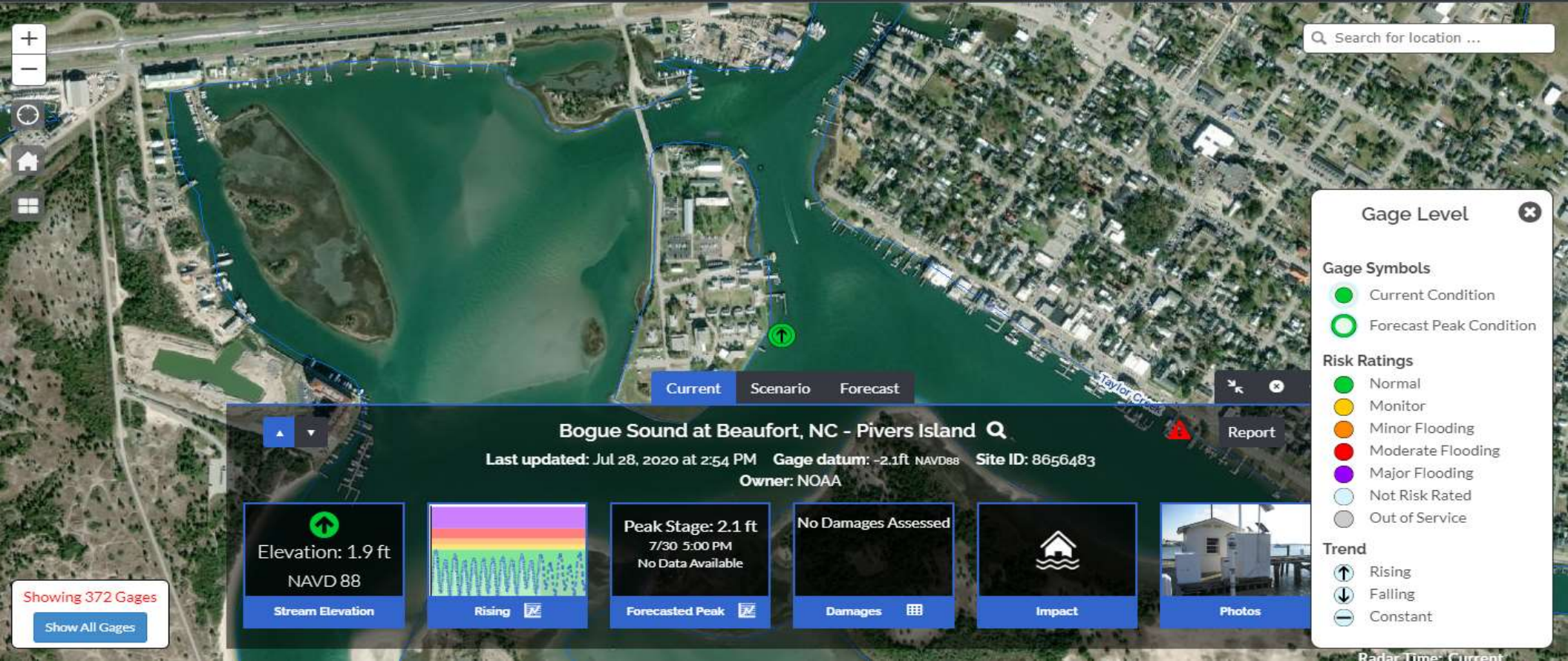
- How do I determine if the structure is in the SFHA?**  
Check the Flood Risk Information System Website: FRIS
- Will an elevation certificate be required?**  
A Post-FIRM structure should have an elevation certificate completed at the time of construction. An EC is required for rating the flood insurance policy.
- Do Pre-FIRM structures require an elevation certificate?**  
No, but it is strongly encouraged. Pre-FIRM subsidized rates are increasing up to 18% per year (25% in some cases), and an elevation certificate will help an owner decide when to convert to an actuarially-rated policy instead of a subsidized policy. Some owners may save money by converting to an actuarial policy now.







Search for location ...



Current Scenario Forecast

Bogue Sound at Beaufort, NC - Pivers Island

Last updated: Jul 28, 2020 at 2:54 PM Gage datum: -2.1ft NAVD88 Site ID: 8656483  
Owner: NOAA

Report

Elevation: 1.9 ft  
NAVD 88  
Stream Elevation

Rising

Peak Stage: 2.1 ft  
7/30 5:00 PM  
No Data Available  
Forecasted Peak

No Damages Assessed  
Damages

Impact

Photos

Gage Level

Gage Symbols

- Current Condition
- Forecast Peak Condition

Risk Ratings

- Normal
- Monitor
- Minor Flooding
- Moderate Flooding
- Major Flooding
- Not Risk Rated
- Out of Service

Trend

- Rising
- Falling
- Constant

Radars Time: Current

Showing 372 Gages

Show All Gages



# ReadyNC.gov

- [Home](#)
- [Plan And Prepare](#) ▾
- [Stay Informed](#) ▾
- [Recover And Rebuild](#) ▾
- [Get Involved](#) ▾
- [News](#)

## Insurance



One of the best things for homeowners, renters and business owners against any type of natural disaster is a good insurance policy. Be aware that homeowner's insurance does not cover flood damage. You **need** a separate flood insurance policy. Homeowners, renters and business owners can buy flood insurance even if they reside in a high, low or moderate risk area. Policies are available for both residential and commercial buildings as long as the community joins in the National Flood Insurance Program.

For more [North Carolina Insurance Information](#) , call 800-546-5664 or 919-807-6750.

For information about the National Flood Insurance Program, call 888-379-9531.

### Plan and Prepare

[Evacuating](#)

[Functional Needs](#)

[Get a Kit](#)

[Hurricane Guide](#)

**Insurance**

[Make a Plan](#)

[Pets and Service Animals](#)

[Protect Your Home](#)

[Seniors](#)

[Vital Records](#)





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# FloodSmart.gov

Visit FloodSmart for Agents



Buying a Policy ▾

Renewing a Policy ▾

Flood Risks and Costs ▾

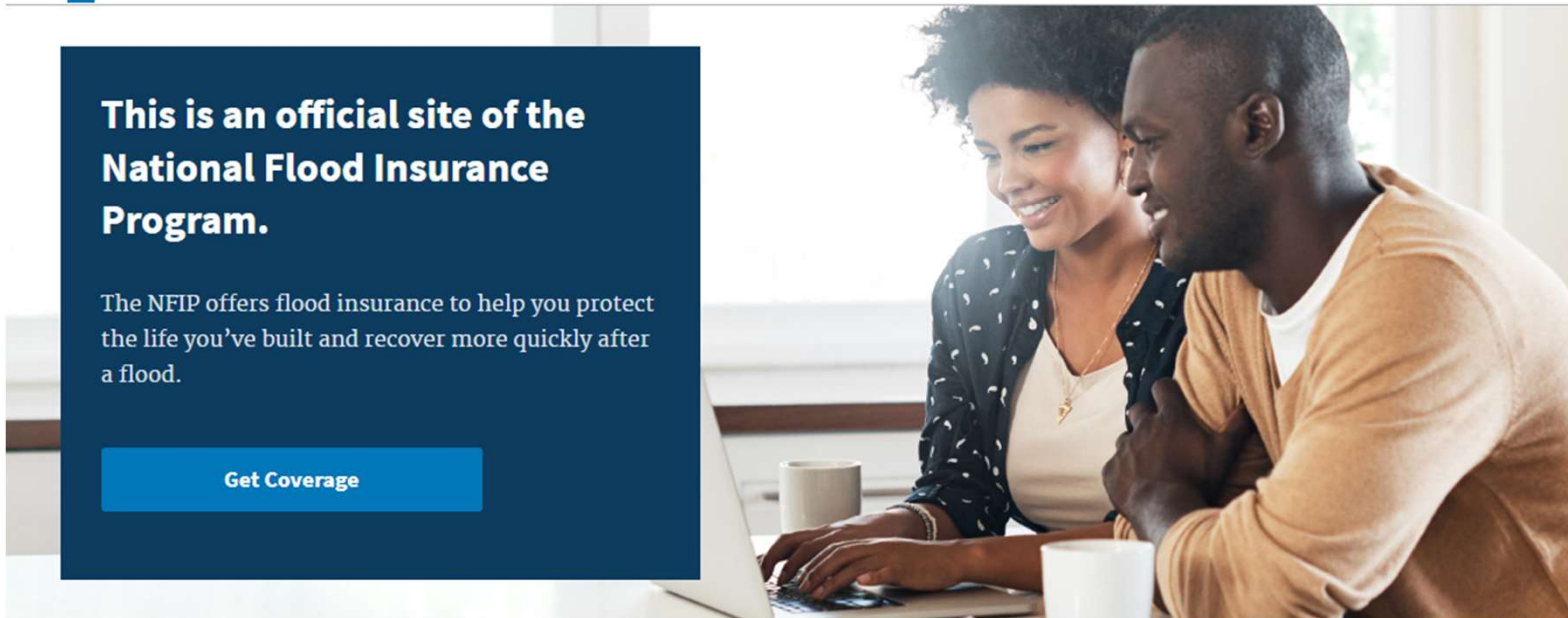
Before and After a Flood ▾

Flood Zones and Maps ▾

**This is an official site of the  
National Flood Insurance  
Program.**

The NFIP offers flood insurance to help you protect the life you've built and recover more quickly after a flood.

[Get Coverage](#)





SECTION F.  
ENVIRONMENTAL/FLOODING

Yes No NR

F1. Is there hazardous or toxic substance, material, or product (such as asbestos, formaldehyde, radon gas, methane gas, lead-based paint) that exceed government safety standards located on or which otherwise affect the property?

Buyer Initials \_\_\_\_\_ Owner Initials \_\_\_\_\_  
Buyer Initials \_\_\_\_\_ Owner Initials \_\_\_\_\_

REC 4.22  
REV 5/24

# Disclosure

Yes No NR

F2. Is there an environmental monitoring or mitigation device or system located on the property?

F3. Is there debris (whether buried or covered), an underground storage tank, or an environmentally hazardous condition (such as contaminated soil or water or other environmental contamination) located on or which otherwise affect the property?

F4. Is there any noise, odor, smoke, etc., from commercial, industrial, or military sources that affects the property?

F5. Is the property located in a federal or other designated flood hazard zone?

F6. Has the property experienced damage due to flooding, water seepage, or pooled water attributable to a natural event such as heavy rainfall, coastal storm surge, tidal inundation, or river overflow?

F7. Have you ever filed a claim for flood damage to the property with any insurance provider, including the National Flood Insurance Program?

F8. Is there a current flood insurance policy covering the property?

F9. Have you received assistance from FEMA, U.S. Small Business Administration, or any other federal disaster flood assistance for flood damage to the property?

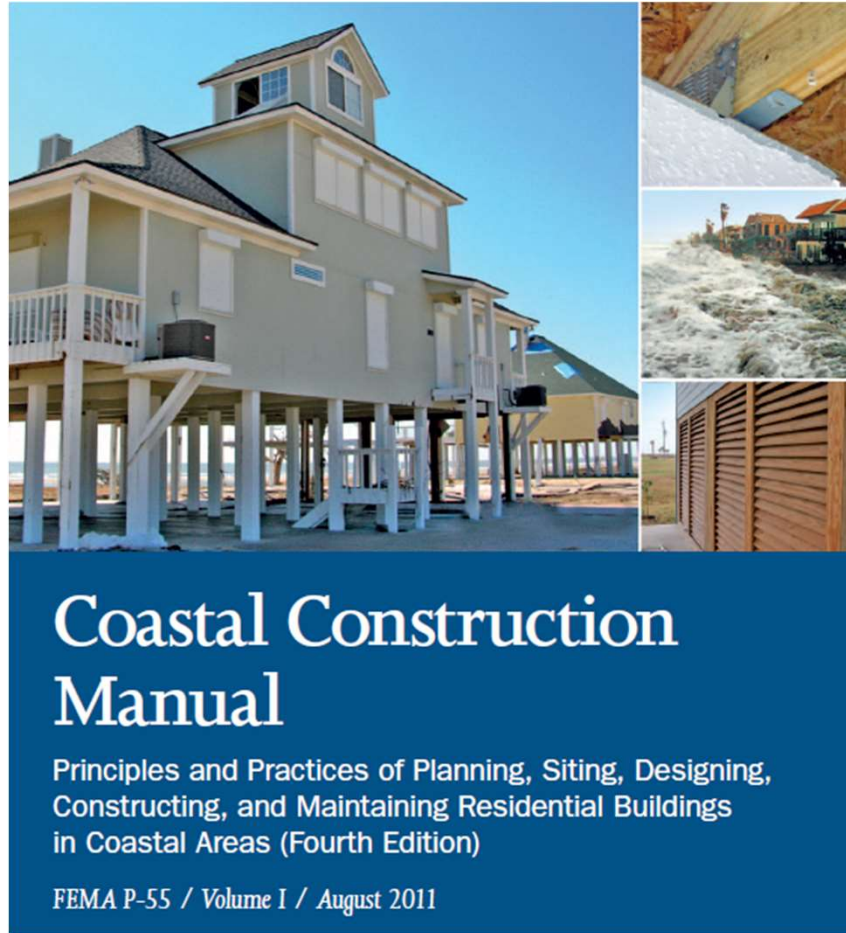
F10. Is there a flood or FEMA elevation certificate for the property?

**NOTE:** An existing flood insurance policy may be assignable to a buyer at a lesser premium than a new policy. For properties that have received disaster assistance, the requirement to obtain flood insurance passes down to all future owners. Failure to obtain flood insurance can result in an owner being ineligible for future assistance.

*Explanations for questions in Section F (identify the specific question for each explanation):*



# Development Standards



# Mitigation Measures





# Regulatory Flood Protection Elevation (RFPE)

- Base Flood Elevation PLUS Freeboard (BFE + Freeboard)
- Freeboard – the elevation required by a local jurisdiction above the base flood elevation
- Higher standard adopted by the local jurisdiction
  - Higher level of protection for structures
  - Community Rating System (CRS) Points = increased flood insurance discounts (in the SFHA and out)

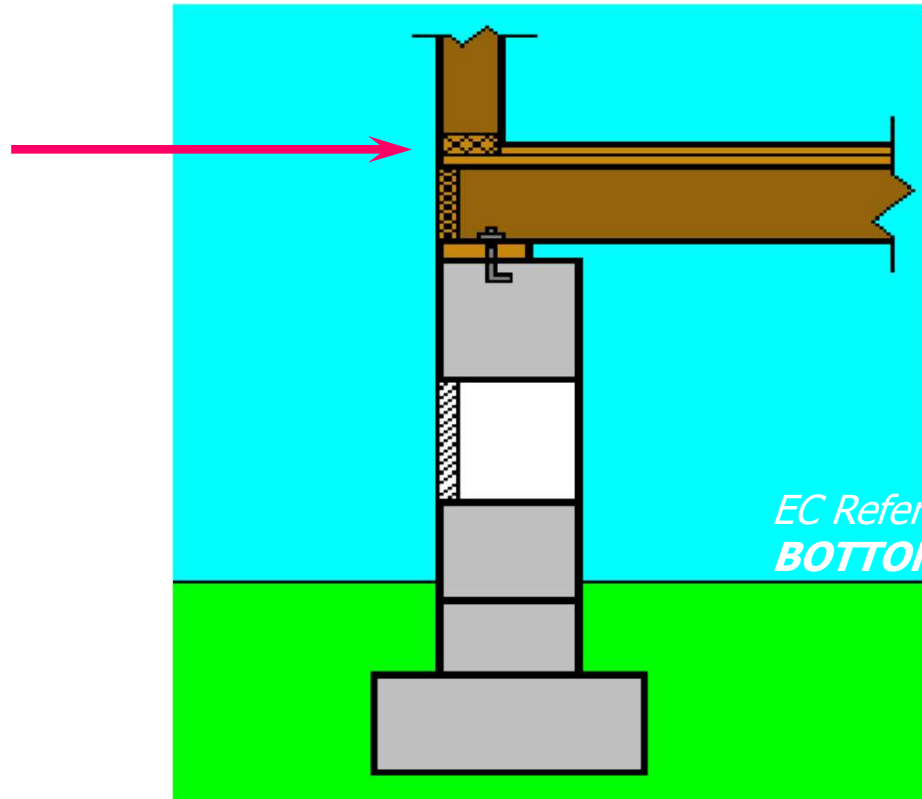
**Example: BFE of 9' + 2' local freeboard =  
RFPE of 11'**

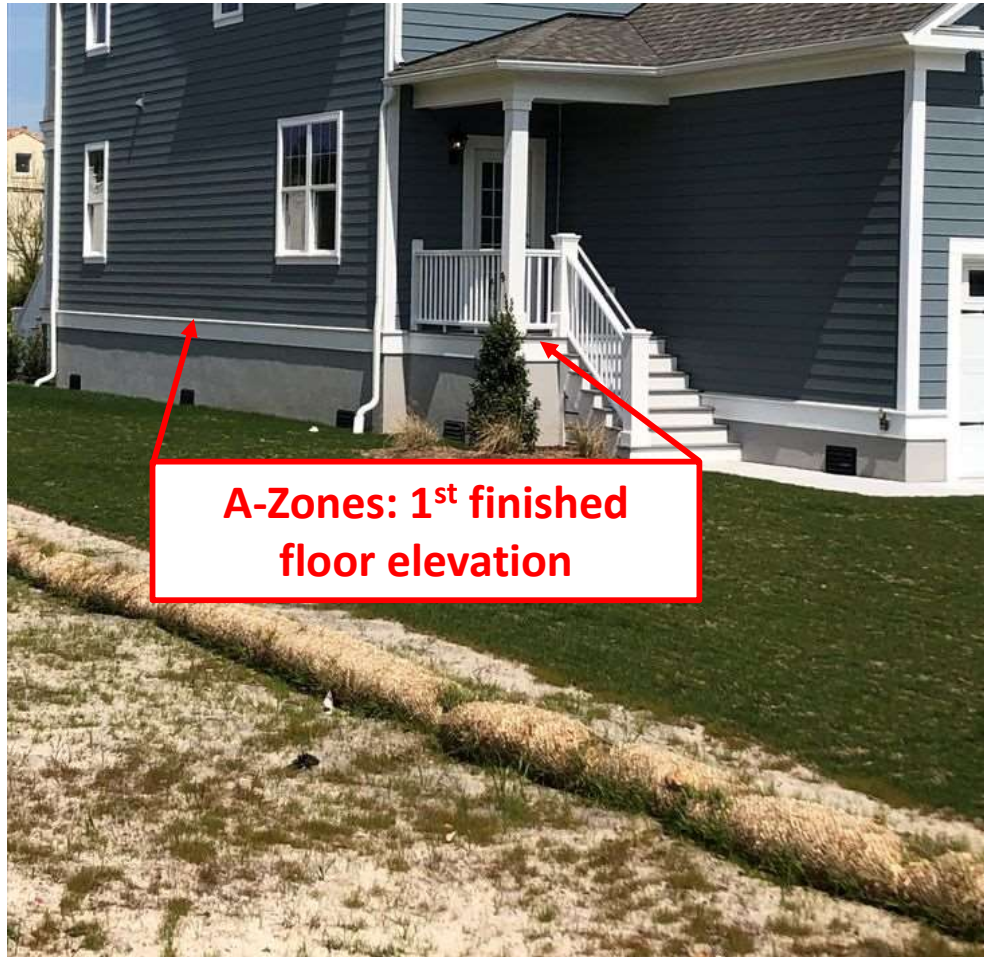




## Lowest Floor in ZONE A, AE, AH, & AO

The lowest floor is measured at the top of the sub-floor, slab or grade for regulatory & flood insurance purposes





**A-Zones: 1<sup>st</sup> finished  
floor elevation**

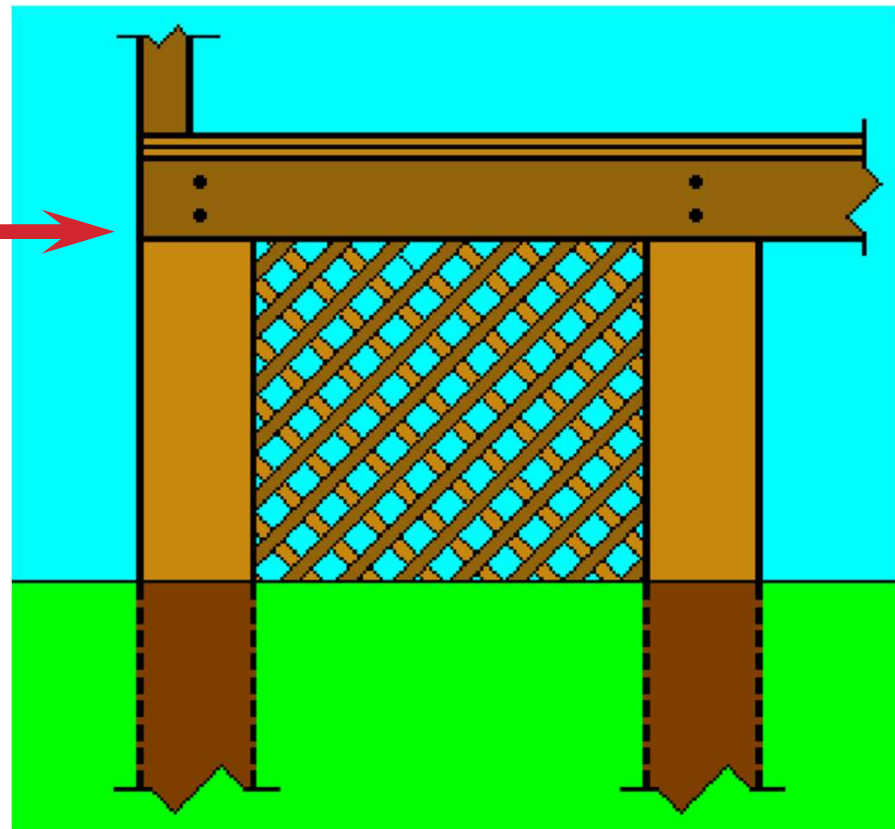






## Lowest Floor in ZONE V, VE & Coastal A

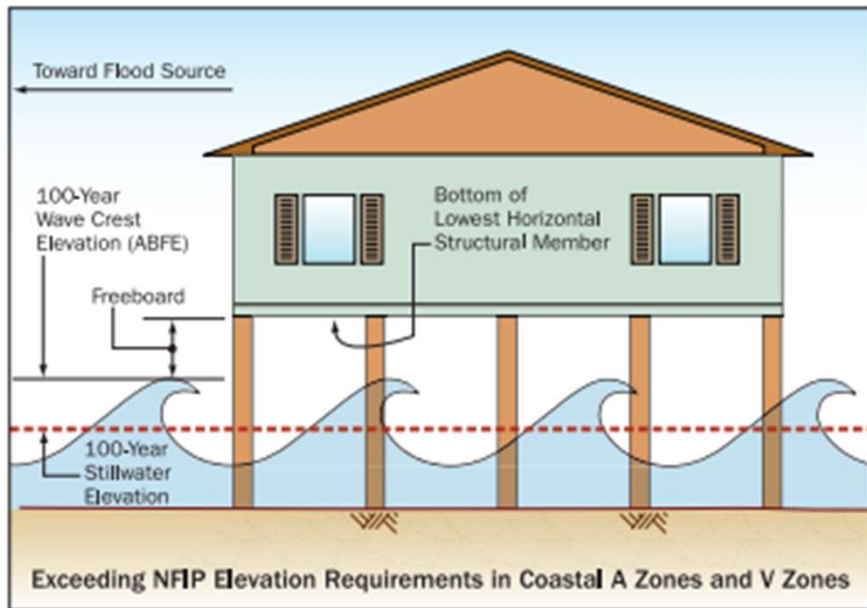
Bottom of the  
lowest horizontal  
structural  
member  
supporting the  
lowest floor



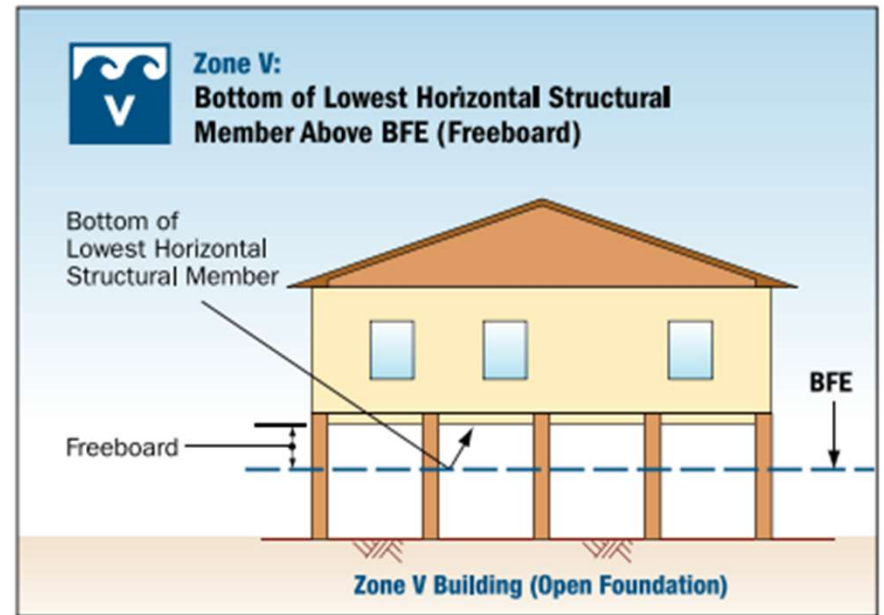


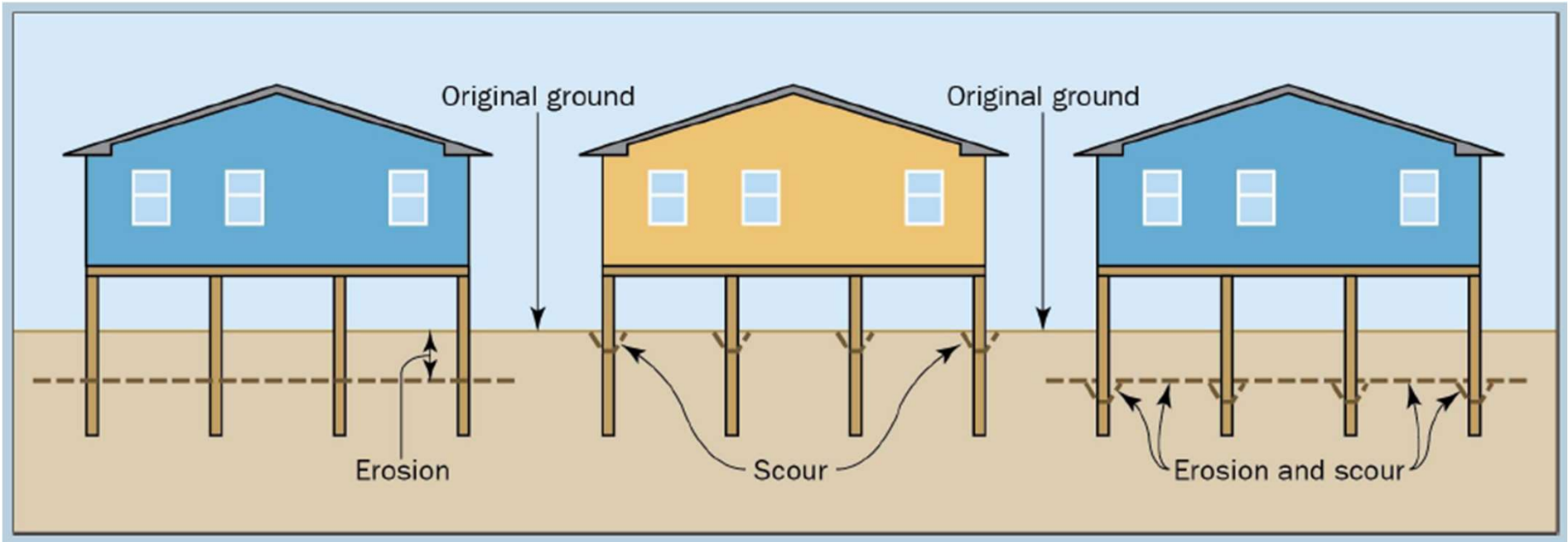
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**Figure 7. Recommended construction in Coastal A zones and V zones.**





# Scour and Erosion



**Figure 1: Three neighboring buildings with varying degrees of elevation and damage on Fort Myers Beach, Florida, after Hurricane Ian. The right-most building has the lowest elevation of the three and the most damage to the lower levels, whereas the middle building has the highest elevation and minimal damage to the lower levels.**



**Bonita Springs, FL  
Hurricane Ian**



# Bolivar Peninsula, TX 2008



**Figure 2. Bolivar Peninsula, TX, V-zone house constructed with the lowest floor (bottom of floor beam) at the BFE (dashed line). The estimated wave crest level during Ike (solid line) was 3 to 4' above the BFE at this location.**



## Designing for Flood Levels Above the Minimum Required Elevation After Hurricane Ian

Recovery Advisory 1

July 2023



FEMA

DR-4673-FL RA 1

## BUT WAIT.....

Where do the regulations and guidance come from?

- Research following past events
- Field investigations post event
- Collaboration among engineers, researchers, home builders, Institute for Business and Home Safety, International Code Council, National Association of Home Builders, US Dept. of Housing and Urban Development, local community officials, etc.



# Protecting Existing Structures



## Purchase Flood Insurance Lower Your Flood Risk

- ✓ Elevate utilities (include duct work)
  - ✓ Install flood openings
  - ✓ Elevate building
- ✓ Flood proof (non-residential only)
- ✓ Relocate



# Flood Openings

**Permanent Opening** in a Wall that Allows the Free Passage of Water in Both Directions, **AUTOMATICALLY**, without Human Intervention.

A Window, a Door, or a Garage Door is **NOT** Considered an Opening.

Vents **MAY** be installed into a door or garage door.



## Requirements for Flood Openings in Foundation Walls and Walls of Enclosures

Below Elevated Buildings in Special Flood Hazard Areas  
In Accordance with the National Flood Insurance Program

NFIP Technical Bulletin 1 / March 2020



# Minimum Requirements for Foundation Openings

- Minimum of two openings on different sides of EACH enclosed area.
- The total net area of all openings must be at least one (1) square inch for each square foot of enclosed area.
- The bottom of all required openings shall be no higher than one foot above the adjacent grade at each opening.
- Openings may be equipped with screens, louvers, or other “automatic” coverings or devices, provided they permit the automatic flow of floodwaters in both directions.

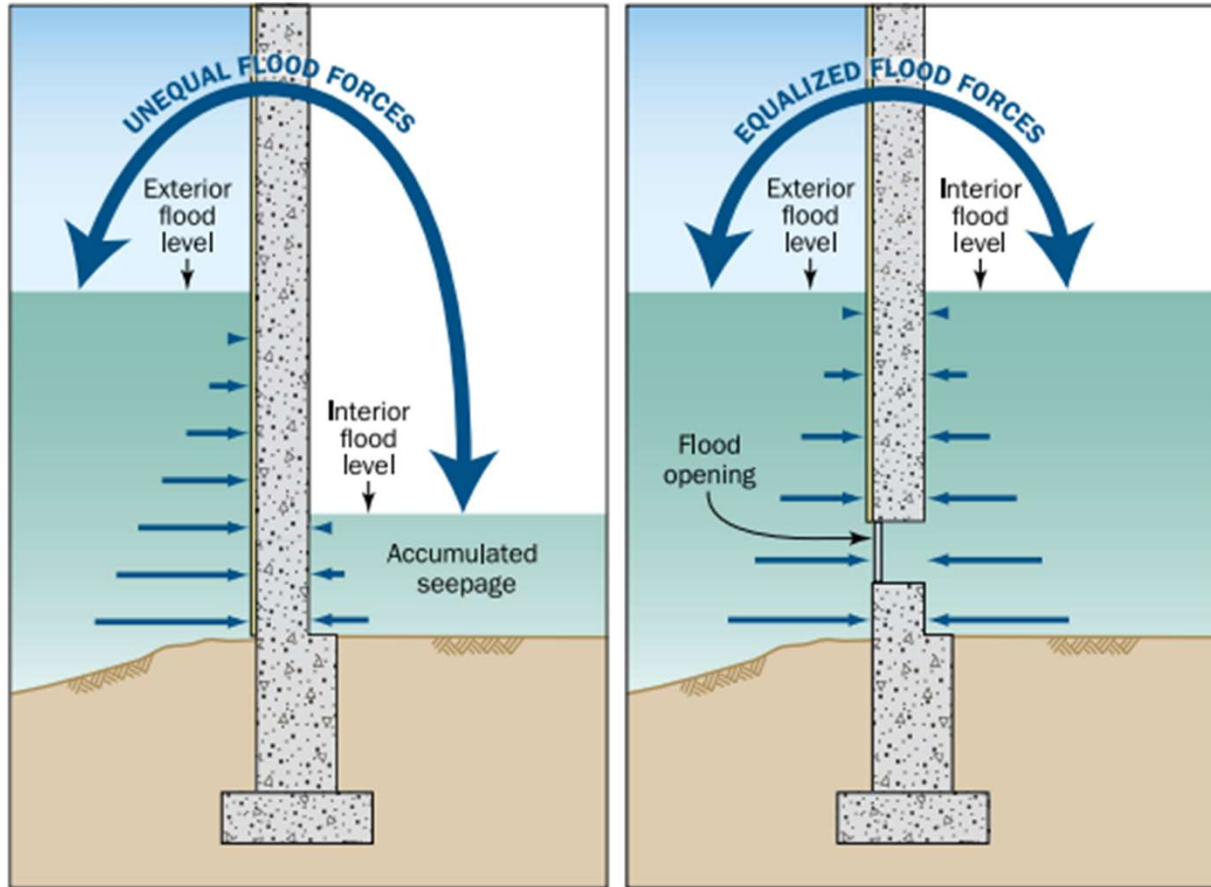
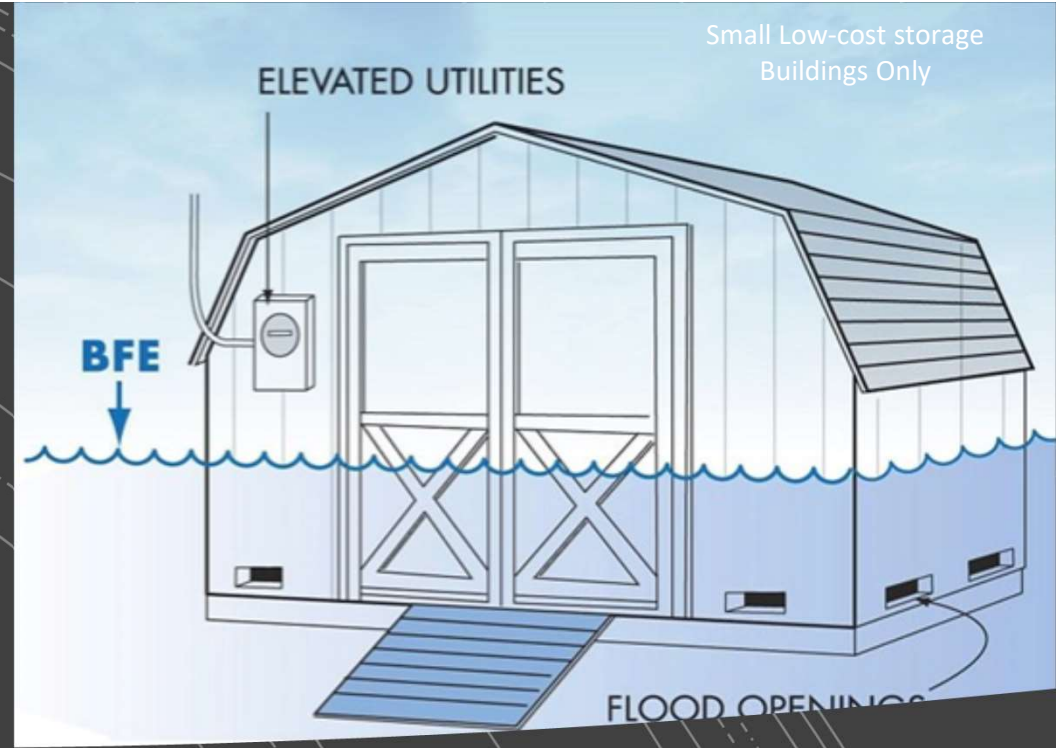


Figure 1: Equalizing flood forces (hydrostatic loads) on exterior walls





# Flood Openings



# Is the Standard Air Vent acceptable to be used as a flood opening or flood vent?



# Standard Air Vent



- × Can be closed manually
- × Does not allow the automatic entry and exist of water
- = Not acceptable as a flood opening UNLESS disabled in the OPEN position

Figure 17: Standard air vent that is unacceptable as a flood opening because it is not disabled in the open position



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This IS complaint





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This IS complaint





Plexiglas cover. This is a violation!!

Spray foam  
insulation. This  
is a violation!!

---





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# Engineered Openings/Vents

## Plastic - No Rust or Rot Crawlspace Flood Vent for Homes (New Construction & Replacement)

Easy Access • Modular Use • Can Be Painted

Model Number	Opening Sizes (HxW)	Non Eng. (Sq. In.)	Eng. (Sq. In.)	Net-Free Air (Sq. In.)
D0816	8" X 16"	120	230	95
D1220	12" X 20"	240	425	175
D1232	12" X 32"	380	705	290
D1616	16" X 16"	255	485	200
D1624	16" X 24"	380	695	285
D1632	16" X 32"	510	935	385
D2032	20" X 32"	640	1,225	505
D2424	24" X 24"	575	1,065	435
D2436	24" X 36"	860	1,620	665



### Flood Vent (No Cover)

One-piece ventplate with easy to insert vermin screen and fixed louver. Made of durable PVC/ABS plastic (no rust or rot) with a UV retardant treatment. FEMA compliant. No cover to allow the automatic entry and exit of floodwaters. Quick and easy to install.



3700 Shore Drive, Virginia Beach, VA 23455  
757.363.0005 • 1.800.230.9598 • www.crawspacedoors.com

**Crawl Space Door Systems**  
INCORPORATED  
Plastic Crawlspace Doors & Vents  
Plastic Crawlspace Louvers/Screens  
Plastic FEMA Flood Vents

### Flood Openings (TB 1 - August 2008)

LOUVER, Patent No. US 0583,042, dated December 16, 2008 and owned by Smart Vent, Inc. is used in accordance with Federal Emergency Management Agency's National Flood Insurance Program, Technical Bulletin (TB) 1-August 2008 will allow on exterior walls by allowing for entry and exit of floodwater during floods up to

erred, Net-Free Air and Engineered Opening size for each model and size of the d in the table below. The Engineered size opening calculation was performed ss in Foundation Walls for Buildings Located in Special Flood Hazard Areas in and ASCE/SEI 24-05, Flood Resistance Design and Construction. I measured the to determine the Non-Engineered and Net-Free Air opening size for each model. ug 2008 to determine the Engineered opening size for each model. I used the required (#2); 0.033 = coefficient corresponding to a factor of safety of 5.0 (m2 - rectangular, long axis horizontal, short axis vertical unobstructed during design ven the louvers); R = 5 ft/hr worst case rate of rise and fall; and AB = 1 ft2

$$0.033 (1/0.40) 5 = .4125 \text{ in}^2$$

$$0.616 = 95 / .4125 = 230$$

Engineered (Sq. Inches)	Net-Free Air (Sq. Inches)	Engineered (Sq. Inches)
120	95	230
240	175	425
380	290	705
255	200	485
380	285	695
510	385	935
640	505	1,225
D2424	575	1,065
D2436	860	1,620

#### Installation Limitations and Instructions

Each individual opening, and any louvers, screens, or other covers, shall be designed to allow automatic entry and exit of floodwaters during design flood or lesser flood conditions; there shall be a minimum of two different sides of each enclosed area; if a structure has more than one enclosed area below the BFE, each area shall have openings; openings shall not be less than 3 in. in any direction in the plane of the wall; the bottom of each required opening shall be no more than 1 ft above the adjacent ground level; the difference between the exterior floodwater level and the interior level shall not exceed 1 ft; in the absence of reliable data on the rates of rise and fall, assume a minimum rate of rise and fall of 5 ft/hr.

Signature: *[Signature]*  
Title: **PRESIDENT, ROUSE ENGINEERING P.C.**  
Type of License: **PROFESSIONAL ENGINEER**  
License Number: **24740**



**SMART VENT**  
ICC-ES FEMA ACCEPTED  
ICC-ES EVALUATED

**Smart VENT**  
877-441-8368  
www.smartvent.com

**DETAIL DIAGRAM MODEL 1540-520 FLOOD VENT INSULATED**

16 1/4" R/O

STRAP SLOTS USE TWO TOP AND TWO BOTTOM

FIGURE 1 Front View

FIGURE 2 Side View

FIGURE 3 Side View

STRAP DETAIL: TEETH MUST CLICK IN TIGHT TO INSURE SECURE INSTALLATION. BEND PAST 90° FOR STRAP BACK.

EMERGENCY MANAGEMENT NORTH CAROLINA

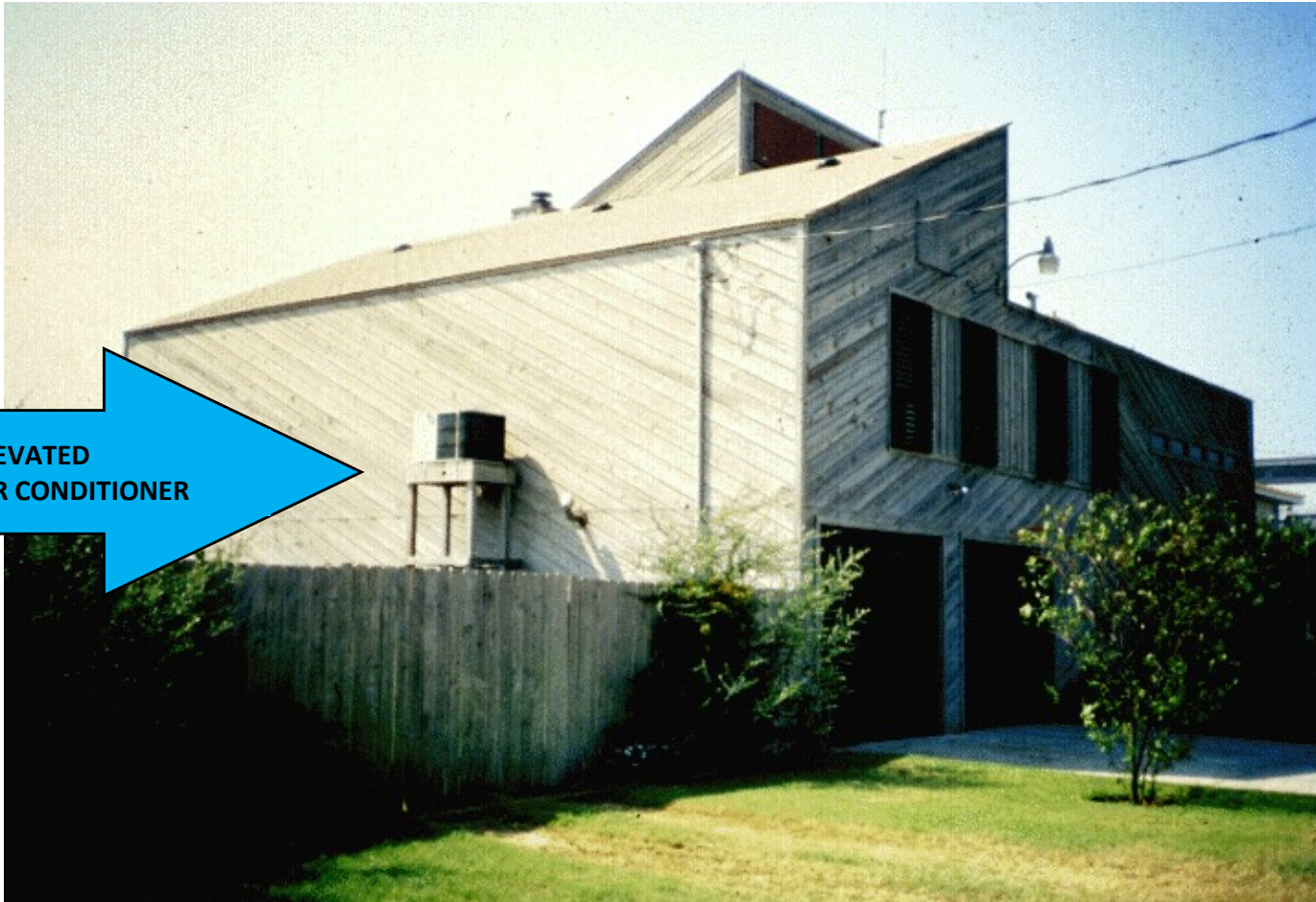




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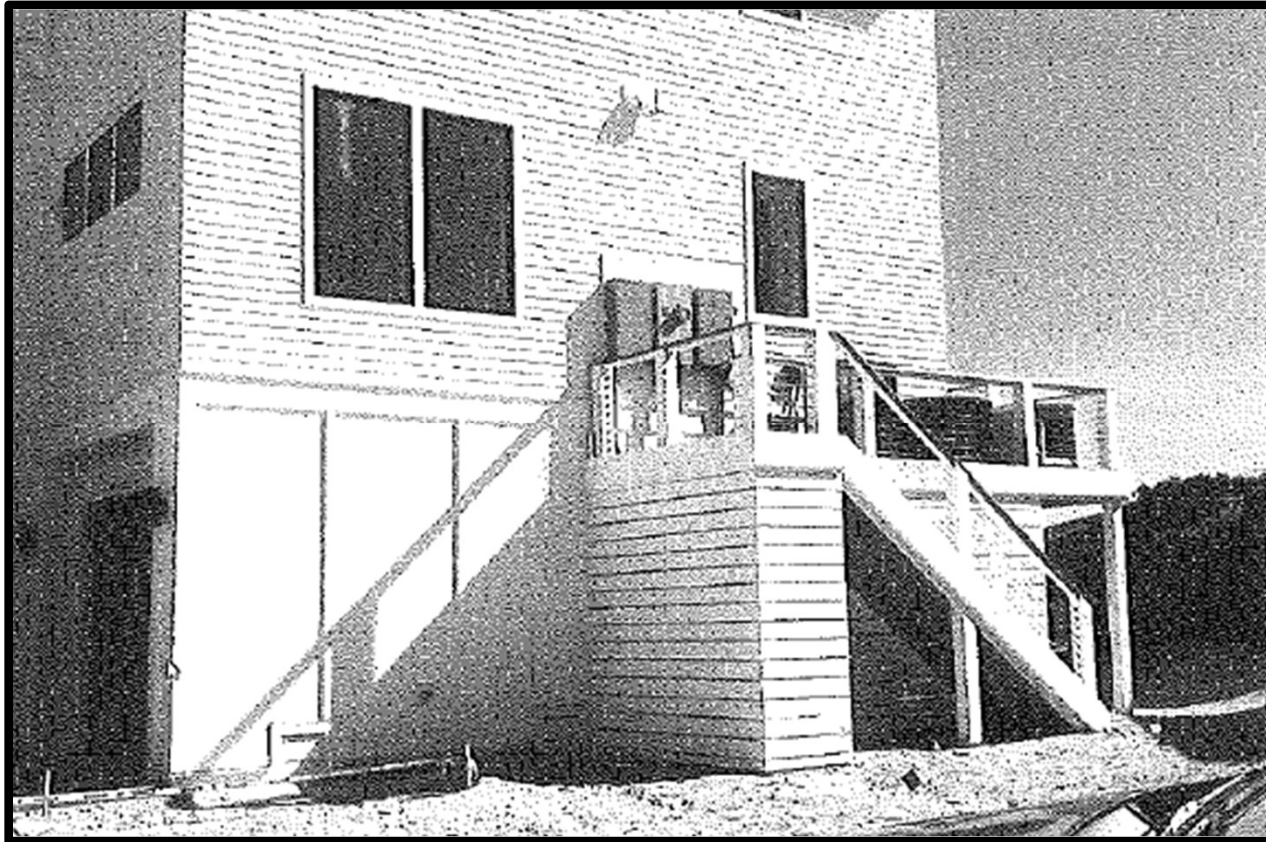
# Flood Proofing (Non-residential Only)





**ELEVATED  
AIR CONDITIONER**

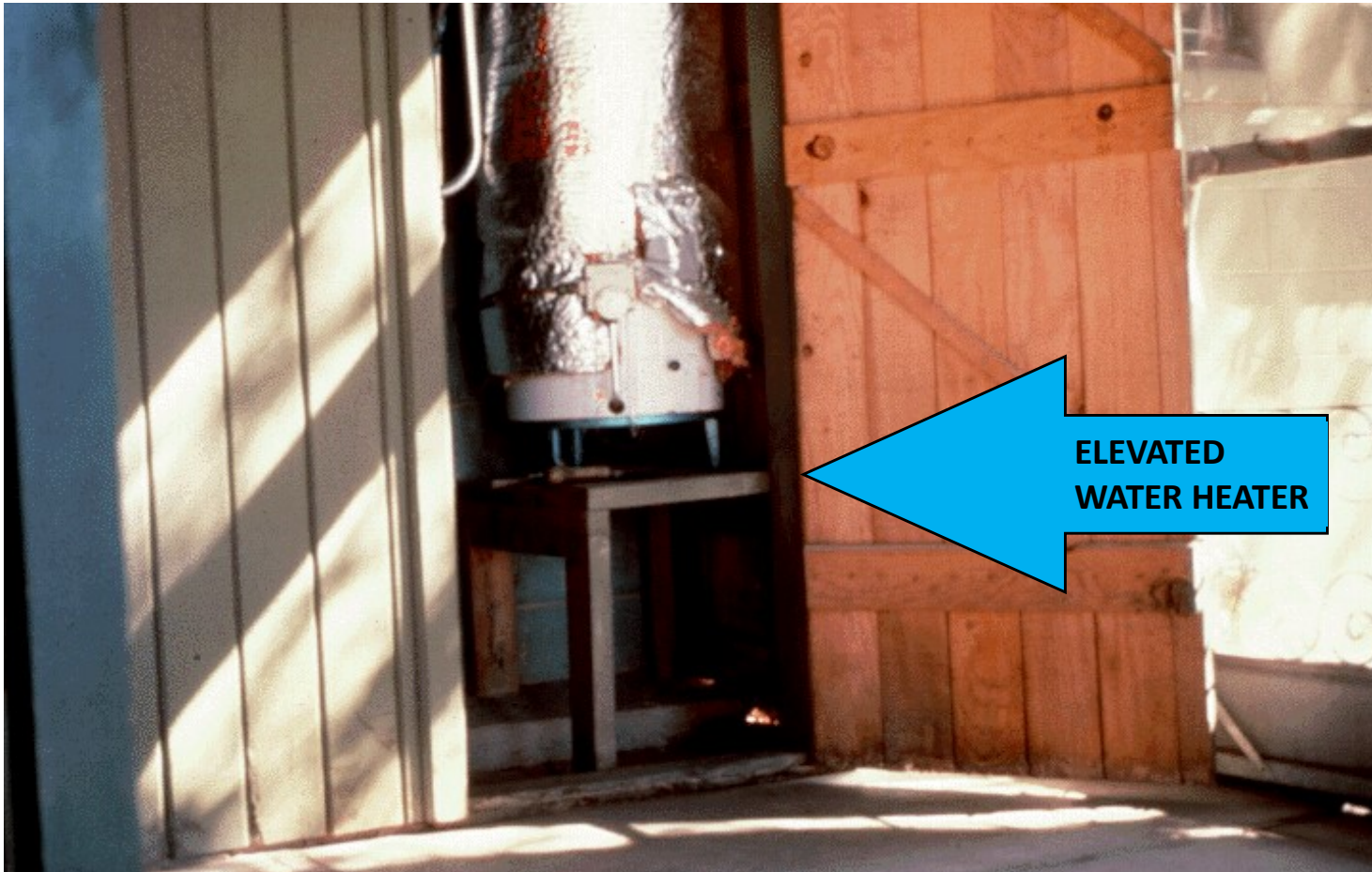






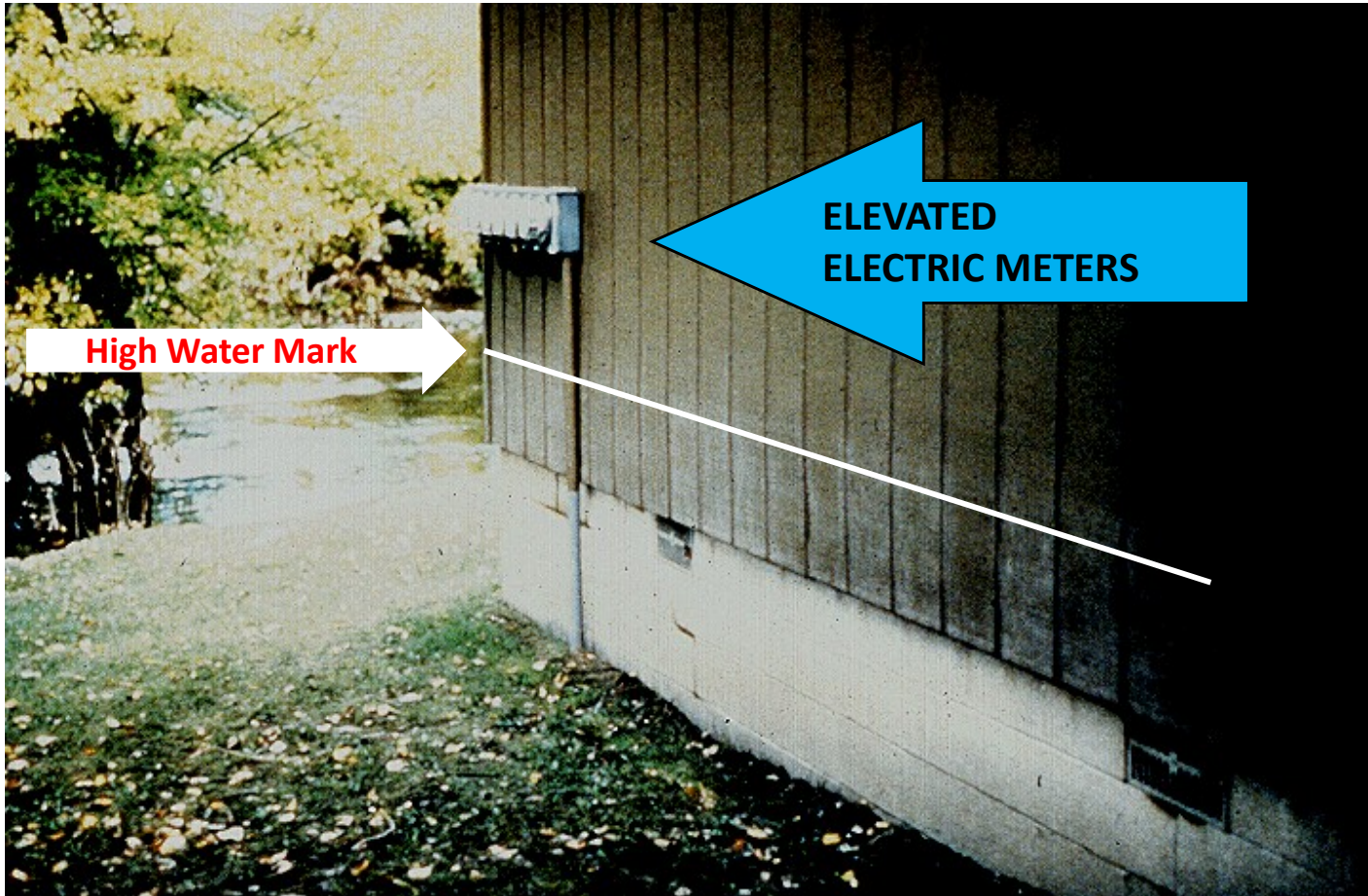


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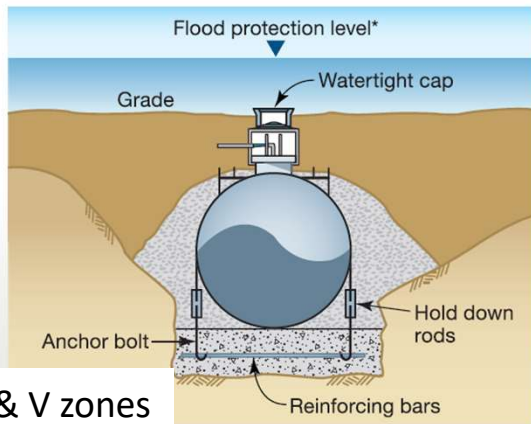


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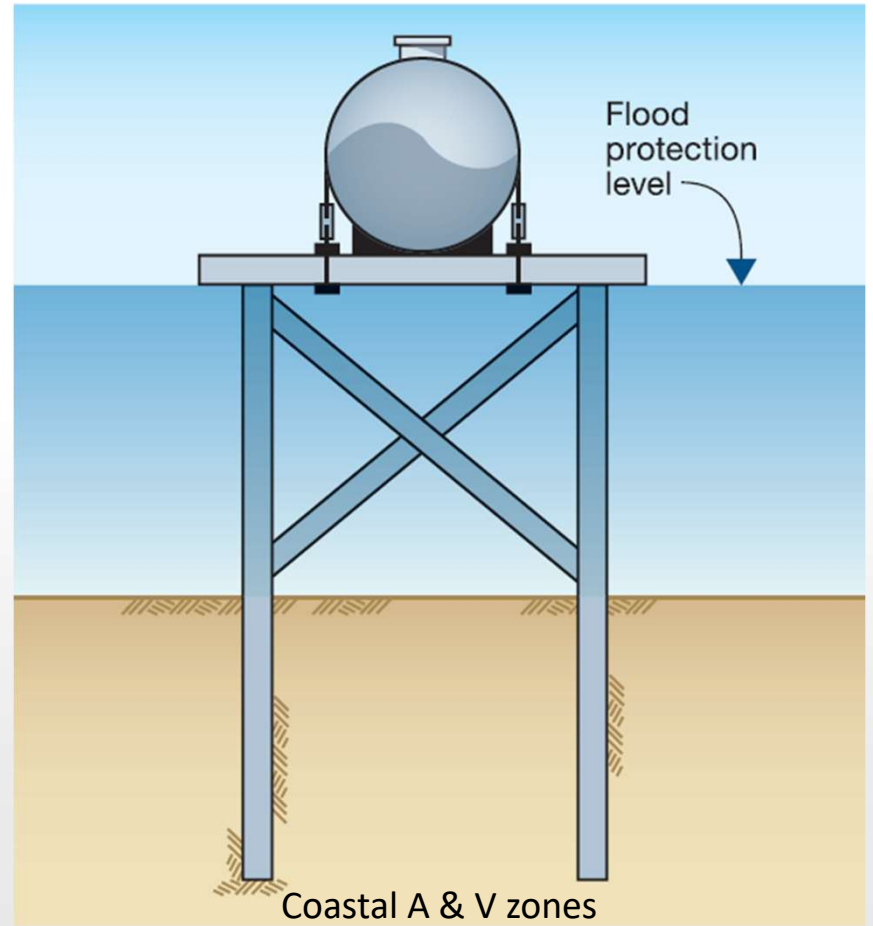
# Other Development

## Fuel Tanks

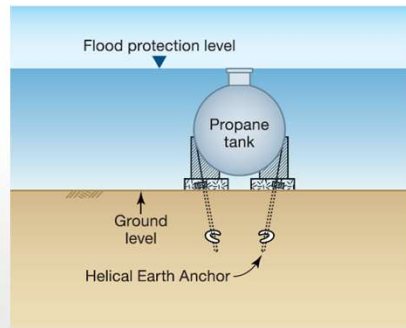
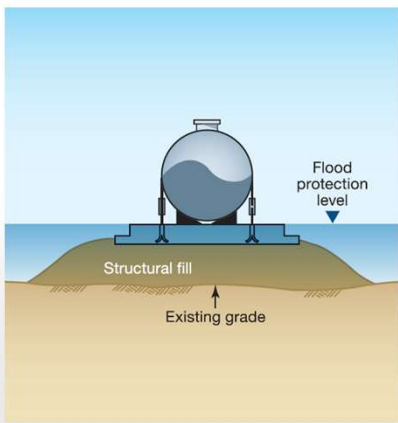




Coastal A & V zones



Coastal A & V zones





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The Ocracoke  
HARBOR INN  
OFFICE

Water Elevation on  
Ocracoke Island  
7.3 ' of storm surge



# Hurricane Dorian - 2019



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**Questions?**  
**Thank You for having me!**

