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Lunch with MIA – Do You Know Your Flood Risk?

Maryland Insurance Administration
December 2, 2021

Common Causes of Flooding

- Stormwater runoff (pluvial flooding)
 - “Urban flooding”
- High tides/coastal storm event (hurricane, Nor’easter)
 - King tide
 - “Nuisance flooding”
- Sea level rise and land subsidence
- Riverine/flash flood (fluvial flooding)
 - Extreme precipitation
- **Other:**
 - Water main break
 - Sewer backup



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Urban Flooding

“...the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems.”



Nuisance Flooding

“...high tide flooding that causes a public inconvenience.”

Water Main Break



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Source: CBS. (2009, December 17) *Huge Baltimore Water Main Break* [Video]
YouTube. <https://www.youtube.com/watch?v=5VVj6el8yMk>

Topics

- **Know Your Risk – Maps and Data**
 - FEMA Flood Insurance Rate Maps (FIRMs)
 - Sources of Information
 - Future Flood Risk
- **Reduce Your Risk – Floodplain Management/Regulations & Mitigation Actions**
 - Floodplain Management Ordinance
 - Flood damage-resistant materials
 - Flood openings, etc.



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National Flood Insurance Program (NFIP)

- Created by the National Flood Insurance Act of 1968 (Hurricane Betsy, 1965)
- Administered by FEMA/DHS
- Participation is **voluntary**
 - Adopt and enforce regulations
 - Eligible for flood insurance
- **Benefits** of participation:
 - Flood insurance
 - Grants and loans
 - Disaster assistance
 - Federally-backed mortgages
- **Partnership** between the Federal government and the “community” (County or municipal government)



National Flood Insurance Program

Answers to Questions About the NFIP

FEMA F-084 / March 2011



FEMA

Key Components of the NFIP

**Maps and
Data**



**Floodplain
Management/
Regulations &
Mitigation
Actions**

Flood Insurance

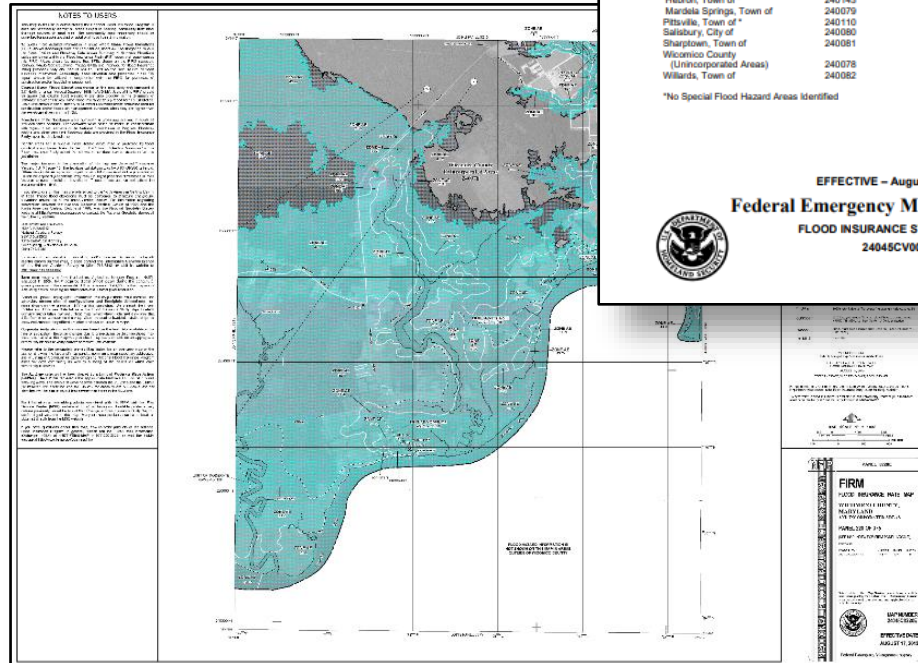


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Know Your Risk – Maps and Data

- Flood Insurance Study (FIS)
- Flood Insurance Rate Map (FIRM)
 - **Geographic Information System: Digital FIRM (DFIRM)**

- Community Identified Flood Risk:
 - Historic high water marks
 - 2050 and 2100 SLR projections
 - Other?



FLOOD INSURANCE STUDY

WICOMICO COUNTY, MARYLAND AND INCORPORATED AREAS

COMMUNITY NAME	FIS NUMBER
Delmar, Town of	240196
Fruitland, City of	240199
Hebron, Town of *	240143
Mardela Springs, Town of	240079
Pattavia, Town of *	240110
Salisbury, City of	240080
Sharptown, Town of	240081
Wicomico County (Unincorporated Areas)	240078
Willards, Town of	240082

*No Special Flood Hazard Areas Identified

EFFECTIVE – August 17, 2015

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
24045CV000A



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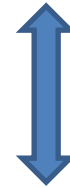
Flood Insurance Rate Map (FIRM)

- Delineates flood risk based on different recurrence intervals (1% and 0.2% annual chance flood)
 - **Floods don't follow map boundaries**
- National standard is the 1% annual chance flood (also known as 100-year flood, or special flood hazard area)
 - Flood insurance rating
 - Floodplain management & development review process



Common FIRM Terms

- **Base Flood Elevation (BFE)**
 - Depth of 1% annual chance flood



- **Special Flood Hazard Area (SFHA)**
 - Extent of 1% annual chance flood



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Flood Risk Zones

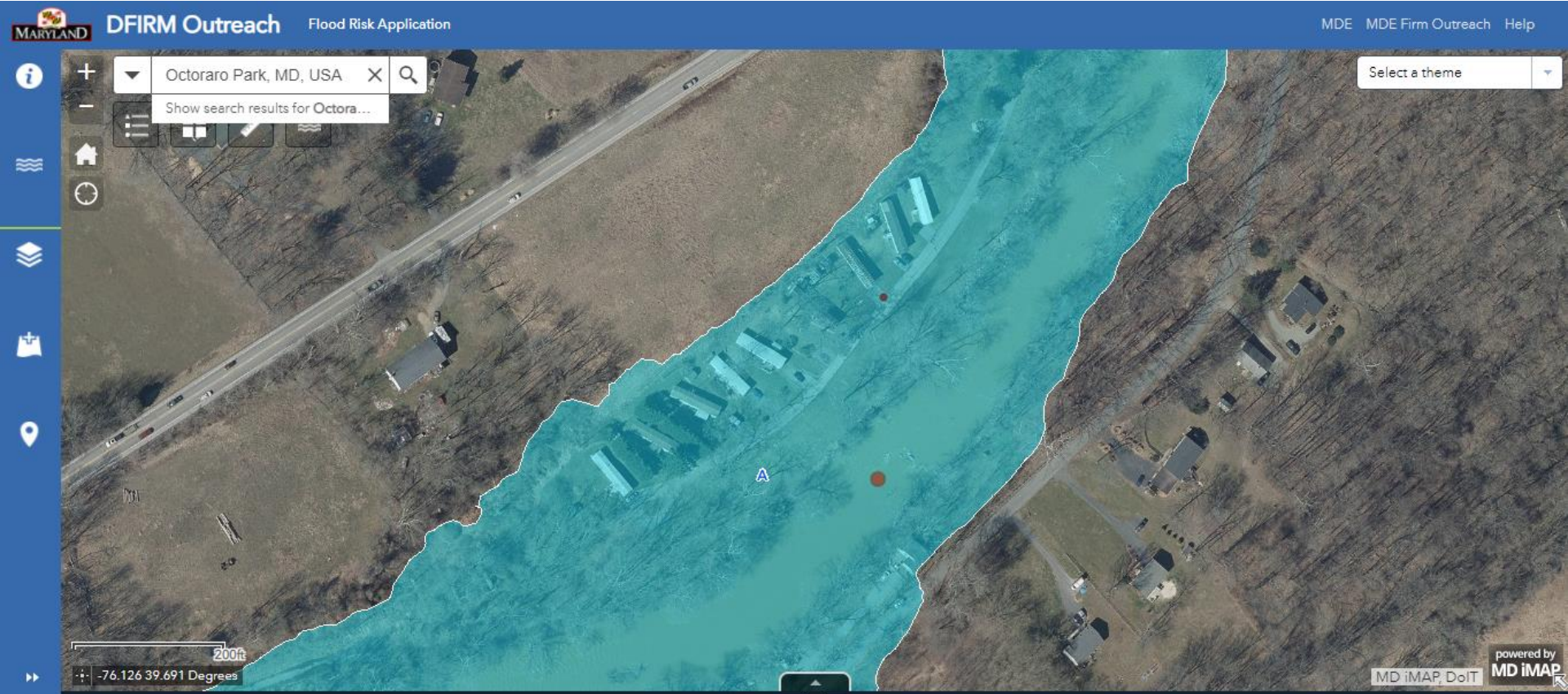
Risk	Zone	Recurrence Interval
Low	X (unshaded)	<0.2%
Moderate	X (shaded)	0.2%
High (Riverine/tidal)*	A, AH, AO, AE	1.0%
High (Coastal)*	VE	1.0%

***Mandatory purchase requirements for flood insurance, and regulatory requirements in high risk areas**



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A Zone Riverine (Nontidal) – No BFE Shown



AE Zone Tidal



AE Zone Riverine (Nontidal)



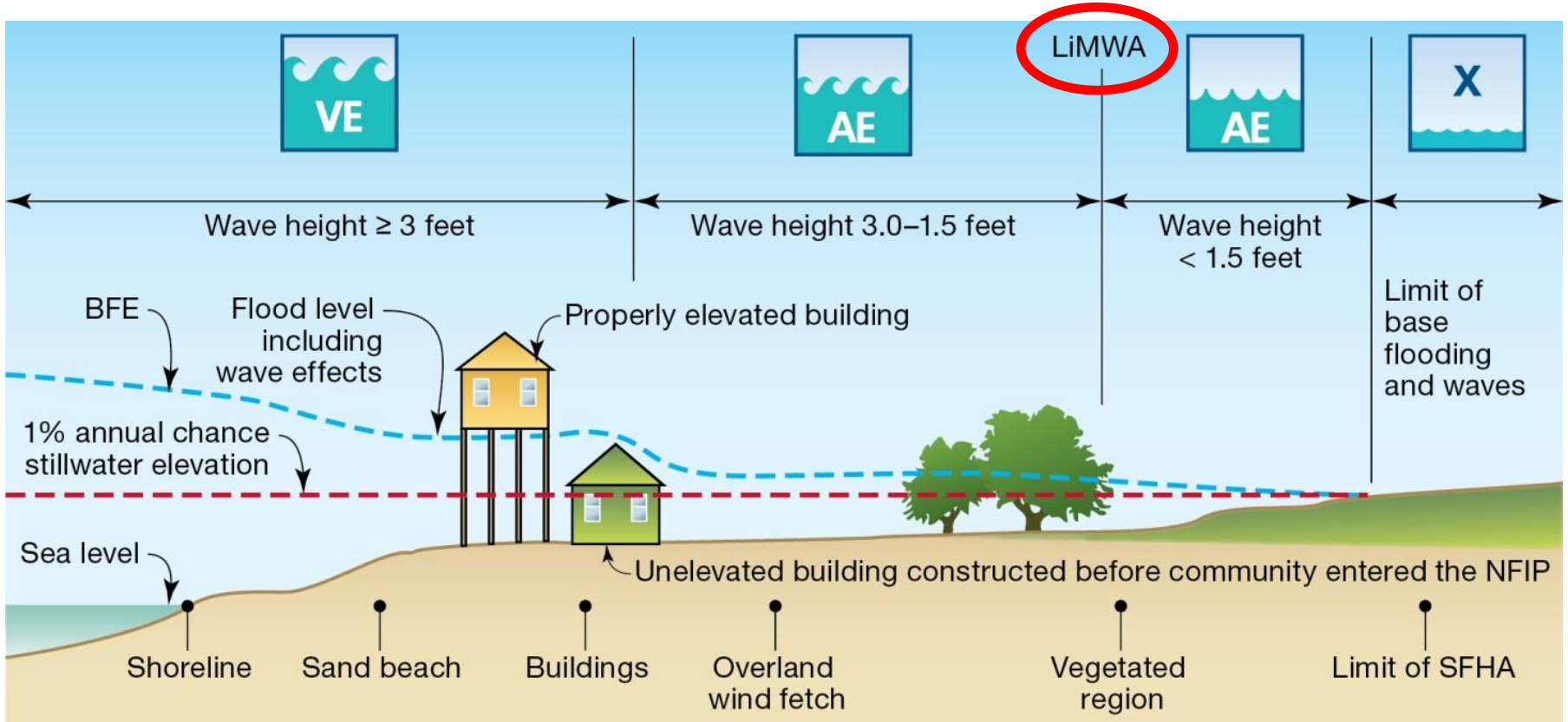
AE Zone Riverine (Nontidal) – Floodway



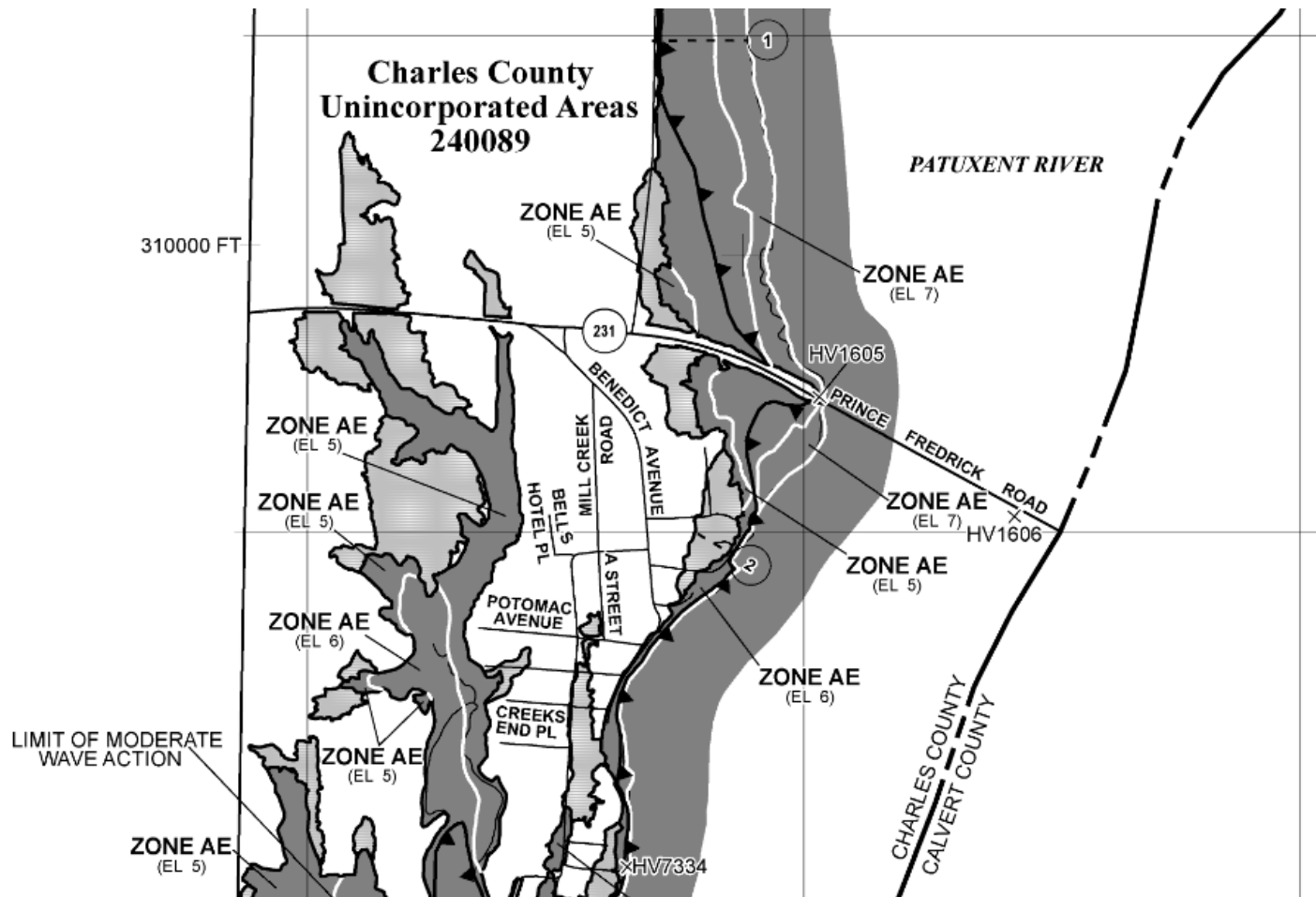
VE Zone



Coastal A Zone (CAZ)



Limit of Moderate Wave Action (LiMWA) – Benedict



Maryland's Flood Risk Application

<https://mdfloodmaps.net/map/>

The screenshot displays the Maryland's Flood Risk Application web interface. The browser address bar shows the URL mdfloodmaps.net/map/. The page header includes the Maryland state logo, the text "DFIRM Outreach Flood Risk Application", and navigation links for "MDE", "MDE Firm Outreach", and "Help".

The main map area shows an aerial view of a residential neighborhood with a teal-colored flood zone overlaid. The flood zone is labeled with "500-Year" and "AE" (Anticipated Equilibrium Flood). Various elevation points are marked along the flood zone boundary, such as "244 Feet", "216 Feet", "233 Feet", "216 Feet", "216 Feet", "208 Feet", "202 Feet", "192 Feet", "184 Feet", and "173 Feet". A search bar at the top of the map area contains the text "Find address or place".

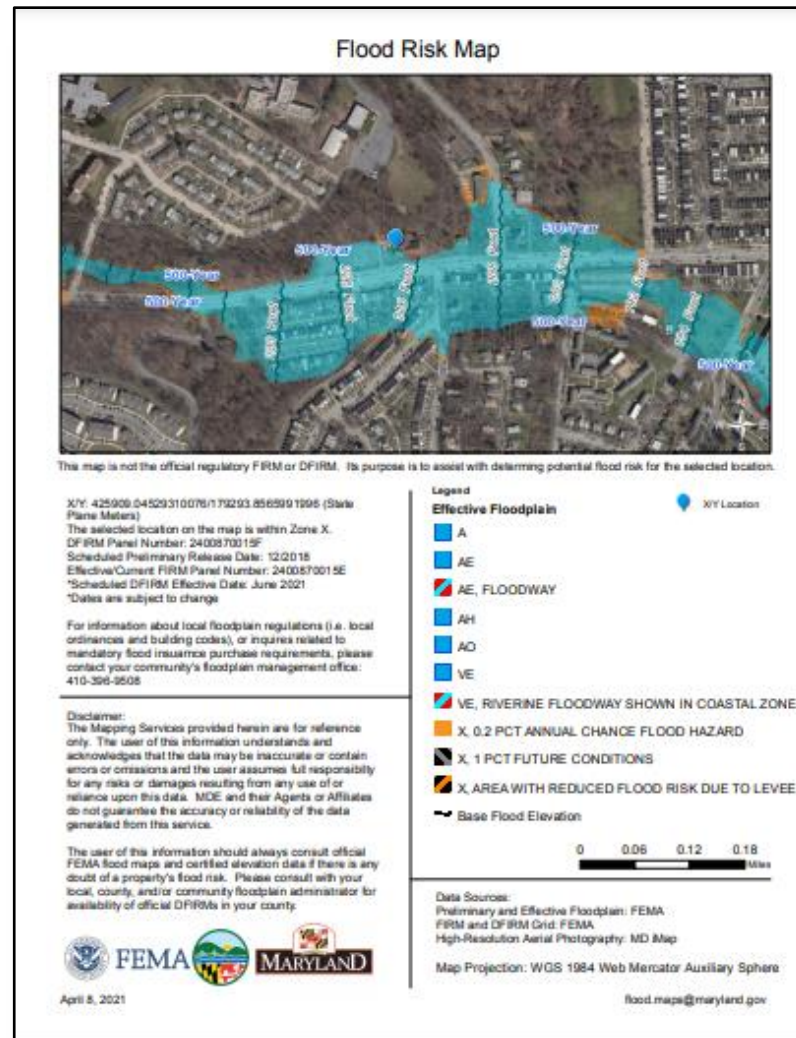
On the left side, there is a "Layer List" panel with the following items:

- Active Road Closures
- Preliminary Floodplain
- Effective Floodplain
- Effective Panels
- Effective Model
- Flood Lines
- Effective Floodplain
- Bridges and Culverts
- LiMWA
- Discharge Points
- Structure Footprint

At the bottom of the map, there is a scale bar for "300ft" and coordinates: "76.699 39.279 Degrees". The bottom right corner of the map area features the text "powered by MD iMAP, DoIT" and the MD iMAP logo.

Flood Risk Map

Download as
a PDF



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FEMA Flood Map Service Center

- Access Products
 - FIRMs & FIS
 - LOMCs
 - DFIRM Database
 - Historic Products
 - Flood Risk Products
- Access Tools
 - Make a **FIRMette**
 - National Flood Hazard Layer (NFHL) Viewer
- Live Support
 - FEMA Mapping and Insurance eXchange (FMIX)

FEMA Flood Map Service Center : Welcome!

Looking for a Flood Map? 

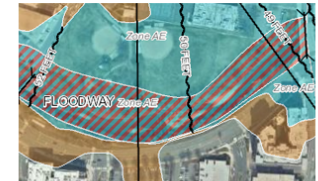
Enter an address, a place, or longitude/latitude coordinates:

Enter an address, a place, or longitude/latitude coordinate:

Search

Looking for more than just a current flood map?

Visit [Search All Products](#) to access the full range of flood risk products for your community.



About Flood Map Service Center

The FEMA Flood Map Service Center (MSC) is the official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP). Use the MSC to find your official flood map, access a range of other flood hazard products, and take advantage of tools for better understanding flood risk.

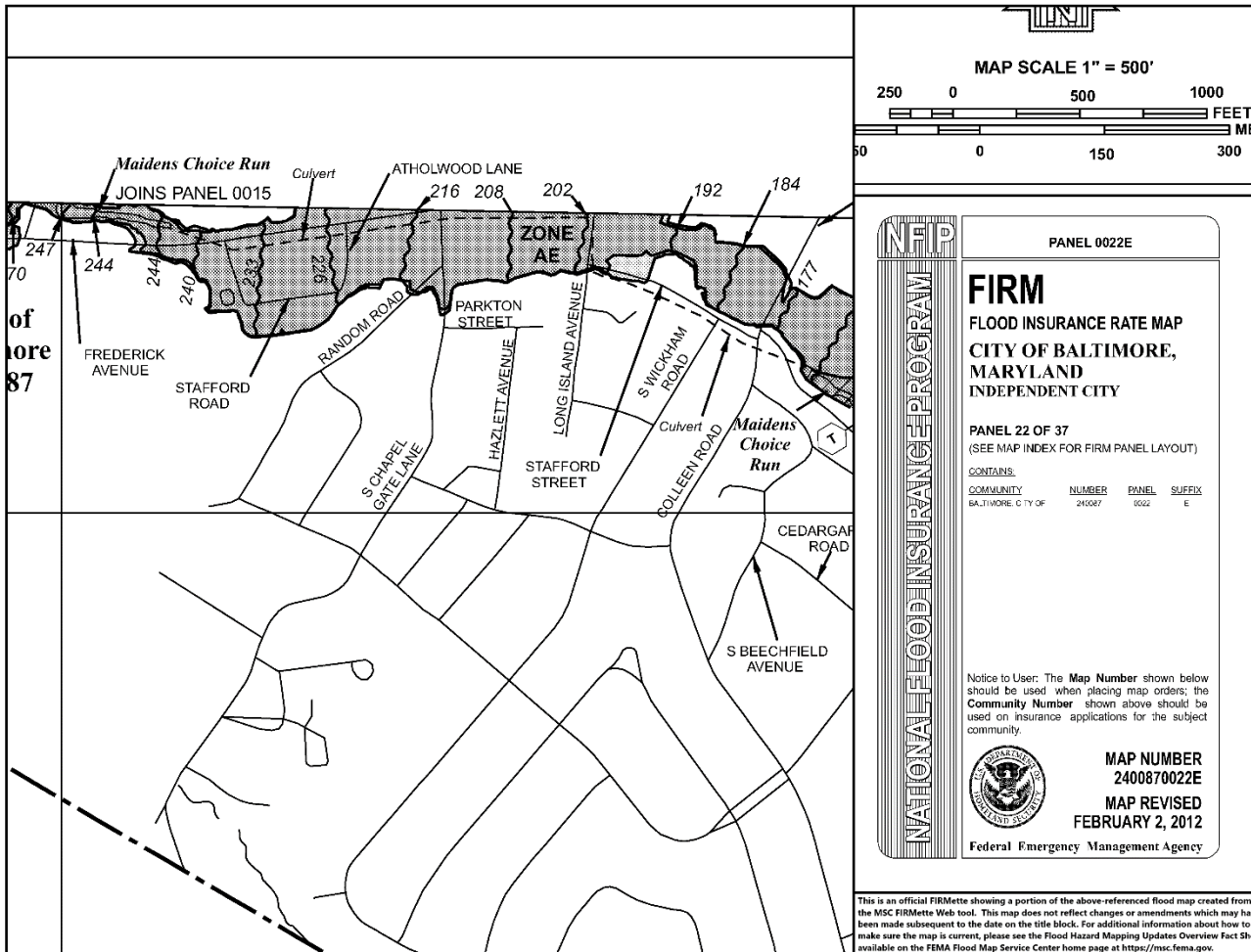
FEMA flood maps are continually updated through a variety of processes. Effective information that you download or print from this site may change or become superseded by new maps over time. For additional information, please see the [Flood Hazard Mapping Updates Overview Fact Sheet](#)

<https://msc.fema.gov/portal/home>



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FIRMette – Web Tool

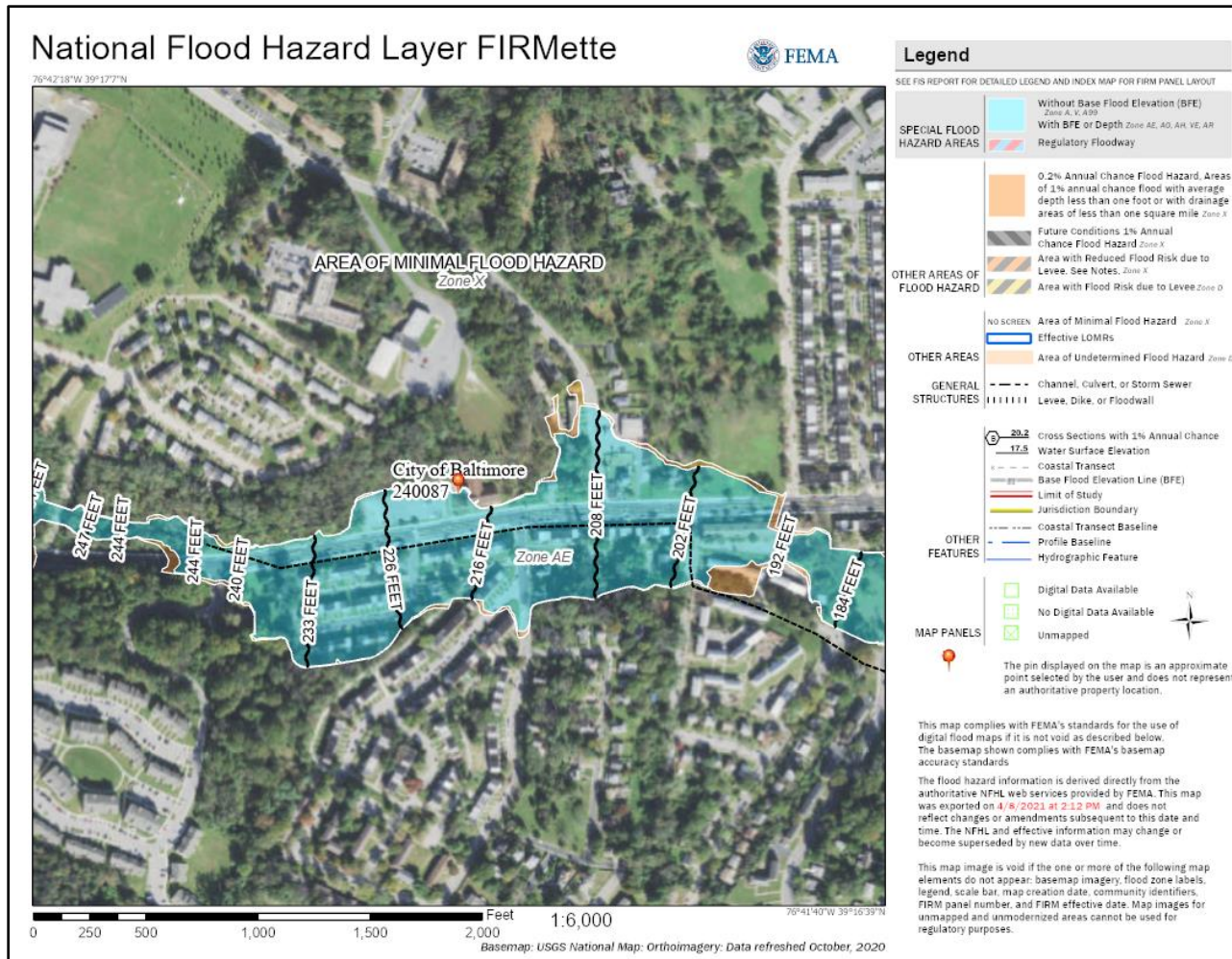


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FIRMette – NFHL Viewer



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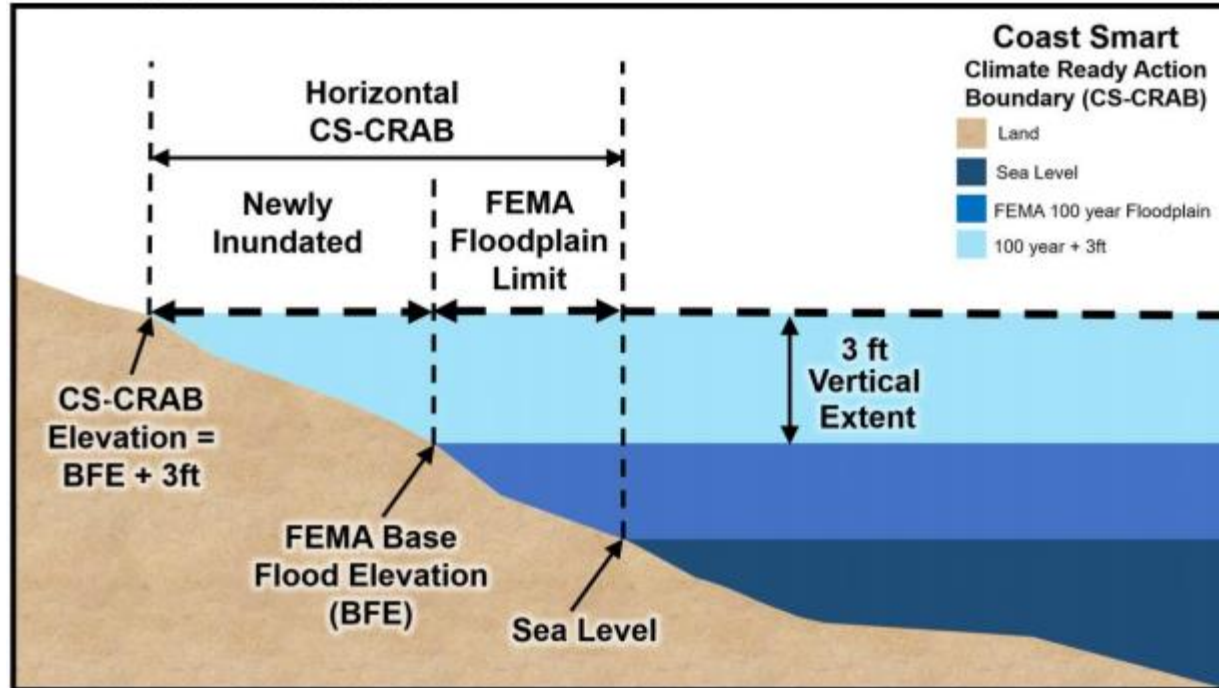
Other Sources of Flood Risk Data

- **Coast Smart Climate Ready Action Boundary (CS-CRAB)**
 - <https://mdfloodmaps.net/crab/>
- **Flood Factor®**
 - <https://floodfactor.com/>
 - Used by realtor.com



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Coast Smart Climate Ready Action Boundary (CS-CRAB)

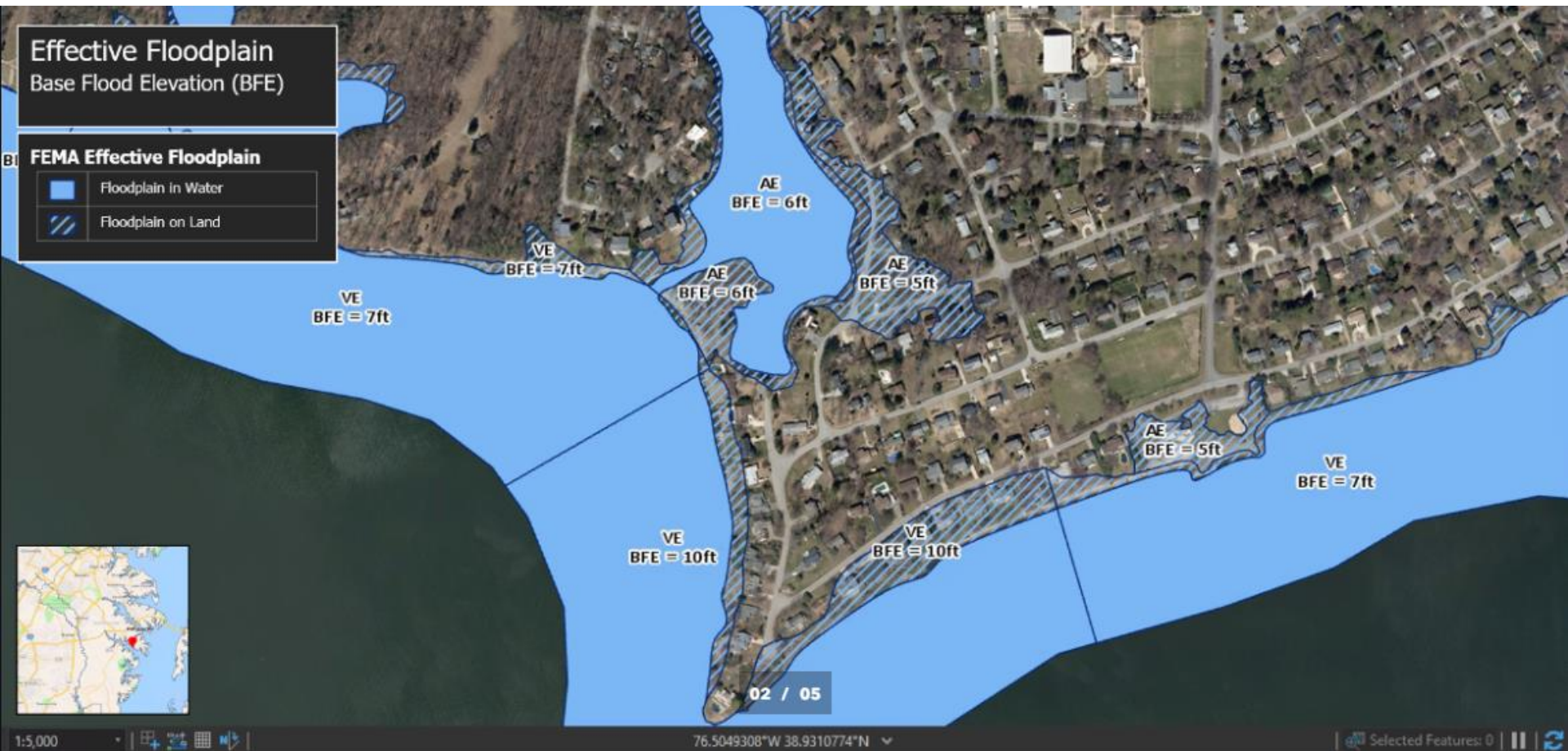


- Story Map: <https://arcg.is/0HXmjj0>
- Mapping: <https://mdfloodmaps.net/CRAB/>

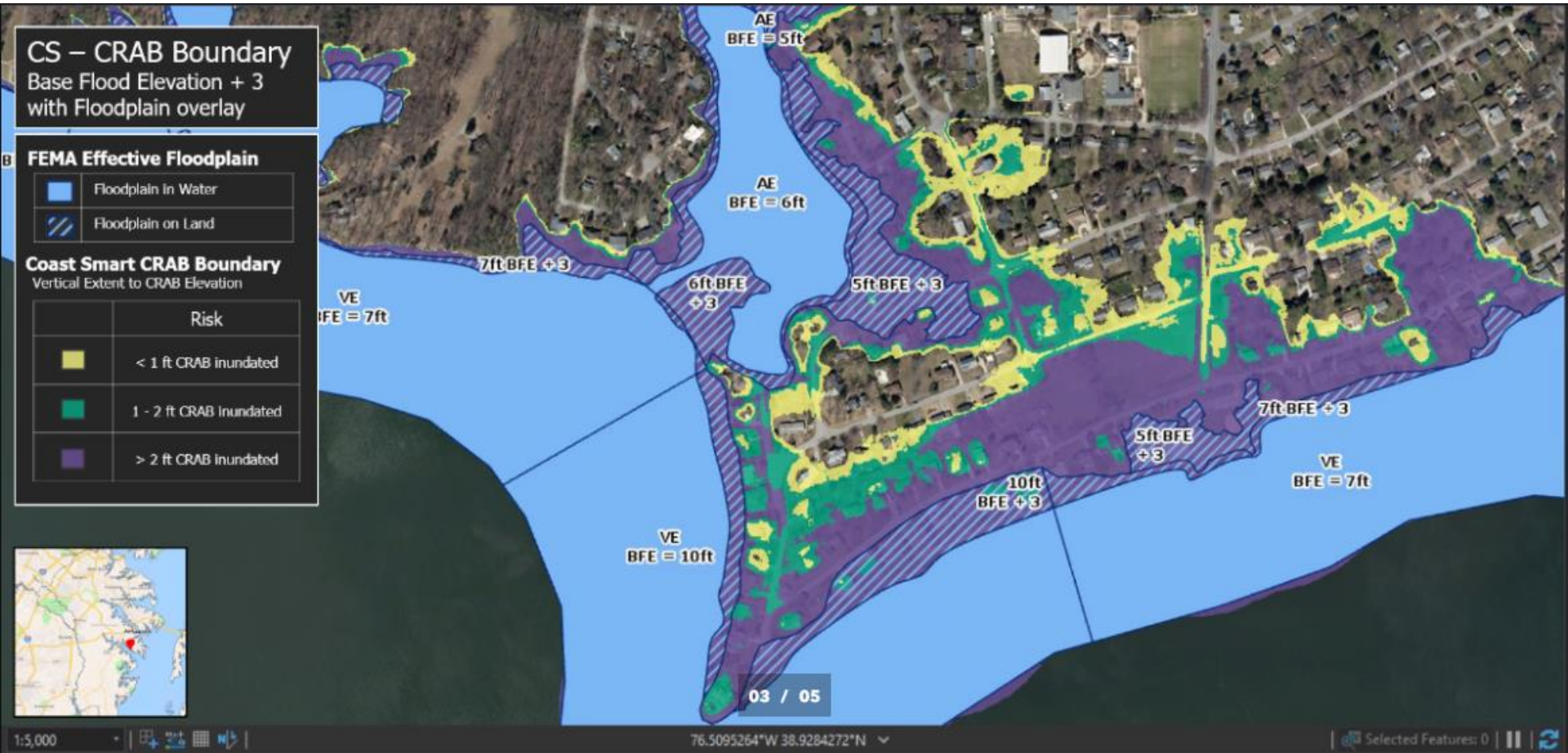


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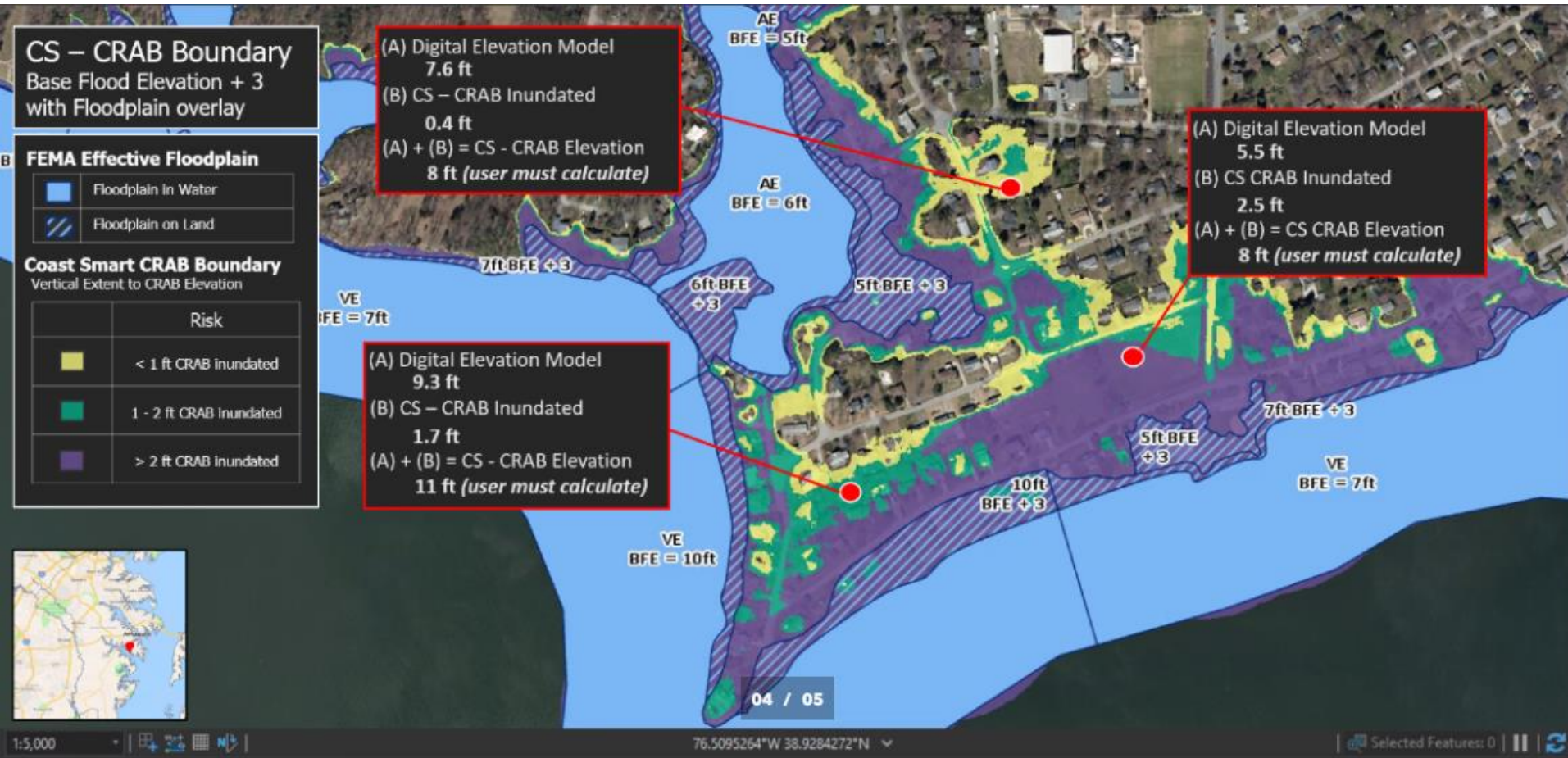
Anne Arundel County - Coastal Neighborhood - Aerial Map



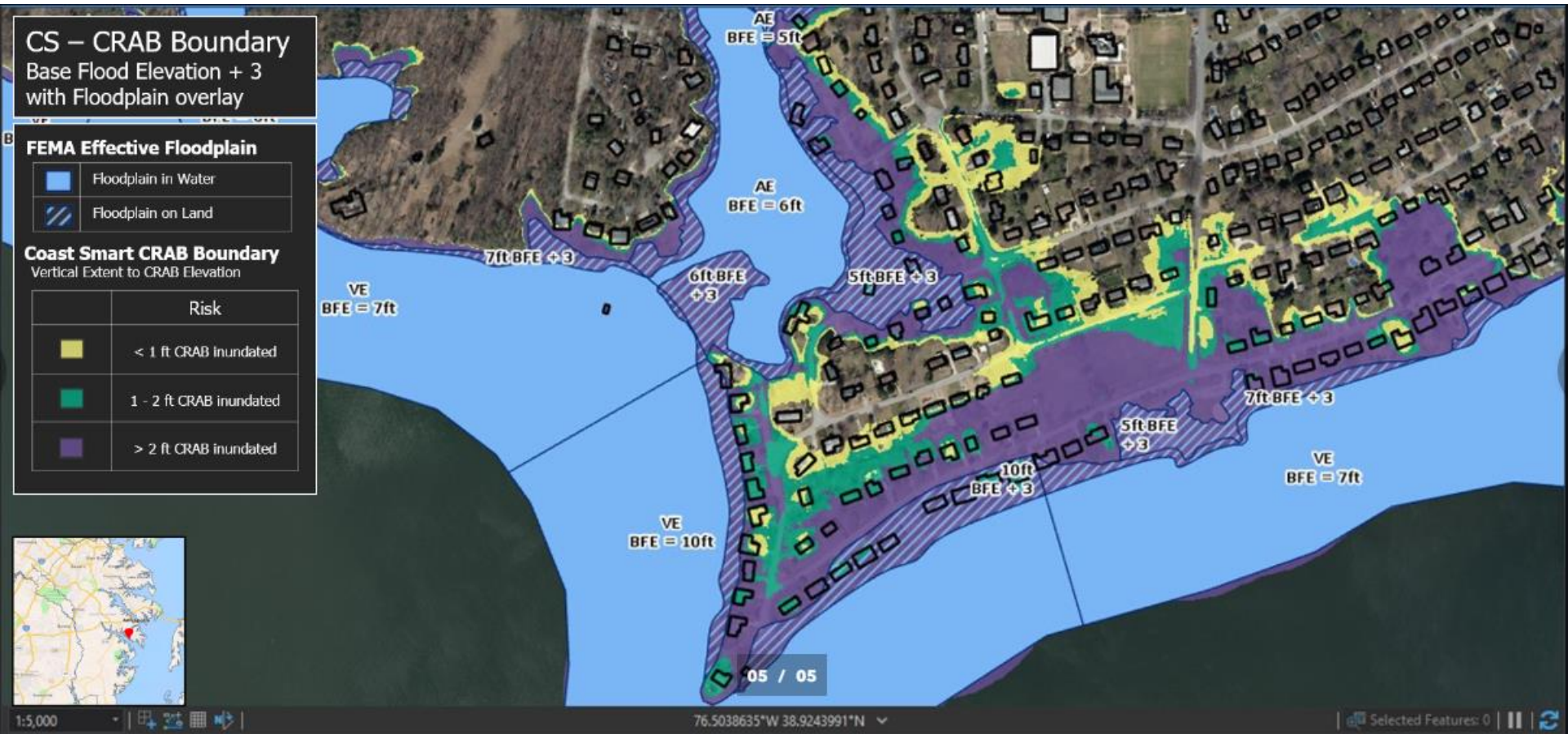
Anne Arundel County - Coastal Neighborhood - Aerial Map



Anne Arundel County - Coastal Neighborhood - Aerial Map



Anne Arundel County - Coastal Neighborhood - Aerial Map



Flood Factor®

- <https://floodfactor.com/>
- “Past floods, current risks, and future projections based on peer-reviewed research from the world’s leading flood modelers.”
- Free online tool created by the nonprofit First Street Foundation
- Used by REDFIN, realtor.com and Estately
- 1-10 scoring matrix



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<https://www.realtor.com/>

- FEMA and Flood Factor flood risk data



A map interface showing the location of the property in Annapolis, MD. The map includes a 3D tour icon, a Street View icon, and a red location pin. Below the map, there are icons for commute time and noise level (Low). At the bottom, there is a blue banner with the text "FEMA Zone VE (est.) • Flood Factor 9/10" and a "NEW" badge.

Flood Risk Information



To help you make informed decisions about this property, we provide two independent flood risk assessments. Be sure to ask your agent as well about local flood risks.

FEMA

VE FLOOD ZONE (EST.)

Within Special Flood Hazard Area and indicates high risk.

The FEMA flood risk model is based on historic flood patterns and covers a general area, not an individual property. It's also used to determine insurance and building code requirements.

[Learn more about FEMA flood maps and zones and what they're used for](#)

Flood Factor



Flood risk is increasing as sea levels rise and weather patterns change.*

Flood Factor identifies the past, present, and future flood risk for a home by identifying risks from rain, rivers, tides and storm surge using advanced modeling techniques.

[Take a closer look at this property's Flood Factor and risk details](#)

[Learn about the differences between FEMA and Flood Factor assessments](#)

[More on how to prepare and protect your home](#)

Flood Insurance

Since this property is located in **FEMA zone VE (est.)***, flood insurance is likely required by federally regulated or insured mortgage lenders.

Select coverage amount

\$250K building and \$100K in contents

Try Flood.com

Estimated Annual Premium
\$--**

[Get Quote](#)

* Flood risk data is provided by Flood Factor™, a product of First Street Foundation®. The Flood Factor model is designed to approximate flood risk and not intended to include all possible risks of flood.

** Most probable FEMA flood zone as estimated by MassiveDart, Inc.

*** This non-binding quotation is not an offer of or a contract for insurance and may be withdrawn for any reason. Price and terms associated with this quote are subject to underwriting review and may change.

Reduce Your Risk – Floodplain Management/Regulations

- Minimum NFIP requirements in the **Code of Federal Regulations (CFR)**
 - Title 44, Subchapter B, Parts 59-60, § 59.1 & § 60.3(a)-(e)
- **State Laws, Regulations and Executive Orders**
 - Annotated Code of Maryland, Environment Article
 - Code of Maryland Regulations (COMAR)
 - Climate Change and “Coast Smart” Construction Executive Order
- **Community’s Floodplain Management Ordinance**
 - Often based on Maryland Model Floodplain Management Ordinance
 - Higher Regulatory Standards? (ex. **Freeboard**)
- **Building Codes/Maryland Building Performance Standards**
 - International Codes (I-Codes):
 - *International Building Code (IBC), International Residential Code (IRC), etc.*
 - ASCE 24: *Flood Resistant Design and Construction*
 - ASCE 7: *Minimum Design Loads for Building and Other Structures*



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Freeboard



Source: [FEMA Build Back Safer and Stronger Fact Sheet](#)



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Elevation: Zone AE – Crisfield



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Elevation: Zone VE – Calvert Co.



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FEMA Elevation Certificate (EC)

1. To ensure compliance with a community's regulations
 - Properly elevated
 - Adequate flood openings

2. Flood insurance rating
 - **Proper documentation required**

3. Support Letter Of Map Change (LOMC) requests
 - Usually, must be certified by a licensed professional
 - **In Maryland, only a land surveyor can certify as-built information**

U.S. DEPARTMENT OF HOMELAND SECURITY Federal Emergency Management Agency National Flood Insurance Program		OMB No. 1560-0008 Expiration Date: November 30, 2018	
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: <input type="checkbox"/> NAD 1927 <input type="checkbox"/> 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? <input type="checkbox"/> Yes <input type="checkbox"/> 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? <input type="checkbox"/> Yes <input type="checkbox"/> 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) (Zones A-C, use Base Flood Depth)	
B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9: <input type="checkbox"/> FIS Profile <input type="checkbox"/> FIRM <input type="checkbox"/> Community Determined <input type="checkbox"/> Other/Source: _____			
B11. Indicate elevation datum used for BFE in Item B9: <input type="checkbox"/> NGVD 1929 <input type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____			
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? <input type="checkbox"/> Yes <input type="checkbox"/> No Designation Date: _____ <input type="checkbox"/> CBRS <input type="checkbox"/> OPA			
FEMA Form 086-D-33 (7/15)		Replaces all previous editions.	
		Form Page 1 of 6	

Reduce Your Risk – Mitigation Actions

- Use flood damage-resistant materials
- Install flood openings in enclosures
- Install backflow prevention valves
- Elevate HVAC and utilities
- Anchor fuel tanks, extend vent pipe (oil)
- Anchor and vent accessory structures (ex. sheds)
- **FRED – Floodproof, Relocate, Elevate, Demolish**
- **Purchase flood insurance!**



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Flood Damage-Resistant Materials

- **Acceptable:**
 - Cement board
 - Brick, tile
 - Marine grade plywood
 - Sprayed polyurethane foam insulation
- **Unacceptable:**
 - Gypsum board, greenboard
 - Carpeting
 - Oriented-strand board (OSB)
 - Fiberglass insulation
- **Fasteners and Connectors**
 - Stainless steel or hot-dip galvanized

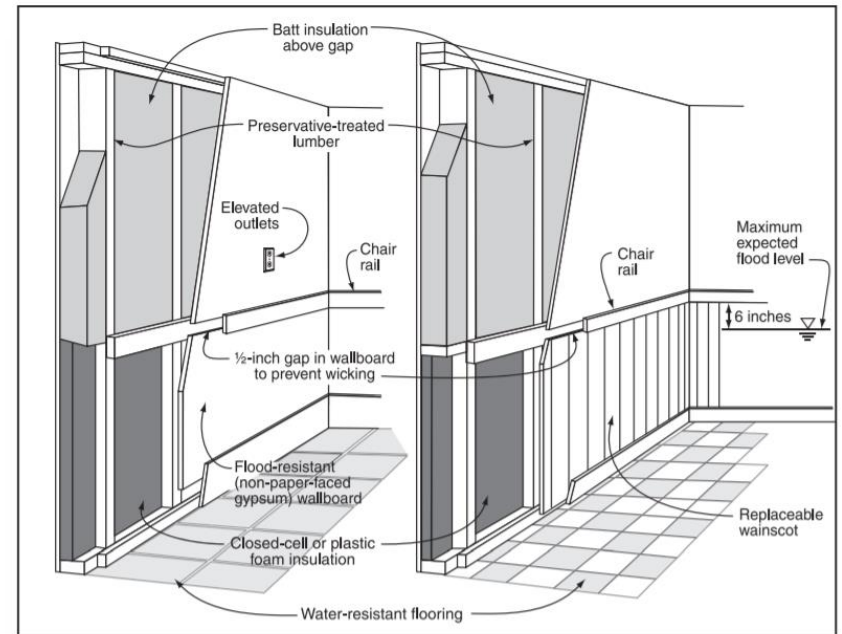


Figure 4. Partial wet floodproofing technique using flood damage-resistant materials for finished wall construction.



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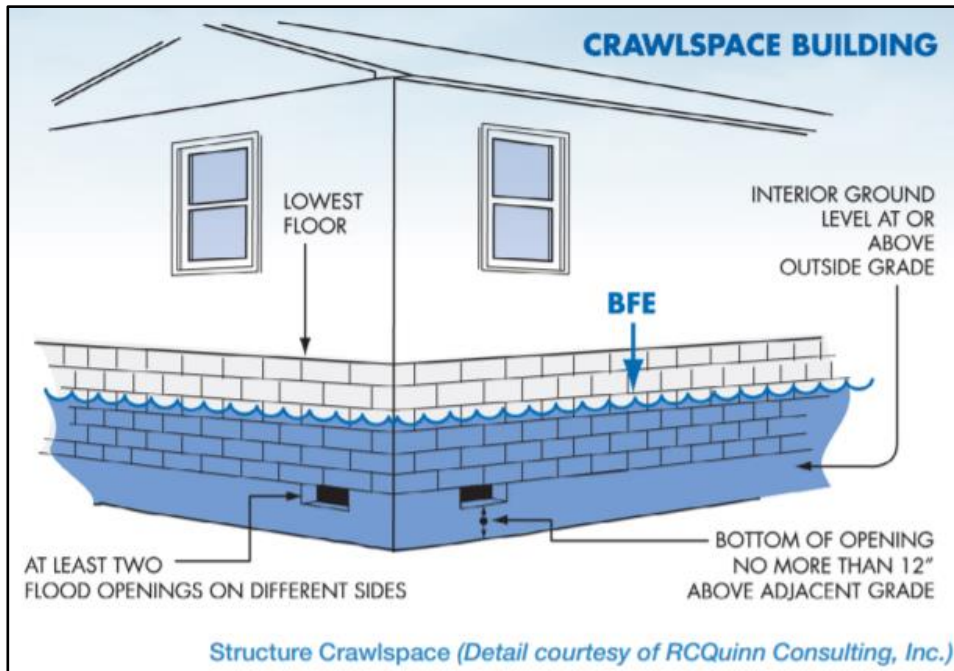
Flood Openings

- Reduce hydrostatic pressure on walls
- Minimum requirements:
 - Bottom of opening must be within 12" of grade
 - 1 square inch of net open area for every square foot of enclosed area OR use engineered openings
 - On at least two different walls

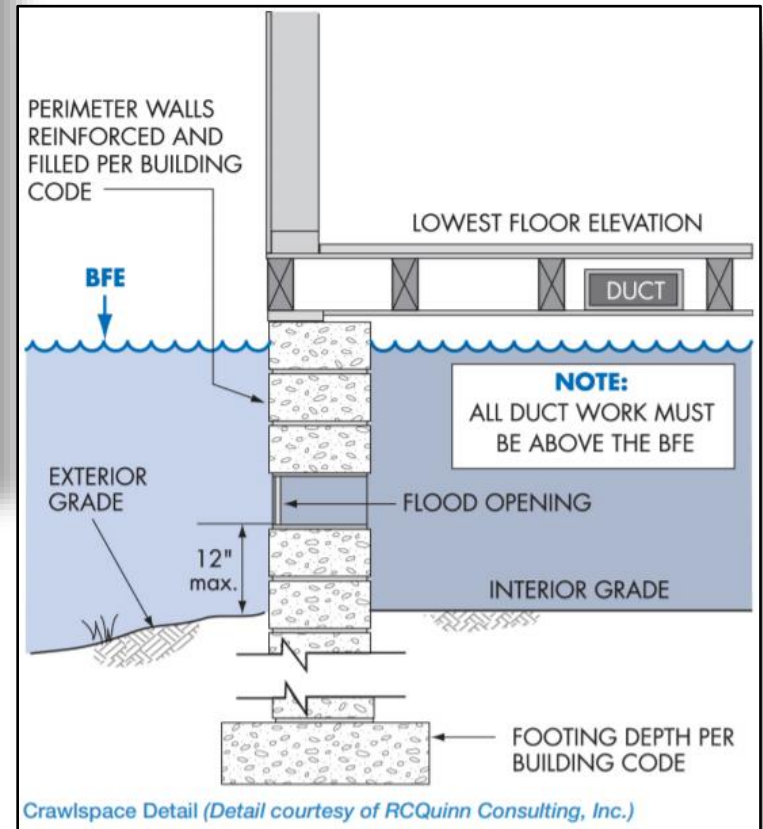


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Flood Openings



Source: [The American Surveyor, Taking the Mystery Out of Flood Openings, Vol. 10 No. 6](#)



Improper flood openings can result in higher flood insurance!

Backflow Prevention Valve

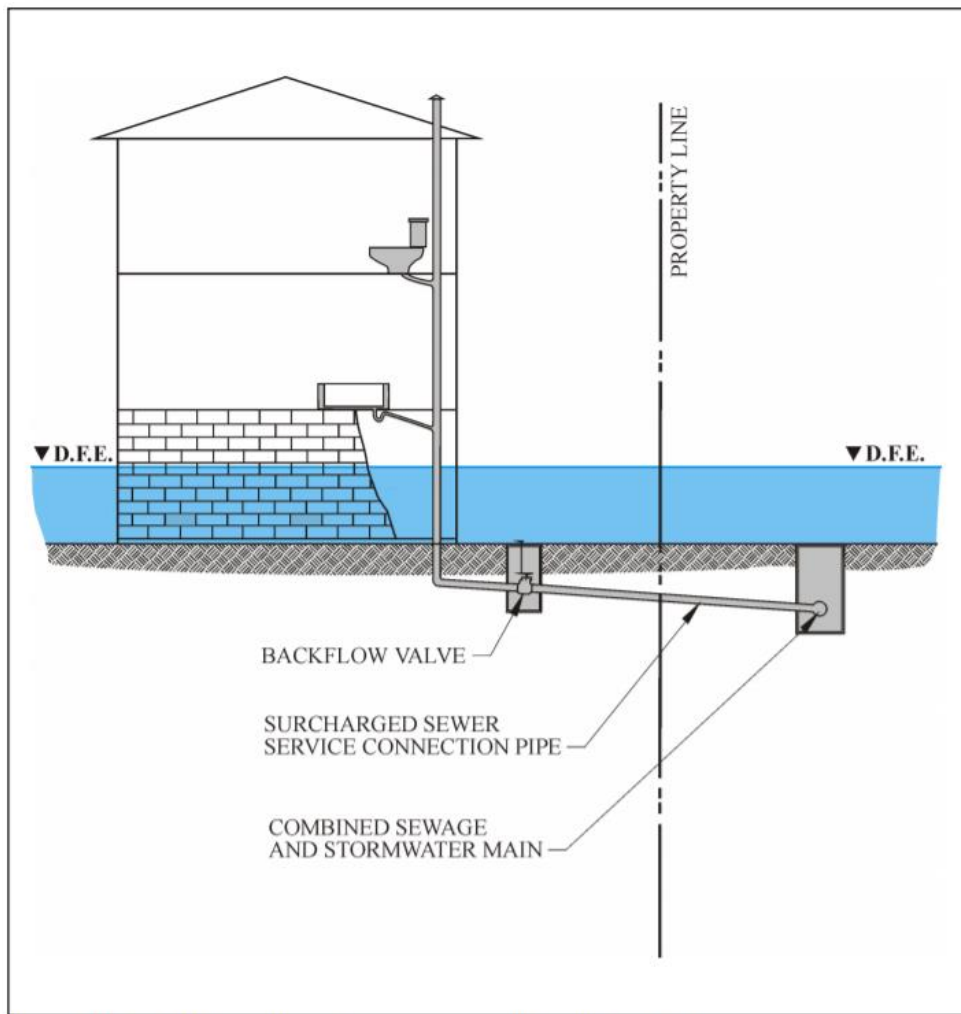


Figure 3.4.4A: Backflow conditions with non-return backflow valve installed

Source: [Protecting Building Utilities From Flood Damage, FEMA-348, November 1999](#)
(has been revised)



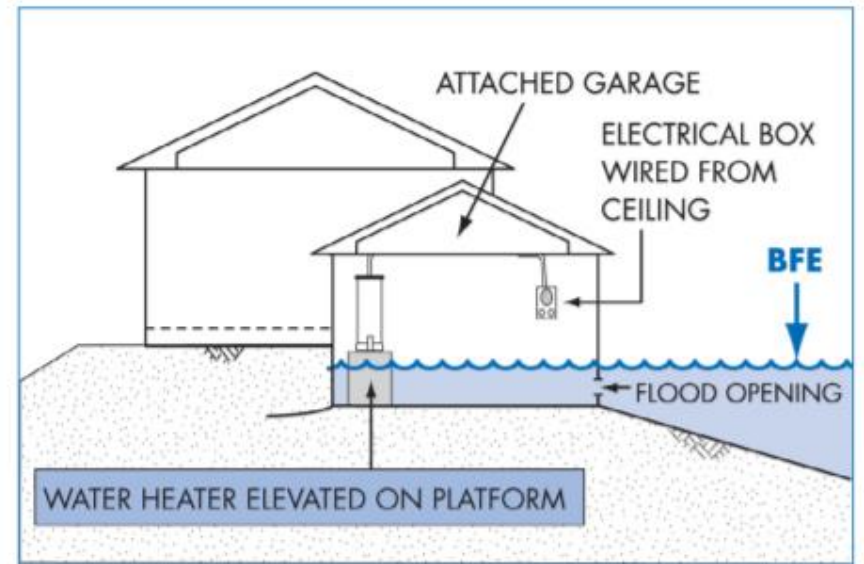
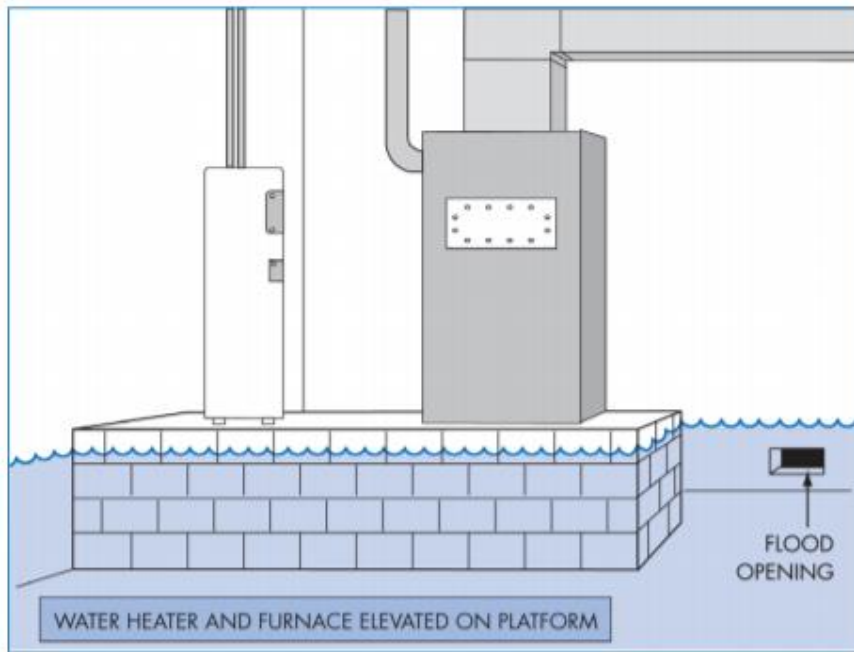
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Elevated HVAC Unit & Flood Openings – Dorchester Co.



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Elevate Utilities



Elevated Utilities (Detail courtesy of RCQuinn Consulting, Inc.)

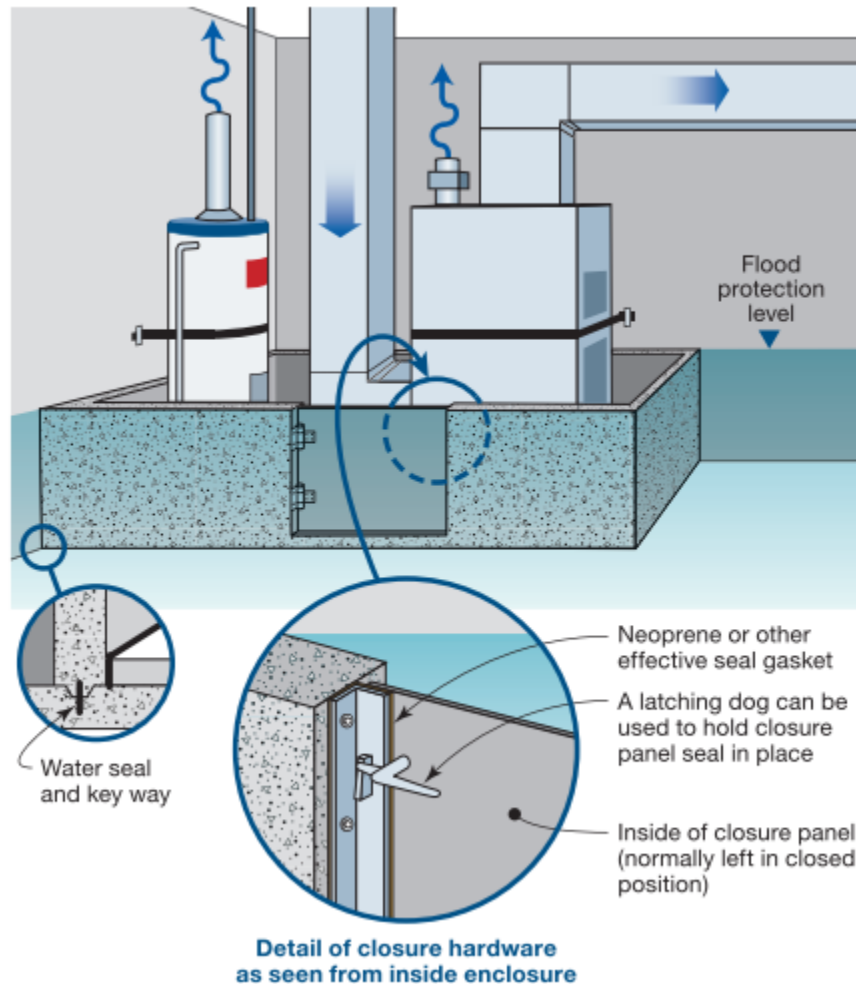
Non-elevated utilities results in higher flood insurance!

Source: [The American Surveyor, Taking the Mystery Out of Flood Openings, Vol. 10 No. 6](#)



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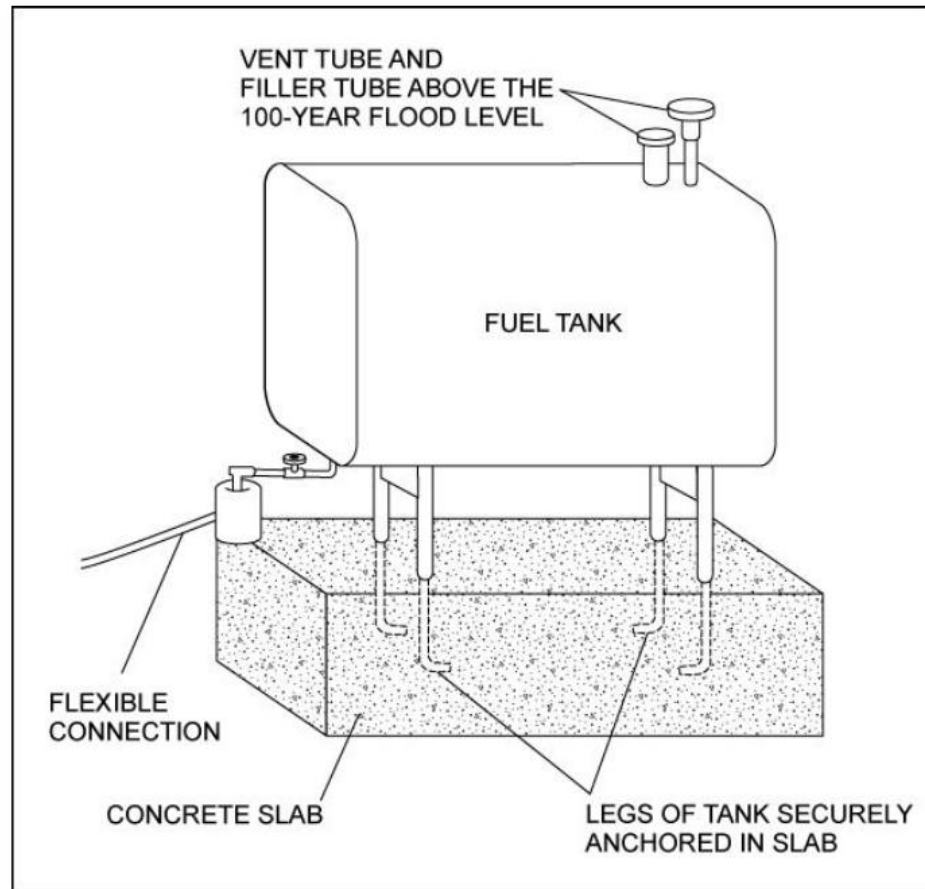
Dry Floodproofing Utilities



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Source: [Protecting Building Utility Systems From Flood Damage](#), FEMA P-348, Edition 2, February 2017

Anchoring a Fuel Tank

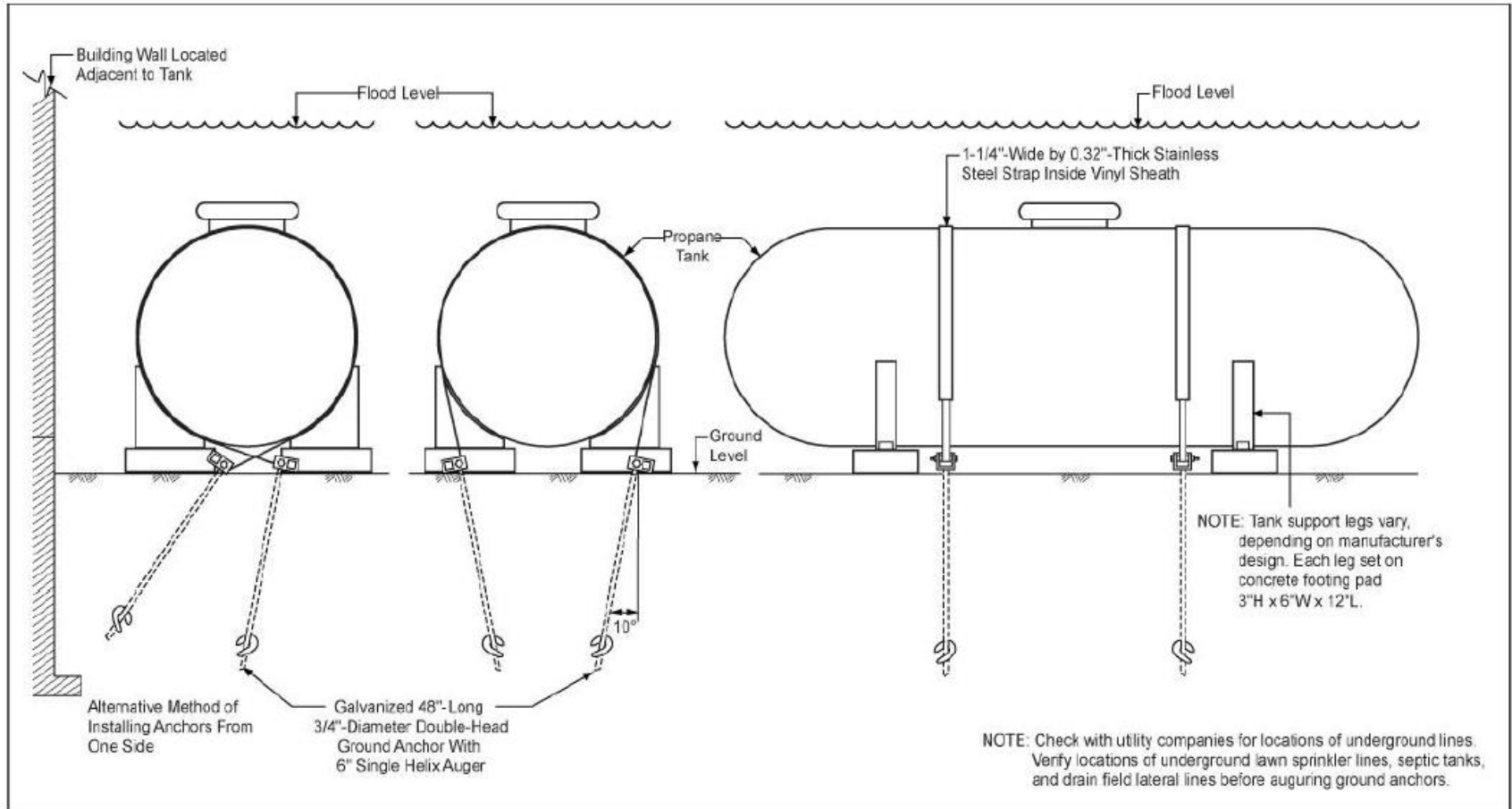


Anchoring a fuel tank.



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Anchoring a Propane Tank – Outside



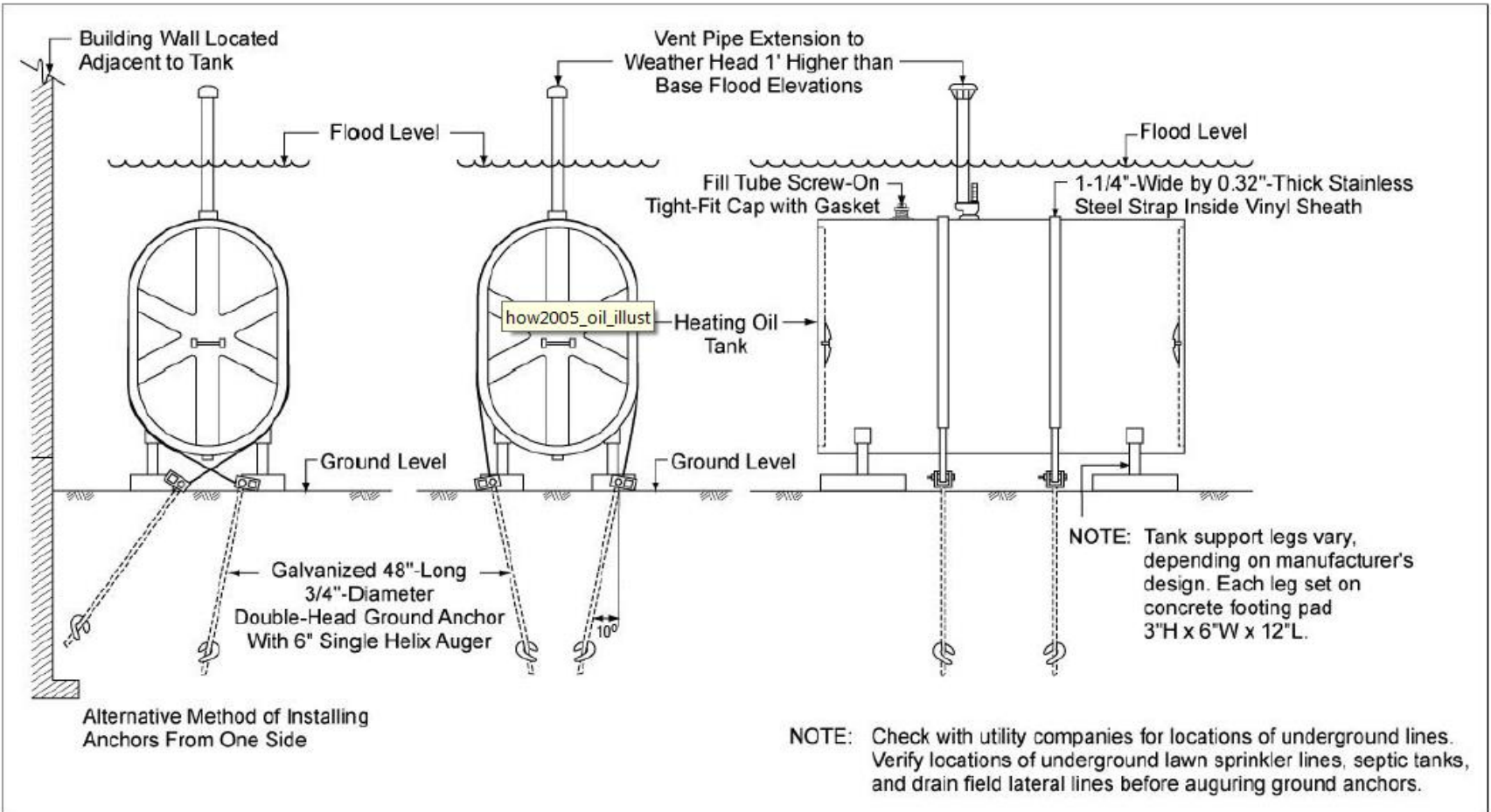
Anchoring an outside propane tank.

Propane Tanks – Eastern Shore



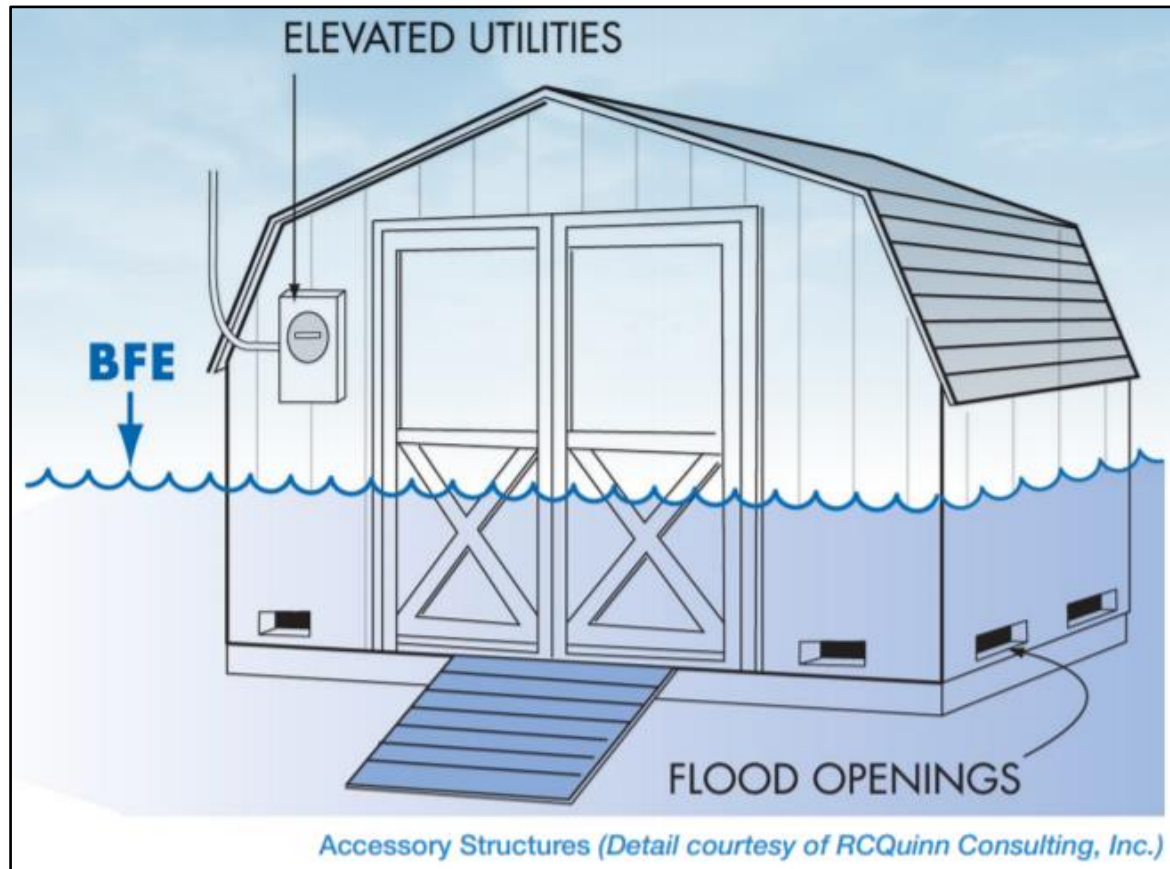
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Anchoring a Heating Oil Tank – Outside



Anchoring an outside heating oil tank.

Accessory Structures



Source: [The American Surveyor, Taking the Mystery Out of Flood Openings, Vol. 10 No. 6](#)



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Accessory Structure – Harford Co.



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FRED: Flood Mitigation Grants

- **Usually requires a local government or non-profit to sponsor the project**
- **FEMA Hazard Mitigation Assistance (HMA) Grants**
 - Hazard Mitigation Grant Program (HMGP)
 - Building Resilient Infrastructure and Communities (BRIC)
 - Flood Mitigation Assistance Grant Program (FMA)
- **Maryland Comprehensive Flood Management Grant Program (CFMGP)**
- **Maryland Community Development Block Grant Program**



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Elevation Project – Hoopers Island, Dorchester Co. (During)



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Elevation Project – Hoopers Island, Dorchester Co. (After)



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FEMA Publications

- [Protect Your Home from Flooding: Low-Cost Projects You Can Do Yourself](#)
- [Mitigation for Homeowners Fact Sheet](#)
- [NFIP Technical Bulletins](#)
 - 12 bulletins that provide guidance for complying with the NFIP's building performance requirements
 - TB 1: [Openings in Foundation Walls and Walls of Enclosures](#)
 - TB 2: [Flood Damage-Resistant Materials Requirement](#)
- [Homeowner's Guide to Retrofitting](#)
- [Protecting Building Utility Systems From Flood Damage](#)



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Protect Your Home from Flooding: Low-Cost Projects You Can Do Yourself



- **OUTSIDE THE HOME**
 - Protect your valuable possessions, maintain proper water runoff and drainage, anchor outdoor fuel tanks, etc.
- **INSIDE THE HOME**
 - Install flood vents, install a sump pump, prevent sewer backups, use flood-resistant building materials, etc.
- **FLOOD PREPAREDNESS**



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Plan Ahead



1. **Make a Plan** – <https://www.ready.gov/plan>
2. **Build a Kit** – <https://www.ready.gov/kit>
3. **Stay Informed** – <https://www.ready.gov/be-informed>
 - <https://www.ready.gov/floods>
 - Sign up for your community’s warning system
 - Learn and practice evacuation routes
 - Build an emergency supply kit
 - Connect with your neighbors, and work together
 - [FEMA Mobile App](#)



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Websites

- **Maryland Department of the Environment (MDE)**
<https://mde.maryland.gov/Pages/index.aspx>
 - **Maryland Flood Risk Application**
<https://mdfloodmaps.net/map/>
 - **Coast Smart CRAB**
<https://mdfloodmaps.net/crab/>
- **Federal Emergency Management Agency (FEMA)**
<https://www.fema.gov/>
 - **National Flood Insurance Program (NFIP)**
<https://www.fema.gov/national-flood-insurance-program>
<https://www.floodsmart.gov/>
 - **FEMA Flood Map Service Center (MSC)**
<https://msc.fema.gov/portal/home>



Thank you!

- **Kevin G. Wagner**
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