

**SUSTAINABILITY
AND RESILIENCE IN
A CHANGING
CLIMATE ERA**

LEANING INTO CHANGE



INTERNATIONAL ASSOCIATION
OF STRUCTURAL MOVERS

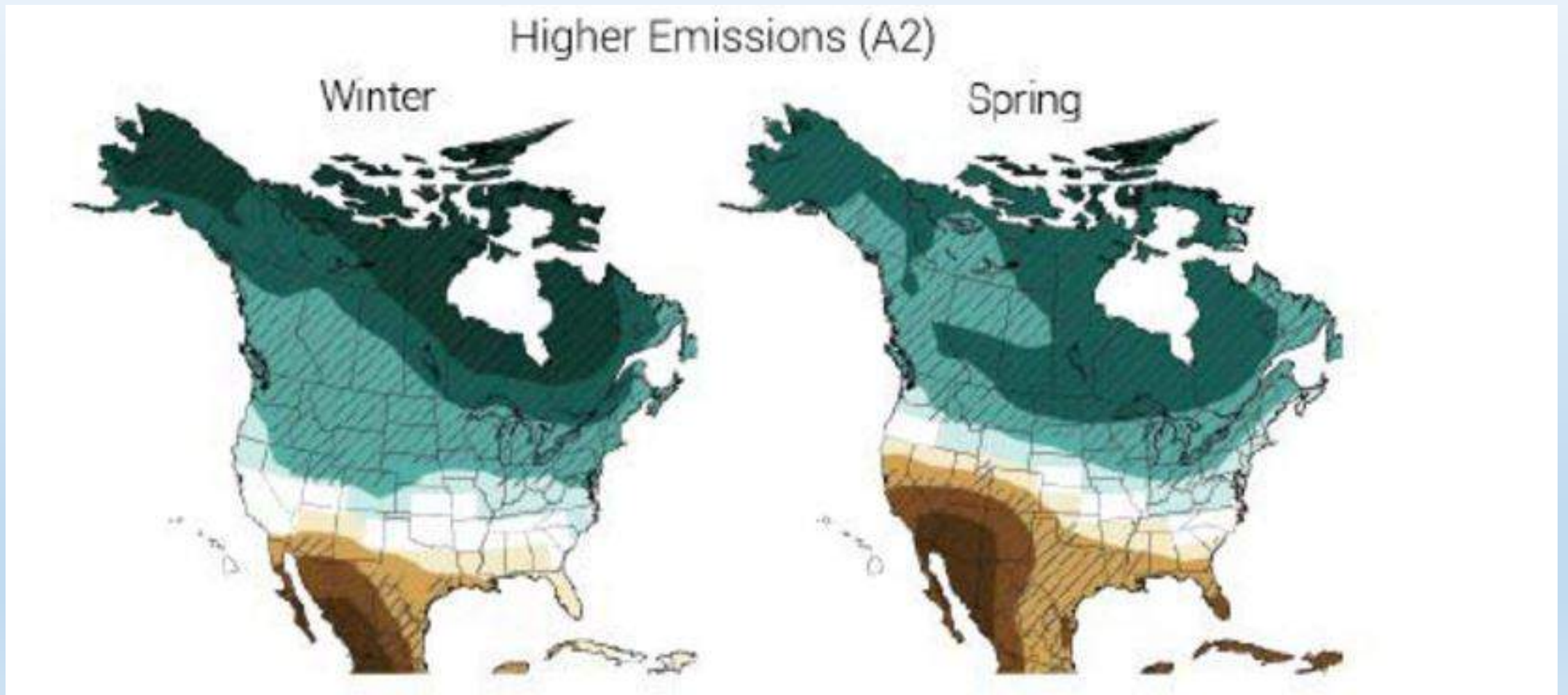
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SUSTAINABILITY & RESILIENCE

**THIS IS OUR PLANET, IT IS CHANGING.
EITHER WE ADAPT WE OR LOSE.**

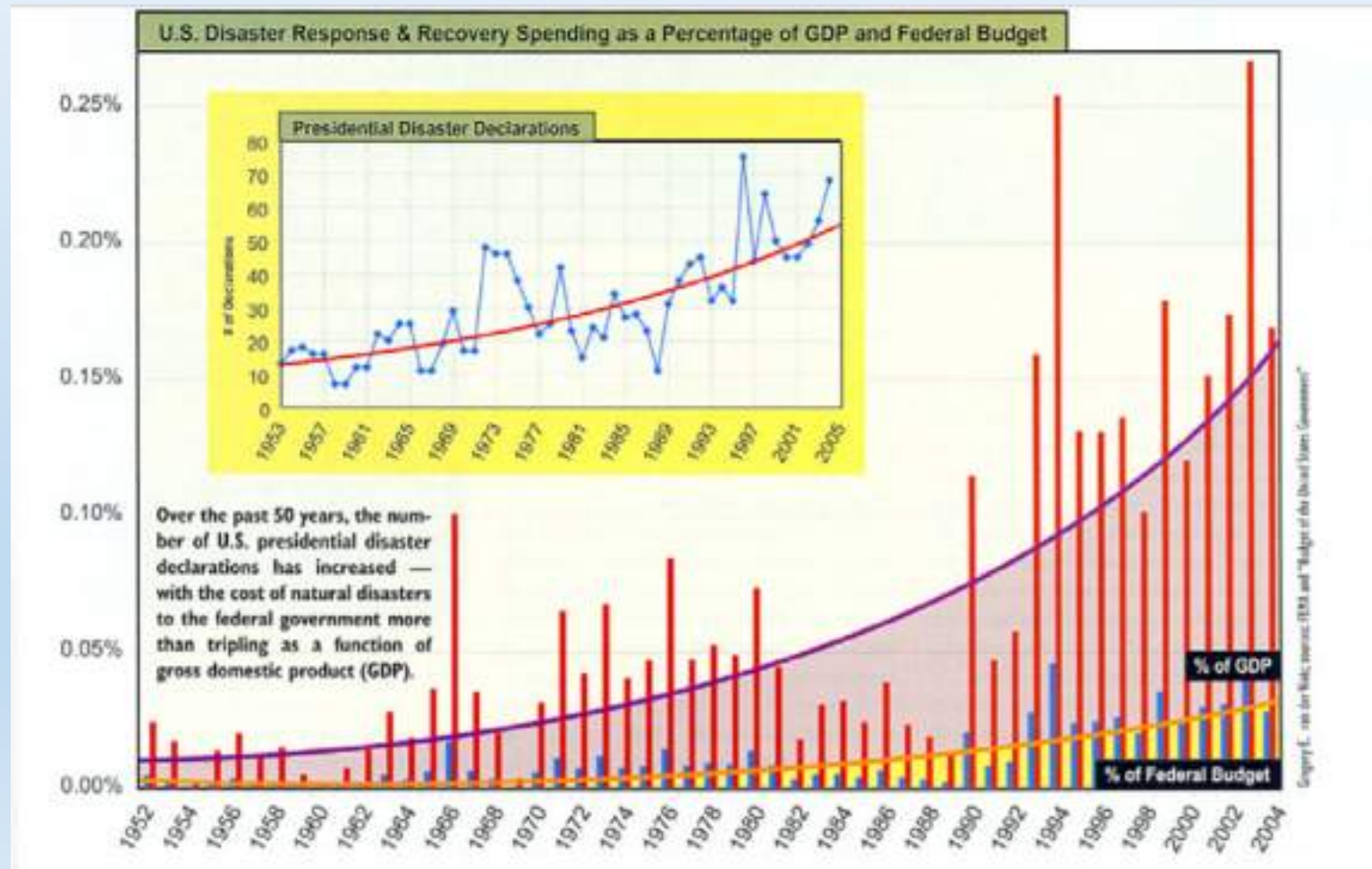


SUSTAINABILITY & RESILIENCE



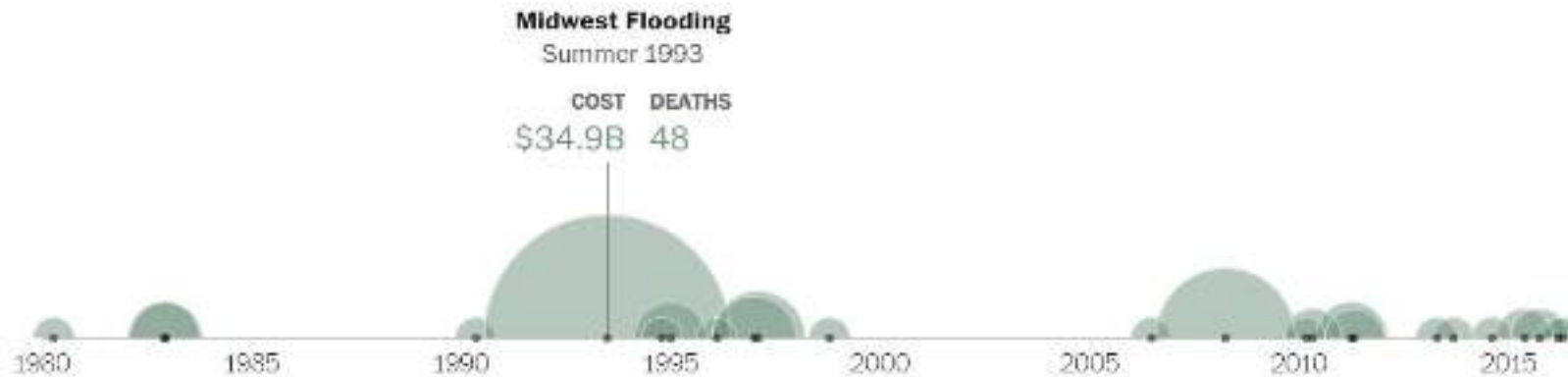
SUSTAINABILITY & RESILIENCE

INCREASING FLOOD DISASTER COSTS



SUSTAINABILITY & RESILIENCE

FLOOD COSTS ARE RISING



Flooding

The most expensive flooding disasters have occurred in the Midwest. In 1993, severe flooding caused by persistent rain plagued the Midwest while much of the Southeast experienced a heatwave. Seven federal agencies were involved in the disaster relief effort.

STATES AFFECTED



INCIDENTS

24

COST

\$96.6 billion

DEATHS

479

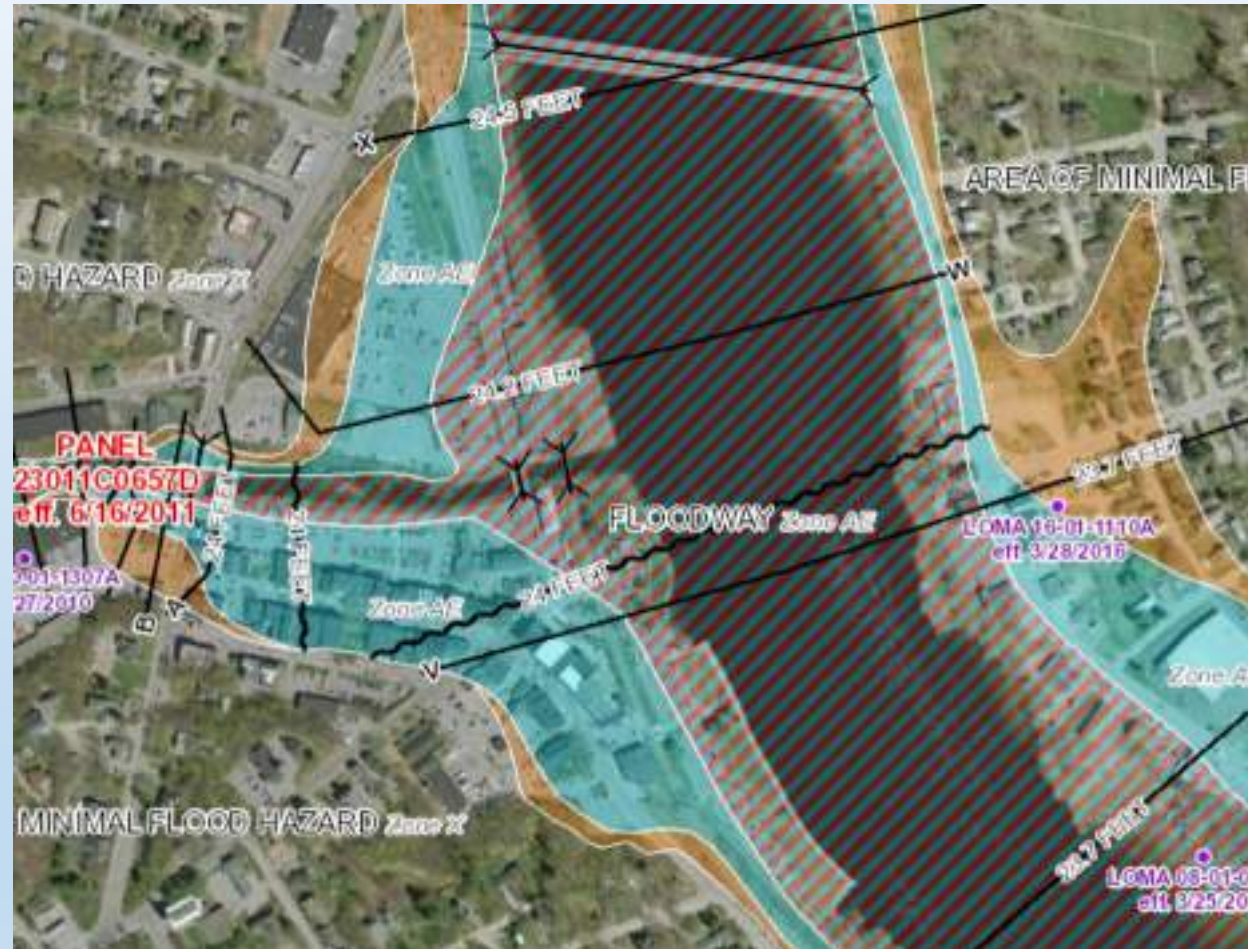
SUSTAINABILITY & RESILIENCE

FLOODING IS INCREASING. THE N.E. IS PROJECTED TO HAVE AN INCREASE IN PERCIPITATION OF OVER 70% ABOVE THE CURRENT AMOUNTS AND OUR OLDER HISTORIC BUILDINGS ARE VULNERABLE



FLOOD HAZARD MITIGATION

GARDNIER, ME FLOOD MAP



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

FLOOD HAZARD MITIGATION

IMPORTANT TERMS

- **Base Flood Elevation (BFE):** The calculated level flood waters will rise during a Base Flood Special Flood Hazard Area (SFHA)
- **AE & A1-30 Zones:** Have established BFE's and low impact from waves
- **VE & V1-30 Zones:** Have established BFE's and impact from storm induced waves.

Note: Both A and V zones subject to experiencing a 1% annual chance flood event. This translates to a 26% chance of flooding over the life of a 30-year mortgage.

- **Freeboard:** Elevating a building's lowest floor above and beyond BFE. This is a built-in safety factor resulting in lower flood insurance premiums. This elevation is required in certain communities with height requirements that vary.

FLOOD HAZARD MITIGATION



NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

WHEN STARTED IN THE LATE 1960'S, ALL BUILDINGS BUILT BEFORE THE FIRST FLOOD MAP WAS ISSUED HAD SUBSIDIZED RATES AND NOW THOSE BUILDINGS ARE BUT 20% OF ALL POLICIES NOW. MORTGAGE = FLOOD POLICY REQUIRED

FLOOD HAZARD MITIGATION

NFIP INCREASES BEGINNING 4/2016

- **12%/YR FOR PRIMARY RESIDENTIAL - \$2500/YR MAX**
- **19%/YR FOR NON PROFITS**
- **25%/YR FOR NON-PRIMARY RESIDENCES SEVERE REPETITIVE LOSS, INCOME PRODUCING RESIDENTIAL, COMMERCIAL**

FLOOD HAZARD MITIGATION

**PREMIUM AT 4 FEET BELOW
BASE FLOOD ELEVATION**

\$9,500/year
\$95,000/10 years



BFE

**PREMIUM AT
BASE FLOOD ELEVATION**

\$1,410/year
\$14,100/10 years



BFE

**PREMIUM AT 3 FEET ABOVE
BASE FLOOD ELEVATION**

\$427/year
\$4,270/10 years



BFE

PRE-FLOOD MAP BUILDINGS POLICY RATES ARE INCREASING

FLOOD HAZARD MITIGATION

**HOW DO WE DETERMINE THE
ELEVATION OF A BUILDING?**

ELEVATION CERTIFICATE

THE ELEVATION CERTIFICATE DOCUMENTS THE ACTUAL HEIGHT OF THE FINISHED FLOOR AND WHEN COMPARED TO THE REQUIRED MINIMUM FLOOD MAP ELEVATION DETERMINES THE FLOOD INSURANCE POLICY RATES.

EVERY PRE-FIRM BUILDING NEEDS ONE NOW TO MAKE SURE THEY ARE NOT BEING OVERCHARGED FOR NFIP POLICY



FEMA

NATIONAL FLOOD INSURANCE PROGRAM

ELEVATION CERTIFICATE

AND

INSTRUCTIONS

ELEVATION CERTIFICATE

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

A7. Building Diagram Number 2

AA. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s) 1026 sq ft

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade 0

c) Total net area of flood openings in AA.b) _____ sq ft

d) Engineered flood openings? Yes No

AB. For a building with an attached garage:

a) Square footage of attached garage _____ sq ft

b) Number of flood openings in the attached garage _____

c) Total net area of flood openings in AB.a) _____ sq ft

d) Engineered flood openings? Yes No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number
NEWPORT 445403

B2. County Name
NEWPORT

B3. State
RHODE ISLAND

B4. Map/Panel Number 0177 B5. Submap J B6. FIRM Index Date Sept. 4, 2013 B7. FIRM Panel Effective/Revised Date SEPT. 4, 2013 B8. Flood Zone(s) A6 B9. Base Flood Elevation(s) (Zone NO. use base flood depth) 12

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
 AS 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

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 AE, A1-A30, AE, A1-A (with BFE), VF, V1-V30, V (with BFE), AR, AR/A, AR/AF, AR/AL-A30, AR/AL, AR/AD. Complete items C2.a-h below according to site building diagram specified in Item A7. In Puerto Rico only, enter meters.
Benchmark Used: USGS DISK Vertical Datum: NAVD 88

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 appropriate unit:

a) Top of bottom floor (including basement, crawlspace, or enclosure floor) 0 4 feet meters

b) Top of the next higher floor 4 3 feet meters

c) Bottom of the lowest horizontal structural member (V Zones only) N/A feet meters

d) Attached garage (top of slab) N/A feet meters

e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) 5 2 feet meters

f) Lowest adjacent (finished) grade next to building (LAG) 3 9 feet meters

g) Highest adjacent (finished) grade next to building (HAG) 4 5 feet meters

h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support 4 3 feet meters

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available.

THIS HOUSE
FINISHED FLOOR
IS 6FT BELOW THE
BFE (A) AND SINCE
THE BASEMENT
HAS NO FLOOD
VENTING (B), THE
NFIP WILL SET THE
RATE AT .4FT =
12FT BELOW BFE

FLOOD HAZARD MITIGATION

BACKFLOW PREVENTER INSTALLATION



FLOOD HAZARD MITIGATION

ELEVATE UTILITIES EQUIPMENT



FLOOD HAZARD MITIGATION

**TYPES OF FLOOD MITIGATION PROJECTS THAT RESULT IN LOWERING
FLOOD RISK AND FLOOD POLICY COSTS**

**EVERY DOLLAR SPENT ON FLOOD MITIGATION = \$4 OF DISASTER
RECOVERY COSTS**

- **ACQUISITION/DEMOLITION – NOT AN OPTION FOR PRESERVATION**
- **RELOCATION – LAST RESORT FOR PRESERVATION**
- **DRY FLOOD PROOFING (COMMERCIAL ONLY)**
- **ELEVATION/FLOOD VENTING**

ELEVATION

FLOOD HAZARD MITIGATION



LOW ELEVATION WITH FLOOD VENTED ENCLOSURE

FLOOD HAZARD MITIGATION ELEVATED WITH ENCLOSURE

FLOOD VENT CASE STUDY



**ELEVATED AFTER KATRINA 10FT-BUILT ENCLOSURE 1
VENT=\$4k/YR AFTER INSTALLING 6 VENTS=\$500/YR**

FLOOD HAZARD MITIGATION ELEVATED WITH ENCLOSURE

NON-ENGINEERED

ENGINEERED



TOTAL FLOOD
COVERAGE:
19.48 SQ FT

TOTAL FLOOD COVERAGE:
200 SQ FT

FLOOD HAZARD MITIGATION

ELEVATION



DRY FLOOD PROOFING

FLOOD HAZARD MITIGATION

DRY FLOOD PROOFING

- **GOAL IS TO KEEP THE BUILDING AS DRY AS POSSIBLE, ALLOWED 4" IN 24HR PERIOD**
- **MUST BE FLOOD PROOFED TO AT LEAST BFE +1FT "FREE BOARD"**
- **DESIGN MUST BE CERTIFIED BY ARCHITECT/CIVIL ENGINEER**
- **CONSTRUCTION MUST BE CERTIFIED BY ARCHITECT/ENGINEER**
- **MUST BE DEPLOYED ONCE A YEAR**
- **MUST HAVE EMERGENCY PLAN**
- **MUST HAVE SUMP PUMP TO ELIMINATE ANY LEAKS WITH POWER THAT WORKS WHEN THE POWER FAILS**

FLOOD HAZARD MITIGATION



ENTRANCE CLOSURE

FLOOD HAZARD MITIGATION



**ENTRANCE CLOSURE OR BUILDING ENCLOSURE
ILC DOVER – FLEX WALL**

FLOOD HAZARD MITIGATION

- **FLOOD MITIGATION COSTS VARY BY TYPE, WET/DRY. A LICENSED DESIGN PROFESSIONAL, ARCHITECT/STRUCTURAL ENGINEER NEEDS TO BE ENGAGED TO PROVIDE DESIGN ASSISTANCE AND PLANS FOR PERMITTING. THEN ESTIMATES CAN BE ACQUIRED.**
- **PROJECT FINANCING CAN BE CASH, GRANTS, EQUITY, HUD 203K, ICC**
- **POSSIBLE FUTURE FUNDING – MULTI BANK LOW INTEREST LOAN POOLS, REVENUE BONDING, VOUCHERS**

FLOOD HAZARD MITIGATION

MITIGATION PROVIDES RESILIENCY AND SUSTAINABILITY IN
A HISTORIC ERA OF CLIMATE CHANGE



FLOOD HAZARD MITIGATION

GETTING STARTED

- **GET ELEVATION CERTIFICATE AND UNDERSTAND IF THE LOCAL COMMUNITY HAS “FREEBOARD” REQUIREMENT**
- **GET FOUNDATION DRAWINGS AND ELEVATIONS – DESIGN REVIEW FOR HISTORIC BUILDINGS AND TAX CREDIT APPLICATIONS**
- **GET ESTIMATES FOR CONSTRUCTION/LIFTING AND LOWERING HOME**
- **ARRANGE FINANCING & INCOME TAX CREDITS, IF AVAILABLE**
- **EXECUTE PROJECT**
- **FINAL ELEVATION/DRY FLOOD PROOFING CERTIFICATE/TAX CREDIT CERTIFICATION**
- **GET LOWER FLOOD INSURANCE POLICY RATES**

FLOOD HAZARD MITIGATION

SCOPE OF WORK SPREAD SHEET

Task	Party	Quantity	Cost	Total	Actual Quantity
Elevation Cert				\$ -	
Soil Test				\$ -	
Engineering & Drawings				\$ -	
Permits				\$ -	
Temp Pole				\$ -	
Job Site Bathrooms				\$ -	
Dumpsters/Site Trash Removal				\$ -	
Site Prep for Elevation				\$ -	
Electric Disconnect/Reconnect				\$ -	
HVAC Disconnect & Reconnect				\$ -	
Erosion Control				\$ -	
Elevation				\$ -	
Foundation demo and removal				\$ -	
Excavation				\$ -	
Rock				\$ -	
Foundation construction				\$ -	
Carpentry - stairs/landings/utility stands				\$ -	
Plumbing Rough Water & Sewer				\$ -	
Gas Line				\$ -	
Insulated Water Line				\$ -	
Hose Bibs - Lowered				\$ -	
Grade out yard & dirt as needed				\$ -	
Install sod by Pallet				\$ -	
Downspouts				\$ -	
General Labor				\$ -	
Landscaping				\$ -	
Site Supervision - Related to work				\$ -	

FLOOD HAZARD MITIGATION

**+2 MILLION PRE-FLOOD MAP BUILDINGS
WITH AN UNKNOWN NUMBER OF HISTORIC
DESIGNATED ONES NEED FLOOD
MITIGATION AS THE HISTORIC ERA OF
CLIMATE CHANGE CONTINUES AND THE SEA
LEVEL RISES**

**THE FLOOD HAZARD MITIGATION
INDUSTRY IS HERE TO ASSIST YOU IN
MAKING YOUR COMMUNITY MORE
RESILIENT FROM THE COSTLY DAMAGES
OF FLOODING AND HELPING TO KEEP
FLOOD INSURANCE POLICY RATES
REASONABLE IN A TIME OF GREAT
CHANGES**