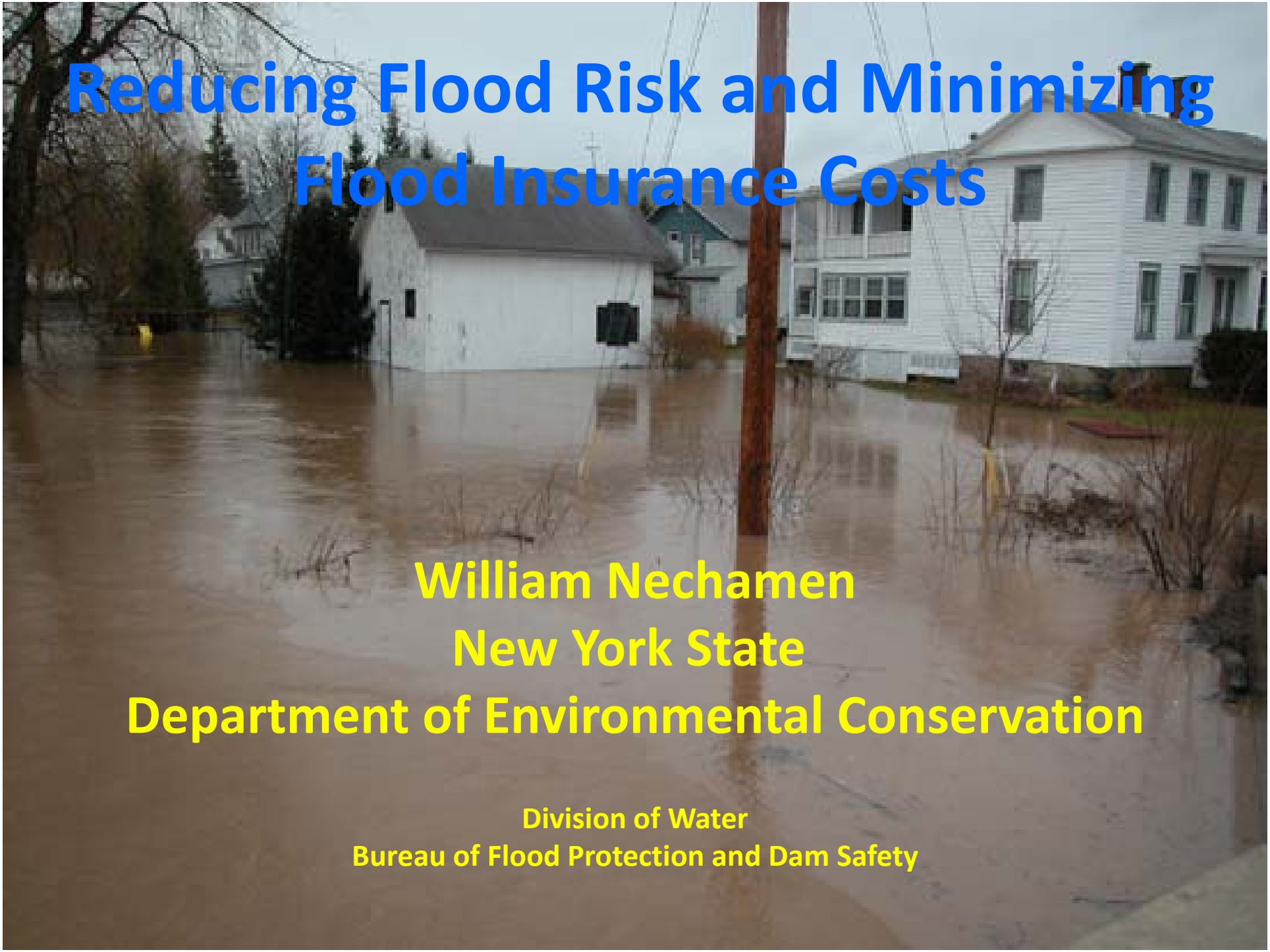


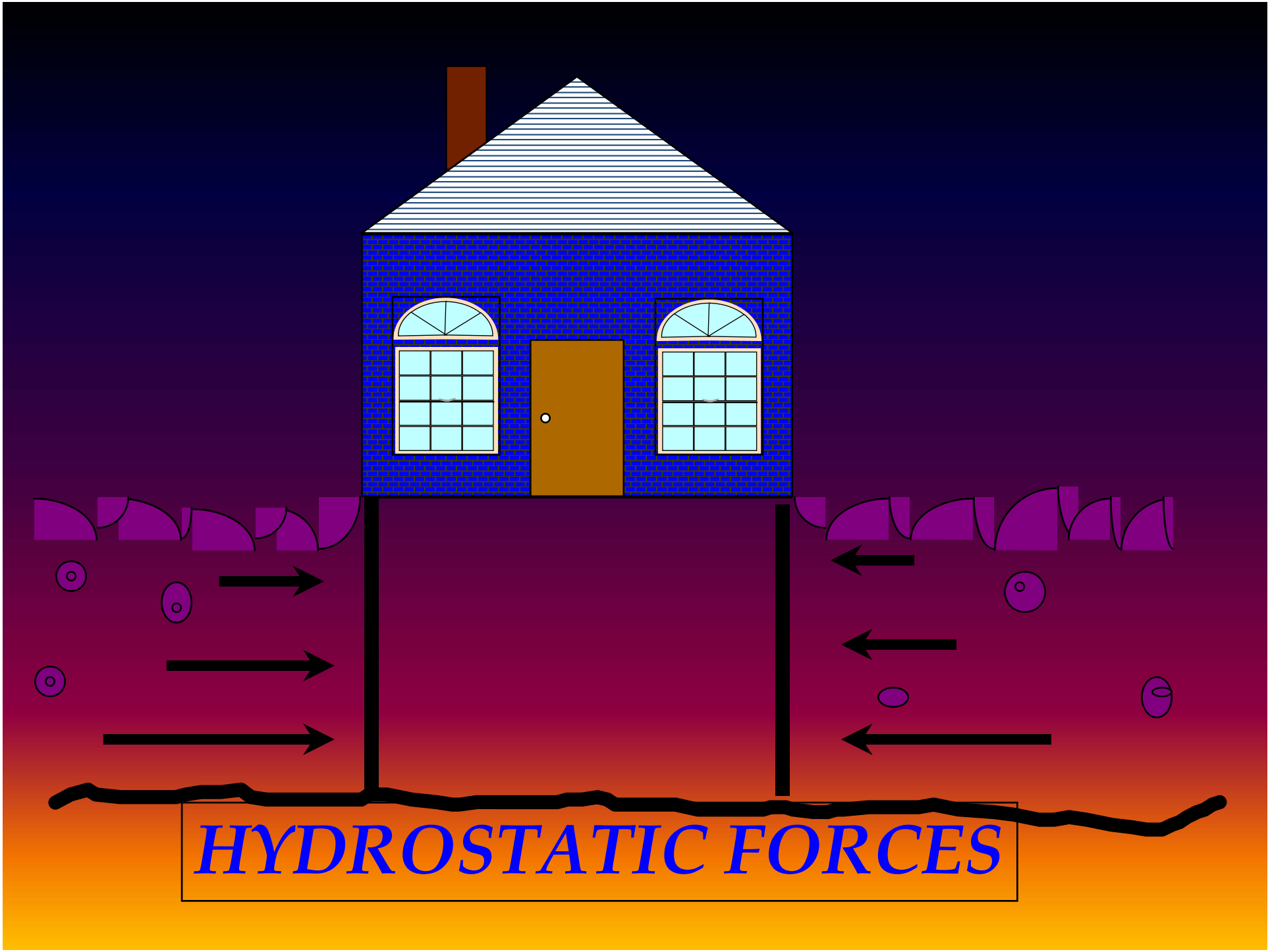
Reducing Flood Risk and Minimizing Flood Insurance Costs

William Nechamen
New York State
Department of Environmental Conservation

Division of Water
Bureau of Flood Protection and Dam Safety

Floods are the Nation's Most Common Disaster

- 80% of all Presidentially Declared Disasters involve flooding - $5 Billion in 2010
- Sandy will be one of the most expensive flood disaster ever
- Flooding is one disaster that can be mapped
- Flood maps are vital tools:
  - Sustainable Community Development
  - Emergency Management
  - Personal Protection
  - Property Protection

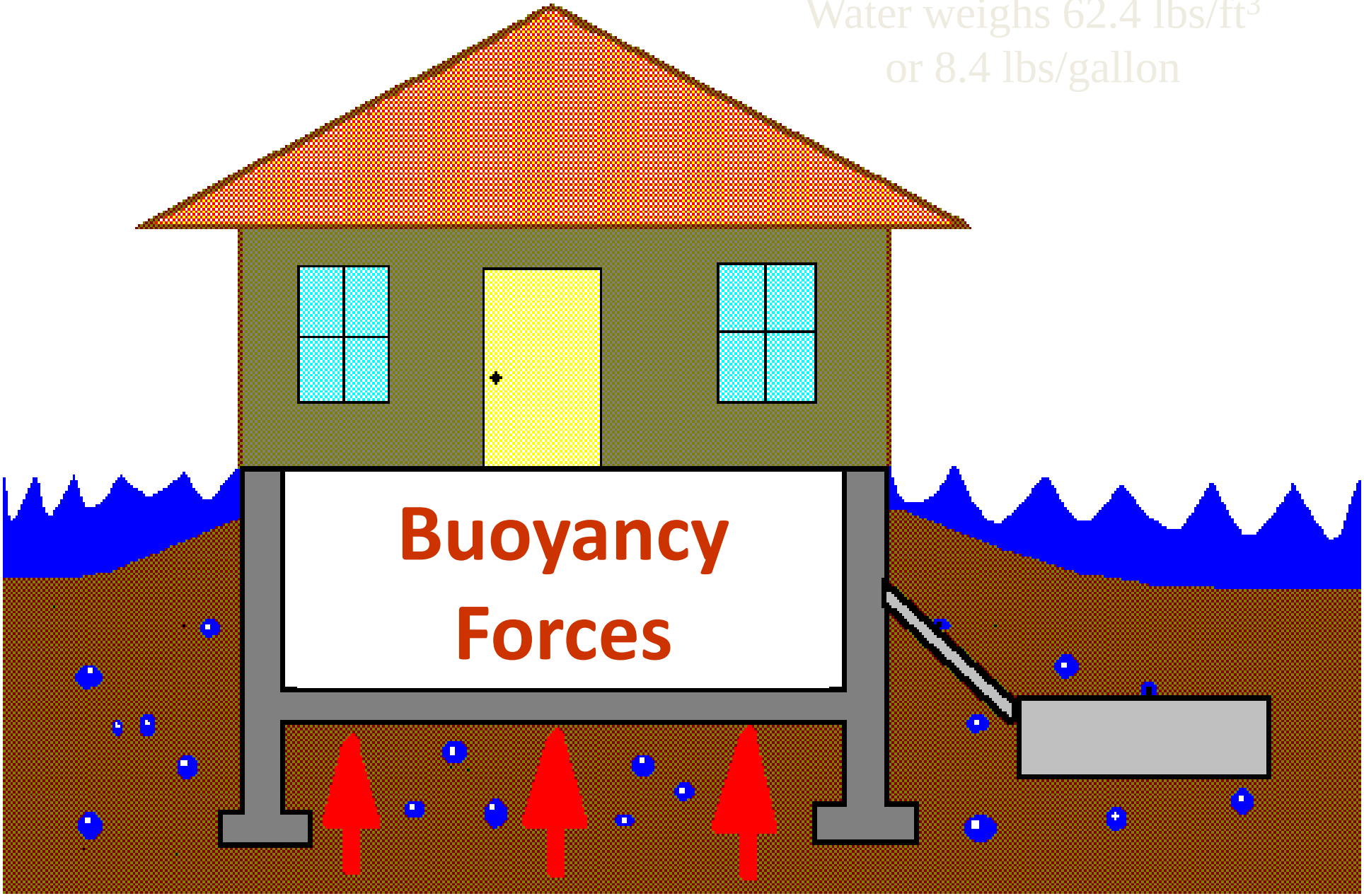

HYDROSTATIC FORCES

Concrete weighs about 140 lbs/cubic foot.
Water weighs 62 pounds/cubic foot.
Residential slabs may be 4” thick.
A foot of water can buckle that.

3 ft of standing water can collapse walls

Basement Walls and Floors are Particularly Vulnerable

Water weighs 62.4 lbs/ft^3
or 8.4 lbs/gallon



Buoyancy Forces

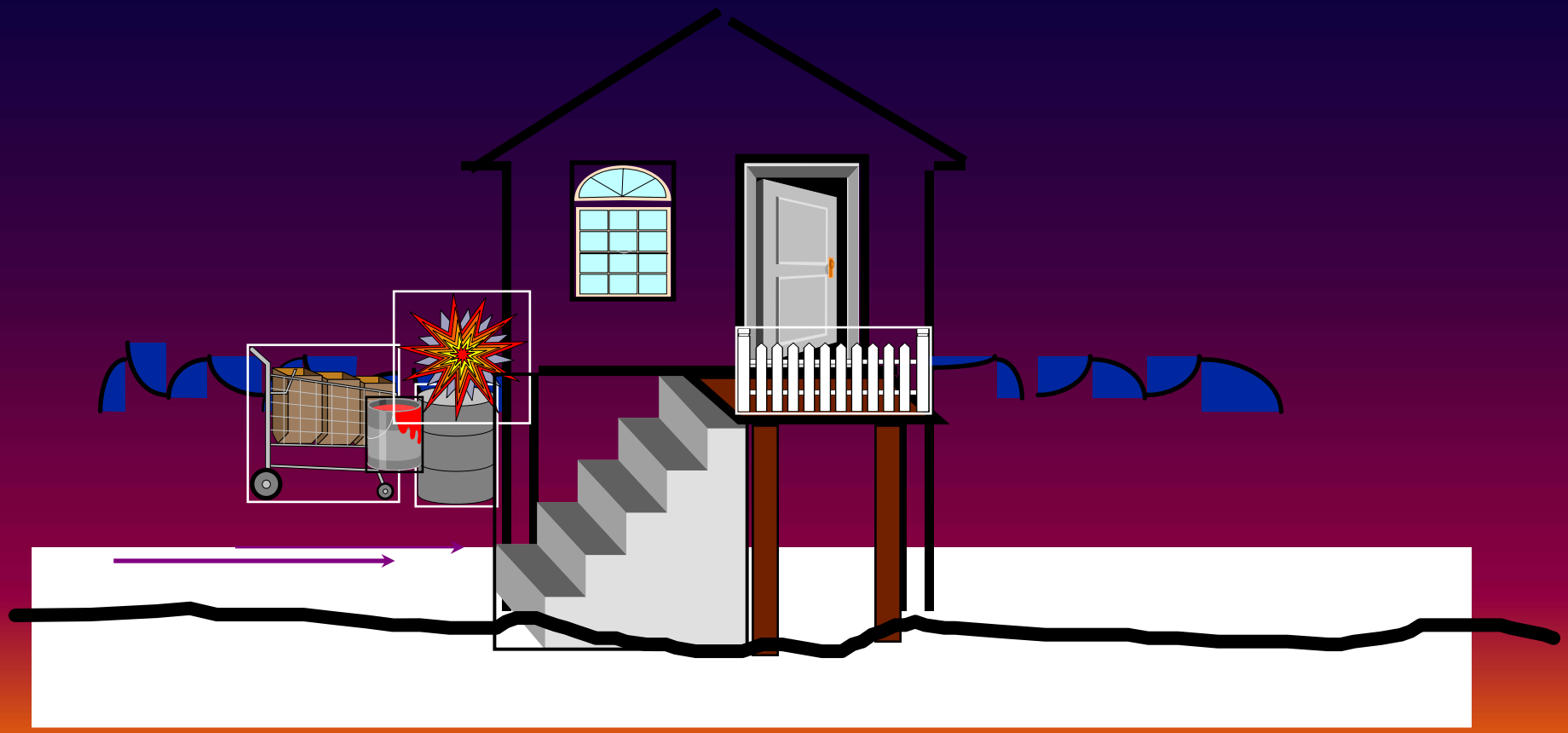
HYDRODYNAMIC FORCES

Raging floodwaters only a foot deep can sweep an adult away

Hydrodynamic Forces

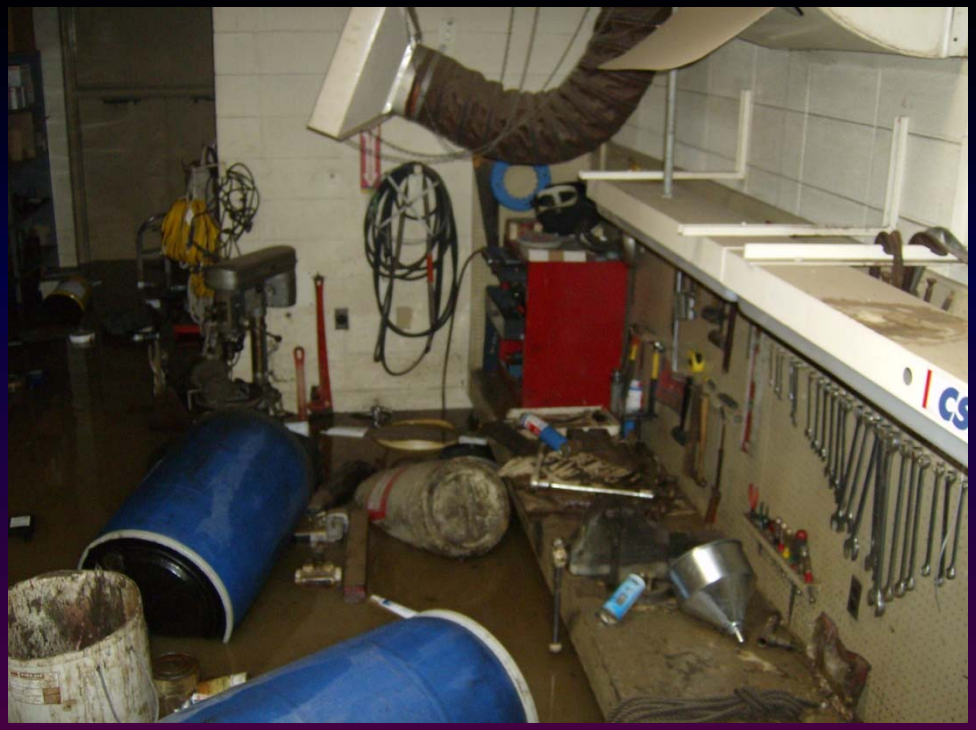
Water moving at 4 mph has same force as a 100 mph wind.

Debris Impact Forces



Debris Impact Forces

Soaking



Sediment and Contaminants

What Is the Special Flood Hazard Area?

It is the dark grey or blue shaded area on the Flood Insurance Rate Map, commonly known as the 100-year flood plain, but more accurately thought of as the area that has a 1% chance or greater of experiencing a flood in any given year. This flood is called the “base flood.”

onal Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

150 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0191E

FIRM

FLOOD INSURANCE RATE MAP

for Schoharie County, New York
All Jurisdictions

CONTAINS:

COMMUNITY	NUMBER
SCHOHARIE, TOWN OF	361198
SCHOHARIE, VILLAGE OF	361061

PANEL 191 OF 510
MAP SUFFIX: E

SEE MAP INDEX FOR FIRM PANEL LAYOUT

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36095C0191E

EFFECTIVE DATE
APRIL 2, 2004

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance

Definition of Base Flood

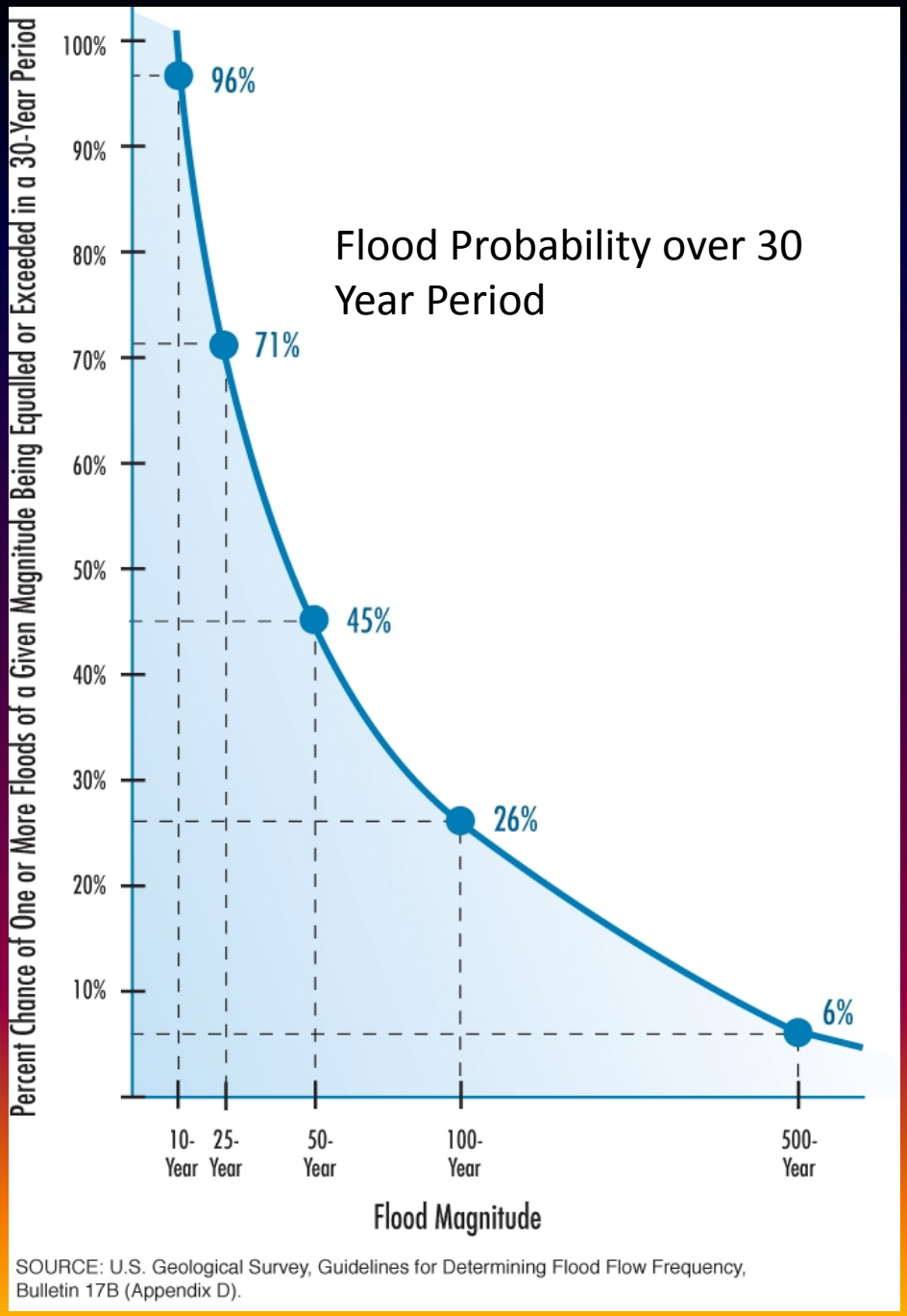
- A flood that has a one-percent chance of being equaled or exceeded in any given year. It often is referred to as the "100-year" flood.
  - 26% chance of occurring in a 30-yr period
  - 39% chance of occurring in a 50-yr period
  - 63% chance of occurring in a 100-yr period

A 500-Year Flood? How did That Happen?

- This is a statistical concept
- 0.2% Probability per Year
- 6% Probability over 30 Years
- Greater Than Chance of Fire

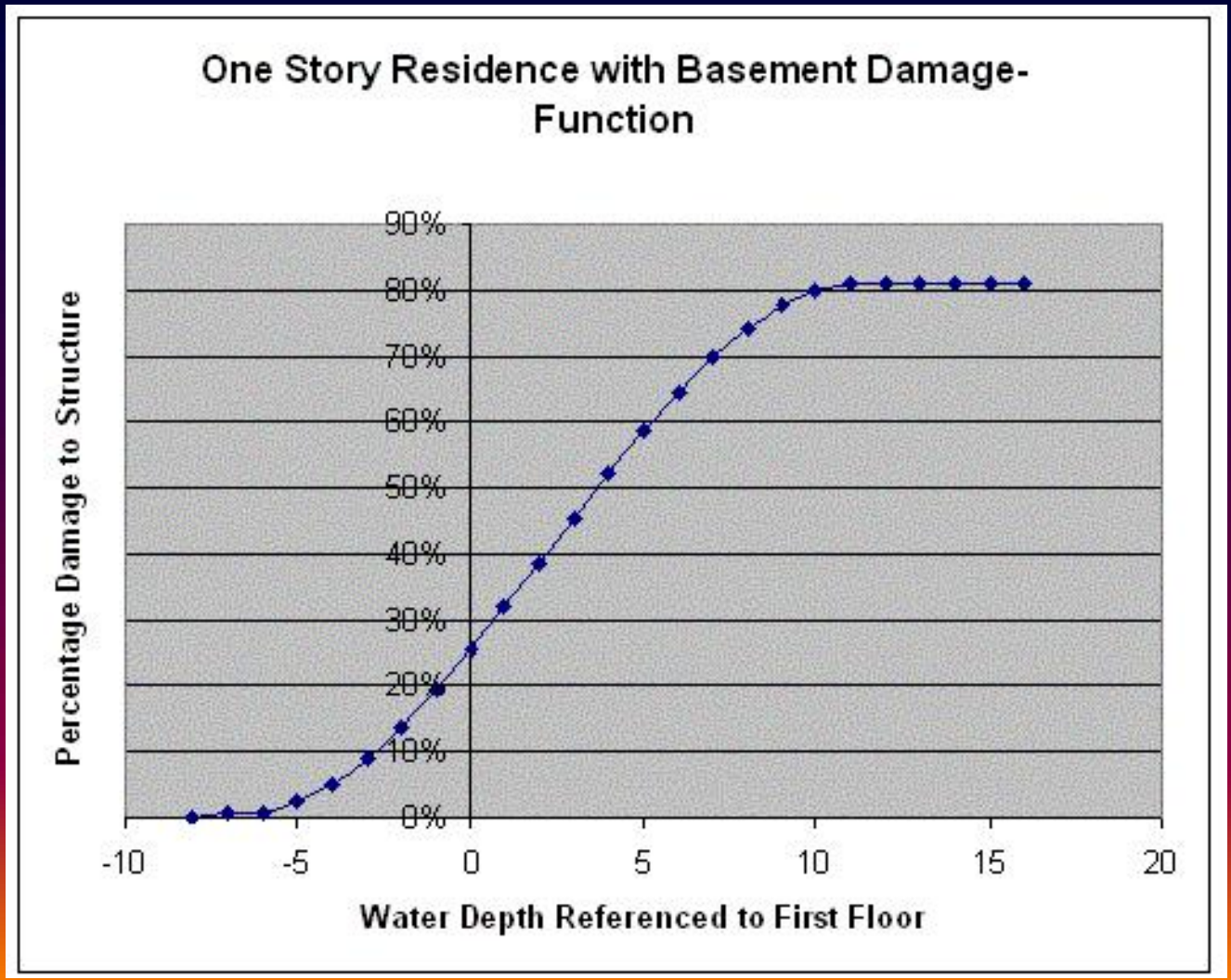
What is the Risk?

- 100-year flood?
- One percent chance per year
  =26% chance over 30 years
- 500-year flood?
  – 6% over 30 years
- *Your Flood may not have been a One – Percent Event*



SOURCE: U.S. Geological Survey, Guidelines for Determining Flood Flow Frequency, Bulletin 17B (Appendix D).

What are the Damages to Structures?



Flood Insurance Finances

	NYS, 11/10	NYS 8/12	NYS, 2/14	U.S., 12/13
Policies	162,965	167,455	195,113	5.5 million
Premiums	$147 Million	$157 Million	$201 million	$3.8 billion
Claim Payments	$631 Million	$1.2 Billion	$5.1 Billion	$50.5 billion
National NFIP Program Debt	$18.8 billion before Sandy. $25 billion now.			

- **Prior to 2005, Program was largely self supporting.**
- **Policy structure not set up to handle catastrophic losses.**
- **Fund was never capitalized.**
- **1% of policies represent 1/3 of all claims.**
- **Congress wants program to be on a sounder financial footing.**
- **It will take years to pay off debt (if ever).**

Flood Insurance Categories

- Pre-FIRM
  - Built prior to Community's First Flood Insurance Rate Map or 1974, Whichever is Later
  - 79% of the state's building stock was built prior to 1980
  - 132,882 of 176,000 policies (2012 data) in NYS are Pre-FIRM (75.5%)
  - About 65,000 of them are paying subsidized rates

Policies by Flood Zone in NYS, 12/13			
Zone	VE	A / AE	B, C or X
	Coastal with 3' or higher wave	Stillwater Coastal, Lake or Riverine	Less than 1% Annual Chance Flood; OR Grandfathered
Policies, 12/13	1,951	86,938	102,239

Insurance Costs: Where you Live and Construction Type

Inside Special Flood Hazard Area		
Oct 2013 Rates	Pre-FIRM with Basement (Subsidized)	Built to Code (Base Flood Elevation + 2')
V-Zone (Coastal)	$2074 - $6781	$1569 - $7568
A-Zone	$1147 - $2983	$274 - $412
Outside of Special Flood Hazard Area		
	Basement	**No Basement**
X-Zone	$845 - $1502	$727 - $1187
Preferred Risk Policy	$346 - $460	$312 - $414

Assumptions: Minimum Deductible
Flood Insurance Ranges from $100,000 to $250,000 Residential Coverage.

No contents coverage except for Preferred Risk Policies.

Preferred Risk Policy:
- **B, C, or X Zone or Newly Mapped to SFHA on or after 10/1/08**
- **No more than one flood insurance payment or flood relief payment of over $1000 in 10 years.**

Pre-FIRM Actuarial Costs Could be Up To $9000 or more!

Flood Insurance: What's Going On?

- Biggert-Waters Flood Insurance Reform Act of 2012
  - Phase Out of Many Subsidies
  - Attempt to Address NFIP Debt
  - Significant Push-Back
- 2014 Reform of the Reform
  - Eliminates or Slows Down Some Rate Increases
  - Creates Surcharge to Pay for Subsidized Rates

Biggert-Waters Flood Insurance Reform Act of 2012

Changes to the NFIP

- Flood Insurance
- Mapping
- Mitigation Programs
- Levees and Flood Protection
- Building Code Enforcement
- Assortment of Studies

Flood Insurance: What's Changing?

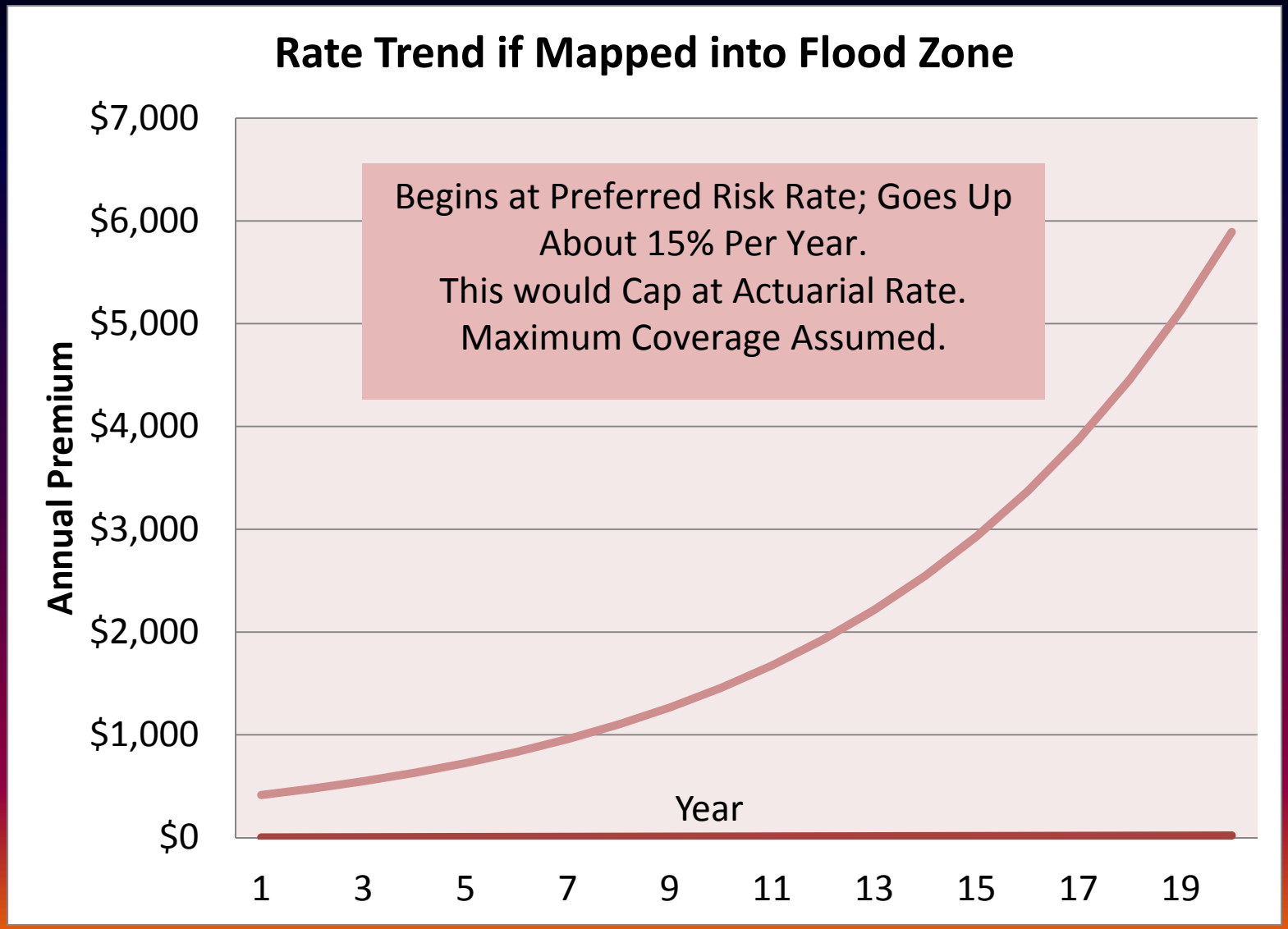
- Phases out Pre-FIRM (subsidized) Rates for:
  - Non Primary Residences (Effective 1/1/13)
  - Business Properties (Effective 10/1/13)
  - Property Damages that Cumulatively Exceed Market Value or Severe Repetitive Loss Buildings (Effective 10/1/13)
- Rates Increase 25%/year until Actuarial Rate Achieved
- 2014 Law Doesn't Change This!

Other Triggers

- No Phase In: **Instant** Actuarial Rate
  1. After Sale or Purchase of a Property
  2. Any New Policy
  3. After a Policy Lapse
  4. Refused FEMA Mitigation Offer
  5. Substantial Damage or Substantial Improvement (should be to code anyway)
- Began October 2013; Retroactive to 7/12
- **2014 Legislation Eliminates 1 & 2 and Modifies 3.**
  - **Policy Lapse Is Not Trigger IF lapse is due to No Longer Being Required to Retain Insurance**

Grandfathered Rates When Maps Change

- 2012 Act, Part 207, Would Eliminate Grandfather Rates when Flood Maps Change.
  - Grandfathered Rates Allow Policies to be Rated Based on Flood Elevation at Time of Construction
  - 2012 Act Phases Out Grandfathering over a 5-Year Path to Actuarial Rates
- **2014 Legislation Restores Grandfathering**
  - **Hopefully, this will Decrease Some Opposition to Updated Flood Insurance Rate Maps**
  - **However, Rates will still Trend Upward**


Rate Trend if Mapped into Flood Zone
Annual Premium
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Begins at Preferred Risk Rate; Goes Up About 15% Per Year.
This would Cap at Actuarial Rate.
Maximum Coverage Assumed.
Year
1
3
5
7
9
11
13
15
17
19

2014 Legislation

- Eliminates some of the 2012 Changes
  - Property Sales; New Policies; Grandfathering
- Establishes floor and ceiling of rate hikes:
  - 5% to 18% Annual Rate Increases for Pre-FIRM Properties
- Annual Surcharge:
  - $25 Primary Residential Properties
  - $250 Other Properties
- Structures Mapped Into SFHA Get PRP, then up to 18% annual increases
- FEMA must “Strive” to Limit Rates to No More than 1% of Coverage
  - Many Categories, Particularly Coastal V Zones, Already Significantly Above That

Other Flood Insurance Changes

- Establishment of Reserve Fund: 5% Increment
- Premiums Paid Annually or by Installments
- Limits on Bank's Practice of Forced Placement
- Lender Penalties Increase from $350 to $2000 per Property
- Lender Penalty Fine Limit of $100,000 Removed
  - Banks will be taking this seriously!

Flood Insurance Goal

- Pay Down Program Debt
- Establish Reserve Fund
- Rates set to Cover Average Historic Loss Years
  - Includes Previously Excluded Catastrophic Loss Years in Average
- Ten-year Repayment Plan for Current Debt
  - Unlikely after Sandy
- Allows Private Insurance to Satisfy Coverage Requirements
  - May see some private insurers getting into the game BUT
  - If this happens, we'll see cherry picking, with riskier policies in the NFIP fund
- Establish Process to Allocate between Wind & Flood Damage

BW-12 Mapping Changes

- Establish Technical Mapping Advisory Council
  - Advises FEMA on Mapping Guidelines
  - To Include Future Conditions Mapping, including Seal Level Rise and Impacts of Development
- New Maps Must Show 100 yr and 500 yr for:
  - All Populated Areas
  - Areas of Potential Population Growth
  - Residual Risk (within 100yr FP) Behind Levees
  - Residual Risk (within 100yr FP) Below Dams
- Flood Data Developed on Watershed Basis (already doing)

Better Risk Communication!

More Map Changes

- FEMA to Notify Owners of Flood Zone Change
- Nationally $400,000,000 Authorized for Mapping (First time in Legislation)
- Formalizes Scientific Resolution Panel
- Study Required for Federal Interagency Coordination of Mapping and Data Collection

BW-12 Studies

- Analysis of Max Coverage Limits and Private Insurance
- Annual Program Financial reports including:
  - Efforts to Purchase Substantially Damaged Properties
  - Analysis of the Nature of Losses
- National Academy of Science (NAS) study of Risk Behind Levees

More Studies

- GAO Report on Pre-FIRM Structures including:
  - Length of Ownership
  - Income of Owners
  - Compare Losses to Post-FIRM
  - Cost of Subsidies to Pre-FIRM Structures
  - Options for Eliminating Subsidies
- GAO & FEMA Study of Reinsurance & Privatization of the NFIP

And More Studies

- FEMA Study of Using Nationally Recognized Building Code as Part of Floodplain Management
- GAO Study of Business Interruption and Living Expense Coverage
- FEMA/NAS Study of maintenance of flood insurance & **affordability** framework
- Federal Insurance Office study of Market for Natural Catastrophe Insurance

BW-12 Changes to Mitigation Programs

- New National Flood Mitigation Fund combines:
  - Repetitive Insurance Claims Program
    - At least 2 claims over $1000 over any 10-yr period
  - Severe Repetitive Loss Properties Program
    - At least 4 claims or over $5000 , or
    - At least 2 claims that cumulatively exceed market value of building
  - Flood Mitigation Assistance (FMA)

Flood Mitigation Programs

- Federal Share Requirement:
  - Up to 100% for Severe Repetitive Loss
  - Up to 90% for Repetitive Loss
    - New Definition: 2 claims averaging at least 25% of market value of structure
  - Up to 75% for Other Mitigation Loss Properties

Flood Mitigation Plan

- Required for Flood Mitigation Programs
- Can now be part of Community's Multihazard Mitigation Plan
- Adds to Mitigation Activities
  - Elevation, Relocation, or Floodproofing Utilities
  - Demolition and Rebuild

Levees and Flood Protection

- Establish A Flood Protection Structure Accreditation Task Force with Army Corps
- Allows Premiums to be same as Fully Protected areas for Adequate Progress in Reconstruction or Improvement of Flood Protection Systems

Building Code Enforcement

- Allows use of Community Development Block Grant Funds for:
  - Increasing Staff
  - Training
  - Providing Hazard & Insurance Info to Residences

Flood Insurance Changes: Bottom Line

- The Elimination or Phase Out of subsidies and discounts will mean big increases for some property owners
  - Properties that do not meet current requirements (e.g., below the current Base Flood Elevation) could see rates increase dramatically.
  - 2014 Legislation Slows the Increase but Doesn't Stop It
- Properties that meet current requirements still could see increases when new maps show higher risk

So how can you help residents save money?

Ways to Lower Costs

- Flood and Hazard Mitigation Grants
  - www.fema.gov/hazard-mitigation-assistance
  - Flood Mitigation Assistance Grants
- Community Rating System
  - http://www.fema.gov/national-flood-insurance-program-community-rating-system
- Increased Cost of Compliance
- Invest in Elevating your House. The annual cost will likely be less than the added flood insurance cost.

Community Rating System

- Provides incentive for local officials to implement requirements that exceed NFIP minimum criteria
- Grants flood insurance program credits calculated for activities undertaken to
  - Reduce flood losses
  - Facilitate accurate insurance rating
  - Promote the awareness of the benefits of flood insurance

Costs to Elevate Structure

- About $90,000 Average depending on Structure and Amount of Elevation
  - Downstate figures. Costs will vary.
- Additional Cost of Each Foot of Added Elevation = @ $1.06 per Square Foot of Building Footprint
  - 1000 Square Foot Footprint = $1060 for each extra foot of elevation.

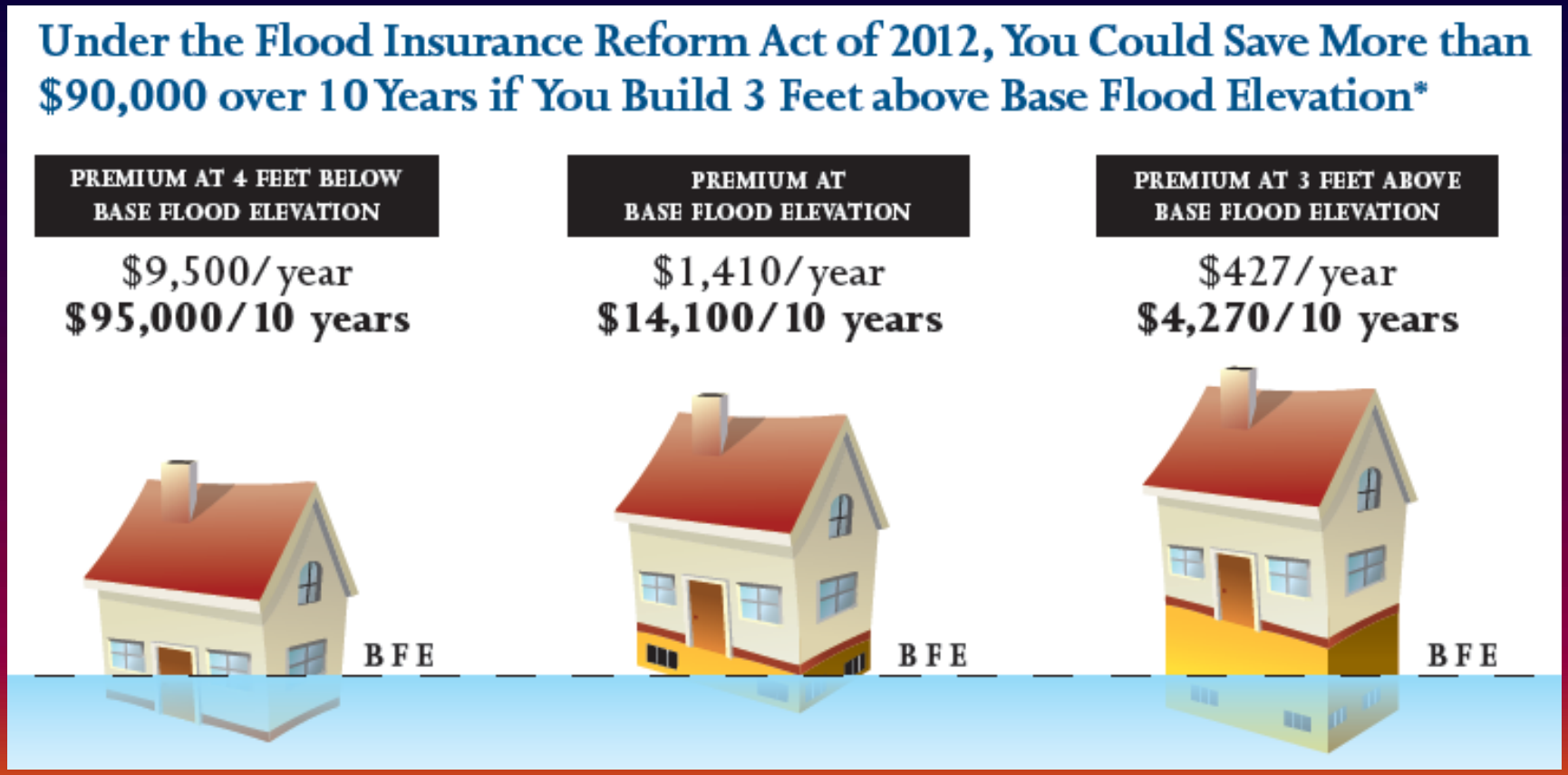
Added Cost to Elevate Paid Back in Reduced Flood Insurance

2 story house, 1000 square feet, A Zone, New Construction

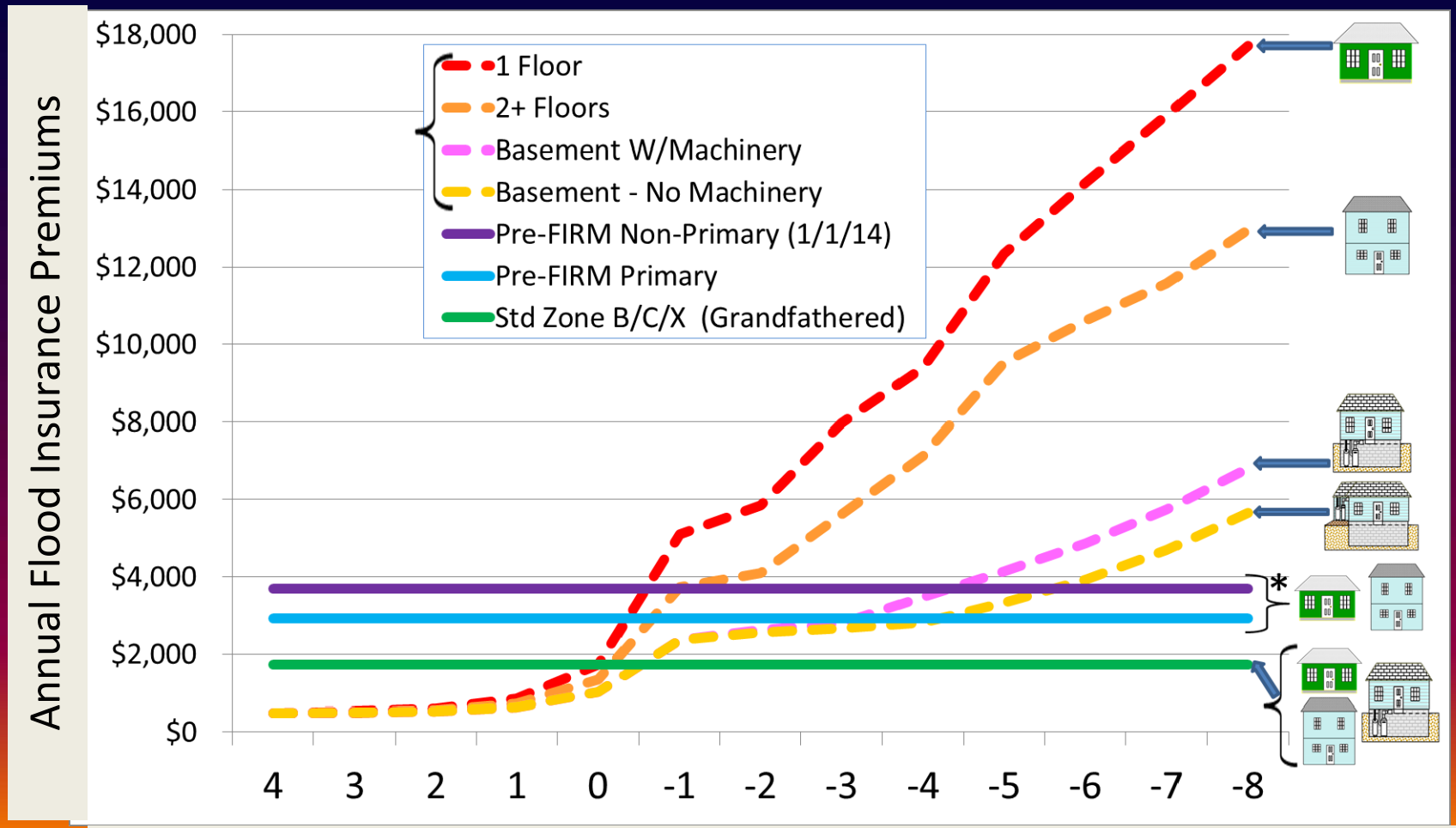
Elevation above BFE	Added Cost to Elevate	Flood Insurance: $250,000 Coverage	Flood Insurance: Pay Back in Years
0	$0	$1,331	
1	$1,060	$737	1.8
2	$2,120	$568	2.8
3	$3,180	$536	4.0
4	$4,240	$520	5.2

Estimated cost: $1.06 per square foot per foot of additional elevation.
Source: FEMA 312: Homeowner's Guide to Retrofitting, June 1998, Page 44. Costs adjusted to 2013 dollars.
Flood insurance rates are due to rise due to the Biggert-Waters Flood Insurance Reform Act of 2012. As such, the pay back periods will decrease.

Need to Build Higher!



Actuarial Rates: Elevation and Insurance Premiums



Rates for 200K Building/80K Contents coverage on 10/1/2013 (except as noted).
*Pre-FIRM Basement Rates are a bit higher

Homeowner Options

- Get an Elevation Certificate
  - This will tell you how high your insurance can go
  - Will provide guidance on how to mitigate
- Elevate your utilities
  - FEMA may provide insurance benefits for elevated building utilities
- Increase your Deductible
  - Standard Deductible: $1000 Post-FIRM; $2000 Pre-FIRM
  - $5000 Deductible (maximum allowed):
    - 25% Reduction Post-FIRM; 19% Pre-FIRM
  - 2014 Legislation Allows up to $10,000 Deductible
    - Careful. This reduces insurance costs but increases repair costs.
- Look at long term costs and benefits of elevating your house or flood proofing your business

Floodplain Development Standards

- NO BASEMENTS
- Studied Floodplains: Lowest floor at least 2 ft above BFE (R324.1.3.3, R324.2.1)
- Unstudied Floodplains: Lowest floor at least 3 ft above highest adjacent grade
- Almost all Development Requires Permits
- Floodway Development Requires Study

Floodplain Development Standards

- Storage of Materials may Require Permit
- Stuff FLOATS…Anchor Everything!
- New Structures Require Elevation Certificates (R324.1.9)
- Floodplain Residence May Need Rescue!
- Keep the Bulldozer out of the Creek!
- Call DEC with Questions

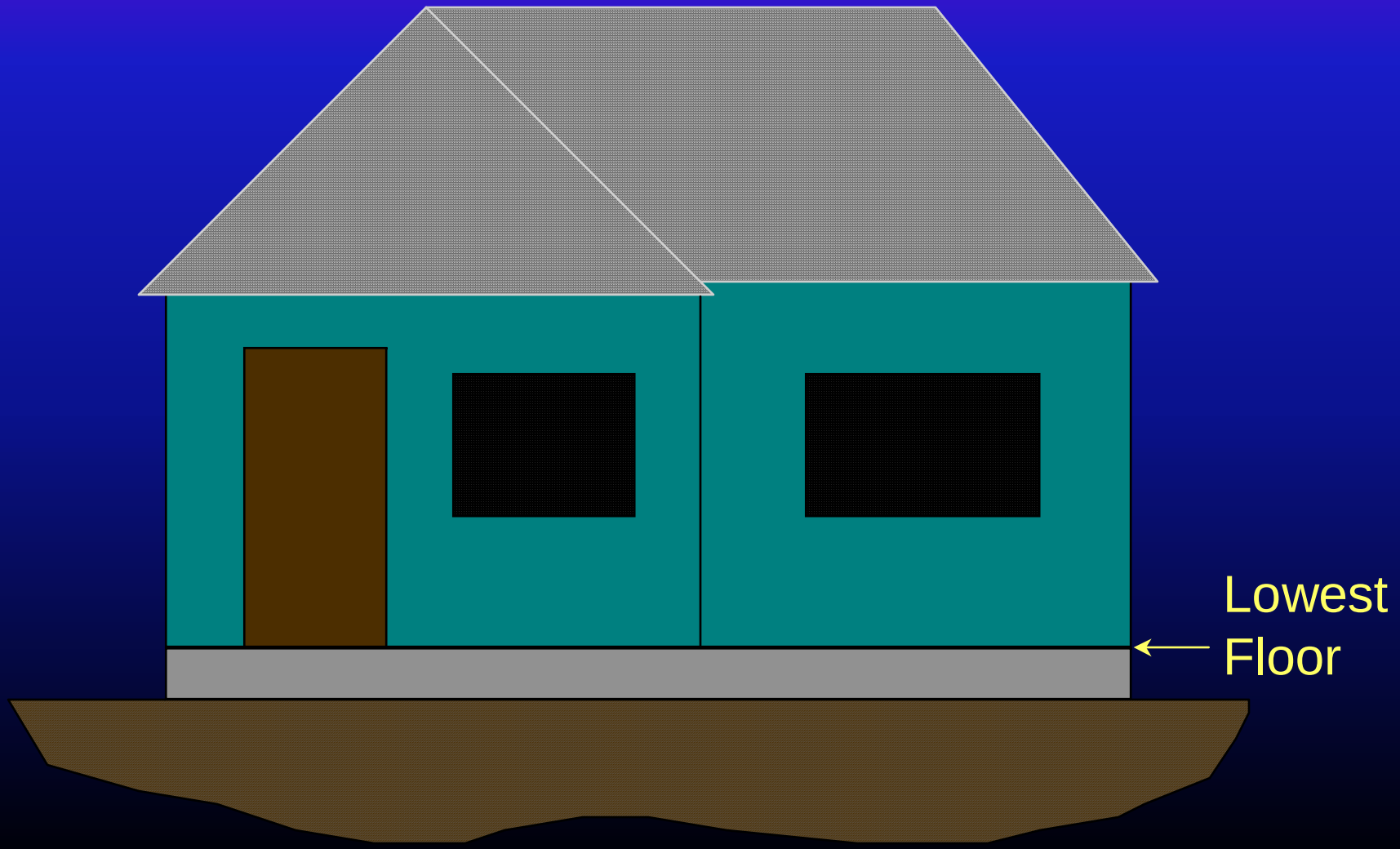
Elevation Requirements

- Requirements in A and V Zones
- Elevated Foundations
- Lowest Floor Elevation is Key

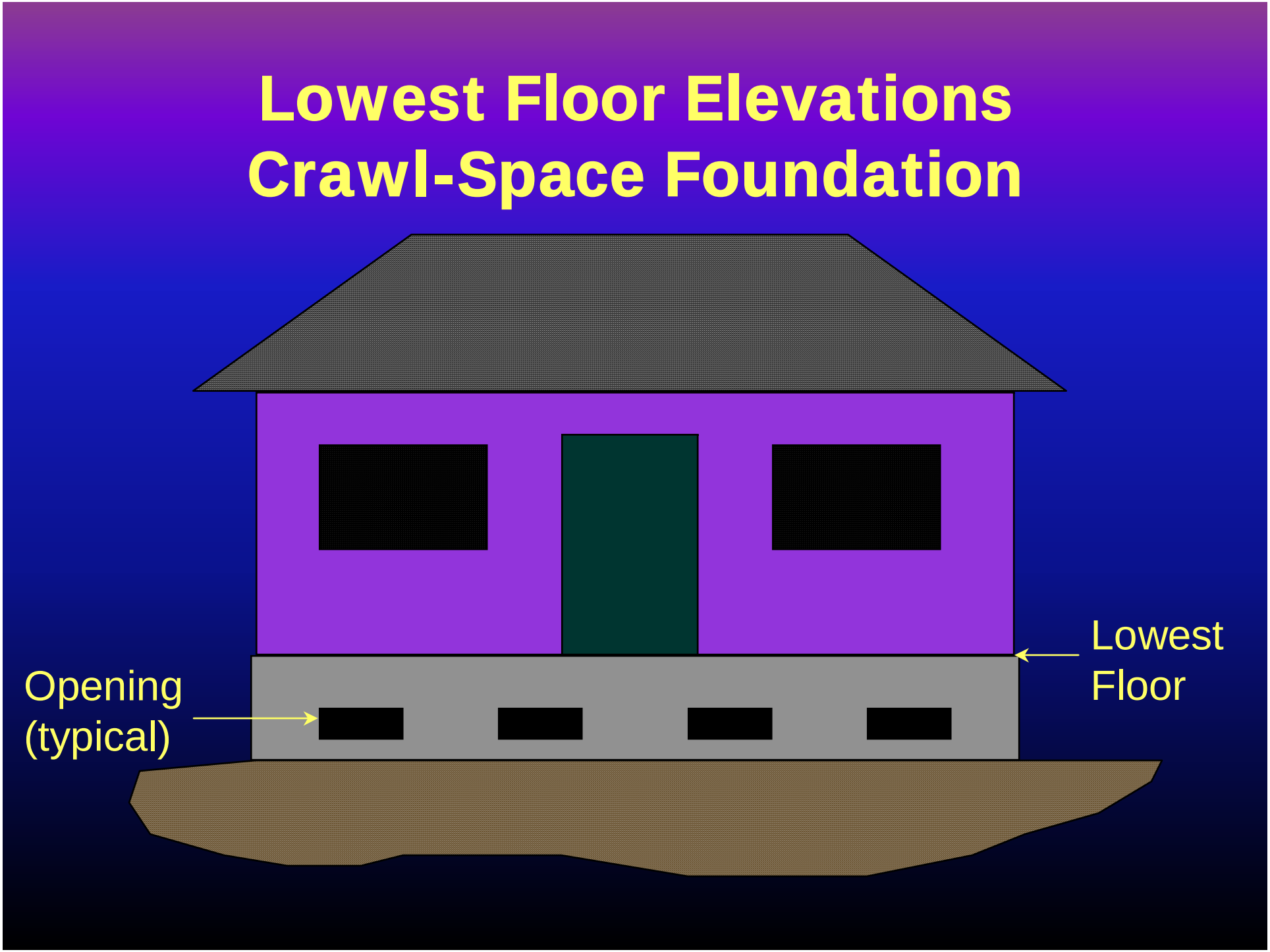
Definition of Lowest Floor

"...means 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 this ordinance."

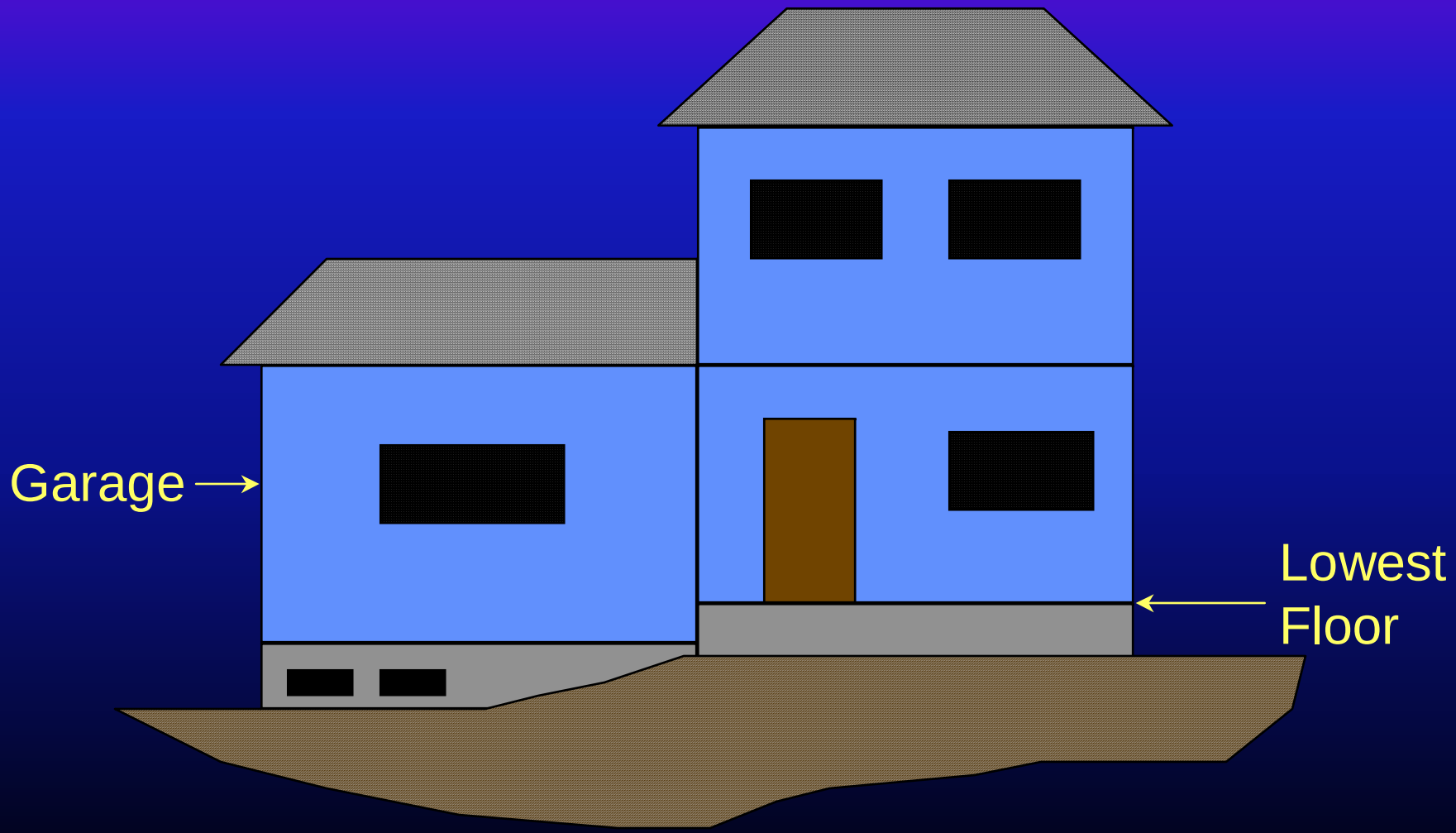
Lowest Floor Elevations
Slab Foundation



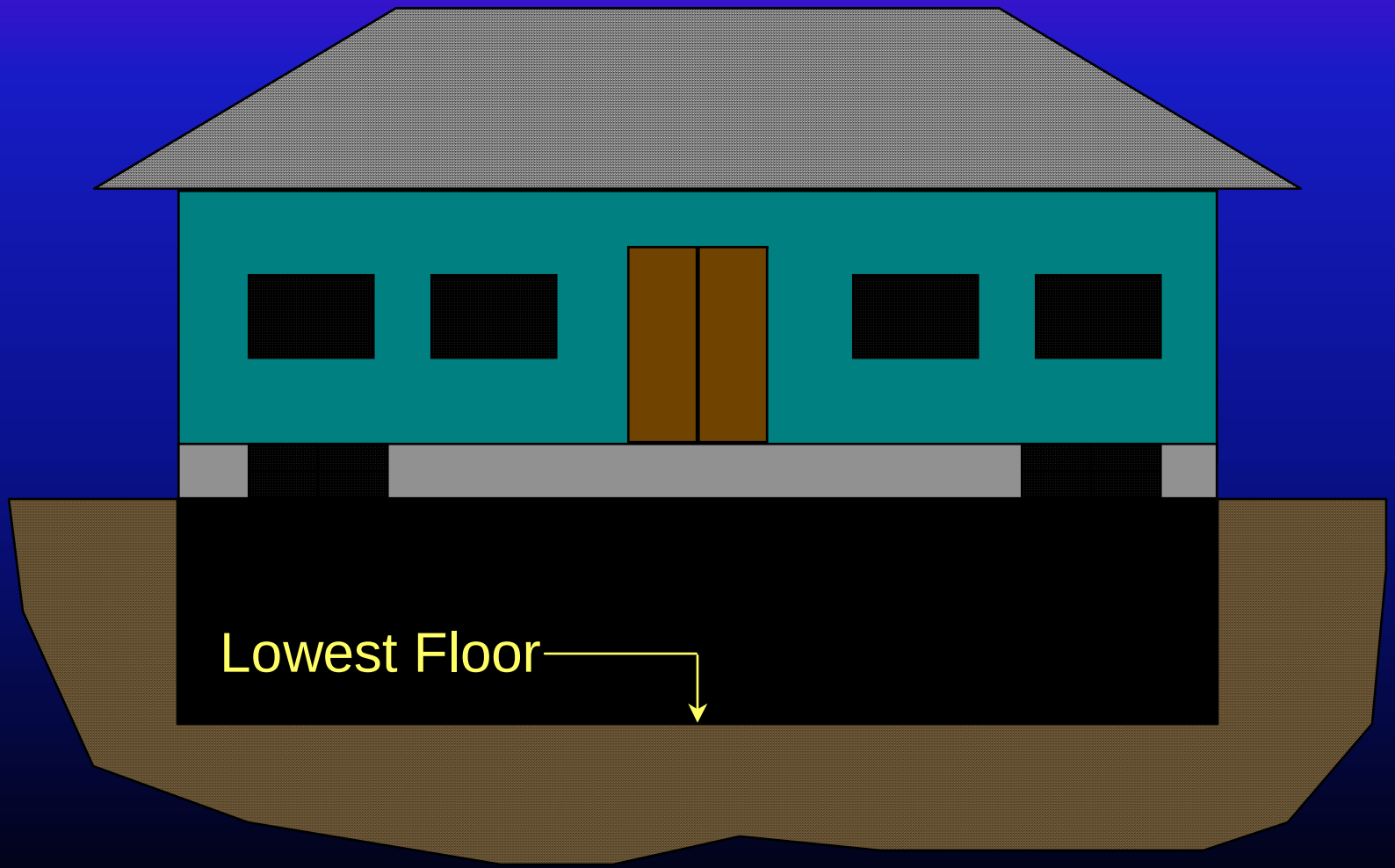
Lowest Floor Elevations
Crawl-Space Foundation



Lowest Floor Elevations
Split Level



Lowest Floor Elevations
Basement Foundation



Definition of Basement

- Basement or Cellar is that portion of a building having its floor subgrade (below ground level) on all sides.

Elevation Requirements for Zones AE, AH, and A1-30

- All new construction and substantial improvement shall have the Lowest Floor, including basement, elevated to or above the BFE (Plus 2’ Freeboard if Residential Construction)
- The reference level for the lowest floor is measured at the top of the sub-floor

Residential Building Code: R324.2.1

Building Code Section 1612.4: Refers to ASCE 24

Elevation Requirements: Zone A- NO Base Flood Elevation Data

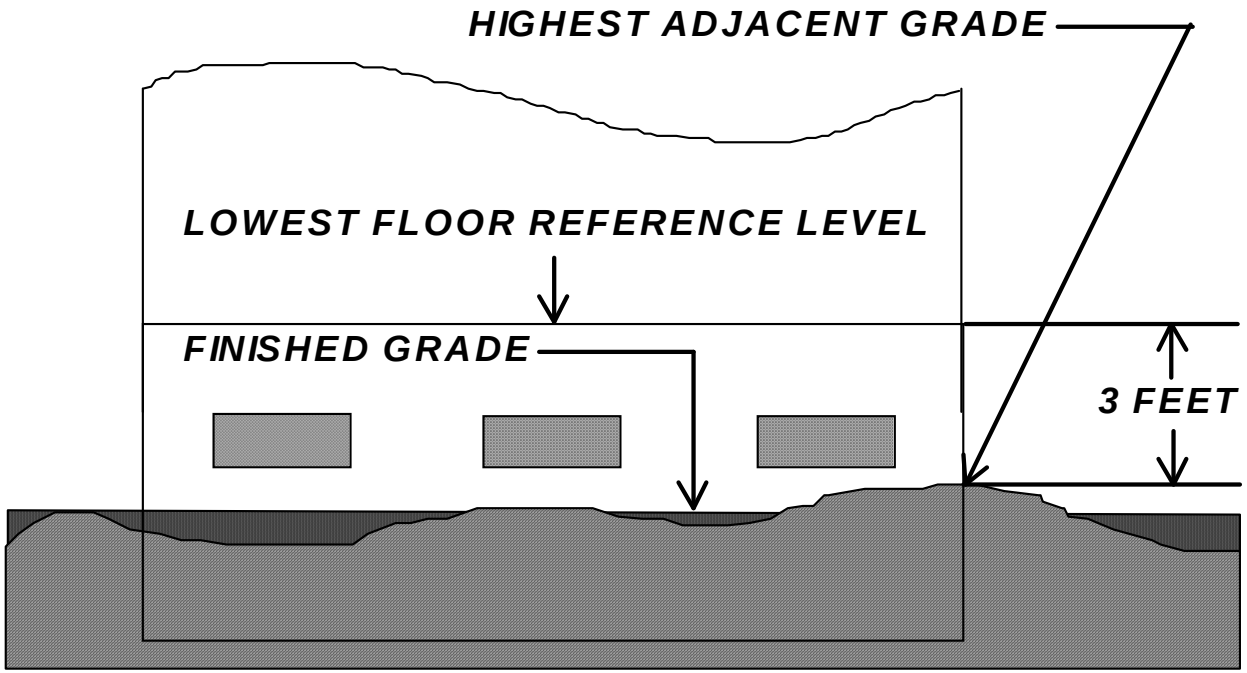
- All new construction or substantial improvement, shall have the lowest floor, including basement, elevated at least three feet above the highest adjacent grade. (DEC Model Local Law; NYS Residential Building Code, R324.1.3.2)
- For subdivisions or other developments over 50 lots or 5 acres, applicant must provide flood elevation data and build accordingly. (FEMA Regulations: 44CFR60.3(b)(3))

Elevation Requirements: Zone A- NO Base Flood Elevation Data

- If there is a Base Flood Elevation from a reputable source, then use it.
  - NYS DEC
  - Corps of Engineers
  - NRCS
  - Historic Flood Data
  - Other engineering study, including for development of over 5 acres or over 50 lots

Unnumbered A ZONE REFERENCE LEVELS

(DEPTH 3 FEET)

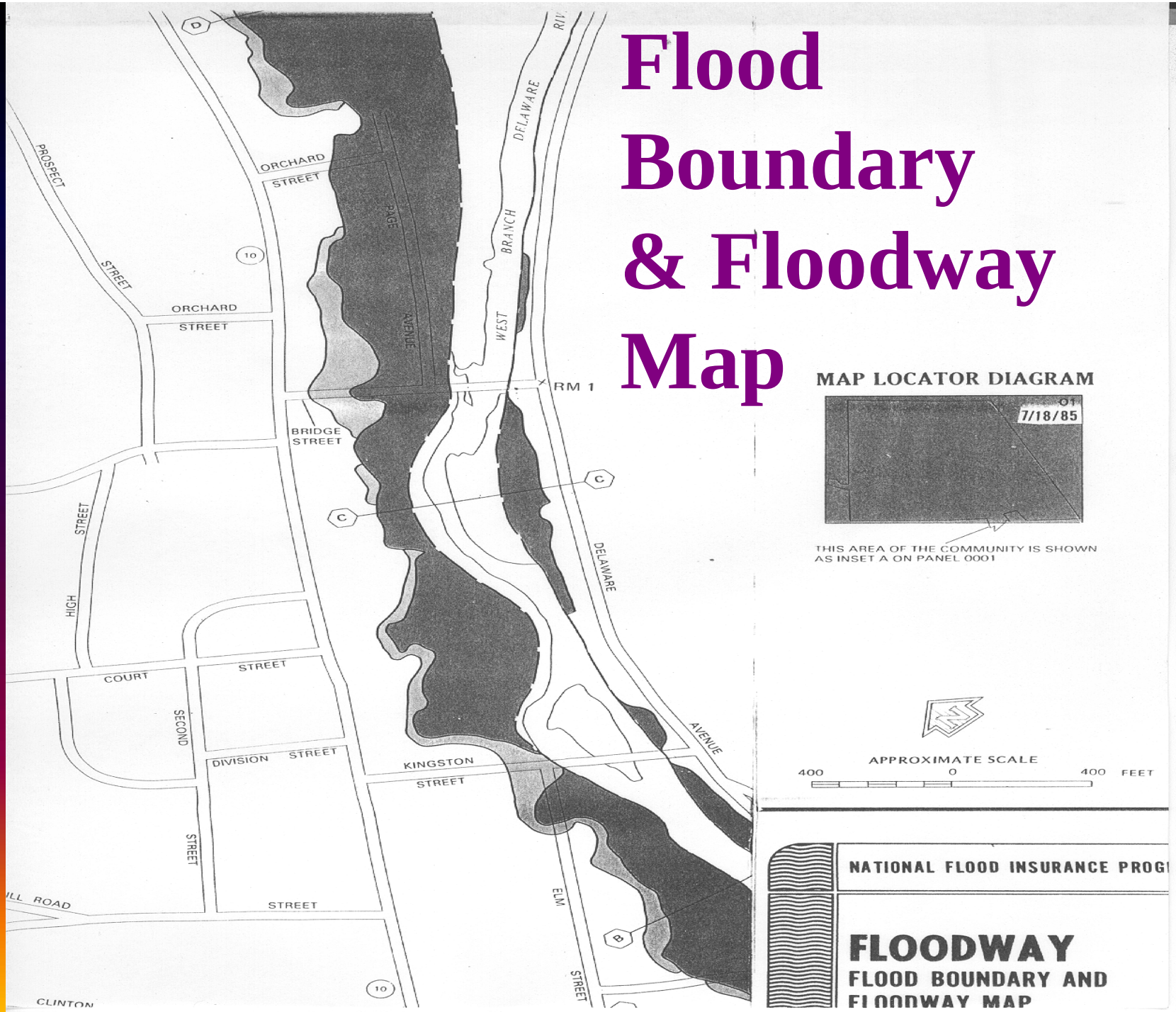


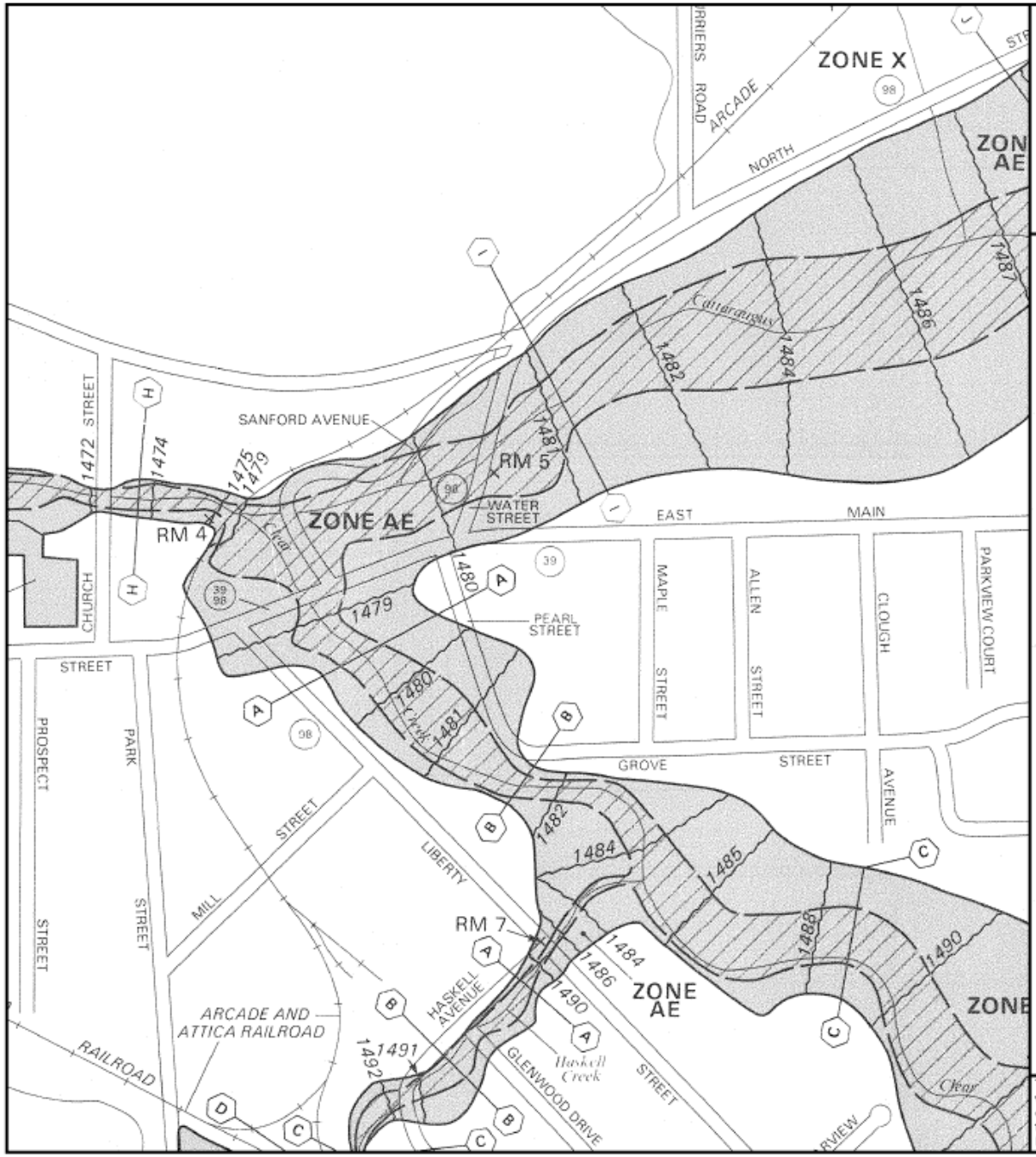
HIGHEST ADJACENT GRADE - HIGHEST NATURAL GRADE ADJACENT TO THE FOOTPRINT OF THE BUILDING PRIOR TO CONSTRUCTION.

Requirements in the Floodway

- No new development, including fill, in designated floodways that would increase flood heights.
- Developer must submit a hydraulic analysis which determines no rise in flood heights.
- If there is any rise, project must be reconfigured or maps revised.
- No variances for development in floodway.

Flood Boundary & Floodway Map





APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP and STREET INDEX

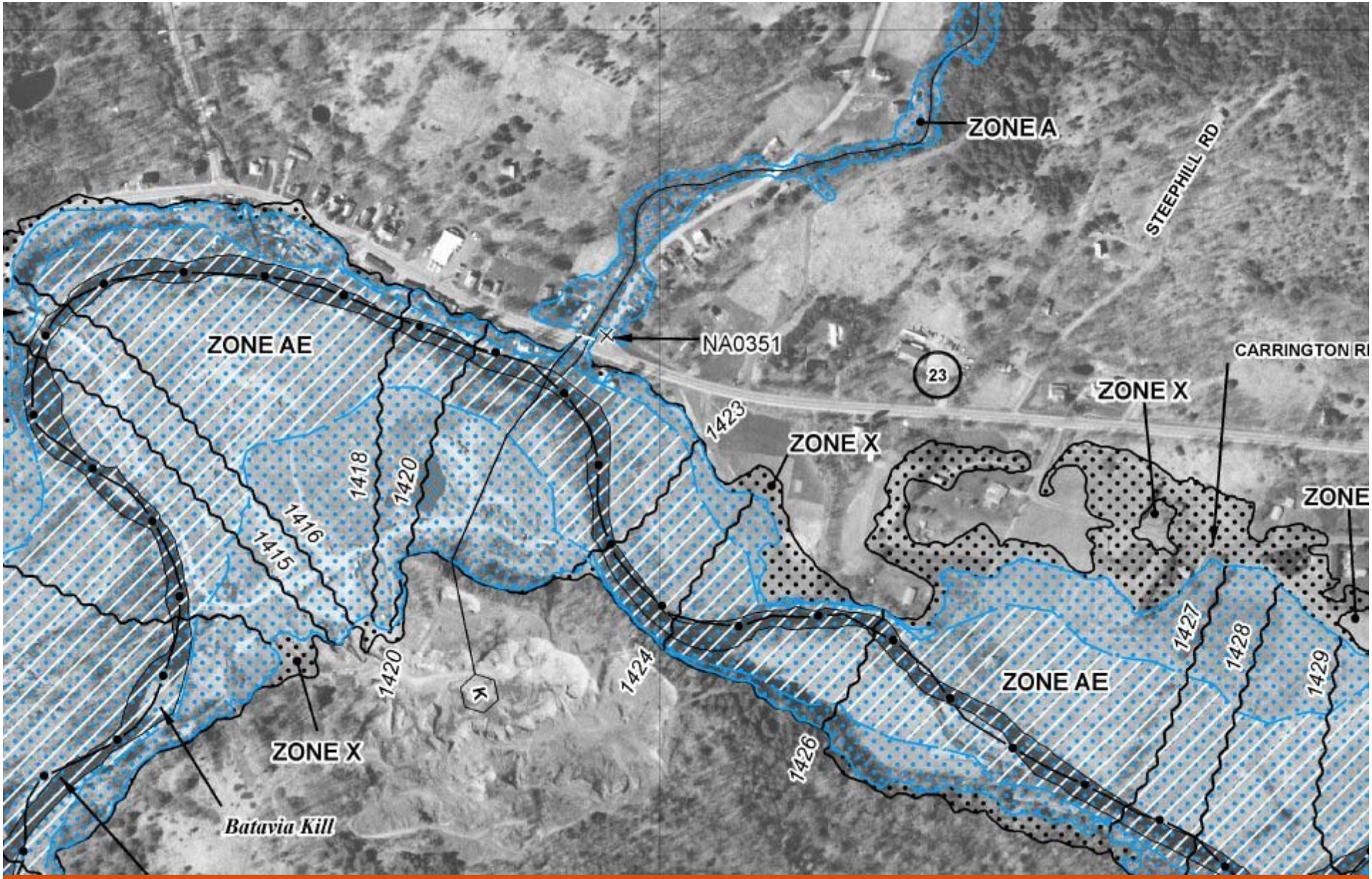
VILLAGE OF
ARCADE,
NEW YORK
WYOMING COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
361555 0005 D

MAP REVISED:
MARCH 3, 1992

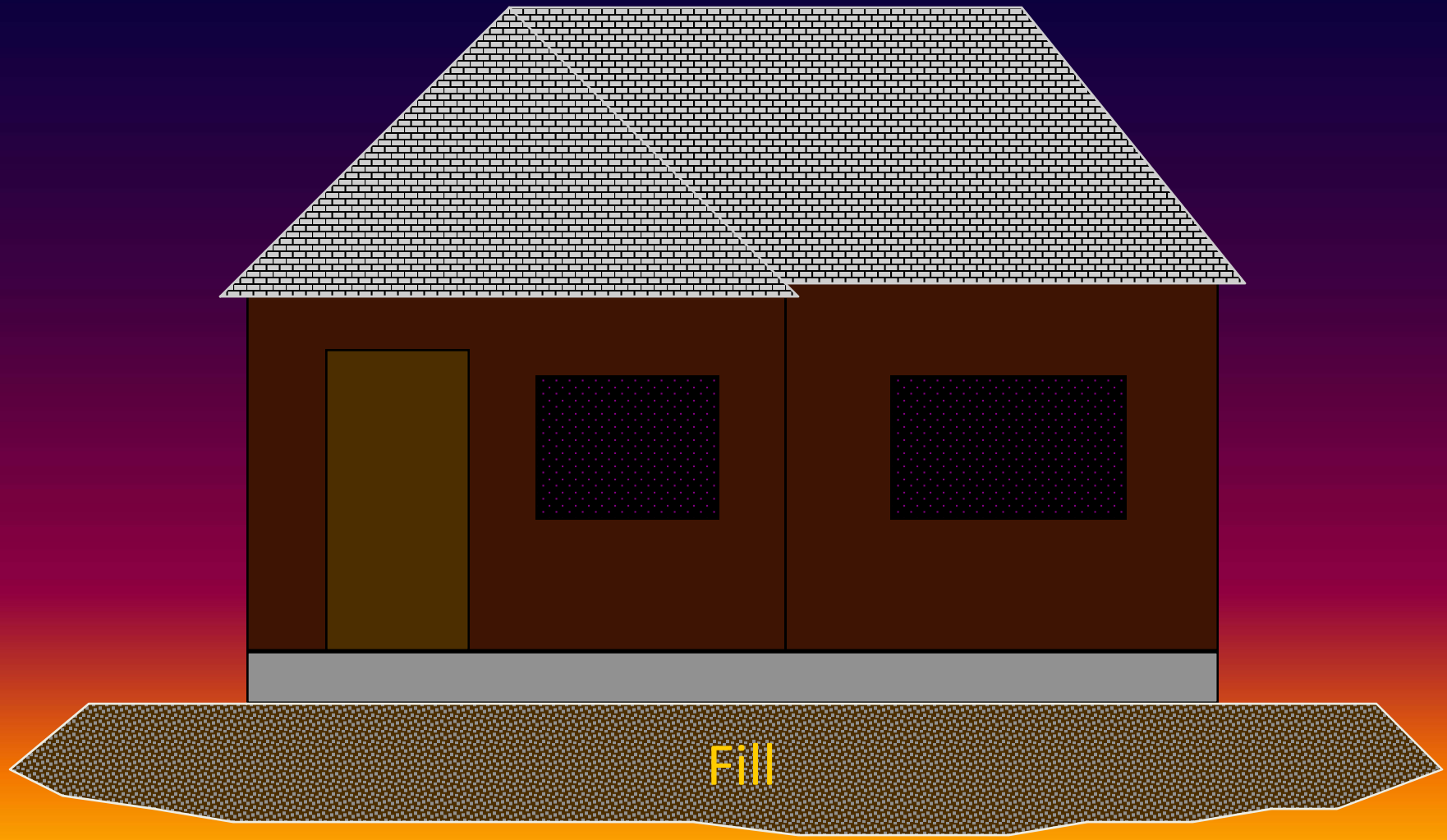
Federal Emergency Management Agency


ZONE A
STEEPHILL RD
NA0351
23
CARRINGTON RI
ZONE X
ZONE AE
1423
ZONE X
1418
1420
1416
1415
ZONE
1427
1428
1429
1420
1424
ZONE AE
ZONE X
1426
Batavia Kill

Construction Standards: Elevated Foundations

- Fill
- Perimeter Wall
- Pile

Slab on Fill



Standards for Elevation on Fill

- Fill should be placed in maximum 12-inch lifts, and compacted to 95% of the maximum density obtainable with the Standard Proctor Test Method
- Fill slopes should be no steeper than 1.0-foot vertical to 1.5-feet horizontal

NOTE: This is guidance, but would be required for a Letter of Map Revision based on fill.

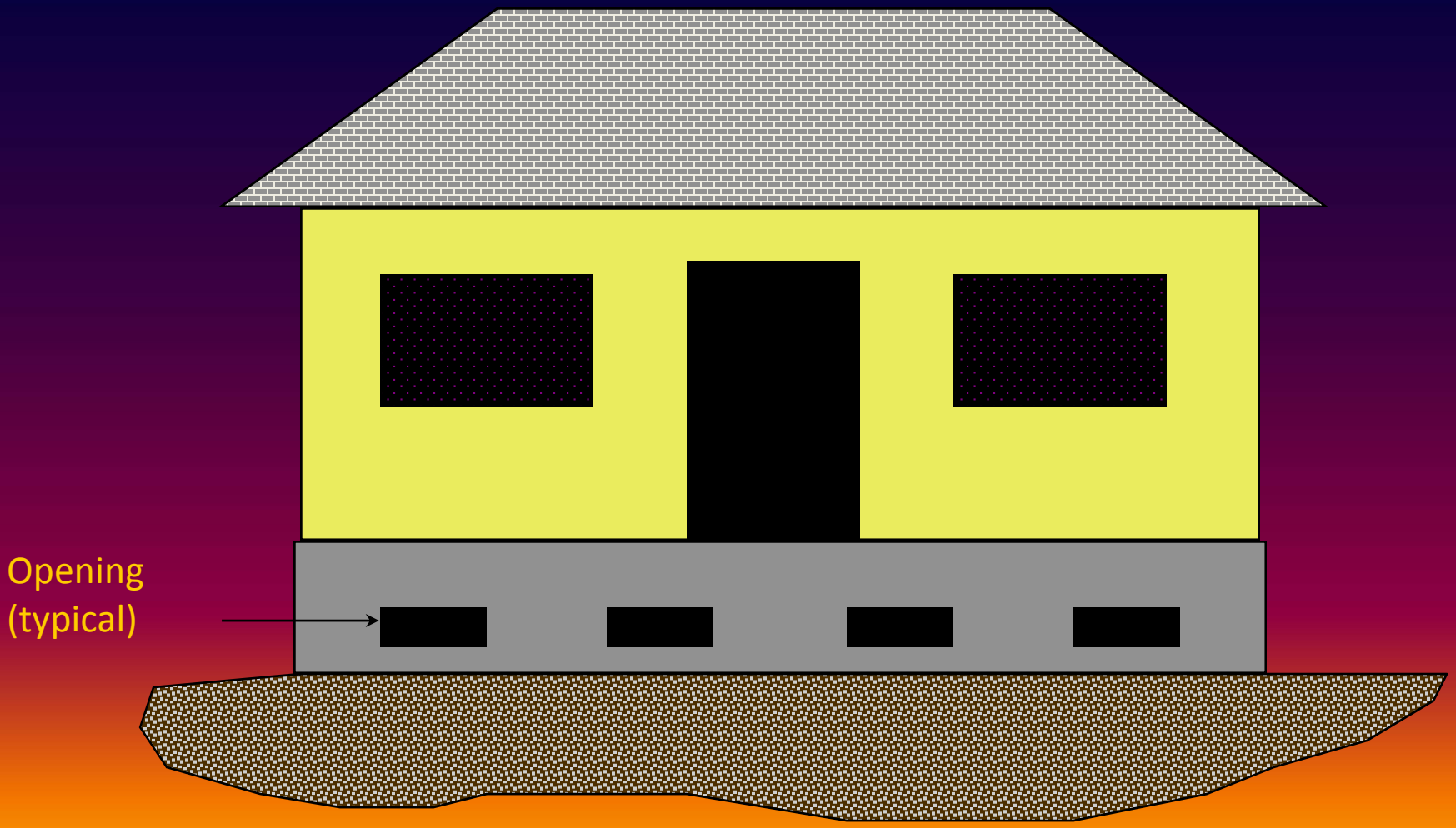
Standards for Elevation on Fill…

- Fill will NOT settle below BFE
- Protected from scour, differential settlement, and erosion
- Flood flow less than 5 ft/sec - vegetation
- Flood flow greater than 5 ft/sec - armoring

Placement of Fill

- No Fill in a Floodway
- Zones A1-A30 and AE without a Floodway must demonstrate that the cumulative effect of the proposed development when combined with all other existing and anticipated development will not increase the base flood by more than 1 foot.
- Construction on fill still subject to NFIP regs unless site first removed by LOMR-F

Perimeter Wall Foundation



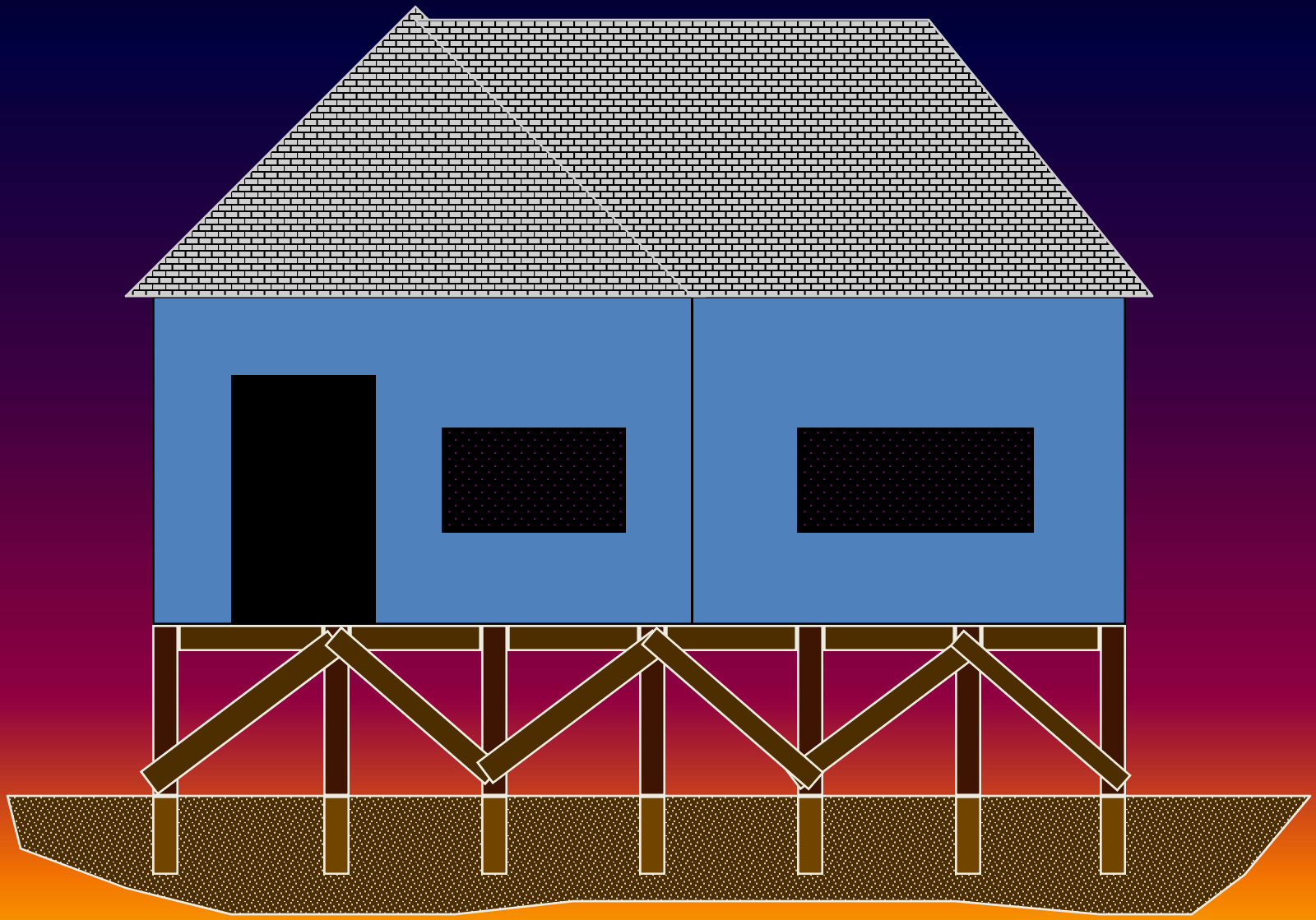
Standards for Elevation on Perimeter Wall Foundations

- Fully enclosed areas below the lowest floor shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters

Minimum Standards for Foundation Openings

- A minimum of two openings having a total **net** area of not less than one square inch for every square foot of enclosed area subject to flooding. The bottom of all openings shall be no higher than one foot above grade.
- Openings may be equipped with screens, louvers, valves, or other “automatic” coverings

Pile Foundation



Post or Pile Foundations

- Have much greater resistance to lateral loads
- Should be used in areas of deep flooding and/or high velocities
- Over-the-top ties or frame ties must be used on manufactured homes to resist wind and water forces

Other Elevated Foundation Systems

- Sheer Walls
- Posts
- Piers

Anchoring and Elevated Foundations

All structures must be properly anchored.

When elevating a manufactured home above the BFE, the home must be anchored to the foundation or ground to resist wind and water forces.

Pier Foundations

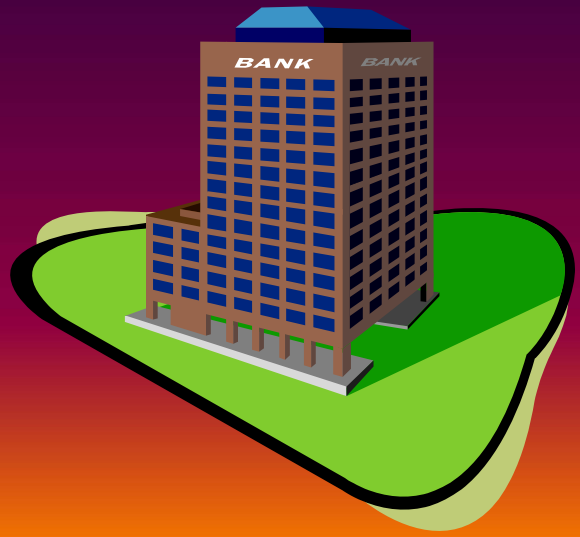
- Have limited resistance to lateral loads
- Should only be used in low velocity areas
- Must have vertical steel reinforcement to resist lateral forces
- Ground anchors must be used to resist wind and water forces

Anchoring to Foundation

Flood Proofing Requirements

Floodproofing

ONLY NON-RESIDENTIAL STRUCTURES MAY BE FLOODPROOFED IN LIEU OF ELEVATION.



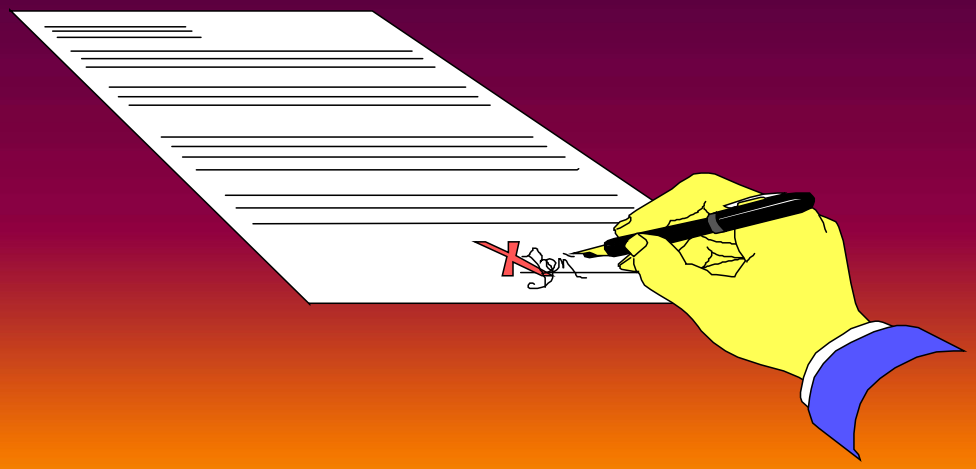
Floodproofing Requirements

- Non-residential construction, new or substantial improvement, may be floodproofed below the BFE so that the structure is watertight with walls substantially impermeable to the passage of water.
- Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

NOTE: Insurance Requirements are 1' *above* bfe

More Floodproofing Requirements...

- Be certified by a registered professional engineer or architect that the previous standards are satisfied.



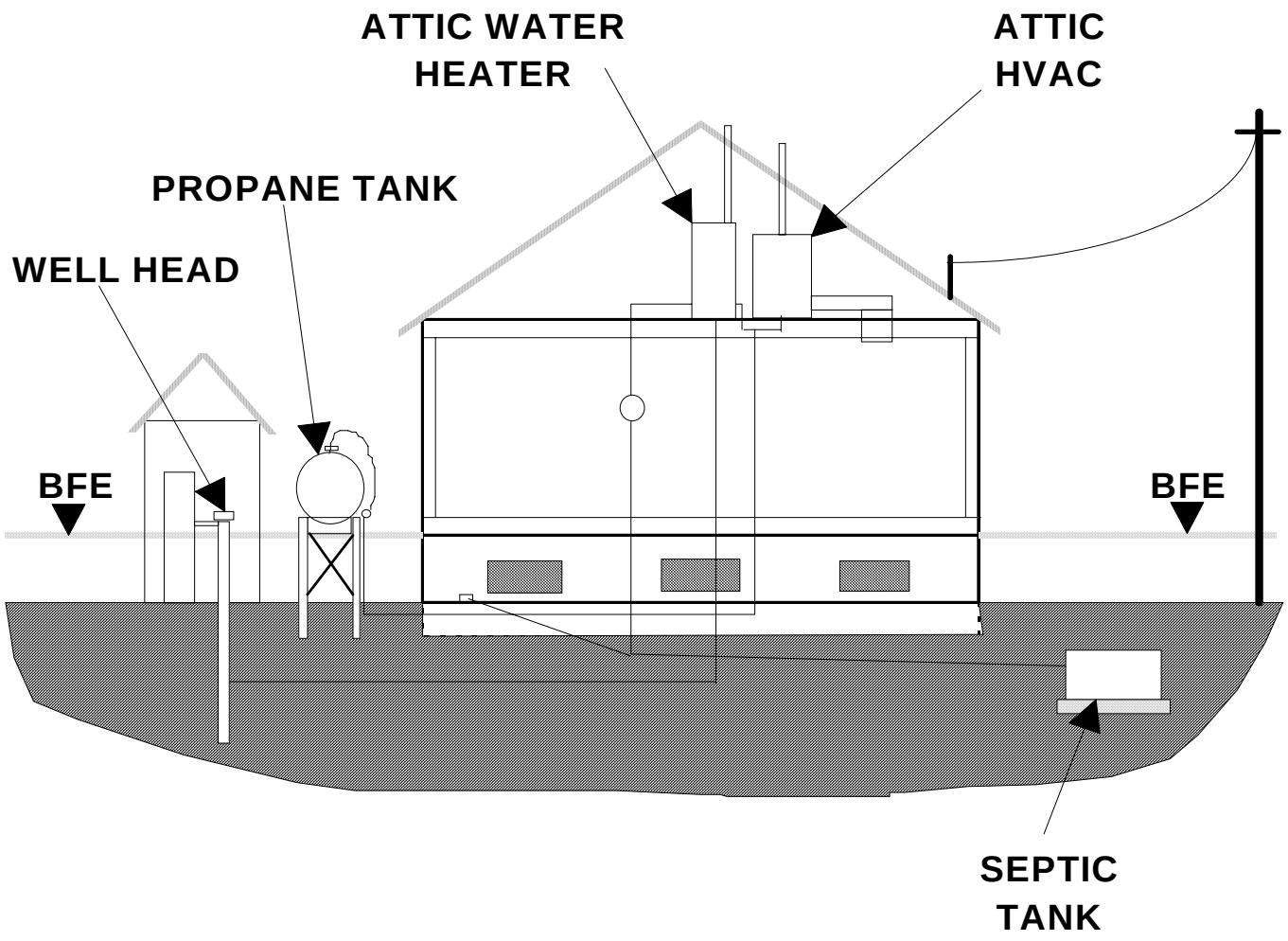
Dry Floodproofing

- Limited Effectiveness
  - Shallow Flooding < 3 ft
  - Short Duration < 12-24 hours
  - Low Velocity and Impact Hazard
- Often Requires Maintenance
  - Resealing
  - Pumps, Drainage Systems, Backflow Valves
- May Require Human Intervention
- Emergency Operations Plan

Standards For Utilities And Building Systems

All new construction and substantial improvement shall be constructed with electrical, HVAC, plumbing and other service facilities elevated or floodproofed to prevent water from entering or accumulating within the components during conditions of flooding. (Residential Code of NYS: R324.1.5)

UTILITY LOCATION SCHEMATIC



Properly Elevated and Vented Home, Ulster, NY

East Rockaway, NY

Thankful Homeowner

- Home Remodeling early 2012
- Improvements exceeded 50% of home's value.
- Village enforced substantial improvement requirement
- Owner "begrudgingly" accepted. Elevated to 2' above Base Flood Elevation
- Neighborhood took on 4' of water
- Water reached bottom of top step.
- Home was dry; Family was safe

Long Pond Village Apartments Rotterdam

- Floodplain Administrator Advised to Elevate to BFE + 2 feet
- Developer Elevated only to BFE because of costs
- Complex had to be evacuated
- About 30 first floor units flooded by……


1.25 feet!!
9
1
8
7
6
5
1
4
3
2
1
1
11
10
9

Riverstone Manor, Glenville

- Floodplain Administrator Advised to Elevate to BFE + 2 feet
- Owner Followed Advice
- Pays Significantly Lower Flood Insurance Premium
- $ 0 damage to structure
- $ 0 first responder cost
- $ 0 cost to Town
- Minimal clean up costs of grounds
- Minimal loss of business

Admiral's Walk, Cohoes

- Advised to elevate to BFE +2 feet
- Elevated buildings between 1.7 and 8 feet
- Has LOMR-F… removing insurance requirement
- 2011 Flood was 2nd event
- All units remained dry both times
- $0 damages
- $0 first responders cost
- $0 cost to City

Freeport Elevation

For Consideration

- FEMA is required by Congress to establish actuarial rates.
- Current rating only looks at lowest floor and BFE.
- Other Ideas for FEMA:
  - Consider depth and frequency of flooding
  - Consider partial mitigation such as elevating utilities and emptying and wet floodproofing basements
  - Consider flood-proofing of large, multi-family residential structures
  - Consider long term flood insurance financing tied to funding of mitigation
  - Consider community based flood insurance

Example: Darlington, WI

Aerial view of Darlington showing flood-prone area between bridge over east-flowing portion of Pecatonica River and horse-shoe bend. Photo courtesy of USGS

- Population: 2,451
- Main St. is on National Register of Historic Places
- Long History of Flooding
- Destructive Flood in 1998

Darlington Floods

Buildings on a Darlington side street surrounded by flood waters in 1998.

- Declining Property Values
- Dying Business District

Darlington Tackles Flood Mitigation

- Business Owners covered Costs of Rehabilitation and Historic Preservation
- Home Owners Encouraged to Purchase Flood Insurance
- Historic Business Structures Brought into Compliance with ADA
- Downtown Historic Preservation a Key Component

Darlington Flood Mitigation

- Structural and Non-Structural Mix
  - Flood Shields to Flood-proof Lower Levels of Historic Buildings
- Business Lowest Floor Elevations Raised
- Basements were Filled
- Some Businesses were Relocated
  - 13 Commercial Properties Demolished
  - New 33 Acre Business Park out of Floodplain
- 19 Commercial Buildings Floodproofed and Elevated

Darlington Mitigation Funding

- $2.3 Million Total
  - FEMA's HMGP
  - FEMA's Pre-Disaster Mitigation and Flood Mitigation Assistance
  - U. S. Department of Commerce Economic Development Administration
  - State of Wisconsin Funding

Darlington Business District

Former Darlington Mayor Bev Anderson and FEMA Mitigation Specialist Chuck Black inspect stanchions and drain cover at top of steps leading into a Main Street business. It is at this point that flood shields are attached when flooding is imminent.

Historic buildings that grace Darlington's Main Street are protected from flood damage and their historical character is preserved.
Photo: Barbara Ellis, FEMA

Vestibule Steps to First Floor
ADA Ramps from Parking in Rear

Darlington Results

- Increased Property Values
  - Business Property Appraisals Doubled
- Residents, Including Seniors, Remaining in Community
- Flooding Hit Again in 2007 and in 2008
  - Flood Shields and Elevations Protected Businesses
  - Utilities were Elevated and were not damaged
- http://emergencymanagement.wi.gov/mitigation/stories/BP_Darlington.pdf

Conclusions

- The Risks are Real!
- The Costs are High!
- Government is Less and Less Willing to Subsidize Risk.
- New Buildings need to meet Standards … And then some
- Consider Building Higher Adjacent to Flood zones … Maps can change!
- Costs of Building Higher far exceeded by Reduced Risk and Lower Flood Insurance