



Water
Resource
Center

Southwestern Pennsylvania Commission

WEBINAR

Floodplain Management 101

Josh Lippert, CFM

City of Philadelphia Floodplain Manager

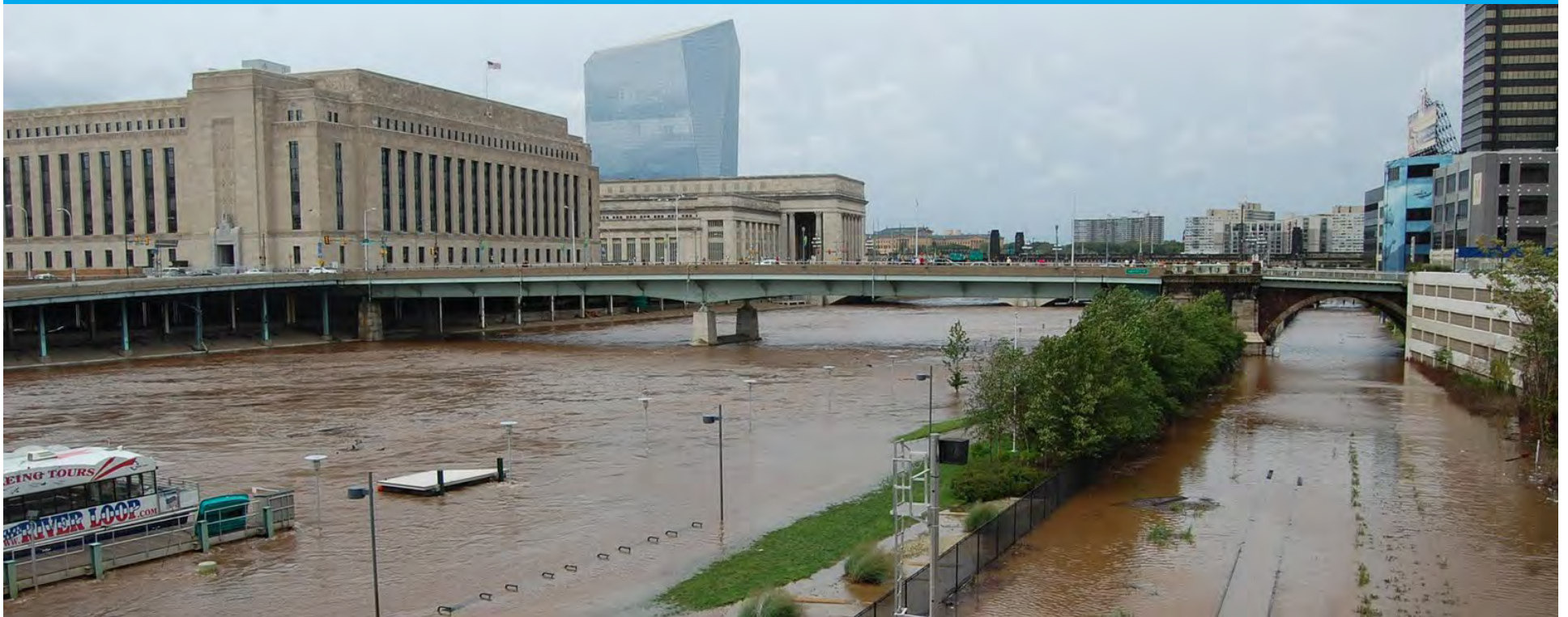
PAFPM – Vice Chair

Overview:

Flooding is the #1 natural hazard to affect all Pennsylvanians. Gain a holistic understanding of the regulatory requirements for development in floodplains. The presenter of this course will provide an overview on NFIP (National Flood Insurance Program) and current Pennsylvania floodplain regulations in the context of the State's model ordinance as well as International Construction Codes (ICC). Best practices and resources will be highlighted. Participants will learn the responsibilities for design professionals and local floodplain administrators/managers for managing flood risks and loss through proper planning, permitting, and design.

MAY 14, 2020

FLOODPLAIN MANAGEMENT 101



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JOSHUA.LIPPERT@PHILA.GOV

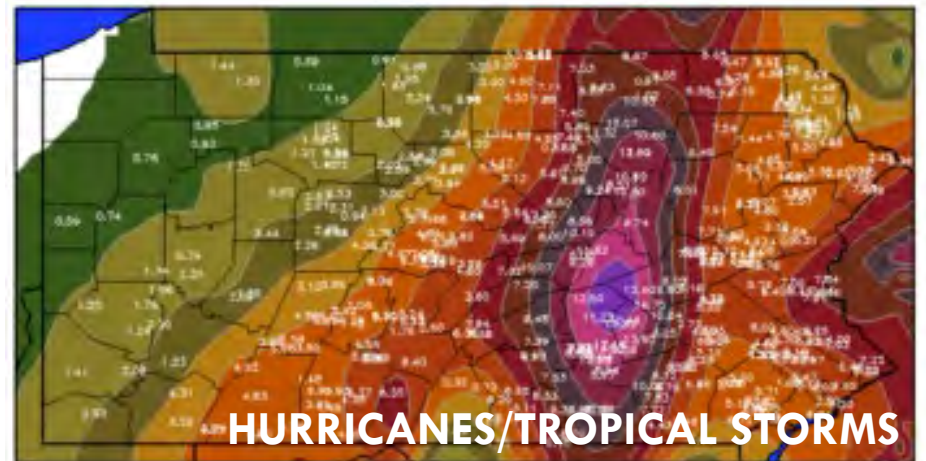
DISCLAIMER

About this Training

- **Advisory** [always review local codes/regulations]
- **Guidance** [best practices and resources – not necessarily adopted codes/regulations]
- **Codes/regulations** are generally based upon the [PA Model Floodplain Ordinance](#) (April 2016), with the incorporation of Building Codes (IRC, IBC, IBC Appendix G, & ASCE 24)

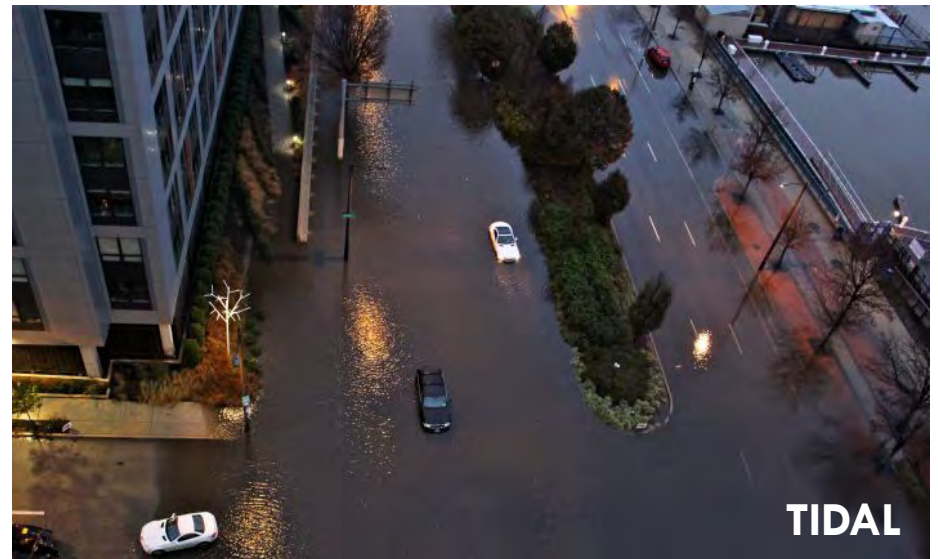
TYPES OF FLOODING

In Pennsylvania



TYPES OF FLOODING

In Pennsylvania



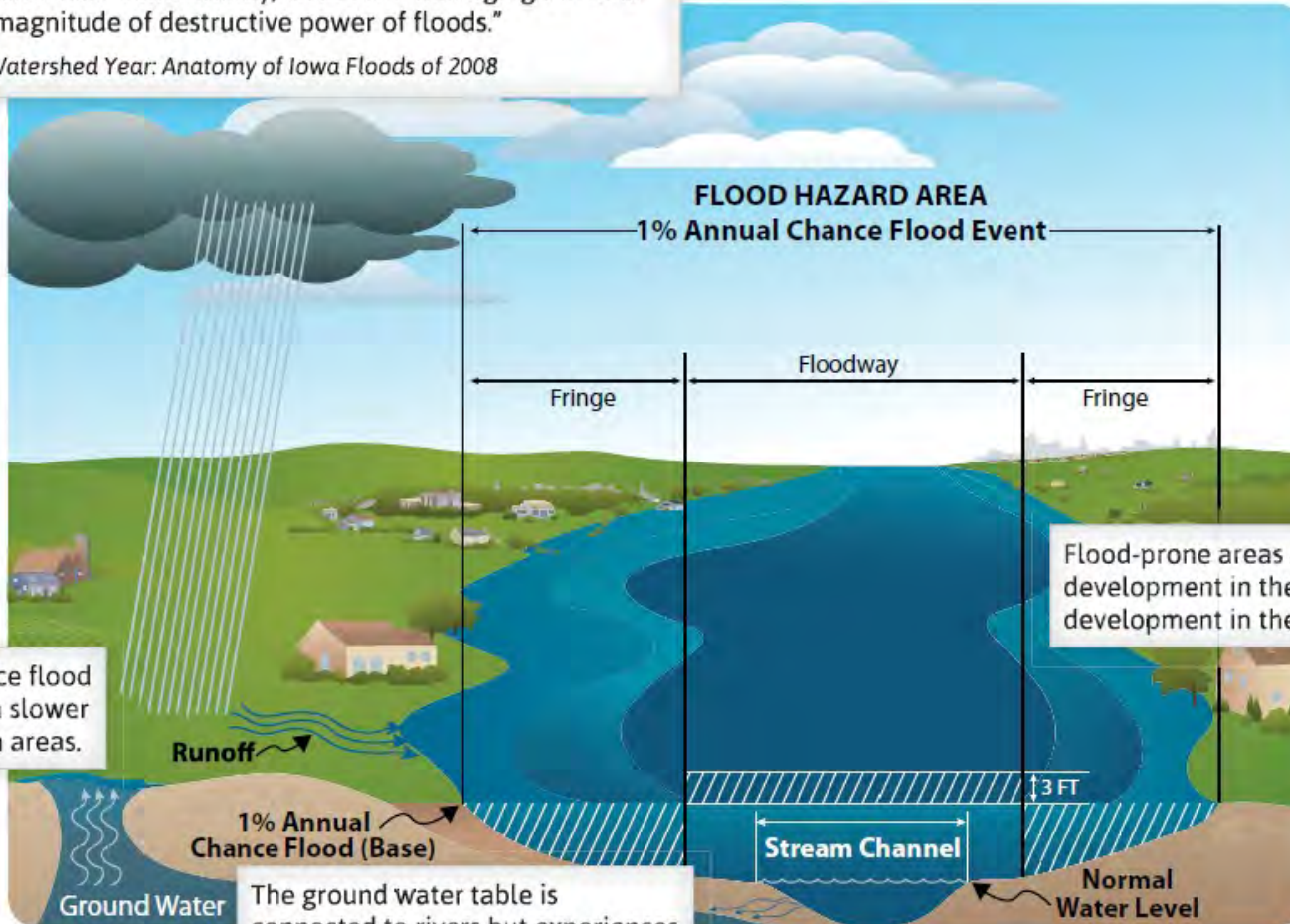
WHAT IS A FLOODPLAIN?

Typical Section

"Living with floods involves two broad activities: better managing the risks and taking steps to reduce our vulnerability, and better managing the landscape to reduce the magnitude of destructive power of floods."

--Connie Mutel, *A Watershed Year: Anatomy of Iowa Floods of 2008*

Rural areas produce flood causing runoff at a slower rate than do urban areas.



Flood-prone areas are managed by restricting development in the floodway, but allowing development in the floodway fringe.

The ground water table is connected to rivers but experiences a delayed response to flood waters. Ground water rises in a flood event.

ROLES

Zoning Administrator/Building Code Official/ Floodplain Administrator/Manager

- Administer codes
 - Code interpretations, if escalated from supervisor
 - Code bulletins
 - Forms/guides/checklists
 - New/revised codes
- Training/education of codes
- Auditing of code effectiveness + compliance
- Permit audits (FEMA CAV's and Yearly Permit Report to State NFIP Coordinator)
- Letter of Map Change - Community Acknowledgment
- State and Federal agency coordination



ROLES

Plans Examiners

- Review plans to ensure they meet building codes, local ordinances, and zoning regulations
- Approve building plans
- Maintain permit records
 - Permit plans/details
 - Elevation Certificate
 - Floodproofing Certificate
- Pre-application meetings
- Coordinate with inspectors for approved plan questions
- Render decisions (issue permits, amend permits, revoke permits, etc.)



ROLES

Inspectors- Building Construction

- Review plans, including FEMA Elevation Certificate or Dry floodproofing Certificate
- Conduct inspections
 - Pre-construction meeting
 - Foundation/lowest floor installation
 - Final Construction (prior to Certificate of Occupancy)
 - Floodproofing Certificate
- Coordinate with plan review for approved plan questions
- Questions escalated to supervisors
- Render decisions (issue violations, stop work orders, etc.)

ROLES

Design Professionals

Types of design professionals (permitting)

- Land Surveyors
- Architects
- Landscape Architects
- Engineers
 - Structural
 - Civil
 - Water Resources/Hydraulic

Other design professionals (non-permitting)

- Urban Planners

NATIONAL FLOOD INSURANCE PROGRAM [NFIP]

FLOOD HAZARD INFORMATION

REGULATIONS

ELEVATION CERTIFICATE

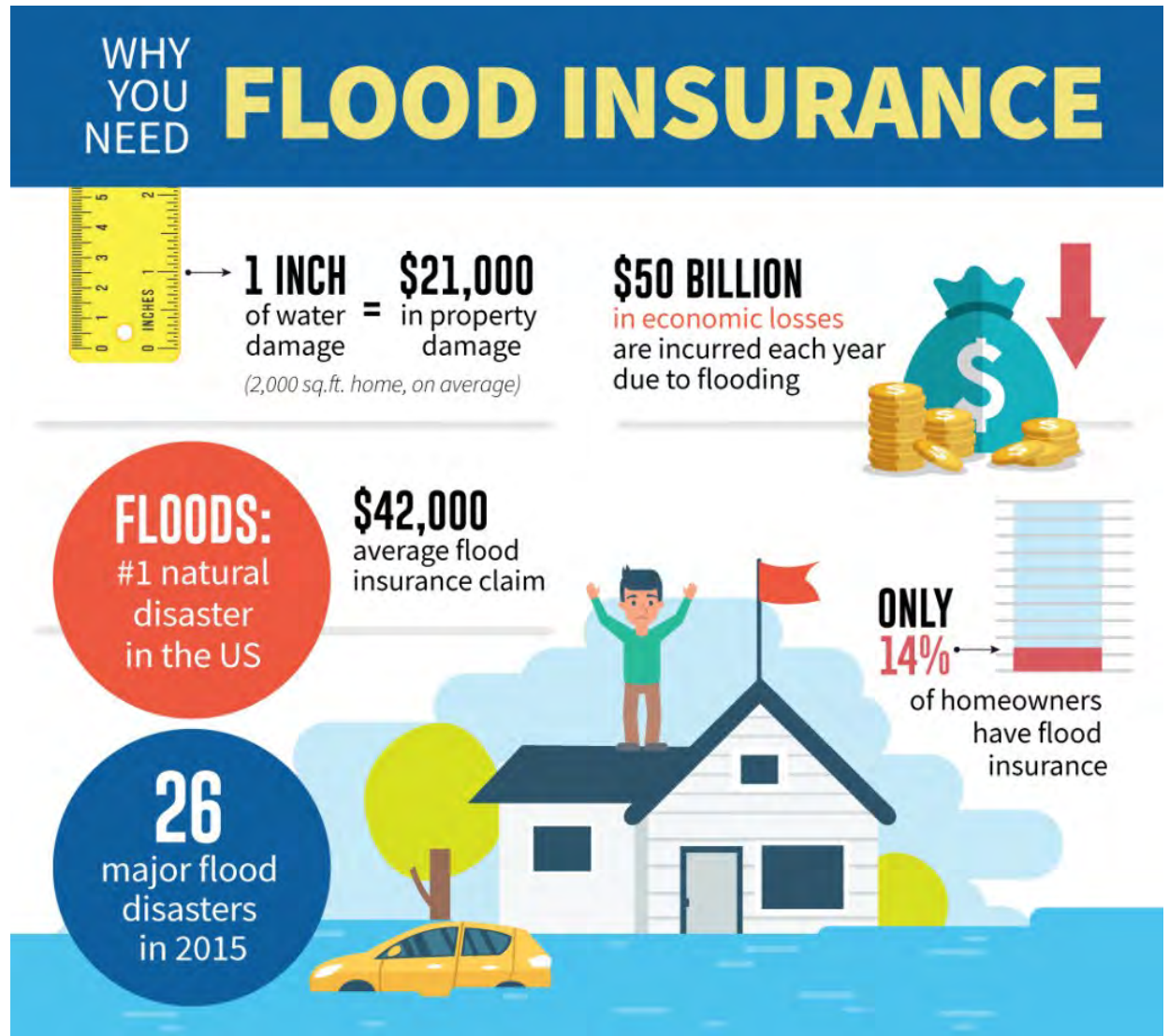
LETTER OF MAP REVISION [LOMC]

RESOURCES

BACKGROUND

National Flood Insurance Program [NFIP]

- Risk Identification (mapping)
- Management (regulations)
- Insurance



BACKGROUND

National Flood Insurance Program [NFIP]

Created by the National Flood Insurance Act of 1968

- Participation is **mandatory** in Pennsylvania

(Pennsylvania Act 166 of 1978, the [Pennsylvania Floodplain Management Act](#))

- Adopt and enforce regulations
- Benefits of participation:
 - Flood insurance
 - Grants and loans
 - Disaster assistance
 - Federally-backed mortgages



COST OF FLOOD INSURANCE EXAMPLE

**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



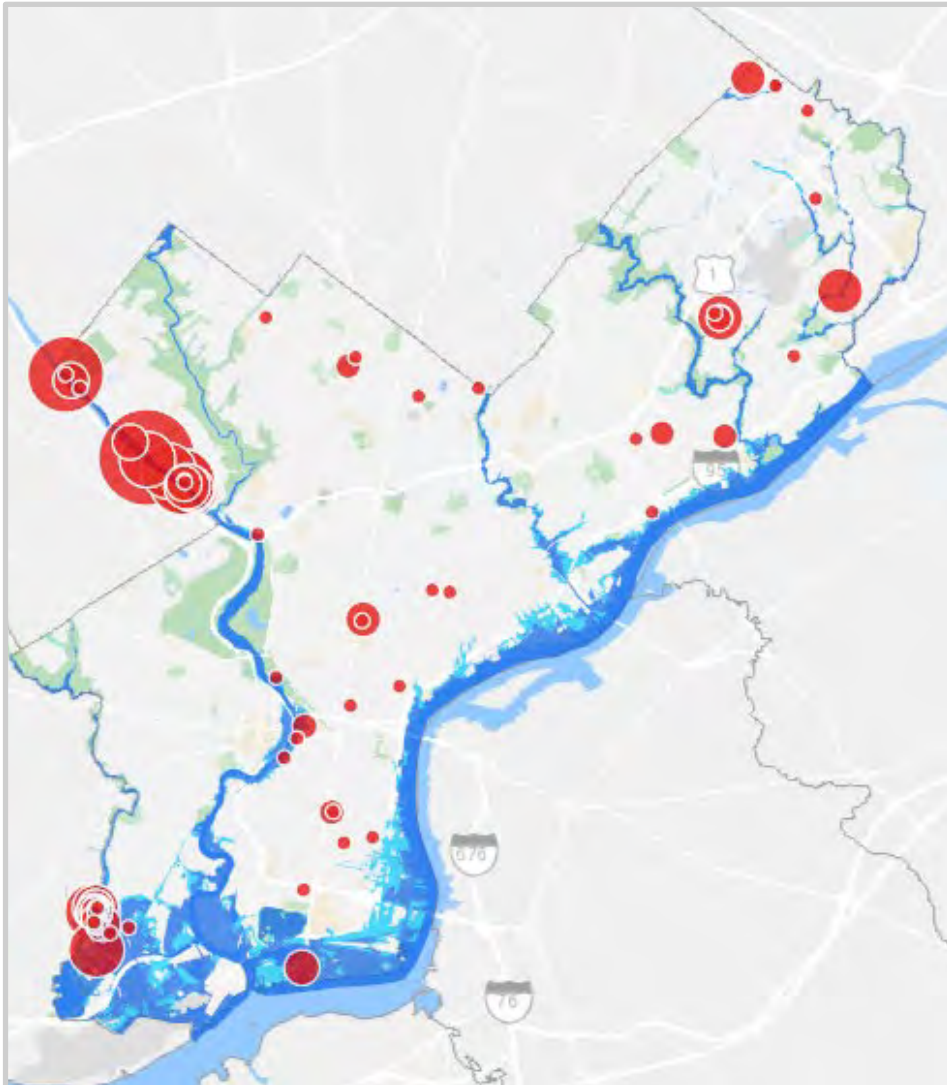
BFE

*\$250,000 building coverage only (does not include contents), AE (high to moderate risk) zone, single-family, one-story structure without a basement at: 4 feet below Base Flood Elevation (BFE); at BFE; and at 3 feet above BFE. (Rating per FEMA flood insurance manual, October 1, 2012). The illustration above is based on a standard National Flood Insurance Program (NFIP) deductible.

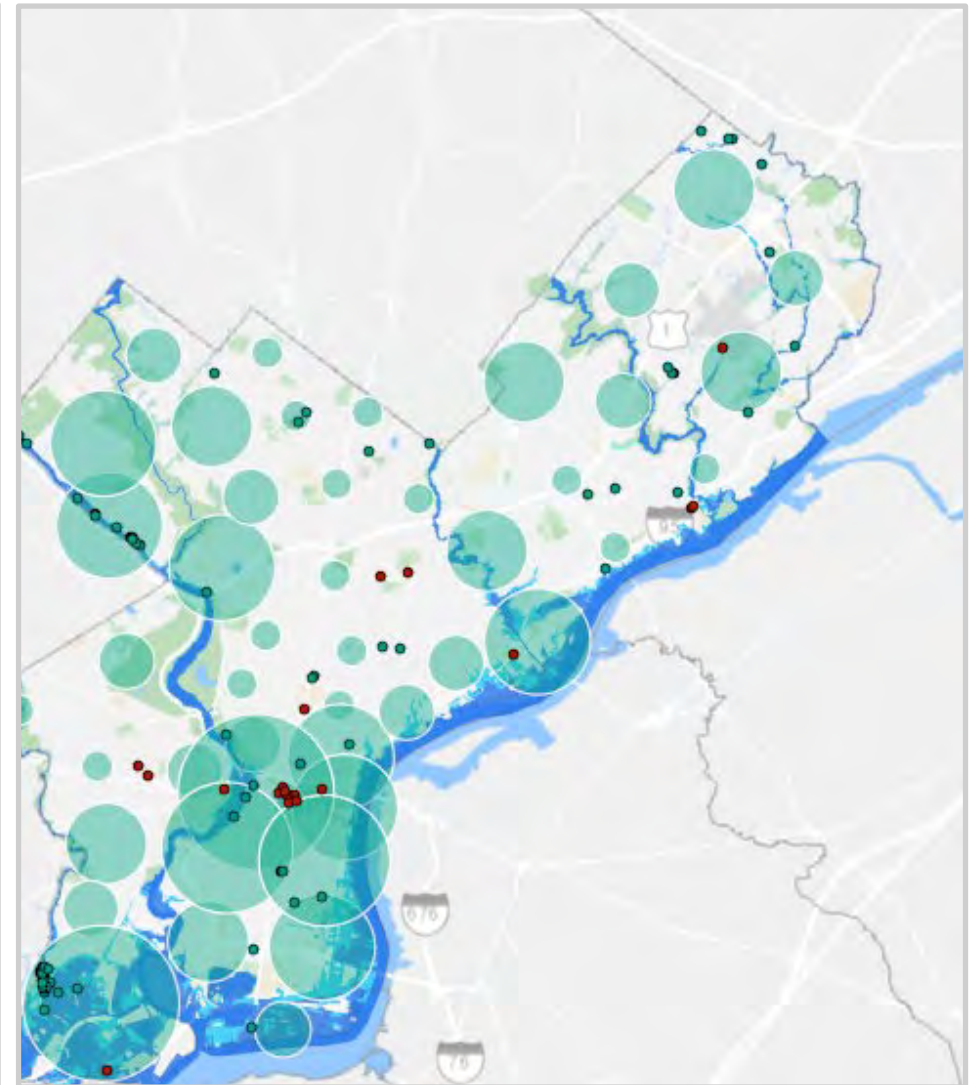
COST OF FLOOD INSURANCE

Losses and Insurance

Repetitive Loss Properties



NFIP Policies (+/- 4,200)



NFIP ROLE: Federal and State

FEDERAL

- National program oversight
- Risk Identification (mapping)
- Establish development/building standards
- Provide insurance coverage



FEMA

STATE

- State program oversight
- Establish development/building standards
- Provide technical assistance to local communities/agencies
- Evaluate and document floodplain



pennsylvania
DEPARTMENT OF COMMUNITY
& ECONOMIC DEVELOPMENT



pennsylvania
EMERGENCY MANAGEMENT AGENCY

NFIP ROLE

Local Jurisdiction

Local Officials and Floodplain Administrators

[Licenses & Inspections, Planning Commission, Floodplain Manager]

- Adopt and enforce floodplain management ordinance compliant with Federal/State laws
- Issue or deny development
- Inspect development and maintain records
- Make substantial damage determinations
- Regulations apply to Special Flood Hazard Area (SFHA) on the Flood Insurance Rate Map (FIRM)
- Development oversight is a local responsibility our local regulations are located in the Zoning and Building Codes

FEMA COMMUNITY ASSISTANCE VISIT [CAV]

- Audit of the last 5 years of floodplain permits issued
- Tour throughout the community for non-permitted development
- Review of the community's "floodplain program"
- Review of community's compliant floodplain regulations

RESULTS:

- Potential violations of individual properties/development
- NFIP program compliance (codes, practice, etc.)
- Violations may lead to the locality being placed on **Probation**
- **NFIP Probation**
 - \$50 surcharge to all NFIP policy holders, yearly until probation is lifted

ORDINANCE NON-COMPLIANCE

Failure to adopt a compliant ordinance by map effective date or having non-compliant ordinance = **easiest way to get suspended**

Unanswered CAV can also result in suspension

- Serious ramifications:
 - No federally backed mortgages or home equity loans in floodplain areas
 - No renewals of existing flood insurance policies
 - Loss of most forms of Disaster Assistance
 - No federal grants or loans
 - Loss of subsidized insurance for Pre-FIRM structures

FLOOD HAZARD INFORMATION

FEMA FLOOD MAP SERVICE CENTER

msc.fema.gov

FEMA Flood Map Service Center: Search By Address


Enter an address, place, or coordinates: ?


Whether you are in a high risk zone or not, you may need [flood insurance](#) because most homeowners insurance doesn't cover flood damage. If you live in an area with low or moderate flood risk, you are 5 times more likely to experience flood than a fire in your home over the next 30 years. For many, a National Flood Insurance Program's flood insurance policy could cost less than \$400 per year. Call your insurance agent today and protect what you've built.

Learn more about [steps you can take](#) to reduce the risk flood damage.

Search Results—Products for PHILADELPHIA, CITY OF

The flood map for the selected area is number **4207570183G** effective on **01/17/2007**

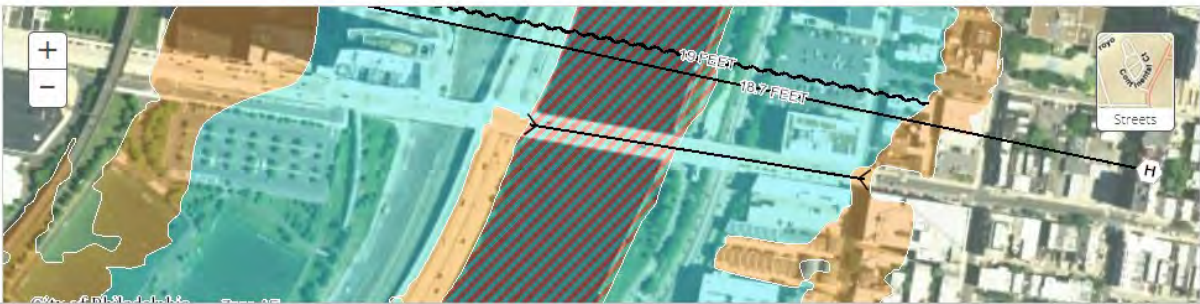
DYNAMIC MAP

PRINT MAP / FIRMette

MAP IMAGE

DOWNLOAD FIRM PANEL

Changes to this FIRM ?

- Revisions (0)
- Amendments (15)
- Revalidations (0)

You can choose a new flood map or move the location pin by selecting a different location on the locator map below or by entering a new location in the search field above. It may take a minute or more during peak hours to generate a dynamic FIRMette.



→ ADDRESS

→ CREATE FIRMette-
8.5x11" Print of
property on FIRM Map

→ FIRM DATE

→ FIRM PANEL #

FIRMette with mapped floodway

National Flood Hazard Layer FIRMette



Legend

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, AO, A
		With BFE or Depth
		Regulatory Floodway Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Tract
		Coastal Tract Base Elevation Line (BFE)
		Limit of Study
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

SPECIAL FLOOD HAZARD AREA - regulated by City of Philadelphia

CROSS SECTION - w/BFE

ZONE AE - FLOODWAY
ZONE AE

0.2% (not regulated)

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below.

accuracy standards

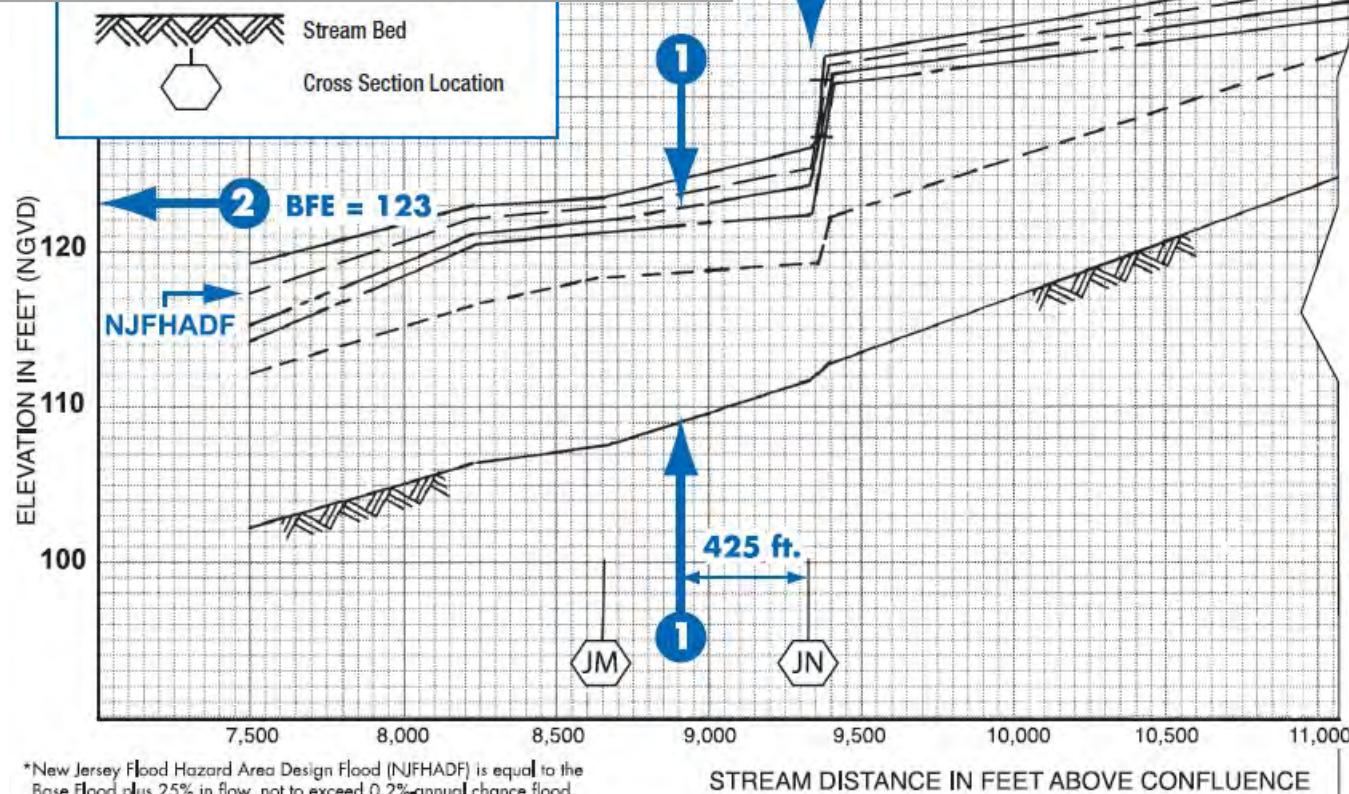
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/9/2018 at 9:08:42 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FLOOD INSURANCE STUDY [FIS]

Riverine flood profile to determine BFE

FLOOD INSURANCE STUDY



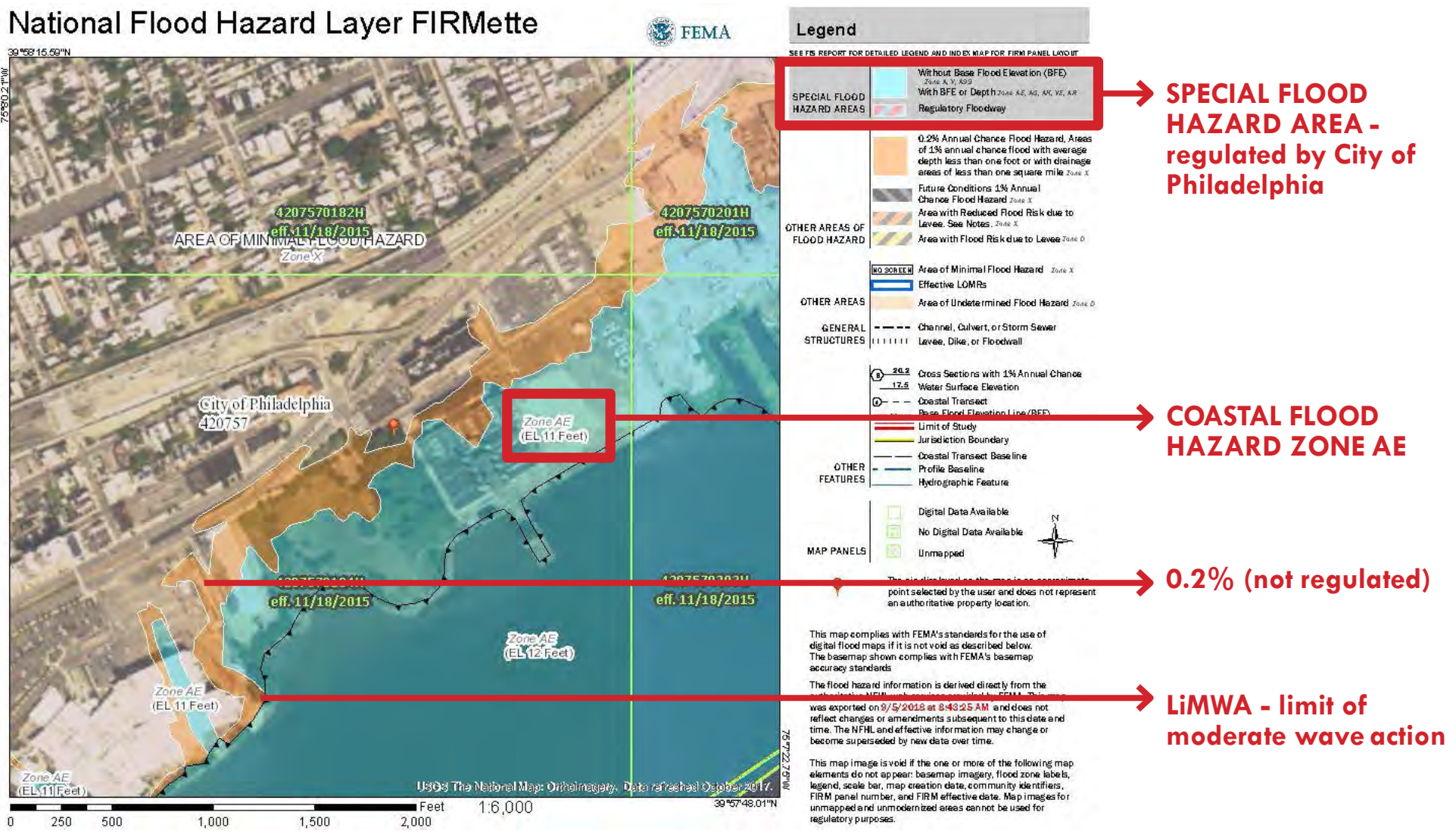
*New Jersey Flood Hazard Area Design Flood (NJFHADF) is equal to the Base Flood plus 2.5% in flow, not to exceed 0.2%-annual chance flood.

Flood Profiles from Flood Insurance Study reports can be used to determine the BFE at a specific site. Profiles also show estimated water surface elevations for floods other than the 1% annual chance flood (100-year).

- 1 On the effective flood map, locate your site by measuring the distance, along the profile baseline of the stream channel, from a known point such as a road or cross section, for example, JM or JN.
- 2 Scale that distance on the Flood Profile and read up to the profile of interest, then across to determine the BFE, to the nearest 1/10 of a foot. (Answer: 123 feet).

FIRMette w/o mapped floodway [Coastal Flood Hazard]

- areas mapped with a LiMWA, must comply with Coastal A Zone codes/regulations



FEMA FLOOD MAP SERVICE CENTER

Previous FIRM maps and Flood Insurance Profiles [FIS]

msc.fema.gov

FEMA Flood Map Service Center: Search By Address

Enter an address, place, or coordinates: [?](#)


philadelphia pa


Whether you are in a high risk zone or not, you may need [flood insurance](#) because most homeowners insurance doesn't cover flood damage. If you live in an area with low or moderate flood risk, you are 5 times more likely to experience flood than a fire in your home over the next 30 years. For many, a National Flood Insurance Program's flood insurance policy could cost less than \$400 per year. Call your insurance agent today and protect what you've built.

Learn more about [steps you can take](#) to reduce the risk flood damage.

Search Results—Products for PHILADELPHIA, CITY OF

The flood map for the selected area is number **4207570183G**, effective on **01/17/2007** [?](#)

DYNAMIC MAP  [PRINT MAP/ FIRMette](#)

MAP IMAGE  [DOWNLOAD FIRM PAPER](#) [Changes to this FIRM](#) [?](#)

Search Results for PHILADELPHIA, CITY OF

Click [subscribe](#) to receive email notifications when products are updated.

Please Note: Searching All Products by county displays all products for all communities within the county. You can refine your search results by specifying your specific jurisdiction location using the drop-down menus above.

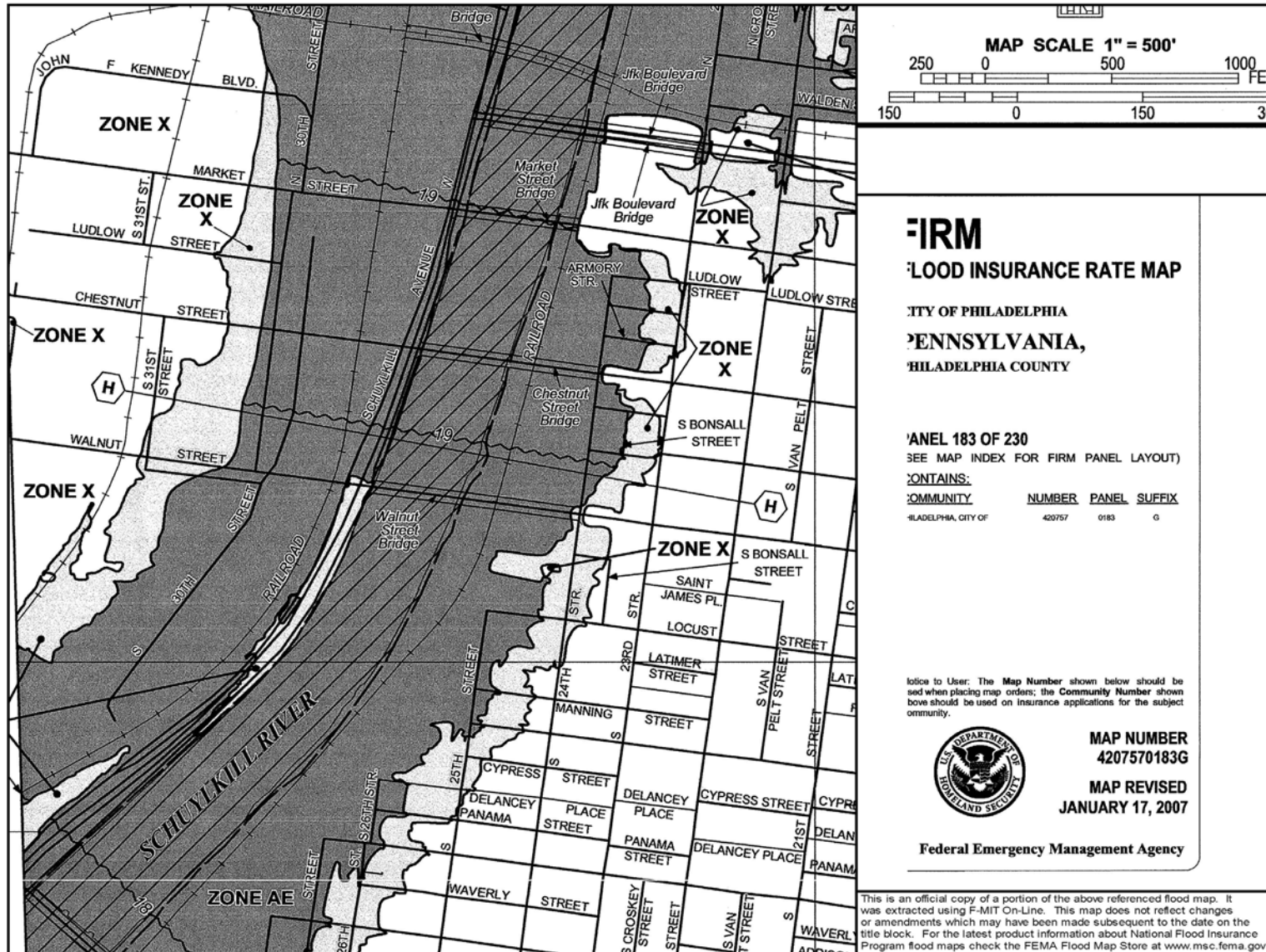
- Effective Products (89) [?](#)
- Preliminary Products (0) [?](#)
- Pending Product (0) [?](#)
- Historic Products (139) [?](#)
- Flood Risk Products (5) [?](#)

[Share This Page.](#)

SEE all effective and historic maps and profiles


FIRMette

Print version (previous)



FIRMette

FEMA Map Change Notifications



Subscribe to receive email notifications when products are updated!

Login

Email Address

Password

[Forgot Password?](#)

[New User? Create a profile now](#)

Would you like to receive Map Service Center announcements via email?

FEMA provides a free email service that sends out notifications when new information is available on a selected topic. This service allows users to select one or more topic-specific channels such as Map Service Center, Flood Hazard Mapping or Hazus through which they will receive notices. To learn more, please visit the [FEMA Email Subscriptions page](#).

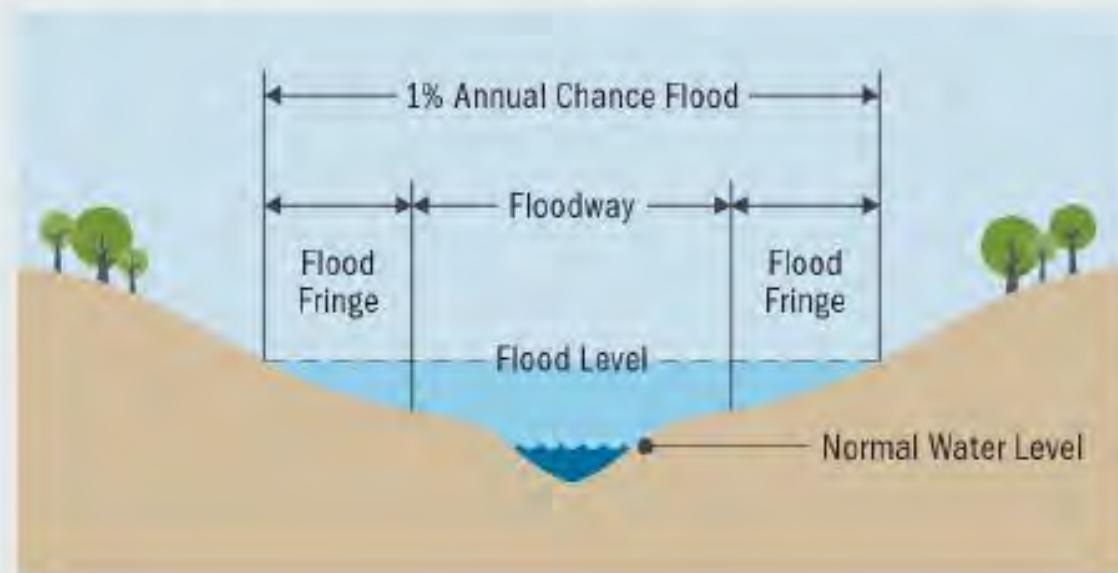
- ### Products
- Pending FIRM Panels
 - Pending FIS Reports
 - Pending FIRM Database
 - NFHL Data
 - LOMR
 - LOMA
 - Revalidations
 - Preliminary Regulatory Products
 - Flood Risk Products

REGULATIONS

Overview

Floodplain Management Regulations

Floodplain management regulations include zoning ordinances, subdivision regulations, building codes, health regulations, and special purpose ordinances (such as a floodplain ordinance, grading ordinance or erosion control ordinance). The term describes any combination of these State or local regulations that provides standards for preventing and reducing flood damage.



REGULATIONS

Various Sources

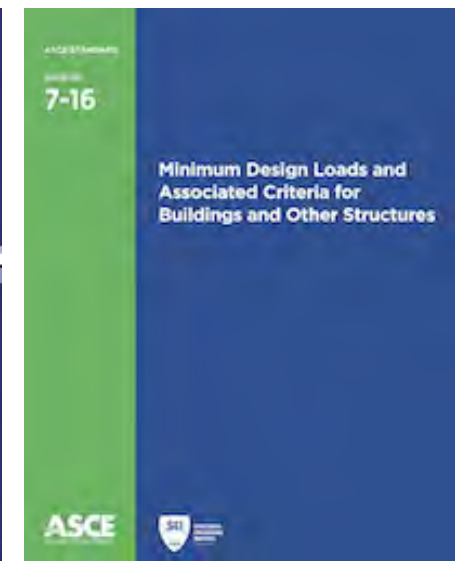
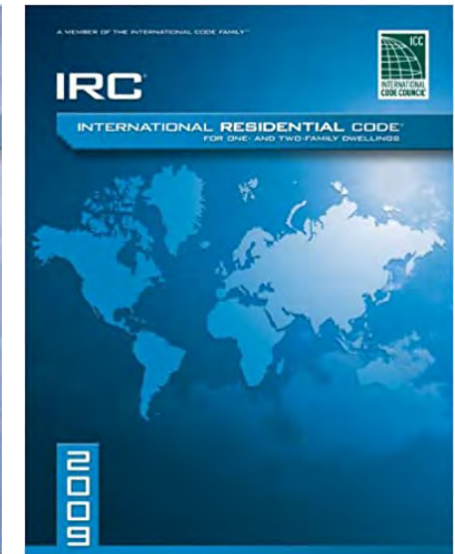
Suggested Provisions

Meeting the Minimum Requirements of
the
**THE NATIONAL FLOOD
INSURANCE PROGRAM**
and the
**PENNSYLVANIA FLOOD PLAIN
MANAGEMENT ACT (1978-166)**
SECTION 60.3 (d)

IBC Appendix G - Flood-Resistant Construction

- Addresses flood-related administrative requirements
- The only place in the I-Code that addresses development **other than buildings**

G101 Administration	G501 Manufactured Homes
G102 Applicability	G601 Recreational Vehicles
G103 Powers and Duties	G701 Tanks
G104 Permits	G801 Other Building Work
G105 Variances	G901 Temp Structures & Temp Storage
G201 Definitions	G1001 Utility & Miscellaneous Group U
G301 Subdivisions	
G401 Site Improvement	



REGULATIONS

NFIP + Building Codes



* NFIP-consistent administrative provisions, community-specific adoption of Flood Insurance Studies and maps, and technical requirements for development outside the scope of the building code (and higher standards, in some communities).

Figure 1-1: Relationship of NFIP regulations to building code flood provisions

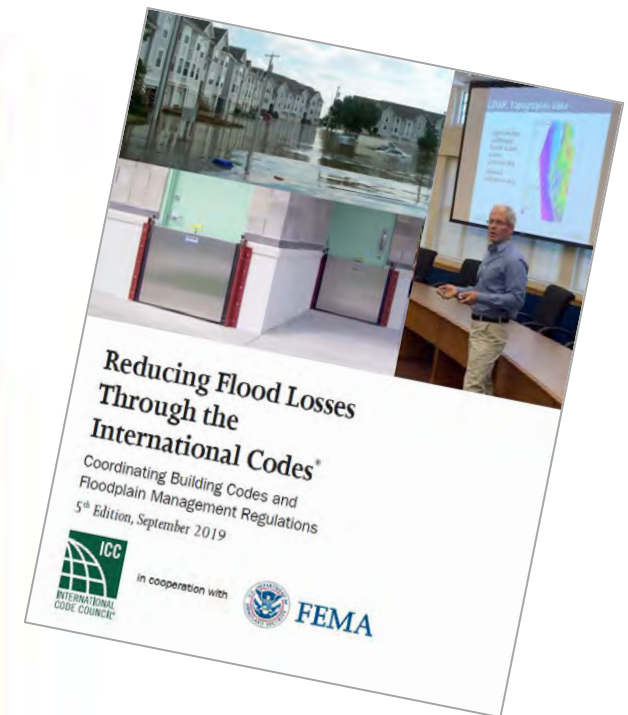
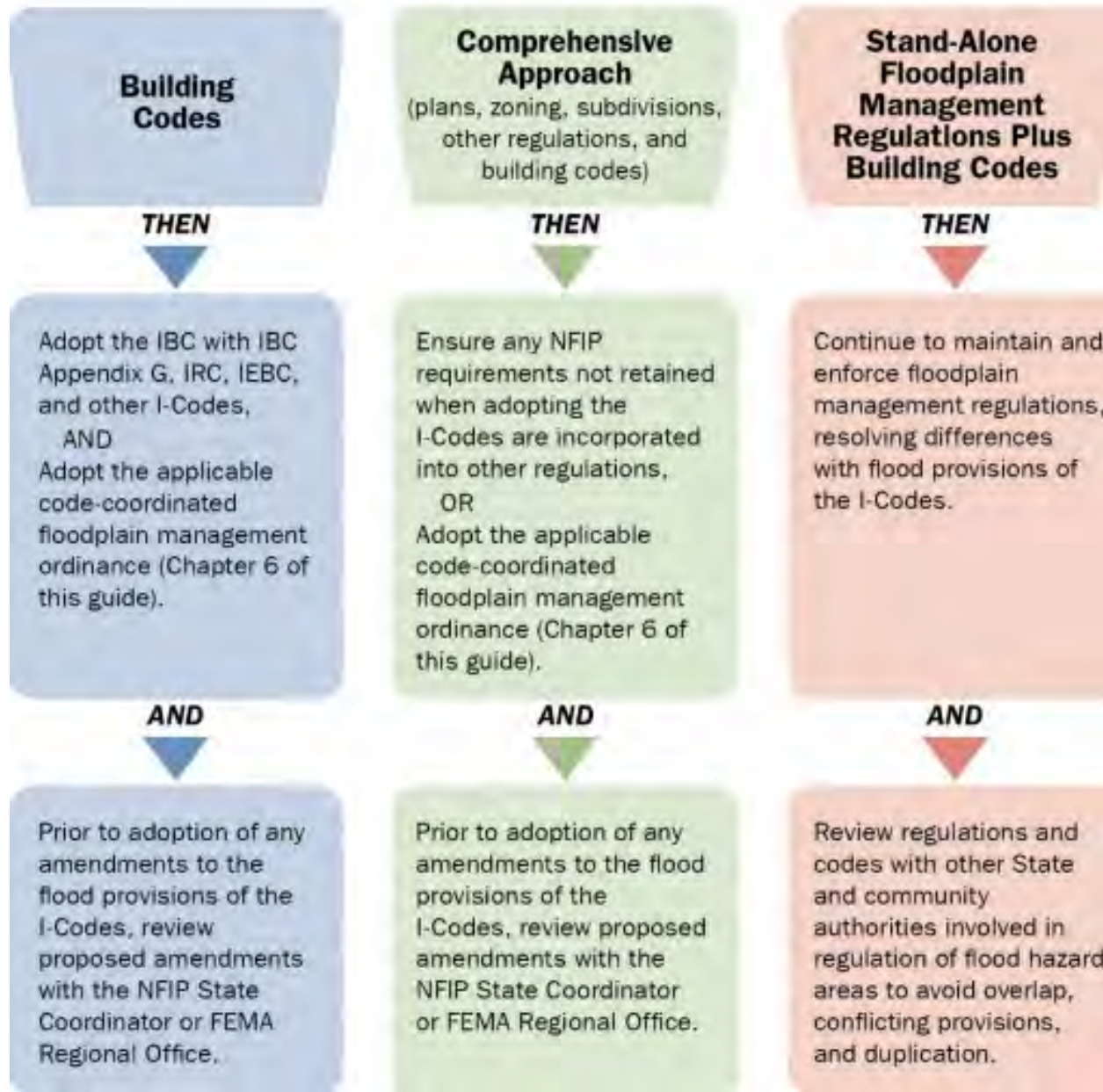
REGULATIONS

Conflicts

- **Wording differences.** If regulations use different, although similar, words to describe similar requirements, the differences may be interpreted to be meaningful, which can complicate resolution of the differences on a case-by-case basis.
- **Differences in requirements.** Although the concept that the more restrictive of conflicting provisions prevails is common, allowing known conflicts to remain can cause confusion. Having such differences places an undue burden on property owners, design professionals, builders, and local officials who have to determine which regulation or code contains the more restrictive provisions. This step adds to the cost of preparing, reviewing, and revising designs and construction documents. Importantly, local officials may be liable for failing to enforce the more restrictive provisions, especially if that failure is shown to have contributed to damage after a flood event.

REGULATIONS

Approaches





REGULATIONS

Benefits of the I-Codes

- **Fewer conflicts**
- **All hazard related building construction requirements in one place**
- **Improved construction quality**
- **Exceed or are more specific than NFIP requirements**
- **Aligned with FEMA's goals and emerging policies**
- **Consistent permit conditions and requirements**
- **Permits issued for all buildings and structures**
- **Strengthened enforcement**
- **Effective, routine inspections**
- **Improved compliance with requirements for existing buildings**
- **Saves money**



REGULATIONS

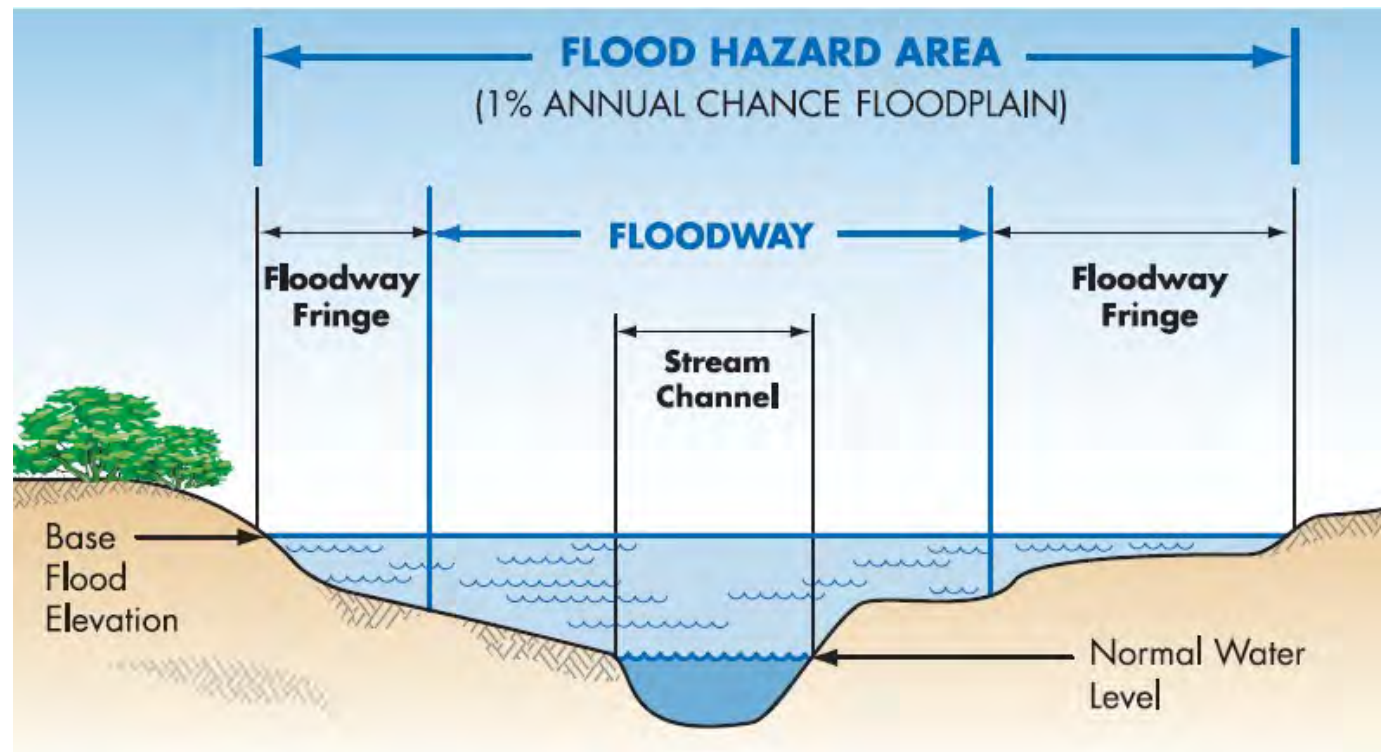
Concerns of the I-Codes

- **Building codes apply only to buildings and structures**
- **States many limit local adoption of higher standards**
- **Certain structures may be exempt or not required to obtain permits**
- **Potential for codes to be inconsistent with the NFIP**

REGULATIONS

Development Definition

- development located in flood hazard areas, including the subdivision of land; installation of utilities; placement and replacement of manufactured homes; new construction and repair, reconstruction, rehabilitation or additions to new construction; substantial improvement of existing buildings and structures, including restoration after damage; **temporary structures and temporary or permanent storage;** utility and miscellaneous buildings and structures

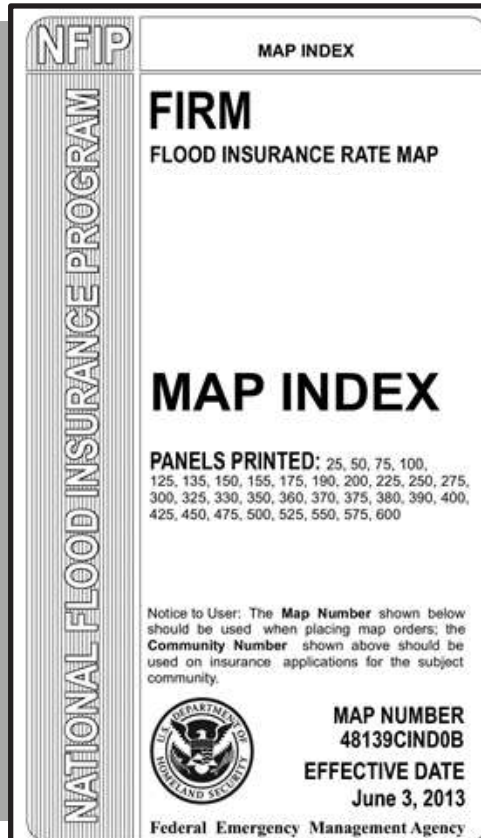


REGULATIONS

Key Dates

PRE-FIRM BUILT BEFORE

or structures mapped into SFHA's
post construction, see historical
FIRM maps



POST-FIRM BUILT AFTER

Regulations **do not** apply
unless substantially improved,
but mitigation is always
highly suggested

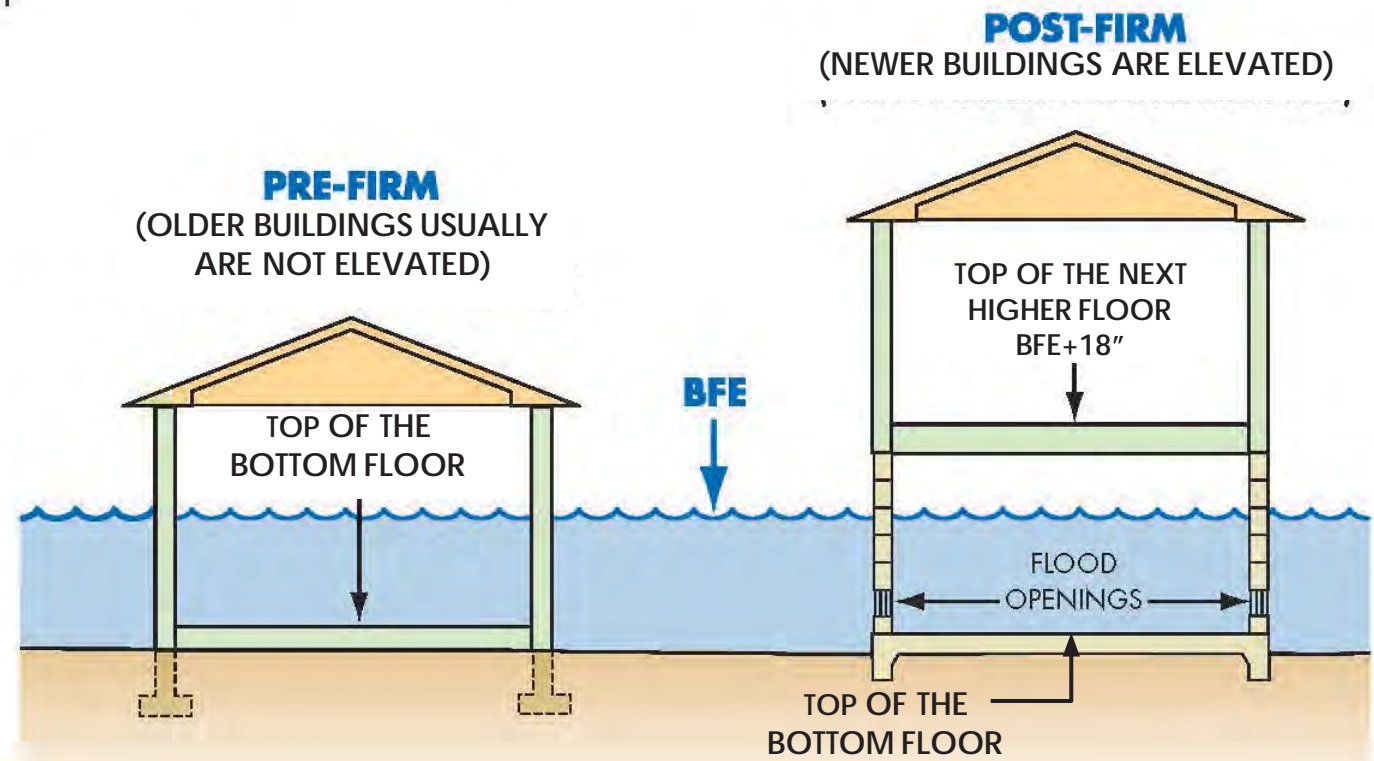
MUST maintain compliance from
date of initial construction and/
or substantial improvement

REGULATIONS

Lowest Floor

- Lowest Floor - lowest enclosed floor including: crawl space, basement, garage.

Pre-FIRM and **Post-FIRM** are insurance terms tied to a community's initial FIRM. The terms are used to determine flood insurance rates. Although common, the terms should not be used to distinguish between new construction built before a community joined the NFIP and those built after, especially in communities where the FIRMs have been revised.



REGULATIONS

Prohibited/restricted uses

Prohibited Uses:

- Hospitals
- Group living uses housing the elderly or disabled persons with limited mobility
- Detention or correctional facilities
- New manufactured home park
- Manufactured home subdivision
- Substantial improvement to an existing manufactured home park or manufactured home subdivision.

REGULATIONS

Prohibited/restricted uses

Development Which May Endanger Human Life

- production or storage or will be used for any activity requiring the maintenance of a supply of more than 550 gallons, or other comparable volume, of any of the following dangerous materials or substances on the premises; or, 3. will involve the production, storage, or use of any amount of radioactive substances; shall be subject to the provisions of this section, in addition to all other applicable provisions. The following list of materials and substances are considered dangerous to human life:

- Acetone
- Ammonia
- Benzene
- Calcium carbide
- Carbon disulfide
- Celluloid
- Chlorine
- Hydrochloric acid
- Hydrocyanic acid
- Magnesium
- Nitric acid and oxides of nitrogen
- Petroleum products (gasoline, fuel oil, etc.)
- Phosphorus
- Potassium
- Sodium
- Sulphur and sulphur products
- Pesticides (including insecticides, fungicides, and rodenticides)
- Radioactive substances, insofar as such substances are not otherwise regulated.

REGULATIONS

Subdivisions

50 lots or at least 5 acres, whichever is the lesser, in Identified Floodplain Areas where base flood elevation data are not available

- hydrologic and hydraulic (H&H) engineering analyses that determine base flood elevations and floodway information
- prepared by a licensed professional engineer in a format required by FEMA for a Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR). Submittal requirements and processing fees shall be the responsibility of the applicant

REGULATIONS

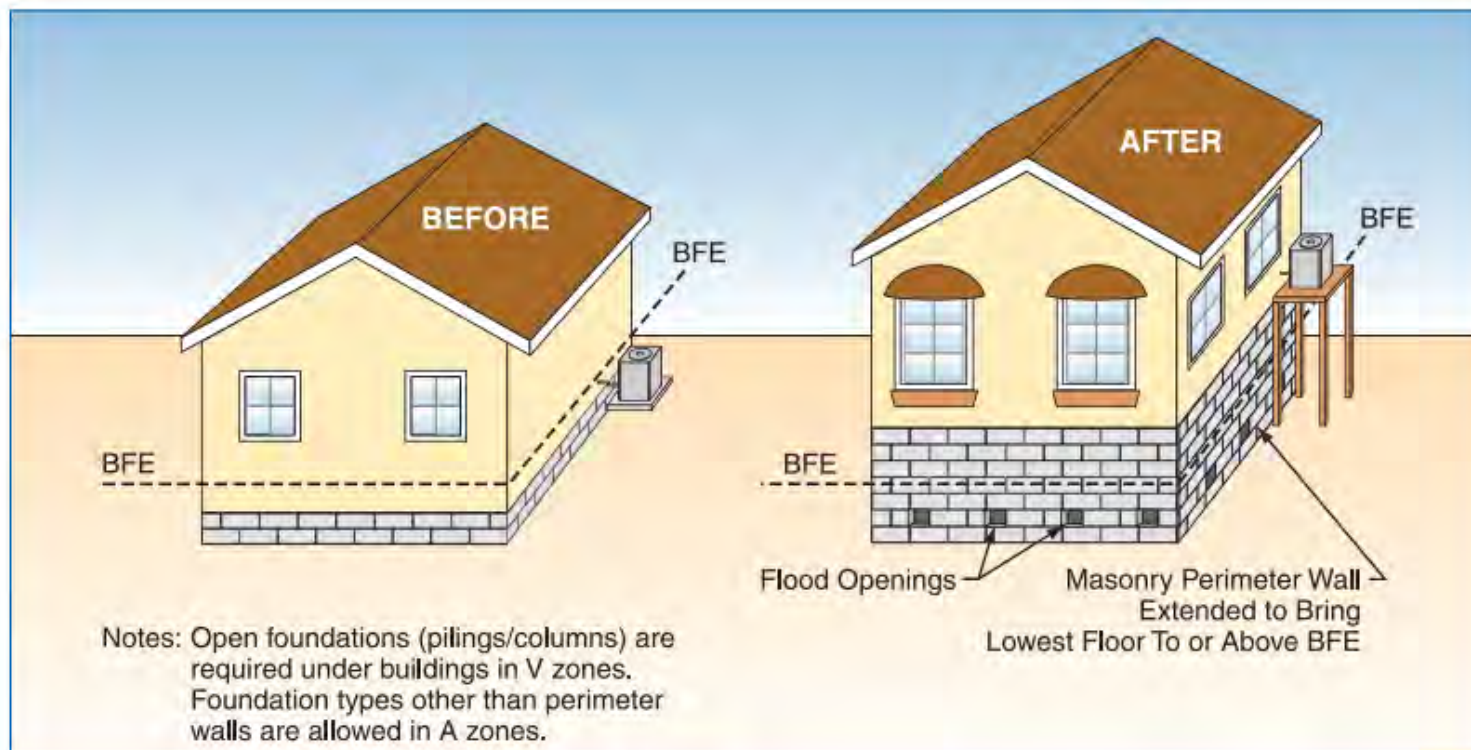
Definitions ASCE 24-14

- **RESIDENTIAL** - building or structures and portions thereof where people live or that are used for sleeping purposes on a transient or non-transient basis - including but not limit to 1-family, 2-family, townhouses, condominiums, multifamily dwellings, apartments, congregate residences, boarding houses, lodging houses, rooming houses, hotels, motels, convents, monasteries, dormitories, fraternity houses, sorority houses, vacation time-share properties and institutional facilities: halfway houses, social rehabilitation facilities, alcohol and drug centers, detoxification facilities
- **NON-RESIDENTIAL** – not mentioned above
- **CRITICAL/ESSENTIAL FACILITIES** (required to have 24” freeboard) – Generally structures needed in emergency events (see for full list)

REGULATIONS

Existing Structures: Substantial Improvements

- means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure (or smaller percentage if established by the community) before the “start of construction” of the improvement. This term includes structures that have incurred “substantial damage,” regardless of the actual repair work performed



REGULATIONS

Substantial Improvements - VALUE OF WORK



Substantial Improvement Calculation

$$\frac{\text{IMPROVEMENT VALUE}}{\text{MARKET VALUE}} = \text{PERCENTAGE OF IMPROVEMENT}$$

ESTIMATED COST

- Materials and labor, including the estimated value of donated or discounted materials and owner or volunteer labor, plus sales tax
- Site preparation related to the improvement or repair (e.g., foundation excavation or filling in basements)
- Demolition and construction debris disposal
- Construction management and supervision
- Structural elements and exterior/interior finishes
- Utility and service equipment

Items that can be excluded:

- Costs to obtain or prepare plans and specifications
- Land survey costs
- Permit fees and inspection fees
- Outside improvements, including landscaping, irrigation, sidewalks, driveways, fences, yard lights, swimming pools, pool enclosures, and detached accessory structures (e.g., garages, sheds, and gazebos)
- Costs required for the minimum necessary work to correct existing violations of health, safety, and sanitary codes

REGULATIONS

Substantial Improvements - MARKET VALUE

City of Philadelphia **Property** WWW.ATLAS.PHILA.GOV

Property 2301 MARKET ST Translate

2301 MARKET ST
Philadelphia, PA 19103-1338

Address **INSERT ADDRESS** Unit #

OWNER _____

PECO

MAILING ADDRESS
2301 MARKET ST
Philadelphia, PA
19103-1338

REAL ESTATE TAX BALANCE _____

Real Estate Tax account balances have not yet been added to this application.

[VIEW THE TAX BALANCE](#)

VALUATION HISTORY _____

ADD TO GET MARKET VALUE

Year	Market Value	Taxable Land	Taxable Improvement	Exempt Land	Exempt Improvement
2019	\$121,612,200	\$24,537,640	\$97,074,560	\$0	\$0
2018	\$110,000,000	\$23,100,000	\$86,900,000	\$0	\$0
2017	\$75,000,000	\$33,057,600	\$41,942,400	\$0	\$0
2016	\$74,000,000	\$33,057,600	\$40,942,400	\$0	\$0
2015	\$73,000,000	\$33,057,600	\$40,942,400	\$0	\$0

See in Google Street View [↗](#)

These maps are created for reference only and do not represent precise legal boundaries. For more information about deeds, please visit [Atlas](#).

OPA ACCOUNT **883054500** HOMESTEAD EXEMPTION **No**

DESCRIPTION **OFF BLD N/PKG N/COM MASON**

CONDITION

REGULATIONS

Substantial Improvements - APPRAISAL

TO CHALLENGE THE MARKET VALUE: CERTIFIED APPRAISAL

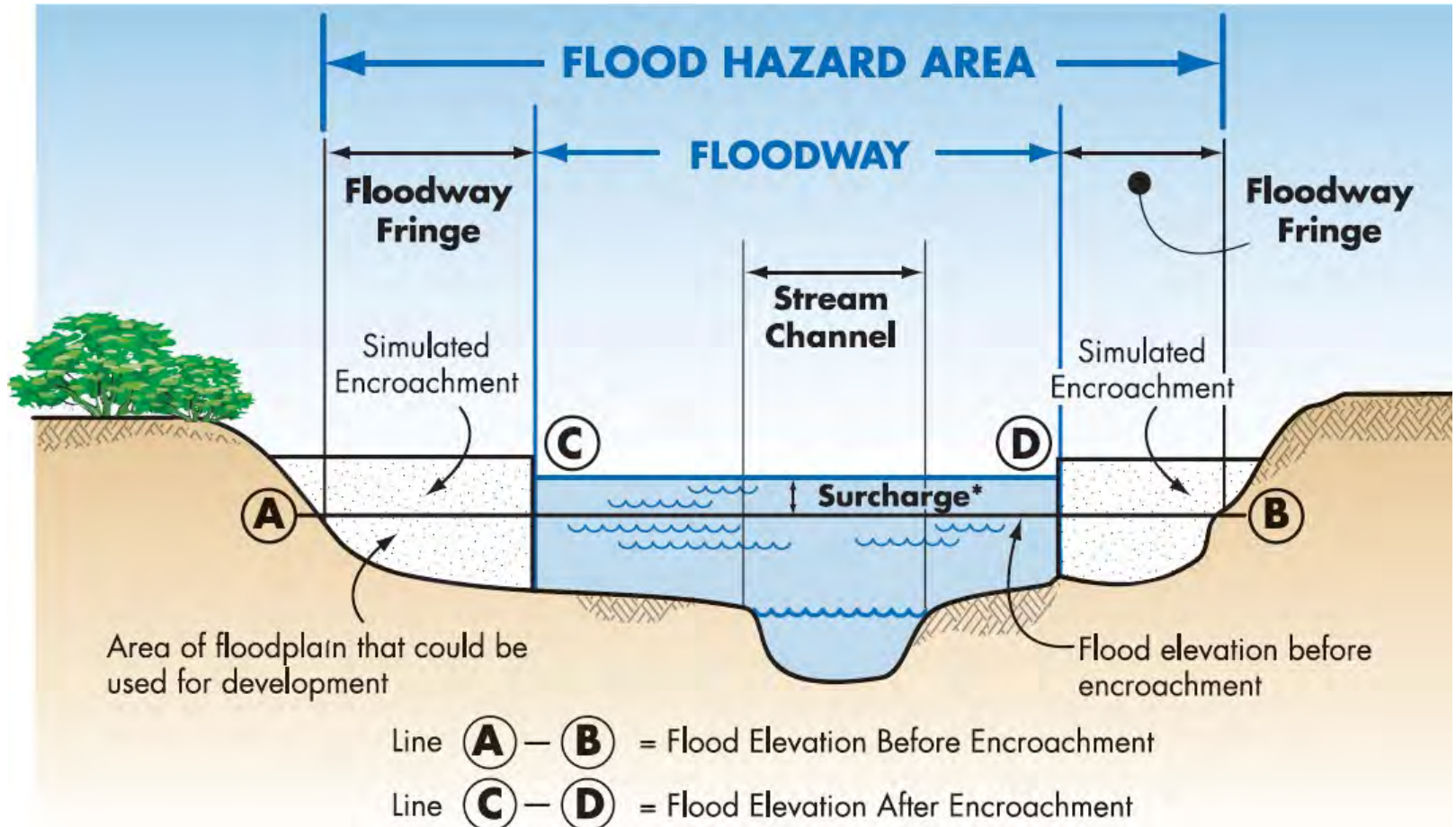
- Licensed Appraiser in Pennsylvania
- Report
 - Identify intended user (including property owner)
 - Completed less than 1 year before floodplain application
 - “Market Approach” is preferred - for structure only, land must be broken out (**NOTE: to separate the market value of a structure from the value of the land on which it is located, appraisers may need to do more research than is normally undertaken in order to reasonably allocate the total value between the structure and the land**) - for multiple buildings on one parcel, each must be assessed for existing market value
 - “Income Capitalization Approach” is not acceptable
 - All values must be for existing conditions, without any proposed improvements



REGULATIONS

Floodway

- **No Rise** study must be completed, with technical analysis (usually and H&H Study)
- Other local, state, and federal permits apply (DEP, USACE, Submerged Lands License)



REGULATIONS

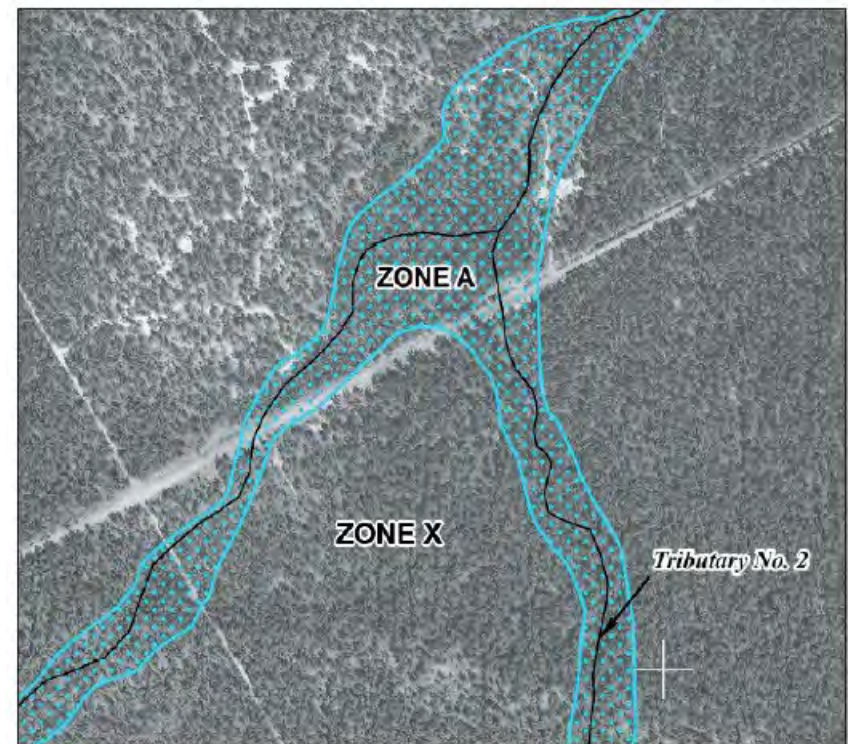
Alteration or Relocation of a Watercourse

- Included encroachment, alteration and improvements
- Notification: adjacent municipalities (which may be affected by such action), FEMA and PA-DCED.
- Must not reduce or impede the flood carrying capacity of the watercourse in any way
- No Rise study must be completed, with technical analysis
 - Hydrologic and Hydraulic Study
- Other state and federal permits (obtained before local permit)
- FEMA Letter of Map Change (LOMC)
 - Detailed later in this presentation

REGULATIONS

A Zones

- FEMA uses existing information - not engineering studies - to draw Approximate Zone A boundaries. Information may have been provided by the USACE, other federal agencies, State and local agencies, and historic records.
- For existing single family residential and accessory structures, the City may specify the BFE through contour interpolation, for all other development a Hydrologic and Hydraulic Study must be completed to determine a BFE



REGULATIONS

Residential

- Lowest “livable” floor must be BFE+18”
 - Living room, office, bedrooms, bathrooms, etc.
- If spaces below BFE+18”, can only be used for: parking, building access, and incidental storage.
 - Fully enclosed spaces must be “wet-floodproofed” - allow the automatic entry and exit of floodwater, through **Flood Vents**
 - No bathrooms, offices, bedrooms, furniture, etc.
 - No basements or crawl spaces that are below-grade on all sides
 - **Non-conversion** clause on Certificate of Occupancy for space(s) below BFE+18”
 - Space can never be converted to “livable” space
 - Future underpinning is prohibited
 - Use of **Flood Damage Resistant Materials**

REGULATIONS

Residential - w/ enclosures



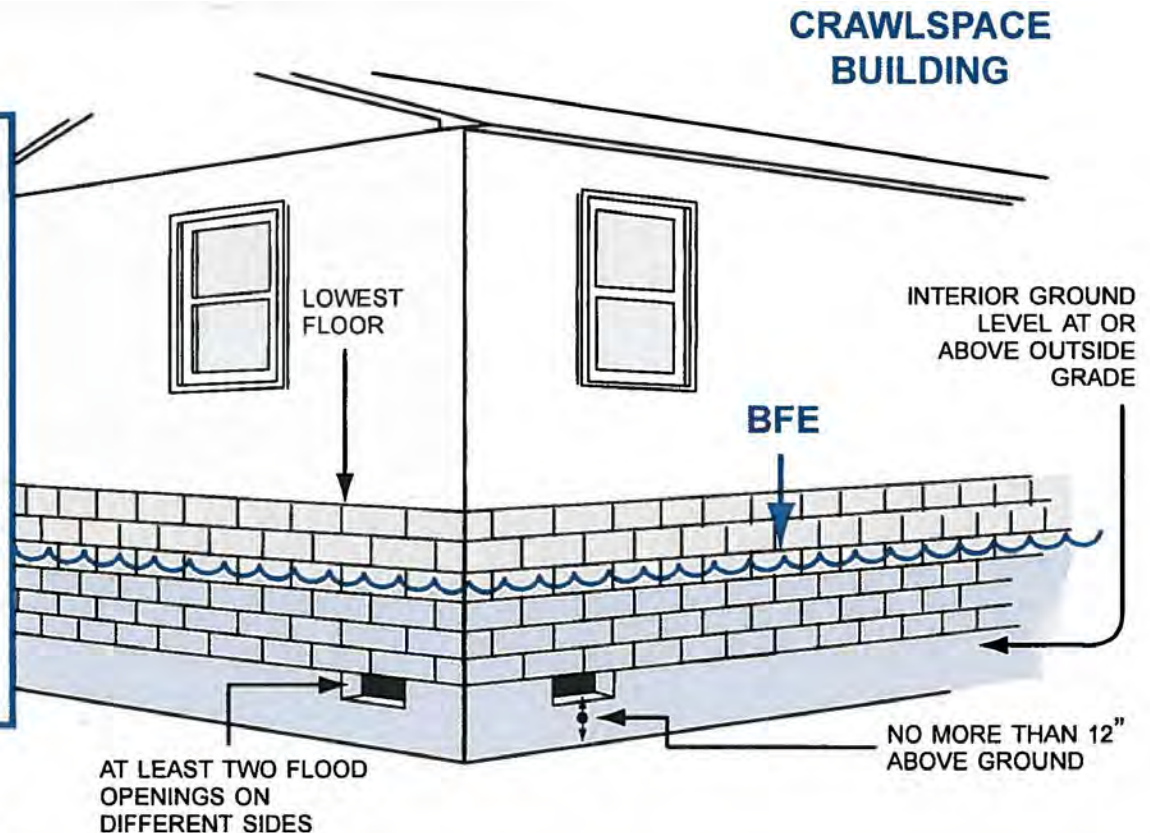
Important

Information

NOTE:

- Total net area of all total openings is 1 sq. in. per sq. ft. of enclosed area.
- A 25' x 45' building needs 1,125 sq. inches of openings.
- Standard ventilation units used in foundation walls must be disabled in the open position to allow water to flow in and out.
- A standard ventilation unit with screen, provides 42 to 65 sq. inches of opening.

ALTERNATIVE: Engineered openings are acceptable if certified to allow adequate automatic inflow and outflow of floodwaters.



Solid perimeter walls can enclose floodprone areas. A crawlspace is a good way to elevate just a couple of feet. In all cases the following are required: flood openings, utilities elevated to or above the BFE, flood resistant materials and limitations on use of enclosures below the lowest floor. Check with the local permit office for details and restrictions.

REGULATIONS

Residential - townhouses w/ flood vents

- Bottom of vent no higher than 12" above adjacent grade
- Vents on at least 2 sides of a structure
- 2 vents per enclosed space
- 1sq/in for every 1sq/ft of enclosed space
- Only vent openings below BFE count

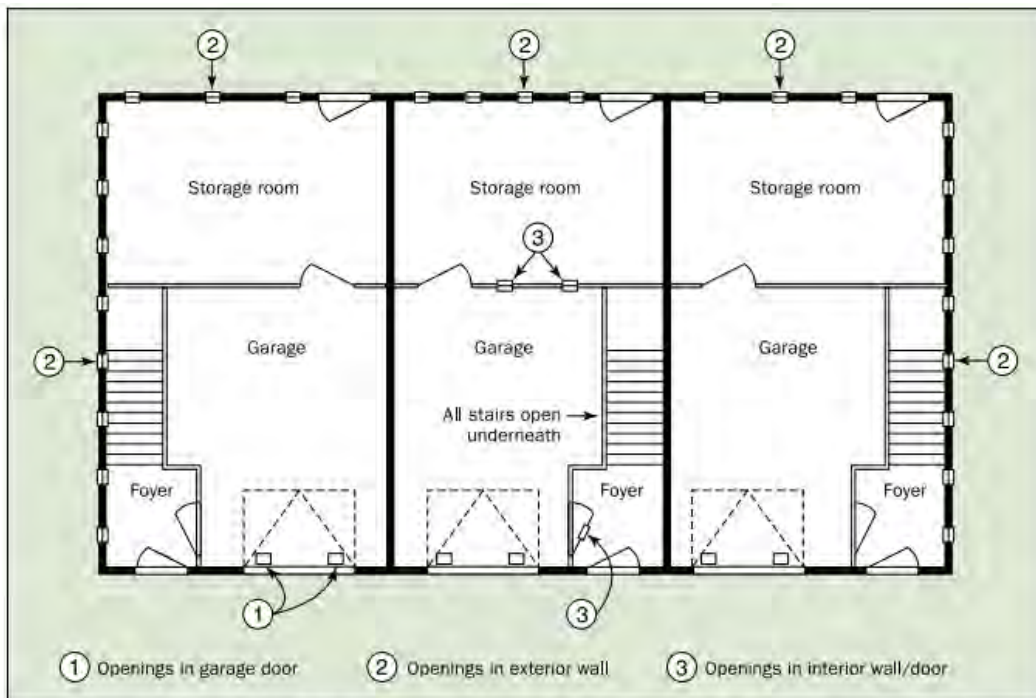
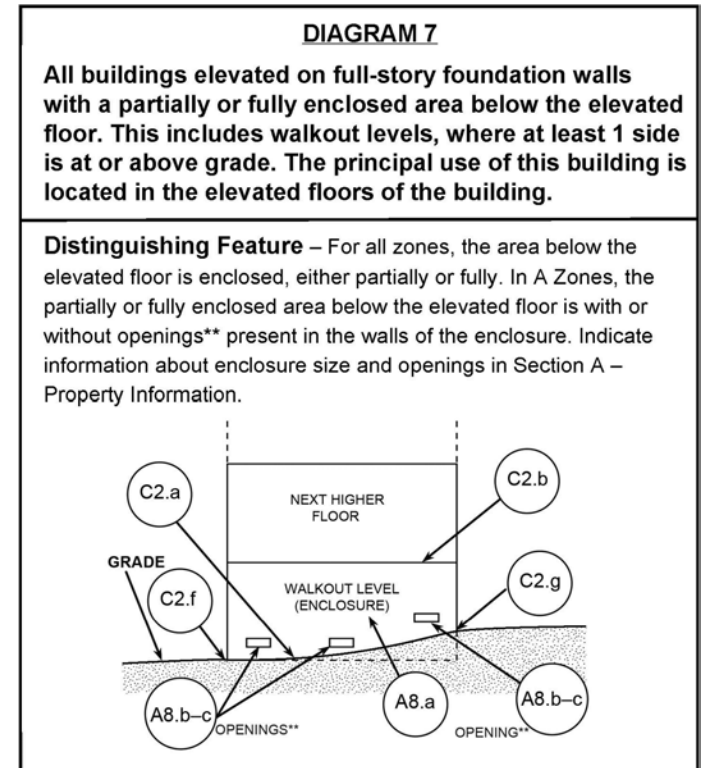


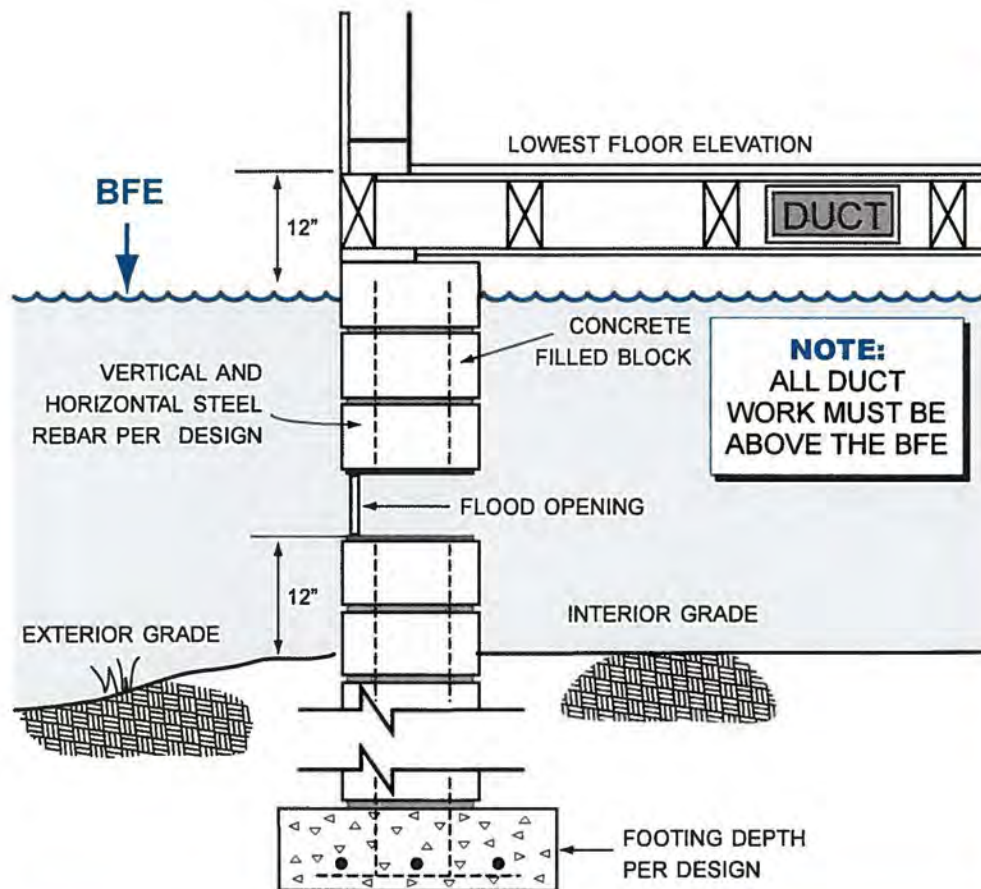
Figure 15: Suggested flood openings in enclosures under elevated townhouses (number of openings for illustration purposes only)



- ① Openings in garage door
- ② Openings in exterior wall
- ③ Openings in interior wall/door
- ④ Openings in exterior door

REGULATIONS

Flood Vents - crawl space



- The Lowest Floor Elevation must be at or above the BFE.
- The bottom of flood openings must be no more than 1 foot above the grade.
- Standard ventilation units must be permanently disabled in the "open" position to allow water to flow in and out.
- Interior and exterior grades should be equal on at least one side.

Calculate Net Flood Opening:

A building that measures 25' x 45' has 1,125 square feet of enclosed crawlspace. Flood vents must provide 1,125 sq. in. of net open area (or have certified engineered openings). If a standard air vent unit provides 60 sq. in. of net open area, then to satisfy the flood opening requirement 19 vent units are required (1,125 divided by 60).

REGULATIONS

Flood Vents - Elevation Certificate

- See A8 and A9 on Elevation Certificate



- Air vents and/or manually operated vents are **not allowed**

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? Yes No

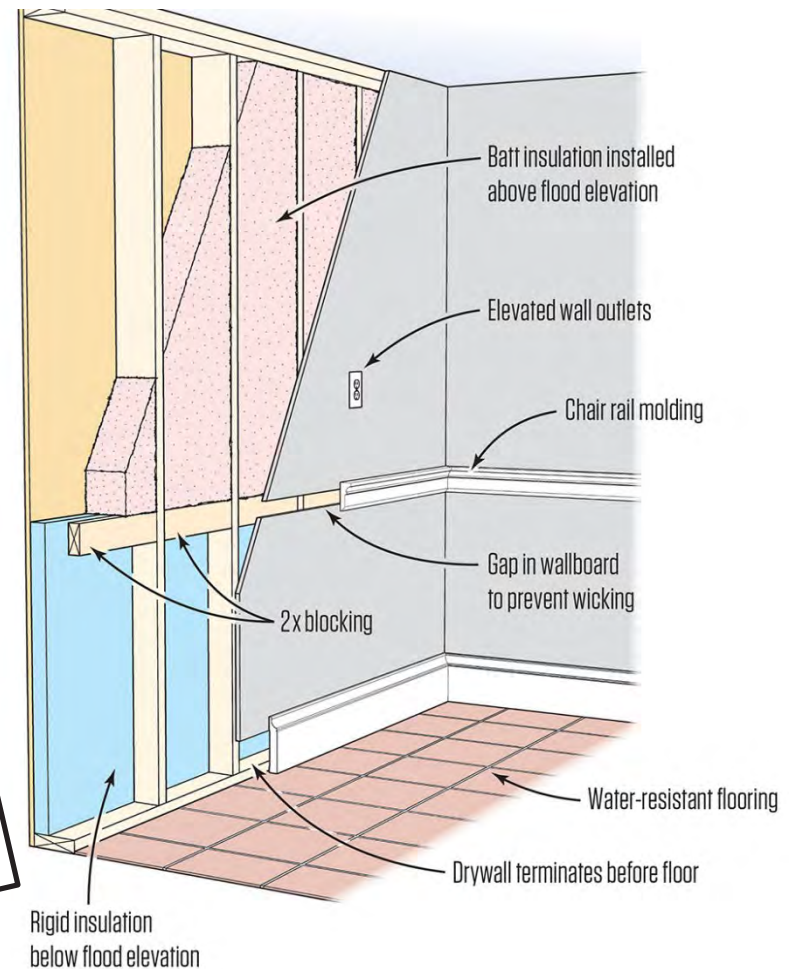
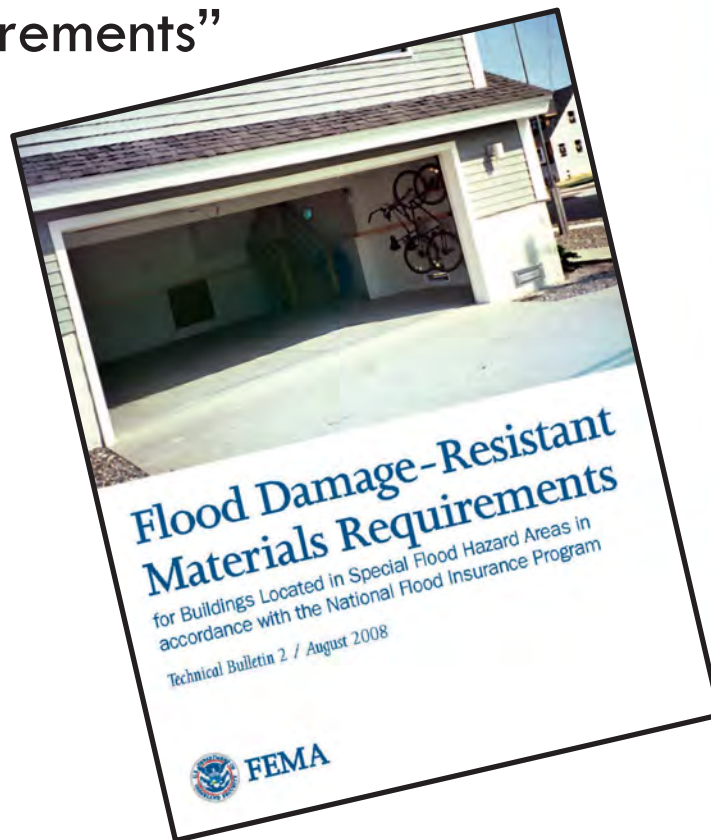
A9. For a building with an attached garage:

- 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? Yes No

REGULATIONS

Flood Damage Resistant Materials

- any building product [material, component or system] capable of withstanding direct and prolonged (at least 72 hours) contact with floodwaters without sustaining significant damage
- See Table 2 in FEMA Technical Bulletin “Flood Damage-Resistant Material Requirements”



REGULATIONS

Non-Residential

- Option: **Wet-floodproofed** or **Dry-floodproofed**
- If **Wet-floodproofed**, then spaces below BFE+18", can only be used for: parking, building access, and incidental storage.
 - Fully enclosed spaces must be "wet floodproofed" - allow the automatic entry and exit of floodwater, through **Flood Vents**
 - **Non-conversion** clause on Certificate of Occupancy for space(s) below BFE+18"
 - Use of **Flood Damage Resistant Materials**
- If **Dry-floodproofed**, below BFE+18"
 - structure, including utilities and equipment, being watertight with all elements substantially impermeable to the entrance of floodwater and with structural components having the capacity to resist flood loads.
 - typical use up to 3 feet
 - **Not** allowed in Coastal A Zones (along Delaware River)

BUILDING PERMITS

Mixed-Use Structures

Considerations:

- **Commercial portions:**

- **Wet-floodproofed**, spaces below BFE+18", use only as parking, building access, and incidental storage

or

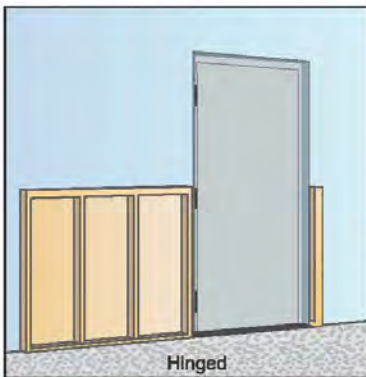
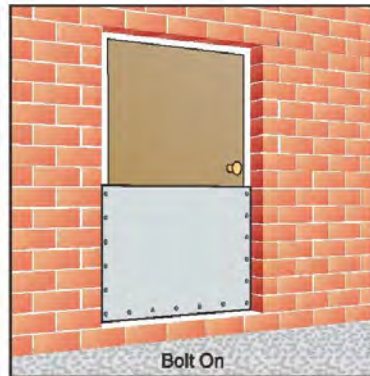
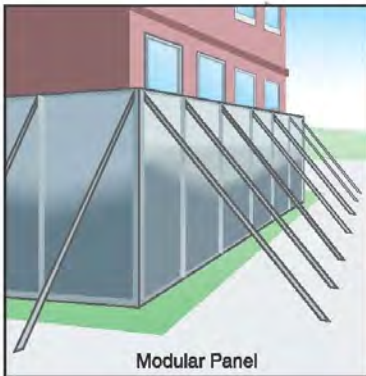
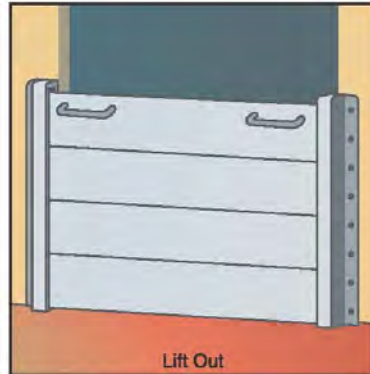
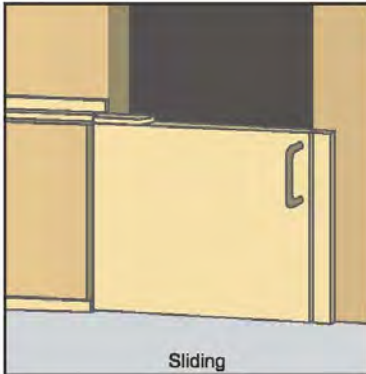
- **Dry-floodproofed**, commercial spaces below BFE+18"

- **Residential portions:** must be elevated BFE+18", including lobbies with furniture, desk attendants, mailboxes, trash receptacles, and resident only facilities (gyms, game rooms, amenity spaces, etc)

- **Wet-floodproofed**, spaces below BFE+18", use only as parking, building access, and incidental storage
 - bicycle parking, stairwell enclosure, elevator vestibule, etc.

REGULATIONS

Dry-floodproofing - examples



REGULATIONS

Dry-floodproofing Certificate & considerations

• Dry-floodproofed considerations:

- Building strength
- Warning time
- Level of protection
- Operational
 - Inspection/maintenance plans
 - **Flood Emergency Operation Plan**, see FEMA technical bulletin “Floodproofing Non-Residential Buildings”
- Seepage
 - Sump pumps
 - Back-flow preventers
- **Floodproofing Certificate**
 - Must be submitted for Certificate of Occupancy

DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
**FLOODPROOFING CERTIFICATE
FOR NON-RESIDENTIAL STRUCTURES**

OMB Control Number: 1680-0048
Revision: 11/2009

Paperwork Burden Disclosure Notice

Public reporting burden for this data collection is estimated to average 3.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this form. Send comments regarding this burden estimate or any aspect of this collection of information, including suggestions for reducing the burden, to Information Collection Management, Department of Homeland Security, Federal Emergency Management Agency, 1200 South Bell Street, Arlington, VA 22204-3025, Paperwork Reduction Project (1680-0048). NOTE: Do not send your completed form to this address.

General: This information is provided pursuant to Public Law 96-511 (the Paperwork Reduction Act of 1980, as amended), dated December 11, 1980, to allow the public to participate more fully and meaningfully in the Federal paperwork review process.

Authority: Public Law 96-511, amended, 44 U.S.C. 3507, and 5 CFR 1320.

Privacy Act Statement

Authority: Title 44 CFR § 61.7 and 61.8.

Principal Purpose(s): This information is being collected for the primary purpose of estimating the risk premium rates necessary to provide flood insurance for new or substantially improved structures in designated Special Flood Hazard Areas.

Routine Use(s): The information on this form may be disclosed as generally permitted under 5 U.S.C. § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA 025 - National Flood Insurance Program Files System or Records Notice 71 Fed. Reg. 77747 (December 16, 2006); DHS/FEMA/PI/025A - National Flood Insurance Program (NFIP) Letter of Map Amendment (LOMA) System of Records Notice 71 Fed. Reg. 7950 (February 15, 2006); and open order issued, written consent, by agreement, or as required by law.

Disclosure: The disclosure of information on this form is voluntary. However, failure to provide the information requested may result in the inability to obtain flood insurance through the National Flood Insurance Program or being subject to higher premium rates for flood insurance. Information will only be released as permitted by law.

Purpose of the Floodproofing Certificate for Non-Residential Structures

Under the National Flood Insurance Program (NFIP), the floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation (BFE). A floodproofing design certification is required for non-residential structures that are floodproofed. This form is to be used for that certification.

A floodproofed building is a building that has been designed and constructed to be watertight (but not necessarily impervious to floodwaters) below the BFE and with structural components having the capacity of resisting hydrostatic and dynamic loads and effects of buoyancy. Before a floodproofed building is designed, numerous planning considerations, including the location, design, construction, and use of the building, must be addressed to ensure that dry floodproofing will be a viable floodplain management option.

The minimum NFIP requirement is to floodproof a building to the BFE. However, when it is below the floodproofed elevation. Therefore, a building has to be floodproofed to one foot above the BFE to qualify for the reduced insurance rates as a building elevated to the BFE.

Additional guidance can be found in FEMA Publication 505, Floodproofing Non-Residential Buildings. <https://www.fema.gov/media-library/download/document/505>.

FEMA Form 580-0-04 (01/13)

FLOODPROOFING CERTIFICATE FOR NON-RESIDENTIAL STRUCTURES (continued)

1. Building Name: _____

2. Address: _____

3. City/County/State: _____

4. Flood Hazard Area: _____

5. Floodproofing Method: _____

6. Floodproofing Elevation: _____

7. Floodproofing Date: _____

8. Floodproofing Engineer/Designer: _____

9. Floodproofing Engineer/Designer License No.: _____

10. Floodproofing Engineer/Designer Title: _____

11. Floodproofing Engineer/Designer Signature: _____

12. Floodproofing Engineer/Designer Date: _____

13. Floodproofing Engineer/Designer Seal: _____

14. Floodproofing Engineer/Designer Stamp: _____

15. Floodproofing Engineer/Designer Title: _____

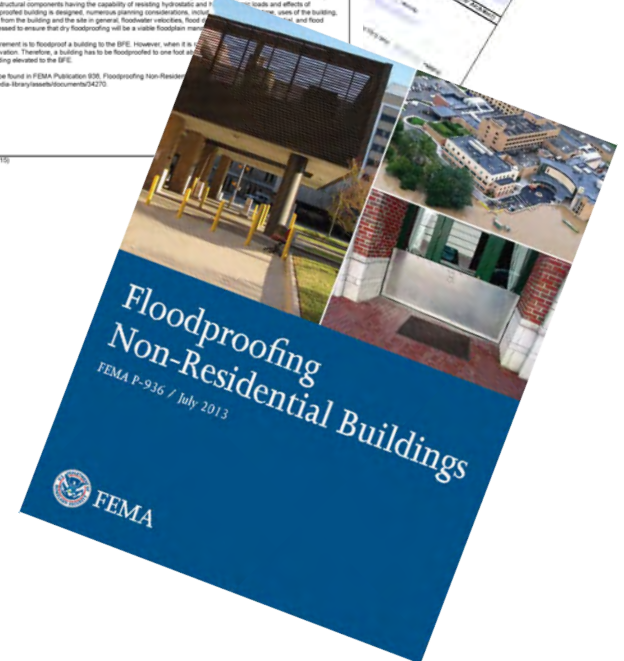
16. Floodproofing Engineer/Designer License No.: _____

17. Floodproofing Engineer/Designer Signature: _____

18. Floodproofing Engineer/Designer Date: _____

19. Floodproofing Engineer/Designer Seal: _____

20. Floodproofing Engineer/Designer Stamp: _____



REGULATIONS

Dry-floodproofing requirements

Flood Emergency Plan that includes:

- Chain of command
- Notification procedures
- Personnel duties
- Location of floodproofing components, install procedures, repair procedures
- Evacuation procedures for building occupants
- Component maintenance procedures during flooding event
- Drill and training program (at least once a year)
- Regular review/update of Flood Emergency Plan

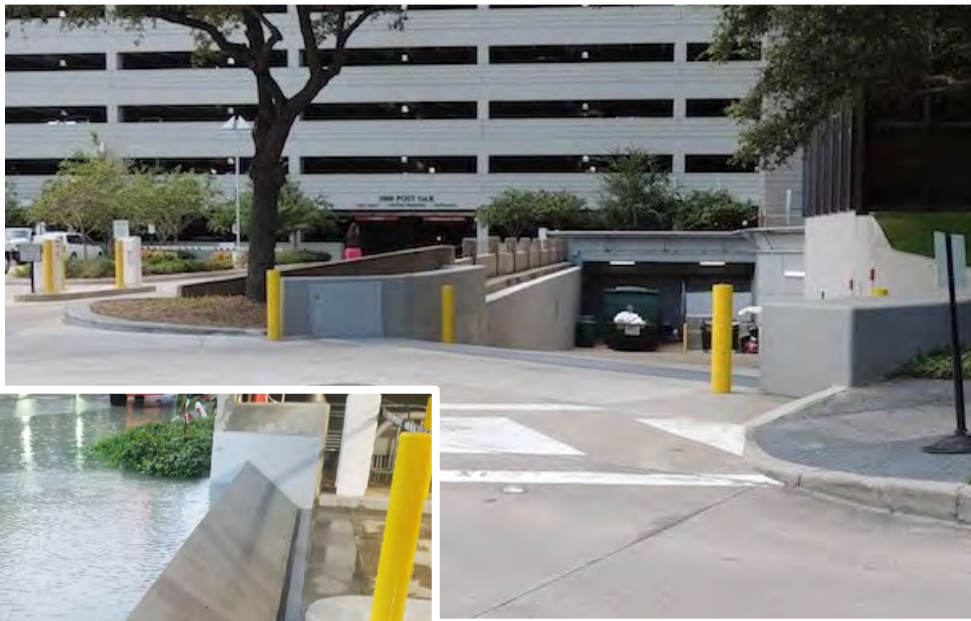
Maintenance Plan (annually):

1. Mechanical equipment such as sump pumps and generators,
2. Flood shields and closures,
3. Walls and wall penetrations, and
4. Levees and berms (as applicable)

REGULATIONS

Below-Grade Parking: Non-residential only

- Must be **Dry-floodproofed**, to BFE+18”
 - **Not** allowed in Coastal A Zones
 - **Not** allowed in fully residential structures (IE. condominium and apartment buildings)



REGULATIONS

Machinery/Equipment

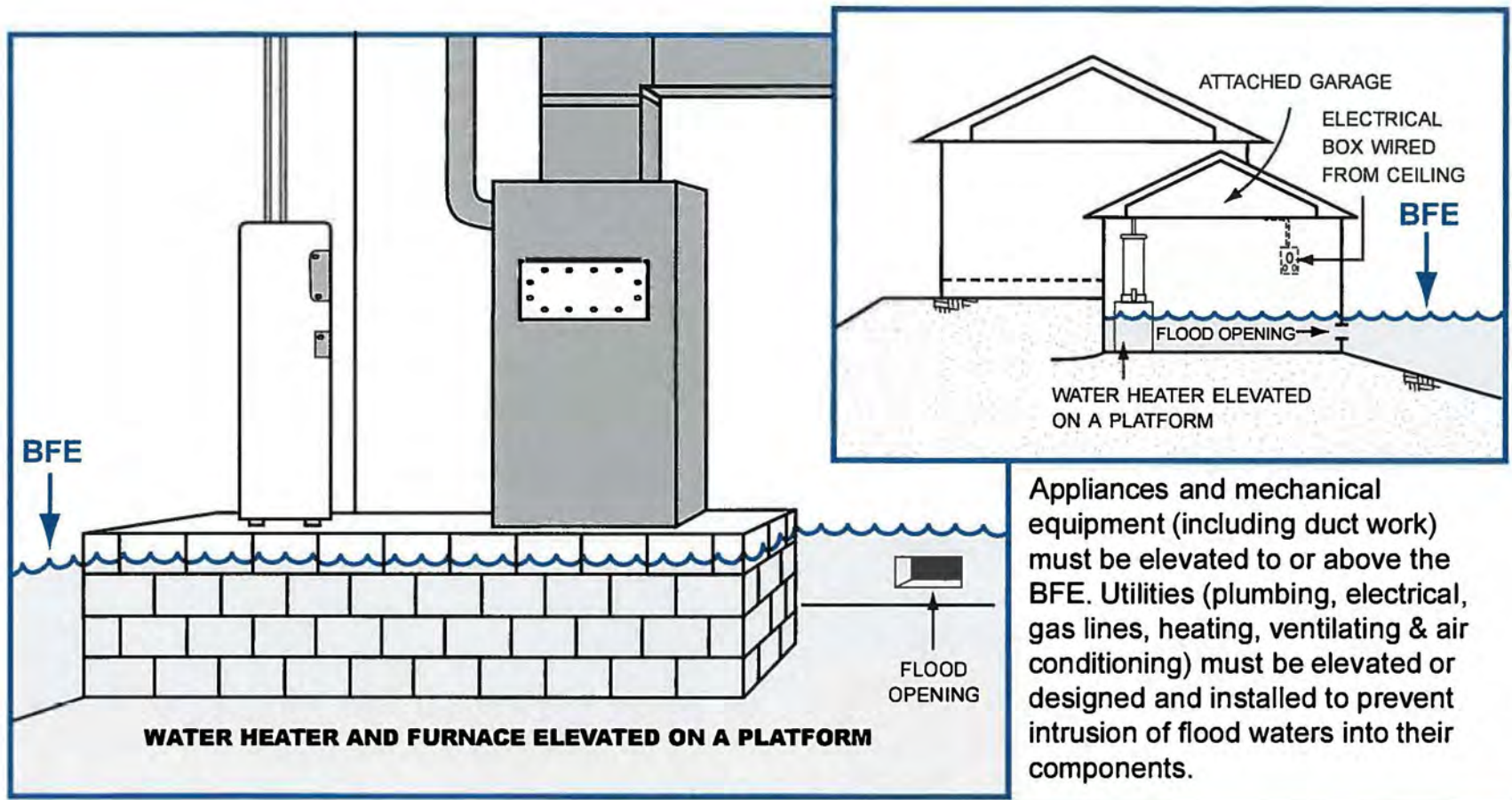
- Mechanical
- Fuel Systems
- Electrical
- Water supply
- Elevator/escalators
- Plumbing
- Transformers
- Generators
- BFE + 18" unless designed to submersible/dry floodproofed/waterproof
- Systems and components emerging from underground shall be designed to be anchored to resist flood loads and debris impact



REGULATIONS

Machinery/Equipment

Utility Service Inside Enclosures

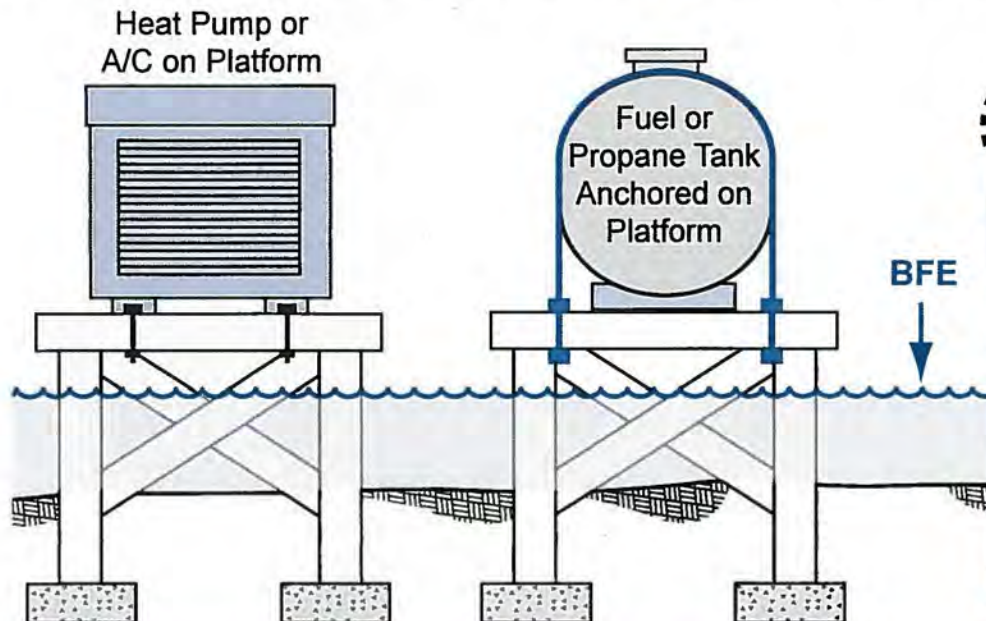


REGULATIONS

Machinery/Equipment

Utility Service / Fuel Tanks

All utilities, appliances, and equipment must be elevated to or above the BFE. Utilities include plumbing, electrical, gas lines, fuel tanks, and heating, ventilating and air conditioning equipment.



Important

Information

For floodplain management purposes, a gas or a liquid storage tank that is principally above ground is considered a structure and must be elevated to or above the BFE.

Fuel and propane tanks may cause explosion and pollution risks during floods. Even shallow water can create significant buoyant forces on tanks so extra care must be taken to ensure that all tanks are appropriately anchored.

Fuel and propane tanks can pose serious threats to people, property, and the environment during flood conditions. Even shallow water can create a large buoyant force on tanks. Videos on "Fuel Tank Flood Hazards" and "How to Anchor Home Fuel Tanks" are available from FEMA Publications at 1-800-480-2520 and "How-To Guides" on anchoring fuel tanks and other flood damage reduction techniques are available at: <http://www.fema.gov/library/viewRecord.do?id=3262>.

REGULATIONS

Elevators

Shafts below BFE+18"

- Flood vents not required
- All mechanicals elevated to BFE+18"
- Float switch
- Programed for cab to rest on the floor above BFE+18"

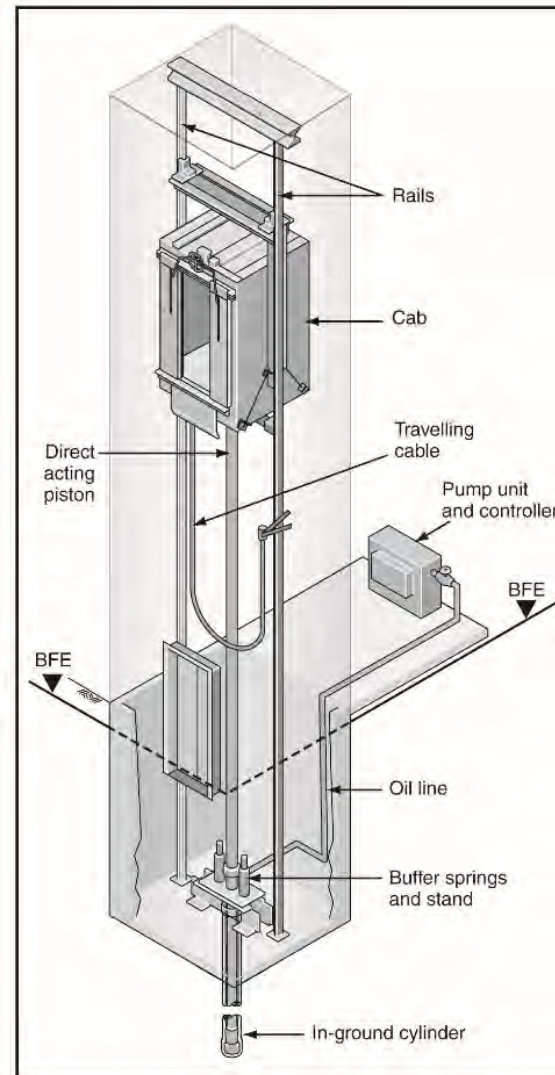


Figure 1. Direct Acting (Holed) Hydraulic Elevator
(Source: Otis Elevator Company)

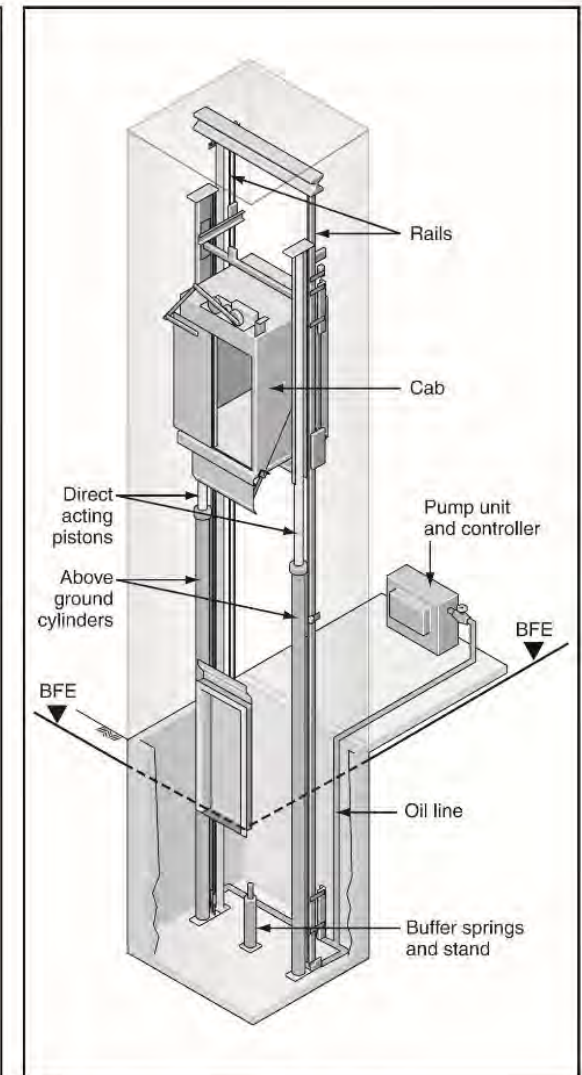


Figure 2. Holeless Hydraulic Elevator
(Source: Otis Elevator Company)

REGULATIONS

Sanitary Systems

- All new or replacement water supply and sanitary sewer facilities and systems shall be located, designed and constructed to minimize or eliminate flood damages and the infiltration of flood waters.
- Sanitary sewer facilities and systems shall be designed to prevent the discharge of untreated sewage into flood waters.
- No part of any on-site waste disposal system shall be located within any identified floodplain area except in strict compliance with all State and local regulations for such systems. If any such system is permitted, it shall be located so as to avoid impairment to it, or contamination from it, during a flood.

REGULATIONS

Streets

- The finished elevation of all new streets shall be no more than one (1) foot below the Regulatory Flood Elevation (PA Model Ordinance- Section 5.03 Design and Construction Standards)



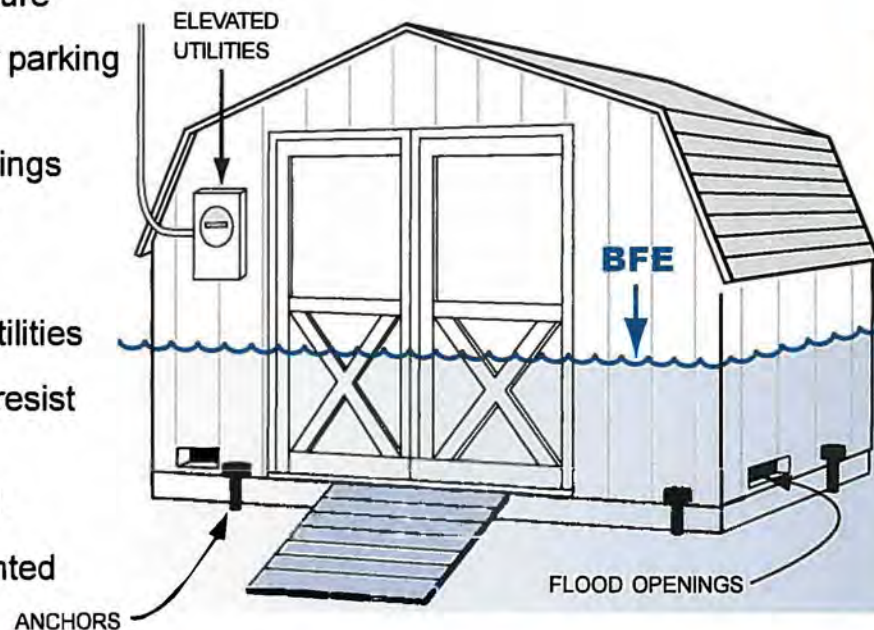
REGULATIONS

Accessory Structures

Accessory Structures

Accessory Structures in a Special Flood Hazard Area:

- Cannot be modified for a different use in the future
- Must be used only for parking or storage
- Must have flood openings
- Must be built of flood resistant materials
- Must have elevated utilities
- Must be anchored to resist floating
- Must not be inhabited
- Must have a documented floor elevation



de Terms and Definitions

Accessory (Appurtenant) Structure means a structure that is located on the same parcel of land as a principle structure and whose use is incidental to the use of the principal structure. Accessory structures should be no more than a minimal initial investment, may not be used for human habitation, and must be designed to minimize flood damage. Examples include: detached garages, carports, storage sheds, pole barns, and hay sheds.

Even small buildings are considered “development” and permits or variances with noted conditions are required. **CAUTION!** Remember...everything inside is likely to get wet when flooding occurs.

REGULATIONS

Vehicles/Trailers

Recreational Vehicles

In a Special Flood Hazard Area, a Recreational Vehicle (RV) must:

- Remain on site for fewer than 180 consecutive days, **and**
- Be fully licensed and ready for highway use; **or**
- Meet the permitting, elevation, and anchoring requirements for manufactured homes of the community's Flood Damage Prevention Ordinance.

A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick-disconnect type utilities and security devices, and has no permanently attached additions.

RVs that do not meet these conditions must be installed, elevated, and secured like a manufactured home, including a permanent foundation and tie-down.



Important

Information

Camping near the water? Ask the campground or RV Park operator about flood warnings and plans for safe evacuations.

REGULATIONS

Seasonal/Temporary Structures

Non-enclosed

- Anchored to withstand the hydrostatic & hydrodynamic loads as well as not become buoyant
- Examples: event tents, pergolas, ice rinks, event stage, etc.

Enclosed

- Anchored to withstand the hydrostatic & hydrodynamic loads as well as not become buoyant
- Parking and Incidental storage use
 - Flood vents
- Use other than parking and incidental storage uses
 - See residential or non-residential standards



REGULATIONS

Storage

Prohibited, unless:

- designed to be easily movable (no equipment required for removing), in the event of a flood (IE. outdoor furniture, items on wheels, etc.),
- anchored to withstand the hydrostatic & hydrodynamic loads as well as not become buoyant
- elevated above BFE+18”



REGULATIONS

Construction Storage/Trailers

Licensed and Road-ready

- On site less than 180 days
- Must be on wheels/chassis
- No connected mechanicals (electric service, plumbing, etc)

More than 180 days and/or connected to mechanicals and/or not on wheels/chassis

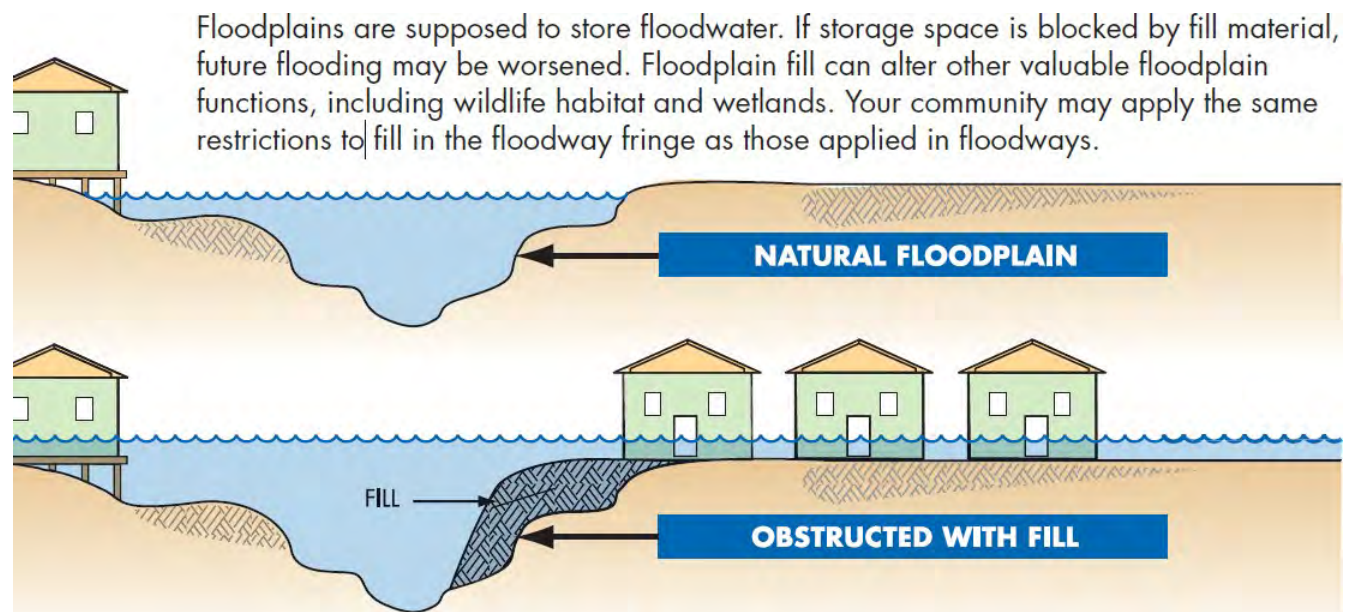
- Anchored to withstand the hydrostatic & hydrodynamic loads as well as not become buoyant
- Elevated to BFE+18”



REGULATIONS

Fill

- If less than 12", in-place dry density is not less than 90% of the max. dry density at optimum moisture content determined in accordance with ASTM D 1557 Less than 180 days
- If over 12", then **GEO-TECHNICAL REPORT** (Section 1803 of IBC)
 - Requires Special Inspections
- **Requires** a Zoning Permit, and a Building Permit if over 5,000 SF
- **Requires** a Letter of Map Change [LOMC] if a Hydrologic and Hydraulic study shows any rise in the BFE



REGULATIONS

Historic Structures

- Analysis that elevating and/or floodproofing would remove it from historic designation
 - Singed and seal analysis from an Architect
- Variance **required** (by building codes)
- Mechanicals should be elevated to BFE+18”
- Flood damage resistant materials should be used in areas below BFE+18”



REGULATIONS

Variations

Requirements:

- Applicant conditions
- Applicant technical requirements
- Community's conditions when granting a variance

Considerations:

- Annual reporting of variations to State and FEMA
- Community:
 - Liability
 - Cumulative impacts on the floodplain of granting multiple similar variations
 - Variance decision will last the life of the structure
 - NFIP participation impact

ELEVATION CERTIFICATE

Requirements

- **CONFIRM CORRECT EDITION**
- **READ INSTRUCTIONS**
- **REQUIRE 3 TIMES:**
(see section C on EC)
 1. ***Floodplain/Zoning/Building Permit submission***
 2. ***During construction - Lowest Floor installation (No vertical work can occur)***
 3. ***Final completion, prior to Certificate of Occupancy***

U.S. DEPARTMENT OF
HOUSING AND SECURITY

FEMA

NATIONAL FLOOD INSURANCE PROGRAM

ELEVATION CERTIFICATE

AND

INSTRUCTIONS

2019 EDITION

OM3 No. 196D-0008
Expiration Date: November 30, 2018

agent/company and (3) building owner:
FOR INSURANCE COMPANY USE

Policy Number: _____

Company NAIC Number: _____

Code: _____

1927 NAD 1983

Replaces all previous editions.

Special Area (OPA)? Yes No

Form Page 1 of 6

ELEVATION CERTIFICATE

How to complete fully and correctly

General:

- All lines shall be completed, and when not applicable an “N/A” should be entered
- Should be signed and sealed by a PA licensed surveyor, architect, or engineer
- **A8-9: Flood Vents**
 - Complete fully per design plans
- **B9: Base Flood Elevation**
 - Confirm vertical datum (based on FIRM/FIS)
 - Rounded to nearest tenth degree, no whole numbers
 - Should be based from Flood Insurance Study [FIS] when cross sections are available. If, no cross section, then use the Flood Insurance Rate Map [FIRM]

ELEVATION CERTIFICATE

How to complete fully and correctly

- **C2.a-h:** Structure design elevations (must be in NGVD 29)
 - **C2.a** lowest floor elevation of lowest enclosed space (IE. crawlspace (rat slab), basement slab, garage slab (if attached - townhouse/rowhouse))
 - **C2.c** is N/A in Philadelphia (No velocity or wave action zones)
 - **C2.e** Lowest machinery/equipment should be identified
 - In “Comments” section at bottom of PG2, list lowest elevations of these mechanicals/equipment if applicable: HVAC, electrical, gas, plumbing, elevators, transformer pad, generator, etc.
- **Floodplain Plan Exhibits:** should always illustrate existing and proposed topography (1-foot contours), BFE should be adjusted to actual existing site contours and **NEVER** just copied and pasted from a FEMA FIRM map. [always require the use of the best available technical data]

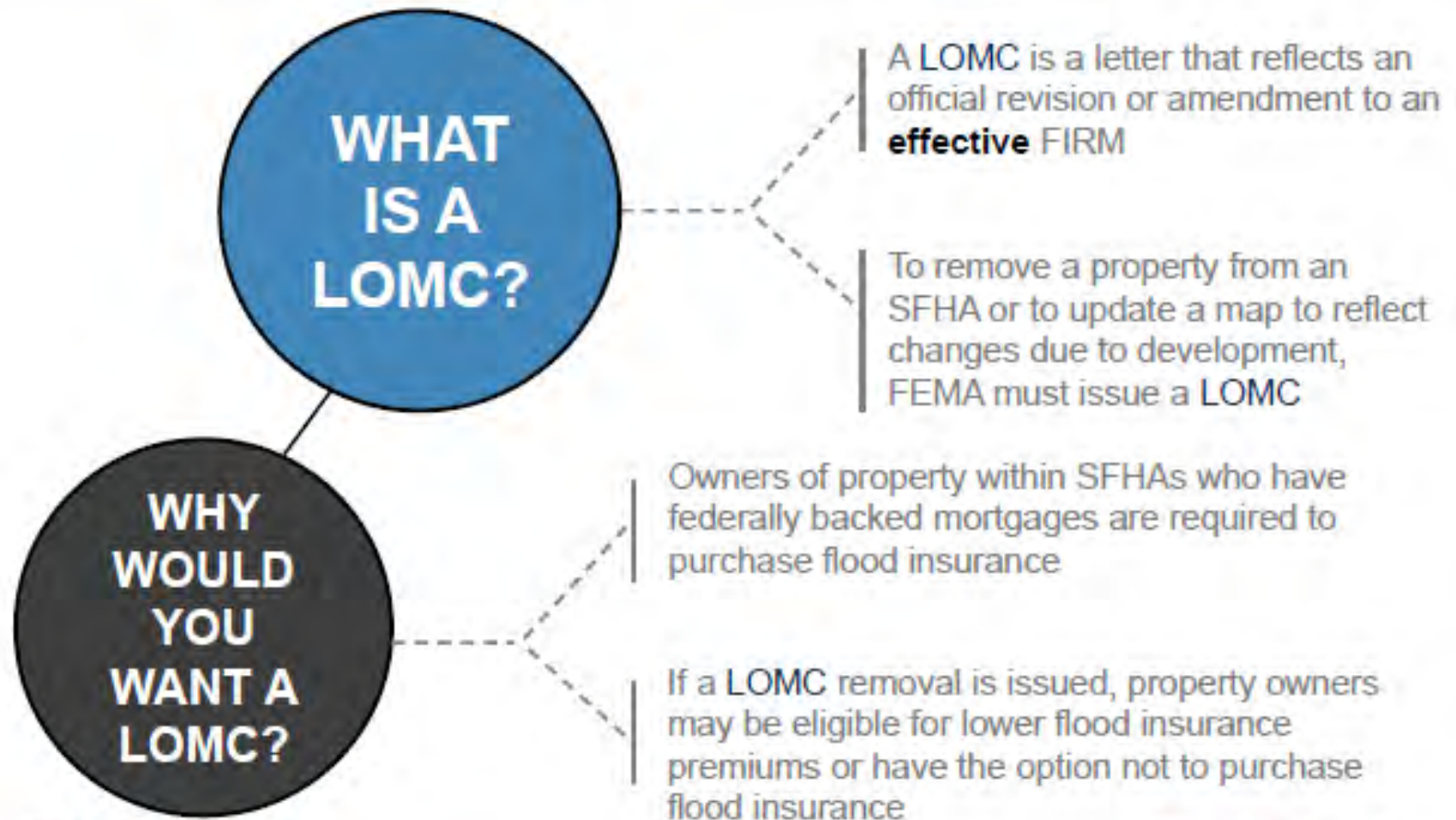
LETTER OF MAP REVISION [LOMC]

Reasons for a Map Change

- **Updated data**
 - Elevation (newer LiDAR or site-specific survey)
 - Flood Study (can cover various geographic sized areas; funded by Federal, State, Local, or private stakeholders)
- **To reflect physical and flood control changes**
 - Fill has been placed
 - New developments or to understand the effects of a proposed development
 - Roadway construction
 - Pier/wharf construction
 - Flood Control Projects (dams, levees, culverts)

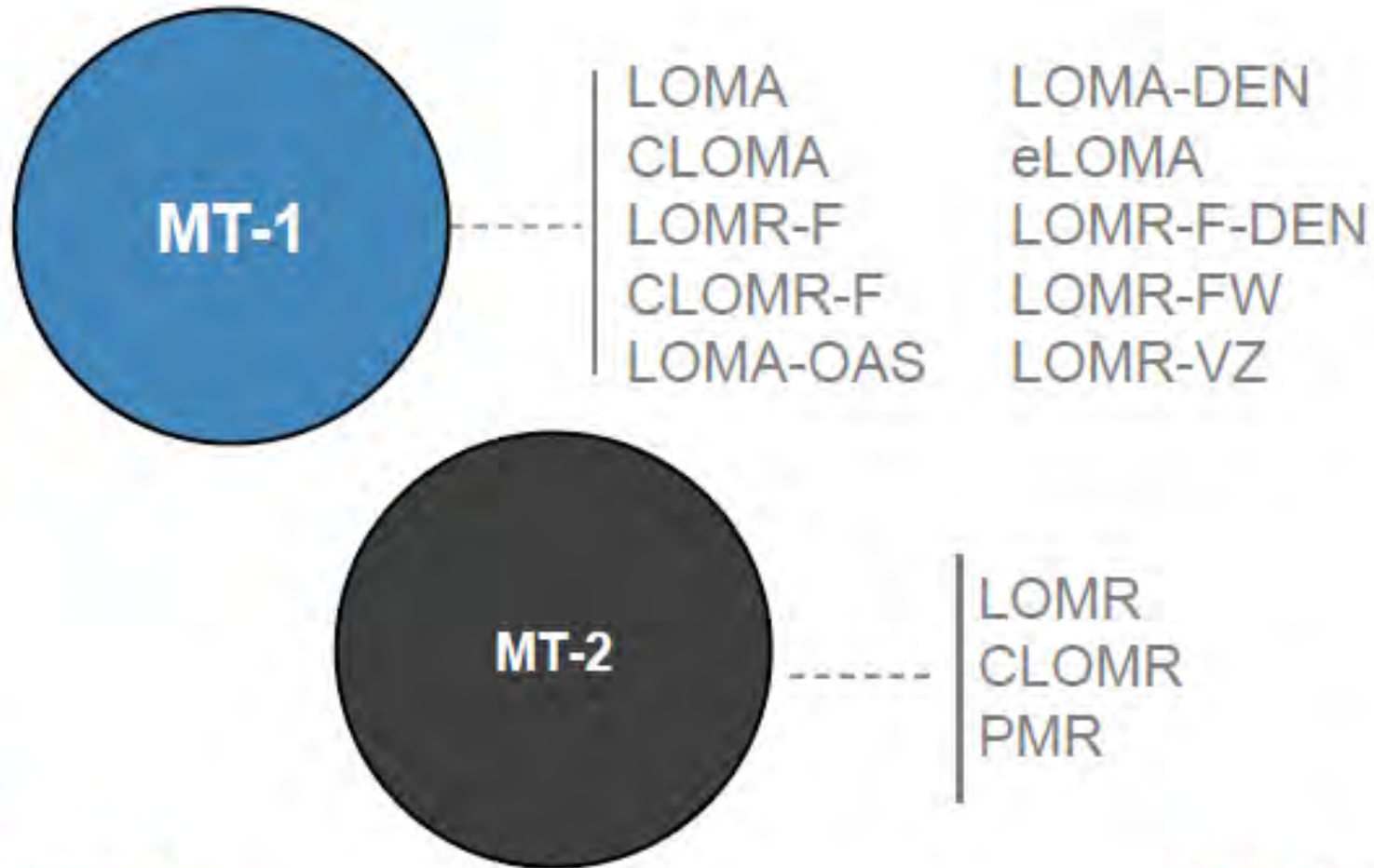
LETTER OF MAP REVISION [LOMC]

General



LETTER OF MAP REVISION [LOMC]

General



LETTER OF MAP REVISION [LOMC]

General

MT-1

- LOMA, CLOMA, LOMR-F, CLOMR-F
- Single or multiple structures or parcels receive a determination letter
- **Do not result in changes to the physical effective Flood Insurance Rate Map (FIRM)**
- Goal is usually to remove the insurance requirement, local permit requirements may still apply
- Homeowners who successfully remove their homes from the 1% floodplain should be encouraged to keep their flood insurance

MT-2

- LOMR, CLOMR, PMR
- Floodplains, floodways, BFEs, Cross Sections, etc. are revised
- **Result in an official revision to the physical effective FIRM and/or FIS; therefore, the community must be involved**
- More complicated than an MT-1
- Technical engineering changes resulting from a new study, development, or infrastructure projects.
- New or better data can trigger a LOMR

LETTER OF MAP REVISION [LOMC]

General

- **Reasons for a LOMR:**

- Modified hydrology (flood discharges)
- Modified hydraulics (elevations)
- Better topography (e.g. LiDAR, site-specific survey)
- Modified floodway
- New bridges/culverts
- Channel improvements/flood control projects (levees, dams, culverts)
- Large developments or roadway projects

- **CLOMR-F/LOMR-F:** Use of Fill: Generally, excavation of basements into fill may expose the structure to residual risk and damage associated with flooding and saturated fill. Designers proposing basements in fill are advised that the elevation requirements of this standard apply to the basement, unless the building and structure is dry-floodproofed in accordance with Section 6.2 See ASCE 24-14 2.4 Use of Fill

LETTER OF MAP REVISION [LOMC]

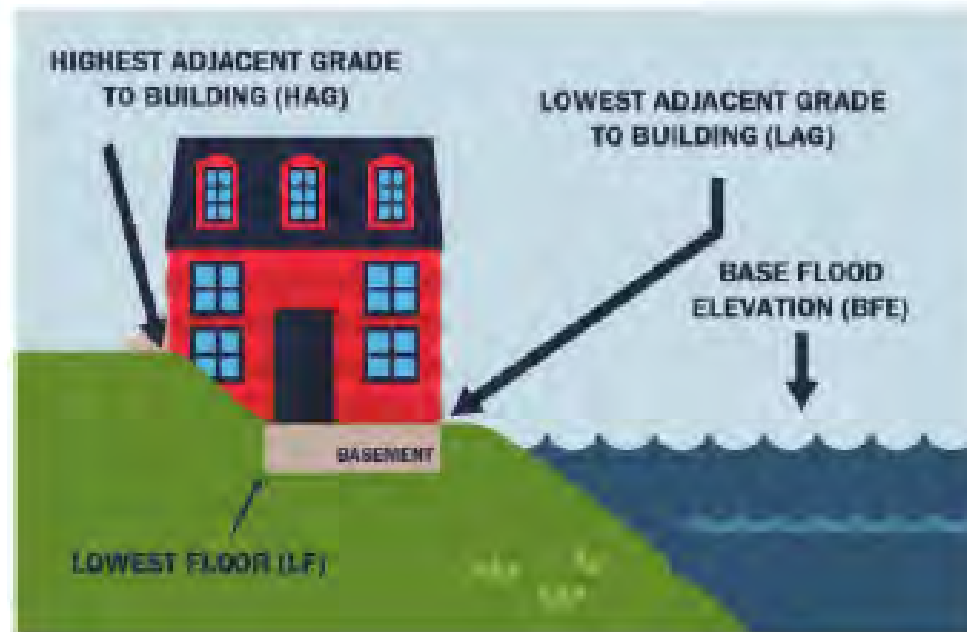
General

Permitting

- Lowest Floor Elevation
- Elevation Certificate

LOMC

- Elevation Form
- Lowest Adjacent Grade



LETTER OF MAP REVISION [LOMC]

General

Community Acknowledgment Form Required (CLOMR-F/LOMR-F):

- Community Official Signs acknowledging:
 - Fill will not be placed in floodway
 - Complies with Endangered Species Act (ESA)
 - Have all necessary federal, state, & local permits
 - Existing and proposed structures will be “reasonably safe from flooding”
 - Supporting documentation is available to submit to FEMA upon request
 - **Community Officials do not have to sign if they do not concur!**
- **Similar process for CLOMR/LOMR as part of MT-2 applications**
 - **Additional public comment/appeal period**



See [FP-LOMC](#)

LETTER OF MAP REVISION [LOMC]

Resources

- FEMA website: www.fema.gov
- [MT-1 Application and instructions](#)
- [MT-2 Application and instructions](#)
- FEMA online submissions: www.fema.gov/online-lomc
- FEMA Flood Map Service Center: <http://msc.fema.gov>
- **FEMA Map Information eXchange (FMIX): 877-FEMA MAP (877-336-2627)**
- **State NFIP Coordinator: Bill Bradfield wbradfield@pa.gov**

Other resources:

- [FEMA Flood Hazard Mapping Frequently Asked Questions](#)
- [Flood Map Revision Processes](#)
- [LOMA and LOMR-F Processes](#)
- [Establishing Effective Dates for LOMRs](#)
- [Fee Schedule](#)
- [eLOMA information](#)

RESOURCES

FEMA Technical Bulletins

Technical Bulletins:

- [Openings in Foundation Walls and Walls of Enclosures Below Elevated Buildings Flood](#)
- [Damage Resistant Materials](#)
- [Non-Residential Floodproofing and Certification](#)
- [Elevator Installation](#)
- [Free-of-Obstruction Requirements](#)
- [Below-Grade Parking Requirements](#)
- [Wet Floodproofing Requirements](#)
- [Corrosion Protection for Metal Connectors](#)
- [Design and Construction Guidance for Breakaway Walls Below Elevated Buildings in Coastal Zones](#)
- [Ensuring that Structures Built on Fill in or Near SGHA are Reasonably Safe from Flooding](#)
- [Crawlspace Construction](#)

www.fema.gov/nfip-technical-bulletins

*note all development is subject to local codes/regulations

*note FEMA Technical Bulletin provide guidance on min. NFIP standards



Flood Damage Materials Requirements
for Buildings Located in Special Flood Hazard Areas
Technical Bulletin 2 / August 2008

FEMA

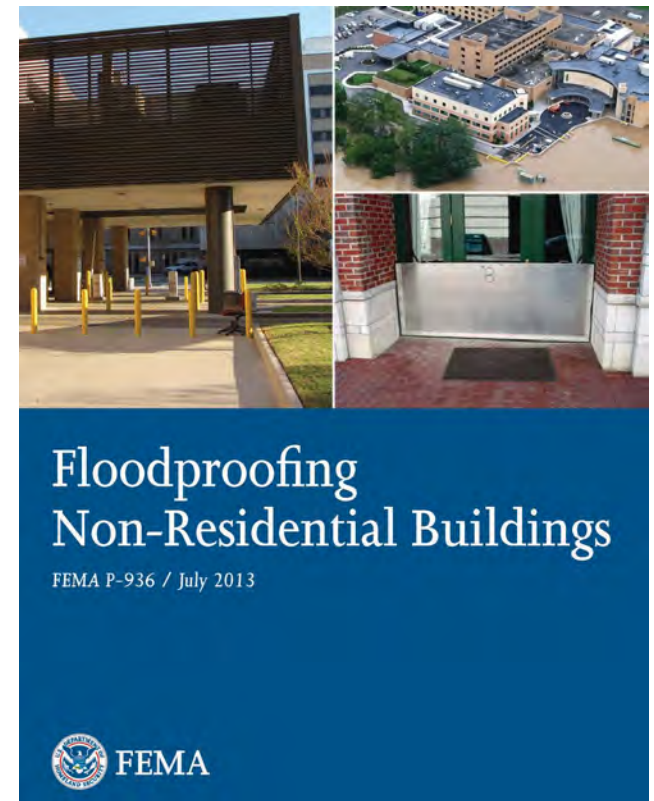
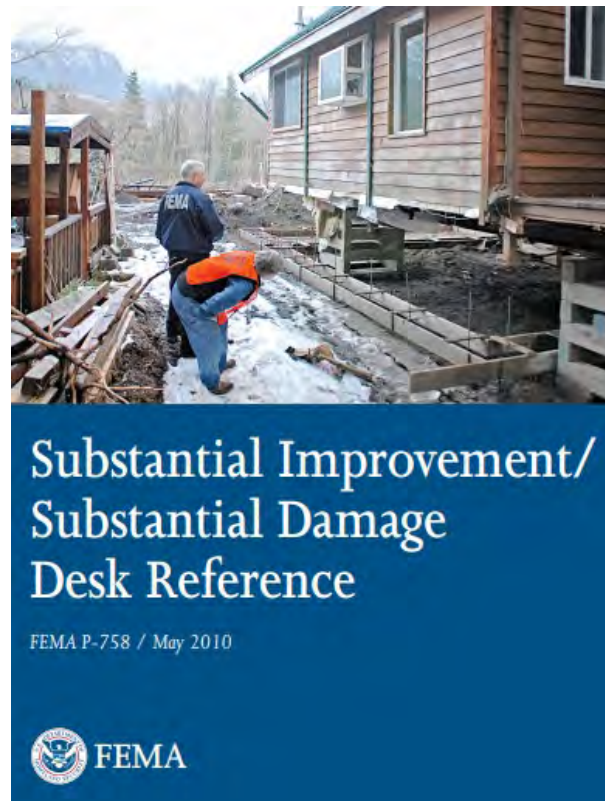
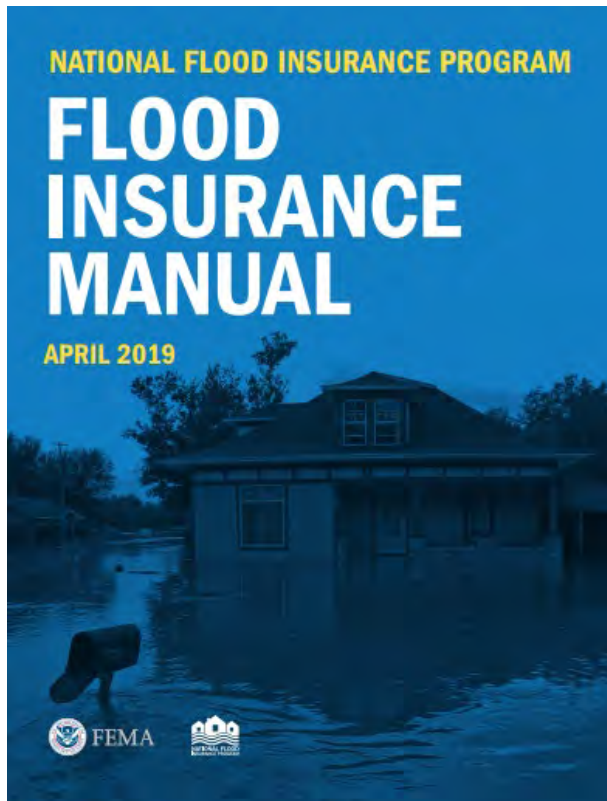
Table 2. Types, Uses, and Classifications of Materials

Types of Building Materials	Uses of Building Materials			Classes of Building Materials																
	Floors	Walls/ Ceilings	Roofs	Acceptable	Unacceptable	1	2	3	4	5										
Structural Materials (floor slabs, beams, columns, framing, and joists)																				
Asbestos-cement board																				
Brick																				
Face or glazed																				
Common (clay)																				
Cast stone (clay)																				
Cement board (fiberglass mat)																				
Cementitious, formed-in-place																				
Clay tile, structural glazed																				
Concrete, precast or cast-in-place																				
Concrete block*																				
Gypsum products																				
Paper-faced gypsum board																				
Non-paper-faced gypsum board																				
Gypsum board																				
Kerolan cement or plaster																				
Plaster, other than, including structural																				
Sheeting panels, exterior structural																				
Water-resistant, floor-ventilated																				
Gypsum board, exterior sheathing																				
Hardboard (high-density fiberboard)																				
Tempered (high-density fiberboard)																				
All other types																				
Mineral fiberboard																				
Mineral fiberboard																				
Oriented strand board (OSB)																				
Exterior grade																				
Edge seal resistant OSB																				
All other types																				
Particle board																				
Plywood																				
Marine grade																				
Pressure-treated, alkaline copper quaternary (ACQ) or copper azole (CA)																				

TECHNICAL BULLETIN 2 - AUGUST 2008

RESOURCES

Other FEMA Guidance



***note all development is subject to local codes/regulations**

RESOURCES

FEMA + Building Code Provisions

FEMA

Navigation

Search

Languages

Multimedia (Photos, Video, and Audio)

Multimedia Collections

Documents and Resources

Document Collections

Photo, Video Use Guidelines

Flood Resistant Provisions of the 2009 International Codes (2011)

The 2009 edition of the International Codes (I-Codes) contains provisions that meet or exceed the minimum flood-resistant design and construction requirements of the NFIP for buildings and structures. This page contains the following documents:

- A compilation of flood resistant provisions from the 2009 editions of the IBC, IRC, IEBC, IMC, IPC, IFGC, IFC, ISPC, IPSDC, and ICC Performance Code.

This document contains excerpts of the flood provisions from the 2018 editions of the IBC, IRC, IEBC, IMC, IPC, IFGC, IFC, ISPC, IPSDC, and ICC Performance Code.

2018 International Building Code
[a compilation of flood resistant provisions, prepared by FEMA]

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CHAPTER 1 ADMINISTRATIVE

[A] 101.2 Scope. The provisions of this code shall apply to the construction, alteration, relocation, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

Exception: Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the International Residential Code.

[A] 101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

Highlights:

- Published when I-Codes releases any new editions
 - **2009 – Current PA**
 - 2015
 - 2018
- More restrictive code applies
- Local amendments could effect which sections apply
- During building permit review this document can assist in comment/request for information from applicant

RESOURCES

Code Master

CodeMaster
NATIONAL FLOOD INSURANCE PROGRAM
INTERNATIONAL CODE COUNCIL
FLOOD RESISTANT DESIGN
2015 IBC 2015 IRC ASCE 24-14

PRELIMINARY CONSIDERATIONS

This CodeMaster identifies a 12-step procedure for designing a structure for flood loads in accordance with the requirements of the 2015 International Residential Code (IRC), the 2015 International Building Code (IBC), ASCE 7-10 Minimum Design Loads for Buildings and Other Structures, and ASCE 24-14 Flood Resistant Design and Construction.

All steps will not be applicable in all cases, but following the applicable steps is necessary to meet the requirements of the National Flood Insurance Program (NFIP) – see Code of Federal Regulations, Title 44, Parts 59 and 60.

SECRETS OF THE CODEMASTER: Consider the Jurisdiction to determine whether and how its floodplain management regulations and building code requirements vary from the flood resistant design and construction requirements found in the IRC, IBC, and ASCE 24. Also inquire if IBC Appendix G (Flood Resistant Construction) is adopted.

The CodeMaster applies to new construction, which also includes existing structures that are Substantially Damaged or Substantially Improved, which may be brought into compliance with the requirements for new construction.

The flow chart below will guide designers in their use of this CodeMaster.

FLOOD TERMINOLOGY

This terminology section is provided so that the designer can easily refer back to these terms and acronyms. Where used in this CodeMaster, these terms are in bold italics as a reminder that they are defined here.

500-Year Flood Elevation: The elevation of flooding having a 0.2-percent chance of being equaled or exceeded in any given year. ASCE 24-14 Section 1.2.

Base Flood: The flood having a 1-percent chance of being equaled or exceeded in any given year. Also known as the "100-year flood." 2015 IBC Section 202, ASCE 24-14 Section 1.2.

CodeMaster developed by
Structures & Codes Institute
A subsidiary of S.K. Ghosh Associates Inc.
www.ski-hq.com
ISBN 978-1-526208-33-4

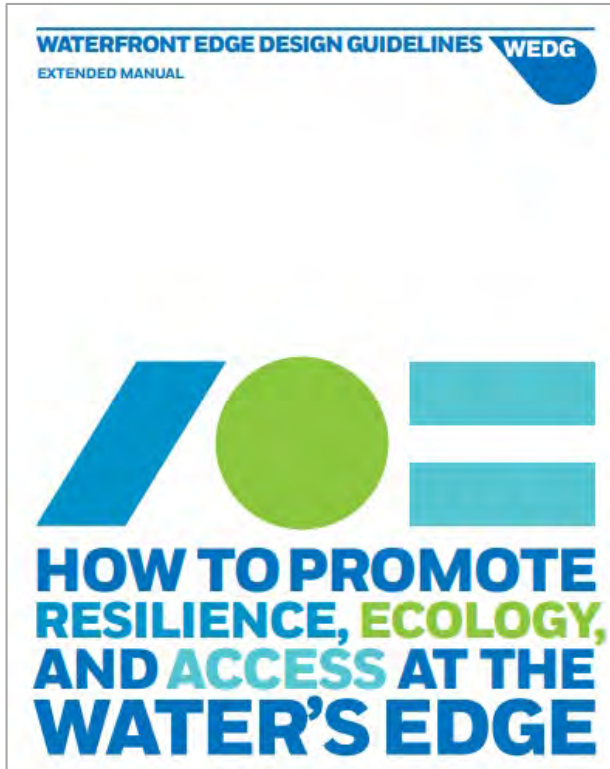
Tel: (847) 881-2703
Fax: (847) 961-2702
skghosh@gmail.com
Copyright © 2015 by SKGI

Tips:

- Published when I-Codes releases any new editions
 - 2009 – Current PA**
 - 2015
 - 2018
- For purchase [here](#)
- Local amendments could effect which sections apply
- During building permit review this document can assist in comment/request for information from applicant
- 8 concise pages
- Quick guide that can easily sit on your desk

RESOURCES

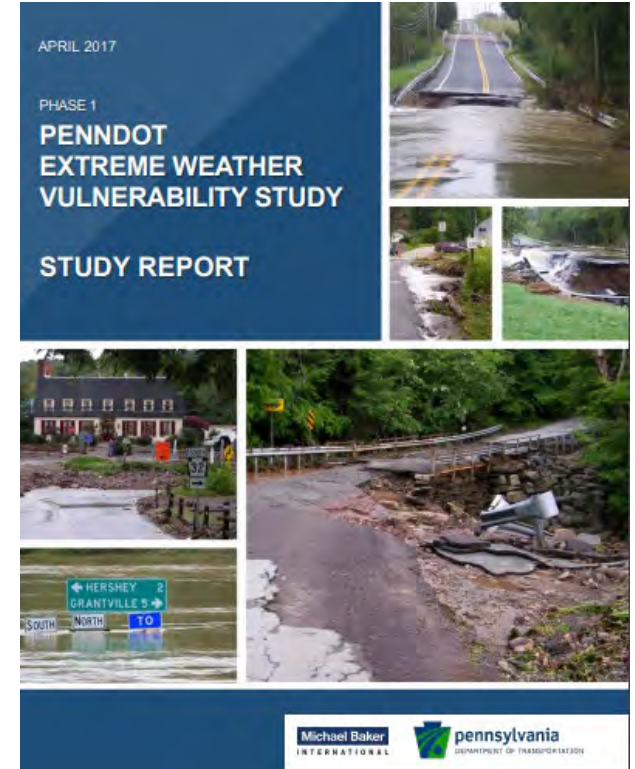
Other



**WATERFRONT EDGE DESIGN
GUIDELINES**
WATERFRONT ALLIANCE



**DESIGN AND PLANNING
FOR FLOOD RESILIENCY**
NYC PARKS DEPARTMENT



**EXTREME WEATHER
VULNERABILITY STUDY**
PENNDOT

RESOURCES

Other

The screenshot shows the Federal Highway Administration website. At the top, there are navigation links: About, Programs, Resources, Briefing Room, Contact, Search FHWA, and social media icons for Facebook, Twitter, YouTube, and LinkedIn. Below this is the U.S. Department of Transportation Federal Highway Administration logo. The main heading is 'Bridges & Structures'. Underneath are several sub-sections: Structures, Geotech, Hydraulics, and Safety and Management. The 'Hydraulics' section is expanded to show 'Hydrology Coastal Highways', 'Highway Drainage', 'Culvert Hydraulics', 'Bridge Hydraulics', and 'Scour'. The 'Floodplains' section is also expanded to show 'Hydrology' and 'Climate Change & Extreme Events'. A breadcrumb trail reads: Home / Programs / Bridges & Structures / Hydraulics / Hydrology & Floodplains / Floodplains. The 'Floodplains' section is highlighted, and under 'Principal Documents', there is a link to '23 CFR 650 Subpart A Location and Hydraulic Design of Encroachments on Flood Plains (11/26/1979)'. Under 'Regulation', there are links to 'Highway Embankments versus Levees and other Flood Control Structures (09/10/2006)' and 'Backwater Criterion for Hydraulic Design of Structures (04/21/1992)'. Under 'Policy', there are no links listed.



PROCEDURES FOR COORDINATING WITH FEMA REQUIREMENTS FEDERAL HIGHWAY

RESOURCES

PA NFIP/Floodplain Management Webpages



Pennsylvania
WORK SMART. LIVE HAPPY.
Pennsylvania Department of Community and Economic Development

MENU ☰

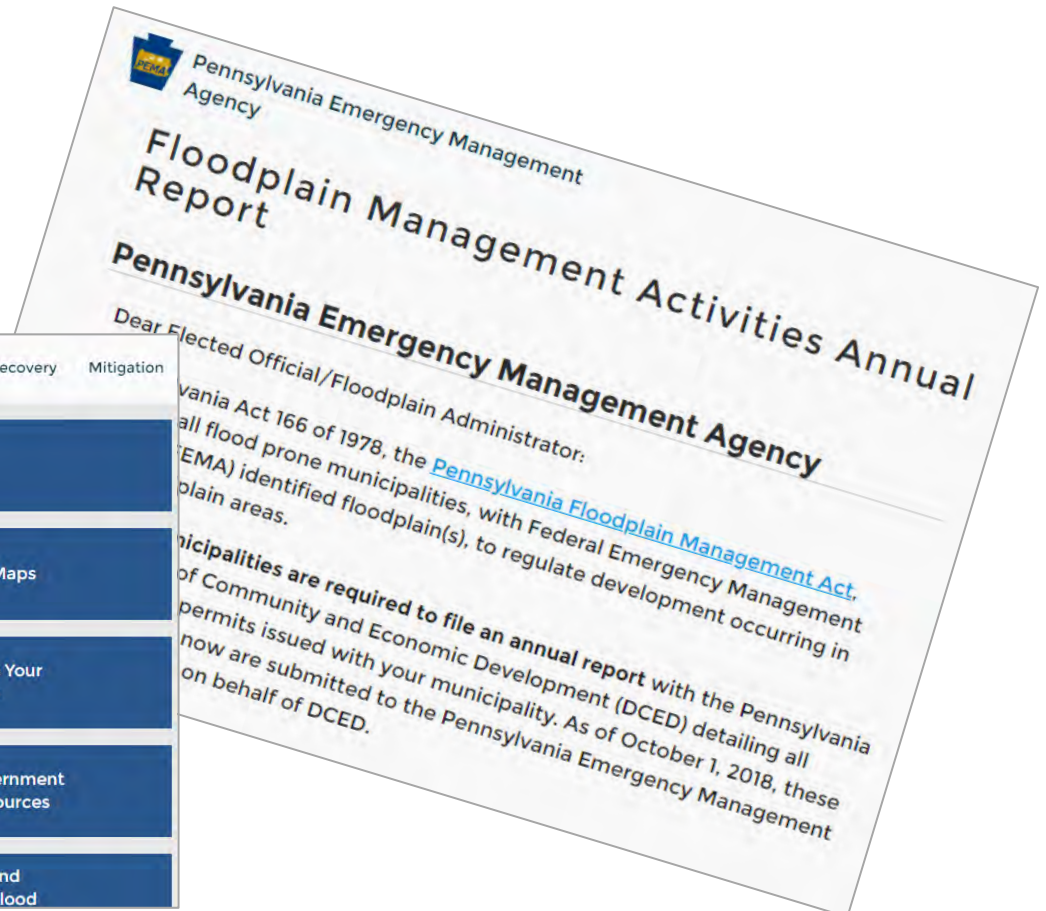


DCED > Local Government Services > Pennsylvania Flood Maps > National Flood Insurance Program (NFIP)

NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

Annual Report – **MANDATORY**

- Mandatory for everyone in PA
- Online Submission
- Due end of February
- Permits and NFIP changes



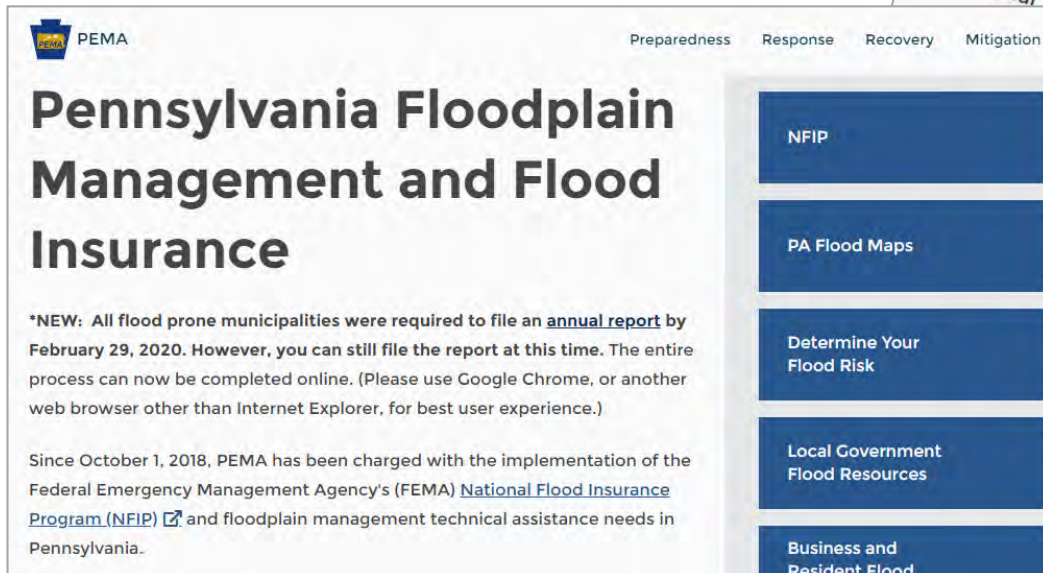
Pennsylvania Emergency Management Agency

Floodplain Management Activities Annual Report

Dear Elected Official/Floodplain Administrator:

Pennsylvania Act 166 of 1978, the [Pennsylvania Floodplain Management Act](#), requires all flood prone municipalities, with Federal Emergency Management Agency (FEMA) identified floodplain(s), to regulate development occurring in floodplain areas.

Municipalities are required to file an annual report with the Pennsylvania Department of Community and Economic Development (DCED) detailing all permits issued with your municipality. As of October 1, 2018, these reports are submitted to the Pennsylvania Emergency Management Agency on behalf of DCED.



PEMA Preparedness Response Recovery Mitigation

Pennsylvania Floodplain Management and Flood Insurance

***NEW:** All flood prone municipalities were required to file an [annual report](#) by February 29, 2020. However, you can still file the report at this time. The entire process can now be completed online. (Please use Google Chrome, or another web browser other than Internet Explorer, for best user experience.)

Since October 1, 2018, PEMA has been charged with the implementation of the Federal Emergency Management Agency's (FEMA) [National Flood Insurance Program \(NFIP\)](#) and floodplain management technical assistance needs in Pennsylvania.

- NFIP
- PA Flood Maps
- Determine Your Flood Risk
- Local Government Flood Resources
- Business and Resident Flood

RESOURCES

Training

The screenshot shows the TRAIN PA website interface. At the top right, there is a link for "Log In or Create Account". The main header features the "TRAIN PA" logo and a navigation menu with "HOME", "COURSE CATALOG", "CALENDAR", "RESOURCES", and "HELP". A search bar is located on the right side of the header. Below the header, there is a login form with fields for "Login Name" and "Password", a "Remember me" checkbox, and a "Login" button. A "Can't log in?" link and a "Create an Account" button are also present. The main content area displays a "Welcome to TRAIN PA" message, followed by a description of the site as a gateway to the TRAIN Learning Network. A list of user benefits is provided, and a "Looking for a course?" section is partially visible.

This screenshot shows a page from the PA Construction Codes Academy (PCCA) website. The header includes navigation links for "FLOODPLAIN MANAGEMENT", "ENERGY CODE RESOURCES", "ENERGY RESILIENCE", and "CONTACT", along with a "LOGIN" button and a "NOT A MEMBER? REGISTER" link. The main heading is "PA Construction Codes Academy". The primary content is for a "FLOODPLAIN MANAGEMENT COURSE L-273 (03-19-19 TO 03-22-19) (COLUMBIA COUNTY)". A secondary heading below it reads "HOME • FLOODPLAIN MANAGEMENT COURSE L-273 (03-19-19 TO 03-22-19) (COLUMBIA COUNTY)". The course details are listed as follows:

- Start Date: Tuesday, March 19, 2019
- End date: Friday, March 22, 2019
- Series: Floodplain
- Location: 702 Sawmill Road Bloomsburg PA 17815
- County: Columbia

Others

- ASFPM.org
- PAFPM.org
- FEMA Emergency Management Institute

RESOURCES

Professional Organizations

Join and Become a Member of ASFPM

Home | Member Login | Contact Us | Links

Association of State Floodplain Managers

- About ASFPM
- ASFPM Membership Information
- Certification Program (CFM®)
- Conferences & Events
- Training and Education
- Committees
- Chapter and State Contacts
- State/Local Resources and Tools
- Flood Maps & Data
- National Policy and Programs
- Publications and Policy Papers
- Press Room
- Job/RFP Postings

ASFPM Mission

The mission of ASFPM is to promote education, policies and activities that mitigate current and future losses, costs and human suffering caused by flooding, and to protect the natural and beneficial functions of floodplains - all without causing adverse impacts.

What's New

[FEMA Seeks Comments on New BRIC Guidance](#)
Wednesday, April 15, 2020
Building Resilient Infrastructure and Communities (BRIC) is a new FEMA... may view the proposed policy and provide comments until May 11, 2020.

[Spring Flood Update Webinar from U.S. Army Corps of Engineers](#)
Tuesday, April 7, 2020
The U.S. Army Corps of Engineers (USACE) is hosting a 60-minute webinar on flood planning and readiness for the spring flood season, given current pub...

National Organization

- Annual Conference
- Training/CEU resources
- Professional certification program (Certified Floodplain Manager)

Pennsylvania Organization

- Annual Conference
- Newsletters
- CFM Exam Offering (Proctor)
- Webinars
- State floodplain training calendar
- Mentorship program (coming soon)

PAFPM

HOME ABOUT US COMMITTEES JOIN US NEWS PAFPM EVENTS BECOME A CFM RESOURCES CONTACT

Joshua Lippert (Joshua.Lippert@phila.gov) is signed in



Questions and/or comments?

JOSH LIPPERT, CFM
FLOODPLAIN MANAGER
FLOOD@palpm.org