Flood Resilience Zoning

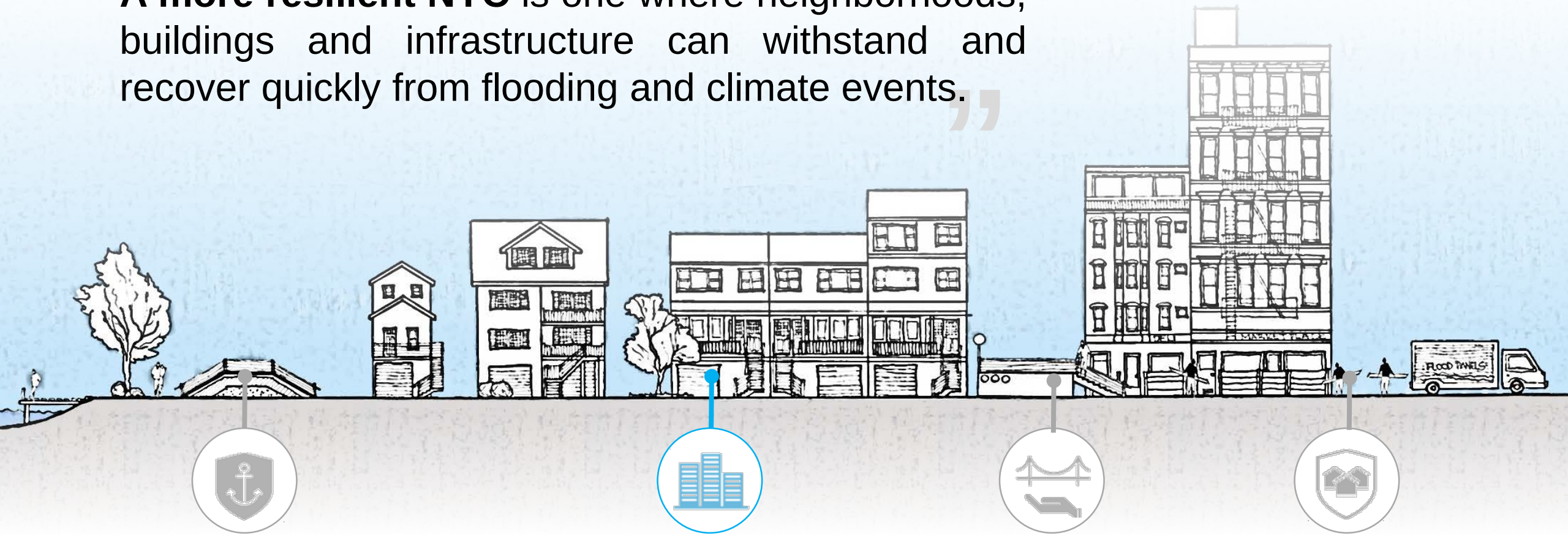
Manhattan District Service Cabinet

May 19, 2017

NYC PLANNING

#ONENYC

"**A more resilient NYC** is one where neighborhoods, buildings and infrastructure can withstand and recover quickly from flooding and climate events."



Coastal defenses
are strengthened as first line of defense against flooding and sea level rise

Buildings
are designed to withstand and recover from flooding

Infrastructure
is protected from climate hazards

Residents and businesses
are prepared

FEMA Flood Map
Citywide Flood Risk

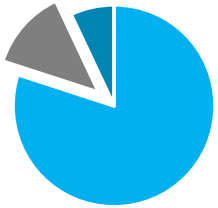
NYC's flood risk is high.

The floodplain affects a large geography and most community and council districts.

100 Year Floodplain
FEMA 2015 PFIRM

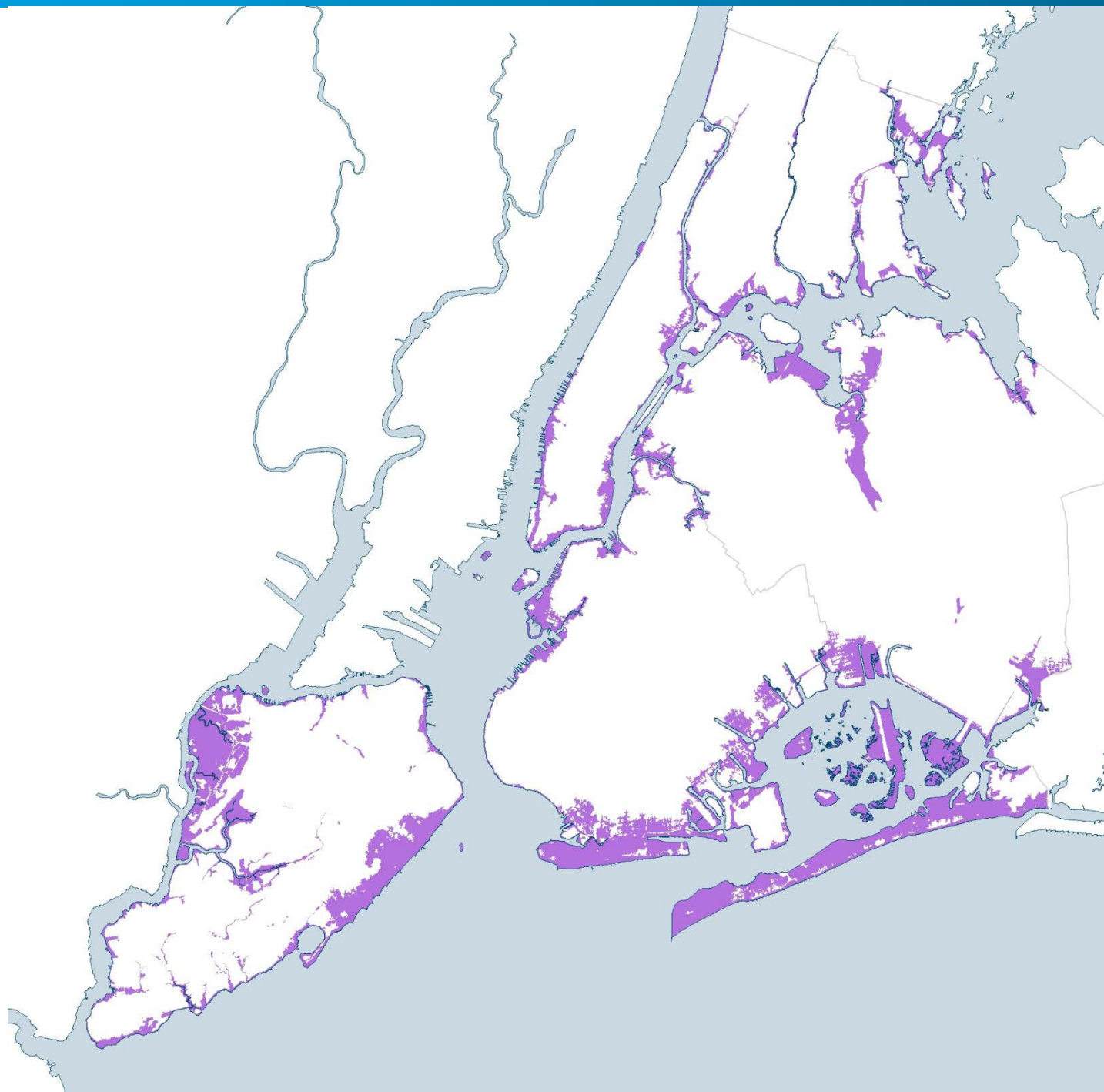
Population: **400,000**
Buildings: **71,500**

50 of 59 Community Boards
45 of 51 Council Districts



Buildings:
80% 1-4 units
7% 5+ units
13% nonresidential

Residential Units:
30% 1-4 units
70% 5+ units



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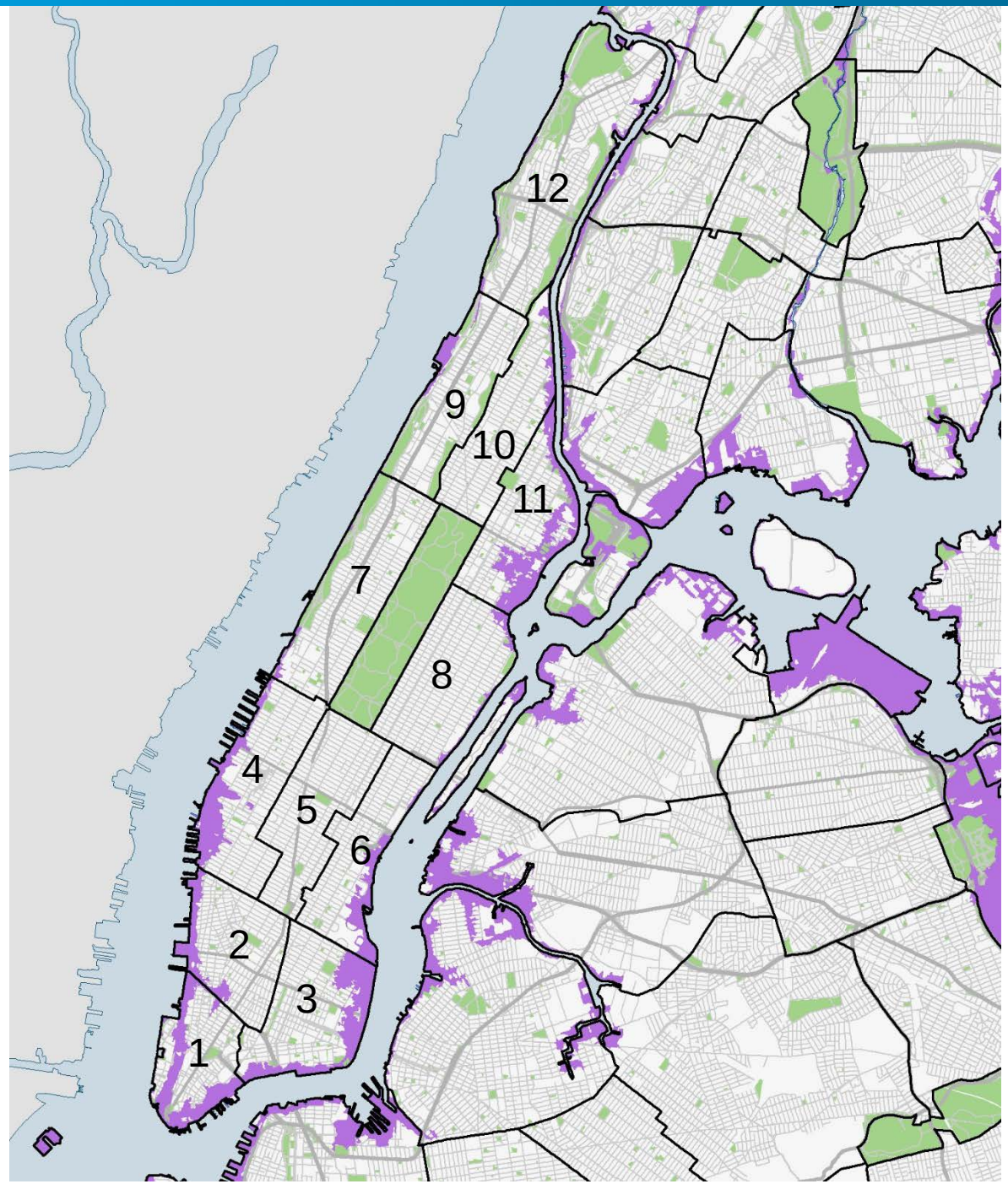
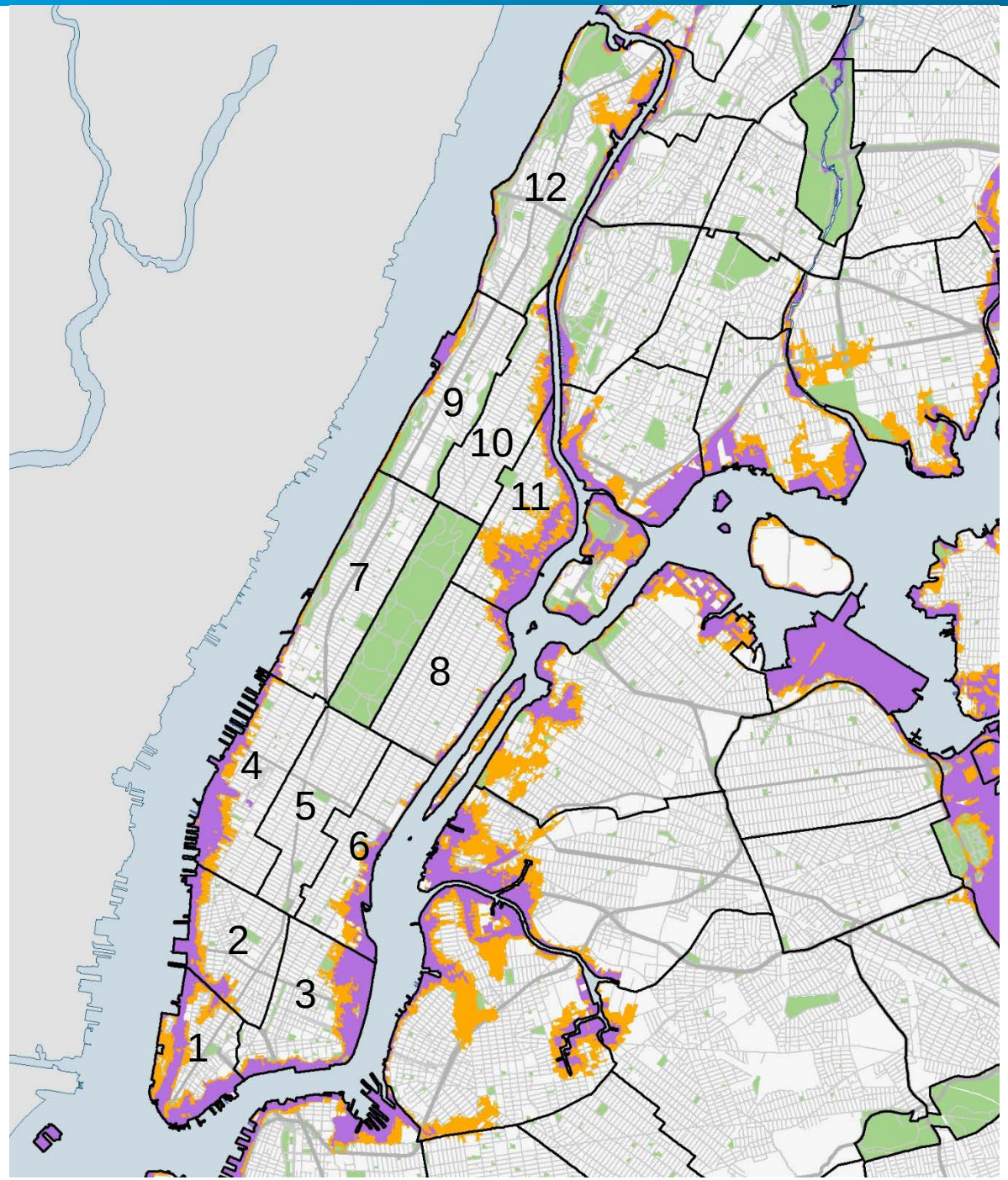
FEMA Flood Map
Flood Risk in Manhattan

	2015 PFIRMs
Population in Floodplain	89,100
Buildings in Floodplain	3,100



Future Flood Map
Flood Risk in Manhattan

	2015 PFIRMs	2050s Projected	
Population in Floodplain	89,100	214,500	***140%***
Buildings in Floodplain	3,100	5,900	***90%***



Buildings in the Floodplain
in Manhattan

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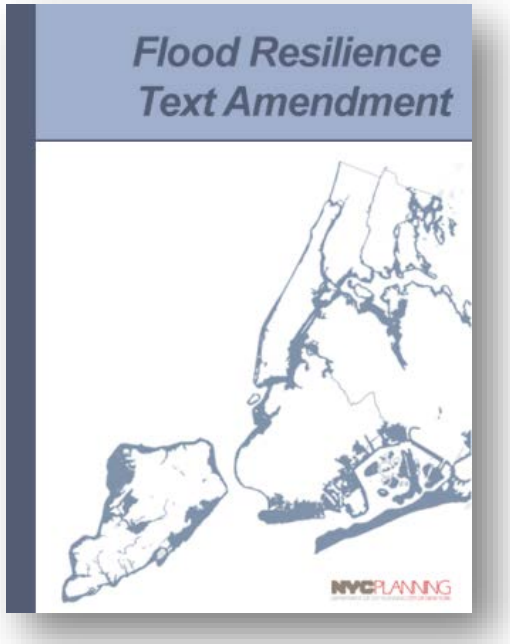
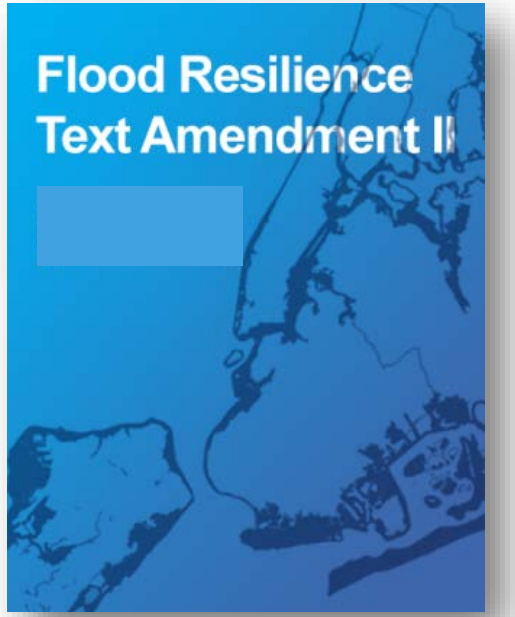
Flood resilience zoning

Projects at DCP





2013

“Flood Text”

initial <u>temporary</u> regulations to facilitate recovery

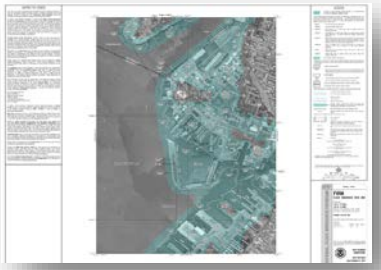
2018

“Flood Text II”

improve upon, and make permanent, the Flood Text

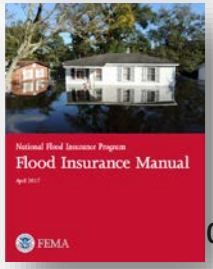
How are buildings in the floodplain regulated?

FEMA



Flood Insurance Rate Maps (FIRMs)

Determine **where floodplain regulations apply**



National Flood Insurance Program

Set up Insurance Rates depending on building elevation and other requirements

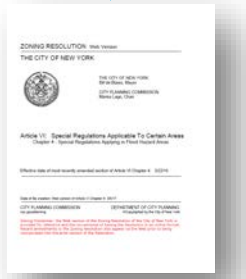
Construction Standards (ASCE 24)

Design minimum construction requirements for flood hazard areas

NYC

Building Code (DOB)

Requires new buildings and substantial improvements to meet FEMA standards



Zoning Resolution (DCP)

Zoning **accommodates** these regulations and improves neighborhood character

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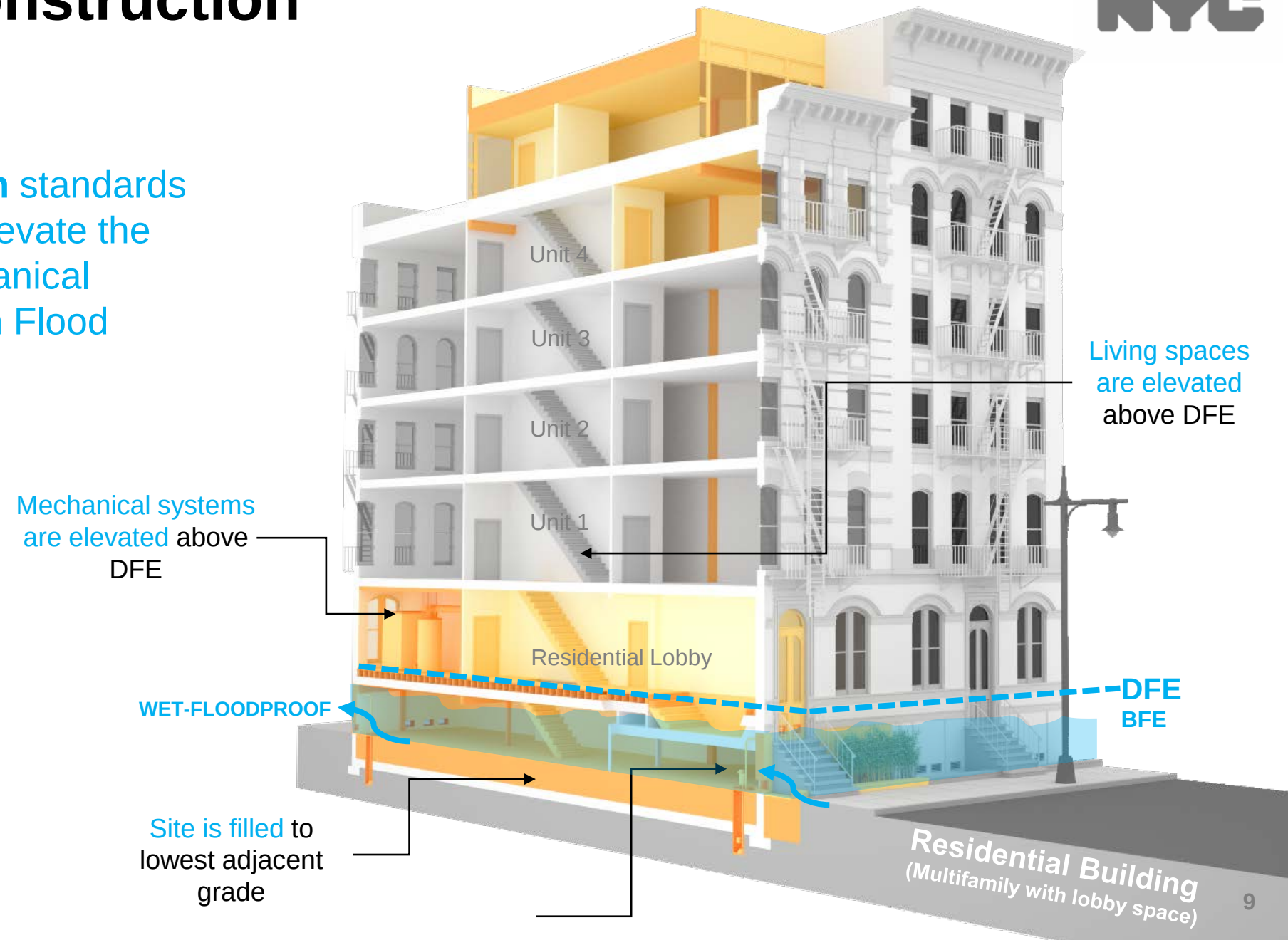
Flood resilient construction
Required by DOB

Flood resilient construction standards require certain buildings to elevate the lowest floor, as well as mechanical equipment, above the Design Flood Elevation (DFE).



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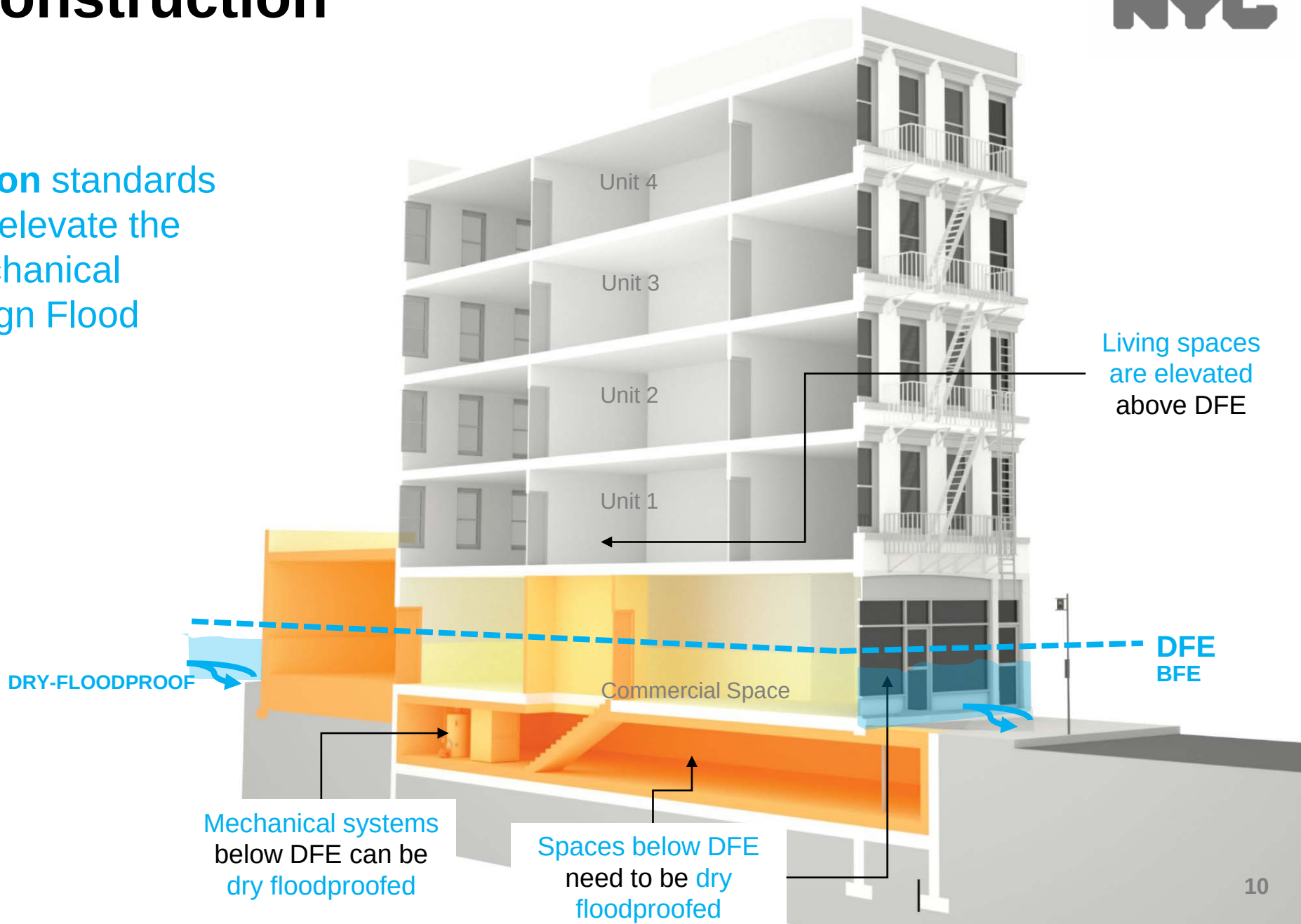


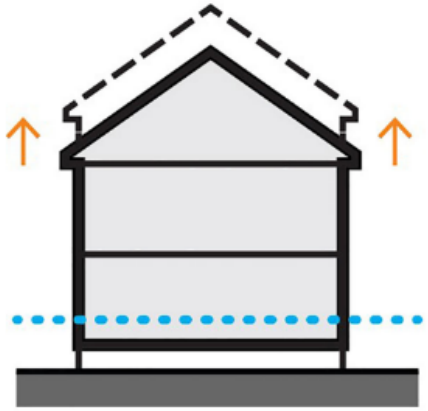
2013 Citywide Flood Text

Amended zoning in six key areas

1

Height

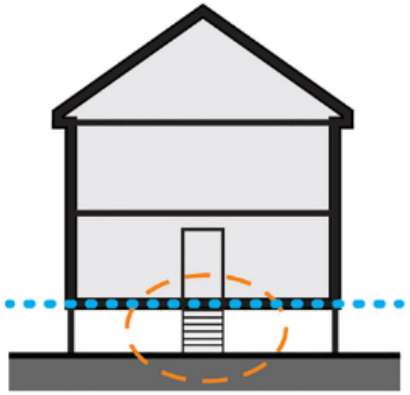
Measured from flood elevation



2

Access

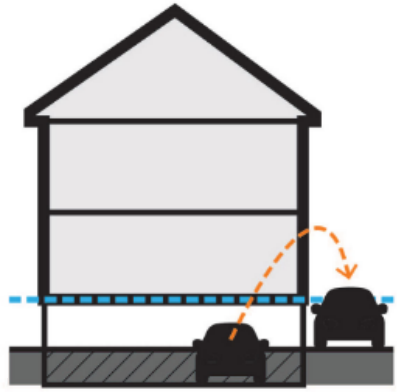
Flexibility for stairs, ramps, lifts



3

Parking

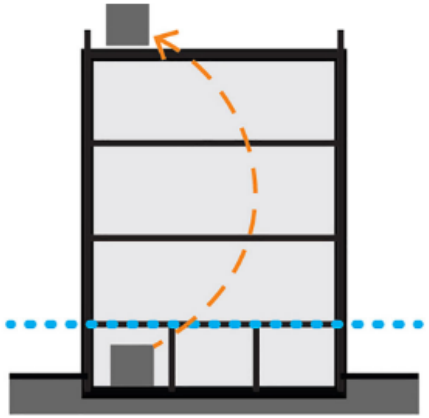
Flexibility to relocate parking



4

Systems

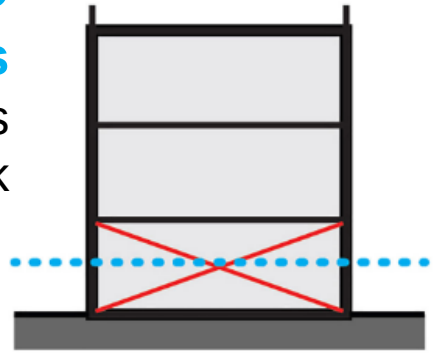
Flexibility to relocate/elevate



5

Ground Floors

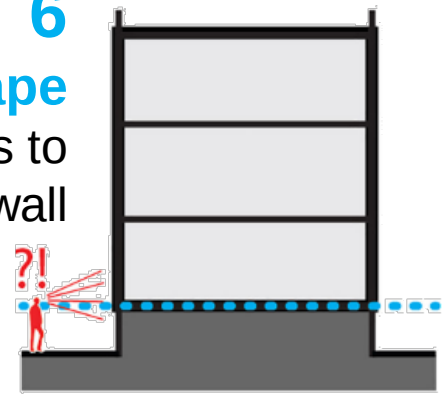
Account for costs of new flood risk



6

Streetscape

Require features to mitigate blank wall



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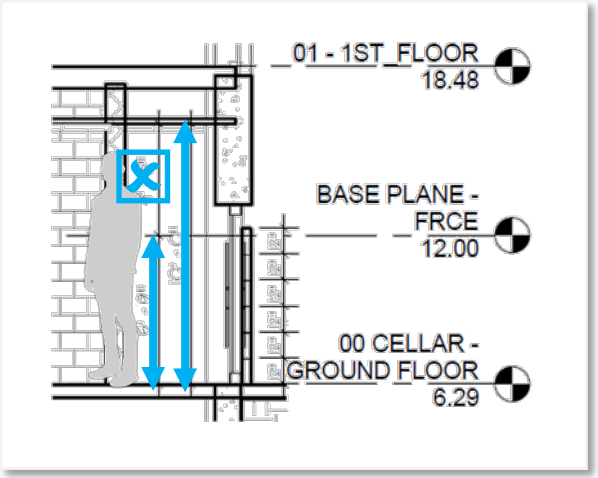
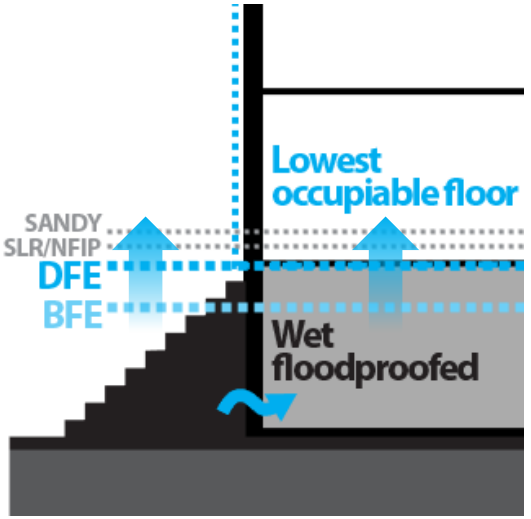
Flood Text II

Need for a new citywide text amendment:





1

Make the provisions of the current, temporary 2013 Flood Text **permanent**

2

Fix and **improve** provisions based on studies and lessons learned

3

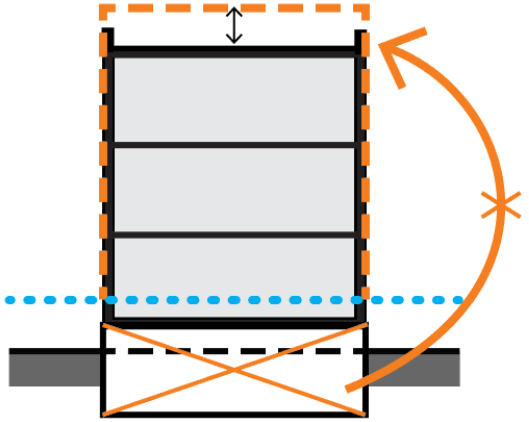
Begin to **promote** new development + proactive retrofitting to high resiliency standards

Flood Text II

Fix and improve provisions based on lessons learned

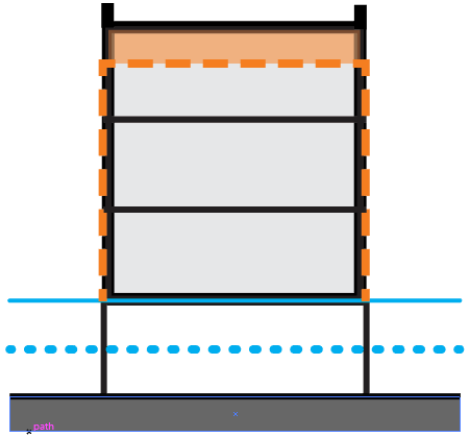
1
Height

Homeowners may face the loss of subgrade spaces when retrofitting



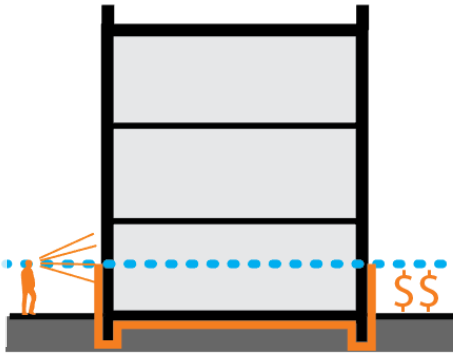
2
Height

Properties owners may want to address future risk by over-elevating



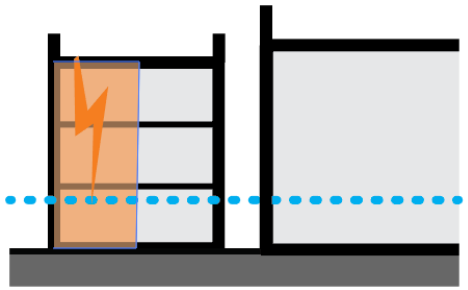
3
Ground Floors

Current incentives to keep active ground floors may not be enough



4
Homes in M Districts

Existing homes in M. Districts, if damaged, may not be able to rebuild

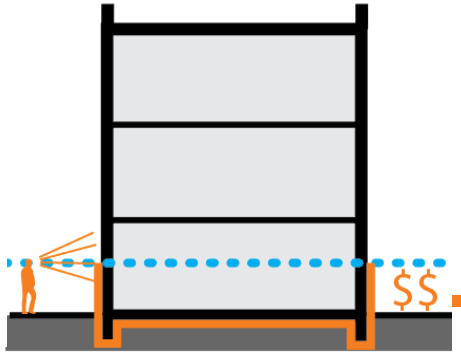


Commercial Ground Floors
Improvements and lessons learned

3

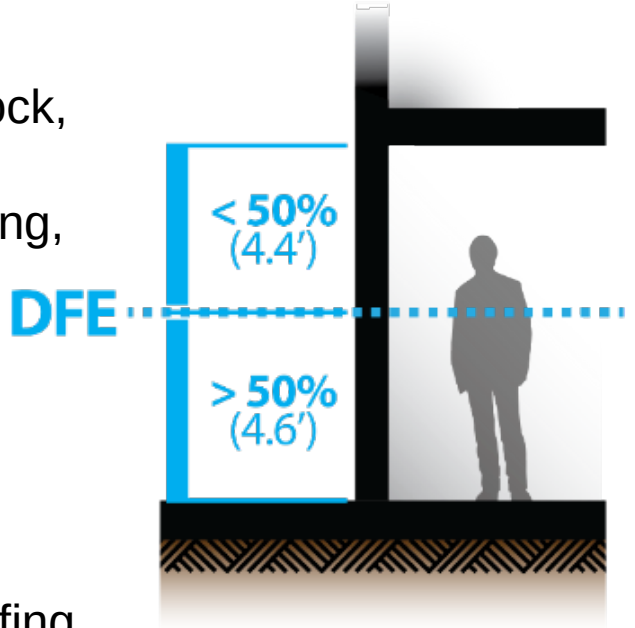
Ground Floors

Current incentives to keep active ground floors may not be enough

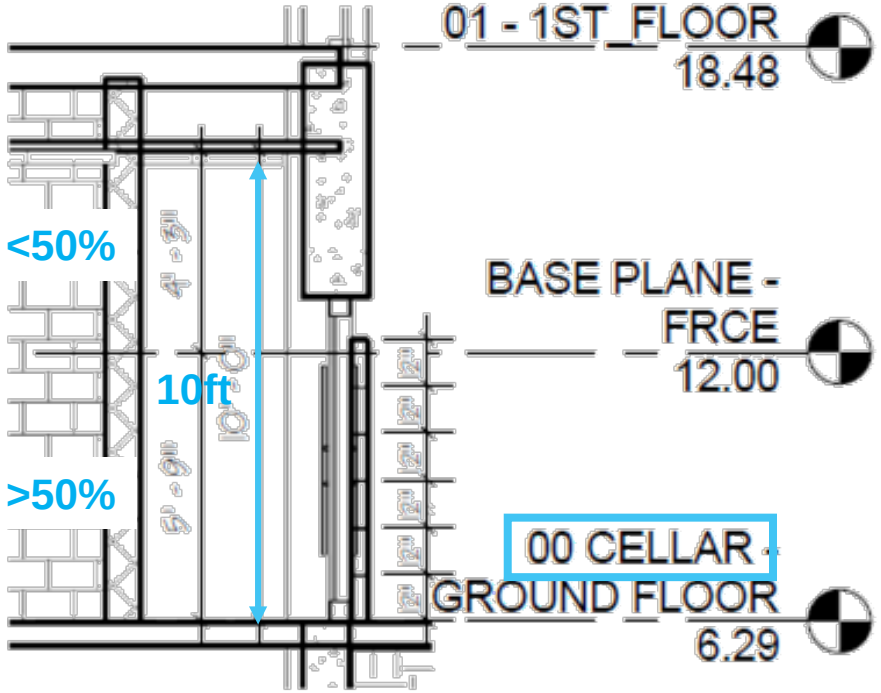


ISSUE

- Bad urban design outcomes due to “squishing” – dark, low-ceilinged establishments.
- Causes lower-grade commercial stock, limits the types of retail tenants and services that can locate in the building, such as restaurants.
- Doesn’t apply to at least half of the floodzone.
- Doesn’t create a zoning incentive to prefer **dry floodproofing** implementations over wet floodproofing (active over passive).



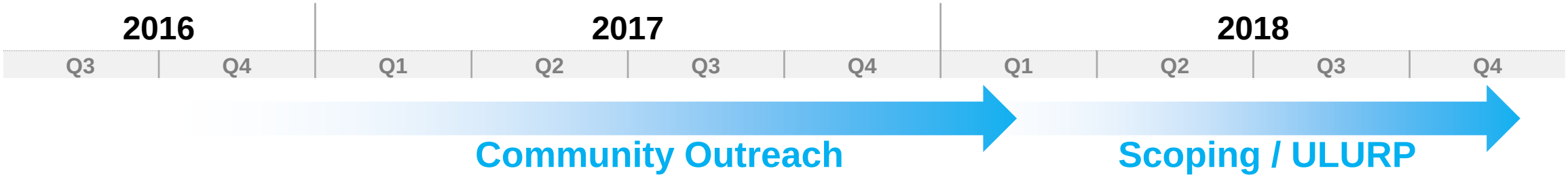
Above-grade cellar in the flood zone



Example of ‘squished’ retail
(1809 Emmons Ave., BK)

Flood Text II
Outreach

DCP plans a robust public engagement process:



As part of this outreach process, DCP will:

- **Partner with stakeholders** to educate and promote awareness of flood risk and resiliency issues
- **Explain how zoning tools** relate to resiliency
- **Explore unique neighborhood issues** through in-depth public presentations and workshops
- Develop a proposal through an **iterative process** that is shaped by feedback

*** Schedule is tentative and subject to change**

Outreach Resources

NYC Flood Hazard Mapper

www.nyc.gov/floodhazardmapper

Info briefs on Flood Resilience Zoning, Flood Risk, Flood Resilient Construction, and Flood Insurance

www.nyc.gov/resilientneighborhoods

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Info Brief
Flood Insurance

Flood insurance covers damages to property or personal contents from flooding caused by excessive rainfall, tidal flooding, or wind-driven storm surges. Changes to flood maps and reforms to the National Flood Insurance Program will lead to increases in flood insurance rates over time. In addition to flood resilient construction, insurance is another strategy for reducing flood risk.

Why is Flood Insurance Important?

- Floods can cause significant d to your most valuable asset: you business.
- Even properties far from the coas risk of flooding.
- Homeowner and property insura cover damage by flooding. You n separate policy.
- Federal assistance is not guaran event of a flood.
- Many property owners are requi federal law to purchase and m insurance if the property is locat risk flood zone of the 2007 FIRM to right), has a federally backed has received federal disaster ass

How Much Flood Insura Must a Homeowner Pur

Properties with a federally backed in a high-risk flood zone and thos received federal disaster assistan maintain flood insurance up to the N limits, or the outstanding mortgage b whichever is lower. Failure to do so mortgage servicers to purchase a po property—possibly at a higher price- on the cost through monthly mortgag

Homeowners without a federally-b mortgage or outside a high flood carry up to the maximum policy limit with additional contents coverage av $100,000 for owners or renters. Co- multifamily buildings and business p be covered up to $500,000. Busines and tenants can also purchase up to contents coverage.

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Info Brief
Flood Risk in NYC

New York City is highly vulnerable to flooding from coastal storms due to its intensively used waterfront and its extensive coastal geography. Floods have the potential to destroy homes and businesses, impair infrastructure, and threaten human safety. With climate change and sea level rise, these risks are expected to increase in the future, but will most adversely affect low-lying neighborhoods.

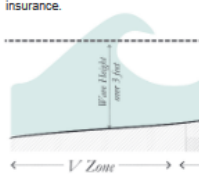
Flood Risks

Hurricanes, tropical storms, nor'e intense rain storms, and even ext tides are the primary causes of fl NYC.

For building code, zoning, and pl purposes, flood risk in NYC is rep on FEMA's 2015 Preliminary Floo Rate Maps (PFIRMs).

- PFIRMs show the extent to whic waters are expected to rise duri event that has a 1% annual cha occurring. This height is denotec Flood Elevation (BFE) on the ma
- The 1% annual chance floodpla sometimes referred to as the 10 floodplain. However, this term is since these floods can occur mu within 100 years. In the 1% annu floodplain, there is a 26% chanc over the life of a 30-year mortga

For flood insurance purposes, rel 2007 Flood Insurance Rate Maps property owners of buildings in the 1 chance floodplain with a federally in mortgage are mandated by law to p insurance.



The 1% annual chance floodplain is divided different degree of flood risk. V and Coastal flooding but not wave damage. The maps al which has a lower annual chance of flooding

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Flood Resilience Zoning
www.nyc.gov/resilientneighborhoods

City Planning is working with communities throughout the floodplain to identify zoning and land use strategies to reduce flood risks and support the city's vitality and resiliency through long-term adaptive planning. The Flood Resilience Zoning Text is one part of a wide range of efforts by the City to recover from Hurricane Sandy, promote rebuilding, and increase the city's resilience to climate-related events.

Overview

The Flood Text enables and encou resilient building construction thr designated floodplains.

The Flood Text modified zoning to re regulatory barriers that hindered or p the reconstruction of storm-damaged by enabling new and existing buildin with new, higher flood elevations issu the Federal Emergency Managemen (FEMA), and to comply with new req the New York City Building Code.

It also introduced regulations to mitig negative effects of flood resilient con the public realm. The text was adopt on a temporary, emergency basis. Th future update of this text, guided by input, will aim to make the text perma incorporate lessons learned during th and rebuilding process.

Where is the Flood Text Applicable?

The Flood Text is available to build located entirely or partially within annual chance floodplain*.

These rules can be found in Article V of the Zoning Resolution and, if utiliz require the building to fully comply w resilient construction standards foun G of the New York City Building Cod some provisions, such as elevation d spaces, are available to all buildings the floodplain, even if not fully compl Appendix G.

For more information about the Floo www.nyc.gov/resilientneighborho

*Per the more restrictive of the 2007 FIRMs PFIRMs.

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Info Brief
Flood Resilient Construction

Flood resilient construction reduces potential damages from flooding and can lower flood insurance premiums. New buildings in the floodplain are required to meet flood resilient standards. Existing buildings can reduce their risk by retrofitting or rebuilding to meet these standards, or can take partial, short-term measures to address safety concerns.

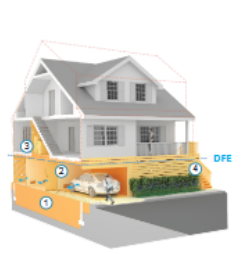
Overview

There is a wide range of accepted flood resilient construction practices for buildings to better withstand floods and reoccupy more quickly following a storm. These include:

- Elevating the lowest floor.
- Elevating mechanical equipment such as electrical, heating, and plumbing equipment.
- Wet floodproofing by utilizing water resistant building materials and limiting uses below the Design Flood Elevation (DFE) to parking, building access, and minor storage. This allows water to move in and out of uninhabited, lower portions of the building with minimal damage.
- Dry floodproofing sealing the building's exterior to flood waters and using removable barriers at all entrances below the expected level of flooding in mixed-use and non-residential buildings.

Examples of Flood Resilient Construction

Visit www.nyc.gov/resilientneighborhoods to see more examples in the *Retrofitting for Flood Risk* report.



Wet floodproofed residential building

1. Site is filled to the lowest adjacent grade
2. Space below the DFE is for parking, building access or minor storage
3. Mechanical systems are above the DFE
4. Plants and stair turns improve the look of the building from the street

Dry floodproofed mixed-use building

5. Rooftop addition replaces lost below grade space
6. Commercial space is dry floodproofed with removable barriers

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Thank you!

For more information, and to stay involved, email

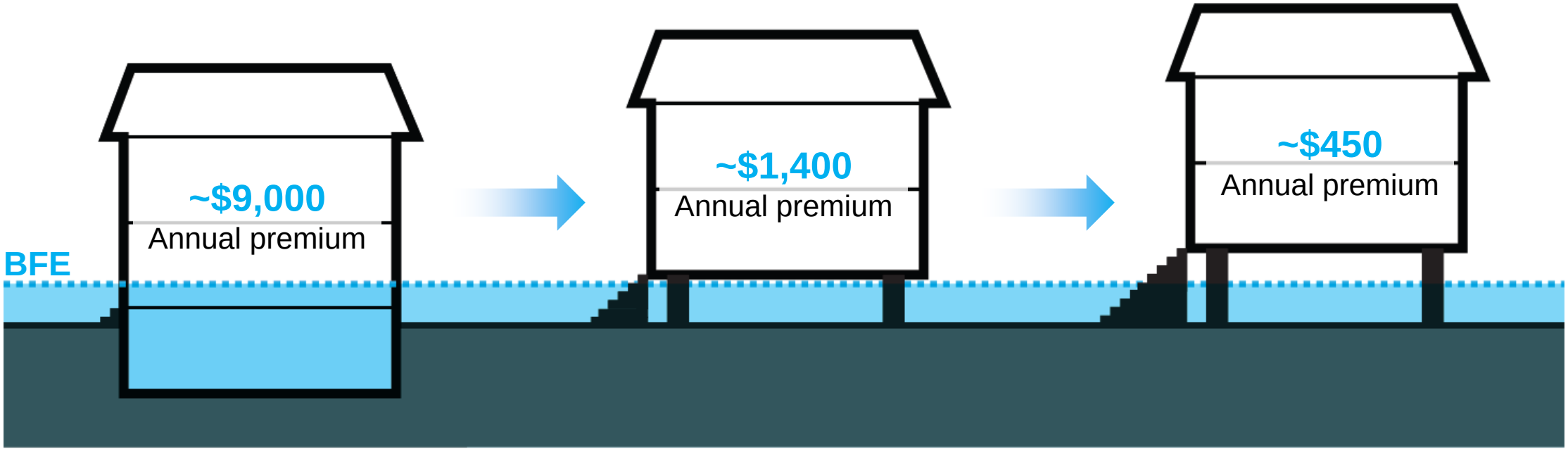
resilientneighborhoods@planning.nyc.gov

Appendix

Flood insurance rates
Set by FEMA

Raising or retrofitting your home will reduce costs

FEMA's flood insurance premiums are lowest when the lowest inhabited floor (any area not used solely for storage, access or parking) is elevated above the Base Flood Elevation (BFE).



4 FEET OR MORE
BELOW BFE

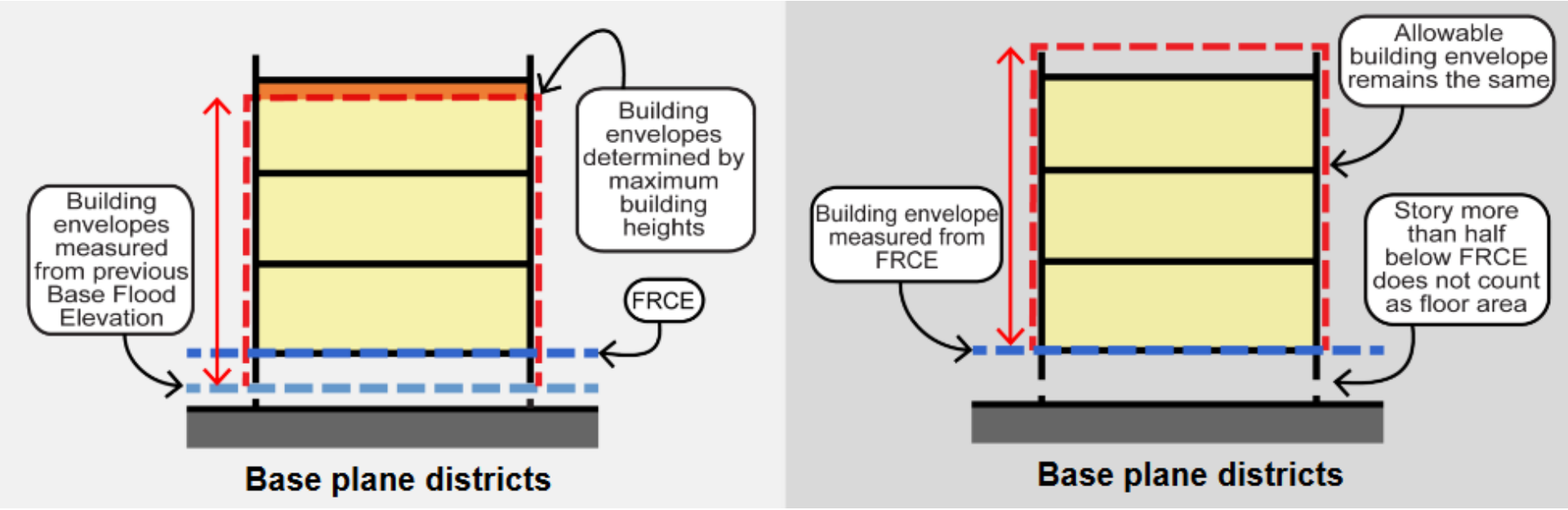
AT
BFE

3 FEET OR MORE
ABOVE BFE

2013 Citywide Flood Text

The reference for height was changed from grade to the flood level

This change in how zoning envelopes are measured was intended to ensure that a new building in the flood zone need not be significantly smaller than the same building (in the same zoning district) outside of the flood zone. While the average flood elevation above grade is 3’ to 5’, in some areas this change allowed 13’ of extra height.



2013 Citywide Flood Text

Bump-up: where DFE is moderate, additional height was given

To ensure the utility of spaces subject to flooding, further height (“the bump-up”) is available

Residential buildings:

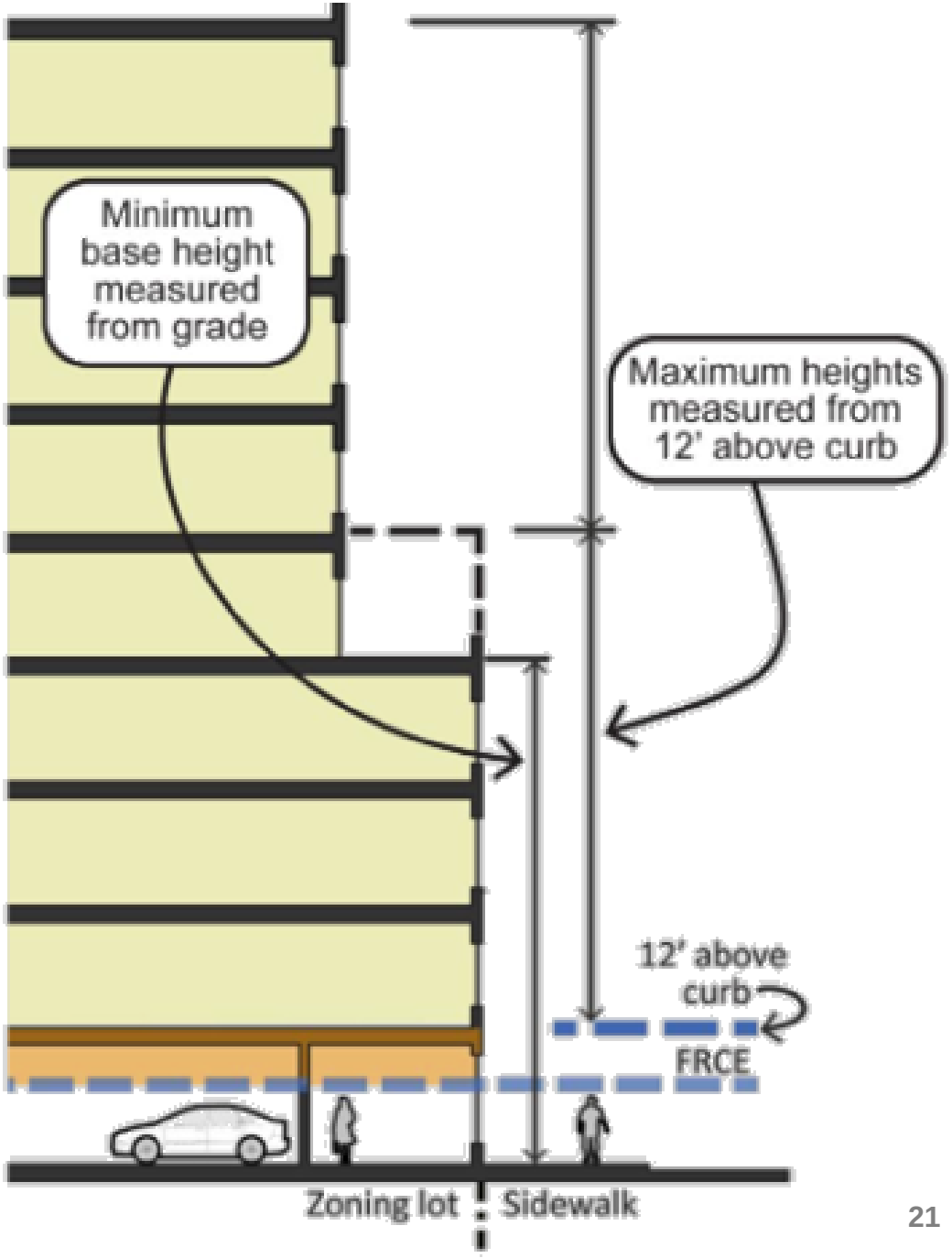
Where the DFE is between **5’-10’** above grade, you can “bump-up” all heights to **10’**

Commercial / mixed buildings:

Where the DFE is between **5’-12’** above grade, you can “bump-up” all heights to **12’**

(depicted at right)

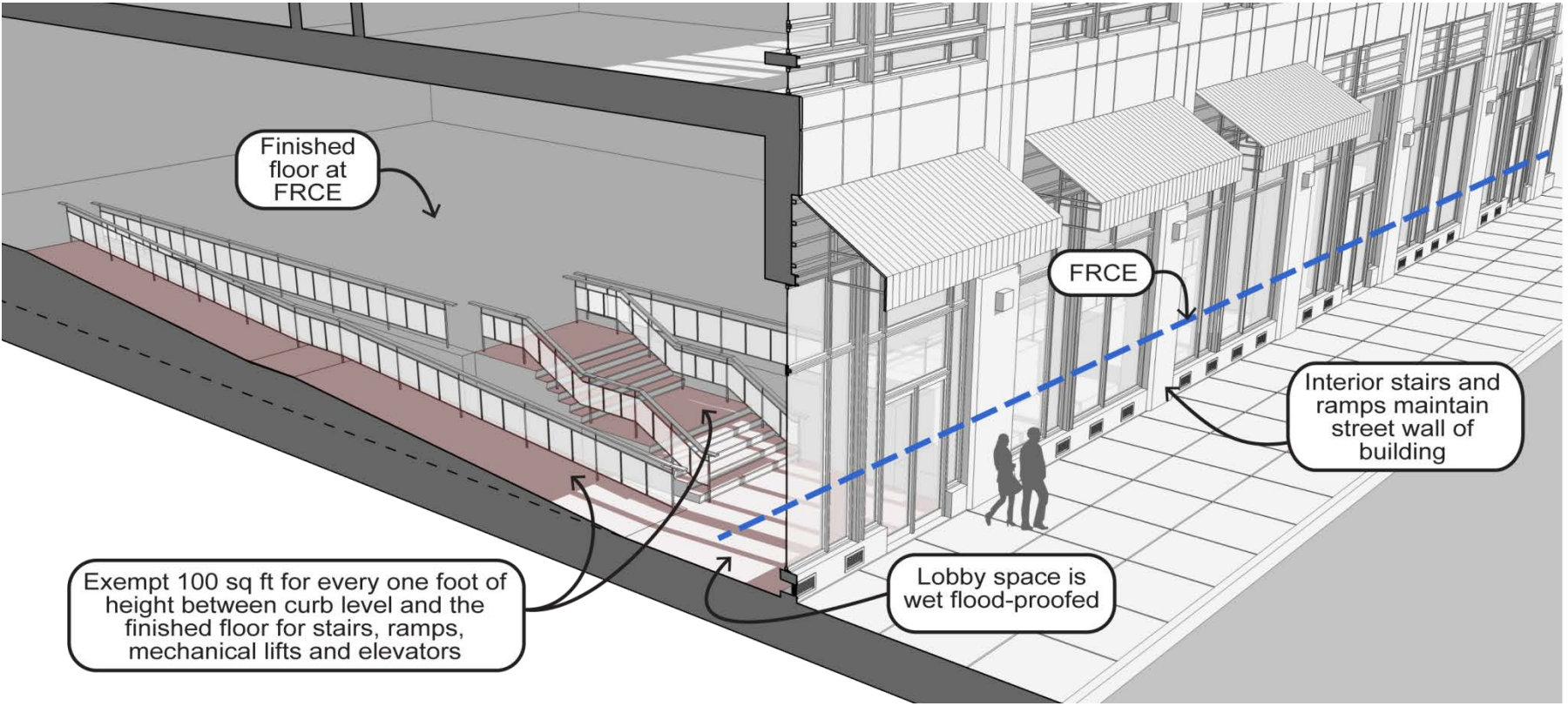
This extra height is designed to promote a **full, floodproofed, at-grade** story – as opposed to an elevated story at the DFE.

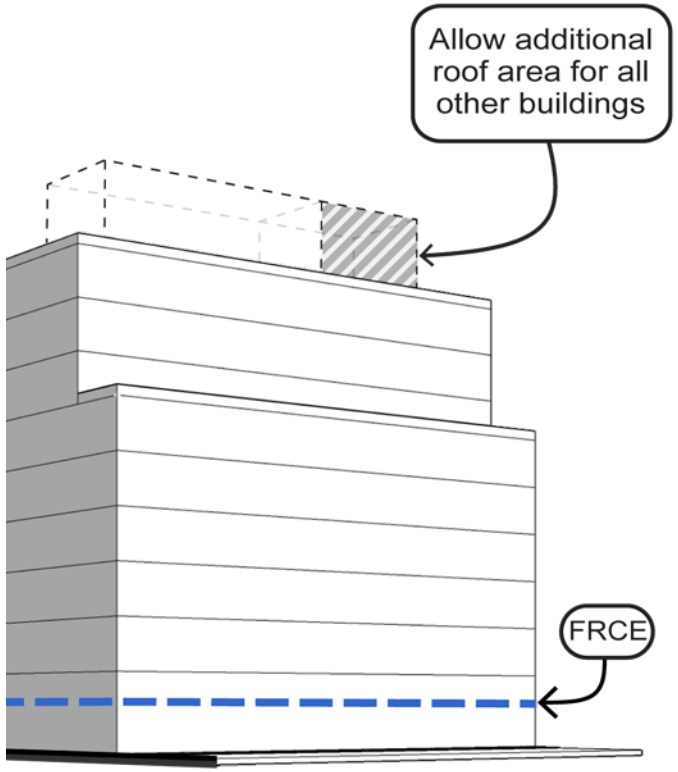


2013 Citywide Flood Text

Penalties for complying with new code requirements were lifted

New buildings have a number of new design challenges that existing, grandfathered buildings did not face – these include having to provide ample access to elevated levels (stairs, ramps, and lifts) and locating vital mechanical equipment somewhere other than a cellar. To ensure these did not create a ‘zoning penalty’ these components were exempted from floor area.



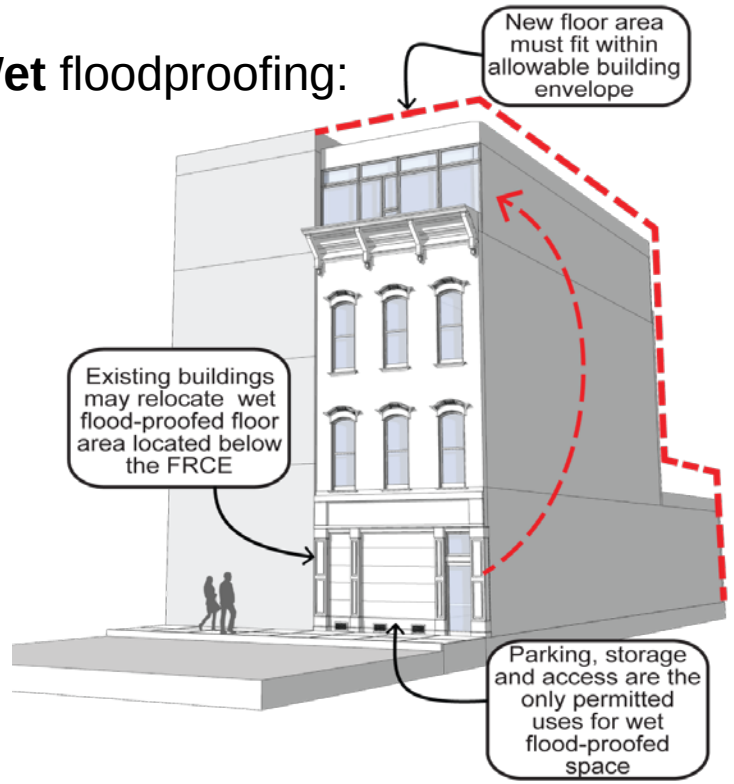


2013 Citywide Flood Text

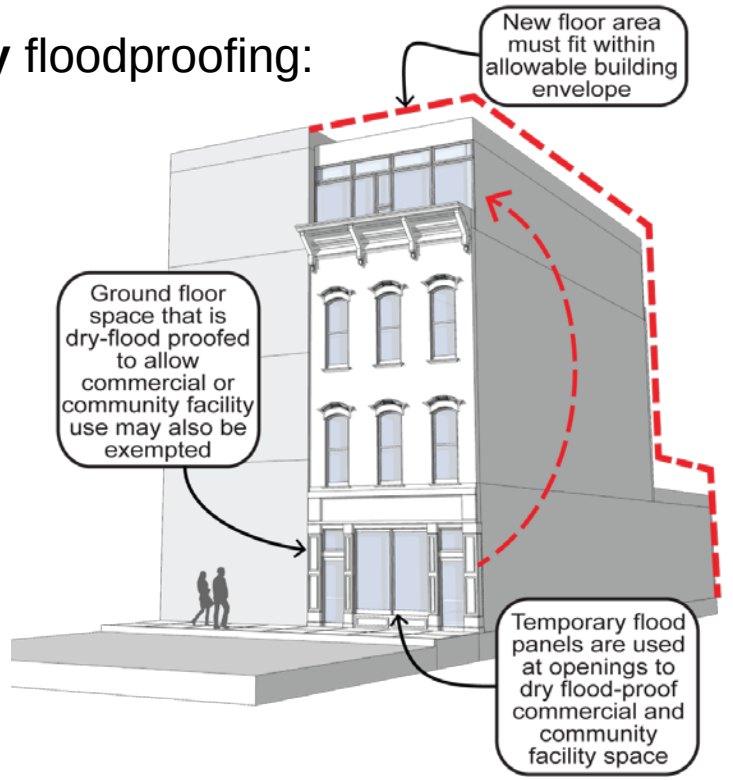
To incentivize the costly retrofitting and floodproofing of old buildings, a floor area incentive was provided.

A building owner could floodproof their bottom story, and then add an additional story (or equivalent amount of space) elsewhere in their building, helping to finance a retrofit.

Wet floodproofing:



Dry floodproofing:

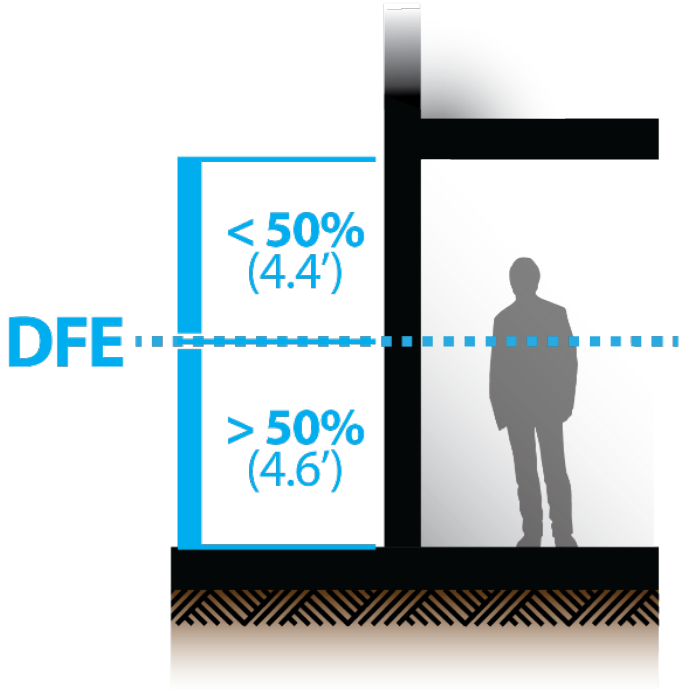


2013 Citywide Flood Text

To offset the cost of floodproofing, a floor area incentive was offered

In some areas, where the flood elevation is moderate-to-high above grade, the entire ground floor can be exempted from floor area, without limitation, if it is wet or dry floodproofed, by virtue of a changed definition of a “cellar”. (Cellars are generally exempt from floor area)

Typical cellar space
(Exempt from floor area)

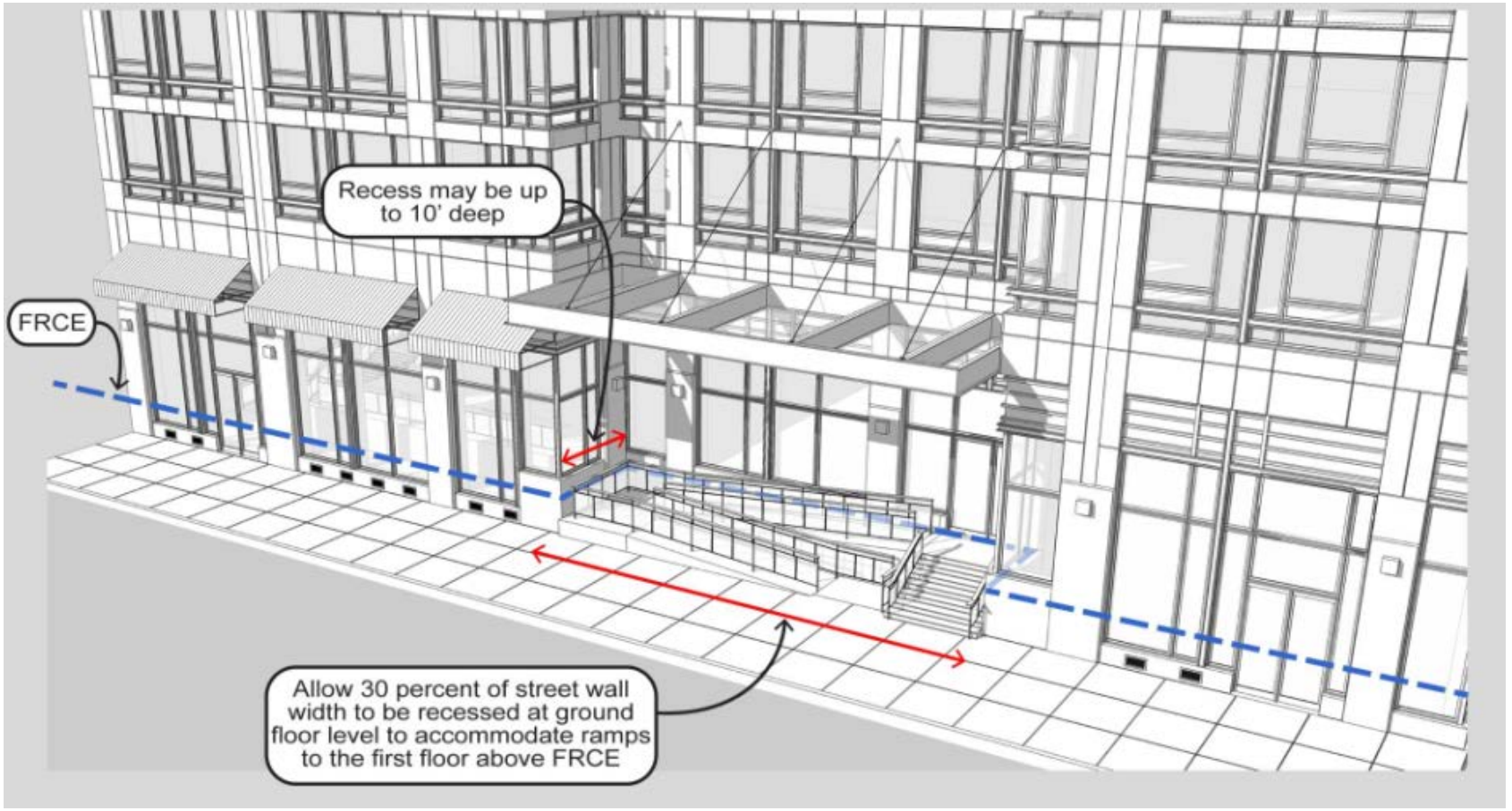


Above-grade cellar space
(Also exempt, in flood zones where DFE above grade is more than 4½ ft.)

2013 Citywide Flood Text

Certain zoning design requirements were updated

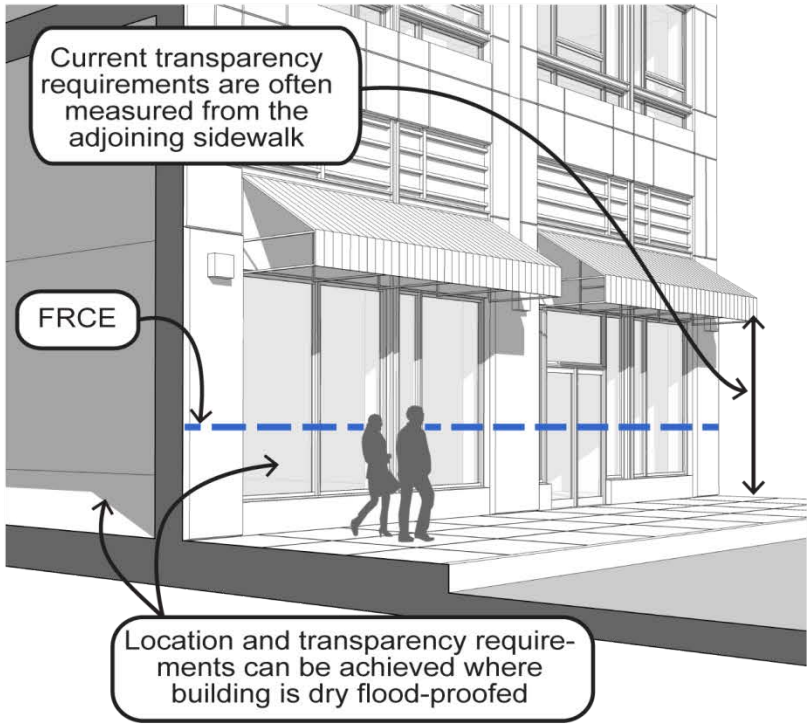
Elements of zoning which predate the new FEMA PFIRM and did not take significant flood levels (and flood resistant construction difficulties) into account were updated to ensure that new buildings could comply with these requirements while complying with Appendix G – these include street wall location requirements (below)



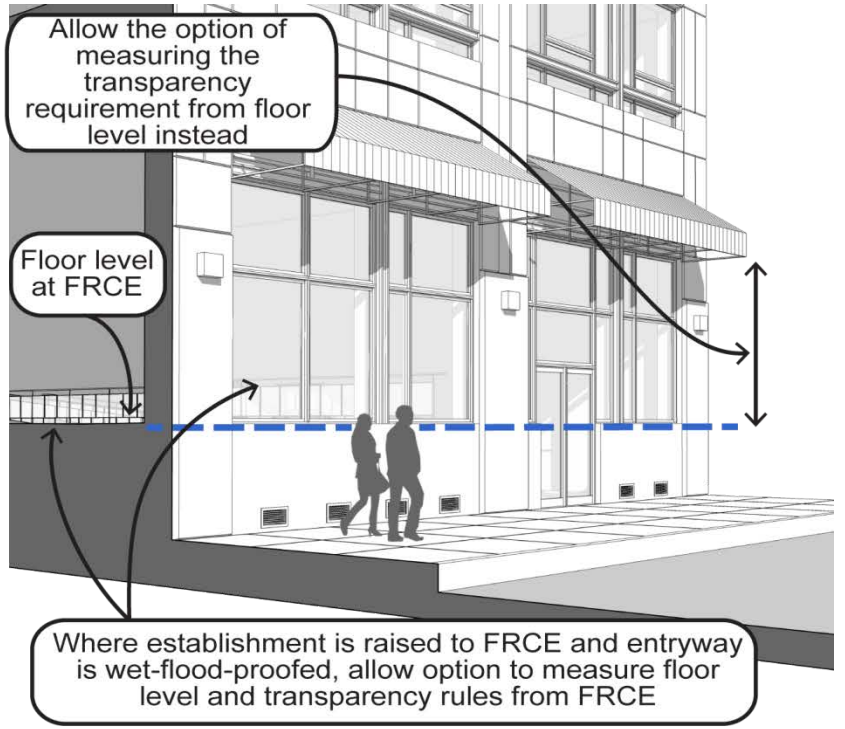
2013 Citywide Flood Text

Certain zoning design requirements were updated

Elements of zoning which predate the new FEMA PFIRM and did not take significant flood levels (and flood resistant construction difficulties) into account were updated to ensure that new buildings could comply with these requirements while complying with Appendix G – these include transparency requirements (depicted below) and ground floor use requirements.



Typical transparency requirements



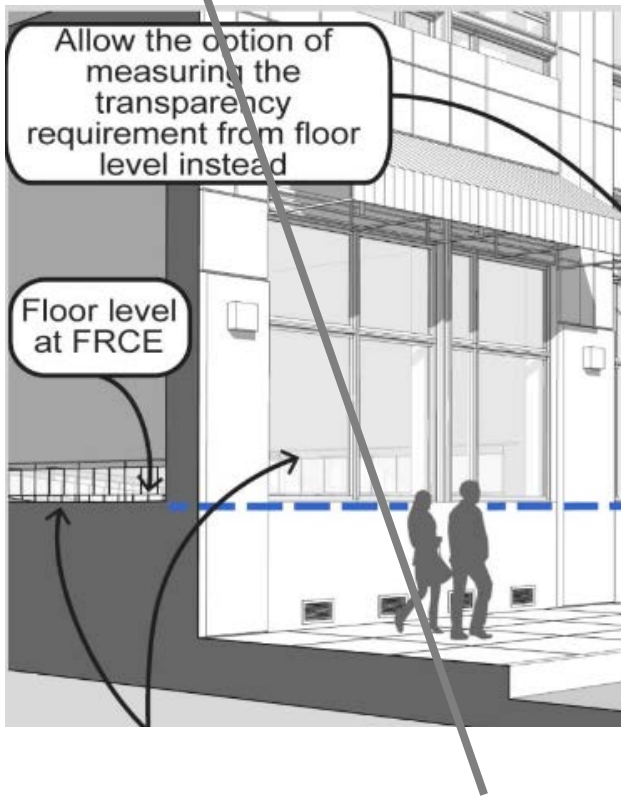
Optional reduced transparency

2013 Citywide Flood Text

Streetscape mitigations

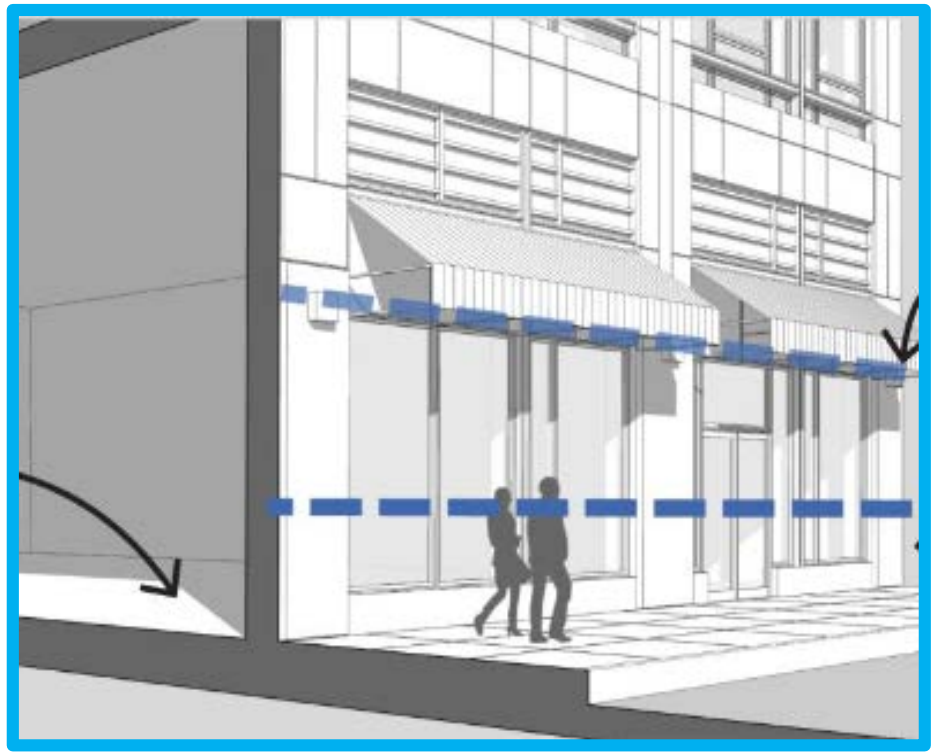
When the DFE >10', or when the bump-up has been used, any new or enlarged building must provide streetscape mitigations. For residential buildings, this involves a glazed, at-grade lobby. For **mixed-use or commercial buildings,** we require:

~~Elevation~~



Wet floodproofing

Dry floodproofing



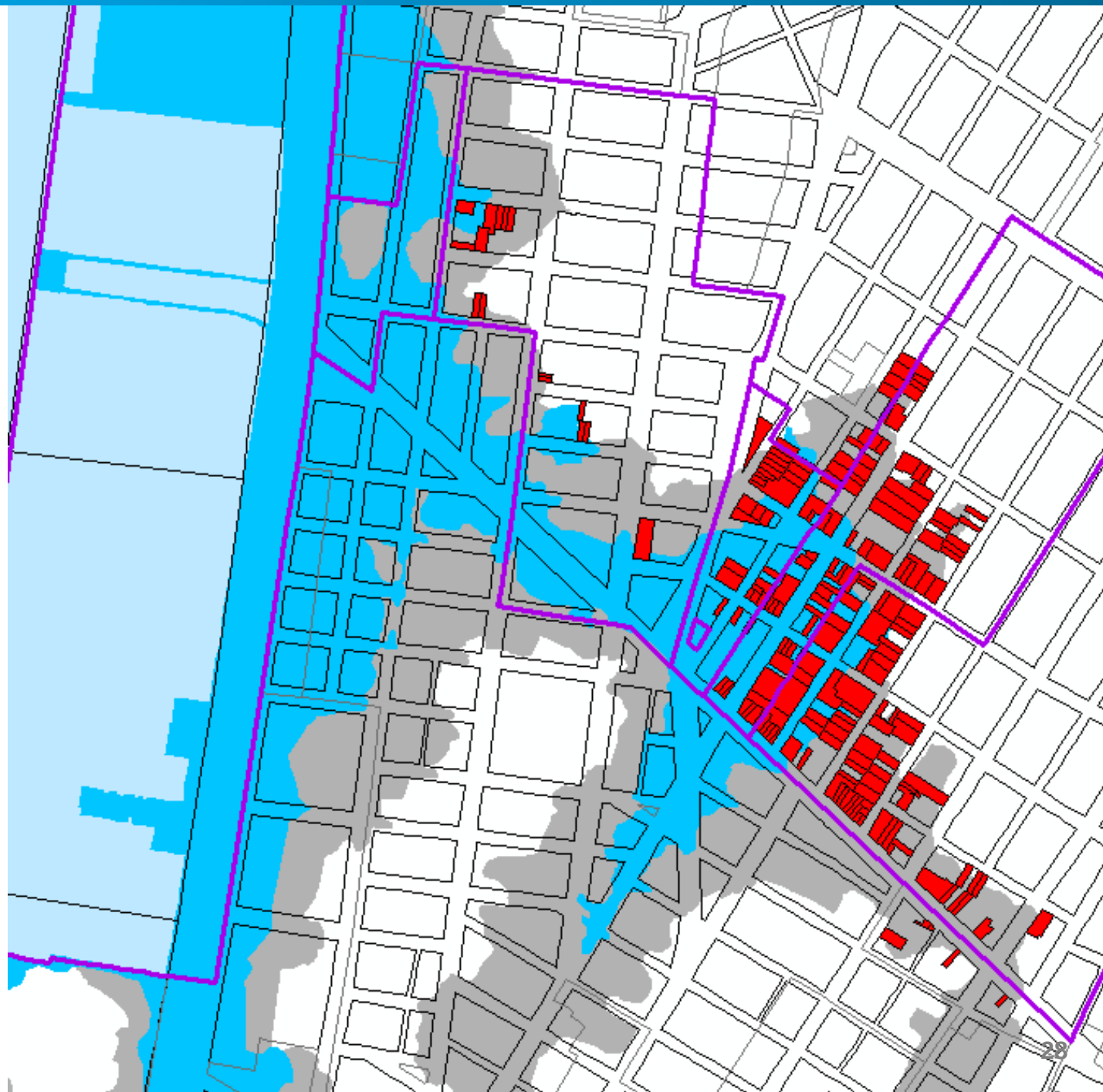
For **mixed-use buildings** in **commercial districts**:
ZR 64-64 requires 50% transparency between 2'-12' above *curb level*.

2013 Citywide Flood Text

Prohibitions on rebuilding grandfathered buildings (non-conforming uses) after 50% destruction were lifted, and given extensive vesting

Most non-conforming uses (such as a store in a Residence District, or a three-family home in a 1- or 2-family district) were permitted to be completely rebuilt, provided they were damaged by Hurricane Sandy, and given 10 years from the adoption of new flood maps to complete this work.

This was not extended to Residential buildings in M Districts – largely an issue in Brooklyn, though there are a few non-conforming residential buildings in normal M Districts:



2013 Citywide Flood Text

A number of other changes were made to facilitate recovery work.
The relevant changes in Manhattan:

- Changes were made to the **required slopes of landscape** in view corridors along waterfront public access.

- A new **BSA Special Permit** (SP 64-92) was created to allow for modifications to zoning laws, without needing a variance, to accommodate unforeseen situations and problems.
  - 35 single or two-family homes have utilized this permit since 2013, to reduce yard, floor area, or parking location problems.
  - All registrants were part of the Build it Back program.

Dry floodproofing issues

To incentivize the floodproofing of at-grade spaces the 2013 Flood Text redefined “cellar” to exempt at-grade stories in certain cases.

ISSUE

- Ongoing uncertainty regarding acceptable dry floodproofing methods:

Non-NFIP compliant
(e.g. “Aquafence”; allowed for Pre-FIRM buildings)

Deployable floodgate
(currently allowed only at doors and operable windows)

Integrated floodproofing
(‘aquarium-grade’ glass for glazing or curtain-wall systems)

Dry floodproofing issues

To incentivize the floodproofing of at-grade spaces the 2013 Flood Text redefined “cellar” to exempt at-grade stories in certain cases.

ISSUE

- Ongoing uncertainty regarding acceptable dry floodproofing methods:

Deployable floodgate
(currently allowed only at doors and operable windows)

Deployable floodgate
(allowed at perimeter only for pre-FIRM buildings)