

This row house example is an unreinforced masonry structure with party-walls, rubble foundation and a garden level residential unit. This structure has two shared bearing walls and is not suited for structural elevation.

Retrofit strategies that will result in full NFIP reduction in flood insurance premiums require extensive modifications to the building structure and program, which results in the loss of useable space, and may have structural integrity implications for the neighboring properties.

NFIP premium reduction options include filling the cellar and the basement to the lowest adjacent grade, converting that space to storage and access, and converting the first residential level to

storage and a new mechanical room. Replacing most of the lost residential space would require a new, two-story addition, which also requires significant structural modifications.

Alternative adaptation strategies, currently not recognized by NFIP, include leaving existing uses in place and dry or wet floodproofing below the DFE.

Partial adaptation could be limited to elevating or dry floodproofing the critical systems in place.

All floodproofing solutions require assessment of the building's structural integrity and the implications of the changes on the neighboring buildings.

KEY CHARACTERISTICS

FLOOD RISK



Flood Zone/BFE	AE +12'
Grade Elevation	+6' at sidewalk, +2' at rear property
Design Flood Elevation (DFE)	+14' (8' above sidewalk grade)
Lowest Occupiable Floor	+2' (4' below sidewalk grade)
Cellar Elevation	-5' (11' below sidewalk grade)
Critical Systems Location	Cellar

TPOLOGY

Lot Size	20' x 100'
Building Size	20' x 50'
Yards	10' front; 40' rear
Construction Type	Masonry with wood joists
Foundation Type	Rubble
Year Built	1900
Stories	2 + basement and cellar
Residential Floor Area	3,000 s.f. total
Residential Units	1 single storey, 1 duplex
Elevator	N/A

SITE CONDITIONS

Sidewalk Width	8'
Roadbed Width	32'
Zoning District	R5, Residential

 1% annual flood chance
 0.2% annual flood chance



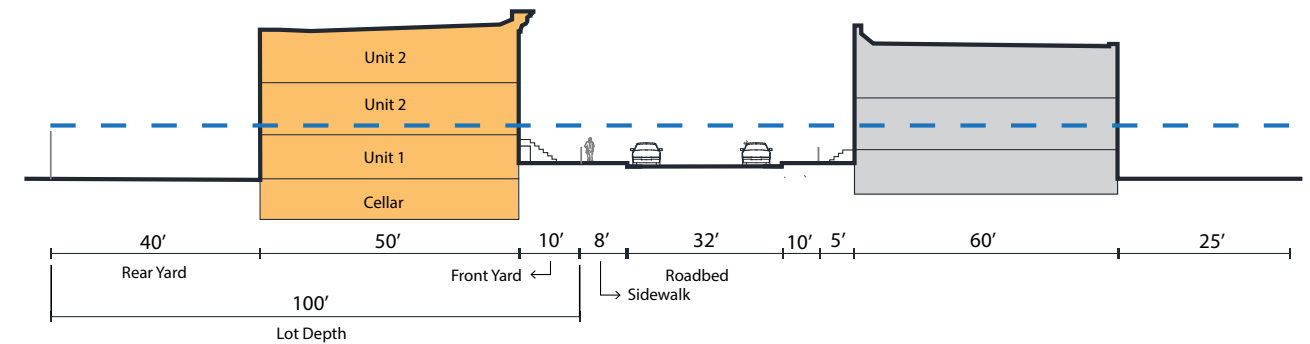
SITE & BUILDING CONDITIONS

SITE CONDITIONS

Sites with standard lot size and rear yards that are 0 to 6 feet below sidewalk grade. No side yards are provided. Streets and sidewalks are typically of standard width.

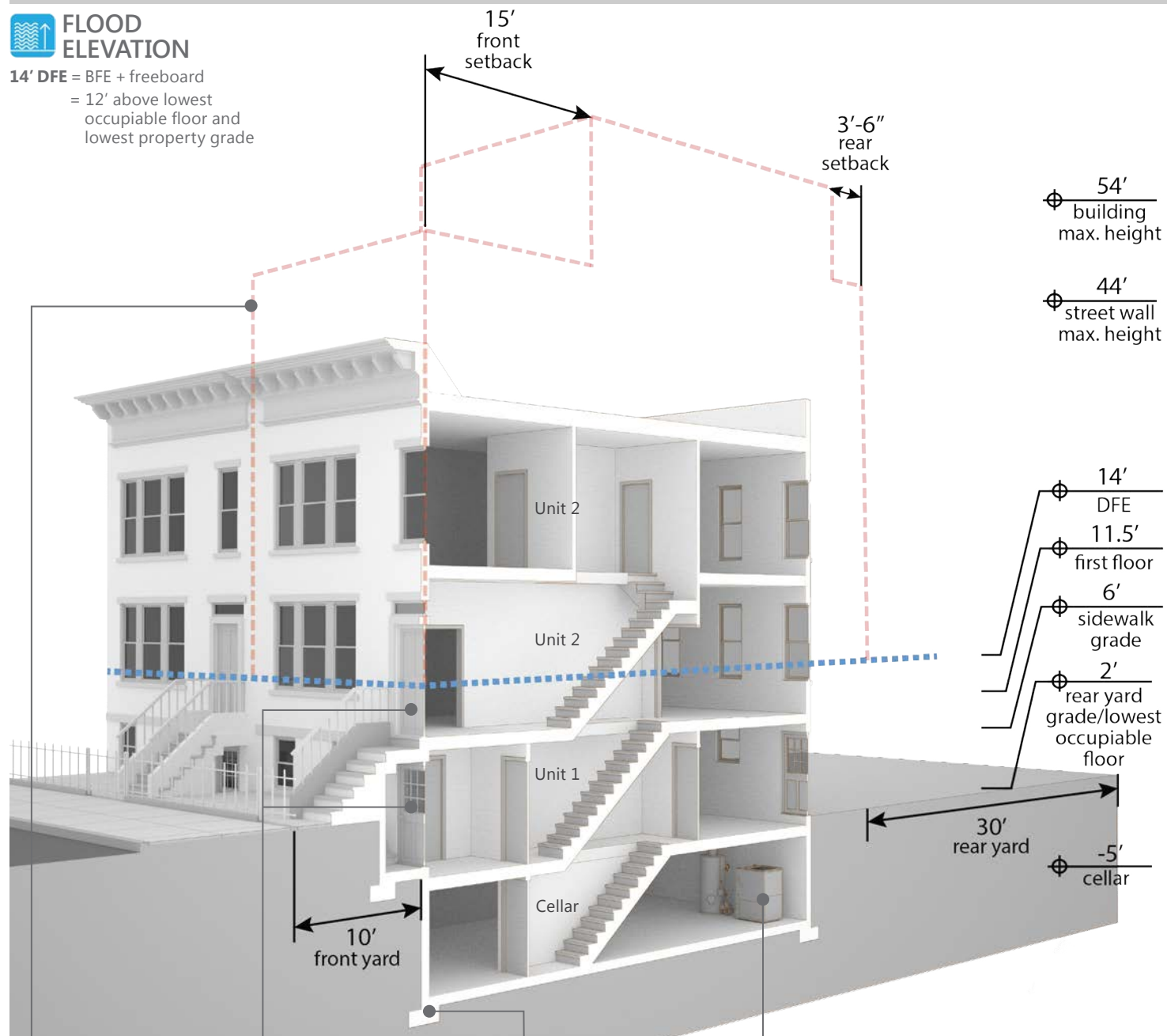
BUILDING TYPOLOGY

Buildings are two to four-story masonry party-walls with wood joists and a rubble foundation. Critical systems are located in the basement or cellar. Entrances are located above and below the sidewalk and property grade.



EXISTING CONDITIONS

FLOOD ELEVATION
 14' DFE = BFE + freeboard
 = 12' above lowest occupiable floor and lowest property grade

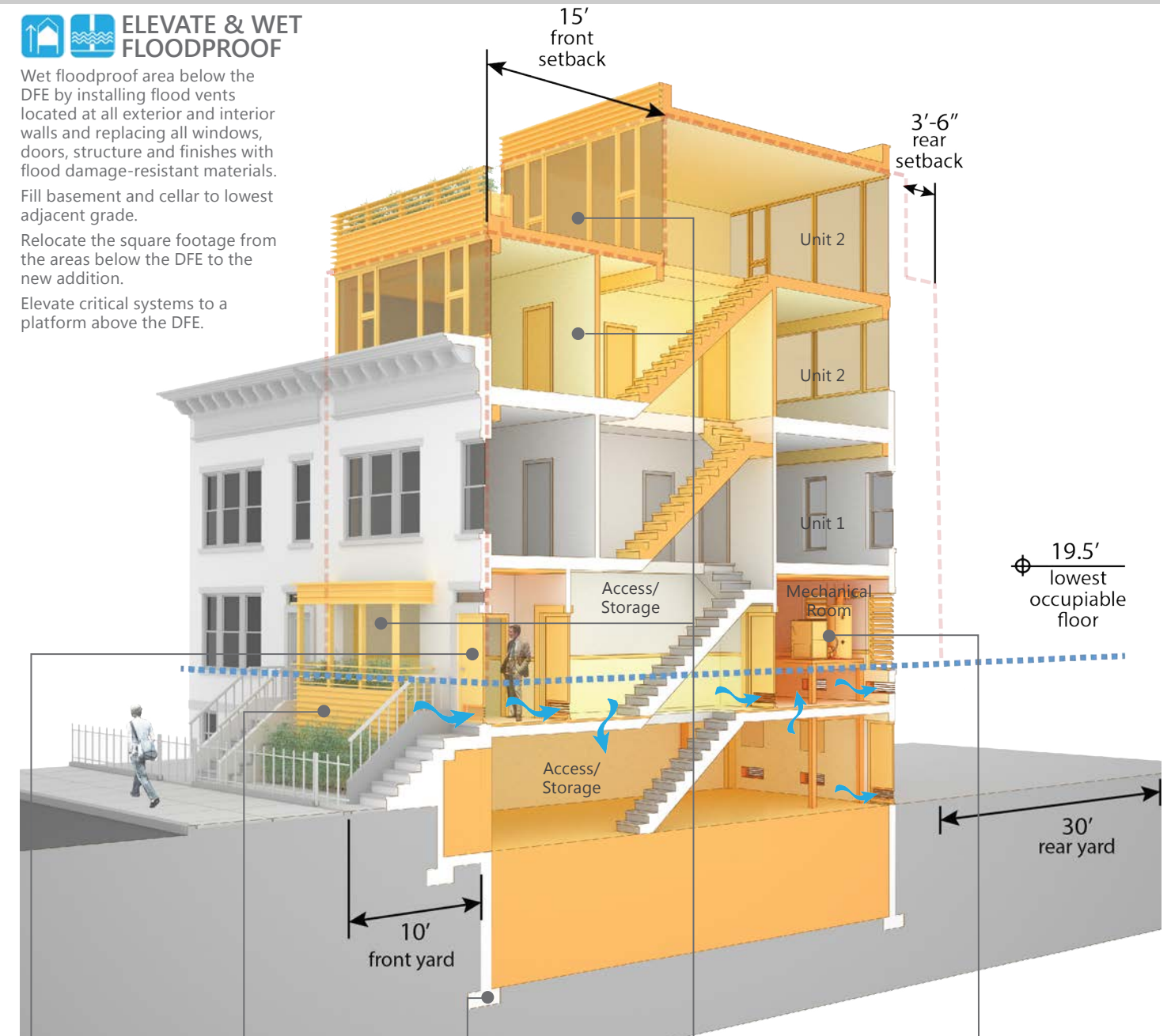


ILLUSTRATIVE RETROFIT STRATEGY

ATTACHED

ELEVATE & WET FLOODPROOF

Wet floodproof area below the DFE by installing flood vents located at all exterior and interior walls and replacing all windows, doors, structure and finishes with flood damage-resistant materials. Fill basement and cellar to lowest adjacent grade. Relocate the square footage from the areas below the DFE to the new addition. Elevate critical systems to a platform above the DFE.



ZONING ENVELOPE

The allowable building height is measured from the DFE. The floor area is overbuilt, which is an existing non-compliance. Zoning allows the relocation of existing non-compliant floor area to above the DFE within the adjusted bulk envelope.

ACCESS

Building access is provided at two front entrances, one located 5' above sidewalk grade and the second located 4' below sidewalk grade. The building access at the rear yard is provided at rear grade, 4' below the sidewalk grade.

STRUCTURAL SYSTEMS

Three-story combustible construction with unreinforced masonry bearing party-walls and wood joists on a rubble foundation.

CRITICAL SYSTEMS

All systems are located in the cellar.

ACCESS

All doors below the DFE are required to be wet floodproofed by installation of flood vents. Modify the height of the rear building entry to the adjusted lowest level. Existing entrance at the front stairs to remain. Interior layout of this entrance reconfigured to accommodate the new vestibule, front porch and circulation.

STREETScape

Add plantings and porch to fulfill the zoning streetscape mitigation requirements. Replace windows at streetwall elevation below the DFE with flood damage-resistant materials and install planters at the front facade.

STRUCTURAL SYSTEMS

Remove existing floor plate and slab, and fill the cellar and basement to lowest adjacent grade. Add reinforcement to the foundation walls. If the adjacent properties are not infilling their shared party wall areas, reinforce the foundation walls to account for new load. New addition at roof and platform for critical systems require additional structural support.

USE

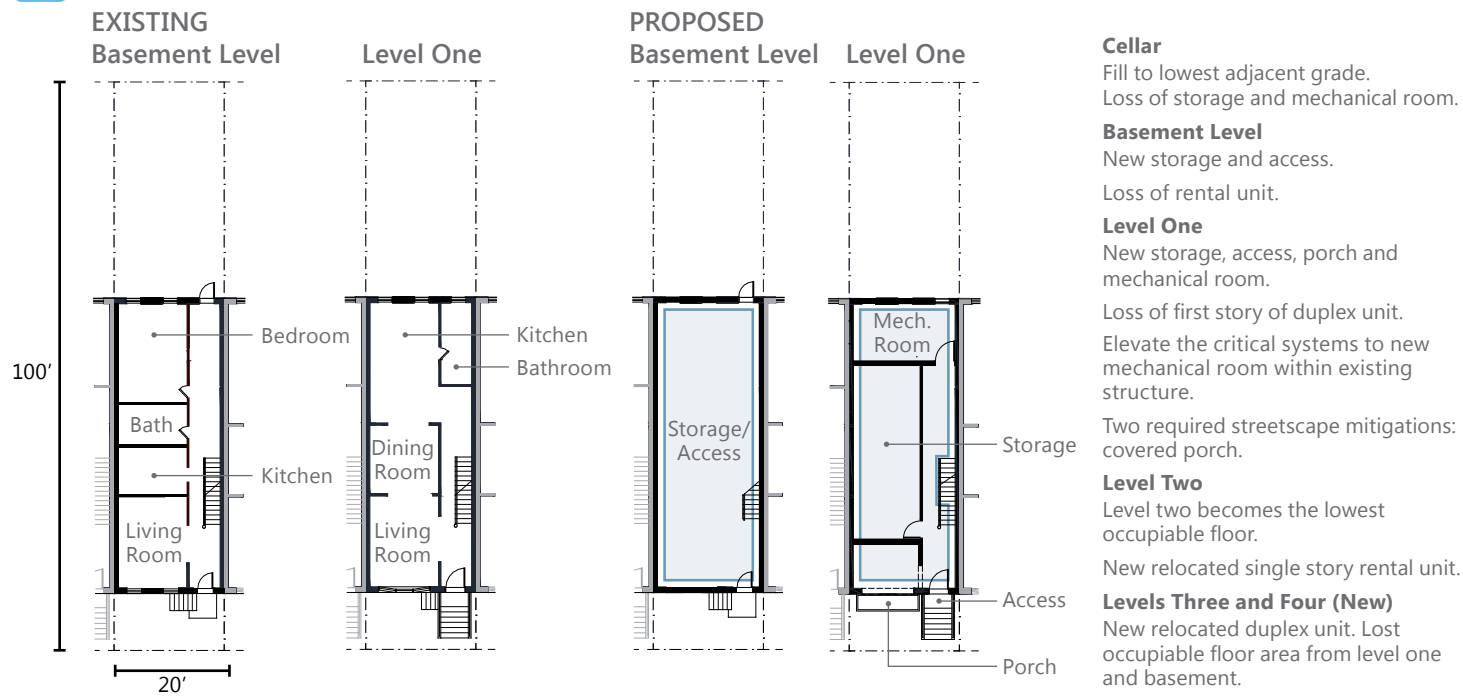
Relocate uses from the basement level and first level to the two story addition. Convert first level to porch, storage, access and mechanical room. The building remains 2-family. Relocate the garden level unit to the second story and the duplex unit to the new third and fourth stories. New entry vestibule to allow for reconfigured circulation. There is a total loss of 370 s.f. of floor area due to reconfigured unit and new interior access layout.

CRITICAL SYSTEMS

Elevate systems on a platform above the DFE within new fireproof and vented mechanical room. New building height requires installation of sprinkler system.



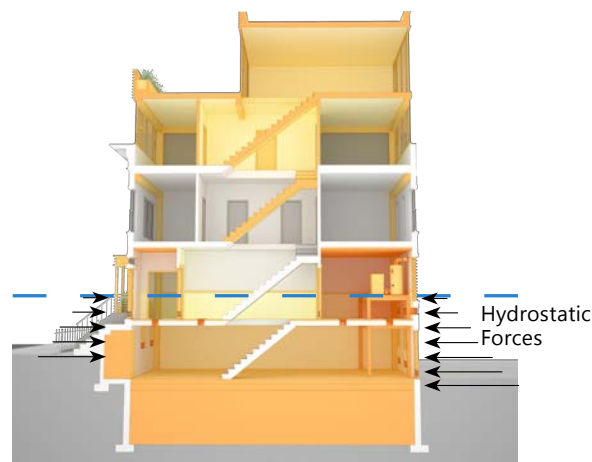
CHANGE OF USE



ADAPTATION CONSIDERATIONS

WET FLOODPROOFING

When wet floodproofing between two floors, important steps must be taken to ensure the floor plate does not collapse. All wet floodproofed areas must be constructed of approved materials and contain vents to allow water to flow horizontally and vertically. It is important to prohibit buoyancy loads to build up in air pockets that could form in between the floor framing. A new floor framing system below the DFE constructed with flood damage-resistant materials may be required. This 1900-era construction type and the fact that the rear yard grade is lower than the sidewalk grade could prove to be problematic with load path issues associated with flooding and the additional rooftop structure. Front walls may need to be strengthened to handle surge or high flood elevation loads. Rear walls may need to be reinforced as well to deal with the loads of the sitting floodwaters in the rear yard.



ACCESS & STREETScape

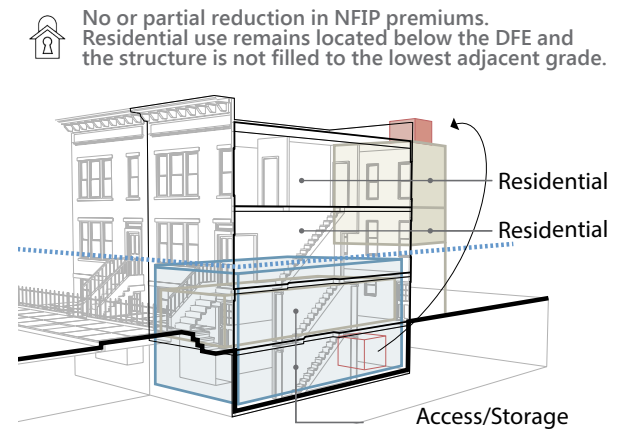


NON-SUBSTANTIAL DAMAGE/IMPROVEMENT STRATEGIES

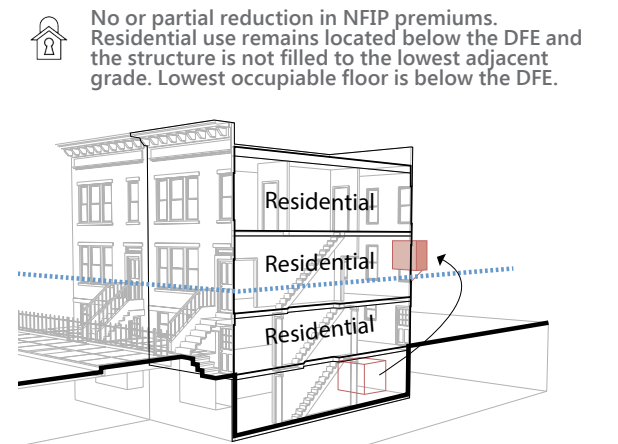
Non-substantially improved buildings within the floodplain are not required to comply with Appendix G of the NYC Building Code. This allows for greater flexibility in adapting buildings for flood resiliency. The alternatives illustrated below lower the risk for buildings and provide practical pathways for adaptation. Under current NFIP regulations, these measures may not lower insurance premiums. The blue icons below illustrate adaptive measures that receive full reduction of NFIP premiums. Icons in gray indicate strategies that improve building resilience, but receive no or partial reduction of NFIP premiums. If the lowest occupiable floor is left below the DFE, life safety must be considered. Residents should always follow evacuation procedures.

- Occupied Space
- Critical Systems
- Dry Floodproof
- Wet Floodproof
- Open Structure
- NFIP Premium Reduction

- Elevate the critical systems and residential use above the DFE.
- Wet floodproof below the DFE. Install flood vents at walls and floors to ensure vertical and horizontal water flow. Replace all windows, doors and finishes with flood damage-resistant materials.
- Relocate basement level floor area to new addition on rear of second and third stories. Basement and cellar use as access and/or storage. Residential use remains at first and second stories.
- Add reinforcement for addition at rear. Ensure wet floodproofing at party-wall locations does not impact neighboring property's structural integrity.
- Relocate critical systems within fire-rated and vented enclosure on roof of the rear addition.



- Elevate the critical systems above the DFE within a fire-rated and vented enclosure in the rear yard.
- Existing residential use remains. Loss of occupiable space may occur if systems location requires a window to be infilled.
- Add structural support to accommodate relocated critical systems.



- Dry floodproof cellar, basement and part of level one below the DFE by strengthening the foundation, floors and walls and sealing all penetrations. Provide temporary flood shields at windows and doors.
- All existing uses remain.
- Add reinforcement to roof, party-walls, exterior walls, foundation walls and slab. Ensure changes to party-walls do not impact neighboring property's structural integrity.
- Critical systems to remain in place within dry floodproofed mechanical room. Provide emergency shut off above the DFE.

