

This semi-detached case study begins to demonstrate the complexity of the federal regulations when applied to urban typologies. This building is an unreinforced masonry structure with a shallow foundation, one party-wall, and critical systems located on the first level. The structure is attached on one side and therefore not suitable for elevation.

Retrofit strategies resulting in full NFIP reduction in flood insurance premiums require extensive modifications to the building structure and program, which would result in the loss of useable space and have structural integrity implications for the neighboring property. NFIP premium reduction options include wet floodproofing the

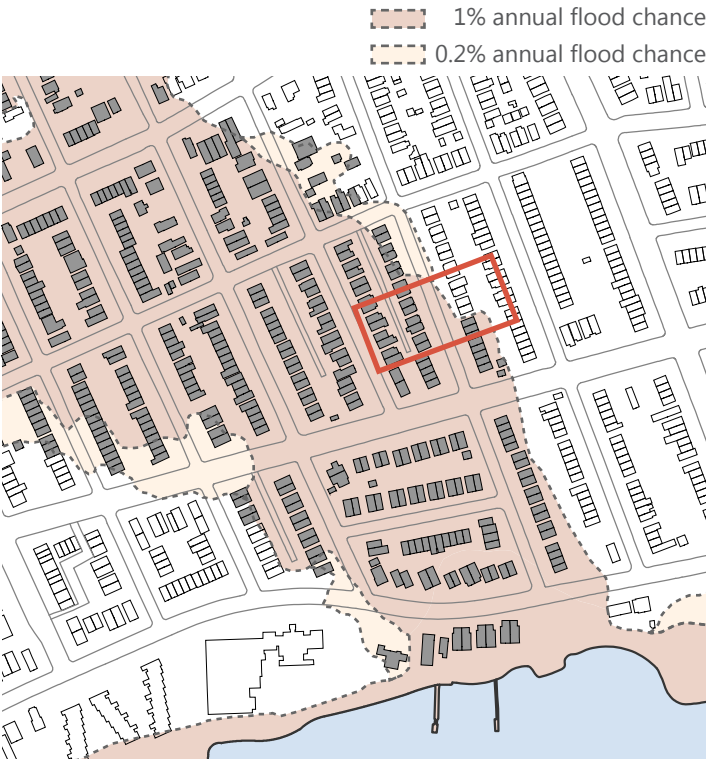
ground floor, converting it into a garage, access and storage area, and building a new addition on the second and third levels to minimize loss of square footage. These changes require substantial structural reinforcement.

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

Partial adaptation could be limited to elevating or floodproofing the critical systems. Dry and wet floodproofing solutions also require assessment of the building’s structural integrity and implications of changes on the neighboring buildings.

KEY CHARACTERISTICS

FLOOD RISK	
Flood Zone/BFE	AE +13'
Grade Elevation	+11' at sidewalk and property
Design Flood Elevation (DFE)	+15' (4' above sidewalk grade)
Lowest Occupiable Floor	+11.5' (6" above property grade)
Cellar Elevation	N/A
Critical Systems Location	Ground Level
TYPOLOGY	
Lot Size	25' x 80'
Building Size	20' x 35'
Yards	20' front; 25' rear, including alley
Construction Type	Masonry with wood joists
Foundation Type	Shallow Masonry
Year Built	1925
Stories	3
Residential Floor Area	2,000 s.f.
Residential Units	1
Elevator	N/A
SITE CONDITIONS	
Sidewalk Width	15'
Roadbed Width	34'
Zoning District	R4-1, Residential



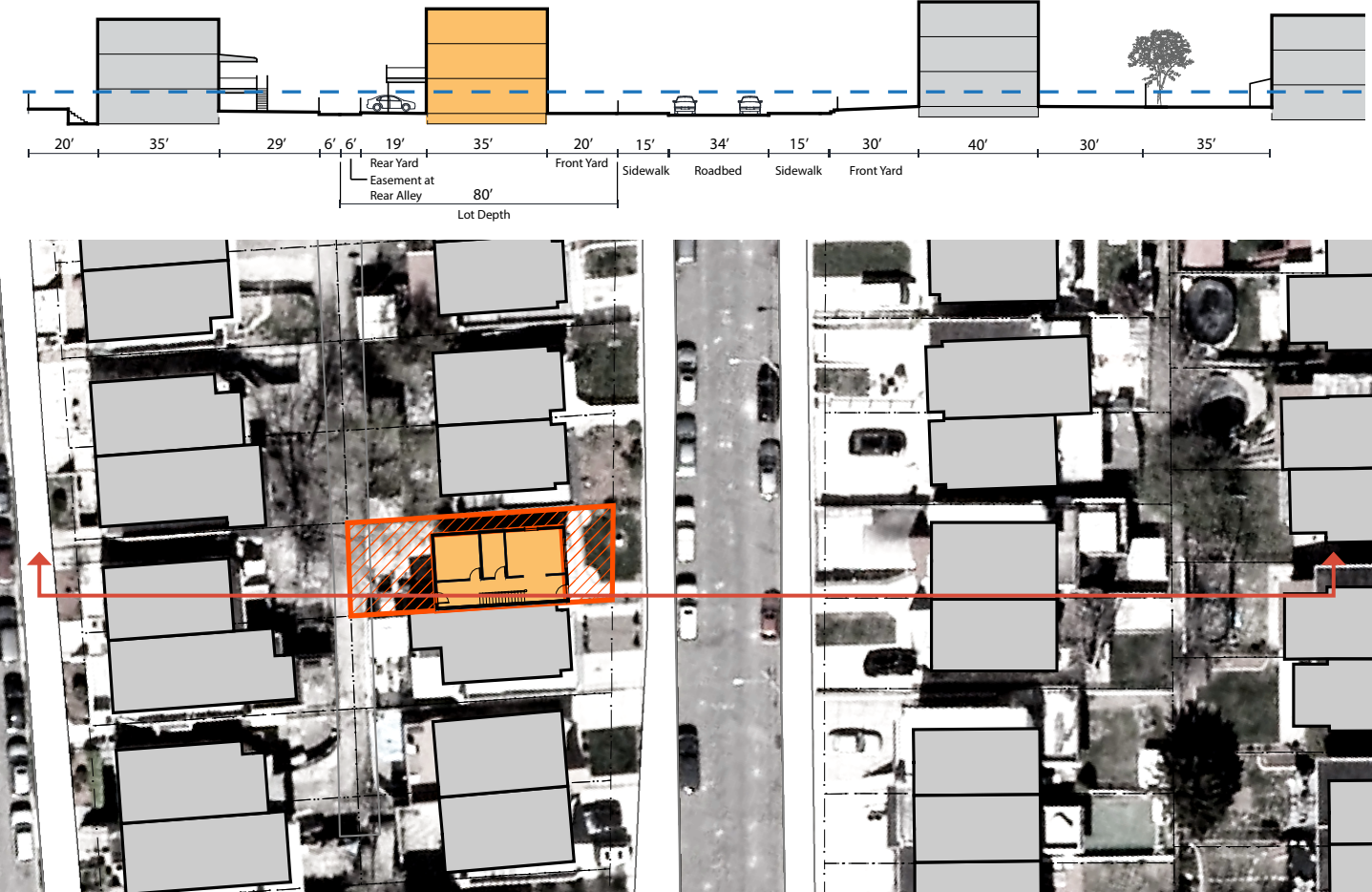
SITE & BUILDING CONDITIONS

SITE CONDITIONS

Sites with standard lot size, one side yard and may have rear alley access. Streets and sidewalks are typically of standard width.

BUILDING TYPOLOGY

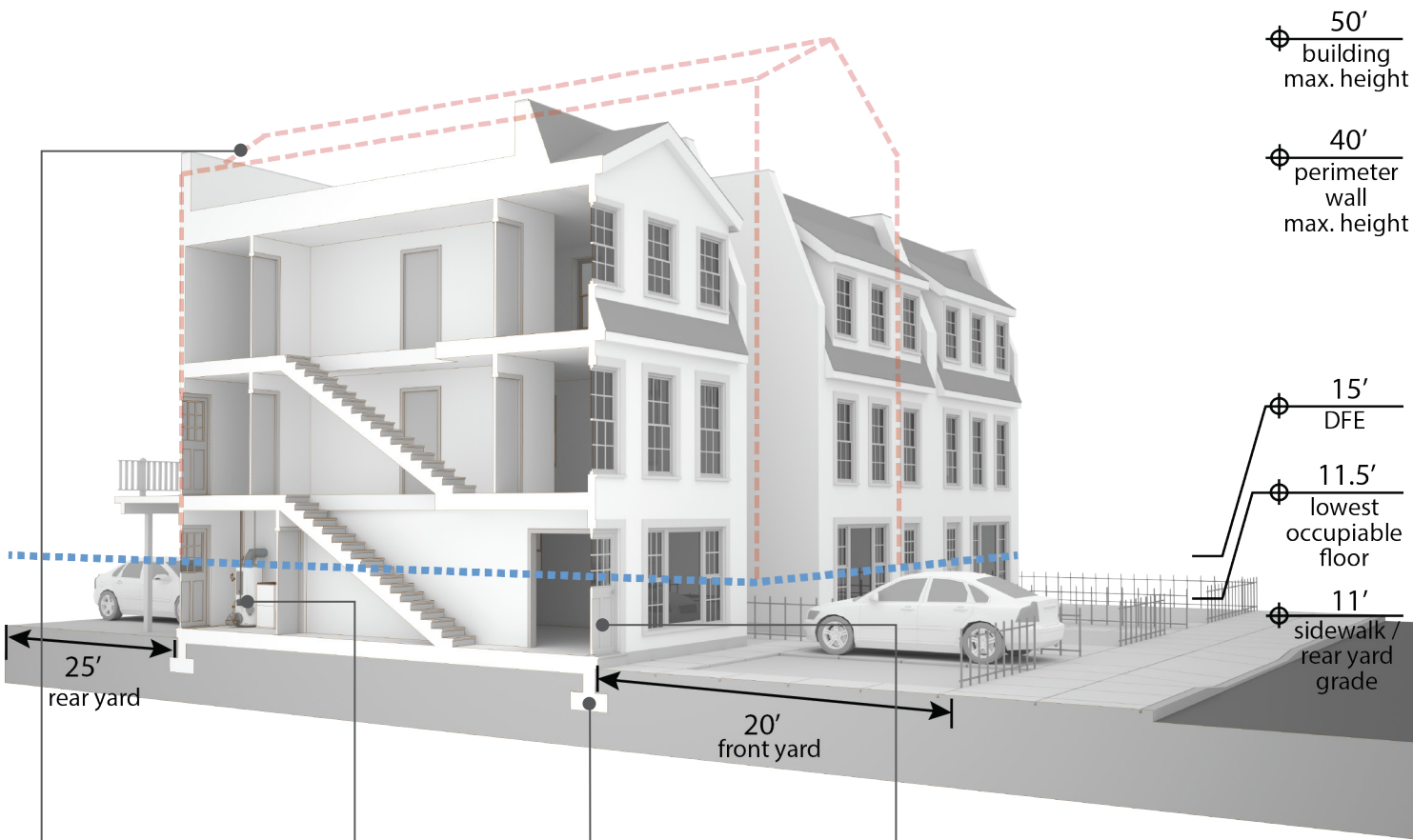
Buildings are two to three-story masonry party-wall with wood joists and a masonry foundation. Critical systems are located in the basement/cellar or at grade.



EXISTING CONDITIONS

FLOOD ELEVATION

15' DFE = BFE + freeboard
= 3.5' above lowest occupiable floor
= 4' above lowest property grade



ZONING ENVELOPE

The allowable building height is measured from the DFE. The building has a non-compliant rear yard of less than 30 feet. Parking is compliant in the rear yard and non-compliant in the front yard. The building is built to the maximum allowable floor area. To comply with the flood resistant construction standards, the floor area below the DFE can be relocated within the adjusted building bulk envelope.

CRITICAL SYSTEMS

All systems are located in a mechanical room on the lowest floor.

STRUCTURAL SYSTEMS

Three-story combustible construction with an unreinforced masonry bearing party-wall and wood joists on a shallow masonry foundation.

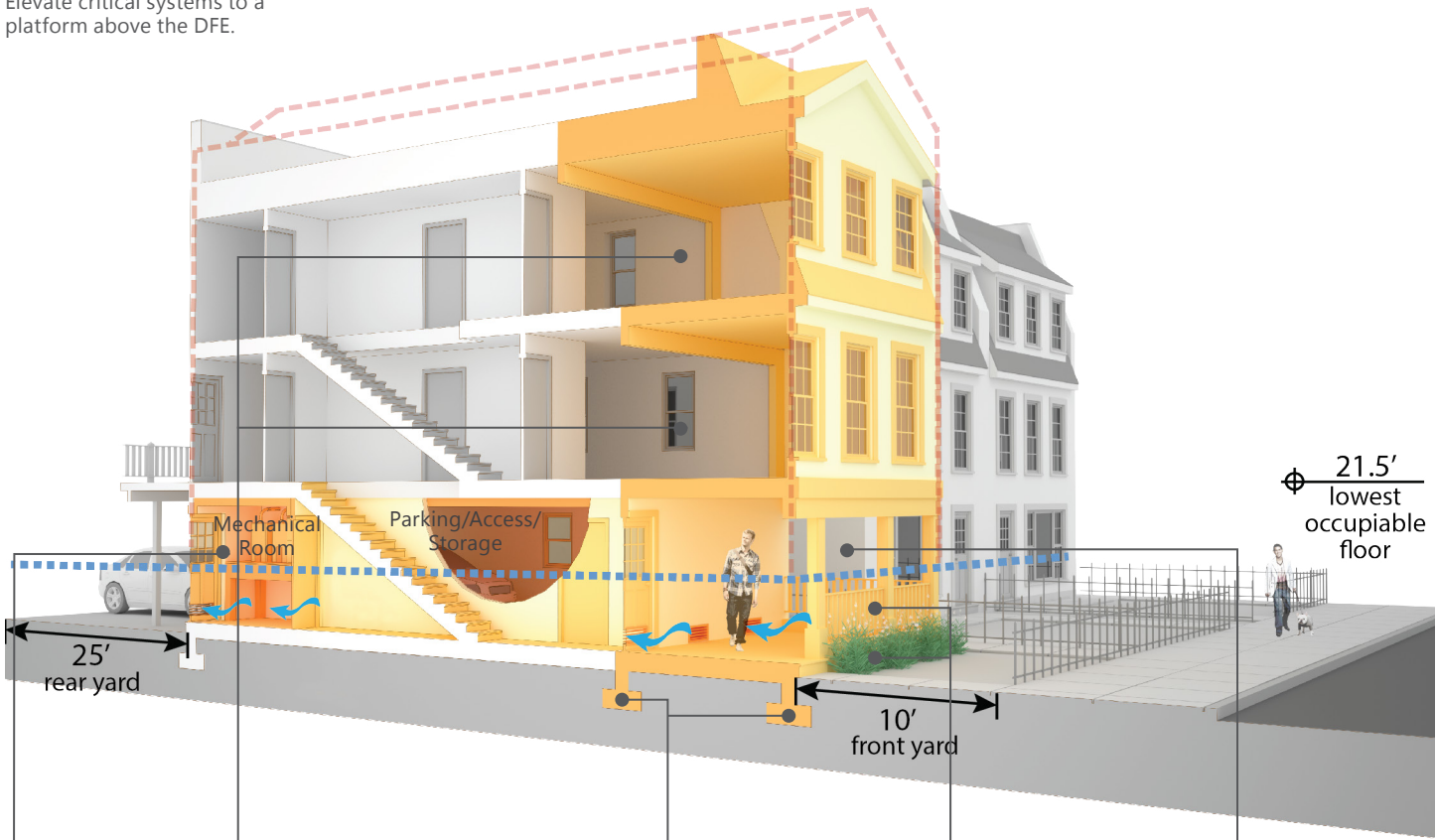
ACCESS

Building access is provided at the front and rear entrances at sidewalk grade. There is an alley easement along the rear property line for vehicular access and parking.

ILLUSTRATIVE RETROFIT STRATEGY

ELEVATE & WET FLOODPROOF

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



CRITICAL SYSTEMS

Elevate systems on a platform above the DFE within the existing mechanical room. Replace existing systems to fit within limited height clearance, as required.

USE

Per Zoning, wet floodproofing the ground floor allows the lost floor area below the DFE to be relocated within the building bulk envelope to the new addition on the second and third levels. There is a total loss of 180 s.f. of floor area. Relocate the front yard parking to the rear and convert the partial interior floor area below the DFE to a garage and storage. The mechanical room remains. A new porch is added at grade below the addition. If zoning regulations require the streetwall to align with adjacent buildings, a BSA special permit may be required.

STRUCTURAL SYSTEMS

Add a new foundation system to support the addition. Reinforce the party-wall and the associated foundation system as required. Locating parking within the building requires new fire-rated walls, ceiling assemblies and slab reinforcement.

STREETSCAPE

Due to the construction of a new streetwall, where the lowest occupiable floor is over 9' above the sidewalk grade, the Zoning Resolution requires two streetscape mitigations be implemented. These enhancements can be selected from a list of options specified in the Zoning Resolution. Here plantings, and a covered porch fulfill the requirements.

ACCESS

New porch below the new addition provides access at grade to existing front entrance. At rear, existing entrance to remain with the addition of an entry point at the new garage door.

RETROFIT FLOOR PLAN

CHANGE OF USE



ADAPTATION CONSIDERATIONS

ACCESS

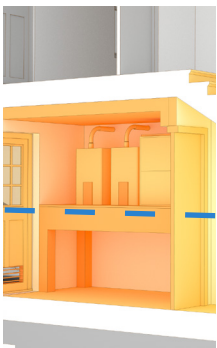
Inviting access and a strong relationship with the streetscape are important design elements when relocating access points. Zoning requires homes to provide specific streetscape mitigations such as plantings along the streetwall, open or covered porches, stair turns, or raised yards.



CRITICAL SYSTEMS

Heating system components are vulnerable to flood damage. Relocating boilers, furnaces or other forced air systems to an upper story is ideal but may not be practical. If relocation is infeasible, try to elevate as high as possible at the current location.

Property owners should consider required equipment clearances and venting before determining if and where to relocate.



STREETSCAPE



ALTERNATIVE STRATEGIES

NON-SUBSTANTIAL DAMAGE/IMPROVEMENT STRATEGIES

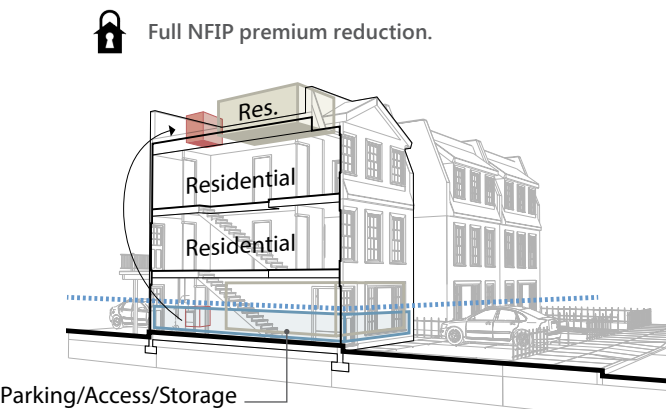
Non-substantially improved buildings within the floodplain are not required to comply with Appendix G of the NYC Building Code. This allows for greater flexibility in adapting buildings for flood resiliency. The alternatives illustrated below lower the risk for buildings and provide practical pathways 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 critical systems and lowest occupiable floor above the DFE.
- Wet floodproof enclosed area below the DFE by installing flood vents and replace all windows, doors and finishes with flood damage-resistant materials.
- Relocate partial ground floor area to a new fourth floor addition within adjusted bulk envelope. Restrict all uses below DFE to parking, crawl space, access, and storage.
- Add structural reinforcement for additional structural loads on the roof. Ensure changes to party-wall do not impact neighboring property's structural integrity.
- Relocate partial critical systems to the roof within a fire-rated and vented enclosure. Raise electrical utilities above DFE at the existing location.
- Due to the elevated height of the lowest occupiable floor 9 feet above sidewalk grade, two streetscape mitigations are required.



- Dry floodproof below the DFE by strengthening the foundation, floors and walls and sealing all penetrations. Provide temporary flood shields at all windows and doors.
- Retain existing first floor residential use.
- Strengthen foundation, floors and walls to withstand flood loads below and above grade. Ensure changes to party-wall 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. Raise electrical utilities above DFE at the existing location.

No or partial reduction in NFIP premiums. Residential use and critical systems remain located below the DFE. Dry floodproofing is not permitted at residential use. Lowest occupiable floor is below the DFE.



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

No or partial reduction in NFIP premiums. Residential use remains located below the DFE. Lowest occupiable floor is below the DFE.

