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)
- Cellar Elevation: -5' (-17' below sidewalk grade)
- Critical Systems Location: Cellar

#### TYPOLOGY
- Lot Size: 20' x 100'
- Building Size: 20' x 50'
- Yards: 10' front, 40' rear
- Construction Type: Masonry with wood joints
- 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

#### 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**

**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.

**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.

**STREETSACE**
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**
All systems are located in the cellar.

**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.

**STRUCTURAL SYSTEMS**
Three-story combustible construction with unreinforced masonry bearing party wall and wood piers on a rubble foundation.

**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.

**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**
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**FLOODPROOFING**

**ATTACHED**

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**RETROFIT FLOOR PLAN**

**CHANGE OF USE**

**EXISTING**
- Basement Level
- Level One

**PROPOSED**
- Basement Level
- Level One

**CELLAR**
- Fill to lowest adjacent grade.
- Loss of storage and mechanical room.

**BASEMENT LEVEL**
- New storage and access.
- Loss of rental unit.

**LEVEL ONE**
- New storage, access, porch, and mechanical room.
- Loss of first story of duplex unit.
- Elevate the critical systems to new mechanical room within existing structure.
- Two required streetscape mitigations: covered porch.

**LEVEL TWO**
- Level two becomes the lowest occupiable floor.
- New relocated single story rental unit.
- Levels Three and Four (New)
  - New relocated duplex unit.
  - Lost occupiable floor area from level one and basement.

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**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 roof 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**

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**RETROFIT FLOOR PLAN ALTERNATIVE STRATEGIES**

**CHANGE OF USE NON-SUBSTANTIAL DAMAGE/IMPROVEMENT STRATEGIES**

**ADAPTATION...**

**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.

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**ACCESS/STORAGE**

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**RETROFITTING BUILDINGS FOR FLOOD RISK**

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