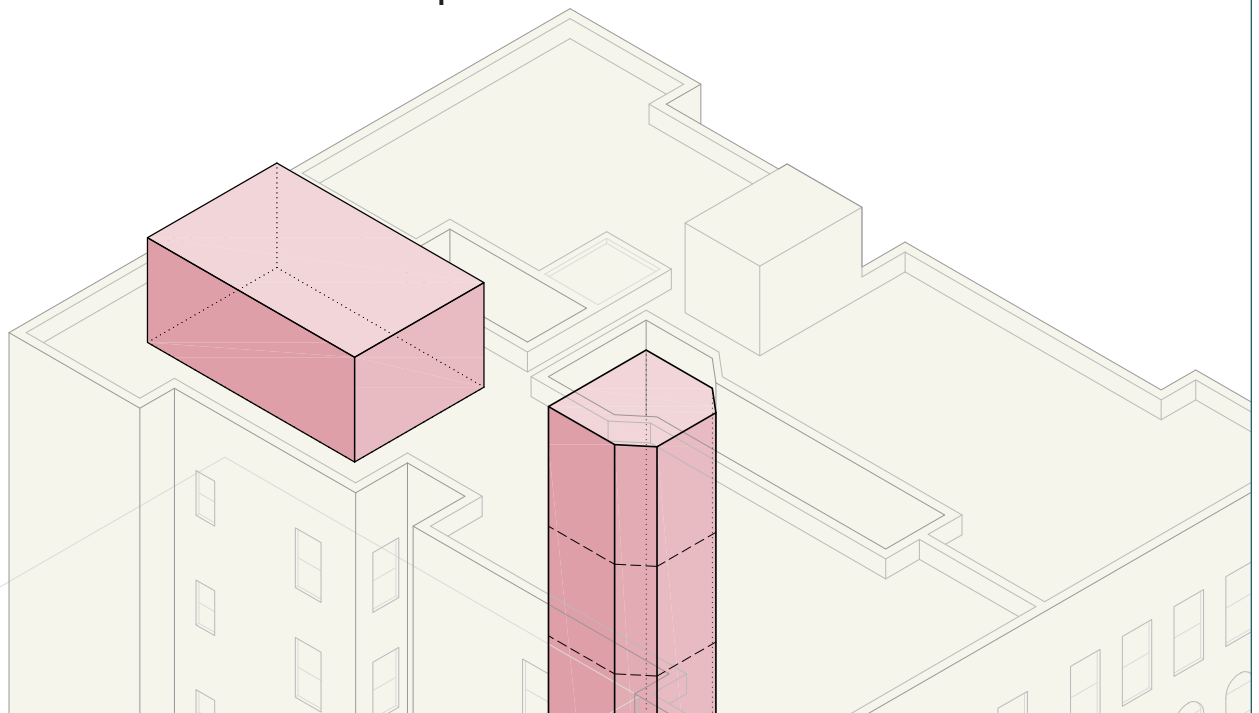


JULY 2014

# The Price of Resilience: Can Multifamily Housing Afford to Adapt?

In partnership with



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# 1. Introduction

Since Superstorm Sandy made landfall on October 29, 2012, New York City has strived not just to recover from the immense damage the storm’s winds and floodwaters wrought, but also to find ways to become more resilient to future storms. Although the city, state, and federal governments have been actively investigating strategies to shield the city and ensure the safety of its residents, much of the onus falls on individual property owners to protect their own buildings. In light of rising seas and climate change, the stakes are clearly very high. Moreover, as a result of a federal legislative change, many property owners will face rapidly escalating flood insurance premiums over the next several years if their properties do not meet specific flood-resistant design standards.

Storm-proofing a city like New York, however, poses several special challenges not shared by all coastal areas. First, New York City is largely built out, with much of its building stock long pre-dating current flood-resistant design standards. Resilience in New York, then, primarily means retrofitting older buildings, not just strengthening building codes for new construction. Second, much of the official guidance about how to retrofit residential properties to reduce risk and lower insurance premiums is geared toward 1-4 family buildings, reflecting the national housing stock. In New York City, though, only one-third of the buildings thought to be vulnerable to flooding are 1-4 family, detached homes. A much larger number of housing units vulnerable to future storms are located in roughly 4,500 multifamily buildings with five or more rental units. Finding ways to cost effectively retrofit these types of buildings to protect residents and reduce insurance premiums for owners needs to be central to New York City’s storm-preparedness efforts.

Finally, the extreme shortage of affordable housing in New York may make the direct and indirect costs of retrofitting particularly hard to bear.

Based on current federal policy, increased flood risk requires for many buildings either investment in physical improvements or payment of higher insurance premiums. Without external funding or other relief, there is no clear avenue to enact these resilience improvements while maintaining affordability. Eliminating all units below the predicted flood level, for example, could result in the loss of thousands of indispensable housing units. Even if units are not lost, property owners may pass on the costs of retrofitting buildings to residents through a rent increase, reducing the supply of affordable units in New York City’s coastal areas. For buildings that are constrained in their ability to raise rents and raise funds for improvements, like many of the rent stabilized and subsidized buildings in the city, the financial burden of making costly retrofits might be overwhelming, leading to the conversion of those buildings to market rate (when permitted), unsustainable operating budgets that may require a bail-out, or a large number of buildings left unprepared for future storms. The costs of not retrofitting, however, may be even more burdensome: building owners may face skyrocketing flood insurance premiums if they do not retrofit their buildings.

This report explores the challenges of retrofitting New York City’s existing multifamily rental buildings to be more resilient to future storms. After summarizing our key findings, we provide background about the current regulatory requirements existing building owners who wish to retrofit must navigate. We then discuss the results of a design workshop the Furman Center convened in January 2014 with the help of our partners at the New York Chapter of the American Institute of Architects (AIA) and Enterprise Community Partners. During the workshop, we tasked designers, engineers, and other experts with identifying and analyzing cost-effective retrofit strategies for New York City’s multifamily buildings. Finally, drawing on the lessons learned at the workshop, we discuss some of the key challenges to implementing the retrofit strategies identified and possible policy reforms that may help multifamily rental buildings achieve long-term resilience.

## Key Recommendations to Help Preserve Affordable Housing in the Floodplain

***The Federal Emergency Management Agency (FEMA) should modify the guidelines for its National Flood Insurance Program for coverage of existing multifamily buildings.***

First, FEMA should allow owners of multifamily buildings who have made incremental resilience improvements to their properties to realize incremental decreases (or less steep increases) in their flood insurance rates. Second, FEMA should create retrofitting guidelines specifically for multifamily buildings. For example, our research shows that “dry floodproofing” (i.e., making flood-prone parts of buildings watertight) would be a cost effective option for multifamily residential buildings in some situations, but it is currently not allowed by FEMA.



© NYU Photo Bureau: Hollenshead

***New York City should expand its Flood Resilience Zoning Text Amendment to cover buildings in the 500-year floodplain.***

More areas of the city may become increasingly vulnerable to flooding in future years. Retrofitting a building is a capital-intensive process that may take a long time to finance and plan. Extending the area covered by the Zoning Text Amendment can offer an incentive for building owners to begin the process of making their properties more flood resistant even if such changes are not currently required by FEMA.

***The city should revisit its existing rehabilitation programs to ensure that resilience measures can be readily funded; and it should require that buildings in the 100-year and 500-year floodplains that receive city assistance have adequate emergency and resilience plans.***

Rent stabilized and government subsidized multifamily buildings often have limited resources and limited ability to raise money for major capital projects because of the rules and agreements that govern them. To help these buildings, the city should make sure its subsidy programs for rehabilitation include resilience in their scope; and it should also require that buildings it assists in the riskiest parts of the city prepare for disasters and have long-term capital plans that include resilience.

## 2. New York City's At-Risk Housing Stock

Superstorm Sandy's floodwaters were devastating to New York City. Figure 1 shows the extent of the storm surge, which not only covered wide swaths of the city's outer coastline but penetrated the city through its many inlets and bays. Although Sandy only destroyed 230 buildings,<sup>1</sup> the extent of the surge area suggests that nearly 74,000 buildings in New York City may have sustained damage, especially to their mechanical systems, which were often vulnerable to floodwaters. Table 1 shows the distribution of buildings and residential units in Sandy's surge area.<sup>2</sup>

Because of the path and timing of Superstorm Sandy, its surge reached just a fraction of the buildings considered at risk of flooding by the Flood Insurance Rate Maps (FIRMs) produced by FEMA, the most widely used measure of flood vulnerability. Every storm is different, however, and the fact that vulnerable buildings were unaffected by Sandy does not mean they are safe from future danger. FEMA publishes and maintains the flood insurance maps<sup>3</sup> to administer the National Flood Insurance Program (discussed in more detail in Section 3). The maps include many detailed flood-risk categories, which can generally be divided into areas with a one percent probability of flooding each year—also known as the 100-year floodplain because these areas are expected to flood once in every 100 years—and areas with a 0.2 percent probability of flooding each year—also known as the 500-year floodplain because these areas are expected to flood once in every 500 years. Table 2

shows the distribution of building types in the current, effective flood insurance maps which were adopted in New York City in 1983.

The most up-to-date flood insurance maps currently available for New York City are the Preliminary Flood Insurance Rate Maps that were released in December 2013 and are expected to become effective in 2016. Figure 2 shows the 100-year and 500-year floodplains in New York City from these maps. About 60,000 buildings with over 250,000 residential units are located in the 100-year floodplain and an additional 35,000 buildings with 145,000 residential units are located in the 500-year floodplain.

The building stock in the floodplain is extremely diverse, reflecting the variety in the city as a whole. Table 3 shows that just one-third of the buildings at risk of flooding (i.e., in the 100-year or 500-year floodplain) are detached, 1-4 family homes. Another 41 percent are attached or semi-attached 1-4 family homes. The remaining 26 percent of buildings are condominiums (3.5%), cooperative apartments (1.1%), multifamily rental apartments (4.8%), mixed-use buildings (3.4%), or non-residential buildings (13.6%). Although multifamily buildings make up a fairly small share of buildings in the floodplain, more than two-thirds of the housing units in buildings at risk of flooding are located in multifamily buildings (i.e., those with five or more residential units). In this report, we focus on the retrofitting challenges specific to multifamily buildings, particularly rental buildings, though much of our analysis and many of the design ideas could also be applied to other building types.

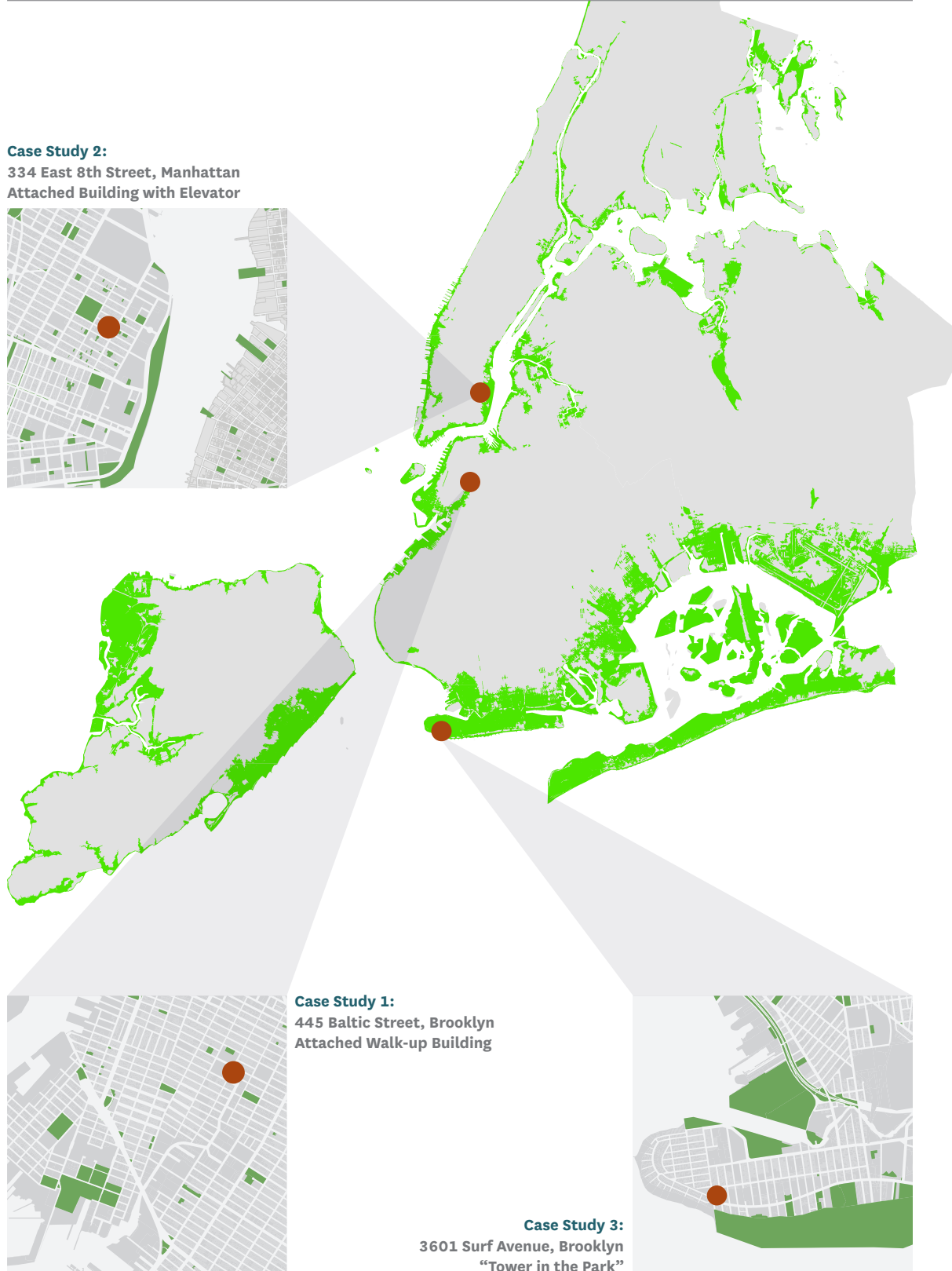
Even among multifamily rental buildings, there is abundant diversity in building types. These buildings range from small walk-up buildings with five to nine units to large towers with elevators and over 100 units. Figure 3 shows the distribution of multifamily rental properties in the 100-year and 500-year floodplains by a number of characteristics.

<sup>1</sup> City of New York. (June 2013). *A Stronger, More Resilient New York*, p. 74. Retrieved from <http://www.nyc.gov/html/sirt/html/report/report.shtml>

<sup>2</sup> An explanation of our methodology can be found at page 52 of the Appendix.

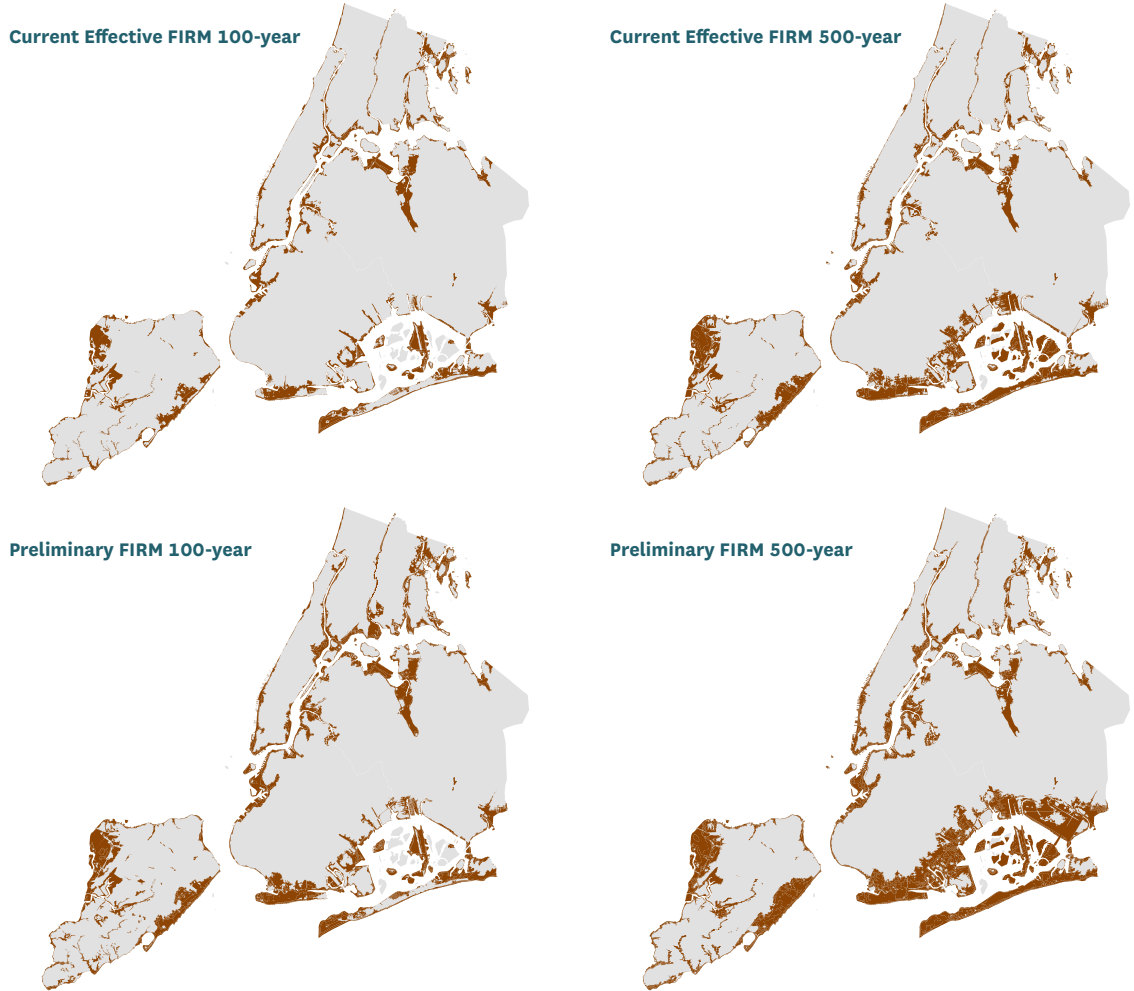
<sup>3</sup> Throughout this report we refer to Flood Insurance Rate Maps (FIRMs) as flood insurance maps.

**Figure 1: Superstorm Sandy's Surge Area and the Locations of Buildings Explored in This Report's Case Studies**



Sources: FEMA Modeling Task Force, NYU Furman Center

Figure 2: Current Effective (1983) and Preliminary (December 2013) Flood Insurance Rate Maps (FIRM)



Sources: FEMA, NYU Furman Center



**Table 1: Distribution of Building Types in Sandy's Surge Area**

<i>Building Type</i>	<i>Buildings in Surge Area</i>	<i>Share of All Buildings in Surge Area</i>	<i>Housing Units in Buildings in Surge Area</i>	<i>Share of All Units in Surge Area</i>
1-4 Family	55,127	74.8%	87,092	27.7%
Condo <sup>(1)</sup>	2,564	3.5%	25,258	8.0%
Co-op				
<i>Mitchell-Lama Co-ops</i> <sup>(2)</sup>	113	0.2%	20,097	6.4%
<i>Market-Rate Co-ops</i>	603	0.8%	25,820	8.2%
NYCHA <sup>(3)</sup>	482	0.7%	43,159	13.7%
Other Rental Subsidies (SHIP)	324	0.4%	34,228	10.9%
Rent Stabilized <sup>(4)</sup>	1,048	1.4%	42,016	13.4%
Market-Rate Multifamily Rental	1,077	1.5%	21,448	6.8%
Mixed Use, Market-Rate Rental	2,109	2.9%	15,353	4.9%
Commercial/Other	10,243	13.9%	—	—
<b>Total</b>	<b>73,690</b>	<b>100.0%</b>	<b>314,471</b>	<b>100.0%</b>

Sources: FEMA Modeling Task Force, New York City Department of City Planning (PLUTO), Furman Center Subsidized Housing Information Project, New York City Housing Authority, New York City Rent Guidelines Board

Notes: 1. The majority of condo units are in buildings with five or more units. 2. Includes co-op properties with parcels only partially in the surge area. Some very large co-op complexes such as Co-op City (4,458 units in surge area) are included here even though the surge likely did not reach all buildings. 3. Includes all buildings on properties only partially in the surge area. The surge may not have reached all buildings. 4. Includes all units in buildings with any rent stabilized units. It is possible that some individual units have been deregulated.

**Table 2: Distribution of Building Types in the Current Effective Flood Insurance Maps (Adopted in 1983)**

<i>Building Type</i>	<i>100-Year Floodplain</i>				<i>500-Year Floodplain</i>			
	<i>Buildings</i>	<i>Share of Buildings</i>	<i>Housing Units</i>	<i>Share of Housing Units</i>	<i>Buildings</i>	<i>Share of Buildings</i>	<i>Housing Units</i>	<i>Share of Housing Buildings</i>
1-4 Family	19,115	64.1%	27,805	16.8%	19,544	69.3%	33,329	24.7%
Condo <sup>(1)</sup>	1,261	4.2%	15,335	9.3%	1,355	4.8%	13,310	9.8%
Co-op								
<i>Mitchell-Lama Co-ops</i>	58	0.2%	10,622	6.4%	178	0.6%	18,435	13.6%
<i>Market-Rate Co-ops</i>	173	0.6%	11,484	6.9%	318	1.1%	10,342	7.7%
NYCHA	306	1.0%	31,676	19.1%	165	0.6%	10,318	7.6%
Other Rental Subsidies (SHIP)	231	0.8%	29,549	17.8%	214	0.8%	7,193	5.3%
Rent Stabilized <sup>(2)</sup>	403	1.4%	12,289	7.4%	894	3.2%	30,331	22.4%
Market-Rate Multifamily Rental	545	1.8%	15,603	9.4%	632	2.2%	7,105	5.3%
Mixed Use, Market-Rate Rental	1,016	3.4%	11,357	6.9%	1,099	3.9%	4,776	3.5%
Commercial/Other	6,721	22.5%	—	—	3,796	13.5%	—	—
<b>Total</b>	<b>29,829</b>	<b>100.0%</b>	<b>165,720</b>	<b>100.0%</b>	<b>28,195</b>	<b>100.0%</b>	<b>135,139</b>	<b>100.0%</b>

Sources: FEMA Flood Insurance Rate Map, New York City Department of City Planning (PLUTO), Furman Center Subsidized Housing Information Project, New York City Housing Authority, New York City Rent Guidelines Board

Notes: 1. The majority of condo units are in buildings with five or more units. 2. Includes all units in buildings with any rent stabilized units. It is possible that some individual units have been deregulated.

**Table 3: Distribution of Building Types in the Preliminary Flood Insurance Maps (Released December 2013)**

Building Type	100-Year Floodplain				500-Year Floodplain			
	Buildings	Share of Buildings	Housing Units	Share of Housing Units	Buildings	Share of Buildings	Housing Units	Share of Housing Units
1-4 Family	44,112	73.8%	68,874	27.4%	25,784	73.2%	43,438	30.0%
Attached or Semi-Attached	21,369	35.7%	36,412	14.5%	17,334	49.2%	30,626	21.1%
Detached	22,743	38.0%	32,462	12.9%	8,450	24.0%	12,812	8.8%
Condo <sup>(1)</sup>	1,798	3.0%	20,403	8.1%	1,511	4.3%	14,823	10.2%
Co-op								
Mitchell-Lama Co-ops	82	0.1%	14,962	5.9%	44	0.1%	6,919	4.8%
Market-Rate Co-ops	467	0.8%	20,778	8.3%	451	1.3%	11,366	7.8%
NYCHA	333	0.6%	31,881	12.7%	237	0.7%	17,610	12.2%
Other Rental Subsidies (SHIP)	339	0.6%	32,994	13.1%	121	0.3%	6,895	4.8%
Rent Stabilized <sup>(2)</sup>	887	1.5%	27,875	11.1%	952	2.7%	29,080	20.1%
Market-Rate Multifamily Rental	991	1.7%	20,690	8.2%	725	2.1%	9,139	6.3%
Mixed Use, Market-Rate Rental	1,813	3.0%	13,356	5.3%	1,434	4.1%	5,668	3.9%
Commercial/Other	8,985	15.0%	—	—	3,959	11.2%	—	—
<b>Total</b>	<b>59,807</b>	<b>100.0%</b>	<b>251,813</b>	<b>100.0%</b>	<b>35,218</b>	<b>100.0%</b>	<b>144,938</b>	<b>100.0%</b>

Sources: FEMA Preliminary FIRM (December 2013), New York City Department of City Planning (PLUTO), Furman Center Subsidized Housing Information Project, New York City Housing Authority, New York City Rent Guidelines Board

Notes: 1. The majority of condo units are in buildings with five or more units. 2. Includes all units in buildings with any rent-stabilized units. It is possible that some individual units have been deregulated.

**Table 4: Distribution of Multifamily Rental Buildings in the Preliminary Flood Insurance Maps (Released December 2013)**

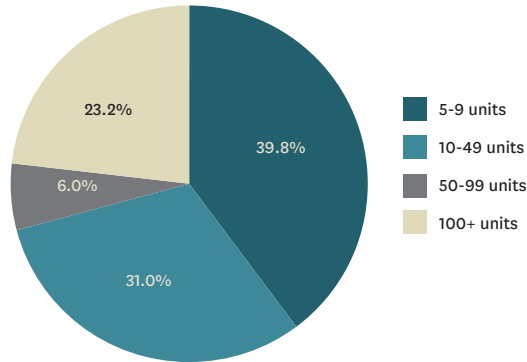
Building Type	100-Year Floodplain				500-Year Floodplain			
	Buildings	Share of Buildings	Housing Units	Share of Housing Units	Buildings	Share of Buildings	Housing Units	Share of Housing Buildings
NYCHA	333	13.1%	31,881	28.1%	237	11.6%	17,610	28.1%
Other Rental Subsidies (SHIP)	339	13.3%	32,994	29.1%	121	5.9%	6,895	11.0%
Mitchell-Lama Rental	58	2.3%	11,443	10.1%	0	0.0%	0	0.0%
HUD Financing and Insurance	12	0.5%	2,070	1.8%	9	0.4%	1,377	2.2%
HUD Project-Based Rental Assistance	96	3.8%	12,936	11.4%	25	1.2%	1,464	2.3%
LIHTC	173	6.8%	6,545	5.8%	87	4.3%	4,054	6.5%
LIHTC pre Year 15	81	3.2%	3,730	3.3%	51	2.5%	1,142	1.8%
LIHTC post Year 15	92	3.6%	2,815	2.5%	36	1.8%	2,912	4.6%
Rent Stabilized <sup>(1)</sup>	887	34.8%	27,875	24.6%	952	46.8%	29,080	46.4%
Market-Rate Multifamily Rental	991	38.9%	20,690	18.2%	725	35.6%	9,139	14.6%
<b>Total</b>	<b>2,550</b>	<b>100.0%</b>	<b>113,440</b>	<b>100.0%</b>	<b>2,035</b>	<b>100.0%</b>	<b>62,724</b>	<b>100.0%</b>

Sources: FEMA Preliminary FIRM (December 2013), New York City Department of City Planning (PLUTO), Furman Center Subsidized Housing Information Project, New York City Housing Authority, New York City Rent Guidelines Board

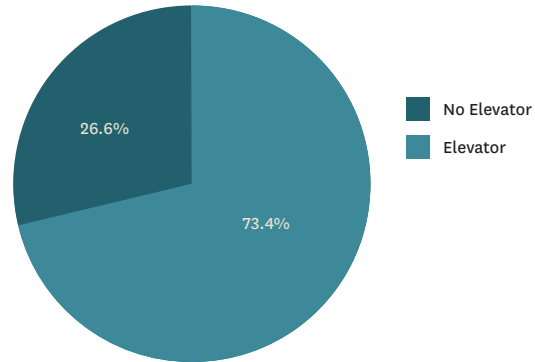
Note: 1. Includes all units in buildings with any rent-stabilized units. It is possible that some individual units have been deregulated.

**Figure 3: Characteristics of Multifamily Rental Buildings in the Preliminary 100-year and 500-year Floodplains**

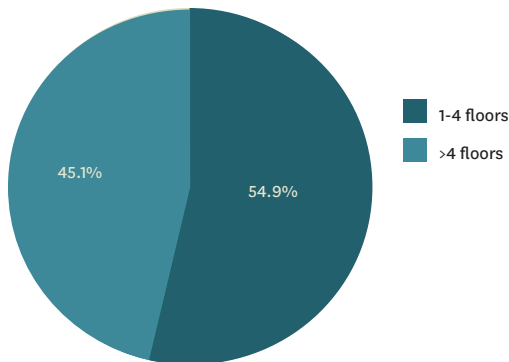
**Buildings by Number of Units per Building**



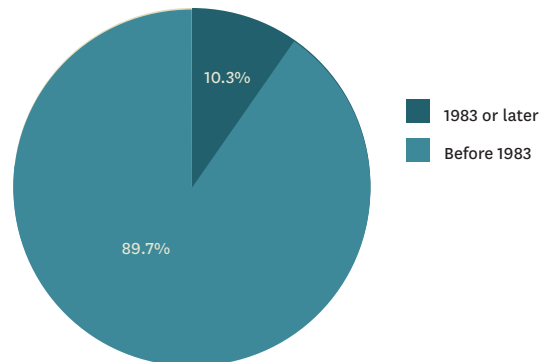
**Buildings With or Without Elevators**



**Buildings by Number of Floors**



**Buildings by Year Built**



Sources: FEMA, NYC Department of City Planning (PLUTO), NYU Furman Center

About 40 percent of the multifamily rental buildings have 5-9 units, 31 percent have 10-49 units, six percent have 50-99 units, and 23 percent have 100 or more units. Most of these buildings are low rise—55 percent have four or fewer stories. Over a quarter of the buildings have an elevator, which presents a specific resilience challenge given that elevator equipment is often located in the basement.

Nearly 90 percent of the multifamily rental buildings in the floodplain were built before 1983, the year the city first added flood-resistant

construction standards to its Building Code.<sup>4</sup> Although these buildings are grandfathered under older versions of the Building Code and so do not need to be retrofitted to be legally occupied, they may be particularly vulnerable to flooding and at risk of escalating flood insurance premiums, as discussed below.

The majority of privately owned multifamily rental buildings in the 100-year and 500-year floodplains have rents that are regulated through a subsidy

<sup>4</sup> Federal Emergency Management Agency (FEMA) Community Status Book Report New York, Communities Participating in the National Flood Program. Retrieved from <http://www.fema.gov/cis/NY.html>



Flooding in Sheepshead Bay, Brooklyn.

© Anton Oparin

program or through New York’s rent stabilization law. Table 4 shows the distribution of multifamily rental buildings and units in the 100-year and 500-year floodplains on the Preliminary Flood Insurance Rate Maps. Fifty-eight rental buildings receive a subsidy through the state or city Mitchell-Lama program; 142 are subsidized through one of HUD’s financing and insurance programs or receive project-based rental assistance through HUD; and 260 are subsidized through the Low-Income Housing Tax Credit (LIHTC).<sup>5</sup> Owners of these subsidized properties may have trouble financing retrofits because the amount of rent they collect is restricted and their rental and subsidy incomes are usually just enough to cover their operating expenses plus debt payments and funds to build reserves for expected system replacements over time. Because regulations often prevent these owners from raising rents to cover the cost of unplanned retrofits, owners will likely need an additional government subsidy to do the work necessary to safeguard their buildings, protect their tenants, and avoid sharp increases in flood insurance premiums. Further, program restrictions on removing units may make it difficult or impossible to reconfigure the units so that they are all located above

the minimum elevation required by FEMA regulations (described further below) or to allow for mechanical systems to be placed in former residential units located above a minimum elevation, both of which may be required to qualify for lower rates on flood insurance. Owners of the 1,839 properties in the 100-year or 500-year floodplain with rent stabilized units face similar challenges but may have more flexibility than subsidized properties to raise rents to finance retrofits that qualify as a “Major Capital Improvement.” The relevant rules governing subsidized and stabilized buildings are discussed in more detail in Part 5 of this report.

Even properties in which the rent levels are not regulated through a subsidy program or rent-stabilization may have trouble financing retrofits. Most of the neighborhoods in the floodplain are home to low- and moderate-income residents. The median income of the renters in the floodplain is just \$36,000, and over 50 percent of them are already rent burdened, paying more than 30 percent of their income on rent.<sup>6</sup> Thus, even if owners tried to raise rents to finance retrofits and make their buildings more resilient, existing tenants (and potential new low-income tenants) would face difficulties in paying the increased rents. New York City is already suffering from a lack of affordable housing, and sacrificing affordable units in exchange for building resilience may address one problem while exacerbating another.

<sup>5</sup> For ease of interpretation and to prevent double counting, we treat subsidies as mutually exclusive. However, in practice, many subsidized rental properties receive multiple subsidies.

<sup>6</sup> NYU Furman Center calculation of data from U.S. Census Bureau 2008-2012, American Community Survey, Table B25119, Median Household Income, Renters, and Table B25070, Share Rent Burdened.

### 3.

## Overview of the Regulatory Framework

Much of the discussion in the remainder of this report of the design, regulatory, and financial challenges facing multifamily rental buildings in the floodplain requires an understanding of the complicated rules that govern how these buildings operate. In this section we provide an overview of the regulatory landscape in which these buildings operate.

### A. FEMA rules about qualifying for the National Flood Insurance Program (NFIP) dictate much of the design standards for buildings.

Flood insurance in participating communities<sup>7</sup> in the United States is provided through the National Flood Insurance Program (NFIP) administered by FEMA. Any property owner in these participating communities can purchase flood insurance through the NFIP<sup>8</sup> and some are required to do so. The owners of properties within the 100-year floodplain (A and V zones)<sup>9</sup> are required to buy flood insurance if they have a mortgage that is federally backed or issued by a federally regulated lending

institution.<sup>10</sup> Additionally, all multifamily properties that are in the 100-year floodplain and receive an affordable housing subsidy from the federal government (e.g., HUD Project-Based Section 8, the Low-Income Housing Tax Credit, or the city's Build it Back program<sup>11</sup>) or have received FEMA aid are required to have flood insurance. Owners who are not required to buy flood insurance may still choose to do so.

FEMA periodically updates the flood insurance maps to account for changes in the risk of flooding. Depending on the changes to the 100-year floodplain, the updates may require more or fewer properties to have flood insurance. New York City's floodplain maps were adopted in 1983 and were not updated for nearly 30 years. In 2007, realizing that the maps were out of date, New York City requested that FEMA update the maps.<sup>12</sup> This process began in 2009 and the preliminary flood insurance maps are now available. Revisions are expected to be finalized and become effective in 2016.<sup>13</sup> Based on the preliminary flood insurance maps, 30,000 properties in New York City will be added to the 100-year floodplain in 2016 and may be required to buy flood insurance if their mortgage or subsidy requires it.

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7 Communities must actively decide to participate in the NFIP to make this flood insurance available to owners. Participation requires that a jurisdiction pass a resolution of intent to participate and adopt flood-resistant building codes for new construction in the 100-year floodplain that are not less strict than FEMA's guidelines. FEMA, National Flood Insurance Program. Retrieved from <http://www.fema.gov/floodplain-management/participation-national-flood-insurance-program>

8 The NFIP does not sell insurance directly to property owners. Rather, property owners purchase flood insurance through a private property or casualty insurance company. The losses are underwritten by the NFIP.

9 For simplicity, in this report, we refer to all properties in the A and V zones as the 100-year floodplain. The V-zones are also called the Coastal High Hazard Area, and the A and V zones together are called the Special Flood Hazard Area (SFHA).

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10 This covers the vast majority of mortgages, including those insured by the Federal Housing Administration or backed by either Fannie Mae or Freddie Mac. FEMA. *Mandatory Purchase of Flood Insurance Guidelines*. Retrieved from [http://hazardmitigation.caema.ca.gov/docs/10040\\_NFIP.pdf](http://hazardmitigation.caema.ca.gov/docs/10040_NFIP.pdf)

11 City of New York. *Flood Insurance FAQ*. Retrieved from [http://www.nyc.gov/html/recovery/downloads/pdf/Flood\\_Insurance\\_FAQ.pdf](http://www.nyc.gov/html/recovery/downloads/pdf/Flood_Insurance_FAQ.pdf)

12 City of New York. (June 2013). *A Stronger, More Resilient New York*, p. 23. Retrieved from <http://www.nyc.gov/html/sirr/html/report/report.shtml>

13 City of New York. (2014). *PlaNYC- Progress Report 2014*. Retrieved from [http://www.nyc.gov/html/planyc2030/downloads/pdf/140422\\_PlaNYCP-Report\\_FINAL\\_Web.pdf](http://www.nyc.gov/html/planyc2030/downloads/pdf/140422_PlaNYCP-Report_FINAL_Web.pdf)

All of the specific properties featured in the case studies in the following section of the report receive federal government subsidies. One of the buildings is currently located within the 100-year floodplain, so it is already required to carry flood insurance; one will be added to the 100-year floodplain when the preliminary flood insurance maps are finalized, at which point it will be required to purchase flood insurance; and one is outside of the 100-year floodplain, and will remain outside, so it is not required to buy flood insurance. Within the 100-year floodplain, flood insurance premiums are calculated for each building based on its elevation and type of construction. Outside of the 100-year floodplain, property owners can purchase flood insurance for a standard rate.<sup>14</sup>

Because of recent changes to federal law, flood insurance premiums will soon rise for properties in the 100-year floodplain and for any properties that will be added to it. Since its inception in 1968, the NFIP has provided subsidized rates for flood insurance. In 2012—prior to and unrelated to Sandy—Congress passed the Biggert-Waters Flood Insurance Reform Act of 2012,<sup>15</sup> which required the NFIP to charge actuarially sound premiums for flood insurance, called the full-risk rate. Some owners could now see their premiums rise as much as tenfold for the same coverage.<sup>16</sup> In response to concerns about the new rates rising too quickly and being unaffordable for many, in 2014 the President signed into law the Homeowner Flood Insurance Affordability Act of 2014<sup>17</sup>

to moderate the effects of Biggert-Waters. The new law will still require flood insurance policy holders in the 100-year floodplain to eventually pay the full risk rate, but the increases will be phased in at a slower pace, with premiums rising up to 18 percent per year until they reach the new rate.<sup>18</sup> The Homeowner Flood Insurance Affordability Act of 2014 also ensures that when a building is sold or the ownership structure otherwise changes, the new owner can continue paying the same premiums that the prior owner had paid, with the same scheduled increases.<sup>19</sup> Existing properties that are added to the 100-year floodplain when the new flood insurance maps are adopted will be able to buy flood insurance in the first year at the same rate offered to properties located outside of the 100-year floodplain, before being subject to the schedule of increases at up to 18 percent each year until they reach the full-risk rate.<sup>20</sup>

Owners of existing properties in the 100-year floodplain are eligible for reduced flood insurance premiums if they retrofit their properties to comply with FEMA flood-resistant construction requirements. FEMA flood maps establish a Base Flood Elevation (BFE) for all properties in the 100-year floodplain, which is the “elevation to which floodwater is expected to rise” during a flood with a one percent chance of happening in any given year. FEMA regulations call for there to be no living space (including basements) or mechanical systems below the BFE for residential buildings. For detached, single-family homes, this is often done by raising the entire house on a foundation above the BFE. However, for most buildings in

14 Standard rates for residential properties are available at [https://www.floodsmart.gov/floodsmart/pages/residential\\_coverage/policy\\_rates.jsp](https://www.floodsmart.gov/floodsmart/pages/residential_coverage/policy_rates.jsp); standard rates for non-residential properties are available at [https://www.floodsmart.gov/floodsmart/pages/commercial\\_coverage/policy\\_rates.jsp](https://www.floodsmart.gov/floodsmart/pages/commercial_coverage/policy_rates.jsp)

15 Act of July 6, 2012, Pub. L. No. 112-141, Title II, 126 Stat. 405, 916 (2012).

16 See example from these FEMA guidelines for the same building at various heights above the BFE: [http://www.fema.gov/media-library-data/20130726-1858-25045-7797/build\\_back\\_stronger02\\_2013.pdf](http://www.fema.gov/media-library-data/20130726-1858-25045-7797/build_back_stronger02_2013.pdf)

17 Homeowner Flood Insurance Affordability Act of 2014, Pub. L. No. 113-89, 128 Stat. 1020 (2014).

18 For example, an owner who has been paying \$1,000 per year for flood insurance but is subject to a tenfold increase as a result of the new legislation would see her premiums increase to \$1,180 in the first year, \$1,394 in the second year, and so on until reaching \$10,000 in fourteen years.

19 This replaced the provision in the Biggert-Waters Flood Insurance Reform Act of 2012 that would have required a new owner to pay the actuarially sound rate immediately upon taking ownership.

20 FEMA. *Homeowner Flood Insurance Affordability Act*. Retrieved from [http://www.fema.gov/media-library-data/1396551935597-4048b68f6d695a6eb6e6e7118d3ce464/HFIAA\\_Overview\\_FINAL\\_03282014.pdf](http://www.fema.gov/media-library-data/1396551935597-4048b68f6d695a6eb6e6e7118d3ce464/HFIAA_Overview_FINAL_03282014.pdf)

New York City, this is not feasible. Attached row houses cannot be individually raised, and large, multifamily buildings are difficult if not impossible to raise. Alternatively, buildings are eligible for lower insurance rates by eliminating all living spaces and mechanical systems on any floors below the BFE. Because insurance in the 100-year floodplain is rated based on the elevation of the “lowest floor”<sup>21</sup> relative to the BFE, existing buildings with basements<sup>22</sup> are subject to excessive flood insurance premiums. One retrofit idea for a building with a basement is to fill in the basement and wet floodproof (and use for a permitted purpose) the remaining space below the BFE so that during a flooding event water could flow through without causing any damage. However, this option is also not ideal for buildings in New York City. Eliminating all of the housing units on the first floor of buildings in the floodplain would result in a dramatic loss of housing units in New York City, where the supply of housing is already strained. We estimate that there are as many as 87,000 first floor units in multifamily rental buildings in the 100-year floodplain in New York (many of which are likely below the BFE, though we cannot calculate that number).<sup>23</sup> Reconfiguring the ground floors can also have negative impacts on the streetscape, neighborhood character, public safety, and underlying property values.

FEMA provides commercial and mixed-use buildings slightly more flexibility for retrofitting to

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21 FEMA regulations define Lowest Floor as “the lowest floor of the lowest enclosed area (including basement). An unfinished or flood-resistant enclosure useable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building’s lowest floor” as long as other design requirements are met. 44 C.F.R. § 59.1 (2011).

22 FEMA defines Basement as “any area of the building having its floor subgrade (below ground level) on all sides.”<sup>44</sup> C.F.R. § 59.1 (2011).

23 We estimate this number for each building by dividing the total number of units by the number of stories. To be conservative, if this equation results in a fraction of a number, we round down, assuming that there may be fewer units on a first floor to make room for lobby space. Then we sum the estimates for all buildings to arrive at the citywide total.



© Anton Oparin

*Flooding in Sheepshead Bay, Brooklyn.*

lower flood insurance premiums. Unlike residential structures, these “non-residential” structures can use “dry floodproofing” (sealing enclosed areas to be watertight) to comply with FEMA regulations.<sup>24</sup> Dry floodproofing can be less costly for these buildings than elevating building systems and can prevent the loss of usable area that usually goes along with wet floodproofing.

Without the same flexibility that FEMA provides to non-residential buildings, any residential building in the 100-year floodplain that does not undertake expensive and disruptive elevation of all residential areas and mechanical systems above the BFE will be required to pay the new, much higher flood insurance premiums in the coming years. However, as this report will illustrate, for multifamily buildings, in some cases dry floodproofing may be a less disruptive (avoiding the loss of residential units) retrofitting option that would mitigate the risk of damage from flooding as well or nearly as well as systems elevation or wet floodproofing. Additionally, there is a provision in the

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24 44 CFR § 60.3(c)(3) (2011).

Homeowner Flood Insurance Affordability Act of 2014 that requires FEMA to study alternative mitigation strategies and incorporate new guidelines into its flood insurance regulations.<sup>25</sup> We hope that this report can help further the conversation about what partial mitigation and alternative mitigation measures FEMA should recognize for multifamily residential buildings.

As the climate changes and sea levels rise, it is likely that more buildings will become vulnerable to flooding. Indeed, the New York City Panel on Climate Change predicts that more areas of the city will be vulnerable to flooding in the coming decades.<sup>26</sup> FEMA's Flood Insurance Rate Maps are based on past events, and thus are a lagging indicator of the risk of flooding. When FEMA issues new flood insurance maps for New York City, it is likely that more buildings will be added to the 100-year floodplain and required to buy flood insurance. Almost two-thirds of the properties that were in the 500-year floodplain in the 1983 flood insurance maps have been added to the 100-year floodplain in the new preliminary flood insurance maps. The properties in the preliminary 500-year floodplain will not be required to purchase flood insurance and they will not benefit from lower flood insurance premiums if they retrofit their properties. However, property owners in the preliminary 500-year floodplain should still consider retrofitting their properties to mitigate damage from flooding as the risk of flooding may increase from climate change and sea-level rise, and the properties may be added to the 100-year floodplain when the flood insurance maps are next updated. Indeed, FEMA estimates that in any given storm event, about one-quarter of the damage claims come from areas outside of the 100-year floodplain.

<sup>25</sup> Homeowner Flood Insurance Affordability Act of 2014, Pub. L. No. 113-89, § 26, 128 Stat. 1020, 1032 (2014).

<sup>26</sup> New York City Panel on Climate Change. (June 2013). Climate Risk Information 2013 Observations, Climate Change Projections, and Maps. Retrieved from [http://www.nyc.gov/html/planyc2030/downloads/pdf/npsc\\_climate\\_risk\\_information\\_2013\\_report.pdf](http://www.nyc.gov/html/planyc2030/downloads/pdf/npsc_climate_risk_information_2013_report.pdf)

## B. City Regulation

To ensure that newly constructed buildings are resilient to flooding and comply with the requirements of the NFIP, the New York City Department of Buildings (DOB) has incorporated all of the FEMA guidelines for new buildings into its Building Code for buildings within the 100-year floodplain (Flood Zones V and A) as well as a stricter regulation for increased elevation. Meeting the city's Building Code, including its flood-resistant design standards, is a legal requirement for all new construction located in the 100-year floodplain.<sup>27</sup> In general, the city's Building Code requires all living spaces and mechanical systems in a new residential building to be located above the BFE and requires an additional minimum elevation above the BFE than is mandated for participation in the NFIP. This distance between the BFE and the minimum required elevation is called "freeboard." The BFE plus any required freeboard is called the Design Flood Elevation (DFE). The specific requirements for the required elevation above the BFE vary by flood zone and building use but generally range from one to two feet. There are four main provisions of the New York City Building Code stemming from the FEMA guidelines that any new or Substantially Improved residential structures must comply with:<sup>28</sup>

- **Lowest Floor.** The lowest floor (including the basement, if applicable) of a building must be elevated at or above the DFE. This can be achieved either by elevating the building on foundations, as is common in single family homes, or by limiting the ground floor to certain non-residential uses, as described by the enclosure rules below.
- **Enclosures.** The only uses allowed in enclosed spaces below the DFE are vehicle parking, building access (lobby), storage, or crawlspace. Any

<sup>27</sup> Establishing flood-resistant building codes is also a requirement for a jurisdiction to participate in the NFIP.

<sup>28</sup> New York City Administrative Code, Building Code, § G304.1.1 (2008).



enclosed spaces must be wet floodproofed.

- **Materials.** Only flood-damage resistant materials can be used below the DFE.
- **Utilities and Equipment.** All utilities including electrical, heating, ventilation, plumbing, and air conditioning equipment must be located above the DFE or be constructed to prevent water from entering or accumulating within the components during flooding.

Additionally, buildings in the 100-year floodplain are subject to special inspections and certifications.

All buildings in the 100-year floodplain constructed before 1983, the year the first flood insurance maps were published, are grandfathered in under older versions of the city's Building Code, and thus do not have to comply with the regulations described above to be legally occupied.

Nearly 90 percent of multifamily rental buildings in the new 100-year floodplain were constructed prior to 1983 and are unlikely to meet the current flood-resistant building standards. Furthermore, the new preliminary flood insurance maps greatly increase the number of buildings in the 100-year floodplain. Most of the buildings newly mapped into the 100-year floodplain may not be in compliance with the Building Code provisions described above, even if recently built, because they were not previously subject to these requirements. Recently constructed buildings in this group are grandfathered in under the provisions of the current Building Code that apply to buildings outside the 100-year floodplain, and these provisions do not require the floodproofing measures outlined above. Even if buildings are grandfathered in under the Building Code, their insurance premiums will be affected by failure to meet these standards.



Superstorm Sandy damage in Lower Manhattan.

© Daryl Lang

However, when an owner of a building in the 100-year floodplain not previously subject to the Building Code's flood-resistant construction provisions makes large-scale repairs or improvements to her building, the building may lose its grandfathered status. Before making repairs or alterations to an existing building in the 100-year floodplain, the owner must submit a statement to DOB that compares the estimated cost of the proposed improvements to the market value of the building.<sup>29</sup> If the total cost of the improvements<sup>30</sup> is greater than 50 percent of the market value of the building prior to the improvement, the project is a "Substantial Improvement."<sup>31</sup> The Building Code also defines "Substantial Improvement" to include any repairs following "Substantial Damage," which is defined as damage to a structure where "the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred."<sup>32</sup>

Buildings that exceed this Substantial Improvement threshold are no longer grandfathered under earlier versions of the Building Code and must therefore comply with the currently applicable version of the Building Code's flood-resistant construction standards (Appendix G of the Building Code), including the requirement that the lowest floor of the building be elevated at or above

<sup>29</sup> Title 1 RCNY § 3606-01. Every alteration that costs more than \$40,000 in a 100-year floodplain must include a calculation of the building's market value. New York City Department of Buildings. *Information for Architects & Engineers*. Retrieved from <http://www.nyc.gov/html/>.

<sup>30</sup> When calculating whether improvements will qualify as a Substantial Improvement, the estimated cost of improvements must include all related improvements for a project, even if the improvements will be spread out over an extended period of time. The market value used can be either the market value of the building from the Final Assessment determined by the Department of Finance or estimated through an appraisal. For the affordable rental buildings studied here, the Final Assessment from the DOF would likely be lower than an appraisal based on a comparative property or replacement approach. Title 1 RCNY § 3606-01.

<sup>31</sup> Building Code, § G201.2 (2014).

<sup>32</sup> Building Code, § G201.2 (2014).



© NYU Photo Bureau: Hollenshead

the Design Flood Elevation for residential buildings.<sup>33</sup> This, in turn, may trigger other building code requirements, depending on the changes a building makes. In addition, even when the Substantial Improvement threshold is not met, alterations that increase the degree of noncompliance with Appendix G are prohibited.<sup>34</sup>

The city's zoning code (the "Zoning Resolution") also has rules that affect the ability of buildings to implement retrofit strategies. After Superstorm Sandy, the city passed an emergency resolution, later codified in a zoning amendment, which changed a number of requirements in the 100-year floodplain to accommodate resilience measures. Despite the amendment, there are still limitations in the Zoning Resolution and even in the amendment that pose challenges for buildings at risk of flooding, which we explore in more detail in the case studies below.

<sup>33</sup> New York City Administrative Code, New York City Building Code, § G304.1.1 (2008).

<sup>34</sup> New York City Administrative Code, New York City Building Code, § G102.1.9 (2008).

# 4. Retrofit Solutions Workshop

## A. Workshop Overview

On January 11, 2014, the Furman Center, with the help of our partners at AIANY and Enterprise Community Partners, convened the Retrofit Solutions Workshop, a full-day event at which a range of experts—including architects, landscape architects, structural engineers, mechanical, electrical and plumbing (MEP) engineers, elevator consultants, energy consultants, cost estimators, building managers, lenders, and representatives from the Department of City Planning, the Department of Housing Preservation and Development, the Department of Buildings, and FEMA<sup>35</sup>—explored options for retrofitting multifamily buildings in New York City’s 100-year and 500-year floodplains. To focus their work, we divided the experts into three Workshop Teams and assigned each an existing building that was damaged by

Superstorm Sandy. Each of the three buildings represents a building type that, according to our analysis, is common among the affordable housing stock at risk of flooding: an attached walk-up building, an attached elevator building, and a detached “tower in the park.” Working with the buildings’ management, we provided the teams with detailed packets of information about the buildings, including damage assessments created post-Sandy, reports noting potential resilience measures, construction drawings, and photographs. Each team then considered various retrofit strategies, including those explored in 2013 by the AIANY Housing Task Force.<sup>36</sup>

The day of the Workshop, we tasked each team with identifying and documenting both the ideal retrofit plan and, given cost and regulatory constraints, the most feasible retrofit plan. We also asked the teams to work with the government agency representatives to identify constraints to implementation in the Zoning Resolution, Building Code, and FEMA rules, and to work with our

<sup>35</sup> A full list of all Workshop participants can be found at page 45 in the Appendix of this report.

<sup>36</sup> The work completed by the AIANY Housing Task Force provided the starting point for this project. More information about the Task Force can be found at <http://postsandyinitiative.org>

**Table 5: Retrofit Strategies Explored**

	<b>445 Baltic St.</b> <i>Attached Walk-Up Building</i>	<b>334 East 8th St.</b> <i>Attached Elevator Building</i>	<b>3601 Surf Ave.</b> <i>“Tower in the Park”</i>
Relocation of Critical Building Systems	✓	✓	✓
Dry Floodproofing	✓		
Wet Floodproofing		✓	
Addition of Non-residential uses to allow the Dry Floodproofing of the Cellar		✓	
Demountable Flood Barrier			✓
Built Barriers			✓



cost estimators to develop detailed cost estimates for each proposal. The work done by the assembled experts during the Workshop is summarized in the case studies below. The lessons we learned that day also informed much of the research presented in the next section of this report, which addresses some of the key policy and regulatory challenges facing this building stock.

Table 5 identifies each of the assigned buildings and summarizes the retrofit ideas that the teams explored. As the chart shows, the teams studied options that have been commonly recommended as potential solutions for multifamily housing and a few less common ideas, too, which may be suitable for New York City's building stock. Each retrofit option poses different opportunities and challenges, which we describe in more detail below.



Courtesy of Fifth Avenue Committee



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© NYU Photo Bureau: Hollenshead

(Top Left) Flooding in the basement of 445 Baltic Street; (Bottom Left) Mechanical systems at 3601 Surf Avenue; (Top & Bottom Right) NYU Furman Center's Retrofit Solutions Workshop

## Case Studies Key Terms<sup>37</sup>

**Base Flood Elevation (BFE):** The computed elevation to which floodwater is anticipated to rise during a 100-year flood. Base Flood Elevations (BFEs) are shown on Flood Insurance Rate Maps (FIRMs) and on the Flood Insurance Surveys. NFIP bases flood insurance premium rates on the relationship between the elevation of a structure and its BFE.

**Basement/Cellar:** According to the New York City Zoning Resolution, a cellar is a level of a building that has more than one-half of its floor-to-ceiling height below curb level or the base plane. By contrast, a basement has at least one-half of its floor-to-ceiling height above curb level or the base plane. A cellar is not included in floor area calculations.<sup>38</sup> Conversely, FEMA and the flood-resistant construction provisions of New York City's Building Code define any area of the building, including any sunken room or sunken portion of a room, having its floor below ground level (sub grade) on all sides, as a basement. For the purposes of this report, the terms cellar and basement will be used according to the Zoning Resolution.

**Design Flood Elevation (DFE):** Defined by the New York City Building Code as the base flood elevation plus the designated amount of freeboard for the applicable building type. See definition of freeboard below.

**Dry Floodproofing:** Making a space watertight below the level that needs flood protection to prevent floodwaters from entering. Making the structure watertight requires sealing the walls and utility penetrations below the DFE with waterproof coatings, impermeable membranes, or a supplemental layer of masonry or concrete, incorporating backflow preventers on all plumbing penetrations, and designing the structure to resist hydrostatic forces.

**Effective Flood Hazard Area:** This is the current effective flood zone indicated by a lettered flood zone and is associated with the location shown on the effective Flood Insurance Rate Map.

**Flood Insurance Rate Map (FIRM):** A map produced by FEMA showing a community's base flood elevations, flood zones, and floodplain boundaries.<sup>39</sup>

**Flood Barrier:** Flood protection measures that include permanent floodwalls and levees, which create a barrier between the building and floodwaters.

**Flood Zone:** Geographic areas that FEMA has defined according to the levels of flood risk and type of flooding.

**Freeboard:** An additional amount of height above the BFE to factor in safety for the elevation or floodproofing of a structure to compensate for factors such as wave action, usually expressed in feet above a flood level.

**National Flood Insurance Program (NFIP):** Created by Congress, the NFIP offers flood insurance to homeowners, renters, and business owners if their community participates in the NFIP.

**Preliminary Flood Hazard Area:** Based on data provided by FEMA, the preliminary flood hazard area provides the public a view of the projected risk of flood hazards for their home or community. This information offers guidance only and is subject to change. This information is also used during FEMA's public review process. Preliminary data cannot be used to rate flood insurance policies or enforce the federal mandatory purchase requirement. Preliminary data will be removed and replaced once new effective data are available.

**Special Flood Hazard Area (SFHA):** The land area covered by the floodwaters of a 100-year flood is the Special Flood Hazard Area (SFHA) on NFIP maps. The SFHA is the 100-year floodplain, and the area where the NFIPs floodplain management regulations must be enforced and where the mandatory purchase of flood insurance applies. These areas are shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map as Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE, or V. Throughout this report, we sometimes refer to the SFHA as the 100-year floodplain.

**Wet Floodproofing:** Permanent or contingent measures applied to a structure or its contents that prevent or provide resistance to damage from flooding while allowing floodwaters to enter the structure or area and exit as the water recedes. Generally, this includes properly anchoring the structure, using flood-resistant materials below the BFE, protection of mechanical and utility equipment, and use of openings or breakaway walls. This strategy requires positive drainage away from the structure. Application of wet floodproofing as a flood protection technique under the National Flood Insurance Program (NFIP) is limited to enclosures below elevated residential and non-residential structures and to accessory and agricultural structures that have been issued variances by the community.

<sup>37</sup> All key terms are defined according to FEMA, unless otherwise noted. FEMA. *Definitions*. Retrieved from <http://www.fema.gov/national-flood-insurance-program/definitions>

<sup>38</sup> New York City Department of City Planning. *Zoning Glossary*. Retrieved from <http://www.nyc.gov/html/dcp/html/zone/glossary.shtml>

<sup>39</sup> Throughout this report we refer to Flood Insurance Rate Maps (FIRMs) as "flood insurance maps."



## B. Case Study 1: 445 Baltic Street, Brooklyn Attached Walk-up Building

### 1. Building Overview

Building Operator	Fifth Avenue Committee
Owner	South Brooklyn Mutual
Borough-Block-Lot	Brooklyn-00399-0001
Residential Units	5
Stories	4
Cellar	Yes
Structure Type	Brick
Elevator	No; Walk-Up
Year Built	1900 (approximate)
Year Altered	1997
Zoning	R6
Subsidy	Low Income Housing Tax Credit
Subsidy Start Year	1998
Evacuation Zone	2
Effective Flood Hazard Area	Zone X—0.2 PCT Annual Chance Flood Hazard
Preliminary Flood Hazard Area	Zone X—0.2 PCT Annual Chance Flood Hazard
BFE	The BFE has not been published for this site because it is located in Flood Zone X.



445 Baltic Street, located on the north end of the Gowanus neighborhood in Brooklyn, is a four-story walk-up, masonry building with a cellar, housing five residential units, located within Flood Zone X in the 500-year floodplain. The building's mechanical and electrical equipment is located in the cellar, which is only accessible through a ground hatch.

During Superstorm Sandy, the cellar underwent severe flooding, primarily from three sources: 1) water infiltration through the cellar walls and floor, 2) grade level water inflow from the cellar entrance hatches, and 3) sewage infiltrations possibly from the floor drain and sump pit. The water level rose to the ceiling of the cellar, causing damage to the electrical equipment and boiler. Tenants had to be evacuated for 10 days until all of the systems were in operation again. Although the damaged equipment has now been replaced and repaired, the equipment remains in the same location, below the base flood elevation (BFE), and at risk of damage from future flooding.

Because 445 Baltic Street is located in the Preliminary Flood Hazard Area, Zone X (500-year floodplain), the property will not be required to obtain flood insurance when the updated flood insurance maps become effective. Insurance premiums are fairly low for buildings in Flood Zone X (about \$2,000 for \$350,000 in coverage for the building and its contents<sup>40</sup>) in comparison to buildings in the 100-year floodplain. The type of resilience strategy implemented in this zone does not have an effect on the premium rates.

40 NFIP. Residential Policy Rate. Retrieved from [https://www.floodsmart.gov/floodsmart/pages/residential\\_coverage/policy\\_rates.jsp](https://www.floodsmart.gov/floodsmart/pages/residential_coverage/policy_rates.jsp)

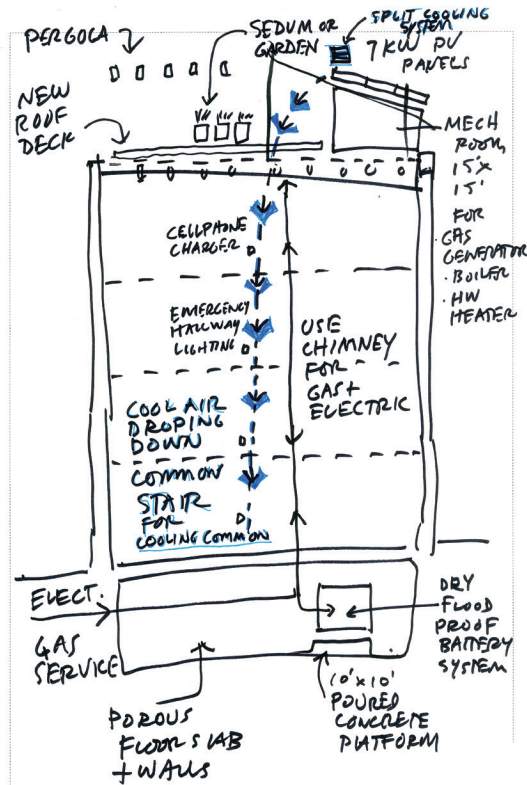
## 2. Workshop Recommendations

The Workshop Team assigned to this building explored two options: a) relocating critical building systems, or b) dry floodproofing the cellar, which makes a space watertight to prevent floodwaters from entering.<sup>41</sup>

### a. Relocation of Critical Building Systems

Many buildings similar in scale to 445 Baltic Street use a cellar to house mechanical and electrical equipment; however, being below the BFE, this location leaves equipment vulnerable to damage during flood events. Flooded equipment can result in building-wide loss of electricity, clean water, and gas, causing disruption and distress for tenants. Equipment is best protected when located at or above the DFE, which typically means above the cellar.

For this building, the Workshop Team explored moving the boiler to the roof and all other critical building systems to the side yard. The Workshop Team designed an elevated, enclosed unit in the side yard for electric, gas, and water utilities, and suggested moving the boiler to the roof, while still using the existing chimney for air supply and return. The Team's suggestion of placing a boiler room on the roof would require an engineer to analyze the effect of the added load on the roof to determine if the roof would need to be reinforced. Relocating the boiler would then involve disconnecting and moving the existing boiler, domestic hot water heater, pumps, controls, and fittings to the roof. Having the boiler on the roof would allow it to operate more efficiently. Also, having the boiler on the roof would reduce the size of the enclosure needed for the other systems in the side yard.



While a boiler operates more efficiently on the roof, it is less feasible and less efficient to move other building systems to a higher elevation. For example, gas and electricity often enter buildings from below grade. The farther the utility rooms are moved from the entry point, the more expensive it becomes to run the utilities to the rooms. Electrical service is required to be encased in concrete until it reaches the main meter. In addition, the longer the electrical wiring runs, the greater the power loss, thus lowering efficiency. Moving all of the building systems to the roof would also be much more expensive than locating some to a side yard because of the work likely needed to reinforce the roof.

<sup>41</sup> Wet floodproofing is not an option for this building because it would require a space that allows the in- and out-flow of water. Because the cellar of this building is below grade on all sides, there is no place above grade to locate a vent to allow the water to naturally flow out.

**Relocation of Building Systems to Roof and Side Yard**

Cost: \$435,000<sup>42</sup>

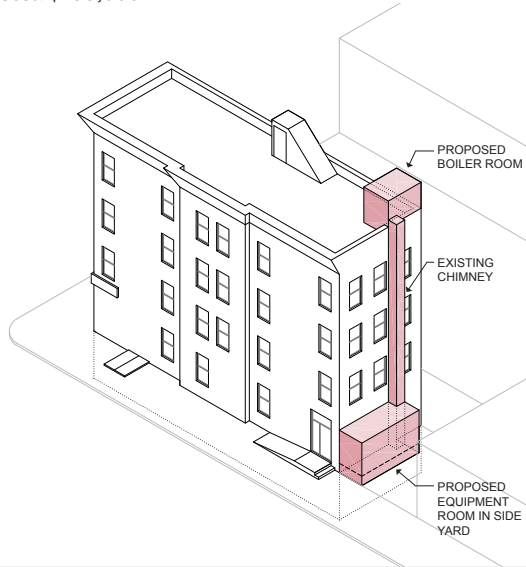


Diagram by Spencer Leaf

Here, the Zoning Resolution allows the use of the side yard for locating equipment because, as a corner lot in an R6 district, it has no yard requirements.<sup>43</sup> However, if this lot were not on a corner, its open space would be considered a rear yard,<sup>44</sup> and the zoning would not allow the structure in the yard. The Zoning Resolution only permits specific obstructions in yards, and the type of structure necessary to house building systems is not permitted in every location.<sup>45</sup> While the New York

42 All of the costs listed in this report are rough estimates based on the design work completed at the Workshop in January 2014. Mark Ginsberg, FAIA, LEED AP, and Adam Watson, AIA, LEED AP, helped us refine the work done that day and prepare it for this report. A description of the elements of each retrofit that went into the estimate can be found in the Summary of Costs on page 48 of this report's Appendix.

43 Because this building is in an R6 zone on a corner lot, it has no yard requirements. New York City Zoning Resolution ("ZR") § 23-465 (2013). Therefore, the rules about permitted obstructions in required yards do not apply. ZR § 23-44 (2013). However the zoning does require open space on the lot; the maximum permitted lot coverage is 80%. ZR § 23-145 (2013).

44 The ZR defines any yard on a corner lot that is not a front yard a side yard. However, on non-corner lots, this space between the back of a building and the rear lot line, which is required to be at least 30 feet deep in residential zones, is considered a rear yard. New York City Department of City Planning. Zoning Glossary. Retrieved from <http://www.nyc.gov/html/dcp/html/zone/glossary.shtml>

45 ZR §§ 23-44, 64-421(b) (2013).

City Flood Resilient Zoning Text Amendment that passed after Superstorm Sandy relaxed this rule, this zoning amendment does not apply to buildings outside of the 100-year floodplain.<sup>46</sup>

In a larger building, it might be possible to move building systems to a space within the building above the DFE. However, the Workshop Team did not consider this option here because there is no space large enough to house the equipment that would not result in a loss of units. As discussed in more detail below, because of cash flow constraints and regulatory requirements, removing a residential unit, especially in such a small building, is not a feasible option.

**b. Dry Floodproofing**

The Workshop Team for 445 Baltic Street also considered the option of dry floodproofing the cellar in order to continue using the existing space for mechanical and electrical equipment. Dry floodproofing makes a space watertight to prevent floodwaters from entering. Here, the Team suggested dry floodproofing the entire cellar using reinforced concrete floor slabs, 12" thick, over the existing floor membrane and reinforced concrete walls over the wall membranes, 8" thick. The existing hatches, doors, and frames would need to be removed, and new waterproof "marine" hatches would need to be installed.

46 With the New York City Flood Resilience Text Amendment, the city made a number of changes to the zoning regulation designed to accommodate and incentivize resilience measures, including allowing accessory mechanical equipment for buildings with more than two units as a permitted obstruction in rear yards, rear-yard equivalents, courts, and open space. ZR §§ 64-322(c), 64-421(b) (2013). However, the Amendment only applies in zones with a one percent annual chance of flooding. ZR §§ 12-10, 64-12 (2013).



### Dry Floodproofing the Cellar

Cost: \$450,000

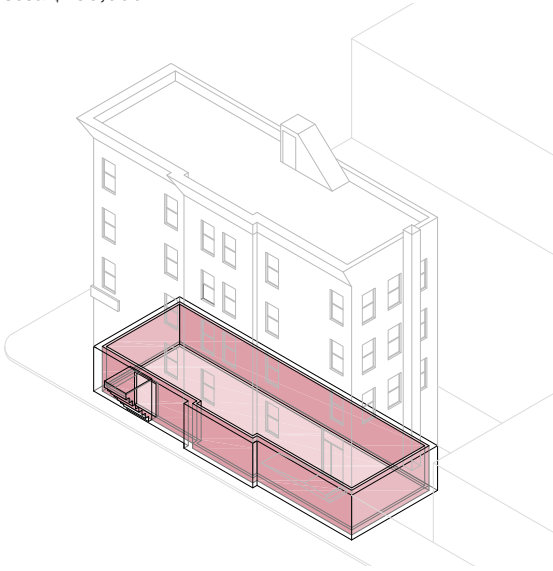


Diagram by Spencer Leaf

Dry floodproofing may be a practical solution for protecting building systems in some circumstances, such as 445 Baltic Street, which is located in the 500-year floodplain. Dry floodproofing of a residential building in the 100-year floodplain is prohibited by Appendix G of the New York City Building Code if such an alteration would trigger a Substantial Improvement.<sup>47</sup> It is also important to note that dry floodproofing is not compliant with NFIP guidelines for residential buildings in the 100-year floodplain. Thus, for buildings in the 100-year floodplain, even if dry floodproofing will further resilience goals, it will not help reduce insurance premium rates. Buildings like 445 Baltic Street that are not located in the 100-year floodplain may consider adopting this strategy (because their flood insurance premium rates would not be affected by any type of resilience measures, even if NFIP-compliant).

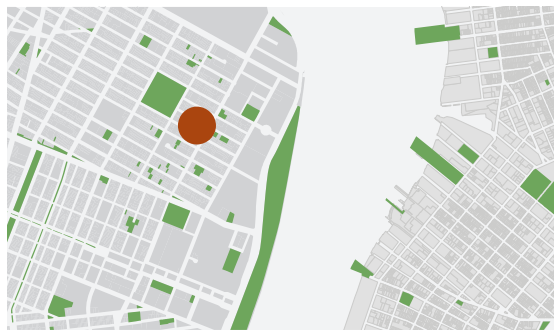
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<sup>47</sup> New York City Administrative Code, Building Code, § G304.1.1 (2008).

## C. Case Study 2: 334 East 8th Street, Manhattan Attached Building with Elevator

### 1. Building Overview

Building Operator	Lower East Side Peoples Mutual Housing Association
Owner	8th and C HDFC
Borough-Block-Lot	Manhattan-00390-0024
Residential Units	30
Stories	6
Cellar	Yes
Structure Type	Brick
Elevator	Yes
Year Built	1900 (approximate)
Year Altered	1994
Zoning	R8B
Subsidy	Low Income Housing Tax Credit
Subsidy Start Year	1995
Evacuation Zone	1
Effective Flood Hazard Area	Zone X
Preliminary Flood Hazard Area	Zone AE
BFE	11 feet



334 East 8th Street, located in the East Village neighborhood of Manhattan, is a six-story, masonry structure, with a cellar, a passenger elevator, and a handicap lift, housing 30 residential units, located within the Preliminary Flood Hazard Area, Zone AE (meaning it will likely be added to the 100-year floodplain in 2016). The building's mechanical and electrical equipment is located in the cellar, which is accessible from a ground floor entry.

During Superstorm Sandy, the cellar had about 5.5 feet of flooding from water flowing from the East River along East 8th Street and Franklin D. Roosevelt East River Drive. The water primarily entered from the utility hatches along the front of the building, cellar floor drains, rear cellar doors and windows, and the front door. The floodwater damaged the electrical equipment, boiler, and hydraulic elevator systems. Both the hydraulic lift from the entrance to the first floor and the building's single (hydraulic) elevator from the first floor to the sixth floor were destroyed and later replaced, during which time several wheelchair bound residents could not leave the building. Additionally, the damage to the Consolidated Edison electrical facility that serves the neighborhood resulted in a loss of electricity for two weeks. All of the damaged areas underwent repairs post-Sandy, but no additional retrofits are currently planned to mitigate the damage from potential future flooding.

Of our three case study buildings, 334 East 8th Street is the only one whose flood zone classification will change with the new preliminary flood maps. The building's risk of flooding has been elevated from Effective Flood Hazard Area, Zone X (part of the 500-year floodplain), to the Preliminary Flood Hazard Area, Zone AE (part of the future 100-year floodplain), which means that the property, because of its government subsidy,

will be required to carry flood insurance once the Preliminary Zone becomes the Effective Zone. Its flood insurance premium rates, like those of all the buildings in Zone AE, will be affected by the extent to which the building complies with NFIP rules.

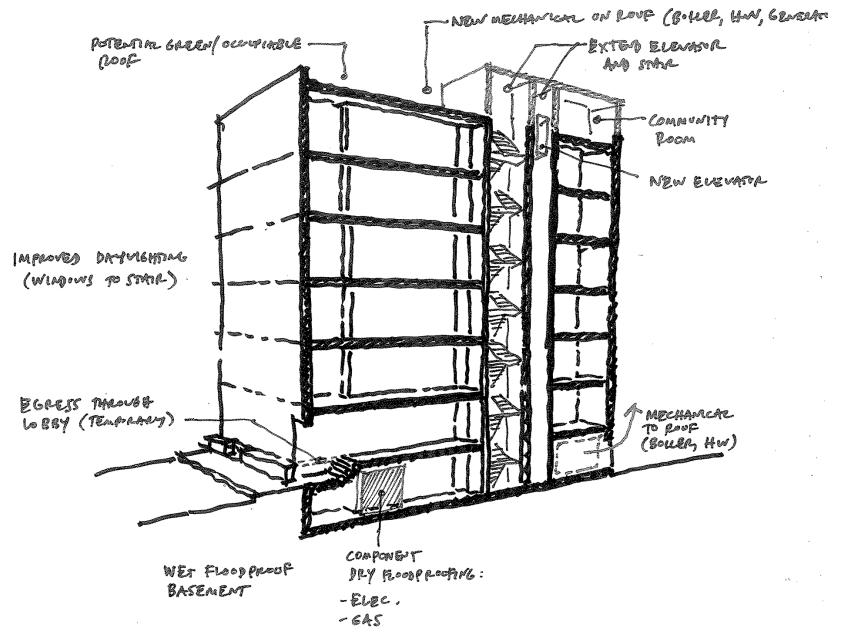
## 2. Workshop Recommendations

The Workshop Team assigned to 334 East 8th Street explored two options: a) relocating equipment above the DFE and wet floodproofing the cellar, or b) changing the use of the building to allow for dry floodproofing of the cellar.

### a. Relocation of Critical Building Systems & Wet floodproofing the Cellar

As noted in the previous case study, equipment should be located at or above the DFE to reduce the risk of damage to critical building systems from flooding. Here, the team proposed relocating the boiler to the roof and other building systems to the first floor. This property has an open area on the first floor that could accommodate the relocated equipment to avoid sacrificing residential units.<sup>48</sup> The Workshop Team proposed building an enclosed room in the open area and using the shaft to run various lines throughout the building, as illustrated in the diagram below.

Once the building systems have been relocated, the building owner must consider how to address the vacant cellar. Thus, in conjunction with relocating building systems, the Workshop Team explored the option of wet floodproofing the cellar because the rear yard is lower than the street elevation, thus allowing positive drainage.



### Relocation of Building Systems

Cost: \$1,260,000<sup>49</sup>

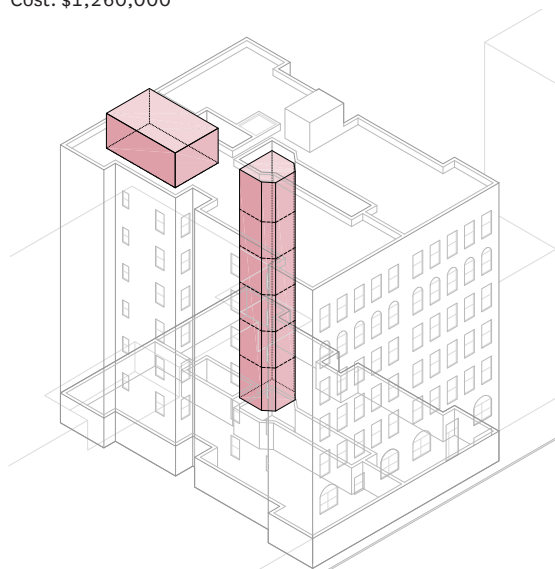


Diagram by Spencer Leaf

<sup>48</sup> A building would only be permitted to implement a retrofit that fills the ground floor level of an internal courtyard if, with the change, it would still be in compliance with applicable rules in the Zoning Resolution.

<sup>49</sup> This estimate does not include the cost of floodproofing the cellar, which appears below.

Wet floodproofing allows water to run in and out of buildings through hydrostatic flood vents. Wet floodproofing requires that a structure be properly anchored, flood-resistant materials be used below the DFE, and mechanical and utility equipment be relocated to a dry space above the DFE. When using wet floodproofing for resilience measures, the cellar can no longer be used for any activity other than a lobby, parking, or storage, and all valuable contents must be relocated. Thus, spaces in the cellar such as the laundry room will need to be relocated.<sup>50</sup>

Application of wet floodproofing under the NFIP rules is limited to enclosures below the lowest habitable floor of residential and non-residential structures. According to NFIP, wet floodproofing without elevating building systems above the BFE does not reduce flood insurance premium rates on residential structures. Wet floodproofing might still be an attractive option for buildings because the effects of hydrostatic pressure and buoyancy are greatly reduced. As a result, the loads imposed on a building during a flood, and the likelihood of structural damage, may be greatly reduced. Wet floodproofing is generally used to limit damage to enclosures below elevated buildings, walkout-on-grade basements, crawlspaces, or attached garages.

<sup>50</sup> NFIP regulations only allow wet floodproofing to be used to bring a structure into compliance when the area to be wet floodproofed is used solely for parking, building access, or storage. 44 CFR § 60.3(c) (5) (2011); FEMA. (2013). *Floodproofing Non-Residential Buildings*, p. 4-1. Retrieved from [http://www.fema.gov/media-library-data/2c435971150193efc6a6ba08f2403863/P-936\\_sec4\\_508.pdf](http://www.fema.gov/media-library-data/2c435971150193efc6a6ba08f2403863/P-936_sec4_508.pdf)

**Diagram: Wet Floodproofing the Cellar**

Cost: \$1,350,000

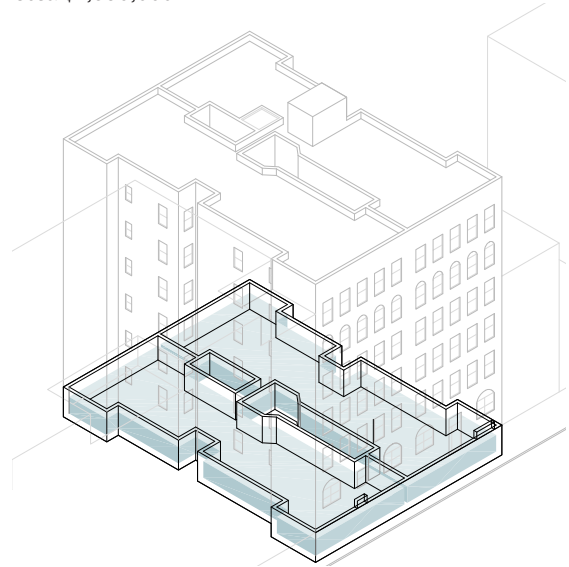


Diagram by Spencer Leaf

**b. Addition of Non-residential Use to Allow Dry Floodproofing of the Cellar**

The Workshop Team also developed a proposal to convert the building from residential to non-residential, for flood zone purposes, thus permitting dry floodproofing and subgrade spaces. Such a conversion can be accomplished by introducing a use that is not accessory, as the term is defined in the New York City Zoning Resolution, on the lowest floor. Buildings defined as non-residential for flood zone purposes in Appendix G of the Building Code or under FEMA regulations (44 C.F.R. § 59.1) are permitted to employ dry floodproofing to continue the use of a subgrade cellar to house building systems. A non-residential building that is dry floodproofed in accordance with the Building Code would have reduced insurance premiums when compared to the same residential building with a subgrade cellar. Dry floodproofing requires exterior walls and slabs that are impermeable to the passage of water. This is usually achieved by installing reinforced concrete floor slabs over the existing floor membrane and reinforced concrete walls over the wall membranes. The existing hatches, doors, and frames would need to

be removed and replaced with flood shields and flood doors designed to resist all flood loads. Dry floodproofing measures are usually designed in consultation with a structural engineer.

FEMA regulations, and thus New York City Building Code, do not permit dry floodproofing of entirely residential buildings or residential portions of mixed-use buildings in the 100-year floodplain for new construction or when a building qualifies as Substantially Improved.<sup>51</sup> Existing residential buildings that are not Substantially Improved and that have mechanical systems located in the cellar may use dry floodproofing to protect those systems; however, doing so would not qualify the building owner for any reductions in flood insurance premiums.<sup>52</sup> On the other hand, buildings that are considered “nonresidential,” for flood zone purposes, under the Building Code are permitted to use dry floodproofing to come into compliance with Appendix G and reduce flood insurance premiums. Appendix G lists the requirements for dry floodproofing a nonresidential building.<sup>53</sup> Under the Building Code definition of “nonresidential,” a multifamily building, which would otherwise be considered “residential,”<sup>54</sup> can be considered nonresidential if it contains “space on the lowest floor that is not accessory” to the residential use—meaning not incidental to and customarily found in connection with the principal use.<sup>55</sup> For buildings that are currently only residential, this flexibility is a factor in favor of adding non-residential uses that qualify as not accessory to the building (e.g., commercial office space, retail space, or community facility space).

51 44 C.F.R. § 60.3 (2011); New York City Administrative Code, Building Code, § G501 (2013).

52 New York City Administrative Code, Building Code, §§ G201 & G304.1.2 (2014).

53 New York City Administrative Code, Building Code, § G304.1.2 (2013).

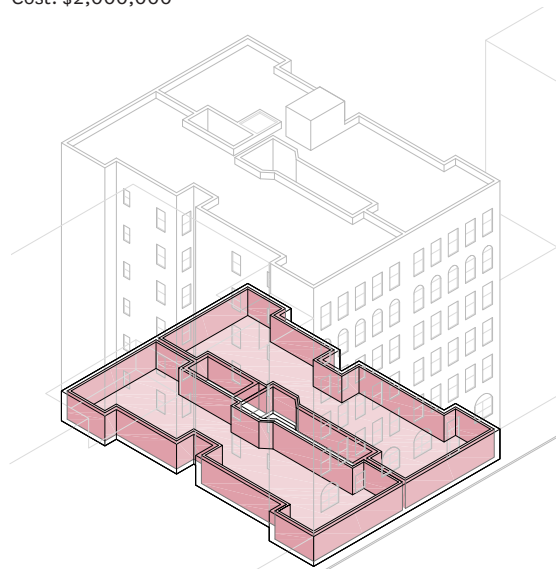
54 A multifamily apartment building is classified under the Building Code as Residential Group R-2. New York City Administrative Code, Building Code, § 310.1.2 (2011). Appendix G defines this use group as “residential.” New York City Administrative Code, Building Code, § G201 (2014).

55 ZR § 12-10 (2013).

Here, this building is located in a residential zoning district (R8B), which prohibits conversion to most non-residential uses; however, if it had a commercial overlay, or if a similar building in a mixed-use zone was confronting this issue, this option would be more readily available. Depending on the layout of the building, it may be difficult or impossible to convert space to non-residential use without losing residential units, which would pose both cash-flow problems and possibly other complications if the building were subsidized or rent stabilized, as discussed in Section 5 below.

**Diagram: Dry Floodproofing the Cellar**

Cost: \$2,000,000<sup>56</sup>



*Diagram by Spencer Leaf*

56 This estimate does not include costs involved with converting space to non-residential use.

## D. Case Study 3: 3601 Surf Avenue, Brooklyn “Tower in the Park”

### 1. Building Overview

Building Operator	Jewish Association Serving the Aging
Owner	Coney Island Site Nine Homes
Borough-Block-Lot	Brooklyn-07045-0031
Residential Units	197
Stories	19
Basement / Cellar	No
Structure Type	Brick
Elevator	Yes
Year Built	1972
Zoning	R6
Subsidy	Section 236 & Rental Assistance Demonstration
Subsidy Start Year	1973
Evacuation Zone	1
Effective Flood Hazard Area	Zone AE
Preliminary Flood Hazard Area	Zone AE
Preliminary BFE	11 feet



3601 Surf Avenue, located on the southwest end of Coney Island, is a 19-story, 197-unit masonry structure with a parking lot, courtyard, and two elevators, located within Flood Zone AE in the 100-year floodplain. The property only houses residents over the age of 55, some of whom have limited mobility and other vulnerabilities. The property also hosts the local senior center with approximately 125 to 150 daily participants from the community.

During Superstorm Sandy, the extremely high winds and swells of approaching water collapsed a 57-foot section of retaining wall along the perimeter of the property. Water infiltrated through the building’s terrace and doors, as well as the gated slots along the exterior walls. The first floor, including the senior center, was inundated with water four feet high, cutting off the electricity, elevators, water pumps, and boilers in the building. Due to loss of electricity, the elevators were not in operation for almost two weeks. Following the storm, repairs were made to the walls and flooring throughout the first floor, doors, the main electrical cables for the elevators, a section of the retaining wall, and to address major sinkholes.

Because the building is located in the Preliminary Flood Hazard Area, Zone AE (part of the 100-year floodplain), the property is required to carry flood insurance. The flood insurance premium rates will depend on the building’s compliance with NFIP rules.

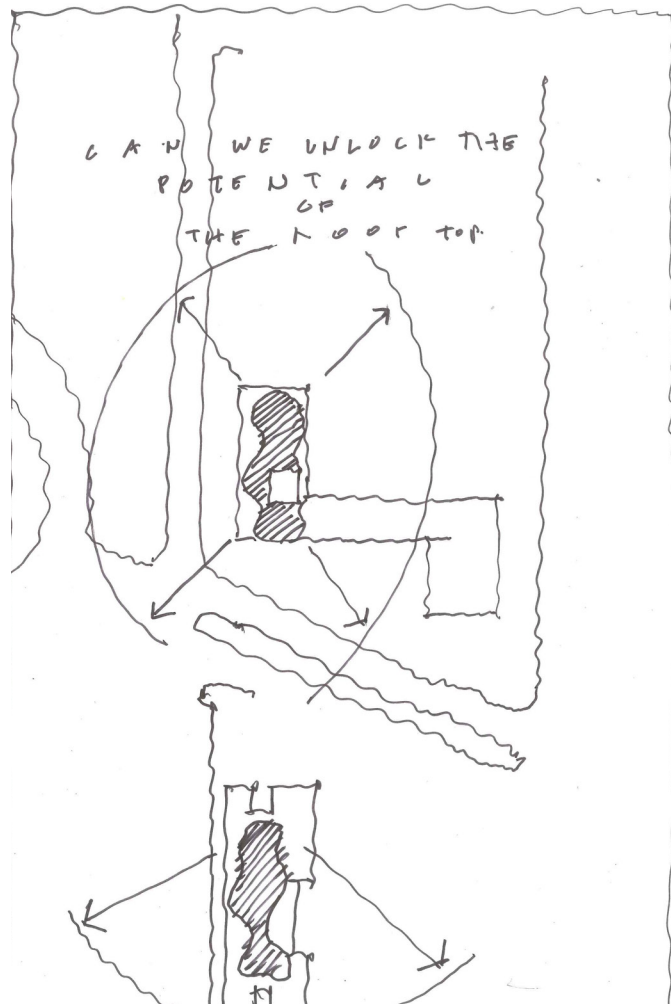
### 2. Workshop Recommendations

The Workshop Team assigned to this building explored two options: a) relocating critical building equipment; or b) creating floodwalls and removable flood barriers to prevent floodwaters from entering onto the property.

### a. Relocation of Critical Building Systems

The Workshop Team explored the option to relocate critical building systems either to an open space on the second floor, above the DFE, or to the roof. The building's critical equipment is currently located on the first floor; however, the first floor is below the DFE. If the equipment were moved to another floor, such as the second floor, the relocation would likely result in the loss of approximately four residential units (4,000 square feet). In addition to the demolition of existing units, the space would need to be renovated to include new walls of a higher fire resistance rating and structural reinforcement of the floor.

If, instead, equipment was moved to the roof, then the building owner could avoid sacrificing any residential units. However, as noted above, many building systems should be located near the utility service entrances which are typically below grade. The Team's suggestion of placing equipment on the roof would require an engineer to analyze whether the roof could accept the added load and whether the roof needs to be reinforced.



### Diagram: Relocation of Building Systems to the Second Floor

Cost: \$2,540,000

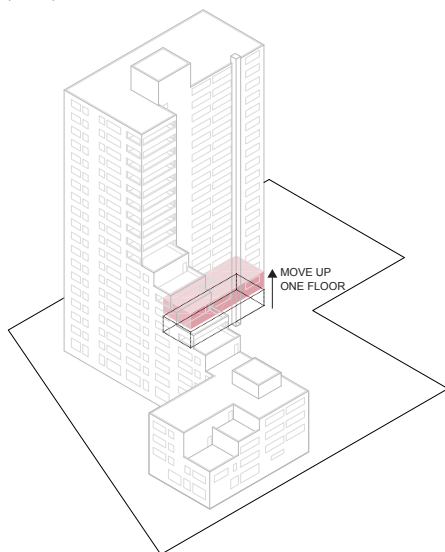


Diagram by Spencer Leaf

### b. Flood Barriers

The Workshop Team also explored the option of using flood barriers to protect the property from surge waters. Typically, when considering the use of a flood barrier, a design strategy for an entire block would be considered to address the area-wide vulnerability and to ensure that water is not being redirected to neighboring buildings. A building owner can also consider implementing a combination of barrier strategies for the property, as each side of a building may require a different solution specific to its context. Importantly, although flood barriers might mitigate the risk of damage from flooding, they are not compliant with NFIP regulations,

unless it is a permanent, accredited levee.<sup>57</sup> Thus, most flood barriers would not reduce the building's flood insurance premium rates and are not compliant with the Building Code requirements for Substantially Improved buildings.

Below are two flood-barrier strategies that the Workshop Team explored.

**i. Option 1: Demountable Flood Barrier**

The Workshop Team proposed that 3601 Surf Avenue consider creating a demountable flood barrier, a suggestion that was also explored by AIA-NY's Post Sandy Initiative study. Demountable flood barriers are panelized, temporary, movable walls that only go up during a storm or flood event, and can be located along the perimeter of a property to protect the building from the force of water. The team acknowledged that building-specific flood barriers may not address neighborhood concerns, as floodwater could be pushed towards adjacent structures in some circumstances, creating a greater challenge for neighboring property owners.

**ii. Option 2: Built Barriers**

The Workshop Team also explored the creation of built barriers that serve as a permanent barrier along the perimeter of the property. The barrier can vary in form, such as a gate or levee, or it can be wide enough to allow usable non-residential space, such as commercial use or parking.<sup>58</sup> Creating usable space might allow for better integration into the landscape and streetscape; and if zoning regulations allow for commercial use, the retail tenants could generate additional income for the property.<sup>59</sup>

**Diagram: Combination of Barrier Strategies**

Removable Barrier Cost: \$100,000  
 Built Barrier Cost: \$800,000 (raw space)  
 (Cost estimates only cover a portion of the work diagramed below.)

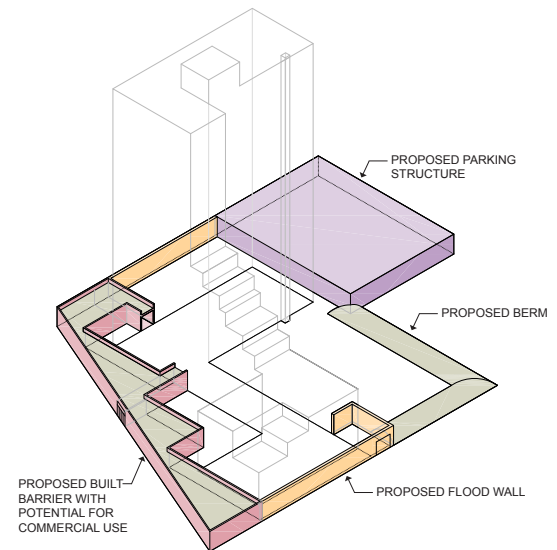


Diagram by Spencer Leaf

<sup>57</sup> Floodwalls and levees are not permitted under the Building Code for New or Substantially Improved residential buildings, and do not bring new buildings into compliance with NFIP regulations unless they are accredited per 44 CFR § 65.10 (2011). Building Code, § G304.1 (2008); FEMA. (2013). *Floodproofing Non-Residential Buildings*. Retrieved from [http://www.fema.gov/media-library-data/2c435971150193efc6a6ba08f2403863/P-936\\_sec4\\_508.pdf](http://www.fema.gov/media-library-data/2c435971150193efc6a6ba08f2403863/P-936_sec4_508.pdf)

<sup>58</sup> Non-residential uses are allowed per the Zoning Resolution. The space can also be rented for these uses, generating income. For a list of permitted uses, see ZR §§ 22-13, 22-14 (2014).

<sup>59</sup> If the cost of construction is less than 50 percent of the dollar value of the property, the owner only has to bring the new construction portion of the building up to current code. When over 50% the entire building has to be brought up to current code, which is often very costly and sometimes impossible.



## E. Financial Implications

The case studies presented above make clear that retrofitting a multifamily building for resilience against flooding in New York City is no minor expense. Although multiple options and strategies exist, they are costly to implement, especially for buildings such as those presented here that serve low- and moderate-income residents. Salient financial concerns that building owners must consider include having sufficient net income to cover the debt service required for any additional borrowing (called debt service coverage or DSC), sufficient value of the building not already pledged as collateral on existing outstanding debt (called combined loan to value or combined LTV ratio), funds set aside for future capital improvements (called reserve funds), and the Substantial Improvement rule.

The first consideration of building owners is the ability to fund additional debt through existing, or possibly reduced, cash flow. Small multifamily buildings such as 445 Baltic Street must operate on a lean balance sheet in order to offer affordable rents. With only five units, the maximum possible allowable LIHTC rental income for the building is \$5,353 monthly or \$64,236 annually.<sup>60</sup> From the annual income, the building needs to be able to cover loan payments, capital improvements, utilities, insurance, legal, and management costs, and the setting aside of money in reserve funds. As a simple illustration, if the building owner sought a 30-year amortized loan at a rate of 4 percent to finance the more expensive of the two retrofits described above—relocation of equipment estimated at \$435,000—the resulting annual payment for a loan of that amount would total \$24,922 (\$17,261 in interest and \$7,661 in amortization the first year), an amount potentially larger than the current net income. Moreover, a building's rental

income may itself be impaired by the implementation of a resilience measure, for instance by the elimination of a ground floor unit or by a protracted vacancy during the construction period, which would be particularly harmful to smaller buildings with only a limited number of units. Unless the building was previously able to generate significant surpluses, it may not be able to carry all of the additional debt payments required to fund a retrofit.

Second, obtaining a loan may also be challenging because the value of the building may not be able to support the size of the loan required. For example, in 2014, the New York City Department of Finance estimated the market value of 334 East 8th Street at \$1,599,000,<sup>61</sup> with a gross operating income of \$426,203, expenses of \$186,792, and net operating income of \$239,411.<sup>62</sup> To relocate the building's systems at a cost of \$1,260,000, assuming that there is no capital reserve for the expense, the owner would need to obtain a loan of at least 79 percent of the New York City Department of Finance estimated market value just for this improvement; at a 4 percent rate, the annual loan payment on a 30-year fixed loan would be \$72,410 in the first year, assuming \$50,152 in interest and amortization of \$22,258.

Such large loans would likely be impossible to obtain even if cash flow could cover additional financing and the building owner had no other debt on the building. The maximum LTV a building owner likely could seek from Fannie Mae would be 75 percent.<sup>63</sup> Other collateral would have to be pledged in order to lower the LTV to meet typical bank underwriting requirements.

<sup>61</sup> An independent assessment would likely yield a higher estimated market value for the building.

<sup>62</sup> New York City Department of Finance. (January 15, 2014). Notice of Property Value for 334 East 8th Street, Manhattan. Retrieved from <http://nycprop.nyc.gov/nycproperty/StatementSearch?bbl=1003900024&stmtDate=20140115&stmtType=NPV>

<sup>63</sup> Fannie Mae. Supplemental Loan Term Sheet. Retrieved from [https://www.fanniemae.com/content/fact\\_sheet/supplementalloans.pdf](https://www.fanniemae.com/content/fact_sheet/supplementalloans.pdf).

<sup>60</sup> This statement assumes the 60% AMI limit for a unit mix of a studio, a one-bedroom, and three two-bedroom units.



Although the first two retrofit recommendations would increase the resilience of 334 East 8th Street, it is clear that the high LTV required to undertake those retrofits for a building like this one would pose a challenge, even in a competitive interest rate environment, and likely would prove to be a barrier to implementation, unless an independent appraisal were to find the market value of the building to be significantly higher than the DOF estimate. The elimination of usable space in the cellar and the relocation of uses to other parts of the building with rentable floor area would also cause the building to lose a portion of income, thereby posing another potential threat to the building's debt service coverage as well as to its market value.

A third consideration is the availability of reserve funds to cover resilience investments, either as an alternative to loan financing or as part of an overall strategy. The third case-study building here, 3601 Surf Avenue, is a senior assisted living facility owned and operated by a nonprofit organization. The building maintains a healthy cash reserve for capital improvements funded as part of its expense budget, but it should be noted that this reserve is slated for repairs and regular replacement of building systems that wear out—not necessarily for large scale investment in a resilience retrofit. The rental income this building reported in 2012 was \$2,192,620; the building received \$404,403 in government subsidy; and building expenses totaled \$2,213,736.<sup>64</sup> The New York City Department of Finance has determined the building's market value in 2014 to be \$7,231,000, based on a comparison with similar properties;<sup>65</sup> notably, this is a 14.99 percent drop in value attributed

to Superstorm Sandy.<sup>66</sup> Its tax liability would be \$367,976 annually if the building did not have a property tax exemption. A building of this size could sustain some vacancy without taking a significant hit to cash flow, thus allowing the building to pursue a strategy of developing a reserve fund for a retrofit; doing so, however, would delay the retrofit investment for several years, leaving the building at risk in the meantime.

Finally, even when a building owner is able to finance a retrofit, the Substantial Improvement threshold may present an additional complication. For example, of the recommended retrofit options for 334 East 8th Street, the option to relocate critical building systems would present an important protection for the building, given its susceptibility to flooding. However, we estimate that relocating the critical mechanical systems and wet floodproofing the cellar would cost \$2.6 million, far more than the New York City Department of Finance's estimated value of the building (\$1.6 million). Even if the owners of this building got an independent assessment showing that the building was worth more than \$1.6 million, it is still likely that this retrofit project would exceed the 50 percent Substantial Improvement threshold. As discussed in Section 3 of this report, triggering a Substantial Improvement would require bringing the existing building up to current code—incurring significant additional costs—and, unfortunately, could deter even a very sophisticated owner from pursuing a creative retrofit strategy to protect the asset.

In short, for these reasons, multifamily buildings in the floodplain, particularly those that are rent subsidized or stabilized, are likely to have difficulty funding resiliency improvements through reserve funds or private loans.

64 Internal Revenue Service. (2012). Form 990: Return of Organization Exempt from Income Tax: Coney Island Site Nine Houses Inc. Retrieved from [http://990s.foundationcenter.org/990\\_pdf\\_archive/112/112306651/112306651\\_201212\\_990.pdf](http://990s.foundationcenter.org/990_pdf_archive/112/112306651/112306651_201212_990.pdf).

65 New York City Department of Finance. (January 22, 2014). Notice of Property Value for 3601 Surf Avenue, Brooklyn. Retrieved from <http://nycprop.nyc.gov/nycproperty/StatementSearch?bbl=3070450031&stmtDate=20140115&stmtType=NPV>.

66 New York City Department of Finance (May 31, 2013). Notice of Revised Property Value for 3601 Surf Avenue, Brooklyn. Retrieved from <http://nycprop.nyc.gov/nycproperty/StatementSearch?bbl=3070450031&stmtDate=20130531&stmtType=NRV>

## F. Case Study Conclusions

As the case studies show, several variations of retrofit strategies can be implemented to make a building more resilient to future flooding events. Building owners in New York City will need to consider which retrofit options are best suited for their properties, which provide the most value, and how they will fund and manage implementation. While these challenges raise a number of important questions, we highlight below a few of the key issues that are broadly applicable to the multifamily buildings in New York City's floodplains.

### 1. The Challenge of Protecting Building Systems

As noted already, in order to provide an additional margin of safety, New York City Building Code requires all new and Substantially Improved buildings within the 100-year floodplain to elevate residential spaces, including the basement and building systems above the DFE, which is two feet above the BFE for one and two family houses and one foot above the BFE for multifamily and commercial structures. The key issue for many multifamily buildings is that major building systems and equipment are currently located below the DFE. Mechanical and electrical systems are interconnected, and

the damage of any individual component may result in the failure of an entire system. The most effective mitigation measure is to ensure that all essential equipment is protected either by relocating at or above the DFE or by dry floodproofing the structure that houses the building equipment.

#### a. Barriers to Dry Floodproofing

For many existing buildings, dry floodproofing is a less disruptive solution to mitigate damage from flooding because it does not require finding new, appropriate space to relocate building equipment. However, dry floodproofing a residential building is prohibited by Appendix G of the New York City Building Code for buildings in the 100-year floodplain. Notably, this strategy is permitted in non-residential buildings, as defined by the Building Code, even in the 100-year floodplain.<sup>67</sup> If the Substantially Improved threshold is not passed, then existing residential buildings may be able to use dry floodproofing to protect mechanical systems that are currently located below the BFE; however, this strategy is not recognized by FEMA and flood insurance premiums would not be reduced.

<sup>67</sup> New York City Administrative Code, Building Code, § G304.1.2 (2013).



NYU Furman Center's Retrofit Solutions Workshop

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**b. Barriers to Relocating Building Systems**

For buildings that consider relocation of critical building systems, a number of challenges exist. First, sacrificing a residential unit is simply not feasible for most multifamily buildings that are rent stabilized or subsidized. They will often not be able to absorb the lost rent, and rent stabilization and subsidy programs have strict rules that limit the ability of buildings to eliminate units, discussed in more detail in the next section. While the New York City Flood Resilient Text Amendment tried to mitigate the harm of lost units by providing buildings with the ability to build higher in some circumstances,<sup>68</sup> the expense of adding additional residential units to the roof of a building will make this solution unworkable for many.

The option discussed in Case Study 1 of relocating equipment to a yard may help some buildings avoid sacrificing residential units, but the availability of this option is limited. For multifamily buildings in the 100-year floodplain, the post-Sandy Flood Resilience Zoning Text Amendment allows construction of the necessary structures in yards, courts, or open space, as long as specified requirements are met.<sup>69</sup> However, most buildings outside of the 100-year floodplain would likely be prohibited by zoning rules from constructing the kind of structure needed to house these systems in a yard. (Because it happens to be on a lot with no yard requirements, 445 Baltic Street would be able to implement this, despite being located outside the 100-year floodplain.)

While there are certainly competing considerations the city must balance when it relaxes zoning requirements to accommodate resilience planning, the city should carefully consider whether the reforms it implemented in its recent zoning amendment should be expanded to apply to the

wider 500-year floodplain. There are technical challenges associated with regulating the 500-year flood zone in this manner, including the absence of flood elevations on the flood insurance maps; however, it is in the city’s interest to encourage, and certainly to not impede, building owners with properties at risk of flooding to take steps now to prepare for long-term resilience and rising sea level. More flexibility in the code regulations for Zone X would help accomplish this.

**2. Addition of Commercial Overlays**

Another creative solution that our Workshop participants explored is adding non-residential uses to a residential building, where zoning allows, in the 100-year floodplain so that the building can fulfill Building Code requirements by dry flood-proofing the cellar. The city may want to consider the expansion of commercial overlays in the floodplain to allow for more first floor conversions to commercial, which would allow for more flexibility to comply with NFIP requirements, reduce insurance premiums, and help offset the financial losses associated with converting residential units into building-systems rooms. It is important to note, however, that even with greater zoning and regulatory flexibility, rent stabilization and subsidy programs may still limit the ability of many building owners to eliminate units and convert space to non-residential uses, as discussed in greater depth below. Additionally, because of local demand and commercial rents, in some places a new commercial space would not generate enough income to make up for the lost residential income.

68 New York City Department of Planning. (2013). *New York City Flood Resilience Text Amendment*, § 64-63. Retrieved from [http://www.nyc.gov/html/dcp/pdf/flood\\_resiliency/final\\_text.pdf](http://www.nyc.gov/html/dcp/pdf/flood_resiliency/final_text.pdf)

69 New York City Department of Planning. (2013). *New York City Flood Resilience Text Amendment*, §§ 64-322(c), 64-421(b). Retrieved from [http://www.nyc.gov/html/dcp/pdf/flood\\_resiliency/final\\_text.pdf](http://www.nyc.gov/html/dcp/pdf/flood_resiliency/final_text.pdf)

# 5.

## Preserving Affordable Housing: Threats and Opportunities In the Floodplain

Retrofitting our case study buildings, and the hundreds of others like them in flood-prone areas of the city that provide affordable housing, faces clear implementation challenges from the complex interaction among flood insurance rules, city regulations, rent stabilization, and housing subsidy program rules. Hurdles that make it harder or more expensive to implement effective retrofit strategies are certainly a threat to the safety of the residents and buildings affected, but they are also a threat to those buildings' continued affordability, as rising insurance rates loom for buildings that are unable to adequately adapt. In addition to highlighting these challenges, we identify below opportunities for reform that may improve incentives and resources available to multifamily buildings attempting to achieve long-term resilience.

### A. FEMA/Insurance

One of the biggest threats to preserving affordable housing in the floodplain is that flood insurance premiums will likely rise in upcoming years. As described above in Section 3, annual premiums for the National Flood Insurance Program have been subsidized for many buildings in the past but will now rise to actuarially sound rates over time. Owners of properties in the 100-year floodplain will be subject to much higher annual premiums unless they retrofit their properties to be in full compliance with the current Building Code and all NFIP requirements. For residential buildings, this includes raising all habitable spaces and mechanical systems above the BFE. However, as demonstrated in part by our case studies, doing so is often cost prohibitive to owners of subsidized and stabilized multifamily



*Flooding in Rockaway, Brooklyn*

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rental buildings both because the costs of retrofitting are so high and because the owners would lose the rental income from any units that were located below the BFE. Owners, then, are caught in a catch-22. If they do nothing, their flood insurance premiums will rise to unaffordable rates. But to lower their rates, they would need to undertake expensive retrofits they may not be able to afford while charging affordable rents. There are three key changes that could be made to the NFIP rules to help make New York City's multifamily building stock safer.

First, FEMA should consider creating separate guidelines for multifamily buildings. Most of the guidelines for the NFIP are written for owners of single-family, detached homes, which predominate in many other coastal areas. FEMA has separate guidelines for non-residential buildings—including mixed-use buildings with commercial units on the ground floor and residential units above. These buildings have an option to meet the flood-proofing requirement by dry floodproofing mechanical equipment. As demonstrated in our case studies, dry floodproofing may be a cost-effective strategy for protecting



mechanical equipment from damage. In many ways, multifamily rental buildings are more like commercial buildings than single-family homes. They are professionally managed and the structures themselves may be less susceptible to catastrophic damage from water infiltration. FEMA should consider creating separate guidelines for existing multifamily buildings that would mitigate risk of damage through means other than raising the entire buildings above the BFE. Any new measures would of course have to balance the risk to the health and safety of residents with the greater flexibility in flood mitigation strategies. However, because non-residential buildings already allow dry floodproofing, there is precedent for expanding this option.

Second, FEMA could consider giving credit for partial mitigation measures. Under the current rules, a building in the 100-year floodplain has to comply entirely with the NFIP guidelines to realize any reduction in its flood insurance rates. This means that all enclosed spaces and mechanical systems must be located above the BFE. Our case studies show that full compliance may be very difficult and costly for multifamily rental buildings, especially those with regulated rents. However, there are lower-cost, easily implementable strategies that could substantially lower, if not fully eliminate, risks. For example, a boiler may be relocated to a roof, which would mitigate the need to replace the boiler after a future flooding event. Under current FEMA rules, though, as long as other mechanical equipment, residential units, a laundry room, or community space is still located below the BFE, the owner will not realize any insurance premium cost savings. FEMA should explore the option of partial reductions in flood insurance premiums for partial mitigation efforts. FEMA could structure this to prioritize relocating the most critical systems first. The Homeowner Flood Insurance Affordability Act of 2014 specifies that FEMA must establish alternative methods of mitigation to reduce flood risk for

buildings that cannot be elevated so there may be an opportunity for the city to push for recognition of partial mitigation measures that significantly reduce risk.

Finally, FEMA should consider broadening the types of non-residential space it permits residential buildings to maintain below the BFE. The current NFIP rules are very strict about permitted uses of enclosed space that is wet floodproofed and below the BFE, allowing only parking, a lobby, storage, or crawl space. Multifamily buildings often include a variety of uses throughout the building that are not strictly residential, such as laundry rooms, community rooms, gyms, and offices for the property manager. The current NFIP guidelines would require all of these spaces to be moved above the BFE. FEMA should consider whether it can add uses that are accessory to residential dwelling units (e.g., laundry rooms, building management offices, or common spaces) to the list of allowable uses below the BFE for multifamily buildings so that buildings do not lose all potential benefits of that space. This could also be a way to indirectly allow for dry floodproofing of residential buildings as a mitigation strategy. For example, all dwelling units could be located above the BFE and all spaces below the BFE would either be dry floodproofed or reserved for non-critical, shared uses.

## **B. Substantial Improvement Rule**

Although the Substantial Improvement rule was designed to incentivize—or force—buildings to become more resilient by complying with the current building codes instead of investing money in more superficial improvements on vulnerable buildings, it may have the perverse effect of discouraging any retrofits for mitigation of damage to multifamily buildings. As our case studies demonstrate, almost any strategy that a building could implement to achieve full compliance with the NFIP regulations would be very expensive and very possibly qualify as a Substantial,

Improvement, especially for smaller buildings. However, once a Substantial Improvement is triggered, a building must also comply with all flood-resistant construction standards in the Building Code. Changes that buildings make as a result of compliance with Appendix G may, in turn, trigger other Building Code requirements that they previously did not have to comply with. With these added expenses, building owners may choose not to retrofit at all because the entire cost of alterations would be too high. With rising insurance rates and of course the safety issues this raises, this inertia poses a real public policy problem.

### C. Rules Governing Subsidized and Stabilized Multifamily Buildings

Nearly 25 percent of the housing units in the preliminary 100-year or 500-year floodplains are in buildings that are privately owned and either receive a government subsidy to provide affordable housing or are governed by rent stabilization. Both subsidized and stabilized housing are governed by rules that do not apply to private, market-rate housing. And these rules have implications for how these buildings respond to their long-term resilience needs. Below, we explore the challenges that these buildings face in raising money for capital improvements. We also consider the rules that these buildings face when undertaking retrofits that involve the loss of residential units. As we discuss above in our case studies, moving utilities out of cellars, adding non-residential uses, and wet floodproofing are options that may help protect buildings in the floodplain and reduce their flood insurance premiums, but the resulting loss of residential units is likely to be challenging for many buildings, especially those that are rent subsidized or stabilized.

## 1. Threat: Rent Stabilization Rules

### a. Major Capital Improvements

Rent stabilization is the term used to describe the state laws and rules that regulate rents in certain buildings in New York City because of the “housing emergency” created by the city’s perpetually low vacancy rate.<sup>70</sup> Units enter stabilization because of their building’s physical characteristics (six or more units; built between 1947 and 1974);<sup>71</sup> for buildings built before 1947, as they exit rent control, which is an older and more restrictive form of rent regulation;<sup>72</sup> and as a condition of certain public subsidies, like the J-51 and 421-A tax benefits.<sup>73</sup>

New York City’s rent stabilization program regulates both the frequency and magnitude of rent increases for covered units.<sup>74</sup> Each year the Rent Guidelines Board sets the rate by which rents can be increased with lease renewals, taking into account yearly changes in maintenance and operating expenses, as well as overall vacancy rates and the projected cost of living.<sup>75</sup> State law allows owners to further increase rents during vacancy, and to pass on the costs of improvements made to an individual apartment (known as Individual Apartment Improvements or IAIs),<sup>76</sup> or to the building as a whole (known as Major Capital Improvements or MCIs).

70 N.Y. Unconsol. Law § 26-501 (McKinney) (declaring a public emergency due to the “acute shortage of dwellings which creates a special hardship to persons and families occupying rental housing . . .”); *id.* § 26-502 (declaring a serious public emergency continues to exist and can be expected to extend until at least 2015).

71 *Id.* § 26-512(b).

72 Rent controlled apartments become rent stabilized upon vacancy. Rent control is increasingly uncommon, as it only applies to tenants who have occupied their unit continuously since July 1, 1971, in housing completed prior to 1947. *See id.* § 26-403(e)(2)(h). Rent controlled apartments are subject to a maximum base rent, computed every two years on the basis of an owner’s projected operating costs and other factors defined by the statute. *Id.* § 26-405(b).

73 N.Y. Comp. Codes R. & Regs. tit. 9, § 2500.9(m)(5).

74 N.Y. Unconsol. Law §§ 26-501 to 26-520.

75 N.Y. Unconsol. Law § 26-510(b).

76 N.Y. Comp. Codes R. & Regs. tit. 9, § 2522.4(a)(1) (defining IAI as “a substantial increase . . . of dwelling space or an increase in services, or installation of new equipment or improvements, or new furniture or furnishings . . .”). Owners may increase the rent by 2.5 percent of the actual costs. *Id.* § 2522.4(a).



After making a qualified building-wide repair or improvement, the owner can apply to the state Division of Housing and Community Renewal (DHCR) for an MCI increase, raising the rents of all the rent stabilized apartments in the building.<sup>77</sup> To qualify as an MCI, the work performed must be deemed depreciable by the IRS; be for the operation, preservation, and maintenance of the structure; be an improvement to the building that inures to all tenants; and meet the requirements set forth in the useful life schedule of the Rent Stabilization Code, unless the owner obtains a waiver from DHCR.<sup>78</sup> While the Rent Stabilization Code lists a number of improvements that qualify as MCIs, it also contains a catch-all provision stating that “other improvements or installations that are not included may also qualify.”<sup>79</sup> The enumerated list covers many of the kinds of long-term resilience retrofits that buildings might undertake.<sup>80</sup>

The rent increases resulting from MCIs are a primary tool that owners of rent stabilized buildings have to fund capital improvements. Thus, ensuring that they permit the range of work necessary to protect buildings for long-term resilience is critical. However, it is important to note that MCIs also function to increase rents permanently.<sup>81</sup> So while MCIs are a critically important tool for landlords, they are also a threat to the affordability of rent stabilized units in the floodplain.

<sup>77</sup> *Id.* § 2522.4.

<sup>78</sup> *Id.* § 2522.4(a)(2)(i).

<sup>79</sup> *Id.* § 2522.4(a)(3).

<sup>80</sup> Relevant items on the list include: creation of a new boiler room; improvements to courtyards, driveways, and walkways; elevator upgrades; improvements to windows and doors; pointing and water-proofing; resurfacing of exterior walls; rewiring and repiping; roof replacement or cap; replacement of structural steel; new installation of a water tank. *Id.*

<sup>81</sup> *Id.* § 2522.4(a)(4).

Expensive retrofits in particular may lead to apartments exiting the rent stabilization program entirely.<sup>82</sup> Even when work is done with a low-interest loan or subsidy, it can still serve as the basis for an MCI.<sup>83</sup> Some government subsidy programs explicitly prohibit owners from applying for MCIs for the work done with government support, like the Article 8A Loan Program<sup>84</sup> and, according to HPD, Build it Back. If other subsidy programs are crafted for resilience work in the coming years, policymakers should similarly limit the ability of owners to apply for MCIs with work funded through government subsidies. That said, this might discourage owners of rent stabilized units from participating. There is no easy answer to this problem, but the threat to the affordability of these units is an important factor for policymakers to consider as they make decisions about how to support and provide incentives for resilience projects going forward.

## b. Evictions

New York has detailed rules governing when landlords may evict tenants from rent stabilized buildings. As long as a tenant is paying rent, the law prohibits a landlord from evicting a tenant or failing to renew a lease except in a few situations enumerated in state law.<sup>85</sup> If a landlord in a floodplain sought to evict a tenant in order to demolish a unit to implement a resilience measure (like wet floodproofing or creation of a new building

<sup>82</sup> Apartments may exit the rent stabilization system either on the basis of “high-rent/vacancy” or “high rent/ high income.” High rent/vacancy decontrol allows an owner to remove a vacant unit from rent stabilization if the monthly legal rent exceeds \$2,500 per month, including any vacancy allowance, MCI or IAI increases to reach the \$2,500 threshold. High rent/high income decontrol allows an owner to petition for the deregulation of an occupied unit if the monthly legal rent exceeds \$2,500 and the total tenant income exceeds \$250,000 per year for two consecutive years. N.Y. Unconsol. Law § 26-504.3.

<sup>83</sup> The statute itself prohibits landlords from applying for MCIs for work funded by government grants. N.Y. Comp. Codes R. & Regs. tit. 9, § 2522.4(a)(10).

<sup>84</sup> New York City Department of Housing Development and Preservation. *Article 8A Loan Program Term Sheet*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/Article-8A-Term-Sheet-Final.pdf>

<sup>85</sup> N.Y. Comp. Codes R. & Regs. tit. 9, § 2524.1



systems room), she would need to seek approval from the state agency that oversees rent stabilization, DHCR. DHCR has the authority to grant applications for eviction in certain specified situations, including where a landlord seeks to withdraw a unit from the rental market or when a landlord wants to demolish a building.<sup>86</sup> However, even if a landlord were able to satisfy the requirements for either of these exceptions to the no-eviction rule, the landlord would still be required to assist the evicted household in obtaining new housing.

## 2. Threat: Complex Rules Governing Subsidized Stock

339 of the buildings, with nearly 33,000 units, in the new 100-year floodplain are government subsidized, privately owned affordable rental housing. These buildings often have complicated regulatory rules imposed on them by virtue of their subsidy program, which may limit the ability of the building to raise money for resilience work, and, in some cases, the ability of the building to undertake certain retrofits. To the extent that the subsidy program rules pose additional hurdles, they make these already vulnerable buildings even more vulnerable.

Here we focus on the rules governing buildings funded through the Low Income Housing Tax Credit (LIHTC), Project-based Section 8, and the Mitchell-Lama program because these programs govern 13 percent of the rental units in the New York City 100-year floodplain.

The **Low Income Housing Tax Credit** program is a federal tax incentive program designed to encourage private investment in affordable housing development.<sup>87</sup> Affordable housing developers are awarded tax credits that they typically sell to investors to raise equity for their development projects.<sup>88</sup> Instead of receiving a traditional return for their investment, investors receive a credit against their federal tax liability for a 10-year period, as long as the property remains in compliance with the LIHTC program rules during a 15-year compliance period.<sup>89</sup>

In New York City, developers may obtain four percent tax credits, which cover 30 percent of the construction of low-income units,<sup>90</sup> automatically when financed through tax-exempt bonds issued by the city's Housing Development Corporation (HDC) or the state's Housing Finance Agency.<sup>91</sup> In order to obtain the more valuable nine percent tax credits, covering 70 percent of unit construction costs,<sup>92</sup> developers apply to HPD

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87 U.S. Department of Housing and Urban Development. *LIHTC Basics*. Retrieved from [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/affordablehousing/training/web/lihtc/basics](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/training/web/lihtc/basics)

88 U.S. Department of Housing and Urban Development. *How Do Housing Tax Credits Work?* Retrieved from [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/affordablehousing/training/web/lihtc/basics/work](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/training/web/lihtc/basics/work)

89 New York City Department of Housing Preservation and Development. (2008, November). *Low Income Housing Tax Credit Program Compliance Manual* (pp. 40-41). Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/HPD-LIHTC-Compliance-Manual.pdf>

90 Novogradac Affordable Housing Resource Center. *About the LIHTC*. Retrieved from [http://www.novoco.com/low\\_income\\_housing/resources/program\\_summary.php](http://www.novoco.com/low_income_housing/resources/program_summary.php)

91 New York State Homes & Community Renewal. *Stand-Alone As of Right LIHTCs*. Retrieved from <http://www.nyscr.org/Topics/Developers/LowIncome/Stand-AloneAsOfRightLIHTCs.htm>

92 Novogradac Affordable Housing Resource Center. *About the LIHTC*. Retrieved from [http://www.novoco.com/low\\_income\\_housing/resources/program\\_summary.php](http://www.novoco.com/low_income_housing/resources/program_summary.php)

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86 N.Y. Comp. Codes R. & Regs. tit. 9, § 2524.5(1) & (2).



or the state through a competitive bidding process to obtain an allocation of tax credits.<sup>93</sup> The amount of the allocation awarded to a developer is based on detailed information submitted to the agency about the building’s finances, including operation and maintenance projections and other financing sources, and other criteria.<sup>94</sup>

For the 15-year LIHTC compliance period, the building is governed by complex regulations and closely monitored. Any change to the building’s finances—including the assumption of additional debt or the receipt of a government loan or grant—may disrupt the tax credit allocation in ways that have consequences for the building, such as triggering penalties or repayment of the tax credits to the IRS (known as “recapture”). Because of this risk, LIHTC buildings in the compliance period will need to have any influx of money reviewed by the project partnership, which adds a layer of complexity and uncertainty to the process of funding resilience measures.

LIHTC buildings will also face a unique problem implementing retrofits that result in the loss of rental units, like the wet floodproofing discussed in the case studies or the relocation of building mechanical systems to a higher floor. Of course, many rental buildings would struggle with these options because the loss of rental income would disrupt their budget for building operations and possibly the cash flow projections upon which their financing is based. And, New York’s rent stabilization rules, discussed above, and the rules of many subsidy programs will likely make displacing tenants unfeasible. In LIHTC buildings, however, there is an added wrinkle: the tax benefits that the buildings receive are directly linked to

the affordable units in the LIHTC property. If the building loses a unit because it pursues a retrofit method that requires it to sacrifice units, some of the tax credits may be subject to IRS recapture.

During the 15-year compliance period, LIHTC buildings face unique challenges in addressing long-term resilience needs. While they may be surmountable, we highlight them because they represent challenges unique to affordable multifamily buildings that may impede the ability of these buildings to address their resilience needs. Building operators and policymakers should be aware of these constraints so that they can strategically structure capital plans and any new government assistance programs to try to provide relief where possible to this vulnerable stock.

The other most common subsidy sources in New York City’s 100-year floodplain (just as in the city more widely) are Project-Based Section 8 (12,936 units) and Mitchell-Lama Rentals (11,443 units). Neither of these programs poses the same challenge to implementing resilience retrofits as do the LIHTC rules during the compliance period.

**Project-Based Section 8** is a federal program administered by the U.S. Department of Housing and Urban Development. It does not place any limits on a building’s ability to obtain additional financing or grants. However, if a building operator wanted to remove a unit covered under her program contract, she would need to obtain approval from the U.S. Department of Housing and Urban Development, the counterparty to the contract.

Developments in the **Mitchell-Lama** program have low-interest mortgages held by either the state (New York State Homes and Community Renewal (HCR)) or the city (HDC or HPD). While they remain in the program, the buildings are supervised by either HPD or HCR, depending on whether the city or the state was the source of the

93 New York City Department of Housing Preservation and Development. (2008, November). *Low Income Housing Tax Credit Program Compliance Manual* (pp. 19). Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/HPD-LIHTC-Compliance-Manual.pdf>

94 New York City Department of Housing Preservation and Development. *Application for Low-Income Housing Tax Credits*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/Tax-credit-application.pdf>

original financing.<sup>95</sup> If the owner of a Mitchell-Lama development wished to obtain additional debt on the property, she would need to obtain the permission of its supervising agency and senior lender. Similarly, the development would need agency and senior lender approval if it wished to undertake resilience retrofits that resulted in the loss of residential units, or if it wished to increase rents to pay for resilience work.

Despite the challenges LIHTC buildings and, to a lesser extent, other subsidized buildings face in addressing resilience needs, these buildings have one significant advantage over non-subsidized buildings: access to city assistance programs aimed at ensuring their long-term health. The city has dedicated programs aimed at rehabilitating LIHTC buildings at the end of the compliance period, and Mitchell-Lama buildings. And, the city has a number of other programs that it uses to provide funding for repairs and capital improvements in subsidized buildings in exchange for extending their affordability requirement. In the next section, we will briefly discuss how these city programs, and others, provide an opportunity to help multifamily buildings prepare for long-term resilience.

### **3. Opportunity: Harnessing Existing Government Subsidies and Oversight of Multifamily Buildings**

There are a number of housing rehabilitation programs that can support capital improvements in multifamily buildings with low and moderate rent levels.<sup>96</sup> A summary of these programs can be found on page 50 of the Appendix. Some of these programs are targeted at a specified building stock, for example the Year 15 program that is only available to LIHTC buildings at year 15, the

HUD Multifamily Loan Program for Project-Based Section 8 buildings, and the Mitchell Lama Repair Program. Other programs, like the Article 8A Loan Program and the Participation Loan Program, are also available to unsubsidized multifamily buildings. The J51 tax benefit is a particularly important tool for multifamily buildings making capital improvements. While it is a state tax law, the city controls the list of work covered by the program and the value of the benefit for each type of work.

While the city's Sandy-response program for housing, Build it Back,<sup>97</sup> will help make many buildings in the floodplain more resilient, its limited resources and scope mean that many buildings at risk of future flooding will need to look for funding elsewhere. To help fill the gap, the city should review the scope of its other rehabilitation programs to ensure that they cover a sufficiently broad array of resilience-related improvements. And, just as critically, the city should also think about how to add resources to its rehabilitation programs to increase capacity in light of the enormous need. In addition to adding more dollars, adding non-city funding sources may also help address one of the limitations that exists in some of the city's existing rehabilitation programs—restrictions on how city capital budget dollars can be spent, which is currently limited (in this context) to system-wide improvements. Resilience measures that involve replacement of portions of systems may be efficient and cost effective, but the city will have to look for creative ways to fund that work given the current restrictions in housing subsidy programs funded through the city's capital budget. However, programs that leverage other sources of funds, like the Participation Loan Program and HUD Multifamily Loan Program, provide more flexibility to fund a wider range of rehab work.

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<sup>95</sup> New York University Furman Center. Directory of New York City Affordable Housing Programs. Retrieved from <http://furmancenter.org/institute/directory/entry/mitchell-lama-housing-program>

<sup>96</sup> New York City Department of Housing Preservation & Development. *Building Rehabilitation Loans*. Retrieved from <http://www.nyc.gov/html/hpd/html/homeowners/loans.shtml>

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<sup>97</sup> The Build it Back Multifamily Repair Program provides evaporating loans to multifamily buildings for storm-related repairs or resilience measures. City of New York. *Build it Back Multi-Family Repair Program*. Retrieved from <http://www.nyc.gov/html/recovery/downloads/pdf/N23.pdf>



In addition to the provisions of specific programs, HPD has another set of rules that apply across many of its programs and have significant effect on the type of work that can be funded—the agency’s Standard Specifications. These standard specifications, which set a base level for the type and quality of work completed with HPD funds and through HPD contracts, do not currently impose resilience requirements for buildings in the floodplain, though they are in the process of being updated. The Standard Specifications provide HPD an opportunity to incorporate resilience measures into projects across its programs. Of course, buildings may then need assistance from HPD or other sources to fund that work.

Finally, another major tool that HPD has at its disposal is its ability to encourage building owners to engage in capital planning that includes long-term resilience needs. When HPD provides rehabilitation or preservation funding to buildings in the floodplain, it should consider imposing a requirement that the building complete a resilience checklist, analogous to the Enterprise Green Communities Certification that requires certain projects to demonstrate that they are addressing a range of sustainability and efficiency goals. An analogous resilience checklist might require buildings in the floodplain that receive HPD assistance to demonstrate that they have a building emergency protocol, a plan for getting the building back on line after an emergency, and a long-term capital plan that incorporates resilience measures.

#### **4. Opportunity: Combining Resilience Retrofits with Energy Efficiency Upgrades to Obtain Financing**

Another alternate funding source for building owners planning a retrofit are existing programs that provide subsidies for efficiency upgrades in multifamily buildings. As described in the case studies

above, many buildings located in the 100-year floodplain will need to replace and move critical electrical and mechanical equipment above the BFE. The replacement and relocation of this equipment represents an opportunity to realize an energy efficiency goal—for instance, reducing boiler size to achieve greater efficiency—while addressing the threat of flooding. It also provides buildings with the ability to tap into existing subsidy programs to fund a portion of the retrofit: the purchase and installation of new building equipment.

New York State already has in place some programs focused on improving energy efficiency, such as NYSERDA’s Green Jobs-Green NY vehicle, which provides energy efficiency financing for multifamily buildings. This program advances, directly to the lender, 50 percent of the principal borrowed at an interest rate of zero percent, effectively allowing lenders to charge half the market interest rate to building owners taking out loans for energy efficiency projects. Green Jobs—Green NY will contribute up to \$5,000 per unit or up to \$500,000 per project. Additional cash incentives are available if building enhancements result in energy usage savings of at least 15 percent annually.<sup>98</sup> NYSERDA also runs the Multifamily Performance Program (MPP), which offers cash incentives to owners of buildings that have at least five units and four or more stories to conduct an energy audit and upgrade equipment.<sup>99</sup> New York City building owners can also apply for energy upgrade financing through the New York City Energy Efficiency Corporation (NYCEEC), which was established by the City of New York to achieve the goals of the Bloomberg

<sup>98</sup> New York Energy Research and Development Authority. Green Jobs—Green New York. Retrieved from <http://www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Green-Jobs-Green-New-York.aspx>

<sup>99</sup> New York Energy Research and Development Authority. *Multifamily Performance Program*. Retrieved from <http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Program.aspx>

Administration's PlaNYC to lever private investment in energy upgrades.<sup>100</sup> NYCEEC provides advice as well as direct loans to buildings larger than 50,000 square feet, although smaller multifamily buildings (5-75 units) may be eligible for different incentives through a partnership with Con Edison.<sup>101</sup> NYCEEC has also partnered with the NYC Housing Development Corporation on a low-interest loan program available to affordable multifamily buildings that participate in an HDC or HPD program.<sup>102</sup> Buildings that serve low-income individuals additionally could pursue refinancing through HUD's Green Refinance Plus program, which specifically targets LIHTC properties.<sup>103</sup>

There are, however, some major considerations for building owners interested in pursuing such a strategy to combine an energy efficiency upgrade with a resilience retrofit. First, because many of these programs function as incentives for private loans, they require building owners to have private lenders in place or who are willing to offer

financing in conjunction with these programs. Second, many programs require the calculation of a savings to investment ratio in order to qualify for the incentive. In some cases, due to economies of scale, gains realized with an energy efficiency upgrade are more easily achieved by larger buildings, or by owner-manager organizations that pool such investments in a multi-building, portfolio-based approach, rather than small, individual buildings. Third, owners of smaller buildings may find that the labor required to navigate and execute multi-party contracts involved in programs such as those offered by NYSERDA is a disincentive to participation. Changes to the program to make it easier and more accessible to smaller property owners would require modifications of current regulations. Last, the kind of large scale energy retrofits supported by these incentives are more likely to take place when ownership of a building changes hands, or at points in the lifecycle of a building where energy audits are conducted for the purpose of a sale. For these reasons, combining energy efficiency upgrading with a retrofit may not be possible for smaller, owner-occupied multifamily buildings, or for individual buildings that are not part of a larger portfolio, especially those without a current mortgage lender.

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100 City of New York. NYC Energy Efficiency Corporation. Retrieved from <http://www.nyc.gov/html/gbee/html/incentives/nyceec.shtml>

101 City of New York. NYC Energy Efficiency Corporation. Retrieved from <http://www.nyceec.com>

102 New York City Housing Development Corporation. Retrieved from <http://www.nychdc.com/program-for-energy-retrofit-loans/>

103 US Department of Housing and Urban Development. (May 31, 2011). Green Refinance Plus Program. Retrieved from [http://portal.hud.gov/hudportal/HUD?src=/press/press\\_releases\\_media\\_advisories/2011/HUDNo.11-106](http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2011/HUDNo.11-106)



## 6. Conclusion

In New York City there are nearly 60,000 buildings in the preliminary 100-year flood insurance map that is expected to go into effect in 2016. If sea levels continue to rise, and storms become more severe, many more buildings may be added to the 100-year floodplain in future revisions. Over 1,500 buildings in the preliminary 100-year floodplain, with over 90,000 units, are public housing, subsidized housing, or rent stabilized housing. Many more of them are unregulated buildings that house low- and moderate-income households with limited ability to pay more in rent. Often with very limited ability to raise rents, these buildings will have a particularly hard time implementing resilience measures to protect themselves from future storms, but if they do not take protective measures they will likely face dramatically rising insurance premiums and, more distressingly, potentially unsafe conditions. The catch-22 that this critical, and large, building stock faces is untenable.

The Retrofit Solutions Workshop that the Furman Center, AIANY, and Enterprise Community Partners convened in January 2014 was a valuable forum for exploring these challenges in detail. The analysis by the interdisciplinary group of experts on actual buildings shed new light on some of the key design, regulatory, and financial hurdles multifamily buildings with restricted rents must face. While there are no easy answers, the results of the Workshop and our subsequent analysis suggest there are a number of measures policymakers should consider to make it possible for buildings to afford to prepare for future climate threats.

- The city should continue to push FEMA to create guidelines for multifamily buildings and offer insurance premium rate reductions for partial mitigation measures that substantially reduce risk.
- The city should consider expanding some of the zoning accommodations it made for buildings in the 100-year floodplain to other areas at risk of flooding, so that zoning does not prevent building owners in those areas from investing in resilience improvements.
- The city should review its existing housing rehabilitation subsidy programs to ensure that resilience measures are fundable through those programs. And, when HPD works with buildings in the 100-year and 500-year floodplains, it should require them to have a long-term capital plan that reflects emergency and resilience planning.

The housing stock in New York City and other dense, coastal cities faces challenges that differ significantly from those facing the single-family homes that have most often suffered the brunt of natural disasters. But, in coming years, New York City will have to adapt to the growing risks it faces because of climate change; and FEMA rules will hopefully come to better reflect the risk and needs of multifamily buildings. In the meantime, however, local policymakers and building owners will need to think creatively about how to ensure that vulnerable multifamily buildings do not get left behind.



NYU Furman Center's Retrofit Solutions Workshop

# Appendix

## NYU Furman Retrofit Solutions Workshop Attendees

*The organizations listed were provided by the participants at the time of the Workshop.*

### Team for 445 Baltic Street

**Andrew Acevedo**, Lothrop Associates

**Venesa Alicea**, Dattner Architects

**Michael Brusic**, Bright Power, Inc.

**Fiona Cousins**, ARUP

**Don Friedman**, Old Structures Engineering

**Jonathan Marvel**, Marvel Architects

**Carl Mister**, ARUP

**Abdul Tabbara**, ME Engineers

**Vrunda Vaghela**, NYU Furman Center

**Donna Walcavage**, Stantec

### Team for 334 East 8th Street

**Ed Bosco**, ME Engineers

**Nicole Halsey**, COOKFOX Architects

**James Hannah**, Bright Power, Inc.

**David Levine**, Dattner Architects

**Christopher Marino**, VDA

**Sam Peng**, Lower East Side People's Mutual Housing Association, Inc.

**Layng Pew**, WXY Architecture + Urban Design

**Cristian Vimer**, Madsen Engineering

**Cea Weaver**, NYU Furman Center

**Claire Weisz**, WXY Architecture + Urban Design

**Adam Yarinsky**, Architecture Research Office (ARO)

### Team for 3601 Surf Avenue

**Rosemary Fraser**, JASA

**Debroah Gans**, Gans Studio

**Justin Halsey**, Dattner Architects

**Ali Levine**, NYU Furman Center

**Donald Manning**, JASA

**Andrew McNamara**, Bright Power, Inc.

**Joseph Tortorella**, Robert Silman Associates

**Jessica Wang**, New York City Department of Design and Construction

**Lee Weintraub**, Lee Weintraub Landscape Architecture LLC

**Steve Zirinsky**, American Institute of Architects

### Expert Consultants:

**Joseph Ackroyd**, New York City Department of Buildings

**Lance Jay Brown**, Lance Jay Brown Architecture + Urban Design

**Eugenia Di Girolamo**, New York City Department of City Planning

**John Gearrity**, New York City Department of Housing Preservation and Development

**Mark Ginsberg**, Curtis and Ginsberg Architects LLP

**Cathal Gleeson**, Steven Winters Associates

**Jennifer Goldsmith**, Federal Emergency Management Agency (FEMA)

**Erick Gregory**, New York City Department of City Planning

**Louise Harpman**, Specht Harpman Architecture

**Dakota Hendon**, New York City Department of City Planning

**Christopher Holme**, New York City Department of City Planning



**Tom Miller**, Federal Emergency Management Agency (FEMA)

**Deborah Morris**, New York City Department of Housing Preservation and Development

**Thaddeus Pawlowski**, New York City Department of City Planning

**Nancy Pochensky**, Federal Emergency Management Agency (FEMA)

**Lindsay Robbins**, New York State Energy Research and Development Authority

**Glenny Rodriguez**, Federal Emergency Management Agency (FEMA)

**Pinky Samat**, New York City Housing Development Corporation

**Laurie Schoeman**, Enterprise Community Partners, Inc.

**Crystal Tramunti**, Federal Emergency Management Agency (FEMA)

**Ron Walker**, New York City Department of Housing Preservation and Development

**Adam Watson**, L+M Development Partners Inc.

**James Zemlicka**, Federal Emergency Management Agency (FEMA)

## **Furman Center**

**Vicki Been\***

**Kevin Findlan**

**Shannon Moriarty**

**Sarah Stefanski**

**Max Weselcouch**

**Mark Willis**

**Jessica Yager**

*\* Vicki Been's involvement with this project ceased once her appointment as Commissioner of the New York City Department of Housing Preservation and Development was announced.*



## **Project Sponsor**

*The Furman Center would like to acknowledge the NYC Housing and Neighborhood Recovery Donors Collaborative for its generous support of this project. The contents of this report are solely the responsibility of the authors and do not necessarily represent the official views of the Donors Collaborative.*

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**New York Community Trust**

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**Rockefeller Brothers Fund**

**Rockefeller Foundation**

**Toyota Foundation**



**COST ESTIMATE:  
Case Study #1/ 445 Baltic Street**

RETROFIT	RELOCATION OF BUILDING SYSTEMS
DESCRIPTION	Boiler Room
	Deferred maintenance and reinforcement of roof
	Cellar Infill
	Generator and additional hookups
	Safety Railing at parapet
	Reinforced fireproof vaults 3hr. at 100sq/800cf
	Sewage backwater valve
	Ejector/sump pumps
	New elevated enclosure
	Relocation and elevation of building equipment
	Communication cabling/central alert system
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$435,000</b>

RETROFIT	DRY FLOODPROOFING
DESCRIPTION	Disconnection and reinstallation of building systems
	Repointing
	HDPE membrane
	Reinforced concrete flood slabs
	Reinforced concrete walls
	Marine hatch
	Backflow preventer
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$450,000</b>

**COST ESTIMATE:  
Case Study #2/334 East 8th Street**

RETROFIT	RELOCATION OF BUILDING SYSTEMS
DESCRIPTION	Boiler Room
	Deferred maintenance and reinforcement of roof
	Cellar Infill
	Generator and additional hookups
	Safety Railing at parapet
	Demolition of elevator
	Installation of new elevator
	Extension of stair to access roof
	Reinforced fireproof vaults 3hr. at 100sq/800cf
	Sewage backwater valve
	Ejector/sump pumps
	New enclosure
	Relocation and elevation of building equipment
	Communication cabling/central alert system
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$1,260,000</b>

RETROFIT	WET FLOODPROOFING
DESCRIPTION	Fill in cellar; allow for crawl space
	Structural reinforcement
	Flood vents
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$1,350,000</b>

RETROFIT	DRY FLOODPROOFING
DESCRIPTION	Disconnection and reinstallation of building systems
	Repointing
	HDPE membrane
	Reinforced concrete flood slabs
	Reinforced concrete walls
	Marine hatch
	Backflow preventer
	Contingencies and overhead
<b>TOTAL COST</b>	<b>2,000,000</b>

**COST ESTIMATE:**  
**Case Study # 3/3601 Surf Avenue**

<b>RETROFIT</b>	<b>RELOCATION</b>
DESCRIPTION	Demolition of residential units
	Reconstruction of walls
	Structural reinforcement of floor
	Boiler Room
	Generator and additional hookups
	Reinforced fireproof vaults 3hr. at 100sq/800cf
	Sewage backwater valve
	Ejector/sump pumps
	Communication cabling/central alert system
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$2,540,000</b>

<b>RETROFIT</b>	<b>REMOVABLE BARRIER</b>
DESCRIPTION	Removable barrier
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$100,000</b>

<b>RETROFIT</b>	<b>BUILT BARRIER</b>
DESCRIPTION	Site improvements
	New construction of raw space
	Contingencies and overhead
<b>TOTAL COST</b>	<b>\$800,000</b>



## Existing Rehabilitation Subsidies for Multifamily Housing in New York City

### **Article 8A Loan Program<sup>104</sup>**

HPD’s Article 8A Loan Program provides low-interest loans to multifamily buildings, including Mitchell Lama developments and certain HDFC co-ops, for replacement or repair of building systems and the removal of housing violations and hazardous conditions. The program provides loans of up to \$35,000 per residential unit. Buildings that receive an 8A loan enter into a regulatory agreement with a minimum term of 30 years that restricts rent levels, tenant income for new occupants, and prohibits vacancy and luxury decontrol and MCIs based on work completed with the 8A loan, among other terms.

### **Participation Loan Program<sup>105</sup>**

Like Article 8A, the Participation Loan Program (PLP) provides low-interest loans to rehabilitate multifamily housing. The PLP program has three different categories of maximum subsidy, determined by the average post-rehabilitation rents. The most a building can receive is \$90,000 per unit, if average rents are affordable to households earning less than 60% of the area median income (AMI). Participating owners enter into a regulatory agreement for a minimum of 30 years that restricts rent levels, tenant income for new occupants, requires that all units become subject to rent stabilization, and prohibits vacancy and luxury decontrol, among other terms. Because the PLP loan is generally part of a composite subsidy plan, property owners are able to complete more substantial rehabilitation work than under Article 8A.

104 New York City Department of Housing Preservation and Development. *Article 8A Loan Program Term Sheet*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/Article-8A-Term-Sheet-Final.pdf>.

105 New York City Department of Housing Preservation and Development. *Participation Loan Program Term Sheet*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/PLP-term-sheet.pdf>

### **LIHTC Portfolio Preservation (Year 15) Program<sup>106</sup>**

The Year 15 Program provides technical assistance to property owners of LIHTC projects that are nearing the end of their 15-year compliance period. Through the Year 15 Program, building owners work with asset managers and Sponsor/Technical Assistance Providers to complete a capital needs assessment. The program encourages extended affordability by addressing long-term financial and physical viability through modifications of existing mortgages and/or additional subsidies.<sup>107</sup> It can provide loans of up to \$15,000 per unit. Participating owners agree to extend their affordability period for the term of any additional mortgage provided or for an additional 15 years.

### **HUD Multifamily Loan Program<sup>108</sup>**

For HUD-assisted buildings, including those receiving HUD Section 8 subsidies, that have rehabilitation needs or that are considered “at risk” of converting to market rate housing, HPD’s HUD Multifamily Loan Program (HUD MLP) leverages public and private sector financing to rehabilitate privately owned, HUD-assisted rental housing. The program targets distressed multifamily buildings and offers loans at a one-percent interest rate. Private owners can receive up to \$35,000 per unit that receives HUD assistance. The program requires buildings to maintain affordable rents and extend the Section 8 contract to the maximum term. HUD Multifamily projects, like those in PLP, are generally funded through multiple funding sources, which provides property owners flexibility to address a range of rehabilitation needs.

106 New York City Department of Housing Preservation and Development. *LIHTC Portfolio Preservation (Year 15) Program Term Sheet*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/Term-Sheet.pdf>

107 New York University Furman Center. Directory of NYC Affordable Housing Programs. Retrieved from <http://bit.ly/iixwT2s>

108 New York City Department of Housing Preservation and Development. *HPD/HUD Multifamily Loan Program Term Sheet*. Retrieved from <http://www.nyc.gov/html/hpd/downloads/pdf/HPD-HUD-Multifamily-Loan-Program.pdf>

### **HDC Mitchell-Lama Repair Loan Program<sup>109</sup>**

New York City's Housing Development Corporation (HDC) operates a Repair Loan Program with the purpose of preserving aging Mitchell-Lama Stock and allowing owners to make necessary capital improvements on buildings in need of repair. For Mitchell-Lama buildings supervised by HPD, owners can secure repair loans for amounts between \$100,000 and \$10,000,000. In exchange, owners agree to extended affordability terms within the Mitchell-Lama program. While there is potential to include flood mitigation in the scope of work at the time of rehabilitation, all capital projects must be approved by HDC. The agency also expects owners to participate in the HDC refinancing program concurrently.

### **New York State Homes and Community Renewal's Mitchell-Lama Rehabilitation and Preservation Program<sup>110</sup>**

New York State also runs a program similar to HDC's but for state-financed Mitchell-Lama properties. The Mitchell-Lama Rehabilitation and Preservation Program provides low-cost loans for rehabilitation of state-financed Mitchell's Lama rental buildings. Loans are issued after a physical needs assessment has determined the scope of the rehabilitation needed. In exchange for the loan, borrowers enter into a regulatory agreement where they agree to keep agreed up on units affordable for a specified length of time.

### **J-51**

The J-51 tax benefit program offers as-of-right tax abatements and exemptions to owners who make substantial retrofits to multifamily housing.<sup>111</sup> The tax abatement reduces existing taxes by a percentage of the cost of the work performed for up to 20 years, and the tax exemption freezes the assessed value of the property at the pre-construction level for up to 34 years.<sup>112</sup> Annual tax abatements are equal to 8.33 percent of the "certified reasonable cost" of the capital improvement,<sup>113</sup> as determined by the Itemized Cost Breakdown Schedule promulgated by the city's Housing and Preservation Department.<sup>114</sup>

As a condition of the tax benefits, all units in the building enter the rent stabilization program,<sup>115</sup> and owners cannot apply to deregulate the units until the benefits have expired.<sup>116</sup> Under the rent stabilization rules, owners can apply for a rent increase on the basis of the same capital improvements that form the basis of J-51 tax benefits, but the increase will be reduced by half of the value of the tax abatement.<sup>117</sup> Once the J-51 tax benefits expire, the owner may begin collecting the full amount of the monthly rent adjustment under the rent stabilization rules based on the capital improvements.<sup>118</sup>

109 New York City Housing Development Corporation. *HDC Mitchell-Lama Repair Loan Program Term Sheet*. Retrieved from [https://www.nychdc.com/content/pdf/Developers/ml.repair.loan\\_term\\_sheet\\_2008.pdf](https://www.nychdc.com/content/pdf/Developers/ml.repair.loan_term_sheet_2008.pdf)

110 New York State Homes and Community Renewal. *New York State Homes and Community Renewal's Mitchell-Lama Rehabilitation and Preservation Program Term Sheet*. Retrieved from [http://www.nyshcr.org/assets/documents/final\\_mitchell\\_lama\\_program\\_term\\_sheet\\_.pdf](http://www.nyshcr.org/assets/documents/final_mitchell_lama_program_term_sheet_.pdf)

111 N.Y. Real Prop. Tax Law § 489(1)(a)(5) (McKinney).

112 *Id.* §§ 489(2)(a)(1), 489(1)(a)(6).

113 *Id.*

114 Title 28 RCNY § 5-08.

115 N.Y. Comp. Codes R. & Regs. tit. 9, § 2500.9(m).

116 *Roberts v. Tishman Speyer Props., L.P.*, 918 N.E.2d 900 (N.Y. 2009) (interpreting N.Y. Comp. Codes R. & Regs. tit. 9, § 2500.9(m)).

117 New York State Homes and Community Renewal. *Fact Sheet No. 24: Major Capital Improvements (MCI)—Questions and Answers*. Retrieved from <http://www.nyshcr.org/Rent/factsheets/orafac24.htm>. *72A Realty Associates. v. State of N.Y. Div. of Hous. & Comty. Renewal*, 749 N.Y.S.2d 13 (2002) (slip op.) (discussing the reduction of MCI increases by a portion of the J-51 abatement underlying the same improvements).

118 N.Y.C., N.Y. Code tit. 28, § 11-243(dd). New York City Department of Housing Preservation and Development. *J-51 Guidebook*. Retrieved from <http://home2.nyc.gov/pdf/j51-gb-2004.pdf>



## Table and Figure Methodology

All of the building classifications used in this report rely on the New York City Department of City Planning’s PLUTO data sets containing information on New York City’s properties. We layered on a number of additional datasets to gain a more nuanced understanding of both the physical and financial characteristics of buildings. Throughout the tables, we classify buildings according to the following rules. Unless otherwise noted, we counted all buildings on a property if a property contained multiple buildings, and all residential units as recorded in PLUTO.

**1-4 Family Homes**—Any property with a building class code for one-family dwellings (A), a two-family dwellings (B), or a walk-up or elevator apartment buildings (C or D, except cooperative building class codes C6, C8, D0, and D4) with three or four residential units. We assumed that each property contained one building that may need to be retrofit. Some properties also contain free-standing parking garages or sheds, but these are generally not required to be retrofit to comply with FEMA guidelines.

**Attached, Semi-Attached, Detached** are defined by the proximity code in the PLUTO data.

**Condominium**—Any property classified by the Department of City Planning as a condominium. Some condominium buildings contain both residential and non-residential space.

**Mitchell-Lama Co-op**—A cooperative building that is currently participating in the city or state’s Mitchell-Lama co-op program, as identified by the NYU Furman Center’s Subsidized Housing Information Project (SHIP).

**Market-Rate Co-op**—Any property classified by the Department of City Planning as a co-op (building class codes C6, C8, D0 or D4) and not in the Mitchell-Lama co-op program.

**New York City Housing Authority (NYCHA)**—Buildings owned and operated by the New York City Housing Authority.

**Other Rental Subsidies (SHIP)**—These classifications come from the NYU Furman Center’s Subsidized Housing Information Project (SHIP) Database, and reflect the number of buildings with residential units subsidized by at least one of four types of programs: HUD financing or insurance, HUD Project-Based Rental Assistance, the Low-Income Housing Tax Credit (LIHTC), or the Mitchell-Lama Rental program. These are the four largest subsidy programs used in New York City and all require means testing of residents. The city and state administer some other programs that are not explicitly captured in the SHIP Database because they do not require means testing (e.g. LAMP, 8A, PLP). Those units are generally subject to rent stabilization and are counted as such in this report.

**Rent Stabilized**—A list of buildings with rent stabilized units was provided by the New York City Rent Guidelines Board. These buildings contain at least one rent stabilized unit, though some units in the buildings may have been deregulated. Properties that have both rent-stabilized units and other rental subsidies are counted in the “Other Rental Subsidies” category (e.g., Mitchell-Lama rental buildings built before 1974 or any subsidized property with a 421a or J51 tax incentive).

**Market-Rate Multifamily Rental**—Any walk-up or elevator apartment building with five or more residential units and no commercial or office space that is not a condo or co-op; regulated by NYCHA; subsidized by one of the four categories of rental subsidies described above; or rent-stabilized.

**Mixed Use, Market-Rate Rental**—Any building with at least one residential unit and at least one non-residential unit that is not a condo or co-op; regulated by NYCHA; subsidized by one of the four categories of rental subsidies described above; or rent-stabilized.

**Commercial/Other**—Any building without any residential units.

**Surge Area, Effective and Preliminary Floodplains**—To categorize properties as being within Sandy’s surge area or the effective or preliminary floodplains, we used geographic information systems software to overlay PLUTO with maps of the 100-year and 500-year floodplains. Buildings are considered to be in the 100-year floodplain if any part of the building is in the floodplain. However, PLUTO only provides geographic information about property boundaries, which may extend beyond the footprint of any buildings on a property. FEMA’s Flood Insurance Rate Maps do not follow property boundaries or even street lines. For properties that straddled multiple flood zones, we estimated which flood zone would be used for flood insurance purposes in the following way. If more than 10 percent of the property’s land area was in the 100-year floodplain, we assigned it to the 100-year floodplain. If less than 10 percent of the property’s land area was in the 100-year floodplain, but more than 10 percent was in the 500-year floodplain, we assigned it to the 500-year floodplain. If less than less than 10 percent of the land area was in either the 100-year or 500-year floodplain, but more than 10 percent of the area was in one of the two floodplains combined, we assigned it to the floodplain with greater coverage. If properties contain multiple buildings, all buildings were categorized in the same floodplain.

Base maps in figures (e.g., borough boundaries, parcels, and streets) are provided by the New York City Department of City Planning’s Bytes of the Big Apple program.

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