

Resilient Neighborhoods

WEST CHELSEA



GALLERY HENOCH

FIRE
DEPARTMENT
CONNECTION

This study was funded through the *U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant Disaster Recovery Program (CDBG-DR)*, as part of the *New York City Department of City Planning's Resilient Neighborhoods Initiative*.

West 25th Street, West Chelsea

Resilient Neighborhoods

West Chelsea

THE CITY OF NEW YORK
MAYOR BILL DE BLASIO

DEPARTMENT OF CITY PLANNING
CARL WEISBROD, DIRECTOR

MAY 2016
www.nyc.gov/resilientneighborhoods

FOREWORD

West Chelsea is a dynamic, mixed-use neighborhood along the Hudson River in Manhattan. The neighborhood is one of the city's most prominent cultural destinations, a growing office district, and is equally a vibrant residential community. It is a neighborhood where historic lofts meet cutting-edge architecture, where street-level galleries meet an elevated park and where a daytime population of office workers, shoppers, and tourists meets a nighttime culture of restaurants and bars. As experienced during Hurricane Sandy, West Chelsea's vitality is threatened by its vulnerability to flooding. To remain strong, West Chelsea must fortify its building stock and implement other measures of protection while maintaining the engaging streets and cultural destinations that distinguish the neighborhood.

Hurricane Sandy starkly demonstrated the hazards facing New York City's coastal neighborhoods, like West Chelsea. The storm also highlighted these communities' resiliency — their ability to bounce back from the storm and to strengthen themselves for the next one.

Since the storm, the Department of City Planning (DCP) has been working on both the citywide and local level with communities and other agency partners to increase the resiliency of all five boroughs' coastal neighborhoods. Our work includes a citywide flood resiliency zoning text amendment that changes zoning in the floodplain to make it easier and more cost-effective for property owners to retrofit their buildings, and guidelines, such as *Retrofitting Buildings for Flood Risk* and *Urban Waterfront Adaptive Strategies*, that help designers, planners, and residents plan for and adapt to the risks of flooding.

As a complement to these citywide efforts, DCP has been working with various communities in all five boroughs where there was particularly heavy damage from Sandy or substantial flood risks still exist. DCP's Resilient Neighborhoods, an initiative funded by the U.S. Department of Housing and Urban Development, focuses on areas that present specific land use, zoning and resiliency issues that cannot be fully addressed by citywide zoning changes or guidelines.

This report marks the culmination of over two years of research, outreach and hard work by DCP, working closely with the West Chelsea community to identify a set of tools that address resiliency challenges specific to the neighborhood's built fabric. Residents and businesses will find guidance on retrofitting strategies for West Chelsea's galleries and small businesses, and resources for properties located in historic districts.

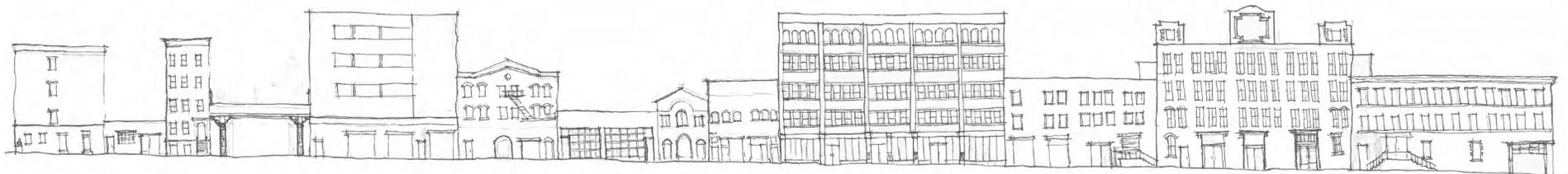
These recommendations illustrate the importance and effectiveness of strengthening New York City's resiliency through place-based planning, alongside the other city, state, and federal agency projects. This plan is the beginning of a conversation and a commitment to work with West Chelsea to ensure their ongoing vibrancy and resiliency.



Carl Weisbrod, Director
Department of City Planning

TABLE OF CONTENTS

Introduction	02
Resiliency Planning in New York City	04
Regulatory Framework	06
Planning Approach for Resiliency	08
Outreach Process	08
Community Risk Profile	10
Community Character and History	10
Flood Risk Profile	18
Building and Lot Typology Profile	20
Resiliency Framework	26
Framework Map	27
Case Studies	28
Zoning Analysis	38
Design Best Practices	39
Historic Districts	42
Gallery District	43
Conclusion	49
Glossary of Key Terms	50
Acknowledgements and Resources	52



INTRODUCTION

Hurricane Sandy's devastating impacts on neighborhoods within New York City served as a vivid reminder of the city's vulnerability to coastal storms and flooding. With climate change, storms like Sandy are expected to increase in frequency and severity in the future, putting New Yorkers living and working near the waterfront at even greater risk. Yet, as Sandy also demonstrated, resilient building design can significantly reduce the damage caused by flooding and enable homes and businesses to be reoccupied sooner. By combining resilient building with thoughtful land use planning and strategic investment in infrastructure, the city can adapt to challenging environmental conditions over time and create neighborhoods that are both vibrant under ordinary conditions and able to withstand and recover quickly from future floods.

Resilient Neighborhoods is a place-based planning initiative, led by the New York City Department of City Planning in collaboration with communities and other City agencies, to identify strategies to support the vitality and resiliency of ten neighborhoods in the city's floodplain. This study focused on a targeted review of zoning and retrofitting regulations as they apply to West Chelsea, and provides guidelines for adapting buildings while maintaining an engaging, resilient streetscape.

Reducing flood risk

Identify flood mitigation tools and urban design strategies that respond to West Chelsea's unique building stock and site conditions.

Planning for adaptation over time

Review underlying zoning and Special West Chelsea District regulations to ensure implementation of key resiliency measures, while maintaining an active and vibrant streetscape.

Creating resilient, vibrant neighborhoods

Support the continuing vitality of West Chelsea's creative community and reinforce the neighborhood's distinctive commercial character.

In addition, this report provides a detailed description of the outreach, research, and analysis conducted, as well as an overview of the planning framework and regulatory context for these efforts. A glossary of key terms is provided following the conclusion.

The recommendations outlined in this report include specific actions to be undertaken in the short-term, as well as broader strategies that can guide an ongoing response to evolving risks and changing conditions, to promote equity, livability, and safety.





Regulatory considerations: Special District or Landmarks designation require particular attention in identifying appropriate retrofitting strategies.

Ground floor commercial spaces such as art galleries, stores and restaurants are at risk from flooding and storm surge. These active pedestrian-level uses are essential in preserving West Chelsea's vibrant streetscape experience.

Resiliency Planning in New York City

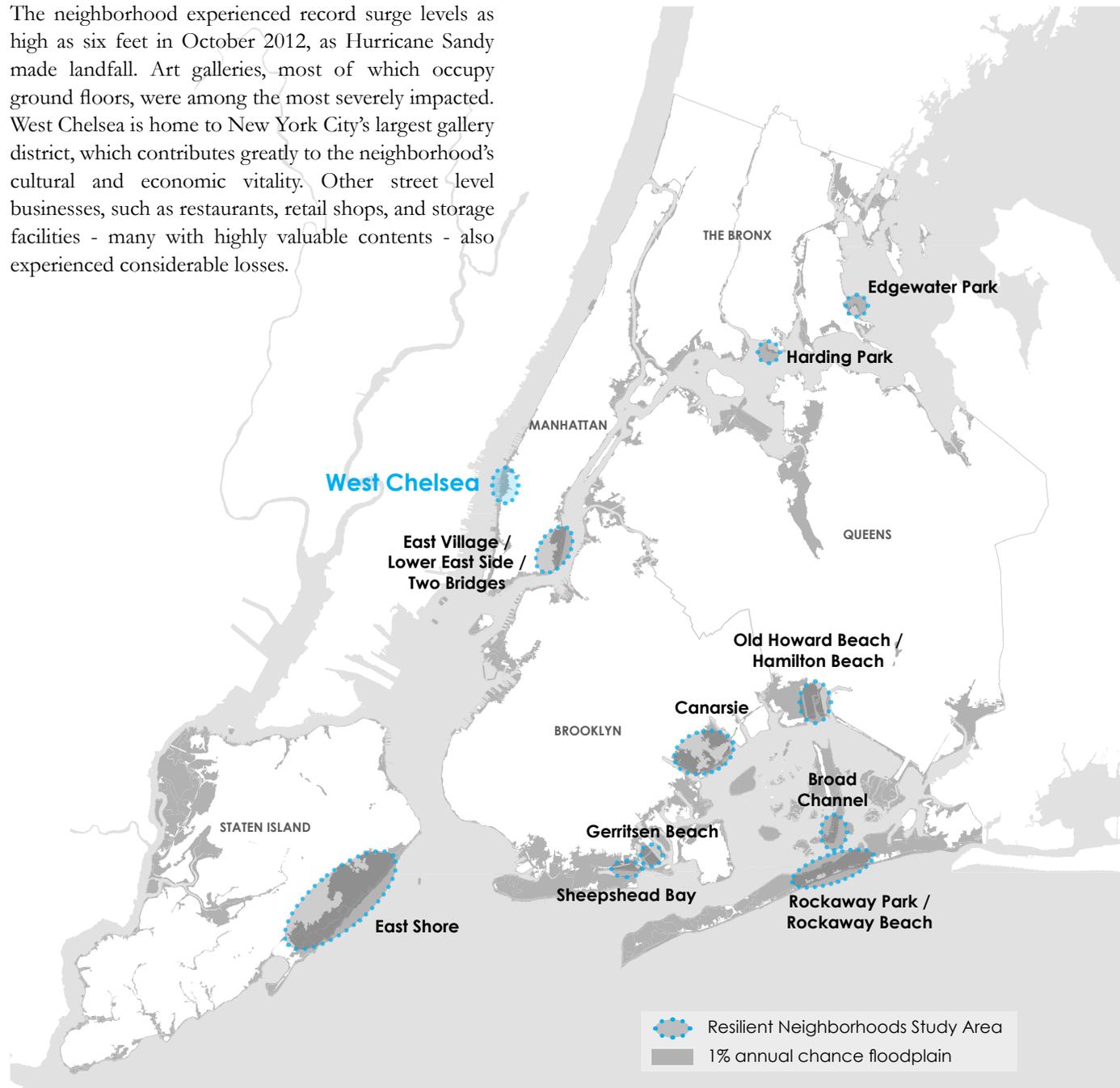
Following Hurricane Sandy in October 2012, the City developed *A Stronger, More Resilient New York*, which laid out a detailed action plan for rebuilding post-Sandy and making the city's coastal communities, buildings, and infrastructure more resilient in the long-term. The City has made significant progress implementing the plan, including funding a \$20 billion climate resiliency program, advancing housing recovery through the Build it Back program, and making long-term resiliency a reality by investing in infrastructure upgrades. Drawing on this work and earlier planning efforts, the City released in Spring 2015 *OneNYC: The Plan for a Strong and Just City*, a long-term strategy to address the city's most pressing challenges, including a rapidly growing population, rising inequality, aging infrastructure, and climate change.

Resilient Neighborhoods

One of the projects described in *OneNYC* is Resilient Neighborhoods, a place-based planning initiative to identify tailored strategies, including zoning and land use changes, to support the vitality and resiliency of communities in New York City's floodplain. Based on collaboration with residents, stakeholders, elected officials, and other City agencies, the initiative focuses on ten study areas located in all five boroughs that represent a variety of demographic and built conditions. The Department of City Planning (DCP) identified these study areas because they present specific land use, zoning, and other resiliency issues that cannot be fully addressed by citywide zoning changes.

West Chelsea, located along the Hudson River between West 14th and West 29th streets in Manhattan, was selected not only because it was severely impacted by Hurricane Sandy, but also because of the neighborhood's distinctive mix of land uses, in particular its concentration of arts and cultural uses, unique built character, and economic vitality.

The neighborhood experienced record surge levels as high as six feet in October 2012, as Hurricane Sandy made landfall. Art galleries, most of which occupy ground floors, were among the most severely impacted. West Chelsea is home to New York City's largest gallery district, which contributes greatly to the neighborhood's cultural and economic vitality. Other street level businesses, such as restaurants, retail shops, and storage facilities - many with highly valuable contents - also experienced considerable losses.



While the building stock in the study area did not experience significant structural damage, the electrical and mechanical systems of many mixed-use and residential buildings were rendered inoperable. As a result, residents were unable to return home for an extended period and businesses experienced a prolonged recovery process. The West Chelsea community remains vulnerable to future coastal storms and flooding, which will be further exacerbated by climate change.

The West Chelsea study is a product of collaboration between DCP, the Mayor's Office, and other City agencies, including the Mayor's Office of Recovery and Resiliency, the Landmarks Preservation Commission, New York City Departments of Buildings, Cultural Affairs, Emergency Management, and Small Business Services. Recommendations made through Resilient Neighborhoods also draw on previous work by DCP and other City agencies.



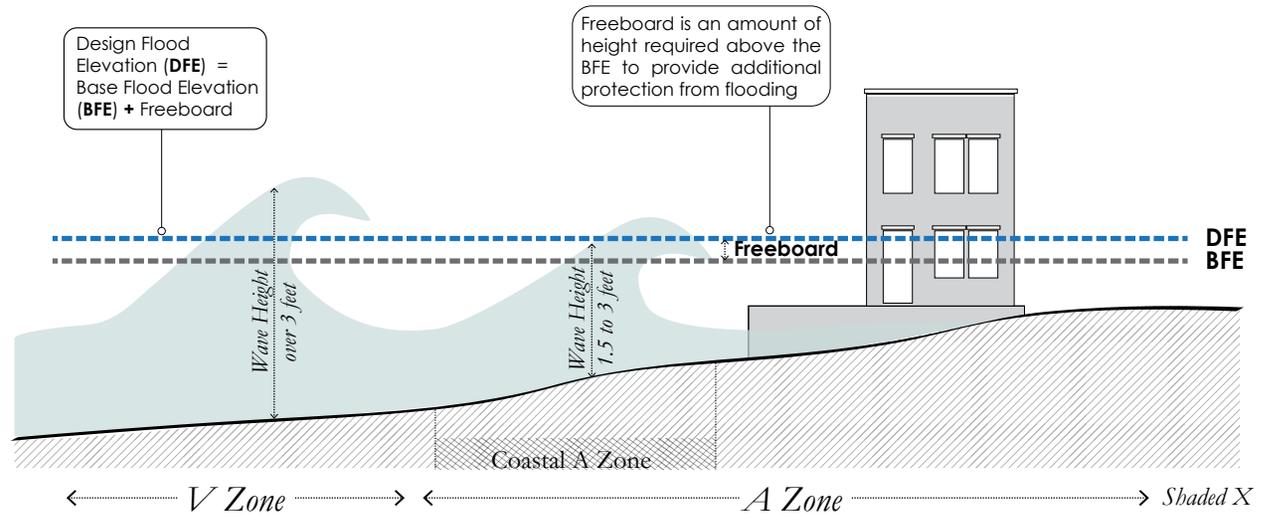
Regulatory Context

A wide array of programs and regulations at various levels of government shape the City's approach to managing flood risk and promoting resilient development. In the United States, floodplain regulation begins with Flood Insurance Rate Maps (FIRMs), which the Federal Emergency Management Agency (FEMA) creates and maintains. The maps show the extent and elevation to which flood waters are expected to rise during a 100-year flood or a flood that has a 1% chance of occurring in any given year. The elevation of the expected 1% annual chance flood is called the Base Flood Elevation or BFE. FIRMs also show the 500-year or 0.2% annual chance floodplain, which is shown as the Shaded X Zone.

The 1% annual chance floodplain is divided into three areas -- the V Zone, Coastal A Zone, and A Zone -- each associated with a different degree of flood risk. The diagram to the right illustrates these zones and the types of flood risk in each.

The 1% annual chance floodplain is also the area where property owners with federally-regulated or federally-insured mortgages are required to carry flood insurance. For residential structures, flood insurance premiums under FEMA's National Flood Insurance Program (NFIP) are determined by the relationship between the lowest occupied floor of the structure and the BFE shown on the FIRMs at the structure's location, as well as other factors. Homes built before the FIRMs were established have historically been offered subsidized insurance rates. However, due to recent federal legislative changes, those subsidized rates are gradually increasing to come in line over time with actuarial rates more closely reflecting the flood risk a home faces.

For the past several years, FEMA has been in the process of updating the FIRMs for New York City, which were implemented in 1983 and most recently updated in



	ELEVATE	WET FLOODPROOF	DRY FLOODPROOF
	Open structure Eg. Open lattice	Water to run in / run out Eg. Flood vents	Watertight structure Eg. Flood shields
Ground Floor Configuration	<p>Open Structure</p> <p><i>Bottom of lowest horizontal structural member to be at or above Design Flood Elevation</i></p>	<p>1 inch of net open area per 1 sq.ft of enclosed area</p> <p><i>Lowest occupiable floor to be at or above Design Flood Elevation</i></p>	<p>Flood shields prevent water from entering</p> <p><i>Lowest occupiable floor allowed to be excavated below grade. (Not permitted for residential buildings)</i></p>
Permitted Uses (BELOW DFE)	<input checked="" type="checkbox"/> Parking <input checked="" type="checkbox"/> Access <input checked="" type="checkbox"/> Storage <input checked="" type="checkbox"/> Non-Residential <input checked="" type="checkbox"/> Residential	<input checked="" type="checkbox"/> Parking <input checked="" type="checkbox"/> Access <input checked="" type="checkbox"/> Storage <input checked="" type="checkbox"/> Non-Residential <input checked="" type="checkbox"/> Residential	<input checked="" type="checkbox"/> Parking <input checked="" type="checkbox"/> Access <input checked="" type="checkbox"/> Storage <input checked="" type="checkbox"/> Non-Residential <input checked="" type="checkbox"/> Residential

2007. As part of the mapping update, FEMA issued updated Preliminary FIRMs (PFIRMs) in December 2013 with another revision in January 2015. In most places, these PFIRMs show an expanded 1% annual chance floodplain. The maps also heighten Base Flood Elevations for much of the city. The City has filed an appeal of the PFIRMs because they overstate the size of the city's 1% annual chance floodplain due to inaccuracies in FEMA's underlying analysis. The City is committed to resolving the appeal and adopting accurate flood maps as quickly as possible.

Flood Resilient Construction and Building Design

The primary purpose of the FIRMs is to establish parameters for NFIP, based on present-day flood risk. However, the same maps also establish where federal minimum standards for flood resistant construction apply. These standards are enacted through the New York City Building Code's Appendix G on "Flood-Resistant Construction," which as of 2013 applies to the 1% annual chance floodplain shown on FEMA's PFIRMs or the 2007 effective FIRMs, whichever of the two is more restrictive. Appendix G includes different elevation and floodproofing requirements for each flood zone, as well as separate requirements for residential and non-residential structures. Appendix G also includes rules requiring that most residential and commercial developments be floodproofed an additional one or two feet of "freeboard" above the FEMA-designated BFE. The elevation of the BFE plus freeboard is called the Design Flood Elevation (DFE).

To fully comply with Appendix G requirements, residential buildings must elevate all living space to be at or above the DFE, and any enclosed space below the DFE must be wet floodproofed. Non-residential buildings (any building that contains non-accessory non-residential floor area) have the option of elevating

and wet floodproofing, or dry floodproofing. Where there is a mix of residential and non-residential uses, dry floodproofing is allowed, but no dwelling units may be located below the DFE. Full compliance with Appendix G results in lower NFIP premiums.

Buildings that are neither new, "Substantially Damaged," nor "Substantially Improved" (see glossary) are not required to meet Appendix G requirements as long as any changes to the building do not increase the level of noncompliance, but owners may voluntarily choose to implement partial flood mitigation strategies including elevating or floodproofing a building's mechanical systems. These measures may not currently result in lower NFIP premiums, but will reduce a building's overall vulnerability to future floods and enable the building to be reoccupied more quickly in the aftermath of a flood.

Citywide Zoning for Flood Resiliency

The City has instituted a series of zoning changes that remove impediments to retrofitting residential and commercial properties and accommodate many of the aforementioned building regulations. The first of these changes was an emergency Executive Order, issued in January 2013, which suspended height and other restrictions to the extent necessary for property owners to rebuild after Sandy. The City Council adopted many of these changes as the Flood Resilience Zoning Text Amendment in October 2013. This text amendment created allowances for measuring building height from the latest FEMA flood elevations (including freeboard required by building code), providing access from grade to elevated buildings, locating mechanical systems above flood levels, accommodating off-street parking requirements, and allowing reallocation of floor space that is abandoned and wet floodproofed. It also incorporated provisions to mitigate adverse streetscape

impacts. The rules, still in effect, apply to all buildings in the PFIRM 1% annual chance floodplain.

The 2013 Flood Resilience Zoning Text Amendment was conducted as an emergency measure to facilitate ongoing rebuilding and retrofitting following Sandy, and included a sunset provision, so will expire a year after new flood maps are adopted by the City. DCP anticipates advancing another amendment that will make permanent the basic provisions set forth in the 2013 text, and potentially address resiliency challenges identified since then, to make it easier for property owners to make existing and new buildings resilient to current and future flood risks, while supporting the vibrancy and character of neighborhoods.

Regulatory Context Summary

- The Federal Emergency Management Agency (FEMA) creates Flood Insurance Rate Maps (FIRMs) that show the extent and elevation of the 1% and 0.2% annual chance floodplains.
- FEMA also administers the National Flood Insurance Program (NFIP).
- The New York City Building Code's Appendix G on Flood-Resistant Construction applies within the 1% annual chance floodplain.
- The Department of City Planning works to create zoning, which controls the size and use of buildings, to accommodate flood resilient building regulations and remove impediments to flood resilient construction.

RESILIENCY ASSESSMENT



The resiliency assessment evaluates coastal risks, the capacity of neighborhoods to adapt to these risks, and the potential to align adaptation options with other policy goals or community priorities. The objective is to determine which hazards and vulnerabilities are present within a neighborhood and evaluate the potential for adaptive strategies, such as retrofitting buildings or creating new coastal protection infrastructure, to reduce these vulnerabilities.

Ongoing community outreach

ESTABLISH RESILIENCY FRAMEWORK



The resiliency framework uses the results of the resiliency assessment to envision the range of changes necessary to make the neighborhood more resilient, which might include coastal protection, infrastructure investments, changes to regulations, and community education, among other strategies.

Ongoing community outreach

SELECT LOCAL RESILIENT LAND USE STRATEGIES



Across the city, there is a spectrum of potential land use strategies that can be used as appropriate to achieve the goals envisioned in the resiliency framework. In areas that are at significant risk from future frequent tidal flooding due to sea level rise, as well as more severe flooding from extreme events, it will often make sense to limit growth. In other areas where buildings are at risk of flood damage primarily from extreme events, there may be ways to alter regulations to promote retrofits. Where growth can be supported, increasing densities may promote investment in resilient buildings that will reduce risks of flood damage. More than one type of land use strategy may be appropriate in different parts of a neighborhood, based on flood risk and other planning considerations.

Ongoing community outreach

IMPLEMENT RESILIENCY STRATEGIES



Resiliency strategies can be implemented through a range of tools, including but not limited to zoning changes, changes to other City, State, or Federal regulations, operational measures, education and outreach, financial assistance, construction or upgrades of infrastructure, and emergency preparedness training. A combination of tools enacted at different scales and amongst different stakeholders is likely to be necessary to fully implement a set of resiliency strategies.

Planning Approach for Resiliency

The ten Resilient Neighborhoods study areas each exhibit a variety of physical, environmental, social, and economic conditions, the combination of which creates a distinct set of resiliency challenges, and different potential strategies for addressing them. To account for this diversity of contexts and to ensure that a consistent planning approach underpins the City's resilient land use goals, DCP developed a four-step process for coordinated analysis to guide risk-based decision-making. The diagram shown to the left explains this approach and the latter half of this report details the strategies and recommendations generated for West Chelsea using this process.

Outreach Process

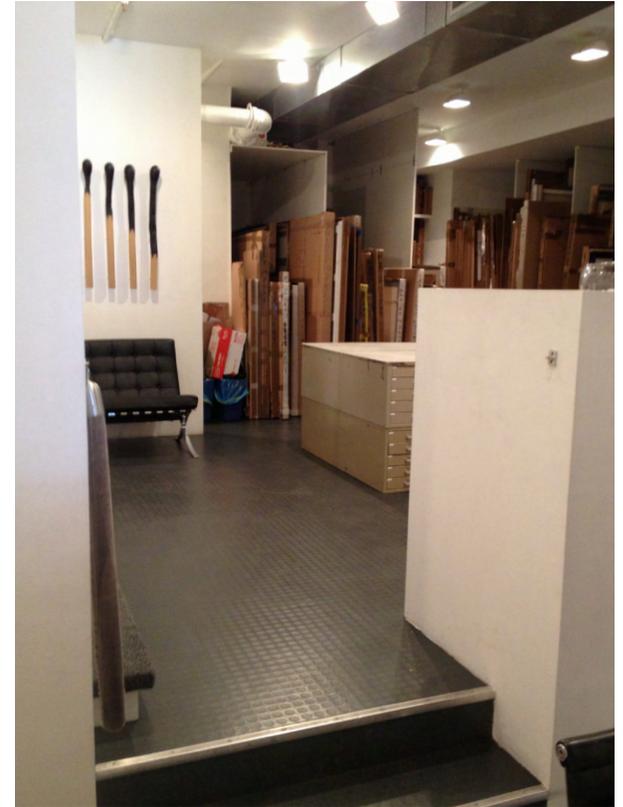
During the course of the Resilient Neighborhoods study, DCP has engaged Manhattan Community Board 4, local businesses, non-profit and for-profit industry professionals, elected officials, and sister agencies to plan for the long-term resiliency and vibrancy of West Chelsea.

The study launched in June 2014 when DCP presented goals for the Resilient Neighborhoods Initiative to the Community Board and Council Member. Staff met with members of the Landmarks Preservation Commission and the Department of Cultural Affairs to share objectives and begin to discuss how efforts could be synchronized.

That summer, DCP engaged in an extensive survey that included sixty galleries, retail stores and arts-related businesses in the neighborhood. The participants included forty-one galleries with ground floor locations, to obtain firsthand accounts of their experience, issues, and concerns, as well as nine upper floor galleries to understand locational advantages and disadvantages. The survey participants consisted of thirty-five renters

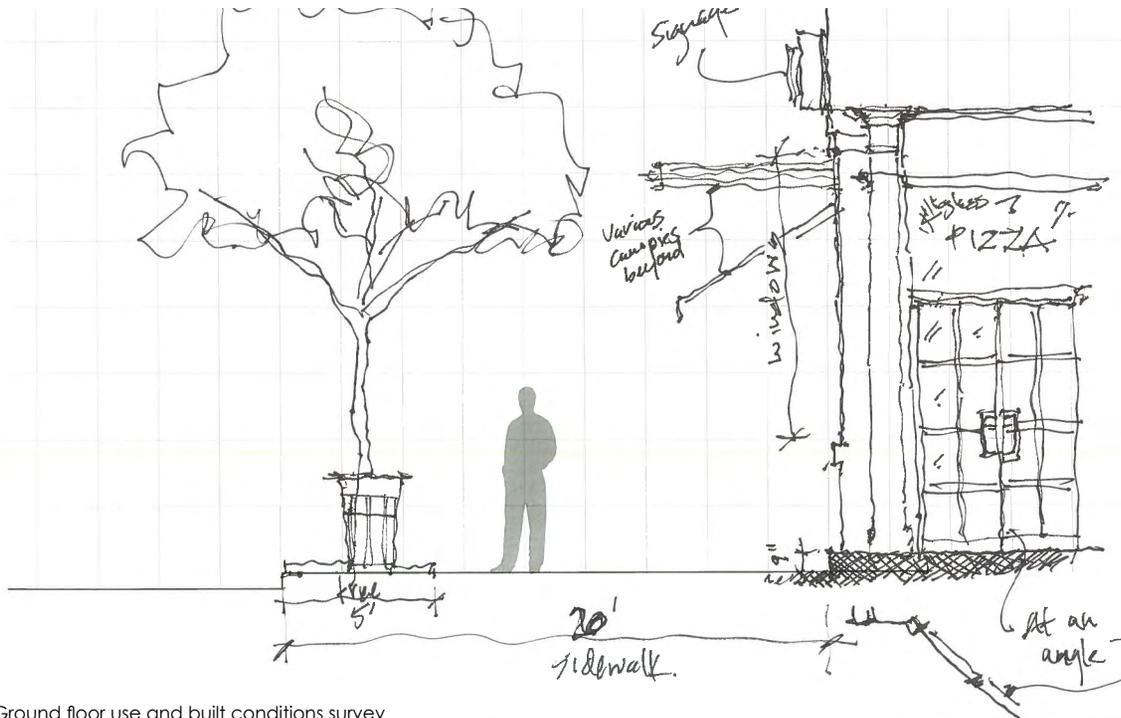


West Chelsea Gallery District



and four galleries that own their spaces. DCP also met with art industry and real estate specialists to better understand the specific operational needs of galleries.

With the results of the survey, a rigorous review of zoning requirements, consultation with staff at LPC and analysis of new construction building plans provided by the Department of Buildings, DCP developed an initial set of recommendations that were presented to the Community Board in October 2014. Following a receptive response to the research and findings, staff continued to formulate a resiliency framework for West Chelsea and an implementation strategy, described in detail in the forthcoming sections.



Ground floor use and built conditions survey

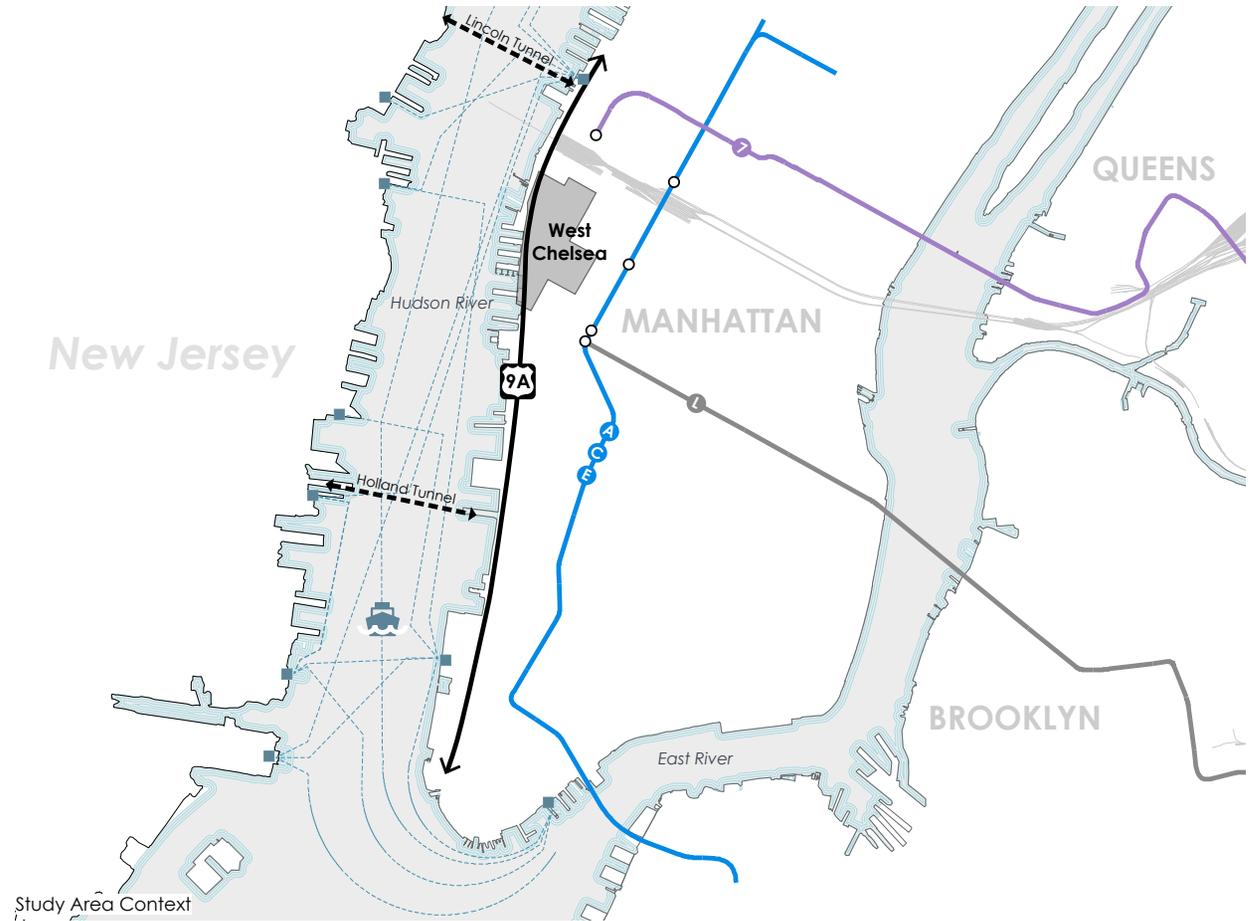
COMMUNITY RISK PROFILE

Community Character and History

The West Chelsea study area, informed by extent of the 1% annual chance floodplain as shown on the 2015 Preliminary FIRMs, is roughly bound by West 14th and West 29th Streets, and Tenth and Twelfth Avenues. Prevalent uses include an increasing number of commercial, residential and office properties, galleries and arts-related businesses, some warehouses, and large utility or infrastructure facilities. Some of the defining features are the High Line park, a segment of Hudson River Park, and Chelsea Piers.

Neighborhoods surrounding the study area are diverse. The Meatpacking District and Gansevoort are home to creative firms, high-end retail, event spaces, restaurants and nightlife establishments. East of Tenth Avenue is the neighborhood of Chelsea, with historic row houses, new condominiums, and residential towers. Immediately to the north of the study area is the high-density, mixed-use Hudson Yards development.

The West Chelsea study area comprises a wide range of building typologies – from low-rise art galleries to lofts, warehouses and critical infrastructure facilities that occupy full city blocks, to the more recent residential and commercial developments designed by world-famous architects. New and old buildings flank the High Line, sharing a unique relationship with the very successful public open space that draws nearly five million visitors annually. By Manhattan standards, portions of the neighborhood are fairly low-rise, with almost a quarter of buildings having less than two stories and many others no higher than six stories. Many segments of the study area are beginning to be developed with taller, primarily residential buildings consistent with the zoning regulations. Commercial uses account for approximately seventy-six percent of building floor area. Sixty percent of the study area is mapped within manufacturing zoning districts. Tenth Avenue and West 23rd Street are dominated by active ground floor retail uses.



West Chelsea is well-connected by public transit with several bus lines, the Eighth Avenue subway line, and the 7 line extension at West 34th Street, Hudson Yards. It is also in close proximity to ferry stops on Piers 79 and 45 to the north and south of the study area, respectively. The area is home to over 5,500 residents in 4,400 housing units.

West Chelsea has a rich and varied history that dates back to the 1800s, when factories and ancillary facilities were located in close proximity to worker housing. The far west side was newly-reclaimed filled land adjoining

rail yards, most desirable for manufacturing uses. To the east was Clement Clarke Moore's residential estate of Chelsea. Beginning in the nineteenth century, the area flourished as a center for freight-handling and production with metal works factories, lumber yards, and distilleries. The area experienced a second wave of development in the early twentieth century, and West Chelsea soon had a large concentration of factories and loft structures. The elevated freight rail line, the High Line, connected directly to factories and warehouses. The Chelsea Piers served as a passenger ship terminal handling trans-Atlantic liners.



Hudson River

West 14th Street

CHelsea PIERS

Route 9A

HUDSON RIVER PARK

Eleventh Avenue

THE HIGH LINE

West 18th Street

West 29th Street

Tenth Avenue

West 23rd Street

Ninth Avenue



West Chelsea Historic District | West 25th Street

With the decentralization of industry and decline in manufacturing, West Chelsea went into a period of transition during the second half of the twentieth century. The subsequent years saw automobile garages and nightclubs beginning to occupy former warehouses, followed by art galleries drawn to the well-lit, loft-style open floor spaces. However, the area continued to be dominated by underused buildings and parking lots. The neighborhood's evolving nature and distinct built character provided impetus for the City to revisit underlying regulations and establish mechanisms to encourage new development, restoration, and growth that reinforce the area's strengths and energy.

Special West Chelsea District

In 2005, the Department of City Planning led a rezoning of a portion of West Chelsea and the Special West Chelsea District (SWCD) was established. The rezoning aimed to encourage a diverse mix of land uses, carefully direct new development, facilitate reuse of the High Line as a public park, and support the neighborhood's thriving gallery district. West Chelsea has since seen a dramatic transformation and continues to evolve as one of Manhattan's most multifaceted, dynamic neighborhoods.

The SWCD permits residential and commercial uses primarily along Tenth and Eleventh avenues. The M1-5 manufacturing district, which permits commercial and light manufacturing uses and encourages loft-type envelopes, was retained in the midblocks as a means to reinforce the growth of arts-related uses. Within these zones, between West 20th and West 22nd streets and between West 24th and West 27th Streets, museums and non-commercial galleries are permitted as-of-right.

The SWCD comprises ten subareas with special bulk regulations that respond to the varied built conditions in the special district and immediate surroundings.

Regulations governing building height and setbacks bolster the area's built character and ensure that the massing of new construction is consistent with its context. Development sites with High Line adjacencies and Tenth Avenue frontages are subject to additional bulk controls which facilitate the reuse of the High Line as a public park by preserving views, light, and air.

Furthermore, the SWCD has streetscape regulations in place to maintain a high quality pedestrian experience. Transparency and use requirements for new developments along Tenth Avenue ensure visual connectivity and encourage active uses on ground floors. The street wall location requirements create strong, consistent street walls, characteristic of dense urban environments. These regulations shape the ground floors of buildings, and define the neighborhood block's edges. The *Zoning Analysis* section provides a detailed description of strategies that encourage a vibrant streetscape, while facilitating resilient retrofits.

LPC-Designated Historic Districts

The New York City Landmarks Preservation Commission designated the predominantly residential Chelsea Historic District in 1970, and the Chelsea Historic District Extension thereafter in 1981, with the goal of preserving the historical and architectural significance of the Greek-revival and Italianate style row houses (*see map on page 14*). Roughly bound by West 20th and West 23rd streets, between Eighth and Tenth avenues, the districts consist of over 250 one- to four-family homes. The streetscape is defined by a relative uniformity of building forms with planted yards and trees. Other prominent buildings within the district include the neo-Gothic style General Theological Seminary built in 1827. In 2008, The Landmarks Preservation Commission designated the West Chelsea Historic District, which includes portions of blocks from West 25th Street to West 28th Street on the west



Art gallery occupying a former-industrial building | West 25th Street

and east sides of Eleventh Avenue, where many former industrial buildings remain. They serve as a reminder of the area's rich industrial waterfront history.

Industrial architecture underwent engineering advances in the early twentieth century, with the introduction of concrete as a building material. Long-span structures with distinctive architectural detailing were constructed along the waterfront. Some had direct access for freight railway cars and trucks with large elevators that hoisted them up to higher floors, like in the Starrett-Lehigh building constructed in 1931 and made an individual landmark in 1986. Today, it is tenanted by several high-profile media and design firms. Terminal Stores, constructed in 1891, occupies an entire block stretching from West 27th Street to West 28th Street between Eleventh and Twelfth Avenues. Trains would travel through the massive round archway in the building's façade to access the warehouse complex. Today, it is also occupied by a wide range of offices, studios and galleries.

Gallery District

The arrival of art galleries in the 1980s transformed the landscape of West Chelsea. Densely packed with approximately 290 galleries, as seen in the map on the following page, the area is now home to New York City's largest arts district. Galleries and arts-related uses are primarily concentrated west of Tenth Avenue, between West 18th and West 27th streets. Just outside the study area are the new Whitney Museum of American Art, the Rubin Museum, performance spaces like The Joyce Theater and the Westbeth artist community.

West Chelsea galleries showcase a wide-ranging collection of works by world-renowned, as well as burgeoning, artists. The gallery district is strengthened by the presence of non-profit arts organizations like the Dia Foundation. The larger, established galleries own



Regulatory Districts and Gallery District

Gallery District

- Art Gallery
- Multiple Galleries
- Special West Chelsea District
- LPC -Designated Historic Districts
- Study Area Boundary

their properties or are subject to long-term leases, and serve as anchors for the district as a whole. In addition, there is a significant presence of small and mid-sized galleries throughout the district that contribute to the cultural and economic vitality of this unique West Chelsea resource.

The repurposed 20th century lofts and warehouses are now sought-after gallery spaces. Newer, mixed-use developments also accommodate gallery uses on ground floors. In the early 1980s, there were 5 galleries in West Chelsea. The number rose to approximately 300 in 2005-2006 after the rezoning, and has held relatively steady since, with 290 galleries today. Gallery counts are greater in the northern section of the gallery district, explained by the presence of more multi-gallery, mid-rise loft structures. The remainder of the share is located in the southern section of the gallery district, and roughly a third occupy space outside of the core gallery midblocks.

Arts-related businesses like fine-art storage facilities, art supplies stores, logistics providers and art-handlers tend to cluster in and around the gallery midblocks. Together, they constitute an arts ecosystem, supporting the day-to-day needs and continued vitality of West Chelsea's gallery community.

Hurricane Sandy severely impacted the gallery district, with galleries experiencing tremendous losses including water damage to artwork - often deemed unsalvageable - extensive damage to spaces and contents, loss of vital records and files, and business interruption. Following Sandy, many galleries changed their practices and day-to-day operations to account for flooding. A survey conducted in July 2014 with 54 galleries participating indicated that sixty percent of galleries have on-site and off-site storage, thirty percent have higher ground storage, and ten percent continue to use basement

storage. Two-thirds of the galleries felt landlords and building management were responsive in the aftermath of the storm, while others experienced difficulties during the repairs and reconstruction phase. All participating upper floor galleries indicated that they experienced business interruption, due to loss of power and failure of building systems, such as, passenger and freight elevators.

Recent Development Trends

Since 2005, when the SWCD was adopted, the study area's land use composition has changed markedly. Prior to the adoption of the SWCD, the neighborhood was dominated by industry, car repair, surface parking and storage. The last ten years have seen significant growth in retail, office space, and new residential construction. Overall, building area has increased by twenty-six percent. Through both new construction and conversion, residential floor area has doubled, and retail and office space has more than tripled, while garage and

storage area has either remained level or declined. In the past decade, residential floor area has increased from comprising roughly eighteen percent of total building area in the study area to approximately thirty percent of floor area today, consistent with the significant amount of new housing constructed since 2005.

There are currently nearly 4,400 residential units in the West Chelsea study area. Ninety-four percent of units are in buildings of more than four units and such buildings account for sixty-six percent of all residential buildings. With the exception of the row house buildings in the study area east of Tenth Avenue, the vast majority of residential buildings in the study area are mid- to high-rise apartment buildings with commercial uses and lobbies on ground floors, suggesting that while mechanical systems, basements and street-level commercial uses are vulnerable to flooding, most residential units in West Chelsea (within the 1% annual chance floodplain) are not at risk of direct flooding from storm surge. Eighty-

six percent of residential structures were built pre-FIRM (prior to 1983), and would likely need to undergo extensive upgrades in order to fully meet Appendix G requirements for substantial improvements.

The substantial amount of condominium development is reflected in the recent increase in homeownership. Sixty percent of current homeowners moved in since 2000, compared to forty-three percent of homeowners who moved in since 2000 across New York City. In total, one-third of residential units are owner-occupied, and forty-two percent of these have mortgages, compared to sixty-three percent of owner-occupants in the entire city.

Properties with federally-backed or insured mortgages are required to carry flood insurance if they are in the 1% annual chance floodplain shown on the 2007 FIRMs, the cost of which is based on the height of the lowest occupied floor relative to the BFE and the extent to which the property meets flood resistant construction standards.

Commercial floor area makes up roughly two-thirds of all built floor area in the study area. West Chelsea is home to a diverse grouping of businesses, which includes arts-related uses, restaurants, technology and new media firms, and creative services, among many others. The industries with the largest numbers of firms are retail, professional and technical services, arts and entertainment, information, and accommodation.

There has also been a considerable addition of office space, some in the SWCD M1-5 districts, and another concentration on the border with the Meatpacking District in the vicinity of West 14th Street. Businesses are attracted to West Chelsea's stock of former industrial loft buildings, as well as the many new office buildings, which offer light, flexible floor plates with good transit access. While most offices are located on upper floors,



Tenth Avenue and West 22nd Street



New Construction in West Chelsea

Development

- Residential
- Commercial
- Mixed - Use
- Under Construction
- Study Area Boundary

they are, just as most residential spaces, also impacted by failure of building systems resulting from flooding.

In the years leading up to 2016, West Chelsea has experienced an exceptional amount of new construction, as seen in the map to the left. In as many blocks, there are currently twelve residential or mixed commercial/residential buildings under construction, as well as two new office buildings. Among these, six sites are located within the 1% annual chance floodplain as shown on the 2015 PFIRMs, and are therefore required to build pursuant to Appendix G of the NYC Building Code. In seeking to address resiliency, this new development presents concrete case studies demonstrating how regulations are being implemented and what floodproofing methods are being used.

West Chelsea’s strong retail, restaurant and gallery establishments rely on street-level visibility and access, as well as below-grade storage, making their success and viability more directly contingent on effective floodproofing strategies, discussed in the forthcoming sections.

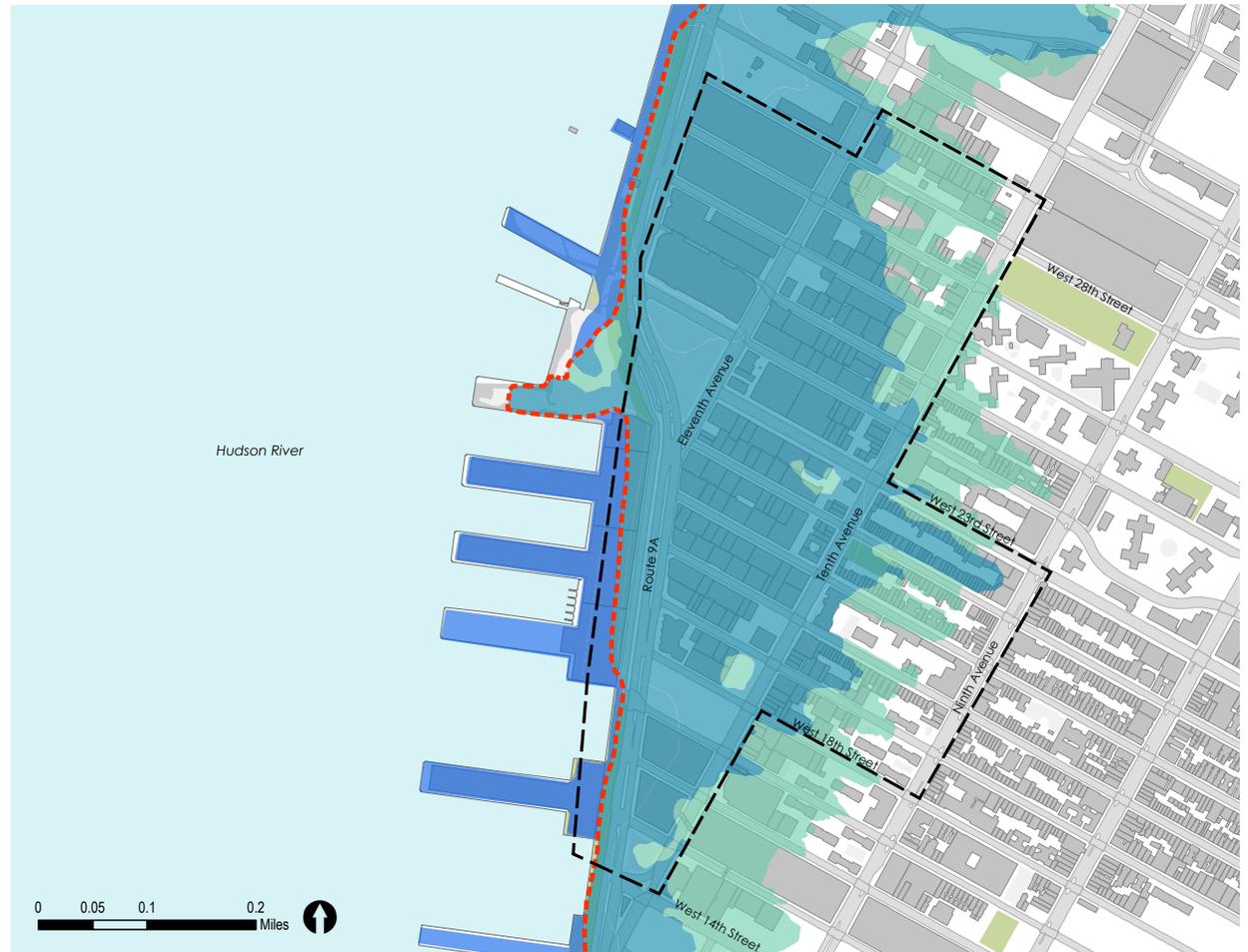


Flood Risk Profile

West Chelsea is significantly vulnerable to flooding from a 1% annual chance storm event as depicted on the 2015 PFIRMs. This is in large part due to the neighborhood's development on low-lying filled land. Grade changes across the study area contribute to varied levels of exposure to flooding. The westernmost blocks as well as the gallery district south of West 23rd Street experienced higher surge levels during Hurricane Sandy, consistent with the BFEs of four to six feet above grade as indicated in the map on page 19. Other areas tend to have relatively lower BFEs above grade, between two and four feet. However, with the prevalence of active ground floor uses, basements, and cellars, even structures with low BFEs face considerable challenges. While there are few instances of buildings in West Chelsea with ground floor residential use, units at this level of occupation could be lost due to required flood resistant construction standards.

Following Sandy, with the issuance of the PFIRMs in December 2013, the number of properties in the 1% annual chance floodplain in West Chelsea increased by fifty-five percent. The expanded floodplain includes approximately two-thirds of the SWCD comprising a wide range of building types and portions of the LPC-designated historic districts with contributing loft and row house buildings. With newer codes and construction standards in place to enable buildings to be more resilient, it is necessary to review how flood resilient construction requirements interact with existing zoning and LPC regulations to ensure that they facilitate resiliency and maintain quality design.

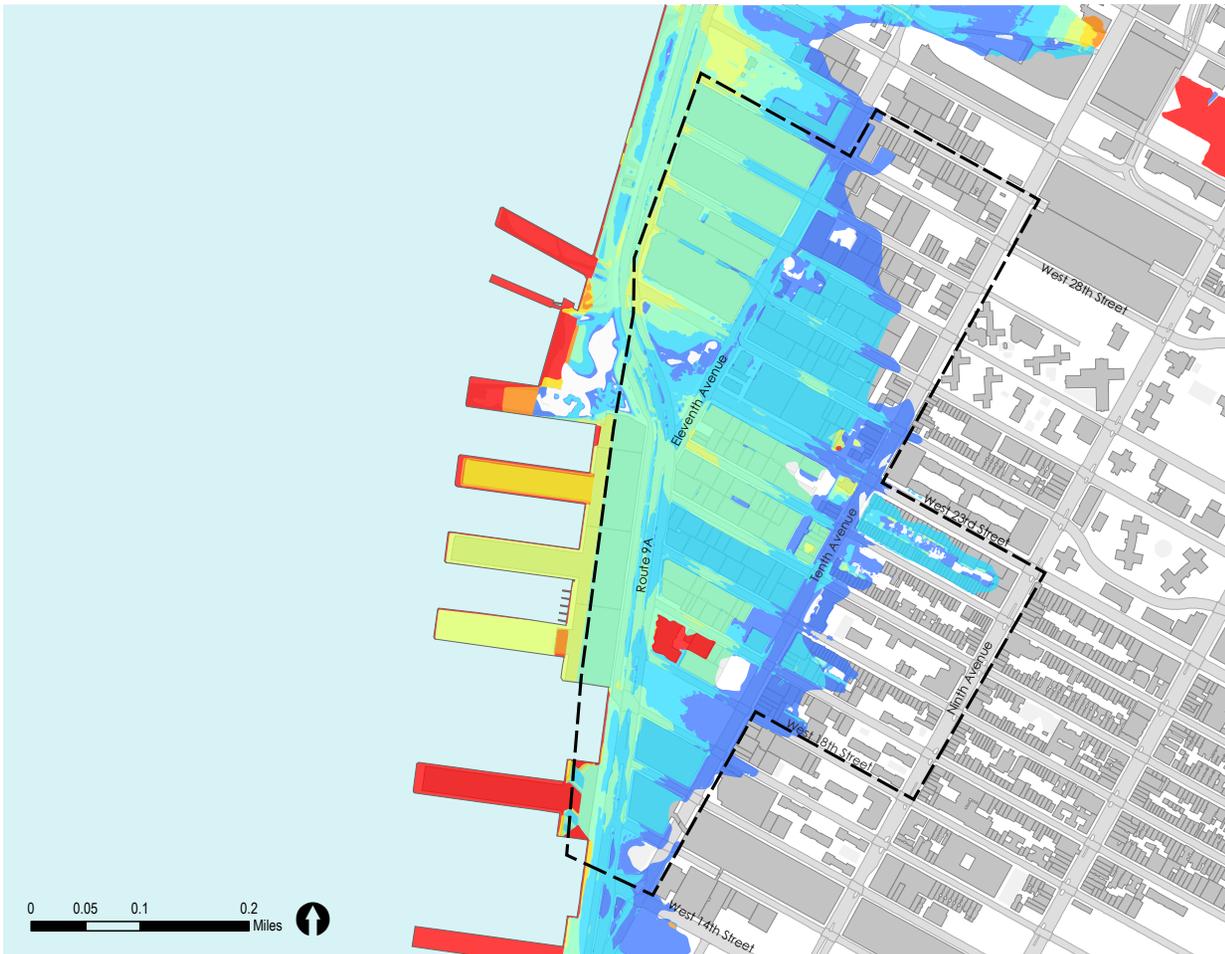
Future flood risk, based on sea-level rise projections, indicate that the floodplain could expand to include an additional 100 properties by 2080s due to sea level rise.



Extent of flooding based on 2015 FEMA Preliminary Flood Insurance Rate

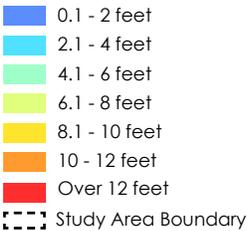
Preliminary FIRMs Flood Zones

- V Zone
- Coastal A Zone
- A Zone
- Shaded X Zone
- Limit of Moderate Wave Action
- Study Area Boundary



Base Flood Elevations Above Grade

Base Flood Elevations Above Grade_2015 PFIRMs



Flood Risk Summary

- West Chelsea, like many other areas in the floodplain, is **low-lying infill land that is vulnerable to coastal storm surge-related flooding**, which compromises the building stock, impairs ground-level businesses, disrupts the gallery community, and impacts local residents.
- The neighborhood's vulnerability will only become **more pronounced in the future** with sea level rise.
- Following FEMA's issuance of updated flood maps in December 2013, the **number of properties in the floodplain increased by 55%**.

Building and Lot Typology Profile

Lofts, Former-manufacturing Buildings

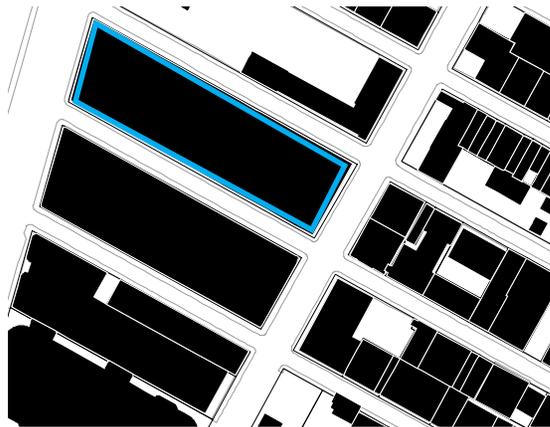
Lofts, former-manufacturing buildings, and warehouses constitute about a third of the building stock in the West Chelsea study area. These high lot-coverage buildings have open floor plates, large windows, and high ceilings ideal for current occupants: primarily art galleries, offices, and storage and logistics facilities. Originally built for manufacturing, freight-handling, and to house heavy equipment and machinery, these typologies have robust structural systems - masonry bearing walls with reinforced concrete or steel framing. As a result, they suffered no structural damage during Sandy and will not require significant structural reinforcement if dry floodproofed. However, they were impacted significantly by costly damage to critical systems and contents typically located in basements and cellars.

Low-lying areas, particularly the northwestern and southern portions of the study area saw surge levels over six feet. Businesses occupying the lower floors and ones that stored goods, art work, or merchandise below-grade were impacted severely. Raised first floors to accommodate loading docks are characteristic of former industrial typologies, which provided some buildings that are located at higher ground an intrinsic layer of protection. In these buildings, flooding was limited to below-grade spaces and first floors sustained minimal damage. Some properties that experienced higher surge levels or are located on lower ground experienced damage to loading dock level spaces as well.

Loss of power caused electrically operated security gates to fail. This made access to flooded spaces challenging. While tenants on the lower floors in some properties were able to recover relatively quickly when power was restored, those on the upper floors were inconvenienced for several weeks as repairs were being made to the elevators. Galleries which are, in particular, reliant on foot-traffic and elevators to transport art work saw a decline in business.



Terminal Stores, a former warehousing and freight-handling facility, located on Eleventh Avenue between West 27th and West 28th Streets



Lot Size

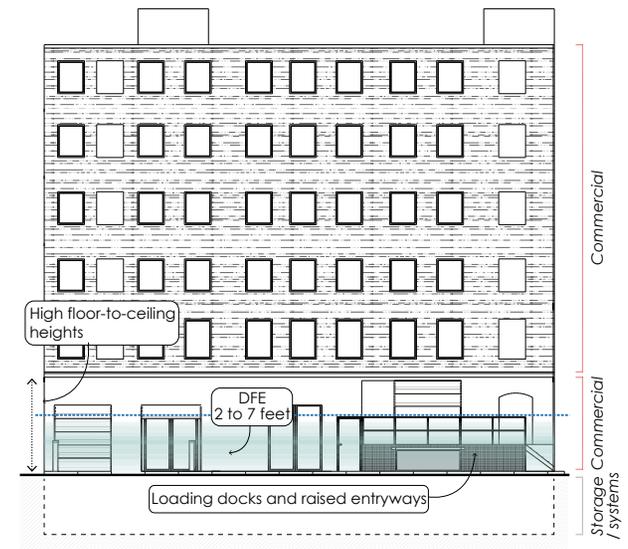
Standard width and depth.

Lot Coverage

High lot coverage. No front, side or rear yards.

Streets

Medium to wide. Sidewalk widths vary.





Art Gallery, West 22nd Street

Low Rise Galleries

In addition to large industrial facilities, a number of smaller buildings were constructed in the early twentieth century for production, warehousing operations, and storage. One- to two-story masonry structures with slab-on-grade foundations were built on reclaimed land replacing older workers' tenements. Large openings and double-height spaces were a functional necessity to facilitate seamless movement of materials and goods. When manufacturing in West Chelsea declined, such architectural features enabled easy conversion of these spaces into garages, auto-related uses and, subsequently, into arts spaces.

Art galleries experienced significant damage from flooding and loss of artwork. When the Hudson River breached its banks and surged through the streets of West Chelsea, only a few galleries were spared from extensive damage to their spaces. Many, including those that had taken precautionary measures, were impacted by the unprecedented surge levels.

Besides damage to artwork that was on-site, flooding gutted interior walls and finishes. Equipment to pump out flood waters was scarce following the storm, delaying access to the spaces and water-damaged artwork. In many cases, inventory was submitted for costly restoration or could not be salvaged. Computers and office equipment were destroyed and galleries lost digital archives, files, and data.

Building repairs were extensive and often costly, including, but not limited to, reconstruction of walls, replacement of electrical and mechanical systems, and measures to eliminate or prevent mold. Recovery was long and often arduous, made even more so by the complicated process of filing insurance claims.



Lot Size

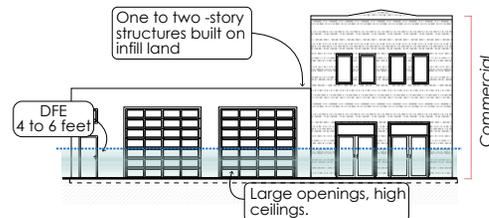
Lot sizes vary.
High lot coverage.

Lot Coverage

High lot coverage.
No front or side yards.
Narrow / no rear yards.

Streets

Medium to wide. Sidewalk widths vary.



Row Houses

The row houses in the Landmarks Preservation Commission-designated Chelsea Historic District experienced high levels of flooding, primarily due to topographical conditions. They are in a particularly low-lying part of the study area and are among the properties that were newly mapped into the 1% annual chance floodplain according to the PFIRMs.

Brick and brownstone facades with brownstone stoops, wrought iron railings, and planted front yards are some of the defining features of these Greek-revival and Italianate-style row houses, built in the 1800s. Buildings of this type are typically three to four stories with a walk-out basement unit. They are narrow, attached one-to-four family residential buildings (sixteen-to-eighteen feet in width) with load bearing party-walls, constructed using brick held in place with mortar. Floors and beams are made of wood joists that span from wall to wall. The houses have a sub-grade brick or brick-on-rubble foundations.

The first floor - the parlor floor - tends to have higher ceilings and a more open plan than the stories above, with ornate facade details and paneling. As the parlor floors are generally four to five feet above grade, they were typically protected from flooding during Sandy. Some walk-out basement units, however, were inundated. As the rear yards are lower than the street level, in many instances, flood waters accumulated there, creating a so-called “bathtub,” which required the use of pumps to remove the water.



Row Houses in the Chelsea Historic District Extension



Lot Size

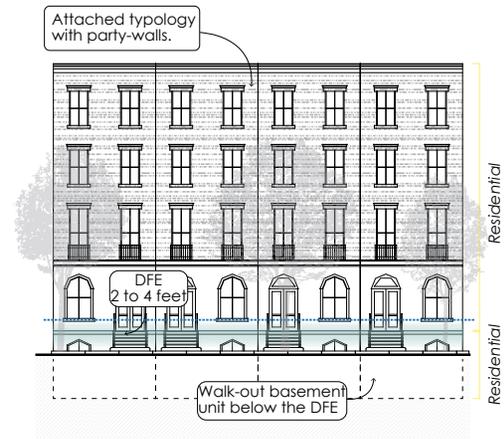
Narrow lot sizes,
16-18 ft. wide.

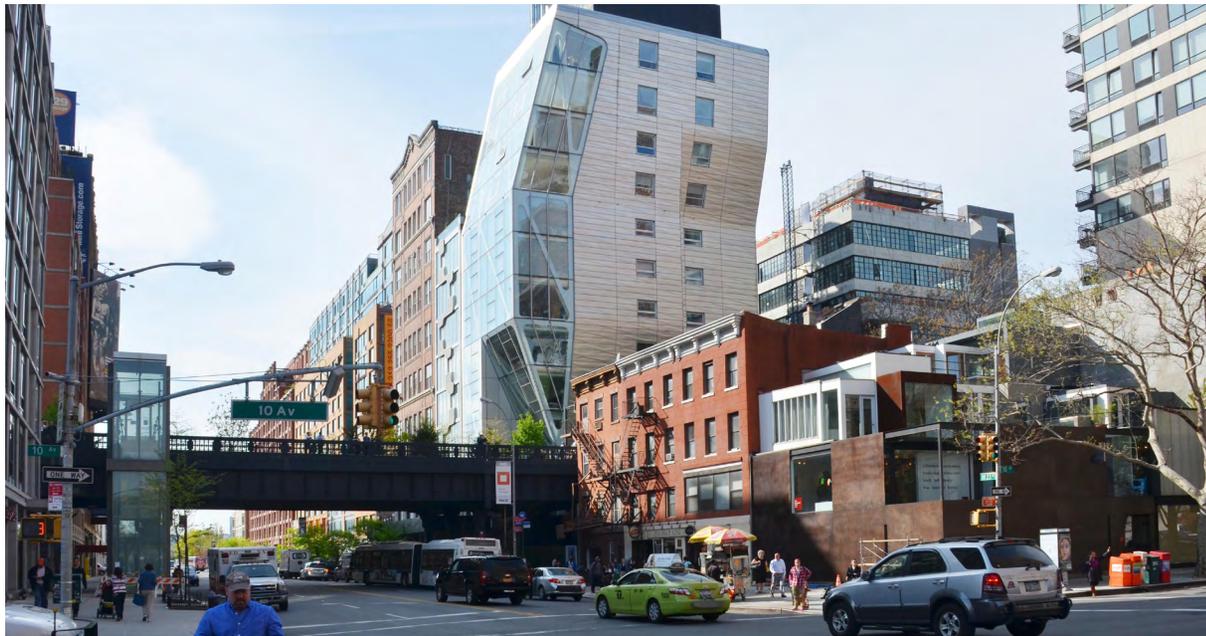
Lot Coverage

Standard lot
coverage with front
and rear yards.

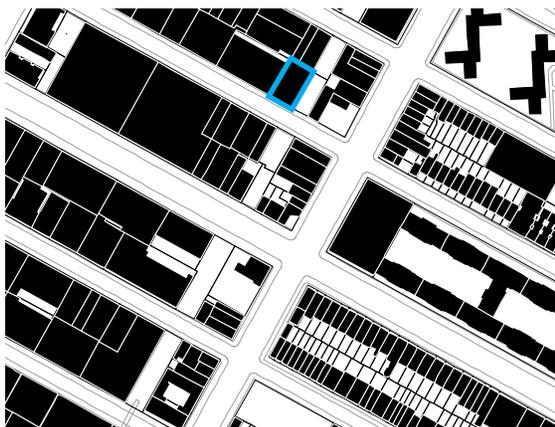
Streets

Medium to wide.
Standard Sidewalk
widths vary.





Tenth Avenue and West 23rd Street



Lot Size

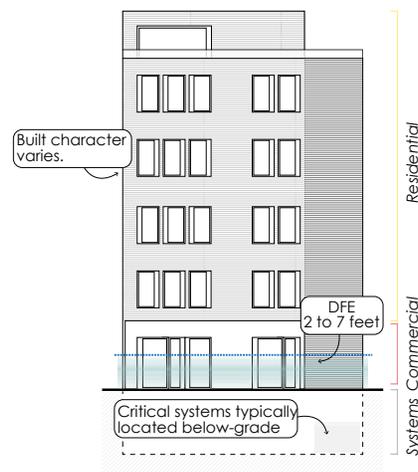
Standard width and depth.

Lot Coverage

High lot coverage. No front, side or rear yards.

Streets

Medium to wide. Sidewalk widths vary.



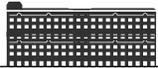
Mixed-Use and Commercial

West Chelsea has seen a large number of mixed-use, office and residential developments in the last decade, particularly since the rezoning in 2005 which allowed greater heights and density along wide streets. Many of these developments fell outside the bounds of the 2007 FIRMs. While they were not built to flood resistant construction standards, newer buildings are required to meet increasingly high safety and fire protection standards. As witnessed during Hurricane Sandy, heavier buildings constructed using non-combustible materials like steel, or masonry and concrete frames, proved to be less susceptible to structural damage.

Like other buildings in the study area, the primary damage experience during Sandy was to critical systems. Centralized mechanical and electrical systems were placed below grade or in the lower floors due to their dimensional-needs, structural loads, and ventilation requirements. These systems included boilers, control systems, switchgear, electrical panels, and other such equipment highly vulnerable to flooding.

Most residential units in West Chelsea, with the exception of the row house typology, are located above the DFE and were protected from flooding. However, as in other areas of the neighborhood, lobbies and ground floor commercial spaces, predominantly art galleries and stores, suffered extensive damage to highly vulnerable artwork or merchandise, interior walls and doors, and exterior glazing. Heavy pieces of furniture floating in flood waters broke down partition walls causing further inundation of neighboring spaces. In some instances, the high water pressure (hydrostatic pressure) caused additional flooding from sewer back-flow. Building operations were suspended for several weeks and residents did not have access to heat, electricity, and other basic services.

WEST CHELSEA | BUILDING TYPOLOGIES

	Strengths	Challenges
<p>LOFTS / FORMER - MANUFACTURING <i>Masonry / Reinforced concrete/ Steel framing</i></p> 	<ul style="list-style-type: none">• Former industrial buildings are constructed using heavier framing systems, making them inherently more-resilient to structural damage.• Since they tend to be occupied by commercial uses in ground and upper floors, dry floodproofing is a viable option and may not require significant structural reinforcement.	<ul style="list-style-type: none">• Relocation of mechanical systems may or may not be possible as complete reconfiguration and rewiring may be required.• Critical systems can be encased in dry floodproofed enclosures, which will enable buildings to remain functional, but will also result in partial or no reduction in insurance premiums.
<p>LOW RISE GALLERY <i>Masonry / Concrete Floor Slabs</i> <i>Masonry / Wood Joists / Slab-on-grade foundations</i></p> 	<ul style="list-style-type: none">• Art galleries have the advantage of operating with spare interior spaces, which allows opportunity for flexible organization and reconfiguration.• Once high-value artwork and contents are relocated, the space could be wet floodproofed, significantly minimizing flood damage.	<ul style="list-style-type: none">• Wet floodproofing of commercial spaces is not a Building Code-compliant adaptation strategy.• Dry floodproofing of low rise buildings with shallow foundations, would require extensive structural work and reinforcement of foundation and exterior walls. Not only is this approach costly, but also it may prove to be difficult, and in some instances, not feasible, as many of these building types have been constructed on infill land.
<p>ROW HOUSE <i>Brick and brownstone masonry construction / Attached typology with party-walls</i></p> 	<ul style="list-style-type: none">• Masonry buildings are structurally sound and are unlikely to suffer extensive physical damage.	<ul style="list-style-type: none">• Row houses include a walk-out basement unit which may no longer be used as habitable space below the DFE, in order to fully comply with flood resistant construction standards.• Most interior and exterior retrofit strategies require careful consideration in order to preserve historic integrity and ensure consistency with existing character.
<p>MIXED-USE <i>Masonry / Reinforced concrete/ Steel framing</i></p> 	<ul style="list-style-type: none">• The vast majority of mixed-use and residential buildings in West Chelsea (post-FIRM) are built to NYC Building Code's newer, more stringent requirements.• These buildings are typically occupied by commercial uses on lower floors. As a result, loss of units located below the DFE is not a prevalent issue.	<ul style="list-style-type: none">• Residential uses can only be elevated or wet floodproofed, and commercial uses can only be dry floodproofed, thereby limiting options available and resulting in additional retrofitting challenges in mixed buildings.• Access and egress issues may arise in mixed-use buildings as a combination of floodproofing strategies may need to be applied on constrained building and lot conditions.

SUMMARY OF KEY RESILIENCY CHALLENGES IN WEST CHELSEA

1 Existing building stock is vulnerable to flooding, requiring unique retrofitting strategies

Many structures that experienced inundation during Sandy were older, attached buildings that cannot be easily elevated and need adaptation strategies suited to their unique built characteristics.

2 Zoning and historic district regulations present challenges to mitigating flood risk

In order to encourage resilient construction in West Chelsea that reinforces special district goals and is faithful to the integrity of historic buildings, underlying regulations concerning bulk, streetscape, and incentive provisions must accommodate appropriate flood-proofing measures.

3 Flood risk threatens the vitality of West Chelsea's arts district

West Chelsea's ground floor commercial spaces, including galleries, restaurants, and shops in the 1% annual chance floodplain, are vulnerable to storm surge and extreme weather. Businesses must be provided with information and tools to integrate resiliency measures.

RESILIENCY FRAMEWORK

The challenges outlined in the previous sections speak to the need for identifying and promoting strategies that preserve the West Chelsea community's social and economic vitality in the near and long term. Urban buildings necessitate flood mitigation and adaptation measures that lower risk, while maintaining characteristics such as active ground floors and vibrant, walkable streets. Existing built conditions layered with regulatory considerations, similarities in retrofitting challenges, as well as inherent structural strengths, define a distinct sets of issues and opportunities in West Chelsea.

Special West Chelsea District

DCP has reviewed how flood-damaged properties and future developments have been able to implement resiliency improvements under current zoning, in a way that is reflective of existing built character and complements the goals and original intent of the Special West Chelsea District.

The *Case Studies* section provides options on resilient retrofits and flood mitigation strategies for property owners and businesses in West Chelsea. The *Zoning Analysis* section describes the specific zoning provisions that have an impact on the streetscape and built form of ground floors. Additionally, the recommendations include design best practices that can contribute positively to the public realm.

LPC-Designated Historic Districts

DCP has coordinated with the Landmarks Preservation Commission to provide guidance on pursuing retrofit strategies that safeguard the historic integrity of buildings in the LPC-Designated Historic Districts

The *Case Studies* section includes retrofitting options which may be applicable to properties located in historic districts, as well as specific guidance on the LPC's review process.

Gallery District

DCP is supporting the gallery district's continued presence in West Chelsea and promoting long-term resilience by providing guidance on retrofitting and flood mitigation strategies.

This report also provides preparedness strategies and resources to a spectrum of arts-related businesses in the floodplain to assist in planning for, mitigating, and recovering from storm surge and flooding.

The resilient land use strategy DCP has developed for the neighborhood is to encourage building retrofits that protect the area's unique architecturally and historically significant building stock, and maintain the vitality of its streets. These strategies together will help ensure that the West Chelsea community has the tools to remain strong and flourish.



Hudson River

WEST CHELSEA
HISTORIC DISTRICT

SPECIAL
WEST CHELSEA
DISTRICT

CHELSEA
HISTORIC DISTRICT

Route 9A

Eleventh Avenue

Tenth Avenue

Ninth Avenue

West 28th Street

West 23rd Street

West 18th Street

West 14th Street

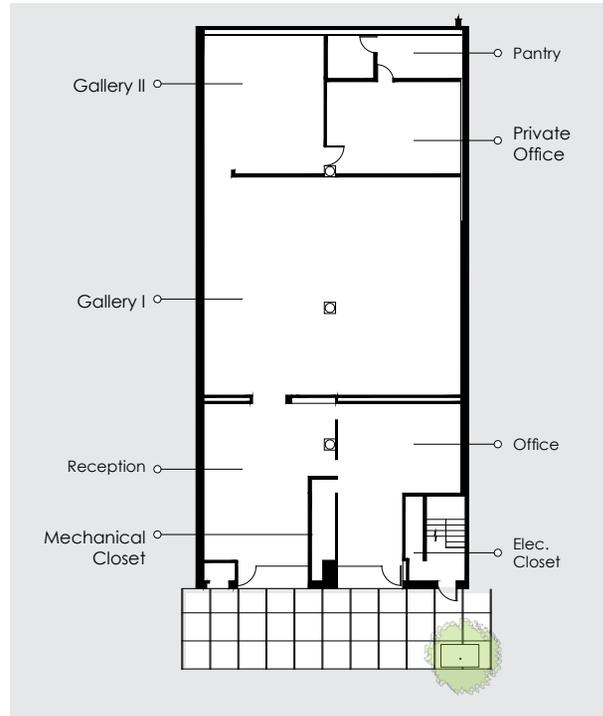
- Special West Chelsea District
- LPC-designated Historic District
- Gallery District
- Study Area Boundary



Case Study I : Retrofit of a Low-Rise Gallery

Of the prevalent building typologies in the study area, older, one-to-two story structures are faced with more complex retrofitting challenges due to their unique built characteristics: low-rise, masonry construction with shallow foundations and attached or abutting walls. Buildings of this type are found throughout the gallery midblocks in the SWCD.

The only feasible mitigation strategy that is in full compliance with FEMA standards is to dry floodproof, as elevating all uses above the DFE would not be feasible given adjacent uses. Alternative strategies, that are likely less expensive but will not result in significant NFIP premium reductions, include wet floodproofing and elevating critical systems.



FLOOD RISK	
Flood Zone/BFE	AE +13**
Grade Elevation	+11' at sidewalk and property
Design Flood Elevation (DFE)	+15' (4' above sidewalk grade)
Lowest Occupiable Floor	+11.5' (6" above property grade)
Critical Systems Location	Ground Level

TYPOLOGY	
Lot Size	125' x 198' (Two buildings on lot)
Building Size	9500 SF estimated
Yards	N/A
Construction Type	Masonry with steel structure
Foundation Type	Shallow Masonry
Year Built	1931
Stories	2
Residential Floor Area	N/A
Residential Units	0
Elevator	N/A

SITE CONDITIONS	
Sidewalk Width	13'
Roadbed Width	59'
Zoning District	M1-5, within SWCD

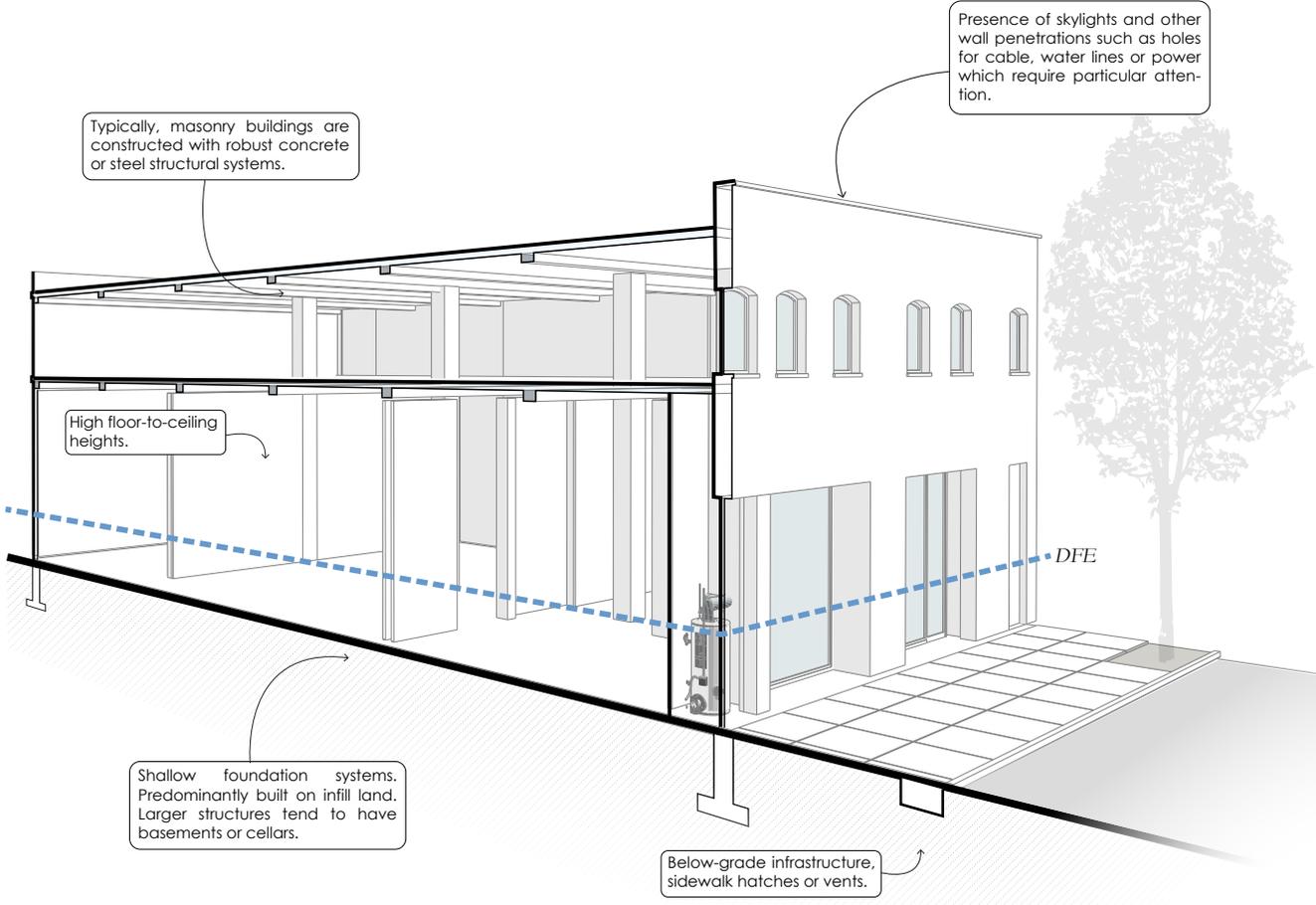
* Elevations are referenced to NAVD88



EXISTING CONDITIONS

This example is a two-story masonry building with a slab-on-grade foundation. It is occupied by a commercial gallery on the ground-floor and an attic floor above. The building shares a party-wall on the rear with a neighboring gallery building of the same typology.

The presence of an elevated space, the attic floor, can be advantageous in implementing adaptation strategies that could minimize or prevent extensive damage to business contents such as furniture, files and records. which may be relocated prior to a flood.



FULL COMPLIANCE RETROFIT STRATEGY

Dry Floodproofing

Dry floodproofing commercial uses is in compliance with New York City Building Code for substantial improvements, and is a recognized measure under NFIP. This retrofit strategy may require significant structural reinforcement of the entire structure, as well as attention to structural reinforcement at the party-walls so as not to affect the neighboring property. Periodic maintenance is critical, as any alterations to the wall and floor systems must be waterproofed, pumps and backup power must be tested, and flood shield gaskets must be replaced regularly.



Dry floodproof building below the DFE including all wall penetrations for utilities. Install deployable flood shields at building frontage and temporary egress stairs.



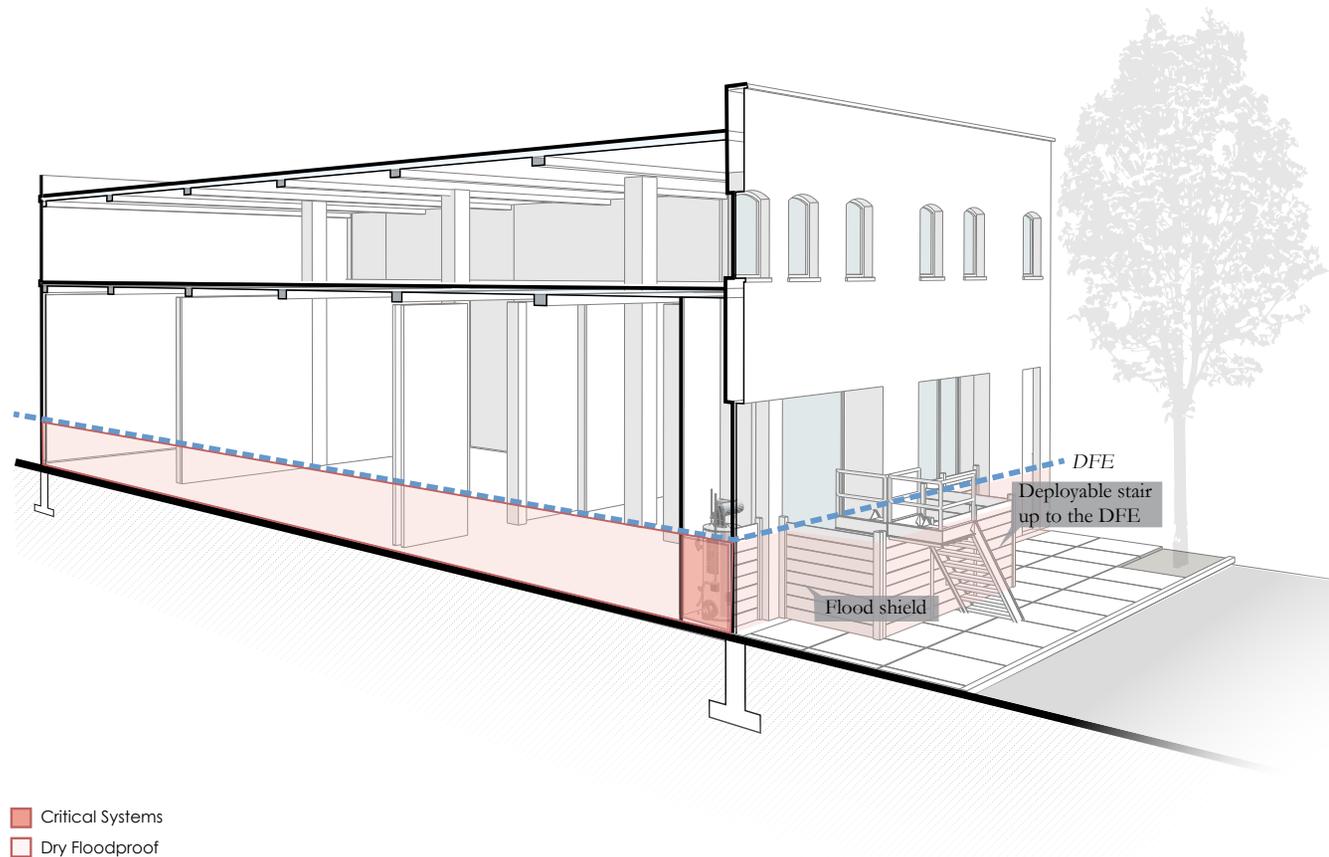
Dry floodproof critical systems. Install underdrain and sump pump system to drain water that seeps from under the slab, through walls, and around shield gaskets. The pump system and the backup power system is essential in effective dry floodproofing.



Structurally reinforce slabs, foundation walls and exterior walls below the DFE to withstand hydrodynamic and hydrostatic forces. If adjacent properties are not infilling their sub-grade spaces, reinforce foundation walls to account for new load. Add reinforcement at foundation wall below the sidewalk and at the building facade for flood shields.



Obtain revocable consent from the Department of Transportation (DOT) as a portion of the flood shield assembly falls onto the sidewalk.



ALTERNATIVE STRATEGIES

Non-substantially improved buildings within the floodplain have greater flexibility in complying with Appendix G of the New York City Building Code. The alternative adaptation strategies illustrated here are not recognized by FEMA and may not lower insurance premiums. However, they minimize flood-damage and reduce recovery times.

The illustrated alternative strategies implement wet floodproofing and a combination of wet and dry floodproofing of the space below the DFE as well as application of flood damage-resistant materials.

Dry Floodproofing + Wet Floodproofing



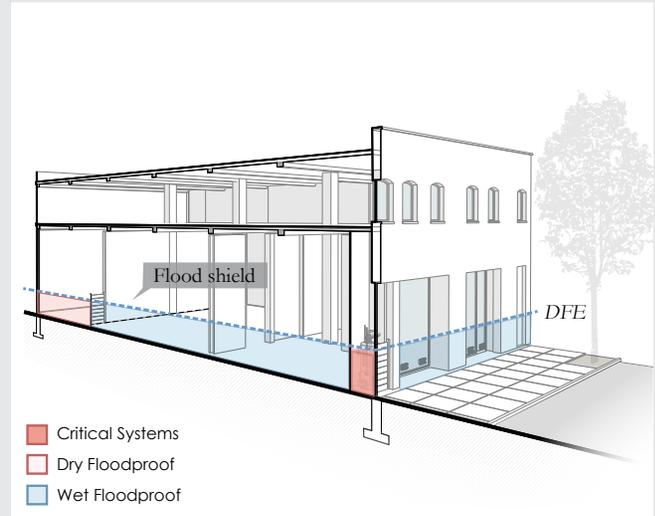
Wet floodproof below the DFE. Install flood vents and replace all windows, doors and finishes with flood damage-resistant materials.



Install deployable flood shield and create a dry floodproofed vault at the rear. Provide alternate means of egress over flood shield and relocate contents to dry floodproofed enclosure. Critical systems to remain in place within a dry floodproofed enclosure. Provide emergency shut off above the DFE.



Add reinforcement to party walls, exterior walls and foundation slab at dry floodproof enclosure and ensure changes do not impact neighboring property's structural integrity.



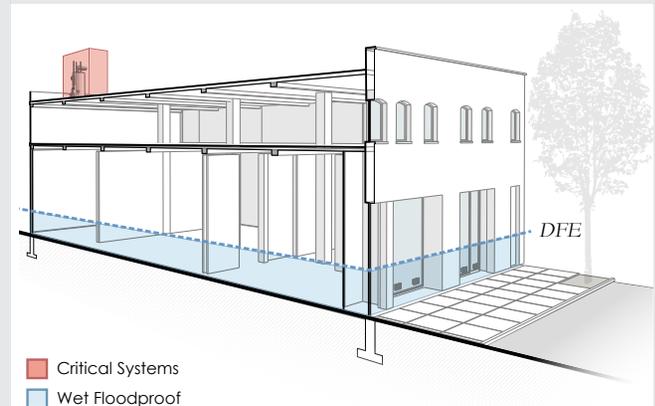
Wet Floodproofing + Elevate Critical Systems



Wet floodproof below the DFE. Install flood vents and replace all windows, doors and finishes with flood damage-resistant materials.



Relocate critical systems to the roof. Anchor systems securely and protect from windborne debris. Raise electrical utilities above DFE within electrical closet



* Changes affecting properties located within Landmarks Preservation Commission-designated historic districts are subject to LPC review at staff level or at a public hearing. (See page 42 for more information about the LPC review process)

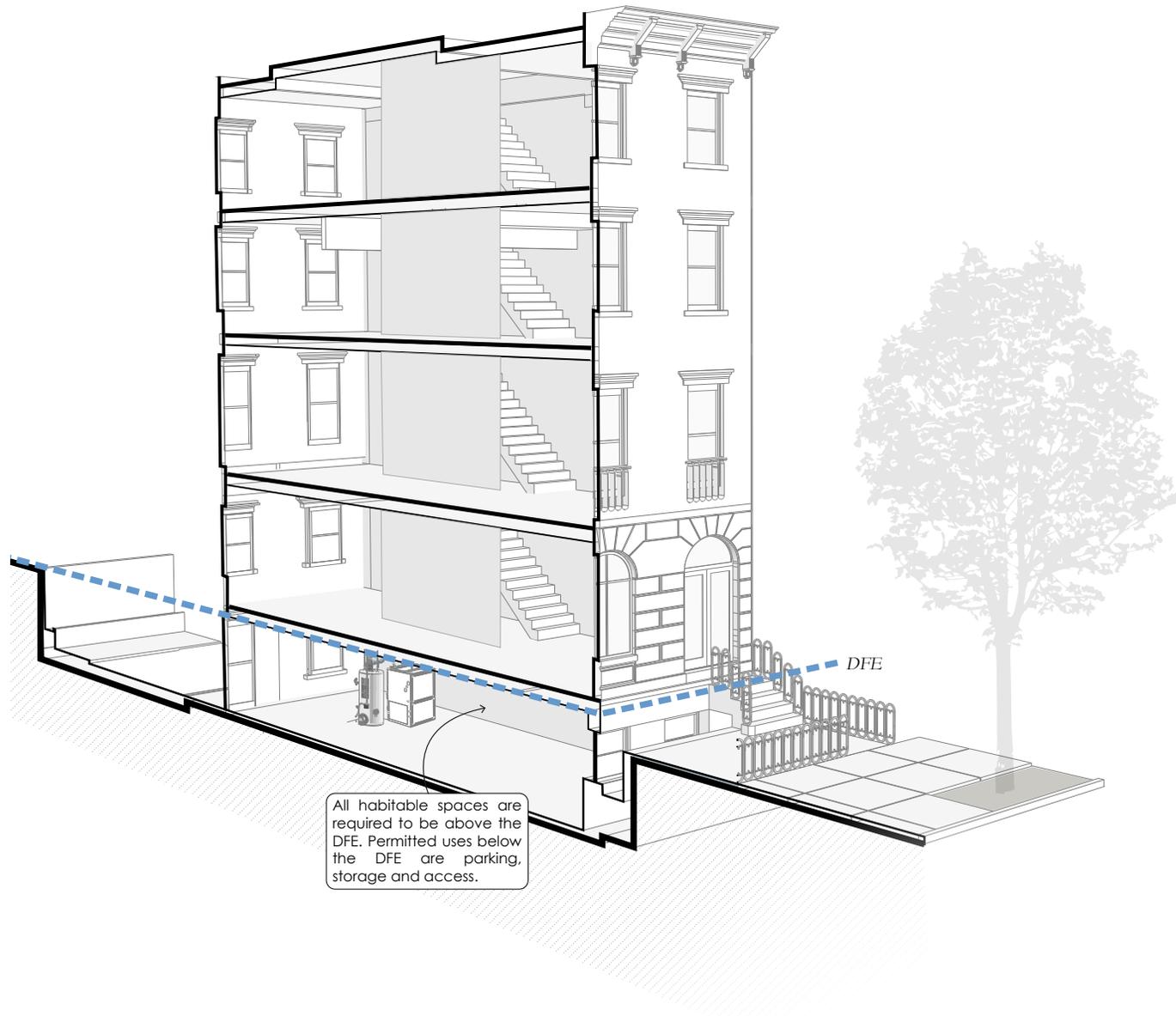
Case Study II : Retrofit of a Row House

EXISTING CONDITIONS

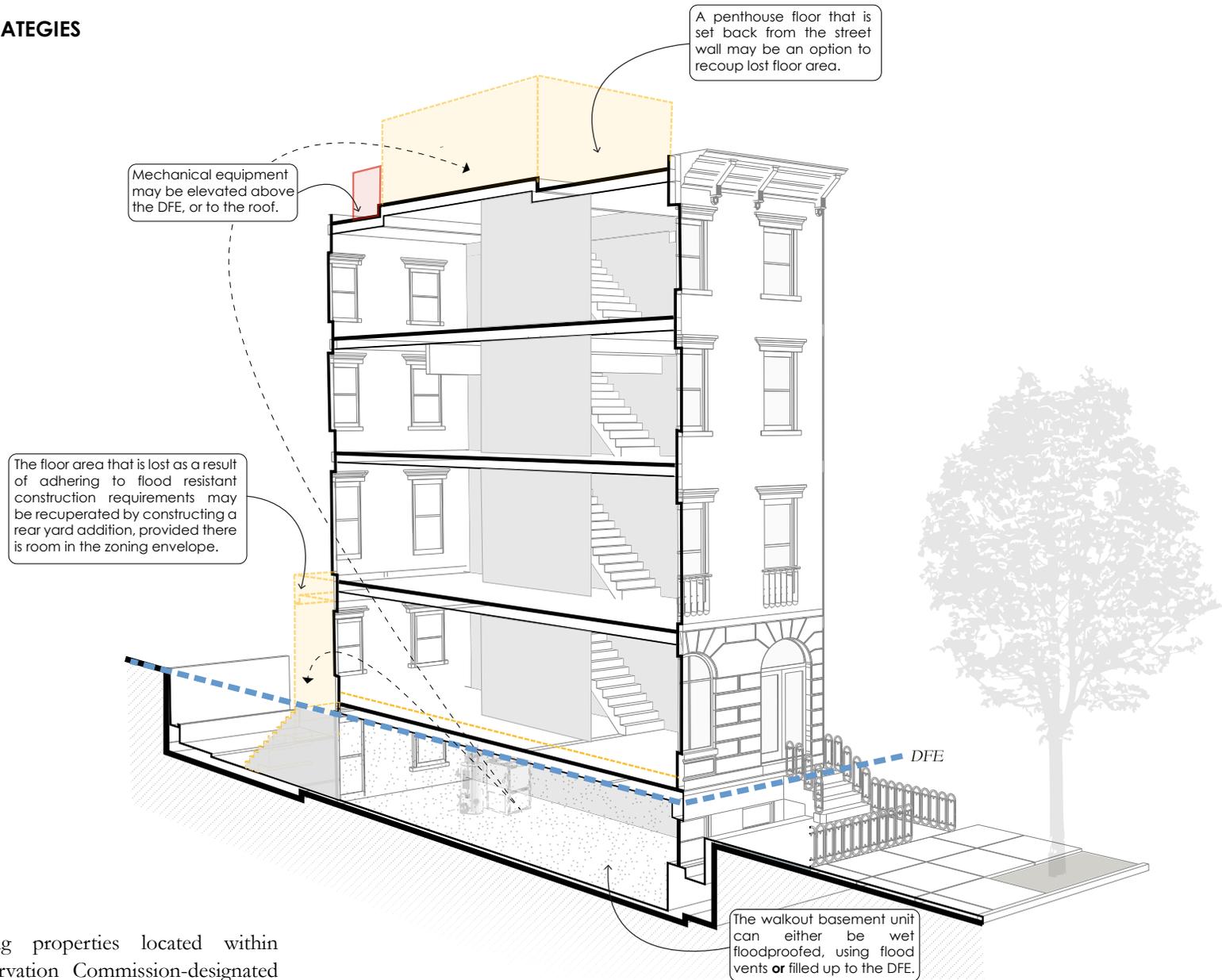
The example illustrated here is a row house constructed using load-bearing masonry walls on shallow rubble foundations. Row houses have a walk-out basement unit, which is used primarily as habitable space, and also houses boilers and other critical building systems. A key challenge in such residential buildings is that to fully comply with current Appendix G requirements, floor area below the DFE can only be used for parking, storage, and access.

FLOOD RISK	
Flood Zone/BFE	AE +13'*
Grade Elevation	+12' at sidewalk and property
Design Flood Elevation (DFE)	+15' (3' above sidewalk grade)
Lowest Occupiable Floor	+3.5'
Critical Systems Location	Basement / Ground Level
TYOLOGY	
Lot Size	16' x 98'
Building Size	16' x 53'
Yards	15' front; 30' rear
Construction Type	Masonry
Foundation Type	Shallow Masonry
Year Built	1900 estimated
Stories	4
Residential Floor Area	4200 SF
Residential Units	1
Elevator	N/A
SITE CONDITIONS	
Sidewalk Width	15'
Roadbed Width	30'
Zoning District	R7-B

* Elevations are referenced to NAVD88



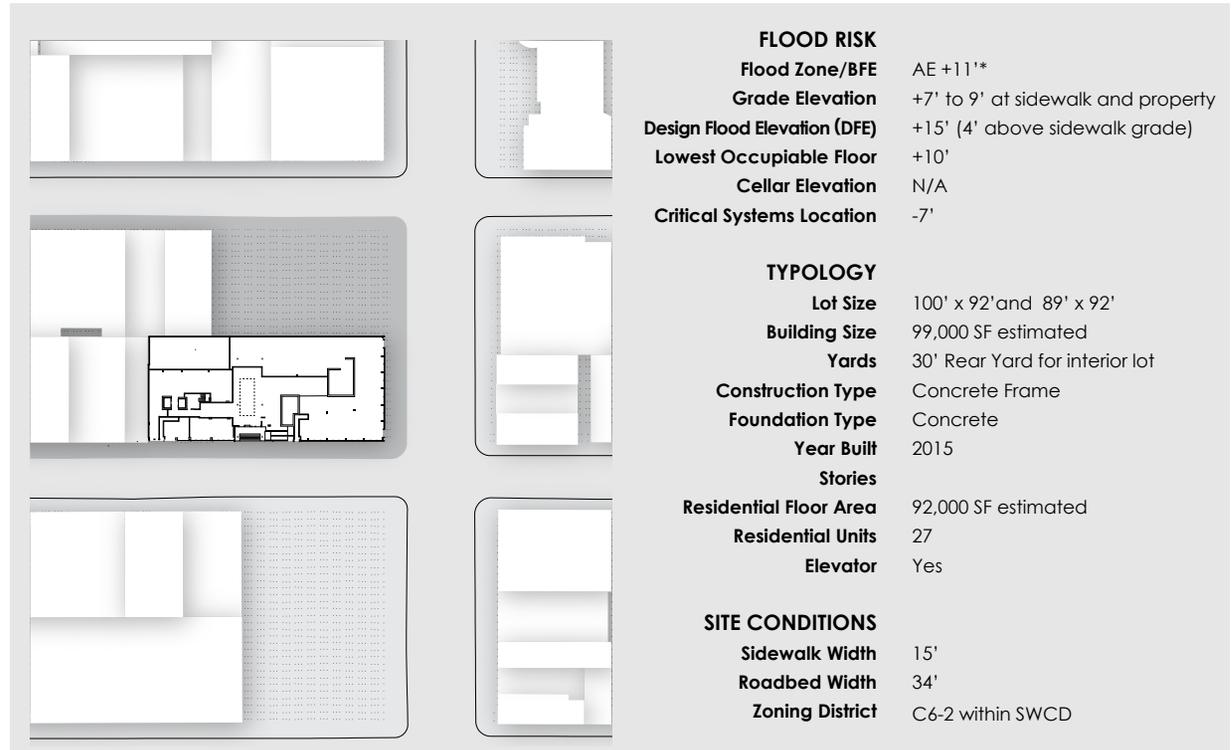
RETROFITTING STRATEGIES



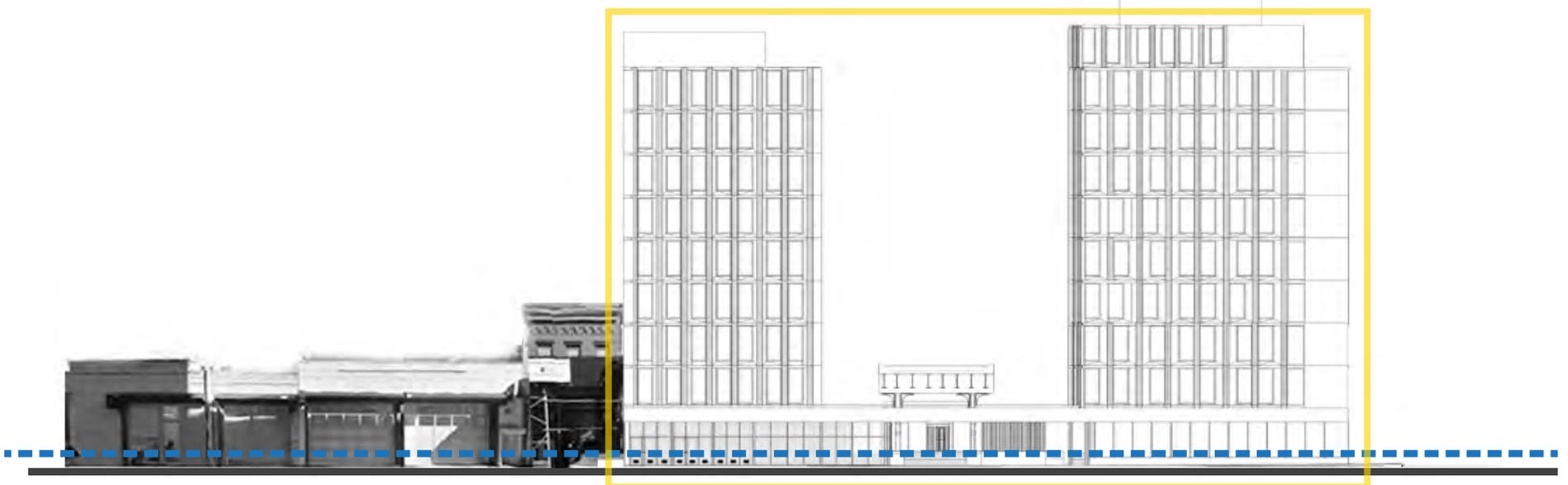
* Changes affecting properties located within Landmarks Preservation Commission-designated historic districts are subject to LPC review at staff level or at a public hearing. *(See page 42 for more information about the LPC review process)*

Case Study III : New Construction

The example illustrated here is new construction in the 1% annual chance floodplain, required to comply with Appendix G of the New York City Building Code. It is a mixed-use typology with twenty-seven residential units, commercial space on the ground floor and a cellar. The ten story building has a concrete frame structure and a sub-grade foundation system, constructed on a standard size corner lot.



* Elevations are referenced to NAVD88



FLOOD MITIGATION STRATEGY

The flood mitigation strategy includes a combination of wet and dry floodproofing techniques that are fully compliant with the NYC Building Code.



Residential uses are located above the DFE as per code requirements. The residential lobby has been elevated to the DFE providing required means of egress.



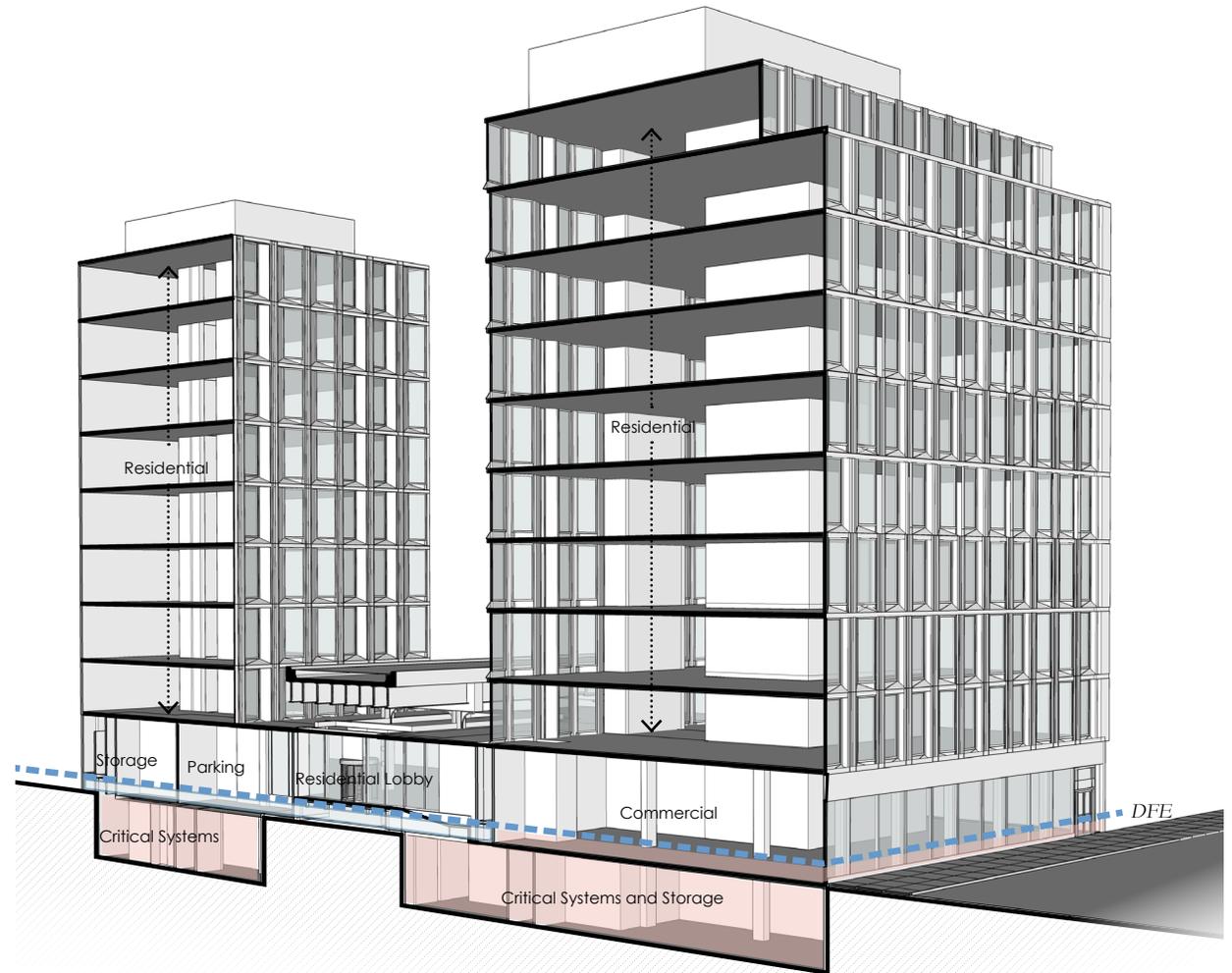
The storage area on the ground floor has been wet floodproofed with flood-damage resistant materials and flood vents. Residential entryways have also been wet floodproofed.



The commercial space has been dry-floodproofed. The cellar is also dry floodproofed and is used for storage and housing mechanical systems within fire-rated and vented enclosures. (Some mechanical systems must always be elevated and may not be dry floodproofed as specified in Appendix G of the NYC Building Code). Deployable flood shields will be installed prior to a flood event. Alternate means of egress over flood shields would also need to be provided.



All foundation walls have been designed to resist hydrostatic and hydrodynamic loads in addition to considering impact on neighboring property's structural integrity.



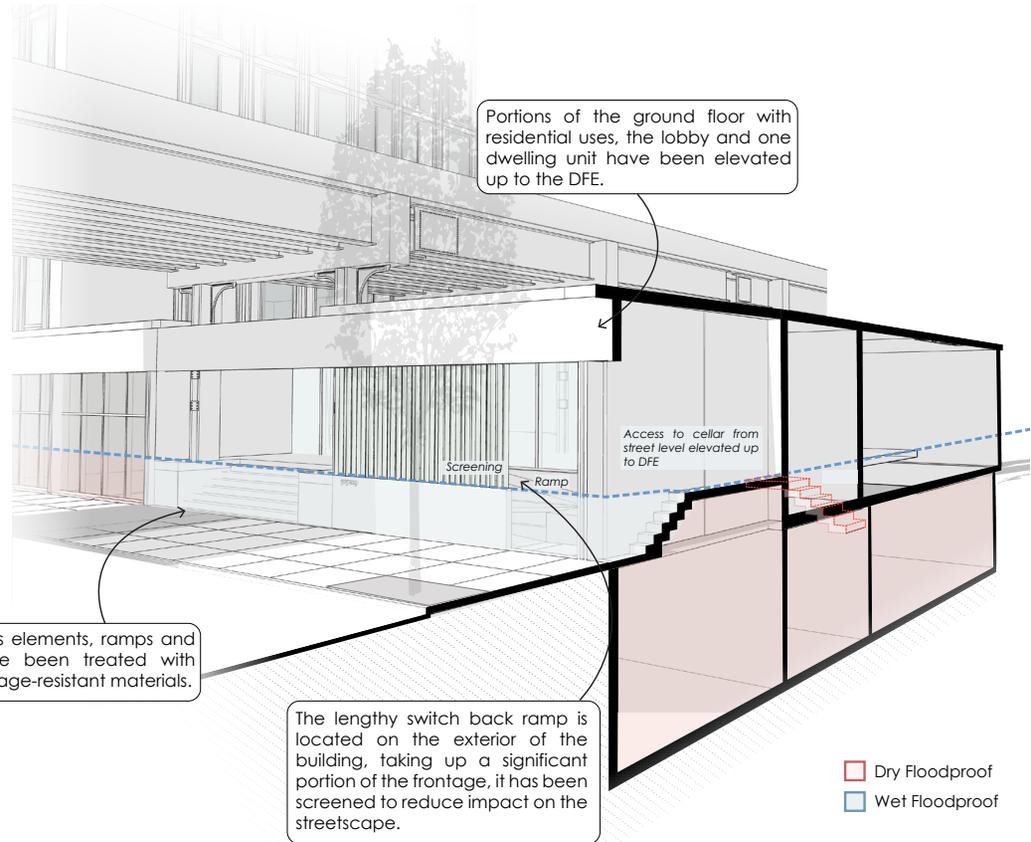
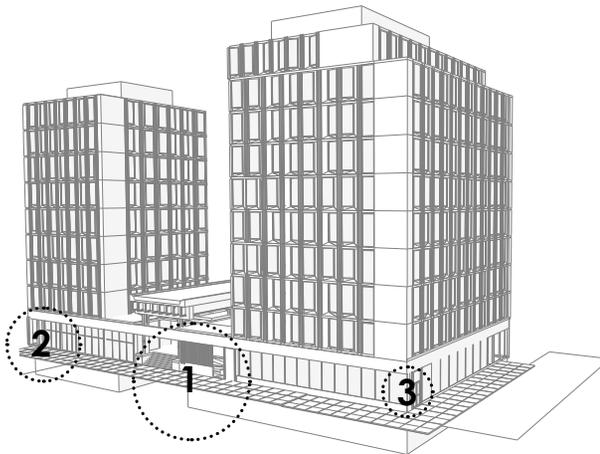
■ Dry Floodproofed
■ Wet Floodproofed

DESIGN CONSIDERATIONS

The property is located within the Special West Chelsea District. It is a High Line-adjacent development with Tenth Avenue frontage, subject to additional use, bulk and streetscape regulations.

The Special West Chelsea District's transparency and ground floor use requirements for Tenth Avenue have been met, resulting in an active, vibrant streetscape experience during non-flood conditions. The ramp is on the narrow street located at a distance greater than fifty feet from the intersection with Tenth Avenue, as per the SWCD's street wall requirements, giving the commercial use a strong corner presence.

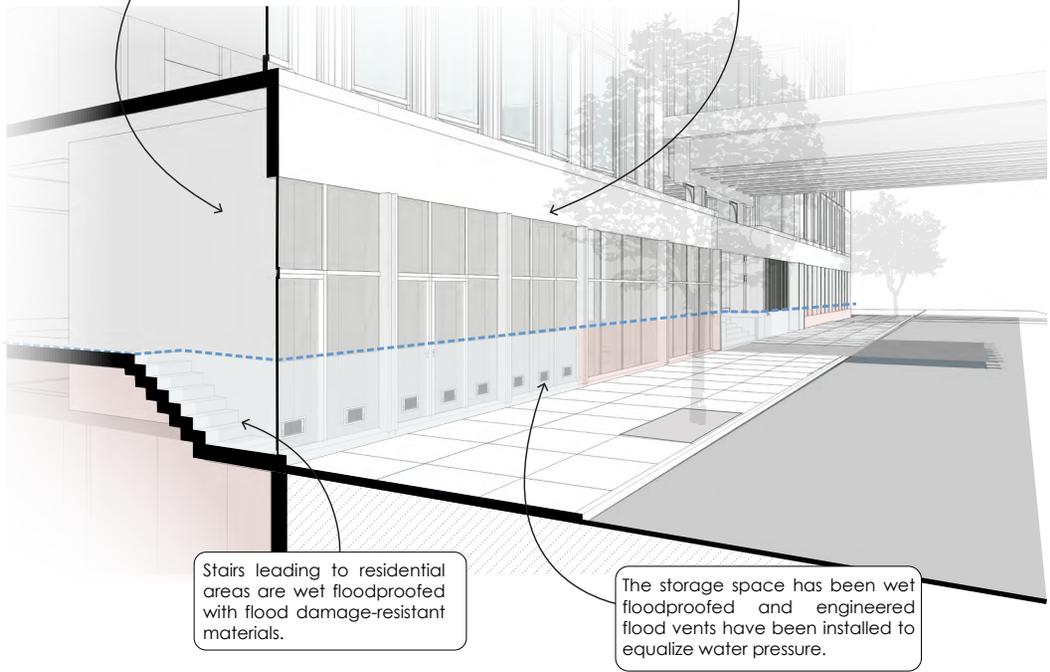
Illustrated here are some of the urban design considerations that offer a quality pedestrian experience, while satisfying resiliency standards.



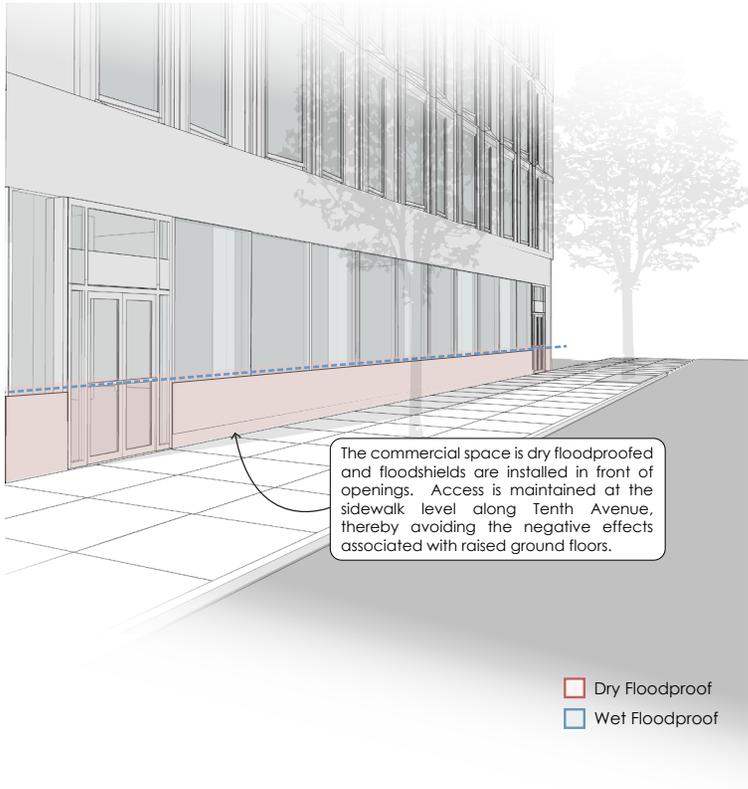
1. Provide engaging entryways

Although this stretch of the building includes parking, access and storage uses, impacts associated with a disrupted street wall and unengaging uses on the pedestrian experience are minimized by locating stairs on the interior of the building.

A consistent street wall is maintained with façade elements relatable to the human-scale.



2. Maintain ground flood access and visibility



Dry Floodproof
 Wet Floodproof

3. Maintain a street-level presence with active uses

Zoning Analysis

In 2013, a Flood Resilience Zoning Text Amendment was adopted to encourage flood-resilient building construction in FEMA-designated flood hazard areas. The amendment was intended to remove regulatory barriers that would hinder or prevent the reconstruction or retrofiting of storm-damaged properties. The 2013 Flood Resilience Zoning Text Amendment was passed with a sunset provision and is set to expire a year after the PFIRMs are formally adopted by the City.

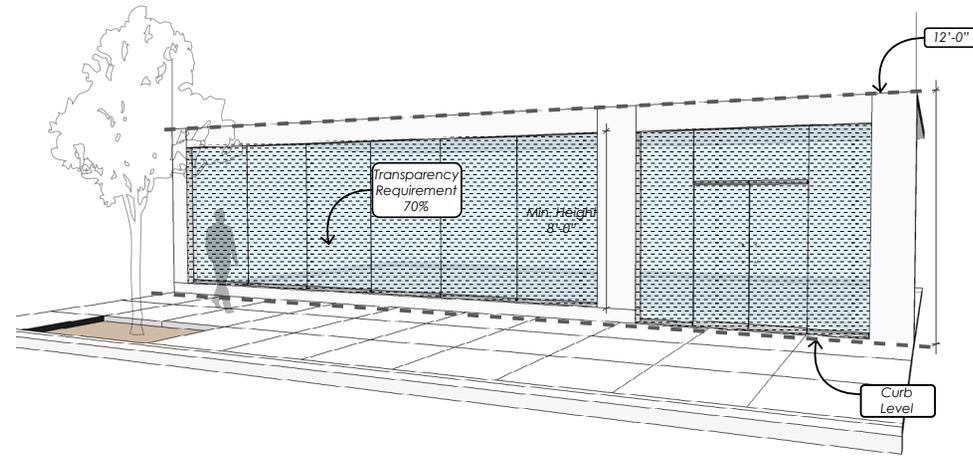
The Special West Chelsea District, in effect since 2005, set forth streetscape requirements. The special district regulations have been reviewed to ensure that they allow for flood-resistant construction standards. Key to the zoning analysis was ensuring consistency with existing built character and reinforcing streetscape vibrancy, while making sure buildings could be resilient.

Transparency Requirements:

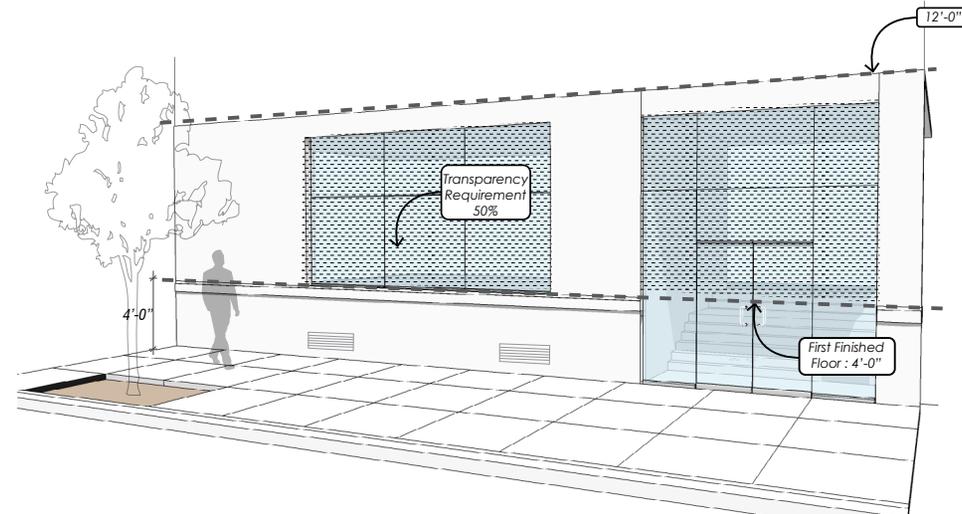
SWCD has special transparency requirements along Tenth Avenue. An optional provision in the Flood Resilience Zoning Text amendment allows for greater flexibility with measurement and a lower percentage of transparency to accommodate floodproofing measures. Recent developments along Tenth Avenue have incorporated high percentages of ground floor transparency and encouraged a strong commercial presence. To date, the alternative transparency provision applicable in the flood zone has not resulted in buildings that detract from visibility, impact the pedestrian experience or affect business vitality.

Street Wall Location:

While the Special District includes stringent street wall requirements, the street wall provisions in the Flood Resilience Zoning Text Amendment allow for a higher percentage of the street wall to be set back from the street line and deeper recesses for access elements and entryways. When the DFE is low, dry floodproofing of commercial uses is recommended to maintain active



Special West Chelsea District | Transparency Requirements

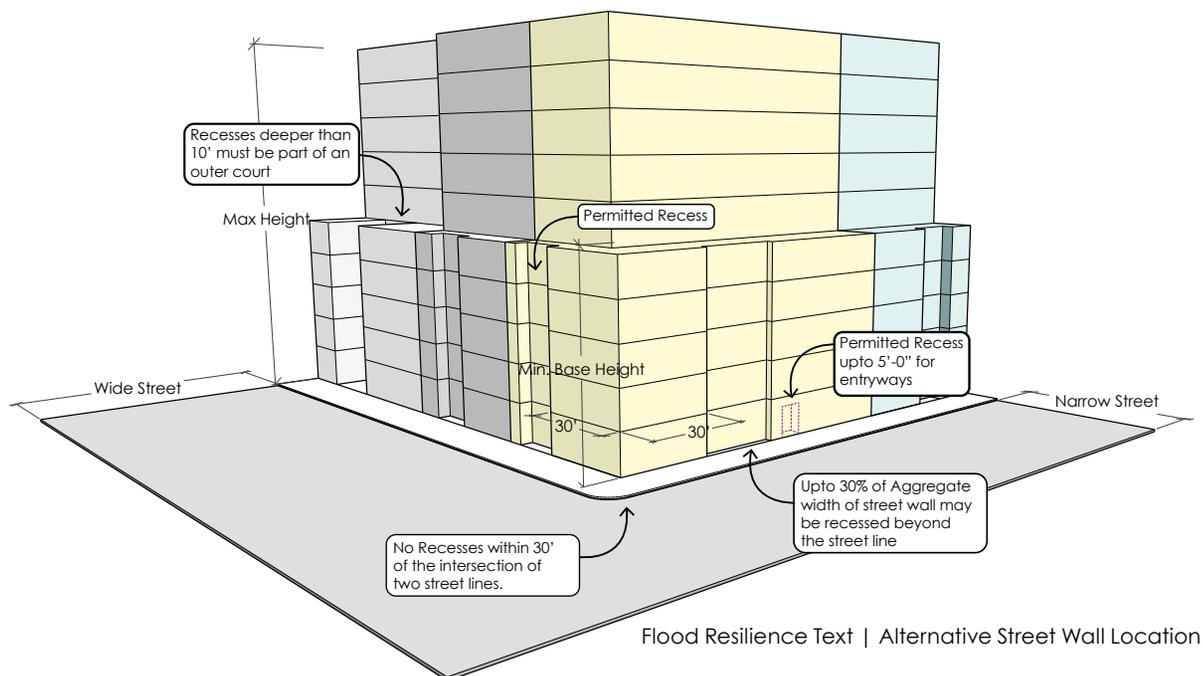
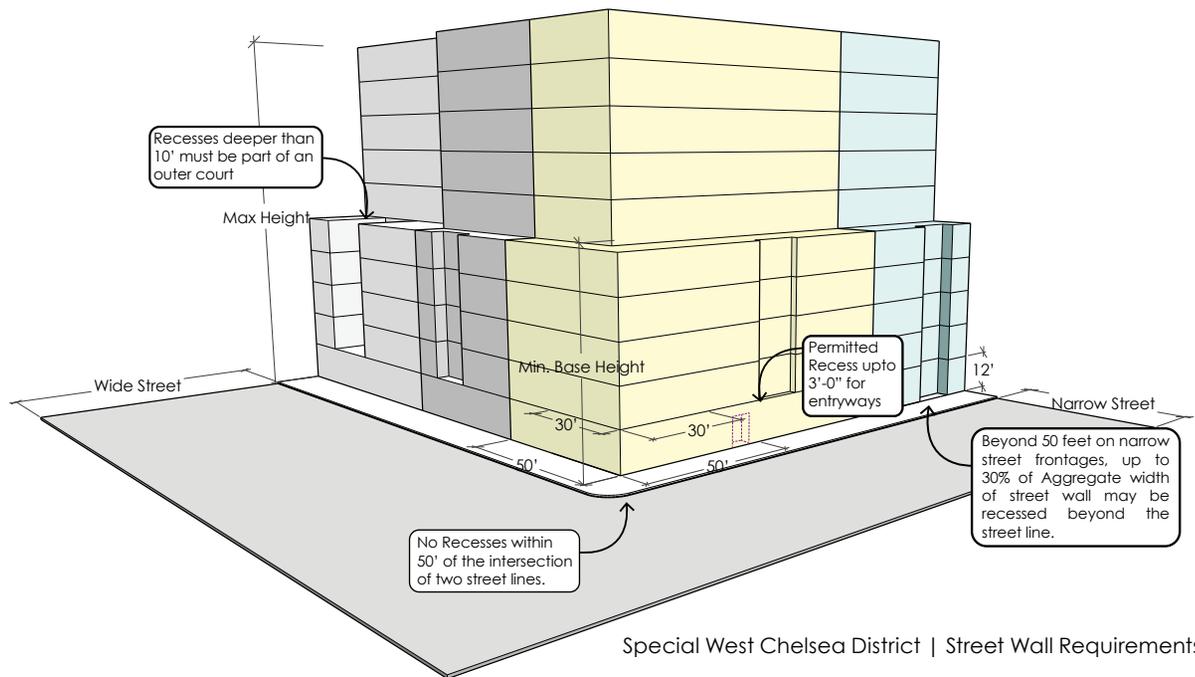


Flood Resilience Text | Alternative Transparency Provision

ground floors. When the DFE is high, zoning allows additional height sufficient to create a full-height ground-floor space and accessible entries at grade from the sidewalk. When the lowest occupiable floor is above sidewalk grade, lengthy ramps and stairs located on the exterior can dominate the streetscape, divorcing the building from the street. While setting back from the

street line aids in resolving issues associated with access to elevated floors, it hinders visibility and often times results in uninviting access.

The Flood Resilience Zoning Text Amendment allows access elements located inside of a building to be exempted from floor area, which allows these elements



to be located inside of a building without a penalty to maximum buildable area. This provision allows 100 square feet to be deducted for each one foot of elevation above sidewalk level.

Recently constructed buildings in West Chelsea pursuant to Appendix G, as well as Special District's streetscape requirements, have accomplished resiliency while still providing transparency and consistent street walls at the ground level.

Design Best Practices

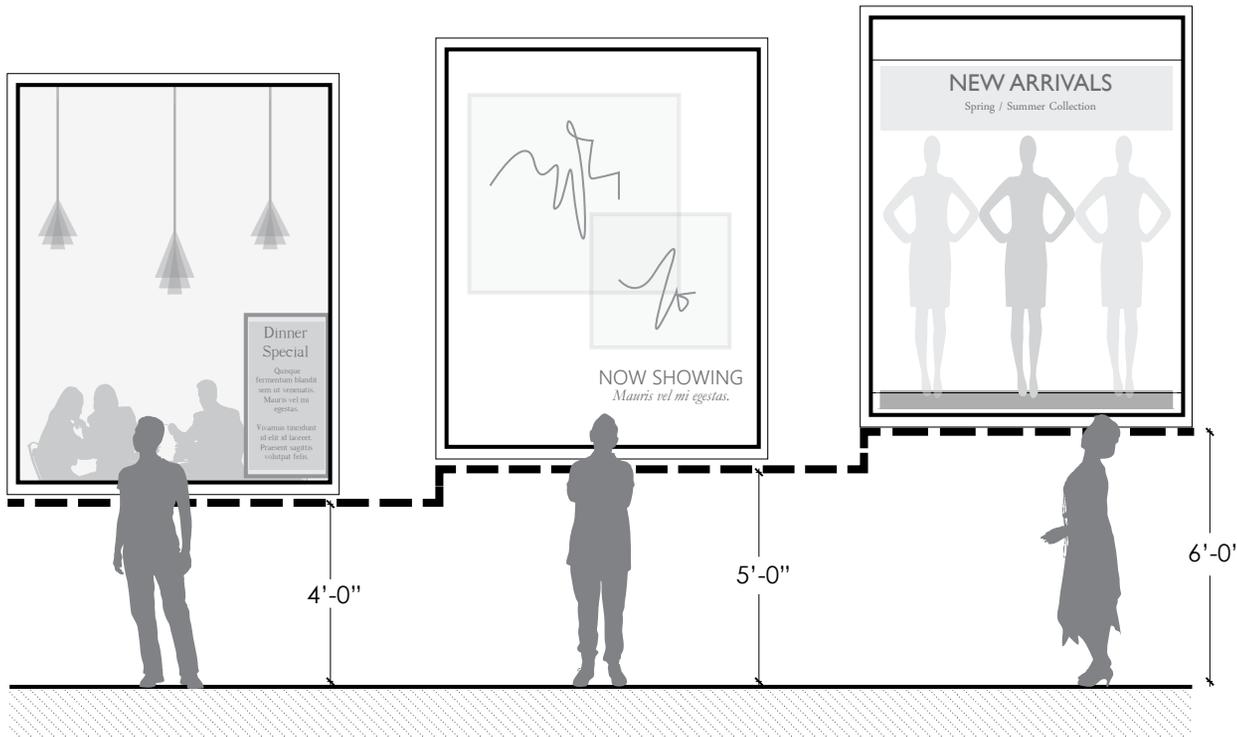
West Chelsea has a distinct built character, consisting of an eclectic mix of old and new. Taking cues from the existing context is not only important to ensure that neighborhood character is maintained, but also to help create well-designed buildings with ground floors that provide visual interest and enhance the pedestrian experience. A small height differential between the first occupied floor and sidewalk level can be treated in a manner that does not have adverse effects on the streetscape.

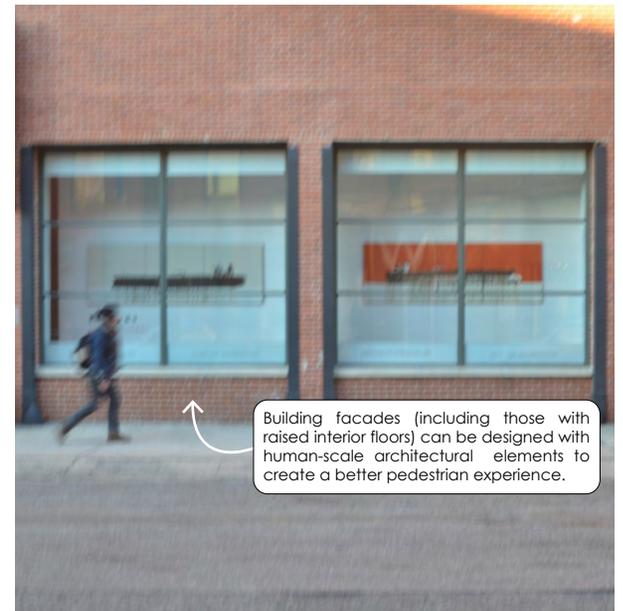
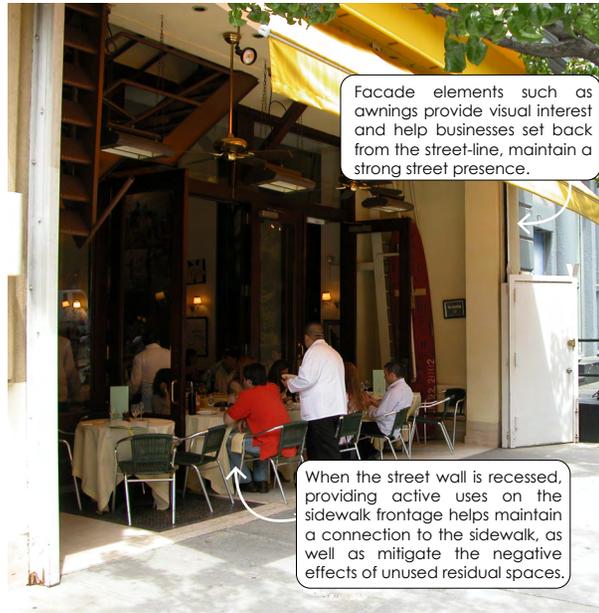
West Chelsea's existing building stock includes a host of former industrial buildings with loading docks and raised entrances that are three-to-four feet above adjacent grade. These buildings present a useful benchmark and a dynamic condition to integrate similar access and visual connectivity. Above a height of roughly three feet, issues of access become more pronounced.

On commercial streets, a strong, consistent street wall and legible access is critical to the viability of businesses. This is especially true in the arts district, where ground floor galleries establish a fundamental connection to the pedestrian realm, and those on upper floors rely on creating inviting entryways to draw foot traffic within the multi-floor building.

Elevated buildings pose challenges for accessibility where space to accommodate lengthy ramps and stairs is constrained. Dry floodproofing of commercial spaces is recommended to enable businesses to maximize their visual and physical presence at the sidewalk and remain functional during non-flood conditions. When dry floodproofing is not feasible, or not permitted, as is the case for residential buildings, access elements

should be designed to minimize their impact on the pedestrian realm. Despite the challenges associated with adapting to higher standards of flood safety, improving resiliency offers an opportunity to achieve higher quality design, which has a positive effect on the public realm in neighborhoods recovering from the effects of flooding and planning for protection from future floods.





LPC-Designated Historic Districts

The Landmarks Preservation Commission is the municipal agency responsible for identifying, designating and assuring the continued protection of the city's landmarks and historic districts. There are more than 33,000 designated buildings in all five boroughs, including 114 historic districts, twenty district extensions and 1,347 individual landmarks. The number of newly-mapped properties in New York City's expanded floodplain, located within LPC-Designated Historic Districts, at risk from a 1% annual chance storm has increased by thirty-six percent in the updated PFIRMs. This includes approximately ninety homes in the residential Chelsea Historic District and Chelsea Historic District extension, approximately thirty former-industrial buildings in the West Chelsea Historic District, as well as the individual landmark, the Starrett-Lehigh building.

LPC Regulatory Jurisdiction

Every designated structure, whether it is an individual landmark or a building in a historic district, is protected under the Landmarks Law and subject to the same review procedures. Any minor work or alterations to a building *[with the exception of ordinary repairs and some interior alterations (see Case Studies pages 28-33)]*, must obtain the Commission's approval before beginning work.

The State and National Registers of Historic Places are separate from the Landmarks Preservation Commission, although many of New York City's individual landmarks and historic districts are also listed on the State and National Registers. The State and National Registers of Historic Places are lists of buildings and sites of local, state, or national importance. These programs are administered by the National Park Service through the New York State Office of Parks, Recreation, and Historic Preservation.

LPC must approve in advance all work affecting an individually designated building or any property within



Theological Seminary, Chelsea Historic District



West 26th Street, West Chelsea Historic District



West 22nd Street, Chelsea Historic District

a historic district designated by the LPC. The LPC has adopted rules that authorize the staff to issue permits for work that meets the LPC's Rules. Approximately 95% of applications are approved by the staff. The LPC staff review proposals to evaluate the effect of the proposed changes on the architectural and historical character of buildings and/or the historic district.

Floodproofing Measures

Proposals to address floodproofing needs may require close consultation with the staff to consider all options and to determine the best avenue for seeking the necessary approvals. Proposals for certain work types, such as floodproofing affecting exterior features, are reviewed on a case-by-case basis; there is no standard and/or mandatory solution.

The installation of permanently attached hardware designed for temporary flood shields and barriers does require review and approval by the Landmarks Preservation Commission. Such hardware includes posts and post plates, channels and brackets, and all other attachments to the façade, windows or doors, and the ground. The Commission is currently studying the physical and visual effects of these installations on historic properties, and reviews such proposals on a case-by-case basis.

Installing channel-free shields or emergency measures such as stacking sandbags or plywood at openings in advance of an imminent flooding event does not require a LPC permit or review. Property owners and tenants should check with the Department of Buildings regarding the applicability of building codes for all of these installation types.

Other related work, such as preventative façade maintenance, relocating equipment to higher floors or rooftops, and miscellaneous interior alterations, typically requires LPC review and is usually reviewed and

approved by staff under current rules and regulatory policy. Alterations such as raising window and door openings, interior floors or entire buildings always requires LPC review, possibly at a Public Hearing. Applicants should identify such proposals as part of the initial application filing, or notify the Commission staff in advance particularly when the changes are extensive.

For information:

Visit www.nyc.gov/landmarks

Public Information: 212-669-7817 info@lpc.nyc.gov

Gallery District

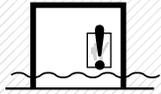
Art galleries, museums, and storefronts located in the floodplain are immediately affected by a storm. These spaces rely on a ground-level, engaging street presence that encourages visitors to easily meander from venue to venue. This reliance on a location at grade is also what makes these businesses especially vulnerable to damage from a flood or other natural disasters.

As part of the efforts to support the West Chelsea gallery district, DCP has developed a resilience guide for galleries, informed by the arts community's experience during Sandy. The guide was produced in coordination with the Mayor's Office of Recovery and Resiliency, and the New York City Departments of Cultural Affairs, Emergency Management, and Small Business Services. The *Resilient Art Spaces* guide includes options to lower flood risk and provides practical measures for adaptation at the gallery, building, and collective scales. The recommendations comprise physical retrofits of the spaces and buildings, as well as suggestions to integrate flood resiliency into everyday operations.

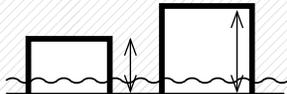
Illustrated on the following page, are flood mitigation and preparedness strategies which reduce exposure and decrease recovery times. For more information, visit www.nyc.gov/resilientneighborhoods.

Identify what's at risk

THINGS TO CONSIDER:



High priority contents



Floor-to-ceiling heights



Access + clearances



Grade changes

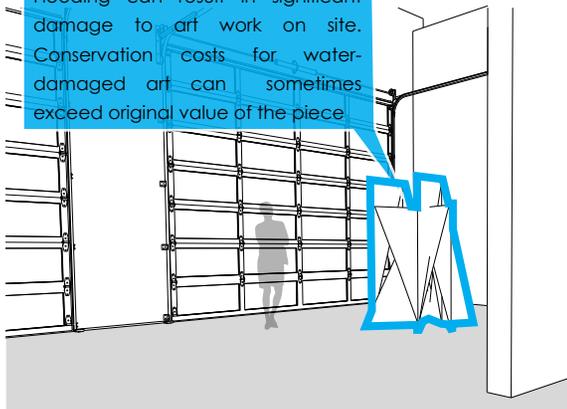


Storage needs

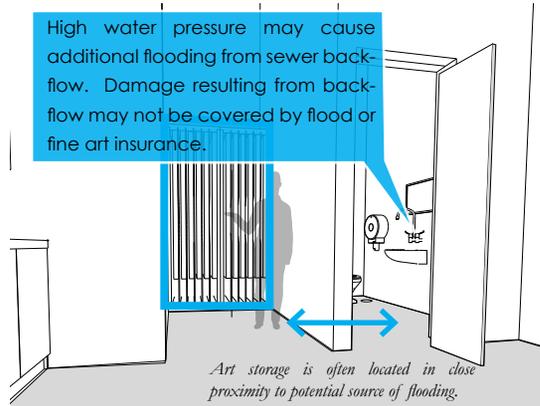


Site conditions + below-grade infrastructure

Flooding can result in significant damage to art work on site. Conservation costs for water-damaged art can sometimes exceed original value of the piece.



High water pressure may cause additional flooding from sewer back-flow. Damage resulting from back-flow may not be covered by flood or fine art insurance.

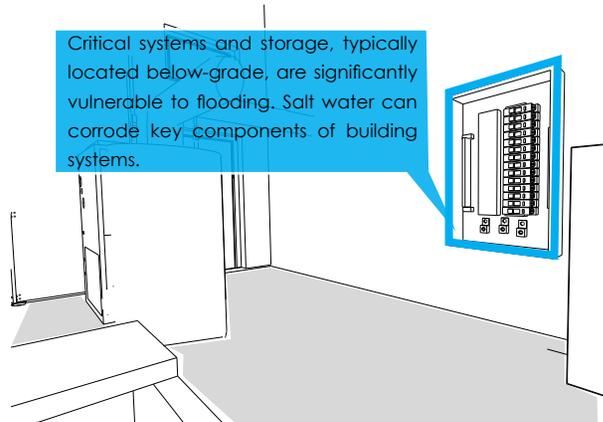


Art storage is often located in close proximity to potential source of flooding.

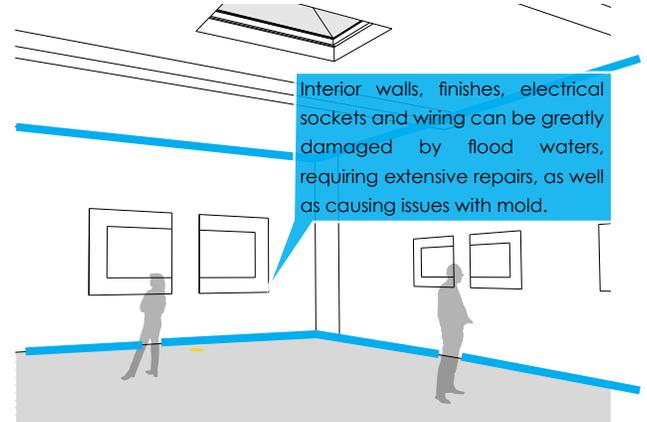
Damage to computers and office equipment results in loss of critical business documentation such as financial records and insurance information.



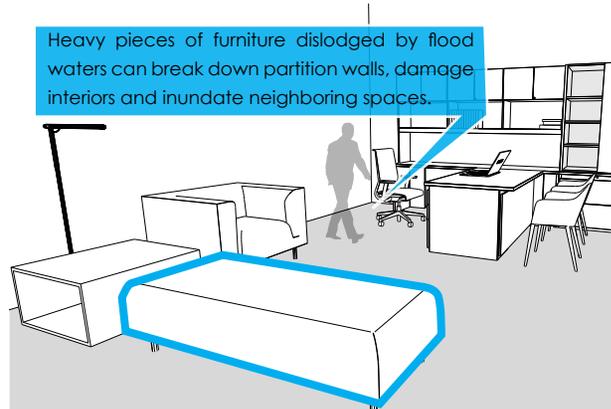
Critical systems and storage, typically located below-grade, are significantly vulnerable to flooding. Salt water can corrode key components of building systems.



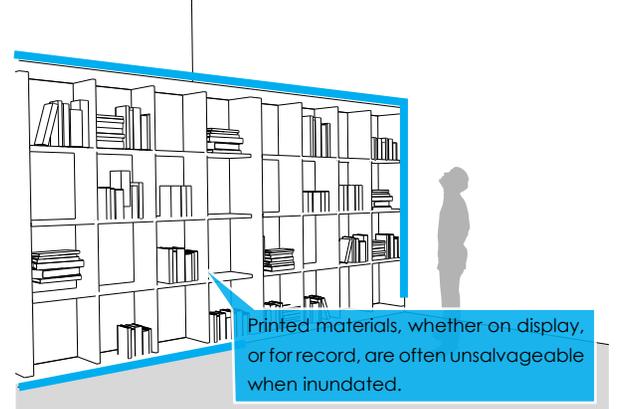
Interior walls, finishes, electrical sockets and wiring can be greatly damaged by flood waters, requiring extensive repairs, as well as causing issues with mold.



Heavy pieces of furniture dislodged by flood waters can break down partition walls, damage interiors and inundate neighboring spaces.



Printed materials, whether on display, or for record, are often unsalvageable when inundated.



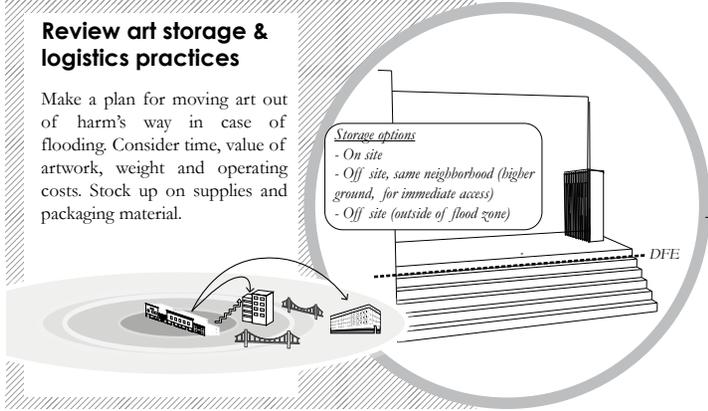
MITIGATION STRATEGIES

Review art storage & logistics practices

Make a plan for moving art out of harm's way in case of flooding. Consider time, value of artwork, weight and operating costs. Stock up on supplies and packaging material.

Storage options

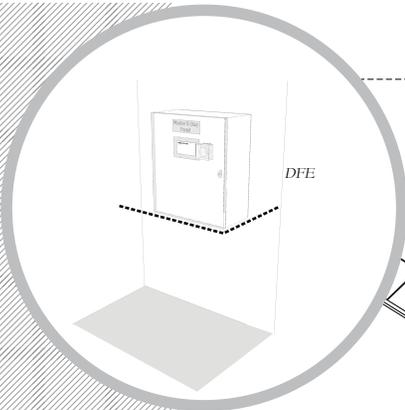
- On site
- Off site, same neighborhood (higher ground, for immediate access)
- Off site (outside of flood zone)



Elevate or protect critical systems in place

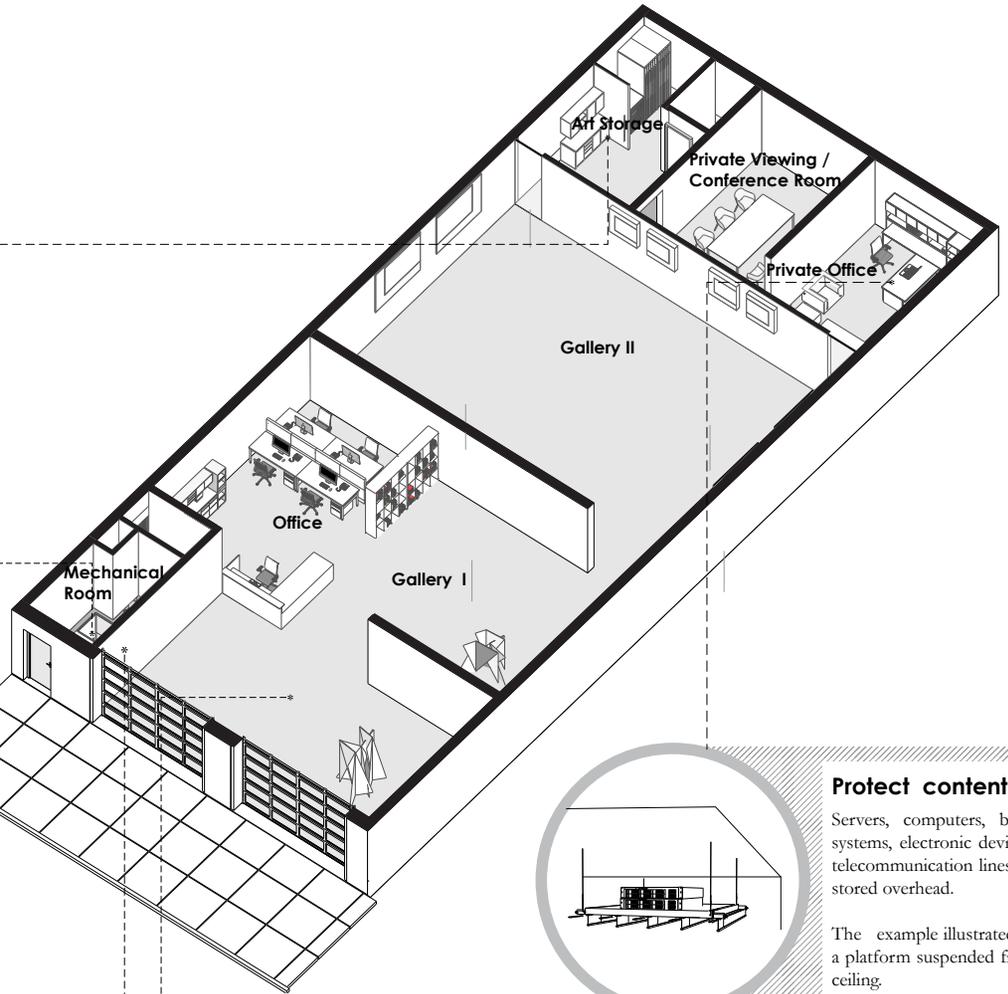
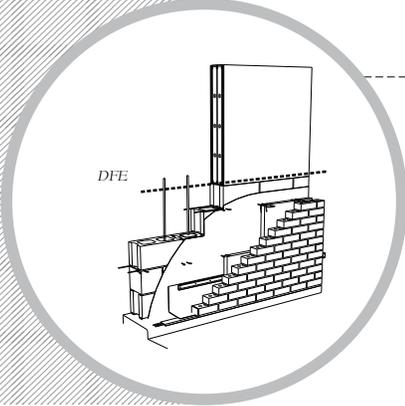
Elevate critical building systems to at or above the anticipated level of flooding. Raise electrical panels and outlets to at or above the DFE.

When relocating is not a feasible option, critical building systems can be encapsulated in a dry floodproofed enclosure, which may need to be fire-rated.



Use flood-damage resistant materials

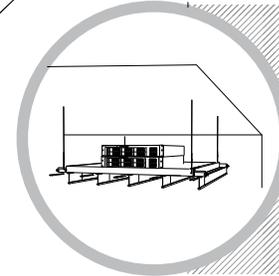
Wall assembly (including interior walls) designed with flood damage resistant materials can survive with little or no damage. After a flood, it can be cleaned out and dried quickly enough to avoid decay and reduce mold growth. Walls may be constructed of flood-damage resistant materials (with reinforcement if dry floodproofing), at least up to the DFE as a means to reduce costs.



Protect contents

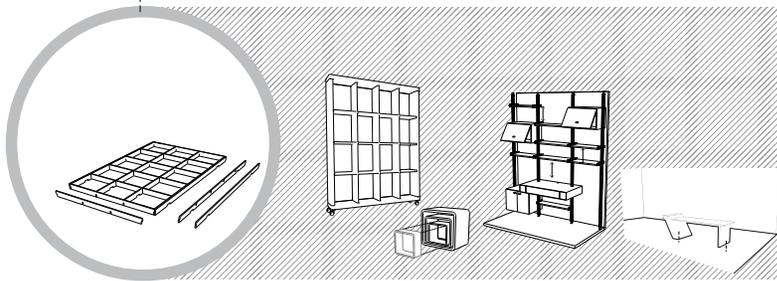
Servers, computers, back up systems, electronic devices and telecommunication lines can be stored overhead.

The example illustrated shows a platform suspended from the ceiling.



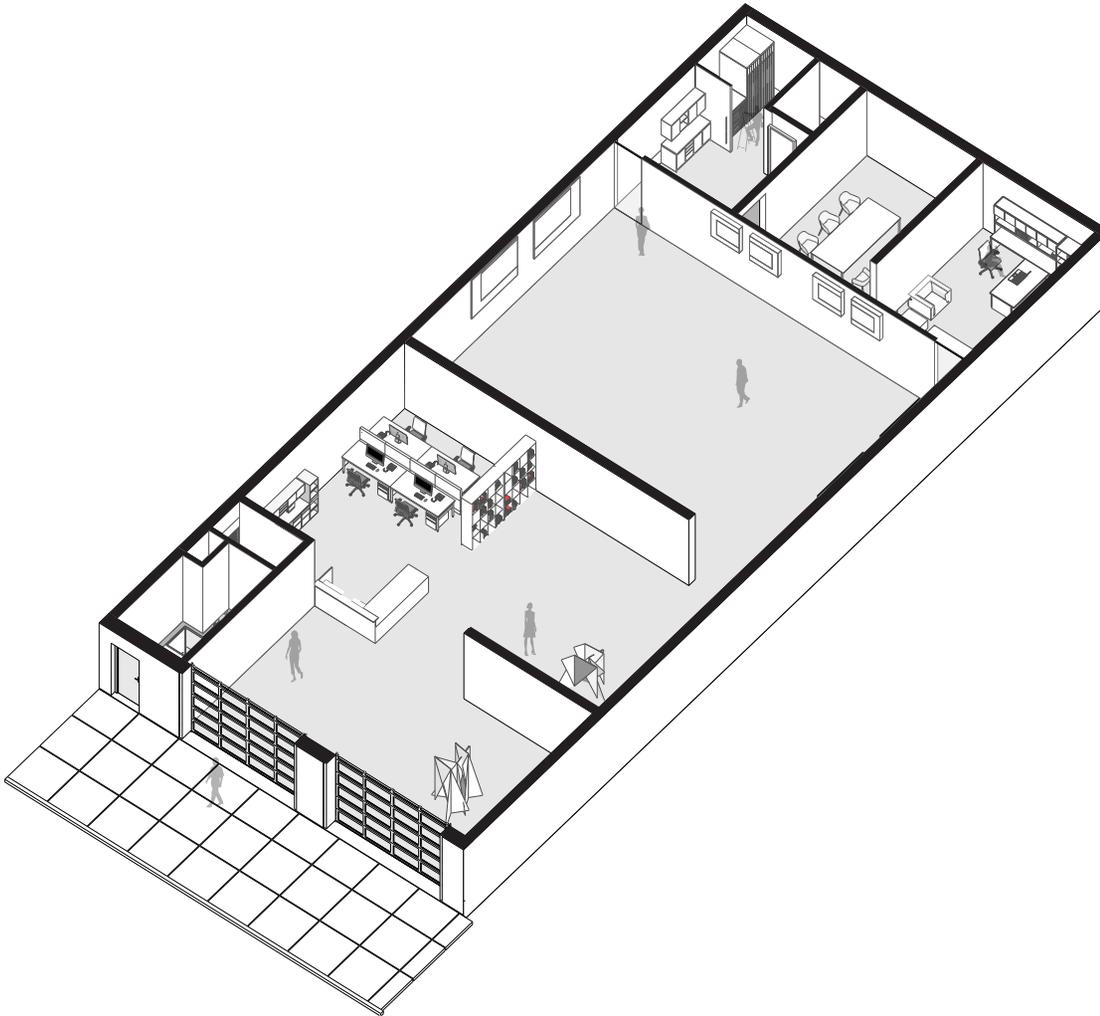
Plan for flexibility

Flexible furniture and storage solutions can facilitate quick and easy dismantling for relocation to higher ground areas or to a dry floodproofed enclosure.



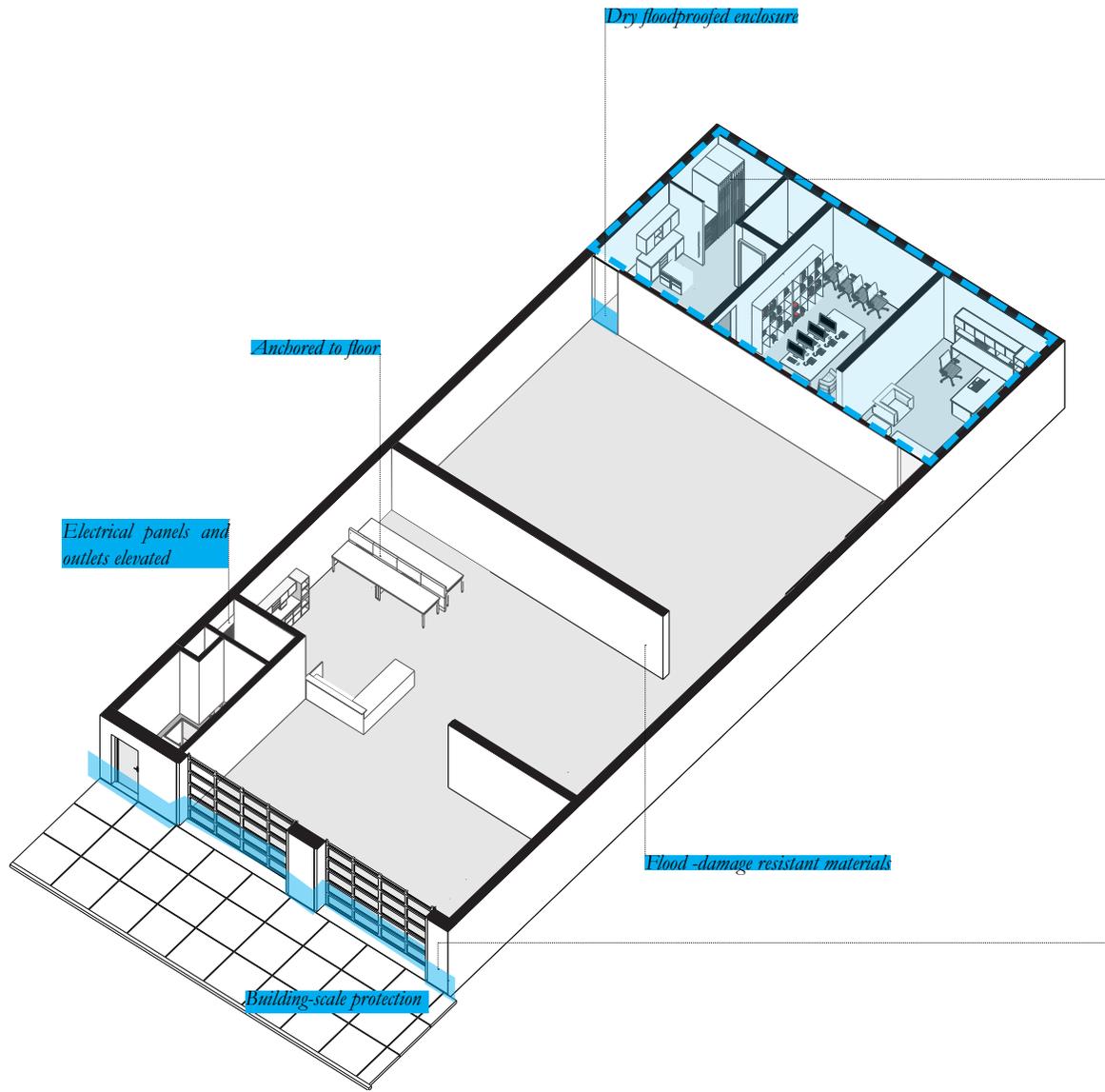
PREPAREDNESS STRATEGIES

Before the flood...



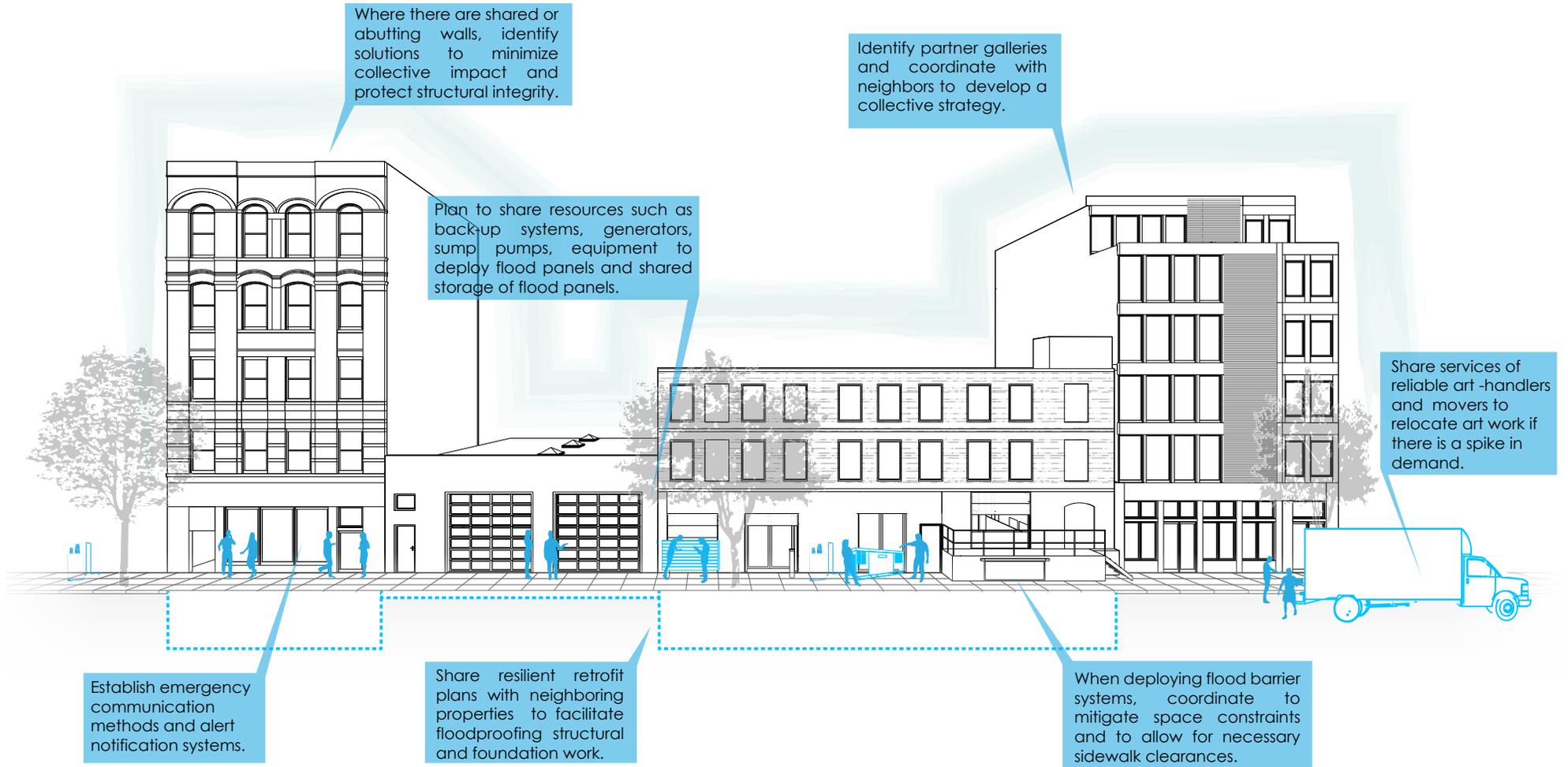
- 1** Develop a disaster preparedness plan. **Identify operations that are critical to business function and operations.** Review plan with staff and establish crisis back-up procedures.
- 2** Review options available to protect the building perimeter and coordinate with the landlord and building management. **Prioritize protecting critical building systems. Install sewer backflow valves.**
- 3** Maintain accurate inventory of art work and other items on site. **Build a regular cycle for updating the inventory** into your work schedule.
- 4** **Keep a list of essential contacts:** art storage facilities, art transport companies, conservators, clients, art dealers, consultants and local contractors for emergency repair work.
- 5** Make sure you have **copies of insurance information and important records** stored in a waterproof and fireproof container. **Keep extra copies off-site** as a precaution.
- 6** **Arrange emergency transport/storage facilities.** Practice due diligence when hiring vendors. Confirm that the storage facility has a storm preparedness plan in place if also located in a flood zone.
- 7** **During hurricane season,** plan to show artwork that can be **easily moved or relocated.**

Once a flood is predicted...



- 1** **Tune in to radio, television or internet sources for weather alerts.** Check for live updates on *notifyNYC*. When a flood warning is issued, implement disaster preparedness plan.
- 2** **Contact logistics providers and art handlers** in advance to move artwork. Consider any announced road or tunnel closings. **Contact insurance agent and clients** with works on consignment.
- 3** **Elevate / protect in place any pieces that cannot be moved off-site.** Take precautions to ensure that the artwork is not damaged.
- 4** **Relocate or elevate and protect in place critical records, possessions and furniture.** When left in place, **anchor any heavy equipment or free-standing items** to walls or floors.
- 5** Identify meeting place and time for all key employees in crisis management team. **Plan in advance to work remotely** in the event of a prolonged recovery process.
- 6** **Install flood protection** as necessary if a flood mitigation plan exists involving deployable barriers at the building-scale.
- 7** **Follow life safety and evacuation procedures.** Stay tuned to local news and media coverage.

WORKING COLLECTIVELY



CONCLUSION

West Chelsea experienced significant damage and losses as a result of Hurricane Sandy. The gallery and business communities were notably affected by extensive flooding. With projected sea level rise, an expanding floodplain, and increased frequency and severity of storms, a localized approach to resiliency planning is critical to West Chelsea's future as a thriving, multi-faceted community.

Through its Resilient Neighborhoods place-based planning initiative, the Department of City Planning aims to empower stakeholders at all levels to identify and pursue neighborhood specific strategies to support the ongoing vitality and resiliency of coastal communities such as West Chelsea. Here, three sets of issues were analyzed to support resiliency improvements that address the vulnerabilities of the community:

Special West Chelsea District

DCP aims to preserve vibrancy of the neighborhood by identifying resiliency strategies that complement the goals of the Special West Chelsea District and cater to the built characteristics unique to West Chelsea, and by encouraging design best practices to ensure an active, resilient streetscape.

LPC-Designated Historic Districts

By providing guidance on LPC's process, this report aims to encourage that historic buildings be made more resilient without damaging their historic integrity.

Gallery District

DCP is seeking to promote resilience of the arts district by identifying retrofitting tools and urban design strategies that mitigate flood risk. In coordination with Mayor's Office of Recovery and Resiliency, and the New York City Departments of Cultural Affairs, Emergency Management, and Small Business Services, DCP has produced a best practices guide for galleries, informed by issues and concerns raised during the gallery survey.

The Resilient Neighborhoods West Chelsea study has engaged local stakeholders to better understand first-hand experiences, respond to the neighborhood's unique strengths, and make recommendations that aim to enhance the neighborhood's built fabric with an understanding of flooding vulnerabilities. As an outcome of this work, the City will encourage resilient construction appropriate to West Chelsea, provide guidelines that bolster ground level businesses and active streetscapes, and enhance the neighborhood's exceptional character.

GLOSSARY OF KEY TERMS

Base Flood Elevation (BFE)

The computed elevation in feet to which floodwater is anticipated to rise during the 1% annual chance storm shown on the Flood Insurance Rate Maps (FIRMs) issued by the Federal Emergency Management Agency (FEMA). A building's flood insurance premium is determined by the relationship between the BFE and the level of the lowest floor of a structure.

1% Annual Chance Floodplain (100 Year Floodplain)

The area that has a 1% chance of flooding in any given year. It is indicated on FEMA's Flood Insurance Rate Maps (FIRMs). See "Special Flood Hazard Areas," below.

Design Flood Elevation (DFE)

As defined by the New York City Building Code, the Design Flood Elevation (DFE) is the minimum elevation to which a structure must be elevated or floodproofed. It is the sum of the BFE and a specified amount of freeboard (see definition below) based on the building's structural category.

Flood Insurance Rate Maps (FIRMs)

The official flood map, on which FEMA has delineated the Special Flood Hazard Area (SFHA), 0.2% annual floodplain (Shaded X Zone), Base Flood Elevations (BFEs), and floodways.

Preliminary Flood Insurance Rate Maps (PFIRMs)*

The PFIRMs are the best available flood hazard data. FEMA is in the process of updating the Flood Insurance Rate Maps (FIRMs) for New York City and issued PFIRMs in December 2013 and again in 2015 as part of this process. The New York City Building Code requires new and substantially improved buildings to use the PFIRMs (unless the effective FIRMs are more restrictive) until the maps become effective. The PFIRMs, however, are not used to guide the requirements of the National Flood Insurance Program.

Floodproofing, Dry

For non-residential buildings, a flood mitigation technique that results in the building resisting penetration of flood water up to the DFE, with walls substantially impermeable to the passage of water and structural components having the capacity to resist specified loads.

Floodproofing, Wet

A flood mitigation technique designed to permit parts of the structure below the DFE to intentionally flood, by equalizing hydrostatic pressures and by relying on the use of flood damage-resistant materials. With this technique, parts of the building below the DFE are only to be used for parking, storage, building access, or crawl space.

Freeboard

An additional amount of height above the BFE to provide a factor of safety to address the modeling and mapping uncertainties associated with FIRMs, as well as a degree of anticipated future sea level rise. It is a risk reduction requirement found in Appendix G of the Building Code and recognized by NFIP as an insurance premium reduction factor. In New York City, one foot of freeboard is required for commercial and multi-family buildings, and two feet for single- and two-family buildings.

* In summer 2015, the City submitted a formal appeal to FEMA, citing internal technical analysis that showed a smaller 1% annual chance floodplain across much of the city. As part of the public review of the PFIRMs, FEMA will review the appeal and determine if a re-mapping of the floodplain is necessary.

National Flood Insurance Program (NFIP)

Federal program that makes flood insurance available to municipalities that enact and enforce floodplain management regulations that meet or exceed the criteria established by FEMA. Under this program, properties within the SFHA with a federally-backed or -regulated mortgage are required to buy flood insurance. Communities participating in the NFIP must incorporate flood-resistant construction standards into building codes.

Special Flood Hazard Areas (SFHA)

Area of the floodplain that has a 1% chance, or greater, of flooding in any given year. Also referred to as the 100-year floodplain or the 1% annual chance floodplain. The SFHA is separated into zones depending on the level of hazard:

V Zone

The area of the SFHA subject to high-velocity wave action that can exceed three feet in height.

Coastal A Zone

A sub-area of the A Zone that is subject to moderate wave action between one-and-a-half and three feet in height.

A Zone

The area of the SFHA that is subject to still-water inundation by the base flood.

Substantial Damage

Damage sustained by a building whereby the cost of restoring the structure to its pre-damaged condition would equal or exceed fifty percent of the market value before the damage occurred. When a building is substantially damaged or substantially improved (see below), it is required to comply with Appendix G of the Building Code as if it was a post-FIRM structure.

Substantial Improvement

Any repair, reconstruction, rehabilitation, addition or improvement of a building with cost equaling or exceeding fifty-percent of the current market value of the building. When a building is substantially improved, it is required to comply with the flood-resistant construction requirements of Appendix G of the Building Code.

ACKNOWLEDGEMENTS

New York City Department of City Planning

Carl Weisbrod, Chairman of City Planning Commission
Purnima Kapur, Executive Director
Howard Slatkin, Deputy Executive Director for Strategic Planning

Manhattan Office Project Team

Edith Hsu-Chen, Director
Erik Botsford, Deputy Director
Karolina Hall, Senior Planner
Amritha Mahesh, Urban Designer

Resilient Neighborhoods Program Team

Michael Marrella, Director of Waterfront and Open Space Planning
Mary Kimball, Program Manager
Nilus Klingel, Urban Designer
Ryan Jacobson, Urban Designer
Trevor Johnson, City Planner
Allan Zaretsky, City Planner

Advisors and Contributors

Andrew Cantu	Cecilia Kushner
Johane Clermont	Eric Kober
Rachel Cohen	Anita Laremont
Danielle DeCerbo	Beth Lebowitz
Jessica Fain	Jesse Levin
Danny Fuchs	Stephany Lin
Janine Gaylard	Joe Marvilli
Erick Gregory	Thaddeus Pawlowski
Dakota Hendon	Manuela Powidayko
Claudia Herasme	Racheale Raynoff
Christopher Holme	Will Rosenthal
Samantha Kleinfeld	Jeffrey Shumaker

Data Sources

Federal Emergency Management Agency
NYC Panel on Climate Change
U. S. Department of Housing and Urban Development

External Contributors

Landmarks Preservation Commission
Cory Scott Herrala

NYC Department of Buildings

Joseph Ackroyd
Keith Wen
Clinton Peterson
Felisha Torres
Wendy Wan

NYC Department of Cultural Affairs

Edwin Torres
Shirley Levy
Ryan Max
Sara Cobb

Mayor's Office of Recovery & Resiliency

Carrie Grassi
Katherine Greig
Hyunjin Kim

NYC Small Business Services

Benjamin Newman

NYC Emergency Management

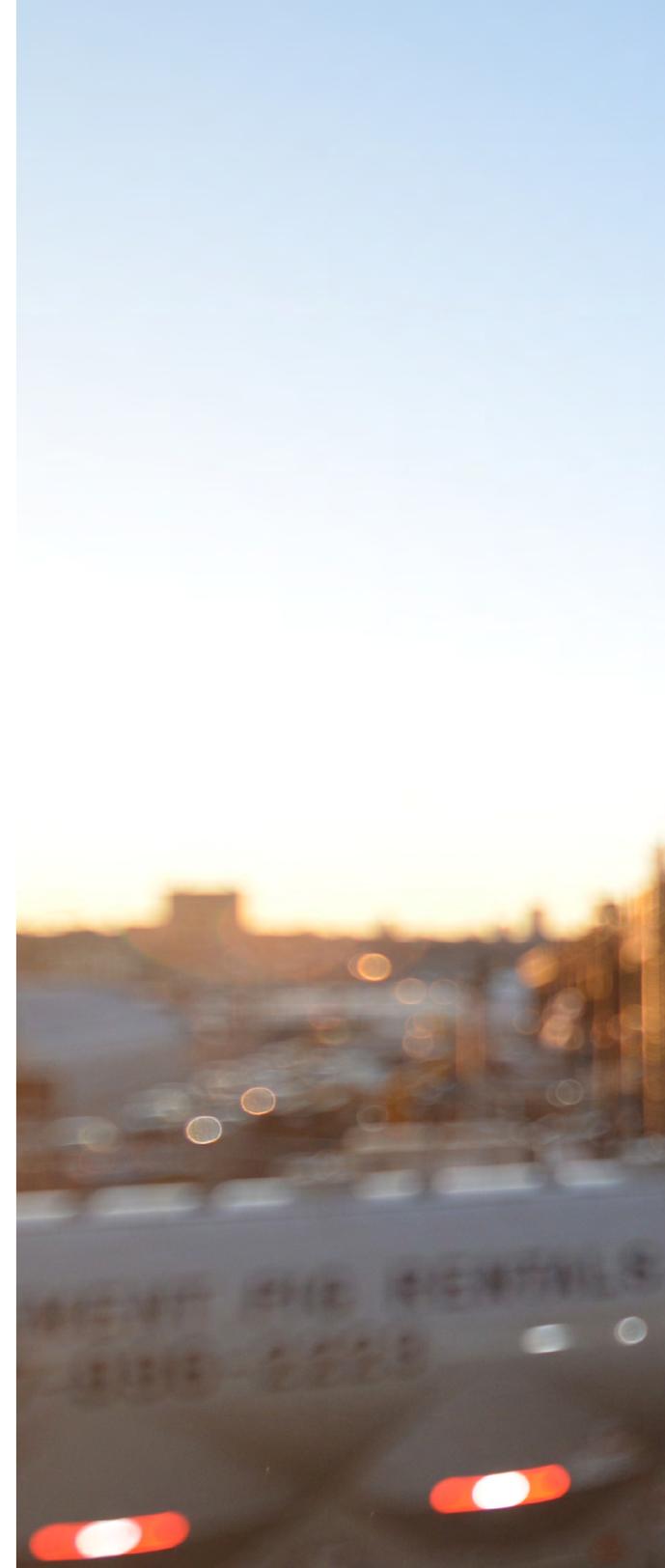
Ira Tannenbaum
Melissa Umberger

FEMA Building Science

John Ingargiola
Andrew Martin
Adam Reeder

Special Thanks

Manhattan Community Board 4
Earl Bateman
Art Dealers Association of America





RESOURCES

TECHNICAL GUIDANCE

Federal Emergency Management Agency

Floodproofing for Non-Residential Buildings / July 2013

[fema.gov/media-library/assets/documents/34270](https://www.fema.gov/media-library/assets/documents/34270)

Technical Bulletin 3, Non-Residential Floodproofing - Requirements and Certification (1993)

[fema.gov/media-library/assets/documents/3473](https://www.fema.gov/media-library/assets/documents/3473)

Technical Bulletin 2, Flood Damage-Resistant Materials Requirements (2008)

[fema.gov/z/h-hans/media-library/assets/documents/2655](https://www.fema.gov/z/h-hans/media-library/assets/documents/2655)

Flood Insurance Manual, Effective November 1, 2015

[fema.gov/media-library/assets/documents/110085](https://www.fema.gov/media-library/assets/documents/110085)

New York City Department of Buildings

Building Code Appendix G Flood-Resistant Construction

[nyc.gov/html/dob/html/codes_and_reference_materials/reference.shtml](https://www.nyc.gov/html/dob/html/codes_and_reference_materials/reference.shtml)

New York City Department of City Planning

Retrofitting Buildings for Flood Risk

[nyc.gov/retrofittingforfloordrisk](https://www.nyc.gov/retrofittingforfloordrisk)

Designing for Flood Risk

[nyc.gov/designingforfloordrisk](https://www.nyc.gov/designingforfloordrisk)

INFORMATIONAL RESOURCES

New York City Emergency Management

Ready New York is New York City Emergency Management's education campaign to prepare residents and businesses for emergencies.

[nyc.gov/readyny](https://www.nyc.gov/readyny)

New York City Department of Cultural Affairs

The Department of Cultural Affairs maintains a list of organizations that provide services and information useful to artists and cultural organizations:

[nyc.gov/html/dcla/html/resources/resources.shtml](https://www.nyc.gov/html/dcla/html/resources/resources.shtml)

