1.0 Project Description

1.0.1 Introduction

Climate change-induced sea-level rise accompanied by more frequent, intense storm events and tidal surges present a significant risk to coastal communities. In 2012 Superstorm Sandy revealed the potential for significant public safety impacts and property damage ~~and community impacts~~ from major coastal ~~storm events~~storms in the New York City area, including the potential for widespread damage to private property and public infrastructure. In response to the significant risks associated with these changing climatic conditions, the North/West Battery Park City Resiliency (NWBPCR) Project (the Proposed Project) has been proposed by the Battery Park City Authority (BPCA) for the purpose of implementing coastal protection against future severe storms for Battery Park City and adjoining upland areas. Specifically, it is the purpose of the Proposed Project to establish a flood protection system comprised of a combination of floodwalls and deployable gates, along with drainage infrastructure improvements, that are designed to Federal Emergency Management Agency (FEMA) standards for flood protection, taking into consideration projections of sea-level rise, while retaining community character and design features, minimizing community impacts, and, where possible, providing targeted urban design and open space enhancements.

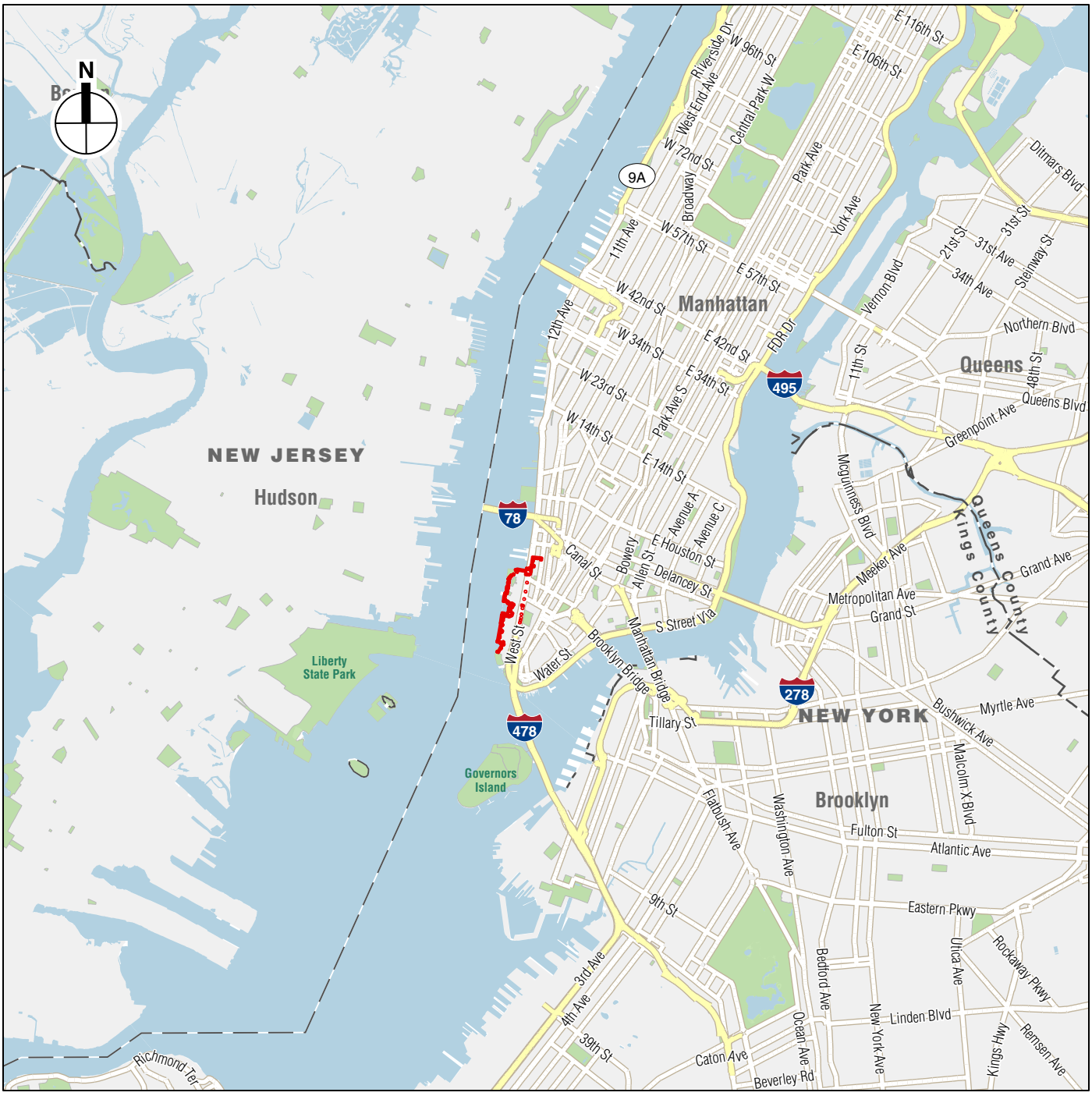
This proposal is part of a broader integrated coastal flood risk management system proposed for Lower Manhattan comprised of several interconnecting projects that together are designed to reduce the vulnerability of Lower Manhattan to coastal flood events. Since the Proposed Project is a major capital improvement project that is approximately 7,900 linear feet in length, it has been designed in sections, referred to in this FEIS as specific "reach" numbers or area designations, that extend between North Moore Street on the north (Reach 1) and South Cove on the south (Reach 7). At its southern end, the ~~project~~Proposed Project is designed to connect with the South Battery Park City Resiliency Project (SBPCR Project) at approximately 1st Place. In addition to providing organization to the design process, these reach designations were also used to organize the stakeholder/community engagement outreach and the analyses contained in this ~~Draft~~Final Environmental Impact Statement (~~DEIS~~FEIS). Assuming all required approvals are issued, the projected project construction duration ~~is~~ would be approximately five years, ~~60 months, and is based on a beginning~~ commencing in ~~July~~ the 4th quarter of 2025 and ~~completion in December anticipated to be operational~~completed in ~~2030~~2031.

BPCA, as the project sponsor, is the Lead Agency that prepared this ~~DEIS~~FEIS to examine and disclose the potential environmental impacts of implementing the Proposed Project. ~~The DEIS~~This FEIS has been prepared in accordance with the requirements of State Environmental Quality Review Act (SEQRA) and the analyses provided herein have also been prepared following the methodologies of the Final Scope of Work to prepare a DEIS issued on August 28, 2024 and also addresses the requirements of both SEQRA and the City Environmental Quality Review (CEQR) process, using the technical guidelines for impact analyses contained in the 2021 *CEQR Technical Manual*.

1.0.1.1 Background

New York City Panel on Climate Change (NPCC) projections show that climate change-induced sea-level rise accompanied by more frequent, intense storm surge and rain events pose a significant and increasing risk to coastal communities such as New York City. In 2012, Superstorm Sandy demonstrated the severity of impact that these types of extreme weather events can have on the region and underscored the City's need to address its vulnerability to coastal storm surges and severe weather events. This Proposed Project has therefore been proposed to provide coastal protection against future severe storms and sea-level rise for the portion of Lower Manhattan that includes all of the Battery Park City neighborhood as well as the ~~inland~~upland State Route 9A/West Street corridor and properties between North Moore Street on the north, Greenwich Street on the east, Battery Place on the south and State Route 9A/West Street on the west and including within the northern blocks the Borough of Manhattan Community College (BMCC) campus, Independence Plaza Towers and other properties east of Battery Park City (see **Figure 1-1**). The Proposed Project has been designed in coordination with a broader coastal flood risk management system for Lower Manhattan that includes several separate and distinct projects, among them the SBPCR to which this Proposed Project is designed to connect; the Battery Coastal Resilience (BCR) Project; the Financial District (FiDi) and Seaport Climate Resilience Master Plan; the Seaport Coastal Resilience Project; and the Brooklyn Bridge-Montgomery Coastal Resilience Project. Together, these projects will collectively support the overall Lower Manhattan Coastal Resiliency (LMCR) Strategy and in doing so reduce vulnerability to coastal floods (see **Figure 1-2**). The Proposed Project is also one of three resiliency projects that BPCA has advanced to provide coastal flood risk reduction for Battery Park City and the surrounding area of Lower Manhattan in response to the impacts of climate change. The other two projects are the SBPCR ~~project~~Project referenced above, which is currently under construction and the completed Battery Park City Ballfields and Community Center Resiliency Project (see **Figure 1-3**). By connecting with the SBPCR Project, the Proposed Project will enable both projects to achieve the full extent of coastal flood risk reduction currently targeted for Battery Park City and the inland streets and blocks of Lower Manhattan. A detailed discussion of the purpose and need for the Proposed Project and the area to be protected is provided below under section 1.2, "Purpose and Need for the Proposed Project."

Design of the Proposed Project has been informed and guided by extensive community and stakeholder outreach and input. Since August 2021, BPCA has held seven public meetings, three community "walkshops," four reach-specific public workshops, and four "site walks" to inform the community on the approach and to share design information for the Proposed Project. BPCA has also met separately with the residents and managers of the affected buildings within the ~~project's footprint~~Project Area and other interested stakeholder groups and public organizations. BPCA has organized over 45 meetings with different City and State agencies, such as the Hudson River Park Trust (HRPT), the New York State Department of Transportation (NYSDOT), the New York City Department of Transportation (NYCDOT), the New York City Department of Environmental Protection (DEP), the New York State Department of Environmental Conservation (NYSDEC), and the U.S. Army Corps of Engineers (USACE), among others, between November 2022 and April 2024 to coordinate on project design, identify the necessary permitting requirements and to ensure proper consultation and coordination with each of these respective parties. BPCA will continue to ensure that the relevant and interested parties are informed of the latest project design developments and that there is a system in place for providing feedback. The

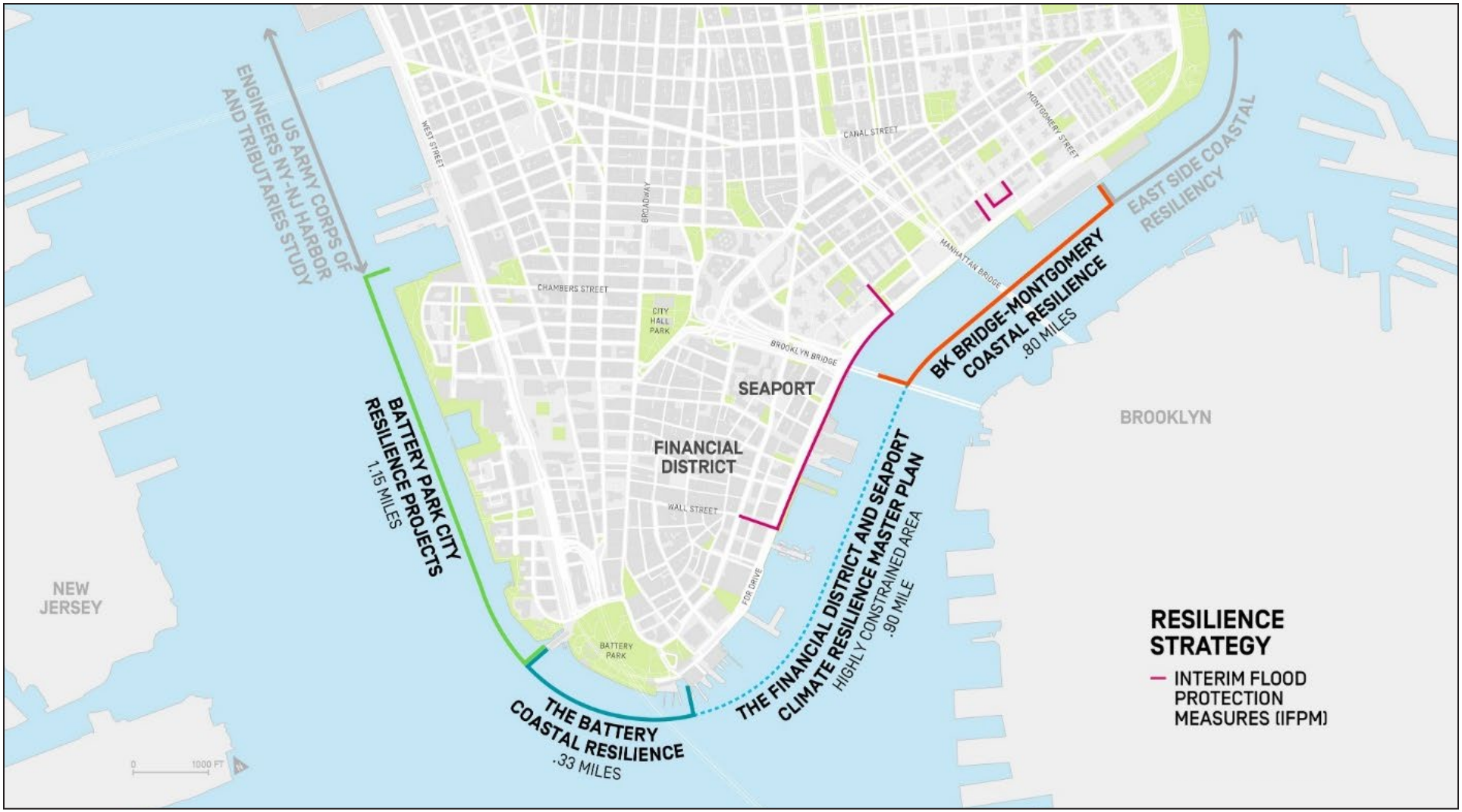


Project Area

This figure has been updated for the FEIS.

Regional Location

Figure 1-1

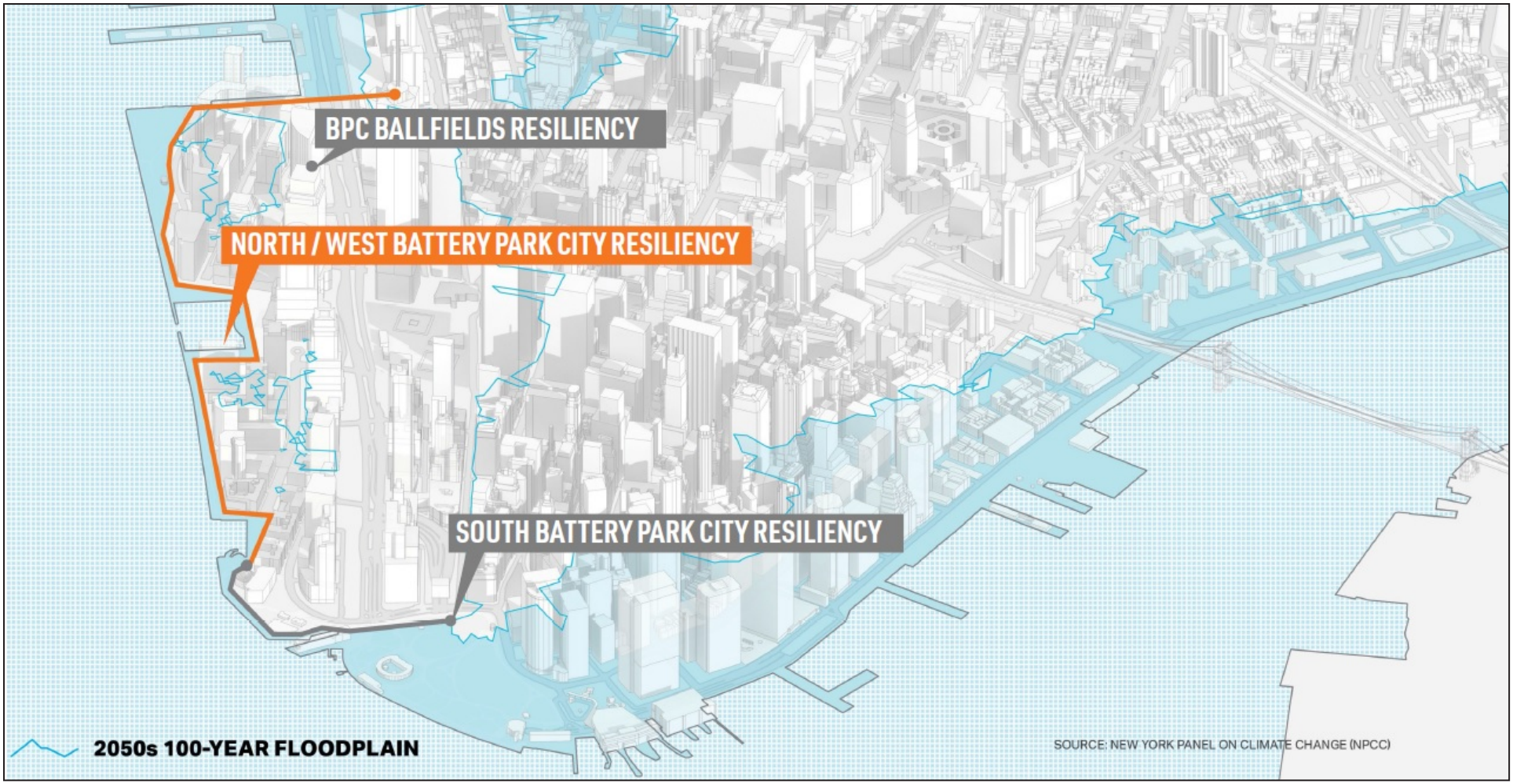


Lower Manhattan Resiliency Projects

NORTH/WEST BATTERY PARK CITY RESILIENCY

Figure 1-2

12.6.24



Battery Park City Resiliency Projects

NORTH/WEST BATTERY PARK CITY RESILIENCY

Figure 1-3

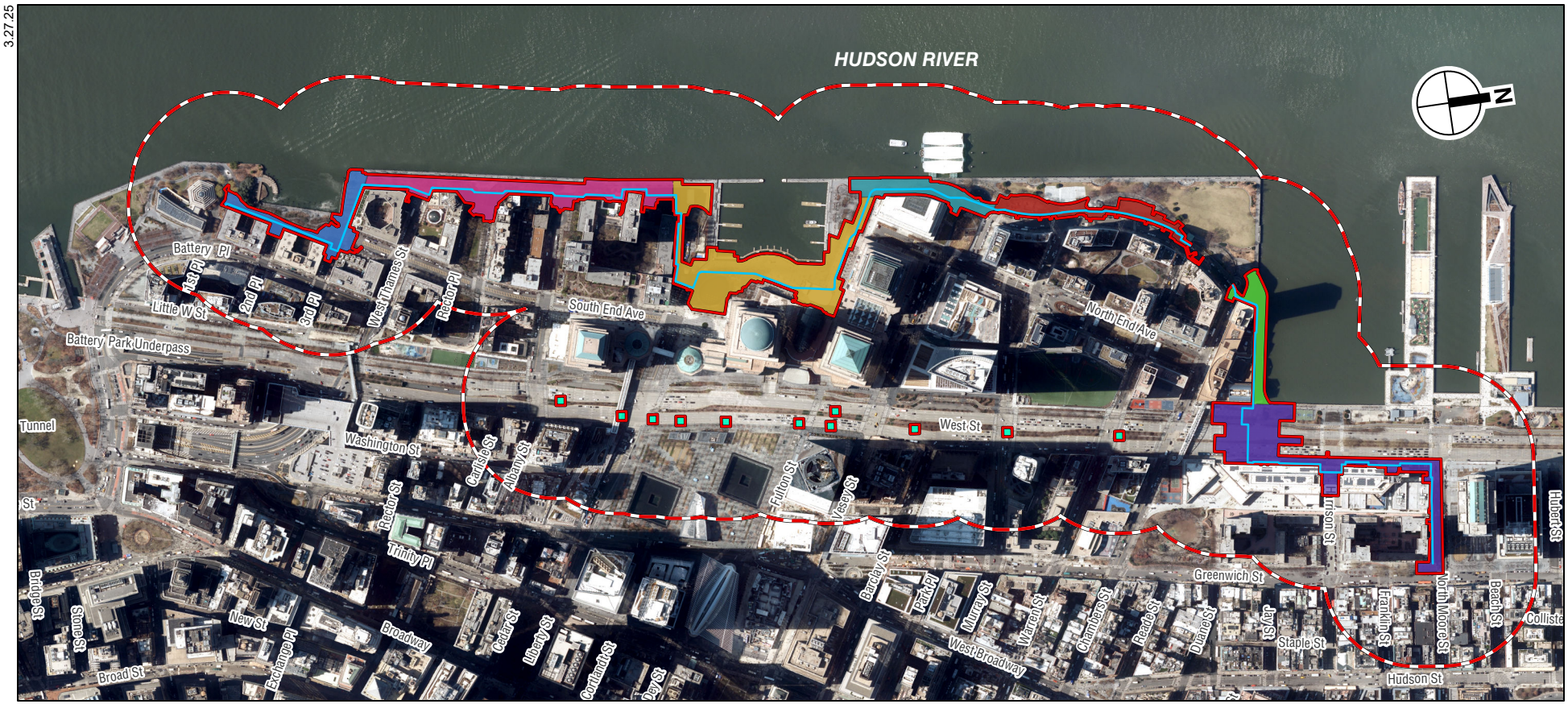
~~public will also have opportunities to comment~~public's input on the Proposed Project ~~throughout~~was also solicited during the environmental review process, which included a DEIS hearing on September 18, 2024 and a period for submitting written comments that was open through October 7 (see Chapter 10, "Response to Comments," for the DEIS's public comments and BPCA's responses). Key design elements within the Proposed Project have been informed by the coordination and discussions held during a series of outreach meetings to date.

As discussed and refined during the course of that outreach, it is the objective of the Proposed Project to provide coastal storm risk reduction by incorporating an adaptable flood barrier system along the public street corridors and the waterfront parkland of Battery Park City, while respecting, embracing, and strengthening the landscape and urban design elements that define Battery Park City. In doing so, it is also a design objective to both celebrate and complement the existing material palette of Battery Park City, restoring and enhancing spatial experiences, and introducing targeted landscape diversity that supports adaptability and resilience for future decades. In furtherance of these objectives, the Proposed Project has been designed to achieve Waterfront Edge Design Guidelines (WEDG) certification through innovative and integrated landscape architectural and engineering site planning.

Project Area Alignment and Study Areas

The Project Area includes the footprint of the proposed flood barrier system, along with areas for grading and ~~landscaping~~ planting along the 7,900 linear foot alignment. As previously stated, the Project Area was organized during the project design phase into seven reaches (see **Figure 1-4**) for ease of reference and description. These reaches begin on the north at the inland "tie-back" on North Moore Street just west of Greenwich Street in Tribeca (Reach 1). From here, the proposed flood barrier system alignment extends along the south side of North Moore Street, then turns south along the east side of State Route 9A/West Street with a connection across Harrison Street before crossing to the west side of State Route 9A/West Street. Here, the flood barrier ~~alignment~~system enters Battery Park City at the North Esplanade and continues west (Reach 2~~).~~) where it ties into high ground at the intersection of Chambers Street and River Terrace near the Hurricane Maria Memorial. The alignment then resumes farther south at the Pavilion by Demetri Porphyrios in the Battery Park City North Neighborhood (Reach 3) and runs parallel to and along the west side of River Terrace alongside Rockefeller Park. The alignment continues southward along the waterfront heading toward North Cove (Reach 4). From the northwest area of North Cove, the alignment extends east, south, and west around North Cove (Reach 5). South of North Cove, the alignment continues south running parallel to and along the upper walkway and perpendicular to street ends at Albany, Rector Place and West Thames Streets (Reach 6). ~~The southern terminus design is aligned east~~The alignment continues along the northern edge of South Cove and then south along the upland interior of South Cove to complete the system and connect with the SBPCR Project at approximately 1st Place (Reach 7). In the vertical dimension (i.e., depth of work), the ~~project area foundations and~~ supporting piles for the foundations of the proposed flood barrier system are expected to extend as much as 50 to 90 feet below the existing surface grade.

3.27.25



0 1,000 FEET

- Project Area
- Study Area (400-foot perimeter)
- Flood Barrier System
- Reach 1 - North Moore Street and West Street
- Reach 2 - North Esplanade
- Reach 3 - Rockefeller Park and Playground
- Reach 4 - Lily Pond and Ferry Terminal
- Reach 5 - North Cove
- Reach 6 - South Esplanade
- Reach 7 - South Cove
- Interior Drainage Elements

This figure has been updated for the FEIS.

Project Area and Reaches

NORTH/WEST BATTERY PARK CITY RESILIENCY

Figure 1-4

For the purpose of the EIS impact analyses, the Study Area generally referred to for the Proposed Project extends 400 feet from the limits of the Project Area (although the study area for each technical analysis may vary in terms of size). See **Figure 1-4** for a reach-by-reach view of the flood barrier alignment.

Principal Design Parameters and Objectives

As stated above, the Proposed Project has been designed to connect to the SBPCR Project at which time the two projects will provide comprehensive coastal flood protection at the targeted storm design level for the entirety of Battery Park City and the immediately inland streets, infrastructure, and properties that are currently susceptible to flooding associated with elevated high-water levels and wave effects from coastal storms that affect the Hudson River surface water elevation. The principal design objective is to provide flood risk reduction for the 100-year joint probability event of both a simultaneous coastal storm high tide and rainfall event (see **Figures 1-5 and 1-6**), inclusive of 2.5 feet of sea~~–~~-level rise, with adaptability built into the system for potentially higher sea level conditions in the future (see **Figure 1-7 and 1-8**). To achieve this goal, the Proposed Project is comprised of passive structures (e.g., above-grade walls, below-grade concealed walls) with deployable structures at vehicle and pedestrian crossings such as streets and sidewalks, such as the crossing of State Route 9A/West Street and Harrison Street (see **Figures 1-9 and 1-10a-f**). In addition to the proposed flood barrier system, the Proposed Project includes drainage management and infrastructure improvements to address precipitation-related flooding from a simultaneous storm tide/rainfall event. A more detailed description of these project elements is provided below under "Proposed Flood Barrier System Design Elements."

Once implemented, the Proposed Project would provide protection from coastal storm events for Battery Park City—including the private residential and commercial assets as well as public community facilities (e.g., Stuyvesant High School and two public schools) and cultural facilities, memorials, and art installations as well as the many street corridors that provide access to these uses. In addition, the Proposed Project is designed to protect a critical segment of the State Route 9A/West Street transportation corridor, immediately inland from Battery Park City, against coastal flooding while also providing drainage improvements to address simultaneous rainfall.

The area protected by the Proposed Project also includes inland commercial and residential properties, public facilities, memorials, parks, and open spaces in the block south of North Moore Street and east of State Route 9A/West Street that includes Independence Plaza and the Borough of Manhattan Community College; the area south of Chambers Street that includes the Freedom Tower and the World Trade Center Memorial, as well as all ~~the~~ of the properties inland to Greenwich Street; and a portion of the area between Greenwich Street and Church Street between Barclay Street and Liberty Street.

Adaptability

The Proposed Project has been designed to accommodate adaptation of the flood barrier system elevation should future coastal storm projections indicate that the design flood elevation needs to be increased. Therefore, the proposed foundation supporting elements of the flood barrier system (i.e., deep piles, micropiles) have been designed taking into account increasing the system height by two feet should that be necessary in the future.

3.27.25



0 1,000 FEET

Project Area

SBPCRP Project Area

Protected Area

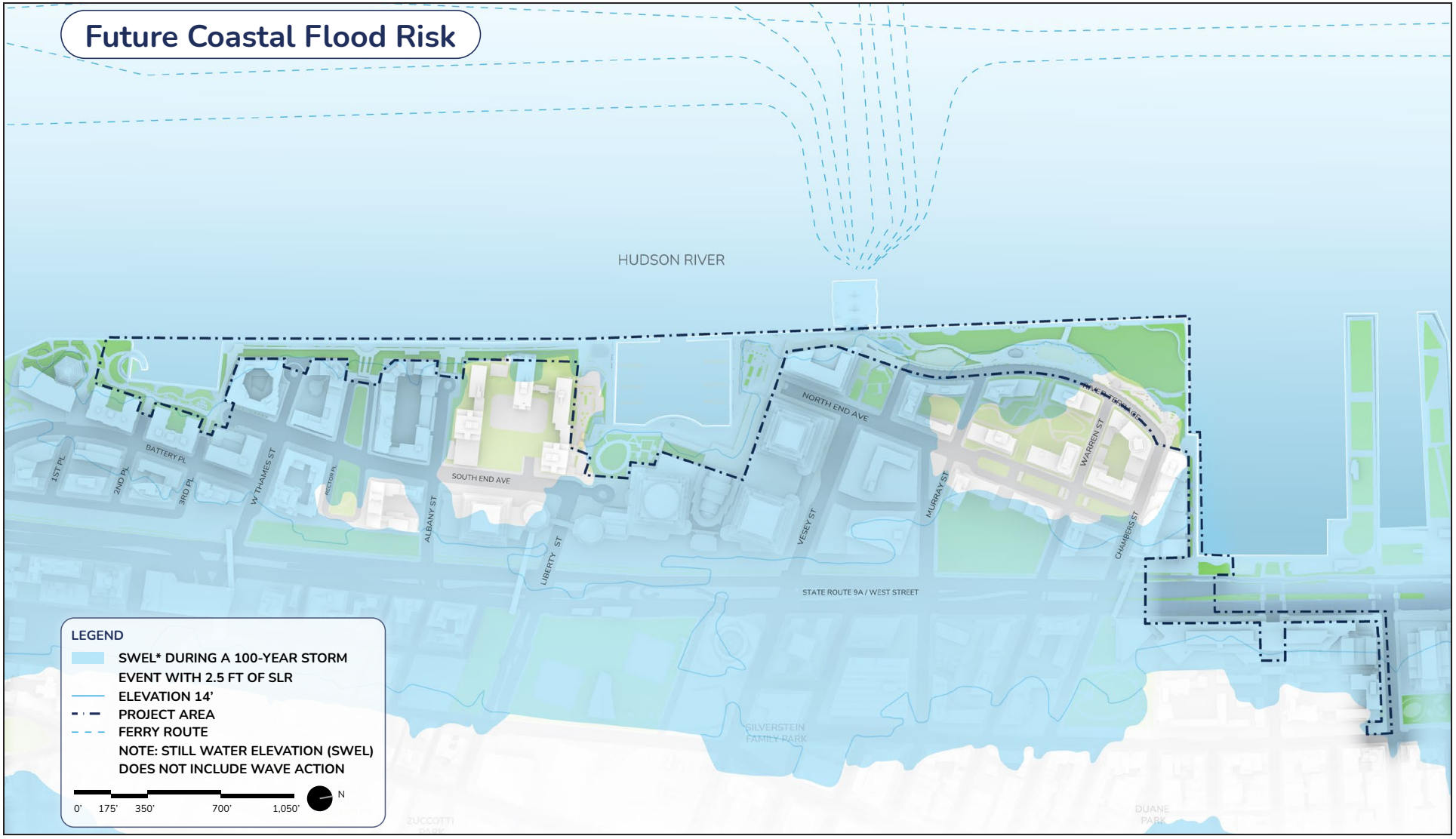
This figure has been updated for the FEIS.

Protected Area Aerial Map

NORTH/WEST BATTERY PARK CITY RESILIENCY

Figure 1-5

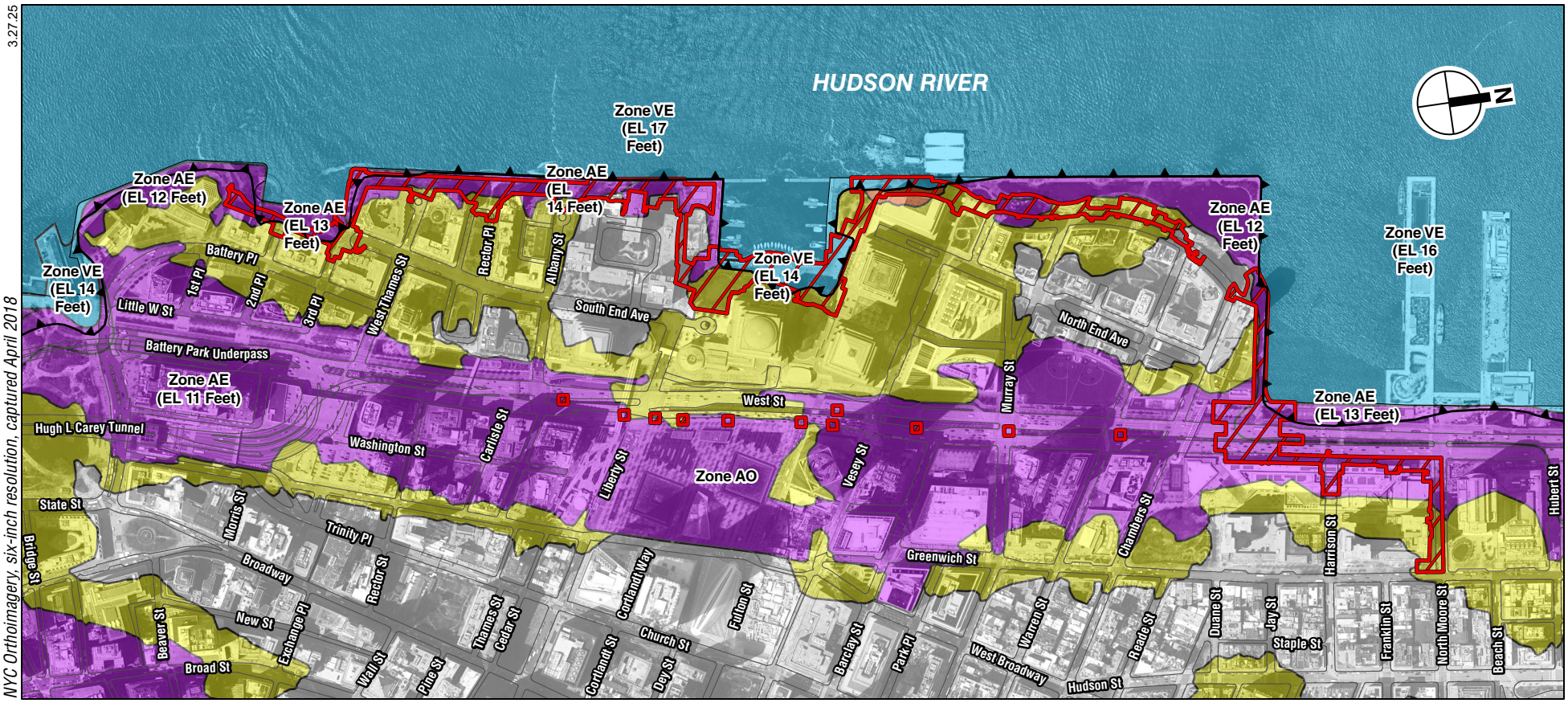
12.6.24



Note: Projected to 2050 with 2.5 feet of sea level rise.

This figure has been updated for the FEIS.

Flood Risk Area (Projected to 2050)



0 1,000 FEET

Data sources: FEMA, January 2015 / NYS GIS Program Office; NYC Orthoimagery, six-inch resolution, captured April 2018

3.27.25

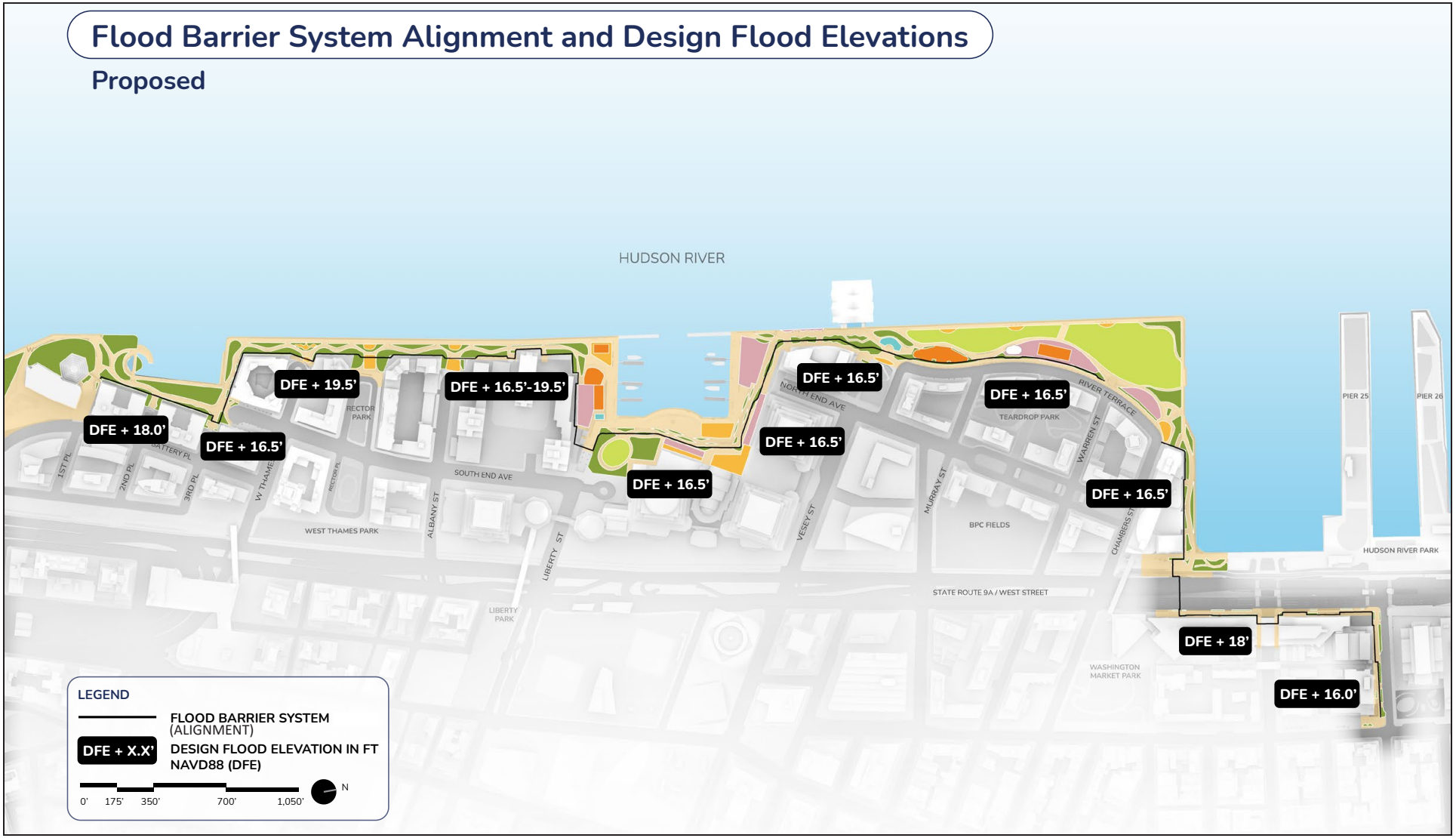
- *Project Area*
- *1% Annual Chance of Flooding - Zone AE*
- *1% Annual Chance of Flooding - Zone AO*
- *1% Annual Chance of Flooding - Zone VE*
- *0.2% Annual Chance of Flooding*
- *Limit of Moderate Wave Action*

This figure has been updated for the FEIS.

FEMA Preliminary FIRM 2015

NORTH/WEST BATTERY PARK CITY RESILIENCY

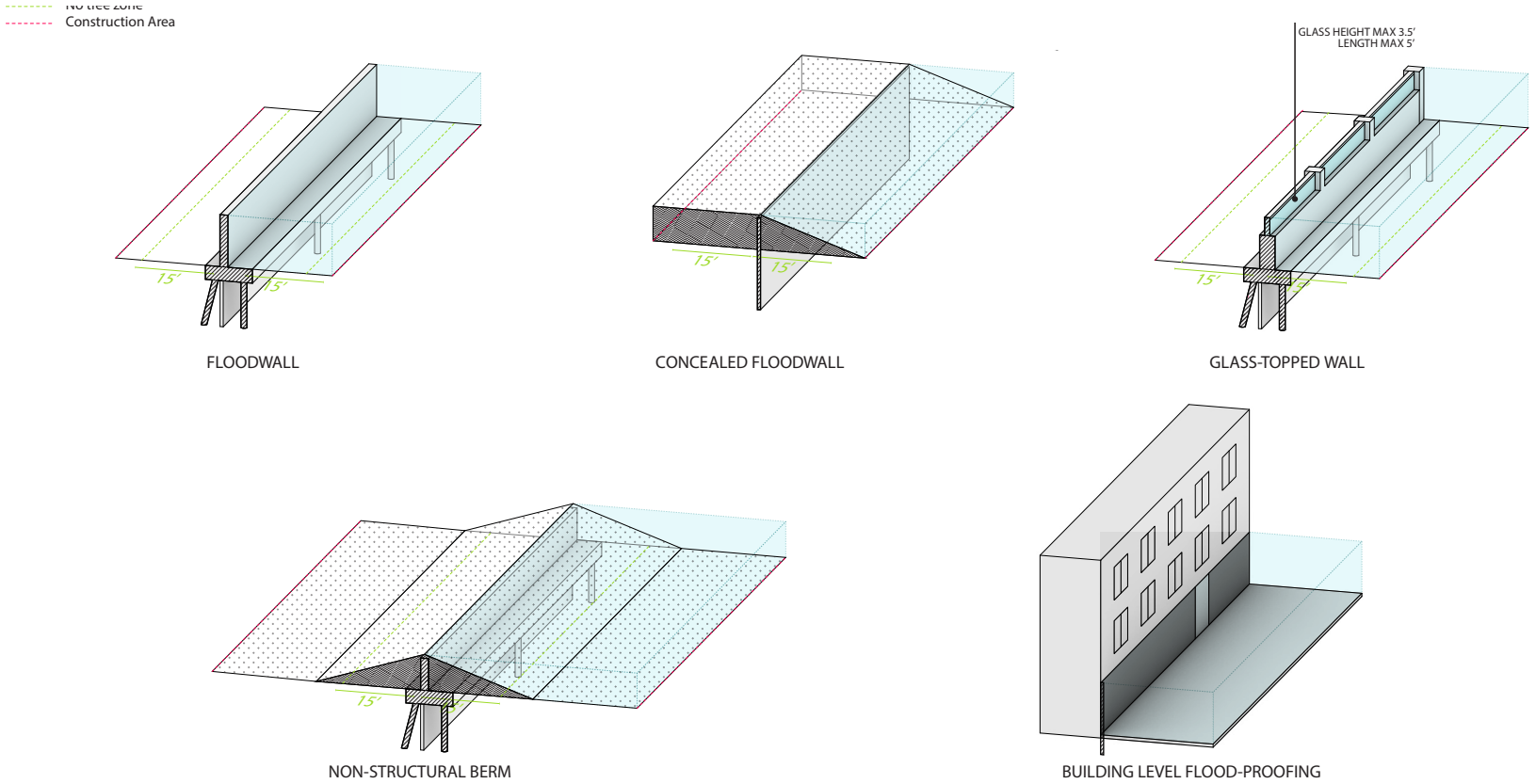
Figure 1-7



This figure has been updated for the FEIS.

Flood Barrier System Design
Flood Elevations (above NAVD88)

Figure 1-8

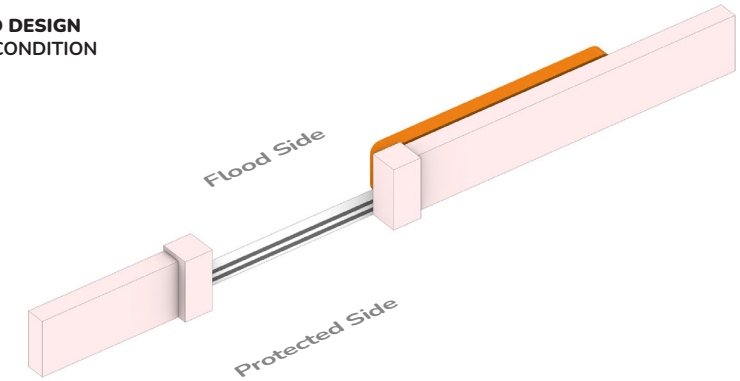


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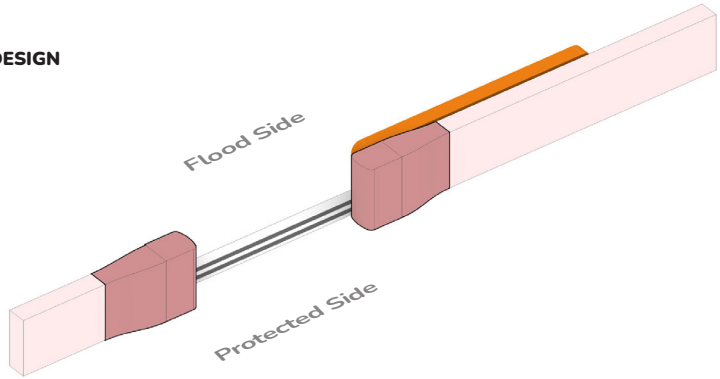
Flood Protection System: Passive Treatments (Illustrative)

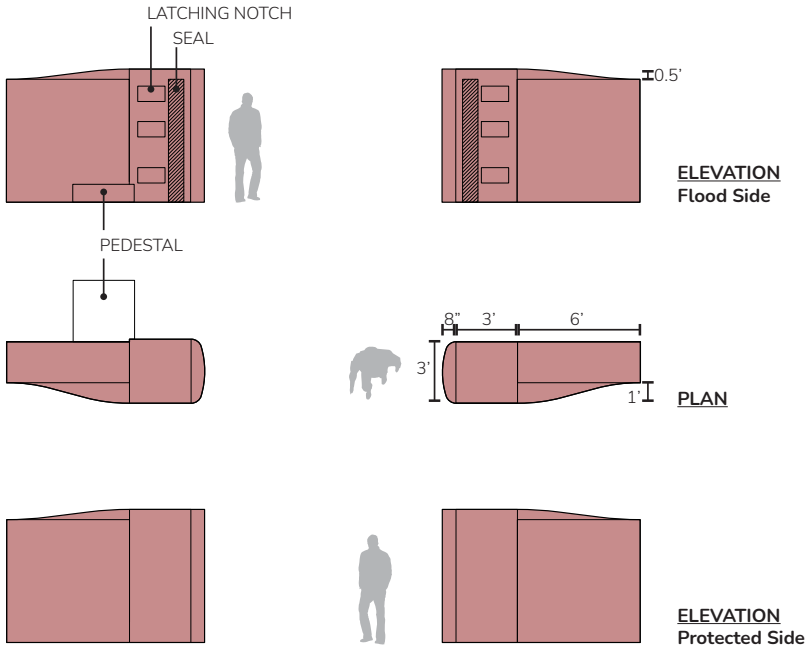


STANDARD DESIGN
BASELINE CONDITION



PROPOSED DESIGN
BULLNOSE





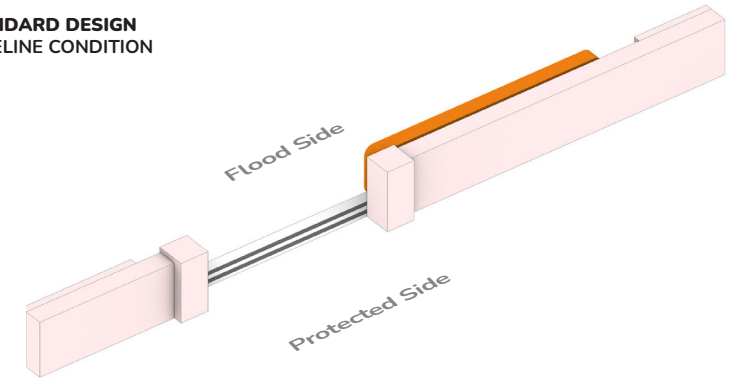
Flood Protection System: Deployable Elements - Roller Gate Typology 1

NORTH/WEST BATTERY PARK CITY RESILIENCY

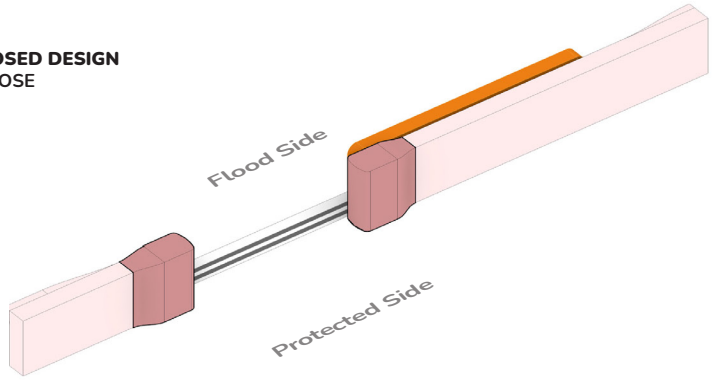
Figure 1-10a

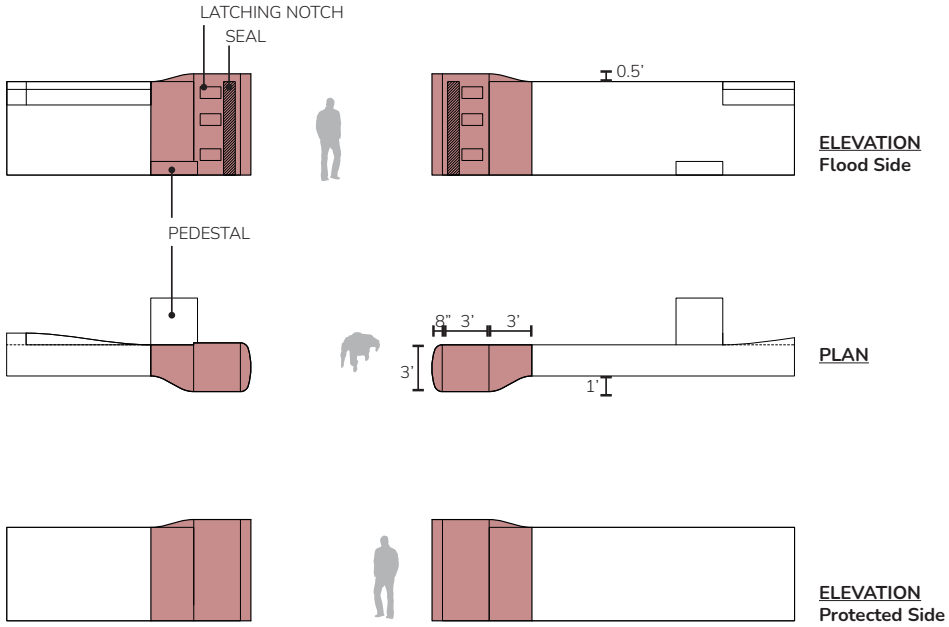


STANDARD DESIGN
BASELINE CONDITION



PROPOSED DESIGN
BULLNOSE

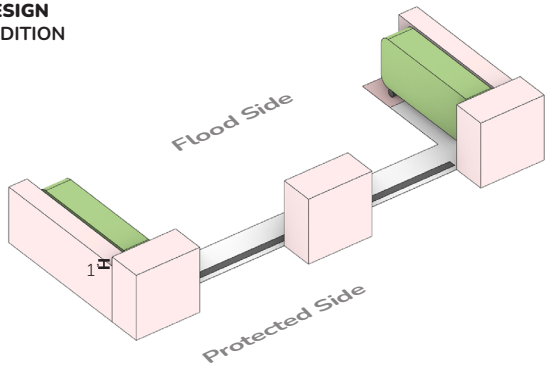




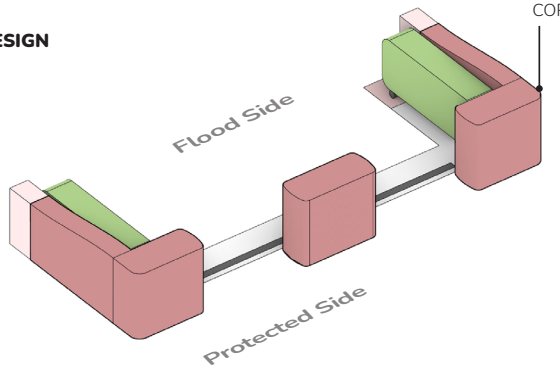
Flood Protection System: Deployable Elements - Roller Gate Typology 3

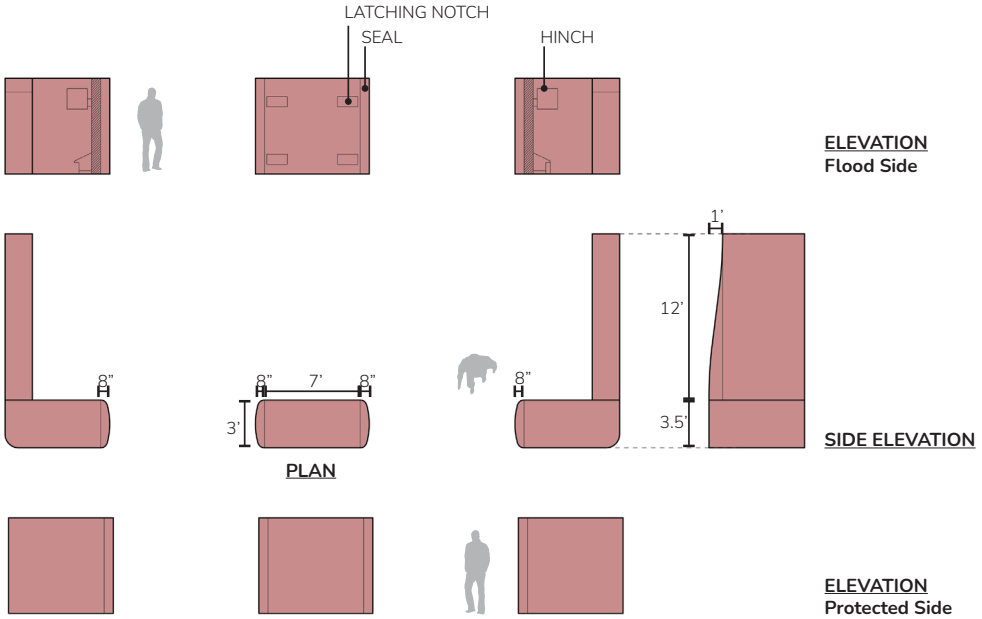


STANDARD DESIGN
BASELINE CONDITION



PROPOSED DESIGN
BULLNOSE

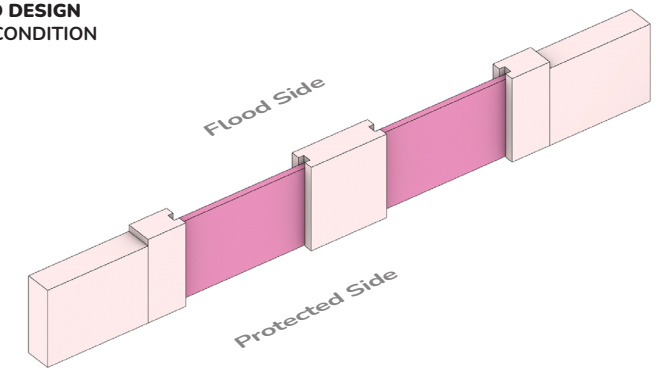




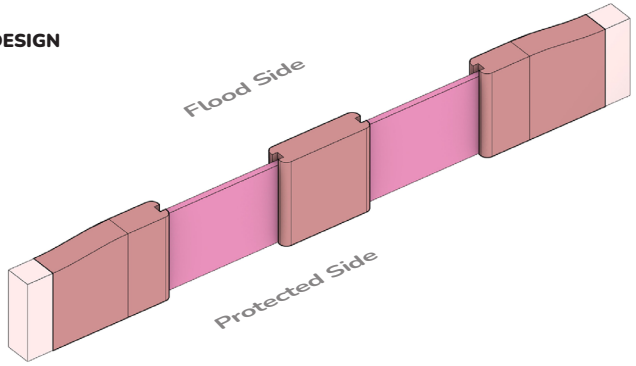
Flood Protection System: Deployable Elements - Swing Gate Typology 2

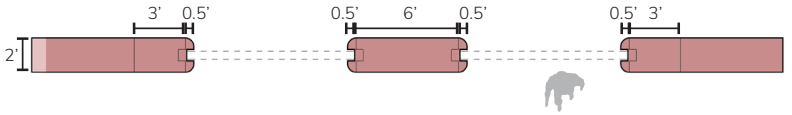


STANDARD DESIGN
BASELINE CONDITION

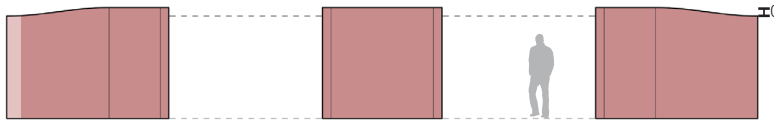


PROPOSED DESIGN
BULLNOSE





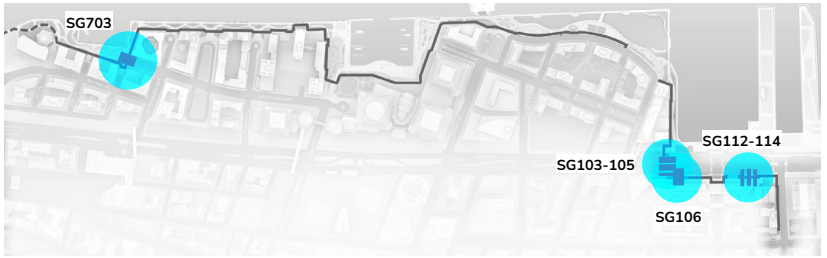
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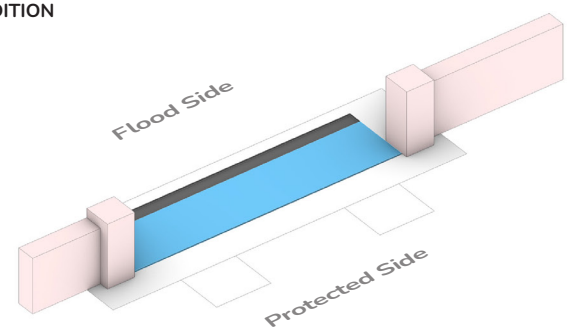
ELEVATION
Protected Side

Flood Protection System: Deployable Elements - Stop Log Typology 1

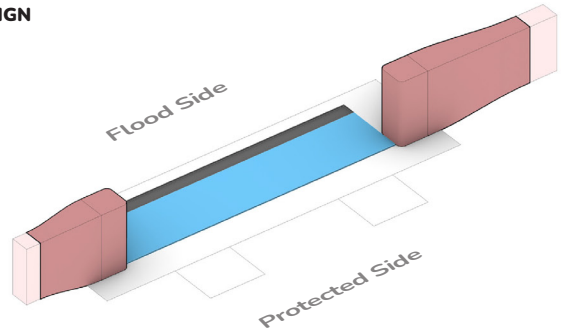
Figure 1-10d

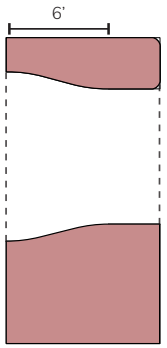


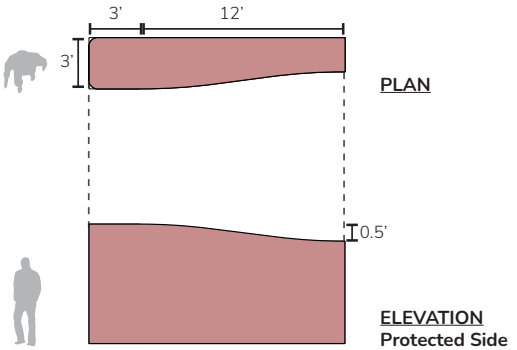
STANDARD DESIGN
BASELINE CONDITION



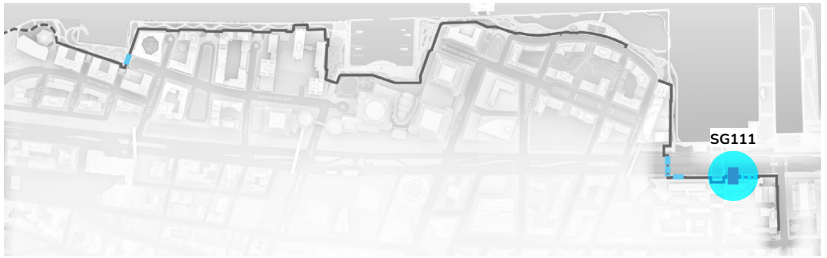
PROPOSED DESIGN
BULLNOSE



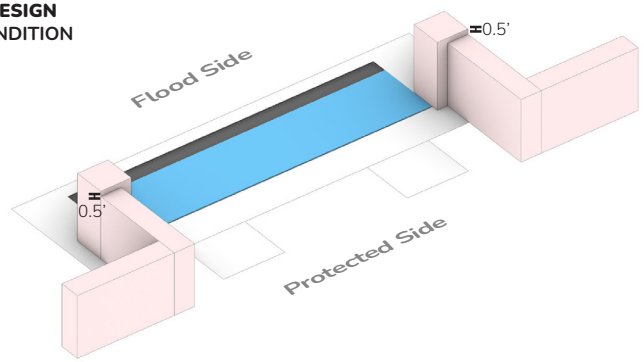




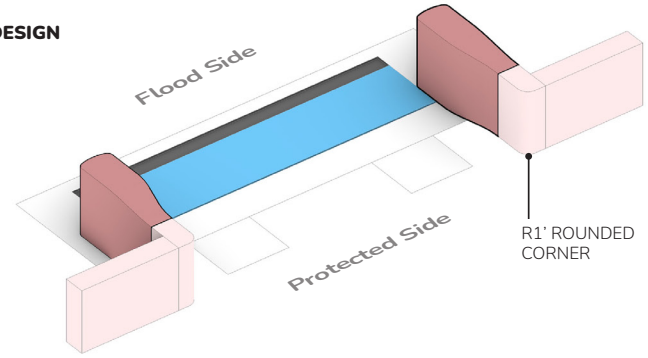
Flood Protection System: Deployable Elements - Flip-Up Gate Typology 1

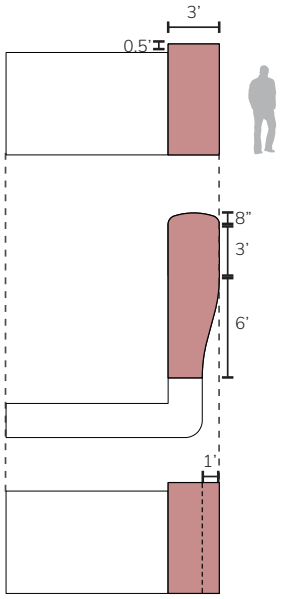


STANDARD DESIGN
BASELINE CONDITION

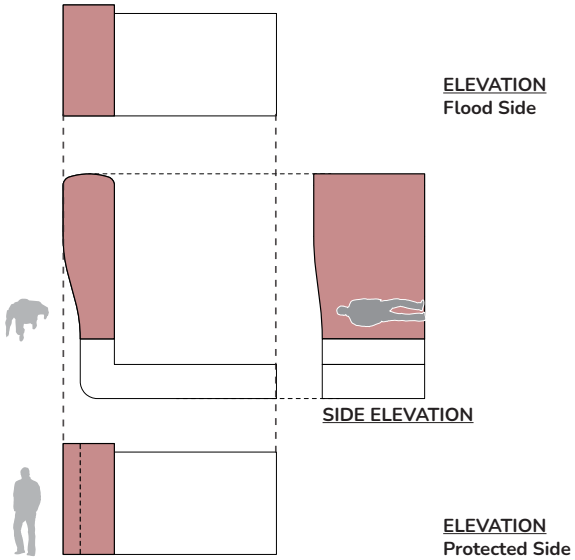


PROPOSED DESIGN
BULLNOSE





PLAN



Flood Protection System: Deployable Elements - Flip-Up Gate Typology 2

1.0.2 Purpose and Need for the Proposed Project

Many coastal communities like Battery Park City and the inland neighborhoods of Lower Manhattan face the significant challenge of identifying how to address the impacts from more frequent and ~~intensive~~intense storm events and tidal ~~surges~~flooding while simultaneously prioritizing design strategies that preserve the quality of life and livability in City spaces.

The Proposed Project's primary goal is addressing these challenges and providing coastal storm flood risk reduction through a flood barrier system that is: (1) integrated into the public space/~~–~~realm with accompanying urban design and open space enhancements; and (2) meets the design criteria for a 2050s 100-year storm event~~,~~ (referred to hereafter as the "design storm event"), inclusive of increased intensity and frequency of rainfall, coastal surge, and predicted sea ~~–~~ level rise of 2.5 feet (consistent with design parameters for certain other LMCR projects in Lower Manhattan).

The principal purposes of the Proposed Project are to:

- Provide a reliable coastal flood barrier system that addresses the potential flooding impacts of the design storm event and reduces flood risk to residents, property, and assets within Battery Park City;
- Preserve, enhance, and protect to the maximum extent practicable the open spaces and waterfront cultural resources of Battery Park City;
- Preserve and enhance to the greatest extent possible the character, accessibility, including universal access, and design aesthetic of the neighborhood and its interface with the Battery Park City waterfront with access to coastal view sheds, particularly views of the Hudson River, New York Harbor, and the Statue of Liberty; and
- Avoid or minimize disruption to existing below and above-ground infrastructure (i.e., water and sewer infrastructure, tunnels, utilities, etc.) from both construction impacts and flood events.

Specific design objectives of the Proposed Project are to:

- Provide a reliable and adaptable coastal flood barrier system that minimizes flood risk by relying on passive flood control rather than operational interventions and mechanical "deployable" flood barrier systems;
- Reduce urban heat island effect and enhance outdoor thermal safety;
- Construct and operate the Proposed Project in an environmentally responsible manner; and
- Utilize cost-effective low-impact solutions to maximize capital investment over the lifespan of the Proposed Project.

It is BPCA's objective that once installed the flood barrier system be accredited by FEMA. Accreditation requires a FEMA review of as-built plans and verification that the flood barrier system meets all pertinent requirements and in ~~-~~ practice can achieve acceptable risk reduction. Once approved, FEMA accreditation would remove the Project Area from the currently mapped flood zone, and property owners in the area~~,~~

~~including those~~ who have a federally backed mortgage~~,~~ would no longer be required to obtain flood insurance.

1.0.3 Project Area

1.0.3.1 Principal Elements

As described in detail above, the proposed flood barrier system alignment extends from North Moore Street at the intersection of Greenwich Street in ~~TriBeCa~~Tribeca on the north to 1st Place in Battery Park City on the south and for the majority of its length is aligned along the upland limits of the Battery Park City open spaces. In addition to the proposed flood barrier system, interior drainage improvements are proposed that include a pump station (in Reach 1), as well as new tide gates, conveyance improvements in select areas, near surface isolation systems and drainage improvements along State Route 9A/West Street (see **Figure 1-11**). Each of these project elements is described in greater detail below.

Since the issuance of the DEIS, the BPCA has advanced the project design and made various design updates and modifications, including, but not limited to, changes in the proposed drainage design an updated design for the North Moore Street corridor and design updates related to the State Route 9A/West Street and Harrison Street gate crossings. These updates are described in greater detail below.

1.0.3.2 Background: Battery Park City Design History

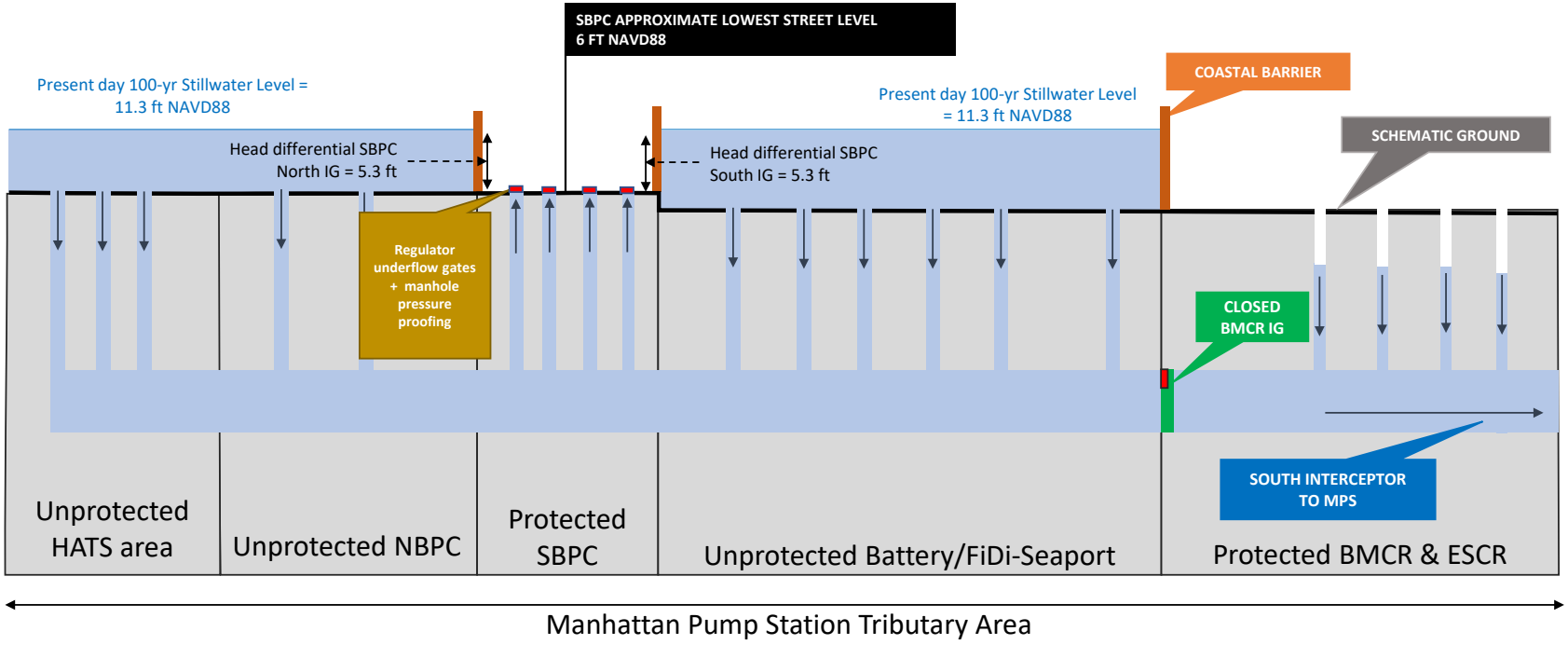
Battery Park City was planned and developed according to a Master Plan adopted in 1979. It is built in part on fill that was created from material excavated during the World Trade Center complex construction in the late 1960s and the early 1970s and is also built on pile-supported platforms over the river. In addition to the Master Plan design for residential neighborhoods and a commercial center, a key element in the Master Plan was the waterfront Esplanade and open spaces that opened to the river.[1]

Rockefeller Park in the north neighborhood of Battery Park City was designed to provide the majority of Battery Park City's recreational lawn area supported by a large playground, plantings and gardens, several public art pieces, and a sheltered pavilion. This park is named in honor of Governor Nelson A. Rockefeller who signed the Battery Park City Authority Act in 1968 establishing Battery Park City for generations of New Yorkers and visitors. Rockefeller Park opened in 1992 and was designed by the architecture firm Carr, Lynch, Hack, and Sandell and landscape architects Oehme Van Sweden and Donna Walcavage.

The Battery Park City Esplanade was designed by landscape architecture firm Hanna Olin and opened in phases between 1986 and 1996. It runs the entire length of Battery Park City's Hudson River waterfront from Wagner Park in the south to Stuyvesant High School in the north. The Esplanade provides expansive views of the Hudson River and New York Harbor, the Statue of Liberty, Ellis Island, and the New Jersey

[1] https://bpca.ny.gov/places/parks/

CONCEPTUAL NEAR-SURFACE ISOLATION



***Requires assessment of existing conditions and intervention on multiple regulators and interceptor manholes.**

Drainage Management Option – Near Surface Isolation System Approach

waterfront. There are also landscaped parks and gardens inland from the Esplanade with memorials, sculptures, and public art installations.

Belvedere Plaza was designed by the architecture firm Mitchell Giurgola, the landscape architecture firm Child Associates, and the artist Martin Puryear. It opened in 1995 and is a semicircular redoubt.

North Cove was designed by the artists Scott Burton and Siah Armajani, the architect Cesar Pelli, and the landscape architect M. Paul Friedberg. It includes the North Cove Marina, which provides public access to the waterfront with views of the Hudson, as well as a marina with recreational, commercial, and public boat slips.

South Cove was developed as a collaboration between the artist Mary Miss, the landscape architect Susan Child, and the architect Stan Eckstut. South Cove opened in 1988 and incorporates natural materials, plantings, and constructed elements to create a public open space at the water's edge.

1.0.3.3 Reach-by-Reach Area Descriptions

For the purposes of design development, organizing the stakeholder/community engagement outreach process and the impact analyses provided in this EIS, the Project Area is organized into seven (7) reaches each of which is ~~h~~ named for their primary features including:

- Reach 1 – State Route 9A/West Street/Tribeca;
- Reach 2 – North Esplanade;
- Reach 3 – North Neighborhood/Rockefeller Park;
- Reach 4 – Ferry Terminal;
- Reach 5 – Brookfield Place;
- Reach 6 – South Esplanade; and
- Reach 7 – South Neighborhood

A description of existing conditions, key features, and flood barrier design considerations for each reach is below.

Reach 1 – State Route 9A/West Street/Tribeca

Reach 1, which is approximately 1,700 linear feet in length and 2.0 acres in size, begins along North Moore Street at the intersection of Greenwich Street then extends west along the south side of North Moore Street, before turning south along the east side of State Route 9A/West Street, adjacent to the Borough of Manhattan Community College, crossing Harrison Street, and turning west with a gate crossing proposed across State Route 9A/West Street. To the west of State Route 9A/West Street, the proposed

alignment crosses the Hudson River Greenway[2] and the pedestrian plaza to the east of Stuyvesant High School. Both State Route 9A/West Street and the Hudson River Greenway are under the jurisdiction of the NYSDOT. The pedestrian plaza between Stuyvesant High School and the Hudson River Greenway is under the jurisdiction of the BPCA ~~NYC Department of Small Business Services (SBS)~~. Key design features in this reach include the design interface with BMCC, Independence Plaza and Hudson River Park. Approximately 10,000 square feet of Reach 1 is within Hudson River Park (see **Figure 1-12a**).

Reach 2 – North Esplanade

Reach 2 begins at the Battery Park City property jurisdiction and includes the north segment of the Battery Park City Esplanade, which begins at the connection with the Greenway. This reach is approximately 485 linear feet in length and totals approximately 0.7 acres that extends along the North Esplanade and is adjacent to Stuyvesant High School and the Tribeca Pointe residential building. Currently, the Battery Park City Esplanade in this reach is primarily a corridor shared by pedestrians and bicyclists into and from the Battery Park City Esplanade and open spaces. Also included in this reach is a water area that is under the jurisdiction of the HRPT; this includes an area six feet wide extending north of the current North Esplanade that is proposed for a widening of the esplanade with a transition curve into Hudson River Park ~~that include the Hudson River Park~~ (see **Figure 1-13a**).

Reach 3 – North Neighborhood/Rockefeller Park

Reach 3 is the ~~largest~~longest of the reaches and is approximately 1,700 linear feet in length and totals approximately 6.5 acres. It includes the Battery Park City waterfront west of River Terrace from the North Esplanade south to the southern end of Rockefeller Park's South Meadow. The primary design element in Reach 3 is Rockefeller Park, which at approximately 8 acres in size, is the largest contiguous open space in Battery Park City and provides the majority of the open lawns in the Battery Park City park system. Rockefeller Park also includes the Rockefeller Park Playground, basketball courts, Park House, and artwork. There are several residential buildings upland of this reach: Tribeca Park, The Solaire, River & Warren, and Riverhouse.

Reach 4 – Ferry Terminal

South of Rockefeller Park's South Meadow is Reach 4 which extends along the Battery Park City Esplanade. Features in this reach include the Lily Pond, the open spaces at the Irish Hunger Memorial, the Battery

[2] The Hudson River Greenway (or "Greenway") is part of the Empire State Trail, and the southern portion of the Empire State Trail—the 12.5-mile-long Manhattan Greenway—runs through the Study Area and sections of the Project Area. In this document, the portion of the Greenway adjacent to Hudson River Park north of Battery Park City is also referred to as the Hudson River Bikeway/Walkway.

Park City Ferry Terminal in the river, and the plaza west of the commercial office building at 300 Vesey Street. Reach 4 is approximately 500 linear feet in length and 1.4 acres in size (see **Figure 1-14a**).

Reach 5 – Brookfield Place

Reach 5 is the largest reach in total area, measuring approximately 1,630 feet in length and 8.7 acres in size. Its primary features are the North Cove Marina, the adjacent Esplanade, and upland open spaces. North Cove comprises multiple distinct active and passive use areas in the terraced plazas that face the marina. The reach also includes access to the Winter Garden and fronts Brookfield Place. There is substantial seasonal public programming in this reach which also includes the Belvedere Plaza, Sirius Dog Run, Kowsky Playground, the New York City Police Memorial and Pumphouse Park. There are also subsurface transit tunnels ~~that provide cooling water for the inland office buildings and~~ below that are Port Authority Trans-Hudson (PATH) train tunnels (see **Figure 1-15a**).

Reach 6 – South Esplanade

Reach 6 is approximately 1,500 linear feet in length and totals approximately 2.8 acres. It extends south from the southern terminus of North Cove to the northwest corner of 21 South End Avenue (The Regatta Building) and includes three street ends—Albany Street, Rector Place, and West Thames Street. The limits of work in this reach include the areas landward of the South Esplanade at these intersections, including several public art installations. Fronting this reach are several residential buildings, including Gateway Plaza, Hudson Tower, Liberty House, Liberty Terrace, and The Regatta (see **Figure 1-16a**).

Reach 7 – South Neighborhood

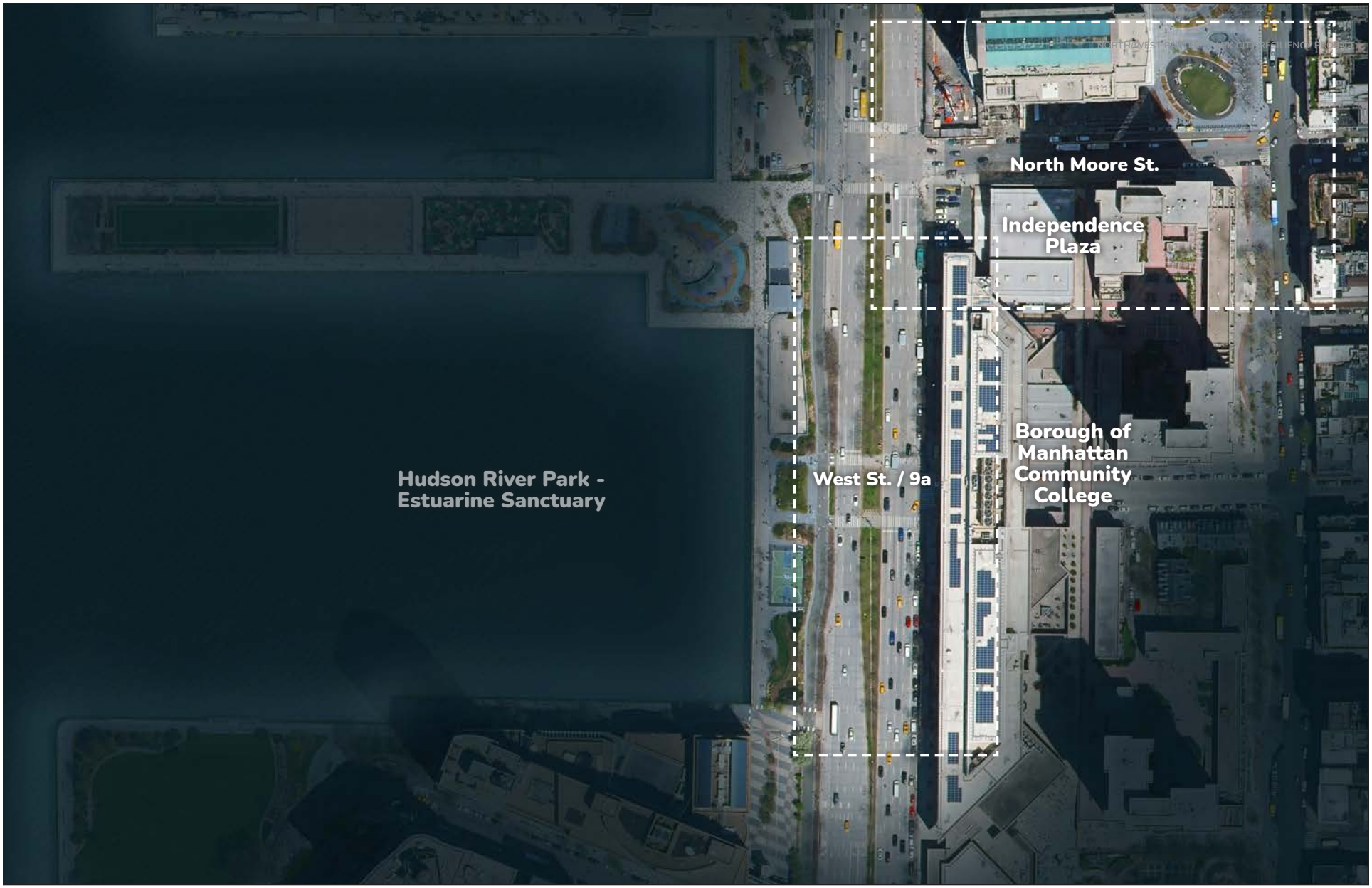
Reach 7 includes the South Cove, a public land art piece and the adjacent Esplanade. At its southern terminus in this each, the Proposed Project is designed to connect with the SBPCR Project at the 1st Place western terminus right-of-way ~~corridor~~. This reach begins at the southwest corner of The Regatta ~~Building~~ at 21 South End Avenue and is aligned to proceed east and south along the perimeter walkways inland from the cove to the proposed connection with the SBPCR. There are several residential buildings along this reach, including Cove Club at 2 South End, River Watch at 70 Battery Place, and South Cove Plaza at 50 Battery Place. Reach 7 is approximately 950 linear feet in length and totals approximately 2.7 acres (see **Figure 1-17a**).

1.0.3.4 Proposed Project Design Elements

This section describes the key design elements of the Proposed Project, with a reach-by-reach description of the proposed flood barrier system, planting and drainage improvement measures. **Figures 1-9 and 1-10a-f** provided illustrations of the types of flood barrier measures proposed.

1.0.3.5 Design Flood Elevation

A coastal modeling analysis was prepared as the basis for determining the Design Flood Elevation (DFE) for the proposed flood protection system (see **Appendix B** for the modeling report). This modeling considered both elevated surface water elevations in the Hudson River during a coastal storm event as well as wind direction and the resulting height and angle of wave impacts. Given the length of the



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Reach 1 Aerial



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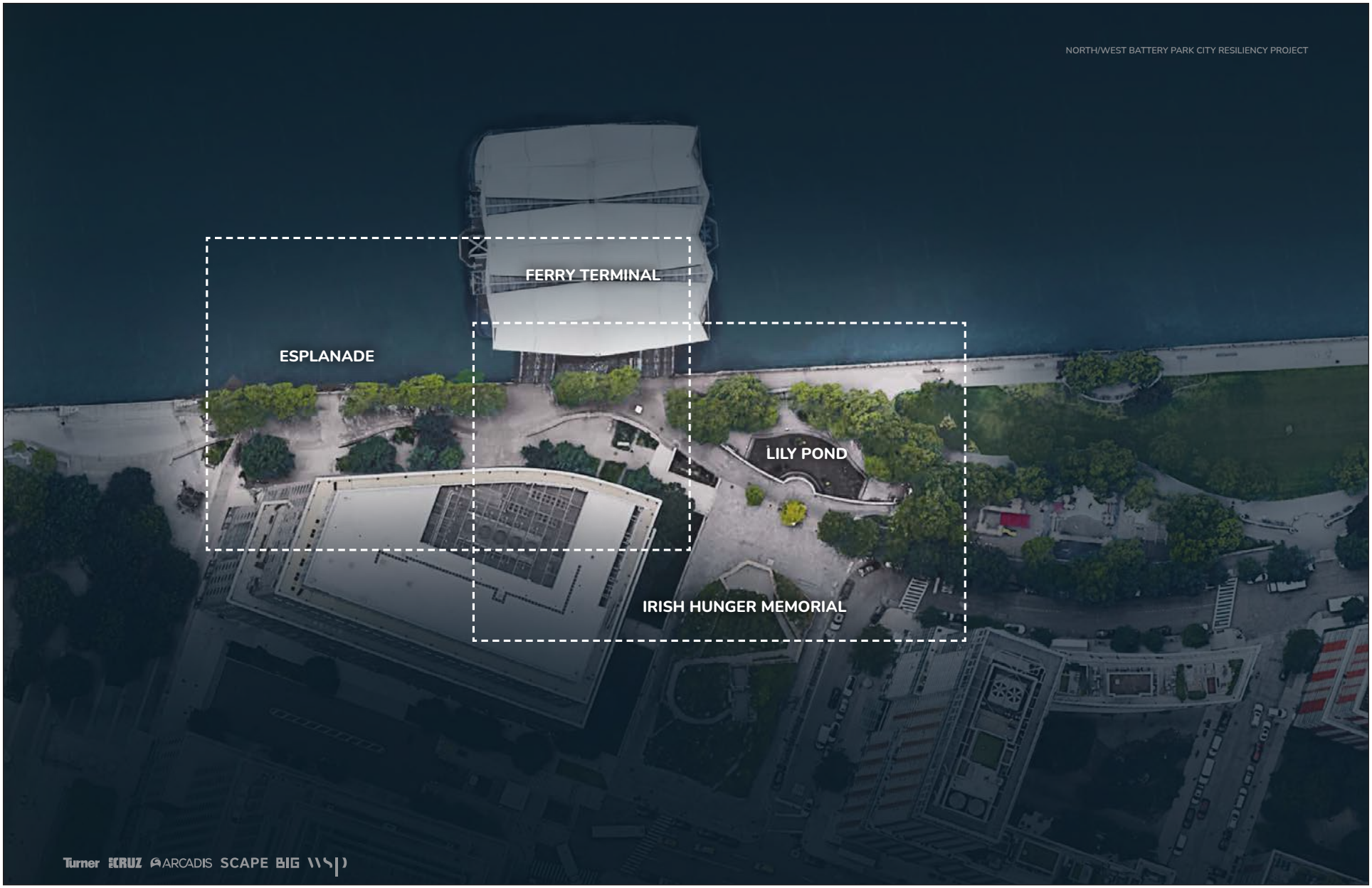
Reach 2 Aerial

Figure 1-13a



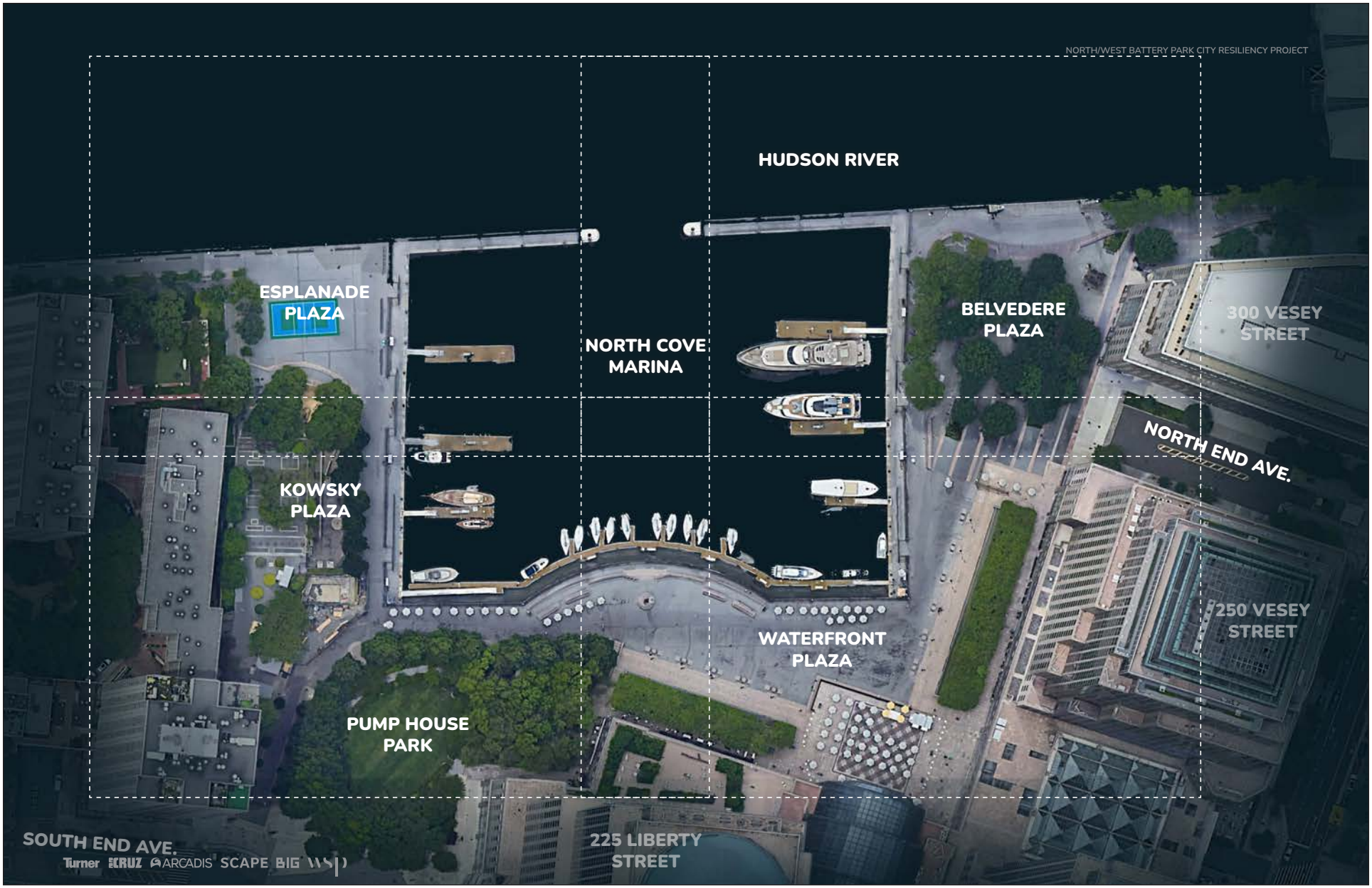
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Reach 3 Aerial



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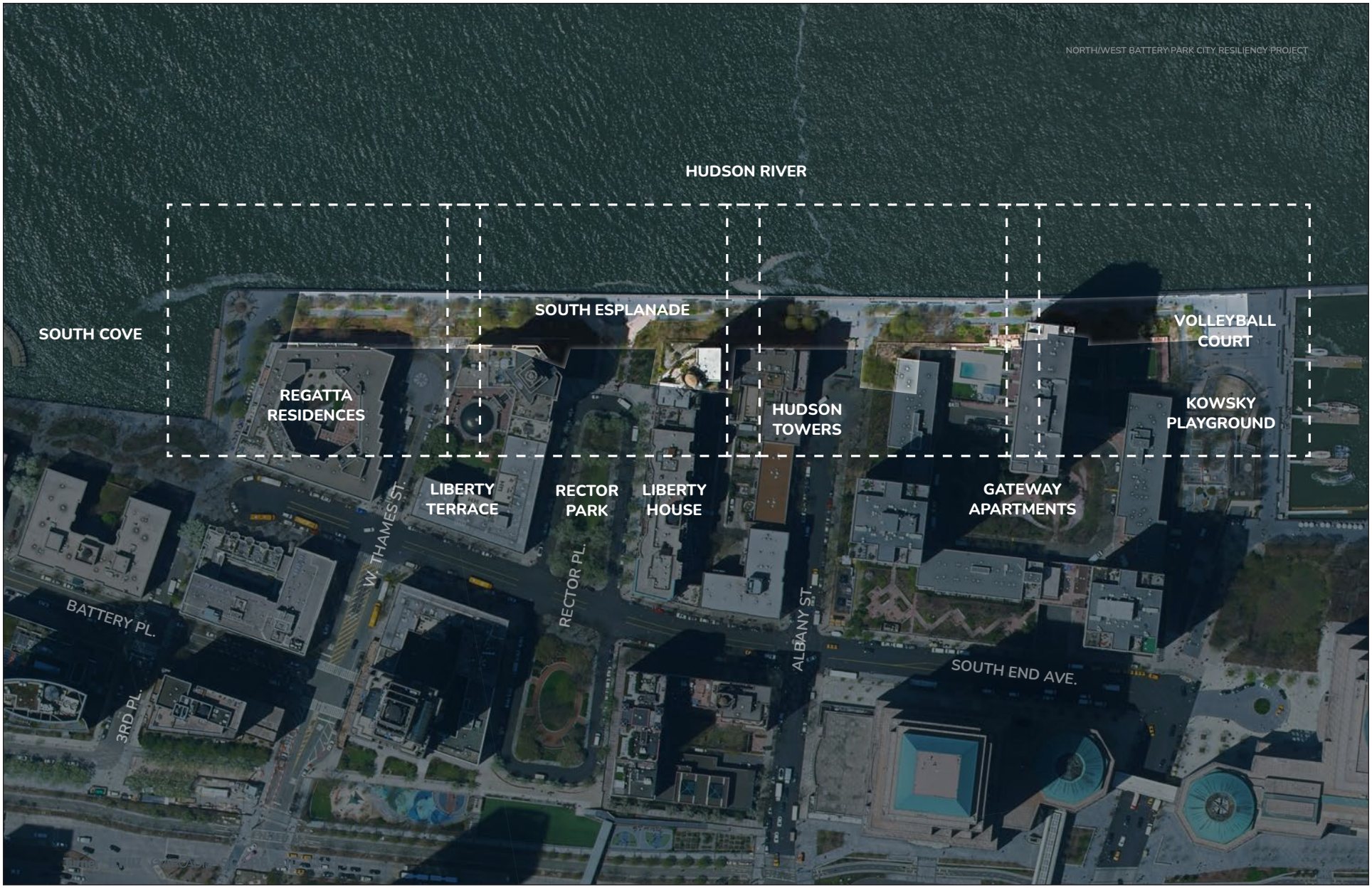
Reach 4 Aerial



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Reach 5 Aerial

Figure 1-16a



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Reach 6 Aerial

Figure 1-17a

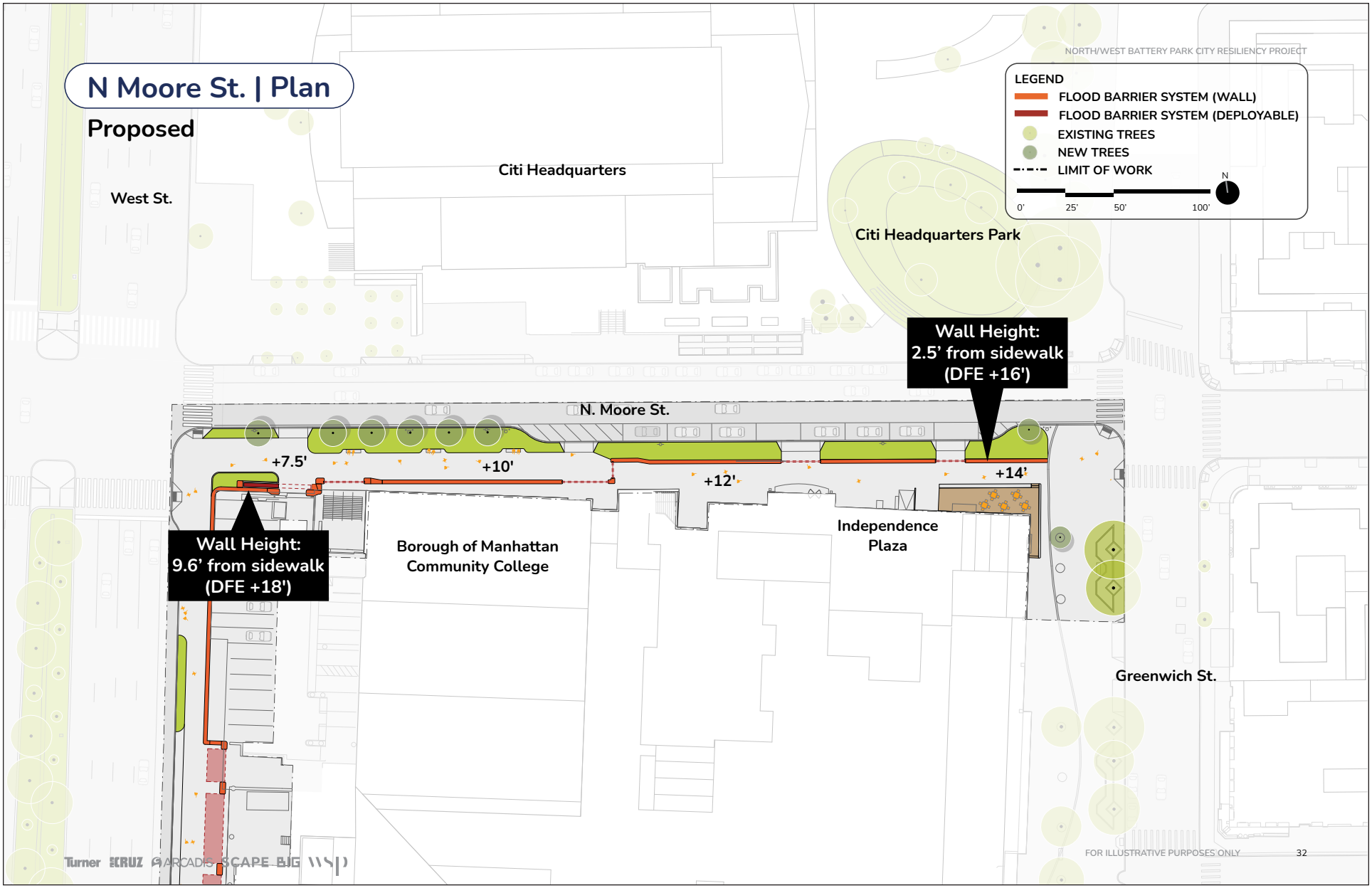
maintaining pedestrian circulation along the sidewalk corridor and at the sidewalk/property line interface. As shown on **Figure 1-12b**, with a widened sidewalk there would be planted spaces between the sidewalk and the parking lane that allow for grassy areas and tree replacement. On the eastern portion of the block, the flood barrier system would be aligned closer to the curbline and landscaped areas, while on the western portion of the block, the alignment shifts south closer to the BMCC property line.

At the intersection of State Route 9A/West Street and North Moore Street, the alignment turns south ~~in~~along the east sidewalk (parallel to State Route 9A/West Street) on ~~as it follows~~ an alignment ~~southward along~~ that parallels the BMCC property. At Harrison Street, the proposed alignment ~~continues turn~~turns around the corner of the BMCC North building~~,~~ heading eastward for a short distance (approximately 10 feet along the southern façade of BMCC and sidewalk on the north side of Harrison Street) with a ~~swing~~deployable flip-up gate system crossing proposed to provide the flood protection at the Harrison Street crossing. The alignment then runs west along the sidewalk on the south side of Harrison Street (parallel again to the BMCC South building) back to the State Route 9A/West Street sidewalk where the flood barrier system turns south along the sidewalk ~~on northbound side~~east of State Route 9A/West Street. Just south of Harrison Street (at a point approximately opposite the Battery Park City North Esplanade) the proposed alignment turns west. In this segment, the project alignment crosses State Route 9A/West Street and the flood barrier system design here here ~~is a~~would be ~~large, deployable flip-up gate that is stored below the street grade and is then activated during a design storm event.~~deployable swing gate system that would be stored in the recessed position at street level adjacent to State Route 9A/West Street. A more detailed description of the proposed gate systems is provided below.

West of State Route 9A/West Street, ~~In addition to the flip-up gate across Route 9A/West Street,~~ the alignment continues west, crossing the Hudson River Greenway where a swing gate is proposed to maintain an open corridor during non-storm event conditions and then activated for protection against the design storm. As part of the Proposed Project, all areas affected by construction outside of the proposed structure are to be restored with minor grade changes required to accommodate the proposed flood barrier system. ~~In Reach 1, the proposed flood barrier system would be constructed within the jurisdictions of New York City and State DOT, Hudson River Park Trust (HRPT), BMCC and Battery Park City.~~

In Reach 1, the flood barrier system is proposed to be constructed within the jurisdictions of NYCDOT (e.g., North Moore Street, Harrison Street and the east sidewalk of State Route 9A/West Street), NYSDOT (including the bikeway/walkway, the roadbed and median east to the east curbline and encompassing any area previously acquired for highway purposes inclusive of both the subsurface and aerial space), HRPT (west of the highway, the esplanade and park are under the jurisdiction of HRPT), BMCC and Battery Park City. Where project construction affects features under these jurisdictions, they will be restored in accordance with a final design developed in coordination with NYCDOT, NYSDOT, BMCC and HRPT.).

As described above, in this reach there are segments of the Proposed Project along the public sidewalk, that ~~required~~would require minor reductions in sidewalk widths along ~~Greenwich, North Moore, and~~ Harrison ~~Streets~~Street and State Route 9A/West Street; the Proposed Project has therefore been designed to the minimum effect required to install the flood barrier system, to allow new tree planting and also to provide a planting buffer between the flood barrier system and the sidewalk. With the Proposed Project,



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Reach 1 Proposed Site Plan

Figure 1-12b

the sidewalk widths along ~~North Moore Street, Greenwich Street,~~State Route 9A/West Street~~,~~ and Harrison Street would be slightly reduced to accommodate the proposed flood barrier system. South of Harrison Street, the existing sidewalk width may also be reduced to maintain façade access to the BMCC facilities; however, the final design will provide a minimum clear sidewalk width of 10 feet. (see Chapter 3.8, "Transportation," for the dimensions of sidewalk width reductions and any effects on pedestrian flow). NYSDOT ROW includes the bikeway/walkway, road, medians, and sidewalk to the east of the roadway. To the degree that the ~~proposed project~~Proposed Project affects these features, they will be restored in-kind.

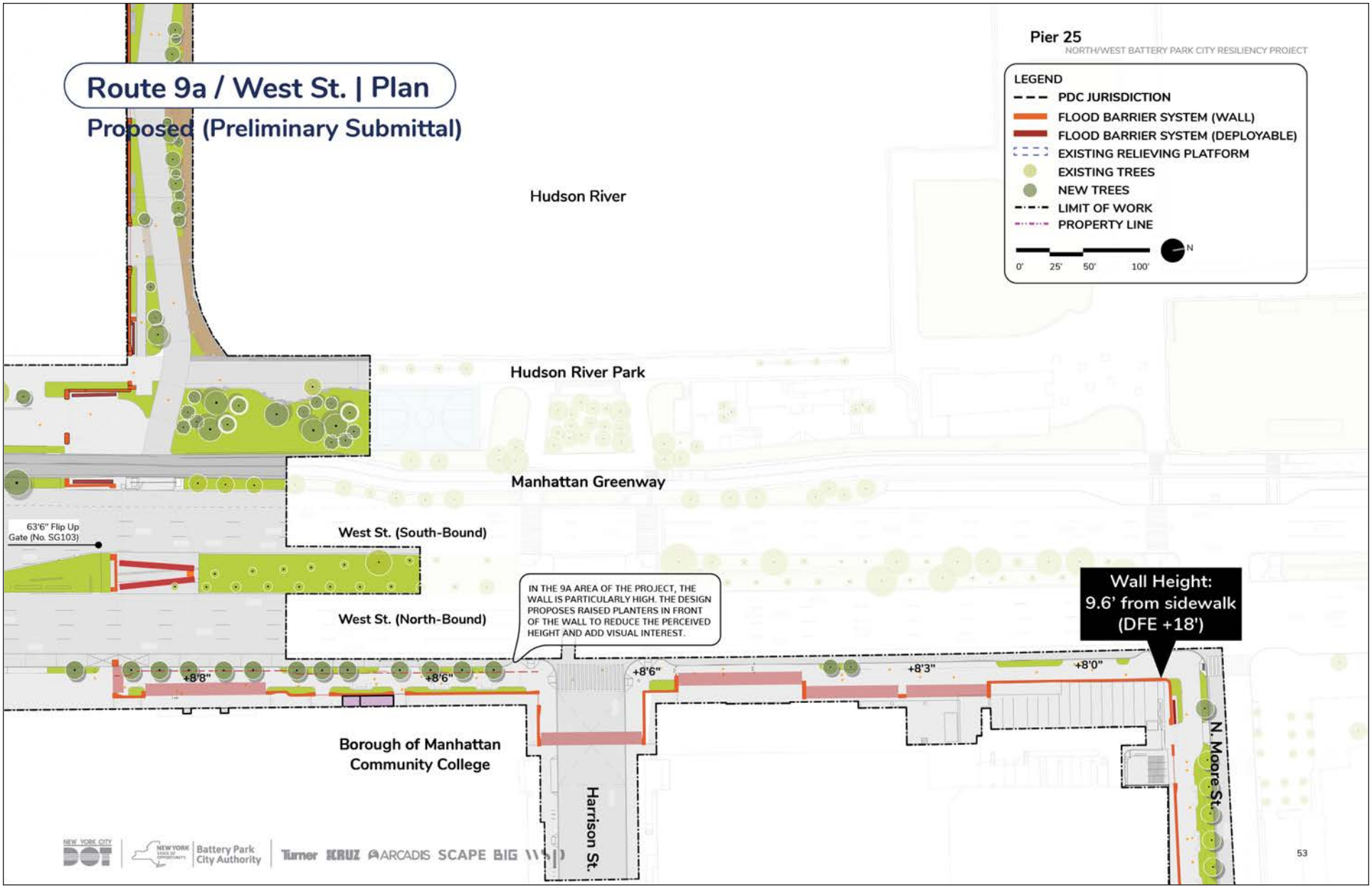
Trees proposed for removal in this segment are located along North Moore Street and State Route 9A/West Street. Street trees in this segment are to be replaced in accordance with a New York City Department of Parks and Recreation (NYC Parks)-approved tree replacement plan and restitution guidelines (see Section 1.3.9, below~~), but outside the required FEMA 15-foot-wide protection and maintenance zone along the flood barrier system (see also the description below under "Tree Removal and Replacement").~~). Benches and other pedestrian amenities, such as signage, are to be replaced in their approximate existing locations as the updated design allows.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-12b through 1-12n**.

Drainage improvements proposed in Reach 1 include installing ~~two~~three below-grade slide gates within two ~~the existing~~existing combined sewers and one existing storm sewer to prevent storm surge waters from backflowing into the protected area. ~~One~~Two of these slide gates ~~is~~are proposed in the northbound and southbound lane of State Route 9A/West Street just north of Chambers Street and the ~~other~~third one in Harrison Street. ~~Drainage improvements also include a Proprietary Treatment Device (PTD) for treating stormwater runoff; these systems are designed into a subsurface vault and would remove sediment and heavy pollutants through a treatment process comprised of baffles and weirs or filtration.~~ Tree pits to collect and percolate sidewalk drainage are also proposed.

Drainage improvements in Reach 1 also include relocating the existing 114-by-50-inch combined sewer overflow (CSO) pipe and tide gate structure to allow the flood barrier system to bridge over the historic bulkhead by Stuyvesant High School and minimize impacts to the historic bulkhead at this location. The relocation of the CSO pipe and tide gate would also provide space for the proposed pump station. (A more detailed description of the proposed pump station is provided below.) To improve surface drainage, an overflow pipe for the BMCC parking lot is proposed to allow runoff to be rerouted south along State Route 9A/West Street and to the proposed pump station. This pipe is designed to connect downstream of the parking lot's existing catch basin and is designed to reduce flooding in the protected area from rain event drainage. Other proposed drainage improvements include modifications to existing storm sewers within city streets to support the Proposed Project.

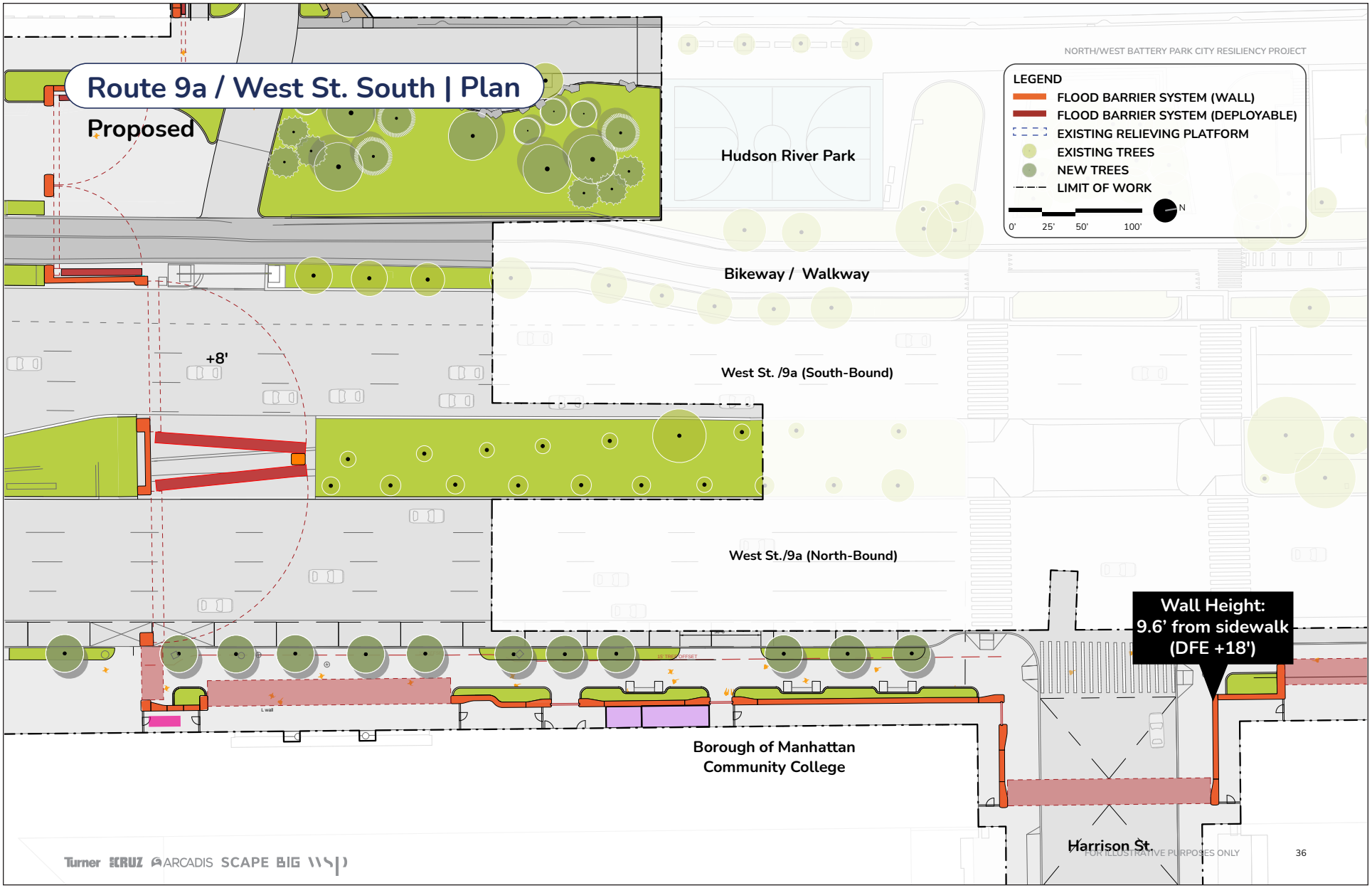
Reach 1 Gate Options



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Reach 1 Proposed Site Plan

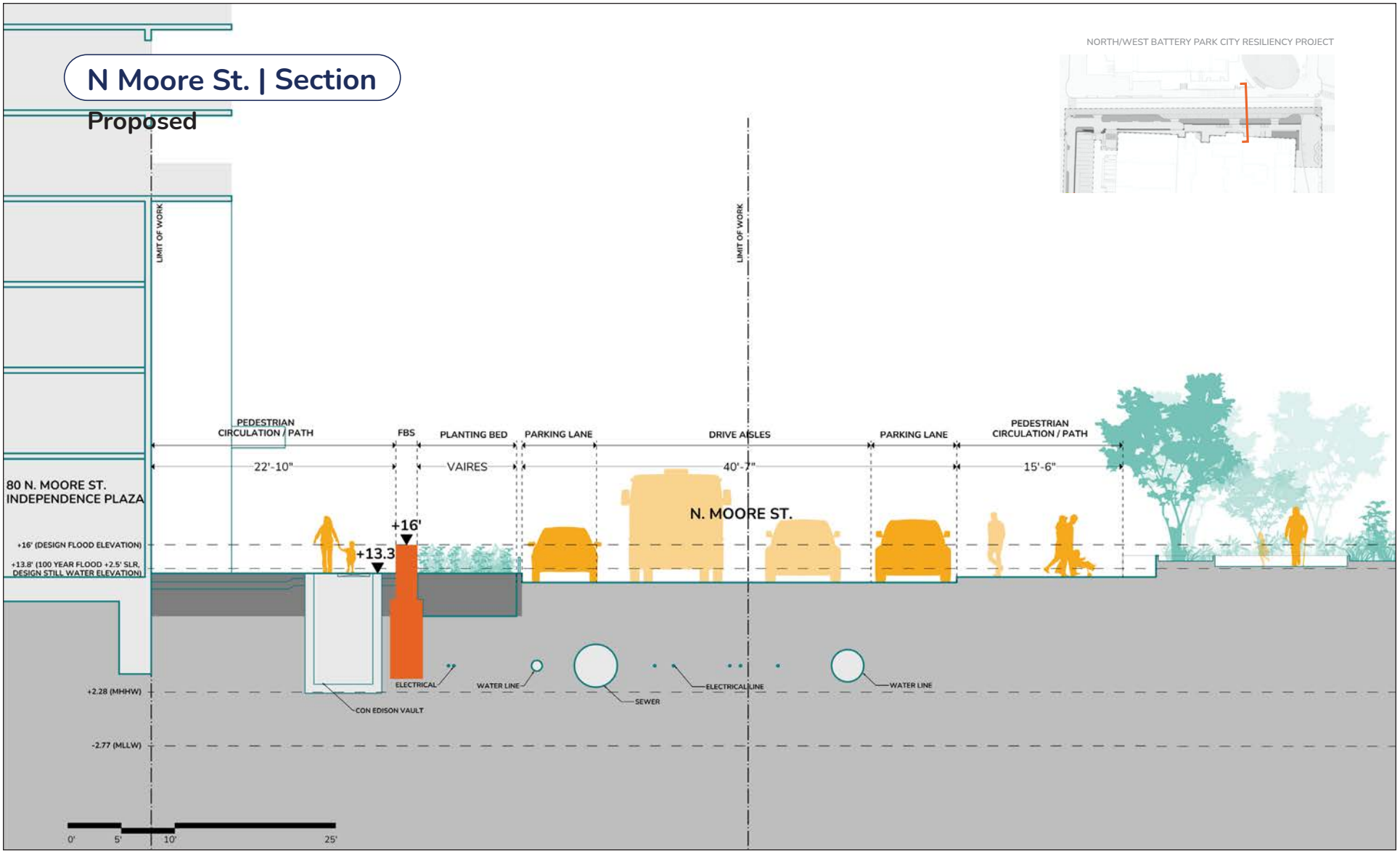
Figure 1-12c.1



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Reach 1 Proposed Site Plan

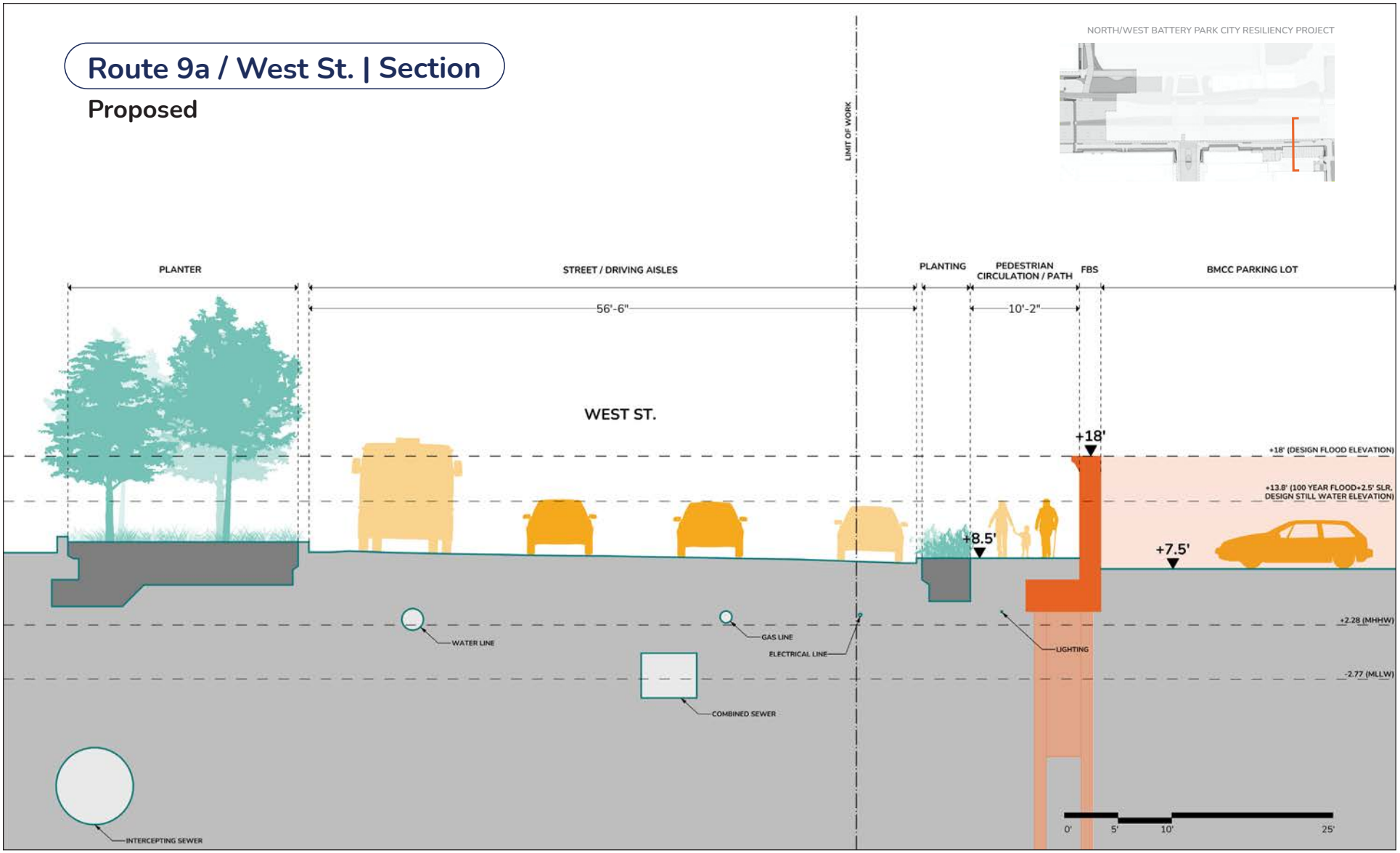
Figure 1-12c.2



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Reach 1 Proposed Section

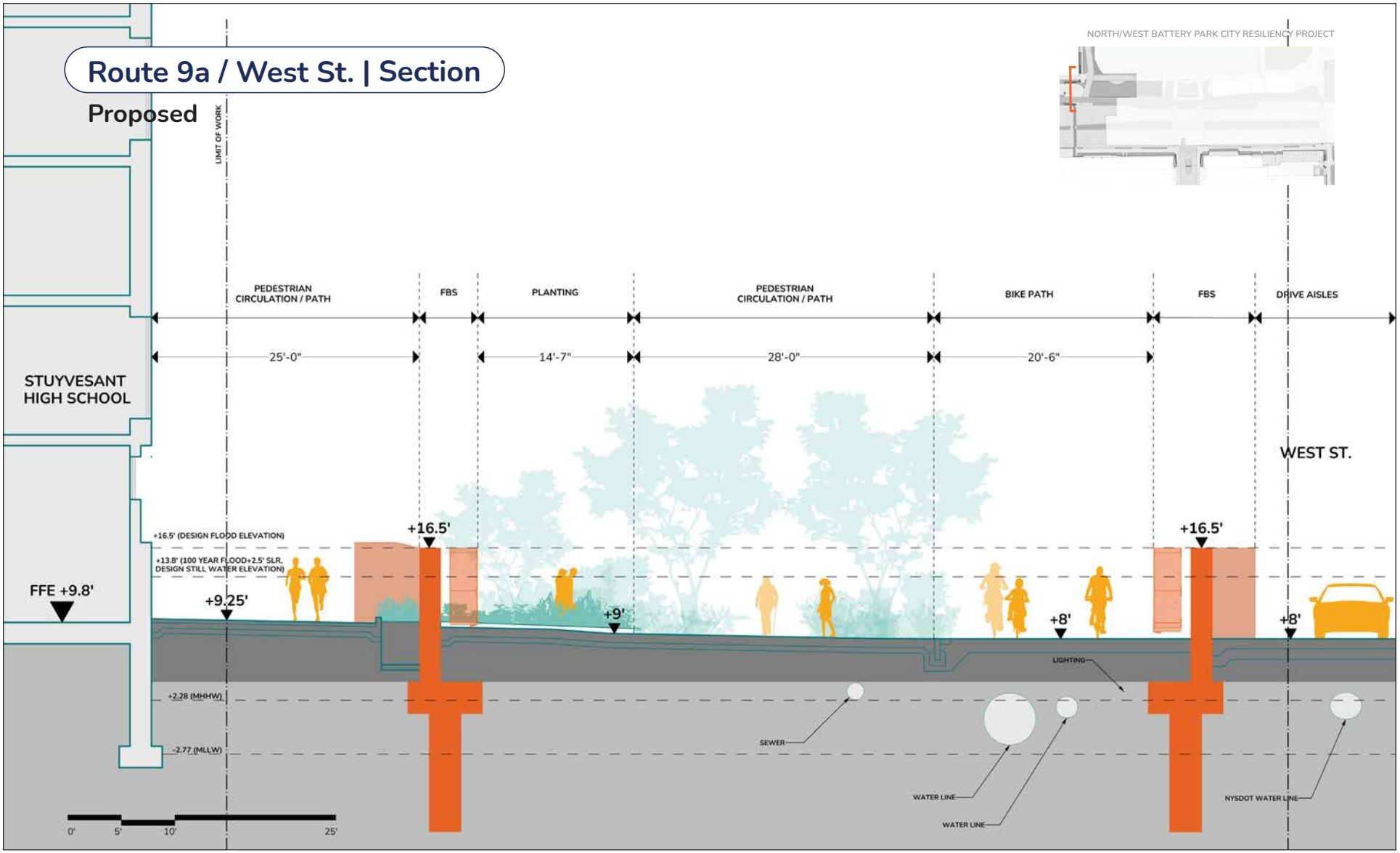
Figure 1-12d



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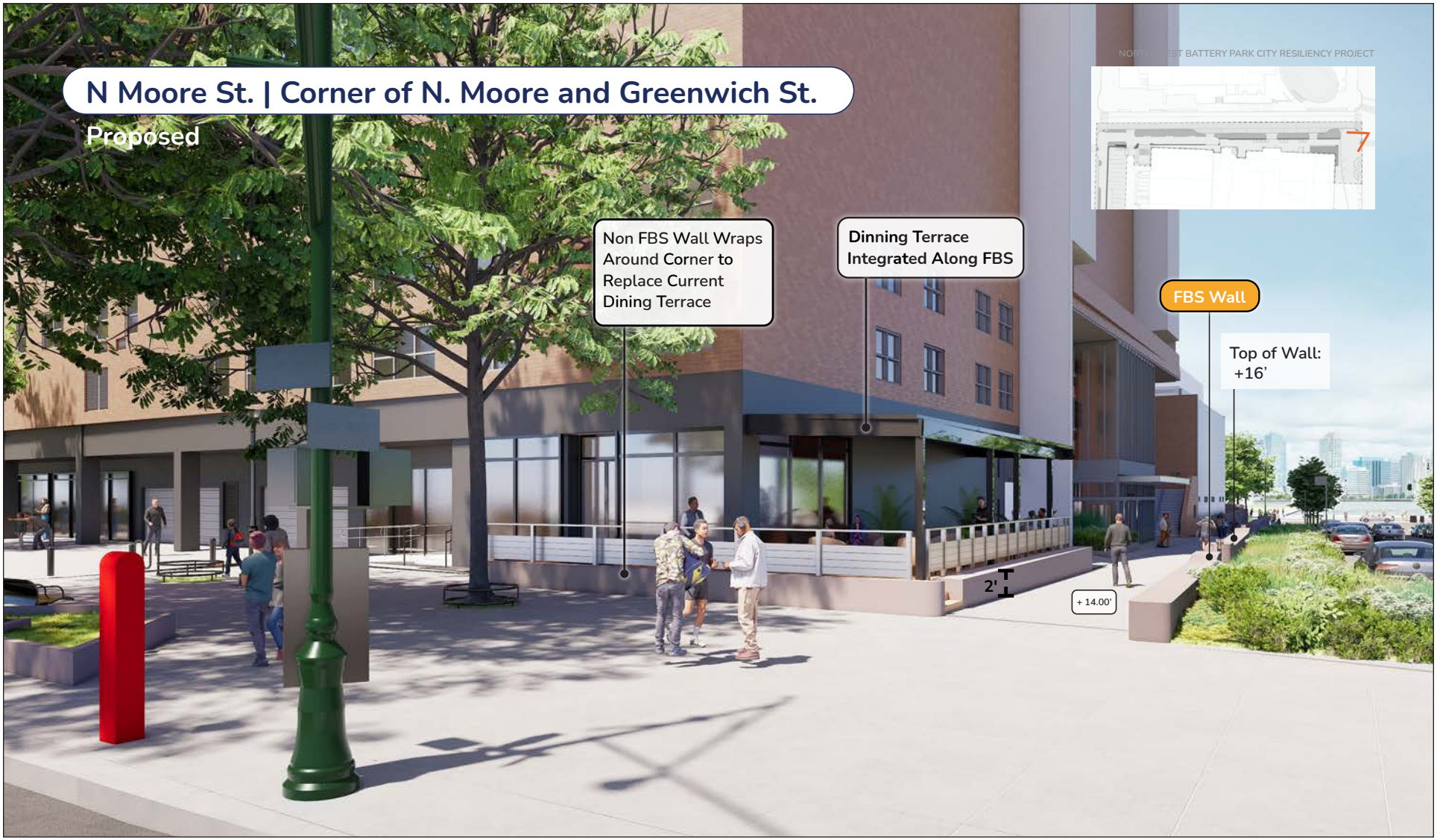
Reach 1 Proposed Section

Figure 1-12e



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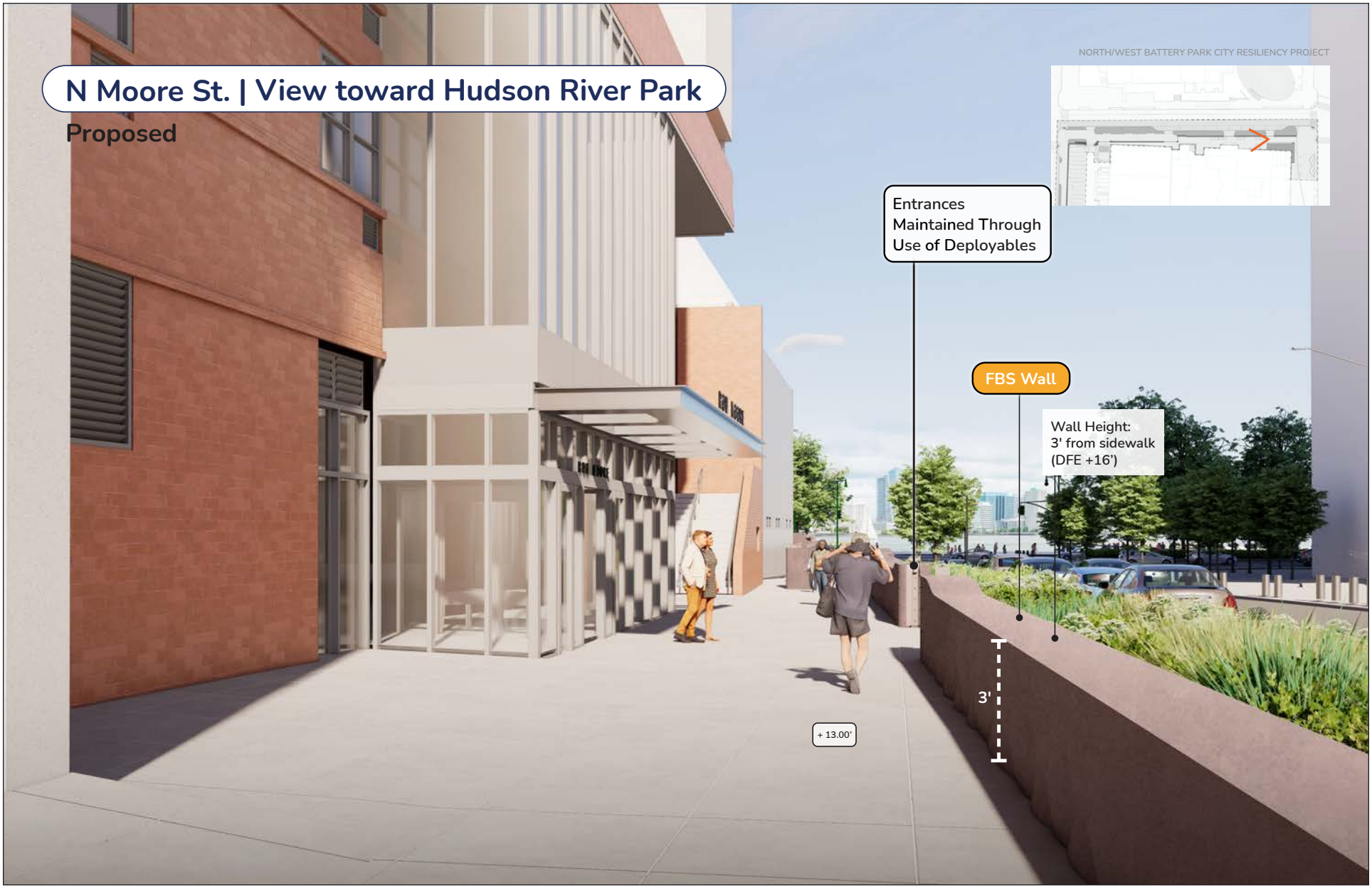
Reach 1 Proposed Section



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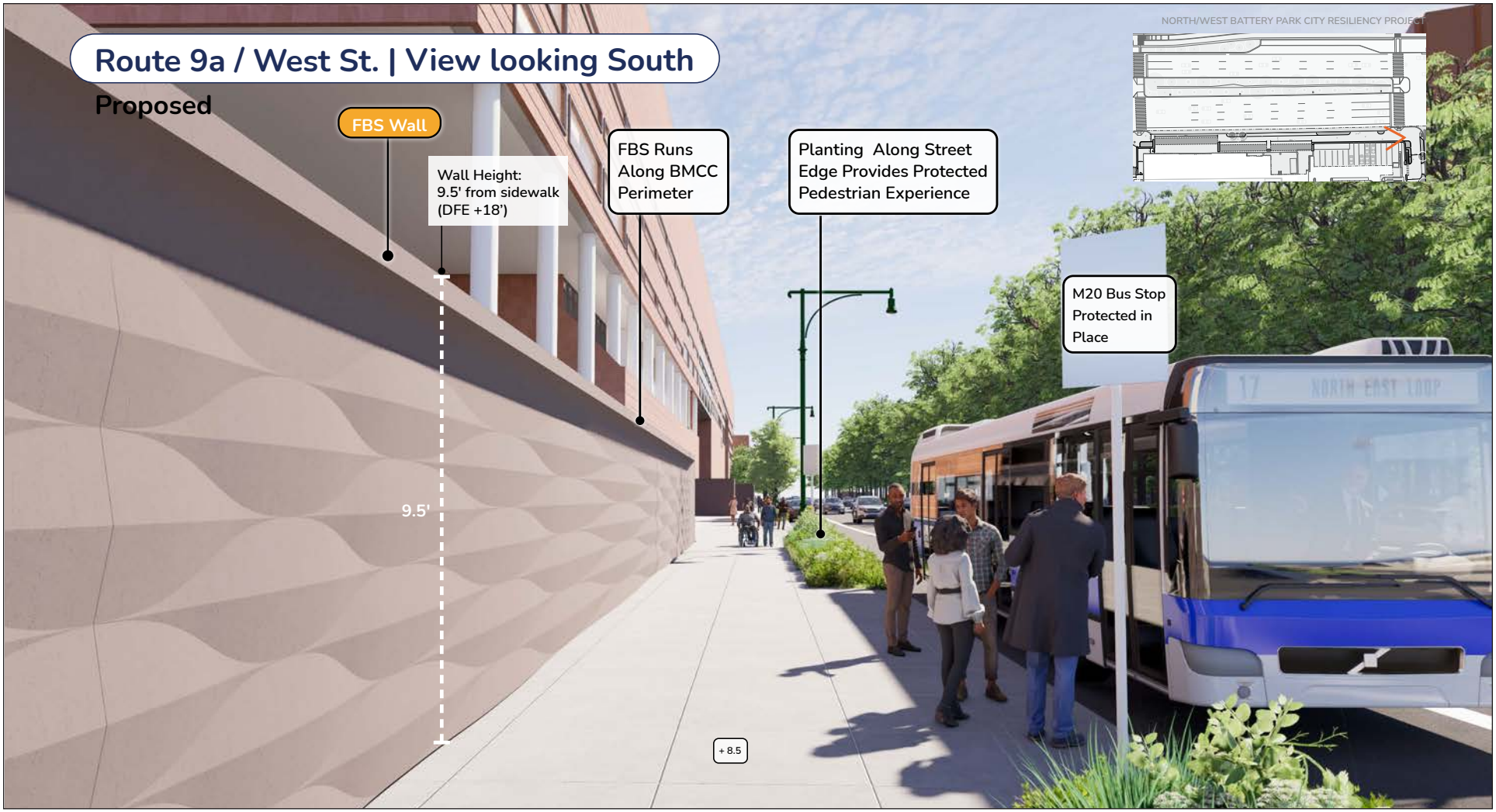
Reach 1 Rendering

Figure 1-12g



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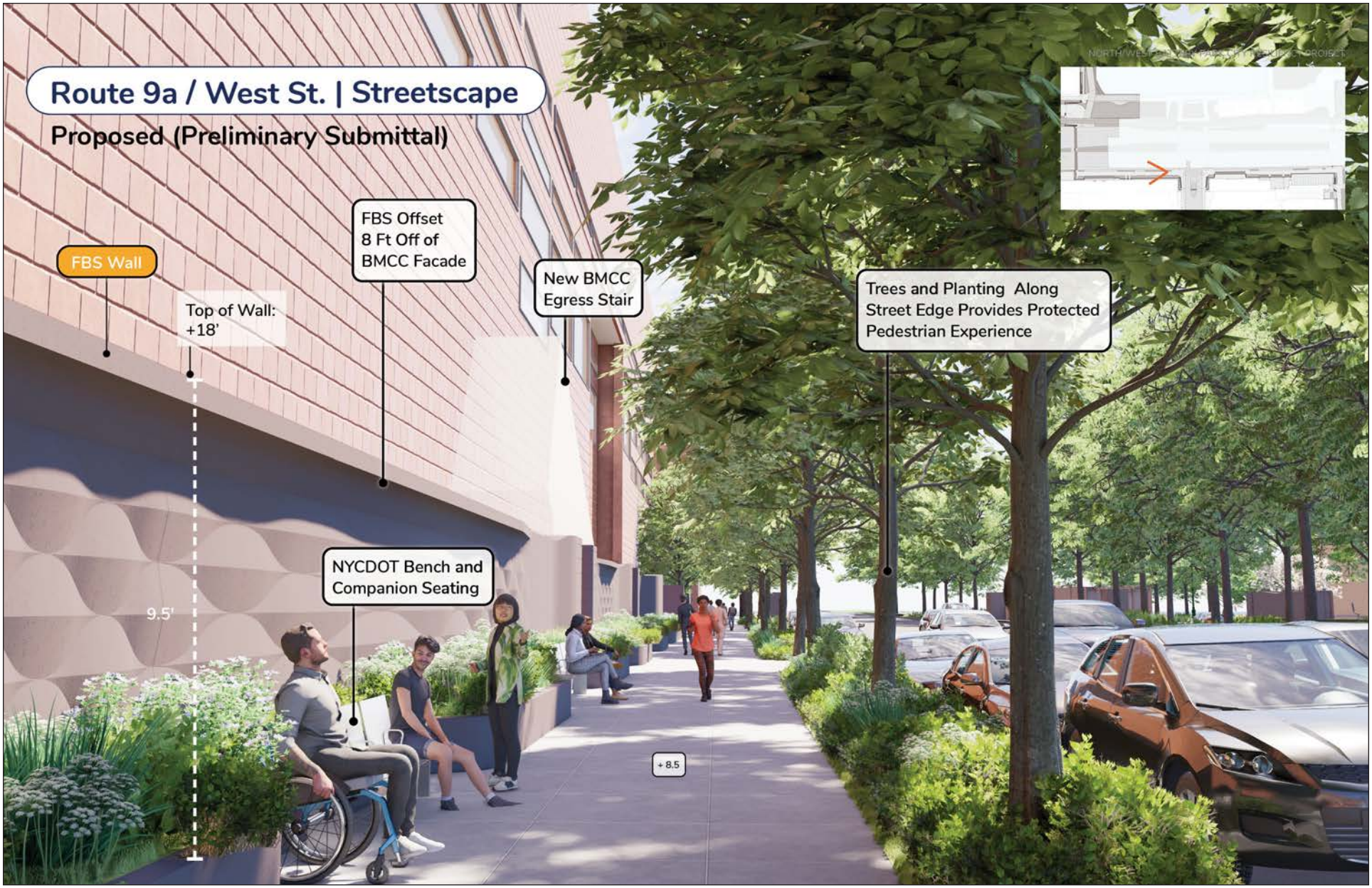
Reach 1 Rendering



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Reach 1 Rendering

Figure 1-12i



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Reach 1 Rendering



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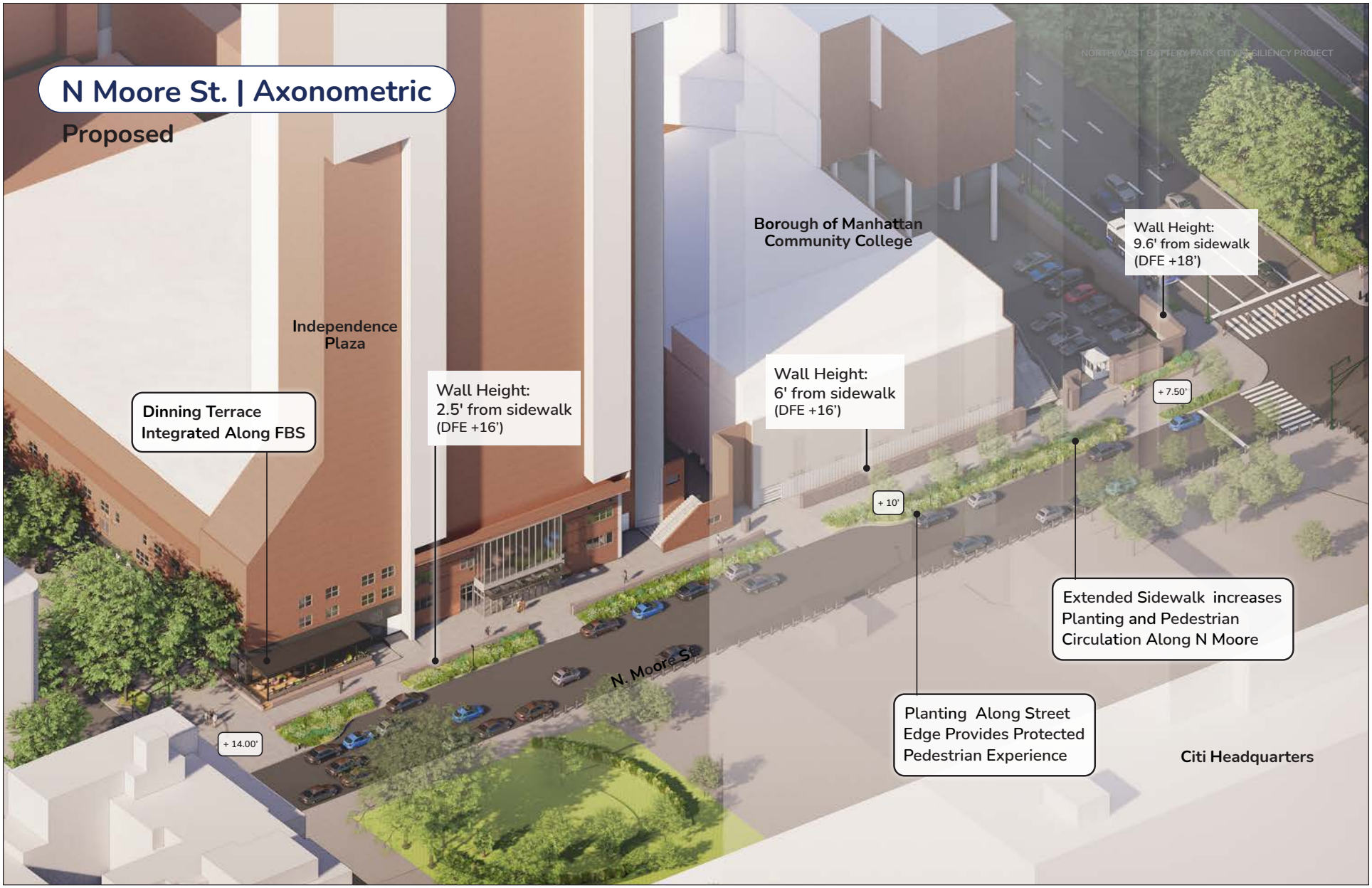
Reach 1 Rendering



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Reach 1 Rendering

Figure 1-12l



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Reach 1 Axonometric

Figure 1-12m



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Reach 1 Axonometric

Harrison Street Gate

Where the flood barrier system alignment crosses Harrison Street, flip-up gates are proposed which is an , as an update from the swing gate design described in the DEIS. These flip-up gates would be stored in the street and deployed using hydraulics to raise them to a vertical position ahead of a storm and then lowered post-storm. A specialized drainage system is also proposed to prevent freezing during winter months. Two annual deployments of the system would be required—one in late spring before hurricane season and one in the fall—for inspection and maintenance of the system. In addition to the gates, a seepage barrier would be required below the roadway along the crossing alignment to prevent seepage of floodwaters into the Protected Area during a storm event.

State Route 9A/West Street Gate

The gates crossing proposed for State Route 9A/West Street are swing gates, which is a design update from the previously analyzed in the DEIS. Under the proposed designs in the recessed position the gates are stored in the median of State Route 9A/West Street at a location north of Chambers Street: one gate for the southbound side and another for the northbound side. To achieve acceptable swing gate and geometric street design dimensions, the median at this location is also widened from approximately 20 to 30 feet for a distance of approximately 250 feet (see Figure 1-12c.2).

Reach 2 – North Esplanade

This reach extends from just south of where the Hudson River Greenway meets the North Esplanade and continues west along the north façade of Stuyvesant High School and the Tribeca Pointe apartments; as the alignment approaches Reach 3, it turns southward just outside Tribeca Pointe's western façade. The key public space in this reach is the North Esplanade. In this reach, the design objective is to integrate the flood barrier system (the top of the floodwall elevation in this reach is a uniform 16.5 feet[3] above the Hudson River datum) into the Esplanade to maintaining and its important function as a connection between Hudson River Park and Rockefeller Park in Battery Park City. To that end, the flood barrier system design is integrated along an interior alignment parallel to Stuyvesant High School into a terraced garden landscape treatment. The North Esplanade is also to be rebuilt at an elevation that varies from +12.5 feet at the eastern end, +15 feet toward the center, and +10 feet at the western end as a transition to the grade at Rockefeller Park.

Also proposed in this reach is a reconstructed relieving platform that widens the North Esplanade by six feet to the north with a transition at the bulkhead. Widening the Esplanade in this already narrow reach is proposed to provide additional deck area for the public that is structurally supported to allow for future upgrades and adaptability of the flood barrier system, should that be needed. The new, wider platform is designed to provide a primary circulation space that is a minimum of at least 20 feet wide and in addition to accommodating emergency and maintenance vehicles, also provides for a separation of circulation

[3] Datum references in this section are to NAV88.

space for cyclists and pedestrians in a more immersive boardwalk experience with waterfront seating opportunities in a landscaped setting separate from the bikeway/walkway corridor. Both the upper and lower circulation areas, as well as the building are separated and screened by a series of raised planters with lush vegetation. On the east where the North Esplanade connects with the bulkhead, a gradual curve in the deck is introduced to enhance the transition between the North Esplanade and the Hudson River Park esplanade. ~~. On~~To the west where the North Esplanade leads into Rockefeller Park, the existing plaza area is to be reconstructed with raised planting beds and new seating oriented along the waterfront railing.

Under the proposed designs, access to the Stuyvesant High School building entrance/exit points is maintained through the use of deployable gates at the access points (specifically, the east doors and north emergency doors). Accessibility will be improved at one location by eliminating the need for the existing stairs. While the Tribeca Pointe Apartment's main access is not affected by the flood barrier system, a roller gate is proposed to preserve access to the building's basement doors.

Installation of the proposed flood barrier system in this reach ~~requires~~would involve the removal of approximately 30 existing trees, the transplanting of one tree, and the planting of ~~55~~approximately 50 new trees. Other plantings within the limit of work in this reach would be limited to replacement landscaping integrated to the design.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-13b through 1-13g**.

Drainage improvements proposed in Reach 2 include new catch basins and trench drains to capture stormwater runoff within the new platform, a new tide gate structure along the existing 30-inch stormwater outfall located in Chambers Street ~~, and a PTD system~~ to treat stormwater runoff prior to discharge to the Hudson River.

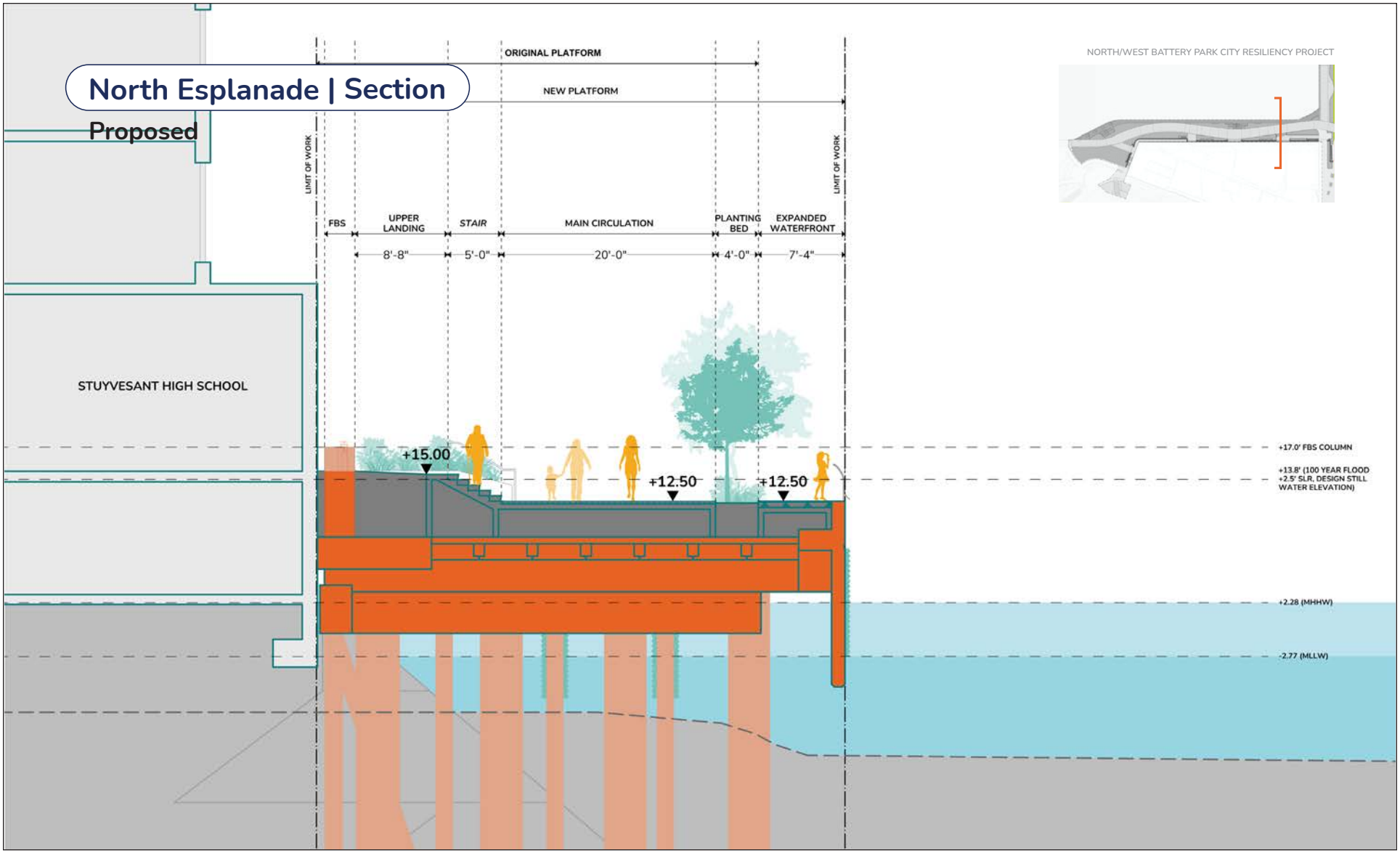
Reach 3 – North Neighborhood/Rockefeller Park

In Reach 3, the Proposed Project design is comprised ~~is comprised of~~ a passive structure that generally follows the same alignment as the existing retaining stone wall along the eastern edge of Rockefeller Park where it meets River Terrace. In this reach a ~~It is a~~ key design objective is to minimize impacts on Rockefeller Park, including features such as the large recreational lawn, the south meadow, the Esplanade, the terrace containing the sculptural group The Real World, the Pavilion by Demetri Porphyrios, and the Hurricane Maria Memorial. To that end, the floodwall is aligned along the park side of the existing wall ranging from 1.~~3.5~~ feet above grade on the sidewalk side near the ~~ball courts~~Pavilion by Demetri Porphyrios, to 4.75 feet on the sidewalk side near the playground, only 1 to 2 feet taller than the existing stone wall that is approximately at 2.75 feet above ground from the sidewalk side. Between Warren Street and the Irish Hunger Memorial area, the above ground portion of the existing stone wall is removed under the proposed design, leaving the below-ground portion buried under a new planting strip, with the new floodwall at a 3-foot offset to the west. This strategy allows the Proposed Project to protect many of the existing trees along River Terrace. At the Park House area and at the termination by the Pavilion by Demetri Porphyrios the proposed floodwall replaces the existing stone wall. Installation of the Proposed Project would remove some sections of the existing stone wall along River Terrace, reconfigure the



This figure has been updated for the FEIS.

Reach 2 Proposed Site Plan



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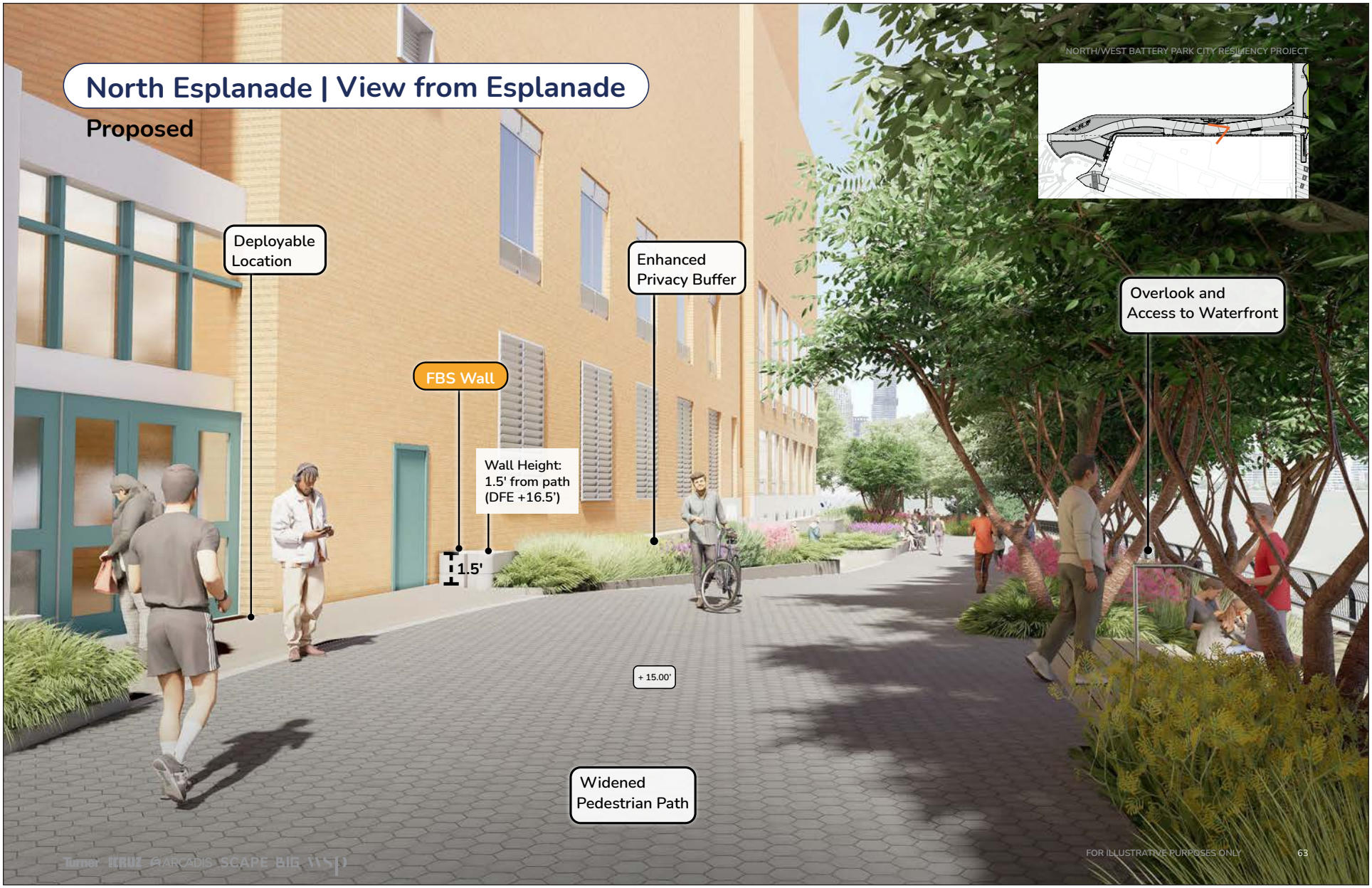
Reach 2 Proposed Section

Figure 1-13c



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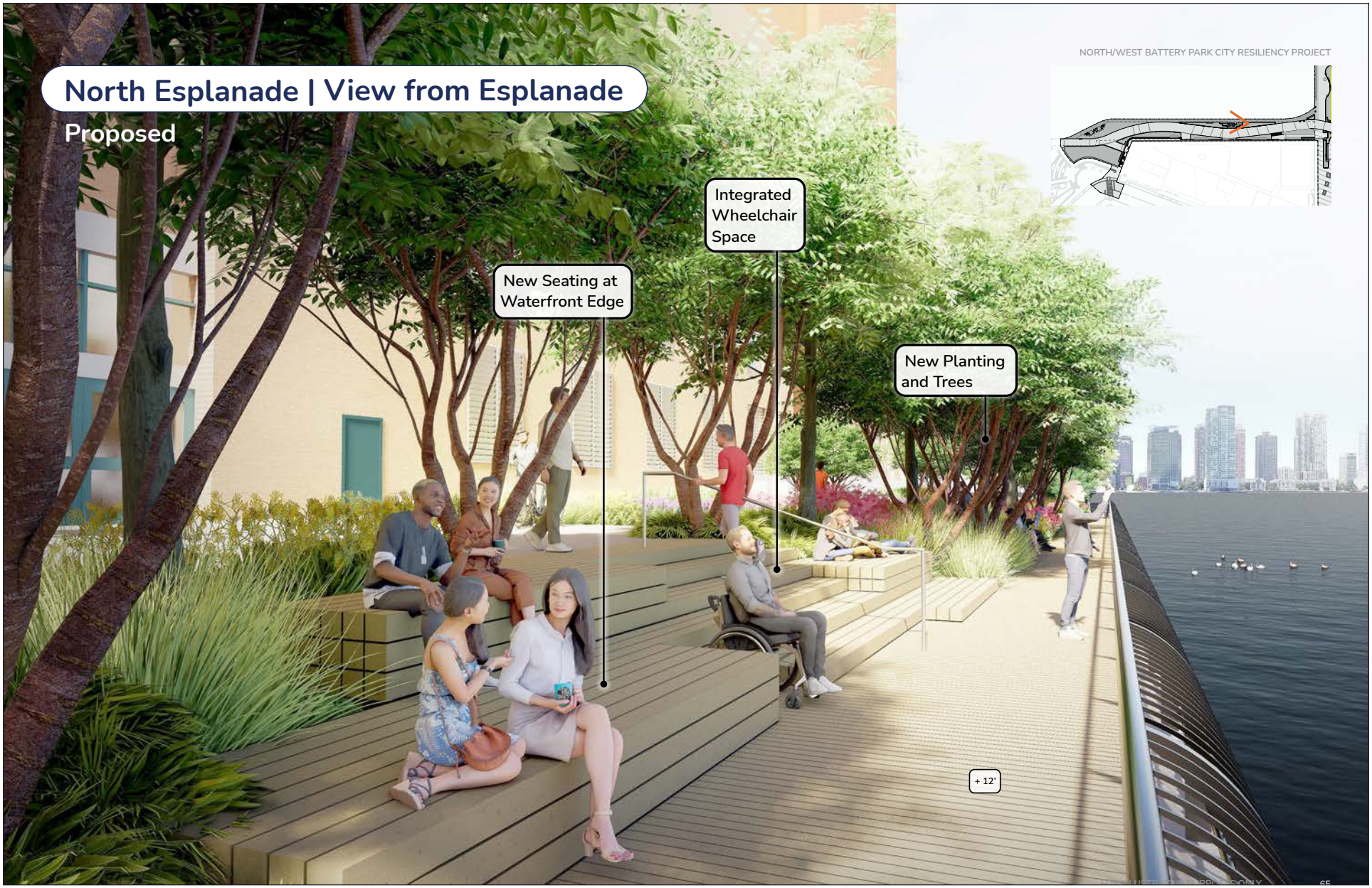
Reach 2 Rendering



This figure has been updated for the FEIS.

Reach 2 Rendering

Figure 1-13e

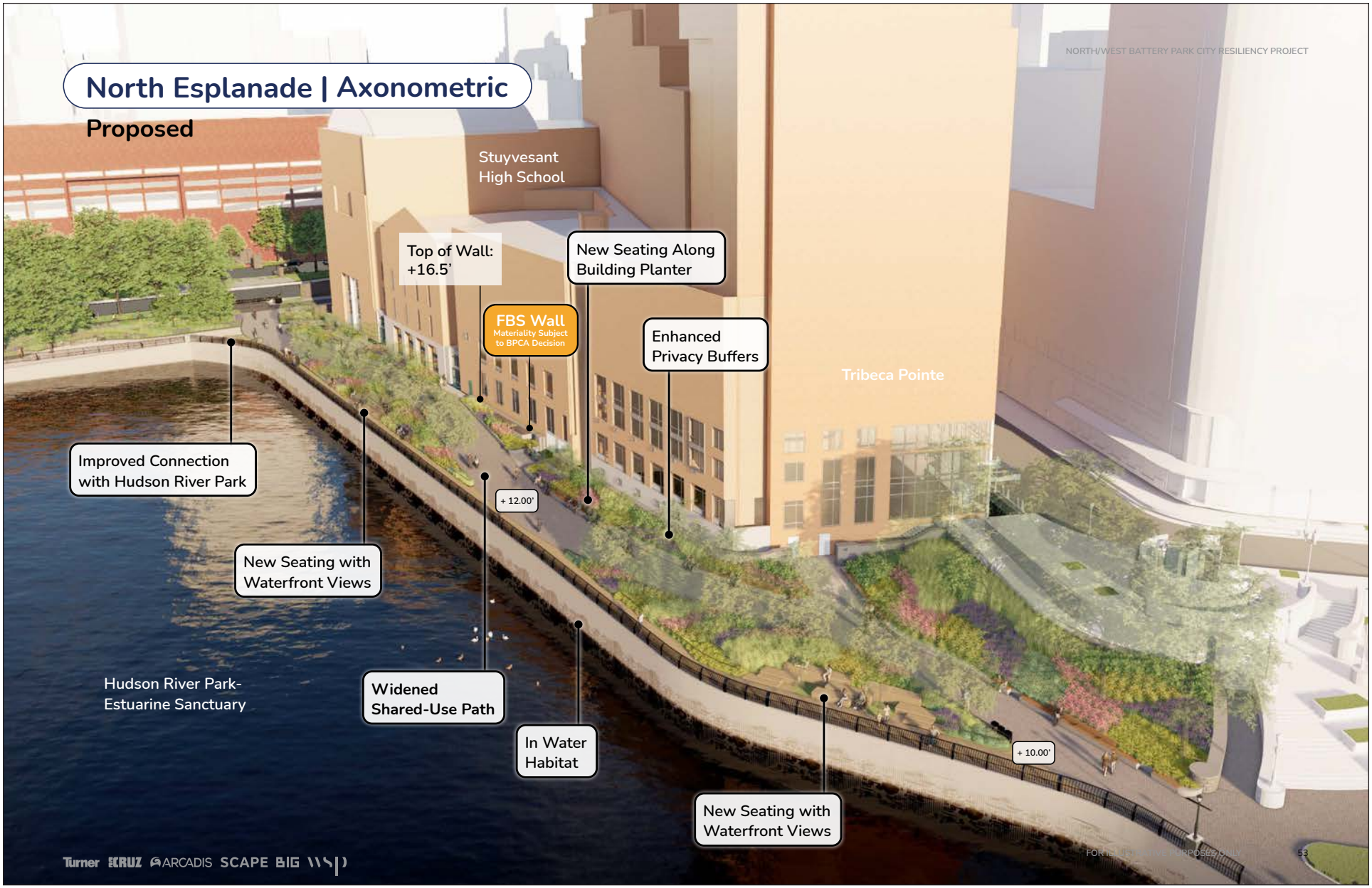


This figure has been updated for the FEIS.

Reach 2 Rendering

NORTH/WEST BATTERY PARK RESILIENCY

Figure 1-13f



This figure has been updated for the FEIS.

Reach 2 Axonometric

Figure 1-13g

basketball courts in their existing location with new seating, retrofitting and ~~retrofit and reinstall~~reinstalling some of the existing playground~~. The proposed design also includes a~~ equipment and installing some new ~~planting strip along~~equipment matching the ~~sidewalk~~character and materials of the existing playground. On the northern portion of this reach, the stone wall between Warren and Chambers Streets would remain; here, the elevated topography ~~in combination with~~ and the characteristics of existing ~~stone wall achieves~~fill, as demonstrated by a seepage analysis, achieve the ~~design~~necessary flood ~~elevation~~protection and therefore no additional flood barrier system is needed in this ~~subarea~~sub-area.

Open space and landscape preservation with targeted enhancements are the key design landscape design considerations in Reach 3, with the objective of minimizing impacts of the proposed flood barrier system ~~on~~to Rockefeller Park and the streetscape along River Terrace.

With the Proposed Project, the following ~~landscaping~~site enhancements are also proposed:

- Playground Reconstruction – design objective to preserve the current play experience.
- Basketball Court Improvements – design objective to ~~replace and~~ resurface courts with an improved configuration and integrated seating.

The design of the sidewalk along River Terrace also includes a planting strip adjacent to the proposed flood barrier systems alignment. Here the passive landscape ~~is comprised of~~comprises planting beds and defined seating areas. ~~Enhanced green infrastructure features~~High-performance rain gardens are also proposed along River Terrace. Between Warren and Murray Streets the Proposed Project maintains the entrance to the basketball courts from River Terrace with a deployable closure structure that utilizes stop logs. Swing gates are proposed at the park entrance from Murray Street.

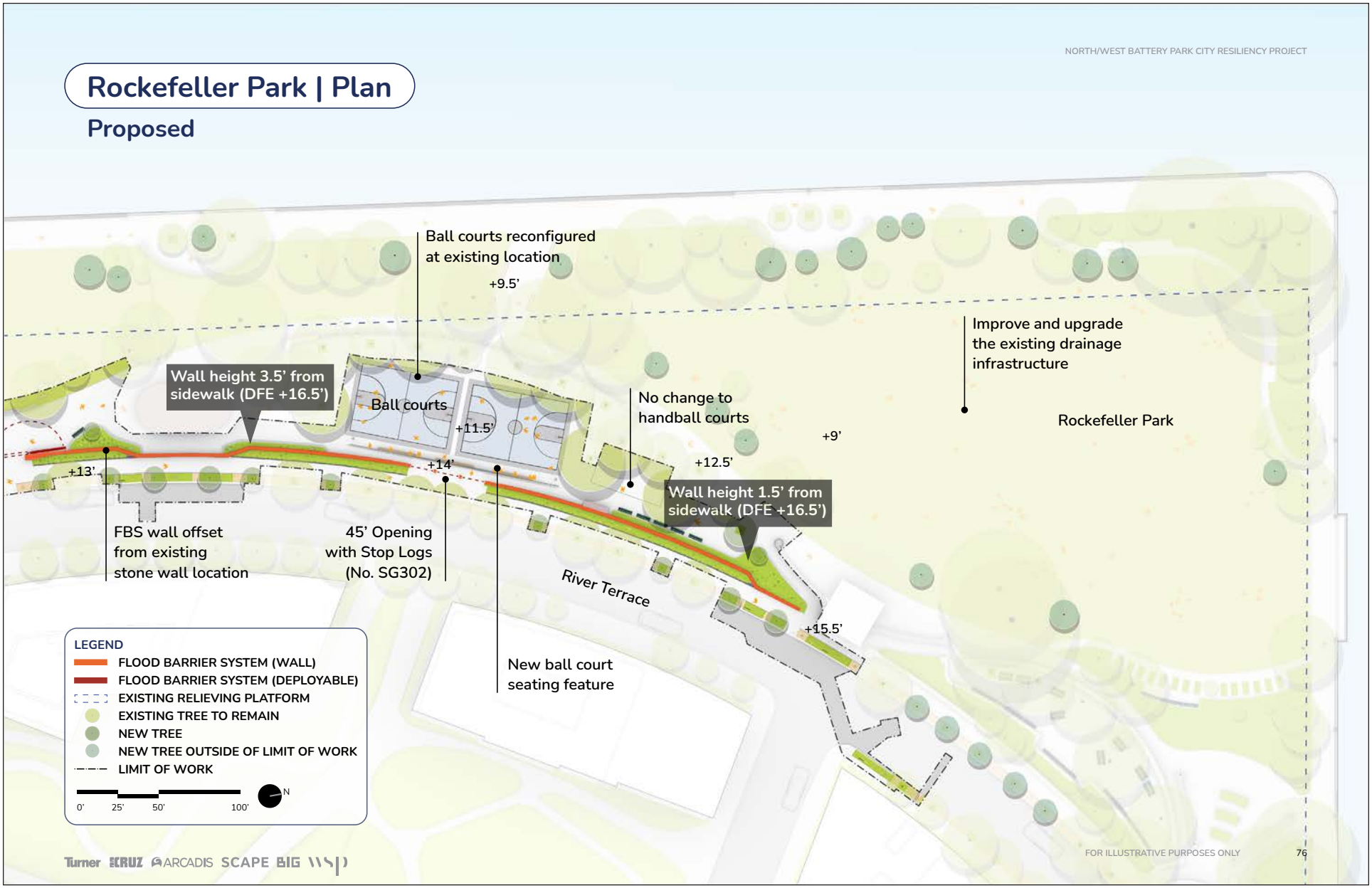
With respect to tree removal, the Proposed Project would require the removal ~~and replacement~~ of approximately ~~40~~35 trees and planting of 65 trees in this reach, primarily along River Terrace.

Circulation facilities in this reach include the Esplanade and paved paths with street/park furnishings. Under the Proposed Project, the circulation systems are similar to existing, and where possible, the Proposed Project provides enhanced accessibility through universal design.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-14b through 1-16j**.

Drainage improvements proposed in this reach ~~are comprised of~~comprise green infrastructure practices, such as the high-performance rain gardens proposed along River Terrace to capture and treat stormwater runoff from the roadway. High-performance rain gardens are manufactured systems that function similar to a standard rain garden, but within a smaller footprint. This ~~is~~ stormwater management approach is a preferred practice in built conditions where the system incorporates a high permeability soil to treat runoff from larger drainage areas in a smaller footprint when compared to a more traditional treatment practice.

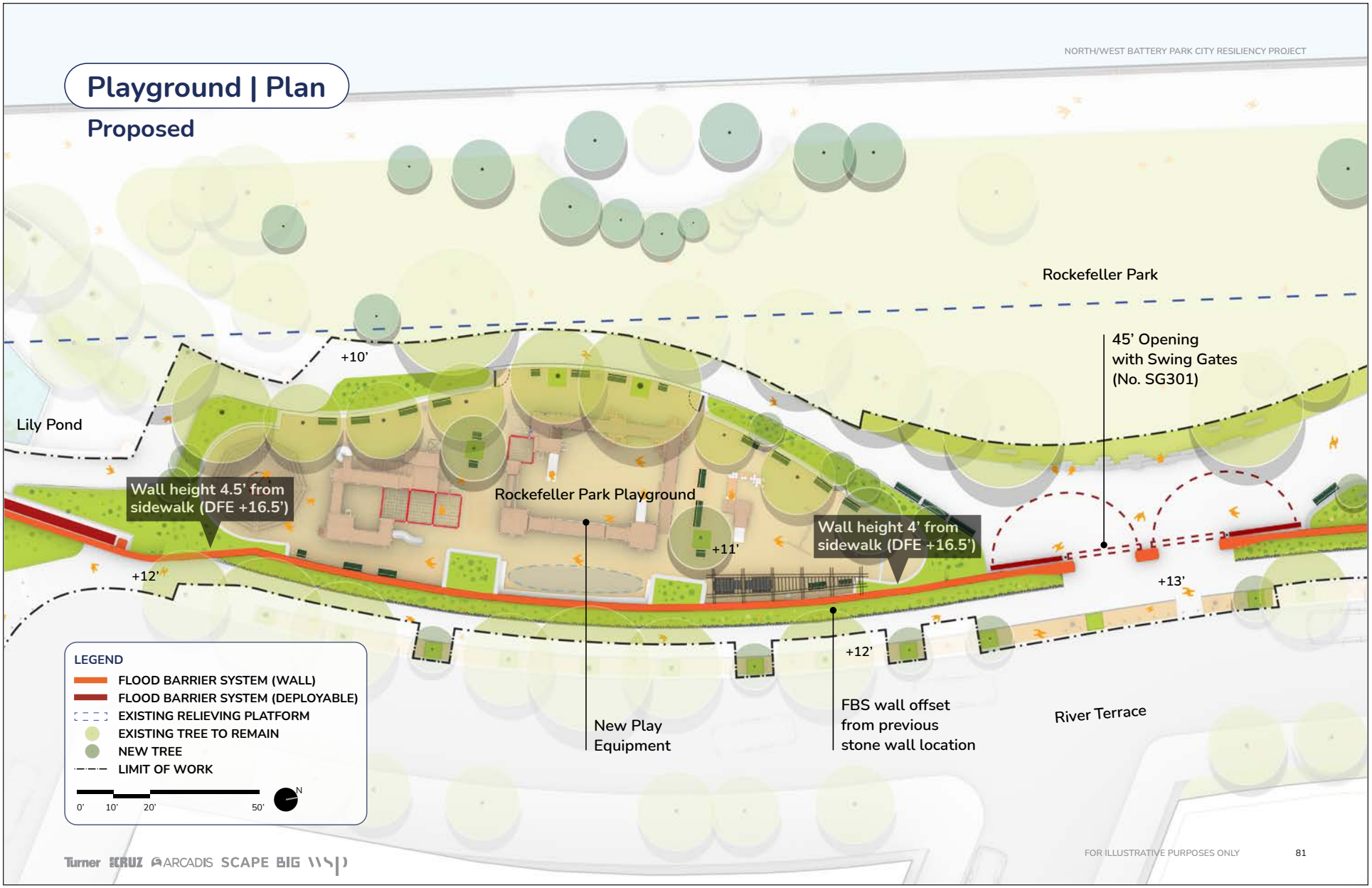
Reach 4 – Ferry Terminal



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Reach 3 Proposed Site Plan

Figure 1-14b



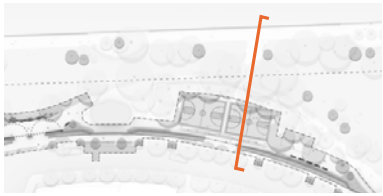
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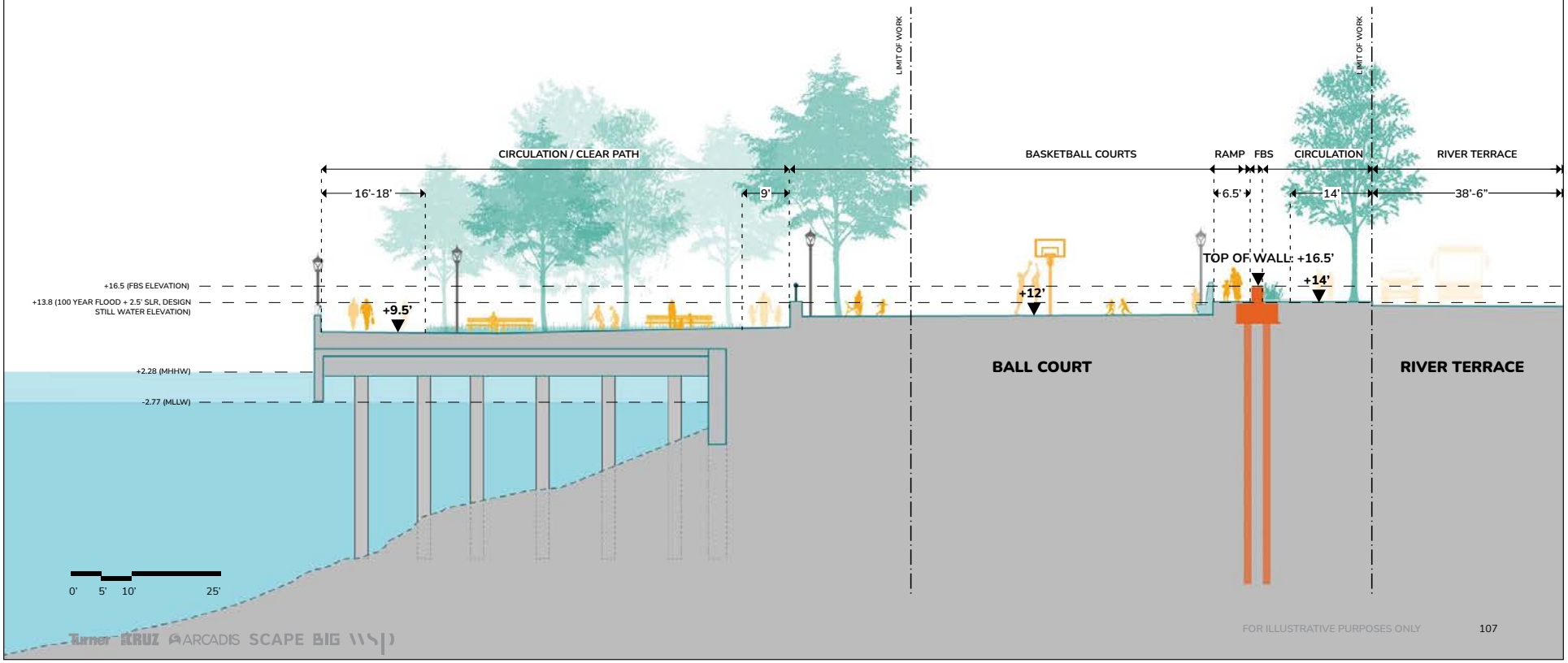
Reach 3 Proposed Site Plan

Figure 1-14c

Ball Court | Section

Proposed





This figure has been updated for the FEIS.

Reach 3 Proposed Section

Figure 1-14d



This figure has been updated for the FEIS.

Reach 3 Rendering

Figure 1-14e



This figure has been updated for the FEIS.

Reach 3 Rendering

Figure 1-14f



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Reach 3 Rendering

Figure 1-14g



This figure has been updated for the FEIS.

Reach 3 Rendering

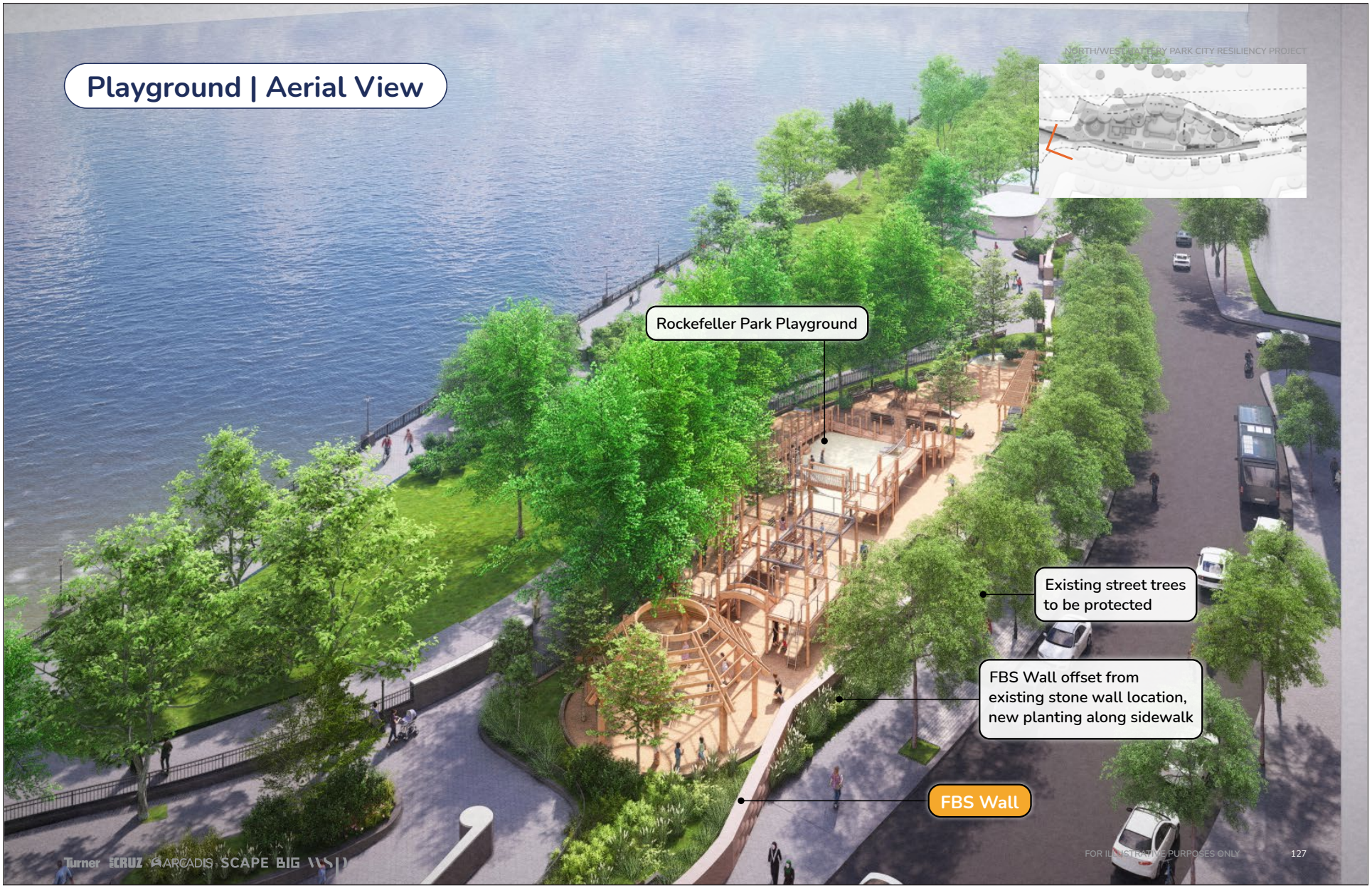
Figure 1-14h



This figure has been updated for the FEIS.

Reach 3 Rendering

Figure 1-14i



This figure has been updated for the FEIS.

Reach 3 Rendered Aerial

Figure 1-14j

In Reach 4, the key project design elements include a new elevated platform with an integrated flood barrier system. At 300 Vesey Street the building is in close proximity to the existing relieving platform which precludes the complete positioning of the flood barrier system off the existing platform structure. This in turn requires platform reconstruction west of the building at 300 Vesey Street at an elevation above the existing platform and the installation of piles and a seepage barrier. Reconstruction and raising of the platform at this location provide the co-benefits of both wave attenuation and reducing the above-ground height of the flood barrier system in this sub-area.

At the southern end of Reach 4, the Proposed Project includes reconstructing the existing platform on the west side of the building at 300 Vesey Street with an expanded planting area, an immersive landscape with seating areas, and a secondary ~~path with a~~ meandering ~~alignment that is designed for universal accessibility across the platform.~~path. In addition, the proposed design includes removing the existing ~~curving~~curved granite walls in front of the building at 300 feet Vesey Street, raising the Esplanade in front of 300 Vesey Street by 3 feet to an elevation of 12.5 feet, which eliminates universal accessibility challenges, and an above-ground 4-foot-high flood barrier system, which is aligned between the waterfront Esplanade and the inland plaza.

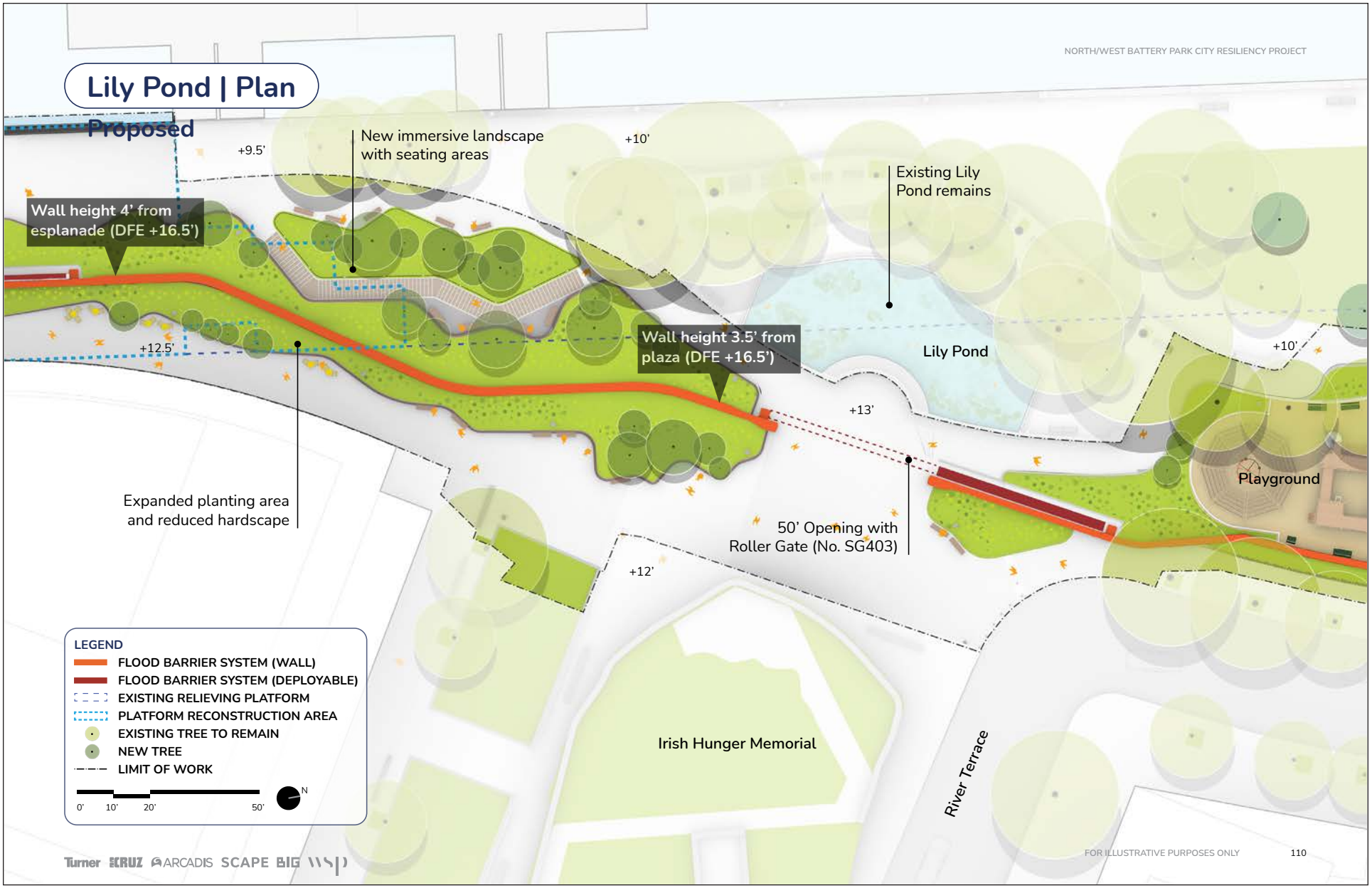
To the north, under the proposed design, the Lily Pond is unaffected, and a roller gate is constructed across the ~~south~~ entrance into Rockefeller Park from the Irish Hunger Memorial Plaza. This proposed roller gate connects to the floodwall element of the flood barrier system along the eastern edge of the playground where it ranges in height from 3.5 to 4.75 feet above grade south ~~from the entrance~~of the gate, similar to the elevation of the existing wall in this location.

Key landscape design objectives for Reach 4 include preserving the existing Lily Pond while optimizing circulation space with new planted areas and an immersive path south of the pond intended to reduce pedestrian congestion around the ferry terminal, diversify park visitors' experience, increase habitat value, and provide additional tree canopy where possible.

Under the proposed landscape design, the planted areas are concentrated along the flood barrier system while pedestrian circulation is consolidated along the Esplanade edge and the building facade, with the addition of an immersive path with seating areas set in an enhanced landscape setting. This reconfiguration also allows for an increase in the total planted area and simplification of the circulation. The proposed circulation design improvements also eliminate the existing stairs by raising the grade at the Esplanade platform reconstruction areas, thereby creating a contiguous open space and improved accessibility.

A site plan, cross sections, and illustrative renderings of this reach are provided in **Figures 1-15b through 1-15k**.

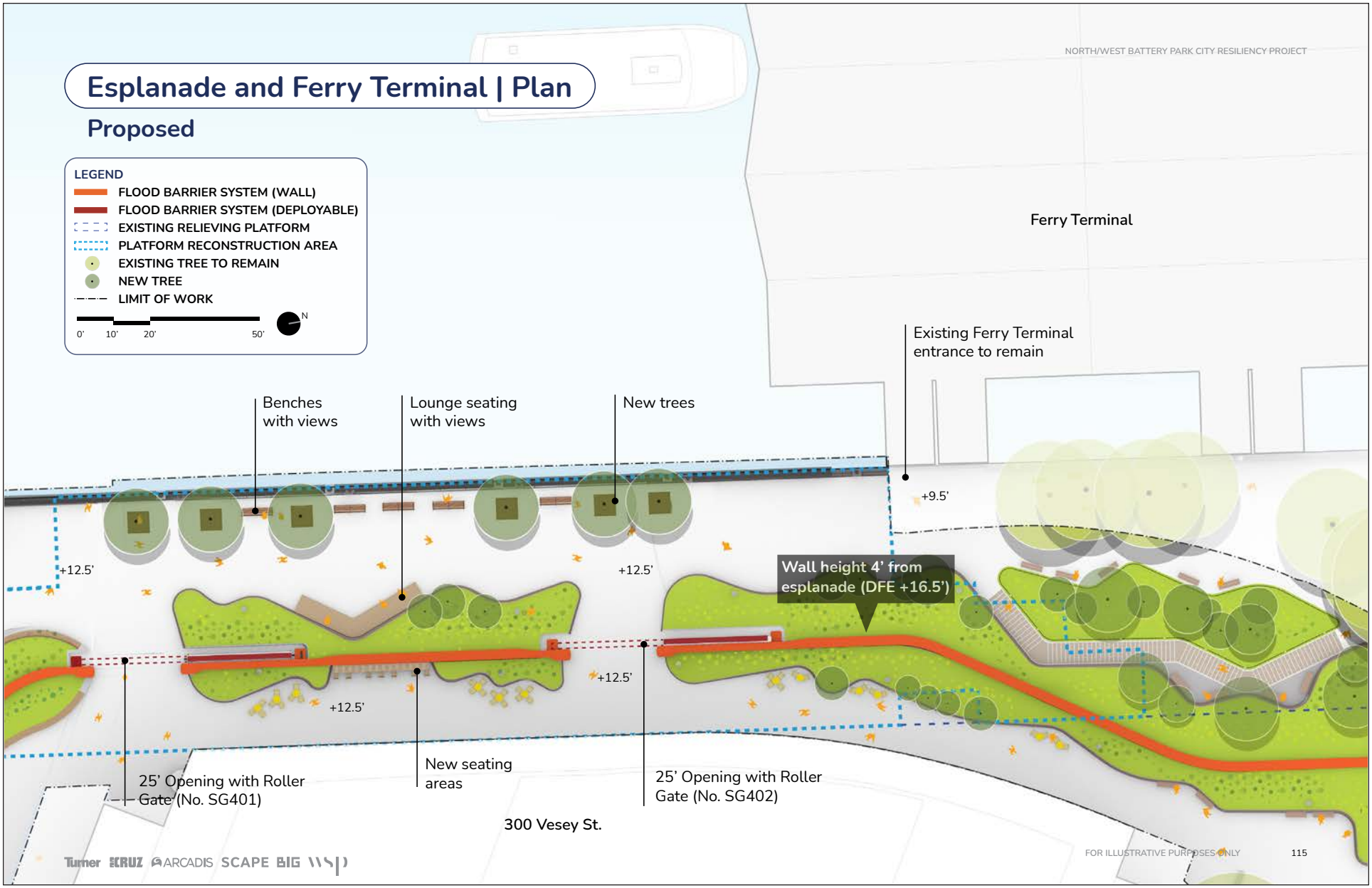
Drainage improvements in Reach 4 include installing green infrastructure practices such as permeable paving to reduce runoff discharges the Hudson River. A new tide gate structure to be installed within ~~along~~ the existing 96-inch CSO, in Vesey ~~Street~~Place, is also proposed to prevent storm flows from entering the protected area during storm surge conditions. Additional drainage infrastructure such as ~~PTD structures,~~



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Reach 4 Proposed Site Plan

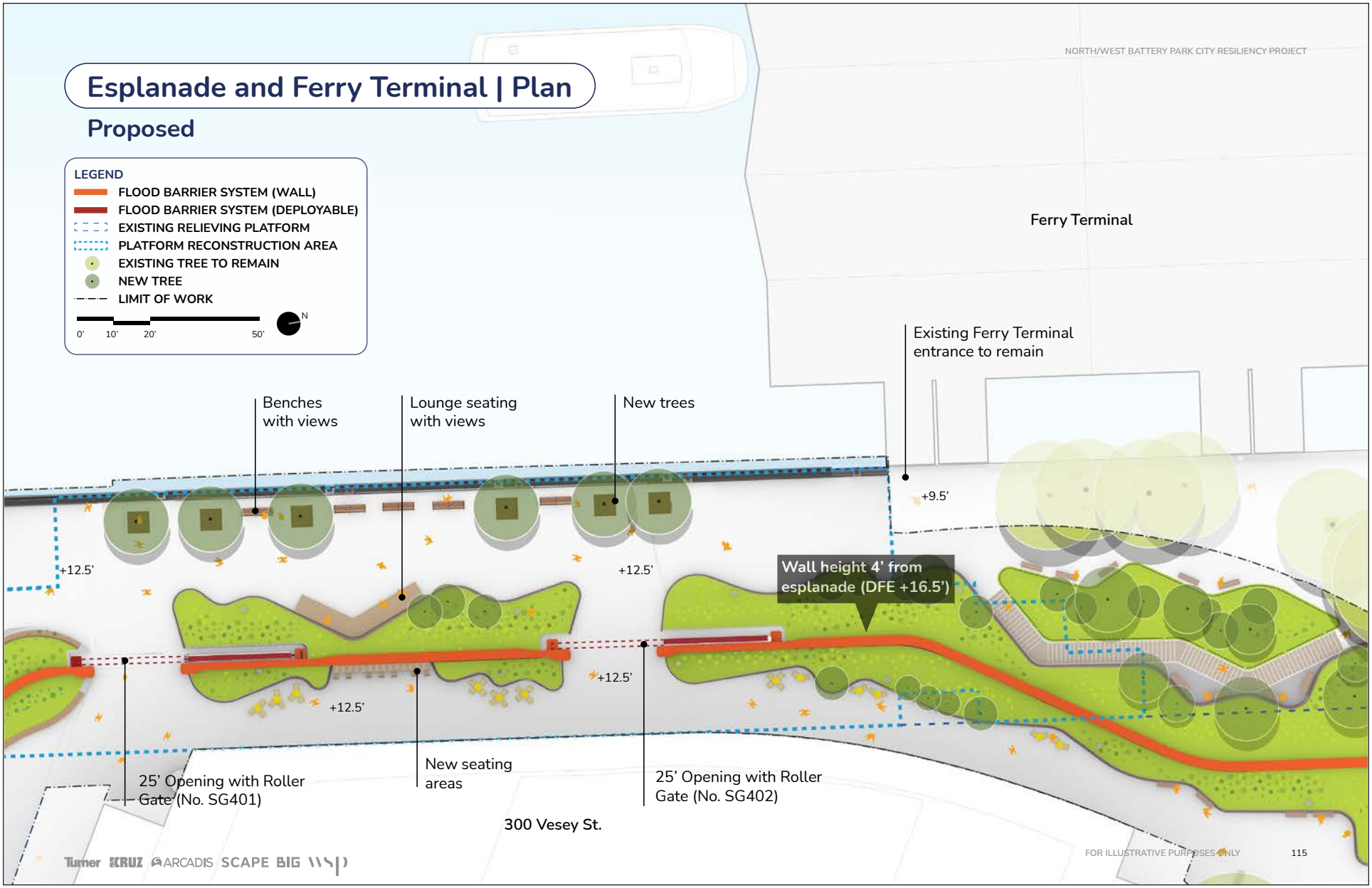
Figure 1-15b



This figure has been updated for the FEIS.

Reach 4 Proposed Site Plan

Figure 1-15c



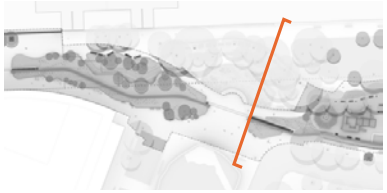
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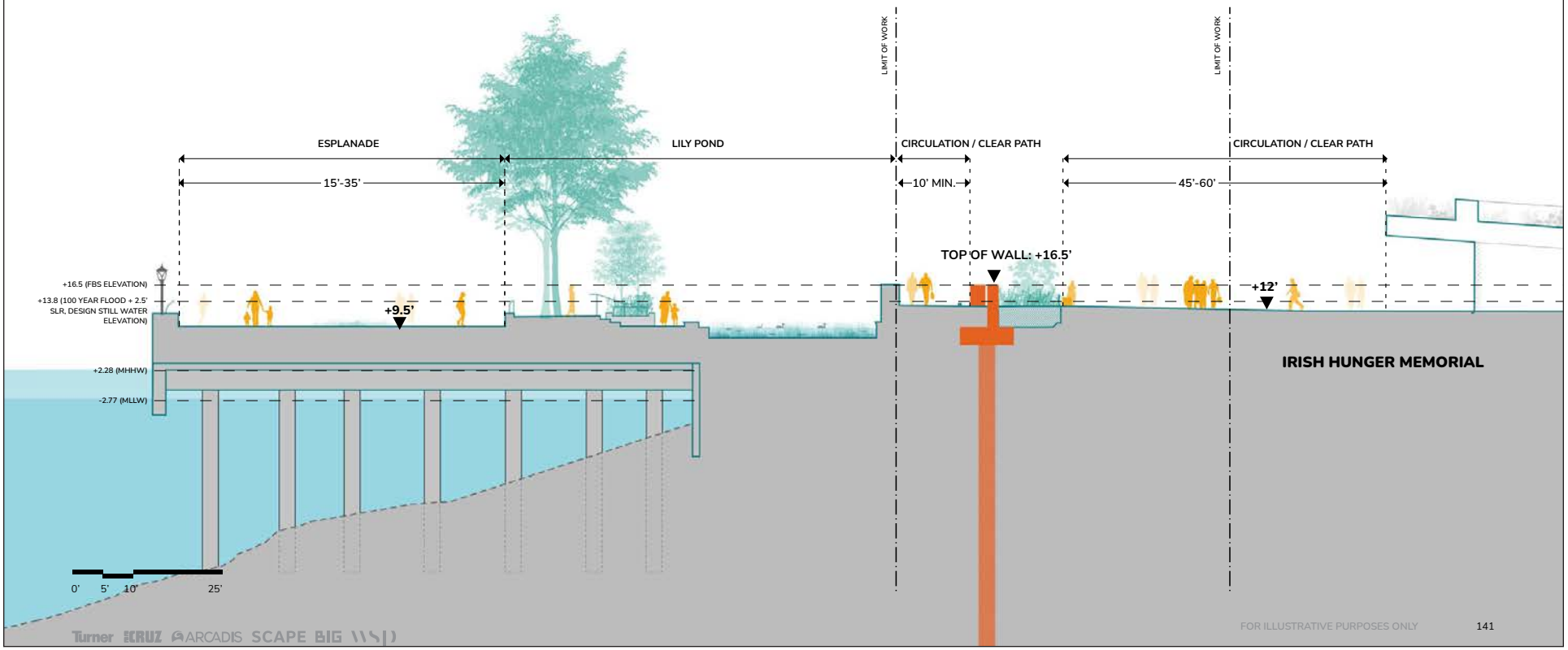
Reach 4 Proposed Site Plan

Figure 1-15c

Lily Pond | Section

Proposed





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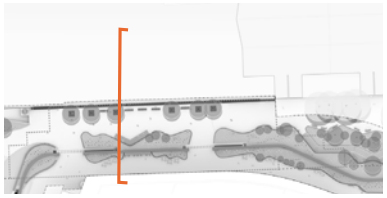
Reach 4 Proposed Section

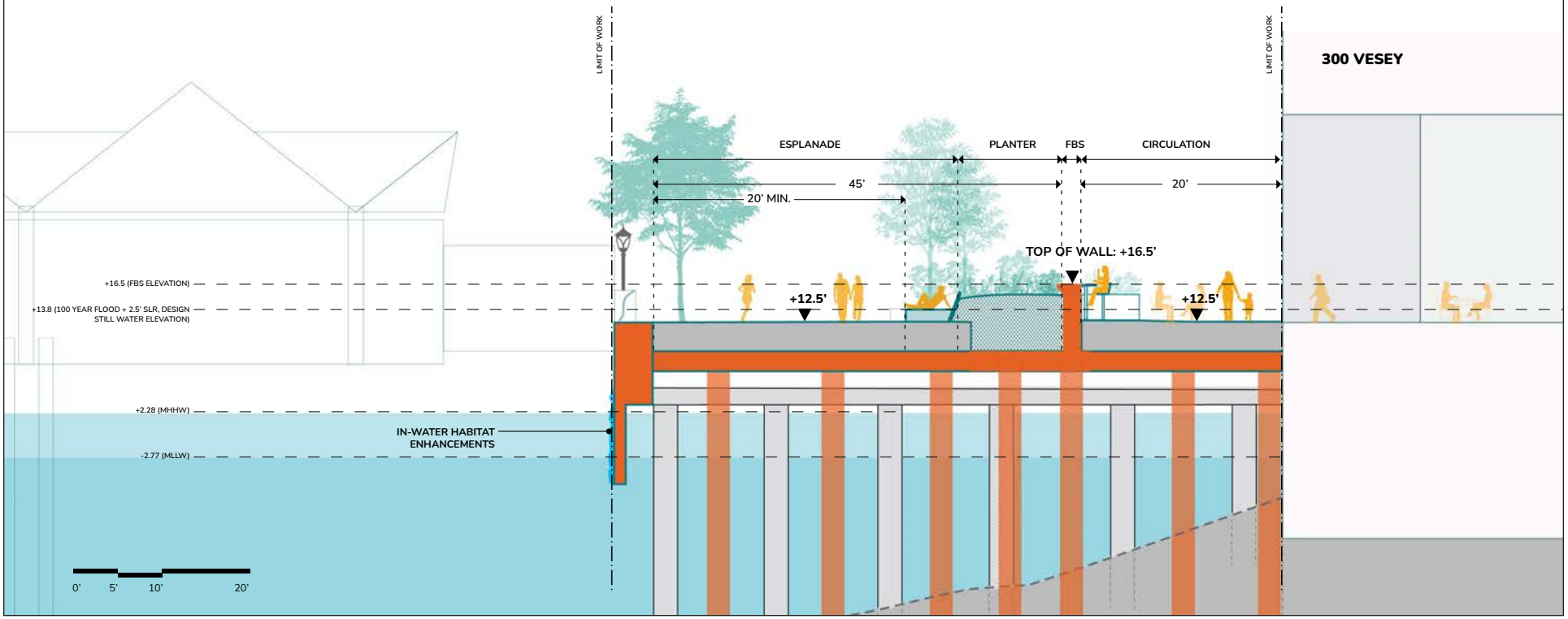
Figure 1-15d

Esplanade | Section

Proposed

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT





This figure has been updated for the FEIS.

Reach 4 Proposed Section

Figure 1-15e



This figure has been updated for the FEIS.

Reach 4 Rendering

Figure 1-15f



This figure has been updated for the FEIS.

Reach 4 Rendering

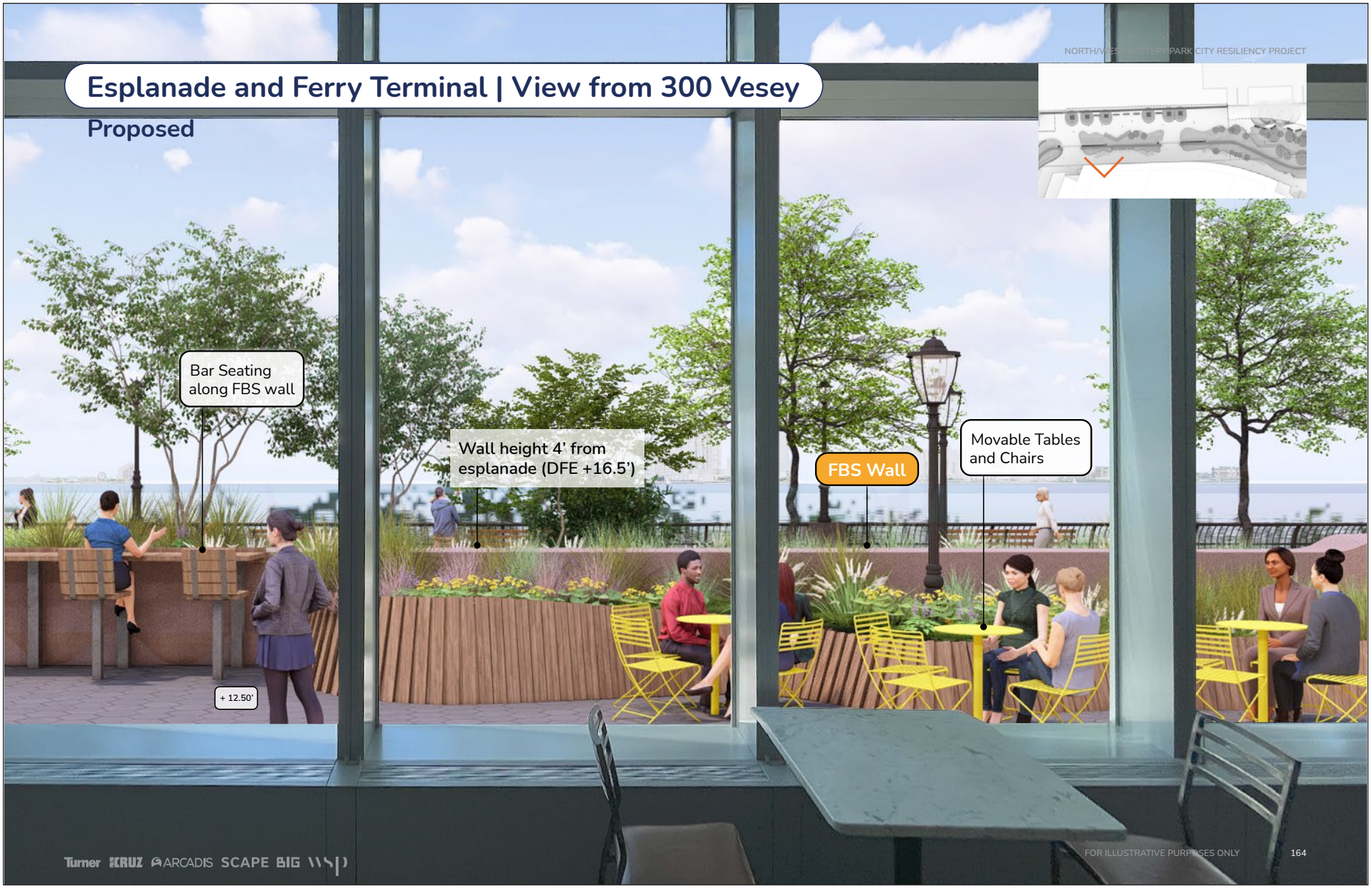
Figure 1-15g



This figure has been updated for the FEIS.

Reach 4 Rendering

Figure 1-15h



This figure has been updated for the FEIS.

Reach 4 Rendering

Figure 1-15i



This figure has been updated for the FEIS.

Reach 4 Rendering

Figure 1-15j



This figure has been updated for the FEIS.

Reach 4 Rendered Aerial

NORTH/WEST BATTERY PARK RESILIENCY

Figure 1-15k

trench drains and catch basins are also proposed to capture and convey stormwater runoff. ~~A modification of the sanitary sewer system is also proposed at Vesey Street to enable gravity flow.~~

Reach 5 – Brookfield Place

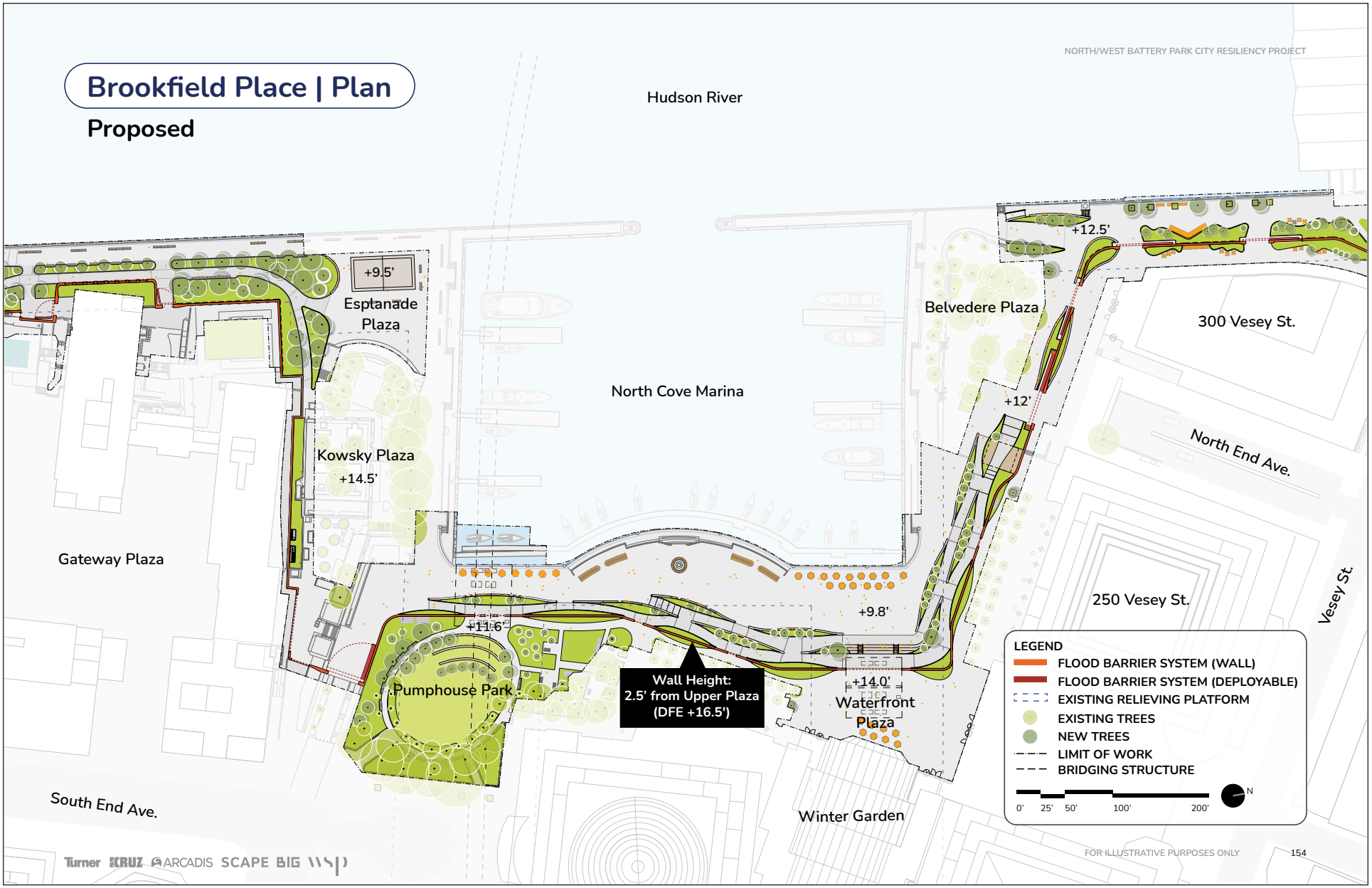
The proposed flood barrier system design in this reach is a combination of passive structures integrated into terraced planting (inland from the bulkhead/water's edge) with deployable elements to maintain pedestrian access between the upper and lower Esplanade levels. The system alignment here begins in the north at Belvedere Plaza and continues approximately 50 feet along the face of the Brookfield Place buildings at 300 and 250 Vesey Street, respectively. At the 230 Vesey Street building this distance is increased to approximately 65 feet. The proposed alignment then continues at the perimeter of Pumphouse Park before crossing Liberty Street to the east of the Battery Park City mechanical structures adjacent to the Police Memorial. From here, the alignment follows along the façade of the Gateway apartments and replaces the existing privacy wall. To maintain accessibility, the proposed flood barrier system alignment essentially follows the edge of the platform which minimizes the impact to the plaza, trees, and dining terraces at Brookfield Place. It is also a design objective for the plaza spaces to remain essentially in their current configuration for the continued purpose of hosting year-round events. Therefore, the grade transitions between the upper dining terraces at Brookfield place have been designed with a series of interconnected switch-back ramps that also provide seating opportunities, shade, and pockets of trees and vegetation.

In this reach the Proposed Project alignment also crosses two Port Authority of New York and New Jersey (PANYNJ)/PATH tunnels. At these locations special bridging structures are therefore required below the plaza deck to maintain the function of these tunnels. The proposed bridging structures are also designed with butterfly valves so that in a design storm the valves can be closed to prevent the flood waters from flowing inland and under the flood barrier system and then impacting State Route 9A/ West Street. These valves would otherwise remain open to maintain the current water flow and tidal exchange in the tunnel channels.

This alignment includes limited tree removal at Belvedere Plaza and ~~on the perimeter of Pump House~~in Pumphouse Park. Overall, it is estimated that up to 120 trees would be removed in this reach, with 3 trees transplanted and ~~75~~80 new trees planted where possible.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-16b through 1-16p**.

Drainage improvements proposed in Reach 5 are comprised of stormwater treatment practices such as permeable pavers ~~and PTD systems~~. Permeable pavers are also proposed to reduce overland runoff prior to discharge to the Hudson River. ~~A new 24-inch outfall in Belvedere Plaza is also proposed to redirect stormwater runoff from the plaza to the River.~~ As part of the drainage improvements, a new 12-inch outfall is proposed at Belvedere Plaza to redirect stormwater runoff from the plaza to the river. Additionally, due to conflicts with the flood barrier system, two existing 18-inch outfalls are to be replaced with four new small stormwater outfalls (two 12-inch outfalls on the flood side and one 15-inch and one 12-inch outfall on the protected side). These are proposed for the purpose of separating and improving



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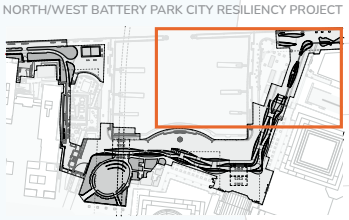
Reach 5 Proposed Site Plan

NORTH/WEST BATTERY PARK RESILIENCY

Figure 1-16b

Belvedere Plaza | Plan

Proposed



Hudson River

+8.3'

+9.5'

+12.5'

Wall Height:
4' from Path
(DFE +16.5')

North Cove
Marina

Belvedere Plaza

300 Vesey st.

+12'

+14'

North end Ave

LEGEND

- FLOOD BARRIER SYSTEM (WALL)
- FLOOD BARRIER SYSTEM (DEPLOYABLE)
- EXISTING RELIEVING PLATFORM
- EXISTING TREES
- NEW TREES
- LIMIT OF WORK

0' 25' 50' 100'

N

Turner CRUZ ARCADIS SCAPE BIG WSP

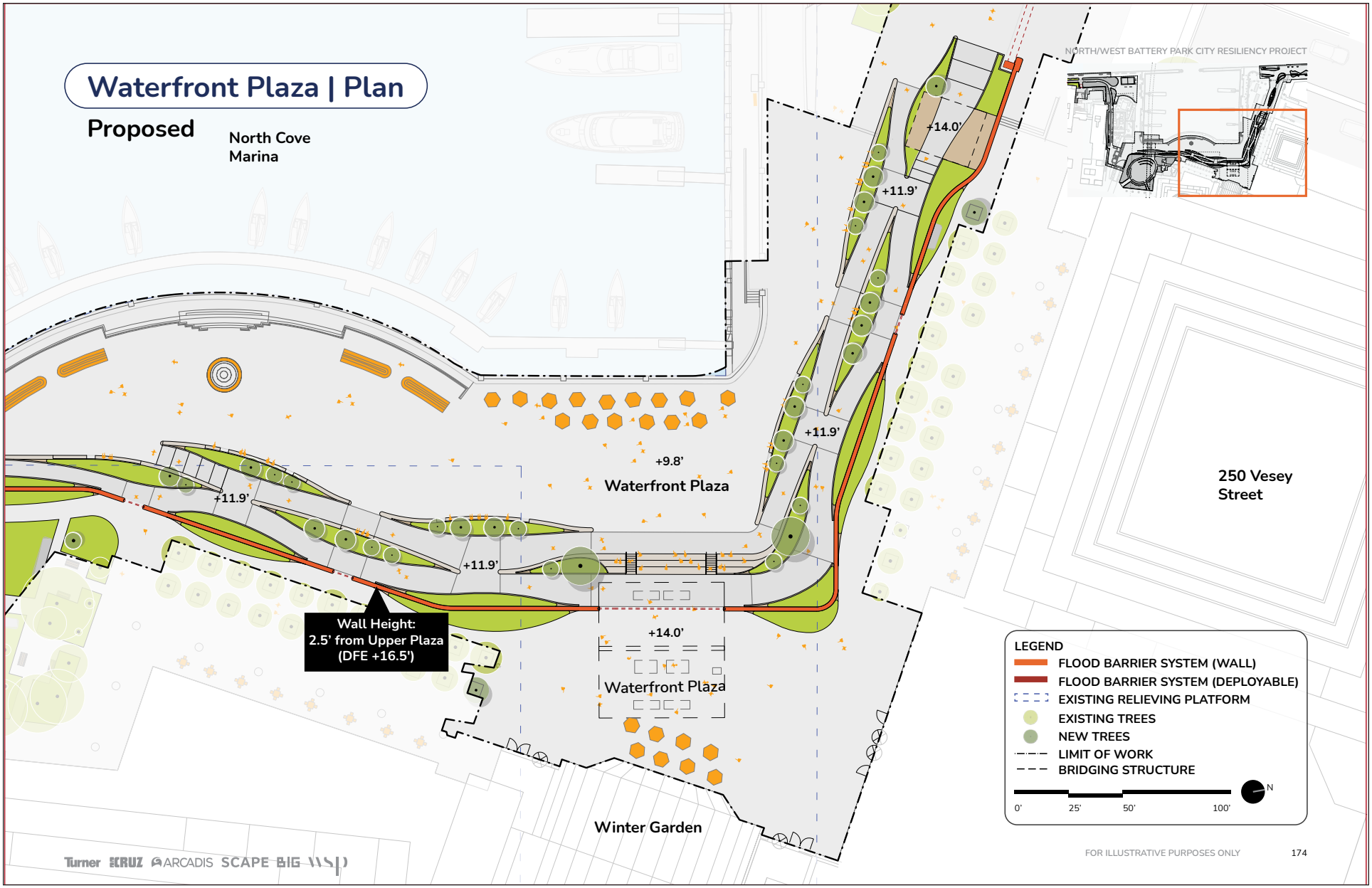
FOR ILLUSTRATIVE PURPOSES ONLY

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This figure has been updated for the FEIS.

Reach 5 Proposed Site Plan

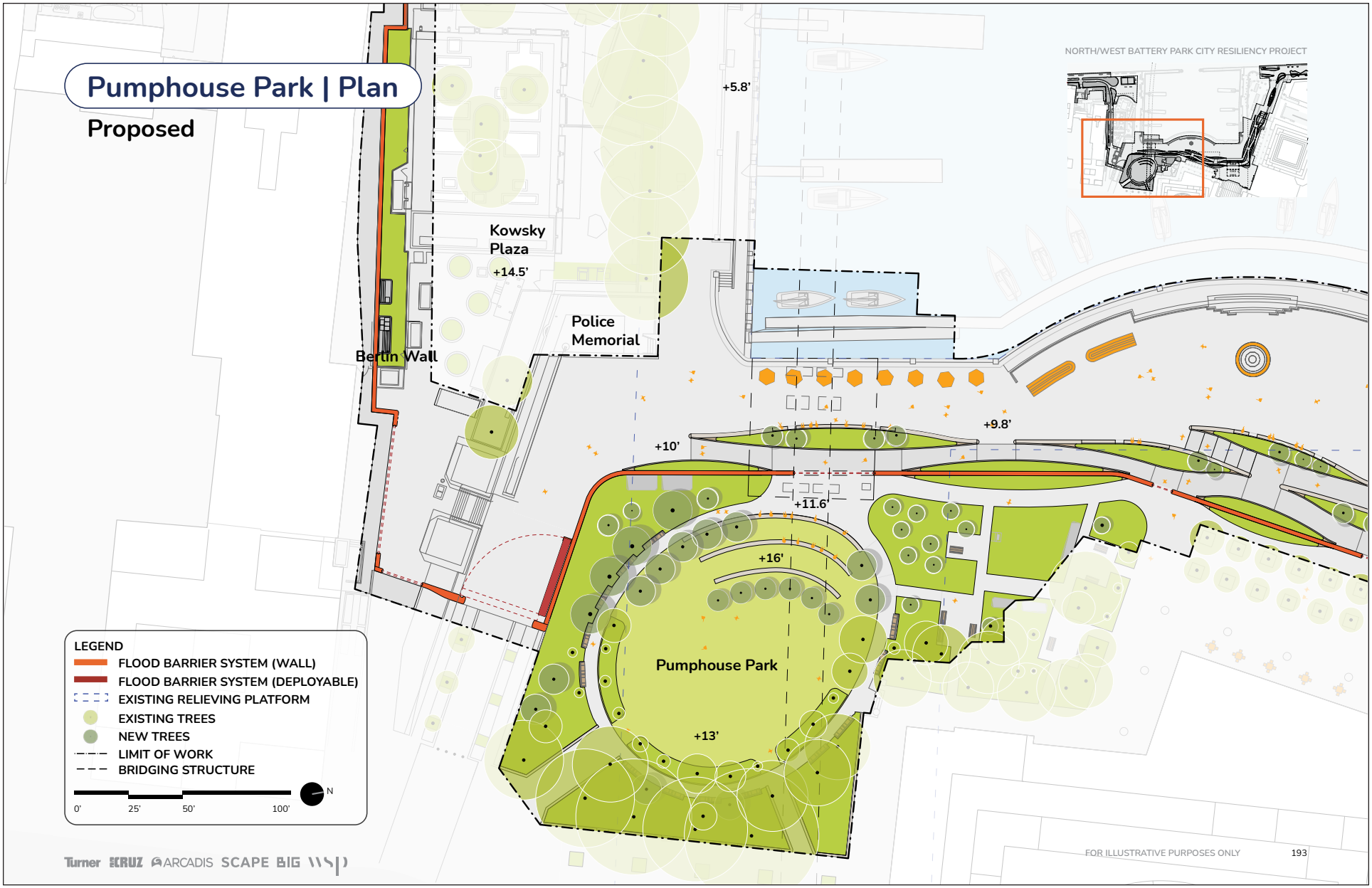
Figure 1-16c



This figure has been updated for the FEIS.

Reach 5 Proposed Site Plan

Figure 1-16d



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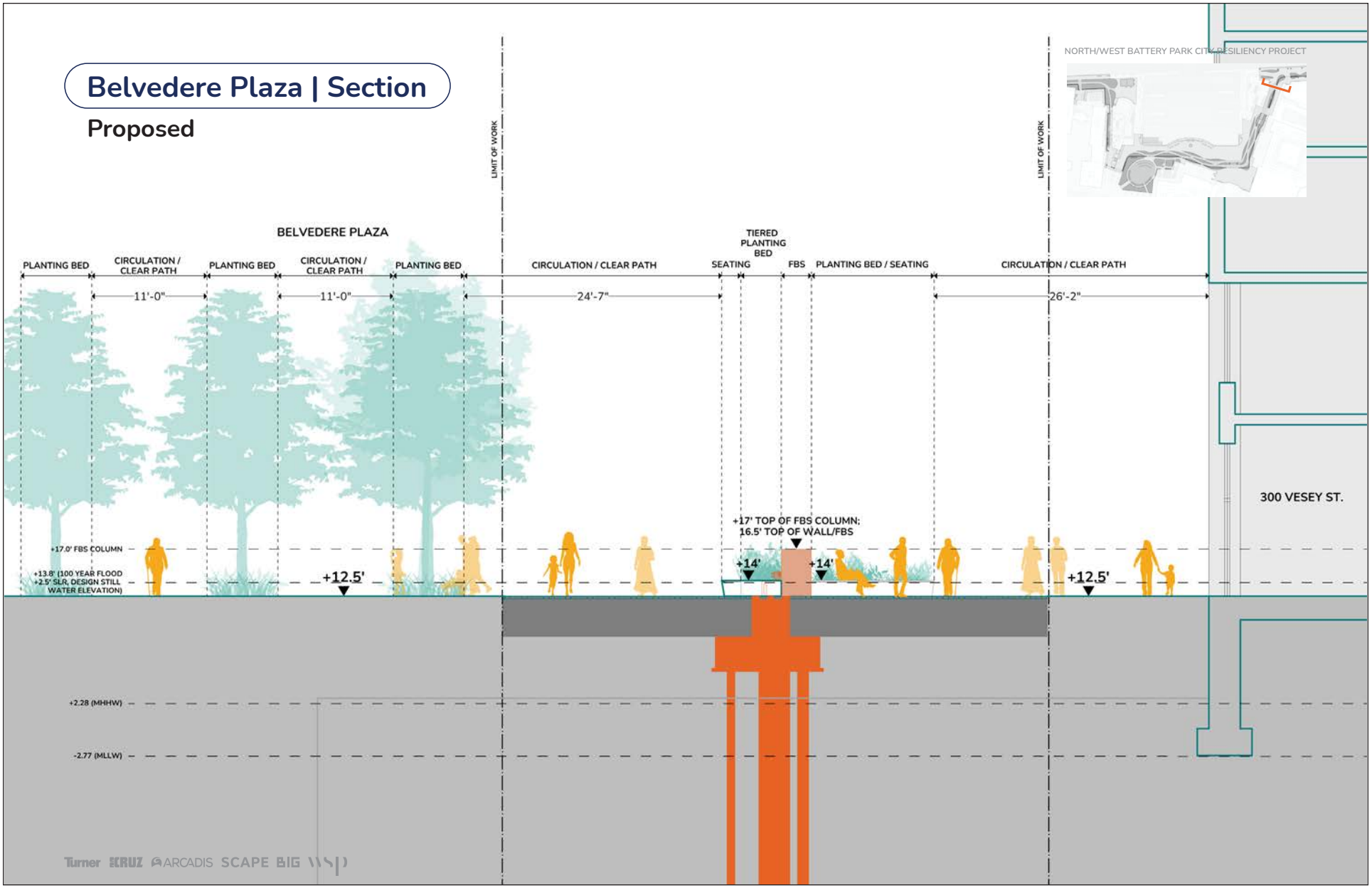
Reach 5 Proposed Site Plan

Figure 1-16e



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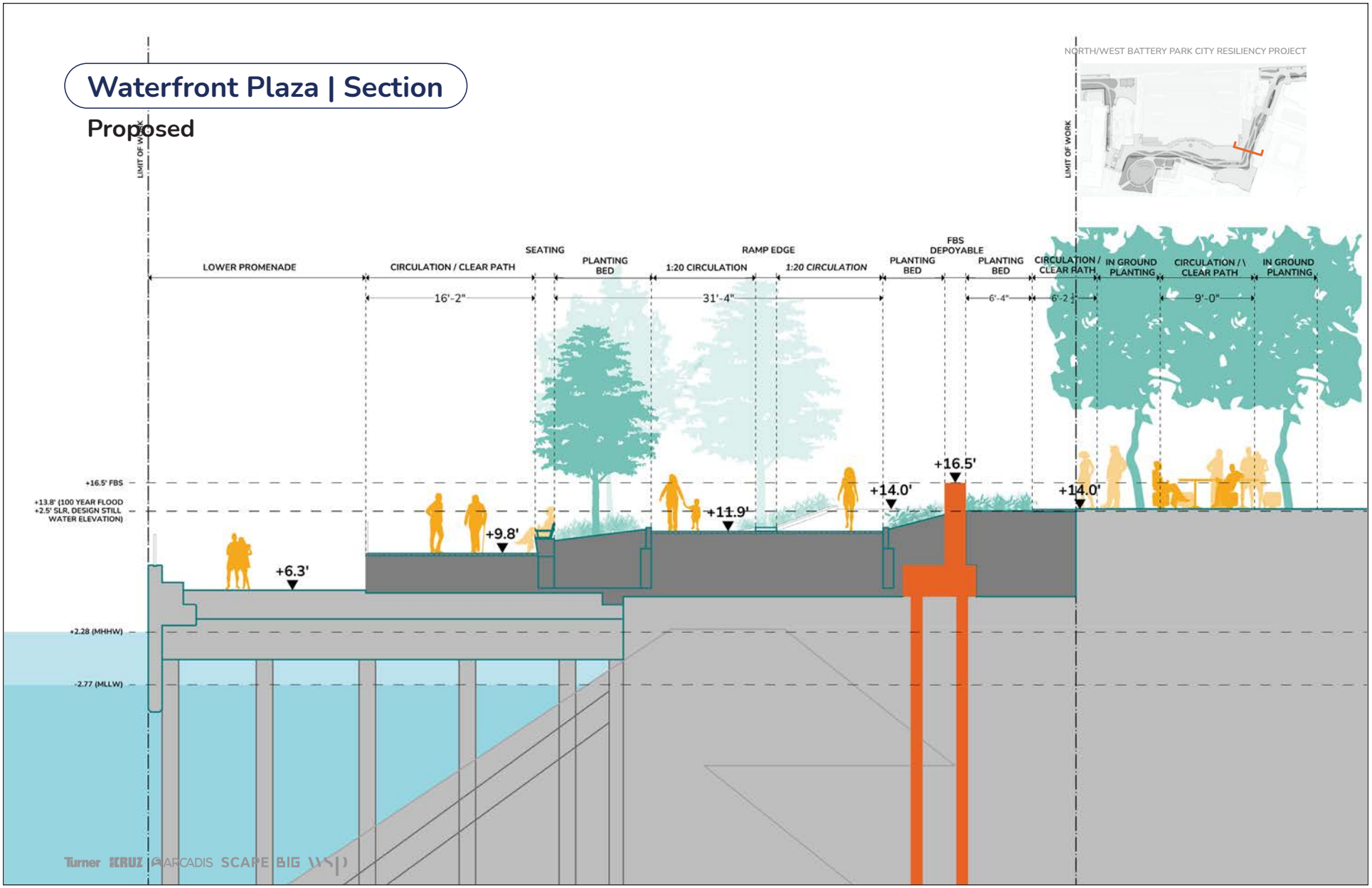
Reach 5 Proposed Site Plan



This figure has been updated for the FEIS.

Reach 5 Proposed Section

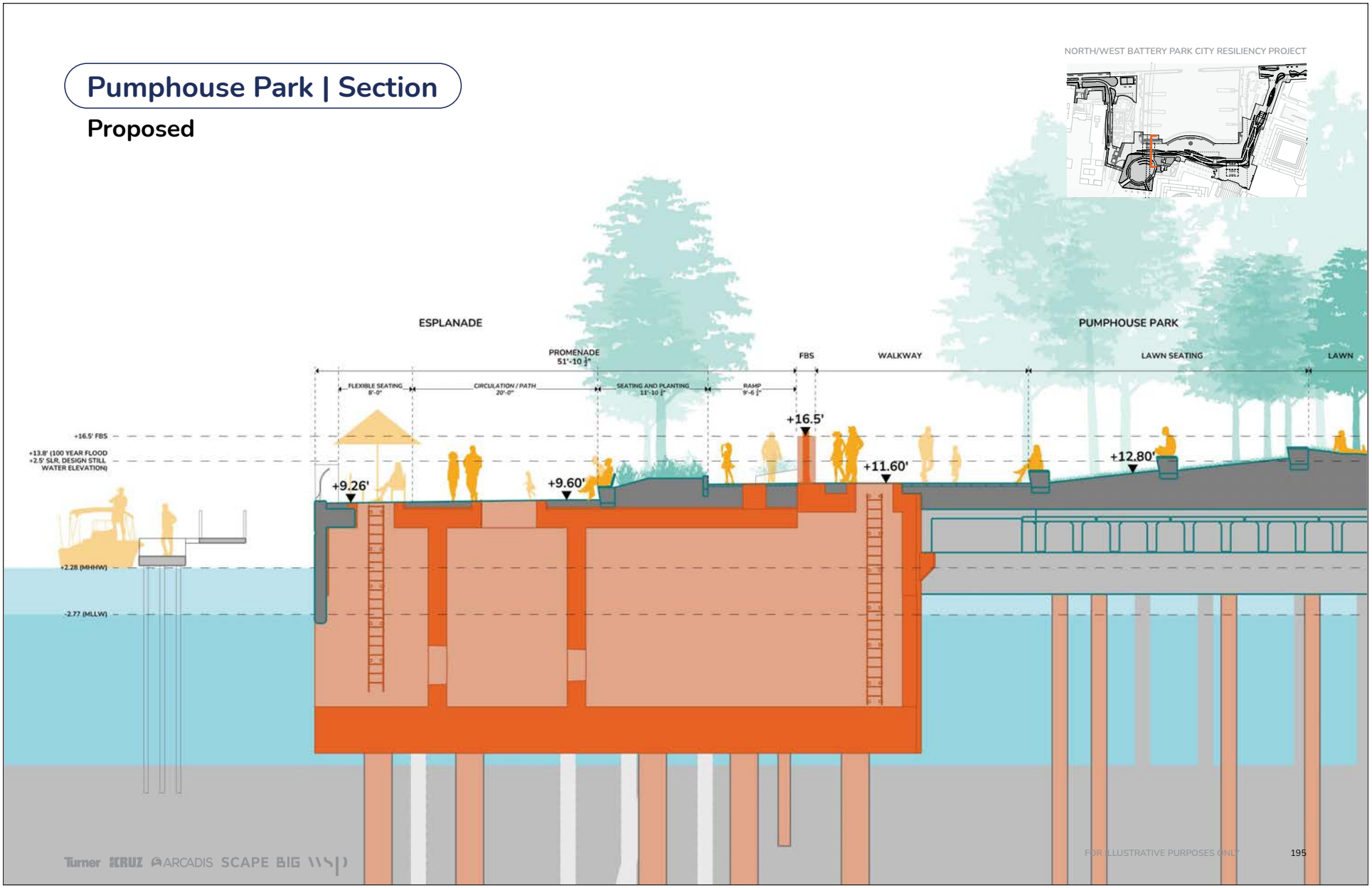
Figure 1-16g



This figure has been updated for the FEIS.

Reach 5 Proposed Section

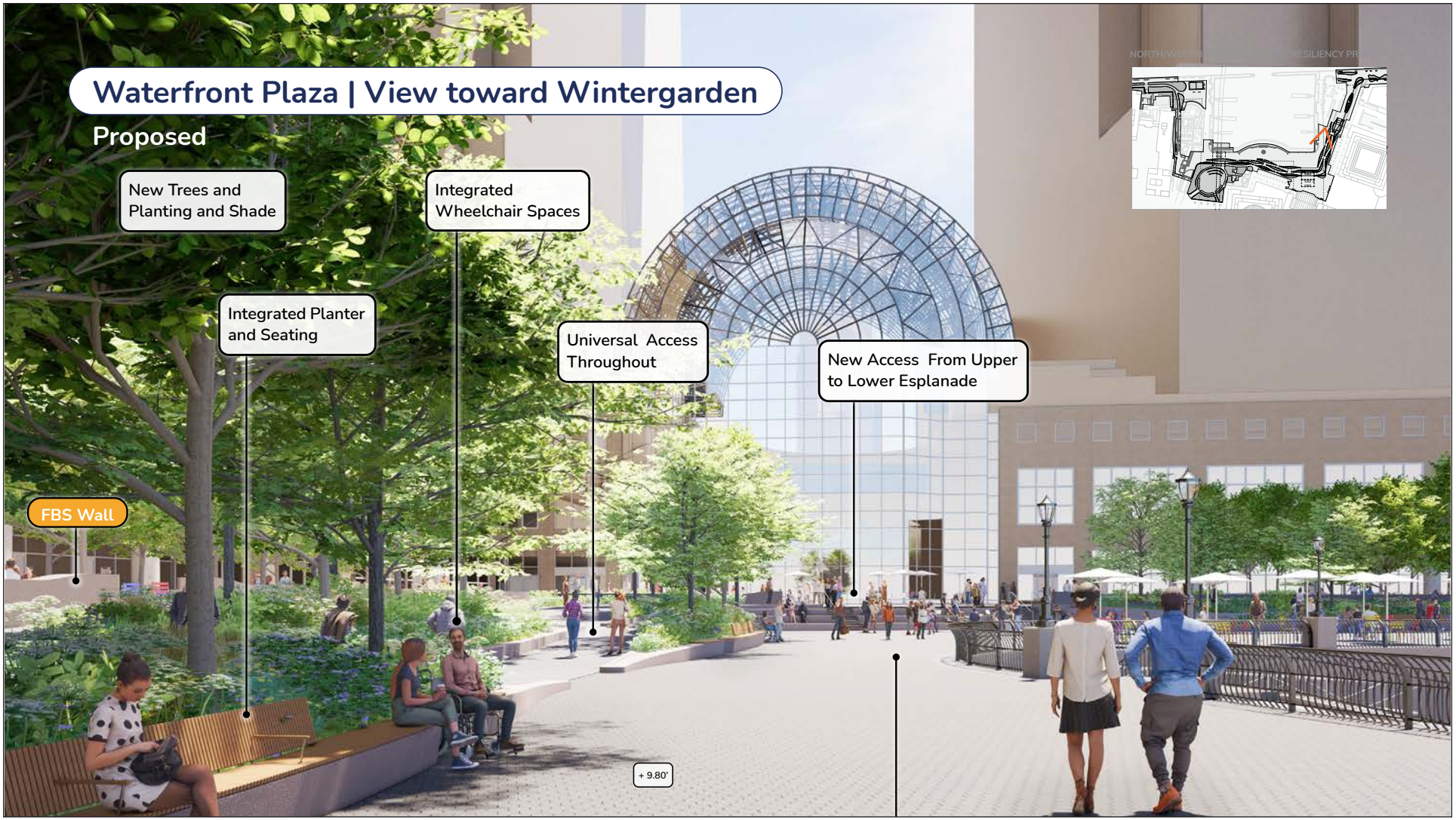
Figure 1-16h



This figure has been updated for the FEIS.

Reach 5 Proposed Section

Figure 1-16i



This figure has been updated for the FEIS.

Reach 5 Rendering

Figure 1-16j



This figure has been updated for the FEIS.

Reach 5 Rendering

Figure 1-16k



This figure has been updated for the FEIS.

Reach 5 Rendering

Figure 1-16l



This figure has been updated for the FEIS.

Reach 5 Rendering

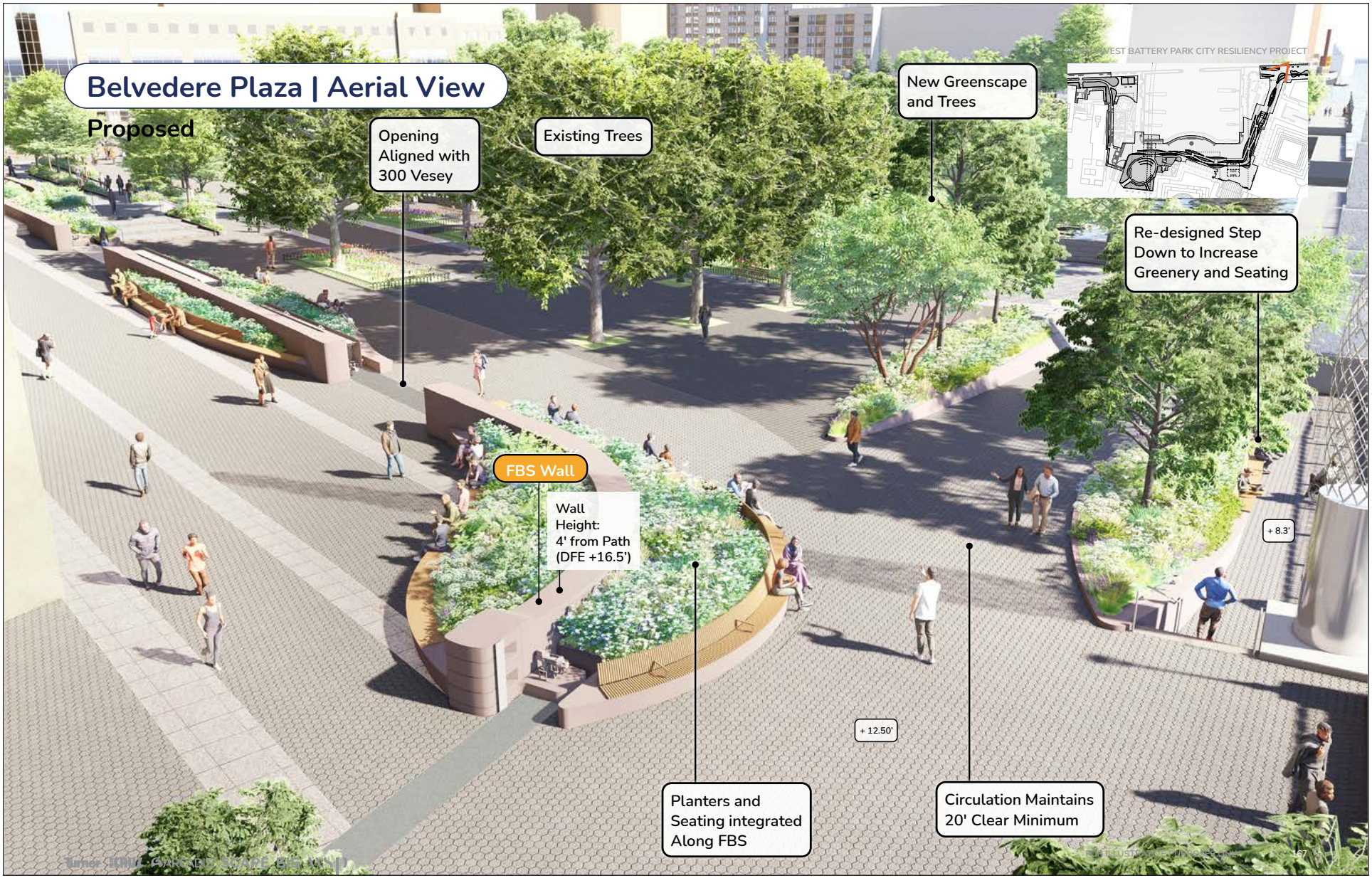
Figure 1-16m



This figure has been updated for the FEIS.

Reach 5 Rendering

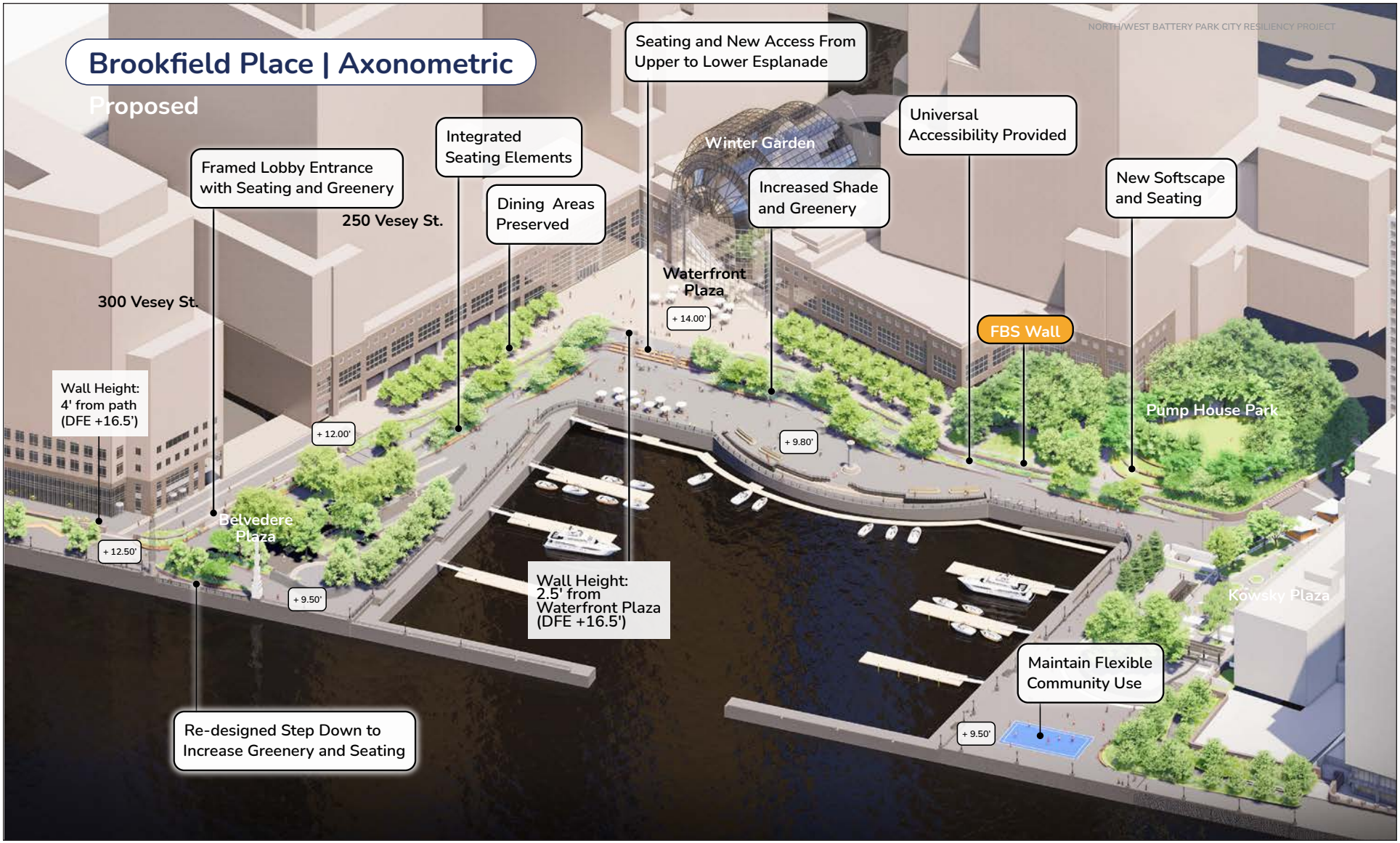
Figure 1-16n



This figure has been updated for the FEIS.

Reach 5 Rendered Aerial

Figure 1-16o



This figure has been updated for the FEIS.

Reach 5 Axonometric

Figure 1-16p

drainage systems on both the flood and protected sides of the proposed flood barrier system. Existing drainage areas discharging to the Hudson River will remain the same under proposed conditions. Additional drainage infrastructure such as trench drains and catch basins are also proposed to capture and convey stormwater runoff.

Reach 6 – South Esplanade

Along the South Esplanade in Reach 6, a passive structure is proposed in an alignment parallel to the existing masonry privacy wall at the inland edge of the reach and set back from the South Esplanade.

This design approach in Reach 6 is to replace the existing privacy wall that separates the ground and lower floors of the buildings from the South Esplanade with the proposed flood barrier system. This proposed design maintains the existing South Esplanade at the water's edge, while creating the opportunity for a winding secondary path inland to accommodate more leisurely pedestrian flow through a meandering design that discourages more rapid pedestrian traffic modalities. This design also creates the opportunity for more tree planting and replacement ~~outside of the 15-foot flood barrier system offset~~. The flood barrier system in Reach 6 ~~would~~is proposed to be several feet from any building's exterior walls with ventilation louvers.

In addition to the passive system, this reach design includes deployable elements to maintain access at the end of Albany, Rector, and West Thames Streets. Roller gates are also proposed at these locations to maintain both pedestrian and emergency vehicle access while also providing programmed amenities with ample seating provided along both the existing South Esplanade and the secondary winding walkway.

Three new programmatic nodes are proposed where Albany Street, Rector Place, and West Thames Street terminate into the South Esplanade. Two of these nodes provide smaller, passive seating opportunities or "reading" and "conversation" rooms and the art piece "Sitting Stance" is to be relocated from the West Thames Street end to one of these nodes.

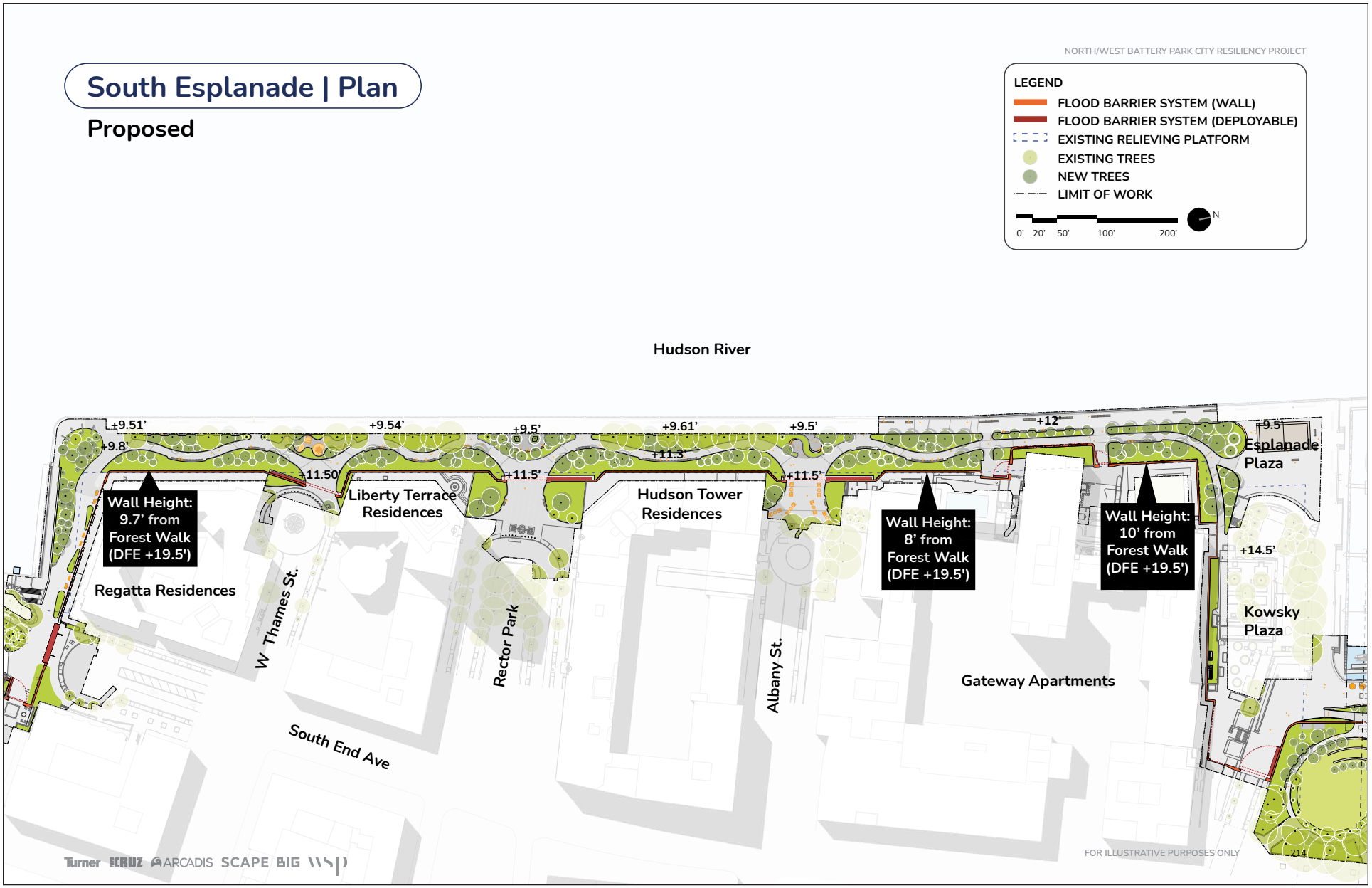
Landscaping proposed along this reach is comprised of ~~is comprised of~~ lush native ~~plantings~~planting and tree replacement with the objective of providing shade, ecological habitat, and a visual amenity.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-17a through 1-17w**.

Infrastructure improvements proposed in this reach include four~~two~~ new tide-gate structures, with one along~~parallel to~~ the existing 18-inch stormwater outfall located at the end of Albany Street and another along the existing 96-inch CSO at the end of Rector Place. ~~PTD are proposed to treat stormwater runoff from impervious surfaces. A lift station is proposed for West Thames Street to transport flow to the existing 84-inch CSO.~~ Additionally, drainage improvements proposed within Gateway Plaza consist of installing sump pumps located on the south side of the Gateway building to manage stormwater that would require a small area of disturbance for installation. When operating in a storm event, the pumped water would then be pumped downstream of the proposed tide gate structure on the south side of the

South Esplanade | Plan

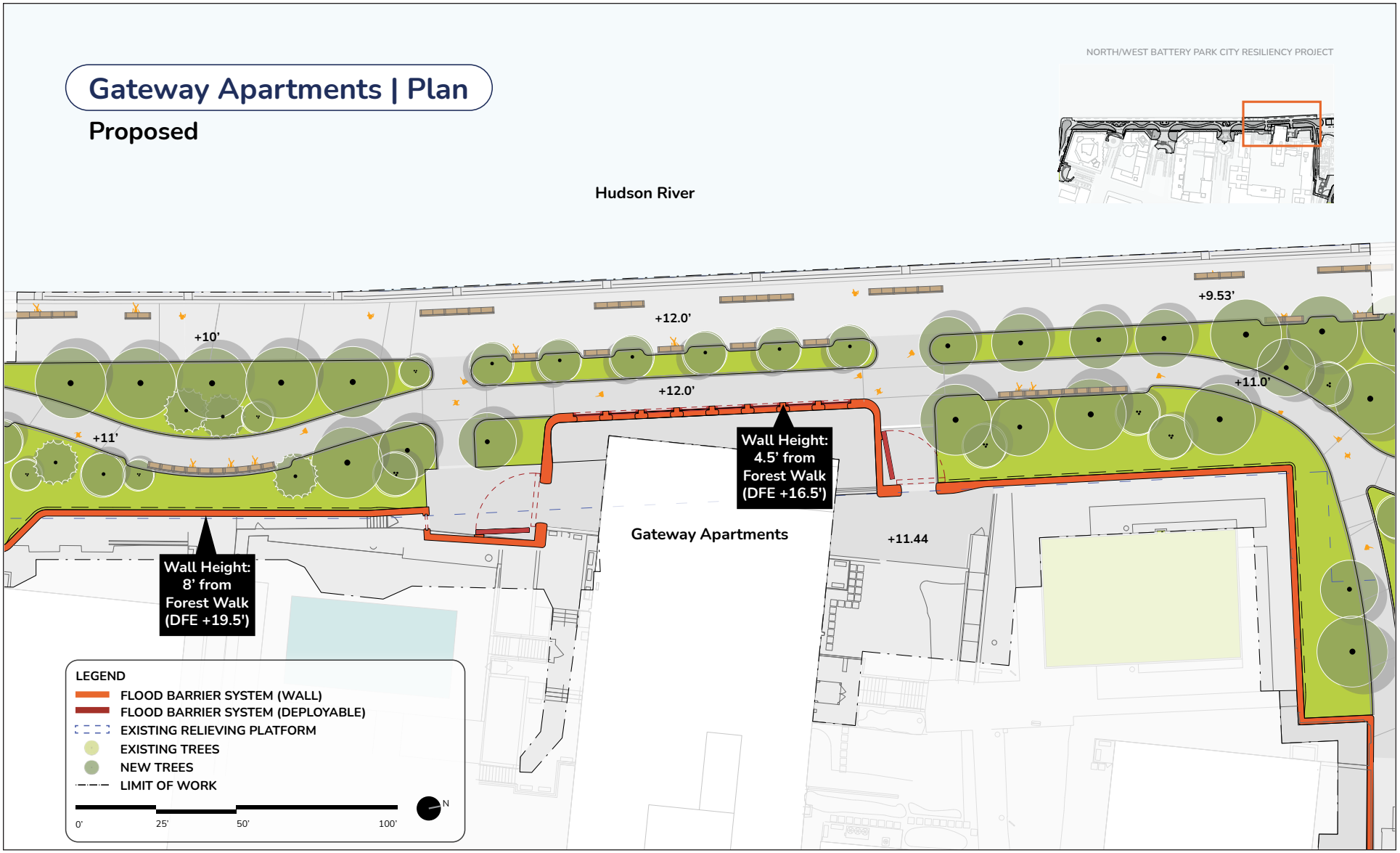
Proposed



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Reach 6 Proposed Site Plan

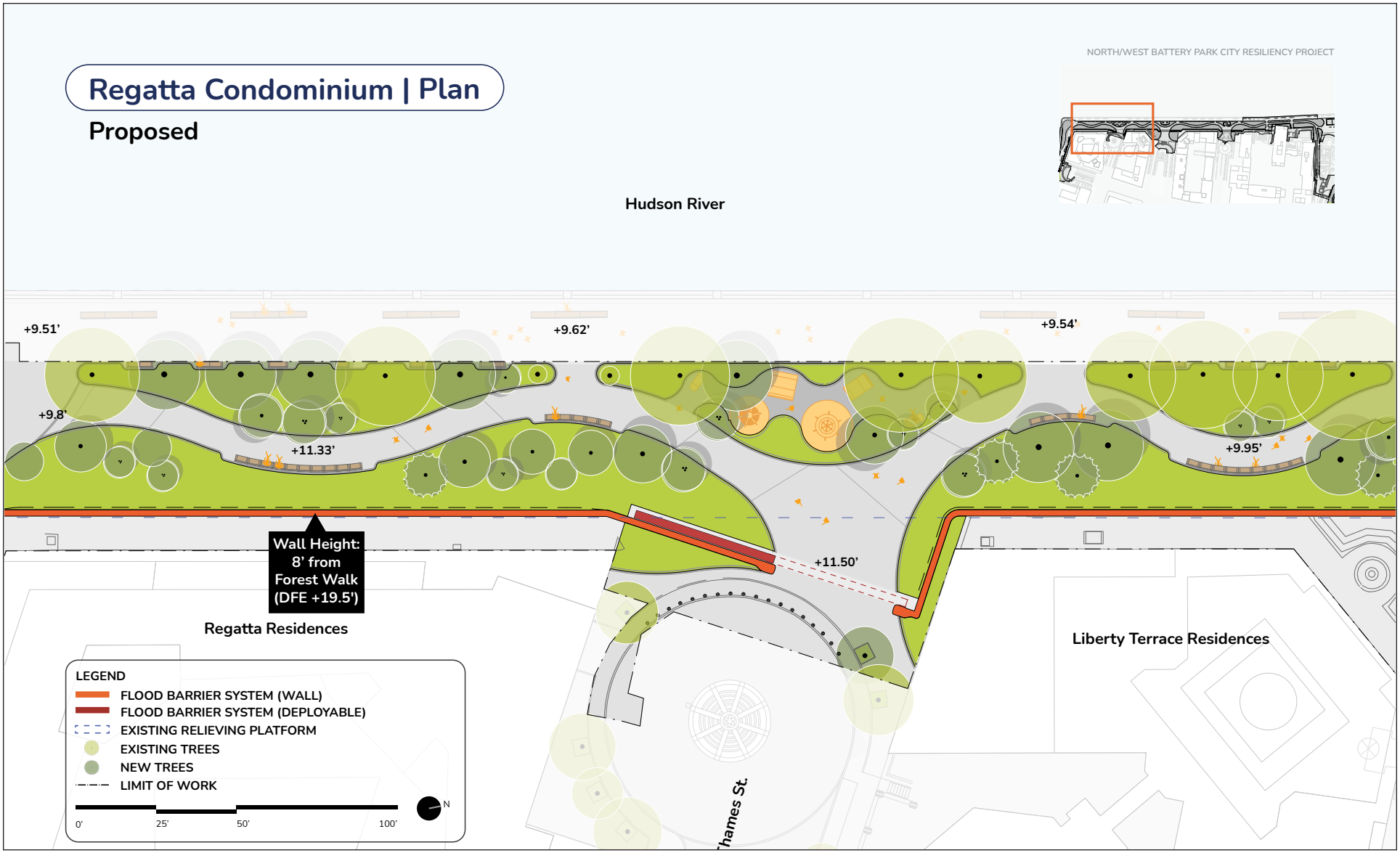
Figure 1-17b



This figure has been updated for the FEIS.

Reach 6 Proposed Site Plan

Figure 1-17c



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Reach 6 Proposed Site Plan

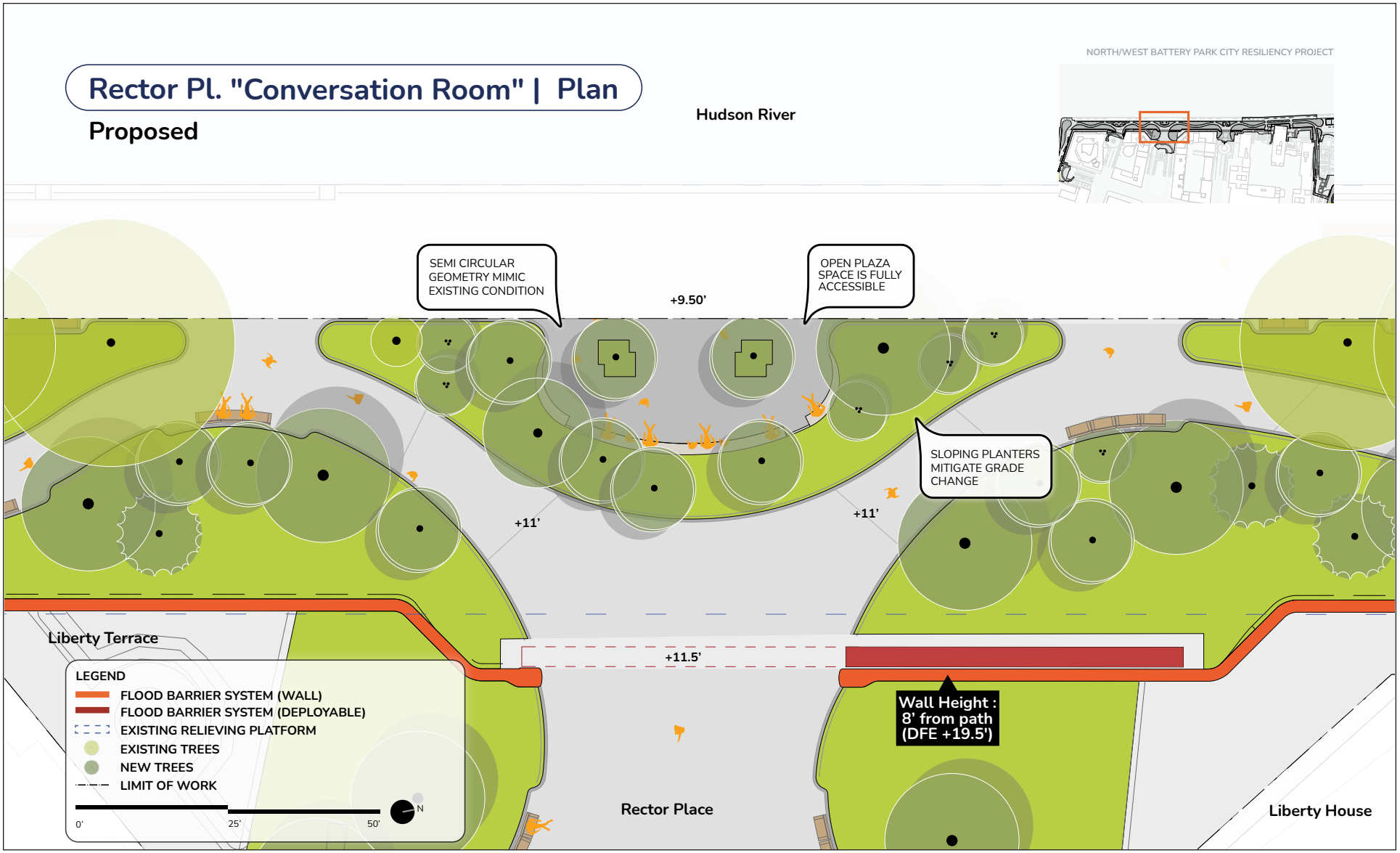
Figure 1-17d



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Reach 6 Proposed Site Plan

Figure 1-17e



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Reach 6 Proposed Site Plan

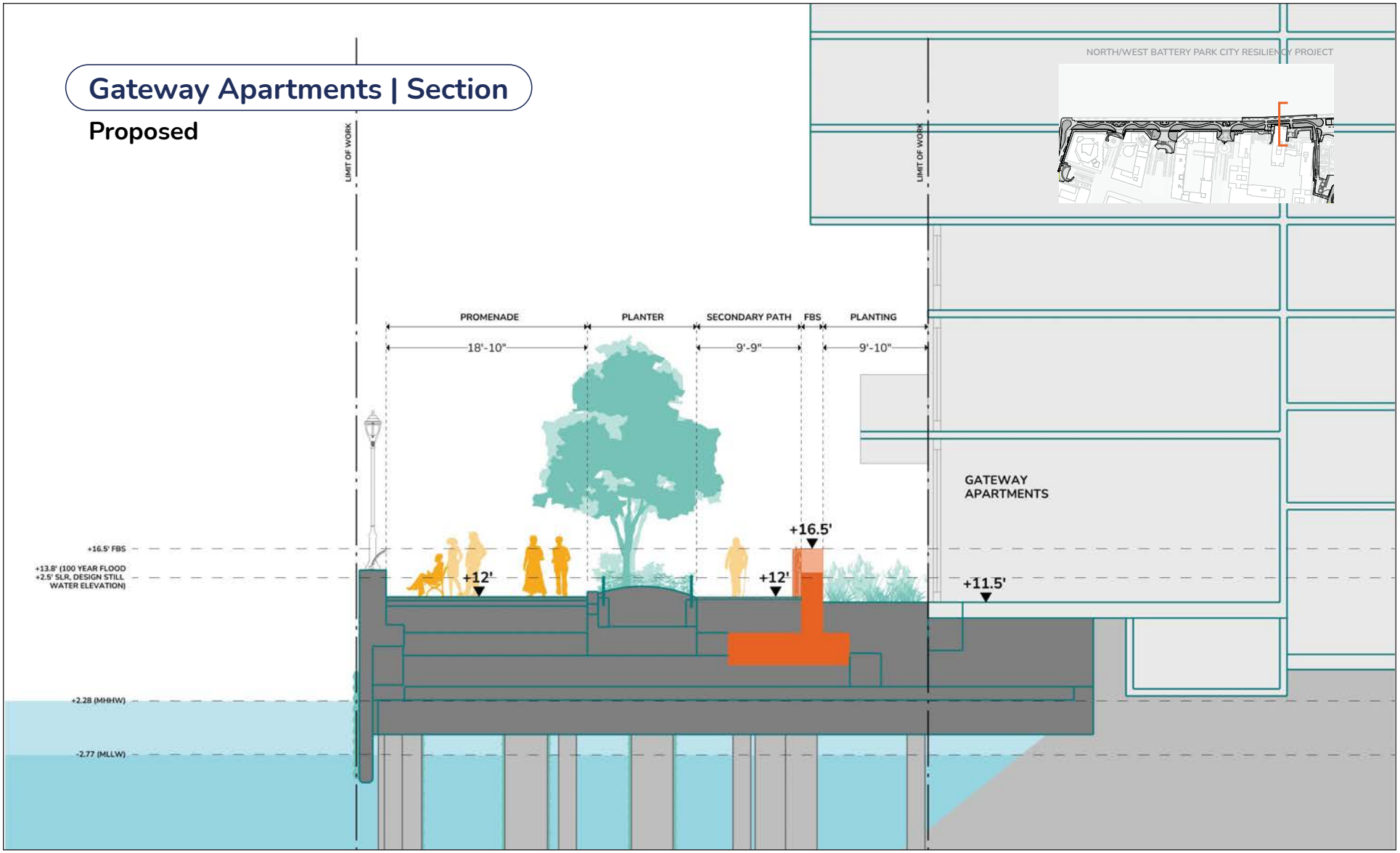
Figure 1-17f



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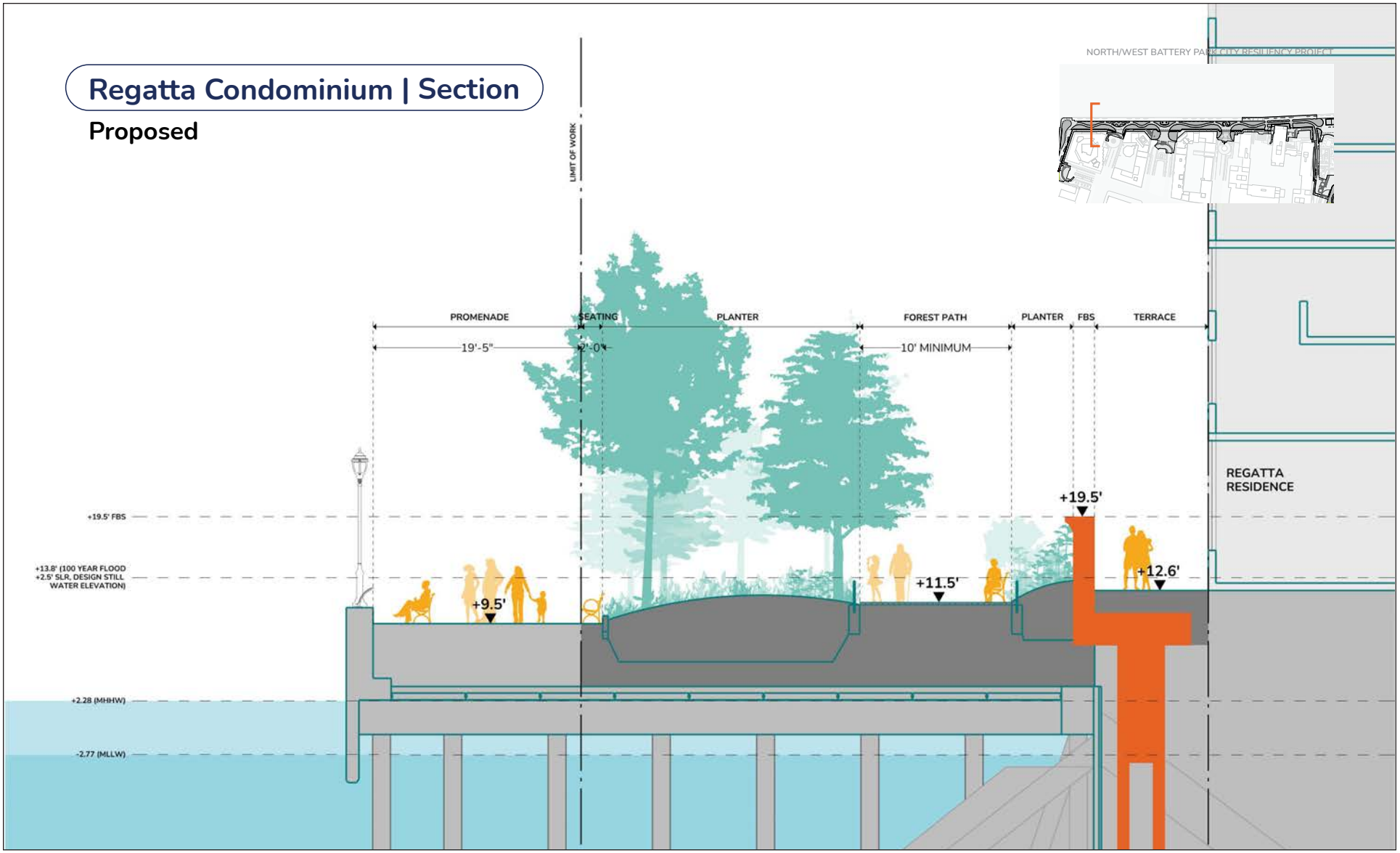
Reach 6 Proposed Site Plan

Figure 1-17g



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Reach 6 Proposed Section

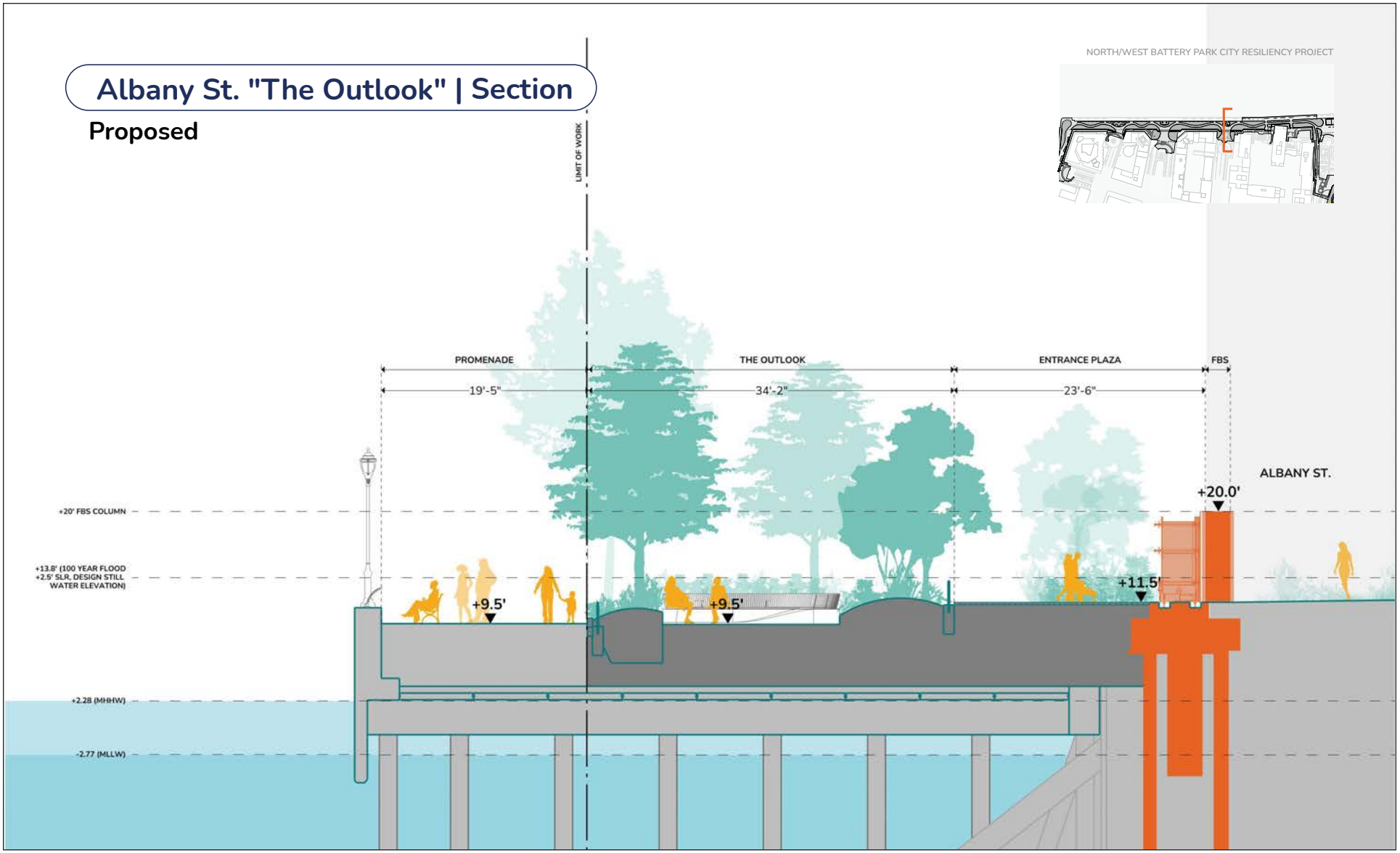


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Reach 6 Proposed Section

NORTH/WEST BATTERY PARK RESILIENCY

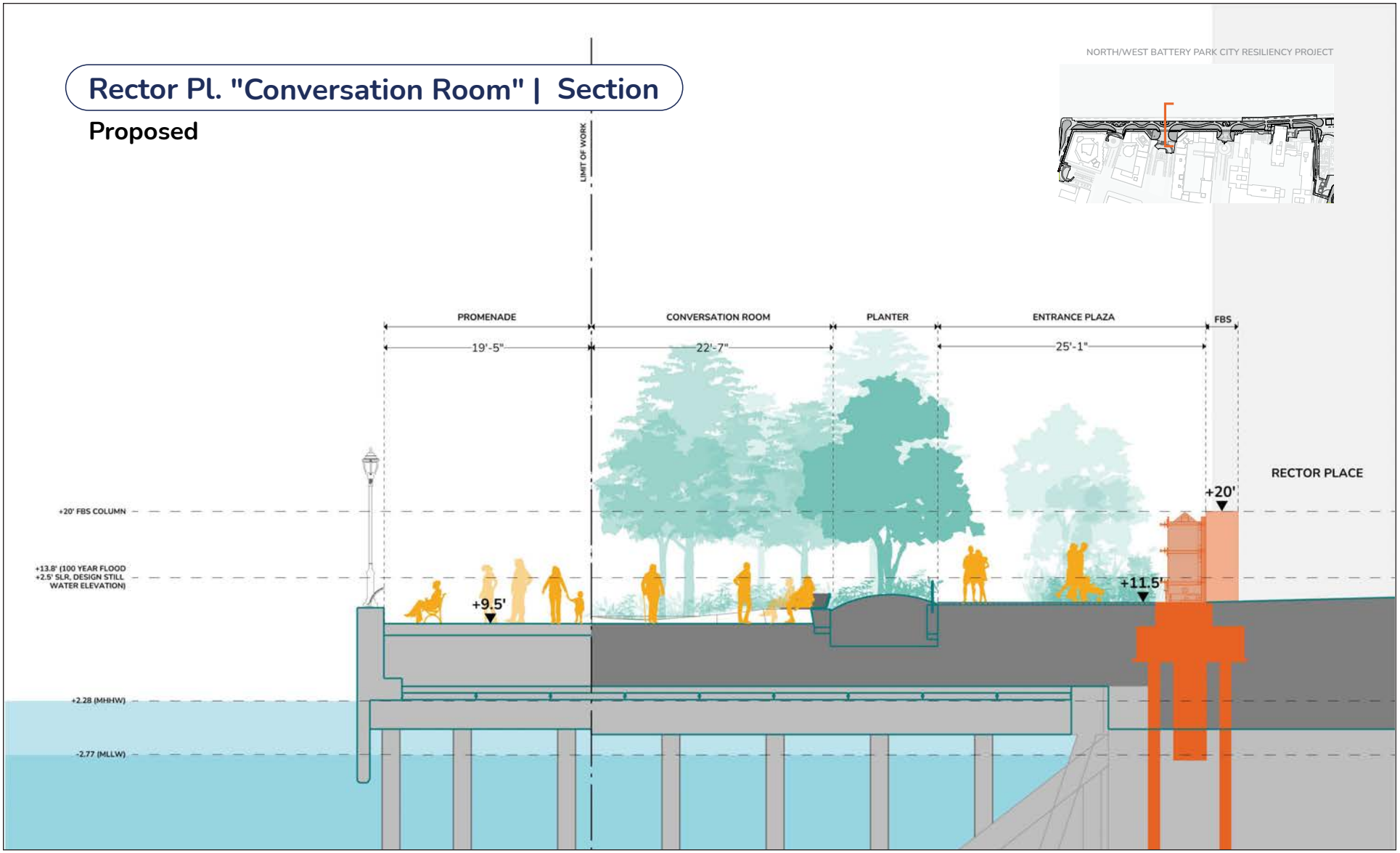
Figure 1-17i



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Reach 6 Proposed Section

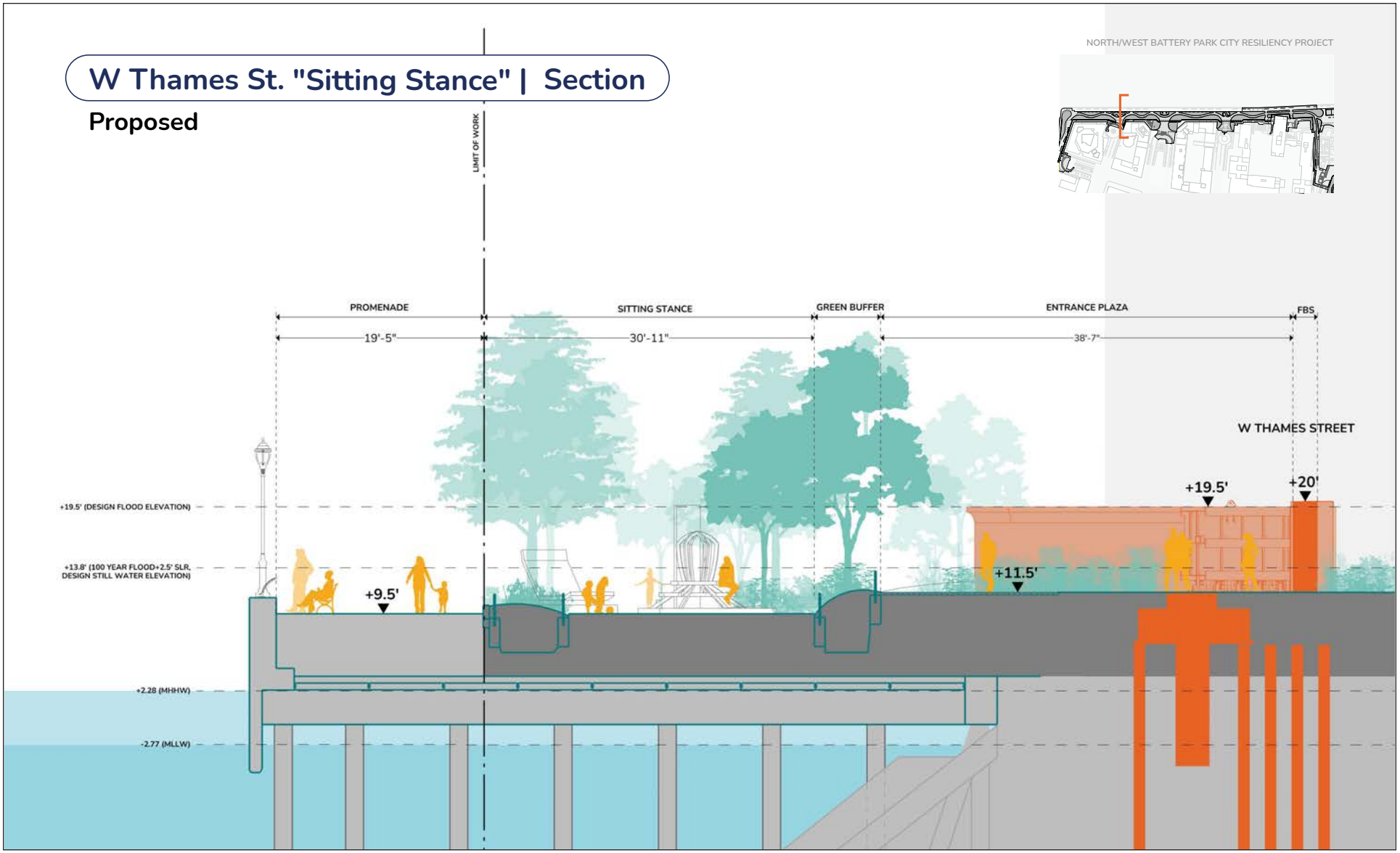
Figure 1-17j



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Reach 6 Proposed Section

Figure 1-17k



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Reach 6 Proposed Section

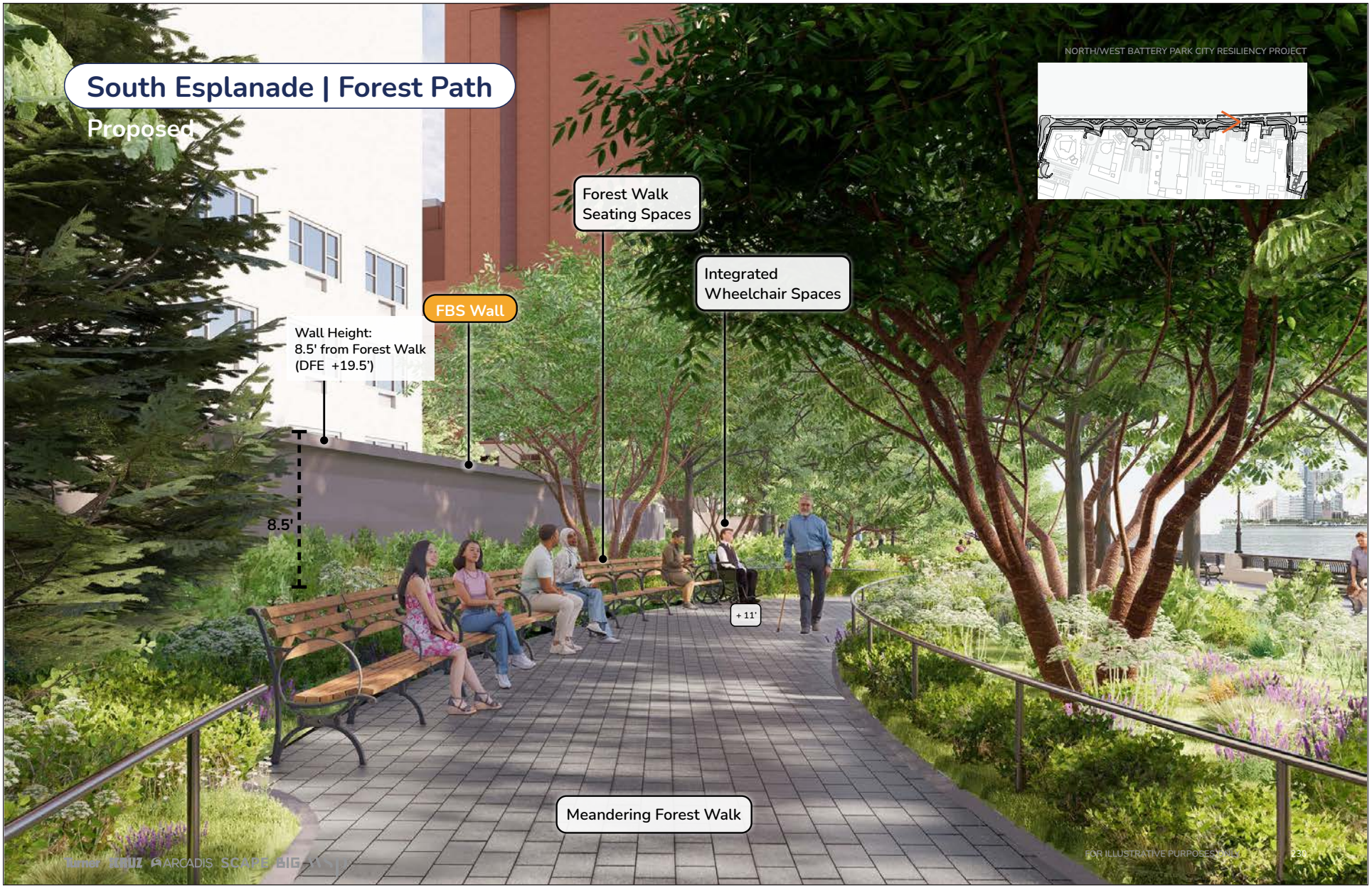
Figure 1-17l



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Reach 6 Rendering

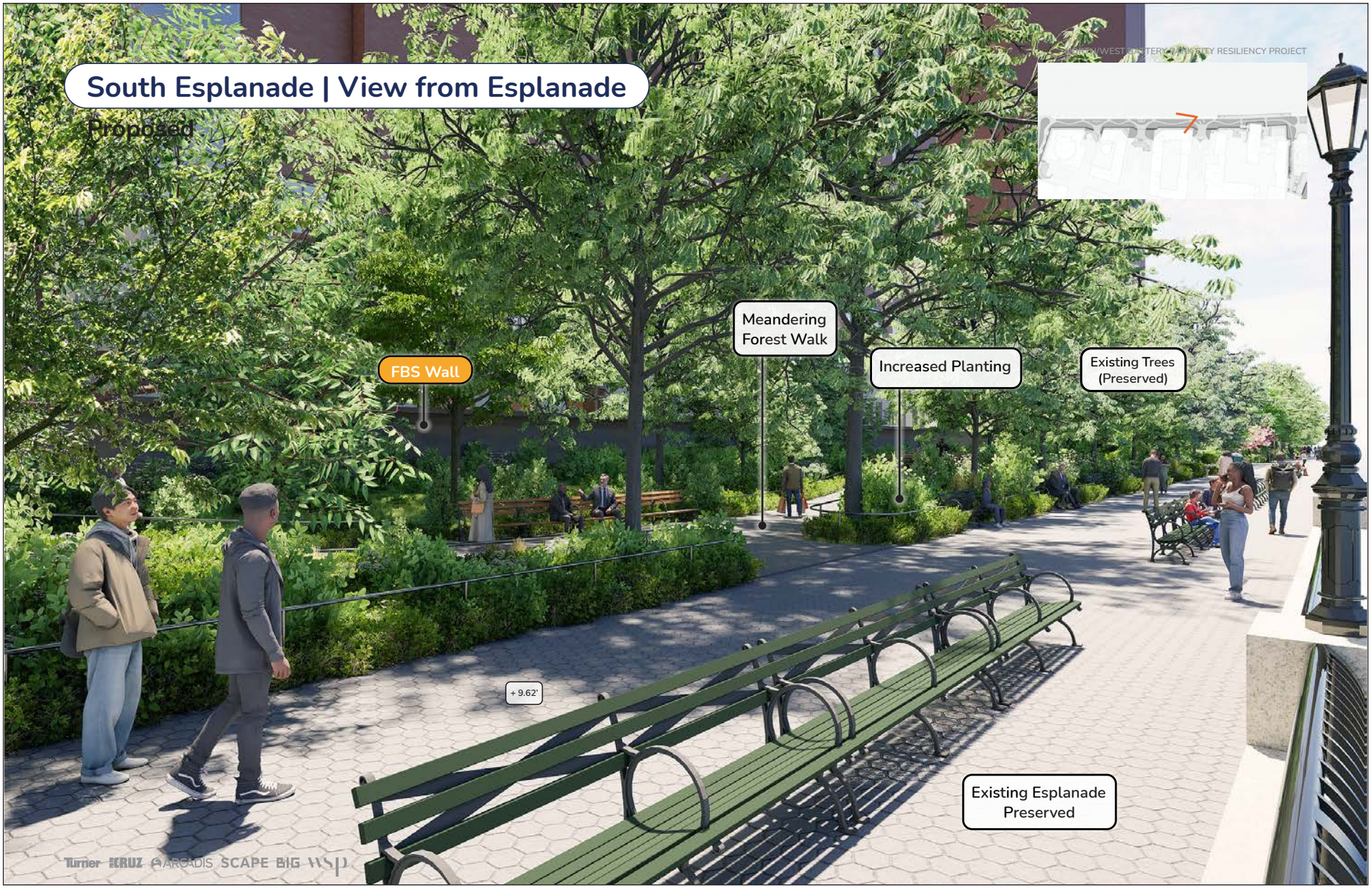
Figure 1-17m



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Reach 6 Rendering

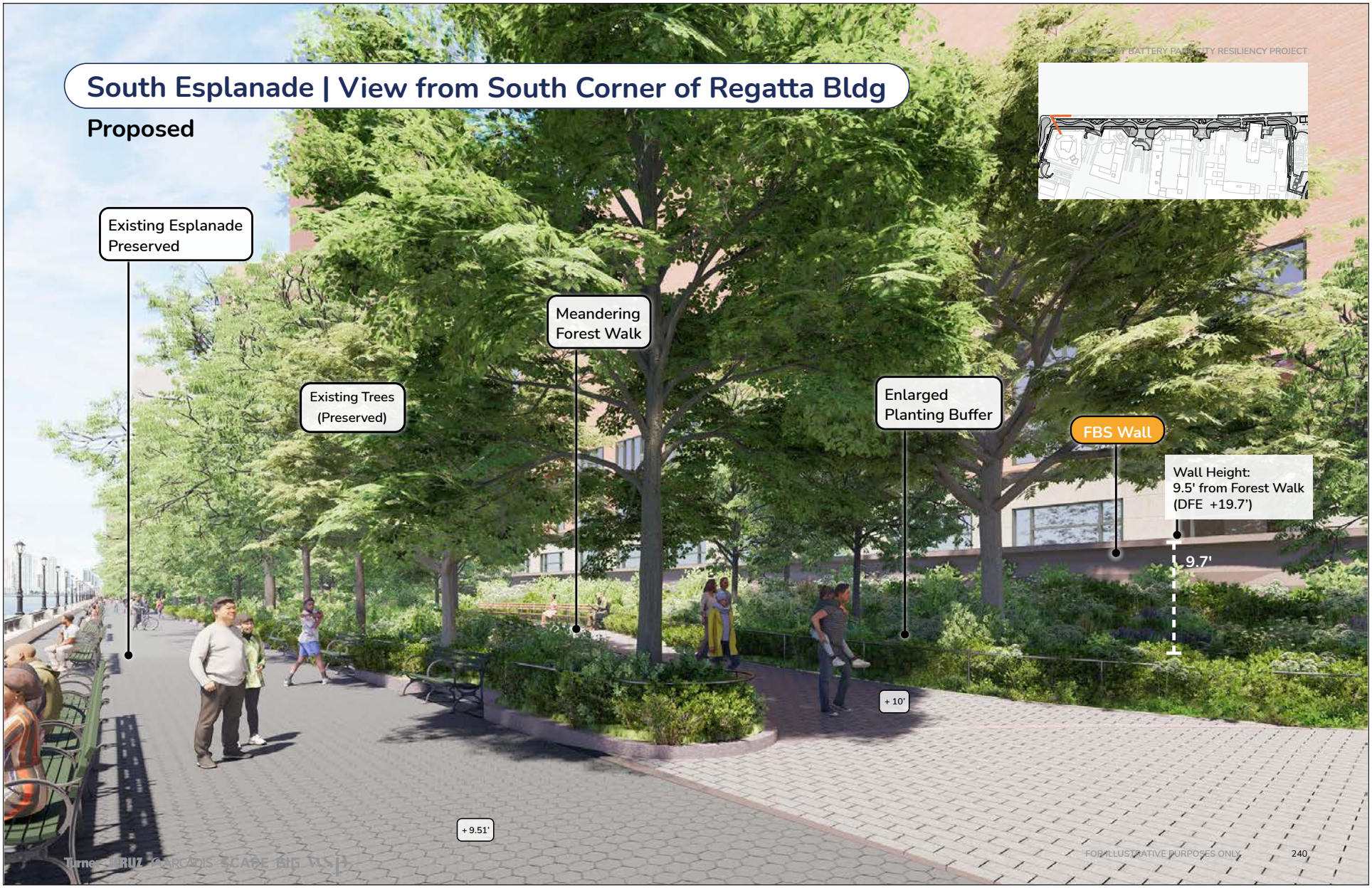
Figure 1-17n



This figure has been updated for the FEIS.

Reach 6 Rendering

Figure 1-17o



This figure has been updated for the FEIS.

Reach 6 Rendering

NORTH/WEST BATTERY PARK RESILIENCY

Figure 1-17p



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Reach 6 Rendering

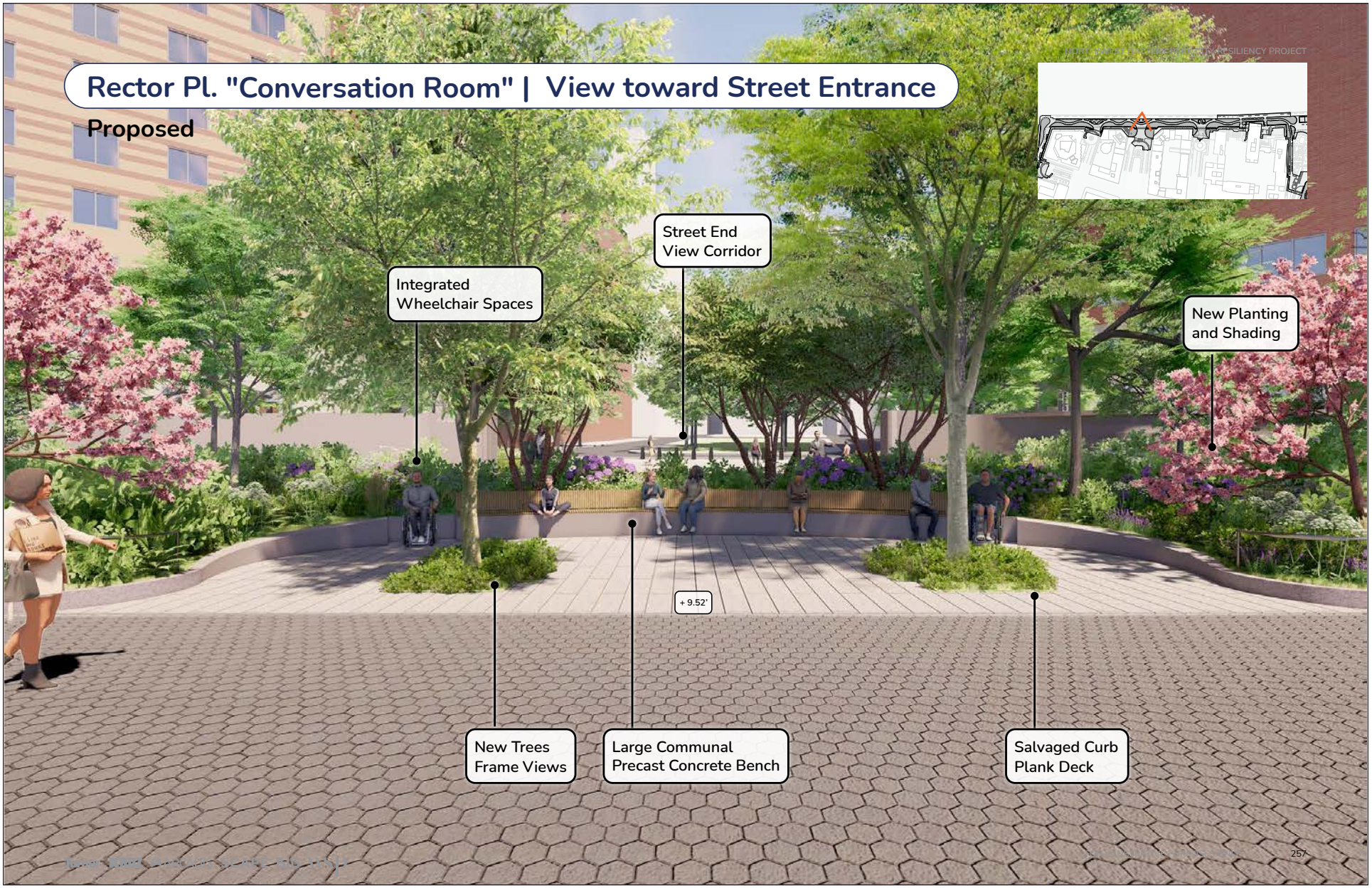
Figure 1-17q



This figure has been updated for the FEIS.

Reach 6 Rendering

Figure 1-17r



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Reach 6 Rendering

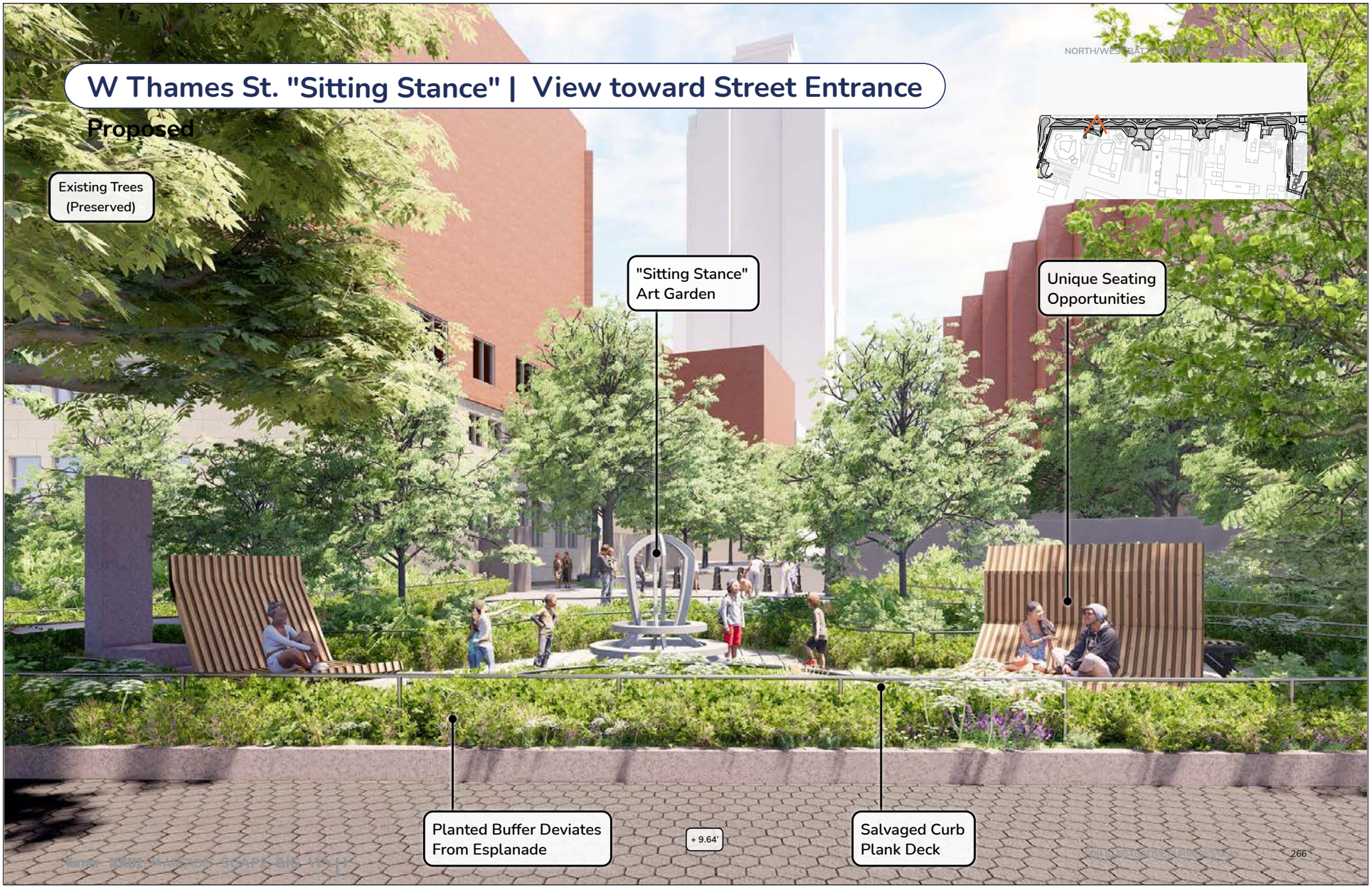
Figure 1-17s



This figure has been updated for the FEIS.

Reach 6 Rendering

Figure 1-17t



This figure has been updated for the FEIS.

Reach 6 Rendering



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Reach 6 Axonometric

Figure 1-17v

Gateway building. There is another tide gate structure on the north side of the Gateway building. Both tide gates are proposed along existing 24-inch stormwater outfalls.~~.~~

Reach 7 – South Neighborhood

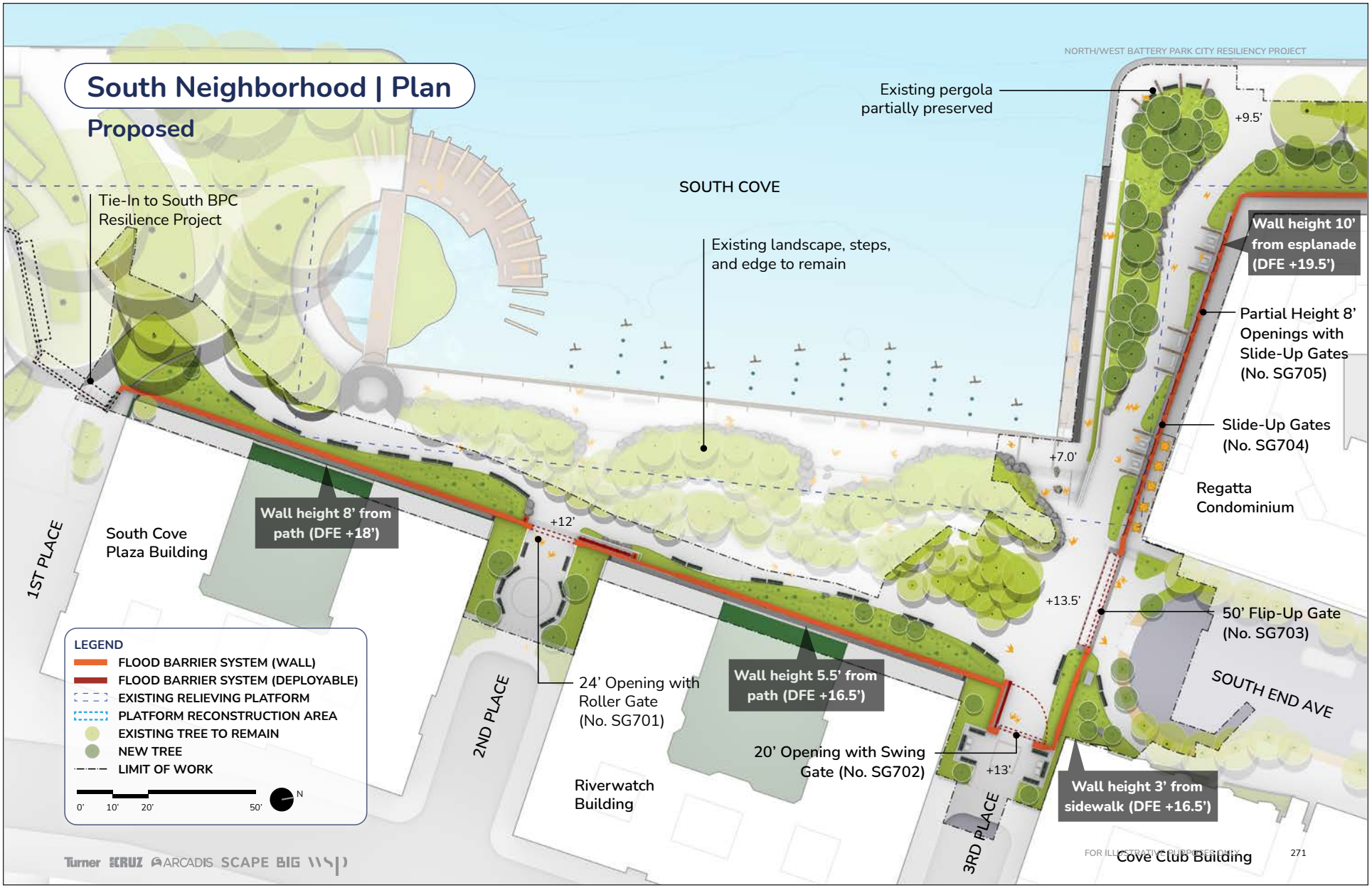
South Cove is the prominent landscape feature in Reach 7~~,~~ and the Proposed Project has been designed to minimize to the greatest extent possible impacts of the proposed flood barrier system on the public experience in South Cove and along the private courtyards that face the water, while also providing the required flood protection. To achieve this objective, the proposed flood barrier system alignment runs parallel to the existing privacy walls of the Regatta Condominium, the Riverwatch, and South Cove Plaza, which minimizes impacts to the private courtyards of the adjacent buildings. This proposed alignment also requires a small section of the flood barrier system ~~is~~ to be installed using micropiles through the existing platform near the south-west corner of the Regatta Condominium. Also, along the Regatta Condominium, the Proposed Project includes a partial height flood barrier that includes deployable gates for the design purposes of maintaining views and air circulation for the private outdoor space currently used by the childcare facility and the corner retail space. ~~To minimize visual impacts, the~~The privacy wall alignment on the eastern side of South Cove follows the upland topography and the existing privacy walls of the existing buildings. At the intersection of South End Ave and 3rd Place, some regrading is proposed to minimize the visual impact of the proposed flood barrier system and gates are also proposed to maintain pedestrian access to South Cove and the South Esplanade from South End Avenue, 3rd Place, and 2nd Place.

In this reach, the proposed design includes new immersive planting along the north side of South Cove and accessible seating and shade structures ~~that parallel~~along the flood barrier system with planting beds and seating areas proposed to enhance the use and enjoyment of this space and the waters of the Cove. Under the proposed design, circulation spaces include the Esplanade and paved paths with trees integrated in hardscapes and street/park furnishings at the three street ends. The proposed open space design is directed at maintaining the existing character and accessibility at the street ends while increasing the landscaping footprint. Along the north wall facing the cove it is also proposed to include a new waterside ecological experience using the face of the structural wall adjacent to the sloped path with landscape enhancements that support the local ecology and also provide educational opportunities. Under the proposed design the ramp leading to the lower-level Esplanade is proposed to be reconstructed.

In keeping with the design objective for this reach, the ~~art in the~~ lower Esplanade and the majority of the Honey Locust grove that ~~is~~are part of the South Cove art installation ~~is~~are outside the limit of work and would not be affected by the Proposed Project.

A site plan, cross sections and illustrative renderings of this reach are provided in **Figures 1-18b through 1-18q**.

Drainage improvements proposed in this reach include green infrastructure practices such as three rain gardens proposed to treat stormwater runoff from impervious surfaces in South Cove. Additional drainage infrastructure, such ~~as PTD structures,~~ trench drains~~,~~ and catch basins, are also proposed to capture and convey stormwater runoff.

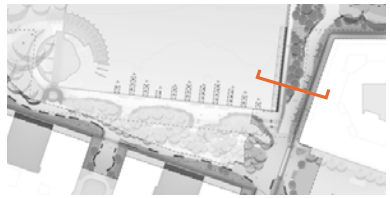


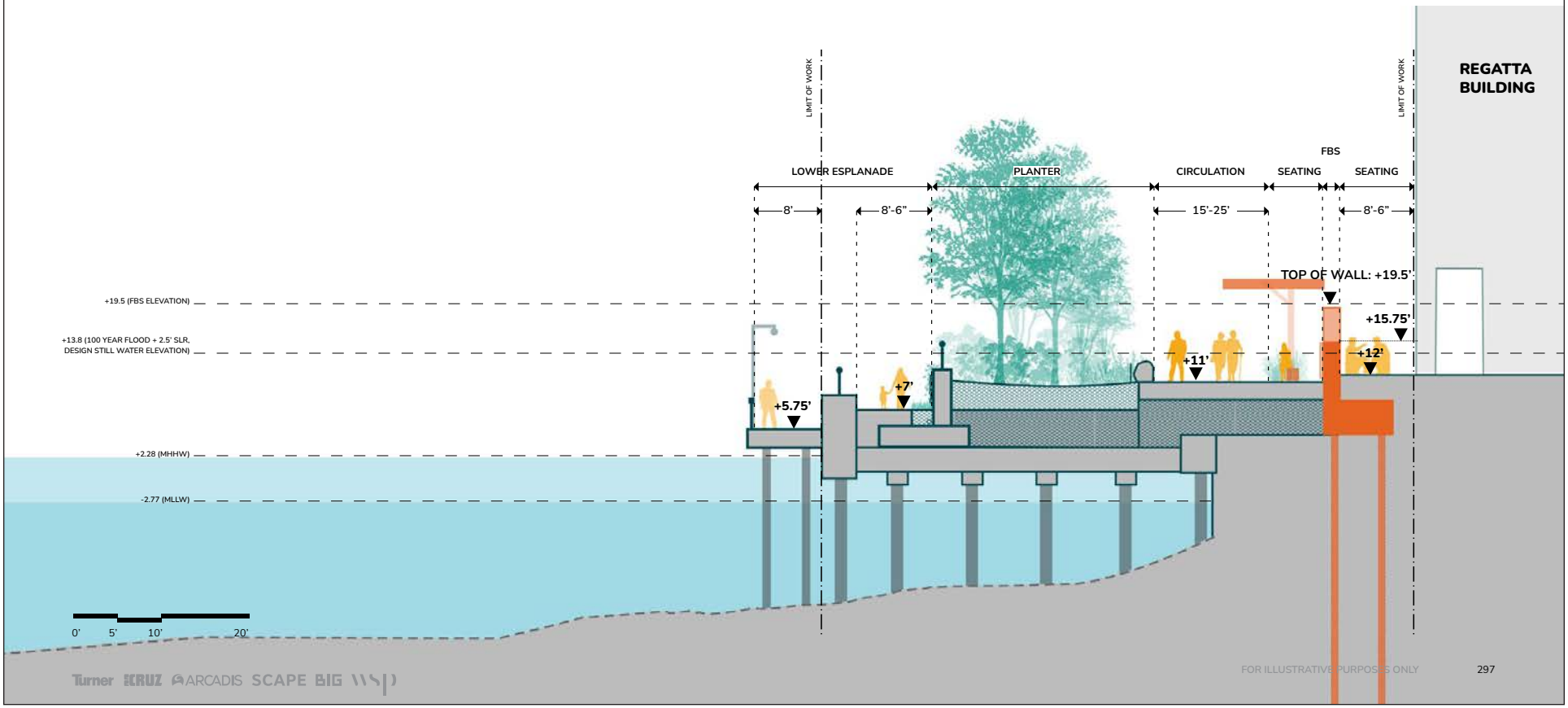
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Reach 7 Proposed Site Plan

North Edge of South Cove | Section

Proposed





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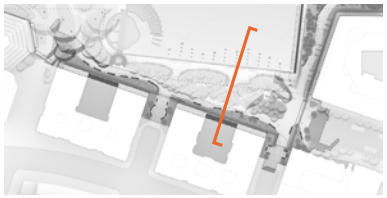
Reach 7 Proposed Section

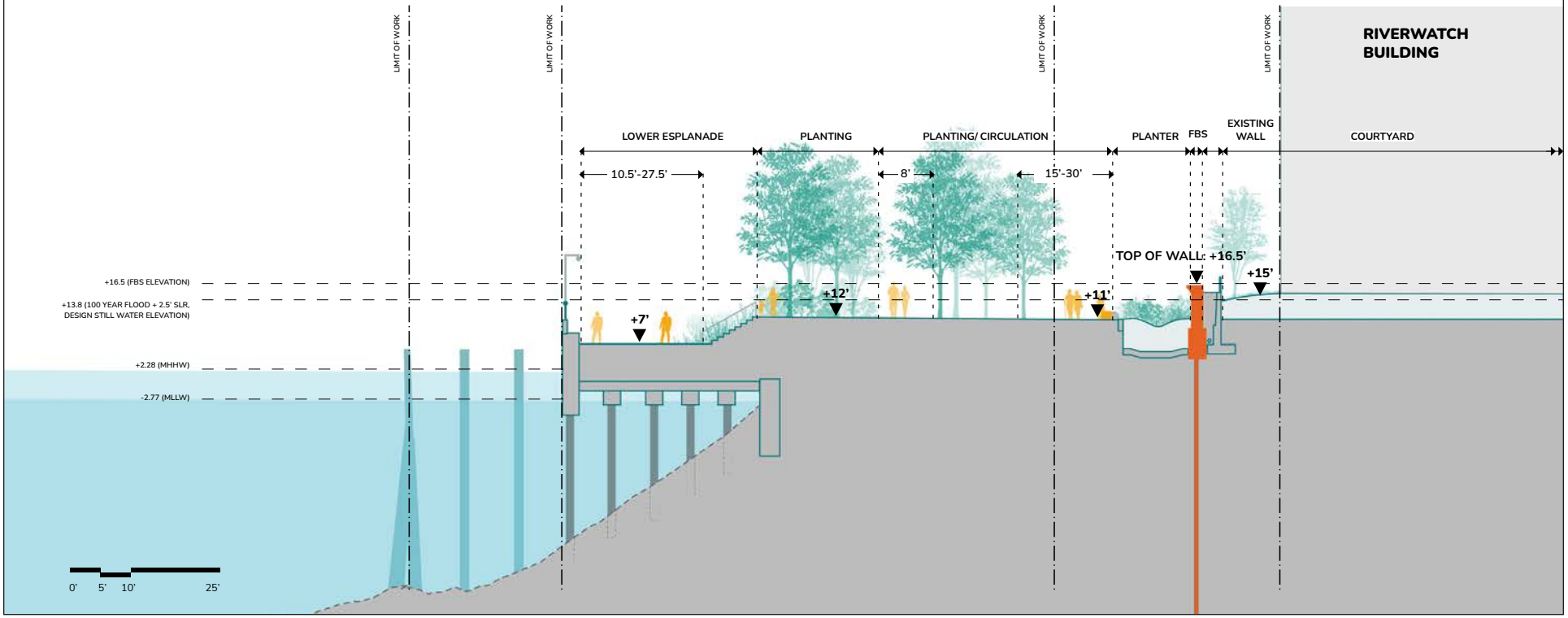
Figure 1-18c

East Edge of South Cove | Section

Proposed

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT





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Reach 7 Proposed Section

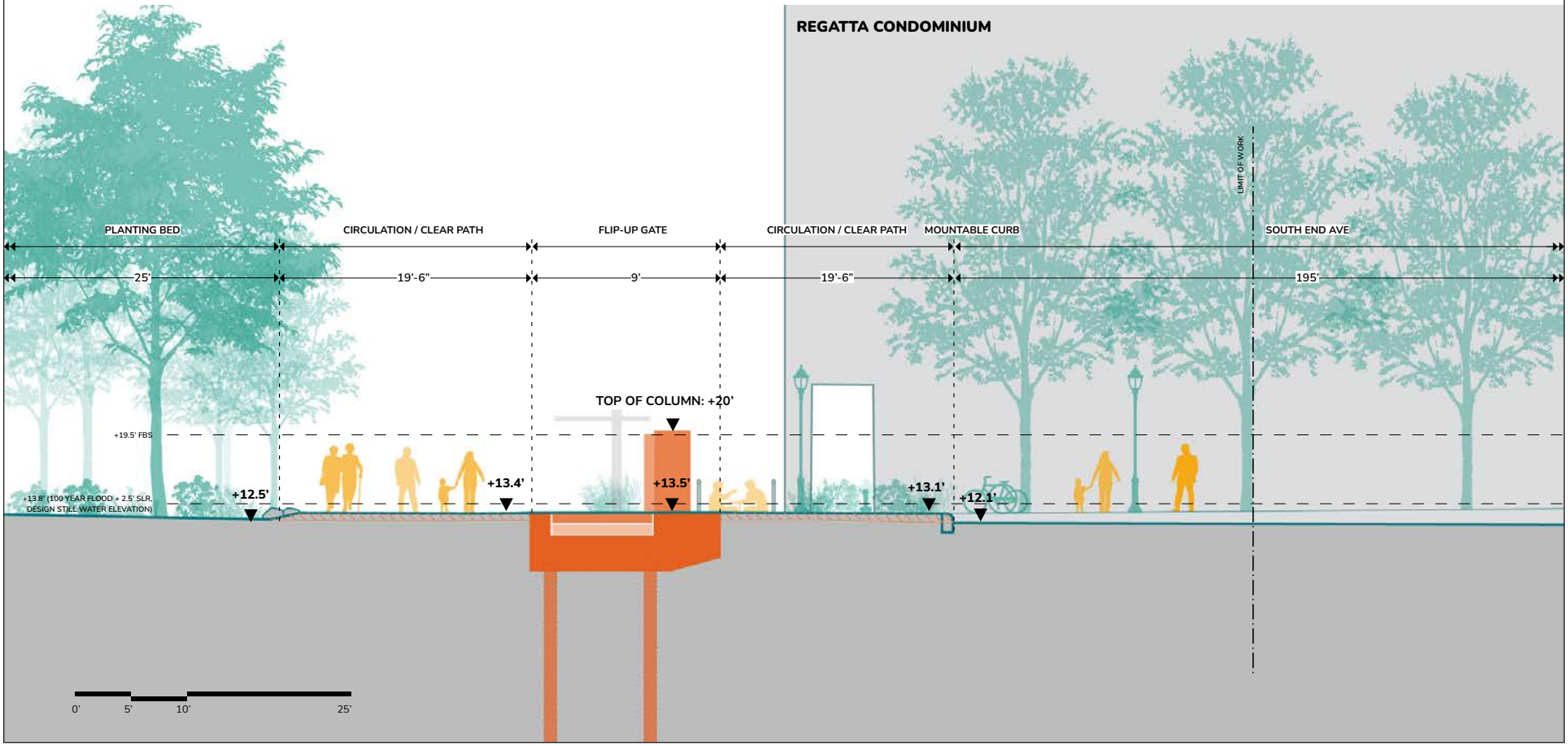
Figure 1-18d

South End Avenue | Section

Proposed

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

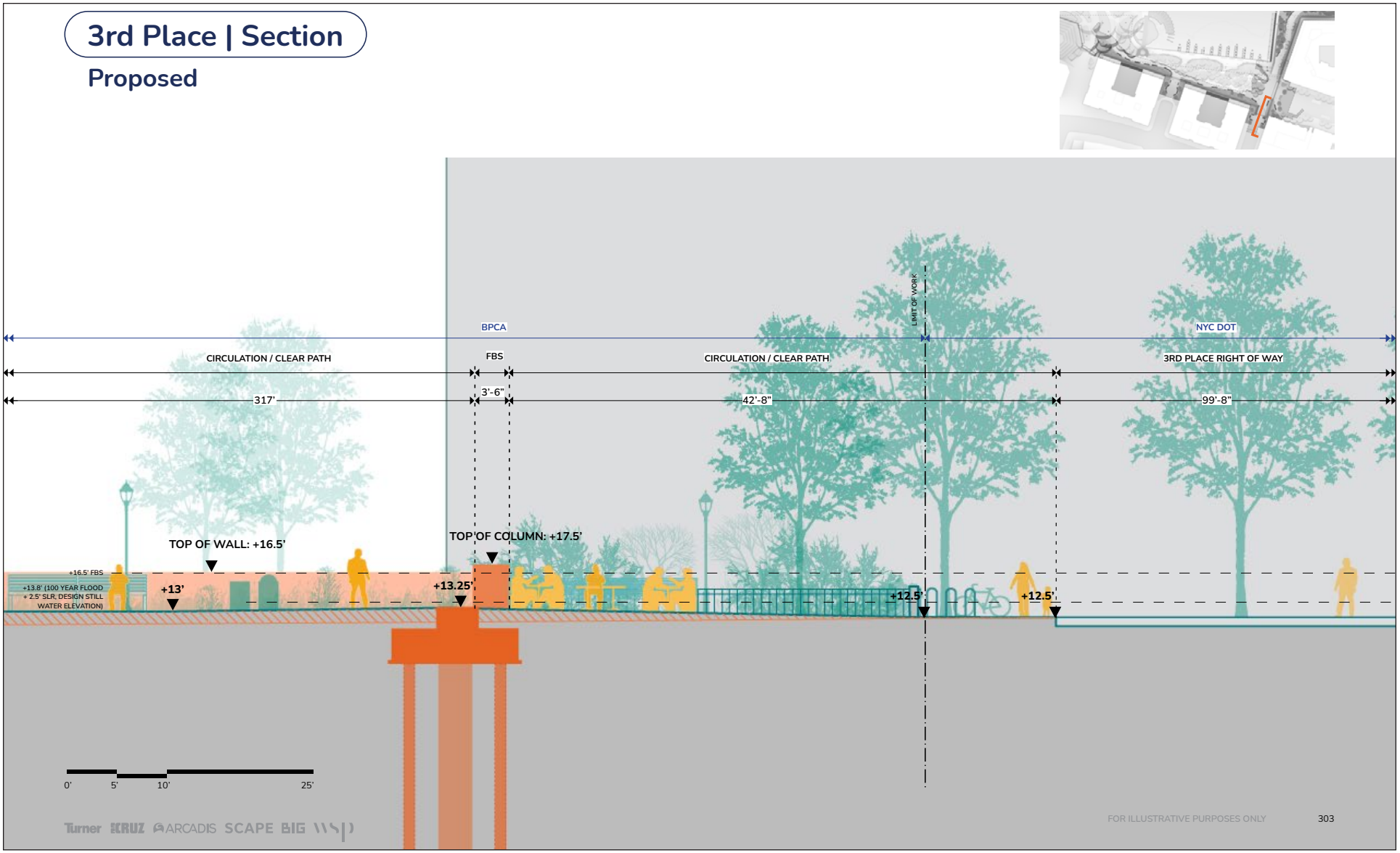




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Reach 7 Proposed Section

Figure 1-18e



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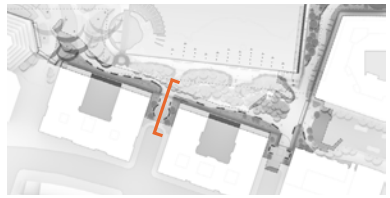
Reach 7 Proposed Section

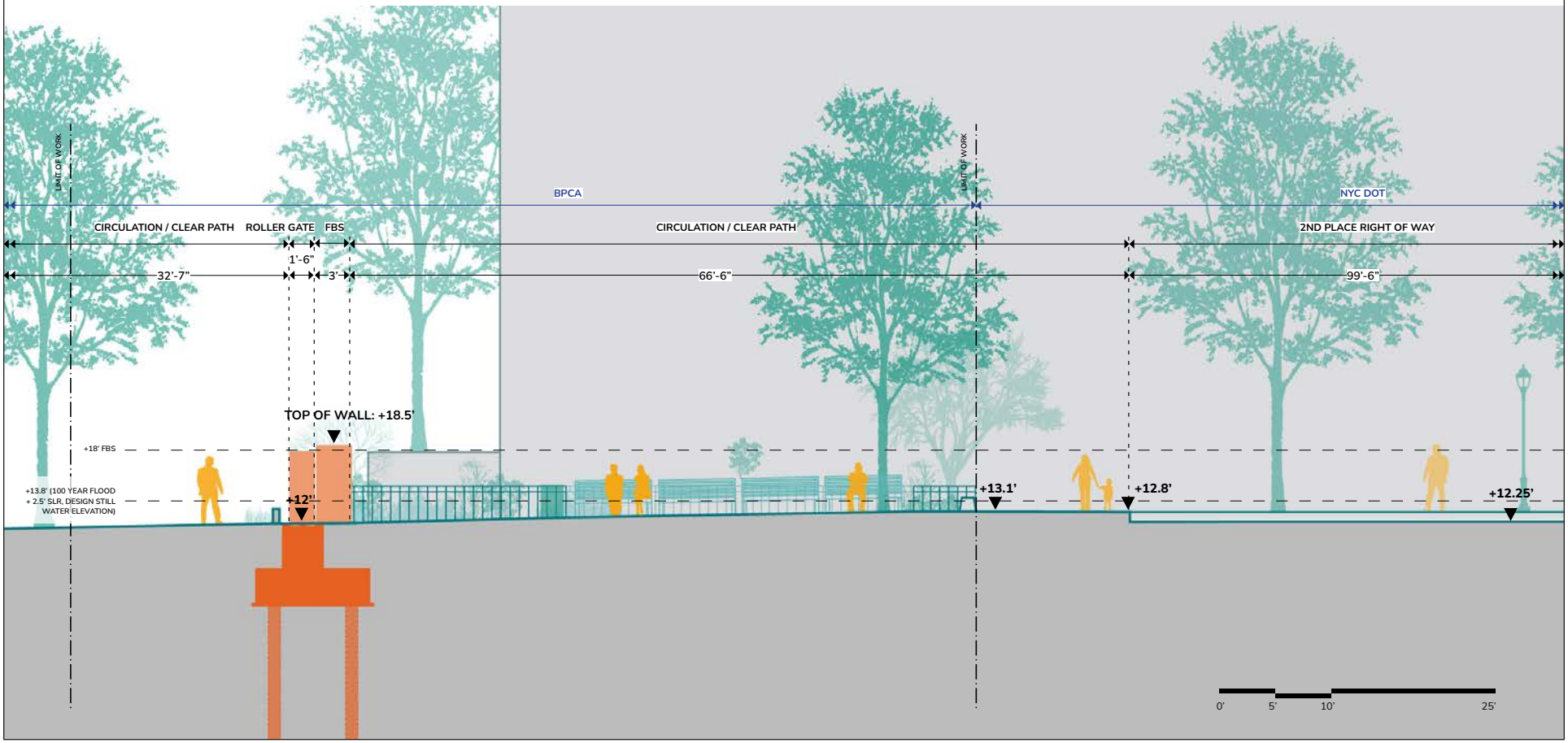
Figure 1-18f

2nd Place | Section

Proposed

NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT





This figure has been updated for the FEIS.

Reach 7 Proposed Section

Figure 1-18g



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18h



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18i



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18j



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18k



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18l



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18m



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Reach 7 Rendering

Figure 1-18n



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Reach 7 Rendering

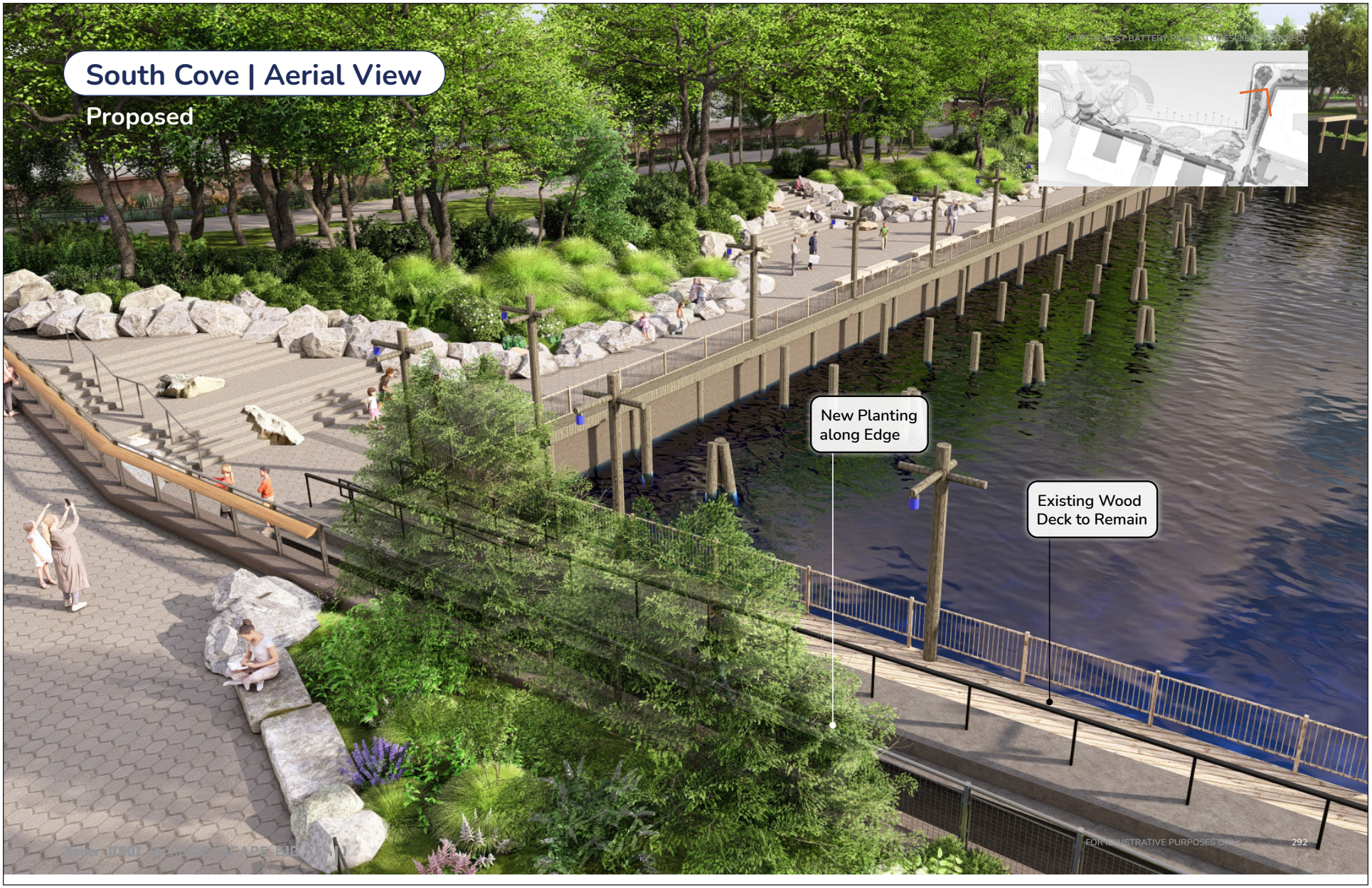
Figure 1-18o



This figure has been updated for the FEIS.

Reach 7 Rendering

Figure 1-18p



This figure has been updated for the FEIS.

Reach 7 Rendered Aerial

Figure 1-18q

1.0.3.2 Interior Drainage Improvements

As part of the Proposed Project, several measures are proposed to prevent coastal storm surge waters from entering the Protected Area through the existing outfalls to the Hudson River. These proposed protective measures include of a series of at- or below-grade improvements, such as installation of tide gates at existing combined sewer and municipal separate storm sewer system outfalls, replacement of existing slide gates, and isolating the Protected Area from adjacent unprotected drainage areas that includes flood-proofing approximately six existing access manholes to the regulator chambers and ~~eight~~10 interceptor sewer manholes along State Route 9A/West Street which is also referred to as near surface isolation (NSI) methods (see **Figure 1-11**). As the Proposed Project's design progressed following publication of the DEIS, several new infrastructure components were added to further prevent coastal storm surge waters from entering the Protected Area and manage interior drainage that collects from rainfall during coastal storm events in select reaches (see Chapter 3.7, "Water and Sewer Infrastructure"). The drainage elements that have been added since the DEIS have also been included in the model evaluations and coordinated with NYCDEP.

~~In addition, sanitary flow management of the Battery Park City's sewer system would reduce the risk of backups in the system during storm surge condition when the NSI system is activated. The proposed sanitary flow management would redirect by gravity the sanitary flow to the existing CSO system located at the north side of the Project Area near Vesey StreetAt the south side of the Project Area near West Thames Street, sanitary flow is to be directed to the CSO system by a proposed lift station.~~ As part of the drainage system analysis, it was also determined through modeling that with the installation of these improvements to isolate the protected area, a pump station was also needed to address the impacts on interior drainage flows during a combined storm surge and rain event.

~~Therefore, t~~To prevent such flooding, a pump station is proposed at a location in the northern portion of the Protected Area (i.e., near Reaches 1 and 2) that is designed to pump collected drainage out to the Hudson River during the combined high tide and rainfall storm event. The pump station mechanical equipment is proposed to be located below grade at a pedestrian plaza adjacent and to the east of Stuyvesant High School, just north of the intersection of Chambers Street and State Route 9A/West Street. A more detailed description of the pump station is provided below.

Proposed Pump Station

Design Analysis and Objectives

To achieve the project goal of FEMA Accreditation, interior drainage needs during the coastal storm event ~~must be addressed.~~were examined to ensure that the installation and operation of the flood barrier system and proposed drainage improvements would not increase the risk of drainage related flooding conditions outside of the Protected Area. Therefore, in addition to the coastal storm surge barrier protection, the Proposed Project includes improvements to the interior drainage system that are necessary in the event of simultaneous tidal/rainfall storm events. An initial analysis evaluated both temporary and permanent pump station design approaches, concluding ~~determining~~ that a permanent pump station would ~~approach~~ provide~~s~~ greater reliability, minimize ~~reduces~~ the need for pre-storm

mobilization, and mitigates the associated risks of a temporary facility. Furthermore, the initial analysis showed that a temporary facility at the size needed to be fully effective is not feasible. With a permanent solution, the pump station components are then in-place and ready to be activated in the event of a pending storm condition.

The proposed pump station location and sizing ~~was~~ were selected based on modeling ~~performed of the intensities of rainfall and potential inland flooding with closed tide gates during a design storm event.~~ of present and future storm events. Consistent with FEMA certification guidelines, a number of storm conditions were modeled assuming various combinations of tidal design storm surge and rainfall intensity. These model simulations showed that the storm event closure of the tide gates at outfalls NCM~~-72~~072 and NCM~~-73~~073, is largely responsible for the potential interior drainage flooding. A siting study was then conducted to identify locations in the Protected Area and along the existing infrastructure grid where a pump station would yield the greatest benefit in addressing this flooding.

Based on this modeling and a number of other siting factors (e.g., land use compatibility, accessibility, etc.), Stuyvesant Plaza (west of the Hudson River Greenway/State Route 9A/West Street) was identified as the preferred location for siting the pump station (see **Figures 1-19a to 19c**). This location was selected since it is in the Protected Area upstream of the existing tide gates and proximate to CSO outfall NCM~~-73~~073, which minimizes the length of force main pipe between the pump station and the proposed discharge location at outfall NCM073.

Siting and preliminary designs of the pump station are being developed in consultation with DEP, which is the agency that ~~is anticipated to~~will ultimately maintain and operate the facility; final design of this station is expected to continue into 2026.

Pump Station Design Analysis

Based on the modeling analysis, it was determined that the pumping rate needed at the station is 60 million gallons per day (mgd).

A concept design for the proposed pump station was then developed (see **Figures ~~1-19a to 19c~~ 1-19ba to 19c**). Based on the pumping rate and design parameters assuming a trench-type wet-well system design inclusive of four below-grade, 20-mgd submersible centrifugal pumps with ~~grinders~~ manual bar screens to intercept and reduce the debris and large floatables in CSO streams that could potentially damage the pumping mechanism. Submersible centrifugal pumps were identified as the most appropriate mechanical system, given they can handle a wide range of flows within a relatively lower requirement of at- and below-grade space coupled with the capability to convey solids up to 3-inches in diameter. In addition to the pump station, a new flow diversion chamber is also proposed in the nearby 114- by 50-inch CSO outfall located between State Route 9A/West Street and Stuyvesant High School.

During design storm events, this chamber is designed to direct CSO flows to the pump station via a new 60-inch pipe that is equipped with grinders to reduce floatables in the incoming flow. The pump station outflow is handled by a 48-inch ductile iron force main approximately 100 linear feet in length that connects to the ~~CSO 73~~NCM-073 outfall pipe downstream of the tide gate for final discharge into the

Hudson River. The above-described elements of the proposed pump station are all below grade. At-grade access hatches are proposed to allow for maintenance and repair of the system.

As part of the proposed pump station design, an electrical room needs to be provided proximate to the subgrade mechanical systems for the purpose of activating the pumps and related mechanical equipment when needed during the design storm event. It has been determined through BPCA's collaboration with DEP that ~~this~~an electrical room and backup generator must be located above grade. Recognizing the space limitations in this area for such a facility, with the need to maintain circulation and access at the school and along the Greenway, ~~three~~ multiple design options are under consideration (Figure 1-19b illustrates a building envelope for the proposed pump station), each of which assumes a new structure to house the necessary natural gas or diesel sources to the electrical power generation and the operational panels. ~~In each of the options a location in the pedestrian plaza adjacent to Stuyvesant High School, north of the east entrance and between the school and the Route 9A pedestrian overpass has been selected as the preferred location and includes accommodating the continued use of the plaza as open space and for pedestrian circulation. The designs options also avoid encroaching on the Hudson River Greenway.~~

~~Design Options 1 and 2 separate the electrical operational panel space and power generation unit into two separate spaces thereby minimizing the size and height of the structure at grade by placing the backup electrical power generator in a separate structure. By separating the two functions, these options provide the potential for siting the electrical power generator system on the roof of the adjacent high school structure.~~

~~Under these design options, the proposed structure under Option 1 is approximately 31 feet long by 15 feet wide and 20 feet high. Option 2 has a smaller footprint at approximately 22 feet long by 13 feet wide and 20 feet high. Option 2 would minimize the footprint of the structure as compared to Option 1, by reducing the length of the building by approximately 9 feet and the width by 2 feet as compared to Option 1. While these two design options minimize the size of the at-grade structure, they are subject to an assessment of structural, mechanical, and operational feasibility as well as review, coordination and approval of the New York City School Construction Authority (SCA) and the Stuyvesant High School administration for placing a supporting power generation unit, which would vary in size depending on the option, on the roof as well as electrical conduit along the exterior wall.~~

~~Design Option 3 assumes a two-story structure at grade that houses all the necessary electrical station functions, along with the backup electrical power unit and the operational panels, within the same at-grade structure. Under this design option the proposed structure is larger at approximately 30 feet long by 18 feet wide and 37 feet high, with an exhaust fan routed along the high school exterior wall to a height 10 feet above the building roof.~~

~~Each of the above options is also~~ Design of the pump station is subject to additional review and ~~further~~ refinement through a ~~of~~ facility planning design analysis that will finalize ~~,~~ space programming, finishes, which will include ~~n and related approvals, including~~ review and approval by NYCDEP, NYCDOT, the New York City Department of Buildings (NYCDOB), the School Construction Authority, the New York City Fire Department (FDNY) and the New York City Public Design Commission. The above-ground elements of the

pump station are to be designed with the objective of minimizing effects on pedestrian circulation in this public space and avoiding interference with the emergency entrance/exit at the high school. Final exterior finishes are to enclose all equipment and achieve design compatibility with the aesthetic context of the adjacent school and bridge.

Maintenance requirements for the proposed pump station include both regular inspections as well as pre- and post-storm event inspections for the purposes of system testing, debris removal and cleaning. This would be performed by maintenance and inspections crews that would access the below-grade operational systems through an at-grade hatch with a ladder into the pumping units.

1.0.3.3 Open Space Designs and Planting

It is an objective of the Proposed Project to limit impacts ~~on~~to open space and trees to the minimum necessary to install the proposed flood barrier system and to restore the impacted landscapes with a design that includes a variety of native plants that together support the robust ecological communities of the Battery Park City open spaces, with enhancements where appropriate. It is also a project design objective to increase habitat biodiversity in the planted zones of the six BPCA reaches to enhance opportunities for wildlife by providing not only foraging opportunities, but also creating habitat that allows all park users (human and non-human) to thrive. To that end, the proposed planting plans include a variety of salt tolerant oaks such as red oak, swamp white oak, and willow oak in the planting palette, as well as winter foraging sources like hawthorn and holly. A description of the proposed open space design elements is provided below.

- In Reach 1 the proposed flood alignment is primarily inland. Therefore, impacts in this reach are limited to trees ~~along~~ at the intersection of Greenwich Street and North Moore Street, along North Moore Street, and along State Route 9A/West Street. The proposed flood barrier system has also been designed to minimize impacts on open spaces and to enhance the transition between the North Esplanade in Reach 2 and Hudson River Park (see the description above). As described above, the Proposed Project also includes a pump station at a location immediately west of the Greenway and just south of the proposed State Route 9A/West Street crossing; while much of this facility is below grade, the proposed above-grade structure would house the electrical panels to operate the pump. Outside the station structure all open space areas affected by construction would be restored.
- In Reach 2, the flood protection system is aligned along the North Esplanade north of and adjacent to the northern boundary of Stuyvesant High School. In this reach, the North Esplanade is proposed to be elevated and expanded to the north (over the water) by six feet with a new transition curve at the connection into Hudson River Park. The proposed North Esplanade design includes an upper and lower pathway, separated by new plantings and vegetation to provide aesthetic enhancement to the open space with improved pedestrian/cyclist circulation and a separated area with enhanced seating opportunities for waterfront viewing.
- In Reach 3, the proposed flood barrier system extends primarily along River Terrace parallel to the interior (eastern) edge of Rockefeller Park following the current alignment of the ~~street~~existing stone wall. This alignment has been selected since it meets the flood protection objective with the least disturbance to the open lawn space facing the Hudson River and the higher elevations limit the need

for a flood barrier structure. During installation of the flood barrier system, ~~,~~ while the lawn and Esplanade are proposed to remain open, the playground and basketball and handball courts need to be temporarily closed~~,~~ but would then be restored. In addition to installing new playground equipment and reinstalling ~~the~~some refurbished playground equipment, the Proposed Project includes resurfacing the basketball courts and improving the layout while integrating public seating. The proposed design also includes a planting strip parallel to the flood alignment and the outside edge of the River Terrace sidewalk to create more space between the existing street trees and proposed flood barrier system and to protect trees from clearing, where possible.

- In Reach 4, the proposed design protects and preserves the existing Lily Pond while adding new ~~plantings~~planting along a new~~n~~ immersive pedestrian path immediately to the south ~~to enhance the access experience~~. Overall, design in this reach involves targeted upgrades in seating, planting, and optimizing access for pedestrian circulation.
- Along Reach 5, the proposed design integrates the flood barrier system with a targeted plaza redesign that has as its objective maintaining accessible open space coupled with targeted improvements. Existing open spaces in this reach include the large plazas with dining terraces at Brookfield Place, some active recreational space (e.g., volleyball), memorials, and Pumphouse Park. Modifications proposed to these existing open spaces are minimal with no impact on the primary functions as a public gathering, recreational and event space, supported by maritime features in and around the marina and public views of the water. To facilitate public use and universal access, additional ~~landscaping~~ planting and switchback ramps are proposed between the Esplanade and Brookfield Place, while also increasing seating opportunities with shade and pockets of trees and vegetation.
- In Reach 5, the proposed design also includes the removal and replacement of several large trees in Belvedere Plaza and ~~along the perimeter of~~in Pumphouse Park. These removals are necessary to install the proposed below grade flood control gates within the Port Authority water exchange tunnels (see also the discussion below under "Impacts to Trees"). Under the proposed design the west side of Pumphouse Park is also landscaped with native grasses, shrubs and new ramps to improve accessibility.
- Along Reach 6, the Proposed Project introduces the flood barrier with a stretch of new and redesigned open spaces adjacent to the privacy walls. Based on this design, the South Esplanade at the water's edge remains in its existing condition; however, a secondary, meandering path inland of the South Esplanade is proposed to provide a separation of space with the secondary path that allows for more leisurely pedestrian strolling. This secondary path is proposed to be landscaped with tree plantings and the opportunity to provide more shaded seating and respite from heat. Also proposed for this reach are redesigned open spaces at the street ends of Albany, Rector, and West Thames Streets.
- In Reach 7, the proposed flood protection system alignment runs ~~along~~alongside the existing privacy walls which minimizes impacts to the public spaces in the South Cove. With this proposed alignment, the existing lower Esplanade that overlooks the cove is unaffected by the Proposed Project; there would also be no changes in total open space acreage, only targeted enhancements along the upper Esplanade that include providing lush planting along the north side of the South Cove coupled with

new seating and shade structures along the proposed flood barrier system. The proposed design in this reach also includes reconstructing the existing Esplanade ramp to account for changes in the proposed grades of the walkway on the upper level. The Proposed Project also includes using the face of the flood barrier system ~~flood barrier system~~wall adjacent to the sloped path to provide targeted ~~local ecology~~ecological and educational opportunities.

Tree Removal and Replacement

Introduction

Although the Proposed Project has been designed to minimize tree clearing to the extent possible while integrating the proposed flood barrier system within existing streets and open spaces, an estimated 435 trees are proposed to be cleared, and up to approximately 17 trees are proposed to be transplanted along the Proposed Project corridor with ~~390 planted~~ 450 new replacement trees~~.~~ to be planted. Of the 435 total trees proposed to be removed, approximately 40 trees are proposed to be removed due to tree health, which would happen regardless of the Proposed Project.

~~Based on USACE guidance~~Overall planting objectives were to ensure the enhancement of natural features, urban tree canopy and diversity; supporting the park user experience through thermal comfort and providing shade; meeting BPCA's sustainability targets for biodiversity, habitat creation, and canopy cover; fostering and enhancing the aesthetic and functions of the open spaces; integrating the flood barrier system into the surrounding natural/human environment and existing park spaces; and screening the proposed structural elements to maintain a pleasant environment for human use and recreation. Finally, it was an overarching objective of this design evaluation to ensure that the Proposed Project's primary project goal of providing a flood barrier system that performs as designed and can be deployed during the Proposed Project's design storm condition without risk from potential damage due to tree roots or compromising the access necessary for the regular maintenance and inspection of the flood barrier system is achieved.

The DEIS assumed that no trees would be planted within a 15-foot-wide corridor parallel to the flood barrier system, as a conservative interpretation of USACE guidelines for flood walls (EP 1110-2-18, "Engineering and Design Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures," Department of the U.S. Army, Corps of Engineers [USACE], May 1, 2019). ~~which are accepted by FEMA as part of the flood protection system accreditation process, a 15 foot (minimum) clear zone is to be provided on both sides of a flood barrier structure for the purposes of avoiding damage from tree limbs and roots and to provide a clear zone for inspections and repairs. The Proposed Project designs described in this DEIS reflects adherence to the USACE Guidance. As part of the final design process, the BPCA in coordination with its design team will continue to review the proposed designs with the objective of maximizing tree replacement locations along the project corridor where it may be acceptable to FEMA through its variance procedures to plant trees and enhance environmental values without compromising the flood barrier system functionality, safety or the necessary maintenance, inspection and repair of the proposed flood barrier. Also being explored are opportunities within~~Between the DEIS and FEIS, BPCA and the design team reviewed the design to maximize tree replacement planting. A focus of this review was to identify targeted tree species

and locations that would complement the current landscape design in the Battery Park City ~~for additional~~setting, while also maintaining the flood barrier system's structural integrity and functionality (meeting the objectives of FEMA and the USACE guidelines). Based on this engineering and landscape review, the planting plan was refined between the DEIS and this FEIS to incorporate the planting of select tree species (based on size, growth rate, root system, fruiting, salt and wind tolerance, and other characteristics) at a distance between 10 and 15 feet from the flood barrier system in specific locations that were evaluated based on their exposure to wave impact, elevation, proximity to gates and other operable/deployable elements, and other engineering parameters. Additionally, a limited range of shrub species have been incorporated into the landscaping along the flood barrier systems at a distance of 6 feet or greater. These refined engineering and planting designs would result in a net increase in tree replacement with 390 projected in the DEIS and 450 proposed in this FEIS. ~~plantings along public street corridors and open spaces.~~

Table 1-2 provides a summary of the total projected tree clearing, transplanting and ~~new~~replacement planting. ~~by reach under the current designs.~~

For City street trees under the jurisdiction of NYC Parks (i.e., street trees along North Moore ~~and Route 9A/West Street~~), the Proposed Project would comply with the requirements of Chapter 5 of Title 56 of the Rules of the City of New York (NYC Parks Rules) and Local Law 3 of 2010, and BPCA would ~~implement a~~submit a permit application including final tree clearing, protection, and replacement ~~plan~~ for review and approval by NYC Parks. In accordance with City regulations, all tree clearing and protection measures along North Moore Street ~~and Route 9A/West Street~~ must be approved by NYC Parks before construction activities can proceed and these activities are also subject to a NYC Parks construction permit that addresses the final tree clearing, protection and replacement based on a pre-construction inventory of the trees to be cleared; specifications for trees to be protected or pruned; and a tree replacement plan that includes tree planting locations and species with a post-construction monitoring during the warranty period. Trees to be removed and replacement trees planted within the right-of-way of State Route 9A/West Street will be subject to review and approval by NYSDOT and the number of impacted trees is subject to the design alternative selected for this crossing (see the description above).

Table 1-2
NWBPCR Tree Removals and New Trees

Reach	Total Trees to be Removed [1][2]	Total New Trees to be Planted [3][4]
1	65	40
2	30	50
3	35	65
4	25	40
5	120	80
6	125	135
7	35	40
Total	**435**	**450**

Notes:
1. Approximately 40 trees would be removed due to tree health; this should happen regardless of the Proposed Project.
2. Includes removal of approximately 6 trees in Reach 1 in NYC Parks jurisdiction.
3. Includes approximately 8 trees in Reach 1 in NYC Parks jurisdiction.

4. Up to approximately 17 trees are assumed to be candidates for transplanting.

Tree protection measures during construction along the entire project corridor would also include the protection of individual trees not proposed for clearing, which typically includes both tree trunk protection barriers as well as protections for root zones to avoid impacts associated with the operation of construction heavy equipment.

In addition, there will be a number of mature trees and vegetation on the unprotected side of the flood barrier system. Strategies will be implemented by the BPCA to minimize potential tree damage from flood events that may include, but not be limited to, "flushing" soils, tree roots and planted areas with fresh water after a flood event. This and other strategies will be considered as part of the BPCA's open space maintenance and operation plan.

1.0.3.4 Urban Heat Reduction - Design Elements

The Proposed Project has been designed to reduce urban heat impacts through an abundance of planting and, where hardscape is needed, a reliance on high-albedo and pervious materials. The proposed design increases the total planting coverage over what exists today within the limit of work by approximately 30 percent. In some areas, such as Reaches 4 (Ferry Terminal) and 7 (South Neighborhood), there would be a 50 percent increase in ~~landscaped surfaces~~planted areas. The planting design throughout the Reaches employs a multi-layered approach, incorporating groundcover, tall perennials, shrubs, understory trees, and canopy trees to provide maximum evapotranspiration and to protect the ground from drying out or absorbing heat. Over 75 percent of the proposed paved areas will be made of high-albedo materials (such as light-colored pavers, stone, and concrete), which reflect more light, cool the surrounding air, and serve to reduce urban heat as compared to materials that absorb and increase heat, like asphalt.

1.0.3.5 System Testing, Maintenance and Operations

The Proposed Project, once installed, would require regular maintenance and inspections that are performed in accordance with an approved Operation and Maintenance (O&M) manual and an Emergency Response Plan for use during storm surge events. At a minimum, the O&M manual is to provide the procedures for regular testing, routine maintenance and repair, inspection and reporting requirements for the agencies with these responsibilities. Performing these maintenance obligations is essential for the operational reliability of those elements of the flood barrier system that are considered critical to providing the storm protection and interior drainage improvements described above. It is expected that the proposed interior drainage elements of the Proposed Project would be under the jurisdiction of and operated by NYCDEP in accordance with the O&M requirements for their systems. A maintenance agreement will be required, which will also confirm that NYSDOT will not be responsible for any operation and maintenance of the flood barrier system, including deployable gates, drainage improvements and any project elements installed within the State ROW.

Testing and maintenance of the deployable gates during non-storm conditions is expected to be undertaken annually to ensure they are ready to operate in a storm condition. This gate testing would require temporary closure of the sections of the roadways and sidewalks within the Project Area, including

State Route 9A/West Street (both the roadway and parallel bikeway between Chambers Street and North Moore Street), Harrison Street, and North Moore Street, and various locations within Battery Park City. This testing would be implemented in accordance with an approved flood barrier system maintenance and operations plan that would be subject to review and approval by NYSDOT and NYCDOT, New York City Emergency Management (NYCEM), as well as NYPD and FDNY, NYCDEP, other City agencies and FEMA, while minimizing impacts on transportation systems including temporary closures and diversions of vehicles, cyclists and pedestrians with the objective to ensure safe access is coordinated and maintained with alternate access routes, as needed. To that end, it is expected that gate maintenance and testing operations would be performed for each gate during overnight hours. The closures would last up to 8 hours, and the frequency of the closures would depend on the type of gate installed. A flip-up gate is expected to require testing closures twice per year per gate, and swing-gate closure testing would be limited to once per year, per gate.

1.0.3.6 Design Storm Conditions

Design storm conditions would require the deployment of all gates to complete the flood barrier protection that encloses the Protected Area and provides the necessary flood protection. In a storm event, NYCEM would determine the timing of the deployment of the gates along State Route 9A/West Street. This will be addressed in the Emergency Response Plan that will be designed to address the needs of the community and emergency vehicles both in the Protected Area and the adjacent neighborhoods. This Plan will be prepared in coordination with FEMA, NYCEM, BPCA, NYSDOT, NYCDOT, NYCDEP, NYPD, FDNY, NYC Parks, and other City and State agencies, including the MTA, for issues related to transit systems management.

The interior drainage elements proposed, including the pump station, would serve to avoid and minimize any flooding during a design storm event in the Protected Area by pumping runoff from rainfall as well as sanitary flows out of the Protected Area. During a design storm event, the pump station would draw flow from the existing CSO and pump it to the downstream side of the tide gate before discharging through the existing outfall. With the isolation of the sewer system in place prior to a severe storm event, preliminary modeling determined that interior flooding would result from the sewer system's inability to drain during the design storm event due to surge and high tides.

1.0.3.7 Property Jurisdiction and Construction Access Agreements

While much of the Project Area alignment is within the jurisdiction of BPCA, Reach 1 is comprised of primarily City and state-owned property along built street rights-of-way, including the lands along North Moore and Harrison Streets which are under City jurisdiction and the highway lands along the State Route 9A/West Street segment. State Route 9A/West Street is ~~shared jurisdiction between~~ owned by the State through NYSDOT and ~~the City of New York Departments of Transportation~~is maintained by NYCDOT. There are parts of the project segment along North Moore Street that may require use of property within Independence Plaza (which is privately owned) and lands adjacent to BMCC (under the jurisdiction of DASNY). The portion of the Project Area that is west of State Route 9A/West Street includes lands (and lands underwater) managed by the State of New York through NYSDEC and HRPT. Land along the marginal street, wharf, or place between the State Route 9A/West Street right-of-way and the North Esplanade (i.e., the location of the proposed pump station) is under the jurisdiction of BPCA~~SBS~~. In addition, access

agreements are expected to be needed to allow for temporary construction access ~~for~~to properties fronting the Proposed Project corridor as well as access to properties for the long-term inspection, monitoring, and maintenance of the flood barrier system.

1.0.4 Alternate Scenarios Considered in Development of the Proposed Project

This section provides a summary of the alternative flood barrier system alignments that were considered during the design process; these design alternatives are compared with the Proposed Project in Chapter 5.0, "Alternatives." As described below, a number of flood protection alternative alignment approaches were considered in developing the Proposed Project which was guided by the evaluation of inboard (i.e., upland) and outboard (i.e., at water's edge)~~,~~ alignments.

1.0.4.1 Inboard Alignment Scenario

The Inboard Alignment scenario design objective proposed providing flood protection along the most upland location from the water's edge (see **Figure 1-20**). Under this design scenario, in Reaches 1 and 2, the alignment is similar to the Proposed Project, with an upland "tie-back" to Greenwich Street in Reach 1 that extends west along North Moore Street, crossing State Route 9A/West Street near Harrison Street; in Reach 2 along the North Esplanade, the Inboard Alignment assumes in-place reconstruction, without modification of width. Turning southward this alignment generally follows the existing BPCA retaining wall that frames the interior edge of Rockefeller Park, thereby minimizing park modifications in Reach 3. In Reach 4, this alternative alignment proposes to reconstruct the waterfront platform at the location of the ferry terminal, and in Reach 5, this alternative is aligned along the upland terraces of the plaza where it is integrated into the existing plaza platform and cross the two PATH tunnels, requiring special subsurface bridging structures and sluice gates. Continuing along the South Esplanade, in Reach 6 this alignment includes replacing the existing privacy walls with the goal of maximizing the preservation of existing trees and minimizing changes to the South Esplanade, to the extent feasible. In Reach 7, the system is integrated to the existing elevated sidewalks and privacy walls along the developed edge of the open space at South Cove. Overall, the Inboard Alignment scenario generally minimizes regulatory approvals when compared with outboard alternatives. This results in a lower cost and shorter construction period (see description below) with less modification of existing open spaces and urban design features and a lesser impact on existing view corridors; however, this alternative alignment also provides the least protection of the existing waterfront against the design storm.

1.0.4.2 Outboard Alignment Scenario

The Outboard Alignment Flood Protection scenario provides the flood barrier system primarily along the water's edge (with the exception of Reach 1) the result of which increases area of disturbance and modification of existing open spaces (see **Figure 1-20**). In Reach 1, this alignment "ties-back" near Greenwich Street and then extends west along Chambers Street, crossing State Route 9A/West Street between Greenwich and Harrison Streets. This alignment would therefore not provide coastal flood protection for the blocks south of North Moore (e.g., Independence Plaza, BMCC) or Harrison Streets, which are included in the above-described Inboard Alternative scenario. In Reach 2, the North Esplanade is to be reconstructed and expanded thereby providing additional public space for pedestrian, vehicular,

and bicycle access. Continuing southward to Reach 3, the Outboard Alignment extends through the center of Rockefeller Park, with the proposed flood barrier system installed beneath a partially raised and reconstructed park. At Belvedere Plaza in Reach 4, this alignment requires reconstruction of the waterfront platform with a temporary relocation of the ferry terminal. In Reach 5, the flood barrier system alignment under this alternative is outboard along the marina breakwater with a barge gate system that is deployed at the marina entrance during a storm event. In Reach 6, the alignment is co-located with a reconstructed and raised Esplanade structure. Only one alignment—comprised of elevated sidewalks and privacy walls along the eastern edge of the cove—was considered for Reach 7.

While the Outboard Alignment Flood Protection scenario generally increases the protection area of BPCA open space and assets, it would also have greater costs and construction duration, with substantially more in-water work and impacts on the Hudson River. It would also increase both the duration of the temporary closure of public open space during construction and the area of permanent alterations to existing open space resources. This scenario could increase the opportunity for new public space programming, amenities and accessways and could also minimize the need for deployable structures with the opportunity to provide in-water ecological features as part of the in-water construction.

1.0.5 Regulatory Permitting, Approvals, and Coordination

Implementing the Proposed Project requires federal, state, and local approvals involving the following agencies:

1.0.5.1 Federal

- U.S. Army Corps of Engineers (USACE) – Permits or authorizations for activities in Waters of the United States (Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act).
- As part of the USACE permitting process, coordination with the U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) – Advisory agencies to the federal permitting process focusing on activities that affect wetlands, water quality, protected plant and wildlife species, and essential fish habitat.
- U.S. Coast Guard (USCG) – Coordination and authorization, as needed (e.g., temporary siting of construction barges).
- Federal Emergency Management Agency (FEMA) – Letter of Map Revision (LOMR) revising the current Flood Insurance Rate Maps (FIRM) to show changes based on the flood barrier design and construction.

1.0.5.2 State of New York

- New York State Department of Environmental Conservation (NYSDEC) – Permits related to activities in tidal wetlands (Article 25), Water Quality Certification (Section 401); ~~permits related~~ modifications to the City's State Pollutant Discharge Elimination System (SPDES) ~~program~~permit to address the

proposed pump station and related drainage system modifications; dewatering and discharge activities; and approvals related to the import of fill material requiring a Beneficial Use Determination.

- New York State Department of State (NYSDOS) – Coastal Zone Consistency Determination.
- New York State Office of Parks, Recreation and Historic Preservation (OPRHP) /New York State Historic Preservation Office (SHPO) – Consultation on federal and state review process pursuant to Section 106 of the National Historic Preservation Act (NHPA) and/or Section 14.09 of the State Historic Preservation Act (SHPA) with respect to designated and protected properties on the State and National Registers of Historic Places and properties determined eligible for such listing.
- New York State Department of Transportation (NYSDOT) – Design ~~coordination as needed,~~ and maintenance agreement and a Highway Use and Occupancy Agreement for the use of the state highway for the placement of proposed flood barrier system and other project elements proposed to be installed in the State ROW and construction permits for work within the NYSDOT-owned right-of-way (ROW) within State Route 9A/West Street~~.~~, which will require compliance with 17 NYCRR Part 15.
- Dormitory Authority of the State of New York (DASNY) – Coordination for proposed work affecting BMCC and easement for encroachment on DASNY owned property (BMCC).
- New York State Office of General Services (NYSOGS) Bureau of Land Management – Coordination on Joint Application for USACE and NYSDEC permits, and easement for Reach 2 esplanade expansion.
- Hudson River Park Trust (HRPT) – Design coordination for work within and along the Park, at the southern boundary of the HRPT jurisdiction adjacent to BPCA's North Esplanade property. Construction work permits from HRPT for work within the HRPT's boundary and access rights from HRPT or the State for any permanent structures within Hudson River Park.

1.0.5.3 City of New York

- New York City Department of Environmental Protection (DEP) – Review and approval of ~~design for the plan~~designs for stormwater management and project elements that ~~may~~ require modification of the City sewer system including the proposed pump station.
- New York City Department of Transportation (NYCDOT) – Coordination/review for flood barrier elements, bike lane, lighting, and other work in NYCDOT ROW, including a revocable consent for flood barrier elements in the public ROW. For activities within the State Route 9A/West Street right of way and the intersecting City Streets, all work must be performed in accordance with applicable means and methods approved by NYSDOT, NYCDOT and NYC Parks, where applicable.
- New York City Department of City Planning (DCP) – Consistency determination under the Waterfront Revitalization Program and any future Uniform Land Use Review Procedure (ULURP) actions, as needed.
- New York City Landmarks Preservation Commission (LPC) – Advisory agency for activities on or near sites of potential historical or archaeological significance.
- New York City Transit (NYCT) and the Metropolitan Transit Authority (MTA)– For any temporary relocation of bus routes/stops in the Project Area during construction. As currently proposed, no NYCT

bus stops or routes are anticipated to be affected, and one MTA bus stop (at North Moore and 9A/West Street) would be temporarily relocated during construction.

- New York City Police Department (NYPD) – Review by counterterrorism unit for conformance with security requirements.
- New York City Fire Department (FDNY) – Plan review and coordination on access requirements and impact to FDNY facilities (e.g., fire hydrants) and conduits.
- New York City Department of Parks and Recreation (NYC Parks) – Permit for street tree pruning and removal, construction near street trees including North Moore Street, Harrison Street and the State Route 9A/West Street east sidewalk.
- New York City Department of Buildings (DOB) – Plan review for elements of flood barrier system on privately owned property.
- ~~New York City Department of Small Business Services (SBS) – Review of design, plan approval, and work permit for project elements on SBS-managed property (the pedestrian plaza adjacent to Stuyvesant High School).~~
- New York City Public Design Commission (PDC) – Design review of project elements within City street rights-of-way and City-owned land.
- New York City Department of Education (NYCDOE)/School Construction Authority (SCA) – Coordination and review of project elements that relate to Stuyvesant High School.

1.0.5.4 Regional Agencies

- Port Authority of New York and New Jersey (PANYNJ) – Approval for alignment crossings over the PATH tunnels and phasing of construction work related to pedestrian access to/from the Battery Park City Ferry Terminal.