NORTH/WEST BATTERY PARK CITY RESILIENCY PROJECT

Reach 1-2 Workshop

February 16, 2023

NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

Turner | DE CRUZ | ARCADIS | SCAPE | BIG | WSP

Project Team

CLIENT TEAM:

CLIENT:

NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

ADVISORS:

AECOM one architecture

CONSULTANTS:

AKRF

EIS CONSULTANT

DESIGN-BUILD TEAM:

PRIMARY CONTRACT:

Turner and CRUZ

CONSTRUCTION

CONSULTANT:

ARCADIS

CIVIL / STRUCTURAL ENGINEERING

SUB-CONSULTANTS:

BIG

URBAN DESIGN

SCAPE

LANDSCAPE ARCHITECTURE

WSP

GEOTECHNICAL

Project Schedule

Precise construction completion dependent upon agency permitting and approvals

BATTERY PARK CITY

A Piece of a Connected & Resilient Waterfront

NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

Turner ECRUZ ARCADIS SCAPE BIG WSP

Today's Focus Area

Future Flood Risk

REACHES 1 & 2


Reach 1 + 2
REACH 1
NORTH MOORE ST
INDEPENDANCE PLAZA
HUDSON RIVER PARK
WEST ST / 9A
BOROUGH OF MANHATTAN COMMUNITY COLLEGE
GREENWICH ST
REACH 2
NORTH ESPLANADE
STUYVESANT HIGH SCHOOL
ROCKEFELLER PARK
N
NEW YORK STATE OF OPPORTUNITY.
Battery Park City Authority
Turner
DE CRUZ
ARCADIS
SCAPE
BIG

REACH 2:
NORTH ESPLANADE

North Esplanade

Existing Conditions

Existing Conditions

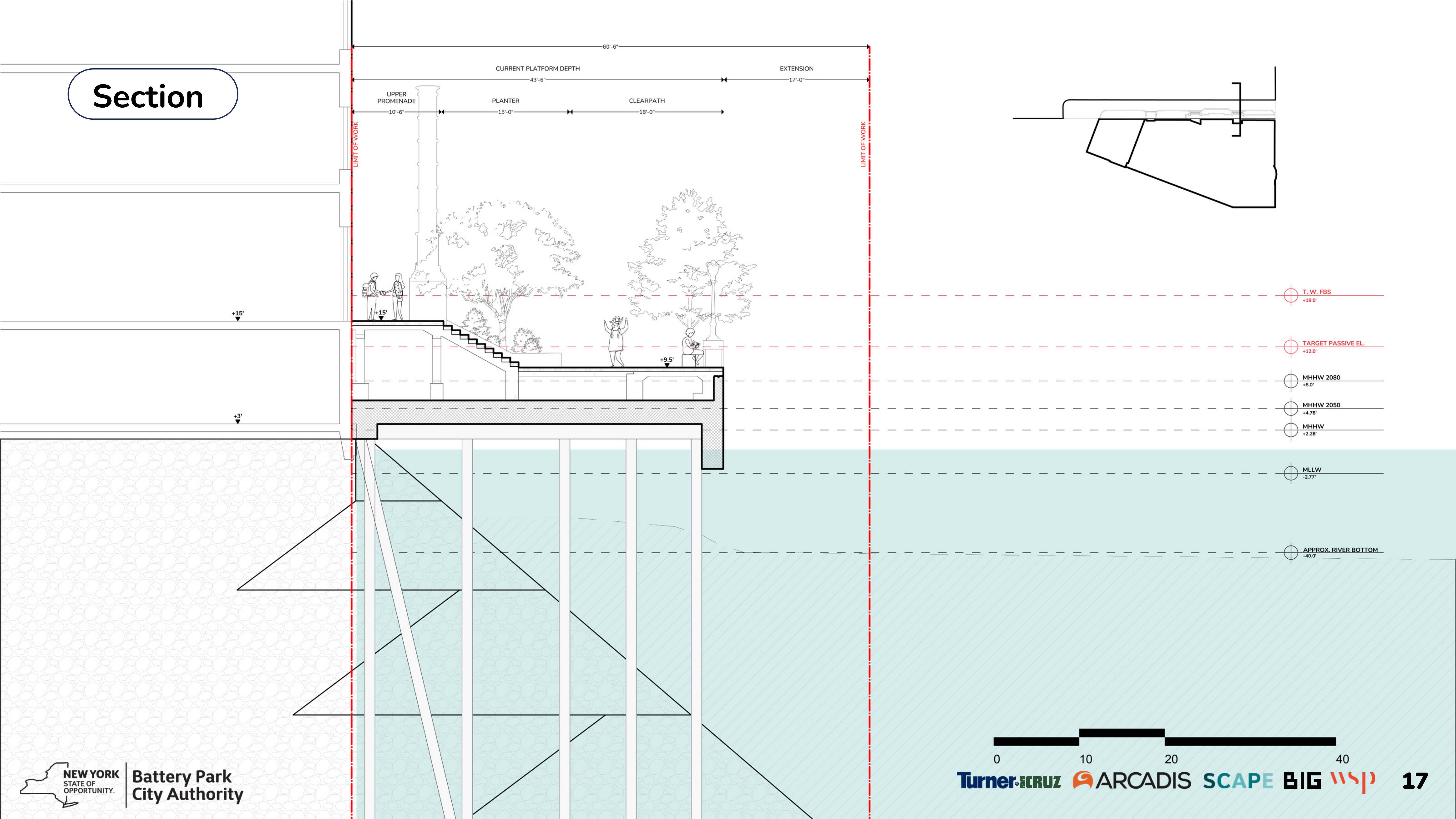
What We Heard

What We Heard

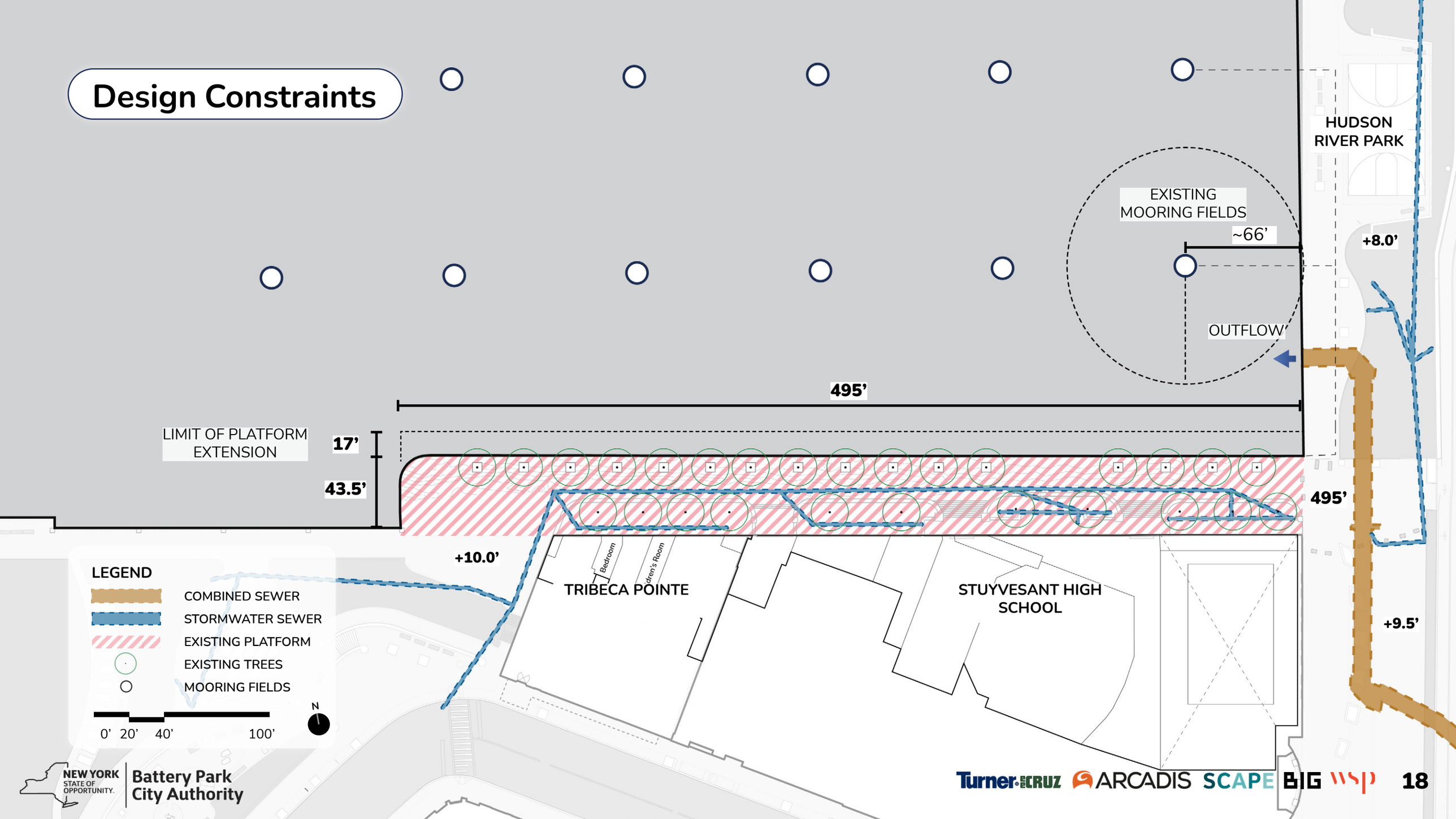
- Concerns over circulation conflicts.
- Support for building adjacent flood protection.
- Desire for enhanced waterfront access and programming.

Existing Conditions

Section


60'-6"
CURRENT PLATFORM DEPTH
43'-6"
EXTENSION
17'-0"
UPPER PROMENADE
10'-6"
PLANTER
15'-0"
CLEARPATH
18'-0"
LIMIT OF WORK
LIMIT OF WORK
+15'
+15'
+9.5'
+3'
T. W. FBS
+18.0'
TARGET PASSIVE EL.
+12.0'
MHHW 2080
+8.0'
MHHW 2050
+4.78'
MHHW
+2.28'
MLLW
-2.77'
APPROX. RIVER BOTTOM
-40.0'
0
10
20
40

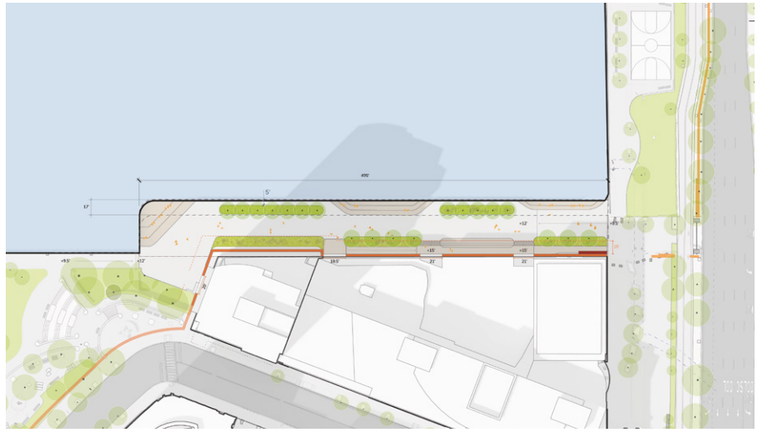
Design Constraints



New Design Options

Option 1: Extension

Expand platform to prioritize public amenities and social spaces.



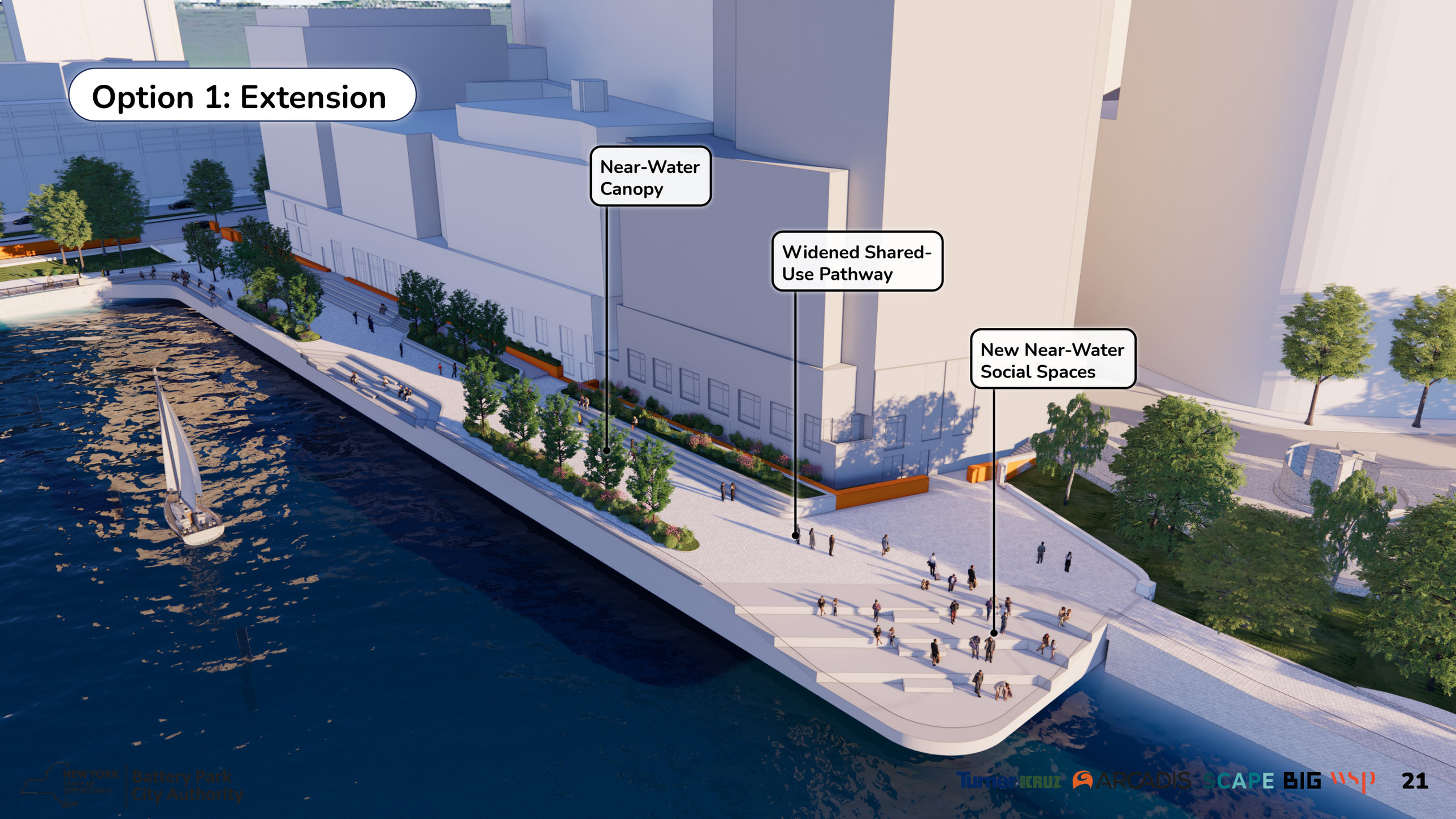
Option 2: Meander

Expand platform to prioritize public amenities and social spaces.

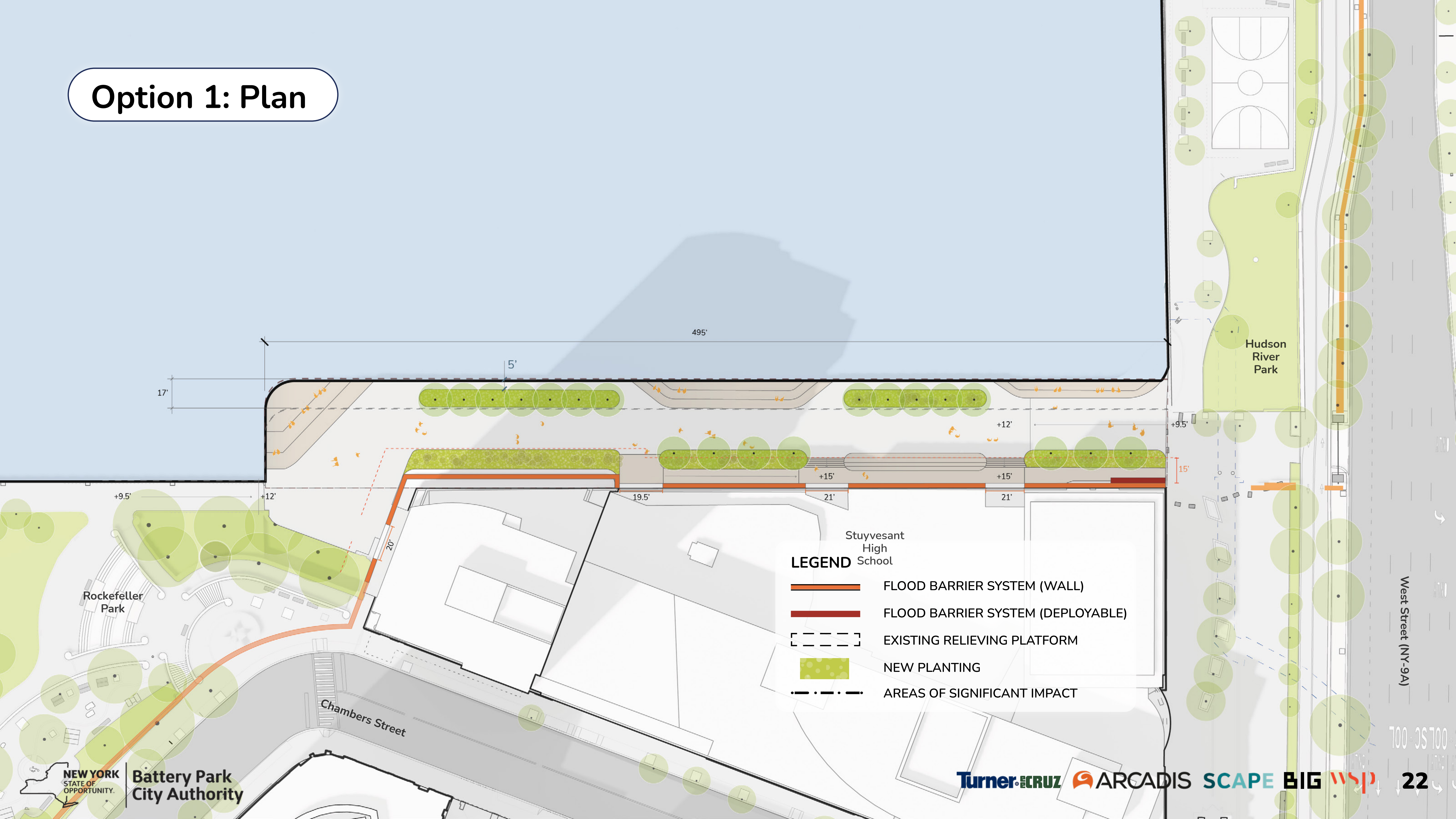
Option 3: Wave

Balance public needs with in-water habitat enhancement.

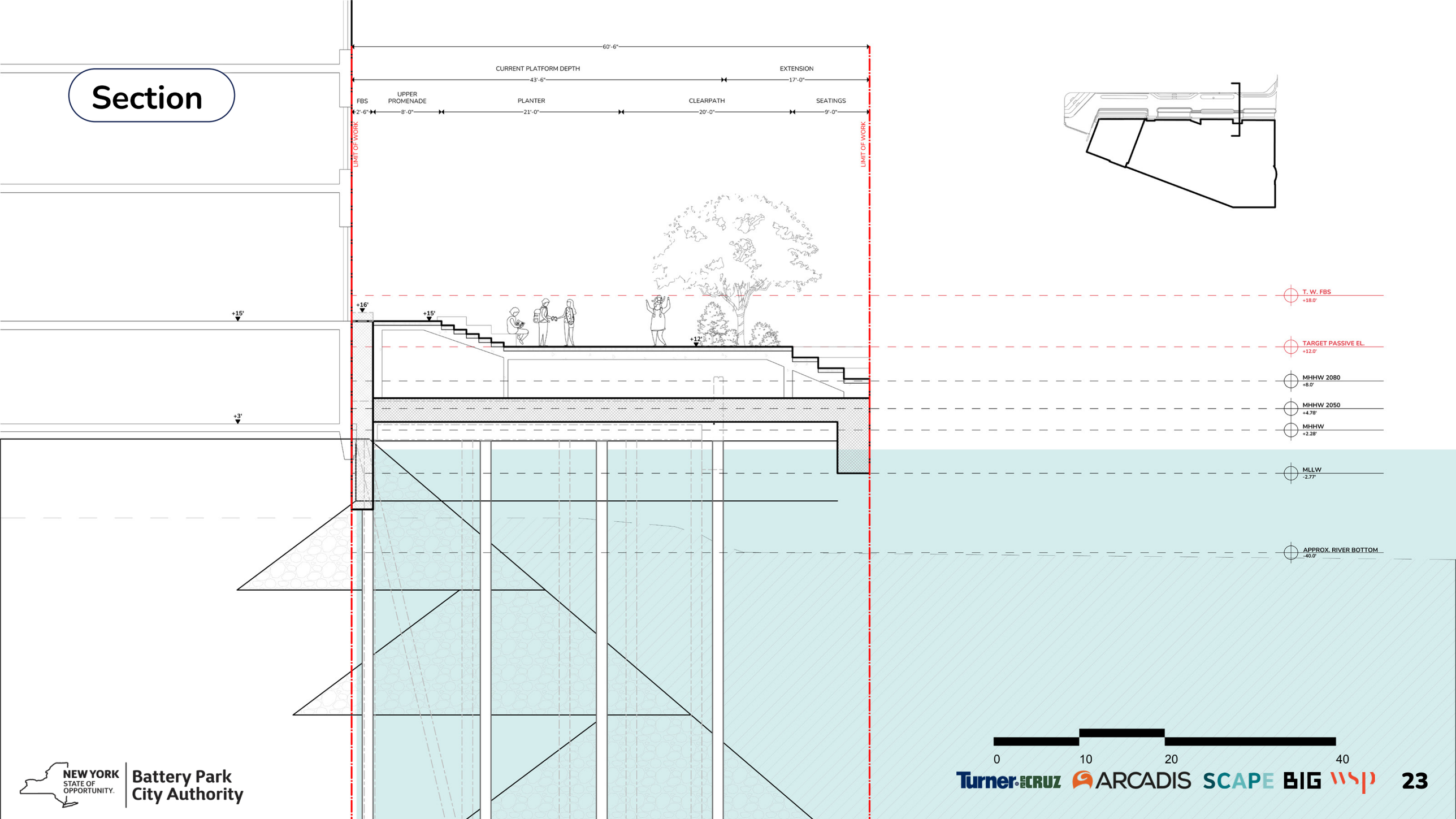
NORTH ESPLANADE:
OPTION 1


Option 1: Extension
Near-Water Canopy
Widened Shared-Use Pathway
New Near-Water Social Spaces

Option 1: Plan



Section



NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

Turner Cruz ARCADIS SCAPE BIG WSP

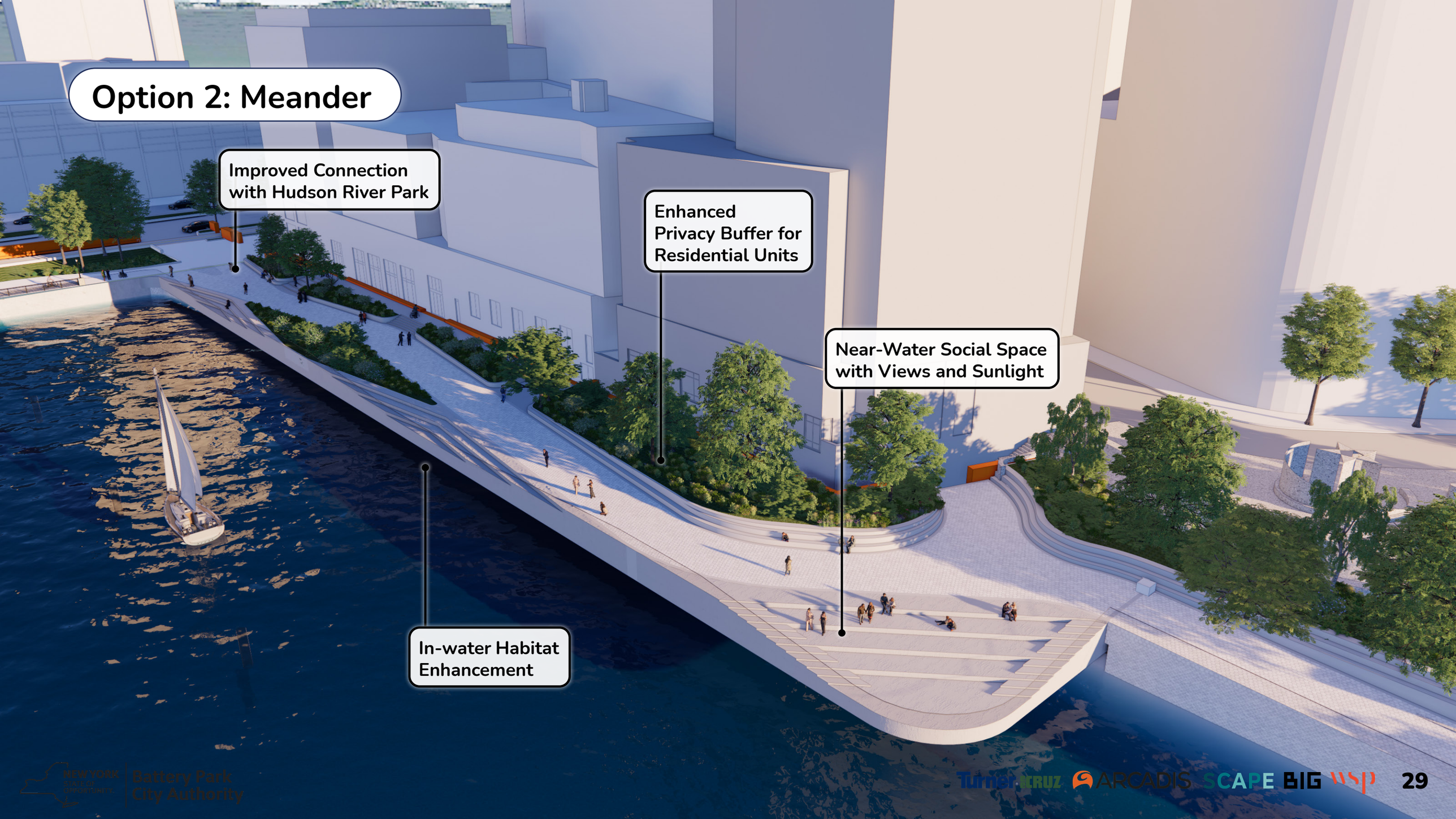
Existing: View from Hudson River Park

Option 1: View from Hudson River Park

Existing: View from North Esplanade

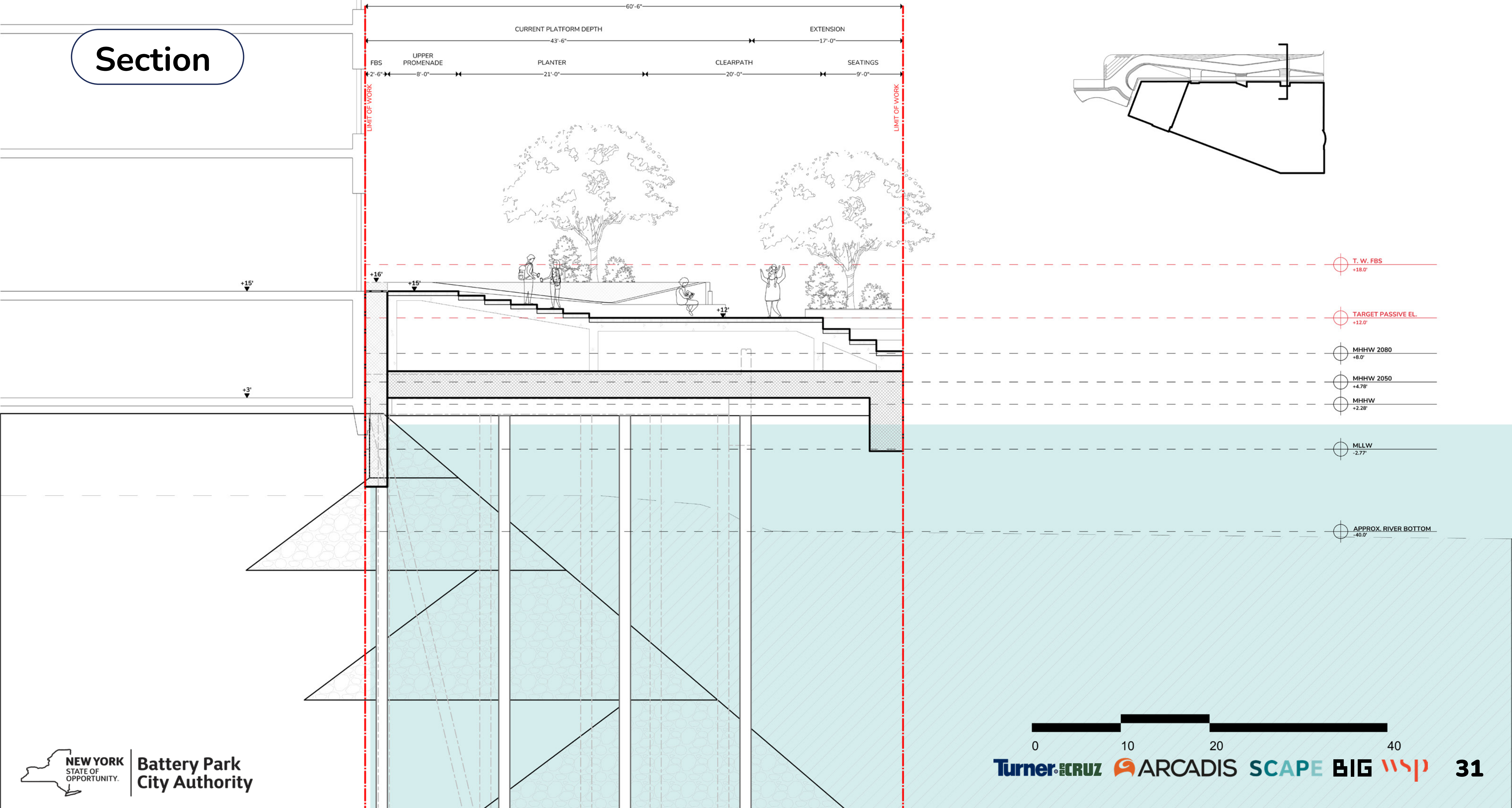
Option 1: View from North Esplanade

NORTH ESPLANADE:
OPTION 2


Option 2: Meander
Improved Connection with Hudson River Park
Enhanced Privacy Buffer for Residential Units
Near-Water Social Space with Views and Sunlight
In-water Habitat Enhancement

Option 2: Plan

Section



60'-6"
CURRENT PLATFORM DEPTH
43'-6"
EXTENSION
17'-0"
FBS
2'-6"
UPPER PROMENADE
8'-0"
PLANTER
21'-0"
CLEARPATH
20'-0"
SEATINGS
9'-0"
LIMIT OF WORK
LIMIT OF WORK
+16'
+15'
+15'
+12'
+3'
T. W. FBS
+18.0'
TARGET PASSIVE EL.
+12.0'
MHHW 2080
+8.0'
MHHW 2050
+4.78'
MHHW
+2.28'
MLLW
-2.77'
APPROX. RIVER BOTTOM
-40.0'
0
10
20
40

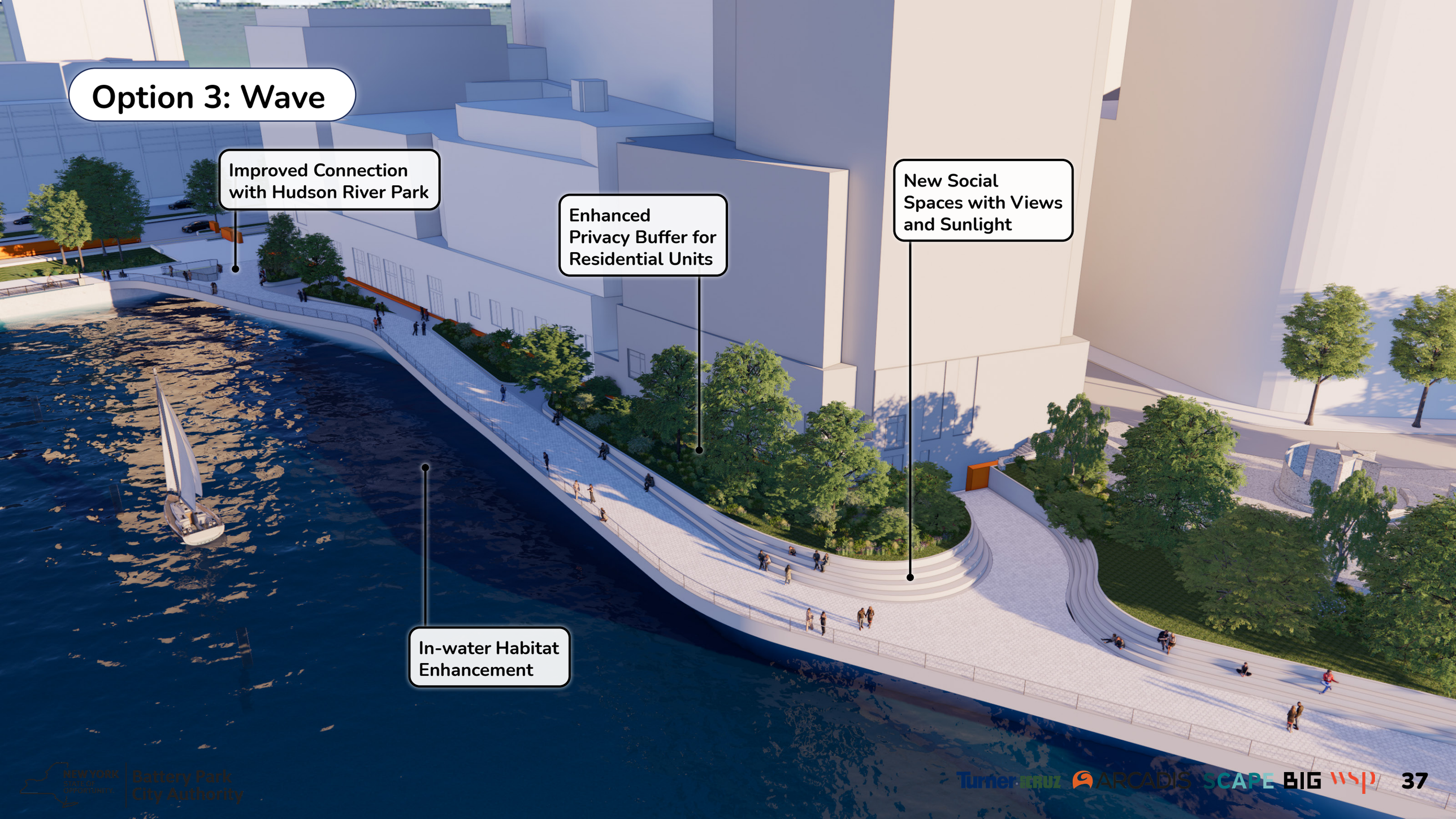
Existing: View from Hudson River Park

Option 2: View from Hudson River Park

Existing: View from North Esplanade

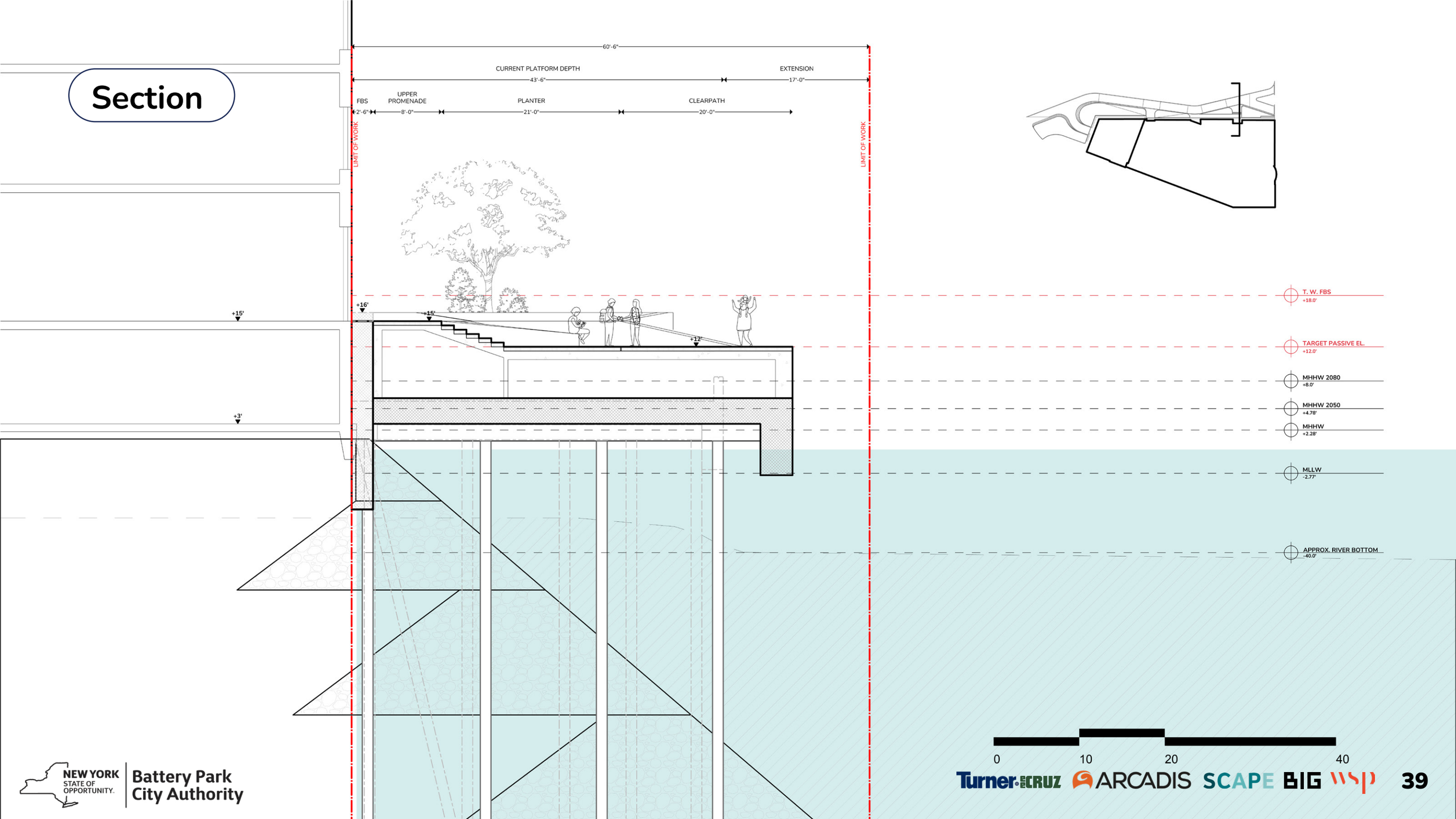
Option 2: View from North Esplanade

NORTH ESPLANADE:
OPTION 3


Option 3: Wave
Improved Connection with Hudson River Park
Enhanced Privacy Buffer for Residential Units
New Social Spaces with Views and Sunlight
In-water Habitat Enhancement

Option 3: Plan

Section



NEW YORK STATE OF OPPORTUNITY. | Battery Park City Authority

Turner · de la CRUZ ARCADIS SCAPE BIG WSP

Existing: View from Hudson River Park

Option 3: View from Hudson River Park

Existing: View from North Esplanade

Option 3: View from North Esplanade

REACH 1:
TRIBECA TIE-BACK

Reach 1

TRIBECA TIE-BACK:
NORTH MOORE STREET

North Moore Street


Existing Conditions
NEW YORK STATE OF OPPORTUNITY.
Battery Park City Authority
Turner DE CRUZ
ARCADIS
SCAPE
BIG

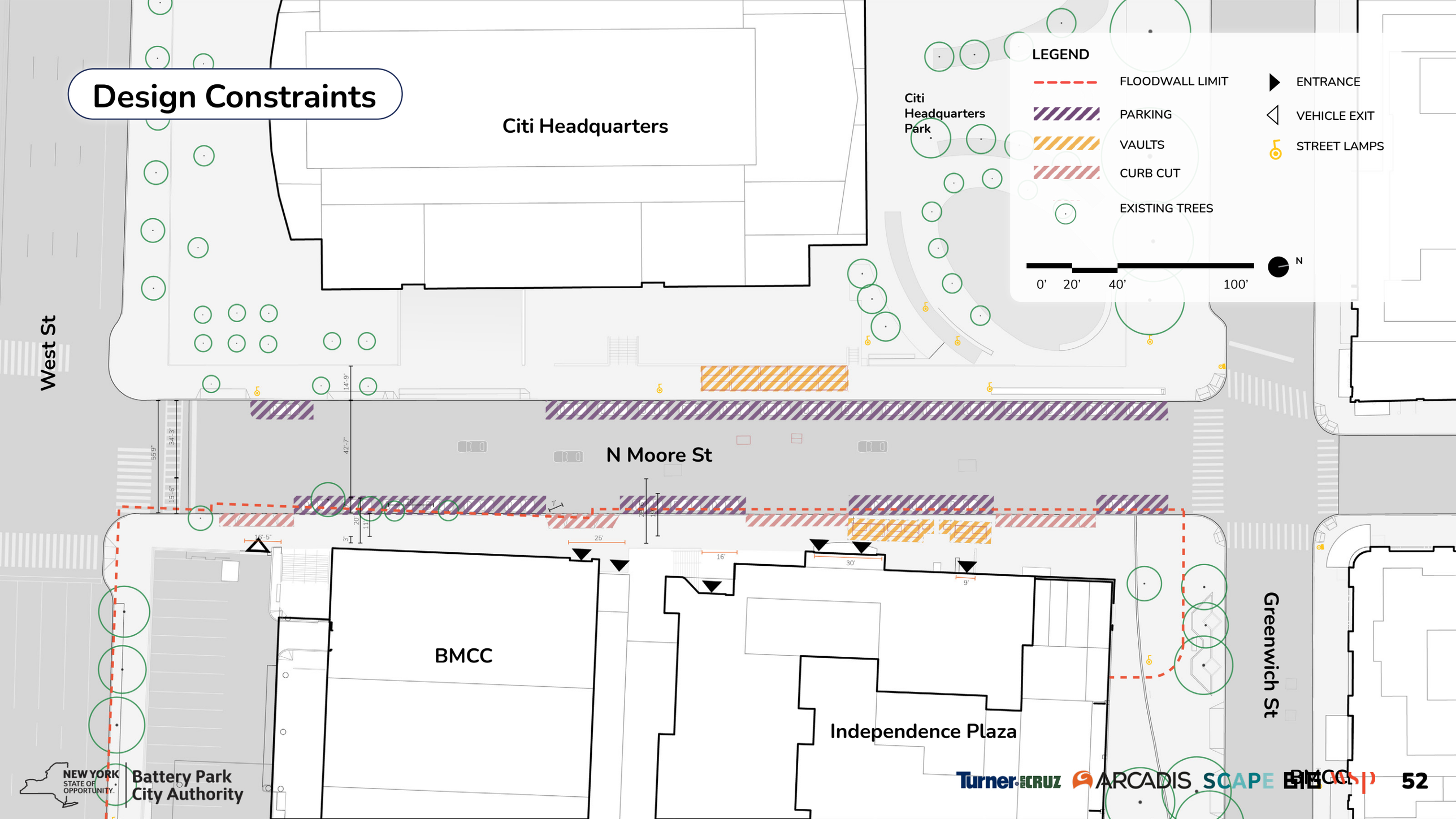
Existing Conditions

NORTH MOORE STREET:
DEVELOPMENT

What We Heard

- Concerns over impact to bikepaths and circulation.
- Concerns over wall height and impacts on view.
- Minimize impact to existing trees.

Design Constraints



New Design Options

Option 1
Align With Curb

Construct floodwall along curb to reduce impact to residential building.

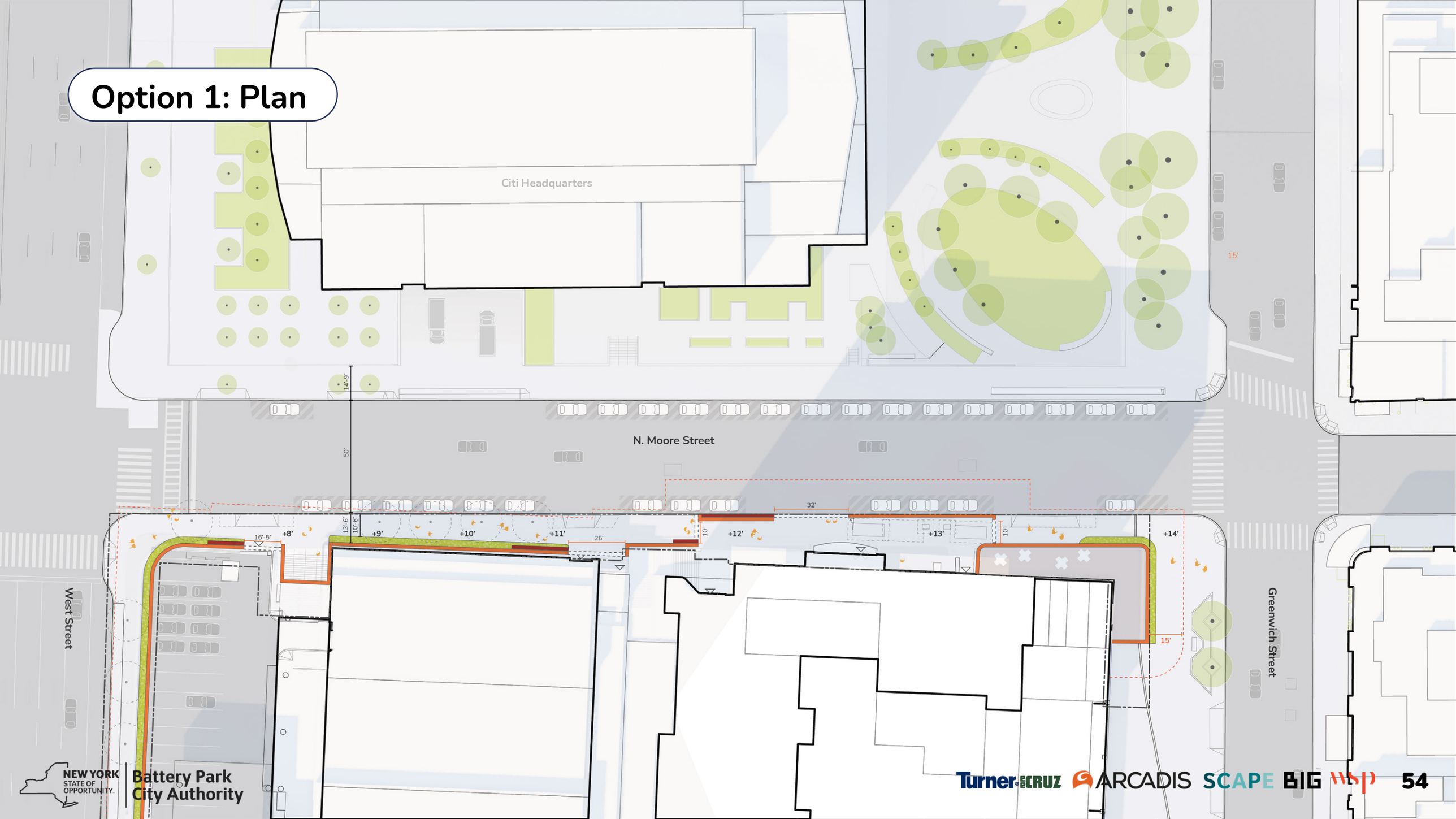
Option 2
Align With Building

Integrate floodwall with building to reduce impact to existing streetscape uses.

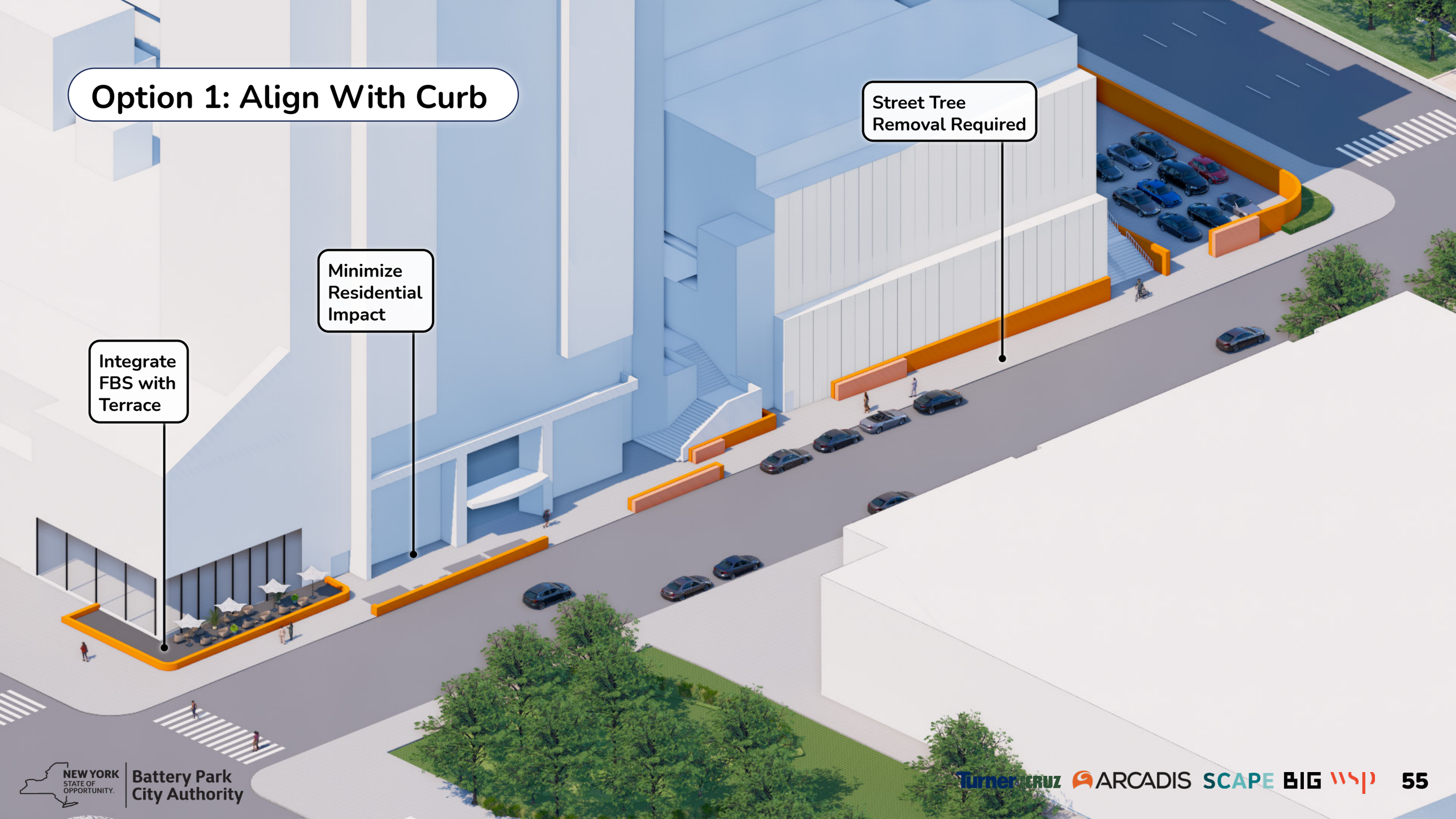
Option 3
Enhance Streetscape

Integrate floodwall with building and widen sidewalk by reducing on-street parking for more trees.

Option 1: Plan

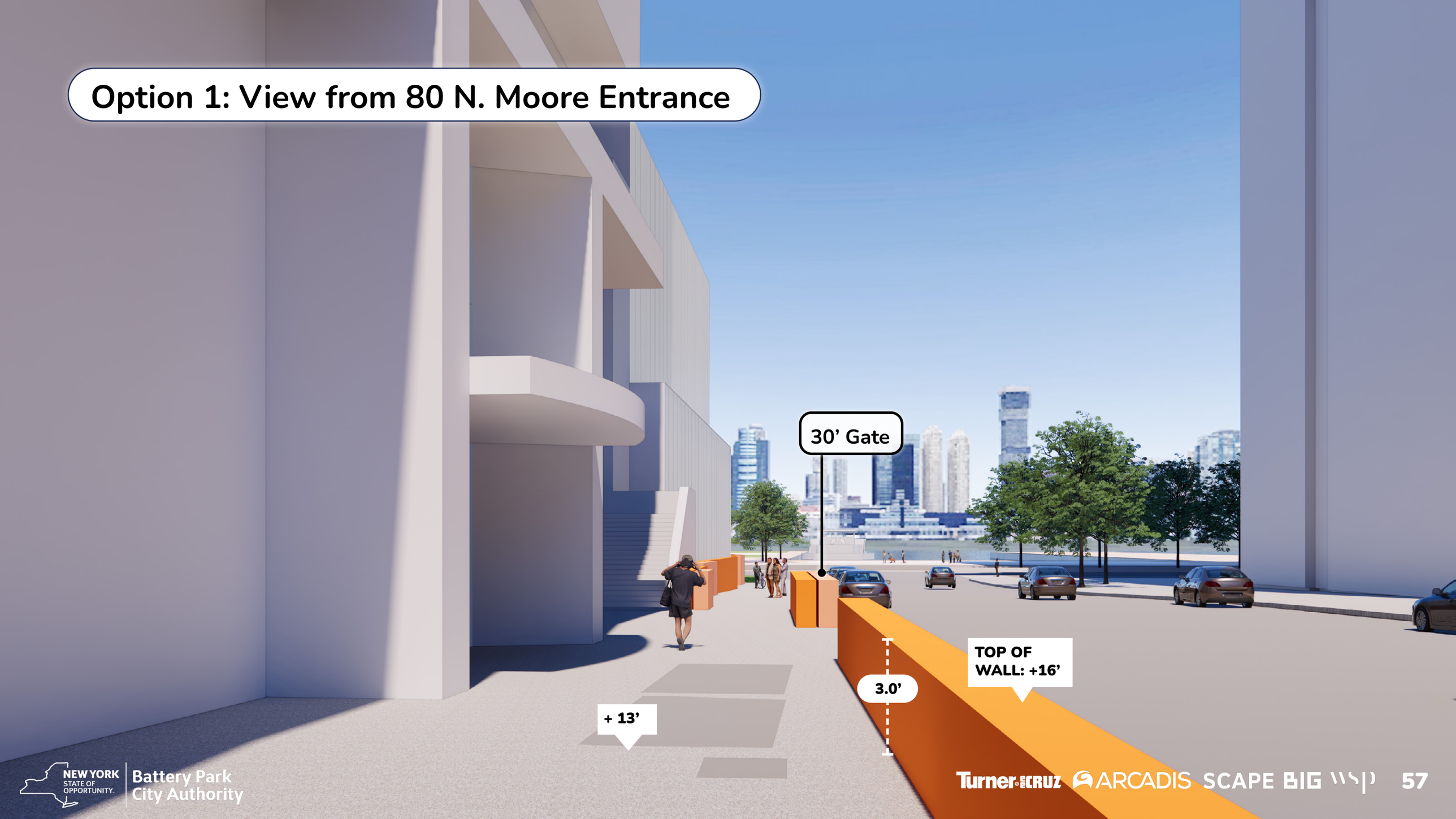


Option 1: Align With Curb



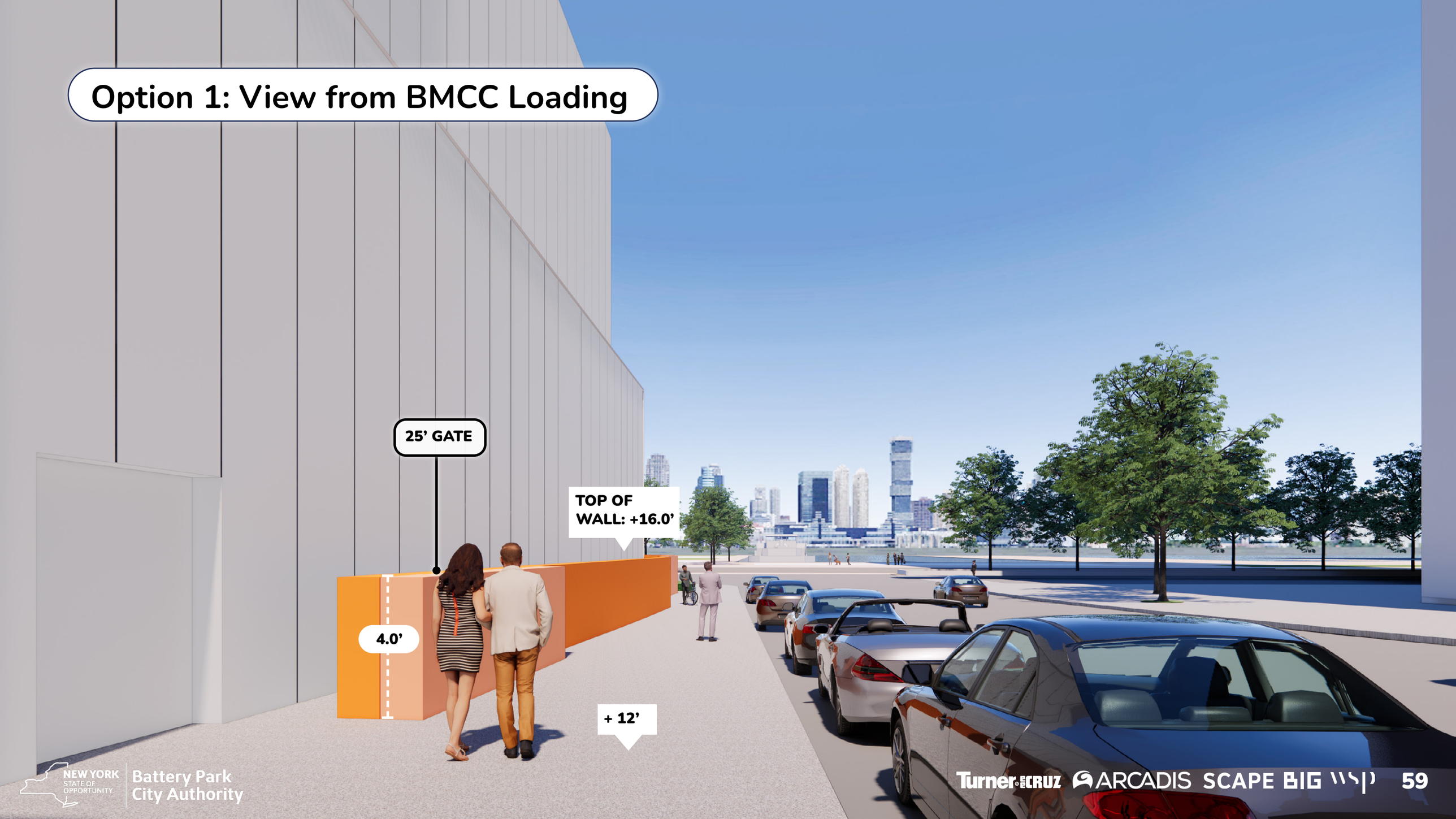
Existing: View from Hudson River Park

Option 1: View from 80 N. Moore Entrance



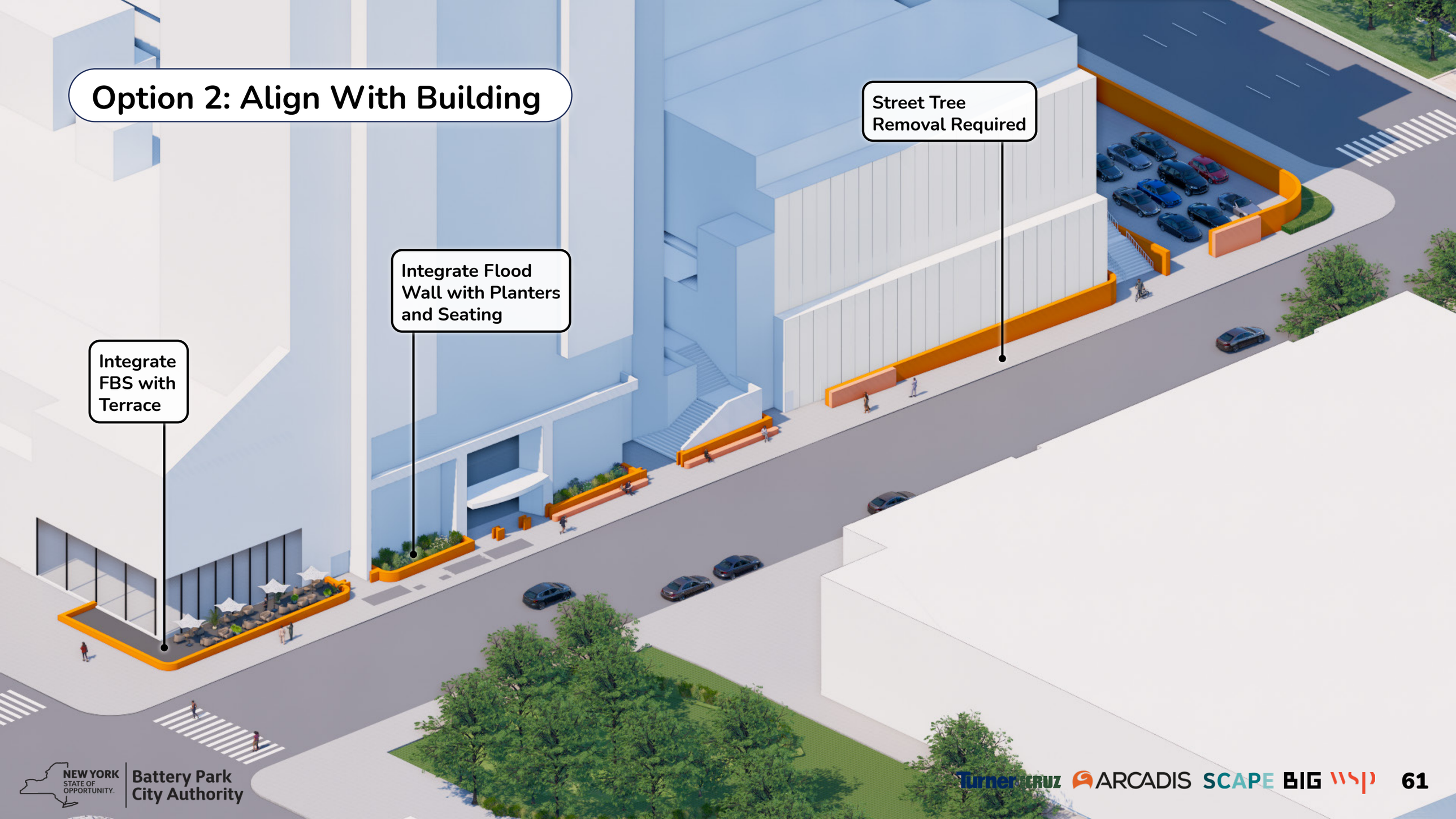
Existing: View from North Esplanade

Option 1: View from BMCC Loading



Option 2: Plan

Option 2: Align With Building



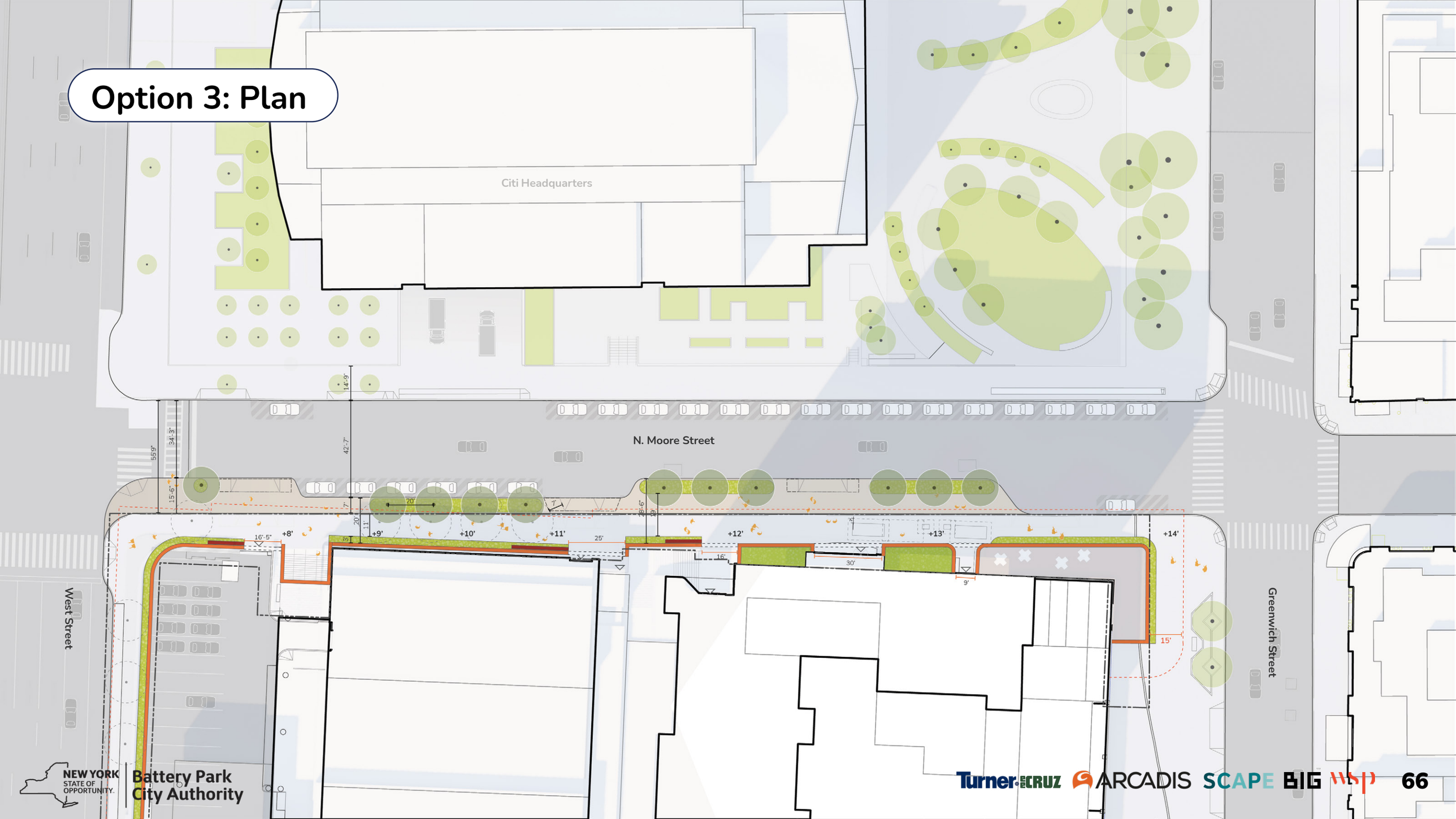
Existing: View from Hudson River Park

Option 2: View from Hudson River Park

Existing: View from North Esplanade

Option 2: View from North Esplanade

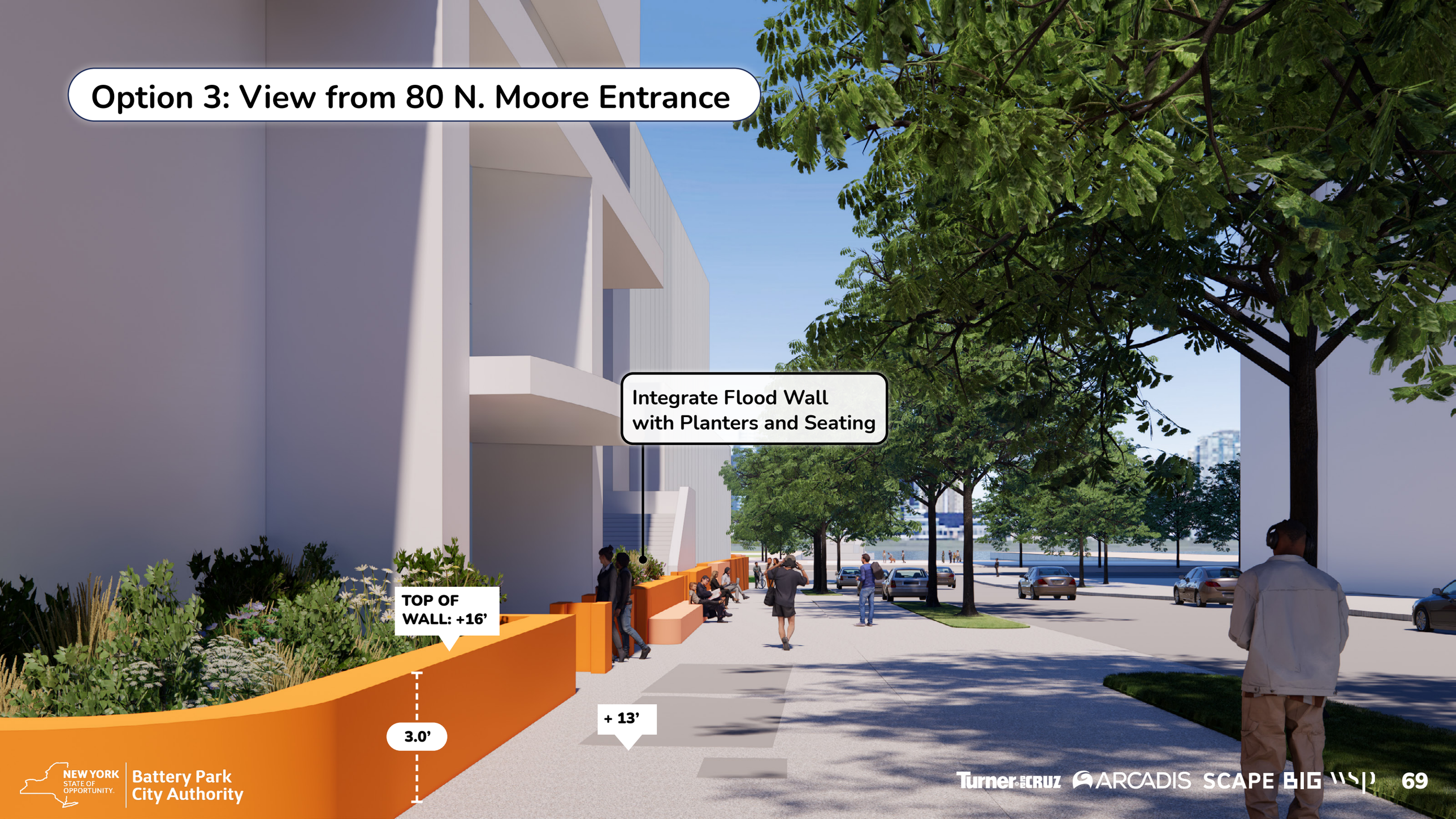
Option 3: Plan



Option 3: Enhance Streetscape

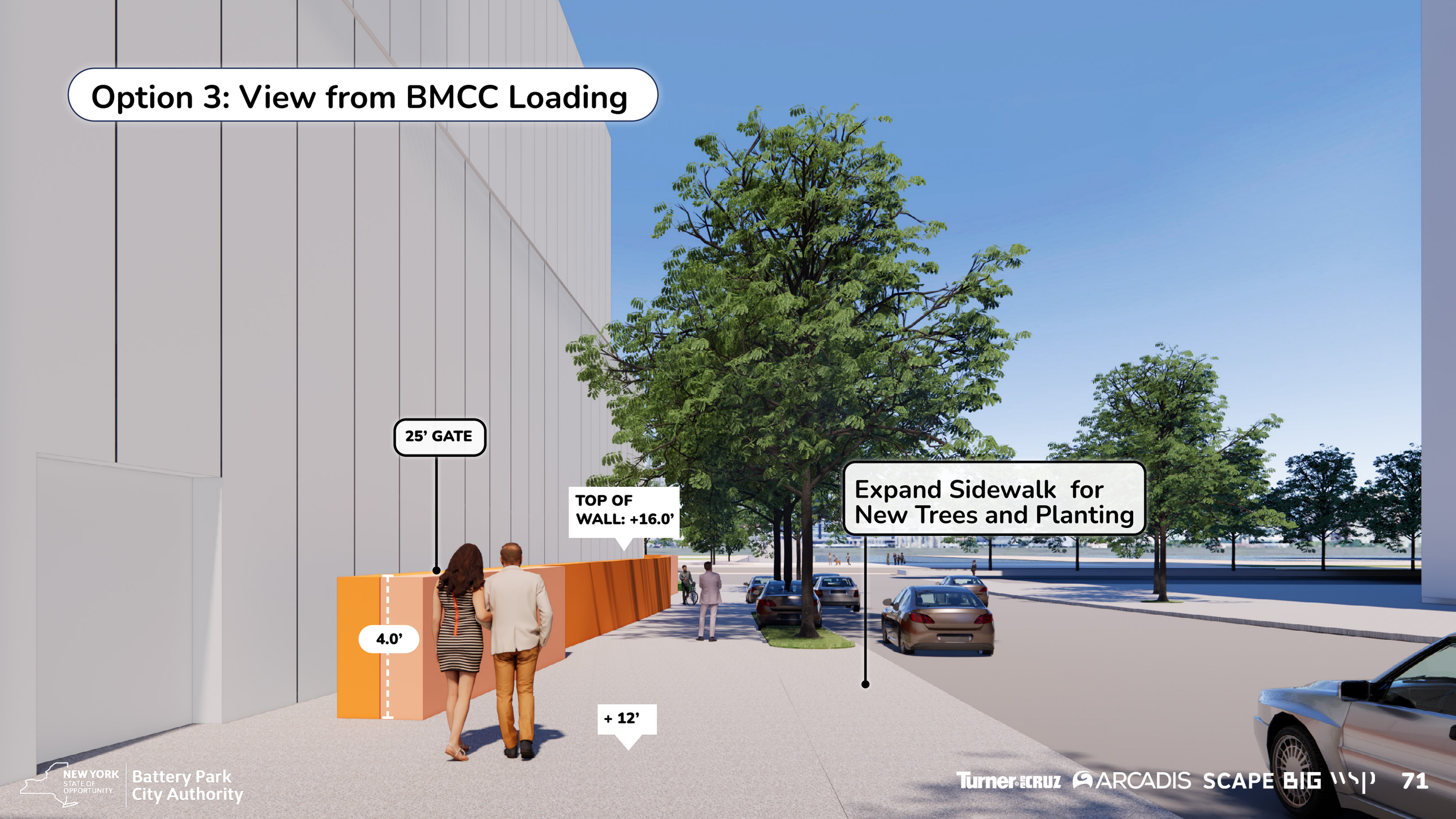
Existing: View from Hudson River Park

Option 3: View from 80 N. Moore Entrance



Existing: View from North Esplanade

Option 3: View from BMCC Loading



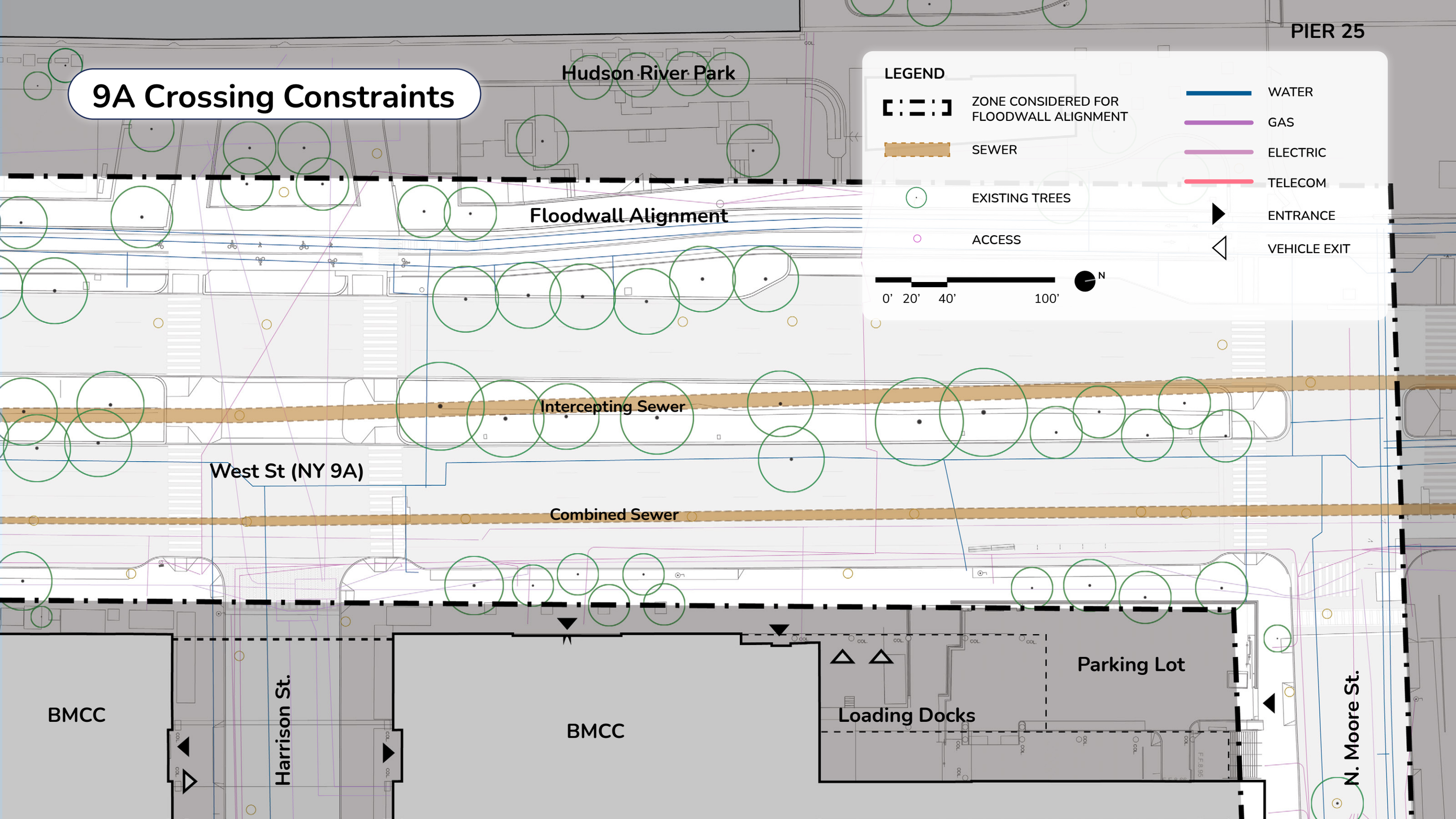
TRIBECA TIE-BACK:
WEST STREET

West Street

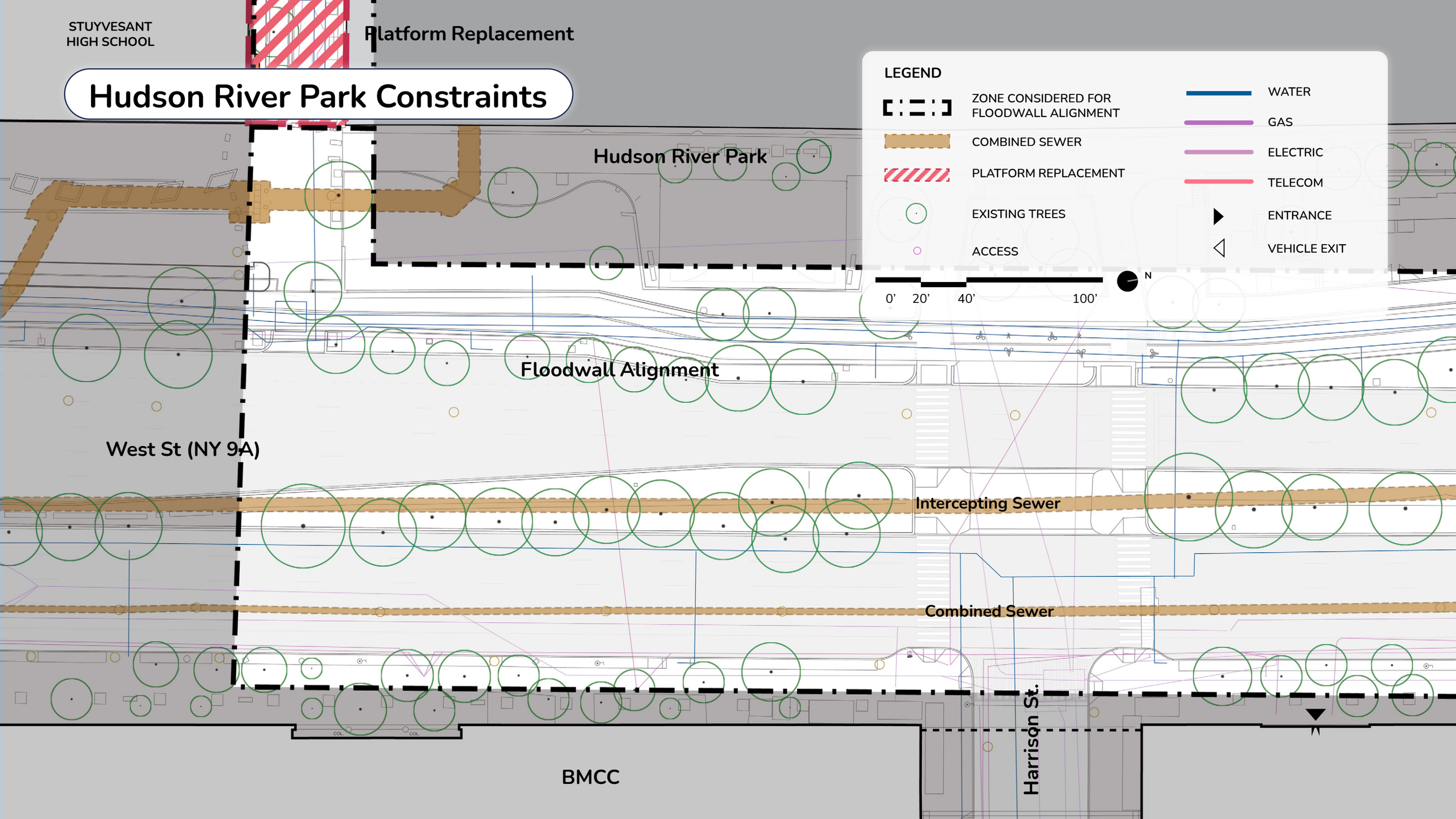
NEW YORK STATE OF OPPORTUNITY.
Battery Park City Authority


West St

9A Crossing Constraints

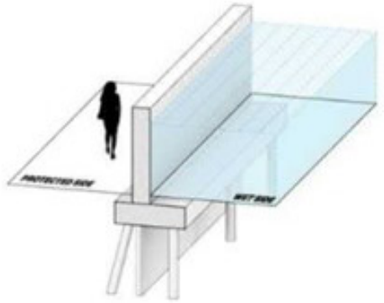



Hudson River Greenway


STUYVESANT
HIGH SCHOOL
Platform Replacement
Hudson River Park Constraints
Hudson River Park
LEGEND
ZONE CONSIDERED FOR FLOODWALL ALIGNMENT
COMBINED SEWER
PLATFORM REPLACEMENT
EXISTING TREES
ACCESS
WATER
GAS
ELECTRIC
TELECOM
ENTRANCE
VEHICLE EXIT
N
0’
20’
40’
100’
Floodwall Alignment
West St (NY 9A)
Intercepting Sewer
Combined Sewer
BMCC
Harrison St.

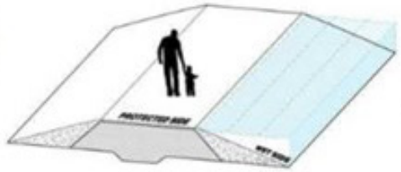
Flood Barrier Systems

STATIC

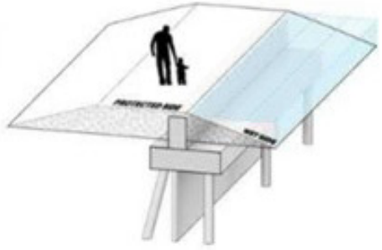


FLOOD WALL

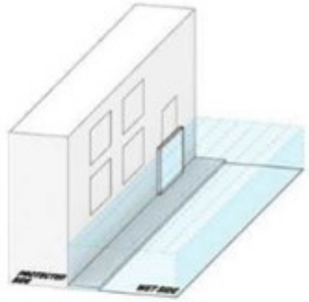
CONCEALED FLOODWALL



STRUCTURAL BERM

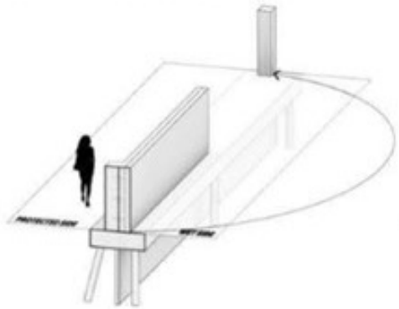


BERM WITH CONCEALED FLOODWALL

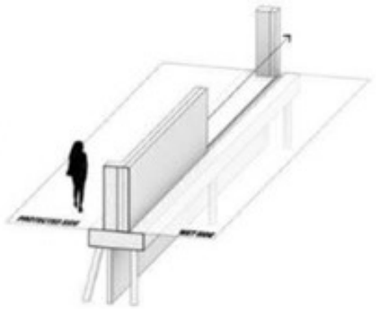


DRY-FLOOD PROOFING

DEPLOYABLES

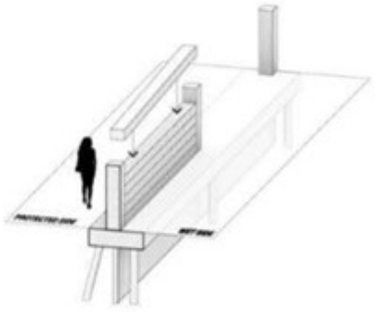


SWING GATE

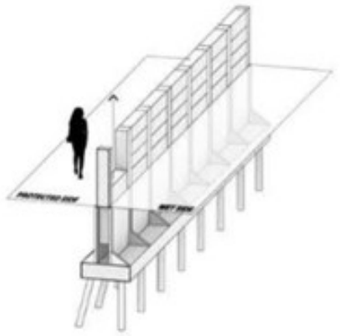


SLIDING GATE

FLIP UP GATE



STOP LOGS



VERTICAL SLIDING GATE

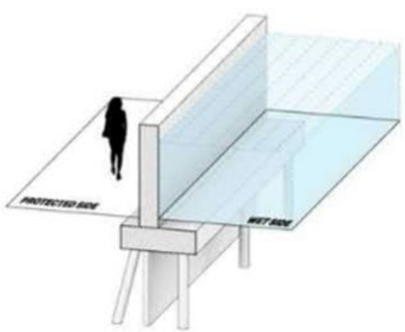
Impacts

- Full height fixed wall between bike path and Rte 9A

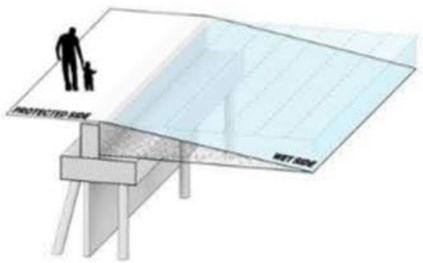
- Partial height fixed wall with deployable elements between bike path and Rte 9A

Flood Barrier Systems: Passive

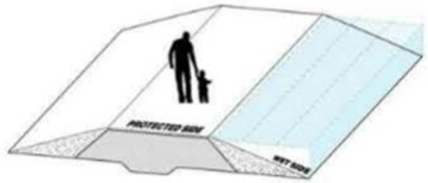
- Static options
  - More reliable (no moving parts)
  - Lower installation costs
  - Fewer O&M requirements
  - More visible
    - Dry floodproofing structures can be a less visible option, but structures then become part of the FBS with additional FEMA structural, access, inspection, and maintenance requirements



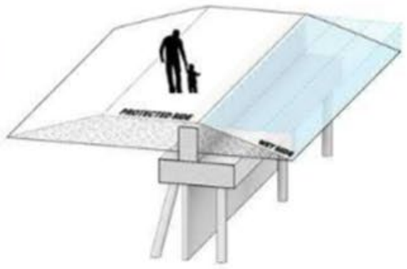
FLOOD WALL



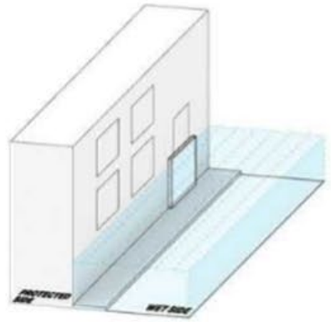
CONCEALED FLOODWALL



STRUCTURAL BERM



BERM WITH CONCEALED FLOODWALL



DRY-FLOOD PROOFING

Buried Flood Wall / Levee

Reliability	High
Operations & Maintenance	Low
Construction Cost	Low
Deployment Time	N/A
View Impacts	High
FEMA Certification Concerns	Low
Other: Needs a large area, but has other environmental benefits	

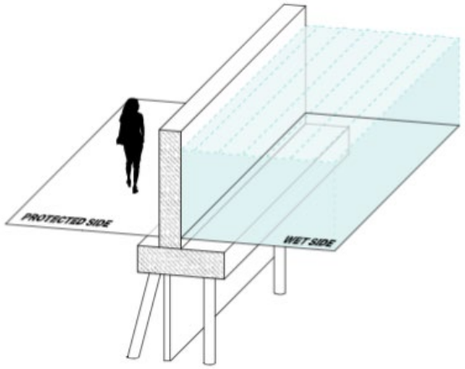
Mostly buried floodwall example

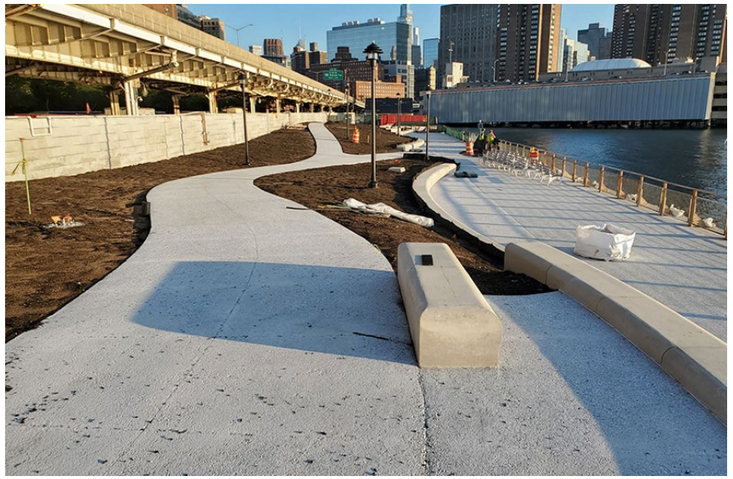
Brooklyn Bridge Park, Pier 5 Uplands
(not flood protection)

Dayton, KY Flood Wall

Flood Wall

Reliability	High
Operations & Maintenance	Low
Construction Cost	Low
Deployment Time	N/A
View Impacts	High
FEMA Certification Concerns	Low
Other: Many options for landscape integration	





East Side Coastal Resilience Project

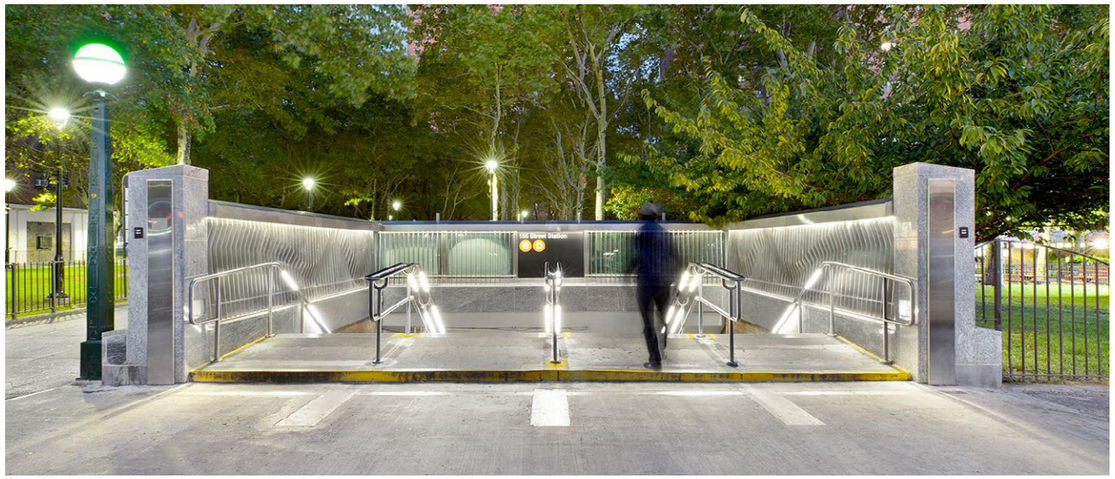
Stone facing on Potomac Park Levee

Art installations on Ohio River floodwall

8

Structural Glass

Reliability	High
Operations & Maintenance	Moderate
Construction Cost	High
Deployment Time	N/A
View Impacts	Reduced
FEMA Certification Concerns	High
Other: May not be appropriate in high impact areas	



' Station – structural glass with architectural stainless-steel ribs

Installation in Westhoven, Germany on the Rhine

Installation in Worcestershire, England

9

Flood Barrier Systems: Deployable

- Deployable options
  - Reliability dependent on robust O&M schedule and emergency response plan
  - More expensive to install
  - Higher O&M requirements
  - Can be less visible

Roller and Swing Gates

Reliability	Moderate
Operations & Maintenance	High
Construction Cost	High
Deployment Time	Quick
View Impacts	Reduced
FEMA Certification Concerns	Low
Other: fewer personnel for deployment	

East Side Coastal Resilience

Roller Gate – East Side Coastal Resilience

Stop Log (Plank) Systems

Reliability	Moderate
Operations & Maintenance	High
Construction Cost	Moderate
Deployment Time	Long
View Impacts	Low
FEMA Certification Concerns	Low
Other: On-site storage required. Labor intensive to install	

2013 flood on the Danube in Grein, Austria

Post and Panel Systems

Reliability	Moderate
Operations & Maintenance	High
Construction Cost	High
Deployment Time	Moderate
View Impacts	Low
FEMA Certification Concerns	Moderate
Other: Similar to stop log system	

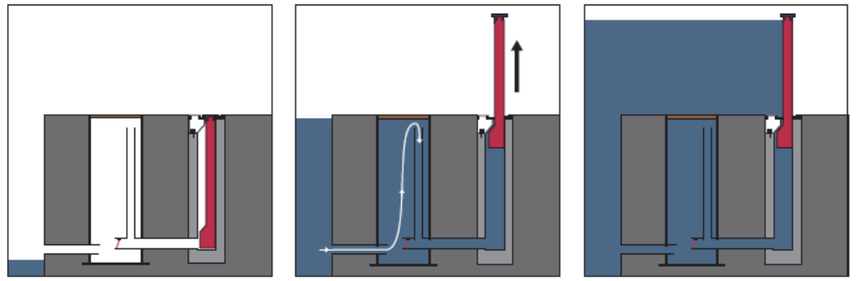
Stop log panels that store in place as seating (King's Lynn, England)

Flip-Up Gates

Reliability	Moderate
Operations & Maintenance	V. High
Construction Cost	High
Deployment Time	Moderate
View Impacts	Low
FEMA Certification Concerns	Moderate
Other: Concerns with in-roadway use and high impact areas	

Vertical Lift Gates

Reliability	Moderate
Operations & Maintenance	V. High
Construction Cost	V. High
Deployment Time	Moderate
View Impacts	Low
FEMA Certification Concerns	High
Other: Concerns with use in high impact areas	



TRIBECA TIE-BACK:
NEXT STEPS

West Street (NY-9A) Crossing: Next Steps Underway

- Continued evaluation of median alignment - confirming technical feasibility.
- Additional coordination with NY State and City Departments of Transportation – better understanding of operational constraints and flexibility.
- Construction logistics development


NEW YORK
STATE OF
OPPORTUNITY.
Battery Park
City Authority
Turner
DE CRUZ
ARCADIS
SCAPE
BIG
WSP