The N-EWN Knowledge Series

A Continuing Education Series about Engineering with Nature

Roopesh Joshi, PE
Acting Assistant Commissioner
New York City Department of Environmental Protection's Bureau of Sustainability

The Tibbetts Brook Daylighting and Greenway Project – Restoring a Waterway in New York City

This presentation will discuss the Tibbetts Brook Daylighting and Greenway project. Until the late 1800s, Tibbetts Brook flowed through Westchester, into the Bronx through the Van Cortlandt plantation to Van Cortlandt Lake, and meandered its way to the Harlem River. Around 1900, Van Cortlandt Lake was connected to the newly built combined sewer system in Broadway eliminating the connection between Tibbetts Brook and the Harlem River except during combined sewer overflow (CSO) events. Under current conditions, the dry weather flow of approximately 5 million gallons a day is a constant inflow to the combined sewer system, and is treated by the Wards Island Wastewater Recovery Facility, expending energy to treat clean water. During wet weather events, peak flows from the Tibbetts Brook watershed contribute significantly to the inflows into the combined sewer system. This results in capacity limitations in the sewer system, which leads to combined sewer overflows into the Harlem River.

New York City Department of Environmental Protection (DEP) worked with NYC's Department of Parks and Recreation to develop a design that would daylight the stream and develop a parkway within the old rail corridor. The project is expected to reduce CSO discharges to the Harlem River by 215 million gallons per year and will be the largest green infrastructure project in New York City. The project is currently in Design and is anticipated to go into construction in 2026.

Save the date!

Upcoming webinars will take place the 3rd Thursday of the month.

Nov. 21
12:30pm ET

Roopesh Joshi, PE, NYC Department of Environmental Protection
The Tibbetts Brook Daylighting and Greenway Project – Restoring a Waterway in New York City

There will not be a N-EWN Webinar in December 2024

Jan. 16
12:30pm ET

Hailey Blackwell & Nethmi Silva, University of Oklahoma
Ecology and Engineering of Native Plant-Soil Interactions and Riparian Structures

Feb. 20
12:30pm ET

Dr. Christopher Haring, US Army Corps of Engineers
Fluvial Applications of NNBF

Register here: https://bit.ly/3gR9ADL or scan:

1 Continuing Education Credit (CEC) is available to attendees

Recorded webinars will be posted online at: https://n-ewn.org/resources/n-ewn-knowledge-seminars/

Presented by:

NETWORK FOR ENGINEERING WITH NATURE
LimnoTech Water Environment | Scientists Engineers
UNIVERSITY OF GEORGIA
ERDC

Questions? Please contact:
Sage Paris, LimnoTech
sparis@limno.com

The Tibbetts Brook Daylighting and Greenway Project – Restoring a Waterway in New York City

November 2024 N-EWN Seminar

Roopesh Joshi, P.E. Acting Assistant Commissioner
NYC DEP

NYC Environmental Protection

Agenda

- Project Background and Need
- Design Formulation
- Integrated Approach
- Next Steps

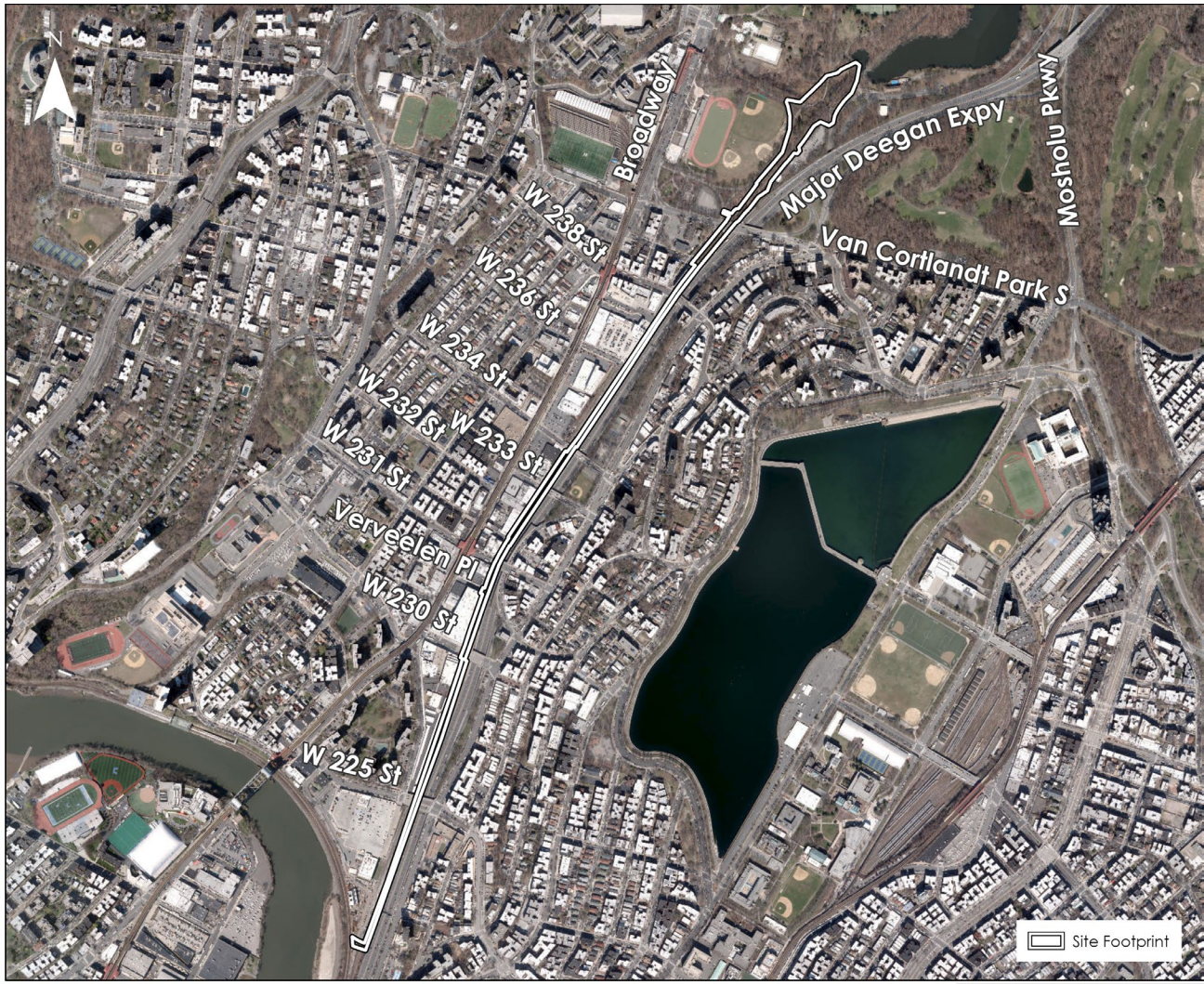
Project Background

City

10 MI

Neighborhood

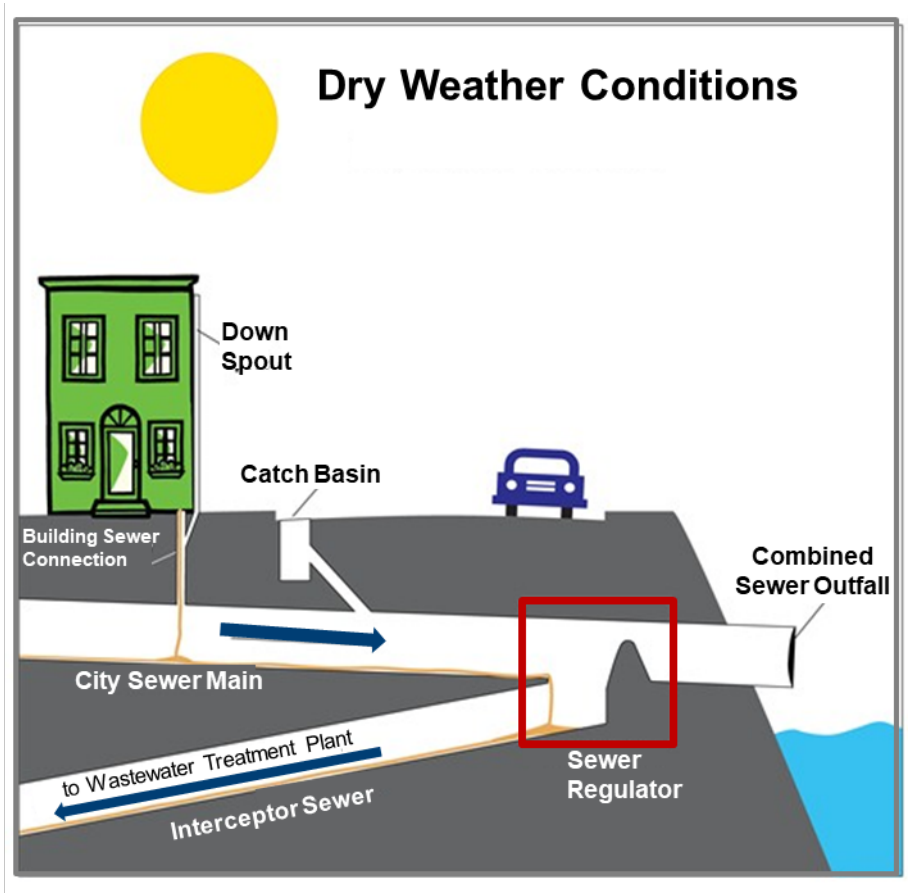
1 MI

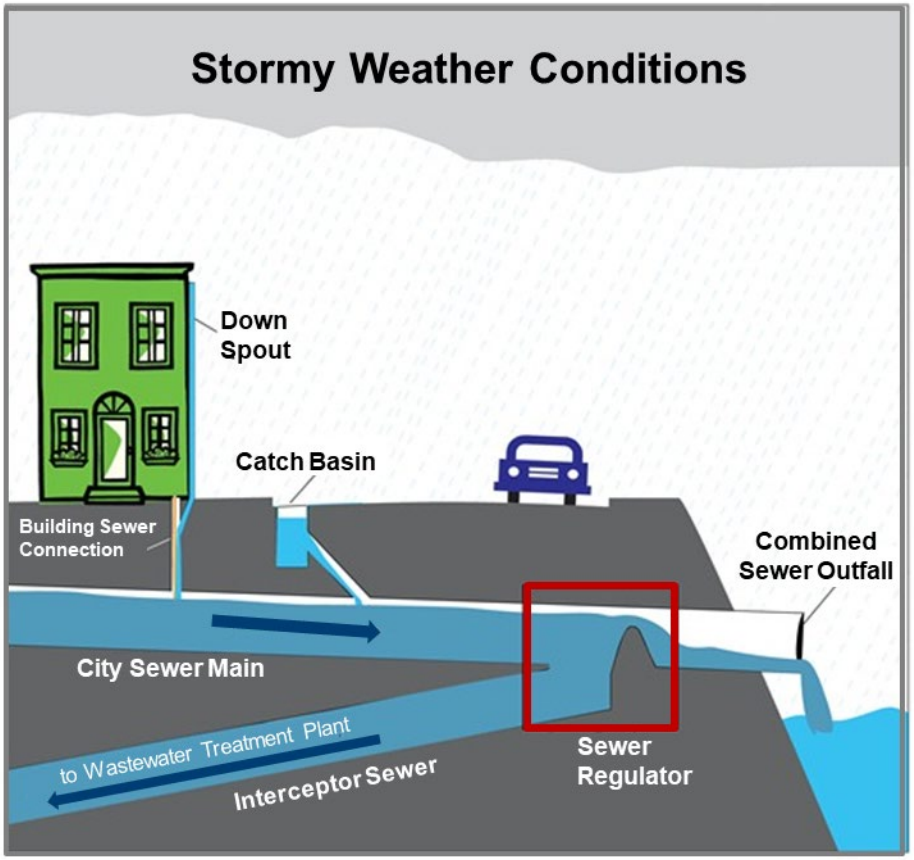


Site

2000 FT

What is a Combined Sewer Overflow?





- When the sewer system is at full capacity, a diluted mixture of rain water and sewage is released into local waterways. This is called a combined sewer overflow (CSO).

NYC Green Infrastructure Program

City Sidewalks

City Streets

Grant Program for Private Property

Public Property Retrofits

Public Property Retrofits

Key partnerships:

- NYC Housing Authority
- NYC Parks
- NYC Department of Education/ NYC School Construction Authority
- DDC Public Buildings Portfolio (Library, Fire, Police, Other)

Public Parks – Lt. Petrosino Park, Brooklyn

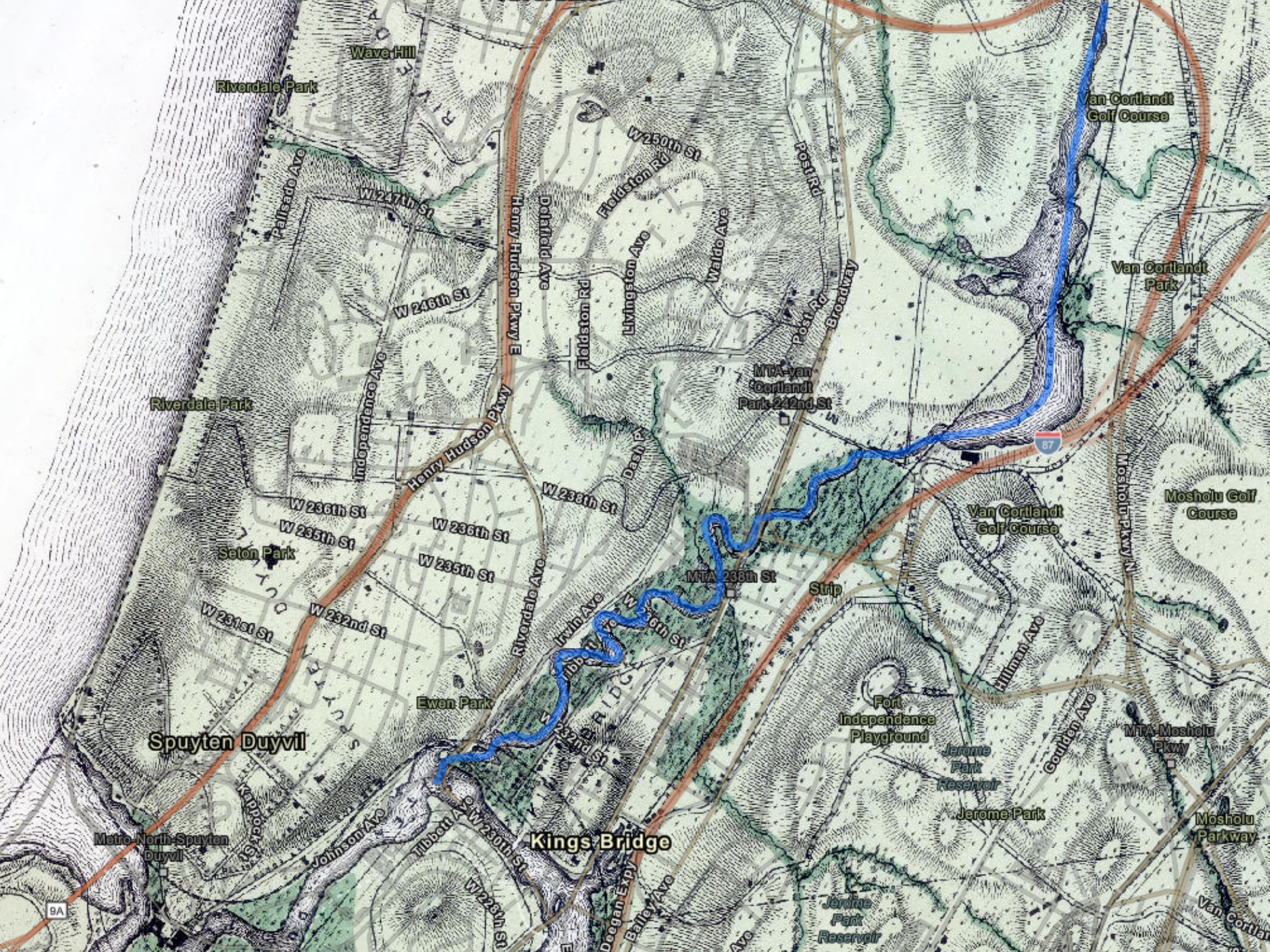
Public Schools – Winthrop Campus, Brooklyn

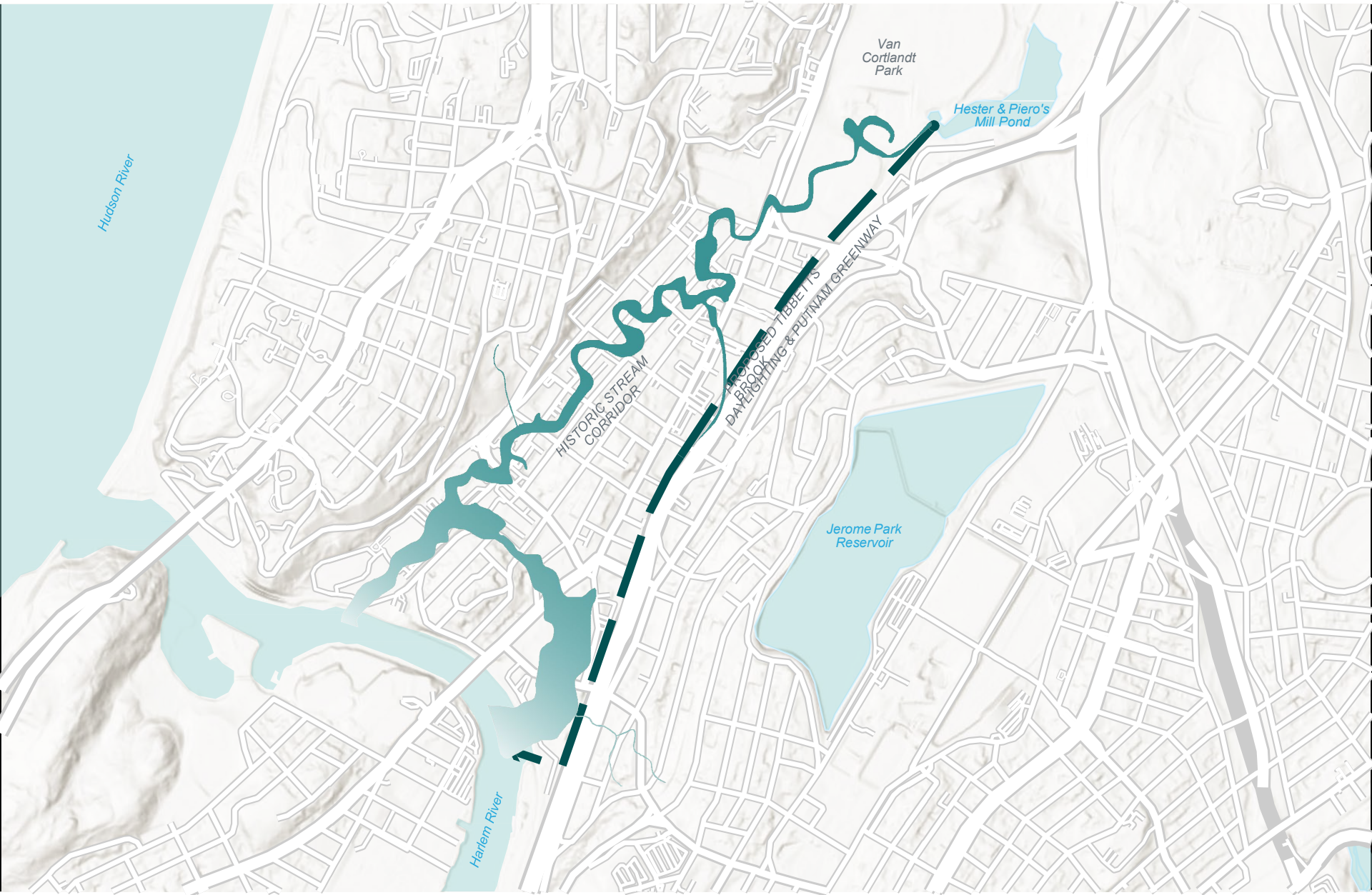
Public Housing – Hope Gardens, Brooklyn

Project Background

- Tibbetts Brook currently ends in Hester and Piero's Mill Pond
- Enters the combined sewer system
- Tributary to Wards Island WRRF

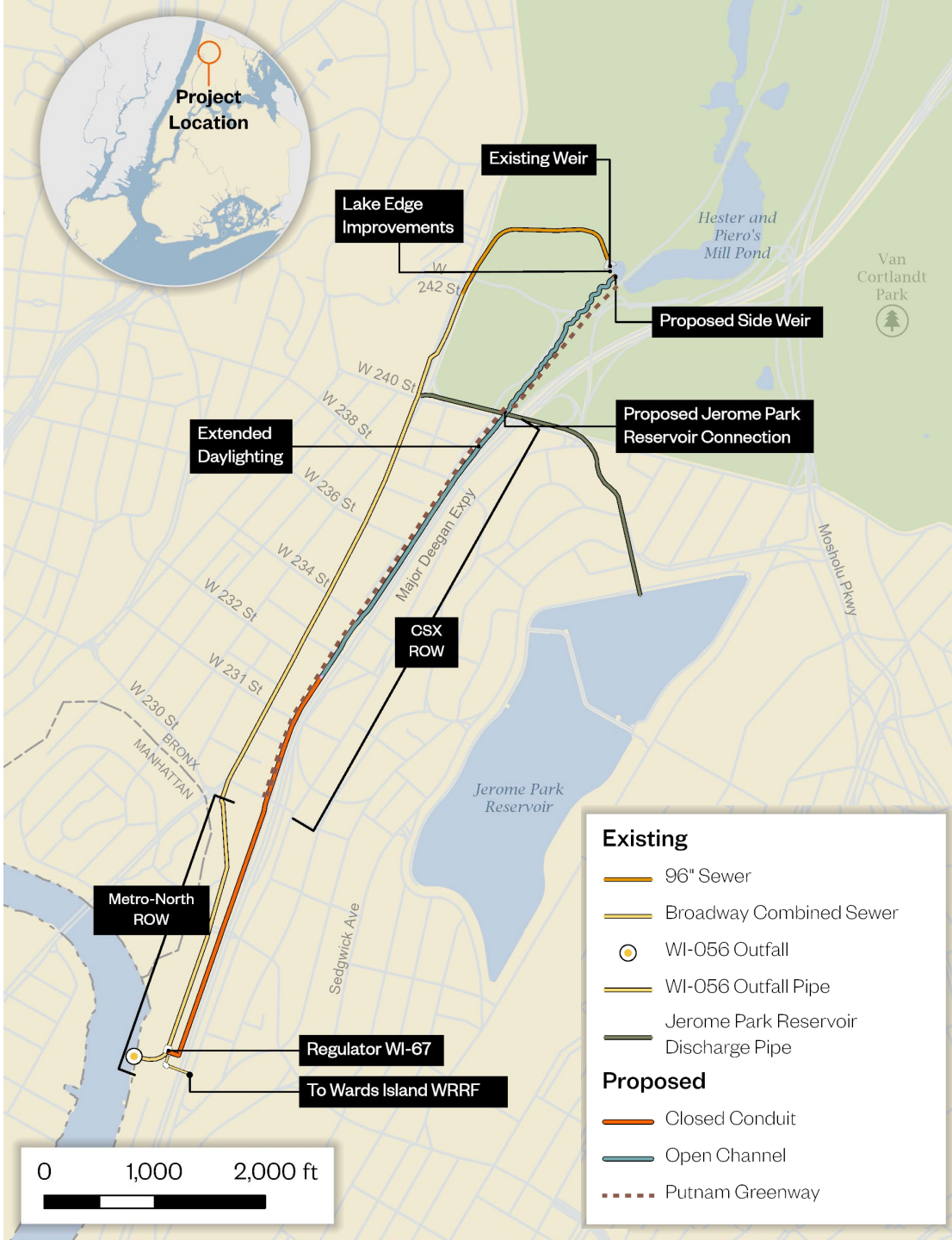
Project Background


Wave Hill
Riverdale Park
Palisade Ave
W 247th St
Henry Hudson Pkwy E
Delafield Ave
Fieldston Rd
W 250th St
Livingston Ave
Waldo Ave
Post Rd
Broadway
Van Cortlandt Golf Course
Van Cortlandt Park
W 246th St
Independence Ave
Riverdale Park
Henry Hudson Pkwy
MTA-Van Cortlandt Park-242nd St
Dash Pl
W 238th St
87
Mosholu Golf Course
Mosholu Pkwy N
W 236th St
W 235th St
Seton Park
W 236th St
W 235th St
Van Cortlandt Golf Course
MTA 238th St
Strip
W 231st St
W 232nd St
Riverdale Ave
Irwin Ave
W 236th St
Hillman Ave
Ewen Park
Fort Independence Playground
Spuyten Duyvil
Jerome Park Reservoir
Goulden Ave
MTA-Mosholu Pkwy
Jerome Park
Mosholu Parkway
Metro-North Spuyten Duyvil
Johnson Ave
Tibbett Ave
W 230th St
Kings Bridge
W 228th St
Deegan Expy
Bailey Ave
Jerome Park Reservoir
9A


Van Cortlandt Park
Hester & Piero's Mill Pond
Hudson River
HISTORIC STREAM CORRIDOR
PROPOSED TIBBETTS BROOK DAYLIGHTING & PUTNAM GREENWAY
Jerome Park Reservoir
Harlem River

Project Overview

- Proposed open channel designed for a baseflow of **7 cfs and max wet weather flow of 38 cfs**
- CSO Reduction to Harlem River of 215 MGY
- 1.1 miles of new public greenway



Daylighting Opportunity

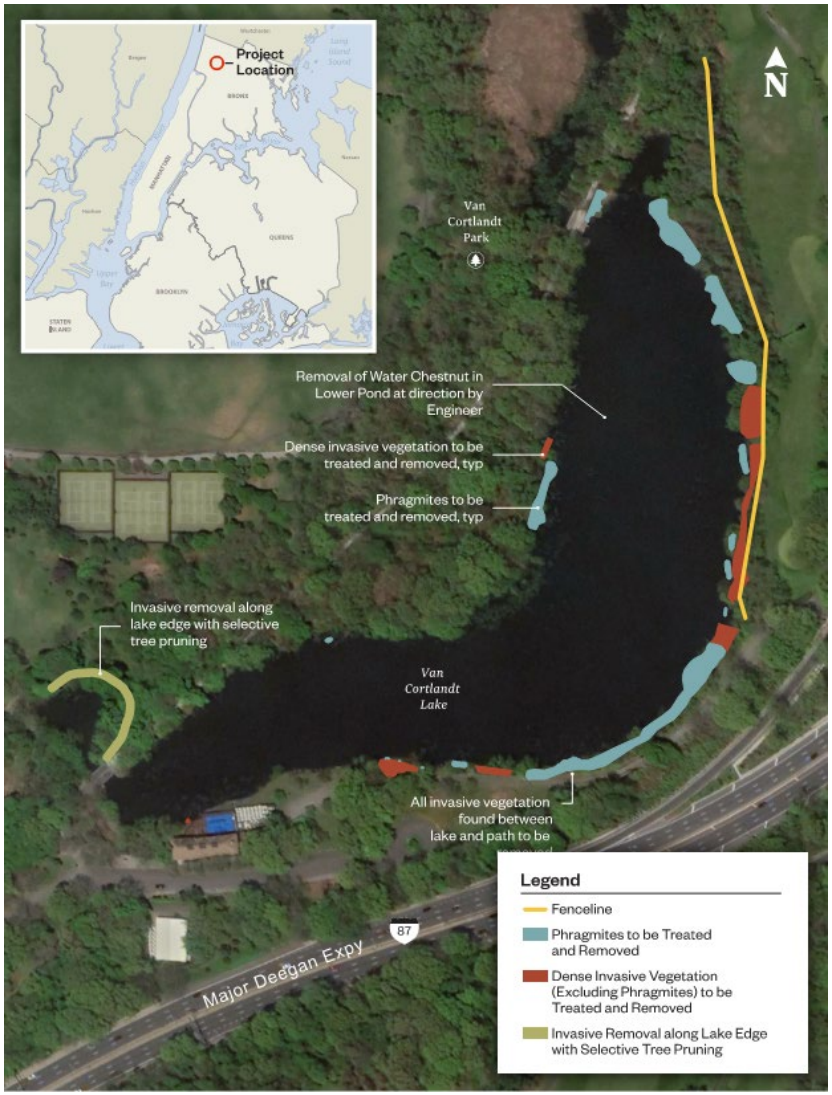
- Putnam Railroad formerly crossed through Van Cortlandt Park down to Harlem River
- Went out of use in late 1980s
- In mid-2010s, discussions on sale of property to City advanced with CSX

Project Synergy

- Parks had already purchased portion of railroad within Van Cortlandt Park
- Parks also was interested in CSX property to extend greenway

Project Goals

- Restore the hydraulic connection between Tibbetts Brook and the Harlem River
- Diversion of freshwater from the combined sewer system to the new stream corridor to reduce CSO volumes
- Extend a public greenway from the current Putnam Trail end in Van Cortlandt Park to W. 230th Street, connecting the trail to the existing bicycle network.
- Create an inviting experience for the public along the daylighted stream and greenway extension
- Expand and enhance the wetland habitat within Van Cortlandt Park and the CSX Corridor



Phase 1 Restoration: Overview

- Controlling and disposal of nearly 1 acre of *phragmites* and other invasive shoreline vegetation
- Controlling and disposal of water chestnut and other invasive floating aquatics within the lake
- Contract Registered – Steven Dubner Landscaping, Inc.
- Work began: August 2024
- Total Cost: $1.5M

Phase 1 Updates

- Conditions at start of work

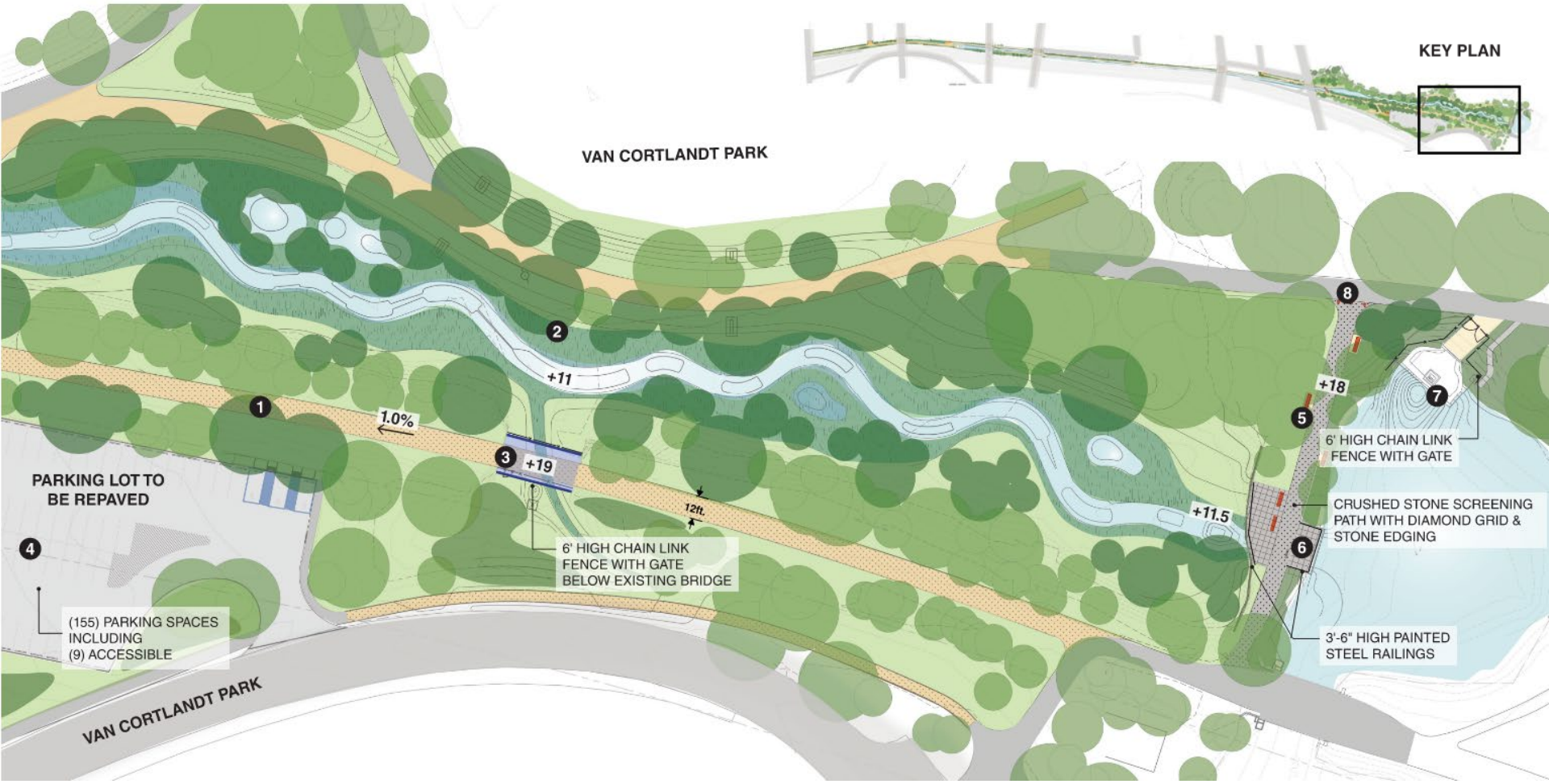
Phase 1 Updates

- Contractor in action

Phase 1 Updates

- After contractor summer activities

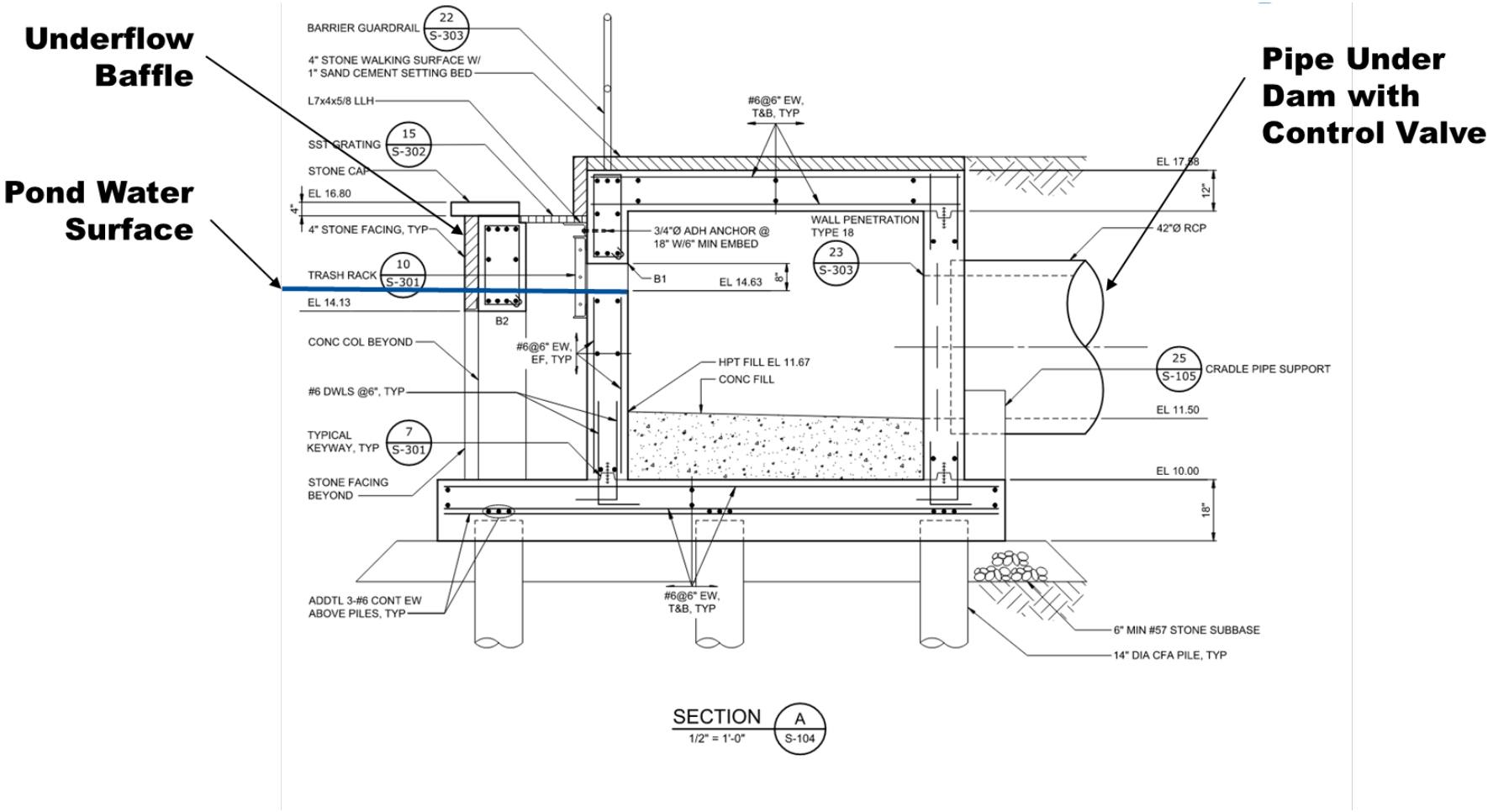
Design Overview - VCP



Existing Weir Modifications

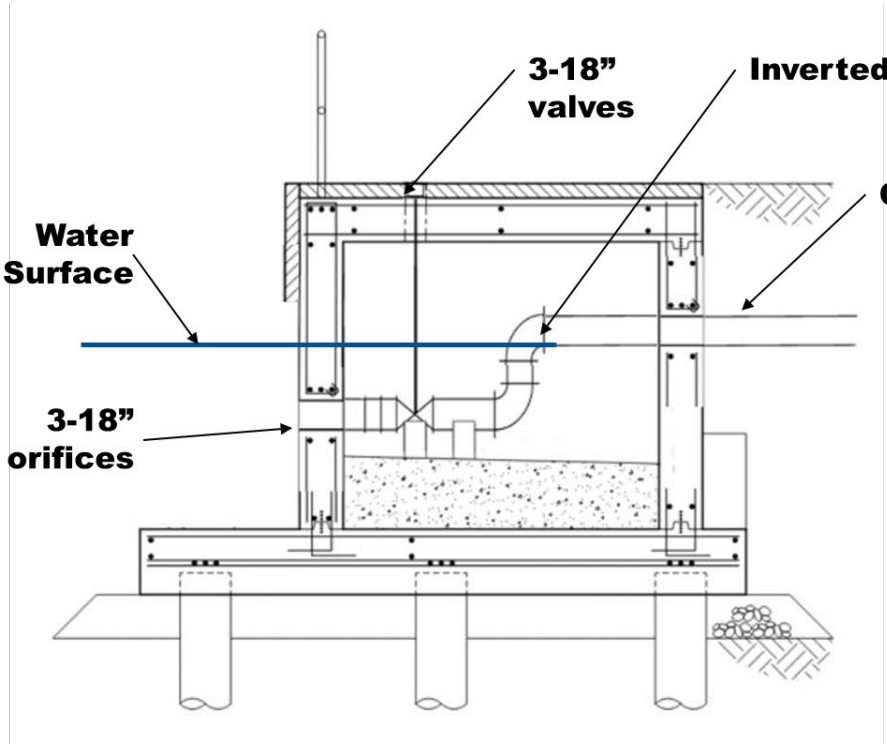
- Addition of grating on top and underflow baffle in front to streamline maintenance
- Addition of weir plates on front of weir to formalize additional detention within pond

Side Weir - Old Design



Side Weir - Modified Design

Based on Stakeholder Feedback



Existing Conditions

Proposed Daylighting

Design Overview - VCP

LEGEND

1 Putnam Trail
2 Proposed Bridge
3 Proposed Channel
4 Trash Receptacle
5 Benches
6 Bike Racks
7 Compost Area
8 Parking lot

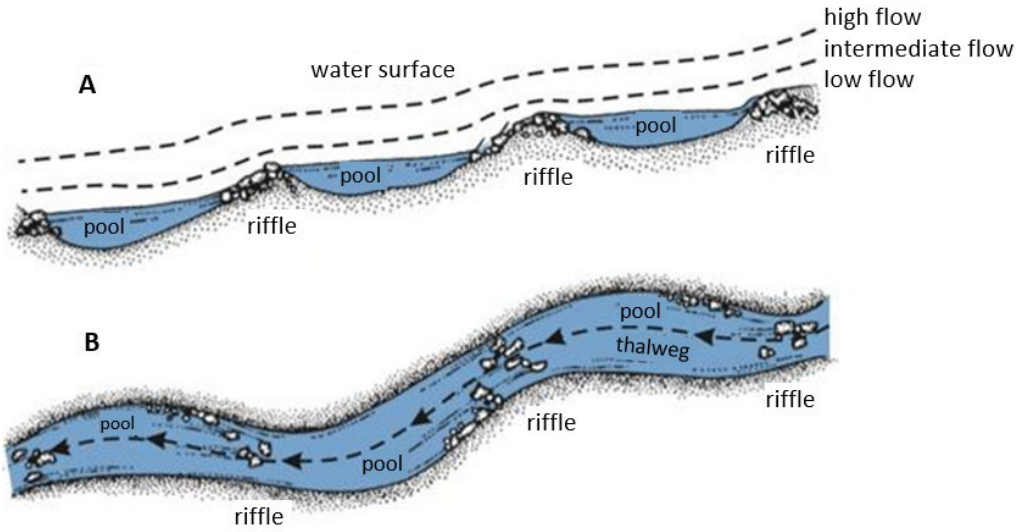
Asphalt Path
Porous Asphalt
Colonial Flat Truss Bridge
Existing Park Path
Bluestone Pavement
Water
Wetland
Shrubland
Parking
Existing Trees
Proposed Trees
Hex Pavement
Painted Warning Strip
Steel Picket Fence
Chain Link Fence
Gate

0 25' 50'

N

Van Cortlandt Park – Mimicking Natural Channel Aesthetics

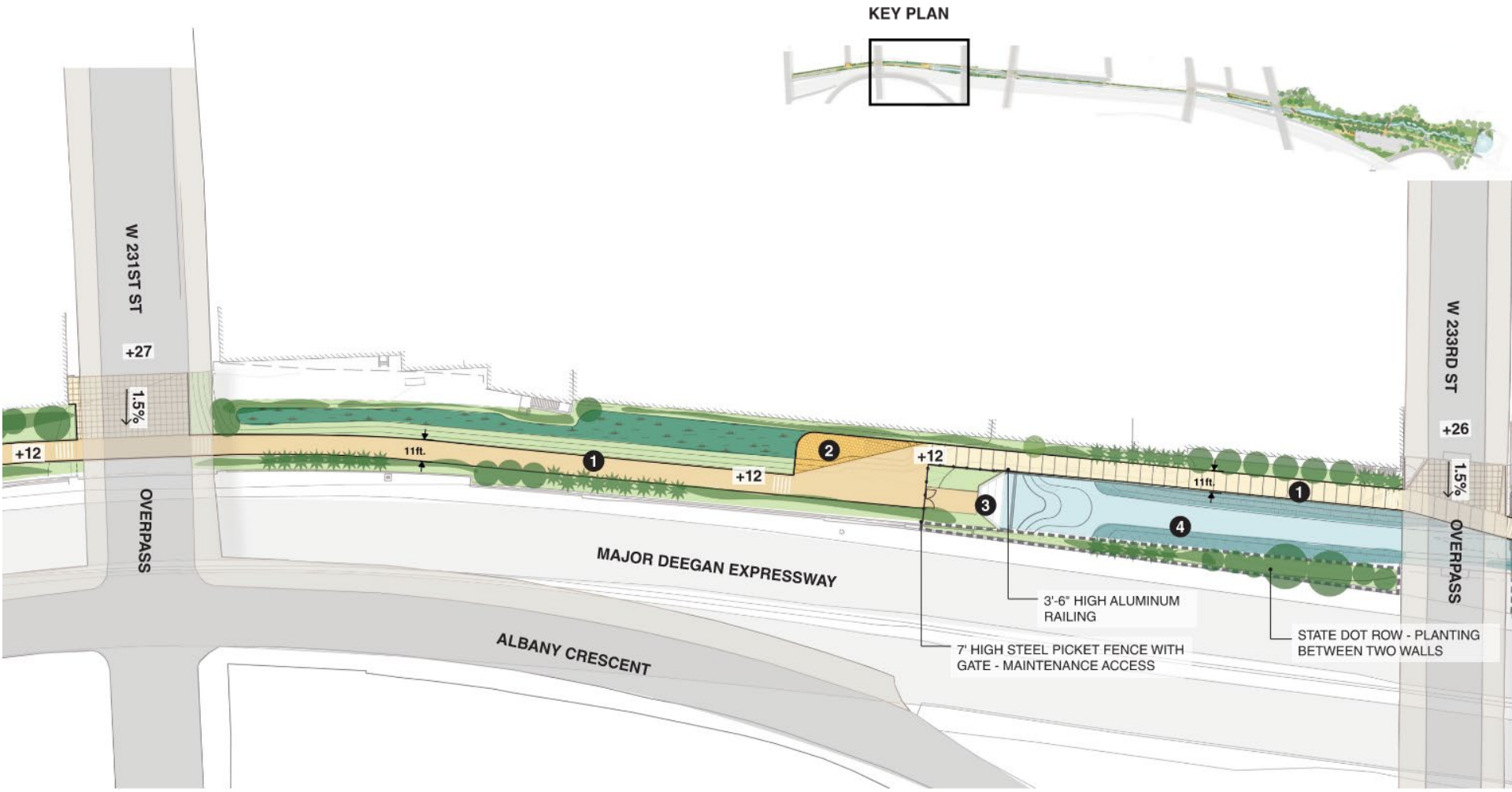
Typical Riffle and Pool Morphology



Schematic of Riffle and Pool Morphology

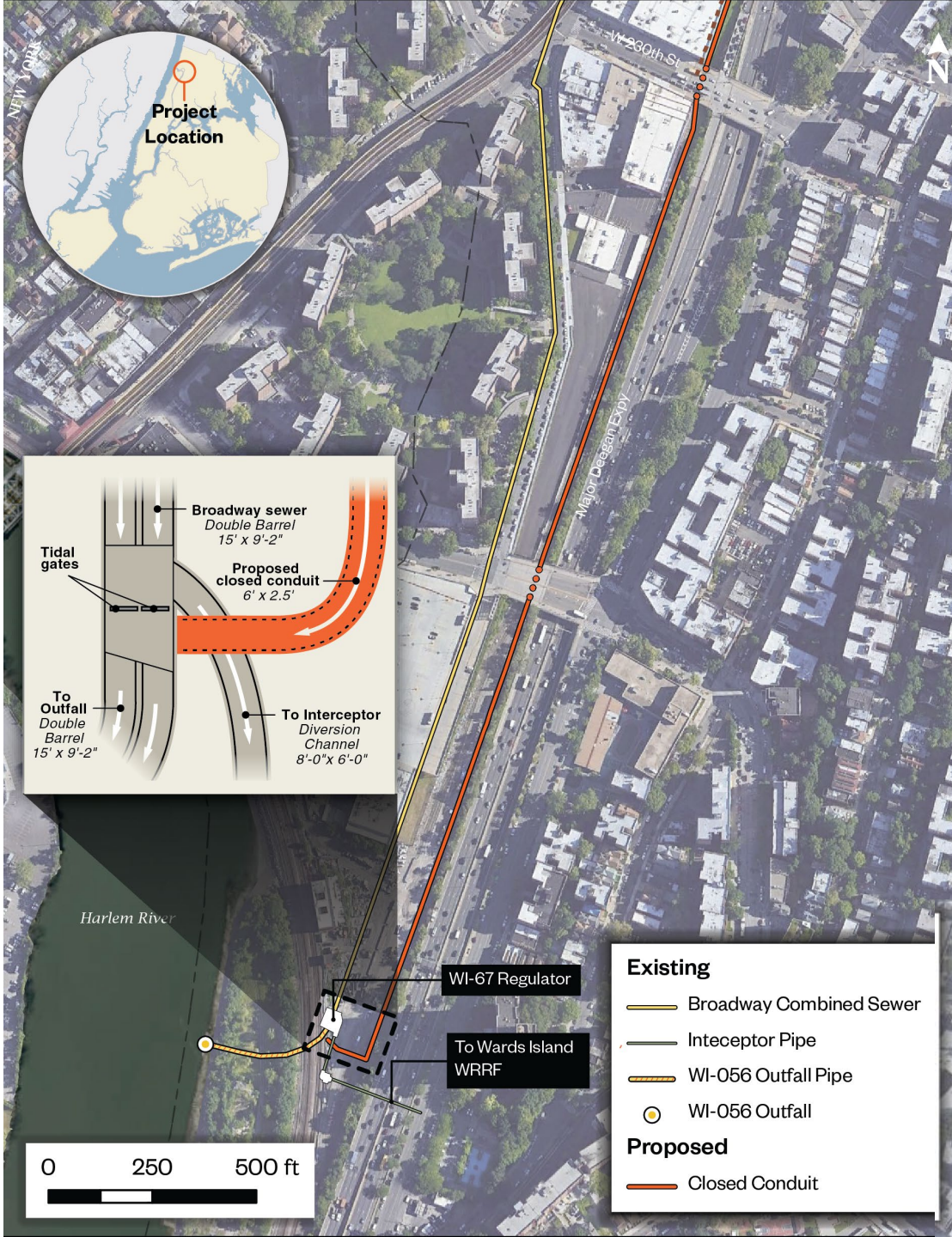
Conceptual Rendering

Design Overview – CSX Parcels

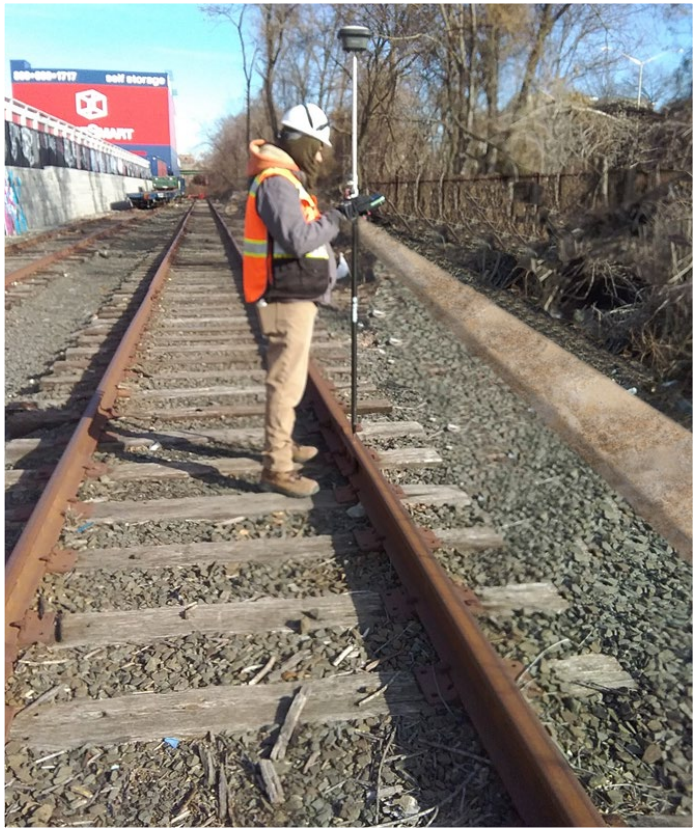


Design Overview - MNRR

- Pipe runs adjacent to tracks in railyard
- Crosses under tracks to connect into regulator

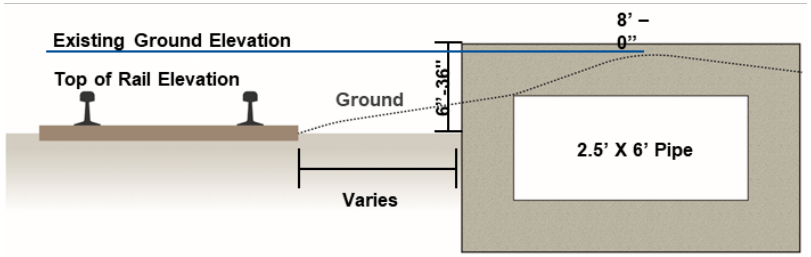


MTA-MNRR Coordination

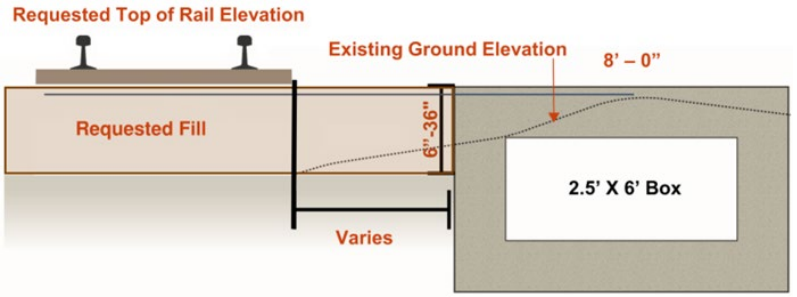


Existing Conditions: Bronx Metro-North Railyard

DEP Initial Proposal:



Updated Design:

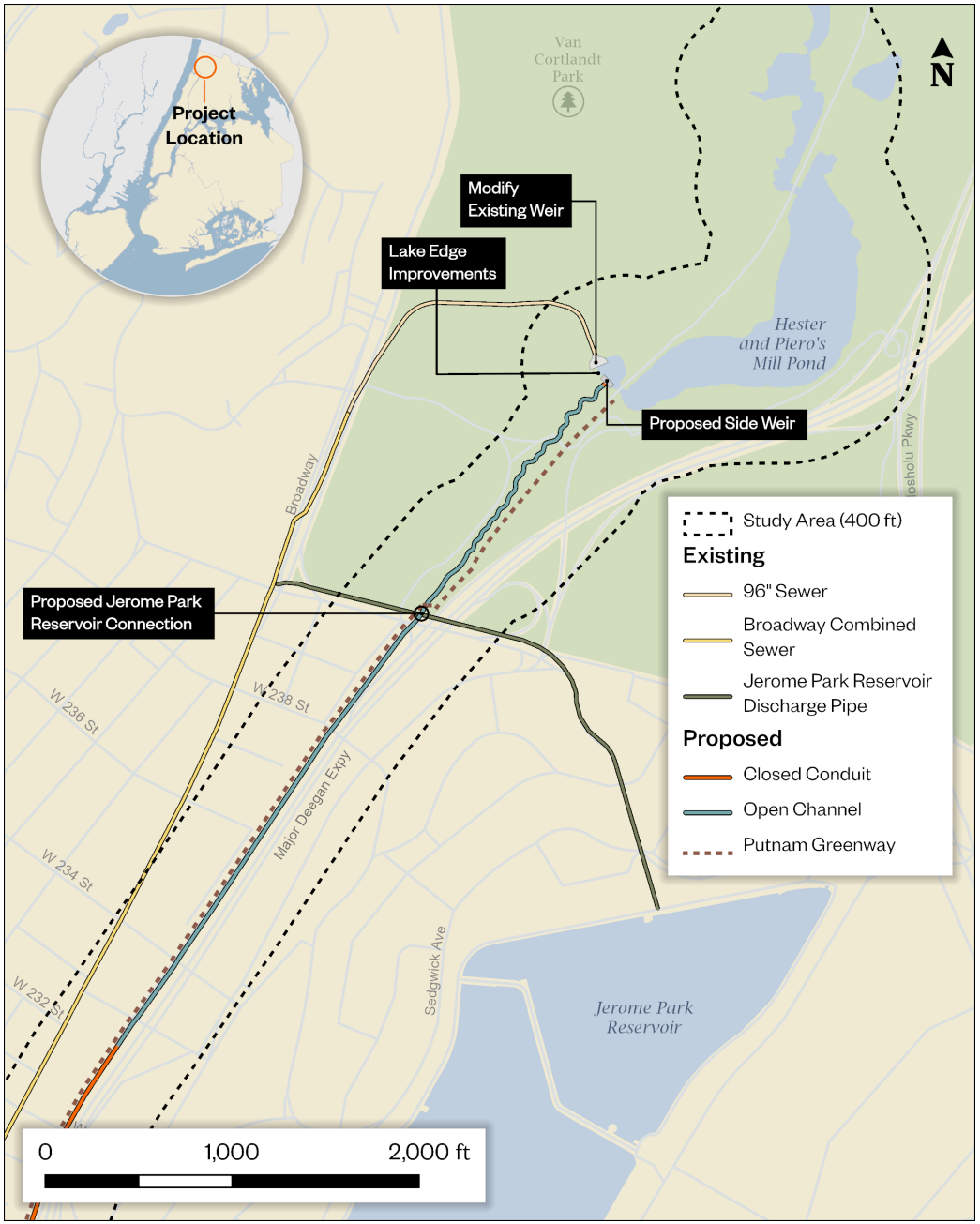


NYC Environmental Protection

NYC Parks

Jerome Park Reservoir

- Blowoff connection currently drains to combined sewer
- Diversion manhole is incorporated into project to divert flows into daylighted stream



View of CSX Corridor looking South from Van Cortlandt Park South bridge

Tibbetts Brook Daylighting | Existing Conditions - CSX Corridor

December 14, 2022

NYC Parks

NYC Environmental Protection

Hazen

STARR WHITEHOUSE
Landscape Architects
and Planners PLLC

Greenway/Park Integration

Tibbetts Brook Daylighting | W. 239th Street View Looking South

December 14, 2022

NYC Parks

NYC Environmental Protection

Hazen

STARR WHITEHOUSE
Landscape Architects
and Planners PLLC

Public Access

Tibbetts Brook Daylighting | Proposed Access Points

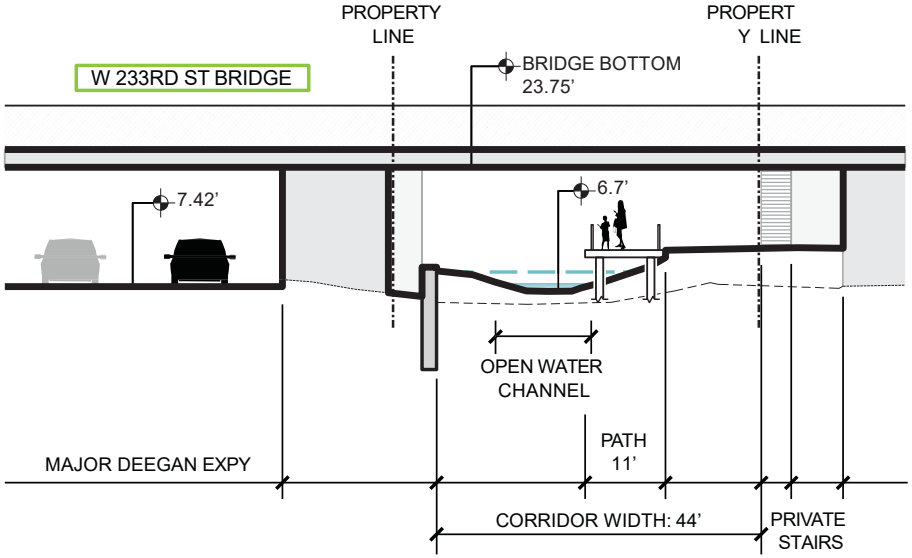
December 14, 2022

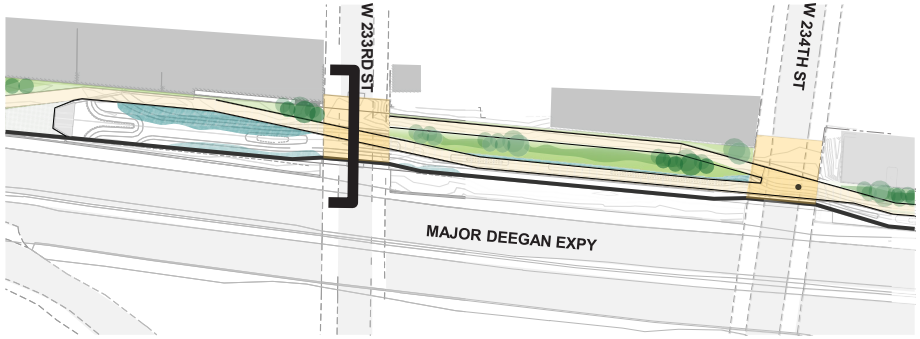
NYC Parks · NYC Environmental Protection · Hazen · STARR WHITEHOUSE Landscape Architects and Planners PLLC

Community Involvement

SECTION

Section through area under W 233rd St Bridge





LEGEND

- *Proposed grade*
- *Existing Grade*
- *Base Flow*
- *Wet Weather Flow*

BRIDGE UNDERPASS (W. 233RD ST)

BRIDGE UNDERPASS (W. 234TH ST)

Tibbetts Brook Daylighting | Section - W. 233rd St to W. 234th St

December 14, 2022

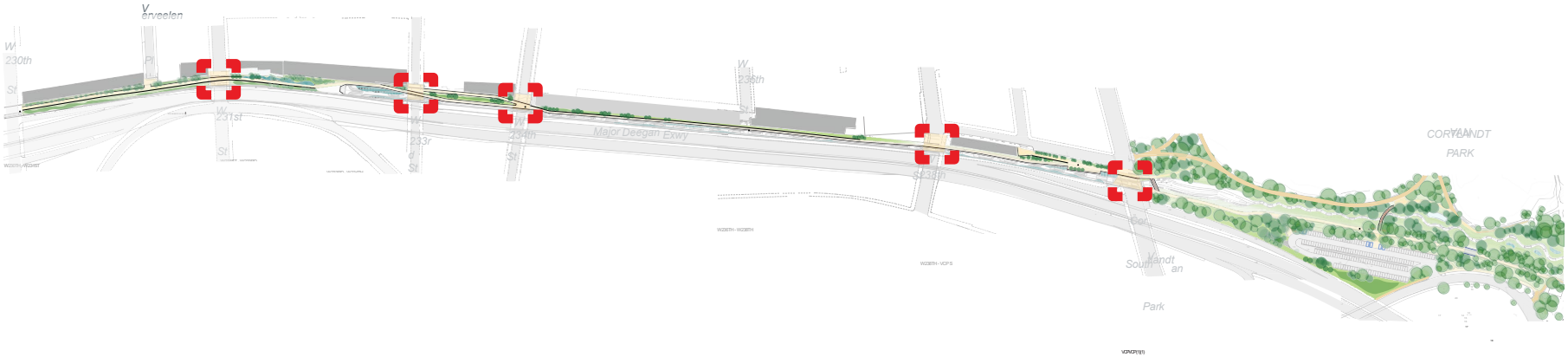
NYC Parks · NYC Environmental Protection · Hazen · STARR WHITEHOUSE Landscape Architects and Planners PLLC

PUBLIC ART CONSIDERATIONS

- Public art can enhance the trail experience and is an important means to bring community members into the trail experience.

- The City has robust temporary art programs that could help facilitate art in the corridor and showcase local artists' work.

- Space under bridges present unique spaces that would benefit from animation through public art.



Art Opportunities Areas - Plan

NYC Parks
NYC Environmental Protection
Hazen
STARR WHITEHOUSE Landscape Architects and Planners PLLC

Community Involvement

- Created Tibbetts Advisory Group (TAG) with website and email list to engage public stakeholder groups
- Organized multiple site visits and meetings for TAG
- Other significant stakeholders included:
  - NYC Parks
  - NYC DOT (greenway, lighting, bridges, public access points)
  - NYS DOT (adjacent highway)
  - Metro North Railroad
  - NYPD (emergency access)
  - Local community board
  - Public Design Commission

Project Overview

Thank You!

- Amy Motzny, DEP Project Manager
- DEP Team
- Department of Parks and Recreation
- Hazen and Sawyer, P.C

The N-EWN Knowledge Series

A Continuing Education Series about Engineering with Nature

Roopesh Joshi, PE
Acting Assistant Commissioner
New York City Department of Environmental Protection's Bureau of Sustainability

The Tibbetts Brook Daylighting and Greenway Project – Restoring a Waterway in New York City

This presentation will discuss the Tibbetts Brook Daylighting and Greenway project. Until the late 1800s, Tibbetts Brook flowed through Westchester, into the Bronx through the Van Cortlandt plantation to Van Cortlandt Lake, and meandered its way to the Harlem River. Around 1900, Van Cortlandt Lake was connected to the newly built combined sewer system in Broadway eliminating the connection between Tibbetts Brook and the Harlem River except during combined sewer overflow (CSO) events. Under current conditions, the dry weather flow of approximately 5 million gallons a day is a constant inflow to the combined sewer system, and is treated by the Wards Island Wastewater Recovery Facility, expending energy to treat clean water. During wet weather events, peak flows from the Tibbetts Brook watershed contribute significantly to the inflows into the combined sewer system. This results in capacity limitations in the sewer system, which leads to combined sewer overflows into the Harlem River.

New York City Department of Environmental Protection (DEP) worked with NYC's Department of Parks and Recreation to develop a design that would daylight the stream and develop a parkway within the old rail corridor. The project is expected to reduce CSO discharges to the Harlem River by 215 million gallons per year and will be the largest green infrastructure project in New York City. The project is currently in Design and is anticipated to go into construction in 2026.

Save the date!

Upcoming webinars will take place the 3rd Thursday of the month.

Nov. 21
12:30pm ET

Roopesh Joshi, PE, NYC Department of Environmental Protection
The Tibbetts Brook Daylighting and Greenway Project – Restoring a Waterway in New York City

There will not be a N-EWN Webinar in December 2024

Jan. 16
12:30pm ET

Hailey Blackwell & Nethmi Silva, University of Oklahoma
Ecology and Engineering of Native Plant-Soil Interactions and Riparian Structures

Feb. 20
12:30pm ET

Dr. Christopher Haring, US Army Corps of Engineers
Fluvial Applications of NNBF

Register here: https://bit.ly/3gR9ADL or scan:

1 Continuing Education Credit (CEC) is available to attendees

Recorded webinars will be posted online at: https://n-ewn.org/resources/n-ewn-knowledge-seminars/

Presented by:

NETWORK FOR ENGINEERING WITH NATURE
LimnoTech Water Environment Scientists Engineers
UNIVERSITY OF GEORGIA
ERDC

Questions? Please contact:
Sage Paris, LimnoTech
sparis@limno.com