



US Army Corps
of Engineers®

RESILIENT NORFOLK

COASTAL STORM RISK MANAGEMENT

City of Norfolk
Architectural Review Board

November 18, 2024





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Resilient Norfolk Coastal Storm Risk Management Project Overview





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Project Features

Structural

Constructed measures that counteract coastal flooding

Property-Specific, Nonstructural

Home elevations, basement fills, floodproofing commercial structures

Natural and Nature-based Features

Oyster reefs, living shorelines, and wetlands mitigation

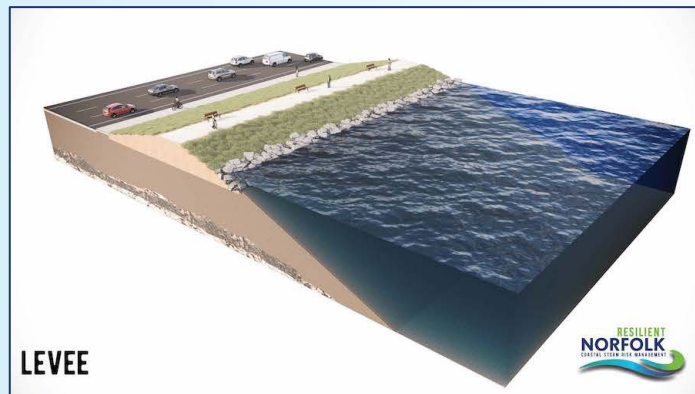


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Risk Reduction Features



Levee - Man-made structures, such as an earthen embankment, designed and constructed practices to contain, control, or divert the flow of water.



T-wall - A sturdy concrete wall, shaped like an upside-down T. It consists of a concrete base with tall floodwall panels extending upward.



Bin-wall - A gravity retaining wall system made from adjoining closed-faced bins, then backfilled with soil.



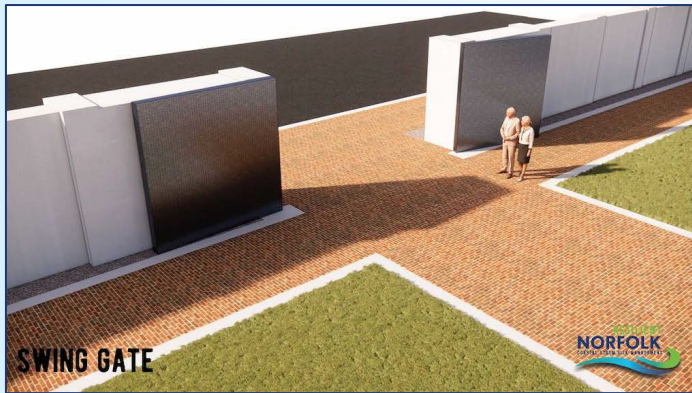


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Risk Reduction Features



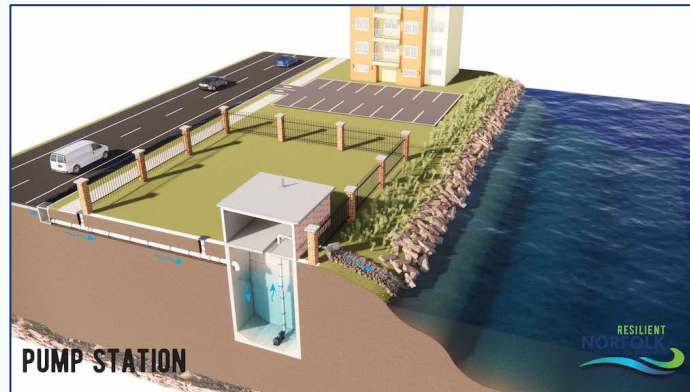
Gate - Adjustable gates used to control water flow in flood barriers, reservoirs, rivers, streams, or levee systems.



SWING GATE



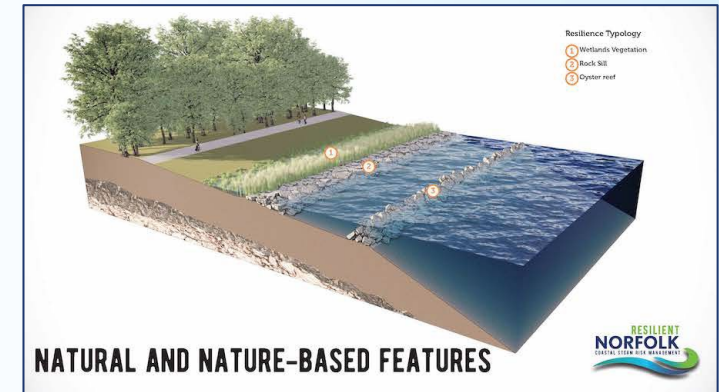
Pump station - These help protect areas by pumping away large volumes of water, preventing the occurrence of flooding.



PUMP STATION



Natural / Nature-based features - These are flood mitigation solutions that mimic natural processes and include varied practices that can be applied at many different scales.



NATURAL AND NATURE-BASED FEATURES

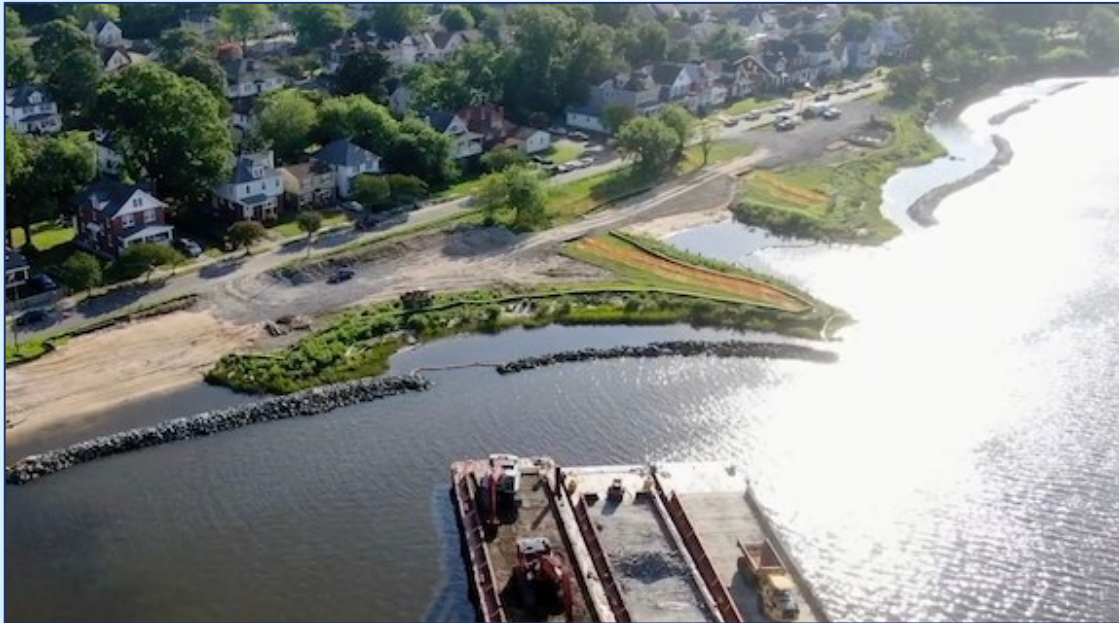


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Natural and Nature-Based Features



Natural / Nature-based features – Are incorporated in all phases of the project and are environmentally friendly solutions to flood mitigation techniques. They can enhance the resilience of coastal areas challenged by sea level rise and coastal storms.





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Risk Reduction Features



Property-specific, nonstructural -

These focus on reducing the damages caused by flooding to homes, businesses and critical infrastructure.



Critical infrastructure - Flood mitigation solutions that will protect the assets, systems and networks that are essential to the City's function.





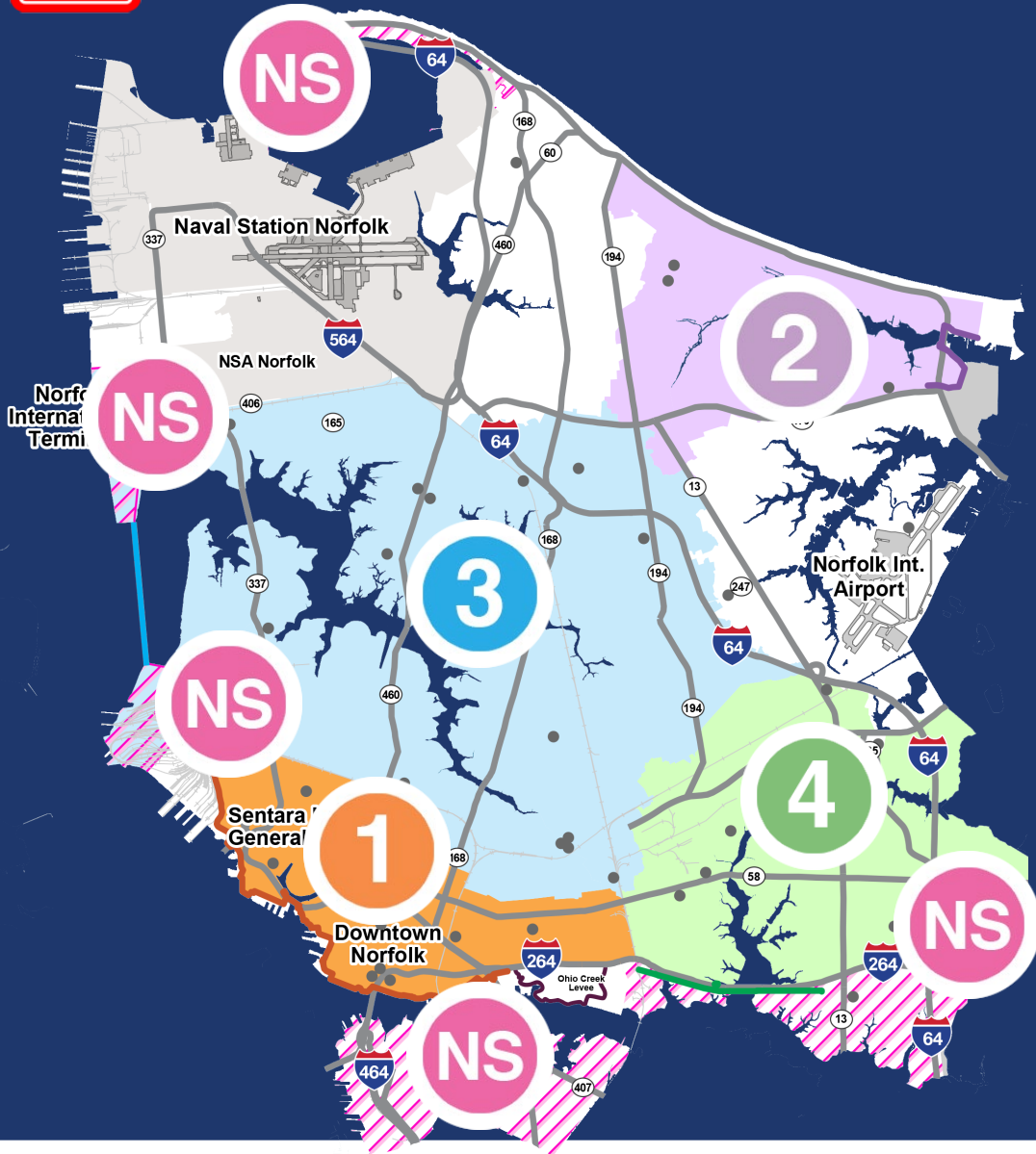
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Implementation Phases





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5 IMPLEMENTATION PHASES

1 Downtown

2 Pretty Lake

3 Lafayette

4 Broad Creek

NS Nonstructural



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THE CITYWIDE PROJECT IS DIVIDED INTO 5 Implementation Phases



1 Downtown



A system of floodwalls with a levee, surge barriers, and natural and nature-based features, extending from Ghent through downtown connecting to the Ohio Creek Watershed project.

Design Phase
Construction Phase

PHASE	LOCATION	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1A	Berkley Bridge to Chesterfield Heights		Design Phase				Construction Phase						
1B	Town Point Park/Waterside			Design Phase		Construction Phase							
1C	Ghent to Town Point Park				Design Phase			Construction Phase					
1D	Downtown Floodwall				Design Phase		Construction Phase						





NOVEMBER 2024

Harbor Park & South Brambleton

Architectural Review Board

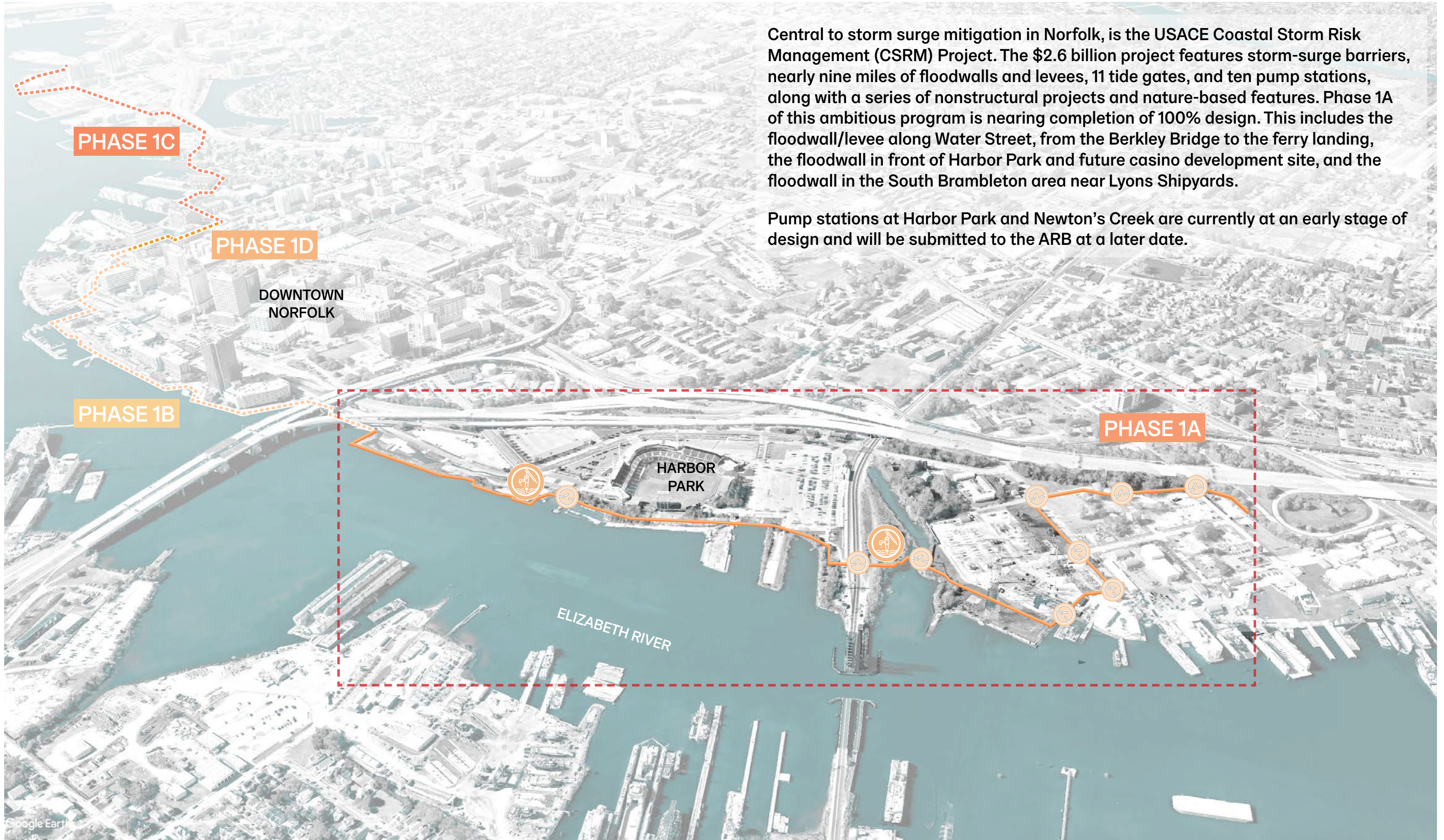
Preliminary Submission



NCSRM Phase 1A



Norfolk Coastal Storm Risk Management: Phase 1A

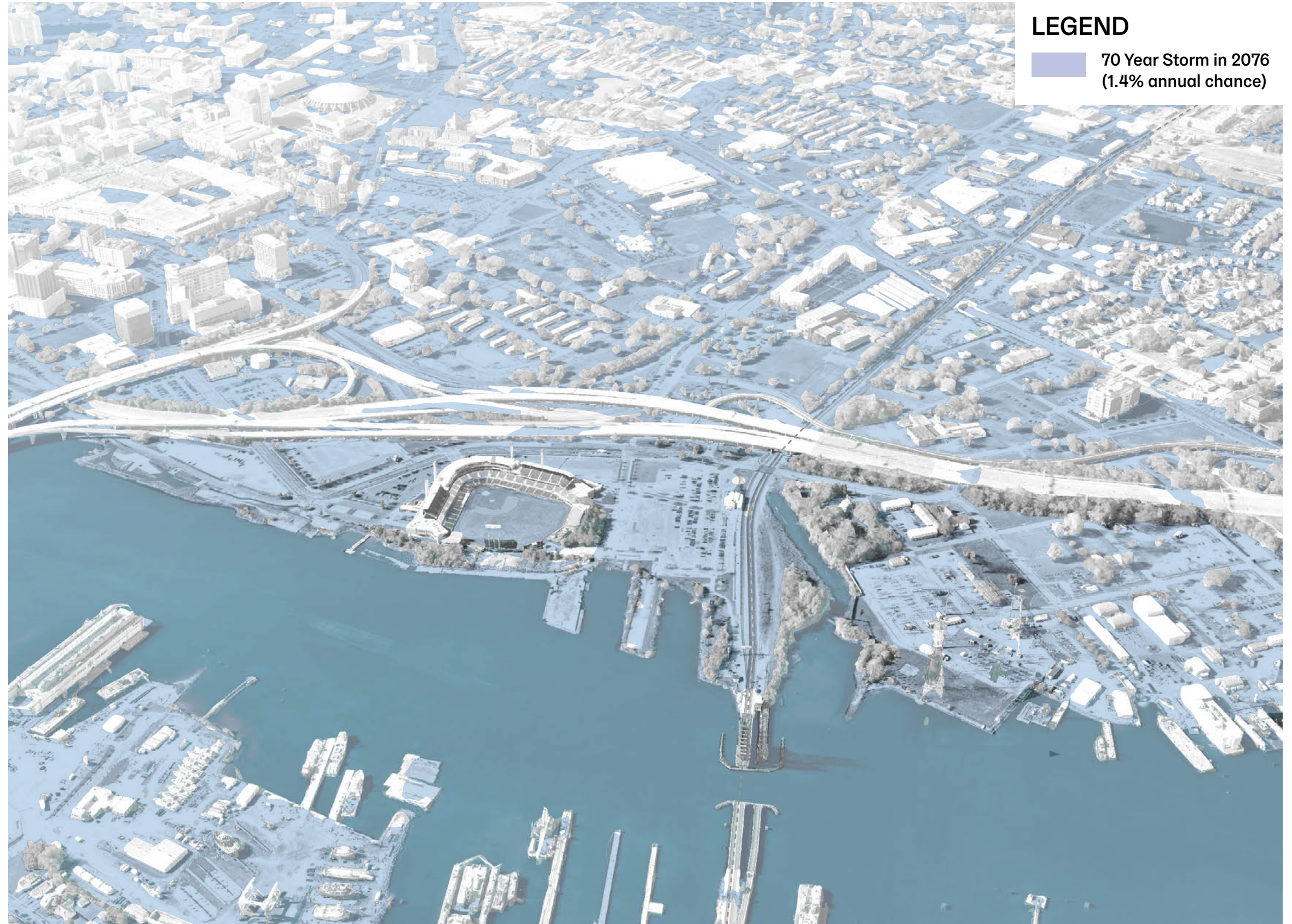


Central to storm surge mitigation in Norfolk, is the USACE Coastal Storm Risk Management (CSRM) Project. The \$2.6 billion project features storm-surge barriers, nearly nine miles of floodwalls and levees, 11 tide gates, and ten pump stations, along with a series of nonstructural projects and nature-based features. Phase 1A of this ambitious program is nearing completion of 100% design. This includes the floodwall/levee along Water Street, from the Berkley Bridge to the ferry landing, the floodwall in front of Harbor Park and future casino development site, and the floodwall in the South Brambleton area near Lyons Shipyards.

Pump stations at Harbor Park and Newton's Creek are currently at an early stage of design and will be submitted to the ARB at a later date.

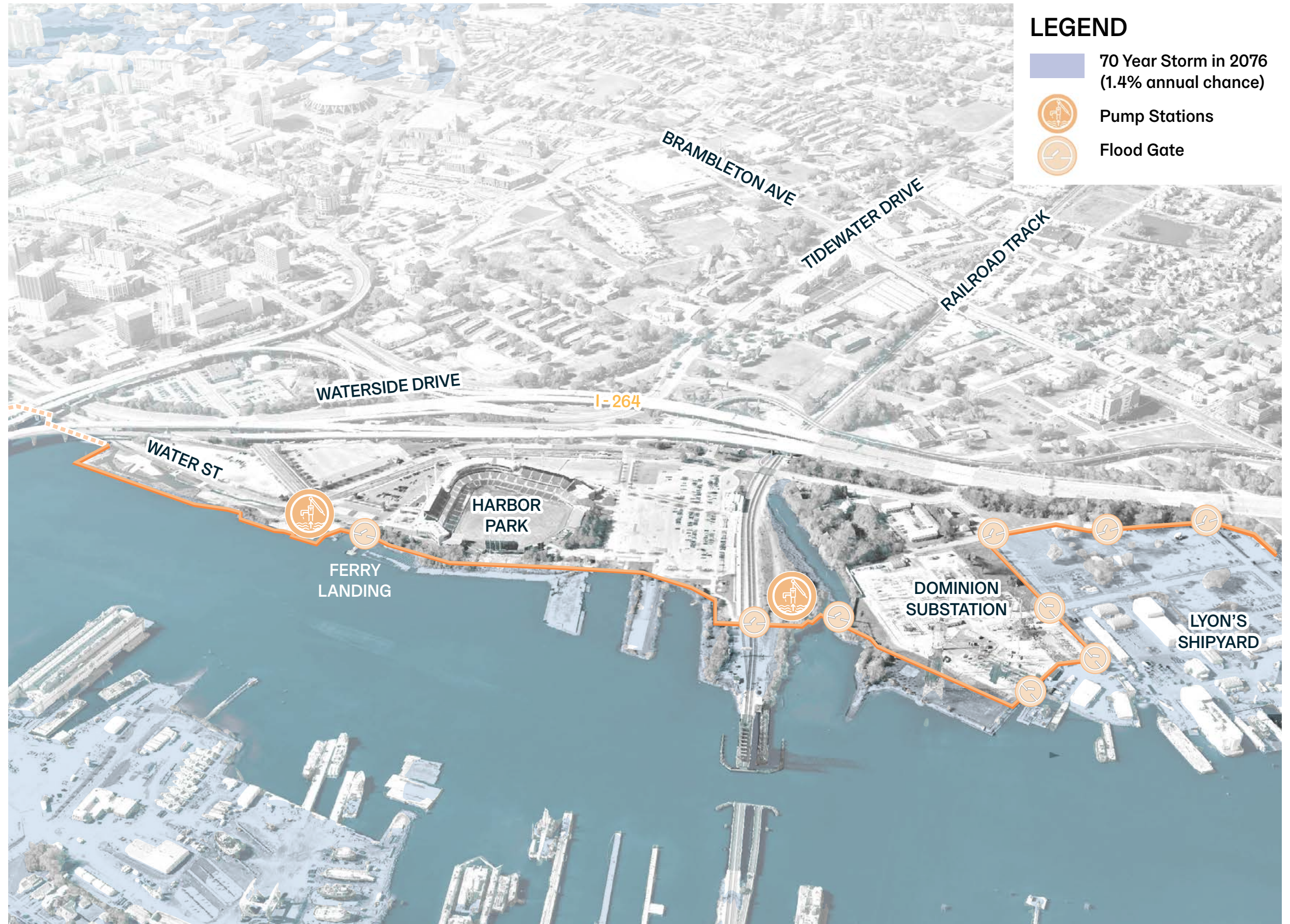
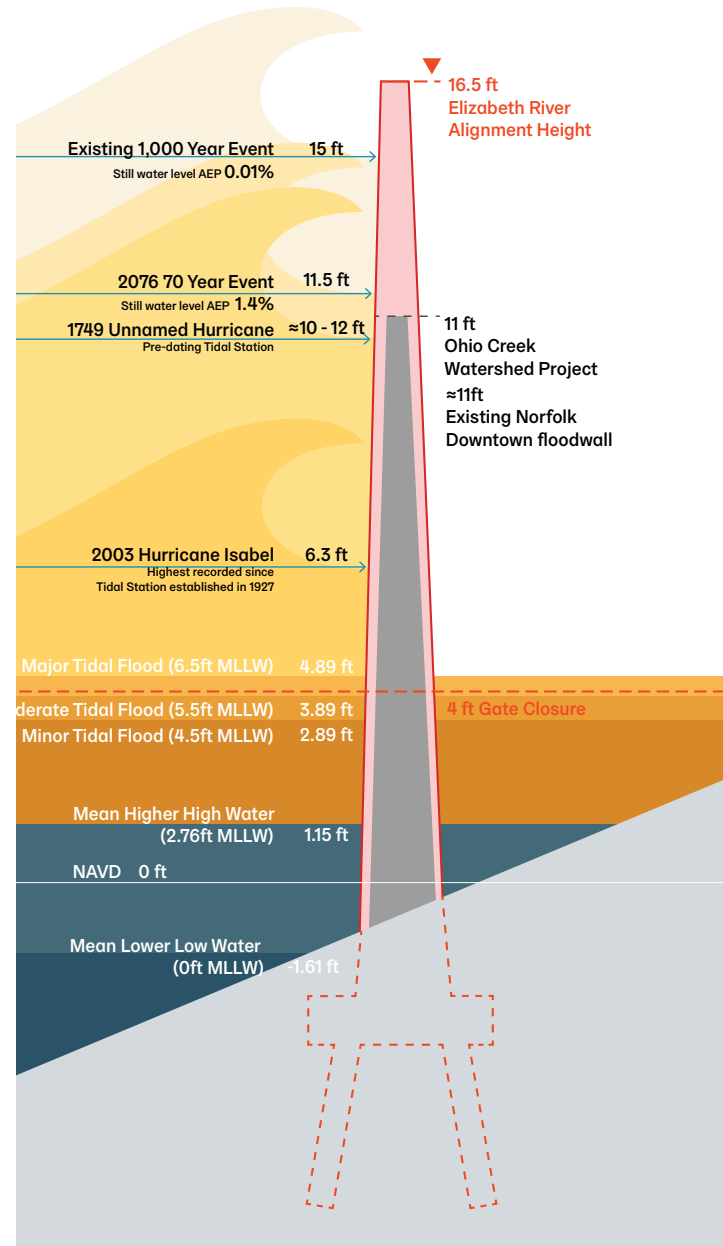
Storm Surge and Flood Risk

Storm surges and wind-driven waves, produced by hurricanes, tropical storms, nor'easters, and other large coastal storms threaten low lying areas of Norfolk. Modeled flood risk to Harbor Park, the Tidewater Drive and Brambleton Avenue Corridors, and the St. Paul's/Kindred neighborhoods is shown at right.



USACE Structures Reduce Flood Risk From Storm Surge Events

The authorized USACE alignment height is 16.5 feet NAVD88 along the Elizabeth River. This height is designed to protect against a 70 year storm surge in the year 20276. To maintain tidal flows and vehicle, marine, and pedestrian traffic, the perimeter includes a series of gates, that would be open during normal conditions.



LEGEND

- 70 Year Storm in 2076 (1.4% annual chance)
- ⚙️ Pump Stations
- ⚓ Flood Gate

High Tide Flooding on East Water Street

September 20th 2024

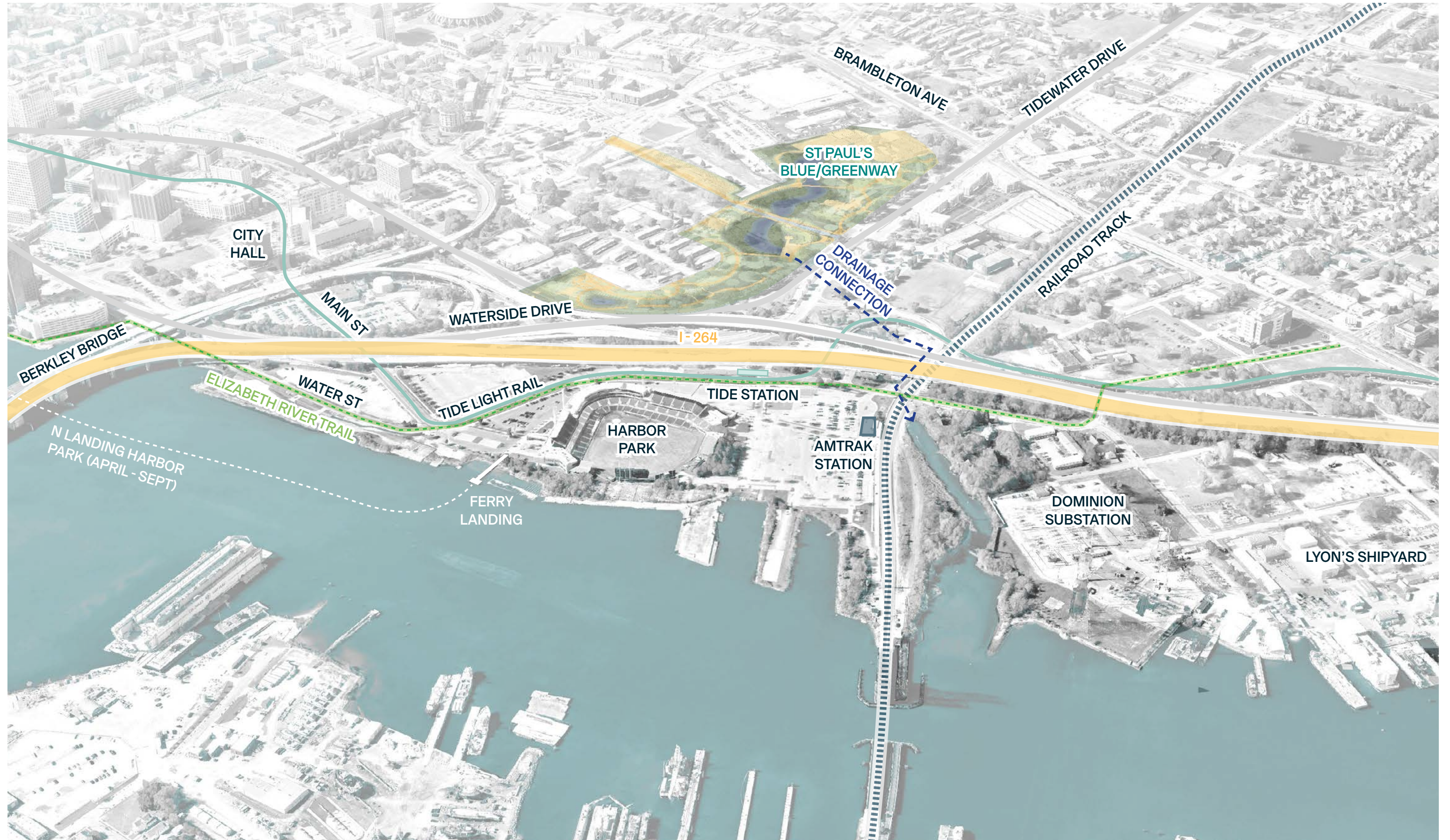


High Tide Flooding on Waterside Drive

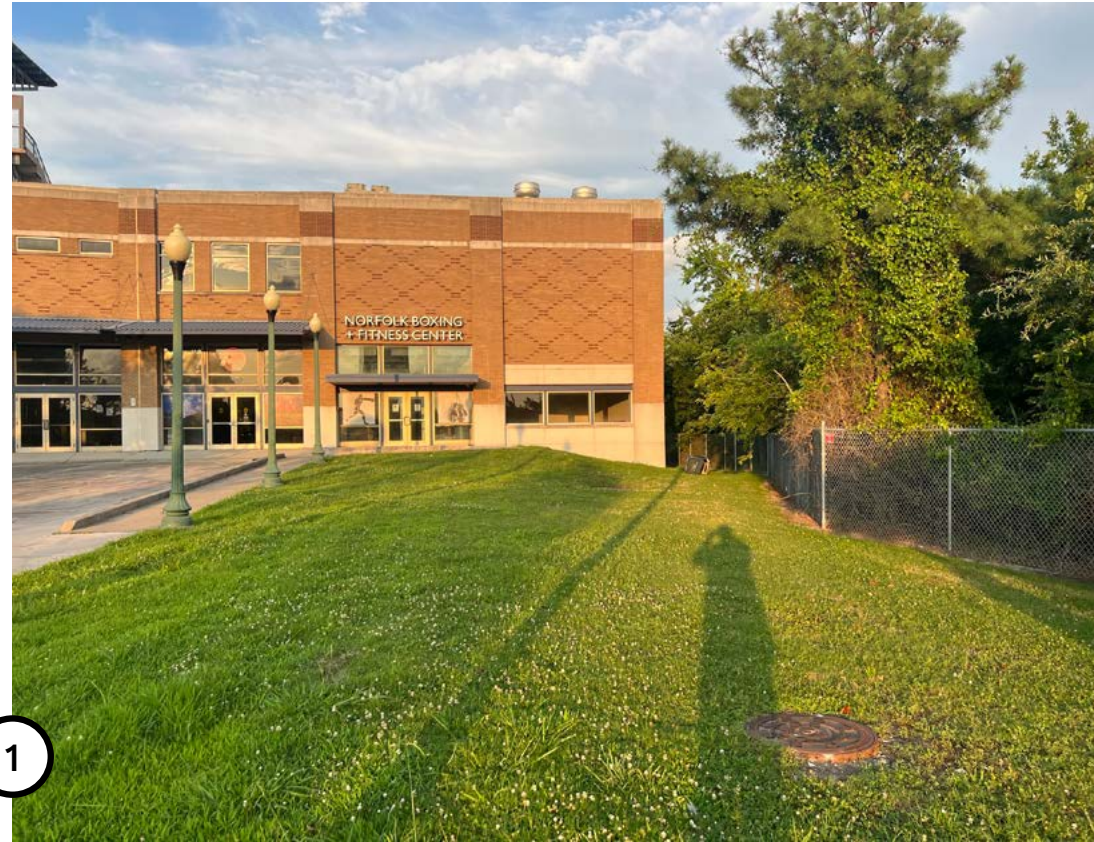
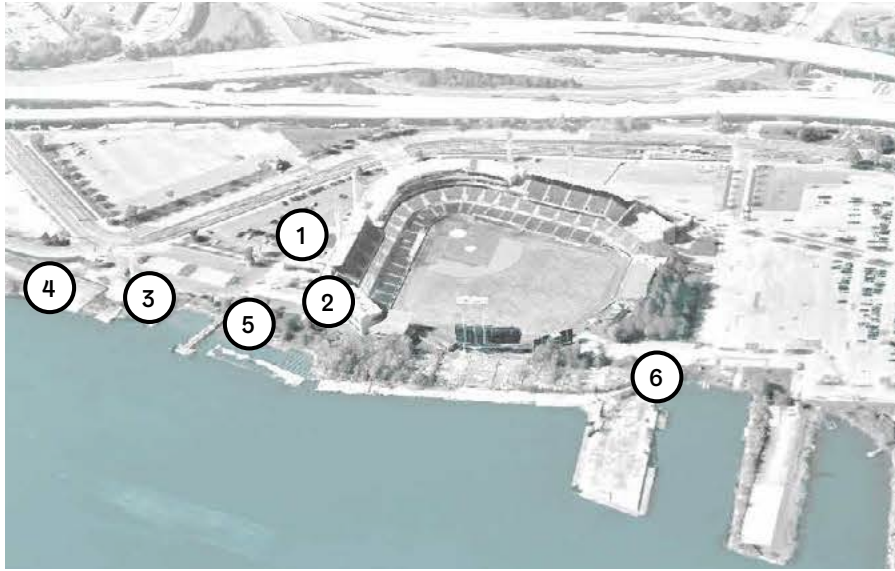
September 20th 2024



Site Connections



Existing Condition Photos



1 Harbor park baseball stadium



2 Rear of harbor park baseball stadium



3 Ferry landing



5 View towards downtown

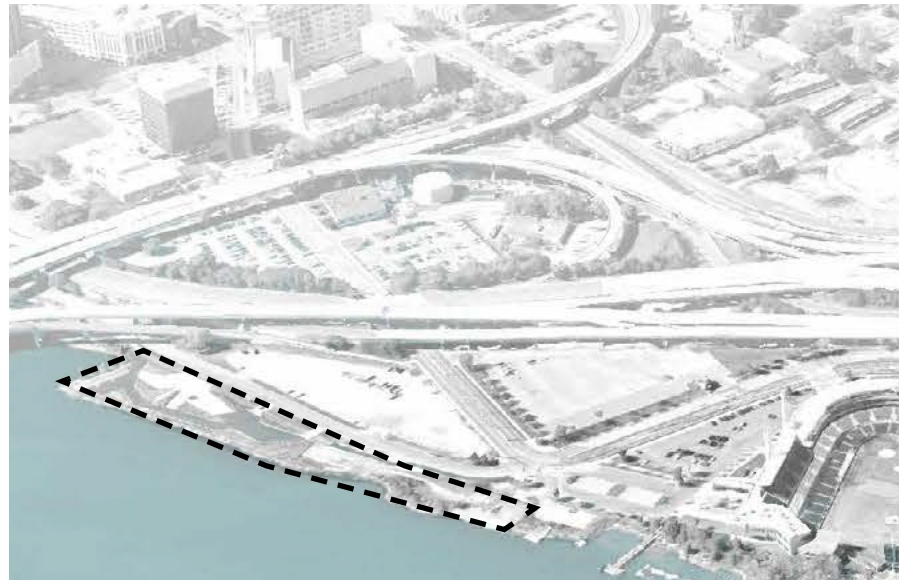


6 Warehouse pier condition



4 View towards ferry landing

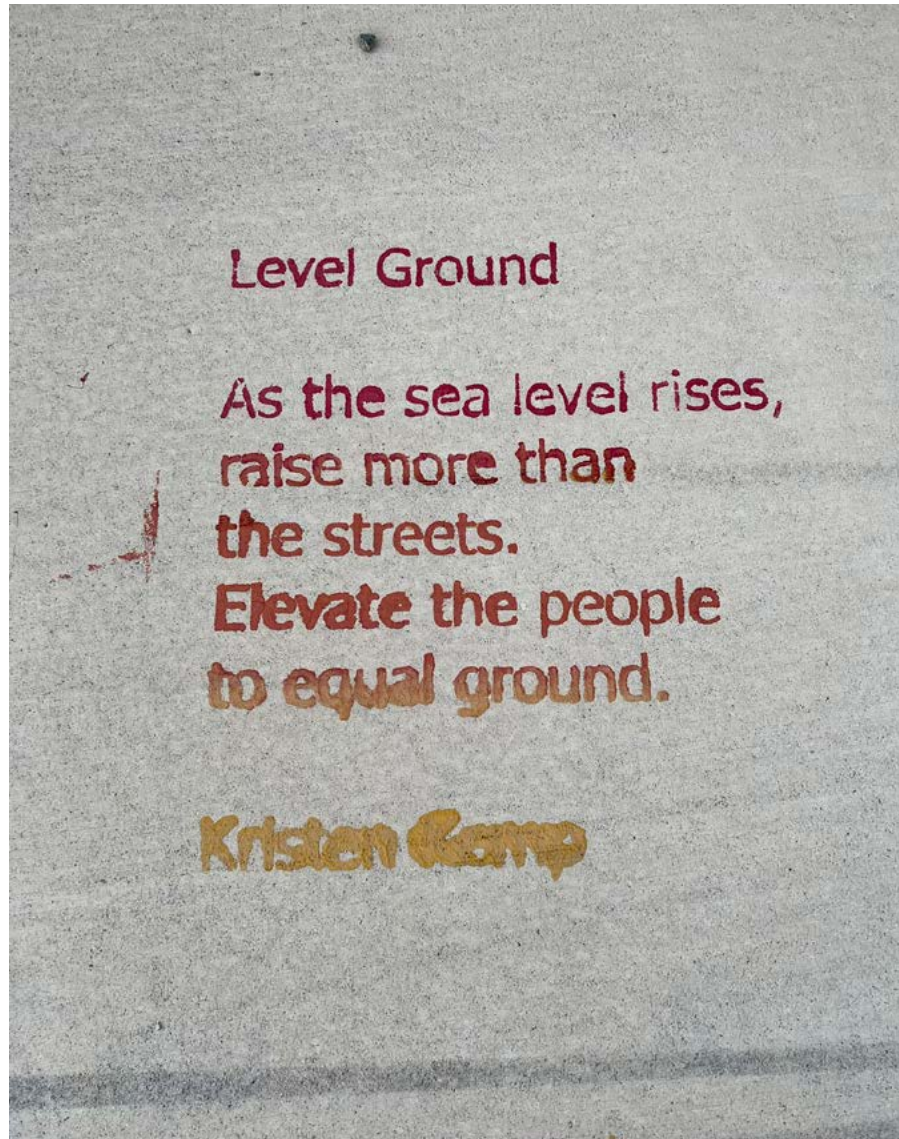
Water Street Open Space



Native planting at waters edge

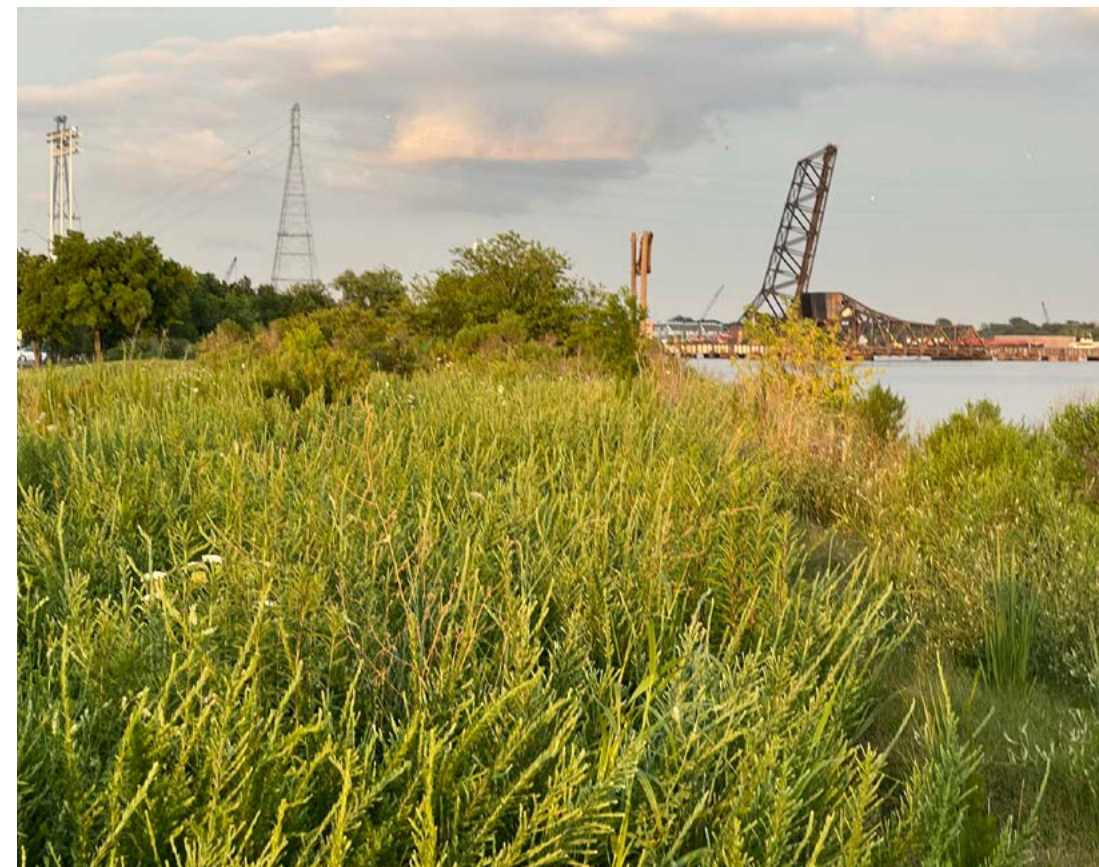


Existing site furnishings



Public art instillation

11/08/2024

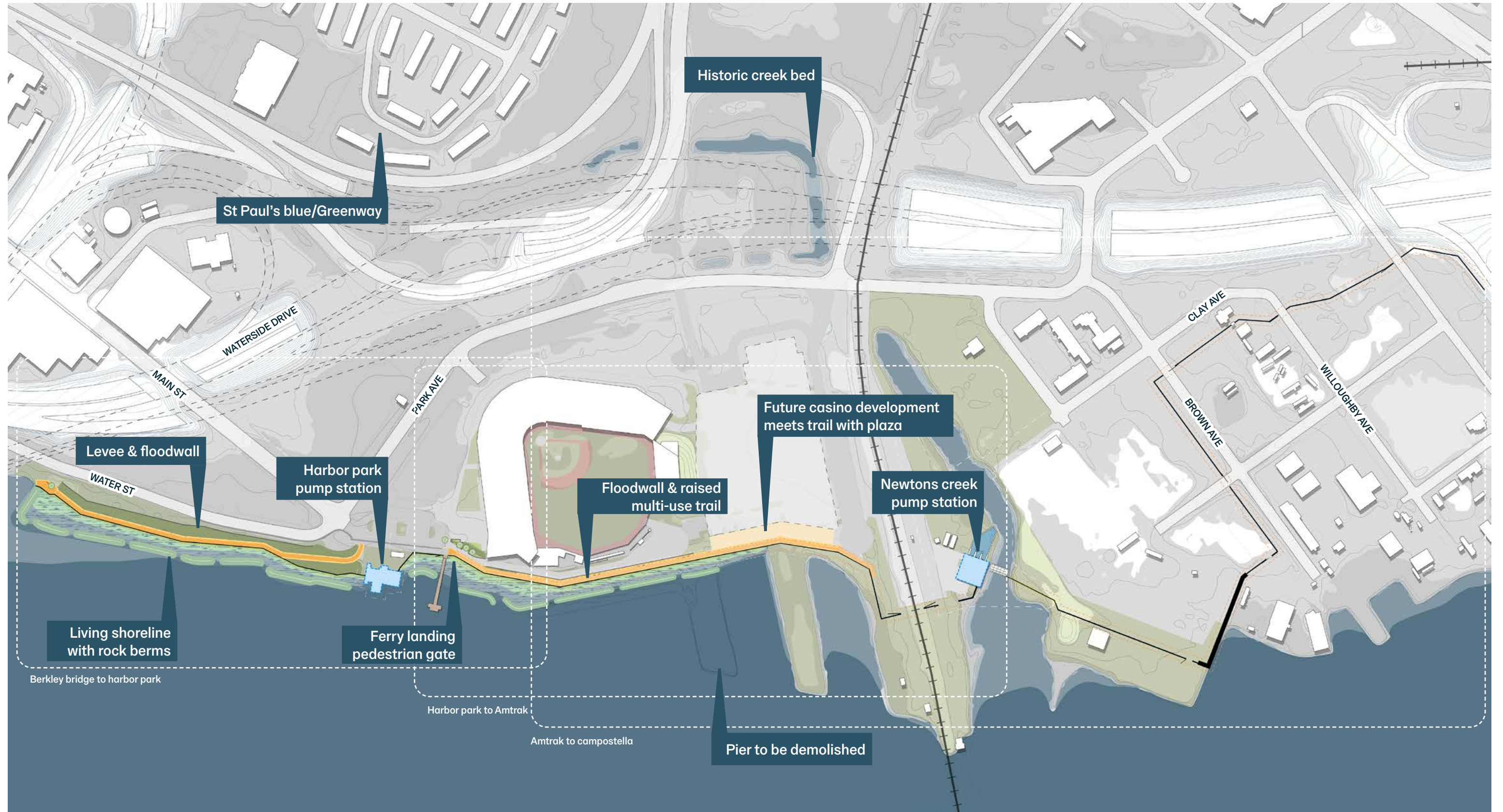


Native planting at waters edge

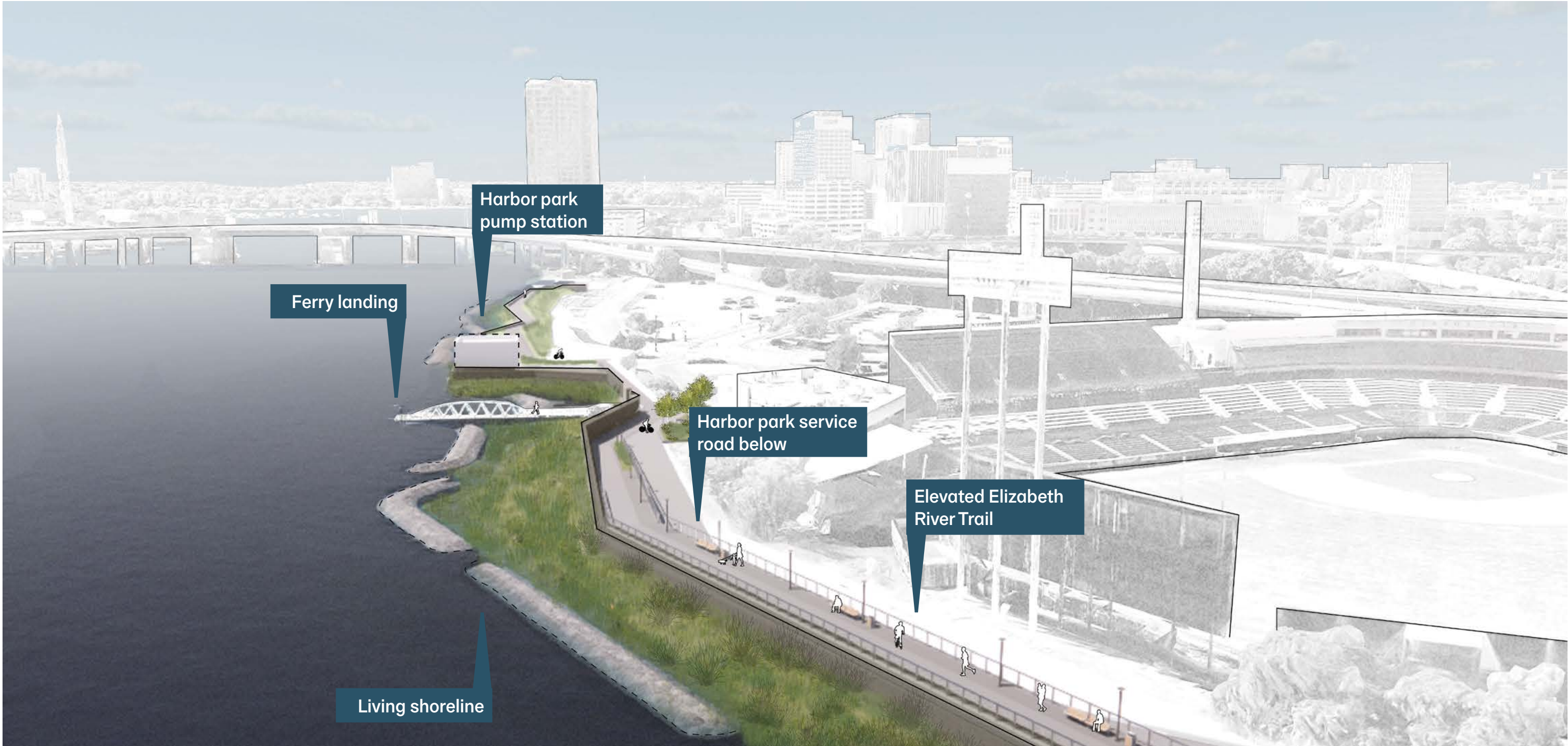


Existing site furnishings

Proposed Site Design

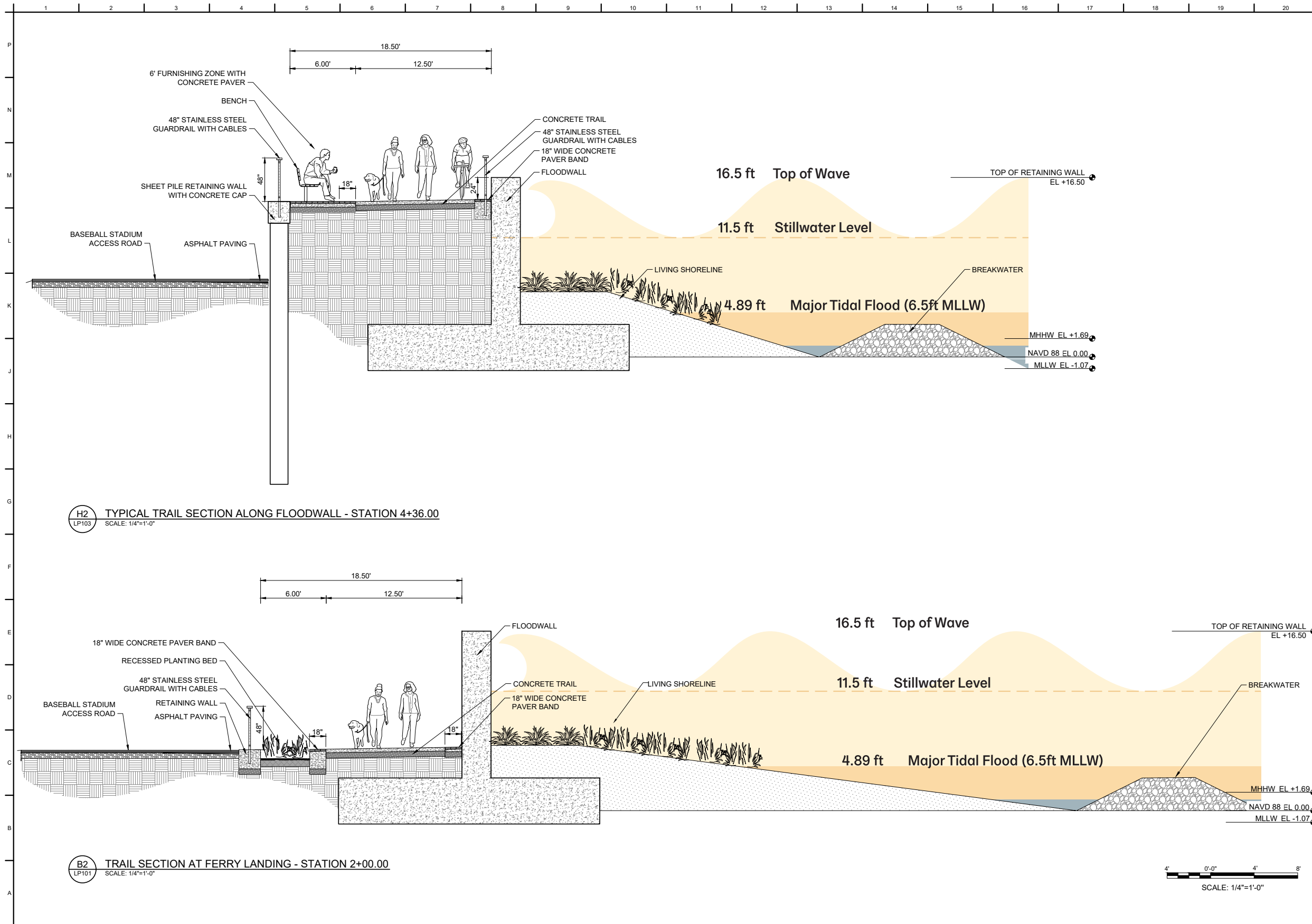


View towards Downtown Norfolk



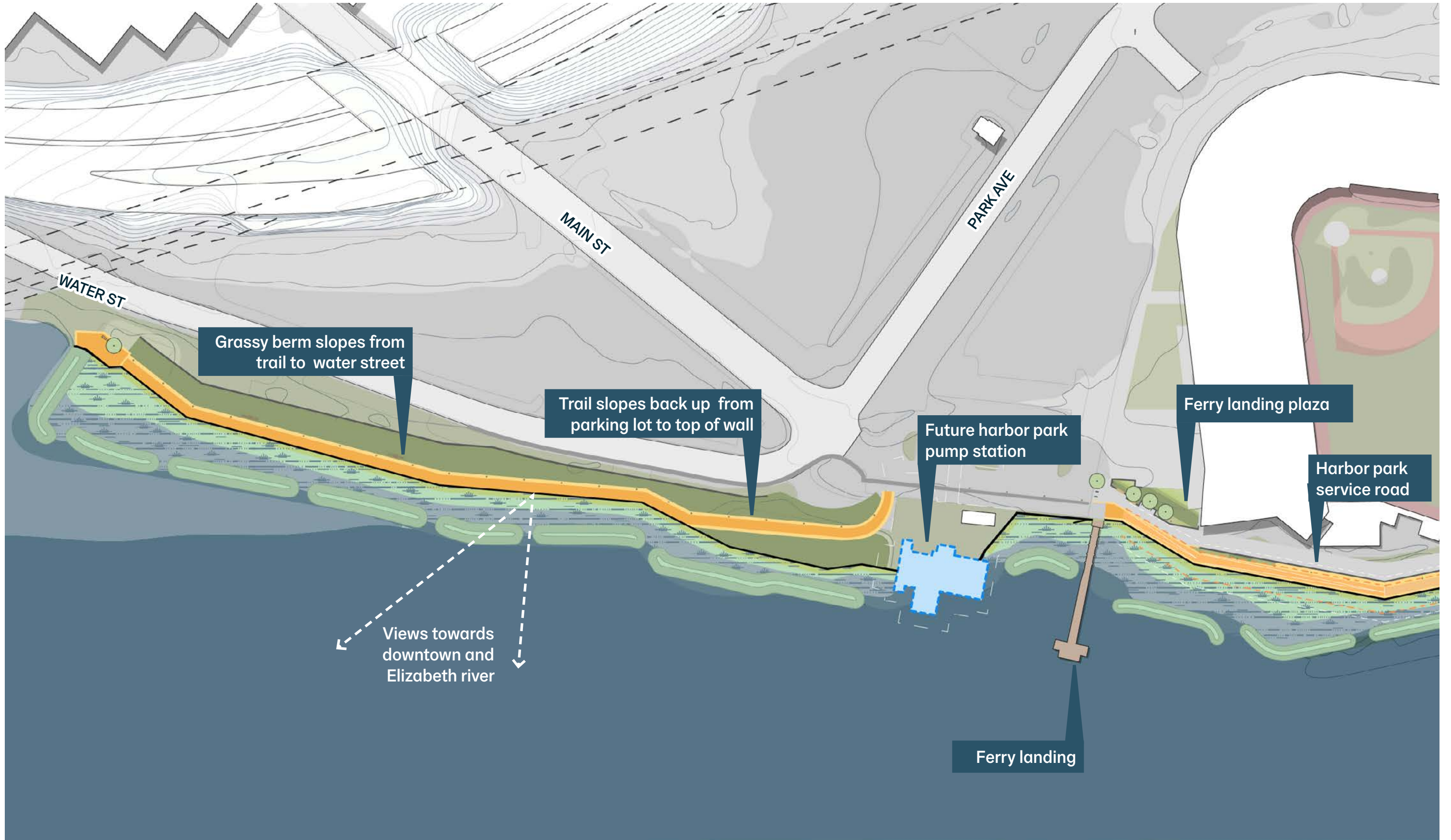
For illustrative purposes only.

Typical Sections at Harbor Park



		DATE	
DESIGNED BY: C. NICHOLS DRAWN BY: C. NICHOLS CHECKED BY: R. DIAZ SUBMITTED BY: J. WEAVER SIZE: 22x34		ISSUE DATE: 2024-08-17 SOLICITATION NO.: CONTRACT NO.: NAD FILE NO.:	
U.S. ARMY CORPS OF ENGINEERS NORFOLK DISTRICT 803 FRONT STREET NORFOLK, VA 23510		DRAFT (NOT TO BE USED FOR CONSTRUCTION)	
CITY OF NORFOLK, VA COASTAL STORM RISK MANAGEMENT PHASE 1A2 - CASINO PARCEL P2-481416		CROSS SECTIONS (1 OF 2)	
SHEET ID PH. 1A2 LS301		SCALE: 1/4"=1'-0"	

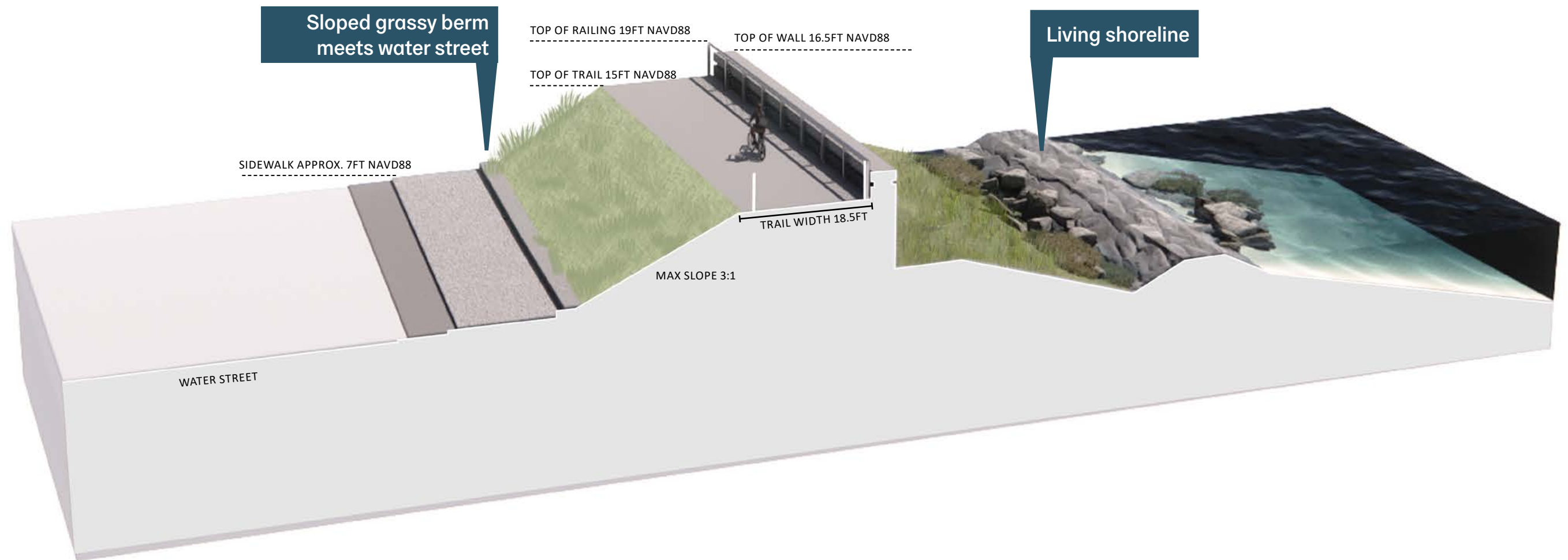
Berkley Bridge to Harbor Park



For illustrative purposes only.

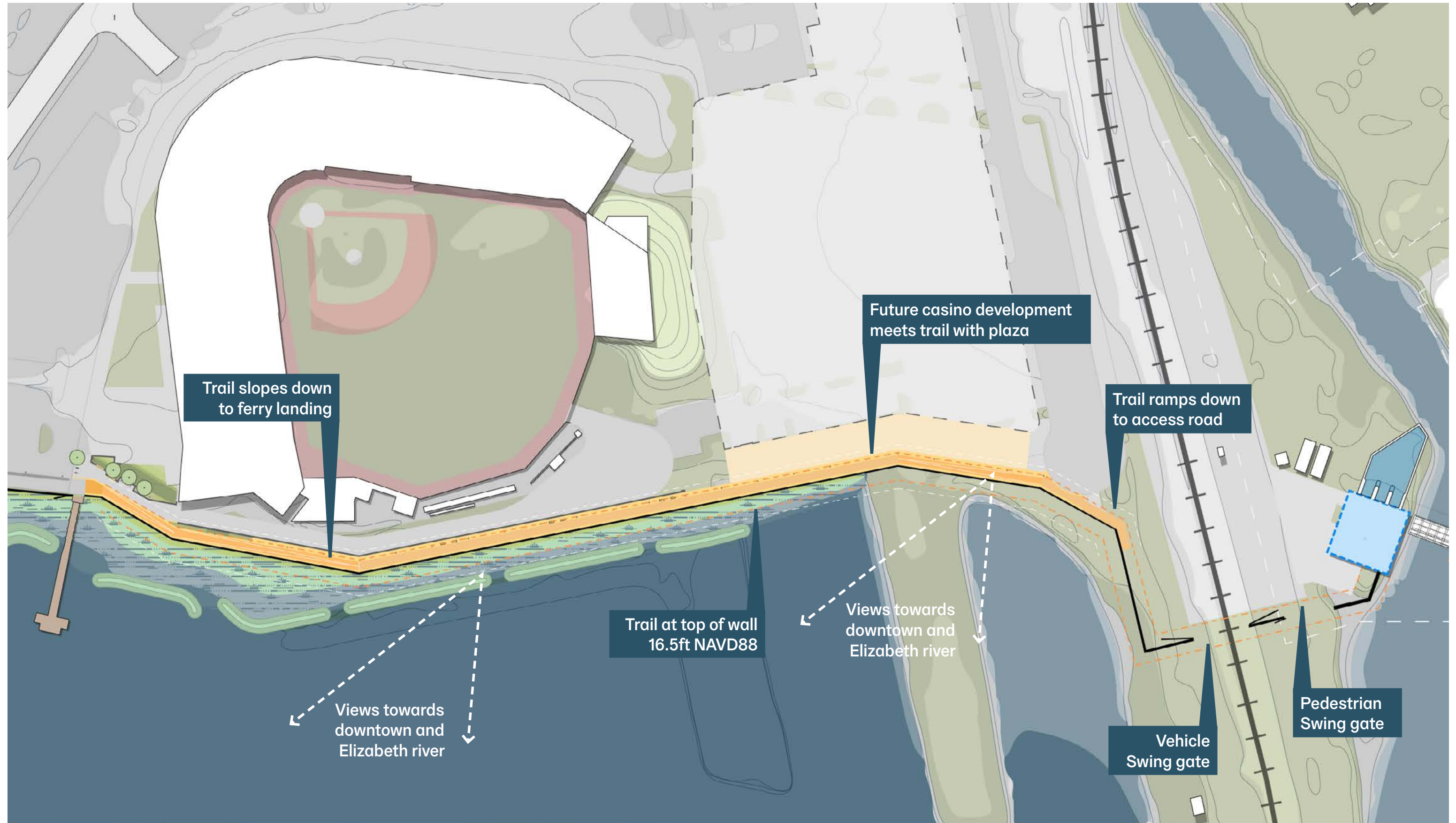
Typical Levee/Floodwall

Profile at Water Street

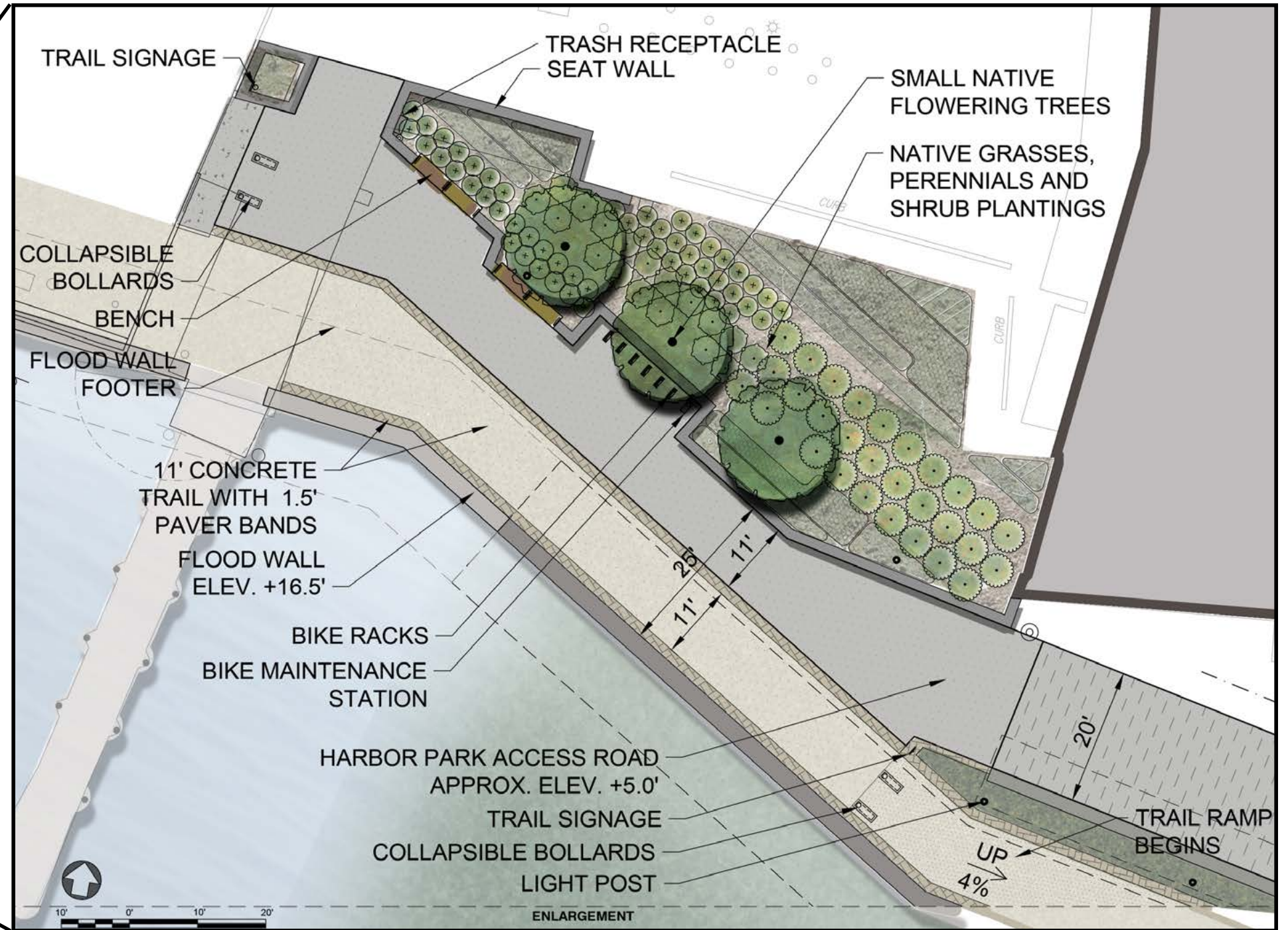


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Harbor Park to Amtrak



Ferry Landing Plaza

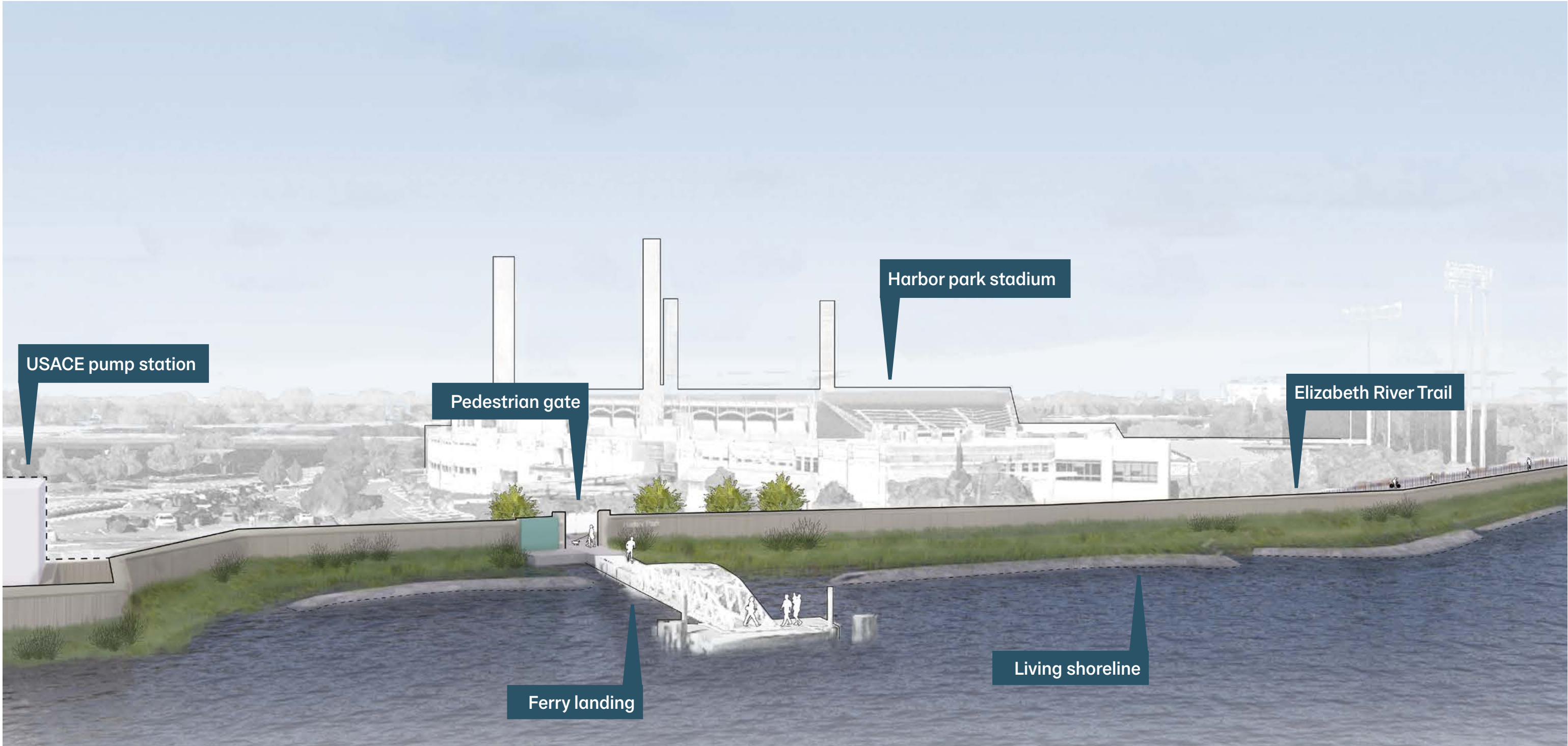


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View at Ferry Gate



View of Ferry Landing



For illustrative purposes only.

View on Elizabeth River Trail looking Downtown



View on Water Street looking Downtown

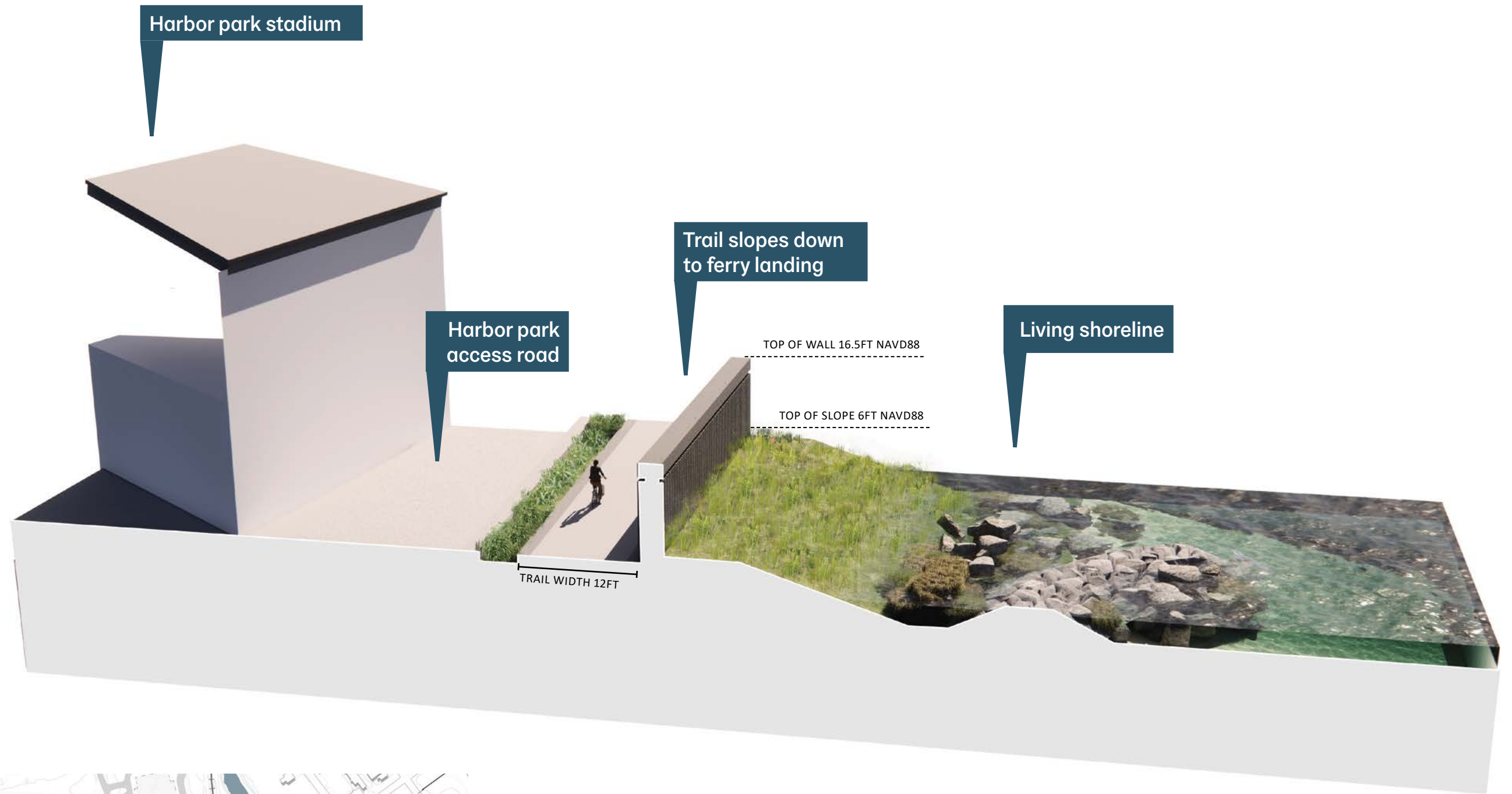


View on Water Street looking Downtown



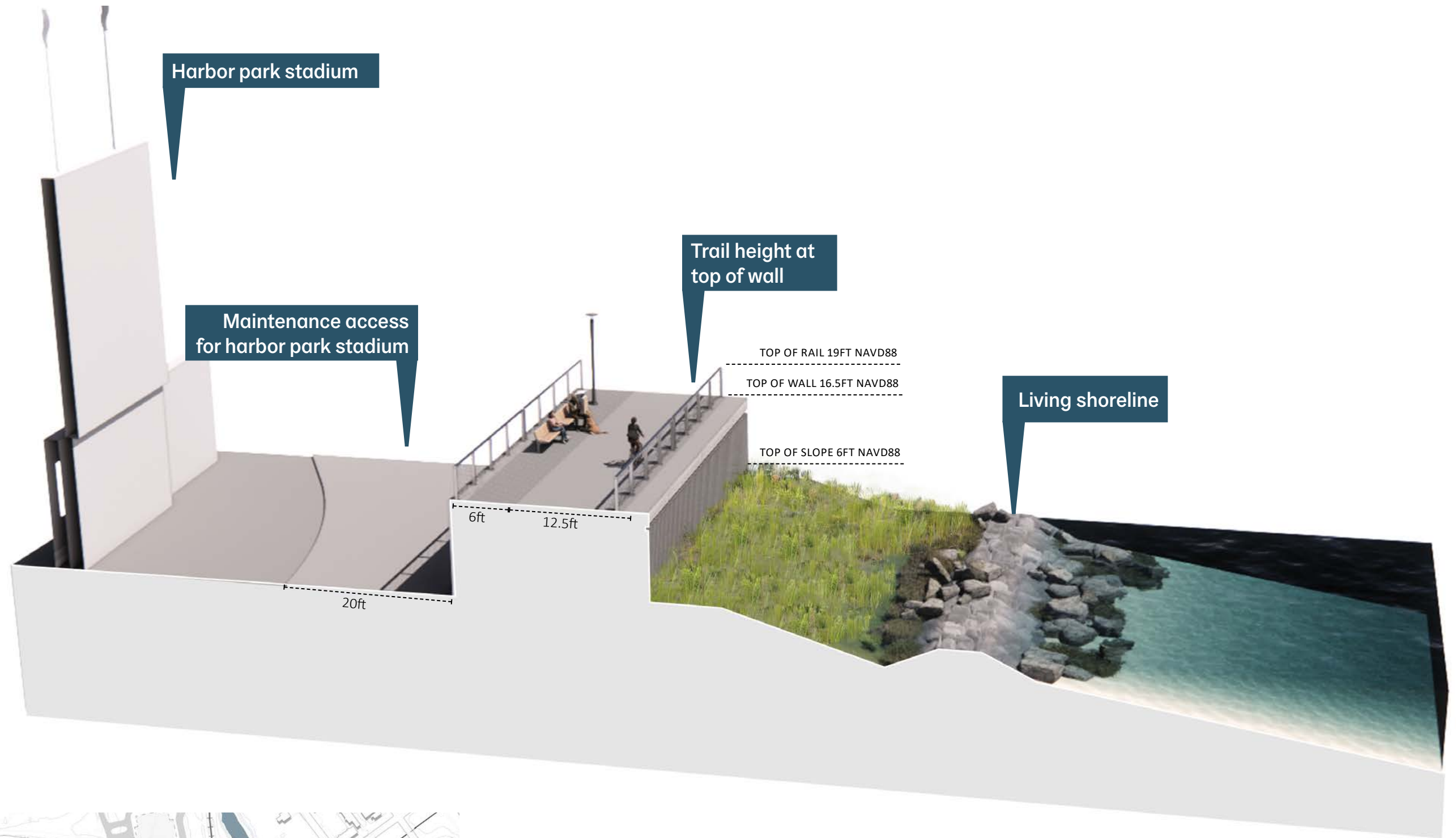
For illustrative purposes only.

Ramped Trail Access at Ferry Landing



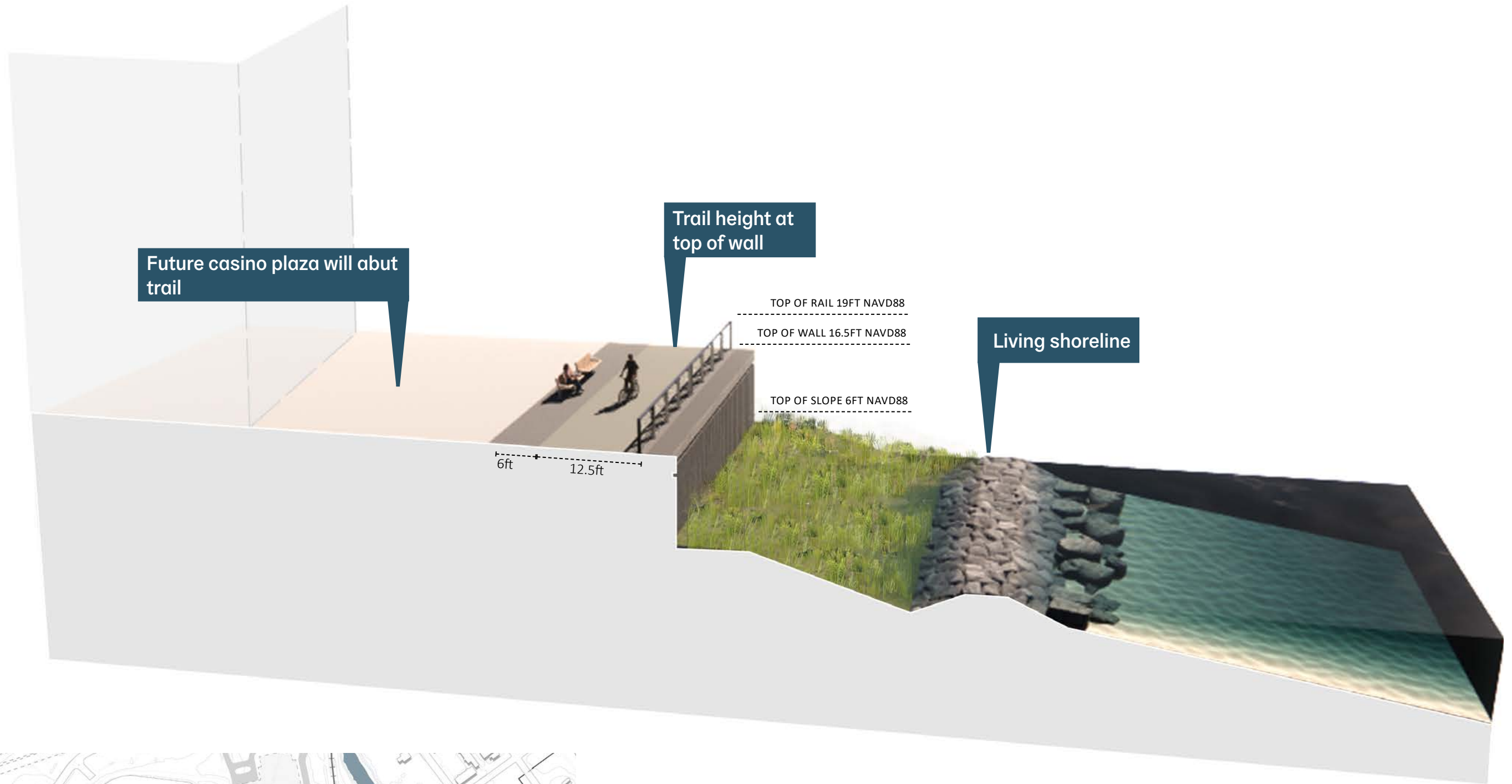
For illustrative purposes only.

Floodwall and Elizabeth River Trail at Harbor Park Stadium



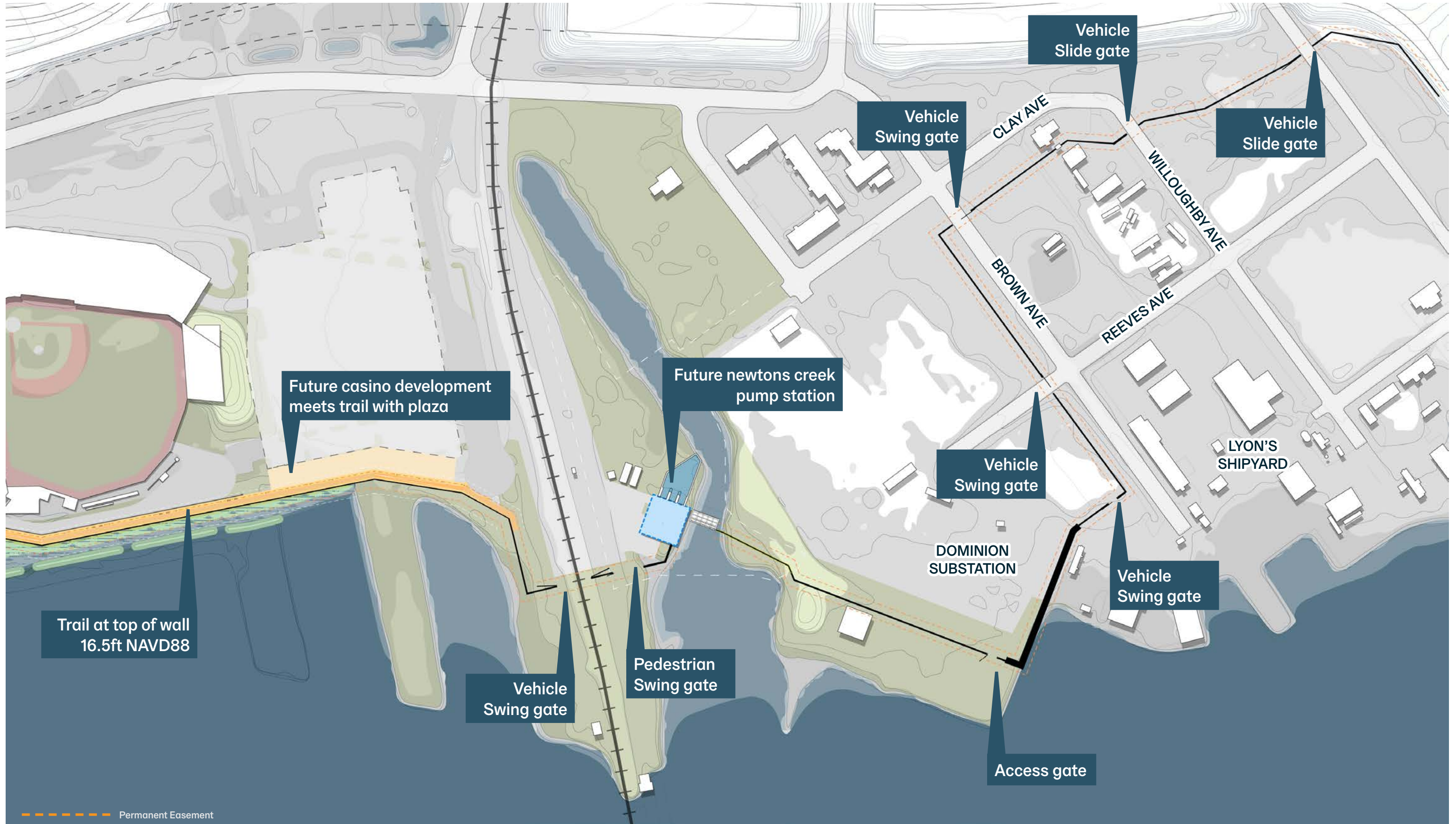
For illustrative purposes only.

Floodwall and Elizabeth River Trail Future Casino Development



For illustrative purposes only.

Amtrak to campostella road



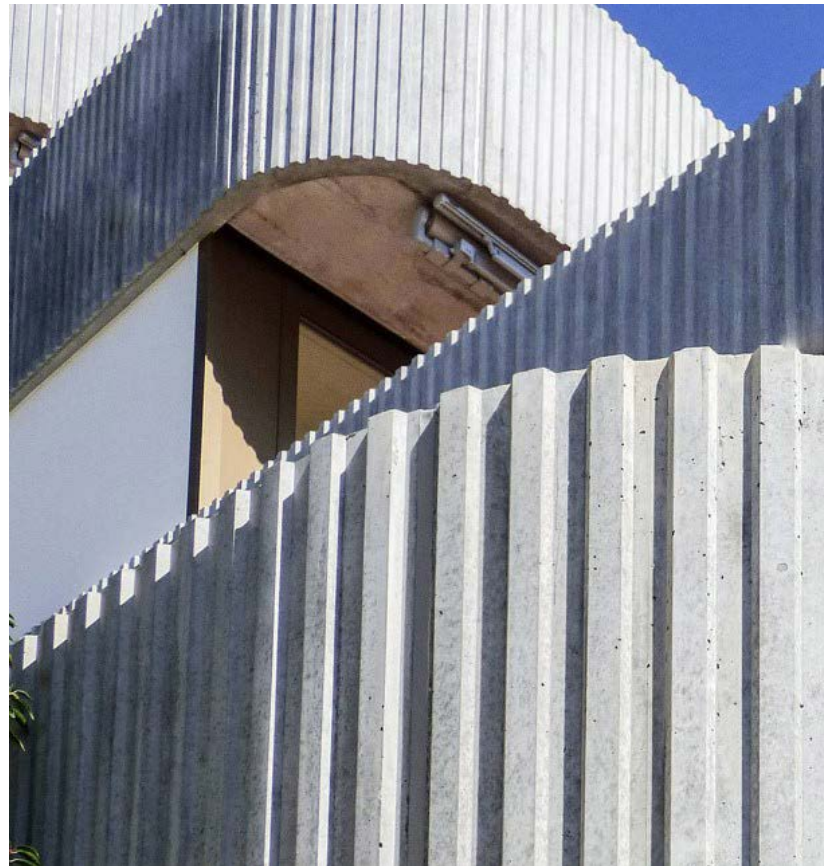
Wall Elevation Precedents



University of Pamplona, Spain.



Sport Campus, Den Haag.



Reckli 2/75 Kocher.



Richmond Flood Wall.



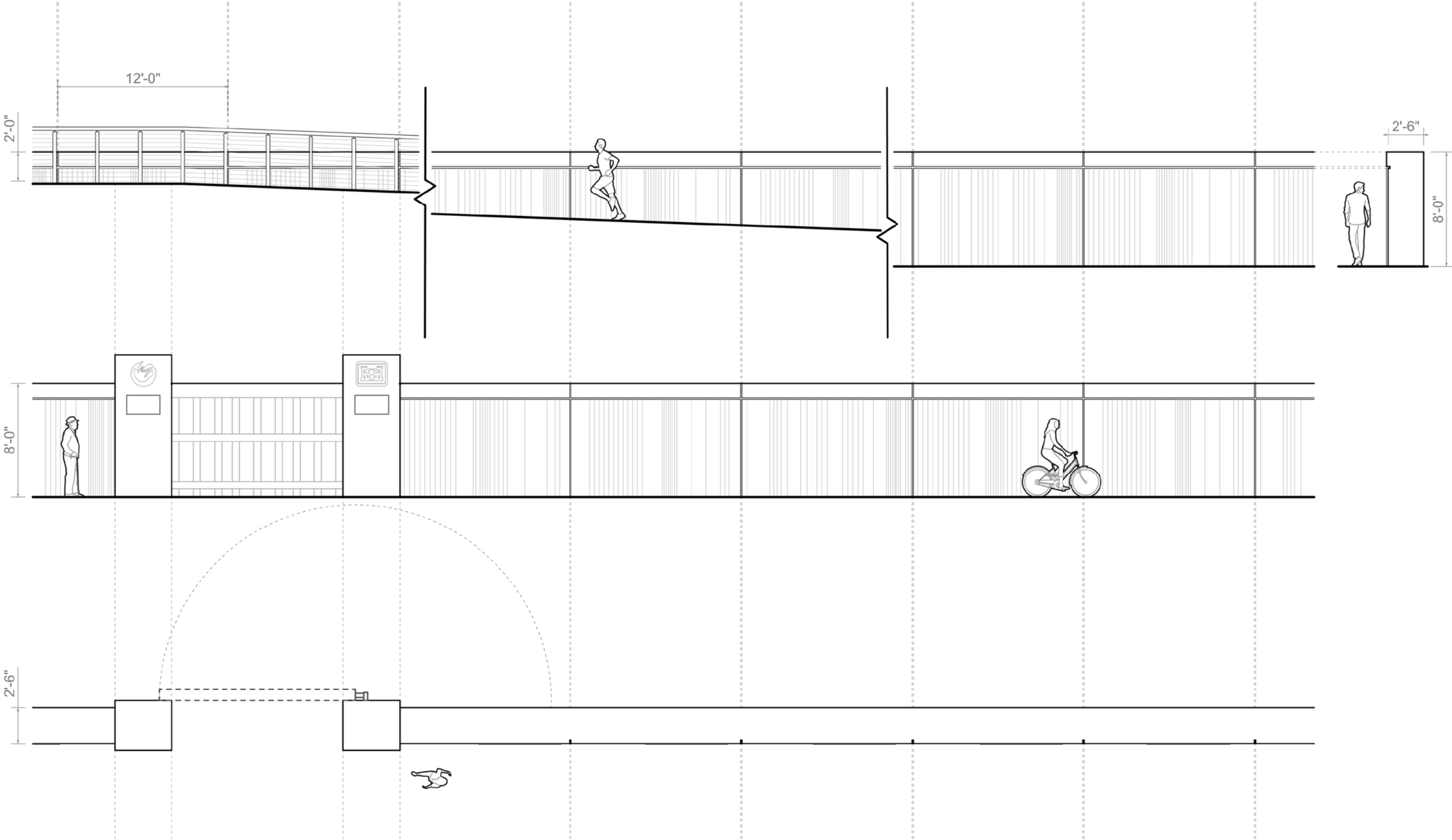
Reckli 2/122 Yukon.

Potential Mural/Art Wall Panels

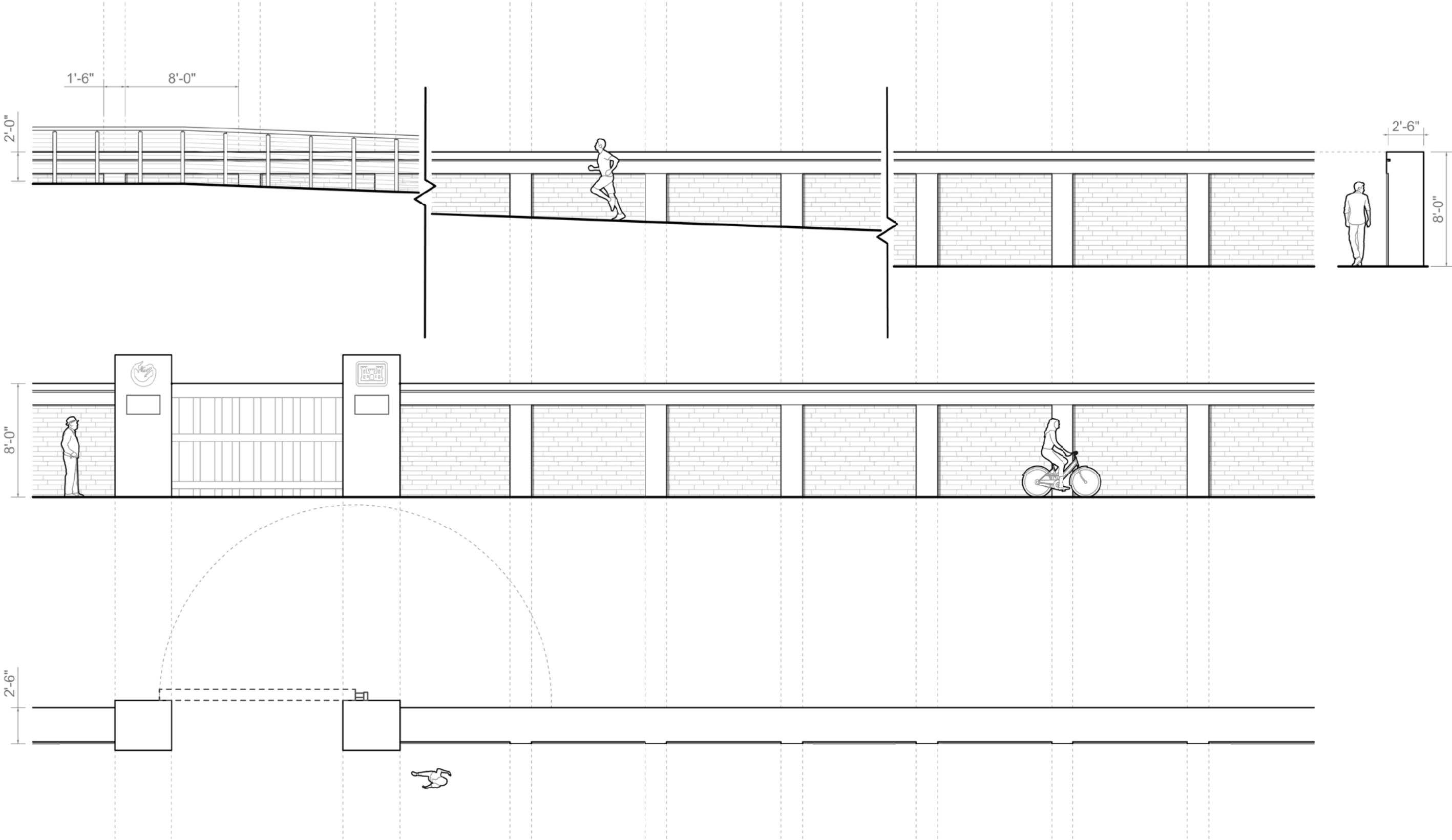


E.2

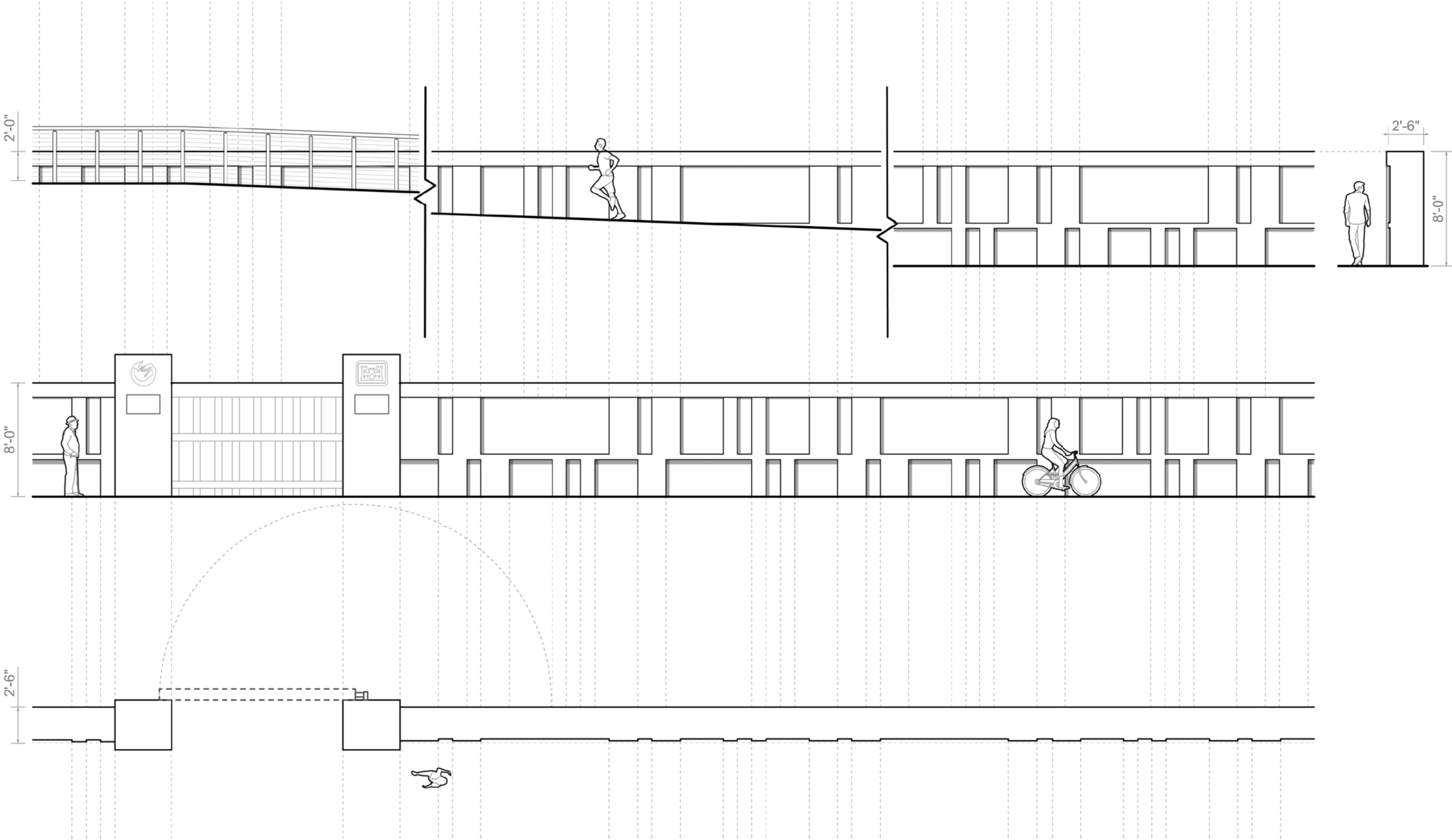
Wall Elevation Studies Option A



Wall Elevation Studies Option B

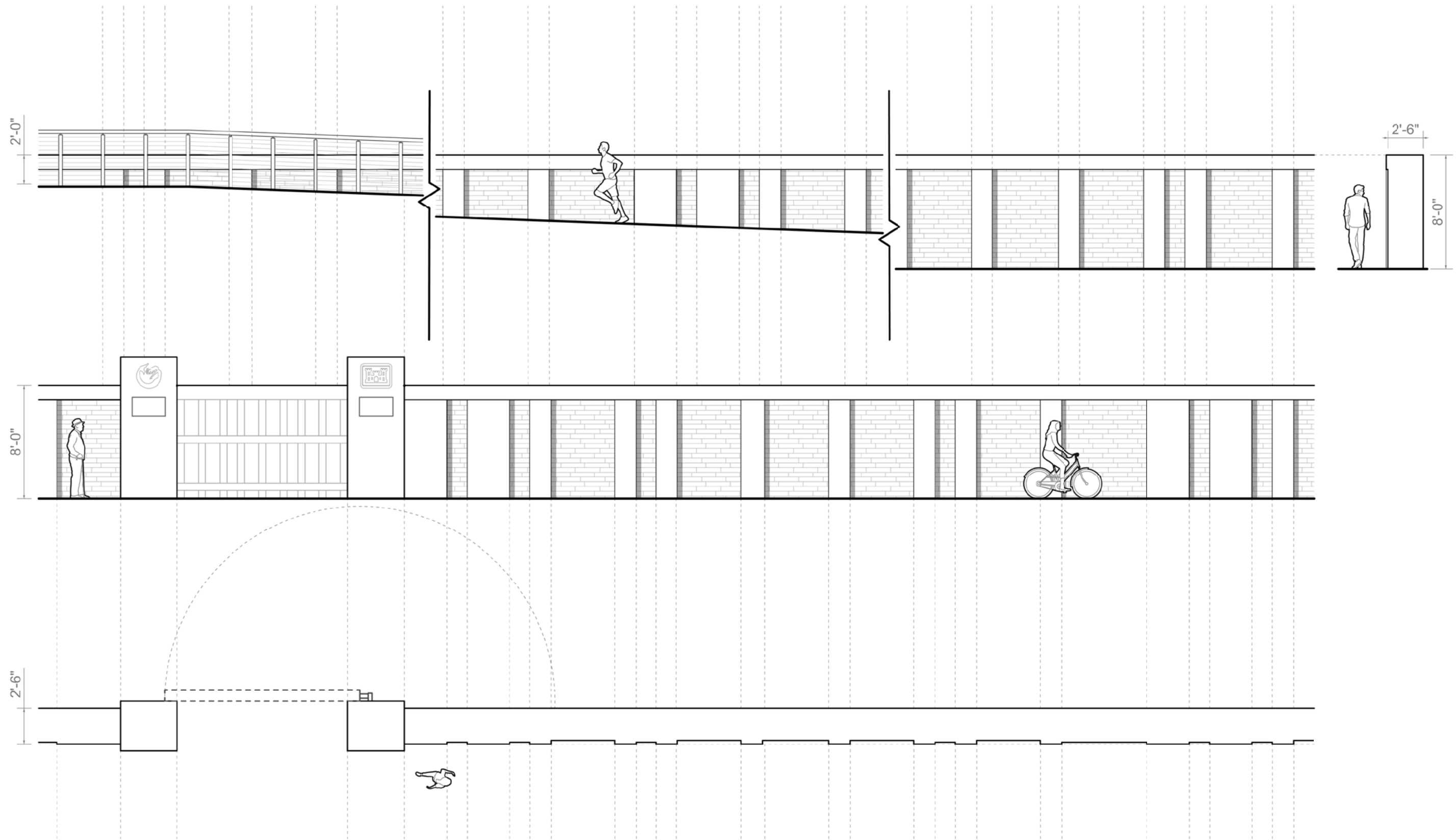


Wall Elevation Studies Option C



For illustrative purposes only.

Wall Elevation Studies Option D



Railing

Railings will be minimal and as transparent as possible to maximize views to the river and downtown. Design of railings is similar to the nearby st. Paul's blue Greenway.



Chincoteague national wildlife refuge

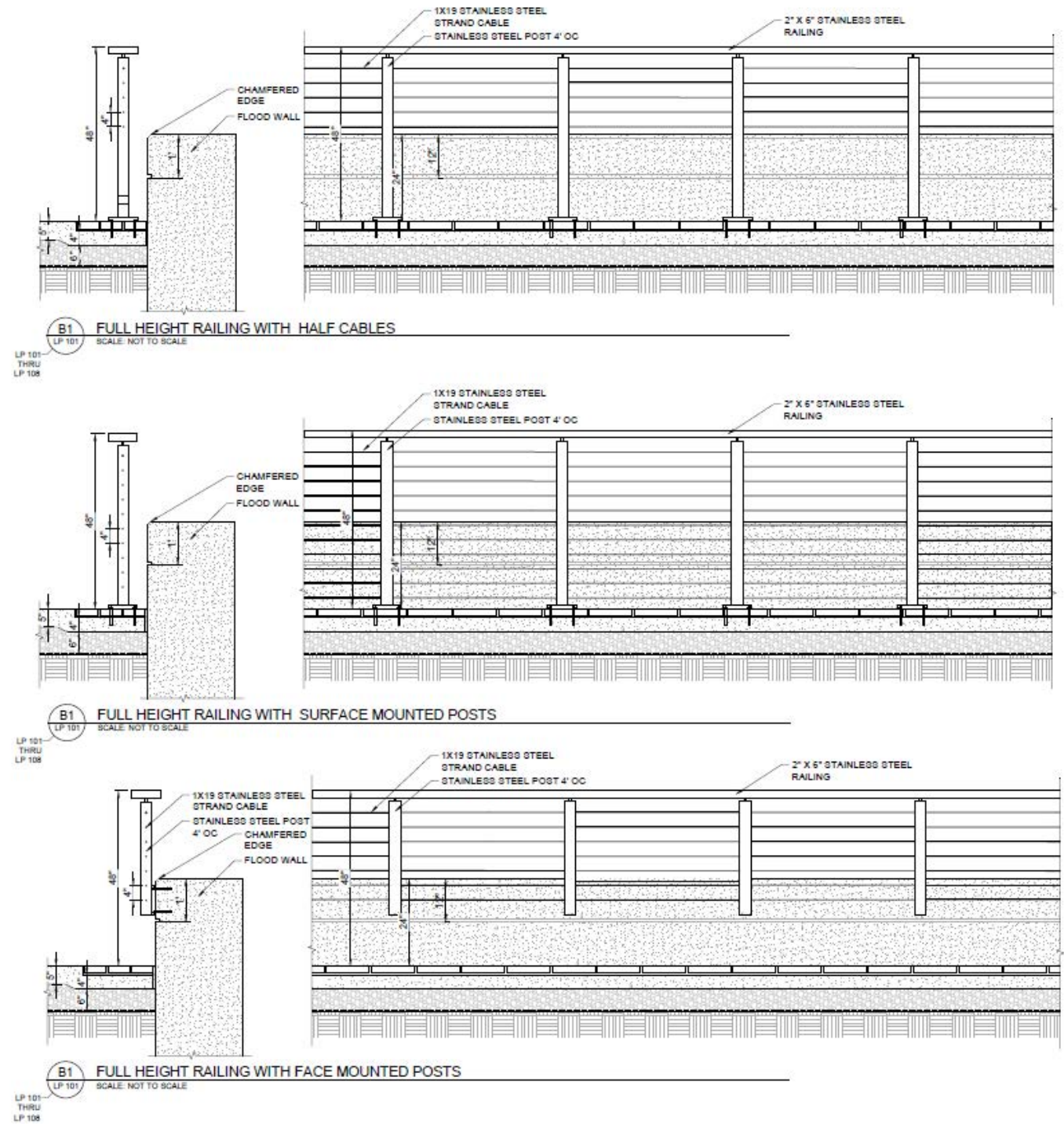


Carl stahl wire mesh railing
11/08/2024



Cable Railing on Top of Wall

RAILING OPTIONS



For illustrative purposes only.

Existing Site Furnishings

Benches and trash/recycling receptacles could be reused from the Water Street Open Space park



Existing benches and trash receptacles at Water Street Open Space



Existing planters



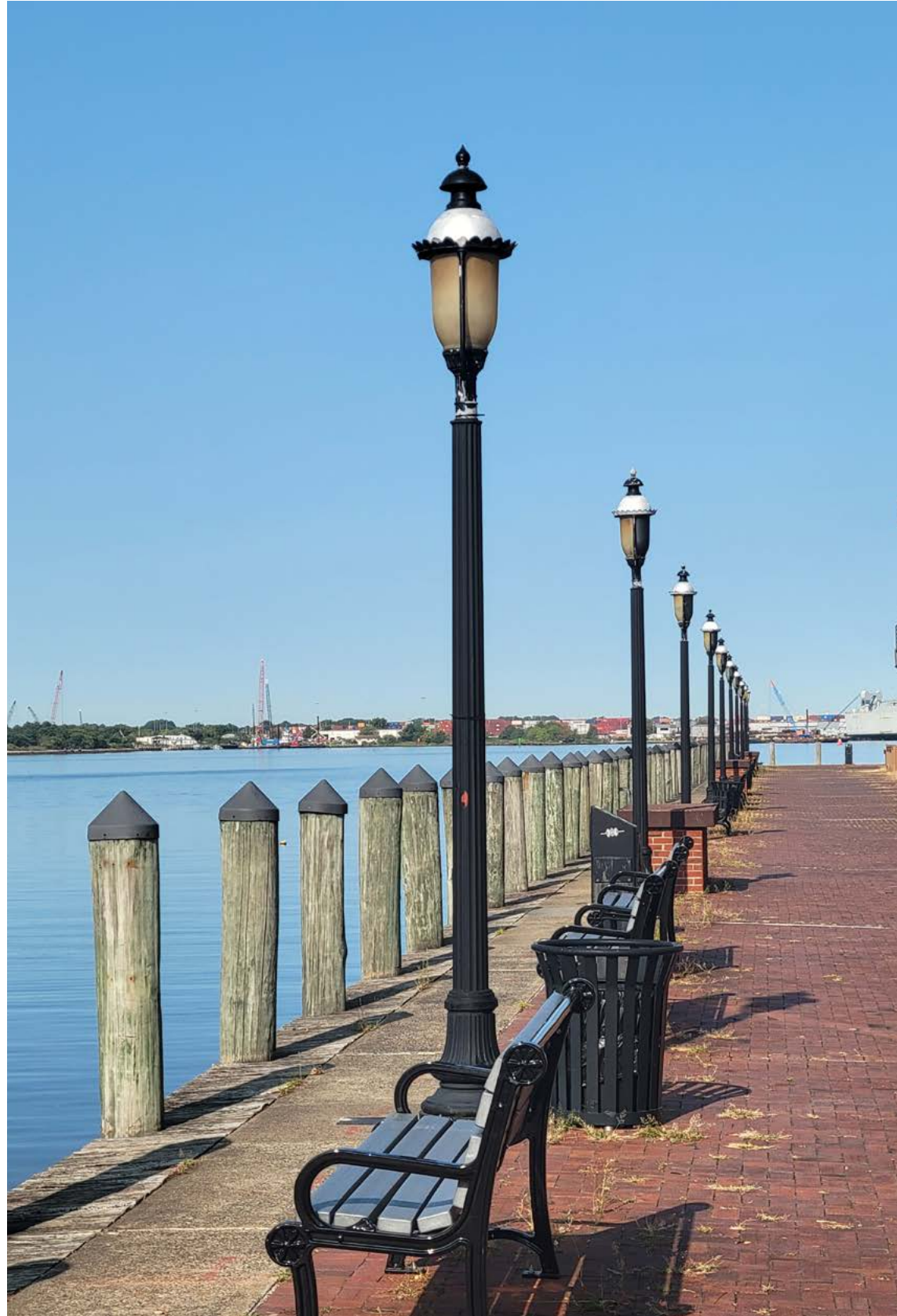
Existing bench



Existing bench

Pedestrian Street Lights and Illuminated Bollards

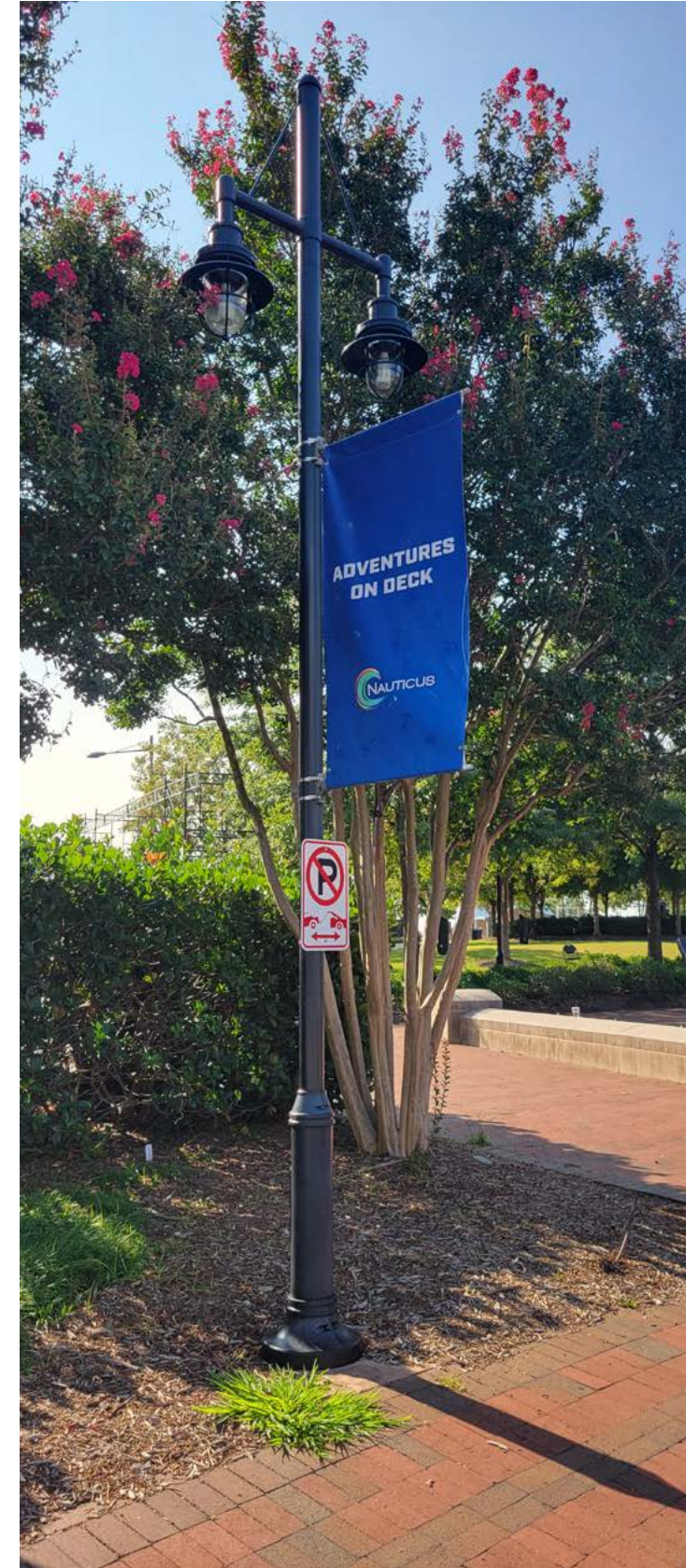
Light fixtures for this project will continue the Town Point Park style, per Dominion Energy standards.



Dominion lighting at Town Point Park



Illuminated bollards at own Point Park



Dominion lighting at Town Point Park

Cycling



Mmcite Elk



Dero Fixit Plus



Mmcite Bikebloq



Bike racks at Town Point Park





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Questions?



ResilientNorfolk.com



An aerial photograph showing a residential neighborhood with several houses, some of which are surrounded by construction activity. A large area of land is being cleared or prepared, with heavy machinery like excavators and bulldozers visible. The area is bordered by water, and a rocky shoreline is visible in the foreground.

Thank you

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