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Rondout Riverport | Shoreline Stabilization & Public Access

Project Overview

Weston & Sampson is providing design and engineering consulting services to the City of Kingston for the Rondout Riverport Shoreline Stabilization and Public Access project. The team is working towards creating an enduring design to revitalize the waterfront space along Rondout Creek and the Hudson River that responds to climatic conditions.

Sea level rise is projected to impact the annual chance flood elevation within the design life of the project. A comparison of climate research for the City and New York State shows that the area may experience up to 36 inches of sea level rise by 2060, which is roughly the 35-year design life of the project.

The Rondout Riverport Shoreline Stabilization and Public Access Project (Phase II) is comprised of four distinct proposed revitalization project areas, including: the Kingston Riverwalk, the Breakwater to the Lighthouse, the Trolley Trail and Causeway, and the East Strand & North Street Improvements.

Kingston's waterfront is currently underutilized. There are many opportunities to improve the public realm for City residents and visitors, including increased commercial and tourism opportunities; increased park and recreational space; improved multi-modal transportation links like bike paths, walking trails, and sidewalks; improved riverfront access; improved boating and pedestrian access to the Lighthouse; and increased scenic vistas.

Existing Conditions

sub project areas
1 Kingston Riverwalk
2 Breakwater to Rondout II Lighthouse
3 Trolley Trail Causeway
4 East Strand St & North St Improvements

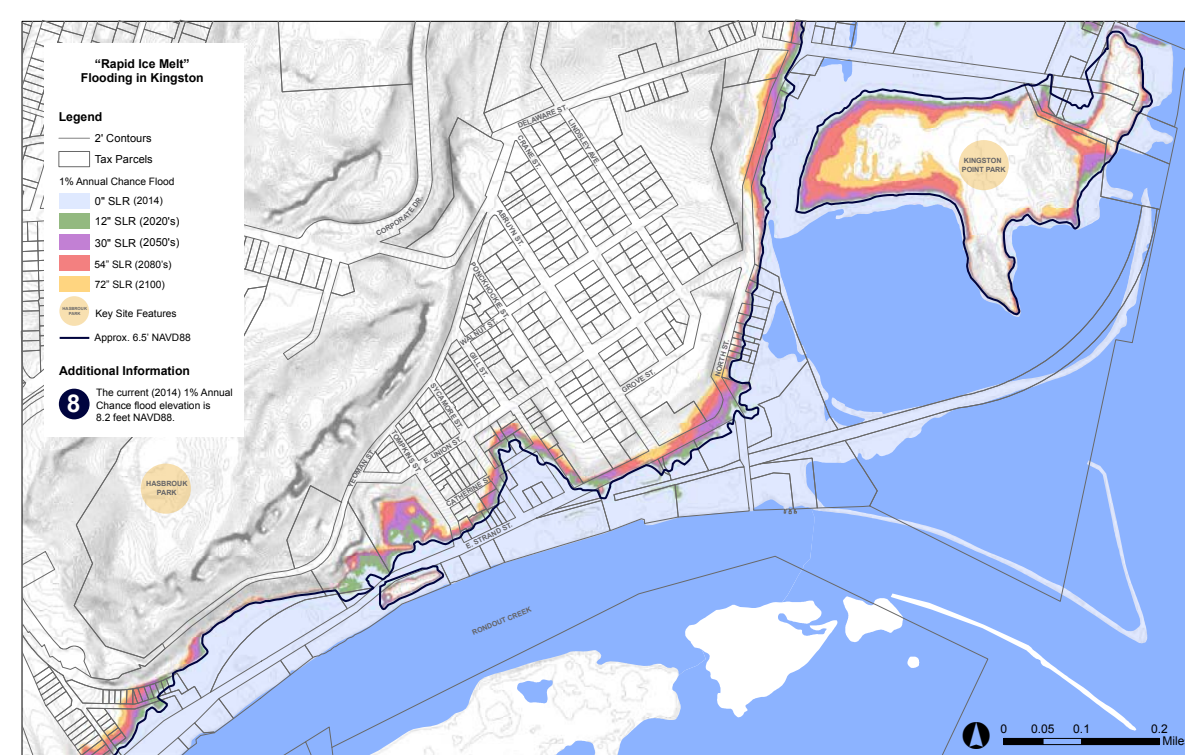**Kingston Riverwalk**   **Trolley Trail & Causeway**   **East Strand & North St.**   **Lighthouse Breakwater**

Sea Level Rise

A map of projected flooding by 2100, under a "central range" global warming scenario

*A map of projected flooding by 2100, under a "rapid ice melt" global warming scenario*

Flooding observed along the Lighthouse Jetty in January 2019

Climate Adaptation Strategies for Preliminary Design Concepts

Multi-Purpose Flood Storage
Plazas can be active recreation spaces during nice weather and storage during floods.

Vegetated Berm
These berms serve as flood barriers while also creating open spaces and additional value along the waterfront.

Tiered Walkway
This design creates a tiered, raised area that provides gathering space and boating access to the waterfront.

Pathways
Pedestrian and bike pathways provide important shoreline access points for waterfront communities.

Living Shoreline
A "soft," green infrastructure approach to managing erosion and flooding, and providing habitat.

Live Crib Wall
A built structure that uses vegetated root mass to stabilize slopes and manage erosion.

Raised Roadway
Elevated roadways act as flood barriers and can provide emergency and evacuation routes during a flood.

Breakwater
An offshore strategy to attenuate wave action, facilitate sediment accretion, and provide habitat.

Vegetated Retaining Wall
Systems like Flex MSE provide erosion control without the need for concrete or rebar.

Bioretention
This green infrastructure approach can help manage stormwater by increasing infiltration and filtering runoff.

Adaptable Floodwall
These barriers allow for incremental adaptation while maintaining pedestrian connectivity to the waterfront.

Revetments
A sloped structure constructed with stones or other materials to help manage storm surge.

Joint Planting
This approach combines riprap with live stakes, which are inserted between the rocks to help stabilize the slope.

Gabions
These structures can be vegetated or filled with rocks, rubble, or even oyster shells to help manage erosion.

Low Impact Development
Strategies that increase stormwater infiltration, such as street trees and green roofs.

Steel Bulkhead
A vertical, "hard" infrastructure, coastal retaining structure.

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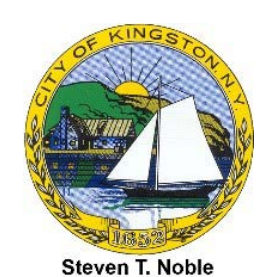
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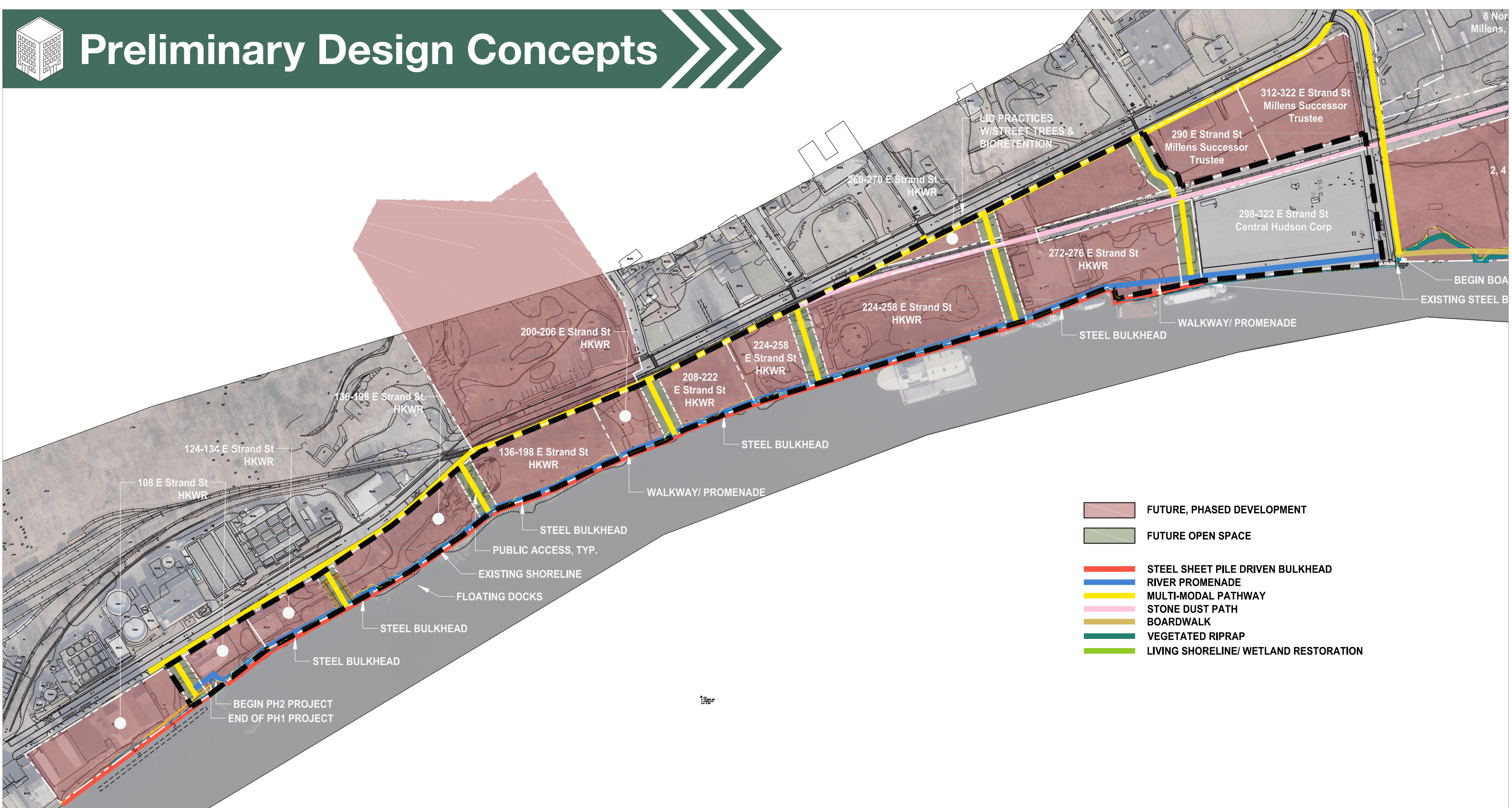## Rondout Riverport | Shoreline Stabilization & Public Access

Kingston Riverwalk

Existing Conditions

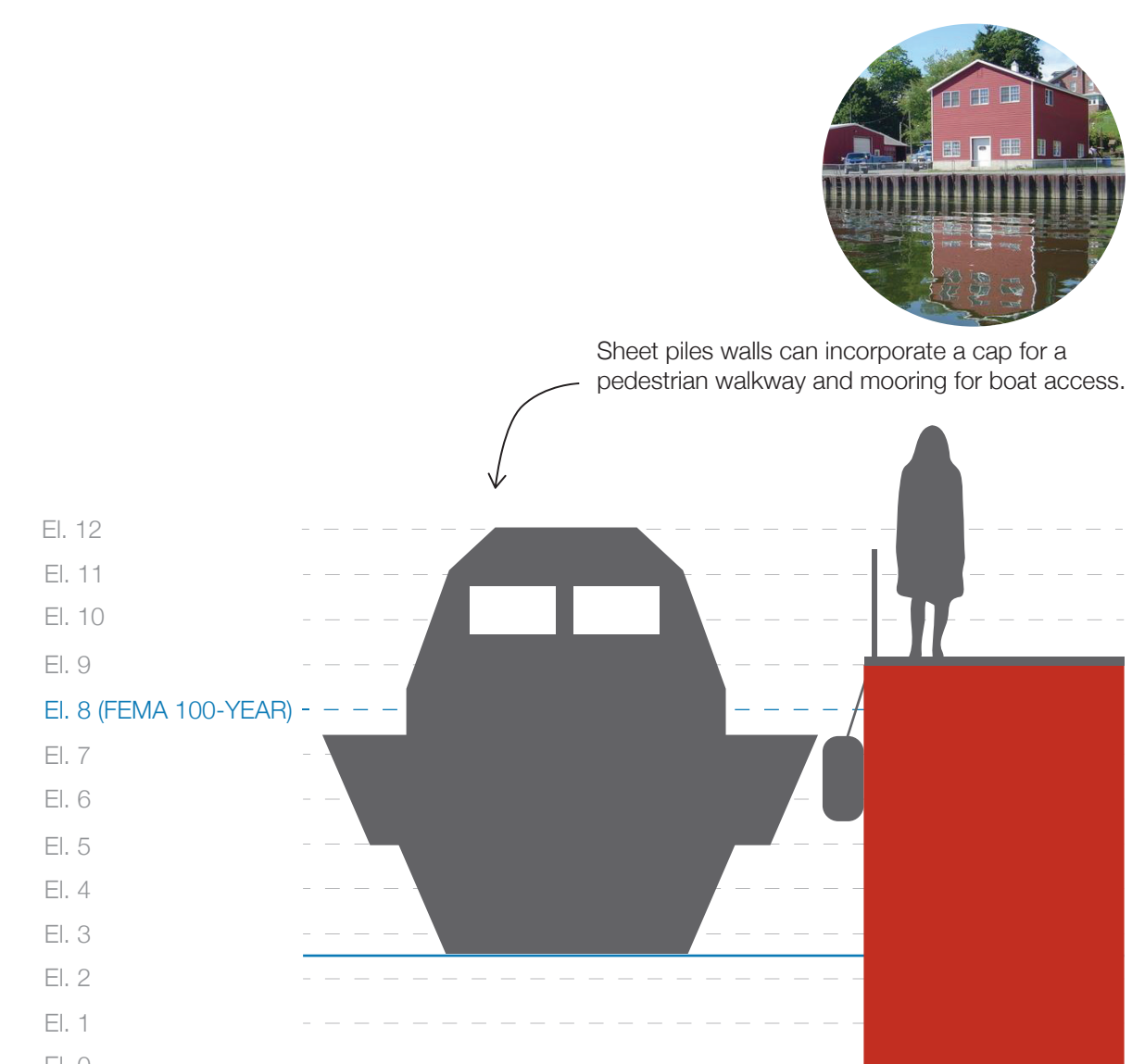*Site photos of existing conditions taken in January and March 2019*

Preliminary Design Concepts

Legend:
- FUTURE, PHASED DEVELOPMENT
- FUTURE OPEN SPACE
- STEEL SHEET PILE DRIVEN BULKHEAD
- RIVER PROMENADE
- MULTI-MODAL PATHWAY
- STONE DUST PATH
- BOARDWALK
- VEGETATED RIPRAP
- LIVING SHORELINE/ WETLAND RESTORATION

A plan of the preliminary design concepts for the Kingston Riverwalk

A rendering of the preliminary design concepts for the Kingston Riverwalk

Sheet piles walls can incorporate a cap for a pedestrian walkway and mooring for boat access.

El. 12
El. 11
El. 10
El. 9
El. 8 (FEMA 100-YEAR)
El. 7
El. 6
El. 5
El. 4
El. 3
El. 2
El. 1
El. 0

A diagram of the sheet pile wall with boat access

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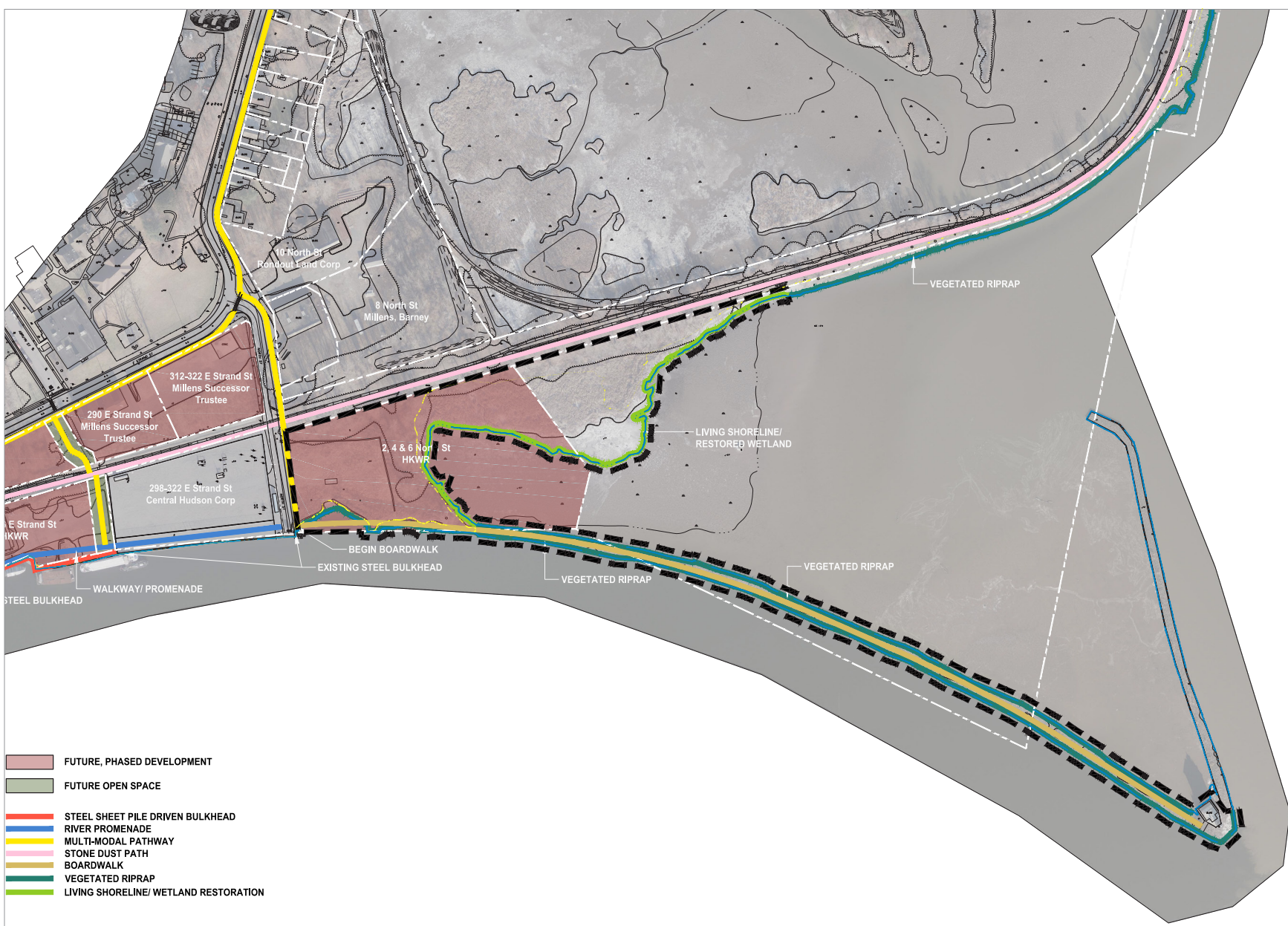## Rondout Riverport Shoreline Stabilization & Public Access

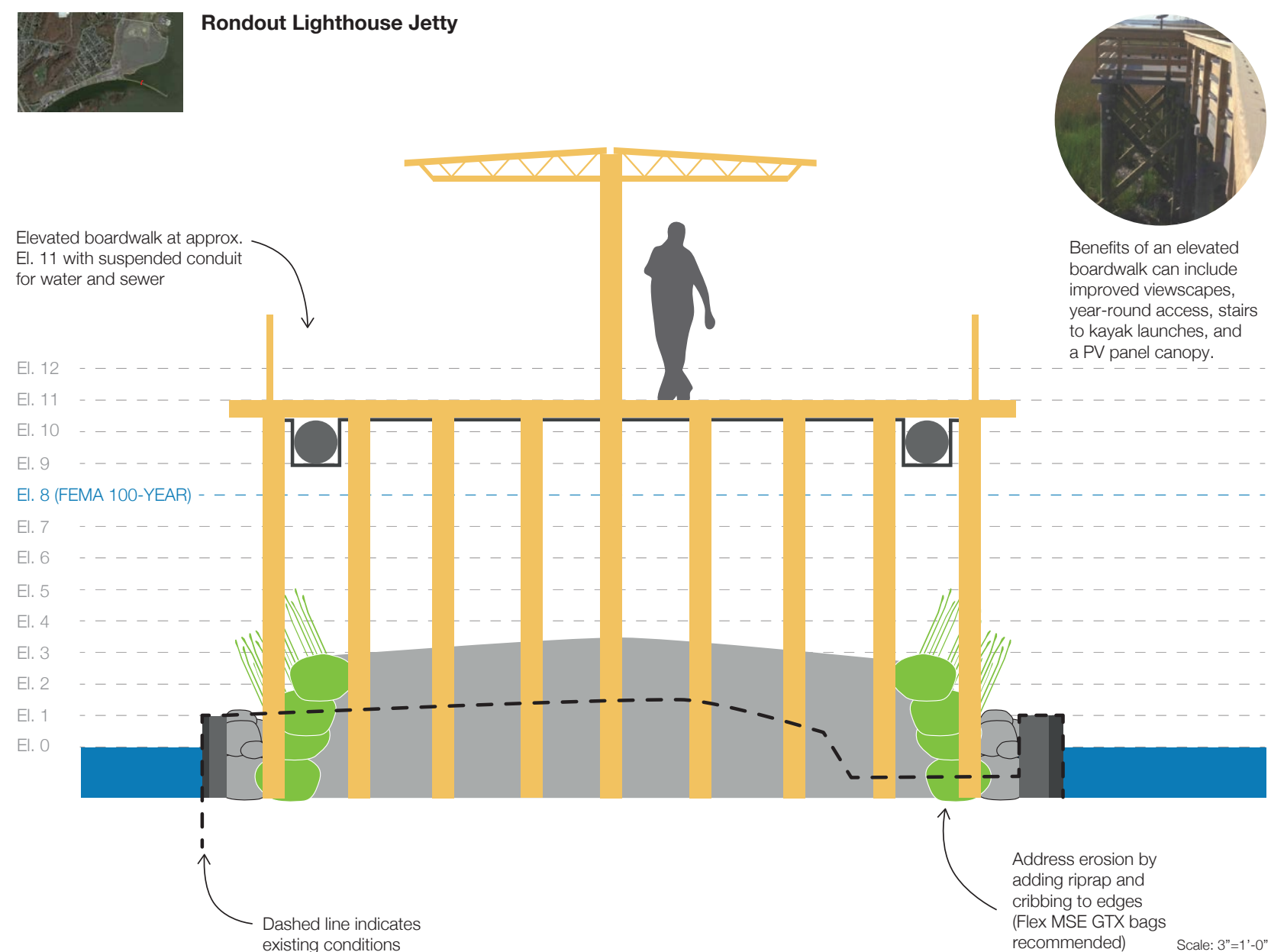### Lighthouse Breakwater

Existing Conditions

Drone footage and site photos of existing conditions taken in January 2019
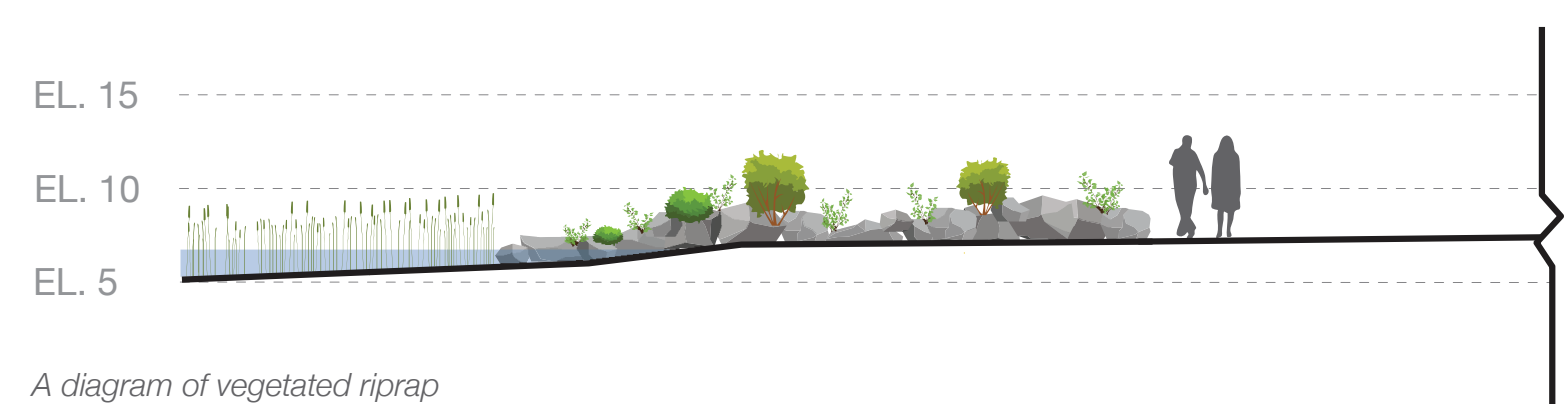
Preliminary Design Concepts

A plan of preliminary design concepts for the Lighthouse Breakwater

Rondout Lighthouse Jetty

Elevated boardwalk at approx. El. 11 with suspended conduit for water and sewer

Benefits of an elevated boardwalk can include improved viewscapes, year-round access, stairs to kayak launches, and a PV panel canopy.

EL. 12
EL. 11
EL. 10
EL. 9
EL. 8 (FEMA 100-YEAR)
EL. 7
EL. 6
EL. 5
EL. 4
EL. 3
EL. 2
EL. 1
EL. 0

Dashed line indicates existing conditions

Address erosion by adding riprap and cribbing to edges (Flex MSE GTX bags recommended)

Scale: 3"=1'-0"

A diagram of an elevated boardwalk over the Jetty

A rendering of a pedestrian pathway along the Jetty

EL. 15
EL. 10
EL. 5

A diagram of vegetated riprap

EL. 15
EL. 10
EL. 5

A diagram of a restored wetland

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Trolley Trail & Causeway
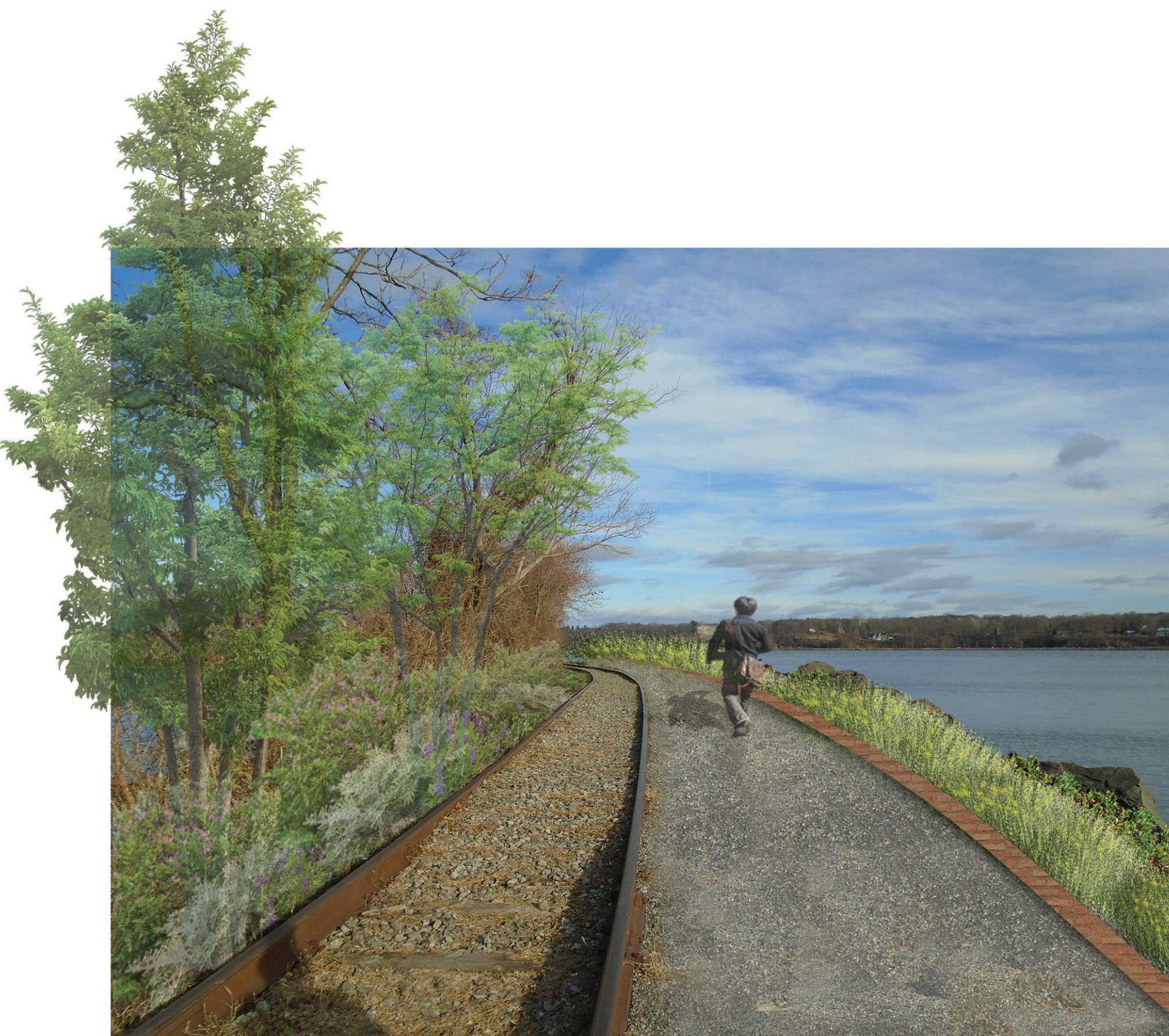
Existing Conditions ›››

Preliminary Design Concepts ›››

A site plan of preliminary design concepts along the trolley trail and causeway

From left to right: vegetated riprap, pedestrian pathways, and a living shoreline

Site photos of existing conditions taken in January 2019

A rendering of proposed stratgies along the trolley trail and causeway

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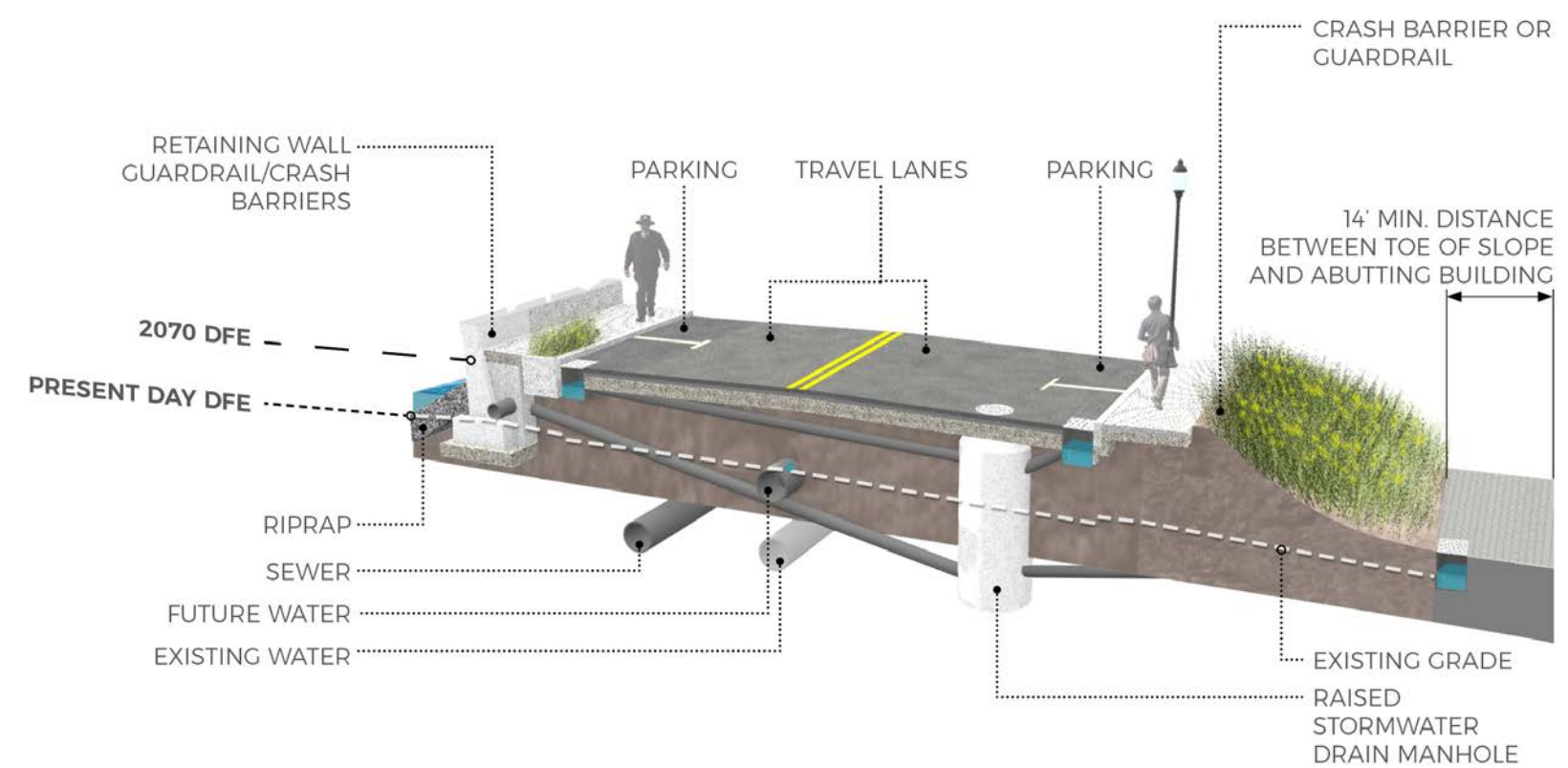
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East Strand & North Street Improvements

## Existing Conditions

Site photos of East Strand and North Street

CRASH BARRIER OR GUARDRAIL

RETAINING WALL GUARDRAIL/CRASH BARRIERS

PARKING   TRAVEL LANES   PARKING

14' MIN. DISTANCE BETWEEN TOE OF SLOPE AND ABUTTING BUILDING

2070 DFE
PRESENT DAY DFE

RIPRAP
SEWER
FUTURE WATER
EXISTING WATER

EXISTING GRADE
RAISED STORMWATER DRAIN MANHOLE

A diagram of an elevated roadway with stormwater management strategies proposed in Boston, Massachusetts
Note: DFE, or Design Flood Elevation, is the height of the lowest occupiable space when designing for anticipated future flooding

Preliminary Design Concepts

A rendering of proposed bioretention along East Strand Street
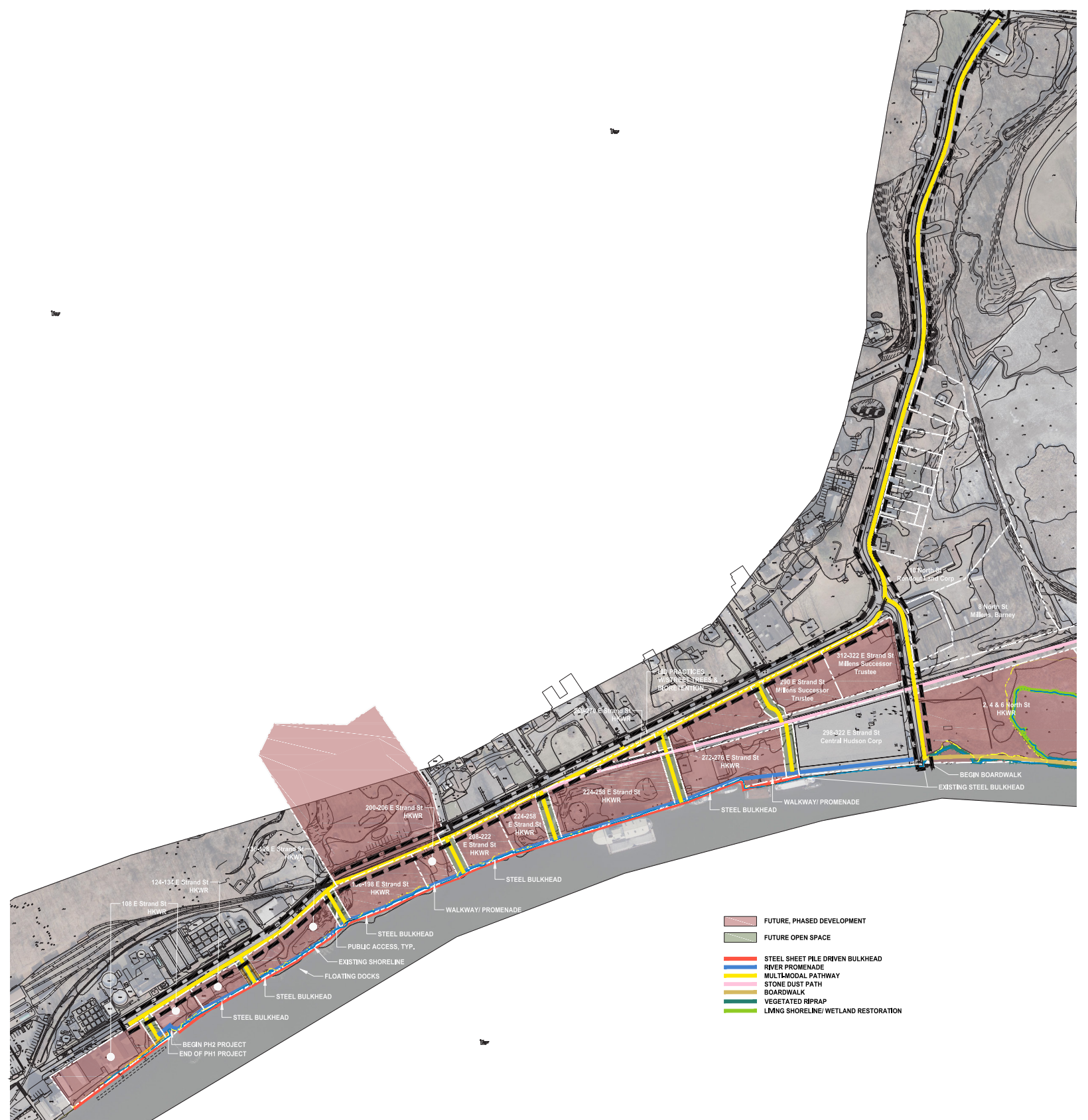
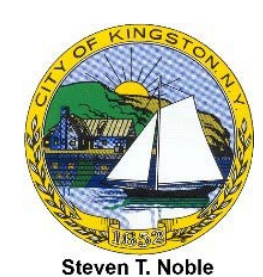*A site plan of preliminary design concepts*

A rendering of a bike lane along North Street. Base image credit: Google Maps

Diagrams of bioretention strategies including porous pavement and rain gardens

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Kingston Rondout II Lighthouse Renovations

The lighthouse, located in the Hudson River at the mouth of the Rondout Creek, is owned by the City of Kingston. The City is responsible for maintenance, but the structure is utilized by the Hudson River Maritime Museum for seasonally offered tours of the historic site. The property is registered historic and has an active light station owned and maintained by the US Coast Guard. This light is a self-contained automatic solar powered system.

On October 29th, 2012 Hurricane Sandy struck Ulster County, NY. Tidal surge in the Hudson River entered the exterior basement door and flooded the basement of the historic (1915) Kingston Lighthouse (a.k.a. Rondout II Lighthouse) located on an islet in the Hudson River. Water flooded to the basement ceiling, soiling the floors, walls, ceiling, and damaging the basement's contents and the buildings electrical service/system, plumbing, sump pump, oil tanks and boiler.

Restoring the Rondout II Lighthouse to its condition prior to Superstorm Sandy will require electric and heat service to be reestablished. The source of the electric and the service on land was disconnected by Central Hudson as part of a site remediation project. Additionally, the City of Kingston is interested in moving away from an oil heating system as was previously present, to a cleaner and more sustainable heating system.

Weston & Sampson and the City are identifying and designing an electric system while also determining the best source of electricity. Options are traditional electric lines, solar, or a combination. The electric system that is chosen will depend on the design for access along the breakwater to the lighthouse. A preferred heating and plumbing system is also being identified and designed. Sewer or composting services are being explored to provide bathrooms at the lighthouse, and options for the delivery of potable water are in development.

Existing Conditions

Aerial drone footage of the lighthouse

Erosion along the jetty, observed in January 2019

The solaris boat

The lighthouse basement, which lacks utility connections

Preliminary Design Concepts
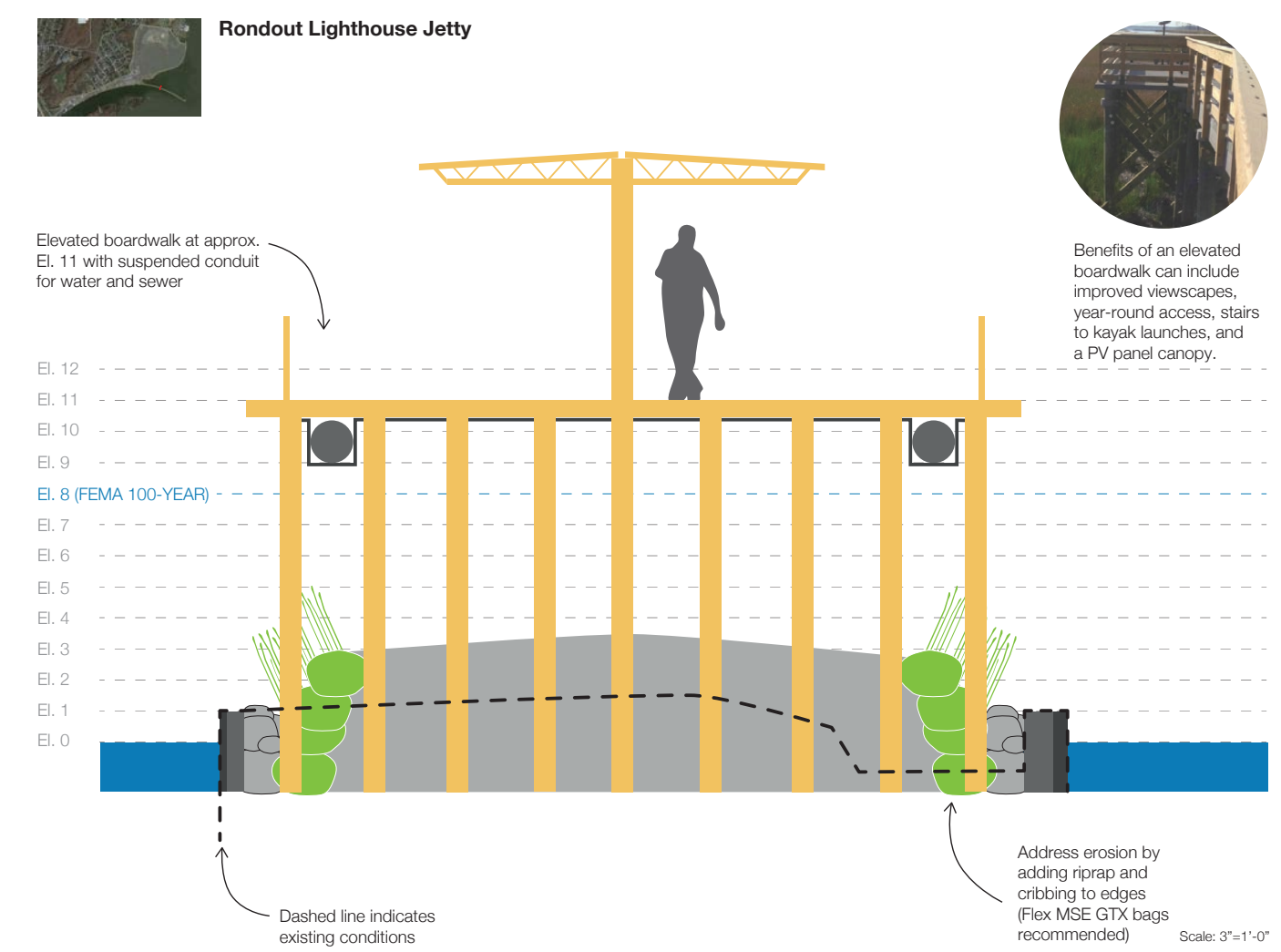
Solar Options

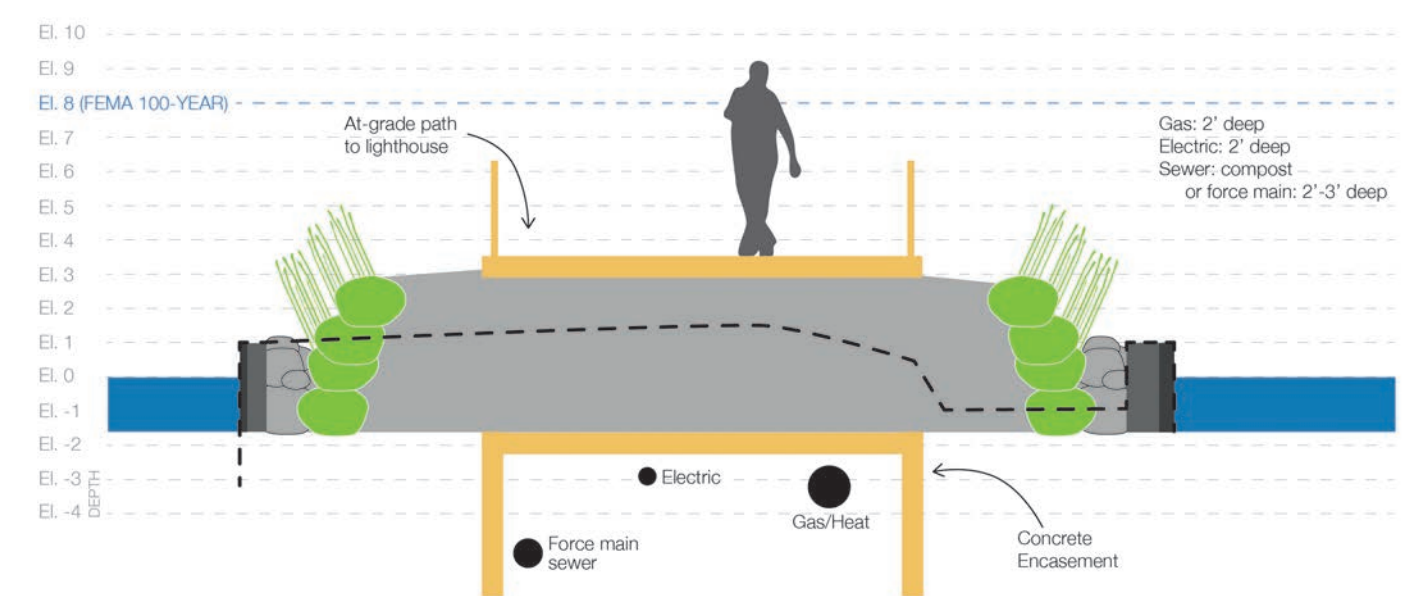*Rendering of solar panels and shade structure on the gangway*

Rendering of solar panels along the lighthouse jetty

Traditional Electric Options

A diagram of an elevated boardwalk over the Jetty, with utilities under the boardwalk

Diagrams of a pedestrian path on the jetty to the lighthouse, with utility piping below grade

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