

ATTACHMENT E  
**MAPS AND DRAWINGS**

AttEMapsDrawings  
AttEMapsDrawings.pdf

U.S Department of Housing & Urban Development's  
**NATIONAL DISASTER RESILIENCE COMPETITION**

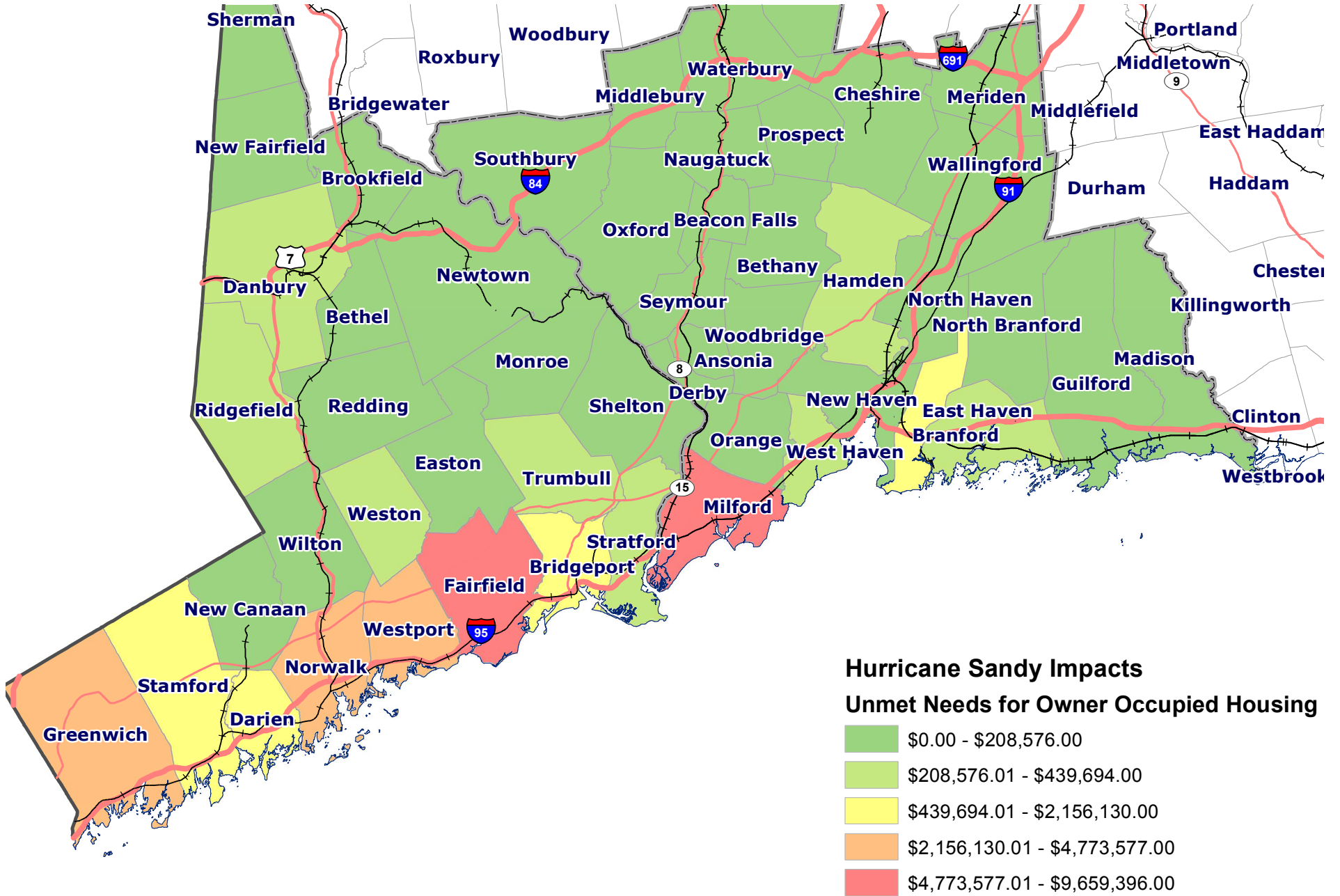
**APPLICANT: THE STATE OF CONNECTICUT  
PHASE II APPLICATION**

October 27, 2015

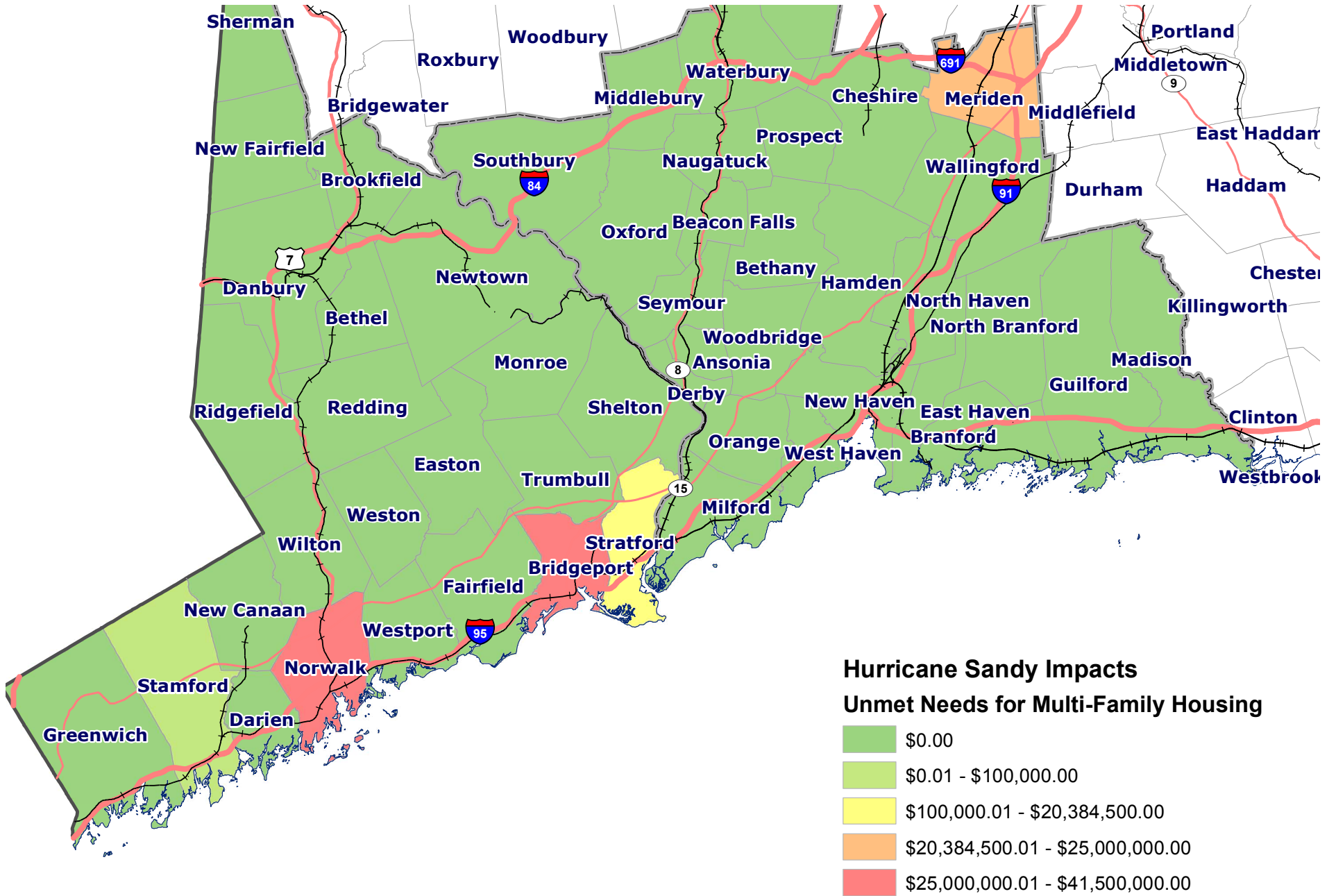
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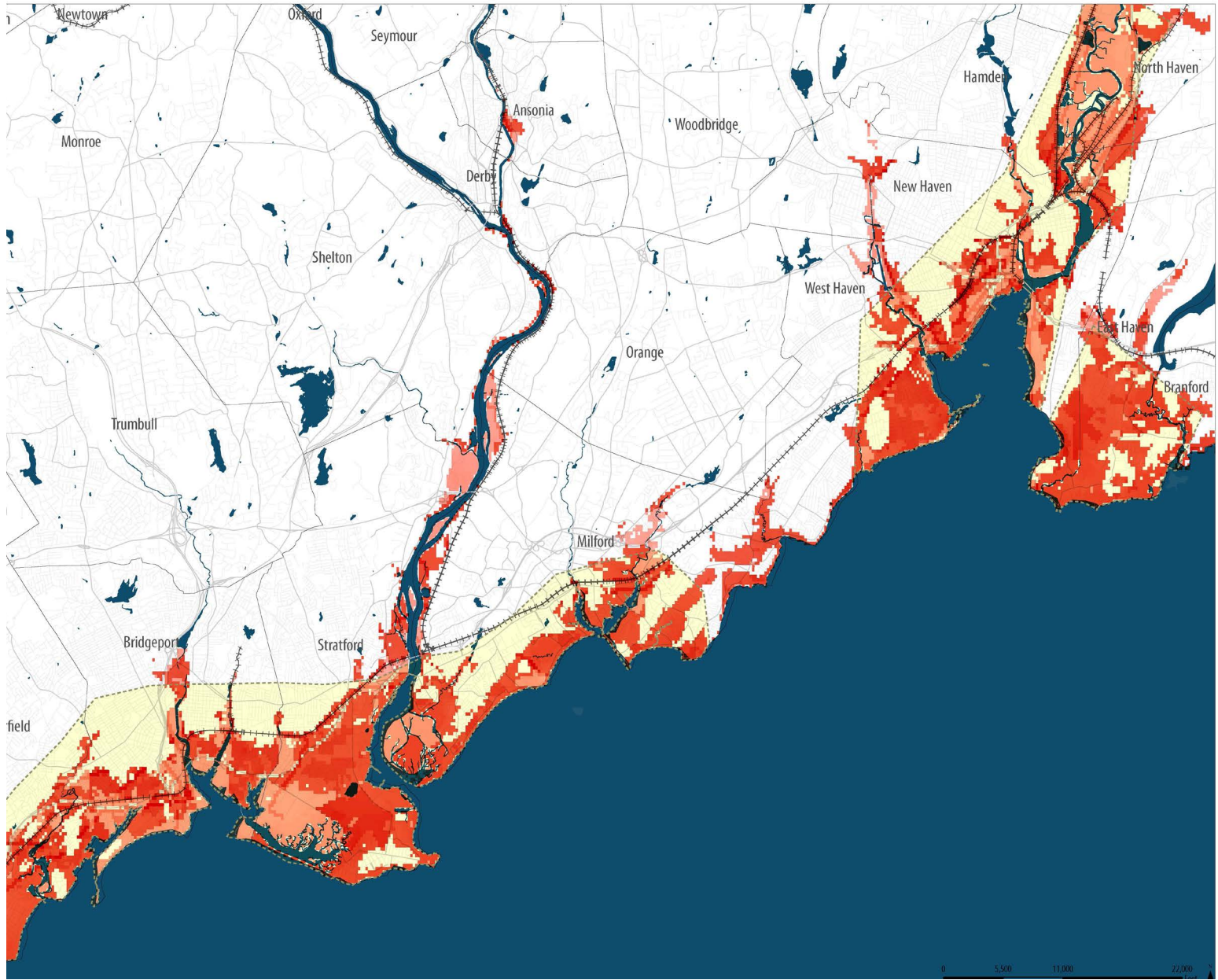
## Regional Map 1: Hurricane Sandy Impacts - Total Unmet Owner Occupied Housing Needs



Regional Map 2: Hurricane Sandy Impacts - Total Unmet Multi-Family Housing Needs







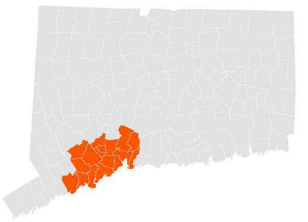
**CT NDRC**

■ NACCS Risk Areas

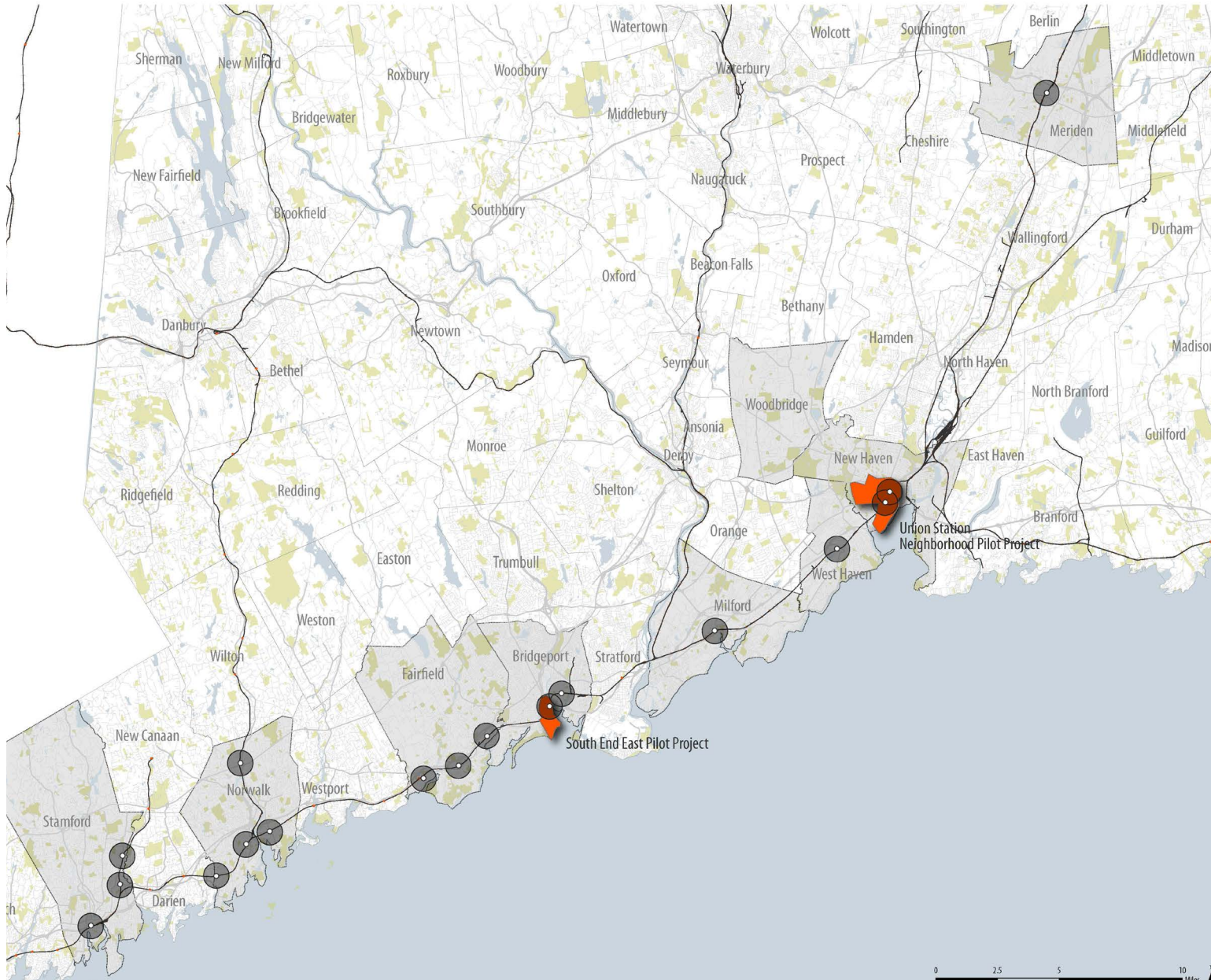
**USACE COMPOSITE EXPOSURE INDEX**

■ High  
■ Low

Source:  
City of New Haven, CT DOT  
FEMA FIRM, NOAA NACCS



**Regional Map 3: USACE NACCS Risk Areas + Composite Exposure Index**



**CT NDRC  
Regional**

**CT COASTAL PLAN AREA &  
RESILIENCE PILOT LOCATIONS**

- Pilot Projects
- Regional Initiative

**RESILIENT TOD**

- 1/2 Mile Buffer around Stations
- Train Station



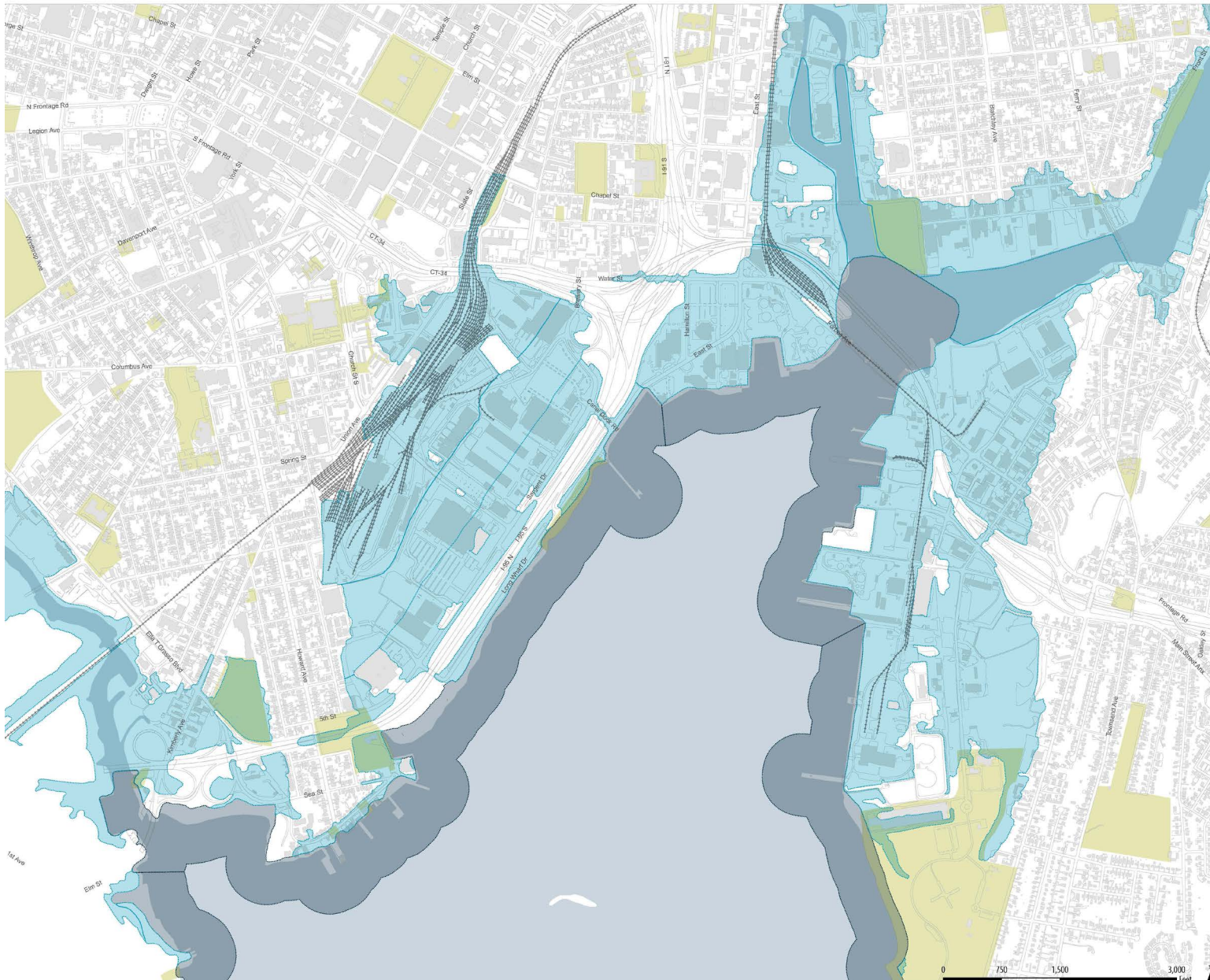
**Regional Map 4: CT Coastal Plan Area + Resilience Pilot Locations**



# CT NDRC // NEW HAVEN//L.WHARF

## FEMA FIRM FLOOD ZONE

- VE Zone (waves above 3')
- 100 Year Floodplain (1% annual chance)
- 500 Year Floodplain (.2% annual chance)



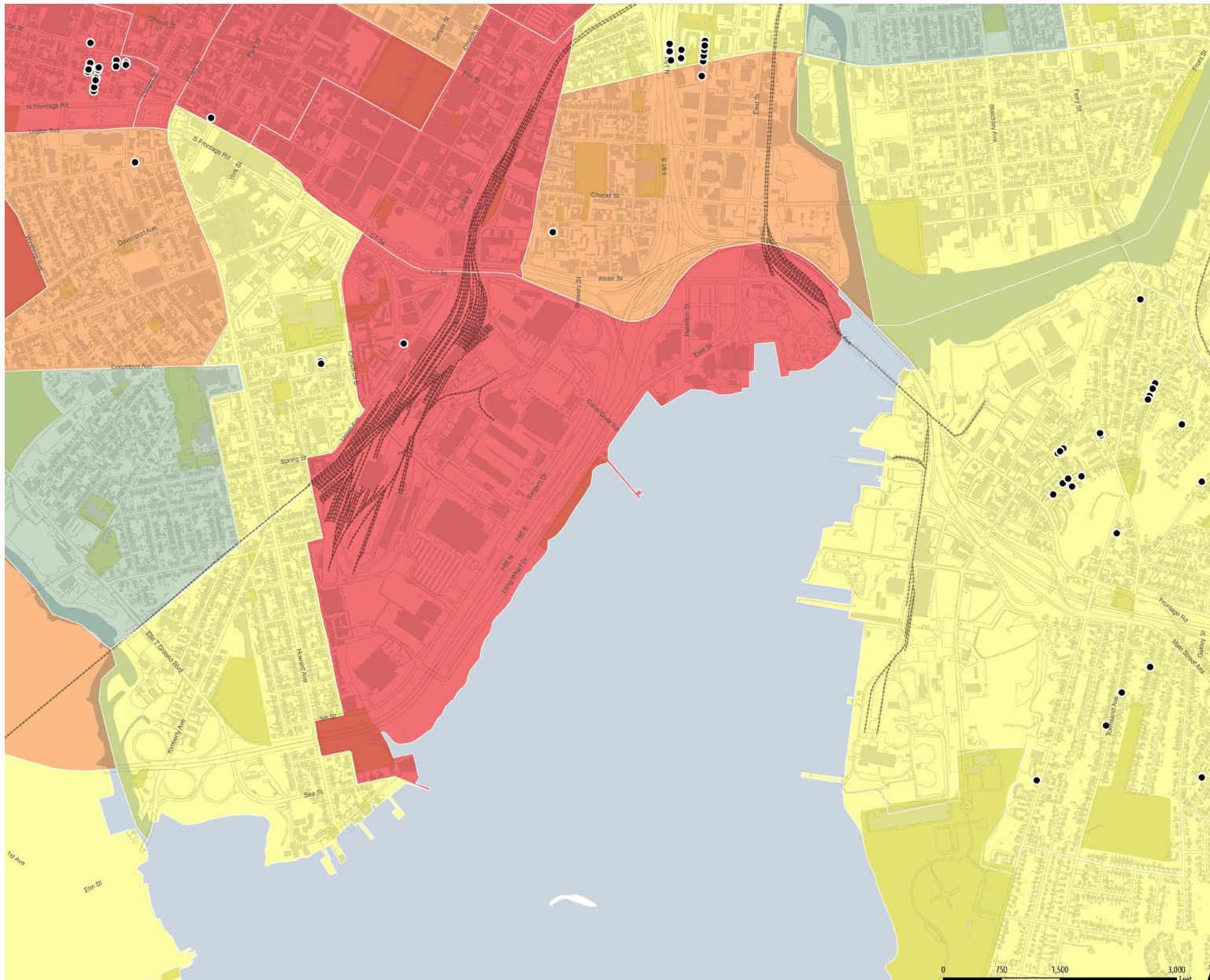
Source:  
City of New Haven, CT DOT  
FEMA FIRM



## New Haven Map 1: FEMA FIRM Flood Zone



**CT NDRC // NEW HAVEN//L.WHARF**



**SOCIAL VULNERABILITY INDEX**

- High
- Medium High
- Medium
- Medium Low
- Low

**VULNERABLE POPULATIONS**

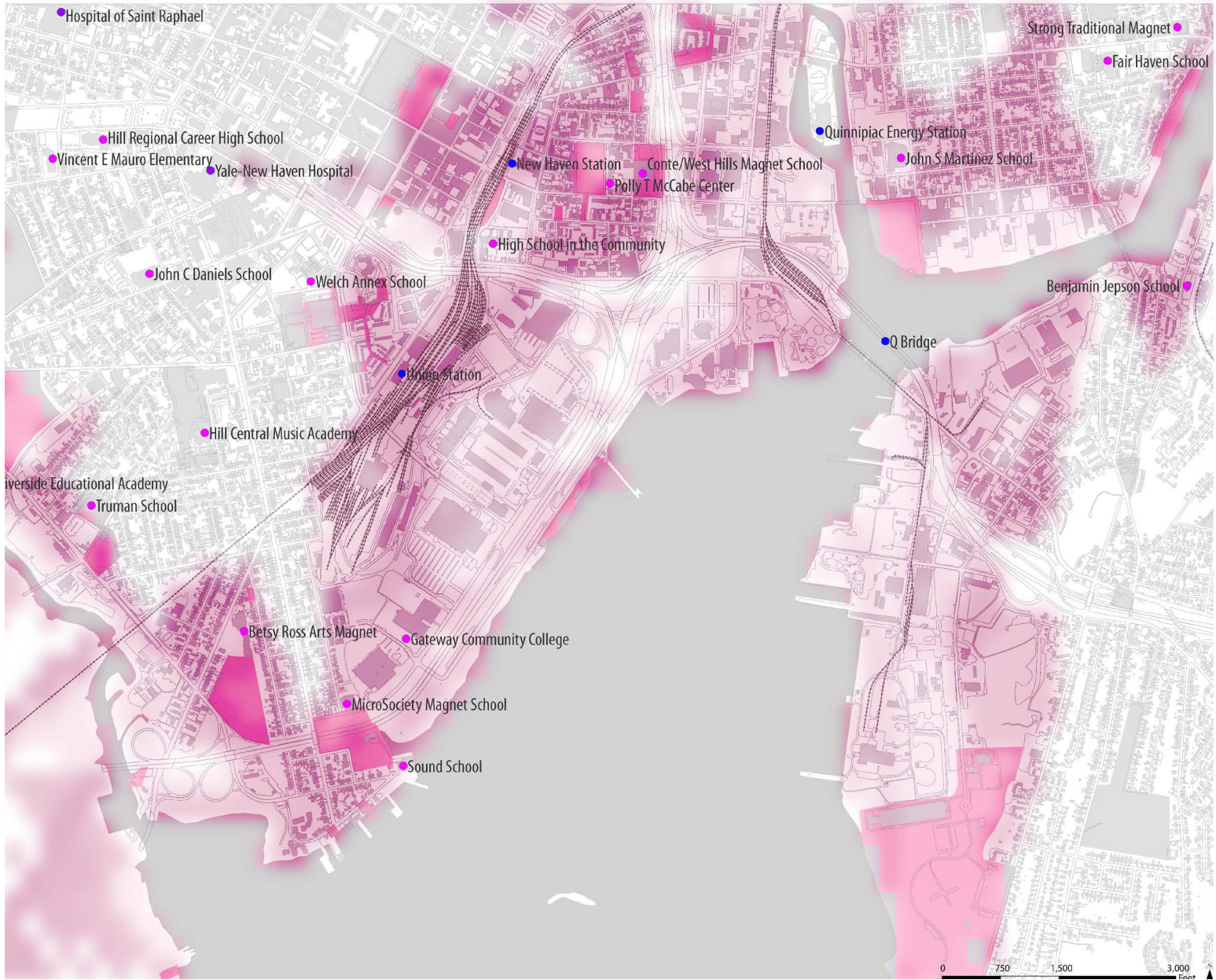
- Public Housing Facility

Source:  
City of New Haven, CT DOT  
Social Vulnerability Index (SOVI), NOAA



**New Haven Map 2: Social Vulnerability**





**CT NDRC // NEW HAVEN//L.WHARF**

**ASSETS**

- Airport
- School Facility
- Medical Facility
- Government Facility
- Other

**USACE INFRASTRUCTURE EXPOSURE INDEX**



Source:  
City of New Haven, CT DOT  
USACE North Atlantic Coast Comprehensive Study, CT DEEP



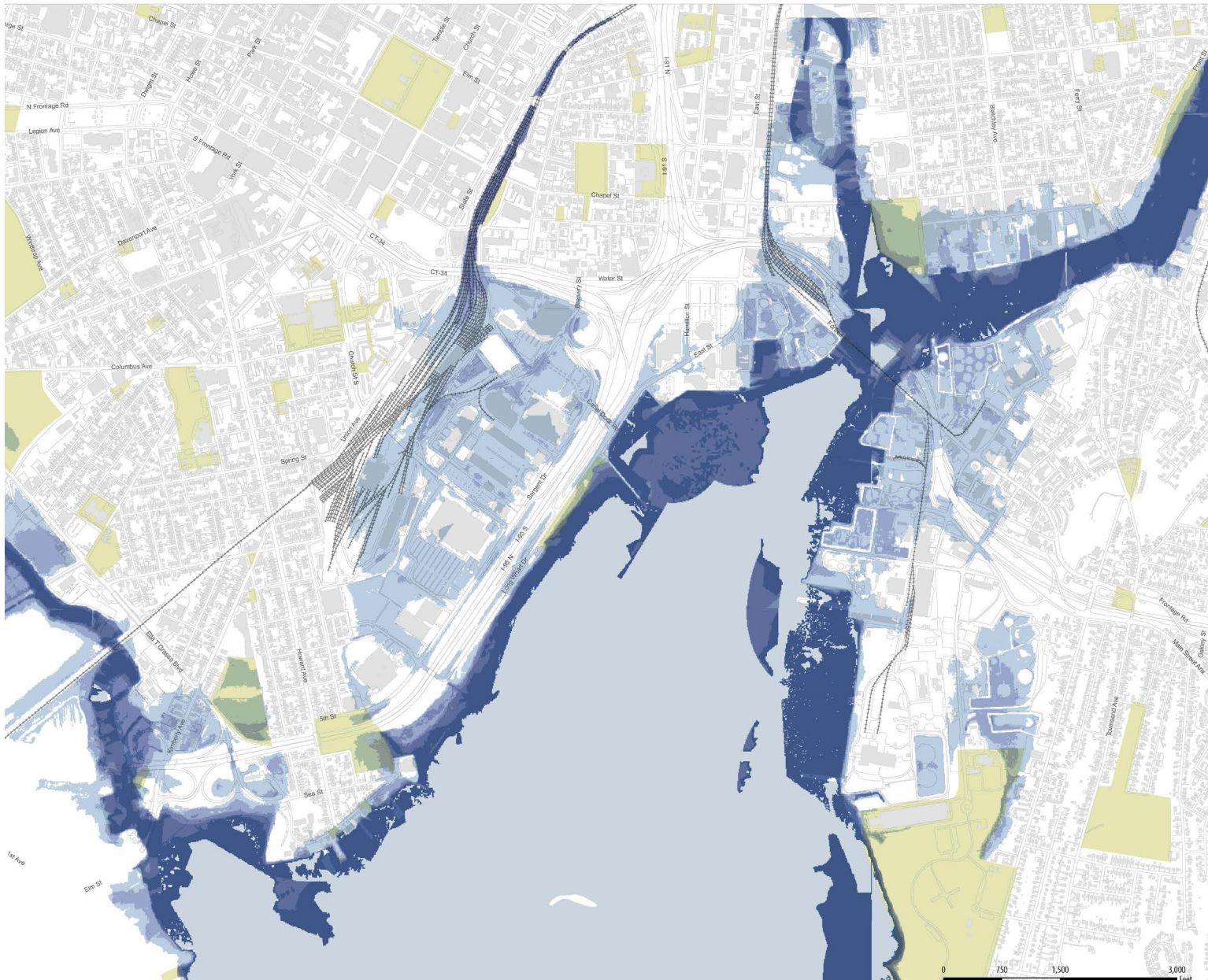
**New Haven Map 3: Assets, Infrastructure, and Neighborhoods**



**CT NDRC // NEW HAVEN//L.WHARF**

**HURRICANE SANDY INUNDATION**

- <3 ft
- 3-6 ft
- 6-9 ft
- >9 ft



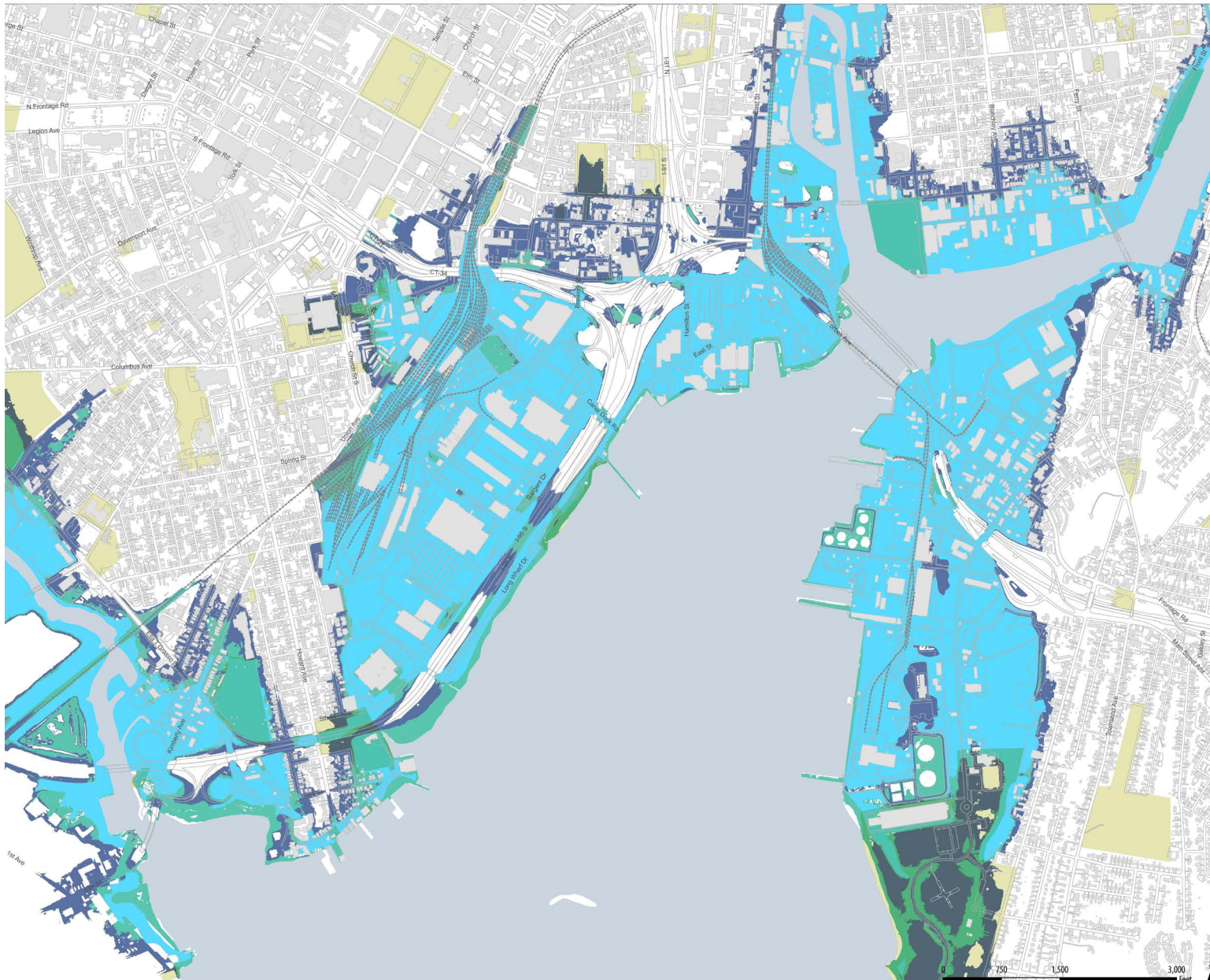
Source:  
City of New Haven, CT DOT  
FEMA Sandy Modeling Task Force



**New Haven Map 4: Sandy Inundation**



**CT NDRC // NEW HAVEN//L.WHARF**



- SEA LEVEL RISE APPROXIMATIONS**
- 100 Year Floodplain (1% annual chance)
  - 100 Year Floodplain + 2050 Sea Level Rise (>1')
  - 100 Year Floodplain +2100 Sea Level Rise (>6.6')

Source:  
City of New Haven, CT DOT  
FEMA FIRM, NOAA NACCS



**New Haven Map 5: Sea Level Rise, 2050 & 2100**



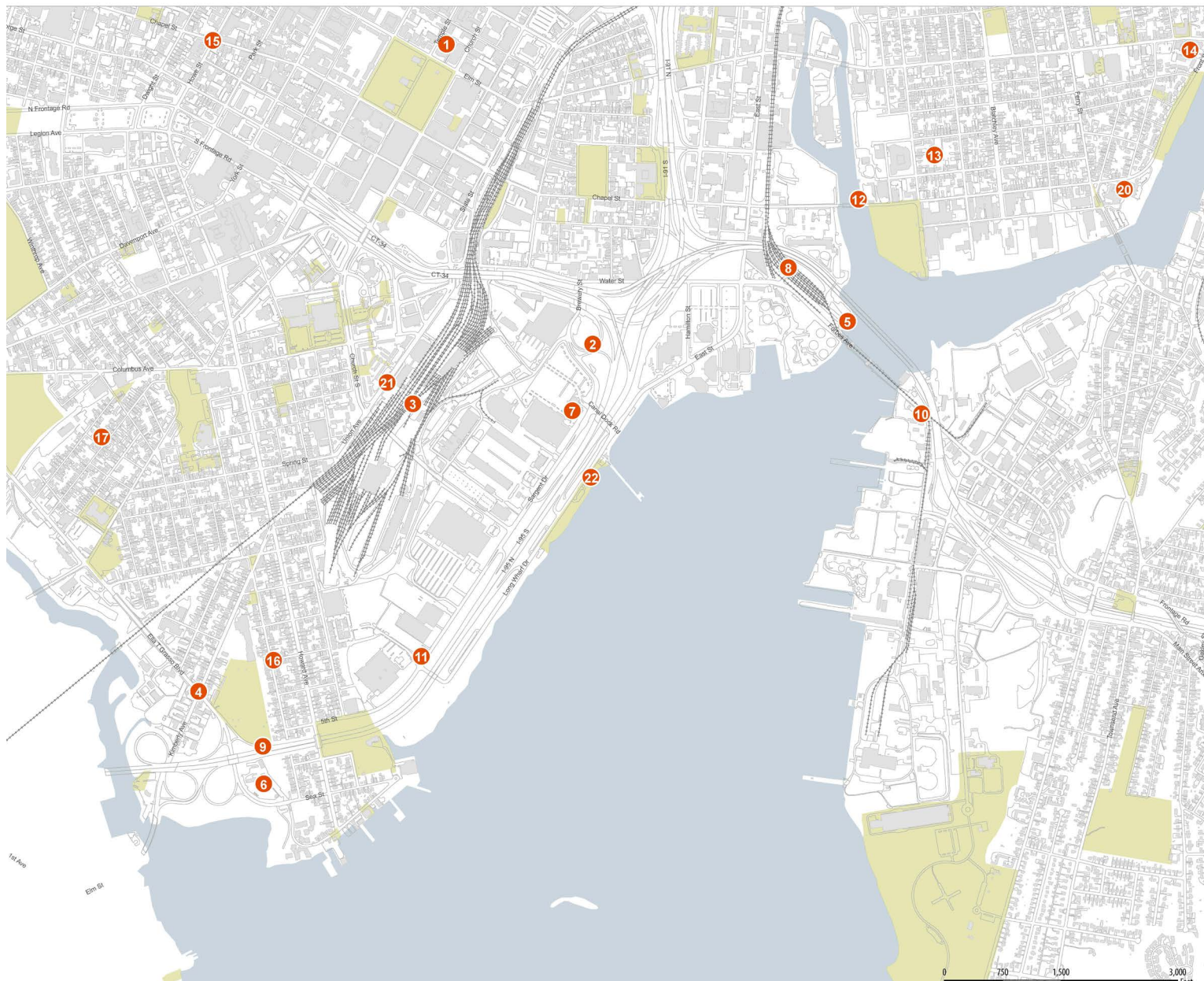
# CT NDRC // NEW HAVEN//L.WHARF

## EXISTING/ONGOING PROJECTS

# Project

ID	AGENCY	PROJECT DESCRIPTION
1	CTDOT	Traffic Signal Upgrade
2	CTDOT	Contaminated Soil Management
3	CTDOT	NHRY - Yard Power Upgrade
4	CTDOT	Safety Improvements
5	CTDOT	Bridge Aesthetic Lighting
6	CTDOT	Generator Replacement
7	CTDOT	Reconstruction of I-95/I-91/RTE 34
8	CTDOT	B2 Pearl Harbor Mem Br.
9	CTDOT	Rehabilitation Bridge 00163A
10	CTDOT	I-95 Q Bridge Replacement
11	CTDOT	I-95 Long Wharf - Final
12	CTDOT	I-95/I-91New Haven Area VMS
13	CTDOH	Fair Haven Mutual Housing (2013)
14	CTDOH	River Run Apartments
15	CTDOH	West Village Apartments
16	CTDOH	Affordable Housing Development Project (2011)
17	CTDOH	Val Macri Supportive Housing (aka Columbus House Supportive Housing
18	CTDOH	George Street Mutual Housing
19	CTDOH	New Haven Microhomes
20	CITY	Brewery Square Bulkhead Rehabilitation
21	CITY	Mitigation and Resiliency Projects for Union Avenue
22	CITY	Long Wharf Storm Water Mitigation

Source:  
City of New Haven, CT DOT  
CT DOH, CT DEEP



## New Haven Map 6: Existing Projects



**1. MANAGEMENT OF COASTAL AND INLAND STORM WATER CONVERGENCE**

- 1.1** Connection to storm water junction bypass using archimedes screw
- 1.2** Public art feature as entry to Long Wharf neighborhood and connection to New Haven downtown art walk
- 1.3** Dry canal to redirect storm water from J3 bypass
- 1.4** Wet/dry storm water detention basins as elemental landscape
- 1.5** Secondary inland protection of rail yard through elevating the Vision Trail, reinforcing planned wall at MOW facility and constructing a berm along Church Street Extension
- 1.6** Future bioswale installation in industry parking lots
- 1.7** Future expansion of stormwater management system

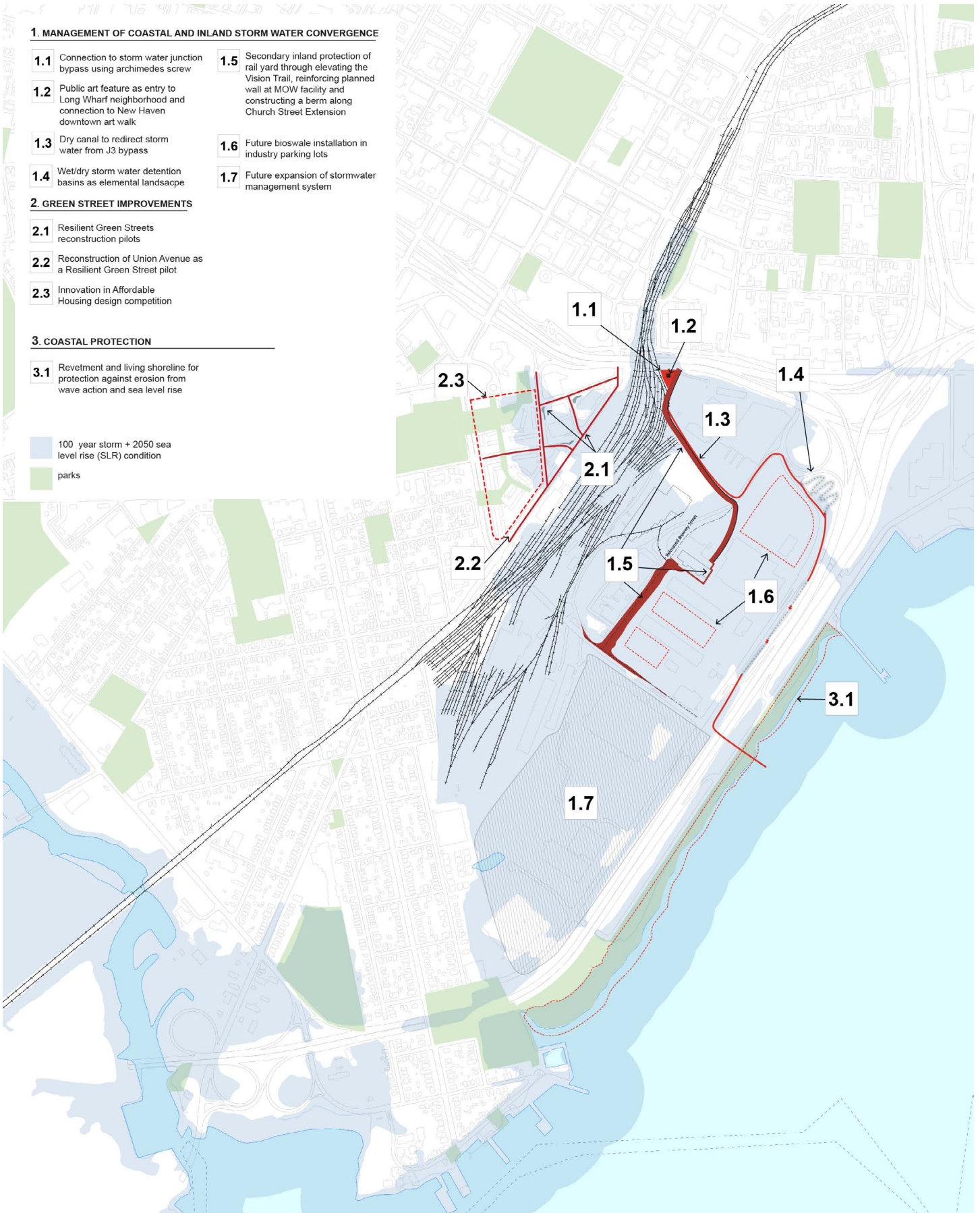
**2. GREEN STREET IMPROVEMENTS**

- 2.1** Resilient Green Streets reconstruction pilots
- 2.2** Reconstruction of Union Avenue as a Resilient Green Street pilot
- 2.3** Innovation in Affordable Housing design competition

**3. COASTAL PROTECTION**

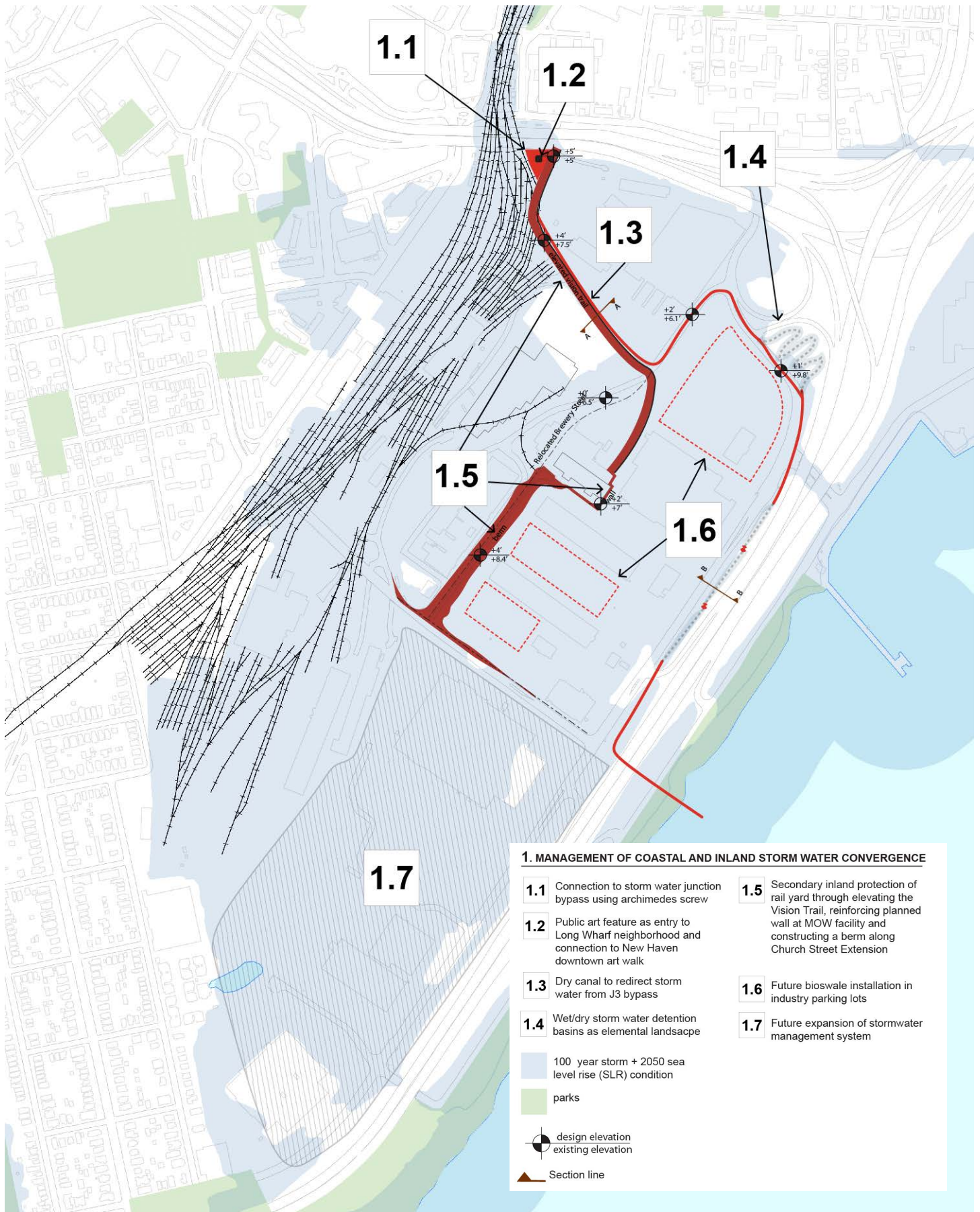
- 3.1** Revetment and living shoreline for protection against erosion from wave action and sea level rise

100 year storm + 2050 sea level rise (SLR) condition  
parks



**New Haven Map 7: Pilot Project Map**





New Haven Map 8: Management of Coastal and Inland Stormwater Convergence Project Map



LEGEND

- ELEVATED BERM AND WALL AS SECONDARY PROTECTION
- GREEN SPACE AND PARK
- CONSTRUCTED SALT MARSH
- STORM WATER TREATMENT AREA
- ARCHEMEDIES SCREW
- LIVING REVETMENT SHORELINE

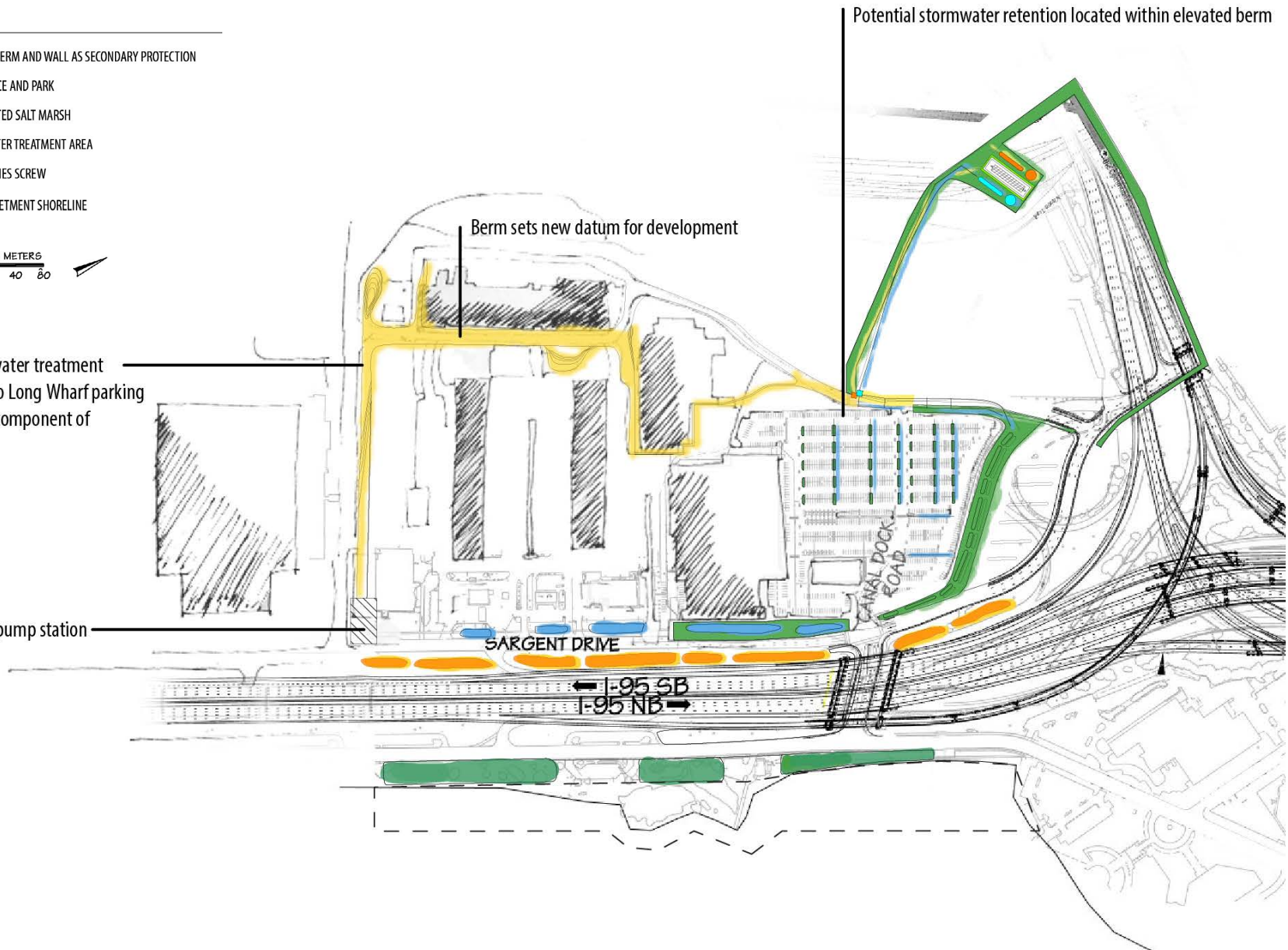
SCALE IN METERS  
 40 0 40 80

Future stormwater treatment integrated into Long Wharf parking lots as future component of development

Church street pump station

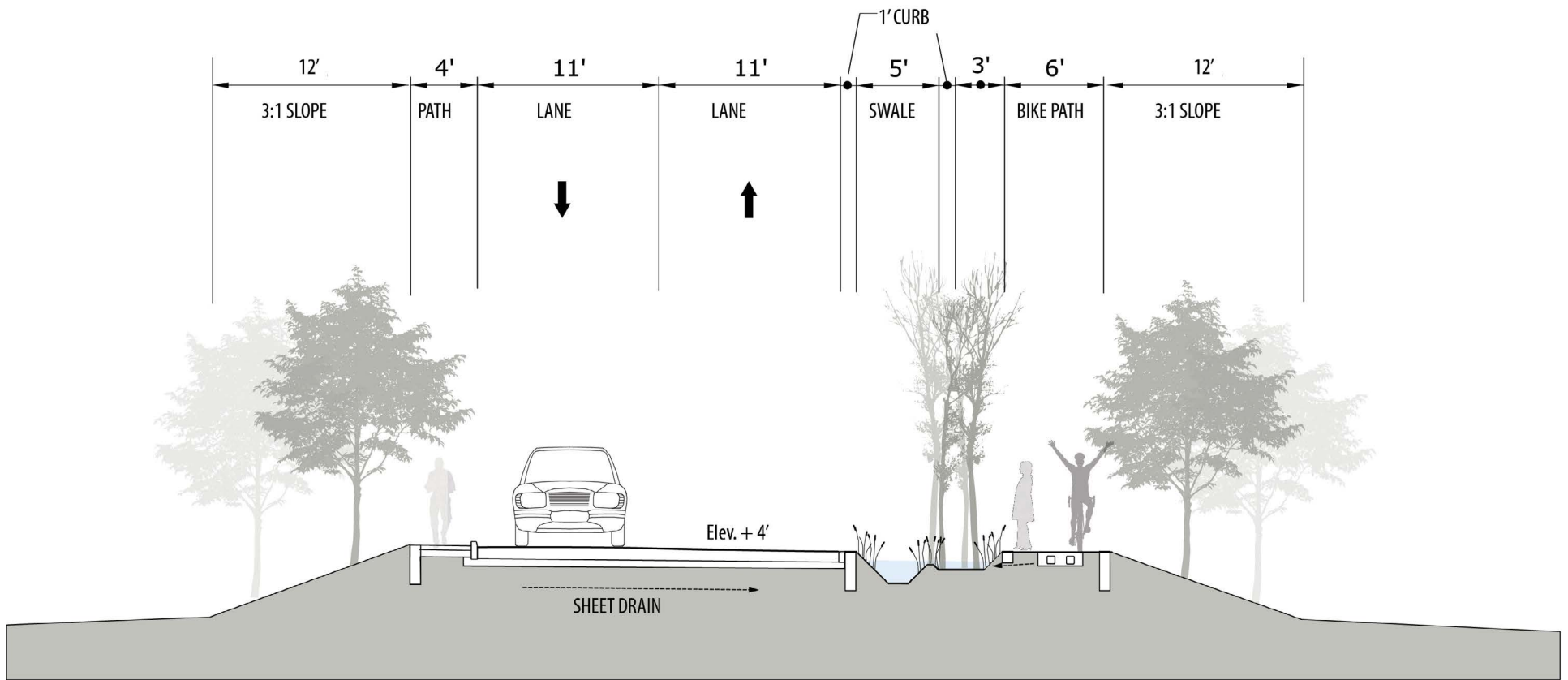
Berm sets new datum for development

Potential stormwater retention located within elevated berm



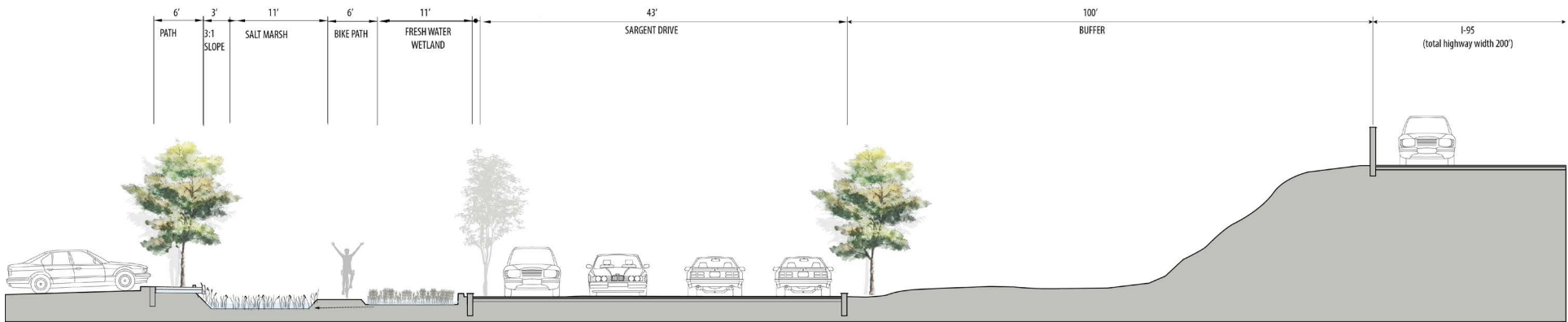
New Haven Conceptual Drawing 1: Long Wharf Stormwater Management Plan



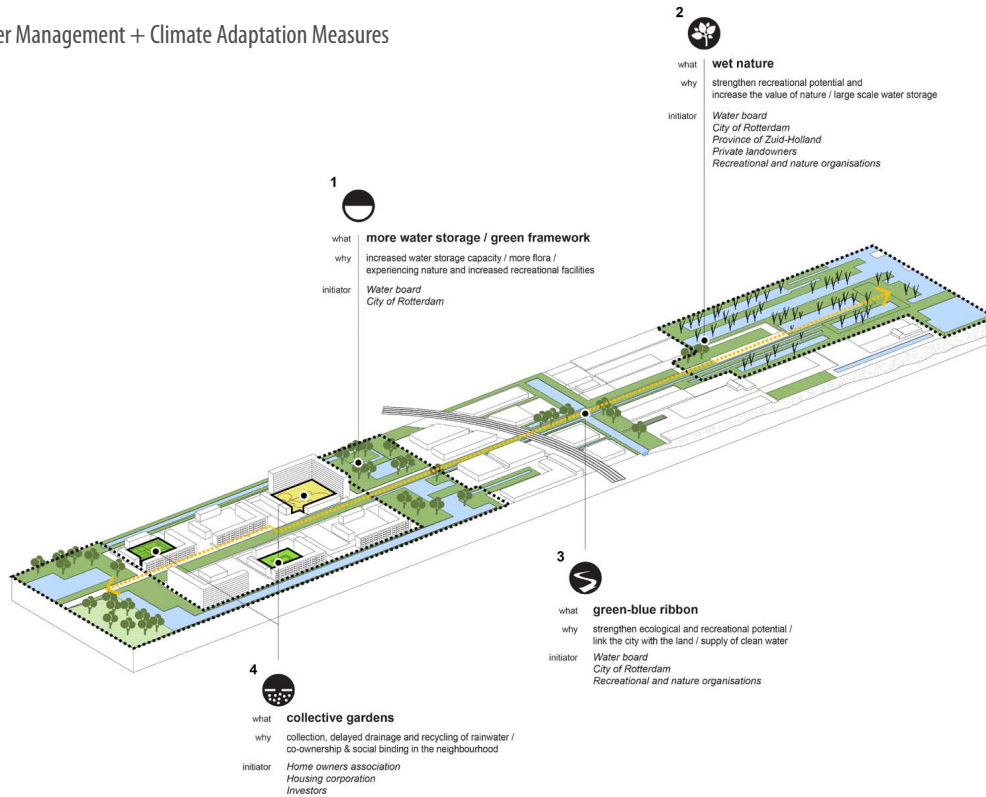


## New Haven Conceptual Drawing 2: Long Wharf Dry/Wet Canal Elevated Along Raised Vision Trail

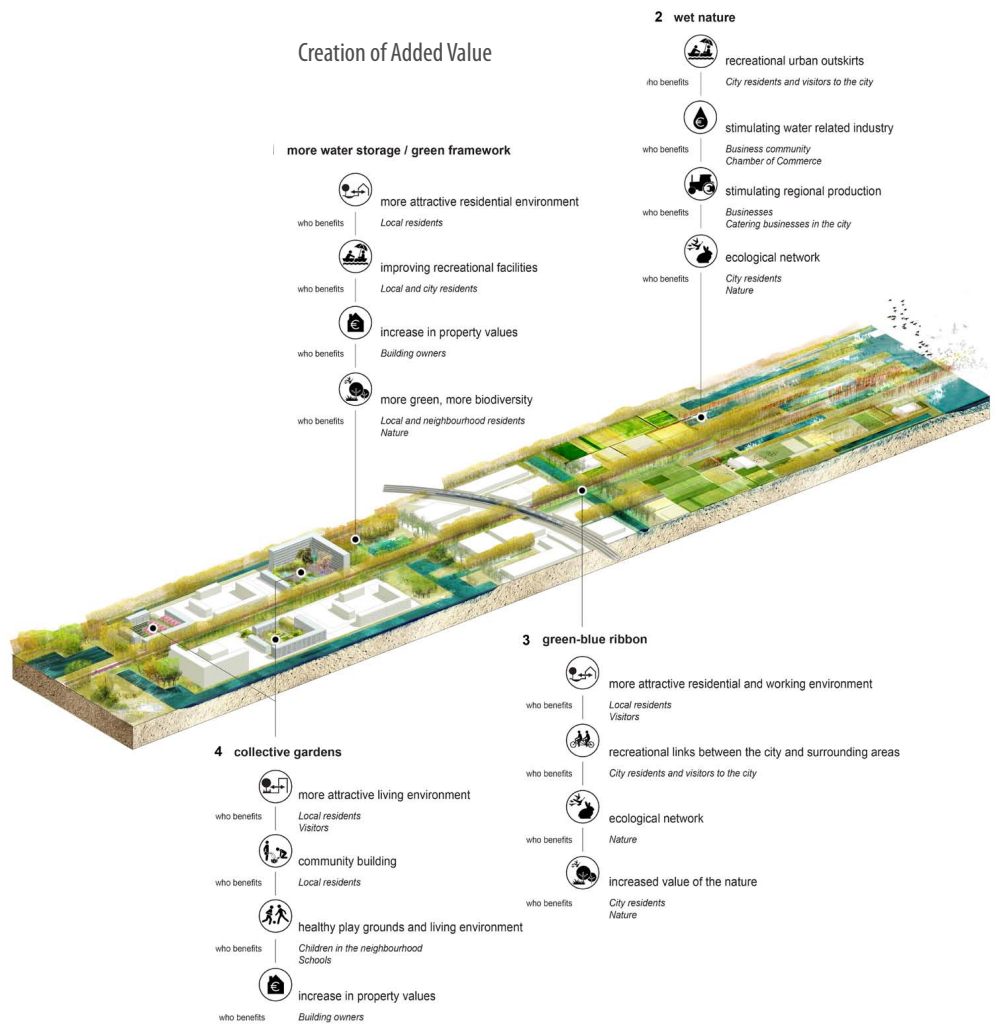




### New Haven Conceptual Drawing 3: Long Wharf Stormwater Retention Basins at Sargent Drive, Section



Creation of Added Value



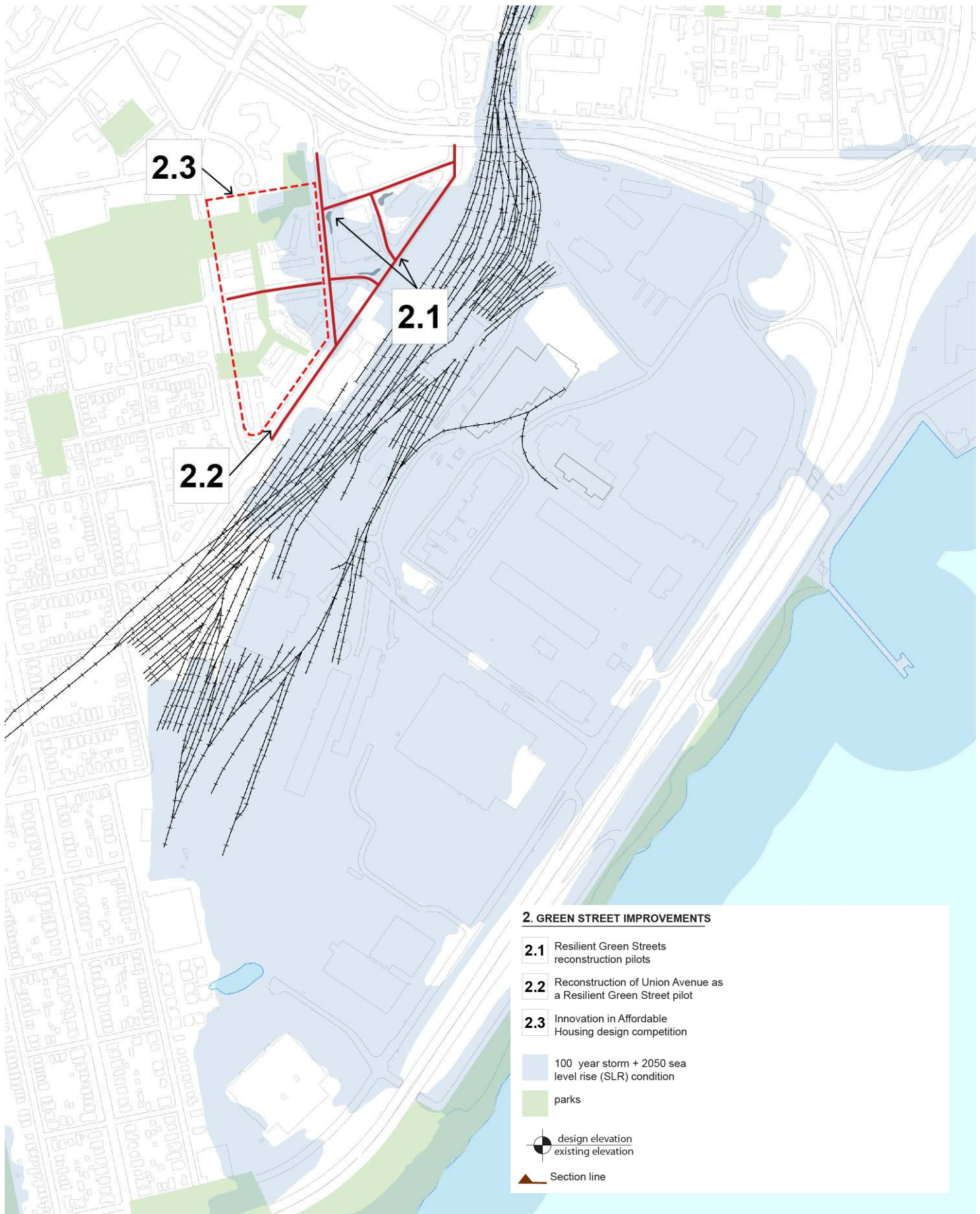
New Haven Conceptual Drawing 4: Rotterdam Adaptation Strategy Precedent





## New Haven Conceptual Drawing 5: London Wetland Center Precedent





## New Haven Map 9: Green Street Improvement Project Map





Plaza with Avenue to Green, Plan for New Haven, 1910



Train Station Design, Plan for New Haven, 1910



Union Station



Union Station to Church Street Housing



Hill to Downtown Study, Plaza and Train Station, Goody Clancy, 2012



## New Haven Conceptual Drawing 6: Reimagining Union Station District



Rotterdam Centraal Station Plaza, Benthem Crouwel Architects

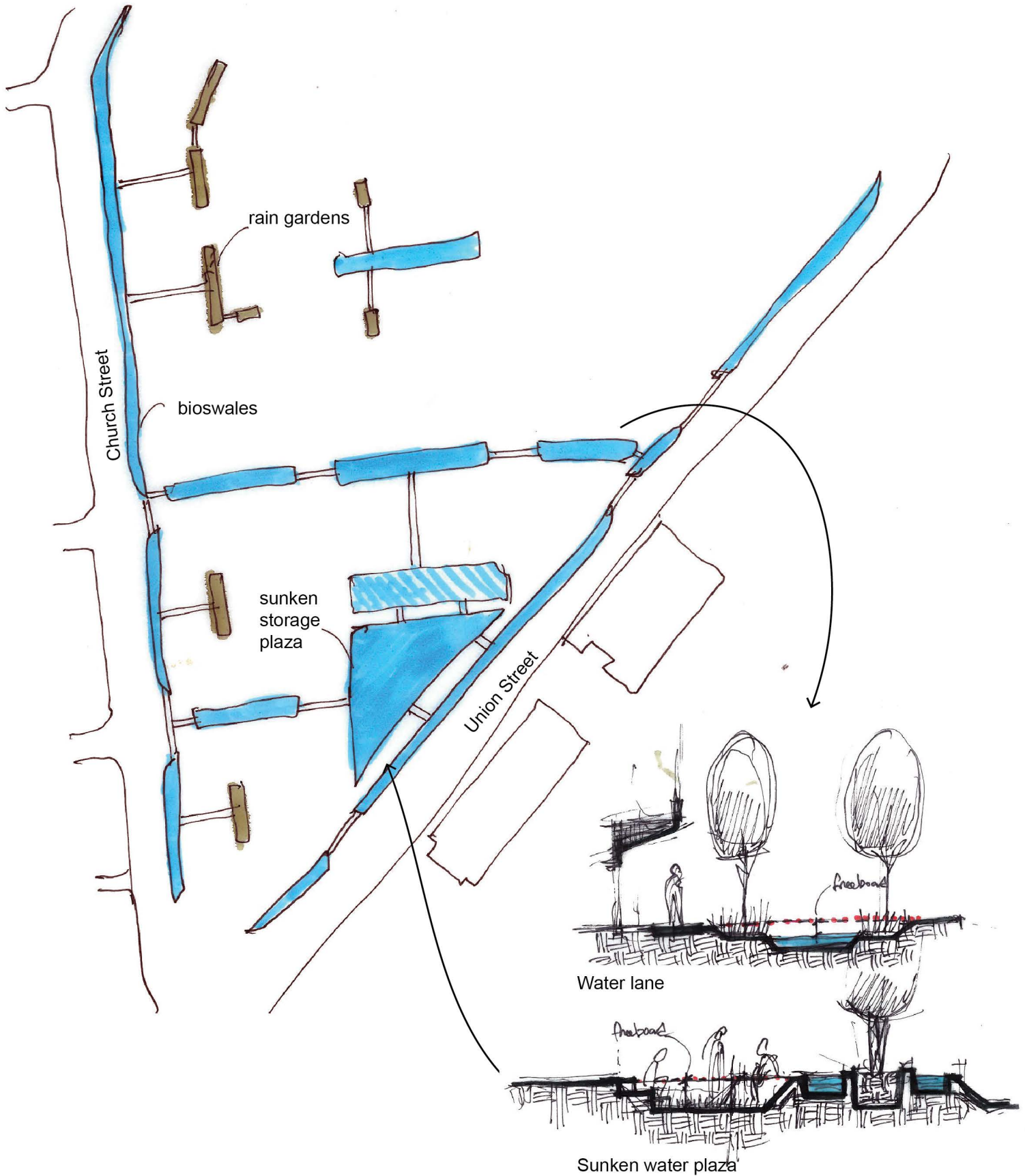


Delft Train Station and City Arrival, Benthem Crouwel Architects

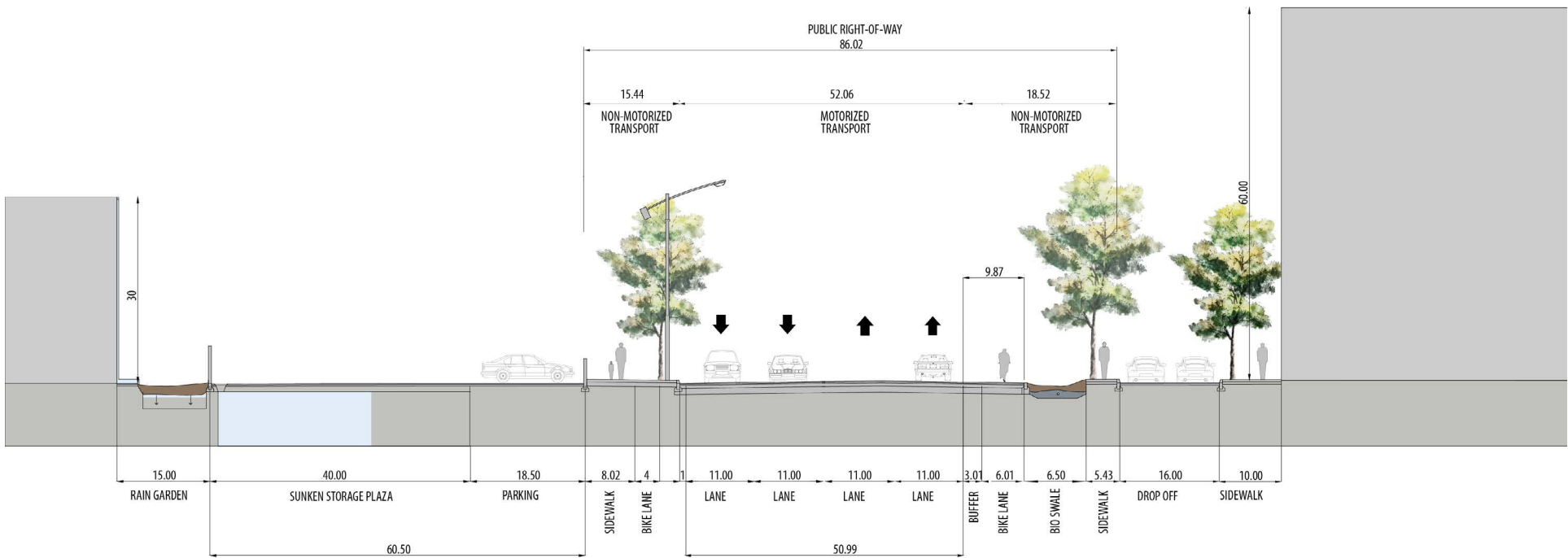


### Reimagining Union Station District (cont...)

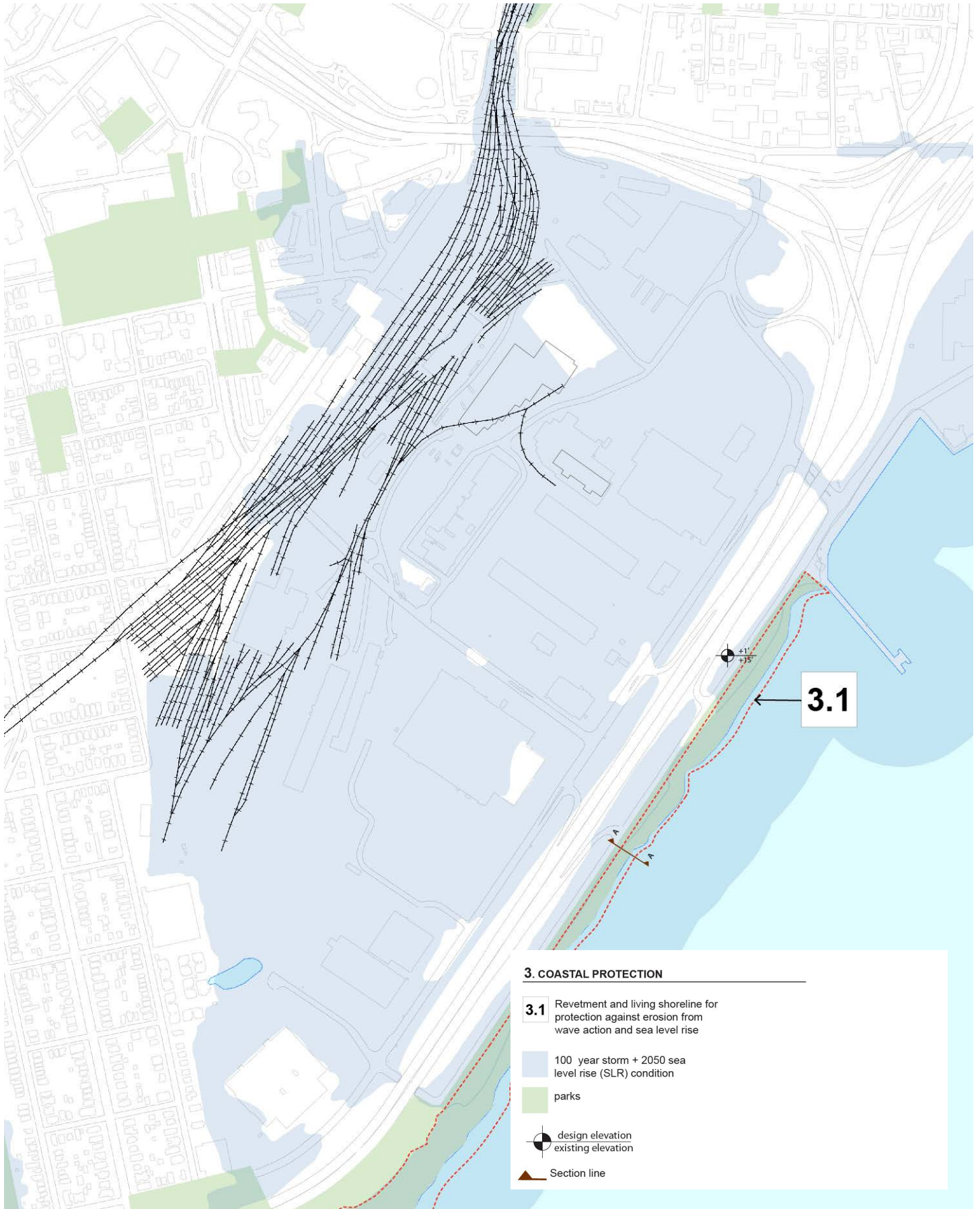




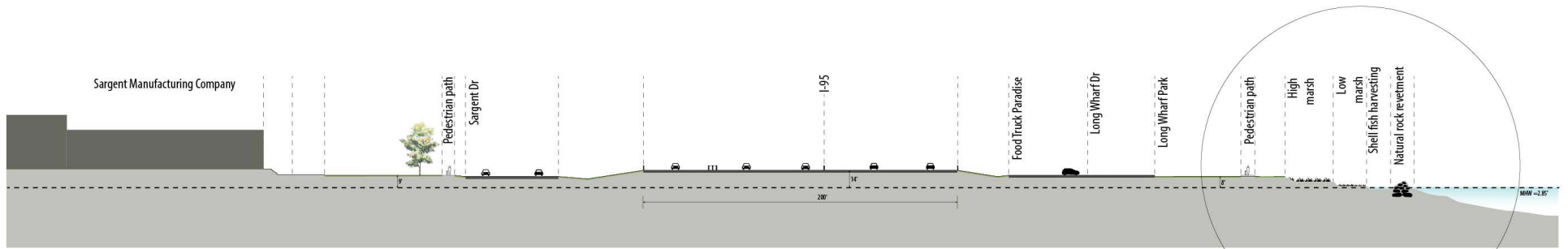
New Haven Conceptual Drawing 7: Stormwater Management in Hill-to-Downtown Neighborhood Plan



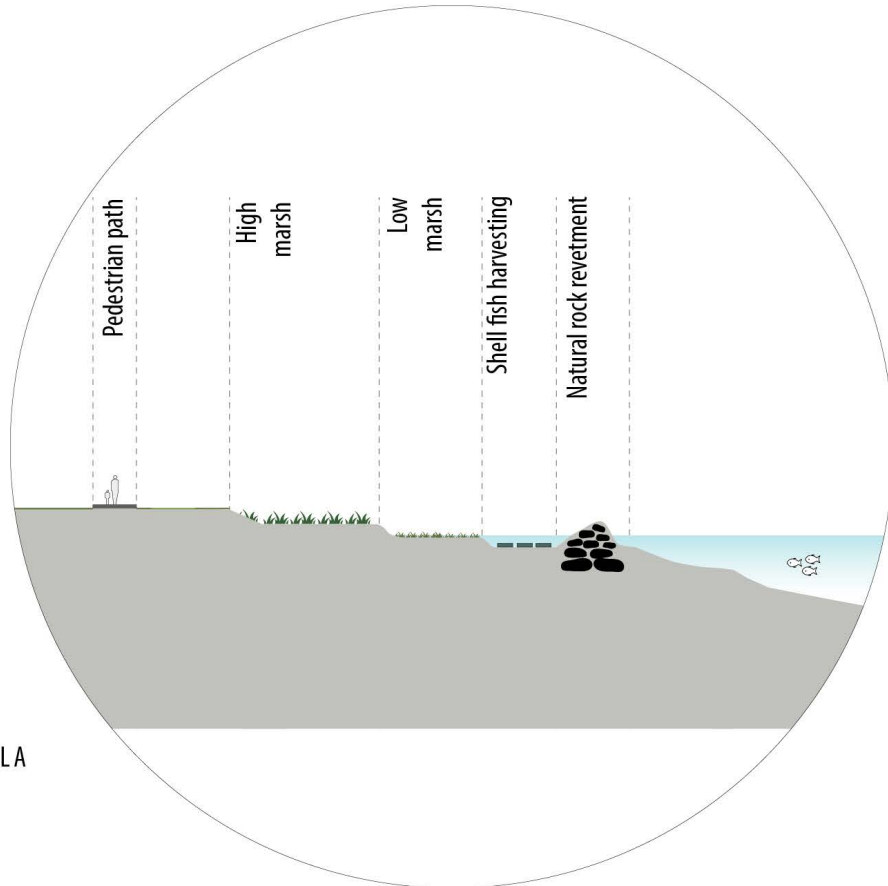
## New Haven Conceptual Drawing 8: Stormwater Management in Hill-to-Downtown Neighborhood Section



## New Haven Map 10: Coastal Protection Project Map



SECTION A

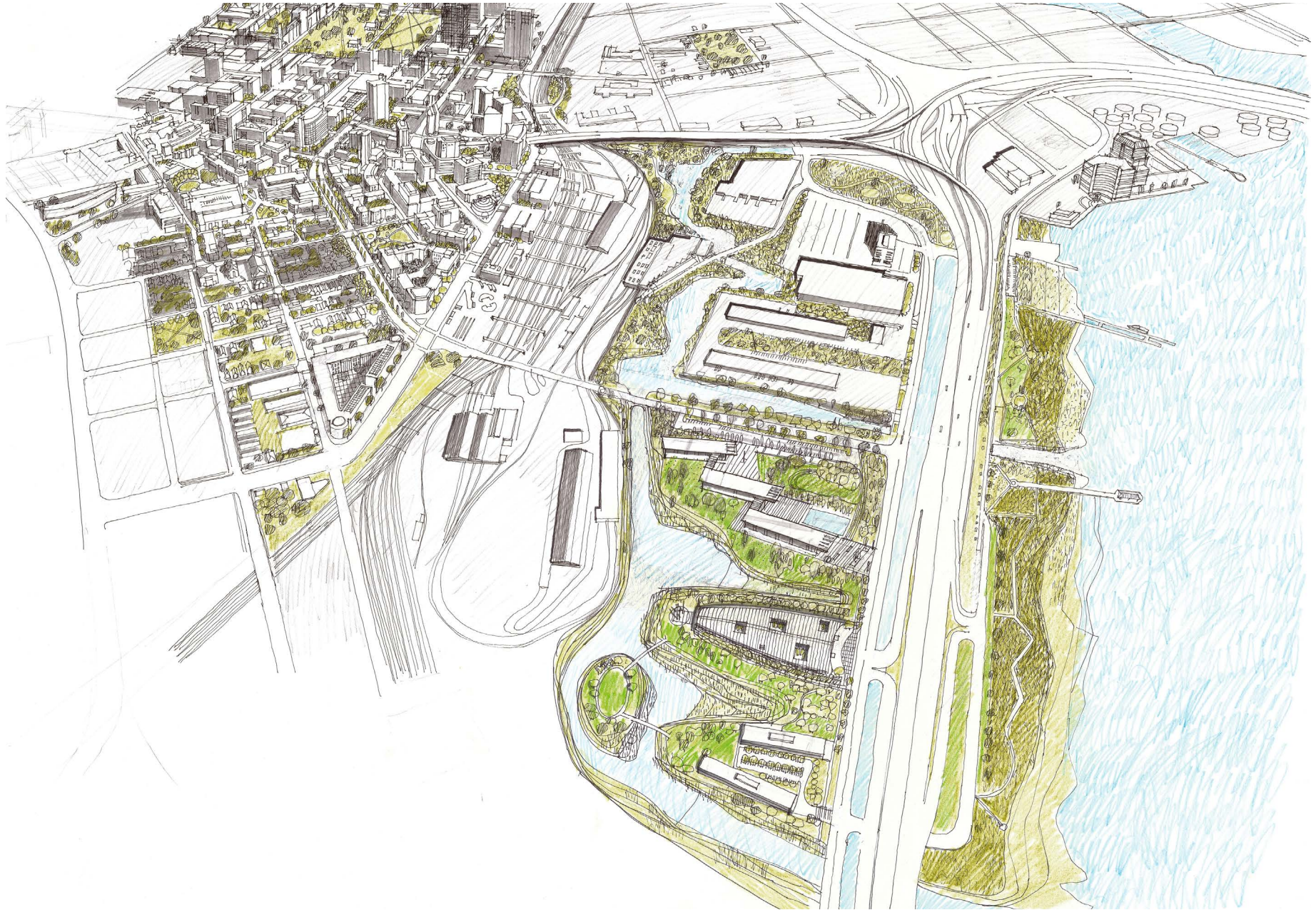


DETAIL A



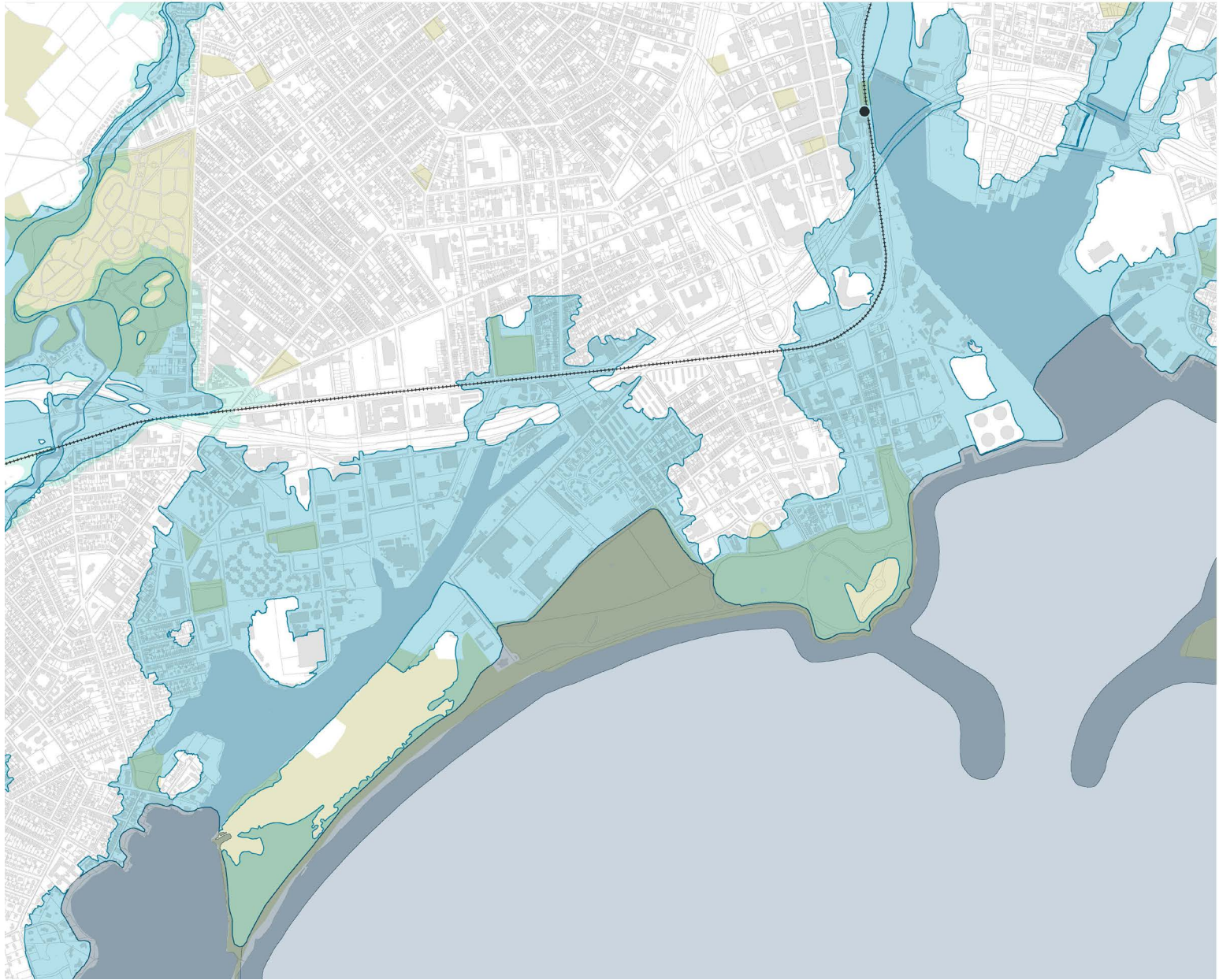
New Haven Conceptual Drawing 9: Living Revetment Shoreline Section





## New Haven Conceptual Drawing 10: Long-Term Vision for Union Station District





**CT NDRC//BRIDGEPORT//S.END**

**FEMA FIRM FLOOD ZONE**

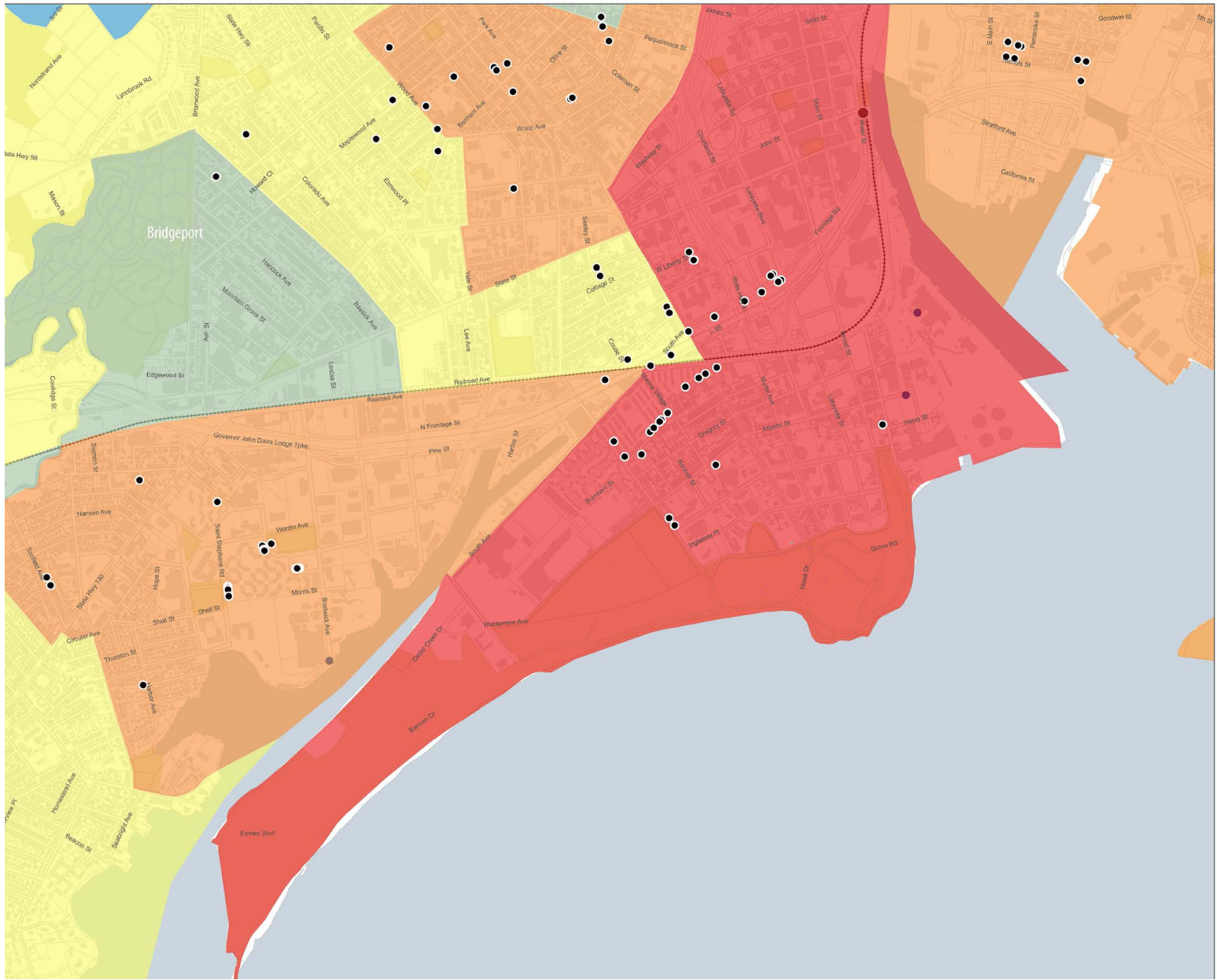
- VE Zone (waves above 3')
- 100 Year Floodplain (1% annual chance)
- 500 Year Floodplain (.2% annual chance)

Source:  
City of Bridgeport, CT DOT  
FEMA FIRM



**Bridgeport Map 1: FEMA FIRM Flood Zone**





**CT NDRC//BRIDGEPORT//S.END**

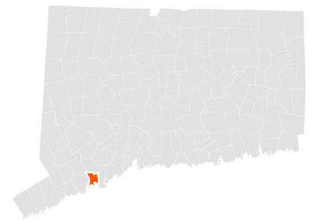
**SOCIAL VULNERABILITY INDEX**

- High
- Medium High
- Medium
- Medium Low
- Low

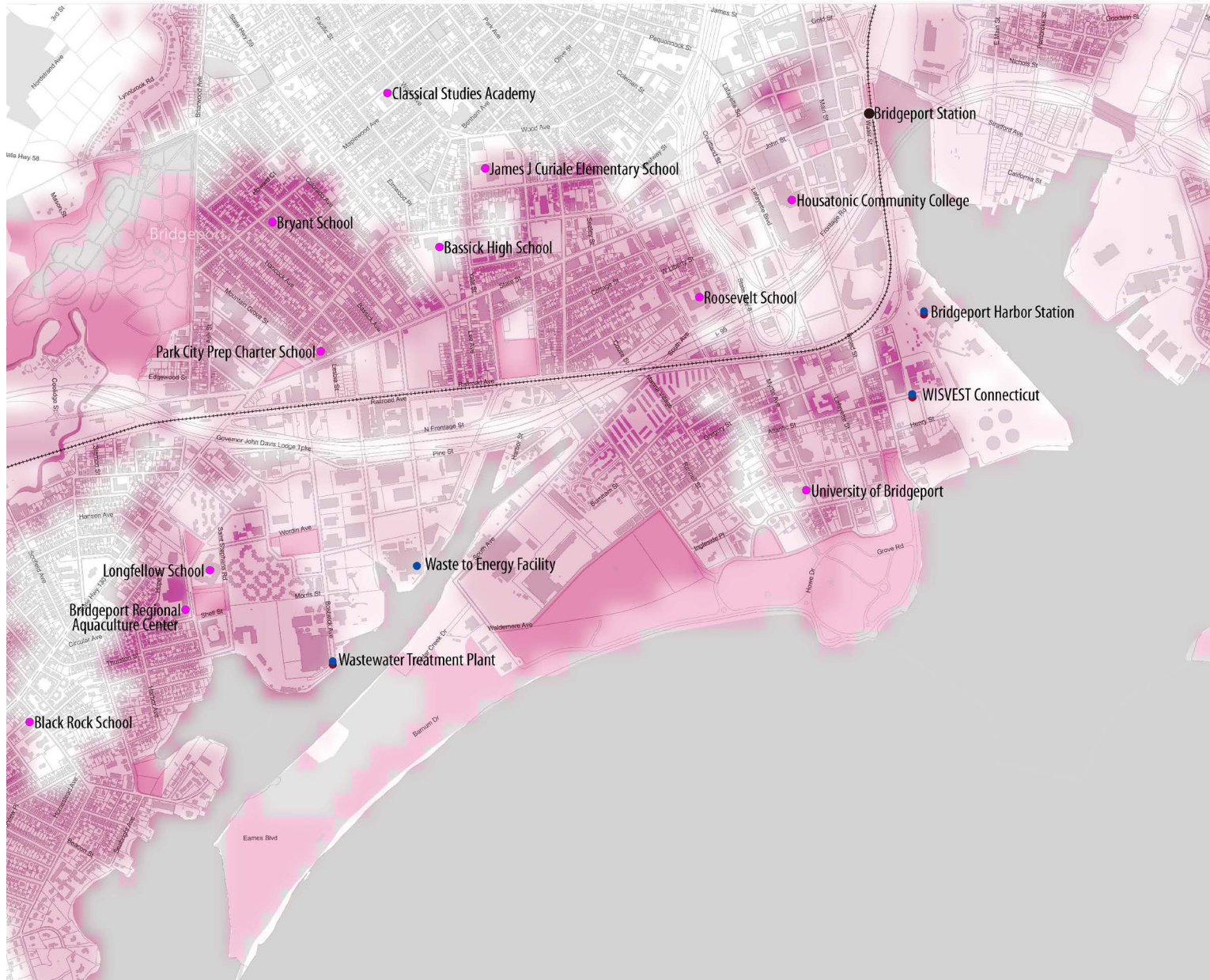
**VULNERABLE POPULATIONS**

- Public Housing Facility

Source:  
City of Bridgeport, CT DOT  
Social Vulnerability Index (SOVI), NOAA



**Bridgeport Map 2: Social Vulnerability**



**CT NDRC//BRIDGEPORT//S.END**

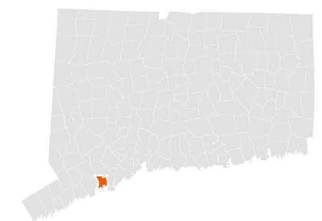
**ASSETS**

- Airport
- School Facility
- Medical Facility
- Government Facility
- Other

**USACE INFRASTRUCTURE EXPOSURE INDEX**

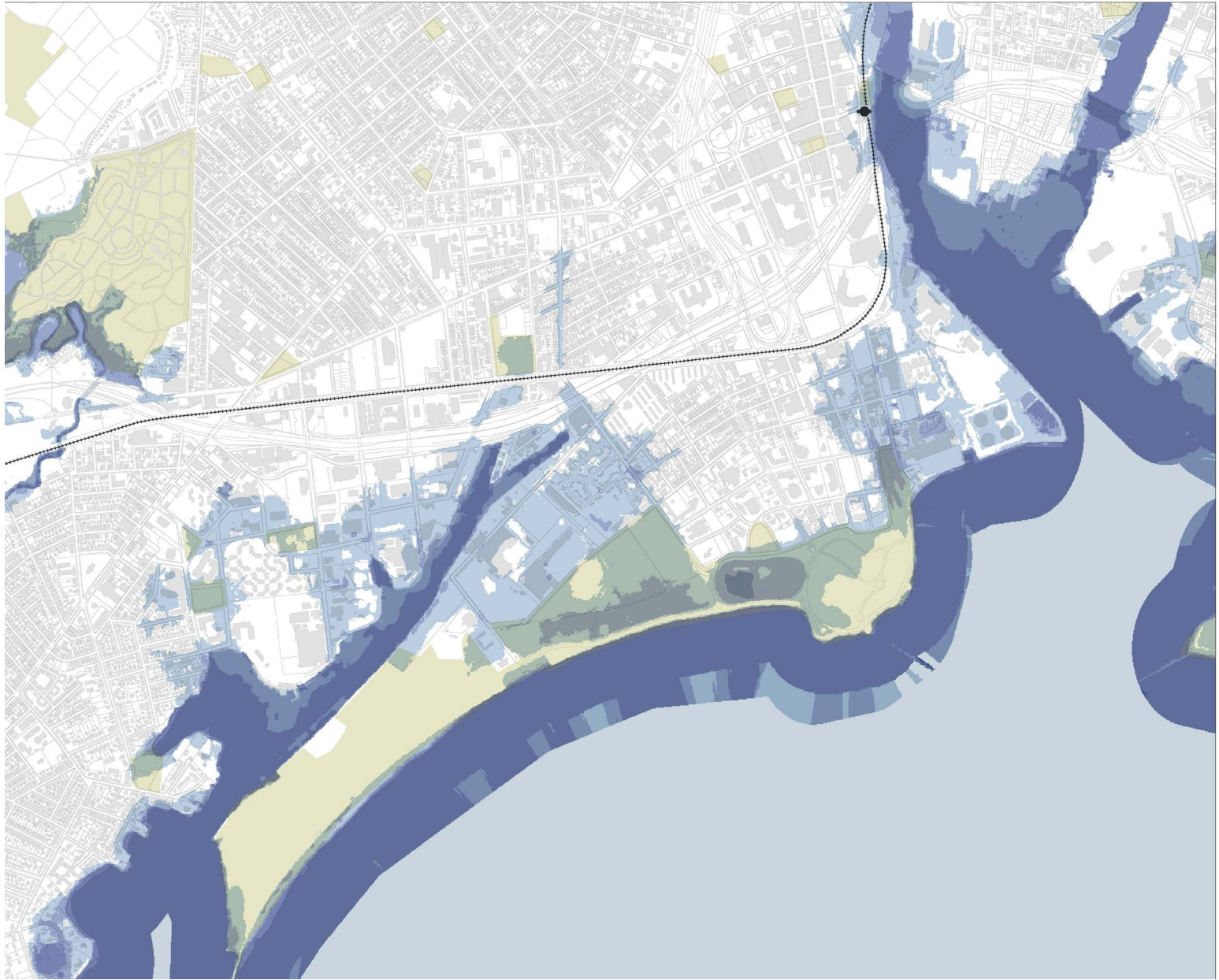


Source:  
City of Bridgeport, CT DOT  
USACE North Atlantic Coast Comprehensive Study, CT DEEP



**Bridgeport Map 3: Assets, Infrastructure, and Neighborhoods**





**CT NDRC//BRIDGEPORT//S.END**

**HURRICANE SANDY INUNDATION**

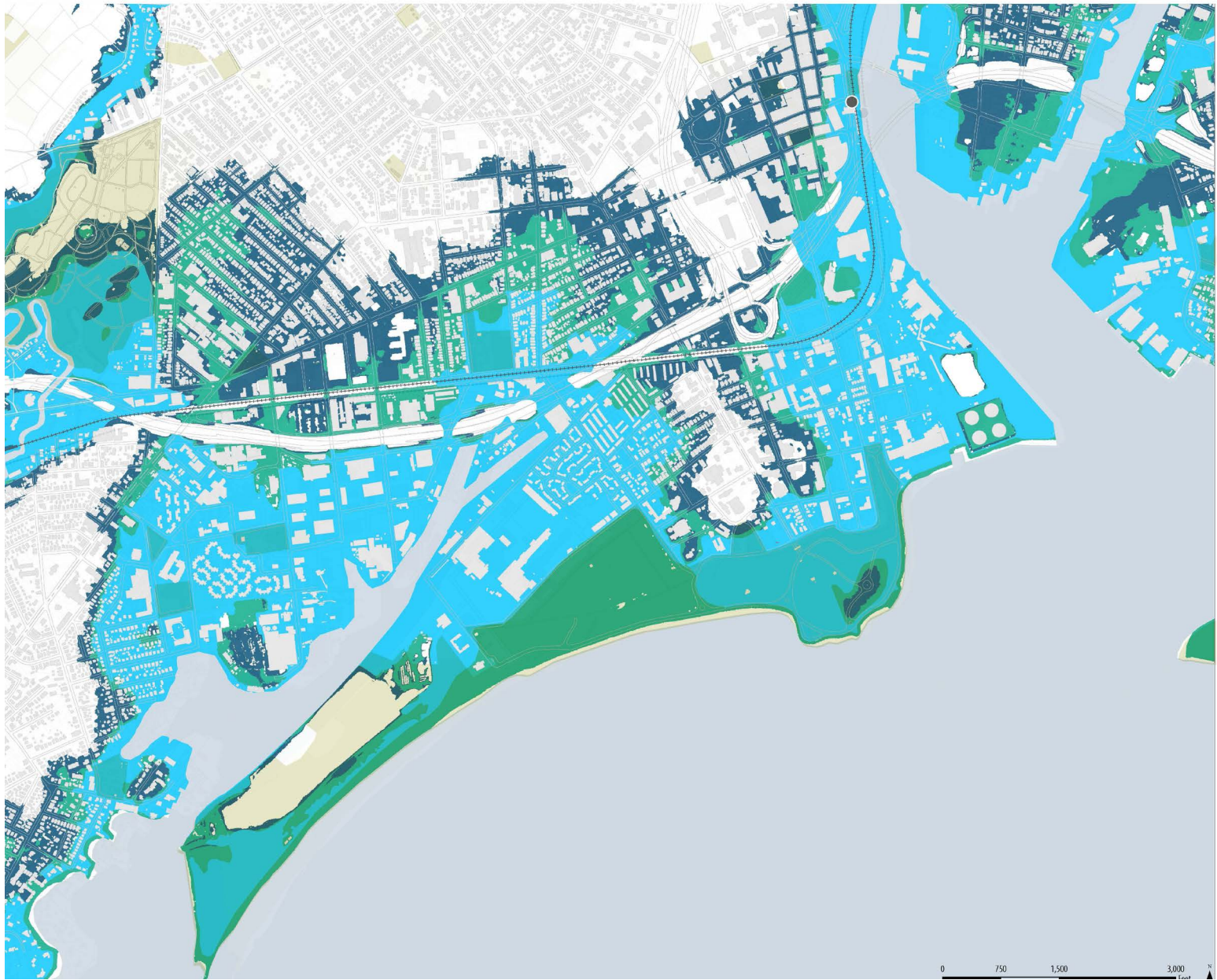
- <3 ft
- 3-6 ft
- 6-9 ft
- >9 ft

Source:  
City of Bridgeport, CT DOT  
FEMA Sandy Modeling Task Force



**Bridgeport Map 4: Sandy Inundation**

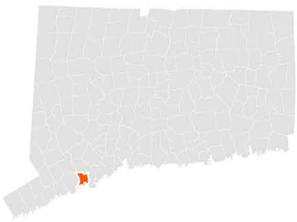




**CT NDRC//BRIDGEPORT//S.END**

- SEA LEVEL RISE APPROXIMATIONS**
- 100 Year Floodplain (1% annual chance)
  - 100 Year Floodplain + 2050 Sea Level Rise (>1')
  - 100 Year Floodplain + 2100 Sea Level Rise (>6.6')

Source:  
City of Bridgeport, CT DOT  
FEMA FIRM, NOAA NACCS



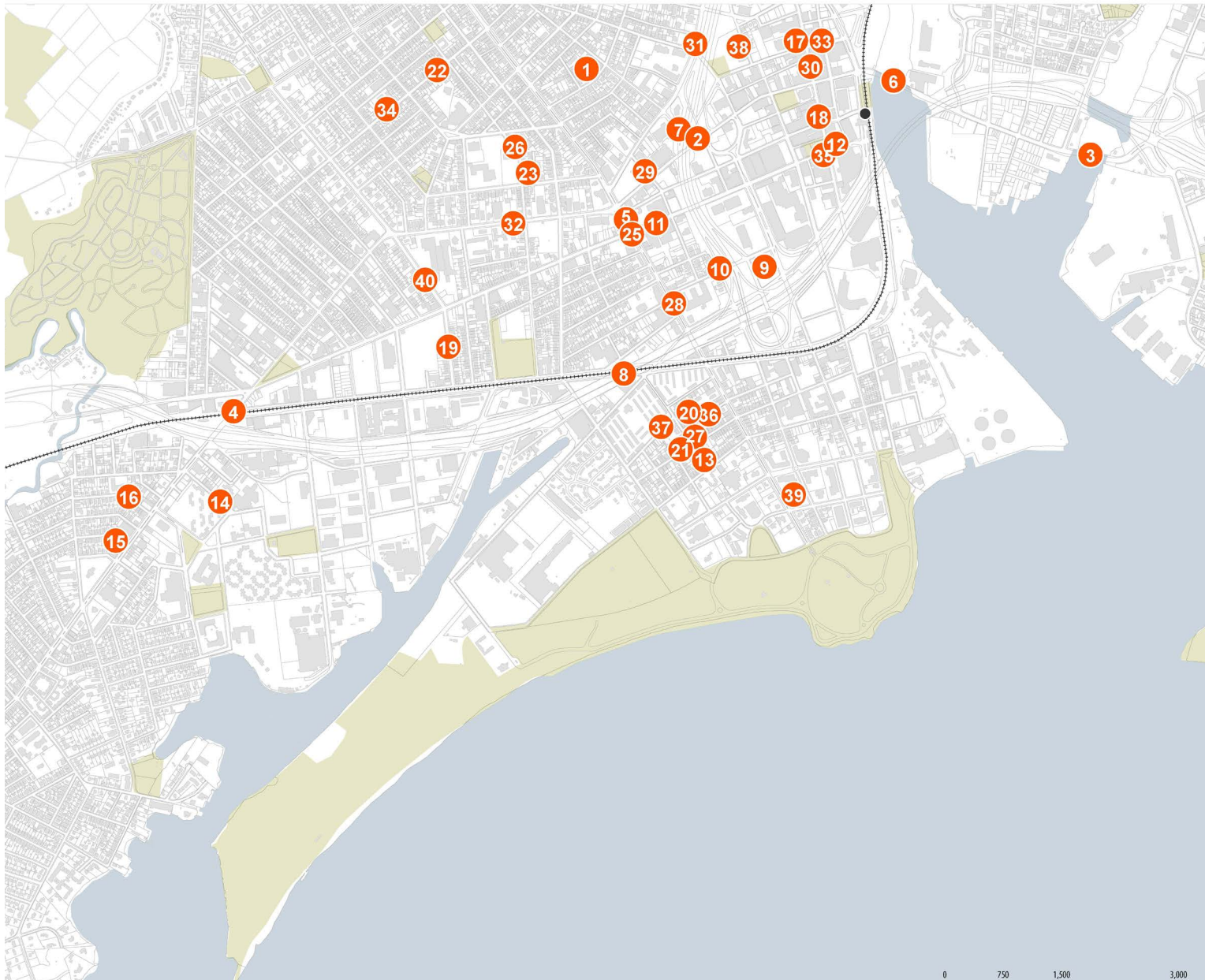
0 750 1,500 3,000 Feet



**Bridgeport Map 5: Sea Level Rise, 2050 & 2100**



CT NDRC//BRIDGEPORT//S.END

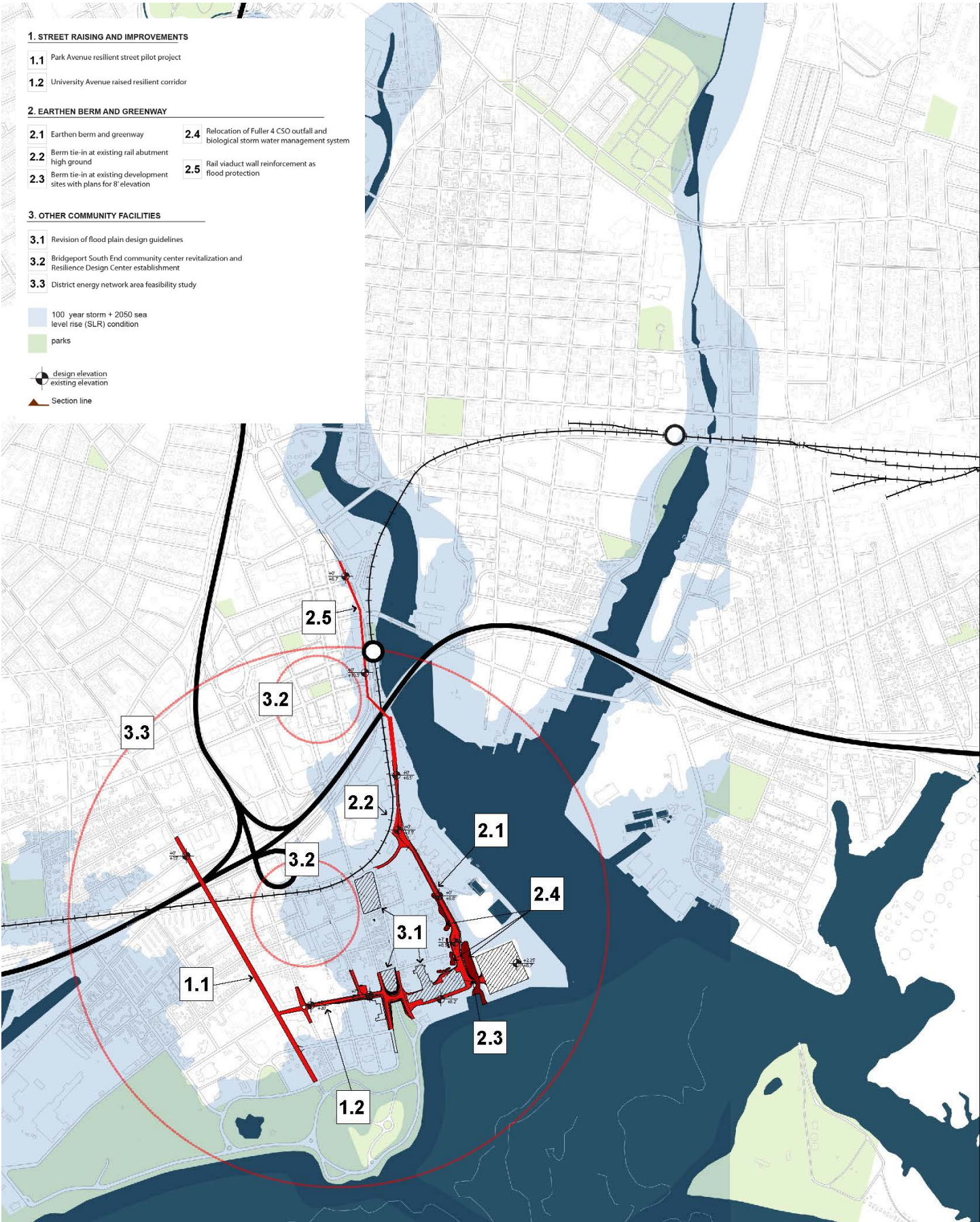


ID	AGENCY	PROJECT DESCRIPTION
1	CTDOT	Safety Improvements
2	CTDOT	I-95 Rte 8 Bridgeport Area VMS
3	CTDOT	Hardening of Movable Bridge
4	CTDOT	Reconstruction of Fairfield Ave
5	CTDOT	SAFETY IMPROVEMENTS
6	CTDOT	REHABILITATION of BR 02475
7	CTDOT	I-95 Rt 8 Bridgeport Area CCTV
8	CTDOT	Bridgeport Bridge 00105A Rehab
9	CTDOT	DOT Bridgeport Hwy Ops Ctr
10	CTDOT	Safety Improvements
11	CTDOH	570 State Street
12	CTDOH	Mechanics & Farmers
13	CTDOH	Southend Community Building Initiative Phase II
14	CTDOH	Albion Street Apartments
15	CTDOH	Bridgeport Neighborhood Build
16	CTDOH	Bridgeport Neighborhood Build
17	CTDOH	Bridgeport Phase II Comp. (Arcade)
18	CTDOH	Bridgeport Phase II Comp. (Arcade)
19	CTDOH	Clinton Commons
20	CTDOH	South End Community Initiative
21	CTDOH	Southend Community Bldg Initiative Phase II
22	CTDOH	Sycamore Place
23	CTDOH	Bridgeport Neighborhood Build 2
24	CTDOH	Bridgeport Neighborhood Build 2
25	CTDOH	Harrison Apartments
26	CTDOH	Laurelwood Place Apartments
27	CTDOH	South End Phase 1
28	CTDOH	The Eleanor Apartments
29	CTDOH	515 West Avenue
30	CTDOH	Bridgeport Historic Ventures
31	CTDOH	Crescent Apartments
32	CTDOH	Fairfield Apartments
33	CTDOH	Jayson/Newfield
34	CTDOH	Maplewood Court
35	CTDOH	McLevy Square
36	CTDOH	Southend Community Building Initiative Phase III
37		Marina Village Resiliency - Crescent Crossing
38	CTDEEP	Bridgeport Microgrid Installation
39	CTDEEP	University of Bridgeport Microgrid Installation
40	CTDOH	Elias Howe Elderly Housing



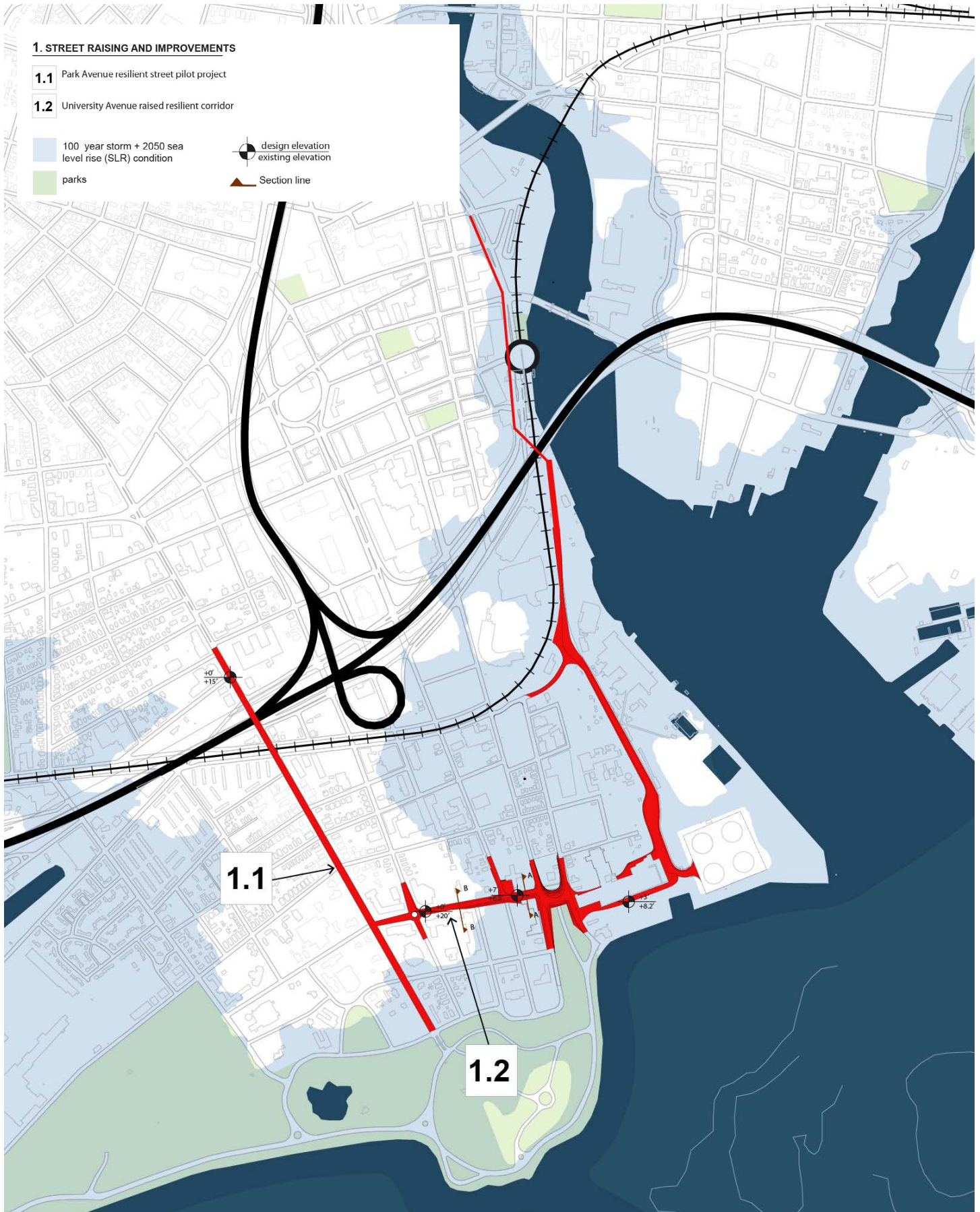
Bridgeport Map 6: Existing Projects



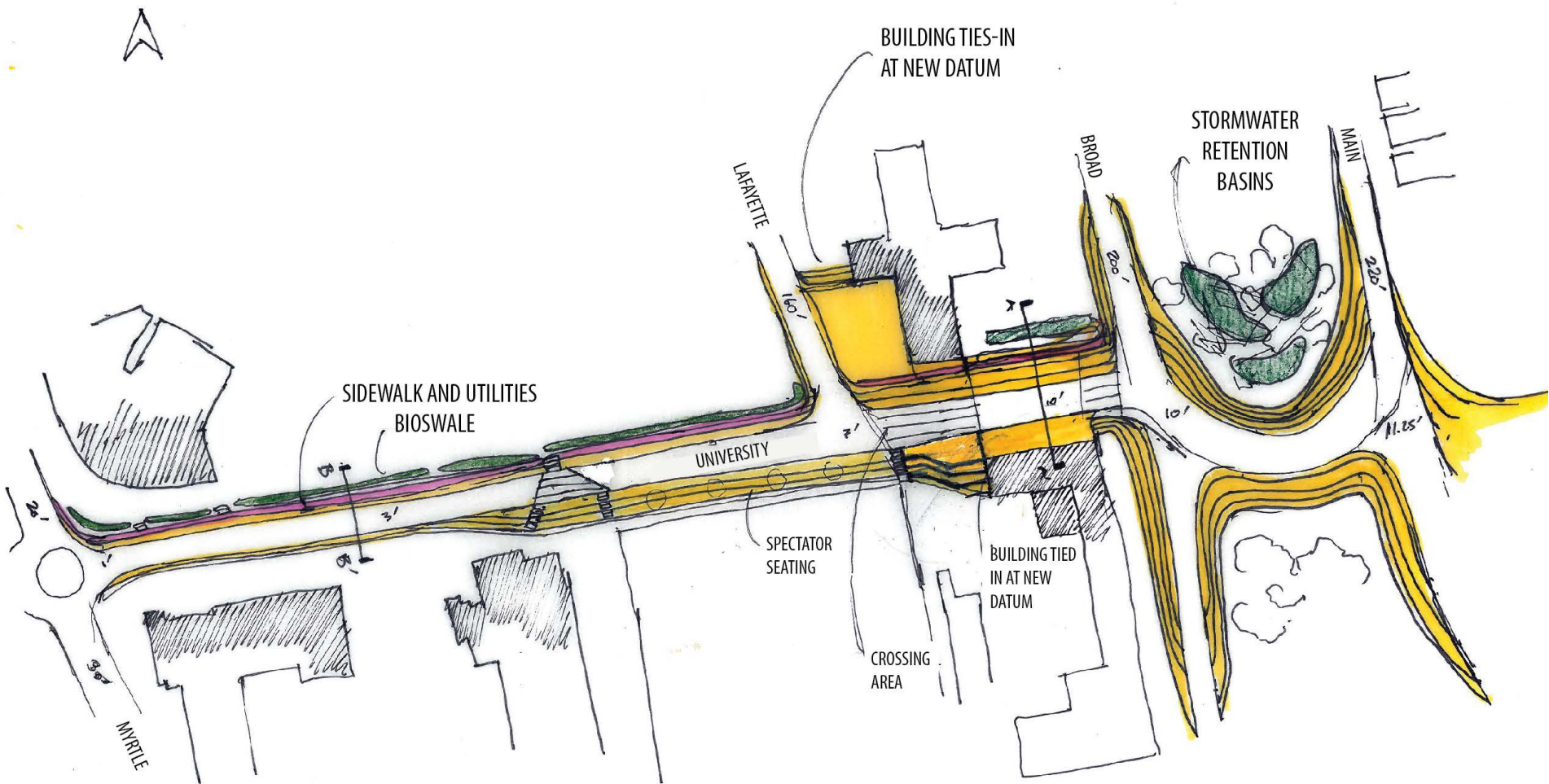


## Bridgeport Map 7: Pilot Project Map



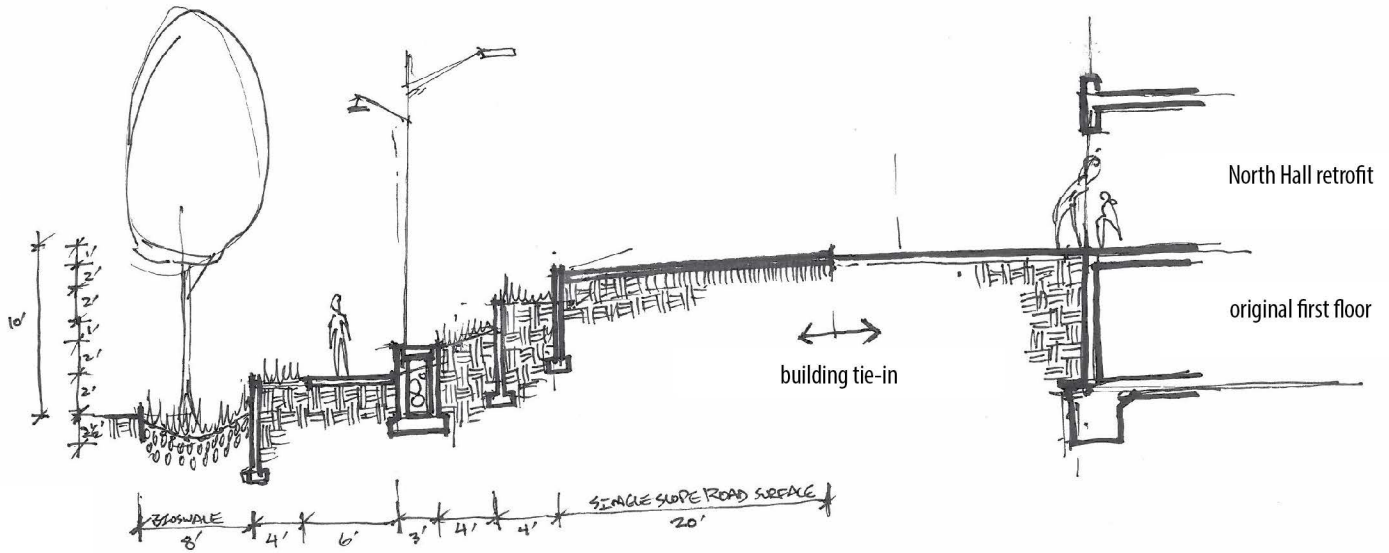


## Bridgeport Map 8: Street Raising and Improvements Project Map

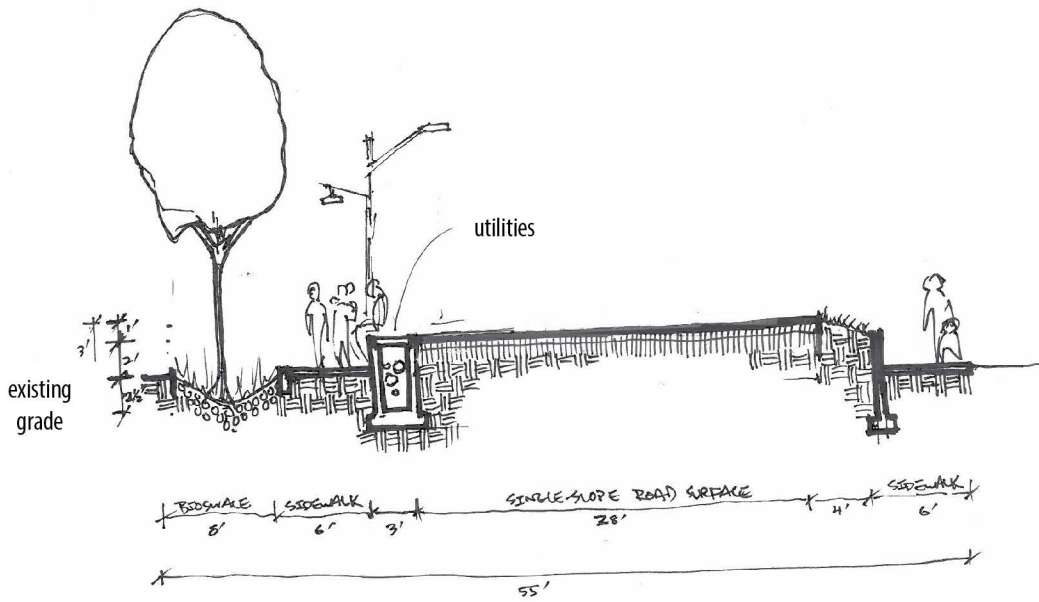


Bridgeport Drawing 1: University Avenue Street Raising and Street Improvements Plan





Section A-A



Section B-B

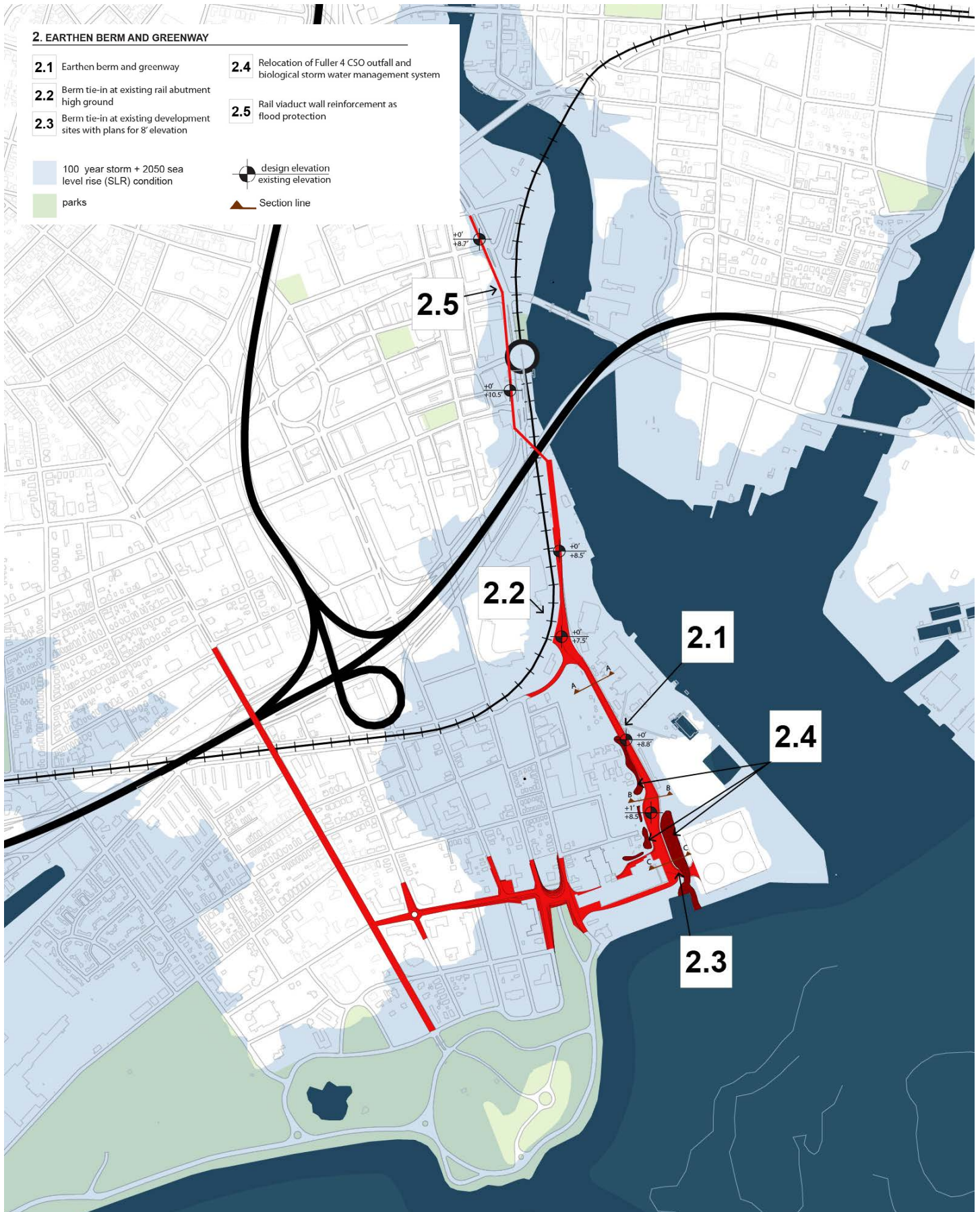


## Bridgeport Drawing 2: University Avenue Street Raising and Street Improvement Sections

**2. EARTHEN BERM AND GREENWAY**

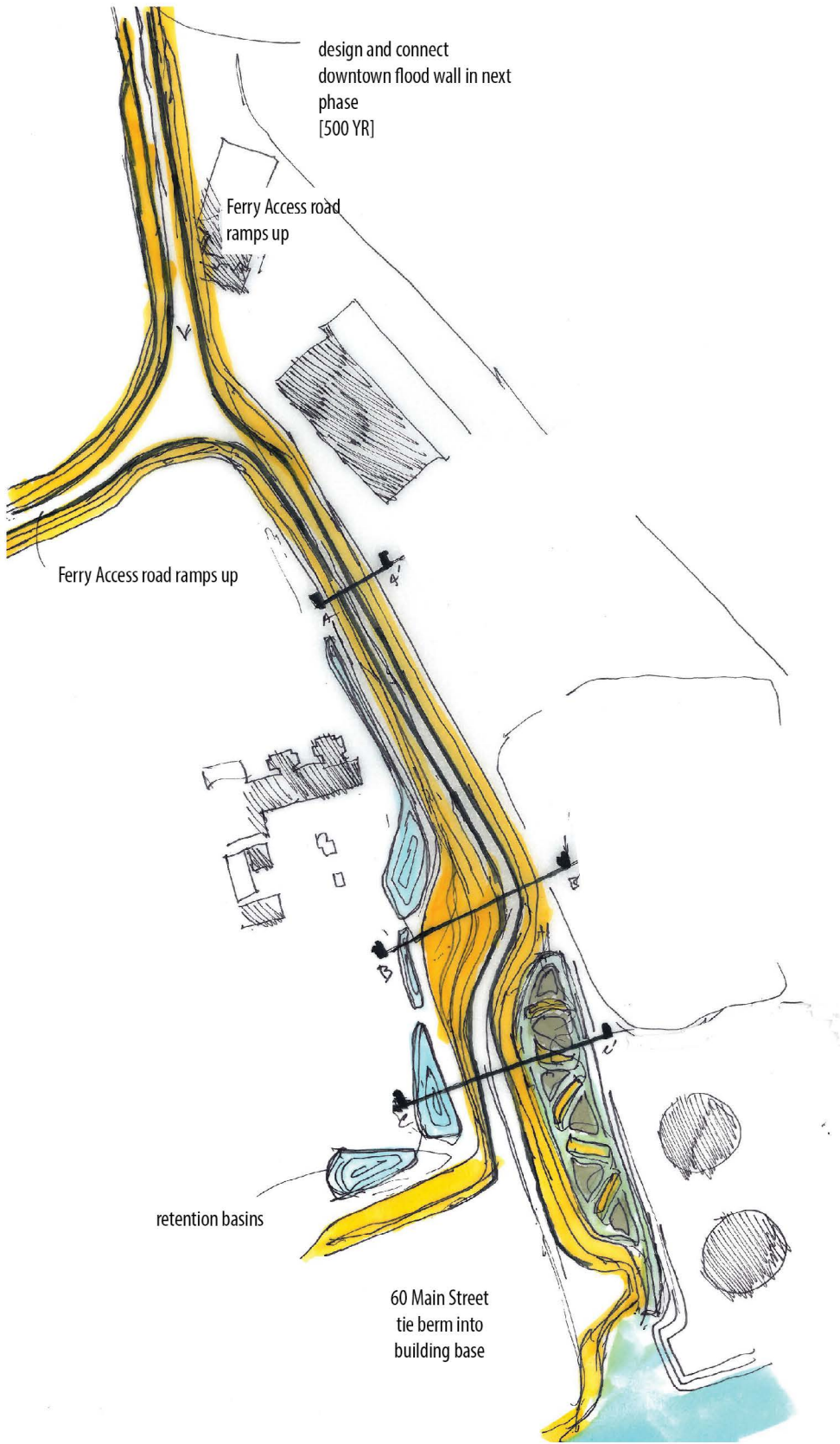
- 2.1** Earthen berm and greenway
- 2.2** Berm tie-in at existing rail abutment high ground
- 2.3** Berm tie-in at existing development sites with plans for 8' elevation
- 2.4** Relocation of Fuller 4 CSO outfall and biological storm water management system
- 2.5** Rail viaduct wall reinforcement as flood protection

- 100 year storm + 2050 sea level rise (SLR) condition
- parks
- design elevation
- existing elevation
- Section line



**Bridgeport Map 9: Earthen Berm and Greenway Project Map**

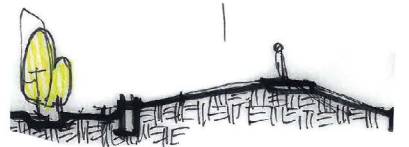




Section A-A  
Typical condition  
Narrow section



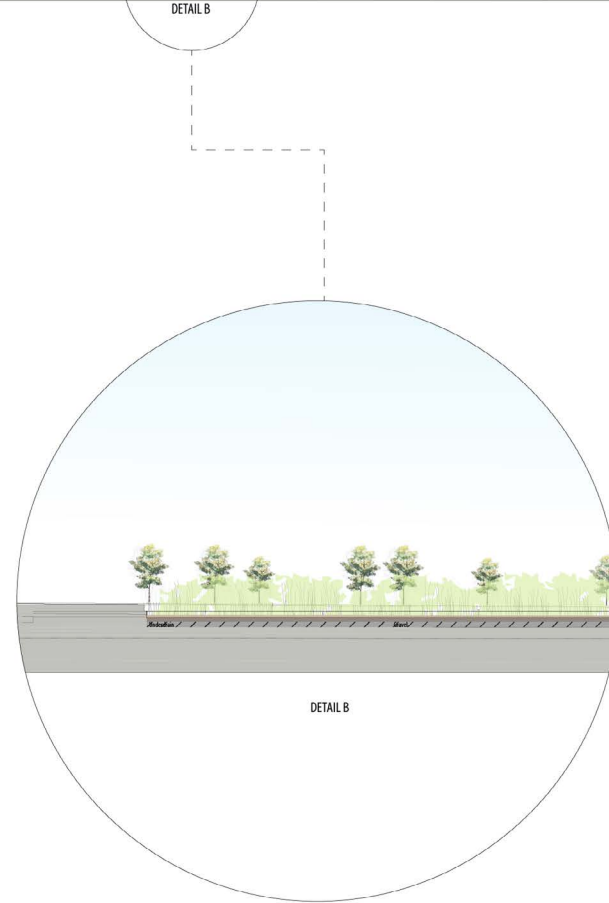
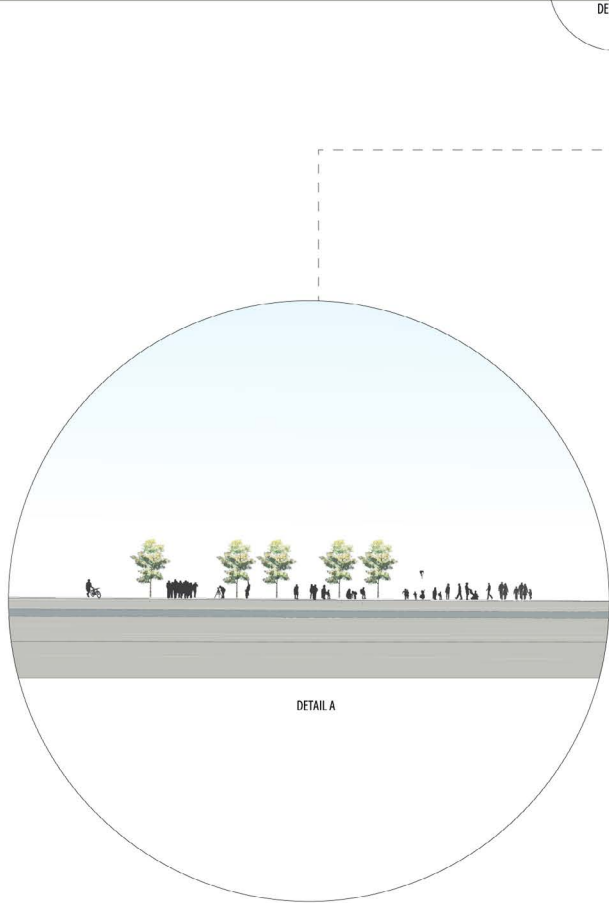
Section B-B  
Wide section



Section C-C  
Berm + wetlands retention basins

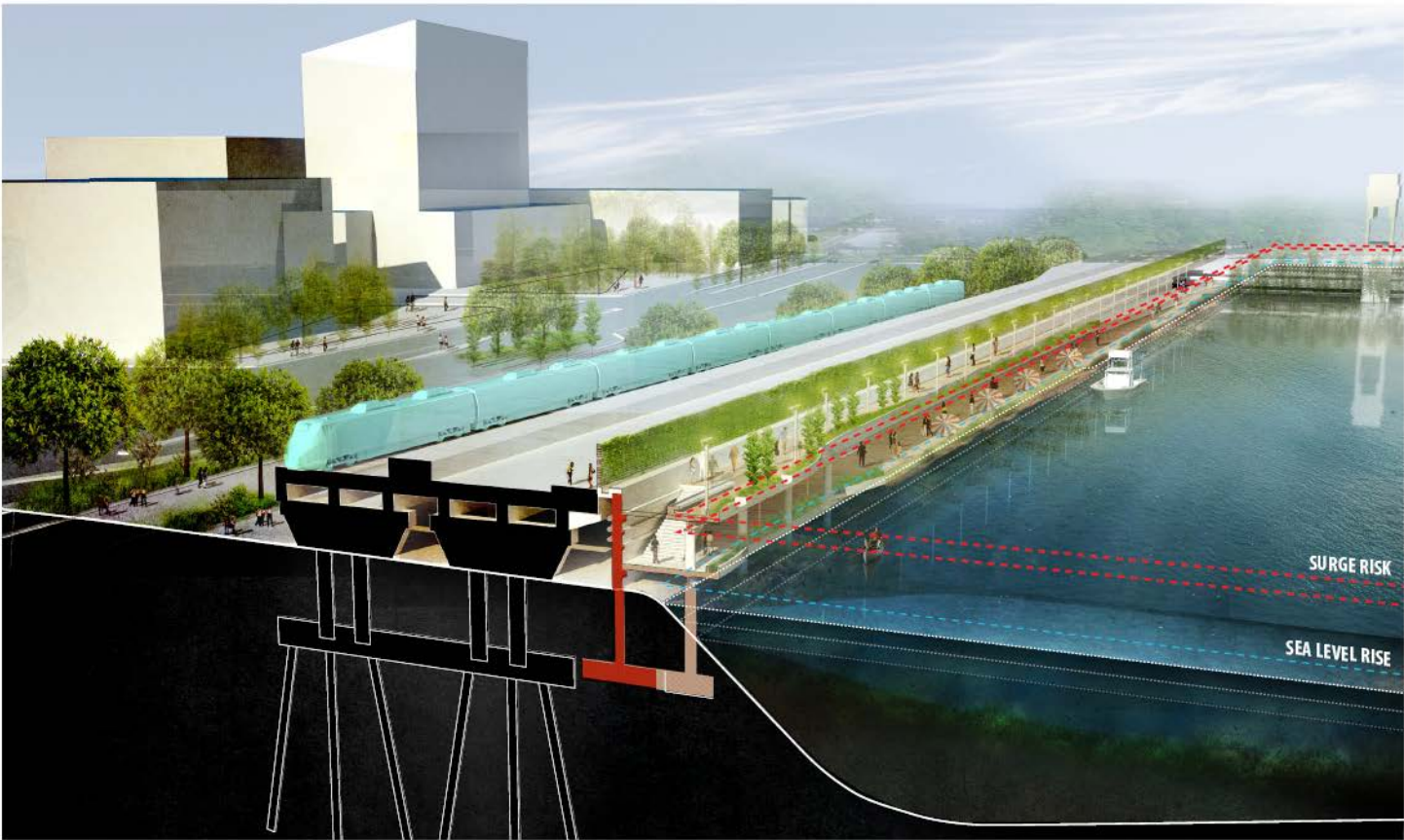


### Bridgeport Drawing 3: East Side Berm Plan and Sections



## Bridgeport Drawing 4: East Side Berm Longitudinal Section





Future Floodwall and Promenade at Bridgeport Train Station

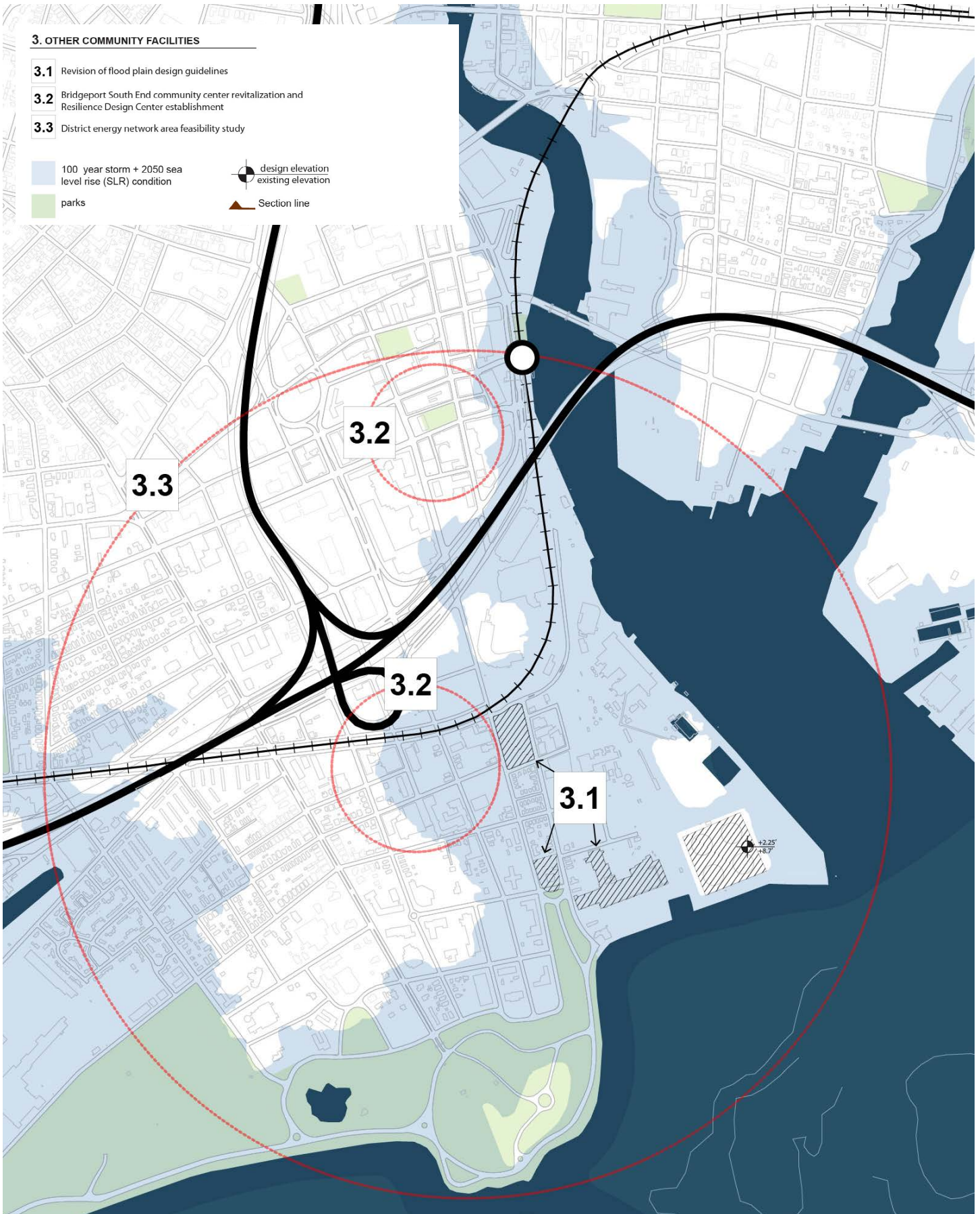


### Bridgeport Drawing 5: Long-Term Integrated Protection for Downtown Bridgeport

**3. OTHER COMMUNITY FACILITIES**

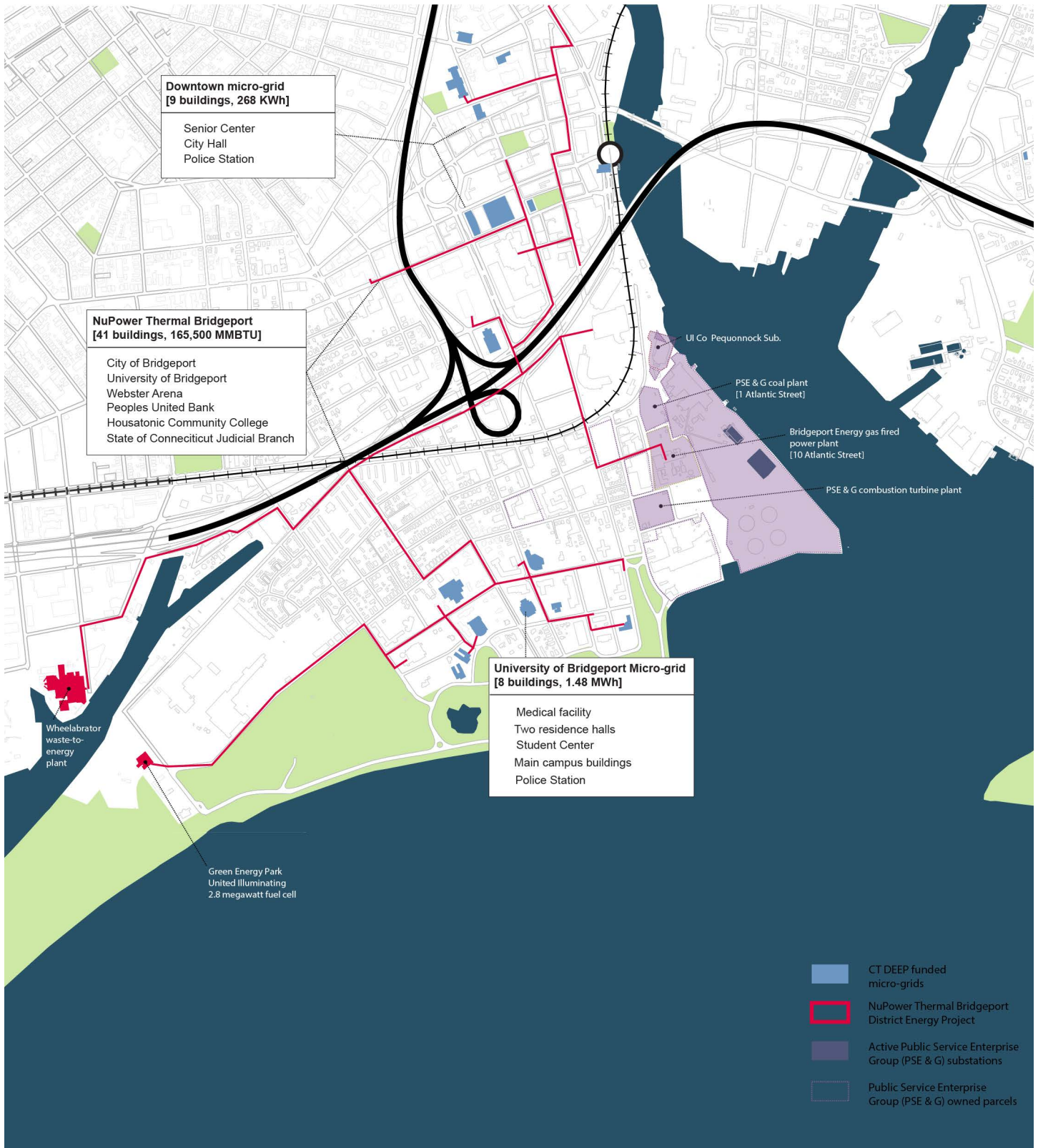
- 3.1** Revision of flood plain design guidelines
- 3.2** Bridgeport South End community center revitalization and Resilience Design Center establishment
- 3.3** District energy network area feasibility study

100 year storm + 2050 sea level rise (SLR) condition  
parks  
design elevation  
existing elevation  
Section line



**Bridgeport Map 10: Community Facilities Project Map**





## Bridgeport Map 11: Energy Facility Map



One of multiple Bridgeport South End community centers damaged and unrepaired after Hurricane Sandy



## Bridgeport Drawing 6: Community Center Rehabilitation

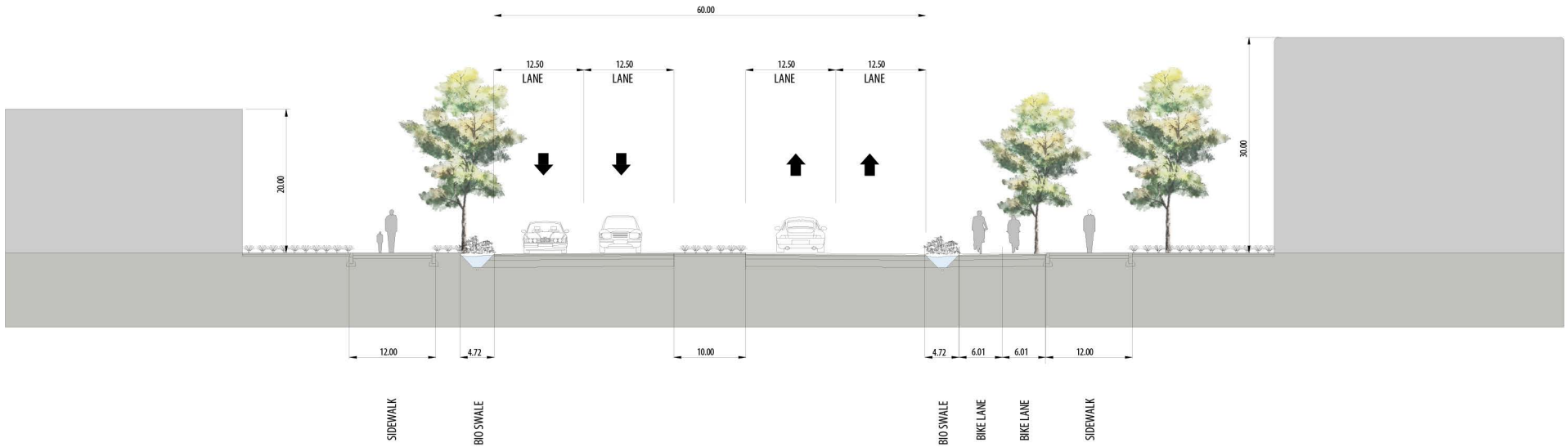




Potential Resilience Design Center in Downtown Bridgeport



### Bridgeport Drawing 7: Resilience Design Center



## Bridgeport Drawing 8: Park Avenue Street Improvement Section





Rebuild by Design Illustrative plan of South End showing catalytic development potential and NDRC Projects



## Bridgeport Drawing 9: Long-Term Vision for South End East Resilient Network Plan





## Bridgeport Drawing 10: Pilot Project Overview Perspective