King + Spencer Park Green Infrastructure Designs Newport RI







The two parks will be redesigned and connected to serve the community and the environment. The boardwalk will serve as a memorial to Ida Lewis's service to Newport





Accessibility

The seawall will be built in a stepped configuration allowing full access to the shoreline. Ramps will be incorporated to allow handicap access.





Sustainability

King and Spencer Park will become a unified green space, the stormwater infrastructure will be linked between the two.

Runoff along Spencer Park will be captured by the bioswales and directed into the detention basins located in the center of the park.







By creating several raingardens, as well as bioswales along Wellington Ave and around Spencer Park runoff will be captured and filtered before it enters the harbor.





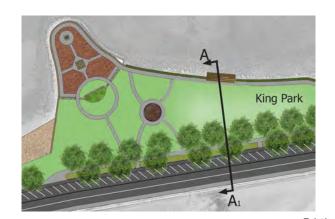
King & Spencer Park's

Produced By: Nick Concra

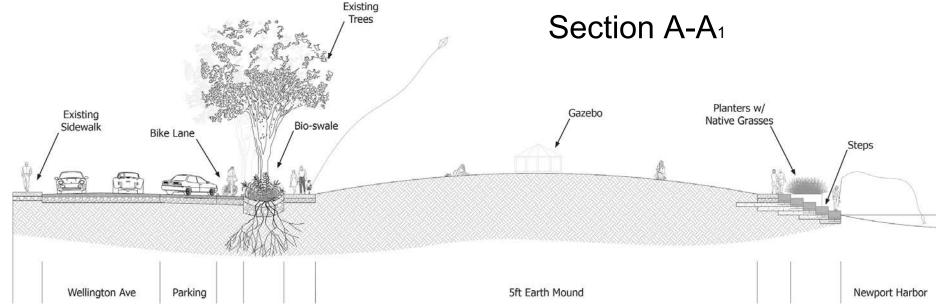
attract new visitors to the space by providing exciting features and improved accessibility as well as incorporating green infrastructure to reduce negative impacts on the environment.



This image shows one of the large steps that enters the water along the seawall. It also shows the section where the seawall was replaced with planters filled with native beach grasses as well as the open lawn in the background.

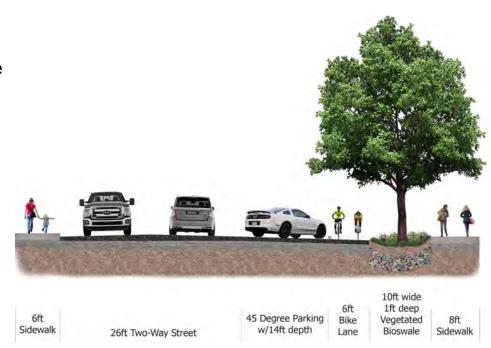


Below is a cross section of King Park. The left portion of the section shows the layout of the complete street along Wellington Ave. The middle portion of the section depicts the 5ft earth mound. The right portion shows the section of the wall that was replaced with planters filled with native beach grasses and the large granite steps that enter the water.



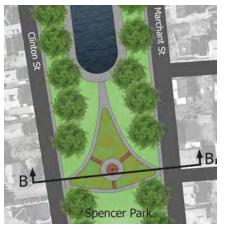
Green Street Layout

- <u>Street</u>- existing Wellington Ave
- <u>Sidewalks</u>- existing concrete sidewalks provide pedestrians with a safe walking and jogging environment, separate from traffic
- <u>Bike Lane</u>- two-way bike path that separates bikers from traffic the busy Wellington Ave, and people backing out of parking spaces
- Roadside Parking
 - diagonal parking along
 Wellington Ave, adjacent to King Park
- Bioswale- catches the polluted runoff from Wellington Ave, parking spaces, bike path and sidewalks, as well as excess runoff from the surrounding areas; vegetation includes the existing Pin Oaks and London Plane Trees, as well as the additions of Sedges, Joe Pye Weed, Sweet Pepperbush and Goldenrod

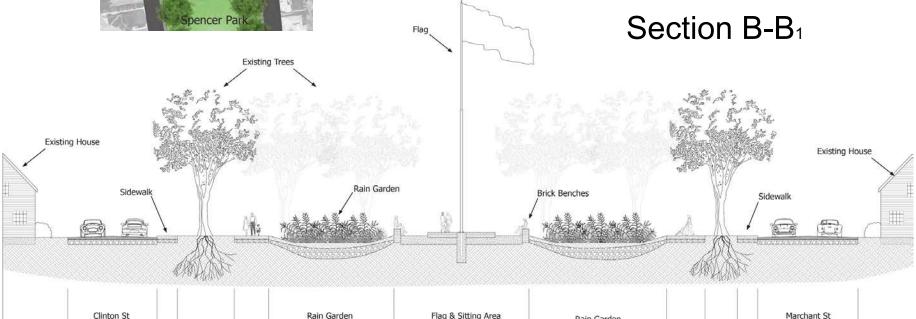




This image shows the street layout of Wellington Ave across from Spencer Park. It also shows the added pathways in and around Spencer Park as well as the reflecting pool/ice skating rink in the upper portion of the image.



Below is a cross section of Spencer Park. The park is surrounded by neighborhood streets, shown on the outer portions of the section. Moving closer to the center of the section are a series of walkways for accessibility and rain gardens to catch and absorb polluted runoff. The center portion of the section depicts the seating area that surrounds the flag pole.



Benefits of Park Design

- Catch and store polluted runoff from impervious surfaces through the use of rain gardens and bioswales.
- Provide residents and visitors with more activities for enjoyment.
- Protect bikers and pedestrians from the traffic on Wellington Ave.
- Improve accessibility through the addition of sidewalks.
- Create a more interactive shoreline by replacing sections of seawall with native grasses, lookout decks and large steps that allow visitors to access the water's edge.



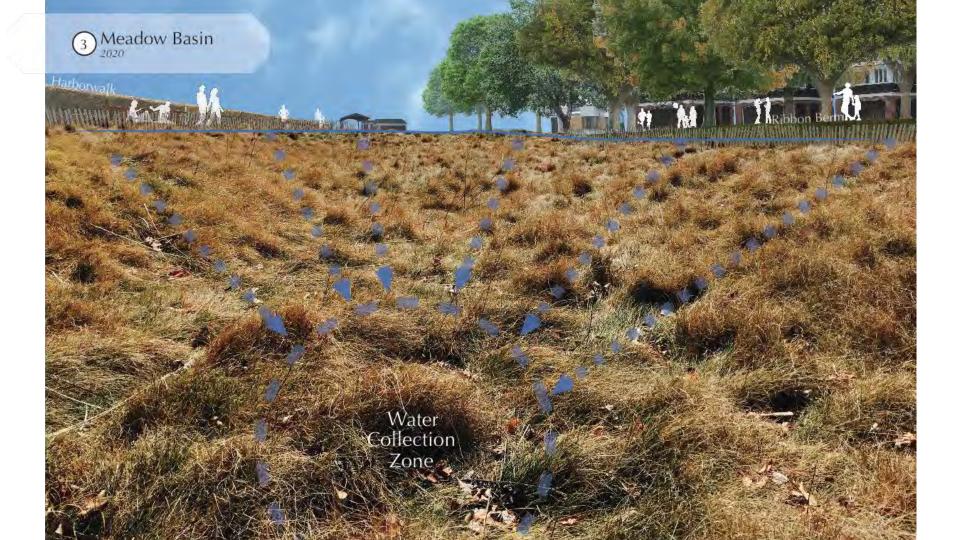






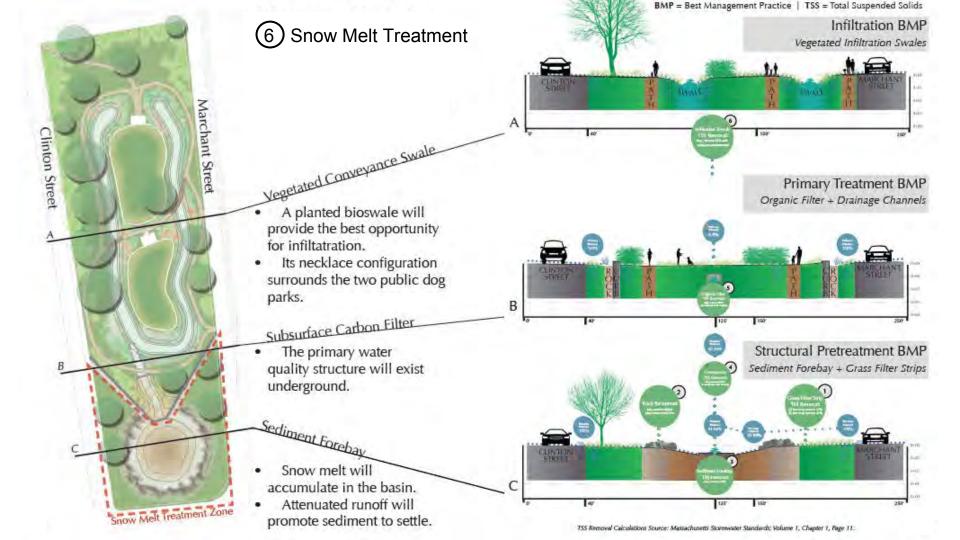






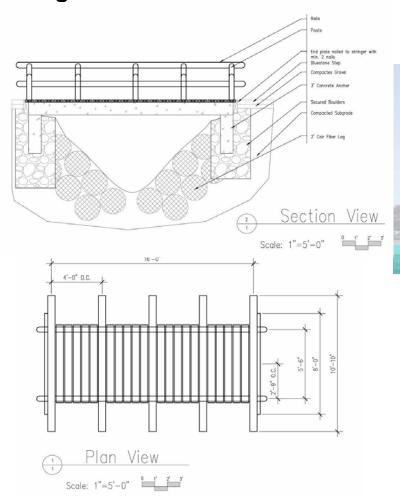








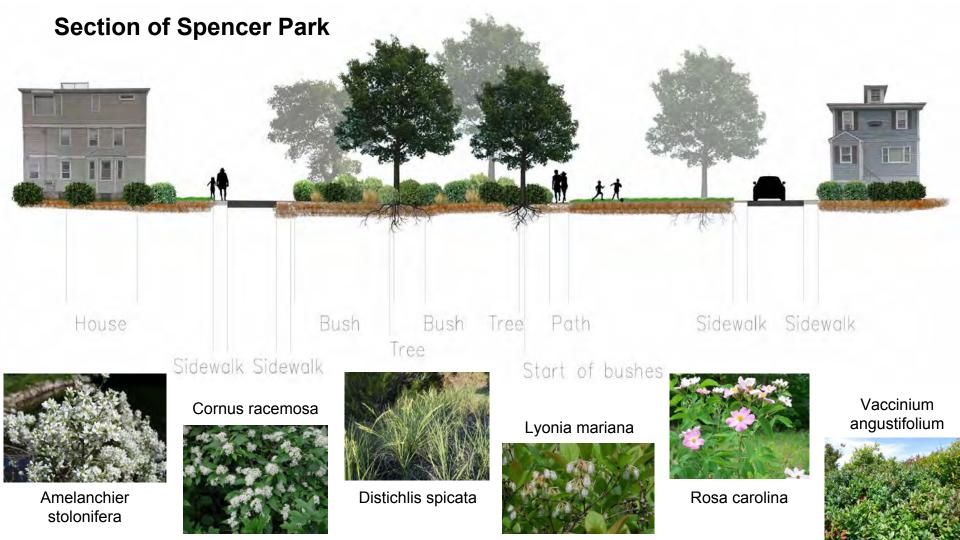
King Park Section with Pedestrian Bridge and Coir Details





The section above is looking at the waterway with the coir fiber logs along with one of the pedestrian bridges.







Benefits

Bioretention System

 Cleans stormwater runoff from surrounding areas and allows natural habitats to form.

Removal of Sea Wall

 Allows for natural processes to occur along the waterfront and reduces the impact on the bay's habitat.

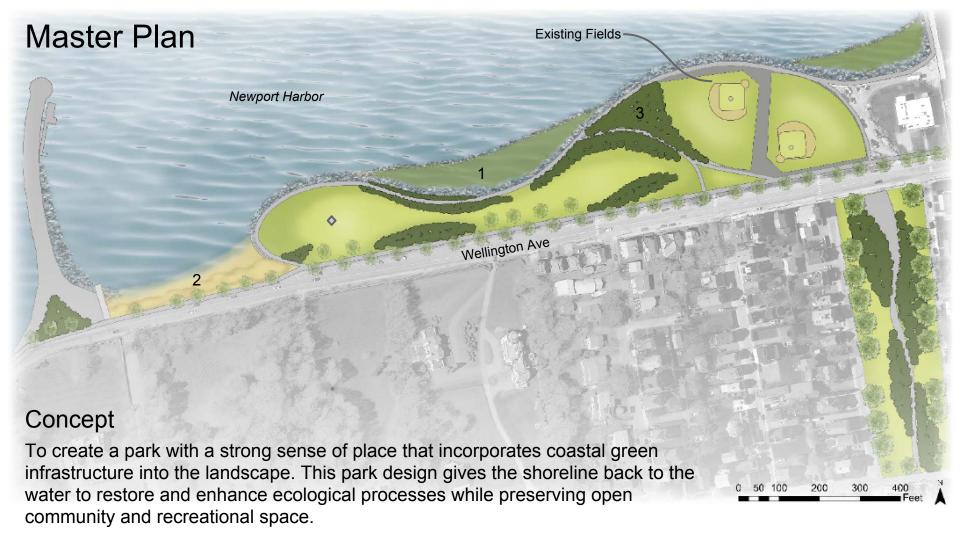
Rain Garden

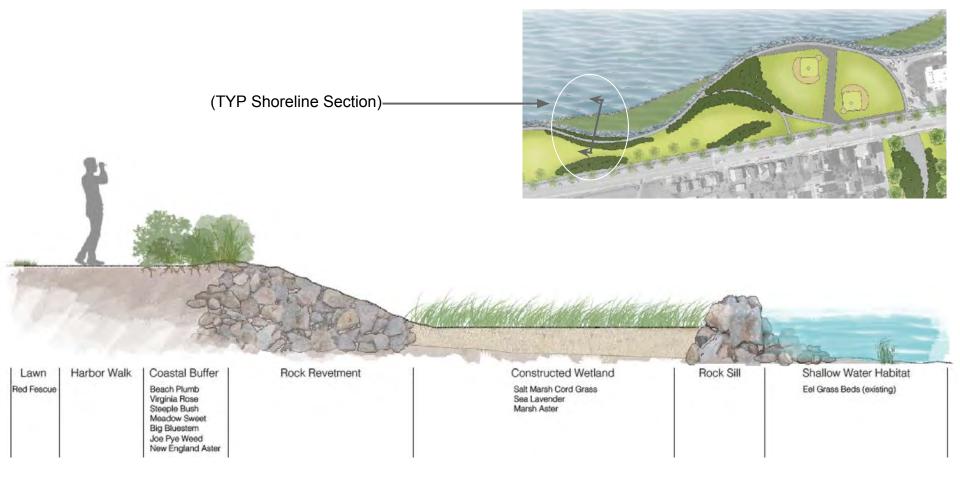
 Another form of cleaning water runoff from Wellington Ave and acts as a buffer between King Park and the street parking.

Use of Native Plants

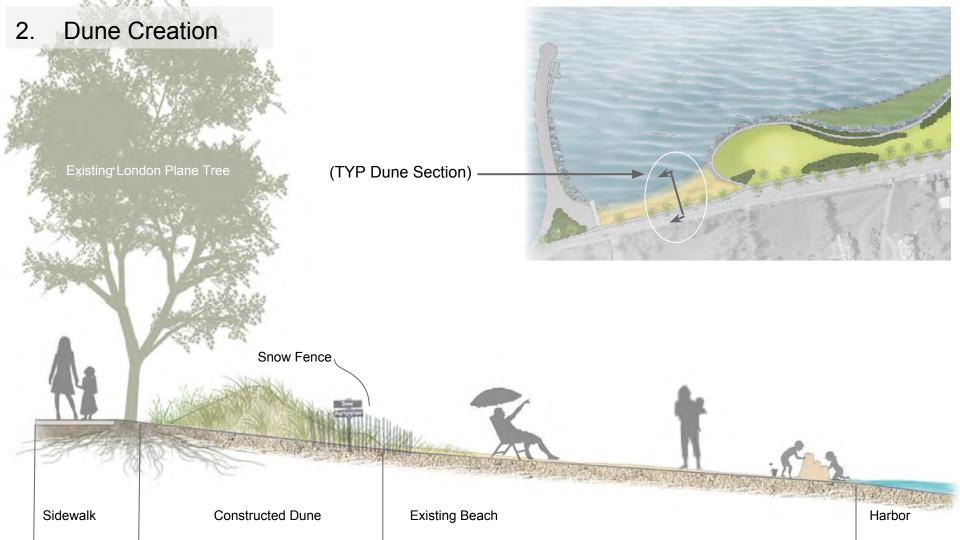
- Adds natural biodiversity to the area and increases the ecological functions of both parks.

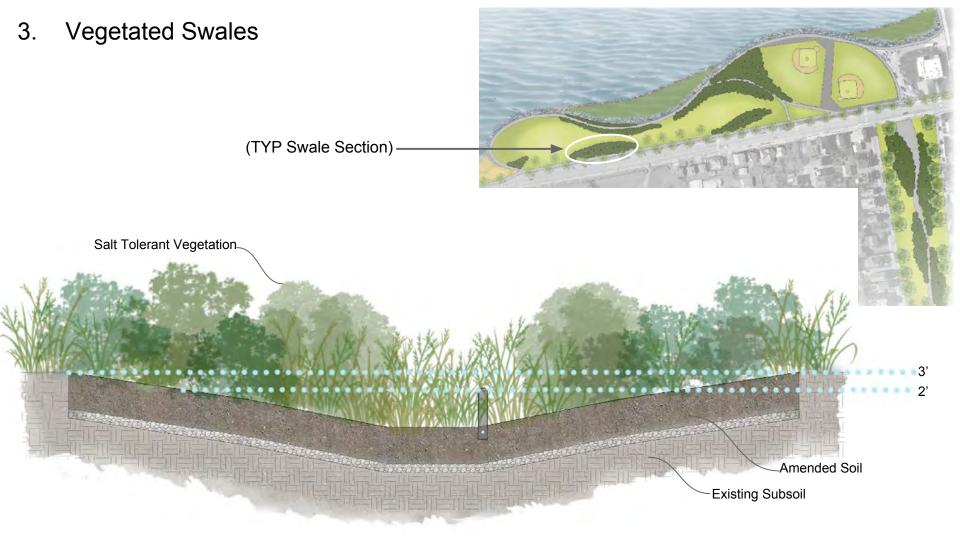






1. Living Shoreline







Perspective view from Wellington Ave



Perspective view of harbor walk and living shoreline

Benefits

Living Shoreline

- Improves water quality
- Improves and creates habitat for coastal birds and aquatic life
- Provides erosion control and protection

Eelgrass Restoration

- Improves water quality
- Improves and creates habitat for aquatic life
- Provides erosion control

Restored Dunes

- Creates habitat
- Provides erosion control
- Provides a coastal buffer

Vegetated Swales

- Improves water quality
- Handles stormwater



King + Spencer Park Design Coastal Green Infrastructure for Newport



Multi-use Observation Deck

The multi-use observation deck is constructed using synthetic wood for decking supported by a steel frame structure with porous concrete blocks as a base. The porous blocks also serve as a shallow water habitat rejuvenating species that have been lost due to the hardened shoreline.



Benefits

Observation Deck

- Improves overall water quality.

Pavillion

- Rejuvenates shallow water habitat.

100'

200

- Educates the community on the importance of aquatic habitat.
- Promotes healthy outdoor activity.

Wellington Ave Complete Street The complete street includes Wellington Ave 6 foot sidewalks on both sides, a two way bike path along King Park that will connect to the existing Aquidneck Island Bike Path, and important bio-swales to manage stormwater runoff. 100' 200' Mulch Bioretention Soil Mix Gravel Base w/ Perf. Pipe 6' 11' 6' King Park Parking Wellington Ave Swale 5th Ward Neighborhood Swale Side Bike Side Walk Path Walk

Enhanced Pedestrian Crossings

Consist of creating vegetated curb extensions. Allowing all of the stormwater runoff on Wellington Ave to become collected, filtered and infiltrated instead of adding to the combined sewer outfall.

Changing the material used to distinguish the crosswalks will slow down vehicular traffic, increase pedestrian safety and enhance the overall sites aesthetics.



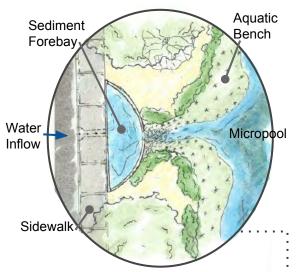


Spencer Park

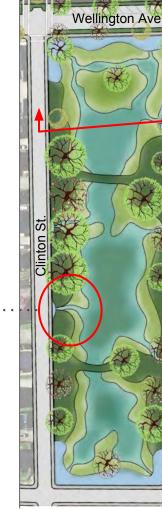
Shallow wet detention basin with extended sediment forebays and a vegetated aquatic bench intertwined with a pedestrian path.

Benefits

- Removes particulates, organic matter, and metal from runoff.
- Protects surrounding neighborhood in the event of a 100 year storm.
- Improve native bird habitat.
- Promote healthy outdoors activity.







Clinton]

Lawn Aquatic Bench

Micropool

to

St.

CSO

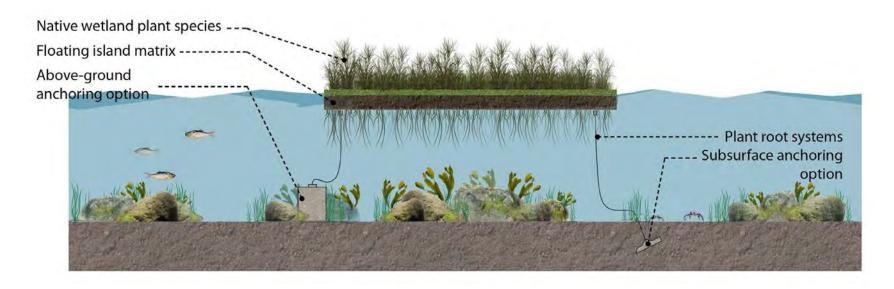




Floating Wetlands

- Demonstrate plant, soil, and root interactions similar to a natural wetland
- Made from dense mesh of polyethylene terephthalate (PET) fibers: recycled waste from plastic materials
- Help absorb storm surge
- Provides homes to beneficial water cleaning micro-organisms, as well as mussels, crabs, fish, waterfowl
- Anchored to stay in one area of the harbor to rise and flow with the tides





Dune Restoration

- Doubles as a windbreak and protection from incoming waves and surge
- Geotextiles may be used for stabilization and erosion control; adaptable to morphology of dune system
- Provides habitat for different animal and plant species

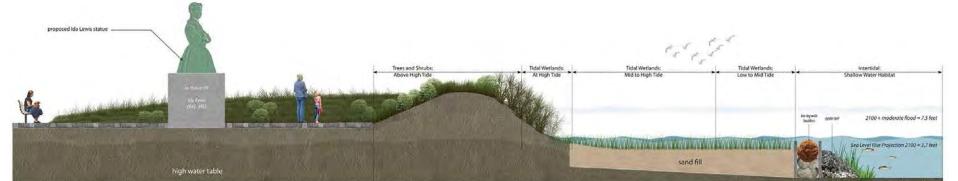




Living Shoreline

- Existing seawall failing as a park barrier; destroys the ecological connection between land and water
- Living shoreline and berm systems will protect the park from destructive waves
- Provides crucial habitat for fish, oysters, and other wildlife within its smaller ecosystems





Stream Daylighting

- Returns the landscape back to its original state
- Allows water to be properly stored, maintained, and discharged as nature intended
- Host to many native salt tolerant plants and wildlife alike





Benefits of Proposed Design

- Protection from storm surge in many forms
- Effective stormwater management through landscape restoration
- Increased wildlife habitat on both land and in water
- Improved quality of life and sense of place
- Increased awareness of Newport history



Design Objectives

Proposed Plan

The goal of my design is to attract residents and visitors to King & Spencer Park while incorporating coastal green infrastructure to:

- Mitigate shoreline erosion
- Reduce flooding on site
- Deflect wave energy
- Improve the quality of water & air
- Treat stormwater runoff
- Increase ecological habitats



Jeanette Dragonetti

Section of Living Shoreline One oyster can filter about 30 gallons of water per day and uptake 1.5 grams of nitrogen per year. Submergered Oyster Reef Native Decidious Trees & Shrubs High Marsh Low Marsh & Aquatic Vegetation **Upland Buffer** Coastal Wetlands & Beach Strand **Subtidal Waters**

Section A - A'

Jeanette Dragonetti

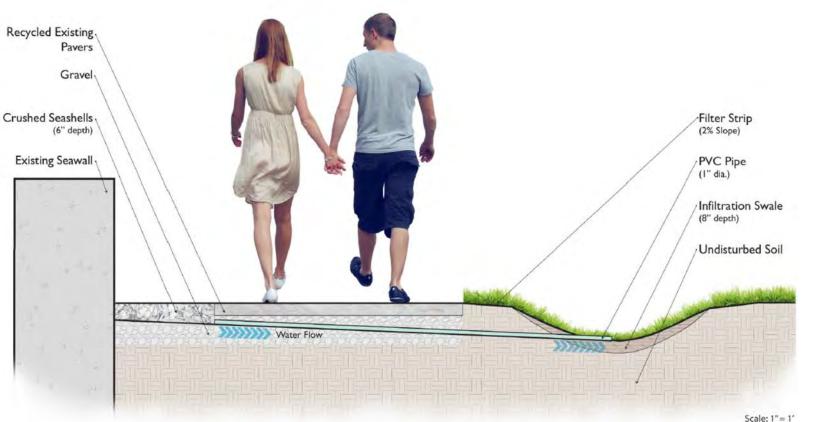
Perspectives



The observatory deck holds an educational value as it allows you to view the habitat created within the living shoreline closely

View of the observatory deck over the living shoreline facing east

Harbor Walk Detail

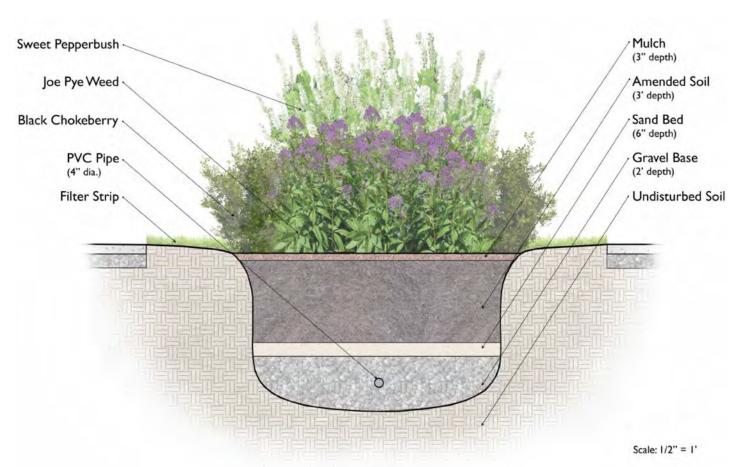


This design reuses the seashells on site to create a channel of crushed seashell within the walkway. so that rainwater & runoff can filter through the seashells and flow to an infiltration swale.

Typical Rain Garden Detail

The rain garden collects runoff from surrounding impervious surfaces. It stores the stormwater so it can slowly infiltrate it back into the soil as the plants, mulch and soil naturally remove pollutants from the runoff.

Rain Gardens reduce the amount of runoff pollutants collected and flowing into storm drains and out to Newport Harbor.



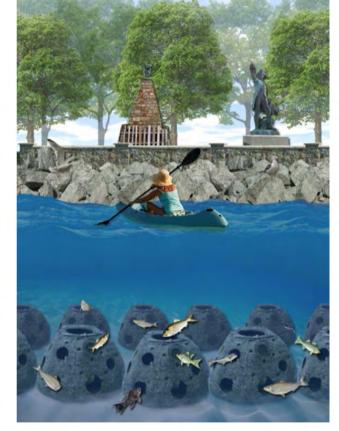
Jeanette Dragonetti

Perspectives



View into the amphitheater facing south,

Recycled water on site from a cistern will be reused to pump to dancing fountains



Reef Balls can improve water quality, help to stabilize the shoreline by creating sediment accumulation. Reef Balls also protect, preserve and enhance the marine environment.

Benefits

Infiltration Swale & Rain Garden

- Improve water quality Filter pollutants
- Infiltrate runoff into groundwater

Detention Basin

Water and snow storage for excess runoff

Living Shoreline

- Improve water quality
- Stabilize soil and prevent tidal erosion
- Settle sediments and filter pollutants
- Habitat enhancement

Reef Balls and Oyster Reef

- Improve water quality
- Mitigate erosion
- Deflect wave energy
- Increase ecology

Jeanette Dragonetti





Green Infrastructure Techniques Applied

Exfiltration trenches reduce **Permeable paving** allows rainwater stormwater runoff by capturing and storing and runoff to move through the runoff in an underground storage area. They pavement's surface into the underlying slowly replenish the groundwater supply and soil and back to the groundwater supply treat storm water quality. EXFILTRATION TRENCH PERMEABLE PAVING OCEAN WALK Rain gardens are used to collect and percolate water slowly into the surrounding soil and while the

Constructed wetlands help control shoreline erosion and provide aquatic wildlife habitat at the same time

Chelsea Gates

water infiltrates, stormwater is

filtered.

King Park





View looking at the constructed man-made seawall and permeable paving along its side.

View showing the proposed constructed wetland area and docks for public use.

Spencer Park



Section through Spencer Park showing the parking lot area for events and food trucks, the proposed rain garden with native plants, and an open green space for recreation.

SALT TOLERANT PLANTINGS INCLUDED:







ELDER



PEPPERBUSH





HACKBERRY GROUNDSEL BUSH

Benefits of the Proposed Design:

- Improved ability to adapt to climate change impacts such as storm events
- Contribution to the beauty and livability of communities
- Opportunities for interaction with nature and associated psychological benefits
- Groundwater recharge
- Surface water purification
- Storm water retention
- Soil/Erosion protection
- Reduced urban heat island effect
- Support for biodiversity

Revitalizing King Park & Spencer Park







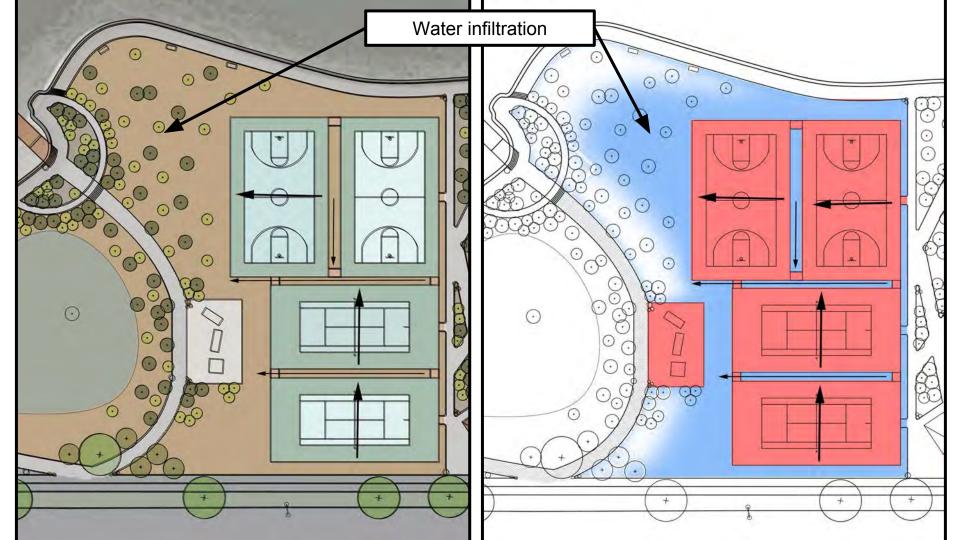
Storm Water Amelioration:

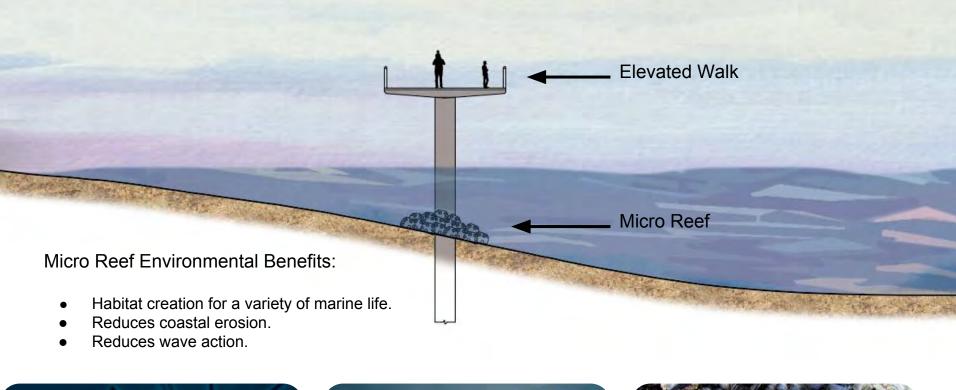
- Green roofs store, filter and release rainwater.
- Delay heavy runoff during precipitation.
- Overall reduction of impact created by storm events and reduction of stress on existing drainage infrastructure.

Urban Heat Island Effect:

- Green roofs absorb radiation from the sun instead of reflecting it back into the atmosphere.
- Reductions in this effect can be attributed to lower temperatures and increased air quality.









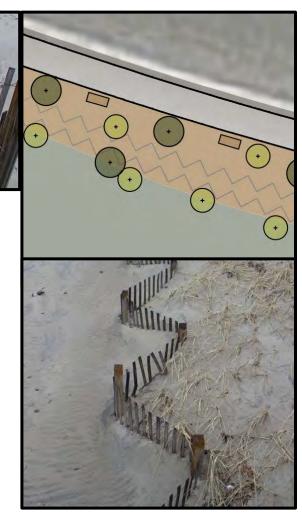






Sand Drift Snow Fencing Environmental Benefits:

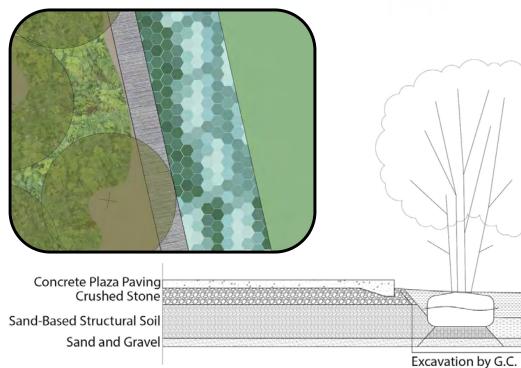
- Low cost, easy to install efficient way to build dunes and protect plants from storm damage.
- Increases King Park's value for storm damage protection, recreation and habitat.
- Can be used with other forms of green infrastructure to manage erosion.





Structural Soil Environmental Benefits:

- Increase oxygen intake to roots
- Important for the growth and health of trees planted in a high water table.
- Provides additional area for root growth for trees planted in proximity to pavement.
- Provides structural stability to pavement above the structural soil.



Overall Benefits

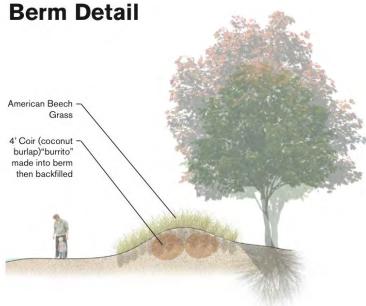
- Increased storage, filtration and controlled release of stormwater.
- Reduction of stress on existing drainage infrastructure.
- Habitat creation.
- Reduction of coastal erosion and wave action.
- Increased protection of damage to habitat and recreation.
- Improved growth for plants.
- Improved structural stability of park infrastructure.





Perspective 1: Vegetated Berm

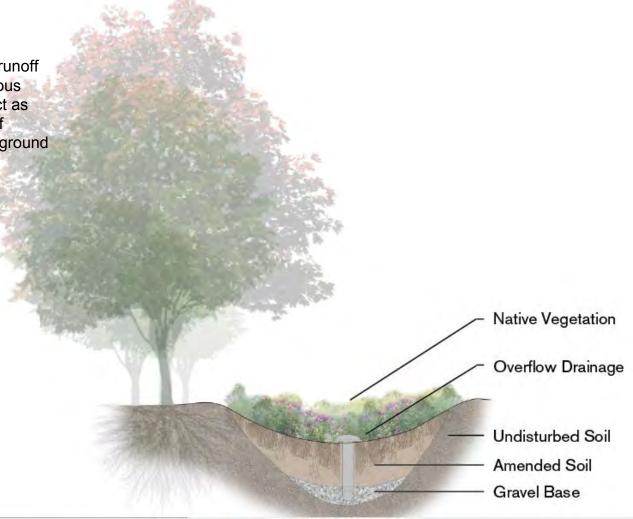




Vegetated Berm will imitate coastal dunes reducing wind speed, providing habitat, preventing erosion and acting as a barrier, protecting the land behind it from rising sea levels.

Bioswale Detail

Bioswales reduce stormwater runoff from the street and other impervious surfaces. Vegetated bioswales act as filters and will treat water runoff of pollutants before returning to the ground and into the ocean.



Section A - A': Complete Street

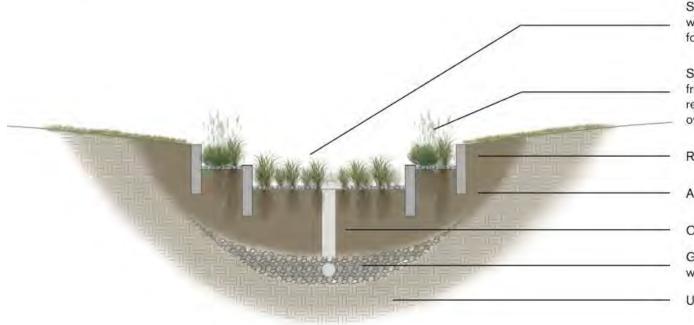


Complete Streets are accessible, safe and aesthetically pleasing providing multi-modes of transportation, with wide sidewalks and vegetated medians.



Raingarden Detail

Raingardens are aesthetically pleasing and serve as another means of collecting stormwater runoff and using native, salt tolerant vegetation.



Salt Tolerant grasses that will be inundated with extreme tides, storm surge and allow for salt marsh migration with rising sea.

Salt Tolerant plants that will collect runoff from Spencer Park. Future conditions may result in natural selection with grasses taking over.

Rhode Island granite slabs

Amended soil

Overflow drainage

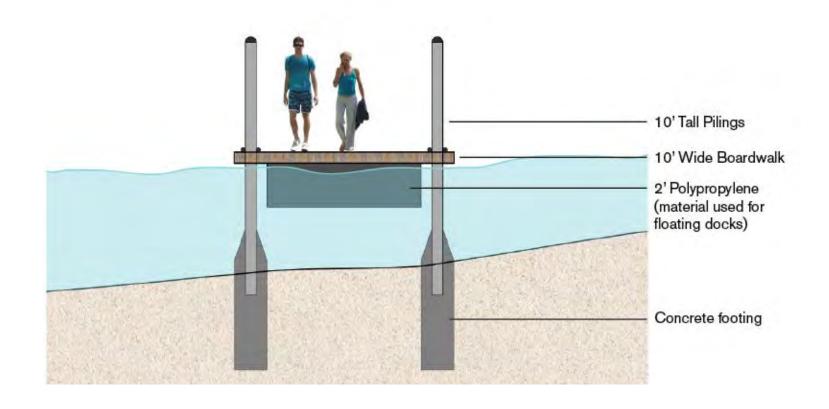
Gravel base and approximate water table level at 42"

Undisturbed existing soil





Boardwalk Detail



Removal of the Sea Wall will allow for sea level rise inundation providing connection between park and water, letting nature to take its course, learning from the past and providing solutions for the future.

Vegetated Berm will imitate coastal dunes reducing wind speed, providing habitat, preventing erosion and acting as a barrier, protecting the land behind it from rising sea levels.

Bioswales will reduce stormwater runoff from the street and other impervious surfaces. Vegetated bioswales act as filters and will treat water runoff of pollutants before returning to the ground and into the ocean.

Complete Street is accessible, safe and aesthetically pleasing providing multi-modes of transportation, wide sidewalks and vegetated medians.

Raingardens are aesthetically pleasing and serve as another means of collecting stormwater runoff and using native, salt tolerant vegetation.

Salt Marshes act as shoreline stabilizers and provide habitat to many species of fish, shellfish, shorebirds and mammals. The salt marsh will provide an opportunity to educate the community on the importance of salt marshes in Narragansett Bay.

Native, Salt Tolerant Plants provide habitat and restore the biological integrity and improve ecological function in the coastal setting.







Section AA

Site Proposal Birdseye View

Site Proposal Birdseye View 2050



Kings Park Progression



1. Gazebo Rain Garden, Facing East



3. Amphitheater Seating with Shading Pergolas



2. Connector Paths Create a Break in Rain Gardens



4. Beach Dune Area

Spencer Park Progression





1. Spencer Park Entry, Vegetated Traffic Island in View



2-3. Progression Towards Middle of Park Along Path Bisecting Detention Area and Rain Garden

Green Infrastructure Systems





Vegetated Floating Island System







http://www.martinecosystems.com/

Benefits

- Floating Vegetated Islands:
 - Reduced erosion from wind and wave movements against beach and sea walls
 - Creates habitat for animals while improving water quality
- Rain Gardens:
 - Increased water filtration and infiltration
 - Cleaning and reducing the amount of runoff returning to the bay
- Beach Dune:
 - Slowing bank erosion and protecting sea walls
 - Allowing beach to gain increase stability as sea level rises
- Detention Basins:
 - Water and snow storage for excess runoff
- Pathways:
 - New paths in King and Spencer parks to increase connectivity and usage
- Vegetated Road Buffer:
 - Slows traffic allowing safer pedestrian travel between King and Spencer Park

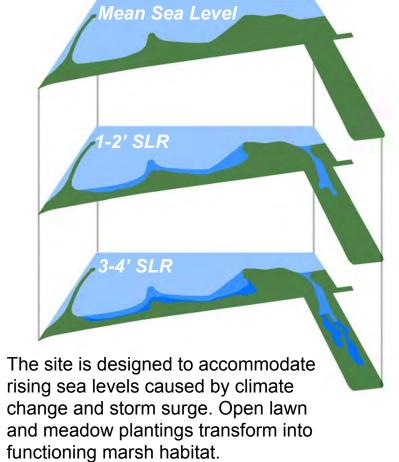




Site Plan in 25-50 Years



Sea Level Rise Adaptation





The existing sea wall is retrofitted **Harbor Boardwalk** with a wooden boardwalk and protected on the seaward side by large angular boulders, which also serve as marine habitat in artificial tide pools. The boardwalk floats on pilings with elevated sea levels and the low elevations of King Park become tidal marsh.



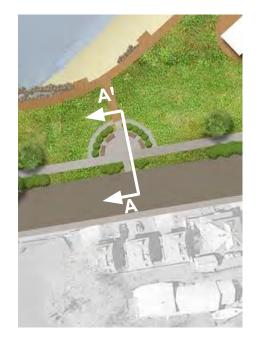




Wellington Avenue Streetscape

The street side of King Park will undergo changes to make the park more accessible and use green infrastructure to address stormwater concerns. Bioswales along the street filter and absorb runoff, with overflow being piped into plantings in the lower elevations of the park.

Site lighting will be improved to extend the hours of park use and a raised central plaza will create a formal entrance where visitors can sit together and enjoy the view of Newport Harbor.







Spencer Park becomes a pedestrian gateway from the surrounding neighborhoods to the waterfront and King Park. Cobblestone paths bring visitors from one end of the green space to the other and create a sense of place in Newport. Two stone bridges traverse the low elevation marsh that is created by the breachway connecting Spencer Park to Newport Harbor.

Benefits of the Proposal

Preservation of Existing Park Uses and Amenities

- Elevation of monuments, structures, and baseball fields above flood levels

Improved Wildlife Habitat and Environmental Quality Through Green Infrastructure

Treatment of stormwater via roadside bioswales and Spencer Park basins

Adaptation to Sea Level Rise and Storm Surge

- Creation of tidal marsh habitat in low elevations of King Park and Spencer Park
- Excavation of breachway to replicate historic morphology

Enhanced Recreation and Open Space

- Preserved open lawn in higher elevations of King Park and Spencer Park
- Floating boardwalk allows visitors to connect with healthy waterfront environment

Connection of Two Parks That Represent Newport and Rhode Island

Use of native plant and hardscape materials that fit the regional vernacular