The background image shows a close-up of a storm drain on a paved surface. A large, iridescent oil spill is visible on the pavement, reflecting rainbow colors. The drain is partially covered with leaves and debris. The surrounding area is grassy with some fallen leaves.

# Cleaning Up The Bays

## Managing Stormwater in the Three Bays



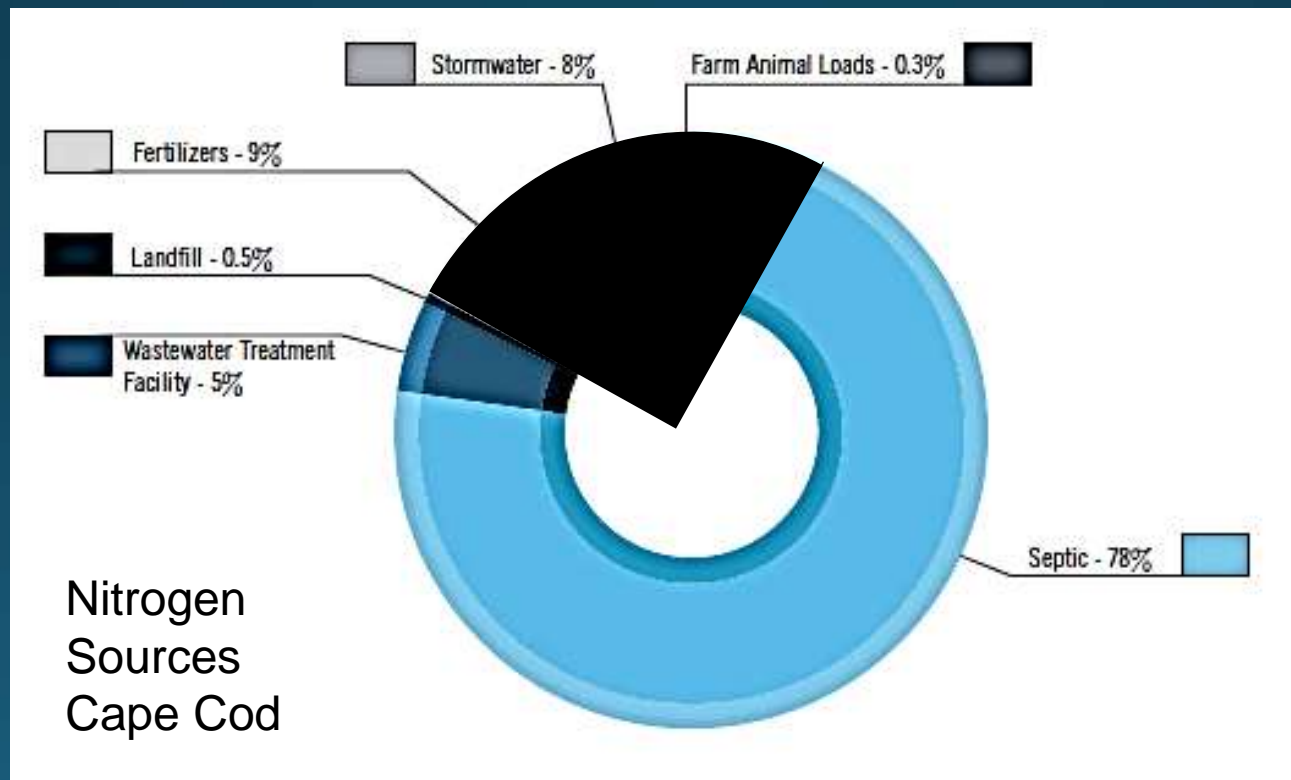


# Three Bays Impaired by Excess Nitrogen and Bacteria



# Nitrogen and Stormwater

- On average 8% of nitrogen in estuaries across the Cape is from stormwater runoff, and 9% from fertilizer use.
- In the Three Bays: **more than 23% of nitrogen** comes from these two sources.



# Negative Effects on the Environment and Community



A “blue economy”

*livelihood and  
sustenance brought  
forth from the sea*





# Project Overview

A photograph of a sunset over the ocean. The sun is low on the horizon, creating a bright, golden glow that reflects on the water. The sky is filled with dark, dramatic clouds. In the foreground, the dark silhouette of a boat's bow is visible, pointing towards the horizon.

3 Year Project

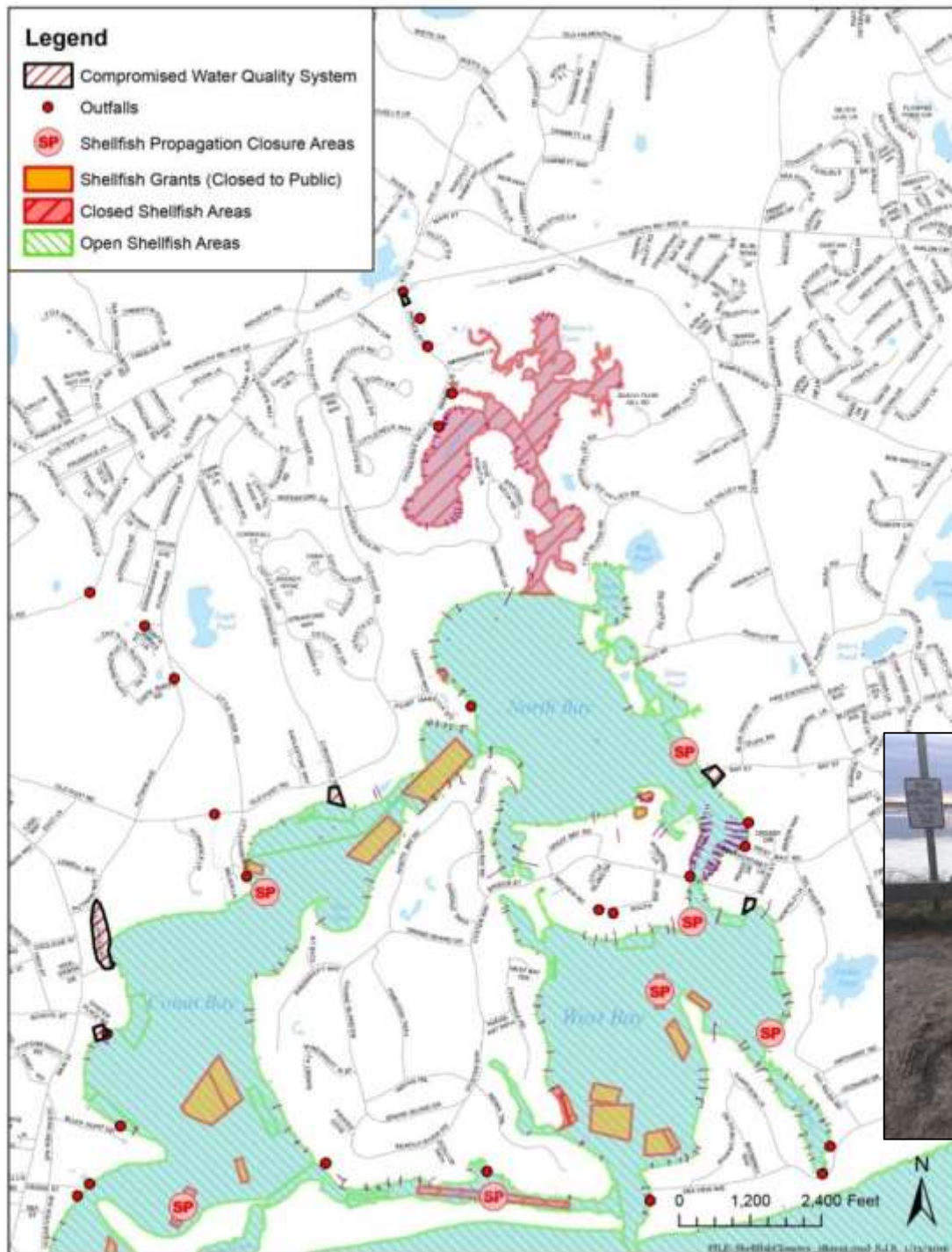
Total Cost: \$692,386

\$472,574 from U.S. EPA Southeast New England Program

\$59,014 from MA Office of Coastal Zone Management

## Legend

- Compromised Water Quality System
- Outfalls
- Shellfish Propagation Closure Areas (SP)
- Shellfish Grants (Closed to Public)
- Closed Shellfish Areas
- Open Shellfish Areas

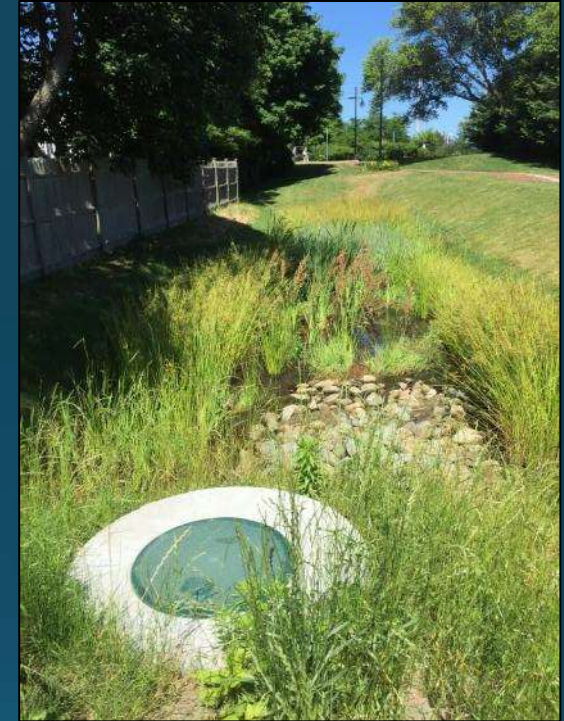
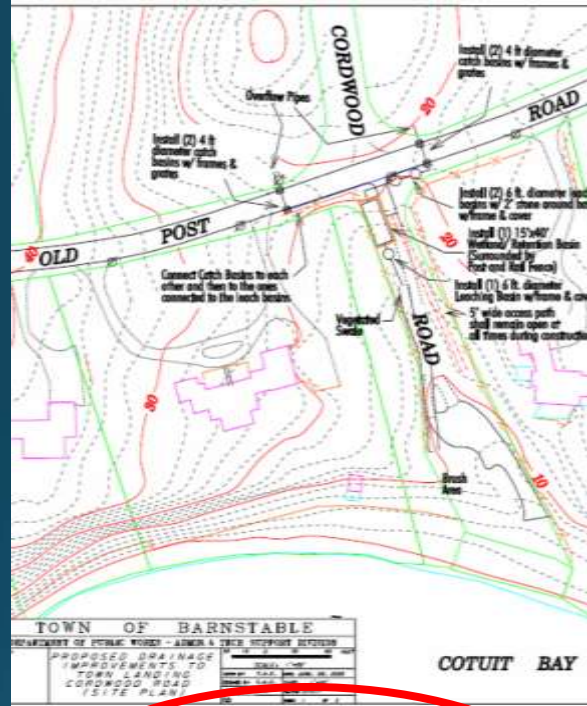
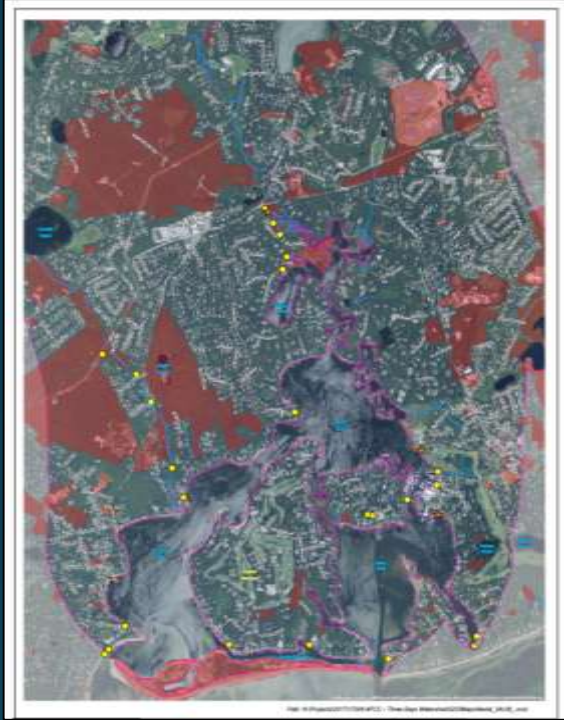


# Project Area





# Approach



## Assessment and Prioritization

March – August  
2017

## Design and Permitting

2017 – 2018

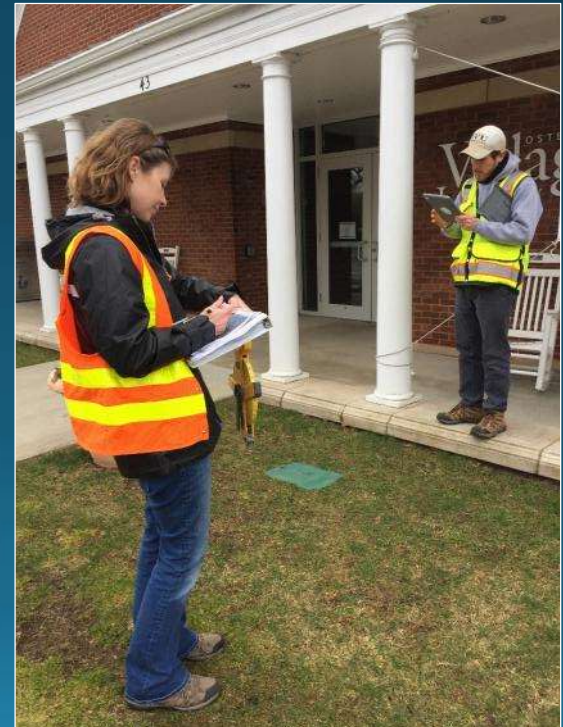
## Installation

September -  
December 2018



# Field Assessment

- Collect data on iPads loaded with existing info
- Visit pre-identified areas
- Talk to the experts/locals





# Rain Garden Workshop and Installation Osterville Library



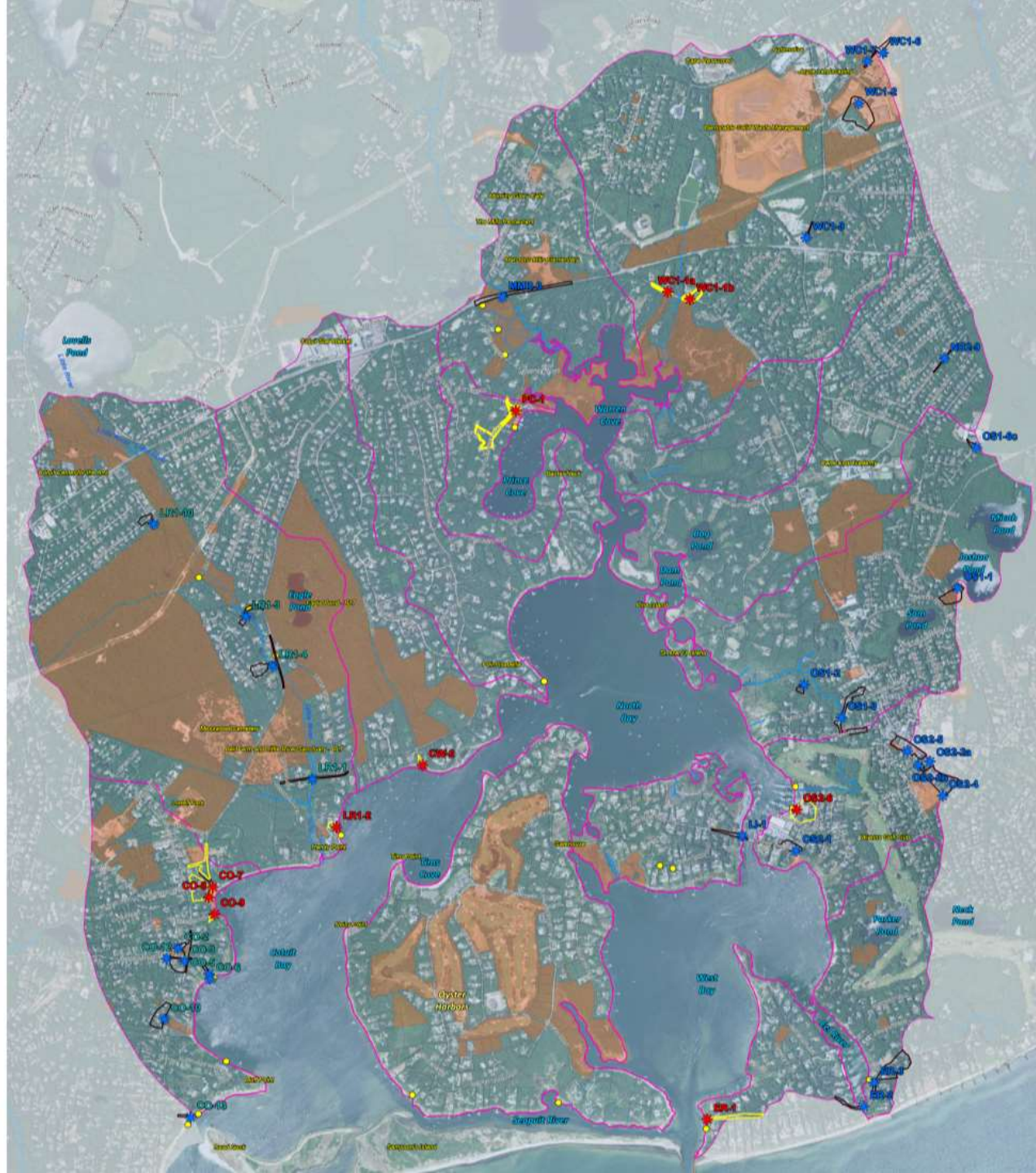
Photo Credits: APCC, Tara Racine and Horsley Witten Group



# Maintenance and Operation Workshops







# Seven Priority Sites Selected for Design and Permitting

## COTUIT

- Ropes Beach
- Little River
- Cordwood Landing

## MARSTONS MILLS

- Prince Cove

## OSTERVILLE

- Eel River – Seaview Avenue
- Osterville Center – Crosby Yacht Yard



# CO-7B: Ropes Beach

## Concept:

- Gravel Wetland
- Pavement Reduction
- Keep Parking but Move Back
- Public Education:  
Incorporate Site into Cotuit Stormwater Walking Tour





# CO-7B: Ropes Beach







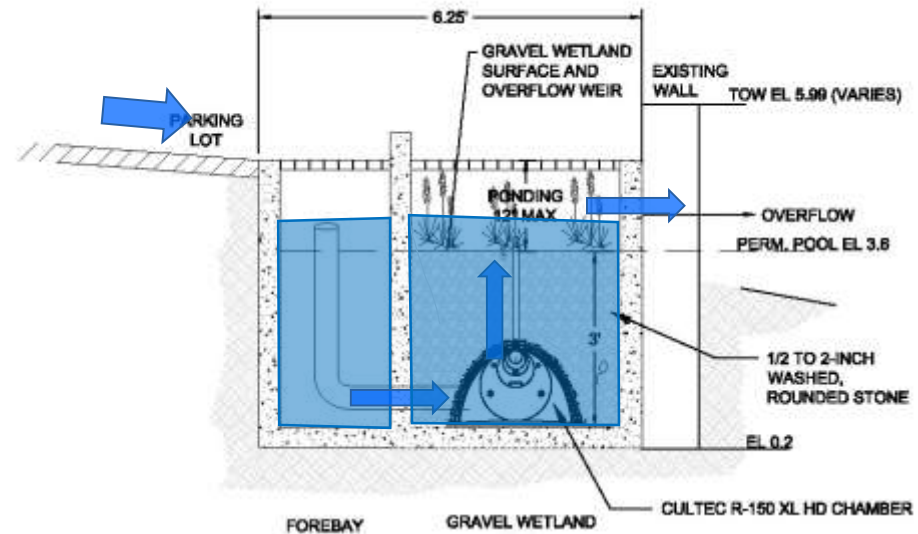
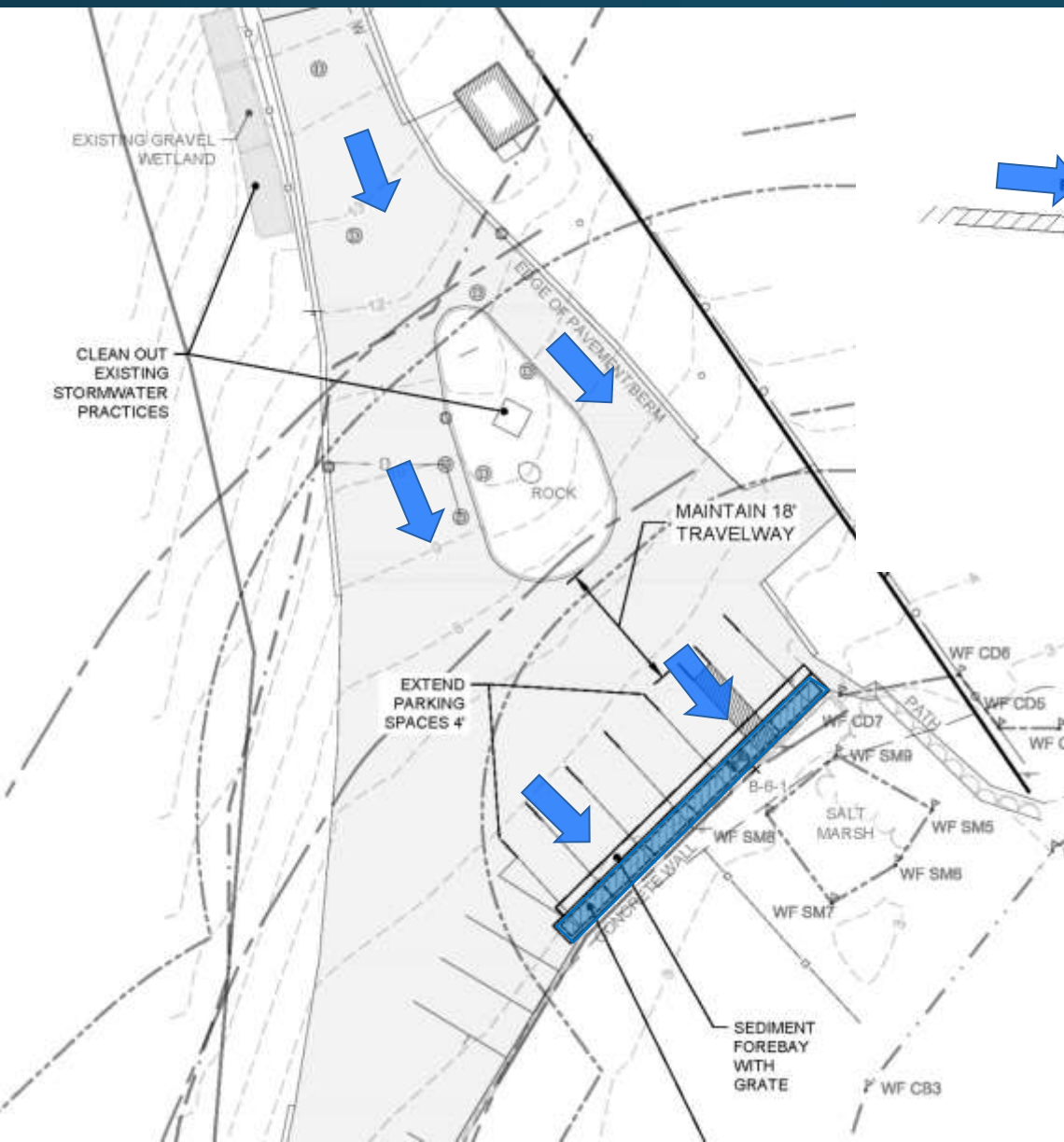


# Parking Lot Gravel Wetland





# CO-7B: 25% Design



# CO-8: Ropes Beach

## Concept:

- **Wet Swale**
- Salt Marsh Restoration
- Public Education: Incorporate Site into Cotuit Stormwater Walking Tour





# CO-8: Ropes Beach





# Wet Swale







# LR1-2: Little River Landing





# Concept:

- **Wet Bioswales**
- Pavement Reduction
- Salt Marsh Restoration
- Stabilized/Improved Water Access
- Public Education





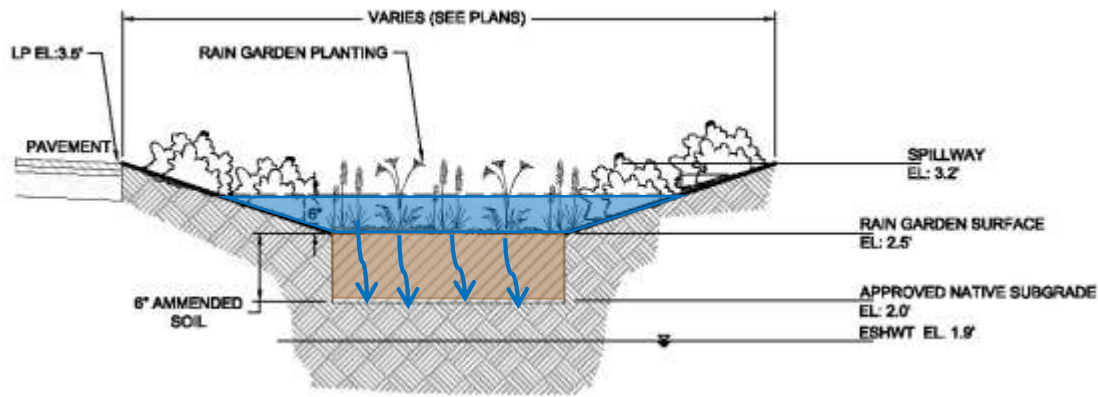
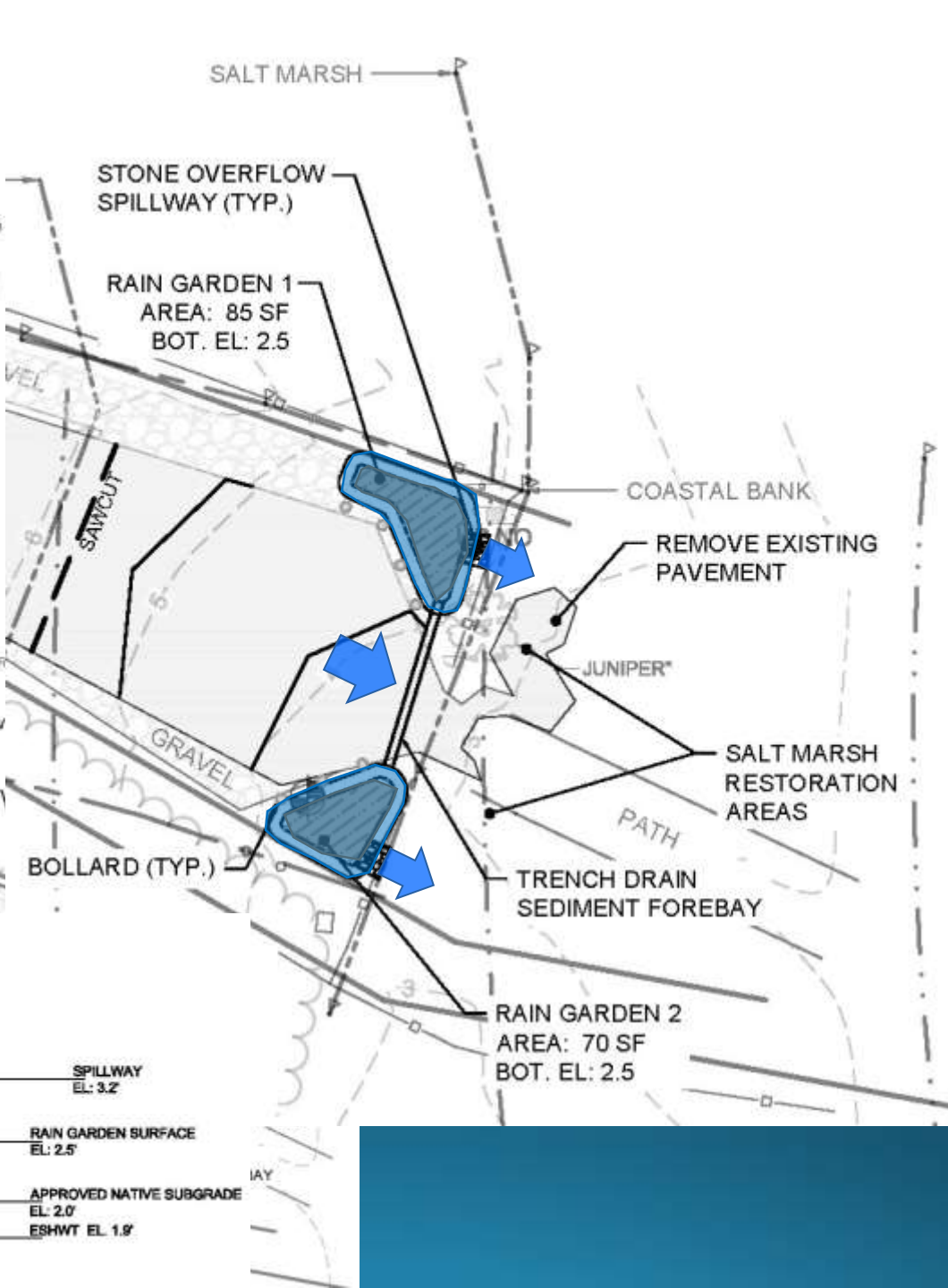
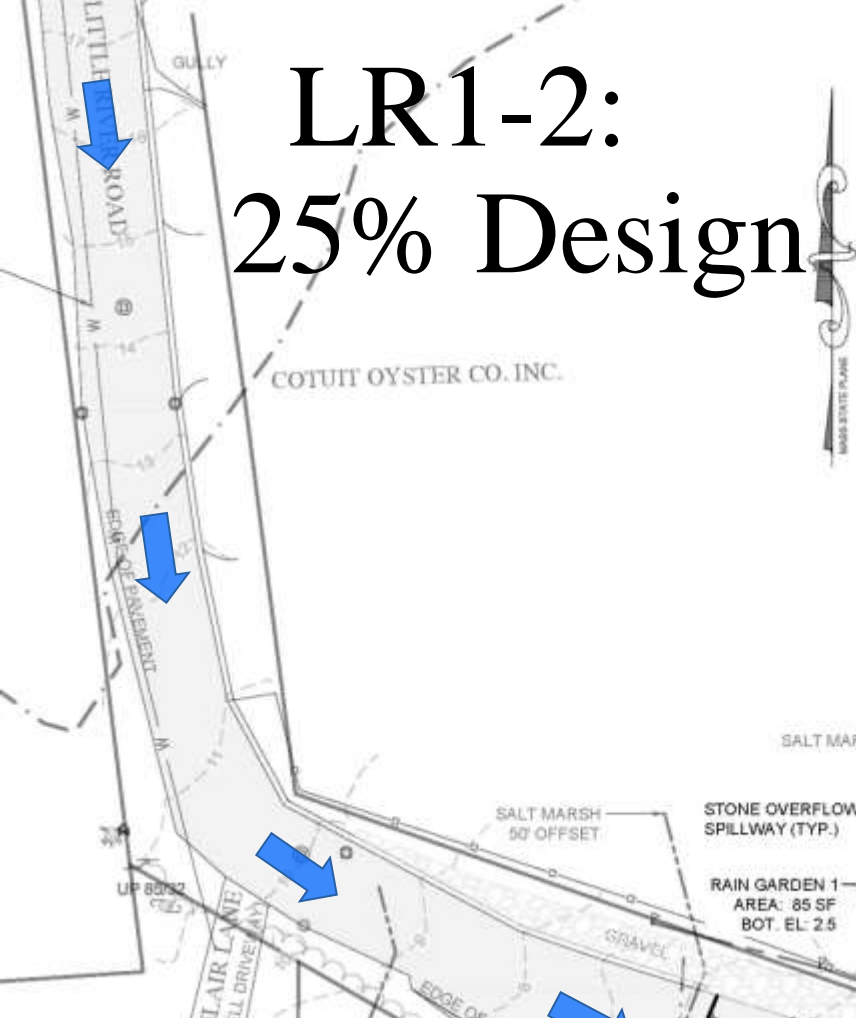


Remove Old  
Pavement and  
Restore Marsh

Stormwater  
Treatment

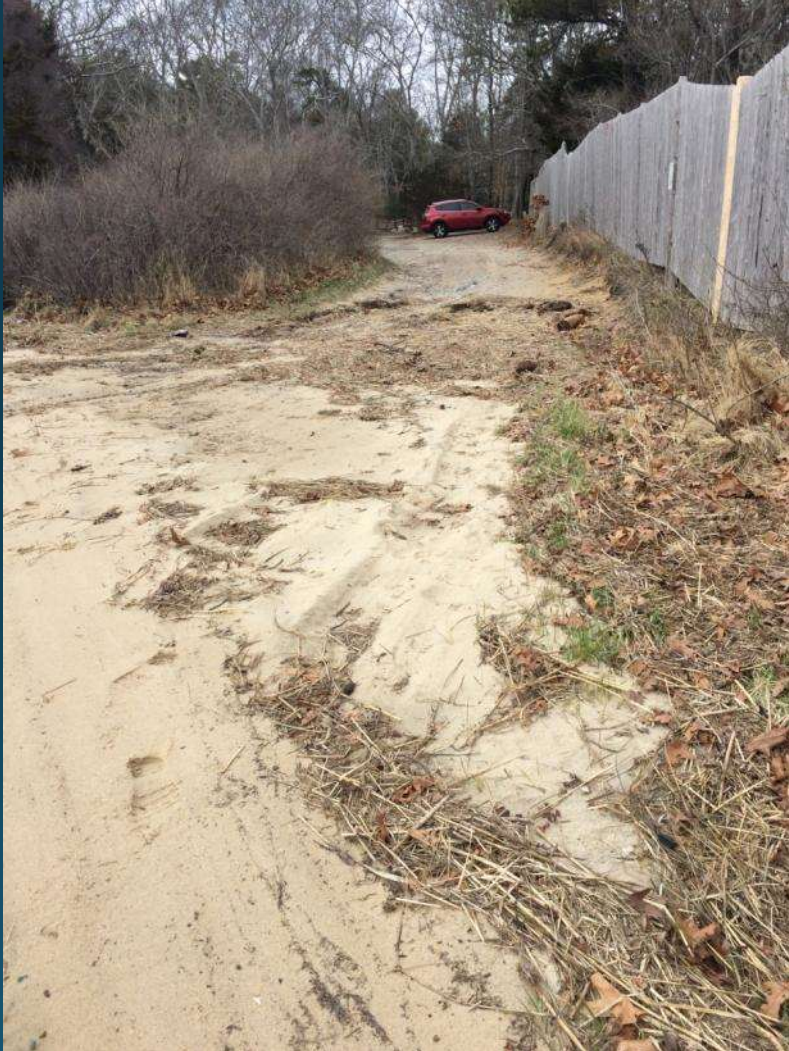


# LR1-2: 25% Design





# CW-2: Cordwood Landing





## Concept:

- **Bioretention**
- Invasive Species Removal/  
Buffer Restoration
- Stabilized/  
Improved  
Water Access
- Improve  
Parking Lot
- Public  
Education





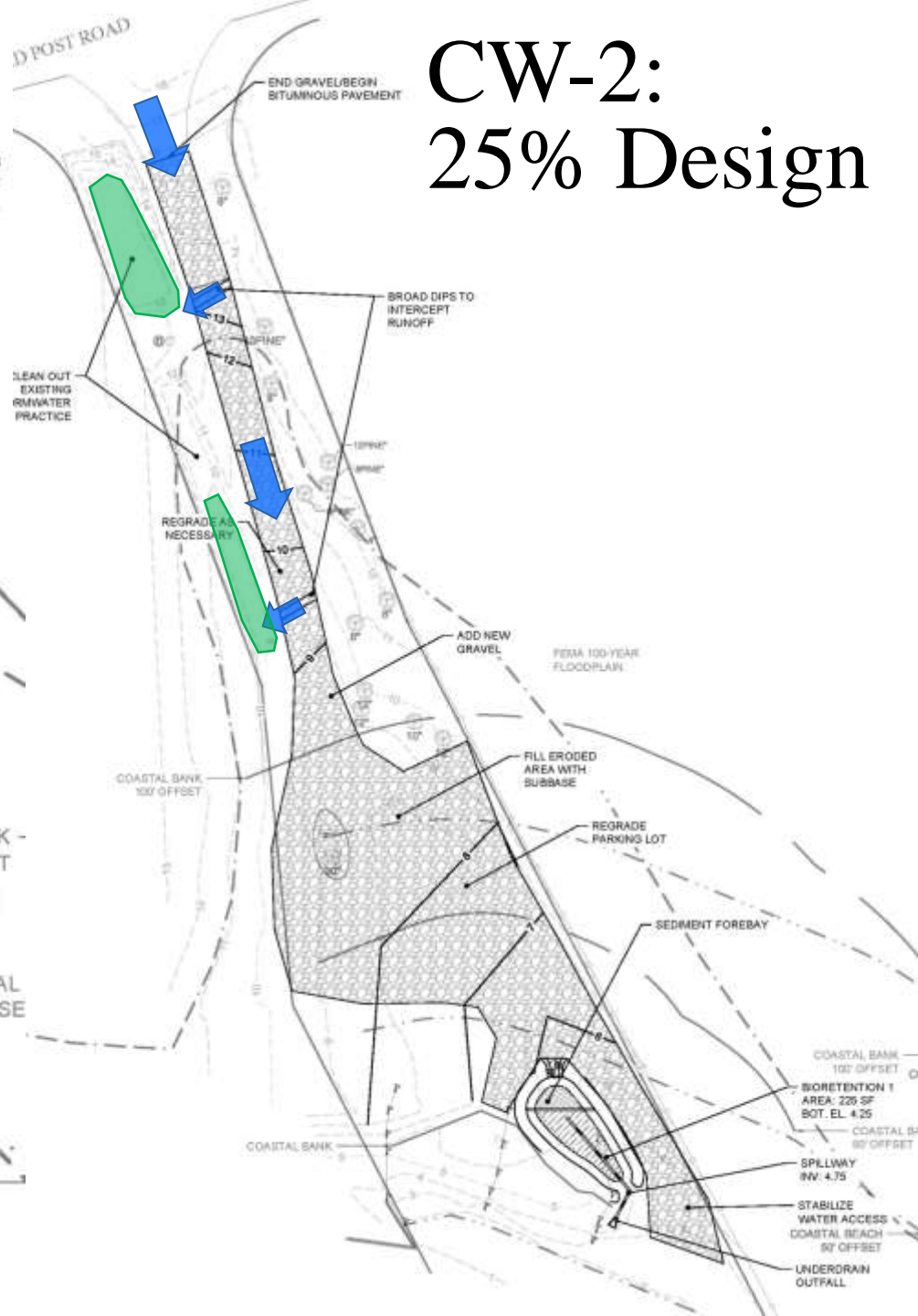
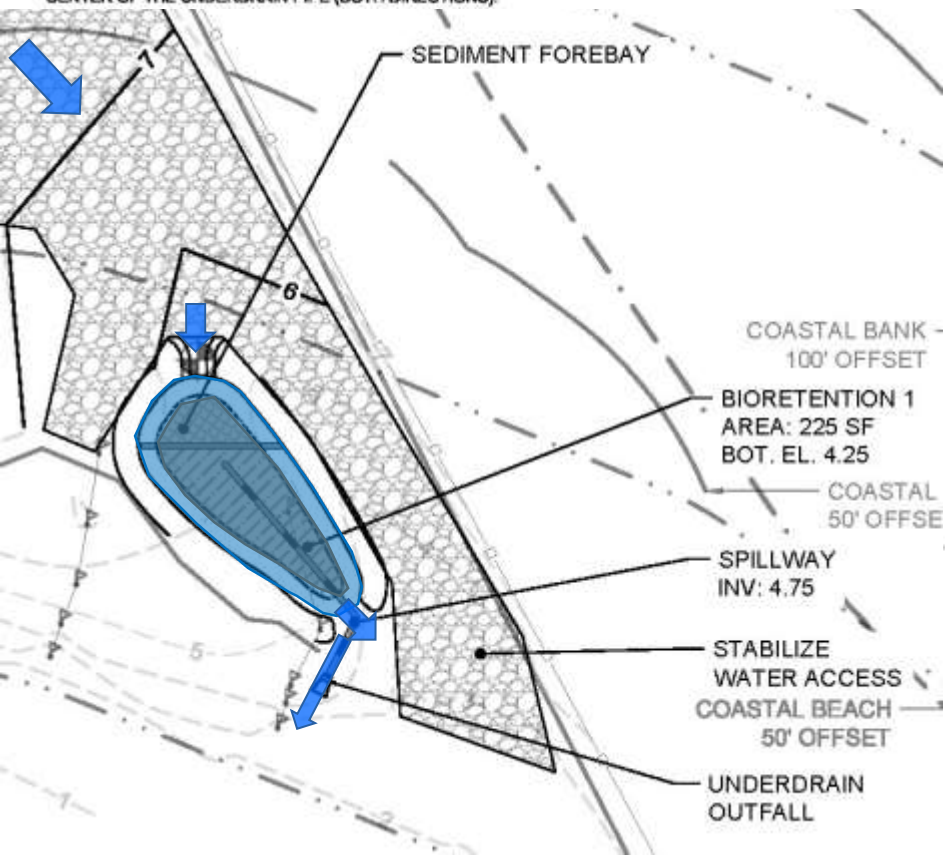
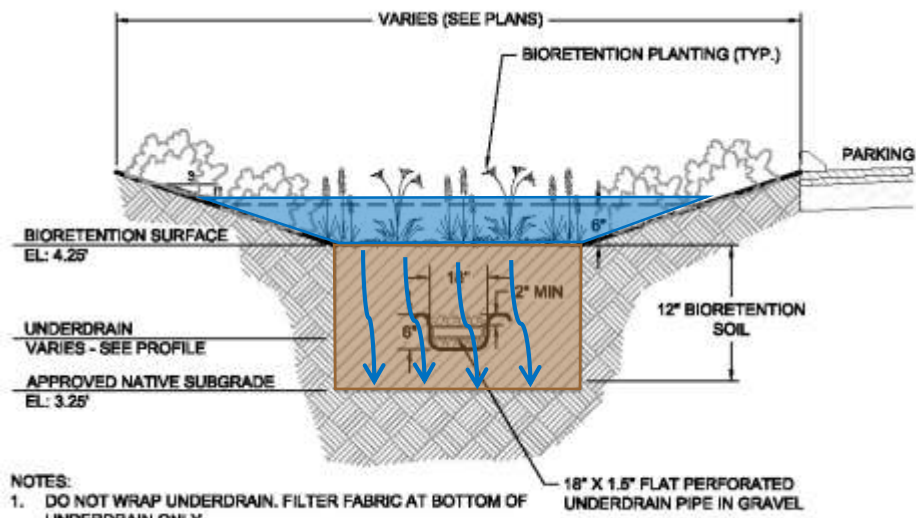


# Bioretention Areas





# CW-2: 25% Design





# PC-1: Prince Cove Marina





## Concept:

- Sand Filter
- Pavement Reduction
- Coordination with Barnstable Land Trust
- Buffer Restoration
- Public Education







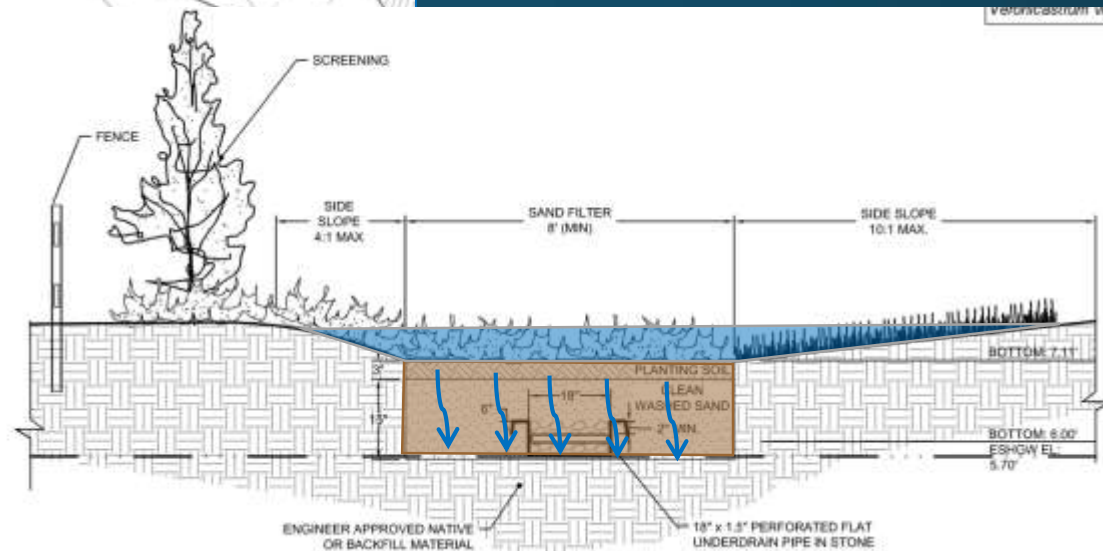
# Sand Filter





The site plan illustrates the Prince of Wales Wetland Restoration Project. Key features and dimensions include:

- PRINCE AVENUE**: A major road running vertically through the center of the site.
- UNDERDRAIN OUTFALL**: Located at the top right, with an elevation of  $INV: 5.86'$ .
- WF 7**: A wetland feature located near the underdrain outfall.
- DRIVEABLE SWALE**: A drainage feature located near the underdrain outfall.
- BOAT STORAGE ACCESS**: Located near the top center of the site.
- WELL**: Located near the boat storage access, with a diameter of  $12.0'$ .
- REINFORCED TURF OUTFALL**: Located near the boat storage access.
- OVERFLOW**: Located near the reinforced turf outfall, with an elevation of  $INV: 7.61'$ .
- BUFFER RESTORATION**: Located on the right side of the site, with an approximate area of  $220 SF \pm$ .
- MOWED LAWN SEED**: Located on the right side of the site, with an approximate area of  $1,300 SF$ .
- 50' WETLAND BUFFER**: Located on the right side of the site.
- DECK**: Located on the right side of the site.
- SCREENING**: Located on the right side of the site.
- FENCE**: Located on the right side of the site.
- SAND FILTER LOW**: Located near the center of the site, with a mow seed mix area of  $750 SF \pm$ .
- SCREENING PLANTING**: Located near the center of the site, with an approximate area of  $90 SF \pm$ .
- SAND FILTER**: Located near the center of the site, with a bottom elevation of  $EL: 7.11'$  and a bottom area of  $315 SF$ .
- CHECKDAM**: Located near the center of the site, with an elevation of  $INV: 8.0'$ .
- STORM SPILLWAY**: Located near the center of the site.
- SEDIMENT FOREBAY**: Located near the center of the site, with a bottom elevation of  $EL: 7.55'$  and a bottom area of  $35 SF$ .
- UNDERDRAIN CLEANOUT**: Located near the center of the site.
- UP 274**: A road located at the bottom of the site.
- 100' WETLAND BUFFER**: Located on the left side of the site.
- FEAR 100-YEAR FLOODPLAIN**: Located on the left side of the site.



# ER-1: End of Seaview Ave



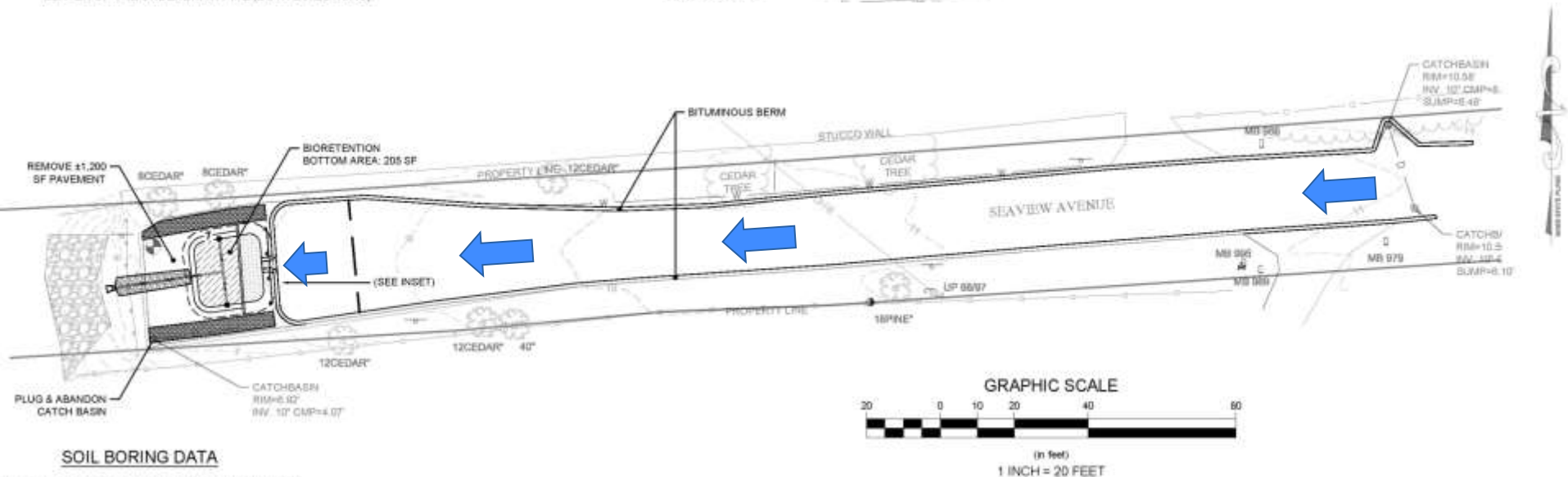
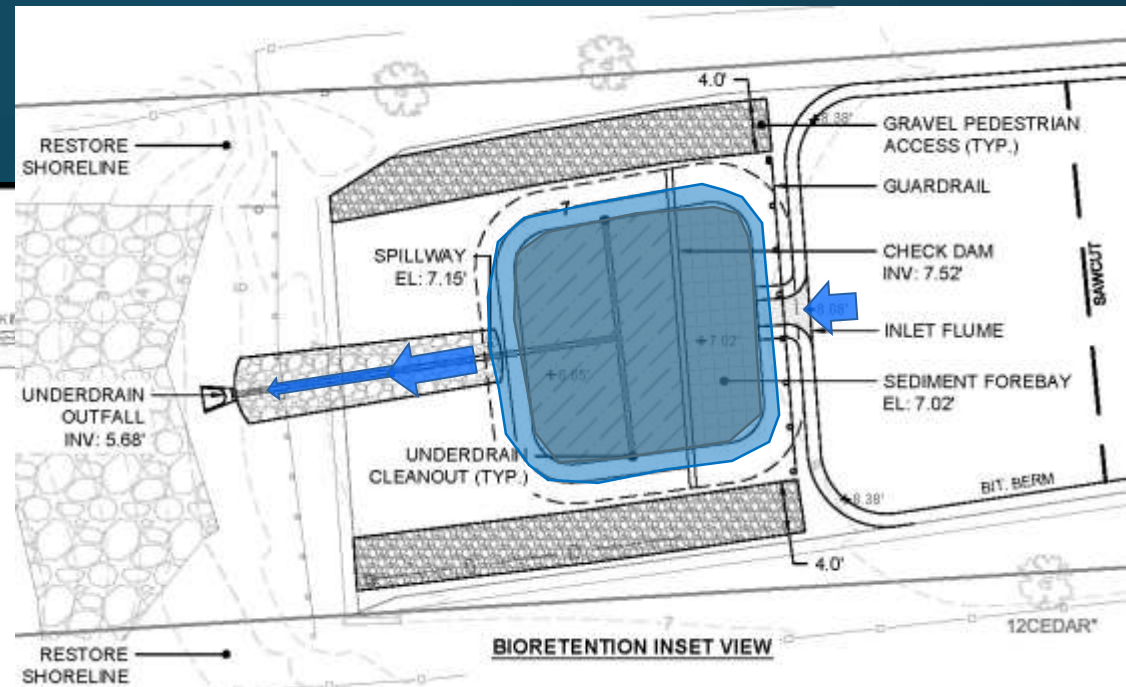
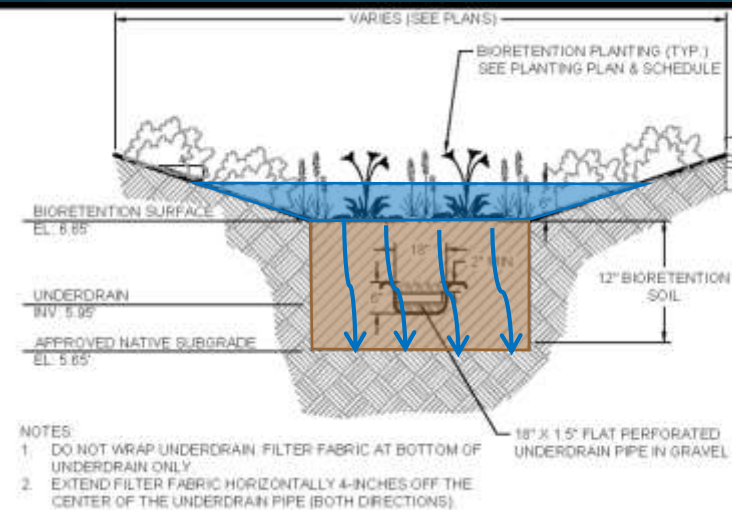


# Concept:

- **Bioretention**
- Pavement Reduction
- Stabilized/Improved Access
- Public Education



# ER-1: 25% Design



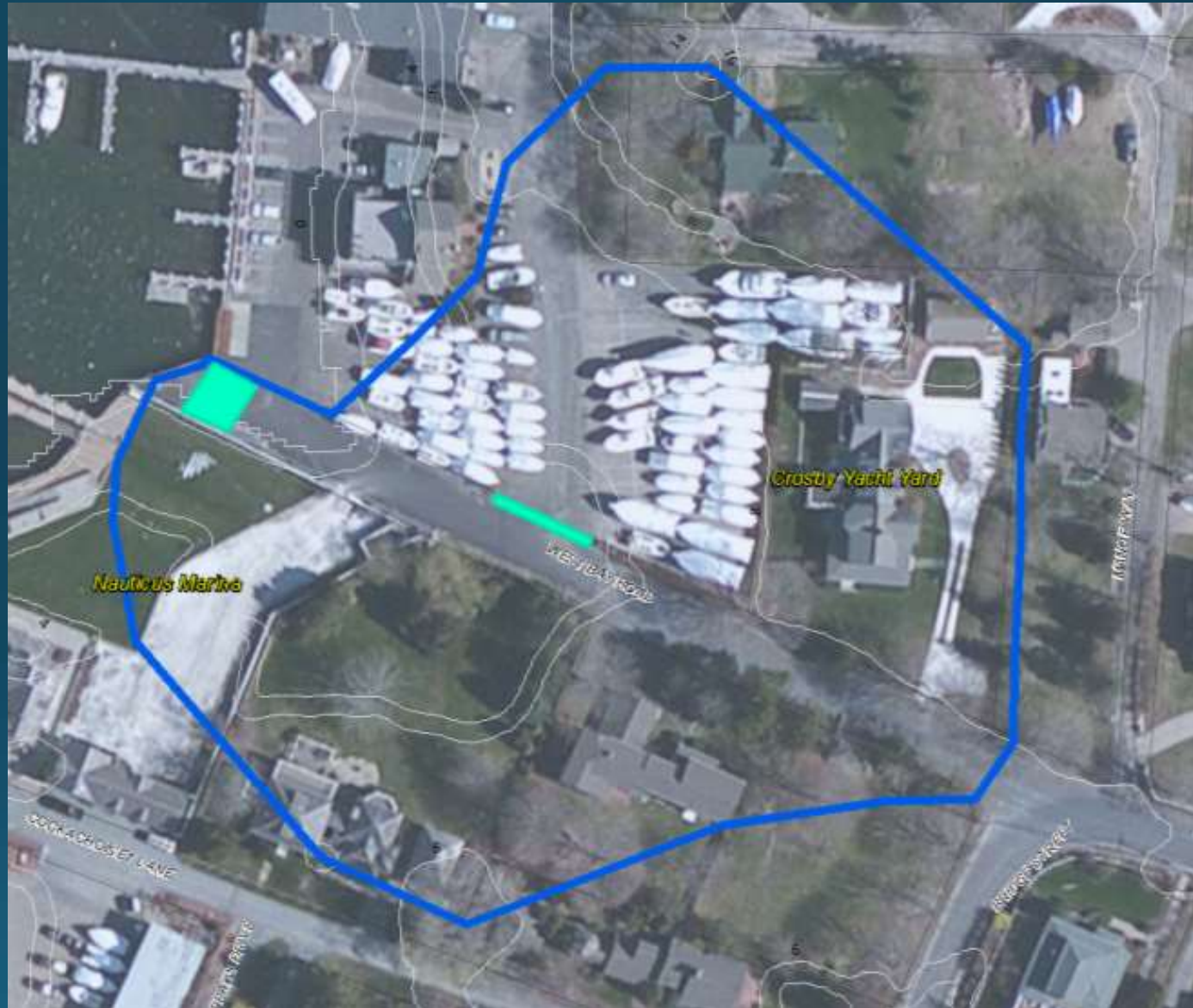


# OS2-6: End of W. Bay Rd



## Concept:

- Underground Sand Filters
- Pavement Reduction
- Public Education
- Public/Private Partnership Opportunity



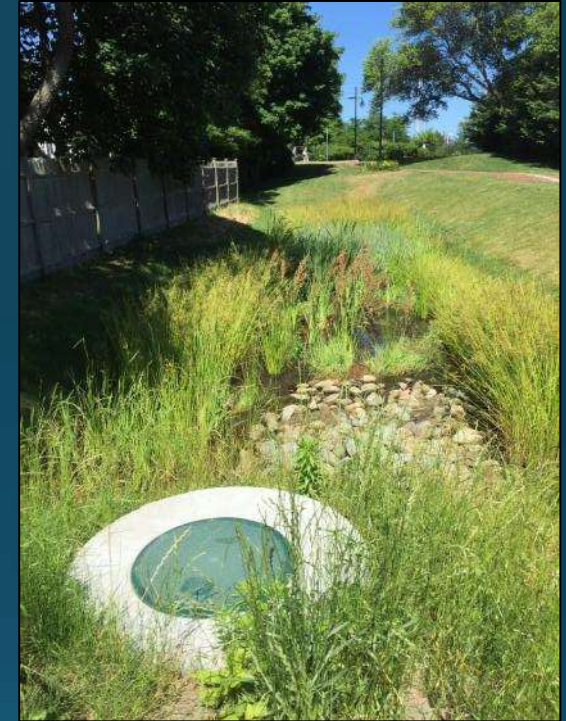
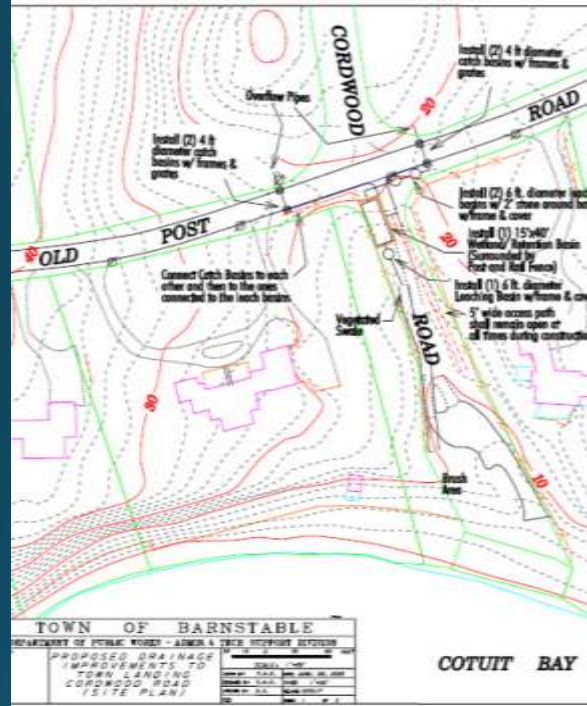
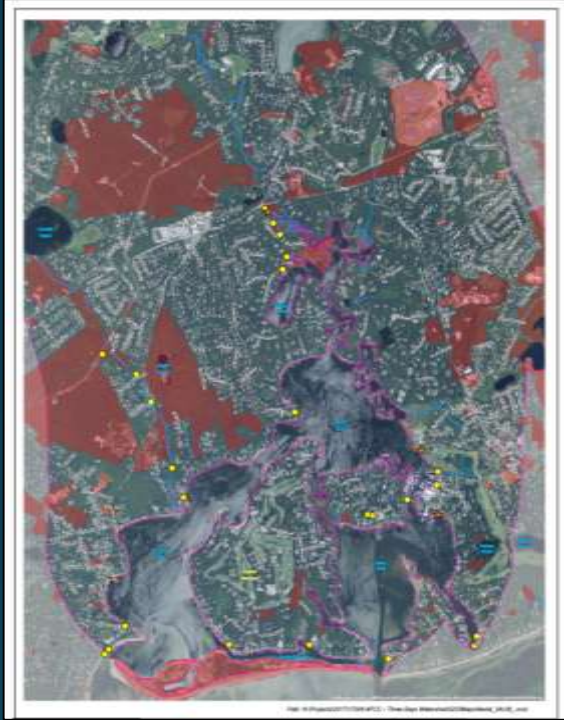


# Underground Sand Filter





# Next Steps and Timeline



## Assessment and Prioritization

March – August  
2017

## Design and Permitting

Fall 2017 –  
Summer 2018

## Installation

September -  
December 2018



# Questions?

