



SALEM LIVING SHORELINE PROJECT

CZM Green Infrastructure for Coastal Resilience Grant
COLLINS COVE LIVING SHORELINE DESIGN

Salem Conservation Commission
June 8, 2017

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Salem Sound Coastwatch Executive Director & MassBays Lower North Regional Service Provider



City of Salem awarded

Massachusetts Coastal Zone Management Green Infrastructure for Coastal Resilience

Financial & Technical Resources to advance understanding &
implementation of **natural approaches to**
mitigate coastal erosion
& flooding problems

1. December 2014 – June 2016 for shoreline assessment
2. December 2016 – June 2017 design & permitting 1 site

Kathryn Glenn – CZM North Shore Regional Coordinator

Julia Knisel – CZM Coastal Shoreline & Floodplain Manager



The PROCESS

1. Municipal Shoreline Survey
2. Identify up to 10 possible sites
3. Chose 3 sites
4. Develop 3 Conceptual Designs



Created a Matrix to Determine Site Priority

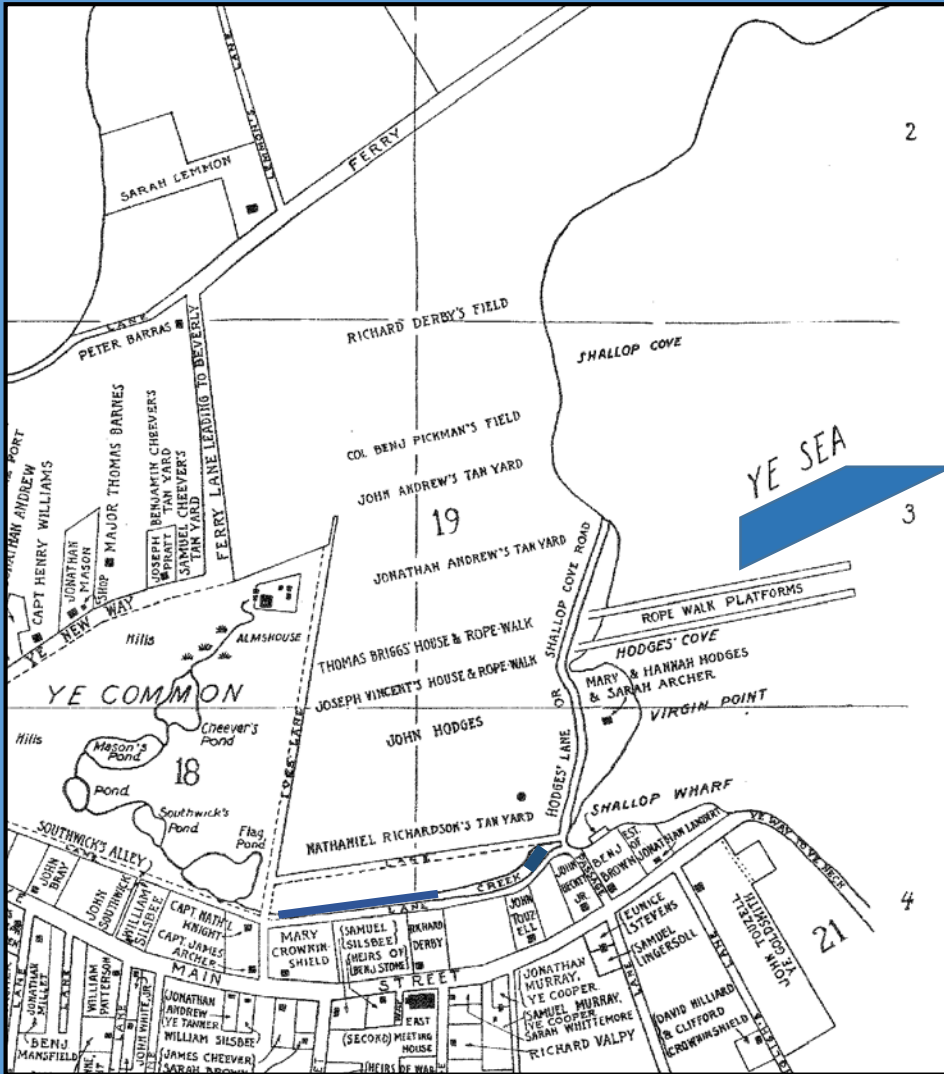
	Kernwood Marina	McCabe Park	Furlong Park	Collins Cove - East	Collins Cove Park	Collins Cove Beach
Site Name						
Site ID	5	6	14	19	20	21
Criteria -- Scoring System: High (3); Medium (2); Low (1) Use number in cells.						
Physical						
Natural shoreline	2	3	2	3	1	1
Flooding potential (FEMA & Storm surge maps)	1	1	3	3	3	2
Erosion impacts (extent, rate, cause and shoreline change)	2	1	1	3	2	2
Filled tidelands (shoreline change map & chapter 91 maps)	1	1	2	3	3	2
Low topography	1	3	3	3	1	2
Exposure to storm waves	1	2	2	1	1	2
Vulnerability to sea level rise	2	2	2	2	2	2
Potential for natural shoreline adaptation / resilience (landward migration or sediment accretion)	2	2	3	3	2	3
Biological						
Presence of marine & coastal resources (eelgrass, shellfish, salt marsh, etc.)	3	3	3	3	2	3
Restoration potential for coastal habitat	2	1	2	2	2	2
Social						
Public property	3	3	3	1	3	3
Residential impacts	1	1	3	2	3	3
Vulnerable population (elderly, schools, low income, hospitals)	1	1	2	2	3	3
Evacuation route / connector road	2	1	1	2	3	3
Recreational benefits	3	2	3	2	3	2
Historical & cultural significance	2	1	3	1	2	2
Economic						
Cost of gray infrastructure repair or installation (functional condition assessment)	2	2	2	2	3	3
Economic value (lost revenues for City, businesses, residents)	2	1	3	1	1	1
Cost of recovery to repair flooding impacts	2	2	2	2	3	3
Funding opportunities	2	1	3	1	3	3
Transferability to other coastal communities	3	1	3	2	3	3
TOTAL SCORE	40	35	51	44	49	50

Collins Cove Selected as 1 of the 3 Priority Sites



Awarded 2nd Massachusetts Coastal Zone Management Coastal Resilience Grant for design and permitting of Collins Cove

Looking at Collins Cove Past



c. 1650-1700: There are a few dozen houses along the Cove.

A creek runs from the Salem Common along present-day Forrester Street to the Cove.

1800: The Common is leveled and drained. The creek begins to disappear.

1790 Salem Map of Collins Cove

Shallop Cove 1700 - 1800

1805 (*September 12*):

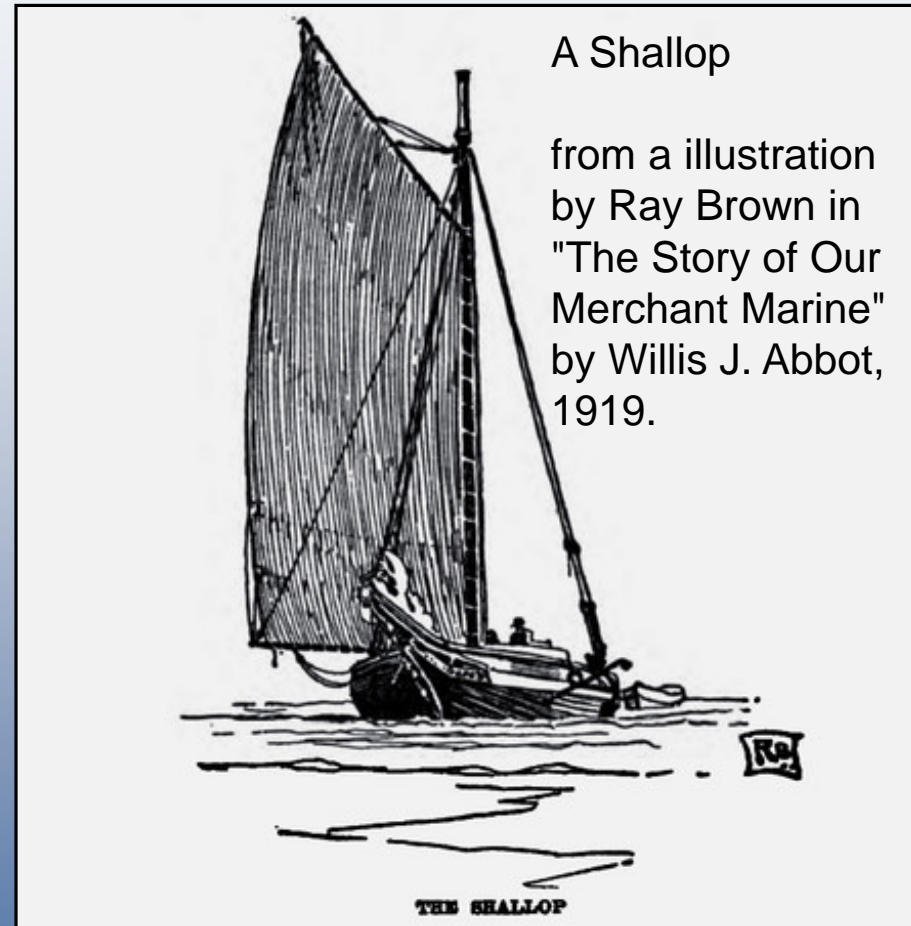
The *Salem Register* reports that a 460-pound “tunny” (tuna) was stranded on the flats at “Shallop Cove.”

1815 (June 17):

The *Essex Register* notes that “the Shallop Cove, which lays eastward of the bridge, Pleasant and East [present-day Forrester] streets, & the Neck, is continually filling up.

Great changes have taken place in the memory of the present generation, and very great from the first settlement of the town.

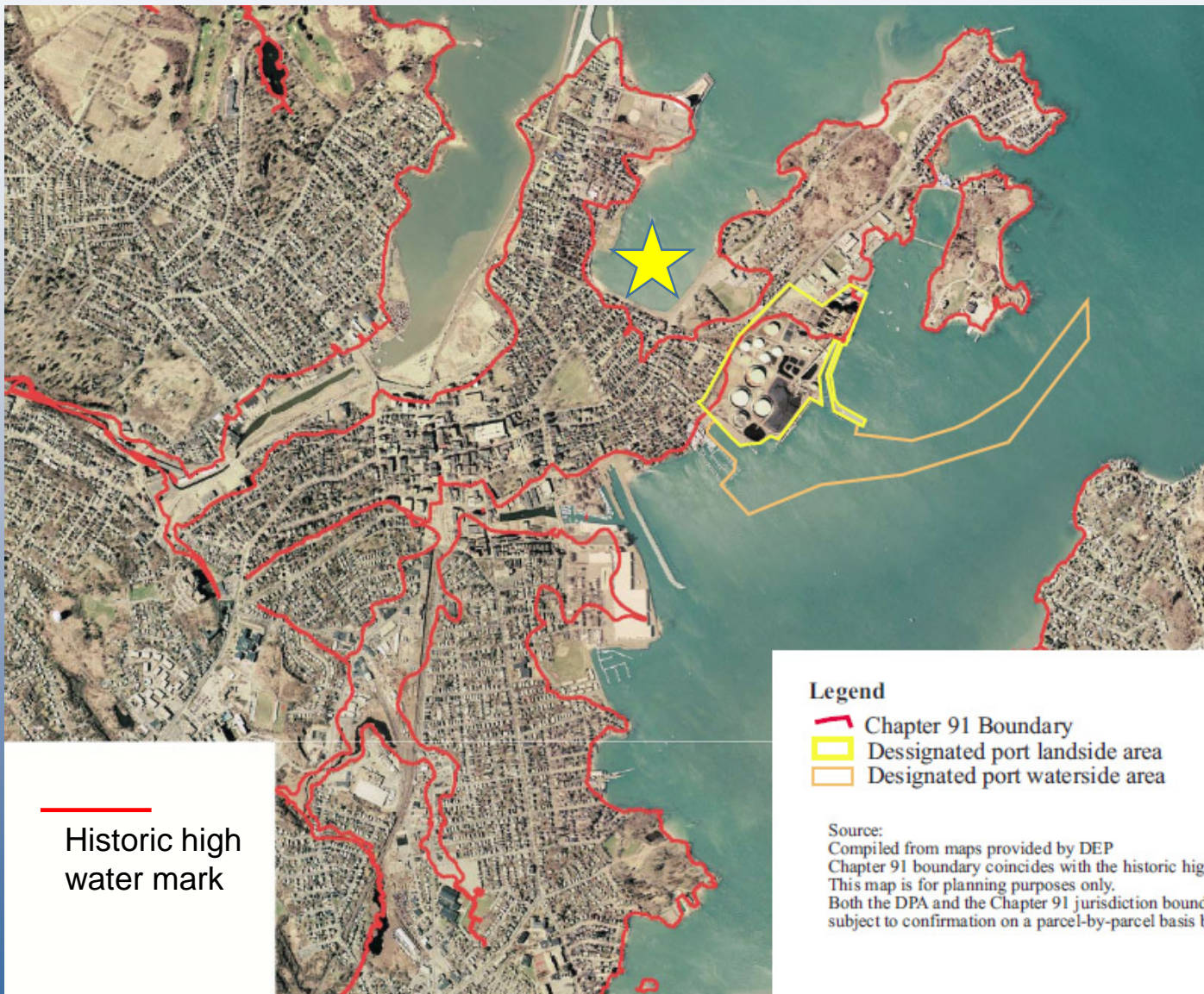
It was at first their principal place for their Shallops; it is now without water at every fall of the tide.”



Salt Marsh in Collins Cove - 1875 US Coast and Geodetic Survey



Filled Tide Lands – Chapter 91



Salt Marsh in Collins Cove - 1875 US Coast and Geodetic Survey



EXISTING VEGETATION



Spartina patens (salt meadow cordgrass)
and other salt marsh plants growing there now

Collins Cove – *Spartina alterniflora* and other salt marsh plants growing there now



Collins Cove – walking and bike path along the water



Collins Cove – average tide



Collins Cove – After 11.8ft. King Tide on 11/16/2016



Collins Cove – During hurricane Sandy 10/29/2012



Nothing like Scituate.....



Salem Sound Coastwatch *ESRI Story Map*

Mozilla Firefox Start Page | A Living Shoreline: Collins Cove | <https://www.arcgis.com/apps/MapJournal/index.html?appid=30a586cb43914bb89d197e09c37021cd>

A story map | **Salem Sound COASTWATCH**
A Living Shoreline: Collins Cove

As sea levels rise and pressures from climate change increase, Massachusetts coastal communities are approaching an imperative decision:

Gray or Green?

In Salem, local government and Salem Sound Coastwatch are promoting living shoreline, green infrastructure projects. The project is funded by grants received from Massachusetts Office of Coastal Zone Management. The first implementation is aimed at Collins Cove (see right photo).


LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES

Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.

- One square mile of salt marsh stores the carbon equivalent of 76,000 gal of gas annually.
- Marshes trap sediments from tidal waters, allowing them to grow in elevation as sea level rises.
- Using shorelines improve water quality, provide fishery habitat, increase biodiversity, and promote recreation.
- Marshes and oyster reefs act as natural barriers to waves. 15 ft of marsh can absorb 50% of incoming wave energy.
- Using shorelines are more resilient against storms than bulkheads.
- 33% of shorelines in the U.S. will be hardened by 2100, decreasing fisheries habitat and biodiversity.
- Hard shoreline structures like bulkheads prevent natural marsh migration and may create seaward erosion.

The National Centers for Coastal Ocean Science | coastalscience.noaa.gov

What are the benefits of a living shoreline?



<https://www.arcgis.com/apps/MapJournal/index.html?appid=30a586cb43914bb89d197e09c37021cd>

SITE



COLLINS COVE

WEBB STREET

MEPA Review Thresholds

ENF and Other MEPA Review

1. Permit is required because:

c. alteration of 1,000 or more sf of salt marsh or outstanding resource waters;

or
e. New fill or structure or Expansion of existing fill structure, except a pile-supported structure, in a velocity zone or regulatory floodway; or

f. alteration of one half or more acres of any other wetlands.











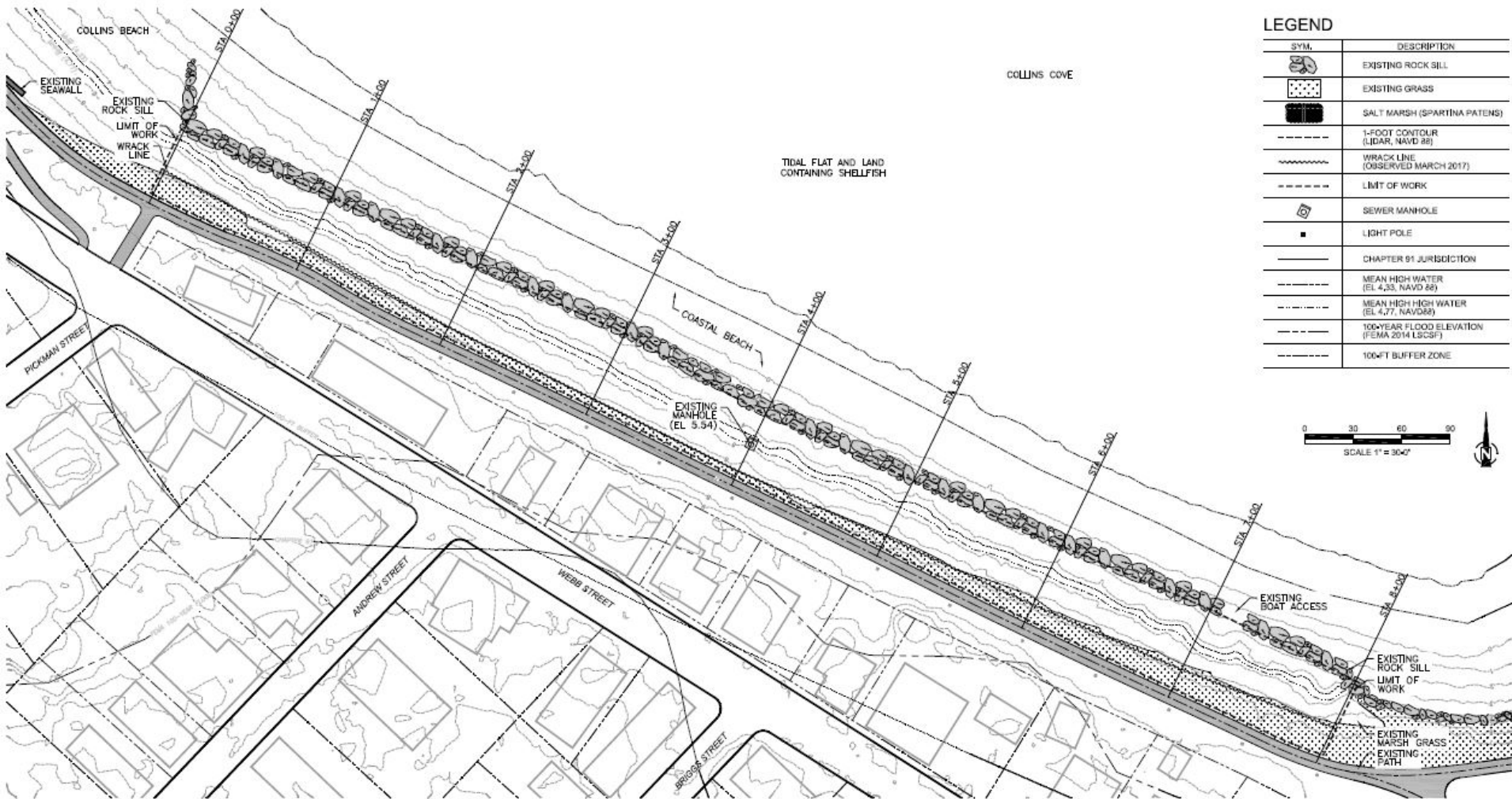








EXISTING CONDITIONS



Project Area

Total Size

38,350 sq. feet (0.88 acres)

Coastal Beach

35,120 sq. feet (0.81 acres)

Marsh

3,230 sq. feet (0.07 acres)

WETLAND RESOURCE AREAS

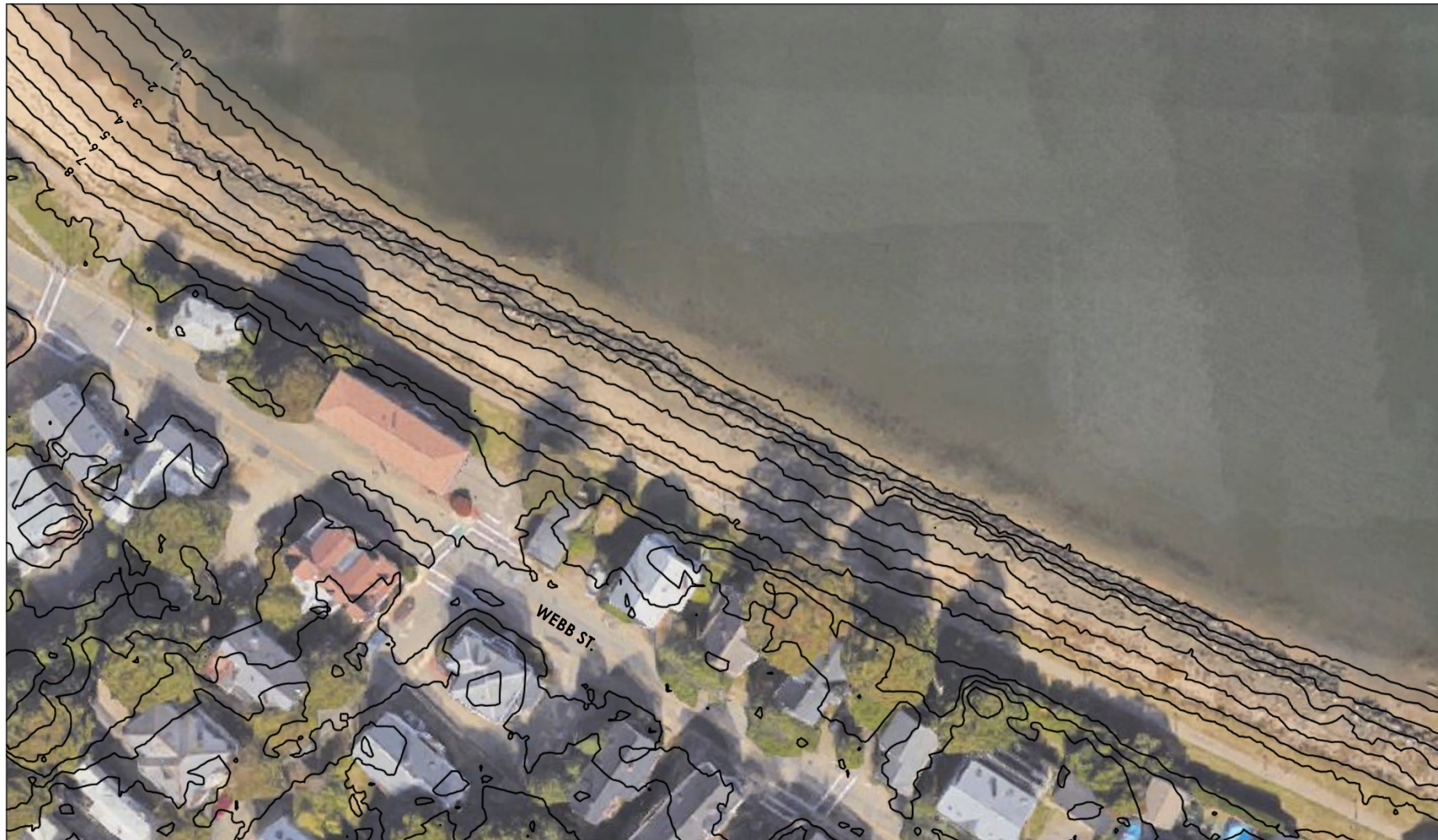


SHELLFISH SUITABILITY AREAS





TIDE DATUMS BOSTON		Station 8443970
Datum	Description	NAVD88 (feet)
MHHW	Mean Higher-High Water	4.77
MHW	Mean High Water	4.33
MTL	Mean Tide Level	-0.42
MSL	Mean Sea Level	-0.30
DTL	Mean Diurnal Tide Level	-0.37
MLW	Mean Low Water	-5.16
MLLW	Mean Lower-Low Water	-5.51
NAVD88	North American Vertical Datum of 1988	0
STND	Station Datum	-9.03
MN	Mean Range of Tide	9.49



0 50 100 150 200
Feet



FIGURE 2: Collins Cove LIDAR

Google Earth 2016 Ortho Imagery
2013-2014 Sandy DEM Data
Contours referenced to NAVD88 (feet)

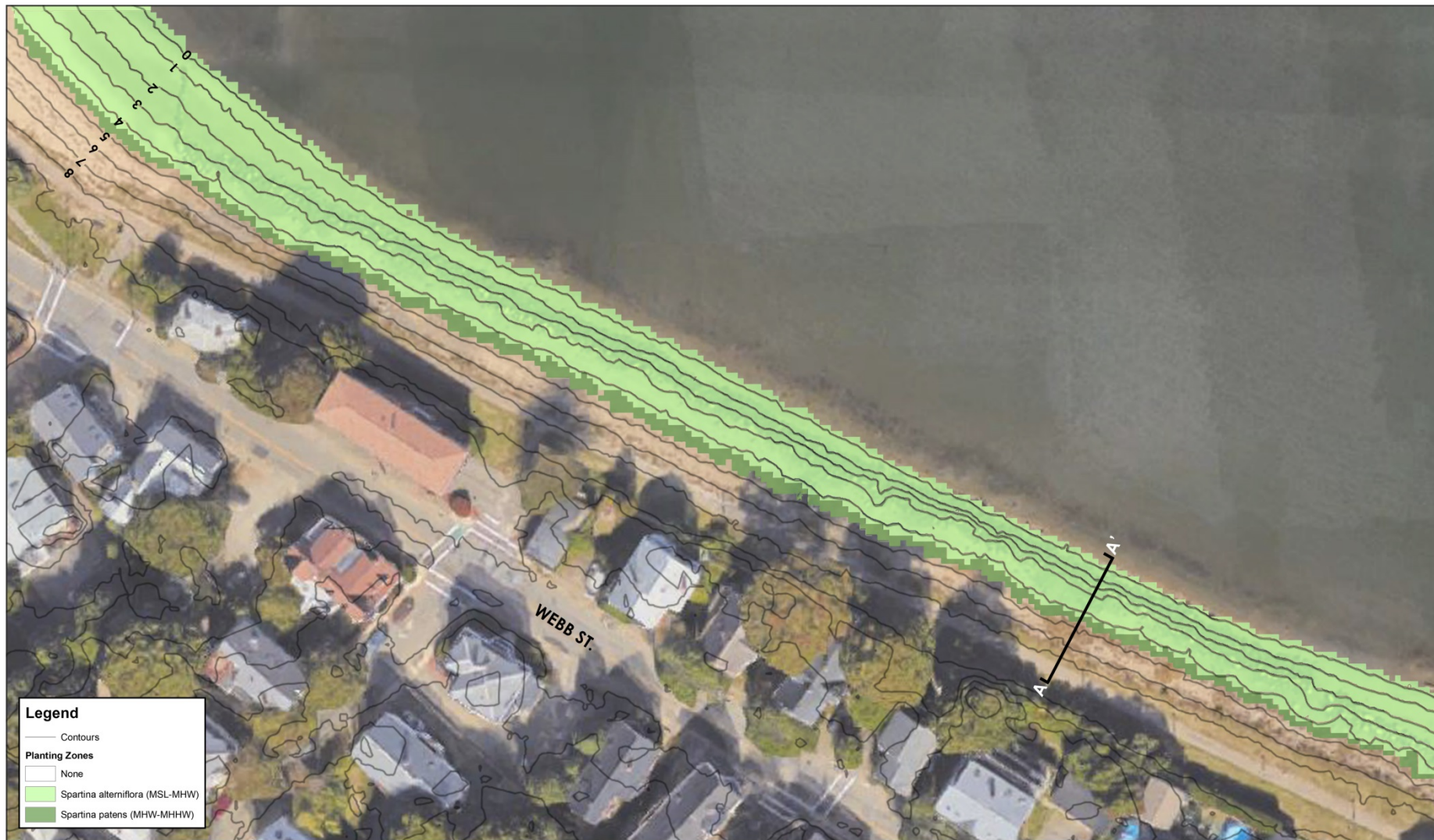


FIGURE 3: MAPTITE Output Collins Cove Area

Google Earth 2016 Ortho Imagery
MAPTITE Planting Zones based on 2013-2014 Sandy DEM Data
Contours referenced to NAVD88 (feet)

Living shorelines trap sediment
and appear to decrease erosion at
low-moderate energy sites.

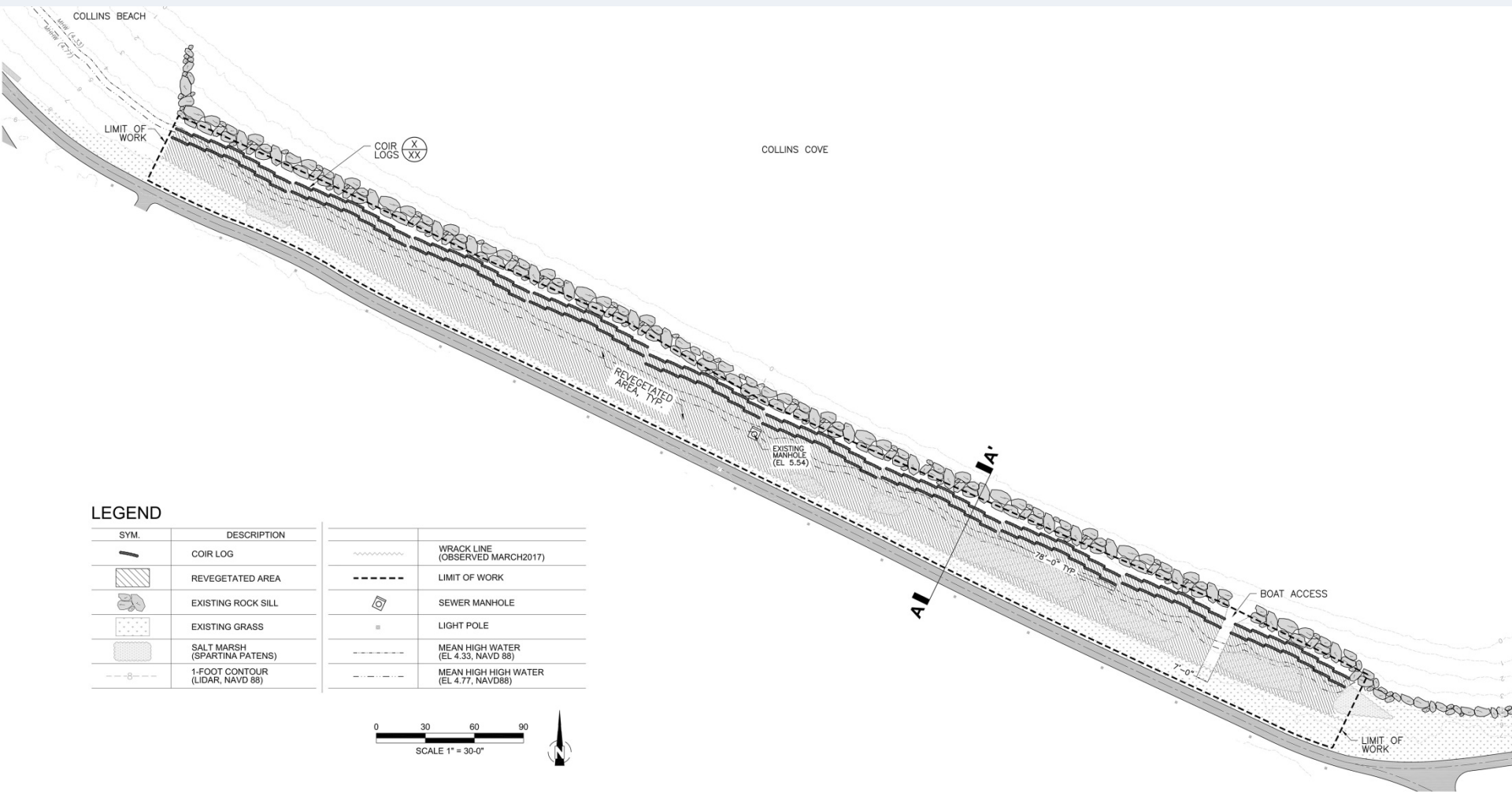
DelawareEstuary.org



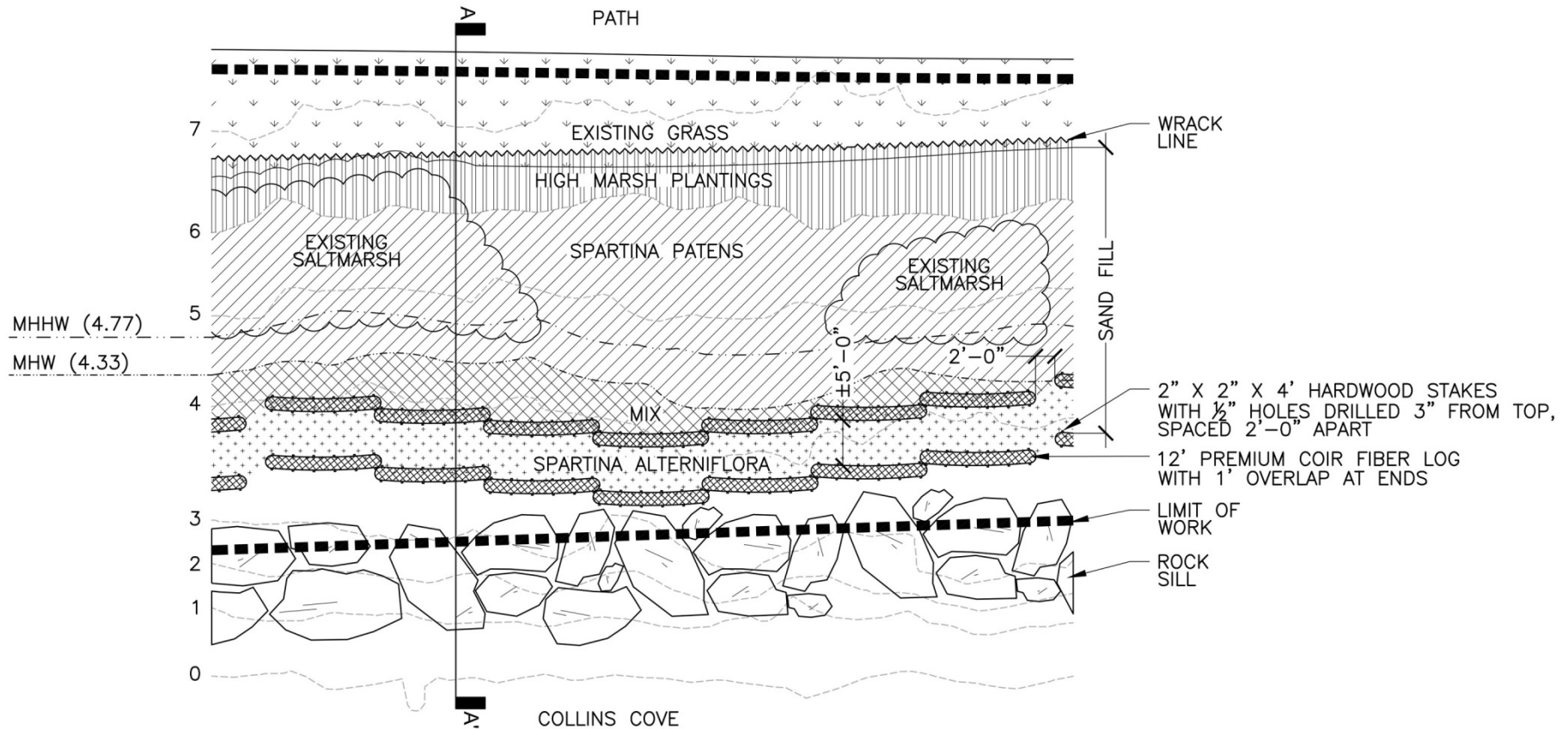
Design Elements

- Construction landward of rock sill
- Double Row of Coir Logs
- Arcuate pattern
- About 10 segments along beach
- Limited sand fill above rocky substrate
- Planting of *Spartina patens* and *Spartina alterniflora*
- Other high marsh species in upper zone
- Preservation of existing marsh

DESIGN LAYOUT



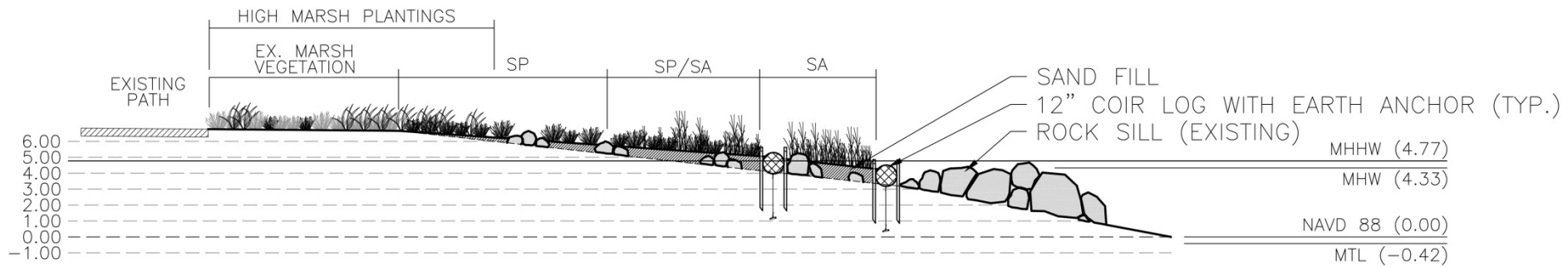
DETAIL PLAN LAYOUT



NOTE:

HIGH MARSH PLANTINGS START AT ELEVATION 6+ AND CONSIST OF DISTICHLIS SPICATA (SPIKE GRASS), JUNCUS GERARDII (BLACK GRASS), AND SOLIDAGE SEMPERVIRENS (SEASIDE GOLDENROD).

TYPICAL DESIGN CROSS SECTION



Preliminary Plant List

Spartina patens

Spartina alterniflora

Distichlis spicata (spike grass)

Limonium nashii (sea lavender)

Solidago sempirvirens (seaside goldenrod)

Iva frutescens (marsh elder)



VIEW LOOKING WEST – PHOTO RENDERING

Approach to Wetlands Permitting

File NOI as Ecological Restoration Limited Project

- The condition of existing and historic Resource Areas proposed for restoration

Other Ecological Restoration Limited Project Type.

- Thinning or planting of vegetation to improve habitat value.



QUESTIONS?

COMMENTS?

