

Cedar Key ShOREs: Sea Groin design overview and funding discussion

Cedar Key Community Redevelopment Agency

May 13, 2026



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SEA GROIN DESIGN APPROACH

- Address erosion of a critically eroded shoreline
- Create area sheltered from waves
- Mimic Cedar Key's historic sand bar

Understanding
of the physical
environment

1

Apply
engineering &
landscape
design

2

Get
community
feedback (and
repeat #2)

3



DESIGN APPROACH

- Geotechnical analysis
- Bathymetric survey
- Forcing
 - Wave effects
 - Currents
 - Water levels
- Structure dimensions
 - Hudson, Van Gent equations
 - Crest and width
 - Slope
- Stone size
- Fill and environmental features



PHYSICAL ENVIRONMENT



Typical Day

		Upper	Middle	Lower	Unit
Speed	Mean	0.13	0.13	0.12	m/s
	Max	0.50	0.49	0.46	m/s
	Min	0.00	0.00	0.00	m/s
	Std. dev	0.09	0.09	0.08	m/s

H. Idalia

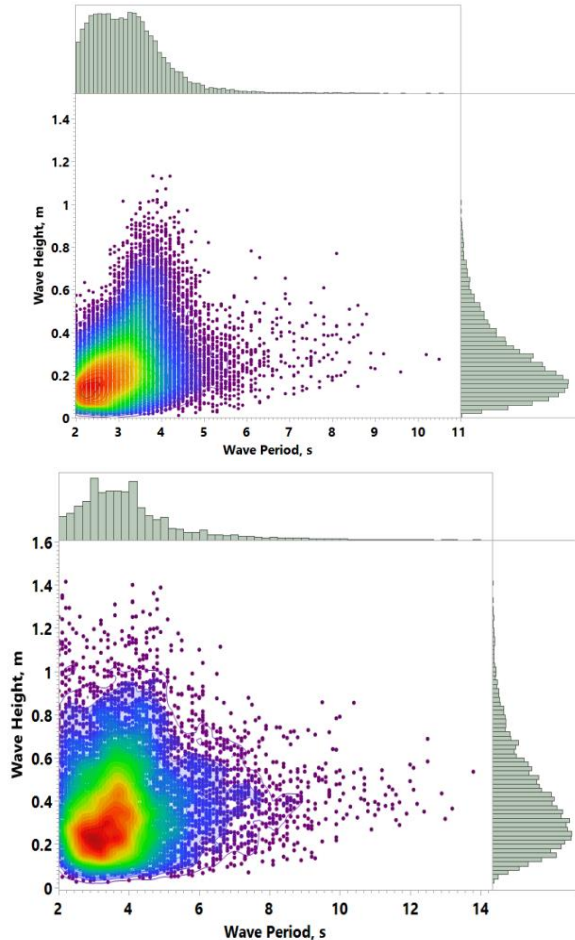
		Upper	Middle	Lower	Unit
Speed	Mean	0.28	0.27	0.21	m/s
	Max	0.85	0.82	0.77	m/s
	Min	0.01	0.01	0.00	m/s
	Std. dev	0.13	0.12	0.11	m/s

H. Helene

		Upper	Middle	Lower	Unit
Speed	Mean	0.26	0.25	0.21	m/s
	Max	0.94	0.89	0.80	m/s
	Min	0.01	0.00	0.00	m/s
	Std. dev	0.16	0.15	0.13	m/s

2.6 – 3.1 fps

PHYSICAL ENVIRONMENT



IDALIA

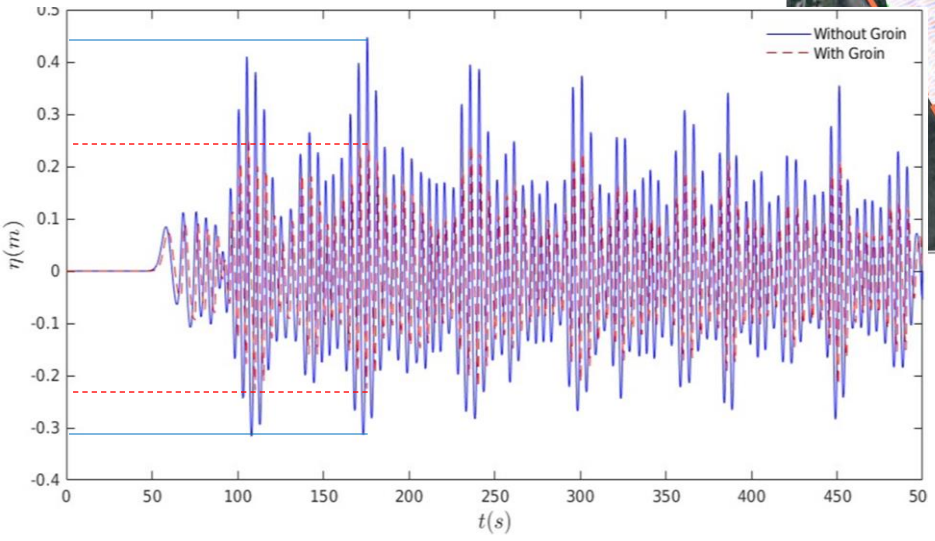
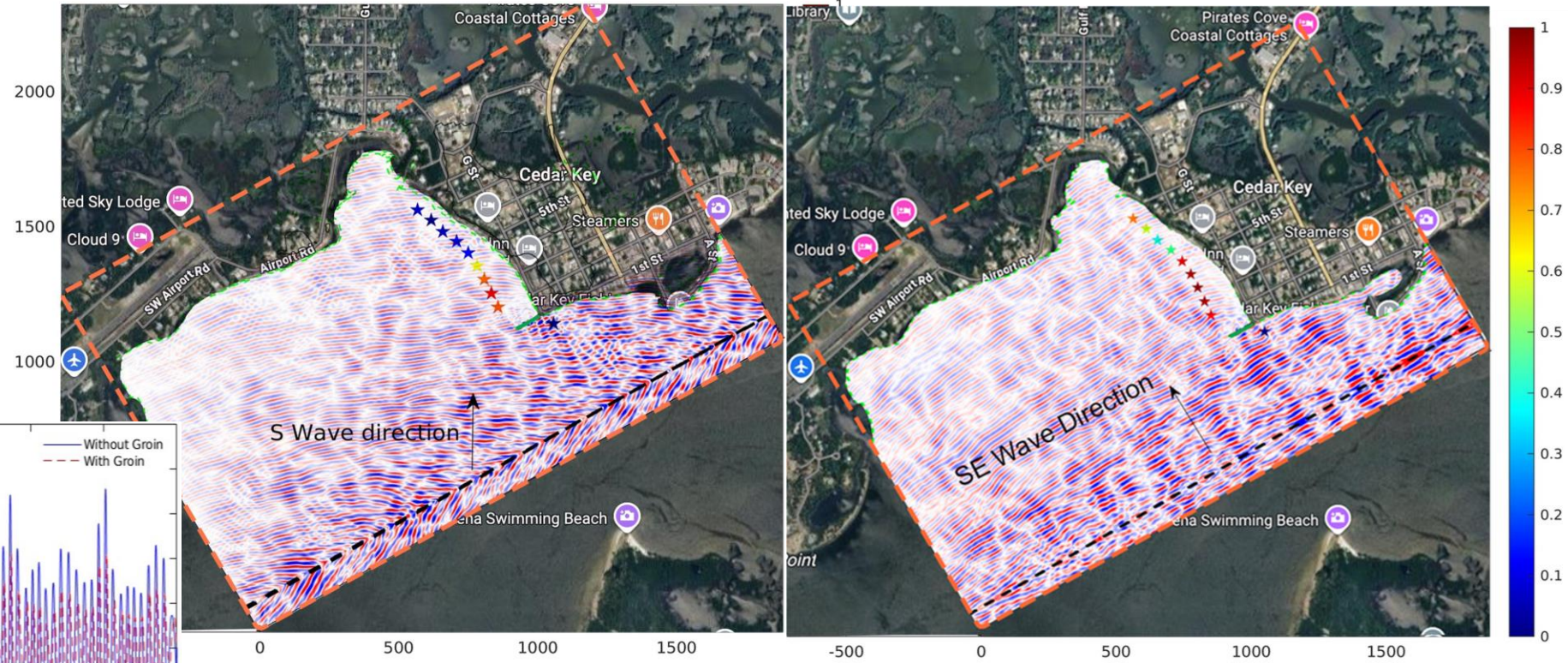
Max water depth: **2.8 m (9.2 ft)**
Max wave height: **1.13 m (3.7 ft)**
Max wave period: **4.0 s**

HELENE

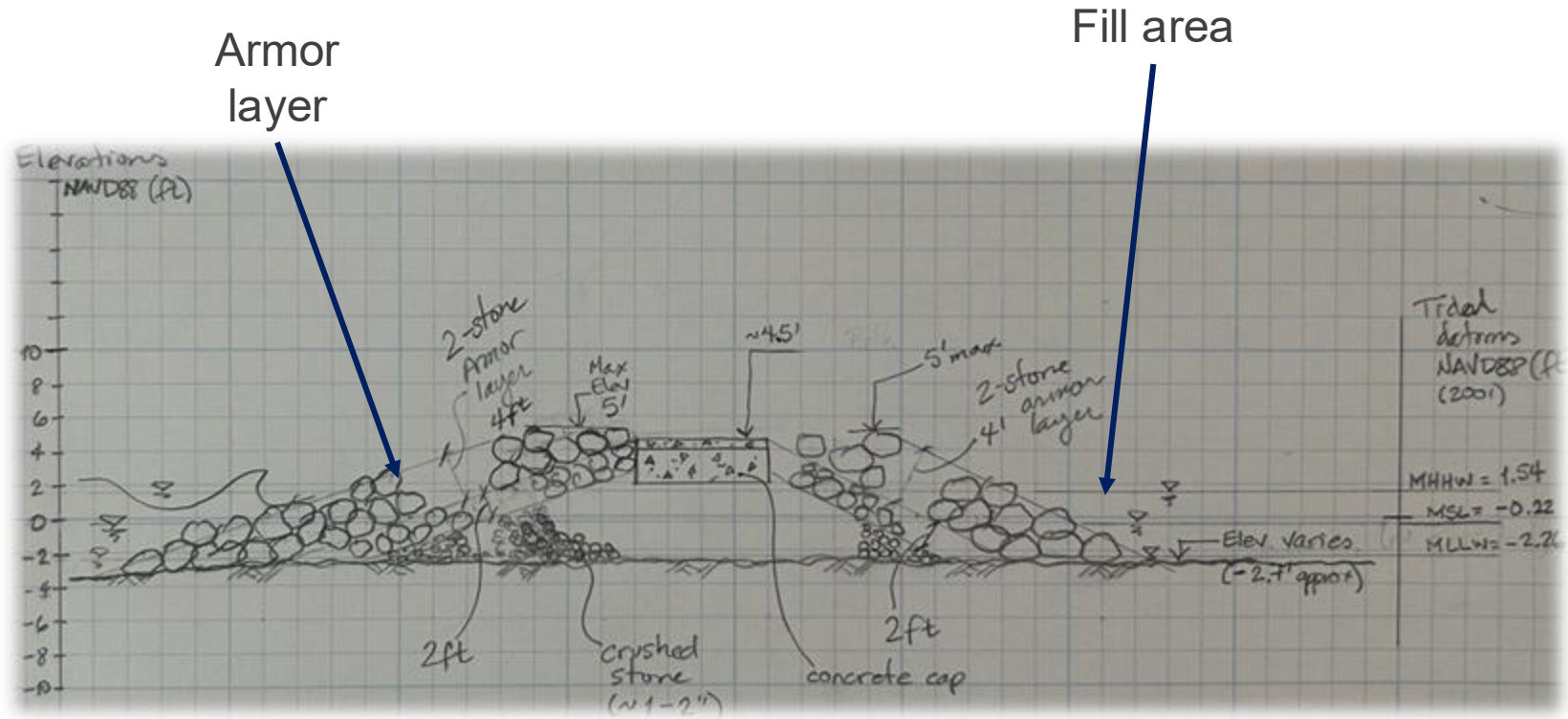
Max water depth: **3.6 m (11.8 ft)**
Max wave height: **1.4 m (4.6 ft)**
Max wave period: **4.1 s**

SEA GROIN EFFECT ON WAVE PROPAGATION — WAVE HEIGHT REDUCTION

Wave energy reduction estimated to be around 70% to 80% under Hurricane Idalia wave condition simulation.



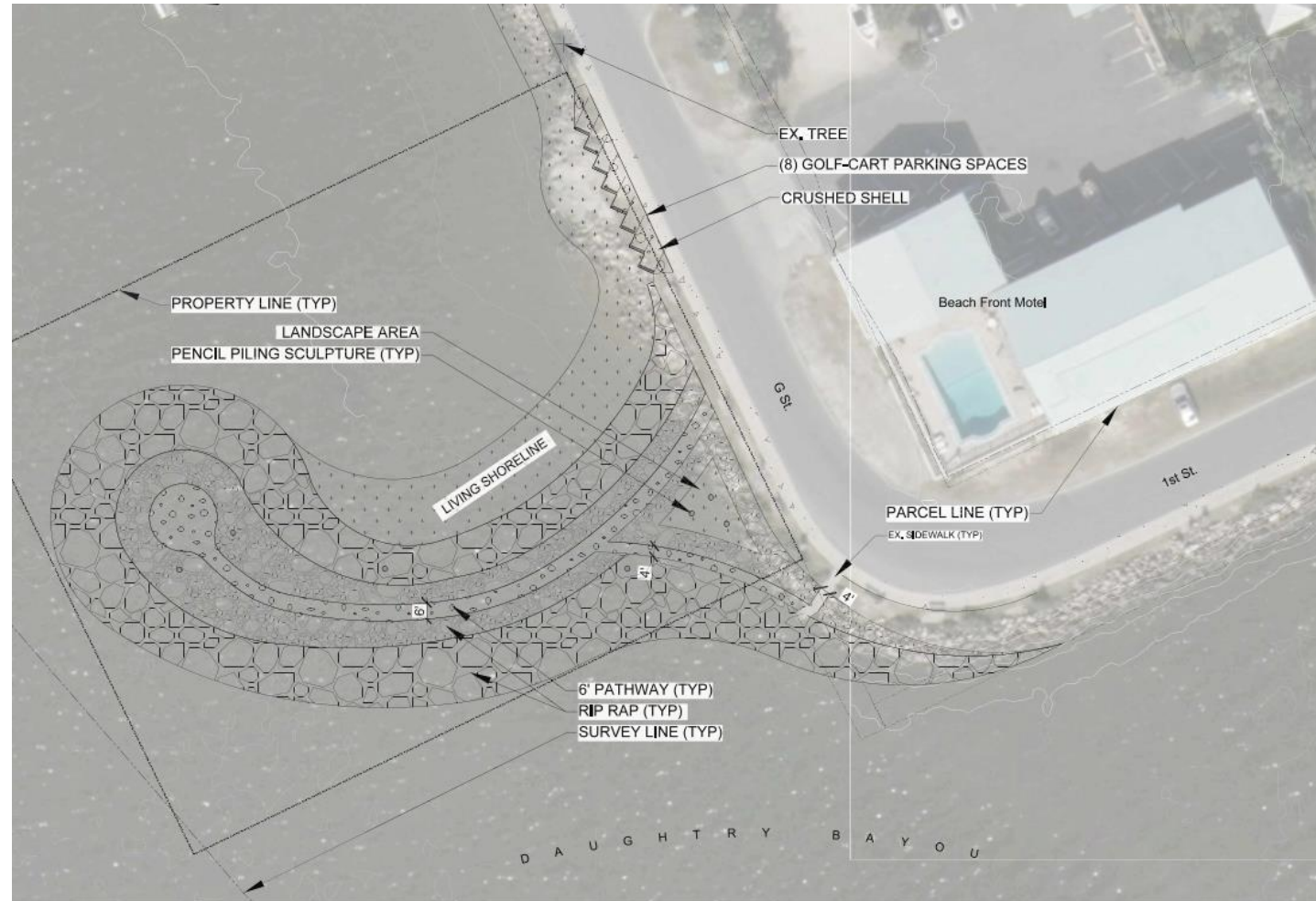
ENGINEERING AND LANDSCAPE DESIGN



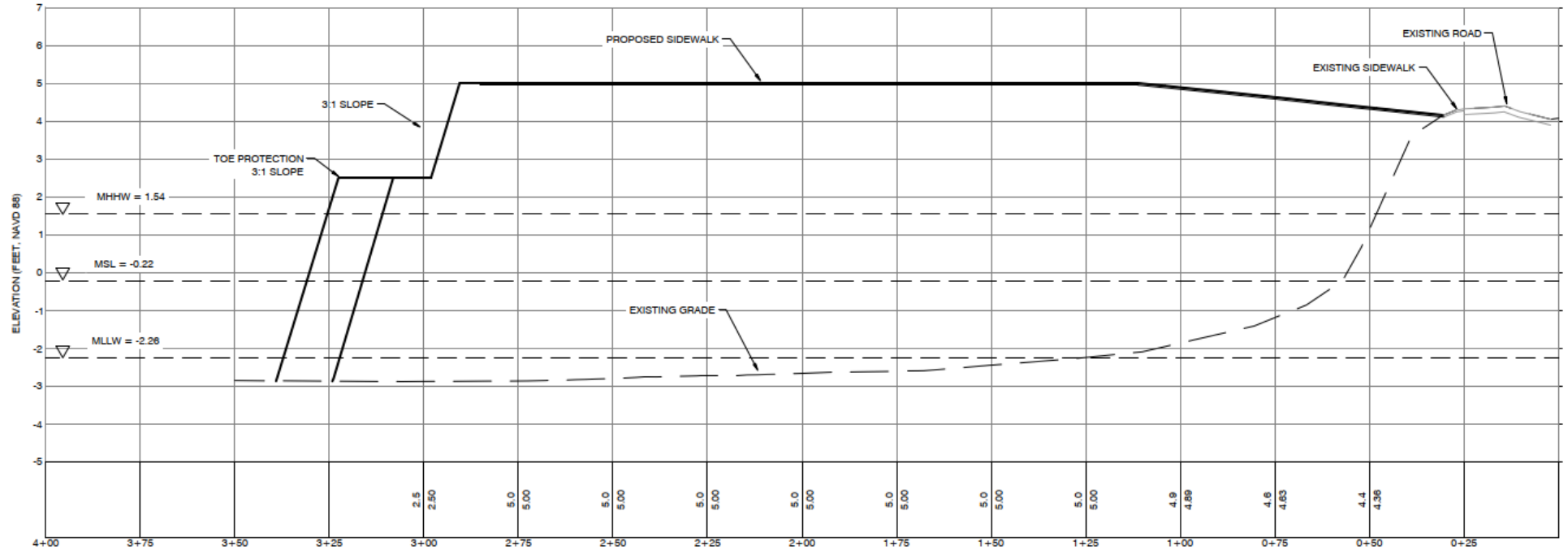
Armor layer

Fill area

ENGINEERING AND LANDSCAPE DESIGN

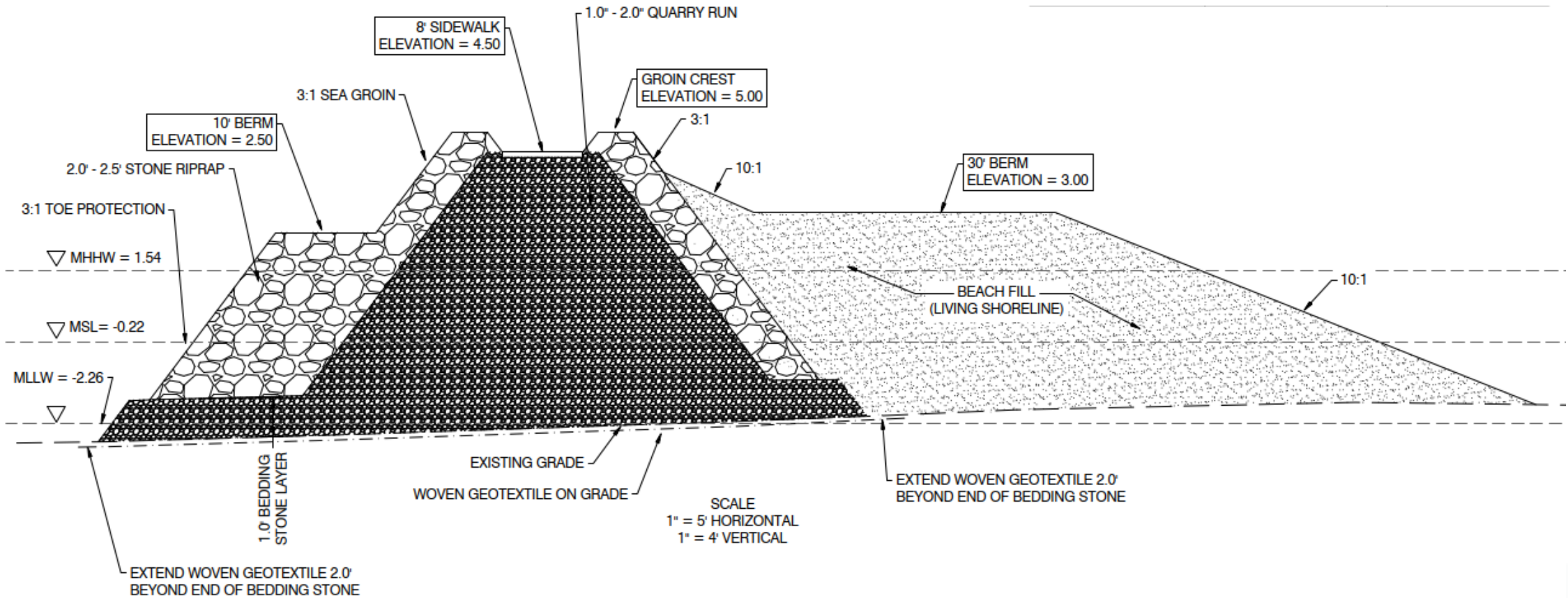


SEA GROIN PROFILE



Conceptual design — subject to change

SEA GROIN TYPICAL CROSS SECTION



Conceptual design — subject to change

ENGINEERING AND LANDSCAPE DESIGN

Planting Area	Elevation Range (MHW: 1.21')	Acreage	Abundance	Zone Location	Common Name	Scientific Name	Recommended Spacing	Size	Quantity
Low Marsh	0.0 - 2.0'	0.084	D	L	Smooth Cordgrass	<i>Spartina alterniflora</i>	2' o.c.	bareroot or qt. equiv.	900
	1.5 - 2.0'		S	H	Black Rush	<i>Juncus roemerianus</i>	2' o.c.	bareroot or qt. equiv.	165
High Marsh	2.0' - 3.5'	0.158	S	H	Saltgrass	<i>Distichlis spicata</i>	2' o.c.	bareroot or qt. equiv.	150
			M	L	Christmas Berry	<i>Lycium carolinianum</i>	2' o.c.	bareroot or qt. equiv.	15
			D	H	Marshhay Cordgrass	<i>Spartina patens</i>	2' o.c.	bareroot or qt. equiv.	450
			S	L	Seashore Dropseed	<i>Sporobolus virginicus</i>	2' o.c.	bareroot or qt. equiv.	150
Dune	>3.5'	0.098	M	H	Beach sunflower	<i>Helianthus debilis</i>	2' o.c.	bareroot or qt. equiv.	30
			S	L	Railroad vine	<i>Ipomoea pes-caprae</i>	2' o.c.	bareroot or qt. equiv.	30
			S	L	Seashore paspalum	<i>Paspalum vaginatum</i>	2' o.c.	bareroot or qt. equiv.	50
			M	H	Sand Cordgrass	<i>Spartina bakeri</i>	2' o.c.	bareroot or qt. equiv.	50
			D	H/L	Seaoats	<i>Uniola paniculata</i>	2' o.c.	bareroot or qt. equiv.	315



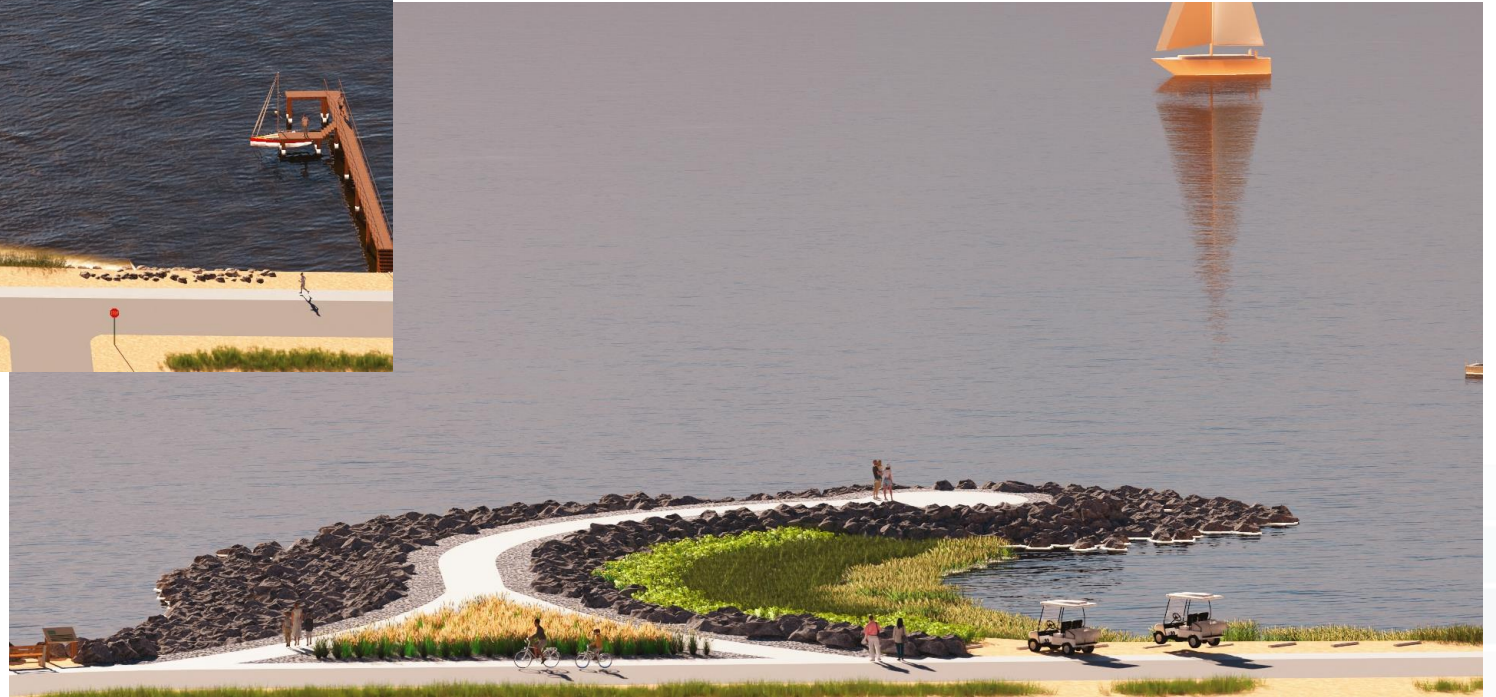
Conceptual design — subject to change

ADOPTED PROJECT DESIGN



Concept B

ADDITIONAL VIEWS

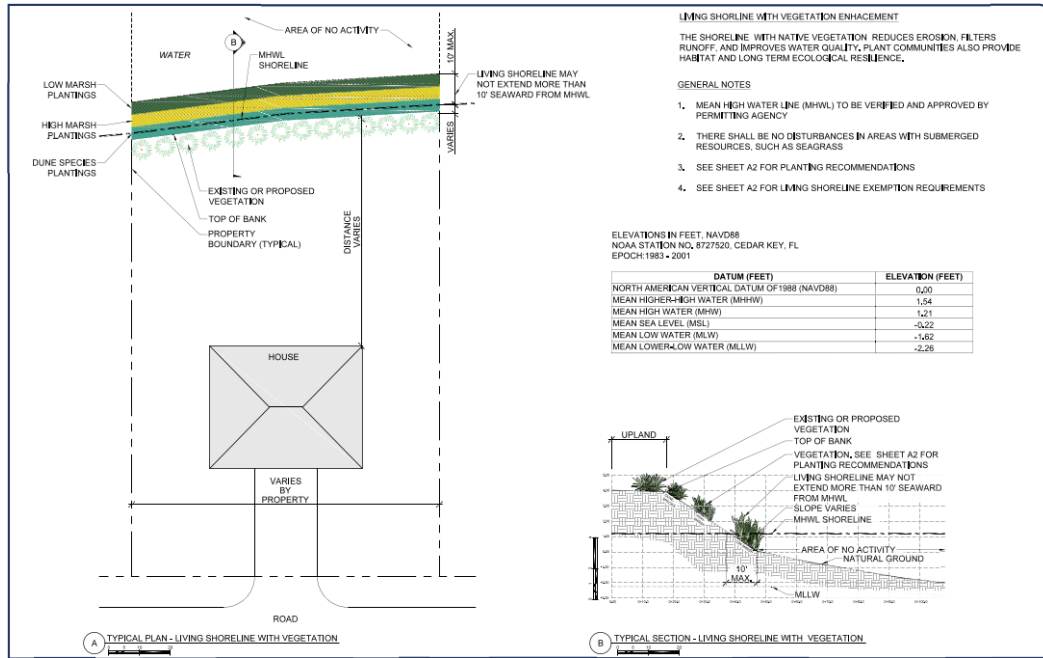


ADDITIONAL VIEWS



Conceptual design — subject to change

LIVING SHORELINE TEMPLATES



SHORELINE PLANT PALETTE

PLANTING AREA	ELEVATION RANGE (FEET)	ABUNDANCE	JOB LOCATION	COMMON NAME	SCIENTIFIC NAME	RECOMMENDED SPECIES	NOTE
DUNE	+1.0'	1	1	BEACH BLUENET	HELIOPSIS SCILLA	LP-1200	EMERGENCY OR EQUIPMENT
				BEACH SANDSPUR	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				BEACH WHEATGRASS	DIPOLOPSIS POLYCHAETA	LP-1200	EMERGENCY OR EQUIPMENT
				COLEMAN BEELY	BEACONIA FLORIDA	LP-1200	EMERGENCY OR EQUIPMENT
				HIGHWATER WHEATGRASS	DIPOLOPSIS POLYCHAETA	LP-1200	EMERGENCY OR EQUIPMENT
HIGH MARSH	0.0' - 1.0'	1	1	SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
LOW MARSH	-1.0' - 1.0'	1	1	SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT
				SPERMATOPHYTES	SPERMATOPHYTES	LP-1200	EMERGENCY OR EQUIPMENT

NOTES:

- GENERAL APPLICATION
 - USED FOR EROSION CONTROL ON SHORELINES
 - PROVIDES BANK STABILIZATION
 - CREATES NATURAL HABITAT
- MATERIALS
 - NATIVE GRASSES AND SHRUBS
 - BIODEGRADABLE MATS OR COIR BLANKETS FOR TEMPORARY STABILIZATION
- PLACEMENT & INSTALLATION
 - PLACED OVER A GRADED SLOPE OR BEDDING LAYER
 - MAY REQUIRE BIODEGRADABLE MATS PLACED ON ERODIBLE SLOPES TO PROTECT YOUNG PLANTS AND RETAIN SOIL
 - PLANTINGS ARE INSTALLED ACCORDING TO SPECIES SPACING RECOMMENDATIONS, WITH ATTENTION TO ROOT DEPTH AND SOIL CONDITIONS, MULCHING, WATERING, AND TEMPORARY ANCHORING OF MATS HELP ENCOURAGE SUCCESSFUL ESTABLISHMENT, OVER TIME, ROOTS CONSOLIDATE THE SOIL, PROVIDING LONG-TERM STABILIZATION AND ECOLOGICAL BENEFITS

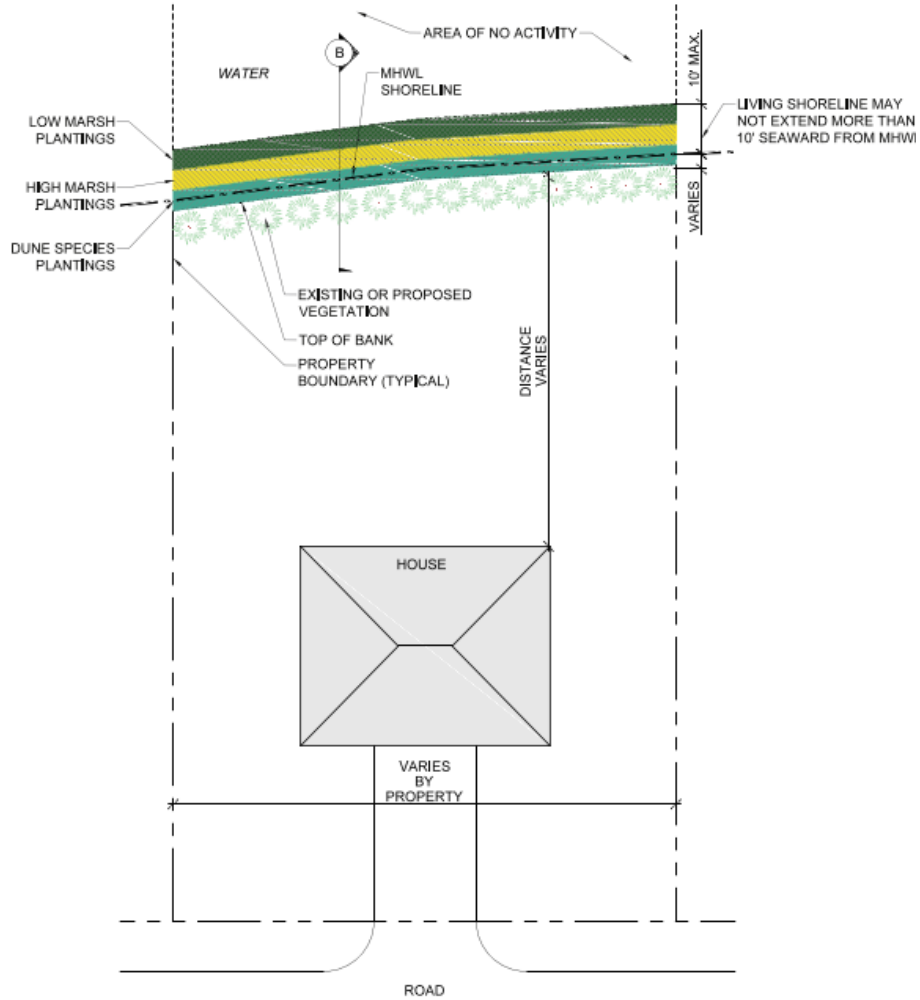
ENVIRONMENTAL RESOURCE PERMIT (ERP) AND PROGRAMMATIC GENERAL PERMIT (PGP)

LIVING SHORELINE EXEMPTION REQUIREMENTS: (1) PROJECT AREA SHORELINE SHALL BE NO MORE THAN 500 LINEAR FEET LONG. (2) PLANTINGS SHALL BE NATIVE WETLAND PLANTS APPROPRIATE FOR THE SITE. (3) PLANTINGS SHALL NOT EXTEND FURTHER THAN 10 FEET UPWARD FROM THE UPPLAND MEAN HIGH WATER LINE (MHW). (4) ALL WILD AND SUCCESSIONAL SPECIES ALONG THE SHORELINE SHALL BE REMOVED IN CONJUNCTION WITH THE PLANTING TO THE FULLEST EXTENT PRACTICABLE. (5) IF NECESSARY, BIODEGRADABLE NATURAL FIBER COGS OR MATS MAY BE USED TO SUPPORT VEGETATION PLANTINGS AND SHALL BE SECURED IN PLACE WITH THE USE OF WOODEN STAKES. (6) NO FILL SHALL BE PLACED OTHER THAN THAT NEEDED TO SUPPORT THE VEGETATION PLANTINGS. (7) A BREAKWATER IS AUTHORIZED TO BE NOTICED CONCURRENT WITH THE PLANTING IF PERMANENT WAVE ATTENUATION IS REQUIRED TO MAINTAIN THE SHORELINE VEGETATION, PROVIDED (A) THE WATERWAVED TOE OF THE BREAKWATER EXTENDS NO MORE THAN 10 FEET WATERWARD OF THE APPROXIMATE MHW, WITH A TOP HEIGHT OF NO MORE THAN THE MEAN HIGH WATER ELEVATION (1.21 FEET). (B) THE BREAKWATER IS COMPOSED PRECIPITANTLY OF NATURAL OYSTER SHELLS (3/4" TO 1 1/4" CLEAN) AND FISSURED OYSTER SHELLS OR OTHER STABLE, NONCORROSIVE MATERIALS SUCH AS OYSTER REEF, REEF BALLS, BOULDERS, CLEAN CONCRETE RUBBLE, RIPRAP, ROCK BILLS, OR DIFFERENT CONCRETE FORMS. OYSTER SHELLS, IF USED, SHALL BE ENCLOSED IN BIGH BAGS HAVING OPENINGS OF NO MORE THAN 3 INCHES, OR SECURELY TIED TO MATTING PRIOR TO PLACEMENT IN THE WATER. OYSTER BAGS AND MATS MUST BE ANCHORED TO PREVENT MOVEMENT OF SHELLS FROM THE PROJECT AREA. (8) THE BREAKWATER SHALL NOT BE PLACED OVER, OR WITHIN 3 FEET IN ANY DIRECTION OF ANY SUBMERGED GRASS BED OR EXISTING EMERGENT MARSH VEGETATION. (9) THE BREAKWATER SHALL BE PLACED UNITS SO THAT THERE IS AT LEAST ONE OPENING MEASURING AT LEAST 3 FEET IN WIDTH LOCATED EVERY 15 LINEAR FEET ALONG THE BREAKWATER, WITH A MINIMUM OF ONE OPENING TO ALLOW THE FLOW OF WATER AND THE PASSAGE OF FISH AND AQUATIC INVERTEBRATE LIFE. (10) ALL EQUIPMENT USED DURING CONSTRUCTION SHALL BE OPERATED FROM AND BE STORED IN UPPLANDS, AND ALL WORK IS CONDUCTED IN COMPLIANCE WITH SUBSECTION 62-330.06(3), F.A.C.

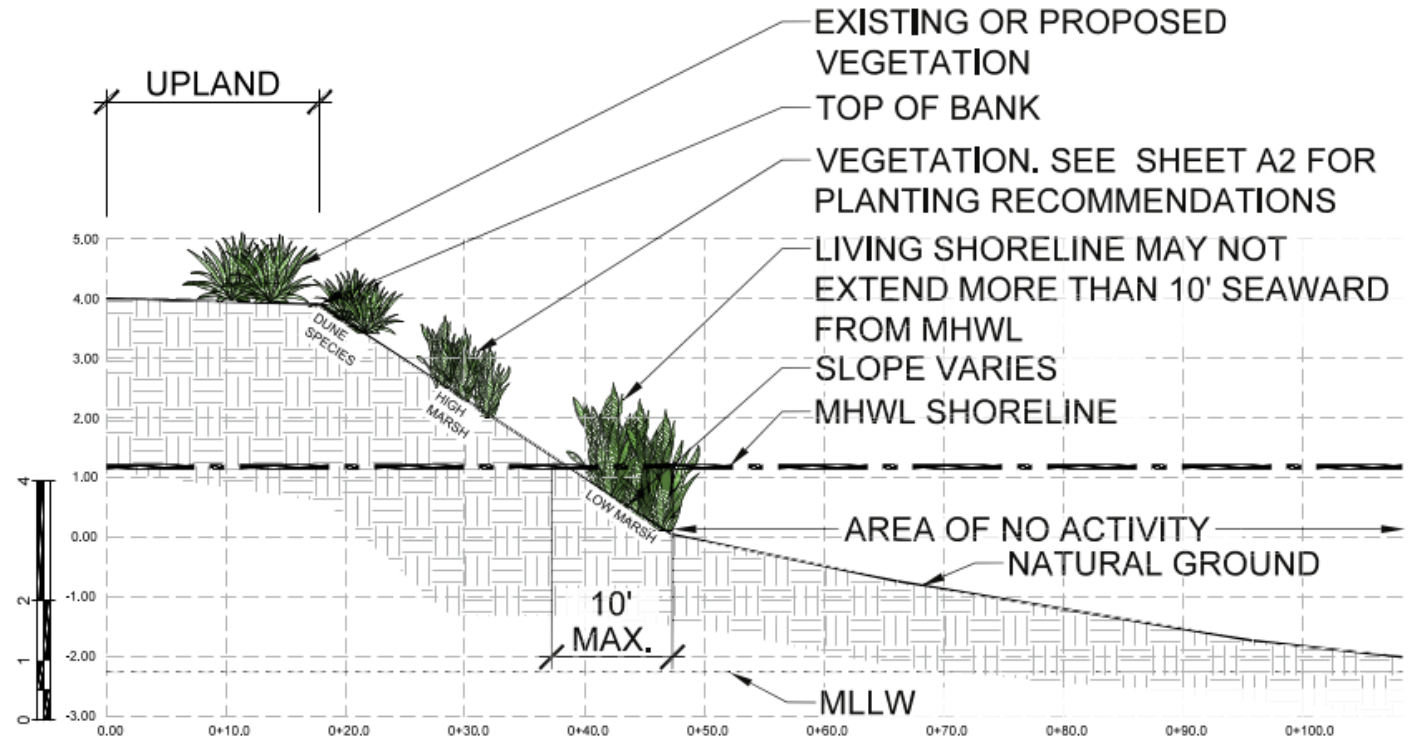
LIVING SHORELINE BUFFER **GREEN SOFT SHORELINE** **SEAWALL WITH VEGETATION** **RIPRAP SYSTEM WITH VEGETATION** **RIPRAP SYSTEM WITH VEGETATION**

Conceptual design — subject to change

LIVING SHORELINE TEMPLATES



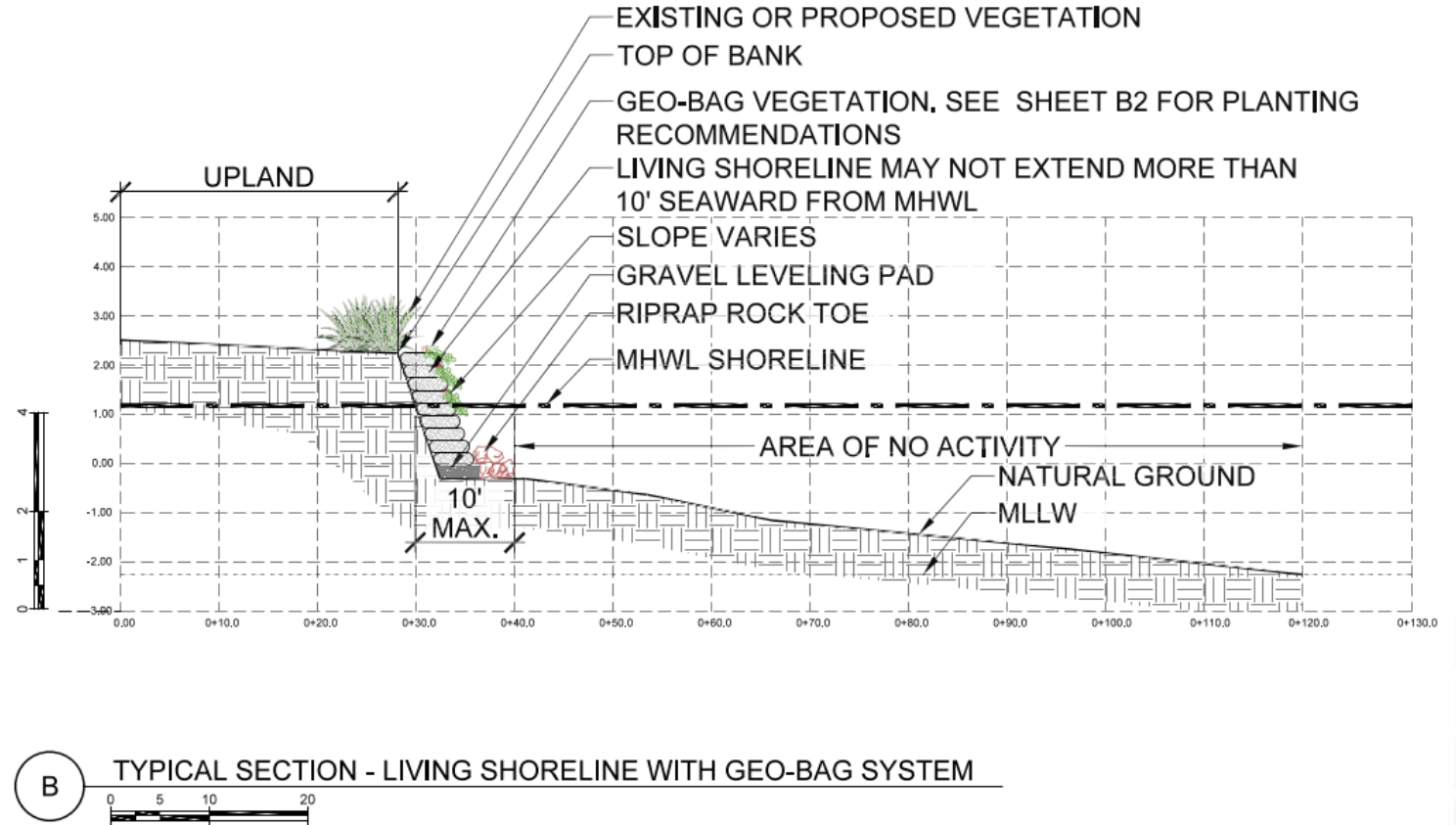
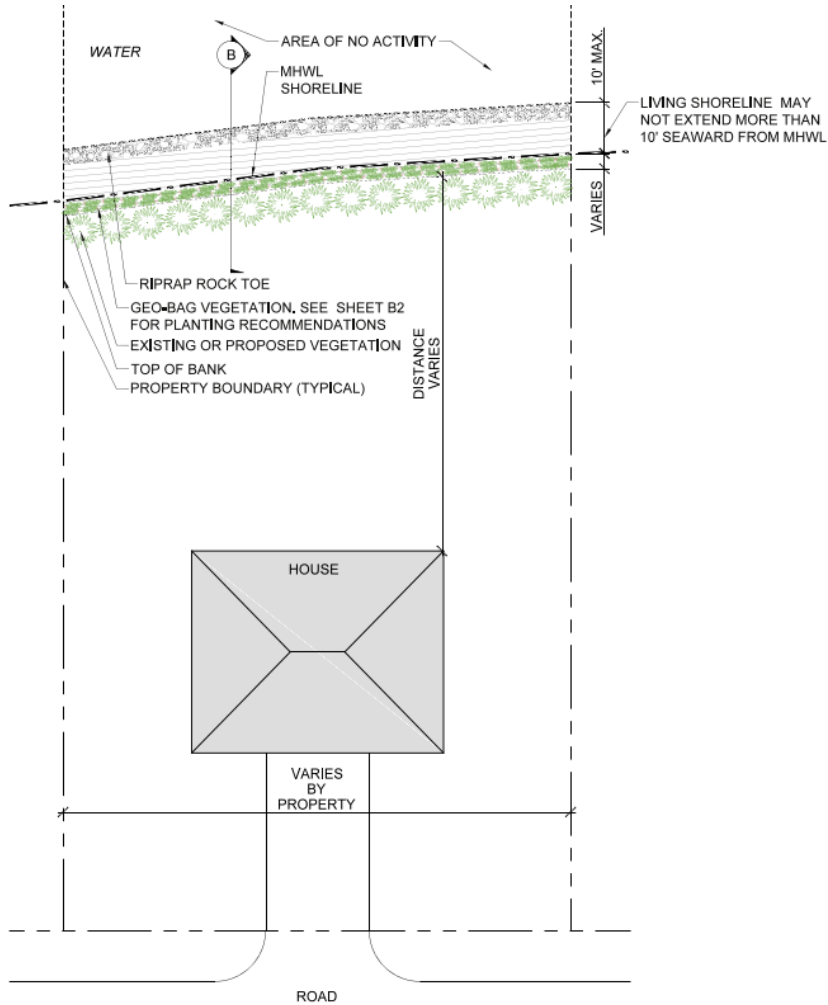
A TYPICAL PLAN - LIVING SHORELINE WITH VEGETATION



B TYPICAL SECTION - LIVING SHORELINE WITH VEGETATION

Conceptual design — subject to change

LIVING SHORELINE TEMPLATES



A TYPICAL PLAN - LIVING SHORELINE WITH GEO-BAG SYSTEM

B TYPICAL SECTION - LIVING SHORELINE WITH GEO-BAG SYSTEM

Conceptual design — subject to change

COST ESTIMATE

Item	Description	Item
General	Mobilization, General Conditions, Project Layout/Survey, MOT, Construction Admin	\$ 355,555.00
Erosion Control	Erosion Control, SWPPP, Silt Fence	\$ 60,127.50
Demolition	Remove storm sewer, benches, posts	\$ 27,500.00
Earthwork	Riprap, 3 rock types, Sidewalk, Woven geotextile	\$3,064,974.78
Drainage	24" RCP, inlet etc	\$ 52,885.00
Landscape	Plants	\$ 10,650.00
Subtotal		\$3,561,137.28
Contingency	30%	\$1,071,341.18
Project Total		\$4,642,478.46

NOTE: These costs are intended only as a planning-level tool and not as a final cost.

RESILIENT FLORIDA IMPLEMENTATION GRANT

The **Resilient Florida Program** is designed to assist Florida communities in planning and implementing projects that enhance resilience against climate change impacts, particularly flooding and sea level rise.

- Communities that have completed a Vulnerability Assessment are eligible for implementation grants
 - Cedar Key's Vulnerability Assessment was completed in September 2024
- The planning for this project was also funded by Resilient Florida.
- Implementation grants are due September 1, 2026
- Cedar Key is eligible for a 100% grant
- Awards are usually announced in December and projects can commence in the new State Fiscal Year starting July 1, 2027



Discussion