National Conference on
Beach Preservation Technology
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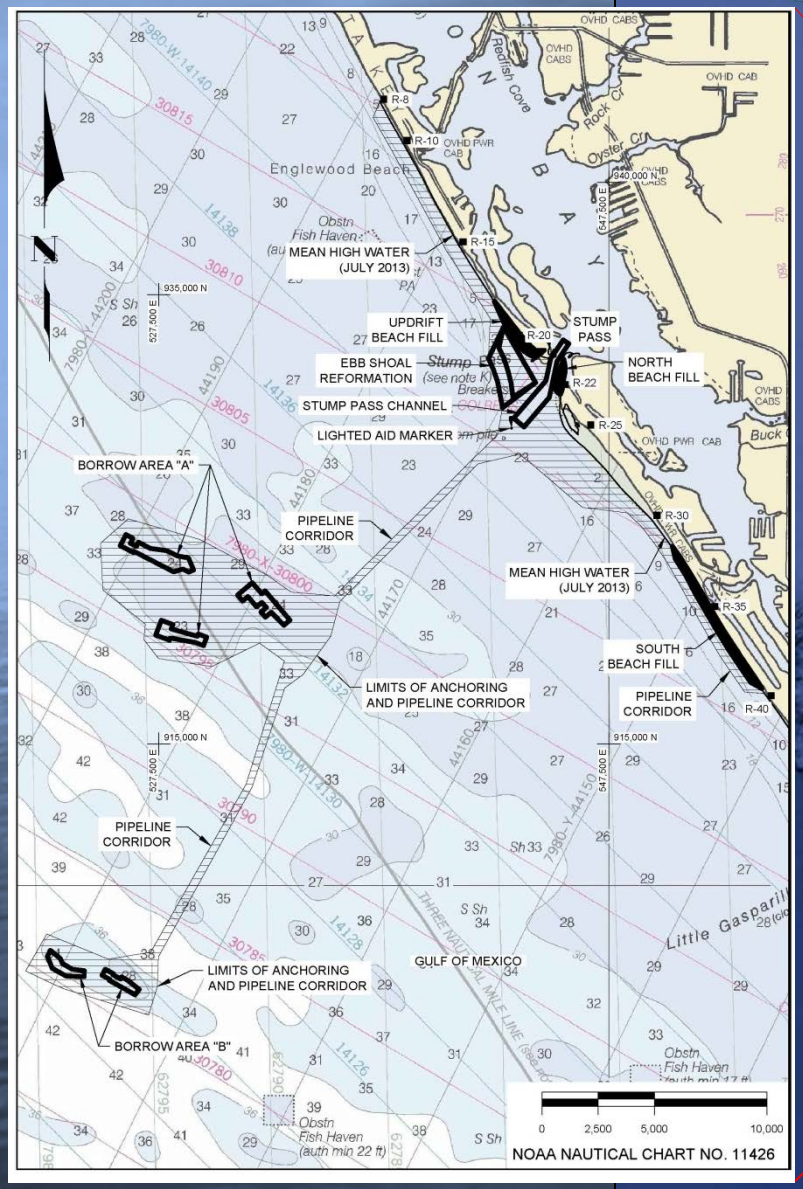
Charlotte County Erosion Control Project

Vadim Alymov, Ph.D.
Michael Poff, P.E.

COASTAL ENGINEERING CONSULTANTS INC

Location Map



Outline

- Project Description
- Alternatives Analysis
- Long-term Management Plan
  - Terminal Groin Design
  - Sand Source Search
  - Pipeline Corridor Layout
- Summary

Project Description

Fill Renourishment and New Structural Complement to

- Restore & Maintain Critically Eroding Beaches
- Provide Storm Damage Reduction Benefits Along Developed Shoreline Through “Engineered Beach Design”
- Provide for Improved Navigation Through Stump Pass
- Enhance Recreational Opportunities
- Provide Environmental Protection and Enhancement for T&E Species
- Apply Adaptive Management

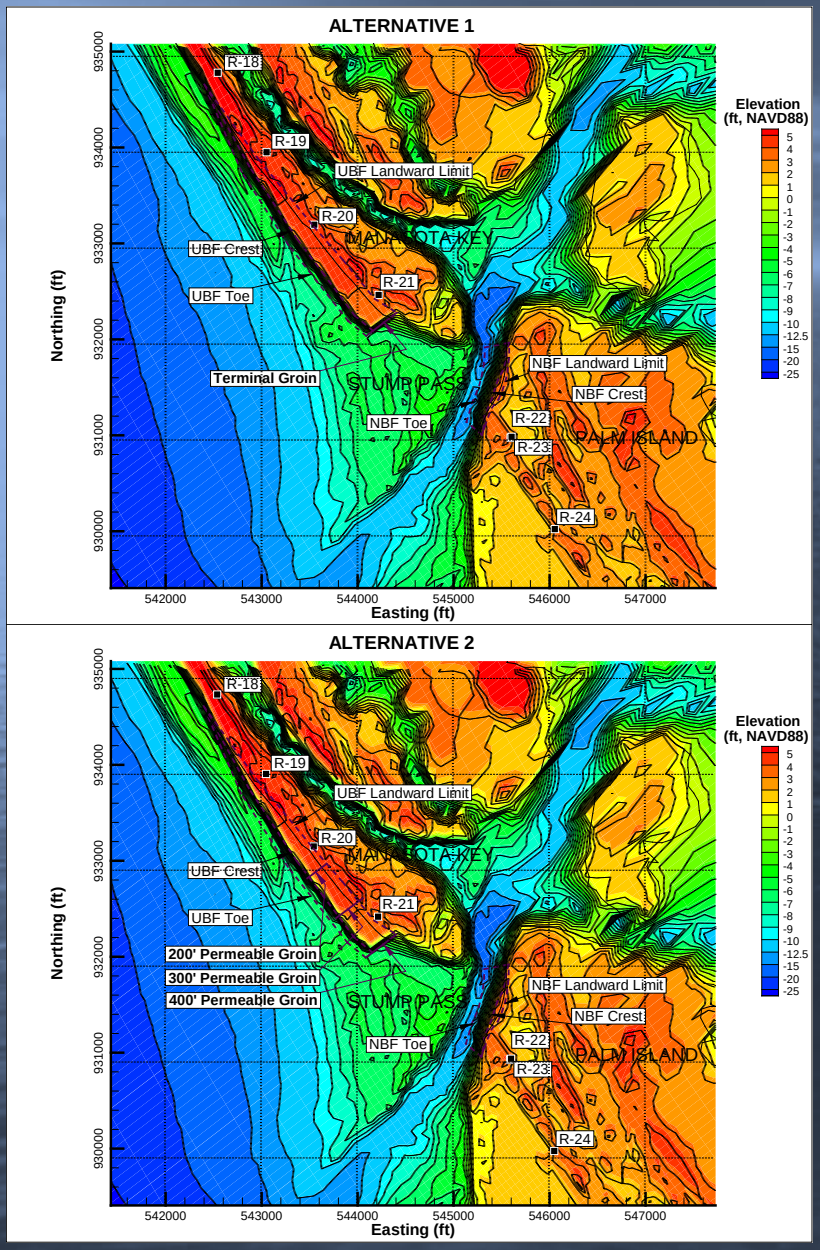
Alternatives Analysis

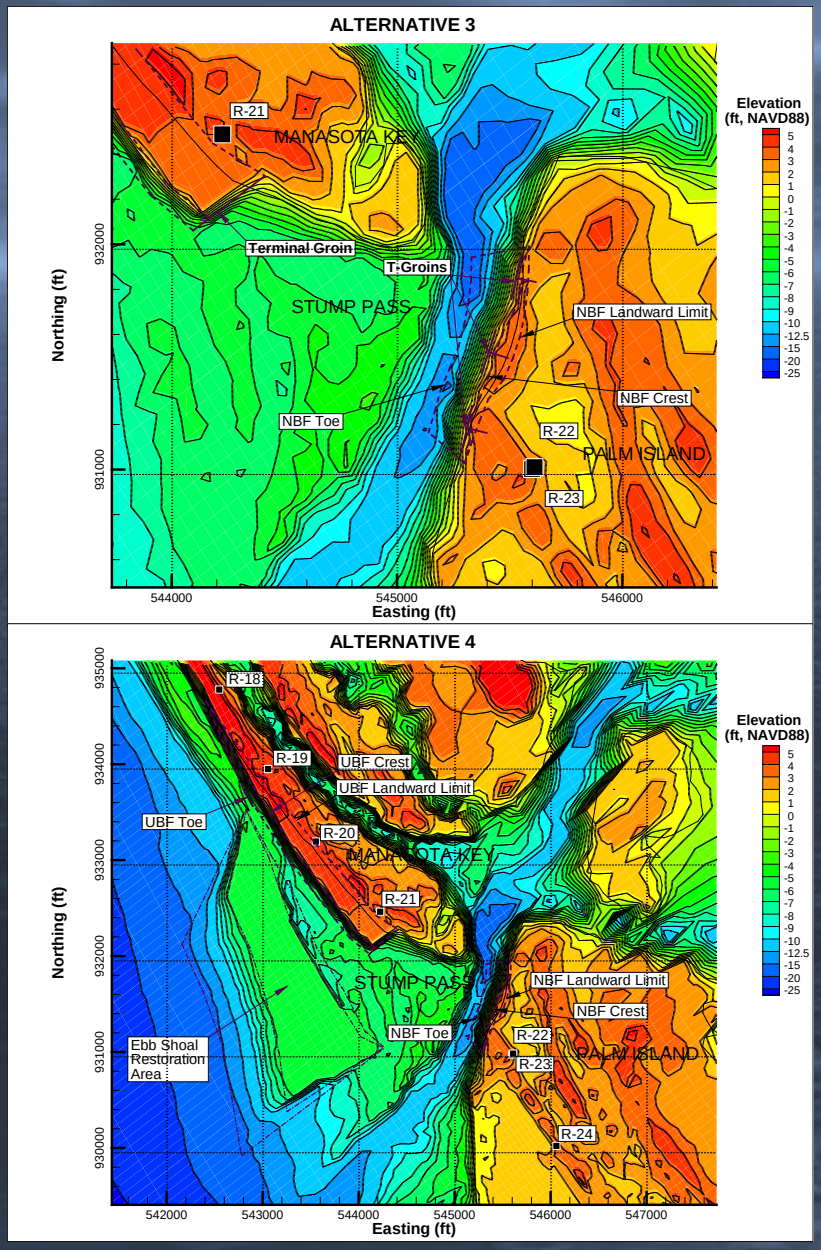
- Beach Fills
  - Updrift ~ Reestablish and Stabilize Updrift Shoreline
  - North ~ Stabilize Downdrift Inlet Shoreline
  - South ~ Periodic Renourishment of Engineered Beach Project
- Navigation Channel
  - Reduce Reliance on Stump Pass as Sole Sand Source
  - Maintain Hydraulic Efficiency
  - Provide for Safe Navigation
- Introduce Offshore Sand Sources
- Structural Complements
  - Terminal Groin (Updrift)
  - Permeable Groin Field (Updrift)
  - T-groin Field (Downdrift)

Numerical Model Study

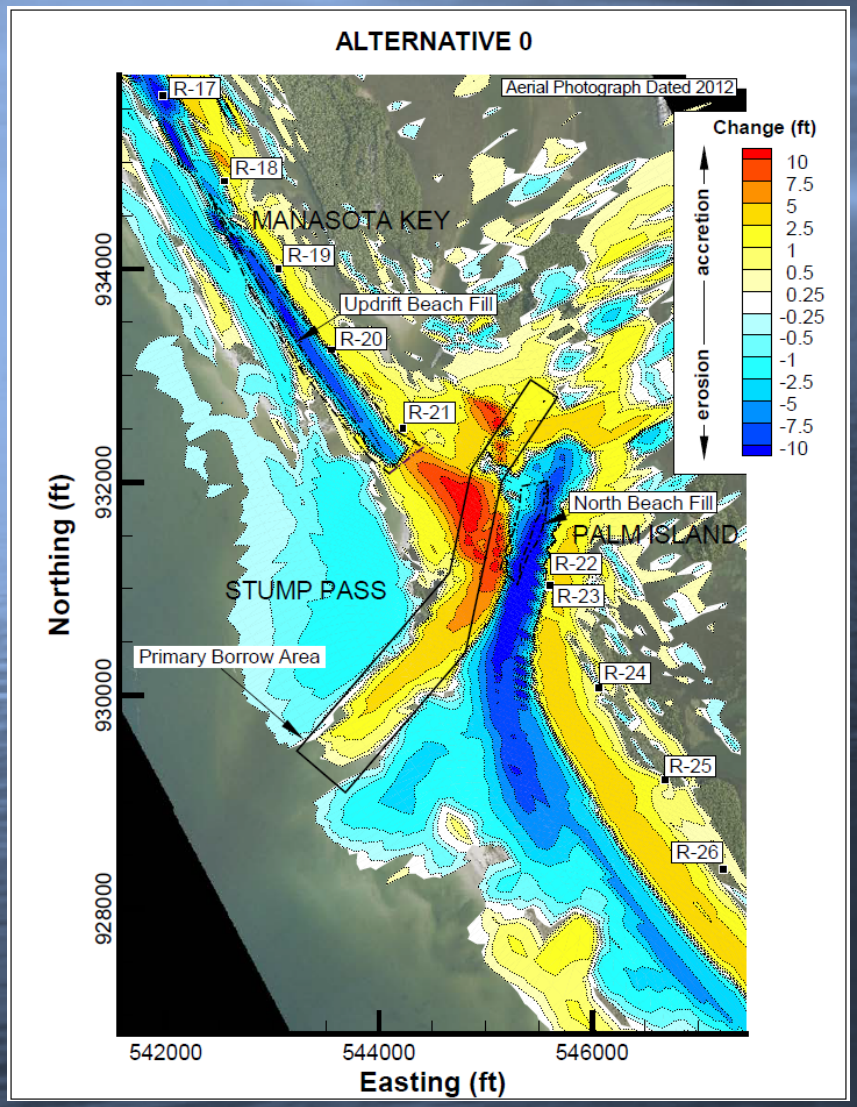
- Delft3D Model
  - Three-dimensional (3-D) State-of-the-art
  - Fully-coupled Simulation of Waves, Flow, and Sediment Transport
  - Open Source
- Model Calibration and Validation
  - Gauge Deployment to Collect Data
  - Topo/bathy Model Study Survey
  - Topo/bathy Historic Monitoring Surveys

Alternatives Analysis

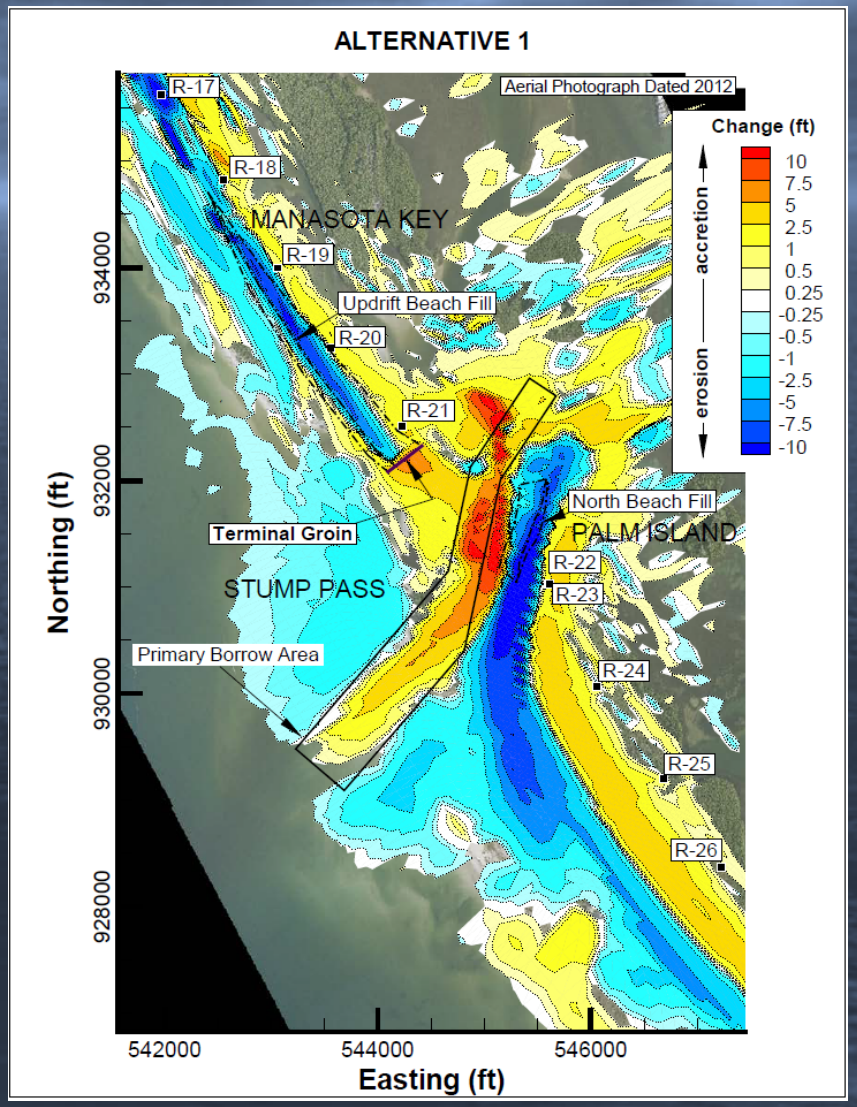




Model Results: 4-Year Simulation

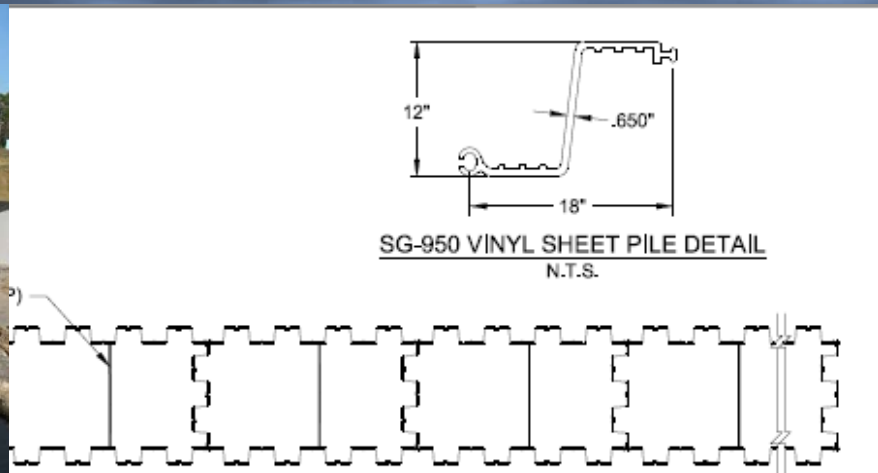


No New Action



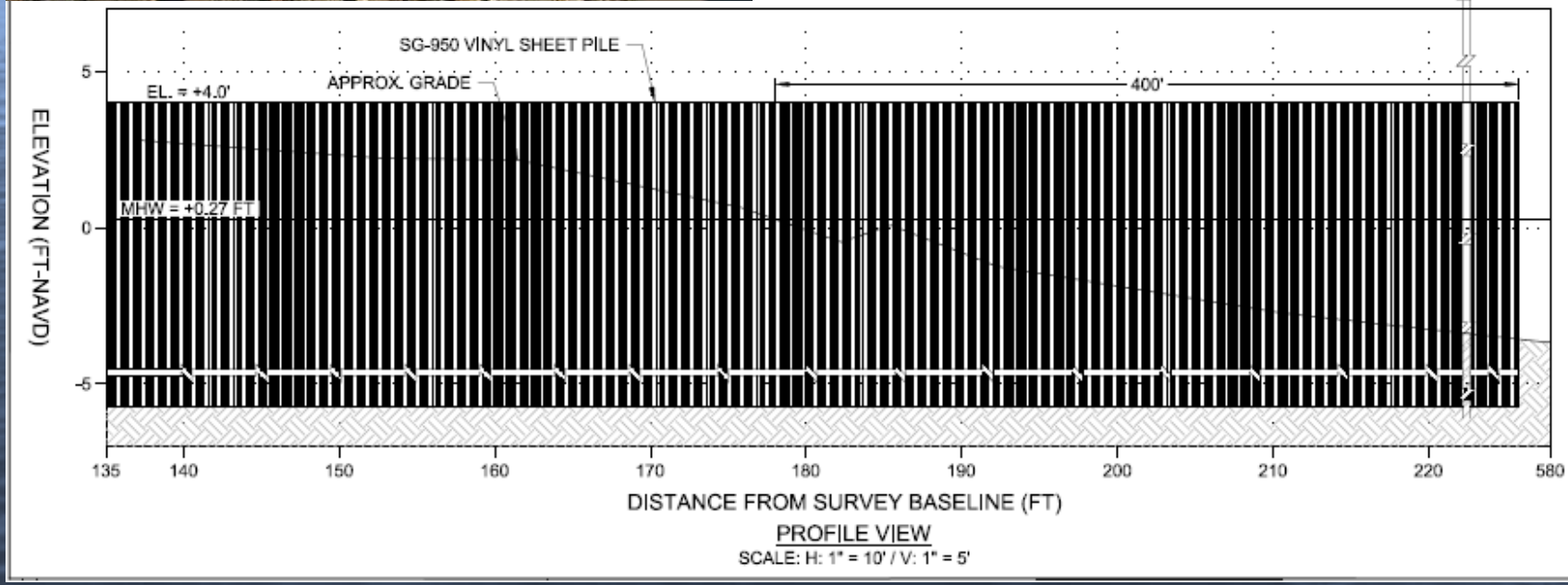
Terminal Groin on Manasota Key

VINYL SHEET PILE OPTION



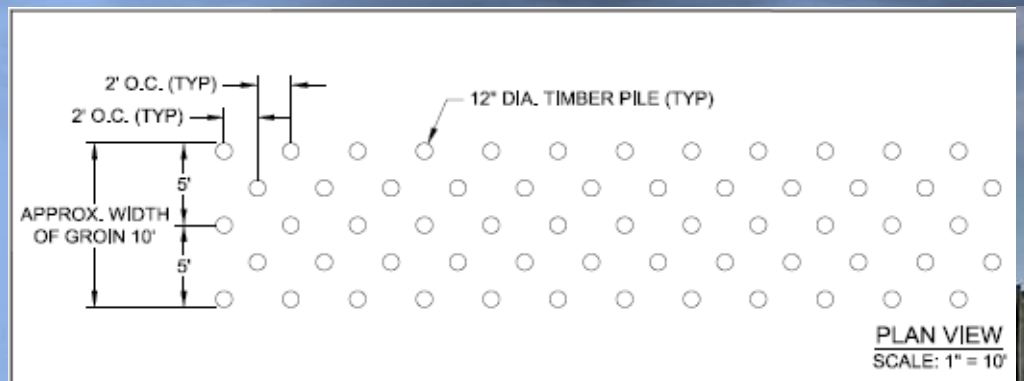
SG-950 VINYL SHEET PILE DETAIL
N.T.S.

PLAN VIEW
SCALE: 1" = 10'

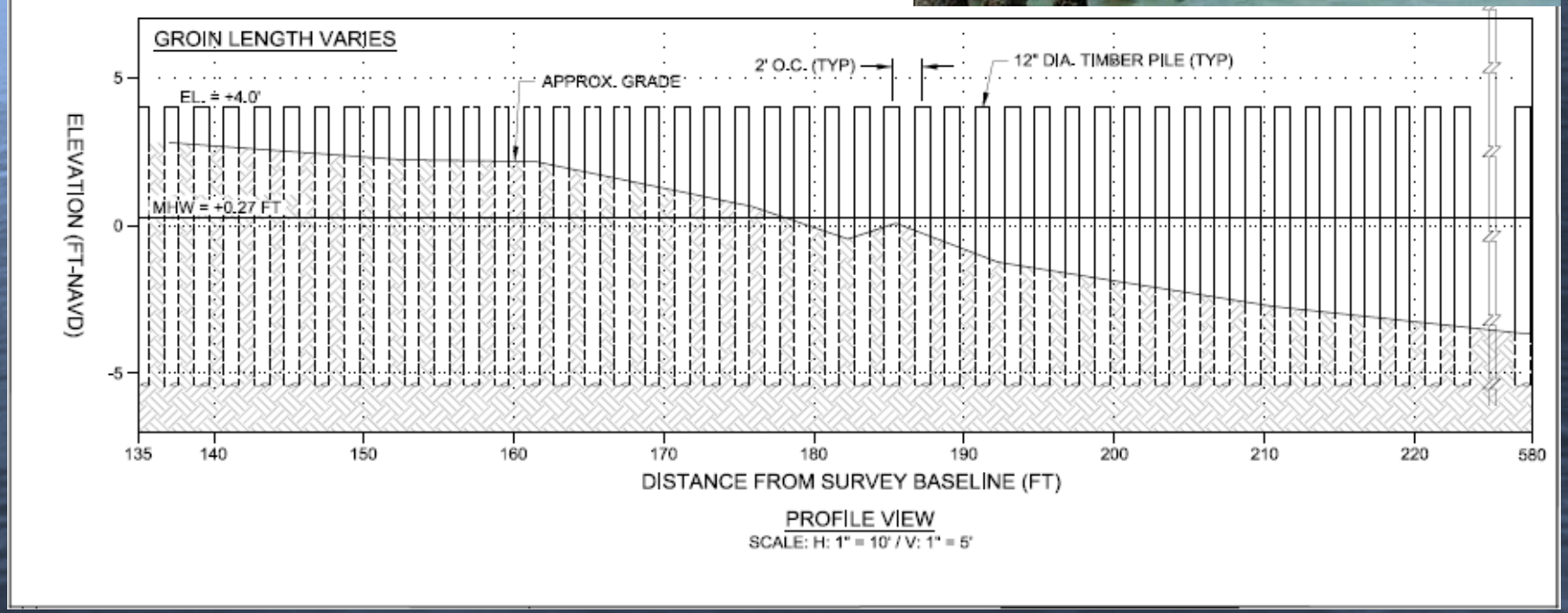


PROFILE VIEW
SCALE: H: 1" = 10' / V: 1" = 5'

Permeable Groin (Pile Cluster) Option

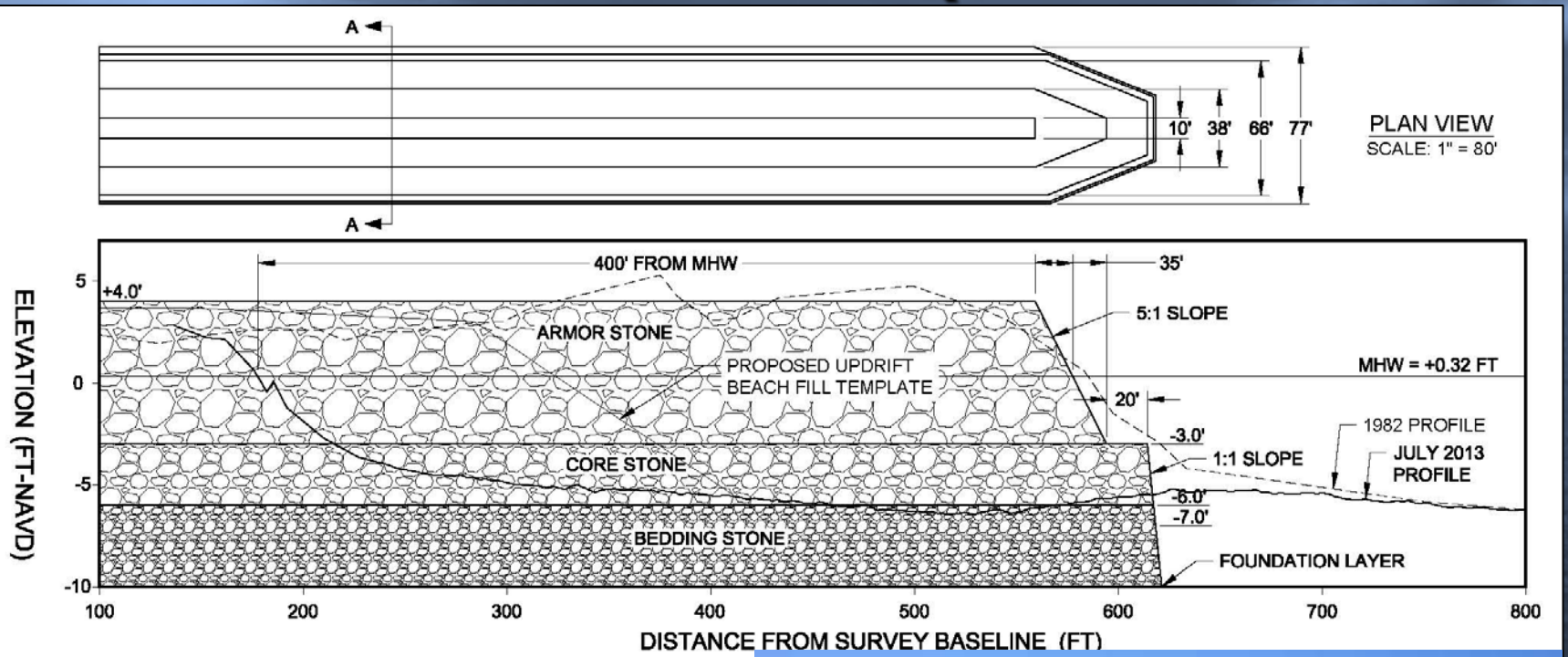


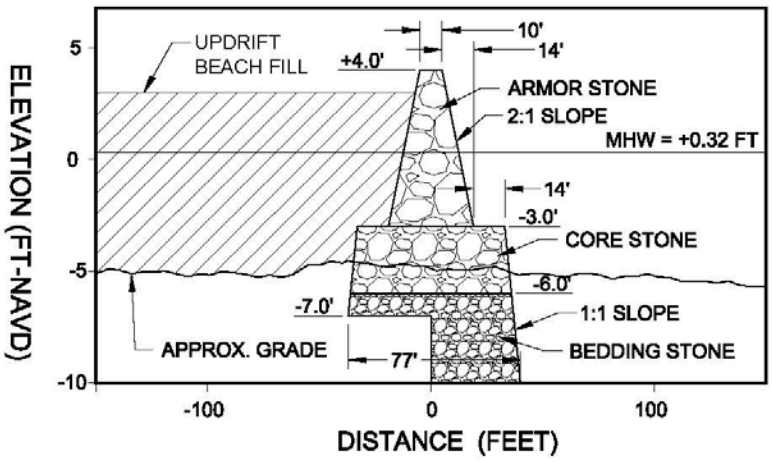
PLAN VIEW
SCALE: 1" = 10'



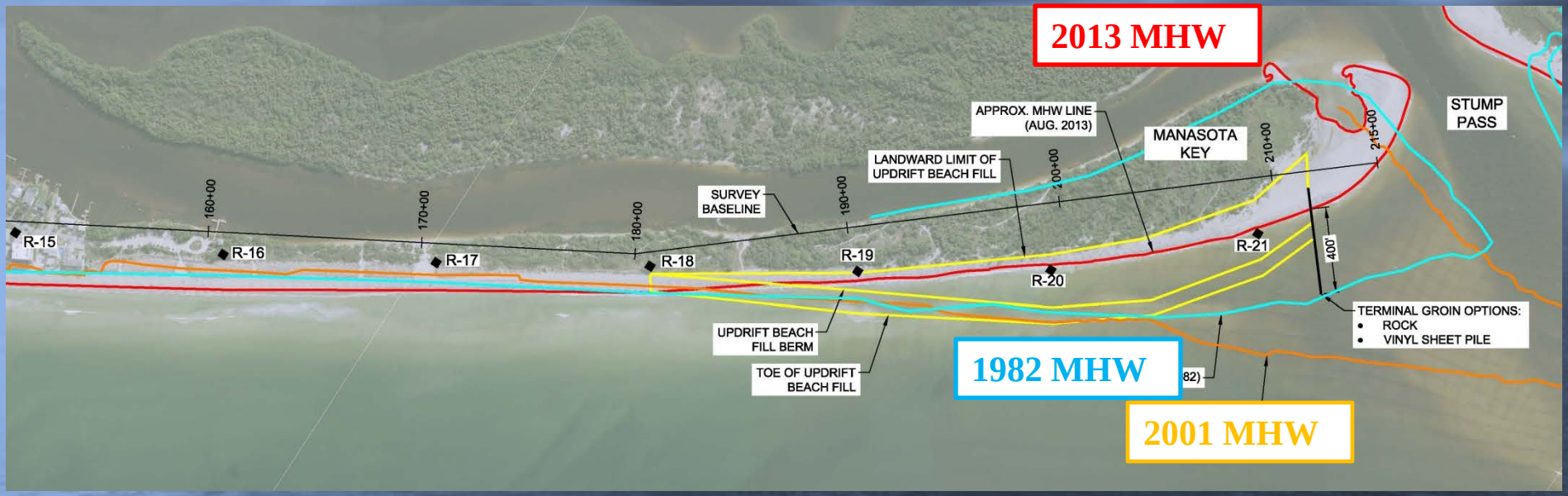
PROFILE VIEW
SCALE: H: 1" = 10' / V: 1" = 5'

Rock Groin Option (Prelim Design)





Additional Modeling

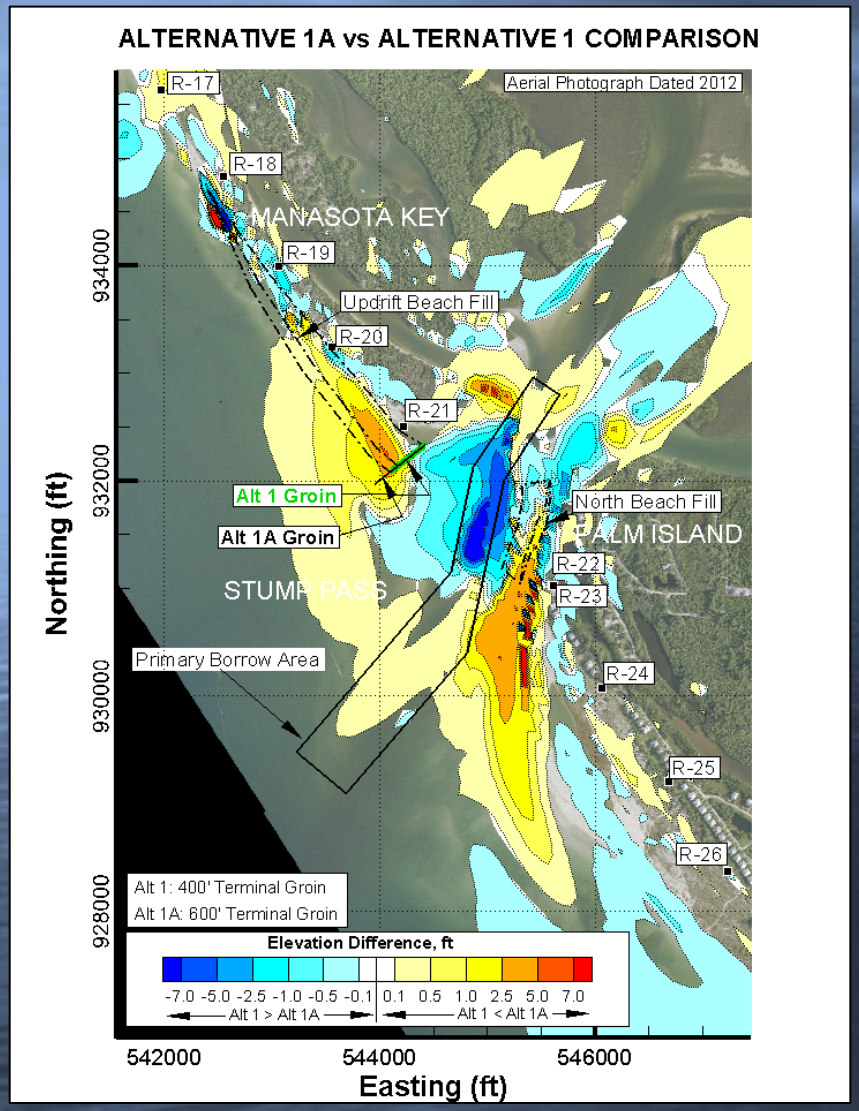


- Inflection in 1982 Shoreline Indicates a Point where Shoreline Re-curves to Form South End of Manasota Key's "Drumstick"
- Structure was Sited at Inflection Point to Help Recreate Quasi-stable 1980's Conditions North of Structure
- State Park Raised Concern ~ Immediate Downdrift Impact in Park

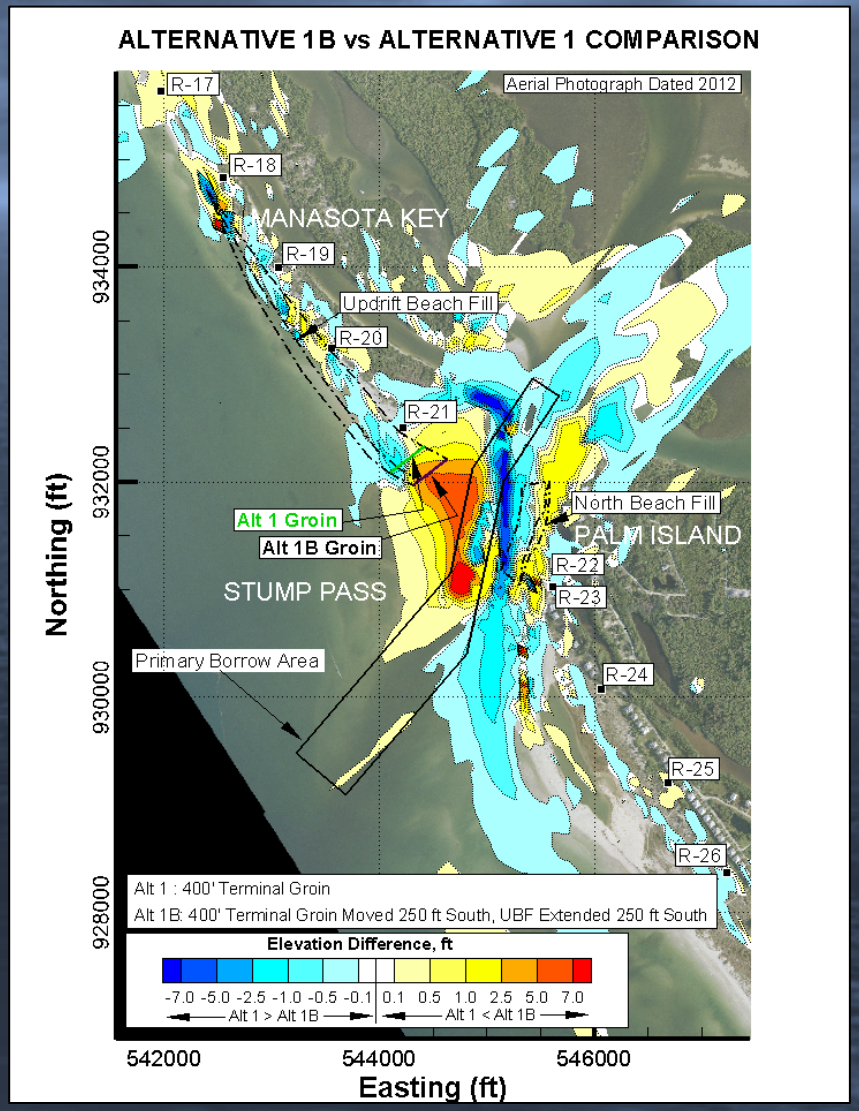
Terminal Groin Modifications

- Alt 1A: Terminal Groin Extended 200 Feet
- Alt 1B: Terminal Groin Shifted South 250 Feet
- Alt 1C: Terminal Groin Shifted South 500 Feet
- Alt 1D: Terminal Groin Orientation Rotated 45°
- Alt 1E: Terminal Groin ~ 20% Permeable
- Alt 1F: Terminal Groin ~ 40% Permeable
- Alt 1G: Terminal Groin Crest Lowered 1.5 Feet

Model Results: 4-Year Simulation

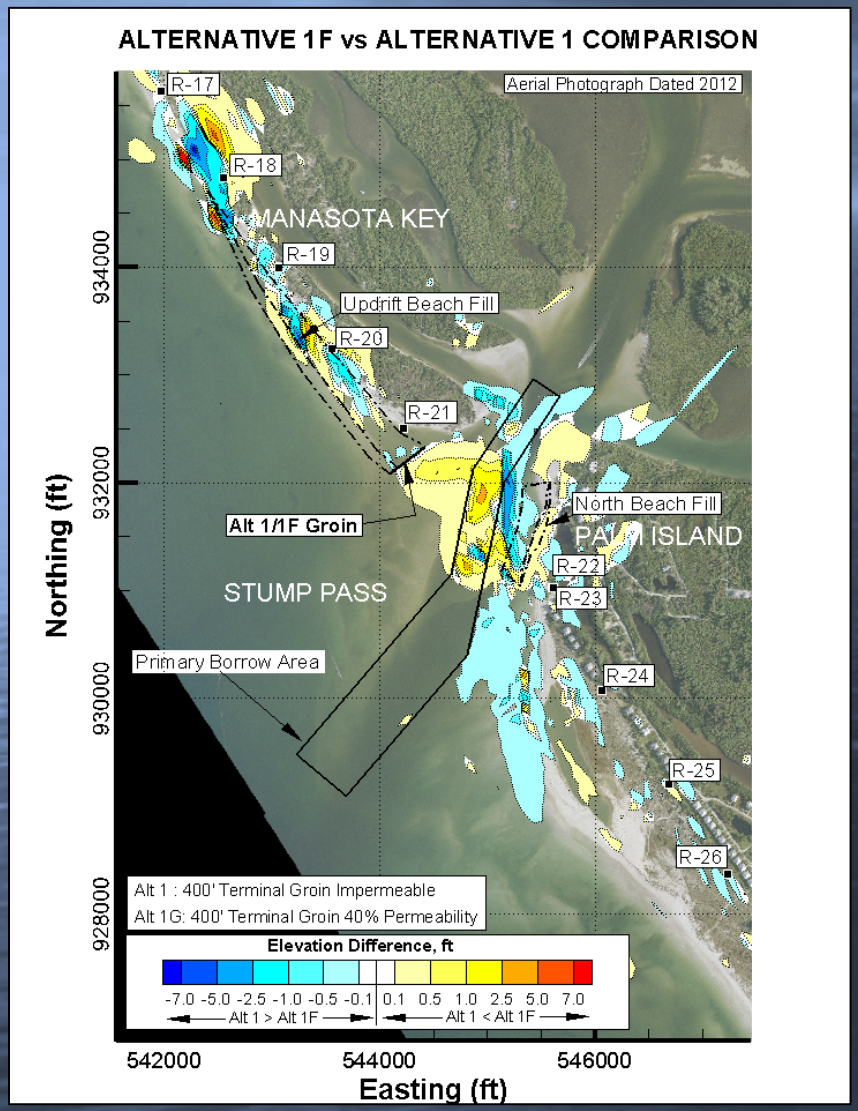


Alt 1A vs. Alt 1

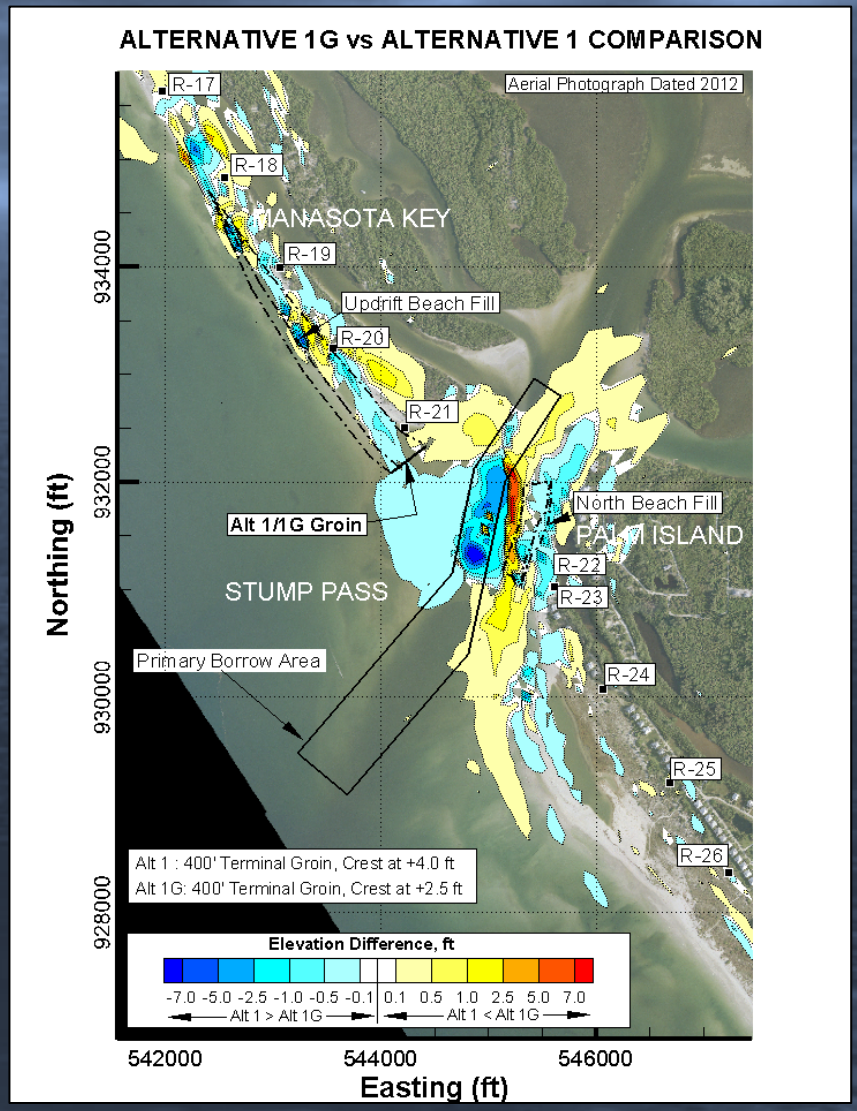


Alt 1B vs. Alt 1

Model Results: 4-Year Simulation



Alt 1F vs. Alt 1



Alt 1G vs. Alt 1

Scoring Summary

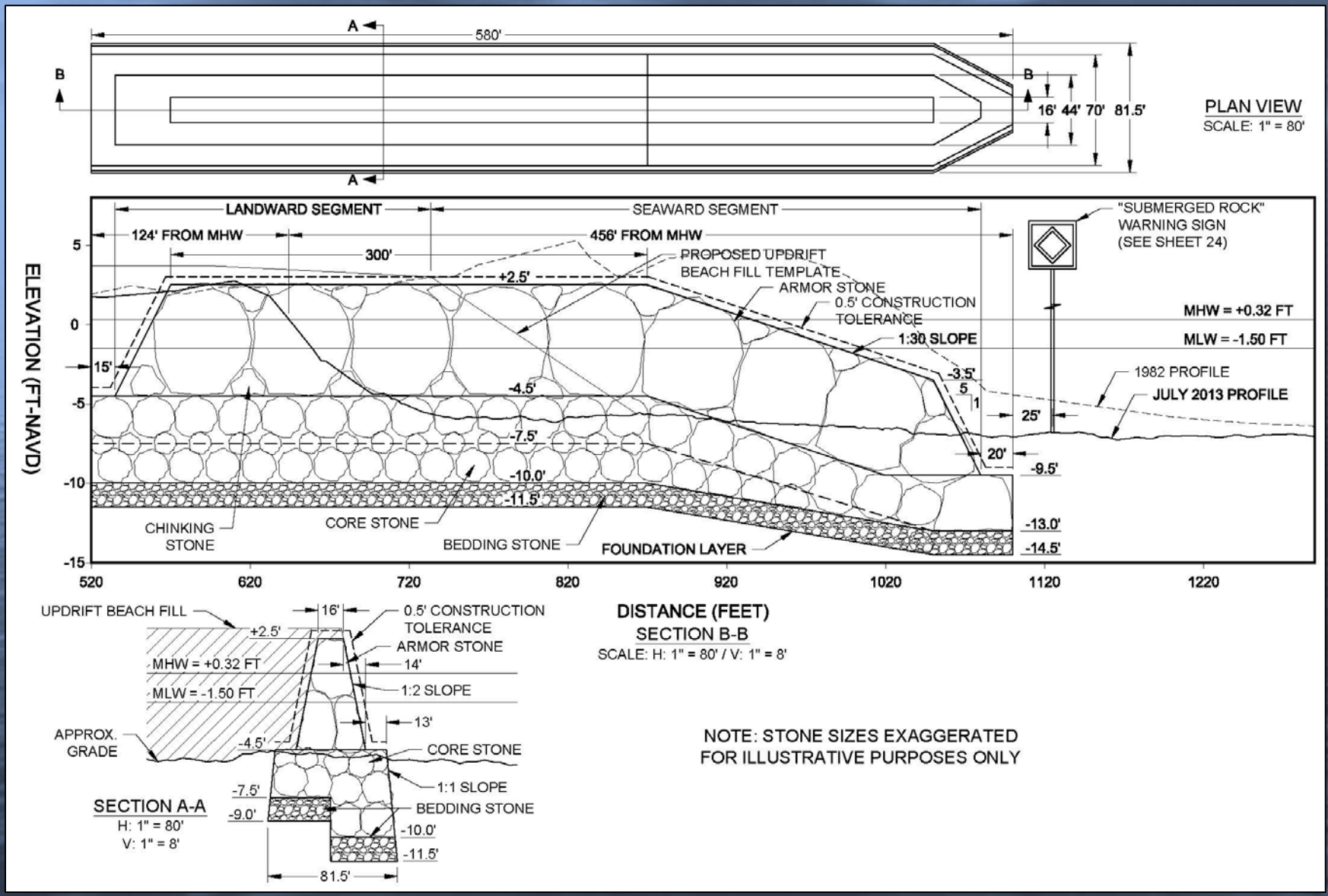
Alternative	Acreage Change	Volume Change		Downdrift Effects*		Borrow Area Infilling	Construction Budget	Total Score	Rank
	UBF	UBF	NBF	MK†	PI‡				
1	4	3	11	15	15	15	28	91	#6
1A	18	25	14	0	22	42	12	133	#1
1B	15	14	0	24	0	4	17	74	#7
1C	28	38	2	21	5	0	0	94	#5
1D	3	2	2	18	4	11	18	58	#8
1E	4	5	10	27	13	14	31	104	#3
1F	0	0	10	33	13	11	33	100	#4
1G	4	5	13	6	19	27	33	107	#2

† denotes south end of Manasota Key
‡ denotes north end of Palm Island
* higher score denotes less downdrift impact

Alternatives 1E and 1F (Increased Permeability) as well as Alternative 1G (Lower Crest Elevation) were Recommended for Consideration

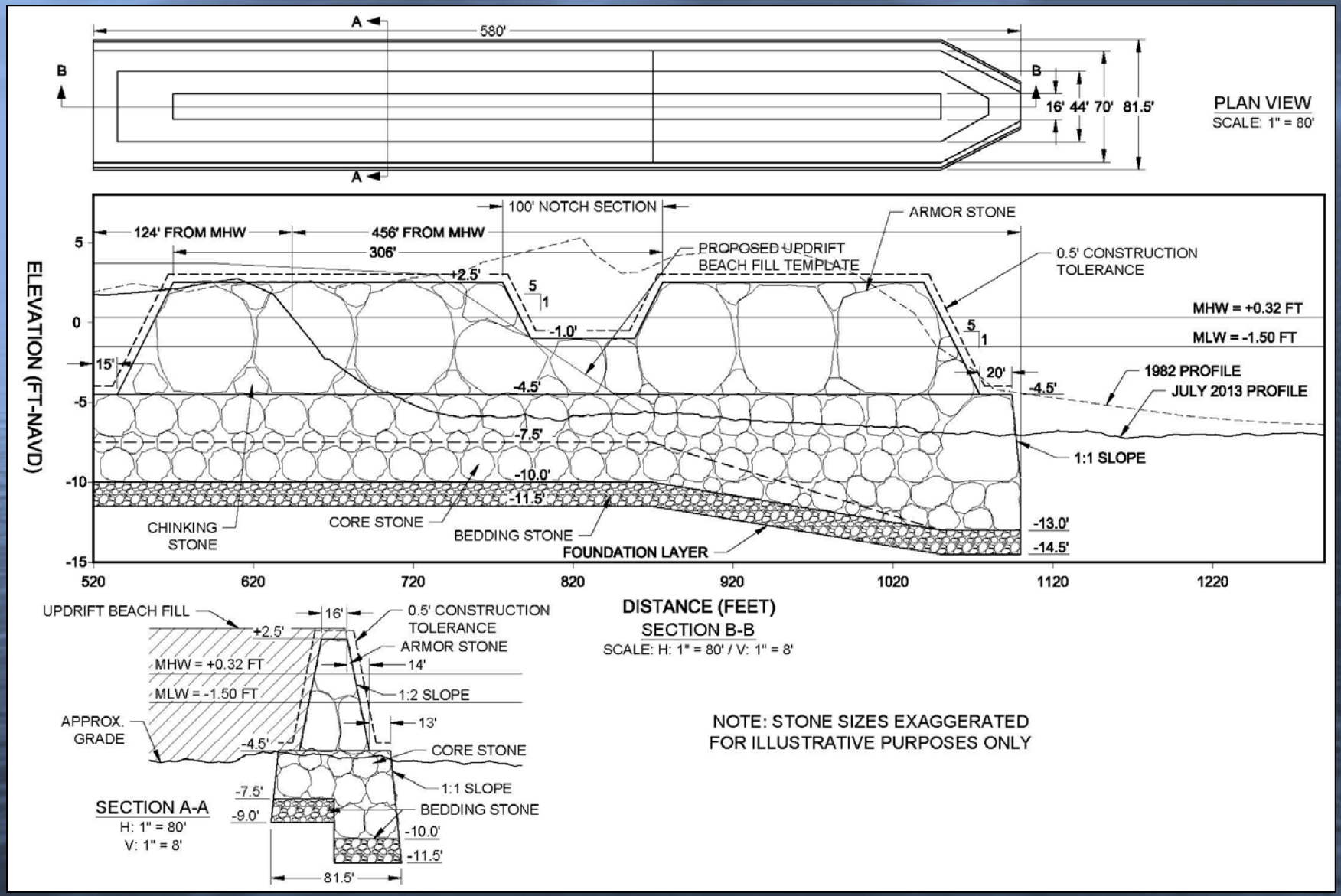
Terminal Groin: Preliminary Design

Option A: Sloping Crest

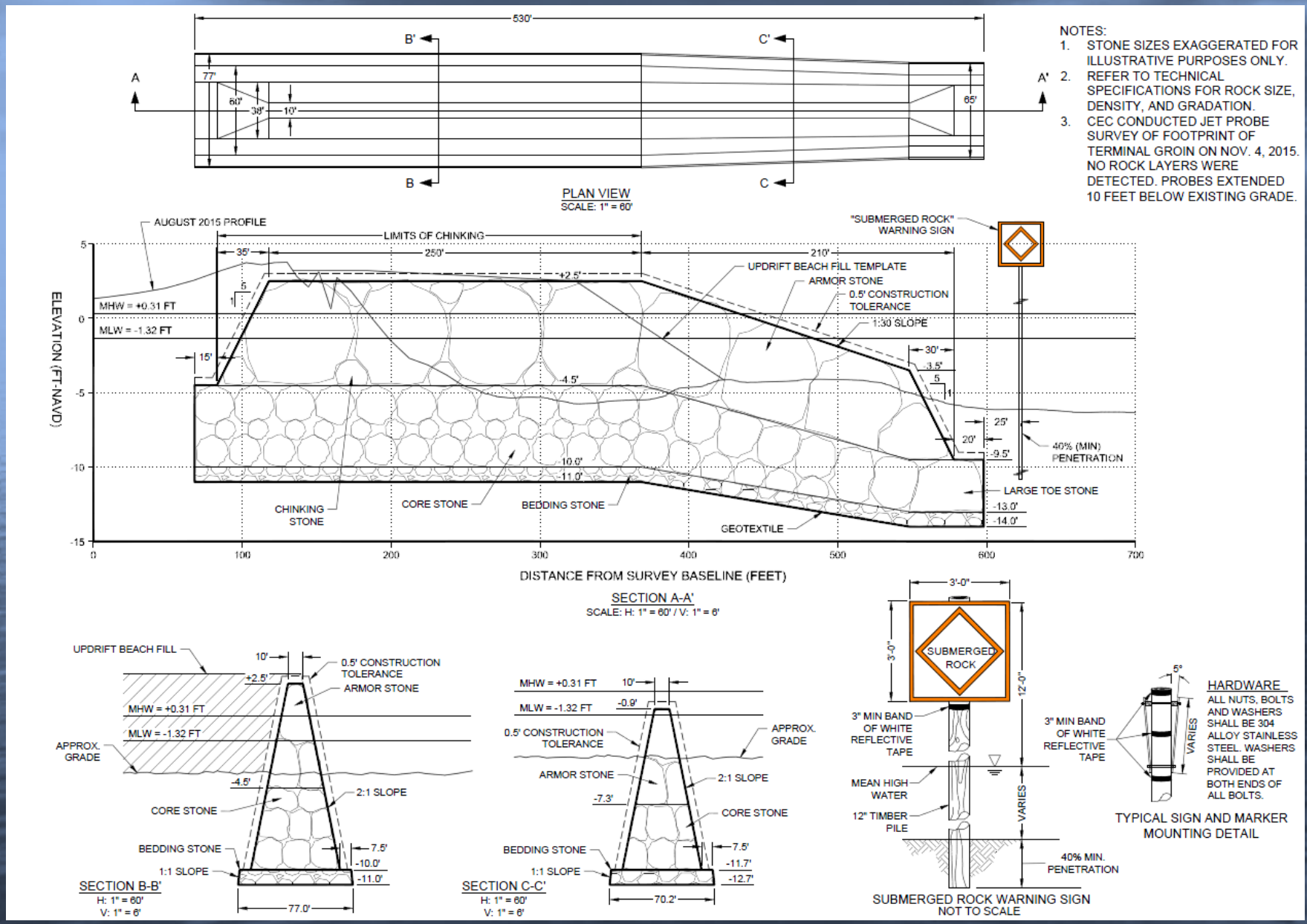


Terminal Groin: Preliminary Design

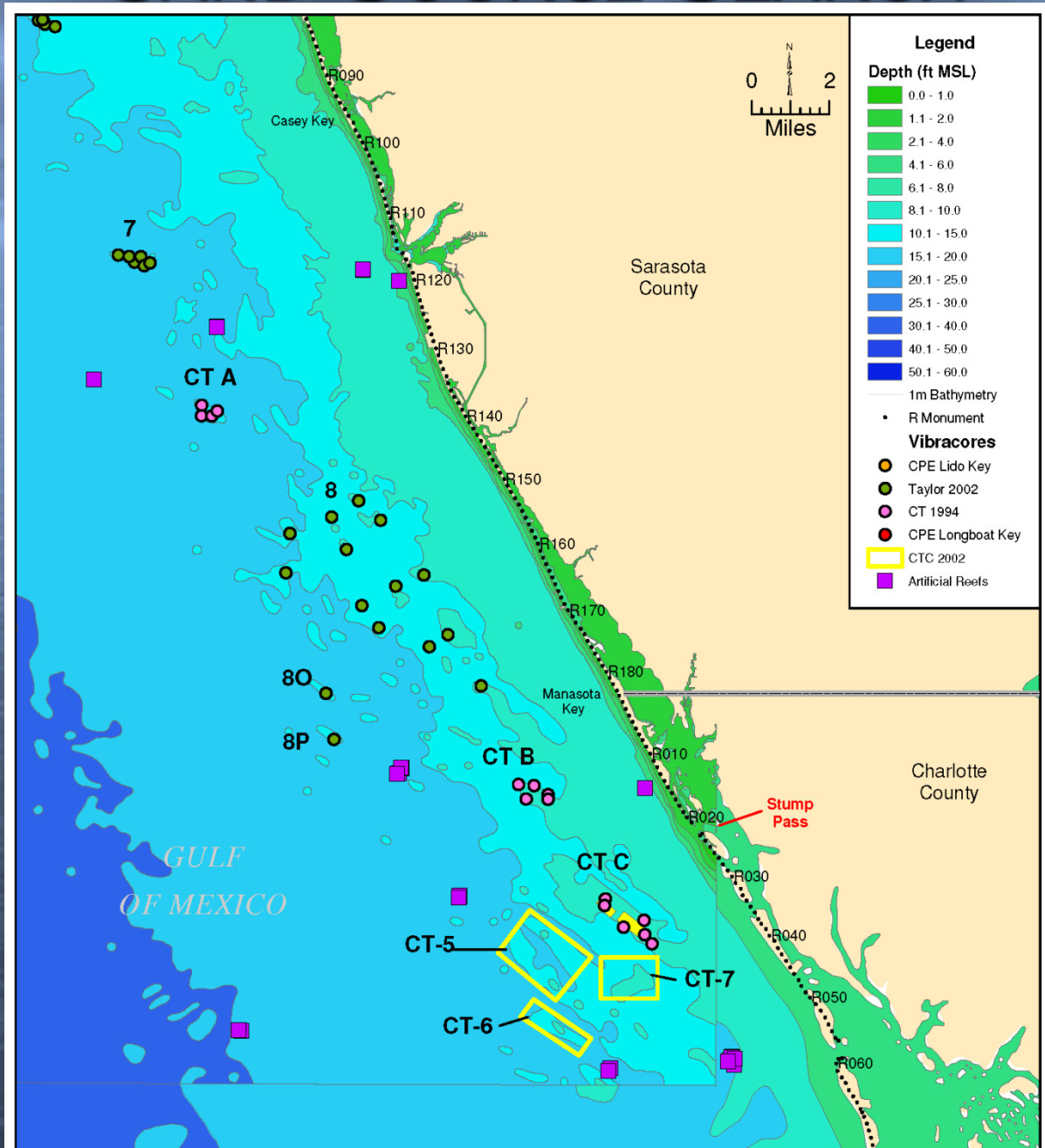
Option B: Notched Section



Terminal Groin: Final Design



Sand Source Search



Recon & Detailed Level Search Areas

Recon Survey:

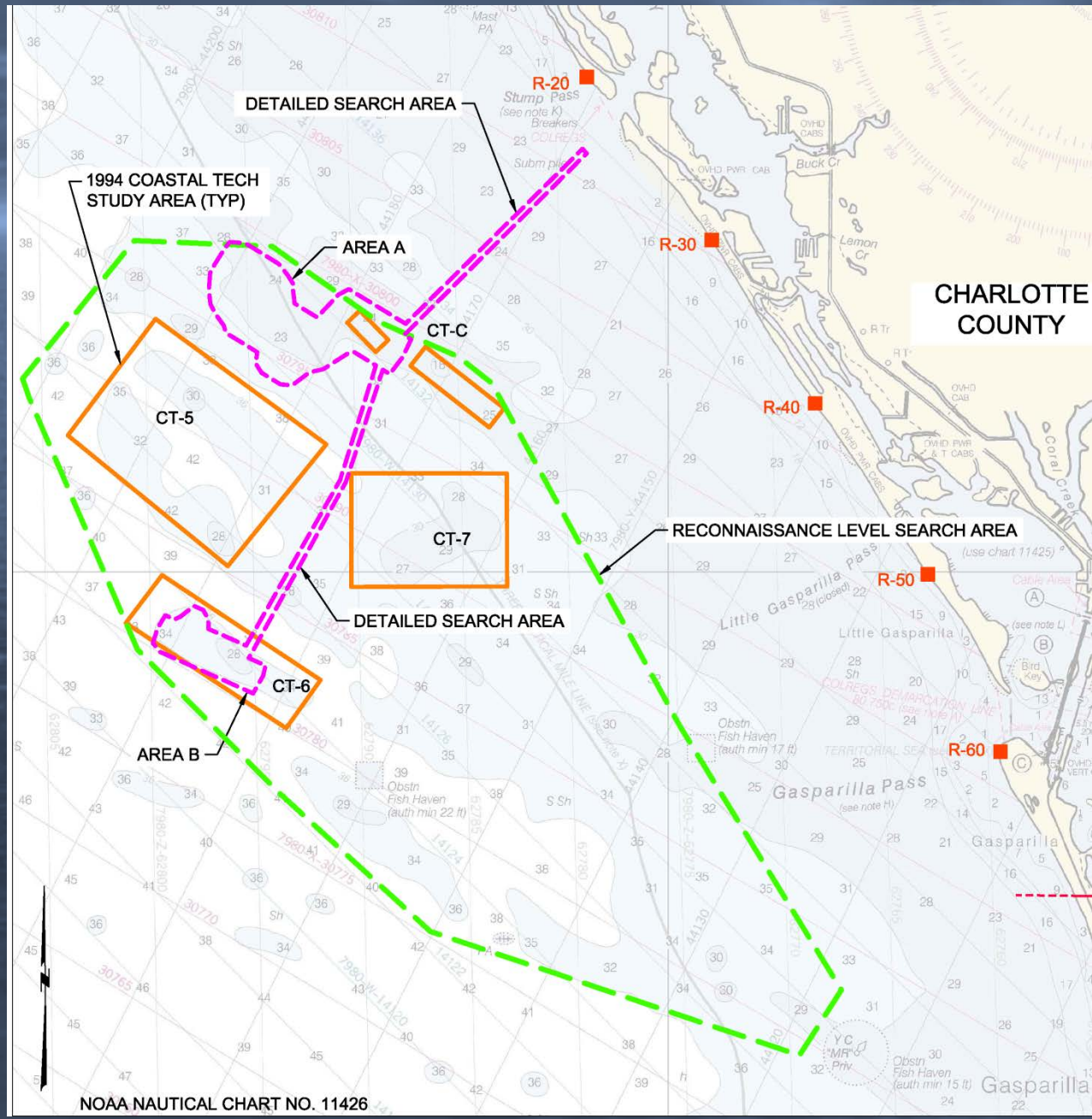
9 Target Areas
60 Nautical Line Miles
14 Vibracores

Summary
- 3 Areas Eliminated
- 6 Areas Carried Forward
  * d_{50} (avg) = 0.41 mm
  * 95% sand

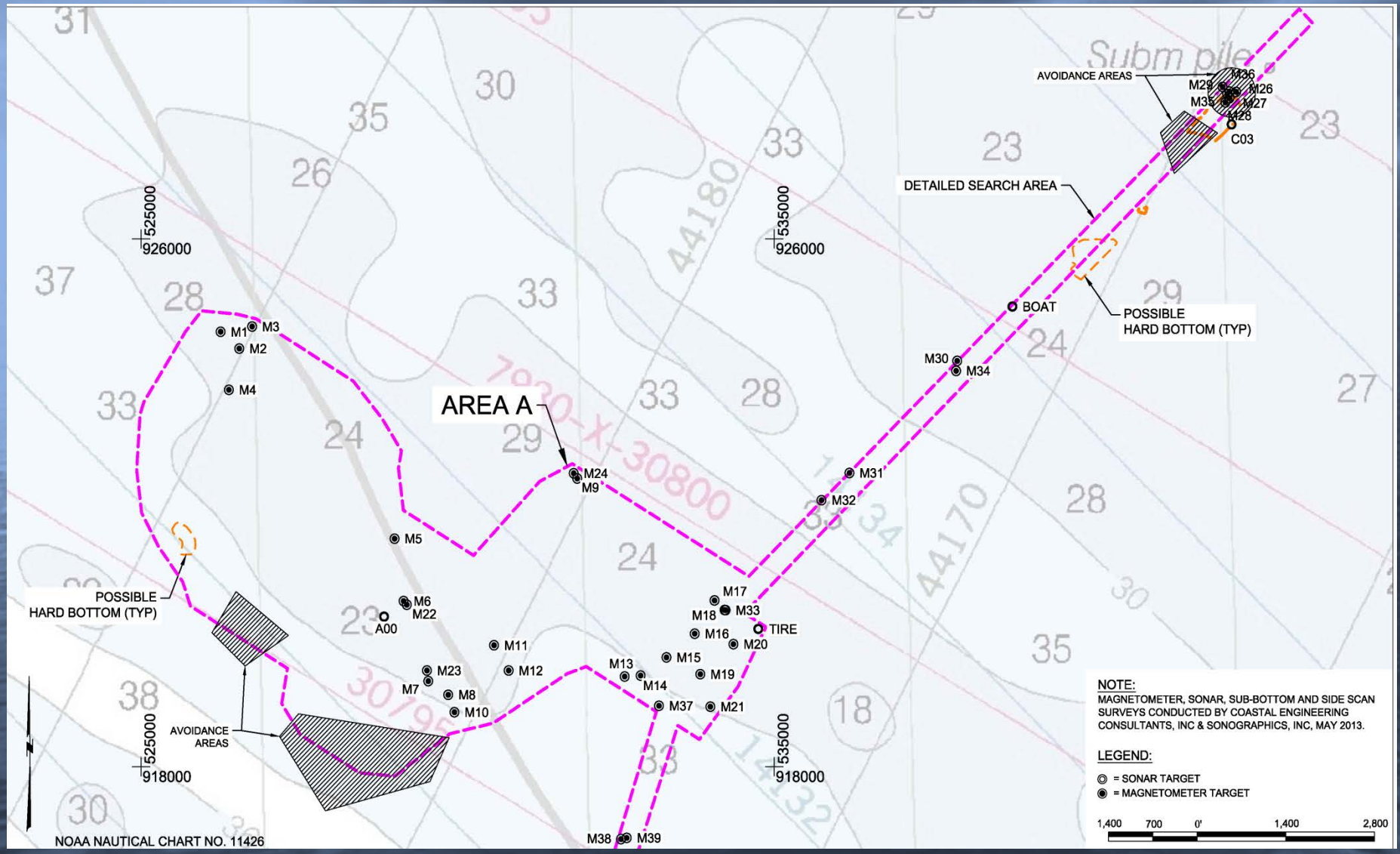
Detailed Survey:

6 Target Areas
72 Nautical Line Miles
23 Vibracores

Summary
- 2 Primary Areas
- 1.5 MCY
  * d_{50} (avg) = 0.32 mm
  * 98% sand



DETAILED GEOPHYSICAL SURVEY



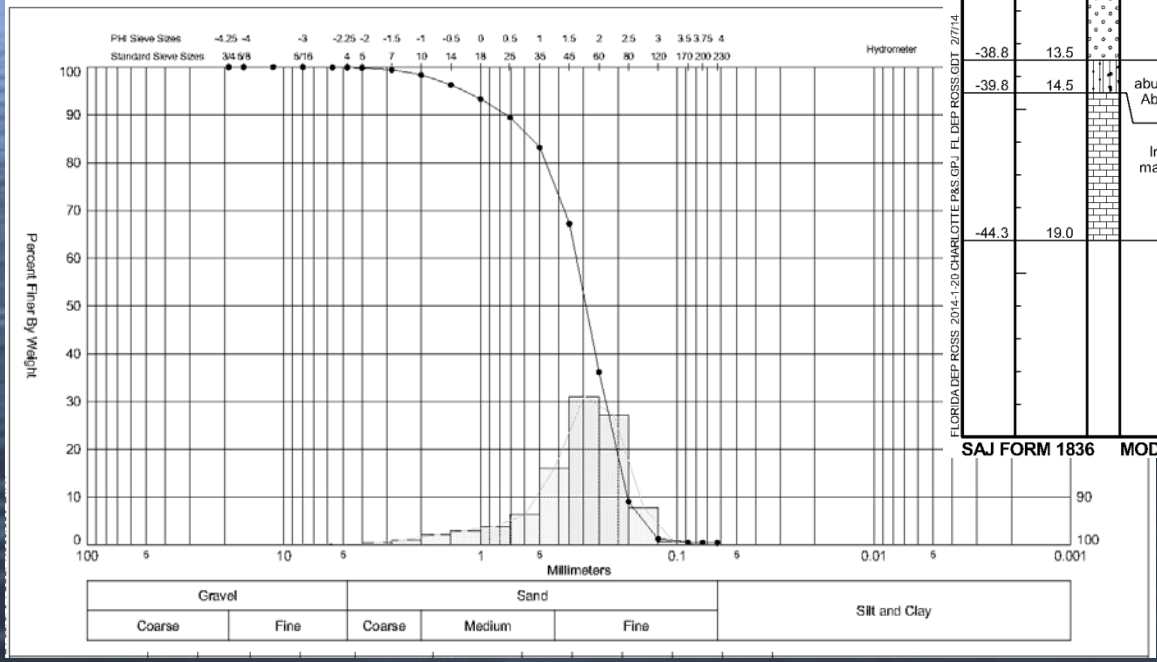
Detailed Geotechnical Survey

4. NAME OF DRILLER: AVS			13. TOTAL NUMBER CORE BOXES
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL	BEARING	14. ELEVATION GROUND WATER
			15. DATE BORING: STARTED 12-13-13 / COMPLETED 12-13-13
6. THICKNESS OF OVERBURDEN: 0.0 Ft.			16. ELEVATION TOP OF BORING: -25.3 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.			17. TOTAL RECOVERY FOR BORING: 19 Ft.
8. TOTAL DEPTH OF BORING: 20.0 Ft.			18. SIGNATURE AND TITLE OF INSPECTOR

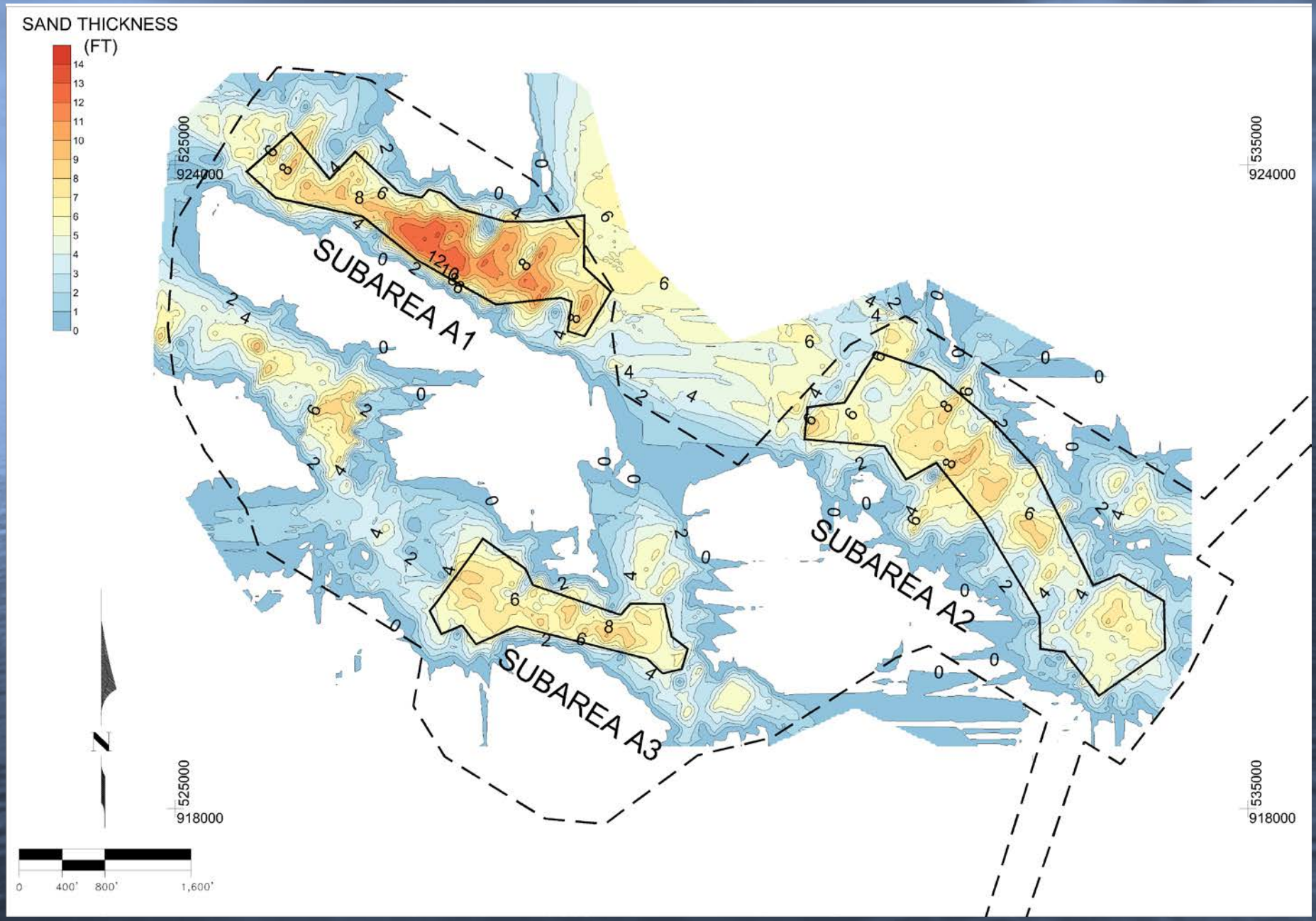
ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-25.3	0.0				1	Sample #1, Depth = 0.5' - 0.8' Mean (mm): 0.50, Phi Sorting: 1.19 Fines (230): 0.22% (SW)
			Fine grained quartz sand with some medium to coarse shell hash, some blackened. Layer of blackened shell hash from 10.4'-10.6'. Lightening in color with depth. Gradational contact, gray (5Y 6/1) to, light gray (5Y-7/1), (SW).		2	Sample #2, Depth = 5.0' - 5.3' Mean (mm): 0.33, Phi Sorting: 0.87 Fines (230): 0.43% (SW)
-38.8	13.5				3	Sample #3, Depth = 11.0' - 11.3' Mean (mm): 0.32, Phi Sorting: 0.99 Fines (230): 0.41% (SW)
-39.8	14.5		Fine grained quartz sand and silt with abundant coarse to fine gravel bivalve shells. Abrupt contact, olive gray (5Y-5/2), (SM W/ GRAVEL).			
			Indurated limestone in fine white silt/clay matrix (possibly kaolinite). Some limestone cobbles, white (5Y-8/1), (LS).			
-44.3	19.0					
			End of Boring			

FLORIDA DEP ROSS 2014-1-20 CHARLOTTE P&S.GPJ FL DEP ROSS.GDT 2/7/14

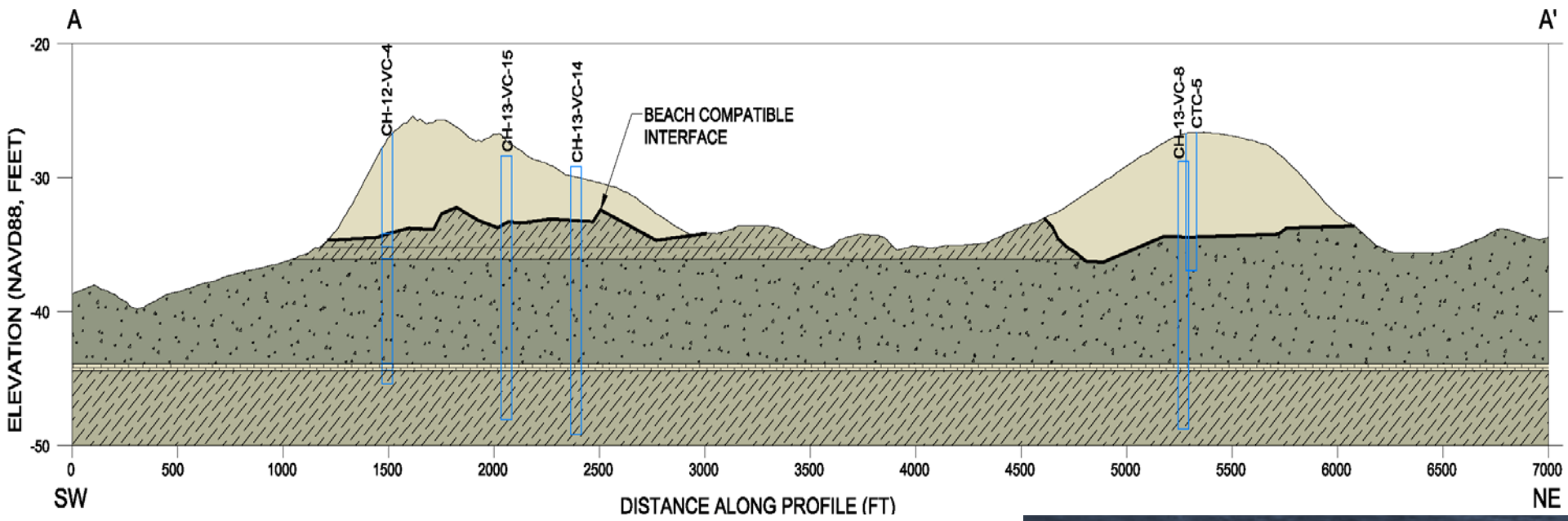
SAJ FORM 1836 MODIFIED FOR THE FLORIDA DEP



AREA A: SAND THICKNESS



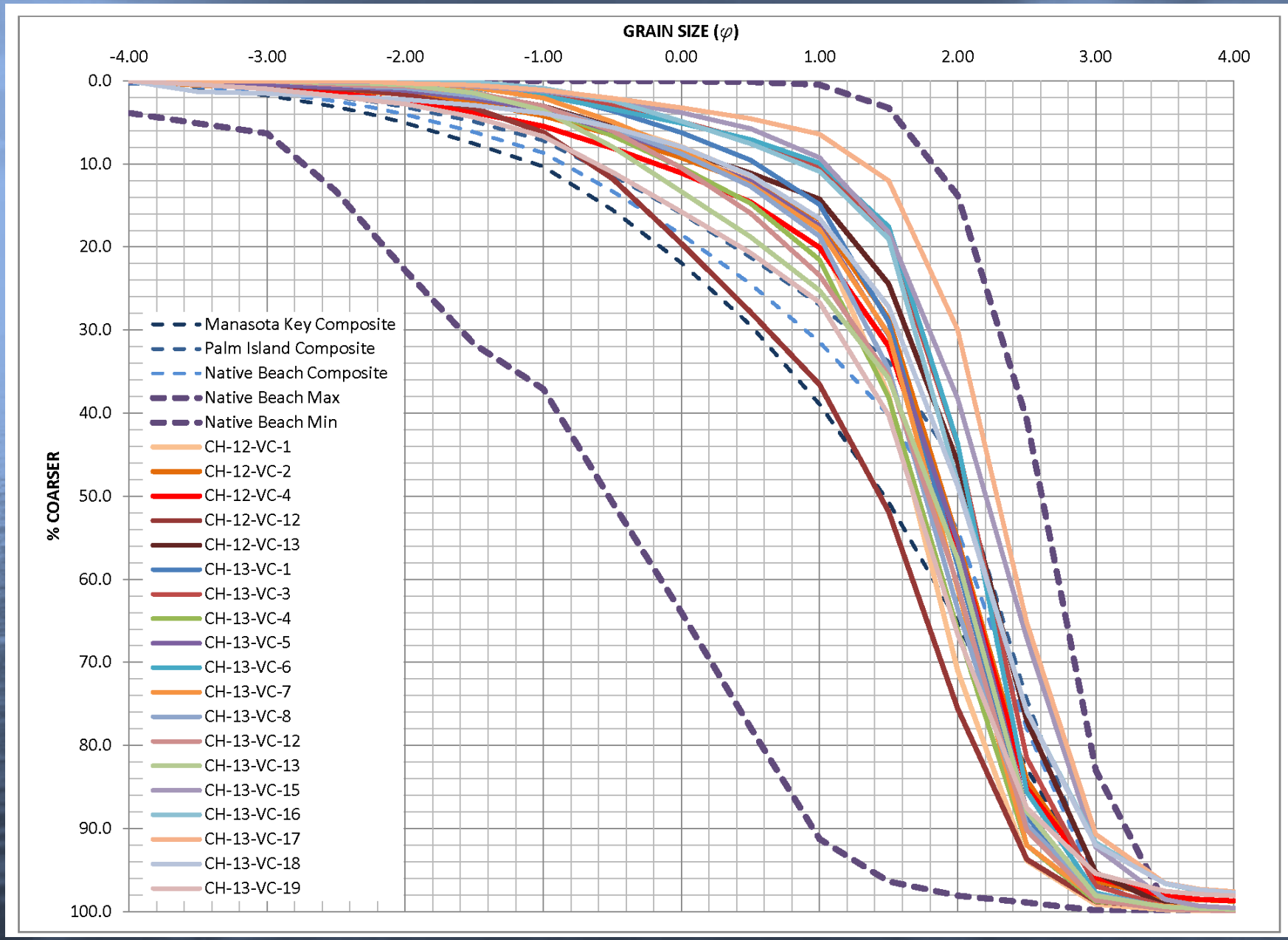
Sediment Profile



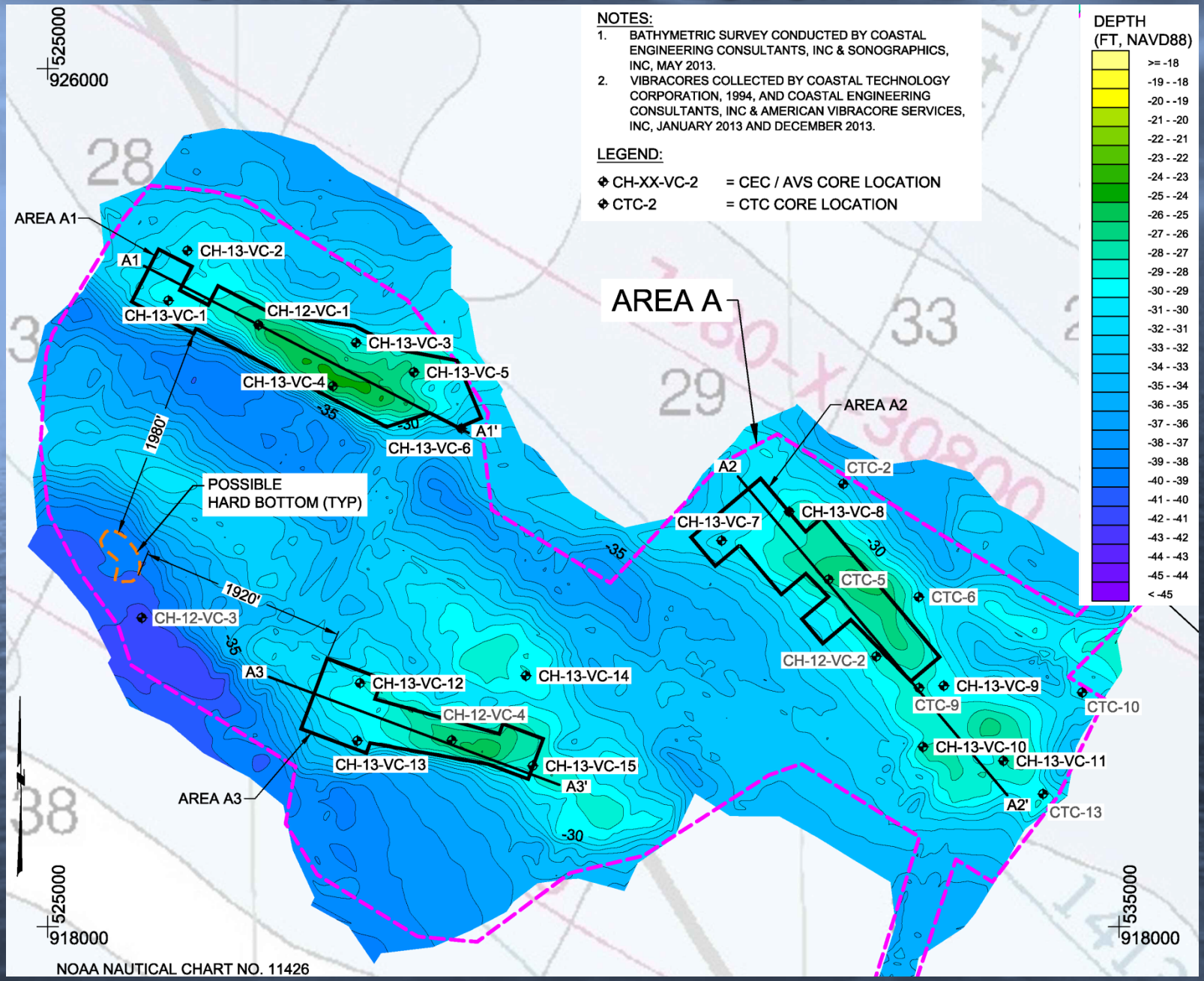
LEGEND:

SAND	SILT	LIGHT GRAY	GRAY
SILTY SAND	PALE YELLOW	LT OLIVE GRAY	BEACH COMPATIBLE INTERFACE
LIMESTONE	GRAY BROWN	DARK GRAY	

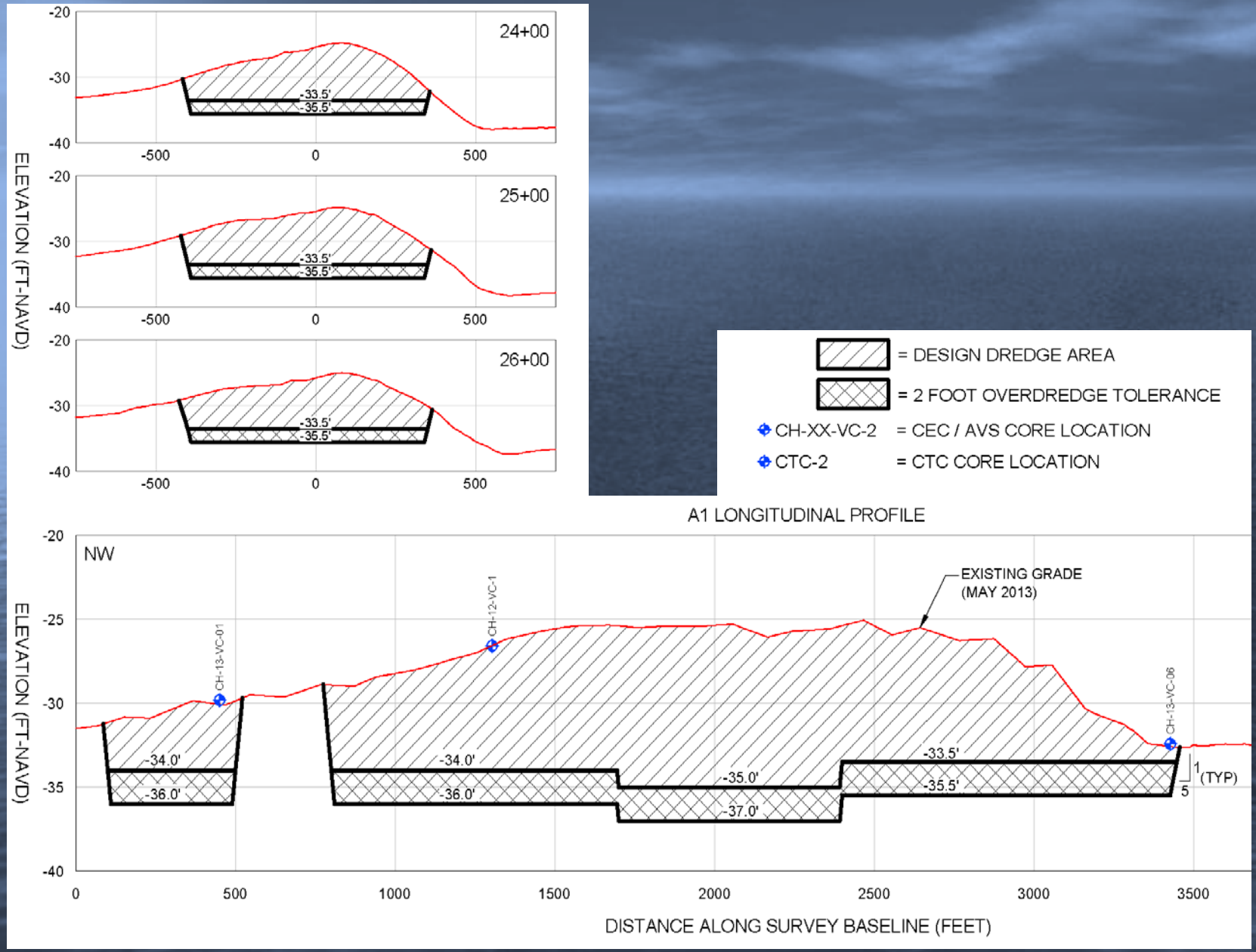
COMPATIBILITY ANALYSIS



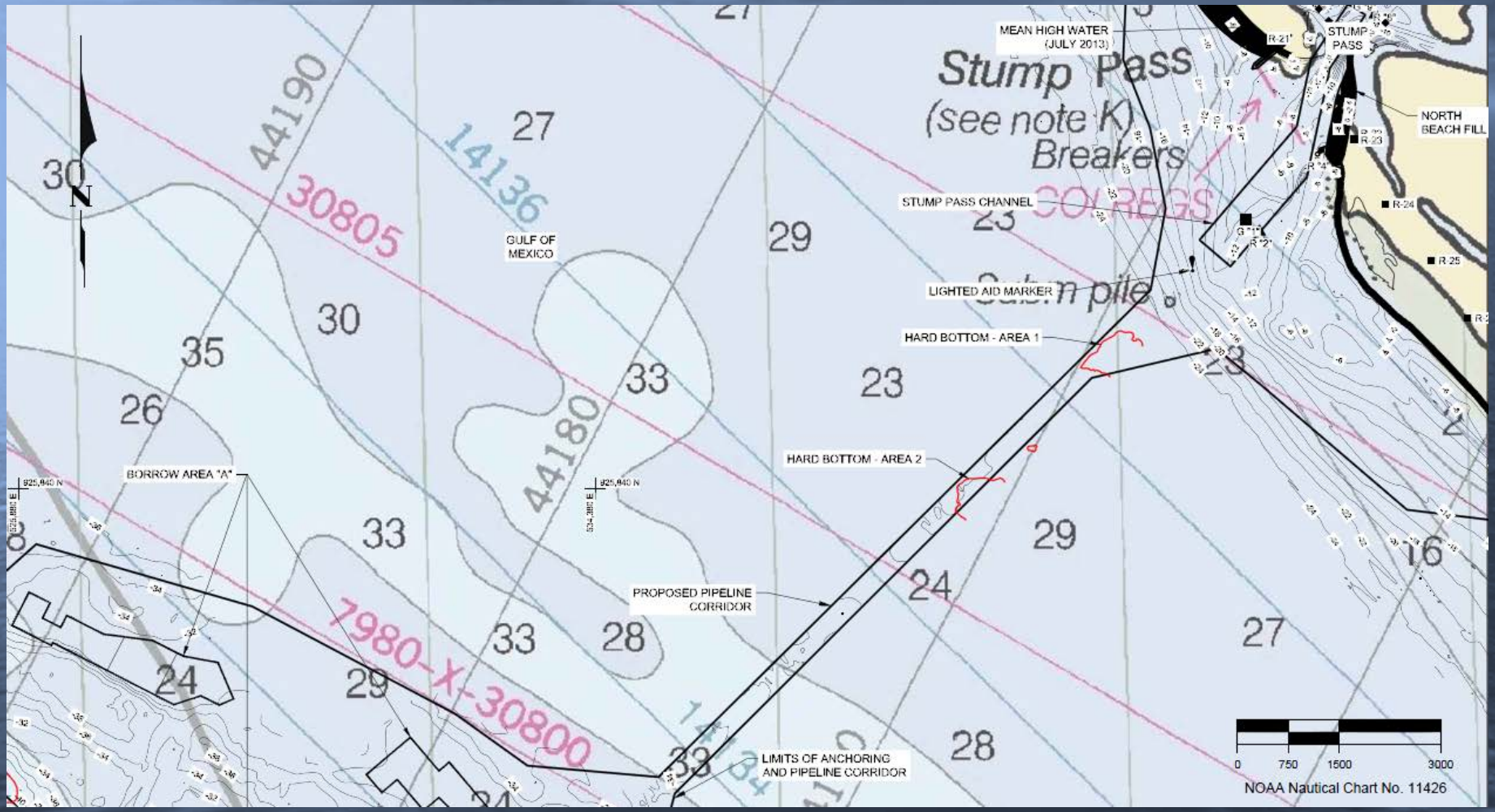
Borrow Area Design Plan



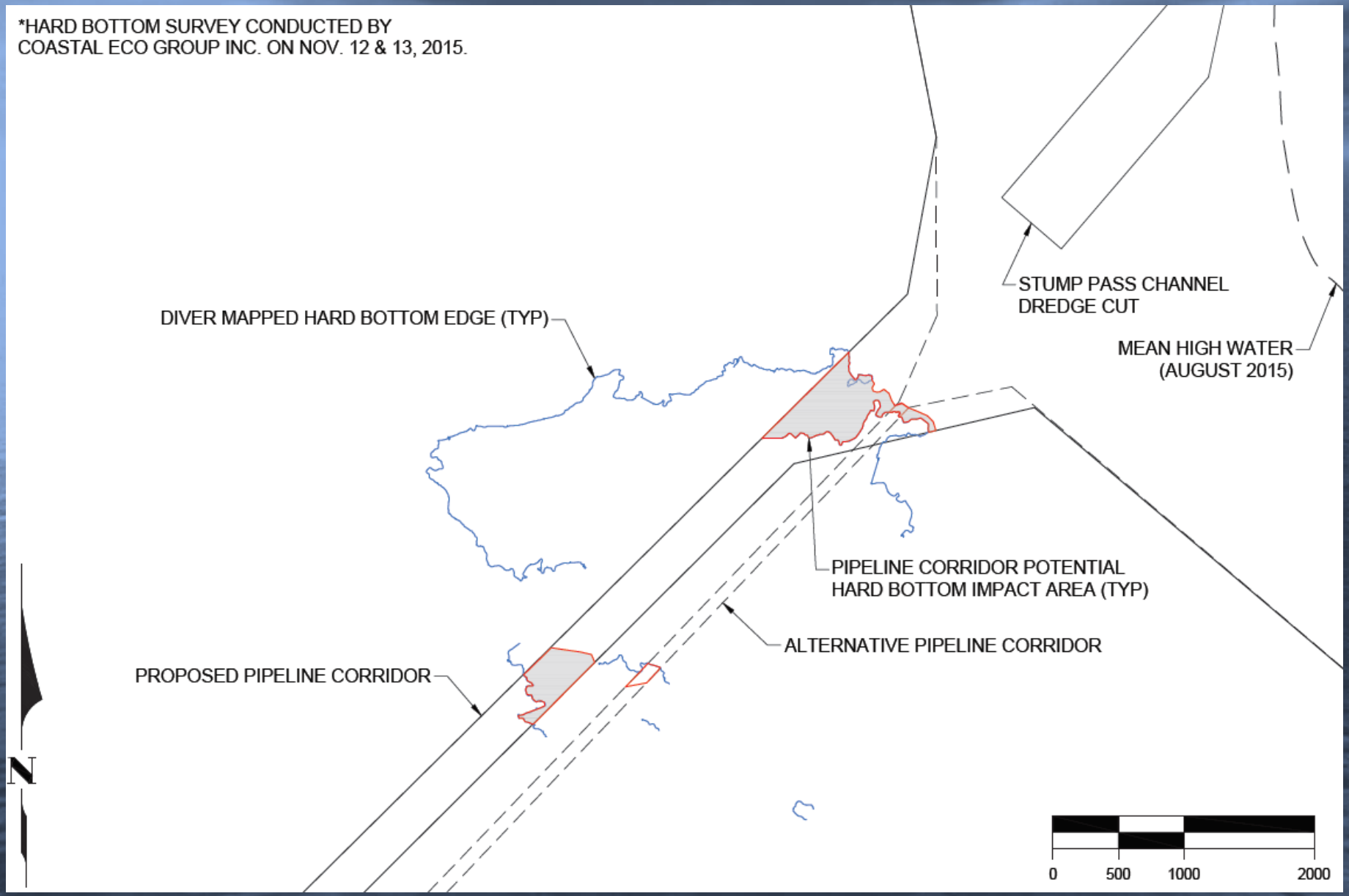
Borrow Area Design Sections



Pipeline Corridor



Cultural Resources Survey / HB Mapping



Detailed Hardbottom Mapping

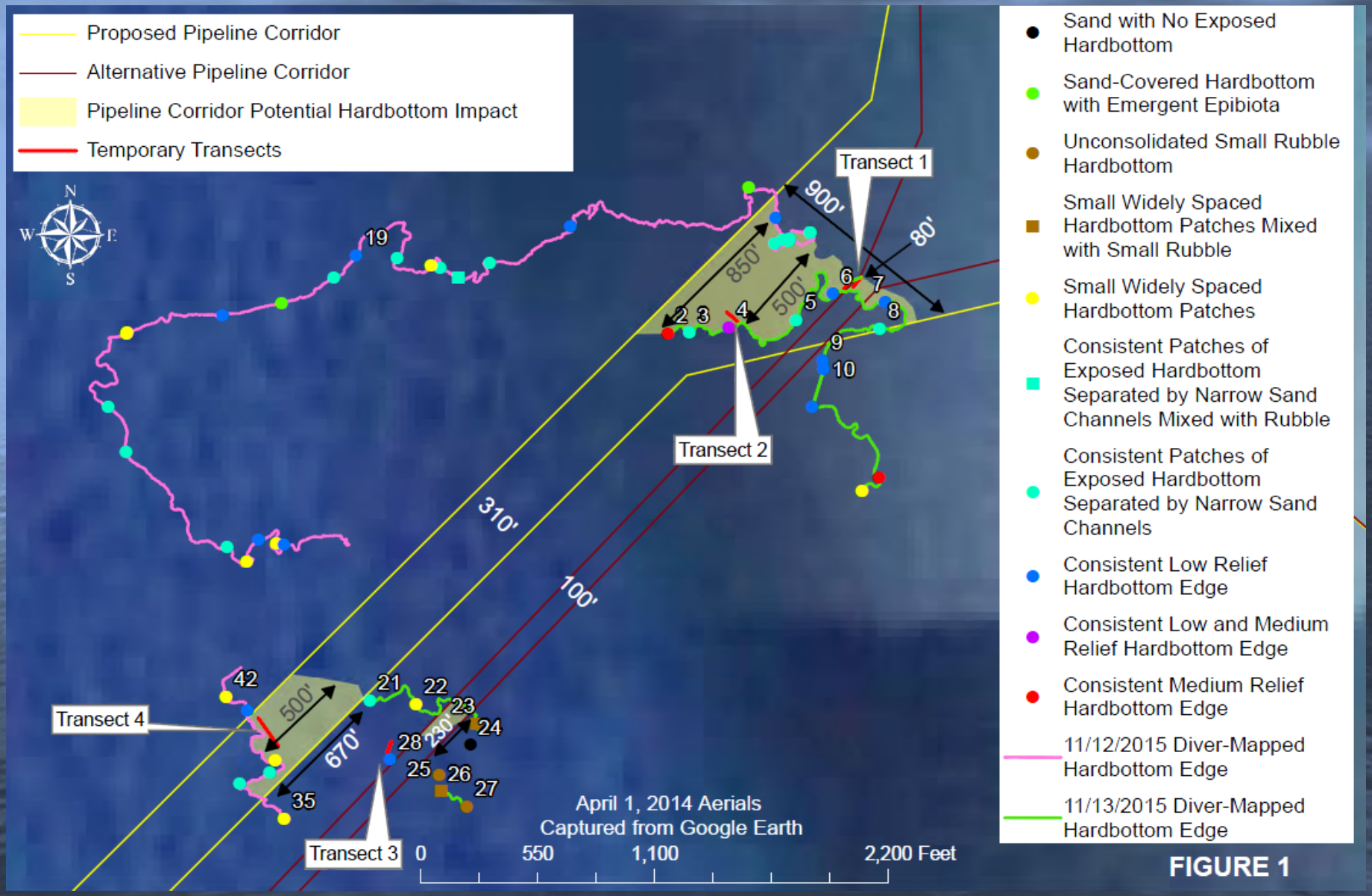


FIGURE 1

Projected Schedule

- February 2016 – Complete Permitting
- March – May 2016 – Conduct Bid Process & Issue Notice of Contract Award
- July 2016 – Issue Notice to Proceed / Mobilization
- August 2016 – Commence Construction
  - Channel Dredging ~ Downdrift Beach Fill
  - Knight - Don Pedro Islands Beach Fill
- November 2016 – Manasota Key Construction
  - Channel Dredging ~ Updrift Beach Fill
  - Terminal Groin / Backfill Structure
- January 2017 – Demobilization

Acknowledgements

- Charlotte County BCC & Staff
- Advisory Committees
- Residents & Boating Community
- FDEP Beaches
- FL State Park Staff
- FFWCC & Aquatic Preserves
- Federal Agencies
- Shorebird and Sea Turtle Monitors
- Coastal Tech, AVS, Sonographics, and Coastal Eco Group