

# Estero Island Shore Protection Project Pre-Application Meeting

**OCTOBER 6, 2021**



# OUTLINE

- 2011 Project Performance
- Existing Conditions
- Beach Fill Design
- Borrow Area Design
- Pipeline Corridor Design
- Summary



# 2011 PROJECT PERFORMANCE

- Lee County Sponsored Project
- Construction: Apr–Dec 2011
- 403,000 CY
- New Terminal Groin
- Borrow Area  $\sim$  1 MCY  
(Remaining -2019 Condition)



# 2010 PRE-CONSTRUCTION

Google Earth

1 mi



# 2012 Post-CONSTRUCTION

Google Earth

1 mi



# POST-CONSTRUCTION MONITORING REPORT (LEE COUNTY, 2012)



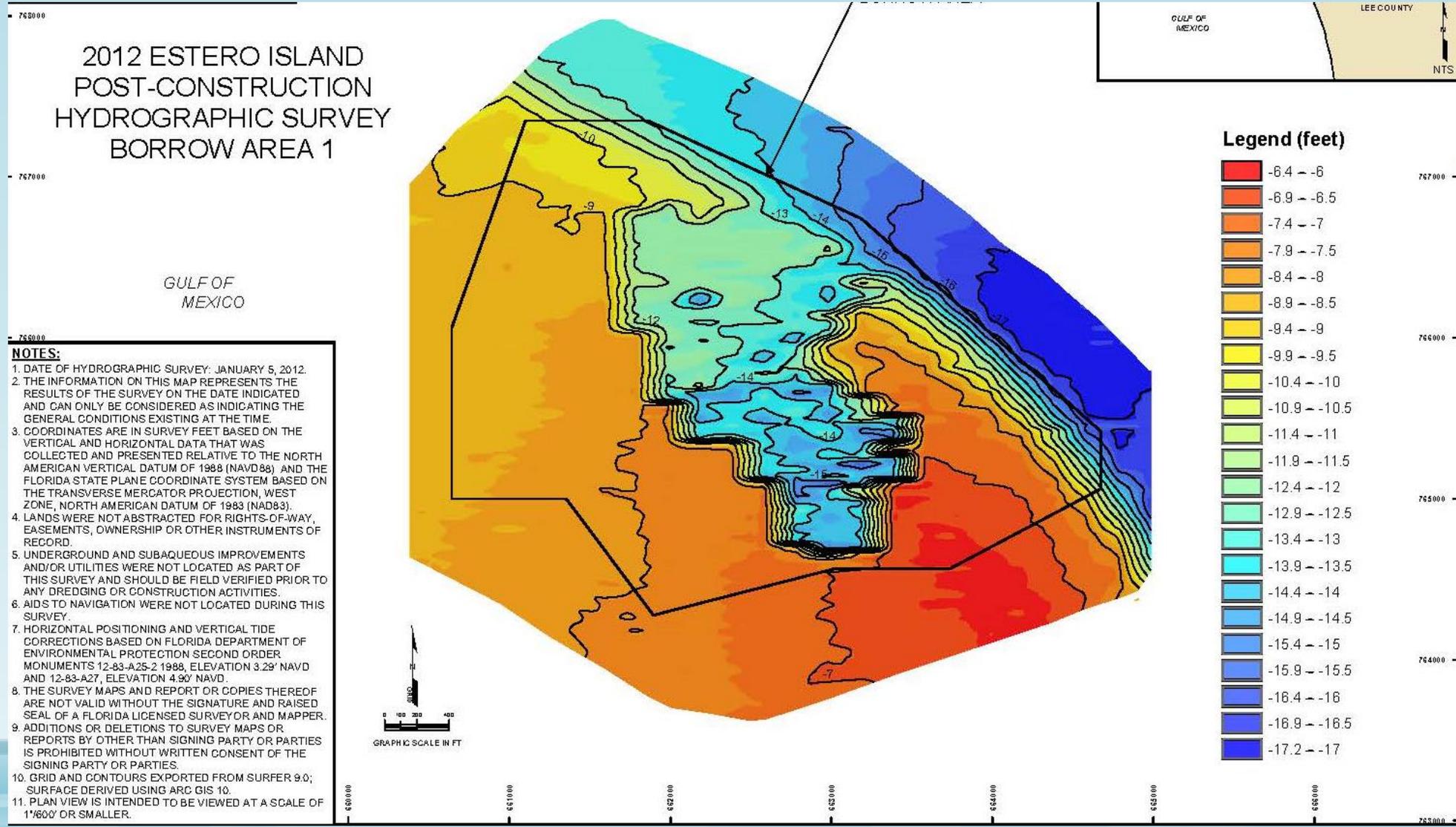
**NOTES**

1. CONSTRUCTION CONCLUDED ON DEC 17, 2011.
2. PROJECT LIMITS ARE C174A.5 TO R181.5.
3. SURVEY EVENT DATES ARE REFERENCED IN ESTERO ISLAND POST CONSTRUCTION MONITORING REPORT.
4. ELEVATION OF SHORELINE 0.21 NAVD88.
5. PHOTOGRAPHY DATED JAN. 2012.

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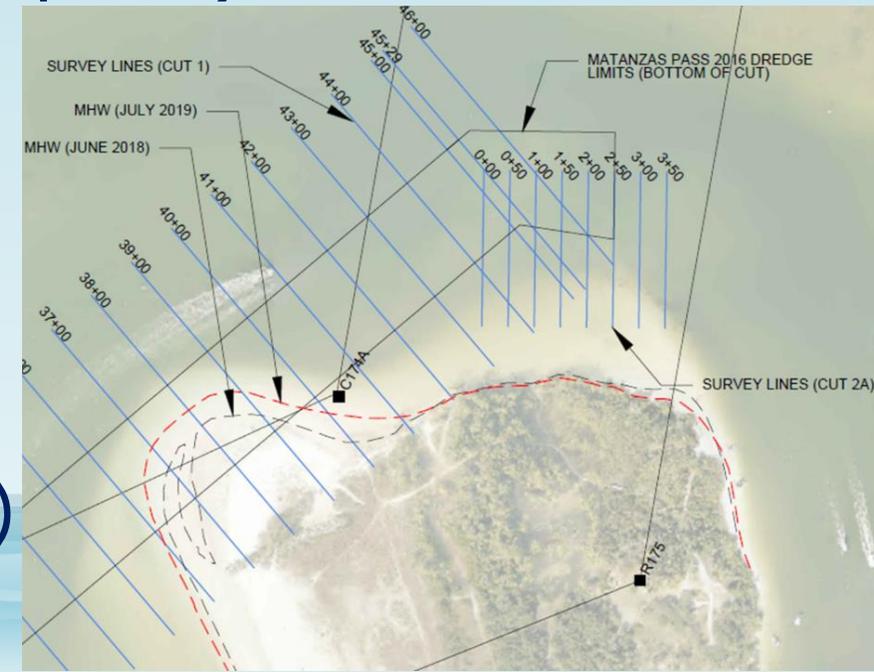


# BORROW AREA POST-CONSTRUCTION SURVEY (CPE, 2012)



# ADDITIONAL BEACH AND INLET MANAGEMENT ACTIVITIES

- 2016 USACE Maintenance Dredging and Beneficial Use Project
  - 130,000 CY placed ~ R-182 and R-187 (nearshore)
- 2017 Initial Dredging of Big Carlos Pass Navigation Channel
  - 55,000 CY placed ~ R-203 and R-206 (WCIND and Lee County)
- 2017 Post-Irma Truck Haul (County)
  - 2,100 CY placed on Crescent Beach ~ R-181 (upland)
- 2020 USACE Maintenance Dredging and Beneficial Use Project
  - 124,000 CY placed ~ R-182 and R-187 (nearshore)
- 2020 Post-Eta Truck Haul (County)
  - 4,000 CY placed on Lynn Hall ~ R-180 (upland)



# EXISTING CONDITIONS

- Town of Ft. Myers Beach Assumed Local Sponsor Role
- 2019: Hired CEC to Perform Due Diligence
  - Analyzed 2011 Project Performance (7+ Years)
  - Recommended Proceed with Next Renourishment Using Same Design Template, Borrow Area, etc.
  - Filed Funding Application
- 2020-21: Major Storm Impacts, Stakeholders (South) Engaged with Town, Town hired CEC and Expanded Project to Include all Designated Critically Eroding Shorelines

# 2012-2019 Mean High Water Shoreline Changes

MONUMENT (AZIMUTH)	POSITION (FT)		2012-2019 SHORELINE CHANGE RATE (FT/YR)	2012-2019 AVERAGE SHORELINE CHANGE RATE (FT/YR)	
	POST-CON JAN. 2012	MONITORING JUL. 2019			
R-175 (az=10)	352.8	350.6	-0.3	-0.3	North Adjacent Shoreline
C-174A (az=10)	N/A	-40.3	N/A		
C-174A (az=245)	N/A	405.0	N/A		
R-175 (az=248)*	759.7	774.1	1.9	-14.5	Project Area
R-176 (az=245)	673.0	526.0	-19.6		
R-177 (az=220)*	739.8	580.2	-21.3		
R-178 (az=227)*	656.2	560.0	-12.8		
R-179 (az=230)*	564.7	439.8	-16.6		
R-180 (az=210)*	332.1	163.8	-22.4		
C-180.5 (az=205)	323.9	153.1	-22.8		
R-181 (az=205)	331.9	162.0	-22.6		
R-182 (az=204)*	394.8	440.8	6.1		
R-183 (az=205)	449.6	510.1	8.1		
R-184 (az=205)	469.5	563.7	12.5	12.3	South Adjacent Shoreline
R-185 (az=200)*	229.1	383.4	20.6		
R-186 (az=205)	296.9	358.3	8.2		

\* 2012 line was shifted from adjacent azimuth

N/A = profile below MHW

# 2012-2019 Volume Changes

MON (AZIMUTH)	2012 to 2019				2012 to 2019 TOTAL VOLUME CHANGE (CY)	2012 to 2019 ANNUALIZED VOLUME CHANGE RATE (CY/YR)	2012 to 2019 TOTAL ANNUALIZED VOLUME CHANGE RATE (CY/YR)	
	CELL AREA (CY)	AVE CELL AREA (CY/FT)	LENGTH (FT)	VOLUME (CY)				
C-174 (az=245)	0.0				2,142		286	North Adjacent Shoreline
		4.0	531	2,142		286		
R-175 (az=248)*	8.1	-7.9	817	-6,441	-148,153	-859	-19,750	Project Area
R-176 (az=245)	-23.8	-27.5	1,160	-31,856		-4,247		
R-177 (az=220)*	-31.1	-19.8	1,033	-20,456		-2,727		
R-178 (az=227)*	-8.5	-14.3	790	-11,320		-1,509		
R-179 (az=230)*	-20.1	-30.0	1,244	-37,295		-4,972		
R-180 (az=210)*	-39.8	-39.6	500	-19,789		-2,638		
C-180.5 (az=205)	-39.4	-36.5	508	-18,545		-2,472		
R-181 (az=205)	-33.6	-2.4	1,005	-2,449		-327		
R-182 (az=204)*	28.7							
R-183 (az=205)	34.2	31.4	856	26,921		3,589		
R-184 (az=205)	19.6	26.9	1,070	28,770		3,835		
R-185 (az=200)	40.6	30.1	980	29,491		3,931		
R-186 (az=205)	8.3	24.4	948	23,147	3,086			
				108,329			14,441	South Adjacent Shoreline

\* 2012 line was shifted from adjacent azimuth

# 2021 AERIAL

Google Earth

Image © 2021 TerraMetrics

1 mi



# BEACH FILL DESIGN

- Beach Fill Segments
  - North: C-174.5 (Terminal Groin) to R-182
  - Central: R-182 to R-200
  - Non-Critical Erosion Segment: R-200 to R-203
  - South: R-203 to R-207
  - Non-Critical Erosion Segment: R-207 to R-210
- 25-Year Design Storm Event
- Shoreline Change Analysis
  - Background Erosion
  - Equilibrium Profile Adjustment
- SBEACH Model Study

# BEACH FILL DESIGN: SHORELINE CHANGE ANALYSIS

Monument	Segment	Fill Placed Mar 2010- Jan 2012 (feet)	MHW Change Rate (Equilibration) Jan 2012-Apr 2013 (feet per year)	MHW Change Rate ** Background Erosion (feet per year)	MHW Change Rate *** Background Erosion (feet per year)	Average Fill Placed Mar 2010- Jan 2012 (feet)	Avg Change Rate (Equilibration) Jan 2012-Apr 2013 (feet per year)	Avg Change Rate Background Erosion (feet per year)
R-175 (248)*	North	320.1	6.0	-0.5	Terminal Groin Influence	232.7	-61.1	-9.8
R-176 (245)		325.2	-65.6	-6.6				
R-177 (220)*		284.0	-74.1	-11.5				
R-178 (227)*		184.0	-35.6	-10.4				
R-179 (230)*		211.0	-38.3	-10.8				
R-180 (210)*		214.8	-59.3	-13.1				
C-180.5 (205)		191.1	-66.1	-11.5				
R-181 (205)	Central	218.8	-88.8	-4.9				7.8
R-182 (204)*					7.6			
R-183 (205)					12.2			
R-184 (205)					11.7			
R-185 (200)*					16.3			
R-186 (205)					16.6			
R-187					5.2			
R-188					6.9			
R-189					5.0			
R-190					3.8			
R-191					3.7			
R-192					6.1			
R-193					4.4			
R-194					4.2			
R-195				7.1				
R-196				9.8				
R-197				7.1				
R-198				5.5				
R-199	South of ECL				5.2			
R-200					2.2			
R-201	Non-Critical				-1.1			
R-202					-6.4			
R-203	South				-8.2			-10.7
R-204					-12.6			
R-205					2.1			
R-206					-18.1			
R-207					-16.9			
R-208	Non-Critical				-7.0			
R-209					19.5			
R-210					62.0			

\* 2012 line was shifted from adjacent azimuth

\*\* Apr 2013-May 2021

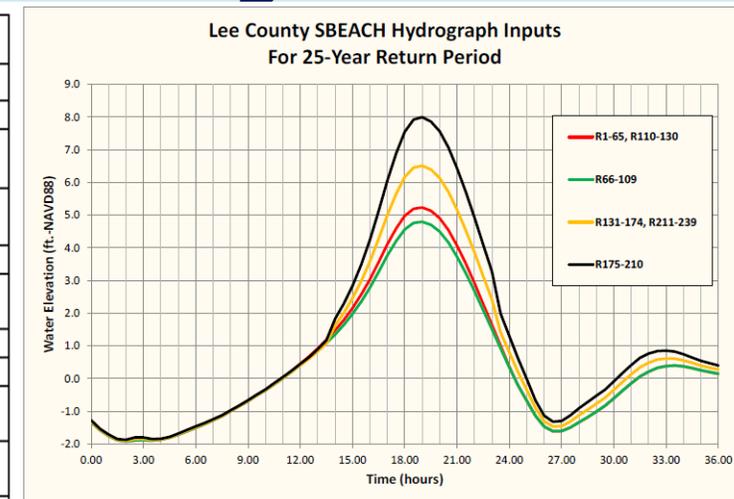
\*\*\* Mar 2010-May 2021

N/A = profile below MHW

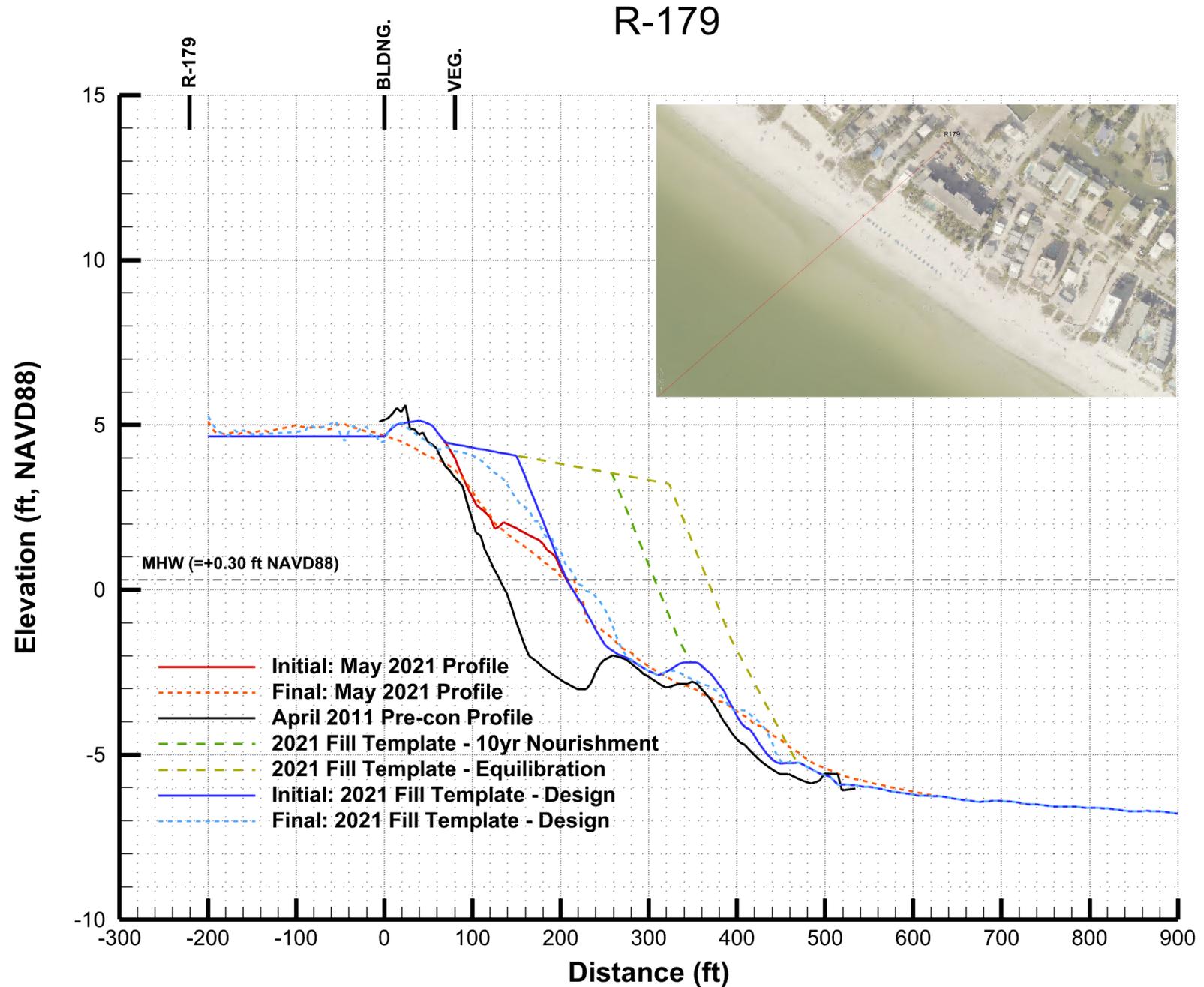
# SBEACH MODEL STUDY

- Lee County Storm Tide Frequency Restudy (Wang, 2012)
- Lee County SBEACH Model Study (Wang&Manausa, 2015)
- Ran 2021 Monitoring Profiles to Identify Shoreline Reaches with Structures Susceptible to 25-Year Storm
- Developed Fill Templates to Yield Storm Damage Reduction Benefits

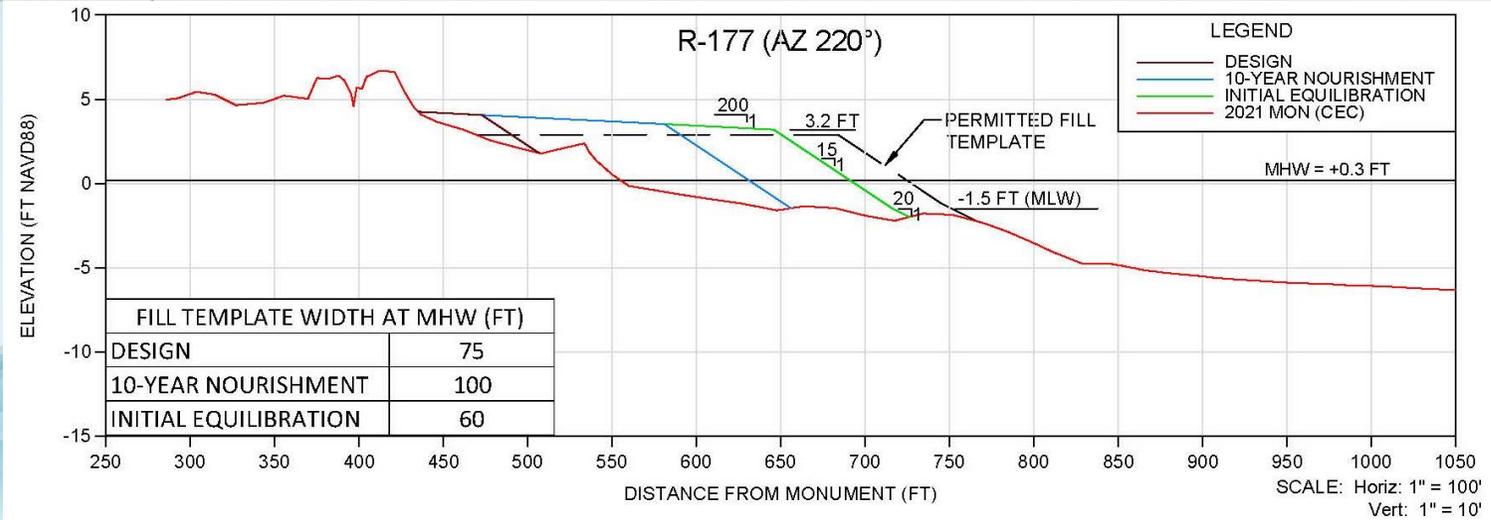
Range Segments	R1 - R130	R131 - R174, R211 - R239	R175 - R210
Transport Rate Coefficient, $K$	$0.5 e^{-006}$	$0.5 e^{-006}$	$0.5 e^{-006}$
Overwash Transport Parameter	0.002	0.002	0.002
Coefficient for Slope Dependent Term, $\epsilon$	0.005	0.005	0.005
Transport Rate Decay Coeff. Multiplier, $\lambda$	0.5	0.5	0.5
Landward Surf Zone Depth (ft.)	1.0	1.0	1.0
Maximum Slope Prior to Avalanching	15	15	15
Constant Wave Height (ft.)	10	10	10
Constant Wave Period (sec.)	10	10	10
Adjusted 15-year Hydrograph Peak Elevation (ft.)	6.5	7.3	8.2
Adjusted 25-year Hydrograph Peak Elevation (ft.)	7.7	8.7	9.7



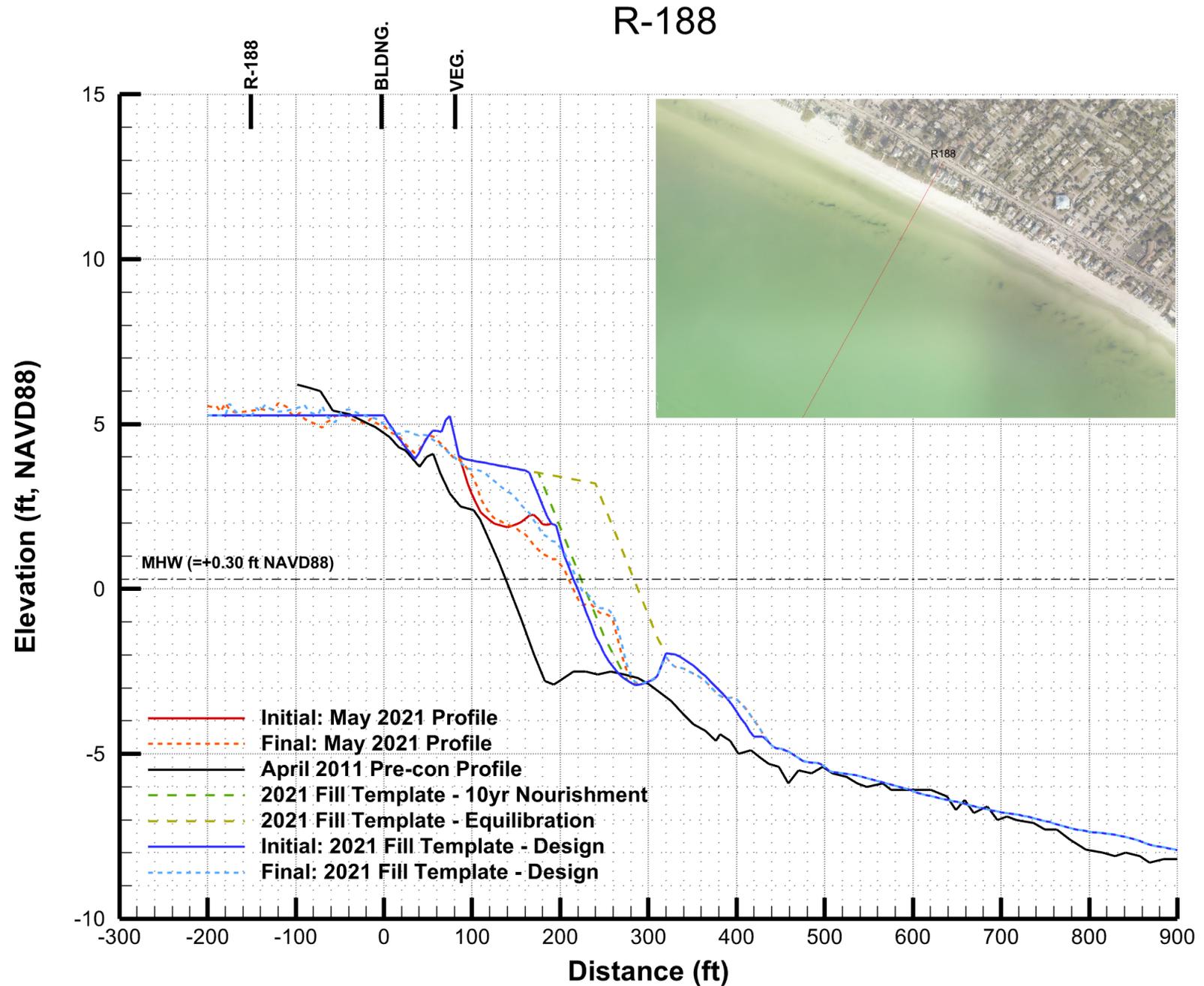
# MODEL RESULTS: NORTH



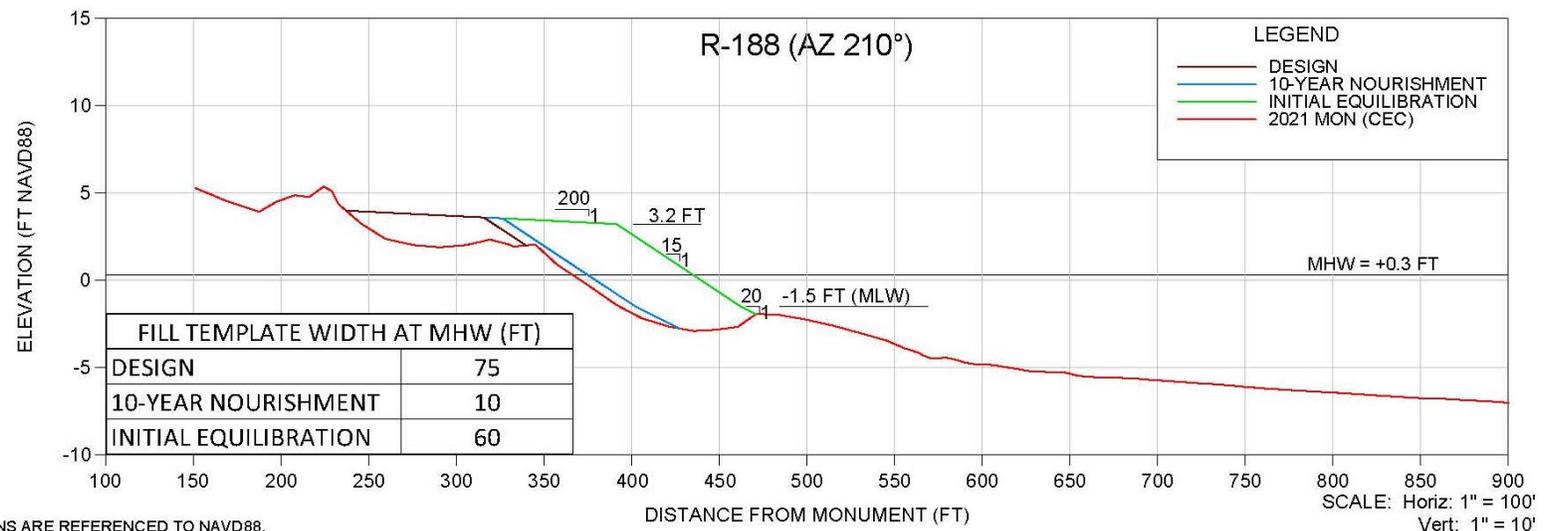
# DESIGN PLAN: NORTH



# MODEL RESULTS: CENTRAL



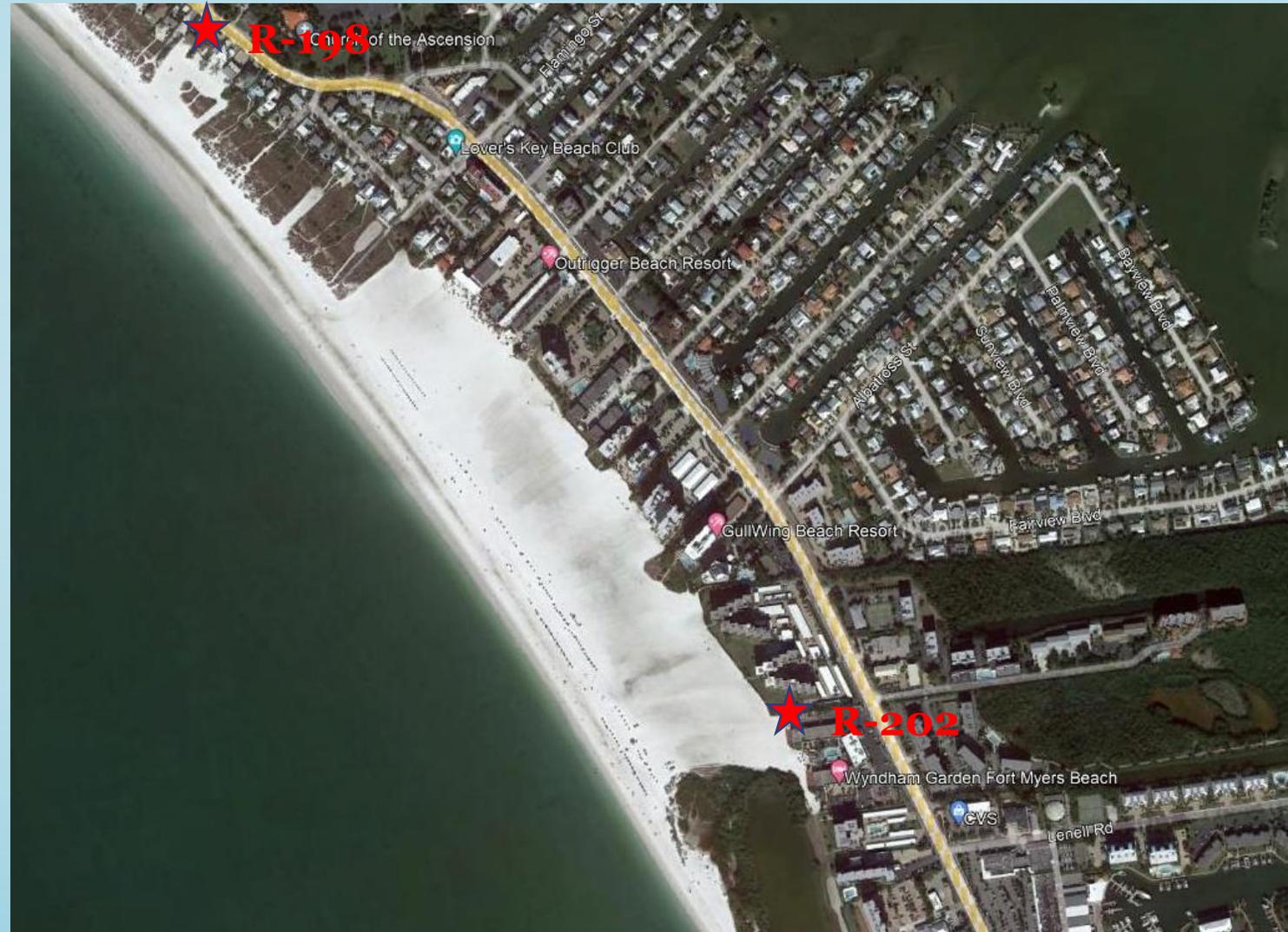
# DESIGN PLAN: CENTRAL



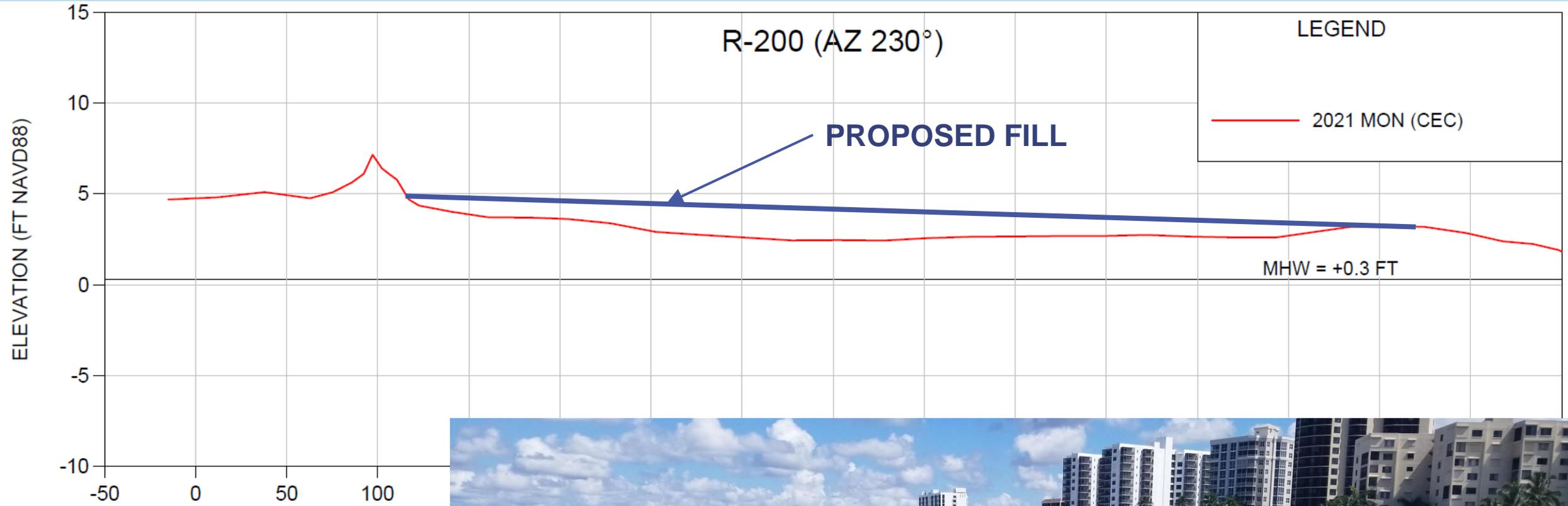
NOTES:  
1. ELEVATIONS ARE REFERENCED TO NAVD88.  
2. PROFILE DATA IS FROM SURVEYS BY CEC.

# DESIGN PLAN: R-198 TO R-202

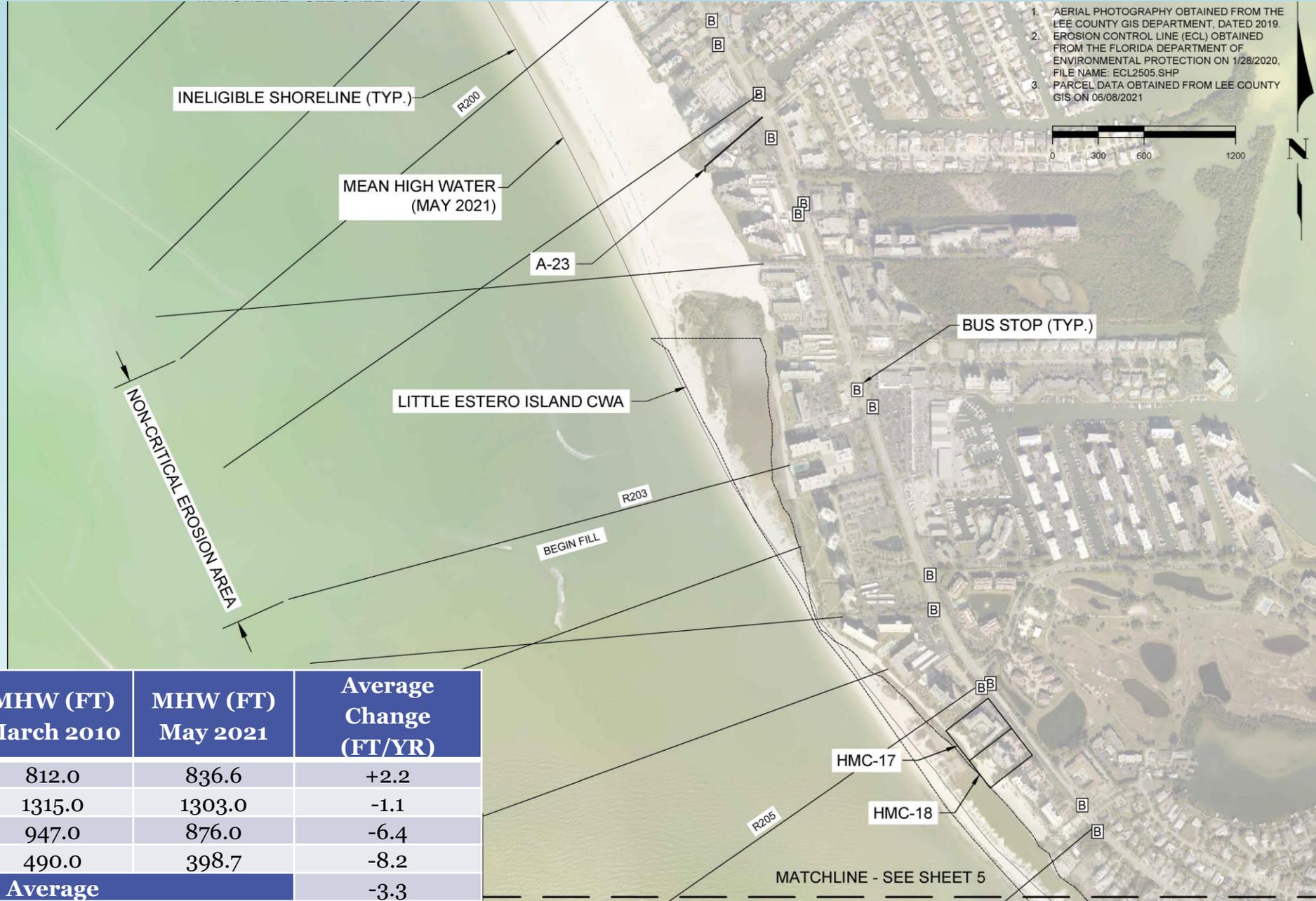
- ECL Ends ~ R-198
- Little Estero Island CWA Begins ~ R-202
- Upland Development set back from Gulf Shoreline; Wide Open Sandy Beach Area
- Address Ponding Issues: Import Fill & Maintenance Grading



# TYPICAL DESIGN SECTION



# NON-CRITICALLY ERODING SEGMENT: R-200 TO R-203

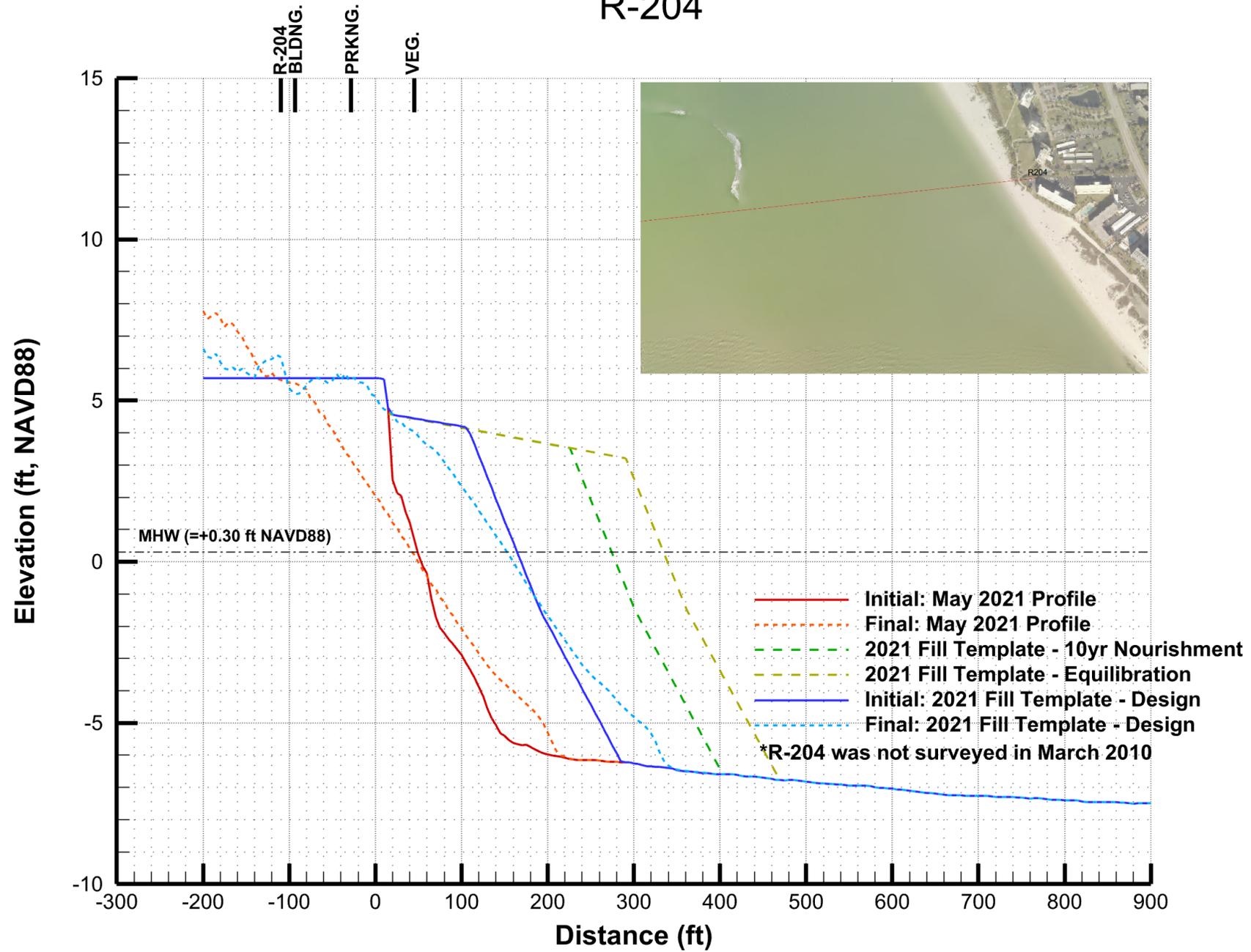


Monument	MHW (FT) March 2010	MHW (FT) May 2021	Average Change (FT/YR)
R-200	812.0	836.6	+2.2
R-201	1315.0	1303.0	-1.1
R-202	947.0	876.0	-6.4
R-203	490.0	398.7	-8.2
<b>Average</b>			<b>-3.3</b>

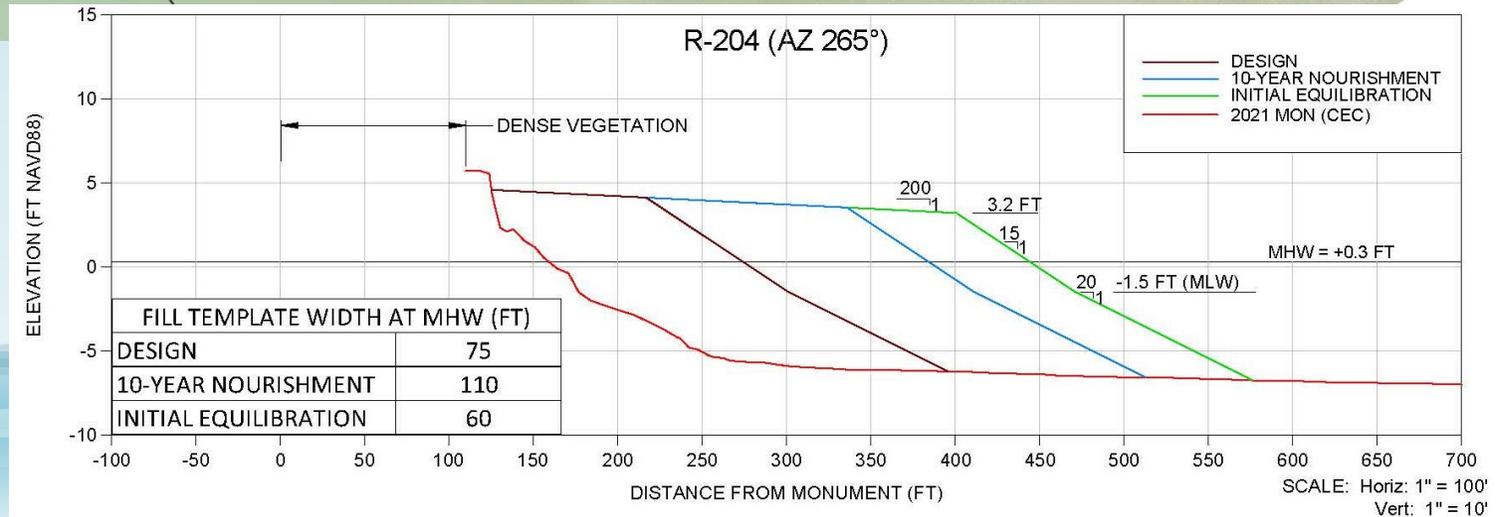
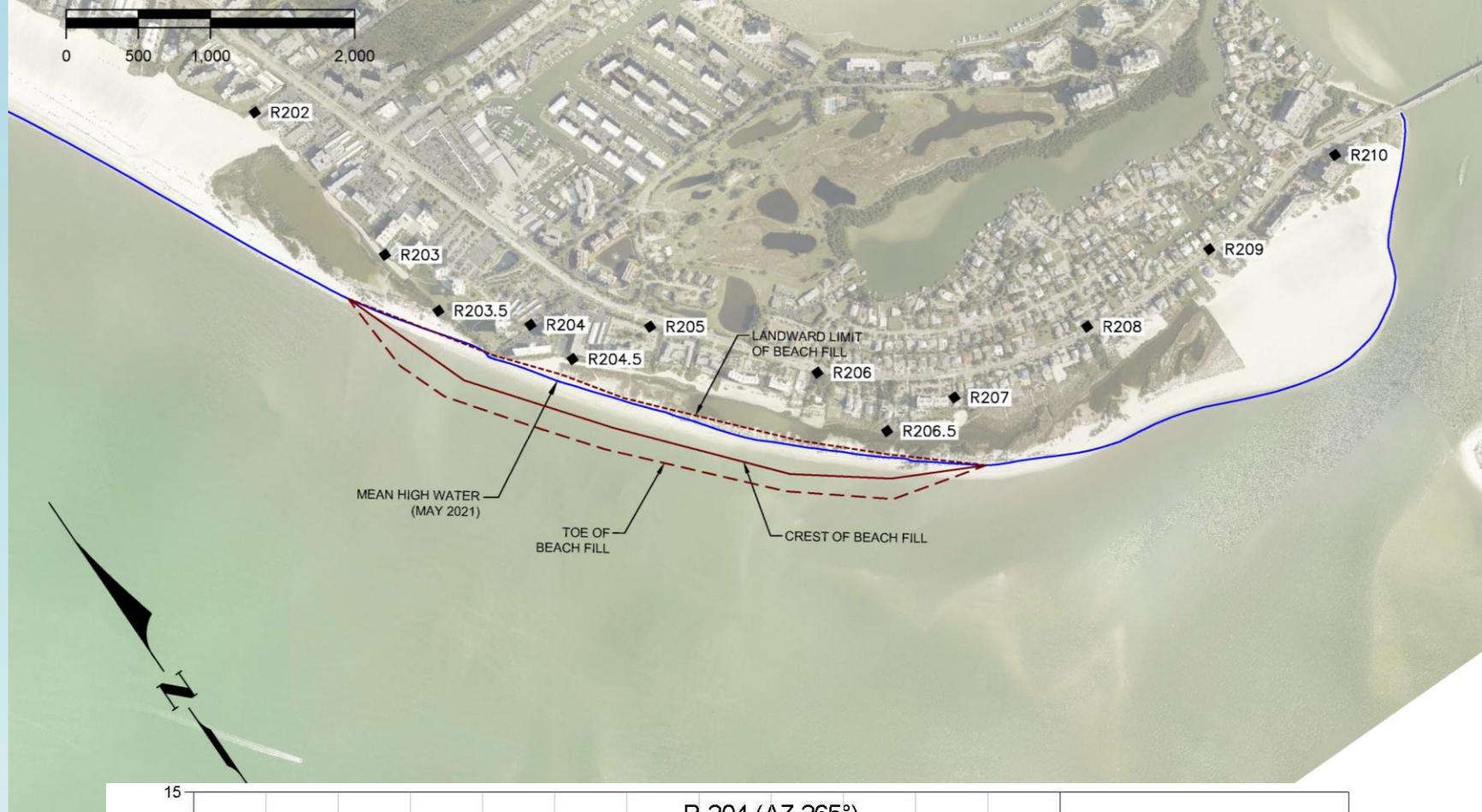


# MODEL RESULTS: SOUTH VERSION 2

R-204



# DESIGN PLAN: SOUTH



# NON-CRITICALLY ERODING SEGMENT: R-207 TO R-210

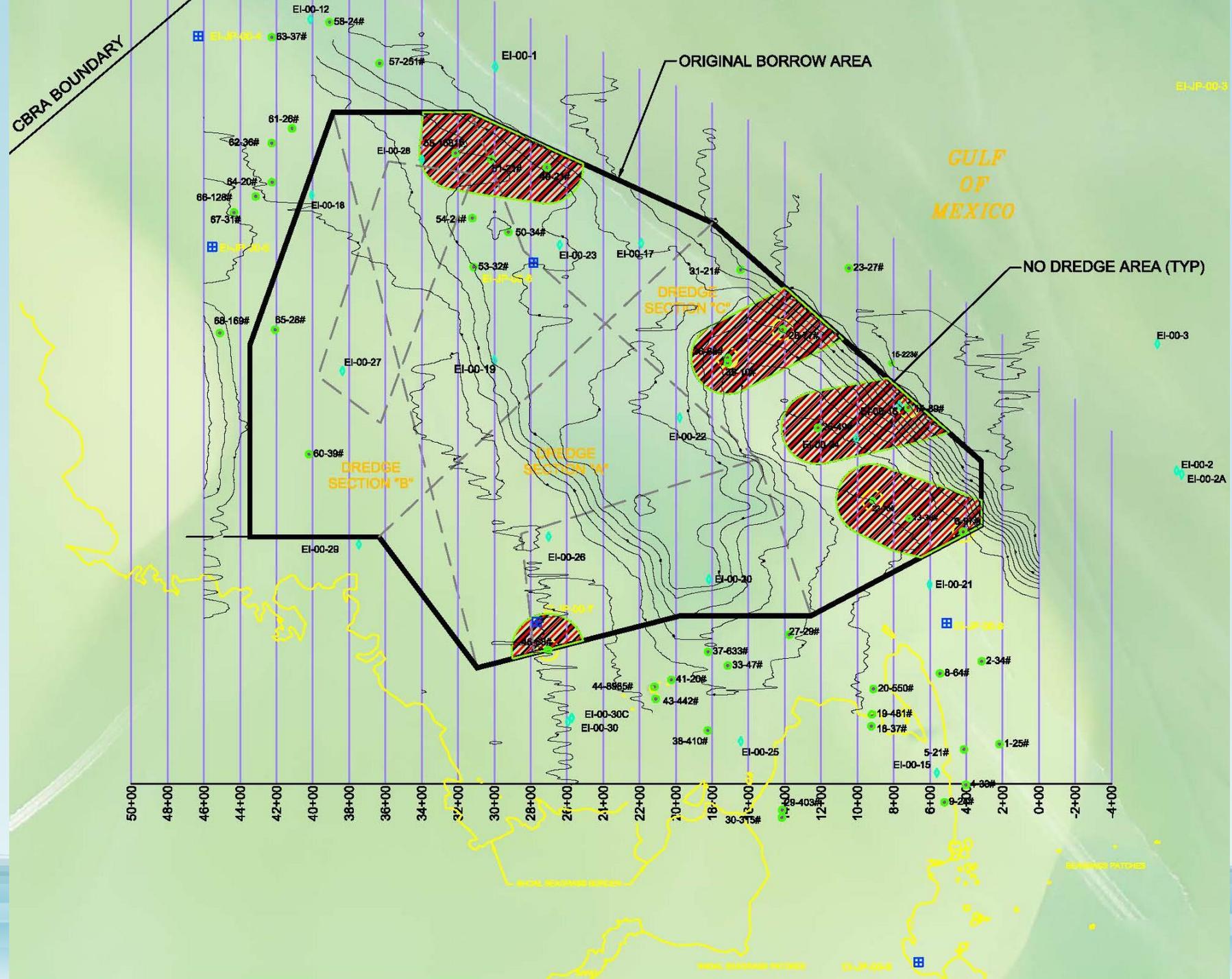
Mar 2010-May 2021

R-205	South	2.1
R-206		-18.1
R-207		-16.9
R-208	Non-Critical	-7.0
R-209		19.5
R-210		62.0

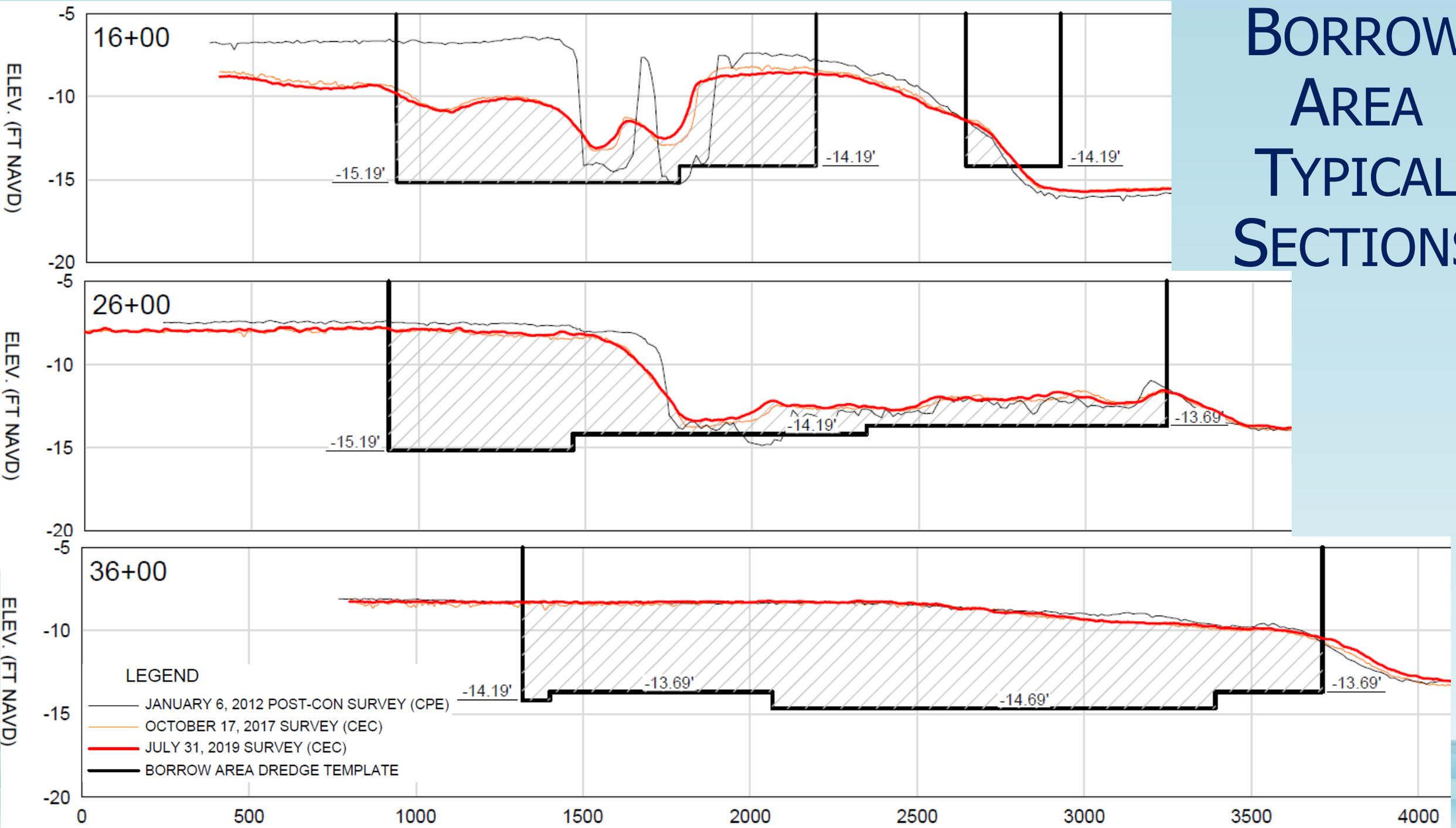


# BORROW AREA DESIGN

- 2001-2003 G&G Investigations
- 2019 Condition Survey
  - 1 MCY Available



# BORROW AREA TYPICAL SECTIONS

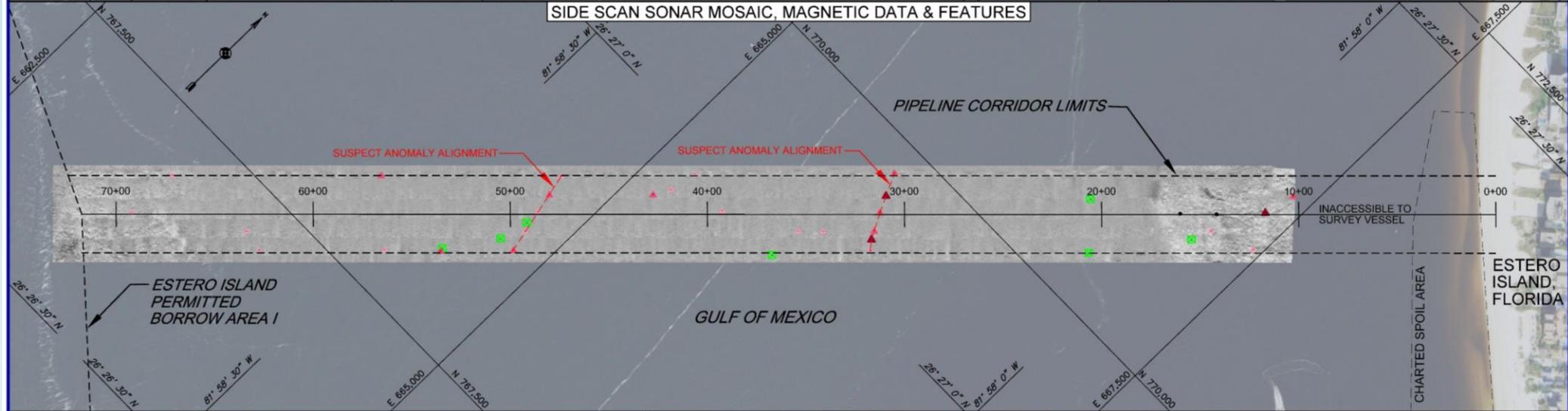
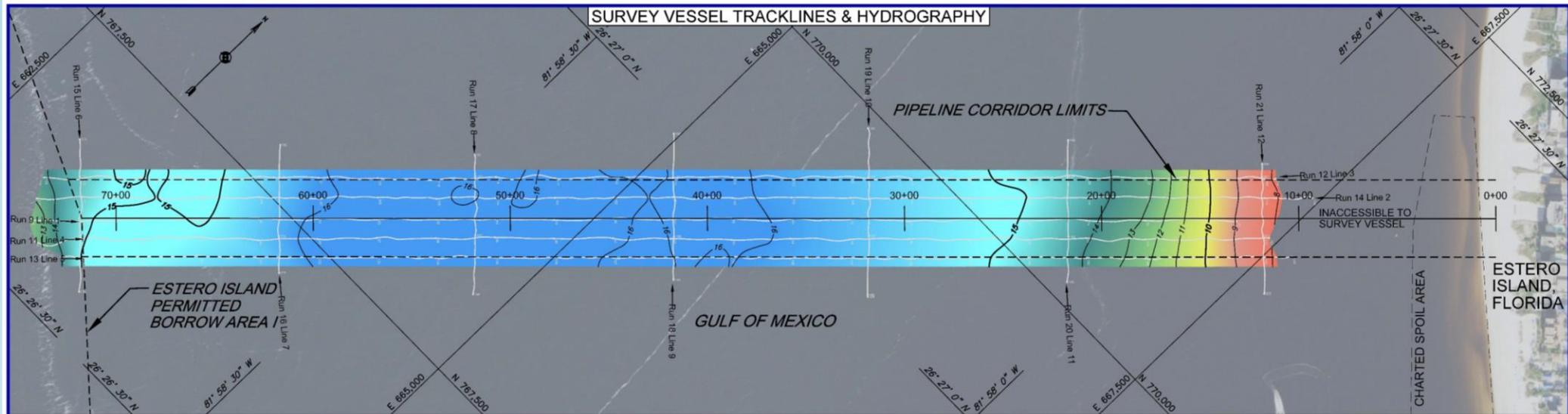


# PIPELINE CORRIDOR DESIGN

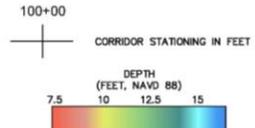
- Detailed Geophysical and Cultural Resource Investigation
- 2021 Survey
  - Primary – North Segment @ R-178
  - Secondary – South Segment @ R-204



# PIPELINE CORRIDOR DESIGN



- LEGEND**
- SURVEY VESSEL TRACKLINE WITH EVENT NUMBERS
  - MAJOR DEPTH CONTOUR
  - MINOR DEPTH CONTOUR
  - SIDE SCAN SONAR TARGET
  - POSSIBLE ISOLATED BURIED FEATURE
- MAGNETIC ANOMALY CLASSIFICATION:**
- CLASS 1:  $\leq 25$  GAMMAS
  - CLASS 2:  $> 25-100$  GAMMAS
  - CLASS 3:  $> 100$  GAMMAS



- NOTES**
1. GRID LINES ARE IN U.S. SURVEY FEET AND REFERENCE THE FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE 0902, NAD83. GRID TICS REFERENCE THE GEOGRAPHIC COORDINATE SYSTEM, NAD83.
  2. DEPTHS ARE IN FEET AND ARE REFERENCED TO NAVD 88 BASED ON FFMN RTK GNSS CORRECTORS. PROJECT CONTROL BENCHMARK WAS "ESTERO 101" (PD BREVES) WHICH HAS AN ELEVATION OF 4.73 FEET NAVD 88 PER AN OPUS SHARED SOLUTION FROM 2015-05-01.
  3. CONTOURS ARE IN FEET AND WERE GENERATED USING QUICKSURF. CONTOUR INTERVAL IS ONE FOOT.
  4. INTERPRETATIONS ARE BASED ON THE ANALYSIS OF MULTI-SENSOR GEOPHYSICAL DATA. ADDITIONAL INFORMATION REGARDING THE DATA PRESENTED CAN BE FOUND IN OSI TECHNICAL MEMO NO. 21E5023.
  5. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHO TO QUADRANGLES FLOWN IN 2017 AND OBTAINED FROM THE NOAA DATA ACCESS WEBER.
  6. CHARTED FEATURES ARE APPROXIMATE AND WERE TAKEN FROM NOAA ENC CHART 15474LES - PINE ISLAND SOUND TO SAN CARLOS BAY (DATED 12 AUGUST 2021).
  7. THE INFORMATION PRESENTED ON THIS DRAWING REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 15 JULY 2021 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.
- SCALE: 1"=500'
- 

**OCEAN SURVEYS, INC.**

**R-178 Pipeline Corridor Survey**  
 Geophysical/Cultural Resource Survey to Support Fort Myers Beach  
 Estero Island Beach Renourishment Project  
 Gulf of Mexico

[www.oceansurveys.com](http://www.oceansurveys.com)

# SUMMARY

- JCP Application in Development (~ Nov 2021 Submittal)
- 10-Year Permit
  - Initial Event ~ Up to 930,000 CY
  - Hot Spot Maint / Post-Storm Recovery ~ Upland Quarries
  - Maintenance Grading (Ponding Areas)
- Original Borrow Area
  - 1 MCY Available
  - Rerunning Geophysical & Archy Review to Clear Anomalies

# SUMMARY

- Two Pipeline Corridors
  - Primary Route – Completed
  - Secondary Route – To Be Surveyed Prior to Construction
- Two Sections Designated Non-Critical
  - R-200 to R-203 – Request Redesignation to Critical
    - ✓ If Successful ~ Redesign South Segment to extend to R-202
  - R-207 to R-210 – To Be Determined