Coastal Management at Stumphole: "Everything, and Then Some!" (Everything but the Kitchen Sink!)

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OUTLINE

- Project Background
- Erosion Rates and Conditions
- FDOT Design of 1997 Revetment
- Options
- County Design of 2009 Revetment
- Funding and Phasing
- Construction
- Project Performance
- Future Projects

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LOCATION MAP

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GULF COUNTY STATISTICS

- Florida's 59 out of 67 Most Populous County
- 0.1% of Florida’s Population (16,160 as of 2017)
- 1.19% of Florida’s Tax Base
- “Rural Area of Opportunity” per Florida DEO (formerly known as “Rural Area of Critical Economic Concern”)

Hence, the County does a lot with a little.

http://edr.state.fl.us/content/area-profiles/county/gulf.pdf

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PROJECT BACKGROUND

- SR-30E (Cape San Blas Road) is the only vehicular access and hurricane evacuation route for St. Joseph Peninsula.
- FDOT design "Stumphole" revetment was initially constructed after 1997 in response to Hurricane Opal.
- County re-designed revetment reconstructed between 2009 and 2018.
- "Toll" the long-term erosion and provide a greater level of storm protection to SR-30E.

FDOT

Dewberry

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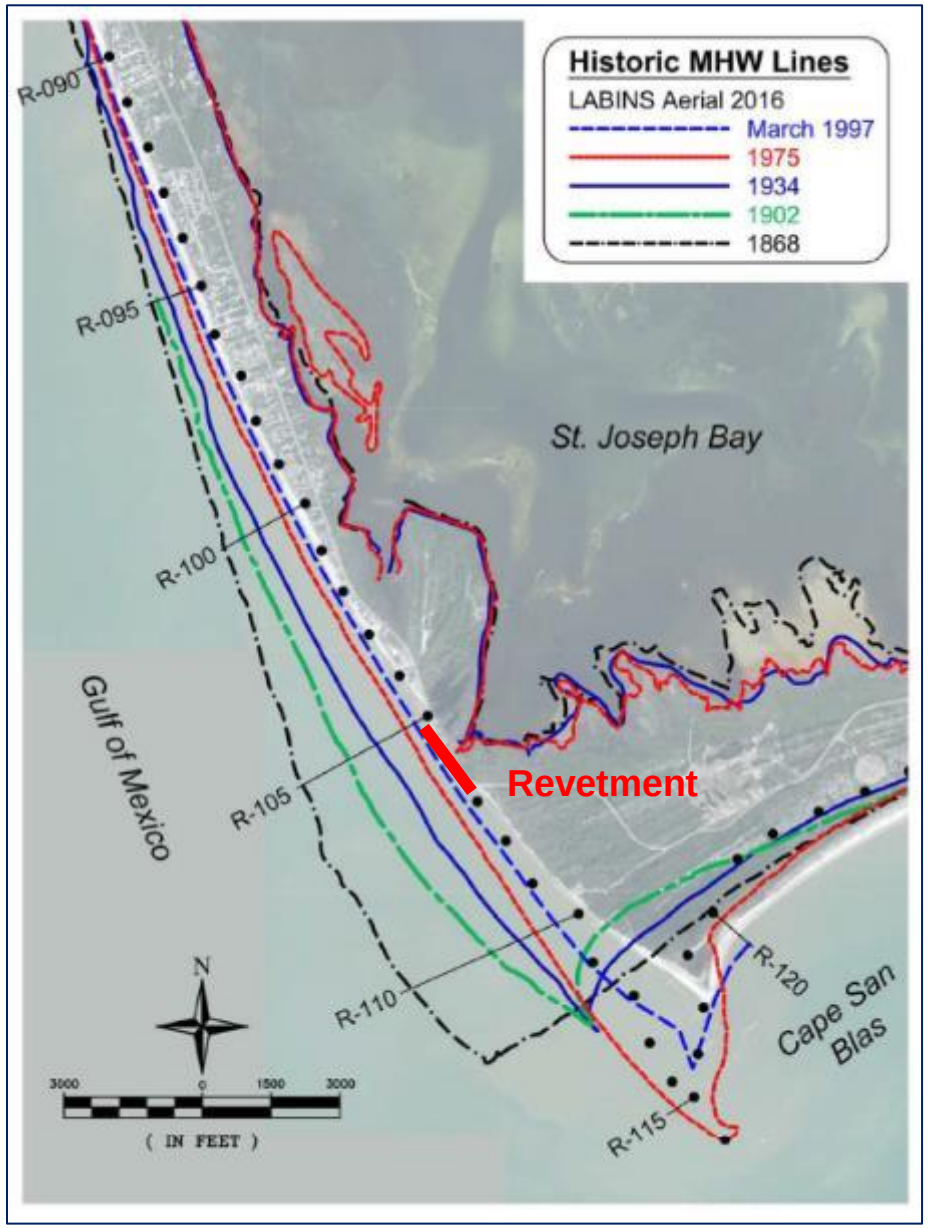
HISTORIC EROSION RATES



- Between 1868 and 1975, the Stumphole shoreline eroded 2,600 feet over 107 years – an average rate of -**24.3 ft/yr**.

- Between 2009 and 2014, north of the revetment V-105.5 an average rate of -**24.3 ft/yr** and **-25.8 ft/yr** to the south at R-107.

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1994 CONDITIONS

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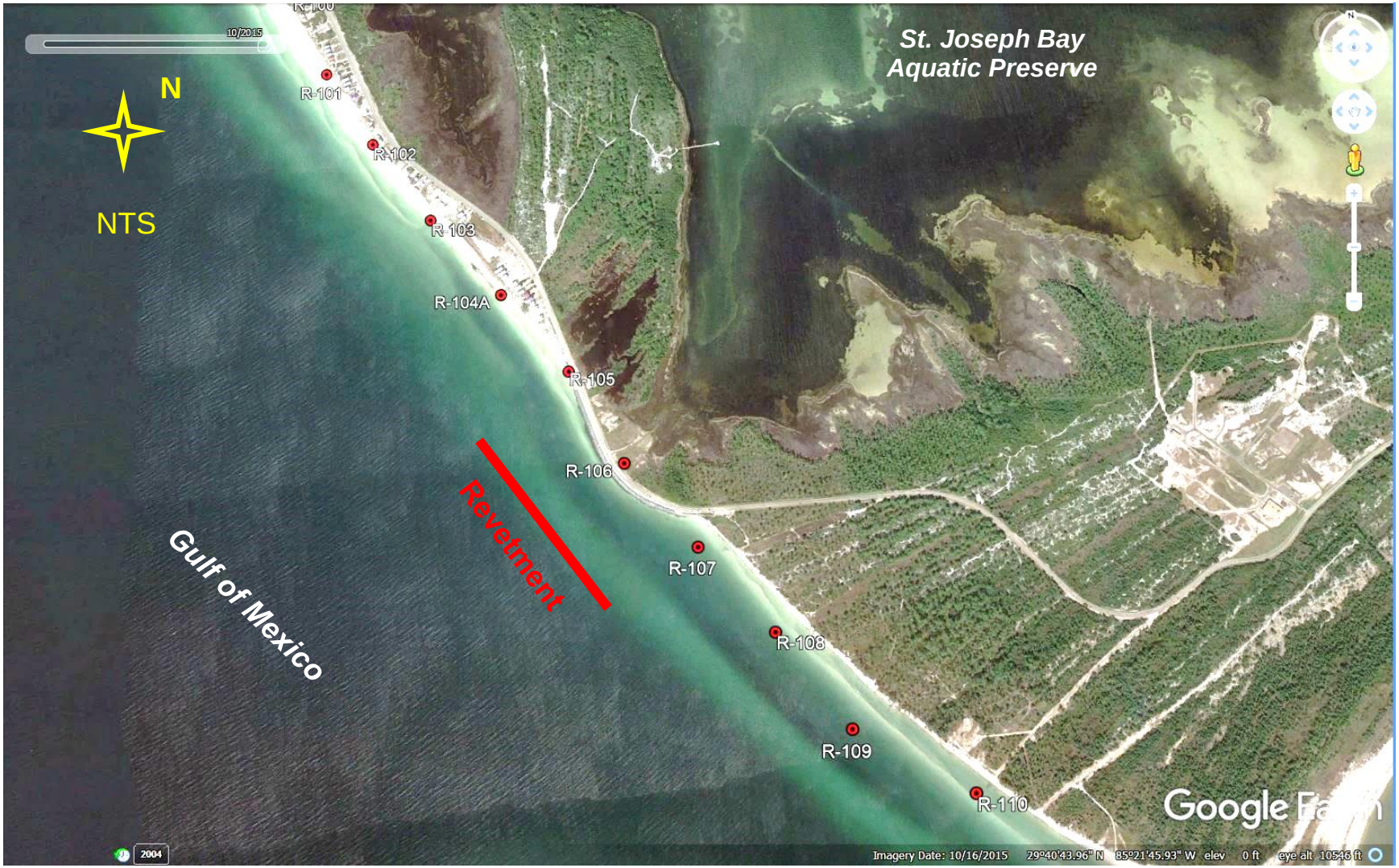
2015 CONDITIONS



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2018 CONDITIONS

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STORM IMPACTS

- Crest Height = 8’ to 14’ NAVD
- Road @ 6’ NAVD
- Height is Inconsistent
- Continual Maintenance
- Frequent Storm Events
- Low Level of Storm Protection
- Erosion Rate

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FDOT DESIGN

Hudson's Equation:

$$H = \left(\frac{W_{50} K_d (SG-1) \cot\propto}{\rho_a}\right)^{1/3}$$

Armor Stone =

1.5'Ø (0.3 tons)

ρ_a = 165 lb/ft^3

0% to 5% Damage

Storm Surge = 3' NAVD88

Wave Height = 3' to 4'

10-year Storm Event (Dean and Chiu, 1985)

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OPTIONS

1) No Action
2) Pile-supported road in existing footprint.
3) RETREAT! Relocate the road further inland and construct a bridge.
4) **Re-design and construct the revetment to protect again a greater storm event.**
5) **Beach restoration and renourishment.**

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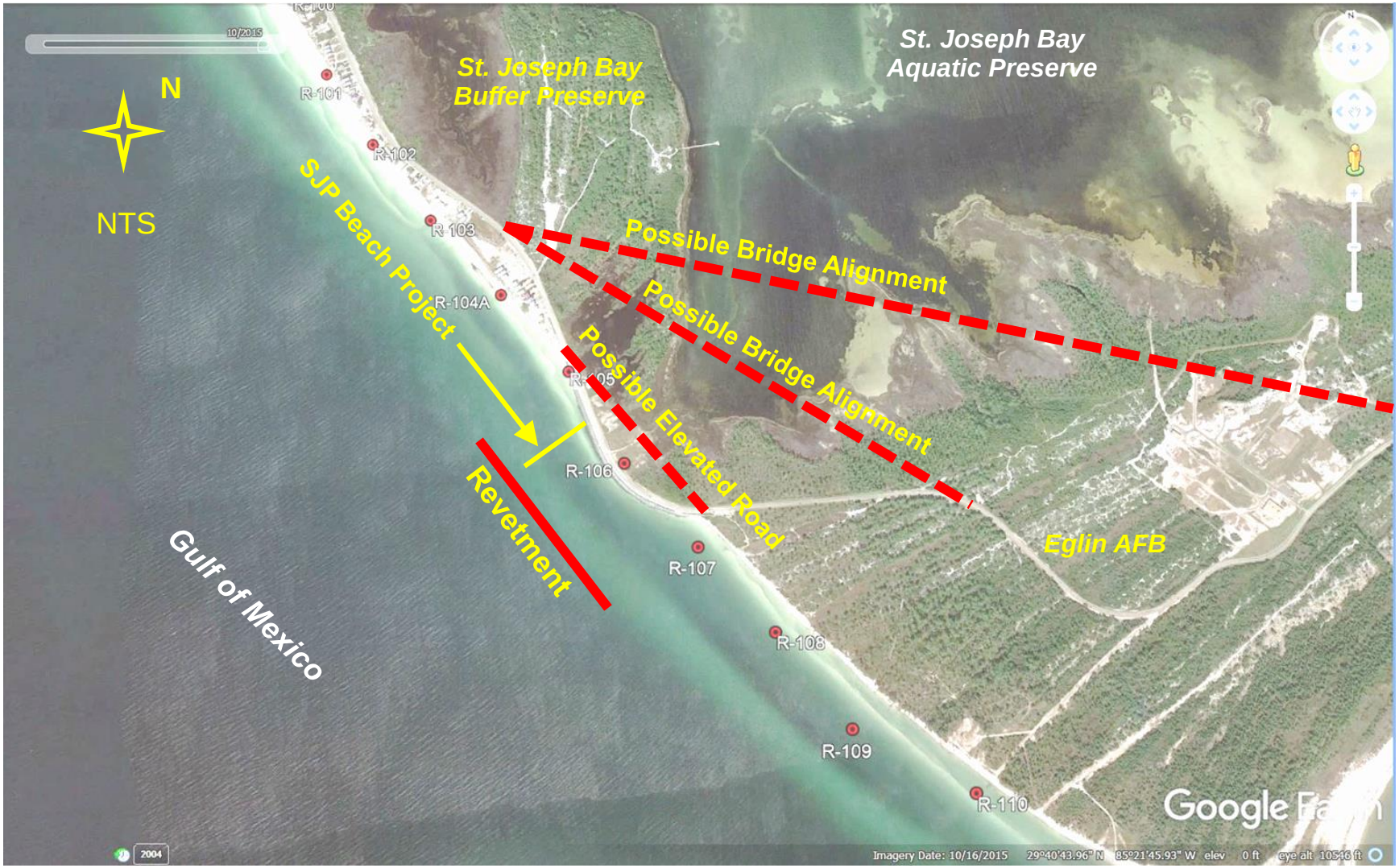
OPTIONS



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COUNTY PROJECT DESIGN - 2009

161.085, F.S. Rigid coastal armoring structures….*public infrastructure is vulnerable to damage from frequent coastal storms…..“public infrastructure” means, for purposes of this section, public evacuation routes …..*

62B-33.0051(2)(b).3.FAC “….. *not to exceed a 50-year design storm.*”

Hudson’s Equation:

$$W = \frac{\gamma_r H^3}{K_D \Delta^3 \cot\theta}$$

Table 2.2. Combined total storm tide level near Cape San Blas, Florida.

Return Period (years)	Combined Total Storm Tide Level above NAVD, 1988 (feet)
100	10.6
50	8.8
20	5.7
10	2.9

0% to 5% Damage

Storm Surge = 8.8’ NAVD88

Wave Height = 8‘

Maximum wave run-up = greater than 17’ NAVD88

Armor Stone = 2.25 tons to 3.75 tons, 50% 3.0 tons or greater.

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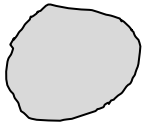
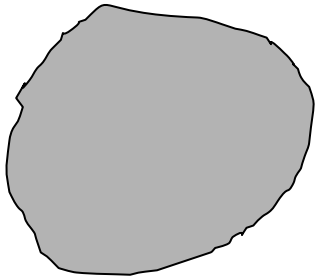
ARMOR STONE COMPARISION

FDOT Design (1.5’ø)

County Design (3.5’ø)





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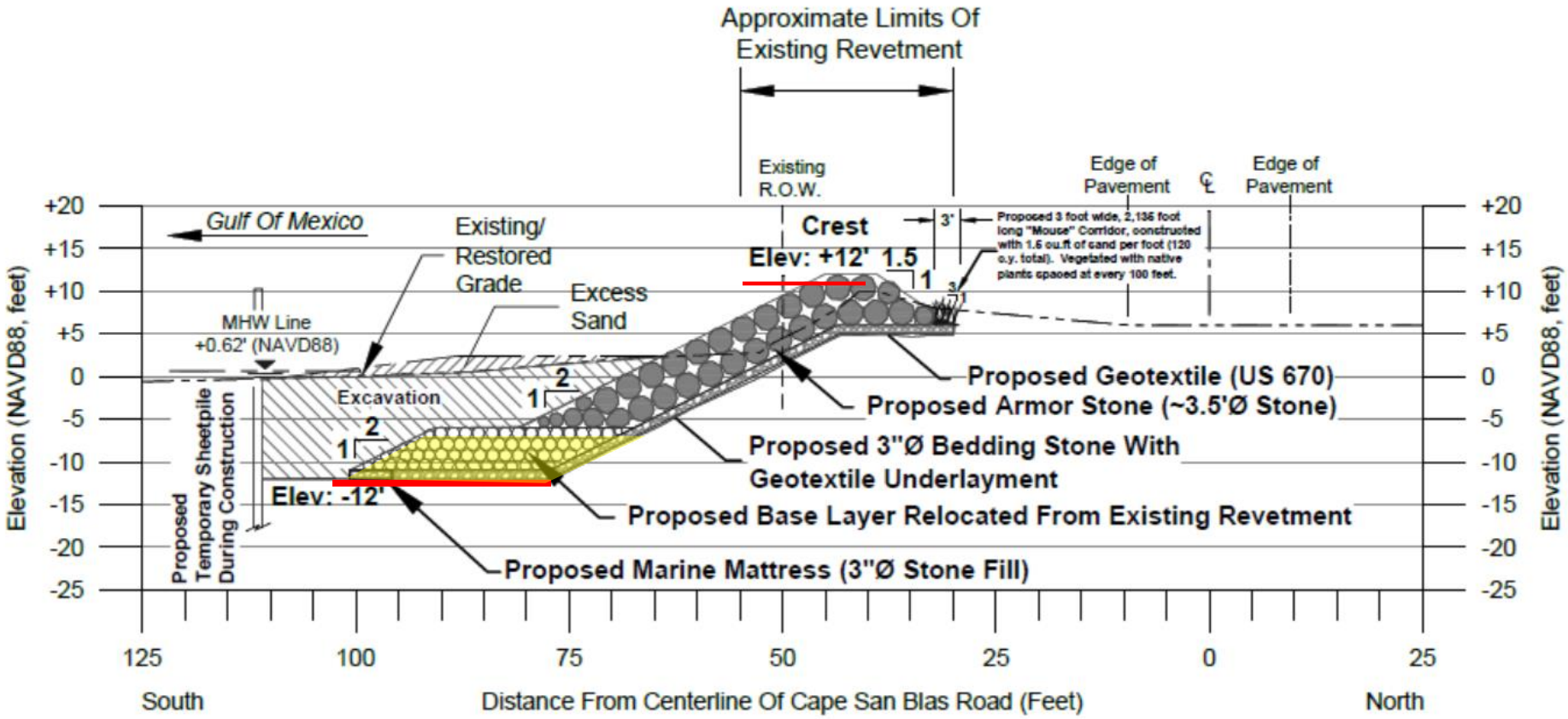
COUNTY PROJECT DESIGN - 2009

Armor Stone = 2.25<3.0<3.75 tons
Armor Diameter = 3.3’
Crest Height = +12.0’ NAVD88
Crest Width = ~6.6’ (min.2 stones)



COUNTY PROJECT DESIGN - 2009

Armor Stone = 40,385 tons

Toe Protection Stone = 15,785 tons

Bedding Stone = 10,455 tons

Marine Mattress Stone = 738 tons

Marine Mattress = 8,692 ft^2

Geotextile (US-670) = 295,200 ft^2 (6.8 Acres)

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FUNDING

The construction of the project was completed in phases, based on the availability of grant funding.

- **FDOT TRIP -** Transportation Regional Incentive Program
- **FEMA HMGP -** Hazard Mitigation Grant Program
- **HUD DDR -** Community Development Block Grant Declared Disaster Recovery
- **Florida DEO DRI -** Disaster Recovery Initiative
- **HUD DREF -** Community Development Block Grant Disaster Recovery Enhancement Fund

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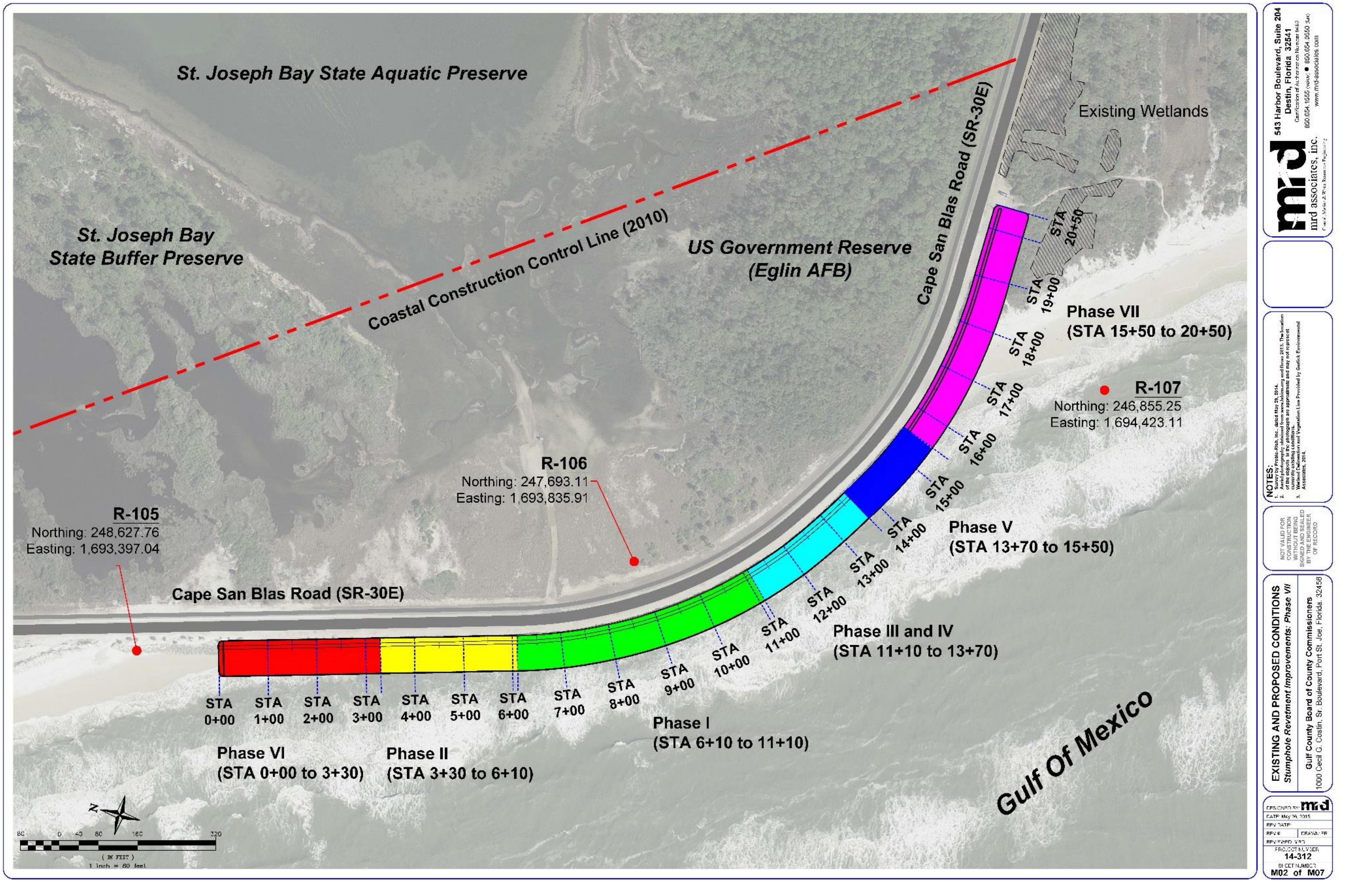
PHASE SECTIONS



PHASE FACTS

PHASE	LINEAR FEET	FUNDING SOURCES	TOTAL COST	COMPLETED
Phase I	500	FDOT-TRIP	$2,188,646	Aug-09
Phase II	280	FL DEO-DRI	$1,128,207	Jul-11
Phase III	160	FEMA-HMGP, FDOT-TRIP, HUD-DDR	$832,904	Jul-11
Phase IV	100	FL DEO-DRI	$372,380	Nov-12
Phase V	180	HUD-DREF	$710,612	Nov-12
Phase VI	330	FDOT-TRIP	1,473,000	Oct-14
Phase VII	500	FEMA-HMGP, FDOT-TRIP	$1,626,930	Oct-18
TOTALS	**2,050**		**$8,332,679**	**$4,065/ft**

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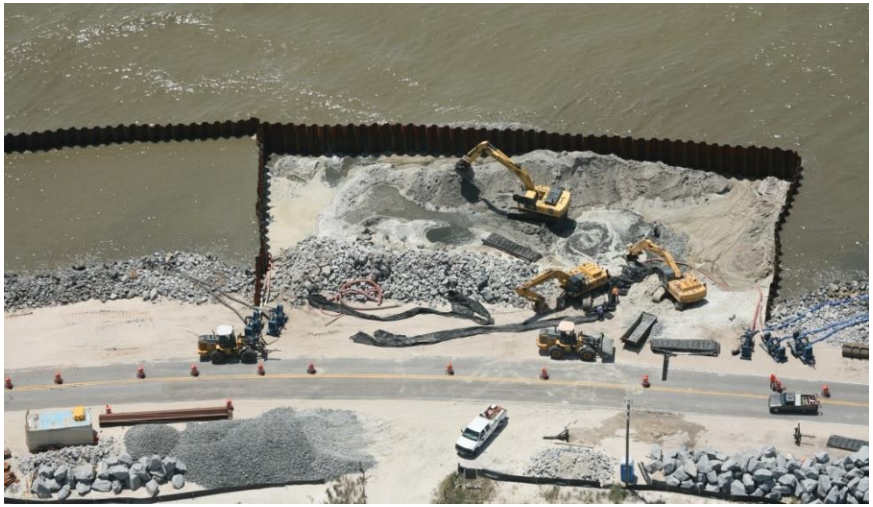
CONSTRUCTION



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PROJECT PERFORMANCE

- Hurricane Michael (10/10/18)
- 11:25 a.m. Eastern
- 2 p.m. Landfall
- USGS +7.8’ to +10.9’ NAVD
- <50-year Storm Event
- Provided Substantial Protection

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PROJECT PERFORMANCE

- Toe Undamaged
- Minor Damage <5% Face
- Minor Road Damage
- 50’ Crest Damage
- Flanking at Ends where the Road Sustained Damage

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FUTURE PROJECTS

North of Revetment

- Beach renourishment – 2019
- Coastal structures – 2021
- Revetment repairs - FEMA

South of Revetment

- County, FDOT and Eglin AFB

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THANK YOU!

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FDOT

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THANK YOU!

FDOT

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