Florida's Resilience Action Plan and Practices for Transportation Infrastructure

A Focus on Bridges and Structures

Will Potter


SAFETY

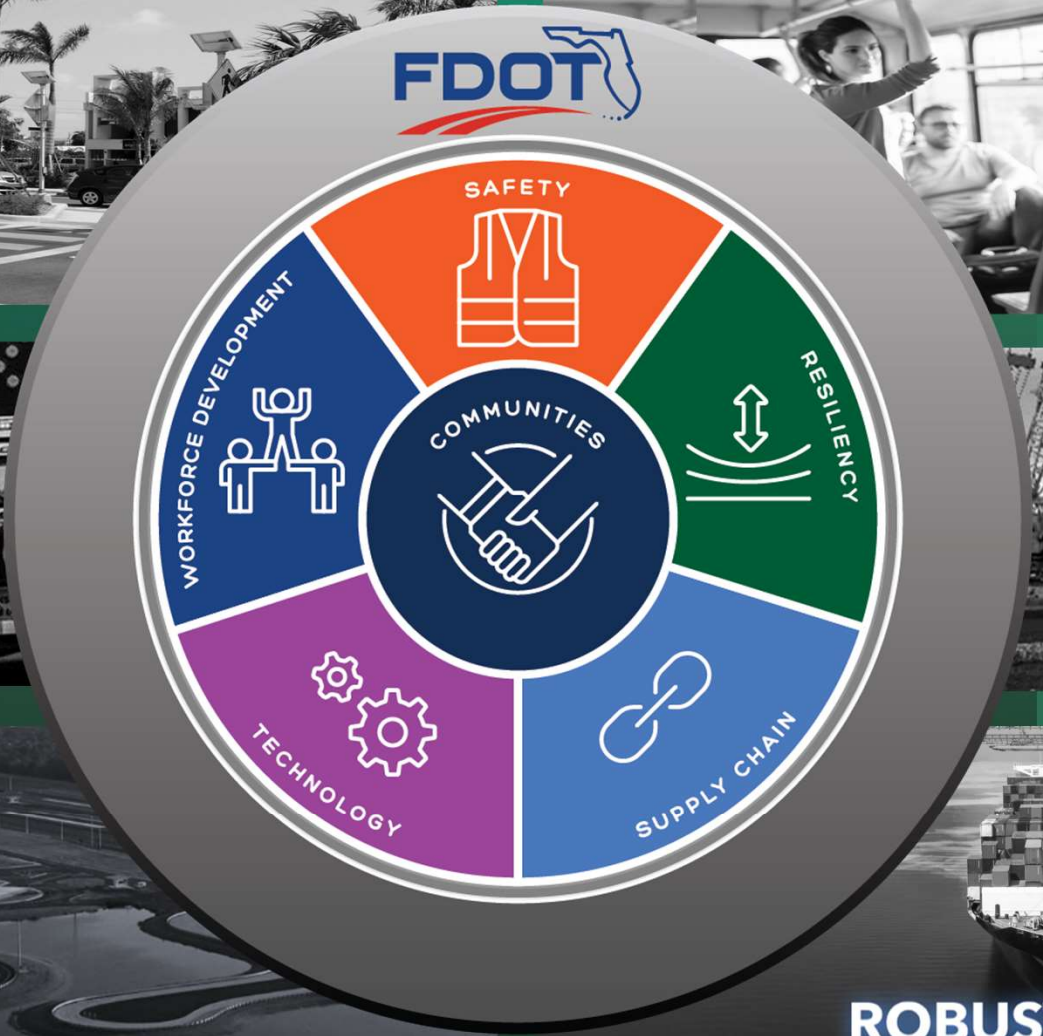

COMMUNITIES


WORKFORCE
DEVELOPMENT


RESILIENCY


TECHNOLOGY


ROBUST SUPPLY CHAIN


FDOT
SAFETY
RESILIENCY
SUPPLY CHAIN
TECHNOLOGY
WORKFORCE DEVELOPMENT
COMMUNITIES

Florida's Community Trends and Conditions

FLORIDA HAS A POPULATION OF

22.2 MILLION

TODAY, RANKING

3RD

AMONG
THE STATES

Source: Bureau of Economic and Business Research (BEBR).

FLORIDA'S

65+ POPULATION

IS PROJECTED TO

GROW BY

73%

BY 2045

Source: BEBR.

15 MILLION PEOPLE

[**3 IN 4 FLORIDA RESIDENTS**] LIVE IN A **COASTAL COUNTY**

Source: US Census.

60% **OF POPULATION GROWTH**

BETWEEN 2021 AND 2050 IS
PROJECTED TO BE CONCENTRATED IN

10 COUNTIES

[ORANGE, HILLSBOROUGH,
MIAMI-DADE, LEE,
PALM BEACH, BROWARD,
POLK, OSCEOLA, DUVAL & PASCO]

Source: BEBR.

FLORIDA IS PROJECTED TO ADD

548 NET **NEW PEOPLE PER DAY**

BETWEEN 2021 AND 2050

Source: BEBR.

THE TOTAL NUMBER OF

OUT-OF-STATE VISITORS

TO FLORIDA IS PROJECTED TO

INCREASE

55% BETWEEN
2019 AND 2031

Source: Economic Demographic Research.

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Florida's Transportation System

12,121 CENTERLINE MILES OF SHS

19 COMMERCIAL SERVICE AIRPORTS

8 ACTIVE SPACEPORT LAUNCH SITES

2,738 MILES OF MAINLINE RAILROAD TRACK

4,850 BRIDGES ON SHS

16 PUBLIC SEAPORTS

30 URBAN TRANSIT SYSTEMS

18 RURAL TRANSIT SYSTEMS

Source: FDOT Florida Transportation Fast Facts.

Seven Mile Bridge "New" and Old (Florida Keys)

FDOT

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

KEVIN J. THIBAULT, P.E.
SECRETARY

POLICY

Effective: April 27, 2020
Office: Policy Planning
Topic No.: 000-525-053

RESILIENCY OF STATE TRANSPORTATION INFRASTRUCTURE

It is the policy of the Florida Department of Transportation to consider resiliency of the State's transportation system to support the safety, mobility, quality of life, and economic prosperity of Florida and preserve the quality of our environment and communities. Resiliency includes the ability of the transportation system to adapt to changing conditions and prepare for, withstand, and recover from disruption.

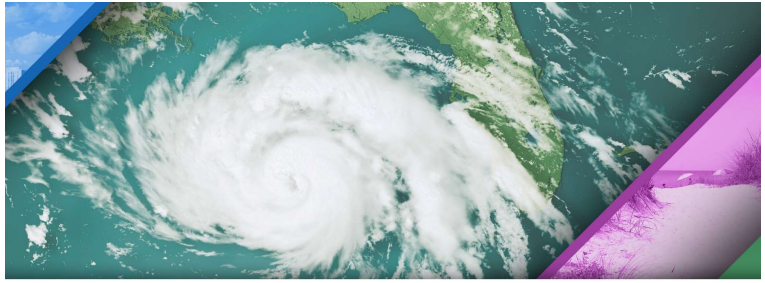
The Department will continue to identify risks, particularly related to sea level rise, flooding, and storms; assess potential impacts; and employ strategies to avoid, mitigate,

"Resiliency includes the ability of the transportation system to adapt to changing conditions and prepare for, withstand, and recover from disruption."

work program; asset management plans; research efforts; and internal manuals, tools, guidelines, procedures, and related documents, guiding planning, programming, project development, design, construction, operations, and maintenance.

Docu Signed by:
[signature]
Kevin J. Thibault, P.E.
Secretary

Resiliency Policy (2020)



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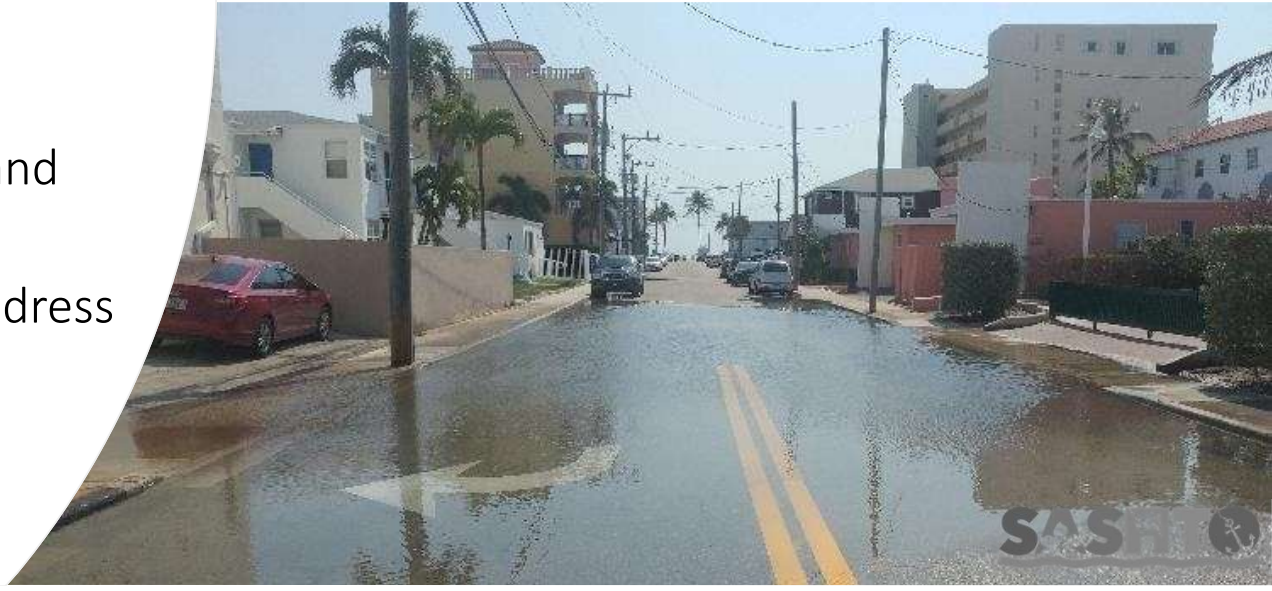
RESILIENCE ACTION PLAN

STATE HIGHWAY SYSTEM

RAP-23

State Legislation

- CS/HB 7503 (Section 339.157, F.S.)
  - FDOT Resilience Action Plan (RAP)
    - Enhance infrastructure and operational resilience
    - Design changes to retrofit and construct highway facilities
    - Enhance partnerships to address multijurisdictional needs



Resiliency Approach

- Leverage existing resources
  - Capability Maturity Framework
  - Existing Resilience Strategies
  - Internal & Community Collaboration
    - Technical Advisory Team
    - MPOs and Regional Collaboratives
    - FL Chief Resilience Officer
  - GIS Data

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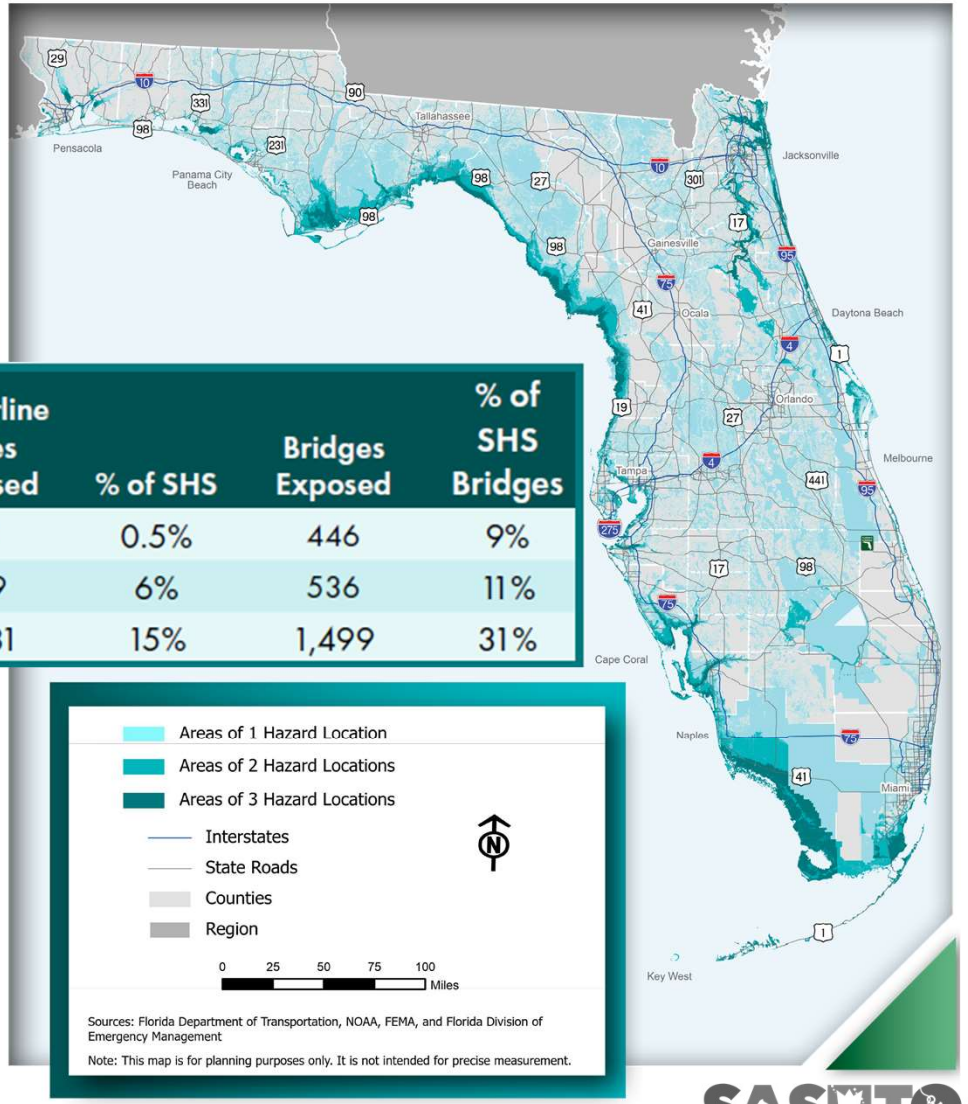
Vulnerable Areas

VULNERABILITY	HAZARDS AFFECTING A GEOGRAPHIC AREA		
	1% CHANCE OF FLOODING (100-YEAR FLOOD ZONE)	2 FEET OF SEA LEVEL RISE	CATEGORY 3 STORM SURGE
High	Geographic areas affected by all three hazards		
Medium	Geographic areas affected by any two of the three hazards		
Low	Geographic areas affected by any one of the three hazards		

* Prioritization Tier	Centerline Miles Exposed	% of SHS	Bridges Exposed	% of SHS Bridges
High	57	0.5%	446	9%
Medium	709	6%	536	11%
Low	1,781	15%	1,499	31%



*Does not account for elevation of facility

Resilience Strategies

Focusing on Bridges and Structures

Focusing on Structures: LRFD Design Practice

Load (Stressors & Shocks)

- Structural Loading
  Traffic, Vessel Impact, Waves, Wind
- Environmental
  Cl-, pH, UV, Sea Level Rise, Fire
- Future Use
  Capacity Increase, Functional Change

Justification

Life Cycle Cost, Cost/Benefit, Risk

Resistance (Resilience)

- Structural Capacity
  Codes, Ultimate vs Service Limit State
- Material Endurance
  Strength, Fatigue, Creep
- Material Durability
  Aging Effects, Environmental
- Redundancy
  Load Paths, Multi-Girder, Continuous

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Bob Graham
Sunshine Skyway Bridge
Tampa Bay

R&A Structure Design Goals

Resilience

- Robustness
  Redundancy, Bend Don't Break
- Durability
  Inert, Regenerative
- Maintenance
  Prioritize, Repair, Element/Component Replacement
- Inspection
  Easy Access, Visual, Monitoring

Adaptability

- Repurposing
  Roadway, Shared Use, Transit, Rail
- Tunable
  Widen, Strengthen, Raise, Lengthen
- Future Proofing
  Hydraulic, Vertical Clearance, Seawater Encroachment, Emerging Technology

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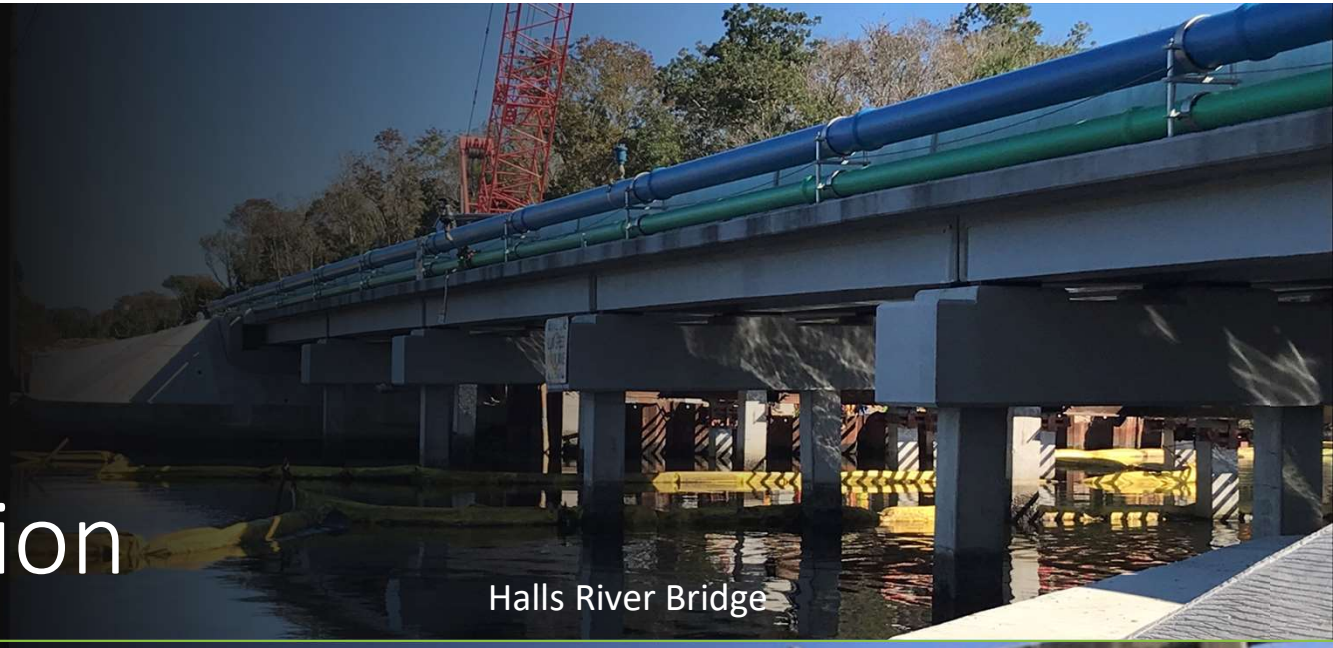
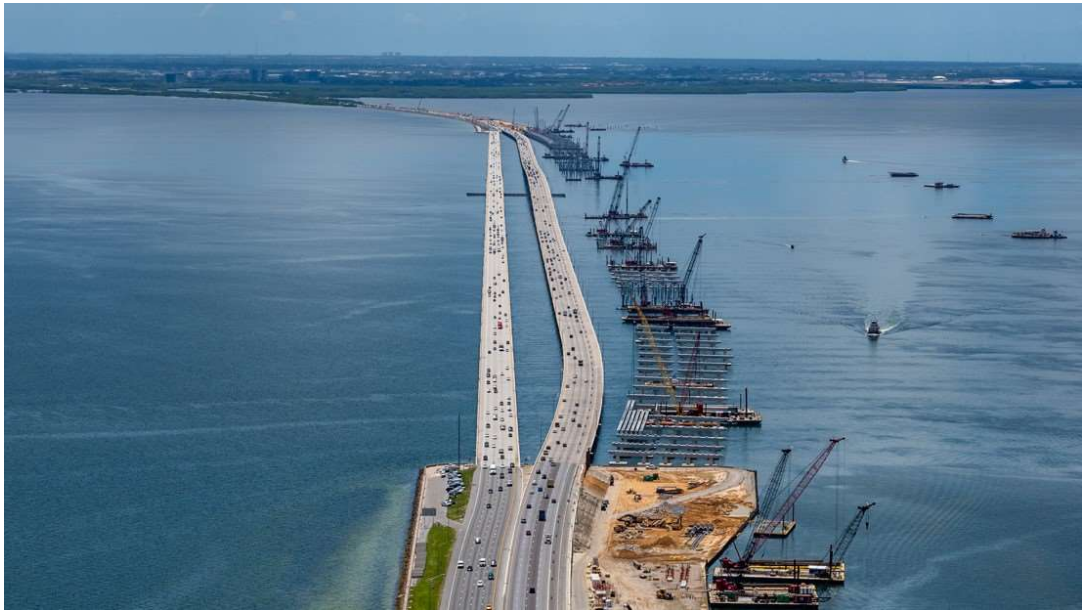
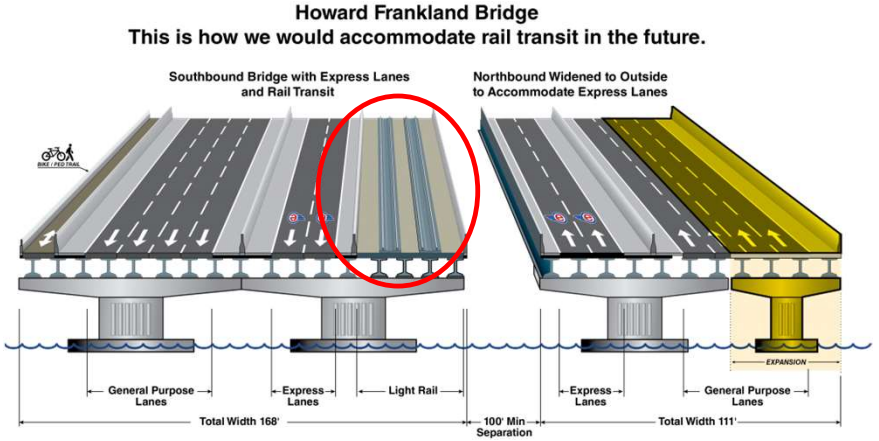
Resiliency in Action



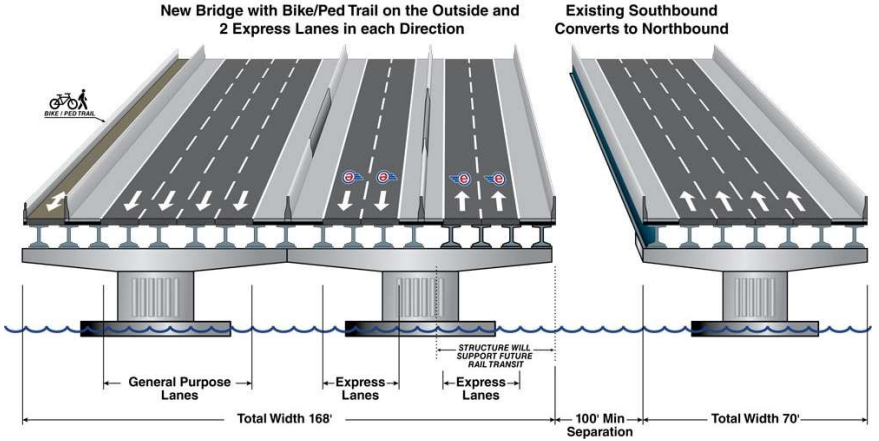
Halls River Bridge

Resiliency in Action

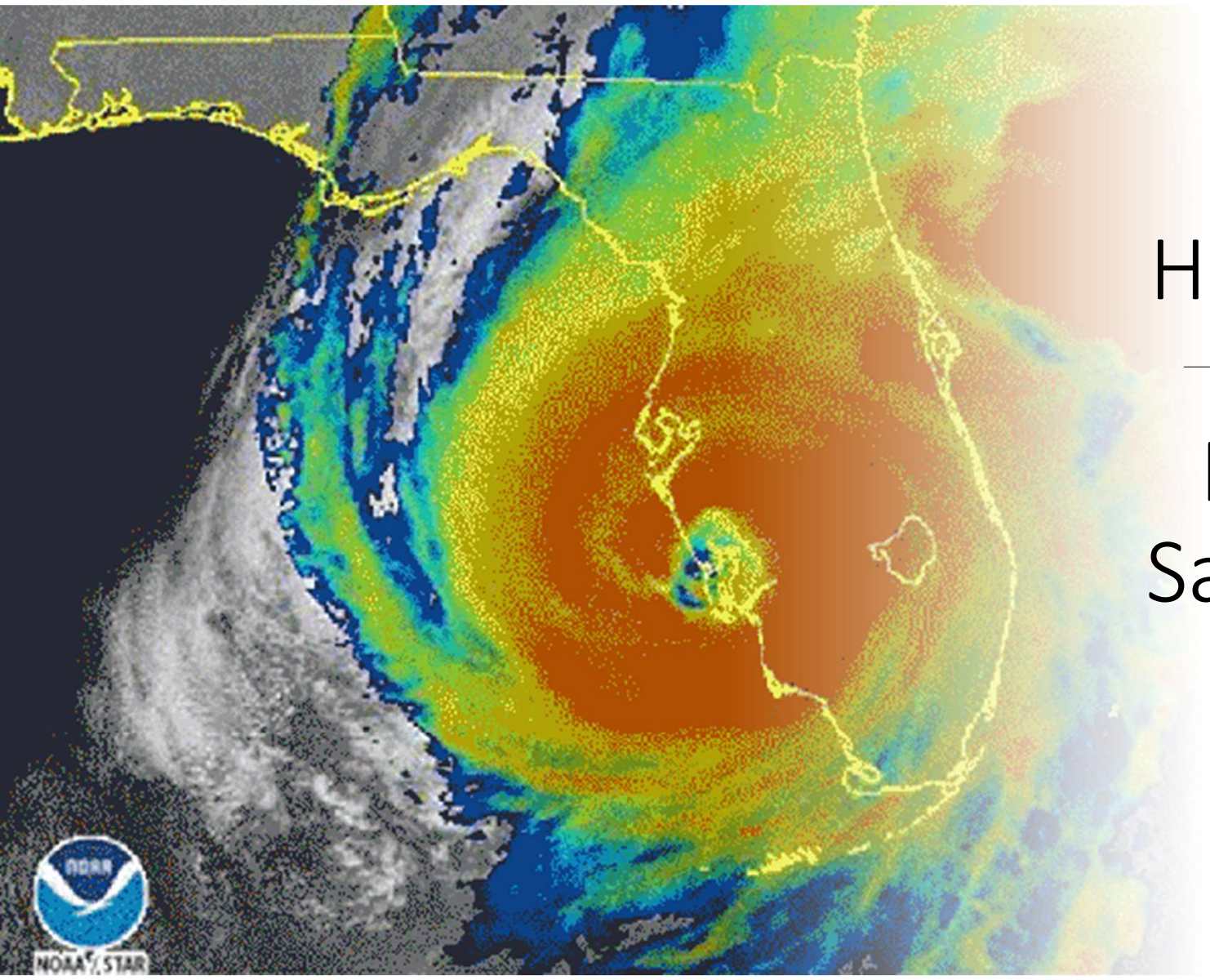




Future Configuration



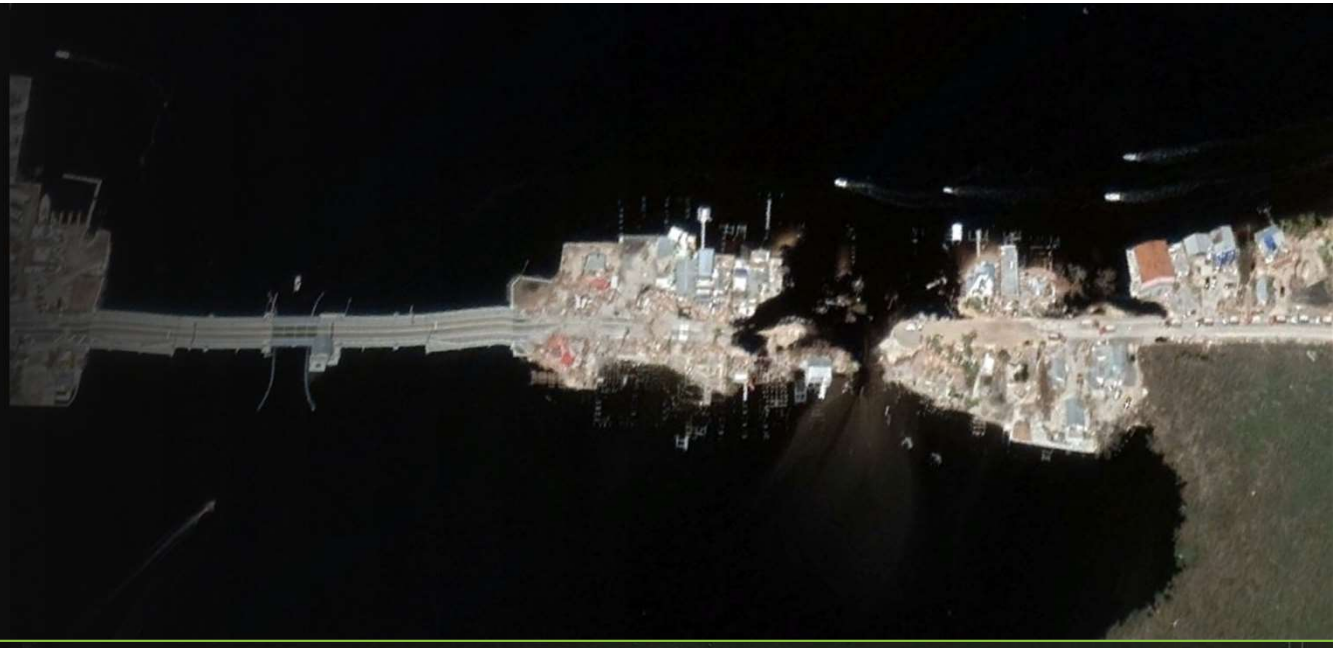
Configuration at Completion



Hurricane Ian

Pine Island
Sanibel Island

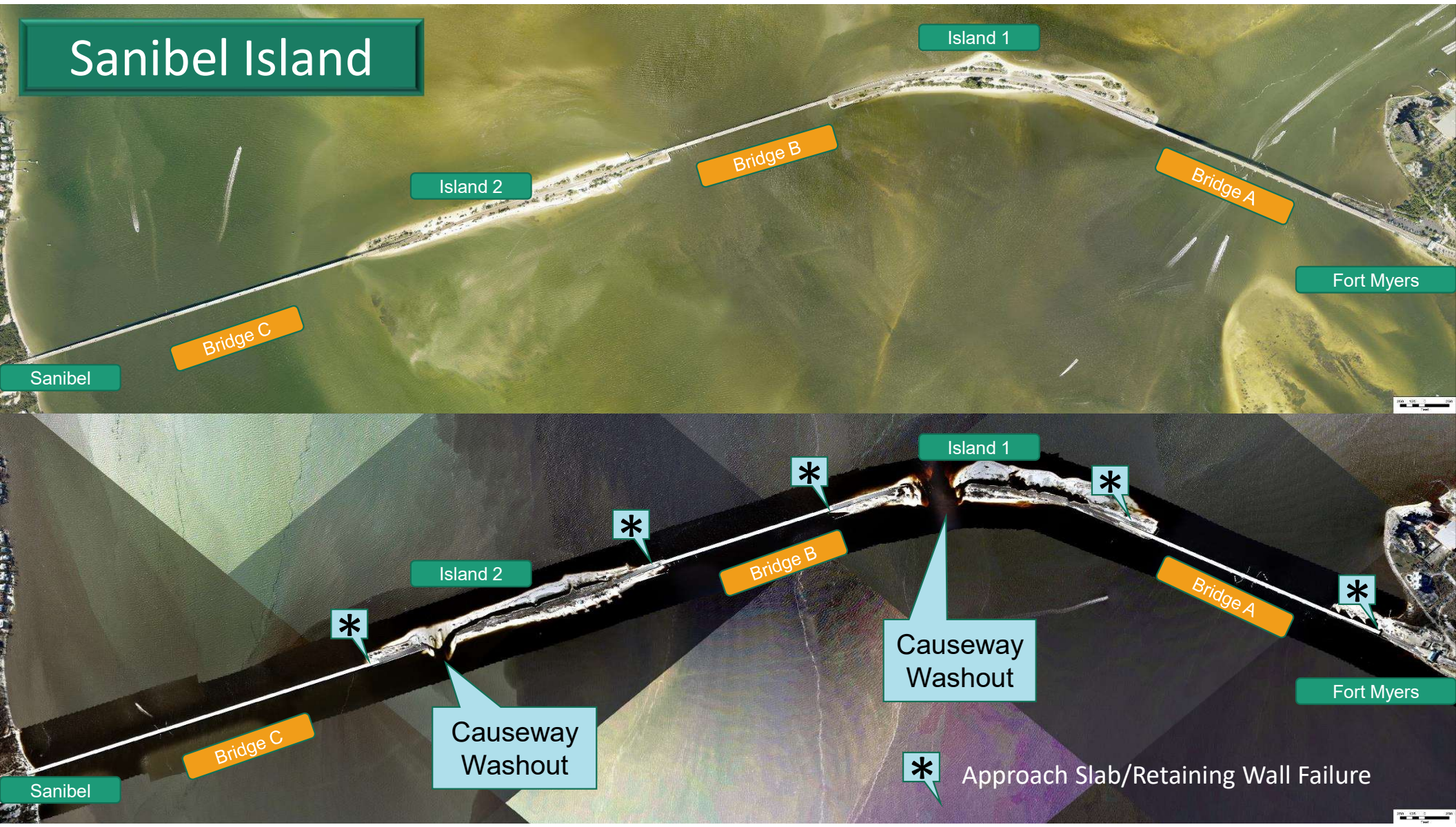
Pine Island

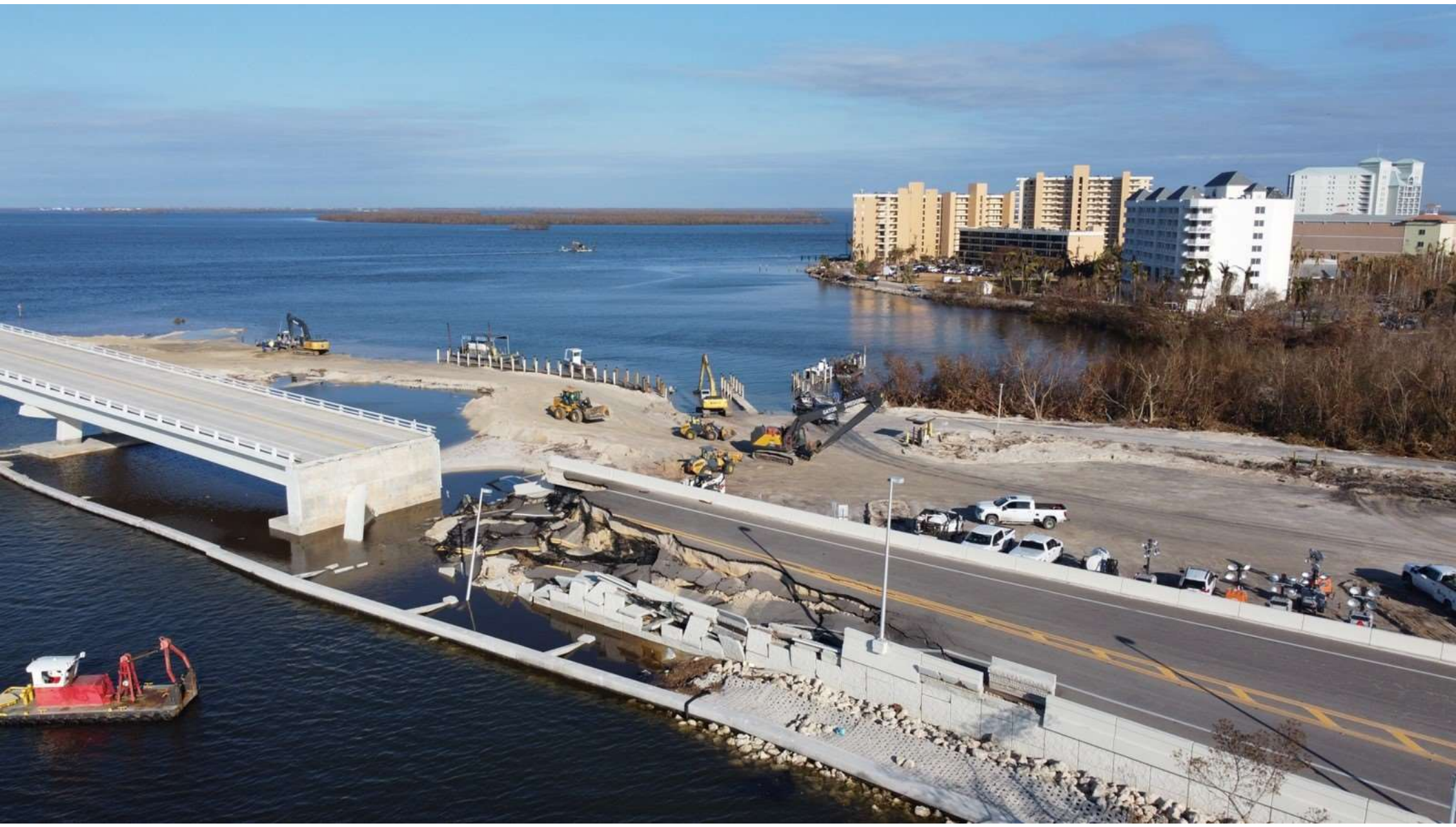


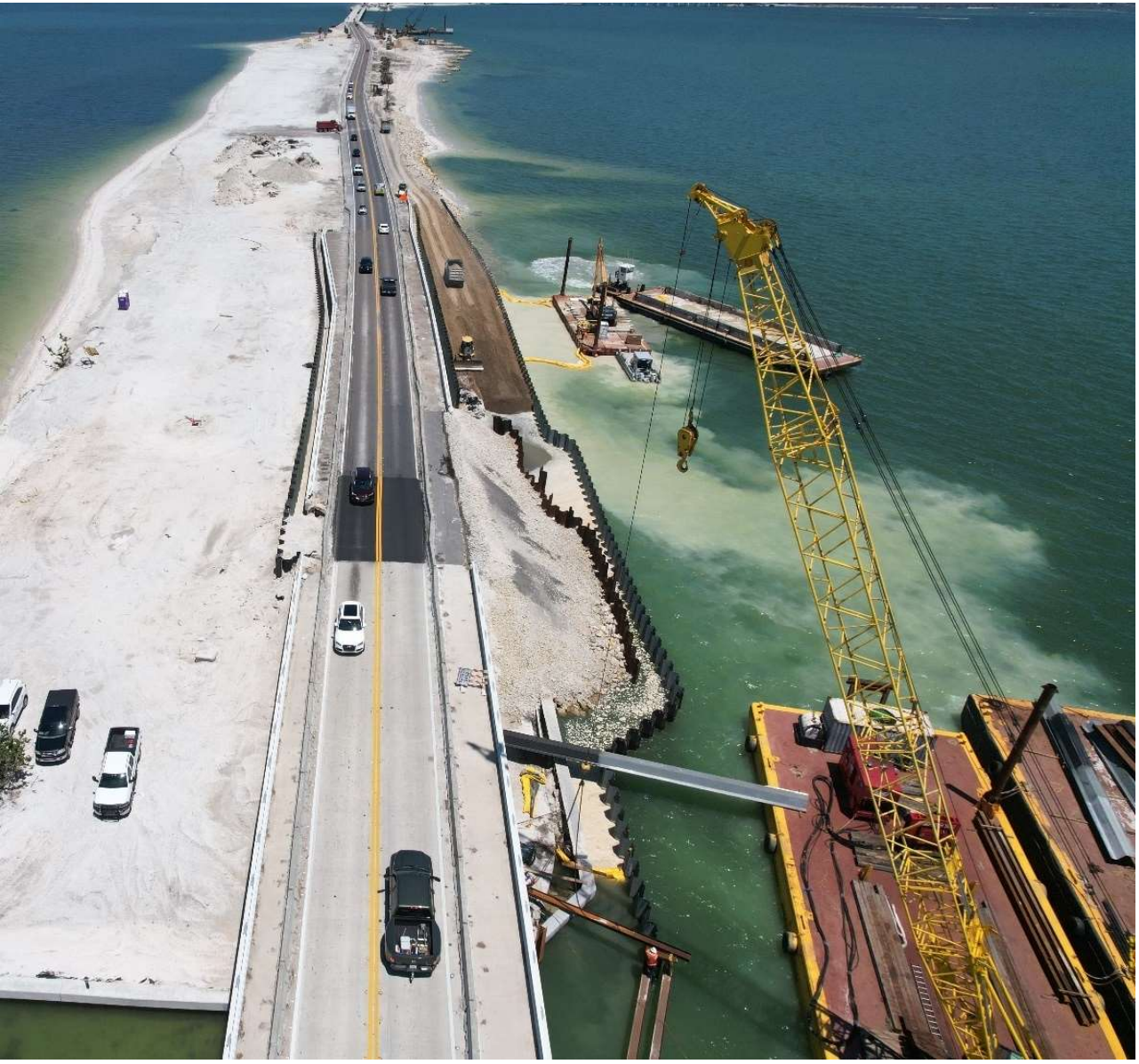
Emergency Repair – 3 days

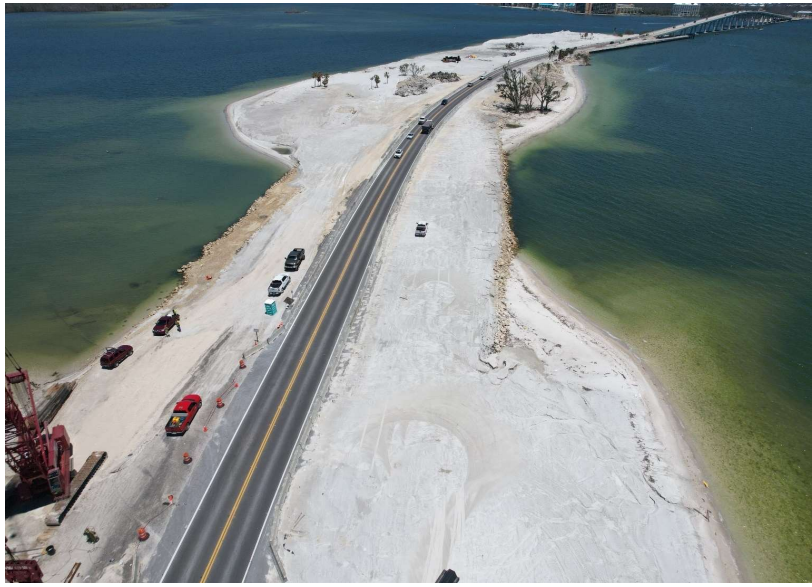
Hurricane Ian Damage

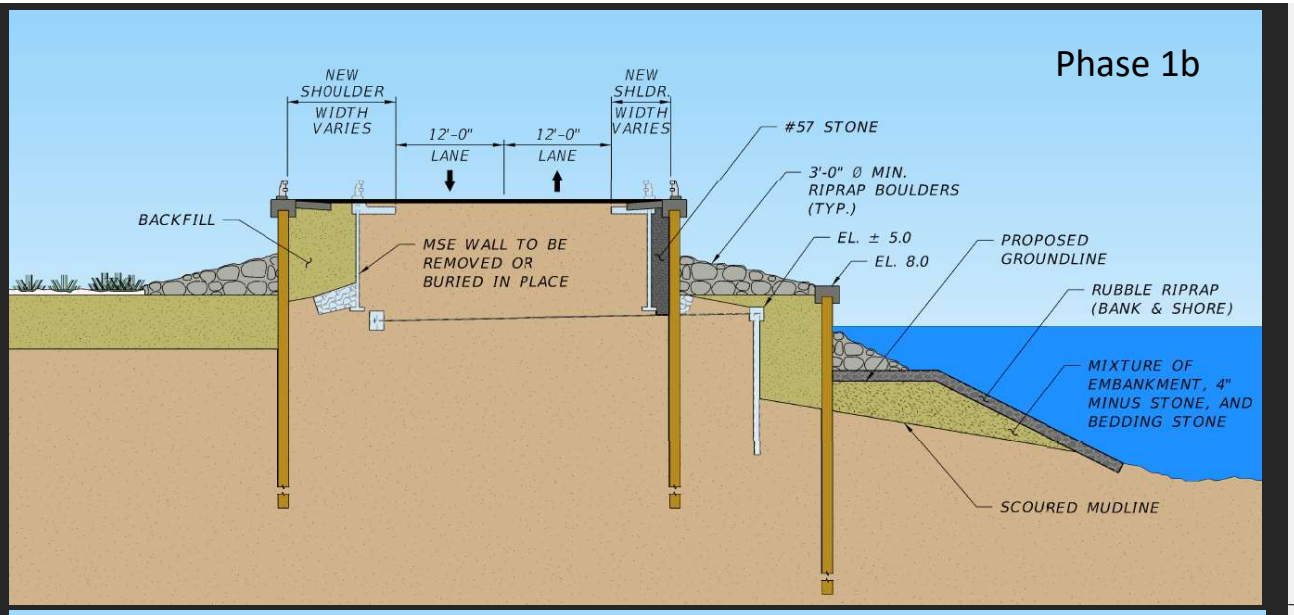
Pine Island


Sanibel Island
Island 1
Island 2
Bridge B
Bridge A
Fort Myers
Bridge C
Sanibel
Island 1
Island 2
Bridge B
Bridge A
Causeway Washout
Causeway Washout
Fort Myers
Bridge C
Sanibel
Approach Slab/Retaining Wall Failure

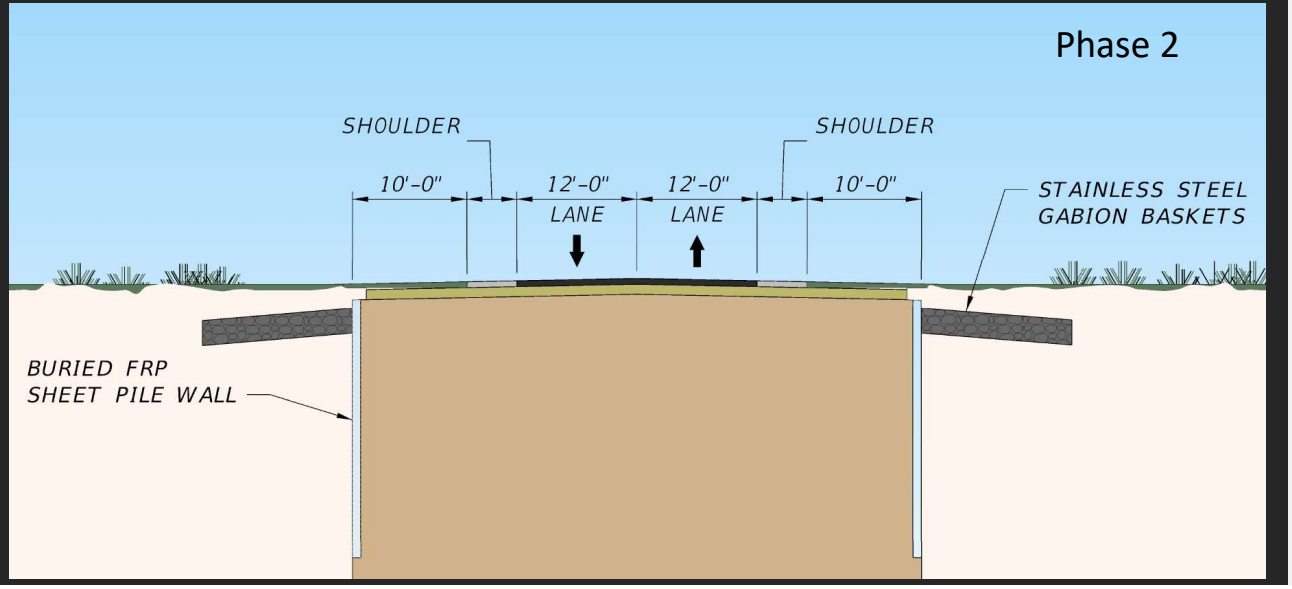








Hardening Repairs

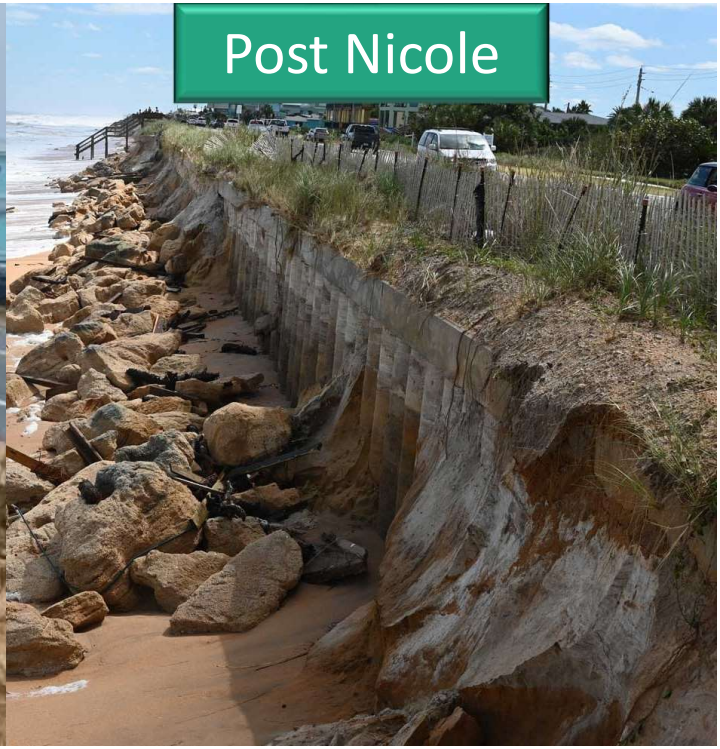


Proposed Resiliency Work

SR A1A – Hurricane Matthew 2016



SR A1A - Secant Pile Seawall - 2019



SR A1A – 2022 Hurricane Season

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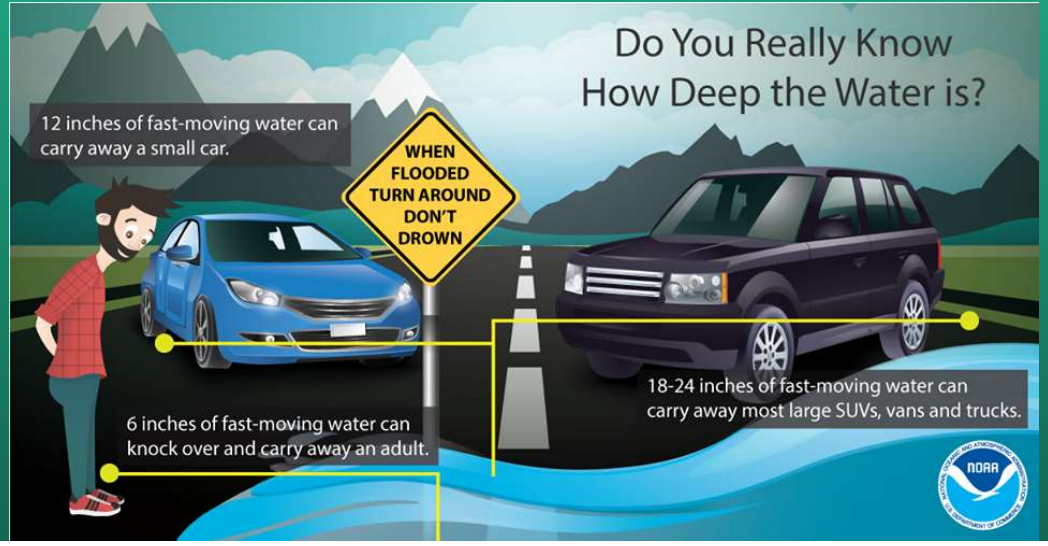
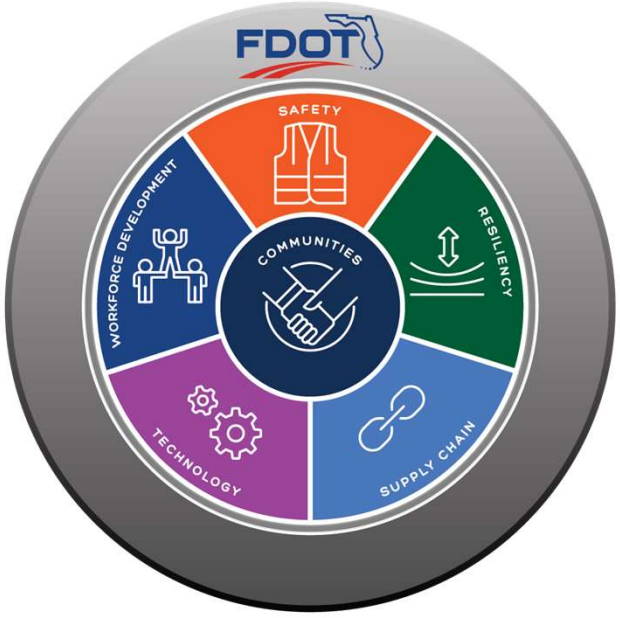
Don’t Drive Into the Unknown…….

…..Stay Away from Flooded Streets!



Thank you for your time!



Resilience Action Plan Website

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