

# Incorporation of Dunes into Federal Projects

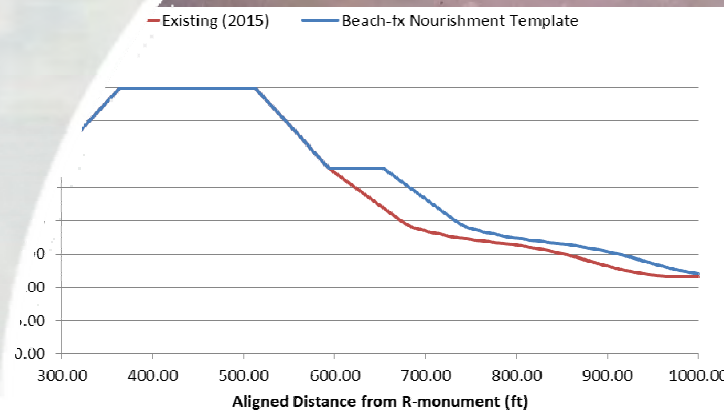
Will Reilly, P.E.  
U.S. Army Corps of Engineers, Jacksonville District

Florida Shore & Beach Preservation Association  
35th Annual National Conference on  
Beach Preservation Technology

St. Augustine Beach, FL

February 2, 2022

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# OUTLINE



BUILDING STRONG®

- Where we were
- Where we are
- Where we are going

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# 19<sup>TH</sup> AND EARLY 20<sup>TH</sup> CENTURY



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**Pensacola, FL  
c1941**

Source: Library of Congress and Photographs Division Washington, D.C.  
<https://www.loc.gov/pictures/item/2017806423/>

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# 19<sup>TH</sup> AND EARLY 20<sup>TH</sup> CENTURY



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**Plank Road  
Winterhaven, California  
c1925**

Source: Library of Congress and Photographs Division Washington, D.C.  
<https://www.loc.gov/pictures/resource/cph.3c02733/>

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# 19<sup>TH</sup> AND EARLY 20<sup>TH</sup> CENTURY



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## **Sand fixation on the Oregon coast through planting of Holland Grass c1936**

Source: Library of Congress and Photographs Division, Washington, D.C.  
<https://www.loc.gov/pictures/item/2017760706/>

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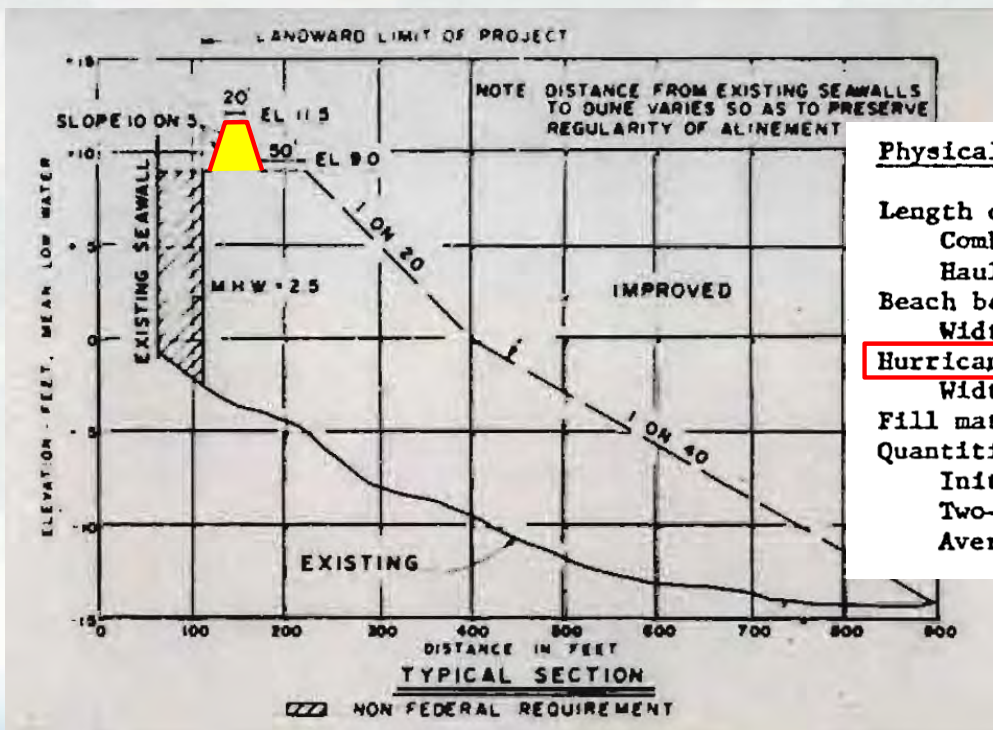


# MID/LATE 20<sup>TH</sup> CENTURY



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## Miami-Dade County BEC & HP (1975)



**PERTINENT DATA**

DADE COUNTY, FLORIDA  
BEACH EROSION CONTROL AND  
HURRICANE SURGE PROTECTION PROJECT

*8900000*

**Description**

Project provides for a protective and recreational beach along 10.5 miles of the Dade County shoreline including hurricane surge protection for the cities of Miami Beach, Surfside and Bal Harbour (9.3 miles).

### Physical Features

Length of Project (miles)	
Combined project	9.3
Haulover Beach Park	1.2
Beach berm elevation (Ft. m.l.w.)	9.0
Width (ft.)	50
<b>Hurricane dune elevation (Ft. m.l.w.)</b>	<b>11.5</b>
Width (ft.)	20
Fill material source	Offshore
Quantities:	
Initial beach fill (Cu. Yd.)	13,500,000
Two-year advance nourishment (Cu. Yd.)	422,000
Average annual nourishment (Cu. Yd.)	211,000

Two-year advance nourishment (Cu. Yd.) \_\_\_\_\_ 422,000  
Average annual nourishment (Cu. Yd.) \_\_\_\_\_ 211,000

**Construction**

Method \_\_\_\_\_ Hydraulic pipeline dredge  
(Alternate) Hopper dredge with pumpout facilities

Order of Work \_\_\_\_\_ Northerly shores first of five equal-size contracts

Construction time \_\_\_\_\_ Six years

(R 1-6-76)

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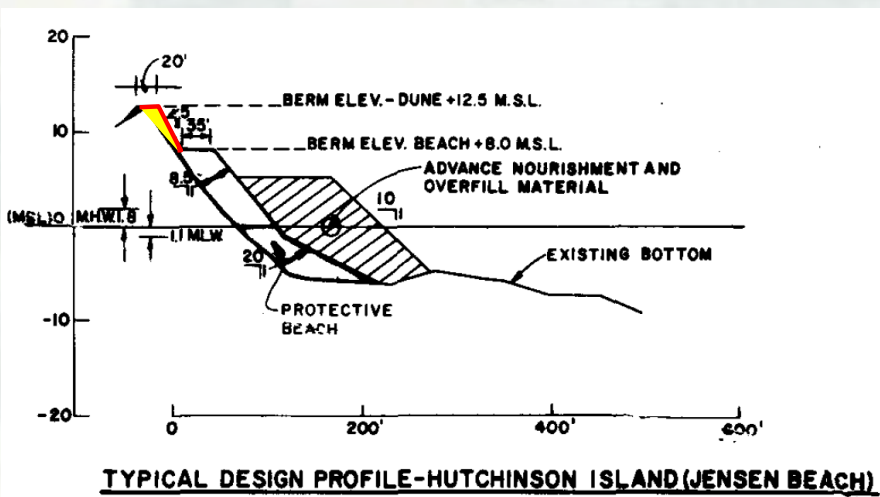


# MID/LATE 20<sup>TH</sup> CENTURY



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## Martin County SPP (1986)



## Hurricane surge protection-sand dune

TABLE 2  
POSSIBLE SOLUTIONS AND PLANNING ACCOMPLISHMENTS

POSSIBLE MEASURES	LOCAL PLANNING OBJECTIVES <sup>1</sup>				PRINCIPLES AND GUIDELINES <sup>2</sup>			
	PB	FP	EC	TBE	NED	EQ	OSE	RD
NA NO ACTION	0 <sup>3</sup>	0	0	0	0	0	0	0
<b>NONSTRUCTURAL MEASURES</b>								
NS-1 Rezoning of beach area	0	P	0	P	0	0	P	P
NS-2 Modification of building codes	0	P	0	0	0	0	P	0
NS-3 Construction setback line	0	P	0	P	0	P	P	P
NS-4 Moratorium on construction	0	P	0	0	0	0	0	0
NS-5 Flood insurance	0	0	0	P	0	0	P	0
NS-6 Evacuation planning	0	0	0	0	0	0	P	0
NS-7 Establish a no-growth program	0	0	0	0	0	0	0	0
NS-8 Other recreational facilities	0	0	0	0	0	0	0	0
<b>STRUCTURAL MEASURES</b>								
S-5 Breakwater	F	F	F	F	F	F	V	F
S-5 Corps 1968 Plan of Improvement	P	P	P	P	P	0	P	P
S-6 Hurricane surge protection-sand dune	P	P	P	P	0	P	P	0
S-7 Revetment	0	P	P	0	0	0	P	0
S-8 Seawall	0	P	P	P	P	0	P	0
S-9 Stabilization of beaches and dunes by vegetation	0	P	P	0	0	P	0	0
S-10 Modification of building codes and rezoning of beach area	0	P	P	0	P	P	0	0
S-11 Flood proofing of structures	0	P	0	0	0	0	P	0
S-12 Condemnation of land and relocation of structures	0	P	0	0	0	0	P	0

NOTES:  
<sup>1</sup>PB - Provision of recreation beach  
 FP - Protection of flooding and wave damage  
 EC - Beach erosion control  
 TBE - Protection of tourist base economy  
<sup>2</sup>NED - National Economic Development  
 EQ - Environmental Quality  
 OSE - Other Social Effects  
 RD - Regional Development  
<sup>3</sup>F - Meet fully objective  
 P - Meet partially objective  
 0 - Not meeting objective

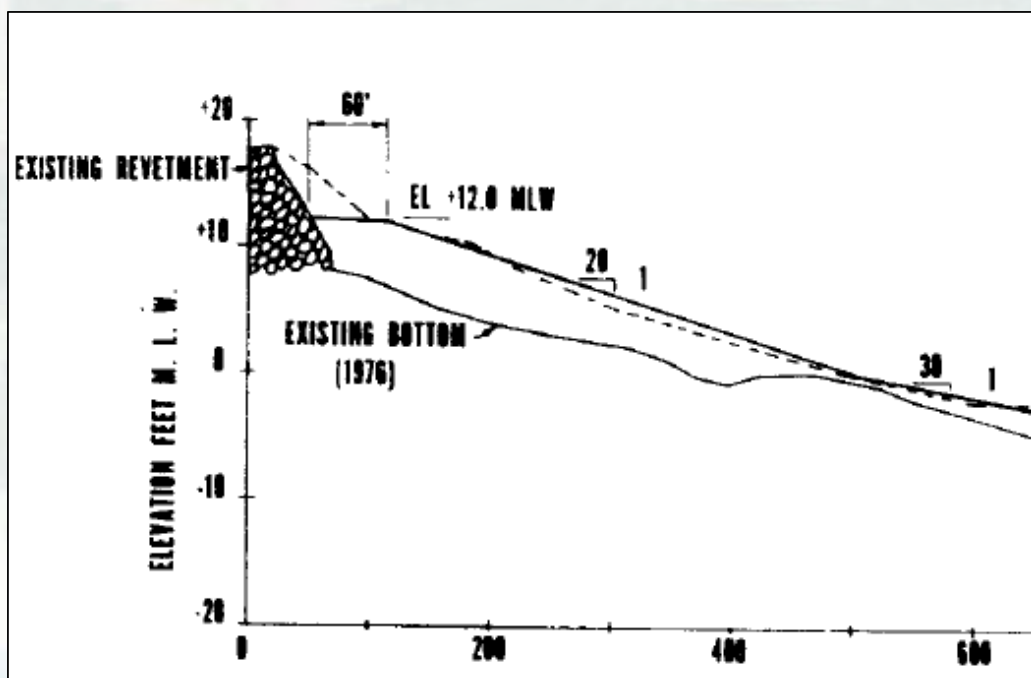


## MID/LATE 20<sup>TH</sup> CENTURY



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### St. Johns County SPP (1979)



*"Stabilization of the beaches and adjacent dunes with vegetation is, for the most part, not applicable in the present situation. Dunes will not be constructed and beach grassing would be unsightly, unnecessary, and deprive the area of a recreational beach."*

– 1979 USACE Feasibility Report for Beach Erosion Control, St. Johns County, Florida



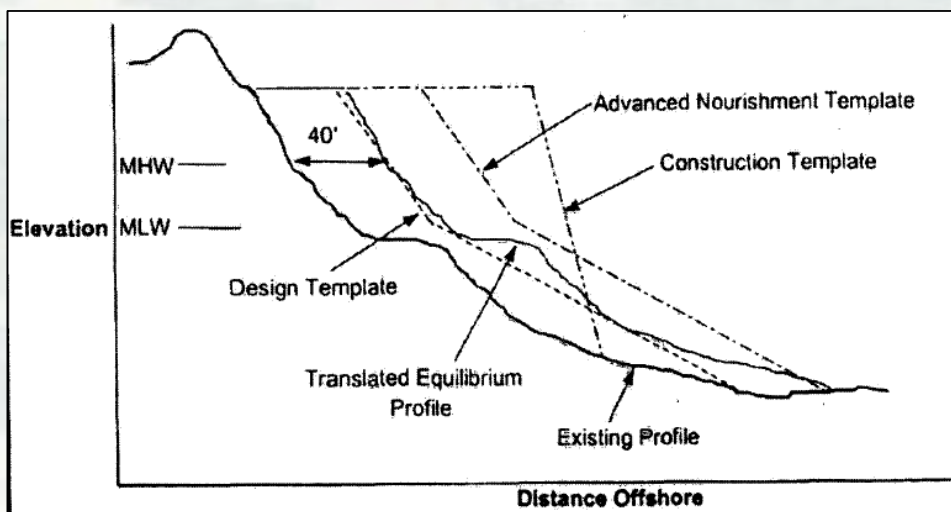


## MID/LATE 20<sup>TH</sup> CENTURY



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### Nassau County SPP (1985)



*“Hurricane surge protection in the form of a sand dune was eliminated from consideration as the populated areas elevation to withstand such a surge” ... “Although effective in stabilizing dunes, the grasses natural to the area are ineffective in preventing erosion in the local high energy wave climate.”*

**– 1985 USACE Feasibility Report and EIS, Beach Erosion Control for Nassau County, FL**

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# 1984 - A BETTER UNDERSTANDING



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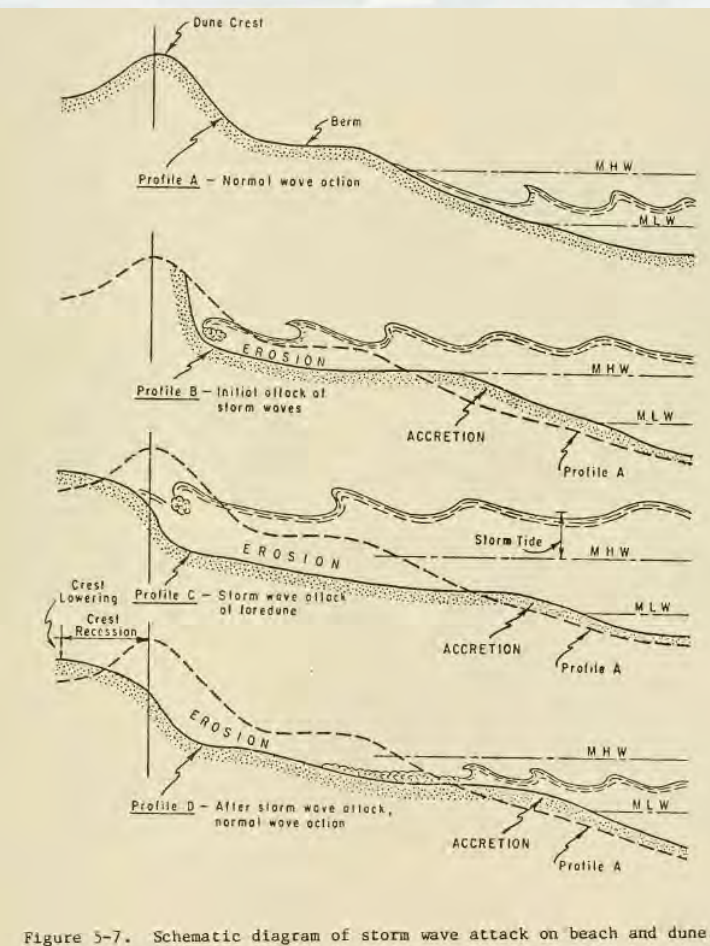
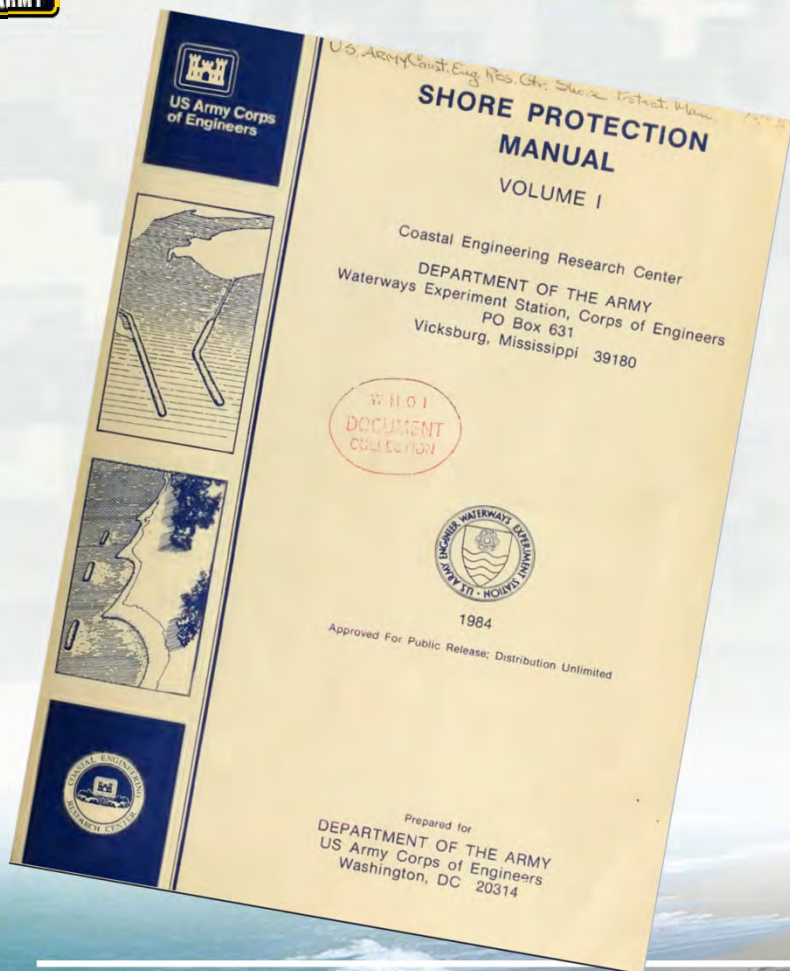
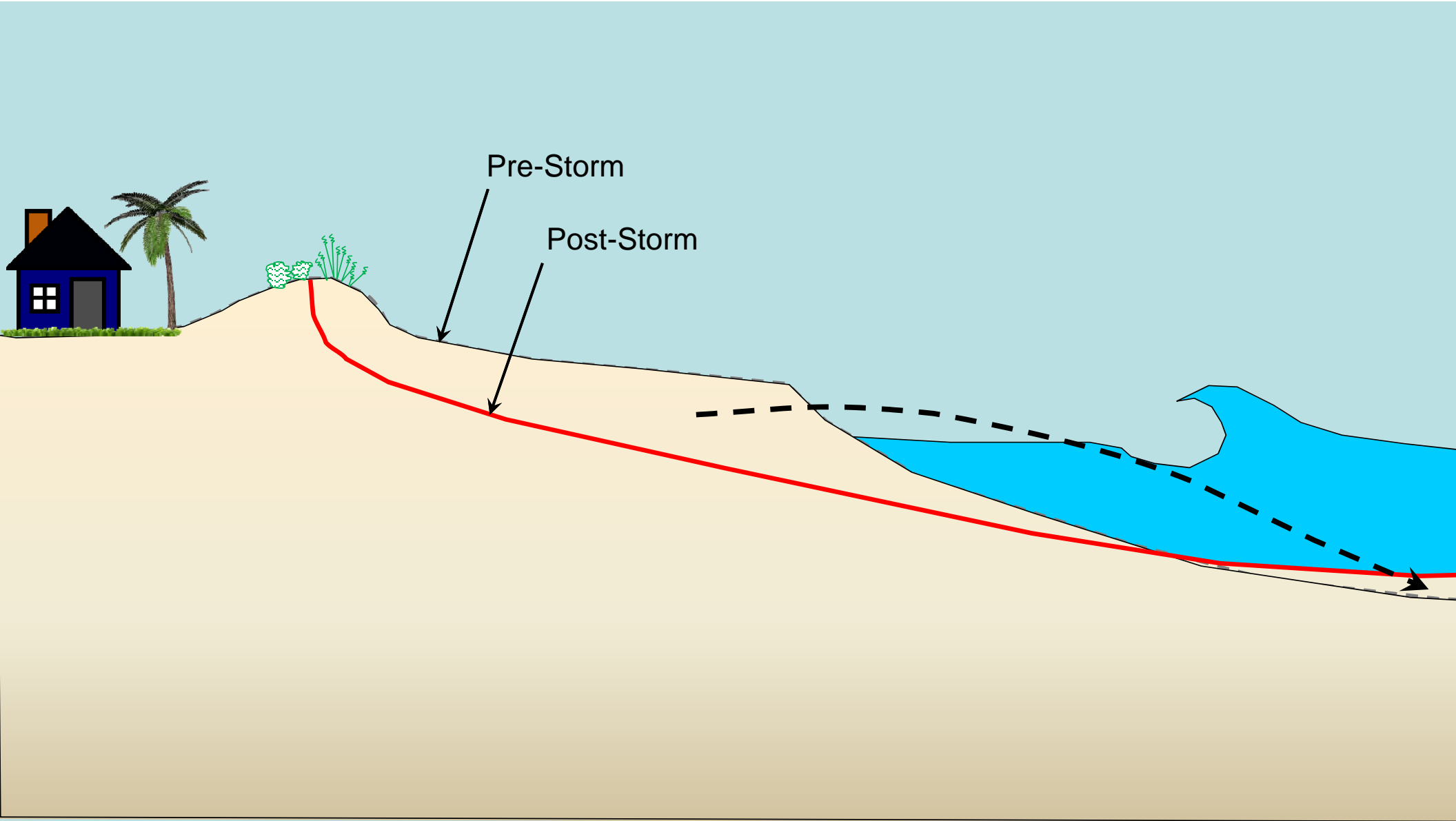


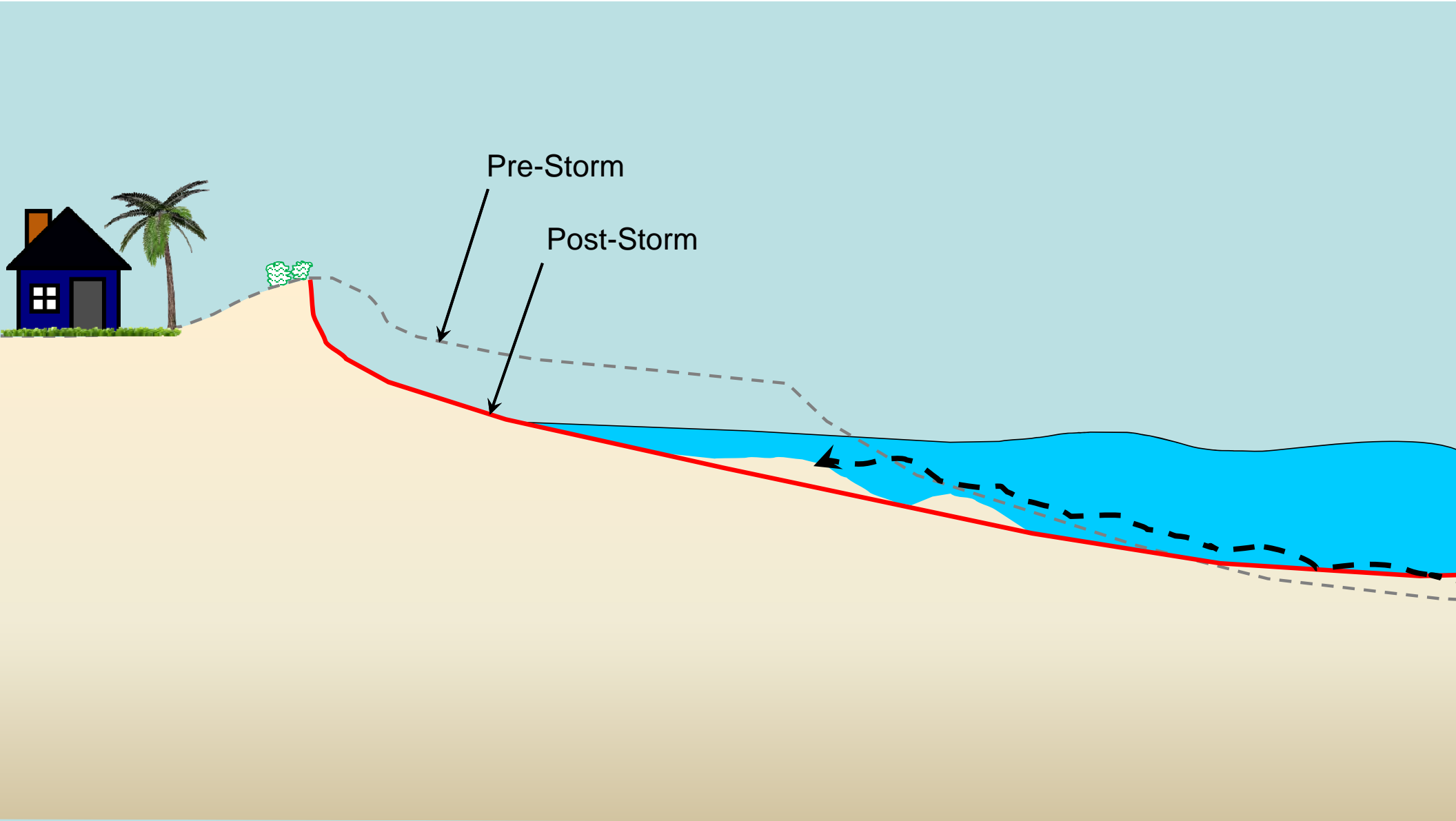
Figure 5-7. Schematic diagram of storm wave attack on beach and dune.

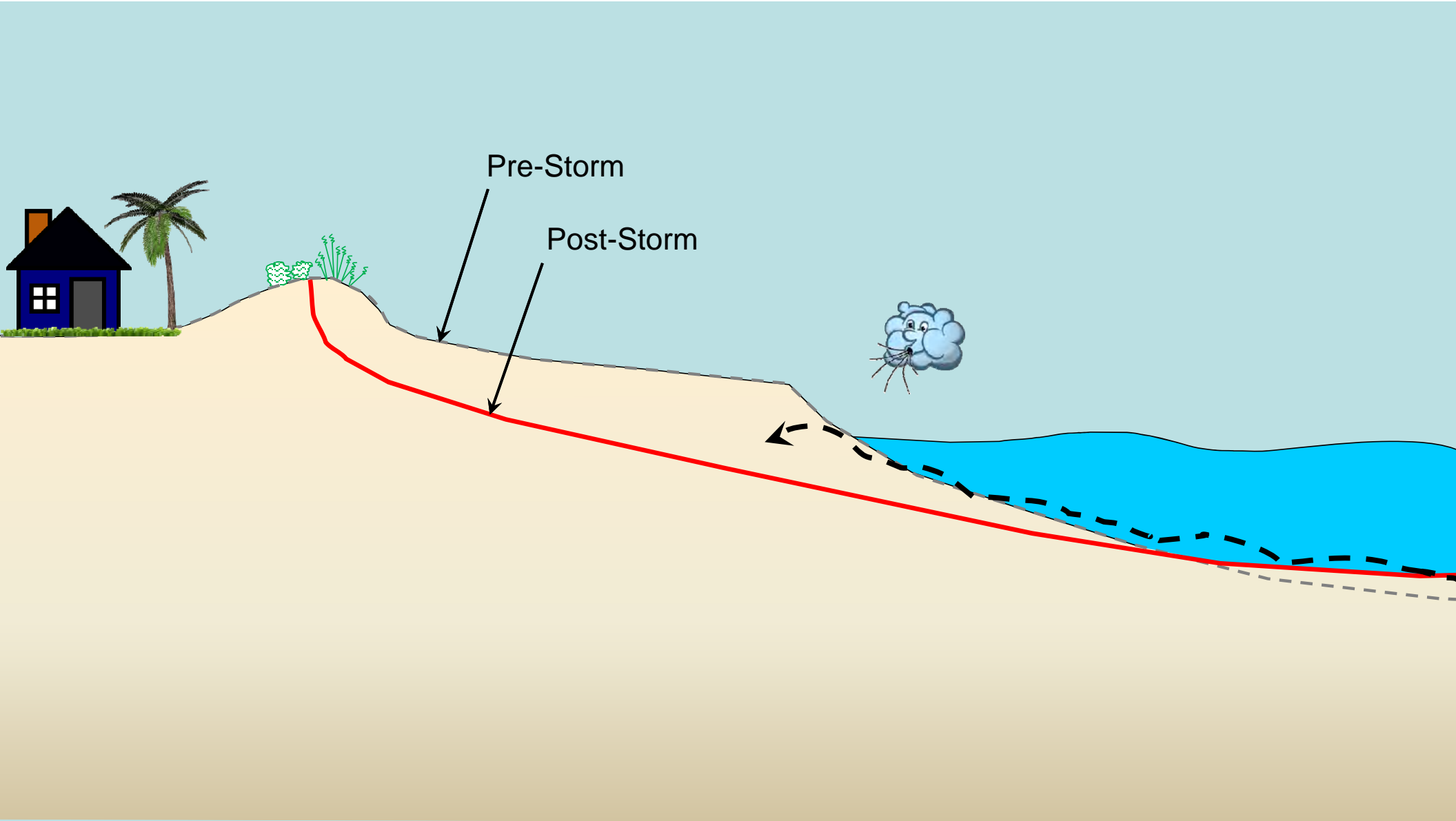
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Pre-Storm

Post-Storm





Pre-Storm

Post-Storm



# 1995 - DESIGN GUIDANCE

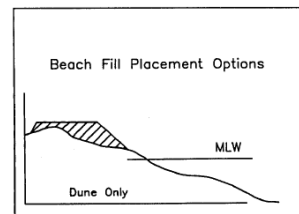


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EM 1110-2-3301  
31 May 95

Two basic types of dredging techniques used are hydraulic pipeline dredges and hopper dredges (with and without pump-out capabilities). The choice of placement method depends upon the location of suitable borrow sources and availability of equipment. Each method differs in its capabilities for the area of fill placement. Fill material brought to the site by truck is limited in its placement to dry beach or water's edge. Pumping and barging materials provides the ability to place materials in the nearshore zones. Design requirements should consider available placement methods.



(3) Placement position. The placement of fill material within the beach system should be determined by the protection required. Figure 4-1 illustrates locations most widely used (Smith and Jack):

(a) Dune only - creation of a new dune or reinforcement of an existing dune in the back-beach areas. This technique is intended to provide the beach system with a reserve of sand against erosive storm events and to prevent wave energy from reaching upland property.

(b) Dune and berm - widen the berm record plus an overtopping and

(c) Berm only - beach by translation. Height is usually increased to the berm height or the berm height. For recreational purposes, the increased width of the beach will provide additional area for recreational use.

(d) Profile fill - method is designed to increase the volume of sand throughout the entire profile. Placement usually occurs at an active zone in the profile and relies on natural processes to distribute the fill over the entire profile. Theoretically, this method should produce a profile shape already in equilibrium with the energy environment.

(e) Nearshore berm - intended to simulate natural storm bar formation by creating an artificial shore-parallel storm bar to dissipate storm wave energy before impacting the inshore beach. During prolonged low-energy conditions, much of the artificial bar material may be moved onshore, nourishing the berm and nearshore.

Longshore placement considerations include the creation of a feeder beach. This is performed by stockpiling fill material at the updrift end of the areas intended to receive

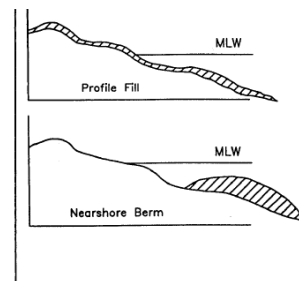


Figure 4-1. Various fill placement zones within the beach profile system

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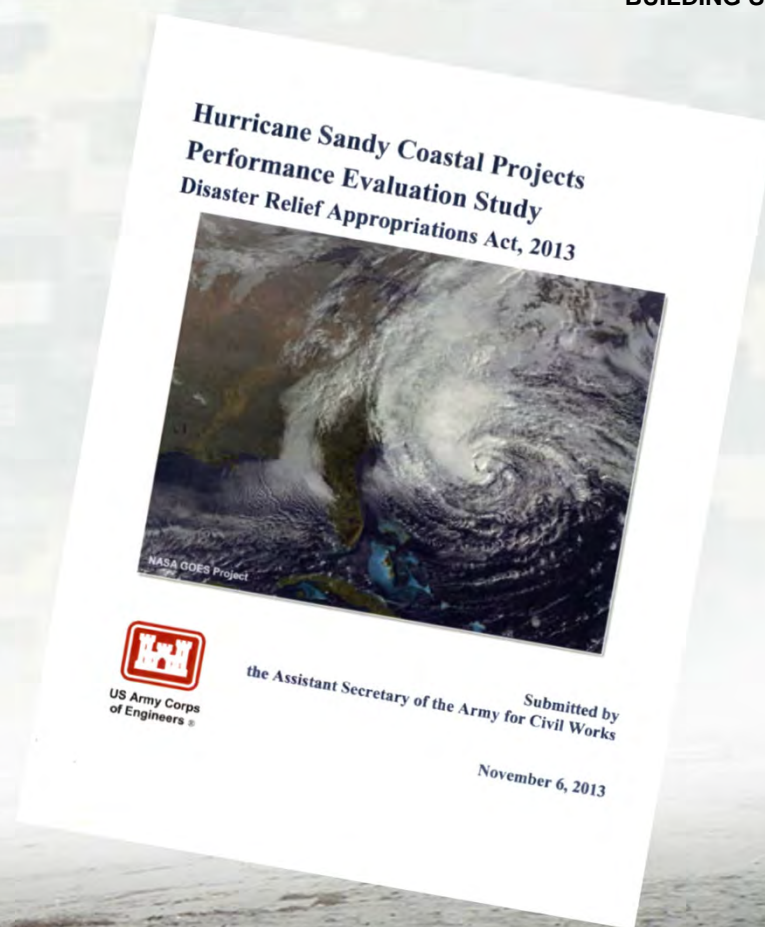
# 2013 - POST-SANDY PERFORMANCE EVALUATION



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*“Dunes can significantly contribute to the volumes of sediment available for redistribution along the shoreline during a storm, reducing the potential for undermining and exposure of land-based infrastructure, and impeding the landward reach of storm tides.”*

– 2013 USACE Hurricane Sandy Coastal Projects Performance Evaluation Study.



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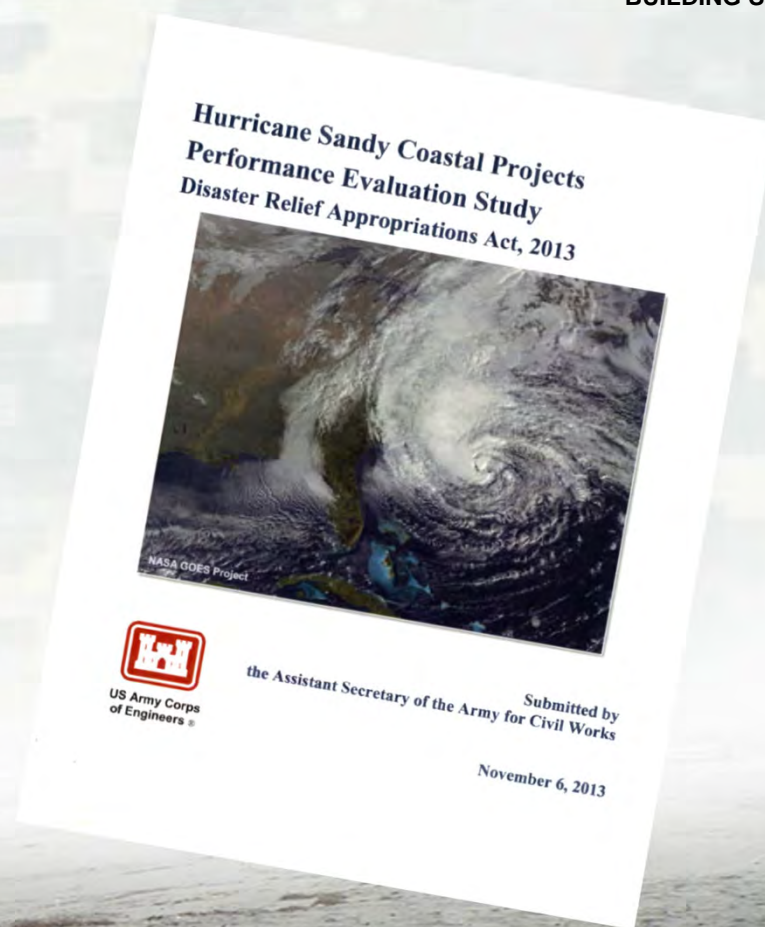
# 2013 - POST-SANDY PERFORMANCE EVALUATION



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*“Conventionally, dunes should be constructed along with a protective beach. At the time of construction, dunes should be actively vegetated to reduce loss from wind-blown sand transport and increase their resistance to erosion.”*

– 2013 USACE Hurricane Sandy Coastal Projects Performance Evaluation Study.



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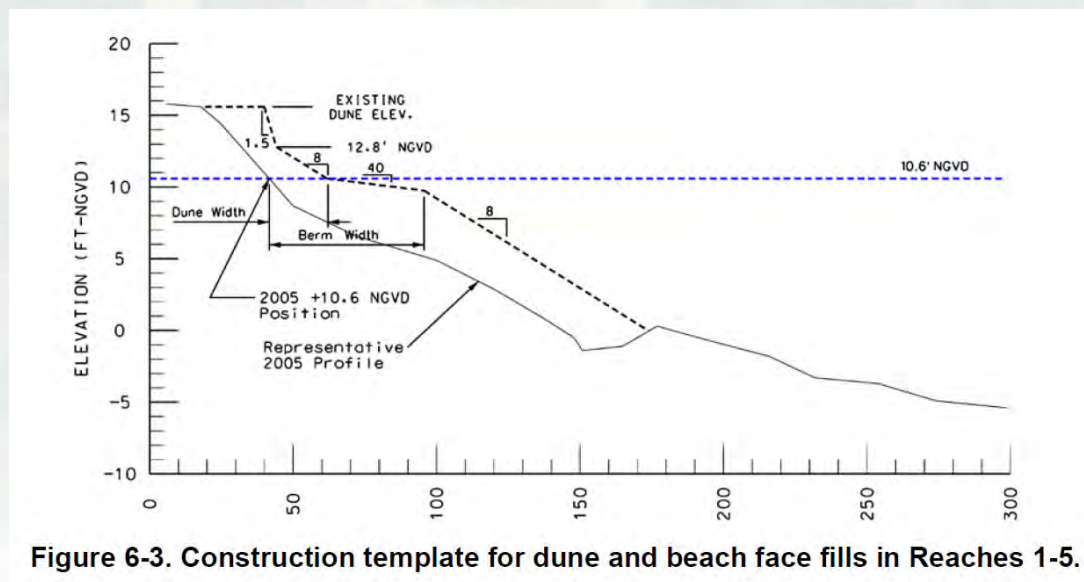
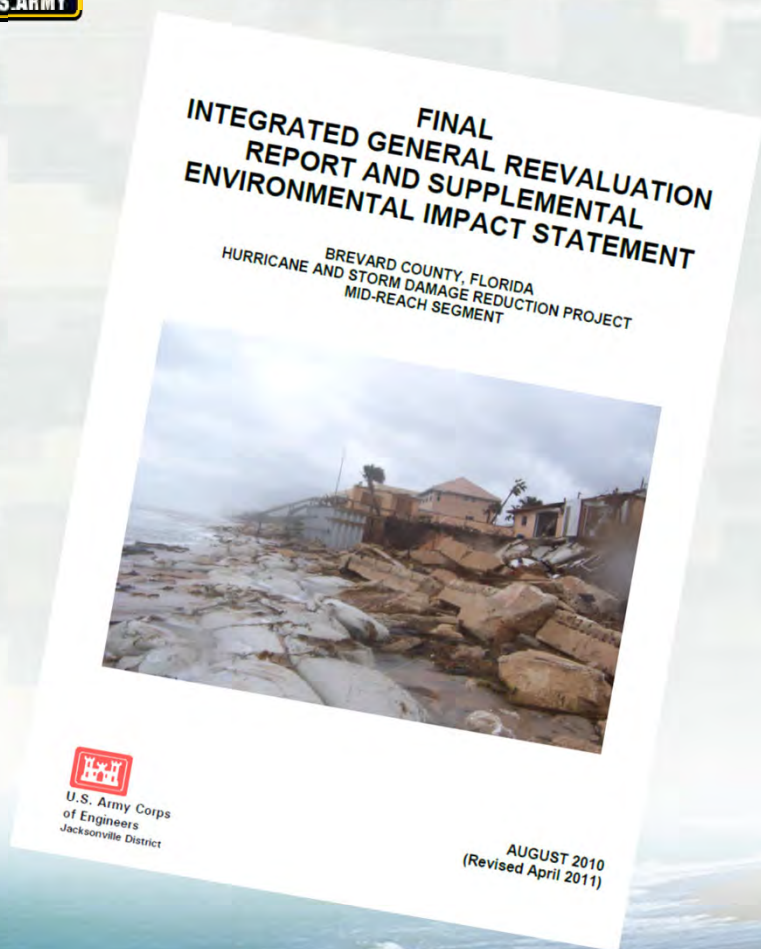




# INCLUDED IN NEW PROJECTS



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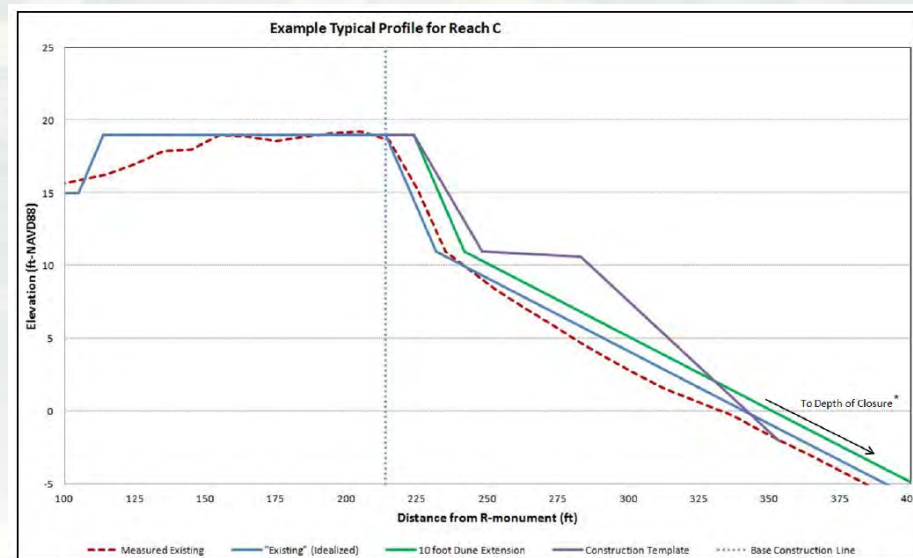
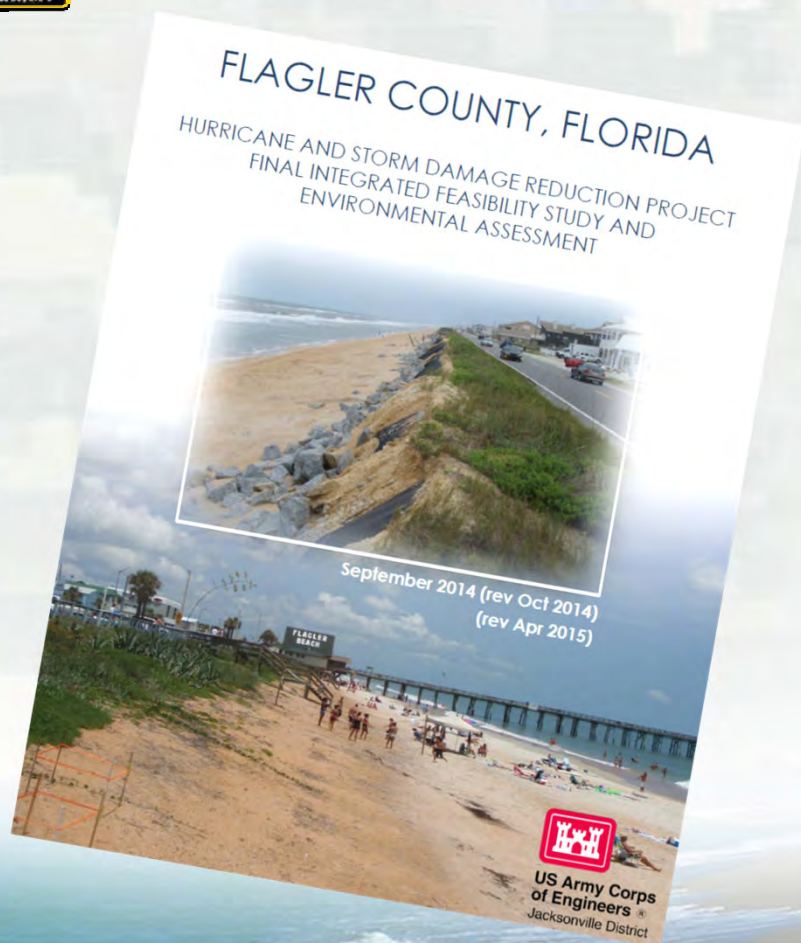
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# INCLUDED IN NEW PROJECTS



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\*The depth of closure for a given or characteristic time interval is the most landward depth seaward of which there is no significant change in bottom elevation and no significant net sediment transport between the nearshore and the offshore.

Figure 6-5: Typical Profile Sketch, Recommended Plan

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# INCLUDED IN NEW PROJECTS



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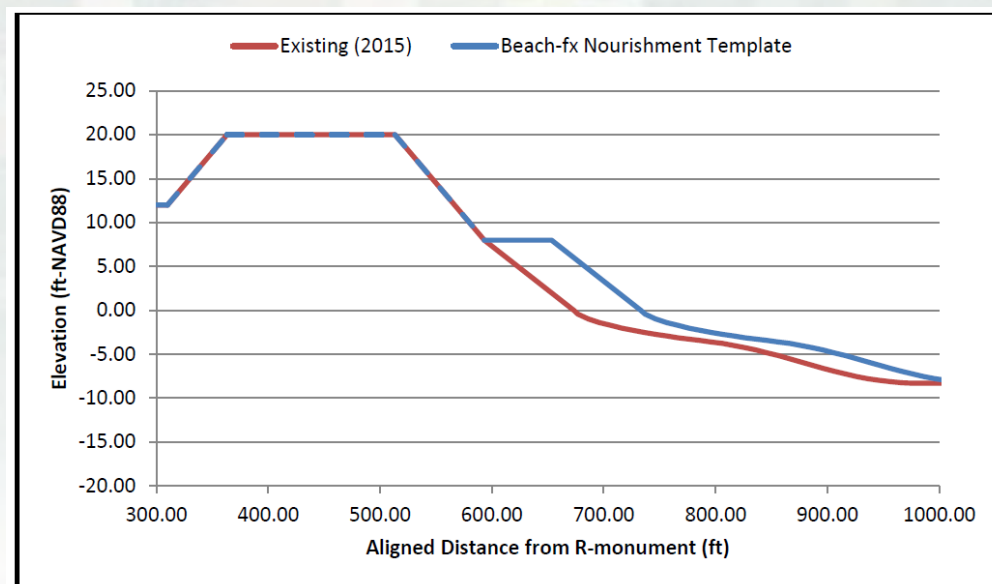
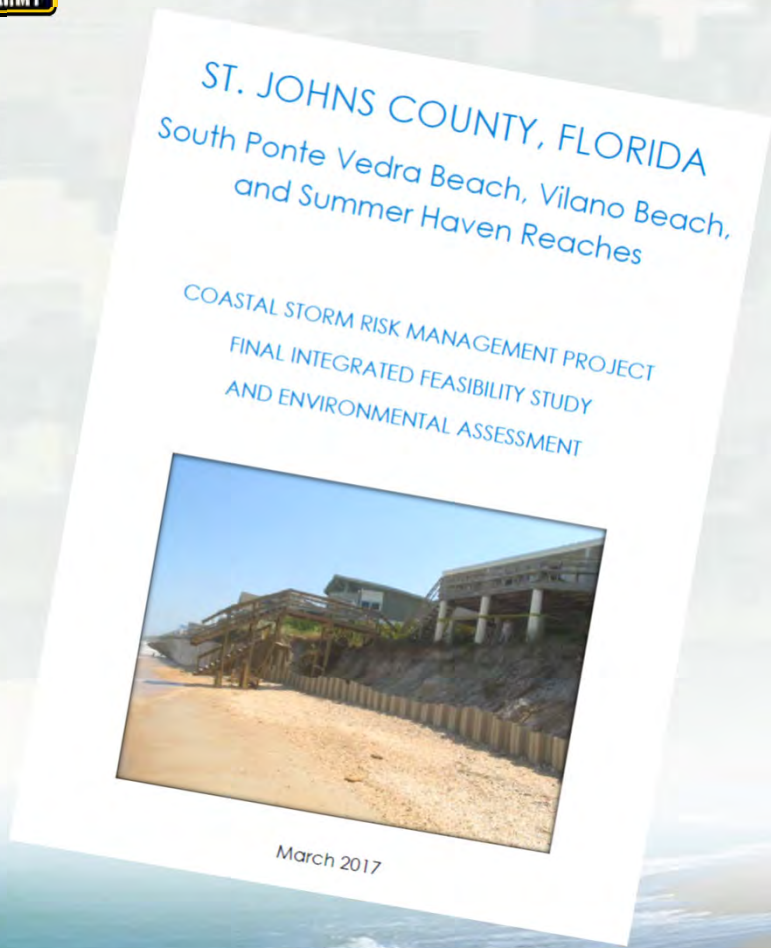


Figure 4-1. Typical Existing Idealized Profile and Nourishment Template.

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# INCLUDED IN NEW PROJECTS



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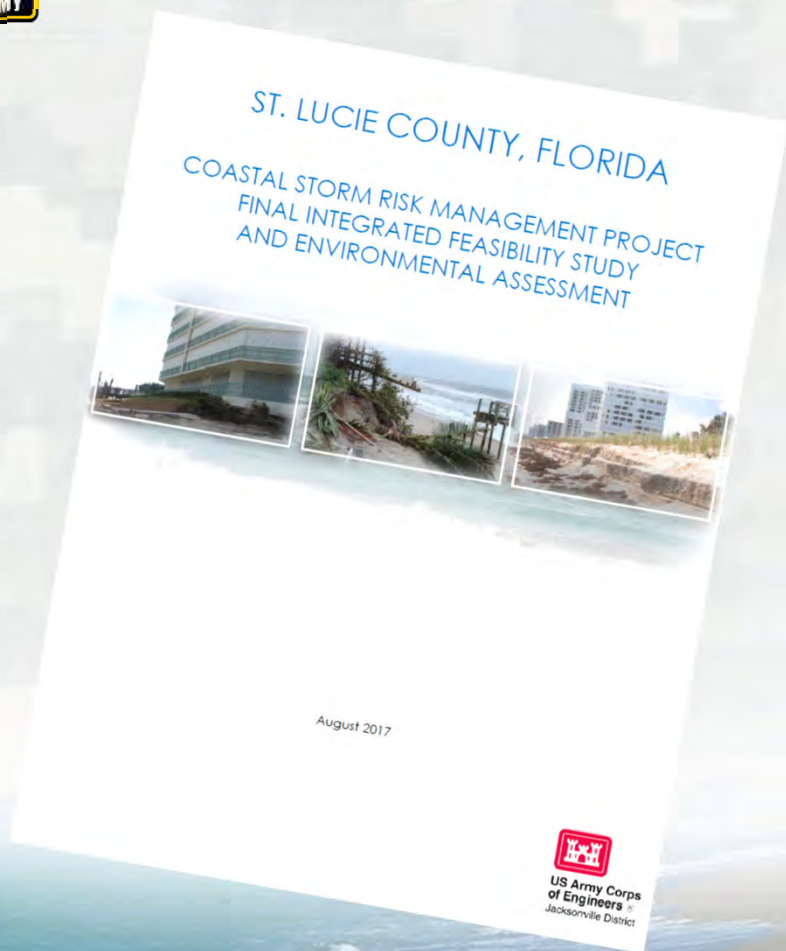
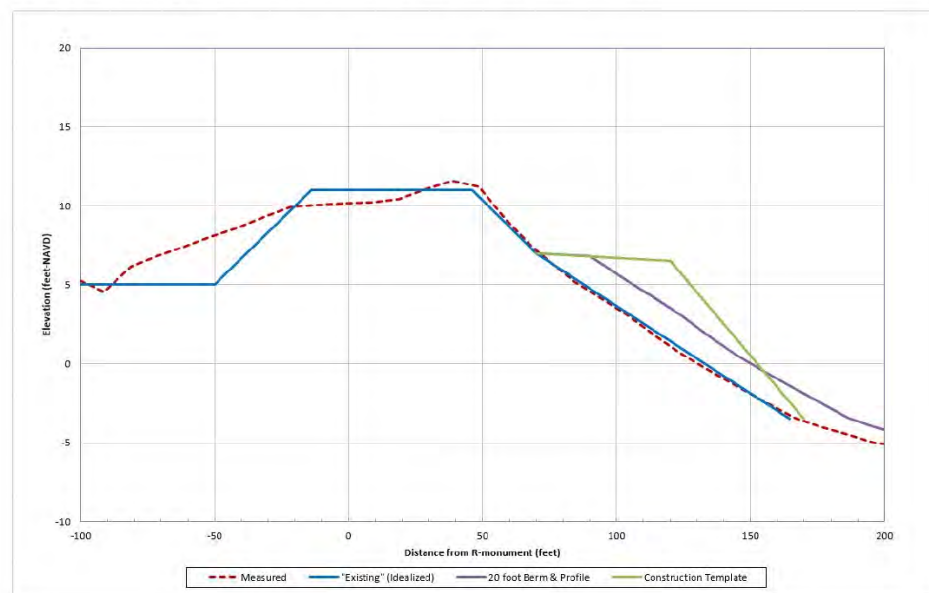


Figure 4-1: Existing profile and nourishment template for R-100 to R-111.



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# WHAT ABOUT EXISTING PROJECTS?



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## Hurricane Irma - 2017



## Bipartisan Budget Act of 2018



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## INCLUDE OR MODIFY IN EXISTING PROJECTS

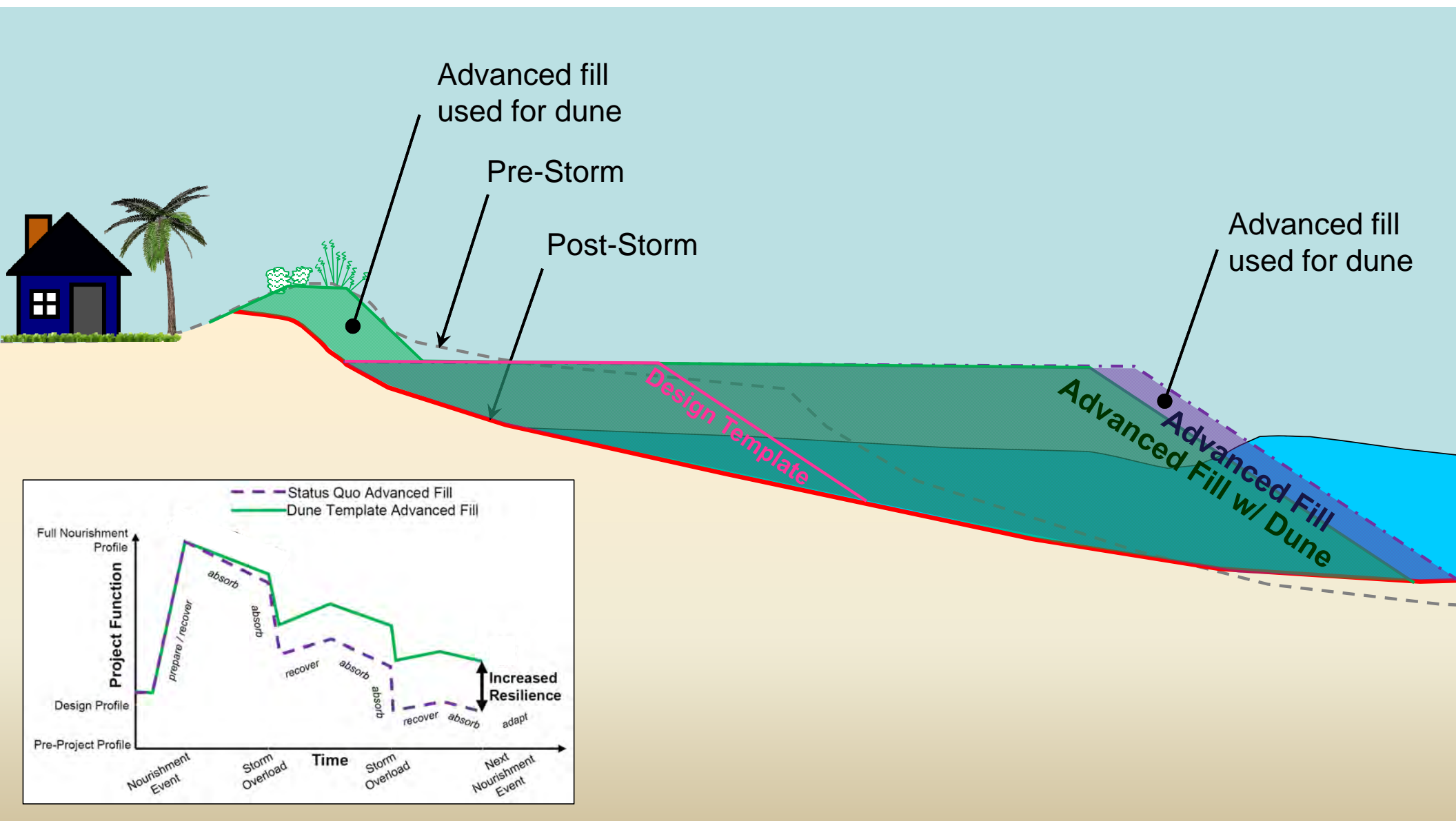


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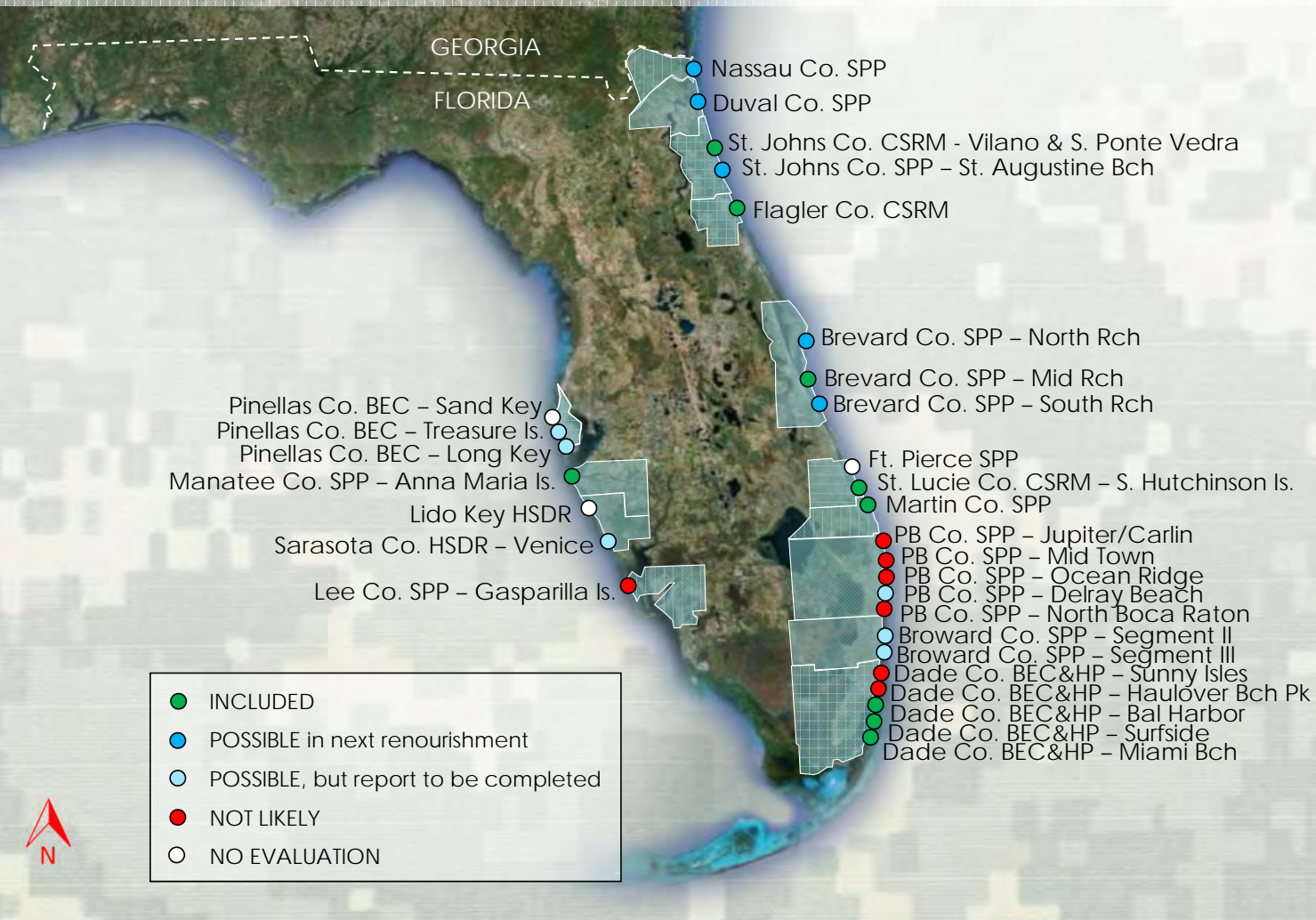
- Evaluate design changes to include or modify sand dunes in existing Federal projects.
- Engineering Documentation Report (EDR)
  - ▶ Approval only needed at the District level (Jacksonville)
  - ▶ Design changes cannot constitute reformulation
  - ▶ Complexity level must be minimal (real estate, sand volume, cost)
- Not officially in project until next nourishment event

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# STATUS OF DUNES IN FEDERAL PROJECTS



Project Name	Dunes in Project	EDR Status	Result
Nassau County SPP	No	Complete	APPROVED - possible construction/ incorporation in next renourishment
Duval County SPP	No	Complete	APPROVED - possible construction/ incorporation in next renourishment
St. Johns County CSRSM, Vilano Beach	Yes		NO EDR NEEDED
St. Johns County SPP, St. Augustine	No	Complete	APPROVED - possible construction/ incorporation in next renourishment
Flagler County CSRSM	Yes		NO EDR NEEDED
Brevard County SPP, North Reach	No	Complete	APPROVED - possible construction/ incorporation in next renourishment
Brevard County SPP, Mid-Reach	Yes		NO EDR NEEDED
Brevard County SPP, South Reach	No	Complete	APPROVED - possible construction/ incorporation in next renourishment
Fort Pierce SPP	No		NO EDR
St. Lucie County CSRSM, South Hutchinson Is.	Yes		NO EDR NEEDED
Martin County SPP	Yes		NO EDR NEEDED
Palm Beach County SPP, Jupiter Carlin	No	Draft	NOT LIKELY construction/incorporation due to real estate constraint
Palm Beach County SPP, Mid-Town	No	Draft	NOT LIKELY construction/incorporation due to real estate constraint
Palm Beach County SPP, Ocean Ridge	No	Draft	NOT LIKELY construction/incorporation due to real estate constraint
Palm Beach County SPP, Delray	No	Draft	POSSIBLE construction/incorporation, but EDR to be completed
Palm Beach County SPP, North Boca Raton	No	Draft	NOT LIKELY construction/incorporation due to real estate constraint
Broward County SPP, Segment II	No	Draft	POSSIBLE construction/incorporation, but EDR to be completed
Broward County SPP, Segment III	No	Draft	POSSIBLE construction/incorporation, but EDR to be completed
Miami-Dade County BEC, Sunny Isles	No	Complete	NEGATIVE
Miami-Dade County BEC&HP, Haulover Bch Pk	No		
Miami-Dade County BEC&HP, Bal Harbor	Yes		NO EDR NEEDED
Miami-Dade County BEC&HP, Surfside	Yes		Ongoing Feasibility Study (LIKELY includes dune, except Haulover Bch Pk)
Miami-Dade County BEC&HP, Miami Beach	Yes		
Lee County SPP, Gasparilla	No	Draft	NOT LIKELY incorporation of dune due to real estate constraint
Sarasota County SPP, Venice	No	Draft	POSSIBLE construction/incorporation, but EDR to be completed
Lido Key HSDR	No		NO EDR
Manatee County SPP, Anna Maria Island	Yes	Complete	APPROVED - construction/incorporation in 2020 renourishment
Pinellas County CSRSM, Long Key	No		NO EDR NEEDED
Pinellas County CSRSM, Treasure Island	No		Ongoing Feasibility Study (LIKELY includes dune)
Pinellas County BEC, Sand Key	No		NO EDR





# DESIGN CHANGES – MANATEE COUNTY SPP



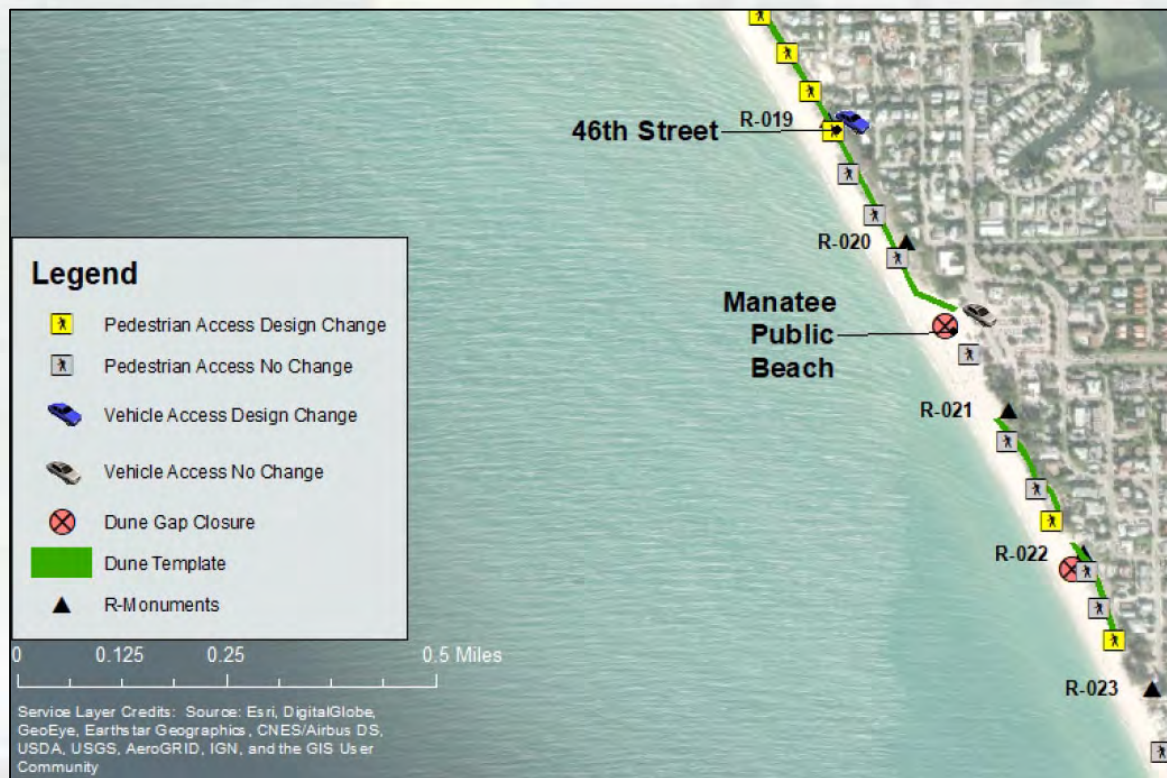
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Manatee County, Florida Shore Protection  
Project  
Manatee County, Florida

FINAL  
Engineering Documentation Report (EDR):  
Dune Resilience



U.S. Army Corps of Engineers  
Jacksonville District  
September 2020



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# DESIGN CHANGES – MANATEE COUNTY SPP



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Manatee County, Florida Shore Protection  
Project  
Manatee County, Florida

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U.S. Army Corps of Engineers  
Jacksonville District  
September 2020



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# IMPLEMENTATION – MANATEE COUNTY SPP



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# CONCLUSION



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- We have come a long way in our understanding of dunes.
- Dunes should be considered for all new Federal projects (or reauthorizations).
- It is possible to include dunes into existing Federal projects (design changes/costs must be minimal to avoid reformulation).
- Dune is not officially in project until next nourishment event.
- This is just the beginning - we still have a long way to go to implement into all applicable projects.

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# QUESTIONS



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- Thank you!

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