

**City of Shoreacres
Bayfront Erosion Study
Public Input Meeting
June 2, 2004**

How do you use the park and particularly the bayfront shoreline and nearby water?

How has the erosion, including the concrete rip-rap placed to combat it, affected your use of the park, the shoreline, and nearby water?

How important are the following screening criteria to you?

1 = most important, 2 = very important, 3 = less important, 4 = unimportant

- ☐ Erosion prevention for frequent storm events, wakes, etc. (day-to-day)
- ☐ Erosion prevention for infrequent storm events (1 to 10 yr return period storms)
- ☐ Erosion prevention for rare storm events (50 to 100 yr return period storms)
- ☐ Cost to build
- ☐ Cost to maintain
- ☐ Proven design / construction
- ☐ Reasonable to obtain permits
- ☐ Funding potential
- ☐ Recreational preservation / enhancement
- ☐ Aesthetic preservation / enhancement
- ☐ Ecological diversity preservation / enhancement
- ☐ Private property value preservation / enhancement
- ☐ Impact to adjacent shore / marina
- ☐ Stormwater runoff & water quality preservation / enhancement

Are there other criteria not covered here that are important to you?

Which alternative or combination of alternatives would you most favor and why?

Which alternative or combination of alternatives would you least favor and why?

Other Comments (use back of sheet as needed)

Note: Please return this form to City Hall by 7/12/04.

City of Shoreacres Bayfront Erosion Study



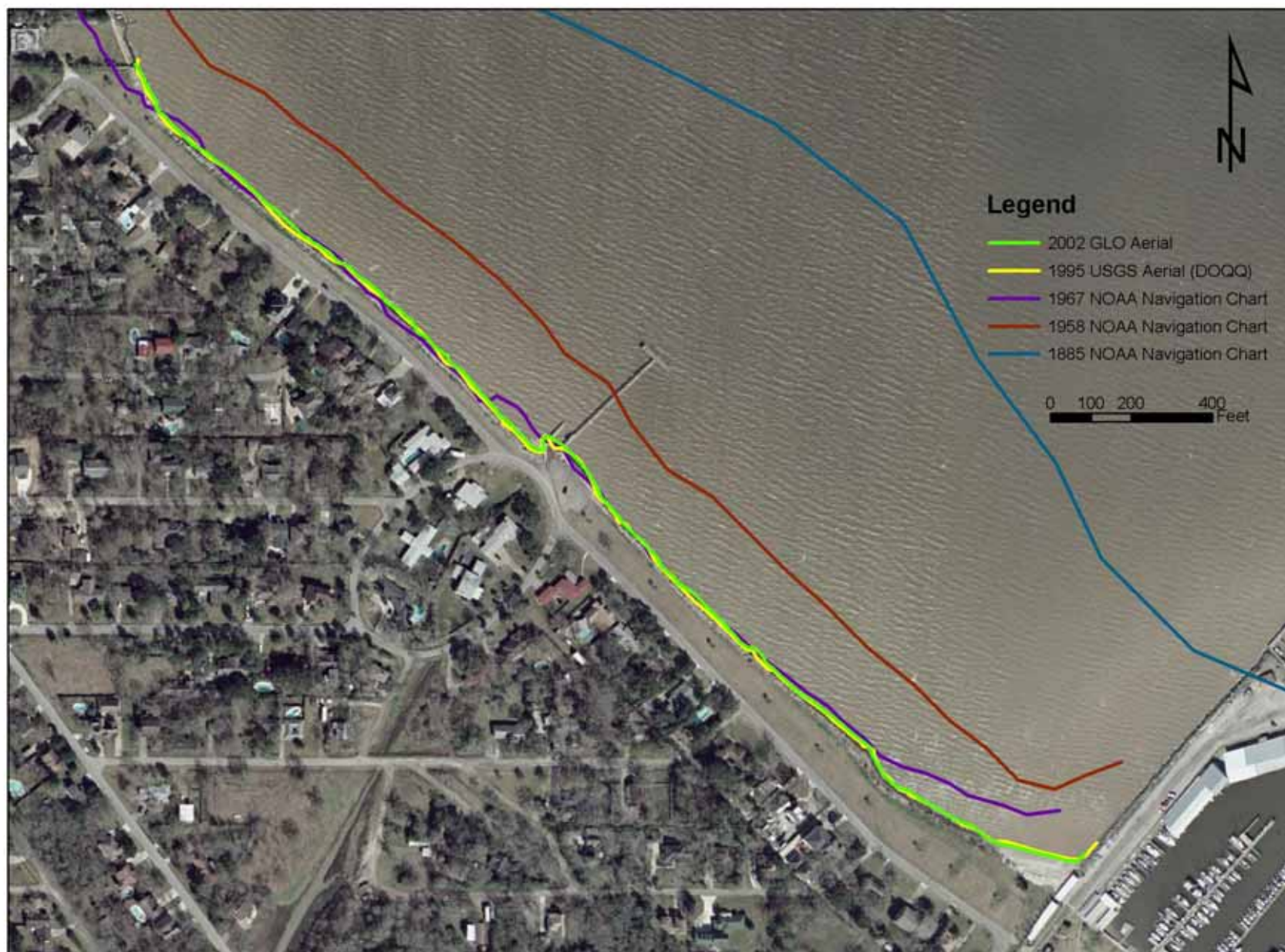
Public Input Meeting June 2, 2004

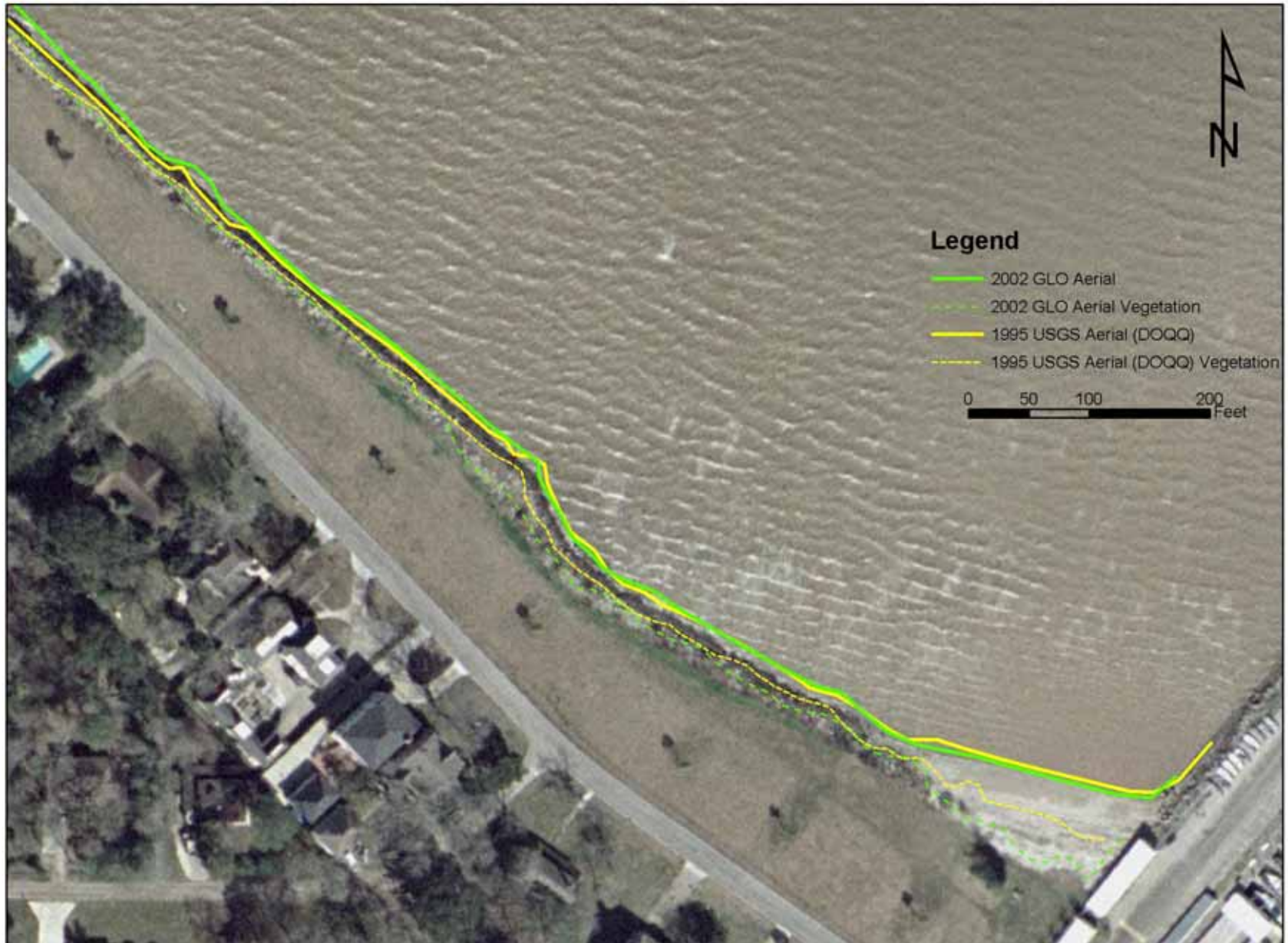
Purpose

- Share information on what's going on
- Look at information on erosion
- Discuss criteria for what the community would like to see
- Discuss possible solutions

Background

- CMP Grant
- Survey Work
- Historic Erosion
- History of Concrete Rip-Rap Revetment

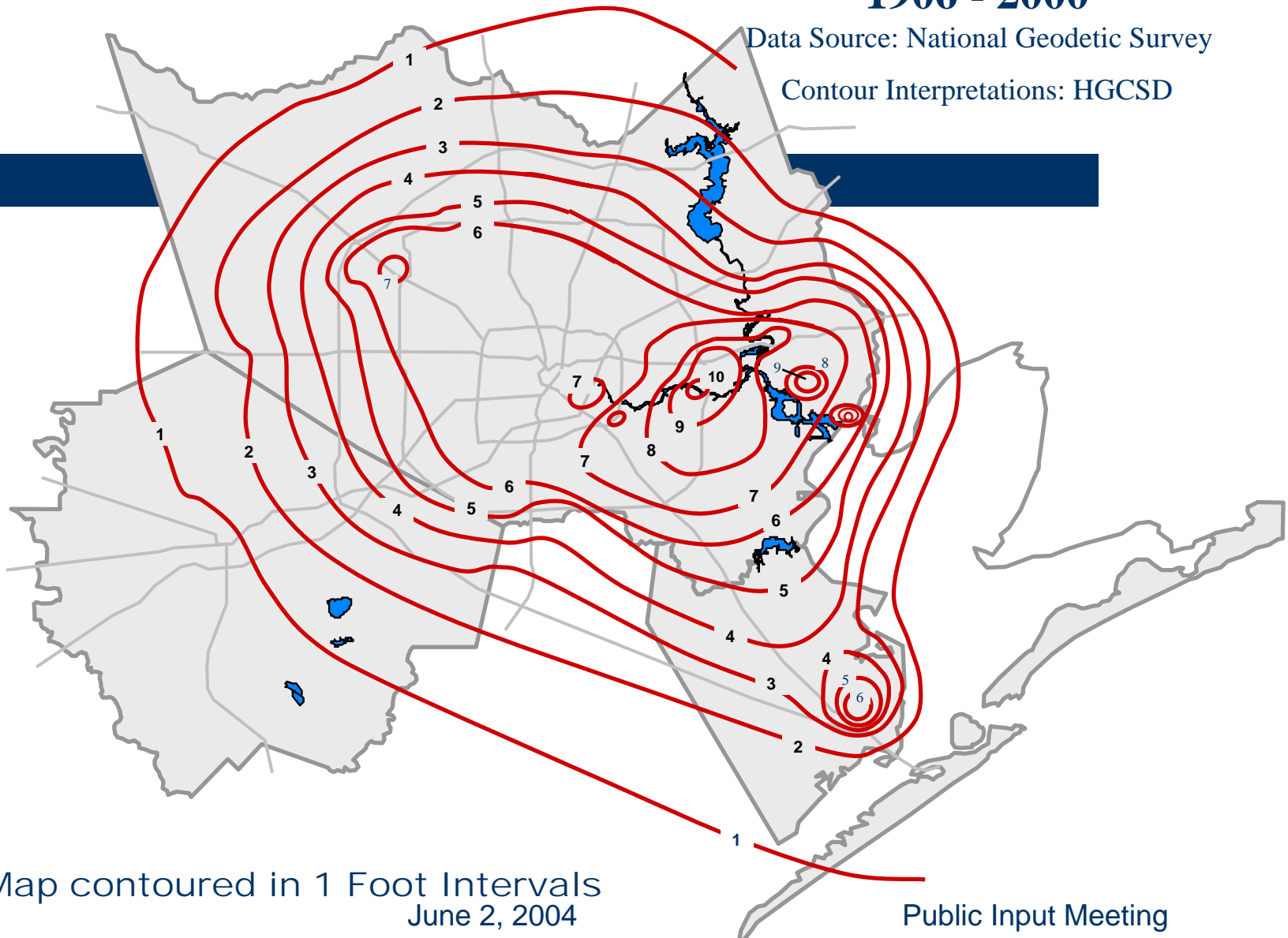




1906 - 2000

Data Source: National Geodetic Survey

Contour Interpretations: HGCSD

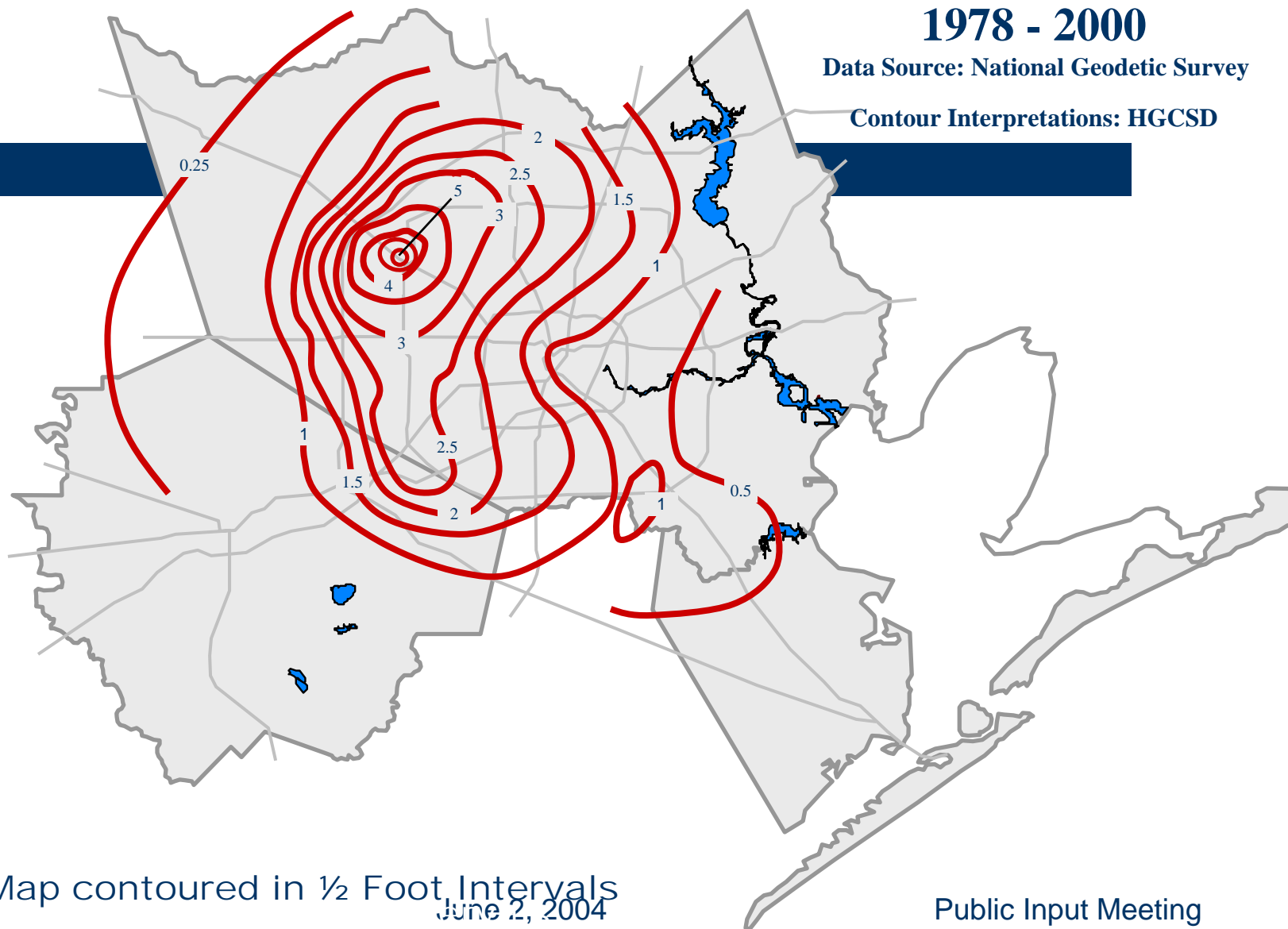


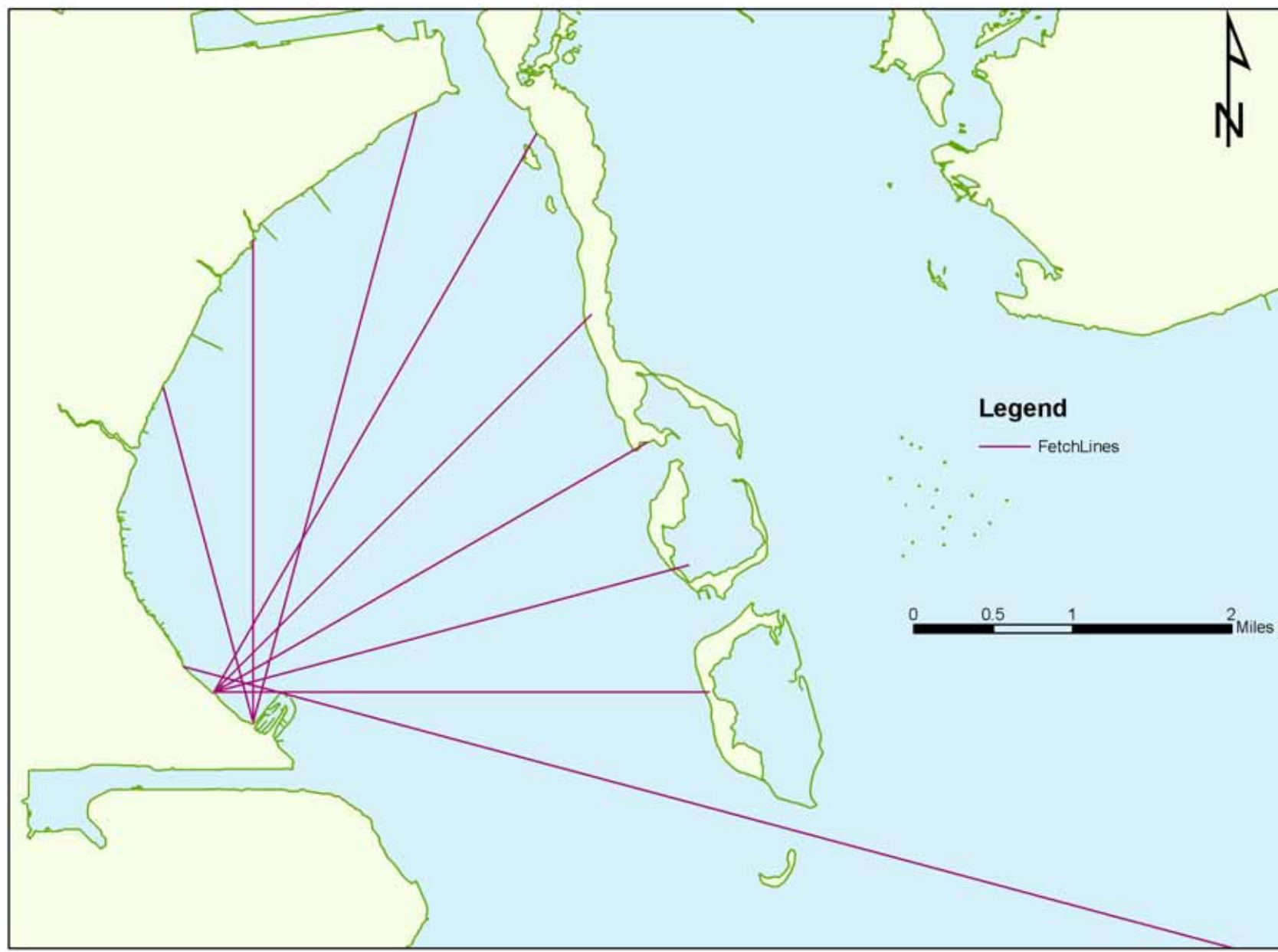
Subsidence in Feet

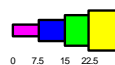
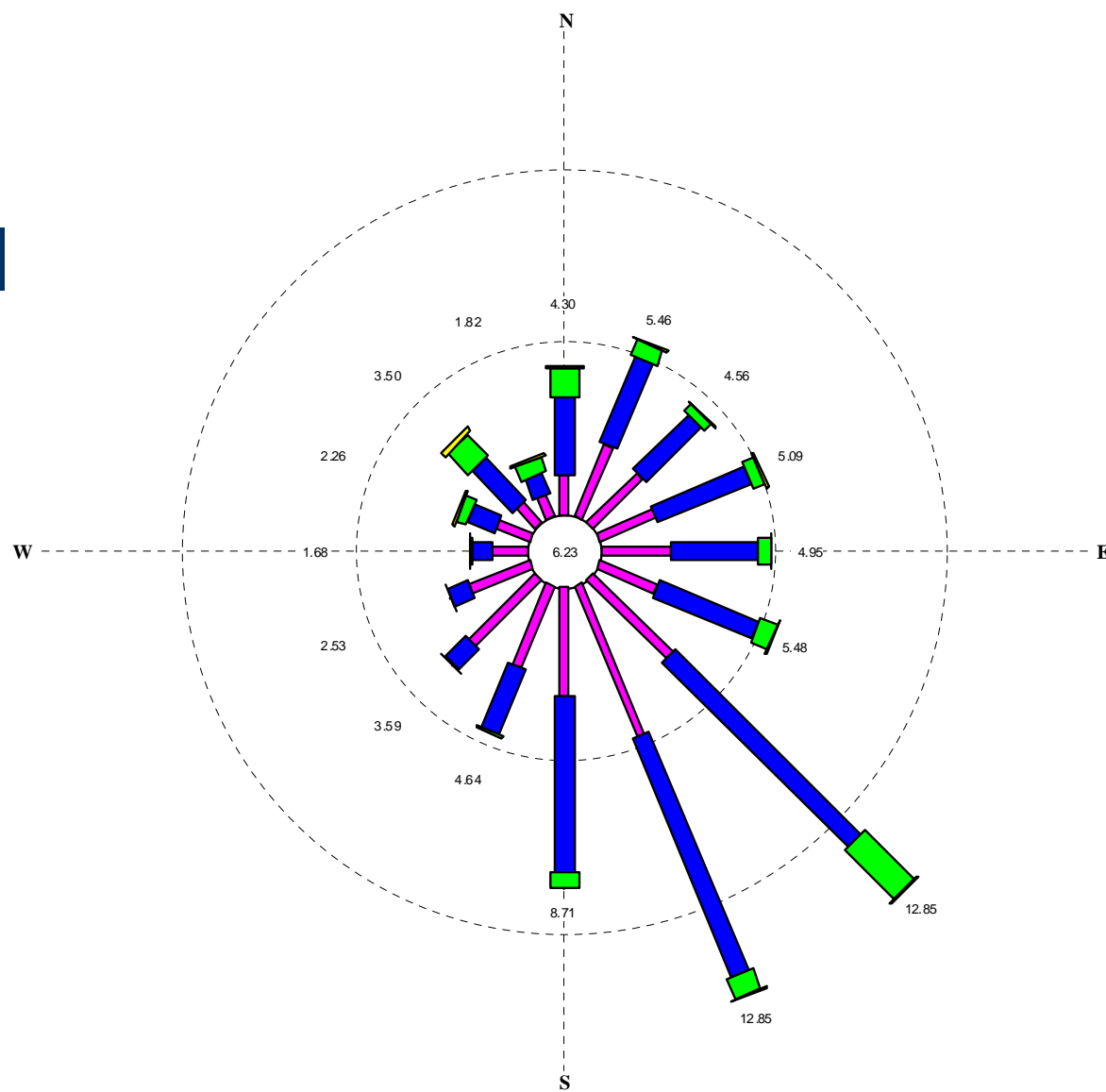
1978 - 2000

Data Source: National Geodetic Survey

Contour Interpretations: HGCS







Wind Speed (Miles PerHour)

Rings drawn at 5% intervals.
9.51% of observations were missing.

Environmental Conditions

Design Condition	Storm	Water Level (ft)	Wind- speed (knots)	Wave Height (ft)	Wave Period (s)
Day-to-Day / Frequent Storms	Cold Front, etc	0.7	20	1	1.8
Infrequent Storms (approx. 10-yr return period)	Cat. I	5.4	64	4.3	2.9
Rare Storms (approx. 50-yr return period)	Cat. III	10.2	96	7	3.4

Alternatives

- Beach Nourishment
- Beach Nourishment w/ Sill
- Beach Nourishment w/ Groins
- Beach Nourishment w/ Breakwaters
- Concrete Articulating Block Mattress (ABM) Revetment
- Bulkhead
- Rock Revetment
- Rock Filled Gabion Revetment
- Rock Breakwater w/ Marsh and/or Seagrass
- Geotextile Tube Breakwater w/ Marsh and/or Seagrass
- Timber Breakwater w/ Marsh and/or Seagrass
- Rock Filled Gabion Breakwater w/ Marsh and/or Seagrass

Screening Criteria

- Erosion prevention effectiveness for:
 - a. frequent storm events, wakes, etc. (day-to-day)
 - b. infrequent storm events (1 to 10 yr return period storms)
 - c. rare storm events (50 to 100 yr return period storms)
- Cost to build
- Cost to maintain
- Proven design / construction
- Reasonable to obtain permits
- Funding potential
- Recreational preservation / enhancement
- Aesthetic preservation / enhancement
- Ecological diversity preservation / enhancement
- Private property value preservation / enhancement
- Impact to adjacent shore / marina
- Stormwater runoff & water quality preservation / enhancement

Recreational Impacts

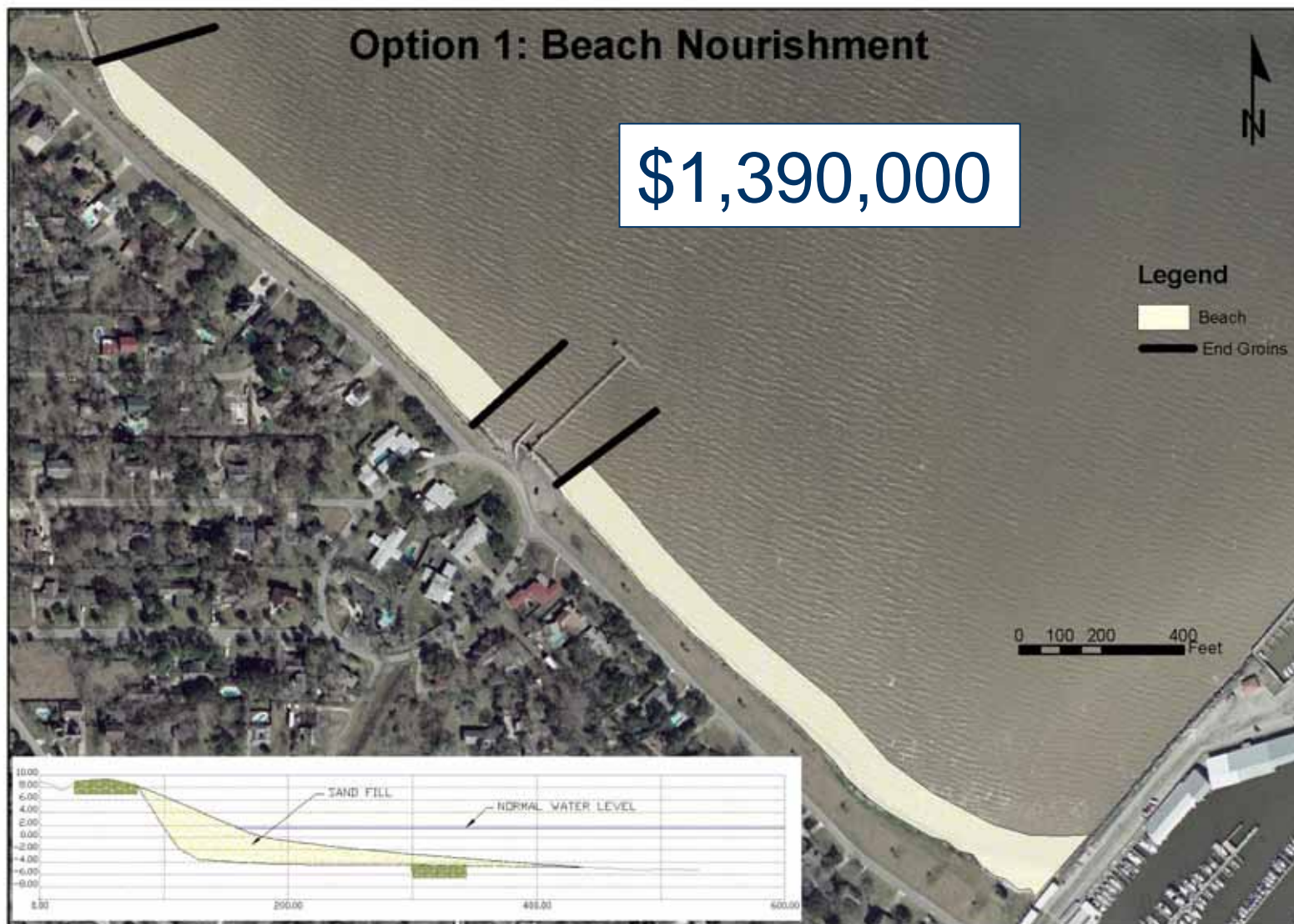
- bird watching
- boat fishing
- boat ramp use
- jet skiing
- kayaking/canoeing
- larger craft boating
- pier fishing
- small boat (dinghy/catamaran) sailing
- shore / wade fishing
- swimming
- walking / running
- water skiing

Alternatives

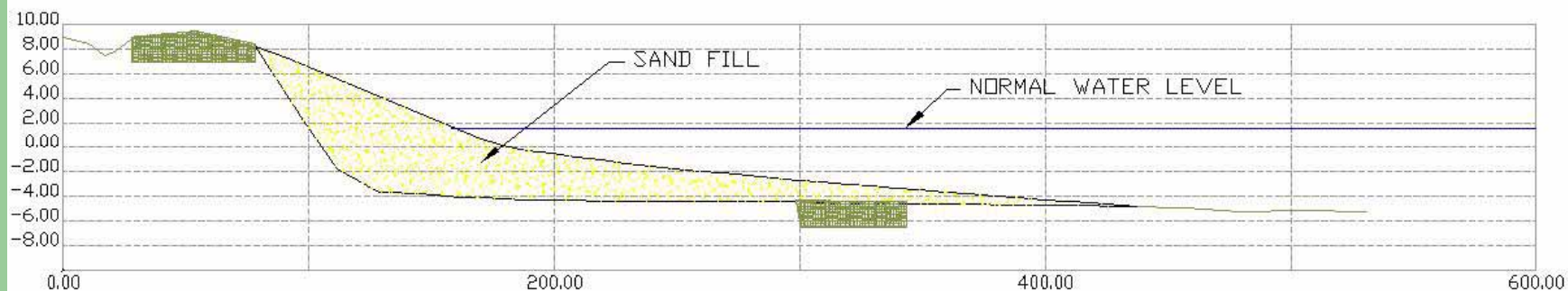
- Beach Nourishment
- Marsh Creation with Gabion Breakwaters
- Beach Nourishment with Groins
- Beach Nourishment with Breakwaters
- Rock Rip-rap Revetment

Option 1: Beach Nourishment

\$1,390,000



Beach Nourishment



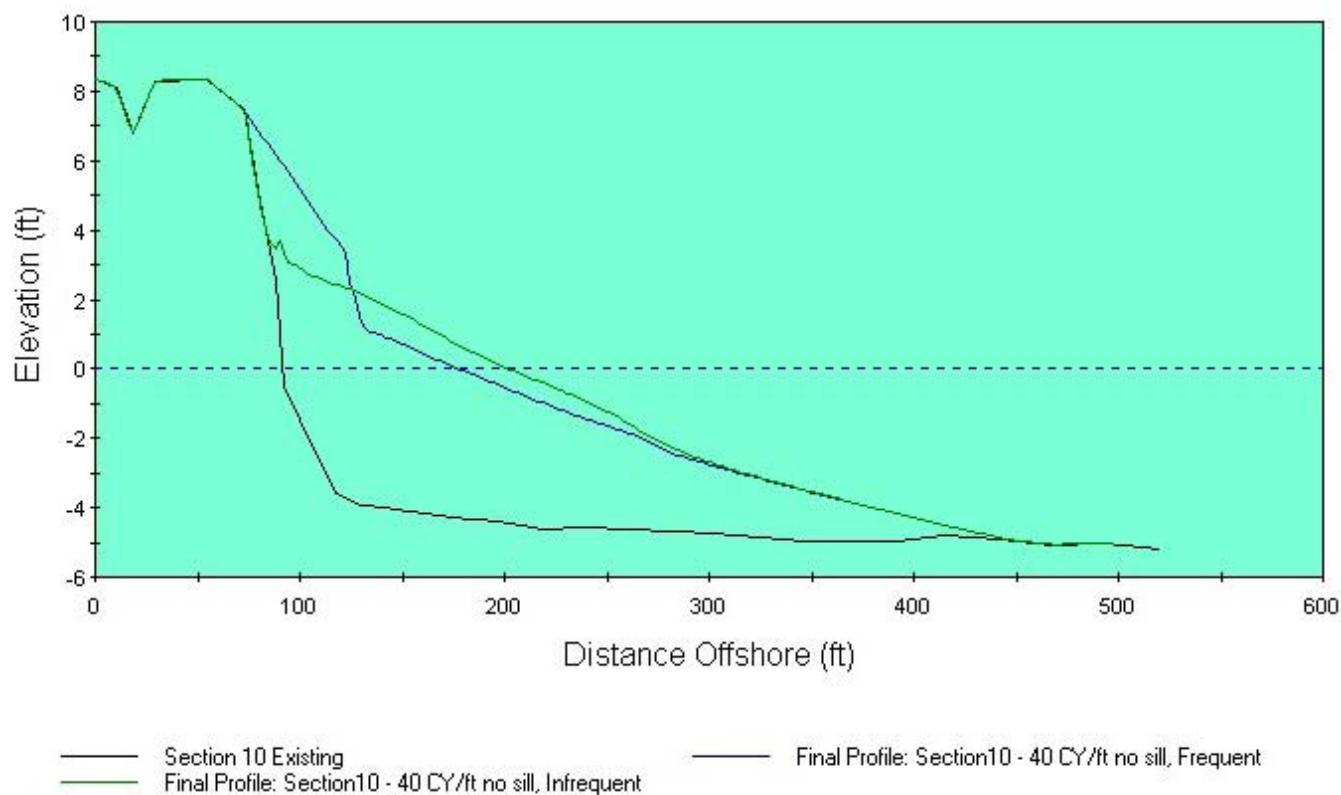
Beach Nourishment



Texas A&M
University – Corpus
Christi

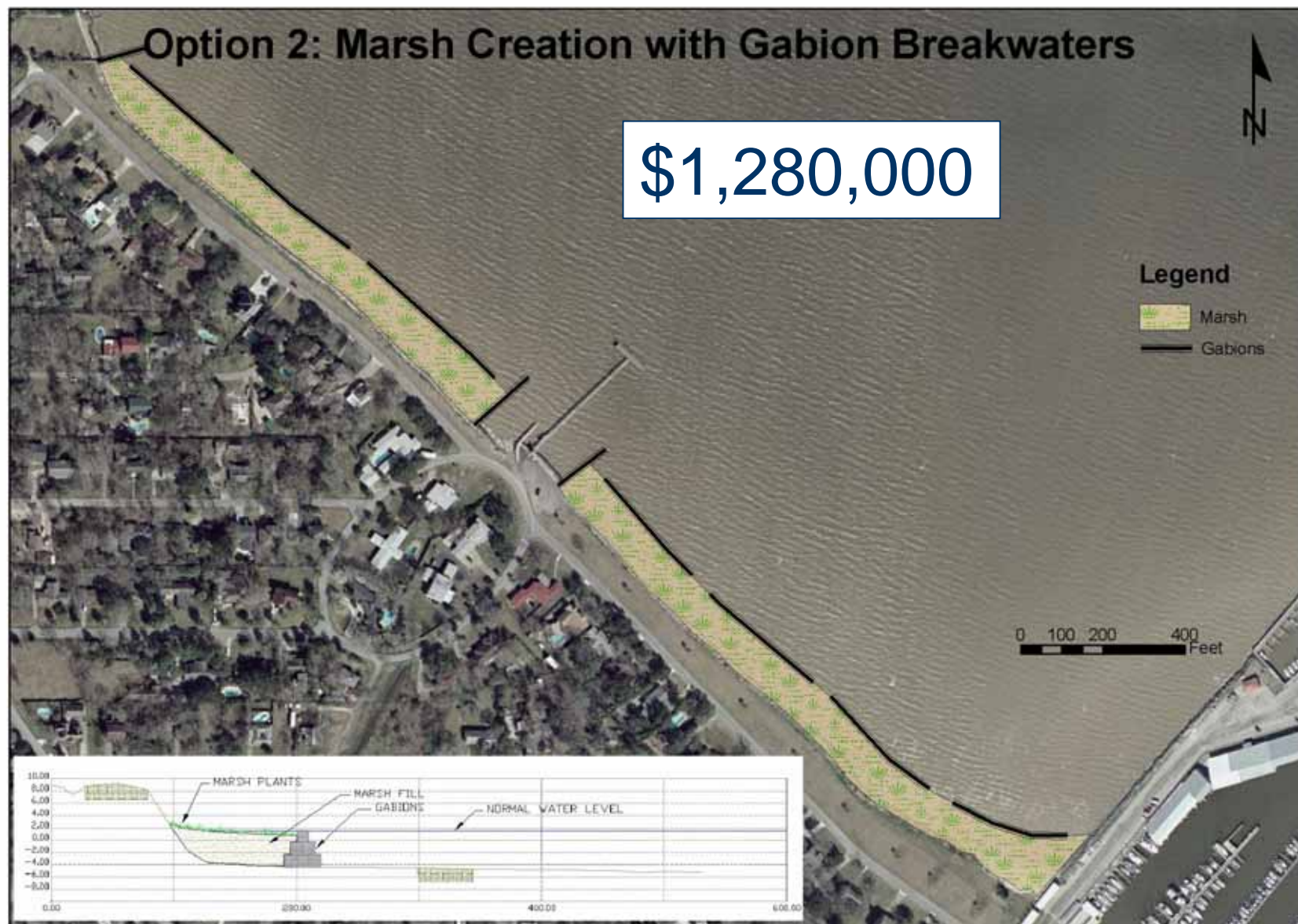
Constructed by GLO
in 2001

Beach Nourishment – Storm Effects

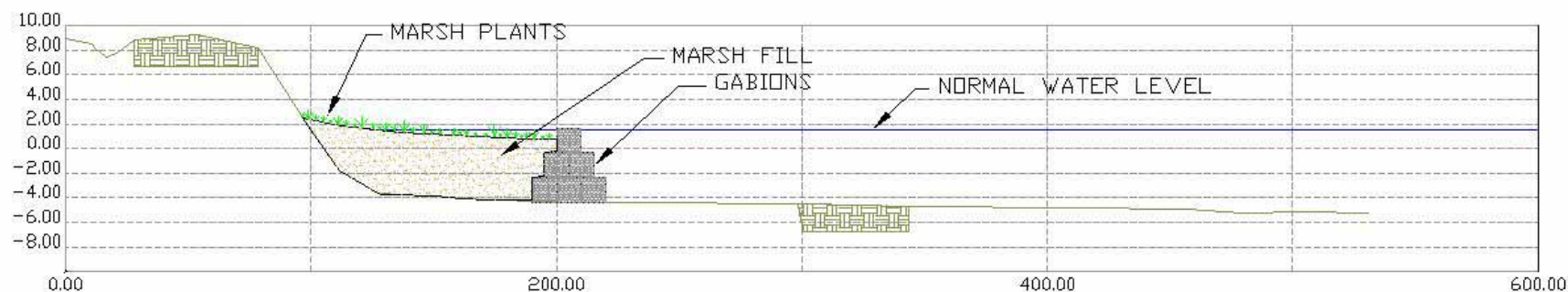


Option 1: Beach Nourishment (after Adjustment)





Marsh Creation with Gabion Breakwaters



Breakwaters with Marsh / Seagrass



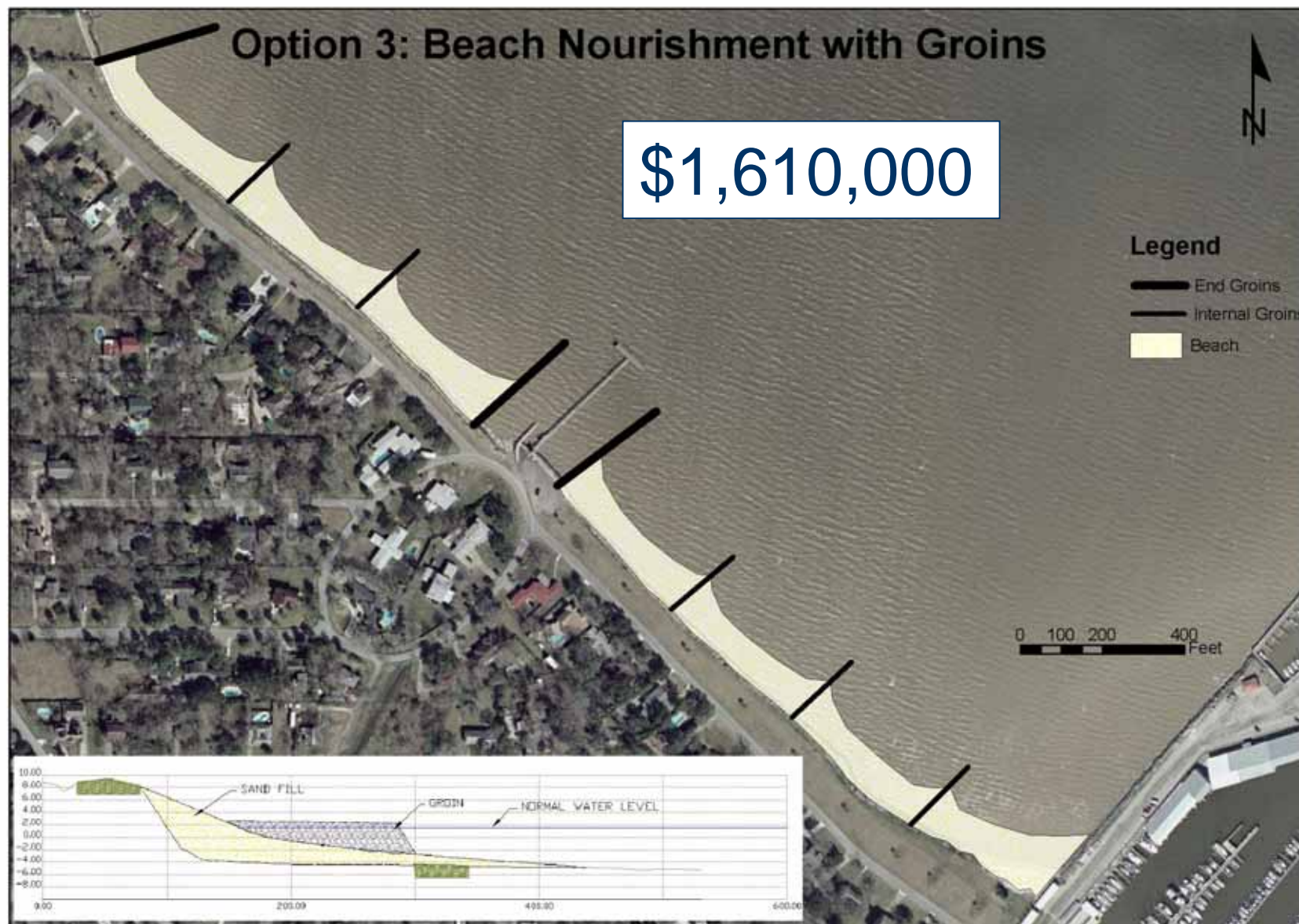
Copano Bay Shoreline

Constructed by GLO in 2001

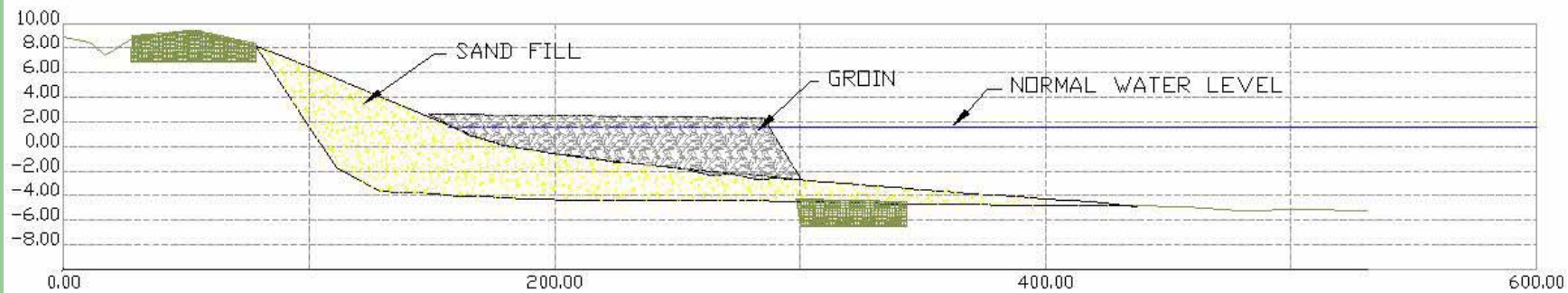
Breakwaters with Marsh / Seagrass



Gabions



Beach Nourishment with Groins



Beach Nourishment with Groins



Indianola Beach

Constructed by GLO in
2003

Beach Nourishment



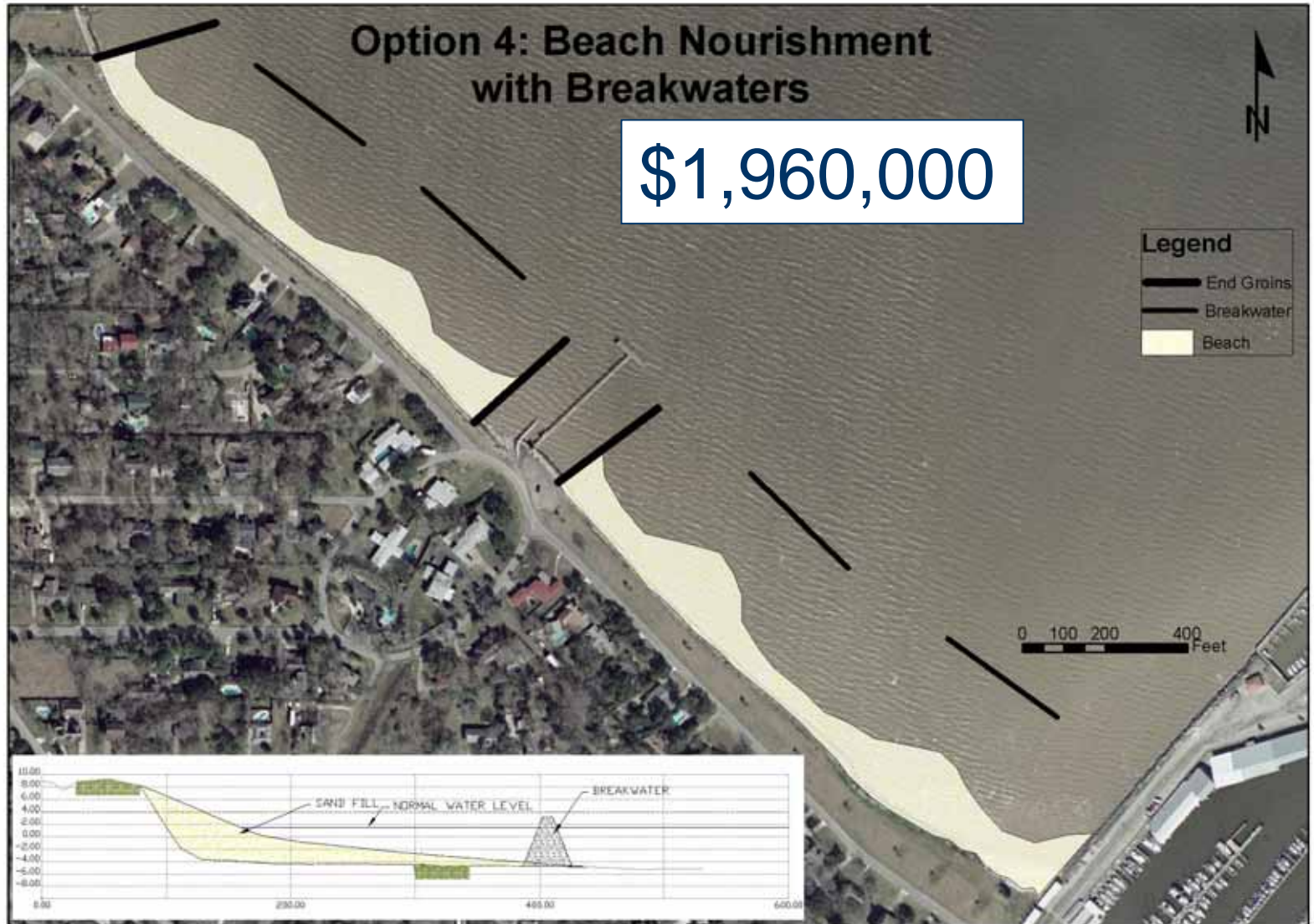
Indianola Beach

Constructed by GLO
in 2003

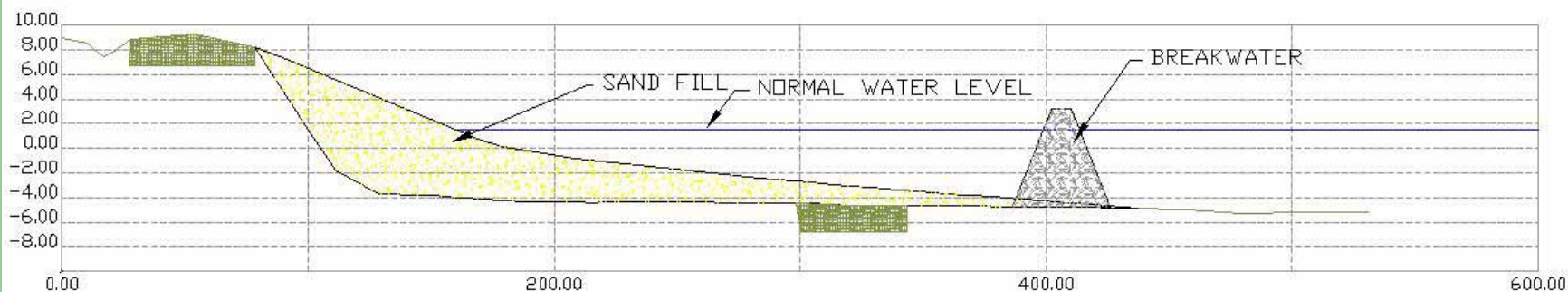
Photograph is post-
Hurricane Claudette

Option 4: Beach Nourishment with Breakwaters

\$1,960,000



Beach Nourishment with Breakwaters



Beach Nourishment with Breakwaters



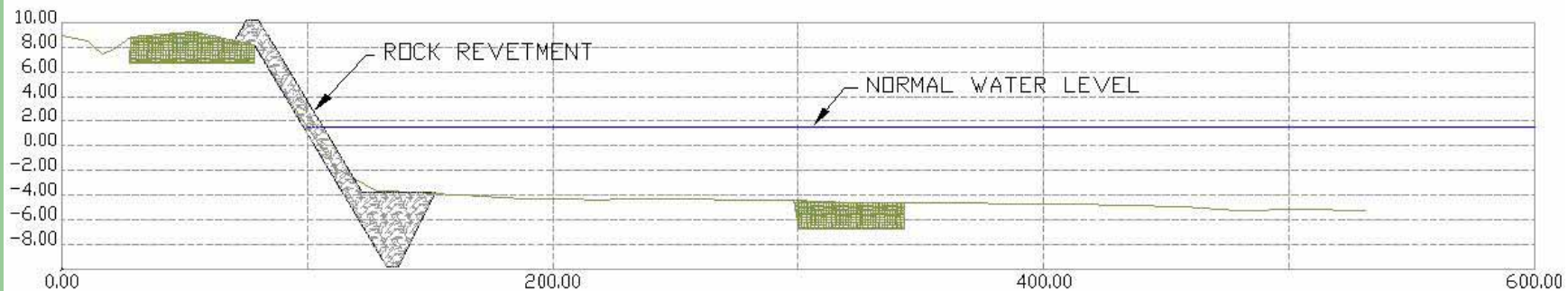
Texas A&M Corpus Christi – Constructed by GLO in 2001

Option 5: Revetment

\$1,390,000



Revetment



Rock Revetment



Hall's Lake

West Galveston Bay

Constructed by GLO
in 2001







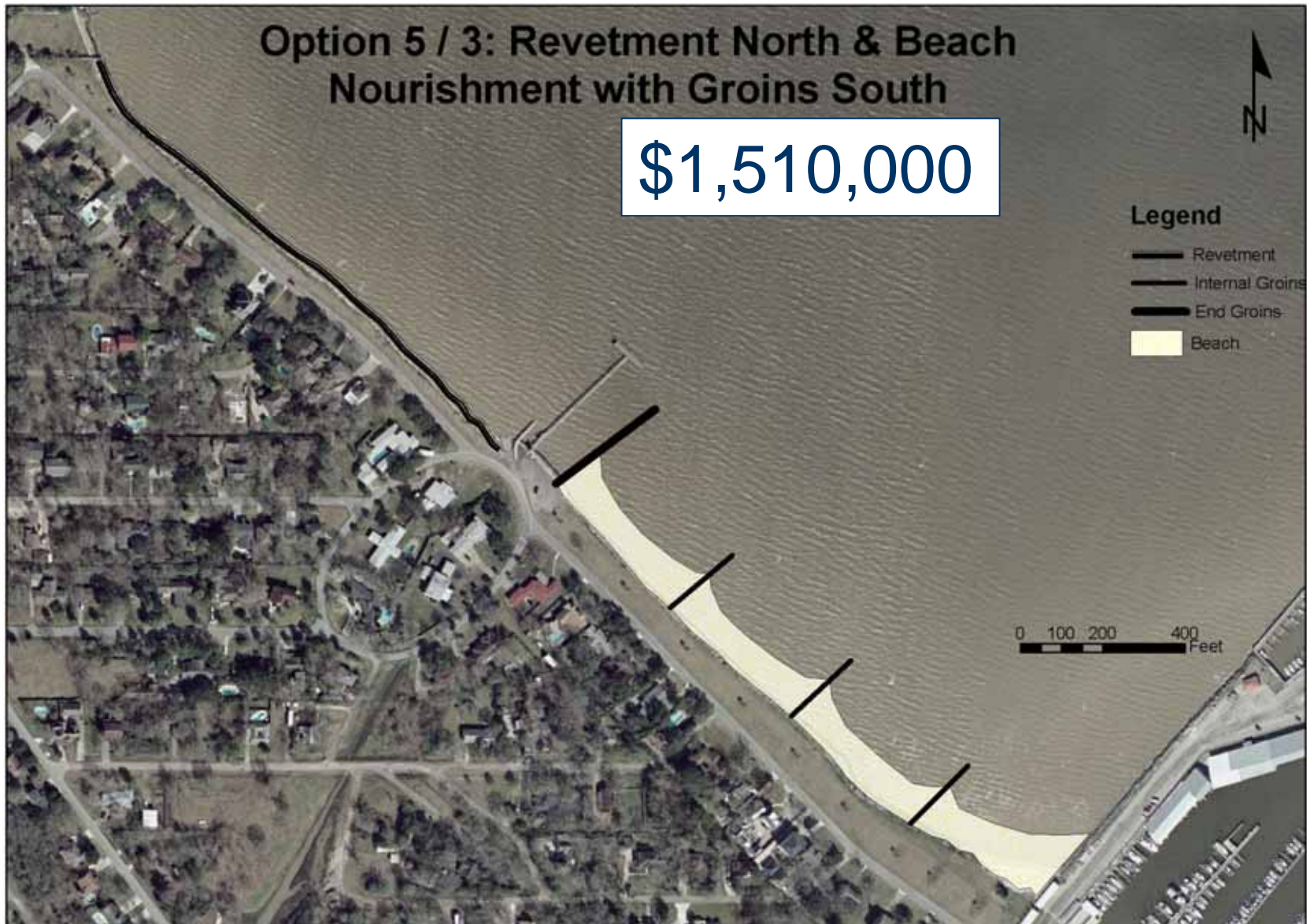
Option 5 / 1: Revetment North & Beach Nourishment South

\$1,360,000



Option 5 / 3: Revetment North & Beach Nourishment with Groins South

\$1,510,000



Option 5 / 4: Revetment North & Beach Nourishment with Breakwaters South

\$1,680,000



Funding Possibilities

- Texas General Land Office – CEPRA, CMP
- Texas Parks & Wildlife – Outdoor Recreation Grants, Small Community Grants, Recreational Trails Grants
- Galveston Bay Estuary Program
- US Fish & Wildlife – CWPPRA, Texas Coastal Program
- US Army Corps of Engineers – Section 111
- NOAA – Community Based Restoration Program
- Private Groups

Alternatives	Beach Nourishment	Beach Nourishment w/ Sill	Beach Nourishment w/ Groins	Beach Nourishment w/ Breakwaters	Concrete Articulating Block Mattress (ABM) Revetment	Bulkhead	Rock Revetment	Rock Filled Gabion Revetment	Rock Breakwater w/ Marsh and/or Seagrass	Geotextile Tube Breakwater w/ Marsh and/or Seagrass	Timber Breakwater w/ Marsh and/or Seagrass	Rock Filled Gabion Breakwater w/ Marsh and/or Seagrass	Floating Breakwaters
Screening Criteria													
Erosion prevention effectiveness for: a. frequent storm events, wakes, etc. (day-to-day) b. infrequent storm events (1 to 10 yr return period storms) c. rare storm events (50 to 100 yr return period storms)	● ⊙ ☒	● ● ☒	● ⊙ ☒	● ● ⊙	● ● ⊙	● ● ●	● ● ●	● ● ⊙	● ⊙ ⊙	⊙ ⊙ ☒	● ⊙ ☒	● ● ⊙	● ⊙ ☒
Cost to build	●	⊙	⊙	⊙	⊙	☒	⊙	⊙	☒	●	●	●	⊙
Cost to maintain	⊙	●	●	●	☒	●	●	⊙	●	☒	☒	⊙	⊙
Proven design / construction	●	⊙	●	●	●	●	●	●	●	●	●	●	⊙
Reasonable to obtain permits	●	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●	●	●	●	⊙
Funding potential	●	●	●	●	⊙	⊙	⊙	⊙	⊙	●	●	●	⊙
Recreational preservation / enhancement	●	⊙	●	⊙	⊙	☒	☒	☒	⊙	⊙	⊙	⊙	⊙
Aesthetic preservation / enhancement	●	☒	⊙	☒	⊙	⊙	⊙	⊙	☒	☒	☒	☒	⊙

Alternatives	Beach Nourishment	Beach Nourishment w/ Sill	Beach Nourishment w/ Groins	Beach Nourishment w/ Breakwaters	Concrete Articulating Block Mattress (ABM) Revetment	Bulkhead	Rock Revetment	Rock Filled Gabion Revetment	Rock Breakwater w/ Marsh and/or Seagrass	Geotextile Tube Breakwater w/ Marsh and/or Seagrass	Timber Breakwater w/ Marsh and/or Seagrass	Rock Filled Gabion Breakwater w/ Marsh and/or Seagrass	Floating Breakwaters
Screening Criteria													
Ecological diversity preservation / enhancement	●	●	●	●	●	●	●	●	●	●	●	●	●
Private property value preservation / enhancement	●	●	●	●	●	●	●	●	☒	☒	☒	☒	●
Impact to adjacent shore / marina	●	●	●	●	●	●	●	●	●	●	●	●	●
Stormwater runoff & water quality preservation / enhancement	●	●	●	●	●	●	●	●	●	●	●	●	●
OVERALL	●	●	●	●	☒	☒	●	☒	●	☒	●	●	☒
CARRY FORWARD?	Yes	No	Yes	Yes	No	No	Yes	No	No	No	No	Yes	No

Note: Analysis considers alternatives in comparison to existing shoreline condition.

● = good, high performance, low cost, most beneficial, likely, no impact = most preferable

● = neutral, moderate performance, moderate cost, not as beneficial, not as likely, minimal impact = less preferable

☒ = poor, poor performance, high cost, least beneficial, unlikely, negative impact = not preferable

Alternatives	Beach Nourishment	Beach Nourishment w/ Sill	Beach Nourishment w/ Groins	Beach Nourishment w/ Breakwaters	Concrete Articulating Block Mattress (ABM) Revetment	Bulkhead	Rock Revetment	Rock Filled Gabion Revetment	Rock Breakwater w/ Marsh and/or Seagrass	Geotextile Tube Breakwater w/ Marsh and/or Seagrass	Timber Breakwater w/ Marsh and/or Seagrass	Rock Filled Gabion Breakwater w/ Marsh and/or Seagrass	Floating Breakwaters
Recreational Use													
bird watching	●	●	●	●	⊙	⊠	⊙	⊙	●	●	●	●	⊙
boat fishing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●	⊙	⊙	●	⊙
boat ramp use	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●
jet skiing	●	⊙	●	⊠	⊙	⊙	⊙	⊙	⊠	⊠	⊠	⊠	⊠
kayaking/canoeing	●	⊙	●	⊙	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊙
larger craft boating	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊠
pier fishing	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	●	●	●	●	⊙
small boat (dinghy/catamaran) sailing	●	⊙	●	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠
shore / wade fishing	⊙	⊙	⊙	⊙	⊠	⊠	⊠	⊙	●	●	●	●	⊙
swimming	●	⊠	⊙	●	⊠	⊠	⊠	⊠	⊠	⊠	⊠	⊠	●
walking / running	●	●	⊙	●	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
water skiing	⊙	⊙	⊙	⊠	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊠
OVERALL	●	⊙	●	⊙	⊠	⊠	⊠	⊠	⊙	⊙	⊙	⊙	⊙

Note: Analysis applies to section where alternative is applied (i.e., bulkhead analysis does not consider that there may be beach, etc. elsewhere in park that is still usable).

● = beneficial / positive impact, ⊙ = not as beneficial / little or no impact, ⊠ = least beneficial / negative impact

OPTION 1: BEACH NOURISHMENT WITH END GROINS ONLY				OPTION 2: CONCRETE RIP-RAP FILLED SS GABIONS WITH MARSH RESTORATION			
Shoreline Length		2640 ft		Shoreline Length		2640 ft	
Length to be Nourished		2440 ft		Length to be Protected		2440 ft	
Nourishment Density		40 CY/ft		Fill Density		20 CY/ft	
Sand Cost		\$10 /CY		Fill Cost		\$6 /CY	
Nourishment Subtotal	\$	976,000			\$	292,800	
Groins to be Built		3		Additional Gabion Groins		3	
Groin Length		300 ft		Gabion Groin Length		200	
Groin Material Cost		\$200 /ft		Gabion Installed Cost		\$250 /ft	
Groins Subtotal	\$	180,000		Gabion Subtotal	\$	760,000	
Rip-rap Removal Cost		\$12 /ton		Wetland Width		50 ft	
Rip-rap Removal Quantity		3 tons/ft		Wetland Planting Cost		\$3,000 /acre	
Rip-rap Removal Subtotal		\$91,440		Wetland Planting Subtotal		\$8,402.20	
Mobilization / Demobilization		\$140,000		Rip-rap Removal Cost		\$12 /ton	
				Rip-rap Removal Quantity		3 tons/ft	
				Rip-rap Removal Subtotal		\$91,440	
				Mobilization / Demobilization		\$130,000	
Construction Cost	\$	1,387,440		Construction Cost		\$1,282,642.20	

OPTION 3: BEACH NOURISHMENT WITH GROINS				OPTION 4: BEACH NOURISHMENT WITH BREAKWATERS			
Shoreline Length		2640 ft		Shoreline Length		2640 ft	
Length to be Nourished		2440 ft		Length to be Nourished		2440 ft	
Nourishment Density		40 CY/ft		Nourishment Density		40 CY/ft	
Sand Cost		\$10 /CY		Sand Cost		\$10 /CY	
Nourishment Subtotal	\$	976,000		Nourishment Subtotal	\$	976,000	
End Groins to be Built		3		Breakwaters to be Built		4	
Groin Length		300 ft		Breakwater Length		300 ft	
Groin Material Cost		\$200 /ft		Breakwater Material Required		7.1 tons/ft	
End Groins Subtotal	\$	180,000		Breakwater Material Cost		\$60 /ton	
Internal Groins to be Built		5		Breakwater Subtotal	\$	511,200	
Groin Length		200 ft		Groins to be Built		3	
Groin Unit Cost	\$	200 /ft		Groin Length		300 ft	
Internal Groins Subtotal	\$	200,000		Groin Material Cost		\$200 /ft	
Rip-rap Removal Cost		\$12 /ton		Groins Subtotal	\$	180,000	
Rip-rap Removal Quantity		3 tons/ft		Rip-rap Removal Cost		\$12 /ton	
Rip-rap Removal Subtotal		\$91,440		Rip-rap Removal Quantity		3 tons/ft	
				Rip-rap Removal Subtotal		\$91,440	
Mobilization / Demobilization		\$160,000		Mobilization / Demobilization		\$200,000	
Construction Cost	\$	1,607,440		Construction Cost	\$	1,958,640	

OPTION 5: Rock Rip-Rap Revetment

Shoreline Length	2640 ft
Length to be Nourished	2440 ft
Rock Fill Density	8 tons/ft
Rock Cost	\$60 /ton
Rock Subtotal	\$ 1,171,200
Rip-rap Removal Cost	\$12 /ton
Rip-rap Removal Quantity	3 tons/ft
Rip-rap Removal Subtotal	\$91,440
Mobilization / Demobilization	\$130,000
Construction Cost	\$ 1,392,640

OPTION 1: BEACH NOURISHMENT WITH END GROINS ONLY		
Construction Cost	\$	1,387,440
OPTION 2: CONCRETE RIP-RAP FILLED SS GABIONS WITH MARSH RESTORATION		
Construction Cost		\$1,282,642
OPTION 3: BEACH NOURISHMENT WITH GROINS		
Construction Cost	\$	1,607,440
OPTION 4: BEACH NOURISHMENT WITH BREAKWATERS		
Construction Cost	\$	1,958,640
OPTION 5: ROCK RIP-RAP REVETMENT		
Construction Cost	\$	1,392,640
OPTION 2 / 1: Gabions w/ Marsh North & Beach Nourishment South		
Construction Cost	\$	1,310,041
OPTION 2 / 3: Gabions w/ Marsh North & Beach Nourishment w/ Groins South		
Construction Cost	\$	1,450,041
OPTION 2 / 4: Gabions w/ Marsh North & Beach Nourishment w/ Breakwaters South		
Construction Cost	\$	1,625,641
OPTION 5 / 1: Revetment North & Beach Nourishment South		
Construction Cost	\$	1,355,040
OPTION 5 / 3: Revetment North & Beach Nourishment w/ Groins South		
Construction Cost	\$	1,505,040
OPTION 5 / 4: Revetment North & Beach Nourishment w/ Breakwaters South		
Construction Cost	\$	1,680,640