U.S. ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

116680 LIDO KEY HURRICANE AND STORM DAMAGE REDUCTION PROJECT (Preconstruction, Engineering and Design Phase) SARASOTA COUNTY, FL

VALUE ENGINEERING REPORT

31 October 2013

DOD SERVICE: USACE **VALUE ENGINEERING OFFICER:** Jimmy Matthews, PE, CVS
CONTROL NO: CESAJ-VE-2014-001C

REPORT INFORMATION

VALUE ENGINEERING FIRM: U. S. Army Corps of Engineers
Jacksonville District
701 San Marco Blvd
Jacksonville, FL 32232-0019
(904) 232-2087

VALUE ENGINEERING WORKSHOP CONDUCTED: 7-11 October 2013

VALUE ENGINEERING STUDY TEAM LEADER: Jimmy Matthews, P.E., CVS

VALUE ENGINEERING STUDY TEAM MEMBERS: Team member names and contact information are in Appendix B.

STUDY RESULTS:

Evidence of Unfettered Creativity: 69 ideas generated, several ideas were combined into alternatives and comments

Number of Proposals: 7
Number of Accepted Proposals: 7

Number of Comments: 12
Number of Comments Accepted: 12

Maximum Cost Avoidance (Gross): $3,627,000
Accepted Cost Avoidance (Gross): $2,866,000 to 3,627,000, tbd after award

Study Cost to Government: $28,000 (total)
Return on Investment: *102:1*

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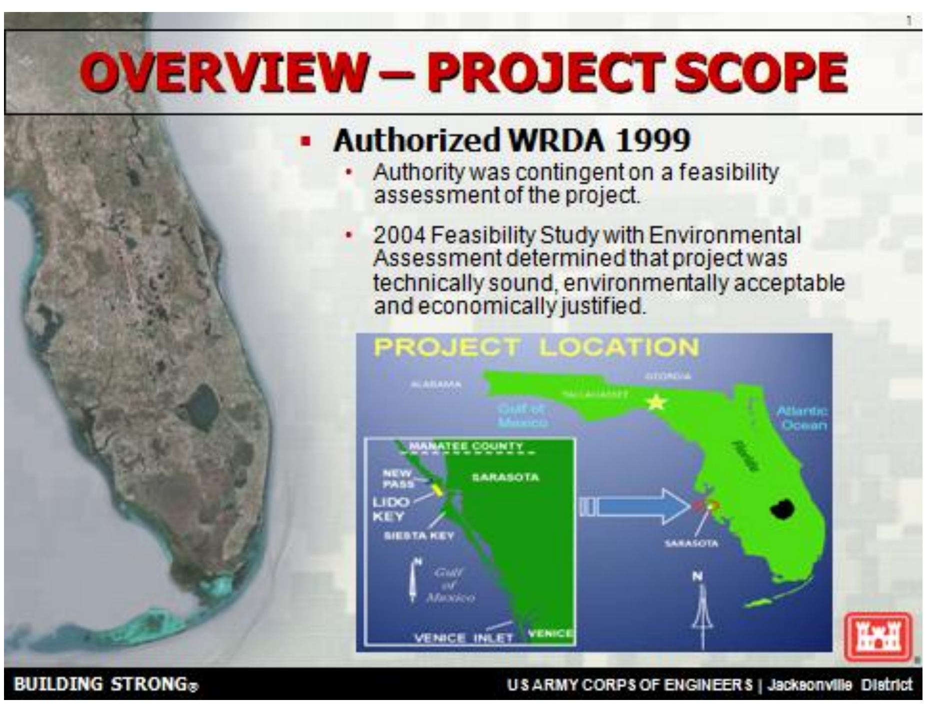
INTRODUCTION

This Value Engineering (VE) Report documents the completion of the Lido Key Hurricane and Storm Damage Reduction Project (Preconstruction, Engineering and Design Phase), Sarasota County, FL, October 2013.value analysis. The project is at the Preconstruction, Engineering and Design (PED) phase, preliminary phase of development for the Plans and Specifications (P&S). Value improvements proposed herein will be addressed during further P&S refinements.

PROJECT DESCRIPTION (on date of VE Study, 7-11Oct13)

The Hurricane and Storm Damage Reduction (HSDR) Project, Lido Key, Sarasota County, Florida (Lido Key Project) is described in a Final Integrated Project Implementation Report and Environmental Impact Statement dated October 2002 with April 2004 Addendum. The Chief of Engineers Report was signed 22 December 2004. Congress re-authorized the project in Section 364 of the Water Resources Development Act of 1999, Public Law 106-53. The non-Federal sponsor is the City of Sarasota. A Design Agreement for the Lido Key Project was signed 12 September 2007 between The Department of the Army and The City of Sarasota, Florida.

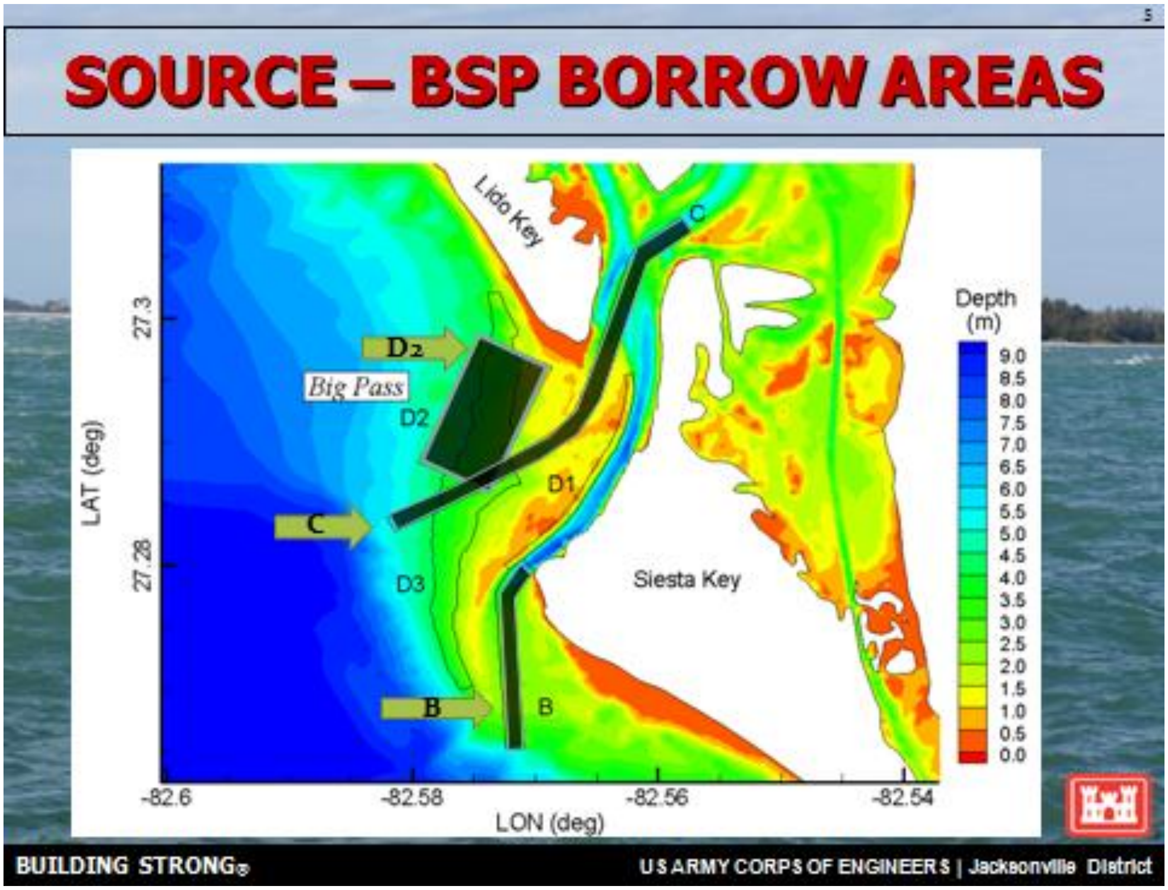
The Lido Project consists of a set of features that will improve shore protection while reducing coastal erosion and wave or surge impacts to upland development for 8,280 ft segment of the Lido Key Gulf of Mexico shoreline. The authorized plan as recommended in the Chief's Report includes construction of an 80-foot-wide beach berm at elevation +5 feet National Geodetic Vertical Datum (NGVD) over 8,200 ft. of shoreline, with 3 groins located near the southern limits of the project. Periodic nourishment, at a five (5) year interval, would optimize the net benefits over the 50 year period of analysis. Construction of the project would require placement of approximately 460,200 cy of design fill and 614,500 cy of advanced fill material. Three borrow areas, delineated for use, are located between 7.2 and 9.5 nautical miles offshore. The Lido Key shoreline is made up of private and extensively used public beaches. The project will improve storm damage prevention to coastal development and existing structures, while providing recreational benefits to Lido Key. A vicinity map and the recommended plan are displayed below.



2004 Feasibility Study Features

- Project Length (ft) = 8,280 (R-35 to R43)
- Design berm elevation = +5 ft NGVD
- Approximately 460,000 cy of design and 615,000 cy of advance material (1,075,000 cy)
- Three Borrow areas were delineated (5, 6 & 7)
- 5-year nourishment interval over 50-year life
- 615,000 cy required for each re-nourishment
- Three groins are part of the project along the southern portion
- Initial Estimated Construction cost = $22,708,000 (62.4%/37.6%)

Subsequent to the Chiefs Report, borrow area clearances were updated to protect habitats of concern. The result was the borrow areas in the decision document needed to replaced or augmented. Further detailed analyses and coordination changed the borrow area to Big Shoal Pass. The current alternative borrow alternatives at Big Pass are depicted on the following graphic.



PROJECT ISSUES, CONCERNS AND VALUE IMPROVEMENT OPPORTUNITIES

The Project Delivery Team identified the follow topics that could be improved via a Value Analysis. These topics were discussed and improvement ideas vetted during this VE study.

- Cost versus 902 Limits
- Use of Groins and Optimization
- Project schedule needs
- PED activities and costs
- NEPA and Permitting
- Non-Federal Sponsor Concerns
- Navigability of Big Pass
- Dredging of B/A
- Prevention of erosion on south end of Lido Key
- Bay side erosion, South Lido Park Area

VALUE METHODOLOGY

This report documents the VE workshop conducted 11-17 October 2013. The workshop was conducted using the six-phase Value Engineering Job Plan as sanctioned by USACE and the Society of American Value Engineers International (SAVE). This process, as explained below, was executed as part of daily activities as described in the Workshop Agenda exhibited in Appendix A. The VE Team was comprised of USACE Team Members from the Jacksonville District. The roster is located in Appendix B.

The VE Workshop culminated in the development phase where ideas were captured and refined into proposals or design comments. Design comments are topics that warrant consideration but their savings were not computable (quantitative) with current information. Appendix E contains the related documentation.

Information Phase

At the beginning of the study, the project team presents current planning and design status of the project. This includes a general overview and various project requirements. Project details are presented as appropriate. Discussion with the VE Team enhances the Team's knowledge and understanding of the project.

Function Analysis Phase

Key to the VE process is the Function Analysis. Analyzing the functional requirements of a project is essential to assuring an owner that the project has been designed to meet the stated criteria and its need and purpose. The analysis of these functions is a primary element in a value study, and is used to create ideas and develop proposals. This procedure is beneficial to the team, as it forces the participants to think in terms of functions. For this study, team members developed a function list and then considered the list in regards to the report's recommended plan features. This facilitated a deeper understanding of the project. The function analysis is presented in Appendix C.

Creativity Phase

The Creativity Phase involves identifying and listing creative ideas. During this phase, the team participates in a brainstorming session to identify as many means as possible to provide the necessary project functions. Judgment of the ideas is not permitted in order to generate a broad range of ideas. The creative phase continues through the other phases as ideas can, and often times do, create other ideas.

Evaluation Phase

The purpose of the Evaluation Phase was to systematically assess the potential impacts of ideas generated during the Creativity Phase relative to their potential for value improvement. Each idea is evaluated in terms of its potential impact to cost and overall project performance. Once each idea is fully evaluated, it is given a rating to identify whether it would be carried forward and/or developed as an alternative, combined with other ideas, presented as a design suggestion, dismissed from further consideration or that it is already being done by Project Delivery Team. Appendix D lists those ideas with their evaluation disposition.   The appendix tables also display the evolution of ideas from creation through their embodiment into proposals or comments.

Development Phase

During the Development Phase, ideas passing evaluation are expanded and developed into comments. The development process considers such things as the impact to performance, cost, constructability, and schedule of the alternative concepts relative to the baseline concept. This analysis is prepared as appropriate for each alternative, and the information may include an initial cost and/or life cycle cost comparisons. Each alternative or idea describes the baseline concept and proposed changes and includes a technical discussion.

Presentation Phase

The VE Workshop concluded with a preliminary presentation of the value team's assessment of the project and value alternatives and ideas. The presentation provides an opportunity for the owner, project team, and stakeholders to preview the alternatives and develop an understanding of the rationale behind them.   The presentation is also used to refine proposal justification to include the corporate perspective. The presentation was conducted 4Nov13.

STUDY RESULTS AND RECOMMENDATIONS

Study results are summarized below in proposals where quantitative cost avoidance opportunities can be realized and in comments where those ideas are captured that warrant further consideration by the PDT. Related cost avoidance will be developed for awarded contract and reported in the Value Engineering Reporting System (VERS). Should ideas/comments result in quantifiable cost avoidance, those ideas/comments will be documented as proposals and appended to this report.

The VE team developed seven proposal alternatives that warrant more detailed investigation. In general, VE team proposals centered on:

- Updating the beach fill erosion rates with post 2004 information; and
- Optimizing groin design.

PROPOSALS

The following proposals and potential cost avoidance will be evaluated by the PDT for incorporation into the project's design.

P1. Base beachfill quantities and erosion rates on P&S scope development and include post 2004 information instead of using 2004 report alone, $1,476,000.

P2A. Groin Optimization (Optimize dimensions, use local stone in marine mattresses, reduce sheet pile lengths), $1,139,000.

P2B. Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with grouted chinking stone), $1,390,000.

P2C. Groin Optimization (Optimize dimensions, use local stone in marine mattresses, reduce sheet pile lengths, selectively shorten groins), $1,422,000.

P2D. Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with grouted chinking stone, selectively shorten groins), $1,661,000.

P2E1. Eliminate the grouting from the chinking for P2B, $1,910,000.

P2E2. Eliminate the grouting from the chinking for P2D, $2,151,000.

COMMENTS

The following comments are offered for consideration by the PDT during further P&S and Design Documentation Report development. Should comments result in quantitative cost avoidance, this report will be appended with the proposal.

C1. Consider allowing the use of truck hauled sand.

C2. Reevaluate the use of T-groins (other alternatives to rubble mound groins).

C3. Revisit the northwest borrow area for contour dredging/backpassing for beachfill.

C4. Reconsider the equipment assumptions in the current estimate and address sequencing in the order of work.

C5. Check environmental windows for piping plover versus construction period.

C6. Consider RFP for acquisition.

C7. Plant dune vegetation.

C8. Use park for staging area.

C9. Reuse any remnant stone from the beach in groins.

C10. Revisit Current Working Estimate construction period for groins.

C11. Recommend reviewing the Cost and Schedule Risk Analysis for related VE improvements.

C12. Using sheet pile to the top elevation in the groins will pose a safety hazard to the public. Reduce several feet below top of groin or do not use.

APPENDIX A: VALUE ENGINEERING WORKSHOP AGENDA

VALUE ENGINEERING WORKSHOP AGENDA
116680 LIDO KEY HURRICANE AND STORM DAMAGE REDUCTION PROJECT
SARASOTA COUNTY, FL
7-11 OCTOBER 2013

Meeting Location:
Engineering Conference Room, 381, 3E

MONDAY
<u>7Oct13:</u>

0900-0930	Introductions and Workshop Purpose – Jimmy Matthews
	VE Process, How it will be used, and Agenda - Jimmy Matthews
0930-1100	*<u>Information Phase:</u>* Presentation of Project Status and Recommended Plan Summary - PDT
	Project Overview Presentation – PDT Cost Estimate Overview – Tony Ledford NEPA Compliance – PDT Project Issues and Goals
	Q & A
Hourly	Break as needed
1100-1200	Lunch
1200-1400	*<u>Function Analysis Phase:</u>* - J Matthews
1400-1500	Day One Recap - J Matthews

TUESDAY
<u>8Oct13:</u>

0900-1100	*<u>Creativity Phase</u>:* (Brainstorming – Ideas by PDT/VE Team) – VE Team
Hourly	Break as needed
1100-1200	Lunch
1200-1400	*<u>Evaluation Phase:</u>* (Critical assessment of Brainstorming) – VE Team
Hourly	Break as needed
1400-1500	*<u>Explain and Start Development Phase:</u>* (Start development of priority ideas into proposals or comments) - J Matthews
1500-1600	*<u>Proposal and Comment Development Assignments</u>*: - J Matthews

WEDNESDAY
<u>9Oct13:</u>

0900-1200	*<u>Complete Development Phase:</u>*
Hourly	Break as needed
1100-1200	Lunch
1200-1600	*<u>Complete Development Phase:</u>*
1600-1700	VE Recap

THURSDAY
<u>10Oct13:</u>

0900-1200	*<u>Start Report &Report Development Phase Results:</u>*
Hourly	Break as needed
1200-1300	Lunch
1300-1600	*<u>Complete draft Report and Start Presentation:</u>*

FRIDAY
<u>11Oct13:</u>

0900-1200	*<u>Complete draft Report &Complete Presentation:</u>*
Hourly	Break as needed
1200-1300	Lunch
1300-1500	*<u>Complete draft Report and Complete Presentation:</u>*
1500-1600	Summarize and present follow up actions

<u>14Oct13:</u>	Send Report to PDT for Review and Comment
<u>TBD:</u>	Decision Makers VE Results Briefings, if required
<u>TBD:</u>	Final VE Report – Jimmy Matthews

APPENDIX B: WORKSHOP PARTICIPANT ROSTER

Value Engineering Workshop - Lido Key HSDR Project
7-12 October 2013

				Attendance				
Name	**Office**	**Phone**	**E-mail (@usace.army.mil)**	**7-Oct-13**	**8-Oct-13**	**9-Oct-13**	**10-Oct-13**	**11-Oct-13**
Jimmy Matthews	CESAJ-EN-Q	(904) 232-2087	Jimmy.D.Matthews@usace.army.mil	x	x	x	x	x
Tom Martin	CESAJ-EN-HC	(904) 232-2428	Tom.R.Martin@usace.army.mil	x	x	x	x	x
Tony Ledford	CESAJ-EN-TC	(904) 232-3695	Tony.W.Ledford@usace.army.mil	x	x	x	x	x
Rafael Rios	CESAJ-EN-GG	(904) 232-3916	Rafael.A.Rios@usace.army.mil	x	x	x	x	x
Jim Lagrone	CESAJ-EN-DW	(904) 232-2437	James.W.Lagrone@usace.army.mil		x	x	x	
Millan Mora	CESAJ-PM-WN	(910) 251-1454	Millan.A.Mora@usace.army.mil	x	x	x	x	x

APPENDIX C: FUNCTION ANALYSIS

DOD VE and Efficiency Initiatives

In an effort to provide better value for the taxpayer and the warfighter…. *(examine)* five broad areas of initiatives as follows:

- *Target affordability and control cost growth;*
- *Incentivize productivity and innovation in industry;*
- *Promote real competition;*
- *Improve tradecraft in services acquisition; and*
- *Reduce non-productive processes and bureaucracy.*

LIDO KEY, FL- FUNCTION LIST		
Reduce Storm/Hurricane Damage	Identify/Distribute Sand Sources	Attract User
Maintain Sand in coastal system	Vegetate dunes	
Protect Property/Infrastructure	Distribute Sand (Pipe/Truck)	Target Affordability
Minimize Erosion Impacts	Protect Environmental Habitat	Control Cost Growth
Enhance Beach/Shoreline	Minimize Environmental Impacts	Incentivize innovation
Add Beachfill	Monitor Impacts	Incentivize productivity
		Promote Competition
Develop Sand Delivery/Placement Options		
	Satisfy User	Reduce Processes
Widen Advanced Sand Nourishment		
		Reduce Bureaucracy

LIDO KEY, FL- FUNCTION LIST		
Install Groins		
Block Sand Transport		
or		
Impede Sand Transport		
Retain fill template		
Block longshore currents		
Provide habitat		
Anchor tip of island		
Protect park		

RUBBLE MOUND GROIN FUNCTIONS

Other Breakwater, Groin or Training Wall Functions
- Allow overtopping
- Reduce wave heights
- Dissipate or reflect wave energy
- Force currents along structure
- Reduce or address wave run-up

Rubble Mound Training Wall Functions
- Break waves
- Reduce wave height/climate
- Block transverse current
- Retain fill
- Prevent scour

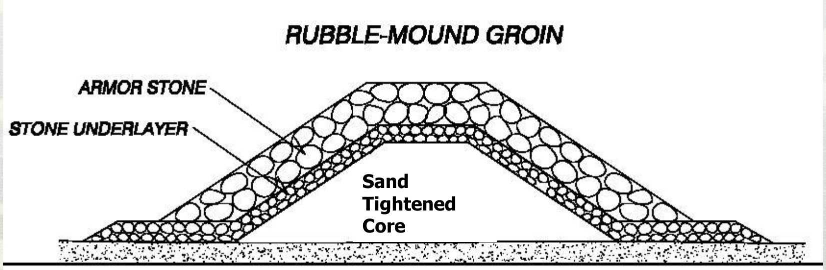


Figure VI-2-9. Examples of groin structures

Mat or Blanket/Foundation Layer Functions
- Retain fill
- Prevent Scour
- Distribute weight

Sand Tightened Core Functions
- Impede or limit energy transmission
- Block Sand
- Retain blanket or underlayer

APPENDIX D: CREATIVITY AND EVALUATION

LIDO KEY VE - Created Ideas			
Idea	Idea Group	Action	Created Ideas
1			truck inland sand
2			use local rock
3			project w/o groins
4			less groins
5			geotubes instead of groins
6			put a covering on geotubes
7			cover geotubes with rock
8			modify groin xsec design
9			min groin dimensions
10			use local rock only
11			use local rock for sublayers then granite for armor
12			revisit Top groin elevations
13			revisit interior groin elevations
14			variable base el for groins
15			use t-groins
16			use retaining walls instead of rubble mound groins
17			use cribs
18			use matresses for foundation layer
19			innovative materials for groins
20			base sand quantity on recent survey
21			was 2004 survey post storm
22			use breakwaters instead of groins
23			revisit n nw b/a for contour dredging/backpassing/ beachfill
24			reconsider equip assumptions
25			address sequencing of work
26			optimize use of new pass O&M material
27			use combo plan anything but shoal.. New pass, truck
28			Use D2 square only
29			revisit northern limit to see if it could be moved southward
30			nearshore placement of material
31			overbuild nothern section and let migrate
32			look at bird windows (piping plover)
33			base all quantities on P&S scope development
34			longer renourishment intervals
35			alternative means of sand tightening
36			model verification group/committee to build consensus with non-federal
37			update overfill ratio
38			reconsider equip assumptions
39			reconsider dredge plant possibilities
40			Use RFP
41			Use MATOC
42			evaluate USCG certified versus non-USCG certified
43			plant dune vegetation
44			Meet authorization timeline
45			eliminate overwidened beach from renourishment calculation
46			don't renourish overwidened beach
47			consider low profile groins
48			staggered heights of groins
49			staggered lengths of groins

LIDO KEY VE - Created Ideas			
Idea	Idea Group	Action	Created Ideas
50			rip rap south inlet groin
51			combination of the above, hybrid
52			sandtightening of groins, needed or not
53			geotubes instead of groins
54			low profile groins being geotubes and regular groins being of rock
55			use park for staging area (needed to meet the schedule)
56			order of construction for groins and beachfill
57			model the installation sequence to avoid construction issues and to select best
58			phase the installation of groins between the construction and renourishement
59			phase the installation of groins during initial construction
60			remove remnant groin on beach
61			reuse remnant stone from beach
62			don't extend vinyl sheet pile to El 5, safety hazard
63			Reduce the vinyl sheet pile depth to extend into the foundation mattress only
64			use one t groin instead of two northern groins
65			revisit CWE construction period for groins
66			verify stone source assumptions in CWE
67			recommend CSRA and VE of risk register
68			develop list of Cost DX topics and vet with VE team and PDT

Lido Key VE - Evaluated and Grouped Ideas

Idea	Idea Group	Action	Already Being Done or Eliminate, Idea Group = 0.00; Keep Idea, Idea Group = Number; Combine into another idea, Idea Group = N.ii
3	0.00	bd	project w/o groins
4	0.00		optimize number of groins
5	0.00		geotubes instead of groins (they have UV coating)
6	0.00		put a covering on geotubes
7	0.00		cover geotubes with rock
10	0.00		use local rock only
20	0.00		base sand quantity on recent survey
21	0.00		was 2004 survey post storm
22	0.00		use breakwaters instead of groins
26	0.00	bd	optimize use of new pass O&M material
29	0.00	bd	revisit northern limit to see if it could be moved southward
30	0.00		nearshore placement of material
31	0.00		overbuild northern section and let migrate
34	0.00	bd	longer renourishment intervals
36	0.00		model verification group/committee to build consensus with non-federal
37	0.00	bd	update overfill ratio
38	0.00		reconsider equip assumptions
39	0.00		reconsider dredge plant possibilities
44	0.00	bd	Meet authorization timeline
45	0.00	bd	eliminate overwidened beach from renourishment calculation
46	0.00		don't renourish overwidened beach
50	0.00		rip rap south inlet instead of groin
51	0.00		combination of the above, hybrid
52	0.00	bd	sandtightening of groins, needed or not
53	0.00		geotubes instead of groins
54	0.00		low profile groins being geotubes and regular groins being of rock
57	0.00		model the installation sequence to avoid construction issues and to select best
58	0.00		phase the installation of groins between the construction and renourishement
59	0.00		phase the installation of groins during initial construction (stage groin
66	0.00	bd	verify stone source assumptions in CWE
68	0.00		develop list of Cost DX topics and vet with VE team and PDT
1	1.00		truck inland sand alternative
27	1.27		use combo plan anything but shoal.. New pass, truck
2	2.00		use local rock in groin xsec
11	2.11		use local rock for sublayers then granite for armor
8	8.00		Groin Modification (modify groin xsec design)
9	8.09		min groin dimensions
12	8.12		revisit Top width and top groin elevation
13	8.13		revisit groin side slopes
14	8.14		variable base el for groins
18	8.18		use matresses for foundation layer
35	8.35		alternative means of sand tightening
47	8.47		consider low profile groins
48	8.48		staggered heights of groins
49	8.49		staggered lengths of groins
62	8.62		don't extend vinyl sheet pile to El 5, safety hazard
63	8.63		Reduce the vinyl sheet pile depth to extend into the foundation mattress only
15	15.00		use t-groins (other alternatives to rubble mound groins)

Idea	Idea Group	Action	Already Being Done or Eliminate, Idea Group = 0.00; Keep Idea, Idea Group = Number; Combine into another idea, Idea Group = N.ii
16	15.16		use retaining walls instead of rubble mound groins
17	15.17		use cribs
19	15.19		innovative materials for groins (WADS, etc..)
64	15.64		use one t groin instead of two northern groins
23	23.00		revisit n nw b/a for contour dredging/backpassing/ beachfill
28	23.28		Use D2 square only
24	24.00		reconsider equip assumptions
25	25.00		address sequencing of the order of work
56	25.56		order of construction for groins and beachfill
32	32.00		look at bird windows (piping plover)
33	33.00		base all quantities on P&S scope development instead of 2004 report
40	40.00		Use RFP (Acquisition Plan)
41	40.41		Use MATOC
42	40.42		evaluate USCG certified versus non-USCG certified equip
43	43.00		plant dune vegetation
55	55.00		use park for staging area (needed to meet the schedule)
60	60.00		remove remnant groin on beach
61	60.61		reuse remnant stone from beach
65	65.00		revisit CWE construction period for groins
67	67.00		recommend CSRA and VE of risk register

Lido Key VE - Proposals and Comments				9-Oct-13
Idea	Idea Group	Cmnt or Proposal	Created Ideas	POC
1	1.00	**C1**	truck inland sand alternative	**Tony/Rafael**
27	1.27	**C1**	truck inland sand alternative	
15	15.00	**C2**	use t-groins (other alternatives to rubble mound groins)	**Jim**
16	15.16	**C2**	use retaining walls instead of rubble mound groins	
17	15.17	**C2**	use cribs	
19	15.19	**C2**	innovative materials for groins (WADS, etc..)	
64	15.64	**C2**	use one t groin instead of two northern groins	
23	23.00	**C3**	revisit n nw b/a for contour dredging/backpassing/ beachfill	**Jim**
28	23.28	**C3**	Use D2 square only	
24	24.00	**C4**	reconsider equip assumptions	**Tony**
25	25.00	**C4**	address sequencing of the order of work	**Tony**
56	25.56	**C4**	order of construction for groins and beachfill	
32	32.00	**C5**	look at bird windows (piping plover)	
40	40.00	**C6**	Use RFP (Acquisition Plan)	**Tony/Rafael**
41	40.41	**C6**	Use MATOC	
42	40.42	**C6**	evaluate USCG certified versus non-USCG certified equip	
43	43.00	**C7**	plant dune vegetation	**Jim**
55	55.00	**C8**	use park for staging area (needed to meet the schedule)	**Jim**
60	60.00	**C9**	remove remnant groin on beach	**Jim**
61	60.61	**C9**	reuse remnant stone from beach	
65	65.00	**C10**	revisit CWE construction period for groins	**Tony**
67	67.00	**C11**	recommend CSRA and VE of risk register	**Tony**
69	69.00	**C12**	Using sheet pile to the top elevation in the groins will pose a safety hazard to the public. Reduce several feet below top of groin or do not use.	
33	33.00	**P1**	base all quantities on P&S scope development instead of 2004 report	**Jim**
2	2.00	**P2**	use local rock in groin xsec	**Tom**
11	2.11	**P2**	use local rock for sublayers then granite for armor	
8	8.00	**P2**	Groin Modification (modify groin xsec design)	**Tom**
9	8.09	**P2**	min groin dimensions	
12	8.12	**P2**	revisit Top width and top groin elevation	
13	8.13	**P2**	revisit groin side slopes	
14	8.14	**P2**	variable base el for groins	
18	8.18	**P2**	use matresses for foundation layer	
35	8.35	**P2**	alternative means of sand tightening	
47	8.47	**P2**	consider low profile groins	
48	8.48	**P2**	staggered heights of groins	
49	8.49	**P2**	staggered lengths of groins	
62	8.62	**P2**	don't extend vinyl sheet pile to El 5, safety hazard	
63	8.63	**P2**	Reduce the vinyl sheet pile depth to extend into the foundation mattress only	
69	8.69	**P2**	Do not grout the groin chinking stone	

APPENDIX E: PROPOSAL AND RECOMMENDATION DOCUMENTATION

PROPOSAL NO. 1 (33.00): ***Base beachfill quantities and erosion rates on P&S scope development and include post 2004 information instead of using 2004 report alone***

ORIGINAL DESIGN:

The beach template design presented in the 2004 Feasibility Study would require placement of approximately 1,074,700 cubic yards (CY) of sand fill, consisting of 460,200 CY of design fill volume and approximately 614,500 CY of sacrificial advance fill. The design volumes were "…based on nourishment of the entire active profile rather than a design template." Paragraph A-75 of the study indicated "the width of the advance fill section is based on the 5 year renourishment interval and the observed rates of erosion and shoreline recession between 1991 and 1998." Therefore, this would indicate a 122,900 CY/YR of erosion would occur to support the 614,500 CY value.

However, the tabulation of the 122,900 CY/YR cannot be ascertained within the report. Please review and consider the following:

1. Table A-27 indicates the design erosion rate of 95,251 cy/yr.
2. The 1974-1992 sediment budget indicates a 117,000 Cubic Yards (CYs) losses on the island with 17,000 CY/YR of erosional losses to the north.
3. A response to an ITR comment indicated that "The engineering appendix suggests that aggravated erosion is not expected at the north end."
4. A review of the 3-year post-construction monitoring report after the most recent placement event in 2009, indicates 464,176 of cubic yards were placed, but after three years, 282,742 cubic yards still remain, or essentially 60,478 CY/YR of erosional loses.
5. Of the selected plan which considers placement of three terminal structures at the south end of the island, I am not sure if the erosion rate was adjusted by the presence of these structures. Now, the meeting minutes from ITR conference held on 02 May 2012 indicated that "modeling showed that over 50,000 cubic yards of material per year could be reduced from the diffusion losses at the south end of the project with these structures.

Therefore, it would seem clear to use a 65,000 CY/YR erosion rate from the existing area.

PROPOSED DESIGN:

The proposed design will based on the design provided in table A-25 and not meeting volume requirements as specified in the 2004 report. In addition, the cost savings will include the reduction in other project costs related to the shortened construction schedule such as environmental monitoring, construction vibration controls and monitoring, etc…

ADVANTAGES:

There will be two advantages. The first advantage would be the decrease in costs associated with the project from 1,074,700 cubic yards to about 880,000 cubic yards. The last value was attained comparing the 2013 survey of the area to the template provided in table A-25 which tallied to 750,000 cubic yards and assuming a 65,000 cubic yard erosion rate for two years would be appropriate. This amount could be considerable less if the sponsor proceeds with the schedule nourishment of 122,000 cubic yards of material within reaches 2 and 3.

The second advantage is a reduced quantity of fill material needed within the selected borrow area. This should help the borrow area in recovery of lost material when it erodes back to the dredged areas.

DISADVANTAGES:

None.

COST ESTIMATE WORK SHEET

COST ESTIMATE WORKSHEET				
Proposal NO.	**P1**			
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
BEACH FILL	CY	1,074,700	$7.58	$8,146,226
=================	==========	===========	============	============
		Total Deletions		**$8,146,226**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
BEACH FILL	CY	880,000	$7.58	$6,670,400
=================	==========	===========	============	============
		Total Additions		**$6,670,400**
	Net Cost Decrease/Increase			**$1,475,826**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,475,826**
			Rounded:	

PROPOSAL NO. P2, (See Idea List): ***Groin Optimization*** **(optimize groin design and layout)**

VE ANALYSIS OF THE LIDO KEY GROIN FIELD.

The purpose of this VE Study is to examine the authorized project features, with the goal of reducing costs without sacrificing project performance. The first step of this process involved a review of the development of the currently authorized project, as presented in the 2004 report "*Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, Lido Key, Feasibility Report, April 2004 Addendum*". This report served as the basis of design for the proposed beach fill template and groin structures.

Some more recent follow-up investigations have been performed by Dr. Kelly Legault (SAJ-EN-WC). These investigations involved modeling of the project area with the numerical model GENESIS (to determine optimal groin design) and CMS (to determine changes to flow through Big Sarasota Pass under a number of borrow area dredging scenarios). As a result of this modeling effort there were no changes recommended to the groin system as presented in the 2004 Feasibility Report. Dr. Legault's modeling did suggest some additional refinements of the borrow areas originally proposed in the 2004 report however.

Since no changes to the layout of the groin field were recommended during this recent numerical modeling investigation, the plan as presented in the 2004 Feasibility Study will be the subject of this VE Study. The plan consists of 3 groins, located at the southern end of Lido Key. The southernmost groin is located at the very southern tip of the island and will function as a terminal structure, anchoring the southern end of Lido Key. This groin will be 650 feet long, with the landward half of the structure positioned along the northern bank of Big Sarasota Pass. The next groin will be located 800 feet north of the terminal groin, and will extend from the +5 ft NGVD (= +4.0 ft NAVD88) contour, seaward for a distance of 440 feet. The northernmost groin will be located 1,400 feet north of the terminal groin, and will extend from the existing seawall, seaward for a distance of 320 feet. Each structure will be oriented along an azimuth of 235 degrees, as measured from due north, clockwise.

These groin positions, lengths, and orientations were modeled in some detail in the 2004 study using the numerical model GENESIS. Additional design parameters for the groins were established in the 2004 report as well. Median stone size, crest elevation, side slopes, foundation elevation etc were all specified in the 2004 report. Some of these parameters may be evaluated and changed based on updated information on site conditions. These re-evaluations are presented in the following sections of this discussion.

As part of the VE process, a matrix of suggested cost-saving alternatives to the recommended plan was developed. The table below represents the portion of this matrix that is specific to reducing costs associated with construction of the groins only. Other portions of the overall VE proposal matrix focus on cost-reducing measures for beach fill placement, borrow areas, construction methodology, etc, and will be included in the final VE report.

Lido Key VE - Evaluated and Grouped Ideas			
Idea	Idea Group	Action	Already Being Done or Eliminate, Idea Group = 0.00; Keep Idea, Idea Group = Number; Combine into another idea, Idea Group = N.ii
2	2.00		use local rock in groin xsec
11	2.11		use local rock for sublayers then granite for armor
5	5.00		geotubes instead of groins (they have UV coating)
8	8.00		Groin Modification (modify groin xsec design)
9	8.09		min groin dimensions
12	8.12		revisit Top width and top groin elevation
13	8.13		revisit groin side slopes
14	8.14		variable base el for groins
18	8.18		use matresses for foundation layer
35	8.35		alternative means of sand tightening
47	8.47		consider low profile groins
48	8.48		staggered heights of groins
49	8.49		staggered lengths of groins
62	8.62		don't extend vinyl sheet pile to El 5, safety hazard
63	8.63		Reduce the vinyl sheet pile depth to extend into the foundation mattress only

The matrix of VE proposals from the table above were investigated, discussed, and recommendations made as to whether to pursue the proposed action further. Because many of these options were logically combined together to optimize project performance and/or reduce costs, a much shorter final matrix of proposals resulted from this analysis, and is summarized in the following table.

Groin Optimization Alternatives	
P2A	Optimize Dimensions, use local stone in mattresses, reduce sheet pile lenghts
P2B	Optimize Dimensions, use local stone in mattresses, replace sheet pile w/chinking
P2C	P2A with selective shortened groins
P2D	P2B with selective shortened groins
P2E1	P2C without grouted chinking stone
P2E2	P2D without grouted chinking stone

PROPOSAL NO. P2A, (Ideas 2.11, 8.18, 8.14, 8.62, 8.63): ***Groin Optimization (Optimize dimensions, use local stone in marine mattresses, reduce sheet pile lengths).***

ORIGINAL DESIGN:

The groin cross-section design as described in the 2004 Feasibility Study consists of the following: all three structures would be constructed of 2-ton, 165 pcf granite, with a crest elevation of +5 ft NGVD (= +4.0 ft NAVD), a crest width of 12 feet, and side slopes of 1v : 2h. Two layers of granite (total 6 ft thick) would be placed over a layer of 400-lb core stone. Core and armor stone are placed over a layer of unconstrained bedding stone. A vinyl sheet pile wall would be driven down the centerline of each groin to -24 feet to sand-tighten the structures.

PROPOSED DESIGN:

Several VE proposals are included in this design since these improvements represent current construction practice and/or changing site conditions since the 2004 study. The use of foundation mattresses **(VE # 8.18)** is recommended in accordance with current design practices and as a cost-saving measure. Furthermore, the foundation mattresses can be filled with either native Florida limerock or imported granite, whichever is cheaper **(VE # 2.11)**, with no loss of performance. Side slopes will be steepened to 1v : 1.5h along both sides of each groin **(VE # 8.13)** in order to reduce the quantity of materials (and cost) required. The original 1v : 2h side slope will be maintained at the head of each structure, to avoid compromising structural stability. A variable base elevation **(VE # 8.14)** was incorporated into all VE alternatives as described in the general overview document, based on the latest survey data. The top elevation of the sheet pile was reduced **(VE # 8.62)** to +3.5 ft NAVD, which equates to 6 inches below the crest of the groins. This modification was recommended for safety reasons, as all structures are expected to accommodate heavy pedestrian traffic. The depth of embedment of the sheet piles was reduced **(VE # 8.63)** from -24 feet to 5 feet below existing grade, because the piles are included only to provide a sand-tight barrier, not as structural members. Armor stone placement will provide the required lateral stability of the sheet pile wall. Other VE proposals recommended further reducing groin cross-sectional dimensions **(VE # 8.09, 8.12)**, but this was not possible because the groin crest widths and elevations as described above are currently at the minimum dimensions required to still be in accordance with current design guidance.

ADVANTAGES:

Incorporation of the proposals described above would significantly reduce the quantities of materials required, without compromising the function or the longevity of the structures. Use of foundation mattresses would improve the overall stability of the structures, as the bedding material would be more effectively contained than in the original design, and a thinner bedding layer could be used. The side slopes of 1v:1.5h provide adequate stability along the sides of the structures, while the flatter slope of 1v : 2h would be used only at the heads, where waves impact the structures head-on. The variable base elevations of the groins are generally only about 2-4 feet below existing grade and minimize the volume of excavation, and the quantity of materials required to construct the structures. Lowering the top elevation and raising the bottom elevation of sheet piles significantly reduces the quantities of piles required.

DISADVANTAGES:

Marginally increased sediment bypassing could occur during storm events due to the slight lowering of the sheet pile elevation. This rate is expected to be minimal, and would only occur during period of heavy overwash. However, some bypassing is desirable in order to renourish the downdrift beaches. Decrease in depth of penetration of sheet piles can result in loss of stability of the pile wall during construction; stone should be placed along the newly-constructed wall to increase lateral stability. A shallower base elevation could result in an increased potential for scouring along the downdrift (south) side of the structures. To avoid scouring damage a 5-ft wide scour apron would be constructed by extending the foundation mattresses beyond the southward-facing toe of the structures as shown.

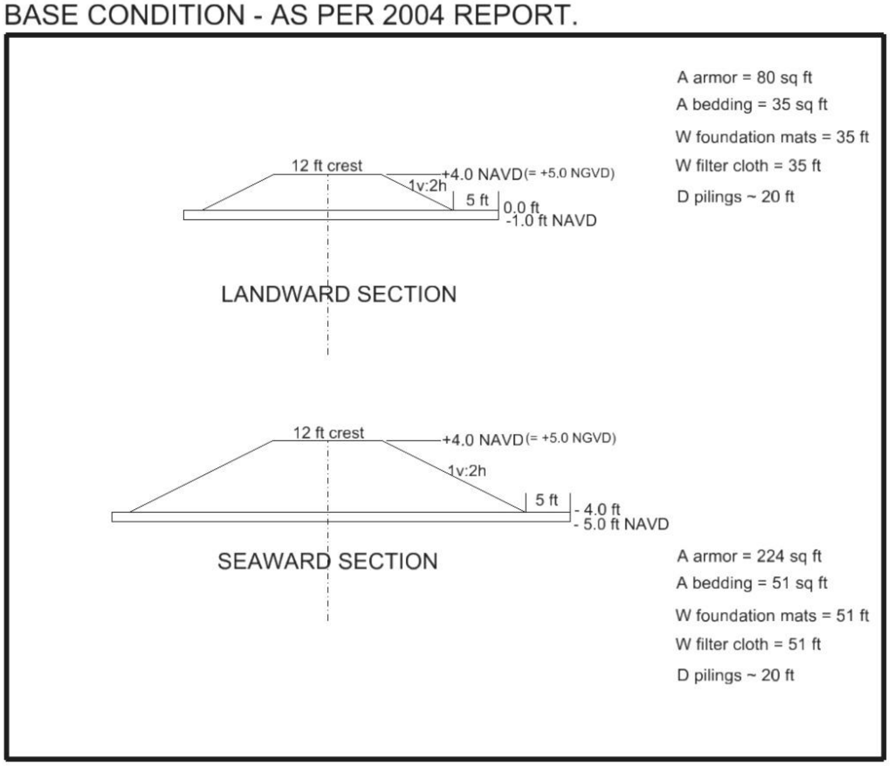
ACTIVITIES TO IMPLEMENT:

Obtain cost estimates, determine availability of local limerock for bedding material.

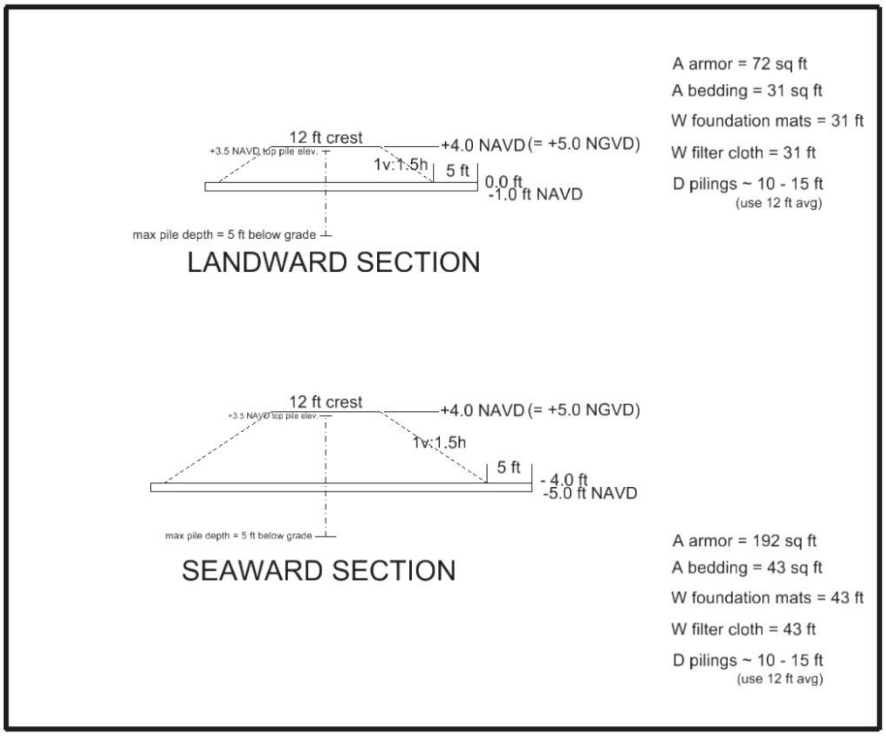
JUSTIFICATION: The justification for considering this alternative is below.

DRAWINGS – EXISTING and PROPOSED (AS APPLICABLE)

BASE CONDITION - AS PER 2004 REPORT.



VE P2A - MODIFY GROIN XS'S.



<u>NOTES AND CALCULATIONS (</u>AS APPLICABLE)

Summary of Quantities of Materials Required – Proposal VE P2A.

SUB TOTAL - ALL 3 GROINS :					
Armor stone	8582	CY	1.838	15774	TONS
Bedding stone	2101	CY	1.593	3347	TONS
12-inch Foundation mats	6303	SY			
Geotextile fabric	6303	SY			
Vinyl sheet piles	16920	SF			

Summary of Quantities of Materials Required – 2004 Feasibility Study

QUANTITIES OF MATERIALS PRESENTED IN 2004 REPORT :				
Armor stone			15400	TONS
Core stone			3000	TONS
Bedding stone			8300	TONS
12-inch Foundation mats	N/A			
Geotextile fabric	9644	SY		
Vinyl sheet piles	34200	SF		

COST ESTIMATE WORK SHEET

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2A**			
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING	SF	16920	$28.70	$485,604
GEOTEXTILE	SY	6303	$14.85	$93,600
BEDDING STONE	TON	0	$136.14	$0
MATS (L)	SY	6303	$189.00	$1,191,267
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	15774	$188.51	$2,973,557
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$4,866,497**
	Net Cost Decrease/Increase			**$1,139,022**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,139,022**
			Rounded:	

PROPOSAL NO. P2B (Ideas 2.11, 8.18, 8.14): ***Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with grouted chinking stone).***

ORIGINAL DESIGN:

The three groins would be constructed as rubble-mound structures. Sand-tightening would be achieved using a vinyl sheet pile wall, driven down the centerline of the structure.

PROPOSED DESIGN:

This proposal further refines the design presented in Alternative P2A, substituting the use of chinking stone instead of sheet pile to provide the required sand-tightening. The sheet pile wall would be removed from all three structures and replaced with chinking stone, which would be placed within the voids of the armor stone during construction. Chinking stone would be grouted as it was placed, to further reduce voids and increase stability of the chinking layer. Chinking stone density would be 165 pcf, to further decrease the potential for any ungrouted stone to be washed out of structure by wave action. Corps guidance requires a minimum of 3 stone-widths across the crest of such rubble-mound structures. The original groin design was 4 stones wide (12 ft), to allow for the placement of 2 stones on each side of the sheet pile wall. Without this sheet pile wall the crest can be reduced to 3 stones wide (9 ft), which will reduce the volume of stone accordingly.

ADVANTAGES:

In addition to frequently providing cost savings over other methods, chinking and grouting have proven to be effective means of sand-tightening structures. Construction is simplified : typically, a layer of armor stone will be placed along the foundation, then a layer of smaller chinking stone placed within the voids, grouted if necessary, then the next armor layer is placed, etc. This method is often easier to construct in the field vs the difficulties (and specialized equipment) associated with driving sheet piles in a wave-prone environment. Chinking to the top elevation of the structure could provide a smooth surface to drive equipment over, and for public use of the structure for recreational purposes. Chinking stone is flexible and can settle, etc, along with the structure over time, typically with little or no damage.

DISADVANTAGES:

The use of the more expensive granite (vs locally-produced limerock) is recommended for the chinking stone, due to its greater density and resistance to breaking. The use of this more expensive stone could negate some cost savings. Grout would be added to the chinking stone as it is placed, both to further decrease the permeability of the structure and to bind the chinking stone together so that wave action does not displace the chinking stone outward through voids in the armor stone. This option also increases the cost somewhat, and includes the risk that grout may leak into adjacent waters during construction. Heavily-grouted sections may crack and break over time due to differential settlement, possibly compromising the long term sand-tightness of the structure.

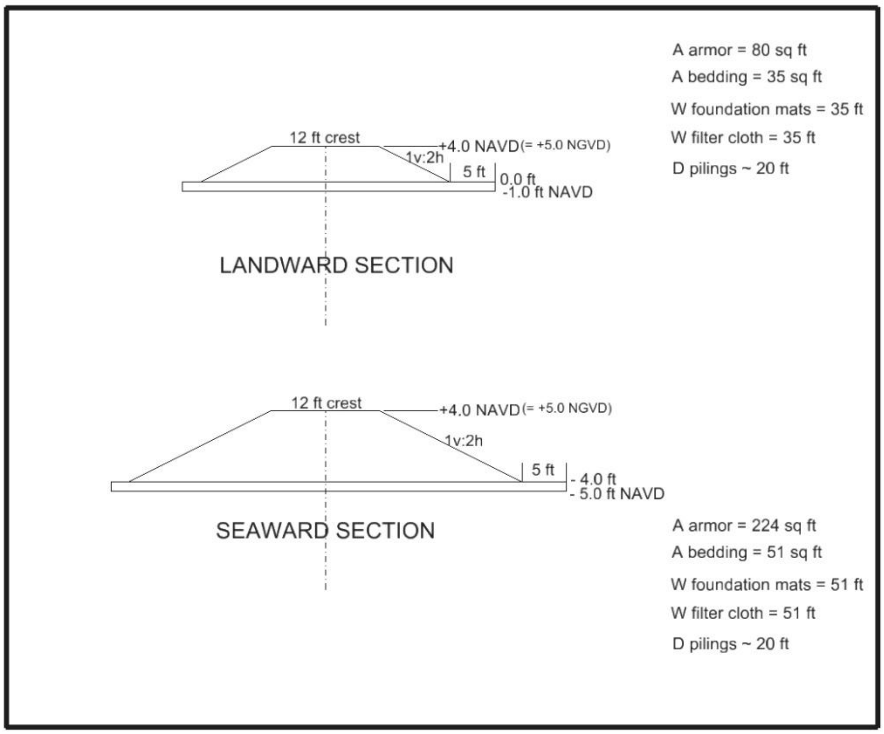
ACTIVITIES TO IMPLEMENT:

Develop cost estimates for chinking/grouting based on revised quantities attached to this proposal.

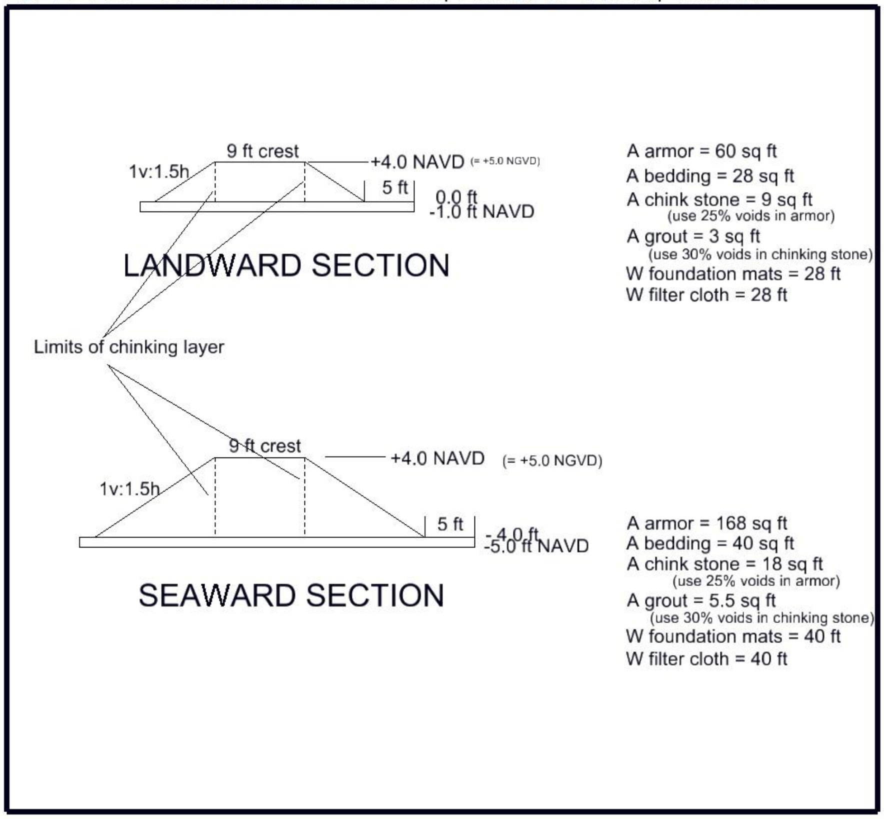
JUSTIFICATION: The justification for considering this alternative is below.

DRAWINGS – EXISTING and PROPOSED (AS APPLICABLE)

BASE CONDITION - AS PER 2004 REPORT.



VE P2B - Remove Sheet Pile, Narrow Crest, Chink.



NOTES AND CALCULATIONS (AS APPLICABLE)

Summary of Quantities of Materials Required – Proposal VE P2B.

SUB TOTAL - ALL 3 GROINS :					
Armor stone (granite)	7473	CY	1.838	13736	TONS
Bedding stone (limerock)	1944	CY	1.593	3098	TONS
12-inch Foundation mats	5833	SY			
Geotextile fabric	5833	SY			
Chinking stone (granite)	832	CY	1.715	1426	TONS
Grout	257	CY			

Summary of Quantities of Materials Required – 2004 Feasibility Study

QUANTITIES OF MATERIALS PRESENTED IN 2004 REPORT :				
Armor stone			15400	TONS
Core stone			3000	TONS
Bedding stone			8300	TONS
12-inch Foundation mats	N/A			
Geotextile fabric	9644	SY		
Vinyl sheet piles	34200	SF		

COST ESTIMATE WORK SHEET (AS APPLICABLE)

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2B**			
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING (VINYL)	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING (PZC 13)	SF	0	$0.00	$0
GEOTEXTILE	SY	5833	$14.85	$86,620
CHINKING STONE	TON	1426	$136.14	$194,136
MATS (L)	SY	5833	$189.00	$1,102,437
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	13736	$188.51	$2,589,373
GROUT	CY	257	$2,025.00	$520,425
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$4,615,461**
	Net Cost Decrease/Increase			**$1,390,058**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,390,058**
			Rounded:	

PROPOSAL NO. P2C (Ideas 2.11, 8.18, 8.14, 8.62, 8.63, 8.49): ***Groin Optimization (Optimize dimensions, use local stone in marine mattresses, reduce sheet pile lengths, selectively shorten groins).***

ORIGINAL DESIGN:

The groin field was designed as an interactive system of structures, working together to stabilize the south end of Lido Key. The number, positions, and lengths of the structures were fine-tuned in the 2004 Feasibility Study, using the numerical shoreline simulation model GENESIS. The end result of this analysis was a system of 3 groins, described as follows. A terminal groin is located at the south end of Lido Key, and its purpose is to anchor the southern end of the island. This structure is 650 feet long, with a portion of the groin extending along the bayside shoreline of the island. The second groin is located 800 feet north of the terminal structure, and extends 440 feet seaward of the +4 ft NAVD contour. The northernmost groin is located 1,400 feet north of the terminal structure, and extends 320 feet seaward of the seawall at that location. All structures are oriented roughly shore-normal, at an azimuth of 235 degrees as measured from north, clockwise. All three groins would be sand-tightened by driving vinyl sheet piling down the centerlines during construction.

PROPOSED DESIGN:

VE proposal 8.49 suggest a re-examination of the lengths of the groins, to determine if any of the structures could be shortened without compromising project performance. A re-analysis of the plan-view layout of the groin system is not the intention of this proposal; Proposal #8.49 is more of a response to changing site conditions since the numerical modeling was performed for the 2004 Feasibility Study. At the time of the shoreline modeling analysis for the 2004 Feasibility Study, aerial photography shows that the offshore positions of the seaward tips of the northern 2 groins were about equal, with each situated about 275 feet seaward of the shoreline position at that time. Since that time the shoreline has been renourished and its position has changed considerably, and the future performance of the groin field could be impacted as a result. Based on current shoreline aerial photography, the position of the seaward tip of the northern groin would be approximately 175 feet from the (2013) waterline, while the position of the seaward tip of the central groin is only about 100 feet from the waterline. By extending the northern (updrift) structure further offshore, this arrangement has the potential to impound large volumes of sediment updrift of the groin field. While beneficial to the shoreline to the north of the groin system, the shoreline within the field could be starved of material until the northern groin becomes fully impounded. Based on the present shoreline position it appears that the northernmost groin could be shortened by up to about 75 feet with no significant loss of performance of the groin field system. This would position the seaward end of the northern groin approximately 100 feet seaward of the waterline, which is the same relative position as the second groin. Shortening this structure could improve performance of the groin field by allowing additional material to bypass the northernmost structure, allowing more material to enter the two shoreline cells contained within the groin field. This layout would provide more effective nourishment of the shoreline along the south end of Lido Key. Essentially, this VE proposal recommends all of the design modifications as described in VE Proposal # P2A, with the only additional change being that the seaward end of the northern groin be shortened by 75 feet.

ADVANTAGES:

Incorporation of the proposals described above should still maintain berm widths in excess of the design template to the north (updrift) of the structure, while allowing more material to bypass and nourish the two remaining shoreline cells to the south. Shortening the north groin by 75 feet would reposition the seaward tip of the structure to approximately 100 feet seaward of the waterline, which is the same position as the second groin. This would tend to equalize the bypass rates between the two northern groins, as was the goal of the 2004 design. Additionally, the quantities of materials required to construct the north groin would be reduced substantially. Groin construction would be mostly eliminated through some of the deepest waters observed in the project area.

DISADVANTAGES:

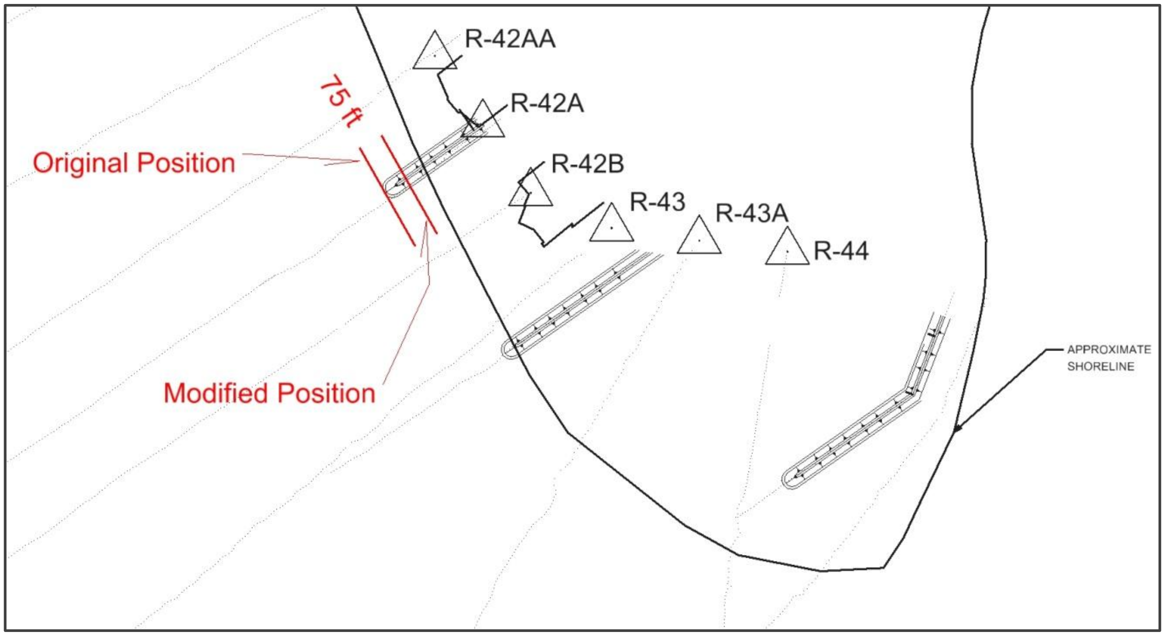
The width of the accreted beach berm north of the northern groin would be reduced accordingly, but would still be well in excess of the 80-foot design template. Increased sediment bypassing would occur, especially during storm events as material bypasses around the seaward tip of the structure due to wave action. However, adequate bypassing is essential to maintaining the downdrift beaches.

ACTIVITIES TO IMPLEMENT:

Obtain consensus from modelers that any reduction in length of the northern groin would not be detrimental to the project.

JUSTIFICATION: The justification for considering this alternative is below.

DRAWINGS – EXISTING and PROPOSED (AS APPLICABLE)



NOTES AND CALCULATIONS (AS APPLICABLE)

Summary of Quantities of Materials Required – Proposal VE P2C.

SUB TOTAL - ALL 3 GROINS :					
Armor stone	8049	CY	1.838	14794	TONS
Bedding stone	1982	CY	1.593	3157	TONS
12-inch Foundation mats	5945	SY			
Geotextile fabric	5945	SY			
Vinyl sheet piles	16020	SF			

Summary of Quantities of Materials Required – 2004 Feasibility Study

QUANTITIES OF MATERIALS PRESENTED IN 2004 REPORT :				
Armor stone			15400	TONS
Core stone			3000	TONS
Bedding stone			8300	TONS
12-inch Foundation mats	N/A			
Geotextile fabric	9644	SY		
Vinyl sheet piles	34200	SF		

COST ESTIMATE WORK SHEET (AS APPLICABLE)

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2C**			
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING	SF	16020	$28.70	$459,774
GEOTEXTILE	SY	5945	$14.85	$88,283
BEDDING STONE	TON	0	$136.14	$0
MATS (L)	SY	5945	$189.00	$1,123,605
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	14794	$188.51	$2,788,817
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$4,582,949**
	Net Cost Decrease/Increase			**$1,422,570**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,422,570**
			Rounded:	

PROPOSAL NO. P2D (Ideas 2.11, 8.18, 8.14, 8.49): *Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with grouted chinking stone, selectively shorten groins).*

ORIGINAL DESIGN:

The three groins would be constructed as rubble-mound structures. Sand-tightening would be achieved using a vinyl sheet pile wall, driven down the centerline of the structure.

PROPOSED DESIGN:

This alternative further refines the design presented for proposal P2B. Specifically, the length of the northernmost groin would be reduced by 75 feet, in accordance with the changing site conditions described in the discussion for Proposal P2C above. All other aspects of the cross-section and plan-view layout would be the same as for Proposal P2B : chinking stone would still be the means of sand-tightening the three structures; the only difference is that the length of the northern groin would be reduced by 75 feet at its seaward end.

ADVANTAGES:

As described for Proposal P2B, chinking and grouting have proven to be effective means of sand-tightening structures, and can result in cost savings. This method is often easier to construct in the field vs the difficulties (and specialized equipment) associated with driving sheet piles in a wave-prone environment. The shortened northern groin would allow greater sand-bypassing to the two shoreline cells at the southern end of the island, and would result in additional savings of materials and cost during construction.

DISADVANTAGES:

Shortening the length of the northern structure by 75 feet would result in a narrowing of the berm width north of the structure by a similar amount, but the resulting berm would still be adequate to provide the desired level of protection.

ACTIVITIES TO IMPLEMENT:

Develop cost estimates for the groin field based on revised quantities attached to this proposal. Obtain consensus from modelers that any reduction in length of northern groin would not be detrimental to the project.

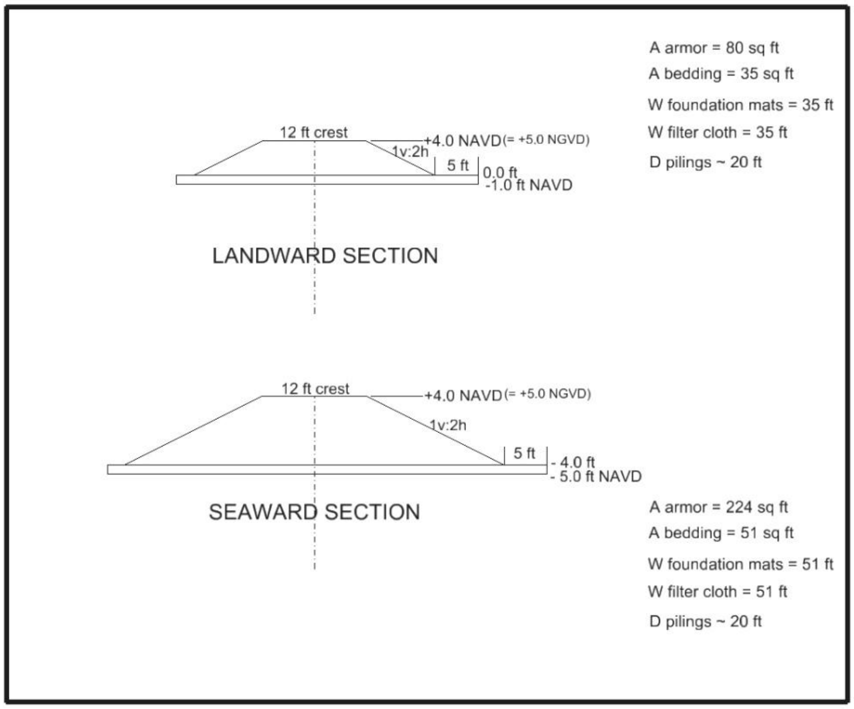
JUSTIFICATION:

Proposal Financial Benefit – Quantified Value of Proposal

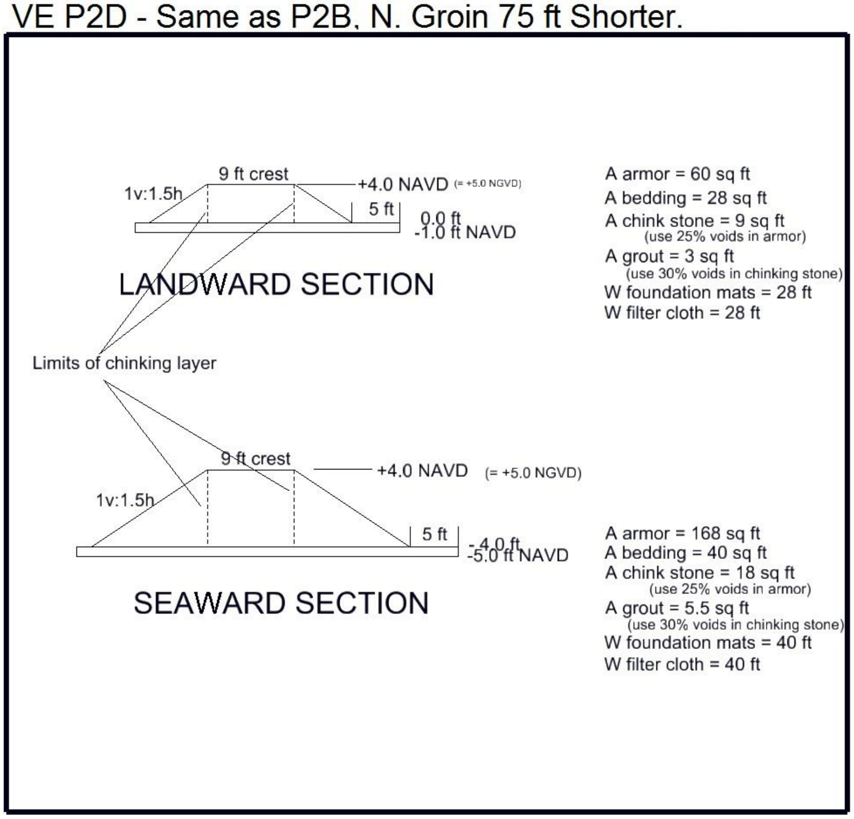
DETERMINATION: (PDT Responses)

DRAWINGS – EXISTING and PROPOSED (AS APPLICABLE)

BASE CONDITION - AS PER 2004 REPORT.



VE P2D - Same as P2B, N. Groin 75 ft Shorter.



NOTES AND CALCULATIONS (AS APPLICABLE)

Summary of Quantities of Materials Required – Proposal VE P2D.

SUB TOTAL - ALL 3 GROINS :					
Armor stone (granite)	7007	CY	1.838	12878	TONS
Bedding stone (limerock)	1833	CY	1.593	2921	TONS
12-inch Foundation mats	5500	SY			
Geotextile fabric	5500	SY			
Chinking stone (granite)	782	CY	1.715	1341	TONS
Grout	242	CY			

Summary of Quantities of Materials Required – 2004 Feasibility Study

QUANTITIES OF MATERIALS PRESENTED IN 2004 REPORT :				
Armor stone			15400	TONS
Core stone			3000	TONS
Bedding stone			8300	TONS
12-inch Foundation mats	N/A			
Geotextile fabric	9644	SY		
Vinyl sheet piles	34200	SF		

COST ESTIMATE WORK SHEET

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2D**			
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING (VINYL)	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING (PZC 13)	SF	0	$0.00	$0
GEOTEXTILE	SY	5500	$14.85	$81,675
CHINKING STONE	TON	1341	$136.14	$182,564
MATS (L)	SY	5500	$189.00	$1,039,500
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	12878	$188.51	$2,427,632
GROUT	CY	242	$2,025.00	$490,050
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$4,343,891**
	Net Cost Decrease/Increase			**$1,661,629**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,661,629**
			Rounded:	

PROPOSAL NO. P2E1. (Ideas 2.11, 8.18, 8.14): *Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with chinking stone without grout).*

<u>ORIGINAL DESIGN</u>:

The original design for proposal P2B calls for chinking all three structures, then grouting the chinking stone.

<u>PROPOSED DESIGN</u>:

This proposal eliminates the grouting from the chinking for Proposal P2B. There are some opinions that if properly installed the grouting can be eliminated.

<u>ADVANTAGES:</u>

Eliminating the grouting will make the groin installation much easier, faster and less expensive.

<u>DISADVANTAGES</u>:

The structures could become slightly more permeable without the use of grout to seal voids in the chinking layer. This increase in permeability is expected to be minimal however. There is an increased chance that chinking stone could be washed out of the groins and onto adjacent beaches without grout to bind the chinking stone together.

<u>JUSTIFICATION</u>:

If upon further analysis and coordination the grouting can be eliminated, definite savings can be realized through cost savings by removal of the grouting from the bid schedule plus any additional savings associated with shortening the construction schedule.

COST ESTIMATE WORK SHEETS

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2E-1**	**2B w/o grout**		
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING (VINYL)	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING (PZC 13)	SF	0	$0.00	$0
GEOTEXTILE	SY	5833	$14.85	$86,620
CHINKING STONE	TON	1426	$136.14	$194,136
MATS (L)	SY	5833	$189.00	$1,102,437
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	13736	$188.51	$2,589,373
GROUT	CY	0	$2,025.00	$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$4,095,036**
	Net Cost Decrease/Increase			**$1,910,483**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$1,910,483**
			Rounded:	

PROPOSAL NO. P2E2. (Ideas 2.11, 8.18, 8.14, 8.49): *Groin Optimization (Optimize dimensions, use local stone in marine mattresses, replace sheet pile with chinking stone without grout, selectively shorten groins).*

ORIGINAL DESIGN:

The original design for proposal P2D calls for chinking all three structures, then grouting the chinking stone.

PROPOSED DESIGN:

This proposal eliminates the grouting from the chinking for Proposal P2D. There are some opinions that if properly installed the grouting can be eliminated.

ADVANTAGES:

Eliminating the grouting will make the groin installation much easier, faster and less expensive.

DISADVANTAGES:

The structures could become slightly more permeable without the use of grout to seal voids in the chinking layer. This increase in permeability is expected to be minimal however. There is an increased chance that chinking stone could be washed out of the groins and onto adjacent beaches without grout to bind the chinking stone together.

JUSTIFICATION:

If upon further analysis and coordination the grouting can be eliminated, definite savings can be realized through cost savings by removal of the grouting from the bid schedule plus any additional savings associated with shortening the construction schedule.

COST ESTIMATE WORKSHEET				
PROPOSAL NO.	**2E-2**	**2D w/o grout**		
Title:				
DELETIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	53000	$6.62	$350,860
SHEETPILING (VINYL)	SF	34200	$28.70	$981,540
GEOTEXTILE	SY	9644	$14.85	$143,213
BEDDING STONE (G)	TON	8300	$136.14	$1,129,962
CORE STONE (G)	TON	3000	$165.63	$496,890
ARMOR STONE (G)	TON	15400	$188.51	$2,903,054
				$0
				$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Deletions		**$6,005,519**
ADDITIONS				
ITEM	**UNITS**	**QUANTITY**	**UNIT COST**	**TOTAL**
				$0
EXCAVATION	CY	18500	$6.62	$122,470
SHEETPILING (PZC 13)	SF	0	$0.00	$0
GEOTEXTILE	SY	5500	$14.85	$81,675
CHINKING STONE	TON	1341	$136.14	$182,564
MATS (L)	SY	5500	$189.00	$1,039,500
CORE STONE (G)	TON	0	$165.63	$0
ARMOR STONE (G)	TON	12878	$188.51	$2,427,632
GROUT	CY	0	$2,025.00	$0
				$0
				$0
				$0
				$0
=================	==========	===========	============	============
		Total Additions		**$3,853,841**
	Net Cost Decrease/Increase			**$2,151,679**
	Mark-ups	**0.00%**		**$0**
	Total Cost Decrease/Increase			**$2,151,679**
			Rounded:	