APPENDIX H

VALUE ENGINEERING STUDY ALTERNATIVES

ENVIRONMENTAL ASSESSMENT FOR ST. LUCIE INLET, FLORIDA PROJECT - SOUTH JETTY REHABILITATION

ST. LUCIE INLET, MARTIN COUNTY, FLORIDA

NEPA ID#: EAXX-202-00-K3P-1742397469

U.S. Army Corps of Engineers
JACKSONVILLE DISTRICT

Table of Contents

List of Figures

INTRODUCTION

During the planning and design for the rehabilitation effort, a Value Engineering (VE) study was completed in order to identify additional alternatives for design, construction methodology, materials, and access. The VE study identified rehabilitation with slope adjustment, rehabilitation with alternative geometries, rehabilitation using concrete armor units (dolosse), rehabilitation using a dredged barge access channel, rehabilitation of the entire jetty structure, and jetty head rehabilitation and seaward extension as additional alternatives. More information on each of these alternatives is described in this appendix. These alternatives were not carried forward for detailed analysis as many are cost prohibitive and/or present the need to expand the footprint further, which would impede upon the Federal navigation channel.

REHABILITATION WITH SLOPE ADJUSTMENT

Rehabilitation of the jetty would occur however, this alternative would adjust the design of the jetty structure by modifying the slope from the design shown in Alternative 2 to a more gradual slope, as shown in ***Figure 1***. This would create a larger footprint and therefore longer construction duration for the jetty structure and would cost more than Alternative 2. Though this modified slope may offer protection from a limited number of larger storms, the additional cost was not justified for a small increase in potential protection. It is also expected that the larger footprint would increase effects to ESA-listed species and other resources. Based on the increased footprint, increased cost, and longer construction duration, this alternative was removed from further evaluation.

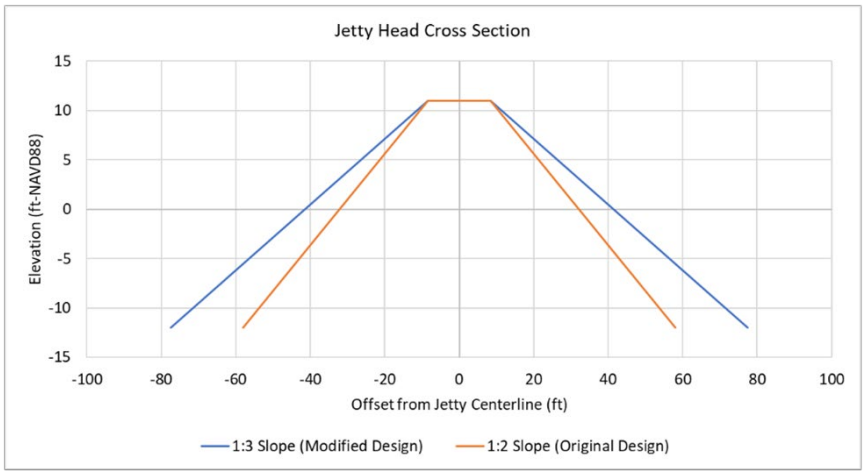

Figure 1: Modified Slope as Compared to Original Slope Design

REHABILITATION WITH ALTERNATIVE GEOMETRIES

This alternative would adjust the design of the jetty structure by modifying the slope from a straight line to a bench-like “S”-shape, as shown in ***Figure 2***. The rest of construction for this alternative would be the same as that described in Alternative 2. This modified geometry for the slope of the jetty would likely have a slightly smaller footprint than Alternative 2 at initial construction, but it would likely equilibrate to a slightly wider footprint than that of Alternative 2. Due to the larger footprint, it is expected this alternative would incur greater costs and would have greater potential for effects to environmental resources. Current engineering guidance for jetty construction, as

well as the likelihood of an even larger footprint once the structure has equilibrated have removed this alternative from further analysis.

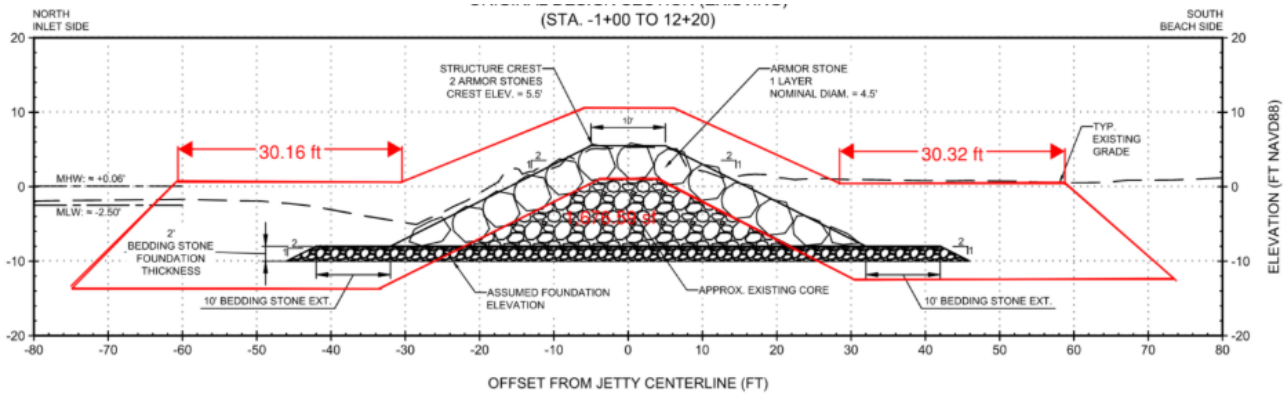

Figure 2: Modified Slope Geometry

REHABILITATION USING CONCRETE ARMOR UNITS (DOLOSSE)

The jetty could be rehabilitated using concrete armor units instead of granite armor stone. These armor units, called dolosse, are designed for their interlocking capability rather than just weight. (*See* ***Figure 3***). They are placed strategically to create a porous and resilient armor layer to dissipate wave energy. Design for use of these units is very extensive as there are strict quality control procedures for the production and installation of the units. These units also require periodic surveys and monitoring after placement in order to track their movement and verify the stability of the structure throughout its lifetime. These units have been utilized infrequently throughout the U.S., and therefore institutional knowledge is limited on their design and implementation.

Use of dolosse would reduce dependency on quarries for acquisition of stone for the rehabilitation, however, a large storage area is required for the cast armor units. Local material availability for manufacturing the units is unknown, therefore this alternative is not practical. Therefore, this alternative was eliminated from further analysis. Implementation of concrete armor units could potentially shorten the construction schedule if materials and sufficient temporary storage were available, and it would require minimal maintenance for the life of the project.

Figure 3: Concrete Armor Units (Dolosse) Implemented in Corps' Cleveland Harbor East Breakwater Project (2016)

REHABILITATION ACCESS USING DREDGED BARGE ACCESS CHANNEL

Though the rehabilitation construction in this alternative is the same as that of Alternative 2, access would be via a dredged barge access channel. Due to the cost of mobilizing and demobilizing equipment for a large dredging operation such as this, as well as considerable environmental impacts from creation of a new channel, this alternative is likely not feasible for the project area.

REHABILITATION OF THE ENTIRE JETTY STRUCTURE

This alternative would complete rehabilitation of the entire jetty structure, including excavation, placement of marine mattress, repair of the jetty core, and placement of 2 layers of armor stone. This rehabilitation alternative would create a wider footprint for the entire structure and would include extensive environmental monitoring and surveys. Additionally, mangrove trees have grown up and into the trunk section of the existing jetty, adding complexity to the potential environmental restrictions for construction. Costs for rehabilitation of the rest of the structure make this alternative infeasible at the time of the writing of this EA. Therefore this alternative was not considered practical.

JETTY HEAD REHABILITATION AND SEAWARD EXTENSION

This alternative would be comprised of the rehabilitation described in Alternative 2, plus an additional 200-foot seaward extension of the jetty head. This extension would require extensive coordination with state and federal agencies, and would require additional authorizations to lengthen the jetty. This extension would also require additional efforts to investigate economic benefits, costs, environmental impacts, and construction methodology. An extension of the jetty head would increase the difficulty of construction due to the in-water work and high energy of the inlet. Additional funding for new work would be required in order to complete extension of the jetty head.