Review of the Draft June 11, 2014 '*Study of Big Sarasota Pass Sediment Mining Alternatives for Sarasota County, Lido Key Federal Shore Protection Project*' by the US Army Corps of Engineers

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Submitted to:
City of Sarasota

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REVIEW SUMMARY

Coastal Technology Corporation (COASTAL TECH or Reviewer) was retained by the City of Sarasota (CITY) to independently review and provide technical comments on a proposal by the US Army Corps of Engineers (USACE) to mine sand from the ebb shoal system of Big Sarasota Pass for use as fill in the Lido Key Federal Shore Protection Project. Specifically, COASTAL TECH reviewed a draft document (Report) entitled "*Study of Big Sarasota Pass Sediment Mining Alternatives for Sarasota County, Lido Key Federal Shore Protection Project*," dated June 11, 2014. Individual report authors are not indicated, however the work was performed by staff of the USACE Jacksonville District.

The draft Report was made available to COASTAL TECH on June 11, 2014. A preliminary reading was completed immediately, following which the Reviewer met on June 17, 2014 with the City Engineer and staff from the Jacksonville District to discuss details of the review scope, timing and any need for additional supporting information or data. Among the points noted in prior discussions with the CITY and during this meeting is that the review was to focus only on the efficacy and impacts of mining a portion of the Big Sarasota Pass ebb shoal as presented in the referenced report. The review was not to extend to elements of the beach fill design, associated groins being discussed, nor to any other options for the fill source. The COASTAL TECH .review was based on engineering judgment, experience and familiarity with the local setting and processes No independent modeling was performed by COASTAL TECH. The form of the review document offered herein is this Executive Summary with conclusions, followed by specific technical comments on a section-by-section basis, followed again by some comments directed to various editorial and formatting issues noted in the course of the review.

Report Overview: The Report begins with an historic overview of Big Sarasota Pass, including the original artificial creation of Lido Key from the Cerol Isles. The technical value of this material is primarily to aid in better understanding the general morphology and processes which are the basis for subsequent modeling and analyses. It is also helpful to recognize from this history that although natural processes continue to operate on the inlet and adjacent shorelines, the present system is by no means "natural," but is the result of substantial and continued anthropogenic influences including the original creation of Lido Key and subsequent fill there and on Longboat Key, the hardening of the north Siesta Key shoreline and on-going maintenance of the New Pass Federal Navigation Channel.

The Report draws the conclusion in several places that the volume of sand contained in the ebb shoal of Big Sarasota Pass has been largely unchanged (~20 million cubic yards (MCY)) since at least 1883, and has only begun to increase (to ~23+ MCY) the past decade. The review, below, notes potential issues with the analytical method used to arrive at the historically stable volume conclusion. However, we concur/conclude that:

- The trend of relatively recent increases in Big Sarasota Pass shoal volume is likely a result of the introduction of 'new' sand to the littoral system in the form of fill from non-littoral sources (e.g., offshore borrow, maintenance of New Pass Channel). The linkage among the prior fill projects on Longboat Key and Lido Key and the maintenance of the New Pass navigation project is clear and in itself supports the idea that some amount of sediment back-passing from the shoal to Lido would amount to a "re-cycling" process.
- There is reasonable consensus among prior independent calculations that the present shoal volume is indeed in the range of ~20 to ~23 MCY. The proposed mining would extract approximately 1.3 MCY of sand which is less than 6 percent of the present shoal volume.
- There is also strong linkage between the ebb shoal and Siesta Key in the form of direct wave sheltering of the Key by the shoal and sediment bypassing along the ebb shoal to the Key. The discussion of the ebb shoal attachment (Section 1.5.3) is a key element in understanding how alterations to the ebb shoal potentially affect adjacent shorelines. The bypassing attachment "point" on north Siesta Key oscillates over at least a mile of shoreline (e.g., a contact "zone," rather than a "point"). The historic and on-going background variation in the width of the beaches on north Siesta Key in response to changes in contact zone is clearly evident in the figures in this section.

Sediment Budgets: Section 2 of the Report presents a sediment budget previously proposed as part of the 2008 County-sponsored Inlet Management Program and re-casts the same data using an alternative technical formulation. Section 7 then 'updates' the sediment budget based on the numerical modeling results as an aid in assessing what potential impacts the mining alternative may have. The review expresses some concern that the conventional depiction in these two Report sections of the sediment budget in "annualized" terms (cubic yards per year) may actually hinder understanding how sediment reaches the shoal, moves through it and is eventually deposited and/or bypassed. The discussion of bypassing and contact zones described above (Section 1.5.3) along with later discussion of sediment transport pathways (Section 4.4 and portions of Section 8) better capture the actual processes including their short-term variation related to tide direction and incident wave direction, their longer-term episodic features such as detachment of swash bars from the southern shoal lobe and the presence of nodes or reversals in net sand movement. The discussion of the sediment budget(s) would benefit from a broader presentation of the actual transport processes and some reasonable cautions about annualized values in contrast to episodic storm events, which dominate sediment processes. That said, it is fully acknowledged that the value of annualizing transport values is that it allows for 'fair' comparisons across differing timeframes and for dissimilar alternatives. Based on review of the present and 'updated' annualize sediment budgets, we concur/conclude that:

- At the present time a net volume of sand equal to a yearly average of perhaps 90,000 to 100,000 cubic yards is naturally bypassed as sand moves through the ebb shoal complex and feeds the Siesta Key shorelines and the southern offshore bar system.
- There is competent modeling and analyses presented in the Report to reasonably conclude that none of the three presently-considered mining geometries would reduce the net transport on a yearly average to significantly less than this present value.
- Although some modeling runs are presented as suggesting that certain mining and fill geometries could actually increase sediment bypassing (even by almost 30%) above the present values, these results are based on assumed sediment enrichment of the eroding Lido shoreline by fill and on the effect on the unverifiable predictions of sediment transport values *within* the shoal and channels.

Numerical Modeling: As expected substantial use is made of numerical model results in the Report's assessment of alternatives. The basic modeling procedure followed the generalized conventional steps of: 1) developing and calibrating a model for one specific historical data set and time period; 2) testing or validating that model by using a second, different time and historical data set; 3) using the calibrated and verified model to project some present, unaltered base condition ('No Action') into a future time period; and lastly 4) applying the model to alternative conditions in the future period as a comparison to the base condition. The historical time and data set used throughout this process was based on a six month period from May- November 2004. The Report never clearly explains *why* this data set and time period was used, but because the text describes the passage of tropical storms during the timeframe, the Reviewer's presumption is that this was an atypically energetic period and by using this data it is believed that some inherent degree of conservatism is imparted to the results.

When future conditions were forecast (Section 6), the initial model runs began with recent 2013 bathymetry and the simulations ran for the same six month time frame of waves and water levels. The Report acknowledges that six months of change may not be sufficient to fully understand morphological changes and therefore, additional model runs were made for a 1.5 year period. It is questionable whether the absolute values/results from even a 1.5 year simulation accurately capture the real changes to the inlet morphology over the appropriate time scales. However, beyond calibration, the value in simulations such as these is not so much in directly predicting long-term changes, but rather in allowing valid comparisons of changes, performance and impacts among alternatives for like conditions and times, and in comparing outcomes from six months *to* 1.5 years to estimate time-based trends. A number of review comments are directed to very detailed, specific assumptions used in parts of the model. In addition, improvements to certain output formats and organization clarity are suggested. However, in general we concur/conclude that:

- The models and approach used in their application are consistent with state-of-practice; assumptions used are reasonable and the results are competently interpreted.
- Although the lengths of the simulations (6 months and 1.5 years) do not coincide with the longer time scales of typical inlet morphological evolution, the results are nevertheless valuable in directly comparing alternative-to-alternative and in assessing trends applicable to longer time frames. It can be noted that the simulation periods are sufficient to estimate the effects under single storm events or over a single storm season.
- Screening criteria for alternatives are presented along with hypotheses and goals for the modeling. However, in the Reviewer's opinion there could be a much stronger, clearer link presented to show how the model results, sediment budget analyses and engineering judgment were weighted and applied leading to the final two recommended alternatives. The objective should be to not simply present and discuss results, but to more succinctly illustrate the decision-making process.

Report Discussion and Conclusion Sections: As noted above, alternatives were screened at two steps in the study, but little if any quantification is ever offered as to what constitutes "significant" changes in morphology, wave energy or shoaling. In the final presentation of the two recommended alternatives (e.g., Table 14) no quantification of the original three criteria is given and multiple additional criteria are listed. While many of the considerations listed are valuable to understanding the effects of the alternatives, it would be helpful to offer in the text the degree to which each factor might be 'weighted' as influencing the decision. The table would also benefit from a column-reference to the Report section or other basis for drawing the conclusions listed.

Of the two final alternatives recommended for further consideration, both involve 'contour' dredging of a portion of the outer flank of the northern lobe of the shoal (cuts D* and D**); neither option carries forward the previously considered rectangular geometry of a more typical borrow area (cut D2). Both alternatives include dredging the outer entrance channel that separates the south shoal lobe from the main planform (cut B). One alternative adds dredging of the ephemeral channel in the main shoal which subsequently acts as a deposition basin. It is not clear how or when a final selection between the two would be made, or on what basis the decision would be made.

Throughout Sections 8 and 9 the idea that dredging the ephemeral channel in the middle of the north lobe (cut C) would result in net positive *benefits to the system* gains increasing momentum in the discussion. This notion culminates on page 154 with the suggestion that sedimentation pressure on the existing main ebb channel might be relieved to the extent that the channel actually would move back to the north. While there may be some theoretical basis for this line of general discussion, the general lack of quantification of processes and impacts provide a gap against extrapolating the idea of 'no adverse impacts' to one of 'positive benefits.'

Concluding Review Comments and Recommendation:

- An independent technical review of the analyses and conclusions supporting mining of a portion of the Big Pass ebb shoal finds that the approach, models and assumptions are generally appropriate and reflect competent application of state-of-practice.
- The modeling results, taken together with discussions of historical conditions, sediment budgets and various other screening criteria support the identification of two mining alternatives (dredging cut combinations) that could be completed at least on a one-time basis with no significant adverse impacts to adjacent shorelines or major effects on present ebb shoal morphology.
- We conclude that it is reasonable for the conceptual project to advance through further public review and input, the NEPA process and Water Quality Certification review with the following recommendations:
    - A series of Adaptive Management actions to address a range of possible outcomes from a project should be identified early in the future process with broad input. This plan should be based on periodic, funded monitoring and should include identification of types of appropriate monitoring and thresholds for various tiered response actions.
    - The mining should be characterized as a 'one time' action *until* such time as monitoring and management analyses demonstrate that the impacts are within the ranges predicted. This approach is clearly meant to contrast with the idea that mining could be an on-going activity unless adverse effects are proven.
    - At this time and with the analyses presented, contention of an alternative as producing net positive benefits is speculative and would not likely further the reception of the project.

COMMENTS ON TECHNICAL CONTENT

The following are specific review comments of a technical nature, organized to follow the outline of the Report.

Report Section - EXECUTIVE SUMMARY

- The first paragraph of the Report summary introduces the need for obtaining a State Water Quality Certification for the Lido Key Project. While certainly true, this is not mentioned at all in the actual report, nor are any of the other procedural steps under NEPA. Given the wide interest in the Project and expected diverse readership of the Report perhaps a paragraph offering a brief overview of the process and opportunities for input should be included as part of the introduction and the single mention of the required permit could then be expanded in the summary.
- The fifth paragraph of the summary notes that dredging configurations have been investigated and shown to not adversely affect the shoal system. The Report ultimately recommends two specific combinations of multiple dredge cuts and the Executive Summary would benefit from a brief description of those two options and perhaps simple line figure(s); figures similar to report Figures 140 and 141 are suggested.
- This paragraph also contains a sentence, although heavily caveated, suggesting that certain of the dredging options could alleviate existing negative impacts from the present channel on north Siesta Key. This topic is indeed discussed in the Report body; however, in the opinion of the Reviewer not only is the conclusion speculative and unclear as to what actually would be the result, but it could be argued that it reaches beyond the intended scope of the study.
- Other summary conclusions are based on Report contents which are discussed below under the respective sections and those comments apply to the summary.

Report Section 1. – OVERVIEW

1.1 Statements of Methodology Workflow and Report Layout in this section are logical and positive elements in the document. In fact, it would be helpful to the reader if the introductions to subsequent sections essentially repeated where that material falls in the approach and outline; e.g., repeat the goals in each section, what it builds on and where it leads. This is done to some extent in Section 4, for example, but could be strengthened and expanded throughout.

ii. Why does the Methodology assume the use of May-November 2004 as a basic premise? If there is a specific reason such as data availability, or that period being representative of some average or maxima in energy, it would help to state

those reasons here and again as part of the modeling background in Section 3 (See expanded comment/question under Section 3, below).

ii. There are no expanded explanations, definitions, or preferably quantification, of the Screening Criteria proposed: significant morphological change, increased wave energy, increased shoaling. While any definitions would inherently be subjective, perhaps it would still be useful to describe how 'degradation' might be determined (e.g., predicted change in tidal prism), or greater than "10 %" increase in wave energy reaching specific sections of shoreline

1.2 Figures 1 and 2 do not appear to be referenced in the text. Figure 2 is titled "Project Location;" however, the included figure labels, "Study Area" and "Project Area," do not even extend to Big Sarasota Pass.

1.5 [Morphological Description of…] Big Sarasota Pass.

- A basic premise of this section and the subsequent sediment budget is that the ebb shoal volume of Big Pass has remained essentially unchanged since at least 1883. The methodology of Walton and Adams (1976) is cited as the basis for these calculations and resulting conclusion. Notwithstanding that methodology, if one simply visually compares Figure 10 and Figure 11, side-by-side, it would be difficult to reasonably conclude that they both reflect the same volume conditions, at least within similar domains.
  It is possible/likely that specifying a base beach elevation plane to use in the volume calculations inherently changes the horizontal limits of the ebb shoal at each time period. While this may seem reasonable in theory and even in keeping with the idea of a broadly defined shoal 'system,' it is of questionable practical value in understanding the effects of the proposed borrow area mining. It is counterintuitive to the Reviewer to expect that over the course of almost a hundred years and given the dramatic alterations to the area described in the Overview, there would be no difference in volume *within comparable portions of the ebb shoal* likely to be affected by the proposed mining work. On a broader level it might be that the methodology proposed by Walton and Adams (1976) is less useful in situations like Big Pass where the updrift beach has changed so significantly during the analyses periods and/or where the downdrift shoreline existing with such a pronounced seaward offset.
  Note further, that in Figure 24 and the text describing it on page 35, the calculated shoal volume is anomalistically large for the tidal prism. This result seems to support the above general concern and certainly would suggest that some discussion could be offered as to why the volume is so large and how it could have been at equilibrium for so long.
  Lastly, other investigators have reported different, smaller ebb shoal volumes for interim time periods, e.g., Hines and Davis (1984).

- Tables 3 and 4 are offered to document placement of fill on Lido Key and Longboat Key as part of the discussion of increased shoaling in Big Pass since 2004. The Reviewer is under the impression that New Pass was dredged a number of times following its 1964 commissioning and prior to the 1991 initial entry in Table 3 (e.g., 1973, 1977, 1982, 1985). It is understood that the tables are intended to reflect fill placement, not channel maintenance events, but there is nothing to suggest that dredged material was ever placed anywhere *other* than on Lido or Longboat Keys. The omission of these events from the tables and discussion does not change the premise being offered, but they should be included or otherwise addressed in the discussion.
- Text on page 38 describes the contents of Figures 27 and 28. Specifically, the contours in the figures are implied (although not explicitly stated) to be the 1 meter contour. However, simple visual comparison with other report figures (e.g., Figure 13, 2010 to Figure 28, 2010) indicates inconsistencies in morphology for comparable times. The descriptive text should be verified and figure captions clarified/revised as necessary.
- In Figure 28, page 39, the contours for all five time periods generally overlay along most of the shoal boundary. A clear exception can be seen for the 2010 and 2013 data where the contours diverge from the historic locations on the northwest flank of the shoal. In this area the recent contours prograde by perhaps 1000+ (scale ?) feet in the direction of Lido Key suggesting a zone of recent deposition. It is suggested that after confirming the depth and location of the contours (as discussed above), the approximate volume of sand deposited in this specific area be calculated and compared to the discussion of shoal growth and Tables 3 and 4. The results of this volume comparison would help inform the premise that the shoal is receiving sand directly as a result of fill events on Lido Key and the degree to which subsequent characterization of an overall, annualize sediment budget (Section 2) is a useful tool in evaluating morphological changes. This premise about the transport from Lido and the general area of the apparent deposition are particularly relevant because the mining cut alternatives D2, D3, D3* and D3 ** essentially coincide with the location.
- Section 1.5.2 discusses the migration of the main ebb channel landward, toward north Siesta Key and Figure 29, page 41, presents a plan view plot of the channel positions over time. The channel migration is not disputed, but the Report subsequently discusses in several places and contexts that certain dredging options may serve to "relieve pressure" of the channel on the adjacent shoreline. No real discussion or data is offered here or in later sections about any more recent trends in channel geometry, including whether or not the channel is constricting and/or tidal currents are increasing with time. There is recent anecdotal evidence that sand deposition continues on the main ebb shoal planform immediately west of the channel. In fact, portions of

that area can be subaerial at some tidal stages. However, the Reviewer's sense is that the sediment influx in this area may not be having further significant effects on the already-'pinned' section of the channel immediately adjacent. To the contrary, the majority of the observable changes to the channel, certainly as they might affect navigation, seem to be in the outer segments, southwest of Sarasota Point (the area of Cut 'B'). If the Report intends to assert the potential for positive benefits from the mining, it is suggested that some further discussion and evidence be offered explaining how ongoing deposition within the shoal *continues* to influence the interior channel (e.g., channel cross-sectional or marginal plots if available). This is contrasted, for example, to such sand being entrained in the ebb jet and continually 'flushed' offshore in some existing dynamic equilibrium. In fact, later in the Report in Section 4.6 this very mechanism of 'jetting' sand onto the south lobe is described versus any conclusions about deposition affecting the main channel, and the same process is described again in Section 8.4, page 150.

- The discussion of the ebb shoal attachment beginning on page 42 (Section 1.5.3) is a key element in understanding how alterations to the ebb shoal potentially affect adjacent shorelines, at least through the sediment transport process versus direct alteration of incident wave energy. A great deal of the subsequent modeling and analyses focus on predicting the movement of sand on a more localized basis within the ebb shoal system, but Section 1.5.3 and Figures 30 through 37 provide the context for how those results translate into shoreline changes. Because of the likely wide reading the report will receive it is suggested that Section 1.5.3 be expanded to include a somewhat general discussion of inlet bypassing (cf, Figure 39, page 47 and Figures 91 and 92 for the 'No Action' Alternative). For example, the additional text material might contrast the view of bypassing as a "river of sand" with the idea of more discrete, episodic sand transfer. The present text confirms that the bypassing attachment "point" on north Siesta Key oscillates over at least a mile of shoreline (e.g., a contact "zone"). The background variation in the width of the beaches on north Siesta Key in response to changes in contact zone is clearly evident in the figures in this section.

  Although the focus of the discussion in this section is on Siesta Key, the overall objective would benefit from a similar treatment of an attachment zone and the divergent bypassing bar from Lido Key to the ebb shoal. This addition would be relevant to the comment above about Figure 28 and the text on page 39.

Section 2. - QUANTITATIVE ANALYSIS OF EXSISTING DATA

- This section restates the Sediment Budget developed in the 2008 Inlet Management Program (IMP) document. The report then reanalyzes that data

using the Bodge Method (1993) (also, in CEM, Part V-6) to present a more detailed view of the same budget showing gross transport estimates from Siesta Key and Lido Key into the inlet. Note that by convention all values are annualized and as a result may not represent the actual transport processes/mechanism. Also, the reference historical sediment budget being discussed was for the period 1987-2006 during which time the estimated annual shoal growth rate of ~37,000 cubic yards per year would have resulted in an ebb shoal change of ~ + 703,000. This result would seem to be inconsistent with either of the two report premises: 1) the shoal has been generally unchanged from 1883 through about 2004, *OR* 2) the shoal grew by almost 3 MCY from 2004 through 2013.

- It is acknowledged that the 2008 Sediment Budget may not be 'correct,' but no discussion of assessment is offered in Section 2. Among the possible concerns that could be raised about the 2008 effort and the updated sediment budgets in report Section 7.0 are assumptions that there is negligible permanent loss of sediment onto the flood shoal of the inlet and/or Point of Rocks is a perfect littoral barrier with no loss of sediment to the south, or [more likely] dispersed offshore from the headland.
- No other technical concerns were noted in the section except as will be discussed subsequently, comparing Figure 41 to Figure 143.

Section 3. – NUMERICAL MODELING

In general, the Reviewer has few issues with the technical aspects of the basic numerical modeling setup and use. Issues with numerical modeling are more typically found in assumptions made when the model is applied to the alternatives, how model results are interpreted and/or the degree to which model result are relied upon in making final recommendations. A few relatively minor questions about the model setup are noted below and bear brief explanation in Section 3.

- On page 53 it is noted that there is no wind forcing used within the local model grid. This is explained in part by stating that the local model grid is too limited to generate significant" wave energy or "substantial" currents. No threshold of significance is offered. In reviewing the calibration plots (Figures 48 and 49) it can be seen that overall the model's 'fit' to measured data is very good with R^2 values ~0.90. However, a very close examination of the plots indicates that although the model does a very good job of replicating the central data, it misses the 'peaks' in both data sets. It might be that this outcome results from omitting the local wind forcing.
- It appears that constant values for bottom friction were used (Manning's n and Darcy Weisbach friction factor), although both models seem to be capable of using variable friction values. Perhaps this could be further explained in Section 3.2.1.2.

- It has been previously noted as part of the review that the report does not definitively state why the 2004 time period was used as input data and for subsequent analyses. Section 3.3.3.1 on page 63 seems to imply that was a particularly energetic period as a result of a number to tropical storm events. However, there is still no clear statement if this case and if the premise was intended to be using the most energetic period available as opposed to more 'average' conditions. Such a clarification here and in Section1 would help readers put the results in better perspective.

Section 4. – ALTERNATIVE SELECTION

This section seems to be intended as a preliminary screening exercise (although not specifically stated as such) and the introduction (paragraph 4.1) repeats the same three considerations from Section 1.1 ii: 1). Morphological Change….2). Increased Wave Energy and 3). Increased Channel Shoaling. A hypothesis about these three considerations is stated on Page 71, the answer to which is offered as the preliminary modeling result.

- Although 11 alternatives are identified (including 'No Action') it is not clear that all were analyzed. Table 9, page 74 (which is incorrectly referenced in the text (page 73) as Table 12) lists 9 summaries (not including 'No Action').
- Of more relevance, however, Table 9 shows the 'answers' to the screening criteria (and the hypothesis) as simply 'Yes,' or 'No.' There is no summary from Appendix A of the *measures* of morphological change or increased wave energy, and therefore no ranking of alternatives by potential impacts. The result of this approach is that the final list of alternatives (three combination cuts) is identified for subsequent additional model testing based primarily on providing the required volume of fill. The sub-listing screens out only Alternative D3 based on the "Yes" answer to potential for increased wave energy. While it may be pragmatic to screen on the volumetric basis, the discussion did not explain this was the intent. It would seem that either the screening could have proceeded from the start on that basis without the modeling, or if the modeling was desired for background understanding and comparison, so quantitative summary/comparison should be provided.
- The idea of quantification of the model results gives rise to a comment about the modeling based on a six-month period (May 2004 to November 2004). Comments have previously been made about better explaining from the beginning why this time period was selected. Irrespective of how this time period was selected, and acknowledging that six months is a relatively short time for assessing morphological changes, the Reviewer is nonetheless satisfied that the approach offers valuable *comparative* results addressing the three criteria. It is presumed that the report authors accept and agree with this point, but it is not communicated well in the document. The short time period and uncertain representative conditions may argue for not quoting 'absolute'

quantitative answers to the questions. However, a comparative summary could still be made to show, for example, that the increase in wave energy for one alternative was some percentage higher/lower compared to the 'No Action' base condition, or compared (ranked) against another 'Action' alternative.

- The discussion of sediment transport pathways in Section 4.4 is reasonable and valuable. In fact, it would seem that some form of the transport figures (e.g., Figure 91) for the 'No Action" alternative could be used as supporting explanation for the introduction of the sediment budget as suggested above.

Section 5. – ROLE OF GROINS AND BEACH NOURISHMENT ON THE SELECTED ALTERNATIVE

As noted, this section was reviewed only to the extent that the proposed groins might be relevant in how the ebb shoal responds to the mining. No assessment of the groin(s) performance or impacts with respect to the fill project or shoreline were considered by the Reviewer and it is suggested that the Report be modified to exclude those discussions and Appendix B. The focus of the Report should be only on the effects of mining the ebb shoal.

Section 6. – ROLE OF SELECTED ALTERNATIVES ON FUTURE MORPHOLOGY

Previous comments (Section 3) have been made about better clarity in explaining how and why specific data sets were selected for the modeling. Other comments are offered below about inconsistency in figure legends and suggested editorial and organizational changes. Otherwise, this section simply presents modeling results and no technical issues are noted.

Section 7. – UPDATED SEDIMENT BUDGETS – FUTURE ALTERNATIVES

Previous comments on the sediment budget introduced in Section 2 are applicable here as well. A review comment was made about comparing Figures 41 and 143, both of which represent "No Action." It would appear that the two primary differences between these analyses are: 1) Figure 41 looks at the historic condition from 1987 to 2006, while Figure 143 in some way forecasts from 2013 (no wave data or morphology is directly used in the Bodge Method); and, 2) the forecasted budget assumes no further fill is placed on Lido Key. Both results indicate identical transport off Lido Key (118.2 Thousand Cubic Yards (TCY)) and identical bypassing to Siesta Key (81.2 TCY); however, the transport though the shoal is 89.6 TCY for the historic case, but 10% higher (98.4 TCY) for the future case. It is not apparent to the Reviewer why there would be this difference and neither this section, nor the discussion of Sediment Budgets in Section 8.4 offers an explanation.

Sections 8. and 9. - DISCUSSION AND CONCLUSIONS

Section 8.3 summarizes a prior decision to screen four of the initial alternatives because they do not provide the desired fill volume even though they are stated as meeting the original criteria for lack of adverse impact. This point has been commented on above. The section (page 149) further removes alternative D2-C-B (D2 being the 'rectangular' cut) from consideration based on a discussion of 'unnatural contours' and rapid infilling. The Reviewer does not disagree with this observation nor the decision to remove the option from consideration; however, the decision would seem to be based more on engineering judgment and experience than on direct modeling results. The introduction of this into the discussion, in combination with the addition of a number of 'new,' or at least expanded selection criteria, in Table 14 moves the conclusions away from the original hypotheses and may potentially weaken the overall logic to some readers. To restate for clarity, the Reviewer does not substantially disagree with the majority of the contents of Sections 8.3 and 8.5; the objection is that many of these points are introduced for the first time in this section rather than having been part of the discussion from the beginning.

Lastly, the conclusions leave unstated what the 'next steps' are and what will be advanced as part of the Water Quality Certification application, or who/how a selection will be made.

EDITORIAL COMMENTS AND SUGGESTIONS

Section 1:

- Pg. 30 - on the top of the page there are one or more missing sentences. The second sentence refers to Sarasota Key which likely should be Siesta Key. Beginning here, and on several subsequent pages, the citation of Walton and Adams (1976) is made in several different formats (Walton & Adams, Walton Adams, and as "(1979)" in Figure 15).

- Pg. 32 – titles for Figures 16-23 are inconsistently formatted and Figure 16 appears to be at a different scale. Is the 'D' in caption for Figure 23 intended to be 'Delta' (or, spell out 'difference')?

- Pgs. 35-38 – an entire section beginning with "In the past decade…" is repeated over these pages. In this section the District's office symbol "SAJ" is introduced with no explanation. This is certainly a matter of minor style, but typically there are better options for identification to non-USACE readers; at a minimum, the terms used should be explained and applied consistently.

- Pg. 37 – In the text a statement is made that the ebb shoal has grown at the rate of 50% "of the volume placed." It is not clear what volume is intended; is it only the volume from 'offshore' (Table 4)? Or, is it some sub-dates of Tables 3 and 4 combined? Prior text states growth was approximately 3 MCY "since 2004."

Section 3:

- Beginning on page 68 with Figures 55 and 56, *and continuing systemically throughout ALL remaining report sections*, the color-coded legends for "Depth (m)" in the model graphics are inconsistent. Experience suggests that perhaps this is the result of default scaling for different output products. However, not only is it confusing to see positive and negative values intermixed, the color bands used are not the same from figure to figure and results in potential misunderstanding when comparing results.

Section 4:

- The statement in Section 4.1, page 70 that alternatives were screened based on the three criteria is not strictly correct, because four options were dropped solely because of insufficient volume.

- The hypothesis on page 71 about 'answering the question' is poorly worded and at least misleading because no summary is offered showing what would have been the actual changes.

- The reference in Section 4.2, page 73, to Table 12 apparently should have been to Table 9.
- The final statement about the remaining three alternatives on page 73 would greatly benefit from inserting simple line graphics at this point to 'set' for the reader what those options involve; at a minimum, the later figures (60, 65 and 70) should be re-referenced here.
- The discussion of sediment transport pathways in Section 4.4, page 87 -95 is reasonable and valuable. However, the long and complex text runs could be better organized and would benefit from several interim summary statements and perhaps some form of a final concluding table or graphic.

Section 5: References to GENESIS modeling of the groin performance and to Appendix B should be removed so that the overall report remains focused and limited to the ebb shoal mining.

Section 6:

- Concerns with this section are largely with the amount of material presented and its organization. The section would greatly benefit from some simple 'flowchart' graphic presenting the modeling steps: what time period is simulated, lengths of the simulation and how/what results are extracted and subsequently presented. This idea is offered to some degree in Table 12, page 102, but the table itself is difficult to follow and is limited.
- Previous comments have noted the inconsistencies in legends among the figures throughout this section.
- The initial paragraph in Section 6.2 needs editing; words are repeated and the description of Tables 11 and 12 does not appear to be correct

Section 7: All of the details in each of the sub-sections (e.g., 7.2.1, 7.3.1, etc.) would lend themselves well to presentation in simple tables following a shortened text description.

Section 8:

- It would help the discussion of final alternatives to include simple figures for each; as noted above, Figures 140 and 141 are appropriate choices.