Florida Department of Environmental Protection

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March 24, 2010

Collier County
3301 E. Tamiami Trail
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c/o Stephen Keene
Coastal Planning and Engineering, Inc.
2481 NW Boca Raton Blvd.
Boca Raton, FL 33431

REQUEST FOR ADDITIONAL INFORMATION (RAI #1)

JCP File Number:	0142538-008-JC, Collier County
Applicant Name:	Collier County
Project Name:	Wiggins Pass Navigation Channel Expansion and Maintenance Dredging

Dear Mr. Keene:

This letter is to acknowledge receipt of your application for a Joint Coastal Permit, pursuant to Chapter 161 and Part IV of Chapter 373, Florida Statutes; and authorization to use state-owned submerged lands, pursuant to Chapter 253 and 258, Florida Statutes.

Preliminary evaluation of your proposed project leads Bureau staff to the conclusion that the placement options for the non-beach compatible material to be dredged from the channel expansion cannot be recommended for approval. Specifically, the placement of clay and peat into the existing inlet channel meander and/or the nearshore waters of the Gulf. Special handling is required for disposal of this material in an appropriate upland location outside the coastal zone.

Also, this does not imply that the staff will recommend approval of the excavation of the clay and peat substrata. The consolidated material beneath the inlet bottom acts to maintain the inlet at this historical location along the coast and its removal could lead to inlet migration and erosion of the adjacent Park lands. Additional information is requested below regarding this potential adverse impact. In any case, the staff does not anticipate a recommendation for approval of a permit that includes disposal of the clay/peat in the coastal zone.

While this is by no means final agency action or notice of intent thereof, it does represent the staff review of your application and considerable experience in permitting matters. We

are sending you these comments at this early stage of the processing to allow you to assess fully the further commitment of financial resources for design dependent on permit issuance.

Please be advised that your permit application is considered to be incomplete as provided for by Chapter 120.60, Florida Statutes, and Rule 62B-49, Florida Administrative Code. Receipt of information listed below is required. The items of information are numbered to correspond with the item numbers on the application form.

When replying to this Request for Additional Information (RAI), please address your response to my attention (the undersigned permit processor). Please keep your RAI response separate from Scope of Work (SOW) submittals to the Project Manager in the Bureau's Beach Erosion Control Program. Misdirecting your response or combining your response with SOW matters will delay the review of your application. Please feel free to **courtesy copy** any other individuals with your response, but only responses addressed to the permit processor will be reviewed as part of your permit application.

Please submit three (3) hard copies of your response. Also, please prepare and submit one (1) electronic copy of your response (response document text, all attachments, and drawings) and submit it on a CD in Adobe Acrobat Reader® (.pdf) format.

5. Describe in general terms the proposed activity including any phasing.

Total estimated volume to be dredge is 80,000 cy. Please provide estimates of the dredge volumes to be placed in each of the material placement areas stated above.

The dredge depths noted on the cross-section vary from the table in Attachment 5. Please clarify the maximum dredge depths for the entire channel, noting the maximum dredge depths on a drawing for each subarea of the channel.

Of the 80,000 cy proposed to be dredged from the channel, what volume will be placed in the existing channel meander, the beach disposal sites, and nearshore disposal sites? What portion of the total volume is expected to be unsuitable material? Of that unsuitable material volume, what is the volume of the rock, peat, organic clay, and silty sands? What portion of the total volume is expected to be beach quality sands?

Describe the purpose and need of the proposed activity including any public benefits.

Please provide information to justify the navigational need for straight interior channel as opposed to the recreational boating access that has been provided by the natural interior channel. Information may include a record of reported accidents and navigation advisories.

11. Have you obtained approval from the Department of State, Division of Historical Resources? If yes, provide a copy of the letter of approval.

We have requested this information on your behalf but it has not yet been received. No further action is required of you at this time, however, you application will remain incomplete until the information is received.

13. A copy of the Division of State Lands title determination. If you do not have title determination, department staff will request that the Division of State Lands conduct a title check.

The title information check on your project reveals two existing easements (No. 30353 (5165-11)) and 29908 (5265-11)) and two existing leases (No. 3869 to Collier County for Barefoot Beach State Recreation Center, and No. 2514 to DEP Division of Parks and Recreation for Delnor Wiggins State Recreation Area) in the project area - as well as state owned submerged lands. There is a concern that the new channel template may encroach onto Park land. Your project will require a "letter of no objection" from the other easement/lease holders, and the applicant is required to obtain and submit those letters to FDEP. See also Item 14 below.

14. Satisfactory evidence demonstrating that the applicant has sufficient control and interest in the riparian upland property, as described in Subsection 18-21.004 (3)(b), Florida Administrative Code. Governmental entities that qualify for the waiver or deferral outlined in this rule must provide supporting documentation in order to be eligible. If the applicant is not the property owner, then authorization from the property owner for such use must be provided.

It is unclear from your response (attachment 14) if you are invoking the governmental waiver of this requirement. If you are, please submit evidence to show you qualify for the waiver. If you are not requesting the waiver your response it not satisfactory in response to this Item – please provide the required information.

17. A legal property description and acreage of any sovereign submerged land that would be encompassed by the requested lease or easement, plus two (2) prints of a survey prepared, signed and sealed by a person properly licensed by the Florida State Board of Land Surveyors.

Once the design has been finalized and the easement area has been determined we will required your sketches to be submitted and official notice of the proposed easement to be sent to all affected property owners within the 1000 foot (500 foot radius) of the easement area. The official notice template is attached. Noticing can occur after the permit has been issued, however, the easement package cannot be processed by the Department and the Division of State Lands until the permit is issued and the green cards (or attempted delivery notices) have been submitted. Construction may not begin until the easement has been recorded Please ensure your

sketches meet the required 10 year public easement survey standards of the Division of State Lands. Your application will remain incomplete pending receipt of the required survey sketches

19. *Written evidence, provided by the appropriate governmental agency having jurisdiction over the activity, that the proposed activity, as submitted to the Department, is consistent with the state-approved Local Comprehensive Plan.*

Please provide this information when it is available. Your application will remain incomplete pending your response.

23. *Complete sets of construction plans and specification for the proposed activity, certified by an engineer duly registered pursuant to Chapter 471, Florida Statutes. The plans shall clearly distinguish between existing and proposed structures and grades, and shall include the following:*

a. *Plan view of the proposed activity depicting the mean high-water line, any easement boundary and the erosion control line (if applicable) within the area of influence of the proposed activity. Identify the boundaries of significant geographical features (e.g., channels, shoals) and natural communities (e.g., submerged grass beds, hardbottom or mangroves) within the area of influence of the activity. Include a north arrow and a scale bar on each drawing.*

Show the mixing zone and OFW limits on the plan view drawings (please make sure they are shown together, along with the resources, on at least one plan view drawing).

b. *A sufficient number of cross-section views of the proposed activity depicting the slopes, the mean high-water line, any easement boundary and the erosion control line (if applicable) within the area of influence of the proposed activity. Identify the boundaries of significant geographical features and natural communities in the area of influence of the proposed activity. Elevations indicated on the cross-sections shall be referenced to the North American Vertical Datum of 1988 (NAVD 88).*

Please provide any missing cross section views (03+00, C-4, etc). Please provide longitudinal cross sections of the channel for all areas (C26 to 12+00, C33 to C29 and CN35 to C29).

On sheet 30, why are there two colors shown on the fill cross-section of the scarp repair area– does this just delineate the MHWL elevation? Or does it have more meaning? What is the plan for stabilizing the areas above MHW in this cross section? Why is construction to this elevation (+3.7 feet) necessary? How was this elevation chosen? Is it only temporary as a result of the containment dike construction? See also Item 28.

c. *Details of construction, including materials and general construction procedures and equipment to be used (e.g., construction access, dredging method, dredged material containment, pipeline location).*

The Construction Document (Attachment 23c) should identify those reaches and placement options such that triggers are set to change the placement option as necessary. This is particularly important to address the dredging of organic clay, peat, silty, and rocky layers that have been identified through the geotechnical investigation and provide the Department with reasonable assurance that non-beach compatible material will not be placed on the beach, in the nearshore, or in the channel meander, and potentially impact resources both during construction and in the near future. (This is important for areas such as the organic clay layer seen in vibracore WPVC-09-06 and those materials from the flood shoal and tributaries currently proposed for placement in the channel meander.)

Please clarify what is meant on page 5 of Attachment 5 where it states: "In keeping with a small project, the material can be disposed by sidecasting to the area 1,000 feet north of the inlet. There is no hardbottom north of the inlet and the nearest hardbottom is approximately 1,200 feet south of the inlet. Since this is a short term solution to lengthen navigation, sand returning quickly to the channel is not the major concern." This is also mentioned again in Attachment 23c.

This narrative (attachment 5) also states: "Full periodic and intermediate maintenance dredging will be target for the low wave season during the late spring to early summer (during sea turtle nesting season), but with no on beach disposal or construction activity. Construction requiring beach placement of sand will take place outside sea turtle nesting season." What is the fate of material dredged during the periodic and intermediate maintenance dredging? Do you also intend to limit the placement of dredged material in the nearshore to between November 1 and April 30?

The narrative under Attachment 23c states: "Turbidity will be addressed similar to existing requirements." Please elaborate on these methods as this is an insufficient explanation to provide reasonable assurance that state water quality standards will be met during and after construction (see also Item 33d). The placement of silty/organic material in the existing channel, even if 'capped' by coarser material will potentially lead to chronic turbidity problems (and the associated natural resource concerns) if the filled existing channel eroded again in the future (see also Items 27 and 33b). Pay particular attention to describing how you will meet the OFW turbidity standards of 0 NTU's above background at the edge of the mixing zone during construction in some parts of the project area and particularly where constructing the proposed dikes and associated infilling of the channel and the Delnor Wiggins beach and nearshore placement areas (see also Item 33d below).

Please elaborate on the project design and construction details for the 'scarp repair area' shown in Figure A of Attachment 5 and the same area of Barefoot Beach called out as 'South Point Restoration' shown on sheets 3 and 5 of the plan view drawings and cross sections C-5, C-8 and sheet 30. Pay particular attention to describing how you will meet the OFW turbidity standards of 0 NTU's above background at the edge of your mixing zone (see also Item 33d below).

What are the details of your plan to install new, or revise the locations of the existing, Aids to Navigation in the affected area? How will you update the appropriate Agencies navigational maps, Notice to Mariners, etc.? Have you coordinated with the US Coast Guard on your planned activities? If not, please do so.

24. *In addition to the full-size drawings requested above, the information required under Paragraphs (20), (22) and (23) above shall be provided on 8 1/2-inch by 11-inch paper, certified by an engineer duly registered pursuant to Chapter 471, Florida Statutes. Each drawing shall include an accurate scale or dimensions, and all information shown on the drawing shall be clearly legible.*

Please provide a fully annotated plot of the longitudinal cross-section of the proposed design of the channel cut, superimposed with the current bottom profile of the channel at Wiggins Pass and depicting the upper horizon of the limestone/peat/clay substrata.

See also Item 23 above.

25. *An aerial photograph or map with a scale of 1" = 200', showing: the project boundaries, DNR Reference Monument locations, major county landmarks, boundaries of significant natural communities (e.g., submerged aquatic vegetation, hardbottom or mangroves) and special aquatic or terrestrial sites (parks, sanctuaries, refuges, Outstanding Florida Waters, aquatic preserves, etc.) within the project boundary and a minimum of 1,000 feet in both shore parallel directions of the project boundary.*

This aerial does not meet the size requirement specified for this item; please submit expanded and updated resource maps for the dredge and fill regions that meet the proper scale requirements. Show the OFW boundaries and hardbottom resources on the map(s). Show the project area plus 1000 ft. in either direction on the map(s). See also Item 28 below regarding the identification of natural resources on this graphic that differ from the resource locations shown in Passarella – Exhibit 1 (2007).

26. *A proposed construction schedule.*

The current maintenance dredging application is expired and the construction schedule you propose is ambitious, particularly in light of the proposed channel straightening. Has avoidance of snook spawning season been accounted for during the construction schedule, as with previous

maintenance dredging events? If not please discuss this in an updated schedule. This item is complete, but provide an updated construction schedule after the final project design is achieved.

27. *Permit applications for excavation or fill activities shall include the following detailed information concerning the material to be excavated and the existing or native material at the beach fill site:*

a. *Site plans showing the location of all core borings and the boundaries of the area to be excavated.*

Please provide a figure with the showing maximum dredge depths for each subarea of the channel with the locations of the vibracores and jet probes superimposed.

Please provide a drawing(s) of the best estimate of the extent of the rock and organic clay layer that underlie the ebb shoal and current channel mouth. Both the rock and the organic clay layer (as seen in WPVC-09-06) are noted in Attachment 27, but no figure is provided other than the extent of the rock ledge noted previously by CEC.

On Figure 1 in Attachment 27, the locations of four possible peat areas (labeled 2009 Possible Peat Areas) are noted on the map. How were these located? Is this something observed in the field? Was the areal and/or vertical extent mapped? How much of the material to be dredged do these peat locations represent?

b. *Core boring logs of all cores taken throughout the area to be excavated and surrounding area. Logs should extend at least two feet below the proposed bottom elevation. The depth of each visible horizon in the log should be reported relative to NAVD (88) and the material in each stratum classified according to grain size.*

Please provide the jet probe logs and other supporting geotechnical information gained from the collection of the jet probes. (Were samples collected? Field notes made that may help define the extent of rock and/or the organic clay layer underlying the ebb shoal? A brief discussion was provided in the geotechnical report with the application, but the supporting documentation is being requested.)

f. *A sediment QA/QC plan that will ensure that the sediment to be used for beach restoration or nourishment will meet the standards set forth in paragraph 62B-41.007(2)(j), F.A.C.*

Please provide a sediment QA/QC plan required in Chapter 62B-41.008(1)(k)4.b.

The template Sediment QA/QC plan and guidance document for offshore borrow areas is available for guidance for this project on the Bureau's website (http://www.dep.state.fl.us/beaches/publications/tech-rpt.htm#Geotechnical-Table).

Please submit a Word version of the plan so that changes from the template document can be easily seen and comments can be sent back to you (as necessary) using Track Changes feature in Word.

28. *Using an established natural community classification system, describe each natural community within the area of influence of the proposed activity and include:*

a. *Acreage.*
b. *Identification of the flora and fauna to the lowest taxon practicable.*
c. *Characterization of dominant and important flora and fauna and estimates of percent biotic cover.*
d. *Sampling locations, date of sampling or measurements and methods used for sampling.*

Appendix 28-1 was missing Figure 2 and the map of the numbered resource Areas listed in Table 1 – and some of the appendices referenced in this report. Please provide at least an electronic version of the complete report.

The black and white resource map by Passarella – Exhibit 1 submitted in the narrative under attachment 28-1B (page 6), based on natural resource surveys performed in 2007 seems to indicate more resources and in different areas than shown on the aerial submitted in Attachment 25. Since this is black and white it is difficult to read – please provide a color version of this figure and at a larger scale. Discuss the sometimes dramatic differences in resources and locations identified in the project area in just a year. Are you confident that the recently performed CPE field survey visited all the areas identified in this map and confirmed those resources do not exist today?

As a result of this discrepancy between the statements in the narrative under Attachment 33d and 28-1B we must inquire for clarification on direct impacts. Please also elaborate on indirect and cumulative impacts, including potential sloughing of channel walls, which may impact the adjacent seagrass beds. What type, by species, and acreage(s) of benthic natural resources (seagrass, hardbottom, and oyster reefs) will be directly and indirectly impacted by filling in the old existing channel? By dredging the new alignment to the channel? By disposing of the material in the nearshore off Denlor Wiggins and Barefoot Beach? What acreage of new intertidal habitat suitable for colonization of these resources will be created? Do you intend to transplant seagrasses into the newly created intertidal habitat where the channel is infilled? Will you maintain the diked areas that may be supratidal for some time period to ensure that no exotic invasive plant species colonize them?

Hardbottom exists directly south of the inlet and this edge was mapped during the Collier County nourishment project. A pre-construction update (baseline survey for this project) will be required. The project description states there is no hardbottom north of the pass (off Barefoot Beach "disposal" area which is suggested as the priority of the two placement areas). Is this

based upon a prior survey? If so, provide the data from this survey in support of Item 28. The hardbottom south of the pass was mapped; the volumes of placement, equilibration of the toe of fill of the beach and nearshore placement material, etc. should be discussed in your response in relation to the existing hardbottom resources here.

Biological monitoring will be required at all hardbottom locations (either ephemeral or persistent) adjacent to the Pass. A recent baseline natural resource survey, conducted during the summer months, and a draft biological monitoring plan are required to be submitted as a completeness items (we acknowledge the 2009 survey, but normally our requirement is that the survey must be less than 1 year old. This is open to negotiation). Differentiate between ephemeral (less than 30cm of sand depth coverage) and persistently exposed nearshore hardbottom in these surveys. The applicant/agent is advised to contact Dr. Kosmynin about the current requirements of the post-construction biological monitoring plan and the baseline survey prior to conducting this survey in the field. The previous Collier County project can be used as a basis for developing a similar protocol even if the specific transect and quadrat locations will differ.

30. *Results of available wildlife surveys that have been conducted on the site, and any comments pertaining to the proposed activity from the Florida Fish and Wildlife Conservation Commission.*

In accordance with Florida Statute 379.2431 (1), the following additional information is required for FWC to complete their review of this project.

a. Please provide a detailed map showing the location of all gopher tortoise burrows within 25 feet of the area that is proposed to have scarp repair at the southern end of Barefoot Beach. These gopher tortoise burrows may need to be relocated prior to construction. Please check with your regional gopher tortoise conservation biologist.

b. We are concerned about the ratio of sea turtle false crawls to nests in the proposed fill area on Delnor-Wiggins State Park (R17-R19) for the 2008 and 2009 sea turtle nesting seasons. Can you please explain the high ratio of sea turtle false crawls to nests for the past two nesting seasons in the proposed fill area?

c. The table depicting the marine turtle nesting data shows the number of nests and false crawls for Barefoot Beach between R13 and R16. Does the nesting data include the area south of R-16 and the proposed South Point Restoration area? If not, please provide the marine turtle nesting data that has occurred south of the R-16 marker on Barefoot Beach.

d. Although your application states there are none, please identify all derelict structures that will be removed prior to beneficial beach disposal (restoration) of

dredged material – or re-confirm there are no derelict structures, outfalls or mangrove stumps to be removed along these shorelines.

e. It has been noted that piping plovers have been observed on Barefoot Beach. Are winter shorebird surveys being conducted on Barefoot Beach and Delnor-Wiggins State Park for piping plovers and other shorebirds? If so, how often? It has been noted that no shorebirds have nested within Delnor-Wiggins Pass State Park since the 1980's. Are nesting shorebird surveys being conducted on Delnor-Wiggins State Park and Barefoot Beach each year?

f. Creation of an elevated beach berm can expose marine turtle hatchlings to lights that were not visible prior to the beach project. Under existing state requirements, marine turtle nests cannot be relocated due to lighting. Prior to construction, the local government should ensure that appropriate measures are in place, such as a lighting ordinance, within the project area. We acknowledge a copy of the lighting ordinance for Collier County which includes Barefoot Beach has been provided. Is Delnor-Wiggins State Park under the same lighting ordinance? If it is different, please provide a copy of the lighting ordinance for Delnor-Wiggins State Park.

Please contact Eric Seckinger at (850) 922-4330 or via e-mail at Eric.Seckinger@myfwc.com if you have questions or clarifications about this Item.

31. *A current Biological Opinion from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, when the Florida Wildlife Conservation Commission has determined that the proposed project will result in a take of marine turtles, which could not be authorized without an incidental take determination under federal law.*

Please provide the USFWS and NMFS (if applicable, as essential [snook] fish habitat) Biological Opinion(s) for this project when they are available. Ensure your consultations cover the range of dredging equipment you propose to use under Attachment 23c and that all the federally listed fish, birds, reptiles/amphibians and mammals that may be impacted by the project are covered in your BO(s). Your application will remain incomplete until they are received.

33. *Analysis of the expected effect of the proposed activity on the coastal system including but not limited to:*

a. *Analysis of the expected physical effect of the proposed activity on the existing coastal conditions and natural shore and inlet processes. The analysis should include a quantitative description of the existing coastal system, the performance objectives of the proposed activity, the design parameters and assumptions, relevant computations, validation of the results and the data used in the analysis.*

After a review of the information submitted in the application, the Bureau engineering staff considers the engineering data and analysis to be incomplete to adequately demonstrate the expected effect of the navigation channel expansion on the inlet and adjacent beaches. Coastal engineering data and analyses necessary to complete the application are requested under Item 33a and Item 33c below.

In addition to other information contained in the application and the Bureau files, engineering staff has reviewed Attachment 33a to the application titled "Engineering Report for a Maintenance Dredging, Navigation Improvement and Erosion Reduction Project for Wiggins Pass, Florida", February 2010, prepared by CP&E (35 pages). The engineering staff also reviewed: the *"draft* Numerical Modeling of Wave Propagation, Currents and Morphology Changes, Phase II: Numerical Modeling of Alternatives Report", January 2009, also prepared by CP&E (89 pages); the "Wiggins Pass Study, Hydrodynamic and Sand Transport Modeling", August 2007, prepared by Humiston and Moore; and the "Wiggins Pass Inlet Management Plan" report dated August 1995, prepared by CP&E.

Coastal Engineering Analyses and Reporting

Please provide a **revised** report including the information requested below. The report shall be certified by a professional engineer registered in the State of Florida. The data and analysis should include but not be limited to the following specific items below.

Provide engineering data and analysis that demonstrates with reasonable assurance the proposed activity will maintain lateral stability within the historic alongshore location of the Wiggins Pass.

The engineering and modeling reports do not provide adequate data and analysis of geologic control on the alongshore location of the inlet that is provided by the limestone, peat and clay substrata. More importantly, information does not demonstrate that dredging and removal of this stabilizing geologic feature will not cause the inlet to migrate and erode the adjacent Park lands.

The ebb shoal provides hydraulic stability both in maintaining the lateral location along the shoreline and shoaling rates and patterns. The modeling analysis predicts the deflation and eventual loss of the ebb shoal feature after navigation channel expansion and continuing maintenance dredging. The reports do not provide adequate data and analysis on the lateral stability of the inlet or shoaling rates and patterns under these conditions.

Please provide engineering data and analysis that demonstrates with reasonable assurance the expected effects of the proposed activity on the inlet system and adjacent beaches. The data and analysis should include but not be limited to the following specific items below.

The engineering report references the historical loss of ebb shoal volume attributed to channel maintenance dredging and associated with increased erosion rates on the adjacent

beaches. As noted above, the modeling analysis indicates the deflation and perhaps eventual loss of the ebb shoal feature after navigation channel expansion and continuing maintenance dredging. The reports do not demonstrate that the placement of maintenance dredge material will be sufficient to offset increased erosion associated with long-term maintenance dredging activities in conjunction with continued deflation of the ebb shoal.

The applicant has relied extensively upon numerical modeling to predict the expected effects of the proposed activity. Specific information is requested further below regarding the numerical modeling analysis; however, the Bureau engineering staff cannot recommend approval based numerical modeling without corroborating coastal data and analysis using generally accepted empirically- and theoretically based analytic solutions. Please include but not limit such an analysis to the following information:

Inlets constricted by man-made or natural features may exhibit an actual throat section that is smaller than a stable cross-section in sedimentary equilibrium as determined from its tidal prism. The removal of constrictions can reduce the channel frictional resistance and thereby allow an increased flow that could cause increased sediment transport with unexpected results on channel shoaling and lateral stability. Removing the constriction(s), such as the peat and clay substrata within Wiggins Pass, could result in unexpected inlet cross-section enlargement. Empirical data may provide insight into this potential. An understanding of the general hydraulic characteristics has not been provided, notwithstanding the development of a fluvio-hydrodynamic model of the inlet. To assist in addressing the potential impacts of dredging Wiggins Pass, please provide the following hydraulic characteristics for both the predominantly diurnal tides and the predominantly semi-diurnal tides –

Gulf tide range – $2a_0$
Bay tide range – $2a_b$
Ratio of ranges – $\frac{a_b}{a_0}$
Maximum ebb velocity – V_{MAX_E}
Average max. ebb velocity – $\overline{V}_{MAX_E}$
Duration of ebb – ΔT_e
Lag of slack after low tide – Δt_e
Phase lag, ebb – ε_e
Maximum flood velocity – V_{MAX_F}
Average max. flood velocity – $\overline{V}_{MAX_F}$
Duration of flood – ΔT_f
Lag of slack after high tide – Δt_f
Phase lag, flood – ε_f
Existing cross-sectional area of the inlet throat – $A_{existing}$ (or A_c)

Critical cross-sectional area of the inlet throat – $A_{critical}$ (or A_c^*) [reference: O'Brien, M.P., and Dean, R.G., 1972. *Hydraulics and Sedimentary Stability of Coastal Inlets*, Proceedings of the 13th International Conference on Coastal Engineering, Chapter 41, pp. 761-780.]
Hydraulic tidal prism for flood and ebb – P_H
Keulegan coefficient of repletion – K [reference: Keulegan, G.H., 1967. *Tidal Flows in Entrances: Water Level Fluctuations of Basins in Communication with Seas*, Technical Bulletin No. 14, Committee on Tidal Hydraulics, Waterways Experiment Station, U.S. Army Corps of Engineers.]
Impedance –

$$F = \frac{2a_o g \sin \varepsilon}{(\overline{V}_{max})^2}$$

[reference: O'Brien, M.P., and Clark, R.R., 1974. *Hydraulic Constants of Tidal Entrances*, Proceedings of the 14th International Conference on Coastal Engineering, Chapter 90, pp. 1546-1565.]

Numerical Modeling Analyses and Reporting

Please provide a **revised** report including the information requested below. The report shall be certified by a professional engineer registered in the State of Florida. The *draft* numerical modeling report does not contain information necessary for a complete Bureau engineering staff review and basis for recommending approval or denial of the permit.

The long term morphology modeling simulation (4 years) needs to consider changes that would occur in the sediment characteristics at Wiggins Pass and the surrounding area, including adjacent beaches, after the construction of the proposed project. Wide variations in sediment size distribution can affect the sediment transport potential at Wiggins Pass and the adjacent beaches. For assurances that the long term morphology modeling simulation results are accurate, such as Figure 40 on page 41 of the report, the changes in the median sediment size distribution need to be well represented in the model. Considering a constant value of 0.35mm for the median sediment size for all the grids for the entire simulation period is not adequate for analyzing the coastal processes at Wiggins Pass.

In addition, please provide information on the sediment size distribution based on measured data assigned to the grid values in and about Wiggins Pass. (Also, provide the expected sediment size distribution after the 4 year morphology modeling simulation (equilibration).)

As previously noted, the engineering and modeling reports indicate the deflation of the ebb shoal with historical and future maintenance dredging. However, the numerical modeling is limited to predicted effects on the coastal system through an initial four-year post-construction period following navigation channel expansion dredging. Please

demonstrate how the modeling results lead to the long-term management of the improved navigation inlet considering the continuing changes to the inlet ebb shoal.

The numerical modeling is used to assess sediment transport patterns, which significantly revise the results of the 1995 sediment budget developed by CP&E. Please provide a detailed explanation of how the modeling results were used develop the sediment budget. Please demonstrate that the revisions are not the result of changes in predominate wave direction that may occur during the record periods. The Bureau engineering staff has observed such changes in other areas of southwest Florida, although not within Collier County. Please include an explanation of Figure 40 of the report that appears to indicate the inlet is not a sediment sink, but is losing sediment to the adjacent coastal system north and south of the inlet. The reliability of the sediment budget is critical to inlet management activities; a sediment budget based upon coastal monitoring data is requested in Item #33c to validate the numerical modeling results.

Please provide additional detail from the simulation results, such as the channel stability computation methods used and the numerical values for each of the alternative, besides the classification provided in the tables. Please provide larger plots of the initial and final graphs with the borders of the channel designs of the 8 alternative cases drawn. In general, please provide larger plots than provided of key figures, such as of Figures 31-37 for visual analysis.

If the applicant or the applicant's consultant has any questions about the comments or information requested above, please contact Subarna Malakar Coastal Engineer, at 850-413-7847.

Looking at the cross-sections for profile lines C-12, and C-13, there is an interesting shape to the cut bank wall of the existing meander channel. In C-11 and C-14, the cut bank wall is nearly vertical. In C-12 and C-13, a small 'ledge' is seen in the wall. Is there some geologic control, such as a layer of organic or peat material, or is this a function of the flow regime within the channel? What types of sediment exist on the cut bank wall of the existing meander?

Within the existing meander channel, the channel deepens near profiles C-13 through C-15. Is this a function of a geologic control forcing the flow to erode the channel down (deepen the channel) rather than out (into the cut back) into the mangroves? Is there peat or organic clay at the channel bottom in the areas seaward of profile C-13?

The analysis provided does not adequately assess the geologic control of the existing meander positioning. Please provide additional data and analysis to determine what geologic controls (as noted in the two comments above) exist.