CHANGE ORDER APPROVAL FORM

RCVD COUNTY MGR
19 MAR '18 PM4:54

18 APR -9 PM 4:22

PROJECT: Coastal Engineering Services for FDEP/USACE Permit-Level Design And Application – SAISS Project

CHANGE ORDER NUMBER: 1

DATE: 03-16-18

CONTRACT NUMBER: CM1852-TO26

TO CONTRACTOR: Olsen Associates, Inc.

Reason for Change Order: SAISSA Trustees recommend a deduct CHANGE ORDER to TO26 (CM1852). The change was necessitated by the need to provide more-detailed modeling analyses to address questions from the FL Department of Environmental Protection (FDEP). For that reason, the modeling subtask, Subtask II in TO26 in the amount of $42,800.00 is hereby recommended for deleted in its entirety, and new Task Orders will be prepared and submitted with a more extensive modeling effort. Attached is a memorandum from the Project Engineer with a more detailed description of the reason for the deductive Change Order and future additional tasks. The SAISSA Trustees meeting March 14, 2018 unanimously recommend the Task Order modification as requested and as described below:

Original Contract Sum.....	$	226,900.00
Net Change by Previous Change Order/Supplemental Agreement.	$	0.00
Contract Sum Prior to This Change Order.....	$	226,900.00
Amount of This Change Order (~~Add~~/Deduct).....	$	(42,800.00)
New Contract Sum Including this Change Order.....	$	184,100.00

APPROVED BY: William Moore — DATE: 3.16.18
William Moore, SAISSA

APPROVED BY: Grayson Hagins — DATE: 3/19/18
Grayson Hagins, Contract/Purchasing Manager

APPROVED BY: — DATE: 3/27/18
Justin Stankiewicz, OMB Director

3.21.18

APPROVED BY: — DATE: 4-5-18
Shanea Jones, County Manager

ACCOUNT NO.: 43603539 563802

olsen associates, inc.
Coastal Engineering

MEMORANDUM

Date: 16 March 2018

To: D. Wallace, W. Moore – SAISSA

From: Albert E. Browder, Ph.D., P.E.
Principal Engineer

Cc: E. Olsen – OAI

Re: Additional discussion of the need to conduct additional analyses at Nassau Sound (Task Orders #26, #30, and #31-draft)

Regarding Task Order #30 (and the to-be prepared companion Task Order #31 for analytical/numerical modeling analyses of Nassau Sound and the proposed dredging of an ebb shoal borrow area there upon, the following additional information is provided. This information focuses primarily on the FDEP request to conduct these additional studies and the rationale behind their request. The discussion relates to two specific Task Orders submitted to SAISSA and FDEP for the permitting of the upcoming beach renourishment for South Amelia Island:

- Task Order #26
  - Coastal Engineering Services for FDEP/USACE Permit-level design and permit application
- Task Order #30 (part 1 of 2)
  - Nassau Sound: Analyses of Potential Impacts of Borrow Area Excavation
  - Part 1 - Field Data Collection, Historical Analyses, Model Setup/Calib./Existing Condition.
- *Task Order #31 (part 2 of 2, draft in prep.)*
  - Nassau Sound: Analyses of Potential Impacts of Borrow Area Excavation
  - Part 2 – Simulation of project alternatives, final report, RAI assistance
  - Specific scope of work (# of alternatives, etc.) still under discussion with FDEP

Task Order #26 includes subtasks to conduct a permit-level design of the beach renourishment project, prepare the permit application documents, and submit and coordinate the permit applications on SAISSA's behalf. A subtask of TO#26, Subtask II, included a numerical-model-based wave field impact analysis to investigate the potential for the dredge pit to impact the local wave climate by potentially creating areas of wave focusing in and down-wave of the excavation area. Such an analysis extends to the shorelines in the vicinity to assess those areas (i.e., the Amelia Island and Talbot Islands shorelines).

TO #26 was submitted for review to the FDEP Beaches Inlets and Ports Program (FDEP BIPP) for approval for State cost-sharing and to receive feedback from the regulatory and coastal engineering sections of the BIP Program. The feedback from the engineering section included questions relating to the ability of the proposed numerical-modeling wave field impact analyses to sufficiently investigate potential impacts of the dredging upon not only the wave climate at the ebb shoal, but also the hydrodynamics and sediment transport pathways for sand at Nassau Sound. The FDEP feedback indicated that a much more sophisticated level of modeling would be required to address these questions, and to ultimately secure the project permits. TOs #30 and #31 were developed to address these questions.

Regulatory Basis of FDEP's Questions

The FDEP comments regarding TO #26, and specifically the proposed wave field modeling (Subtask II), centered on the need to adequately demonstrate "the expected physical effects of the proposed activity and minimize the potential adverse impacts to the coastal system." The FDEP opined that the proposed wave field modeling would not adequately describe the expected physical effects of the proposed dredging activity, which would include not only the initial dredging for the next renourishment, but also a subsequent dredging in the same area 8-10 years later. The second dredge event is included in this discussion because at this time the duration of the requested permit is expected to be 15 years.

It is noted that the scope-of-work for the borrow area analysis included in Task Order #26, as originally submitted, was the same scope-of-work as that of the permitting process for the prior beach renourishment project (same approach, different borrow area). That analysis was conducted roughly ten years ago. Since that time, the state of the art in numerical modeling has improved dramatically. More importantly, the standards for evaluating project impacts have increased significantly as well. This was recently demonstrated in several projects in the State. In one example, at Big Sarasota Pass between Lido Key and Siesta Key in Sarasota County, a project permit to excavate sand from the ebb shoal was challenged by Siesta Key residents, leading to an Administrative Hearing. Much of the FDEP's decision to issue the permit hinged on the findings of a detailed numerical model.

It is clear from their comments on TO #26 and the recent Administrative Hearing at Big Sarasota Pass that FDEP is requiring more analyses than in years past, in order to inform and guide their decision making and to demonstrate and defend their review and due diligence processes. At this time, however, the exact level of analyses required to successfully acquire a permit varies from project to project, and there is no specific guide from FDEP as to what analyses are required for a particular project. Rather, projects are evaluated on a case-by-base basis. Due to the significant cost and time requirement of the higher-level modeling, the initial Task Order #26 scope was submitted with the lower level of analyses proposed. These factors were discussed with the SAISSA board and staff prior to the submittal of TO #26, as was the

possibility that additional numerical modeling might be required by FDEP. This led to the establishment of a reserve fund for this probable additional work.

Physical basis of FDEP's Questions

As mentioned above, regulators from FDEP and USACE are charged with evaluating the potential physical impacts of a proposed activity and the potential minimization or avoidance of any adverse impacts, if apparent. In the evaluation of the effects and/or potential impacts of a proposed dredging project (or multiple dredging projects over time), several physical aspects must be considered. The manner and degree to which these effects and potential impacts are evaluated ranges in terms of complexity.

In general, the excavation of the seabed in the nearshore, including upon an ebb tidal shoal such as at Nassau Sound, can have effects on the local wave field as waves pass over the excavated area. Likewise, the increased depth and altered relief of the seabed may affect tidal currents and sediment transport pathways in the vicinity. The greater the excavation (broader and/or deeper excavation), the greater the possible impact of the action.

- Waves: the increased depth of the excavated area and the altered relief (seabed shape) of the borrow pit can alter the travel direction and wave height of waves that pass over the area. This alteration, principally due to a process called wave refraction, can produce areas of wave focusing and areas of wave divergence. In some instances these altered wave patterns can affect wave breaking and sediment transport along the shoreline, leading to localized areas of beach erosion (hot spots) and accretion;
- Currents: Similarly, the altered relief may affect the path and speed of the currents in the vicinity of the excavation; and
- Sediment Tranport: Within the excavation area and in its immediate vicinity, sediment transport is interrupted or altered. The deepened borrow pit can trap sediments that would otherwise be transported along the seabed to other areas of the Sound. That trapping leads to the infilling of the excavation area, and can eventually cause the borrow pit to fill in, eliminating the effects of the pit. This infilled material, however, came from somewhere else in the littoral system, thus the impacts of the sediment trapping must be considered. Sediment transport can also be affected by changes in the wave fields and the current patterns at some distance away from the borrow pit.

These factors generally do not have much of an effect for excavation areas offshore in deeper waters. As an example, the Duval County borrow area is several miles offshore in 60 to 70 ft of water. At that depth and distance from shore, there is no reasonable expectation of adverse impacts to waves, currents, or sediment transport (and no such impact studies are performed). For borrow areas sited closer to shore, within 0.5 to 2.0 miles (approx.), questions regarding wave focusing and impacts to the shoreline are typically evaluated. For borrow areas in increasingly shallow waters and those proposed near the influence of tidal inlets, all of these

factors must be considered. Again, the method and degree to which these factors are considered varies on a project-to-project basis.

Methods to evaluate possible impacts from excavation can range from comparison of historical examples, to analytical methods of evaluating wave and sediment transport effects, to numerical modeling of waves, currents, and sediment transport. The complexity of these models likewise ranges substantially, and the degree of effort, time for analyses, and cost rises significantly with the increasingly complexity.

The initially proposed wave impact modeling in TO #26 focused on the potential effects of the borrow pit to alter the wave climate and possibly produce hot-spot wave focusing areas in the vicinity of the excavation. As mentioned, this was the level of investigation performed in the previous permitting effort for the 2011 borrow area. No field work was proposed for the comparative study, and the numerical model used to perform the analysis is relatively simple and relatively time-efficient to implement. The effects of the excavation on currents and sediment transport were to be evaluated by proxy through an analytical comparison of the changes in shoreline positions and bathymetric survey conditions within the Sound over the last several decades. This period includes the effects of the prior borrow area excavations for the 1994, 2002, and 2011 projects. The period also includes the potential effects of the construction of the new A1A bridge over the Sound in 1999.

In comparison, the modeling effort proposed in the pair of Task Orders #30 and #31 to address FDEP's questions requires a far more sophisticated suite of models, requires a significant field data collection effort to calibrate the model to local oceanographic conditions, and requires far more time to create the model parameters and run time-dependent simulations of waves and currents in the Nassau Sound area. The modelled area in the simulations, called the model domain, must include the offshore areas in the Atlantic Ocean, extending many miles from Nassau Sound, and must extend inland into the AIWW and Nassau and S. Amelia Rivers, in order to properly simulate the magnitude, directions, and phasing of the tidal currents that flow in and out of the Sound and over the borrow area during a representative tide cycle.

It is noted that the results of the more-sophisticated modeling would also be supplemented by the historical/analytical study described above. Further, in the proposed modeling, we have not proposed to simulate changes in the seabed morphology in Nassau Sound. To do so would greatly increase the field data collection effort, the time required to set the model up, and the time required to actually run the time-dependent simulations. It is our opinion from prior modeling studies that in many cases the level of confidence in the results in such studies is not high enough to warrant the additional work. We continue to assert that position with the FDEP.

If you have any questions regarding this information, please do not hesitate to contact us at 904-387-6114. Thank you.