

SUBJECT

Supplement to the Sand Search Proposal to the
Captiva Erosion Prevention District

TO

Paul Winklejohn, General Manager and CEPD Board

DATE

September 14, 2026

FROM

Douglas W. Mann, PE, Chief Coastal Engineer,
APTIM



-
1. At the Board Meeting on August 10, 2026, APTIM's sand search proposal was discussed and tabled pending APTIM providing supplemental information. The supplemental information revolved around two (2) general questions:
 - a. What have the historic costs to the District for sand search activities, specifically with reference to Phase 1 (desktop) investigations been?
 - b. Are there any permitted borrow areas remaining? Do they contain substantive volumes of dredgable sand?

These general questions are addressed as follows.

2. Historic and Comparable Costs of Desktop Sand Search Investigations

A review of records indicate two (2) desktop investigations of offshore sand have been completed for the District.

- a. In 2000, a proposal was submitted to the District for a sand search investigation for a total price (1999 services plus 2000 services) of \$372,916. The proposal references a preliminary (desktop) investigation which was carried out in 1999 for a cost of \$48,416 (Attachment 1).
- b. The District approved a \$349,932.25 contract for the 2019 Redfish Pass Sand Search and Borrow Area Design. The scope included a desktop study, geophysical and geotechnical investigations, cultural resource surveys, laboratory testing, and borrow-area design. The desktop analysis and project planning line item was \$21,532. This represents a review of just the Redfish Pass ebb and flood shoals (Attachment 2).

For a more recent comparison, Bay County Tourist Development Council completed a regional desktop sand-source evaluation in 2022. This investigation reviewed an area approximately 24 miles alongshore and up to seven (7) miles offshore. Aptim Environmental & Infrastructure, LLC (APTIM) proposed a \$75,450 desktop study to compile and reevaluate historic and recent

geophysical and geotechnical data to identify, characterize, and quantify beach-compatible sand resources for future coastal restoration projects. The scope included data compilation, review of sub-bottom profile data, geotechnical evaluation, borrow-area assessment, and preparation of a final report.

3. Previously Used Borrow Areas

The District has focused on the dredging of two (2) borrow areas designated Borrow Area III-B and Borrow Area VI-E over the last 30 years (Attachment 3). No other borrow areas are currently permitted.

- a. **Borrow Area VI-E.** Borrow Area VI-E has been used by the District as a source of sand since 2006 (Table 1). Sand has also been dredged and placed on northern Sanibel in three (3) events. The borrow area is now functionally depleted.

Table 1. Borrow Area VI-E History

Year	Event	Volume Change (cy)	Notes
2006	Nourishment of Captiva	-1.0 M	FDEP records
2006	Northern Sanibel	-305,000	FDEP records
2013	Captiva Nourishment	-783,369	FDEP records
2013	Northern Sanibel	-80,823	FDEP records
2021	CEPD Nourishment	-845,600	FDEP records
2025	CEPD Nourishment	-1,050,000	FDEP records
2025	Sanibel Nourishment	-295,000	Ref: H&M Post-Construction Report

- b. **Borrow Area III-B** was utilized in April 1996 when 817,300 cy was dredged. A volume of 237,100 cy was also placed on northern Sanibel. This borrow area has been used as a supplemental borrow area for Captiva in the 2021 and 2025 projects but was not dredged. Based on a 2025 survey of the borrow area, there is approximately 326,000 cy of (functionally) dredgable sand remaining in the borrow area. While this sand could be used for smaller scale projects, the borrow is insufficient for a typical District project of 0.8 to 1.3 MCY.

COASTAL PLANNING & ENGINEERING, INC.

2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

(561) 391-8102 Fax: (561) 391-9116
Internet: <http://www.cpeflorida.com>
E-mail: mail@cpe.dynip.com

8402.41

June 6, 2000

Attachment 1

Ms. Alison Hagerup, Administrator
Captiva Erosion Prevention District
11550 Chapin Lane
Captiva, FL 33924

Re: Offshore Regional Borrow Area Investigation and Sand Search

Dear Alison:

This is a request for authorization to proceed with the remaining phases of the project to locate borrow areas for future nourishments of the Captiva/Sanibel project, as described in our draft proposal of May 21, 1999. The Reconnaissance Geotechnical phase has been completed and the findings will be presented to the Board at its June meeting. This request is based on the findings of the first phase efforts and our recommendations for proceeding to detailed borrow area investigations.

This project will continue to be performed as a joint investigation with Lee County (Estero Island project). Combining these investigations results in savings to the District, Lee County and the State through reduced mobilization costs. The work is described by phase as it will occur in the field. Costs are presented for each phase, and include the savings of combining the CEPD and Lee County work into one program.

Detailed Geotechnical Surveys

This phase consists of detailed bathymetry, seismic (or additional jet probes where areas are too shallow to perform seismic surveys) and side scan sonar investigations. For the Captiva portion, 39 vibracores will be performed in up to three areas selected by the District.

Bathymetry and side scan sonar surveys will provide detailed mapping of the potential borrow areas. The vibracore operation includes the use of a vibracoring unit with its support vessel, and a survey vessel to locate the core sites and act as an assisting vessel during the coring operation. The vibracores will be brought to our laboratory, where cores will be split by geologists and a geotechnical log described for each core. Cores will then be sampled at each distinct sediment layer. Samples will be analyzed to determine the mean grain size and silt/clay content to determine its suitability for use in the beach nourishment project. Sediment analysis results will be documented and grain size analysis curves developed.

A geotechnical report will be prepared that will document the results of the geotechnical investigation. The information in the report will include the results of the bathymetric and side scan sonar surveys, jet probe analysis, vibrocore studies and sand analysis. Sand deposits suitable for future borrow area design will be mapped. The report will be required by permitting agencies to receive permits and easements for the borrow areas.

The cost of this phase is: \$289,500

Cultural Resource Surveys and Investigations

This phase consists of magnetometer surveys and data reduction, anomaly investigation and mapping, and historic research as required by Federal and State agencies. The Submerged Cultural Resources Management Report will be prepared in accordance with procedures contained in 36 CFR 800 (Protection of Historic Properties), along with considerations for possible impact to archeological and historic sites or properties, listed or eligible for listing in the National Register of Historic Places. The authority for this procedure is the National Preservation Act of 1996 (Public Law 89-665), as amended.

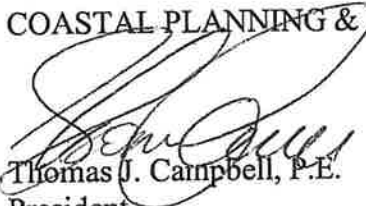
The cost of this phase is: \$35,000

The total cost to complete the project is \$324,500. When added to the \$48,416 authorized for the reconnaissance geotechnical surveys, the total cost of the offshore borrow area investigations and sand search will be \$372,916. This cost is within the amount anticipated in the capital projects budget (\$273,000 in FY99/00 and \$100,000 in FY00/01).

Please authorize our firm to proceed with the remainder of the offshore borrow area investigations and sand search on a lump sum basis. Should you have any questions, please call me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.



Thomas J. Campbell, P.E.
President

cc: John Walker
 Jeff Andrews
 Susan Beumel

P:lee/8402.41/proposal for remainder of sand search



Attachment 2

Michelle R. Pfeiffer
Sr. Project Engineer
Coastal, Ports & Marine

APTIM
2481 NW Boca Raton Blvd.
Boca Raton, FL. 33431
Tel: +1 561 361 3177
Cell: +1 772 971 0044
Michelle.Pfeiffer@aptim.com

February 8, 2019

Carolyn Weaver, CEPD Administrator
Captiva Erosion Prevention District
11513 Andy Rosse Lane, Unit 4
Captiva, FL 33924

Re: Proposal for Redfish Pass Sand Search and Borrow Area Design

Dear Carolyn:

This letter is in response to your request for a proposal for Aptim Coastal Planning & Engineering, Inc., n/k/a Aptim Coastal Planning & Engineering, LLC. (APTIM), to assist the Captiva Erosion Prevention District (CEPD) with sand search activities to locate and design a borrow area in Redfish Pass. The following Scope of Work describes the proposed services for this effort.

Introduction

Redfish Pass is a natural inlet that separates the barrier islands of North Captiva Island (to the north) and Captiva Island (to the south), and connects Pine Island Sound and the Gulf of Mexico. Redfish Pass interrupts the natural alongshore sediment transport from North Captiva Island to Captiva Island and traps sand within the shoal complex. The shoal has been growing since the formation of the Pass in 1921.

APTIM has completed the 2019 Inlet Management Study of Redfish Pass and Adjacent Beaches as an update to the original Redfish Pass Inlet Management Plan (CPE, 1995) to address natural and anthropogenic changes that have occurred since completion of the 1995 study. The study has been submitted to the Florida Department of Environmental Protection for review and formulation of the State's adopted inlet management plan. The results of the study suggest that the plan to manage the inlet should include dredging the Redfish Pass ebb shoal and placing the material on the adjacent beaches in an effort to balance the sediment budget and utilizing the ebb shoal as a sand source.

The study suggests that areas of the Redfish Pass ebb shoal can be mined without affecting the adjacent beaches. In the interest of identifying beach quality sand within these areas, this proposal outlines tasks for APTIM to conduct a comprehensive geophysical and geotechnical sand search for Redfish Pass. APTIM proposes an investigation consisting of a desktop study, geophysical, geotechnical and cultural resource surveys to collect information to characterize the sediment source for use in the design and permitting of a borrow area.



The following will be provided by APTIM under the scope of services:

- Task 1: Desktop Study;
- Task 2: Geophysical Surveys;
- Task 3: Geotechnical Surveys;
- Task 4: Cultural Resource Survey;
- Task 5: Borrow Area Design;
- Task 6: Product and Report Development.

Each task is described in greater detail below.

Scope of Work

Task 1: Desktop Study

Prior to conducting any field investigations, a desktop study will be conducted to identify historic datasets available for the study area (bathymetry, seismic, sidescan sonar, bottom grab samples, vibracores, etc.), Florida Department of Environmental Protection (FDEP) Regional Offshore Sand Source Inventory (ROSSI) datasets, National Oceanic and Atmospheric Administration (NOAA) bathymetry datasets, and morphologic maps will be compiled, evaluated, and analyzed in a Geographical Information System (GIS) framework. APTIM will locate and review existing infrastructures, including outfalls, proposed underwater cable routes, cultural resources (i.e. shipwrecks) and hardbottom/reefs to identify avoidance areas. This will provide a baseline that will be analyzed in conjunction with the findings from previous studies. The information and conclusions gathered during this phase will be evaluated and used to develop the geophysical and geotechnical survey plan.

Prior to starting the geophysical operations, APTIM will review the desktop study to finalize an area and determine the appropriate line layout/coverage for the ebb shoal. A final survey plan will be communicated to CEPD before any field activities commence. APTIM will coordinate survey planning and execution with the Florida Department of Environmental Protection (FDEP) and the Florida Department of State Division of Historical research and State Historical Preservation Office (SHPO).

Task 2: Geophysical Surveys

APTIM will perform geophysical survey operations within the Redfish Pass ebb shoal, which include bathymetric and sub-surface geology data collection, a cursory investigation for magnetic anomalies and to establish the presence and location of any potential underwater wrecks, cultural resources, or submerged hazards. APTIM will utilize survey grade single-beam echosounder (bathymetry), sidescan sonar, chirp sub-bottom, and magnetometer systems (detailed below) for this survey. Sidescan sonar and chirp sub-bottom data will be used to produce an enhanced image of the seafloor and sub-surface geology to characterize and delineate the sand deposit as well as any avoidance areas. Magnetometer data will be utilized to determine any potential cultural resources and areas that should be avoided when designing the borrow area.

Task 2 will consist of three (3) days of geophysical surveys intended for full coverage of the investigation area. Primary lines will be spaced 30 m (98 ft) apart and crossed by three (3) tie lines to satisfy the cultural resource requirements set forth by SHPO. This data will allow for the placement of up to 16 vibracores 1,000 ft apart which will be collected during Task 3 (detailed below).



During the geophysical survey operations, APTIM will have a Registered Professional Archeologist (RPA) onboard to provide data collection oversight, perform the archeological clearance needed prior to the collection of the vibracores, and to complete a full Cultural Resource Investigation to satisfy the requirements of the Florida Department of State, Division of Historical Resources (detailed in Task 4).

Geophysical Vessel and Survey Equipment

The vessel and equipment that will be used for the geophysical surveys are further described below.

Vessel

APTIM will use the R/V Eugenie Clark (or a similar vessel) for geophysical data collection. The R/V Eugenie Clark is a 46 ft. (14 m) fiberglass hulled vessel, suited for geophysical surveys in the relatively shallow waters of Redfish Pass' ebb tidal shoals. It comes equipped with twin C7 CAT diesel main engines, Northern Lights 12KW marine generators, one hydraulic deck winch, and a 1,500 lbs. capacity hydraulic U-frame. As a USCG inspected vessel, the Eugenie Clark safety features include fire extinguishers, life vests/survival suits, 6-man life raft, first aid kits, radar, VHF radios, and an EPIRB with GPS and more. These safety features and the level of experience and expertise from the captain and crew allows the R/V Eugenie Clark to operate safely and efficiently, providing proficient geophysical support throughout project operations.

The following equipment will be utilized for the geophysical investigation:

Table 1: Geophysical survey equipment

System	Type
Positioning	Trimble R8 GNSS
Navigation	Hypack 2018
Heading	Trimble SPS461
Bathymetry	Odom Hydrographic Systems, Inc.'s Hydrotrac II
Sidescan Sonar	EdgeTech 4125-P
Chirp Sub-Bottom	EdgeTech 3200 512i Chirp Sub-Bottom
Magnetometer	Geometrics G-882 Digital Cesium Marine Magnetometer

Positioning System and Dynamic Motion Compensation

A Trimble R8 RTK GNSS receiver (or equivalent) will be used for the main horizontal positioning system for the survey. Water level (tide) corrections will also be provided by GNSSs. GNSS corrections will be provided by the Florida Permanent Reference Network (FPRN) utilizing reference stations DSTN, PNMA. Corrections are received over air through a cellular network internet connection. A traditional land based RTK base station will be utilized if cellular signal is lost or intermittent offshore. All GNSS data will be tied to local CORS and/or National Geodetic Survey (NGS) control monuments. System checks will be performed at the beginning and end of the survey using National Geodetic Survey (NGS) control monuments.

A Trimble SPS461 (or equivalent) will be used to provide true heading for vessel and geophysical systems. The SPS461 is a dual antennae system that provides true heading over short baselines. The SPS461 will be used for heading only.



A TSS DMS-25 (or equivalent) will be used to provide heave, pitch, and roll corrections of the vessel. Motion data will be acquired in real time with the navigation system and applied in the post-processing of applicable systems.

Navigation System

Hypack 2018 is a state-of-the-art navigation and hydrographic survey software system. The navigation system will be interfaced with the RTK GNSS system and an onboard navigation computer. The location of the GPS antennae will be set relative to the reference point of the vessel with each tow point of the geophysical systems measured to the vessel reference point. All offsets will be entered into the Hypack hardware setup and all data will be integrated in real time using the Hypack 2018 software. Online screen graphic displays will include the pre-plotted geophysical survey line locations, the updated boat track across the survey area, adjustable left/right indicator, as well as other positioning information such as boat speed, and bearing. Navigation and positioning data will be collected in the North American Datum (NAD) of 1983/2011 State Plane Florida West Zone (US feet). Vertical water level (tide) data will be collected in North American Vertical Datum (NAVD) or 1988 using Geoid 12b.

Bathymetry

APTIM will utilize an Odom Hydrographic Systems, Inc.'s Hydrotrac II (or equivalent), a single frequency portable hydrographic echo sounder for bathymetric data collection of the investigation area. A 200 kHz transducer will be used for the hydrographic survey. The sounder will be calibrated via bar-checks and a sound velocity probe at the beginning and end of the survey day. Sound velocity profiles will be collected using the Digibar sound velocity meter and profiles will be collected throughout the entire water column at the beginning and end of the survey operation period. Bar checks will be performed from a depth of 5 feet to a depth of 25 feet or to the allowed shallow depths.

Sidescan Sonar

An EdgeTech 4125-P sidescan sonar system (or equivalent) will be used to collect sidescan sonar data over the entire area of investigation. The sidescan sonar allows for the efficient creation of an image of a large area of the sea floor. The 4125-P uses full-spectrum chirp technology to deliver wide-band, high-energy pulses coupled with high resolution signal to noise ratio echo data. The portable sidescan package includes a laptop computer running the Discover® acquisition software and a 600/1600 kHz dual frequency towfish running in high definition mode.

Chirp Sub-Bottom

A high-resolution sub-bottom profiler, EdgeTech 3200 512i chirp sub-bottom (or equivalent) will be used to collect the high-resolution (shallow) chirp sub-bottom profile data. The 3200 SB-512i Full Spectrum Sonar is a versatile wideband FM sub-bottom profiler that collects digital normal incidence reflection data over many frequency ranges. This instrumentation generates cross-sectional images of the seabed capable of resolving bed separation resolutions of at least 0.3 meters up to a bed depth of up to 15 meters. The 3200 SB-512i transmits an FM pulse that is linearly swept over a full spectrum frequency range (also called a "chirp pulse"). Throughout the offshore chirp sub-bottom survey, selection of the chirp pulse will be modified in real time to obtain the best possible resolution of geologic features and the sequence stratigraphy (*i.e.* vertical sequence and lateral distribution of sediment bodies comprised by different grain sizes, sediment composition, and physical properties) that in turn optimizes data quality and enhances subsequent interpretation.



Magnetometer

A Geometrics G-882 Digital Cesium Marine Magnetometer (or equivalent) will be used to perform a cursory investigation of magnetic anomalies and to establish the presence and location of any potential underwater wrecks, cultural resources, or submerged hazards. The Geometrics G-882 magnetometer is capable of detecting and aiding the identification of any ferrous, ferric, or other objects that might have a distinct magnetic signature. This particular magnetometer is highly sensitive and is capable of identifying targets less than 1 gamma. The magnetometer will be towed at a depth above the seafloor that maximize the data resolution and far enough from the vessel to minimize interference from the vessel.

Geophysical Data Analysis

The data collected during the design-level investigation will be analyzed in the office. This data will be thoroughly processed, reviewed, and interpreted, to aid in the design of a borrow area (Task 5). The raw sounding (bathymetric) data will be reviewed and processed in HYPACK's *Single Beam Editor*. All errant soundings will be removed and corrected for the dynamic motion of the vessel. RTK GNSS water level data will be compared to the local observed tide data for verification purposes and merged with processed soundings. The corrected file will be exported as a comma delimited XYZ file and used to create a bathymetric surface in ArcGIS. Sidescan sonar and chirp sub-bottom data will be reviewed in Chesapeake Technology's SonarWiz processing software, where it will be bottom tracked and gained accordingly to produce an enhanced image of the seafloor and sub-surface geology. Sidescan sonar data will be utilized to characterize and delineate the sand deposit as well as any avoidance areas. Much like the sidescan sonar data, magnetometer data will be utilized to determine any potential cultural resources and areas that should be avoided when designing the borrow area.

Task 3: Geotechnical Survey

The geotechnical survey task includes vibracore collection and analysis. Vibracore collection is a method of retrieving a vertical column of sediment. Through the analysis of a number of these samples collected at specifically designated locations within the borrow area, the engineers and geologists are able to create a map of the sediment characteristics within the borrow area. This data will be used to refine the borrow area to target high quality sediment and avoid areas of the potential borrow area with undesirable sediment. The data collected during this Task in conjunction with Task 4 will be used in Task 5 in the design of the borrow area.

Once the geophysical phase of Task 2 is complete, APTIM will demobilize the geophysical vessel and submit data to the archaeology subcontractor for review and clearance of the planned vibracore sites. Vibracores will be collected throughout the area at a spacing not to exceed 1,000 ft to satisfy the borrow area design and permitting requirements set forth by the FDEP. APTIM is expecting that 16 vibracores will be needed in order to sample the entire investigation area. It is assumed that this effort will take four (4) days.

Once field operations are completed, vibracores will be sent to APTIM's Boca Raton office where they will be split, logged and sampled. Additional information on vibracore collection and processing is described below.

Geotechnical Survey Equipment

APTIM will utilize a subcontractor for collection of the vibracores. The following additional equipment will be used for the geotechnical investigation.



Table 2: Geotechnical survey equipment

System	Type
Positioning	Trimble R8 GNSS
Navigation	Hypack 2018
Bathymetry	Odom Hydrographic Systems, Inc.'s Hydrotrac II
Vibracore	Pneumatic/Electric

Positioning System

A Trimble R8 RTK GNSS receiver (or equivalent) will be used for the main horizontal positioning system for the survey. GNSS corrections will be provided by the Florida Permeant Reference Network (FPRN) utilizing reference stations DSTN, PNMA. Corrections are received over air through a cellular network internet connection. A standard DGPS system will be used if cellular signal is lost or intermittent offshore

Navigation System

Hypack 2018 is a state-of-the-art navigation and hydrographic surveying software system. The navigation system will be interfaced with the Trimble R8 receiver and an onboard navigation computer. The location of the GPS antennae will be set relative to the reference point of the vessel. The offset to the over-the-side mounted fathometer, and the A-frame sheave point will be measured to the vessel reference points and entered into the navigation system to account for offsets. All data will be integrated in real time using the Hypack 2018 software. Online screen graphic displays will include the pre-plotted vibracore locations, the updated boat track across the survey area, adjustable left/right indicator, as well as other positioning information such as boat speed, and bearing. Navigation and positioning data will be collected in NAD 1983 State Plane Florida West Zone (US feet).

Bathymetry

APTIM will utilize an Odom Hydrographic Systems, Inc.'s Hydrotrac II, a single frequency portable hydrographic echo sounder to confirm water depths (and top of probe elevations) at each vibracore location. A 200 kHz transducer will be used for the hydrographic survey. The sounder will be calibrated via bar-checks and a sound velocity probe at the beginning and end of the survey day. Sound velocity profiles will be collected using the Digibar sound velocity meter and profiles will be collected throughout the entire water column at the beginning and end of the survey operation period. Bar checks will be performed from a depth of 5 feet to a depth of 25 feet or the allowed shallow depths.

Vibracore

APTIM will utilize the subcontractor's vibracore system, configured to collect undisturbed sediment vibracores up to 20 ft in length. The vibracore will be a mechanical vibracore system. The system will be deployed via winch and lowered to the ocean floor. Once on the bottom the vibracore system will be turned on and allowed to penetrate the sediments until it reaches the required target depth of 20 feet or refusal. If vibracore recovery is less than 80% then 2 more attempts will be given to reach the required penetration and/or increase core recovery.



Geotechnical Data Analysis

Upon completion of field operations, all vibracores will be transported to APTIM's Construction Materials Engineering Council, Inc.'s (CMEC) accredited geotechnical laboratory in Boca Raton, FL.

Vibracores will then be split lengthwise and logged in detail by APTIM geologists, describing sedimentary properties by layer in terms of layer thickness, color, texture (grain size), composition and presence of clay, silt, gravel, or any other identifying features in accordance with American Society for Testing and Materials (ASTM) standard procedure D2488-09a. The vibracores will be photographed in 2.0 ft intervals using a 16-megapixel digital camera (or equivalent) that will be mounted on a frame directly above the vibracores. The photographs will be taken using full spectrum overhead lighting and an 18% gray background, which provides a known reference color and is the standard reference value against which all camera light meters are calibrated. Sediment samples will be extracted from the vibracores at irregular intervals based on distinct stratigraphic layers and sediment quality. For stratigraphic layers within each vibracore that occurred at different depths, but that were significantly similar, a sample will not be collected or analyzed for this similar unit(s). Instead, APTIM will report the results of the first sample for the first unit as the virtual results of the similar unit(s).

The sediment samples will be analyzed to determine color, grain size distribution, and carbonate content. During sieve analysis, the wet, dry and washed Munsell colors will be noted. Grain size will be determined through sieve analysis in accordance with ASTM Standard Materials Designation D6913-17 for particle size analysis of soils. This method covers the quantitative determination of the distribution of sand particles. Sediment finer than the No. 230 sieve (4.0 phi) will be analyzed following ASTM Standard Test Method, Designation D1140-17. Mechanical sieving will be accomplished using calibrated sieves with a gradation of half phi intervals. Additional sieves representing key ASTM sediment classification boundaries will be included to meet appropriate beach-compatible mineral characterization. Weights retained on each sieve are then recorded cumulatively. The sieve stack, together with its Wentworth equivalence, used for mechanical analysis is provided in Table 3. Grain size results will be entered into the gINT® software program, which computes the mean and median grain size, sorting, and silt/clay percentages for each sample using the moment method. Grain size results will be displayed on the granulometric reports, grain size distribution curves, and logs. Carbonate content will be determined by percent weight using the acid leaching methodology described by Twenhofel and Tyler, 1941, and the testing procedures outlined within CPE-HAT-09. Results will be entered into the gINT® software program and displayed on the granulometric reports and grain size distribution curves.



Table 3: Granularmetric Analysis Mesh Sizes with associated Wentworth Size Class

Sieve Number	Size (phi)	Size (mm)	Wentworth Scale	
3/4	-4.25	19.00	Pebble	Gravel
5/8	-4.00	16.00		
7/16	-3.50	11.20		
5/16	-3.00	8.00		
3 1/2	-2.50	5.60		
4	-2.25	4.75		
5	-2.00	4.00		
7	-1.50	2.80	Granule	
10	-1.00	2.00		
14	-0.50	1.40	Very Coarse Sand	Sand
18	0.00	1.00		
25	0.50	0.71	Coarse Sand	
35	1.00	0.50		
45	1.50	0.36	Medium Sand	
60	2.00	0.25		
80	2.50	0.18		
120	3.00	0.13	Fine Sand	
170	3.50	0.09		
200	3.75	0.08	Very Fine Sand	
230	4.00	0.06		

Task 4: Cultural Resource Survey

As part of the requirements set forth by SHPO and FDEP, APTIM is required to conduct a Cultural Resource Survey (CRS) in order to clear the potential borrow area of any significant archaeological artifacts. As previously mentioned, during the geophysical survey, an RPA will be onboard the vessel to review the geophysical data and provide the necessary archeological clearance.

A cultural resource survey report will be completed by the RPA and submitted to CEPD and all regulatory agencies. For this report, historical research will be conducted within the survey region regarding any culturally significant activities and material. Geophysical data collected during the design-level geophysical survey will be used to assess the presence of culturally relevant sites and/or any manmade material and hazards on and potentially below the seafloor. Buffers will be applied to any hazards or potential culturally significant material identified on or below the seafloor. A thorough analysis of the sub-bottom data will be conducted to review for the presence of buried geomorphological features of archaeological potential including shell middens, paleochannels, levees, inset terraces, paleo-lagoon systems etc. The results of the Cultural Resource Investigation will be submitted to FDEP and SHPO and incorporated into the borrow area design.



Task 5: Borrow Area Design

APTIM geologists and engineers will conduct a Compatibility Analysis and write a Sediment QA/QC plan to match the borrow area(s) and the existing beach for optimum project performance. Under Task 1, information on the previously collected existing dry beach sand samples will be collected and reviewed. The results of the existing beach sand samples will be included as part of the final geotechnical report.

Based on the compatibility analysis, as well as the collected geophysical and geotechnical data, APTIM will design a borrow area within Redfish Pass. This borrow area will be delineated based on the correlation of the chirp sub-bottom and geotechnical information (vibracore logs and sediment sample analysis results) to produce an isopach (sediment thickness) map of the beach compatible sand resources in the investigation area. The isopach data will then be combined with the processed bathymetric elevation data to determine the elevation of the beach compatible material. The area is then further refined and buffered to remove anomalies, hazards, and protected resources identified from the sidescan sonar data, magnetometer data, and the Cultural Resource report results. The resulting elevations and deposit shapes are further considered in respect to dredge optimization, resulting in a finalized borrow area boundary with dredge cut elevations. The borrow area design will be drawn in the permit sketch format such that it can be used for future permitting. Permit sketches will include a plan-view and cross-sections for the borrow area design.

Task 6: Product and Report Development

A geotechnical report will be prepared summarizing the results of the investigation, and submitted to the FDEP and the CEPD. This report will include project results, including bathymetric and isopach (sediment thickness) maps, sub-bottom (seismic) survey profiles, vibracore logs, vibracore photographs, granulometric reports and grain size distribution curves.

APTIM will provide all geotechnical information in an electronic format suitable for input to the FDEP Regional Offshore Sand Source Inventory (ROSSI) database. The data will be submitted in Access or gINT files. The submission will include shapefiles (with the associated FGDC compliant metadata) of borrow area boundaries and seismic tracklines. Seismic data will be provided in HTML format. Seismic timestamps and shot points are not recorded as HTML formatting embeds all navigation data, making timestamps and shot points obsolete.

Assumptions

Work described herein is based upon the assumptions described below. If conditions differ from those assumed in a manner that will affect schedule of Scope of Work, APTIM shall advise the CEPD in writing of the magnitude of the required adjustments, and changes in completion schedule or compensation to APTIM will be discussed with the CEPD.

APTIM proposes to perform the Redfish Pass Geotechnical Investigation to the industry standard of care and will coordinate the investigations with FDEP as required. Even though FDEP may agree with the scope of the investigations, beach compatible sand may not be located, FDEP may not approve the sand source(s) located, or FDEP may impose a sand placement QA/QC requirement that would be difficult to meet. If any of these events occur, it may be necessary to locate additional beach compatible sand sources at additional cost. APTIM will also make reasonable attempts to determine if other entities are



exploring the same sand sources or have a permit to use the same sand we intend to investigate. While unlikely, it is possible that others may claim the sand that we find, and negotiations and/or further exploration may be required if that occurs. Lastly, cultural or environmental resources may exist in or near the investigated borrow area that would limit or preclude a portion or all of its use.

In the case that a vibracore does not have 80% retention, the agencies may not approve its use for design purposes.

APTIM will attempt to avoid any issues and restrictions, but there may be adverse circumstances that cannot be avoided or mitigated. This is to inform the client of the above referenced risks. All of the listed potential outcomes may be beyond the control of APTIM and may result in the need for additional services, which may include sand investigations, permitting, biological investigations, or engineering. APTIM is committed to working exclusively on CEPD's behalf and will strive to avoid or mitigate the risks as described above to the greatest extent practicable.

Schedule

Upon receiving the Notice to Proceed (NTP), APTIM will begin mobilization efforts, including survey planning and coordination and vessel transit/mobilization. Once mobilization is completed, it is expected that the geophysical survey (Task 2) will take 3 days. After the sub-contractor's vessel and equipment are mobilized, the design-level geotechnical survey (Task 3) will begin and should take approximately 4 days. Once vibracores are collected, APTIM will demobilize field operations and begin processing all geophysical and geotechnical data and begin designing the borrow area and generating a final report of findings.

Fee Proposal

The proposed work will be performed by APTIM as a Task Order under the terms and conditions of our Master Services Agreement dated October 17, 2012, (the "Agreement"). The work described above, to perform a sand search with borrow area design for Redfish Pass, Florida, has a lump sum cost of \$349,932.25, as detailed in Exhibit A.

If you have any questions, please feel free to call or email me directly. Thank you for the opportunity to serve the CEPD.

Sincerely,

Michelle R. Pfeiffer, P.E.
Senior Coastal Engineer
Aptim Coastal Planning & Engineering, LLC.

Jeffrey L. Andrews, P.S.M., C.H.
Director of Operations

cc: Thomas P. Pierro, P.E., D.CE., APTIM
Beau C. Suthard, PG, APTIM

Please Reply To: Michelle Pfeiffer
Phone: 561 361 3177
E-Mail Address: michelle.pfeiffer@aptim.com

EXHIBIT A

**FEE PROPOSAL FOR
CAPTIVA EROSION PREVENTION DISTRICT
REDFISH PASS SAND SEARCH AND BORROW AREA DESIGN**

February 8, 2019

PREPARED BY:

APTIM

FEE PROPOSAL FOR
CAPTIVA EROSION PREVENTION DISTRICT
REDFISH PASS SAND SEARCH AND BORROW AREA DESIGN

PROJECT PROPOSAL SUMMARY
PREPARED BY: APTIM

	DESCRIPTION	LABOR COSTS	EQUIPMENT COSTS	DIRECT COSTS	TASK COST
	REDFISH PASS SAND SEARCH AND BORROW AREA DESIGN	\$221,388.00	\$19,974.00	\$108,570.25	\$349,932.25
	SUBTOTALS	\$221,388.00	\$19,974.00	\$108,570.25	\$349,932.25
TOTAL PROJECT COST =					\$349,932.25

REDFISH PASS SAND SEARCH AND BORROW AREA DESIGN

LABOR COSTS

**FEE PROPOSAL FOR
CAPTIVA EROSION PREVENTION DISTRICT**

EQUIPMENT COSTS

FEE PROPOSAL FOR
CAPTIVA EROSION PREVENTION DISTRICT
REDFISH PASS SAND SEARCH AND BORROW AREA DESIGN

Description	DIRECT COSTS							
	Eugenie Clark (Geophysical) (Cost)	SEARCH (CRS) (Cost)	Athena Vibracores (Geotechnical) (Cost)	Dockage (Days)	Vibracore Supplies (Storage Liners/Steel) (Cost)	Vibracore Shipping/ Handling (Cost)	Meals (Days)	Lodging (Units)
Redfish Pass Sand Search and Borrow Area Design	1	1	1	4	1	1	42	13
Total =	1	1	1	4	1	1	42	13
Rate =	\$19,610	\$27,415.85	\$41,960	\$165.60	\$1,110	\$2,000	\$36	\$1,100
Cost =	\$19,610	\$27,415.85	\$41,960	\$662.40	\$1,110	\$2,000	\$1,512	\$14,500
DIRECT COST								\$108,570.25



SPM REVISION: 2018 - REV 18.3

Release Date: 8/7/18

PROJECT NUMBER: 0
 PROPOSAL NUMBER: 1570003532.00039311
 Date Pricing Model was Prepared: 1/14/19

**Project Estimate
 Summary By Task**
 Captiva - Redfish Pass Sand Search
 01/21/19

Task Number	Task Name	Labor	Sub-contractors	Equipment	Materials	Other ODC's	Travel	Total	Adjustments	Total Project
Tsk-001	Project Support, Planning, and Coordination	\$ 21,532.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 21,532.00	-	\$ 21,532.00
Tsk-002	Geophysical Reconnaissance-Level and Design-Level Surveys	\$ 75,969.00	\$ 20,272.40	\$ 12,818.40	\$ -	\$ -	\$ 9,880.00	\$ 118,939.80	-	\$ 118,939.80
Tsk-003	Design-Level Geotechnical Surveys	\$ 71,429.00	\$ 41,960.00	\$ 10,265.60	\$ -	\$ -	\$ 5,932.00	\$ 129,586.60	-	\$ 129,586.60
Tsk-004	Cultural Resource Survey	\$ 5,830.00	\$ 27,415.85	\$ -	\$ -	\$ -	\$ -	\$ 33,245.85	-	\$ 33,245.85
Tsk-005	Borrow Area Design and Permitting	\$ 32,100.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 32,100.00	-	\$ 32,100.00
Tsk-006	Product and Report Development	\$ 14,528.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 14,528.00	-	\$ 14,528.00
Tsk-007	Permitting	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
Tsk-008		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
Tsk-009		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
Tsk-010		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-	\$ -
Totals =		\$ 221,388.00	\$ 89,648.25	\$ 23,084.00	\$ -	\$ -	\$ 15,812.00	\$ 349,932.25	\$ -	\$ 349,932.25

Submitted By: Michelle Pfeiffer
 Submitted To: Captiva - Redfish Pass Sand Search
 Submission Date: 01/21/19

Exhibit A Scope of Services

Background

Beach restoration on Captiva Island has progressed from exploratory studies in the late 1970s and 1980s to a long-term, managed nourishment program continuing through 2026. Early efforts focused on identifying offshore sand sources and understanding erosion patterns. Studies by Tetra Tech, the U.S. Army Corps of Engineers, and others confirmed that the shoreline was actively eroding due to dominant north-to-south longshore sediment transport and storm impacts. Initial projects relied on nearby tidal shoals, such as Redfish Pass, and limited offshore deposits, but challenges such as variable sand quality and shallow limestone layers highlighted the need for more reliable, large-scale offshore sources.

By the late 1980s and 1990s, beach nourishment became more engineered and systematic. Geotechnical and geophysical investigations identified offshore borrow areas, which supported major regional renourishment projects and benefited nearby Sanibel Island. Building on this work, APTIM was contracted by the Captiva Erosion Prevention District (CEPD) in 2001–2002 to conduct a comprehensive offshore sand source investigation.

The investigation began with a desktop review of existing geologic and sand resource data, which revealed a thin, highly variable sand layer overlying limestone and helped target offshore bathymetric highs as the most promising sand sources. Phase I reconnaissance surveys across 25 sites—including sediment sampling and jet probing—confirmed significant variability in sand thickness, leading to the selection of three priority deposits for further study. Phase II detailed investigations using advanced geophysical and geotechnical methods verified the presence of high-quality beach-compatible sand, particularly in thicker accumulations at select locations. Subsequent data integration in Phases III and IV enabled the delineation of environmentally compliant dredging areas, resulting in the identification of four (4) new offshore borrow areas (IV–VII) with suitable grain size and low silt content, of which Areas IV and VI were prioritized for development and Areas V and VII reserved for future use.

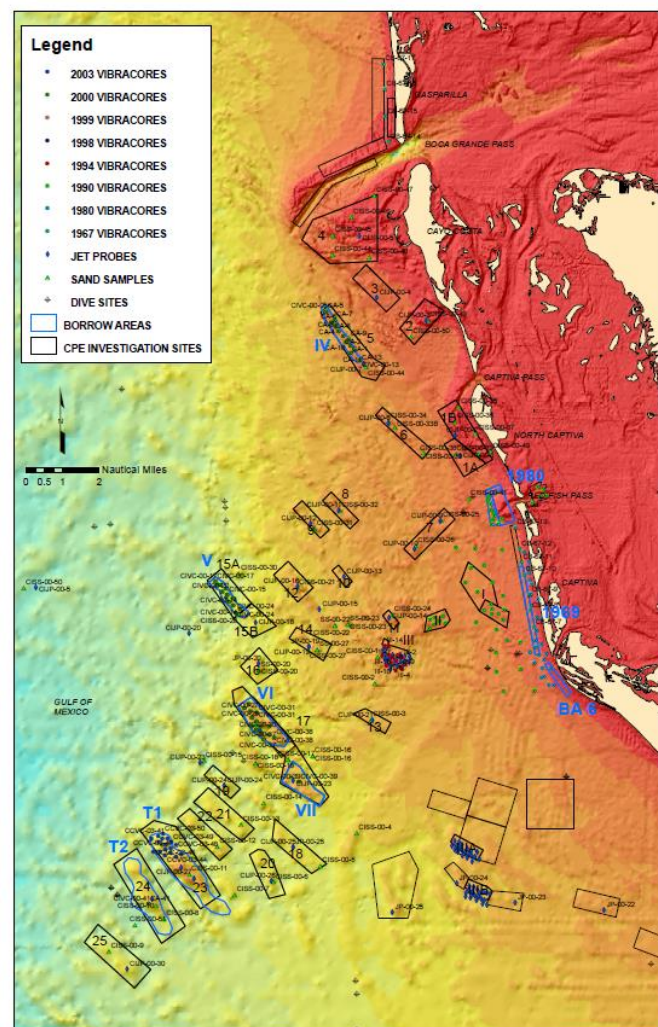


Figure 1 Captiva Island 2002 Sand Investigation.

The 2002 investigation confirmed that substantial quantities of suitable sand were available to support long-term nourishment of Captiva and Sanibel Islands, while emphasizing the need for careful environmental and cultural resource management. CEPD has since maintained a successful beach nourishment program spanning more than 65 years. Using these offshore resources, major restoration