A Geosyntec Company

Work Proposal

Applied Technology & Management

A Geosyntec Company

2024 Town of Palm Beach Sand Search Investigations for the Town of Palm Beach Coastal Management Program

1/26/2024

This Work Order, when executed, shall be incorporated in, and become an integral part of the Agreement for professional services between the Town of Palm Beach (TOWN), Florida and Applied Technology & Management (CONSULTANT), hereafter referred to as the Agreement.

Project Background

This proposal provides services to delineate borrow area resources within the nearshore vicinity of the Town of Palm Beach to support the Mid-Town (Federal) and Phipps Nourishment projects. The identification of beach compatible offshore sand sources is a key component to future Town beach nourishment efforts. Previous sand search efforts have been conducted within the Town. These have included the sand search associated with the 2003 Mid-Town project immediately south and offshore of Lake Worth Inlet, the Reach 8 (LADS based) study conducted in 2006, and the most recent North Town and South Town studies completed in 2010. Primary borrow areas delineated within these previous studies have already been utilized or are slated to be used for the next round of nourishment projects. Additional borrow sources will be required to support future and ongoing nourishment projects and it is the intent of this study will identify additional resources to further the Town's long-term project needs.

The work proposed will be undertaken in a phased approach with significant coordination with the Town and FDEP at key decision points and will be based on previous, successful strategies developed for the delineation of offshore sand sources. This work will be conducted in

conformance with current FDEP standards and guidelines for beach nourishment sand searches and final data will be provided in data forms consistent with the State's ROSS Database.

In order to address the range of technical expertise required, a team approach is proposed which includes the following sub-consultants:

- Coastal Protection Engineering, LLC. (Tom Pierro, P.E. – Principal) – CPE provides expert coastal geology and engineering expertise associated with beach compatible sand sources. They will support geologic and engineering analysis of potential areas and conduct the geotechnical lab analysis of sand samples consistent with State standards.

- Athena Technologies, Inc. – Athena is a geotechnical investigation firm with extensive experience and capabilities in marine field studies. They will provide the vessel and equipment required to conduct the vibracore investigations necessary for borrow area delineation.

- Search, Inc. – SEARCH has significant expertise in coastal and marine archeology and cultural resources. SEARCH will oversee the Cultural Resources Investigation of potential borrow sites as required by State and Federal regulatory agencies.

- Sonographics, Inc. (Rick Horgan - Principal) – Rick Horgan is an expert in the field of marine remote sensing and will oversee the operation of magnetometer and sonar (side-scan and sub-bottom) equipment. Sonographics will also provide data-reduction and analysis support to the evaluation of the remote sensing data collected in this study.

Each of these firms has demonstrated experience in the delineation of beach nourishment sand sources and has worked with ATM on previous efforts.

SCOPE OF SERVICES

The following Scope of Services is proposed:

Task 1: Data Inventory and Field Plan

Under this task available information will be compiled to develop a focused and efficient plan for further investigation (Task 2). Data includes but is not limited to all existing USACE and Town datasets (bathymetry, side-scan, bottom physical samples, vibracores, etc.), LADS bathymetric and morphologic mapping.

The following sub-tasks will be completed under this effort.

1.1 Data Inventory

A number of sand investigations have been undertaken within the Central Palm Beach County region to support various beach nourishment efforts. These include previous investigations by the Town, County and USACE. Under this task the existing in-house datasets will be expanded to incorporate the County's and USACE's data and will be compiled into a more useable and targeted baseline database to delineate known information, identify data gaps which must be addressed within the field investigations and provide focus to further sand investigations. In addition, this effort will provide a regional geologic framework for the search.

This study will consider areas north, south and within the vicinity of the Town.

1.2 Agency Coordination

This study will require prior authorization from the State Historic Preservation Office (SHPO). An A32 permit application will be prepared and submitted to SHPO to support field investigations. Additional coordination with be conducted with the FDEP and USACE regarding study requirements and expectations. In particular all work must conform to requirements within the most recent Southern Area Regional Biological Opinion (SARBO) for beach projects and geotechnical investigations

1.3 Scoping Investigations

A scoping level investigation will be conducted to collect surficial sand samples and observe current site conditions in areas of interest. This effort will consider general siting constraints associated with the study areas.

This expedited field effort will provide a first-cut assessment of the study area prior to mobilization of the full field effort in order provide initial information and identify any crucial issues with the delineated areas. This initial field effort will be conducted from ATM's survey vessel and will encompass three field days.

1.4 Delineate Survey Areas

Based on the data acquired as part of Tasks 1.1 and 1.3, areas of greatest promise will be delineated for further investigation in Task 2. Potential investigation area screening will be completed based on the baseline data using engineering and geologic assumptions of probable sand yield, compatibility, quality and aesthetics. Areas of critical data need will be identified and prioritized and efforts conducted within Phase 2 will focus on the areas of greatest need and promise.

Task 1 Deliverable: A memorandum with relevant figures and attachments will be developed for review and comment by the Town. Results of Task 1 will be summarized within this document. Working survey drawings will be developed to delineate Task 2 survey areas for use by the Town and field crews.

Task 2: Preliminary Field Investigations

Based on the results of Task 1 and consultation with the Town, field investigations will be undertaken to provide additional targeted information to further delineate sand sources. Field investigations will be conducted in two Phases (Tasks 2 and 3). The preliminary field investigations will include the geophysical surveys to delineate gross geological dimensions and relative quality of the material delineated with jet probes. This information will be utilized to further delineate areas of greatest promise for further detailed study and analysis.

The following sub-tasks will be conducted.

2.1 Data Review and Analysis

The field effort will require approximately ten days of dedicated field time and will be planned in a manner to maximize resources and weather windows. The study will utilize the database developed in Task 1 in concert with data collected within this Task. Sand samples collected as part of the jet probe study will be compared to the existing database for further site delineation. Areas of hardbottom in the vicinity will be confirmed.

2.2 Planning and Mobilization

Field efforts will focus on areas which present the greatest potential for compatible sand to meet the Town's beach nourishment needs. Field surveys will be conducted from ATM's survey vessel which is equipped to support sand search investigations of this type.

2.3 Jet Probes

The consultant will conduct jet-probe investigations to further assess potential borrow areas. This will provide material samples for testing and will provide visual assessments of bulk material quality including potential rock and silt fractions. This task will provide a representative assessment of the material prior to acquisition of vibracores which represent a much higher level of detail and per unit cost.

A total of ten field days are scoped for the acquisition of jet probes and this work will be staggered with the efforts in Tasks 2.1 and 2.2 to maximize the efficacy of the field efforts. The field team will acquire as many probes as possible during this effort. Two samples will be taken from each jet probe for laboratory analysis using standard methodologies.

Task 2 Deliverable: A memorandum with relevant figures and attachments will be developed for review and comment by the Town. Results of Task 2 will be summarized within this document.

Task 3 Detailed Field Investigations

Following the geophysical and jet probe investigations conducted in Task 2, the general dimensions and quality of material available for use will be generally delineated. Task 3 will be undertaken to collect additional detailed information required to further quantify the material characteristics of the borrow areas and provide assurance that no cultural resources are present within the proposed dredge areas. This information is required to calculate the relative compatibility of the material with native beach sand and provide sufficient assurance to the regulatory agencies for borrow area approval.

3.1 Remote Sensing / Cultural Resources Survey

Additional geophysical data will be collected within the Borrow Area to provide a side-scan and magnetometer survey density sufficient to meet State Historic Preservation Office (SHPO) requirements. These surveys will be conducted at 100 foot (30 meter) spacing. This survey will only be conducted in areas intended for utilization as Borrow Areas. A cultural resource assessment of the acquired magnetometer and side-scan data will be conducted to identify targets of potential historic significance. These areas will require the adoption of an avoidance or further investigation strategy for borrow area approval. Survey equipment will be run concurrently and will consist of the following:

- EdgeTech SB-512i Chirp X-Star Sub-Bottom Profiler System – Sonar system which resolves sub-surface sediment layers and geologic characteristics
- Geometrics G-882 Digital Cesium Magnetometer System- Unit which identifies ferrous metals (possible cultural resources)
- 4200FS Side-Scan Sonar System - Sonar which measures bottom type and texture (used to resolve possible cultural resources and reef areas)
- Trimble DSM-232 DGPS – Determines horizontal position to centimeter accuracy
- Hypack Computer/ Software – Software system which records vessel position and
- Odom Echotrac Fathometer – Sonar which accurately measures bottom elevation.

This array of survey instruments will provide a continuous record of bottom depth, sub-bottom geology, bottom surface topography and elevation. In addition the magnetometer will provide

the relative location of any ferrous metal which is indicative of potential cultural resources or significant debris which must be avoided in the dredging process.

This investigation will be conducted to FDEP and USACE technical requirements for hydrographic and topographic surveys. A total of ten (10) field days has been scoped to complete this investigation. This represents a minimum survey effort of 200 line-miles, though the survey team will acquire as much data as possible during this effort. The survey effort will be adapted to data acquired in the field to maximize survey effort.

3.2 Vibracores

As vibracores represent the greatest cost per unit of borrow area field investigation efforts, the collection of vibracores will commence once study efforts have identified areas of highest potential for utilization. Vibracore efforts will be focused within these areas to further delineate and quantify material characteristics.

Proposal cost is based on the collection and analysis of fifty (50) new cores. These new cores will be used to supplement the existing database of cores that have already been taken by the Town.

Vibracore acquisition will be conducted with active adaptive management by ATM/CPE geological and engineering staff to focus vibracore efforts on areas of greatest promise. The vibracore plan will be updated in the field to incorporate results of the initial core assessment. Vibracores will be split and qualitatively examined on the vibracoring vessel. This allows for the adaptive field decisions to be made in order to optimize the number and locations of the vibracores. Cores will be taken on approximate 1,000 foot maximum spacing and will incorporate existing core information into the collection grid. Cores will be taken to an approximate 20 foot depth or to the point of refusal. If penetration refusal occurs at a depth less than 20 feet the retained sample will be removed from the sampler and a second vibracore sample will be taken by jetting the sampler to within two feet of the depth of refusal prior to initiation the vibracore.

Analysis of each core will be conducted to determine material physical and aesthetic characteristics using FDEP standards and will be incorporated into a database consistent with

ROSS standards. Each core will be split with one half saved for reference. The remaining half will be photographed logged and sampled at representative layers within the sample. A portion of this analysis will be conducted on-board the survey vessel to provide real time verification of material quality during the data collection phase. This will allow the effort to focus on areas of greatest promise and ensure that the vibracore data that is being collected represents material that is of sufficient quality to be utilized for beach nourishment.

Vibracore samples will be analyzed for grain size distribution through mechanical sieving using ASTM Standard Method (D 422-63). ASTM Standard (D 1140-54) will be used to determine the fraction of material finer than the No. 230 (4 phi) sieve (percent silt/clay). Data will be plotted in frequency distribution curves consistent with FDEP and USACE standards. Samples will be tested to determine the percent of Carbonate composition will be calculated and the relative (Munsell) coloration of each sample will be quantified.

3.3 Data Review and Analysis

The field investigations will develop a large data set that will identify areas of potential use and the quantity of material available within these areas. These investigations will also provide an assessment of material parameters and physical characteristics. It is the intent of this study to delineate sand resources in the vicinity of the Town to a sufficient level to support planning, design and regulatory efforts.

Under this task all of the data developed in this study will be reviewed, synthesized and summarized to provide a comprehensive assessment of sand resources.

Task 3 Deliverable: A memorandum with relevant figures and attachments will be developed for review and comment by the Town. Results of Task 3 will be summarized within this document. Extensive data files and geotechnical data will be developed and provided in electronic form.

Task 4 Borrow Area Analysis

Based on the data acquired, the Borrow Areas will be further delineated and analyzed to a level sufficient for regulatory review and permitting. Efforts conducted under Task 4 are required to

provide sufficient assurance to both State and Federal regulatory agencies for borrow area approval.

4.1 Compatibility Analysis

Quantified values of native and borrow area composites will be utilized to evaluate the compatibility of the borrow material for site-specific use and consistency with BMA requirements. This will provide an evaluation of the suitability of the borrow area material in comparison to historic and in-situ material.

4.2 Borrow Area Impact Assessment (Numerical Wave Modeling)

The permitting regulatory agencies require numerical wave modeling of nearshore borrow sites to evaluate potential dredging-induced impacts. The viable borrow sites identified under this scope of services will be analyzed for potential effects to the wave field and longshore sediment transport. The numerical model methods used will be consistent FDEP's published protocol and guidelines.

To evaluate the potential impacts to the wave field in the vicinity and landward of the borrow areas; a spectral wave model (STWAVE, CMS-Wave, or equivalent) will be utilized. Bathymetric data for the model will be based on the most recent LADS/LiDAR and beach profile data available. Sources for wave data will be the USACE's Wave Information Study (WIS) data and the NOAA's WaveWatch III data. Both the WIS and WaveWatch III data are hindcast datasets based on recorded atmospheric conditions. The WIS and WaveWatch III data provide long-term wave records and are sufficient for this modeling effort; thus, collection of wave data is not included in this effort. The bathymetric and wave data will be analyzed and imported into the wave model domain. The wave data will be characterized by a number of cases to sufficiently represent the long-term wave conditions and episodic storm events. The numerical wave model will be used to compare existing and post-dredging conditions to evaluate potential changes to the wave climate at and landward of each borrow area.

Further, possible impacts to the shoreline adjacent to each borrow area will be assessed. The potential alongshore sediment transport rate will be estimated from the numerical wave model output. Potential impacts to the shoreline will be evaluated by comparing the project-induced

changes to the wave conditions. Areas of possible impact along the shoreline will be identified and the potential for impact will be estimated.

Task 4.2 Deliverable: A model report will be prepared which will include the background of the wave models used, input data, model parameters, and model results. The report will be consistent with FDEP guidance and protocol for numerical modeling. A draft report will be prepared for the Town's review and comment. Based on the Town's comments, a final report will be prepared and submitted to regulatory agencies as agreed to by the Town.

4.3 SHPO Analysis and Coordination

Under this task ATM will coordinate Borrow Area review with the State Historic Preservation Office to attain a letter of approval with support from SEARCH. The cultural resources survey data will be analyzed by SEARCH to determine areas of possible cultural value. These will be buffered to minimize the potential for disturbance based on their recommendation.

Task 4.3 Deliverable: Results of the cultural resources investigation incorporating efforts from tasks 1-3 will be summarized in a report consistent with SHPO standards. This report will be submitted to SHPO for borrow area approval.

4.4 Final Borrow Area Delineation

A final borrow area excavation plan will be developed sufficient for regulatory review and approval. Areas of excavation will be identified including boundaries and depths of cuts inclusive of reef and cultural resource buffers. This analysis will include the development of a borrow area composite based on the area of influence method and acquired core data. Plan view and cross-sectional views will be developed including topographic, geophysical and geotechnical data.

4.5 Summary Report

The results of this study will be incorporated into a single planning document for submission to the Town. This report will provide a summary of the tasks conducted and a review and synthesis of the data. The report will delineate areas of greatest promise for use as borrow areas for future Town projects and will provide an assessment of the quantity and quality of material available

within these areas. The report will provide a geologic framework of the borrow areas and will identify issues of concern and suggest strategies for future design and permitting efforts.

Report attachments will include the data and analysis required for regulatory review and approval of the borrow areas.

At a minimum this report will include:

- Borrow area ispopach maps
- Annotated sub-bottom profile lines
- Plan view maps of borrow areas include data layers (contours, vibracore locations, etc.)
- Core logs, sediment histograms and gradation curves
- Tabular summaries of gradation analysis
- Sediment compatibility analysis
- Design drawings of the borrow areas sufficient for permit inclusion
- Borrow area impact analysis (wave modeling)
- Cultural resources evaluations and delineated buffers

Task 4 Deliverable: A summary report will be submitted as defined in Task 4.5. All data files will be submitted in FDEP ROSS Database format.

Task 5: Regulatory Permitting and Coordination

The Consultant team will initiate regulatory review and approval of the new borrow areas. Specific subtasks include:

Task 5.1 FDEP Regulatory

Under this task a request to modify the Beach Management Agreement (BMA) to include the new borrow areas will be submitted. This will require a modification to the BMA agreement, and it is noted this will be the first formal modification of the original agreement. The team will respond to up to 2 Requests for Additional Information (RAI) relative to the modification request.

Task 5.2 USACE / SARBO Coordination

The adoption of new borrow areas will require project specific Coordination with the USACE for both the Phipps and Mid-Town projects. In particular, coordination will be required regarding updated SARBO conditions. This review will be coordinated with the Jacksonville District but will include commenting agencies (specifically USFWS, NOAA-HCD and NOAA_PRD). Under this task the project team will engage and support the review process which will include a request for permit modifications for both projects.

Task 5.3 408 Section Review

The incorporation of new borrow areas into the Mid-Town project will trigger a formal Section 408 review with the USACE. This review is intended to confirm that the new borrow areas are consistent with the project intent and do not adversely impact the Federal project. Under this task the project team will coordinate and support the Section 408 review with the Jacksonville District.

Task 5 Deliverables: All relevant correspondence including requests from permit modifications and responses to Requests for additional Information (RAI).

Task 6: Meetings and Consultation

The Consultant team will provide regular and proactive communication with Town Staff regarding the project schedule, preliminary results, and key decision requirements. It is also envisioned that a high level of coordination will be undertaken with stakeholders within Palm Beach County and with the FDEP and USACE.

Task 6 Deliverable: Meeting minutes and summaries will be provided.

Task 7: Supplemental Services

The study may require additional support depending on the development of the study. Under this task the project team will perform additional unspecified tasks as needed and in consultation with Town Staff. Items that may arise include:

1. Need for additional vibracores or field data.
2. Need for additional field investigations of hardbottom in the vicinity of delineated borrow areas.
3. Need for additional stakeholder or regulatory coordination.
4. Need to investigate cultural resource anomalies to reduce the need for an avoidance buffer.
5. Additional unanticipated issues.

Task 7 Deliverable: Relevant correspondence and supporting documentation.

SCHEDULE

ATM can initiate services immediately upon receipt of Notice to Proceed. The following schedule is proposed, though it is noted that field investigations are dependent on appropriate weather and sea condition and the timeline for regulatory approvals (Task 5) is dependent on the regulatory agencies:

TASK	ESTIMATED COMPLETION
Task 1: Data Inventory and Field Plan	60 days from NTP
Task 2: Preliminary Field Investigations	120 days from NTP
Task 3: Detailed Field Investigations	180 days from NTP
Task 4: Final Borrow Area Analysis	270 days from NTP
Task 5: Regulatory Permitting and Coordination	450 days from NTP
Task 6: Meetings and Coordination	TBD
Task 7: Supplemental Services	TBD

FEES

This work will be conducted on a Time and Materials basis for a total not to exceed amount of $1,693,479. Costs by Task as delineated in Table 1 below and detail is provided within Attachment “A”. *Invoicing shall be consistent with the executed master services agreement rates and conditions.*

If larger issues require a more dedicated effort, this larger effort will be specifically scoped under a separate, project specific agreement.

This proposal has been authorized and proffered by the following:

Applied Technology & Management – A Geosyntec Company
Michael G. Jenkins, Ph.D., P.E.
Senior Principal

Table 1

Summary of Fees by Task

	Task Description and Breakdown	Total ATM Labor	CPE	Athena	Sonographics	SEARCH	Markup on Subs	Internal Direct Expenses	Total Task Budget
Task 1	**Data Inventory and Field Plan**								
	Total Cost - Task 1	$56,260	$60,710				$6,071	$6,000	$129,041
Task 2	**Preliminary Field Investigations**								
	Total Cost - Task 2	$92,400	$102,770				$10,277	$23,000	$228,447
Task 3	**Detailed Field Investigations**								
	Total Cost - Task 3	$133,490	$215,870	$233,625	$75,190		$52,469	$20,000	$730,644
Task 4	**Final Borrow Area Analysis**								
	Total Cost - Task 4	$201,520	$99,840			$47,746	$14,759	$1,000	$364,865
Task 5	**Regulatory Permitting and Coordination**								
	Total Cost - Task 5	$55,720	$36,460				$3,646		$95,826
Task 6	**Meetings and Consultation**								
	Total Cost - Task 6	$39,180	$43,440				$4,344		$86,964
Task 7	**Supplemental Services**								
	Total Cost - Task 7	$28,620	$26,430				$2,643		$57,693
	Total Task Order Costs	**$607,190**	**$585,520**	**$233,625**	**$75,190**	**$47,746**	**$94,208**	**$50,000**	**$1,693,479**

ATTACHMENT “A”

Detailed Cost and Expenses