

***Terraquatic, Inc.
1220 Tangelo Terr, Unit A-12
Delray Beach, Florida 33444***



May 18, 2020

Mike Jenkins
Project Manager
Applied Technology & Management
2047 Vista Parkway, Suite 201
West Palm Beach, FL 33411

**RE: Professional Surveying & Mapping Services
2020 Annual Beach Monitoring Survey
Aerial Photography & Onshore/Offshore Profiles
Town of Palm Beach, Florida
Proposal 20-985**

Dear Mr. Jenkins,

In accordance with your request, Terraquatic, Inc. (TI) is pleased to provide the following cost proposal for professional surveying services pertaining to the above referenced project. The scope of work shall be based upon that provided via e-mail May 14, 2020 and summarized as follows:

Summary:

Ninety-three (93) onshore/offshore profiles including three (3) shore-parallel profiles. Aerial photography shall be acquired concurrently with the profile surveys, weather conditions permitting. Beach onshore and offshore profile surveys and the aerial photography acquisition shall be in accordance with the Monitoring Standards for Beach Erosion Control Projects prepared by the Department of Environmental Protection. The data collection shall be performed in August 2020. In addition to the profiles this proposal shall include collecting aerial photography of the survey area. Aerial photography shall be collected twice a year, one concurrent with the onshore / offshore profiles, in August 2020 and six-months later, February 2021.

Surveyor shall provide supervision, field / office support staff and equipment to perform the scope of work described, herewith. All work shall be conducted to the highest level of industry standards and under the responsible charge of a Professional Surveyor and Mapper registered in the State of Florida. All work shall meet or exceed the Standards of Practice set forth by the Florida Board of Professional Surveyors and Mappers in Chapter SJ-17, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes.

Horizontal datum shall be in feet, relative to the Florida State Plane Coordinate System, East Zone, North American Datum (NAD), 83/90. The vertical datum shall be in feet, relative to the North American Vertical Datum, 1988 (NAVD, 88).

Task 1 Onshore / Offshore Profiles

Onshore and offshore profiles shall be conducted along Ninety-three (93) profiles and three (3) shore-parallel profiles. The historical, additional intermediate and shore parallel profiles are defined as follows:

- Onshore / offshore profiles extending from FDEP Range Monument R-68 to R-135 **(68-Profiles)**
- Intermediate profiles at R-73.5, R-74.5, R-76.5 and R-77.5, R-110.5, R-111.5, R-112.5, R-113.5, R-114.5, R-115.5, R-116.5, R-117.5, R-118.5, R-119.5, R-120.5 and R-121.5 **(16 Profiles)**
- Intermediate profiles at the Breakers per H&M Scope, specifically R-93+601.6, R-94+406.5, R-94+708.7, R-94+1008.4, R-94+1308.0, R-95+316.2, R-95+412.7, R-96+224.7 and R-96+429.7 **(9 Profiles)**

- Three (3) shore-parallel profiles between R-93 and R-97.

Profile Control

In accordance with the Specifications, TI will verify the horizontal and vertical position of all found and used monuments for the survey. Horizontal and vertical positions will be verified via Real-Time Kinematic GPS procedures. In the event vertical obstructions prohibit the use of GPS, conventional methodologies will be employed. Historic profile control shall be consistent with that found and published by the FDEP, Bureau of Beaches & Coastal Systems (BBCS). Intermediate profile control and alignment of parallel profiles shall be provided by the client.

Profile Data Collection

Onshore and offshore profile data shall be collected consistent with the scope of services provided.

Onshore Profiles

Profile data shall be collected along historic or established azimuths as described for Task 1, above. Elevations along each profile shall be collected using either conventional methods or using real-time kinematic GPS. Data points shall be collected at not greater than twenty-five (25') foot intervals along each profile and at all grade breaks (greater than 6") and material changes. Onshore profiles shall extend seaward to a distance to ensure a minimum of fifty-feet (50') of overlap with the offshore profile data.

Offshore Profiles

Offshore profile data shall be collected at the R-monuments and intermediate points described in Task 1, above. Additional offshore profile data shall be collected along shore-parallel transects at the Breakers (R-93 to R-97). Bathymetric profile data at R-monuments and intermediate points shall be extend seaward minimum distance of 3000 feet from the shoreline or to -40 feet (NAVD), whichever is further offshore.

Bathymetric data shall be collected using an automated hydrographic system comprised of a survey launch equipped with a marine grade sounder, differential global positioning system and computer-based navigation / data collection system. The sounder shall be calibrated via bar checks prior to the start of the survey. Real-Time Kinematic (RTK) GPS shall be utilized to account for tidal variations and sea conditions during the course of data collection.

Data Processing and Final Deliverables

Upon completion of field survey activities, data will be edited and reduced to the project datum and translated to an X,Y,Z, ASCII format for submittal to the BBCS. In addition, and in accordance with the scope of services provided, the following deliverables will be provided:

1. Survey report / monument control report certified by a Professional Surveyor and Mapper.
2. Copies of field books and data collection files, as applicable. (hardcopy and PDF format)
3. Description of all monuments and TBM's used for the survey, including identification, stamping, coordinates, elevations and profile azimuths. Control description shall be provided in both hardcopy and digital formats (ASCII and Excel)
4. Final profile data in ASCII X,Y,Z format and FDEP distance / depth format with, associated header records
5. ASCII raw data file in XYZ format
6. Plan / profile charts in AutoCAD .dwg format
7. Plan / profile charts in hardcopy format (24"x 36"), four (4) copies
8. Metadata files

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Fee Schedule

Total lump sum fee for Task One, Onshore / Offshore Profile Survey, August 2020 event, including field data collection, data processing and preparation of final deliverables shall be \$64,750.00.

Task Two: Aerial Photography

Aerial photography shall be acquired by GPI Geospacial, Inc. (or similar) from R-68 to R-135 plus five hundred (500) feet past monuments. The scope of work shall be consistent with prior aerial surveys conducted by ACA. Work shall be done in accordance with Section 02100 Environmental Aerial Acquisition Specifications included as part of the Specifications. This scope of services shall encompass two (2) separate flights and deliverables. The first flight (Event 1) shall follow the schedule for the onshore / offshore profile surveys by TI, which shall commence in August of 2020 and the second flight (Event 2) shall be in the Spring of 2021.

The following scope of work for the aerial photography was provided by the client:

Flight

After authorization to fly by Surveyor, ACA will accomplish the 1"=660' scale color aerial flight utilizing a precision aerial camera to obtain negatives suitable for the preparation of raster imagery per your specifications. Fresh AGFA x 100 film will be used on this project.

Photo Lab

Process the aerial negatives and prepare one (1) complete set of 9" x 9" contact prints.

Control Targets

Surveyor will provide ground control support and control information to ACA (or similar) as required for the project. Two (2) GPS base stations will be established collecting one second data on ground control points during aerial flight in accordance with the Specifications.

Analytical Triangulation

ACA will triangulate the color aerial photography to expand the horizontal control to each corner of the image file. This process is a cost-effective alternative to targeting each image corner. A report will be furnished.

Raster Imagery

ACA will scan the color film diapositives at a 21-micron scan rate. Photogrammetric software will be used to geo-reference the raster imagery. Imagery will be supplied in AutoCAD DWG, format and TIFF / TFW on CD-ROM disks with a 0.4-foot pixel resolution. Imagery will also be provided in a compressed .jpeg format by ACA.

Accuracies

The raster image files will meet or exceed an accuracy of one half of one percent of the distance measured along the controlled alignment.

Raster Plotting

Upon receipt of sheet layout specifications, ACA (or similar) will utilize the color raster image files to prepare the raster image plots with R-monuments superimposed.

Deliverable, Per Flight Date:

1. One (1) set of 9" x 9" color stereoscopic photographs, including flight, film and analytical triangulation.
2. One (1) set of 1" = 100' scale color raster image files as specified above.
3. One (1) set of 1" = 100' scale color 24" x 36" color plots.
4. Reports and Metadata files.

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5. File compression.

Fee Schedule:

Total lump sum fee for Task Two, Aerial Photography including field data collection, data processing and preparation of final deliverables shall be as follows:

- August 2020 Flight \$21,734.00 Estimated cost
- Spring 2021 Flight \$21,734.00 Estimated cost

Task Three: Before and After Storm Profile Surveys

As required TI shall acquire before and /or after storm profile data to document beach and nearshore changes that may have occurred as a result of the passing storm event. The two (2) areas include the Phipps Park reach from R-117 to R-127 (11 profiles) and the Mid-Town reach from R-89 to R-102 (14 profiles). Storm event surveys shall encompass onshore and offshore profile data collection following the scope and protocol described above for the monitoring surveys, Task 1.

Fee Schedule:

Total fees for Task Three survey efforts shall be as follows:

- Phipps Park: R-117 to R-127 (11 profiles)
- Onshore / Offshore profiles: \$ 9,020.00 per survey event
- Mid-Town Area: R-89 to R-102 (14 profiles)
- Onshore / Offshore profiles: \$ 11,480.00 per survey event

We appreciate the opportunity to provide this proposal.

Sincerely,
Terraquatic, Inc.

A handwritten signature in blue ink, appearing to read "Kenneth C. Jackson".

Kenneth C. Jackson, PSM

Terraquatic, Inc.

By signing below, I APPROVE AND ACCEPT this letter as a legal contract and I have read and agree to the payment terms as set forth above.

By: _____ Date: _____
(Authorized Signature)

(Typed or print name) Title: _____