



October 12, 2017

Mr. Moshe Anuar
Senior Coastal Project Manager
1948 Harrison Street
Hollywood, FL 33020

Re: City of Hollywood –Biological and Physical Monitoring for
2017 Hollywood Truck Haul Beach Renourishment Project Work Order #1

Dear Mr. Anuar:

Applied Technology & Management (ATM) is pleased to provide this proposal to the City of Hollywood, Community Redevelopment Agency (CRA) for environmental services in support of the City's 2017 Truck Haul Beach Nourishment Project. It is our understanding that the City wishes to receive a cost proposal for the conduction of the post-construction environmental (hardbottom) monitoring required under the proposed *Biological Monitoring Plan data August 8, 2017*. This document provides the basis for this scope of work and is included herein for reference. Work will be conducted in accordance with the requirements of the BMP. Additionally, a cost proposal for conducting post-construction physical monitoring has been requested and is included herein. We consulted with FDEP and learned that the pre-construction survey for the 2011/12 project is to be utilized as the baseline survey for the 2017 project. It is our understanding that the only pre-construction task required for the 2017 project is the staghorn coral (*Acropora cervicornis*) station establishment and baseline assessment. The nearshore hardbottom edge was mapped in the project area in August 2017 under a separate contract between Broward County and Nova Southeastern University these survey data are available and can be used for the summer 2017 pre-construction edge mapping requirement. ATM utilized information provided by the City to develop the scope of services for physical monitoring. To date, the Physical Monitoring Plan has not been finalized and may alter the requirements and scope outlined herein.

ATM proposes to conduct this effort with significant support from Coastal Eco-Group (CEG). CEG is a woman-owned Broward firm which focuses on coastal environmental resources including nearshore hardbottom. ATM and CEG have extensive experience working together on similar nearshore hardbottom monitoring efforts in support of beach nourishment projects including the 2011 Interim Beach Nourishment Project for the City.

As outlined in the BMP, a series of field studies and reporting efforts are required annually to document changing physical and biological conditions before, during, and after construction activities associated with the imminent beach nourishment project. The beach nourishment project is proposed for construction during the winter of 2017/18; beach fill will be placed between reference monuments R-100 and R-102 (above MHW), R-107 and 300 ft. south of R-10 along approximately 2,380 linear ft. of shoreline, and between 350 ft. north of R-119 and 310 ft. north of R-124 along approximately 5,255 linear ft. of shoreline.



The Florida Department of Environmental Protection (DEP) and USACE permit require monitoring in accordance with the approved BMP (DEP File No. 0135660-001-JC) during the following project milestones:

- Just prior to construction (pre-construction *Acropora* assessment (tagging of colonies and presence/absence of sediment accumulation and percent burial at the base of the colony),
- Immediate post-construction (summer following beach project construction, typically within 6 months of construction completion and,
- Annually for three years following construction (annual monitoring).

It is assumed herein that established permanent transects need rehabilitation/re-establishment in accordance with BMP requirements. This scope includes up to three days of installation/remediation of missing transect and quadrat pins. Under this scope of work, ATM/CEG will perform the pre-construction *Acropora* assessment and annual post-construction monitoring, requiring close coordination and data transfer between the City and all Consultants. Work efforts and labor/expenses included herein are predicated on this assumption.

It is also assumed herein that the data collected for the Nearshore Hardbottom Edge Mapping conducted by Broward County will be sufficient to satisfy the permit requirement. The cost for ATM/CEG to conduct this task IS NOT included in this proposal.

KEY STAFF

The following Key Staff will provide primary support to this effort for the duration of the project:

Michael Jenkins, Ph.D., PE will serve as Project Principal.

John Waszak will serve as Project Manager.

Cheryl Miller will serve as Principal Scientist for Biological Monitoring.

Greg Braun will serve as Sr. Biologist for Shorebird Monitoring.

SCOPE OF SERVICES

Under this proposed Scope of Services, the ATM project team will complete the field work, data analyses and reporting as required in the Biological Monitoring Plan. Additionally, efforts necessary for project coordination between ATM and the City, State and other entities are included herein.

The work will be completed in phases in accordance with the monitoring milestones and as detailed in the following work tasks:

- I. Pre-Construction *Acropora* Assessment – Locate, tag and collect the required information for each of the 20 tagged *A. cervicornis* colonies along three transects.
- II. Post-Construction Biological Monitoring –Nearshore Hardbottom and Artificial Reef Sediment Accumulation Surveys, Data Analysis, and Reporting
- III. Year One Biological Monitoring - Nearshore Hardbottom and Artificial Reef Sediment Accumulation Surveys, Data Analysis, and Reporting



- IV. Year 2 Biological Monitoring - Nearshore Hardbottom and Artificial Reef Sediment Accumulation Surveys, Data Analysis, and Reporting
- V. Year 3 Biological Monitoring - Nearshore Hardbottom and Artificial Reef Sediment Accumulation Surveys, Data Analysis, and Reporting
- VI. Post-Construction Physical Surveys
- VII. Post-Construction Aerial Photography
- VIII. Post-Construction Escarpment Monitoring
- IX. Post-Construction Shorebird Monitoring
- X. Sea Turtle Nesting Success
- XI. Project Coordination

The following excerpts from the BMP provided guidance in formulating the detail work tasks and fee outlined herein and hereby further defines this scope of work.

Biological Monitoring Plan Requirements for Post-Construction Surveys:

Nearshore Hardbottom Edge Mapping and Monitoring
(Optional Task if not available from Broward County)

The entire length of the nearshore hardbottom edge between R-106 and R-111 and between R-118 and R-127 shall be mapped during each post-construction monitoring event. The nearshore edge is defined as the visible border between sand and hardbottom. It is understood that bounce dives will not be used to delineate the hardbottom edge unless authorization is granted by FDEP staff. If necessary, requests will be submitted to FDEP resource staff (BMES@dep.state.fl.us).

The western hardbottom edge will be mapped by recording the position of a diver swimming along the hardbottom-sand interface. The diver will tow a buoy mounted with a GPS antenna attached by cable to a positioning system. The buoy will be on the shortest possible tether, such that it is directly over the diver's head. The diver will follow the contour of the most prominent hardbottom-sand interface (e.g., ignoring isolated mobile rubble in the midst of sand). The positioning system will be a Trimble AgGPS Differential Global Positioning System (DGPS) with Survey Pro Beacon, or equivalent interfaced with HYPACK, Inc. processing program with correction from a U.S. Coast Guard Navigational Beacon. The positioning data will be tracked using the HYPACK, Inc. program. All data obtained shall be recorded on the computer;/s hard disk and copied to external memory at the end of each day.

Nearshore Hardbottom Assessments

At each of the 13 nearshore transects a survey tape will be secured to the pin established at the west end (0 m) of the transect and stretched east and secured to the pin at the east end (150 m). Biologists will conduct the following assessments at each nearshore transect:

1. Video Documentation
2. Sediment Depth Measurements



3. Sand/Hardbottom Line Intercept Measurements
4. Quadrat Assessments

1. Video Documentation

Video documentation of the benthic resources will occur along the entire 150 m long transect. Video documentation will be accomplished using a digital handheld underwater video camera. A qualified marine biologist will swim along the transect tape, while documenting the benthic communities along the length of the transect line. The following parameters will be used in collecting quantitative digital video documentation:

- The distance from the substrate to the video camera will be maintained at approximately 40 cm.
- The camera will be held perpendicular to the substrate.
- The video will be taken at a swim speed that allows for clear images (approximately 4.5 m per minute).
- The video will be recorded in progressive scan mode.

This BMP does not incorporate post collection analysis of video documentation, but relies on in situ surveys (hardbottom edge mapping, sediment depth measurements, sand/hardbottom line intercept, quadrat monitoring and *Acropora cervicornis* colony health monitoring) to provide the basis for comparative analyses and effect determinations. However, video survey data could be used for additional data collection and analysis if visual signs of impact are recorded and/or quadrats demonstrate impacts. In such a case, frame grabbing and application of PointCount procedures would be applied to video records. Although less precise in comparison to quadrats, video survey has the advantage of providing continuous information in addition to the discrete information provided by quadrats. If required, video surveys would be reviewed between surveys and visually compared to the previous survey in an attempt to document qualitative and quantitative changes between surveys.

2. Sediment Depth Measurements

Maximum sediment depth will be measured along the length of the 150 meter long transects to track changes in sediment accumulation and will be used with the data gathered during the sand/hardbottom line intercept measurements to track any east/west movement of sediment along the length of the transect. Maximum standing sediment depth will be measured (in centimeters) along the north side of the transect at every second meter (0 m, 2 m, 4 m, 6 m etc.) along the full length of the 150 meter long transect, for a total of 75 measurements between 0 and 150 meters. In addition, the area immediately west of the start of the transect will be monitored to track changes in sediment depth. Biologists will secure a survey tape to the pin established at the west end (0 m) of the nearshore transects and stretch the tape west 10 meters from the start (0 meter pin) of the transect. Sediment depth measurements will be conducted every meter on the north side of this temporary west/east transect for a total of 10 additional sediment depth measurements. A grand total of 85 sediment depth measurements



will be collected along the permanent and temporary portion of each transect. A ruler, graduated in centimeters, will be driven through the sediment until the ruler cannot be driven further. If no areas of loose unconsolidated sediment exist, then a depth value of zero (cm) will be recorded. Sediment must be at least 1 cm deep to be recorded. A 30 cm sediment depth will be recorded when the maximum sediment depth measurement is greater than or equal to 30 cm.

3. Sand/Hardbottom Line Intercept Measurements

The sand/hardbottom line intercept method estimates the linear extent of sand coverage along each transect and will be used to measure sand movement along the transects at each monitoring event. These measurements will be used along with sediment depth data to track sediment transport and accumulation along the natural hardbottom. A biologist will swim along the transect tape placed on the permanent 150 meter long transect and the temporary 10 meter transect west of the 0 meter pin, while documenting the location of the sand/hardbottom border as it occurs along the transect. Each time the bottom substrate changes from sand to hardbottom, the location of the change along the transect line will be recorded by indicating where along the transect line this change occurs. For sand patches that intercept the transect for a distance of 0.5 m up to 2 meters and where sediment depth is >1cm, sand depth measurements will be taken 10 cm from the border with hardbottom on each side of the sand patch and in the middle of the patch. Since sediment depth measurements will be collected every 2 meters, as described in #2 above, no additional sediment depth measurements will be conducted for sand patches that are greater than 2 meters.

4. Quadrat Assessments

Within each 1 m² quadrat, maximum relief of the hardbottom, coral colony diameter, octocoral height, and sediment depth will be recorded to the nearest cm. Maximum vertical relief of hardbottom will be measured from the lowest point in the quadrat to the highest point in the quadrat. The maximum height or width of stony and octocorals will be recorded to the nearest cm. Standing sediment depth over hardbottom will be determined by acquiring three random measurements within the quadrat and reporting the deepest sediment measurement. If no areas of loose unconsolidated sediment exist within the quadrat, then a depth value of 0 cm will be recorded for the station. Sediment bound in a turf algae matrix and/or a dusting of sediment on bare substrate must be at least 1 cm deep to be recorded as an accumulation of sediment. A 30 cm sediment depth will be recorded when the maximum sediment depth measurement is greater than or equal to 30 cm.

Percent cover of standing sediment over hardbottom, including sand, shell, and mud, will be surveyed in each quadrat and estimated to the nearest 1%. If no sediment is present within a quadrat, then a value of 0% will be recorded. Sediment depth and percent cover monitored in each quadrat will supplement sediment depth and sand/hardbottom intercept measurements taken along the length of each transect. This data will be used to detect possible effects of the Project by tracking changes in sediment accumulation and distribution before and after construction. Percent cover of sessile benthos including fleshy and/or calcareous macroalgae, turf algae (green, red, or brown), encrusting red algae, sponges, hydroids, octocorals, stony



corals, tunicates, and any other sessile benthic organisms will be recorded to the nearest 1%. Other benthic organisms may include: seagrass, bryozoans, sessile worms, anemones, zoanthids, *Millepora* sp., bivalves, gastropods, and barnacles. Each functional group will be assigned a number from 0% to 100%, with the total of all functional groups equaling 100%. Macroalgae will be identified to genus level and the percent cover of each genus will be recorded. Unattached or floating macroalgae will be disregarded. Octocoral and scleractinian colonies will be identified to the lowest practical taxonomic level and the maximum height or width will be recorded to the nearest cm. The smallest size recorded is 1 cm, for individuals less than or equal to 1 cm. Abnormal conditions of each colony will also be recorded (e.g., bleaching, disease, stress). These investigations will provide a quantitative and qualitative data set that will be utilized to assess and comparatively evaluate changes in the benthic macroinvertebrate and macroalgal communities at each study site.

Acropora cervicornis Monitoring Stations

During the 2017 pre-construction survey, at least three transects will be selected to monitor the health of selected *A. cervicornis* colonies. The transects selected to monitor *A. cervicornis* will depend upon the presence and density of *A. cervicornis* observed along the transect during the pre-construction transect installation and monitoring phase (to be performed by others). Biologists will select 20 *A. cervicornis* corals located along, or immediately adjacent to the permanently established transects. The selected *A. cervicornis* colonies must be ≥ 15 cm in dimension (tall or long). Once selected, the location (north/south side of transect & distance along the transect) will be recorded, and a pin will be installed near the coral to permanently mark the coral for future monitoring. A tag will be securely attached to the pin to label each coral so that the 20 monitored corals can be distinguished during each monitoring event.

Acropora cervicornis Assessments

For each of the 20 tagged *A. cervicornis* colonies the following information will be collected:

1. Largest linear dimension of the colony (length, height or width) in cm
2. The percent of live tissue
3. The percent of colony affected by disease(s) and type of disease(s)
4. Percent of the colony that is bleached
5. Physical damage(s) to the colony
6. Photograph(s) of the colony and close-up photographs of any disease(s), damage(s) and bleaching observed
7. Photographs of the surrounding landscape characterizing the status of the hardbottom community and sediment around the colony
8. A sediment depth measurement (in cm) adjacent to the pin demarcating the coral
9. The presence/absence of sediment accumulation
10. The presence/absence of burial of the base (attachment point) of the colony



Artificial Reef Monitoring

Artificial Reef Station Locations

The artificial reef, located between R-123 and R-124, was constructed in 2003 as partial mitigation for the direct burial of natural hardbottom associated with the Broward County Segment III Renourishment Project. The reef is comprised of one layer of 4 to 6 foot diameter limestone boulders in water depths between 15 and 20 feet.

The artificial reef will be monitored to evaluate any possible physical or biological effects as a result of sediment accumulation and transport from the construction and equilibration of the proposed Project. Monitoring stations will be established at the edge of the artificial reef. The stations will be demarcated by the installation of rebar stakes into the sediment directly adjacent to the outermost boulder, with at least 2 feet of rebar to remain exposed when installed. GPS coordinates of the station locations will be taken after all rebar is installed.

Ten (10) monitoring stations will be established along the western and southern edge of the reef. Station locations were prescribed along the edge of the artificial reef, maintaining approximately 100 foot spacing between stations and within or just outside of the area where the Profile Translation Method predicted the ETOF could extend east of the artificial reef edge.

Artificial Reef Assessments

At each of the 10 artificial reef stations a biologist will conduct the following assessments:

1. Sediment Accumulation Measurements
2. Photographic Documentation

1. Sediment Accumulation Measurements

Sediment accumulation at the base of the artificial reefs will be evaluated by measuring the height of the exposed rebar at each of the 10 monitoring stations. A ruler graduated in centimeters will be used to measure the height of the rebar from the top of the rebar to the top of the substrate where the rebar meets the sand. The net accumulation of sand immediately adjacent to the artificial reef, as measured through the amount of rebar exposed at each site, will be monitored before and after construction to assess whether sand from fill placement has equilibrated eastward of the artificial reefs.

2. Photographic Documentation

Photographic documentation of the benthic resources at the base of the artificial reef will occur at each station location. During each monitoring event a series of images of the base of the artificial reef will be collected. Images will include: one overview of the side of the boulder with the station rebar in the photograph for reference and several close-up images of the base to compare to other monitoring event images. Photographic documentation will be accomplished using a digital handheld underwater camera. Photographic documentation of the benthic community along the



base of the artificial reef at each station will be used in conjunction with the data gathered during the sediment accumulation measurements to track any accumulation of sediment at the base of the artificial reef and any corresponding impacts to the benthos.

Hardbottom Monitoring Reports

A comprehensive environmental monitoring report detailing the findings of each sampling event will be submitted within 90 days of the completion of post-construction field surveys. Reports will be presented in hardcopy and electronic format. All collected raw data will be provided to the DEP, Corps, and Broward County electronically so that it can be used for processing (Excel, video in DVD, field data sheets in PDF, etc). The reports will also include the following:

- Comparative analysis of sediment accumulation at the base of the artificial reef and qualitative data on any effects to benthic resources;
- Comparative analysis of sediment changes at each *A. cervicornis* monitoring station and qualitative data on any affects to the corals;
- Quantitative data on major benthic biological components (percent cover);
- Statistical evaluation and comparison of the data collected along the permanent transects and monitoring stations to ascertain changes in community composition/abundance during the study period; and
- Copies of representative photographs and all videos in their original format.

Reports documenting findings will be prepared and submitted as a PDF to the DEP, Corps, and Broward County as follows:

Post-construction: The reports will analyze and discuss any observed burial, sedimentation, sediment transport/movement, trauma or community changes affecting marine algae, coral, sponges or other marine resources based on the data collection and observations. The final report will include an analysis of the hardbottom community changes throughout the monitoring period. If any impacts are identified, the report will include an estimate of the amount of impact. The amount of direct and indirect impacts will be evaluated using UMAM as outlined in the Hollywood Beach Contingency Mitigation Plan.

The following are detailed descriptions of each work task based on the requirements of the Biological Monitoring Plan:

I. PRE-CONSTRUCTION – ACROPORA ASSESSMENT

A. Field Surveys

For each of the 20 tagged *A. cervicornis* colonies the following information will be collected:

1. Largest linear dimension of the colony (length, height, or width) in cm,
2. The percent of live tissue,



3. The percent of the colony affected by disease(s) and type of disease(s),
4. The percent of the colony that is bleached,
5. Physical damage(s) to the colony,
6. Photograph(s) of the colony and close-up photograph(s) of any disease(s), damages(s), and bleaching observed,
7. Photographs of the surrounding landscape characterizing the status of the hardbottom community and sediment around the colony,
8. A sediment depth measurement (in cm) adjacent to the pin demarcating the coral,
9. The presence/absence of sediment accumulation,
10. The presence/absence of burial of the base (attachment point) of the colony.

Not To Exceed Labor Cost: \$10,960

Estimated Expenses: \$1,556

II. POST-CONSTRUCTION –NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION SURVEYS, DATA ANALYSIS, AND REPORTING

A. Field Surveys

Field Surveys shall be repeated in the same manner as for the post-construction event (see above). Nearshore hardbottom and artificial reef monitoring will occur in the summer months. The year one monitoring event will occur one time during the summer following the post-construction monitoring event.

Not To Exceed Labor Cost: \$47,544

Estimated Expenses: \$10,120

B. Data Analysis and Reporting

Data analysis and reporting shall be conducted in the same manner as for the post-construction event (see above).

Not To Exceed Labor Cost: \$25,020

C. Work Schedule

A draft report will be provided to the City within 75 days following completion of field activities. City staff will have 8 days to review the draft report and provide comments to ATM. Within 7 days of receipt of the City's comments, ATM will revise the document and submit a final report to the FDEP, USACE, and Broward County to meet the report submittal timeline specified with the Biological Monitoring plan of 90 days after completion of the immediate post-construction monitoring survey.



III. YEAR ONE MONITORING - NEARSHORE HARDBOTTOM EDGE MAPPING, NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION SURVEYS, DATA ANALYSIS, AND REPORTING

A. Field Surveys

Field Surveys shall be repeated in the same manner as for the post-construction event (see above). Nearshore hardbottom and artificial reef monitoring will occur in the summer months. The year one monitoring event will occur one time during the summer following the post-construction monitoring event.

Not To Exceed Labor Cost: \$25,452

Estimated Expenses: \$7,505

B. Data Analysis and Reporting

Data analysis and reporting shall be conducted in the same manner as for the post-construction event (see above).

Not To Exceed Labor Cost: \$41,820

C. Work Schedule

A draft report will be provided to the City or about 75 days following completion of field activities. City staff will have 8 days to review the draft report and provide comments to ATM. Within 7 days of receipt of the City's comments, ATM will revise the document and submit a final report to the FDEP, USACE, and Broward County to meet the report submittal timeline specified with the Biological Monitoring plan of 90 days after completion of the year one monitoring survey.

IV. YEAR TWO MONITORING - NEARSHORE HARDBOTTOM EDGE MAPPING, NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION SURVEYS, DATA ANALYSIS, AND REPORTING

A. Field Surveys

Field Surveys shall be repeated in the same manner as for the post-construction event (see above). Nearshore hardbottom and artificial reef monitoring will occur in the summer months. The year two monitoring event will occur one time during the summer following the year one monitoring event.

Not To Exceed Labor Cost: \$25,452

Estimated Expenses: \$7,505

B. Data Analysis and Reporting

Data analysis and reporting shall be conducted in the same manner as for the post-construction event (see above).

A total of 6 hardcopies and 6 electronic copies will be submitted to the City of Hollywood for distribution to the state and federal regulatory agencies and Broward County.

Not To Exceed Labor Cost: \$41,820



C. Work Schedule

A draft report will be provided to the City within 75 days following completion of field activities. City staff will have 8 days to review the draft report and provide comments to ATM. Within 7 days of receipt of the City's comments, ATM will revise the document and submit a final report to the FDEP, USACE, and Broward County to meet the report submittal timeline specified with the Biological Monitoring plan of 90 days after completion of the year two monitoring survey.

V. YEAR THREE MONITORING - NEARSHORE HARDBOTTOM EDGE MAPPING, NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION SURVEYS, DATA ANALYSIS, AND REPORTING

A. Field Surveys

Field Surveys shall be repeated in the same manner as for the post-construction event (see above). Nearshore hardbottom and artificial reef monitoring will occur in the summer months. The year three monitoring event will occur one time during the summer following the year two monitoring event.

Not To Exceed Labor Cost: \$25,452

Estimated Expenses: \$7,505

B. Data Analysis and Reporting

Data analysis and reporting shall be conducted in the same manner as for the post-construction event (see above).

The final three-year biological monitoring report will also analyze and discuss any observed burial, sedimentation, sediment transport/movement, trauma or community changes affecting algae, corals, sponges or other marine resources based on the data collection and observations and will include all analyses outlined under Task I. The final three-year post-construction report will provide analysis of the hardbottom community changes throughout the monitoring period. If any impacts are identified, the final report will include an estimate of the amount of impact. The amount of direct and indirect impacts will be evaluated using UMAM as outlined in the Hollywood Beach Contingency Mitigation Plan.

Not To Exceed Labor Cost: \$49,080

C. Work Schedule

A draft final report will be provided to the City or about 72 days following completion of field activities. City staff will have 10 days to review the draft report and provide comments to ATM. Within 8 days of receipt of the City's comments, ATM will revise the document and submit a final report to the FDEP, USACE, and Broward County to meet the report submittal timeline specified with the Biological Monitoring plan of 90 days after completion of year three monitoring survey

VI. POST-CONSTRUCTION PHYSICAL SURVEYS

Following the recently finalized physical monitoring plan, ATM will perform post-construction physical surveys for the full length of the two project segments and expanding 5,000 feet north and south of the limits of fill.

Pursuant to 62B-41.005(16), F.A.C., physical monitoring of the project is required through acquisition of project-specific data to include, at a minimum, topographic and bathymetric surveys of the beach, offshore, and borrow site areas, and engineering analysis. The monitoring surveys and reports described herein fulfill



the topographic and bathymetric survey and reporting requirements for beach nourishment projects as regulated by the Department of Environmental Protection's Bureau of Beaches & Coastal Systems (BBCS), Broward County's Environmental Protection and Growth Management Department (EPGMD), and the U.S. Army Corps of Engineers (COE).

Table 1 shows the survey and reporting requirements for DEP, EPGMD, and COE. The monitoring data is necessary for the permitting agencies and project sponsor to regularly observe and assess, with quantitative measurements, the performance of the project, any adverse effects which have occurred, and the need for any adjustments, modifications, or mitigative response for the project.

Table 1 – Schedule of Surveys and Reports as Required by DEP

Survey	Number Of Surveys	Timing of Surveys	Reports
	DEP Required Surveys		
Pre-Construction	1	Prior to start of Project	Not Specified
Immediate Post-Construction	1	Within 60 days of Project completion	90 days following survey
Post-Construction	3	Annually for 3 years	90 days following survey

Survey	Number Of Surveys	Timing of Surveys	Reports
	COE Required Surveys		
Pre-Construction	1	Prior to start of Project	Not Specified
Immediate Post-Construction	1	Within 60 days of Project completion	90 days following survey
Post-Construction	3+	Annually for 3 years, biennially thereafter until expiration of Project life	90 days following survey

It is assumed in this proposal that the Post-Strom (Hurricane Irma) Survey conducted Broward County will be considered the pre-construction survey for this Project. Based on Table 1, ATM will perform two surveys during Post-Construction Year 1 (immediate Post-Construction and the 1 year Post-Construction), one annual survey for Year 2 and one for Year 3.

All topographic and bathymetric profile surveys of the beach and offshore will be conducted by a Florida licensed surveyor. Topographic and bathymetric surveys will be conducted within the bounds of the beach fill area and along 5,000 feet of the adjacent shoreline to both the north and south ends of the beach fill area. Profile surveys will be conducted at each of the Department of Environmental Protection's reference monuments within the following areas:



Hollywood North Dune Segment:

- R-95 to R-100 5,000 feet up drift of Project Area
- R-100 to R-102 Project Area

Hollywood North Segment:

- R-102 to R-107 5,000 feet up drift of Project Area
- R-107 to R-109+300 Project Area
- R-109+300 to R-114+300 5,000 feet down drift of Project Area

Hollywood South Segment:

- R-114-380 to R-119-380 5,000 feet up drift of Project Area
- R-119-380 to R-124-280 Project Area
- R-124-280 to R-129-280 5,000 feet down drift of Project Area

All profile surveys will be measured along the previously established azimuths and locations of each historical monument. The profiles will extend from the monument or at least 100-ft. landward of the dune/vegetation/seawall line to at least 2,000 ft. offshore of the monument or to the -30 ft. NAVD seabed contour, whichever is greater. Wading profiles will extend to at least -4 feet NAVD. All survey activities and deliverables will be conducted in accordance with the latest update of the DEP BBCS *Monitoring Standards for Beach Erosion Control Projects, Section 01000 – Beach Profile Topographic Surveying and Section 01100 – Offshore Profile Topographic Surveying*.

ATM will provide all survey data, as well as resultant survey drawings to the City both as electronic files (dwg, pdf and raw data x,y,z files) and five sets of signed and sealed full-size drawings. A survey report suitable for submission to DEP will also be generated and provided to the City. It is assumed herein that the Engineer of Record will perform all engineering analyses, submitted any required engineering reports to the appropriate agencies.

Not To Exceed Labor Cost: \$70,920

Estimated Expenses: \$24,944

VII. POST-CONSTRUCTION AERIAL PHOTOGRAPHY

Following project construction, ATM will contract a qualified survey company to acquire new aerial photography as required by the FDEP. Aerial photography will be flown twice a year, once in the summer and once in the winter, for three years following construction.

The aerial photography acquired will comply with Section 02100 of the *Monitoring Standards for Beach Erosion Control Projects*, Bureau of Beaches and Coastal Systems, Division of Water Resource Management, Dept. of Environmental Protection, State of Florida, Revision 03/03/04. Water clarity will be an important factor for obtaining sufficiently clear photography of the nearshore hardbottom. It will be necessary for ATM to coordinate closely with the City to monitor water clarity leading up to each flight/event. It is assumed herein that the City will monitor and provide authorization for execution of each flight.



All reports per the Section 02100 standards will be provided. The final files will be delivered in a .TIF format along with corresponding .tfw file for geo-referencing on DVD.

Not To Exceed Labor Cost: \$2,310

Estimated Expenses: \$42,000

VIII. POST-CONSTRUCTION ESCARPMENT MONITORING

Weekly escarpment monitoring during sea turtle nesting season (April 1st to November 1st) will be conducted by ATM staff. Daily inspections of the full length of each constructed beach segment will be conducted in accordance with permit requirements.

Immediately after project completion and prior to March 1 for 3 subsequent years, if placed sand still remains on the beach, ATM shall conduct visual surveys for escarpments along the beach fill. The number of escarpments and their location relative to FDEP reference monuments shall be recorded during each weekly survey and reported relative to the length of the beach surveyed (e.g., 50% scarps). Notations on the height of these escarpments shall be included (0 to 2 ft., 2 to 4 ft., and 4 ft. or higher) as well the maximum height of all escarpments.

ATM will notify the City of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 ft. These shall be leveled to the natural beach contour by the City/Contractor. Any escarpment removal shall be reported relative to R-monument.

If weekly surveys during the marine turtle nesting season document subsequent reformation of escarpments that exceed 18 inches in height for a distance of 100 ft., the FWC shall be contacted immediately to determine the appropriate action to be taken. Upon written notification, the escarpments will be leveled in accordance with mechanical methods prescribed by FWC.

Not To Exceed Labor Cost: \$27,720

Estimated Expenses: \$1,386

IX. SHOREBIRD MONITORING

Environmental permits for the Project will likely require monitoring of the beach to document use by shorebirds. Under this task, biweekly (every other week) shorebird surveys will be conducted for one nesting season post-construction during the shorebird nesting season (April 1 – August 31). A biologist, approved by FWC to monitor shorebirds, will conduct the required biweekly shorebird surveys. Data will be input into the State eBird database on a monthly basis, as required by the permits.

Not To Exceed Labor Cost: \$12,435

Estimated Expenses: \$1,359

X. SEA TURTLE NESTING SUCCESS

Following project construction, ATM will collect sea turtle nesting data and reports for the first and second year post-construction nesting seasons from Broward County. ATM will interpolate the data and reports provided, documenting turtle nesting and hatchling activities and shall develop a summary report for submission to FDEP following each nesting season.



A total of 9 hardcopies and 9 electronic copies will be submitted to the City of Hollywood for distribution to the state and federal regulatory agencies and Broward County.

Not To Exceed Labor Cost: \$3,610

Estimated Expenses: \$50

XI. PROJECT COORDINATION

It is anticipated that significant consultation and coordination efforts between the project team and multiple parties (City, other consultants, state and regulatory agencies) will be required to completely satisfy the permit requirements for biological monitoring. Under this task, a project coordination budget has been proposed to address these multiple meeting requirements.

It is assumed for the purposes of this proposal that all meetings are local (S. Florida region) and no travel expense or per diem is anticipated.

Not To Exceed Labor Cost: \$10,000

XII. PROJECT CONTINGENCY

A contingency for the project is included to ensure adequate funds are available for unforeseen work efforts that are not captured under Tasks I-X above. Such work efforts may include but are not limited to:

- Additional meetings beyond those budgeted under Task X.
- Increased sampling or documentation requirements by DEP or others for future monitoring events.
- Additional monitoring events beyond the Year 3 post-construction monitoring.
- Modifications to existing permits and /or biological monitoring program requirements.

Not To Exceed Labor Cost: \$10,000

ADDITIONAL SERVICES

Services beyond the work tasks and contingency included in this scope of work shall be considered Additional Services. Such additional services include, but are not limited to, the following:

- Pre-Construction Monitoring
- Edge of hardbottom mapping (to be provided by others).
- Correcting and/or resetting baseline transects (pins, etc.).

Additional Services can be provided on an hourly fee basis in accordance with the negotiated rate schedule, or, under an additional services proposal as a fee modification to this proposal. The Team shall only provide additional services with prior written authorization from the City of Hollywood.



COMPENSATION

The following hourly rates for key staff will be utilized under this scope of work. Effort will be charged on a time and materials not to exceed basis.

Staff Position	Hourly Rate (\$/hr.)
Project Principal	\$185.00
Project Manager	\$145.00
Staff Engineer	\$120.00
Professional Surveyor/Mapper	\$120.00
Junior Engineer	\$105.00
Senior Scientist/Biologist (ATM)	\$135.00
Survey Technician	\$85.00
CAD Tech/GIS	\$90.00
Administrative	\$80.00



COMPENSATION

The following table summarizes the time and materials (labor and expenses) required to complete the Scope of Work detailed herein.

TASK	Not To Exceed Labor Cost	Estimated Expenses
I. PRE-CONSTRUCTION – ACROPORA ASSESSMENT	\$10,960	\$1,556
II. POST-CONSTRUCTION - NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION		
A. Field Surveys	\$47,544	\$10,120
B. Data Analysis and Reporting	\$25,020	\$300
III. YEAR ONE MONITORING - NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION		
A. Field Surveys	\$25,452	\$7,505
B. Data Analysis and Reporting	\$41,820	\$300
IV. YEAR TWO MONITORING - NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION		
A. Field Surveys	\$25,452	\$7,505
B. Data Analysis and Reporting	\$41,820	\$300
V. YEAR THREE MONITORING - NEARSHORE HARDBOTTOM AND ARTIFICIAL REEF SEDIMENT ACCUMULATION		
A. Field Surveys	\$25,452	\$7,505
B. Data Analysis and Reporting	\$49,080	\$300
VI. POST-CONSTRUCTION - PHYSICAL SURVEYS		
A. Immediate Post Construction (1 Surveys)	\$17,730	\$6,236
B. Year 1 (1 survey)	\$17,730	\$6,236
C. Year 2 (1 Survey)	\$17,730	\$6,236
D. Year 3 (1 Survey)	\$17,730	\$6,236
VII. POST-CONSTRUCTION - AERIAL PHOTOGRAPHY		
A. Year 1	\$770	\$14,000*
B. Year 2	\$770	\$14,000*
C. Year 3	\$770	\$14,000*
VIII. POST-CONSTRUCTION - ESCARPMENT MONITORING		
A. Year 1	\$9,240	\$462
B. Year 2	\$9,240	\$462
C. Year 3	\$9,240	\$462
IX. SHOREBIRD MONITORING	\$12,435	\$1,359
X. SEA TURTLE NESTING SUCCESS		
A. Year 1	\$1,805	\$25
B. Year 2	\$1,805	\$25
XI. PROJECT COORDINATION	\$10,000	
XII. PROJECT CONTINGENCY	\$10,000	
SUB-TOTAL	\$428,595	\$103,930
TOTAL	\$532,525	

*Based on previous invoice from ACA (2015) for aerial photography.



If the above meets with your understanding and approval, please sign one (1) original of this proposal, initial the attachments and return for our files. Receipt of the signed original shall serve as our authorization to proceed. If you feel modifications to this proposal are required, please do not hesitate to call.

Regards,

Michael G. Jenkins, Ph.D., P.E.
Coastal Engineering Principal

John Waszak
Project Manager

APPROVED and ACCEPTED this _____ day of _____, 2017.

By _____

Name: _____
(Please type name and title)

cc: Sam Phlegar, ATM

