

RESOLUTION NO. 2019- _____

A RESOLUTION OF THE VILLAGE COUNCIL OF THE VILLAGE OF KEY BISCAYNE, FLORIDA, AUTHORIZING THE VILLAGE MANAGER TO ISSUE A WORK ORDER TO EAC CONSULTING, INC. FOR A COST BENEFIT ANALYSIS RELATING TO A SHORELINE PROTECTION PROJECT; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Village of Key Biscayne (“Village”) issued Request for Qualifications No. 2016-02-09 (“RFQ”) for continuing professional engineering services; and

WHEREAS, pursuant to the RFQ, the Village Council selected EAC Consulting, Inc. (“Consultant”) as one of the consultants to provide continuing professional engineering services and authorized the Village Manager to execute an agreement with Consultant; and

WHEREAS, Consultant has provided a proposal, attached as Exhibit “A,” (the “Proposal”) to perform a cost benefit analysis relating to a Shoreline Protection Project (the “Project”); and

WHEREAS, the Village Council desires to authorize the Village Manager to negotiate and issue a work order for the Project consistent with the Proposal attached as Exhibit “A” and the professional services agreement entered into between the Village and Consultant; and

WHEREAS, the Village Council finds that this Resolution is in the best interest and welfare of the residents of the Village.

NOW, THEREFORE, BE IT RESOLVED BY THE VILLAGE COUNCIL OF THE VILLAGE OF KEY BISCAYNE, FLORIDA, AS FOLLOWS:

Section 1. Recitals Adopted. That each of the above-stated recitals are hereby adopted, confirmed, and incorporated herein.

Section 2. **Authorization.** The Village Manager is hereby authorized to negotiate and issue a work order to Consultant for the Projects consistent with the Proposal attached hereto as Exhibit "A" in an amount not to exceed \$178,325.

Section 3. **Effective Date.** That this Resolution shall take effect immediately upon adoption.

PASSED and ADOPTED this _____ day of _____, 2019.

MICHAEL W. DAVEY, MAYOR

ATTEST:

JENNIFER MEDINA, CMC
VILLAGE CLERK

APPROVED AS TO FORM AND LEGAL SUFFICIENCY

WEISS SEROTA HELFMAN COLE & BIERMAN, P.L.
VILLAGE ATTORNEY

SCOPE OF WORK for

COASTAL ENGINEERING ANALYSIS AND MODELING TO INCLUDE THE VILLAGE OF KEY BISCAYNE IN THE MIAMI-DADE COUNTY FEDERAL COASTAL STORM RISK MANAGEMENT STUDY (CSRSM)

Background The Miami-Dade County (County) and the Jacksonville District, U.S. Army Corps of Engineers (USACE), have partnered to conduct a Coastal Storm Risk Management (CSRSM) Study to determine the Federal interest and feasibility of alternatives to mitigate coastal flood risk in the County. The CSRSM Study is a three (3) year feasibility study to evaluate extension of the 50-year federal shore protection project that extends from Sunny Isles Beach south to Government Cut. Miami-Dade County is the local sponsor, and the USACE is providing 100% of the funding for this study. This shore protection project is currently planned to expire in the 2025 time frame, and this ongoing CSRSM Study will provide justification for the proposed re-authorization of the federal shore protection project. The USACE has established the following milestones

- Initial Scoping Meeting: 2 October 2018
- Public Scoping Meeting: 5 Dec 2018
- Vertical Team Meeting: 22 July 2019
- Policy Exception Memo – (\$2M) 10 July 2019
- TSP Milestone: 9 Apr 2020
- Agency Decision: 9 Oct 2020
- Final Report: 23 June 2021

The Village of Key Biscayne (Village) has established a strategy to be added to the federal shore protection project for long term beach management. The current extents of the CSRSM study extends from Bakers Haulover Inlet south to Government Cut (approximately 9.3 miles) and does not include the Village. For the Village's inclusion in the CSRSM study, the Village will need to fund portions (or possibly fully fund) its CSRSM Study individually. The CSRSM Study would need to be conducted with the tools and methods as outlined by the USACE in recent meetings at the Jacksonville District. The CSRSM study would be conducted on behalf of the USACE as a collaborative approach. Currently the USACE has progressed with the CSRSM to meet the April, 2020 deadline for project alternatives within the study area. The Village recently conducted meetings in Washington, DC and in Jacksonville to support additional funding for the USACE shortfall on the CSRSM study. However, due to the timing and other constraints with this federal funding the Village will need to initiate data collection and coastal engineering efforts as part of the CSRSM study.

The project area being evaluated consists of Key Biscayne's shoreline within the municipal limits along approximately 6,000 feet of shoreline. For modeling purposes, some areas of the adjacent parks will need to be evaluated. The following work tasks outline the scope of work to be provided by EAC Consulting with subconsultant, Moffatt & Nichol (M&N). This scope of work includes the compilation and query of historical data, to conduct coastal numerical modeling to estimate storm effects on beach profile and to conduct analytical calculations relative to existing and post-project shoreline

change rates for the Future Without Project (FWOP) and Future With Project (FWP) scenarios in the various reaches of the project area. The scope of services will include close collaboration with the USACE as they have requested the scenarios of the larger beach nourishment to evaluate the level of storm protection. The overall scope approach to the letter to the Village dated August 12, 2019. The project is expected to be completed in separate phases as it is difficult to estimate the level of modeling and analysis that will have to be completed until meetings and coordination with the USACE commences.

Scope of Services

EAC Consulting and M&N proposes to carry out this project in accordance with the following tasks:

- Task 1 – Project Management, QC, etc. (a portion of this task to be completed during this phase)
- Task 2 – Existing Data Collection & Review (completed during this phase)
- Task 3 – CSHORE Storm Suite Modeling (a portion of this task to be completed during this phase)
- Task 4 – Shoreline Change Rate Analysis & Modeling (completed during this phase)
- Task 5 – Beach-fx Modeling (to be completed in a later phase)
- Task 6 – Report (to be completed in a later phase)

The purpose of this proposed scope of work is to begin the overall study, coordinate the scope of work and procedures with the USACE, complete the data collection and begin the CSHORE storm suite modeling as well as the shoreline change rate analysis and modeling. Other tasks, as coordinated with the USACE, will be completed during later phases.

Details of the proposed Tasks are described below:

Task 1 – Project Management, QC, Meetings & Coordination, etc.

Task 1.1: Kickoff Meeting. Participate in a kickoff meeting with Village and USACE personnel to discuss the project goals, scope and tasks being completed by the USACE for the Miami-Dade study so that the scope and level of effort completed for this study is comparable and can be folded seamlessly into the USACE study.

Task 1.2: Bi-weekly Conference Calls. Participate in a bi-weekly conference calls with the USACE and Village to discuss project progress and coordinate activities. These will be conducted over WebEx (or similar system).

Task 1.3: Monthly Meetings. Participate in a two monthly meetings at the USACE Jacksonville District offices with the USACE and Village to discuss project progress and coordinate activities.

Task 1.4: Council Meetings. Participate in up to two (2) Village Council meetings to review progress and status and to present results from the study.

Task 2 – Existing Data Collection & Review

Task 2.1: Existing Data Set Collection and Compilation. compile and review existing available data sets regarding coastal processes (beach profile conditions, shoreline position, waves, tides and sediment characteristics) and assets (buildings and infrastructure that can be considered in Beach-fx) in the study area that are relevant to the USACE CSRM requirements. The existing available data sets will include the following specific data types:

Reports

- Historical reports and data sets describing beach and nearshore sediment characteristics; specifically, this work will rely on information developed for the *Key Biscayne Beach Management Feasibility Study* (February 2018) by M&N and EAC Consulting, Inc. (EAC) for the Village
- Reports and similar technical documents being prepared by USACE for adjacent areas of the Miami-Dade County CSRM.
- General Reevaluation Report (GRR) completed by the USACE in the 1980's completed for the 1987 beach nourishment project implemented as a Section 107 Project by the USACE.
- USACE SAND report updates for Miami-Dade County that include the Village

Coastal Processes Data Sets

- Historical Beach profiles and other survey data
- Historical aerial photography
- Tidal levels at NOAA tidal station #8723214 at Virginia Key, Biscayne Bay, FL
- Nearshore and offshore USACE WIS wave data sets, and NOAA Wavewatch III data
- MIKE 21 nearshore wave transformation model results, in the form of nearshore wave time series, developed for the *Key Biscayne Beach Management Feasibility Study* (February 2018)
- Storm suite data – to be provided by USACE

GIS Data Sets (Geodatabases and/or Shapefiles)

- Building footprints and parcel outlines supplied by the Village of Key Biscayne and/or Miami-Dade County
- Roads and other paved surfaces' outlines supplied by the Village of Key Biscayne, Miami-Dade County and/or Florida Department of Transportation (FDOT)
- Building information obtainable from the current FEMA HAZUS database for the census blocks including the Village of Key Biscayne

Task 2.2: Data Collection Technical Memorandum. prepare a technical memorandum summarizing the data collected and providing recommendations for data sets to rely on during the remainder of this study. A draft memo will be provided for USACE review, and feedback/review comments received from USACE will be incorporated into a single Final edition of the memo. Information from the memo will be incorporated into the overall Report to be completed in a subsequent phase.

Task 3 – CSHORE Storm Suite Modeling

The storm suite serves as an input to the Beach-fx program. This suite is essentially a “look-up” table of beach profile responses to storms, to be used by Beach-fx to determine the amount of damage a particular stretch of beach may endure during a particular storm. To generate the database, response of beach profiles to a suite of storms will be modeled using Cross-shore numerical model (CSHORE) which is used by the USACE to estimate storm effects on the planform beach to document the levels of inundation, wave heights, and erosion for individual beach.

Task 3.1. Storm Wave Transformation Modeling. M&N will use their existing MIKE 21 spectral wave (SW) nearshore wave transformation model, developed for the *Key Biscayne Beach Management Feasibility Study* (February 2018), to simulate storm waves for a series of storm events consistent with USACE’s CSHORE storm suite for the adjacent areas of the Miami-Dade County CSRM. Utilization of information from this previous study will save costs. The additional wave modeling is necessary because the nearshore waves along the Key Biscayne shoreline are likely to be different than those occurring at the same nearshore water depths (relevant to CSHORE modeling) in other areas of Miami-Dade County. For the shoreline change rate modeling and model calibration in Task 4, additional years of nearshore wave conditions from 2015 to 2019 are required. The wave transformation study from 2015 and 2019 will be conducted using the MIKE 21 SW wave model. Output from this task will include wave height and wave period inputs to the CSHORE simulations.

Task 3.2 & 3.3. Selection of Representative Cross-sections for CSHORE and CSHORE Model Calibration and Validation. The CSHORE model provides understanding of cross shore loss of sand in the berm and/or dune following storm activity. However, CSHORE must be calibrated and validated to the specific site conditions at which it is to be applied. In line with the ongoing USACE Miami-Dade County's Beach Erosion Control Project, M&N will use Hurricane Matthew for calibration and Hurricane Irma for validation. M&N will carry out CSHORE calibration and validation efforts on representative profiles. It is expected that three to five representative profiles will be selected for study within the village and that two to four additional representative profiles will be selected for the adjacent parks. The selection of representative profiles will be based on review of the existing profile data and a qualitative morphological assessment.

Task 3.4. Testing of Various Beach Nourishment Templates and Breakwater Configurations to Determine GENCADE Alternatives. Understanding the effects of future beach nourishment projects are crucial in order to estimate the potential effect on future shoreline change rates. To develop the beach nourishment alternatives for use in later GENCADE model runs, M&N will develop various nourishment templates and analyze the storm protection provided using the CSHORE model for a selected range of storm events (three to four return periods). During these analyses, M&N will also consider the effect of the addition of detached breakwaters. Again, the purpose of this task is to assist in the development of a realistic range of nourishment alternatives/breakwater configurations to run within GENCADE. The CSHORE Storm Suite Development and Model Runs will be completed in subsequent phases.

Task 4 – Shoreline Change Rate Analysis & Modeling

Recent meetings between the USACE and the Village in Jacksonville resulted in the request from the USACE to evaluate the level of protection from a large scale beach nourishment. This nourishment would also include the evaluation of offshore coastal structures that could potentially reduce the historical erosion rates. To address this request from the USACE, shoreline change modeling is necessary to develop shoreline change rates, generally in the form of representative erosion rates, for inclusion in the Beach-fx model simulations required as part of the CSRM. While existing conditions and Future Without Project (FWOP) erosion rates may be determined through historical data analysis, without shoreline change numerical modeling, developing shoreline change rates for the Future With Project (FWP) conditions that include the proposed potential detached breakwater alternative will require shoreline change modeling. For consistency across the various conditions considered – Existing Conditions, FWOP, and FWP including nourishment and/or breakwaters – the scenarios will be simulated in a shoreline change numerical model for a representative time series of waves and water levels that cause sediment transport and erosion.

M&N will apply the USACE one-line GENCADE shoreline model for the shoreline change rate analysis. GENCADE is a shoreline evolution numerical model developed by the Coastal Inlets Research Program (CIRP) to combine and improve upon the capabilities of previous response models Cascade and GENESIS. GENCADE calculates shoreline change based on differential wave-driven longshore sediment transport rates. The shoreline model includes the effects of structures such as breakwaters, groins, jetties, revetments and sources and sinks.

Task 4.1: Shoreline Evolution Model Setup and Calibration. A GENCADE shoreline evolution model will be set up covering the Village of Key Biscayne and the adjacent shoreline segments of the island. The exact length of the GENCADE model will be refined during model setup and initial simulation testing. The GENCADE model will be driven by time series of wave conditions from an existing set of MIKE 21 SW wave transformation model results. This method of model calibration/validation forecasts shoreline position changes associated with the adjustment of the project area's beach width in response to typical annual wave conditions, over time scales of months to years. The shoreline model parameters will be calibrated for representative segments of the project shoreline using available historical shoreline positions from prior surveys and studies, including post-nourishment shoreline monitoring following previous projects. Representation of the beach and nearshore sediment characteristics in the shoreline evolution model will be developed based on sediment data compiled in Task 2 as described above.

Task 4.2: Shoreline Change Rates for Beach-fx from GENCADE Simulations. The GENCADE shoreline evolution model will be used to simulate shoreline changes for a multi-year period for the proposed physical project area conditions. M&N will evaluate the results of the GENCADE simulations and will recommend representative shoreline change rates for each of the Beach-fx reaches for each of the four proposed project area conditions. Specific alternatives modeled (nourishment volumes/cycles and breakwater configurations) will be based on past modeling completed by M&N, results from the limited CSHORE modeling, and discussions with the Village and USACE. M&N will also complete a technical memorandum documenting the work and findings from this task.

Assumptions and Limitations

The following assumptions are in addition to the ones stated in the various paragraphs preceding this section:

1. The Village will provide any available as-built plans and electronic files pertaining to the work area, including easements and right of ways.
2. No additional benthic, environmental, archaeological, hazards, utility, subsurface, topographic, boundary, or hydrographic surveys will be conducted.
3. The City will provide existing as-built and record maps for all known utilities, including subsurface, within the project limits.
4. Subsurface/underground utility location is not a part of the above tasks.
5. No additional sediment data collection or analyses (sediment cores/samples or geophysical/seismic surveys) will be collected.
6. GIS set up and modeling is for study purposes and does not include detailed coastal engineering design or preparation of construction documents.

Engineering Fee Estimate

Based on the above scope of services and assumptions, EAC Consulting with subconsultant M&N proposes to provide the engineering design services at a Lump Sum Fee of \$178,325 plus reimbursable expenses. A detailed fee table, including man-hours and expenses, is attached on the following page.

Schedule of Work

The following is a summary schedule, which will commence upon written authorization of work order.

Task	Description	Schedule
1	Project Management, etc. (Partial)	Ongoing throughout project; specific meetings scheduled in collaboration with Village and USACE
2	Data Collection (Complete)	4 Weeks post NTP
3	CSHORE Storm Suite Modeling (Partial)	6 Weeks post NTP
4	Shoreline Change Rate Analysis & Modeling (Complete)	10 Weeks post NTP

I. MAN-HOUR BUDGET BY LABOR COSTS

Task	Classification	Principal Engineer	Project Manager	Principal Engineer	Senior Engineer	Eng. III	Eng. II	Eng. I	Staff Engineer	Senior Tech.	ACAD Designer	ACAD CADD II	ACAD CADD I	Project Control	Word Proc.	General Clerical	Total Hours	Total Labor Cost
	Rate	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$		
1 Project Management, etc. (Partial)		32	-	-	32	-	-	8	-	-	-	-	-	1	-	-	73	\$ 12,689.00
2 Data Collection (Complete)		6	-	20	38	-	74	176	-	-	-	-	-	6	4	-	324	\$ 40,622.00
3 CSHORE Storm Suite Modeling (Partial)		9	-	22	56	-	258	100	-	-	-	-	-	-	-	-	445	\$ 58,598.00
4 Shoreline Change Rate Analysis & Modeling (Complete)		13	6	32	80	-	302	46	-	-	-	-	-	2	4	-	485	\$ 66,416.00
Total Labor Budget	\$	12,120	\$ 1,170	\$ 14,430	\$ 33,990	\$ -	\$ 79,250	\$ 36,300	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 585.00	\$ 480.00	\$ -		
Labor Budget Distribution		7%	1%	8%	19%	0%	44%	20%	0%	0%	0%	0%	0%	0%	0%	0%	1327	\$ 178,325.00
Total Labor Hours		60	6	74	206	-	634	330	-	-	-	-	-	9	8	-		
Labor Hours Distribution		5%	0%	6%	16%	0%	48%	25%	0%	0%	0%	0%	0%	1%	1%	0%	100%	
Man-weeks		1.5	0.2	1.9	5.2	0.0	15.9	8.3	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	33.2	