AMENDMENT TO AGREEMENT BETWEEN COUNTY AND CONSULTANT RFQ2020-3177

THIS AMENDMENT #2 made and entered into this 30 day of April 2024, by and between **MARTIN COUNTY**, a political subdivision of Florida, (Hereinafter "County"), 2401 SE Monterey Road, Stuart, Florida 34996 and **Singhofen & Associates, Inc. (SAI)** (Hereinafter "Consultant"), 2035 Vista Parkway, West Palm Beach, FL 33411.

WITNESSETH

WHEREAS, the **County** and **Consultant** entered into an Agreement for Palm City Farms Stormwater Modeling on March 24, 2020; and

WHEREAS, the **County** and **Consultant** desire to amend the Agreement to expand the model domain and provide a higher level of detail than originally scoped and to also provide real-time flood forecasting for the Palm City Farms watershed as documented and justified by the Consultant as shown in Exhibit A and Exhibit B respectively; and

WHEREAS, the County and Consultant have agreed to a cost for these services of $235,480.

NOW THEREFORE, in consideration of the promises, covenants, and mutual benefits which all accrue to the parties hereto in carrying out the terms of this Agreement, it is mutually covenanted and agreed that the contract will be amended as follows:

1. The Agreement is hereby amended to include services outlined in Exhibits attached, and
2. The new total contract value is $991,604.00; and
3. All remaining pricing, terms and conditions of the Agreement not specifically amended herein shall remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Amendment to the Agreement as of the date first set forth above.

REVIEWED BY

Jim Gorton
Public Works Director

BOARD OF COUNTY COMMISSIONERS MARTIN COUNTY, FLORIDA

Don G. Donaldson, P.E.
County Administrator

SINGHOFEN & ASSOCIATES, INC.

Kent Boulicault, P.E.
Vice President

APPROVED AS TO FORM AND LEGAL SUFFICIENCY

Sarah W. Woods
County Attorney

SINGHOFEN & ASSOCIATES INCORPORATED

Memorandum

To: Jim Gorton

From: Kent Boulicault, PE, Matt Deal, GISP

Date: Wednesday, March 20, 2024

Subject: Palm City Farms Stormwater Master Plan; Model Development and Design Services; Change Order Request

PO: RFQ2020-3177

Singhofen & Associates, Inc. (SAI) respectfully requests a change order to increase the budget to account for significant additional efforts that were required throughout the course for the project. These additional efforts were for services that were not originally anticipated when we developed the scope of work and budget. At SAI, we pride ourselves on the work that we do and we do not like to ask our clients for change orders but the additional work that was conducted was substantial and we believe that the County has and will benefit from the efforts for many years to come. At the same time, we also fully understand that that this work was entirely at our own risk. We appreciate your consideration in this. Below is a brief discussion of the additional efforts conducted.

- The additional unanticipated efforts were primarily associated with both expanding the model domain and providing a much higher level of detail than originally planned. This has cascading implications on work throughout the project, increasing the efforts associated with data collection and review, data cataloging, model network development subbasin delineation, parameterization, hydraulic feature data capture, model debugging and stabilization, calibration, results review and documentation (e.g., mapping, tabulation, etc.).

	Prof. Engineer IV	Eng. Intern/ Scientist III	CADD/GIS Tech. III	Tech. II	Man Hours By Activity	Cost By Activity
Hourly Rate:	$212.00	$132.00	$116.00	$71.00		
Additional Out of Scope Services	18	23	96	98	235	**$ 24,946.00**

SAI is requesting a change order to increase the amount of the project by **$24,946.00**.

Singhofen & Associates, Inc.

Kent J. Boulicault, P.E.
Vice President

March 20, 2024
Date

Martin County

Jim Gordon
Public Works Director

4/11/24
Date

Proposal to Develop a Real-Time Flood Forecasting System for the Palm City Farms Watershed within Martin County, Florida

May 25, 2023

To become more proactive in managing flood risks and improving resiliency in the Palm City Farms watershed (**Figure 1**), Martin County (COUNTY) has requested a proposal from Singhofen & Associates, Inc. (SAI or CONSULTANT) in collaboration with Streamline Technologies, Inc. (SLT or SUBCONSULTANT) for the development of a real-time flood forecasting system for this watershed.

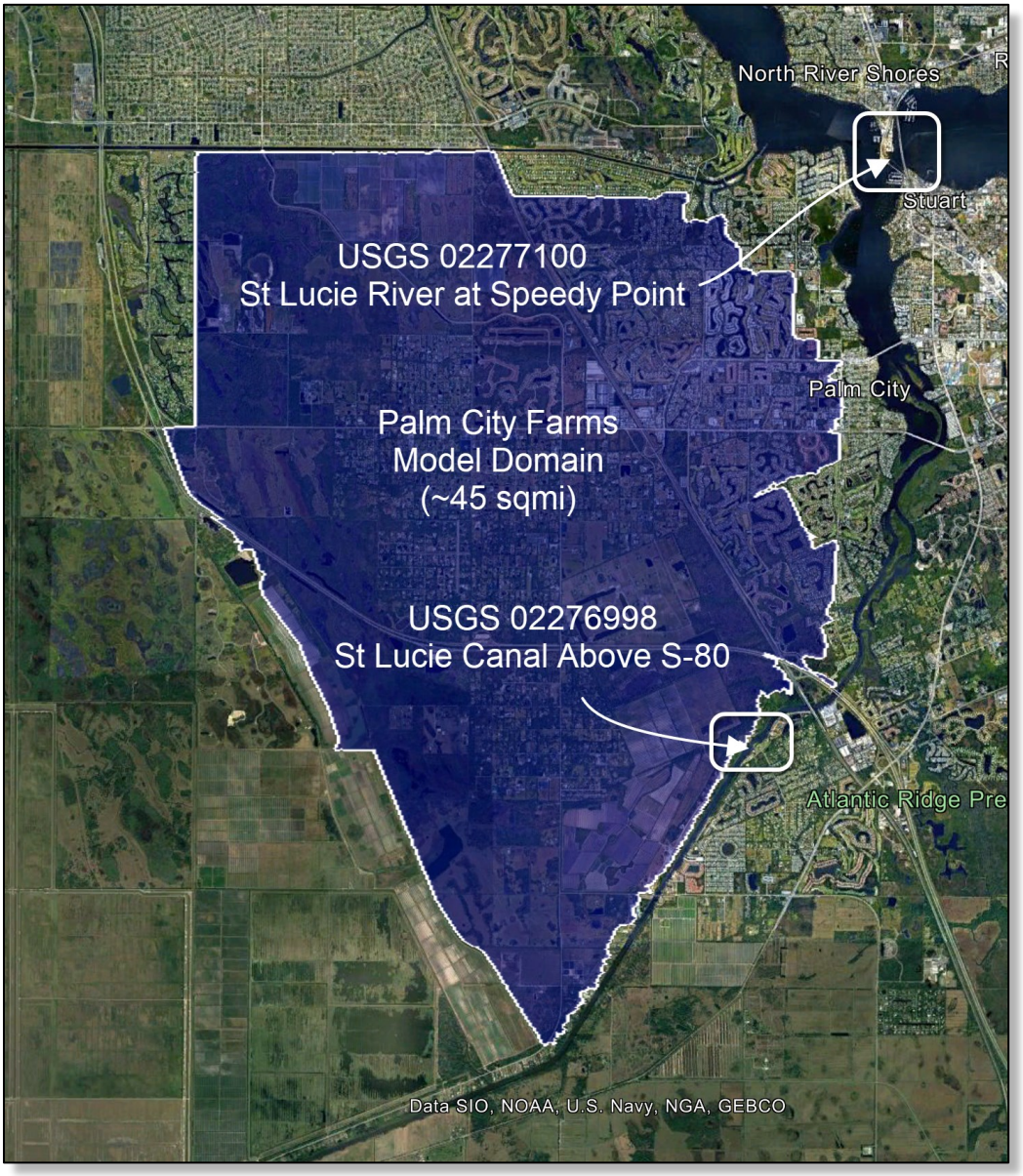

Figure 1. Palm City Farms Model Domain.

BACKGROUND

Streamline Technologies, Inc. (SLT), a member of the SAI Team, has developed a real-time flood forecasting system powered by ICPR. It automatically retrieves near real-time and forecasted rainfall and evapotranspiration data produced by the National Water Model (NWM) on a 1-km^2 grid. Two (2) simulations are performed by the RTFF each day. A near real-time simulation is updated every hour based on the NWM forcing data. The real-time simulation is used to track current water surface elevations and soil moisture conditions. The second simulation currently uses a 10-day medium range forecast that predicts into the future in 1-hour increments. Typically, the forecast simulation is limited to 4 to 5 days. This forecast derives its initial conditions from the real-time simulation. Results from both simulations are uploaded to a dashboard system that can be accessed through a web browser from any device (e.g., smart phone, tablet, laptop, desktop) that has internet access.

SCOPE OF SERVICES

The scope of services will generally include the following:

- Task 1 – ICPR RTFF Model Setup
- Task 2 – Flood Risk Points
- Task 3 – Calibration, Verification, & Testing
- Task 4 – Coastal Interface
- Task 5 – Dashboard Training
- Task 6 – Deployment and Maintenance
- Task 7 – Project Management

In order to complete the above general elements, the CONSULTANT shall conduct the following tasks:

TASK 1: ICPR RTFF Model Setup

The Palm City Farms watershed is shown in **Figure 1** and encompasses approximately 45 mi^2 in Martin County. The ICPR4 model for Palm City Farms was recently developed by SAI and is considered current. This model will become the basis for the RTFF system. It will require adjustments to make it “forecastable”. This will include development of an impervious percentages lookup table, preparation of a soils map layer, development of a Green-Ampt lookup table, development/modification of a NEXRAD grid map layer, development of a National Water Model (NWM) grid map layer, development of a crop coefficient map layer, preparation, importing and pyramiding aerial imagery.

TASK 2: Flood Risk Points

A flood risk point is a specific location within the model domain (e.g., roadway intersections, low points on roadways, buildings, critical infrastructure). Flood warning and flood alert elevations are specified for each flood risk point. If water surface elevations exceed either the warning elevation or the alert elevation, orange and red points are displayed in the dashboard system, respectively, as shown in **Figure 2**. Also, if either the flood warning or flood alert stages are exceeded, a text message can be automatically issued to all phone numbers included in a watch list provided by the County. Flood risk points will be incorporated into the model domain as described in the subtasks below. [SLT Task]

2.1 Develop Flood Risk Polygons: Flood risk polygons are used as part of the flood risk point (FRP) development. Relationships are developed between individual flood risk points within a given flood risk polygon and the hydraulic computational framework. The basin map layer will be the primary source of the flood risk polygons, but modifications will be made depending on the hydraulic network and multiple basin polygons will be aggregated into larger flood risk polygons in some areas. [SLT subtask]

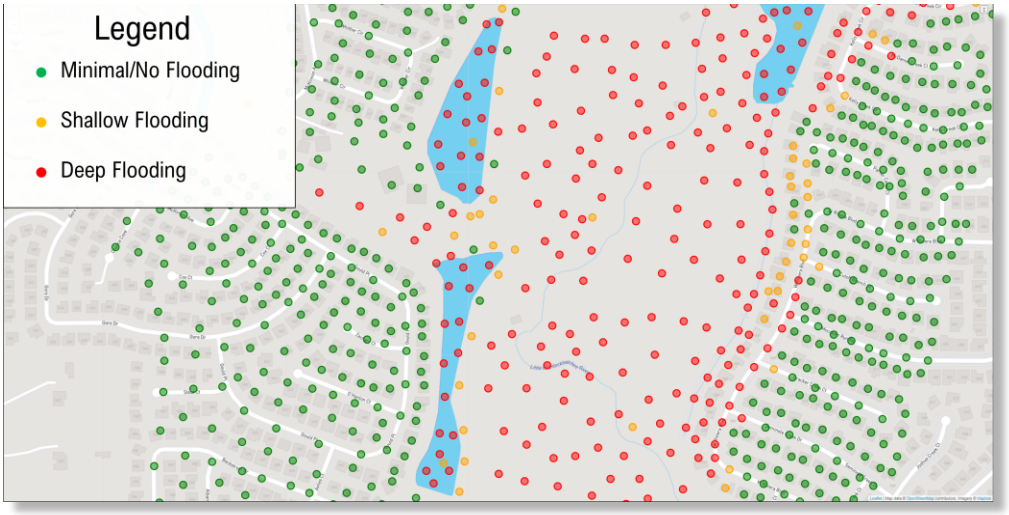

Figure 2. Example of "flood warning" and "flood alert" flags displayed on the RTFF dashboard system.

2.2 Develop Flood Risk Points within Each Flood Risk Polygon: Various flood risk points will be placed within each flood risk polygon. One point will be placed inside each available building footprint provided by the County or obtained from an open data source such as Microsoft Building Footprints. Street addresses will be included for each building point. Surveyed finished floor elevations will be used to set flood warning and flood alert elevations if and where they are available. Otherwise, the highest elevation inside the building footprint from Lidar-based terrain data plus 0.1' will be used as the flood warning elevation and the flood alert elevation will be set to the flood warning elevation plus 1.0 foot. Flood risk points will also be placed along roadways at a spacing no greater than 250 feet, but at least at all roadway intersections. Flood warning elevations will be set to 0.1' above the Lidar-based ground elevation at each roadway point and flood alert elevations will be set 1.0' above the flood warning. Street names plus a unique index will be used for each of these points. Flood risk points can be included at other critical infrastructure such as sanitary lift stations if these locations and descriptions are provided by the County. [SLT subtask]

TASK 3: Calibration, Verification, & Testing

The model will be calibrated using a storm of resent memory based on NEXRAD rainfall data. It will be verified using a second storm. The model will then be tested using the NWM data set. The only calibration/verification parameters to be adjusted during this process will be the Green-Ampt parameters and the Impervious Percentage parameters. [SLT task]

TASK 4: Coastal Interface

To expedite deployment of the Palm City Farms RTFF system, a 2-phase approach is proposed for interfacing with the coast. [SLT task]

4.1 Phase 1, Interim Coastal Interface:

4.1.1 *Live Stream Gauge Data*: USGS 02277100 (St. Lucie River at Speedy Point) and USGS 02276998 (St. Lucie Canal Above S-80) will be used as boundary conditions. Live observed water levels at these two stations will be used in the deployed RTFF system. [SLT subtask]

4.1.2 *Evaluate Other Options*: Other options will be evaluated for a permanent coastal interface including but not limited to use of Renaissance Computing Institute at UNC (RENCI) forecasts, use of NOAA's PSURGE forecasts, and development of a new coastal forecast system. [SLT subtask]

4.2 Phase 2, Implementation of Permanent Coastal Interface: This subtask is not included in this scope of work. Since this subtask depends on the outcome of **Subtask 4.1.2**, a fee cannot be provided until **Subtask 4.1.2** is completed. [SLT subtask]

TASK 5: Dashboard Training

SLT will provide basic virtual training to City staff on the dashboard system. Access to the dashboard will be password protected and limited to City staff. [SLT and SAI task]

TASK 6: Project Management

This task includes coordination with the COUNTY, internal coordination with the project team, and administration of the project. [SAI task]

TASK 7: Deployment & Maintenance

The ICPR RTFF system will be deployed on an SLT server for a period of three years. This task includes all license fees associated with the RTFF system, computational costs, and normal O&M associated with operating system and hardware updates such as restarting simulations due to routine computer maintenance and downtime. [SLT task]

DELIVERABLES:

- Deployment of the dashboard.
- Training of County staff.

SCHEDULE

Tasks 1, 2, 3, and 4.1.1 will be completed within ten (10) weeks of receiving notice to proceed. The deployment of the RTFF system will take place immediately following completion of these tasks and will continue for three (3) years following the initial deployment. **Subtask 4.1.2** will be completed within fourteen (14) weeks of receiving a notice to proceed. **Task 5** will take place at a time convenient with County staff soon after the system is deployed. Subsequent years of deployment (beyond year 3) will require written authorization.

LIMITATIONS

The scope of work described in this proposal relies on the watershed model “as is” with the exceptions noted in Task 1. Verifying the accuracy of the underlying drainage infrastructure data, including channel cross sections and structure operations, is not included. Real-time flood forecasting is an inexact science, and the Streamline RTFF system relies on forecasted rainfall and other meteorological data produced by the National Water Center and the National Water Model.

COMPENSATION

The compensation to be paid to SAI for providing the services described in the above scope of work shall be on a “Fixed Fee” basis. A detailed breakdown of SAI’s estimated professional fee (including man-hours and rates) is included as **Table 1**. The Consultant will submit invoices to the County’s Project Manager for work performed during each calendar month showing the current month’s percent complete on each task. Invoicing will be accompanied by a brief description of the work effort completed during the billing period. Annual fees for deployment of the system will be billed at the beginning of each year for the three-year period.

Task		Professional Engineer IV	Professional Engineer III	Professional Engineer II	Eng. Intern / Scientist IV	CAD/GIS Technician III	Man Hours By Activity	Cost By Activity
	Hourly Rate:	$212.00	$171.00	$147.00	$134.00	$116.00		
1	ICPR RTFF Model Setup	10.50	0.00	55.00	88.00	76.00	229.50	$ 30,919.00
2	Flood Risk Points	64.00	0.00	202.00	0.00	0.00	266.00	$ 43,262.00
3	Calibration, Verification, & Testing	36.00	0.00	148.00	0.00	0.00	184.00	$ 29,388.00
4	Coastal Interface	84.00	111.00	0.00	0.00	0.00	195.00	$ 36,789.00
5	Dashboard Training	18.00	0.00	0.00	0.00	0.00	18.00	$ 3,816.00
6	Project Management	28.00	0.00	0.00	0.00	0.00	28.00	$ 5,936.00
7	Deployment & Maintenance	2.00	0.00	0.00	0.00	0.00	2.00	$ 424.00
Total Estimated Labor		242.50	111.00	405.00	88.00	76.00	922.50	**$ 150,534.00**
(3) 1-Year Deployment & Maintenance						3.00	$ 20,000.00	$ 60,000.00
Total Other Direct Costs								**$ 60,000.00**
					TOTAL FEE COMPUTATION			**$ 210,534.00**

Table 1. SAI Fee Quotation - Real-Time Flood Forecasting System for the Palms City Farms Watershed in Martin County.