

April 06, 2020

Job No. 2020-0020

Mel E. Montagne
President
Fair Insurance Rates in Monroe (FIRM)
422 Fleming St
Key West, FL 33040
Phone 305-294-3476

Sent Via Email : Mel.Montagne@ioausa.com

cc: Scott Fraser, Floodplain Administrator, City of Key West

Re: FEMA Review and Support – City of Key West, FL

Mr. Montagne,

The Woods Hole Group is pleased to provide you with the following proposal for technical review and appeal services related to the new Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) being developed for Monroe County and the City of Key West.

As you are aware, Woods Hole Group is currently supporting Monroe County in reviewing the coastal storm surge and wave height analyses conducted by FEMA as part of the Risk MAP development process. In addition, we are currently reviewing the Preliminary Maps released in December on behalf of the County for all unincorporated areas.

Per your request, we are proposing a similar scope of services for review and support to the City of Key West during FEMA's Risk MAP process that includes the Tasks identified below. Ransom Consulting will be supporting this effort as a Subcontractor to Woods Hole Group.

Task 1: Review and Reanalysis of FEMA Storm Surge Study and Statistical Analysis - A review will be performed of FEMA's storm surge study and the statistical analysis that was performed to develop the 1%- and 0.2%-annual-chance stillwater elevations (SWELs). Based on our reviews conducted to date, it is anticipated the following aspects of the study will be further investigated. These aspects will require reanalysis and/or modeling to assess errors and/or the approach used by FEMA.

Task 1.1 – Review of Statistical Analysis

- a) Uncertainty terms used in the statistical analysis – our team will reevaluate the uncertainty terms used by FEMA in conducting their statistical analysis (to include measurement error and look at spatially variable model validation term). The statistical analysis will then be updated using revised uncertainty terms to assess the effect on the resulting SWELs.



- b) Adjustment and refinement of annual storm rates used in the statistical analysis – our team will reevaluate the storm rates defined by FEMA and used in conducting the statistical analysis. The storm rates will be spatially varied and calculated for a set of points running along the Florida Keys shoreline. The statistical analysis will then be updated using revised storm rates to assess the effect on the resulting SWELs.
- c) Storm parameter distributions for the Florida Keys used to define the JPM reference set – our team will reevaluate the storm parameter distributions (and rates) that would be appropriate for Monroe County. The storm parameter distributions will be spatially varied and calculated based on a new reference point established for the Florida Keys shoreline. The revised parameter distributions will be compared with the storm parameter distributions used by FEMA to assess the effect on the resulting SWELs.

Task 1.2 - Review of Storm Surge Model

- a) Storm surge model mesh resolution – our team will update the model resolution in key areas where it appears channels are underrepresented in the ADCIRC+SWAN model. Initial investigations indicate there is insufficient model resolution in a number of areas throughout the Keys. Model simulations will be conducted with the updated mesh resolution to assess the model sensitivity. If model testing shows substantive sensitivity to the increased resolution, model simulations will then be conducted for five (5) validation storms as well as fifteen (15) synthetic tropical storms that had the highest contribution to the 1% SWELs in the Keys.
- b) Storm surge model spatial attributes – our team will update the bottom friction coefficients used in the ADCIRC+SWAN model. Initial investigations indicate there are 1) areas of reef where the bottom friction should be increased, 2) areas within channels where the bottom friction is too high, and 3) areas of high bottom friction which appear to be erroneous and have no documentation/explanation. Model simulations will be conducted with the updated spatial attributes file to assess the model sensitivity. If model testing shows substantive sensitivity to adjusting bottom friction, model simulations will then be conducted for five (5) validation storms as well as fifteen (15) synthetic tropical storms that had the highest contribution to the 1% SWELs in the Keys.
- c) Wave breaking formulation in the wave model – our team will update the wave breaking parameters used in the ADCIRC+SWAN model. Initial investigations indicate that the default wave breaking formulation used in the ADCIRC+SWAN model by FEMA is not the best formulation to capture the breaking processes at reefs. Model simulations will be conducted with the updated wave breaking parameters file to assess the model sensitivity. If model testing shows substantive sensitivity to selected wave model parameters, model simulations will then be conducted for five (5) validation storms as well as fifteen (15) synthetic tropical storms that had the highest contribution to the 1% SWELs in the Keys.

If additional aspects of the study are identified that require further analysis, Woods Hole Group will notify FIRM and the City and provide an additional Scope and Fee for approval to address, as necessary.

This scope was developed with the assumption that a complete restudy of the storm surge analysis (modeling of 392+ storms) is not required, but rather a subset of storms (on the order of 40 with additional storms being simulated for the County) that have the largest contribution the 1%-annual-chance SWELs will be simulated. It is anticipated revised SWELs will be computed (based on the results of items 1 and 2, and possibly 4, 5, and 6) and will be carried through to the overland wave analysis which will be reassessed and a new set of FIRM maps will be developed in Task 3 to support an appeal. Work under Task 1 is proposed on a fixed fee basis.



Task 2: Review and Reanalysis of FEMA Overland Wave Analysis and Mapping - A review will be performed of FEMA’s overland wave modeling including CHAMP database files, engineering analyses for structure failure (if applicable), wave runup, overtopping, PFD and LiMWA delineations, and GIS files and associated flood zone mapping. A report will be prepared describing deficiencies identified (if any) with FEMA’s Risk MAP study. If warranted, the basis for an appeal will be described, and information will be provided on possible map revisions if the deficiencies are corrected through the appeal process. Work under Task 2 is proposed on a fixed fee basis.

Task 3: Appeal Preliminary Coastal Study and FIRMs – At the conclusion of Tasks 1 and 2, Woods Hole Group will provide a recommendation to FIRM and the City on whether to pursue an appeal of the Preliminary FIRMs with FEMA. If there are grounds for an appeal, Woods Hole Group will provide an additional Scope and Fee for the development of draft and final appeal packages. Tasks 1 and 2 will help to define what aspects of the study warrant an appeal, and what will be required in the appeal package.

Task 4: Post Appeal Filing and Testimony – Woods Hole Group and Ransom Consulting scientists and engineers will respond to questions from FEMA on the appeal package and supply supplemental data and analyses as necessary. Work under Task 4 is proposed on a time and materials basis and would only be necessary if FEMA has questions on the appeal, or a need for additional data.

It should also be noted that maps showing changes in flood zone and BFE between the Effective and Preliminary Maps are being produced as part of our contract with Monroe County. These maps will be made available to the City of Key West at no extra cost.

The following Table provides fixed fee (Not To Exceed) and hourly costs for Tasks 1 through 4 described above.

Woods Hole Group Fee Proposal.

Task 1.1: Review of Statistical Analysis	\$44,400
Task 1.2: Review of Storm Surge Model	\$55,000
Task 2: Review and Reanalysis of FEMA Overland Wave Analysis and Mapping	\$18,600
Task 3: Appeal Preliminary Coastal Study and FIRMs	TBD
Task 4: Post Appeal Filing Testimony HOURLY RATE:	\$185/hr

We appreciate the opportunity to work with FIRM on this study. If you have any questions or require additional information, please let me know. I can be reached directly at (508)-495-6259.

Sincerely,

Matt Shultz, PE
Senior Coastal Engineer

Leslie Fields
Senior Coastal Geologist, CFM