

## Open Coast Storm Surge Hydrographs for Florida's Coastline

### A. Problem Statement:

The design flow event for most coastal bridges in Florida is due to hurricane generated storm surge. A number of federal and state agencies (e.g. Florida Department of Environmental Protection (FDEP), U.S. Army Corps of Engineers Waterways Experiment Station (USACOE WES), and National Oceanic and Atmospheric Administration (NOAA) have generated open coast storm surge estimates for return intervals up to 500 years. In some cases estimates of storm surge hydrographs (water elevation versus time) for key return interval events have been reported. The techniques used to make these predictions are all different. Not only are the computer models different between agencies but the methodology used in the extremal analyses are different as well. As a result the predicted values of peak water elevation for a given return interval event (and the associated hydrograph shape) at a specific location can differ significantly. As an example consider the 100 year return interval storm surge predictions made by FDEP and USACOE WES for the open coast at Palm Beach, Florida shown in Figure 1.

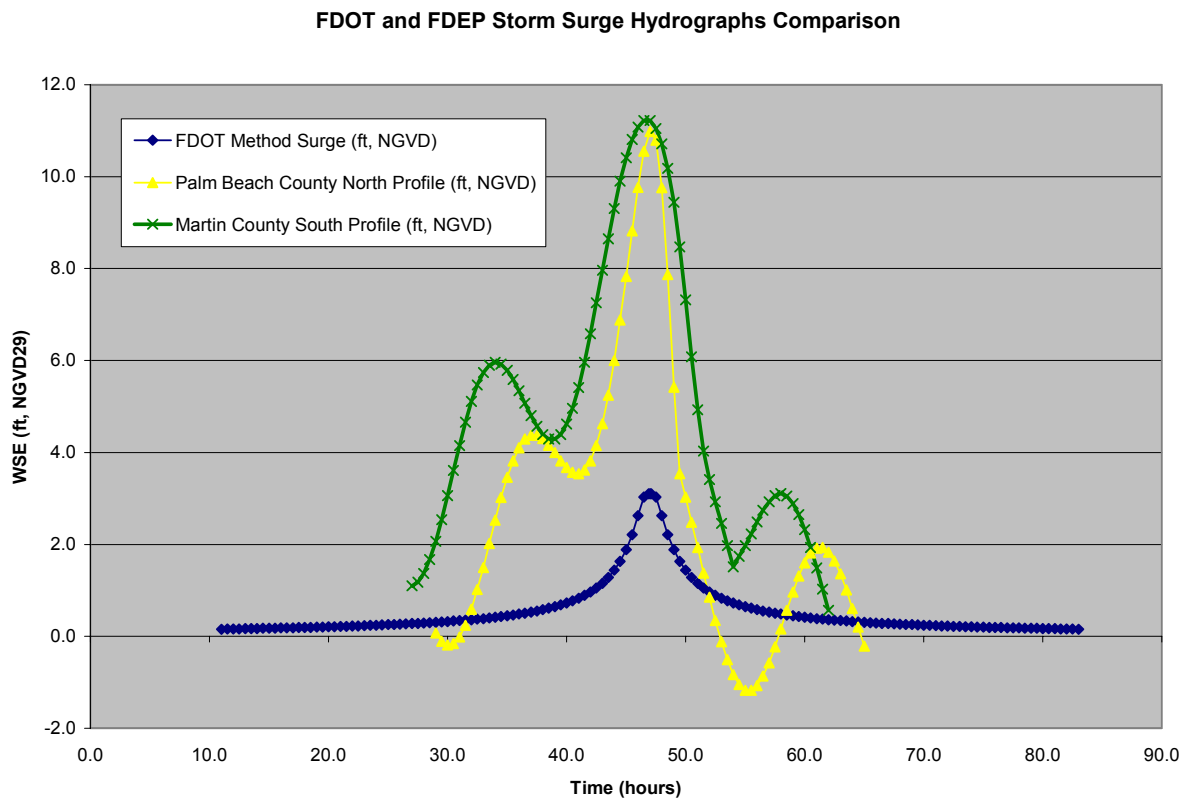


Figure 1. Comparison of storm surge hydrographs published by FDEP and FDOT. The FDOT values were taken from published values by USACOE WES.

The USACOE WES hydrograph does not include the astronomical tide but even if the peak surge and peak tide occur at the same time the maximum value is considerably lower than

that predicted by FDEP. The two FDEP plots are far adjacent sections of the coast, one is for the northern part of Palm Beach, County and one is for the southern part of Martin County. Note that the peak values are approximately the same but the hydrograph shapes are different. This may be correct but it should be examined to determine why there is such a difference.

The USACOE WES values currently being recommended for use by the FDOT for this site seem to be unreasonably low. This could produce erroneous design flow velocities and bridge scour depths.

There is a need to investigate the techniques used by these agencies and make recommendations regarding which results are most correct and thus the ones that should be used by FDOT. Once the recommendations have been reviewed and approved by the FDOT 50, 100 and 500 year return interval storm surge hydrographs for each coastal county will be produced in a report for use by FDOT and its consultants. The work should therefore be performed in two phases: Phase 1 would collect and analyze the data and make recommendations regarding those values deemed to be the most accurate. Phase 2 would follow the review and approval of the recommendations by the FDOT. Hydrographs for 50, 100 and 500 year return intervals for each coastal county will be constructed from the information gathered in Phase 1 and placed in a report that can be published by the FDOT State Drainage Engineers Office.

#### **B. Approach:**

The proposed approach is outlined below:

1. Search out and obtain published information on computer models and methods used to produce storm surge predictions. This will require a literature search, telephone calls, email, web searches, etc.
2. Compile and analyze the information obtained in item 1.
3. Prepare and submit to the FDOT a summary of the strengths and weaknesses of each approach and a recommendation regarding which should be used by the FDOT.
4. Make additions/modifications recommended by the FDOT review.
5. Compile 50, 100 and 500 year return interval storm surge hydrographs for all of Florida's coastal counties. The number of hydrographs per county will depend on the length of county coastline.
6. Submit a report that contains the hydrographs produced in item 5 along with the rationale used to arrive at these values.

#### **C. Similar Efforts:**

To the knowledge of the author there are no similar studies in progress.

#### **D. Risk**

The information needed to conduct this study should be in the public domain since all of the predictions were produced by state and federal agencies. The details of the procedures may be difficult to obtain and will require contacting the right individuals in these organizations. The probability of meeting the objectives of this study is high.

**E. Schedule and Cost Estimate**

Schedule

Task	2002					
	J	F	M	A	M	J
Task 1	x	x				
Task 2	x	x	x			
Task 3			x			
Task 4			x	x		
Task 5				x	x	
Task 6					x	x

Cost

See the attached budget.

**F. Equipment**

There is no equipment requested for this study.

**G. Implementation Plan**

The results of this study can be implemented immediately upon completion and final review by the FDOT.

**H. Other**

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