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### **Review of New FEMA Flood Maps**

Dear Al:

We have completed our peer review of the new provisional FEMA coastal zone flood maps for Falmouth. We have completed two basic tasks. The first task was mapping the current flood map zone elevations to the new LIDAR-based 2-foot contour map of the Town and comparing that with the new provisional zone lines. We provided a series of maps in ArcGIS and digital form to you several weeks ago that does that comparison. The second task was a fairly detailed review of the FEMA wave transects from which the various provisional zone boundaries were determined. We basically remodeled from start to finish all 6 of the wave transects that were used to make the new maps. It is important to note that FEMA did not re-do the original mid-1980's wave transects, so the new wave generation, wave modeling, and wave runup methods covered under the new FEMA coastal zone flood mapping guidelines were **not** applied in Falmouth. We used the new methods to determine what the VE-zone elevations should be if all of the new methods were applied, **and** our newly-calculated wind velocity is used, **and** STWAVE is used to calculate the incident wave height.

The attached detailed report is meant to be used in any appeal the Town may decide to take to FEMA once the new maps are re-posted to the 90-day municipal comment period. The report is technical and will not be understood by many, but this is the kind of technical information and jargon that FEMA requires to be presented where their maps are challenged. In the main text of the report, we have tried to describe the main processes involved in deriving coastal flood elevations under the new FEMA technical guidelines. Although we have tried to make the process descriptions generally understandable to a lay person, there is still much technical discussion there that will not be understood by all. This is a very technically demanding process with a lot of different procedures that must be followed in a certain order and in the end there is still an element of professional judgment where two equally qualified professionals may differ.

One of the main differences in our approach over FEMA's is the use of a 3-D wave model STWAVE3 to derive the incident wave at the start of each wave transect. All of Falmouth's transects are governed by fetch-limited wind-generated waves created within Casco Bay. FEMA uses a program to estimate wave height based on a weighted fetch distance, but they originally used 71 mph as the one-hour duration, 1% annual chance wind velocity. As part of our work for the City of Portland, we did a detailed statistical analysis of wind data from the area and derived 52.3 mph as the wind to use in the calculations.

Besides the differences in incident wave heights to the start of the FEMA wave transects, there are many other details that result in some differences between our results and those of FEMA. The key differences between FEMA's results and ours are presented in Table 2 and Figure 1. You should note that we find that if the new FEMA methodologies are applied with our wind velocities and the use of STWAVE to estimate incident wave heights, we find FEMA's new provisional V-zone maps will be **lower** by 1 to 5 feet (depending on the transect) from where they should be. This is due primarily to the fact that FEMA did not update the old transect calculations from the mid-1980's. This could mean that some properties that should be covered by flood insurance may not in fact obtain that insurance due to a belief that they are outside of the 100-year flood zone.

Finally, we note that the Falmouth shoreline is variable from point to point. Although any given wave transect may be relatively representative of the incoming wave height for that area, the high variability in offshore bathymetry and slope profile above high water in the runup zone will result in greatly different results in the height of the V-zone. Therefore, regardless of whatever final maps are approved by FEMA under these new procedures, there will undoubtedly be many locations in Falmouth where either higher or lower V-zones would be justified if detailed transect analysis were done at those particular locations. FEMA necessarily has to generalize and interpolate between transects, but there will be future opportunities for individual property owners to apply for Letters of Map Revision because of the particular circumstances at their locations.

Let us know if we can be of further help to you in this complicated mapping process.

Sincerely,

SEBAGO TECHNICS, INC.



Robert G. Gerber, P.E. & C.G.  
Vice President, Environmental Engineering

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Enclosure: CD of Complete Report plus some Electronic Files; Hard Copy of Report Text, Tables, Figure, and Appendices