

# Florida Public Hurricane Loss Model (FPHLM) Development Process for Model Changes for FPHLM V6.1 to become FPHLM V6.2

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This document describes the development process related to each model change identified in Standard G-1, Disclosure 5. The development process followed the process described in Standard G-1, C, Figure 1.

## **1. Changes in the low-rise commercial residential model (LR-CR) of the Engineering Component**

### **1.1. Calculation of Soffit Areas of Hip and Gable Roof Buildings**

### **1.2. Correction in the Handling of WDR2**

### **1.3. Removal of Rain Sampling Bounds**

#### *Development process*

The engineering team reviewed the source code for the generation of commercial residential low-rise vulnerabilities, and identified possible areas of improvements.

After internal discussion, the engineering team identified the proposed modifications. Dr. Pinelli had phone and face-to-face conversations with Dr. Hamid to inform him of the intended modifications.

After verbal approval from Dr. Hamid, the group proceeded with implementing the modifications in the code. A graduate student preformed the work under the supervision of Dr. Pinelli. Both the programmer and Dr. Pinelli were in constant communication via face-to-face meetings and via emails, to ensure that the modifications were consistent with current FPHLM documentation, technical papers, and slides, and to ensure that the programming student understood the requirements.

The graduate student implemented the modifications with appropriate comments throughout the program. The programmer performed the work within SVN to keep track of the different versions.

Extensive testing was done through visual inspection of the resulting vulnerabilities and comparisons against the V6.1 vulnerability curves, to ensure that logical relationships were satisfied. A GUI was used to perform these tests.

Once the verification was successful, the new vulnerability curves for V6.2 were released to the computer team.

## **2. Update of the statistics used to weigh the vulnerability matrices**

### **2.1. Update of the statistics used to weigh the low-rise commercial residential vulnerability matrices**

### **2.2. Update of the statistics used to weigh the personal residential vulnerability matrices**

#### *Development process*

In 2014, the engineering team, as part of the larger effort to enhance the FPHLM with surge capabilities, discussed with the actuarial team the necessity of updating the statistical study of the Florida Building code, to incorporate most coastal counties in the survey. The FPHLM team then made a proposal to the Office of Insurance Regulation to fund this study. OIR approved that study and it was one of the contractual tasks listed in the 2015 contract.

No code development was involved in this task, and the development process and survey methodology is described in Michalski (2016)

The engineering team verified the adequacy of the results by visually inspecting the table of county statistics, before they were used to generate a new set of weighted matrices. The team visually inspected the new weighted matrices with GUI's to verify that logical relationships between the curves were satisfied.

A report to OIR summarized the results.

#### *Reference*

Joshua Michalski, "Building Exposure Study in the State of Florida and Application to the Florida Public Hurricane Loss Model," Master Thesis, Civil Engineering Department, Florida Tech, Melbourne, Florida, December, 2016

FPHLM, "Update on Collection and Statistical Analysis of Property Appraiser Databases," submitted to OIR, December 30<sup>th</sup>, 2015.

### **3. Update of the HURDAT database**

The HURDAT2 database was downloaded directly from the official National Hurricane Center (NHC) website. The data set is a simple comma-separated text file. Standard Unix/Linux tools were used to examine and check the contents of the data. The “diff” tool was used to identify differences between the updated HURDAT2 and the version used for the previous submission. The changes were compared to documented revisions posted by NHC. Tools such as “awk”, “sort” and “grep” were used to examine extreme values in the data set and identify possible erroneous values.

The data set was converted to a GIS format and displayed using GIS software, such as “qgis”. The data was displayed with Florida ZIP code and U.S. county layers. In addition, the data from the previously used version of HURDAT2 was also displayed and the differences were examined.

### **4. Update of ZIP Code database and the centroid locations**

The updated ZIP Code data was obtained from a commercial vendor (Pitney Bowes, Inc.). The vendor provides the data in a GIS format. The ZIP Code data was checked by displaying the data in GIS software such as “qgis”. The data was displayed simultaneously with the ZIP Code data used in the previously accepted version of the FPHLM model and differences were examined.

The centroids and population weighted roughness derived from the updated ZIP Code data were compared with those used in the previously accepted version of the FPHLM model. The differences were compared with the corresponding changes in the ZIP Code boundaries or geometry. Any additions or deletions of ZIP Codes were identified.