

## EXECUTIVE SUMMARY

A Home Structure Rating System (HSRS) has been developed to provide an objective measure of the relative ability of a Florida home to withstand wind effects from sustained severe tropical windstorms and hurricanes. This rating system is based on an inspection procedure that uses readily verifiable (visual) methods to determine the building's construction and wind mitigation features.

The rating system produces a score between 1 and 100, with 1 being the score for a very weak structure and 100 the score for a very strong, code-plus structure. The system was designed to allow room in the top portion of the scale for building code improvements over time and for implementation of code-plus mitigation techniques. The scale produces the greatest relative change in score for code and code-plus construction.

**Objective Measures.** The system includes the following measures to determine the score:

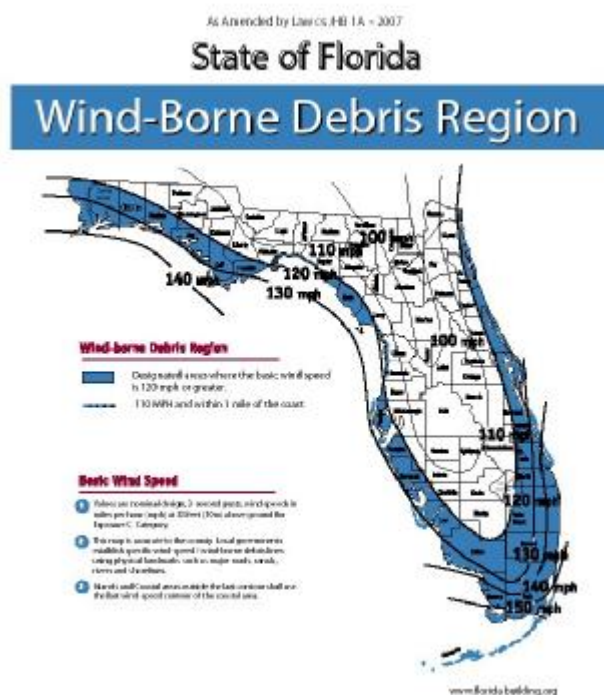
1. A set of basic construction and wind damage mitigation features;
2. The home's location in Florida, as determined by its Florida Building Code wind zone location;
3. A set of wind resistive features relative to a Florida Building Code (2001 version, adopted 3-1-2002) home, built in that specific wind zone location; and
4. A simplified terrain exposure of the home, which considers coastal locations (Terrain C) and inland suburban locations (Terrain B).

The score within each of Florida's "wind zones" is based on eight primary and eleven secondary inputs from these four groups of measures. The score does not reflect structures that may be attached to the home, such as screen enclosures or carports.

**Score Interpretation.** The HSRS score is founded in loss cost relativities. It measures the home's relative ability to withstand hurricane wind effects as an integrated structural system, including: roof covering, roof shape, roof deck, roof-to-wall, wall, wall-to-foundation, openings, and other components. A weakness in one or more of these building envelope components has a measurable effect on the score.

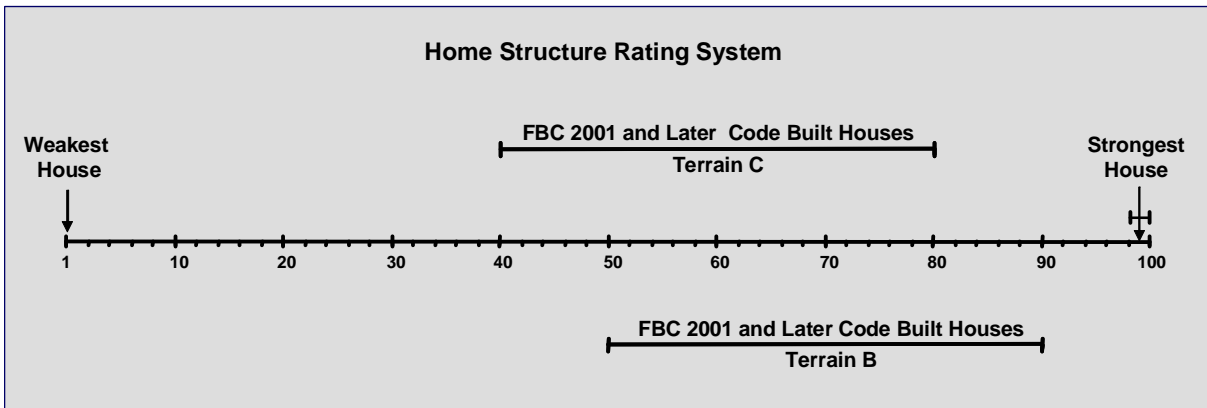
The HSRS was designed to be interpreted in a reasonably consistent manner throughout the State:

1. Within each of the wind zones in the State, the score for a FBC 2001 (and later) code-built home lies within a scoring range of 40 to 90.
2. FBC 2001 and later code construction with one or more code-plus improvements will always produce a score within or greater than the design range.
3. Effective loss mitigation improvements to a house, from among the 19 primary and secondary features, always produce higher scores.



4. A house in a Terrain B wind zone location scores higher than the same house in a Terrain C location within the same wind zone.

The range of score for FBC 2001 and later code-built homes is illustrated in the following figure.



Hence, a house with a score of 50 can be interpreted consistently, regardless of the wind zone location. In more severe wind zones (such as 120 mph and above), a house will need to have stronger construction features to achieve a good score than the same house in a milder wind zone (such as 100 mph).

The HSRS rating is not intended to be used or interpreted as a simplified stand-alone insurance rating measure. The HSRS scale was developed using loss relativities with a nonlinear risk-averse scoring function to promote wind mitigation of homes. While insurance rate differentials are determined from the same home inspection information as the HSRS rating, the determination of insurance rate differentials for wind mitigation features is more complicated than can be represented by a two-digit score. As the HSRS and insurance rate differentials further evolve, and as long as the HSRS is founded in loss cost relativities, the rating score and insurance rate differentials should be reasonably correlated.

**Testing.** The developed HSRS has been tested and statistically compared to the Hurricane Resistance Rating (HRR) used in the My Safe Florida Home pilot program. The HSRS scores are generally lower than the HRR scores, but result in a higher range of scores for code and code-plus construction. The testing confirms that the HSRS scores are performing in a reasonable manner and provide a consistent range of scores across wind zones, based on the home's construction and wind damage mitigation features. The HSRS scores increase monotonically with increasing mitigation of a house.

**Limitations.** While this initial HSRS has many desirable features, it also has many limitations. It is based largely on research done in the 2001-2002 period for single-family, site-built houses. The current HSRS rating system should not be applied to manufactured housing or multifamily structures. While the methodology is based on significant prior research, the relative scores are limited by our basic knowledge, estimation methods, and numerous uncertainties. Care must be taken to ensure that the score is interpreted as a relative, best-estimate measure that is subject to further refinement and improvement. Much additional data exists now to improve the estimation of building performance and to validate the relative differences in construction and damage mitigation features, including new-code construction. The HSRS scale will need to evolve with improved methodologies and recognize further improvements in the building code. The ratings of homes will therefore need periodic updating to best reflect the structure's ability to withstand hurricane wind effects. A rough guess on the accuracy of a house's relative position on the HSRS scale is about  $\pm 10$  points.