Post-2004 Hurricane Field Survey of Residential Building Performance

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Project motivation: The documentation and analysis of damage caused by land falling hurricanes contribute to preparedness, mitigation, building codes/standards, and policy making. Following the 2004 hurricane season, a detailed investigation of wind damage to site-built single-family structures was conducted in Florida. The Florida Building Commission initiated this study to provide a quantitative comparison of the performance of homes built post-Andrew between 1994 and 2001 with those built after the 2001 Florida Building Code (FBC) replaced the Standard Building Code (SBC).

Project scope and results: The evaluation was conducted through a survey of homes built between 1994 and 2004 in the Florida counties that experienced the highest wind speeds from the 2004 storms. Homes were randomly selected and surveyed in these regions to define correlations between damage and age, referenced to maximum wind speed. Investigators included faculty and students from the University of Florida, Florida A&M University, Florida International University and staff at the Institute for Business & Home Safety. A summary of successes in terms of performance and mitigation include:

- The structural integrity (walls, roof sheathing) of post 1994 construction was maintained in all survey subjects (highest wind gusts of up to 150 mph)
- FBC approved shingle roofs performed very well relative to pre FBC roof cover
- No pressure failures were observed for wind rated garage doors
- The use of window protection is a very effective mitigation, reducing the probability of window damage by at least a factor of 2.5 relative to unprotected windows

A summary of outstanding issues includes:

- The tile roof cover attachment requirement should be addressed. Fenestration and facade damage from windborne roof tile debris was abundant
- Water penetration was an issue in both SBC and FBC construction. Common entry points were windows (including unbroken), soffits, ridge vents, and exposed roof sheathing
- Soffit failure was significant in FBC construction, leading to water intrusion
- The integrity of double entry doors is suspect in high winds

Summary Outcome: The performance of homes built to the FBC showed improvements over those built to the SBC. For some component aging vs. code change was difficult to delineate.

The complete study has been documented in the following peer reviewed journal publication: