Gascon, Jaime (RER)

From: Arindam Chowdhury <chowdhur@fiu.edu>
Sent: Thursday, July 10, 2014 6:06 PM
To: Gascon, Jaime (RER)
Cc: Peter Irwin (peter.irwin@rwdi.com); Carolyn Robertson; Richard Olson
Subject: Three research areas

Hi Jaime:

Thank you very much for your time today. It was a very useful discussion about what research topics can be presented to the FBC technical advisory committee (TAC).
We appreciate your willingness to convey (at Monday's TAC meeting) FIU's intension to help the FBC with wind related research projects using the state funding we received.

Topic 1: Dynamic Effects of Wind Loading on Photovoltaic Systems

Reliable wind loading information on Photovoltaic (PV) systems is essential for the large scale deployment of solar technologies in North America. This research will investigate the importance of the dynamic response of PV systems to wind excitation. Preliminary research at FIU has shown the importance of dynamic effects of small structures such as PV systems which can lead to dynamic amplification of wind loading and failures due to fatigue. The commonly used 1 Hz criteria as an indicator of the dynamic sensitivity, while useful for larger structures, is not such a useful guideline for smaller structures such as PV systems. For this project, we will develop more realistic criteria for wind induced vibration of roof mounted PV systems including those installed on non-structural roofs using c-clips.

Topic 2: Wind Effects on Standing Seam Metal Roofs

Current testing methods for standing seam metal roofs are based on uniform pressures applied to roof samples. Preliminary testing has shown that the current testing can possibly set higher minimum design requirements than necessary in some cases and in others it could underestimate effects of very localized peak pressures. The shape and spacing of standing seams have been found, through recent research at FIU, to significantly affect the wind pressures on the roof. Wind induced vibrations were also observed. The proposed project will expand upon the initial research to compare WOW test results with those of the ASTM/UL test methodology. Further investigation of aerodynamic effects of standing seam will be undertaken. Recommendations will be developed for improved deflection and loading criteria.

Topic 3: Wind Effects on Shingle Roofs

The overarching goal of the project is to develop a 'holistic' testing procedure for shingle roofs which goes beyond the current test protocols that do not fully capture the realistic effects of hurricane wind. The new 'code plus' testing protocol will be used to systematically compare results with those obtained from current testing methods (such as in ASTM, TAS, etc.). FIU has already done such testing for tiled roofs to evaluate performance of prescriptive attachment techniques for ridge and hip tiles. Similar test protocol will be used for shingled roofs. The shingles will be cured based on current guidelines (using a conditioning chamber). Effects of wind directions will be tested, including diagonal winds that generate conical vortices. Based on the results, recommendations will be provided to modify and improve ASTM and TAS test methods. We will also investigate the application of shingles to roofs with mean roof height higher than 33 ft.