Appendix 7 – Proposed future research for Florida Building Commission funding consideration

The fenestration industry supports objective research that allows the Florida Building Commission to make data-driven decisions that will benefit the residents of Florida. The Florida Fenestration Work Group was formed to aid the Commission in making these decisions.

The scope of work for the Work Group is:

- Evaluate the Florida Building Code "the Code" requirements relating to design and testing of exterior envelope and fenestration and determine:
    - Whether the Code requirements should be modified to provide better resistance to water intrusion during high wind events, and/or…
    - Whether installation/maintenance of fenestration as well as the installation of the building envelope in general is suspect and should be better defined and more effectively monitored.
- Formulate a proposed code change language/recommendation for addressing water leakage due to wind-driven rain.

To help fulfill this Work Group's scope, the fenestration industry proposes a two-step research project.

Part one: post-storm survey and analysis of building envelope systems

After the next major storm, researchers would physically survey mid-rise and high-rise buildings in the path of the storm.

Buildings will be classified in two primary categories:

- Buildings with reported water penetration during the storm.
- Buildings without reported water penetration during the storm.

Surveying buildings from both categories close to each other would be ideal for this study since they likely would experience the same storm conditions.

The construction/makeup of the building envelope of these buildings will then be analyzed and documented using investigative methods in AAMA 511 and ASTM E2128.

Features of the analysis should include:

- **Architectural and Structural Drawings**
    - Acquire architectural drawings that show how each building envelope component was intended to be constructed and fastened, including — at a minimum — a dimensioned installation drawing of the fenestration product(s) and associated flashings.
- **Product Specifications**
    - Obtain a copy of fenestration specifications and surrounding condition specifications.
    - Verify that the fenestration products installed were rated to meet or exceed the design pressure requirements of the building.
- **Test and Inspection Reports**
    - Obtain and review any prior test, investigative or inspection reports (for example, AAMA 502 and AAMA 503.)
- **Fenestration Assembly Shop Drawings**
    - Obtain a copy of elevation drawings, dimensioned sections, profiles, and material descriptions/properties of fenestration assemblies.

- **Interview Building Staff**
    - Interview knowledgeable personnel (i.e. anyone with credible information relating to the project performance) to obtain an account of the reported leaks, including the location, durations, time of leak with respect to precipitation events, start and stop times, and volume of each leak, any photos and/or security video which may be available from during storm conditions, etc. Additionally, acquire information about the direction and magnitude of the wind during leak events and the repair history of the interior and exterior wall components (including fenestration products) at, and adjacent to, all leak locations during this interview. The number of occurrences of water penetration over a specific time period is critical information that will determine the test pressures used in this guideline.
- **Interior and Exterior Observations**
    - Perform detailed observations of interior and exterior wall surfaces at, and adjacent to leak locations. Staining on building surfaces may be indicators of areas for further investigation. Certain construction details (i.e. expansion joint, flashing/coping joints, penetration of the building envelope) are areas which shall be considered in the forensic investigation.
    - *For buildings that had reported water penetration*, the collection of data during this phase shall include the identification of workmanship deficiencies and ascertain whether or not the architectural, structural and fenestration product shop drawings match the as-built conditions. If these drawings do not match the as-built conditions, alterations (which may be destructive) to the material surrounding the product or installation being evaluated are most likely needed to create accurate drawings of the installed assemblies, and to understand the performance characteristics of the wall system.
    - Additionally, it is necessary to collect information about environmental exposures (elevation, orientation, adjacent structures, awnings, etc.) of all specimens scheduled for testing. This information, in conjunction with climatic data and information about leak history, will enable the forensic investigator(s) to calculate approximate wind pressures during the reported water penetration.

After data collection is completed, the features of the building envelopes should be compared and contrasted to identify any emerging trends. This analysis will identify features of the envelope that performed well, features that did not perform, and features that require further investigation.

Part Two: Forensic Testing

The second stage of the project will involve testing using the investigative techniques found in AAMA 511. Ideally, this testing will be performed on buildings where water leakage identified in part one of this study was reported. This will require the cooperation of the building owners/managers and may be disruptive to occupants.

- If it is not possible to conduct testing on occupied buildings, then a series of mockups could be created to replicate building envelopes that reported water penetration.
- Testing should focus on features of the building envelope identified in part one that require further investigation and identifying the actual source of water penetration.
- Results of this study could be submitted to the Florida Fenestration Water Resistance Work Group to help them fulfill their mandated scope. Study results could also be submitted to the Florida Hurricane Research Advisory Committee (HRAC) to help fulfill their role as well.