

NSF I/UCRC Wind Hazard and Infrastructure Performance (WHIP) Center

Center Director's Report

February 1, 2023 – January 31, 2024 (Year 5)

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Introduction

The WHIP Center was established on February 1, 2019. It is completing its fifth year. It is a collaborative Center between the two institutions, Texas Tech University and Florida International University. Florida Institute of Technology is an affiliate institute with Texas Tech.

Out of seven companies that were members of the Center during the fourth year one of them, GAF, informed us in May 2023, after the annual meeting that they had change in the company administration and will discontinue the membership in the Center. We had an hour long zoom conversation with GAF representatives to ascertain the reason for leaving WHIP Center. During the call they were informed of the requirement that the Center should get 90 days' notice of termination. As a result, the official termination date was August 30, 2023 and the company paid fees for one-half of the year. GAF actively participated in the WHIP Workshop that was held on October 27, 2023. The termination of GAF is not based on the research results that WHIP Center had provided.

During the fifth-year membership included:

- Berkshire Hathaway – Specialty Insurance, Boston, MA
- GAF Materials, Parsippany, NJ
- Enstall, Greenwich, CT
- National Institute of Standards and Technology, Gaithersburg, MD
- StateFarm – Insurance, Bloomington, IL
- USAA – Insurance, San Antonio, TX
- VERISK (previously AIR) – Boston, MA

The three academic institutions (including one affiliate) and seven companies have worked together to pursue industry selected research projects. Of the seven memberships, three represent insurance industry, one is risk management company, one is roofing material company, one is solar installation company, and one is federal agency which is in charge of the federally mandated National Windstorm Impact Reduction Program (NWIRP).

Florida International University has the Wall of Wind (WOW) experimental facility that can test building and components from model to full scale at wind speeds up to 150 mph. This facility is also a part of the NSF funded NHERI Infrastructure nationally shared facility. Several projects of WHIP Center have used this facility effectively.

Texas Tech University has conducted wind engineering experimental and analytical research on effects of wind on low buildings since 1970. The research facilities at Texas Tech include VorTECH (simulating tornado), 200-m tower for atmospheric measurement, Stick-net for spatial wind measurement in hurricane, Doppler radars, and debris impact facility. VorTECH is used for a WHIP Center project in Year 5.

The Florida Institute of Technology has Wireless Sensor Network for field monitoring of building pressures induced by hurricane winds, Portable Lidar, and Hurricane Risk modeling system. Some of these facilities obtained field data in Hurricane Ian that impacted Florida in 2022.

The six projects of Year 4 are completed, and the final reports are archived in the log-in page of the WHIP website www.whipc.org.

Center Operation in the Current Year (Year 5)

The Year 5 annual meeting held on March 30 – 31, 2023, was hosted in-person by Florida International University in Coral Gables, FL. The attendance at the meeting included representatives of IAB members, three academic institutions, and a guest from Texas Windstorm Insurance Association. The faculty presented 12 proposals for research of which IAB selected five proposals to pursue research during the year. There were also presentations by Eric Haeli of StateFarm titled *Equation for Success*, by David Williams of TWIA on *Texas Wind Damage Model*, and by Ioannis Zisis of FIU on *Summary of IUCRC Program*. The minutes of the meeting are on the WHIPC website, https://whipc.org/wp-content/uploads/Minutes_of_Annual_Mtg_Final.pdf

Mid-annual meeting was held on October 27, 2023, in-person at the corporate offices of VERISK in Boston, MA (hosted by one of the member company). The meeting was attended by 11 IAB members, 11 persons from the three institutions, and 10 guests from companies. Progress reports on the projects were presented and discussed. No significant change in the scope of projects for year 5 was proposed. In the Executive Session the IAB members suggested to have PI and mentors of each project interact on zoom on a regular basis instead of having zoom meetings for the entire group.

A 90-minute zoom meeting was held on May 11, 2023, for the project to discuss progress on the projects of Year 4 and plans for projects of Year 5.

Annual IAB Meeting on March 30-31, 2023

This meeting was attended by a total of 32 individuals in-person and remotely consisting of IAB members, faculty and students from the three institutions, WHIP coordinator, 2 representing NSF, several guests.

The meeting agenda included progress reports on the projects of Year 4 since the end dates of these projects were extended. In addition, 12 proposals for consideration in Year 5 were presented. The proposals were sent to the IAB members two weeks in advance of the meeting.

The IAB in its executive session on the second day selected 5 research projects for pursuit in Year 5. The IAB members volunteered to act as mentors for the projects of their choice. The projects with PIs and Mentors for the Year 5 are:

Approved projects for year 5 for WHIP Center

Number	PI/Co-PI (Institution)	Title	Mentors
WHIP2023-01	Zuo (TTU)	Evaluation of Tornado-Like Loading on Buildings of Various Shapes and Geometries	Tim Johnson, Marc Levitan, Tim Doggett, Dan Rhee
WHIP2023-02	Smith (TTU)	Prediction of wind and surge damage to buildings by hurricane	Eric Haefli, Tim Doggett, Karthik Ramanathan, Tim Johnson, Marc Levitan
WHIP2023-03	Chowdhury/Zisis (FIU)	Ballasted PV system load sharing and effective wind area (EWA)	Yann Schwarz, Tanya Brown-G., Sarah Bobby
WHIP2023-04	Pinelli (FIT)	EXPLORATORY Risk vulnerability model for components of refinery plants or industrial facilities	Karthik Ramanathan, Tim Doggett, Marc Levitan
WHIP2023-05	Elawady (FIU) Pinelli (FIT)	Empirical vulnerability model to assess impact of windborne tree debris on low-rise construction	Tim Johnson, Abby Scott, Chris Kang, Tanya Brown-Giammanco, Daan Rhee, Daniel Diaz

Other item discussed during the meeting was Phase 2 (years 6 through 10) for the Center. Erica Sherman of GAF Roofing became the Chair of IAB. However, in August 2023 GAF Roofing terminated their membership making Marc Levitan from NIST to be the Chair of IAB for the rest of the year. Denis Gray, NSF appointed evaluator provided comments on pursuit of Phase 2.

Promotional Effort

Promotional efforts during the year included a Workshop on October 27, 2023 (in conjunction with the Mid-annual meeting) and offering of the webinars on the completed research projects.

Workshop

A 2.5 -hour workshop was offered on October 27, 2023 at the corporate offices of VERISK in Boston, MA. The workshop was open to individuals from close to 120 companies in WHIP mailing list. It was available in-person as well as online.

The purpose of the workshop was to present value of the WHIP Center and why it should continue through Phase 2 (another five years) and beyond. The most important component of the workshop was to illustrate the benefits of the Center through examples of research results useful to member companies. This illustration logically led to discussion on growth of the Center with expanded research portfolio and membership. Items covered in the workshop were:

- Brief history of the Center

- Partnership of industry, academia, and the government
- Operation of the Center
- Examples of translating research into practice (five project results with comments by IAB members on how they have used the results)
- Benefits to member companies, the universities, the government, and the society
- Returns on the investment of fees

The workshop was attended by close to 20 guests (in-person and online) in addition to IAB members, faculty and students. It was a very successful endeavor with 4 companies indicating strong interest in joining the WHIP Center in Phase 2.

Webinars

A series of webinars were presented during the year on completed projects. The webinars were free to the attendees and were widely advertised. The dates, title, and attendance are as follows:

- February 2, 2023: Tornado loading by Delong Zuo; 171 Participants
- May 25, 2023: Wind and rain vulnerability by Jean-Paul Pinelli; 126 Participants
- September 21, 2023: Performance of curtain wall by Amal Elawady and S J Lee; 76 Participants
- October 12, 2023: Wind and surge damage by Doug Smith; 67 Participants
- November 16, 2023: Irregular shaped building loads by Ioannis Zisis; 77 Participants

The attendees included from many countries including Australia, Brazil, Canada, Czech Republic, China, Egypt, France, Germany, Ghana, Iceland, India, Iraq, Italy, Japan, Kuwait, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Puerto Rico, Romania, Singapore, Spain, Switzerland, Taiwan, Trinidad and Tobago, United Kingdom, and United States.

Unanticipated Problem and Solution

On May 30, 2023, we were informed by GAF that they are terminating their membership in the WHIP Center. The reason for termination is restructuring of the GAF Company. The notice of termination was given after the annual meeting of March 2023 where projects were selected and funding for the selected projects were allocated. In addition, it was determined that GAF had not paid fees for Year 5. This termination created a dilemma for the Center on pursuit of projects during Year 5.

Negotiations with GAF was pursued to pointing out that Membership Agreement requires notice of termination to be given 90 days in advance. As such the actual termination took place on August 30, 2023. It was also negotiated that GAF will pay fees for one-half of the year 5, a sum of \$25,000. In agreement with IAB, PI, and Leadership of the Center the scope of the project WHIP2023-04 *Risk vulnerability model for components of refinery plants or industrial facilities* was reduced to *Exploratory*. This change allowed the other projects to continue with full funding as agreed on by IAB at the annual meeting.