

This resume provides information related to Mr. Smith's expertise related to wind performance of roof systems. It supplements his general resume.

Mr. Smith's national and internationally recognized expertise is based on a unique combination of extensive experience with wind-damage investigation and analysis, involvement in academic and applied research, involvement in standards development and preparation of wind design guidelines, experience in designing roof assemblies in high-wind regions, formal education and teaching as discussed below:

### **Damage Investigations and Analysis**

Mr. Smith has performed several hundred detailed roof investigations. These evaluations included all of the low- and steep-slope roof system types commonly used in the U.S. Comprehensive investigations have been performed after the following storms:

- Oklahoma/Kansas Tornadoes, 1999. Member of the Federal Emergency Management Agency (FEMA) Building Performance Assessment Team.
- Hurricane Georges, Puerto Rico, 1998. Member of the Federal Emergency Management Agency (FEMA) Building Performance Assessment Team.
- Typhoon Paka, Guam, 1997. Member of the FEMA Hazard Mitigation Technical Assistance Program team.
- Hurricane Fran, North Carolina, 1996.
- Hurricane Bertha, North Carolina, 1996.
- Hurricane Marilyn, U.S. Virgin Islands (1995). Member of the FEMA Hazard Mitigation Technical Assistance Program team.
- Hurricane Andrew, South Florida, 1992. Member of the Wind Engineering Research Council team.
- Plainfield Tornado, Plainfield, Illinois, 1990.
- Hurricane Hugo, South Carolina, 1989. Member of the Institute for Disaster Research team, Texas Tech University.

A limited number of investigations were performed after Hurricane Bonnie in North Carolina (1998), and several investigations were performed throughout Alaska in the late 1970's and the 1980's.

### **Academic and Applied Research**

- Since 1989, Mr. Smith has served on the Technology Assessment and Advisory Council for the Colorado State University/Texas Tech University Cooperative Program in Wind Engineering. This multi-disciplinary project included fundamental work on wind tunnel boundary layer flow, full scale pressure measurements on a building, investigations of building/wind interaction in the areas on the roof subjected to corner vortices and uplift loads on concrete roof pavers.
- Mr. Smith was instrumental in formulating a consortium to sponsor research on wind resistance of unsealed asphalt shingles at Colorado State University, and he served on the project's steering committee and participated in the wind tunnel studies.
- From 1996 – 1998, Mr. Smith was on a Ph.D. dissertation advisory committee for a graduate student at Clemson University. The dissertation was on the wind uplift behavior of mechanically-attached single-ply roof membrane systems.
- Mr. Smith is a steering committee member of an industry-government consortium that is sponsoring work at the National Research Council of Canada on dynamic uplift testing of mechanically attached single-ply and modified bitumen membrane systems.
- Mr. Smith was instrumental in formulating a consortium to sponsor research on dynamic uplift testing of mechanically attached single-ply membranes at Clemson University, and he served on the project's steering committee.
- Mr. Smith was instrumental in formulating a consortium to sponsor research on wind loads on metal edge flashings and copings at Texas Tech University, and he served on the project's steering committee.
- In 1994 Mr. Smith conducted research on resistance of tile systems to wind-borne debris (missiles) at Texas Tech University. Results were published in a paper in 1994.
- Mr. Smith was on the steering committee of the Roofing Industry Wind Uplift Resistance Workshop, which was an industry-government sponsored event in 1989.

### **Standards Development and Design Guidelines**

- Since 1990, Mr. Smith has served on the American Society of Civil Engineers (ASCE) committee that is responsible for ASCE 7, *Minimum Design Loads for Buildings and Other Structures*. As a member of the subcommittee on Wind Loads, he prepared some of the text that is currently in ASCE 7. His committee involvement has presented an opportunity to understand the basis of design criteria given in ASCE 7 and limitations thereof.
- Mr. Smith was a contributing author to *Buildings at Risk: Wind Design Basics for Practicing Architects*, published by the American Institute of Architects in 1997.

- In 1998, Mr. Smith co-authored two design guidelines published by FEMA and the Government of Guam: *Building to Minimize Typhoon Damage: Design Guidelines for Buildings*, and *Building to Minimize Typhoon Damage: Design Guidelines for Essential Facilities*.
- From 1997 -- 1999, Mr. Smith served on the review committee for the revision of FEMA's *Coastal Construction Manual*, and he has authored the sections related to roof coverings.

### **Design Experience in High-Wind Regions**

Mr. Smith has designed a large number of roofing systems in areas where the design peak-gust wind speed was between 100 and 130 miles per hour. The projects have included the following types of systems: Asphalt shingle, built-up (protected and exposed systems), EPDM (fully adhered, mechanically attached and protected), liquid-applied membrane over plywood, metal (corrugated with exposed fasteners and structural standing seam) and modified bitumen (protected and exposed).

### **Education and Teaching**

Mr. Smith's formal wind-related education occurred in 1989 when he attended a three day seminar on "Engineering for Extreme Winds" at Texas Tech University. However, his informal wind-related education started when he commenced design work on buildings located on Alaska's Aleutian Chain, where winds are very high and frequent. Discussions with roofing contractors, manufacturers and other architects that had previous experience in that hostile environment began the informal education process, which over the years has been augmented by experience with damage investigations, research and standards development activities.

In 1986, Mr. Smith gave his first presentation on wind performance. The presentation titled "Roofing Wind Failures," received a Construction Specifications Institute (CSI) Chapter Technical Award. Since that time, he has made many wind-related presentations at national and international technical conferences. He also made presentations at two National Hurricane Conferences, a hurricane conference in Virginia, presentations in Guam, and four one-day seminars in Florida.

In 1999, Mr. Smith became a co-instructor for the American Society of Civil Engineers, for their short course on wind loads derived from ASCE 7.