Structural Engineering

CLEMSON UNIVERSITY
Civil Engineering Department

The Wind Load Test Facility (The Wind Tunnel)
For tests in the wind tunnel, contact Dr. Scott D. Schiff at 864.656.0456

The facility was founded in 1991 with federal funds obtained from FEMA under the Stafford Act as part of the post-Hurricane Hugo mitigation effort. Since that time, research at the Wind Load Test Facility has made great contributions to improving building codes and increasing our understanding of wind forces.

About 50% of the US population currently lives in hurricane-prone coastal areas. Hundreds of miles of once empty coastlines are now major population centers with trillions of dollars of buildings and infrastructure exposed to the risk of hurricane damage. The risk of hurricane damage is a national issue facing the United States today, and it must be addressed through concerted scientific research that supports policies and formulates incentives that help us manage this risk.

As part of this scientific effort, the Wind Load Test Facility (WLTF) at Clemson University has been playing its part through wind engineering and structural engineering research of hurricanes and low-rise buildings.

The WLTF is a 10,000 sf laboratory housing one of the largest atmospheric boundary wind tunnels in the country. Our current research focus is on the wind loading of buildings within suburban neighborhoods because so little information is available to designers. In addition, the WLTF possesses an instrumentation and model shop area, actuators and fabrication workshop that are used for constructing test specimens.

The Wind Engineering and Structures Laboratory (WESL)
For tests using the debris cannon or BRERWULF, contact Dr. Scott D. Schiff at 864.656.0456

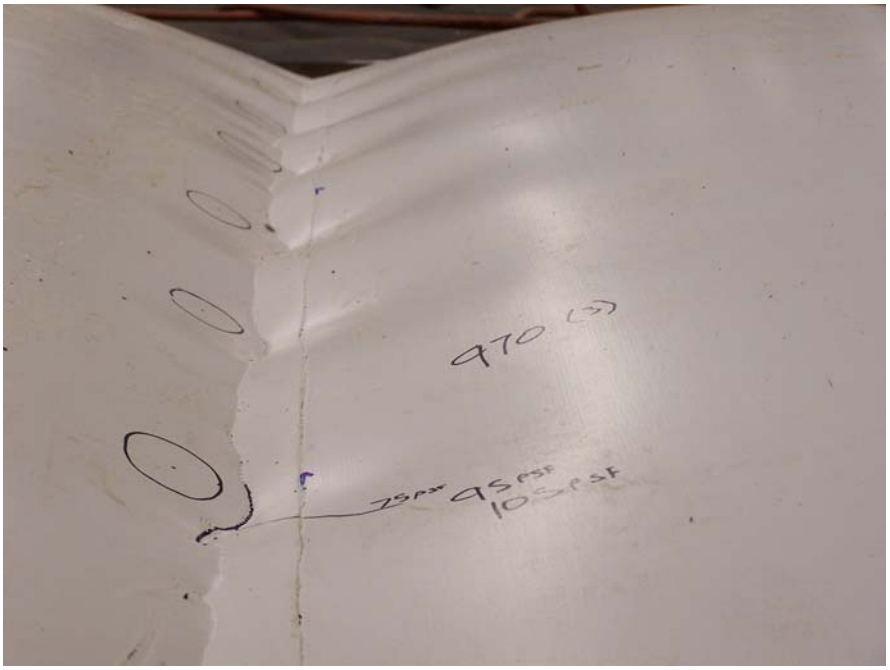
This lab supports experimental research related to the performance of buildings, bridges and other structures. The lab has an indoor test area with nearly 4000 ft^2 of floor space for testing of full-scale building components, a 5000 ft^2 outdoor reaction slab for testing large structural systems, and an outdoor reaction frame for testing long structural members in bending. In addition, the lab serves as the home base for mobile instrumentation lab for testing highway bridges. The lab is equipped with hydraulic and screw-drive actuators for applying loads, BRERWULF for applying static and fluctuating air pressures, an air cannon for missile impact studies, a universal test machine for testing small components and data acquisition equipment to measure and record data (stresses, loads, accelerations and deformations).

Dr. Scott D. Schiff, Professor and Graduate Program Coordinator, has conducted research for various government sponsors including the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), South Carolina Sea Grant Consortium and the South Carolina Department of Transportation. Many industrial sponsors such as The National Brick Research Center, Simpson Strong-Tie, Prestressed/Precast Concrete Institute (PCI), The National Roofing Contractors Association (NRCA), Milliken & Company, Huber Engineered Woods, Eastman Chemicals, Tindall Corporation and Metromont Prestressed have also conducted research at the lab.

Photograph shows the test set-up to investigate the performance of roof-to-wall connections under combined cyclic uplift and in-plane shear loads. A computer controlled screw drive actuator simultaneously applies the uplift and shear loads to the roof framing.

Photograph shows impact damage to a hurricane shutter from a 9-lb 2x4 missile traveling approximately 34 mph.

Photograph shows the impact damage to the wall system of a tornado shelter from a 15-lb 2x4 missile traveling approximately 100 mph.



Photograph shows a single-ply roof membrane subjected to a stepwise increase in uplift wind pressure.

Lower photograph shows the instrumentation attached to the steel framing of a skewed highway bridge to provide data needed for the assessment and rating of the bridge.