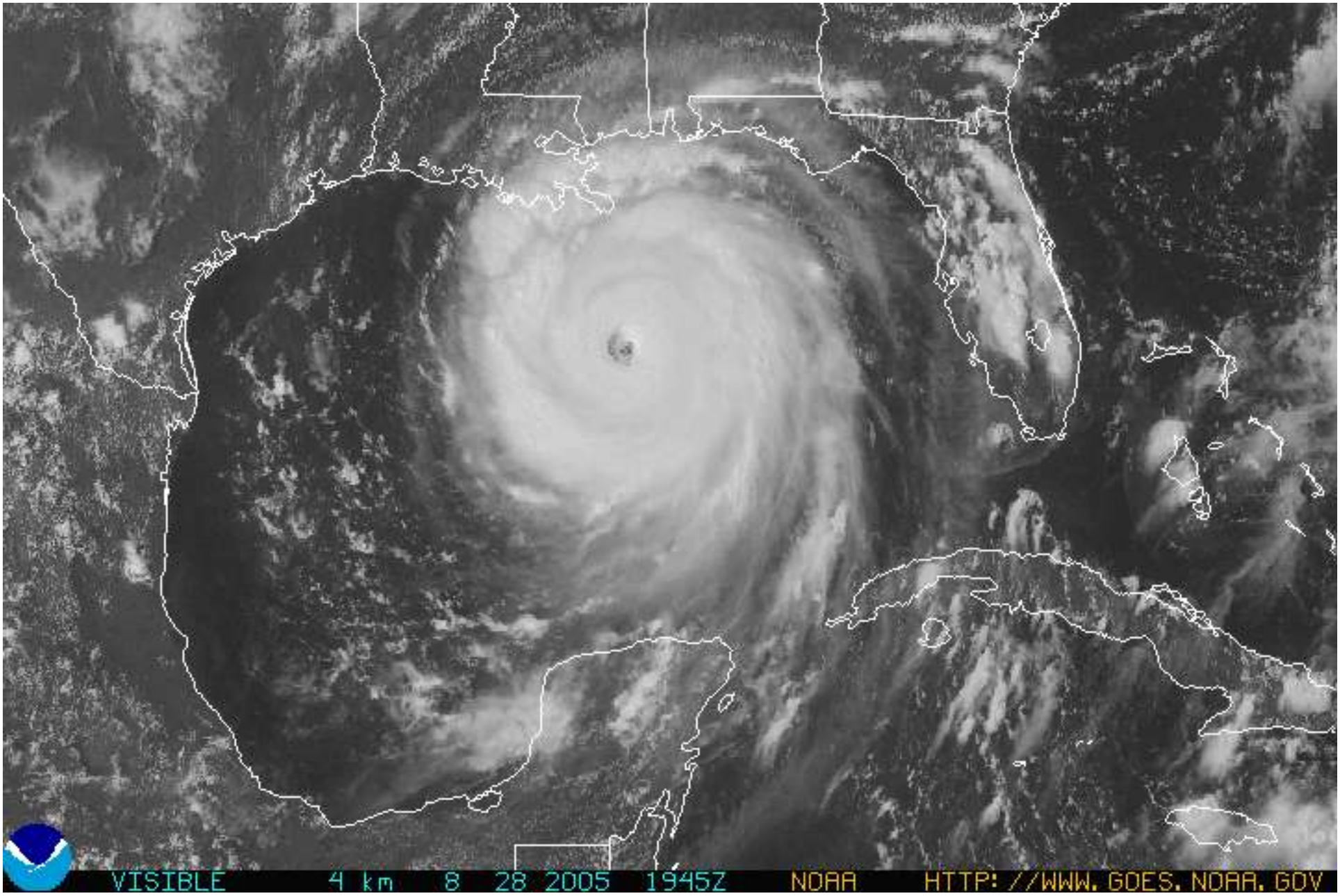


Hurricane Katrina as Category 5, August 28, 2005

Some observations of damage from Hurricanes Katrina and Dennis –

and the role of the Three Little Pigs project

G.A. Kopp

gakopp@uwo.ca

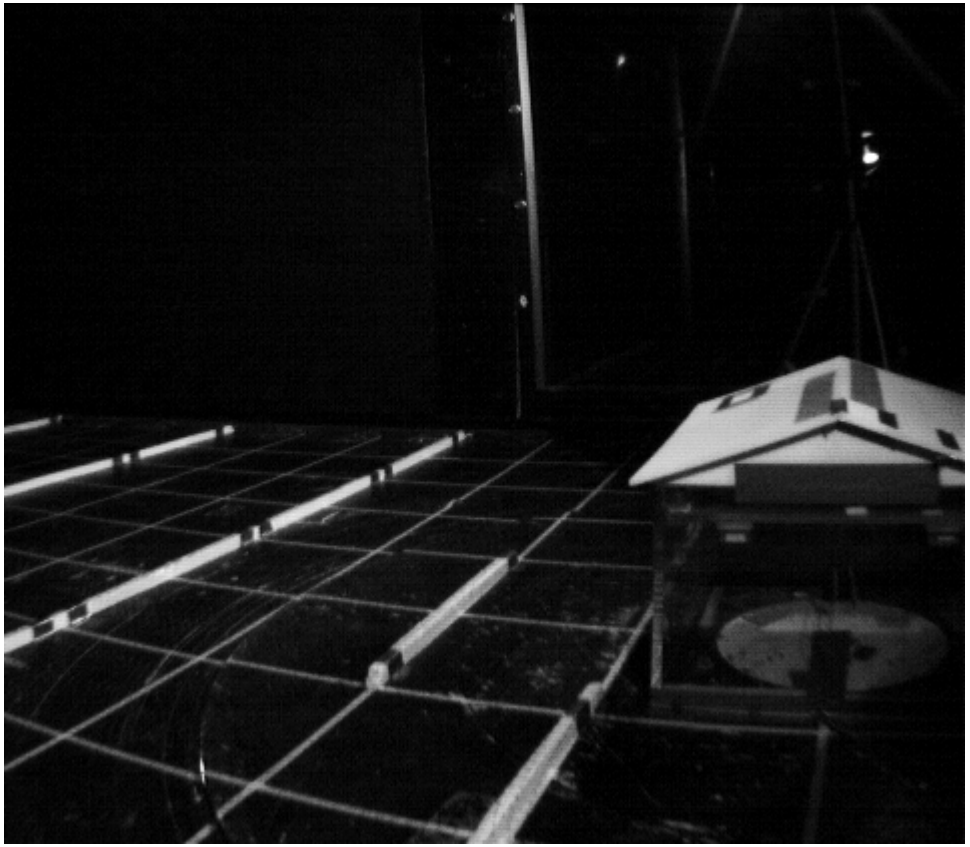
Alan G. Davenport Wind Engineering Group
Boundary Layer Wind Tunnel Laboratory
The University of Western Ontario
London, Ontario, Canada

Hurricane Dennis with the Florida Coastal Monitoring Program

(at Navarre Beach, Florida)


206
106
205
105

Wind tunnel experiments can model particular failure modes and the flight of debris



Hurricane Katrina with the Institute for Business & Home Safety


CAUTION
In case of windy conditions, if you are unable to operate gate doors. Please contact the office.


NO
U
TURN
8AM-4PM


SPEED
LIMIT
15

Déjà vu (all over again)…

Hurricane Camille, 1969
Coastal Mississippi

(Photo Credit: Chauncey Hinman)

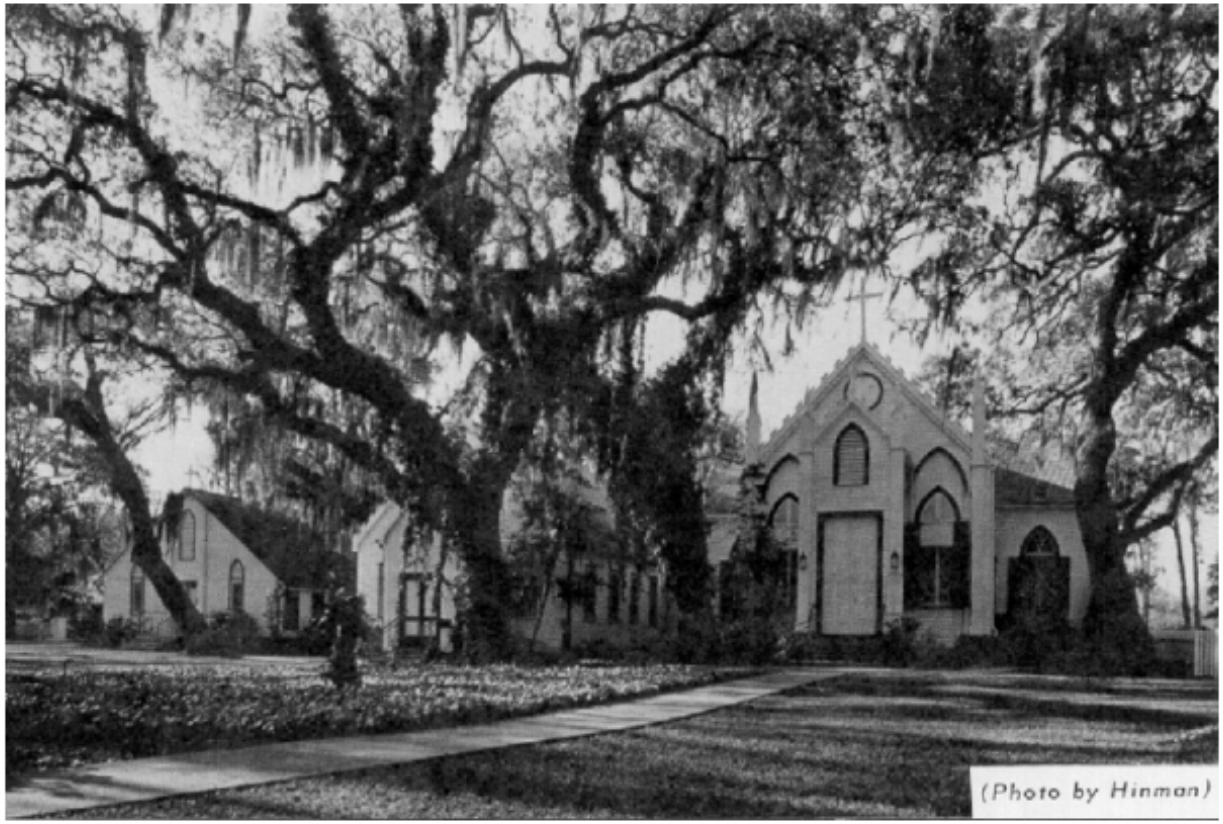
Richelieu Apartments Before Hurricane Camille

From http://sciencepolicy.colorado.edu/about_us/meet_us/roger_pielke/camille/gallery.html

(Photo Credit: Chauncey Hinman)

Richelieu Apartments After Hurricane Camille

(Photo Credit: Chauncey Hinman)



Trinity Episcopal Church Before Hurricane Camille

(Photo Credit: Chauncey Hinman)

Trinity Episcopal Church After Hurricane Camille

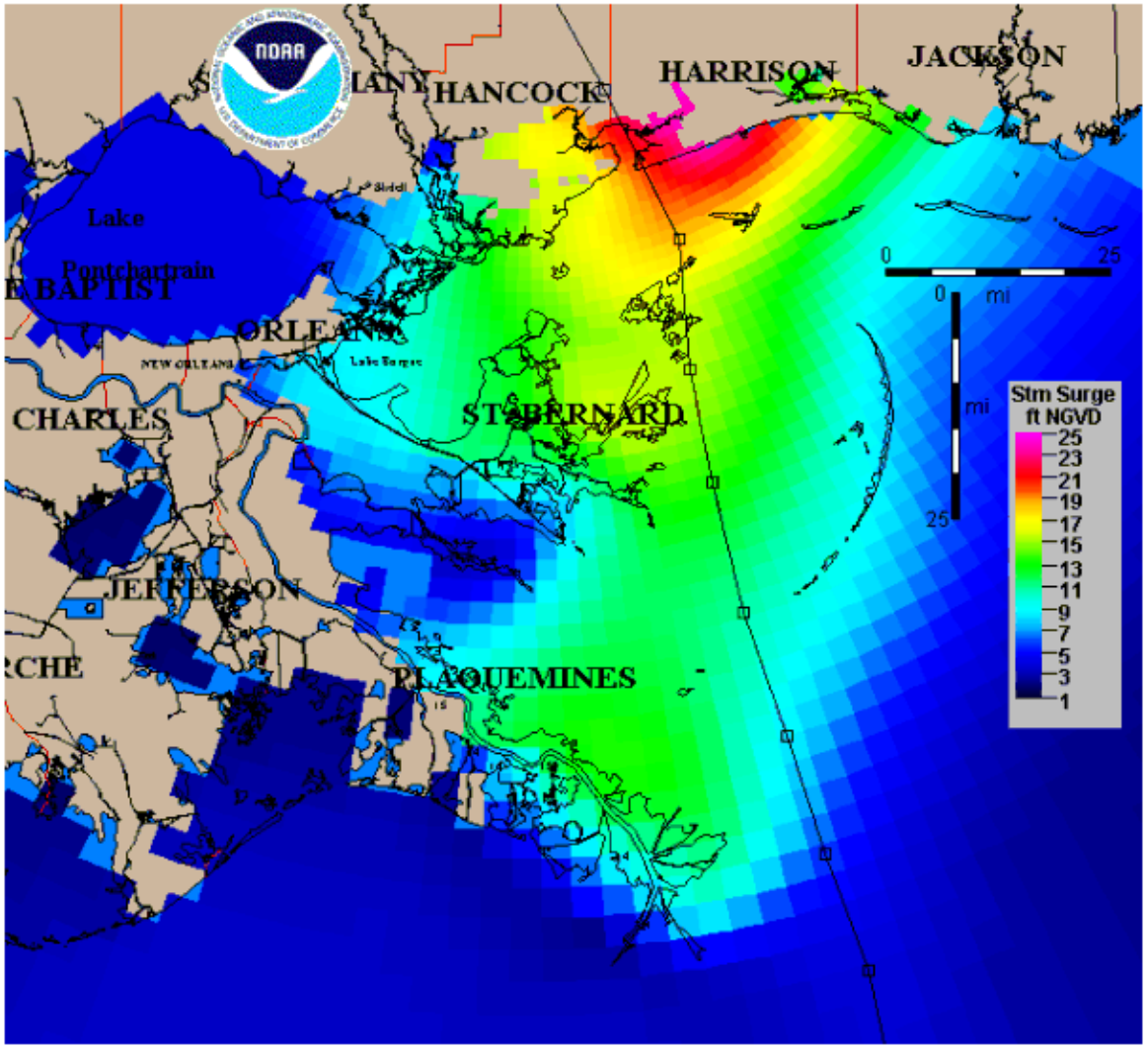
Biloxi in

1969 and 2005

(Photo Credit: Fred Hutchings)

House At Rest On Top of Cars

(Wilson Shaffer, National Weather Service/NOAA)

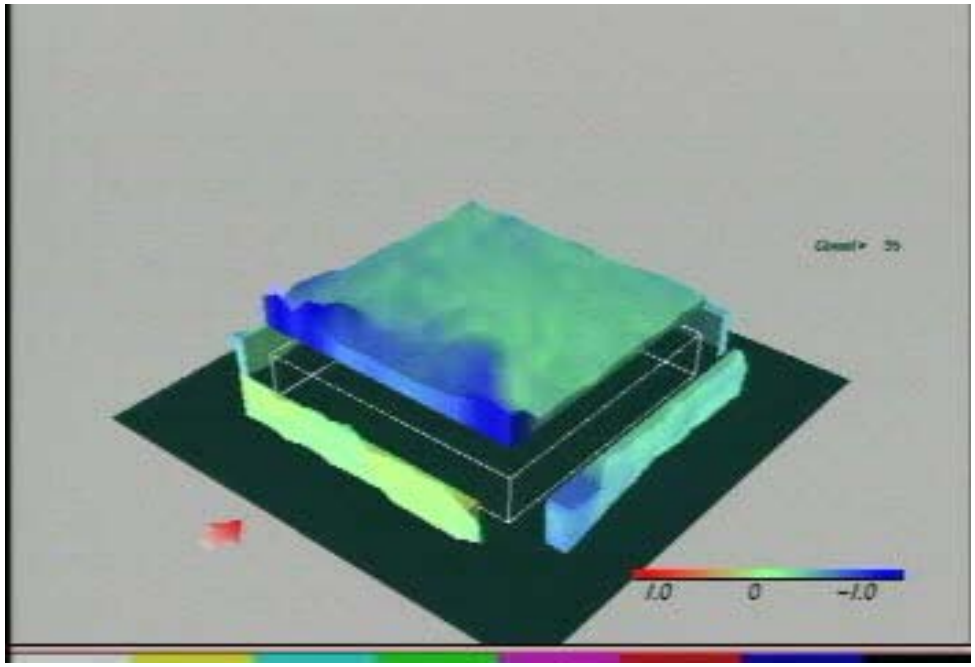


Camille's Envelope of High Water From SLOSH Model


UWO ENGINEERING
THREE LITTLE PIGS PROJECT


November 14, 2005

Wind-induced pressures on a low-rise building

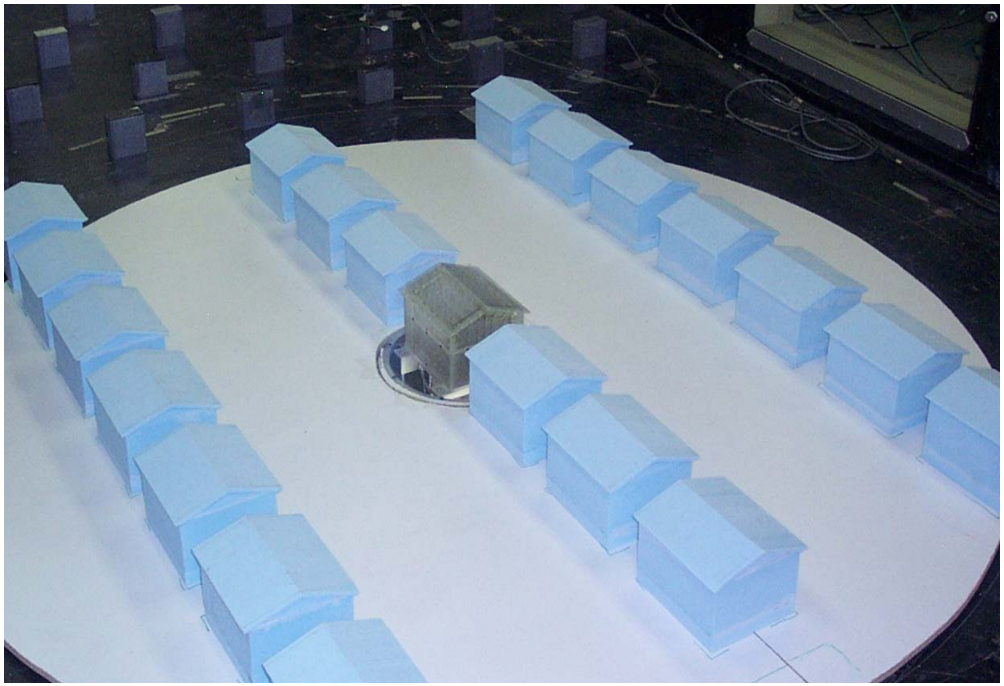


From Y. Tamura

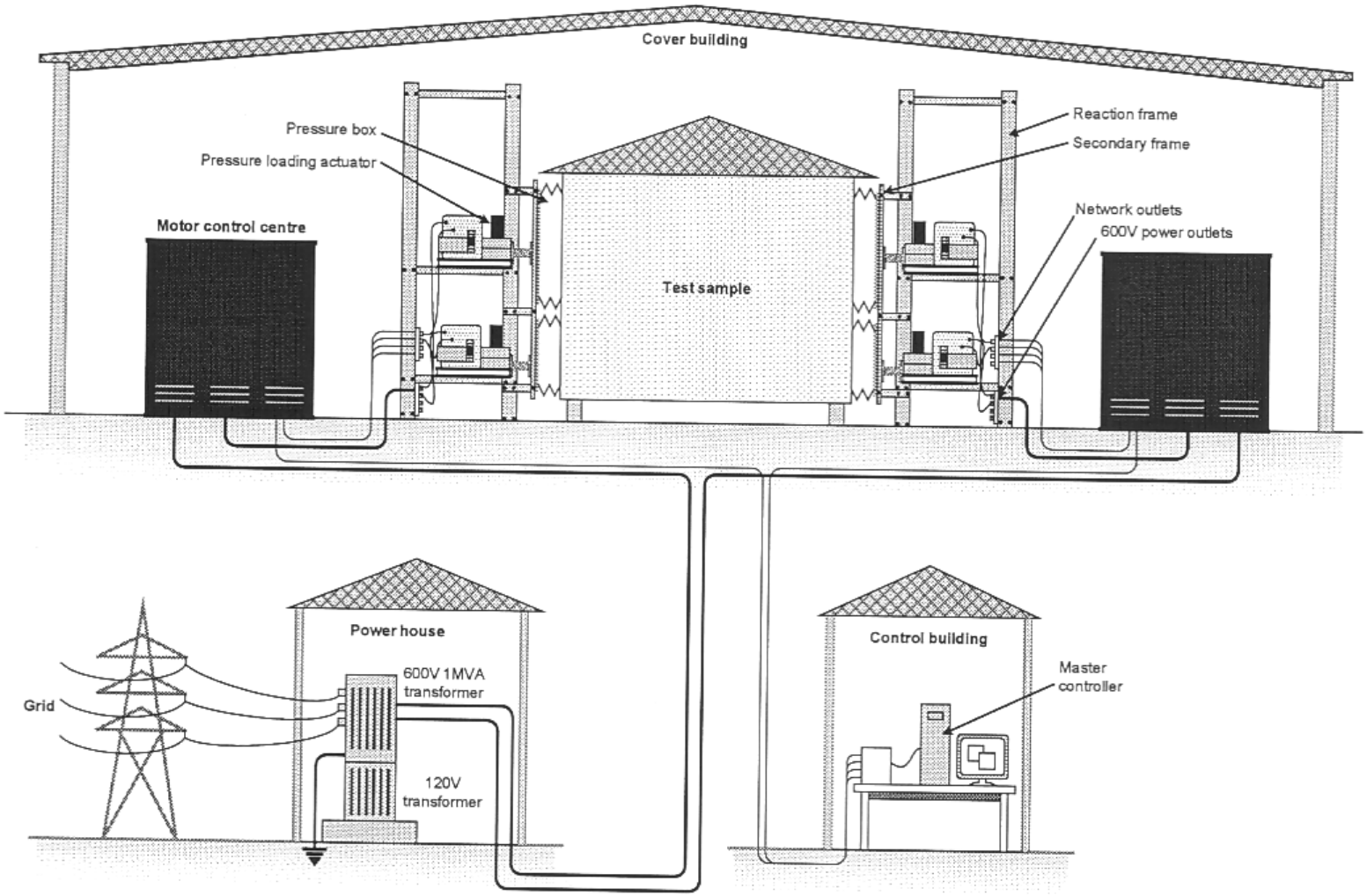
Prototype 1 (several years ago!)
- a vacuum cleaner

The loading concept…

- We want realistic wind loads to full-scale structures without building an absolutely enormous wind tunnel
- Time histories of pressures will be obtained from wind tunnel experiments
- A loading system based on BRERWULF system
- say, ~100 mini-BRERWULFs to cover all surfaces of the test building.



What's involved to make this happen?



Specifications for our Pressure Loading Acutators

- *Pressure boxes of 2’ x 2’, 4’x 4’, and 8’x 8’ (nominal)*

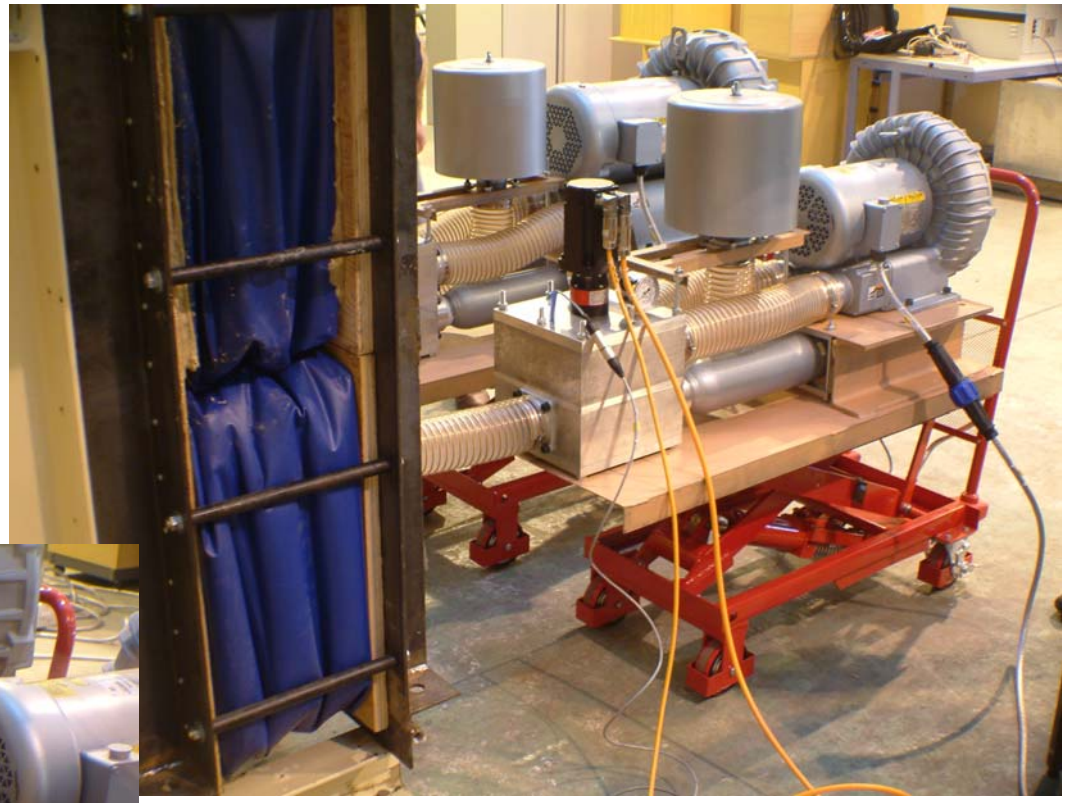
  2’x 2’ box pressure range of +5/-18 kPa

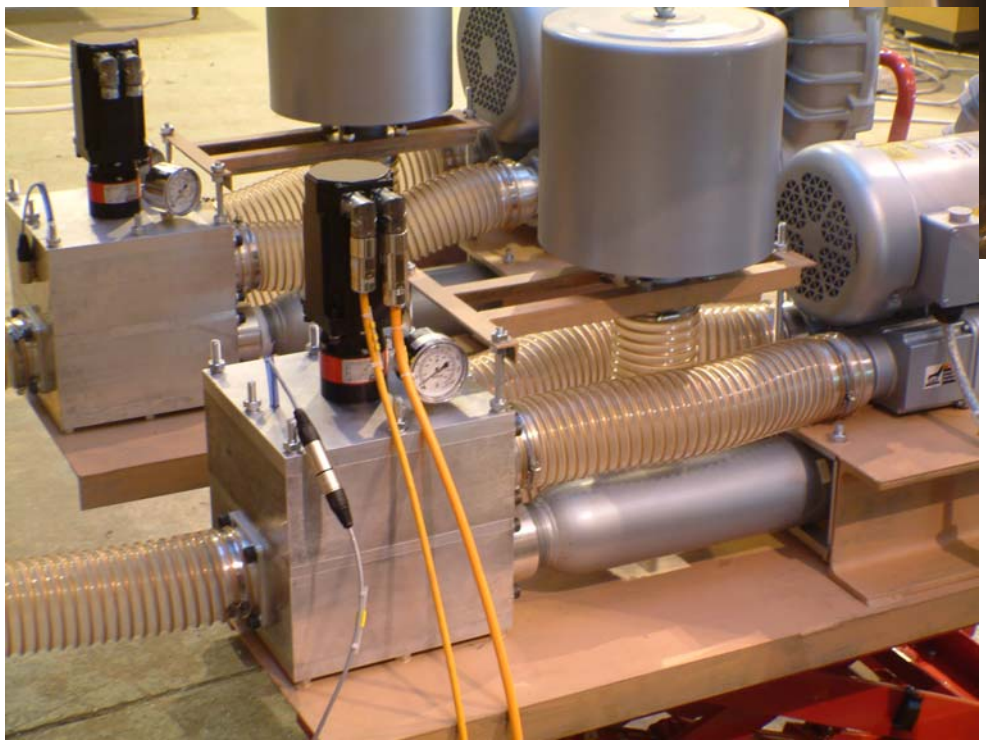
  4’x 4’ box pressure range of +5/-15 kPa

  8’x 8’ box pressure range of +4.5/-11 kPa,

- *Frequency response in the range of 4 – 7 Hz*
- *Large leakage flow rates to allow testing of porous materials such as bricks, or materials with cracks*
- *Turn down ratio on pressures is 1/10*

The results so far…





The first prototype at
CCL in Cambridge

The connection between loading system and house surface - Pressure boxes

Current Design

Should work well for structural tests

The gaskets between the surface and the blue “bag” will cause problems for panel testing

What it will look like one year from now