# Cat tales

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**Inside this issue:**



## Ontario's second Safer Living home is launched—Canada's third

An ambitious program designed to confront the challenge presented by increasing weather-related catastrophes celebrated another important milestone on December 17, with the showing of Ontario's second safer living home—the country's third.

Located in Fort Erie and designed and constructed to withstand winds of 200 km/h, the house is the third to be completed under the *Designed...for safer living* program. The program is a partnership between ICLR and the Canadian insurance industry. The first *Safer Living* home was constructed on West Point, Prince Edward Island and was launched on December 17, 2006. That home scored a direct hit from tropical storm Noel the weekend of November 3, 2007 and incurred no damage whatsoever. The second *Safer Living* home, located in Sudbury, Ontario, was launched on February 19, 2007.

Construction of the homes to "better than building code" standards, which involve special building materials and methods from the foundation to the roof, was funded by The Co-operators.

"The insurance industry sees first-hand the devastation that increasingly frequent natural disasters are causing. In financial terms, the cost of damage from natural disasters has doubled every five to seven years since the 1960s. In human terms, more and more families are suffering unnecessary losses," said Kathy Bardswick, president and CEO of The Co-operators and chairperson of ICLR. "We feel a responsibility to respond to the realities of today's weather by promoting safer living standards in Canada. We hope this encourages all stakeholders to embrace safer standards."

As with the PEI and Sudbury houses, both of which were insured by ►

## Ontario's second Safer Living home launched—Canada's third *cont*...


The roof of the home is tied down with hurricane straps.

The Co-operators, the Fort Erie home had to be rebuilt from the ground up after it was destroyed by fire. The new house was designed to withstand the most hazardous weather conditions in the area - wind storms and extreme winter weather.

Special construction features include:

- steel hurricane clips and strapping to secure the trusses to the framing, and braced gable ends to withstand high winds;
- reinforced rebar in the foundation;
- wider foundation footings;
- triple-glazed windows and doors;
- laminate shingles installed with additional nails;
- ice and water shield over the entire roof;
- spray foam insulation; and
- 5/8-inch fire rated drywall.

Many of the special features were imported from the United States, where a similar program was developed several years ago by ICLR's sister organization, the Institute for Business and Home Safety.

"Canadians have a tradition of building strong homes, yet we have the knowledge to build homes that are even more resilient to extreme weather events that are increasing in frequency and severity," said ICLR executive director, Paul Kovacs. "We need to harness that knowledge to build safer homes for future generations of Canadians. This home – and the two before it - stand as models as we work to build more resilient homes and communities right across the country."

In the months and years to come, additional Safer Living homes will be built in various regions of Canada. The homes will be designed to be resilient to the perils in that area, which may include earthquakes, prairie wildfire, tornadoes and hailstorms.


The Fort Erie home was built on a strong foundation, with reinforced steel rebar.

# Hurricane Gustav—Observations from the eye of the storm



**By Gregory A. Kopp**
**Boundary Layer Wind Tunnel Laboratory, University of Western Ontario**

Damage surveys following major wind events are critical for identifying potential problems with building codes, construction practices and building products. In order for the surveys to be of value, it is necessary to know the wind speeds that caused (or did not cause) damage since all design is based on the induced forces at particular wind speeds. This is more challenging than it may appear since wind speeds in the neighbourhoods where houses and other buildings are have been rarely measured. Usually, the only direct measurements of ground-level wind speeds are at airports, or at other weather stations. These are sparsely spaced, are often far from where the hurricane makes landfall, and often do not function during the storm because of power outages. While 'hurricane hunter' aircraft measure wind speeds in the hurricane, these are far above ground and assumptions have to be made about what is happening down where the houses are. Hurricane hunters also provide valuable data for input to numerical models, which are getting increasingly better at predicting or estimating surface wind speeds. Recently, there has been a significant effort to get portable anemometers into storms with at least three different groups now making measurements routinely. In the 2004-2005 hurricanes, these groups tried to find the highest wind speeds in the hurricanes, since hurricanes are categorized by this (on the Saffir-Simpson Scale). More recently, the emphasis has shifted to relating the speeds in open areas near the coast (where the highest speeds are found) to those in suburban neighbourhoods, where the majority of houses are.

Hurricane Gustav was not a particularly powerful storm although it has been estimated to have caused upwards of $10B in damage even though the wind speeds were significantly lower than those used for design in this area. (Measured peak gust speeds in Houma were about 80 mph, while the design speed for the region is 140 mph.) Much of the damage was caused by flooding and storm surge, but wind damage also played a role, with much of the media attention focused on Baton Rouge. However, much closer to the coast, where wind speeds are highest, the eyewall passed close to Houma, Louisiana, an area which had been hit by the 2005 hurricanes. This provided an ►

Photograph of tower belonging to the Florida Coastal Monitoring Program of the University of Florida, deployed in a suburban neighbourhood in Houma, Louisiana during Hurricane Gustav. This tower measured peak gust wind speeds of less than 80 mph. The house in the background was undamaged except for loss of about 2% of shingles. Nearby houses lost up to 50% of the shingles.

Photograph of a recently-constructed house in Houma, Louisiana the morning after Hurricane Gustav made landfall. The general lack of debris indicates a relatively minor wind event, although one cannot see all of the shingles in the backyard that flew off from the front of the house. Note that this area had been evacuated and no one had yet returned to clean up; we were the only people there except for Emergency Response Personnel.

## Hurricane Gustav—Observations from the eye of the storm *cont*...

opportunity to evaluate recent construction and measure wind speeds in typical suburban neighbourhoods.

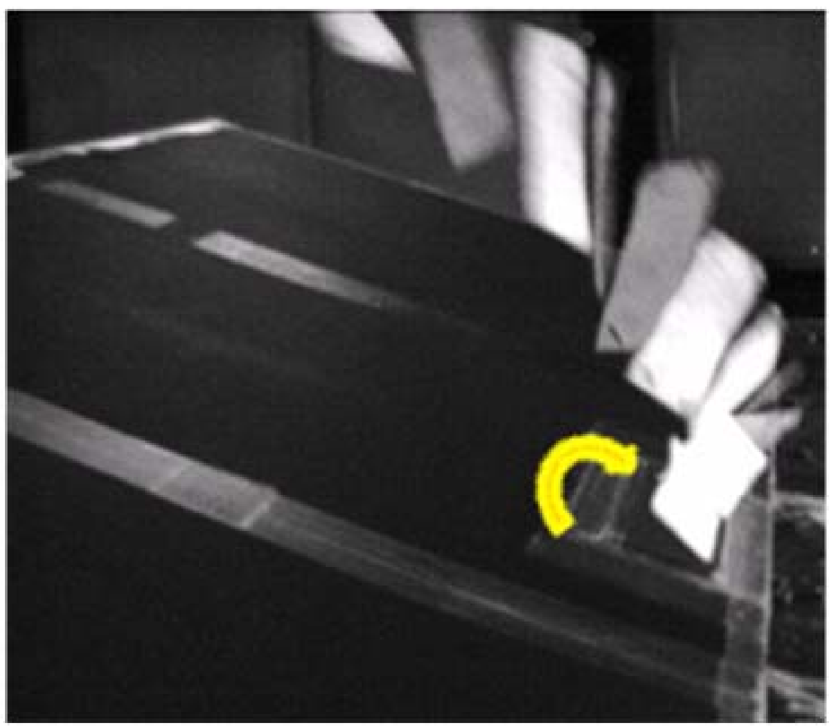
University of Florida researchers, Drs. Forrest Masters and Kurt Gurley and their team positioned five portable towers in several neighbourhoods in and around Houma and then waited for Gustav to arrive.

One of the advantages (for researchers) of a hurricane making landfall during the day is that you can see what is going on. And what we saw surprised us. Shingles were coming off everywhere, even in the weaker winds in the range of 40 to 60 mph prior to arrival of the eye of the storm. What was worse is that these failures appeared to be particularly bad for the new houses built since Hurricane Rita in 2005. When you can stand outside in the wind, effortlessly, and watch things coming apart, you know there is a problem.

As a result of these observations during the storm, the team decided to conduct a damage survey on the following day of more than 1000 houses in Houma, in randomly chosen streets, but covering every quadrant of the city. It was apparent that shingle failure was the only real issue in Houma, aside from the downed power lines and trees, so our damage survey focused on this issue alone. It seems that the problems were primarily with new construction with relatively high roof slopes and few trees around. Preliminary analysis suggests these failures may have been due to insufficient connection between the adhesive on the underside of the shingle, with the roof. This led to shingle tabs flipping over and pulling the shingles over the nail heads. The close-up photos show this in detail.

Aside from direct costs associated with the replacement of the roofing material, other potentially more significant costs can arise from these types of failures. One is obviously water penetration, while the other is more indirect, namely, the costs associated with damage when the shingles become windbourne and impact adjacent structures.

Close-up photographs showing typical shingle failures with the nails still in the roof (top) and one of the shingles that came off with two nail holes visible (bottom).



Close-up stroboscopic image showing a single realization of shingle flight from the roof of a house in a scale model wind tunnel study. In this image, the shingle fails in the lower right, gets caught up in high speed flow at the roof edge, and accelerates upwards, eventually moving downstream with a speed higher than the gust speed upstream of the house that actually caused the failure.

Fortunately, neither seem to have played much of a role during Gustav because of low wind speeds. One wonders what would have happened if the wind speeds had been much higher.

To answer that question, we have been conducting wind tunnel studies at the University of Western Ontario on shingle and roof tile flight in order to assess the risk due to shingles impacting and penetrating adjacent houses. We have found several ► Pg. 6

# Insurance Bureau of Canada issues preliminary report on costs of B.C. storms

On January 9, Insurance Bureau of Canada released a preliminary assessment of the claims costs of insurable losses related to recent winter storms in the Vancouver area. IBC reported an estimated $39 million was tallied for the 4,300 claims received so far.

As a result of this series of storms, insurance companies received an unusually high number of claims within a short time. IBC noted that insurance company employees and independent adjustors were working diligently to process these claims in order to help British Columbians recover as quickly as possible.

"Insurers continue to swiftly process claims for their customers," said Lindsay Olson, Vice-President, British Columbia, Saskatchewan & Manitoba, Insurance Bureau of Canada. "However, it could take months to assess the full extent of the damage caused by the storms."

Most of the claims submitted relate to burst pipes, snow load/roof collapses, sewer back-up problems or wind damage. Coverage for these perils is typically offered on most comprehensive homeowner's insurance policies or is available as an add-on.

However, IBC reminds consumers once again that any damage caused by overland flooding is not covered by home insurance.

# ICLR holds first meeting of its Insurance Advisory Committee

On Friday, November 21, ICLR held the first meeting of its new Insurance Advisory Committee.

Earlier in the year, ICLR member insurers and associate members were asked to provide representatives to participate on the Committee. Numerous companies answered the call, resulting in a well-rounded group consisting of representatives from insurance and reinsurance companies, as well as primary brokers, and academics from the University of Western Ontario.

The initial focus of the Committee will be on resilient homes and preventing water, wind and fire losses. In the letter of invitation, ICLR noted that it will bring together the latest academic research on home design, construction and maintenance practices that reduce the risk of loss claims. The Committee would then endeavor to couple that information with the extensive knowledge and experience that exists in the insurance community. Though the primary focus of the Committee will be on resilience to water damage, the Committee will work to address all aspects of loss prevention.

Specifically, the Committee will:

- develop ICLR's 'Safer Living Homes' loss prevention information that can be shared with homeowners, builders and other stakeholders
- speak directly with housing research leaders about their findings and knowledge gaps that can be addressed
- provide a forum to discuss resilient homes and loss prevention with others in the industry and research leaders

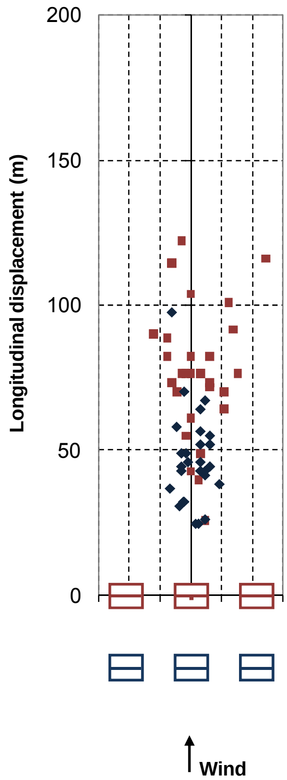
The inaugural meeting was fittingly held at the Boundary Layer Wind Tunnel (BLWT) at the University of Western Ontario. Interested members of the Committee were given a tour of the BLWT after the meeting and an afternoon tour of the Insurance Research Lab for Better Homes, located on the grounds of the London International Airport.

Carol Jardine, Senior Vice President, Property & Casualty of Cumis agreed to serve as Chair of the Committee.

Being a new initiative, the frequency of meetings, seniority of participants and specific mechanics of the Committee will be determined through consensus. However ICLR expects that the Committee will meet once each quarter.

Carol Jardine, Senior Vice President, Property & Casualty, Cumis and Chair of ICLR's new Insurance Advisory Committee.

## Hurricane Gustav—Observations from the eye of the storm *cont*...




Typical flight distances observed in wind tunnel experiments. Note the great variability and that typical trajectories are further than the distance between houses.

surprising facts, perhaps the most important pertaining to the flight speeds of the shingles. Typically, shingles can fly at speeds in the range of 50% to 120% of the undisturbed, upstream gust wind speed. This is a large range and is due to the nature of the turbulent wind gusts. While the shingles do not fly faster than the wind (actually they can, but there is not space to explain that interesting fact here), wind is actually accelerated above the roof of the house. Since the shingles are so light, they also accelerate quickly, leading to these high flight speeds. What this means, practically, is that they carry a lot of energy and the potential to break windows. They can also travel very far. Just as important for answering the question above, is to determine the flight speeds which break windows, and such research is currently being conducted at the University of Florida using full-scale impact tests. We have just begun to link the data from these two types of experiments.

As this research progresses we will be able to link all of this observational data in loss models which consider typical neighbourhood layouts, shingle loss frequencies (from damage surveys such as these, sponsored by the Institute for Catastrophic Loss Reduction), the flight distance data (from the wind tunnel tests), and the full-scale impact test results to develop probabilistic models for shingles hitting windows and breaking them. This is then linked to observed financial costs associated with the broken windows (due to water penetration and potential subsequent roof or sheathing failures due to internal pressurization) so that expected losses versus wind speed can be established. Relating storm wind speeds in open areas near the coast to wind speeds in the typical suburban and urban neighbourhoods (from observed tower data) is required for such models. Of course, loss models already exist, but the point to be made here is that it is of critical importance to incorporate all of this new information so that they are based on the most accurate engineering data available. These same data are also critical for the development of loss mitigation strategies, modifications to building codes, identification of code enforcement issues, and improvements to product tests. All of this starts by riding out the storm to get that data accurately.

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***Mission***
**To reduce the loss of life and property caused by severe weather and earthquakes through the identification and support of sustained actions that improve society's capacity to adapt to, anticipate, mitigate, withstand and recover from natural disasters.**

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