



DUFFERIN COUNTY

Reducing the risk of wind damage by
building stronger homes

By Leila Darwish

THE SCIENCE

In Canada, tornado season usually runs between April and September with the risk of tornadoes peaking during summer months. After the United States, Canada has the highest incidence of tornadoes in the world, with Southwestern Ontario and parts of the southern Prairies most at risk. Ontario has seen its fair share of notable tornados, such as those that struck the Woodstock area in 1979, Grand Valley and Barrie in 1985, Violet Hill in 1996, Vaughan in 2009, Leamington in 2010, Goderich in 2011, Angus in 2014, and Dunrobin in 2018.

Dufferin County has the highest elevation in southern Ontario and sits between Lake Ontario, Lake Huron and Georgian Bay and to the west of Lake Simcoe. The terrain of Dufferin County and the surrounding area makes it highly susceptible to strong winds and tornadoes, with tornadoes having touched down in recent years in Grand Valley (2013), Amaranth (2014), Hillsburgh (2014), and East Garafraxa (2015).

According to Dufferin County, "With climate change, damaging winds and tornadoes are occurring more often and causing more damage than ever before. In addition to storms that are more numerous and more severe, trends in insurance claims across Southern Ontario suggest that critical wind damage is now occurring at lower wind speeds than it has in the past."

In a tornado, the roof of a house can be particularly vulnerable to being blown off by extreme wind. Research has shown that extreme wind blowing over peaked roofs exerts an upward lift on the structure which can lead to roof loss. The collapse or loss of a roof leaves a home and its occupants more vulnerable to collapsing walls, falling debris, and further damage. It can also increase the risk of damage to neighbouring properties if the roof, or parts of it, strike other properties at a high speed. While toe nails are commonly used to hold down a roof under normal conditions, they are more likely to fail under extreme wind conditions. In order to prepare for extreme wind events, measures need to be taken to strengthen the connection between the walls and the roof.

THE TRIGGER

Having seen the impacts of three tornadoes, including the major one that went through Grand Valley in 1985, Dufferin County's Chief Building Official and Director of Facilities and Property Mike Giles has always considered tornadoes as a potential threat. Following the tornado that struck Angus in 2014, Giles came across an article in the Toronto Star on how damage from the tornado could have been prevented. The article interviewed Greg Kopp, a professor at the University of Western Ontario and the Director of the Boundary Layer Wind Tunnel Laboratory. Dr. Kopp's research highlighted hurricane ties as an inexpensive measure to decrease tornado damage to homes by significantly increasing the strength of connection between the roof and walls. This caught the attention of Mr. Giles, who reached out to Professor Kopp for more information on hurricane clips, and then connected with the Institute for Catastrophic Loss Reduction to collaborate on increasing the tornado resiliency of homes in Dufferin County.



Figure 19: Hurricane ties, including clips, are strips of metal that are engineered to bind the roof rafters or trusses to the top plate of a wall. (Source: IPSC)

THE APPROACH

Hurricane ties, including clips, are strips of metal that are engineered to bind the roof rafters or trusses to the top plate of a wall. The clips, which can sustain wind speeds of up to 217 km/h, ensure that the roof and walls are securely fastened. This reduces the risk of damage caused to roofs, and structures being torn from buildings and becoming airborne debris during high wind events and tornadoes.

The Ontario Building Code does not presently require houses to be fitted with hurricane ties. Since Dufferin County cannot mandate builders to use them, they began by offering a rebate to property owners and builders who install hurricane clips during construction on new buildings, additions, or renovations.

On average, hurricane clips cost around \$1.00. The County partnered with the Institute for Catastrophic Loss Reduction (ICLR) to offer a \$4.50 rebate per hurricane clip for homeowners or building owners wanting to install the clips. Dufferin County will pay builders a rebate of \$3.00 per clip, with ICLR contributing an additional \$1.50. During the framing inspection, the Building Inspector records the number of hurricane clips installed in accordance with the clip manufacturers specifications. Following the framing inspection, the County of Dufferin forwards a cheque for the appropriate amount to the holder of the building permit.

THE OUTCOME

Dufferin County Council approved the Hurricane Clip Rebate Program in March 2016 and the program was officially launched on January 1, 2017. As of June 1, 2018, approximately 2,200 clips had been installed in an area serviced by Dufferin County Building Department whose population is around 30,000 people. According to Dufferin County, "By offsetting the cost of hurricane clips and construction projects, Dufferin County and the Institute for Catastrophic Loss Reduction are mitigating this issue, protecting homeowners and reducing the impact of severe weather."

A WORD FROM DUFFERIN COUNTY

For communities that cannot rely on the building code to require the use of hurricane clips, Dufferin County's Chief Building Official Mike Giles emphasized the importance of local governments taking the initiative to make homes more tornado resilient by making hurricane clips affordable for homeowners and builders. "People agree it's a really good idea, but it comes down to cost. If you can afford to fund them, it's a no brainer. I'm sitting on a very large reserve fund of \$3 million that I can only spend on building department issues. I went to my Chief Administrative Officer and told her I want to try to fund people to put hurricane clips up. I got council buy in and here we are. It's gone very well. We've got lots of interest, from builders, homeowners and the insurance industry. With our rebate program, it's not costing builders or homeowners anything – we'll pay for any type of building. You put them on, we'll pay you!"