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## ICLR launches basement flooding mitigation website [www.basementfloodreduction.com](http://www.basementfloodreduction.com)

In July ICLR launched a comprehensive website to help spread the word about measures homeowners can take to reduce their risk of experiencing basement flooding. The site is timely, as 2012 could very well go down as the 'year of the basement flood' as no fewer than six major Canadian communities have been hit by heavy rainfalls and substantial basement flooding since May.

The site brings together all ICLR knows and all it has done regarding the hazard in recent years, and is directed at three main audiences: insurers, municipal governments and homeowners.

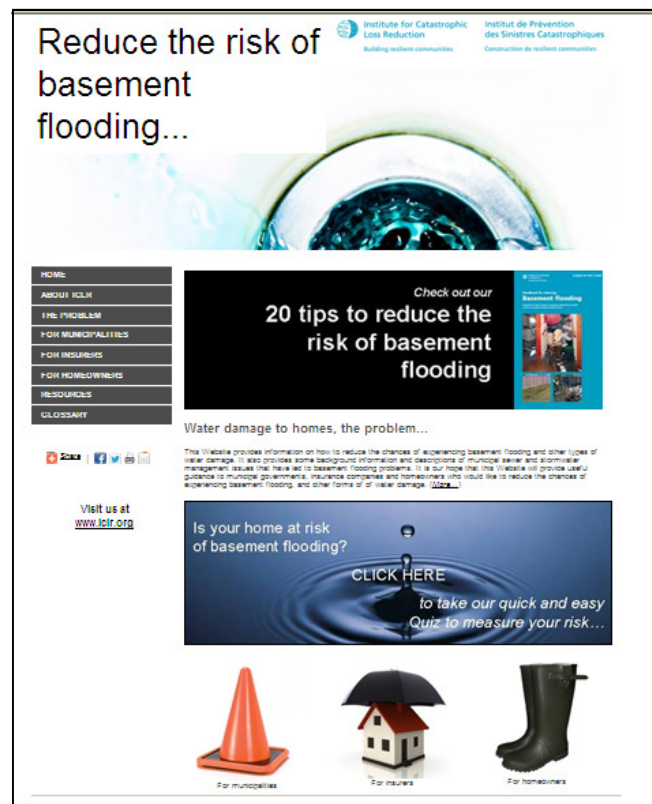
The backbone of ICLR's efforts in the area of basement flooding is the *Handbook for reducing basement flooding*, released by ICLR in June 2009. The handbook provides information on how homeowners can reduce their chances and their neighbours' chances of experiencing basement

flooding. It also provides some background information and descriptions of municipal sewer and stormwater management issues that have led to basement flooding problems. The handbook was published primarily as a source of information for insurers and municipalities, to help them develop their own materials for homeowners, and not as a source for the homeowner directly, as its 56 pages may be viewed as too cumbersome and intimidating to the average homeowner. ►



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The screenshot shows the homepage of the website. At the top, it says "Reduce the risk of basement flooding..." with logos for the Institute for Catastrophic Loss Reduction and Institut de Prévention des Sinistres Catastrophiques. Below this is a navigation menu with links for HOME, ABOUT ICLR, THE PROBLEM, FOR MUNICIPALITIES, FOR INSURERS, FOR HOMEOWNERS, RESOURCES, and GLOSSARY. A central banner features the text "Check out our 20 tips to reduce the risk of basement flooding" and a "CLICK HERE" button. Below the banner, there are three icons representing different audiences: a traffic cone for municipalities, a house for insurers, and a boot for homeowners. A small text box explains the website's purpose: "The Website provides information on how to reduce the chances of experiencing basement flooding and other types of water damage. It also provides some background information and descriptions of municipal sewer and stormwater management issues that have led to basement flooding problems. It is our hope that this Website will provide useful guidance to municipal governments, insurance companies and homeowners who would like to reduce the chances of experiencing basement flooding and other forms of water damage." (2012)

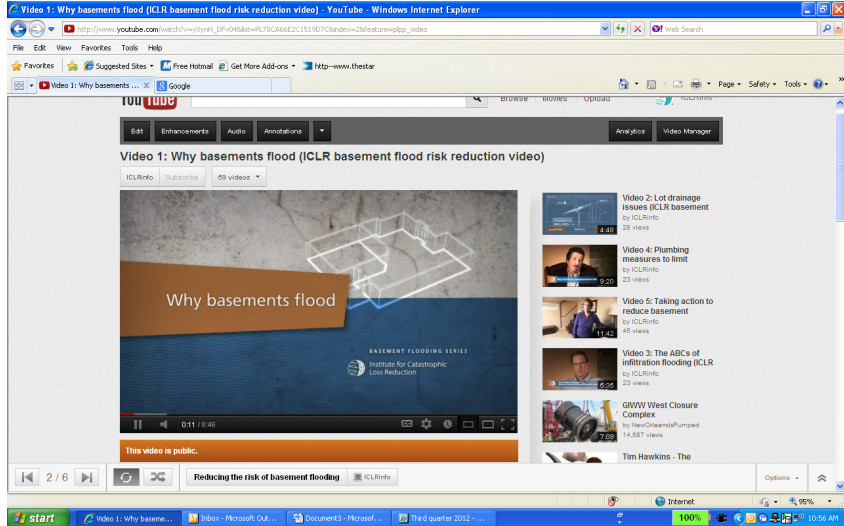
The website takes the 20 flood reduction tips in the handbook and makes them interactive through use of photographs, engineering drawings, narrated animations and embedded YouTube videos. Being a fairly complex issue that requires highly technical solutions, the videos and animations prove to illustrate the nature of the problem and the required solutions in a fairly simple, visual and easy to understand format.

Insurers and municipal governments can use the component parts of the website to develop their own web-based or print education/communication materials, or can simply provide a link from the stormwater management/basement flooding portions of their own websites.

Along with photographs of such devices as a backwater valve (an important basement flood mitigation device that remains unknown to many), the site allows access to a series of five YouTube videos on why basements flood, and six narrated animations dealing with various issues related to why basements flood and what can be done to reduce the risk.

The five videos are:

- 1) Why basements flood
- 2) Lot drainage issues
- 3) The ABCs of infiltration



- 4) Plumbing measures to limit basement flooding, and
  - 5) Taking action to reduce basement flooding.
- The six narrated animations are:
- 1) Proper lot grading
  - 2) Water from roof during a storm
  - 3) Infiltration flooding
  - 4) Backwater valves
  - 5) Backwater valves and disconnecting foundation drains, and
  - 6) Weeping tiles and sump pumps.

All five videos and six animations are available in English and French.

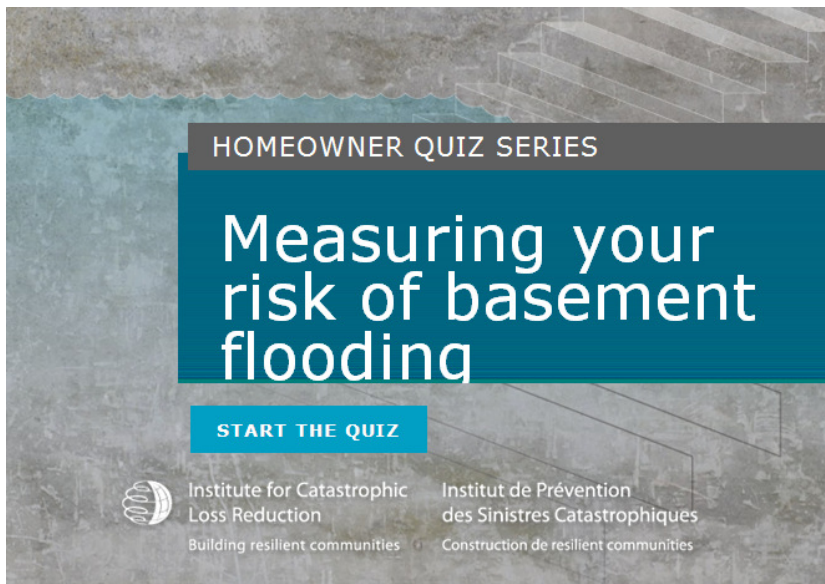
The website also hosts a brief and easy quiz that

homeowners can take to get a measure of their risk of experiencing basement flooding. Upon answering 14 simple questions, the homeowner will get a risk rating ranging from extreme to low.

The website also contains a comprehensive list of those Canadian municipalities that offer subsidies to homeowners who chose to install basement flood mitigation measures such as backwater valves and sump-pumps.

Finally, visitors to the site can download PDFs of the *Handbook for reducing basement flooding* and the lighter, less cumbersome and less intimidating basement flooding booklet for homeowners. Both publications are available in English and French. The entire site has been translated into French, and the bilingual site will be available in the coming weeks.

As municipalities work towards finding long-term solutions to the urban flooding problem, and insurers cope with the dramatic increase in water damage claims, this website illustrates what actions homeowners can take to reduce the risk of experiencing damage from basement flooding and other types of water damage. 🐾



# Retrofitting homes to reduce basement flood risk: Lessons learned

By Dan Sandink, Manager, Resilient Communities & Research  
Institute for Catastrophic Loss Reduction

Over the past few years, the Institute for Catastrophic Loss Reduction (ICLR) has retrofitted ten Canadian homes to demonstrate measures that can be taken by homeowners to reduce risk from hazards that affect communities across the country, including severe wind, wildfire, earthquake and basement flooding. These retrofits were undertaken as part of our Designed for Safer Living “Showcase Homes” series, where we conduct a home retrofit and invite the media and insurers to view risk reduction measures during National Emergency Preparedness Week.

Dozens of insurance professionals attend the events each year and often comment on the benefits of seeing on-the-ground application of homeowner mitigation options.

Due to the localized nature of natural hazard impacts and differences in home design, some of the retrofits were undertaken as collaborative efforts with local municipalities.

Since 2009, we have retrofitted three homes to reduce basement flood risk as part of this program. Our experience with basement flood retrofits highlights the complicated nature of home drainage systems and the need to customize retrofits for each individual home.

## Toronto, 2009

The first house we retrofitted to reduce basement flood risk was in the North York area of Toronto. This home was located in an area of the city that suffered severe and widespread flooding during an extreme rainfall event on August 19, 2005 and was at risk of future flood events.

One of the first steps in any flood retrofit project should be a plumbing inspection by a licensed plumber, including a camera inspection of the home’s sewer laterals.

In this case, the camera inspection revealed that a backwater valve had been

installed without proper disconnection of the foundation drains from the sanitary sewer. This type of arrangement can cause “self flooding” in the home, because when the backwater valve closes during an extreme rainfall event, water from the foundation drainage (i.e. weeping tiles) would not be able to exit the home and may backup into the basement through floor drains or bathroom drains and flood the basement. Thus, disconnection of the foundation drain from the sanitary sewer and installation of a sump pump system to pump foundation drainage to the surface of the lot were necessary measures that we incorporated into the home.

We also rearranged downspout drainage outlets, including installing a French drain system on a downspout that was discharging directly onto the home’s driveway.

## Hamilton, 2011

The home we retrofitted in Hamilton in 2011 had experienced a severe sewer backup flood on July 26, 2009 and is serviced by a combined sewer system. The homeowner had taken advantage of the City of Hamilton’s basement flood retrofit financial assistance program, and had a mainline backwater valve and sump system. Downspouts were also disconnected from the foundation drain before we conducted our work.

The existence of a driveway catch-basin complicated this retrofit and necessitated the installation of additional measures to reduce risk. This catch-basin is connected to the home’s foundation drainage and, surprisingly, served to drain



When ICLR began to look into retrofitting an east-end Hamilton house for basement flooding, researchers were met with a unique feature: a catch-basin located beside the subject house on the neighbour’s driveway. The catch-basin is connected to the subject home’s foundation drain. With a reverse-slope driveway that brings rain toward the subject home, large amounts of water enters the home’s foundation drain during even a moderate rainfall.

the neighbour's driveway, which was sandwiched between the two homes (see image). The catch-basin essentially made the neighbour's driveway into a huge funnel that directed massive quantities of rainwater into the foundation drainage and risked overloading of the sump pit and pump during heavy rainfall events. This arrangement was a relic from a time when property developers did not fully appreciate and understand property drainage issues.

We installed a second, large-capacity sump-pit and pump and re-graded a part of the front yard to direct as much water away from the driveway catch-basin as possible. We also installed an automatic natural gas generator that could power the pumps in the event of a power outage. Had the catch-basin not been there, a simple backwater valve/sump pump arrangement would likely have been sufficient for this home, along with other relatively simple measures including window well covers and disconnecting downspouts.

**Moncton, 2012**

Our Moncton retrofit was conducted on a home that had experienced a severe sewer backup event when tropical storm Danny dumped heavy rain on the city in late August, 2009. In this case, the home was serviced by a separated sewer system and sewage had backed up into the basement from the storm sewer.

This home's plumbing arrangement necessitated the installation of backwater valves on the storm and sanitary sewer laterals, as well as a sump-pump system with a battery backup. We also re-graded a small part of the back yard to direct water away from the foundation and installed window wells and window well covers on two basement windows.

Two surprises were waiting for us in this home. When the plumbers conducted the camera inspection of the laterals on the day the backwater valves were to be installed, they found that both laterals were full of standing water and sewage. Normally, sewer laterals are graded in a manner that directs water away from the home quickly, and should never have any standing water. Thus, before the backwater valves were installed, the laterals had to be torn up and replaced, requiring the excavation of the front yard.

When installing the window wells, the landscapers also found that the foundation drains were plugged with silt and were not properly draining groundwater away from the home's foundation. Before the window wells were installed we had to clear out the foundation drainage using a large vacuum truck.

**Lessons learned**

Failure to disconnect the foundation drainage in the Toronto home meant that the

backwater valve would have provided little flood protection, as the home could have still flooded from its own foundation drainage had the valve closed during a heavy rainfall event. Further, in the Moncton home, backwater valves would have been ineffective and may have even increased flood risk if they were installed in the laterals when they were full of standing water.

In this case, replacement of the laterals was absolutely necessary to ensure that the backwater valves would work properly. Both of these cases illustrated the complex nature of basement flood risk reduction and the fact that the simple, straight-forward installation of a backwater valve on the sanitary sewer lateral is not always an effective or meaningful risk reduction option.

The need to balance the cost and benefits of mitigation measures and the realization that it is difficult to implement perfect or ideal mitigation options in homes was exemplified in the Hamilton case. For this home, we explored the possibility of re-grading the neighbour's driveway and installing a permeable ►



An initial plumbing inspection of the Moncton subject home revealed a major problem with the home's sewer laterals (i.e. the two pipes, storm and sanitary, that connect the home's drainage system to the municipal system).

pavement system. This would have allowed us to totally eliminate the need for the catch-basin. However, to facilitate this approach, huge quantities of fill would have had to be brought in to re-grade the driveway, causing significant disruption for the homeowner and neighbours. It would have also resulted in a cost of tens of thousands of dollars—so we decided that a second sump and a powerful pump and generator system was a reasonable compromise.

Generally, the plumbers and contractors we worked with to retrofit the homes were knowledgeable and conducted the work within a reasonable period of time. However, it was more difficult to find contractors and plumbers who were knowledgeable and willing to complete this type of work than we expected. In some instances, it was necessary to convince contractors that certain flood reduction measures were necessary.

For example, we experienced 'push-back' from a contractor when we asked that he locate the foundation drainage connection in the Toronto home. The contractor cited difficulties in

locating the connection and the possible need to tear up several spots in the basement floor as reasons not to complete this measure. In the end, we insisted that the work be performed, but I have wondered if a homeowner who was not confident in their knowledge of basement flood risk reduction would have been persuaded by the contractor that this measure was not worth the aggravation.

It was clear to us how some homeowners could be intimidated by the retrofit process if they are not armed with clear, consistent information from authorities and if they are not confident in their knowledge of what needs to be done to address basement flood risk.

Some municipalities publish lists of plumbers who are knowledgeable about basement flood risk reduction measures, and some municipalities also provide assistance in the form of home inspections to identify necessary flood reduction options—useful tools for homeowners who are interested in starting the retrofit process but don't know where to begin.

**Conclusion**

Our experience with these three homes brings to mind an old cliché: Easier said than done. Anyone who has undertaken relatively major home improvement projects would likely be all too familiar with this concept, and basement flood retrofits are no different. Indeed, each home we retrofitted had its own idiosyncrasies that increased the complexity of the retrofit.

The most important lesson learned was that every home, neighbourhood and municipality is different and mitigation measures have to be tailored to suit these differences. Complications underscore the need for full understanding of home drainage systems before retrofit measures are installed and the need to communicate with a range of professionals, including city staff, plumbers and contractors. However, complexities should not detract from the importance of homeowner-level basement flood mitigation—lot-level mitigation remains an absolutely necessary piece of the basement flood risk reduction puzzle. 🐾

**ICLR launches new homeowner safety brochures**

ICLR has launched new homeowner safety brochures in English and French. The booklets contain brief information about the subject peril, layout the steps homeowners should take to understand their home's vulnerabilities to that peril, and outline steps that homeowners can take to make their home

more resilient. Each brochure also contains a quick and easy quiz that homeowners can take to get a Risk Score. The four booklets deal with basement flooding, severe wind, wildfire, and snow and ice storms. Future booklets will include earthquake. PDFs of the booklets can be downloaded at [www.iclr.org](http://www.iclr.org) 🐾



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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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