Institute for Catastrophic Loss Reduction
Building resilient communities

CATtales

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CSA Z800-18 Guideline on basement flood protection and risk reduction published

By Dan Sandink, Director of Research, ICLR

In the past two to three years, a number of federal programs focused on incorporating climate change adaptation into codes and standards have been mobilized. The programs have resulted in considerable investment in infrastructure with an interest in mitigating the impacts of extreme weather events for Canada's infrastructure and buildings.

ICLR has been particularly involved in programs focused on mitigating the impacts of extreme weather on low-rise residential buildings, including completing reports and participating on technical committees (TCs) on wildland-urban interface (WUI) fire, extreme wind, and basement flooding for the National Research Council of Canada (developers of Canada's model construction codes), the Standards Council of Canada and the Canadian Standards Association. One of the early outputs of this work was a national guideline on basement flood mitigation. Released this past August, and developed as part of the National Research Council of Canada's Climate Resilient Buildings and Core Public Infrastructure Program, ►

CSA Z800-18 represents the first national, standardized guidance on lot-level basement flood protection for houses.

The document can be purchased here: https://store.csagroup.org/ccrz__ProductDetails?sku=Z800-18

The quality of the document reflects the detailed input of the Technical Committee members and members of the public who took the time to carefully review and provide technical comments on a draft version of the report. Technical Committee members included building code professionals, component manufacturers, contractors, insurance industry representatives, consultants, as well as stormwater and wastewater engineers, and building and plumbing code inspectors from numerous Canadian municipalities.

The TC was chaired by Barbara Robinson (Norton Engineering Inc.), and vice-chaired by Dan Sandink (ICLR). ICLR was also pleased to write the seed document for the guide, which was largely based on our *Handbook for Reducing Basement Flooding* (https://www.iclr.org/wp-content/uploads/PDFS/handbook-for-reducing-basement-flooding.pdf). Aside from the 25 TC members, we received over 60 detailed comments from public reviewers on a draft version of the report, all of which greatly improved the quality of the final output.

The guide is focused on single-family residential buildings (non-engineered low-rise single family detached, semi-detached and townhouses). The guide further focuses on basement flooding caused by a combination of stormwater, sewer backup, and/or infiltration flooding, as well as several additional flood causes associated with failure or blockage of sewer connections, failure of mechanical systems (eg. sump pumps, backwater valves, and sewer connections).

Common basement flood causes in Canada are reviewed and illustrated in the document, followed by a comprehensive set of behavioural, physical (i.e. hard changes to plumbing and drainage) and "resilience" measures aimed at reducing basement flood risk at the lot-level. The relationship between riverine flooding and the abovementioned flood types is also highlighted.

The set of behavioural measures includes:

- Attaining information on home flood risk from appropriate sources, including local, municipal or regional governments. This information should take precedence over information provided in this (or any) third party basement flood protection guidance,
- Critical information for homeowners to record during and after a basement flood event (if it is safe to do so),
- Plumbing, site and sewer lateral inspections, which should always be conducted before physical basement flood protection measures are implemented,
- Insurance coverage (what is typically covered, appropriate questions to ask your insurance provider or broker),
- Routine maintenance of household plumbing and drainage systems to reduce basement flood risk, including testing and maintenance of household flood protection plumbing mechanisms (eg. sump pump systems and backwater valves), and
- Encouragement to disclose flood history as part of the home sales process.

With respect to physical basement flood protection measures, the importance of ensuring that houses are not located in flood prone areas in the first place – specifically, areas that may be prone to overland/stormwater flood hazards and flood hazards associated with groundwater – is highlighted before all other measures. The set of physical measures discussed in the report further includes:

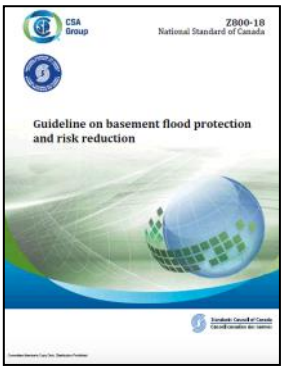
- Site grading and drainage, including addressing hazards associated with the area immediately adjacent to foundations (the backfill zone),
- Restricting use of reverse slope driveways in new home construction, and, for existing houses, identification of measures to mitigate flood risk associated with reverse slope driveways. Similar measures are discussed for window wells and basement stairwells,
- Drainage of eavestrough downspouts, including extensions, limiting impacts on neighbouring properties, and managing icing hazards,
- Managing and addressing cracks and utility penetrations that may serve as conduits for above-ground or below-ground water,
- Foundation drainage systems (eg. underground perforated pipes surrounding foundation footings, used to drain water away from foundations),
- Sump pump systems, including power supply, backup systems, provision of secondary pumps where appropriate, and discouraging use of sump pumps to continuously manage high groundwater levels to mitigate basement flood hazards in new houses,
- Critical issues associated with sewer connection inspections, maintenance, repair and ►

replacement, and
- Protection of new and existing houses from sanitary and storm sewer backwater hazards.

All measures are categorized in terms of application to new and/ or existing houses. Several of the measures identified in CSA Z800-18 are not yet addressed in Canadian construction codes. These measures include backup power for sump pump systems, incorporating means for accessing foundation drainage systems (which are buried, requiring excavation at significant cost for maintenance and/or repair), restricting use of reverse slope driveways, mitigating reversal of flow of discharge water into sump pumps, ensuring basement flood protection measures remain accessible (e.g., flooring, etc. should not cover backwater valves), among other topics.

Resilience measures are those that are aimed at reducing the impact of flooding, and reducing recovery costs and time, should a flood occur. These measures include selection of materials that are less vulnerable to damage from flooding, location of critical utilities in a manner that reduces their exposure to damage, and related measures. It was emphasized in the report that these measures should not be considered a first line of defence, as houses would still experience damage to basement contents, and potential long-term impacts associated with flood events.

Following completion of Z800-18, ICLR submitted an additional report to NRCC aimed at filling 'gaps' identified during development of the guideline. Specific gaps identified included lack of consistent guidance for design and construction of foundation drainage systems, sump pump systems, foundation drainage backflow protection and sanitary laterals. The work described above and ongoing work should serve as a strong basis for code developers, insurers, builders, homeowners and the numerous municipalities and agencies working to mitigate basement flood risk at the homeowner level. **CT**



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Should Canada reconsider how it finances wildfire suppression?

By Jason Contant, Canadian Underwriter

As hundreds of wildfires burn across British Columbia, one disaster mitigation expert is recommending that Canada reconsiders how it finances fire suppression costs.

Last year, B.C. alone paid out more than $560 million in fire suppression costs, and it is not uncommon for all provinces and territories to dish out $1 billion or more a year, Glenn McGillivray, managing director of the Institute for Catastrophic Loss Reduction (ICLR), said August 13.

As of August 9, the Insurance Corporation of British Columbia reported that it had not received any wildfire-related claims. “That said, the wildfire season is not over yet and we could receive these types of claims in the coming weeks,” an ICBC spokesperson said.

Fire suppression costs will again be “up there” this year, said McGillivray, who is recommending an approach like Oregon’s, which has been buying a special reinsurance cover from Lloyd’s of London for decades. In effect, Oregon picks up the first US$50 million of fire suppression costs, and if the costs exceed that, Lloyd’s pays the next US$25 million. This “stop-loss” insurance means that the government’s wildfire-fighting expenses would generally be capped at US$50 million, unless costs exceed US$75 million – a rarity in the state – at which time the government would have to pay out of its taxpayer-funded coffers.

This stop-loss cover offers two benefits: first, the US$25 million for each occurrence in potential expenses is exchanged for a much smaller premium. The cost is then shared with private timber lot owners, who can benefit if they help pay the premium and deductible, and one payout can replace several years of premium payments.

Second, the volatility in the state’s wildfire fighting budget is largely removed, allowing the state to better plan and budget its resources.

Alberta took out a similar policy in 2006, but a relatively less destructive fire season meant that there was no payout, and the policy was not renewed.

This year, the province has had to seek assistance from other provinces and internationally. One particular challenge is that Ontario is also experiencing an active fire season and unable to assist B.C. at this time. Indeed, B.C. crews were assisting in Ontario until they were recalled to deal with the worsening situation in B.C., McGillivray said.

Aaron Sutherland, vice president of the Insurance Bureau of Canada’s (IBC) Pacific region, said that despite a relatively slow start to the fire seasons, over the last several weeks, the province has seen a “really hot, really dry trend” that has dried out forests.

This year, the frequency of fires is up compared to last year, but the severity (measured by area burned) is way down. In 2017, more than 1.2 million hectares burned, compared to over 118,000 hectares so far this year.* And while a total of 1,351 fires in the province last year, so far this year, 1,564 have burned. As well, more than 300 structures were lost last year, while few have been lost this year.

Sutherland said that there are more small fires going on, which are equally challenging for firefighters “because they have to be in so many different places at once.

“As insurers, we are working closely with local governments, with the province, to [make sure] those in need are aware of how insurance can help them recover in this instance,” he said, noting that there are hundreds of people on evacuation alert across the province. “When you look on the horizon, look at the weather forecast, we are still expecting a lot of hot, dry weather in this province over the next several weeks, so as insurers we are going to keep a close eye on what’s going on. **CT**

This piece originally appeared in Canadian Underwriter Online (August 13, 2018)

** Since writing, 2018 has surpassed 2017 in terms of number of fires and area burned.*

What do you mean by 'flood'?

By Glenn McGillivray, Managing Director, ICLR

When a homeowner gets water in the house, they call it a flood. It doesn't matter to them how it happened (pipe or municipal water main break; toilet, water heater, dishwasher or washing machine failure; seepage; sewer backup; riverine; storm surge; tsunamis) it just matters that it happened and that it get fixed right away.

Exactly how the water damage happened, on the other hand, matters a great deal to insurers.

First of all, depending on the cause of the water damage, an insurance policy may or may not respond.

Second, the nature of the advice that would be given to prevent or mitigate a repeat of the loss would depend on the nature of the occurrence. For instance, the advice ICLR would give to prevent damage from a riverine flood is very different from the advice that would be given for a sewer backup that happens as a result of a heavy rainfall event (i.e. an urban flood).

Now, granted, there is some degree of crossover: For instance, a backwater valve could be useful to prevent surcharge of sewage into a basement if an overland flood in an adjacent area inundates the sanitary sewer system. This happened during the 2013 flooding in Calgary (many of the basement floods documented occurred quite a piece away from rivers). Disconnecting foundation drains from the sanitary and running them to a sump system may also prevent surcharge should the sanitary sewer system be inundated from an overland event.

However, if you have water up to the main floor windows, a backwater valve or sump system isn't going to help you, just as gently sloping landscaping, window well covers, clean eavestroughs, or disconnected extended downspouts and the other best practices to prevent basement flooding aren't going to help.

It is key that the nature of the mitigation advice match the hazard, and for the most part, giving basement flood risk reduction advice for riverine flood risk is a non-starter.

At ICLR, we have six booklets in our 'Protect your home from…' series (i.e. Protect your home from snow and ice storms, earthquake, extreme wind, hail, wildfires and basement flooding).

We do not have a booklet for riverine or overland flood and we may never have one. There are not only serious public health and safety matters to consider with this hazard, but also deep philosophical concerns about the wisdom of advising homeowners how to face down an overland flood. We are uncomfortable with the moral questions surrounding the issue, largely because the nature of the measures needed to prevent or mitigate riverine flood risk are very different from the nature of the measures that are needed to mitigate sewer backup or other hazards.

First of all, the best way to prevent riverine flood damage is not to locate assets in flood hazard areas. As an absolute minimum, new structures should never be built in the highest hazard area of a floodplain – often referred to as the floodway, the portion of the flood hazard area where flows are deepest, fastest and most destructive. In our view, assets located on floodways should be moved or abandoned whenever possible (this is where government buyouts would come into play) or protected by dams, levies or other defensive infrastructure. But considering the legacy risk that exists (i.e. all the older parts of communities where entire downtowns and neighbourhoods were built on floodways), this can be difficult.

The next consideration is for those assets located on the fringe, the portion of the flood hazard area that is outside the floodway (i.e. the remainder of the floodplain after the floodway is considered).

Ideally, structures should not be located in the flood fringe. Where there are no other options, structures located on the fringe should be flood proofed (though it is still preferable to avoid constructing vulnerable development, like homes, in these areas whenever possible). ►

This leads to the second main consideration: How should this be done?

Generally, flood protection in the floodplain should involve raising structures above the potential flood level, plus an acceptable freeboard (or safety factor). This type of advice is extremely context-dependent. A qualified engineer should evaluate the hazard level, the structural integrity of the building, whether fill pads will negatively affect the flow of the river, etc. This can also be expensive, especially if the intent is to retrofit an existing home. Homes will also be largely inaccessible during flood events, creating life safety hazards.

Other types of flood proofing are fraught with risk. For example, with dry flood proofing (where there is an attempt to design the building to be watertight), hydrostatic and hydrodynamic forces around foundation walls caused by the force of flood waters can cause a great deal of damage, even destruction, of a home. There can also be buoyancy forces working to cause the home/basement to float. Hence, dry flood proofing is rarely a good idea. Where it is applied, it should be completed with the assistance of a qualified engineer who can assess the hazard level, the structural integrity of the home, and then make recommendations for reinforcement of building foundations to ensure they can withstand the extreme static and dynamic forces that are often associated with river flood events.

With wet flood proofing – where buildings are specifically designed to allow water to safely enter the home during a flood — there can be issues around contamination of flood waters (which may include agricultural runoff, human sewage, fuels, chemicals, and subsequent mould growth). Even when water-friendly materials (such as marine lumber and water resilient drywall) are used to wet flood proof, these materials may still need to be ripped out post flood and replaced due to contamination. A homeowner will also have to remember that they will still experience substantial contents damages and may have to relocate from their home while remediation is performed.

Further, with both dry and wet flood proofing there is always the possibility that a storm will exceed design, leading to property damage and even injury or loss of life.

So there is a lot at stake when advising property owners about protecting their properties from riverine flood and, thus, the provider of the advice must really know their stuff. **CT**

Here are a few guidelines on how insurers should approach the issue of providing flood mitigation advice to property owners and others:

1) Recognize that property owners view all unwanted water as a 'flood', regardless of the source.

2) When advising about flood prevention/mitigation, providers of info ('experts') must be explicit about what type of flood they are referring to (eg. riverine/fluvial or urban/pluvial, storm or sanitary sewer backup, seepage from groundwater or surface water etc.).

3) When referring to more than one type of flooding, experts must be clear about how the types differ – in cause, damage incurred, and with regard to risk mitigation.

4) When providing advice for riverine flood risk reduction, the expert must explicitly outline the risks (some of which can be life threatening) that are present in living with – and confronting – this hazard.

5) The expert must clearly outline both the upsides and the downsides of certain approaches (eg. dry versus wet flood proofing).

6) The expert's advice should include counsel as to whether the property owner should continue to reside in the at-risk location.

7) When referring to 'flood insurance', experts must be explicit about what kind of insurance they are referring to (sewer backup or overland).

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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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