



Institute for Catastrophic
Loss Reduction

Building resilient communities

Institut de prévention
des sinistres catastrophiques

Bâtir des communautés résilientes

Advancing Climate Resilience in the Canadian Insurance and Construction Industries

ICLR/CHBA Resilient Homes Task Force Guidance Documents

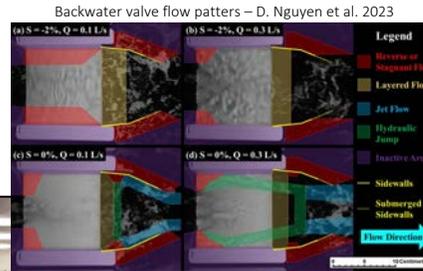


Dan Sandink – Senior Director, Resilience Programs – ICLR – dsandink@iclr.org
Building Knowledge Canada Webinar – March 5, 2026

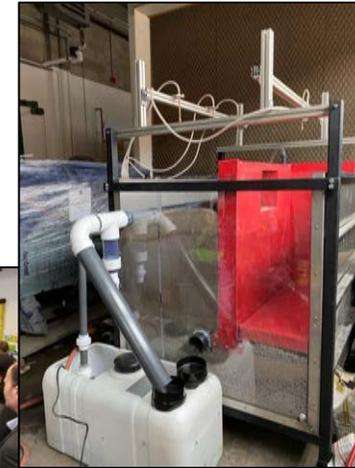
Understanding vulnerability, risk reduction options



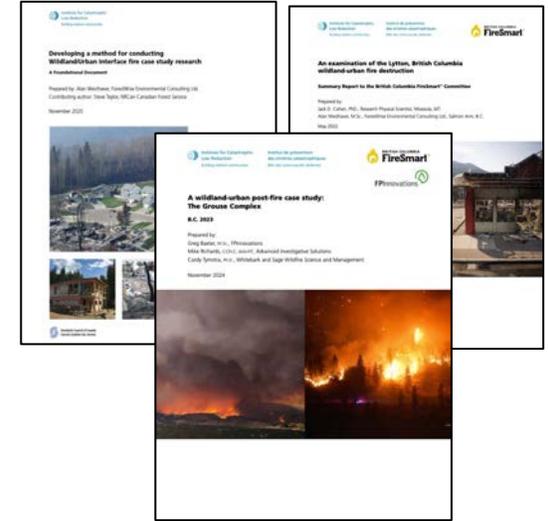
Boundary Layer Wind Tunnel, Three Little Pigs, damage inspection – UWO; Fastener withdrawal tests – K. Porter



ICLR/U of G Basement Flood Protection Lab: <https://basementfloodlab.com/>



Foundation Drainage Model, U of G/ICLR



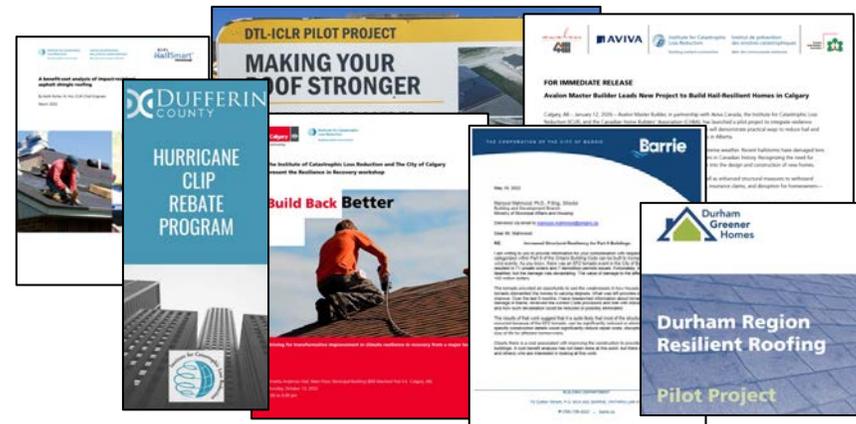
WUI post-fire reports

Standards, guides, assessment methods



Basement flood protection; BCAs, foundational documents, I/I standards

Supporting implementation, pilots, field trials



Insurers Rebuild Stronger Homes

Basement Flood Protection Demonstration Event

A special event in Edmonton, Alberta



Catastrophes in Canada



Image: Calgary Herald

August 5: Calgary Hail Event - **\$3.3 billion** – **SECOND** most expensive event in AB/CAN history



Image: Canadian Underwriter 2024

August 9-10, **Hurricane Debby Remnants (QC)** - **\$2.5 B** – most expensive event in QC history



Image: Canadian Underwriter, 2024

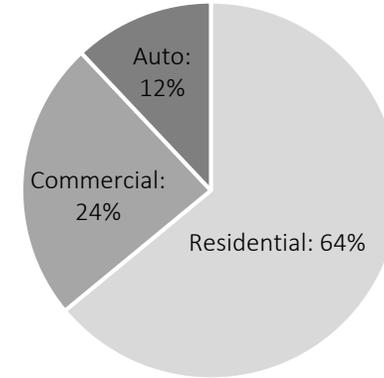
July, Jasper WUI Fire - **~\$900M**



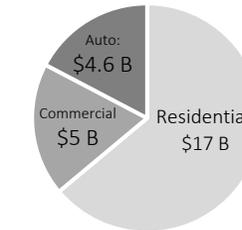
Image: Toronto Star

July 16, Toronto SDHI Rainfall Flood - **~\$940M**

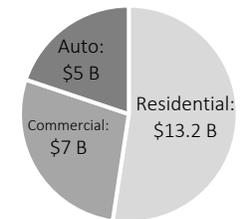
2016 to 2025: **~\$32 B**
Hail, wildfire, pluvial flood, high wind drive most losses



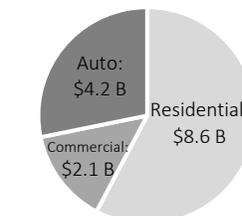
Wind
Wind Cat Losses, 2009 to 2024: **~\$26.6 B**



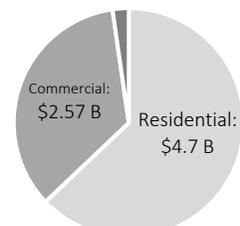
Pluvial Flood
Insured Flood/Water Cats, 2009 to 2024: **~\$25.2 B**



Hail
Hail Cat Losses, 2009 to 2025: **~\$14.9 B**

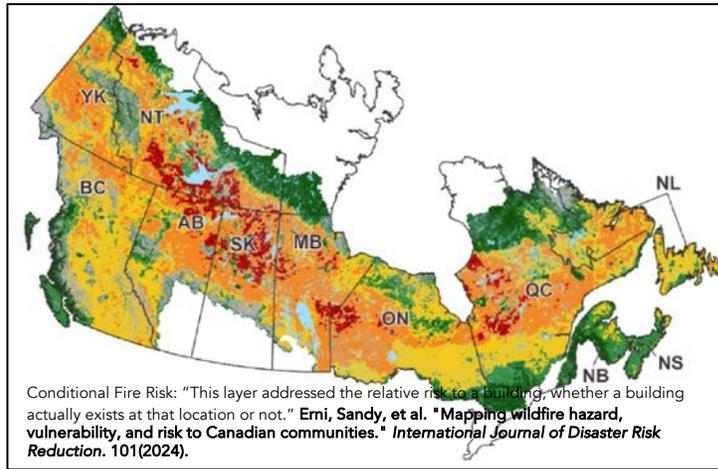
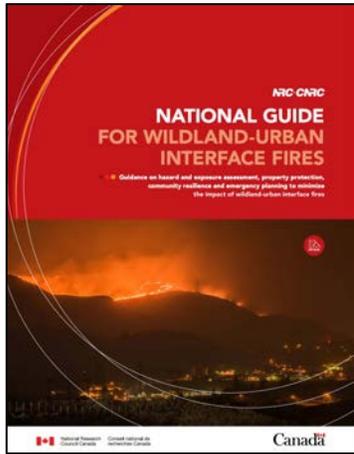


Wildfire
Cat Losses, 2009 to 2025: **~\$7.39 B**

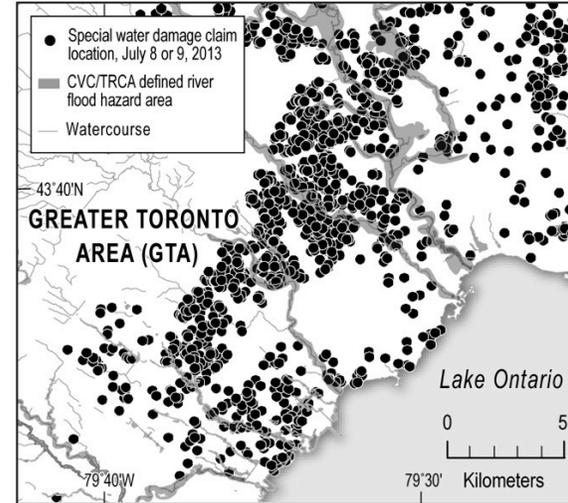


Generally: We know what to do, where to do it

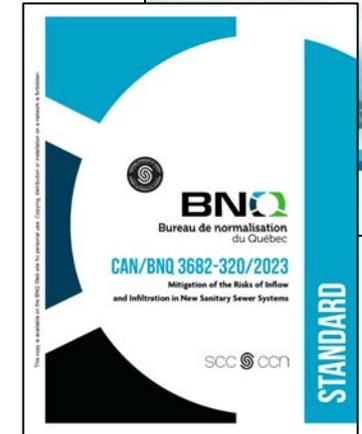
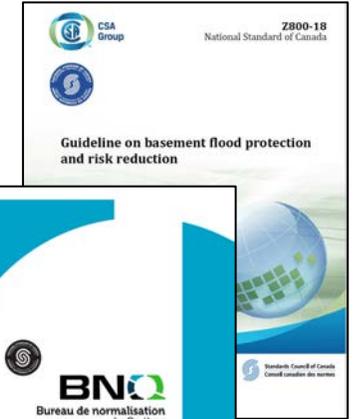
Wildfire



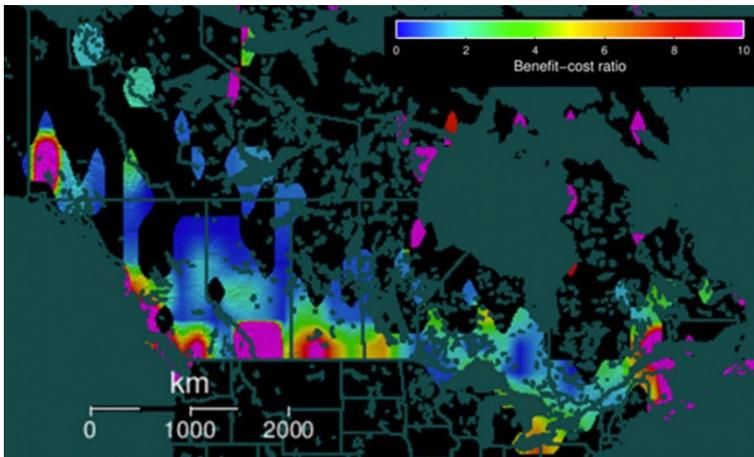
Urban, basement flood



Sandink et al., 2016



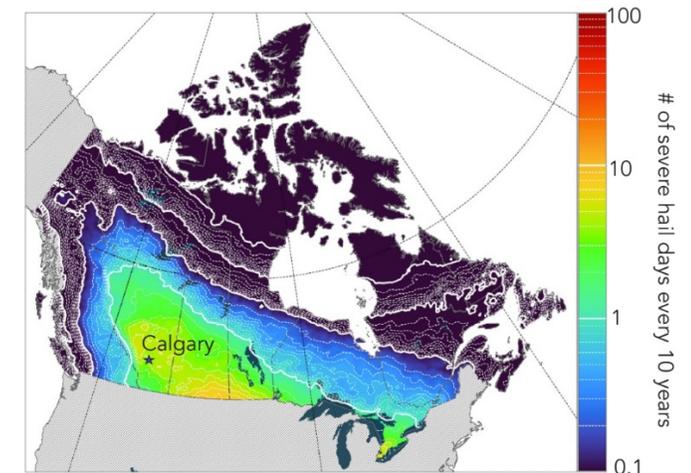
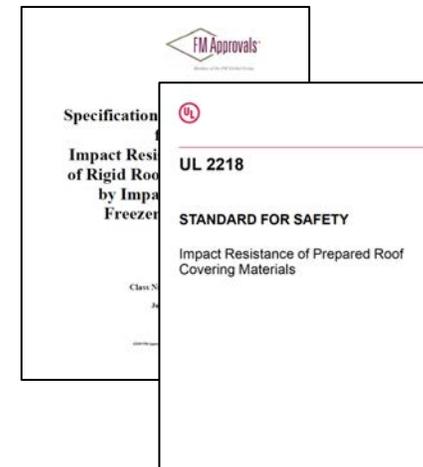
High Wind



Porter, 2023



Hail



Map adapted from: Brunet, D., & Brimelow, J. (2024). A Hail Climatology for Canada Using a Lightning Proxy. *Journal of Applied Meteorology and Climatology*, 63(10), 1227-1240.

How do we implement resilience for homes?

Resilient Homes Task Force (Dec. 2025)

Home Building Industry		Insurance Industry	
Alex Miller	CEO, Big Block Construction	Susan Penwarden	Managing Director, Personal Lines, Aviva Canada
Rick Weste	President & CEO, Triple M Housing	Lisa Guglietti	Executive Vice President & Chief Operating Officer, P&C Insurance Solutions, Co-operators
Cassidy deVeer	President, 3 rd Generation Homes	Anna McCrindell	SVP, Chief Operations Officer-East, Wawanesa
Jamie Yokowski	Doug Tarry Homes Ltd.	Dipika Deol	Senior Client Manager for Public Sector Solutions, Swiss Re
Bob Deeks	President, RDC Fine Homes	Rachel Barry	Insurance Bureau of Canada
Peter Darlington	Solar Homes Inc.	Peter Braid	CEO, IBAC



RHTF Meeting - Toronto, Dec. 8 2025

Roadmap for Mass Adoption of Resilience Options

Timeframe	Short-term	Medium-term	Long-term
	Year 1	Year 2	2 to 5 years+ (beyond TF timeline)
Visions of Success	Builders and insurers are ready to initiate pilot projects and are well-versed in resilience options.	Builders and insurers understand cost-effective options; Pilot projects facilitate wider adoption; Resilience options are endorsed by insurers.	Builders and insurers are ready to drive and facilitate widespread adoption of resilience throughout the entire homeowner supply chain, nationwide.
	Creation and	Guidelines	uation and mass adoption
	<ol style="list-style-type: none"> Guidance documents for builders Collaboration for builder training Paper pilots for resilience integration 	<ol style="list-style-type: none"> Strategy to facilitate adequate number of builders well-versed in resilience measures Authentication of essential technical details (e.g., costing) from residential resilience pilots 	<ol style="list-style-type: none"> Nationwide training of builders Mass adoption of residential resilience across Canada
	<ol style="list-style-type: none"> Home resilience promotion materials 	<ol style="list-style-type: none"> Strategies for increasing demand from homeowners 	<ol style="list-style-type: none"> Consistent implementation of resilience literacy
	<ol style="list-style-type: none"> Standardized criteria for resilience labels Evaluation of incentives for resilience labels 	<ol style="list-style-type: none"> Addition of resilience into the Net Zero label Work toward insurance endorsement of builders and the resilience label 	<ol style="list-style-type: none"> Insurance industry policy endorses resilience-certified builders Industry adoption of resilience incentives
	<ol style="list-style-type: none"> Policy and funding proposals Public communication of Task Force and its objectives 	<ol style="list-style-type: none"> Calls to action towards regional collaborators, industry and governments Press releases of Task Force's project developments 	<ol style="list-style-type: none"> Institutionalization of residential resilience nationwide

Stay agile and responsive, and always be on the outlook for potential disruptions that could require project adjustments, accelerate adoption and uptake, while ensuring ongoing relevance and effectiveness by rapidly responding to market signals.

RHTF Resilience Guidance Material

Tiers



Resilient
Homes
Task
Force

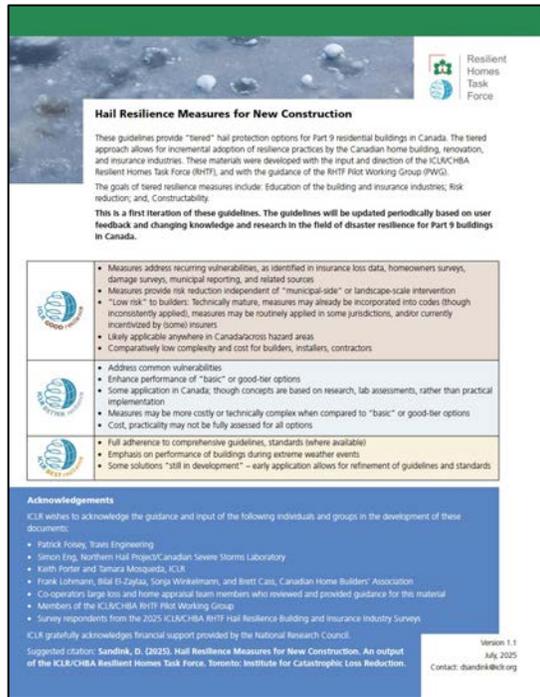
Convert resilience guidance, standards into usable resources – prioritization

Goals: Risk reduction, constructability

Good 	Better 	Best 
<ul style="list-style-type: none">• Address <i>recurring</i> vulnerabilities• “Low risk” to builders: Technically mature• Incentivized by (some) insurers• Comparatively low complexity and cost	<ul style="list-style-type: none">• Enhance performance of “basic” options• Some application in Canada; concepts based on research, lab assessments• Measures may be more costly or technically complex when compared to “basic” options	<ul style="list-style-type: none">• Full adherence to comprehensive guidelines, standards• Emphasis on performance of buildings during extreme weather events• Some solutions “still in development” or experimental

RHTF Resilience Guidelines

Introductory material



Hail Resilience Measures for New Construction

These guidelines provide "tiered" hail protection options for Part 9 residential buildings in Canada. The tiered approach allows for incremental adoption of resilience practices by the Canadian home building, renovation, and insurance industries. These materials were developed with the input and direction of the ICLU/CHBA Resilient Homes Task Force (RHTF), and with the guidance of the RHTF Pilot Working Group (PWG).

The goals of tiered resilience measures include: Education of the building and insurance industries; risk reduction; and, Constructability.

This is a first iteration of these guidelines. The guidelines will be updated periodically based on user feedback and changing knowledge and research in the field of disaster resilience for Part 9 buildings in Canada.

- Measures address recurring vulnerabilities, as identified in insurance loss data, homeowners surveys, damage surveys, municipal reporting, and related sources
- Measures provide risk reduction independent of "municipal-side" or landscape-scale intervention
- "Low risk" to builders: technically mature, measures may already be incorporated into codes (though inconsistently applied), measures may be routinely applied in some jurisdictions, and/or currently incentivized by some insurers
- Likely applicable anywhere in Canada across hazard areas
- Comparatively low complexity and cost for builders, installers, contractors

- Address common vulnerabilities
- Enhance performance of "basic" or good-tier options
- Some application in Canada, though concepts are based on research, lab assessments, rather than practical implementation
- Measures may be more costly or technically complex when compared to "basic" or good-tier options
- Cost, practicality may not be fully assessed for all options

- Full adherence to comprehensive guidelines, standards (where available)
- Emphasis on performance of buildings during extreme weather events
- Some solutions "still in development" – early application allows for refinement of guidelines and standards

Acknowledgements

ICLR wishes to acknowledge the guidance and input of the following individuals and groups in the development of these documents:

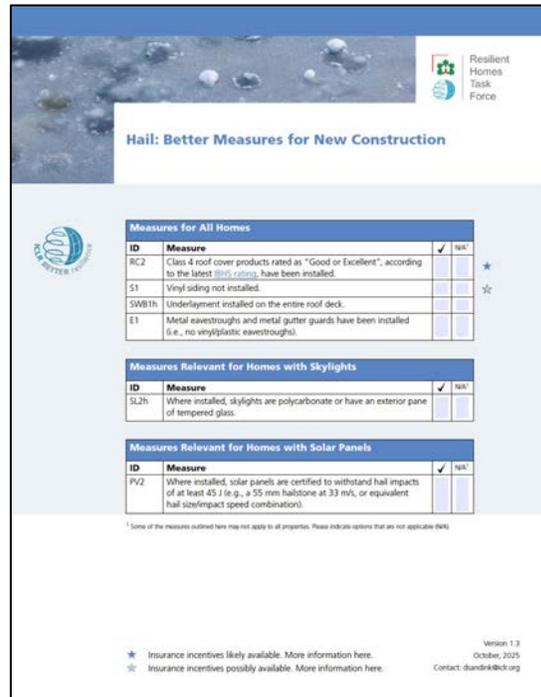
- Patrick Foley, Trane Engineering
- Simon Eng, Northern Hail Project/Canadian Sewere Storms Laboratory
- Keith Porter and Tamara Motaqadda, ICLR
- Frank Lohmann, Bill El-Zayyat, Sonya Warkkelmann, and Brett Cais, Canadian Home Builders' Association
- Co-operators Urga loss and home appraisal team members who reviewed and provided guidance for this material
- Members of the ICLU/CHBA RHTF Pilot Working Group
- Survey respondents from the 2025 ICLU/CHBA RHTF Hail Resilience Building and Insurance Industry Surveys

ICLR gratefully acknowledges financial support provided by the National Research Council.

Suggested citation: Sandink, D. (2025). Hail Resilience Measures for New Construction. An output of the ICLU/CHBA Resilient Homes Task Force. Toronto: Institute for Catastrophic Loss Reduction.

Version 1.1
July 2025
Contact: dundrik@iclr.org

High-level checklists



Hail: Better Measures for New Construction

Measures for All Homes

ID	Measure	✓	N/A	☆
RC2	Class 4 roof cover products rated as "Good or Excellent", according to the latest HMR ratings , have been installed.			☆
S1	Vinyl siding not installed.			☆
SWBth	Underlayment installed on the entire roof deck.			
E1	Metal eavestroughs and metal gutter guards have been installed (i.e., no vinyl/plastic eavestroughs).			

Measures Relevant for Homes with Skylights

ID	Measure	✓	N/A
SL2h	Where installed, skylights are polycarbonate or have an exterior pane of tempered glass.		

Measures Relevant for Homes with Solar Panels

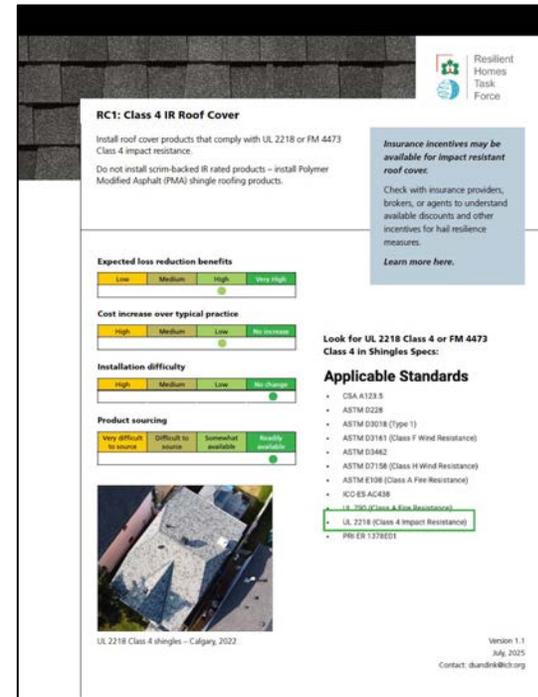
ID	Measure	✓	N/A
PV2	Where installed, solar panels are certified to withstand hail impacts of at least 45 J (e.g., a 55 mm hailstone at 33 m/s, or equivalent hail size/impact speed combination).		

* Some of the measures outlined here may not apply to all properties. Please indicate options that are not applicable (N/A).

- ☆ Insurance incentives likely available. More information here.
- ☆ Insurance incentives possibly available. More information here.

Version 1.1
October, 2025
Contact: dundrik@iclr.org

Tech sheets



RC1: Class 4 IR Roof Cover

Install roof cover products that comply with UL 2218 or FM 4473 Class 4 impact resistance.
Do not install scrim-backed IR rated products – install Polymer Modified Asphalt (PMA) shingle roofing products.

Insurance incentives may be available for impact resistant roof cover.

Check with insurance providers, brokers, or agents to understand available discounts and other incentives for hail resilience measures.

Learn more here.

Expected loss reduction benefits

Low	Medium	High	Very High
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Cost increase over typical practice

High	Medium	Low	No increase
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Installation difficulty

High	Medium	Low	No change
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Product sourcing

Very difficult to source	Difficult to source	Somewhat available	Highly available
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Look for UL 2218 Class 4 or FM 4473 Class 4 in Shingles Specs:

Applicable Standards

- CSA A123.5
- ASTM D228
- ASTM D3018 (Type 1)
- ASTM D3163 (Class F Wind Resistance)
- ASTM D3443
- ASTM D2718 (Class H Wind Resistance)
- ASTM E108 (Class A Fire Resistance)
- ICC-ES AC408
- ICC-ES AC409
- UL 2218 (Class 4 Impact Resistance)
- IBC E1378E01

UL 2218 Class 4 shingles – Calgary, 2022

Version 1.1
July 2025
Contact: dundrik@iclr.org

Insurance incentives



Insurance incentives are available if you protect your roof and siding from hail damage!

ASK YOUR INSURER OR BROKER! They may offer a combination of incentives to protect your home from hail.

This document offers general guidance. Always consult your insurance provider/broker to determine how hail protection may impact your coverage or premiums.

Premiums	Premium reductions could potentially range from \$100s to \$1,000s per year, depending on where your home is located.
Deductibles	Some insurance companies may give you a much lower deductible if your home has hail protection. This could save you thousands of dollars if your home is ever damaged and you need to make a claim.
Availability	In some cases, not having protective measures in place may make it harder to obtain insurance coverage in high-risk areas.
Financial subsidies	Some insurance companies give money to help pay for hail protection, like stronger roofing or siding. Depending on the company, this help could be worth thousands of dollars. These subsidies are typically available after a loss.
Depreciation schedules	As your roof or siding gets older, many insurance companies pay less to fix or replace it – this is called depreciation. If you use stronger, hail-resistant materials, they might reduce the cut or delay depreciation, meaning you will get a better payout if you have to make a claim in the future. Ask your insurer how this works for your home.

If you live in southern Alberta, your home is at risk of hail damage!

Many regions in Alberta are likely to experience at least one – and potentially several – severe hail events over the next 10 years ([see this map](#)).

Talk to your insurer or broker about possible incentives, which may be available anywhere in Alberta.

Products that might be eligible for insurance incentives include:

- Class 4 Impact Resistant Roof cover
- Steel, Fibre Cement, Concrete, Brick or Stone Siding

Check with your insurer to confirm what types of products are eligible for incentives – they may consider additional products.

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May 2025
Contact: dundrik@iclr.org

Field trials

BBC: Wildfire



Avalon: Wind, hail



Empire: Wind, flood, hail



RHTF Field Trials



Calgary - Avalon Field Trial



BBC – wildfire, Fernie, BC



Ontario - Empire Field Trial

New Field Trials

Ontario – wind, flood, hail



ICLR-Durham Region

NRC Project – Renovation Field Trials



Documentation & iteration of guidelines



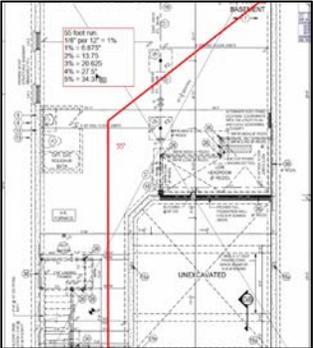
Building Drain, Sewer Slope, run (Nov. 2025)



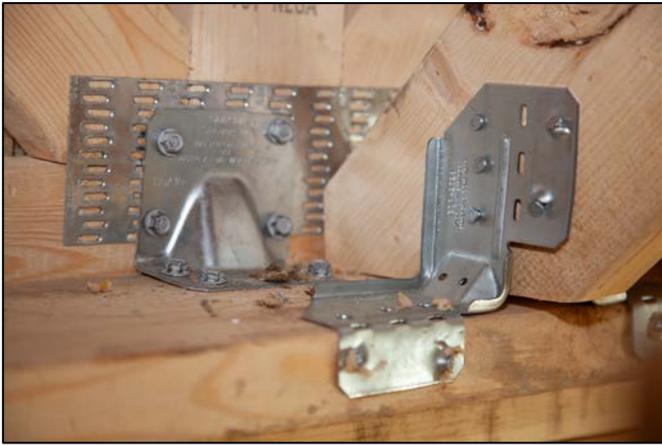
Foundation drain access (Dec. 2025)



Framing (Dec. 2025)



BWV (Nov. 2025)



Gable End Wall Bracing (Jan. 2026)

we will pay additional costs for the use of **eco-efficient material** or **resilient material** in

Resilience impacts on insurance

Hazard

	Premiums	Deduct.	Sub-limits	Avail.	Deprec. schedules	Post-loss resilience subsidy
High Wind					✓	✓
Hail	(✓)	(✓)		(✓)	(✓)	(✓)
Water/ Flood/SB	✓	(✓)	✓	✓		✓
Wildfire	(✓)	(✓)		(✓)	(✓)	

✓ – At least one national insurer in Canada.

(✓) – Applies to some markets/co-benefits with other hazards

All of the above highly dependent on insurer

Resilient material means materials and products that are more resistant to damage and durable than the materials or products that were damaged, which include, but are not limited to:

- Roof and structural strapping;
- Hail resistant shingles;
- Impact resistant windows and doors;
- Water leakage detector;
- Cover for gutters.



Affected materials

The age adjusted cost factor will be applied to the following materials in an insured loss:

- ✓ Asphalt shingles (excluding Class 4 Hail Resistant)
- ✓ Flat roofs made of tar and gravel or membrane
- ✓ Vinyl and/or aluminum siding

Beneva launches the “Rebuild Better” advantage for sustainable and resilient reconstruction

Protect your home. Save money.

The FireSmart BC Wildfire Mitigation Program is pleased to partner with the insurance providers listed below. If your insurance policy is through one of the following providers, you may be eligible for savings upon completion of an assessment and FireSmart certification.



Where applicable, following an insured loss, **TomorrowStrong™** coverage provides reimbursement of up to:

- \$3,000 for eligible resilient roofing upgrades
- Roofing materials and installations that have a Class 4 impact rating (withstands hail up to 2 inches in diameter) and/or Class G or H wind ratings (withstands winds of up to 193 kph and 241 kph) and a Class A Fire rating (fully fire resistant).



tion between a roof truss and wall plate to prevent uplift.

led to security system, sump pump, water alarm, and surge



Stronger Home coverage

We will pay the increased cost to repair or replace your roof or exterior siding with more resilient materials when a loss occurs.

Additional limit
\$25,000

Premium
Varies by region

Resilience Practices – Overview/Examples

Example: Hail, Good

DRAFT

Resilient Homes Task Force

Hail: Good Measures for New Construction

Measures for All Homes

ID	Measure	<input checked="" type="checkbox"/>	N/A ¹
RC1	Class 4 roof cover installed.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
S1	Vinyl siding not installed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Measures for Homes with Skylights

ID	Measure	<input checked="" type="checkbox"/>	N/A ¹
SL1	Acrylic skylight(s) not installed.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Measures for Homes with Solar Panels

ID	Measure	<input checked="" type="checkbox"/>	N/A ¹
PV1	PV panels have passed hail impact test relevant to local hail hazards (IEC 61215 test in low hazard areas, or impact equivalent of 32J in high hazard areas).	<input checked="" type="checkbox"/>	<input type="checkbox"/>

¹ Some of the measures outlined here may not apply to all properties. Please indicate options that are not applicable (N/A).

★ Insurance incentives likely available. More information here.
☆ Insurance incentives possibly available. More information here.

Version 2.1
October, 2025
Contact: dsandink@iclr.org



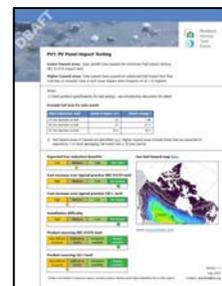
Class 4 IR Roof Cover



Siding (no vinyl siding)



Skylights (where installed)



PV panels (where installed)

Example: Hail, Better

DRAFT

Resilient Homes Task Force

Hail: Better Measures for New Construction

Measures for All Homes

ID	Measure	✓	N/A ¹
RC2	Class 4 roof cover products rated as "Good or Excellent", according to the latest IBHS rating, have been installed.	<input type="checkbox"/>	<input type="checkbox"/>
S1	Vinyl siding not installed.	<input type="checkbox"/>	<input type="checkbox"/>
SWB1	Underlayment installed on the entire roof deck.	<input type="checkbox"/>	<input type="checkbox"/>
E1	Metal eavestroughs and metal gutter guards have been installed (i.e., no vinyl/plastic eavestroughs).	<input type="checkbox"/>	<input type="checkbox"/>

Measures Relevant for Homes with Skylights

ID	Measure	✓	N/A ¹
SL2	Where installed, skylights are polycarbonate or have an exterior pane of tempered glass.	<input type="checkbox"/>	<input type="checkbox"/>

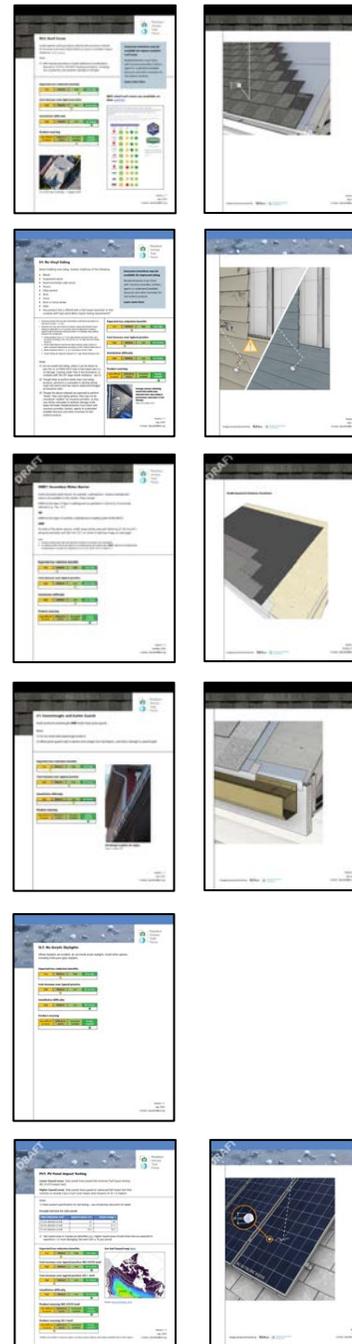
Measures Relevant for Homes with Solar Panels

ID	Measure	✓	N/A ¹
PV2	Where installed, solar panels are certified to withstand hail impacts of at least 45 J (e.g., a 55 mm hailstone at 33 m/s, or equivalent hail size/impact speed combination).	<input type="checkbox"/>	<input type="checkbox"/>

¹ Some of the measures outlined here may not apply to all properties. Please indicate options that are not applicable (N/A).

★ Insurance incentives likely available. More information here.
☆ Insurance incentives possibly available. More information here.

Version 1.2
October, 2025
Contact: dsandink@iclr.org



Class 4 IR Roof Cover – IBHS Rated

Siding – enhanced products

Full-course underlayment

Eavestroughs

Skylights

PV Panels – hail impact testing

Example: Wind, Good



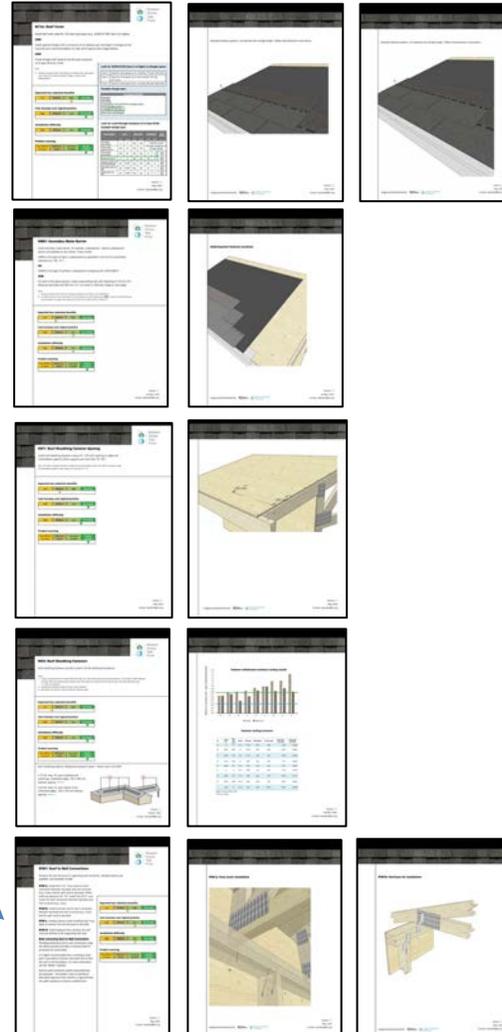
Resilient Homes Task Force

High Wind: Good Measures for New Construction



Measures for All Homes			
ID	Measure	✓	N/A
RC1w	Roof cover is rated for high wind speeds (120 mph/193 kmph), with six fasteners, and with a pull-through resistance of at least 30 lbs.		
SWB1	Underlayment or secondary water barrier is installed on entire roof deck.		
RSF1	Roof sheathing fasteners are installed 6" apart (along edges and intermediate supports).		
RSF2	Roof sheathing fasteners are at least 2 1/4" in length.		
RTW1	The roof structure is tied to supporting walls through application of hurricane ties, truss screws, or related alternative (roof to top-plate, and top-plate to stud).		

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October, 2025
Contact: dsandink@iclr.org



High wind rated shingles (most laminate products already comply)

Underlayment & tighter fastener patterns

Sheathing fastener patterns (additional nails)

Sheathing fastener length (2 1/4" length)

Truss-to-top plate connections

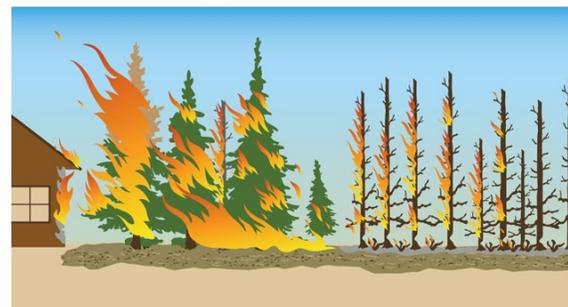
Wildfire: Building ignition



Convection/Transport of Embers



Radiant Heat



Conduction/Direct Flame Contact

Figure 2-2: Spot fires ignited by embers effectively spread fire in both wildland (lower left) and urban fuels (lower right)



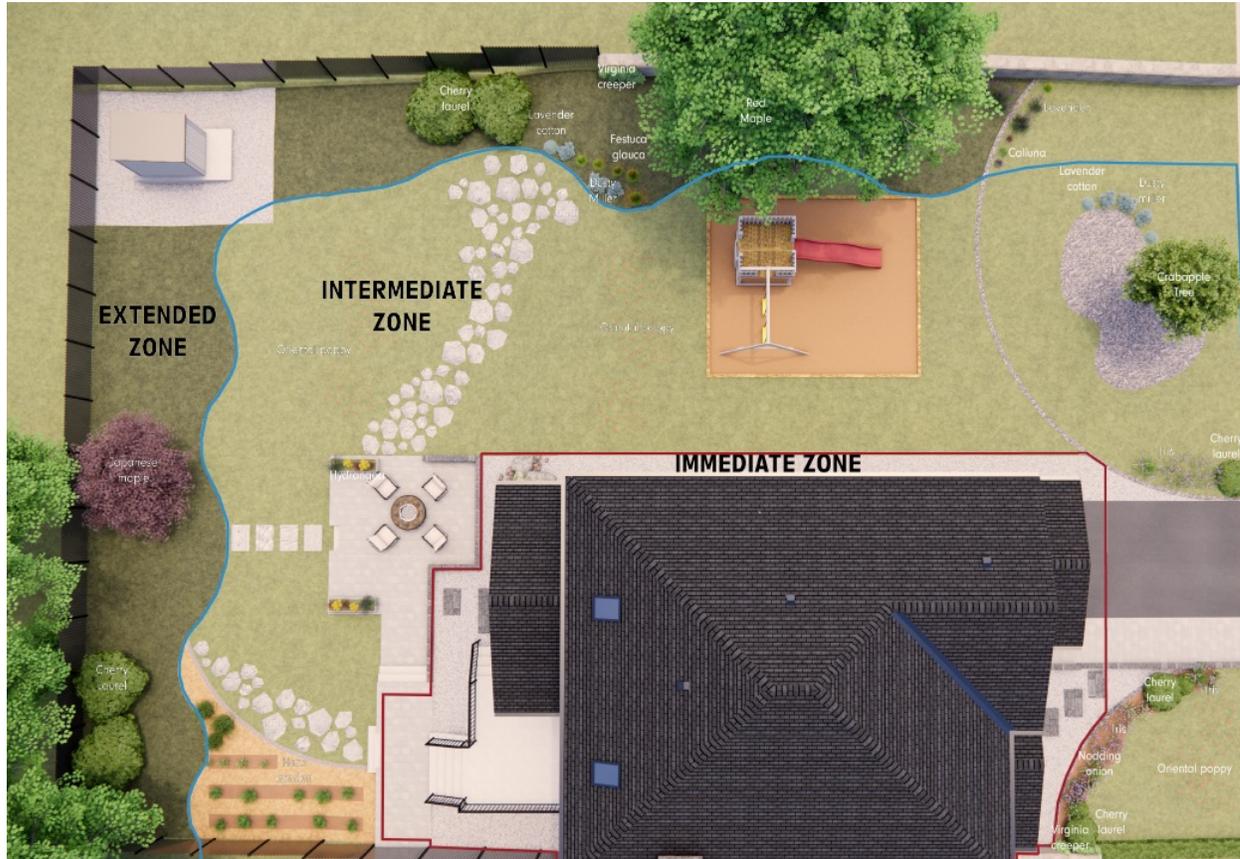
[Photo Credits: Bill Bereska]



[John Gibbins/U-T San Diego/ZUMA Press]

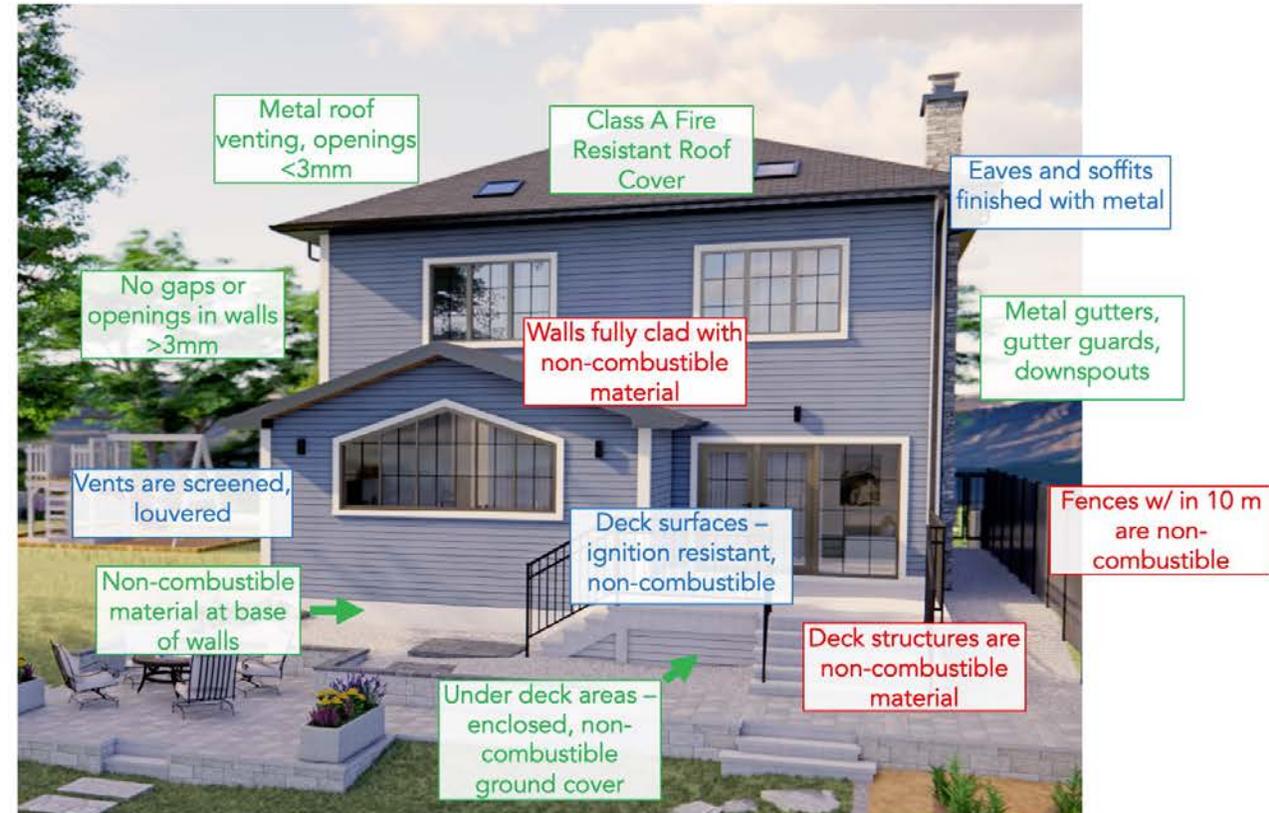
Source: A. Westhaver, 2017: Why some homes survived: Learning from the Fort McMurray wildland/urban interface fire disaster. ICLR.

Manage fuel, protect the building (envelope)



Fully FireSmart Compliant Home (i.e., RHTF "Best"-- Images: ICLR, 2024)

It's not all steel and concrete!



Images: ICLR

Empire Field Trial - Basement Flood Resilience

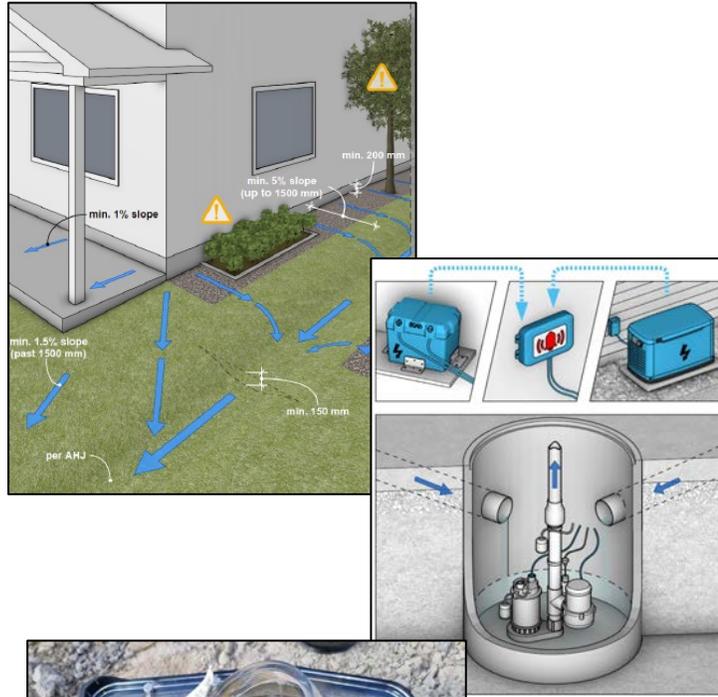
Local Considerations			
ID	Measure	✓	N/A ¹
L1	The home is not known to be vulnerable to groundwater flooding	✓	✓
L2	The home is not located in an area known to be exposed to river, urban, coastal, or pluvial flood hazards	✓	✓

Lot Grading and Drainage			
ID	Measure	✓	N/A ¹
LGD1	Appropriate, local requirements for lot grading and drainage are applied	✓	✓
LGD2	The home does not have a reverse slope driveway	✓	✓
LGD3	Surface drainage features (e.g., catch basins, area drains) are not connected to sanitary or combined sewers	✓	✓
ES1	Exterior stairwells do not increase risk of flooding	✓	✓
ED1	Downspouts are not connected to sanitary or combined sewer systems	✓	✓
ED2	Downspouts draining to the surface discharge to a defined, unobstructed path that reliably carries water away from the building	✓	✓

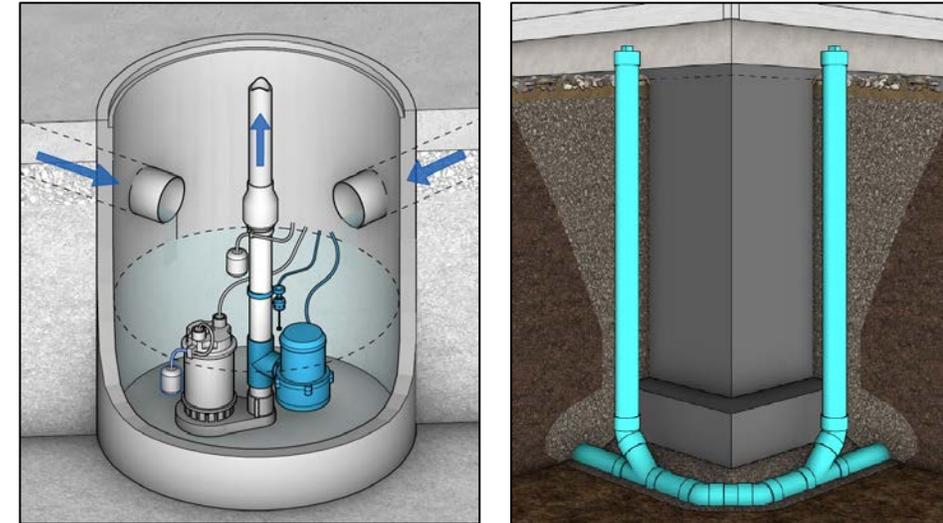
Foundation Drainage Systems			
ID	Measure	✓	N/A ¹
FD1	Foundation drainage systems do not discharge to sanitary or combined systems	✓	✓
SP1	A backup power source is provided for sump pump(s)	✓	✓
SP2	An alarm system is provided to notify building occupants of primary sump pump failure	✓	✓
SP3	Sump pits are accessible for maintenance and inspection	✓	✓
SP4	A dedicated receptacle/circuit is provided for sump pump(s)	✓	✓
SP5	Check valve(s) are incorporated into sump pump discharge pipe(s)	✓	✓
SP6	Sump pump discharge is appropriately drained (when directed to drain to the surface)	✓	✓
SP7	Sump pumps are supplied with pendulum floats or pressure switches, with no risk of interference with the float	✓	✓
SP8	Sump pump maintenance guidance is provided to buyer/occupant	✓	✓

Sewer Backwater Protection			
ID	Measure	✓	N/A ¹
SB1	Sanitary sewer backwater protection is installed (e.g., backwater valve[s])	✓	✓
SB2	Backwater valve(s) close automatically	✓	✓
SB3	Backwater valve(s) are accessible for maintenance	✓	✓
SB4	Backwater valve maintenance guidance is provided to the buyer/occupant	✓	✓
SB5	Backwater valve(s) are appropriately graded based on manufacturers' guidance	✓	✓

Good: Lot grading and drainage, backup power for sumps, sewer backflow protection (much of this required locally already)



Better: Secondary sump pump, means of access for foundation drainage for inspection, maintenance, protection of foundation drainage system from silt/blockage



Incremental cost for "good" level:
\$1,754 for backup power and alarm

Call to action

Please review the resilience guidance documents – comments, feedback, questions: dsandink@iclr.org

Contact us for more discussion – we are happy to work with builders, renovators that are interested in exploring resilience options.

2026-2028 – ICLR renovator field trials in partnership with CHBA

RHTF outputs will be continuously posted to: www.iclr.org/resilient-homes-task-force

