SEVERE STORMS

Risks to Buildings, Occupant Safety & Environment

- Loss of structural integrity due to increased moisture and compromised drainage
- Greater strain on building material fixtures, claddings and fasteners
- Potential utility service interruption due to increased energy usage
- Impact damage (mostly roofs, guttering, windows) and subsequent rain/moisture penetration
- Decreased indoor air quality and associated risk to human health due to increased humidity, condensation, mould

Site Strategies

Strategy	Cost	Impact	Alignment
Make use of past tree fall/structural damage incidents to find common elements and identify high risk situations	$	**	
Identify potential objects, structures, apartments that may be threatened by severe storms (e.g. wires, trees, telephone poles, shutters, HVAC)	$	***	
Plan and site the building to avoid wind tunnel effects	$	***	
Increase use of greenery that is resilient to storm surges (where applicable)	$	***	

Design Strategies

Strategy	Cost	Impact	Alignment
Mitigate increased wind load by aerodynamically efficient structures to reduce deflection and resonance, including curved corners, minimized eave overhangs, dynamic stabilisation systems, and better foundation design. For Part 9 buildings, ensure continuous vertical load path in the structure	$$	***	
Design roof structures to withstand extreme winds by selecting a hip roofs (for houses), hurricane ties, roof-to-wall connectors, and/or plywood sheathing	$$	***	
Ensure roof materials are adequately fixed and roof assemblies are braced and securely connected to walls. Make use of stiffer structural framework sealants to reduce flexure in storms	$$	***	
Consider increased snow loads in building design in areas forecasting heavier snowfalls	$$	*	
Select impact-resistant building materials, external claddings and glazing where continous load path may be insufficient to protect the structure	$$	***	
Avoid mass and barrier exterior wall designs that provide poor performance related to moisture protection	$	**	
Use pressure-moderated rainscreen walls to shed water at the face with back-up drainage. For high-rise buildings, consider pressure-equalized rainscreen walls for exterior walls	$$	***	
Ensure envelope components, such as vapour permeable air barriers, allow for drainage and two-way drying via ventilation, evaporation or diffusion, paying special attention to details and junctions.	$$	***	
During upgrades to existing buildings, provide continuous insulation outboard of the structure to reduce potential for condensation inside of cavities by elevating cavity surface temperatures above the dew point of the indoor air	$$	***	
Ensure façades are able to deflect increasing precipitation loads via overhangs and recessed windows. Consider potential hail damage to roofing, siding and windows	$$	***	
Ensure backup power for 72 hours is available for critical systems and areas (ICI)	$$$	***	
Design common building areas (e.g. amenity rooms) to act as refuge areas	$	***	
Provide energy efficient emergency lighting in highly trafficked areas	$	**	
Install outdoor water fixtures capable of operating on water pressure (i.e. without electricity) in a location easily accessible to building occupants	$	***	

Severe weather – thunderstorms, hail, blizzards, ice storms, high winds or heavy rains – can occur without warning in any season. These events often lead to loss of utility services, including storm and sanitary management and energy supply. Storms can also present problems to building enclosure systems designed to keep moisture outside of buildings and interior spaces sheltered. Ensuring structures can withstand anticipated future conditions should be prioritized over designing for peak conditions of past storm events. In many areas of BC, increasingly warmer temperatures will make more moisture available for storm systems, resulting in higher rates of precipitation overall, and more frequent, severe and prolonged storm events. Several design and operations strategies can be used to mitigate the impact of these events.

Design Strategies

Strategy	Cost	Impact	Alignment
Ensure renewable energy systems (e.g solar PV) are designed to withstand extreme wind or precipitation	$$	***	
Explore opportunities for the use of low-tech, adaptive heating/cooling strategies (e.g. earth tubes, geo-exchange, cross-ventilation, PV, wind) that can operate during storm events	$$	***	

Operations Strategies

Strategy	Cost	Impact	Alignment
Establish a maintenance schedule for structural fixings to ensure they do not become worn, loosened, corroded or warped from previous storm events	$	***	
Inspect building regularly for signs of moisture damage, waterproofing performance and proper drainage around building	$	***	
Identify and remove debris that may prevent emergency vehicle access	$	**	

Power Outages & Emergencies · Chronic Stressors · Flood Events · Seismic Events · Fire at the Urban Interface · Heat Waves

Relative Cost/ Cost Premium

Low	Medium	High
$	$$	$$$

Relative Impact

Low	Medium	High
*	**	***

Community Benefits

Consider the following strategies to help improve the resilience of the community overall:

- Provide a resilient potable water supply in site design to allow for universally accessible drinking water
- Design amenity rooms to act as refuge areas for at-risk community members (e.g. seniors) and a central location for emergency support and services.
- Provide occupant education on refuge areas, evacuation measures, exit locations, etc. in multiple languages according to building occupancy
- Designate building or community members with first aid or other experience as emergency coordinators
- Ensure building and community members have access to key information and contact details

Potential Design Conflicts

Take care and ensure resilient strategies do no exacerbate vulnerability and other risks

- Vegetation setbacks may eliminate benefits associated with trees for shading and heat island reduction
- Building designs intended to mitigate the impact of high winds can reduce the effectiveness of natural ventilation systems

Additional Resources

- The Resilience-based Earthquake Design Initiative (REDi™) Rating System
- Minimum Backup Power Guidelines for MURBs
- Enterprise Green Communities' Strategies for Multifamily Building Resilience
- Enhancing the Livability and Resilience of Multi-Unit Residential Buildings (MURBs), MURB Design Guide
- Protect Your Home From Hail