

MIND your business



Institute for Catastrophic
Loss Reduction

Building resilient communities

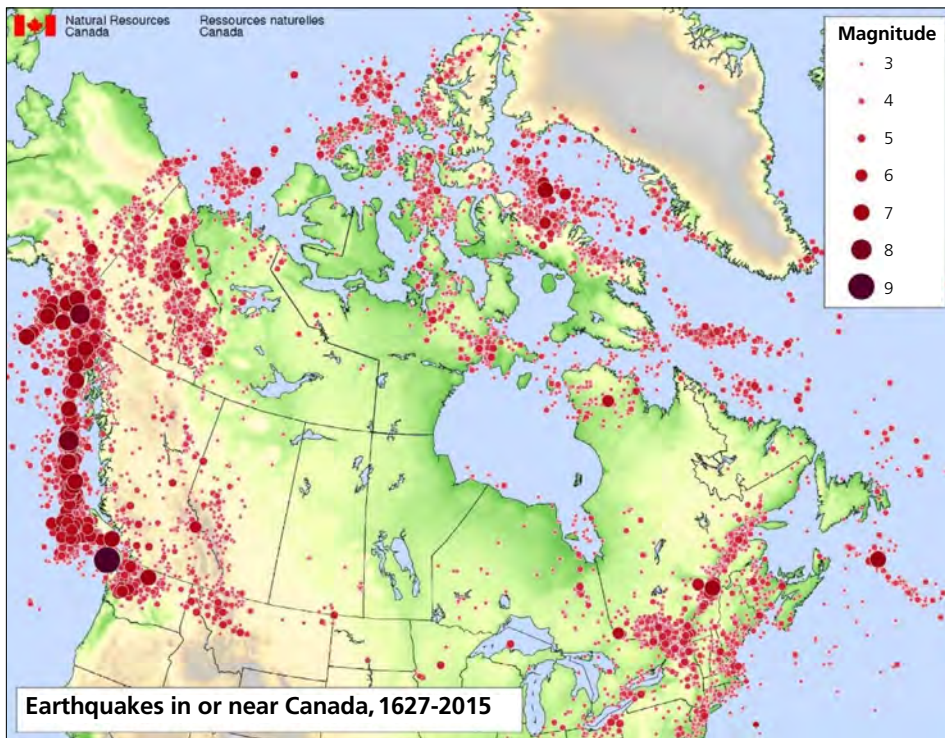
ICLR Commercial Bulletin

ISSUE 4 • MAY 2022

Fire following earthquake and high-rise buildings

Canada experiences up to 5,000 earthquakes each year, most of them small but some large and – sometime in the future – likely catastrophic. While all provinces and territories have some degree of earthquake risk, the western and southwestern regions of British Columbia are most at risk. Other at-risk areas include the St. Lawrence and Ottawa River valleys.

The Lower Mainland region of British Columbia is exposed to significant earthquake hazard with shaking that could cause significant damage to ordinary buildings and infrastructure. Indeed, in January 1700, the region suffered a magnitude 9 (approximate) subduction earthquake, which generated a tsunami that reached Japan. In December 1949, a magnitude 8.1 event off the Queen Charlotte Islands was widely felt throughout the Pacific Northwest and caused property damage across the region. In June 1886, the Great Vancouver Fire, a non-earthquake-related conflagration, took 21 lives and destroyed 600 to 1,000 structures. >

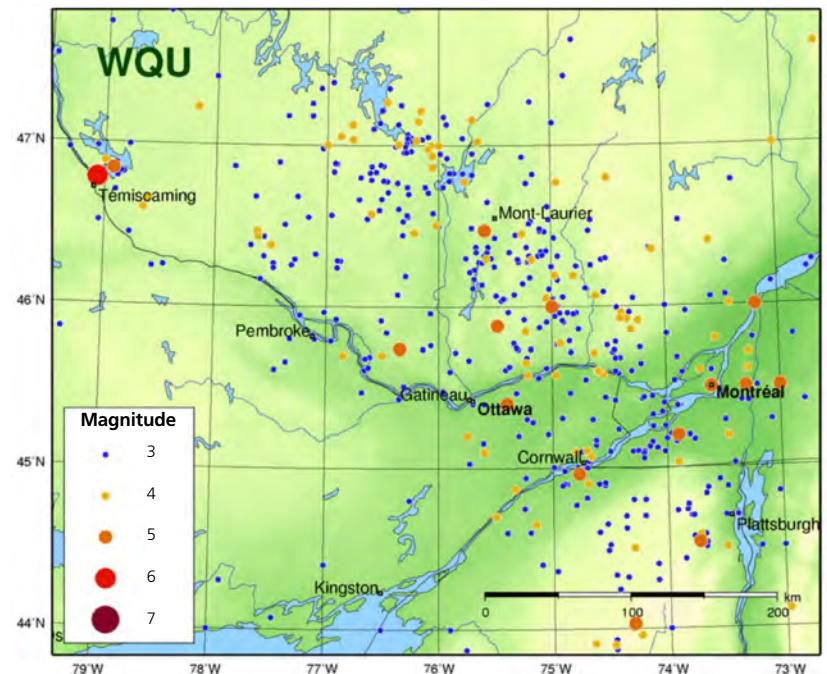


Historical seismicity of Canada.
(Source: Geological Survey of Canada)

The Ottawa/St. Lawrence Valley corridor is also exposed to significant earthquake hazard with shaking that could also cause significant damage to ordinary buildings and infrastructure. Indeed, the region suffered a magnitude 5.8 in a 1732 earthquake which shook Montreal strongly and caused significant damage. In 1852 the city lost half its housing in a Great Fire.

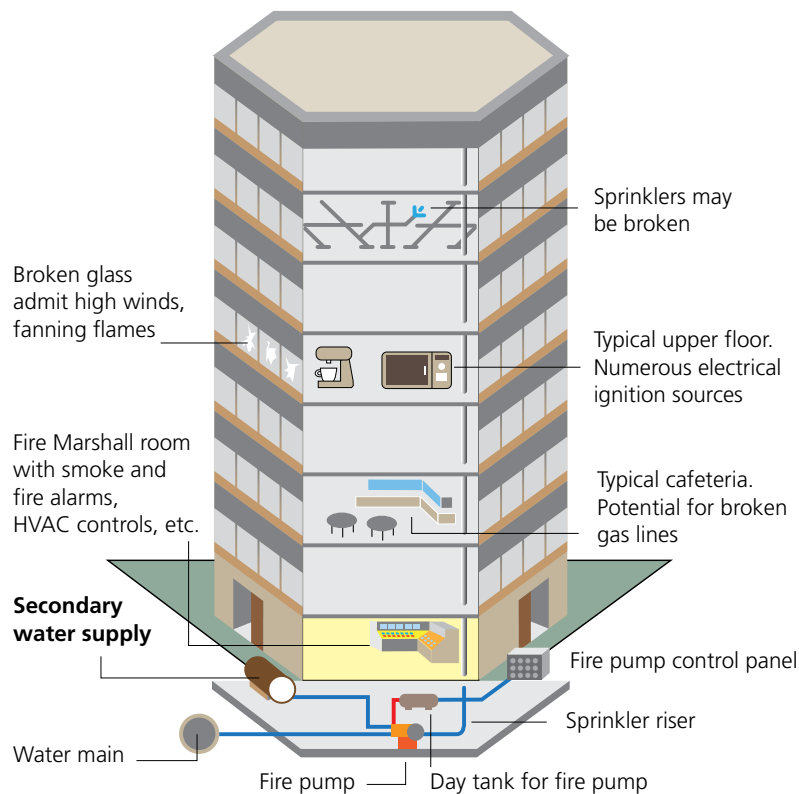
Fire services in these regions are modern, advanced, well-equipped and of a high caliber in their organization, methods and tactics. The earthquake risk is understood and is well-addressed in the Vancouver area, but less so in the Montreal area.

However, damage from fire following an earthquake can greatly exceed the damage caused by shaking alone. This, despite the best efforts of the fire service that can easily be overwhelmed during a large earthquake and fire following event.



The pattern of historical seismic activity recorded by the Canadian seismograph network since the beginning of the century shows the earthquakes concentrating in two sub-zones: one along the Ottawa River and the second along a more active Montreal-Maniwaki axis.
(Natural Resources Canada, Earthquake Zones in Eastern Canada)

High-rise building and post-earthquake fire aspects. Secondary water supply is required in seismic zones in U.S. because it is anticipated water mains may fail. If mains fail, sprinklers have no supply (Scawthorn 1989).



Consider secondary water supply for high-rise buildings

High-rise buildings are particularly vulnerable to fires at all times and fire departments depend to a great extent on sprinkler systems. However, sprinkler systems in Canada typically depend on the underground water distribution system for supply and, if that system fails in an earthquake, sprinklers will be left without water and fires can grow unimpeded.

Because of the risk of fires in high-rise buildings after an earthquake, building codes in the United States for decades have required high-rise buildings in high seismic zones to have a secondary water supply, typically a 60,000-litre tank located in the basement or mechanical room near the backup fire pump.

The Institute for Catastrophic Loss Reduction recommends that the Vancouver Building Code, the Provincial Building Codes in British Columbia and Quebec, and the Canadian National Building Code include a provision for high-rise building secondary water supply in high seismicity areas.

Barring formalized building code changes (and to be sure to consider existing construction) ICLR encourages owners/managers of high-rise buildings that are located in high seismicity zones to consider voluntarily installing tanks and the necessary pumps and other equipment to ensure that high-rises have adequate access to emergency firefighting water in the event that the primary firefighting system fails in an earthquake.



Example of a 60,000 litre (15,000 gallon) steel secondary water supply tank. Tanks such as these are commonly anchored to the floor to prevent them from sliding or tipping during an earthquake.

Institute for Catastrophic Loss Reduction

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.

30-34 Duncan Street
Toronto, Ontario
M5V 2C3
T 416-364-8677
www.iclr.org
www.PIEVC.ca

Western University
Amit Chakma Building, Suite 4405
1151 Richmond Street
London, Ontario, Canada
N6A 5B9
T 519-661-3234
F 519-661-4273
www.iclr.org