

# BC Building Code and Earthquake Safety



British Columbia's Building Code regulates the design and construction of buildings to help keep people and communities safe. The province has some of the highest earthquake hazards of any province in Canada, particularly along the coast. As a result, the code contains provisions that require new buildings to be designed to withstand the effects of earthquakes.

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## Seismic Provisions for New Buildings

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British Columbia is a large and geographically diverse province. Seismic hazard varies across the province, covering the entire range from low to high risk. As a result, the BC Building Code has different seismic design considerations for buildings in different regions of the province.

Buildings are not designed to be earthquake-proof. Seismic provisions in the code are intended to protect life and safety, allowing people to escape buildings even when damaged. A new building designed to code is designed to withstand a moderate earthquake without significant structural damage and a major earthquake without collapsing.

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## Earthquake Resistant Building Design

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During an earthquake the ground shakes, causing a building to sway. To withstand this movement, a new building will have a structural system strong enough to carry the earthquake forces yet flexible enough to respond to the ground motion without losing its strength.

To achieve this, a building's structural system and its foundation are designed after considering a number of factors that include soil type, building height, and materials as well as the seismic hazard of the site based on data from the Geological Survey of Canada.

Non-structural components such as mechanical units and architectural elements like balconies are also considered and taken into account when designing the structure.

## Developing the B.C. Building Code

The seismic provisions in the B.C. Building Code are adopted from the National Building Code (NBC) of Canada that is updated every five years to bring in new information.

The seismic provisions in the code are reviewed continuously as lessons are learned from seismic events all over the world and new best practices and research findings emerge.

They incorporate current and leading-edge knowledge, practice and technologies in seismology and engineering from North America and around the world.

All levels of government, academic experts and industry professionals including engineers and seismologists contribute to the development of the National Building Code.

When B.C. develops building code provisions that vary from the NBC, the Province ensures that seismic risks are addressed. As an example, when new regulations allowed for wood frame residential buildings up to six-storeys, the province supported a full-scale shake-table test of a six-storey wood frame building.

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## Questions and Answers

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### **To what magnitude of earthquake are buildings designed?**

The BC Building Code does not use earthquake intensity scales like the Richter magnitude scale as a direct design parameter. Magnitude is one of many factors that influence building performance. The seismic hazard levels specified in the code take into account factors like the distance from the building site to possible sources of earthquakes, past earthquake activity and geological structure.

### **Are older buildings safe?**

Seismic design has been included in the building code since the 1950s. The requirements have changed over the years as our understanding of earthquakes and their effects on buildings has evolved and improved. Yet, just because a building was built to older seismic building code provisions does not automatically mean that it is inadequate. Many factors contribute to the seismic risk of an existing building, including condition of the building, construction materials used, and how the structural components are connected.

### **Can older buildings be prepared for a seismic event?**

Older buildings can be retrofitted to improve their performance. For example, older masonry walls can be tied back to the floors to prevent collapse during an earthquake. To accurately determine its seismic risk, a building should be assessed by a qualified structural engineer who will take into account how the building was constructed, as well as its current condition, and recommend any building upgrades.

### **What else can be done to prepare a building for a seismic event?**

There are many other steps that building owners and occupants can take to prepare for a seismic event, such as planning evacuation routes, tying down hot water tanks and securing heavy furniture.

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## Further Resources:

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For more information about earthquake preparedness in British Columbia visit: [www.pep.bc.ca](http://www.pep.bc.ca)

To view the shake table test of a six-storey wood-frame building: <http://www.housing.gov.bc.ca/info>

Geological Survey of Canada: <http://earthquakescanada.nrcan.gc.ca>

National Building Code: <http://www.nationalcodes.ca>

BC Association of Professional Engineers: <http://www.apeg.bc.ca>