THE EFFECTS ON INSURANCE TO VALUE (ITV) OF SEISMIC BUILDING CODE CHANGES: BC FOCUS

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The Effects on ITV of Seismic Change

1 Overview

In British Columbia, we live in a seismically active area and are constantly hearing about the potential for the "Big One".

Of course, working in the Insurance field in Western Canada everyone is aware to some degree of the need to build structures that can withstand the effects of ground tremors or "shaking".

When considering the cost of reconstruction many factors come into the equation. Some of these costs have changed very little year after year. However, major changes made in 2012 to the BC Building code have added to the reconstruction cost significantly for many homes, particularly those located in all parts of the Southwestern area of the province.

The next few pages, and this InspekTech Edu Series™ talk, will provide a brief overview (and greater explanation!) in more generalized terms as to the "why" behind changes in the BC Building Code that have, or will, affect homes and especially those that range into the High Value home grid.

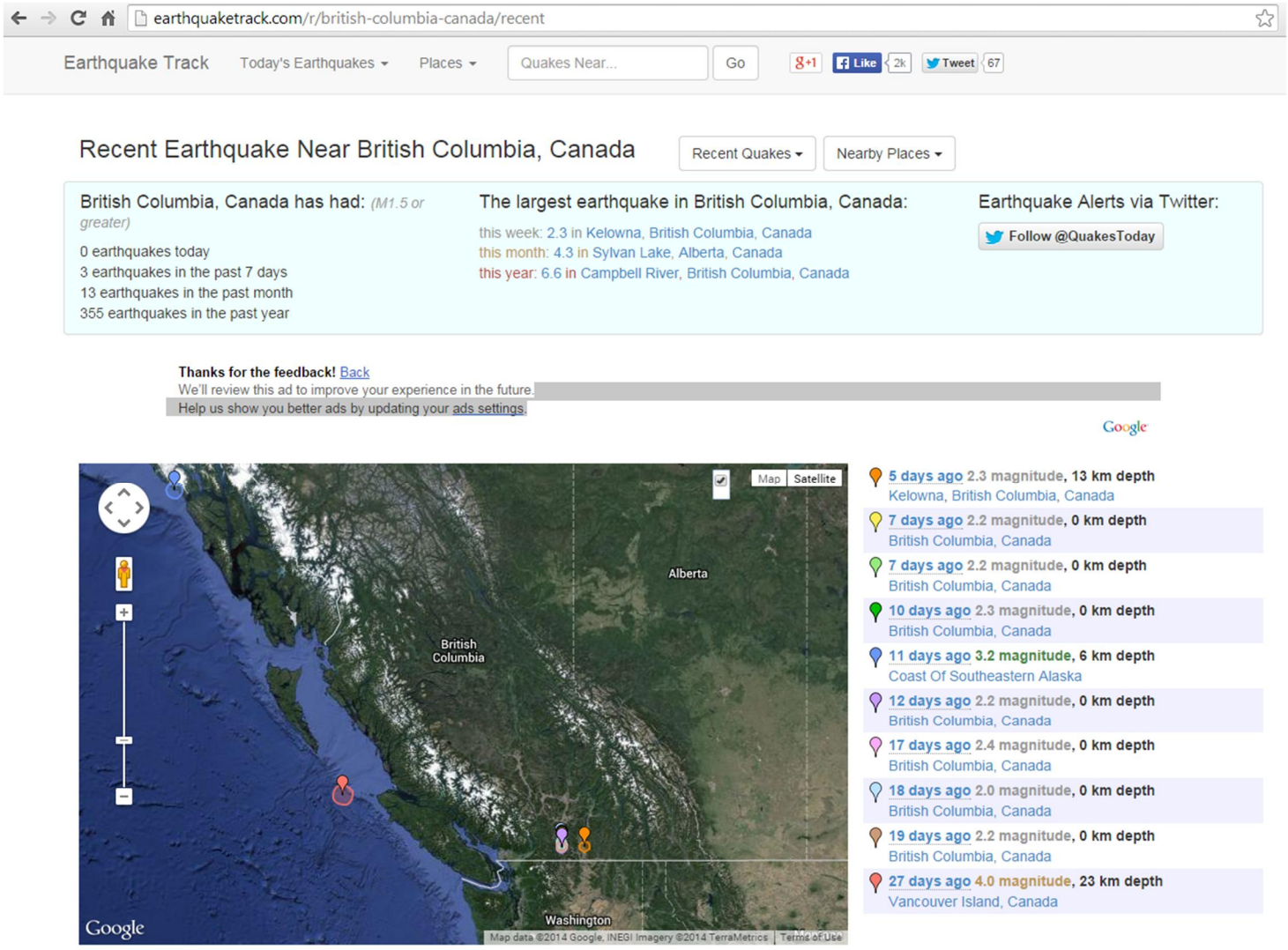
These considerations will be useful to the insurance practitioners we serve as they take into account the reality of where we live and the code changes relating to such realities.

Earthquake Measurement and Frequency

2 Earthquake Measurement

The methods and reporting methods of earthquake dissemination have changed significantly over the past 4 decades. While reporting to the public using the Richter scale (developed in 1935) is still often used as a benchmark of earthquake severity, the geoscience community over the past 20+ years has realized that the Richter scale has limitations. Subsequently, there has been a movement toward using a different scaling method called the "Moment Magnitude" scale. This is a term the insurance practitioner should become familiar with because Building Code changes are based on using this method of measurement (i.e. to determine Spectral Acceleration).

Reporting of Earthquakes can now be checked daily using the Internet and website such as Earthqaketrack.com (see below).



The frequency of earthquake is a lot higher than most people think! Most earthquakes are micro-quakes that are not felt. However, there have been several larger earthquakes this year that occurred underwater, or away from populated areas, and therefore didn't cause any damage (though they were significant in measurement).

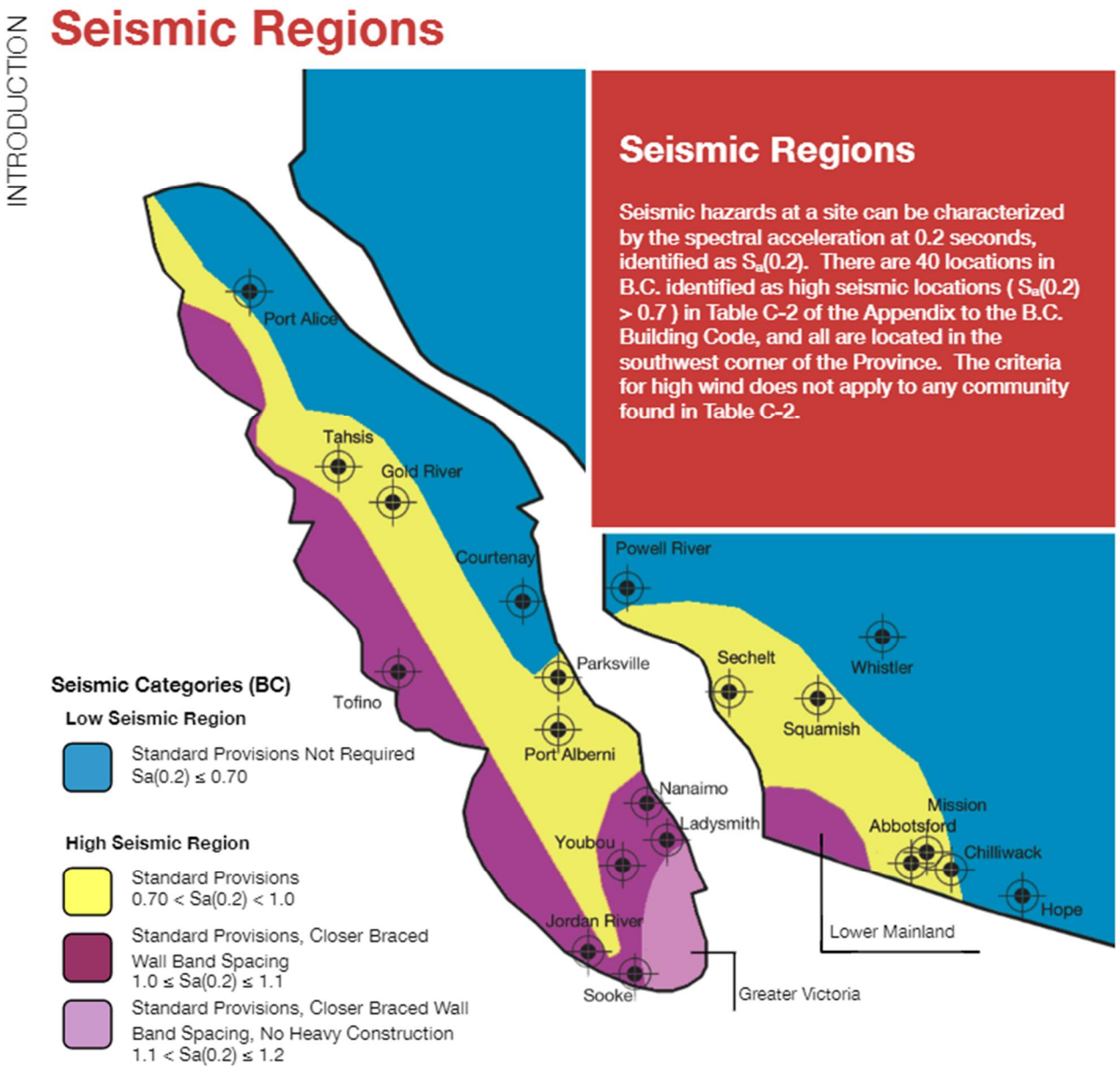
BC Building Code Seismic Changes, By Area

3 Seismic Regions

The province of BC has been mapped into regions that are based on the magnitude and frequency of seismic activity.

The following map show these areas. Based on the area, a different standard for wood framing must be followed.

More on this in the next section!



ITV related note: Light purple areas require the most framing and does not allow for heavy construction (simply defined as using any type of concrete or other tile roofing surface).

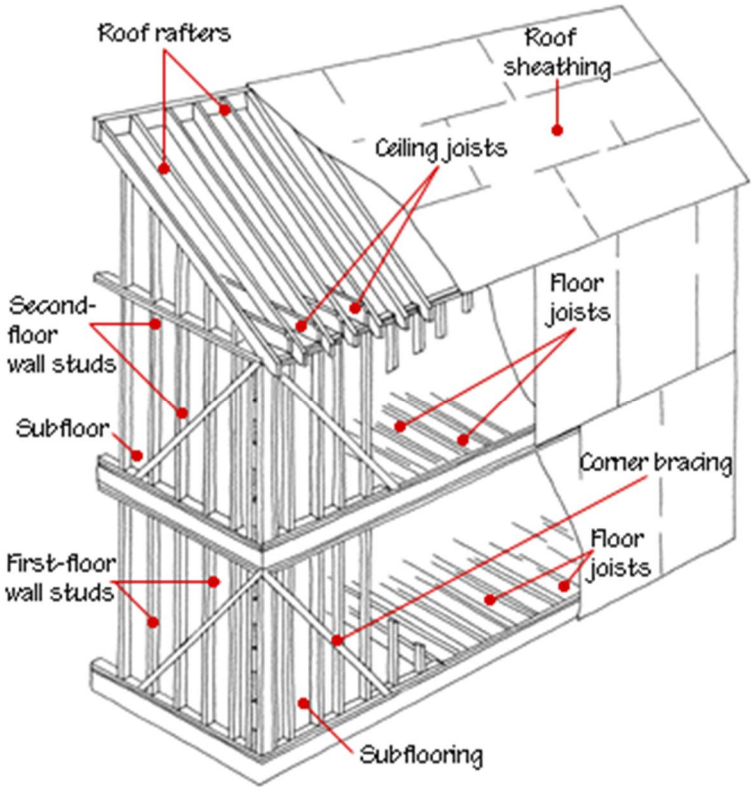
4 BC Building Code Changes to Methods of Framing

The main element of change in the BC Building Code has been to add what is call the “Braced Wall Band”. This refers to a series of walls, for the most part on the exterior of the dwelling, that are designed to withstand greater lateral (i.e. back and forth or side to side) shifting.

The construction (i.e. spacing and number of panels) of these walls changes depending on the seismic regions.

Left image is of a typical wall frame

Right image is of a braced wall frame



Typical wall framing (i.e. showing that the corners are braced only).

Main Requirements

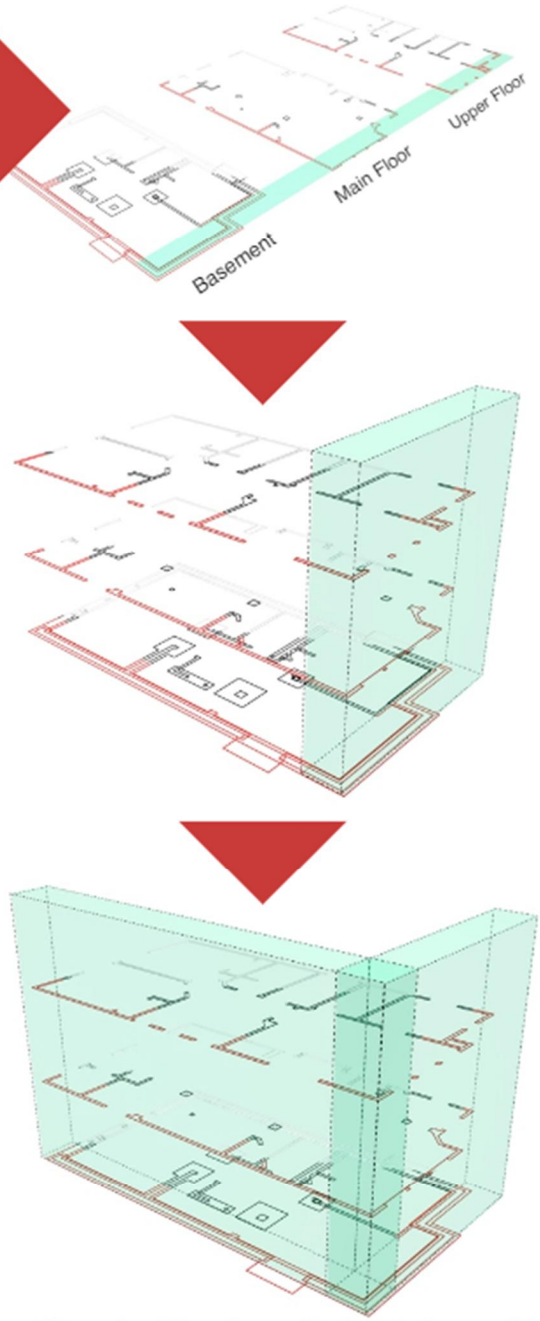
The Braced Wall Band

The braced wall band is an imaginary continuous straight band extending vertically and horizontally through a building (or part of a building) in which braced wall panels are constructed.

The first figure (top right) shows the three floor plans aligned on a drawing and the up to 1.2 m wide braced wall band shown enclosing all of the walls of the front elevation of the house.

The second figure (middle right) shows the band applied to the floor plans as they would stack in construction. Note that the walls on the front elevation are located within the 1.2 m wide band.

The third figure (bottom right) shows the band applied to the second elevation. Bands need to be identified on the remaining elevations and any required interior regions.



Step 1

Braced Wall Band

The braced wall band is an imaginary continuous straight band extending vertically and horizontally through a building (or part of a building) in which braced wall panels are constructed. The first step is to ensure that each perimeter wall and certain interior walls align within an imaginary braced wall band, which extends from the foundation to the roof. These walls must be located within the up to 1.2 m wide braced wall band from the foundation to the roof. [i]

Braced wall bands must be located around the perimeter of the building, and additional braced wall bands may be required at interior wall locations.

[i] 9.23.13.4.(1)(a), (b) and (e), 9.23.13.4.(2) (see Appendix)

Note: This result of using Braced Wall Panels is to create a Braced Wall Band. This is a conceptual design requirement which varies (by percentage) depending on the size and shape of the building. Other considerations are: (i) the amount of open space (typical in high value homes), (ii) the number of stories, and (iii) set back upper building portions, etc. (i.e. which may require internal walls to also be part of the Braced Wall Band).

Summary

5 For seismic considerations... there is no such thing as a typical wood frame house Throughout BC

Meeting the BC Building Code seismic requirement(s) now varies by code as defined via regions throughout the province.

The effect of code changes on ITV can be significant, particularly for high value homes, having special focus on larger open concept ones. Attempting to predict replacement cost using only a standardized per square foot pricing models for values will result in significant errors. This is especially true for large high value homes and homes within open plan designs (regardless of overall size). The number of stories and ceiling height within the story now plays a more significant role in determining framing design for seismic purposes. The amount of glass area needs to be offset by adding more braced wall panels. Open plan designs may need to incorporate more internal walls or have basement foundation changes required and etc.

Alternative construction materials such as using steel beam(s) increases the replacement costs markedly. For example, a Laminated Wood Beam (LVL) assembly that is 20 ft. in length may cost $78/per foot in the Lower Mainland; that beam cost will not rise to a cost of approx. $1,560. Using a steel beam to increase the load bearing capacity for a similar size of beam brings the cost to $ 192/ft. or approx. $3,840. Not factored into this is the cost of installing the steel beam(s) which may require a crane, welding, etc. which is not required for installing the LVL. In short, costs are up and variable.

Other factors beyond that of hard building costs (i.e. materials and labour) are the soft cost of building plans and the building permit process. Plans submitted for permits must now provide 3-D drawings showing the Braced Wall Bands. Additionally, these plans must be reviewed and signed off on by an RPR Engineer, adding yet more specific cost factors. Depending on the Region, some local governments are now requiring a geotechnical review of soil conditions for loading. Again, replacement costs are up and variable.

Determining proper ITV amounts is continuously developing. The introduction of Braced Wall Panels is yet one more factor to be considered, evaluated and costed. To correctly obtain replacement value requires (i) an on-site condition and verification survey and (ii) careful ITV analysis using multi component costing software that marries and validates on-site observations. We invite you to visit InspekTech® for more information on how we can assist.

Acknowledged Sources of Reference:

1. BC Building Code
2. The Illustrated Guide for Seismic Design of Houses, Homeowner Protection Office of BC
3. Canadian Wood Frame House Construction, CMHC for the Government of Canada
4. www.earthquaketrack.com
5. United States Geological Survey via www.usgs.gov

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