

Proposed Changes to the British Columbia Building Code 2024

Title: Structural Alterations

Subject/description: Add a new compliance option for upgrading of the seismic performance of existing buildings subject to alterations and/or additions.

Applicable Code references: Articles 1.1.1.2. and 1.3.3.2. of Division A and Table 1.3.1.2. of Division B

Problem

There is a lack of consistency including inconsistent triggers and scope across the province related to seismic upgrades for existing buildings subject to alterations and/or additions. There is a lack of guidance in the British Columbia Building Code for applying performance-based seismic assessments for “upgrades” and “retrofits”. As a result, industry is challenged to consistently and cost-effectively seismically retrofit existing buildings by applying the Building Code’s current force-based procedures. The Building Code requires that a limited number of admissible seismic force resisting systems be present with each admissible system incorporating prescriptive structural detailing that may not be satisfied by the existing construction completed to previous editions of the Building Code.

Justification

Applying performance-based seismic assessments allows the use of the lateral load resisting capability of the existing structural components that may have been designed using terminology and methodologies that are different from the terminology and methodologies that exist in the current edition of the Building Code and its referenced material standards.

Triggers for seismic upgrades for existing buildings should be consistent across the province. Previously, 5 percent and 10 percent in 50-year seismic hazard data did not exist in a conventional format. That data is now easily available and helps inform consistent assessments of risk hazards.

The Engineers and Geoscientists of British Columbia’s Seismic Retrofit Guidelines offer a proven performance-based methodology to include contributions of the buildings existing lateral force resisting systems (which are not recognized in Article 4.1.8.9. of Division B), however the Seismic Retrofit Guidelines are not currently referenced in the Building Code.

Commentary L of the National Building Code Structural Commentaries outlines scope and performance requirements, and ASCE 41 and the Seismic Retrofit Guidelines describe good engineering practice. These documents are to be used only by registered professionals as defined in the Building Code.

Proposed Change

In this document:

Black text represents 2020 National Model Code content adopted in the British Columbia Building Code 2024

Blue text represents unique-to-British Columbia content adopted in the British Columbia Building Code 2024

Green text represents proposed unique-to-British Columbia content

Only excerpts of the British Columbia Building Code 2024 are reproduced

Division A

1.1.1.2. Application to Existing Buildings

1) Where a *building* is altered, rehabilitated, renovated or repaired, or there is a change in *occupancy*, the level of life safety and *building* performance shall not be decreased below a level that already exists. (See Note A-1.1.1.2.(1).)

2) Where the structure of an existing *building* is altered, rehabilitated, renovated or repaired, seismic design and construction is permitted to comply with the performance requirements of Commentary L entitled “Application of NBC Part 4 of Division B for the Structural Evaluation and Upgrading of Existing Buildings” of the “Structural Commentaries (User’s Guide – NBC 2020: Part 4 of Division B)”.

3) Compliance with Commentary L entitled “Application of NBC Part 4 of Division B for the Structural Evaluation and Upgrading of Existing Buildings” of the “Structural Commentaries (User’s Guide – NBC 2020: Part 4 of Division B)” shall conform to good engineering practice such as described in

- a) ASCE/SEI 41, “Seismic Evaluation and Retrofit of Existing Buildings,” and
- b) SRG, “Seismic Retrofit Guidelines.”

(See Note A-1.1.1.2.(3).)

A-1.1.1.2.(3) Referenced Documents. Commentary L entitled “Application of NBC Part 4 of Division B for the Structural Evaluation and Upgrading of Existing Buildings” of the

“Structural Commentaries (User's Guide – NBC 2020: Part 4 of Division B)” provides thresholds for upgrades based on scope of alterations, rehabilitations, renovations or repairs, as well as an approach for voluntary upgrades. The SRG, “Seismic Retrofit Guidelines” were developed primarily for buildings not greater than three storeys which may or may not include a crawlspace whereas ASCE/SEI 41, “Seismic Evaluation and Retrofit of Existing Buildings,” is applicable to a wider range of buildings.

1.3.3.2. Application of Parts 3, 4, 5 and 6

2) Notwithstanding the application described in Article 1.3.3.3., Part 4 of Division B applies to existing *buildings* for which the performance requirements of Commentary L entitled “Application of NBC Part 4 of Division B for the Structural Evaluation and Upgrading of Existing Buildings ” of the “Structural Commentaries (User's Guide – NBC 2020: Part 4 of Division B)” are used for seismic design and construction of *alterations, rehabilitations, renovations or repairs* as described in Sentences 1.1.1.2.(2) and (3). (See Sentence 2.2.1.2.(1) of Division C.)

Division B

Table 1.3.1.2. Documents Referenced in Book I (General) of the British Columbia Building Code ⁽¹⁾⁽²⁾ Forming Part of Sentence 1.3.1.2.(1)			
Issuing Agency	Document Number ⁽³⁾	Title of Document	Code Reference
ASCE	ASCE/SEI 41-23	Seismic Evaluation and Retrofit of Existing Buildings	1.1.1.2.(3)⁽⁴⁾ A-1.1.1.2.(3)⁽⁴⁾
CCBFC	NRCC-CONST-56529E	Structural Commentaries (User's Guide – NBC 2020: Part 4 of Division B)	... 1.1.1.2.(2)⁽⁴⁾ 1.1.1.2.(3)⁽⁴⁾ 1.3.3.2.(2)⁽⁴⁾ A-1.1.1.2.(3)⁽⁴⁾ ...
EGBC	SRG2020	Seismic Retrofit Guidelines	1.1.1.2.(3)⁽⁴⁾ A-1.1.1.2.(3)⁽⁴⁾

Impact analysis and cost implications

Clear and consistent understanding of the Building Code helps avoid design and construction delays and unnecessary costs. Accounting for the performance of existing structural elements that were designed to previous editions of the Building Code (and not

fully in conformance with the current edition of the Building Code) opens opportunities for cost-effective upgrades.

Applying Commentary L of the Structural Commentaries can help:

- reduce loss of life, injuries, and disruptions due to earthquakes,
- expedite post-earthquake community recovery (decreased repair time, reduced disruption to businesses),
- increase post-earthquake shelter-in-place potential of upgraded buildings,
- contribute to sustainability of buildings (upgrade rather than replace) and sustainability of the community (upgraded buildings as a community asset),
- improve the existing building stock faster and cheaper than replacing existing buildings with new buildings, and
- decrease repair costs following an earthquake event.

Enforcement implications

Can be enforced through the existing enforcement regimes. Enforcement authorities may already be familiar with the Seismic Retrofit Guidelines methodology as it has been applied to the seismic upgrades to many schools across the province.

This compliance option proposed code change is available only to registered professionals as defined in the Building Code, and as such, the authority having jurisdiction would receive applicable schedules in the form of Letters of Assurance.

Who is affected

Designers and regulators

Objective-based analysis of new or changed provisions

No attributions proposed to be assigned.