ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA

PRACTICE ADVISORY

STRUCTURAL DESIGN OF PART 9 BUILDINGS IN HIGH SNOW LOAD REGIONS

Version 1.0, Published May 11, 2022

This practice advisory has been issued for registrants of Engineers and Geoscientists BC (engineering professionals) who provide structural engineering services on buildings classified under Part 9 of Division B of the *British Columbia Building Code* (*BCBC*) 2018 or the Vancouver Building By-law (VBBL) 2019 (referred to collectively in this advisory as "the code") that are located in high snow load regions. It outlines considerations for determining the specified snow load and appropriate design methodology, as well as the implications of high snow load on the primary structural system.

The guidance in this practice advisory is based on and limited to the snow load calculation and design methodology of the code and may not apply to future editions of the code.

For buildings located in regions with a specified snow load (S) greater than 4.0 kPa, calculated according to Part 9 of the code, an engineering professional should be involved with the design and field reviews of the primary structural system. This recommendation stems from the consensus of engineering professionals and industry stakeholders on best practice, rather than an explicit code requirement, in order to increase the reliability and performance of Part 9 buildings in high snow load regions, and is supported by the content presented in this practice advisory. The engineering professional must have regard for the guidance provided in this practice advisory and use professional judgment to determine whether the design should conform with Part 9 or Part 4 of the code.

Regions with a specified snow load greater than 4.0 kPa are referred to in this practice advisory as a "high snow load region."

BACKGROUND

Part 9 of Division B of the code applies to buildings that are:

- three storeys or less in building height;
- have a building area not exceeding 600 m^2; and
- have occupancies as described in Article 1.3.3.3. of Division A of the code.

Structural designs carried out in accordance with Part 9 do not require the design services of an engineering professional. However, Part 9 sets limitations on its use. When those limitations are exceeded on specific components within a Part 9 building, those components must be designed to Part 4 by an engineering professional.

For light-frame construction, component limitations that permit using Part 9 methods alone include, but are not limited to, those where:

- the roof and wall planes are clad, sheathed, or braced on at least one side;
- the small repetitive structural members are spaced not more than 600 mm o.c.;
- the clear span of any structural member does not exceed 12.2 m;
- the maximum deflection of the structural roof members conforms to Article 9.4.3.1. of the code;
- the maximum total roof area, notwithstanding any separation of adjoining buildings by firewalls, is 4,550 m^2; and
- for flat roofs, there are no significant obstructions on the roof, such as parapet walls, that are spaced at less than a prescriptive distance.

In some instances, Part 9 provides a compliance path for design of structural components that utilizes Part 4. Sometimes this compliance path is optional, and sometimes it is mandatory. Regardless of whether the Part 4 compliance path is optional or mandatory, any structural elements that are outside of the scope of Part 9 must be designed by an engineering professional.

While the determination of whether a building is eligible to be designed to Part 9 and whether the prescriptive requirements apply to certain components is relatively straightforward, it is unclear to many engineering professionals what best practice is when the limits of Part 9 are exceeded, or could be construed as being exceeded.

Some examples of where expectations are unclear include when:

- many or most components in a Part 9 building exceed the prescriptive design limits or the limits of the span and load tables;
- the authority having jurisdiction requires “design to Part 4 snow loads”;
- the authority having jurisdiction requires “design to Part 4”; or
- the Part 9 building is located in a high snow load region.

This practice advisory clarifies expectations and obligations of professional practice when a Part 9 building is located in a high snow load region, as defined and discussed in the following sections.

For further guidance on Part 4 components in Part 9 buildings, refer to the following documents, as well as the bulletins and/or bylaws published by the appropriate authority having jurisdiction where the project is located:

- *Joint Professional Practice Guidelines – British Columbia Building Code Letters of Assurance Requirements for Part 9 Buildings* (AIBC and Engineers and Geoscientists BC 2021)
- *Professional Practice Guidelines – Professional Structural Design Services for Part 9 Buildings in British Columbia* (Engineers and Geoscientists BC 2014)

CALCULATING SNOW LOAD

CODE REQUIREMENTS

Part 9 of the code defines the maximum snow load for designing Part 9 components prescriptively; however, it does not prescribe a maximum specified snow load for which the design provisions of Part 9 no longer apply, and an engineering professional must be involved. (See the Span Tables, Part 9 of Division B of the code, as well as Table B - 2 in Attachment B: Snow Load References of this advisory, which provides a summary of the limitations.)

Furthermore, Sentence 9.4.1.1.(1) of the code states that a Part 9 building may be designed according to Part 4 using the loads and the deflection and vibration limits specified in Part 9 or Part 4. This means that:

- a Part 9 building can be designed using Part 4 design procedures and Part 9 loading; or
- a Part 9 building can be designed using Part 9 design procedures and Part 4 loading.

Conversely, a Part 4 building cannot be designed with either Part 9 design procedures or Part 9 loading (note that this is out of the scope of this practice advisory).

Table 1: Requirements and Permissions of Loading and Design Combinations for Part 9 Buildings includes possible loading and design combinations for Part 9 buildings, as well as the requirements and permissions for each situation. As previously discussed, any structural elements outside the scope of Part 9 require design by an engineering professional, while those within the scope of Part 9 do not. Note that Table 1 below assumes that an engineering professional is involved for all situations, even if not required by the code.

Table 1: Requirements and Permissions of Loading and Design Combinations for Part 9 Buildings

	PART 9 LOADING	PART 4 LOADING
Part 9 Design[a]	• The building must meet the requirements of Part 9 of the code • All components must meet the prescriptive requirements of Part 9 • The engineering professional[b] can elect to design all components to Part 9 (minimum requirement)	• The building must meet the requirements of Part 9 of the code • All components must meet the prescriptive requirements of Part 9 • The engineering professional[b] can elect to design all components to Part 9 (minimum requirement) • The engineering professional can elect to use Part 4 loading
Part 4 Design	• The building must meet the requirements of Part 9 of the code • For components that exceed prescriptive requirements of Part 9, the engineering professional must design those components to Part 4 • For components that meet the prescriptive requirements of Part 9, the engineering professional can elect to design those components to Part 4; for example, in high snow load regions	• For buildings that exceed the requirements of Part 9 of the code (i.e., the building is a Part 4 building), involvement of an engineering professional is required • The engineering professional must design all components to Part 4 and use Part 4 loading • For buildings that meet the requirements of Part 9, the engineering professional can elect to design to Part 4 and use Part 4 loading

NOTES:

[a] Per the *Professional Practice Guidelines – Professional Structural Engineering Services for Part 9 Buildings in British Columbia* (Engineers and Geoscientists BC 2014), engineering professionals are expected to apply the *Engineering Guide for Wood Frame Construction* (Canadian Wood Council 2014) as a minimum standard of practice when designing for gravity and lateral loads.

[b] An engineering professional is not required for the design of structural elements that are within the scope of Part 9 of the code.

ADDITIONAL CONSIDERATIONS

There are several differences in the assumptions made for Part 9 versus Part 4 snow load calculation and design, which can have significant effects on the loading and performance of buildings in high snow load regions. The following considerations for these effects are discussed below:

- Specified snow load
- Snow accumulation
- Specific weight of snow
- Seismic weight

SPECIFIED SNOW LOAD

Specified snow load (S) is calculated using the 1-in-50-year ground snow load (S_s) multiplied by the basic roof snow load factor (C_b), then added to the associated 1-in-50-year rain load (S_r) (see Sentence 9.4.2.2.(1) of the code).

The basic snow load factor (C_b) is 0.55 for Part 9 buildings and 0.8 for Part 4 buildings. However, the calculation of specified snow load in Part 4 (see Sentence 4.1.6.2.(1) of the code) also includes factors that consider wind exposure (C_w), the slope of the roof (C_s), and snow accumulation (C_a). These factors, depending on the site and geometry of the roof, could either increase or decrease the difference between the Part 4 and Part 9 specified snow load.

Depending on the ratio of ground snow load to associated rain load, and assuming negligible effect of the other factors, the difference in specified snow loading could be 40% or more.

SNOW ACCUMULATION

Since obstructions are limited for Part 9 buildings with flat roofs, Part 9 does not require consideration of snow build-up, which, depending on steps in the roof structure, projections on the roofs, and/or the effect of neighbouring buildings, could increase the depth of snow accumulated by a factor of two or more.

Most components will not have enough reserve capacity to support significant snow accumulation, unless they are specifically designed to do so.

SPECIFIC WEIGHT OF SNOW

The specific weight of snow varies, depending on the climate and the elevation of the site. The specific weight of snow can range from 2 kN/m^3 at sites with low humidity and/or at a lower elevation, to 5 kN/m^3 at sites with higher humidity and/or at a higher elevation (see Sentences 9.4.2.1.(1) and 4.1.6.13.(1) of the code), and where the snow accumulates and consolidates after multiple snowfalls.

An appropriate estimate of the specific weight must be used to calculate snow accumulation.

SEISMIC WEIGHT

Snow load on the roof is not explicitly considered for the seismic design of Part 9 buildings, whereas for Part 4 seismic design, 25% of the snow load is required to be included (see Articles 4.1.8.1. and 4.1.8.2. of the code).

When considering a residential roof standard dead load of approximately 0.5 kPa, adding 25% of the snow load could have significant impacts on the lateral system, specifically in high snow load regions. For example, a specified snow load of 2 kPa will add 100% to the seismic weight of the roof (0.5 kPa + 0.25 x 2 kPa = 1.0 kPa), and 4 kPa will add 200% (0.5 kPa + 0.25 x 4 kPa = 1.5 kPa).

These snow loads are relatively common in many areas of British Columbia and could affect the lateral performance of a building in a seismic event. In increasingly higher snow load regions, such as in and around ski resorts such as Whistler or Big White, the seismic load due to the weight of snow on the roof could increase as much as three-fold, which will have even more significant effects if not specifically accounted for.

In addition, per A-9.23.13.2.(1)(a)(i) (the notes to Subclause 9.23.13.2.(1)(a)(i) of the code), light construction for roofs is defined as <0.5 kPa, and heavy construction is defined as 0.5 to 1.0 kPa. Assemblies with a dead load greater than 1.0 kPa exceed the bounds of heavy construction and require design to Part 4 or good engineering practice such as that provided in the Canadian Wood Council (CWC) guide titled *Engineering Guide for Wood Frame Construction* (CWC 2014).

PROFESSIONAL PRACTICE

SITE-SPECIFIC AND AUTHORITY HAVING JURISDICTION REQUIREMENTS

Many authorities having jurisdiction have established bylaws and/or published bulletins outlining the requirements for design and permitting of Part 9 buildings. Topics of note include:

- climatic data and calculating site-specific snow loads (particularly in high mountain regions);
- snow retention;
- involvement of an engineering professional due to high snow loads; and
- involvement of an engineering professional for the design and/or coordination of Part 4 components.

Engineering professionals providing structural engineering services for Part 9 buildings should be aware of and meet the requirements of all such bylaws and bulletins that apply to their project. Furthermore, where site-specific climatic data is not available in the code or in bulletins published by the applicable authority having jurisdiction, engineering professionals should contact Environment Canada or an avalanche consultant, if required, to obtain appropriate snow loads and other relevant climatic data.

The Related Documents section of this advisory includes a select list of bylaws and bulletins published by various authorities having jurisdiction. The list is provided for information only. Engineering professionals should obtain the most current information that applies to their particular project.

PROFESSIONAL CONSIDERATIONS FOR PART 9 BUILDINGS

For buildings located in regions with a specified snow load (S) greater than 4.0 kPa (i.e., in a high snow load region), calculated according to Part 9 of the code, an engineering professional should be involved in the design and field reviews of the primary structural system. As noted above, this recommendation stems from the consensus of engineering professionals and industry stakeholders on best practice, rather than an explicit code requirement, in order to increase the reliability and performance of Part 9 buildings in high snow load regions.

The engineering professional should take the following considerations into account, and should use professional judgment to determine the appropriate loading and whether the design should conform with Part 9 or Part 4 of the code.

GRAVITY (SNOW) DESIGN

Engineering professionals should be aware that snow behaves differently in different regions. Depending on the climate and elevation of the site, some regions may be more prone to sliding snow and snow accumulation in valleys, while others may be more prone to snow drift and snow accumulation against vertical surfaces.

There is a significant difference between maximum specified snow loads calculated in accordance with Part 4 versus those calculated in accordance with Part 9. As shown in Attachment A: Sample Specified Snow Load Calculations, it is generally unconservative to design to Part 9 without accounting for snow drift, creep, cornicing, and sliding snow in high snow load regions, where accumulation of snow is inevitable each year. Consequently, even if designing to Part 9 of the code, the engineering professional should use professional judgment to determine whether and how Part 4 provisions, such as snow accumulation, including snow drift and sliding, and unbalanced loading, should be accounted for.

The engineering professional should also be aware that the formulas for snow accumulation on multi-level roofs (per Article 4.1.6.5. of the code) have limitations, and they may not provide realistic results for high ground snow loads. Engineering professionals must apply professional judgment when determining appropriate loading in these situations.

Although it is not a requirement of either Part 9 or Part 4 of the code, it is recommended that engineering professionals consider cornicing and other snow effects where they are likely to occur. See Figure 1: Examples of unbalanced loading, snow accumulation on low roofs due to steps and sliding snow, and cornicing, Revelstoke, British Columbia below for examples.

LATERAL (SEISMIC) DESIGN

Engineering professionals should also consider using the Part 4 provisions for the lateral seismic design of Part 9 buildings in high snow load regions. As previously discussed, snow loads greater than 4.0 kPa are relatively common in many parts of British Columbia and could affect the lateral performance of a building in a seismic event.

Although the definitions of “light construction” and “heavy construction” in Part 9 include only dead load, engineering professionals should consider the following, when determining whether to include a portion of the snow load (per Part 4) in the seismic weight for the lateral seismic design of buildings in high snow load regions:

- Most Part 9 buildings will typically fall under the category of "light construction" for the design of braced wall bands. However, if a seismic event were to occur in the winter when the roof is loaded with snow, the braced wall bands may not provide sufficient lateral capacity.
- As discussed in the Seismic Weight section above, buildings in high snow load regions can reasonably expect to have a seismic weight (calculated to Part 4) greater than 2 kPa.
- Had this seismic weight been obtained per Part 9 (i.e., dead load only), the construction would be considered "heavy construction" and the seismic design would either need to be to Part 4 or to good engineering practice such as that provided in the *Engineering Guide for Wood Frame Construction* (CWC 2014). This suggests that for lateral design where the seismic loads are significant or have the chance to be significant (e.g., during heavy seasonal snowfall events), professional involvement is beneficial. For more information on when Part 9, good engineering practice, and Part 4 should be used for the lateral design of Part 9 buildings, see the *Engineering Guide for Wood Frame Construction* (CWC 2014), Figure C1: Use of Prescriptive Guidelines for Lateral Loads, and the Design Requirements in the Guide, Based on Maximum Spacing Between Braced Wall Bands and Load Conditions.

It is recommended that engineering professionals account for the snow load and all applicable dead loads, including extraordinary loads such as concrete topping and stone cladding, in the lateral seismic design of Part 9 buildings in high snow load regions. For more information on the specifics of light and heavy construction, see subsection 9.23.13. of the code as well as the Notes to Part 9 of the code.

LATERAL (WIND) DESIGN

Similar to lateral seismic design, Part 9 provides limitations and prescriptive requirements for the lateral wind design of buildings and individual walls, but does not explicitly discuss or account for the effect snow may have on the lateral system.

While snow does not increase the wind loading that must be designed for, it does affect the performance of individual components. For example, Table 9.23.10.1. of the code provides maximum stud size and spacing relative to storeys supported, and maximum unsupported height of the wall. However, the loading assumptions for this table are not explicitly described; it is therefore recommended that engineering professionals independently verify (i.e., calculate) that the prescriptive wall stud size and spacing provided is adequate to support both the lateral and gravity loads in high snow load regions, using appropriate load combinations.

Combined bending and axial compression on wood members is addressed in clause 6.5.10 of the CSA O86-14, Engineering Design in Wood, and in chapter 5 of the *Wood Design Manual* (CWC 2017).

SUMMARY

The recommended maximum specified snow load of 4.0 kPa for design to Part 9 without engineering professional involvement is consistent with the maximum load listed in the Part 9 span tables for various components (see the summary tables provided in Attachment B: Snow Load References), beyond which more detailed design and checks for overstress are required.

The following observations provide additional support for the recommendation that snow accumulation and other Part 4 considerations should be applied to Part 9 buildings in high snow load regions:

- The 1-in-50-year ground snow load has already occurred, or has come close to occurring, in many locations in British Columbia in recent years.
- Climate change is anticipated to cause increasingly frequent severe weather events.
- There is a significant difference between maximum specified snow loads calculated in accordance with Part 4 versus those calculated in accordance with Part 9, and it is generally unconservative to design to Part 9 without accounting for snow drift, creep, cornicing, and sliding snow in high snow load regions, where accumulation of snow is inevitable each year. (see Attachment A: Sample Specified Snow Load Calculations).
- There is a trend in Part 9 residential buildings to remove traditional redundancies by having more open living spaces and a greater percentage of openings.

Additionally, this limit under which professional involvement is not required is consistent with the *BCBC* 2006 interpretation (file number: 06-0031) for the design of lintels supporting roofs in regions where the ground snow load is greater than 3.33 kPa (BCBC Interpretation Committee 2006); this ground snow load would generally result in a specified snow load much less than 4.0 kPa.

Importantly, the involvement of an engineering professional would uphold the fundamental goals of Part 9, to preserve the overall durability of buildings, and, ultimately, protect the life safety of the public.

For guidance on designing only select components to Part 4, where the building meets all other Part 9 requirements and the specified snow load is less than 4.0 kPa, see the *Professional Practice Guidelines – Professional Structural Engineering Services for Part 9 Buildings in British Columbia* (Engineers and Geoscientists BC 2014).

Figure 1: Examples of unbalanced loading, snow accumulation on low roofs due to steps and sliding snow, and cornicing, Revelstoke, British Columbia

(A) Sliding snow causing accumulation on low roof

(B) Snow accumulation between dormers

(C) Sliding snow causing unbalanced loading

(D) Cornicing and snow accumulation around dormers

(E) Snow accumulation in a roof valley

(F) Sliding snow causing cornicing

(G) Cornicing and unbalanced loading on a small shed roof

(H) Sliding snow causing unbalanced loading and accumulation on a low roof

REFERENCES AND RELATED DOCUMENTS

REFERENCES

Architectural Institute of British Columbia (AIBC) and Engineers and Geoscientists BC. 2021. Joint Professional Practice Guidelines – British Columbia Building Code Letters of Assurance Requirements for Part 9 Buildings. Version 1.1. Vancouver and Burnaby, BC: AIBC and Engineers and Geoscientists BC. [accessed: 2022 Mar 17]. https://www.egbc.ca/app/Practice-Resources/Individual-Practice/Guidelines-Advisories.

Canadian Wood Council (CWC). 2020. The Span Book 2020. Ottawa, ON: CWC. https://webstore.cwc.ca/product/canadian-span-book-2020/.

Canadian Wood Council (CWC). 2017. Wood Design Manual 2017. Ottawa, ON: CWC. https://cwc.ca/publication-type/manuals/.

Canadian Wood Council (CWC). 2014. Engineering Guide for Wood Frame Construction 2014. Ottawa, ON: CWC. https://webstore.cwc.ca/product/engineering-guide-for-wood-frame-construction-2014/.

Engineers and Geoscientists BC. 2014. Professional Practice Guidelines – Professional Structural Design Services for Part 9 Buildings in British Columbia. Version 3.0. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2022 Mar 17]. https://www.egbc.ca/app/Practice-Resources/Individual-Practice/Guidelines-Advisories.

CODES AND STANDARDS

BC Building Code 2018. https://www.bccodes.ca/building-code.html.

BC Building Code Interpretation Committee. 2006. Interpretation 06-0031 – Lintels for Openings in Flat Insulating Concrete Form Walls. https://boabc.org/wp-content/uploads/2015/10/06-0031.pdf.

CSA O86-14, Engineering Design in Wood.

RELATED DOCUMENTS

The following links to bylaws and bulletins of select authorities having jurisdiction are provided for information:

City of Coquitlam. Planning and Development, Building Permits Division. Guide - Environmental Loads for Use With the British Columbia Building Code. [accessed: 2022 Mar 17]. https://www.coquitlam.ca/DocumentCenter/View/4209/Environmental-Loads-for-Use-with-the-British-Columbia-Building-Code-Guide-PDF?bidId=.

City of Penticton. Building Bulletin No. 18-03. When is a Structural Engineer Required? [accessed: 2022 Mar 17]. https://www.penticton.ca/sites/default/files/docs/business-and-building/building-bulletins/Structural%20Engineer%20Triggers%20Bulletin%2018-03.pdf.

City of Revelstoke. Development Services Building Permit Guide. [accessed: 2022 Mar 17]. https://www.revelstoke.ca/DocumentCenter/View/5084/CoR-Building-Permit-Application-Package.

Regional District of Kootenay Boundary. Building Bylaw No. 1753, 2021. [accessed: 2022 Mar 17]. https://rdkb.com/Portals/0/Administration/Documents/Bylaws/Bylaw1753-BuildingPlumbing2.pdf?ver=2021-02-05-095356-773.

Regional District of Kootenay Boundary. Climatic Design Data. [accessed: 2022 Mar 17]. https://rdkb.com/Portals/0/BuildingInspection/GroundSnowAndWindLoads.pdf?ver=2020-07-08-154905-220.

Regional District of North Okanagan. Silver Star Mountain Building Permit Requirements. [accessed: 2022 Mar 17]. https://www.rdno.ca/sites/default/files/2021-10/210916_Website_Silver_Star_Snow_Load.pdf.

Regional District of North Okanagan. Building Permit Application Form. [accessed: 2022 Mar 17]. https://www.rdno.ca/sites/default/files/2021-09/210923_BP_Application_Complete.pdf.

Resort Municipality of Whistler. Permits And Inspections Bulletin - RMOW Building Department Bulletin Regarding Snow Loading. [accessed: 2022 Mar 17]. https://www.whistler.ca/sites/default/files/2017/Jun/related/23643/snow_load_bulletin.pdf.

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
1.0	May 11, 2022	Initial version.

LIST OF ATTACHMENTS

ATTACHMENT A: SAMPLE SPECIFIED SNOW LOAD CALCULATIONS

There is a significant difference between maximum specified snow loads calculated in accordance with Part 4 versus those calculated in accordance with Part 9. Recognizing that these loads are realistic, it is generally unconservative to design to Part 9 without accounting for snow drift, creep, cornicing, and sliding snow in high snow load regions, where accumulation of snow is inevitable each year (see Figure 1 above for examples).

Consider a typical two-storey house with a one-storey garage on one side, as shown in Figure A - 1 below.

To show the effects of high snow load due to location, as well as due to Part 9 versus Part 4 loading, the snow loads for this theoretical house were calculated for five locations in British Columbia: Vancouver, Whistler, Big White, Fernie, and Mount Washington. The corresponding data are summarized in Table A - 1: Sample Specified Snow Load Calculation below.

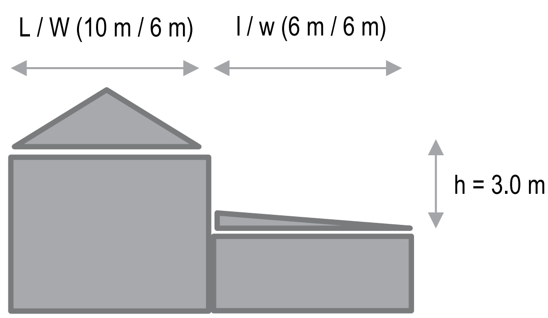

Figure A - 1: Typical two-storey Part 9 residential building

The results listed in Table A - 1 below show that snow accumulation can increase the load on the low roof by approximately 50% or more locally (where the low roof meets the high roof), or by approximately 20% or more on average. It can also be seen that the difference between designing low roofs with specified loads calculated to Part 9, without snow accumulation (S), result in less than half the load calculated to Part 4 (S_{max}), accounting for snow accumulation.

Record snowfalls have been occurring more frequently, and the depth of ground snow, calculated based on the 1-in-50 year ground snow load provided in the climatic data tables of the code, has been met or exceeded in the past 10 years in most of the locations noted in Table A - 1 (see the sources listed in Table A - 1). Historic roof snow load data was not readily available, but it can be reasonably assumed that specified roof snow loads have also been met or exceeded in most of those locations over the past 10 years, particularly those calculated to Part 9, which are inherently less conservative, even considering load combination factors.

Table A - 1: Sample Specified Snow Load Calculations

	Ss[a] (kPa)	Sr[a] (kPa)	γ[g] (kN/m³)	CALCULATED DEPTH OF GROUND SNOW[i] (m)	PART 9[b] / PART 4[c]	S[b,c,d] (kPa)	DRIFT LOAD, $S_{max, low roof}$[d,e,f] (kPa)	AVERAGE SNOW INCREASE[h] (%)	CALCULATED DEPTH OF SPECIFIED SNOW[i] (m)	CALCULATED DEPTH OF SNOW ACCUMULATION[i] (m)	HISTORIC MAXIMUM SNOW DEPTH (m)
Vancouver	1.8	0.2	3.0	0.6	Part 9	1.2	2.6	58	0.4	0.9	0.5[j]
					Part 4	1.6	4.2	75	0.5	1.3	
Whistler	9.5	0.9	4.0	2.4	Part 9	6.1	8.3	20	1.5	2.1	2.6[k]
					Part 4	8.5	12.9	26	2.1	3.2	
Big White	10.0	0.3	4.0	2.5	Part 9	5.8	8.3	22	1.4	2.1	3.9[k]
					Part 4	8.3	12.3	24	2.1	3.1	
Fernie	4.5	0.2	4.0	1.1	Part 9	2.7	5.7	50	0.7	1.4	1.5[k]
					Part 4	3.8	8.5	56	1.0	2.0	
Mount Washington	20.0	0.8	4.0	5.0	Part 9	11.8	8.3[l]	-	3.0	-	4.4[k]
					Part 4	16.8	12.8[l]	-	4.2	-	

NOTES:

Notations: S_s = 1-in-50-year ground snow load; S_r = 1-in-50-year associated rain load; S = specified snow load

a Climatic data obtained from Table C-2 of Appendix C of Division B of the code.

b Specified snow load calculated per Sentence 9.4.2.2.(1) of Division B of the code with C_b = 0.55.

c Specified snow load calculated per Sentence 4.1.6.2.(1) of Division B of the code assuming I_s = 1.0, C_b = 0.8, and $C_w = C_s = C_a$ = 1.0.

d Values provided in this table are unfactored.

e Snow drift calculated per Sentence 4.1.6.2.(1) of Division B of the code assuming I_s = 1.0, and C_b = 0.55 or 0.8 (Part 9 or Part 4, respectively), $C_w = C_s$ = 1.0, and C_a calculated per Article 4.1.6.5.

f Sliding snow is not included in the drift calculation.

g Specific weight of snow calculated as per Sentence 4.1.6.13.(1) of the code.

h Average snow load increase calculated as (snow drift – specified snow load) / (2 x specified snow load).

i S (or S_{max}) / γ.

j Extreme snow depth between 1981 and 2010, obtained from the Government of Canada Canadian Climate Normals website: climate.weather.gc.ca/climate_normals/.

k Maximum snow base depth between 2011 and 2021, obtained from historical snowfall records from the OnTheSnow.com website: onthesnow.com/british-columbia/skireport.

l This is an example where the calculated snow drift is less than the specified roof snow load. Professional judgment on snow behaviour is required to determine appropriate loading conditions.

ATTACHMENT B: SNOW LOAD REFERENCES

Table B - 1: Snow Load References – Span Tables, Part 9 of Division B of the Code (referenced in Article 9.23.4.2. of the code)

		MAXIMUM SNOW LOAD (kPa)		
SPAN TABLE REFERENCE	**SPAN TABLE TITLE**	**GROUND (S_s)**	**SPECIFIED ROOF (S)**	**EQUIVALENT GROUND SNOW LOAD (S_s)[a] (kPa)**
9.20.17.4.-A,B,C	Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete	3.33	-	3.33
9.23.4.2.-E	Maximum Spans for Roof Joists	-	3.00	5.27
9.23.4.2.-G	Maximum Spans for Roof Rafters	-	3.00	5.27
9.23.4.2.-L	Maximum Spans for Built-up Ridge Beams & Lintels Supporting the Roof & Ceiling Only	-	3.00	5.27
9.23.12.3.-A,B,C,D	Maximum Spans for Lintels (D-Fir-Larch, H-Fir, SPF, Glulam)	-	3.00	5.27

NOTES:

[a] $S_s = (S - S_r)/C_b$ (see Sentence 9.4.2.2.(1) of the code), where S_r = 0.1 kPa and C_b = 0.55.

Table B - 2: Snow Load References – The Span Book (CWC 2020)[a]

SPAN BOOK TABLE NUMBER	SPAN BOOK TABLE TITLE	MAXIMUM SNOW LOAD (kPa) GROUND (S_s)	MAXIMUM SNOW LOAD (kPa) SPECIFIED ROOF (S)	EQUIVALENT GROUND SNOW LOAD (S_s)[a]
3.7	Roof Joists	-	4.00	7.09
4.7	Roof Rafters	-	4.00	7.09
7.5	Built-up Lintels Over Large Openings and Built-up Ridge Beams	-	3.00	5.27
8.1	Glued-Laminated Lintels Over Large Openings	-	3.00	5.27
9.1	Lintels with Non-Structural Sheathing – Supporting Roof Only	-	3.00	5.27
9.21	Lintels with Non-Structural Sheathing – End Walls Supporting Roof Snow Loads	-	3.00	5.27
10.4	Deck Beams	-	4.00	7.09

Notes

a $S_s = (S - S_r)/C_b$ (see Sentence 9.4.2.2.(1) of the code), where Sr = 0.1 kPa, and $C_b = 0.55$.